INFORMATION HANDOUT

For Contract No. 12-0F96A4
At 12-Ora-5-3.0/3.7

Identified by
Project ID 1200020277

AGREEMENTS

USFWS Section 7 Informal Consultation Letter, dated June 23, 2011

USFWS Section 7 Informal Consultation Letter, dated January 23, 2013

South Coast Air Quality Management District (SCAQMD), Rule 403 – Fugitive Dust

SCAQMD Rule 1403 – Asbestos Emission From Demolition/Renovation Activates

MATERIALS INFORMATION

Materials Report, dated 8/13/2012

Lead Concentration Data and Sample Location Maps, dated 3/14/2012

Site Investigation Report at 524 and 530 Avenida Pico, dated 6/15/2012

Revised Limited Asbestos Survey Report, dated 7/20/2011

Foundation Report, Avenida Pico UC (Replace), Bridge No. 55-1107, dated 5/30/2013

Foundation Report, Wall 190, Bridge No. 55E-1041, dated 10/01/2012. Addendum dated 7/10/2013

Foundation Report, dated 01/02/2013

- Wall 181 (Br No. 55E-0139)
- Wall 183 (Br No. 55E-0140)
- Wall 193 (Br No. 55E-0142)
- Wall 203 (Br No. 55E-0143)

Foundation Report, Overhead Sign Structures, dated 11/11/12. Addendum dated 4/08/2013

Geotechnical Design Report, dated 10/01/2012

Structural Pavement Investigation Report of Avenida Pico at Interstate 5, dated 8/2012

(Keystone retaining wall design drawings) Avenida Pico East/West of I-5 Freeway, Retaining Wall – East, dated 5/19/00

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011

In Reply Refer To:
FWS-OR-09B0458-11I0399

JUN 23 2011

Mr. Chris Flynn
Senior Environmental Planner
California Department of Transportation
District 12
3347 Michelson Drive, Suite 100
Irvine, California 92612-1692

Attention: Kedest Ketsela, Associate Environmental Planner

Subject: Informal Section 7 Consultation for the I-5 HOV Lane Extension Project between Avenida Pico and San Juan Creek Road, Orange County, California

Dear Mr. Flynn:

This is in response to your letter dated May 9, 2011, requesting our concurrence with your determination that the subject project is not likely to adversely affect the federally endangered least Bell's vireo (*Vireo bellii pusillus*, "vireo") and the federally threatened coastal California gnatcatcher (*Polioptila californica californica*, "gnatcatcher") and its designated critical habitat in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*). The California Department of Transportation (Caltrans) has assumed the Federal Highway Administration's responsibilities under the Act for this consultation in accordance with Sections 6004 and 6005 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) 2005, as described in the National Environmental Policy Act Delegation Pilot Program Memorandum of Understanding between Federal Highway Administration and Caltrans (effective July 1, 2007) and codified in Renewed 23 U.S.C. 326 and 23 U.S.C. 327.

The Orange County Transportation Authority, in cooperation with Caltrans, the City of Dana Point, the City of San Clemente, and the City of San Juan Capistrano, is proposing to widen Interstate 5 (I-5) between Avenida Pico and San Juan Creek Road. The proposed project will add one high-occupancy vehicle (HOV) lane in each direction on I-5 throughout the project limits, reestablish existing auxiliary lanes and construct new auxiliary lanes, and improve several existing on- and off-ramps. The project limits on I-5 extend from 0.4 mile (mi) south of the Avenida Pico Undercrossing (Post Mile [PM] 3.0) to 0.1 mi south of the San Juan Creek Road Undercrossing (PM 8.7). While the Natural Environmental Study for the proposed project includes several alternatives, consultation has been requested for Alternative 4b. Alternative 4b differs from the other alternatives in that the Avenida Pico Overcrossing structure will be reconfigured with a

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northbound loop on-ramp and realigned northbound off-ramp. In addition, no buffer will be included between the HOV lanes and general travel lanes instead of the 4 foot (ft) buffer proposed under Alternatives 2 and 3.

We have reviewed the information provided to us, including *I-5 HOV Lane Extension Project Natural Environmental Study I-5 Between Avenida Pico and San Juan Creek Road 12-ORA-05 (PM 3.0/8.7)* (Caltrans 2010). The gnatcatcher and vireo are known to occur in the vicinity of the project. Gnatcatchers were observed within most of the coastal sage scrub (CSS) within the I-5 right-of-way in the vicinity of the project. Up to seven pairs of gnatcatchers were observed during the surveys (LSA Associates, Inc. 2010a). However, the project will not result in any direct permanent impacts to gnatcatchers or their critical habitat. Project Alternative 4b will result in the permanent loss of 0.4 acre (ac) of unoccupied CSS and temporary impacts to 0.32 ac of unoccupied CSS. A small portion of the temporary impact area, totaling 0.018 ac of ornamentals and disturbed CSS, is located within Unit 6 of designated gnatcatcher critical habitat. The function of Unit 6 is to support a stable population of gnatcatchers and to provide connectivity between populations to the south in San Diego County and farther north in Orange County.

Vireos were observed at three locations in the vicinity of the project during focused surveys conducted in 2010 (LSA Associates, Inc. 2010b). Project Alternative 4b will result in the permanent loss of 0.07 ac of unoccupied degraded riparian scrub habitat that is located approximately 0.25 mi away from the vireo occupied areas.

The following measures have been incorporated into the project design to avoid and minimize impacts to the gnatcatcher and vireo:

1. A biologist ("Project Biologist") approved by the Carlsbad Fish and Wildlife Office (CFWO) will be on site during: a) initial clearing and grubbing; and b) weekly during project construction within 61 meters (200 ft) of offsite gnatcatcher and vireo habitat to ensure compliance with all conservation measures. The Project Biologist will be familiar with gnatcatchers, vireos, and their habitat and will have experience monitoring these species. Caltrans will submit the biologist's name, address, telephone number, and work schedule on the project to the CFWO prior to initiating project impacts. The biologist will be provided with a copy of this consultation.

2. Under the supervision of the Project Biologist, the limits of project impacts (including construction staging areas and access routes) will be clearly delineated with bright orange plastic fencing, stakes, flags, or markers that will be installed in a manner that does not impact habitats to be avoided and such that they are clearly visible to personnel on foot and operating heavy equipment. If work occurs beyond the fenced or demarcated limits of impact, all work will cease until the problem has been remedied to the satisfaction of the CFWO. Temporary construction fencing and markers will be removed upon project completion.

3. The clearing and grubbing of native habitats for the project will be conducted between September 1 and February 14 to avoid the gnatcatcher and vireo breeding season (or sooner

than September 1 if the Project Biologist demonstrates to the satisfaction of the CFWO that all nesting is complete). If vegetation clearing must be conducted during the breeding season, Caltrans will re-initiate consultation with the CFWO to address unanticipated effects to these species.

4. The Project Biologist will submit a final report to the CFWO within 120 days of project completion including photographs of impact areas and adjacent habitat, documentation that authorized impacts were not exceeded, and documentation that general compliance with all conservation measures was achieved. The report will specify numbers, locations, and sex of gnatcatchers and vireos (if observed), observed gnatcatcher and vireo behavior (especially in relation to project activities), and remedial measures employed to avoid and minimize impacts to gnatcatchers and vireos. Raw field notes should be available upon request by the CFWO.

5. An employee education program will be developed. Each employee (including temporary, contractors, and subcontractors) will receive a training/awareness program prior to working on the proposed project. They will be advised of the potential impact to the listed species and the potential penalties for taking such species. At a minimum, the program will include the following topics: occurrence of the listed and sensitive species in the area (including photographs), their general ecology, sensitivity of the species to human activities, legal protection afforded these species, penalties for violations of Federal and State laws, reporting requirements, and project features designed to reduce the impacts to these species and promote continued successful occupation of the project area.

6. Caltrans will ensure that the following conditions will be implemented with regard to project landscaping:

    a. Caltrans will ensure that project landscaping does not include exotic plant species listed on the California Invasive Plant Council's (Cal-IPC) “Invasive Plant Inventory” list. A copy of the complete list can be obtained from Cal-IPC’s web site at http://www.cal-ipc.org.

    b. If invasive weed species are already growing within the project area, special care will be taken during transport, use, and disposal of soils containing invasive weed seeds to ensure that invasive weeds are not spread into new areas by the project. All heavy equipment will be washed and cleaned of debris prior to entering a new area to minimize the spread of invasive weeds. Eradication strategies will be implemented should an invasion of nonnative plant species occur.

    c. The 0.32 ac CSS temporary impact area will be revegetated with native coastal sage scrub species. The proposed seed palette will be provided to the CFWO for review and approval prior to application in the field. A 3-year plant establishment period is proposed that will include exotic species removal and reapplication of seed as necessary.

7. Caltrans will ensure that the following conditions will be implemented during project construction.

a. The project site will be kept as clean of debris as possible. All food-related trash items will be enclosed in sealed containers and regularly removed from the site.

b. Pets of project personnel will not be allowed on the project site.

c. Impacts from fugitive dust will be avoided and minimized through watering and other appropriate measures.

d. Cut and fill will be balanced within the project or the construction contractor will identify the source or disposal location. All spoils and material disposal will be disposed of properly.

e. Appropriate erosion and siltation controls will be installed prior to the onset of vegetation clearing and be maintained in good repair until the completion of project construction. Erosion and sediment control devices used for the proposed project, including fiber rolls and bonded fiber matrix, will be made from biodegradable materials such as jute, with no plastic mesh, to avoid creating a wildlife entanglement hazard.

f. All equipment maintenance, staging, and dispensing of fuel, oil, coolant, or any other such activities will be restricted to designated disturbed/developed areas. These designated areas will be located in such a manner as to prevent run-off from entering existing native vegetation areas.

g. Should construction occur within or adjacent to CSS or riparian habitats during the February 15 to August 31 gnatcatcher and vireo nesting season, all construction equipment, fixed or mobile, will be equipped with properly operating and maintained mufflers to reduce construction noise.

h. All pile driving for the project that will occur near habitats that support gnatcatchers and vireos will be conducted between September 1 and February 14 to avoid the gnatcatcher and vireo breeding season (or sooner than September 1 if the Project Biologist demonstrates to the satisfaction of the CFWO that all nesting is complete) and to minimize construction noise impacts to nesting gnatcatchers and vireos.

i. If nighttime construction is necessary, all project lighting (e.g., staging areas, equipment storage sites, roadway) will be selectively placed and directed onto the roadway or construction site and away from sensitive habitats. Light glare shields will be used to reduce the extent of illumination into sensitive habitats.

Temporary indirect impacts may occur to gnatcatcher and vireo as a result of noise, night lighting, introduction of invasive species, dust, erosion, sedimentation, and human encroachment resulting from the project. Noise and vibrations associated with the use of heavy equipment during construction of the proposed project has the potential to disrupt vireo and gnatcatcher nesting and foraging behaviors in adjacent habitat by masking intraspecific communication and startling birds

(e.g., see Dooling and Popper 2007 for a discussion of observed effects of highway noise on birds). Gnatcatchers and vireos that nest and forage in habitats adjacent to the existing I-5 freeway are subjected to existing noise and vibration and continue to use the habitat. Once construction is complete, project operations are anticipated to result no change in noise levels (LSA Associates, Inc. 2010c). In addition, measures (listed above) have been incorporated into the project to reduce the effects of construction noise on essential vireo and gnatcatcher behaviors (breeding, feeding, sheltering) to the level of insignificance. For the purposes of section 7 consultation, an insignificant effect is one that is sufficiently small that a person would not be able to meaningfully measure, detect, or evaluate it.

Construction and operational lighting has the potential to affect gnatcatchers and vireos. Light that alters natural light patterns in ecosystems can lead to increased predation, disorientation, and disruption of inter-specific interactions (Longcore and Rich 2004). Measures (listed above) will be implemented by Caltrans to reduce the impacts of lighting on gnatcatcher and vireo behavior in the adjacent habitat to the level of insignificance. The project has also incorporated measures (listed above) to prevent the introduction and spread of invasive species, and to minimize construction dust, erosion, sedimentation, and human encroachment into the adjacent habitat. I-5 is an existing facility, so with the proposed measures, any increase in habitat degradation associated with these factors is likely to be insignificant.

The primary constituent elements of designated gnatcatcher critical habitat consist of CSS and other vegetation communities necessary to support core gnatcatcher populations and provide connectivity within populations. The temporary impacts to 0.018 ac of unoccupied ornamentals and disturbed CSS on the edge of Unit 6 of designated gnatcatcher critical habitat will not affect the function of the unit to support a stable population of gnatcatchers and to provide connectivity between populations to the south in San Diego County and farther north in Orange County. With the incorporation of the above measures, the proposed project impacts on the primary constituent elements in Unit 6 of gnatcatcher critical habitat are considered to be insignificant.

Because the above measures have been incorporated into the project, we concur with your determination that the proposed project is not likely to adversely affect the vireo and gnatcatcher and its designated critical habitat. We base our concurrence on the following reasons: 1) no direct permanent or temporary impacts to vireo and gnatcatcher occupied habitat will occur; 2) the permanent loss of 0.4 ac unoccupied CSS and 0.07 ac unoccupied riparian scrub and the temporary loss of 0.32 ac of unoccupied CSS, including 0.018 ac of disturbed CSS and ornamentals within gnatcatcher critical habitat, is not anticipated to significantly interfere with essential gnatcatcher and vireo breeding, feeding, or sheltering behaviors; 3) construction activities will be modified to limit noise, night lighting, introduction of invasive species, dust, erosion, sedimentation, and human encroachment disturbance to gnatcatchers and vireos as described in the measures above to ensure that gnatcatcher and vireo breeding, feeding and sheltering activities in the adjacent habitat are not substantially disrupted. In addition, the project's temporary impact areas will be restored, which will support the survival and recovery of these species.

Therefore, the interagency consultation requirements of section 7 of the Act have been satisfied. Although our concurrence ends informal consultation, obligations under section 7 of the Act will be

reconsidered if new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not previously considered or this action is subsequently modified in a manner that was not considered in this assessment.

This document does not authorize take under the Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. §§ 703-712). In order to avoid violation of the MBTA, Caltrans will avoid take of active nests through implementation of the following measures:

- In order to avoid impacts to nesting birds, any native or exotic vegetation removal, tree trimming activities, or bridge demolition will occur outside of the nesting season. The nesting season is from February 15 to August 31. In the event that vegetation clearing is necessary during the nesting season, a qualified biologist will conduct a preconstruction survey to identify the locations of nests. Should nesting birds be found, an exclusionary buffer will be established by the biologist. This buffer will be clearly marked in the field by construction personnel under the guidance of the biologist, and construction or clearing will not be conducted in this zone until the biologist determines that the young have fledged or the nest is no longer active.

- To prevent project effects to bridge- and crevice-nesting birds (i.e., swifts and swallows), all work on existing bridges with potential habitat that is conducted between February 15 and October 31 will include the removal of all bird nests prior to construction under the guidance and observation of a qualified biologist. Removal will occur prior to February 1 of that year, before the swallow colony returns to the nesting site. Removal of swallow nests that are under construction must be repeated as frequently as necessary to prevent nest completion or until a nest exclusion device is installed (such as netting or a similar mechanism that keeps birds from building nests). Nest removal and exclusion device installation will be monitored by a qualified biologist. Such exclusion efforts must be continued to keep the structures free of swallows until September or the completion of construction. All nest exclusion techniques will be coordinated between the Caltrans District Biologist and the resource agencies.

Thank you for your coordination on this project. If you have any questions regarding this letter, please contact Sally Brown of my staff at (760) 431-9440, extension 278.

Sincerely,

for Karen A. Goebel
Assistant Field Supervisor

Literature Cited:

California Department of Transportation (Caltrans). 2010. I-5 HOV Lane Extension Project Natural Environmental Study I-5 Between Avenida Pico and San Juan Creek Road 12-ORA-05 (PM 3.0/8.7). 90+pp.

Dooling, R. J. and A. N. Popper. 2007. The effects of highway noise on birds. Prepared by Environmental BioAcoustics LLC for the California Department of Transportation, Sacramento, California. 74 pp.

Longcore, T. and C. Rich. 2004. Ecological light pollution. Front Ecological Environment 2(4):191-198.

LSA Associates, Inc. 2010a. Coastal California Gnatcatcher Winter Survey Results: Interstate-5 High Occupancy Vehicle (HOV) Lane Extension Project, October 2009–January 2010. 3+pp.

LSA Associates, Inc. 2010b. Least Bell's Vireo Survey Results: Interstate 5 High-Occupancy Vehicle Lane Extension Project, April–July 2010. 3+pp.

LSA Associates, Inc. 2010c. Noise Study Report I-5 HOV Lane Addition Project.

United States Department of the Interior

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In Reply Refer To:
FWS-OR-09B0458-13I0136

JAN 23 2013

Mr. Chris Flynn
Senior Environmental Planner
California Department of Transportation
District 12
3347 Michelson Drive, Suite 100
Irvine, California 92612-1692

Attention: Ms. Kedest Ketsela, Associate Environmental Planner

Subject: Informal Section 7 Consultation for the I-5 HOV Lane Extension Project between Avenida Pico and San Juan Creek Road, Orange County, California

Dear Mr. Flynn:

This is in response to your email dated October 10, 2012, requesting that our informal consultation (FWS-OR-09B0458-11I0399) for the I-5 HOV Lane Extension Project between Avenida Pico and San Juan Creek Road be amended to address modifications to the project that will result in effects to the federally threatened coastal California gnatcatcher (*Polioptila californica californica,* gnatcatcher) that were not addressed in the original informal section 7 consultation. The California Department of Transportation (Caltrans) has assumed the Federal Highway Administration's responsibilities under the Act for this consultation in accordance with Sections 6004 and 6005 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) 2005, as described in the National Environmental Policy Act Delegation Pilot Program Memorandum of Understanding between Federal Highway Administration and Caltrans (effective July 1, 2007) and codified in Renewed 23 U.S.C. 326 and 23 U.S.C. 327.

The Orange County Transportation Authority, in cooperation with Caltrans, City of Dana Point, City of San Clemente, and City of San Juan Capistrano, is proposing to widen Interstate 5 (I-5) between Avenida Pico and San Juan Creek Road. The proposed project will add one high-occupancy vehicle (HOV) lane in each direction on I-5 throughout the project limits, reestablish existing auxiliary lanes and construct new auxiliary lanes, and improve several existing on- and off-ramps. The project limits on I-5 extend from 0.4 mile south of the Avenida Pico Undercrossing (Post Mile [PM] 3.0) to 0.1 mile south of the San Juan Creek Road Undercrossing (PM 8.7).

Changes to the project design plans have occurred to accommodate the reconstruction of an embankment to build retaining walls. This will increase temporary impacts to unoccupied coastal sage scrub habitat by 0.075 acre, which will increase the total temporary impacts to coastal sage scrub for the project from 0.32 acre to approximately 0.4 acre. The gnatcatcher is known to occur within habitat adjacent to this new impact area.

The following amended conservation measure is proposed to avoid and minimize potential impacts to the gnatcatcher. Changes from the original informal section 7 consultation are indicated with the underlined text.

6. Caltrans will ensure that the following conditions will be implemented with regard to project landscaping:

   a. Caltrans will ensure that project landscaping does not include exotic plant species listed on the California Invasive Plant Council's (Cal-IPC) "Invasive Plant Inventory" list. A copy of the complete list can be obtained from Cal-IPC's web site at http://www.cal-ipc.org.

   b. If invasive weed species are already growing within the project area, special care will be taken during transport, use, and disposal of soils containing invasive weed seeds to ensure that invasive weeds are not spread into new areas by the project. All heavy equipment will be washed and cleaned of debris prior to entering a new area to minimize the spread of invasive weeds. Eradication strategies will be implemented should an invasion of nonnative plant species occur.

   c. The 0.4 acre CSS temporary impact area will be revegetated with native coastal sage scrub species. The proposed seed palette will be provided to the CFWO for review and approval prior to application in the field. A 3-year plant establishment period is proposed that will include exotic species removal and reapplication of seed as necessary.

We have determined that the above modification will not change the conclusion of our June 23, 2011, informal section 7 consultation. This slight increase in the temporary impacts for the project is not anticipated to significantly interfere with essential gnatcatcher breeding, feeding, or sheltering behaviors. In addition, the project's temporary impact areas will be restored, which will support the survival and recovery of the species. Therefore, the interagency consultation requirements of section 7 of the Act have been satisfied. With the exception of the conservation measures amended above, all conservation measures will be implemented as written in the informal section 7 consultation (FWS-OR-09B0458-11I0399) previously issued for the proposed action. By copy of this letter, we are formalizing this change to the June 23, 2011, informal section 7 consultation. If you have any questions regarding this amendment, please contact Sally Brown of this office at 760-431-9440, extension 278.

Sincerely,

for Karen A. Goebel
Assistant Field Supervisor

(Adopted May 7, 1976) (Amended November 6, 1992)
(Amended July 9, 1993) (Amended February 14, 1997)
(Amended December 11, 1998)(Amended April 2, 2004)
(Amended June 3, 2005)

RULE 403. FUGITIVE DUST

(a) Purpose

The purpose of this Rule is to reduce the amount of particulate matter entrained in the ambient air as a result of anthropogenic (man-made) fugitive dust sources by requiring actions to prevent, reduce or mitigate fugitive dust emissions.

(b) Applicability

The provisions of this Rule shall apply to any activity or man-made condition capable of generating fugitive dust.

(c) Definitions

(1) ACTIVE OPERATIONS means any source capable of generating fugitive dust, including, but not limited to, earth-moving activities, construction/demolition activities, disturbed surface area, or heavy- and light-duty vehicular movement.

(2) AGGREGATE-RELATED PLANTS are defined as facilities that produce and / or mix sand and gravel and crushed stone.

(3) AGRICULTURAL HANDBOOK means the region-specific guidance document that has been approved by the Governing Board or hereafter approved by the Executive Officer and the U.S. EPA. For the South Coast Air Basin, the Board-approved region-specific guidance document is the Rule 403 Agricultural Handbook dated December 1998. For the Coachella Valley, the Board-approved region-specific guidance document is the Rule 403 Coachella Valley Agricultural Handbook dated April 2, 2004.

(4) ANEMOMETERS are devices used to measure wind speed and direction in accordance with the performance standards, and maintenance and calibration criteria as contained in the most recent Rule 403 Implementation Handbook.

(5) BEST AVAILABLE CONTROL MEASURES means fugitive dust control actions that are set forth in Table 1 of this Rule.

(6) BULK MATERIAL is sand, gravel, soil, aggregate material less than two inches in length or diameter, and other organic or inorganic particulate matter.

(7) CEMENT MANUFACTURING FACILITY is any facility that has a cement kiln at the facility.

(8) CHEMICAL STABILIZERS are any non-toxic chemical dust suppressant which must not be used if prohibited for use by the Regional Water Quality Control Boards, the California Air Resources Board, the U.S. Environmental Protection Agency (U.S. EPA), or any applicable law, rule or regulation. The chemical stabilizers shall meet any specifications, criteria, or tests required by any federal, state, or local water agency. Unless otherwise indicated, the use of a non-toxic chemical stabilizer shall be of sufficient concentration and application frequency to maintain a stabilized surface.

(9) COMMERCIAL POULTRY RANCH means any building, structure, enclosure, or premises where more than 100 fowl are kept or maintained for the primary purpose of producing eggs or meat for sale or other distribution.

(10) CONFINED ANIMAL FACILITY means a source or group of sources of air pollution at an agricultural source for the raising of 3,360 or more fowl or 50 or more animals, including but not limited to, any structure, building, installation, farm, corral, coop, feed storage area, milking parlor, or system for the collection, storage, or distribution of solid and liquid manure; if domesticated animals, including horses, sheep, goats, swine, beef cattle, rabbits, chickens, turkeys, or ducks are corralled, penned, or otherwise caused to remain in restricted areas for commercial agricultural purposes and feeding is by means other than grazing.

(11) CONSTRUCTION/DEMOLITION ACTIVITIES means any on-site mechanical activities conducted in preparation of, or related to, the building, alteration, rehabilitation, demolition or improvement of property, including, but not limited to the following activities: grading, excavation, loading, crushing, cutting, planing, shaping or ground breaking.

(12) CONTRACTOR means any person who has a contractual arrangement to conduct an active operation for another person.

(13) DAIRY FARM is an operation on a property, or set of properties that are contiguous or separated only by a public right-of-way, that raises cows or

produces milk from cows for the purpose of making a profit or for a livelihood. Heifer and calf farms are dairy farms.

(14) DISTURBED SURFACE AREA means a portion of the earth's surface which has been physically moved, uncovered, destabilized, or otherwise modified from its undisturbed natural soil condition, thereby increasing the potential for emission of fugitive dust. This definition excludes those areas which have:

(A) been restored to a natural state, such that the vegetative ground cover and soil characteristics are similar to adjacent or nearby natural conditions;

(B) been paved or otherwise covered by a permanent structure; or

(C) sustained a vegetative ground cover of at least 70 percent of the native cover for a particular area for at least 30 days.

(15) DUST SUPPRESSANTS are water, hygroscopic materials, or non-toxic chemical stabilizers used as a treatment material to reduce fugitive dust emissions.

(16) EARTH-MOVING ACTIVITIES means the use of any equipment for any activity where soil is being moved or uncovered, and shall include, but not be limited to the following: grading, earth cutting and filling operations, loading or unloading of dirt or bulk materials, adding to or removing from open storage piles of bulk materials, landfill operations, weed abatement through disking, and soil mulching.

(17) DUST CONTROL SUPERVISOR means a person with the authority to expeditiously employ sufficient dust mitigation measures to ensure compliance with all Rule 403 requirements at an active operation.

(18) FUGITIVE DUST means any solid particulate matter that becomes airborne, other than that emitted from an exhaust stack, directly or indirectly as a result of the activities of any person.

(19) HIGH WIND CONDITIONS means that instantaneous wind speeds exceed 25 miles per hour.

(20) INACTIVE DISTURBED SURFACE AREA means any disturbed surface area upon which active operations have not occurred or are not expected to occur for a period of 20 consecutive days.

(21) LARGE OPERATIONS means any active operations on property which contains 50 or more acres of disturbed surface area; or any earth-moving operation with a daily earth-moving or throughput volume of 3,850 cubic

meters (5,000 cubic yards) or more three times during the most recent 365-day period.

(22) OPEN STORAGE PILE is any accumulation of bulk material, which is not fully enclosed, covered or chemically stabilized, and which attains a height of three feet or more and a total surface area of 150 or more square feet.

(23) PARTICULATE MATTER means any material, except uncombined water, which exists in a finely divided form as a liquid or solid at standard conditions.

(24) PAVED ROAD means a public or private improved street, highway, alley, public way, or easement that is covered by typical roadway materials, but excluding access roadways that connect a facility with a public paved roadway and are not open to through traffic. Public paved roads are those open to public access and that are owned by any federal, state, county, municipal or any other governmental or quasi-governmental agencies. Private paved roads are any paved roads not defined as public.

(25) PM_{10} means particulate matter with an aerodynamic diameter smaller than or equal to 10 microns as measured by the applicable State and Federal reference test methods.

(26) PROPERTY LINE means the boundaries of an area in which either a person causing the emission or a person allowing the emission has the legal use or possession of the property. Where such property is divided into one or more sub-tenancies, the property line(s) shall refer to the boundaries dividing the areas of all sub-tenancies.

(27) RULE 403 IMPLEMENTATION HANDBOOK means a guidance document that has been approved by the Governing Board on April 2, 2004 or hereafter approved by the Executive Officer and the U.S. EPA.

(28) SERVICE ROADS are paved or unpaved roads that are used by one or more public agencies for inspection or maintenance of infrastructure and which are not typically used for construction-related activity.

(29) SIMULTANEOUS SAMPLING means the operation of two PM_{10} samplers in such a manner that one sampler is started within five minutes of the other, and each sampler is operated for a consecutive period which must be not less than 290 minutes and not more than 310 minutes.

(30) SOUTH COAST AIR BASIN means the non-desert portions of Los Angeles, Riverside, and San Bernardino counties and all of Orange

County as defined in California Code of Regulations, Title 17, Section 60104. The area is bounded on the west by the Pacific Ocean, on the north and east by the San Gabriel, San Bernardino, and San Jacinto Mountains, and on the south by the San Diego county line.

(31) STABILIZED SURFACE means any previously disturbed surface area or open storage pile which, through the application of dust suppressants, shows visual or other evidence of surface crusting and is resistant to wind-driven fugitive dust and is demonstrated to be stabilized. Stabilization can be demonstrated by one or more of the applicable test methods contained in the Rule 403 Implementation Handbook.

(32) TRACK-OUT means any bulk material that adheres to and agglomerates on the exterior surface of motor vehicles, haul trucks, and equipment (including tires) that have been released onto a paved road and can be removed by a vacuum sweeper or a broom sweeper under normal operating conditions.

(33) TYPICAL ROADWAY MATERIALS means concrete, asphaltic concrete, recycled asphalt, asphalt, or any other material of equivalent performance as determined by the Executive Officer, and the U.S. EPA.

(34) UNPAVED ROADS means any unsealed or unpaved roads, equipment paths, or travel ways that are not covered by typical roadway materials. Public unpaved roads are any unpaved roadway owned by federal, state, county, municipal or other governmental or quasi-governmental agencies. Private unpaved roads are all other unpaved roadways not defined as public.

(35) VISIBLE ROADWAY DUST means any sand, soil, dirt, or other solid particulate matter which is visible upon paved road surfaces and which can be removed by a vacuum sweeper or a broom sweeper under normal operating conditions.

(36) WIND-DRIVEN FUGITIVE DUST means visible emissions from any disturbed surface area which is generated by wind action alone.

(37) WIND GUST is the maximum instantaneous wind speed as measured by an anemometer.

(d) Requirements

(1) No person shall cause or allow the emissions of fugitive dust from any active operation, open storage pile, or disturbed surface area such that:

(A) the dust remains visible in the atmosphere beyond the property line of the emission source; or

(B) the dust emission exceeds 20 percent opacity (as determined by the appropriate test method included in the Rule 403 Implementation Handbook), if the dust emission is the result of movement of a motorized vehicle.

(2) No person shall conduct active operations without utilizing the applicable best available control measures included in Table 1 of this Rule to minimize fugitive dust emissions from each fugitive dust source type within the active operation.

(3) No person shall cause or allow PM_{10} levels to exceed 50 micrograms per cubic meter when determined, by simultaneous sampling, as the difference between upwind and downwind samples collected on high-volume particulate matter samplers or other U.S. EPA-approved equivalent method for PM_{10} monitoring. If sampling is conducted, samplers shall be:

(A) Operated, maintained, and calibrated in accordance with 40 Code of Federal Regulations (CFR), Part 50, Appendix J, or appropriate U.S. EPA-published documents for U.S. EPA-approved equivalent method(s) for PM_{10}.

(B) Reasonably placed upwind and downwind of key activity areas and as close to the property line as feasible, such that other sources of fugitive dust between the sampler and the property line are minimized.

(4) No person shall allow track-out to extend 25 feet or more in cumulative length from the point of origin from an active operation. Notwithstanding the preceding, all track-out from an active operation shall be removed at the conclusion of each workday or evening shift.

(5) No person shall conduct an active operation with a disturbed surface area of five or more acres, or with a daily import or export of 100 cubic yards or more of bulk material without utilizing at least one of the measures listed in subparagraphs (d)(5)(A) through (d)(5)(E) at each vehicle egress from the site to a paved public road.

(A) Install a pad consisting of washed gravel (minimum-size: one inch) maintained in a clean condition to a depth of at least six inches and extending at least 30 feet wide and at least 50 feet long.

(B) Pave the surface extending at least 100 feet and at least 20 feet wide.

(C) Utilize a wheel shaker/wheel spreading device consisting of raised dividers (rails, pipe, or grates) at least 24 feet long and 10 feet wide to remove bulk material from tires and vehicle undercarriages before vehicles exit the site.

(D) Install and utilize a wheel washing system to remove bulk material from tires and vehicle undercarriages before vehicles exit the site.

(E) Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the actions specified in subparagraphs (d)(5)(A) through (d)(5)(D).

(6) Beginning January 1, 2006, any person who operates or authorizes the operation of a confined animal facility subject to this Rule shall implement the applicable conservation management practices specified in Table 4 of this Rule.

(e) Additional Requirements for Large Operations

(1) Any person who conducts or authorizes the conducting of a large operation subject to this Rule shall implement the applicable actions specified in Table 2 of this Rule at all times and shall implement the applicable actions specified in Table 3 of this Rule when the applicable performance standards can not be met through use of Table 2 actions; and shall:

(A) submit a fully executed Large Operation Notification (Form 403 N) to the Executive Officer within 7 days of qualifying as a large operation;

(B) include, as part of the notification, the name(s), address(es), and phone number(s) of the person(s) responsible for the submittal, and a description of the operation(s), including a map depicting the location of the site;

(C) maintain daily records to document the specific dust control actions taken, maintain such records for a period of not less than three years; and make such records available to the Executive Officer upon request;

(D) install and maintain project signage with project contact signage that meets the minimum standards of the Rule 403 Implementation Handbook, prior to initiating any earthmoving activities;

(E) identify a dust control supervisor that:

(i) is employed by or contracted with the property owner or developer;

(ii) is on the site or available on-site within 30 minutes during working hours;

(iii) has the authority to expeditiously employ sufficient dust mitigation measures to ensure compliance with all Rule requirements;

(iv) has completed the AQMD Fugitive Dust Control Class and has been issued a valid Certificate of Completion for the class; and

(F) notify the Executive Officer in writing within 30 days after the site no longer qualifies as a large operation as defined by paragraph (c)(18).

(2) Any Large Operation Notification submitted to the Executive Officer or AQMD-approved dust control plan shall be valid for a period of one year from the date of written acceptance by the Executive Officer. Any Large Operation Notification accepted pursuant to paragraph (e)(1), excluding those submitted by aggregate-related plants and cement manufacturing facilities must be resubmitted annually by the person who conducts or authorizes the conducting of a large operation, at least 30 days prior to the expiration date, or the submittal shall no longer be valid as of the expiration date. If all fugitive dust sources and corresponding control measures or special circumstances remain identical to those identified in the previously accepted submittal or in an AQMD-approved dust control plan, the resubmittal may be a simple statement of no-change (Form 403NC).

(f) Compliance Schedule

The newly amended provisions of this Rule shall become effective upon adoption. Pursuant to subdivision (e), any existing site that qualifies as a large operation will have 60 days from the date of Rule adoption to comply with the notification and recordkeeping requirements for large operations. Any Large Operation

Notification or AQMD-approved dust control plan which has been accepted prior to the date of adoption of these amendments shall remain in effect and the Large Operation Notification or AQMD-approved dust control plan annual resubmittal date shall be one year from adoption of this Rule amendment.

(g) Exemptions

(1) The provisions of this Rule shall not apply to:

(A) Dairy farms.

(B) Confined animal facilities provided that the combined disturbed surface area within one continuous property line is one acre or less.

(C) Agricultural vegetative crop operations provided that the combined disturbed surface area within one continuous property line and not separated by a paved public road is 10 acres or less.

(D) Agricultural vegetative crop operations within the South Coast Air Basin, whose combined disturbed surface area includes more than 10 acres provided that the person responsible for such operations:

(i) voluntarily implements the conservation management practices contained in the Rule 403 Agricultural Handbook;

(ii) completes and maintains the self-monitoring form documenting sufficient conservation management practices, as described in the Rule 403 Agricultural Handbook; and

(iii) makes the completed self-monitoring form available to the Executive Officer upon request.

(E) Agricultural vegetative crop operations outside the South Coast Air Basin whose combined disturbed surface area includes more than 10 acres provided that the person responsible for such operations:

(i) voluntarily implements the conservation management practices contained in the Rule 403 Coachella Valley Agricultural Handbook; and

(ii) completes and maintains the self-monitoring form documenting sufficient conservation management practices, as described in the Rule 403 Coachella Valley Agricultural Handbook; and

(iii) makes the completed self-monitoring form available to the Executive Officer upon request.

(F) Active operations conducted during emergency life-threatening situations, or in conjunction with any officially declared disaster or state of emergency.

(G) Active operations conducted by essential service utilities to provide electricity, natural gas, telephone, water and sewer during periods of service outages and emergency disruptions.

(H) Any contractor subsequent to the time the contract ends, provided that such contractor implemented the required control measures during the contractual period.

(I) Any grading contractor, for a phase of active operations, subsequent to the contractual completion of that phase of earth-moving activities, provided that the required control measures have been implemented during the entire phase of earth-moving activities, through and including five days after the final grading inspection.

(J) Weed abatement operations ordered by a county agricultural commissioner or any state, county, or municipal fire department, provided that:

(i) mowing, cutting or other similar process is used which maintains weed stubble at least three inches above the soil; and

(ii) any discing or similar operation which cuts into and disturbs the soil, where watering is used prior to initiation of these activities, and a determination is made by the agency issuing the weed abatement order that, due to fire hazard conditions, rocks, or other physical obstructions, it is not practical to meet the conditions specified in clause (g)(1)(H)(i). The provisions this clause shall not exempt the owner of any property from stabilizing, in accordance with paragraph (d)(2), disturbed surface areas which have been created as a result of the weed abatement actions.

(K) sandblasting operations.

(2) The provisions of paragraphs (d)(1) and (d)(3) shall not apply:

(A) When wind gusts exceed 25 miles per hour, provided that:

(i) The required Table 3 contingency measures in this Rule are implemented for each applicable fugitive dust source type, and;

(ii) records are maintained in accordance with subparagraph (e)(1)(C).

(B) To unpaved roads, provided such roads:

(i) are used solely for the maintenance of wind-generating equipment; or

(ii) are unpaved public alleys as defined in Rule 1186; or

(iii) are service roads that meet all of the following criteria:

(a) are less than 50 feet in width at all points along the road;

(b) are within 25 feet of the property line; and

(c) have a traffic volume less than 20 vehicle-trips per day.

(C) To any active operation, open storage pile, or disturbed surface area for which necessary fugitive dust preventive or mitigative actions are in conflict with the federal Endangered Species Act, as determined in writing by the State or federal agency responsible for making such determinations.

(3) The provisions of (d)(2) shall not apply to any aggregate-related plant or cement manufacturing facility that implements the applicable actions specified in Table 2 of this Rule at all times and shall implement the applicable actions specified in Table 3 of this Rule when the applicable performance standards of paragraphs (d)(1) and (d)(3) can not be met through use of Table 2 actions.

(4) The provisions of paragraphs (d)(1), (d)(2), and (d)(3) shall not apply to:

(A) Blasting operations which have been permitted by the California Division of Industrial Safety; and

(B) Motion picture, television, and video production activities when dust emissions are required for visual effects. In order to obtain this exemption, the Executive Officer must receive notification in writing at least 72 hours in advance of any such activity and no nuisance results from such activity.

(5) The provisions of paragraph (d)(3) shall not apply if the dust control actions, as specified in Table 2, are implemented on a routine basis for

each applicable fugitive dust source type. To qualify for this exemption, a person must maintain records in accordance with subparagraph (e)(1)(C).

(6) The provisions of paragraph (d)(4) shall not apply to earth coverings of public paved roadways where such coverings are approved by a local government agency for the protection of the roadway, and where such coverings are used as roadway crossings for haul vehicles provided that such roadway is closed to through traffic and visible roadway dust is removed within one day following the cessation of activities.

(7) The provisions of subdivision (e) shall not apply to:

(A) officially-designated public parks and recreational areas, including national parks, national monuments, national forests, state parks, state recreational areas, and county regional parks.

(B) any large operation which is required to submit a dust control plan to any city or county government which has adopted a District-approved dust control ordinance.

(C) any large operation subject to Rule 1158, which has an approved dust control plan pursuant to Rule 1158, provided that all sources of fugitive dust are included in the Rule 1158 plan.

(8) The provisions of subparagraph (e)(1)(A) through (e)(1)(C) shall not apply to any large operation with an AQMD-approved fugitive dust control plan provided that there is no change to the sources and controls as identified in the AQMD-approved fugitive dust control plan.

(h) Fees

Any person conducting active operations for which the Executive Officer conducts upwind/downwind monitoring for PM_{10} pursuant to paragraph (d)(3) shall be assessed applicable Ambient Air Analysis Fees pursuant to Rule 304.1. Applicable fees shall be waived for any facility which is exempted from paragraph (d)(3) or meets the requirements of paragraph (d)(3).

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Backfilling	01-1 Stabilize backfill material when not actively handling; and 01-2 Stabilize backfill material during handling; and 01-3 Stabilize soil at completion of activity.	✓ Mix backfill soil with water prior to moving ✓ Dedicate water truck or high capacity hose to backfilling equipment ✓ Empty loader bucket slowly so that no dust plumes are generated ✓ Minimize drop height from loader bucket
Clearing and grubbing	02-1 Maintain stability of soil through pre-watering of site prior to clearing and grubbing; and 02-2 Stabilize soil during clearing and grubbing activities; and 02-3 Stabilize soil immediately after clearing and grubbing activities.	✓ Maintain live perennial vegetation where possible ✓ Apply water in sufficient quantity to prevent generation of dust plumes
Clearing forms	03-1 Use water spray to clear forms; or 03-2 Use sweeping and water spray to clear forms; or 03-3 Use vacuum system to clear forms.	✓ Use of high pressure air to clear forms may cause exceedance of Rule requirements
Crushing	04-1 Stabilize surface soils prior to operation of support equipment; and 04-2 Stabilize material after crushing.	✓ Follow permit conditions for crushing equipment ✓ Pre-water material prior to loading into crusher ✓ Monitor crusher emissions opacity ✓ Apply water to crushed material to prevent dust plumes

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Cut and fill	05-1 Pre-water soils prior to cut and fill activities; and 05-2 Stabilize soil during and after cut and fill activities.	✓ For large sites, pre-water with sprinklers or water trucks and allow time for penetration ✓ Use water trucks/pulls to water soils to depth of cut prior to subsequent cuts
Demolition – mechanical/manual	06-1 Stabilize wind erodible surfaces to reduce dust; and 06-2 Stabilize surface soil where support equipment and vehicles will operate; and 06-3 Stabilize loose soil and demolition debris; and 06-4 Comply with AQMD Rule 1403.	✓ Apply water in sufficient quantities to prevent the generation of visible dust plumes
Disturbed soil	07-1 Stabilize disturbed soil throughout the construction site; and 07-2 Stabilize disturbed soil between structures	✓ Limit vehicular traffic and disturbances on soils where possible ✓ If interior block walls are planned, install as early as possible ✓ Apply water or a stabilizing agent in sufficient quantities to prevent the generation of visible dust plumes
Earth-moving activities	08-1 Pre-apply water to depth of proposed cuts; and 08-2 Re-apply water as necessary to maintain soils in a damp condition and to ensure that visible emissions do not exceed 100 feet in any direction; and 08-3 Stabilize soils once earth-moving activities are complete.	✓ Grade each project phase separately, timed to coincide with construction phase ✓ Upwind fencing can prevent material movement on site ✓ Apply water or a stabilizing agent in sufficient quantities to prevent the generation of visible dust plumes

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Importing/exporting of bulk materials	09-1 Stabilize material while loading to reduce fugitive dust emissions; and 09-2 Maintain at least six inches of freeboard on haul vehicles; and 09-3 Stabilize material while transporting to reduce fugitive dust emissions; and 09-4 Stabilize material while unloading to reduce fugitive dust emissions; and 09-5 Comply with Vehicle Code Section 23114.	✓ Use tarps or other suitable enclosures on haul trucks ✓ Check belly-dump truck seals regularly and remove any trapped rocks to prevent spillage ✓ Comply with track-out prevention/mitigation requirements ✓ Provide water while loading and unloading to reduce visible dust plumes
Landscaping	10-1 Stabilize soils, materials, slopes	✓ Apply water to materials to stabilize ✓ Maintain materials in a crusted condition ✓ Maintain effective cover over materials ✓ Stabilize sloping surfaces using soil binders until vegetation or ground cover can effectively stabilize the slopes ✓ Hydroseed prior to rain season
Road shoulder maintenance	11-1 Apply water to unpaved shoulders prior to clearing; and 11-2 Apply chemical dust suppressants and/or washed gravel to maintain a stabilized surface after completing road shoulder maintenance.	✓ Installation of curbing and/or paving of road shoulders can reduce recurring maintenance costs ✓ Use of chemical dust suppressants can inhibit vegetation growth and reduce future road shoulder maintenance costs

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Screening	12-1 Pre-water material prior to screening; and 12-2 Limit fugitive dust emissions to opacity and plume length standards; and 12-3 Stabilize material immediately after screening.	✓ Dedicate water truck or high capacity hose to screening operation ✓ Drop material through the screen slowly and minimize drop height ✓ Install wind barrier with a porosity of no more than 50% upwind of screen to the height of the drop point
Staging areas	13-1 Stabilize staging areas during use; and 13-2 Stabilize staging area soils at project completion.	✓ Limit size of staging area ✓ Limit vehicle speeds to 15 miles per hour ✓ Limit number and size of staging area entrances/exists
Stockpiles/ Bulk Material Handling	14-1 Stabilize stockpiled materials. 14-2 Stockpiles within 100 yards of off-site occupied buildings must not be greater than eight feet in height; or must have a road bladed to the top to allow water truck access or must have an operational water irrigation system that is capable of complete stockpile coverage.	✓ Add or remove material from the downwind portion of the storage pile ✓ Maintain storage piles to avoid steep sides or faces

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure	Guidance
Traffic areas for construction activities	15-1 Stabilize all off-road traffic and parking areas; and 15-2 Stabilize all haul routes; and 15-3 Direct construction traffic over established haul routes.	✓ Apply gravel/paving to all haul routes as soon as possible to all future roadway areas ✓ Barriers can be used to ensure vehicles are only used on established parking areas/haul routes
Trenching	16-1 Stabilize surface soils where trencher or excavator and support equipment will operate; and 16-2 Stabilize soils at the completion of trenching activities.	✓ Pre-watering of soils prior to trenching is an effective preventive measure. For deep trenching activities, pre-trench to 18 inches soak soils via the pre-trench and resuming trenching ✓ Washing mud and soils from equipment at the conclusion of trenching activities can prevent crusting and drying of soil on equipment
Truck loading	17-1 Pre-water material prior to loading; and 17-2 Ensure that freeboard exceeds six inches (CVC 23114)	✓ Empty loader bucket such that no visible dust plumes are created ✓ Ensure that the loader bucket is close to the truck to minimize drop height while loading
Turf Overseeding	18-1 Apply sufficient water immediately prior to conducting turf vacuuming activities to meet opacity and plume length standards; and 18-2 Cover haul vehicles prior to exiting the site.	✓ Haul waste material immediately off-site

TABLE 1
BEST AVAILABLE CONTROL MEASURES
(Applicable to All Construction Activity Sources)

Source Category	Control Measure		Guidance
Unpaved roads/parking lots	19-1	Stabilize soils to meet the applicable performance standards; and	✓ Restricting vehicular access to established unpaved travel paths and parking lots can reduce stabilization requirements
	19-2	Limit vehicular travel to established unpaved roads (haul routes) and unpaved parking lots.	
Vacant land	20-1	In instances where vacant lots are 0.10 acre or larger and have a cumulative area of 500 square feet or more that are driven over and/or used by motor vehicles and/or off-road vehicles, prevent motor vehicle and/or off-road vehicle trespassing, parking and/or access by installing barriers, curbs, fences, gates, posts, signs, shrubs, trees or other effective control measures.	

Table 2
DUST CONTROL MEASURES FOR LARGE OPERATIONS

FUGITIVE DUST SOURCE CATEGORY		CONTROL ACTIONS
Earth-moving (except construction cutting and filling areas, and mining operations)	(1a)	Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D-2216, or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations each subsequent four-hour period of active operations; OR
	(1a-1)	For any earth-moving which is more than 100 feet from all property lines, conduct watering as necessary to prevent visible dust emissions from exceeding 100 feet in length in any direction.
Earth-moving: Construction fill areas:	(1b)	Maintain soil moisture content at a minimum of 12 percent, as determined by ASTM method D-2216, or other equivalent method approved by the Executive Officer, the California Air Resources Board, and the U.S. EPA. For areas which have an optimum moisture content for compaction of less than 12 percent, as determined by ASTM Method 1557 or other equivalent method approved by the Executive Officer and the California Air Resources Board and the U.S. EPA, complete the compaction process as expeditiously as possible after achieving at least 70 percent of the optimum soil moisture content. Two soil moisture evaluations must be conducted during the first three hours of active operations during a calendar day, and two such evaluations during each subsequent four-hour period of active operations.

Table 2 (Continued)

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS	
Earth-moving: Construction cut areas and mining operations:	(1c)	Conduct watering as necessary to prevent visible emissions from extending more than 100 feet beyond the active cut or mining area unless the area is inaccessible to watering vehicles due to slope conditions or other safety factors.
Disturbed surface areas (except completed grading areas)	(2a/b)	Apply dust suppression in sufficient quantity and frequency to maintain a stabilized surface. Any areas which cannot be stabilized, as evidenced by wind driven fugitive dust must have an application of water at least twice per day to at least 80 percent of the unstabilized area.
Disturbed surface areas: Completed grading areas	(2c)	Apply chemical stabilizers within five working days of grading completion; OR
	(2d)	Take actions (3a) or (3c) specified for inactive disturbed surface areas.
Inactive disturbed surface areas	(3a)	Apply water to at least 80 percent of all inactive disturbed surface areas on a daily basis when there is evidence of wind driven fugitive dust, excluding any areas which are inaccessible to watering vehicles due to excessive slope or other safety conditions; OR
	(3b)	Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface; OR
	(3c)	Establish a vegetative ground cover within 21 days after active operations have ceased. Ground cover must be of sufficient density to expose less than 30 percent of unstabilized ground within 90 days of planting, and at all times thereafter; OR
	(3d)	Utilize any combination of control actions (3a), (3b), and (3c) such that, in total, these actions apply to all inactive disturbed surface areas.

Table 2 (Continued)

FUGITIVE DUST SOURCE CATEGORY	CONTROL ACTIONS	
Unpaved Roads	(4a)	Water all roads used for any vehicular traffic at least once per every two hours of active operations [3 times per normal 8 hour work day]; OR
	(4b)	Water all roads used for any vehicular traffic once daily and restrict vehicle speeds to 15 miles per hour; OR
	(4c)	Apply a chemical stabilizer to all unpaved road surfaces in sufficient quantity and frequency to maintain a stabilized surface.
Open storage piles	(5a)	Apply chemical stabilizers; OR
	(5b)	Apply water to at least 80 percent of the surface area of all open storage piles on a daily basis when there is evidence of wind driven fugitive dust; OR
	(5c)	Install temporary coverings; OR
	(5d)	Install a three-sided enclosure with walls with no more than 50 percent porosity which extend, at a minimum, to the top of the pile. This option may only be used at aggregate-related plants or at cement manufacturing facilities.
All Categories	(6a)	Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the methods specified in Table 2 may be used.

TABLE 3
CONTINGENCY CONTROL MEASURES FOR LARGE OPERATIONS

FUGITIVE DUST SOURCE CATEGORY	CONTROL MEASURES
Earth-moving	(1A) Cease all active operations; OR (2A) Apply water to soil not more than 15 minutes prior to moving such soil.
Disturbed surface areas	(0B) On the last day of active operations prior to a weekend, holiday, or any other period when active operations will not occur for not more than four consecutive days: apply water with a mixture of chemical stabilizer diluted to not less than 1/20 of the concentration required to maintain a stabilized surface for a period of six months; OR (1B) Apply chemical stabilizers prior to wind event; OR (2B) Apply water to all unstabilized disturbed areas 3 times per day. If there is any evidence of wind driven fugitive dust, watering frequency is increased to a minimum of four times per day; OR (3B) Take the actions specified in Table 2, Item (3c); OR (4B) Utilize any combination of control actions (1B), (2B), and (3B) such that, in total, these actions apply to all disturbed surface areas.
Unpaved roads	(1C) Apply chemical stabilizers prior to wind event; OR (2C) Apply water twice per hour during active operation; OR (3C) Stop all vehicular traffic.
Open storage piles	(1D) Apply water twice per hour; OR (2D) Install temporary coverings.
Paved road track-out	(1E) Cover all haul vehicles; OR (2E) Comply with the vehicle freeboard requirements of Section 23114 of the California Vehicle Code for both public and private roads.
All Categories	(1F) Any other control measures approved by the Executive Officer and the U.S. EPA as equivalent to the methods specified in Table 3 may be used.

Table 4
(Conservation Management Practices for Confined Animal Facilities)

SOURCE CATEGORY	CONSERVATION MANAGEMENT PRACTICES
Manure Handling **(Only applicable to Commercial Poultry Ranches)**	(1a) Cover manure prior to removing material off-site; AND (1b) Spread the manure before 11:00 AM and when wind conditions are less than 25 miles per hour; AND (1c) Utilize coning and drying manure management by removing manure at laying hen houses at least twice per year and maintain a base of no less than 6 inches of dry manure after clean out; or in lieu of complying with conservation management practice (1c), comply with conservation management practice (1d). (1d) Utilize frequent manure removal by removing the manure from laying hen houses at least every seven days and immediately thin bed dry the material.
Feedstock Handling	(2a) Utilize a sock or boot on the feed truck auger when filling feed storage bins.
Disturbed Surfaces	(3a) Maintain at least 70 percent vegetative cover on vacant portions of the facility; OR (3b) Utilize conservation tillage practices to manage the amount, orientation and distribution of crop and other plant residues on the soil surface year-round, while growing crops (if applicable) in narrow slots or tilled strips; OR (3c) Apply dust suppressants in sufficient concentrations and frequencies to maintain a stabilized surface.
Unpaved Roads	(4a) Restrict access to private unpaved roads either through signage or physical access restrictions and control vehicular speeds to no more than 15 miles per hour through worker notifications, signage, or any other necessary means; OR (4b) Cover frequently traveled unpaved roads with low silt content material (i.e., asphalt, concrete, recycled road base, or gravel to a minimum depth of four inches); OR (4c) Treat unpaved roads with water, mulch, chemical dust suppressants or other cover to maintain a stabilized surface.
Equipment Parking Areas	(5a) Apply dust suppressants in sufficient quantity and frequency to maintain a stabilized surface; OR (5b) Apply material with low silt content (i.e., asphalt, concrete, recycled road base, or gravel to a depth of four inches).

(Adopted October 6, 1989)(Amended April 8, 1994)
(Amended November 3, 2006)(Amended October 5, 2007)

RULE 1403. ASBESTOS EMISSIONS FROM DEMOLITION/RENOVATION ACTIVITIES

(a) Purpose

The purpose of this rule is to specify work practice requirements to limit asbestos emissions from building demolition and renovation activities, including the removal and associated disturbance of asbestos-containing materials (ACM). The requirements for demolition and renovation activities include asbestos surveying, notification, ACM removal procedures and time schedules, ACM handling and clean-up procedures, and storage, disposal, and landfilling requirements for asbestos-containing waste materials (ACWM). All operators are required to maintain records, including waste shipment records, and are required to use appropriate warning labels, signs, and markings.

(b) Applicability

This rule, in whole or in part, is applicable to owners and operators of any demolition or renovation activity, and the associated disturbance of asbestos-containing material, any asbestos storage facility, or any active waste disposal site.

(c) Definitions

For the purpose of this rule, the following definitions shall apply:

(1) ACTIVE WASTE DISPOSAL SITE is any disposal site that receives, or has received or processed ACWM within the preceding 365 calendar days.

(2) ADEQUATELY WET is the condition of being sufficiently mixed or penetrated with amended water to prevent the release of particulates or visible emissions. The process by which an adequately wet condition is achieved is by using a dispenser or water hose with a nozzle that permits the use of a fine, low-pressure spray or mist.

(3) AMENDED WATER is water to which a chemical wetting agent or surfactant has been added to improve penetration into ACM.

(4) ASBESTOS is the asbestiform varieties of serpentine (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (amosite), anthophyllite, actinolite or tremolite.

(5) ASBESTOS-CONTAINING MATERIAL (ACM) is both friable asbestos-containing material or Class I nonfriable asbestos-containing material.

(6) ASBESTOS-CONTAINING WASTE MATERIAL (ACWM) is any waste that contains commercial asbestos and that is generated by a source subject to the provisions of this rule. ACWM includes, but is not limited to, ACM which is friable, has become friable, or has a high probability of becoming friable, or has been subjected to sanding, grinding, cutting, or abrading, and the waste generated from its disturbance, such as asbestos waste from control devices, particulate asbestos material, asbestos slurries, bags or containers that previously contained asbestos, used asbestos-contaminated plastic sheeting and clothing, and clean-up equipment waste, such as cloth rags or mop heads.

(7) ASBESTOS HAZARD EMERGENCY RESPONSE ACT (AHERA) is the act which legislates asbestos-related requirements for schools (40 CFR 763, Subpart E).

(8) ASSOCIATED DISTURBANCE of ACM or Class II nonfriable ACM is any crumbling or pulverizing of ACM or Class II nonfriable ACM, or generation of uncontrolled visible debris from ACM or Class II nonfriable ACM.

(9) CLASS I NONFRIABLE ASBESTOS-CONTAINING MATERIAL is material containing more than one percent (1%) asbestos as determined by paragraph (h)(2), and that, when dry, can be broken, crumbled, pulverized, or reduced to powder in the course of demolition or renovation activities. Actions which may cause material to be broken, crumbled, pulverized, or reduced to powder include physical wear and disturbance by mechanical force, such as, but not limited to, sanding, sandblasting, cutting or abrading, improper handling or removal or leaching of matrix binders. Class I nonfriable asbestos-containing material includes, but is not limited to, fractured or crushed asbestos cement products, transite materials, mastic, roofing felts, roofing tiles, cement water pipes and resilient floor covering.

(10) CLASS II NONFRIABLE ASBESTOS-CONTAINING MATERIAL is all other material containing more than one percent (1%) asbestos as determined by paragraph (h)(2), that is neither friable nor Class I nonfriable.

(11) COMMERCIAL ASBESTOS is any material containing asbestos that is extracted from asbestos ore.

(12) CUTTING is penetrating with a sharp-edged instrument and includes sawing, but does not include shearing, slicing, or punching.

(13) DEMOLITION is the wrecking or taking out of any load-supporting structural member of a facility and related handling operations or the intentional burning of any facility.

(14) EMERGENCY DEMOLITION is a demolition ordered by a governmental agency for the purpose of eliminating peril to the safety of persons, property or the environment resulting from hazards such as collapse, fire, crime, disease, or toxic contamination or other hazard as determined by the Executive Officer.

(15) EMERGENCY RENOVATION is any renovation that was not planned and results from a sudden unexpected event that results in unsafe conditions. Such events include, but are not limited to, renovations necessitated by non-routine failures of equipment, earthquake or fire damage. An economic burden alone, without a sudden, unexpected event, does not give rise to conditions that meet this definition.

(16) ENCAPSULATION is the treatment of ACM with a material that surrounds or embeds asbestos fibers in an adhesive matrix to prevent the release of fibers, as the encapsulant creates a membrane over the surface (bridging encapsulant) or penetrates the material and binds its components together (penetrating encapsulant).

(17) ENCLOSED STORAGE AREA means a storage room, drum, roll-off container, other hard-sided container, or fenced area that is designed to be securely closed with a lock.

(18) FACILITY is any institutional, commercial, public, industrial or residential structure, installation, building; any ship; and any active waste disposal site. A facility is subject to this rule regardless of its current use or function. For example, a facility destroyed by fire, explosion, or natural disaster, including any debris, remains subject to this rule's provisions.

(19) FACILITY COMPONENT is any part of a facility including foundations and or utility/commodity pipelines; and equipment such as but not limited to heaters, boilers, HVAC, and motors.

(20) FRIABLE ASBESTOS-CONTAINING MATERIAL is material containing more than one percent (1%) asbestos as determined by paragraph (h)(2), that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

(21) GLOVEBAG is a sealed compartment with attached inner gloves used for handling ACM. When properly installed and used, glove bags provide a small work area enclosure used for small-scale asbestos stripping operations. Information on glovebag installation, equipment, and supplies, and work practices is contained in the Occupational Safety and Health Administration's final rule on occupational exposure to asbestos (Appendix G to 29 CFR 1926.1101(g)).

(22) HIGH EFFICIENCY PARTICULATE AIR (HEPA) FILTER is a filter capable of trapping and retaining at least 99.97 percent of all monodispersed particles of 0.3 micrometer in diameter or larger.

(23) INSTALLATION is any building or structure or any group of buildings or structures at a single demolition or renovation site that are under the control of the same owner or operator (or owner or operator under central control).

(24) ISOLATED WORK AREA is the immediate enclosed containment area in which the asbestos abatement activity takes place.

(25) LEAK-TIGHT is the condition whereby any contained solids or liquids are prevented from escaping or spilling out.

(26) LOCKED means rendered securely closed and able to be opened only with a key or access code.

(27) NONSCHEDULED RENOVATION OPERATION is a renovation operation necessitated by the routine failure of equipment, which is expected to occur within a given calendar year based on past operating experience, but for which an exact date cannot be predicted.

(28) OUTSIDE AIR is air outside of the facility or outside of the isolated work area.

(29) OWNER or OPERATOR OF A DEMOLITION OR RENOVATION ACTIVITY is any person who owns, leases, operates, controls or supervises activities at the facility being demolished or renovated; the demolition or renovation operation; or both.

(30) PERSON is any individual, firm, association, organization, partnership, business, trust, corporation, company, contractor, supplier, installer, user

or owner, or any state or local government agency or public district or any other officer or employee thereof. PERSON also means the United States or its agencies to the extent authorized by Federal law.

(31) PLANNED RENOVATION is a renovation operation, or a number of such operations, in which the amount of ACM that will be removed or stripped within a given period of time can be predicted. Individual nonscheduled renovation operations are included if a number of such operations can be predicted to occur during a given period of time based on operating experience.

(32) PROJECT is any renovation or demolition activity, including site preparation and clean-up activity.

(33) REMOVAL is the taking out of ACM or facility components that contain or are covered with ACM from any facility.

(34) RENOVATION is the altering of a facility or the removing or stripping of one or more facility components in any way, including, but not limited to, the stripping or removal of ACM from facility components, retrofitting for fire protection, and the installation or removal of heating, ventilation, air conditioning (HVAC) systems. Activity involving the wrecking or taking out of load-supporting structural members are demolitions.

(35) RESIDENTIAL SINGLE UNIT DWELLING is a structure that contains only one residential unit. Apartment buildings, townhouses, and condominiums are not residential single unit dwellings.

(36) RESILIENT FLOOR COVERING is asbestos-containing floor tile, including asphalt and vinyl floor tile, and sheet vinyl floor covering containing more than one percent (1%) asbestos as determined by paragraph (h)(2).

(37) STRIPPING is the taking off of ACM from any part of a facility or facility component.

(38) STRUCTURAL MEMBER is any load-supporting member of a facility, such as beams and load-supporting walls; or any nonload-supporting member, such as ceilings and nonload-supporting walls.

(39) WASTE GENERATOR is any person who owns or operates a source subject to the provisions of this rule according to subdivision (b), and whose act or process produces ACWM.

(40) WASTE SHIPMENT RECORD is the shipping document, required to be originated and signed by the waste generator, used to track and

substantiate the disposition of ACWM as specified by the provisions of subdivision (f).

(41) WORKING DAY is Monday through Friday and includes holidays that fall on any of the days Monday through Friday.

(d) Requirements

A person subject to this rule shall prevent emissions of asbestos to the outside air by complying with the following requirements:

(1) Demolition and Renovation Activities

The owner or operator of any demolition or renovation activity shall comply with the following requirements:

(A) Facility Survey

(i) The affected facility or facility components shall be thoroughly surveyed for the presence of asbestos prior to any demolition or renovation activity. The survey shall include the inspection, identification, and quantification of all friable, and Class I and Class II non-friable asbestos-containing material, and any physical sampling of materials.

(ii) A thorough survey shall include, at a minimum, identification of all affected materials at the facility, including but not limited to all layers of flooring materials to the joist level, and all material in the wall or ceiling cavities as necessary to identify and sample them.

(iii) The survey shall be documented with the following information:

(I) The name, address, and telephone number of the person who conducted the survey;

(II) A written statement of the qualifications of the person who conducted the survey, demonstrating compliance with clause (d)(1)(A)(iv);

(III) The dates the survey was conducted;

(IV) A listing of all suspected materials containing any asbestos, a listing of all samples collected, and a sketch of where the samples were taken;

(V) The name, address, and telephone number of any laboratory used to conduct analyses of materials for asbestos content;

(VI) A statement of qualification of the laboratory which conducted the analyses, demonstrating compliance with paragraph (h)(2);

(VII) A list of the test methods used, demonstrating compliance with subdivision (h), including sampling protocols and laboratory methods of analysis, test data, and any other information used to identify or quantify any materials containing asbestos; and

(VIII) A general description of the condition of the facility, including but not limited to a description of any obvious fire or structural damage.

(iv) Persons conducting asbestos surveys in accordance with subparagraph (d)(1)(A) shall be certified by Cal/OSHA pursuant to regulations required by subdivision (b) of Section 9021.5 of the Labor Code, and shall have taken and passed an EPA-approved Building Inspector Course and conform to the procedures outlined in the Course.

(B) Notification

The District shall be notified of the intent to conduct any demolition or renovation activity. Notifications shall be submitted in a District-approved format which may include but not be limited to U.S. mail, telephone, facsimile, digital, internet, and e-mail. Telephone, facsimile, digital, and e-mail notifications shall be confirmed with follow-up written notifications to the District postmarked or delivered to the District within 48 hours from submitting the telephone, facsimile, digital, or e-mail notification. No notification shall be considered received unless it is accompanied by the required fee pursuant to Rule 301, as part of the required written notification. Notifications shall be provided in accordance with the following requirements:

(i) Time Schedule

(I) Demolition or Renovation Activities

The notification shall be submitted to the District no later than 10 working days before any demolition or renovation activities other than emergency demolition, emergency renovation, or planned renovations involving individual nonscheduled renovation operations begin.

(II) Planned Renovation - Annual Notification

The District shall be notified by December 17 of the year preceding the calendar year for which notice is being given for planned renovation activities which involve individual nonscheduled renovation operations.

(III) Emergency Demolition or Renovation

The District shall be notified as soon as possible, but prior to any emergency demolition or renovation activity.

(ii) Notification Required Information

All notifications shall include the following information:

(I) An indication of whether the notice is the original or a revised notification;

(II) Name, address and telephone number of both the owner and operator of the facility, supervising person, and the asbestos removal contractor, owner or operator;

(III) Address and location of the facility to be demolished or renovated and the type of operation: demolition or renovation;

(IV) Description of the facility or affected part of the facility to be demolished or renovated including the size (square meters or square feet and number of floors), age, and present or prior uses of the facility;

(V) The specific location of each renovation or demolition at the facility and a description of the facility components or structural members contributing to the ACM to be removed or stripped from the facility;

(VI) Scheduled project starting and completion dates of demolition or renovation. Notifications shall also include the ACM removal starting and completion dates for demolition or renovation; planned renovation activities involving individual nonscheduled renovation operations need only include the beginning and ending dates of the report period as described in subclause (d)(1)(B)(i)(II);

(VII) Brief description of work practices and engineering controls to be used to comply with this rule, including asbestos removal and waste handling emission control procedures;

(VIII) A separate estimate for each of the amounts of friable, Class I, and Class II nonfriable asbestos-containing material to be removed from the facility in terms of length of pipe in linear feet, surface area in square feet on other facility components, or volume in cubic feet if off the facility components. The total as equivalent surface area in square feet shall also be reported;

(IX) Name and location of waste disposal site where ACWM will be deposited.

(X) Description of steps to be followed in the event that unexpected ACM is found or Class II nonfriable asbestos-containing material becomes crumbled, pulverized, or reduced to powder;

(XI) California State Contractors License Certification number;

(XII) Cal/OSHA Registration number;

(XIII) Name and location address of off-site storage area for ACWM;

(XIV) Name, address, and telephone number of transporters used to transport ACWM off-site;

(XV) Procedures, including analytical methods, used to detect the presence of friable and nonfriable asbestos-containing material; and

(XVI) Signed certification that at least one person trained as required in subparagraph (d)(1)(G) will supervise the stripping and removal described by this notification.

(iii) Emergency Demolition Additional Information

Notification of all emergency demolition activities shall include the following additional information

(I) The agency, name, title, telephone number and authority of the representative who ordered the emergency demolition; and

(II) A copy of the order, and the date on which the demolition was ordered to begin.

(iv) Emergency Renovation Additional Information

Notification of all emergency renovation activities shall include the following additional information:

(I) The name and phone number of the responsible manager or authorized person who is in charge of the emergency renovation;

(II) The date and hour that the emergency occurred;

(III) A description of the sudden, unexpected event;

(IV) An explanation of how the event caused an unsafe condition, or would cause equipment damage or an unreasonable financial burden; and.

(V) A signed letter from the person directly affected by the emergency, such as the property owner or property manager, attesting to the circumstances of the emergency.

(v) Notification Updates

All notifications shall be updated when any of the following conditions arise:

(I) Change in Quantity of Asbestos

A change in the quantity of affected asbestos of 20 percent or more from the notified amount shall be reported to the District as soon as the information becomes available, but not later than the project end

date, unless otherwise specified in an approved Procedure 5.

(II) Later Starting Date

A delay in the starting date of any demolition or renovation activity shall be reported to the District as soon as the information becomes available, but no later than the original start date.

(III) Earlier Starting Date

A change in the starting date of any demolition or renovation activity to an earlier starting date shall be reported to the District no later than 10 working days before any demolition or renovation activities begin.

(IV) Completion Date Change

Changes in the completion date shall be reported to the District at least 2 calendar days before the original scheduled completion date. In the event renovations or demolitions are not completed, are delayed or are completed ahead of schedule, the District shall be notified as soon as possible, but no later than the following business day.

(V) Planned Renovation Progress Report

Notifications for on-going planned renovation operations in which the scheduled starting and completions dates are more than 1 year apart shall be updated, every year of the operation by December 17, unless the most recent written notification update was postmarked or delivered after October 1 of that year and include the amount of ACM removed and the amount of ACM remaining to be removed.

(C) Asbestos Removal Schedule

Material containing asbestos shall be removed from a facility according to the following schedule:

(i) Burning Demolitions

All ACM and Class II asbestos-containing material shall be removed from a facility prior to any demolition by intentional burning. All demolition by intentional burning shall be performed in accordance with Rule 444 – Open Burning.

(ii) Renovations and Non-Burning Demolitions

(I) All ACM shall be removed from a facility being demolished or renovated before any non-burning demolition or renovation activity begins that would break up, dislodge, or similarly disturb the material or preclude access to the material for subsequent removal.

(II) ACM not accessible for testing or not discovered until after the renovation or demolition activities begin may be removed after the start of the renovation or non-burning demolition activities, pursuant to the appropriate procedure in subparagraph (d)(1)(D).

(III) Notwithstanding the above, asbestos-containing packings, gaskets, resilient floor covering, and asphalt roofing products which are not friable and are not crumbled, cut, abraded, or otherwise not damaged and in good condition, may be removed after the start of renovation or non-burning demolition activities if prior approval from the District is obtained (Procedure 5).

(IV) If the renovation or demolition activity involves any mechanical force such as, but not limited to, sanding, sandblasting, cutting, or abrading and thus would render the materials friable, they must be removed prior to the renovation or demolition.

(V) If for any reason, any renovation or demolition results in an associated disturbance of ACM or Class II nonfriable ACM outside of a containment or work area then, prior to continuing with any renovation or demolition activity, the

owner/operator shall secure, stabilize and survey the affected facility areas and submit and obtain an approved Procedure 5 plan, prior to any asbestos clean-up.

(D) Removal Procedures

(i) One or more of the following procedures shall be used when removing or stripping ACM:

(I) Procedure 1 - HEPA Filtration

Remove ACM within an isolated work area. The following techniques shall be used during Procedure 1 ACM removal activities:

(1) All stationary objects and surfaces not intended for removal or stripping of ACM shall be covered with plastic sheeting;

(2) All air passageways, such as doors, windows, vents and registers in the work area, shall be covered and rendered air tight with plastic sheeting or hard wooden barriers with studded support. Air passageways used to provide makeup air for the isolated work space need not be covered;

(3) All sources of air movement, including the air-handling system, shall be shut off or temporarily modified to restrict air movement into the work zone;

(4) The barriers used for the construction of the isolated work area shall be equipped with transparent viewing ports which allow outside observation of all stripping and removal of ACM;

(5) The isolated work area shall be vented, with negative air pressure to a HEPA filtration system, which shall be operated continuously from the commencement of removal activities through the final clean-up of the work area;

(6) The HEPA filter shall be free of tears, fractures, holes or other types of damage and shall be securely latched and properly situated in the holding frame to prevent air leakage from the filtration system; and

(7) ACM shall be adequately wet during the removal process.

(II) Procedure 2 - Glovebag

Remove by the glovebag method or minienclosures designed and operated according to 29 CFR Section 1926.1101(g), Appendix G, and current Cal/OSHA requirements.

(III) Procedure 3 - Adequate Wetting

Procedure 3 shall only be used to remove nonfriable asbestos-containing materials, using the following techniques:

(1) All exposed ACM shall be adequately wet during cutting or dismantling procedures.

(2) ACM shall be adequately wet while it is being removed from facility components and prior to its removal from the facility.

(3) Drop cloths and tenting shall be used to contain the work area to the extent feasible.

(4) Only non-power tools shall be used.

(IV) Procedure 4 - Dry Removal

Obtain written approval from the Executive Officer's designee prior to using dry removal methods for the control of asbestos emissions when adequate wetting procedures in the renovation work area would unavoidably damage equipment or present a safety hazard. Dry removal methods may include one or more of the following:

(1) Use of a HEPA filtration system, operated in accordance with subclause (d)(1)(D)(i)(I), within an isolated work area;

(2) Use of a glovebag system, operated in accordance with subclause (d)(1)(D)(i)(II); or

(3) Use of leak-tight wrapping or an approved alternative, to contain all ACM removed in units or sections prior to dismantlement.

(V) Procedure 5 - Approved Alternative

(1) Use an alternative combination of techniques and/or engineering controls. Written approval from the Executive Officer or his designee shall be obtained prior to the use of a Procedure 5 Approved Alternative.

(2) The Executive Officer may pre-approve specific combinations of techniques and/or engineering controls in writing, which may be used by any person as a Procedure 5 Approved Alternative, subject to such conditions and limitations as required by the Executive Officer.

(3) No person shall use a Procedure 5 Approved Alternative without complying with all of the conditions and limitations set forth therein.

(ii) Specific procedure requirements

(I) No person shall remove or strip ACM or Class II nonfriable ACM that has suffered damage from fire, explosion, or natural disaster without the use of a Procedure 5 Approved Alternative.

(E) Handling Operations

All ACWM shall be collected and placed in transparent, leak-tight containers or wrapping. The following techniques shall be used.

(i) ACM shall be carefully lowered to the ground or a lower floor without dropping, throwing, sliding, or otherwise damaging or disturbing the ACM;

(ii) ACM which has been removed or stripped more than 50 feet above ground level and was not removed as units or in sections shall be transported to the ground via leak-tight chutes or containers;

(iii) ACWM shall be collected, and sealed in leak-tight containers. ACWM shall be adequately wet prior to and during collection and packaging. Alternatively, areas of Class I nonfriable asbestos-containing material which have become friable or have been subjected to sanding, grinding, cutting, or abrading, may be sealed via encapsulation; and

(iv) All surfaces in the isolated work area shall be cleaned, with a vacuum system utilizing HEPA filtration, wet mopping and wipe down with water, or by an equivalent methods, prior to the dismantling of plastic barriers or sealed openings within the work area.

(F) Freezing Temperature Conditions

When the temperature at the point of wetting is below 0°C (32°F), the wetting provisions of subparagraph (d)(1)(D) shall be superseded by the following requirements:

(i) Facility components containing, coated with, or covered with ACM shall be removed as units or in sections to the maximum extent possible; and

(ii) The temperature in the area containing the facility components shall be recorded at the beginning, middle, and end of each workday during periods when wetting operations are suspended due to freezing temperatures. Daily temperature records shall be available for inspection by the District during normal business hours at the demolition or renovation site. Records shall be retained for at least 2 years.

(G) On-Site Representative

At least one on-site representative, such as a foreman, manager, or other authorized representative, trained in accordance with the provisions of paragraphs (i)(1) and (i)(3), shall be present during the stripping, removing, handling, or disturbing of ACM. Evidence that the required training has been completed shall be

posted at the demolition or renovation site and made available for inspection by the Executive Officer's designee.

(H) On-Site Proof

The following shall be maintained on-site and shall be provided to the District upon request:

(i) California State Contractor's License certification number;

(ii) Cal/OSHA Registration number;

(iii) copies of surveys, conducted pursuant to subparagraph (d)(1)(A); and

(iv) copies of notifications submitted pursuant to subparagraph (d)(1)(B).

Proof shall be consistent with the most recently updated information submitted in the notification.

(I) On-Site Storage

No ACWM shall be stored on-site except in a leak-tight container. When leak-tight containers are not in use, they shall be kept inside an enclosed storage area. The enclosed storage area shall not be accessible to the general public and shall be locked when not in use.

(J) Disposal

All ACWM shall be disposed of at a waste disposal site that is operated in accordance with paragraph (d)(3) of this rule.

(K) Container Labeling

Leak-tight containers which contain ACWM shall be labeled as specified in subdivision (e).

(L) Transportation Vehicle Marking

Vehicles used to transport ACWM shall be marked, as specified in subdivision (e), during the loading and unloading of ACWM.

(M) Waste Shipment Records

Waste Shipment Records shall be prepared and handled in accordance with the provisions of paragraph (f)(1).

(N) Recordkeeping

Records shall be kept as specified in subdivision (g).

(2) ACWM Storage Facilities

The owner or operator of any ACWM storage facility shall comply with the following requirements:

(A) Maintenance and Handling

(i) ACWM shall be stored in leak-tight containers;

(ii) All leak-tight containers shall be labeled as specified in paragraph (e)(1); and

(iii) ACWM shall be stored in an enclosed locked area.

(B) Transportation Vehicle Marking

Vehicles used to transport ACWM shall be marked, as specified in paragraph (e)(3), during the loading and unloading of ACWM.

(C) Waste Shipment Records

Waste Shipment Records shall be handled in accordance with the provisions of paragraph (f)(2).

(D) Recordkeeping

Records shall be maintained as specified in paragraph (g)(2).

(3) Active Waste Disposal Sites

The owner or operator of any waste disposal site where ACWM is being deposited shall comply with the following requirements:

(A) Maintenance and Handling

(i) ACWM shall be in leak-tight containers;

(ii) Warning signs, as specified in paragraph (e)(2), shall be displayed at all entrances and at intervals of 330 feet or less along the property line of the site or along the perimeter of the sections of the site where ACWM is being deposited;

(iii) Access to the general public shall be deterred by maintaining a fence along the perimeter of the site or by using a natural barrier;

(iv) All ACWM shall be maintained in a separate disposal section;

(v) ACWM deposited at the site shall be covered with at least six (6) inches of nonasbestos-containing material at the end of normal business hours. The waste shall be compacted only after it has been completely covered with nonasbestos-containing material. A low pressure water spray or nontoxic dust suppressing chemical shall be used for any surface wetting after compaction; and

(vi) ACWM shall be covered with a minimum of an additional thirty (30) inches of compacted nonasbestos-containing

material prior to final closure of the waste disposal site, and shall be maintained to prevent exposure of the ACWM.

(B) Transportation Vehicle Marking

Vehicles used to transport ACWM shall be marked, as specified in paragraph (e)(3), during the loading and unloading of ACWM.

(C) Waste Shipment Records

Waste Shipment Records shall be handled in accordance with the provisions of paragraph (f)(2).

(D) Recordkeeping

Records shall be maintained as specified in paragraph (g)(3).

(e) Warning Labels, Signs, and Markings

Warning labels, signs, and markings shall be used to identify asbestos related health hazards and comply with the following requirements:

(1) Leak-Tight Containers

Leak tight containers shall be labeled according to the following requirements:

(A) Warning labels for leak-tight containers and wrapping shall have letters of sufficient size and contrast as to be readily visible and legible, and shall contain the following information, or as specified by Occupational Safety and Health Standards of the Department of Labor, Occupational Safety and Health Administration (OSHA) under 29 CFR 1910.1001(j)(2) or 1926.58(k)(2)(iii), or current Cal/OSHA requirements:

CAUTION

Contains Asbestos Fibers

Avoid Opening or Breaking Container

Breathing Asbestos is Hazardous to Your Health

or

DANGER

CONTAINS ASBESTOS FIBERS

AVOID CREATING DUST

CANCER AND LUNG DISEASE HAZARD

(B) Leak-tight containers that are transported off-site shall be labeled with the name of the waste generator and the location at which the

waste was generated. The location description shall include the street address.

(2) Active Waste Disposal Sites

No person shall operate an active waste disposal site unless warning signs are conspicuously posted and meet the following:

(A) Are displayed in such a manner and location that a person can easily read the legend;

(B) Conform to the requirements for 51 cm x 36 cm (20 inch x 14 inch) upright format signs specified in 29 CFR 1910.145 (d)(4) and this paragraph;

(C) Display the following legend in the lower panel with letter sizes and styles of a visibility at least equal to those specified in this subparagraph:

Legend	Notation
Asbestos Waste Disposal Site	2.5 cm (1 inch) Sans Serif, Gothic or Block
Do Not Create Dust	1.9 cm (3/4 inch) Sans Serif, Gothic or Block
Breathing Asbestos is Hazardous to Your Health	14 Point Gothic

; and

(D) Have spacing between any two lines at least equal to the height of the upper of the two lines.

(3) Transportation Vehicles

Markings for transportation vehicles shall:

(A) Be displayed in such a manner and location that a person can easily read the legend;

(B) Conform to the requirements for 51 cm x 36 cm (20 inch x 14 inch) upright format signs specified in 29 CFR 1910.145 (d)(4) and this paragraph; and

(C) Display the following legend in the lower panel with letter sizes and styles of a visibility at least equal to those specified in this paragraph:

Legend	Notation
DANGER	2.5 cm (1 inch) Sans Serif, Gothic or Block
ASBESTOS DUST HAZARD	2.5 cm (1 inch) Sans Serif, Gothic or Block
CANCER AND LUNG DISEASE HAZARD	1.9 cm (3/4 inch) Sans Serif, Gothic or Block
Authorized Personnel Only	14 Point Gothic

; and

(D) Have spacing between any two lines at least equal to the height of the upper of the two lines.

(f) Waste Shipment Records

(1) Waste Generators

A waste generator shall comply with the following:

(A) Waste shipment information shall include, but not be limited to, the following:

(i) The name, address, and telephone number of the waste generator;

(ii) The name, address, and telephone number of the South Coast Air Quality Management District;

(iii) The quantity of ACWM in cubic meters or cubic yards;

(iv) The name and telephone number of the disposal site owner and operator;

(v) The name and physical site location of the disposal site;

(vi) The date transported;

(vii) The name, address, and telephone number of the transporter; and

(viii) A signed certification that the contents of this consignment are fully and accurately described by proper shipping name and are classified, packed, marked, and labeled, and in proper condition for highway transport according to applicable federal, state, and local regulations.

(B) A copy of the Waste Shipment Record shall be provided to the disposal site owner or operator at the same time the ACWM is delivered to the disposal site.

(C) If a copy of the Waste Shipment Record, signed by the owner or operator of the designated disposal site, is not received within 35 days of the date the ACWM was accepted by the initial transporter, the transporter and/or the owner or operator of the designated disposal site shall be contacted to determine the status of the waste shipment.

(D) If a copy of the Waste Shipment Record, signed by the owner or operator of the designated disposal site, is not received within 45 days of the date the ACWM was accepted by the initial transporter, a written report shall be submitted to the District and shall include the following:

(i) A copy of the Waste Shipment Record for which a confirmation of delivery was not received; and

(ii) A signed cover letter explaining the efforts taken to locate the ACWM shipment and the results of those efforts.

(2) Storage and Active Waste Disposal Facilities

The owner or operator of any storage facility or active waste disposal site shall comply with the following requirements:

(A) Waste shipment information shall be filled out on the Waste Shipment Record forms provided by the waste generator, for all ACWM received from an off-site facility, and shall include, but not be limited to, the following:

(i) The name, address, and telephone number of the waste generator;

(ii) The name, address, and telephone number of the transporter;

(iii) The quantity of ACWM received in cubic meters or cubic yards; and

(iv) The date of receipt.

(B) No shipment of ACWM shall be received from an off-site facility unless it is accompanied with a completed Waste Shipment Record signed by the waste generator.

(C) If there is a discrepancy between the quantity of ACWM designated in the Waste Shipment Record and the quantity actually received, and if the discrepancy cannot be resolved with the waste generator within 15 days of the date the ACWM was received, a written report shall be filed with the District. The report shall include the following:

(i) A copy of the Waste Shipment Record; and

(ii) A signed cover letter explaining the discrepancy, and the attempts to reconcile it.

(D) If any shipment of ACWM is not properly containerized, wrapped, or encapsulated, a written report shall be filed with the District. The report shall be postmarked or delivered within 48 hours after the shipment is received, or the following business day.

(E) A signed copy of the Waste Shipment Record shall be provided to the waste generator no later than 30 calendar days after the ACWM is delivered to the disposal site.

(g) Recordkeeping

(1) Demolition and Renovation Activities

The owner or operator of any demolition or renovation activity shall maintain the following records for not less than three (3) years and make them available to the District upon request:

(A) A copy of all survey-related documents;

(B) A copy of all submitted notifications. A copy of the most recently updated written notification submitted in accordance with the provisions of this rule shall be maintained on-site;

(C) A copy of all written approvals obtained under the requirements of subparagraph (d)(1)(D);

(D) A copy of all Waste Shipment Records;

(E) All training informational materials used by an owner or operator to train supervisors or workers for the purposes of this rule; and

(F) A copy of all supervisors and workers training certificates and any annual reaccreditation records which demonstrate EPA-approved or state accreditation to perform asbestos-related work.

(2) Storage Facilities

The owner or operator of any storage facility shall maintain a copy of all Waste Shipment Records on site for not less than three (3) years and make them available to the District upon request.

(3) Active Waste Disposal Sites

The owner or operator of an active waste disposal site shall maintain the following information on site for not less than three (3) years and make them available to the District upon request:

(A) A description of the active waste disposal site, including the specific location, depth and area, and quantity, in cubic meters or cubic yards, of ACWM within the disposal site on a map or diagram of the disposal area;

(B) A description of the methods used to comply with waste disposal requirements; and

(C) A copy of all Waste Shipment Records.

(4) In lieu of the requirements of paragraph (g)(1), the owner or operator of a renovation activity at any facility, in which less than 100 square feet of surface area of ACM on facility components is removed or stripped, may instead elect to maintain the following information for a period of not less than three (3) years, and make it available to the District upon request:

(A) A copy of all survey-related documents;

(B) Records containing an estimate of the amount of ACM removed or stripped at each renovation subject to this paragraph;

(C) Type of removal controls used for each renovation; and

(D) A copy of all Waste Shipment Records.

(h) Sampling Protocols and Test Methods

(1) Sampling of materials suspected to contain asbestos, to comply with this rule, shall be conducted following the provisions of 40 CFR Part 763.86.

(2) Analysis of materials for asbestos, to comply with this rule, shall be determined by using SCAQMD Method 300-91 as detailed in the District's *Laboratory Methods of Analysis for Enforcement Samples* manual, or by using the Method specified in Appendix A, Subpart F, 40 CFR Part 763, Section 1, Polarized Light Microscopy. Asbestos analyses performed to comply with this rule must be undertaken by laboratories accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

(i) Training Requirements

The owner or operator performing a demolition or renovation activity shall provide asbestos-related training as follows:

(1) On-site supervisory personnel shall successfully complete the Asbestos Abatement Contractor/Supervisor course pursuant to the Asbestos Hazard Emergency Response Act (AHERA), and obtain and maintain accreditation as an AHERA Asbestos Abatement Contractor/Supervisor.

(2) Workers shall successfully complete the Abatement Worker course pursuant to the AHERA.

(3) Supervisory personnel and workers shall be trained on the provisions of this rule as well as on the provisions of 40 CFR Part 61.145, 61.146, 61.147 and 61.152 (Asbestos NESHAP provisions) and Part 763, and the means by which to comply with these provisions.

(j) Exemptions

(1) The notification requirements of subparagraph (d)(1)(B) and the training requirements of subdivision (i) shall not apply to renovation activities, other than planned renovation activities which involve non-scheduled renovation operations, in which less than 100 square feet of surface area of ACM are removed or stripped.

(2) The notification requirements of subparagraph (d)(1)(B) and the training requirements of subdivision (i) shall not apply to planned renovation activities which involve non-scheduled renovation operations, in which the total quantity of ACM to be removed or stripped within each calendar year of activity is less than 100 square feet of surface area.

(3) Clauses (d)(1)(A)(iii)(V), (VI), and (VII) and subclause (d)(1)(B)(ii)(XV) shall not apply to the owner or operator of any renovation or demolition activity, when the suspected material is treated as ACM when being removed, stripped, collected, handled, and disposed of in accordance with the provisions of this rule.

(4) The portion of clause (d)(1)(A)(iv) which requires Cal/OSHA certification shall not apply to persons performing work not subject to the certification requirement established by regulations pursuant to the Labor Code, Section 6501.5.

(5) Subclause (d)(1)(B)(ii)(XI) and clause (d)(1)(H)(i), requiring a California State Contractors License Certification number, shall not apply to persons

performing work not subject to the certification requirement established pursuant to the Business and Professions Code, Section 7058.5.

(6) Subclause (d)(1)(B)(ii)(XII) and clause (d)(1)(H)(ii), requiring Cal/OSHA registration, shall not apply to persons performing work not subject to the registration requirement established pursuant to the Labor Code, Section 6501.5

(7) The provisions of subparagraph (f)(2)(E) shall not apply to storage facilities that do not meet the definition of an active waste disposal site as defined by paragraph (c)(1).

(8) The handling requirements of phrases (d)(1)(D)(i)(I)(2), (d)(1)(D)(i)(I)(5), and (d)(1)(D)(i)(I)(6), the training requirements of paragraphs (i)(1) and (i)(2), the reporting of training certificate requirement of subclause (d)(1)(B)(ii)(XVI), and the on-site proof of training requirement of subparagraph (d)(1)(G) and subdivision (i) shall not apply to the exclusive removal of asbestos-containing packings, gaskets, resilient floor covering and asphalt roofing products which are not friable, have not become friable, and have not been subjected to sanding, grinding, cutting, or abrading.

(9) The provisions of this rule shall not apply to an owner-occupant of a residential single-unit dwelling who personally conducts a renovation activity at that dwelling.

(10) The survey requirements of subparagraph (d)(1)(A) shall not apply to renovation activities of residential single-unit dwellings in which less than 100 square feet of surface area of ACM are removed or stripped.

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

September 17, 2012

EMI Project No. 11-135

Parsons
2201 Dupont Drive, Suite 200
Irvine, California 92612

Attention: Mr. David Lew

Subject: Materials Report for I-5 HOV Improvement Project (Segment 1), San Clemente, California, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B)

Dear Mr. Lew:

Attached please find the Materials Report for the subject I-5 HOV Improvement Project (Segment 1). This report contains our findings, conclusions, and recommendations for the design and construction of the proposed HOV widening. It addresses geotechnical and materials issues following Topic 114 of the Caltrans Highway Design Manual and Caltrans Test Method 130.

We appreciate the opportunity to provide geotechnical design services for this project. If you have any questions, please call us.

Sincerely,
EARTH MECHANICS, INC.

Mike Kapuskar, GE
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
MIKE KAPUSKAR
No. GE2564
Expires 12-31-12
GEOTECHNICAL
STATE OF CALIFORNIA

Lino Cheang, GE
Project Manager

REGISTERED PROFESSIONAL ENGINEER
LINO C. CHEANG
NO. GE 2345
EXP. 9/30/13
GEOTECHNICAL
STATE OF CALIFORNIA

MK/wd/lcc

MATERIALS REPORT

INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)
SAN CLEMENTE, ORANGE COUNTY, CA
12-ORA-5, PM 3.0/3.7
CALTRANS PROJECT NO. 1200020277 (EA 12-0F96B)

Prepared for:

Parsons
2201 Dupont Drive, Suite 200
Irvine, California 92612

Prepared By:

Earth Mechanics, Inc.
17800 Newhope Street, Suite B
Fountain Valley, California 92708

EMI Project No. 11-135

August 13, 2012

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1.0 GENERAL

1.1 PURPOSE AND SCOPE OF WORK

This Materials Report presents findings and conclusions of a geotechnical investigation conducted by Earth Mechanics, Inc. (EMI) for the Interstate 5 (I-5) High-Occupancy Vehicle (HOV) Lanes Improvement Project (Segment 1) at Avenida Pico interchange located in San Clemente, California. The project location is shown on the Site Location Map in Figure 1. The purpose of the geotechnical investigation was to obtain subsurface information to develop design and construction recommendations to assist Parsons in the preparation of the Project Plans, Specifications, and Estimates (PS&E).

This report follows the requirements for a Materials Report in accordance with Topic 114 of the California Department of Transportation (Caltrans) Highway Design Manual (HDM, 2008) and is organized in general accordance with California Test (CT) 130 (Caltrans, 2000). This report provides geotechnical information and recommendations for pavement structural sections, earthwork, and addresses soil corrosion issues at the site as required by the HDM.

The following geotechnical services were completed for this project:

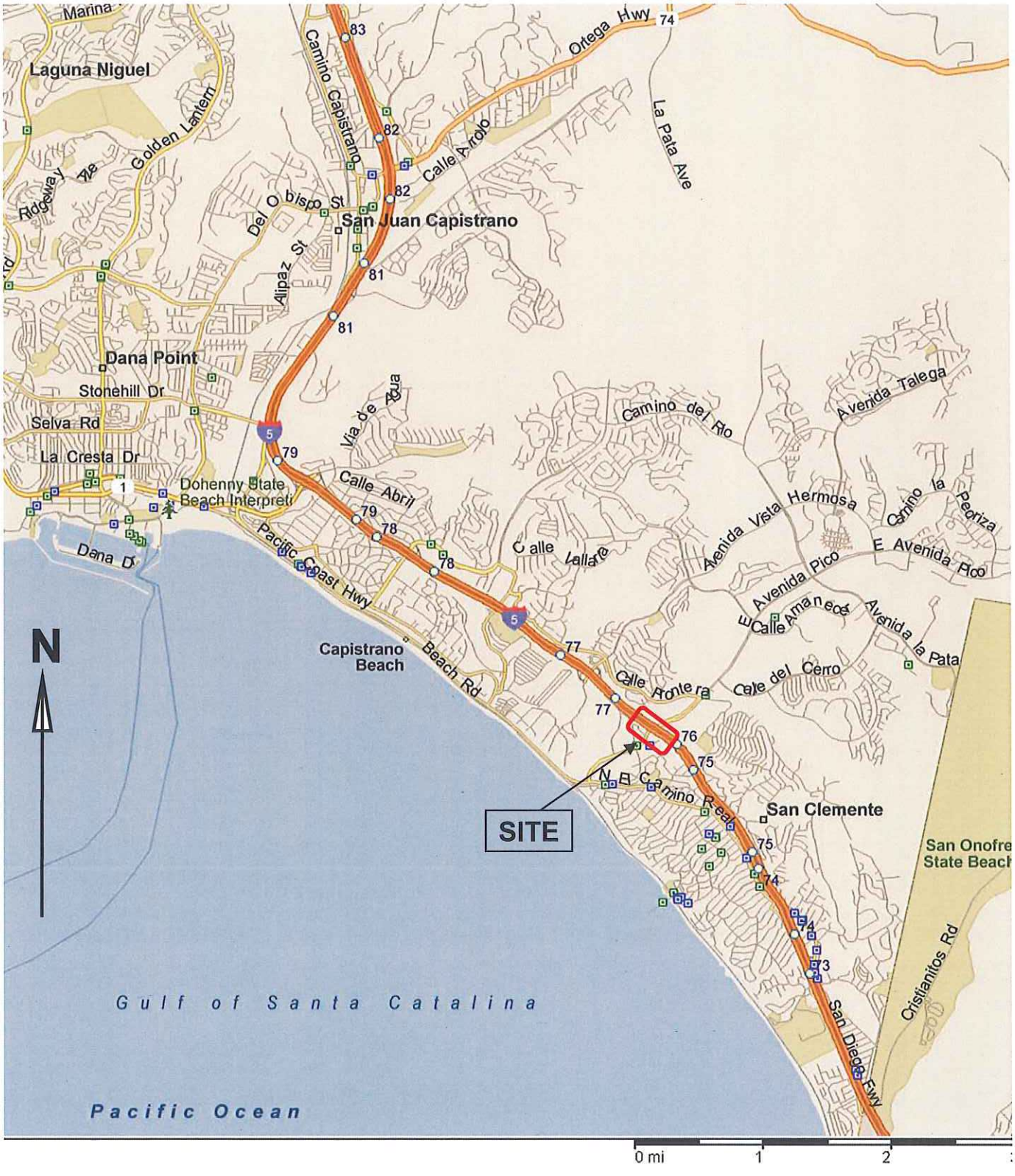
- Geotechnical field exploration consisting of drilling and logging exploratory borings,
- Laboratory testing of selected soil/bedrock samples,
- Pavement structural section design,
- Soil corrosivity evaluation, and
- Preparation of this report presenting our findings, conclusions, and recommendations.

1.2 PROJECT DESCRIPTION

The Orange County Transportation Authority (OCTA), in cooperation with the California Department of Transportation (Caltrans), and the Cities of Dana Point, San Clemente, and San Juan Capistrano, is proposing to widen the I-5 mainline between Avenida Pico and San Juan Creek Road. The total project length along the I-5 corridor is approximately 5.7 miles. The project limits on I-5 freeway extend from 0.47 mile south of the Avenida Pico Undercrossing (UC) at Post Mile (PM) 3.0 to 0.1 mile south of the San Juan Creek Road UC at PM 8.7.

The project is divided into three segments: Segment 1 is from Post Mile 3.0 to 3.7; Segment 2 is from Post Mile 3.7 to 6.2; and Segment 3 is from Post Mile 6.2 to 8.7.

This report pertains to Segment 1 only, and the project extends along I-5 from 0.47 miles south to 0.37 miles north of Avenida Pico (I-5 Mainline Sta. 165+00 to 210+00). Major proposed improvements consist of widening I-5 and adding one HOV lane in both directions, reestablishing auxiliary lanes, realignment of the four ramps, realignment of Avenida Pico, replacement of the existing Avenida Pico Undercrossing bridge structure, new retaining walls, and new sign structures.



I-5 HOV Improvement Project Segment 1	SITE LOCATION MAP
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Figure 1
Project No. 11-135	Date: 02-22-12

1.3 CLIMATIC CONDITIONS

Weather in the coastal Orange County area is a Mediterranean-type, semi-arid, climate characterized by warm dry summers and mild winters. A dominating factor in the weather is the semi-permanent north Pacific high pressure system that migrates northward in summer, holding storm tracks well to the north, and as a result, southern California receives little or no precipitation during the summers. In the winter, the North Pacific High migrates southward permitting storm centers to swing across southern California. These storms generate moderate, but occasionally severe, precipitation events. When changes in the circulation pattern permit storms to approach from a southwesterly direction, the colder northern air masses merge with subtropical air masses and bring copious amounts of moisture with the northeastward streaming air ("pineapple express"). This results in heavy rains and often produces widespread flooding, especially in the spring when it coincides with runoff from melting snow in the mountains.

Summer is a dry period over most of the area. With the northward migration of the Pacific high most storm tracks are deflected far to the north during summer, and southern California seldom receives precipitation from Pacific storms during this time of year. Occasionally, during the summer months, moist air drifts northward from the Gulf of Mexico or the Gulf of California creating monsoonal conditions. At such times, scattered, locally heavy thunder showers occur, mostly in the desert and inland mountain areas.

The average annual high temperature is 73° F and the average low about 52°. The hottest months are July, August, and September when high temperatures average in the high 70's, and low temperatures average in the high 50's. The coolest temperatures are in the winter months of December, January, and February when average highs are in the high 60's and average lows are in the low to mid 40's.

The extreme high temperatures occur during July, August, and September with the record high of 108° in September. These high temperatures are commonly associated with adiabatic heating associated with winds called Santa Ana winds. The extreme low temperatures average about 44° in December through February with a record low of 21°. Freezing occurs occasionally on the winter nights, but is generally of short duration (a couple hours) and does not commonly result in a "hard" freeze.

Annual precipitation averages about 14". The wettest months are November through March with an average of 3.4" in February. Snow is not uncommon in the surrounding high mountains and results in snow-capped peaks for several days, snow fall is extremely rare in the site area.

The prevailing wind direction is from the southwest. Generally these light winds bring cool ocean air that moderates the local climate. A typical weather characteristic in the area results from the juxtaposition of cool marine waters and dry hot desert air. As the moist marine air masses drift over colder water, a bank of fog or low clouds, locally referred to as the "marine layer", sweeps inland a short distance before evaporating. Characteristically, the marine layer extends inland a mile or two and then recedes offshore during the heat of the afternoon. Occasionally the layer may extend to the bordering hills and mountains during the night. During May and June, the marine layer can remain the entire day.

1.4 TERRAIN, LAND USE, AND SURFACE DRAINAGE

The project area extends 4,300 ft along I-5 which runs in a northwest to southeast direction along the coastline of south Orange County among the San Joaquin Hills that border the Santa Ana Mountains to the northeast. The project corridor is in the northwestern portion of the Peninsular Ranges geomorphic province. Elevations along the I-5 stationline decline from about 173 ft above sea level at the north project limit down to about 110 ft at the lowest point at the Avenida Pico Undercrossing, then rise again to about 190 ft at the south project limit.

The project site is in an urban, mostly commercial setting. A residential area exists on the hills in the northwest quadrant of the project.

Major rivers within south Orange County are San Juan Creek and San Mateo Creek which originate in the Santa Ana Mountains. San Mateo Creek is located southeasterly of the project site and flows to the Pacific Ocean in San Clemente. San Juan Creek is located far north of the project site and flows to the Pacific Ocean in Dana Point.

Drainages in proximity to the project area flow from the Santa Ana Mountains on the northeast. The Avenida Pico alignment runs along the Segunda Deshecha Canad a which is the main drainage facility that crosses the project segment at the I-5/Avenida Pico UC and drains to the Pacific Ocean further downstream.

1.5 REGIONAL GEOLOGY

The project area is in the northwestern part of the Peninsular Ranges physiographic province. The Peninsular Ranges comprise a northwest-southeast trending group of fault-bounded ranges between the Salton Trough and the Pacific Ocean. The Santa Ana Mountains, Puente Hills, and San Joaquin Hills are ranges within the Peninsular Ranges.

The site is located on the low lying rolling hills westerly of the Santa Ana Mountains at the southerly end of the San Joaquin Hills in an area referred to as the Capistrano Embayment.

The geological structure at the site consists of slightly to moderately folded bedrock of the Capistrano formation overlain by horizontally bedded Quaternary terrace deposits and alluvium without any notable geological structures such as faults, folds, or unconformities. The northwest quadrant of the Avenida Pico interchange in the central portion of the project is underlain by landslide deposits which are discussed further in the Foundation Report for Retaining Wall 190 (EMI, 2012c).

The Capistrano Formation is widespread throughout the southern part of Orange County, which is known geologically as the Capistrano Embayment. The Capistrano Embayment is the name given to the structural/stratigraphic block west of the Cristianitos Fault. Geological structure in the Capistrano Embayment area consists primarily of a broad, gentle syncline of the Monterey and Capistrano Formations between the San Joaquin Hills and the Santa Ana Mountains. This structure originated as a deep submarine structural trough that has since been uplifted at least 3,000 ft from the marine environment to its present position above sea level (Ehlig, 1989). Subsequent regional uplift during the late Pliocene and Pleistocene time resulted in folding of the bedrock units.

The project area is underlain by silty claystone, claystone and siltstone of the Capistrano Formation, Terrace Deposits and Alluvium consisting of non-indurated silty sand with clay and gravel, and landslide deposits derived from units of the Capistrano Formation. The bedrock of the Capistrano Formation underlying the project area was found to be massive to poorly bedded. Where bedding was observed, the strikes were variable from east to the northeast with shallow dips less than about 10° to the north, east and south. Throughout the project corridor, the dominant structural pattern is high-angle joints and fractures within the Capistrano bedrock.

Pleistocene Terrace Deposits unconformably overlie the Capistrano Formation. The contact is generally undulatory, with a slight overall dip seaward averaging about 2°. This erosional contact is marked by cobble and boulder rich beds of varying thicknesses.

1.6 PERTINENT REPORTS AND INVESTIGATIONS

Kleinfelder West, Inc. (2010) performed a pavement life cycle cost analysis during the PA/ED phase of the project. No other previous geotechnical studies were performed specifically for final pavement design of the improvements addressed in this report.

1.7 RELATED REPORTS PREPARED FOR THE PROPOSED IMPROVEMENTS

A separate Geotechnical Design Report (GDR) (EMI, 2012e) for the current geotechnical study addresses geotechnical issues not included in this report. Other separate Foundation Reports address the Avenida Pico Undercrossing bridge replacement, new proposed retaining walls, and sign structures (EMI, 2012a-d). These reports may be referred to for additional geotechnical information.

1.8 LIMITATIONS

This report is intended for the use of OCTA, Parsons, and Caltrans for design and construction of the I-5 HOV Improvement (Segment 1) at the Avenida Pico interchange. This report is based on the project as described and the information obtained from the exploratory borings at the approximate locations indicated on the attached plans. The findings and recommendations contained in this report are based on the results of the field investigation, laboratory tests, and engineering analyses. In addition, soils and subsurface conditions encountered in the exploratory borings are presumed to be representative of the project site. However, subsurface conditions and characteristics of soils between exploratory borings can vary. The findings reflect an interpretation of the direct evidence obtained. The recommendations presented in this report are based on the assumption that an appropriate level of quality control and quality assurance (inspections and tests) will be provided during construction. EMI should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations contained herein are applicable to the specific design elements and locations which are the subject of this report. Data, opinions, and recommendations herein have no applicability to any other design elements or to any other locations, and any and

all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of EMI.

EMI is not responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction. EMI is not responsible for the acts or omissions of the Contractor, or any other person performing any construction, or for the failure of any worker to carry out construction in accordance with the Final construction drawings and specifications.

Services performed by EMI were conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty or guarantee is included or intended.

2.0 EXISTING FACILITIES AND PROPOSED IMPROVEMENTS

2.1 EXISTING FACILITIES

The project is located along the I-5 corridor and includes the Avenida Pico UC (Bridge No. 55-0207), and two on-ramps and two off-ramp connections to Avenida Pico. The southern limit along the I-5 corridor is about 2,400 ft south to about 1,900 ft north of Avenida Pico (I-5 Mainline Sta. 165+00 to 210+00) with a total project length of 4,500 ft. The segment of I-5 within the project limits currently provides four through-lanes and one auxiliary lane in each direction for the on- and off-ramps which have one to three lanes.

According to Parsons utility plans, there are several utility lines which run parallel to or cross under the I-5 mainline. The major utility lines crossing the I-5 Mainline are:

- 12" Reclaimed water line near I-5 Mainline Sta. 185+25,
- 27" CML (Cement Mortar Lining) steel water line near I-5 Mainline Sta. 185+50, and
- 18" VCP (Vitrified Clay Pipe) sewer line near I-5 Mainline Sta. 201+75.

The utility plans also show the following utilities along Avenida Pico roadway and along the outside shoulders of the mainline and along some of the ramps: 27" CCP (Concrete Cylinder Pipe) water main, 10" to 16" ACP (Asbestos Cement Pipe) water, 21" to 24" CML steel water, 8" sewer and reclaimed water, 2" to 10" gas, electrical, AT&T/PacBell telephone lines, and communication lines.

Most of these utilities are located between Avenida Pico and the south project limit. There are fiber optic lines identified along the mainline outside shoulders and ramps.

Existing pavement structural section information provided by Parsons is summarized in Table 1.

2.2 PROPOSED IMPROVEMENTS

According to the Project Report information, the Preferred Alternative provides continuous access HOV lanes along I-5 and improves the Avenida Pico UC which is a signature access roadway in San Clemente. The Preferred Alternative includes:

- Add one HOV lane per direction on I-5 throughout project limits,
- Reestablish existing auxiliary lanes,
- Replace the existing bridge structure of Avenida Pico Undercrossing (Bridge No. 55-0207),
- Realign the four interchange ramps, and construct two retaining walls along I-5 SB shoulder at Avenida Pico UC, two retaining walls along I-5 SB On- and Off-Ramps, and widen the I-5 NB On-Ramp to three lanes,
- Realign and widen Avenida Pico, including a new EB through lane, new sidewalk and bicycle lanes, and construct a new retaining wall along new WB shoulder to retain a hillside, and
- Construct sign structures at multiple locations throughout the project limits.

TABLE 1. EXISTING PAVEMENT SECTIONS

Stations	Roadway	Shoulder
I-5 NB Mainline		
"A" 176+00 to 195+20	0.29' RHMA 0.13' AC Overlay 0.67' PCC	0.29' RHMA 0.13' AC Overlay 0.67' PCC
"A" 195+20 to 198+39		0.42' AC (Type B) 0.25' PCC
"A" 198+39 to 210+00		0.29' RHMA 0.13' AC Overlay 0.67' PCC
I-5 SB Mainline		
"A" 176+00 to 180+00	0.29' RHMA 0.13' AC Overlay 0.67' PCC	0.42' AC Overlay 0.50' AC (Type B)
"A" 180+00 to 195+20		0.29' RHMA 0.13' AC Overlay 0.67' PCC
"A" 195+20 to 204+30		0.42' AC Overlay 0.50' & 1.3' AC (Type B)
"A" 204+30 to 210+00		0.29' RHMA 0.13' AC Overlay 0.67' PCC
I-5 NB On-Ramp		
"AP1" 100+96.20 to 108+45	1.00' AC (Type B)	None
"AP1" 108+45 to 114+30	0.42' AC Overlay 0.50' AC (Type B)	None
I-5 NB Off-Ramp		
"AP2" 29+00 to 34+20	0.42' AC Overlay 0.50' AC (Type B)	None
"AP2" 34+20 to 39+19.53	1.00' AC (Type B)	None
I-5 SB On-Ramp		
"AP3" 36+00 to 47+10	0.42' AC Overlay 0.50' AC (Type B)	None
"AP3" 47+10 to 49+94.48	1.00' AC (Type B)	None
I-5 SB Off-Ramp		
"AP4" 31+55.92 to 41+59.15	0.44' AC (Type A) 0.61' ACB (Type A) 1.29' AB (Class 2)	None
"AP4" 41+59.15 to 45+29	0.44' AC (Type A) 0.61' ACB (Type A) 1.29' AB (Class 2)	None
"AP4" 45+29 to 48+00	1.38' AC (Type B)	None

Stations	Roadway	Shoulder
WB Avenida Pico		
"AP" 13+87.61 to 28+26.79	0.6' to 1.5' AC 0' to 2.1' AB	None
EB Avenida Pico		
"AP" 13+12.35 to 28+26.79	0.6' to 1.5' AC 0' to 2.1' AB	None

Drainage work involves construction of various sized Reinforced Concrete Pipe (RCP) culverts and drainage inlets throughout the length of the project. The major utility lines crossing the I-5 mainline will be protected in-place.

Recommended pavement structural sections for the I-5 Mainline lanes and shoulders, ramps and Avenida Pico are presented in Section 7.4 of this report.

3.0 ROADWAY AND CULVERT FOUNDATIONS

3.1 GEOTECHNICAL INVESTIGATION

A geotechnical field investigation was conducted in September to November, 2011 for all proposed improvements for Segment 1. The investigation consisted of a total of 27 exploratory borings and 6 cone penetration tests (CPT's). The soil exploration information is summarized in Table 2. Approximate locations of borings and CPT's are shown on Figure 2 to Figure 6. Logs of boring sheets (LOTB's) and CPT's are presented in Appendix A.

Hollow-stem auger (HSA) borings were drilled using a CME 75 truck-mounted drill rig equipped with 8" diameter hollow-stem augers. Sampling was performed by alternating the Modified California Drive (MCD) sampler and Standard Penetration Test (SPT) sampler. The soil sampling interval was 5 ft. Relatively undisturbed soil samples were obtained using a 3.25" outer diameter MCD sampler lined with brass rings. Each of these brass rings is 1" long with a 2.5" outside diameter. The SPT sampler (1.4" inside diameter) was also used to obtain soil samples. The MCD and SPT samplers were driven 18" into the ground or until refusal was encountered using a 140-lb hammer free falling from a height of 30". The numbers of blows to advance the sampler each 6" of penetration were recorded. The number of blows for the final 12" or shorter of driving was recorded on the boring logs. Charts published by Winterkorn and Fang (1975) were used to obtain a reduction factor of 0.5 for this project to convert MCD sampler blowcounts to SPT-equivalent blowcounts.

Hand-auger (HA) borings were manually drilled using a 3" diameter stainless steel auger. Shallow bulk samples were collected from the hand-auger borings.

The CPT sounding was performed adjacent to the location of soil boring for calibration purposes. The CPT used an electronic cone penetrometer in general accordance with current ASTM Standards (ASTM D5778 and D3441). The CPT equipment used hollow sounding rods with a probe with a conical tip with a 60^0 apex angle and a projected cross sectional area of 1.55 in^2 and a cylindrical friction sleeve with a surface area of 23.25 in^2. The interior of the cone penetrometer is instrumented with strain gauges that for cone tip and friction sleeve resistance measurement during penetration. The cone penetrometer assembly is continuously pushed into the soil by a set of hydraulic rams at a standard rate of 0.79" per second while the cone tip resistance and sleeve friction resistance are recorded every 1.967". The 25-ton dead weight of the truck provides the required reaction weight for pushing the rods and is used to transport and house the testing equipment. The computer generated graphical logs include tip resistance, friction resistance, and friction ratio. Soil behavior type interpretations are based on guidelines by Robertson and Campanella (1989).

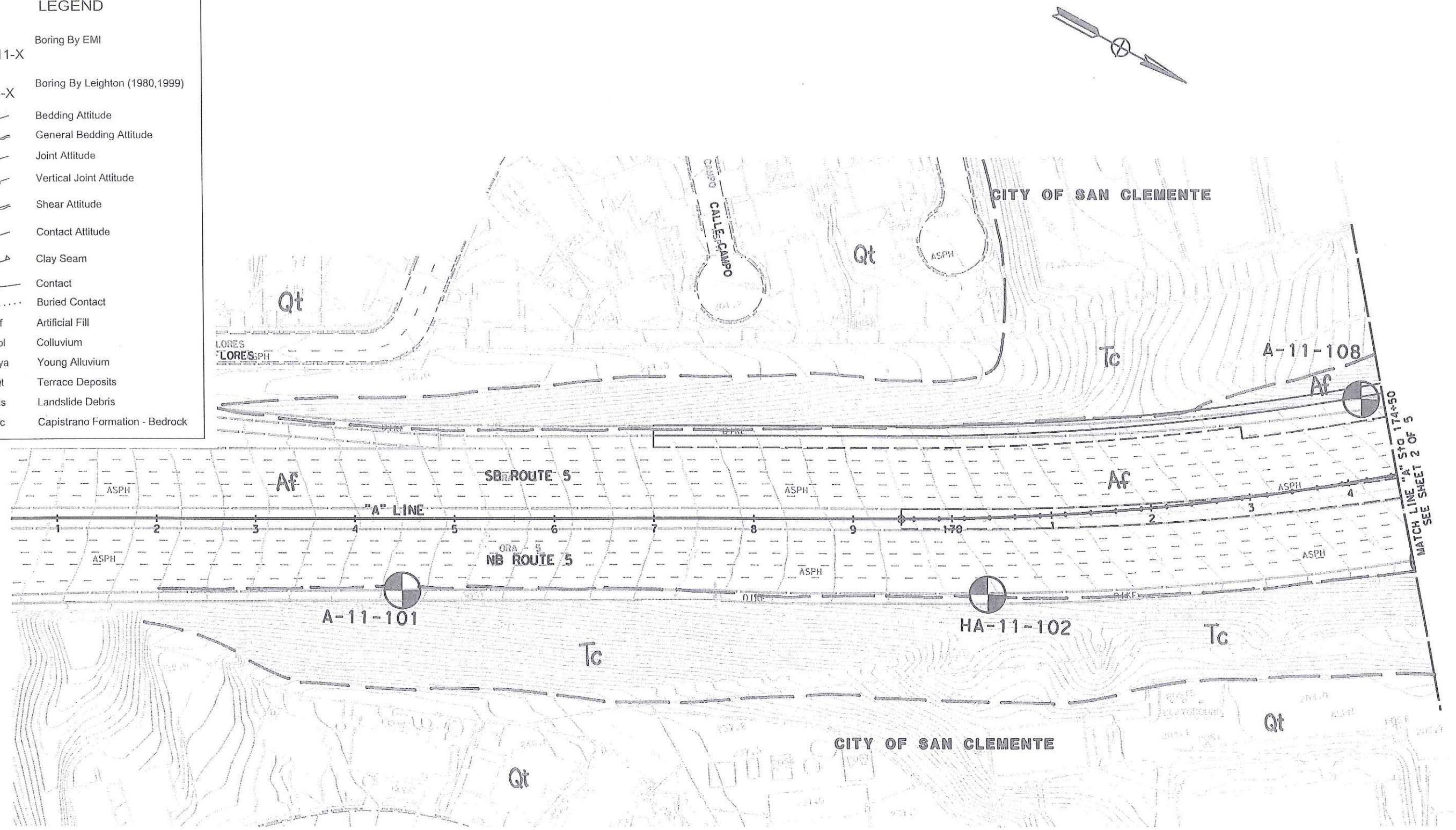
TABLE 2. SOIL EXPLORATION INFORMATION

Boring	Easting (ft)	Northing (ft)	Top of Boring El. (ft)	Depth (ft)	Groundwater El. (ft)	Drilling Method
A-11-101	6,144,824	2,104,209	+202.7	30.5	NE	HSA
HA-11-102	6,144,546	2,104,728	+178.2	3.0	NE	HA
HA-11-103	6,144,305	2,105,100	+158.4	2.5	NE	HA
A-11-104	6,144,002	2,105,453	+136.5	36.5	NE	HSA
A-11-106	6,143,480	2,105,945	+104.2	31.5	NE	HSA
HA-11-107	6,143,694	2,105,759	+116.7	2.0	NE	HSA
A-11-108	6,144,196	2,104,964	+153.8	31.5	NE	HSA
A-11-109	6,143,982	2,105,215	+137.2	70.8	NE	HSA
CPT-11-110	6,143,580	2,105,546	+111.8	81.5	NM	CPT
A-11-111	6,143,220	2,105,740	+95.4	71.5	+50.4	HSA
A-11-112	6,142,953	2,105,842	+88.8	6.5	NE	HSA
A-11-113	6,143,335	2,105,750	+110.9	51.5	NE	HSA
A-11-114	6,143,022	2,105,978	+117.5	101.5	+49.5	HSA
A-11-115	6,143,249	2,106,012	+113.5	100.4	+53.0	HSA
CPT-11-115	6,143,249	2,106,012	+113.5	84.8	NM	CPT
A-11-116	6,142,997	2,106,170	+121.0	89.2	NE	HSA
A-11-117	6,142,778	2,106,149	+125.5	101.4	NE	HSA
A-11-118	6,142,354	2,106,428	+140.4	70.9	NE	HSA
HA-11-119	6,142,687	2,106,380	+132.2	5.0	NE	HA
HA-11-120	6,143,462	2,106,248	+98.0	3.5	NE	HA
HA-11-121	6,142,699	2,105,787	+85.5	2.5	NE	HA
HA-11-122	6,142,622	2,105,661	+81.8	4.0	NE	HA
A-11-124	6,143,375	2,106,283	+97.9	31.5	NE	HSA
CPT-11-125	6,142,946	2,106,286	+111.0	29.0	NM	CPT
A-11-126	6,142,732	2,106,405	+127.0	10.9	NE	HSA
A-11-127	6,142,332	2,106,675	+143.9	6.5	NE	HSA
A-11-128	6,142,681	2,106,063	+92.7	6.5	NE	HSA
CPT-11-129	6,142,417	2,106,285	+118.7	65.6	NM	CPT
A-11-130	6,142,102	2,106,519	+148.1	70.5	NE	HSA
CPT-11-131	6,141,753	2,106,853	+163.9	21.2	NM	CPT
HA-11-132	6,142,045	2,106,652	+151.6	2.0	NE	HSA
CPT-11-133	6,141,987	2,106,883	+152.5	27.7	NM	CPT
A-11-134	6,141,524	2,107,086	+170.5	30.8	NE	HSA

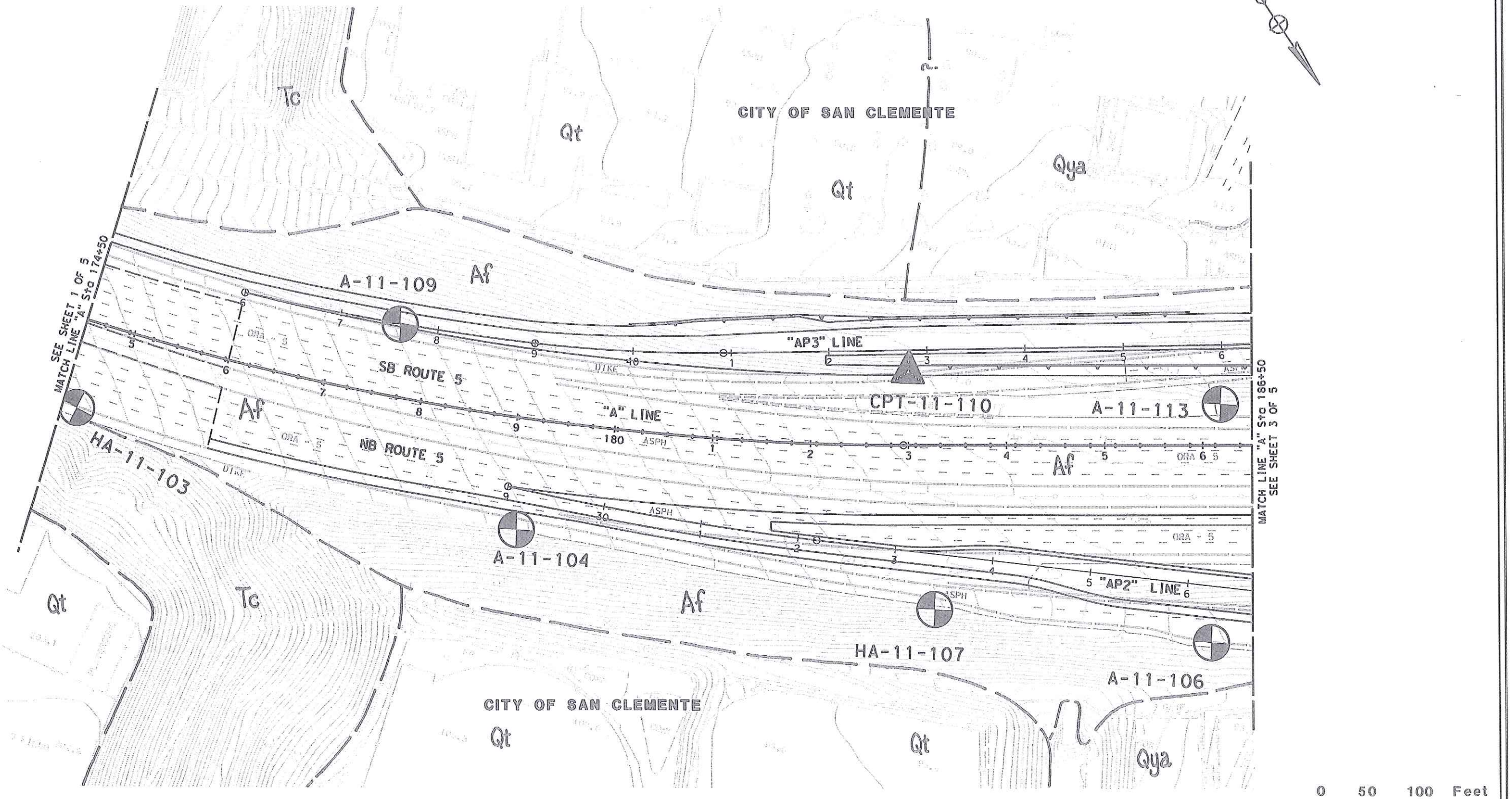
Notes: NE=Not Encountered; NM=Not Measured; HSA=Hollow-Stem Auger Boring; CPT=Cone Penetration Test; HA=Hand Auger Boring

LEGEND

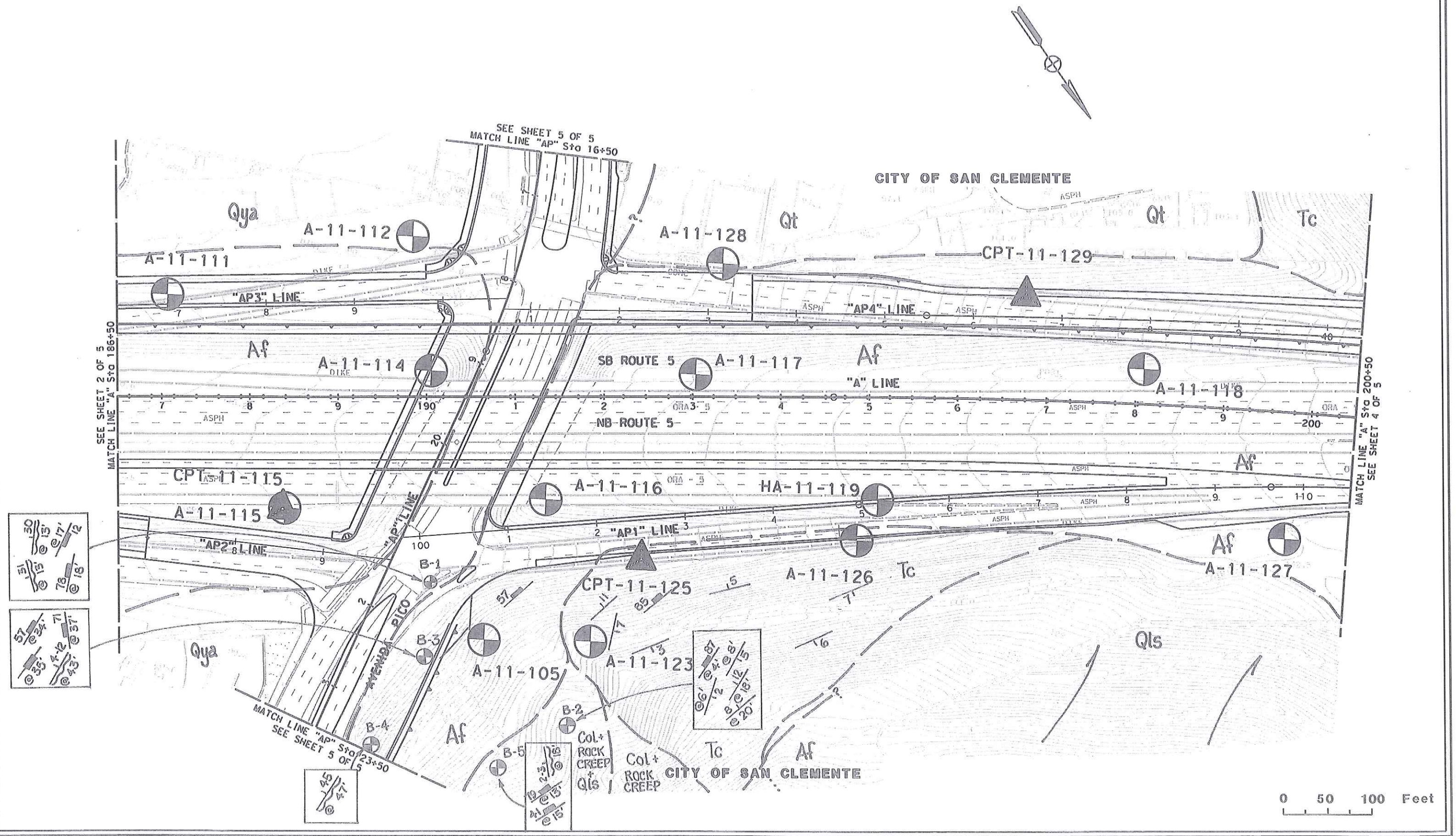
A-11-X	Boring By EMI
B-X	Boring By Leighton (1980,1999)
	Bedding Attitude
	General Bedding Attitude
	Joint Attitude
	Vertical Joint Attitude
	Shear Attitude
	Contact Attitude
	Clay Seam
	Contact
	Buried Contact
Af	Artificial Fill
Col	Colluvium
Qya	Young Alluvium
Qt	Terrace Deposits
Qls	Landslide Debris
Tc	Capistrano Formation - Bedrock



Earth Mechanics, Inc. Geotechnical & Earthquake Engineering	INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)	Exploratory Boring Location Map (1 of 5)
	Project No.: 11-135 / Date: 03-14-2012	Figure 2



Earth Mechanics, Inc. Geotechnical & Earthquake Engineering	INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)	Exploratory Boring Location Map (2 of 5)
	Project No.: 11-135 / Date: 03-14-2012	Figure 3



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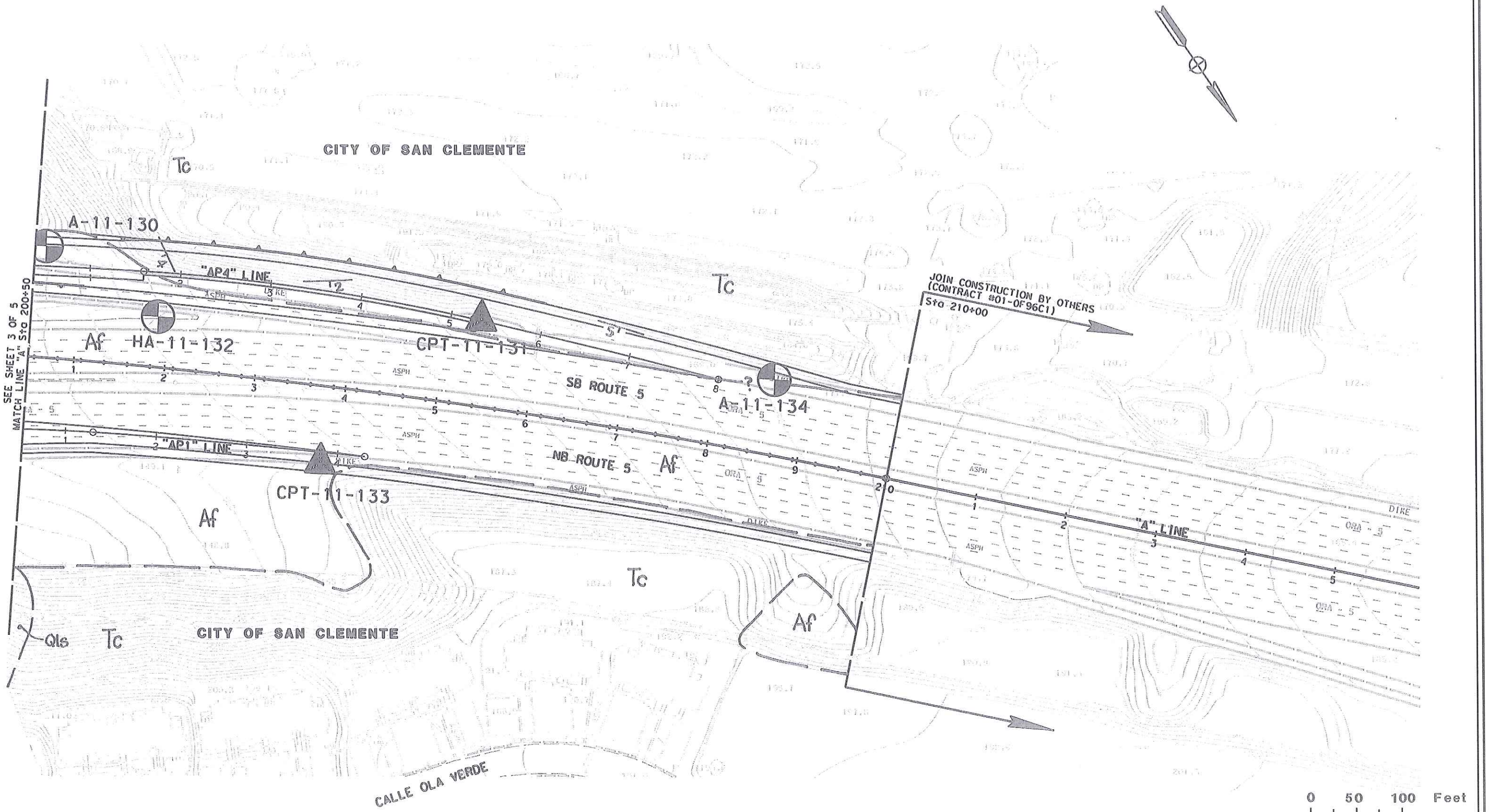
INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)

Project No.: 11-135

Date: 03-14-2012

Exploratory Boring Location Map (3 of 5)

Figure 4



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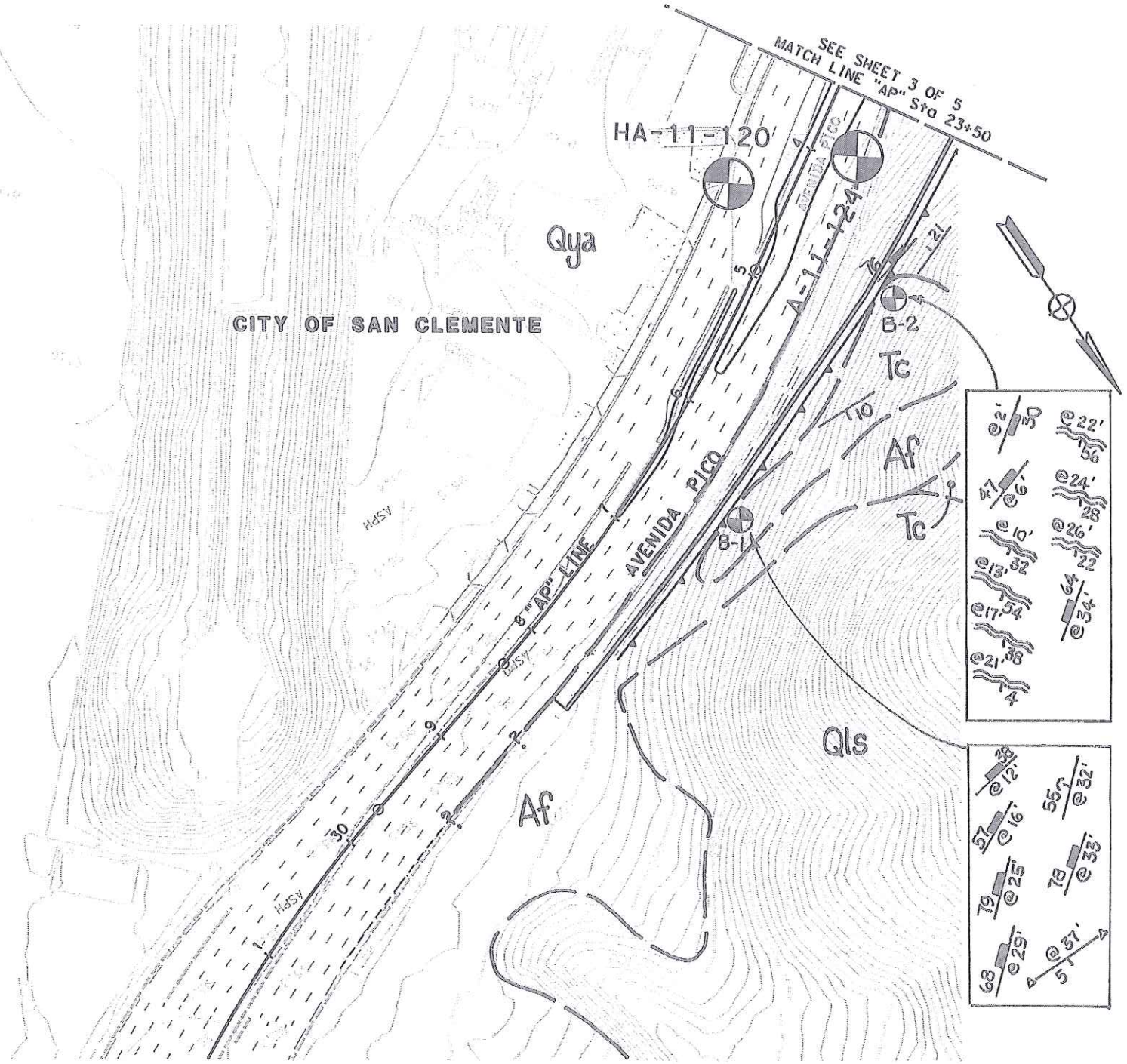
INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)

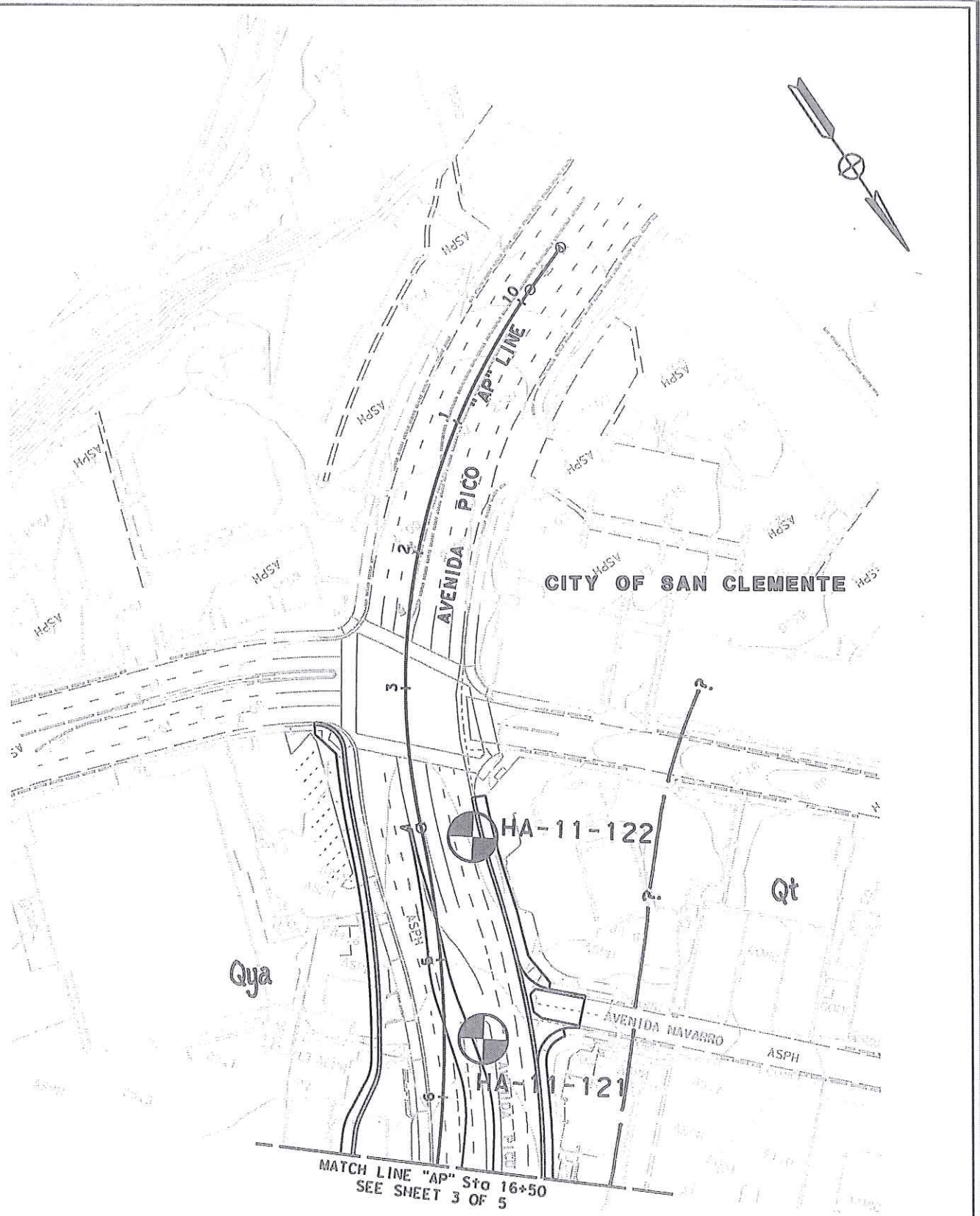
Project No.: 11-135

Date: 03-14-2012

Exploratory Boring Location Map (4 of 5)

Figure 5





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INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)

Project No.: 11-135

Date: 03-14-2012

Exploratory Boring Location Map (5 of 5)

Figure 6

3.2 LABORATORY SOIL TESTING

Laboratory tests were performed on representative samples of soil and bedrock to determine or derive their relevant physical and engineering properties. To perform analyses related to the Materials Report, the following laboratory soil tests were conducted to supplement the observations recorded during the field investigation:

- In-situ Moisture Content and Unit Weight,
- Percent Passing No. 200 Sieve,
- Atterberg Limits,
- Consolidation,
- Pocket Penetrometer,
- Minimum Resistivity, pH, Sulfate Content and Chloride Content (Soil Corrosivity),
- Maximum Density and Optimum Moisture Content, and
- R-Value.

The laboratory tests were conducted in general accordance with California Test (CT) methods or American Society for Testing and Materials (ASTM, 2008) standards. Soil corrosivity test results are presented in Section 6.0. R-value and Atterberg Limits test results for near-surface bulk samples are presented in Section 7.2. Maximum Density and Optimum Moisture Content test results are presented in Section 10.0. The remaining laboratory test results are presented in Appendix B.

Other tests indicated on the LOTB's in Appendix A were performed for other purposes. Those tests were not used for the purpose of this report.

3.3 SOIL AND GROUNDWATER CONDITIONS

3.3.1 Soil Conditions

Based on visual classification and laboratory tests, the vast majority of earth materials throughout the project site are fine-grained fills, alluvium, terrace deposits, and clayey siltstone and claystone of the Capistrano formation. The clays found throughout the project are predominantly stiff to hard lean to fat clays and the silts are stiff to very hard elastic silts. Granular sand fills other than roadway base materials were rarely encountered in the borings documented in this report.

The geologic units encountered in the project area are described in this section. The distribution and location of these materials are shown on the maps of Figure 2 to Figure 6.

Artificial fills (Af) were placed along the project corridor during construction of the I-5 freeway and also adjacent residential and commercial developments. Fill materials were most likely derived from excavation of the Capistrano formation bedrock and local surficial deposits. The fills are predominantly composed of clayey silts and clay soils.

Generally, the existing fills overlie terrace deposits (Qt) or Capistrano formation bedrock (Tc). The terrace deposits are characterized by a basal cobble sequence fining upward to coarse to fine grained sands, silty sand, sandy silt, and clayey silt. The terrace deposits unconformably overlie bedrock units of the Capistrano formation.

The Capistrano formation is a marine sedimentary deposit generally consisting of brown to gray silty claystone, claystone, and siltstone. Secondary gypsum is commonly found deposited along joints, fractures and shears. The formation is generally soft when moist and has engineering properties similar to stiff to very stiff soils. The formation consists generally of soft, weakly cemented to uncemented material that can be disaggregated with finger pressure. A few hard beds occur throughout the formation. Within the project area, the Capistrano formation consists of an oxidized (weathered) zone defined by a light brown to brown color with a mottled appearance, underlain by an unoxidized zone that is generally dark brown to dark gray with a greater degree of induration.

Alluvium (Qal) is present in the drainages and canyons crossing the project corridor. The drainages and canyons are mantled by a relatively thin cover of alluvium that are generally derived from the surrounding bedrock and terrace deposits and are located in the lower elevations of the site. Where encountered in the borings the alluvium was observed to consist of silty sand to sandy clay.

The above soil description is general and only describes the subsurface in very broad terms. For details of stratigraphy at each borehole location, refer to the boring logs, LOTB sheets, and the CPT sounding logs provided in Appendix A.

3.3.2 Groundwater Conditions

As shown in Table 2, groundwater was encountered at three borings between about El. +49.5 ft and +53 ft during drilling in September to November, 2011. These borings are located within the Segunda Deshecha drainage path. The California Geological Survey (CGS, 2002) quadrangle map for San Clemente indicate a highest historical groundwater of 5 to 10 ft below original bottom of nearby Segunda Deshecha canyon which is significantly lower than current roadway grades within the project extents. The soil borings indicate a lack of continuous pervious soil units, and groundwater was encountered in very few borings in September to November 2011 but not in other nearby borings. For example, the As-built plans for Avenida Pico UC include LOTB sheets that show groundwater was not encountered above El. +40 ft in 1955 and El. +37 ft in 1967. These findings suggest that groundwater within the I-5 HOV widening project is perched.

Groundwater levels are also subject to seasonal fluctuation due to precipitation and other man-made and natural influences.

3.4 FOUNDATION TREATMENT FOR GENERAL FILL AREAS

Vegetation on existing ground should be removed from the site prior to fill placement. Loose, soft, dry, wet, or otherwise unsuitable materials should be removed from areas to receive fill. After clearing and grubbing, a minimum overexcavation and recompaction of 24" should be accomplished within all areas to receive compacted fill. The overexcavation should extend horizontally a minimum distance of 24" from edges of new fills. The overexcavation bottoms should be scarified to a minimum depth of 8" moisture-conditioned to near-optimum moisture content, and compacted to at least 90% relative compaction. All overexcavation bottoms should be observed to be firm and unyielding prior to fill placement. No special foundation treatment is recommended for proposed drainage structures at this site. Foundation treatment for pavement subgrade is discussed in Section 7.5.

3.5 DRAINAGE SYSTEMS

The general drainage pattern within the project vicinity is in a southwesterly direction towards the Pacific Ocean. The Segunda Deshecha is the main regional drainage facility that crosses the project site in the area of the Avenida Pico UC and discharges to the Pacific Ocean further downstream. Existing drainage systems within the project limits generally drain to this facility. On-site runoff is collected by drainage systems in the median and on the shoulders which connect to existing cross culverts that discharge to earthen channels or concrete lined trapezoidal channels which parallel the mainline.

Based on current plans, fills are proposed throughout the project area. The impact of fills at least 5 ft in height should be evaluated for utilities and drainage structures that fall within a 45° projection below the footprint of fills.

4.0 CUTS AND EXCAVATIONS

Based on the Profile Sheets provided by Parsons, major cuts and excavations are required as follows:

- Up to 18 ft of cut is required into the north embankment slope of I-5 from approximately "A" Sta. 185+00 to 197+00 for realignment of the new Avenida Pico Undercrossing approaches and I-5 embankments at the north side,
- Up to about 25 ft of cut is required for widening and realignment of the I-5 SB Off-Ramp, and
- A slope cut up to about 34 ft tall is proposed along Avenida Pico roadway.

Minor cuts and excavations of about 5 ft will be required in the other areas, including a cut along the toe of the existing slope adjacent to the outside shoulder of the NB On-Ramp.

In addition to the permanent cuts, temporary excavations (generally up to 5 ft deep) are proposed to accomplish remedial removals in areas where compacted fill and new pavement are proposed and to accommodate construction of short retaining walls.

Per Caltrans HDM Topic 304 (2012b), side slopes should be constructed no steeper than 4H:1V where possible. A design exception will be required for side slopes with steeper gradients.

The stability of cuts is addressed in the Geotechnical Design Report (EMI, 2012e).

5.0 EMBANKMENTS

Based on the Profile Sheets and cross-sections provided by Parsons, the following fills and embankment will need to be placed for the I-5 Improvement:

- Up to 22 ft of fills are required against the south embankment slopes of I-5 between approximately "A" Sta. 173+00 and 182+00 for freeway widening and realignment. These fill embankment slopes will be partially retained by MSE walls.
- Up to 35 ft of fills are required against the south embankment slopes of I-5 between approximately "A" Sta. 182+00 and 202+00 for freeway widening and realignment and to construct both approaches for the new Avenida Pico Undercrossing and realignment of ramps. These fill embankments will be partially retained by MSE walls.

Other embankment fill heights not listed below are relatively minor (5 ft or less). Minor fills less than 5 ft may be required in other places.

Per Caltrans HDM Topic 304 (2012b), side slopes should be constructed (where possible) no steeper for 4H to 1V. Design exception will be required for side slopes with gradients steeper than 4H to 1V.

Stability and settlement of the bridge approach fill embankments for Avenida Pico bridge replacement and the retaining wall backfills are addressed in separate foundation reports (EMI, 2012a, b and c). Stability and settlement of the roadway embankments are addressed in the GDR (EMI, 2012e).

6.0 CORROSION INVESTIGATIONS

A total of seven (7) soil samples were tested to determine minimum resistivity, pH, soluble sulfate content, and soluble chloride content using procedures described in California Test Methods 417, 422, and 643, respectively. The test results are presented in Table 3.

TABLE 3. SOIL CORROSION TEST RESULTS

Boring	Sample Depth (ft)	Soil Type	Minimum Resistivity (ohm-cm)	pH	Soluble Sulfate Content (ppm)	Soluble Chloride Content (ppm)
A-11-104	5	CL	270	7.1	1,620	2,047
A-11-115	5	SC	410	7.2	560	1,281
A-11-116	5	CL	250	7.3	950	2,029
A-11-117	35	CH	170	5.6	5,060	1,950
A-11-118	2.5	CH	270	6.7	550	1,986
A-11-123	10	CH	190	7.0	1,700	680
A-11-124	2.5	CL	310	6.5	1,950	407

Based on the Caltrans Corrosion Guidelines (2003), soils are considered corrosive if the pH is 5.5 or less, or the sulfate concentration is 2,000 ppm or greater, or the chloride concentration is 500 ppm or greater. Based on the test results and the Caltrans criteria, the on-site soils classify as corrosive to bare metals and concrete that is in contact with them. Corrosion protection requirements for various culvert materials are presented in Section 9.5.

7.0 STRUCTURAL PAVEMENT DESIGN

7.1 EXISTING PAVEMENT SECTIONS

The as-built pavement sections along I-5 mainline and ramps, as well as Avenida Pico were summarized in Table 1.

7.2 SUBGRADE R-VALUES

A total of 14 samples of on-site, near-surface soils were tested to determine the R-values. The R-values together with selected Plasticity Index (PI) test results are presented Table 4.

TABLE 4. R-VALUE AND PI TEST RESULTS

Boring	Sample Depth (ft)	USCS Soil Type	R-Value	PI (%)
A-11-101	0 to 5	CL	9	-
A-11-103	0 to 5	CH	5	-
A-11-106	0 to 5	CL	13	24
A-11-109	0 to 5	CL	10	25
A-11-112	0 to 5	CL	7	24
A-11-113	0 to 5	ML	13	-
A-11-115	0 to 5	CL	10	16
A-11-117	0 to 5	CL	10	-
A-11-119	0 to 5	CL	5	26
A-11-121	0 to 5	SM	70	-
A-11-124	0 to 5	CH	5	38
A-11-126	0 to 5	CH	5	-
A-11-128	0 to 5	CH	10	39
A-11-130	0 to 5	SM	72	-

We have the following observations based on an examination of the data in Table 4:

- R-value ranges from 5 to 72.
- 12 out of the 14 samples tested have an R-value less than or equal to 13.
- 2 samples have an R-value greater than or equal to 70: Boring A-11-121 was drilled on Avenida Pico and Boring A-11-130 was drilled on the existing I-5 SB off-ramp at Avenida Pico. These high R-value granular subgrades appear to be localized.
- After omitting the two high R-values, the remaining R-value ranges from 5 to 13 with an average of 9.
- Reported PI values are all greater than 12%.

Soils with PI greater than 12% are considered "Expansive Soil" per Caltrans HDM Topic 614.4 (2012b), and mitigation will be required.

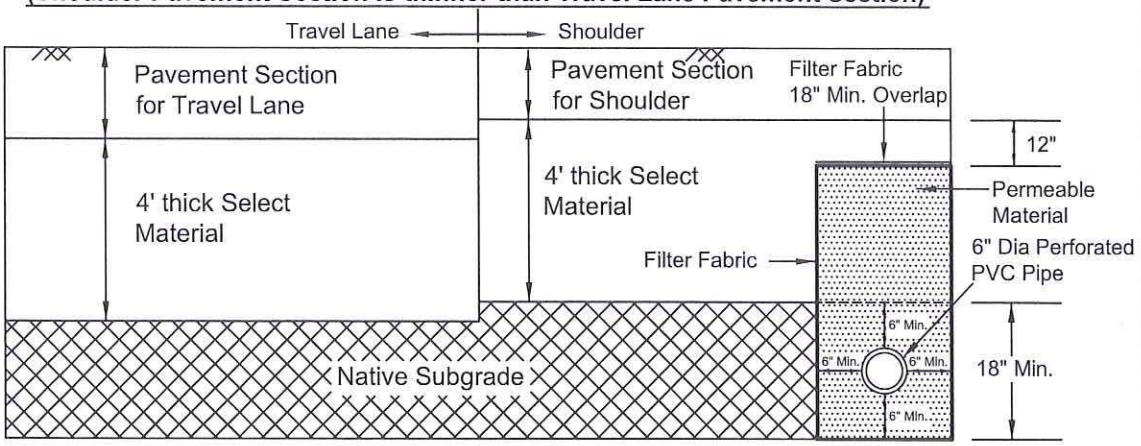
7.3 EXPANSIVE SUBGRADE

Similar expansive soils were encountered in Segments 2 and 3 of this I-5 HOV project; Segments 2 and 3 are located consecutively north of Segment 1. Several options were considered in mitigating on-site expansive soils in Segments 2 and 3. These options include (1) overexcavation and replacement with non-expansive soils, (2) underdrains to intercept water migrating to the pavement subgrade, and (3) lime treatment. After several iterations of discussion with Caltrans, a combination of underdrains, 1.0 to 1.3 ft of additional Aggregate Subbase (AS) and 0.65 ft of lime treatment below the AS is recommended for Segments 2 and 3 (EMI, 2012f and g). Underdrains are required at cut areas and at-grade areas only.

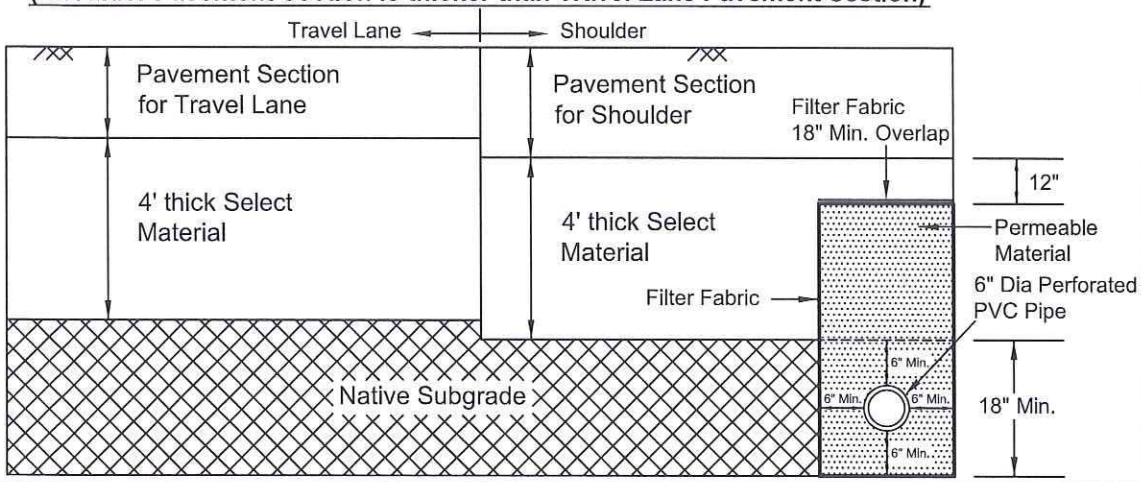
For Segment 1, we could easily follow the same mitigation used in Segments 2 and 3. However, there is a major difference in the Segment 1 roadway design (as compared to Segments 2 and 3) that will have a major impact on subgrade preparation. Freeway widening in Segments 2 and 3 is largely accomplished by sliver cuts and fills outside the existing edge of pavement, whereas in Segment 1, the I-5 freeway will be shifted to the south and the freeway surface grade will be raised. This design will require construction of new embankments with fill thickness up to 35 ft. For this reason, the option of using non-expansive pavement subgrade is easily achievable.

Following Section 614.6(2) of the Caltrans HDM (2012b), non-expansive (select) material is recommended to a depth of 4 ft below the grading plane (top of subgrade). The select material shall possess an R-value greater than 40 and a PI less than 12%. In cut areas, pavement sections can be constructed to meet this requirement by performing 4-ft of overexcavation below the proposed grading plane and replacement by select fill with a minimum R-value of 40 and a PI less than 12%. In fill areas, pavement sections can be constructed to meet this requirement as long as the upper 4 ft of the fill to establish the finish subgrade meets the select material requirements (minimum R-value of 40 and PI less than 12%). To intercept potential moisture migration below the select materials, we also recommend using underdrains (similar to Segments 2 and 3) in cut and at-grade areas. The underdrain configurations are presented in Figure 7. As shown in Figure 7, the underdrains should consist of at least 6-inch diameter perforated plastic pipe surrounded by permeable material wrapped in filter fabric. The underdrains should be constructed in accordance with Caltrans Standard Plan D102 and requirements in Section 68-2 of the Caltrans Standard Specifications (2010), and should outlet to approved surface or subsurface drainage devices.

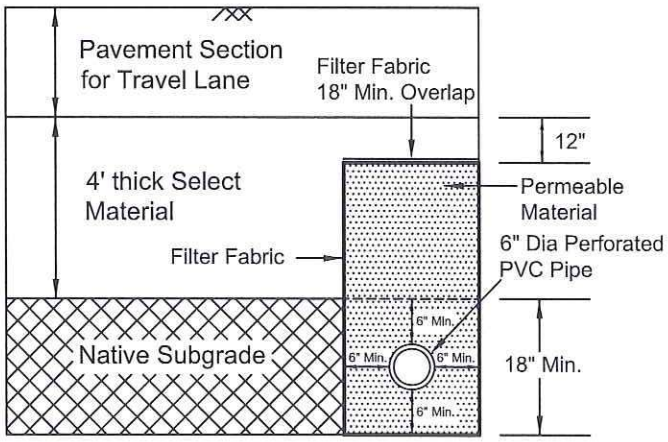
Underdrain for Travel Lane with Shoulder
(Shoulder Pavement Section is thinner than Travel Lane Pavement Section)



Underdrain for Travel Lane with Shoulder
(Shoulder Pavement Section is thicker than Travel Lane Pavement Section)



Underdrain for Travel Lane without Shoulder



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Interstate 5 HOV Improvement Project (Segment 1)

Underdrain Configurations

Project No. 11-135 | Date: 07-26-12

Figure 7

7.4 RECOMMENDED PAVEMENT STRUCTURAL SECTIONS

Rigid and flexible pavement sections were designed in accordance with Chapters 620 and 630 of the Caltrans HDM (2012b), respectively. Calculations to determine the pavement sections are included in Appendix C. Undrained pavement sections are recommended for the I-5 mainline lanes and shoulder, ramps and Avenida Pico to match existing pavement structural sections.

7.4.1 Traffic Indices and Design Life

The Traffic Indices and design life information to be used for pavement design were provided by Parsons after communication with Caltrans District 12 Traffic Studies Branch and City of San Clemente, and are given in Table 5.

TABLE 5. TRAFFIC INDICES

Location	Design Life	Traffic Index
I-5 Mainline	40	16.0
I-5 Mainline Shoulders	40	10.0
I-5 Ramps	40	12.0
Avenida Pico	20	9.5

7.4.2 Pavement Life Cycle Cost Analysis (LCCA)

Pavement LCCA was performed by Kleinfelder West, Inc. (2010) during the PA/ED phase of the project and reviewed by Caltrans. LCCA concluded with recommendations to use Jointed Plain Concrete Pavement (JPCP) for the I-5 Mainline and Hot-Mix Asphalt (HMA) for the I-5 Mainline Shoulders and Ramps for a 40-year design life.

7.4.3 Rigid Pavement

The recommended undrained rigid pavement sections, assuming lateral support, for the I-5 Mainline Lanes is presented in Table 6.

TABLE 6. RECOMMENDED RIGID PAVEMENT STRUCTURAL SECTIONS

Location	Traffic Index	Design Life (years)	Subgrade Type	Undrained Rigid Pavement With Lateral Support (South Coast Climate Region)
I-5 Mainline Lanes	16.0	40	I	0.10' OGFC / 0.20' RHMA-G / 0.95' JPCP / 0.35' LCB or 0.95' JPCP / 0.35' LCB

JPCP = Jointed Plain Concrete Pavement; OGFC = Open-Graded Friction Course;
RHMA-G = Rubberized Hot Mix Asphalt - Gap Graded; LCB = Lean Concrete Base.

Where the existing pavement section has HMA or RHMA overlay, rigid pavement section with OGFC and RHMA-G is recommended for the proposed widening along I-5 Mainline Lanes.

7.4.4 Flexible Pavement

The recommended undrained flexible pavement sections for the I-5 mainline shoulders, ramps and Avenida Pico are presented in Table 7.

TABLE 7. RECOMMENDED FLEXIBLE PAVEMENT STRUCTURAL SECTIONS

Location	Traffic Index	Design Life (years)	Design R-Value	Undrained Section
I-5 Mainline Shoulders	10.0	40	> 40	0.10' OGFC / 0.20' RHMA-G / 0.75' HMA-A / 0.50' AB
Ramps	12.0	4.0	> 40	0.10' OGFC / 0.20' RHMA-G / 0.95' HMA-A / 0.50' AB
Avenida Pico	9.5	20	7	1.0' HMA-A / 0.50' AB

HMA-A = Hot Mix Asphalt-Type A; OGFC = Open-Graded Friction Course;
RHMA-G = Rubberized Hot Mix Asphalt - Gap Graded; AB = Class 2 Aggregate Base.

Topic 626.1(3) of the Caltrans HDM (2012b) requires that rigid pavement be placed at off-ramp termini for the last 150 ft minimum on un-signalized intersections; and the length of rigid pavement should extend to the first set of signal loops for signalized intersections. The recommended rigid pavement section is 0.85' RSC / 0.35' LCBRS, where RSC is Rapid Strength Concrete and LCBRS is Lean Concrete Base, Rapid Setting.

The recommended pavement structural section for Avenida Pico is extracted from the pavement deflection study conducted by LaBelle-Marvin. This pavement section has a design life of 20 years and will be founded on native soils with a design R-value of 7. Details of the LaBelle-Marvin findings and recommendations are documented in a separate report (LaBelle Marvin, 2012).

7.5 COMPACTION AND REMEDIAL GRADING

In areas where new pavement is proposed, in order to mitigate the onsite expansive subgrade, 4 feet of overexcavation below the grading plane is recommended per HDM Section 614.6(2) (Caltrans, 2012b). The overexcavation should be backfilled with a select material. The select material should possess an R-value greater than 40 and a Plasticity Index (PI) less than 12. Compaction of the backfill should confirm to the requirements described in Section 19 of the Caltrans Standard Specifications (2010). Special care is required when compacting subgrade

above reinforced concrete boxes and other drainage devices, buried utility lines, and other sensitive buried structures to avoid damaging these existing facilities. Compaction and remedial grading recommendations for unpaved areas are included in the Geotechnical Design Report (EMI, 2012g).

All overexcavation bottoms should be firm and unyielding prior to fill placement. If not, additional remedial grading may be required.

8.0 MATERIALS AVAILABLE

Construction materials can be supplied by public or private sources. Private sources of construction materials (including sand, gravel, base, concrete, and asphalt concrete) were not investigated. However, materials are available from several commercial suppliers located in Orange and Los Angeles Counties. Table 8 provides the name, location, and telephone number for several commercial sources that can supply materials for the project. The suppliers listed in Table 8 are publicly known suppliers located in the vicinity of the project site; there may be other suppliers located closer to the project site.

Prior to submitting bids and scheduling construction, contractors should verify the availability of materials from the suppliers listed in Table 8.

A current listing of mining operations eligible to sell materials to the State can be found on the Internet at: http://www.consrv.ca.gov/omr/index.htm.

TABLE 8. MATERIAL SOURCES

Operator	Location/Telephone Number
Sand and Gravel	
Chief Eagle Inc.	Santa Ana (714-540-7788)
E.D.S. Sand & Gravel, Inc.	Orange (714-997-8365)
El Toro Materials Company	Lake Forest (949-837-6677)
McAllister Soil Service	Mission Viejo (949-364-0823)
Oglebay Norton Industrial Sands	San Juan Capistrano (800-637-6258)
Sierra SWPPP & Erosion Control Services	Aliso Viejo (866-500-2110)
West Coast Sand & Gravel, Inc.	Buena Park (714-522-0282)
Portland Cement Concrete	
Associated Ready Mix, Inc.	Fountain Valley (714-966-0231)
Bison Ready Mix	Anaheim (714-936-2757)
Catalina Pacific Concrete	San Juan Capistrano (949-728-0448)
Cemex Concrete	Irvine (949-551-9422)
K&G Concrete Pumping	Santa Ana (714-910-9473)
Standard Concrete Products, Inc.	Santa Ana (800-266-2738)
Standard Ready Mix Concrete	Westminster (714-901-2219)
United Concrete Companies, Inc.	South Gate (323-564-1866)

9.0 RECOMMENDED MATERIALS SPECIFICATIONS

9.1 REVIEW OF GRADING AND CONSTRUCTION PLANS

Recommendations contained herein are based on draft design information provided by Parsons. Final grading and construction plans should be reviewed by EMI to confirm that geotechnical recommendations were applied to the design and that no additional recommendations are required. Recommendations contained herein may require revision or additional recommendations may be necessary based on the final design.

9.2 GENERAL EARTHWORK REQUIREMENTS

Earthwork should conform to requirements of Section 19 of the Caltrans Standard Specifications (2010). Compaction of soil should be conducted in accordance with requirements in Section 19-5 of the Standard Specifications. Fills placed on sloping ground should be properly keyed and benched into the existing side slopes as described in Section 19-6.03 of the Caltrans Standard Specifications.

9.3 ADJACENT STRUCTURES

No excavation should be performed below an imaginary plane inclined at 45° from the edge of any existing foundation without providing adequate support for the foundation. The contractor is responsible for worker safety in the field during construction. The contractor shall conform to all applicable occupational safety and health standards, rules, regulations, and orders established by the State of California. In addition, other State, County, or Municipal regulations may supersede the recommendations presented herein. If a trench shoring design and safety plan is required, the geotechnical consultant should review the plan to confirm that recommendations presented in this report have been applied to the design. Appropriate measures should be taken to prevent damage to adjacent existing structures and utilities.

9.4 PAVEMENT

As presented in Section 7.4, pavement structural sections are designed based on R-values greater than 40. In order to mitigate the on-site expansive subgrade, 4 feet of overexcavation below the grading plane is recommended per HDM Section 614.6(2) (Caltrans, 2012b). The overexcavation should be backfilled with a select material. The select material should possess an R-value greater than 40 and a Plasticity Index (PI) less than 12. Compaction of the backfill should confirm to the requirements described in Section 19 of the Caltrans Standard Specifications (2010).

Construction may include pulverizing existing pavements. Any recycled materials used as aggregate base shall conform to Section 26 "Aggregate Bases" of the Caltrans Standard Specifications (2010).

It is our understanding that some of the existing pavements will be pulverized and re-used as fill for new roadway embankments. For this application, the pulverized materials should have a maximum size of 4 inches or less and should be thoroughly mixed with smaller pulverized materials and/or granular soils to prevent nesting of large particles during placement. The mixed

materials should be moisture conditioned and compacted in-place to a minimum relative compaction of 90 percent per Caltrans Test Method 216. In addition, other requirements for re-using pulverized materials in roadway embankments as documented in the Caltrans Specifications should be followed.

9.5 CULVERT MATERIALS

Culvert material requirements along the I-5 Mainline and ramps were calculated using the Caltrans Alternative Pipe Culvert Selection Website (AltPipe) (Caltrans, 2012a) and the corrosion test results in Table 3. Using the corrosion test results of soil samples recovered within the upper 10 ft below the I-5 mainline and ramps, the following worst-case design corrosion values were selected for determining minimum culvert material requirements:

- Minimum Resistivity = 190 ohm-cm,
- pH = 6.5,
- Soluble Sulfate = 1,950 ppm, and
- Soluble Chloride = 2,050 ppm.

Evaluation of pipe culverts below I-5 mainline and ramps was performed for a range of sizes (12", 18", 24", 30" and 36"), an assumed soil cover of 2 ft, Level-1 abrasion and a 2-5 year flow velocity of 5 ft/sec, and a design life of 50 years, AltPipe provides the following recommendations:

- Steel pipes are not allowed.
- Aluminum pipe or aluminized steel pipes are not allowed.
- Corrugated PVC and Type-S corrugated HDPE plastic pipes may be used for all the pipe diameters listed above. Type-C corrugated HDPE plastic pipes may be used for 12", 18" and 24" diameter pipes only. However, abrasion level should be evaluated by the project civil engineer.
- Reinforced concrete pipe design should be suitable for 12", 18", 27" and 36" diameter pipes. The minimum concrete cover is 1". The maximum water-cementitious material ratio can be either 0.35 or 0.40, but the minimum cementitious material content is 470 pounds per cubic yard.

The above recommendations are applicable to Level-1 abrasion only as defined by the AltPipe application and may require additional thickness for potential abrasion, higher flow velocities, strength and overfill requirements. The termini of any plastic pipes should be protected from potential physical or fire damage such as by constructing concrete headwalls, or by concrete or metal treatment.

9.6 INSPECTION AND TESTING

Qualified geotechnical personnel should perform inspections and testing during the following stages of construction:

- Grading operations, including excavations and placement of compacted fill,

- Removal of existing pavement structural sections, curb and gutter, and concrete sidewalk,
- Preparation of pavement subgrade,
- Placement of base and subbase,
- Excavations for utility trenches and drainage structures,
- Removal or support of buried utilities or structures,
- Shoring installation, if necessary, and
- When any unusual conditions are encountered.

10.0 SOIL TESTING AND MATERIAL PROPERTIES SUMMARY

A total of five (5) compaction test were conducted on shallow bulk soil samples. The maximum density and optimum moisture content test results are presented in Table 9.

Relevant borehole logs and materials testing results are provided in Appendix A and Appendix B, respectively.

TABLE 9. SUMMARY OF MAXIMUM DENSITIES AND OPTIMUM MOISTURE CONTENTS

Boring	Sample Depth (ft)	Soil Type	Maximum Wet Density (pcf)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
A-11-101	0 to 5	CL	123.9	105.0	18
A-11-111	0 to 5	CL	133.4	116.0	15
A-11-117	0 to 5	CL	134.8	122.5	10
A-11-121	0 to 5	SM	123.2	112.0	10
A-11-134	0 to 5	CL	126.4	104.5	21

11.0 REFERENCES

American Society for Testing and Materials (ASTM), 2008. Annual Book of Standards. Soil and Rock; Vol. 04.08.

California Geological Survey, 2002, Division of Mines and Geology, Seismic Hazard Zone Report for the San Clemente 7.5-Minute Quadrangle, Orange County, Report 062.

California Department of Transportation (Caltrans), California Test Methods, various dates.

_____, 2012a, Alternative Pipe Culvert Selection Website (AltPipe), Version 6.09, webpage http://www.dot.ca.gov/hq/oppd/altpipe.htm.

_____, 2012b, Highway Design Manual.

_____, 2010, Standard Specifications.

_____, 2003, Corrosion Guidelines, Version 1.0; Office of Materials Engineering and Testing Services, Corrosion Technology Branch.

_____, 2000, California Test 130, Geotechnical Design Reports and Materials Reports.

Ehlig, P., 1989, The Late Cenozoic evolution of the Capistrano Embayment in Engineering geology along coastal Orange County, Association of Engineering Geologists, Southern California Section, Annual Field Trip guide book, pp. 79-87.

Earth Mechanics (EMI), 2012a, Foundation Report for Avenida Pico Undercrossing (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277 (EA 12-0F96B), In-Progress.

_____, 2012b, Foundation Report for Walls 181, 183, 193, and 203, I-5 HOV Improvement Project (Segment 1) , San Clemente, Orange County, California, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B), In-Progress.

_____, 2012c, Foundation Report for Wall 190, I-5 HOV Improvement Project (Segment 1), San Clemente, Orange County, California, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B), In-Progress.

_____, 2012d, Foundation Report for Sign Structures, I-5 HOV Improvement Project (Segment 1), San Clemente, Orange County, California, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B), In-Progress.

_____, 2012e, Geotechnical Design Report for the I-5 HOV Improvement Project (Segment 1), San Clemente, Orange County, California, 12-ORA-5, 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B), In-Progress.

_____, 2012f, Materials Report, Interstate 5 HOV Widening, Segment 2, Cities of San Clemente and Dana Point, Orange County, California, 12-Ora-5, PM 3.8/6.2, Caltrans Project No. 1200020278 (EA No. 12-0F96C01), In-Progress.

_____, 2012g, Materials Report, Interstate 5 HOV Improvement Project (Segment 3), PCH to San Juan Creek Road, Orange County, California, 12-ORA-5, PM 6.2/8.7, Caltrans Project No. 1200020279 (EA 12-0F96E1), In Progress.

Kleinfelder West, 2010, Life Cycle Cost Analysis (LCCA) Report, Interstate 5 HOV Lane Extension PA/ED, Orange County, California, 12-ORA-5 PM 3.0/8.7, Caltrans EA No. 0F9600, Aug. 20.

LaBelle Marvin, 2012, Structural Pavement Investigation Report of Avenida Pico at Interstate 5, Project No. 38212, August.

Robertson, P.K. and Campanella, R.G., 1989, Guidelines for Geotechnical Design Using CPT and CPTU, Civil Engineering Department, University of British Columbia, Vancouver, Canada.

Winterkorn, H.F. and Fang, H.Y., 1975, Foundation Design Handbook, Van Nostrand Reinhold Co., New York, NY.

APPENDIX A

LOG OF TEST BORING SHEETS

LOG OF BORING NO. A-11-106

Grade Elevation:	+104.2 ft				
Boring Depth:	31.5 ft	Driller:	2R Drilling	SHEET 1 of 2	
Borehole Diameter:	8"	Type of Rig:	CME 75	Comments: Hammer Energy Efficiency: 75%	
Date Drilled:	10-19-11	Hammer Data:	Automatic hammer 140-lbs/30-inch drop	Northing: 2,105,945, Easting: 6,143,480	
Logged By:	KK	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 12" Asphalt Concrete; 8" Base.			
					SANDY lean CLAY (CL); olive brown; moist; medium to fine SAND; medium plasticity fines.			PI, R
		Bulk			@ 4'; some subrounded cobbles, size up to 3" dia..			
5		1	9		Lean CLAY with SAND (CL); stiff; olive brown slightly mottled with yellowish brown; moist; fine SAND; medium plasticity fines.	21		
					Trace GRAVEL.			
10		2	42		Lean CLAY (CL); very stiff to hard; olive brown; moist; fine SAND; medium plasticity fines; trace asphalt debris, PP>4.5 tsf.	21	106	UU
15		3	13		Fat CLAY (CH); very stiff; dark olive brown to black; moist; fine SAND; high plasticity fines.	18		
20		4	11		SANDY lean CLAY (CL); hard; dark olive brown; moist; fine SAND; medium plasticity fines; PP>4.5 tsf.	16	106	
25								

(continued)

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I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

(CONTINUED) LOG OF BORING NO. A-11-106

Date Drilled:	10-19-11	Comments: Hammer Energy Efficiency: 75%	SHEET 2 of 2
Logged By:	KK		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
25		5	9		Stiff. SANDY lean CLAY (CL) *(continued)*.	19		
30		6	26		Very stiff to hard; PP=4.25 tsf.	25	96	
					Bottom of borehole at 31.5 ft bgs			
35								
40								
45								
50								

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

LOG OF BORING NO. A-11-112

Grade Elevation:	+88.8 ft				
Boring Depth:	6.5 ft	Driller:	2R Drilling		SHEET 1 of 1
Borehole Diameter:	8"	Type of Rig:	CME 75	Comments: Hammer Energy Efficiency: 75%	
Date Drilled:	9-27-11	Hammer Data:	Automatic hammer 140-lbs/30-inch drop	Northing: 2,105,842, Easting: 6,142,953	
Logged By:	CP	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0		bulk			SANDY SILT (ML); yellowish brown; moist; medium to fine SAND; nonplastic fines.			PI, R
		1	15		Lean CLAY with SAND (CL); very stiff; dark grayish brown; moist; fine SAND; low plasticity fines.			
5		2	42					
					Bottom of borehole at 6.5 ft bgs			
10								
15								
20								
25								

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

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I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

LOG OF BORING NO. A-11-127

Grade Elevation:	+143.9 ft			
Boring Depth:	6.5 ft	Driller:	2R Drilling	SHEET 1 of 1
Borehole Diameter:	8"	Type of Rig:	CME 75	Comments: Hammer Energy Efficiency: 75%
Date Drilled:	9-28-11	Hammer Data:	Automatic hammer 140-lbs/30-inch drop	Northing: 2,106,675, Easting: 6,142,332
Logged By:	CP	Groundwater Reading:	Not Encountered	

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					SILT with SAND (ML); light yellowish brown; moist; fine SAND; nonplastic fines.			
		bulk						
		1	15		Very stiff.			
5		2	45		Lean CLAY (CL); very stiff; yellowish brown; moist; fine SAND; low plasticity fines.			
					Bottom of borehole at 6.5 ft bgs			
10								
15								
20								
25								

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I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

LOG OF BORING NO. A-11-128

Grade Elevation:	+92.7 ft				
Boring Depth:	6.5 ft	Driller:	2R Drilling	SHEET 1 of 1	
Borehole Diameter:	8"	Type of Rig:	CME 75	Comments: Hammer Energy Efficiency: 75%	
Date Drilled:	9-30-11	Hammer Data:	Automatic hammer 140-lbs/30-inch drop	Northing: 2,106,063, Easting: 6,142,681	
Logged By:	CP	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 8" Asphalt Concrete; 4" Base; Geotextile Under Base.			
					Lean CLAY (CL); very stiff; olive brown; moist; fine SAND; trace gypsum.			
		bulk						PI, R
5		1	16					
					Bottom of borehole at 6.5 ft bgs			
10								
15								
20								
25								

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

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I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

LOG OF BORING NO. HA-11-102

Grade Elevation:	+178.2 ft				
Boring Depth:	3.0 ft	Driller:	EMI		SHEET 1 of 1
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:	
Date Drilled:	10-19-11	Hammer Data:	Hand Auger	Northing: 2,104,728, Easting: 6,144,546	
Logged By:	KK	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 14" Asphalt Concrete; No Base.			
		bulk			SANDY lean CLAY (CL); olive brown; moist; medium to fine SAND; low plasticity fines.			
					Bottom of borehole at 3.0 ft bgs			
5								
10								
15								
20								
25								

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

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I-5 HOV Widening Segment 1

Project Number: 11-135

Date: 4-12-12

LOG OF BORING NO. HA-11-103

Grade Elevation:	+158.4 ft				
Boring Depth:	2.0 ft	Driller:	EMI		SHEET 1 of 1
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:	
Date Drilled:	10-19-11	Hammer Data:	Hand Auger	Northing: 2,105,100, Easting: 6,144,305	
Logged By:	KK	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 13" Asphalt Concrete; No Base.			
		bulk			SANDY lean CLAY (CL); olive brown; moist; medium to fine SAND; low plasticity fines; ; some fat CLAY.			R
					Bottom of borehole at 2.0 ft bgs			
5								
10								
15								
20								
25								

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

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I-5 HOV Widening Segment 1

Project Number: 11-135

Date: 4-12-12

LOG OF BORING NO. HA-11-107

Grade Elevation:	+116.7 ft				
Boring Depth:	2.5 ft	Driller:	EMI		SHEET 1 of 1
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:	
Date Drilled:	10-20-11	Hammer Data:	Hand Auger	Northing: 2,105,759, Easting: 6,143,694	
Logged By:	RJ	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0		bulk			SANDY lean CLAY (CL); olive brown; moist; trace coarse to fine GRAVEL; medium to fine SAND; low to medium plasticity fines.			
					Bottom of borehole at 2.5 ft bgs			
5								
10								
15								
20								
25								

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I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

LOG OF BORING NO. HA-11-119

Grade Elevation:	+132.2 ft			
Boring Depth:	5.0 ft	Driller:	EMI	SHEET 1 of 1
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:
Date Drilled:	10-16-11	Hammer Data:	Hand Auger	Northing: 2,106,380, Easting: 6,142,687
Logged By:	KK	Groundwater Reading:	Not Encountered	

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 12" Asphalt Concrete; 8" Base.			
		bulk			Lean CLAY with SAND (CL); olive brown; few fine GRAVEL; medium to fine SAND; nonplastic to low plasticity fines.			PI, R
5					Bottom of borehole at 5.0 ft bgs			
10								
15								
20								
25								

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

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Project Number: 11-135 | Date: 4-12-12

LOG OF BORING NO. HA-11-120

Grade Elevation:	**+98.0 ft**				
Boring Depth:	**3.5 ft**	Driller:	**EMI**		SHEET **1 of 1**
Borehole Diameter:	**Bulk**	Type of Rig:	**Hand Auger**	Comments:	
Date Drilled:	**10-24-11**	Hammer Data:	**Hand Auger**	Northing: 2,106,248, Easting: 6,143,462	
Logged By:	**RJ**	Groundwater Reading:	**Not Encountered**		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 17" Asphalt Concrete; No Base.			
		bulk			Lean CLAY with SAND (CL); olive brown; moist; trace fine GRAVEL; fine SAND; medium plasticity fines.			
					Bottom of borehole at 3.5 ft bgs			
5								
10								
15								
20								
25								

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I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

LOG OF BORING NO. HA-11-121

Grade Elevation:	+85.5 ft				
Boring Depth:	2.5 ft	Driller:	EMI		SHEET 1 of 1
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:	
Date Drilled:	10-24-11	Hammer Data:	Hand Auger	Northing: 2,105,787, Easting: 6,142,699	
Logged By:	RJ	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0		bulk			Poorly graded SAND with SILT (SP-SM); light olive brown; trace coarse to fine GRAVEL, max. 1 in. dia.; medium to fine SAND; nonplastic fines.			CP, R
					@ 2.5' Lean CLAY (CL); dark brown; fine SAND. Bottom of borehole at 2.5 ft bgs			
5								
10								
15								
20								
25								

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

LOG OF BORING NO. HA-11-122

Grade Elevation:	+81.8 ft				
Boring Depth:	4.0 ft	Driller:	EMI		SHEET 1 of 1
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:	
Date Drilled:	10-24-11	Hammer Data:	Hand Auger	Northing: 2,105,661, Easting: 6,142,622	
Logged By:	RJ	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 11" Asphalt Concrete; 12" Base.			
		bulk			Lean CLAY with SAND (CL); soft; olive brown; trace fine GRAVEL; fine SAND; medium plasticity fines.			
					Bottom of borehole at 4.0 ft bgs			
5								
10								
15								
20								
25								

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

LOG OF BORING NO. HA-11-132

Grade Elevation:	+151.6 ft				
Boring Depth:	2.0 ft	Driller:	EMI		SHEET 1 of 1
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:	
Date Drilled:	9-30-11	Hammer Data:	Hand Auger	Northing: 2,106,652, Easting: 6,142,045	
Logged By:	KK	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0		bulk			Lean CLAY with SAND (CL); olive brown; medium to fine SAND; low to medium plasticity fines.			
					Bottom of borehole at 2.0 ft bgs			
5								
10								
15								
20								
25								

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 — EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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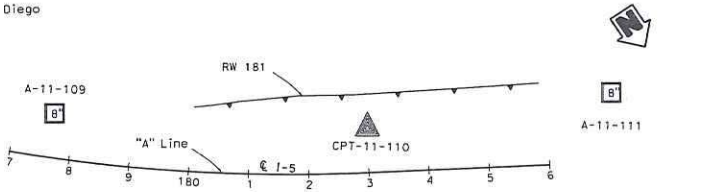
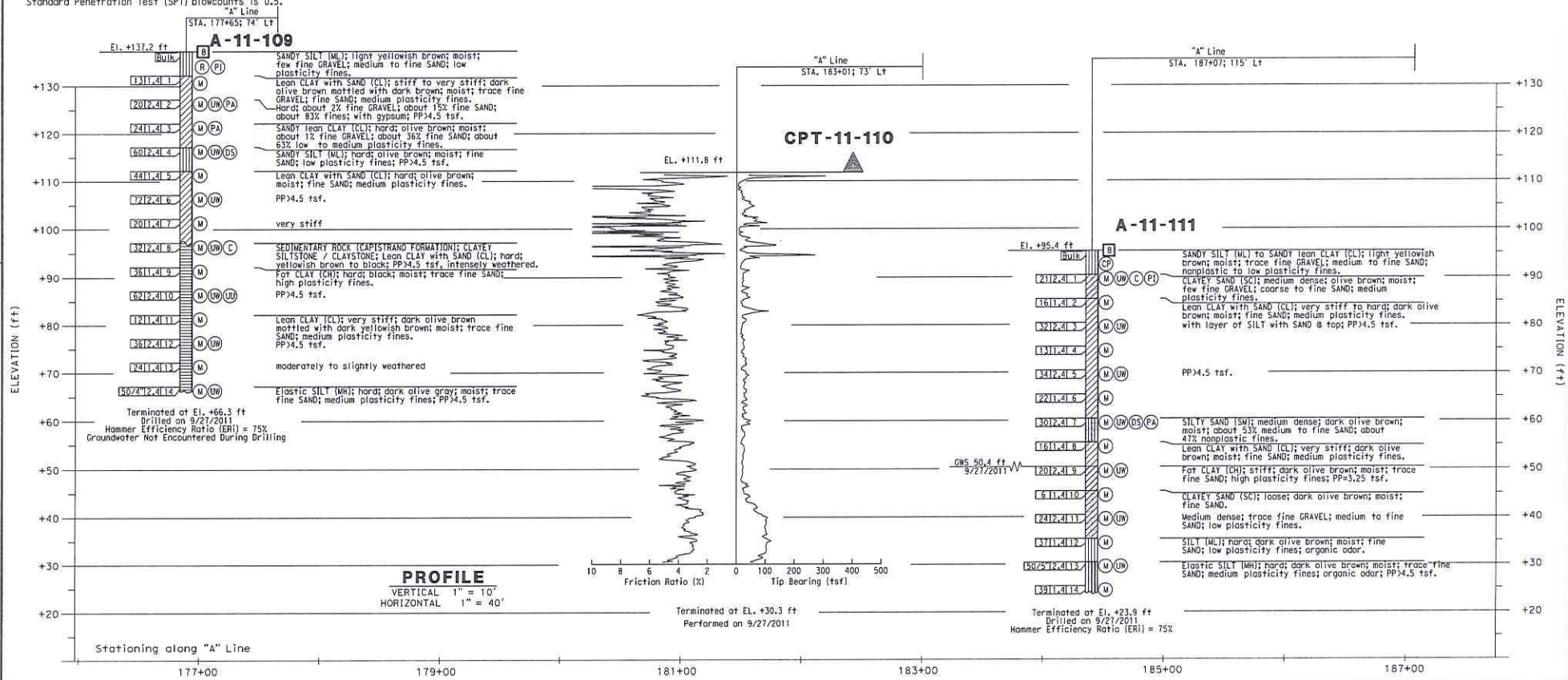
ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708



PLAN
1" = 100'

To Los Angeles



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 40'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -	RETAINING WALL 181
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011			POST MILES -	LOG OF TEST BORINGS 1 OF 1

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => $REQUEST

CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

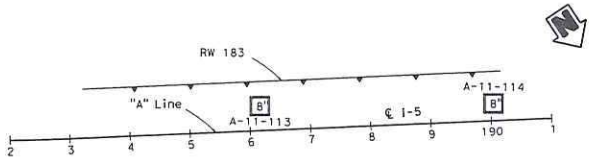
NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



PLAN

1" = 100'

To Los Angeles

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR NO. GE 2564 EXP. 12-31-12 GEOTECHNICAL STATE OF CALIFORNIA

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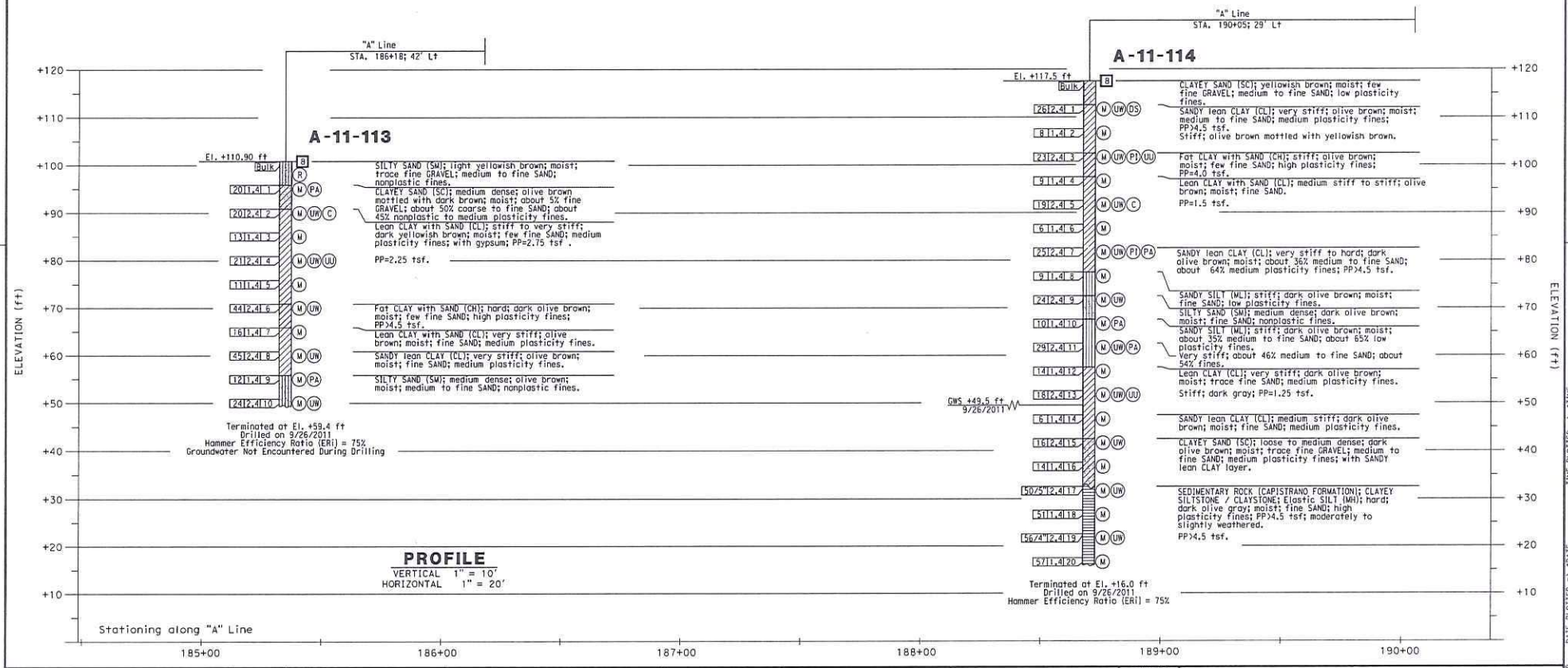
ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -	RETAINING WALL 183
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011			POST MILES -	LOG OF TEST BORINGS 2 OF 2

DS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => $REQUEST

CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

DATE PLOTTED => $DATE TIME PLOTTED => $TIME USERNAME => $USER

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system or a rope and pulley hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR NO. GE 2564 EXP. 12-31-12 GEOTECHNICAL STATE OF CALIFORNIA

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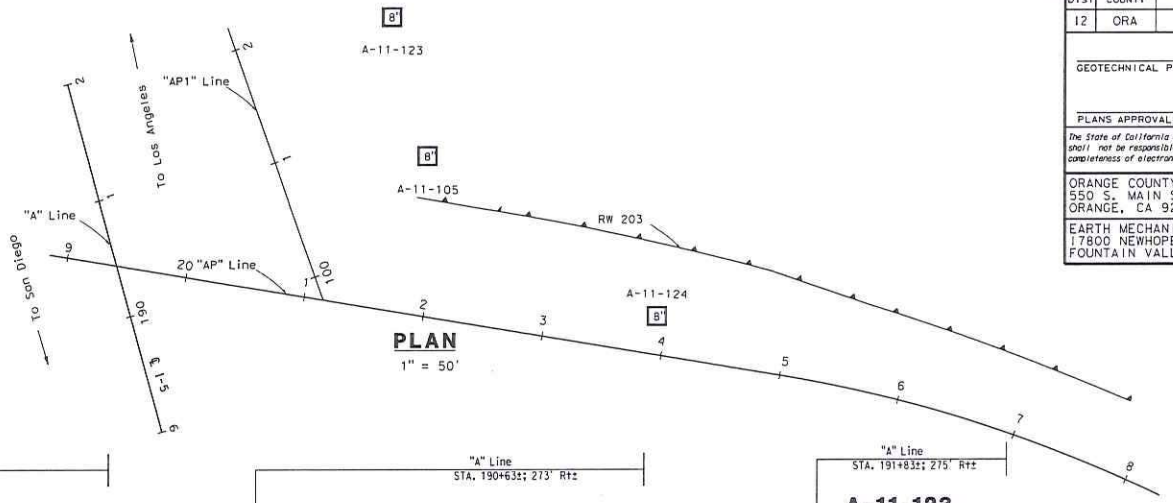
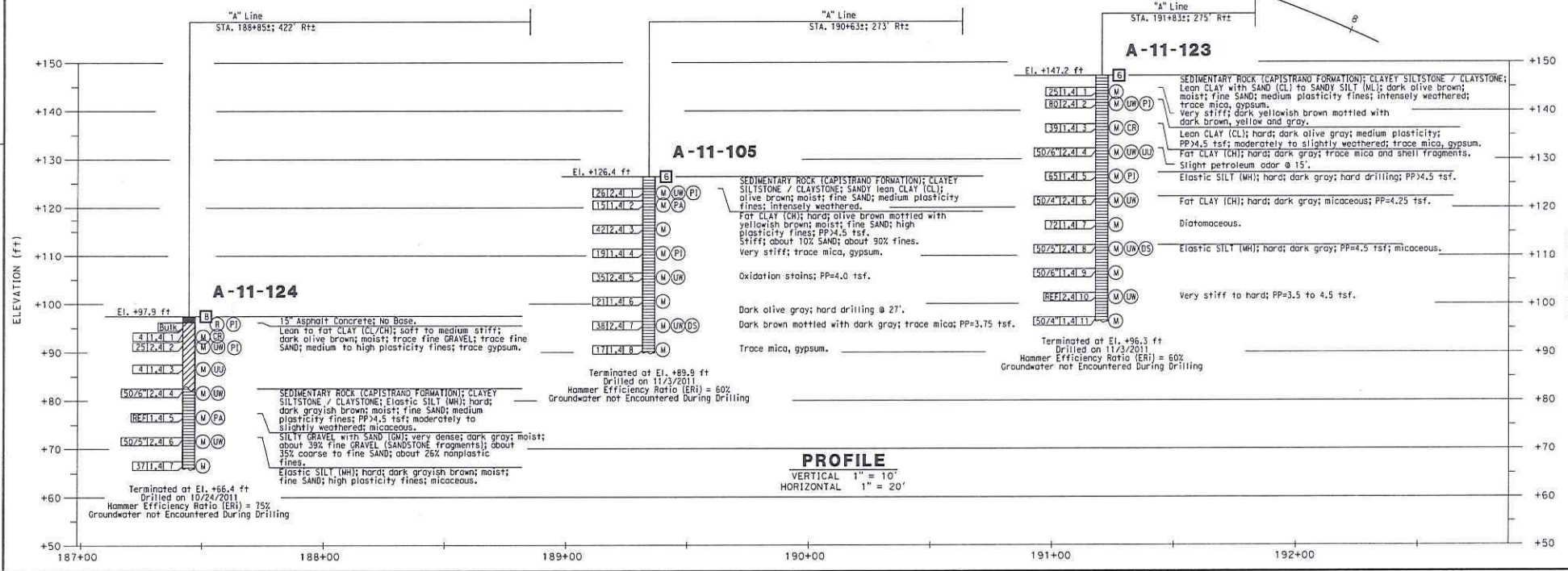
ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708





PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. - / POST MILES -
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 10/2011, 11/2011			RETAINING WALL 190 / LOG OF TEST BORINGS 1 OF 7

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => $REQUEST

CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

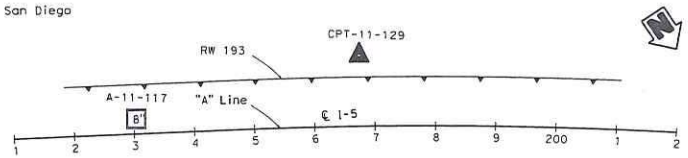
NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



PLAN

1" = 100'

To Los Angeles

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR NO. GE 2564 EXP. 12-31-12 GEOTECHNICAL STATE OF CALIFORNIA

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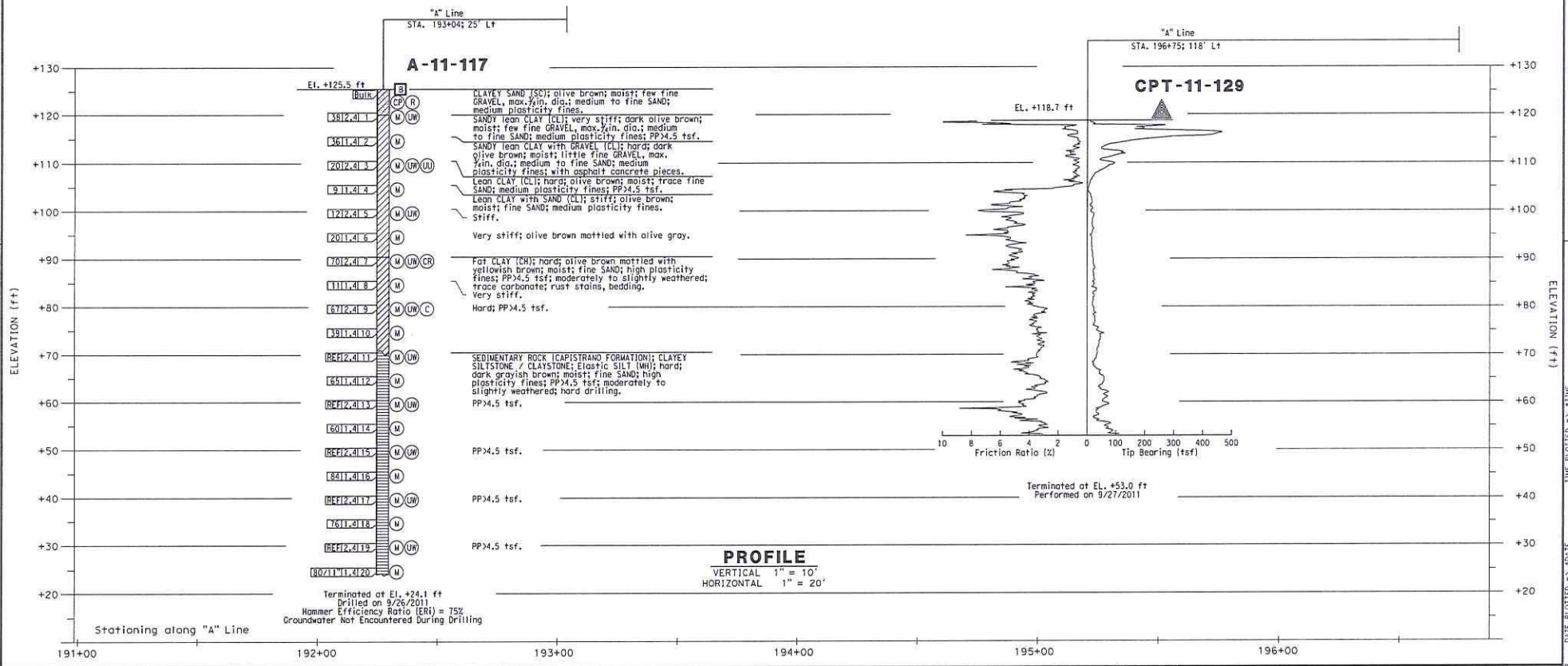
ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -	RETAINING WALL 193
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY DATE: 9/2011			POST MILES -	LOG OF TEST BORINGS 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: PROJECT NUMBER & PHASE: 12000202771

FILE => BREQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

USERNAME => %USER DATE PLOTTED => %DATE TIME PLOTTED => %TIME

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¾" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 — EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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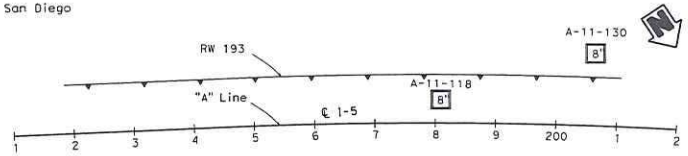
ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

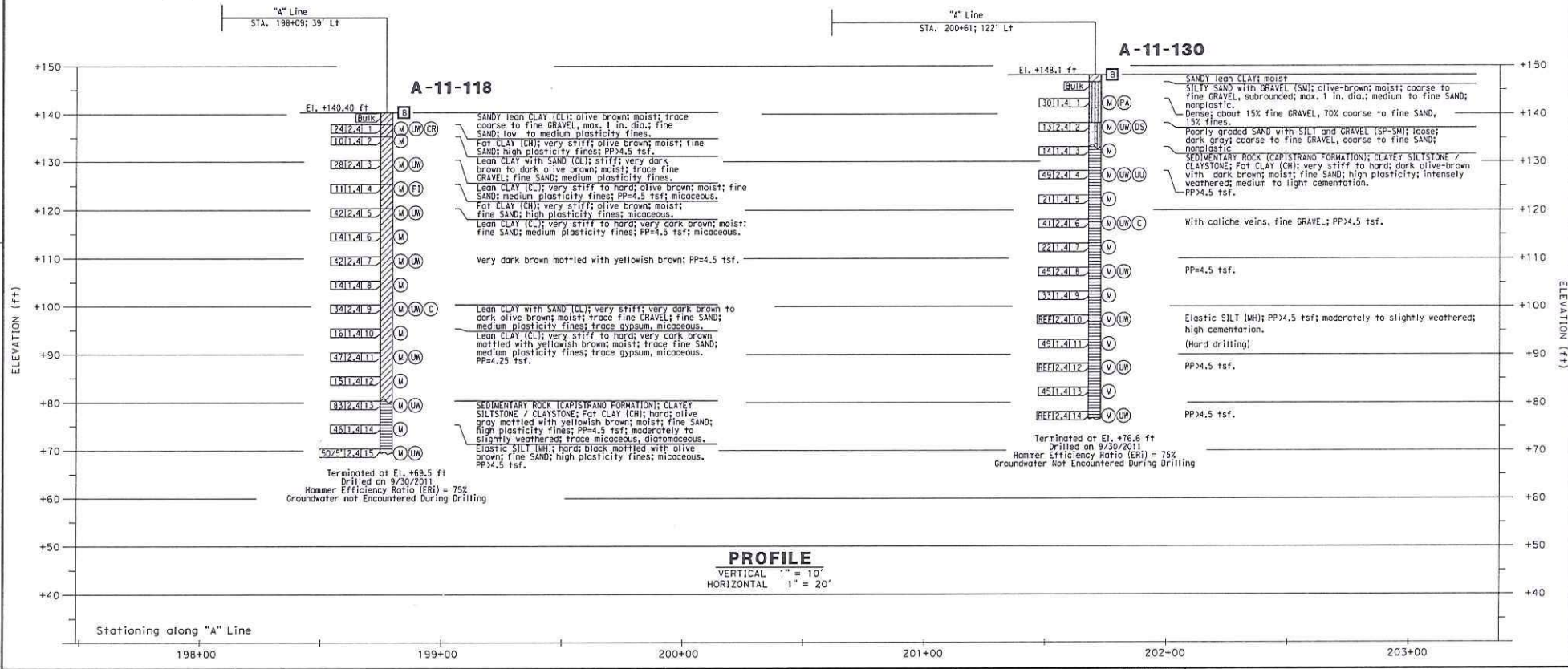
EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708



PLAN

1" = 100'

To Los Angeles



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR	BRIDGE NO. -	RETAINING WALL 193
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011		PROJECT ENGINEER	POST MILES -	LOG OF TEST BORINGS 2 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 1200020277

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => $REQUEST

CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR NO. GE 2564 EXP. 12-31-12 GEOTECHNICAL STATE OF CALIFORNIA

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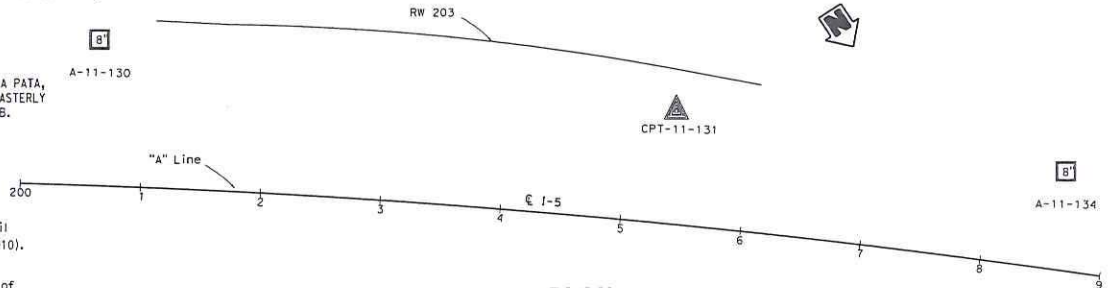
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708



NOTES:

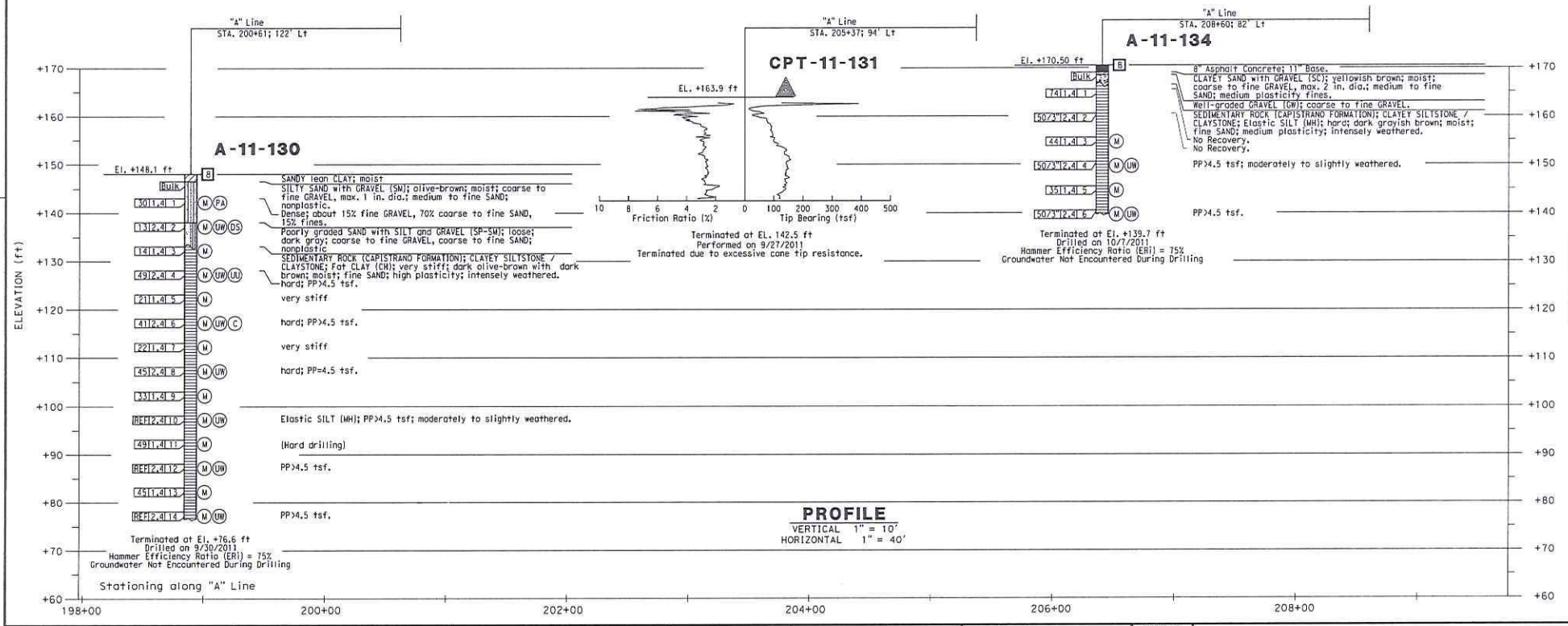
(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.

PLAN
1" = 50'



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 40'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -	RETAINING WALL 203
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011, 10/2011			POST MILES -	LOG OF TEST BORINGS 1 OF 1

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 1200020277

FILE => *REQUEST

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

DATE PLOTTED => *DATE TIME PLOTTED => *TIME USERNAME => *USER

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

NOTES:

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(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

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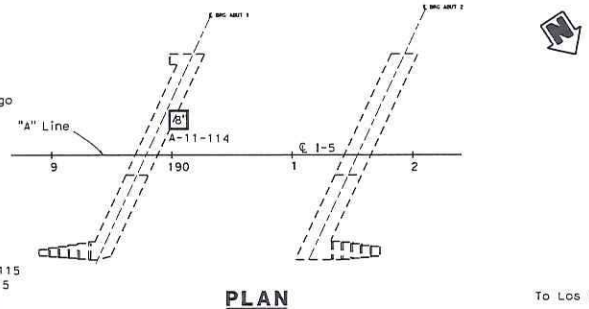

PLAN

1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR NO. GE 2564 EXP. 12-31-12 GEOTECHNICAL STATE OF CALIFORNIA

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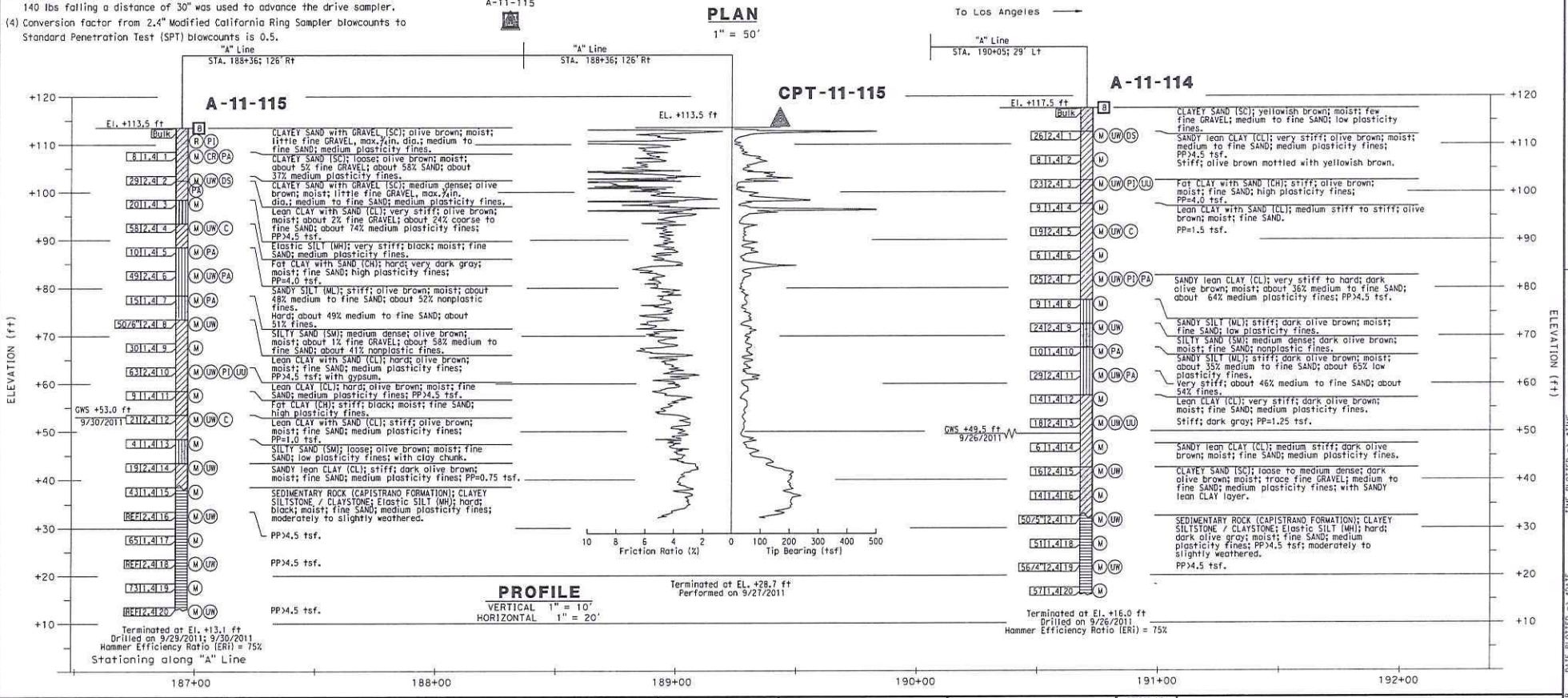
ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708



DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. 55-0207	AVENIDA PICO UC (REPLACE)
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011			POST MILES 3.39	LOG OF TEST BORINGS 1 OF 4

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 1200020277

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => $REQUEST

CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

NOTES:

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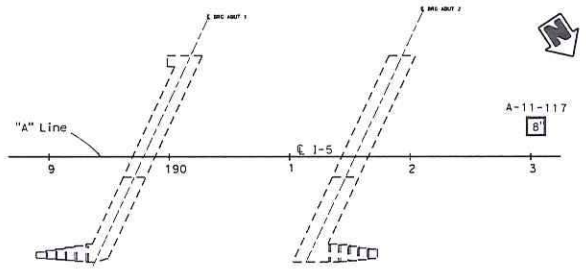
(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



PLAN 8' A-11-116
1" = 50'

To Los Angeles

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

"A" Line
STA. 191+34; 115' Rt

A-11-116

El. +121.0 ft

4	11	4	1	M	CR	
21	24	4	2	M	UW	PI
9	11	4	3	M		
28	24	4	4	M	UW	C
7	11	4	5	M		
49	24	4	6	M	UW	
13	11	4	7	M		
49	24	4	8	M	UW	UU
53	11	4	9	M		
REF	24	10		M	UW	
75	11	4	11	M		
REF	24	12		M	UW	
83/11"	11	4	13	M		
REF	24	14		M	UW	
82/11"	11	4	15	M		
REF	24	16		M	UW	
82	11	4	17	M		
REF	24	17A				

11" Asphalt Concrete; 19" Base.

SILTY SAND with GRAVEL (SM); olive brown; moist; coarse to fine GRAVEL, max. 3 in. dia..

Lean CLAY (CL); medium stiff; dark yellowish brown; moist; trace fine GRAVEL; fine SAND; medium plasticity fines.

Fat CLAY (CH); stiff; dark olive brown mottled with white; moist; fine SAND; high plasticity fines; PP=1.75 tsf [BEDROCK].

Lean CLAY (CL); stiff; yellowish brown mottled with gray; moist; fine SAND; medium plasticity fines.

Fat CLAY with SAND (CH); hard; olive brown; moist; fine SAND; high plasticity fines; PP>4.5 tsf.

Lean CLAY with SAND (CL); stiff; olive brown mottled with yellowish brown; moist; fine SAND; medium plasticity fines.

SEDIMENTARY ROCK (CAPISTRANO FORMATION); CLAYEY SILTSTONE / CLAYSTONE; Fat CLAY (CH); hard; olive brown; moist; fine SAND; high plasticity fines; PP=4.5; intensely weathered.

Very stiff.

Hard; PP>4.5 tsf; moderately to slightly weathered.

Elastic SILT (MH); hard; dark grayish brown; moist; fine SAND; medium plasticity fines. PP>4.5 tsf; hard drilling.

PP>4.5 tsf.

PP>4.5 tsf.

PP>4.5 tsf.

Very hard drilling @ 87'; gray bedrock.

Terminated at El. +31.8 ft
Drilled on 10/16/2011
Hammer Efficiency Ratio (ERI) = 75%
Groundwater Not Encountered During Drilling

"A" Line
STA. 193+04; 25' Lt

A-11-117

El. +125.5 ft

Bulk				CP	R	
38	24	1		M	UW	
36	11	4	2	M		
20	24	3		M	UW	UU
9	11	4	4	M		
12	24	5		M	UW	
20	11	4	6	M		
70	24	7		M	UW	CR
1	11	4	8	M		
67	24	9		M	UW	C
39	11	4	10	M		
REF	24	11		M	UW	
65	11	4	12	M		
REF	24	13		M	UW	
60	11	4	14	M		
REF	24	15		M	UW	
84	11	4	16	M		
REF	24	17		M	UW	
76	11	4	18	M		
REF	24	19		M	UW	
80/11"	11	4	20	M		

CLAYEY SAND [SC]; olive brown; moist; few fine GRAVEL, max. ¾in. dia.; medium to fine SAND; medium plasticity fines.

SANDY lean CLAY (CL); very stiff; dark olive brown; moist; few fine GRAVEL, max. ¾in. dia.; medium to fine SAND; medium plasticity fines; PP>4.5 tsf.

SANDY lean CLAY with GRAVEL (CL); hard; dark olive brown; moist; little fine GRAVEL, max. ¾in. dia.; medium to fine SAND; medium plasticity fines; with asphalt concrete pieces.

Lean CLAY (CL); stiff; olive brown; moist; fine SAND; medium plasticity fines; PP>4.5 tsf.

Lean CLAY with SAND (CL); stiff; olive brown; moist; fine SAND; medium plasticity fines.

Stiff.

Very stiff; olive brown mottled with olive gray.

Fat CLAY (CH); hard; olive brown mottled with yellowish brown; moist; fine SAND; high plasticity fines; PP>4.5 tsf; moderately to slightly weathered; trace carbonate; rust stains, bedding.

Very stiff.

Hard; PP>4.5 tsf.

SEDIMENTARY ROCK [CAPISTRANO FORMATION]; CLAYEY SILTSTONE / CLAYSTONE; Elastic SILT (MH); hard; dark grayish brown; moist; fine SAND; medium plasticity fines; PP>4.5 tsf; moderately to slightly weathered; hard drilling.

PP>4.5 tsf.

PP>4.5 tsf.

PP>4.5 tsf.

PP>4.5 tsf.

Terminated at El. +24.1 ft
Drilled on 9/26/2011
Hammer Efficiency Ratio (ERI) = 75%
Groundwater Not Encountered During Drilling

PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

ELEVATION (ft) +130 +120 +110 +100 +90 +80 +70 +60 +50 +40 +30 +20 +10

190+00 191+00 192+00 193+00 194+00 195+00

DESIGN OVERSIGHT

SIGN OFF DATE

DRAWN BY: J. FANG

CHECKED BY: M. KAPUSKAR

R. JIE; K. KAEKUL; C. PONGSAKORNPATARA
FIELD INVESTIGATION BY

DATE: 9/2011, 10/2011

PREPARED FOR THE STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

M. KAPUSKAR
PROJECT ENGINEER

BRIDGE NO. 55-0207
POST MILES 3.39

AVENIDA PICO UC (REPLACE)
LOG OF TEST BORINGS 2 OF 4

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 12000202771

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | CP

FILE => #REQUEST

CONTRACT NO.: 12-0F9681 PROJECT ID: 1200020277

USERNAME => %USER% DATE PLOTTED => %DATE% TIME PLOTTED => %TIME%

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

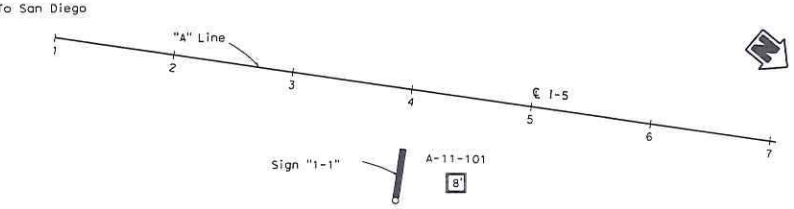
NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

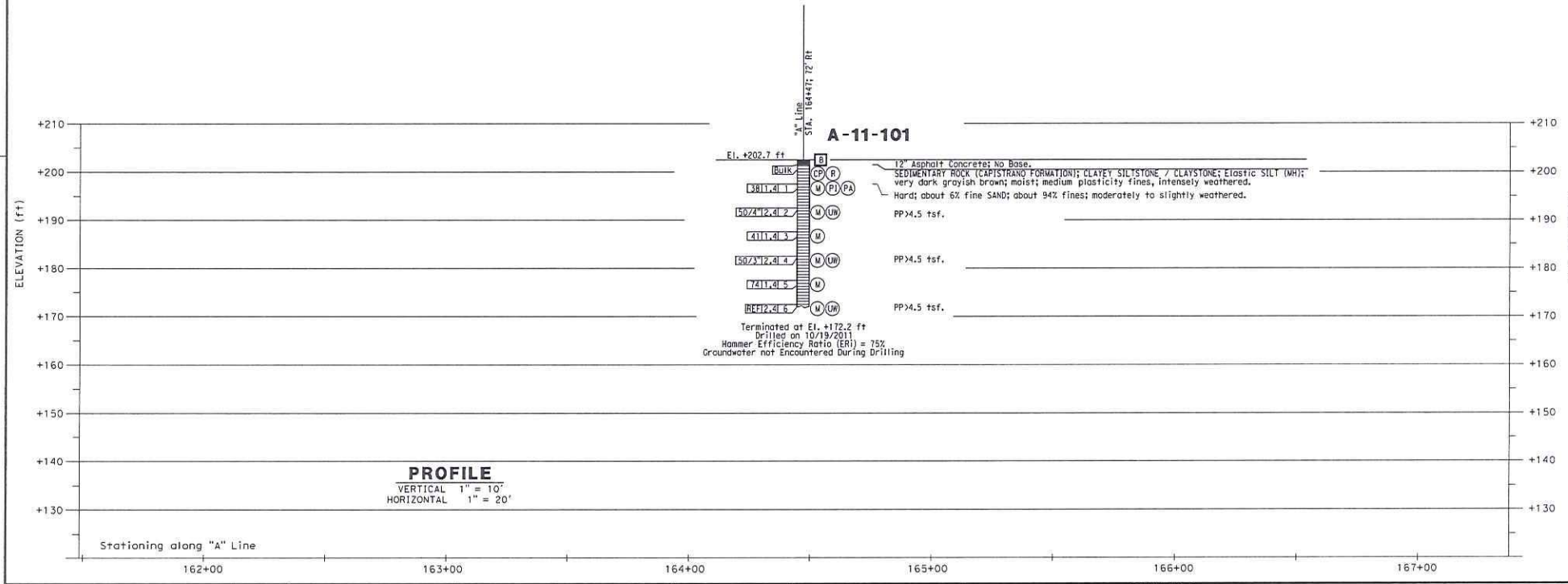
PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR NO. GE 2564 EXP. 12-31-12 GEOTECHNICAL STATE OF CALIFORNIA

ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -	OVERHEAD SIGN STRUCTURES
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 10/2011			POST MILES -	LOG OF TEST BORINGS 1 OF 6

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES: SHEET OF

FILE => $REQUEST

CONTRACT NO.:12-0F96B1 PROJECT ID:1200020277

DATE PLOTTED => $DATE TIME PLOTTED => $TIME USERNAME => $USER

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

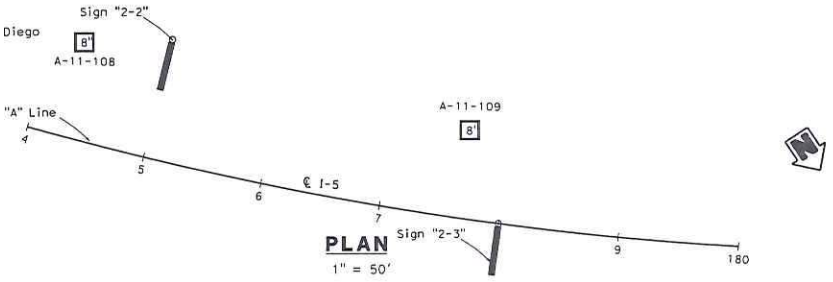
NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

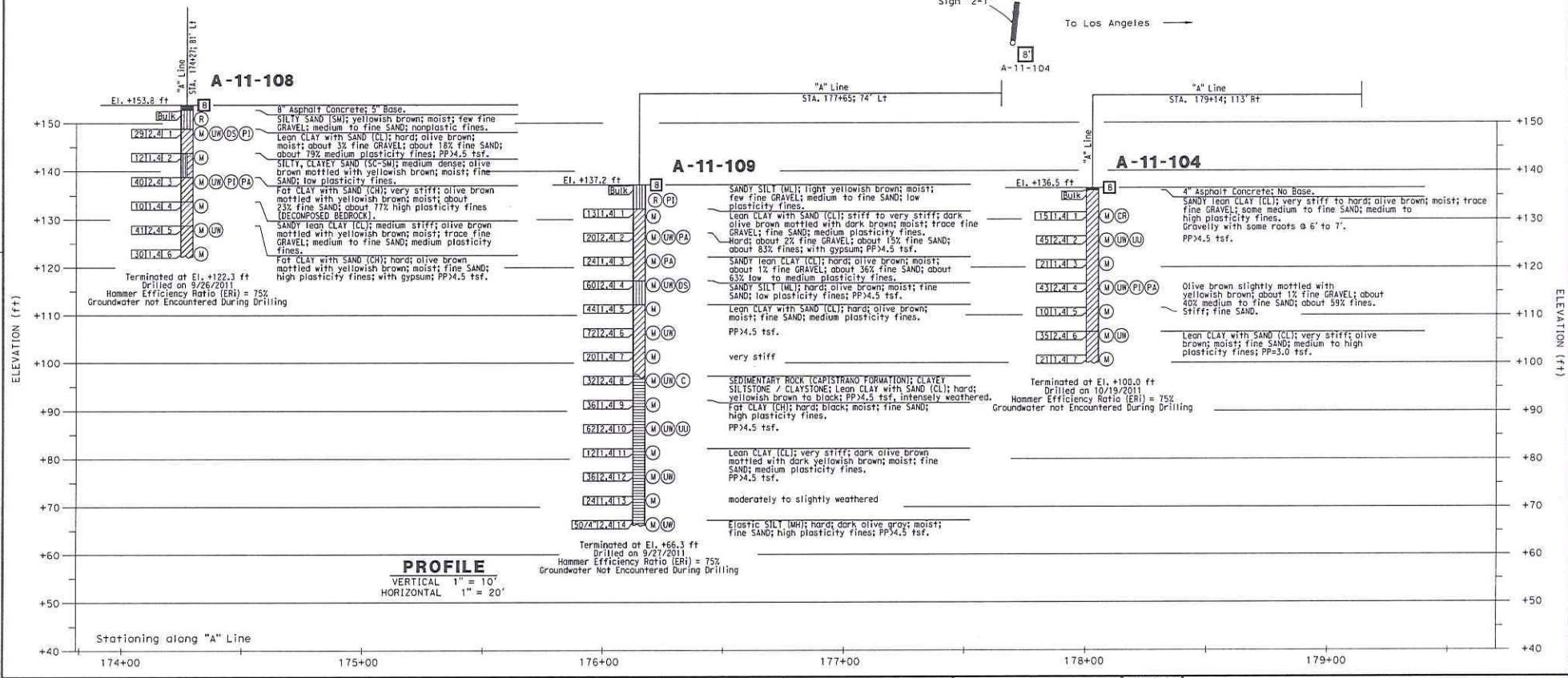
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 — EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708



DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -	OVERHEAD SIGN STRUCTURES
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011, 10/2011			POST MILES -	LOG OF TEST BORINGS 2 OF 6

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 1200020277

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => $REQUEST

CONTRACT NO.:12-0F96B1 PROJECT ID:1200020277

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

APPENDIX B

LABORATORY TEST RESULTS

TABLE B-1 SUMMARY OF SOIL LABORATORY TEST RESULTS

Project No.: *11-135* **Project Name:** Parsons/I-5 HOV Widening Segment 1

Boring No .	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-101	*S-1*	5	MH	26.1				0:6:94		68/33/35				
A-11-101	*D-2*	10	MH	19.3	125.4	>4.5								
A-11-101	*S-3*	15	MH	24.9										
A-11-101	*D-4*	20	MH	26.6	122.7	>4.5								
A-11-101	*S-5*	25	MH	24.9										
A-11-101	*D-6*	30	MH	21.9	125.6	>4.5								
A-11-104	*S-1*	5	CL	13.0							270	7.1	1620	2047
A-11-104	*D-2*	10	CL	12.3	122.9	>4.5								
A-11-104	*S-3*	15	CL	12.3										
A-11-104	*D-4*	20	CL	12.4	121.2			1:40:59		41/20/21				
A-11-104	*S-5*	25	CL	21.5										
A-11-104	*D-6*	30	CL	24.7	123.3	3.0								
A-11-104	*S-7*	35	CL	20.9										
A-11-106	*Bulk*	0-5	CL							39/15/24				
A-11-106	*S-1*	5	CL	21.1										
A-11-106	*D-2*	10	CL	21.0	128.1	>4.5								
A-11-106	*S-3*	15	CH	18.4										
A-11-106	*D-4*	20	CL	15.9	122.5	>4.5								
A-11-106	*S-5*	25	CL	19.3										
A-11-106	*D-6*	30	CL	25.3	120.7	4.25								
A-11-108	*D-1*	5	CL	15.7	120.8	>4.5		3:18:79						
A-11-108	*S-2*	10	SC-SM	16.0										
A-11-108	*D-3*	15	CH	19.1	127.3			0:23:77		52/22/30				
A-11-108	*S-4*	20	CL	17.2										
A-11-108	*D-5*	25	CH	26.6	119.8	>4.5								
A-11-108	*S-6*	30	CH	29.4										
A-11-109	*Bulk*	0-5	CL							40/15/25				
A-11-109	*S-1*	2.5	CL	21.1										
A-11-109	*D-2*	5	CL	17.8	117.2	>4.5		2:15:83						
A-11-109	*S-3*	10	CL to ML	14.0				1:36:63						
A-11-109	*D-4*	15	ML	8.6	120.2	>4.5								
A-11-109	*S-5*	20	CL	17.8										
A-11-109	*D-6*	25	CL	17.2	125.4	>4.5								
A-11-109	*S-7*	30	CL	16.6										
A-11-109	*D-8*	40	CL	13.1	119.9	>4.5								
A-11-109	*S-9*	45	CH	17.8										
A-11-109	*D-10*	50	CH	18.4	128.6	>4.5								
A-11-109	*S-11*	55	CL	27.1										
A-11-109	*D-12*	60	CL	28.3	118.4	>4.5								
A-11-109	*S-13*	65	CL	25.7										
A-11-109	*D-14*	70	MH	21.5	125.5	>4.5								
A-11-111	*D-1*	5	SC	13.7	135.8					31/16/15				
A-11-111	*S-2*	10	CL	11.9		>4.5								
A-11-111	*D-3*	15	ML to CL	10.8	115.4									
A-11-111	*S-4*	20	CL	15.4										
A-11-111	*D-5*	25	CL	10.7	115.9	>4.5								

Project No.: *11-135* **Project Name:** Parsons/I-5 HOV Widening Segment 1

Boring No .	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-111	*S-6*	30	CL	8.9										
A-11-111	*D-7*	35	SM	7.4	112.7			0:53:47						
A-11-111	*S-8*	40	CL	18.2										
A-11-111	*D-9*	45	CH	26.8	111.3	3.25								
A-11-111	*S-10*	50	SC	28.4										
A-11-111	*D-11*	55	SC	21.0	127.7									
A-11-111	*S-12*	60	ML	19.4										
A-11-111	*D-13*	65	MH	23.0	125.2	>4.5								
A-11-111	*S-14*	70	MH	22.5										
A-11-112	*Bulk*	0-5	CL							39/15/24				
A-11-113	*S-1*	5	SC	10.1				5:50:45						
A-11-113	*D-2*	10	CL	24.7	124.2	2.75								
A-11-113	*S-3*	15	CL	26.0										
A-11-113	*D-4*	20	CL	25.8	114.4	2.25								
A-11-113	*S-5*	25	CL	27.3										
A-11-113	*D-6*	30	CH	17.5	128.8	>4.5								
A-11-113	*S-7*	35	CL	14.0										
A-11-113	*D-8*	40	CL	10.5	105.1									
A-11-113	*S-9*	45	SM	8.2				0:51:49						
A-11-113	*D-10*	50	SM	9.3	111.9									
A-11-114	*D-1*	5	CL	11.4	132.9	>4.5								
A-11-114	*S-2*	10	CL	18.8										
A-11-114	*D-3*	15	CH	23.3	123.5	4.0				52/19/33				
A-11-114	*S-4*	20	CL	23.6										
A-11-114	*D-5*	25	CL	23.0	116.6	1.5								
A-11-114	*S-6*	30	CL	18.0										
A-11-114	*D-7*	35	CL	7.6	103.0	>4.5		0:36:64		35/20/15				
A-11-114	*S-8*	40	ML	8.1										
A-11-114	*D-9*	45	SM	6.0	105.1									
A-11-114	*S-10*	50	ML	9.9				0:35:65						
A-11-114	*D-11*	55	ML	9.8	111.0			0:46:54						
A-11-114	*S-12*	60	CL	40.5										
A-11-114	*D-13*	65	CL	30.9	115.0	1.25								
A-11-114	*S-14*	70	CL	25.7										
A-11-114	*D-15*	75	SC to CL	27.6	121.3	1.25								
A-11-114	*S-16*	80	SC to CL	26.1										
A-11-114	*D-17*	85	MH	19.7	127.8	>4.5								
A-11-114	*S-18*	90	MH	25.4										
A-11-114	*D-19*	95	MH	16.1	127.0	>4.5								
A-11-114	*S-20*	100	MH	24.4										
A-11-115	*Bulk*	0-5	CL							29/13/16				
A-11-115	*S-1*	5	SC	9.4				5:58:37			410	7.2	560	1281
A-11-115	*D-2*	10	SC to CL	17.6	129.1	>4.5		2:24:74						
A-11-115	*S-3*	15	MH	24.7										
A-11-115	*D-4*	20	CH	15.9	122.3	4.0								
A-11-115	*S-5*	25	ML	5.3				0:49:51						

Project No.: *11-135* **Project Name:** Parsons/I-5 HOV Widening Segment 1

Boring No .	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-115	*D-6*	30	ML	5.4	100.8			0:48:52						
A-11-115	*S-7*	35	SM	6.6				1:58:41						
A-11-115	*D-8*	40	CL	12.1	128.3	>4.5								
A-11-115	*S-9*	45	CL	15.3										
A-11-115	*D-10*	50	CL	16.3	127.5	>4.5				48/19/29				
A-11-115	*S-11*	55	CH	30.4										
A-11-115	*D-12*	60	CL	29.8	121.6	1.0								
A-11-115	*S-13*	65	SM	25.2										
A-11-115	*D-14*	70	CL	28.6	122.7	0.75								
A-11-115	*S-15*	75	MH	25.0										
A-11-115	*D-16*	80	MH	17.3	127.0	>4.5								
A-11-115	*S-17*	85	MH	22.7										
A-11-115	*D-18*	90	MH	21.5	125.0	>4.5								
A-11-115	*S-19*	95	MH	22.8										
A-11-115	*D-20*	100	MH	23.7	128.7	>4.5								
A-11-116	*S-1*	5	CL	20.2							250	7.3	950	2029
A-11-116	*D-2*	10	CH	25.8	118.8	1.75				56/25/31				
A-11-116	*S-3*	15	CL	25.1										
A-11-116	*D-4*	20	CH	24.8	120.7	>4.5								
A-11-116	*S-5*	25	CL	29.1										
A-11-116	*D-6*	30	CH	29.6	120.5	4.5								
A-11-116	*S-7*	35	CH	28.2										
A-11-116	*D-8*	40	CH	29.0	117.4	>4.5								
A-11-116	*S-9*	45	MH	22.6										
A-11-116	*D-10*	50	MH	21.4	124.2	>4.5								
A-11-116	*S-11*	55	MH	21.2										
A-11-116	*D-12*	60	MH	20.4	121.1	>4.5								
A-11-116	*S-13*	65	MH	20.2										
A-11-116	*D-14*	70	MH	19.7	126.3	>4.5								
A-11-116	*S-15*	75	MH	20.4										
A-11-116	*D-16*	80	MH	20.6	126.7	>4.5								
A-11-116	*S-17*	85	MH	19.0										
A-11-117	*D-1*	5	SC to CL	14.3	126.6	>4.5								
A-11-117	*S-2*	10	CL	10.5										
A-11-117	*D-3*	15	CL	18.1	110.5	>4.5								
A-11-117	*S-4*	20	CL	19.9										
A-11-117	*D-5*	25	CL	17.4	110.4	>4.5								
A-11-117	*S-6*	30	CL	23.4										
A-11-117	*D-7*	35	CH	29.5	120.2	>4.5					170	5.6	5060	1950
A-11-117	*S-8*	40	CH	37.4										
A-11-117	*D-9*	45	CH	30.4	118.2	>4.5								
A-11-117	*S-10*	50	CH	24.6										
A-11-117	*D-11*	55	MH	22.8	126.0	>4.5								
A-11-117	*S-12*	60	MH	24.7										
A-11-117	*D-13*	65	MH	21.7	125.0	>4.5								
A-11-117	*S-14*	70	MH	23.0										

Project No.: *11-135* Project Name: Parsons/I-5 HOV Widening Segment 1

Boring No .	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-117	*D-15*	75	MH	20.9	121.8	>4.5								
A-11-117	*S-16*	80	MH	20.6										
A-11-117	*D-17*	85	MH	18.8	126.8	>4.5								
A-11-117	*S-18*	90	MH	20.0										
A-11-117	*D-19*	95	MH	19.5	121.3	>4.5								
A-11-117	*S-20*	100	MH	19.9										
A-11-118	*D-1*	2.5	CH	30.2	116.7	>4.5					270	6.7	550	1986
A-11-118	*S-2*	5	CL	23.5										
A-11-118	*D-3*	10	CL	25.7	122.1	4.5								
A-11-118	*S-4*	15	CH	33.7						59/28/31				
A-11-118	*D-5*	20	CL	28.0	117.9	4.5								
A-11-118	*S-6*	25	CL	27.8										
A-11-118	*D-7*	30	CL	25.5	115.5	4.5								
A-11-118	*S-8*	35	CL	30.3										
A-11-118	*D-9*	40	CL	30.9	117.3	2.25								
A-11-118	*S-10*	45	CL	28.4										
A-11-118	*D-11*	50	CL	28.0	121.7	4.25								
A-11-118	*S-12*	55	CL	30.5										
A-11-118	*D-13*	60	CH	28.0	121.3	4.5								
A-11-118	*S-14*	65	MH	25.4										
A-11-118	*D-15*	70	MH	25.3	122.7	>4.5								
A-11-119	*Bulk*	0-5	CL							41/15/26				
A-11-124	*Bulk*	0-5	CH							55/17/38				
A-11-124	*S-1*	2.5	CL	21.3							310	6.5	1950	407
A-11-124	*D-2*	5	CH	30.9	114.4					63/28/35				
A-11-124	*S-3*	10	CL	32.5										
A-11-124	*D-4*	15	MH	26.1	125.2	>4.5								
A-11-124	*S-5*	20	GM	3.8				39:35:26						
A-11-124	*D-6*	25	MH	20.4	127.0									
A-11-124	*S-7*	30	MH	21.5										
A-11-126	*D-1*	2.5	MH	22.0	125.3	>4.5								
A-11-126	*S-2*	5	MH	21.1										
A-11-126	*D-3*	10	MH	21.9	123.8	>4.5								
A-11-128	*Bulk*	0-5	CH							57/18/39				
A-11-130	*S-1*	5	SM	6.9				15:70:15						
A-11-130	*D-2*	10	SP-SM	4.6	113.9									
A-11-130	*S-3*	15	CH	22.2										
A-11-130	*D-4*	20	CH	23.8	117.6	>4.5								
A-11-130	*S-5*	25	CH	19.0										
A-11-130	*D-6*	30	CH	19.1	125.5	>4.5								
A-11-130	*S-7*	35	CH	22.2										
A-11-130	*D-8*	40	CH	24.5	119.8	4.5								
A-11-130	*S-9*	45	CH	23.0										
A-11-130	*D-10*	50	MH	23.2	123.8	>4.5								
A-11-130	*S-11*	55	MH	21.8										
A-11-130	*D-12*	60	MH	20.4	127.5	>4.5								

Project No.: *11-135* **Project Name:** Parsons/I-5 HOV Widening Segment 1

Boring No .	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-130	*S-13*	65	MH	20.3										
A-11-130	*D-14*	70	MH	21.3	122.0	>4.5								
A-11-134	*S-3*	15	MH	25.3										
A-11-134	*D-4*	20	MH	19.7	122.8	>4.5								
A-11-134	*S-5*	25	MH	27.7										
A-11-134	*D-6*	30	MH	13.6	121.3	>4.5								

AP Engineering & Testing, Inc.

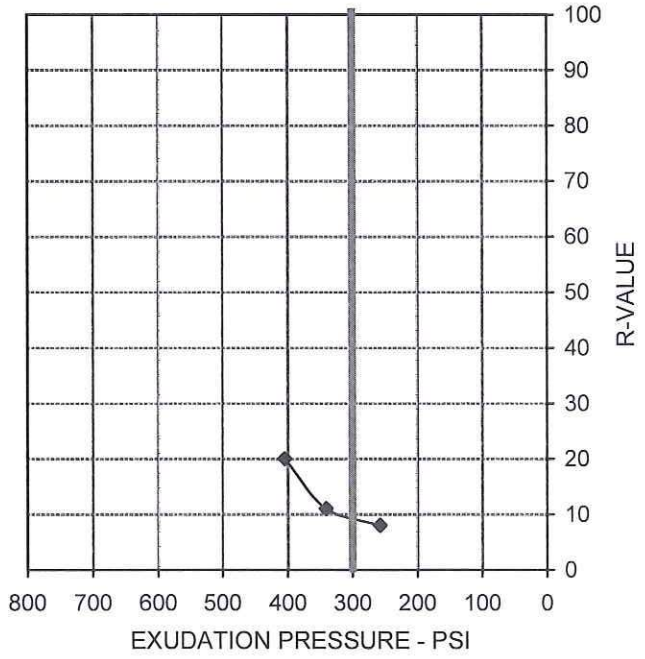
R-VALUE TEST DATA

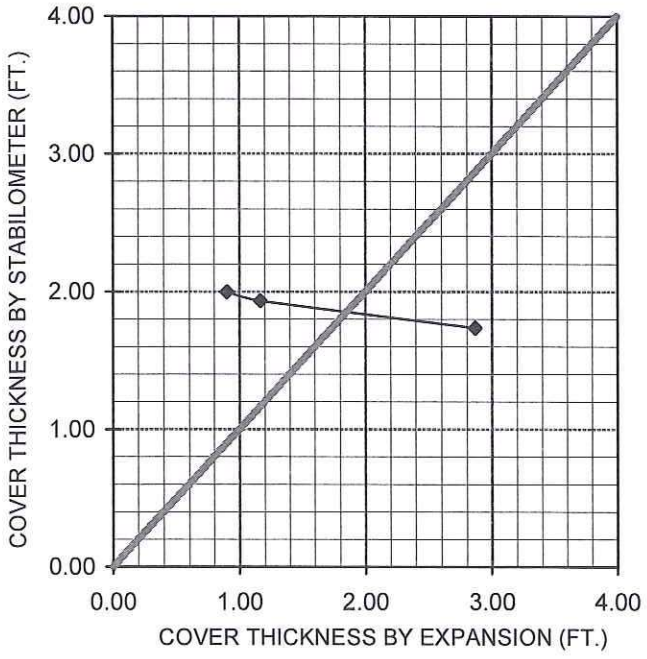
ASTM D2844

Project Name:	I-5 HOV Widening Segment 1	Tested By:	ST	Date:	11/21/11
Project Number:	11-135	Computed By:	KM	Date:	12/08/11
Boring No.:	A-11-101	Checked By:	AP	Date:	12/19/11
Sample No.:	B-0	Depth (ft.):	0-5		
Location:	N/A				
Soil Description:	Sandy Clay w/gravel				

Mold Number	G	H	I	
Water Added, g	15	41	51	
Compact Moisture(%)	27.4	30.5	31.8	
Compaction Gage Pressure, psi	100	90	50	
Exudation Pressure, psi	405	341	258	
Sample Height, Inches	2.6	2.7	2.7	
Gross Weight Mold, g	2847	2864	2896	
Tare Weight Mold, g	1830	1822	1840	
Net Sample Weight, g	1016	1042	1056	
Expansion, inchesx10^{-4}	86	35	27	
Stability 2,000 (160 psi)	49/120	60/132	62/138	
Turns Displacement	3.61	4.87	5.03	
R-Value Uncorrected	19	10	7	
R-Value Corrected	20	11	8	
Dry Density, pcf	93.0	89.6	89.9	
Traffic Index	10.0	10.0	10.0	
G.E. by Stability	1.74	1.93	2.00	
G.E. by Expansion	2.87	1.17	0.90	

R-VALUE		
	By Exudation:	9
	By Expansion:	17
	At Equilibrium: (by Exudation)	9
Remarks	Gf = 1.60, and 0.0 % Retained on the ¾"	





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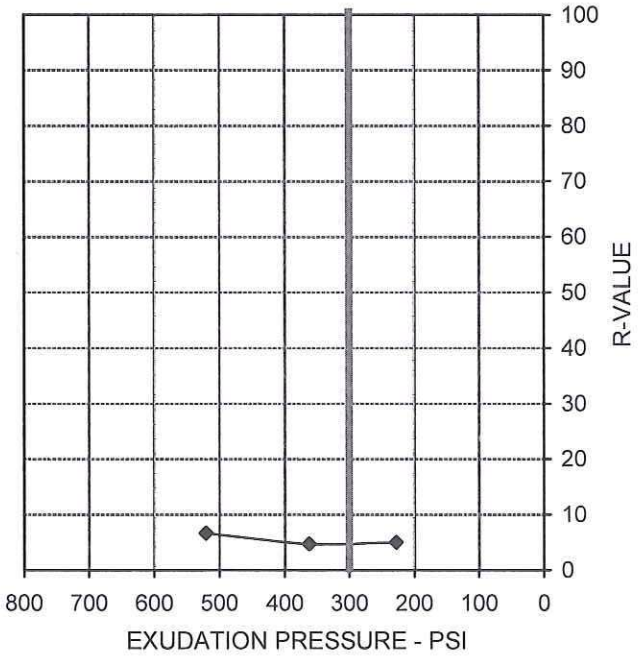
R-VALUE TEST DATA

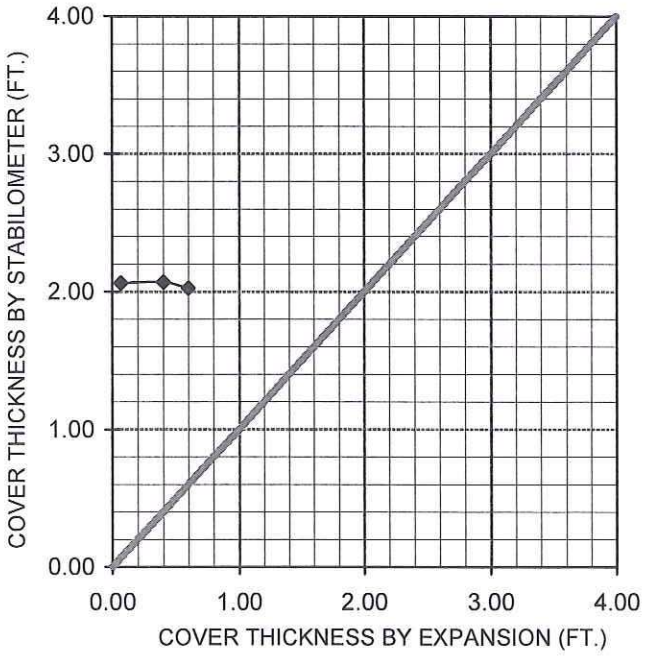
ASTM D2844

Project Name:	I-5 HOV Widening Segment 1	Tested By:	ST	Date:	11/20/11
Project Number:	11-135	Computed By:	KM	Date:	12/08/11
Boring No.:	A-11-103	Checked By:	AP	Date:	12/19/11
Sample No.:	B-0	Depth (ft.):	0-5		
Location:	N/A				
Soil Description:	Fat Clay				

Mold Number	I	C	F	
Water Added, g	10	22	52	
Compact Moisture(%)	20.8	22.2	25.8	
Compaction Gage Pressure, psi	50	50	40	
Exudation Pressure, psi	521	362	228	
Sample Height, Inches	2.5	2.5	2.7	
Gross Weight Mold, g	2850	2984	2904	
Tare Weight Mold, g	1840	1970	1872	
Net Sample Weight, g	1010	1015	1032	
Expansion, inchesx10^{-4}	18	12	2	
Stability 2,000 (160 psi)	60/142	64/146	69/148	
Turns Displacement	4.46	4.84	5.07	
R-Value Uncorrected	7	5	4	
R-Value Corrected	7	5	5	
Dry Density, pcf	101.3	100.6	92.0	
Traffic Index	10.0	10.0	10.0	
G.E. by Stability	2.03	2.07	2.06	
G.E. by Expansion	0.60	0.40	0.07	

R-VALUE		
	By Exudation:	5
	By Expansion:	*N/A
	At Equilibrium: (by Exudation)	5
Remarks	Gf = 1.60, and 0.2 % Retained on the ¾" *Not Applicable	





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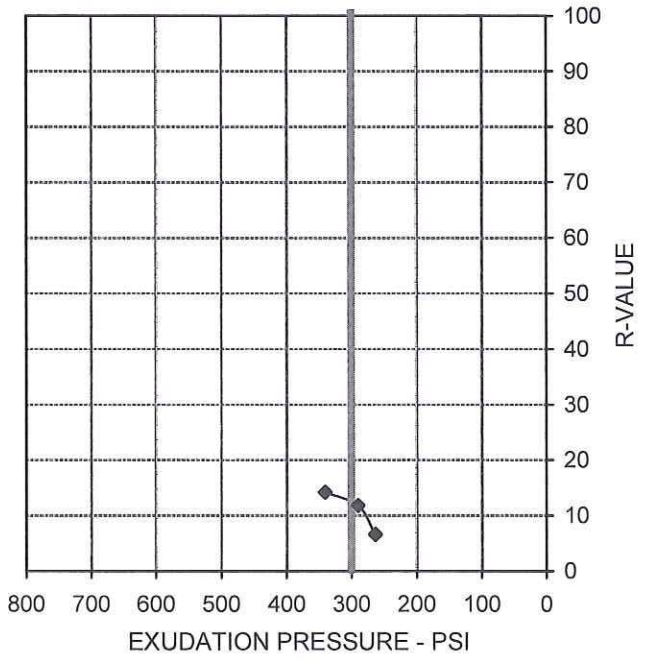
R-VALUE TEST DATA

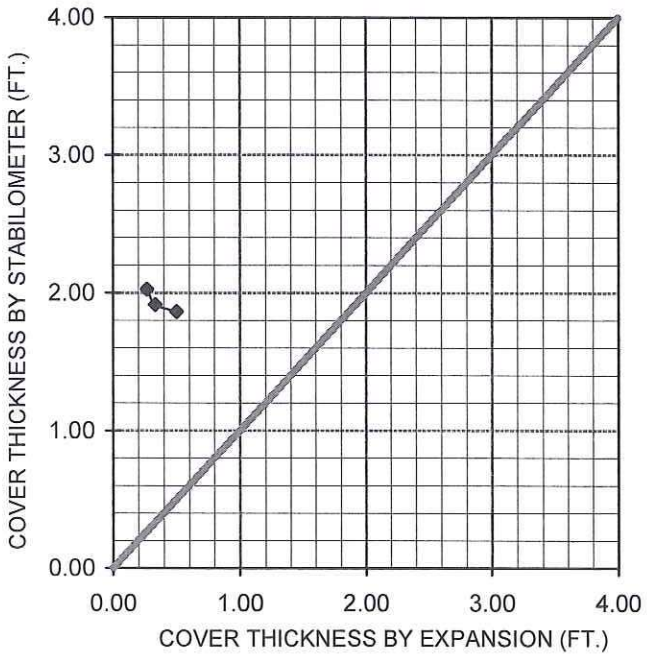
ASTM D2844

Project Name: I-5 HOV Widening Segment 1 Tested By: ST Date: 11/30/11
Project Number: 11-135 Computed By: KM Date: 12/08/11
Boring No.: A-11-106 Checked By: AP Date: 12/19/11
Sample No.: B-0 Depth (ft.): 0-5
Location:
Soil Description: Sandy Clay

Mold Number	A	B	CX	
Water Added, g	4045	36	29	
Compact Moisture(%)	465.9	19.8	18.9	
Compaction Gage Pressure, psi	50	90	100	
Exudation Pressure, psi	264	290	340	
Sample Height, Inches	2.5	2.5	2.5	
Gross Weight Mold, g	3043	3035	3155	
Tare Weight Mold, g	1971	1968	212	
Net Sample Weight, g	1072	1067	2943	
Expansion, inches$\times 10^{-4}$	8	10	15	
Stability 2,000 (160 psi)	60/140	56/130	50/124	
Turns Displacement	5.05	4.31	4.39	
R-Value Uncorrected	7	12	14	
R-Value Corrected	7	12	14	
Dry Density, pcf	23.0	108.0	299.9	
Traffic Index	10.0	10.0	10.0	
G.E. by Stability	2.03	1.91	1.86	
G.E. by Expansion	0.27	0.33	0.50	

R-VALUE	By Exudation:	13
	By Expansion:	*N/A
	At Equilibrium: (by Exudation)	13
Remarks	Gf = 1.60, and 0.9 % Retained on the ¾" *Not Applicable	





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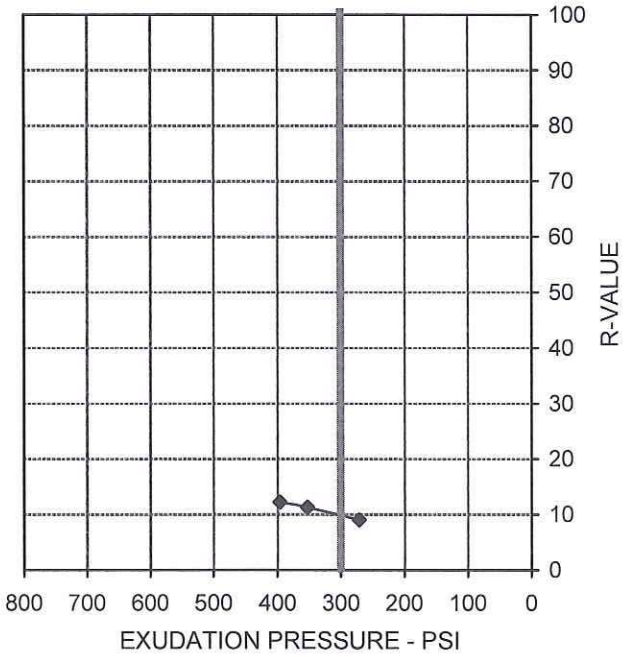
R-VALUE TEST DATA

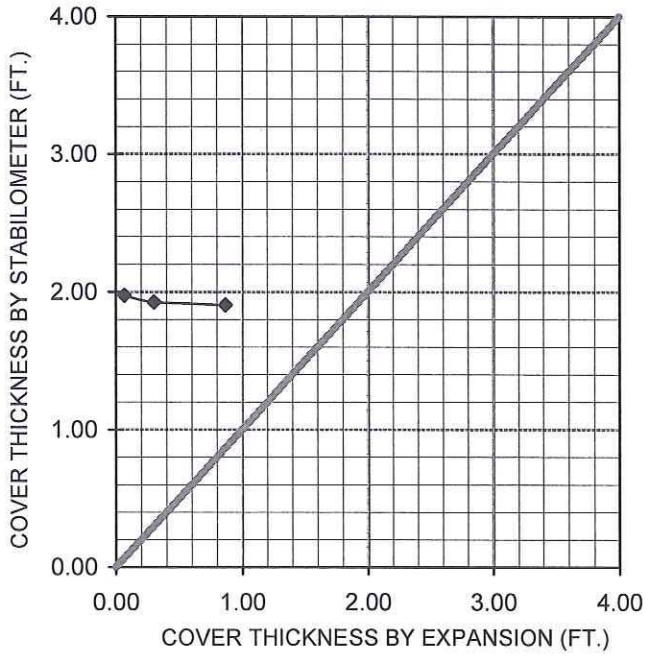
ASTM D2844

Project Name:	I-5 HOV Widening Segment 1	Tested By:	ST	Date:	11/28/11
Project Number:	11-135	Computed By:	KM	Date:	12/08/11
Boring No.:	A-11-109	Checked By:	AP	Date:	12/19/11
Sample No.:	B-0	Depth (ft.):	0-5		
Location:					
Soil Description:	Sandy Silt				

Mold Number	I	G	H	
Water Added, g	32	35	45	
Compact Moisture(%)	18.5	18.9	20.0	
Compaction Gage Pressure, psi	90	70	60	
Exudation Pressure, psi	396	352	271	
Sample Height, Inches	2.4	2.4	2.5	
Gross Weight Mold, g	2865	2857	2864	
Tare Weight Mold, g	1840	1831	1822	
Net Sample Weight, g	1025	1026	1042	
Expansion, inches$\times 10^{-4}$	26	9	2	
Stability 2,000 (160 psi)	54/130	56/134	60/136	
Turns Displacement	3.70	3.62	4.46	
R-Value Uncorrected	13	12	9	
R-Value Corrected	12	11	9	
Dry Density, pcf	109.3	109.0	105.3	
Traffic Index	10.0	10.0	10.0	
G.E. by Stability	1.91	1.92	1.97	
G.E. by Expansion	0.87	0.30	0.07	

R-VALUE		
	By Exudation:	10
	By Expansion:	*N/A
	At Equilibrium: (by Exudation)	10
Remarks	Gf = 1.60, and 0.8 % Retained on the ¾" *Not Applicable	





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AP Engineering & Testing, Inc.

CAL 216 PART 2

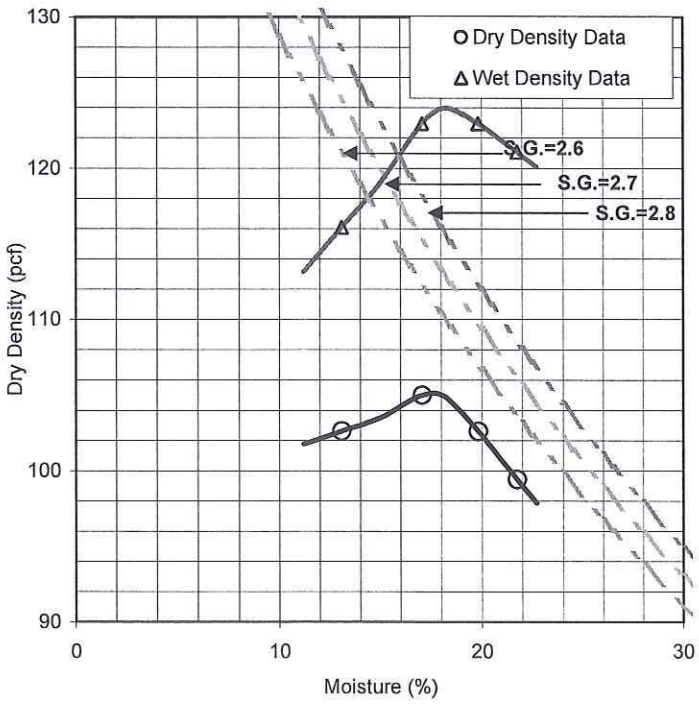
LABORATORY COMPACTED TEST MAXIMUM WET DENSITY

Client:	Earth Mechanics, Inc.			AP Number:	11-1059
Project Name:	I-5 HOV Widening Segment 1	Tested By:	CC	Date:	12/04/11
Project No. :	11-135	Calculated By:	KM	Date:	12/13/11
Boring No.:	A-11-101	Checked By:	AP	Date:	12/18/11
Sample No. :	B-0	Depth (ft):	0-5		
Visual Sample Description:	Sandy Clay w/gravel				

IMPACT TEST DATA							
I	Initial Wet Weight of Test Specimen (Grams)		2350				
	Increment No.	1	2	3	4	5	6
	Water Adjustment (grams)	0	47	94	-47		
J	Tamper Reading	11.4	11.3	11.5	12.0		
K	Wet Density (gm/cc) from Table 1	1.97	1.97	1.94	1.86		
	Dry Density (gm/cc)	1.68	1.64	1.59	1.64		
	Dry Density (pcf)	**105.0**	**102.6**	**99.4**	**102.6**		
	Wt. of Container (gm.)	147.93	149.57	154.24	148.72		
	Wet Wt. of Soil + Cont. (gm.)	632.29	564.82	604.87	521.60		
	Dry Wt. of Soil + Cont. (gm.)	561.56	496.10	524.36	478.40		
	Moisture Content (%)	**17.10**	**19.83**	**21.75**	**13.10**		

ROCK CORRECTION				
L	Total Sample Weight		(grams)	11351
M	+19 mm (¾") Weight in Air		(grams)	0
N	+19 mm (¾") Weight in Water		(grams)	0
O	+19 mm (¾") Volume		(M-N)	0
P	% +19 mm (¾")	100*	(M/L)	0.00
Q	% -19 mm (¾")		(100-P)	100.00
R	Density of +19 mm (¾")		(M/O)	0.00
S	(%+19 mm)/Density of +19 mm		(P/RY)	0.00
T	(%-19 mm)/Density of -19 mm		(Q/K)	50.76
U	Sum of S and T		(S+T)	50.76
V	Average Adjusted Density		(100/U)	1.97
Percent Relative* Compaction	Spec	Failed		or less
		Passed		
*(H/K) for 10% or less +19 mm; (H/V) for > 10% +19 mm				
Note: 62.4 x (gm/cc) = P.C.F.				

Maximum Dry Density (pcf)	**105.0**
Optimum Moisture Content (%)	**18.0**
Maximum Wet Density (pcf)	**123.9**



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CAL 216 PART 2

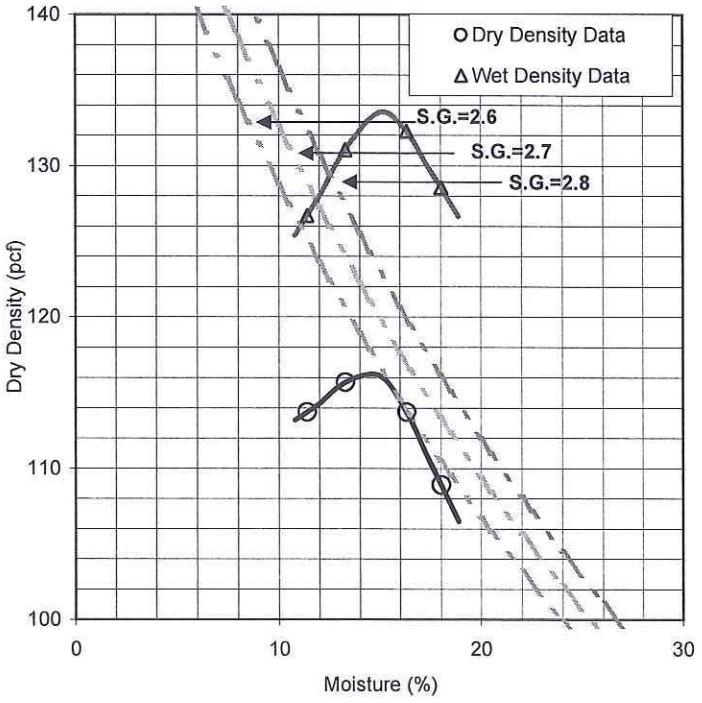
LABORATORY COMPACTED TEST MAXIMUM WET DENSITY

Client:	Earth Mechanics, Inc.			AP Number:	11-1059
Project Name:	I-5 HOV Widening Segment 1	Tested By:	CC	Date:	12/05/11
Project No. :	11-135	Calculated By:	KM	Date:	12/13/11
Boring No.:	A-11-111	Checked By:	AP	Date:	12/18/11
Sample No. :	B-0	Depth (ft):	0-5		
Visual Sample Description:	Sandy Clay w/gravel				

IMPACT TEST DATA							
I	Initial Wet Weight of Test Specimen (Grams)	2350					
	Increment No.	1	2	3	4	5	6
	Water Adjustment (grams)	0	47	-47	94		
J	Tamper Reading	10.5	10.8	10.6	11.0		
K	Wet Density (gm/cc) from Table 1	2.12	2.06	2.10	2.03		
	Dry Density (gm/cc)	1.82	1.75	1.85	1.82		
	Dry Density (pcf)	**113.7**	**108.9**	**115.7**	**113.7**		
	Wt. of Container (gm.)	147.21	181.39	150.36	162.80		
	Wet Wt. of Soil + Cont. (gm.)	597.83	736.32	592.97	637.51		
	Dry Wt. of Soil + Cont. (gm.)	534.54	651.49	541.04	588.93		
	Moisture Content (%)	**16.34**	**18.05**	**13.29**	**11.40**		

ROCK CORRECTION				
L	Total Sample Weight		(grams)	19307
M	+19 mm (¾") Weight in Air		(grams)	852.8
N	+19 mm (¾") Weight in Water		(grams)	495.4
O	+19 mm (¾") Volume		(M-N)	357.4
P	% +19 mm (¾")	100*	(M/L)	4.42
Q	% -19 mm (¾")		(100-P)	95.58
R	Density of +19 mm (¾")		(M/O)	2.39
S	(%+19 mm)/Density of +19 mm		(P/RY)	1.85
T	(%-19 mm)/Density of -19 mm		(Q/K)	45.09
U	Sum of S and T		(S+T)	46.94
V	Average Adjusted Density		(100/U)	2.13
Percent Relative* Compaction	Spec	Failed	or less	
		Passed		
*(H/K) for 10% or less +19 mm; (H/V) for > 10% +19 mm				
Note: 62.4 x (gm/cc) = P.C.F.				

Maximum Dry Density (pcf)	**116.0**
Optimum Moisture Content (%)	**15.0**
Maximum Wet Density (pcf)	**133.4**



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CAL 216 PART 2

LABORATORY COMPACTED TEST MAXIMUM WET DENSITY

Client: Earth Mechanics, Inc.
Project Name: I-5 HOV Widening Segment 1
Project No. : 11-135
Boring No.: A-11-117
Sample No. : B-0
Visual Sample Description: Sandy Lean Clay w/gravel

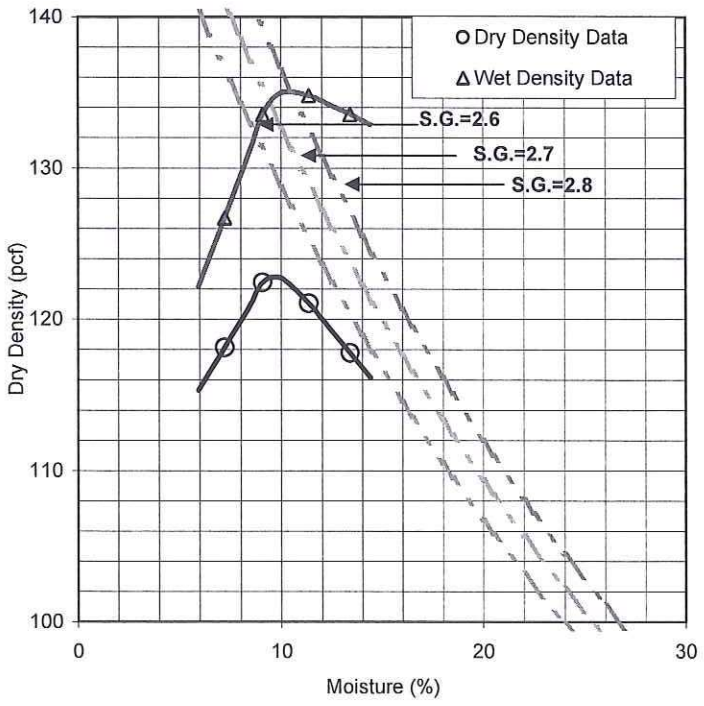
AP Number: 11-1059
Tested By: CC — Date: 11/30/11
Calculated By: KM — Date: 12/13/11
Checked By: AP — Date: 12/18/11
Depth (ft): 0-5

IMPACT TEST DATA

I	Initial Wet Weight of Test Specimen (Grams)		2350				
	Increment No.	1	2	3	4	5	6
	Water Adjustment (grams)	0	47	-47	-94		
J	Tamper Reading	10.3	10.4	10.4	11.0		
K	Wet Density (gm/cc) from Table 1	2.16	2.14	2.14	2.03		
	Dry Density (gm/cc)	1.94	1.89	1.96	1.89		
	Dry Density (pcf)	**121.0**	**117.8**	**122.4**	**118.1**		
	Wt. of Container (gm.)	149.55	181.14	149.88	160.52		
	Wet Wt. of Soil + Cont. (gm.)	566.92	688.05	448.93	449.98		
	Dry Wt. of Soil + Cont. (gm.)	524.36	628.15	424.01	430.49		
	Moisture Content (%)	**11.36**	**13.40**	**9.09**	**7.22**		

ROCK CORRECTION

L	Total Sample Weight (grams)		25770
M	+19 mm (¾") Weight in Air (grams)		836.4
N	+19 mm (¾") Weight in Water (grams)		482.6
O	+19 mm (¾") Volume (M-N)		353.8
P	% +19 mm (¾") 100* (M/L)		3.25
Q	% -19 mm (¾") (100-P)		96.75
R	Density of +19 mm (¾") (M/O)		2.36
S	(%+19 mm)/Density of +19 mm (P/RY)		1.37
T	(%-19 mm)/Density of -19 mm (Q/K)		44.79
U	Sum of S and T (S+T)		46.17
V	Average Adjusted Density (100/U)		2.17
Percent Relative* Compaction	Spec	Failed	or less
		Passed	
*(H/K) for 10% or less +19 mm; (H/V) for > 10% +19 mm			
Note: 62.4 x (gm/cc) = P.C.F.			



Maximum Dry Density (pcf)	**122.5**
Optimum Moisture Content (%)	**10.0**
Maximum Wet Density (pcf)	**134.8**

AP Engineering & Testing, Inc.

CAL 216 PART 2

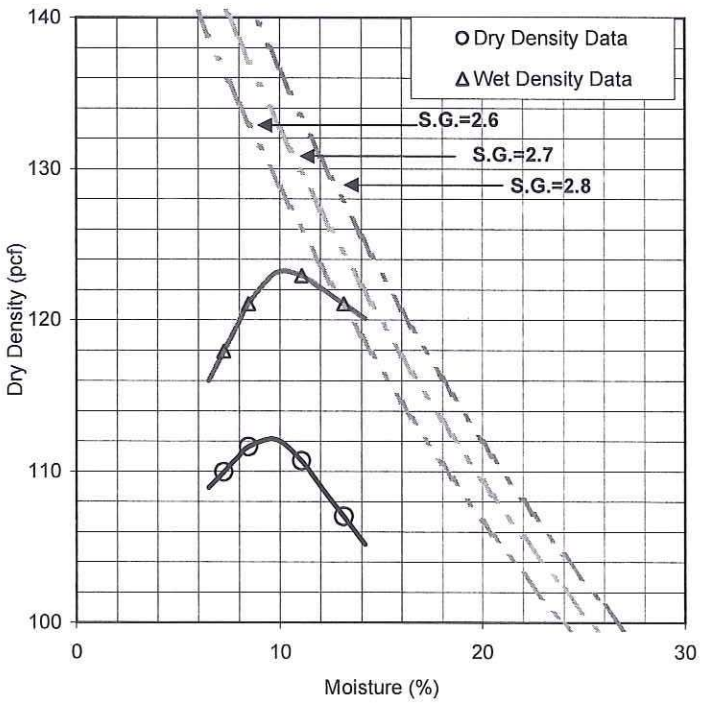
LABORATORY COMPACTED TEST MAXIMUM WET DENSITY

Client:	Earth Mechanics, Inc.			AP Number:	11-1059
Project Name:	I-5 HOV Widening Segment 1	Tested By:	CC	Date:	12/03/11
Project No. :	11-135	Calculated By:	KM	Date:	12/13/11
Boring No.:	A-11-121	Checked By:	AP	Date:	12/18/11
Sample No. :	B-0	Depth (ft):	0-5		
Visual Sample Description:	Silty Sand w/gravel				

IMPACT TEST DATA							
I	Initial Wet Weight of Test Specimen (Grams)	2350					
	Increment No.	1	2	3	4	5	6
	Water Adjustment (grams)	0	47	94	141		
J	Tamper Reading	11.8	11.5	11.3	11.5		
K	Wet Density (gm/cc) from Table 1	1.89	1.94	1.97	1.94		
	Dry Density (gm/cc)	1.76	1.79	1.77	1.71		
	Dry Density (pcf)	**110.0**	**111.6**	**110.7**	**107.0**		
	Wt. of Container (gm.)	149.53	149.84	149.30	179.98		
	Wet Wt. of Soil + Cont. (gm.)	708.28	455.28	684.36	640.31		
	Dry Wt. of Soil + Cont. (gm.)	670.48	431.44	631.01	586.85		
	Moisture Content (%)	**7.26**	**8.47**	**11.08**	**13.14**		

ROCK CORRECTION				
L	Total Sample Weight		(grams)	22018.5
M	+19 mm (¾") Weight in Air		(grams)	460
N	+19 mm (¾") Weight in Water		(grams)	284.7
O	+19 mm (¾") Volume		(M-N)	175.3
P	% +19 mm (¾")	100*	(M/L)	2.09
Q	% -19 mm (¾")		(100-P)	97.91
R	Density of +19 mm (¾")		(M/O)	2.62
S	(%+19 mm)/Density of +19 mm		(P/RY)	0.80
T	(%-19 mm)/Density of -19 mm		(Q/K)	49.70
U	Sum of S and T		(S+T)	50.50
V	Average Adjusted Density		(100/U)	1.98
Percent Relative* Compaction		Spec	Failed	or less
			Passed	
*(H/K) for 10% or less +19 mm; (H/V) for > 10% +19 mm				
Note: 62.4 x (gm/cc) = P.C.F.				

Maximum Dry Density (pcf)	**112.0**
Optimum Moisture Content (%)	**10.0**
Maximum Wet Density (pcf)	**123.2**



AP Engineering & Testing, Inc.

CAL 216 PART 2

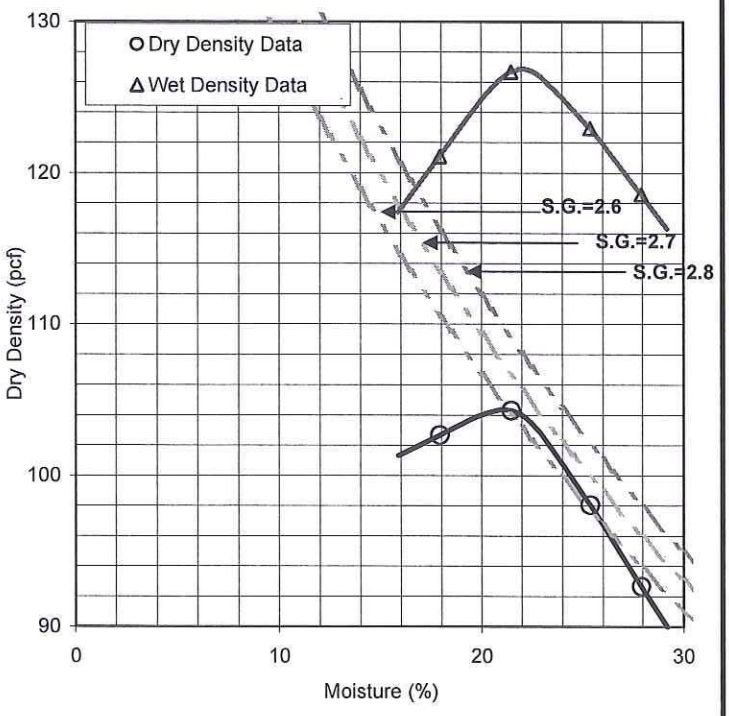
LABORATORY COMPACTED TEST MAXIMUM WET DENSITY

Client:	Earth Mechanics, Inc.			AP Number:	11-1059
Project Name:	I-5 HOV Widening Segment 1	Tested By:	CC	Date:	12/03/11
Project No. :	11-135	Calculated By:	KM	Date:	12/13/11
Boring No.:	A-11-134	Checked By:	AP	Date:	12/18/11
Sample No. :	B-0	Depth (ft):	0-5		
Visual Sample Description:	Sandy Clay w/gravel				

IMPACT TEST DATA							
I	Initial Wet Weight of Test Specimen (Grams)		2350				
	Increment No.	1	2	3	4	5	6
	Water Adjustment (grams)	0	47	-47	-94		
J	Tamper Reading	11.3	11.7	11.0	11.5		
K	Wet Density (gm/cc) from Table 1	1.97	1.90	2.03	1.94		
	Dry Density (gm/cc)	1.57	1.49	1.67	1.64		
	Dry Density (pcf)	**98.0**	**92.7**	**104.3**	**102.6**		
	Wt. of Container (gm.)	149.63	150.66	179.12	149.49		
	Wet Wt. of Soil + Cont. (gm.)	410.28	466.71	475.71	506.28		
	Dry Wt. of Soil + Cont. (gm.)	357.50	397.68	423.27	452.01		
	Moisture Content (%)	**25.39**	**27.95**	**21.48**	**17.94**		

ROCK CORRECTION				
L	Total Sample Weight		(grams)	19400
M	+19 mm (¾") Weight in Air		(grams)	135.9
N	+19 mm (¾") Weight in Water		(grams)	83.1
O	+19 mm (¾") Volume		(M-N)	52.8
P	% +19 mm (¾")	100*	(M/L)	0.70
Q	% -19 mm (¾")		(100-P)	99.30
R	Density of +19 mm (¾")		(M/O)	2.57
S	(%+19 mm)/Density of +19 mm		(P/RY)	0.27
T	(%-19 mm)/Density of -19 mm		(Q/K)	48.92
U	Sum of S and T		(S+T)	49.19
V	Average Adjusted Density		(100/U)	2.03
Percent Relative* Compaction		Spec	Failed	or less
			Passed	
*(H/K) for 10% or less +19 mm; (H/V) for > 10% +19 mm				
Note: 62.4 x (gm/cc) = P.C.F.				

Maximum Dry Density (pcf)	**104.5**
Optimum Moisture Content (%)	**21.0**
Maximum Wet Density (pcf)	**126.4**



APPENDIX C

DESIGN CALCULATIONS FOR FLEXIBLE SECTIONS

TI=12, R=40.txt

CALFP Ver. 1.1

Unit System = E

Title: I-5 HOV Seg 1
Traffic Index (TI) = 12.0
R.Value of Subgrade (Native Soil) = 40
Required GE = 0002.30 ft

Depth (ft)	GF	GE (ft)	Depth (ft)	GF	GE (ft)
00.10	01.64	00.16	00.15	01.64	00.25
00.20	01.64	00.33	00.25	01.64	00.41
00.30	01.64	00.49	00.35	01.64	00.57
00.40	01.64	00.66	00.45	01.64	00.74
00.50	01.64	00.82	00.55	01.66	00.91
00.60	01.70	01.02	00.65	01.75	01.14
00.70	01.79	01.25	00.75	01.84	01.38
00.80	01.88	01.50	00.85	01.91	01.62
00.90	01.95	01.76	00.95	01.99	01.89
01.00	02.02	02.02	01.05	02.05	02.15
01.10	02.09	02.30	01.15	02.12	02.44
01.20	02.15	02.58	01.25	02.18	02.73
01.30	02.21	02.87	01.35	02.23	03.01
01.40	02.26	03.16	01.45	02.29	03.32
01.50	02.31	03.47	01.55	02.34	03.63
01.60	02.36	03.78	01.65	02.39	03.94

HMA Safety Factor (GE) = 0000.10 ft
HMA Ultimate Depth = 0001.65 ft
(HMA MAX. Depth shown in Table)

HMA MIN. Depth (selected) = 0000.30 ft

Note: Mandatory enhancements should be incorporated for design life greater than twenty years:

Note: Positive Residual GE indicates over-design.
Note: Negative Safety Factor in Native Soil

HMA ft	TPB ft	T-Base ft	B-Base ft	Subbase ft	Res-GE ft	Cost $/y^2	HMA-GF ft	
01.15	00.00	00.00	00.00	00.00	00.13	0000.00	02.12	
01.20	00.00	00.00	00.00	00.00	00.28	0000.00	02.15	
01.25	00.00	00.00	00.00	00.00	00.42	0000.00	02.18	
01.30	00.00	00.00	00.00	00.00	00.57	0000.00	02.21	

Note: This design requires a safety Factor for GE. This requires that a design be selected that has a value as close as possible to 0.1 in the 'Res-GE' column. Such a design is generally shown in the first row of the above table.

***** FINISH *****

TI = 12
R = 40

1.15' HMA (full-depth)

TI=12, R=40.txt

CALFP Ver. 1.1

Unit System = E

Title: I-5 HOV Seg 1
Traffic Index (TI) = 12.0
R.Value of Subgrade (Native Soil) = 40
Required GE = 0002.30 ft

Depth (ft)	GF	GE (ft)	Depth (ft)	GF	GE (ft)
00.10	01.64	00.16	00.15	01.64	00.25
00.20	01.64	00.33	00.25	01.64	00.41
00.30	01.64	00.49	00.35	01.64	00.57
00.40	01.64	00.66	00.45	01.64	00.74
00.50	01.64	00.82	00.55	01.66	00.91
00.60	01.70	01.02	00.65	01.75	01.14
00.70	01.79	01.25	00.75	01.84	01.38
00.80	01.88	01.50	00.85	01.91	01.62
00.90	01.95	01.76	00.95	01.99	01.89
01.00	02.02	02.02	01.05	02.05	02.15
01.10	02.09	02.30	01.15	02.12	02.44
01.20	02.15	02.58	01.25	02.18	02.73
01.30	02.21	02.87	01.35	02.23	03.01
01.40	02.26	03.16	01.45	02.29	03.32
01.50	02.31	03.47	01.55	02.34	03.63
01.60	02.36	03.78	01.65	02.39	03.94

HMA Safety Factor (GE) = 0000.10 ft
HMA Ultimate Depth = 0001.65 ft
(HMA MAX. Depth shown in Table)

HMA MIN. Depth (selected) = 0000.30 ft

Note: Mandatory enhancements should be incorporated for design life greater than twenty years:

Note: Positive Residual GE indicates over-design.
Note: Negative Safety Factor in Native Soil

HMA ft	TPB ft	T-Base ft	B-Base ft	Subbase ft	Res-GE ft	Cost	HMA-GF ft	ft	$/y^2
01.15	00.00	00.00	00.00	00.00	00.13	0000.00	02.12		
01.20	00.00	00.00	00.00	00.00	00.28	0000.00	02.15		
01.25	00.00	00.00	00.00	00.00	00.42	0000.00	02.18		
01.30	00.00	00.00	00.00	00.00	00.57	0000.00	02.21		

Note: This design requires a safety Factor for GE. This requires that a design be selected that has a value as close as possible to 0.1 in the 'Res-GE' column. Such a design is generally shown in the first row of the above table.

***** FINISH *****

min. 1.15' HMA

TI=10, R=40.txt

CALFP Ver. 1.1

Unit System = E

Title: I-5 HOV Seg 1
Traffic Index (TI) = 10.0
R.Value of Subgrade (Native Soil) = 40
Required GE = 0001.92 ft

Depth (ft)	GF	GE (ft)	Depth (ft)	GF	GE (ft)
00.10	01.79	00.18	00.15	01.79	00.27
00.20	01.79	00.36	00.25	01.79	00.45
00.30	01.79	00.54	00.35	01.79	00.63
00.40	01.79	00.72	00.45	01.79	00.81
00.50	01.79	00.90	00.55	01.81	01.00
00.60	01.87	01.12	00.65	01.92	01.25
00.70	01.97	01.38	00.75	02.01	01.51
00.80	02.05	01.64	00.85	02.10	01.79
00.90	02.14	01.93	00.95	02.18	02.07
01.00	02.21	02.21	01.05	02.25	02.36
01.10	02.29	02.52	01.15	02.32	02.67
01.20	02.35	02.82	01.25	02.38	02.98
01.30	02.42	03.15	01.35	02.45	03.31

HMA Safety Factor (GE) = 0000.10 ft
HMA Ultimate Depth = 0001.35 ft
(HMA MAX. Depth shown in Table)

HMA MIN. Depth (selected) = 0000.30 ft

Note: Mandatory enhancements should be incorporated for design life greater than twenty years:

Note: Positive Residual GE indicates over-design.
Note: Negative Safety Factor in Native Soil

HMA ft	TPB ft	T-Base ft	B-Base ft	Subbase ft	Res-GE ft	Cost	HMA-GF ft	ft	$/y^2
00.95	00.00	00.00	00.00	00.00	00.15	0000.00	02.18		
01.00	00.00	00.00	00.00	00.00	00.29	0000.00	02.21		
01.05	00.00	00.00	00.00	00.00	00.44	0000.00	02.25		
01.10	00.00	00.00	00.00	00.00	00.60	0000.00	02.29		

Note: This design requires a safety Factor for GE. This requires that a design be selected that has a value as close as possible to 0.1 in the 'Res-GE' column. Such a design is generally shown in the first row of the above table.

***** FINISH *****

TI = 10 R=40

min. 0.95' HMA (full-depth)

CALFP Ver. 1.1

Unit System = E

Title: Avenida Pico
Traffic Index (TI) = 09.5
R.Value of Subgrade (Native Soil) = 40
Required GE = 0001.82 ft

Base Type = AB-Class 2

Base Gravel Factor = 0001.10
Base R.Value = 0078.00
0.0032*TI*(100-R.VALUE) = 0000.67 ft
Base MAX. depth = 0000.35 ft
Base MIN. depth = 0000.35 ft

Depth (ft)	GF	GE (ft)	Depth (ft)	GF	GE (ft)
00.10	01.84	00.18	00.15	01.84	00.28
00.20	01.84	00.37	00.25	01.84	00.46
00.30	01.84	00.55	00.35	01.84	00.64
00.40	01.84	00.74	00.45	01.84	00.83
00.50	01.84	00.92	00.55	01.86	01.02
00.60	01.92	01.15	00.65	01.97	01.28
00.70	02.02	01.41	00.75	02.06	01.55
00.80	02.11	01.69	00.85	02.15	01.83
00.90	02.19	01.97	00.95	02.23	02.12
01.00	02.27	02.27	01.05	02.31	02.43
01.10	02.34	02.57	01.15	02.38	02.74
01.20	02.41	02.89	01.25	02.45	03.06
01.30	02.48	03.22	01.35	02.51	03.39

HMA Safety Factor (GE) = 0000.20 ft
HMA Ultimate Depth = 0001.30 ft
(HMA MAX. Depth shown in Table)

HMA MIN. Depth (from Base) = 0000.20 ft

HMA MIN. Depth (selected) = 0000.20 ft

Note: Positive Residual GE indicates over-design.
Note: Negative Safety Factor in Base

HMA ft	TPB ft	T-Base ft	B-Base ft	Subbase ft	Res-GE ft	Cost $/y^2	HMA-GF ft
00.70	00.00	00.35	00.00	00.00	-00.02	0000.00	02.02
00.75	00.00	00.35	00.00	00.00	00.11	0000.00	02.06

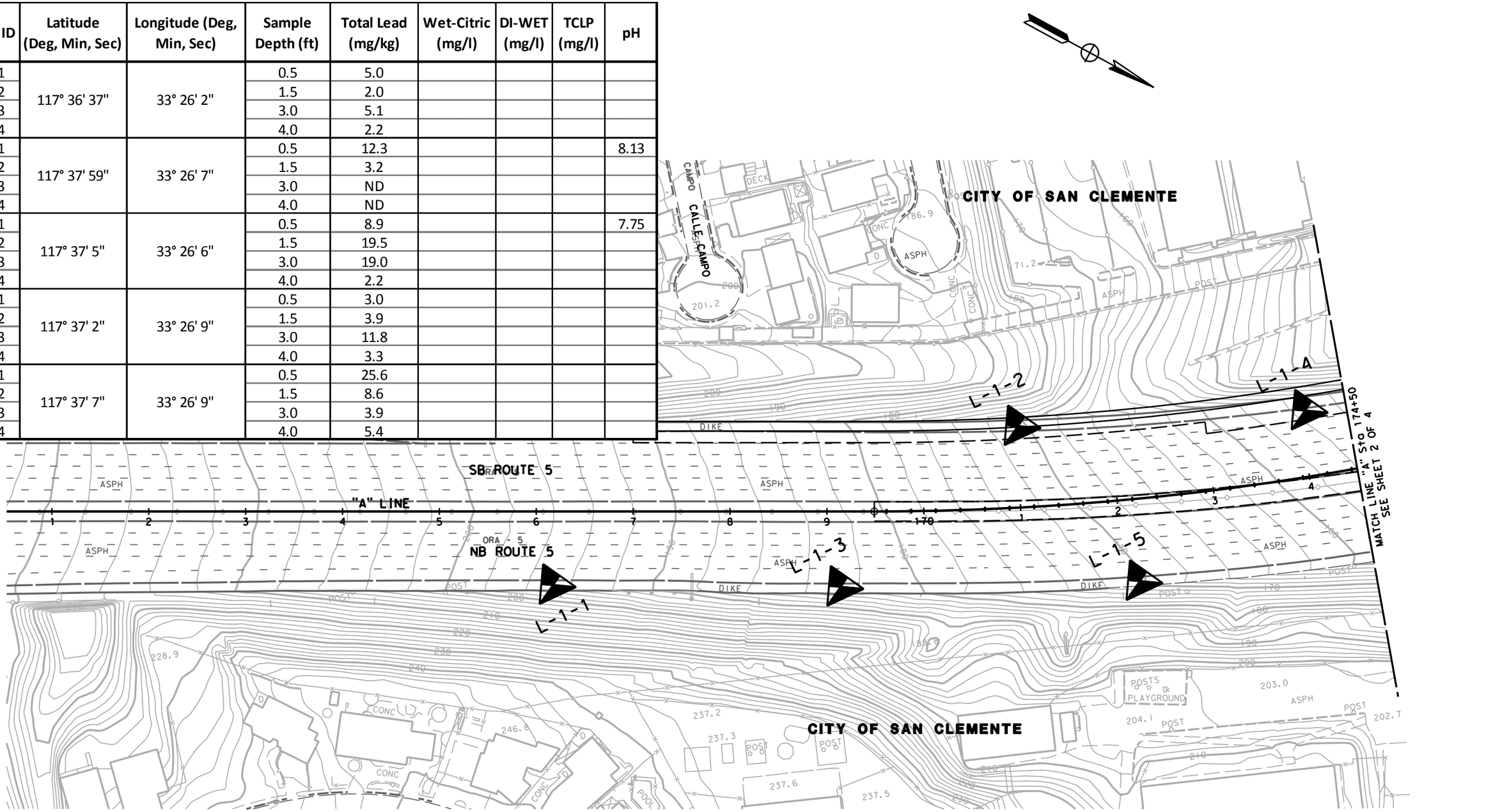
00.80	00.00	00.35	00.00	00.00	00.25	0000.00	02.11
00.85	00.00	00.35	00.00	00.00	00.39	0000.00	02.15
00.90	00.00	00.35	00.00	00.00	00.53	0000.00	02.19

***** FINISH *****

Clients want to use 1' HMA, so recommend

1' HMA over 0.35' min. Class 2 AB

Sample ID	Latitude (Deg, Min, Sec)	Longitude (Deg, Min, Sec)	Sample Depth (ft)	Total Lead (mg/kg)	Wet-Citric (mg/l)	DI-WET (mg/l)	TCLP (mg/l)	pH
L-1-1-1	117° 36' 37"	33° 26' 2"	0.5	5.0				
L-1-1-2			1.5	2.0				
L-1-1-3			3.0	5.1				
L-1-1-4			4.0	2.2				
L-1-2-1	117° 37' 59"	33° 26' 7"	0.5	12.3				8.13
L-1-2-2			1.5	3.2				
L-1-2-3			3.0	ND				
L-1-2-4			4.0	ND				
L-1-3-1	117° 37' 5"	33° 26' 6"	0.5	8.9				7.75
L-1-3-2			1.5	19.5				
L-1-3-3			3.0	19.0				
L-1-3-4			4.0	2.2				
L-1-4-1	117° 37' 2"	33° 26' 9"	0.5	3.0				
L-1-4-2			1.5	3.9				
L-1-4-3			3.0	11.8				
L-1-4-4			4.0	3.3				
L-1-5-1	117° 37' 7"	33° 26' 9"	0.5	25.6				
L-1-5-2			1.5	8.6				
L-1-5-3			3.0	3.9				
L-1-5-4			4.0	5.4				



Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)

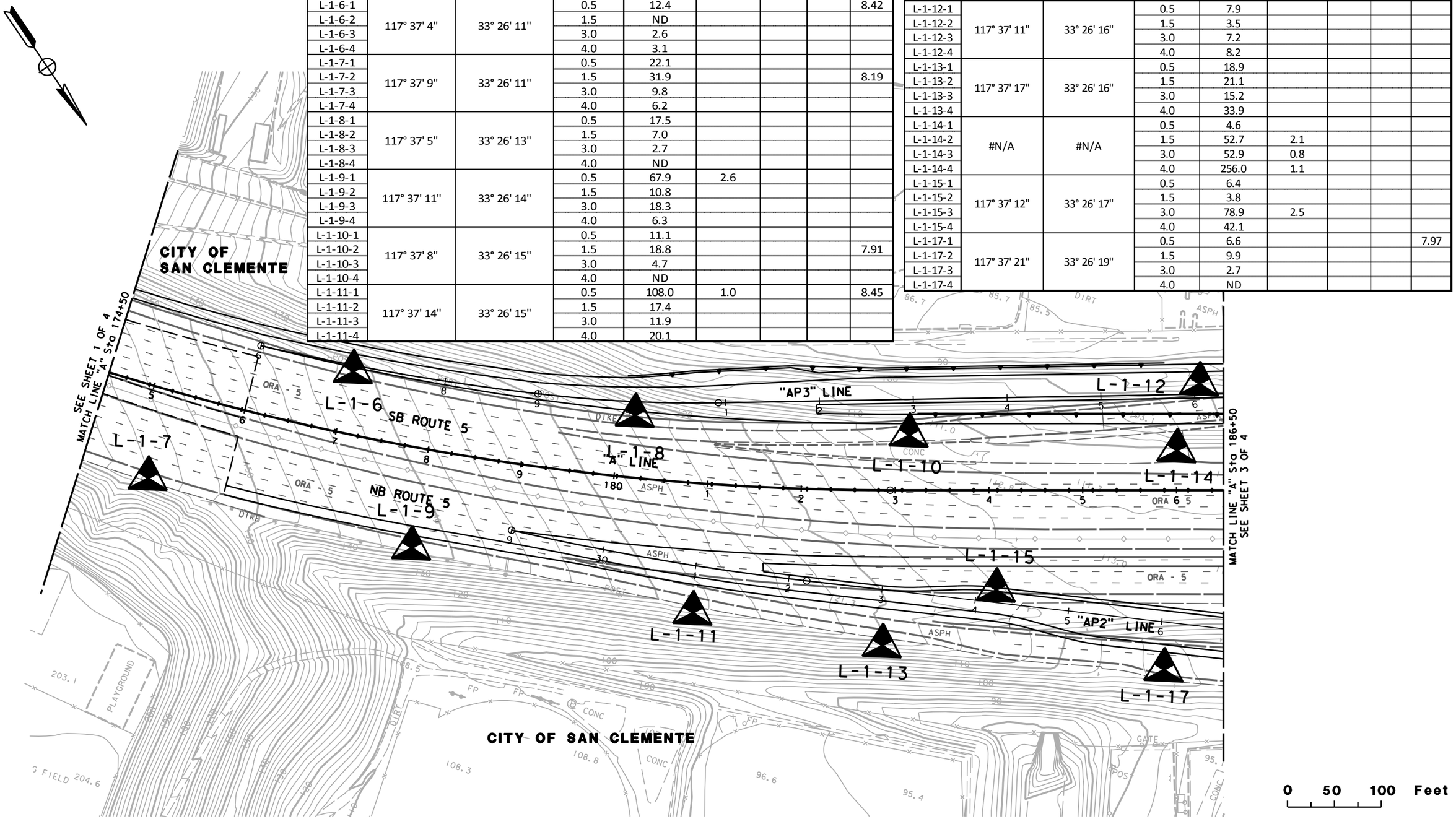
Project No.: 11-135 | **Date: 03-14-2012**

Exploratory Boring Location Map (1 of 4) for ADL Study

Figure 2

Sample ID	Latitude (Deg, Min, Sec)	Longitude (Deg, Min, Sec)	Sample Depth (ft)	Total Lead (mg/kg)	Wet-Citric (mg/l)	DI-WET (mg/l)	TCLP (mg/l)	pH
L-1-6-1	117° 37' 4"	33° 26' 11"	0.5	12.4				8.42
L-1-6-2			1.5	ND				
L-1-6-3			3.0	2.6				
L-1-6-4			4.0	3.1				
L-1-7-1	117° 37' 9"	33° 26' 11"	0.5	22.1				
L-1-7-2			1.5	31.9				8.19
L-1-7-3			3.0	9.8				
L-1-7-4			4.0	6.2				
L-1-8-1	117° 37' 5"	33° 26' 13"	0.5	17.5				
L-1-8-2			1.5	7.0				
L-1-8-3			3.0	2.7				
L-1-8-4			4.0	ND				
L-1-9-1	117° 37' 11"	33° 26' 14"	0.5	67.9	2.6			
L-1-9-2			1.5	10.8				
L-1-9-3			3.0	18.3				
L-1-9-4			4.0	6.3				
L-1-10-1	117° 37' 8"	33° 26' 15"	0.5	11.1				
L-1-10-2			1.5	18.8				7.91
L-1-10-3			3.0	4.7				
L-1-10-4			4.0	ND				
L-1-11-1	117° 37' 14"	33° 26' 15"	0.5	108.0	1.0			8.45
L-1-11-2			1.5	17.4				
L-1-11-3			3.0	11.9				
L-1-11-4			4.0	20.1				

Sample ID	Latitude (Deg, Min, Sec)	Longitude (Deg, Min, Sec)	Sample Depth (ft)	Total Lead (mg/kg)	Wet-Citric (mg/l)	DI-WET (mg/l)	TCLP (mg/l)	pH
L-1-12-1	117° 37' 11"	33° 26' 16"	0.5	7.9				
L-1-12-2			1.5	3.5				
L-1-12-3			3.0	7.2				
L-1-12-4			4.0	8.2				
L-1-13-1	117° 37' 17"	33° 26' 16"	0.5	18.9				
L-1-13-2			1.5	21.1				
L-1-13-3			3.0	15.2				
L-1-13-4			4.0	33.9				
L-1-14-1	#N/A	#N/A	0.5	4.6				
L-1-14-2			1.5	52.7	2.1			
L-1-14-3			3.0	52.9	0.8			
L-1-14-4			4.0	256.0	1.1			
L-1-15-1	117° 37' 12"	33° 26' 17"	0.5	6.4				
L-1-15-2			1.5	3.8				
L-1-15-3			3.0	78.9	2.5			
L-1-15-4			4.0	42.1				
L-1-17-1	117° 37' 21"	33° 26' 19"	0.5	6.6				7.97
L-1-17-2			1.5	9.9				
L-1-17-3			3.0	2.7				
L-1-17-4			4.0	ND				



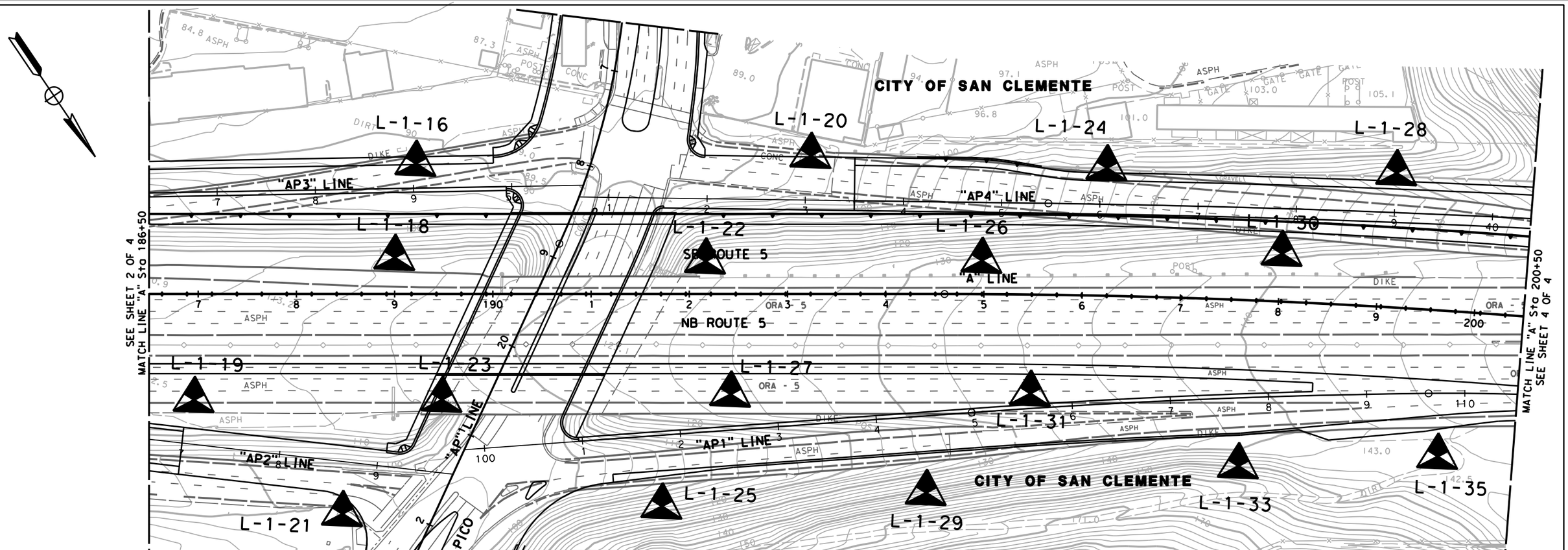
Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)

Project No.: 11-135 | **Date: 03-14-2012**

Exploratory Boring Location Map (2 of 4) for ADL Study

Figure 3



Sample ID	Latitude (Deg, Min, Sec)	Longitude (Deg, Min, Sec)	Sample Depth (ft)	Total Lead (mg/kg)	Wet-Citric (mg/l)	DI-WET (mg/l)	TCLP (mg/l)	pH
L-1-16-1	117° 37' 13"	33° 26' 18"	0.5	18.7				8.21
L-1-16-2			1.5	14.2				
L-1-16-3			3.0	2.2				
L-1-16-4			4.0	ND				
L-1-18-1	117° 37' 15"	33° 26' 19"	0.5	27.7				
L-1-18-2			1.5	15.3				
L-1-18-3			3.0	22.3				
L-1-18-4			4.0	21.6				
L-1-19-1	117° 37' 20"	33° 26' 19"	0.5	91.1	3.9			
L-1-19-2			1.5	41.1				8.48
L-1-19-3			3.0	12.4				
L-1-19-4			4.0	2.7				
L-1-20-1	117° 37' 16"	33° 26' 20"	0.5	5.7				8.04
L-1-20-2			1.5	2.3				
L-1-20-3			3.0	2.4				
L-1-20-4			4.0	2.2				
L-1-21-1	117° 37' 25"	33° 26' 20"	0.5	4.0				
L-1-21-2			1.5	5.6				
L-1-21-3			3.0	ND				
L-1-21-4			4.0	ND				
L-1-22-1	117° 37' 17"	33° 26' 20"	0.5	18.2				
L-1-22-2			1.5	30.2				
L-1-22-3			3.0	21.7				
L-1-22-4			4.0	17.5				

Sample ID	Latitude (Deg, Min, Sec)	Longitude (Deg, Min, Sec)	Sample Depth (ft)	Total Lead (mg/kg)	Wet-Citric (mg/l)	DI-WET (mg/l)	TCLP (mg/l)	pH
L-1-23-1	117° 37' 23"	33° 26' 20"	0.5	9.3				
L-1-23-2			1.5	9.7				
L-1-23-3			3.0	41.3				
L-1-23-4			4.0	18.4				
L-1-24-1	117° 37' 18"	33° 26' 21"	0.5	9.6				
L-1-24-2			1.5	8.7				
L-1-24-3			3.0	10.4				
L-1-24-4			4.0	8.8				
L-1-25-1	117° 37' 27"	33° 26' 22"	0.5	22.1				7.68
L-1-25-2			1.5	16.4				
L-1-25-3			3.0	3.2				
L-1-25-4			4.0	ND				
L-1-26-1	117° 37' 20"	33° 26' 22"	0.5	4.3				8
L-1-26-2			1.5	3.0				
L-1-26-3			3.0	2.1				
L-1-26-4			4.0	7.3				
L-1-27-1	117° 37' 25"	33° 26' 21"	0.5	51.6	1.7			
L-1-27-2			1.5	17.9				8.51
L-1-27-3			3.0	8.2				
L-1-27-4			4.0	11.5				
L-1-28-1	117° 37' 21"	33° 26' 24"	0.5	ND				
L-1-28-2			1.5	ND				8.87
L-1-28-3			3.0	ND				
L-1-28-4			4.0	2.4				

Sample ID	Latitude (Deg, Min, Sec)	Longitude (Deg, Min, Sec)	Sample Depth (ft)	Total Lead (mg/kg)	Wet-Citric (mg/l)	DI-WET (mg/l)	TCLP (mg/l)	pH
L-1-29-1	117° 37' 30"	33° 26' 23"	0.5	19.8				
L-1-29-2			1.5	14.5				
L-1-29-3			3.0	3.5				
L-1-29-4			4.0	7.2				
L-1-30-1	117° 37' 23"	33° 26' 24"	0.5	21.6				
L-1-30-2			1.5	2.9				
L-1-30-3			3.0	6.2				
L-1-30-4			4.0	ND				
L-1-31-1	117° 37' 28"	33° 26' 23"	0.5	32.4				
L-1-31-2			1.5	4.9				
L-1-31-3			3.0	7.8				
L-1-31-4			4.0	39.0				
L-1-33-1	117° 37' 33"	33° 26' 25"	0.5	108.0	1.5			7.61
L-1-33-2			1.5	335.0	23.8	ND	0.18	
L-1-33-3			3.0	25.3				
L-1-33-4			4.0	3.7				
L-1-35-1	117° 37' 32"	33° 26' 26"	0.5	12.9				
L-1-35-2			1.5	19.6				
L-1-35-3			3.0	4.7				
L-1-35-4			4.0	7.6				

0 50 100 Feet

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

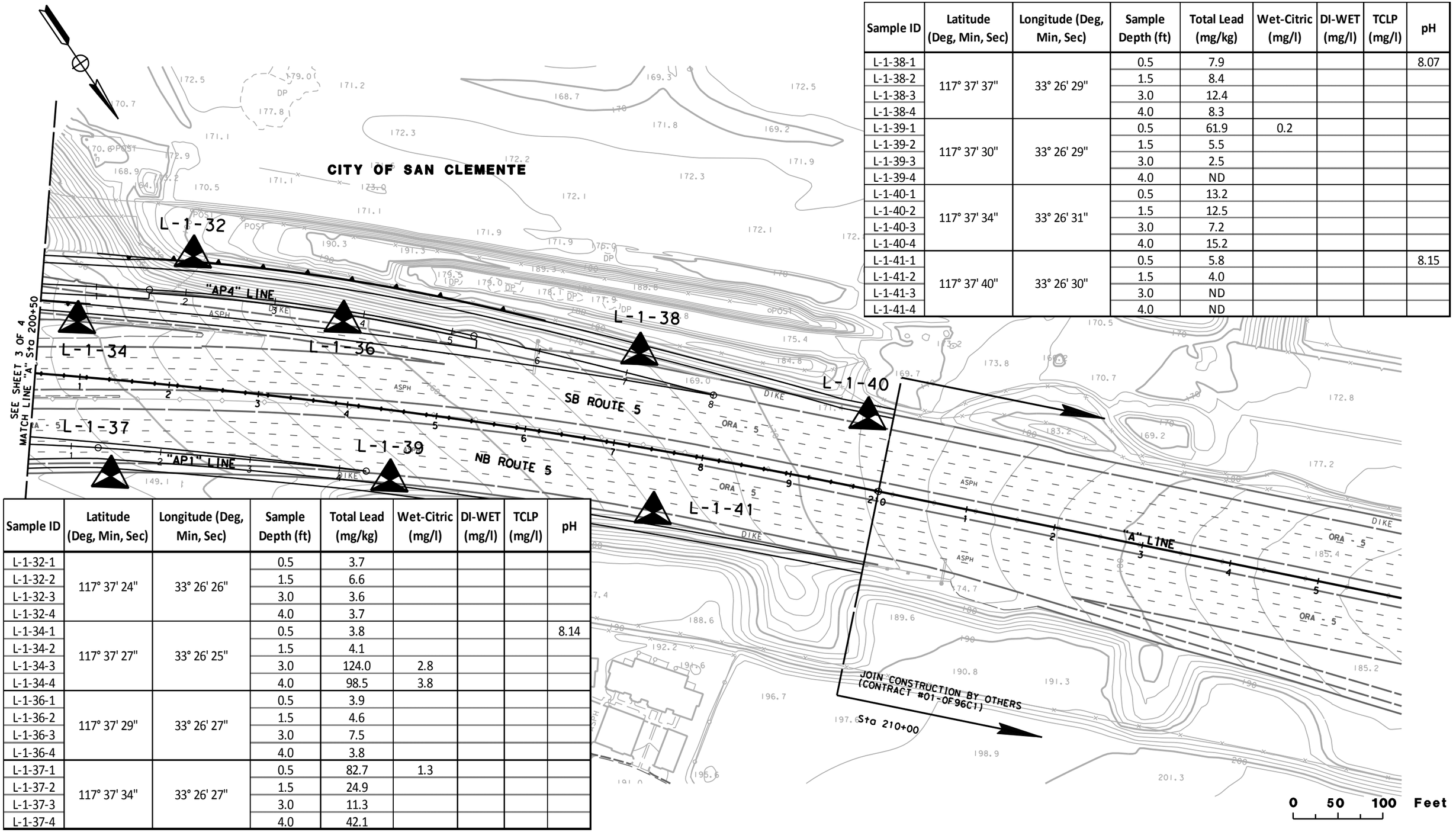
INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)

Project No.: 11-135

Date: 03-14-2012

Exploratory Boring Location Map (3 of 4) for ADL Study

Figure 4



Sample ID	Latitude (Deg, Min, Sec)	Longitude (Deg, Min, Sec)	Sample Depth (ft)	Total Lead (mg/kg)	Wet-Citric (mg/l)	DI-WET (mg/l)	TCLP (mg/l)	pH
L-1-38-1	117° 37' 37"	33° 26' 29"	0.5	7.9				8.07
L-1-38-2			1.5	8.4				
L-1-38-3			3.0	12.4				
L-1-38-4			4.0	8.3				
L-1-39-1	117° 37' 30"	33° 26' 29"	0.5	61.9	0.2			
L-1-39-2			1.5	5.5				
L-1-39-3			3.0	2.5				
L-1-39-4			4.0	ND				
L-1-40-1	117° 37' 34"	33° 26' 31"	0.5	13.2				
L-1-40-2			1.5	12.5				
L-1-40-3			3.0	7.2				
L-1-40-4			4.0	15.2				
L-1-41-1	117° 37' 40"	33° 26' 30"	0.5	5.8				8.15
L-1-41-2			1.5	4.0				
L-1-41-3			3.0	ND				
L-1-41-4			4.0	ND				

Sample ID	Latitude (Deg, Min, Sec)	Longitude (Deg, Min, Sec)	Sample Depth (ft)	Total Lead (mg/kg)	Wet-Citric (mg/l)	DI-WET (mg/l)	TCLP (mg/l)	pH
L-1-32-1	117° 37' 24"	33° 26' 26"	0.5	3.7				
L-1-32-2			1.5	6.6				
L-1-32-3			3.0	3.6				
L-1-32-4			4.0	3.7				
L-1-34-1	117° 37' 27"	33° 26' 25"	0.5	3.8				8.14
L-1-34-2			1.5	4.1				
L-1-34-3			3.0	124.0	2.8			
L-1-34-4			4.0	98.5	3.8			
L-1-36-1	117° 37' 29"	33° 26' 27"	0.5	3.9				
L-1-36-2			1.5	4.6				
L-1-36-3			3.0	7.5				
L-1-36-4			4.0	3.8				
L-1-37-1	117° 37' 34"	33° 26' 27"	0.5	82.7	1.3			
L-1-37-2			1.5	24.9				
L-1-37-3			3.0	11.3				
L-1-37-4			4.0	42.1				

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)

Project No.: 11-135 | Date: 03-14-2012

Exploratory Boring Location Map (4 of 4) for ADL Study

Figure 5

SITE INVESTIGATION REPORT
AVENIDA PICO IMPROVEMENT AT I-5 FREEWAY PS&E
524 AND 530 AVENIDA PICO
SAN CLEMENTE, CALIFORNIA
GDC PROJECT NUMBER I-540
CALTRANS EA#0F96A1

Prepared for

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
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Prepared by

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GDC Project No. I-540
June 15, 2012

GROUP DELTA CONSULTANTS

Certified MBE

Geotechnical Engineering
Geology
Hydrogeology
Earthquake Engineering
Materials Testing & Inspection
Forensic Services

June 15, 2012

Parsons Transportation Group, Inc.
2201 Dupont Dr # 200
Irvine, CA 92612

Attention: David Lew, P.E.

Subject: Site Investigation Report
Avenida Pico Improvement at I-5 Freeway PS&E
530 and 524 Avenida Pico
San Clemente, California
GDC Project Number I-540
Caltrans EA#0F96A1

Dear David,

Group Delta Consultants, Inc. is pleased to submit this report of the Site Investigation for the Avenida Pico and Interstate 5 (I-5) Freeway improvement project in the City of San Clemente, Orange County, California. The project location is presented in Figure 1.

The Avenida Pico project is part of a larger I-5 Freeway improvement project extending from Avenida Pico to San Juan Creek Road. The Initial Site Assessment (ISA) Report for the overall project was prepared by Kleinfelder in 2010. This Site investigation was performed for the two properties proposed for full acquisition. The two properties are: 1) 524 Avenida Pico, currently a Burger Stop; and, 2) 530 Avenida Pico, currently a Shell gas station.

A Limited Phase II Environmental Site Assessment Report for the Shell Station at 530 Avenida Pico was prepared by Kleinfelder in 2011. Focus of this Site investigation was on areas of the Shell Station not covered during the previous investigation conducted on that property. The adjacent Burger Stop was not investigated by Kleinfelder. Project history and the results of the field and laboratory testing are presented in the report.

Should you have any questions regarding this report, please feel free to call us at 949-450-2100.

Yours Sincerely,
GROUP DELTA CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
VESNA GLISIC PETRILLA
No. 70907
Exp. 6-30-2013
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LIST OF ACRONYMS

ACM	Asbestos Containing Materials
ADL	Aerially Deposited Lead
AETL	American Environmental Testing Laboratory, Inc.
bgs	Below The Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene And Xylenes
Caltrans	California Department Of Transportation
CDHSELA	California Department Of Health Services Environmental Laboratory Accreditation Program
CFC	Chlorofluorocarbon
EPA	Environmental Protection Agency
ESL	Environmental Screening Level
HOV	High Occupancy Vehicle
LBP	Lead Based Paint
LPH	Liquid Phase Hydrocarbons
LUST	Leaking Underground Storage Tank
MTBE	Methyl-Tert-Butyl-Ether
OCHCA	Orange County Health Care Agency
OCHCA	Orange County Health Care Agency
OCTA	Orange County Transportation Authority
OEHHA	Office Of Environmental Health Hazard Assessment
PCB	Polychlorinated Biphenyls
PID	Photo Ionization Detector
PLM	Polarized Light Microscopy
PM	Post Mile
ROW	Right-Of-Way
SDG&E	San Diego Gas & Electric
TCE	Temporary Construction Easement
TPH-d	Total Petroleum Hydrocarbons As Diesel
TPHg	Total Petroleum Hydrocarbons As Gasoline
UC	Undercrossing
UST	Underground Storage Tanks
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
VOC	Volatile Organic Compounds
XRF	X-Ray Fluorescence

1.0 PROJECT DESCRIPTION

Interstate 5/Avenida Pico improvement is part of the larger project on I-5 from 0.4 mile south of the Avenida Pico Undercrossing (UC) (Post Mile [PM] 3.0) to 0.1 mile south of the San Juan Creek Road UC (PM 8.7). The project is led by the Orange County Transportation Authority (OCTA), in cooperation with the California Department of Transportation (Caltrans), the City of Dana Point, the City of San Clemente and the City of San Juan Capistrano. The proposed overall project will add one high occupancy vehicle (HOV) lane in both directions on Interstate 5 throughout the project limits, reestablish existing auxiliary lanes, construct new auxiliary lanes, and improve several existing on-and off-ramps to address traffic demand and improve operations and safety.

The proposed improvements at the Interstate 5/Avenida Pico interchange include realignment of the on and off-ramps at Avenida Pico and widening the northbound on-ramp to three lanes. The overall configuration of the interchange would be similar to the existing configuration. Additionally, Avenida Pico will be improved under the structure to provide dual left-turn lanes to both the northbound and southbound on-ramps. Avenida Pico UC will be replaced and widened as part of the project. The geometry of Avenida Pico will also be improved on the east side of Interstate 5 to improve the existing reversing curves. Bicycle lanes and standard outside shoulders will be provided throughout the majority of the interchange in both the eastbound and westbound directions. Sidewalk will be provided through the interchange in the eastbound direction. In the westbound direction, space will be provided to accommodate future construction of a 12-foot wide lane and sidewalk through the interchange. Site improvements map is presented in Figure 2a.

OCTA proposes to fully acquire two properties adjacent to the Interstate 5/Avenida Pico Interchange, identified as the existing Shell Station and Burger Stop properties. Location of the properties is shown in Figure 3. Proposed new Right-of-Way (ROW) improvement extends partially into the acquisition properties; the reminder of the properties will be considered excess property. The anticipated soil disturbance at these properties will generally be limited to the upper 5 feet. In addition to the two full acquisitions, partial ROW acquisition includes a 4 to 9-foot wide strip of a Post Office street frontage, and a Temporary Construction Easement (TCE), which includes a 4-foot wide strip of the Post office, and portion of the St. Andrews by The Sea Church, *see* Figure 2b.

Based on the Caltrans memo dated November 18, 2010 and information collected from the City of San Clemente web site, presented below are the details for the full acquisition properties:

APN	Area Impacted (ft^2)	Nonresidential, Single Business Retail	Address	Building Footage (ft^2)	Year Built
057-013-09	16,500	Shell Station	530 Avenida Pico	1,381	1964
057-013-10	5,600	Burger Stop	524 Avenida Pico	744	1966

2.0 SITE HISTORY AND PREVIOUS INVESTIGATION

Group Delta performed an on-line search of the available files for both of the proposed ROW acquisition properties, and in house file review of the Orange County Health Care Agency (OCHCA) available documents. Summary of Group Delta's file review and information relating to property history is presented below.

2.1 Burger Stop Property at 524 Avenida Pico

Group Delta's data search did not review any existing reports for the property at 524 Avenida Pico. Based on the information presented on the City of San Clemente web site, the property building was first constructed in 1966.

2.2 Shell Station Property at 530 Avenida Pico

Parsons provided several existing reports for the Shell Station property. In addition we visited and reviewed available files in the OCHCA. Copies of the reviewed documents are presented in Appendix C.

Presented below is a review of Site's history based on the available recorded Site environmental entries:

- June 10, 1985 dated as-build plans show presence of two (2) dispenser islands oriented parallel to Avenida Pico and four (4) Underground Storage Tanks (USTs) located in the mid-west portion of the property, east of its current location, and a waste oil tank on the north side of the USTs.
- Report dated December 6, 1996: Fluor Daniel prepared a Work Plan for observation of the removal of the waste oil tank, dispenser islands and product lines. Work plan proposed to perform air monitoring and to segregate the soil excavated with a backhoe to separate clean and impacted areas based on the PID readings. Confirmation soil samples, collected from the base of the excavation were proposed. These samples were to be analyzed for Total Petroleum Hydrocarbons as gasoline (TPHg), benzene, toluene, ethylbenzene, total xylenes using a mobile laboratory at the site. The removal was proposed to begin on December 9, 1996.
- December 11, 1996: Underground tank removal form prepared by the Orange County Health Care Agency shows that sampling of a soil from the pile and excavation of a 550-gallon fiberglass coated steel waste tank was performed that day.
- Report dated December 18, 1996: Fluor Daniel prepared a work plan for performing investigations at five locations using a Geoprobe. The work plan

indicates that fuel contaminated soils were encountered at approximately 17-feet below the ground surface (bgs) at the southernmost dispenser island during backhoe exploration on December 13, 1996, and Liquid Phase Hydrocarbons (LPH) were encountered in the piping trench along the northernmost island during December 9, 1996 product line removal. The work plan proposed to collect samples every 5 feet and test samples in the mobile laboratory. The drilling was scheduled to start on December 19, 1996. Figure 1 shows sketch location of the test trenches excavated during waste oil tank, dispenser islands and product lines removal and approximate location of the grab soil samples.

- Report dated January 9, 1997: Fluor Daniel prepared a Work Plan for installation of three (3) monitoring wells. The drilling was scheduled to start on January 14, 1997. Figure 1 shows proposed well location and location of the five Geoprobes and grab soil sample locations with TPHg test results.
- Report dated April 30, 1997: Fluor Daniel prepared a Site Assessment report summarizing tank and product piping removal and subsurface environmental investigation at the Site. The report states that in the 1980's an old steel gasoline UST and steel product lines were replaced with double-wall fiberglass tanks and single wall fiberglass piping. The single wall pipes were replaced with a double wall fiberglass piping in December 1996. One fiberglass 550-gallon waste oil UST, one concrete clarifier and two self-contained hydraulic hoists were removed on December 1996 and were not replaced.

  The report summary is as follows:

  1. Five (5) soil samples S1 to S5 and one (1) LPH sample- P1 were collected from beneath the former product lines.
  2. Three (3) soil samples were collected from beneath the waste oil UST during removal.
  3. Six (6) soil samples S6 to S10 were collected from the trenches near the east ends of the former dispenser islands and tested for TPH-g, TPH-d and Benzene, Toluene, Ethylbenzene and Xylenes (BTEX). Analytical results show TPH-g concentrations in soil up to 25,000 mg/kg beneath the east end of the former south dispenser island. LPH were observed in a shallow excavation in the east end of the former north dispenser island and were removed. The area near the southern dispenser island was excavated 5-10 feet bgs. The soil cleanup criterion used was Photo Ionization Detector (PID) readings of 100 ppm. Impacted soil was replaced by non-impacted on-site soil and clean soil fill was imported to make up the balance. The backfill was compacted as engineered fill. Soils with higher Volatile Organic Compounds (VOC) readings were

stockpiled on site and transported off-site for disposal. Approximately 100 cubic yards of soil was disposed off site as non-hazardous waste.

4. Six (6) Geoprobe borings were drilled at the site on December 19 and 23, 1996 (B-1 to B-6). Soil samples were collected at 5 feet intervals and tested for TPHg, TPHd, and BTEX. Soil samples with the highest TPHg concentrations were tested for Methyl-Tert-Butyl-Ether (MTBE). Soil with TPHg concentrations of more than 100 mg/kg is present between approximately 5- and 42-feet bgs near the former southern dispenser island.
5. Three monitoring wells MW-1 to MW-3 were installed at the site on January 21, 1997 to 46.5-feet bgs. Wells MW-2 and MW-3 are screened from 5- to 25-feet and from 30- to 45-feet bgs allowing collection of soil vapor and groundwater samples. The upper screen interval was in the vadose zone and was installed for possible vapor pilot testing. Soil samples were collected at 5-feet intervals. Groundwater samples were collected from each well after well purging. Groundwater samples were also collected in borings B1, B2 and B5. Soil and groundwater samples were tested for TPHg, TPHd, BTEX and MTBE. Benzene concentrations of up to 1,721µg/L were present in the site's groundwater. The plume was centered near the former dispenser islands at flowed at a gradient of 0.004feet/feet to beneath Avenida Pico. A plume isoconcentration map is presented as part of the report.

   TPHg concentrations ranged between <100 to up to 326,723 µg/L. Total BTEX ranged from 1.5 to 132,559 µg/L. Soils estimated to contain TPHg in concentrations greater than 100 mg/kg were expected to be found within 11-14 feet from MW-2 and to extend from 5- to 42-feet bgs.

- Report dated September 30, 1997: Alton Geosciences prepared a quarterly groundwater monitoring report for the groundwater sampling performed in July 1997. Concentrations of TPH-g and BTEX in MW-2 and MW-3 decreased by 50% compared to groundwater impacts detected in January 1997. MTBE concentrations increased. No contaminants were encountered in MW-1.
- Report dated January 16, 1998: Fluor Daniel summarized findings of the quarterly groundwater testing performed by Alton Geosciences in October 1997. Concentrations of TPH-g and BTEX were generally lower than groundwater concentrations measured in July 1997. No contaminants were encountered in MW-1.
- Report dated April 10, 2000: Equiva Services LLC on behalf of WGR Southwest, Inc, prepared a work plan for the Site Assessment at the property. They

proposed to advance four geoprobes at the site to collect soil and groundwater samples for analytical testing.

- Report dated July 17, 2000: WGR Southwest, Inc prepared a Site Assessment report. They advanced four geoprobe borings, WGR-1 to WGR-4, to depths ranging from 45- to 51-feet bgs and collected soil and groundwater samples. Borings were advanced to further delineate the down-gradient extent of the groundwater contamination. Three borings (WGR-1, WGR-2 and WGR-3) were located along the south property line and one boring (WGR-4) was located on the west side of the USTs. Soil and groundwater were tested for TPHg, TPHd, BTEX and MTBE. All samples had non-detectable concentrations of the analytes with exception of WGR-4 at 40-feet bgs with measured MTBE concentration of 31µg/L.
- Report dated October 18, 2000: WGR Southwest, Inc. prepared a Quarterly Groundwater monitoring report.
- Letter dated May 8, 2001: WGR Southwest, Inc prepared a letter to the OCHCA requesting a closure of the open Leaking Underground Storage Tank (LUST) case and completion of the groundwater monitoring.
- Report dated November 1, 2001: WGR Southwest, Inc prepared a groundwater monitoring report for groundwater data collected on September 26, 2001. Actual laboratory data was not available for review. Reportedly, MW-3 had concentrations of TPH-g of 21,000 µg/L and benzene in concentrations of 6,000 µg/L. The maximum MTBE concentration of 130 µg/L was recorded in MW-1. Groundwater flow was to the south.
- May 6, 2002 Ambience Engineering Services prepared set of drawings for replacement of the USTs. According to the letter, Shell is proposed to remove the existing four 10,000 gallons USTs and replace them with three tanks: one 10,000-gallons, one 12,000-gallons, and the third a 20,000-gallons double fiberglass wall Underground Storage Tanks (USTs).
- September 11, 2002 Orange County Health Care Agency issued a Case Closure letter. A leaking underground tank case closure summary issued in November 14, 2001, summarizes releases that occurred at the Site, and refers to the residual contamination discovered during removal of dispenser islands in 1996, as reported by Fluor Daniel. The letter notes that there is an estimated 10,000 lb of gasoline remaining in the soil at the Site. A fire and explosion survey was conducted and no detectable levels of vapors were discovered in utility vaults, storm drains or other enclosed areas that were surveyed.

Groundwater contamination at the Site is acknowledged, however it was stated that the Site is located in a groundwater basin that is excluded from all beneficial use designations. There are no municipal wells, and the local water

district has no current plans to develop the groundwater resources in this area. The groundwater contamination did not represent a threat to the ocean located about 3,700 feet to the southwest or the Segunda Deshecha concrete-lined stream channel located about 530 feet down gradient. The report concludes that the remaining soil and groundwater contamination is stable and the groundwater contamination did not pose a threat to public health and safety. A closure of the case was requested. No groundwater monitoring appears to have been conducted since the request for closure.

- September 23, 2003 Wayne Perry Inc. prepared a letter of tank removal and replacement. This work is the implementation of the plan prepared by Ambience Engineering Services in 2002. Soil samples were collected under dispensers, tanks and piping and tested for TPHg, TPHd and BTEX. All samples had non-detectable concentrations of the analytes. The removal was done under supervision of the OCHCA representative.
- May 1, 2007 URS Corporation prepared a Site Assessment report. Seven borings B01 to B07 were drilled on March 29 and 30, 2007 to depths ranging from 31.5-feet to 45-feet bgs. Borings were located on the south and north side of the dispenser islands. Soil samples were collected from each boring and groundwater samples were collected from 3 borings. Samples were tested for TPHg, TPHd, BTEX and fuel oxygenates. TPHg and TPHd were detected in concentration of 420mg/kg in soil samples in boring B02 near the eastern UST at 40-feet bgs. Groundwater was encountered at 40-feet bgs in boring B02. MTBE were detected in concentration ranging from 130 to 520 µg/kg in B02 at depths 25-40 feet bgs, boring B03 at 30-35 feet bgs in concentration ranging from 13 to 53 µg/kg, and boring B07 at 30-30 feet bgs in concentration ranging from 5.1 to 24 µg/kg. Groundwater sample collected from boring B02 showed benzene level of 10 µg/kg, TPHg levels of 5,800 µg/kg, total BTEX level of 815 µg/kg and TPHd level at 1,600. Groundwater collected from boring B03 showed TPHg level at 3,600 µg/kg, and TPHd at 100 µg/kg. All detected levels were reported to be lower than the Environmental Screening Levels published by the Regional Groundwater Quality Control Board.
- August 16, 2011 Kleinfelder prepared Limited Phase II Site Investigation Report. Nine soil borings were advanced to 30-feet bgs. Soil samples were collected every 5 feet and tested for TPHg, TPHd, BTEX and MTBE. All samples had non-detectable concentrations of the analytes. Groundwater was not encountered during the investigation (up to the total depth of 30 feet.)

A complete list of the reviewed documents is presented in the reference Section 10.0 of this report.

2.2.1 Review Summary for Shell Station Property at 530 Avenida Pico

The Site has been used as a gas station since prior to 1980. The project ISA report dates use of this property back to the 1930 time period. During the 1980's, an old steel gasoline UST and steel product lines were replaced with double wall fiberglass UST and single wall fiberglass lines. In December of 1996 the existing dispenser islands, single wall product lines and the waste oil tank were removed, and new dispenser islands and piping were installed. Upon removal, soil contamination with TPH-g, BTEX and MTBE was encountered up to about 17-feet bgs near the east end of the former south dispenser island, and LPH were observed near the east end of the former north dispenser island. LPH was removed. Contamination near the southern dispenser island below 5-10 feet was left in place. In January 1997, Fluor Daniel advanced six geoprobe borings and installed three monitoring wells to further investigate potential site impacts. It was concluded that contamination was localized near the former south dispenser islands and was estimated to extend to groundwater. A LUST case was opened with the OCHCA. Impacts were detected in two monitoring wells located near the south dispenser island. Groundwater monitoring was performed over the next three years. Concentrations of TPH-g, BTEX and MTBE in groundwater were significantly reduced during the period of monitoring. In 2002 the open LUST case was closed by OCHCA. The closure letter dated September 11, 2002 notes that there is an estimated 10,000 lb of gasoline remaining in the soil at the Site. A fire and explosion survey was conducted and no detectable levels of vapors were discovered in utility vaults, storm drains etc. There are no municipal wells, and the local water district has no current plans to develop the groundwater resources in this area. It does not appear that the contamination would affect the ocean or the Segunda Deshecha concrete lined stream channel located about 530 feet down gradient from the site. The report concludes that the remaining soil and groundwater contamination is stable and not expanding, and because groundwater contamination does not pose a threat to public health and safety of groundwater, it was permitted to remain with the Site and the case be closed.

Four existing USTs were removed in September 2003 and three new double wall fiberglass USTs were installed and are still in place. No soil contamination was encountered during the UST removal.

Field investigations and collection of soil sampling were performed after the LUST case closure in 2000 by WGR, in 2007 by URS Corp and in 2011 by Kleinfelder. All borings were advanced to 30 to 40 feet-bgs. No soil or groundwater contamination exceeding the published Environmental Screening Levels (ESLs) was detected in any of these borings. Boring locations are presented in Figure 3.

3.0 SCOPE OF WORK

Group Delta's scope of work generally followed recommendations presented in the project ISA report dated August 18, 2010, prepared by Kleinfelder for the Interstate 5 HOV Extension. Group Delta's scope was aimed in addressing gaps or items not already covered during the previous Site Investigations.

Group Delta's review of the project ISA report dated August 18, 2010 was focused on the full acquisition properties located at 530 and 524 Avenida Pico, and recommendations for mitigation of the project environmental concerns.

Although not recommended to be tested in the ISA report, property located at 524 Avenida Pico (Burger Stop) is adjacent to the potentially contaminated property at 530 Avenida Pico (Shell gas station), and is also proposed for full acquisition. For this reason, testing at the 524 Avenida Pico property was incorporated in this SI.

The Kleinfelder ISA report recommendations are as follows:

1. Sampling for Aerially Deposited Lead (ADL) within unpaved locations adjacent to the existing roadway right-of-way within the study area;
2. Testing of yellow traffic stripes and pavement marking material;
3. Asbestos survey and sampling for existing bridges proposed to be demolished or modified;
4. Soil and groundwater investigation at 530 Avenida Pico;
5. A survey and sampling for asbestos, Lead Based Paint (LBP), Polychlorinated Biphenyls (PCB), mercury-, and chlorofluorocarbon (CFC)-containing equipment on building structures that are located within parcels that will be fully acquired.
6. Testing and sampling of the transformers that will be removed or relocated as part of the proposed project for PCBs;

Soil ADL and yellow LBP testing will be performed by others. The Asbestos Containing Materials (ACM) study for the Avenida Pico Bridge was already performed.

Group Delta's scope of work is defined as follows:

- Soil and groundwater investigation at the Shell Gas Station (530 Avenida Pico) and Burger Stop (524 Avenida Pico);
- Investigation of building materials for structures to be demolished at Shell Gas Station and Burger Stop for ACM and LBP, and mercury and CFC equipment on building structures at 524 and 530 Avenida Pico;

- Investigation of the transformers that are to be relocated;
- Laboratory analysis of collected samples; and,
- Preparation of the report.

4.0 SOIL AND GROUNDWATER INVESTIGATION

Although a Limited Site Assessment report was recently performed for 530 Avenida Pico properties, the depth of the field investigation borings was not adequate and did not extend into the groundwater. Caltrans expressed an interest to evaluate groundwater conditions based on the residual contamination showed during previous Site investigations.

Group Delta advanced six subsurface soil borings utilizing a direct-push geoprobe rig on March 26 and 27, 2012. All borings, labeled B-12-001 to B-12-006, were advanced to 45-feet bgs. Groundwater was encountered in all borings.

Three (3) 45-feet deep groundwater monitoring wells MW-1 to MW-3 installed by Fluor Daniel in 1997 were sampled. Groundwater levels were measured in borings and monitoring wells using a well sounder.

Location of borings and groundwater wells are presented in Figure 3. Also, shown in Figure 3 are locations of soil borings advanced by others. Current boring locations and locations of the monitoring wells are based on the field measurements performed on March 26 and 27, 2012. Location of the previous borings is based on the existing boring location plans.

Soil and groundwater investigation scope consisted of the following:

- Marking the exploration locations in the field and notifying Underground Service Alert of Southern California to clear the underground utilities.
- Core the pavement with a 4-inch concrete core barrel.
- Hand-auger the upper 5 feet using a 3-inch diameter steel auger to avoid interference with the underground utilities. The hand auger was clean and rinsed between borings by washing with a solution of Trisodium Phosphate followed by tap water and deionized water rinses. Excess water was collected in a 55-gallon drum.
- Advance six soil borings up to 45-feet bgs with a geoprobe at locations presented in Figure 3.
- Soil samples were collected every 5 feet with a 0.5 feet long vinyl liner, capped at both ends upon collection, and sealed with an evidence tape to prevent tampering during transport. Soil samples collected for VOC testing (Environmental Protection Agency (EPA) test method 8260B) were collected with a 5035 kit sampling method and placed in 40ml VOA vials.

- Prior to sealing the sample, a headspace reading of VOCs was recorded for each collected sample with a PID, as well as a pocket penetrometer reading for clayey soils. Low levels of VOCs were recorded in all borings except for B-12-003.
- All samples collected from B-12-003 and the hand auger cuttings in the upper 5 feet had strong petroleum odors. The PID readings from the B-12-003 samples ranged from 1,904 ppm at 5-feet to max 7,090 ppm at 15-feet bgs.
- All samples were stored on ice and transferred to the analytical laboratory within 24-hour period.
- Groundwater levels were measured using a well sounder in all borings during drilling. Groundwater was encountered after drilling at depths ranging from 35.5-feet and 42.7-feet bgs. Due to clayey nature of soils and low soil permeability, groundwater levels encountered in borings are considered non-stabilized. Between each use, the well sounder was decontaminated in a triple rinse as described for the hand-auger.
- Measuring groundwater in the existing on site wells MW-1, MW-2 and MW-3 and collecting groundwater samples. Groundwater was measured in the wells at depths ranging from 38.8-feet to 39.5-feet bgs. Prior to collecting groundwater samples, two volumes of water were removed from each well using a ¾-inch bailer. After each well, the bailer was decontaminated in a triple rinse as described for the hand-auger.
- Groundwater samples were collected from all Geoprobe borings in sample containers provided by the analytical laboratory. Groundwater recharge of boring B-12-004 was very slow and not enough groundwater could be collected for full suite of testing. All samples were stored on ice and transferred to the analytical laboratory within 24-hour period.
- Ten percent of collected soil and groundwater samples were field duplicate samples collected to measure precision of the field and analytical procedures.
- All borings were backfilled with bentonite chips and hydrated. Surface was patched with concrete.
- Soil collected during drilling was logged in accordance with the ASTM soil classification and record soil classifications and other field observation on a log of soil borings. Logs of soil borings are presented in Appendix A.
- A chain of custody form was filled out for all collected samples. Completed chain of custody forms are presented with the laboratory results in Appendix B.

The summary of field investigation is presented below:

	Date Drilled	Depth (feet)	Depth to Groundwater (feet)	Notes
B-12-001	3-26-2012	45	39.2	Unstabilized water level
B-12-002	3-26-2012	45	39.7	Unstabilized water level
B-12-003	3-27-2012	45	35.3	Unstabilized water level
B-12-004	3-27-2012	45	36.3	Unstabilized water level
B-12-005	3-27-2012	45	41.9	Unstabilized water level
B-12-006	3-26-2012	45	42.7	Unstabilized water level
MW-1	1-21-1997	45	38.8	Monitoring Well Installed by Fluor Daniel
MW-2	1-21-1997	45	39.5	Monitoring Well Installed by Fluor Daniel
MW-3	1-21-1997	45	39.3	Monitoring Well Installed by Fluor Daniel

5.0 LABORATORY TESTING

Collected soil and groundwater samples were transported to the American Environmental Testing Laboratory, Inc. (AETL), a chemical testing laboratory certified by the California Department of Health Services Environmental Laboratory Accreditation Program (CDHSELAP) for analytical testing.

Collected soil and groundwater samples were tested for:

1. Total Petroleum Hydrocarbons as Diesel (TPH-d) using EPA Test method 8015D;
2. Total Petroleum Hydrocarbons as Gasoline (TPH-g) using EPA Test method 8015G;
3. Volatile Organic Compounds (VOCs) including Benzene, Toluene, Ethyl benzene and Xylenes (BTEX), and Methyl-Tert-Butyl-Ether (MTBE);
4. CAM Title 22 metals using EPA test method 6010/7000CAM.

All test results are compared to Environmental Screening Levels (ESL) based on the publication by the California Regional Water Quality Control Board "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater", dated November 2007, and revised May 2008. Specifically, for the soil ESLs we referred to the Table D-2: Deep Soil Screening Levels (greater than 3 meters bgs) for Commercial/Industrial Land Use, (groundwater is not a current or potential drinking water resource). ESLs for groundwater are based on the Table F-1b: Groundwater Screening Levels (groundwater is not a current or potential drinking water resource).

5.1 Soil Laboratory Test Results

Soil samples from all borings, except from B-12-003, show no detectable levels of tested analytes, or show levels that are below the published ESLs. Therefore, they do not represent a risk and are not further discussed.

Contaminants were detected in boring B-12-003 from 5- to 38-feet below the ground surface. The PID readings recorded from samples collected at boring B-12-003 ranged from 1,904 ppm at 5-feet to 7,090 ppm at 15-feet bgs.

Presented below is a summary of the soil testing laboratory results for B-12-003:

- TPH-g levels for all B-12-003 samples are above the ESLs and range from 1,750 mg/Kg at 5-feet bgs to maximum 20,800 mg/Kg at 20-feet bgs.

- No significant levels of CAM Title 22 metals were encountered in any B-12-003 samples.
- No significant levels of MTBE were encountered in any B-12-003 samples.
- Benzene was encountered in samples below 20 feet in concentrations above the ESLs ranging from 4,330 µg/Kg at 38-feet bgs (just above groundwater level) to 18,800 µg/Kg at 20-feet bgs.
- Ethylbenzene was encountered in all samples in concentrations above the ESLs ranging from 19,500 µg/Kg at 5-feet bgs to 720,000 µg/Kg at 20-feet bgs.
- Toluene was encountered in samples below 10-feet in concentrations above the ESLs ranging from 50,000 µg/Kg at 10-feet bgs, to 1,420,000 µg/Kg at 20-feet bgs.
- Xylenes (total) were encountered in all samples in concentrations above the ESLs ranging from 196,400 µg/Kg at 5-feet bgs to 4,390,000 µg/Kg at 20-feet bgs.
- 1,2 Dibromoethane was encountered in concentration above the ESL at 20-feet at 7,550 µg/Kg at 20-feet bgs.
- Naphtalene was encountered in all samples in concentrations above the ESLs ranging from 15,000 µg/Kg at 30-feet bgs to 91,100 µg/Kg at 10-feet bgs.

In addition, the following analytes were detected in concentrations above laboratory detection limits, however there are no published ESLs associated with these analytes:

- N-Butylbenzene was encountered in all samples in concentrations ranging from 25,300 µg/Kg at 5-feet bgs to 108,000 µg/Kg at 20-feet bgs.
- Sec- Butylbenzene was encountered in all samples in concentrations ranging from 3,180 µg/Kg at 30-feet bgs to 19,700 µg/Kg at 20-feet bgs.
- N-Propylbenzene was encountered in all samples in concentrations above the ESLs ranging from 15,500 µg/Kg at 5-feet bgs to 180,000 µg/Kg at 20-feet bgs.
- 1,2,4 Trimethylbenzene was encountered in all samples in concentrations ranging from 202,000 µg/Kg at 5-feet bgs to 1,400,000 µg/Kg at 20-feet bgs.
- 1,3,5 Trimethylbenzene was encountered in all samples in concentrations ranging from 59,000 µg/Kg at 5-feet bgs to 451,000 µg/Kg at 20-feet bgs.
- Isopropylbenzene was encountered in all samples in concentrations ranging from 3,700 µg/Kg at 5-feet bgs to 46,400 µg/Kg at 20-feet bgs.
- P-Isopropyltoluene was encountered in at 5-feet, 10-feet and 38-feet samples in concentrations ranging from 3,000 µg/Kg at 5-feet bgs to 12,000 µg/Kg at 10-feet bgs.

Summary of the soil laboratory testing and used ESL values are presented in Table 1a. Concentrations of TPHg are also presented in Figure 6.

5.2 Groundwater Laboratory Test Results

- Groundwater collected from borings B-12-005, B-12-006, and monitoring well MW-1 show no detectable levels of tested analytes, or show levels that are below the published ESLs.

- Groundwater collected from borings B-12-001, B-12-002, B-12-003 and monitoring wells MW-2 and MW-3 shows presence of TPH-g, Benzene, Ethylbenzene, Toluene and Xylenes in concentrations above the published ESLs.

- Low levels of MTBEs are encountered in all borings in concentrations below published ESLs.

- Borings B-12-004 did not generate a sufficient quantity of groundwater in order to perform all necessary testing. As a result, analysis for TPH-g, CAM Title 22 metals and VOCs was not performed. Groundwater was analyzed for TPH-d and was not detected.

Summary of the groundwater laboratory testing and used ESL values are presented in Table 1b.

6.0 INVESTIGATION OF BUILDING MATERIALS

Group Delta's subcontractor, Panacea, performed testing of ACM and LBP for the buildings at 524 and 530 Avenida Pico. As part of the fieldwork light fixtures were identified that may contain mercury as indicated in the project ISA report.

During the field investigation a sketch of the building floor plan was drafted in order to show sampling locations. A complete report prepared by Panacea is presented in Appendix C. Summary of the field investigation and laboratory results are presented below.

6.1 ACM Materials Investigation Summary

The objective of the ACM investigation was to assess the likelihood that asbestos is present in suspect and readily accessible construction materials in concentrations greater than 1 percent. Bulk samples of suspect accessible construction materials were collected by Group Delta's certified asbestos sub consultant, and submitted to the Forensic Analytical Specialties, Inc analytical laboratory for analysis using polarized light microscopy (PLM) (U.S. EPA Method - 600/R-93-116). Samples were collected from non-friable building materials evaluated to potentially contain asbestos.

Copies of the laboratory analytical report and chain-of-custody records are presented in Appendix C.

6.1.1 524 Avenida Pico ACM Investigation Summary

A total of 22 bulk samples of accessible suspect materials were collected and submitted for analysis using PLM .

Based on the results of the testing ACM was identified in the following materials:

- Plastic roof cement located on the penetrations and seals scattered throughout the roofs and components of the building comprised of an estimated area of less than 20 square feet, and
- Joint compound on walls and ceilings of the Burger Stop building in the comprised of an estimated area of 2,200 square foot.

Location of the ACM materials in 524 Avenida Pico building is presented in figures in Appendix C.

6.1.2 530 Avenida Pico ACM Investigation Summary

Eighteen (18) bulk samples of accessible suspect materials were collected and submitted for analysis using PLM. Based on the results of the testing, ACM asbestos was not detected in the collected samples.

Location of the samples collected for testing of ACM in 534 Avenida Pico building is presented in figures in Appendix C.

6.2 LBP Materials Investigation Summary

The objective of the LBP investigation was to assess the likelihood that lead is present in concentrations greater than 1.0 milligram per square centimeter (mg/cm^2) in accessible painted surfaces of the buildings. Group Delta's sub consultant Panacea, Inc. conducted a site reconnaissance to identify the locations of potential lead paint and test accessible painted surfaces using a portable, field X-ray fluorescence (XRF) analyzer. At least one XRF reading was taken from each building component (i.e., painted walls and ceiling) of a room.

A description of the sampling locations is presented on the tables in Appendix C.

6.2.1 524 Avenida Pico LBP Investigation Summary

One hundred and eight (108) sampling locations were tested with the XRF analyzer. No LBP materials were found in the Burger Stop building during the investigation.

6.2.2 530 Avenida Pico LBP Investigation Summary

One hundred and twenty eight (128) sampling locations were tested with the XRF analyzer. LBP materials were found at the following locations:

- White paint of the five (5) metal bollards located on the east side of the property; and,
- Red ceramic tiles on exterior walls of the building and columns in gas pump area covering approximate area of 150 square feet.

6.3 Light Fixture Estimate Summary

We estimate that a number of fluorescent light fixtures may contain mercury. The observed ballasts are not PCB-containing materials and are not included in the cost estimate. Below are Group Delta's estimated quantities of the fluorescent light tubes:

524 Avenida Pico:

1 8-foot fluorescent light tubes ~2
2 4-foot fluorescent light tubes ~44

530 Avenida Pico:

1 8-foot (u-shaped) fluorescent light tubes ~4
2 4-foot fluorescent light tubes ~40
3 Round fluorescent light tubes ~8

6.4 On Site Transformers

We observed one pad-mounted electrical transformer on the east side of the Shell Station property along the I-5 Fwy southbound on-ramp. No staining was observed on the asphalt around the transformer or other signs of leaks.

According to San Diego Gas & Electric (SDG&E), no PCB-containing materials have been used in the manufacturing of transformers since 1977. According to SDG&E, over 99% of transformers considered to be PCB-containing that existed prior to 1990 have been removed or replaced. Based on this information, the onsite transformer(s) are not expected to represent a significant environmental concern. In addition, this portion of the property is not part of the proposed Avenida Pico widening, and there may be no need for removal of the transformer as part of the project.

7.0 FINDINGS AND CONCLUSIONS

7.1 Site Soils Findings

Based on the past and current test results, Site soils are not impacted with releases except for the limited zone between the current east and middle dispenser islands where soils impacted with TPH-g, BTEX and other gasoline byproducts were detected in boring B-12-003 from 5-feet to 38-feet bgs. The highest concentration of gasoline byproducts is at a depth of 20-feet bgs. The metals concentrations were not in excess of their respective screening concentrations for industrial sites (OEHHA, 2010).

Contamination was also detected in boring B2 and monitoring well MW-2 advanced and completed in 1997. Results of the historical TPH-g testing are presented in Table 2a and depicted on Figure 6.

Borings B2, B-12-003 and MW-2 are located within less than 10 feet from each other. At this point, there is no reason to believe that a new release had occurred since 1997; therefore, it can be assumed that the contamination encountered in B-12-003 is from the same release.

OCHCA opened LUST case based on the release discovered in boring B2 in 1997 and closed the case in 2002 after 3 years of groundwater monitoring. The closure letter notes that there is an estimated 10,000 lb of gasoline remaining in the soil at the Site. A fire and explosion survey was conduced and no detectable levels of vapors were discovered in utility vaults, storm drains etc. The report concludes that the remaining soil contamination is stable and not expanding, and because does not pose a threat to public health and safety, it was permitted to remain with the Site and the case be closed.

Laboratory soil test results from the investigation in 2012 does not show an increase in soil contamination since it was first discovered in 1997. It can be concluded that there is no new release, and that the past release is stable and not spreading, therefore confirming findings from the OCHCA closure letter.

Soil grading for the widening of Avenida Pico will be limited within the upper 5 feet bgs. The area of contamination appears to be located within the proposed Avenida Pico improvements.

No soil contamination was observed in any other soil borings surrounding B2, B-12-003 and MW-2 area. Therefore, it can be assumed that the contamination is localized in narrow zone surrounding B2, B-12-003 and MW-2, conservatively

estimated at 25 feet by 40 feet or about 1,000 square feet. Approximate area of estimated soil contamination is presented in Figure 6.

For budgeting purposes, it should be assumed that the upper 5 feet of soil excavated from this area is contaminated and will need to be disposed off site. Assuming soil unit weight of 120 lb/ft^3, an estimated 270 tons of impacted soil will need to be disposed off site. The estimated cost of this soil disposal is $55,000 including transportation and disposal.

Soil excavated from this area should be set aside and tested for TPH-g prior to disposal. Excavation should be backfilled with clean soils in accordance with the geotechnical report. Air monitoring should be conducted during excavation.

7.2 Site Groundwater Findings

Levels of TPH-g, and BTEX above the published ESLs were detected in borings B-12-001, B-12-002 and B-12-003 and monitoring wells MW-2 and MW-3 all located at the Shell Station property, 530 Avenida Pico.

No detections above the published ESLs were recorded in MW-1(Shell Station), and borings B-12-05 and B-12-06 located at Burger Stop property, 524 Avenida Pico.

Groundwater is encountered at a depth of approximate 40 feet bgs flowing east/southeast at a gradient of 0.005 feet/feet. Based on the previous reports, groundwater flow was observed in both west and east directions and it appears to vary seasonally.

Construction at the Site is limited to the upper 5 feet; groundwater is not anticipated to be encountered during construction and no groundwater disposal will be needed.

Groundwater impacted with TPH-g and BTEX was reported during Fluor Daniel's field investigation and groundwater monitoring performed from 1997 to 2001. There is no evidence that a new release had occurred since the LUST case was closed in 2001. It can be assumed that current groundwater test results represent residual contamination dating to the 1997 LUST case. Although still present, levels of TPH-g and BTEX concentrations significantly decreased since first sampled and analyzed in 1997. Change in concentrations of TPH-g, BTEX and MTBEs since 1997 are graphically presented in Figures 7a to 7c.

OCHCA closure letter for the 1997 LUST case, notes there are no municipal wells near the Site, and the local water district has no current plans to develop the groundwater

resources in this area. It does not appear that the contamination would impact the ocean or the Segunda Deshecha concrete lined stream channel located about 530 feet down gradient from the Site. The report concludes that the residual groundwater contamination is stable and not expanding, and because groundwater contamination does not pose a threat to public health and safety of groundwater, it was permitted to remain with the Site and the case be closed.

The investigation data developed this year is similar in magnitude as compared to the data previously developed and reported prior to LUST case closure in 2001. The current investigation data also show that the impacted area is stable and has not migrated. Based on the latest available San Diego Regional Quality Control Board Basin Plan site groundwater is not designated for beneficial use. The observations are consistent with the findings presented in the OCHCA closure letter. For this reason, no further action regarding groundwater is recommended.

7.3 Building Materials Findings

7.3.1 524 Avenida Pico Building Materials Findings

- Based on the results of the testing ACM was identified in the following materials:

    1. Plastic roof cement located on the penetrations and seals scattered throughout the roofs and components of the building occupying estimated less than 20 square feet, and
    2. Joint compound on walls and ceilings of the Burger Stop building in the occupying estimated 2,200 square foot area.

- No LBP materials were found in the 524 Avenida Pico building during the investigation.

- Total number of estimated fluorescent light fixtures is:

    1. 8-foot fluorescent light tubes ~2
    2. 4-foot fluorescent light tubes ~44

7.3.2 530 Avenida Pico Building Materials Findings

- Based on the results of the testing ACM materials were not detected in the collected building samples.

- LBP materials were found at the following locations:

  1. White paint of the five (5) metal bollards on the east side of the property.
  2. Red ceramic tiles on exterior walls of the building and columns in gas pump area covering approximate area of 150 square feet.

- Total number of estimated fluorescent light fixtures are:

  1. 8-foot (u-shaped) fluorescent light tubes ~4
  2. 4-foot fluorescent light tubes ~40
  3. Round fluorescent light tubes ~8

- One pad-mounted electrical transformer is located on the east side of the property. No staining was observed on the asphalt around the transformer. The onsite transformer is not expected to represent a significant environmental concern. As this portion of the property is not part of the proposed Avenida Pico widening, there may be no need for removal of the transformer as part of the project.

9. RECOMMENDATIONS

Based on Group Delta's review of site investigations reports, the recently conducted field investigations, and the planned property use, we recommend the following:

524 Avenida Pico- Burger Stop Property Preliminary Recommendations

- Properly remove ACM by a State of California-licensed asbestos contractor prior to building demolition.

530 Avenida Pico-Shell Station Property Preliminary Recommendations

- Soil excavated during grading in the upper 5 feet in the area marked in Figure 6 should be set aside and tested prior to disposal/reuse. Air monitoring should be performed during excavation. For budgeting purposes if all soil excavated from the delineated area needed to be disposed off site, cost of soil disposal is estimated at $55,000.

- Construction at the Site is limited to the upper 5 feet and no dewatering or groundwater disposal will be needed. No further action regarding groundwater is recommended.

- The existing underground fuel storage tanks, current dispenser islands and two out of three existing monitoring wells are also located within the area of the future roadway.

- Prior to start of the construction, abandon the existing monitoring wells in accordance with the requirements of the Regional Quality Control Board (RQCB) Region 9 requirements or the lead project agency.

- Prior to start of the construction remove the existing three underground storage tanks, dispenser islands and accompanying piping in accordance with the OCHCA, Orange County Fire Department requirements, and other applicable regulatory agency standards; and;

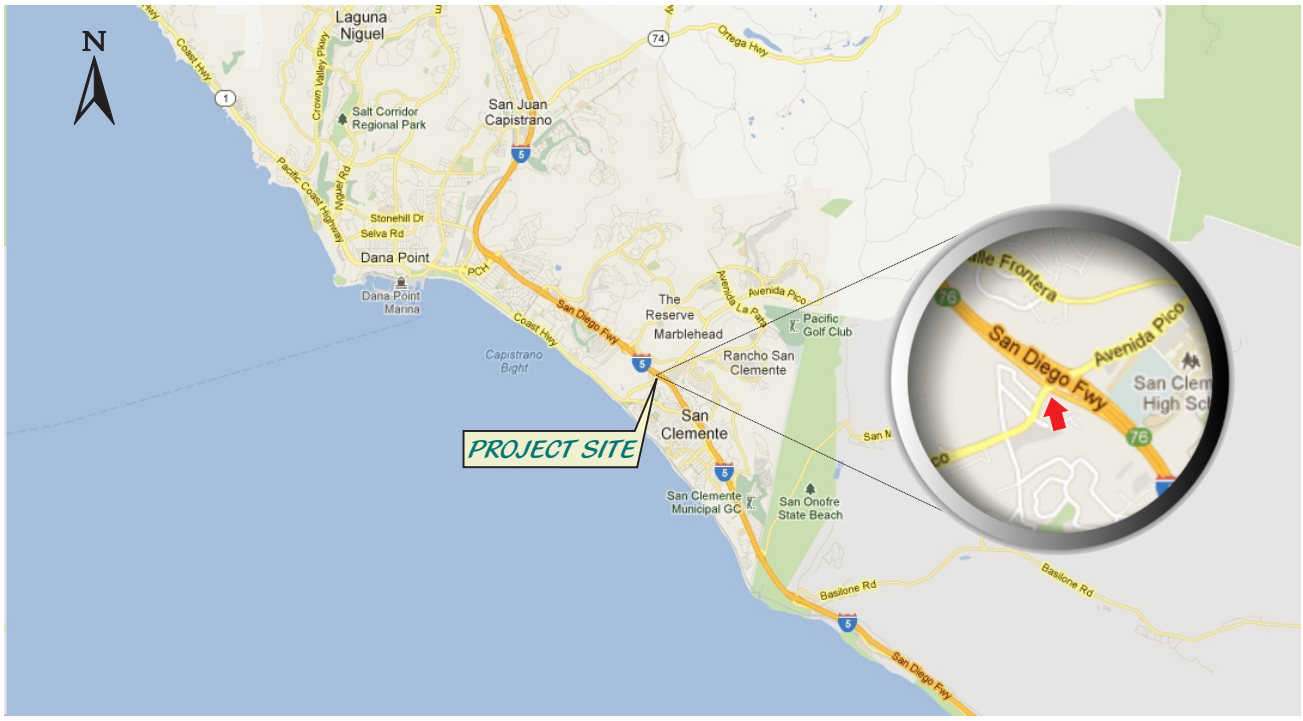
- Properly remove and dispose LBP materials prior to demolition.

10. REFERENCES

1) Alton Geoscience, "Third Quarter 1997, Fluid Level Monitoring and Groundwater Sampling Report", dated September 30, 1997.
2) Caltrans, "Final Relocation Impact Memorandum", dated November 18, 2010.
3) California Environmental Protection Agency, "Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties", January 2005.
4) California Regional Water Quality Control Board, San Francisco Bay Region, "Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater", November 2007 (Revised May 2008).
5) Equiva Services, LLC for WGR, "Site Assessment Work Plan at Texaco Station, 530 Avenida Pico, San Clemente, California", dated April 10, 2000.
6) Equiva Services, LLC for WGR, "Site Assessment Report, Texaco Station, 530 Avenida Pico, San Clemente, California:, dated July 10, 2000.
7) Fluor Daniel, "Work Plan for Monitoring Well Installation, Texaco Service Station, 530 Avenida Pico, San Clemente, California, Fluor Daniel GTI Project, 023400240", dated January 9, 1997.
8) Fluor Daniel, "Site Assessment Report, Texaco Service Station, 530 Avenida Pico, San Clemente, California, OCHCA#96UT48", dated April 30, 1997.
9) Fluor Daniel, " Findings of Recent Groundwater Monitoring Activities, Texaco Service Station, 530 Avenida Pico, San Clemente, California, Site No. 61-106-1117, Fluor Daniel GTI Project 023400309", dated October 14, 1997.
10) Fluor Daniel, " Findings of Recent Groundwater Monitoring Activities, Texaco Service Station, 530 Avenida Pico, San Clemente, California, Site No. 61-106-1117, Fluor Daniel GTI Project 023400309", dated January 16, 1998.
11) Kleinfelder, "Initial Site Assessment (ISA) Report", dated August 18, 2010 (prepared by Kleinfelder for the overall project).
12) Kleinfelder, "Limited Phase II Environmental Site Assessment Report, Interstate 5 HOV Lane Extension Project 530 Avenida Pico, San Clemente, Orange County, California, 12-ORA-5; 5-EA#0F9600", dated August 6, 2011
13) Kleinfelder, "Revised Limited Asbestos Survey Report for the I-5 Bridge Structures" July 7, 2011.
14) Orange County Health Care Agency, Case Closure Summary-Completed Form, Leaking Underground Fuel Tank Program, for Texaco Station, 530 Avenida Pico, San Clemente, CA, dated November 14, 2001
15) Orange County Health Care Agency, Remedial Action Completion Certification, Underground Storage Tank (UST) Case, Texaco Station, 530 Avenida Pico, San Clemente, O.C.H.C.A. Case#96UT48", dated September 11, 2002.

16) URS Corporation, "Phase II Environmental Site Assessment Report, Shell Service Station, 530 Avenida Pico, San Clemente, CA, SAP No. 121371", dated May 1, 2007.
17) WGR, "Response to Request for Closure Letter Dated August 1, 200, O.C.H.C.A. Case#96UT48", dated May 8, 2001.

FIGURES



The base maps/photos are from Google Maps

GROUP DELTA CONSULTANTS	**GROUP DELTA CONSULTANTS, INC.** ENGINEERS AND GEOLOGISTS 32 MAUCHLY, SUITE B IRVINE, CA 92618 (949) 450-2100	FIGURE NUMBER 1
	PROJECT NAME 524 AND 530 AVENIDA PICO SAN CLEMENTE, CA	PROJECT NUMBER I-540
	VICINITY MAP	

GROUP DELTA CONSULTANTS

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

FIGURE NUMBER
2A

PROJECT NAME
524 AND 530 AVENIDA PICO
SAN CLEMENTE, CA

PROJECT NUMBER
I-540

SITE IMPROVEMENTS PLAN

PSOMAS

3 Hutton Centre, Suite 200
Santa Ana, California 92707
714/751-7373
FAX 714/545-8883

EXHIBIT FOR PROPOSED RIGHT OF WAY

LEGEND:

- PROPOSED ROW
- TEMPORARY CONST ESMNT (TCE)
- PERMANENT ESMNT
- ACCESS CONTROL

04/23/12

GROUP DELTA CONSULTANTS

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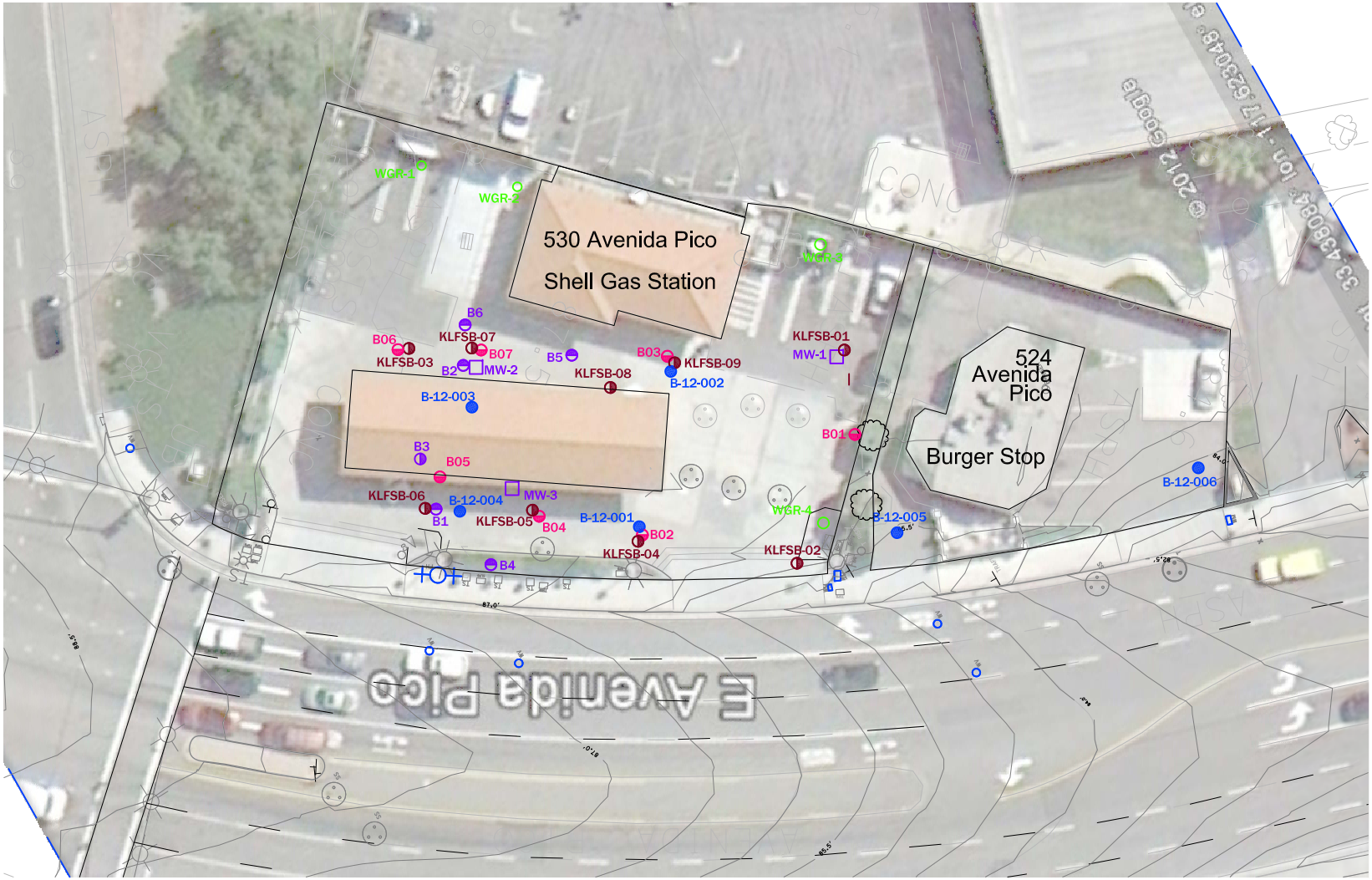
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

FIGURE NUMBER: 2B

PROJECT NAME: 524 AND 530 AVENIDA PICO SAN CLEMENTE, CA

PROJECT NUMBER: I-540

RIGHT-OF-WAY PLAN



LEGEND

B6	Boring by Fluor Daniel (1997)
WGR-3	Boring by WGR (2000)
B07	Boring by URS (2007)
KLFSB-09	Boring by Kleinfelder (2011)
B-12-006	Boring by Group Delta (2012)
MW3	Monitoring Well by Fluor Daniel (1997)

N

SCALE: 1" = 40'

0 20 40 60'

GROUP DELTA CONSULTANTS

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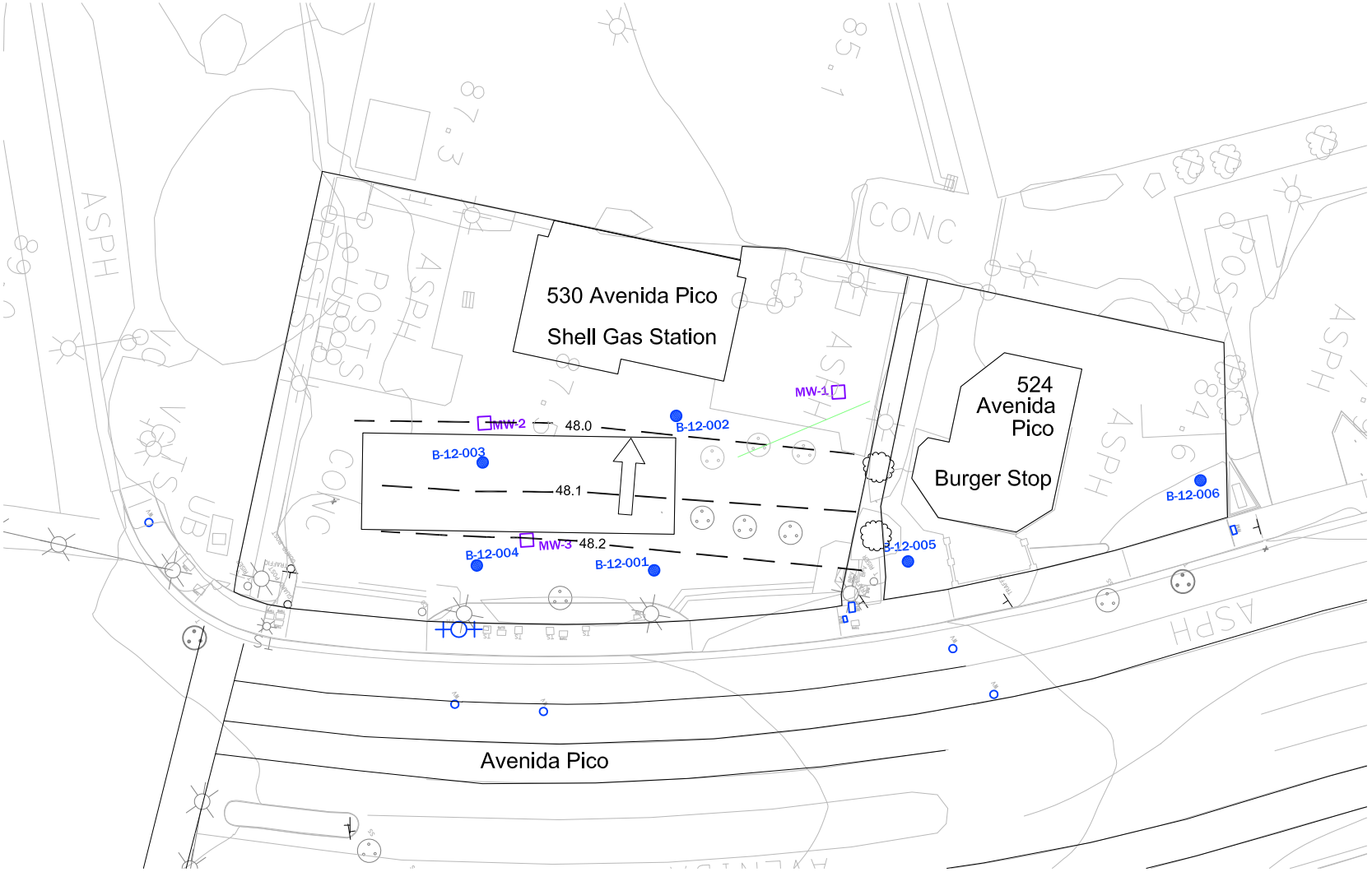
ENGINEERS AND GEOLOGISTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

FIGURE NUMBER
3

PROJECT NAME
524 AND 530 AVENIDA PICO
SAN CLEMENTE, CA

PROJECT NUMBER
I-540

EXPLORATION LOCATION MAP



LEGEND

- B-12-006 Boring by Group Delta (2012)
- MW-3 Monitoring Well by Fluor Daniel (1997)
- —48.0— Groundwater Elevation (MSL, Ft.)
- Direction of ground water flow

SCALE: 1" = 40'

20 40 60'

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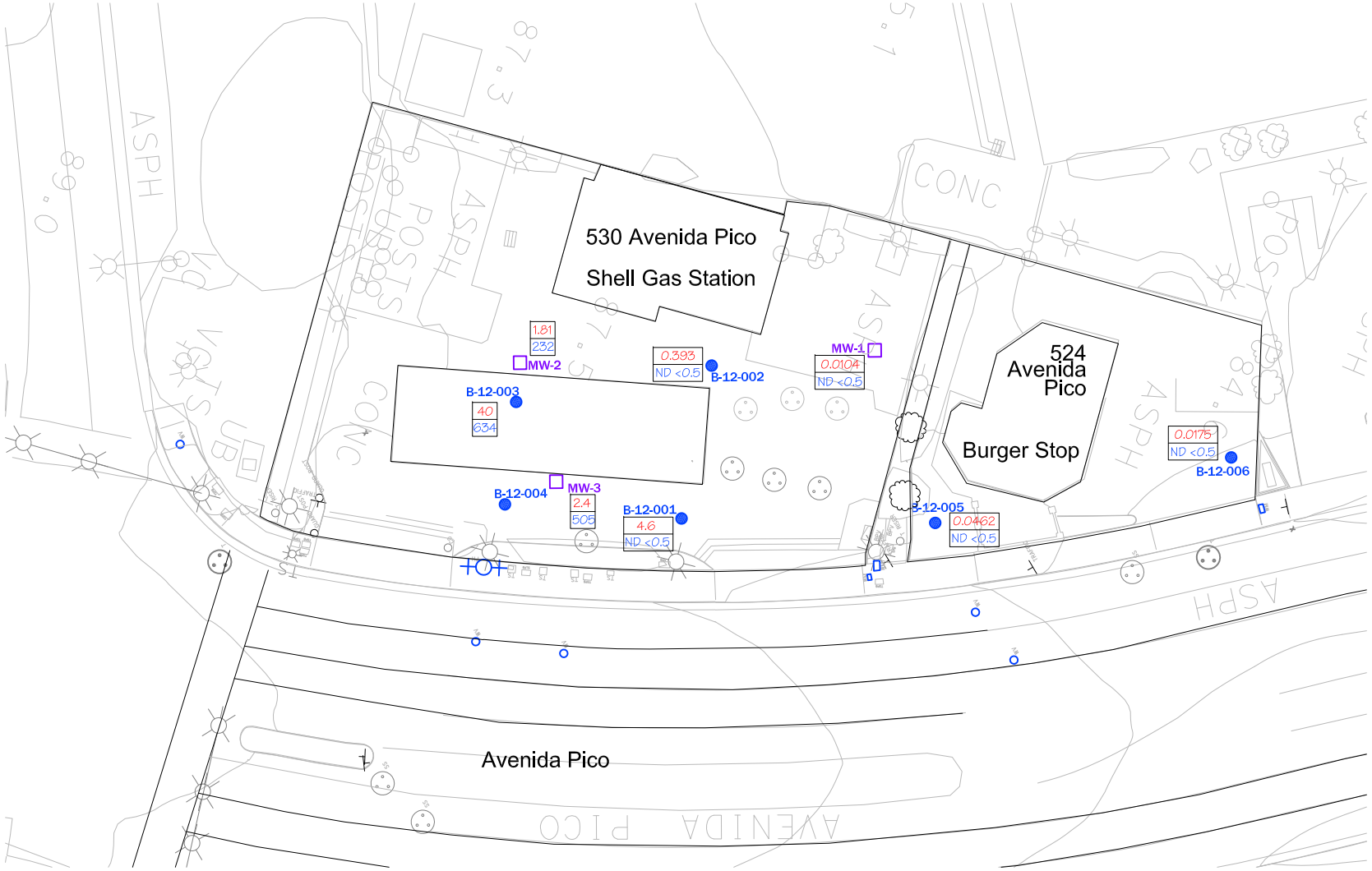
IRVINE, CA 92618 (949) 450-2100

FIGURE NUMBER
4

PROJECT NAME
524 AND 530 AVENIDA PICO
SAN CLEMENTE, CA

PROJECT NUMBER
I-540

GROUNDWATER ELEVATION MAP



LEGEND

- B-12-006 Boring by Group Delta (2012)
- MW-3 Monitoring Well by Fluor Daniel (1997)
- 40 / 634 TPHg (mg/L), 2012 / Benzene (µg/L), 2012

SCALE: 1" = 40'

20 40 60'

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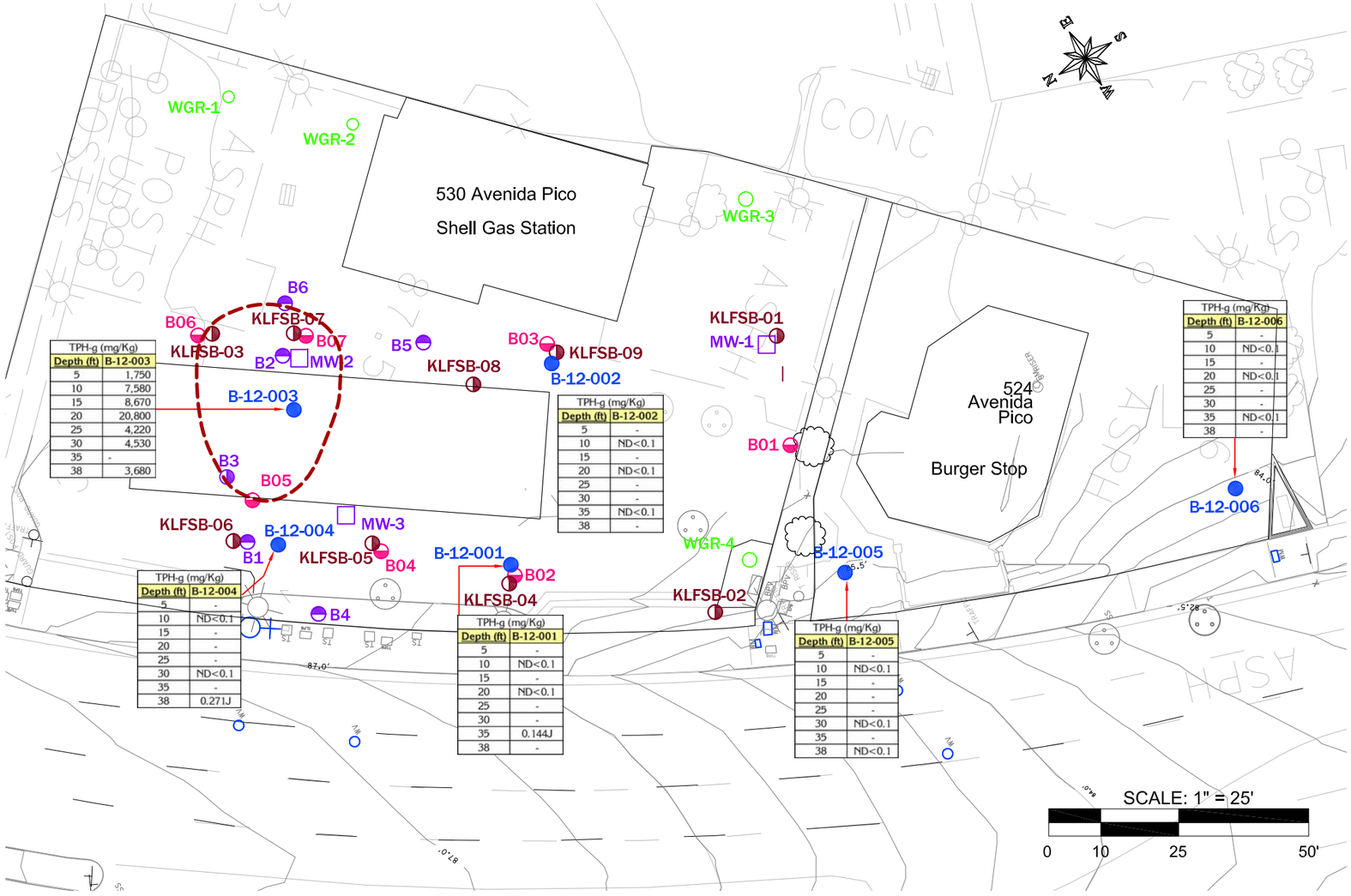
IRVINE, CA 92618 (949) 450-2100

FIGURE NUMBER 5

PROJECT NAME
524 AND 530 AVENIDA PICO
SAN CLEMENTE, CA

PROJECT NUMBER I-540

GROUNDWATER TPHg AND BENZENE CONCENTRATIONS



Historical TPH-g Results (mg/Kg)

Investigation by Fluor Daniel, 1997

Depth (ft)	B1	B2	B3	B4	B5	B6	MW-1	MW-2	MW-3
5	ND<10	7,826	-	-	-	-	-	-	-
10	ND<10	46	ND<10	ND<10	ND<10	ND<10	-	-	-
15	ND<10	21,480	-	-	-	-	-	-	-
20	ND<10	19,513	ND<10	-	ND<10	ND<10	-	-	-
25	ND<10	5,800	-	ND<10	-	-	-	-	-
30	ND<10	15,455	ND<10	ND<10	ND<10	ND<10	ND<0.05	2,200	1
35	ND<10	4,385	-	ND<10	ND<10	ND<10	ND<0.05	570	30
40	ND<10	2,484	25	38	ND<10	ND<10	ND<0.05	-	0.10
45	-	<10	-	-	ND<10		-	-	-

Investigation by WGR, 2000

Depth (ft)	WGR-1	WGR-2	WGR-3	WGR-4					
10	ND<0.5	ND<0.5	ND<0.5	ND<0.5					
15	ND<0.5	ND<0.5	ND<0.5	ND<0.5					
20	ND<0.5	ND<0.5	ND<0.5	ND<0.5					
25	ND<0.5	ND<0.5	ND<0.5	ND<0.5					
30	ND<0.5	ND<0.5	ND<0.5	ND<0.5					
35	ND<0.5	ND<0.5	ND<0.5	ND<0.5					
40	ND<0.5	ND<0.5	ND<0.5	ND<0.5					
45	ND<0.5	ND<0.5	ND<0.5	ND<0.5					

Investigation by URS Corp, 2007

Depth (ft)	B01	B02	B03	B04	B05	B06	B07		
10	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5		
15	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5		
20	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5		
25	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5		
30	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5		
35	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5		
40	ND<0.5	420	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5		

Investigation by Kleinfelder, 2011

Depth (ft)	KLFSB-01	KLFSB-02	KLFSB-03	KLFSB-04	KLFSB-05	KLFSB-06	KLFSB-07	KLFSB-08	KLFSB-09
5	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
15	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
20	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
25	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10
30	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10	ND<10

Notes
"-" - Not Analyzed
ND< - Not detected above the indicated practical quantitation limit (PQL)
TPH g- Total Petroleum Hydrocarbons as gasoline
All test results are in mg/kg - Milligrams per kilogram

LEGEND

- B6 Boring by Fluor Daniel (1997)
- WGR-3 Boring by WGR (2000)
- B07 Boring by URS (2007)
- KLFSB-09 Boring by Kleinfelder (2011)
- B-12-006 Boring by Group Delta (2012)
- MW-3 Monitoring Well by Fluor Daniel (1997)

Approx. zone of TPH impacted soil
(Removal and disposal of the upper 5' bgs)

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32 MAUCHLY, SUITE B
IRVINE, CA 92618 (949) 450-2100

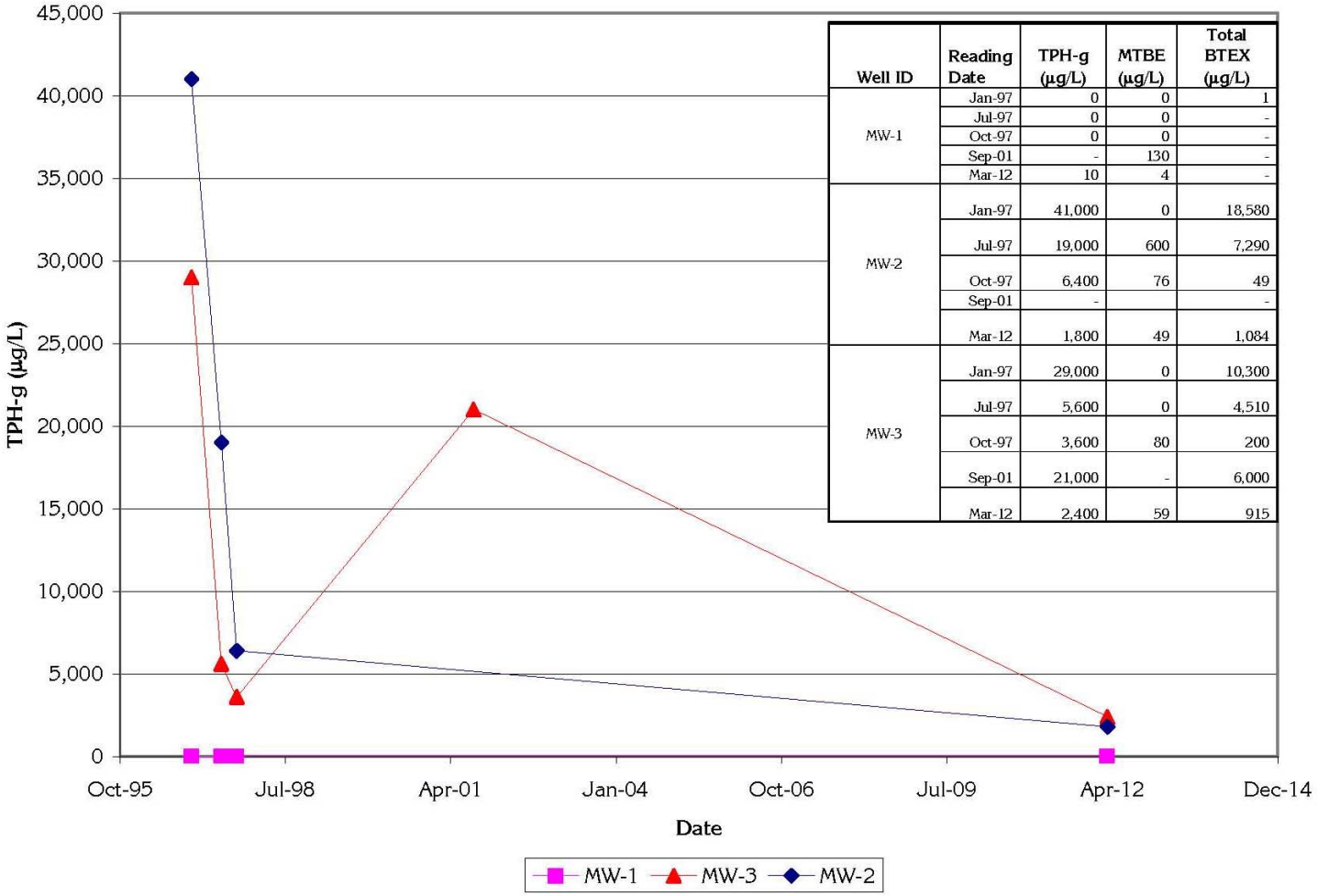
FIGURE NUMBER 6

PROJECT NAME
524 AND 530 AVENIDA PICO
SAN CLEMENTE, CA

PROJECT NUMBER I-540

SOIL TPH-g CONCENTRATIONS MAP

Historical Groundwater TPH-g Concentrations



Well ID	Reading Date	TPH-g (µg/L)	MTBE (µg/L)	Total BTEX (µg/L)
MW-1	Jan-97	0	0	1
	Jul-97	0	0	-
	Oct-97	0	0	-
	Sep-01	-	130	-
	Mar-12	10	4	-
MW-2	Jan-97	41,000	0	18,580
	Jul-97	19,000	600	7,290
	Oct-97	6,400	76	49
	Sep-01	-		-
	Mar-12	1,800	49	1,084
MW-3	Jan-97	29,000	0	10,300
	Jul-97	5,600	0	4,510
	Oct-97	3,600	80	200
	Sep-01	21,000	-	6,000
	Mar-12	2,400	59	915

GROUP DELTA CONSULTANTS

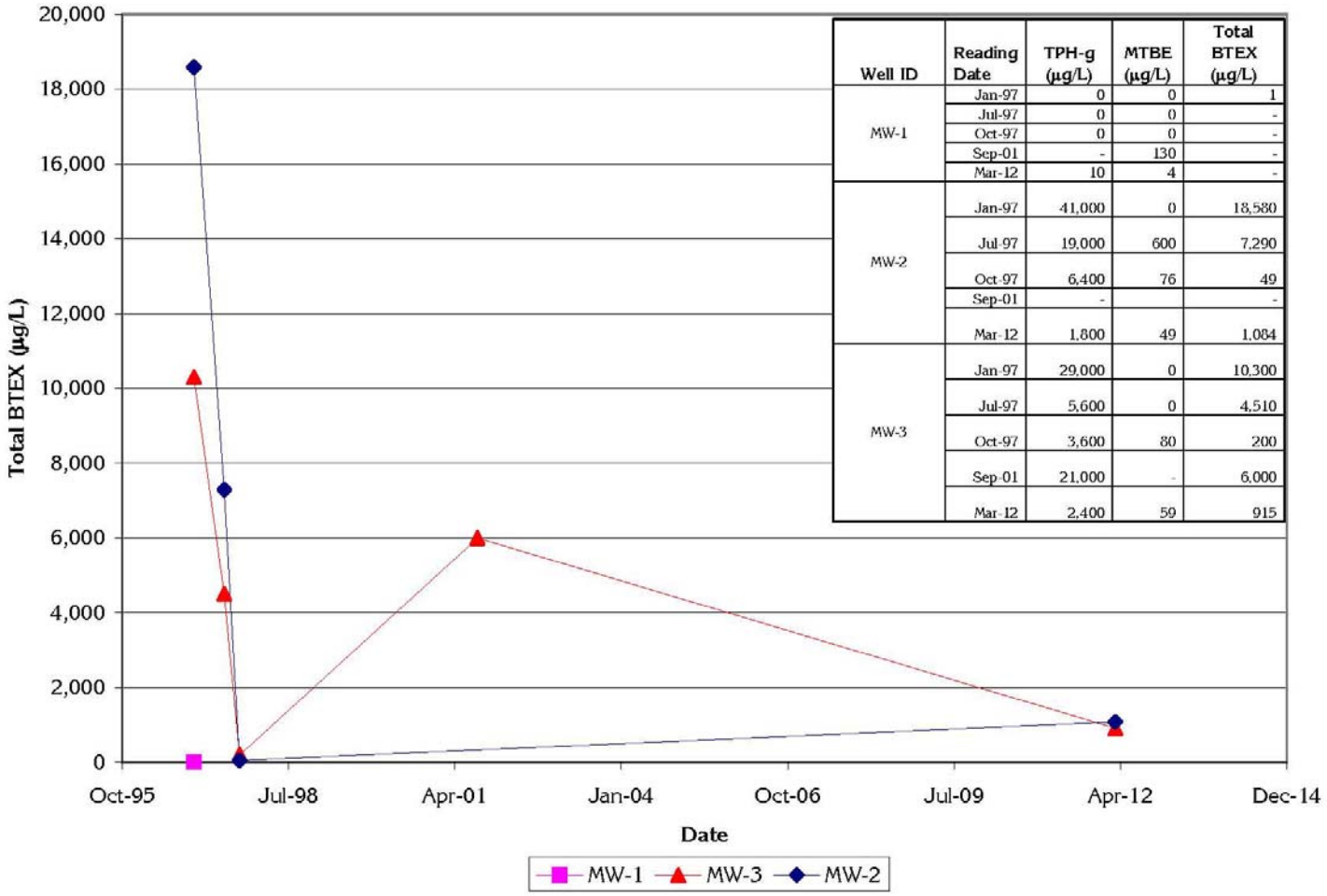
GDC Project Number I-540

524 and 530 Avenida Pico, San Clemente

Historical Groundwater TPH-g Concentrations

Figure 7a

Historical Groundwater BTEX Concentrations



Well ID	Reading Date	TPH-g (µg/L)	MTBE (µg/L)	Total BTEX (µg/L)
MW-1	Jan-97	0	0	1
	Jul-97	0	0	-
	Oct-97	0	0	-
	Sep-01	-	130	-
	Mar-12	10	4	-
MW-2	Jan-97	41,000	0	18,580
	Jul-97	19,000	600	7,290
	Oct-97	6,400	76	49
	Sep-01	-		-
	Mar-12	1,800	49	1,084
MW-3	Jan-97	29,000	0	10,300
	Jul-97	5,600	0	4,510
	Oct-97	3,600	80	200
	Sep-01	21,000	-	6,000
	Mar-12	2,400	59	915

GROUP DELTA CONSULTANTS

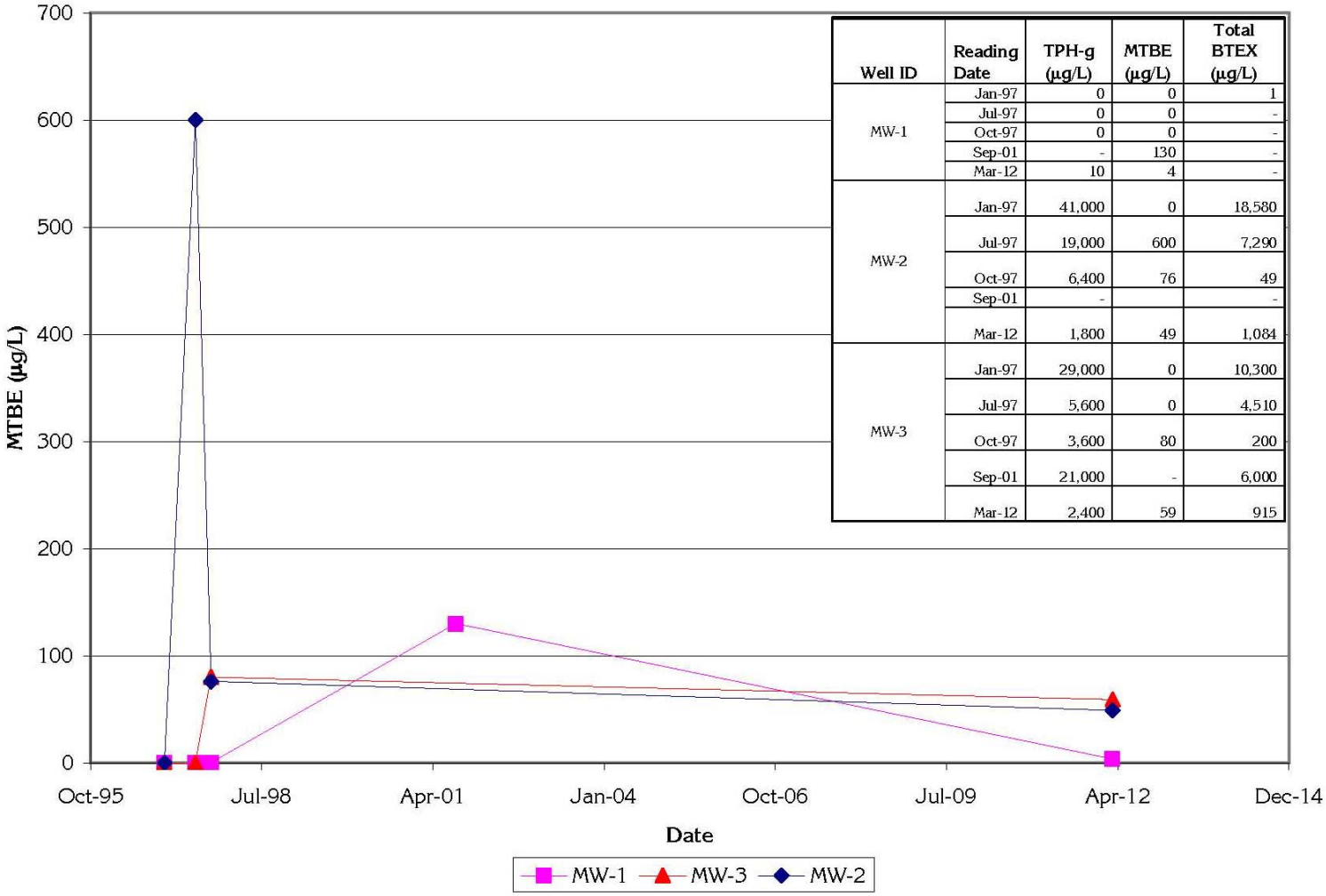
GDC Project Number I-540

524 and 530 Avenida Pico, San Clemente

Historical Groundwater BTEX Concentrations

Figure 7b

Historical Groundwater MTBE Concentrations



Well ID	Reading Date	TPH-g (µg/L)	MTBE (µg/L)	Total BTEX (µg/L)
MW-1	Jan-97	0	0	1
	Jul-97	0	0	-
	Oct-97	0	0	-
	Sep-01	-	130	-
	Mar-12	10	4	-
MW-2	Jan-97	41,000	0	18,580
	Jul-97	19,000	600	7,290
	Oct-97	6,400	76	49
	Sep-01	-		-
	Mar-12	1,800	49	1,084
MW-3	Jan-97	29,000	0	10,300
	Jul-97	5,600	0	4,510
	Oct-97	3,600	80	200
	Sep-01	21,000	-	6,000
	Mar-12	2,400	59	915

GROUP DELTA CONSULTANTS

GDC Project Number I-540

524 and 530 Avenida Pico, San Clemente

Historical Groundwater MTBE Concentrations

Figure 7c

TABLES

Table 1a
Soil Laboratory Test Results
Group Delta Consultants, 2012

Test Method	Analytes	Unit	*Screening Levels*	B-12-001			B-12-002		
				10 ft	20 ft	35 ft	10 ft	20 ft	35 ft
8015G	TPH as Gasoline and Light HC. (C4-C12)	(mg/Kg)	*180*	ND<0.100	ND<0.100	**0.144J**	ND<0.100	ND<0.100	ND<0.100
8015D	TPH as Diesel (C13-C22)	(mg/Kg)	-	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	TPH as Heavy Hydrocarbons (C23-C40)	(mg/Kg)		ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	TPH Total as Diesel and Heavy HC.C13-C40	(mg/Kg)	-	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
6010/7000 CAM Title 22 Metals	Antimony	(mg/Kg)		ND<1.0	-	-	ND<1.0	-	-
	Arsenic	(mg/Kg)	*15*	ND<1.0	-	-	ND<1.0	-	-
	Barium	(mg/Kg)	*2,600*	**99.6**	-	-	**56.9**	-	-
	Beryllium	(mg/Kg)		ND<1.3	-	-	ND<1.3	-	-
	Cadmium	(mg/Kg)		ND<1.3	-	-	ND<1.3	-	-
	Chromium	(mg/Kg)	*5,000*	**10.7**	-	-	**5.69**	-	-
	Cobalt	(mg/Kg)	*94*	**4.62J**	-	-	**3.32J**	-	-
	Copper	(mg/Kg)	*5,000*	**6.35**	-	-	**2.97J**	-	-
	Lead	(mg/Kg)	*750*	ND<2.5	-	-	ND<2.5	-	-
	Mercury (By EPA 7470)	(mg/Kg)		ND<0.1	-	-	ND<0.1	-	-
	Molybdenum	(mg/Kg)		ND<2.5	-	-	ND<2.5	-	-
	Nickel	(mg/Kg)	*260*	**9.91**	-	-	**7.23**	-	-
	Selenium	(mg/Kg)		ND<1.0	-	-	ND<1.0	-	-
	Silver	(mg/Kg)		ND<2.5	-	-	ND<2.5	-	-
	Thallium	(mg/Kg)		ND<1.0	-	-	ND<1.0	-	-
	Vanadium	(mg/Kg)	*770*	**22.9**	-	-	**14.9**	-	-
	Zinc	(mg/Kg)	*5,000*	**32.2**	-	-	**18.3**	-	-
8260B	Acetone	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Benzene	(µg/Kg)	*2,000*	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	Bromobenzene (Phenyl bromide)	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Bromochloromethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Bromodichloromethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Bromoform (Tribromomethane)	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Bromomethane (Methyl bromide)	(µg/Kg)		ND<15	ND<15	ND<15	ND<15	ND<15	ND<15
	2-Butanone (MEK)	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	n-Butylbenzene	(µg/Kg)	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	sec-Butylbenzene	(µg/Kg)	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	tert-Butylbenzene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Carbon Disulfide	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Carbon tetrachloride	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Chlorobenzene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Chloroethane	(µg/Kg)		ND<15	ND<15	ND<15	ND<15	ND<15	ND<15
	2-Chloroethyl vinyl ether	(µg/Kg)		ND<50	ND<50	ND<50	ND<50	ND<50	ND<50
	Chloroform (Trichloromethane)	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Chloromethane (Methyl chloride)	(µg/Kg)		ND<15	ND<15	ND<15	ND<15	ND<15	ND<15
	2-Chlorotoluene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	4-Chlorotoluene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2-Dibromo-3-chloropropane (DBCP)	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Dibromochloromethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2-Dibromoethane (EDB)	(µg/Kg)	*1,000*	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Dibromomethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2-Dichlorobenzene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,3-Dichlorobenzene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,4-Dichlorobenzene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Dichlorodifluoromethane	(µg/Kg)		ND<15	ND<15	ND<15	ND<15	ND<15	ND<15
	1,1-Dichloroethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2-Dichloroethane (EDC)	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,1-Dichloroethene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	cis-1,2-Dichloroethene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	trans-1,2-Dichloroethene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2-Dichloropropane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,3-Dichloropropane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	2,2-Dichloropropane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,1-Dichloropropene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	cis-1,3-Dichloropropene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	trans-1,3-Dichloropropene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Ethylbenzene	(µg/Kg)	*4,700*	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	Hexachlorobutadiene	(µg/Kg)		ND<15	ND<15	ND<15	ND<15	ND<15	ND<15
	2-Hexanone	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Iodomethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Isopropylbenzene	(µg/Kg)	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	p-Isopropyltoluene	(µg/Kg)	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	4-Methyl-2-pentanone (MIBK)	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Methyl-tert-butyl ether (MTBE)	(µg/Kg)	*8,400*	ND<2.0	ND<2.0	**41.0**	ND<2.0	ND<2.0	ND<2.0
	Methylene chloride (DCM)	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Naphthalene	(µg/Kg)	*4,800*	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	n-Propylbenzene	(µg/Kg)	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Styrene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,1,1,2-Tetrachloroethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,1,2,2-Tetrachloroethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Tetrachloroethene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Toluene (Methyl benzene)	(µg/Kg)	*9,300*	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	1,2,3-Trichlorobenzene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2,4-Trichlorobenzene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,1,1-Trichloroethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,1,2-Trichloroethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Trichloroethene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Trichlorofluoromethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2,3-Trichloropropane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2,4-Trimethylbenzene	(µg/Kg)	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,3,5-Trimethylbenzene	(µg/Kg)	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Vinyl Acetate	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Vinyl chloride (Chloroethene)	(µg/Kg)		ND<15	ND<15	ND<15	ND<15	ND<15	ND<15
	o-Xylene	(µg/Kg)	-	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	m,p-Xylenes	(µg/Kg)	-	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	Total Xylenes	(µg/Kg)	*11,000*	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0

Screening Level used are based on Table G: Deep Soil Screening Levels (>3mbgs) Commercial/Industrial Land Use (Grooundwater is not a current or potential drinking water resource). Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater, California Regional Water Quality Control Board, San Francisco Bay Region, November 2007 (Revised May 2008)

Table 1a
Soil Laboratory Test Results
Group Delta Consultants, 2012

Test Method	Analytes	Unit	*Screening Levels*	B-12-003						
				5ft	10 ft	15ft	20ft	25ft	30ft	38ft
8015G	TPH as Gasoline and Light HC. (C4-C12)	(mg/Kg)	*180*	1,750	7,580	8,670	20,800	4,220	4,530	3,680
8015D	TPH as Diesel (C13-C22)	(mg/Kg)	-	237	732	208	261	66.8	64.9	182
	TPH as Heavy Hydrocarbons (C23-C40)	(mg/Kg)		ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	TPH Total as Diesel and Heavy HC.C13-C40	(mg/Kg)	-	237	732	208	261	66.8	64.9	182
6010/7000 CAM Title 22 Metals	Antimony	(mg/Kg)		ND<1.0	ND<1.0	ND<1.0	-	ND<1.0	ND<1.0	-
	Arsenic	(mg/Kg)	*15*	ND<1.0	ND<1.0	ND<1.0	-	**3.82J**	ND<1.0	-
	Barium	(mg/Kg)	*2,600*	**58.3**	**96.6**	**121**	-	**101**	**103**	-
	Beryllium	(mg/Kg)		ND<1.3	ND<1.3	ND<1.3	-	ND<1.3	ND<1.3	-
	Cadmium	(mg/Kg)		ND<1.3	ND<1.3	ND<1.3	-	ND<1.3	ND<1.3	-
	Chromium	(mg/Kg)	*5,000*	**6.43**	**12.4**	**15.1**	-	**7.47**	**15.8**	-
	Cobalt	(mg/Kg)	*94*	**3.57J**	**5.10**	**6.68**	-	**5.66**	**4.99J**	-
	Copper	(mg/Kg)	*5,000*	**4.03J**	**7.23**	**12.0**	-	**5.62**	**10.6**	-
	Lead	(mg/Kg)	*750*	**27.5**	**75.0**	**60.2**	-	**25.8**	**10.4**	-
	Mercury (By EPA 7470)	(mg/Kg)		ND<0.1	ND<0.1	ND<0.1	-	ND<0.1	ND<0.1	-
	Molybdenum	(mg/Kg)		ND<2.5	ND<2.5	ND<2.5	-	**5.40**	ND<2.5	-
	Nickel	(mg/Kg)	*260*	**7.22**	**11.8**	**13.1**	-	**12.1**	**13.2**	-
	Selenium	(mg/Kg)		ND<1.0	ND<1.0	ND<1.0	-	ND<1.0	ND<1.0	-
	Silver	(mg/Kg)		ND<2.5	ND<2.5	ND<2.5	-	ND<2.5	ND<2.5	-
	Thallium	(mg/Kg)		ND<1.0	ND<1.0	ND<1.0	-	ND<1.0	ND<1.0	-
	Vanadium	(mg/Kg)	*770*	**16.3**	**26.8**	**33.2**	-	**24.7**	**23.2**	-
	Zinc	(mg/Kg)	*5,000*	**21.8**	**36.9**	**54.4**	-	**25.1**	**44.4**	-
8260B	Acetone	(µg/Kg)		ND<2500	ND<6125	ND<6250	ND<14625	ND<6250	ND<6250	ND<5450
	Benzene	(µg/Kg)	*2,000*	ND<100	ND<245	**1,530J**	18,800	5,400	14,900	4,330
	Bromobenzene (Phenyl bromide)	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	Bromochloromethane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	Bromodichloromethane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	Bromoform (Tribromomethane)	(µg/Kg)		ND<2500	ND<6125	ND<6250	ND<14625	ND<6250	ND<6250	ND<5450
	Bromomethane (Methyl bromide)	(µg/Kg)		ND<1500	ND<3675	ND<3750	ND<8775	ND<3750	ND<3750	ND<3270
	2-Butanone (MEK)	(µg/Kg)		ND<2500	ND<6125	ND<6250	ND<14625	ND<6250	ND<6250	ND<5450
	n-Butylbenzene	(µg/Kg)	-	**25,300**	**98,700**	**63,000**	**108,000**	**27,300**	**16,900**	**32,800**
	sec-Butylbenzene	(µg/Kg)	-	**3,740**	**15,500**	**11,600**	**19,700**	**5,100**	**3,180**	**4,700**
	tert-Butylbenzene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	Carbon Disulfide	(µg/Kg)		ND<2500	ND<6125	ND<6250	ND<14625	ND<6250	ND<6250	ND<5450
	Carbon tetrachloride	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	Chlorobenzene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	Chloroethane	(µg/Kg)		ND<1500	ND<3675	ND<3750	ND<8775	ND<3750	ND<3750	ND<3270
	2-Chloroethyl vinyl ether	(µg/Kg)		ND<5000	ND<12250	ND<12500	ND<29250	ND<12500	ND<12500	ND<10900
	Chloroform (Trichloromethane)	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	Chloromethane (Methyl chloride)	(µg/Kg)		ND<1500	ND<3675	ND<3750	ND<8775	ND<3750	ND<3750	ND<3270
	2-Chlorotoluene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	4-Chlorotoluene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,2-Dibromo-3-chloropropane (DBCP)	(µg/Kg)		ND<2500	ND<6125	ND<6250	ND<14625	ND<6250	ND<6250	ND<5450
	Dibromochloromethane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,2-Dibromoethane (EDB)	(µg/Kg)	*1,000*	ND<500	ND<1225	ND<1250	7,550	**1,430J**	ND<1250	ND<1090
	Dibromomethane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,2-Dichlorobenzene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,3-Dichlorobenzene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,4-Dichlorobenzene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	Dichlorodifluoromethane	(µg/Kg)		ND<1500	ND<3675	ND<3750	ND<8775	ND<3750	ND<3750	ND<3270
	1,1-Dichloroethane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,2-Dichloroethane (EDC)	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,1-Dichloroethene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	cis-1,2-Dichloroethene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	trans-1,2-Dichloroethene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,2-Dichloropropane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,3-Dichloropropane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	2,2-Dichloropropane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,1-Dichloropropene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	cis-1,3-Dichloropropene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	trans-1,3-Dichloropropene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	Ethylbenzene	(µg/Kg)	*4,700*	19,500	120,000	355,000	720,000	186,000	185,000	119,000
	Hexachlorobutadiene	(µg/Kg)		ND<1500	ND<3675	ND<3750	ND<8775	ND<3750	ND<3750	ND<3270
	2-Hexanone	(µg/Kg)		ND<2500	ND<6125	ND<6250	ND<14625	ND<6250	ND<6250	ND<5450
	Iodomethane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	Isopropylbenzene	(µg/Kg)	-	**3,700**	**19,900**	**27,300**	**46,400**	**11,300**	**8,350**	**8,480**
	p-Isopropyltoluene	(µg/Kg)	-	**3,000**	**12,000**	ND<1250	ND<2925	ND<1250	ND<1250	**3,590**
	4-Methyl-2-pentanone (MIBK)	(µg/Kg)		ND<2500	ND<6125	ND<6250	ND<14625	ND<6250	ND<6250	ND<5450
	Methyl-tert-butyl ether (MTBE)	(µg/Kg)	*8,400*	ND<200	ND<490	ND<500	ND<1170	ND<500	ND<500	ND<436
	Methylene chloride (DCM)	(µg/Kg)		ND<2500	ND<6125	ND<6250	ND<14625	ND<6250	ND<6250	ND<5450
	Naphthalene	(µg/Kg)	*4,800*	22,600	91,100	49,300	52,900	20,900	15,000	27,200
	n-Propylbenzene	(µg/Kg)	-	**15,500**	**84,800**	**110,000**	**180,000**	**44,500**	**31,300**	**36,800**
	Styrene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,1,1,2-Tetrachloroethane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,1,2,2-Tetrachloroethane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	Tetrachloroethene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	Toluene (Methyl benzene)	(µg/Kg)	*9,300*	**5,480**	50,000	343,000	1,420,000	398,000	563,000	178,000
	1,2,3-Trichlorobenzene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,2,4-Trichlorobenzene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,1,1-Trichloroethane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,1,2-Trichloroethane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	Trichloroethene	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	Trichlorofluoromethane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,2,3-Trichloropropane	(µg/Kg)		ND<500	ND<1225	ND<1250	ND<2925	ND<1250	ND<1250	ND<1090
	1,2,4-Trimethylbenzene	(µg/Kg)	-	**202,000**	**924,000**	**873,000**	**1,400,000**	**353,000**	**260,000**	**352,000**
	1,3,5-Trimethylbenzene	(µg/Kg)	-	**59,000**	**279,000**	**275,000**	**451,000**	**110,000**	**78,500**	**104,000**
	Vinyl Acetate	(µg/Kg)		ND<2500	ND<6125	ND<6250	ND<14625	ND<6250	ND<6250	ND<5450
	Vinyl chloride (Chloroethene)	(µg/Kg)		ND<1500	ND<3675	ND<3750	ND<8775	ND<3750	ND<3750	ND<3270
	o-Xylene	(µg/Kg)	-	65,400	353,000	715,000	1,190,000	293,000	275,000	199,000
	m,p-Xylenes	(µg/Kg)	-	131,000	767,000	1,760,000	3,200,000	830,000	800,000	526,000
	Total Xylenes	(µg/Kg)	*11,000*	196,400	1,120,000	2,475,000	4,390,000	1,123,000	1,075,000	725,000

Screening Level used are based on Table G: Deep Soil Screening Levels (>3mbgs) Commercial/Industrial Land Use (Grooundwater is not a current or potential drinking water resource). Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater, California Regional Water Quality Control Board, San Francisco Bay Region, November 2007 (Revised May 2008)

Table 1a
Soil Laboratory Test Results
Group Delta Consultants, 2012

Test Method	Analytes	Unit	*Screening Levels*	B-12-004			B-12-005			B-12-006		
				10ft	30ft	38ft	10ft	30ft	38ft	10ft	20 ft	35 ft
8015G	TPH as Gasoline and Light HC. (C4-C12)	(mg/Kg)	*180*	ND<0.100	ND<0.100	**0.271J**	ND<0.100	ND<0.100	ND<0.100	ND<0.100	ND<0.100	ND<0.100
8015D	TPH as Diesel (C13-C22)	(mg/Kg)	-	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	TPH as Heavy Hydrocarbons (C23-C40)	(mg/Kg)		ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	TPH Total as Diesel and Heavy HC.C13-C40	(mg/Kg)	-	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
6010/7000 CAM Title 22 Metals	Antimony	(mg/Kg)		ND<1.0	-	-	ND<1.0	-	-	ND<1.0	-	-
	Arsenic	(mg/Kg)	*15*	ND<1.0	-	-	ND<1.0	-	-	ND<1.0	-	-
	Barium	(mg/Kg)	*2,600*	**286**	-	-	**68.2**	-	-	**56.9**	-	-
	Beryllium	(mg/Kg)		ND<1.3	-	-	ND<1.3	-	-	ND<1.3	-	-
	Cadmium	(mg/Kg)		ND<1.3	-	-	ND<1.3	-	-	ND<1.3	-	-
	Chromium	(mg/Kg)	*5,000*	**11.8**	-	-	**10.4**	-	-	**5.69**	-	-
	Cobalt	(mg/Kg)	*94*	**4.93J**	-	-	**4.62J**	-	-	**3.32J**	-	-
	Copper	(mg/Kg)	*5,000*	**8.10**	-	-	**7.61**	-	-	**2.97J**	-	-
	Lead	(mg/Kg)	*750*	ND<2.5	-	-	ND<2.5	-	-	ND<2.5	-	-
	Mercury (By EPA 7470)	(mg/Kg)		ND<0.1	-	-	ND<0.1	-	-	ND<0.1	-	-
	Molybdenum	(mg/Kg)		ND<2.5	-	-	ND<2.5	-	-	ND<2.5	-	-
	Nickel	(mg/Kg)	*260*	**9.71**	-	-	**9.88**	-	-	**7.23**	-	-
	Selenium	(mg/Kg)		ND<1.0	-	-	ND<1.0	-	-	ND<1.0	-	-
	Silver	(mg/Kg)		ND<2.5	-	-	ND<2.5	-	-	ND<2.5	-	-
	Thallium	(mg/Kg)		ND<1.0	-	-	ND<1.0	-	-	ND<1.0	-	-
	Vanadium	(mg/Kg)	*770*	**25.2**	-	-	**20.8**	-	-	**14.9**	-	-
	Zinc	(mg/Kg)	*5,000*	**36.4**	-	-	**32.4**	-	-	**18.3**	-	-
8260B	Acetone	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Benzene	(µg/Kg)	*2,000*	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	Bromobenzene (Phenyl bromide)	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Bromochloromethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Bromodichloromethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Bromoform (Tribromomethane)	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Bromomethane (Methyl bromide)	(µg/Kg)		ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15
	2-Butanone (MEK)	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	n-Butylbenzene	(µg/Kg)	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	sec-Butylbenzene	(µg/Kg)	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	tert-Butylbenzene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Carbon Disulfide	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Carbon tetrachloride	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Chlorobenzene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Chloroethane	(µg/Kg)		ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15
	2-Chloroethyl vinyl ether	(µg/Kg)		ND<50	ND<50	ND<50	ND<50	ND<50	ND<50	ND<50	ND<50	ND<50
	Chloroform (Trichloromethane)	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Chloromethane (Methyl chloride)	(µg/Kg)		ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15
	2-Chlorotoluene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	4-Chlorotoluene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2-Dibromo-3-chloropropane (DBCP)	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Dibromochloromethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2-Dibromoethane (EDB)	(µg/Kg)	*1,000*	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Dibromomethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2-Dichlorobenzene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,3-Dichlorobenzene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,4-Dichlorobenzene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Dichlorodifluoromethane	(µg/Kg)		ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15
	1,1-Dichloroethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2-Dichloroethane (EDC)	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,1-Dichloroethene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	cis-1,2-Dichloroethene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	trans-1,2-Dichloroethene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2-Dichloropropane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,3-Dichloropropane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	2,2-Dichloropropane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,1-Dichloropropene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	cis-1,3-Dichloropropene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	trans-1,3-Dichloropropene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Ethylbenzene	(µg/Kg)	*4,700*	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	Hexachlorobutadiene	(µg/Kg)		ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15
	2-Hexanone	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Iodomethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Isopropylbenzene	(µg/Kg)	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	p-Isopropyltoluene	(µg/Kg)	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	4-Methyl-2-pentanone (MIBK)	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Methyl-tert-butyl ether (MTBE)	(µg/Kg)	*8,400*	ND<2.0	ND<2.0	ND<2.0	ND<2.0	ND<2.0	ND<2.0	ND<2.0	ND<2.0	ND<2.0
	Methylene chloride (DCM)	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Naphthalene	(µg/Kg)	*4,800*	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	n-Propylbenzene	(µg/Kg)	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Styrene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,1,1,2-Tetrachloroethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,1,2,2-Tetrachloroethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Tetrachloroethene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Toluene (Methyl benzene)	(µg/Kg)	*9,300*	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	1,2,3-Trichlorobenzene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2,4-Trichlorobenzene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,1,1-Trichloroethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,1,2-Trichloroethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Trichloroethene	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Trichlorofluoromethane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2,3-Trichloropropane	(µg/Kg)		ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,2,4-Trimethylbenzene	(µg/Kg)	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	1,3,5-Trimethylbenzene	(µg/Kg)	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	Vinyl Acetate	(µg/Kg)		ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25	ND<25
	Vinyl chloride (Chloroethene)	(µg/Kg)		ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15	ND<15
	o-Xylene	(µg/Kg)	-	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	m,p-Xylenes	(µg/Kg)	-	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0
	Total Xylenes	(µg/Kg)	*11,000*	ND<1.0	ND<1.1	ND<1.1	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0	ND<1.0

Screening Level used are based on Table G: Deep Soil Screening Levels (>3mbgs) Commercial/Industrial Land Use (Grooundwater is not a current or potential drinking water resource). Screening for Environmental Concerns at Sites With Contaminated Soil and Groundwater, California Regional Water Quality Control Board, San Francisco Bay Region, November 2007 (Revised May 2008)

Table 1b
Groundwater Laboratory Test Results
Group Delta Consultants, 2012

Test Method	Analytes	Units	*Screening Levels*	B-12-001	B-12-002	B-12-003	B-12-004	B-12-005	B-12-006	MW-1	MW-2	MW-3
8015G	TPH as Gasoline and Light HC. (C4-C12)	(mg/L)	*0.21*	**4.60**	**0.393**	**40.0**	-	**0.0462**	**0.0175**	**0.0104**	**1.81**	**2.40**
8015D	TPH as Diesel (C13-C22)	(mg/L)		**0.118J**	ND<0.1	**0.285J**	**ND<0.1**	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1
	TPH as Heavy Hydrocarbons (C23-C40)	(mg/L)		ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1
	TPH Total as Diesel and Heavy HC.C13-C40	(mg/L)		**0.118J**	ND<0.1	**0.285J**	**ND<0.1**	ND<0.1	ND<0.1	ND<0.1	ND<0.1	ND<0.1
6010/7000 CAM Title 22 *Metals*	Antimony	(mg/L)		ND<0.25	ND<0.05	ND<0.25	-	ND<0.05	ND<0.25	ND<0.25	ND<0.25	ND<0.25
	Arsenic	(mg/L)		ND<0.25	ND<0.05	ND<0.25	-	ND<0.05	ND<0.25	ND<0.25	ND<0.25	ND<0.25
	Barium	(mg/L)	-	ND<0.15	ND<0.03	ND<0.15	-	**0.0762**	ND<0.15	ND<0.15	ND<0.15	ND<0.15
	Beryllium	(mg/L)		ND<0.05	ND<0.01	ND<0.05	-	ND<0.01	ND<0.05	ND<0.05	ND<0.05	ND<0.05
	Cadmium	(mg/L)		ND<0.05	ND<0.01	ND<0.05	-	ND<0.01	ND<0.05	ND<0.05	ND<0.05	ND<0.05
	Chromium	(mg/L)		ND<0.05	ND<0.01	ND<0.05	-	ND<0.01	ND<0.05	ND<0.05	ND<0.05	ND<0.05
	Cobalt	(mg/L)	-	ND<0.05	ND<0.01	ND<0.05	-	**0.0111J**	ND<0.05	ND<0.05	ND<0.05	ND<0.05
	Copper	(mg/L)		ND<0.05	ND<0.01	ND<0.05	-	ND<0.01	ND<0.05	ND<0.05	ND<0.05	ND<0.05
	Lead	(mg/L)		ND<0.25	ND<0.05	ND<0.25	-	ND<0.05	ND<0.25	ND<0.25	ND<0.25	ND<0.25
	Mercury (By EPA 7470)	(mg/L)		ND<0.005	ND<0.001	ND<0.005	-	ND<0.001	ND<0.005	ND<0.005	ND<0.005	ND<0.005
	Molybdenum	(mg/L)	-	**0.114J**	**0.191**	**0.137J**	-	**0.196**	**0.223J**	**0.172J**	**0.107J**	**0.146J**
	Nickel	(mg/L)		ND<0.05	**0.0144J**	ND<0.05	-	**0.0198J**	ND<0.05	**0.112J**	ND<0.05	**0.0521J**
	Selenium	(mg/L)		ND<0.25	ND<0.05	ND<0.25	-	ND<0.05	ND<0.25	ND<0.25	ND<0.25	ND<0.25
	Silver	(mg/L)		ND<0.05	ND<0.01	ND<0.05	-	ND<0.01	ND<0.05	ND<0.05	ND<0.05	ND<0.05
	Thallium	(mg/L)		ND<0.25	ND<0.05	ND<0.25	-	ND<0.05	ND<0.25	ND<0.25	ND<0.25	ND<0.25
	Vanadium	(mg/L)		ND<0.15	ND<0.03	ND<0.15	-	ND<0.03	ND<0.15	ND<0.15	ND<0.15	ND<0.15
	Zinc	(mg/L)	-	ND<0.05	ND<0.01	ND<0.05	-	ND<0.01	ND<0.05	**0.142J**	ND<0.05	ND<0.05
8260B	Acetone	(µg/L)		ND<10	ND<10	ND<100	-	ND<10	ND<10	ND<10	ND<10	ND<10
	Benzene	(µg/L)	*46*	ND<0.5	ND<0.5	**634**	-	ND<0.5	ND<0.5	ND<0.5	**232**	**505**
	Bromobenzene (Phenyl bromide)	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Bromochloromethane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Bromodichloromethane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Bromoform (Tribromomethane)	(µg/L)		ND<2.5	ND<2.5	ND<25	-	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5
	Bromomethane (Methyl bromide)	(µg/L)		ND<1.5	ND<1.5	ND<15	-	ND<1.5	ND<1.5	ND<1.5	ND<1.5	ND<1.5
	2-Butanone (MEK)	(µg/L)		ND<5.0	ND<5.0	ND<50	-	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0
	n-Butylbenzene	(µg/L)	-	**55.9**	ND<0.5	**114**	-	**1.47**	ND<0.5	ND<0.5	ND<0.5	**3.49**
	sec-Butylbenzene	(µg/L)	-	**36.8**	ND<0.5	**16.5**	-	**1.03**	ND<0.5	ND<0.5	**1.34**	**3.18**
	tert-Butylbenzene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Carbon Disulfide	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Carbon tetrachloride	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Chlorobenzene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Chloroethane	(µg/L)		ND<1.5	ND<1.5	ND<15	-	ND<1.5	ND<1.5	ND<1.5	ND<1.5	ND<1.5
	2-Chloroethyl vinyl ether	(µg/L)		ND<2.5	ND<2.5	ND<25	-	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5
	Chloroform (Trichloromethane)	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Chloromethane (Methyl chloride)	(µg/L)		ND<1.5	ND<1.5	ND<15	-	ND<1.5	ND<1.5	ND<1.5	ND<1.5	ND<1.5
	2-Chlorotoluene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	4-Chlorotoluene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,2-Dibromo-3-chloropropane (DBCP)	(µg/L)		ND<2.5	ND<2.5	ND<25	-	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5
	Dibromochloromethane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,2-Dibromoethane (EDB)	(µg/L)		ND<0.5	ND<0.5	**32.0**	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Dibromomethane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,2-Dichlorobenzene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,3-Dichlorobenzene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,4-Dichlorobenzene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Dichlorodifluoromethane	(µg/L)		ND<1.5	ND<1.5	ND<15	-	ND<1.5	ND<1.5	ND<1.5	ND<1.5	ND<1.5
	1,1-Dichloroethane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,2-Dichloroethane (EDC)	(µg/L)	*200*	ND<0.5	**3.71**	**83.6**	-	**4.94**	**14.7**	**17.7**	**9.04**	**5.23**
	1,1-Dichloroethene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	cis-1,2-Dichloroethene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	trans-1,2-Dichloroethene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,2-Dichloropropane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,3-Dichloropropane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	2,2-Dichloropropane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,1-Dichloropropene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	cis-1,3-Dichloropropene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	trans-1,3-Dichloropropene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Ethylbenzene	(µg/L)	*43*	**395**	ND<0.5	**1,350**	-	**1.48**	ND<0.5	ND<0.5	**44.0**	**218**
	Hexachlorobutadiene	(µg/L)		ND<1.5	ND<1.5	ND<15	-	ND<1.5	ND<1.5	ND<1.5	ND<1.5	ND<1.5
	2-Hexanone	(µg/L)		ND<2.5	ND<2.5	ND<25	-	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5
	Iodomethane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Isopropylbenzene	(µg/L)	-	**136**	ND<0.5	**60.3**	-	**1.15**	ND<0.5	ND<0.5	**11.0**	**9.66**
	p-Isopropyltoluene	(µg/L)	-	**8.25**	ND<0.5	**11.0**	-	**0.600J**	ND<0.5	ND<0.5	**0.570J**	ND<0.5
	4-Methyl-2-pentanone (MIBK)	(µg/L)	-	**5.23**	ND<2.5	ND<25	-	ND<2.5	ND<2.5	ND<2.5	ND<2.5	ND<2.5
	Methyl-tert-butyl ether (MTBE)	(µg/L)	*1,800*	**8.43**	**4.65**	**142**	-	**10.7**	**8.55**	**3.56**	**48.9**	**59.0**
	Methylene chloride (DCM)	(µg/L)		ND<2.0	ND<2.0	ND<20	-	ND<2.0	ND<2.0	ND<2.0	ND<2.0	ND<2.0
	Naphthalene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	n-Propylbenzene	(µg/L)	-	**504**	ND<0.5	**215**	-	**4.13**	ND<0.5	ND<0.5	**8.31**	**23.1**
	Styrene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,1,1,2-Tetrachloroethane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,1,2,2-Tetrachloroethane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Tetrachloroethene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Toluene (Methyl benzene)	(µg/L)	*130*	ND<0.5	ND<0.5	**4,300**	-	ND<0.5	ND<0.5	ND<0.5	**353**	**99.4**
	1,2,3-Trichlorobenzene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,2,4-Trichlorobenzene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,1,1-Trichloroethane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,1,2-Trichloroethane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Trichloroethene	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Trichlorofluoromethane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,2,3-Trichloropropane	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Trichlorotrifluoroethane (Freon-113)	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	1,2,4-Trimethylbenzene	(µg/L)	-	**5.25**	ND<0.5	**1,720**	-	ND<0.5	ND<0.5	ND<0.5	**65.5**	**27.3**
	1,3,5-Trimethylbenzene	(µg/L)	-	ND<0.5	ND<0.5	**536**	-	ND<0.5	ND<0.5	ND<0.5	**18.6**	**6.87**
	Vinyl Acetate	(µg/L)	-	**82.9**	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	Vinyl chloride (Chloroethene)	(µg/L)		ND<0.5	ND<0.5	ND<5	-	ND<0.5	ND<0.5	ND<0.5	ND<0.5	ND<0.5
	o-Xylene	(µg/L)	*100*	ND<0.5	ND<0.5	**2,460**	-	ND<0.5	ND<0.5	ND<0.5	**67.8**	**29.8**
	m,p-Xylenes	(µg/L)	*100*	ND<1.0	ND<1.0	**5,320**	-	ND<1.0	ND<1.0	ND<1.0	**387**	**62.8**

Screening Level used are based on Table F-1b: Groundwater Screening Levels (Groundwater is not a current or potential drinking water resource), Screening for Environmental Concerns at Sites With Contaminated Soil a
Groundwater, California Regional Water Quality Control Board, San Francisco Bay Region, November 2007 (Revised May 2008)

Table 2a
Historical Soil Laboratory Test Results

Fluor Daniel, 1997

TABLE 2
Soil Analytical Data
Texaco Service Station, 530 Avenida Pico, San Clemente, California
(Page 1 of 4)

Well ID	Date	Depth	TPH_g	TPH_d	TRPH	B	T	E	X	MTBE
Fuel Release Investigation Samples										
B1-5'	12/19/96	5	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B1-10'	12/19/96	10	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B1-15'	12/19/96	15	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B1-20'	12/19/96	20	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B1-25'	12/19/96	25	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B1-30'	12/19/96	30	<10	<10	--	0.056	<0.050	<0.050	0.118	--
B1-35'	12/19/96	35	<10	<10	--	0.740	2.304	0.082	1.647	--
B1-35' dup	12/19/96	35	<10	<10	--	0.842	2.654	0.089	1.879	--
B1-40'	12/19/96	40	<10	<10	--	1.068	0.944	0.379	1.943	<0.020
B2-5'	12/19/96	5	7,626	<10	--	7.2	180.1	118	1,268	--
B2-10'	12/19/96	10	46	<10	--	0.199	3.232	0.960	7.562	--
B2-15'	12/19/96	15	21,480	<10	--	93.2	1,839	852	5,381	6.316
B2-20'	12/19/96	20	19,515	<10	--	112.5	1,912	637	3,883	--
B2-25'	12/19/96	25	5,699	<100	--	6.7	646.1	183	1,185	--
B2-30'	12/19/96	30	15,453	<100	--	91.8	1,850	530	3,553	--
B2-35'	12/19/96	35	4,386	<100	--	5.2	432.0	171	1,068	--
B2-40'	12/19/96	40	2,464	<100	--	21.8	43.3	74.9	463.0	--
B2-45'	12/19/96	45	<10	<10	--	<0.050	0.087	0.155	0.873	--
B2-45' dup	12/19/96	45	<10	<10	--	<0.050	0.092	0.156	0.879	--
B3-10'	12/19/96	10	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B3-20'	12/19/96	20	<10	<10	--	0.085	0.175	0.057	0.476	--
B3-30'	12/19/96	30	<10	<10	--	<0.050	0.206	<0.050	0.245	--
B3-35'	12/19/96	35	<10	<10	--	0.087	1.745	0.253	1.517	--
B3-40'	12/19/96	40	25	<10	--	1.100	0.268	0.455	0.064	<0.020

Notes:
1) All results reported in mg/kg
2) TPH_g = total petroleum hydrocarbons as gasoline, TPH_d = total petroleum hydrocarbons as diesel; analyzed using Modified EPA Method 8015
3) TRPH = total recoverable petroleum hydrocarbons; analyzed using EPA Method 418.1
4) B = benzene, T = toluene, E = ethylbenzene, X = xylenes, MTBE = methyl-tertiary-butyl ether; analyzed using EPA Method 8020
< number = analyte below reported detection limit
-- = not analyzed
7) dup = laboratory duplicate sample

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FLUOR DANIEL GTI

Table 2a
Historical Soil Laboratory Test Results

Fluor Daniel, 1997

TABLE 2
Soil Analytical Data
Texaco Service Station, 530 Avenida Pico, San Clemente, California
(Page 2 of 4)

Well ID	Date	Depth	TPH_g	TPH_d	TRPH	B	T	E	X	MTBE
Fuel Release Investigation Samples (continued)										
B4-10'	12/19/96	10	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B4-25'	12/19/96	25	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B4-30'	12/19/96	30	<10	<10	--	0.083	<0.050	<0.050	<0.050	--
B4-35'	12/19/96	35	<10	<10	--	0.842	<0.050	<0.050	0.121	--
B4-40'	12/19/96	40	38	<10	--	1.607	0.141	1.347	3.919	0.046
B5-10'	12/23/96	10	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B5-20'	12/23/96	20	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B5-20' dup	12/23/96	20	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B5-30'	12/23/96	30	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B5-35'	12/23/96	35	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B5-40'	12/23/96	40	<10	<10	--	0.267	<0.050	<0.050	<0.050	<0.020
B5-45'	12/23/96	45	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B6-10'	12/23/96	10	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B6-20'	12/23/96	20	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B6-30'	12/23/96	30	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B6-35'	12/23/96	35	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B6-40'	12/23/96	40	<10	<10	--	<0.050	<0.050	<0.050	<0.050	<0.020
MW-1-30'	01/21/97	30	<0.05	--	--	<0.005	<0.005	<0.005	<0.01	<0.3
MW-1-35'	01/21/97	35	<0.05	--	--	<0.005	<0.005	<0.005	<0.01	<0.3
MW-1-40'	01/21/97	40	<0.05	--	--	<0.005	<0.005	<0.005	<0.01	<0.3
MW-2-35'	01/21/97	35	2,200	--	--	<3	15	34	250	<200
MW-2-40'	01/21/97	40	570	--	--	<0.5	2.4	13	3.5	5.9

Notes:
1) All results reported in mg/kg
2) TPH_g = total petroleum hydrocarbons as gasoline, TPH_d = total petroleum hydrocarbons as diesel; analyzed using Modified EPA Method 8015
3) TRPH = total recoverable petroleum hydrocarbons; analyzed using EPA Method 418.1
4) B = benzene, T = toluene, E = ethylbenzene, X = xylenes, MTBE = methyl-tertiary-butyl ether; analyzed using EPA Method 8020
5) < number = analyte below reported detection limit
6) -- = not analyzed
7) dup = laboratory duplicate sample

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FLUOR DANIEL GTI

Table 2a
Historical Soil Laboratory Test Results

Fluor Daniel, 1997

TABLE 2
Soil Analytical Data
Texaco Service Station, 530 Avenida Pico, San Clemente, California
(Page 3 of 4)

Well ID	Date	Depth	TPH_g	TPH_d	TRPH	B	T	E	X	MTBE
Fuel Release Investigation Samples (continued)										
MW-3-30'	01/21/97	30	0.84	--	--	0.12	0.17	<0.03	0.11	<2
MW-3-35'	01/21/97	35	30	--	--	3.1	5.9	<1	4.2	<60
MW-3-40'	01/21/97	40	0.10	--	--	<0.005	0.0070	<0.005	0.0061	<0.3
S1-2'	12/09/96	2	2,792	--	--	--	--	--	--	0.498
S2-2'	12/09/96	2	7,864	--	--	--	--	--	--	0.175
S3-3.5'	12/09/96	3.5	<1	--	--	--	--	--	--	0.025
S4-2'	12/09/96	2	837	--	--	--	--	--	--	0.065
S5-3'	12/09/96	3	<1	--	--	--	--	--	--	<0.020
S6-17'	12/13/96	17	25,000	--	--	--	--	--	--	--
S7-8'	12/13/96	8	0.10	--	--	--	--	--	--	--
S8-6'	12/13/96	6	<0.05	--	--	--	--	--	--	--
S9-6'	12/13/96	6	<0.05	--	--	--	--	--	--	--
S10-15'	12/13/96	15	0.091	--	--	--	--	--	--	--
S11-5'	01/07/97	5	0.054	--	-	<0.005	<0.005	<0.005	<0.01	<0.3
S12-9'	01/07/97	9	<0.05	--	--	<0.005	<0.005	<0.005	<0.01	<0.3
S13-10'	01/07/97	10	<0.05	--	--	<0.005	<0.005	<0.005	<0.01	<0.3
Hoist and Clarifier Samples										
Clarifier-3 1/2'	12/17/96	3.5	--	--	42	--	--	--	--	--
Clarifier-5 1/2'	12/17/96	5.5	--	--	13	<0.005	<0.005	<0.005	<0.01	--
E-Hoist-8 1/2'	12/17/96	8.5	--	--	12	--	--	--	--	--
E-Hoist-10 1/2'	12/17/96	10.5	--	<10	21	--	--	--	--	--
W-Hoist-9'	12/17/96	9	--	--	<10	--	--	--	--	--
W-Hoist-11'	12/17/96	11	--	<10	14	--	--	--	--	--

Notes:
1) All results reported in mg/kg
2) TPH_g = total petroleum hydrocarbons as gasoline, TPH_d = total petroleum hydrocarbons as diesel; analyzed using Modified EPA Method 8015
3) TRPH = total recoverable petroleum hydrocarbons; analyzed using EPA Method 418.1
4) B = benzene, T = toluene, E = ethylbenzene, X = xylenes, MTBE = methyl-tertiary-butyl ether; analyzed using EPA Method 8020
< number = analyte below reported detection limit
-- = not analyzed
dup = laboratory duplicate sample

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FLUOR DANIEL GTI

Table 2a
Historical Soil Laboratory Test Results

WGR, 2000

Table 1
Texaco Station
530 Avenida Pico
San Clemente, California

Soil Sample Analytical Summary

Sample Number	Sample Date	8015g TPH mg/Kg	8021B Benzene mg/Kg	8021B Toluene mg/Kg	8021B Ethyl Benzene mg/Kg	8021B Total Xylenes mg/Kg	8021 B MTBE mg/Kg
WGR-1-6'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-10'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-15'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-20'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-25'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-30'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-35'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-40'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-45'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-2-6'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-2-10'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-2-15'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-2-20'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-2-25'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025

Table 1
Texaco Station
530 Avenida Pico
San Clemente, California

Soil Sample Analytical Summary

Sample Number	Sample Date	8015g TPH mg/Kg	8021B Benzene mg/Kg	8021B Toluene mg/Kg	8021B Ethyl Benzene mg/Kg	8021B Total Xylenes mg/Kg	8021 B MTBE mg/Kg
WGR-2-30'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-2-35'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-2-40	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-6'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-10'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-15'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-20'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-25'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-30'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-35'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-40'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-4-6'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-4-10'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025

Table 2a
Historical Soil Laboratory Test Results

WGR, 2000

Table 1
Texaco Station
530 Avenida Pico
San Clemente, California

Soil Sample Analytical Summary

Sample Number	Sample Date	8015g TPH mg/Kg	8021B Benzene mg/Kg	8021B Toluene mg/Kg	8021B Ethyl Benzene mg/Kg	8021B Total Xylenes mg/Kg	8021 B MTBE mg/Kg
WGR-4-15'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-4-20'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-4-25'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-4-30'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-4-35'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-4-40'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	0.031

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TABLE 1
SUMMARY OF SOIL ANALYTICAL RESULTS - BTEX, TPH, AND LEAD
Shell Service Station 121371
530 Avenida Pico
San Clemente, California
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Sample ID	Sample Date	Sample Depth (feet)	Benzene (ug/kg)	Ethylbenzene (ug/kg)	Toluene (ug/kg)	o-Xylene (ug/kg)	p/m-Xylene (ug/kg)	Lead (mg/kg)	TPH (as Gasoline) (mg/kg)	TPH as Diesel (mg/kg)
121371-B01-10	03/29/07	10.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B01-15	03/29/07	15.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B01-20	03/29/07	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B01-25	03/29/07	25.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B01-30	03/29/07	30.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B01-35	03/29/07	35.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B01-40	03/29/07	40.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B02-10	03/30/07	10.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B02-15	03/30/07	15.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B02-20	03/30/07	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B02-25	03/30/07	25.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B02-30	03/30/07	30.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B02-35	03/30/07	35.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B02-40	03/30/07	40.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	420	46 Jm
121371-B03-10	03/29/07	10.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B03-15	03/29/07	15.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B03-20	03/29/07	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B03-25	03/29/07	25.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B03-30	03/29/07	30.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B03-35	03/29/07	35.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B04-10	03/30/07	10.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B04-15	03/30/07	15.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B04-20	03/30/07	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B04-25	03/30/07	25.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B04-30	03/30/07	30.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B05-10	03/30/07	10.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B05-15	03/30/07	15.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B05-20	03/30/07	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm

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Table 2a
Historical Soil Laboratory Test Results

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TABLE 1
SUMMARY OF SOIL ANALYTICAL RESULTS - BTEX, TPH, AND LEAD
Shell Service Station 121371
530 Avenida Pico
San Clemente, California
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Sample ID	Sample Date	Sample Depth (feet)	Benzene (ug/kg)	Ethylbenzene (ug/kg)	Toluene (ug/kg)	o-Xylene (ug/kg)	p/m-Xylene (ug/kg)	Lead (mg/kg)	TPH (as Gasoline) (mg/kg)	TPH as Diesel (mg/kg)
121371-B05-25	03/30/07	25.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B05-30	03/30/07	30.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B06-10	03/30/07	10.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B06-15	03/30/07	15.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B06-20	03/30/07	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B06-25	03/30/07	25.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B06-30	03/30/07	30.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B07-10	03/30/07	10.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B07-15	03/30/07	15.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B07-20	03/30/07	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B07-25	03/30/07	25.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B07-30	03/30/07	30.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-D1-04	03/29/07	0.0	ND (<5.0)	27	ND (<5.0)	83	150	4.03	1.5	160
121371-D2-04	03/30/07	0.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	1.75	ND (<0.50)	ND (<5.0)
121371-D3-04	03/30/07	0.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	1.92	ND (<0.50)	11

TABLE 2
SUMMARY OF SOIL ANALYTICAL RESULTS - FUEL OXYGENATES AND ETHANOL
Shell Service Station 121371
530 Avenida Pico
San Clemente, California
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Sample ID	Sample Date	Sample Depth (feet)	Diisopropyl Ether (DIPE) (ug/kg)	Ethanol (ug/kg)	Ethyl-t-Butyl Ether (ETBE) (ug/kg)	Methyl-t-Butyl Ether (MTBE) (ug/kg)	Tert-Amyl-Methyl Ether (TAME) (ug/kg)	Tert-Butyl Alcohol (TBA) (ug/kg)
121371-B01-10	03/29/07	10.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B01-15	03/29/07	15.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B01-20	03/29/07	20.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B01-25	03/29/07	25.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B01-30	03/29/07	30.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B01-35	03/29/07	35.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B01-40	03/29/07	40.0	ND (<10)	ND (<250)	ND (<10)	5.3	ND (<10)	ND (<50)
121371-B02-10	03/30/07	10.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B02-15	03/30/07	15.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B02-20	03/30/07	20.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B02-25	03/30/07	25.0	ND (<10)	ND (<250)	ND (<10)	130	ND (<10)	ND (<50)
121371-B02-30	03/30/07	30.0	ND (<10)	ND (<250)	ND (<10)	200	ND (<10)	59
121371-B02-35	03/30/07	35.0	ND (<10)	ND (<250)	ND (<10)	520	ND (<10)	350
121371-B02-40	03/30/07	40.0	ND (<10)	380	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B03-10	03/29/07	10.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B03-15	03/29/07	15.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B03-20	03/29/07	20.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B03-25	03/29/07	25.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B03-30	03/29/07	30.0	ND (<10)	ND (<250)	ND (<10)	13	ND (<10)	ND (<50)
121371-B03-35	03/29/07	35.0	ND (<10)	ND (<250)	ND (<10)	53	ND (<10)	ND (<50)
121371-B04-10	03/30/07	10.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B04-15	03/30/07	15.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B04-20	03/30/07	20.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B04-25	03/30/07	25.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B04-30	03/30/07	30.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B05-10	03/30/07	10.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B05-15	03/30/07	15.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B05-20	03/30/07	20.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)

Table 2a
Historical Soil Laboratory Test Results

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TABLE 2
SUMMARY OF SOIL ANALYTICAL RESULTS - FUEL OXYGENATES AND ETHANOL
Shell Service Station 121371
530 Avenida Pico
San Clemente, California
Page 2 of 2

Sample ID	Sample Date	Sample Depth (feet)	Diisopropyl Ether (DIPE) (ug/kg)	Ethanol (ug/kg)	Ethyl-t-Butyl Ether (ETBE) (ug/kg)	Methyl-t-Butyl Ether (MTBE) (ug/kg)	Tert-Amyl-Methyl Ether (TAME) (ug/kg)	Tert-Butyl Alcohol (TBA) (ug/kg)
121371-B05-25	03/30/07	25.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B05-30	03/30/07	30.0	ND (<10)	ND (<250)	ND (<10)	6.9	ND (<10)	ND (<50)
121371-B06-10	03/30/07	10.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B06-15	03/30/07	15.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B06-20	03/30/07	20.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B06-25	03/30/07	25.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B06-30	03/30/07	30.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B07-10	03/30/07	10.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B07-15	03/30/07	15.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B07-20	03/30/07	20.0	ND (<10)	ND (<250)	ND (<10)	5.1	ND (<10)	ND (<50)
121371-B07-25	03/30/07	25.0	ND (<10)	ND (<250)	ND (<10)	24	ND (<10)	ND (<50)
121371-B07-30	03/30/07	30.0	ND (<10)	ND (<250)	ND (<10)	8.3	ND (<10)	ND (<50)
121371-D1-04	03/29/07	0.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-D2-04	03/30/07	0.0	ND (<10)	ND (<250)	ND (<10)	5.4	ND (<10)	ND (<50)
121371-D3-04	03/30/07	0.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)

Kleinfelder, 2011

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Bright People. Right Solutions.

Table 1 – Soil Sample Analytical Results
I-5 HOV Lane Extension Project
530 Avenida Pico
San Clemente, Orange County, California

Boring Number	Sample Number	Sample Depth (feet)	Date Sampled	TPH Carbon Chain Analysis				VOCs[1] (mg/kg)
				TPH-g C_4-C_{10} (mg/kg)	TPH-d C_{11}-C_{22} (mg/kg)	TPH-o C_{23}-C_{35} (mg/kg)	Total TPH (mg/kg)	
KLFSB-01	KLSB-01-05	5	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-01-10	10	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-01-15	15	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-01-20	20	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-01-25	25	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-01-30	30	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
KLFSB-02	KLSB-02-05	5	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-02-10	10	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-02-15	15	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-02-20	20	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-02-25	25	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-02-30	30	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
KLFSB-03	KLSB-03-05	5	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-03-10	10	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-03-15	15	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-03-20	20	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-03-25	25	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-03-30	30	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
KLFSB-04	KLSB-04-05	5	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-04-10	10	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-04-15	15	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-04-20	20	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-04-25	25	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-04-30	30	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020

Table 2a
Historical Soil Laboratory Test Results

Kleinfelder, 2011

Table 1 – Soil Sample Analytical Results
I-5 HOV Lane Extension Project
530 Avenida Pico
San Clemente, Orange County, California

Boring Number	Sample Number	Sample Depth (feet)	Date Sampled	TPH Carbon Chain Analysis				VOCs[1] (mg/kg)
				TPH-g C_4-C_{10} (mg/kg)	TPH-d C_{11}-C_{22} (mg/kg)	TPH-o C_{23}-C_{35} (mg/kg)	Total TPH (mg/kg)	
KLFSB-05	KLSB-05-05	5	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-05-10	10	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-05-15	15	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-05-20	20	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-05-25	25	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-05-30	30	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
KLFSB-06	KLSB-06-05	5	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-06-10	10	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-06-15	15	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-06-20	20	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-06-25	25	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-06-30	30	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
KLFSB-07	KLSB-07-05	5	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-07-10	10	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-07-15	15	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-07-20	20	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-07-25	25	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-07-30	30	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
KLFSB-08	KLSB-08-05	5	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-08-10	10	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-08-15	15	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-08-20	20	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-08-25	25	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-08-30	30	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020

Table 1 – Soil Sample Analytical Results
I-5 HOV Lane Extension Project
530 Avenida Pico
San Clemente, Orange County, California

Boring Number	Sample Number	Sample Depth (feet)	Date Sampled	TPH Carbon Chain Analysis				VOCs[1] (mg/kg)
				TPH-g C_4-C_{10} (mg/kg)	TPH-d C_{11}-C_{22} (mg/kg)	TPH-o C_{23}-C_{35} (mg/kg)	Total TPH (mg/kg)	
KLFSB-09	KLSB-09-10	10	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-09-15	15	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-09-20	20	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-09-25	25	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-09-30	30	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
TTLC				NV	NV	NV	NV	NV
STLC (mg/L)				NV	NV	NV	NV	NV
TCLP (mg/L)				NV	NV	NV	NV	0.2-200
CHHSLs				NV	NV	NV	NV	NV

Table 2b
Historical Groundwater Laboratory Test Results

Well ID	TPH-g	MTBE	B	T	E	X	Total BTEX
Source: 1997 Fluor Daniel							
B-1	13,512	106	1,103	4,083	286	3,184	8,656
B-2	326,723	257	1,721	42,946	11,662	76,230	132,559
B-3	Groundwater samples not collected						
B-4	Groundwater samples not collected						
B-5	6,035	<20	54	5	5	75	139
B-6	Groundwater samples not collected						
MW-1	<100	<30	-	-	-	1	1
MW-2	41,000	<2000	380	3,600	2,600	12,000	18,580
MW-3	29,000	<600	1,200	2,900	1,400	4,800	10,300
Source: July 1997 Alton Geoscience							
MW-1	<100	<30	<0.3	<0.4	<0.5	<0.6	-
MW-2	19,000	600	400	590	2,400	3,900	7,290
MW-3	5,600	<200	280	320	410	3,500	4,510
Source: October 1997 Alton Geoscience							
MW-1	-	-	-	Not tested	Not tested	Not tested	-
MW-2	6,400	76	49	Not tested	Not tested	Not tested	49
MW-3	3,600	80	200	Not tested	Not tested	Not tested	200
Source: July, 2000 WGR Southwest							
WGR-1	-	-	-	-	-	-	-
WGR-2	-	-	-	-	-	-	-
WGR-3	-	-	-	-	-	-	-
Source: September 2001 WGR Southwest							
MW-1	N/A	130	N/A	N/A	N/A	N/A	-
MW-2	N/A	N/A	N/A	N/A	N/A	N/A	-
MW-3	21,000	N/A	6,000	N/A	N/A	N/A	200
Source: 2007 URS Corporation							
B01	-	-	-	-	-	-	-
B02	5,800	20	10	650	6	159	825
B03	3,600	7	-	-	-	-	-
B04	Groundwater not encountered						
B05	Groundwater not encountered						
B06	Groundwater not encountered						
Source: 2011 Kleinfelder							
KLFSB-01							
KLFSB-02							
KLFSB-03			Borings completed at 30 ft bgs.				
KLFSB-04		Groundwater not encountered in any boring.					
KLFSB-05							
KLFSB-06							
KLFSB-07							
KLFSB-08							
KLFSB-09							

Table 2b
Historical Groundwater Laboratory Test Results

Source: 2012 Group Delta Consultants							
B-12-001	4,600	8.4	-	-	395	-	395
B-12-002	393	4.7	-	-	-	-	-
B-12-003	40,000	142	634	4,300	1,350	7,780	14,064
B-12-004	-	*	*	*	*	*	-
B-12-005	46.2	10.7	-	-	-	-	-
B-12-006	17.5	8.6	-	-	-	-	-
MW-1	10	4	-	-	-	-	-
MW-2	1,800	49	232	353	44	455	1,084
MW-3	2,400	59	505	99	218	93	915

	All results are reported in µg/L
*	Not enough sample could be collected to run full set of testing. Only selected testing was performed
-	Concentrations are below the reporting limits
N/A	Information not available
TPH-g	Total Petroleum Hydrocarbons as Gasoline
MTBE	Metyl-Trietary-Butyl-Ether
B	Benzene
T	Toluene
E	Ethylbenzene
X	Xylenes

APPENDIX A
Field Boring Logs

KEY FOR SOIL CLASSIFICATION

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)

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

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

CONSISTENCY CLASSIFICATION

COARSE GRAINED SOILS		FINE GRAINED SOILS		
Blowcount SPT[1] (CAL)[2]	Consistency	Blowcount[3] SPT[1] (CAL)[2]	Consistency	Undrained Shear Strength[3], S_u (ksf)
		<2 (<3)	Very Soft	< 0.25
0-4 (0-6)	Very Loose	2-4 (3-6)	Soft	0.25 -0.50
5-9 (7-14)	Loose	5-8 (7-12)	Medium Stiff	0.50 - 1.0
10-29 (15-44)	Med. Dense	9-15 (13-22)	Stiff	1.0 - 2.0
30-49 (45-74)	Dense	16-30 (23-45)	Very Stiff	2.0 - 4.0
≥50 (≥75)	Very Dense	>30 (>45)	Hard	>4.0

MOISTURE CLASSIFICATION

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

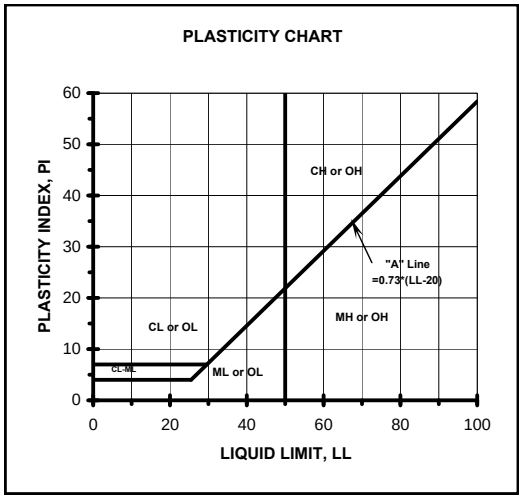
CONSISTENCY NOTES:

1. Number of blows of a 60% efficiency 140-lb. hammer falling 30-inches to drive a 2-inch O.D. (1.375-inch I.D.) **SPT Sampler** the final 12-inches of driving
2. Number of blows of a 140-lb. hammer falling 30-inches to drive a 3-inch O.D. (2.42-inch I.D.) **California Ring Sampler** the final 12-inches of driving.
3. Undrained shear strength of cohesive soils predicted from field blowcounts is generally unreliable. Where possible, consistency should be based on S_u data from pocket penetrometer, torvane, or laboratory testing.

CLASSIFICATION CRITERIA BASED ON LABORATORY TESTS

Grain Size Classification

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



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

Granular Soil Gradation Parameters

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

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

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

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

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

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

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

LOG OF TEST BORING

PROJECT NAME	I-5 / Avenida Pico	**PROJECT NUMBER**	I-540
BORING	**B12-001**		
SITE LOCATION	I-5 Fwy at Avenida Pico, San Clemente, CA	**START**	3/26/2012
FINISH	3/26/2012	**SHEET NO.**	1 of 2
DRILLING COMPANY	Kehoe Testing & Engineering	**DRILLING METHOD**	Direct Push
LOGGED BY	M Lithgow	**CHECKED BY**	V. Glisic
DRILLING EQUIPMENT	Geoprobe 7800	**BORING DIA. (in)**	1 3/4"
TOTAL DEPTH (ft)	45	**GROUND ELEV (ft)**	87.5
DEPTH/*ELEV.* GROUND WATER (ft)	▼ 39.2 / *48.3*		
SAMPLING METHOD	6" Long Acetate Liner	**NOTES**	530 Avenida Pico (Shell Gas Station)

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	PID (ppm)	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	87.5											Cored through Concrete (6").
												Hand Auger to 5'.
	85											Sandy Lean CLAY (CL); brown; moist; fine sand; medium plasticity.
5												less sand.
	80	S	1				0.5					Lean CLAY with sand (CL); to Clayey SAND (SC); light brown; moist; fine to medium sand; low plasticity.
10												
	75	S	2				0.5					Sandy Lean CLAY (CL); brown; moist; stiff; medium plasticity; fine to medium sand.
15												
	70	S	3				0.7					Lean CLAY with SAND (CL); dark brown; moist; medium to high plasticity; fine sand.
20		S	4				0.8					Continues with gray, orange streaks; less sand.
	65											
25												
	60	S	5				1.0					Lean CLAY (CL); dark brown; moist; stiff; high plasticity.
		S	6				1.0					

GDC_LOG_BORING_1A I-540 AVENIDA PICO.GPJ GDCLOG.GDT 5/21/12

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

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

FIGURE A-2 a

LOG OF TEST BORING

PROJECT NAME	I-5 / Avenida Pico	**PROJECT NUMBER**	I-540
BORING	**B12-001**		
SITE LOCATION	I-5 Fwy at Avenida Pico, San Clemente, CA	**START**	3/26/2012
FINISH	3/26/2012	**SHEET NO.**	2 of 2
DRILLING COMPANY	Kehoe Testing & Engineering	**DRILLING METHOD**	Direct Push
LOGGED BY	M Lithgow	**CHECKED BY**	V. Glisic
DRILLING EQUIPMENT	Geoprobe 7800	**BORING DIA. (in)**	1 3/4"
TOTAL DEPTH (ft)	45	**GROUND ELEV (ft)**	87.5
DEPTH/*ELEV.* GROUND WATER (ft)	▼ 39.2 / *48.3*		
SAMPLING METHOD	6" Long Acetate Liner	**NOTES**	530 Avenida Pico (Shell Gas Station)

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	PID (ppm)	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
35	55	SS	7				1.3					
40	50	SS	8				2.0					Lean CLAY with sand (CL); brown; moist; medium plasticity; medium stiffness. ▼
45	45	SS	9				1.1					Boring terminated at 45 ft bgs. Groundwater encountered at 39.2 feet. Borehole backfilled with bentonite, and hydrated. Patched with concrete.
50	40											
55	35											
	30											

GDC_LOG_BORING_1A I-540 AVENIDA PICO.GPJ GDCLOG.GDT 5/21/12

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FIGURE A-2 b

LOG OF TEST BORING

PROJECT NAME	I-5 / Avenida Pico	**PROJECT NUMBER**	I-540
BORING	**B12-002**		
SITE LOCATION	I-5 Fwy at Avenida Pico, San Clemente, CA	**START**	3/26/2012
FINISH	3/26/2012	**SHEET NO.**	1 of 2
DRILLING COMPANY	Kehoe Testing & Engineering	**DRILLING METHOD**	Direct Push
LOGGED BY	M Lithgow	**CHECKED BY**	V. Glisic
DRILLING EQUIPMENT	Geoprobe 7800	**BORING DIA. (in)**	1 3/4"
TOTAL DEPTH (ft)	45	**GROUND ELEV (ft)**	87.5
DEPTH/*ELEV.* GROUND WATER (ft)	▼ 39.7 / *47.8*		
SAMPLING METHOD	6" Long Acetate Liner	**NOTES**	530 Avenida Pico (Shell Gas Station)

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	PID (ppm)	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	85											Core through concrete (6"). Hand Auger to 5 ft. Sandy Lean CLAY (CL); stiff; dark brown; moist; fine sand; medium plasticity.
5		S	1				0.6					
	80											
10		S	2				0.5					
	75											
15		S	3									
	70											Lean CLAY (CL); stiff; moist; dark brown; medium to high plasticity.
20		S	4				0.6					
	65											
25		S	5				0.8					Continues with increase in fine sand.
	60											
		S	6				0.5					

GDC_LOG_BORING_1A I-540 AVENIDA PICO.GPJ GDCLOG.GDT 5/21/12

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FIGURE A-3 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
I-5 / Avenida Pico	I-540	**B12-002**

SITE LOCATION	START	FINISH	SHEET NO.
I-5 Fwy at Avenida Pico, San Clemente, CA	3/26/2012	3/26/2012	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Kehoe Testing & Engineering	Direct Push	M Lithgow	V. Glisic

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Geoprobe 7800	1 3/4"	45	87.5	▼ 39.7 / *47.8*

SAMPLING METHOD	NOTES
6" Long Acetate Liner	530 Avenida Pico (Shell Gas Station)

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	PID (ppm)	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
35	55	S	7				0.6					Lean CLAY (CL); stiff; dark brown; moist; trace fine sand; high plasticity.
40	50	S	8				0.9					▼
45	45	S	9				0.8					Borehole terminated at 45 ft bgs. Groundwater encountered at 39.7 ft. Backfilled with bentonite, and hydrated. Patched with concrete.
50	40											
55	35											
	30											

GDC_LOG_BORING_1A I-540 AVENIDA PICO.GPJ GDCLOG.GDT 5/21/12

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FIGURE A-3 b

LOG OF TEST BORING

PROJECT NAME	I-5 / Avenida Pico	**PROJECT NUMBER**	I-540
BORING	**B12-003**		
SITE LOCATION	I-5 Fwy at Avenida Pico, San Clemente, CA	**START**	3/27/2012
FINISH	3/27/2012	**SHEET NO.**	1 of 2
DRILLING COMPANY	Kehoe Testing & Engineering	**DRILLING METHOD**	Direct Push
LOGGED BY	M Lithgow	**CHECKED BY**	V. Glisic
DRILLING EQUIPMENT	Geoprobe 7800	**BORING DIA. (in)**	1 3/4"
TOTAL DEPTH (ft)	45	**GROUND ELEV (ft)**	87.5
DEPTH/*ELEV.* GROUND WATER (ft)	▼ 35.3 / *52.2*	**SAMPLING METHOD**	6" Long Acetate Liner
NOTES	530 Avenida Pico (Shell Gas Station)		

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	PID (ppm)	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	85											Cored through concrete Hand auger to 5 ft. Silty SAND to clayey SAND (SM-SC).
5	80	S	1				1904					Strong gasoline odor.
10	75	S	2				4502					Lean CLAY with sand (CL); brown ; moist; medium plasticity; strong gasoline odor.
15	70	S	3				7090					Less sand; very strong gasoline odor.
20	65	S	4				6940					Silty, Clayey SAND (SC-SM); brown; moist; medium sand; low plasticity.
25	60	S	5				4130					Silty SAND (SM); brown; moist; fine to medium sand; low plasticity to non-plastic; gas odor.
		S	6				4838					

GDC_LOG_BORING_1A I-540 AVENIDA PICO.GPJ GDCLOG.GDT 5/21/12

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FIGURE A-4 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
I-5 / Avenida Pico	I-540	**B12-003**

SITE LOCATION	START	FINISH	SHEET NO.
I-5 Fwy at Avenida Pico, San Clemente, CA	3/27/2012	3/27/2012	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Kehoe Testing & Engineering	Direct Push	M Lithgow	V. Glisic

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Geoprobe 7800	1 3/4"	45	87.5	▼ 35.3 / *52.2*

SAMPLING METHOD	NOTES
6" Long Acetate Liner	530 Avenida Pico (Shell Gas Station)

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	PID (ppm)	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Silty SAND (SM); brown; moist; fine to medium sand; low plasticity to non-plastic; gas odor.
	55											Clayey SAND (SC); brown; moist; medium sand; slight plasticity; gas odor.
35												▼
	50	SS	7				3764					
40		SS	8				6.5					Lean CLAY with sand (CL); dark brown; moist; fine to medium sand; medium plasticity.
	45											
45		SS	9				4.2					Boring terminated at 45 ft bgs. Groundwater encountered at 35.3 ft bgs during drilling. Borehole backfilled with bentonite chips. Patched with concrete.
	40											
50												
	35											
55												
	30											

GDC_LOG_BORING_1A I-540 AVENIDA PICO.GPJ GDCLOG.GDT 5/21/12

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FIGURE A-4 b

LOG OF TEST BORING

PROJECT NAME	I-5 / Avenida Pico	**PROJECT NUMBER**	I-540
BORING	**B12-004**		
SITE LOCATION	I-5 Fwy at Avenida Pico, San Clemente, CA	**START**	3/27/2012
FINISH	3/27/2012	**SHEET NO.**	1 of 2
DRILLING COMPANY	Kehoe Testing & Engineering	**DRILLING METHOD**	Direct Push
LOGGED BY	M Lithgow	**CHECKED BY**	V. Glisic
DRILLING EQUIPMENT	Geoprobe 7800	**BORING DIA. (in)**	1 3/4"
TOTAL DEPTH (ft)	45	**GROUND ELEV (ft)**	87.5
DEPTH/*ELEV.* GROUND WATER (ft)	▼ 36.3 / *51.2*		
SAMPLING METHOD	6" Long Acetate Liner	**NOTES**	530 Avenida Pico (Shell Gas Station)

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	PID (ppm)	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	85											Cored through concrete (4-5"). Hand auger to 5 ft. Silty SAND (SM); gray; brown; moist; medium sand and asphalt mix [fill].
5		S	1				1.3					Lean CLAY with sand (CL); dark brown; moist; stiff to very stiff; fine to medium sand. Increase in sand.
	80											Lean CLAY (CL); dark brown; stiff; moist; fine sand.
10		S	2				0.4					
	75											
15		S	3				0.7					
	70											
20		S	4				3.6					
	65											
25		S	5				3.7					Very stiff; trace oxidation; slight increase in sand.
	60											
		S	6				18.0					Less sand.

GDC_LOG_BORING_1A I-540 AVENIDA PICO.GPJ GDCLOG.GDT 5/21/12

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

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

FIGURE A-5 a

LOG OF TEST BORING

PROJECT NAME	I-5 / Avenida Pico	**PROJECT NUMBER**	I-540
BORING	**B12-004**		
SITE LOCATION	I-5 Fwy at Avenida Pico, San Clemente, CA	**START**	3/27/2012
FINISH	3/27/2012	**SHEET NO.**	2 of 2
DRILLING COMPANY	Kehoe Testing & Engineering	**DRILLING METHOD**	Direct Push
LOGGED BY	M Lithgow	**CHECKED BY**	V. Glisic
DRILLING EQUIPMENT	Geoprobe 7800	**BORING DIA. (in)**	1 3/4"
TOTAL DEPTH (ft)	45	**GROUND ELEV (ft)**	87.5
DEPTH/*ELEV.* GROUND WATER (ft)	▼ 36.3 / *51.2*		
SAMPLING METHOD	6" Long Acetate Liner	**NOTES**	530 Avenida Pico (Shell Gas Station)

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	PID (ppm)	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
35	55											Lean CLAY (CL); dark brown; stiff; moist; fine sand.
40	50	SS	7				6.1					
		SS	8				9.4					
45	45	SS	9				1.9					
	40											Boring terminated at 45 ft bgs. Groundwater encountered at 36.3 ft. during drilling. Borehole backfilled with bentonite chips, hydrated. Patched with concrete to surface.
50	35											
55	30											

GDC_LOG_BORING_1A I-540 AVENIDA PICO.GPJ GDCLOG.GDT 5/21/12

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32 Mauchly, Suite B
Irvine, CA 92618

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

FIGURE A-5 b

LOG OF TEST BORING

PROJECT NAME	I-5 / Avenida Pico	**PROJECT NUMBER**	I-540
BORING	**B12-005**		
SITE LOCATION	I-5 Fwy at Avenida Pico, San Clemente, CA	**START**	3/27/2012
FINISH	3/27/2012	**SHEET NO.**	1 of 2
DRILLING COMPANY	Kehoe Testing & Engineering	**DRILLING METHOD**	Direct Push
LOGGED BY	M Lithgow	**CHECKED BY**	V. Glisic
DRILLING EQUIPMENT	Geoprobe 7800	**BORING DIA. (in)**	1 3/4"
TOTAL DEPTH (ft)	45	**GROUND ELEV (ft)**	86.0
DEPTH/*ELEV.* GROUND WATER (ft)	▼ 41.9 / *44.1*		
SAMPLING METHOD	6" Long Acetate Liner	**NOTES**	524 Avenida Pico (Burger Stop)

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	PID (ppm)	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	85											Cored through asphalt (4"). Silty SAND (SM); medium density; brown; moist; fine to medium sand; trace clay.
5	80		1				0.2					
												Lean CLAY with sand (CL); dark brown; stiff; moist; fine sand; high plasticity.
10	75		2				0.4					
15	70		3				0.3					brown
												Clayey SAND (SC); brown; moist; medium to coarse sand; slight plasticity.
20	65		4				0.4					
												Lean CLAY with sand (CL); dark brown; very stiff; moist; medium plasticity.
25	60		5				0.5					
			6				0.6					

GDC_LOG_BORING_1A I-540 AVENIDA PICO.GPJ GDCLOG.GDT 5/21/12

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

FIGURE A-6 a

LOG OF TEST BORING

PROJECT NAME	I-5 / Avenida Pico	**PROJECT NUMBER**	I-540
BORING	**B12-005**		
SITE LOCATION	I-5 Fwy at Avenida Pico, San Clemente, CA	**START**	3/27/2012
FINISH	3/27/2012	**SHEET NO.**	2 of 2
DRILLING COMPANY	Kehoe Testing & Engineering	**DRILLING METHOD**	Direct Push
LOGGED BY	M Lithgow	**CHECKED BY**	V. Glisic
DRILLING EQUIPMENT	Geoprobe 7800	**BORING DIA. (in)**	1 3/4"
TOTAL DEPTH (ft)	45	**GROUND ELEV (ft)**	86.0
DEPTH/*ELEV.* GROUND WATER (ft)	▼ 41.9 / *44.1*		
SAMPLING METHOD	6" Long Acetate Liner	**NOTES**	524 Avenida Pico (Burger Stop)

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	PID (ppm)	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	55											Lean CLAY with sand (CL); dark brown; moist; high plasticity; fine sand.
35	50		7				1.4					
40	45		8				20					▼
45	40		9				1.5					Greenish-gray Boring terminated at 45 ft bgs. Groundwater encountered at 41.9 ft bgs. Surface patched with concrete. Borehole backfilled with bentonite, and hydrated.
50	35											
55	30											

GDC_LOG_BORING_1A I-540 AVENIDA PICO.GPJ GDCLOG.GDT 5/21/12

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Irvine, CA 92618

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

FIGURE A-6 b

LOG OF TEST BORING

PROJECT NAME	I-5 / Avenida Pico	**PROJECT NUMBER**	I-540
BORING	**B12-006**		
SITE LOCATION	I-5 Fwy at Avenida Pico, San Clemente, CA	**START**	3/26/2012
FINISH	3/26/2012	**SHEET NO.**	1 of 2
DRILLING COMPANY	Kehoe Testing & Engineering	**DRILLING METHOD**	Direct Push
LOGGED BY	M Lithgow	**CHECKED BY**	V. Glisic
DRILLING EQUIPMENT	Geoprobe 7800	**BORING DIA. (in)**	1 3/4"
TOTAL DEPTH (ft)	45	**GROUND ELEV (ft)**	84.5
DEPTH/*ELEV.* GROUND WATER (ft)	▼ 42.7 / *41.8*		
SAMPLING METHOD	6" Long Acetate Liner	**NOTES**	524 Avenida Pico (Burger Stop)

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	PID (ppm)	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
												Core through asphalt (6").
												Hand auger to 5 ft.
												Sandy Lean CLAY (CL); moist; dark brown; fine sand; medium plasticity.
5	80						0.1					
10	75						0.3					
15	70						0.5			<4.5		
20	65						0.4					
25	60						0.5			<4.5		Increase in fine sand.
	55						0.6					

GDC_LOG_BORING_1A I-540 AVENIDA PICO.GPJ GDCLOG.GDT 5/21/12

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Irvine, CA 92618

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

FIGURE A-7 a

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
I-5 / Avenida Pico	I-540	**B12-006**

SITE LOCATION	START	FINISH	SHEET NO.
I-5 Fwy at Avenida Pico, San Clemente, CA	3/26/2012	3/26/2012	2 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Kehoe Testing & Engineering	Direct Push	M Lithgow	V. Glisic

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Geoprobe 7800	1 3/4"	45	84.5	▼ 42.7 / *41.8*

SAMPLING METHOD	NOTES
6" Long Acetate Liner	524 Avenida Pico (Burger Stop)

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	DRY DENSITY (pcf)	MOISTURE (%)	PID (ppm)	% PASSING #200	ATTERBERG LIMITS LL:PI	POCKET PEN (tsf)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
35	50						0.7					Sandy Lean CLAY (CL); moist; dark brown; fine sand; medium plasticity.
40	45						0.0			1.5		
45	40											Borehole terminated at 45 ft bgs. Groundwater encountered at 42.7 ft. Borehole backfilled with bentonite, and hydrated. Patched with concrete to surface.
50	35											
55	30											
	25											

GDC_LOG_BORING_1A I-540 AVENIDA PICO.GPJ GDCLOG.GDT 5/21/12

GROUP DELTA CONSULTANTS, INC.
32 Mauchly, Suite B
Irvine, CA 92618

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

FIGURE A-7 b

APPENDIX B
Results of Analytical Laboratory Testing

American Environmental Testing Laboratory Inc.
2834 & 2908 North Naomi Street Burbank, CA 91504 • DOHS NO: 1541, LACSD NO: 10181
Tel: (888) 288-AETL • (818) 845-8200 • Fax: (818) 845-8840 • www.aetlab.com

Ordered By

Group Delta Consultants
32 Mauchly Suite B
Irvine, CA 92618-

Telephone: (949)450-2100
Attention: Vesna Glisic

Number of Pages	**38**
Date Received	**03/26/2012**
Date Reported	**04/04/2012**

Job Number	Order Date	Client
65203	03/26/2012	GROUP

Project ID: I-540
Project Name: Avenida Pico SI
Site: 524 & 530 Avenida Pico
San Clemente, CA 92672

Enclosed please find results of analyses of 3 water and 12 soil samples which were analyzed as specified on the attached chain of custody. If there are any questions, please do not hesitate to call.

Checked By: _____ Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

American Environmental Testing Laboratory Inc.

2834 & 2908 North Naomi Street, Burbank, CA 91504 • DOHS NO: 1541, LACSD NO: 10181
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CHAIN OF CUSTODY RECORD

№ 78218

AETL JOB No. 65203

COMPANY: Group Delta Consultants
PROJECT MANAGER: Vesna Glisic
COMPANY ADDRESS: 32 Mauchly, Ste B, Irvine, CA 92618
PHONE: 949.450.2100
FAX: 949 450 2108
PROJECT NAME: Avenida Pico SI
PROJECT #: I-540
SITE NAME AND ADDRESS: 524 & 530 Avenida Pico, San Clemente, CA
PO #:

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	M8015G/8021	M8015D	8260B	6010/7000	TEST INSTRUCTIONS & COMMENTS
1	B-12-006 @10'	65203.01	3-26-12		Soil	1-6" tube	none	/	/		/	Need duplicate M8015D
2	B-12-006 @10'	↓			5035 kits	4				/		
3	B-12-006 @35'	65203.02			Soil	1-6" tube	none	/	/		/	
4	B-12-006 @ 35'	↓			5035 kit	4				/		
5	B-12-006 @20'	65203.03			Soil	1-6" tube	none	/	/		/	
6	B-12-006 @ 20'	↓			5035 kit	4				/		
7	B-12-002 @ 10'	65203.04			Soil	1-6" tube	none	/	/		/	
8	B-12-002 @ 10'	↓			5035 kit	4				/		
9	B-12-002 @35'	65203.05			Soil	1-6" tube	none	/	/		/	
10	B-12-002 @35'	↓			5035 kit	4				/		
11	B-12-002 @ 25'	65203.06			Soil	1-6" tube	none	/	/		/	
12	B-12-002 @ 25'	↓			5035 kit	4				/		
13	B-12-001 @10'	65203.07			Soil	1-6" tube	none	/	/		/	Need duplicate M8015D
14	B-12-001 @10'	↓			5035 kit	4				/		
15	B12-001 @ 35'	65203.08	↓		Soil	1-6" tube	none	/	/		/	

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS	36	PROPERLY COOLED (Y) / N / NA	
CUSTODY SEALS Y / N / (NA)		SAMPLES INTACT (Y) / N / NA	
RECEIVED IN GOOD COND. (Y) / N		SAMPLES ACCEPTED (Y) / N	

TURN AROUND TIME

☑ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

	1.	2.	3.
RELINQUISHED BY SAMPLER: / RELINQUISHED BY:	Signature: Meghan Kilgore	Signature:	Signature:
	Printed Name: Meghan Kilgore	Printed Name:	Printed Name: C. Morales
	Date: 3/26/12 Time: 1700	Date: Time:	Date: 3/26/12 Time: 1900
RECEIVED BY: / RECEIVED BY LABORATORY:	Signature:	Signature:	Signature:
	Printed Name: CARLOS POSADAS	Printed Name:	Printed Name: Jean Claude
	Date: 3/26/12 Time: 1700	Date: Time:	Date: 03/26/12 Time: 1900

DISTRIBUTION: WHITE - Laboratory, CANARY - Laboratory, PINK - Project/Account Manager, YELLOW - Sampler/Originator

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CHAIN OF CUSTODY RECORD

№ 78222

AETL JOB No. 65203

COMPANY	Group Delta Consultants
PROJECT MANAGER	Vesna Glisic
COMPANY ADDRESS	32 Mauchly, Ste B, Irvine, CA 92618
PHONE	949 450 .2100
FAX	949 450 2108
PROJECT NAME	Avenida Pico S1
PROJECT #	I-540
SITE NAME AND ADDRESS	524 & 530 Avenida Pico, San Clemente, CA
PO #	

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	M8015G/8021	8260B	M8015D	6010/7000	[illegible]	8015G	TEST INSTRUCTIONS & COMMENTS
1	B-12-001@35'	65203.08	3/26/12		5035 kit	4			/					
2	B-12-001@20'	65203.09			Soil	1-6" tube	none	/		/				Need duplicate M8015G & 8021 tests
3	B-12-001@20'	"			5035 kit	4			/					
4	B-12-006 GW	Amber			water	1 Lt GL	none			/				65203.10
5	B-12-006 GW	plastic			water	250 mL PL	none				/			
6	B-12-006 GW	40 mL VOA HCl			water	5, 40 mL	HCl		/			(illegible)	/	
7	B-12-002 GW	Amber			water	1 Lt GL	none			/				65203.11
8	B-12-002 GW	plastic			water	250 mL PL	none				/			
9	B-12-002 GW	40 mL VOA			water	5, 40 mL	HCl		/			(illegible)	/	
10	[illegible]													
11	B-12-001 GW	Amber			water	1 Lt GL	none			/				65203.12
12	B-12-001 GW	plastic			water	250 mL PL	none				/			
13	B-12-001 GW	40 mL VOA			water	5, 40 mL	HCl		/			(illegible)	/	
14	Hard Copy	Sample Amber			water	1 Lt GL	none			/				65203.13
15														

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS	31	PROPERLY COOLED (Y / N / NA)	
CUSTODY SEALS Y / N / NA		SAMPLES INTACT (Y / N / NA)	
RECEIVED IN GOOD COND. (Y / N)		SAMPLES ACCEPTED (Y / N)	

TURN AROUND TIME

☑ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

	1.	2.	3.
RELINQUISHED BY SAMPLER: / RELINQUISHED BY:	Signature: Meghan Kathryn	Signature:	Signature:
	Printed Name: Meghan Kathryn	Printed Name:	Printed Name: [illegible]
	Date: 3/26/12 Time: 1750	Date: Time:	Date: 3/26/12 Time: 1900
RECEIVED BY: / RECEIVED BY LABORATORY:	Signature: [illegible]	Signature:	Signature:
	Printed Name: Carmen Ramos	Printed Name:	Printed Name: Dean Claude
	Date: 3/26/12 Time: 1700	Date: Time:	Date: 03/26/12 Time: 1900

DISTRIBUTION: WHITE - Laboratory, CANARY - Laboratory, PINK - Project/Account Manager, YELLOW - Sampler/Originator

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CHAIN OF CUSTODY RECORD

No 78265

COMPANY Group Delta Consultants PROJECT MANAGER Vesna Glisic

AETL JOB No. 65203 Page ____ of ____

COMPANY ADDRESS 32 Mauchly, Ste B, Irvine, CA 92618 PHONE 949-450-2100 FAX 949-450-2108

PROJECT NAME Avenida Pico S1 PROJECT # I-540

SITE NAME AND ADDRESS 524 & 530 Avenida Pico San Clemente, CA PO #

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	ANALYSIS REQUESTED: M8015A	ANALYSIS REQUESTED: M8015A & 8021	TEST INSTRUCTIONS & COMMENTS
1	B-12-006@10 Dup	65203.14	03/26/12		Soil	6" Tube	Ice	*		
2	B-12-001@10 Dup	65203.15	↓		↓	↓	↓	*		
3	B-12-001@20 Dup	65203.16	↓		↓	↓	↓		*	
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS		PROPERLY COOLED Y / N / NA	
CUSTODY SEALS Y / N / NA		SAMPLES INTACT Y/ N / NA	
RECEIVED IN GOOD COND. Y / N		SAMPLES ACCEPTED Y / N	

TURN AROUND TIME

☑ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

RELINQUISHED BY SAMPLER: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature:	Signature:	Signature:
Printed Name:	Printed Name:	Printed Name:
Date: Time:	Date: Time:	Date: Time:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY LABORATORY: AETL 3.**
Signature:	Signature:	Signature:
Printed Name:	Printed Name:	Printed Name: Leah Claude
Date: Time:	Date: Time:	Date: 03/26/12 Time: 1900

DISTRIBUTION: WHITE - Laboratory, CANARY - Laboratory, PINK - Project/Account Manager, YELLOW - Sampler/Originator

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Ordered By

Group Delta Consultants
32 Mauchly Suite B
Irvine, CA 92618-

Telephone: (949)450-2100
Attention: Vesna Glisic

Project ID: I-540
Date Received 03/26/2012
Date Reported 04/04/2012

Job Number	Order Date	Client
65203	03/26/2012	GROUP

CERTIFICATE OF ANALYSIS
CASE NARRATIVE

AETL received 16 samples with the following specification on 03/26/2012.

Lab ID	Sample ID	Sample Date	Matrix	QTY of Containers
65203.01	B-12-006 @ 10'	03/26/2012	Soil	5
65203.02	B-12-006 @ 35'	03/26/2012	Soil	5
65203.03	B-12-006 @ 20'	03/26/2012	Soil	5
65203.04	B-12-002 @ 10'	03/26/2012	Soil	5
65203.05	B-12-002 @ 35'	03/26/2012	Soil	5
65203.06	B-12-002 @ 25'	03/26/2012	Soil	5
65203.07	B-12-001 @ 10'	03/26/2012	Soil	5
65203.08	B-12-001 @ 35'	03/26/2012	Soil	5
65203.09	B-12-001 @ 20'	03/26/2012	Soil	5
65203.10	B-12-006 GW	03/26/2012	Aqueous	7
65203.11	B-12-002 GW	03/26/2012	Aqueous	7
65203.12	B-12-001 GW	03/26/2012	Aqueous	7
65203.13	Hand Auger Sample	03/26/2012	Aqueous	1
65203.14	B-12-006 @ 10 Dup	03/26/2012	Soil	1
65203.15	B-12-001 @ 10 Dup	03/26/2012	Soil	1
65203.16	B-12-001 @ 20 Dup	03/26/2012	Soil	1

The samples were analyzed as specified on the enclosed chain of custody.
Analytical non-conformances have been noted on the report.

Checked By: _____ Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

American Environmental Testing Laboratory Inc.

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ANALYTICAL RESULTS

Ordered By

Group Delta Consultants
32 Mauchly
Suite B
Irvine, CA 92618-

Telephone: (949)450-2100
Attn: Vesna Glisic

Site

524 & 530 Avenida Pico
San Clemente, CA 92672

Page: **2**

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0327122A3

Our Lab I.D.			Method Blank	65203.01	65203.02	65203.03	65203.04
Client Sample I.D.				B-12-006 @ 10'	B-12-006 @ 35'	B-12-006 @ 20'	B-12-002 @ 10'
Date Sampled				03/26/2012	03/26/2012	03/26/2012	03/26/2012
Date Prepared			03/27/2012	03/27/2012	03/27/2012	03/27/2012	03/27/2012
Preparation Method			5030	5035A	5035A	5035A	5035A
Date Analyzed			03/27/2012	03/27/2012	03/27/2012	03/27/2012	03/28/2012
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Acetone	25	50	ND	ND	ND	ND	ND
Benzene	1.0	10.0	ND	ND	ND	ND	ND
Bromobenzene (Phenyl bromide)	5.0	10.0	ND	ND	ND	ND	ND
Bromochloromethane	5.0	10.0	ND	ND	ND	ND	ND
Bromodichloromethane	5.0	10.0	ND	ND	ND	ND	ND
Bromoform (Tribromomethane)	25	50	ND	ND	ND	ND	ND
Bromomethane (Methyl bromide)	15	30	ND	ND	ND	ND	ND
2-Butanone (MEK)	25	50	ND	ND	ND	ND	ND
n-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
sec-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
tert-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Carbon Disulfide	25	50	ND	ND	ND	ND	ND
Carbon tetrachloride	5.0	10.0	ND	ND	ND	ND	ND
Chlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
Chloroethane	15	30	ND	ND	ND	ND	ND
2-Chloroethyl vinyl ether	50	50	ND	ND	ND	ND	ND
Chloroform (Trichloromethane)	5.0	10.0	ND	ND	ND	ND	ND
Chloromethane (Methyl chloride)	15	30	ND	ND	ND	ND	ND
2-Chlorotoluene	5.0	10.0	ND	ND	ND	ND	ND
4-Chlorotoluene	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	25	50	ND	ND	ND	ND	ND
Dibromochloromethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dibromoethane (EDB)	5.0	10.0	ND	ND	ND	ND	ND
Dibromomethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0327122A3

Our Lab I.D.			Method Blank	65203.01	65203.02	65203.03	65203.04
Client Sample I.D.				B-12-006 @ 10'	B-12-006 @ 35'	B-12-006 @ 20'	B-12-002 @ 10'
Date Sampled				03/26/2012	03/26/2012	03/26/2012	03/26/2012
Date Prepared			03/27/2012	03/27/2012	03/27/2012	03/27/2012	03/27/2012
Preparation Method			5030	5035A	5035A	5035A	5035A
Date Analyzed			03/27/2012	03/27/2012	03/27/2012	03/27/2012	03/28/2012
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
1,4-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
Dichlorodifluoromethane	15	30	ND	ND	ND	ND	ND
1,1-Dichloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichloroethane (EDC)	5.0	10.0	ND	ND	ND	ND	ND
1,1-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,3-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
2,2-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,1-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
Ethylbenzene	1.0	10.0	ND	ND	ND	ND	ND
Hexachlorobutadiene	15	30	ND	ND	ND	ND	ND
2-Hexanone	25	50	ND	ND	ND	ND	ND
Iodomethane	5.0	10.0	ND	ND	ND	ND	ND
Isopropylbenzene	5.0	10.0	ND	ND	ND	ND	ND
p-Isopropyltoluene	5.0	10.0	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	25	50	ND	ND	ND	ND	ND
Methyl-tert-butyl ether (MTBE)	2.0	10.0	ND	ND	ND	ND	ND
Methylene chloride (DCM)	25	50	ND	ND	ND	ND	ND
Naphthalene	5.0	10.0	ND	ND	ND	ND	ND
n-Propylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Styrene	5.0	10.0	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5.0	10.0	ND	ND	ND	ND	ND
Tetrachloroethene	5.0	10.0	ND	ND	ND	ND	ND
Toluene (Methyl benzene)	1.0	10.0	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	5.0	10.0	ND	ND	ND	ND	ND

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0327122A3

Our Lab I.D.			Method Blank	65203.01	65203.02	65203.03	65203.04
Client Sample I.D.				B-12-006 @ 10'	B-12-006 @ 35'	B-12-006 @ 20'	B-12-002 @ 10'
Date Sampled				03/26/2012	03/26/2012	03/26/2012	03/26/2012
Date Prepared			03/27/2012	03/27/2012	03/27/2012	03/27/2012	03/27/2012
Preparation Method			5030	5035A	5035A	5035A	5035A
Date Analyzed			03/27/2012	03/27/2012	03/27/2012	03/27/2012	03/28/2012
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Trichloroethene	5.0	10.0	ND	ND	ND	ND	ND
Trichlorofluoromethane	5.0	10.0	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	5.0	10.0	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Vinyl Acetate	25	50	ND	ND	ND	ND	ND
Vinyl chloride (Chloroethene)	15	30	ND	ND	ND	ND	ND
o-Xylene	1.0	10.0	ND	ND	ND	ND	ND
m,p-Xylenes	1.0	20.0	ND	ND	ND	ND	ND
Our Lab I.D.			Method Blank	65203.01	65203.02	65203.03	65203.04
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Bromofluorobenzene	75-125		96.0	92.0	91.2	93.5	94.0
Dibromofluoromethane	75-125		96.9	103	104	110	109
Toluene-d8	75-125		107	100	101	99.6	99.6

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Page: **5**

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0327122A3

Our Lab I.D.			65203.05	65203.06	65203.07	65203.08	65203.09
Client Sample I.D.			B-12-002 @ 35'	B-12-002 @ 25'	B-12-001 @ 10'	B-12-001 @ 35'	B-12-001 @ 20'
Date Sampled			03/26/2012	03/26/2012	03/26/2012	03/26/2012	03/26/2012
Date Prepared			03/27/2012	03/27/2012	03/27/2012	03/27/2012	03/27/2012
Preparation Method			5035A	5035A	5035A	5035A	5035A
Date Analyzed			03/28/2012	03/28/2012	03/28/2012	03/28/2012	03/28/2012
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Acetone	25	50	ND	ND	ND	ND	ND
Benzene	1.0	10.0	ND	ND	ND	ND	ND
Bromobenzene (Phenyl bromide)	5.0	10.0	ND	ND	ND	ND	ND
Bromochloromethane	5.0	10.0	ND	ND	ND	ND	ND
Bromodichloromethane	5.0	10.0	ND	ND	ND	ND	ND
Bromoform (Tribromomethane)	25	50	ND	ND	ND	ND	ND
Bromomethane (Methyl bromide)	15	30	ND	ND	ND	ND	ND
2-Butanone (MEK)	25	50	ND	ND	ND	ND	ND
n-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
sec-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
tert-Butylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Carbon Disulfide	25	50	ND	ND	ND	ND	ND
Carbon tetrachloride	5.0	10.0	ND	ND	ND	ND	ND
Chlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
Chloroethane	15	30	ND	ND	ND	ND	ND
2-Chloroethyl vinyl ether	50	50	ND	ND	ND	ND	ND
Chloroform (Trichloromethane)	5.0	10.0	ND	ND	ND	ND	ND
Chloromethane (Methyl chloride)	15	30	ND	ND	ND	ND	ND
2-Chlorotoluene	5.0	10.0	ND	ND	ND	ND	ND
4-Chlorotoluene	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane (DBCP)	25	50	ND	ND	ND	ND	ND
Dibromochloromethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dibromoethane (EDB)	5.0	10.0	ND	ND	ND	ND	ND
Dibromomethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0327122A3

Our Lab I.D.			65203.05	65203.06	65203.07	65203.08	65203.09
Client Sample I.D.			B-12-002 @ 35'	B-12-002 @ 25'	B-12-001 @ 10'	B-12-001 @ 35'	B-12-001 @ 20'
Date Sampled			03/26/2012	03/26/2012	03/26/2012	03/26/2012	03/26/2012
Date Prepared			03/27/2012	03/27/2012	03/27/2012	03/27/2012	03/27/2012
Preparation Method			5035A	5035A	5035A	5035A	5035A
Date Analyzed			03/28/2012	03/28/2012	03/28/2012	03/28/2012	03/28/2012
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
1,4-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
Dichlorodifluoromethane	15	30	ND	ND	ND	ND	ND
1,1-Dichloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichloroethane (EDC)	5.0	10.0	ND	ND	ND	ND	ND
1,1-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	5.0	10.0	ND	ND	ND	ND	ND
1,2-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,3-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
2,2-Dichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,1-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	5.0	10.0	ND	ND	ND	ND	ND
Ethylbenzene	1.0	10.0	ND	ND	ND	ND	ND
Hexachlorobutadiene	15	30	ND	ND	ND	ND	ND
2-Hexanone	25	50	ND	ND	ND	ND	ND
Iodomethane	5.0	10.0	ND	ND	ND	ND	ND
Isopropylbenzene	5.0	10.0	ND	ND	ND	ND	ND
p-Isopropyltoluene	5.0	10.0	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	25	50	ND	ND	ND	ND	ND
Methyl-tert-butyl ether (MTBE)	2.0	10.0	ND	ND	ND	41.0	ND
Methylene chloride (DCM)	25	50	ND	ND	ND	ND	ND
Naphthalene	5.0	10.0	ND	ND	ND	ND	ND
n-Propylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Styrene	5.0	10.0	ND	ND	ND	ND	ND
1,1,1,2-Tetrachloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	5.0	10.0	ND	ND	ND	ND	ND
Tetrachloroethene	5.0	10.0	ND	ND	ND	ND	ND
Toluene (Methyl benzene)	1.0	10.0	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	5.0	10.0	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	5.0	10.0	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	5.0	10.0	ND	ND	ND	ND	ND

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0327122A3

Our Lab I.D.			65203.05	65203.06	65203.07	65203.08	65203.09
Client Sample I.D.			B-12-002 @ 35'	B-12-002 @ 25'	B-12-001 @ 10'	B-12-001 @ 35'	B-12-001 @ 20'
Date Sampled			03/26/2012	03/26/2012	03/26/2012	03/26/2012	03/26/2012
Date Prepared			03/27/2012	03/27/2012	03/27/2012	03/27/2012	03/27/2012
Preparation Method			5035A	5035A	5035A	5035A	5035A
Date Analyzed			03/28/2012	03/28/2012	03/28/2012	03/28/2012	03/28/2012
Matrix			Soil	Soil	Soil	Soil	Soil
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Trichloroethene	5.0	10.0	ND	ND	ND	ND	ND
Trichlorofluoromethane	5.0	10.0	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	5.0	10.0	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	5.0	10.0	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	5.0	10.0	ND	ND	ND	ND	ND
Vinyl Acetate	25	50	ND	ND	ND	ND	ND
Vinyl chloride (Chloroethene)	15	30	ND	ND	ND	ND	ND
o-Xylene	1.0	10.0	ND	ND	ND	ND	ND
m,p-Xylenes	1.0	20.0	ND	ND	ND	ND	ND
Our Lab I.D.			65203.05	65203.06	65203.07	65203.08	65203.09
Surrogates	%Rec.Limit		% Rec.	% Rec.	% Rec.	% Rec.	% Rec.
Bromofluorobenzene	75-125		93.0	92.4	94.2	90.6	90.6
Dibromofluoromethane	75-125		113	113	107	113	111
Toluene-d8	75-125		100	101	97.6	98.4	98.8

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ANALYTICAL RESULTS

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Page: **8**

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032712OB2

Our Lab I.D.			Method Blank	**65203.01**	**65203.02**	**65203.03**	**65203.04**
Client Sample I.D.				B-12-006 @ 10'	B-12-006 @ 35'	B-12-006 @ 20'	B-12-002 @ 10'
Date Sampled				03/26/2012	03/26/2012	03/26/2012	03/26/2012
Date Prepared			03/27/2012	03/27/2012	03/27/2012	03/27/2012	03/27/2012
Preparation Method			5030	5035A	5035A	5035A	5035A
Date Analyzed			03/28/2012	03/28/2012	03/28/2012	03/28/2012	03/28/2012
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Gasoline and Light HC. (C4-C12)	0.100	1.000	ND	ND	ND	ND	ND
Our Lab I.D.			Method Blank	**65203.01**	**65203.02**	**65203.03**	**65203.04**
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Bromofluorobenzene	75-125		86.2	121	102	96.6	98.2

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ANALYTICAL RESULTS

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Page: 9

Site

524 & 530 Avenida Pico
San Clemente, CA 92672

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032712OB2

Our Lab I.D.			65203.05	65203.06	65203.07	65203.08	65203.09
Client Sample I.D.			B-12-002 @ 35'	B-12-002 @ 25'	B-12-001 @ 10'	B-12-001 @ 35'	B-12-001 @ 20'
Date Sampled			03/26/2012	03/26/2012	03/26/2012	03/26/2012	03/26/2012
Date Prepared			03/27/2012	03/27/2012	03/27/2012	03/27/2012	03/27/2012
Preparation Method			5035A	5035A	5035A	5035A	5035A
Date Analyzed			03/28/2012	03/28/2012	03/28/2012	03/28/2012	03/28/2012
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Gasoline and Light HC. (C4-C12)	0.100	1.000	ND	ND	ND	0.144J	ND
Our Lab I.D.			**65203.05**	**65203.06**	**65203.07**	**65203.08**	**65203.09**
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Bromofluorobenzene	75-125		86.2	84.4	94.6	104	103

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032712OB2

Our Lab I.D.			**65203.16**				
Client Sample I.D.			B-12-001 @ 20 Dup				
Date Sampled			03/26/2012				
Date Prepared			03/27/2012				
Preparation Method			5035A				
Date Analyzed			03/28/2012				
Matrix			Soil				
Units			mg/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
TPH as Gasoline and Light HC. (C4-C12)	0.100	1.000	ND				
Our Lab I.D.			**65203.16**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		93.8				

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 032812DB2

Our Lab I.D.			Method Blank	**65203.01**	**65203.02**	**65203.03**	**65203.04**
Client Sample I.D.				B-12-006 @ 10'	B-12-006 @ 35'	B-12-006 @ 20'	B-12-002 @ 10'
Date Sampled				03/26/2012	03/26/2012	03/26/2012	03/26/2012
Date Prepared			03/28/2012	03/28/2012	03/28/2012	03/28/2012	03/28/2012
Preparation Method			3550B	3550B	3550B	3550B	3550B
Date Analyzed			03/28/2012	03/29/2012	03/29/2012	03/29/2012	03/29/2012
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Diesel (C13-C22)	1.0	5.0	ND	ND	ND	ND	ND
TPH as Heavy Hydrocarbons (C23-C40)	1.0	5.0	ND	ND	ND	ND	ND
TPH Total as Diesel and Heavy HC.C13-C40	1.0	5.0	ND	ND	ND	ND	ND
Our Lab I.D.			Method Blank	**65203.01**	**65203.02**	**65203.03**	**65203.04**
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Chlorobenzene	75-125		99.5	100	98.1	97.8	96.6

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 032812DB2

Our Lab I.D.			**65203.05**	**65203.06**	**65203.07**	**65203.08**	**65203.09**
Client Sample I.D.			B-12-002 @ 35'	B-12-002 @ 25'	B-12-001 @ 10'	B-12-001 @ 35'	B-12-001 @ 20'
Date Sampled			03/26/2012	03/26/2012	03/26/2012	03/26/2012	03/26/2012
Date Prepared			03/28/2012	03/28/2012	03/28/2012	03/28/2012	03/28/2012
Preparation Method			3550B	3550B	3550B	3550B	3550B
Date Analyzed			03/29/2012	03/29/2012	03/29/2012	03/29/2012	03/29/2012
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Diesel (C13-C22)	1.0	5.0	ND	ND	ND	ND	ND
TPH as Heavy Hydrocarbons (C23-C40)	1.0	5.0	ND	ND	ND	ND	ND
TPH Total as Diesel and Heavy HC.C13-C40	1.0	5.0	ND	ND	ND	ND	ND
Our Lab I.D.			**65203.05**	**65203.06**	**65203.07**	**65203.08**	**65203.09**
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Chlorobenzene	75-125		97.8	99.0	96.3	97.4	98.9

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 032812DB2

Our Lab I.D.			**65203.14**	**65203.15**			
Client Sample I.D.			B-12-006 @ 10 Dup	B-12-001 @ 10 Dup			
Date Sampled			03/26/2012	03/26/2012			
Date Prepared			03/28/2012	03/28/2012			
Preparation Method			3550B	3550B			
Date Analyzed			03/29/2012	03/29/2012			
Matrix			Soil	Soil			
Units			mg/Kg	mg/Kg			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
TPH as Diesel (C13-C22)	1.0	5.0	ND	ND			
TPH as Heavy Hydrocarbons (C23-C40)	1.0	5.0	ND	ND			
TPH Total as Diesel and Heavy HC.C13-C40	1.0	5.0	ND	ND			
Our Lab I.D.			**65203.14**	**65203.15**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Chlorobenzene	75-125		98.0	95.2			

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 0402122C1

Our Lab I.D.			Method Blank	65203.01	65203.04	65203.07	
Client Sample I.D.				B-12-006 @ 10'	B-12-002 @ 10'	B-12-001 @ 10'	
Date Sampled				03/26/2012	03/26/2012	03/26/2012	
Date Prepared			04/02/2012	04/02/2012	04/02/2012	04/02/2012	
Preparation Method			3050B	3050B	3050B	3050B	
Date Analyzed			04/04/2012	04/04/2012	04/04/2012	04/04/2012	
Matrix			Soil	Soil	Soil	Soil	
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
Antimony	1.0	5.0	ND	ND	ND	ND	
Arsenic	1.0	5.0	ND	ND	ND	ND	
Barium	2.5	5.0	ND	63.2	56.9	99.6	
Beryllium	1.3	2.5	ND	ND	ND	ND	
Cadmium	1.3	2.5	ND	ND	ND	ND	
Chromium	2.5	5.0	ND	9.38	5.69	10.7	
Cobalt	2.5	5.0	ND	4.19J	3.32J	4.62J	
Copper	2.5	5.0	ND	6.30	2.97J	6.35	
Lead	2.5	5.0	ND	ND	ND	ND	
Mercury (By EPA 7471)	0.1	0.2	ND	ND	ND	ND	
Molybdenum	2.5	5.0	ND	ND	ND	ND	
Nickel	2.5	5.0	ND	9.04	7.23	9.91	
Selenium	1.0	5.0	ND	ND	ND	ND	
Silver	2.5	5.0	ND	ND	ND	ND	
Thallium	1.0	5.0	ND	ND	ND	ND	
Vanadium	2.5	5.0	ND	18.5	14.9	22.9	
Zinc	2.5	5.0	ND	29.6	18.3	32.2	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1

Our Lab I.D.			Method Blank	65203.10	65203.11	65203.12	
Client Sample I.D.				B-12-006 GW	B-12-002 GW	B-12-001 GW	
Date Sampled				03/26/2012	03/26/2012	03/26/2012	
Date Prepared			03/29/2012	03/29/2012	03/29/2012	03/29/2012	
Preparation Method			5030B	5030B	5030B	5030B	
Date Analyzed			03/29/2012	03/29/2012	03/29/2012	03/29/2012	
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	
Units			ug/L	ug/L	ug/L	ug/L	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
Acetone	10	10	ND	ND	ND	ND	
Benzene	0.5	1.0	ND	ND	ND	ND	
Bromobenzene (Phenyl bromide)	0.5	1.0	ND	ND	ND	ND	
Bromochloromethane	0.5	1.0	ND	ND	ND	ND	
Bromodichloromethane	0.5	1.0	ND	ND	ND	ND	
Bromoform (Tribromomethane)	2.5	5.0	ND	ND	ND	ND	
Bromomethane (Methyl bromide)	1.5	3.0	ND	ND	ND	ND	
2-Butanone (MEK)	5.0	5.0	ND	ND	ND	ND	
n-Butylbenzene	0.5	1.0	ND	ND	ND	55.9	
sec-Butylbenzene	0.5	1.0	ND	ND	ND	36.8	
tert-Butylbenzene	0.5	1.0	ND	ND	ND	ND	
Carbon Disulfide	0.5	1.0	ND	ND	ND	ND	
Carbon tetrachloride	0.5	1.0	ND	ND	ND	ND	
Chlorobenzene	0.5	1.0	ND	ND	ND	ND	
Chloroethane	1.5	3.0	ND	ND	ND	ND	
2-Chloroethyl vinyl ether	2.5	5.0	ND	ND	ND	ND	
Chloroform (Trichloromethane)	0.5	1.0	ND	ND	ND	ND	
Chloromethane (Methyl chloride)	1.5	3.0	ND	ND	ND	ND	
2-Chlorotoluene	0.5	1.0	ND	ND	ND	ND	
4-Chlorotoluene	0.5	1.0	ND	ND	ND	ND	
1,2-Dibromo-3-chloropropane (DBCP)	2.5	5.0	ND	ND	ND	ND	
Dibromochloromethane	0.5	1.0	ND	ND	ND	ND	
1,2-Dibromoethane (EDB)	0.5	1.0	ND	ND	ND	ND	
Dibromomethane	0.5	1.0	ND	ND	ND	ND	
1,2-Dichlorobenzene	0.5	1.0	ND	ND	ND	ND	
1,3-Dichlorobenzene	0.5	1.0	ND	ND	ND	ND	
1,4-Dichlorobenzene	0.5	1.0	ND	ND	ND	ND	

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1

Our Lab I.D.			Method Blank	65203.10	65203.11	65203.12	
Client Sample I.D.				B-12-006 GW	B-12-002 GW	B-12-001 GW	
Date Sampled				03/26/2012	03/26/2012	03/26/2012	
Date Prepared			03/29/2012	03/29/2012	03/29/2012	03/29/2012	
Preparation Method			5030B	5030B	5030B	5030B	
Date Analyzed			03/29/2012	03/29/2012	03/29/2012	03/29/2012	
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	
Units			ug/L	ug/L	ug/L	ug/L	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
Dichlorodifluoromethane	1.5	3.0	ND	ND	ND	ND	
1,1-Dichloroethane	0.5	1.0	ND	ND	ND	ND	
1,2-Dichloroethane (EDC)	0.5	1.0	ND	14.7	3.71	ND	
1,1-Dichloroethene	0.5	1.0	ND	ND	ND	ND	
cis-1,2-Dichloroethene	0.5	1.0	ND	ND	ND	ND	
trans-1,2-Dichloroethene	0.5	1.0	ND	ND	ND	ND	
1,2-Dichloropropane	0.5	1.0	ND	ND	ND	ND	
1,3-Dichloropropane	0.5	1.0	ND	ND	ND	ND	
2,2-Dichloropropane	0.5	1.0	ND	ND	ND	ND	
1,1-Dichloropropene	0.5	1.0	ND	ND	ND	ND	
cis-1,3-Dichloropropene	0.5	1.0	ND	ND	ND	ND	
trans-1,3-Dichloropropene	0.5	1.0	ND	ND	ND	ND	
Ethylbenzene	0.5	1.0	ND	ND	ND	395	
Hexachlorobutadiene	1.5	3.0	ND	ND	ND	ND	
2-Hexanone	2.5	5.0	ND	ND	ND	ND	
Iodomethane	0.5	1.0	ND	ND	ND	ND	
Isopropylbenzene	0.5	1.0	ND	ND	ND	136	
p-Isopropyltoluene	0.5	1.0	ND	ND	ND	8.25	
4-Methyl-2-pentanone (MIBK)	2.5	5.0	ND	ND	ND	5.23	
Methyl-tert-butyl ether (MTBE)	0.5	1.0	ND	8.55	4.65	8.43	
Methylene chloride (DCM)	2.0	4.0	ND	ND	ND	ND	
Naphthalene	0.5	1.0	ND	ND	ND	ND	
n-Propylbenzene	0.5	1.0	ND	ND	ND	504	
Styrene	0.5	1.0	ND	ND	ND	ND	
1,1,1,2-Tetrachloroethane	0.5	1.0	ND	ND	ND	ND	
1,1,2,2-Tetrachloroethane	0.5	1.0	ND	ND	ND	ND	
Tetrachloroethene	0.5	1.0	ND	ND	ND	ND	
Toluene (Methyl benzene)	0.5	1.0	ND	ND	ND	ND	
1,2,3-Trichlorobenzene	0.5	1.0	ND	ND	ND	ND	
1,2,4-Trichlorobenzene	0.5	1.0	ND	ND	ND	ND	
1,1,1-Trichloroethane	0.5	1.0	ND	ND	ND	ND	
1,1,2-Trichloroethane	0.5	1.0	ND	ND	ND	ND	
Trichloroethene	0.5	1.0	ND	ND	ND	ND	
Trichlorofluoromethane	0.5	1.0	ND	ND	ND	ND	

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1

Our Lab I.D.			Method Blank	**65203.10**	**65203.11**	**65203.12**	
Client Sample I.D.				B-12-006 GW	B-12-002 GW	B-12-001 GW	
Date Sampled				03/26/2012	03/26/2012	03/26/2012	
Date Prepared			03/29/2012	03/29/2012	03/29/2012	03/29/2012	
Preparation Method			5030B	5030B	5030B	5030B	
Date Analyzed			03/29/2012	03/29/2012	03/29/2012	03/29/2012	
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	
Units			ug/L	ug/L	ug/L	ug/L	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
1,2,3-Trichloropropane	0.5	1.0	ND	ND	ND	ND	
Trichlorotrifluoroethane (Freon-113)	0.5	1.0	ND	ND	ND	ND	
1,2,4-Trimethylbenzene	0.5	1.0	ND	ND	ND	5.25	
1,3,5-Trimethylbenzene	0.5	1.0	ND	ND	ND	ND	
Vinyl Acetate	0.5	5.0	ND	ND	ND	82.9	
Vinyl chloride (Chloroethene)	0.5	3.0	ND	ND	ND	ND	
o-Xylene	0.5	1.0	ND	ND	ND	ND	
m,p-Xylenes	1.0	2.0	ND	ND	ND	ND	
Our Lab I.D.			Method Blank	**65203.10**	**65203.11**	**65203.12**	
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	
Bromofluorobenzene	75-125		108	113	115	120	
Dibromofluoromethane	75-125		99.7	96.8	97.0	93.3	
Toluene-d8	75-125		101	102	101	102	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032912OB2

Our Lab I.D.			Method Blank	**65203.10**			
Client Sample I.D.				B-12-006 GW			
Date Sampled				03/26/2012			
Date Prepared			03/29/2012	03/29/2012			
Preparation Method			5030B	5030B			
Date Analyzed			03/29/2012	03/29/2012			
Matrix			Aqueous	Aqueous			
Units			mg/L	mg/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
TPH as Gasoline and Light HC. (C4-C12)	0.005	0.010	ND	0.0175			
Our Lab I.D.			Method Blank	**65203.10**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Bromofluorobenzene	75-125		94.0	89.6			

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032812OB1

Our Lab I.D.			Method Blank	**65203.11**			
Client Sample I.D.				B-12-002 GW			
Date Sampled				03/26/2012			
Date Prepared			03/28/2012	03/28/2012			
Preparation Method			5030B	5030B			
Date Analyzed			03/28/2012	03/28/2012			
Matrix			Aqueous	Aqueous			
Units			mg/L	mg/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
TPH as Gasoline and Light HC. (C4-C12)	0.005	0.010	ND	0.393			
Our Lab I.D.			Method Blank	**65203.11**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Bromofluorobenzene	75-125		98.0	103			

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524 & 530 Avenida Pico
San Clemente, CA 92672

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032912OB2

Our Lab I.D.			**65203.12**				
Client Sample I.D.			B-12-001 GW				
Date Sampled			03/26/2012				
Date Prepared			03/29/2012				
Preparation Method			5030B				
Date Analyzed			03/30/2012				
Matrix			Aqueous				
Units			mg/L				
Dilution Factor			10				
Analytes	**MDL**	**PQL**	**Results**				
TPH as Gasoline and Light HC. (C4-C12)	0.050	0.100	4.60				
Our Lab I.D.			**65203.12**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		119				

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524 & 530 Avenida Pico
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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: M8015D, TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 032812DB1

Our Lab I.D.			Method Blank	**65203.10**	**65203.11**	**65203.12**	
Client Sample I.D.				B-12-006 GW	B-12-002 GW	B-12-001 GW	
Date Sampled				03/26/2012	03/26/2012	03/26/2012	
Date Prepared			03/28/2012	03/28/2012	03/28/2012	03/28/2012	
Preparation Method			3510C	3510C	3510C	3510C	
Date Analyzed			03/28/2012	03/28/2012	03/28/2012	03/28/2012	
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	
Units			mg/L	mg/L	mg/L	mg/L	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
TPH as Diesel (C13-C22)	0.1	0.5	ND	ND	ND	0.118J	
TPH as Heavy Hydrocarbons (C23-C40)	0.1	0.5	ND	ND	ND	ND	
TPH Total as Diesel and Heavy HC.C13-C40	0.1	0.5	ND	ND	ND	0.118J	
Our Lab I.D.			Method Blank	**65203.10**	**65203.11**	**65203.12**	
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	
Chlorobenzene	60-125		79.0	93.0	90.0	65.5	

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524 & 530 Avenida Pico
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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 0330122C3

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			03/30/2012				
Preparation Method			3005A				
Date Analyzed			04/03/2012				
Matrix			Aqueous				
Units			mg/L				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Antimony	0.05	0.10	ND				
Arsenic	0.05	0.10	ND				
Barium	0.03	0.05	ND				
Beryllium	0.01	0.05	ND				
Cadmium	0.01	0.05	ND				
Chromium	0.01	0.05	ND				
Cobalt	0.01	0.05	ND				
Copper	0.01	0.05	ND				
Lead	0.05	0.10	ND				
Mercury (By EPA 7470)	0.001	0.002	ND				
Molybdenum	0.01	0.05	ND				
Nickel	0.01	0.05	ND				
Selenium	0.05	0.10	ND				
Silver	0.01	0.05	ND				
Thallium	0.05	0.10	ND				
Vanadium	0.03	0.05	ND				
Zinc	0.01	0.05	ND				

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524 & 530 Avenida Pico
San Clemente, CA 92672

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 0330122C3

Our Lab I.D.			**65203.10**				
Client Sample I.D.			B-12-006 GW				
Date Sampled			03/26/2012				
Date Prepared			03/30/2012				
Preparation Method			3005A				
Date Analyzed			04/03/2012				
Matrix			Aqueous				
Units			mg/L				
Dilution Factor			5				
Analytes	**MDL**	**PQL**	**Results**				
Antimony	0.25	0.50	ND				
Arsenic	0.25	0.50	ND				
Barium	0.15	0.25	ND				
Beryllium	0.05	0.25	ND				
Cadmium	0.05	0.25	ND				
Chromium	0.05	0.25	ND				
Cobalt	0.05	0.25	ND				
Copper	0.05	0.25	ND				
Lead	0.25	0.50	ND				
Mercury (By EPA 7470)	0.005	0.010	ND				
Molybdenum	0.05	0.25	0.223J				
Nickel	0.05	0.25	ND				
Selenium	0.25	0.50	ND				
Silver	0.05	0.25	ND				
Thallium	0.25	0.50	ND				
Vanadium	0.15	0.25	ND				
Zinc	0.05	0.25	ND				

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524 & 530 Avenida Pico
San Clemente, CA 92672

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 0330122C3

Our Lab I.D.			**65203.11**				
Client Sample I.D.			B-12-002 GW				
Date Sampled			03/26/2012				
Date Prepared			03/30/2012				
Preparation Method			3005A				
Date Analyzed			04/03/2012				
Matrix			Aqueous				
Units			mg/L				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Antimony	0.05	0.10	ND				
Arsenic	0.05	0.10	ND				
Barium	0.03	0.05	ND				
Beryllium	0.01	0.05	ND				
Cadmium	0.01	0.05	ND				
Chromium	0.01	0.05	ND				
Cobalt	0.01	0.05	ND				
Copper	0.01	0.05	ND				
Lead	0.05	0.10	ND				
Mercury (By EPA 7470)	0.001	0.002	ND				
Molybdenum	0.01	0.05	0.191				
Nickel	0.01	0.05	0.0144J				
Selenium	0.05	0.10	ND				
Silver	0.01	0.05	ND				
Thallium	0.05	0.10	ND				
Vanadium	0.03	0.05	ND				
Zinc	0.01	0.05	ND				

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524 & 530 Avenida Pico
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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 0330122C3

Our Lab I.D.			**65203.12**				
Client Sample I.D.			B-12-001 GW				
Date Sampled			03/26/2012				
Date Prepared			03/30/2012				
Preparation Method			3005A				
Date Analyzed			04/03/2012				
Matrix			Aqueous				
Units			mg/L				
Dilution Factor			5				
Analytes	**MDL**	**PQL**	**Results**				
Antimony	0.25	0.50	ND				
Arsenic	0.25	0.50	ND				
Barium	0.15	0.25	ND				
Beryllium	0.05	0.25	ND				
Cadmium	0.05	0.25	ND				
Chromium	0.05	0.25	ND				
Cobalt	0.05	0.25	ND				
Copper	0.05	0.25	ND				
Lead	0.25	0.50	ND				
Mercury (By EPA 7470)	0.005	0.010	ND				
Molybdenum	0.05	0.25	0.114J				
Nickel	0.05	0.25	ND				
Selenium	0.25	0.50	ND				
Silver	0.05	0.25	ND				
Thallium	0.25	0.50	ND				
Vanadium	0.15	0.25	ND				
Zinc	0.05	0.25	ND				

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524 & 530 Avenida Pico
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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 0330122C3; Dup or Spiked Sample: 65203.10; LCS: Clean Water; QC Prepared: 03/30/2012; QC Analyzed: 04/03/2012; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Antimony	0.00	1.00	0.857	85.7	1.00	0.808	80.8	5.9	80-120	<15
Arsenic	0.00	1.00	0.939	93.9	1.00	0.883	88.3	6.1	80-120	<15
Barium	0.00	1.00	0.905	90.5	1.00	0.876	87.6	3.3	80-120	<15
Beryllium	0.00	1.00	0.955	95.5	1.00	0.926	92.6	3.1	80-120	<15
Cadmium	0.00	1.00	0.872	87.2	1.00	0.845	84.5	3.1	80-120	<15
Chromium	0.00	1.00	0.883	88.3	1.00	0.857	85.7	3.0	80-120	<15
Cobalt	0.00	1.00	0.874	87.4	1.00	0.843	84.3	3.6	80-120	<15
Copper	0.00	1.00	0.867	86.7	1.00	0.843	84.3	2.8	80-120	<15
Lead	0.00	1.00	0.832	83.2	1.00	0.804	80.4	3.4	80-120	<15
Mercury (By EPA 7470)	0.00	0.0100	0.00951	95.1	0.0100	0.0108	108	12.7	80-120	<15
Molybdenum	0.223	1.00	1.10	87.7	1.00	1.08	85.7	2.3	80-120	<15
Nickel	0.00	1.00	0.887	88.7	1.00	0.856	85.6	3.6	80-120	<15
Selenium	0.00	1.00	0.920	92.0	1.00	0.856	85.6	7.2	80-120	<15
Silver	0.00	1.00	0.191M	19.1	1.00	0.187M	18.7	2.1	80-120	<15
Thallium	0.00	1.00	0.791M	79.1	1.00	0.757M	75.7	4.4	80-120	<15
Vanadium	0.00	1.00	0.880	88.0	1.00	0.859	85.9	2.4	80-120	<15
Zinc	0.00	1.00	0.919	91.9	1.00	0.887	88.7	3.5	80-120	<15

QC Batch No: 0330122C3; Dup or Spiked Sample: 65203.10; LCS: Clean Water; QC Prepared: 03/30/2012; QC Analyzed: 04/03/2012; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Antimony	1.00	0.923	92.3	1.00	0.914	91.4	<1	80-120	<15	
Arsenic	1.00	0.930	93.2	1.00	0.930	92.5	<1	80-120	<15	
Barium	1.00	0.930	93.1	1.00	0.930	92.7	<1	80-120	<15	
Beryllium	1.00	1.01	101	1.00	1.00	99.9	1.10	80-120	<15	
Cadmium	1.00	0.920	91.7	1.00	0.920	91.9	<1	80-120	<15	
Chromium	1.00	0.930	92.6	1.00	0.930	92.7	<1	80-120	<15	
Cobalt	1.00	0.930	92.7	1.00	0.920	91.9	<1	80-120	<15	
Copper	1.00	0.910	90.8	1.00	0.910	90.7	<1	80-120	<15	

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QUALITY CONTROL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 0330122C3; Dup or Spiked Sample: 65203.10; LCS: Clean Water; QC Prepared: 03/30/2012; QC Analyzed: 04/03/2012; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Lead	1.00	0.900	89.5	1.00	0.890	89.1	<1	80-120	<15	
Mercury (By EPA 7470)	0.0100	0.0108	108	0.0100	0.00961	96.1	11.7	80-120	<15	
Molybdenum	1.00	0.945	94.5	1.00	0.939	93.9	<1	80-120	<15	
Nickel	1.00	0.930	92.6	1.00	0.930	92.5	<1	80-120	<15	
Selenium	1.00	0.900	90.2	1.00	0.910	90.5	<1	80-120	<15	
Silver	1.00	0.920	91.6	1.00	0.920	92.2	<1	80-120	<15	
Thallium	1.00	0.880	88.3	1.00	0.870	87.3	1.14	80-120	<15	
Vanadium	1.00	0.940	93.6	1.00	0.940	93.9	<1	80-120	<15	
Zinc	1.00	0.930	93.3	1.00	0.930	93.3	<1	80-120	<15	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1; Dup or Spiked Sample: B0329121A1; LCS: Clean Water; QC Prepared: 03/29/2012;MS Analyzed: 03/30/2012; LCS Analyzed: 03/29/2012; Units: ug/L

Analytes	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit	
Benzene	50.0	50.6	101	50.0	50.3	101	<1	75-125	<20	
Chlorobenzene	50.0	47.2	94.4	50.0	47.7	95.4	1.05	75-125	<20	
1,1-Dichloroethene	50.0	44.8	89.6	50.0	44.6	89.2	<1	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	47.0	94.0	50.0	39.8	79.6	16.6	75-125	<20	
Toluene (Methyl benzene)	50.0	51.2	102	50.0	50.3	101	<1	75-125	<20	
Trichloroethene	50.0	59.6	119	50.0	53.3	107	10.6	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	60.5	121	50.0	58.1	116	4.13	75-125	<20	
Dibromofluoromethane	50.0	44.9	89.8	50.0	45.4	90.9	1.22	75-125	<20	
Toluene-d8	50.0	52.9	106	50.0	52.0	104	1.89	75-125	<20	

QC Batch No: 0329121A1; Dup or Spiked Sample: B0329121A1; LCS: Clean Water; QC Prepared: 03/29/2012;MS Analyzed: 03/30/2012; LCS Analyzed: 03/29/2012; Units: ug/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Benzene	50.0	51.6	103	50.0	51.8	104	<1	75-125	<20	
Chlorobenzene	50.0	51.7	103	50.0	52.2	104	<1	75-125	<20	
1,1-Dichloroethene	50.0	50.3	101	50.0	50.0	100	<1	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	45.8	91.6	50.0	46.2	92.0	<1	75-125	<20	
Toluene (Methyl benzene)	50.0	51.3	103	50.0	51.7	103	<1	75-125	<20	
Trichloroethene	50.0	52.3	105	50.0	51.8	104	<1	75-125	<20	
LCS										
Chloroform (Trichloromethane)	50.0	50.9	102	50.0	51.8	104	1.94	75-125	<20	
Ethylbenzene	50.0	51.7	103	50.0	51.5	103	<1	75-125	<20	
1,1,1-Trichloroethane	50.0	52.7	105	50.0	53.6	107	1.89	75-125	<20	
o-Xylene	50.0	53.8	108	50.0	53.5	107	<1	75-125	<20	
m,p-Xylenes	100	108	108	100	107	107	<1	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	47.5	95.0	50.0	46.8	93.5	1.58	75-125	<20	
Dibromofluoromethane	50.0	47.8	95.5	50.0	47.4	94.8	<1	75-125	<20	

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QUALITY CONTROL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1; Dup or Spiked Sample: B0329121A1; LCS: Clean Water; QC Prepared: 03/29/2012;MS Analyzed: 03/30/2012; LCS Analyzed: 03/29/2012; Units: ug/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Toluene-d8	50.0	49.2	98.5	50.0	48.4	96.8	1.73	75-125	<20	

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QUALITY CONTROL RESULTS

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524 & 530 Avenida Pico
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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: M8015D, TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 032812DB1; Dup or Spiked Sample: 65165.03; LCS: Clean Water; QC Prepared: 03/28/2012; QC Analyzed: 03/28/2012; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Diesel (C13-C22)	4.02	5.00	9.11	102	5.00	8.44	88.4	14.3	75-125	<20
Surrogates										
Chlorobenzene	0.00	2.00	1.77	88.5	2.00	1.66	83.0	6.21	60-125	<20

QC Batch No: 032812DB1; Dup or Spiked Sample: 65165.03; LCS: Clean Water; QC Prepared: 03/28/2012; QC Analyzed: 03/28/2012; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Diesel (C13-C22)	5.00	5.27	105	75-125						
Surrogates										
Chlorobenzene	2.00	1.81	90.5	60-125						

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524 & 530 Avenida Pico
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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032812OB1; Dup or Spiked Sample: 65165.03Q,R; LCS: Clean Water; QC Prepared: 03/28/2012; MS Analyzed: 03/29/2012; LCS Analyzed: 03/28/2012; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.729	0.500	1.24	102	0.500	1.24	102	<1	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0591	118	0.0500	0.0521	104	11.9	75-125	<20

QC Batch No: 032812OB1; Dup or Spiked Sample: 65165.03Q,R; LCS: Clean Water; QC Prepared: 03/28/2012; MS Analyzed: 03/29/2012; LCS Analyzed: 03/28/2012; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	0.500	0.490	97.0	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0492	98.4	75-125						

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032912OB2; Dup or Spiked Sample: B032912OB2; LCS: Clean Water; QC Prepared: 03/29/2012;MS Analyzed: 03/30/2012; LCS Analyzed: 03/29/2012; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.00	0.500	0.510	101	0.500	0.460	92.4	8.89	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0485	97.0	0.0500	0.0477	95.4	1.65	75-125	<20

QC Batch No: 032912OB2; Dup or Spiked Sample: B032912OB2; LCS: Clean Water; QC Prepared: 03/29/2012;MS Analyzed: 03/30/2012; LCS Analyzed: 03/29/2012; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	0.500	0.510	102	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0516	103	75-125						

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Page: **33**

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 0402122C1; Dup or Spiked Sample: 65203.01; LCS: Clean Sand; QC Prepared: 04/02/2012; QC Analyzed: 04/04/2012; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Antimony	0.00	50.0	35.6 M	71.2	50.0	34.9 M	69.8	1.99	80-120	<15
Arsenic	0.00	50.0	42.6	85.2	50.0	41.0	82.0	3.83	80-120	<15
Barium	63.2	50.0	112	97.6	50.0	108	89.6	8.55	80-120	<15
Beryllium	0.00	50.0	48.3	96.6	50.0	46.3	92.6	4.23	80-120	<15
Cadmium	0.00	50.0	45.0	90.0	50.0	43.4	86.8	3.62	80-120	<15
Chromium	9.38	50.0	57.5	96.2	50.0	54.8	90.8	5.78	80-120	<15
Cobalt	4.19	50.0	47.6	86.8	50.0	46.3	84.2	3.04	80-120	<15
Copper	6.30	50.0	52.8	93.0	50.0	51.0	89.4	3.95	80-120	<15
Lead	0.00	50.0	43.8	87.6	50.0	42.5	85.0	3.01	80-120	<15
Mercury (By EPA 7471)	0.00	0.500	0.515	103	0.500	0.510	102	<1	80-120	<15
Molybdenum	0.00	50.0	42.7	85.4	50.0	41.8	83.6	2.13	80-120	<15
Nickel	9.04	50.0	54.0	89.9	50.0	52.6	87.1	3.16	80-120	<15
Selenium	0.00	50.0	42.4	84.8	50.0	40.8	81.6	3.85	80-120	<15
Silver	0.00	50.0	46.5	93.0	50.0	44.5	89.0	4.40	80-120	<15
Thallium	0.00	50.0	39.2 M	78.4	50.0	38.6 M	77.2	1.54	80-120	<15
Vanadium	18.5	50.0	69.6	102	50.0	66.6	96.2	5.85	80-120	<15
Zinc	29.6	50.0	81.0	103	50.0	77.6	96.0	7.04	80-120	<15

QC Batch No: 0402122C1; Dup or Spiked Sample: 65203.01; LCS: Clean Sand; QC Prepared: 04/02/2012; QC Analyzed: 04/04/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Antimony	50.0	46.7	93.4	50.0	45.8	91.6	1.95	80-120	<15	
Arsenic	50.0	46.8	93.6	50.0	46.6	93.2	<1	80-120	<15	
Barium	50.0	46.8	93.6	50.0	47.1	94.2	<1	80-120	<15	
Beryllium	50.0	51.2	102	50.0	51.1	102	<1	80-120	<15	
Cadmium	50.0	46.6	93.2	50.0	46.8	93.6	<1	80-120	<15	
Chromium	50.0	47.0	94.0	50.0	47.2	94.4	<1	80-120	<15	
Cobalt	50.0	46.6	93.2	50.0	46.5	93.0	<1	80-120	<15	
Copper	50.0	45.7	91.4	50.0	45.8	91.6	<1	80-120	<15	

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QUALITY CONTROL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 0402122C1; Dup or Spiked Sample: 65203.01; LCS: Clean Sand; QC Prepared: 04/02/2012; QC Analyzed: 04/04/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Lead	50.0	45.1	90.2	50.0	45.1	90.2	<1	80-120	<15	
Mercury (By EPA 7471)	0.500	0.565	113	0.500	0.565	113	<1	80-120	<15	
Molybdenum	50.0	47.1	94.2	50.0	47.0	94.0	<1	80-120	<15	
Nickel	50.0	46.2	92.4	50.0	46.4	92.8	<1	80-120	<15	
Selenium	50.0	46.8	93.6	50.0	45.8	91.6	2.16	80-120	<15	
Silver	50.0	48.3	96.6	50.0	48.9	97.8	1.23	80-120	<15	
Thallium	50.0	44.5	89.0	50.0	44.3	88.6	<1	80-120	<15	
Vanadium	50.0	47.9	95.8	50.0	48.0	96.0	<1	80-120	<15	
Zinc	50.0	47.1	94.2	50.0	47.2	94.4	<1	80-120	<15	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0327122A3; Dup or Spiked Sample: 65203-04A; LCS: Clean Sand; QC Prepared: 03/27/2012; QC Analyzed: 03/28/2012; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Benzene	0.00	50.0	39.2	78.4	50.0	35.0 M	70.0	11.3	75-125	<20
Chlorobenzene	0.00	50.0	40.4	80.8	50.0	35.9 M	71.8	11.8	75-125	<20
1,1-Dichloroethene	0.00	50.0	40.9	81.8	50.0	38.1	76.2	7.09	75-125	<20
Methyl-tert-butyl ether (MTBE)	0.00	50.0	44.2	88.4	50.0	41.8	83.6	5.58	75-125	<20
Toluene (Methyl benzene)	0.00	50.0	39.2	78.4	50.0	34.8 M	69.6	11.9	75-125	<20
Trichloroethene	0.00	50.0	44.8	89.6	50.0	39.1	78.2	13.6	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	50.0	47.6	95.1	50.0	47.0	94.0	1.16	75-125	<20
Dibromofluoromethane	0.00	50.0	50.5	101	50.0	50.5	101	<1	75-125	<20
Toluene-d8	0.00	50.0	48.2	96.4	50.0	48.7	97.3	<1	75-125	<20

QC Batch No: 0327122A3; Dup or Spiked Sample: 65203-04A; LCS: Clean Sand; QC Prepared: 03/27/2012; QC Analyzed: 03/28/2012; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Benzene	50.0	39.9	79.8	50.0	40.3	81.0	1.49	75-125	<20	
Chlorobenzene	50.0	41.8	83.6	50.0	43.4	87.0	3.99	75-125	<20	
1,1-Dichloroethene	50.0	40.3	80.6	50.0	40.7	81.0	<1	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	50.0	100	50.0	49.7	99.0	1.01	75-125	<20	
Toluene (Methyl benzene)	50.0	39.2	78.4	50.0	40.4	81.0	3.26	75-125	<20	
Trichloroethene	50.0	43.5	87.0	50.0	43.6	87.0	<1	75-125	<20	
LCS										
Chloroform (Trichloromethane)	50.0	44.1	88.2	50.0	43.0	86.0	2.53	75-125	<20	
Ethylbenzene	50.0	41.3	82.6	50.0	42.5	85.0	2.86	75-125	<20	
1,1,1-Trichloroethane	50.0	42.5	85.0	50.0	41.9	84.0	1.18	75-125	<20	
o-Xylene	50.0	42.9	85.8	50.0	43.1	86.0	<1	75-125	<20	
m,p-Xylenes	100	83.0	83.0	100	83.9	83.9	1.08	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	46.3	92.5	50.0	46.3	92.6	<1	75-125	<20	
Dibromofluoromethane	50.0	51.5	103	50.0	50.1	100	2.91	75-125	<20	

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QUALITY CONTROL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0327122A3; Dup or Spiked Sample: 65203-04A; LCS: Clean Sand; QC Prepared: 03/27/2012; QC Analyzed: 03/28/2012; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Toluene-d8	50.0	48.0	95.9	50.0	48.3	96.5	<1	75-125	<20	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 032812DB2; Dup or Spiked Sample: 65203.04; LCS: Clean Sand; QC Prepared: 03/28/2012;MS Analyzed: 03/28/2012; LCS Analyzed: 03/29/2012; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Diesel (C13-C22)	0.00	500	501	100	500	501	100	<1	75-125	<20
Surrogates										
Chlorobenzene	0.00	100	92.1	92.1	100	92.6	92.6	<1	75-125	<20

QC Batch No: 032812DB2; Dup or Spiked Sample: 65203.04; LCS: Clean Sand; QC Prepared: 03/28/2012;MS Analyzed: 03/28/2012; LCS Analyzed: 03/29/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Diesel (C13-C22)	500	496	99.2	75-125						
Surrogates										
Chlorobenzene	100	94.5	94.5	75-125						

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65203	03/26/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032712OB2; Dup or Spiked Sample: 65203.04A; LCS: Clean Sand; QC Prepared: 03/27/2012; QC Analyzed: 03/28/2012; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.00	1.00	0.820	82.2	1.00	0.820	82.4	<1	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0528	106	0.0500	0.0476	95.2	10.2	75-125	<20

QC Batch No: 032712OB2; Dup or Spiked Sample: 65203.04A; LCS: Clean Sand; QC Prepared: 03/27/2012; QC Analyzed: 03/28/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	1.00	0.830	83.4	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0540	108	75-125						

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Data Qualifiers and Descriptors

Data Qualifier:

#:	Recovery is not within acceptable control limits.
*:	In the QC section, sample results have been taken directly from the ICP reading. No preparation factor has been applied.
B:	Analyte was present in the Method Blank.
D:	Result is from a diluted analysis.
E:	Result is beyond calibration limits and is estimated.
H:	Analysis was performed over the allowed holding time due to circumstances which were beyond laboratory control.
J:	Analyte was detected . However, the analyte concentration is an estimated value, which is between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL).
M:	Matrix spike recovery is outside control limits due to matrix interference. Laboratory Control Sample recovery was acceptable.
MCL:	Maximum Contaminant Level
NS:	No Standard Available
S6:	Surrogate recovery is outside control limits due to matrix interference.
S8:	The analysis of the sample required a dilution such that the surrogate concentration was diluted below the method acceptance criteria.
X:	Results represent LCS and LCSD data.

Definition:

%Limi:	Percent acceptable limits.
%REC:	Percent recovery.
Con.L:	Acceptable Control Limits
Conce:	Added concentration to the sample.
LCS:	Laboratory Control Sample
MDL:	Method Detection Limit is a statistically derived number which is specific for each instrument, each method, and each compound. It indicates a distinctively detectable quantity with 99% probability.

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Data Qualifiers and Descriptors

MS:	Matrix Spike
MS DU:	Matrix Spike Duplicate
ND:	Analyte was not detected in the sample at or above MDL.
PQL:	Practical Quantitation Limit or ML (Minimum Level as per RWQCB) is the minimum concentration that can be quantified with more than 99% confidence. Taking into account all aspects of the entire analytical instrumentation and practice.
Recov:	Recovered concentration in the sample.
RPD:	Relative Percent Difference

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Number of Pages	**42**
Date Received	**03/28/2012**
Date Reported	**04/09/2012**

Job Number	Order Date	Client
65228	03/28/2012	GROUP

Project ID: I-540
Project Name: Avenida Pico SI
Site: 524 & 530 Avenida Pico
San Clemente, CA 92672

Enclosed please find results of analyses of 6 water and 4 soil samples which were analyzed as specified on the attached chain of custody. If there are any questions, please do not hesitate to call.

Checked By: _____ Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

American Environmental Testing Laboratory Inc.

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CHAIN OF CUSTODY RECORD

Nº 74648

AETL JOB No. 65228

Page 1 of 4

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PHONE: 949. 450.2100
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PROJECT NAME: Avenida Pico 81
PROJECT #: E-540
SITE NAME AND ADDRESS: 524 & 530 Avenida San Clemente, CA
PO #:

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	8015G/8021	8015B	8260B	6010/7000	TEST INSTRUCTIONS & COMMENTS
1	B-12-005@10	65228.01	3/27/12		soil	1-6" tube	none	/	/		/	← please test Duplicate sample for 8015G/8021
2	B-12-005@10	1			5035 kit					/		
3	B-12-005@5'	65228.02			soil	1-6" tube	none					
4	B-12-005@15'	65228.03			soil		none					
5	@20'	65228.04			soil		none					
6	@25	65228.05			soil		none					
7	@30'	65228.06			soil		none	/	/			
8	@30'	1			5035 kit		(varies)			/		
9	@38'	65228.07			soil	1-6" tube	none	/	/			
10	@38'	1			5035 kit		(varies)			/		
11	@40'	65228.08			soil	1-6" tube	none					
12	@45'	65228.09			soil		none					
13	B-12-005 GW	65228.10			water	1 Lt Amber	none		/			
14	B-12-005 GW				water	250mL PL	none				/	
15	B-12-005 GW				water	40mL (3) VOA	HCl	/				~~Duplicate test 8015G/8021~~

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS	26	PROPERLY COOLED (Y) / N / NA	
CUSTODY SEALS Y / N / (NA)		SAMPLES INTACT (Y) / N / NA	
RECEIVED IN GOOD COND. (Y) / N		SAMPLES ACCEPTED (Y) / N	

TURN AROUND TIME

☑ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

RELINQUISHED BY SAMPLER: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature:	Signature:	Signature:
Printed Name: Meghan Lyons	Printed Name:	Printed Name: Myrick
Date: 3/27/12 Time: 0820	Date: Time:	Date: 3-28-12 Time: 1130
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY LABORATORY: AETL 3.**
Signature:	Signature:	Signature:
Printed Name: Myrick	Printed Name:	Printed Name: Jason Claudio
Date: 3/28/12 Time: 0920	Date: Time:	Date: 3/28/12 Time: 1130

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CHAIN OF CUSTODY RECORD

№ 74652

AETL JOB No. 65228

COMPANY: Group Delta Consultants
PROJECT MANAGER: Vesna Glisic
COMPANY ADDRESS: 32 Mauchly, Ste B Irvine CA 92618
PHONE: 949.450.2100
FAX: 949.450.2100
PROJECT NAME: Avenida Pico SD
PROJECT #: I-540
SITE NAME AND ADDRESS: 524 & 530 Avenida Pico San Clemente, CA
PO #:

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	8015G/8021	8015D	8260B	6010/7000	TEST INSTRUCTIONS & COMMENTS
1	B-12-003 GW	65228.11	3/27/12		water	1 Lt Amber	none		/			
2	B-12-003 GW	↓				250 mL PL	none				/	
3	B-12-003 GW	↓				3-40 mL VOA	HCl	/		/		
4	MW-1	65228.12				1 Lt. Amber	none		/			
5	MW-1	↓				250 mL PL	↓				/	
6	MW-1	↓				5-40 mL VOA	HCl	/		/		
7	MW-2	65228.13				1 Lt Amber	none		/			
8	MW-2	↓				250 mL PL	↓				/	
9	MW-2	↓				5-40 mL VOA	HCl	/		/		
10	MW-3	65228.14				1 Lt Amber	none		/			
11	MW-3	↓				250 mL PL	↓				/	
12	MW-3	↓				6-40 mL VOA	HCl	/		/		Duplicate on 8015G/8021
13	MW-3 dup	65228.15				1 Lt Amber	none		/			
14	MW-3 dup	↓				250 mL PL	↓				/	
15	MW-3 dup	↓				5-40 mL VOA	HCl	/		/		

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS	36	PROPERLY COOLED Y / N / NA	
CUSTODY SEALS Y / N / NA		SAMPLES INTACT Y / N / NA	
RECEIVED IN GOOD COND. Y / N		SAMPLES ACCEPTED Y / N	

TURN AROUND TIME

☑ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

RELINQUISHED BY SAMPLER: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature:	Signature:	Signature:
Printed Name: Meghan Boltz	Printed Name:	Printed Name: Meghan Boltz
Date: 3/27/12 Time: 0920	Date: Time:	Date: 3-28-12 Time: 1130
RECEIVED BY: 1.	**RECEIVED BY:** 2.	**RECEIVED BY LABORATORY:** AETL 3.
Signature:	Signature:	Signature:
Printed Name: Meghan Boltz	Printed Name:	Printed Name: Lisa Claudio
Date: 3-28-12 Time: 0920	Date: Time:	Date: 3-28-12 Time: 1130

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CHAIN OF CUSTODY RECORD

№ 78274

AETL JOB No. 65228

Page ____ of ____

COMPANY	Group Delta
PROJECT MANAGER	Vesna Glisic
COMPANY ADDRESS	
PHONE	949-450-2100
FAX	949-450-2108
PROJECT NAME	Avenida Pico SI
PROJECT #	I-540
SITE NAME AND ADDRESS	
PO #	

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	8015G/8021	ANALYSIS REQUESTED	TEST INSTRUCTIONS & COMMENTS
1	BH-005@10ft	65228.16	03/27/12		Soil		none	X		
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS		PROPERLY COOLED (Y) / N / NA	
CUSTODY SEALS Y / N (NA)		SAMPLES INTACT (Y) / N / NA	
RECEIVED IN GOOD COND. (Y) / N		SAMPLES ACCEPTED (Y) / N	

TURN AROUND TIME

☑ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

RELINQUISHED BY SAMPLER: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature:	Signature:	Signature:
Printed Name:	Printed Name:	Printed Name:
Date: Time:	Date: Time:	Date: Time:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY LABORATORY: AETL 3.**
Signature:	Signature:	Signature:
Printed Name:	Printed Name:	Printed Name: Jean Claude
Date: Time:	Date: Time:	Date: 03/28/12 Time: 1130

DISTRIBUTION: WHITE - Laboratory, CANARY - Laboratory, PINK - Project/Account Manager, YELLOW - Sampler/Originator

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Ordered By

Group Delta Consultants
32 Mauchly Suite B
Irvine, CA 92618-

Project ID: I-540
Date Received 03/28/2012
Date Reported 04/09/2012

Telephone: (949)450-2100
Attention: Vesna Glisic

Job Number	Order Date	Client
65228	03/28/2012	GROUP

CERTIFICATE OF ANALYSIS
CASE NARRATIVE

AETL received 16 samples with the following specification on 03/28/2012.

Lab ID	Sample ID	Sample Date	Matrix	QTY of Containers
65228.01	B-12-005 @ 10'	03/27/2012	Soil	5
65228.02	B-12-005 @ 5'	03/27/2012	Soil	1
65228.03	B-12-005 @ 15'	03/27/2012	Soil	1
65228.04	B-12-005 @ 20'	03/27/2012	Soil	1
65228.05	B-12-005 @ 25'	03/27/2012	Soil	1
65228.06	B-12-005 @ 30'	03/27/2012	Soil	5
65228.07	B-12-005 @ 38'	03/27/2012	Soil	5
65228.08	B-12-005 @ 40'	03/27/2012	Soil	1
65228.09	B-12-005 @ 45'	03/27/2012	Soil	1
65228.10	B-12-005 GW	03/27/2012	Aqueous	5
65228.11	B-12-003 GW	03/27/2012	Aqueous	5
65228.12	MW-1	03/27/2012	Aqueous	5
65228.13	MW-2	03/27/2012	Aqueous	5
65228.14	MW-3	03/27/2012	Aqueous	5
65228.15	MW-3 DUP	03/27/2012	Aqueous	5
65228.16	B12-005 @ 10' DUP	03/27/2012	Soil	1

The samples were analyzed as specified on the enclosed chain of custody.
Analytical non-conformances have been noted on the report.

Checked By: _____ Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

American Environmental Testing Laboratory Inc.

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ANALYTICAL RESULTS

Ordered By

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Telephone: (949)450-2100
Attn: Vesna Glisic

Site

524 & 530 Avenida Pico
San Clemente, CA 92672

Page: **2**

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0328122A1

Our Lab I.D.			Method Blank	65228.01	65228.06	65228.07	
Client Sample I.D.				B-12-005 @ 10'	B-12-005 @ 30'	B-12-005 @ 38'	
Date Sampled				03/27/2012	03/27/2012	03/27/2012	
Date Prepared			03/28/2012	03/28/2012	03/28/2012	03/28/2012	
Preparation Method			5030	5035A	5035A	5035A	
Date Analyzed			03/28/2012	03/28/2012	03/28/2012	03/28/2012	
Matrix			Soil	Soil	Soil	Soil	
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
Acetone	25	50	ND	ND	ND	ND	
Benzene	1.0	10.0	ND	ND	ND	ND	
Bromobenzene (Phenyl bromide)	5.0	10.0	ND	ND	ND	ND	
Bromochloromethane	5.0	10.0	ND	ND	ND	ND	
Bromodichloromethane	5.0	10.0	ND	ND	ND	ND	
Bromoform (Tribromomethane)	25	50	ND	ND	ND	ND	
Bromomethane (Methyl bromide)	15	30	ND	ND	ND	ND	
2-Butanone (MEK)	25	50	ND	ND	ND	ND	
n-Butylbenzene	5.0	10.0	ND	ND	ND	ND	
sec-Butylbenzene	5.0	10.0	ND	ND	ND	ND	
tert-Butylbenzene	5.0	10.0	ND	ND	ND	ND	
Carbon Disulfide	25	50	ND	ND	ND	ND	
Carbon tetrachloride	5.0	10.0	ND	ND	ND	ND	
Chlorobenzene	5.0	10.0	ND	ND	ND	ND	
Chloroethane	15	30	ND	ND	ND	ND	
2-Chloroethyl vinyl ether	50	50	ND	ND	ND	ND	
Chloroform (Trichloromethane)	5.0	10.0	ND	ND	ND	ND	
Chloromethane (Methyl chloride)	15	30	ND	ND	ND	ND	
2-Chlorotoluene	5.0	10.0	ND	ND	ND	ND	
4-Chlorotoluene	5.0	10.0	ND	ND	ND	ND	
1,2-Dibromo-3-chloropropane (DBCP)	25	50	ND	ND	ND	ND	
Dibromochloromethane	5.0	10.0	ND	ND	ND	ND	
1,2-Dibromoethane (EDB)	5.0	10.0	ND	ND	ND	ND	
Dibromomethane	5.0	10.0	ND	ND	ND	ND	
1,2-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	
1,3-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0328122A1

Our Lab I.D.			Method Blank	65228.01	65228.06	65228.07	
Client Sample I.D.				B-12-005 @ 10'	B-12-005 @ 30'	B-12-005 @ 38'	
Date Sampled				03/27/2012	03/27/2012	03/27/2012	
Date Prepared			03/28/2012	03/28/2012	03/28/2012	03/28/2012	
Preparation Method			5030	5035A	5035A	5035A	
Date Analyzed			03/28/2012	03/28/2012	03/28/2012	03/28/2012	
Matrix			Soil	Soil	Soil	Soil	
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
1,4-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	
Dichlorodifluoromethane	15	30	ND	ND	ND	ND	
1,1-Dichloroethane	5.0	10.0	ND	ND	ND	ND	
1,2-Dichloroethane (EDC)	5.0	10.0	ND	ND	ND	ND	
1,1-Dichloroethene	5.0	10.0	ND	ND	ND	ND	
cis-1,2-Dichloroethene	5.0	10.0	ND	ND	ND	ND	
trans-1,2-Dichloroethene	5.0	10.0	ND	ND	ND	ND	
1,2-Dichloropropane	5.0	10.0	ND	ND	ND	ND	
1,3-Dichloropropane	5.0	10.0	ND	ND	ND	ND	
2,2-Dichloropropane	5.0	10.0	ND	ND	ND	ND	
1,1-Dichloropropene	5.0	10.0	ND	ND	ND	ND	
cis-1,3-Dichloropropene	5.0	10.0	ND	ND	ND	ND	
trans-1,3-Dichloropropene	5.0	10.0	ND	ND	ND	ND	
Ethylbenzene	1.0	10.0	ND	ND	ND	ND	
Hexachlorobutadiene	15	30	ND	ND	ND	ND	
2-Hexanone	25	50	ND	ND	ND	ND	
Iodomethane	5.0	10.0	ND	ND	ND	ND	
Isopropylbenzene	5.0	10.0	ND	ND	ND	ND	
p-Isopropyltoluene	5.0	10.0	ND	ND	ND	ND	
4-Methyl-2-pentanone (MIBK)	25	50	ND	ND	ND	ND	
Methyl-tert-butyl ether (MTBE)	2.0	10.0	ND	ND	ND	ND	
Methylene chloride (DCM)	25	50	ND	ND	ND	ND	
Naphthalene	5.0	10.0	ND	ND	ND	ND	
n-Propylbenzene	5.0	10.0	ND	ND	ND	ND	
Styrene	5.0	10.0	ND	ND	ND	ND	
1,1,1,2-Tetrachloroethane	5.0	10.0	ND	ND	ND	ND	
1,1,2,2-Tetrachloroethane	5.0	10.0	ND	ND	ND	ND	
Tetrachloroethene	5.0	10.0	ND	ND	ND	ND	
Toluene (Methyl benzene)	1.0	10.0	ND	ND	ND	ND	
1,2,3-Trichlorobenzene	5.0	10.0	ND	ND	ND	ND	
1,2,4-Trichlorobenzene	5.0	10.0	ND	ND	ND	ND	
1,1,1-Trichloroethane	5.0	10.0	ND	ND	ND	ND	
1,1,2-Trichloroethane	5.0	10.0	ND	ND	ND	ND	

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0328122A1

Our Lab I.D.			Method Blank	**65228.01**	**65228.06**	**65228.07**	
Client Sample I.D.				B-12-005 @ 10'	B-12-005 @ 30'	B-12-005 @ 38'	
Date Sampled				03/27/2012	03/27/2012	03/27/2012	
Date Prepared			03/28/2012	03/28/2012	03/28/2012	03/28/2012	
Preparation Method			5030	5035A	5035A	5035A	
Date Analyzed			03/28/2012	03/28/2012	03/28/2012	03/28/2012	
Matrix			Soil	Soil	Soil	Soil	
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
Trichloroethene	5.0	10.0	ND	ND	ND	ND	
Trichlorofluoromethane	5.0	10.0	ND	ND	ND	ND	
1,2,3-Trichloropropane	5.0	10.0	ND	ND	ND	ND	
1,2,4-Trimethylbenzene	5.0	10.0	ND	ND	ND	ND	
1,3,5-Trimethylbenzene	5.0	10.0	ND	ND	ND	ND	
Vinyl Acetate	25	50	ND	ND	ND	ND	
Vinyl chloride (Chloroethene)	15	30	ND	ND	ND	ND	
o-Xylene	1.0	10.0	ND	ND	ND	ND	
m,p-Xylenes	1.0	20.0	ND	ND	ND	ND	
Our Lab I.D.			Method Blank	**65228.01**	**65228.06**	**65228.07**	
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	
Bromofluorobenzene	75-125		94.3	90.0	94.6	95.5	
Dibromofluoromethane	75-125		98.5	115	103	105	
Toluene-d8	75-125		106	98.7	103	102	

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ANALYTICAL RESULTS

Ordered By

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Irvine, CA 92618-

Telephone: (949)450-2100
Attn: Vesna Glisic

Site

524 & 530 Avenida Pico
San Clemente, CA 92672

Page: **5**

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032812NB1

Our Lab I.D.			Method Blank	**65228.01**	**65228.06**	**65228.07**	**65228.16**
Client Sample I.D.				B-12-005 @ 10'	B-12-005 @ 30'	B-12-005 @ 38'	B12-005 @ 10' DUP
Date Sampled				03/27/2012	03/27/2012	03/27/2012	03/27/2012
Date Prepared			03/28/2012	03/28/2012	03/28/2012	03/28/2012	03/28/2012
Preparation Method			5030	5035A	5035A	5035A	5030
Date Analyzed			03/28/2012	03/28/2012	03/28/2012	03/28/2012	03/28/2012
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Gasoline and Light HC. (C4-C12)	0.100	1.000	ND	ND	ND	ND	ND
Our Lab I.D.			Method Blank	**65228.01**	**65228.06**	**65228.07**	**65228.16**
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Bromofluorobenzene	75-125		93.4	113	110	105	107

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ANALYTICAL RESULTS

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Site

524 & 530 Avenida Pico
San Clemente, CA 92672

Page: 6

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 032912DB1

Our Lab I.D.			Method Blank	**65228.01**	**65228.06**	**65228.07**	
Client Sample I.D.				B-12-005 @ 10'	B-12-005 @ 30'	B-12-005 @ 38'	
Date Sampled				03/27/2012	03/27/2012	03/27/2012	
Date Prepared			03/29/2012	03/29/2012	03/29/2012	03/29/2012	
Preparation Method			3550B	3550B	3550B	3550B	
Date Analyzed			03/29/2012	03/29/2012	03/29/2012	03/29/2012	
Matrix			Soil	Soil	Soil	Soil	
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
TPH as Diesel (C13-C22)	1.0	5.0	ND	ND	ND	ND	
TPH as Heavy Hydrocarbons (C23-C40)	1.0	5.0	ND	ND	ND	ND	
TPH Total as Diesel and Heavy HC.C13-C40	1.0	5.0	ND	ND	ND	ND	
Our Lab I.D.			Method Blank	**65228.01**	**65228.06**	**65228.07**	
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	
Chlorobenzene	75-125		109	113	106	111	

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ANALYTICAL RESULTS

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Page: **7**

Site

524 & 530 Avenida Pico
San Clemente, CA 92672

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 0402122C1

Our Lab I.D.			Method Blank	**65228.01**			
Client Sample I.D.				B-12-005 @ 10'			
Date Sampled				03/27/2012			
Date Prepared			04/02/2012	04/02/2012			
Preparation Method			3050B	3050B			
Date Analyzed			04/04/2012	04/04/2012			
Matrix			Soil	Soil			
Units			mg/Kg	mg/Kg			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Antimony	1.0	5.0	ND	ND			
Arsenic	1.0	5.0	ND	ND			
Barium	2.5	5.0	ND	68.2			
Beryllium	1.3	2.5	ND	ND			
Cadmium	1.3	2.5	ND	ND			
Chromium	2.5	5.0	ND	10.4			
Cobalt	2.5	5.0	ND	4.62J			
Copper	2.5	5.0	ND	7.61			
Lead	2.5	5.0	ND	ND			
Mercury (By EPA 7471)	0.1	0.2	ND	ND			
Molybdenum	2.5	5.0	ND	ND			
Nickel	2.5	5.0	ND	9.88			
Selenium	1.0	5.0	ND	ND			
Silver	2.5	5.0	ND	ND			
Thallium	1.0	5.0	ND	ND			
Vanadium	2.5	5.0	ND	20.8			
Zinc	2.5	5.0	ND	32.4			

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1

Our Lab I.D.			Method Blank	**65228.10**			
Client Sample I.D.				B-12-005 GW			
Date Sampled				03/27/2012			
Date Prepared			03/29/2012	03/29/2012			
Preparation Method			5030B	5030B			
Date Analyzed			03/29/2012	03/30/2012			
Matrix			Aqueous	Aqueous			
Units			ug/L	ug/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Acetone	10	10	ND	ND			
Benzene	0.5	1.0	ND	ND			
Bromobenzene (Phenyl bromide)	0.5	1.0	ND	ND			
Bromochloromethane	0.5	1.0	ND	ND			
Bromodichloromethane	0.5	1.0	ND	ND			
Bromoform (Tribromomethane)	2.5	5.0	ND	ND			
Bromomethane (Methyl bromide)	1.5	3.0	ND	ND			
2-Butanone (MEK)	5.0	5.0	ND	ND			
n-Butylbenzene	0.5	1.0	ND	1.47			
sec-Butylbenzene	0.5	1.0	ND	1.03			
tert-Butylbenzene	0.5	1.0	ND	ND			
Carbon Disulfide	0.5	1.0	ND	ND			
Carbon tetrachloride	0.5	1.0	ND	ND			
Chlorobenzene	0.5	1.0	ND	ND			
Chloroethane	1.5	3.0	ND	ND			
2-Chloroethyl vinyl ether	2.5	5.0	ND	ND			
Chloroform (Trichloromethane)	0.5	1.0	ND	ND			
Chloromethane (Methyl chloride)	1.5	3.0	ND	ND			
2-Chlorotoluene	0.5	1.0	ND	ND			
4-Chlorotoluene	0.5	1.0	ND	ND			
1,2-Dibromo-3-chloropropane (DBCP)	2.5	5.0	ND	ND			
Dibromochloromethane	0.5	1.0	ND	ND			
1,2-Dibromoethane (EDB)	0.5	1.0	ND	ND			
Dibromomethane	0.5	1.0	ND	ND			
1,2-Dichlorobenzene	0.5	1.0	ND	ND			
1,3-Dichlorobenzene	0.5	1.0	ND	ND			
1,4-Dichlorobenzene	0.5	1.0	ND	ND			

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1

Our Lab I.D.			Method Blank	**65228.10**			
Client Sample I.D.				B-12-005 GW			
Date Sampled				03/27/2012			
Date Prepared			03/29/2012	03/29/2012			
Preparation Method			5030B	5030B			
Date Analyzed			03/29/2012	03/30/2012			
Matrix			Aqueous	Aqueous			
Units			ug/L	ug/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Dichlorodifluoromethane	1.5	3.0	ND	ND			
1,1-Dichloroethane	0.5	1.0	ND	ND			
1,2-Dichloroethane (EDC)	0.5	1.0	ND	4.94			
1,1-Dichloroethene	0.5	1.0	ND	ND			
cis-1,2-Dichloroethene	0.5	1.0	ND	ND			
trans-1,2-Dichloroethene	0.5	1.0	ND	ND			
1,2-Dichloropropane	0.5	1.0	ND	ND			
1,3-Dichloropropane	0.5	1.0	ND	ND			
2,2-Dichloropropane	0.5	1.0	ND	ND			
1,1-Dichloropropene	0.5	1.0	ND	ND			
cis-1,3-Dichloropropene	0.5	1.0	ND	ND			
trans-1,3-Dichloropropene	0.5	1.0	ND	ND			
Ethylbenzene	0.5	1.0	ND	1.48			
Hexachlorobutadiene	1.5	3.0	ND	ND			
2-Hexanone	2.5	5.0	ND	ND			
Iodomethane	0.5	1.0	ND	ND			
Isopropylbenzene	0.5	1.0	ND	1.15			
p-Isopropyltoluene	0.5	1.0	ND	0.600J			
4-Methyl-2-pentanone (MIBK)	2.5	5.0	ND	ND			
Methyl-tert-butyl ether (MTBE)	0.5	1.0	ND	10.7			
Methylene chloride (DCM)	2.0	4.0	ND	ND			
Naphthalene	0.5	1.0	ND	ND			
n-Propylbenzene	0.5	1.0	ND	4.13			
Styrene	0.5	1.0	ND	ND			
1,1,1,2-Tetrachloroethane	0.5	1.0	ND	ND			
1,1,2,2-Tetrachloroethane	0.5	1.0	ND	ND			
Tetrachloroethene	0.5	1.0	ND	ND			
Toluene (Methyl benzene)	0.5	1.0	ND	ND			
1,2,3-Trichlorobenzene	0.5	1.0	ND	ND			
1,2,4-Trichlorobenzene	0.5	1.0	ND	ND			
1,1,1-Trichloroethane	0.5	1.0	ND	ND			
1,1,2-Trichloroethane	0.5	1.0	ND	ND			
Trichloroethene	0.5	1.0	ND	ND			
Trichlorofluoromethane	0.5	1.0	ND	ND			

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1

Our Lab I.D.			Method Blank	**65228.10**			
Client Sample I.D.				B-12-005 GW			
Date Sampled				03/27/2012			
Date Prepared			03/29/2012	03/29/2012			
Preparation Method			5030B	5030B			
Date Analyzed			03/29/2012	03/30/2012			
Matrix			Aqueous	Aqueous			
Units			ug/L	ug/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
1,2,3-Trichloropropane	0.5	1.0	ND	ND			
Trichlorotrifluoroethane (Freon-113)	0.5	1.0	ND	ND			
1,2,4-Trimethylbenzene	0.5	1.0	ND	ND			
1,3,5-Trimethylbenzene	0.5	1.0	ND	ND			
Vinyl Acetate	0.5	5.0	ND	ND			
Vinyl chloride (Chloroethene)	0.5	3.0	ND	ND			
o-Xylene	0.5	1.0	ND	ND			
m,p-Xylenes	1.0	2.0	ND	ND			
Our Lab I.D.			Method Blank	**65228.10**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Bromofluorobenzene	75-125		108	117			
Dibromofluoromethane	75-125		99.7	97.8			
Toluene-d8	75-125		101	100			

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0402126A1

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			04/02/2012				
Preparation Method			5030B				
Date Analyzed			04/02/2012				
Matrix			Aqueous				
Units			ug/L				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Acetone	10	10	ND				
Benzene	0.5	1.0	ND				
Bromobenzene (Phenyl bromide)	0.5	1.0	ND				
Bromochloromethane	0.5	1.0	ND				
Bromodichloromethane	0.5	1.0	ND				
Bromoform (Tribromomethane)	2.5	5.0	ND				
Bromomethane (Methyl bromide)	1.5	3.0	ND				
2-Butanone (MEK)	5.0	5.0	ND				
n-Butylbenzene	0.5	1.0	ND				
sec-Butylbenzene	0.5	1.0	ND				
tert-Butylbenzene	0.5	1.0	ND				
Carbon Disulfide	0.5	1.0	ND				
Carbon tetrachloride	0.5	1.0	ND				
Chlorobenzene	0.5	1.0	ND				
Chloroethane	1.5	3.0	ND				
2-Chloroethyl vinyl ether	2.5	5.0	ND				
Chloroform (Trichloromethane)	0.5	1.0	ND				
Chloromethane (Methyl chloride)	1.5	3.0	ND				
2-Chlorotoluene	0.5	1.0	ND				
4-Chlorotoluene	0.5	1.0	ND				
1,2-Dibromo-3-chloropropane (DBCP)	2.5	5.0	ND				
Dibromochloromethane	0.5	1.0	ND				
1,2-Dibromoethane (EDB)	0.5	1.0	ND				
Dibromomethane	0.5	1.0	ND				
1,2-Dichlorobenzene	0.5	1.0	ND				
1,3-Dichlorobenzene	0.5	1.0	ND				
1,4-Dichlorobenzene	0.5	1.0	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0402126A1

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			04/02/2012				
Preparation Method			5030B				
Date Analyzed			04/02/2012				
Matrix			Aqueous				
Units			ug/L				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Dichlorodifluoromethane	1.5	3.0	ND				
1,1-Dichloroethane	0.5	1.0	ND				
1,2-Dichloroethane (EDC)	0.5	1.0	ND				
1,1-Dichloroethene	0.5	1.0	ND				
cis-1,2-Dichloroethene	0.5	1.0	ND				
trans-1,2-Dichloroethene	0.5	1.0	ND				
1,2-Dichloropropane	0.5	1.0	ND				
1,3-Dichloropropane	0.5	1.0	ND				
2,2-Dichloropropane	0.5	1.0	ND				
1,1-Dichloropropene	0.5	1.0	ND				
cis-1,3-Dichloropropene	0.5	1.0	ND				
trans-1,3-Dichloropropene	0.5	1.0	ND				
Ethylbenzene	0.5	1.0	ND				
Hexachlorobutadiene	1.5	3.0	ND				
2-Hexanone	2.5	5.0	ND				
Iodomethane	0.5	1.0	ND				
Isopropylbenzene	0.5	1.0	ND				
p-Isopropyltoluene	0.5	1.0	ND				
4-Methyl-2-pentanone (MIBK)	2.5	5.0	ND				
Methyl-tert-butyl ether (MTBE)	0.5	1.0	ND				
Methylene chloride (DCM)	2.0	4.0	ND				
Naphthalene	0.5	1.0	ND				
n-Propylbenzene	0.5	1.0	ND				
Styrene	0.5	1.0	ND				
1,1,1,2-Tetrachloroethane	0.5	1.0	ND				
1,1,2,2-Tetrachloroethane	0.5	1.0	ND				
Tetrachloroethene	0.5	1.0	ND				
Toluene (Methyl benzene)	0.5	1.0	ND				
1,2,3-Trichlorobenzene	0.5	1.0	ND				
1,2,4-Trichlorobenzene	0.5	1.0	ND				
1,1,1-Trichloroethane	0.5	1.0	ND				
1,1,2-Trichloroethane	0.5	1.0	ND				
Trichloroethene	0.5	1.0	ND				
Trichlorofluoromethane	0.5	1.0	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0402126A1

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			04/02/2012				
Preparation Method			5030B				
Date Analyzed			04/02/2012				
Matrix			Aqueous				
Units			ug/L				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
1,2,3-Trichloropropane	0.5	1.0	ND				
Trichlorotrifluoroethane (Freon-113)	0.5	1.0	ND				
1,2,4-Trimethylbenzene	0.5	1.0	ND				
1,3,5-Trimethylbenzene	0.5	1.0	ND				
Vinyl Acetate	0.5	5.0	ND				
Vinyl chloride (Chloroethene)	0.5	3.0	ND				
o-Xylene	0.5	1.0	ND				
m,p-Xylenes	1.0	2.0	ND				
Our Lab I.D.			Method Blank				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		94.3				
Dibromofluoromethane	75-125		101				
Toluene-d8	75-125		99.7				

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0402126A1

Our Lab I.D.			65228.11				
Client Sample I.D.			B-12-003 GW				
Date Sampled			03/27/2012				
Date Prepared			04/02/2012				
Preparation Method			5030B				
Date Analyzed			04/02/2012				
Matrix			Aqueous				
Units			ug/L				
Dilution Factor			10				
Analytes	**MDL**	**PQL**	**Results**				
Acetone	100	100	ND				
Benzene	5	10	634				
Bromobenzene (Phenyl bromide)	5	10	ND				
Bromochloromethane	5	10	ND				
Bromodichloromethane	5	10	ND				
Bromoform (Tribromomethane)	25	50	ND				
Bromomethane (Methyl bromide)	15	30	ND				
2-Butanone (MEK)	50	50	ND				
n-Butylbenzene	5	10	114				
sec-Butylbenzene	5	10	16.5				
tert-Butylbenzene	5	10	ND				
Carbon Disulfide	5	10	ND				
Carbon tetrachloride	5	10	ND				
Chlorobenzene	5	10	ND				
Chloroethane	15	30	ND				
2-Chloroethyl vinyl ether	25	50	ND				
Chloroform (Trichloromethane)	5	10	ND				
Chloromethane (Methyl chloride)	15	30	ND				
2-Chlorotoluene	5	10	ND				
4-Chlorotoluene	5	10	ND				
1,2-Dibromo-3-chloropropane (DBCP)	25	50	ND				
Dibromochloromethane	5	10	ND				
1,2-Dibromoethane (EDB)	5	10	32.0				
Dibromomethane	5	10	ND				
1,2-Dichlorobenzene	5	10	ND				
1,3-Dichlorobenzene	5	10	ND				
1,4-Dichlorobenzene	5	10	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0402126A1

Our Lab I.D.			65228.11				
Client Sample I.D.			B-12-003 GW				
Date Sampled			03/27/2012				
Date Prepared			04/02/2012				
Preparation Method			5030B				
Date Analyzed			04/02/2012				
Matrix			Aqueous				
Units			ug/L				
Dilution Factor			10				
Analytes	**MDL**	**PQL**	**Results**				
Dichlorodifluoromethane	15	30	ND				
1,1-Dichloroethane	5	10	ND				
1,2-Dichloroethane (EDC)	5	10	83.6				
1,1-Dichloroethene	5	10	ND				
cis-1,2-Dichloroethene	5	10	ND				
trans-1,2-Dichloroethene	5	10	ND				
1,2-Dichloropropane	5	10	ND				
1,3-Dichloropropane	5	10	ND				
2,2-Dichloropropane	5	10	ND				
1,1-Dichloropropene	5	10	ND				
cis-1,3-Dichloropropene	5	10	ND				
trans-1,3-Dichloropropene	5	10	ND				
Ethylbenzene	5	10	1,350				
Hexachlorobutadiene	15	30	ND				
2-Hexanone	25	50	ND				
Iodomethane	5	10	ND				
Isopropylbenzene	5	10	60.3				
p-Isopropyltoluene	5	10	11.0				
4-Methyl-2-pentanone (MIBK)	25	50	ND				
Methyl-tert-butyl ether (MTBE)	5	10	142				
Methylene chloride (DCM)	20	40	ND				
Naphthalene	5	10	ND				
n-Propylbenzene	5	10	215				
Styrene	5	10	ND				
1,1,1,2-Tetrachloroethane	5	10	ND				
1,1,2,2-Tetrachloroethane	5	10	ND				
Tetrachloroethene	5	10	ND				
Toluene (Methyl benzene)	5	10	4,300				
1,2,3-Trichlorobenzene	5	10	ND				
1,2,4-Trichlorobenzene	5	10	ND				
1,1,1-Trichloroethane	5	10	ND				
1,1,2-Trichloroethane	5	10	ND				
Trichloroethene	5	10	ND				
Trichlorofluoromethane	5	10	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0402126A1

Our Lab I.D.			**65228.11**				
Client Sample I.D.			B-12-003 GW				
Date Sampled			03/27/2012				
Date Prepared			04/02/2012				
Preparation Method			5030B				
Date Analyzed			04/02/2012				
Matrix			Aqueous				
Units			ug/L				
Dilution Factor			10				
Analytes	**MDL**	**PQL**	**Results**				
1,2,3-Trichloropropane	5	10	ND				
Trichlorotrifluoroethane (Freon-113)	5	10	ND				
1,2,4-Trimethylbenzene	5	10	1,720				
1,3,5-Trimethylbenzene	5	10	536				
Vinyl Acetate	5	50	ND				
Vinyl chloride (Chloroethene)	5	30	ND				
o-Xylene	5	10	2,460				
m,p-Xylenes	10	20	5,320				
Our Lab I.D.			**65228.11**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		96.6				
Dibromofluoromethane	75-125		110				
Toluene-d8	75-125		95.4				

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0402126A1

Our Lab I.D.			**65228.12**				
Client Sample I.D.			MW-1				
Date Sampled			03/27/2012				
Date Prepared			04/02/2012				
Preparation Method			5030B				
Date Analyzed			04/02/2012				
Matrix			Aqueous				
Units			ug/L				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Acetone	10	10	ND				
Benzene	0.5	1.0	ND				
Bromobenzene (Phenyl bromide)	0.5	1.0	ND				
Bromochloromethane	0.5	1.0	ND				
Bromodichloromethane	0.5	1.0	ND				
Bromoform (Tribromomethane)	2.5	5.0	ND				
Bromomethane (Methyl bromide)	1.5	3.0	ND				
2-Butanone (MEK)	5.0	5.0	ND				
n-Butylbenzene	0.5	1.0	ND				
sec-Butylbenzene	0.5	1.0	ND				
tert-Butylbenzene	0.5	1.0	ND				
Carbon Disulfide	0.5	1.0	ND				
Carbon tetrachloride	0.5	1.0	ND				
Chlorobenzene	0.5	1.0	ND				
Chloroethane	1.5	3.0	ND				
2-Chloroethyl vinyl ether	2.5	5.0	ND				
Chloroform (Trichloromethane)	0.5	1.0	ND				
Chloromethane (Methyl chloride)	1.5	3.0	ND				
2-Chlorotoluene	0.5	1.0	ND				
4-Chlorotoluene	0.5	1.0	ND				
1,2-Dibromo-3-chloropropane (DBCP)	2.5	5.0	ND				
Dibromochloromethane	0.5	1.0	ND				
1,2-Dibromoethane (EDB)	0.5	1.0	ND				
Dibromomethane	0.5	1.0	ND				
1,2-Dichlorobenzene	0.5	1.0	ND				
1,3-Dichlorobenzene	0.5	1.0	ND				
1,4-Dichlorobenzene	0.5	1.0	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0402126A1

Our Lab I.D.			**65228.12**				
Client Sample I.D.			MW-1				
Date Sampled			03/27/2012				
Date Prepared			04/02/2012				
Preparation Method			5030B				
Date Analyzed			04/02/2012				
Matrix			Aqueous				
Units			ug/L				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Dichlorodifluoromethane	1.5	3.0	ND				
1,1-Dichloroethane	0.5	1.0	ND				
1,2-Dichloroethane (EDC)	0.5	1.0	17.7				
1,1-Dichloroethene	0.5	1.0	ND				
cis-1,2-Dichloroethene	0.5	1.0	ND				
trans-1,2-Dichloroethene	0.5	1.0	ND				
1,2-Dichloropropane	0.5	1.0	ND				
1,3-Dichloropropane	0.5	1.0	ND				
2,2-Dichloropropane	0.5	1.0	ND				
1,1-Dichloropropene	0.5	1.0	ND				
cis-1,3-Dichloropropene	0.5	1.0	ND				
trans-1,3-Dichloropropene	0.5	1.0	ND				
Ethylbenzene	0.5	1.0	ND				
Hexachlorobutadiene	1.5	3.0	ND				
2-Hexanone	2.5	5.0	ND				
Iodomethane	0.5	1.0	ND				
Isopropylbenzene	0.5	1.0	ND				
p-Isopropyltoluene	0.5	1.0	ND				
4-Methyl-2-pentanone (MIBK)	2.5	5.0	ND				
Methyl-tert-butyl ether (MTBE)	0.5	1.0	3.56				
Methylene chloride (DCM)	2.0	4.0	ND				
Naphthalene	0.5	1.0	ND				
n-Propylbenzene	0.5	1.0	ND				
Styrene	0.5	1.0	ND				
1,1,1,2-Tetrachloroethane	0.5	1.0	ND				
1,1,2,2-Tetrachloroethane	0.5	1.0	ND				
Tetrachloroethene	0.5	1.0	ND				
Toluene (Methyl benzene)	0.5	1.0	ND				
1,2,3-Trichlorobenzene	0.5	1.0	ND				
1,2,4-Trichlorobenzene	0.5	1.0	ND				
1,1,1-Trichloroethane	0.5	1.0	ND				
1,1,2-Trichloroethane	0.5	1.0	ND				
Trichloroethene	0.5	1.0	ND				
Trichlorofluoromethane	0.5	1.0	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0402126A1

Our Lab I.D.			**65228.12**				
Client Sample I.D.			MW-1				
Date Sampled			03/27/2012				
Date Prepared			04/02/2012				
Preparation Method			5030B				
Date Analyzed			04/02/2012				
Matrix			Aqueous				
Units			ug/L				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
1,2,3-Trichloropropane	0.5	1.0	ND				
Trichlorotrifluoroethane (Freon-113)	0.5	1.0	ND				
1,2,4-Trimethylbenzene	0.5	1.0	ND				
1,3,5-Trimethylbenzene	0.5	1.0	ND				
Vinyl Acetate	0.5	5.0	ND				
Vinyl chloride (Chloroethene)	0.5	3.0	ND				
o-Xylene	0.5	1.0	ND				
m,p-Xylenes	1.0	2.0	ND				
Our Lab I.D.			**65228.12**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		96.2				
Dibromofluoromethane	75-125		110				
Toluene-d8	75-125		99.6				

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1

Our Lab I.D.			65228.13	65228.14	65228.15		
Client Sample I.D.			MW-2	MW-3	MW-3 DUP		
Date Sampled			03/27/2012	03/27/2012	03/27/2012		
Date Prepared			03/29/2012	03/29/2012	03/29/2012		
Preparation Method			5030B	5030B	5030B		
Date Analyzed			03/30/2012	03/30/2012	03/30/2012		
Matrix			Aqueous	Aqueous	Aqueous		
Units			ug/L	ug/L	ug/L		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Acetone	10	10	ND	ND	ND		
Benzene	0.5	1.0	232	505	748		
Bromobenzene (Phenyl bromide)	0.5	1.0	ND	ND	ND		
Bromochloromethane	0.5	1.0	ND	ND	ND		
Bromodichloromethane	0.5	1.0	ND	ND	ND		
Bromoform (Tribromomethane)	2.5	5.0	ND	ND	ND		
Bromomethane (Methyl bromide)	1.5	3.0	ND	ND	ND		
2-Butanone (MEK)	5.0	5.0	ND	ND	ND		
n-Butylbenzene	0.5	1.0	ND	3.49	3.92		
sec-Butylbenzene	0.5	1.0	1.34	3.18	3.25		
tert-Butylbenzene	0.5	1.0	ND	ND	ND		
Carbon Disulfide	0.5	1.0	ND	ND	ND		
Carbon tetrachloride	0.5	1.0	ND	ND	ND		
Chlorobenzene	0.5	1.0	ND	ND	ND		
Chloroethane	1.5	3.0	ND	ND	ND		
2-Chloroethyl vinyl ether	2.5	5.0	ND	ND	ND		
Chloroform (Trichloromethane)	0.5	1.0	ND	ND	ND		
Chloromethane (Methyl chloride)	1.5	3.0	ND	ND	ND		
2-Chlorotoluene	0.5	1.0	ND	ND	ND		
4-Chlorotoluene	0.5	1.0	ND	ND	ND		
1,2-Dibromo-3-chloropropane (DBCP)	2.5	5.0	ND	ND	ND		
Dibromochloromethane	0.5	1.0	ND	ND	ND		
1,2-Dibromoethane (EDB)	0.5	1.0	ND	ND	ND		
Dibromomethane	0.5	1.0	ND	ND	ND		
1,2-Dichlorobenzene	0.5	1.0	ND	ND	ND		
1,3-Dichlorobenzene	0.5	1.0	ND	ND	ND		
1,4-Dichlorobenzene	0.5	1.0	ND	ND	ND		

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1

Our Lab I.D.			65228.13	65228.14	65228.15		
Client Sample I.D.			MW-2	MW-3	MW-3 DUP		
Date Sampled			03/27/2012	03/27/2012	03/27/2012		
Date Prepared			03/29/2012	03/29/2012	03/29/2012		
Preparation Method			5030B	5030B	5030B		
Date Analyzed			03/30/2012	03/30/2012	03/30/2012		
Matrix			Aqueous	Aqueous	Aqueous		
Units			ug/L	ug/L	ug/L		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Dichlorodifluoromethane	1.5	3.0	ND	ND	ND		
1,1-Dichloroethane	0.5	1.0	ND	ND	ND		
1,2-Dichloroethane (EDC)	0.5	1.0	9.04	5.23	5.64		
1,1-Dichloroethene	0.5	1.0	ND	ND	ND		
cis-1,2-Dichloroethene	0.5	1.0	ND	ND	ND		
trans-1,2-Dichloroethene	0.5	1.0	ND	ND	ND		
1,2-Dichloropropane	0.5	1.0	ND	ND	ND		
1,3-Dichloropropane	0.5	1.0	ND	ND	ND		
2,2-Dichloropropane	0.5	1.0	ND	ND	ND		
1,1-Dichloropropene	0.5	1.0	ND	ND	ND		
cis-1,3-Dichloropropene	0.5	1.0	ND	ND	ND		
trans-1,3-Dichloropropene	0.5	1.0	ND	ND	ND		
Ethylbenzene	0.5	1.0	44.0	218	228		
Hexachlorobutadiene	1.5	3.0	ND	ND	ND		
2-Hexanone	2.5	5.0	ND	ND	ND		
Iodomethane	0.5	1.0	ND	ND	ND		
Isopropylbenzene	0.5	1.0	11.0	9.66	10.0		
p-Isopropyltoluene	0.5	1.0	0.570J	ND	ND		
4-Methyl-2-pentanone (MIBK)	2.5	5.0	ND	ND	ND		
Methyl-tert-butyl ether (MTBE)	0.5	1.0	48.9	59.0	55.9		
Methylene chloride (DCM)	2.0	4.0	ND	ND	ND		
Naphthalene	0.5	1.0	ND	ND	ND		
n-Propylbenzene	0.5	1.0	8.31	23.1	24.0		
Styrene	0.5	1.0	ND	ND	ND		
1,1,1,2-Tetrachloroethane	0.5	1.0	ND	ND	ND		
1,1,2,2-Tetrachloroethane	0.5	1.0	ND	ND	ND		
Tetrachloroethene	0.5	1.0	ND	ND	ND		
Toluene (Methyl benzene)	0.5	1.0	353	99.4	106		
1,2,3-Trichlorobenzene	0.5	1.0	ND	ND	ND		
1,2,4-Trichlorobenzene	0.5	1.0	ND	ND	ND		
1,1,1-Trichloroethane	0.5	1.0	ND	ND	ND		
1,1,2-Trichloroethane	0.5	1.0	ND	ND	ND		
Trichloroethene	0.5	1.0	ND	ND	ND		
Trichlorofluoromethane	0.5	1.0	ND	ND	ND		

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1

Our Lab I.D.			**65228.13**	**65228.14**	**65228.15**		
Client Sample I.D.			MW-2	MW-3	MW-3 DUP		
Date Sampled			03/27/2012	03/27/2012	03/27/2012		
Date Prepared			03/29/2012	03/29/2012	03/29/2012		
Preparation Method			5030B	5030B	5030B		
Date Analyzed			03/30/2012	03/30/2012	03/30/2012		
Matrix			Aqueous	Aqueous	Aqueous		
Units			ug/L	ug/L	ug/L		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
1,2,3-Trichloropropane	0.5	1.0	ND	ND	ND		
Trichlorotrifluoroethane (Freon-113)	0.5	1.0	ND	ND	ND		
1,2,4-Trimethylbenzene	0.5	1.0	65.5	27.3	28.7		
1,3,5-Trimethylbenzene	0.5	1.0	18.6	6.87	7.12		
Vinyl Acetate	0.5	5.0	ND	ND	ND		
Vinyl chloride (Chloroethene)	0.5	3.0	ND	ND	ND		
o-Xylene	0.5	1.0	67.8	29.8	31.0		
m,p-Xylenes	1.0	2.0	387	62.8	65.1		
Our Lab I.D.			**65228.13**	**65228.14**	**65228.15**		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
Bromofluorobenzene	75-125		119	110	123		
Dibromofluoromethane	75-125		90.7	87.5	88.6		
Toluene-d8	75-125		106	106	106		

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 040312OB1

Our Lab I.D.			Method Blank	**65228.10**			
Client Sample I.D.				B-12-005 GW			
Date Sampled				03/27/2012			
Date Prepared			04/03/2012	04/03/2012			
Preparation Method			5030B	5030B			
Date Analyzed			04/03/2012	04/03/2012			
Matrix			Aqueous	Aqueous			
Units			mg/L	mg/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
TPH as Gasoline and Light HC. (C4-C12)	0.005	0.010	ND	0.0462			
Our Lab I.D.			Method Blank	**65228.10**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Bromofluorobenzene	75-125		102	88.4			

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032912OB2

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			03/29/2012				
Preparation Method			5030B				
Date Analyzed			03/29/2012				
Matrix			Aqueous				
Units			mg/L				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
TPH as Gasoline and Light HC. (C4-C12)	0.005	0.010	ND				
Our Lab I.D.			Method Blank				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		94.0				

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Page: **25**

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032912OB2

Our Lab I.D.			**65228.11**				
Client Sample I.D.			B-12-003 GW				
Date Sampled			03/27/2012				
Date Prepared			03/29/2012				
Preparation Method			5030B				
Date Analyzed			03/30/2012				
Matrix			Aqueous				
Units			mg/L				
Dilution Factor			10				
Analytes	**MDL**	**PQL**	**Results**				
TPH as Gasoline and Light HC. (C4-C12)	0.050	0.100	40.0				
Our Lab I.D.			**65228.11**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		117				

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Page: **26**

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032912OB2

Our Lab I.D.			65228.12	65228.13	65228.14	65228.15	
Client Sample I.D.			MW-1	MW-2	MW-3	MW-3 DUP	
Date Sampled			03/27/2012	03/27/2012	03/27/2012	03/27/2012	
Date Prepared			03/29/2012	03/29/2012	03/29/2012	03/29/2012	
Preparation Method			5030B	5030B	5030B	5030B	
Date Analyzed			03/29/2012	03/29/2012	03/30/2012	03/30/2012	
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	
Units			mg/L	mg/L	mg/L	mg/L	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
TPH as Gasoline and Light HC. (C4-C12)	0.005	0.010	0.0104	1.81	2.40	2.78	
Our Lab I.D.			**65228.12**	**65228.13**	**65228.14**	**65228.15**	
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	
Bromofluorobenzene	75-125		95.6	115	109	123	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: M8015D, TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 040212DB1

Our Lab I.D.			Method Blank	65228.10	65228.11	65228.12	65228.13
Client Sample I.D.				B-12-005 GW	B-12-003 GW	MW-1	MW-2
Date Sampled				03/27/2012	03/27/2012	03/27/2012	03/27/2012
Date Prepared			04/02/2012	04/02/2012	04/02/2012	04/02/2012	04/02/2012
Preparation Method			3510C	3510C	3510C	3510C	3510C
Date Analyzed			04/02/2012	04/02/2012	04/02/2012	04/02/2012	04/02/2012
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units			mg/L	mg/L	mg/L	mg/L	mg/L
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Diesel (C13-C22)	0.1	0.5	ND	ND	0.285J	ND	ND
TPH as Heavy Hydrocarbons (C23-C40)	0.1	0.5	ND	ND	ND	ND	ND
TPH Total as Diesel and Heavy HC.C13-C40	0.1	0.5	ND	ND	0.285J	ND	ND
Our Lab I.D.			Method Blank	65228.10	65228.11	65228.12	65228.13
Surrogates	%Rec.Limit		% Rec.	% Rec.	% Rec.	% Rec.	% Rec.
Chlorobenzene	60-125		94.5	96.5	74.5	89.5	89.5

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524 & 530 Avenida Pico
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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: M8015D, TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 040212DB1

Our Lab I.D.			**65228.14**	**65228.15**			
Client Sample I.D.			MW-3	MW-3 DUP			
Date Sampled			03/27/2012	03/27/2012			
Date Prepared			04/02/2012	04/02/2012			
Preparation Method			3510C	3510C			
Date Analyzed			04/02/2012	04/02/2012			
Matrix			Aqueous	Aqueous			
Units			mg/L	mg/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
TPH as Diesel (C13-C22)	0.1	0.5	ND	ND			
TPH as Heavy Hydrocarbons (C23-C40)	0.1	0.5	ND	ND			
TPH Total as Diesel and Heavy HC.C13-C40	0.1	0.5	ND	ND			
Our Lab I.D.			**65228.14**	**65228.15**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Chlorobenzene	60-125		105	89.5			

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524 & 530 Avenida Pico
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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 0330122C3

Our Lab I.D.			Method Blank	**65228.10**			
Client Sample I.D.				B-12-005 GW			
Date Sampled				03/27/2012			
Date Prepared			03/30/2012	03/30/2012			
Preparation Method			3005A	3005A			
Date Analyzed			04/03/2012	04/03/2012			
Matrix			Aqueous	Aqueous			
Units			mg/L	mg/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Antimony	0.05	0.10	ND	ND			
Arsenic	0.05	0.10	ND	ND			
Barium	0.03	0.05	ND	0.0762			
Beryllium	0.01	0.05	ND	ND			
Cadmium	0.01	0.05	ND	ND			
Chromium	0.01	0.05	ND	ND			
Cobalt	0.01	0.05	ND	0.0111J			
Copper	0.01	0.05	ND	ND			
Lead	0.05	0.10	ND	ND			
Mercury (By EPA 7470)	0.001	0.002	ND	ND			
Molybdenum	0.01	0.05	ND	0.196			
Nickel	0.01	0.05	ND	0.0198J			
Selenium	0.05	0.10	ND	ND			
Silver	0.01	0.05	ND	ND			
Thallium	0.05	0.10	ND	ND			
Vanadium	0.03	0.05	ND	ND			
Zinc	0.01	0.05	ND	ND			

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 0330122C3

Our Lab I.D.			65228.11	65228.12	65228.13	65228.14	65228.15
Client Sample I.D.			B-12-003 GW	MW-1	MW-2	MW-3	MW-3 DUP
Date Sampled			03/27/2012	03/27/2012	03/27/2012	03/27/2012	03/27/2012
Date Prepared			03/30/2012	03/30/2012	03/30/2012	03/30/2012	03/30/2012
Preparation Method			3005A	3005A	3005A	3005A	3005A
Date Analyzed			04/03/2012	04/03/2012	04/03/2012	04/03/2012	04/03/2012
Matrix			Aqueous	Aqueous	Aqueous	Aqueous	Aqueous
Units			mg/L	mg/L	mg/L	mg/L	mg/L
Dilution Factor			5	5	5	5	5
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Antimony	0.25	0.50	ND	ND	ND	ND	ND
Arsenic	0.25	0.50	ND	ND	ND	ND	ND
Barium	0.15	0.25	ND	ND	ND	ND	ND
Beryllium	0.05	0.25	ND	ND	ND	ND	ND
Cadmium	0.05	0.25	ND	ND	ND	ND	ND
Chromium	0.05	0.25	ND	ND	ND	ND	ND
Cobalt	0.05	0.25	ND	ND	ND	ND	ND
Copper	0.05	0.25	ND	ND	ND	ND	ND
Lead	0.25	0.50	ND	ND	ND	ND	ND
Mercury (By EPA 7470)	0.005	0.010	ND	ND	ND	ND	ND
Molybdenum	0.05	0.25	0.137J	0.172J	0.107J	0.146J	0.142J
Nickel	0.05	0.25	ND	0.112J	ND	0.0521J	0.0513J
Selenium	0.25	0.50	ND	ND	ND	ND	ND
Silver	0.05	0.25	ND	ND	ND	ND	ND
Thallium	0.25	0.50	ND	ND	ND	ND	ND
Vanadium	0.15	0.25	ND	ND	ND	ND	ND
Zinc	0.05	0.25	ND	0.142J	ND	ND	ND

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 0330122C3; Dup or Spiked Sample: 65203.12; LCS: Clean Water; QC Prepared: 03/30/2012; QC Analyzed: 04/03/2012; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Antimony	0.00	1.00	0.857	85.7	1.00	0.808	80.8	5.9	80-120	<15
Arsenic	0.00	1.00	0.939	93.9	1.00	0.883	88.3	6.1	80-120	<15
Barium	0.00	1.00	0.905	90.5	1.00	0.876	87.6	3.3	80-120	<15
Beryllium	0.00	1.00	0.955	95.5	1.00	0.926	92.6	3.1	80-120	<15
Cadmium	0.00	1.00	0.872	87.2	1.00	0.845	84.5	3.1	80-120	<15
Chromium	0.00	1.00	0.883	88.3	1.00	0.857	85.7	3.0	80-120	<15
Cobalt	0.00	1.00	0.874	87.4	1.00	0.843	84.3	3.6	80-120	<15
Copper	0.00	1.00	0.867	86.7	1.00	0.843	84.3	2.8	80-120	<15
Lead	0.00	1.00	0.832	83.2	1.00	0.804	80.4	3.4	80-120	<15
Mercury (By EPA 7470)	0.00	0.0100	0.00951	95.1	0.0100	0.0108	108	12.7	80-120	<15
Molybdenum	0.223	1.00	1.10	87.7	1.00	1.08	85.7	2.3	80-120	<15
Nickel	0.00	1.00	0.887	88.7	1.00	0.856	85.6	3.6	80-120	<15
Selenium	0.00	1.00	0.920	92.0	1.00	0.856	85.6	7.2	80-120	<15
Silver	0.00	1.00	0.191M	19.1	1.00	0.187M	18.7	2.1	80-120	<15
Thallium	0.00	1.00	0.791M	79.1	1.00	0.757M	75.7	4.4	80-120	<15
Vanadium	0.00	1.00	0.880	88.0	1.00	0.859	85.9	2.4	80-120	<15
Zinc	0.00	1.00	0.919	91.9	1.00	0.887	88.7	3.5	80-120	<15

QC Batch No: 0330122C3; Dup or Spiked Sample: 65203.12; LCS: Clean Water; QC Prepared: 03/30/2012; QC Analyzed: 04/03/2012; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Antimony	1.00	0.923	92.3	1.00	0.914	91.4	<1	80-120	<15	
Arsenic	1.00	0.932	93.2	1.00	0.925	92.5	<1	80-120	<15	
Barium	1.00	0.931	93.1	1.00	0.927	92.7	<1	80-120	<15	
Beryllium	1.00	1.01	101	1.00	0.999	99.9	1.10	80-120	<15	
Cadmium	1.00	0.917	91.7	1.00	0.919	91.9	<1	80-120	<15	
Chromium	1.00	0.926	92.6	1.00	0.927	92.7	<1	80-120	<15	
Cobalt	1.00	0.927	92.7	1.00	0.919	91.9	<1	80-120	<15	
Copper	1.00	0.908	90.8	1.00	0.907	90.7	<1	80-120	<15	
Lead	1.00	0.895	89.5	1.00	0.891	89.1	<1	80-120	<15	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 0330122C3; Dup or Spiked Sample: 65203.12; LCS: Clean Water; QC Prepared: 03/30/2012; QC Analyzed: 04/03/2012; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Mercury (By EPA 7470)	0.0100	0.00948	94.8	0.0100	0.00961	96.1	1.4	80-120	<15	
Molybdenum	1.00	0.945	94.5	1.00	0.939	93.9	<1	80-120	<15	
Nickel	1.00	0.926	92.6	1.00	0.925	92.5	<1	80-120	<15	
Selenium	1.00	0.902	90.2	1.00	0.905	90.5	<1	80-120	<15	
Silver	1.00	0.916	91.6	1.00	0.922	92.2	<1	80-120	<15	
Thallium	1.00	0.883	88.3	1.00	0.873	87.3	1.14	80-120	<15	
Vanadium	1.00	0.936	93.6	1.00	0.939	93.9	<1	80-120	<15	
Zinc	1.00	0.933	93.3	1.00	0.933	93.3	<1	80-120	<15	

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524 & 530 Avenida Pico
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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1; Dup or Spiked Sample: B0329121A1; LCS: Clean Water; QC Prepared: 03/29/2012;MS Analyzed: 03/30/2012; LCS Analyzed: 03/29/2012; Units: ug/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Benzene	0.00	50.0	50.5	101	50.0	50.5	101	<1	75-125	<20
Chlorobenzene	0.00	50.0	47.2	94.4	50.0	47.7	95.4	1.05	75-125	<20
1,1-Dichloroethene	0.00	50.0	44.8	89.6	50.0	44.6	89.2	<1	75-125	<20
Methyl-tert-butyl ether (MTBE)	0.00	50.0	47.0	94.0	50.0	39.8	79.6	16.6	75-125	<20
Toluene (Methyl benzene)	0.00	50.0	51.0	102	50.0	50.5	101	<1	75-125	<20
Trichloroethene	0.00	50.0	59.5	119	50.0	53.5	107	10.6	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	50.0	60.5	121	50.0	58.0	116	4.13	75-125	<20
Dibromofluoromethane	0.00	50.0	44.9	89.8	50.0	45.5	90.9	1.22	75-125	<20
Toluene-d8	0.00	50.0	53.0	106	50.0	52.0	104	1.89	75-125	<20

QC Batch No: 0329121A1; Dup or Spiked Sample: B0329121A1; LCS: Clean Water; QC Prepared: 03/29/2012;MS Analyzed: 03/30/2012; LCS Analyzed: 03/29/2012; Units: ug/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Benzene	50.0	51.6	103	50.0	51.8	104	<1	75-125	<20	
Chlorobenzene	50.0	51.7	103	50.0	52.2	104	<1	75-125	<20	
1,1-Dichloroethene	50.0	50.3	101	50.0	50.0	100	<1	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	45.8	91.6	50.0	46.2	92.0	<1	75-125	<20	
Toluene (Methyl benzene)	50.0	51.3	103	50.0	51.7	103	<1	75-125	<20	
Trichloroethene	50.0	52.3	105	50.0	51.8	104	<1	75-125	<20	
LCS										
Chloroform (Trichloromethane)	50.0	50.9	102	50.0	51.8	104	1.94	75-125	<20	
Ethylbenzene	50.0	51.7	103	50.0	51.5	103	<1	75-125	<20	
1,1,1-Trichloroethane	50.0	52.7	105	50.0	53.6	107	1.89	75-125	<20	
o-Xylene	50.0	53.8	108	50.0	53.5	107	<1	75-125	<20	
m,p-Xylenes	100	108	108	100	107	107	<1	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	47.5	95.0	50.0	46.8	93.5	1.58	75-125	<20	
Dibromofluoromethane	50.0	47.8	95.5	50.0	47.4	94.8	<1	75-125	<20	
Toluene-d8	50.0	49.2	98.5	50.0	48.4	96.8	1.73	75-125	<20	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0402126A1; Dup or Spiked Sample: B0402126A1; LCS: Clean Water; QC Prepared: 04/02/2012; QC Analyzed: 04/02/2012; Units: ug/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Benzene	0.00	50.0	50.0	100	50.0	50.5	101	<1	75-125	<20
Chlorobenzene	0.00	50.0	47.2	94.4	50.0	46.5	93.0	1.49	75-125	<20
1,1-Dichloroethene	0.00	50.0	53.0	106	50.0	52.5	105	<1	75-125	<20
Methyl-tert-butyl ether (MTBE)	0.00	50.0	53.5	107	50.0	52.0	104	2.84	75-125	<20
Toluene (Methyl benzene)	0.00	50.0	47.8	95.6	50.0	47.1	94.2	1.48	75-125	<20
Trichloroethene	0.00	50.0	53.5	107	50.0	53.0	106	<1	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	50.0	49.2	98.3	50.0	49.0	97.9	<1	75-125	<20
Dibromofluoromethane	0.00	50.0	52.5	105	50.0	51.5	103	1.90	75-125	<20
Toluene-d8	0.00	50.0	49.4	98.7	50.0	48.8	97.5	1.22	75-125	<20

QC Batch No: 0402126A1; Dup or Spiked Sample: B0402126A1; LCS: Clean Water; QC Prepared: 04/02/2012; QC Analyzed: 04/02/2012; Units: ug/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Benzene	50.0	50.8	102	50.0	51.5	103	<1	75-125	<20	
Chlorobenzene	50.0	47.1	94.2	50.0	47.7	95.0	<1	75-125	<20	
1,1-Dichloroethene	50.0	55.4	111	50.0	54.7	109	1.82	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	55.0	110	50.0	54.2	108	1.83	75-125	<20	
Toluene (Methyl benzene)	50.0	48.0	96.0	50.0	48.1	96.0	<1	75-125	<20	
Trichloroethene	50.0	51.1	102	50.0	52.5	105	2.90	75-125	<20	
LCS										
Chloroform (Trichloromethane)	50.0	58.3	117	50.0	57.0	114	2.60	75-125	<20	
Ethylbenzene	50.0	47.5	95.0	50.0	47.9	96.0	1.05	75-125	<20	
1,1,1-Trichloroethane	50.0	52.9	106	50.0	53.6	107	<1	75-125	<20	
o-Xylene	50.0	46.4	92.8	50.0	47.3	95.0	2.34	75-125	<20	
m,p-Xylenes	100	93.7	93.7	100	94.2	94.2	<1	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	49.4	98.9	50.0	48.1	96.2	2.73	75-125	<20	
Dibromofluoromethane	50.0	54.6	109	50.0	52.8	106	2.75	75-125	<20	
Toluene-d8	50.0	49.0	98.1	50.0	48.8	97.7	<1	75-125	<20	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: M8015D, TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 040212DB1; Dup or Spiked Sample: 0402; LCS: Clean Water; QC Prepared: 04/02/2012; QC Analyzed: 04/02/2012; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Diesel (C13-C22)	0.00	5.00	4.48	89.6	5.00	4.70	94.0	4.79	75-125	<20
Surrogates										
Chlorobenzene	0.00	2.00	1.84	92.0	2.00	1.89	94.5	2.72	60-125	<20

QC Batch No: 040212DB1; Dup or Spiked Sample: 0402; LCS: Clean Water; QC Prepared: 04/02/2012; QC Analyzed: 04/02/2012; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Diesel (C13-C22)	5.00	4.53	90.6	75-125						
Surrogates										
Chlorobenzene	2.00	1.87	93.5	60-125						

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524 & 530 Avenida Pico
San Clemente, CA 92672

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032912OB2; Dup or Spiked Sample: B032912OB2; LCS: Clean Water; QC Prepared: 03/29/2012;MS Analyzed: 03/30/2012; LCS Analyzed: 03/29/2012; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.00	0.500	0.510	101	0.500	0.460	92.4	8.89	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0485	97.0	0.0500	0.0477	95.4	1.65	75-125	<20

QC Batch No: 032912OB2; Dup or Spiked Sample: B032912OB2; LCS: Clean Water; QC Prepared: 03/29/2012;MS Analyzed: 03/30/2012; LCS Analyzed: 03/29/2012; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	0.500	0.510	102	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0516	103	75-125						

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 040312OB1; Dup or Spiked Sample: B040312OB1; LCS: Clean Water; QC Prepared: 04/03/2012; QC Analyzed: 04/03/2012; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.00	0.500	0.470	94.0	0.500	0.470	94.8	<1	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0463	92.6	0.0500	0.0514	103	11.2	75-125	<20

QC Batch No: 040312OB1; Dup or Spiked Sample: B040312OB1; LCS: Clean Water; QC Prepared: 04/03/2012; QC Analyzed: 04/03/2012; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	0.500	0.500	101	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0494	98.8	75-125						

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Page: **38**

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 0402122C1; Dup or Spiked Sample: 65203.01; LCS: Clean Sand; QC Prepared: 04/02/2012; QC Analyzed: 04/04/2012; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Antimony	0.00	50.0	35.6 M	71.2	50.0	34.9 M	69.8	1.99	80-120	<15
Arsenic	0.00	50.0	42.6	85.2	50.0	41.0	82.0	3.83	80-120	<15
Barium	63.2	50.0	112	97.6	50.0	108	89.6	8.55	80-120	<15
Beryllium	0.00	50.0	48.3	96.6	50.0	46.3	92.6	4.23	80-120	<15
Cadmium	0.00	50.0	45.0	90.0	50.0	43.4	86.8	3.62	80-120	<15
Chromium	9.38	50.0	57.5	96.2	50.0	54.8	90.8	5.78	80-120	<15
Cobalt	4.19	50.0	47.6	86.8	50.0	46.3	84.2	3.04	80-120	<15
Copper	6.30	50.0	52.8	93.0	50.0	51.0	89.4	3.95	80-120	<15
Lead	0.00	50.0	43.8	87.6	50.0	42.5	85.0	3.01	80-120	<15
Mercury (By EPA 7471)	0.00	0.500	0.500	100	0.500	0.505	101	<1	80-120	<15
Molybdenum	0.00	50.0	42.7	85.4	50.0	41.8	83.6	2.13	80-120	<15
Nickel	9.04	50.0	54.0	89.9	50.0	52.6	87.1	3.16	80-120	<15
Selenium	0.00	50.0	42.4	84.8	50.0	40.8	81.6	3.85	80-120	<15
Silver	0.00	50.0	46.5	93.0	50.0	44.5	89.0	4.40	80-120	<15
Thallium	0.00	50.0	39.2 M	78.4	50.0	38.6 M	77.2	1.54	80-120	<15
Vanadium	18.5	50.0	69.6	102	50.0	66.6	96.2	5.85	80-120	<15
Zinc	29.6	50.0	81.0	103	50.0	77.6	96.0	7.04	80-120	<15

QC Batch No: 0402122C1; Dup or Spiked Sample: 65203.01; LCS: Clean Sand; QC Prepared: 04/02/2012; QC Analyzed: 04/04/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Antimony	50.0	46.7	93.4	50.0	45.8	91.6	1.95	80-120	<15	
Arsenic	50.0	46.8	93.6	50.0	46.6	93.2	<1	80-120	<15	
Barium	50.0	46.8	93.6	50.0	47.1	94.2	<1	80-120	<15	
Beryllium	50.0	51.2	102	50.0	51.1	102	<1	80-120	<15	
Cadmium	50.0	46.6	93.2	50.0	46.8	93.6	<1	80-120	<15	
Chromium	50.0	47.0	94.0	50.0	47.2	94.4	<1	80-120	<15	
Cobalt	50.0	46.6	93.2	50.0	46.5	93.0	<1	80-120	<15	
Copper	50.0	45.7	91.4	50.0	45.8	91.6	<1	80-120	<15	
Lead	50.0	45.1	90.2	50.0	45.1	90.2	<1	80-120	<15	

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QUALITY CONTROL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 0402122C1; Dup or Spiked Sample: 65203.01; LCS: Clean Sand; QC Prepared: 04/02/2012; QC Analyzed: 04/04/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Mercury (By EPA 7471)	0.500	0.426	85.1	0.500	0.441	88.1	3.5	80-120	<15	
Molybdenum	50.0	47.1	94.2	50.0	47.0	94.0	<1	80-120	<15	
Nickel	50.0	46.2	92.4	50.0	46.4	92.8	<1	80-120	<15	
Selenium	50.0	46.8	93.6	50.0	45.8	91.6	2.16	80-120	<15	
Silver	50.0	48.3	96.6	50.0	48.9	97.8	1.23	80-120	<15	
Thallium	50.0	44.5	89.0	50.0	44.3	88.6	<1	80-120	<15	
Vanadium	50.0	47.9	95.8	50.0	48.0	96.0	<1	80-120	<15	
Zinc	50.0	47.1	94.2	50.0	47.2	94.4	<1	80-120	<15	

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Page: **40**

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524 & 530 Avenida Pico
San Clemente, CA 92672

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0328122A1; Dup or Spiked Sample: B0328122A1; LCS: Clean Sand; QC Prepared: 03/28/2012; QC Analyzed: 03/28/2012; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Benzene	0.00	50.0	48.4	96.8	50.0	49.2	98.4	1.64	75-125	<20
Chlorobenzene	0.00	50.0	54.0	108	50.0	54.5	109	<1	75-125	<20
1,1-Dichloroethene	0.00	50.0	50.0	100	50.0	49.8	99.6	<1	75-125	<20
Methyl-tert-butyl ether (MTBE)	0.00	50.0	51.5	103	50.0	52.0	104	<1	75-125	<20
Toluene (Methyl benzene)	0.00	50.0	50.0	100	50.0	50.5	101	<1	75-125	<20
Trichloroethene	0.00	50.0	55.0	110	50.0	55.0	110	<1	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	50.0	46.4	92.7	50.0	46.0	91.9	<1	75-125	<20
Dibromofluoromethane	0.00	50.0	46.7	93.3	50.0	46.4	92.8	<1	75-125	<20
Toluene-d8	0.00	50.0	48.2	96.4	50.0	48.0	96.0	<1	75-125	<20

QC Batch No: 0328122A1; Dup or Spiked Sample: B0328122A1; LCS: Clean Sand; QC Prepared: 03/28/2012; QC Analyzed: 03/28/2012; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Benzene	50.0	53.8	108	50.0	52.6	105	2.82	75-125	<20	
Chlorobenzene	50.0	57.5	115	50.0	55.8	112	2.64	75-125	<20	
1,1-Dichloroethene	50.0	51.7	103	50.0	52.3	105	1.92	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	58.3	117	50.0	57.0	114	2.60	75-125	<20	
Toluene (Methyl benzene)	50.0	54.4	109	50.0	52.7	105	3.74	75-125	<20	
Trichloroethene	50.0	61.0	122	50.0	58.6	117	4.18	75-125	<20	
LCS										
Chloroform (Trichloromethane)	50.0	58.4	117	50.0	55.5	111	5.26	75-125	<20	
Ethylbenzene	50.0	57.7	115	50.0	56.2	112	2.64	75-125	<20	
1,1,1-Trichloroethane	50.0	59.6	119	50.0	57.2	114	4.29	75-125	<20	
o-Xylene	50.0	58.1	116	50.0	56.1	112	3.51	75-125	<20	
m,p-Xylenes	100	115	115	100	113	113	1.75	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	47.2	94.3	50.0	46.5	93.1	1.27	75-125	<20	
Dibromofluoromethane	50.0	49.6	99.2	50.0	48.6	97.1	2.12	75-125	<20	
Toluene-d8	50.0	47.7	95.3	50.0	48.9	97.8	2.62	75-125	<20	

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524 & 530 Avenida Pico
San Clemente, CA 92672

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 032912DB1; Dup or Spiked Sample: 65228.01; LCS: Clean Sand; QC Prepared: 03/29/2012; QC Analyzed: 03/29/2012; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Diesel (C13-C22)	0.00	500	520	104	500	527	105	<1	75-125	<20
Surrogates										
Chlorobenzene	0.00	100	106	106	100	103	103	2.83	75-125	<20

QC Batch No: 032912DB1; Dup or Spiked Sample: 65228.01; LCS: Clean Sand; QC Prepared: 03/29/2012; QC Analyzed: 03/29/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Diesel (C13-C22)	500	547	109	75-125						
Surrogates										
Chlorobenzene	100	108	108	75-125						

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65228	03/28/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032812NB1; Dup or Spiked Sample: 65229.07A; LCS: Clean Sand; QC Prepared: 03/28/2012; QC Analyzed: 03/29/2012; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.271	1.00	1.17	89.9	1.00	1.18	90.9	1.11	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0595	119	0.0500	0.0558	112	5.88	75-125	<20

QC Batch No: 032812NB1; Dup or Spiked Sample: 65229.07A; LCS: Clean Sand; QC Prepared: 03/28/2012; QC Analyzed: 03/29/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	1.00	0.970	96.6	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0517	103	75-125						

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Data Qualifiers and Descriptors

Data Qualifier:

#:	Recovery is not within acceptable control limits.
*:	In the QC section, sample results have been taken directly from the ICP reading. No preparation factor has been applied.
B:	Analyte was present in the Method Blank.
D:	Result is from a diluted analysis.
E:	Result is beyond calibration limits and is estimated.
H:	Analysis was performed over the allowed holding time due to circumstances which were beyond laboratory control.
J:	Analyte was detected . However, the analyte concentration is an estimated value, which is between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL).
M:	Matrix spike recovery is outside control limits due to matrix interference. Laboratory Control Sample recovery was acceptable.
MCL:	Maximum Contaminant Level
NS:	No Standard Available
S6:	Surrogate recovery is outside control limits due to matrix interference.
S8:	The analysis of the sample required a dilution such that the surrogate concentration was diluted below the method acceptance criteria.
X:	Results represent LCS and LCSD data.

Definition:

%Limi:	Percent acceptable limits.
%REC:	Percent recovery.
Con.L:	Acceptable Control Limits
Conce:	Added concentration to the sample.
LCS:	Laboratory Control Sample
MDL:	Method Detection Limit is a statistically derived number which is specific for each instrument, each method, and each compound. It indicates a distinctively detectable quantity with 99% probability.

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Data Qualifiers and Descriptors

MS:	Matrix Spike
MS DU:	Matrix Spike Duplicate
ND:	Analyte was not detected in the sample at or above MDL.
PQL:	Practical Quantitation Limit or ML (Minimum Level as per RWQCB) is the minimum concentration that can be quantified with more than 99% confidence. Taking into account all aspects of the entire analytical instrumentation and practice.
Recov:	Recovered concentration in the sample.
RPD:	Relative Percent Difference

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Number of Pages	**68**
Date Received	**03/28/2012**
Date Reported	**03/30/2012**

Job Number	Order Date	Client
65229	03/28/2012	GROUP

Project ID: I-540
Project Name: Avenida Pico SI
Site: 524 & 530 Avenida Pico
San Clemente, CA 92672

Enclosed please find results of analyses of 2 water and 11 soil samples which were analyzed as specified on the attached chain of custody. If there are any questions, please do not hesitate to call.

Checked By: _____ Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

American Environmental Testing Laboratory Inc.

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CHAIN OF CUSTODY RECORD

Nº 74651

AETL JOB No. 65229

COMPANY: Group Delta Consultants
PROJECT MANAGER: Vesna Glisic
COMPANY ADDRESS: 32 Mauchly, St B, Irvine, CA 92618
PHONE: 949.460 2100
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PROJECT NAME: Avenida Pico SI
PROJECT #: I-540
SITE NAME AND ADDRESS: 524 & 530 Avenida Pico, San Clemente, CA
PO #:

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	8015G/8021	8015D	8260B	6010/7000	TEST INSTRUCTIONS & COMMENTS
1	B-12-004@5'	65229.01	3/27/12		Soil	1-6" tube	none					
2	@10'	65229.02			↓	↓	↓	✓	✓		✓	
3	@10'	↓			5035 kit		varies			✓		
4	@15'	65229.03			Soil	1-6" tube	none					
5	@20'	65229.04										
6	@25'	65229.05										
7	@30'	65229.06						✓	✓		✓	
8	@30'	↓			5035 kit		varies			✓		
9	@38'	65229.07			Soil	1-6"-tube	none	✓	✓			Duplicate on 8015D
10	@38'	↓			5035 kit		varies			✓		
11	@40'	65229.08			Soil	1-6" tube	none					
12	@45'	65229.09			↓		↓					
13	B-12-004 GW	65229.10			water	1 Lt. Amber	none	✓	✓			
14	Barrel sample	65229.11			water	1 Lt amber	none	✓	✓		✓	Rush
15												

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS		PROPERLY COOLED Y / N / NA	
CUSTODY SEALS Y / N / NA		SAMPLES INTACT Y / N / NA	
RECEIVED IN GOOD COND. Y / N		SAMPLES ACCEPTED Y / N	

TURN AROUND TIME

☑ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

RELINQUISHED BY SAMPLER: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature:	Signature:	Signature:
Printed Name: Meghan Strayer	Printed Name:	Printed Name:
Date: 3/27/12 Time: 0920	Date: Time:	Date: 3-28-12 Time: 1130
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY LABORATORY: 3.**
Signature:	Signature:	Signature:
Printed Name:	Printed Name:	Printed Name:
Date: 3/28/12 Time: 0920	Date: Time:	Date: 3-28-12 Time: 1130

DISTRIBUTION: WHITE - Laboratory, CANARY - Laboratory, PINK - Project/Account Manager, YELLOW - Sampler/Originator

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CHAIN OF CUSTODY RECORD

№ 74650

AETL JOB No. 65229

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PROJECT NAME: Avenida Pico SI
PROJECT #: I-940
SITE NAME AND ADDRESS: 524 & 530 Avenida Pico, San Clemente, CA
PO #:

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	M8015B/8021	M8015D	8260B	6010/7000	TEST INSTRUCTIONS & COMMENTS
1	B-12-003@5'	65229.12	3/27/12		Soil	1-6" tube	none					
2	@10'	65229.13			Soil	↓	↓	/	/		/	
3	@10'	↓			5035 kit					/		
4	@15'	65229.14			Soil	1-6" tube	none					
5	@20'	65229.15			Soil	↓	↓	/	/			
6	@20'	↓			5035 kit					/		
7	@25'	65229.16			Soil	1-6" tube	none					
8	@30'	65229.17			↓	↓	↓					
9	@38'	65229.18			Soil	↓	↓	/	/			
10	@38'	↓			5035 kit					/		
11	@40'	65229.19			Soil	1-6" tube	none					
12	@45'	65229.20			↓	↓	↓					
13												
14												
15												

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS		PROPERLY COOLED Y / N / NA	
CUSTODY SEALS Y / N / NA		SAMPLES INTACT Y / N / NA	
RECEIVED IN GOOD COND. Y / N		SAMPLES ACCEPTED Y / N	

TURN AROUND TIME

☑ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

	1.	2.	3.
RELINQUISHED BY SAMPLER:		RELINQUISHED BY:	RELINQUISHED BY:
Signature:		Signature:	Signature:
Printed Name:	Meghan Lagow	Printed Name:	Printed Name:
Date:	3/27/12 Time: 0910	Date: Time:	Date: 3-28-12 Time: 1130
RECEIVED BY:	1.	2.	3.
Signature:		Signature:	RECEIVED BY LABORATORY: AETL
Printed Name:		Printed Name:	Signature:
Date:	3/28/12 Time: 0920	Date: Time:	Printed Name: Jean Claude
			Date: 3-28-12 Time: 1130

DISTRIBUTION: WHITE - Laboratory, CANARY - Laboratory, PINK - Project/Account Manager, YELLOW - Sampler/Originator

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CHAIN OF CUSTODY RECORD

№ 78275

COMPANY Group Delta | PROJECT MANAGER Vesna Glisic | AETL JOB No. 65224 | Page ____ of ____

COMPANY ADDRESS | PHONE 949-450-2100 | FAX 949-458-2108

PROJECT NAME Avenida Pico 87 | PROJECT # I-540

SITE NAME AND ADDRESS | PO #

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	8015 D								TEST INSTRUCTIONS & COMMENTS
1	B12-004@32Dup	65229.2	03/22/12		Soil			*								
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																
12																
13																
14																
15																

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS		PROPERLY COOLED Y / N / NA	
CUSTODY SEALS Y / N / NA		SAMPLES INTACT Y / N / NA	
RECEIVED IN GOOD COND. Y / N		SAMPLES ACCEPTED Y / N	

TURN AROUND TIME

☐ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

RELINQUISHED BY SAMPLER: 1.	RELINQUISHED BY: 2.	RELINQUISHED BY: 3.
Signature:	Signature:	Signature:
Printed Name:	Printed Name:	Printed Name:
Date: Time:	Date: Time:	Date: Time:
RECEIVED BY: 1.	**RECEIVED BY: 2.**	**RECEIVED BY LABORATORY: AETL 3.**
Signature:	Signature:	Signature:
Printed Name:	Printed Name:	Printed Name: Sean Claude
Date: Time:	Date: Time:	Date: 03/28/12 Time: 1130

DISTRIBUTION: WHITE - Laboratory, CANARY - Laboratory, PINK - Project/Account Manager, YELLOW - Sampler/Originator

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CHAIN OF CUSTODY RECORD

№ 74650

AETL JOB No. 65229

COMPANY: Group Delta Consultants
PROJECT MANAGER: Vesna Gilisic
COMPANY ADDRESS: 32 Mauchly Ste B Irvine, CA 92618
PHONE: 949.450.2100
FAX: 949.450.2108
PROJECT NAME: Avenida Pico 51
PROJECT #: I-540
SITE NAME AND ADDRESS: 524 & 530 Avenida Pico San Clemente, CA
PO #:

	SAMPLE ID	LAB ID	DATE	TIME	MATRIX	CONTAINER NUMBER/SIZE	PRES.	8081B/8021	8015D	8260B	6010/7000	TEST INSTRUCTIONS & COMMENTS
1	B-12-003@5'	65229.12	3/27/12		Soil	1-6" tube	none	*	*	*	*	
2	@10'	65229.13			Soil	↓	↓	/	/	/	/	
3	@10'	↓			5035 kit					/		
4	@15'	65229.14			Soil	1-6" tube	none	*	*	*	*	
5	@20'	65229.15			Soil	↓	↓	/	/			
6	@20'	↓			5035 kit					/		
7	@35'	65229.16			Soil	1-6" tube	none	*	*	*	*	
8	@30'	65229.17			↓	↓	↓	*	*	*	*	
9	@38'	65229.18			Soil	↓	↓	/	/			
10	@38'	↓			5035 kit					/		
11	@40'	65229.19			Soil	1-6" tube	none					
12	@45	65229.20			↓	↓	↓					
13												
14												
15												

SAMPLE RECEIPT - TO BE FILLED BY LABORATORY

TOTAL NUMBER OF CONTAINERS		PROPERLY COOLED Y / N / NA	
CUSTODY SEALS Y / N / NA		SAMPLES INTACT Y / N / NA	
RECEIVED IN GOOD COND. Y / N		SAMPLES ACCEPTED Y / N	

TURN AROUND TIME

☑ NORMAL ☐ RUSH ☐ SAME DAY ☐ NEXT DAY ☐ 2 DAYS ☐ 3 DAYS

	1.	2.	3.
RELINQUISHED BY SAMPLER:	Signature:	RELINQUISHED BY: Signature:	RELINQUISHED BY: Signature:
	Printed Name: Meghan Lithgow	Printed Name:	Printed Name:
	Date: 3/27/12 Time: 0920	Date: Time:	Date: 3/28/12 Time: 1130
RECEIVED BY:	Signature:	RECEIVED BY: Signature:	RECEIVED BY LABORATORY: AETL Signature:
	Printed Name:	Printed Name:	Printed Name: Jean Claude
	Date: 3/28/12 Time: 0920	Date: Time:	Date: 3/28-12 Time: 1130

DISTRIBUTION: WHITE - Laboratory, CANARY - Laboratory, PINK - Project/Account Manager, YELLOW - Sampler/Originator

Cyrus Razmara

From: Vesna G. Petrilla [VesnaG@GroupDelta.com]
Sent: Thursday, March 29, 2012 5:40 PM
To: 'Cyrus Razmara'
Subject: Avenida Pico Additional Testing for Boring B12-003

Cyrus,
We need to assign additional tests for the soil samples of boring B12-003.
Please test samples at 5ft, 15 ft, 25 ft and 30 ft for M8015G, M8015D, 8260B and 6010/7000.
Please send me a quote for the additional tests, and bill it separately.

Let me know if you have any questions.
Thank you

Vesna Glisic Petrilla, P.E., REA I
Project Engineer
Group Delta Consultants, Inc.

32 Mauchly Suite B
Irvine, CA 92618
Office phone (949) 450-2100
Cell phone (949) 244-1345
Fax (949) 450-2108

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Ordered By

Group Delta Consultants
32 Mauchly Suite B
Irvine, CA 92618-

Telephone: (949)450-2100
Attention: Vesna Glisic

Project ID: I-540
Date Received 03/28/2012
Date Reported 03/30/2012

Job Number	Order Date	Client
65229	03/28/2012	GROUP

CERTIFICATE OF ANALYSIS
CASE NARRATIVE

AETL received 21 samples with the following specification on 03/28/2012.

Lab ID	Sample ID	Sample Date	Matrix	QTY of Containers
65229.01	B-12-004 @ 5'	03/27/2012	Soil	1
65229.02	B-12-004 @ 10'	03/27/2012	Soil	5
65229.03	B-12-004 @ 15'	03/27/2012	Soil	1
65229.04	B-12-004 @ 20'	03/27/2012	Soil	1
65229.05	B-12-004 @ 25'	03/27/2012	Soil	1
65229.06	B-12-004 @ 30'	03/27/2012	Soil	5
65229.07	B-12-004 @ 38'	03/27/2012	Soil	5
65229.08	B-12-004 @ 40'	03/27/2012	Soil	1
65229.09	B-12-004 @ 45'	03/27/2012	Soil	1
65229.10	B-12-004 GW	03/27/2012	Aqueous	1
65229.11	Barrel Sample	03/27/2012	Aqueous	1
65229.12	B-12-003 @ 5'	03/27/2012	Soil	1
65229.13	B-12-003 @ 10'	03/27/2012	Soil	5
65229.14	B-12-003 @ 15'	03/27/2012	Soil	1
65229.15	B-12-003 @ 20'	03/27/2012	Soil	5
65229.16	B-12-003 @ 25'	03/27/2012	Soil	1
65229.17	B-12-003 @ 30'	03/27/2012	Soil	1
65229.18	B-12-003 @ 38'	03/27/2012	Soil	5
65229.19	B-12-003 @ 40'	03/27/2012	Soil	1
65229.20	B-12-003 @ 45'	03/27/2012	Soil	1
65229.21	B12-004 @ 38 DUP	03/27/2012	Soil	1

Continued

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Telephone: (949)450-2100
Attention: Vesna Glisic

Project ID: I-540
Date Received 03/28/2012
Date Reported 03/30/2012

Job Number	Order Date	Client
65229	03/28/2012	GROUP

CERTIFICATE OF ANALYSIS
CASE NARRATIVE

The samples were analyzed as specified on the enclosed chain of custody. Analytical non-conformances have been noted on the report.

Checked By: _____ Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

American Environmental Testing Laboratory Inc.

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ANALYTICAL RESULTS

Ordered By

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Attn: Vesna Glisic

Site

524 & 530 Avenida Pico
San Clemente, CA 92672

Page: **2**

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0328122A2

Our Lab I.D.			Method Blank	65229.02	65229.06	65229.07	
Client Sample I.D.				B-12-004 @ 10'	B-12-004 @ 30'	B-12-004 @ 38'	
Date Sampled				03/27/2012	03/27/2012	03/27/2012	
Date Prepared			03/28/2012	03/29/2012	03/29/2012	03/29/2012	
Preparation Method			5030	5035A	5035A	5035A	
Date Analyzed			03/29/2012	03/29/2012	03/29/2012	03/29/2012	
Matrix			Soil	Soil	Soil	Soil	
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
Acetone	25	50	ND	ND	ND	ND	
Benzene	1.0	10.0	ND	ND	ND	ND	
Bromobenzene (Phenyl bromide)	5.0	10.0	ND	ND	ND	ND	
Bromochloromethane	5.0	10.0	ND	ND	ND	ND	
Bromodichloromethane	5.0	10.0	ND	ND	ND	ND	
Bromoform (Tribromomethane)	25	50	ND	ND	ND	ND	
Bromomethane (Methyl bromide)	15	30	ND	ND	ND	ND	
2-Butanone (MEK)	25	50	ND	ND	ND	ND	
n-Butylbenzene	5.0	10.0	ND	ND	ND	ND	
sec-Butylbenzene	5.0	10.0	ND	ND	ND	ND	
tert-Butylbenzene	5.0	10.0	ND	ND	ND	ND	
Carbon Disulfide	25	50	ND	ND	ND	ND	
Carbon tetrachloride	5.0	10.0	ND	ND	ND	ND	
Chlorobenzene	5.0	10.0	ND	ND	ND	ND	
Chloroethane	15	30	ND	ND	ND	ND	
2-Chloroethyl vinyl ether	50	50	ND	ND	ND	ND	
Chloroform (Trichloromethane)	5.0	10.0	ND	ND	ND	ND	
Chloromethane (Methyl chloride)	15	30	ND	ND	ND	ND	
2-Chlorotoluene	5.0	10.0	ND	ND	ND	ND	
4-Chlorotoluene	5.0	10.0	ND	ND	ND	ND	
1,2-Dibromo-3-chloropropane (DBCP)	25	50	ND	ND	ND	ND	
Dibromochloromethane	5.0	10.0	ND	ND	ND	ND	
1,2-Dibromoethane (EDB)	5.0	10.0	ND	ND	ND	ND	
Dibromomethane	5.0	10.0	ND	ND	ND	ND	
1,2-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	
1,3-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0328122A2

Our Lab I.D.			Method Blank	65229.02	65229.06	65229.07	
Client Sample I.D.				B-12-004 @ 10'	B-12-004 @ 30'	B-12-004 @ 38'	
Date Sampled				03/27/2012	03/27/2012	03/27/2012	
Date Prepared			03/28/2012	03/29/2012	03/29/2012	03/29/2012	
Preparation Method			5030	5035A	5035A	5035A	
Date Analyzed			03/29/2012	03/29/2012	03/29/2012	03/29/2012	
Matrix			Soil	Soil	Soil	Soil	
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
1,4-Dichlorobenzene	5.0	10.0	ND	ND	ND	ND	
Dichlorodifluoromethane	15	30	ND	ND	ND	ND	
1,1-Dichloroethane	5.0	10.0	ND	ND	ND	ND	
1,2-Dichloroethane (EDC)	5.0	10.0	ND	ND	ND	ND	
1,1-Dichloroethene	5.0	10.0	ND	ND	ND	ND	
cis-1,2-Dichloroethene	5.0	10.0	ND	ND	ND	ND	
trans-1,2-Dichloroethene	5.0	10.0	ND	ND	ND	ND	
1,2-Dichloropropane	5.0	10.0	ND	ND	ND	ND	
1,3-Dichloropropane	5.0	10.0	ND	ND	ND	ND	
2,2-Dichloropropane	5.0	10.0	ND	ND	ND	ND	
1,1-Dichloropropene	5.0	10.0	ND	ND	ND	ND	
cis-1,3-Dichloropropene	5.0	10.0	ND	ND	ND	ND	
trans-1,3-Dichloropropene	5.0	10.0	ND	ND	ND	ND	
Ethylbenzene	1.0	10.0	ND	ND	ND	ND	
Hexachlorobutadiene	15	30	ND	ND	ND	ND	
2-Hexanone	25	50	ND	ND	ND	ND	
Iodomethane	5.0	10.0	ND	ND	ND	ND	
Isopropylbenzene	5.0	10.0	ND	ND	ND	ND	
p-Isopropyltoluene	5.0	10.0	ND	ND	ND	ND	
4-Methyl-2-pentanone (MIBK)	25	50	ND	ND	ND	ND	
Methyl-tert-butyl ether (MTBE)	2.0	10.0	ND	ND	ND	ND	
Methylene chloride (DCM)	25	50	ND	ND	ND	ND	
Naphthalene	5.0	10.0	ND	ND	ND	ND	
n-Propylbenzene	5.0	10.0	ND	ND	ND	ND	
Styrene	5.0	10.0	ND	ND	ND	ND	
1,1,1,2-Tetrachloroethane	5.0	10.0	ND	ND	ND	ND	
1,1,2,2-Tetrachloroethane	5.0	10.0	ND	ND	ND	ND	
Tetrachloroethene	5.0	10.0	ND	ND	ND	ND	
Toluene (Methyl benzene)	1.0	10.0	ND	ND	ND	ND	
1,2,3-Trichlorobenzene	5.0	10.0	ND	ND	ND	ND	
1,2,4-Trichlorobenzene	5.0	10.0	ND	ND	ND	ND	
1,1,1-Trichloroethane	5.0	10.0	ND	ND	ND	ND	
1,1,2-Trichloroethane	5.0	10.0	ND	ND	ND	ND	

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0328122A2

Our Lab I.D.			Method Blank	**65229.02**	**65229.06**	**65229.07**	
Client Sample I.D.				B-12-004 @ 10'	B-12-004 @ 30'	B-12-004 @ 38'	
Date Sampled				03/27/2012	03/27/2012	03/27/2012	
Date Prepared			03/28/2012	03/29/2012	03/29/2012	03/29/2012	
Preparation Method			5030	5035A	5035A	5035A	
Date Analyzed			03/29/2012	03/29/2012	03/29/2012	03/29/2012	
Matrix			Soil	Soil	Soil	Soil	
Units			ug/Kg	ug/Kg	ug/Kg	ug/Kg	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
Trichloroethene	5.0	10.0	ND	ND	ND	ND	
Trichlorofluoromethane	5.0	10.0	ND	ND	ND	ND	
1,2,3-Trichloropropane	5.0	10.0	ND	ND	ND	ND	
1,2,4-Trimethylbenzene	5.0	10.0	ND	ND	ND	ND	
1,3,5-Trimethylbenzene	5.0	10.0	ND	ND	ND	ND	
Vinyl Acetate	25	50	ND	ND	ND	ND	
Vinyl chloride (Chloroethene)	15	30	ND	ND	ND	ND	
o-Xylene	1.0	10.0	ND	ND	ND	ND	
m,p-Xylenes	1.0	20.0	ND	ND	ND	ND	
Our Lab I.D.			Method Blank	**65229.02**	**65229.06**	**65229.07**	
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	
Bromofluorobenzene	75-125		92.8	94.4	93.3	93.3	
Dibromofluoromethane	75-125		102	106	108	109	
Toluene-d8	75-125		104	99.2	100	98.5	

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ANALYTICAL RESULTS

Ordered By

Group Delta Consultants
32 Mauchly
Suite B
Irvine, CA 92618-

Telephone: (949)450-2100
Attn: Vesna Glisic
Page: **5**

Site

524 & 530 Avenida Pico
San Clemente, CA 92672

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A2

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Acetone	25	50	ND				
Benzene	1.0	10.0	ND				
Bromobenzene (Phenyl bromide)	5.0	10.0	ND				
Bromochloromethane	5.0	10.0	ND				
Bromodichloromethane	5.0	10.0	ND				
Bromoform (Tribromomethane)	25	50	ND				
Bromomethane (Methyl bromide)	15	30	ND				
2-Butanone (MEK)	25	50	ND				
n-Butylbenzene	5.0	10.0	ND				
sec-Butylbenzene	5.0	10.0	ND				
tert-Butylbenzene	5.0	10.0	ND				
Carbon Disulfide	25	50	ND				
Carbon tetrachloride	5.0	10.0	ND				
Chlorobenzene	5.0	10.0	ND				
Chloroethane	15	30	ND				
2-Chloroethyl vinyl ether	50	50	ND				
Chloroform (Trichloromethane)	5.0	10.0	ND				
Chloromethane (Methyl chloride)	15	30	ND				
2-Chlorotoluene	5.0	10.0	ND				
4-Chlorotoluene	5.0	10.0	ND				
1,2-Dibromo-3-chloropropane (DBCP)	25	50	ND				
Dibromochloromethane	5.0	10.0	ND				
1,2-Dibromoethane (EDB)	5.0	10.0	ND				
Dibromomethane	5.0	10.0	ND				
1,2-Dichlorobenzene	5.0	10.0	ND				
1,3-Dichlorobenzene	5.0	10.0	ND				
1,4-Dichlorobenzene	5.0	10.0	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A2

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Dichlorodifluoromethane	15	30	ND				
1,1-Dichloroethane	5.0	10.0	ND				
1,2-Dichloroethane (EDC)	5.0	10.0	ND				
1,1-Dichloroethene	5.0	10.0	ND				
cis-1,2-Dichloroethene	5.0	10.0	ND				
trans-1,2-Dichloroethene	5.0	10.0	ND				
1,2-Dichloropropane	5.0	10.0	ND				
1,3-Dichloropropane	5.0	10.0	ND				
2,2-Dichloropropane	5.0	10.0	ND				
1,1-Dichloropropene	5.0	10.0	ND				
cis-1,3-Dichloropropene	5.0	10.0	ND				
trans-1,3-Dichloropropene	5.0	10.0	ND				
Ethylbenzene	1.0	10.0	ND				
Hexachlorobutadiene	15	30	ND				
2-Hexanone	25	50	ND				
Iodomethane	5.0	10.0	ND				
Isopropylbenzene	5.0	10.0	ND				
p-Isopropyltoluene	5.0	10.0	ND				
4-Methyl-2-pentanone (MIBK)	25	50	ND				
Methyl-tert-butyl ether (MTBE)	2.0	10.0	ND				
Methylene chloride (DCM)	25	50	ND				
Naphthalene	5.0	10.0	ND				
n-Propylbenzene	5.0	10.0	ND				
Styrene	5.0	10.0	ND				
1,1,1,2-Tetrachloroethane	5.0	10.0	ND				
1,1,2,2-Tetrachloroethane	5.0	10.0	ND				
Tetrachloroethene	5.0	10.0	ND				
Toluene (Methyl benzene)	1.0	10.0	ND				
1,2,3-Trichlorobenzene	5.0	10.0	ND				
1,2,4-Trichlorobenzene	5.0	10.0	ND				
1,1,1-Trichloroethane	5.0	10.0	ND				
1,1,2-Trichloroethane	5.0	10.0	ND				
Trichloroethene	5.0	10.0	ND				
Trichlorofluoromethane	5.0	10.0	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A2

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
1,2,3-Trichloropropane	5.0	10.0	ND				
1,2,4-Trimethylbenzene	5.0	10.0	ND				
1,3,5-Trimethylbenzene	5.0	10.0	ND				
Vinyl Acetate	25	50	ND				
Vinyl chloride (Chloroethene)	15	30	ND				
o-Xylene	1.0	10.0	ND				
m,p-Xylenes	1.0	20.0	ND				
Our Lab I.D.			Method Blank				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		101				
Dibromofluoromethane	75-125		93.3				
Toluene-d8	75-125		105				

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Site

524 & 530 Avenida Pico
San Clemente, CA 92672

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A2

Our Lab I.D.			**65229.12**				
Client Sample I.D.			B-12-003 @ 5'				
Date Sampled			03/27/2012				
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			100				
Analytes	**MDL**	**PQL**	**Results**				
Acetone	2500	5000	ND				
Benzene	100	1000	ND				
Bromobenzene (Phenyl bromide)	500	1000	ND				
Bromochloromethane	500	1000	ND				
Bromodichloromethane	500	1000	ND				
Bromoform (Tribromomethane)	2500	5000	ND				
Bromomethane (Methyl bromide)	1500	3000	ND				
2-Butanone (MEK)	2500	5000	ND				
n-Butylbenzene	500	1000	25,300				
sec-Butylbenzene	500	1000	3,740				
tert-Butylbenzene	500	1000	ND				
Carbon Disulfide	2500	5000	ND				
Carbon tetrachloride	500	1000	ND				
Chlorobenzene	500	1000	ND				
Chloroethane	1500	3000	ND				
2-Chloroethyl vinyl ether	5000	5000	ND				
Chloroform (Trichloromethane)	500	1000	ND				
Chloromethane (Methyl chloride)	1500	3000	ND				
2-Chlorotoluene	500	1000	ND				
4-Chlorotoluene	500	1000	ND				
1,2-Dibromo-3-chloropropane (DBCP)	2500	5000	ND				
Dibromochloromethane	500	1000	ND				
1,2-Dibromoethane (EDB)	500	1000	ND				
Dibromomethane	500	1000	ND				
1,2-Dichlorobenzene	500	1000	ND				
1,3-Dichlorobenzene	500	1000	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A2

Our Lab I.D.			65229.12				
Client Sample I.D.			B-12-003 @ 5'				
Date Sampled			03/27/2012				
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			100				
Analytes	**MDL**	**PQL**	**Results**				
1,4-Dichlorobenzene	500	1000	ND				
Dichlorodifluoromethane	1500	3000	ND				
1,1-Dichloroethane	500	1000	ND				
1,2-Dichloroethane (EDC)	500	1000	ND				
1,1-Dichloroethene	500	1000	ND				
cis-1,2-Dichloroethene	500	1000	ND				
trans-1,2-Dichloroethene	500	1000	ND				
1,2-Dichloropropane	500	1000	ND				
1,3-Dichloropropane	500	1000	ND				
2,2-Dichloropropane	500	1000	ND				
1,1-Dichloropropene	500	1000	ND				
cis-1,3-Dichloropropene	500	1000	ND				
trans-1,3-Dichloropropene	500	1000	ND				
Ethylbenzene	100	1000	19,500				
Hexachlorobutadiene	1500	3000	ND				
2-Hexanone	2500	5000	ND				
Iodomethane	500	1000	ND				
Isopropylbenzene	500	1000	3,700				
p-Isopropyltoluene	500	1000	3,000				
4-Methyl-2-pentanone (MIBK)	2500	5000	ND				
Methyl-tert-butyl ether (MTBE)	200	1000	ND				
Methylene chloride (DCM)	2500	5000	ND				
Naphthalene	500	1000	22,600				
n-Propylbenzene	500	1000	15,500				
Styrene	500	1000	ND				
1,1,1,2-Tetrachloroethane	500	1000	ND				
1,1,2,2-Tetrachloroethane	500	1000	ND				
Tetrachloroethene	500	1000	ND				
Toluene (Methyl benzene)	100	1000	5,480				
1,2,3-Trichlorobenzene	500	1000	ND				
1,2,4-Trichlorobenzene	500	1000	ND				
1,1,1-Trichloroethane	500	1000	ND				
1,1,2-Trichloroethane	500	1000	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A2

Our Lab I.D.			**65229.12**				
Client Sample I.D.			B-12-003 @ 5'				
Date Sampled			03/27/2012				
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			100				
Analytes	**MDL**	**PQL**	**Results**				
Trichloroethene	500	1000	ND				
Trichlorofluoromethane	500	1000	ND				
1,2,3-Trichloropropane	500	1000	ND				
1,2,4-Trimethylbenzene	500	1000	202,000				
1,3,5-Trimethylbenzene	500	1000	59,000				
Vinyl Acetate	2500	5000	ND				
Vinyl chloride (Chloroethene)	1500	3000	ND				
o-Xylene	100	1000	65,400				
m,p-Xylenes	100	2000	131,000				
Our Lab I.D.			**65229.12**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		90.6				
Dibromofluoromethane	75-125		97.4				
Toluene-d8	75-125		100				

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329122A2

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			03/29/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Acetone	25	50	ND				
Benzene	1.0	10.0	ND				
Bromobenzene (Phenyl bromide)	5.0	10.0	ND				
Bromochloromethane	5.0	10.0	ND				
Bromodichloromethane	5.0	10.0	ND				
Bromoform (Tribromomethane)	25	50	ND				
Bromomethane (Methyl bromide)	15	30	ND				
2-Butanone (MEK)	25	50	ND				
n-Butylbenzene	5.0	10.0	ND				
sec-Butylbenzene	5.0	10.0	ND				
tert-Butylbenzene	5.0	10.0	ND				
Carbon Disulfide	25	50	ND				
Carbon tetrachloride	5.0	10.0	ND				
Chlorobenzene	5.0	10.0	ND				
Chloroethane	15	30	ND				
2-Chloroethyl vinyl ether	50	50	ND				
Chloroform (Trichloromethane)	5.0	10.0	ND				
Chloromethane (Methyl chloride)	15	30	ND				
2-Chlorotoluene	5.0	10.0	ND				
4-Chlorotoluene	5.0	10.0	ND				
1,2-Dibromo-3-chloropropane (DBCP)	25	50	ND				
Dibromochloromethane	5.0	10.0	ND				
1,2-Dibromoethane (EDB)	5.0	10.0	ND				
Dibromomethane	5.0	10.0	ND				
1,2-Dichlorobenzene	5.0	10.0	ND				
1,3-Dichlorobenzene	5.0	10.0	ND				
1,4-Dichlorobenzene	5.0	10.0	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329122A2

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			03/29/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Dichlorodifluoromethane	15	30	ND				
1,1-Dichloroethane	5.0	10.0	ND				
1,2-Dichloroethane (EDC)	5.0	10.0	ND				
1,1-Dichloroethene	5.0	10.0	ND				
cis-1,2-Dichloroethene	5.0	10.0	ND				
trans-1,2-Dichloroethene	5.0	10.0	ND				
1,2-Dichloropropane	5.0	10.0	ND				
1,3-Dichloropropane	5.0	10.0	ND				
2,2-Dichloropropane	5.0	10.0	ND				
1,1-Dichloropropene	5.0	10.0	ND				
cis-1,3-Dichloropropene	5.0	10.0	ND				
trans-1,3-Dichloropropene	5.0	10.0	ND				
Ethylbenzene	1.0	10.0	ND				
Hexachlorobutadiene	15	30	ND				
2-Hexanone	25	50	ND				
Iodomethane	5.0	10.0	ND				
Isopropylbenzene	5.0	10.0	ND				
p-Isopropyltoluene	5.0	10.0	ND				
4-Methyl-2-pentanone (MIBK)	25	50	ND				
Methyl-tert-butyl ether (MTBE)	2.0	10.0	ND				
Methylene chloride (DCM)	25	50	ND				
Naphthalene	5.0	10.0	ND				
n-Propylbenzene	5.0	10.0	ND				
Styrene	5.0	10.0	ND				
1,1,1,2-Tetrachloroethane	5.0	10.0	ND				
1,1,2,2-Tetrachloroethane	5.0	10.0	ND				
Tetrachloroethene	5.0	10.0	ND				
Toluene (Methyl benzene)	1.0	10.0	ND				
1,2,3-Trichlorobenzene	5.0	10.0	ND				
1,2,4-Trichlorobenzene	5.0	10.0	ND				
1,1,1-Trichloroethane	5.0	10.0	ND				
1,1,2-Trichloroethane	5.0	10.0	ND				
Trichloroethene	5.0	10.0	ND				
Trichlorofluoromethane	5.0	10.0	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329122A2

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			03/29/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
1,2,3-Trichloropropane	5.0	10.0	ND				
1,2,4-Trimethylbenzene	5.0	10.0	ND				
1,3,5-Trimethylbenzene	5.0	10.0	ND				
Vinyl Acetate	25	50	ND				
Vinyl chloride (Chloroethene)	15	30	ND				
o-Xylene	1.0	10.0	ND				
m,p-Xylenes	1.0	20.0	ND				
Our Lab I.D.			Method Blank				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		93.2				
Dibromofluoromethane	75-125		94.0				
Toluene-d8	75-125		100				

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329122A2

Our Lab I.D.			**65229.13**				
Client Sample I.D.			B-12-003 @ 10'				
Date Sampled			03/27/2012				
Date Prepared			03/29/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			245				
Analytes	**MDL**	**PQL**	**Results**				
Acetone	6125	12250	ND				
Benzene	245	2450	ND				
Bromobenzene (Phenyl bromide)	1225	2450	ND				
Bromochloromethane	1225	2450	ND				
Bromodichloromethane	1225	2450	ND				
Bromoform (Tribromomethane)	6125	12250	ND				
Bromomethane (Methyl bromide)	3675	7350	ND				
2-Butanone (MEK)	6125	12250	ND				
n-Butylbenzene	1225	2450	98,700				
sec-Butylbenzene	1225	2450	15,500				
tert-Butylbenzene	1225	2450	ND				
Carbon Disulfide	6125	12250	ND				
Carbon tetrachloride	1225	2450	ND				
Chlorobenzene	1225	2450	ND				
Chloroethane	3675	7350	ND				
2-Chloroethyl vinyl ether	12250	12250	ND				
Chloroform (Trichloromethane)	1225	2450	ND				
Chloromethane (Methyl chloride)	3675	7350	ND				
2-Chlorotoluene	1225	2450	ND				
4-Chlorotoluene	1225	2450	ND				
1,2-Dibromo-3-chloropropane (DBCP)	6125	12250	ND				
Dibromochloromethane	1225	2450	ND				
1,2-Dibromoethane (EDB)	1225	2450	ND				
Dibromomethane	1225	2450	ND				
1,2-Dichlorobenzene	1225	2450	ND				
1,3-Dichlorobenzene	1225	2450	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329122A2

Our Lab I.D.			**65229.13**				
Client Sample I.D.			B-12-003 @ 10'				
Date Sampled			03/27/2012				
Date Prepared			03/29/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			245				
Analytes	**MDL**	**PQL**	**Results**				
1,4-Dichlorobenzene	1225	2450	ND				
Dichlorodifluoromethane	3675	7350	ND				
1,1-Dichloroethane	1225	2450	ND				
1,2-Dichloroethane (EDC)	1225	2450	ND				
1,1-Dichloroethene	1225	2450	ND				
cis-1,2-Dichloroethene	1225	2450	ND				
trans-1,2-Dichloroethene	1225	2450	ND				
1,2-Dichloropropane	1225	2450	ND				
1,3-Dichloropropane	1225	2450	ND				
2,2-Dichloropropane	1225	2450	ND				
1,1-Dichloropropene	1225	2450	ND				
cis-1,3-Dichloropropene	1225	2450	ND				
trans-1,3-Dichloropropene	1225	2450	ND				
Ethylbenzene	245	2450	120,000				
Hexachlorobutadiene	3675	7350	ND				
2-Hexanone	6125	12250	ND				
Iodomethane	1225	2450	ND				
Isopropylbenzene	1225	2450	19,900				
p-Isopropyltoluene	1225	2450	12,000				
4-Methyl-2-pentanone (MIBK)	6125	12250	ND				
Methyl-tert-butyl ether (MTBE)	490	2450	ND				
Methylene chloride (DCM)	6125	12250	ND				
Naphthalene	1225	2450	91,100				
n-Propylbenzene	1225	2450	84,800				
Styrene	1225	2450	ND				
1,1,1,2-Tetrachloroethane	1225	2450	ND				
1,1,2,2-Tetrachloroethane	1225	2450	ND				
Tetrachloroethene	1225	2450	ND				
Toluene (Methyl benzene)	245	2450	50,000				
1,2,3-Trichlorobenzene	1225	2450	ND				
1,2,4-Trichlorobenzene	1225	2450	ND				
1,1,1-Trichloroethane	1225	2450	ND				
1,1,2-Trichloroethane	1225	2450	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329122A2

Our Lab I.D.			**65229.13**				
Client Sample I.D.			B-12-003 @ 10'				
Date Sampled			03/27/2012				
Date Prepared			03/29/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			245				
Analytes	**MDL**	**PQL**	**Results**				
Trichloroethene	1225	2450	ND				
Trichlorofluoromethane	1225	2450	ND				
1,2,3-Trichloropropane	1225	2450	ND				
1,2,4-Trimethylbenzene	1225	2450	924,000				
1,3,5-Trimethylbenzene	1225	2450	279,000				
Vinyl Acetate	6125	12250	ND				
Vinyl chloride (Chloroethene)	3675	7350	ND				
o-Xylene	245	2450	353,000				
m,p-Xylenes	245	4900	767,000				
Our Lab I.D.			**65229.13**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		96.4				
Dibromofluoromethane	75-125		101				
Toluene-d8	75-125		98.4				

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A2

Our Lab I.D.			65229.14				
Client Sample I.D.			B-12-003 @ 15'				
Date Sampled			03/27/2012				
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/31/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			250				
Analytes	**MDL**	**PQL**	**Results**				
Acetone	6250	12500	ND				
Benzene	250	2500	1,530J				
Bromobenzene (Phenyl bromide)	1250	2500	ND				
Bromochloromethane	1250	2500	ND				
Bromodichloromethane	1250	2500	ND				
Bromoform (Tribromomethane)	6250	12500	ND				
Bromomethane (Methyl bromide)	3750	7500	ND				
2-Butanone (MEK)	6250	12500	ND				
n-Butylbenzene	1250	2500	63,000				
sec-Butylbenzene	1250	2500	11,600				
tert-Butylbenzene	1250	2500	ND				
Carbon Disulfide	6250	12500	ND				
Carbon tetrachloride	1250	2500	ND				
Chlorobenzene	1250	2500	ND				
Chloroethane	3750	7500	ND				
2-Chloroethyl vinyl ether	12500	12500	ND				
Chloroform (Trichloromethane)	1250	2500	ND				
Chloromethane (Methyl chloride)	3750	7500	ND				
2-Chlorotoluene	1250	2500	ND				
4-Chlorotoluene	1250	2500	ND				
1,2-Dibromo-3-chloropropane (DBCP)	6250	12500	ND				
Dibromochloromethane	1250	2500	ND				
1,2-Dibromoethane (EDB)	1250	2500	ND				
Dibromomethane	1250	2500	ND				
1,2-Dichlorobenzene	1250	2500	ND				
1,3-Dichlorobenzene	1250	2500	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A2

Our Lab I.D.			65229.14				
Client Sample I.D.			B-12-003 @ 15'				
Date Sampled			03/27/2012				
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/31/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			250				
Analytes	**MDL**	**PQL**	**Results**				
1,4-Dichlorobenzene	1250	2500	ND				
Dichlorodifluoromethane	3750	7500	ND				
1,1-Dichloroethane	1250	2500	ND				
1,2-Dichloroethane (EDC)	1250	2500	ND				
1,1-Dichloroethene	1250	2500	ND				
cis-1,2-Dichloroethene	1250	2500	ND				
trans-1,2-Dichloroethene	1250	2500	ND				
1,2-Dichloropropane	1250	2500	ND				
1,3-Dichloropropane	1250	2500	ND				
2,2-Dichloropropane	1250	2500	ND				
1,1-Dichloropropene	1250	2500	ND				
cis-1,3-Dichloropropene	1250	2500	ND				
trans-1,3-Dichloropropene	1250	2500	ND				
Ethylbenzene	250	2500	355,000				
Hexachlorobutadiene	3750	7500	ND				
2-Hexanone	6250	12500	ND				
Iodomethane	1250	2500	ND				
Isopropylbenzene	1250	2500	27,300				
p-Isopropyltoluene	1250	2500	ND				
4-Methyl-2-pentanone (MIBK)	6250	12500	ND				
Methyl-tert-butyl ether (MTBE)	500	2500	ND				
Methylene chloride (DCM)	6250	12500	ND				
Naphthalene	1250	2500	49,300				
n-Propylbenzene	1250	2500	110,000				
Styrene	1250	2500	ND				
1,1,1,2-Tetrachloroethane	1250	2500	ND				
1,1,2,2-Tetrachloroethane	1250	2500	ND				
Tetrachloroethene	1250	2500	ND				
Toluene (Methyl benzene)	250	2500	343,000				
1,2,3-Trichlorobenzene	1250	2500	ND				
1,2,4-Trichlorobenzene	1250	2500	ND				
1,1,1-Trichloroethane	1250	2500	ND				
1,1,2-Trichloroethane	1250	2500	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A2

Our Lab I.D.			**65229.14**				
Client Sample I.D.			B-12-003 @ 15'				
Date Sampled			03/27/2012				
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/31/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			250				
Analytes	**MDL**	**PQL**	**Results**				
Trichloroethene	1250	2500	ND				
Trichlorofluoromethane	1250	2500	ND				
1,2,3-Trichloropropane	1250	2500	ND				
1,2,4-Trimethylbenzene	1250	2500	873,000				
1,3,5-Trimethylbenzene	1250	2500	275,000				
Vinyl Acetate	6250	12500	ND				
Vinyl chloride (Chloroethene)	3750	7500	ND				
o-Xylene	250	2500	715,000				
m,p-Xylenes	250	5000	1,760,000				
Our Lab I.D.			**65229.14**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		94.1				
Dibromofluoromethane	75-125		92.8				
Toluene-d8	75-125		104				

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A1

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Acetone	25	50	ND				
Benzene	1.0	10.0	ND				
Bromobenzene (Phenyl bromide)	5.0	10.0	ND				
Bromochloromethane	5.0	10.0	ND				
Bromodichloromethane	5.0	10.0	ND				
Bromoform (Tribromomethane)	25	50	ND				
Bromomethane (Methyl bromide)	15	30	ND				
2-Butanone (MEK)	25	50	ND				
n-Butylbenzene	5.0	10.0	ND				
sec-Butylbenzene	5.0	10.0	ND				
tert-Butylbenzene	5.0	10.0	ND				
Carbon Disulfide	25	50	ND				
Carbon tetrachloride	5.0	10.0	ND				
Chlorobenzene	5.0	10.0	ND				
Chloroethane	15	30	ND				
2-Chloroethyl vinyl ether	50	50	ND				
Chloroform (Trichloromethane)	5.0	10.0	ND				
Chloromethane (Methyl chloride)	15	30	ND				
2-Chlorotoluene	5.0	10.0	ND				
4-Chlorotoluene	5.0	10.0	ND				
1,2-Dibromo-3-chloropropane (DBCP)	25	50	ND				
Dibromochloromethane	5.0	10.0	ND				
1,2-Dibromoethane (EDB)	5.0	10.0	ND				
Dibromomethane	5.0	10.0	ND				
1,2-Dichlorobenzene	5.0	10.0	ND				
1,3-Dichlorobenzene	5.0	10.0	ND				
1,4-Dichlorobenzene	5.0	10.0	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A1

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
Dichlorodifluoromethane	15	30	ND				
1,1-Dichloroethane	5.0	10.0	ND				
1,2-Dichloroethane (EDC)	5.0	10.0	ND				
1,1-Dichloroethene	5.0	10.0	ND				
cis-1,2-Dichloroethene	5.0	10.0	ND				
trans-1,2-Dichloroethene	5.0	10.0	ND				
1,2-Dichloropropane	5.0	10.0	ND				
1,3-Dichloropropane	5.0	10.0	ND				
2,2-Dichloropropane	5.0	10.0	ND				
1,1-Dichloropropene	5.0	10.0	ND				
cis-1,3-Dichloropropene	5.0	10.0	ND				
trans-1,3-Dichloropropene	5.0	10.0	ND				
Ethylbenzene	1.0	10.0	ND				
Hexachlorobutadiene	15	30	ND				
2-Hexanone	25	50	ND				
Iodomethane	5.0	10.0	ND				
Isopropylbenzene	5.0	10.0	ND				
p-Isopropyltoluene	5.0	10.0	ND				
4-Methyl-2-pentanone (MIBK)	25	50	ND				
Methyl-tert-butyl ether (MTBE)	2.0	10.0	ND				
Methylene chloride (DCM)	25	50	ND				
Naphthalene	5.0	10.0	ND				
n-Propylbenzene	5.0	10.0	ND				
Styrene	5.0	10.0	ND				
1,1,1,2-Tetrachloroethane	5.0	10.0	ND				
1,1,2,2-Tetrachloroethane	5.0	10.0	ND				
Tetrachloroethene	5.0	10.0	ND				
Toluene (Methyl benzene)	1.0	10.0	ND				
1,2,3-Trichlorobenzene	5.0	10.0	ND				
1,2,4-Trichlorobenzene	5.0	10.0	ND				
1,1,1-Trichloroethane	5.0	10.0	ND				
1,1,2-Trichloroethane	5.0	10.0	ND				
Trichloroethene	5.0	10.0	ND				
Trichlorofluoromethane	5.0	10.0	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A1

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
1,2,3-Trichloropropane	5.0	10.0	ND				
1,2,4-Trimethylbenzene	5.0	10.0	ND				
1,3,5-Trimethylbenzene	5.0	10.0	ND				
Vinyl Acetate	25	50	ND				
Vinyl chloride (Chloroethene)	15	30	ND				
o-Xylene	1.0	10.0	ND				
m,p-Xylenes	1.0	20.0	ND				
Our Lab I.D.			Method Blank				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		99.5				
Dibromofluoromethane	75-125		98.5				
Toluene-d8	75-125		103				

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San Clemente, CA 92672

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A1

Our Lab I.D.			**65229.15**				
Client Sample I.D.			B-12-003 @ 20'				
Date Sampled			03/27/2012				
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			585				
Analytes	**MDL**	**PQL**	**Results**				
Acetone	14625	29250	ND				
Benzene	585	5850	18,800				
Bromobenzene (Phenyl bromide)	2925	5850	ND				
Bromochloromethane	2925	5850	ND				
Bromodichloromethane	2925	5850	ND				
Bromoform (Tribromomethane)	14625	29250	ND				
Bromomethane (Methyl bromide)	8775	17550	ND				
2-Butanone (MEK)	14625	29250	ND				
n-Butylbenzene	2925	5850	108,000				
sec-Butylbenzene	2925	5850	19,700				
tert-Butylbenzene	2925	5850	ND				
Carbon Disulfide	14625	29250	ND				
Carbon tetrachloride	2925	5850	ND				
Chlorobenzene	2925	5850	ND				
Chloroethane	8775	17550	ND				
2-Chloroethyl vinyl ether	29250	29250	ND				
Chloroform (Trichloromethane)	2925	5850	ND				
Chloromethane (Methyl chloride)	8775	17550	ND				
2-Chlorotoluene	2925	5850	ND				
4-Chlorotoluene	2925	5850	ND				
1,2-Dibromo-3-chloropropane (DBCP)	14625	29250	ND				
Dibromochloromethane	2925	5850	ND				
1,2-Dibromoethane (EDB)	2925	5850	7,550				
Dibromomethane	2925	5850	ND				
1,2-Dichlorobenzene	2925	5850	ND				
1,3-Dichlorobenzene	2925	5850	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A1

Our Lab I.D.			65229.15				
Client Sample I.D.			B-12-003 @ 20'				
Date Sampled			03/27/2012				
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			585				
Analytes	**MDL**	**PQL**	**Results**				
1,4-Dichlorobenzene	2925	5850	ND				
Dichlorodifluoromethane	8775	17550	ND				
1,1-Dichloroethane	2925	5850	ND				
1,2-Dichloroethane (EDC)	2925	5850	ND				
1,1-Dichloroethene	2925	5850	ND				
cis-1,2-Dichloroethene	2925	5850	ND				
trans-1,2-Dichloroethene	2925	5850	ND				
1,2-Dichloropropane	2925	5850	ND				
1,3-Dichloropropane	2925	5850	ND				
2,2-Dichloropropane	2925	5850	ND				
1,1-Dichloropropene	2925	5850	ND				
cis-1,3-Dichloropropene	2925	5850	ND				
trans-1,3-Dichloropropene	2925	5850	ND				
Ethylbenzene	585	5850	720,000				
Hexachlorobutadiene	8775	17550	ND				
2-Hexanone	14625	29250	ND				
Iodomethane	2925	5850	ND				
Isopropylbenzene	2925	5850	46,400				
p-Isopropyltoluene	2925	5850	ND				
4-Methyl-2-pentanone (MIBK)	14625	29250	ND				
Methyl-tert-butyl ether (MTBE)	1170	5850	ND				
Methylene chloride (DCM)	14625	29250	ND				
Naphthalene	2925	5850	52,900				
n-Propylbenzene	2925	5850	180,000				
Styrene	2925	5850	ND				
1,1,1,2-Tetrachloroethane	2925	5850	ND				
1,1,2,2-Tetrachloroethane	2925	5850	ND				
Tetrachloroethene	2925	5850	ND				
Toluene (Methyl benzene)	585	5850	1,420,000				
1,2,3-Trichlorobenzene	2925	5850	ND				
1,2,4-Trichlorobenzene	2925	5850	ND				
1,1,1-Trichloroethane	2925	5850	ND				
1,1,2-Trichloroethane	2925	5850	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A1

Our Lab I.D.			**65229.15**				
Client Sample I.D.			B-12-003 @ 20'				
Date Sampled			03/27/2012				
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			585				
Analytes	**MDL**	**PQL**	**Results**				
Trichloroethene	2925	5850	ND				
Trichlorofluoromethane	2925	5850	ND				
1,2,3-Trichloropropane	2925	5850	ND				
1,2,4-Trimethylbenzene	2925	5850	1,400,000				
1,3,5-Trimethylbenzene	2925	5850	451,000				
Vinyl Acetate	14625	29250	ND				
Vinyl chloride (Chloroethene)	8775	17550	ND				
o-Xylene	585	5850	1,190,000				
m,p-Xylenes	585	11700	3,200,000				
Our Lab I.D.			**65229.15**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		96.7				
Dibromofluoromethane	75-125		93.1				
Toluene-d8	75-125		101				

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A2

Our Lab I.D.			65229.16	65229.17			
Client Sample I.D.			B-12-003 @ 25'	B-12-003 @ 30'			
Date Sampled			03/27/2012	03/27/2012			
Date Prepared			03/30/2012	03/30/2012			
Preparation Method			5030	5030			
Date Analyzed			03/31/2012	03/31/2012			
Matrix			Soil	Soil			
Units			ug/Kg	ug/Kg			
Dilution Factor			250	250			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Acetone	6250	12500	ND	ND			
Benzene	250	2500	5,400	14,900			
Bromobenzene (Phenyl bromide)	1250	2500	ND	ND			
Bromochloromethane	1250	2500	ND	ND			
Bromodichloromethane	1250	2500	ND	ND			
Bromoform (Tribromomethane)	6250	12500	ND	ND			
Bromomethane (Methyl bromide)	3750	7500	ND	ND			
2-Butanone (MEK)	6250	12500	ND	ND			
n-Butylbenzene	1250	2500	27,300	16,900			
sec-Butylbenzene	1250	2500	5,100	3,180			
tert-Butylbenzene	1250	2500	ND	ND			
Carbon Disulfide	6250	12500	ND	ND			
Carbon tetrachloride	1250	2500	ND	ND			
Chlorobenzene	1250	2500	ND	ND			
Chloroethane	3750	7500	ND	ND			
2-Chloroethyl vinyl ether	12500	12500	ND	ND			
Chloroform (Trichloromethane)	1250	2500	ND	ND			
Chloromethane (Methyl chloride)	3750	7500	ND	ND			
2-Chlorotoluene	1250	2500	ND	ND			
4-Chlorotoluene	1250	2500	ND	ND			
1,2-Dibromo-3-chloropropane (DBCP)	6250	12500	ND	ND			
Dibromochloromethane	1250	2500	ND	ND			
1,2-Dibromoethane (EDB)	1250	2500	1,430J	ND			
Dibromomethane	1250	2500	ND	ND			
1,2-Dichlorobenzene	1250	2500	ND	ND			
1,3-Dichlorobenzene	1250	2500	ND	ND			

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A2

Our Lab I.D.			65229.16	65229.17			
Client Sample I.D.			B-12-003 @ 25'	B-12-003 @ 30'			
Date Sampled			03/27/2012	03/27/2012			
Date Prepared			03/30/2012	03/30/2012			
Preparation Method			5030	5030			
Date Analyzed			03/31/2012	03/31/2012			
Matrix			Soil	Soil			
Units			ug/Kg	ug/Kg			
Dilution Factor			250	250			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
1,4-Dichlorobenzene	1250	2500	ND	ND			
Dichlorodifluoromethane	3750	7500	ND	ND			
1,1-Dichloroethane	1250	2500	ND	ND			
1,2-Dichloroethane (EDC)	1250	2500	ND	ND			
1,1-Dichloroethene	1250	2500	ND	ND			
cis-1,2-Dichloroethene	1250	2500	ND	ND			
trans-1,2-Dichloroethene	1250	2500	ND	ND			
1,2-Dichloropropane	1250	2500	ND	ND			
1,3-Dichloropropane	1250	2500	ND	ND			
2,2-Dichloropropane	1250	2500	ND	ND			
1,1-Dichloropropene	1250	2500	ND	ND			
cis-1,3-Dichloropropene	1250	2500	ND	ND			
trans-1,3-Dichloropropene	1250	2500	ND	ND			
Ethylbenzene	250	2500	186,000	185,000			
Hexachlorobutadiene	3750	7500	ND	ND			
2-Hexanone	6250	12500	ND	ND			
Iodomethane	1250	2500	ND	ND			
Isopropylbenzene	1250	2500	11,300	8,350			
p-Isopropyltoluene	1250	2500	ND	ND			
4-Methyl-2-pentanone (MIBK)	6250	12500	ND	ND			
Methyl-tert-butyl ether (MTBE)	500	2500	ND	ND			
Methylene chloride (DCM)	6250	12500	ND	ND			
Naphthalene	1250	2500	20,900	15,000			
n-Propylbenzene	1250	2500	44,500	31,300			
Styrene	1250	2500	ND	ND			
1,1,1,2-Tetrachloroethane	1250	2500	ND	ND			
1,1,2,2-Tetrachloroethane	1250	2500	ND	ND			
Tetrachloroethene	1250	2500	ND	ND			
Toluene (Methyl benzene)	250	2500	398,000	563,000			
1,2,3-Trichlorobenzene	1250	2500	ND	ND			
1,2,4-Trichlorobenzene	1250	2500	ND	ND			
1,1,1-Trichloroethane	1250	2500	ND	ND			
1,1,2-Trichloroethane	1250	2500	ND	ND			

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A2

Our Lab I.D.			**65229.16**	**65229.17**			
Client Sample I.D.			B-12-003 @ 25'	B-12-003 @ 30'			
Date Sampled			03/27/2012	03/27/2012			
Date Prepared			03/30/2012	03/30/2012			
Preparation Method			5030	5030			
Date Analyzed			03/31/2012	03/31/2012			
Matrix			Soil	Soil			
Units			ug/Kg	ug/Kg			
Dilution Factor			250	250			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Trichloroethene	1250	2500	ND	ND			
Trichlorofluoromethane	1250	2500	ND	ND			
1,2,3-Trichloropropane	1250	2500	ND	ND			
1,2,4-Trimethylbenzene	1250	2500	353,000	260,000			
1,3,5-Trimethylbenzene	1250	2500	110,000	78,500			
Vinyl Acetate	6250	12500	ND	ND			
Vinyl chloride (Chloroethene)	3750	7500	ND	ND			
o-Xylene	250	2500	293,000	275,000			
m,p-Xylenes	250	5000	830,000	800,000			
Our Lab I.D.			**65229.16**	**65229.17**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Bromofluorobenzene	75-125		93.3	95.7			
Dibromofluoromethane	75-125		92.2	92.6			
Toluene-d8	75-125		104	104			

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329122A2

Our Lab I.D.			**65229.18**				
Client Sample I.D.			B-12-003 @ 38'				
Date Sampled			03/27/2012				
Date Prepared			03/29/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			218				
Analytes	**MDL**	**PQL**	**Results**				
Acetone	5450	10900	ND				
Benzene	218	2180	4,330				
Bromobenzene (Phenyl bromide)	1090	2180	ND				
Bromochloromethane	1090	2180	ND				
Bromodichloromethane	1090	2180	ND				
Bromoform (Tribromomethane)	5450	10900	ND				
Bromomethane (Methyl bromide)	3270	6540	ND				
2-Butanone (MEK)	5450	10900	ND				
n-Butylbenzene	1090	2180	32,800				
sec-Butylbenzene	1090	2180	4,700				
tert-Butylbenzene	1090	2180	ND				
Carbon Disulfide	5450	10900	ND				
Carbon tetrachloride	1090	2180	ND				
Chlorobenzene	1090	2180	ND				
Chloroethane	3270	6540	ND				
2-Chloroethyl vinyl ether	10900	10900	ND				
Chloroform (Trichloromethane)	1090	2180	ND				
Chloromethane (Methyl chloride)	3270	6540	ND				
2-Chlorotoluene	1090	2180	ND				
4-Chlorotoluene	1090	2180	ND				
1,2-Dibromo-3-chloropropane (DBCP)	5450	10900	ND				
Dibromochloromethane	1090	2180	ND				
1,2-Dibromoethane (EDB)	1090	2180	ND				
Dibromomethane	1090	2180	ND				
1,2-Dichlorobenzene	1090	2180	ND				
1,3-Dichlorobenzene	1090	2180	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329122A2

Our Lab I.D.			**65229.18**				
Client Sample I.D.			B-12-003 @ 38'				
Date Sampled			03/27/2012				
Date Prepared			03/29/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			218				
Analytes	**MDL**	**PQL**	**Results**				
1,4-Dichlorobenzene	1090	2180	ND				
Dichlorodifluoromethane	3270	6540	ND				
1,1-Dichloroethane	1090	2180	ND				
1,2-Dichloroethane (EDC)	1090	2180	ND				
1,1-Dichloroethene	1090	2180	ND				
cis-1,2-Dichloroethene	1090	2180	ND				
trans-1,2-Dichloroethene	1090	2180	ND				
1,2-Dichloropropane	1090	2180	ND				
1,3-Dichloropropane	1090	2180	ND				
2,2-Dichloropropane	1090	2180	ND				
1,1-Dichloropropene	1090	2180	ND				
cis-1,3-Dichloropropene	1090	2180	ND				
trans-1,3-Dichloropropene	1090	2180	ND				
Ethylbenzene	218	2180	119,000				
Hexachlorobutadiene	3270	6540	ND				
2-Hexanone	5450	10900	ND				
Iodomethane	1090	2180	ND				
Isopropylbenzene	1090	2180	8,480				
p-Isopropyltoluene	1090	2180	3,590				
4-Methyl-2-pentanone (MIBK)	5450	10900	ND				
Methyl-tert-butyl ether (MTBE)	436	2180	ND				
Methylene chloride (DCM)	5450	10900	ND				
Naphthalene	1090	2180	27,200				
n-Propylbenzene	1090	2180	36,800				
Styrene	1090	2180	ND				
1,1,1,2-Tetrachloroethane	1090	2180	ND				
1,1,2,2-Tetrachloroethane	1090	2180	ND				
Tetrachloroethene	1090	2180	ND				
Toluene (Methyl benzene)	218	2180	178,000				
1,2,3-Trichlorobenzene	1090	2180	ND				
1,2,4-Trichlorobenzene	1090	2180	ND				
1,1,1-Trichloroethane	1090	2180	ND				
1,1,2-Trichloroethane	1090	2180	ND				

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329122A2

Our Lab I.D.			**65229.18**				
Client Sample I.D.			B-12-003 @ 38'				
Date Sampled			03/27/2012				
Date Prepared			03/29/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			ug/Kg				
Dilution Factor			218				
Analytes	**MDL**	**PQL**	**Results**				
Trichloroethene	1090	2180	ND				
Trichlorofluoromethane	1090	2180	ND				
1,2,3-Trichloropropane	1090	2180	ND				
1,2,4-Trimethylbenzene	1090	2180	352,000				
1,3,5-Trimethylbenzene	1090	2180	104,000				
Vinyl Acetate	5450	10900	ND				
Vinyl chloride (Chloroethene)	3270	6540	ND				
o-Xylene	218	2180	199,000				
m,p-Xylenes	218	4360	526,000				
Our Lab I.D.			**65229.18**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		97.5				
Dibromofluoromethane	75-125		101				
Toluene-d8	75-125		103				

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032812NB1

Our Lab I.D.			Method Blank	**65229.02**	**65229.06**	**65229.07**	
Client Sample I.D.				B-12-004 @ 10'	B-12-004 @ 30'	B-12-004 @ 38'	
Date Sampled				03/27/2012	03/27/2012	03/27/2012	
Date Prepared			03/28/2012	03/28/2012	03/28/2012	03/28/2012	
Preparation Method			5030	5035A	5035A	5035A	
Date Analyzed			03/28/2012	03/28/2012	03/28/2012	03/28/2012	
Matrix			Soil	Soil	Soil	Soil	
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
TPH as Gasoline and Light HC. (C4-C12)	0.100	1.000	ND	ND	ND	0.271J	
Our Lab I.D.			Method Blank	**65229.02**	**65229.06**	**65229.07**	
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	
Bromofluorobenzene	75-125		93.4	108	101	105	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 033012NB1

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			mg/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
TPH as Gasoline and Light HC. (C4-C12)	0.100	1.000	ND				
Our Lab I.D.			Method Blank				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		96.8				

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524 & 530 Avenida Pico
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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 033012NB1

Our Lab I.D.			**65229.12**				
Client Sample I.D.			B-12-003 @ 5'				
Date Sampled			03/27/2012				
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			mg/Kg				
Dilution Factor			100				
Analytes	**MDL**	**PQL**	**Results**				
TPH as Gasoline and Light HC. (C4-C12)	10	100	1,750				
Our Lab I.D.			**65229.12**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		119				

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032912NB1

Our Lab I.D.			Method Blank				
Client Sample I.D.							
Date Sampled							
Date Prepared			03/29/2012				
Preparation Method			5030				
Date Analyzed			03/29/2012				
Matrix			Soil				
Units			mg/Kg				
Dilution Factor			1				
Analytes	**MDL**	**PQL**	**Results**				
TPH as Gasoline and Light HC. (C4-C12)	0.100	1.000	ND				
Our Lab I.D.			Method Blank				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		96.0				

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524 & 530 Avenida Pico
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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032912NB1

Our Lab I.D.			**65229.13**				
Client Sample I.D.			B-12-003 @ 10'				
Date Sampled			03/27/2012				
Date Prepared			03/29/2012				
Preparation Method			5030				
Date Analyzed			03/29/2012				
Matrix			Soil				
Units			mg/Kg				
Dilution Factor			246				
Analytes	**MDL**	**PQL**	**Results**				
TPH as Gasoline and Light HC. (C4-C12)	24	246	7,580				
Our Lab I.D.			**65229.13**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		115				

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 033012NB1

Our Lab I.D.			**65229.14**				
Client Sample I.D.			B-12-003 @ 15'				
Date Sampled			03/27/2012				
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			mg/Kg				
Dilution Factor			250				
Analytes	**MDL**	**PQL**	**Results**				
TPH as Gasoline and Light HC. (C4-C12)	25	250	8,670				
Our Lab I.D.			**65229.14**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		122				

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 033012NB1

Our Lab I.D.			**65229.15**				
Client Sample I.D.			B-12-003 @ 20'				
Date Sampled			03/27/2012				
Date Prepared			03/30/2012				
Preparation Method			5030				
Date Analyzed			03/30/2012				
Matrix			Soil				
Units			mg/Kg				
Dilution Factor			587				
Analytes	**MDL**	**PQL**	**Results**				
TPH as Gasoline and Light HC. (C4-C12)	58	587	20,800				
Our Lab I.D.			**65229.15**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		115				

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524 & 530 Avenida Pico
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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 033012NB1

Our Lab I.D.			**65229.16**	**65229.17**			
Client Sample I.D.			B-12-003 @ 25'	B-12-003 @ 30'			
Date Sampled			03/27/2012	03/27/2012			
Date Prepared			03/30/2012	03/30/2012			
Preparation Method			5030	5030			
Date Analyzed			03/30/2012	03/30/2012			
Matrix			Soil	Soil			
Units			mg/Kg	mg/Kg			
Dilution Factor			250	250			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
TPH as Gasoline and Light HC. (C4-C12)	25	250	4,220	4,530			
Our Lab I.D.			**65229.16**	**65229.17**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Bromofluorobenzene	75-125		112	114			

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Site

524 & 530 Avenida Pico
San Clemente, CA 92672

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032912NB1

Our Lab I.D.			**65229.18**				
Client Sample I.D.			B-12-003 @ 38'				
Date Sampled			03/27/2012				
Date Prepared			03/29/2012				
Preparation Method			5030				
Date Analyzed			03/29/2012				
Matrix			Soil				
Units			mg/Kg				
Dilution Factor			219				
Analytes	**MDL**	**PQL**	**Results**				
TPH as Gasoline and Light HC. (C4-C12)	21	219	3,680				
Our Lab I.D.			**65229.18**				
Surrogates	**%Rec.Limit**		**% Rec.**				
Bromofluorobenzene	75-125		114				

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 032912DB1

Our Lab I.D.			Method Blank	**65229.02**	**65229.06**	**65229.07**	
Client Sample I.D.				B-12-004 @ 10'	B-12-004 @ 30'	B-12-004 @ 38'	
Date Sampled				03/27/2012	03/27/2012	03/27/2012	
Date Prepared			03/29/2012	03/29/2012	03/29/2012	03/29/2012	
Preparation Method			3550B	3550B	3550B	3550B	
Date Analyzed			03/29/2012	03/29/2012	03/29/2012	03/29/2012	
Matrix			Soil	Soil	Soil	Soil	
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	
Dilution Factor			1	1	1	1	
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	
TPH as Diesel (C13-C22)	1.0	5.0	ND	ND	ND	ND	
TPH as Heavy Hydrocarbons (C23-C40)	1.0	5.0	ND	ND	ND	ND	
TPH Total as Diesel and Heavy HC.C13-C40	1.0	5.0	ND	ND	ND	ND	
Our Lab I.D.			Method Blank	**65229.02**	**65229.06**	**65229.07**	
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	
Chlorobenzene	75-125		109	108	107	108	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 033012DB1

Our Lab I.D.			Method Blank	**65229.12**	**65229.13**	**65229.14**	**65229.15**
Client Sample I.D.				B-12-003 @ 5'	B-12-003 @ 10'	B-12-003 @ 15'	B-12-003 @ 20'
Date Sampled				03/27/2012	03/27/2012	03/27/2012	03/27/2012
Date Prepared			03/30/2012	03/30/2012	03/30/2012	03/30/2012	03/30/2012
Preparation Method			3550B	3550B	3550B	3550B	3550B
Date Analyzed			03/30/2012	03/30/2012	03/30/2012	03/30/2012	03/30/2012
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
TPH as Diesel (C13-C22)	1.0	5.0	ND	237	732	208	261
TPH as Heavy Hydrocarbons (C23-C40)	1.0	5.0	ND	ND	ND	ND	ND
TPH Total as Diesel and Heavy HC.C13-C40	1.0	5.0	ND	237	732	208	261
Our Lab I.D.			Method Blank	**65229.12**	**65229.13**	**65229.14**	**65229.15**
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**	**% Rec.**
Chlorobenzene	75-125		109	94.8	101	95.6	89.5

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524 & 530 Avenida Pico
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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 033012DB1

Our Lab I.D.			**65229.16**	**65229.17**			
Client Sample I.D.			B-12-003 @ 25'	B-12-003 @ 30'			
Date Sampled			03/27/2012	03/27/2012			
Date Prepared			03/30/2012	03/30/2012			
Preparation Method			3550B	3550B			
Date Analyzed			03/30/2012	03/30/2012			
Matrix			Soil	Soil			
Units			mg/Kg	mg/Kg			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
TPH as Diesel (C13-C22)	1.0	5.0	66.8	64.9			
TPH as Heavy Hydrocarbons (C23-C40)	1.0	5.0	ND	ND			
TPH Total as Diesel and Heavy HC.C13-C40	1.0	5.0	66.8	64.9			
Our Lab I.D.			**65229.16**	**65229.17**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Chlorobenzene	75-125		104	111			

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 032912DB1

Our Lab I.D.			**65229.18**	**65229.21**			
Client Sample I.D.			B-12-003 @ 38'	B12-004 @ 38 DUP			
Date Sampled			03/27/2012	03/27/2012			
Date Prepared			03/29/2012	03/29/2012			
Preparation Method			3550B	3550B			
Date Analyzed			03/29/2012	03/29/2012			
Matrix			Soil	Soil			
Units			mg/Kg	mg/Kg			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
TPH as Diesel (C13-C22)	1.0	5.0	182	ND			
TPH as Heavy Hydrocarbons (C23-C40)	1.0	5.0	ND	ND			
TPH Total as Diesel and Heavy HC.C13-C40	1.0	5.0	182	ND			
Our Lab I.D.			**65229.18**	**65229.21**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Chlorobenzene	75-125		108	108			

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 0402122C1

Our Lab I.D.			Method Blank	65229.02	65229.12	65229.13	65229.14
Client Sample I.D.				B-12-004 @ 10'	B-12-003 @ 5'	B-12-003 @ 10'	B-12-003 @ 15'
Date Sampled				03/27/2012	03/27/2012	03/27/2012	03/27/2012
Date Prepared			04/02/2012	04/02/2012	04/02/2012	04/02/2012	04/02/2012
Preparation Method			3050B	3050B	3050B	3050B	3050B
Date Analyzed			04/04/2012	04/04/2012	04/04/2012	04/04/2012	04/04/2012
Matrix			Soil	Soil	Soil	Soil	Soil
Units			mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/Kg
Dilution Factor			1	1	1	1	1
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**	**Results**	**Results**
Antimony	1.0	5.0	ND	ND	ND	ND	ND
Arsenic	1.0	5.0	ND	ND	ND	ND	ND
Barium	2.5	5.0	ND	286	58.3	96.6	121
Beryllium	1.3	2.5	ND	ND	ND	ND	ND
Cadmium	1.3	2.5	ND	ND	ND	ND	ND
Chromium	2.5	5.0	ND	11.8	6.43	12.4	15.1
Cobalt	2.5	5.0	ND	4.93J	3.57J	5.10	6.68
Copper	2.5	5.0	ND	8.10	4.03J	7.23	12.0
Lead	2.5	5.0	ND	ND	27.5	75.0	60.2
Mercury (By EPA 7471)	0.1	0.2	ND	ND	ND	ND	ND
Molybdenum	2.5	5.0	ND	ND	ND	ND	ND
Nickel	2.5	5.0	ND	9.71	7.22	11.8	13.1
Selenium	1.0	5.0	ND	ND	ND	ND	ND
Silver	2.5	5.0	ND	ND	ND	ND	ND
Thallium	1.0	5.0	ND	ND	ND	ND	ND
Vanadium	2.5	5.0	ND	25.2	16.3	26.8	33.2
Zinc	2.5	5.0	ND	36.4	21.8	36.9	54.4

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524 & 530 Avenida Pico
San Clemente, CA 92672

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 0402122C1

Our Lab I.D.			65229.16	65229.17			
Client Sample I.D.			B-12-003 @ 25'	B-12-003 @ 30'			
Date Sampled			03/27/2012	03/27/2012			
Date Prepared			04/02/2012	04/02/2012			
Preparation Method			3050B	3050B			
Date Analyzed			04/04/2012	04/04/2012			
Matrix			Soil	Soil			
Units			mg/Kg	mg/Kg			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Antimony	1.0	5.0	ND	ND			
Arsenic	1.0	5.0	3.82J	ND			
Barium	2.5	5.0	101	103			
Beryllium	1.3	2.5	ND	ND			
Cadmium	1.3	2.5	ND	ND			
Chromium	2.5	5.0	7.47	15.8			
Cobalt	2.5	5.0	5.66	4.99J			
Copper	2.5	5.0	5.62	10.6			
Lead	2.5	5.0	25.8	10.4			
Mercury (By EPA 7471)	0.1	0.2	ND	ND			
Molybdenum	2.5	5.0	5.40	ND			
Nickel	2.5	5.0	12.1	13.2			
Selenium	1.0	5.0	ND	ND			
Silver	2.5	5.0	ND	ND			
Thallium	1.0	5.0	ND	ND			
Vanadium	2.5	5.0	24.7	23.2			
Zinc	2.5	5.0	25.1	44.4			

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1

Our Lab I.D.			Method Blank	**65229.11**			
Client Sample I.D.				Barrel Sample			
Date Sampled				03/27/2012			
Date Prepared			03/29/2012	03/29/2012			
Preparation Method			5030B	5030B			
Date Analyzed			03/29/2012	03/29/2012			
Matrix			Aqueous	Aqueous			
Units			ug/L	ug/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Acetone	10	10	ND	ND			
Benzene	0.5	1.0	ND	ND			
Bromobenzene (Phenyl bromide)	0.5	1.0	ND	ND			
Bromochloromethane	0.5	1.0	ND	ND			
Bromodichloromethane	0.5	1.0	ND	ND			
Bromoform (Tribromomethane)	2.5	5.0	ND	ND			
Bromomethane (Methyl bromide)	1.5	3.0	ND	ND			
2-Butanone (MEK)	5.0	5.0	ND	ND			
n-Butylbenzene	0.5	1.0	ND	ND			
sec-Butylbenzene	0.5	1.0	ND	ND			
tert-Butylbenzene	0.5	1.0	ND	ND			
Carbon Disulfide	0.5	1.0	ND	ND			
Carbon tetrachloride	0.5	1.0	ND	ND			
Chlorobenzene	0.5	1.0	ND	ND			
Chloroethane	1.5	3.0	ND	ND			
2-Chloroethyl vinyl ether	2.5	5.0	ND	ND			
Chloroform (Trichloromethane)	0.5	1.0	ND	ND			
Chloromethane (Methyl chloride)	1.5	3.0	ND	ND			
2-Chlorotoluene	0.5	1.0	ND	ND			
4-Chlorotoluene	0.5	1.0	ND	ND			
1,2-Dibromo-3-chloropropane (DBCP)	2.5	5.0	ND	ND			
Dibromochloromethane	0.5	1.0	ND	ND			
1,2-Dibromoethane (EDB)	0.5	1.0	ND	ND			
Dibromomethane	0.5	1.0	ND	ND			
1,2-Dichlorobenzene	0.5	1.0	ND	ND			
1,3-Dichlorobenzene	0.5	1.0	ND	ND			
1,4-Dichlorobenzene	0.5	1.0	ND	ND			

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1

Our Lab I.D.			Method Blank	65229.11			
Client Sample I.D.				Barrel Sample			
Date Sampled				03/27/2012			
Date Prepared			03/29/2012	03/29/2012			
Preparation Method			5030B	5030B			
Date Analyzed			03/29/2012	03/29/2012			
Matrix			Aqueous	Aqueous			
Units			ug/L	ug/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Dichlorodifluoromethane	1.5	3.0	ND	ND			
1,1-Dichloroethane	0.5	1.0	ND	ND			
1,2-Dichloroethane (EDC)	0.5	1.0	ND	ND			
1,1-Dichloroethene	0.5	1.0	ND	ND			
cis-1,2-Dichloroethene	0.5	1.0	ND	ND			
trans-1,2-Dichloroethene	0.5	1.0	ND	ND			
1,2-Dichloropropane	0.5	1.0	ND	ND			
1,3-Dichloropropane	0.5	1.0	ND	ND			
2,2-Dichloropropane	0.5	1.0	ND	ND			
1,1-Dichloropropene	0.5	1.0	ND	ND			
cis-1,3-Dichloropropene	0.5	1.0	ND	ND			
trans-1,3-Dichloropropene	0.5	1.0	ND	ND			
Ethylbenzene	0.5	1.0	ND	1.17			
Hexachlorobutadiene	1.5	3.0	ND	ND			
2-Hexanone	2.5	5.0	ND	ND			
Iodomethane	0.5	1.0	ND	ND			
Isopropylbenzene	0.5	1.0	ND	ND			
p-Isopropyltoluene	0.5	1.0	ND	ND			
4-Methyl-2-pentanone (MIBK)	2.5	5.0	ND	ND			
Methyl-tert-butyl ether (MTBE)	0.5	1.0	ND	ND			
Methylene chloride (DCM)	2.0	4.0	ND	ND			
Naphthalene	0.5	1.0	ND	ND			
n-Propylbenzene	0.5	1.0	ND	ND			
Styrene	0.5	1.0	ND	ND			
1,1,1,2-Tetrachloroethane	0.5	1.0	ND	ND			
1,1,2,2-Tetrachloroethane	0.5	1.0	ND	ND			
Tetrachloroethene	0.5	1.0	ND	ND			
Toluene (Methyl benzene)	0.5	1.0	ND	1.49			
1,2,3-Trichlorobenzene	0.5	1.0	ND	ND			
1,2,4-Trichlorobenzene	0.5	1.0	ND	ND			
1,1,1-Trichloroethane	0.5	1.0	ND	ND			
1,1,2-Trichloroethane	0.5	1.0	ND	ND			
Trichloroethene	0.5	1.0	ND	ND			
Trichlorofluoromethane	0.5	1.0	ND	ND			

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ANALYTICAL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1

Our Lab I.D.			Method Blank	**65229.11**			
Client Sample I.D.				Barrel Sample			
Date Sampled				03/27/2012			
Date Prepared			03/29/2012	03/29/2012			
Preparation Method			5030B	5030B			
Date Analyzed			03/29/2012	03/29/2012			
Matrix			Aqueous	Aqueous			
Units			ug/L	ug/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
1,2,3-Trichloropropane	0.5	1.0	ND	ND			
Trichlorotrifluoroethane (Freon-113)	0.5	1.0	ND	ND			
1,2,4-Trimethylbenzene	0.5	1.0	ND	ND			
1,3,5-Trimethylbenzene	0.5	1.0	ND	ND			
Vinyl Acetate	0.5	5.0	ND	ND			
Vinyl chloride (Chloroethene)	0.5	3.0	ND	ND			
o-Xylene	0.5	1.0	ND	0.540J			
m,p-Xylenes	1.0	2.0	ND	1.71J			
Our Lab I.D.			Method Blank	**65229.11**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Bromofluorobenzene	75-125		108	109			
Dibromofluoromethane	75-125		99.7	95.2			
Toluene-d8	75-125		101	97.8			

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032912OB2

Our Lab I.D.			Method Blank	**65229.11**			
Client Sample I.D.				Barrel Sample			
Date Sampled				03/27/2012			
Date Prepared			03/29/2012	03/29/2012			
Preparation Method			5030B	5030B			
Date Analyzed			03/29/2012	03/29/2012			
Matrix			Aqueous	Aqueous			
Units			mg/L	mg/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
TPH as Gasoline and Light HC. (C4-C12)	0.005	0.010	ND	ND			
Our Lab I.D.			Method Blank	**65229.11**			
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**			
Bromofluorobenzene	75-125		94.0	99.6			

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: M8015D, TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 032812DB1

Our Lab I.D.			Method Blank	**65229.10**	**65229.11**		
Client Sample I.D.				B-12-004 GW	Barrel Sample		
Date Sampled				03/27/2012	03/27/2012		
Date Prepared			03/28/2012	03/28/2012	03/28/2012		
Preparation Method			3510C	3510C	3510C		
Date Analyzed			03/28/2012	03/28/2012	03/28/2012		
Matrix			Aqueous	Aqueous	Aqueous		
Units			mg/L	mg/L	mg/L		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
TPH as Diesel (C13-C22)	0.1	0.5	ND	ND	ND		
TPH as Heavy Hydrocarbons (C23-C40)	0.1	0.5	ND	ND	ND		
TPH Total as Diesel and Heavy HC.C13-C40	0.1	0.5	ND	ND	ND		
Our Lab I.D.			Method Blank	**65229.10**	**65229.11**		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
Chlorobenzene	60-125		79.0	92.0	96.5		

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 0328122C1

Our Lab I.D.			Method Blank	**65229.11**			
Client Sample I.D.				Barrel Sample			
Date Sampled				03/27/2012			
Date Prepared			03/28/2012	03/28/2012			
Preparation Method			3005A	3005A			
Date Analyzed			03/29/2012	03/29/2012			
Matrix			Aqueous	Aqueous			
Units			mg/L	mg/L			
Dilution Factor			1	1			
Analytes	**MDL**	**PQL**	**Results**	**Results**			
Antimony	0.05	0.10	ND	ND			
Arsenic	0.05	0.10	ND	ND			
Barium	0.03	0.05	ND	0.666			
Beryllium	0.01	0.05	ND	ND			
Cadmium	0.01	0.05	ND	ND			
Chromium	0.01	0.05	ND	0.104			
Cobalt	0.01	0.05	ND	0.0492J			
Copper	0.01	0.05	ND	0.0870			
Lead	0.05	0.10	ND	ND			
Mercury (By EPA 7470)	0.001	0.002	ND	ND			
Molybdenum	0.01	0.05	ND	0.0745			
Nickel	0.01	0.05	ND	0.147			
Selenium	0.05	0.10	ND	ND			
Silver	0.01	0.05	ND	ND			
Thallium	0.05	0.10	ND	ND			
Vanadium	0.03	0.05	ND	0.133			
Zinc	0.01	0.05	ND	0.307			

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524 & 530 Avenida Pico
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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 0328122C1; Dup or Spiked Sample: 65128.04; LCS: Clean Water; QC Prepared: 03/28/2012; QC Analyzed: 03/29/2012; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Antimony	0.00	1.00	0.790M	79.1	1.00	0.790M	78.8	<1	80-120	<15
Arsenic	0.00	1.00	0.860	85.5	1.00	0.840	84.2	1.53	80-120	<15
Barium	0.117	1.00	0.860M	74.2	1.00	0.850M	73.3	1.22	80-120	<15
Beryllium	0.00	1.00	0.880	88.2	1.00	0.880	88.1	<1	80-120	<15
Cadmium	0.00	1.00	0.760M	75.6	1.00	0.750M	75.2	<1	80-120	<15
Chromium	0.00	1.00	0.780M	77.9	1.00	0.780M	77.5	<1	80-120	<15
Cobalt	0.00	1.00	0.750M	75.1	1.00	0.740M	74.3	1.07	80-120	<15
Copper	0.00	1.00	0.780M	78.0	1.00	0.780M	77.7	<1	80-120	<15
Lead	0.00	1.00	0.710M	71.4	1.00	0.710M	70.5	1.27	80-120	<15
Mercury (By EPA 7470)	0.00	0.0100	0.00951	95.1	0.0100	0.0108	108	12.7	80-120	<15
Molybdenum	0.00	1.00	0.772M	77.2	1.00	0.766M	76.6	<1	80-120	<15
Nickel	0.0612	1.00	0.764M	70.3	1.00	0.760M	69.9	<1	80-120	<15
Selenium	0.00	1.00	0.820	81.6	1.00	0.810	81.1	<1	80-120	<15
Silver	0.00	1.00	0.220M	21.9	1.00	0.220M	21.9	<1	80-120	<15
Thallium	0.00	1.00	0.670M	67.4	1.00	0.660M	66.0	2.10	80-120	<15
Vanadium	0.00	1.00	0.790M	78.5	1.00	0.780M	78.2	<1	80-120	<15
Zinc	0.179	1.00	0.830M	65.2	1.00	0.830M	64.8	<1	80-120	<15

QC Batch No: 0328122C1; Dup or Spiked Sample: 65128.04; LCS: Clean Water; QC Prepared: 03/28/2012; QC Analyzed: 03/29/2012; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Antimony	1.00	0.870	86.7	1.00	0.850	85.0	1.98	80-120	<15	
Arsenic	1.00	0.890	88.6	1.00	0.880	87.5	1.25	80-120	<15	
Barium	1.00	0.840	84.2	1.00	0.860	86.4	2.58	80-120	<15	
Beryllium	1.00	0.910	91.2	1.00	0.930	93.2	2.17	80-120	<15	
Cadmium	1.00	0.850	84.9	1.00	0.870	86.6	1.98	80-120	<15	
Chromium	1.00	0.860	85.6	1.00	0.880	87.6	2.31	80-120	<15	
Cobalt	1.00	0.850	84.9	1.00	0.840	84.2	<1	80-120	<15	
Copper	1.00	0.820	82.4	1.00	0.850	84.5	2.52	80-120	<15	
Lead	1.00	0.840	84.4	1.00	0.830	83.1	1.55	80-120	<15	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: 6010/7000CAM, CAM Title 22 Metals (SW-846)

QC Batch No: 0328122C1; Dup or Spiked Sample: 65128.04; LCS: Clean Water; QC Prepared: 03/28/2012; QC Analyzed: 03/29/2012; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Mercury (By EPA 7470)	0.0100	0.00948	94.8	0.0100	0.00961	96.1	1.4	80-120	<15	
Molybdenum	1.00	0.880	87.9	1.00	0.870	87.0	1.03	80-120	<15	
Nickel	1.00	0.840	84.0	1.00	0.859	85.9	2.24	80-120	<15	
Selenium	1.00	0.870	87.0	1.00	0.850	84.9	2.44	80-120	<15	
Silver	1.00	0.870	87.3	1.00	0.900	90.0	3.05	80-120	<15	
Thallium	1.00	0.820	82.0	1.00	0.810	81.2	<1	80-120	<15	
Vanadium	1.00	0.870	86.7	1.00	0.890	88.7	2.28	80-120	<15	
Zinc	1.00	0.860	85.5	1.00	0.870	87.2	1.97	80-120	<15	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: 8260B, Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329121A1; Dup or Spiked Sample: B0329121A1; LCS: Clean Water; QC Prepared: 03/29/2012;MS Analyzed: 03/30/2012; LCS Analyzed: 03/29/2012; Units: ug/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Benzene	0.00	50.0	50.5	101	50.0	50.5	101	<1	75-125	<20
Chlorobenzene	0.00	50.0	47.2	94.4	50.0	47.7	95.4	1.05	75-125	<20
1,1-Dichloroethene	0.00	50.0	44.8	89.6	50.0	44.6	89.2	<1	75-125	<20
Methyl-tert-butyl ether (MTBE)	0.00	50.0	47.0	94.0	50.0	39.8	79.6	16.6	75-125	<20
Toluene (Methyl benzene)	0.00	50.0	51.0	102	50.0	50.5	101	<1	75-125	<20
Trichloroethene	0.00	50.0	59.5	119	50.0	53.5	107	10.6	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	50.0	60.5	121	50.0	58.0	116	4.13	75-125	<20
Dibromofluoromethane	0.00	50.0	44.9	89.8	50.0	45.5	90.9	1.22	75-125	<20
Toluene-d8	0.00	50.0	53.0	106	50.0	52.0	104	1.89	75-125	<20

QC Batch No: 0329121A1; Dup or Spiked Sample: B0329121A1; LCS: Clean Water; QC Prepared: 03/29/2012;MS Analyzed: 03/30/2012; LCS Analyzed: 03/29/2012; Units: ug/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Benzene	50.0	51.6	103	50.0	51.8	104	<1	75-125	<20	
Chlorobenzene	50.0	51.7	103	50.0	52.2	104	<1	75-125	<20	
1,1-Dichloroethene	50.0	50.3	101	50.0	50.0	100	<1	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	45.8	91.6	50.0	46.2	92.0	<1	75-125	<20	
Toluene (Methyl benzene)	50.0	51.3	103	50.0	51.7	103	<1	75-125	<20	
Trichloroethene	50.0	52.3	105	50.0	51.8	104	<1	75-125	<20	
LCS										
Chloroform (Trichloromethane)	50.0	50.9	102	50.0	51.8	104	1.94	75-125	<20	
Ethylbenzene	50.0	51.7	103	50.0	51.5	103	<1	75-125	<20	
1,1,1-Trichloroethane	50.0	52.7	105	50.0	53.6	107	1.89	75-125	<20	
o-Xylene	50.0	53.8	108	50.0	53.5	107	<1	75-125	<20	
m,p-Xylenes	100	108	108	100	107	107	<1	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	47.5	95.0	50.0	46.8	93.5	1.58	75-125	<20	
Dibromofluoromethane	50.0	47.8	95.5	50.0	47.4	94.8	<1	75-125	<20	
Toluene-d8	50.0	49.2	98.5	50.0	48.4	96.8	1.73	75-125	<20	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: M8015D, TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 032812DB1; Dup or Spiked Sample: 65165.03; LCS: Clean Water; QC Prepared: 03/28/2012; QC Analyzed: 03/28/2012; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Diesel (C13-C22)	4.02	5.00	9.11	102	5.00	8.44	88.4	14.3	75-125	<20
Surrogates										
Chlorobenzene	0.00	2.00	1.77	88.5	2.00	1.66	83.0	6.21	60-125	<20

QC Batch No: 032812DB1; Dup or Spiked Sample: 65165.03; LCS: Clean Water; QC Prepared: 03/28/2012; QC Analyzed: 03/28/2012; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Diesel (C13-C22)	5.00	5.27	105	75-125						
Surrogates										
Chlorobenzene	2.00	1.81	90.5	60-125						

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: M8015G, TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032912OB2; Dup or Spiked Sample: B032912OB2; LCS: Clean Water; QC Prepared: 03/29/2012;MS Analyzed: 03/30/2012; LCS Analyzed: 03/29/2012; Units: mg/L

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.00	0.500	0.510	101	0.500	0.460	92.4	8.89	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0485	97.0	0.0500	0.0477	95.4	1.65	75-125	<20

QC Batch No: 032912OB2; Dup or Spiked Sample: B032912OB2; LCS: Clean Water; QC Prepared: 03/29/2012;MS Analyzed: 03/30/2012; LCS Analyzed: 03/29/2012; Units: mg/L

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	0.500	0.510	102	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0516	103	75-125						

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 0402122C1; Dup or Spiked Sample: 65203.01; LCS: Clean Sand; QC Prepared: 04/02/2012; QC Analyzed: 04/04/2012; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Antimony	0.00	50.0	35.6 M	71.2	50.0	34.9 M	69.8	1.99	80-120	<15
Arsenic	0.00	50.0	42.6	85.2	50.0	41.0	82.0	3.83	80-120	<15
Barium	63.2	50.0	112	97.6	50.0	108	89.6	8.55	80-120	<15
Beryllium	0.00	50.0	48.3	96.6	50.0	46.3	92.6	4.23	80-120	<15
Cadmium	0.00	50.0	45.0	90.0	50.0	43.4	86.8	3.62	80-120	<15
Chromium	9.38	50.0	57.5	96.2	50.0	54.8	90.8	5.78	80-120	<15
Cobalt	4.19	50.0	47.6	86.8	50.0	46.3	84.2	3.04	80-120	<15
Copper	6.30	50.0	52.8	93.0	50.0	51.0	89.4	3.95	80-120	<15
Lead	0.00	50.0	43.8	87.6	50.0	42.5	85.0	3.01	80-120	<15
Mercury (By EPA 7471)	0.00	0.500	0.500	100	0.500	0.505	101	<1	80-120	<15
Molybdenum	0.00	50.0	42.7	85.4	50.0	41.8	83.6	2.13	80-120	<15
Nickel	9.04	50.0	54.0	89.9	50.0	52.6	87.1	3.16	80-120	<15
Selenium	0.00	50.0	42.4	84.8	50.0	40.8	81.6	3.85	80-120	<15
Silver	0.00	50.0	46.5	93.0	50.0	44.5	89.0	4.40	80-120	<15
Thallium	0.00	50.0	39.2 M	78.4	50.0	38.6 M	77.2	1.54	80-120	<15
Vanadium	18.5	50.0	69.6	102	50.0	66.6	96.2	5.85	80-120	<15
Zinc	29.6	50.0	81.0	103	50.0	77.6	96.0	7.04	80-120	<15

QC Batch No: 0402122C1; Dup or Spiked Sample: 65203.01; LCS: Clean Sand; QC Prepared: 04/02/2012; QC Analyzed: 04/04/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Antimony	50.0	46.7	93.4	50.0	45.8	91.6	1.95	80-120	<15	
Arsenic	50.0	46.8	93.6	50.0	46.6	93.2	<1	80-120	<15	
Barium	50.0	46.8	93.6	50.0	47.1	94.2	<1	80-120	<15	
Beryllium	50.0	51.2	102	50.0	51.1	102	<1	80-120	<15	
Cadmium	50.0	46.6	93.2	50.0	46.8	93.6	<1	80-120	<15	
Chromium	50.0	47.0	94.0	50.0	47.2	94.4	<1	80-120	<15	
Cobalt	50.0	46.6	93.2	50.0	46.5	93.0	<1	80-120	<15	
Copper	50.0	45.7	91.4	50.0	45.8	91.6	<1	80-120	<15	
Lead	50.0	45.1	90.2	50.0	45.1	90.2	<1	80-120	<15	

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QUALITY CONTROL RESULTS

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (6010B/7000CAM), CAM Title 22 Metals (SW-846)

QC Batch No: 0402122C1; Dup or Spiked Sample: 65203.01; LCS: Clean Sand; QC Prepared: 04/02/2012; QC Analyzed: 04/04/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Mercury (By EPA 7471)	0.500	0.426	85.1	0.500	0.441	88.1	3.5	80-120	<15	
Molybdenum	50.0	47.1	94.2	50.0	47.0	94.0	<1	80-120	<15	
Nickel	50.0	46.2	92.4	50.0	46.4	92.8	<1	80-120	<15	
Selenium	50.0	46.8	93.6	50.0	45.8	91.6	2.16	80-120	<15	
Silver	50.0	48.3	96.6	50.0	48.9	97.8	1.23	80-120	<15	
Thallium	50.0	44.5	89.0	50.0	44.3	88.6	<1	80-120	<15	
Vanadium	50.0	47.9	95.8	50.0	48.0	96.0	<1	80-120	<15	
Zinc	50.0	47.1	94.2	50.0	47.2	94.4	<1	80-120	<15	

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Site

524 & 530 Avenida Pico
San Clemente, CA 92672

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0328122A2; Dup or Spiked Sample: 65229.07; LCS: Clean Sand; QC Prepared: 03/28/2012; QC Analyzed: 03/29/2012; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Benzene	0.00	50.0	37.9	75.8	50.0	37.6	75.2	<1	75-125	<20
Chlorobenzene	0.00	50.0	39.8	79.6	50.0	40.3	80.6	1.2	75-125	<20
1,1-Dichloroethene	0.00	50.0	38.7	77.4	50.0	37.4 M	74.8	3.4	75-125	<20
Methyl-tert-butyl ether (MTBE)	0.00	50.0	43.4	86.8	50.0	48.7	97.4	11.5	75-125	<20
Toluene (Methyl benzene)	0.00	50.0	44.1	88.2	50.0	42.6	85.2	3.5	75-125	<20
Trichloroethene	0.00	50.0	46.2	92.4	50.0	46.7	93.4	1.1	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	50.0	47.9	95.7	50.0	48.0	95.9	<1	75-125	<20
Dibromofluoromethane	0.00	50.0	49.2	98.3	50.0	51.0	102	3.7	75-125	<20
Toluene-d8	0.00	50.0	46.7	93.3	50.0	46.3	92.5	<1	75-125	<20

QC Batch No: 0328122A2; Dup or Spiked Sample: 65229.07; LCS: Clean Sand; QC Prepared: 03/28/2012; QC Analyzed: 03/29/2012; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Benzene	50.0	46.0	92.0	50.0	45.0	90.0	2.2	75-125	<20	
Chlorobenzene	50.0	50.0	100	50.0	50.5	101	<1	75-125	<20	
1,1-Dichloroethene	50.0	43.9	87.8	50.0	41.5	83.0	5.6	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	56.0	112	50.0	55.5	111	<1	75-125	<20	
Toluene (Methyl benzene)	50.0	58.5	117	50.0	56.0	112	4.4	75-125	<20	
Trichloroethene	50.0	52.5	105	50.0	52.0	104	<1	75-125	<20	
LCS										
Chloroform (Trichloromethane)	50.0	51.5	103	50.0	50.5	101	2.0	75-125	<20	
Ethylbenzene	50.0	61.5	123	50.0	56.5	113	8.5	75-125	<20	
1,1,1-Trichloroethane	50.0	51.5	103	50.0	52.0	104	<1	75-125	<20	
o-Xylene	50.0	60.5	121	50.0	61.0	122	<1	75-125	<20	
m,p-Xylenes	100	118	118	100	121	121	2.5	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	48.5	97.0	50.0	48.0	96.0	1.0	75-125	<20	
Dibromofluoromethane	50.0	50.0	100	50.0	50.0	100	<1	75-125	<20	
Toluene-d8	50.0	48.4	96.8	50.0	47.5	95.0	1.9	75-125	<20	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0329122A2; Dup or Spiked Sample: 65229.02A; LCS: Clean Sand; QC Prepared: 03/29/2012; QC Analyzed: 03/30/2012; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Benzene	0.00	50.0	40.1	80.2	50.0	44.1	88.2	9.50	75-125	<20
Chlorobenzene	0.00	50.0	38.6	77.2	50.0	26.5 M	53.0	37.2	75-125	<20
1,1-Dichloroethene	0.00	50.0	43.1	86.2	50.0	47.7	95.4	10.1	75-125	<20
Methyl-tert-butyl ether (MTBE)	0.00	50.0	54.5	109	50.0	49.0	98.0	10.6	75-125	<20
Toluene (Methyl benzene)	0.00	50.0	45.8	91.5	50.0	46.3	92.5	1.09	75-125	<20
Trichloroethene	0.00	50.0	50.5	101	50.0	34.5	69.0	37.6	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	50.0	47.9	95.7	50.0	47.5	95.0	<1	75-125	<20
Dibromofluoromethane	0.00	50.0	51.5	103	50.0	51.0	102	<1	75-125	<20
Toluene-d8	0.00	50.0	47.9	95.8	50.0	48.1	96.1	<1	75-125	<20

QC Batch No: 0329122A2; Dup or Spiked Sample: 65229.02A; LCS: Clean Sand; QC Prepared: 03/29/2012; QC Analyzed: 03/30/2012; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Benzene	50.0	44.9	89.8	50.0	49.0	98.0	8.7	75-125	<20	
Chlorobenzene	50.0	47.4	94.8	50.0	52.5	105	10.2	75-125	<20	
1,1-Dichloroethene	50.0	44.4	88.8	50.0	48.5	97.0	8.83	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	53.0	106	50.0	57.5	115	8.14	75-125	<20	
Toluene (Methyl benzene)	50.0	44.9	89.8	50.0	49.5	99.0	9.75	75-125	<20	
Trichloroethene	50.0	50.0	100	50.0	56.5	113	12.2	75-125	<20	
LCS										
Chloroform (Trichloromethane)	50.0	48.2	96.4	50.0	52.5	105	8.54	75-125	<20	
Ethylbenzene	50.0	48.1	96.2	50.0	52.5	105	8.75	75-125	<20	
1,1,1-Trichloroethane	50.0	53.0	106	50.0	56.5	113	6.39	75-125	<20	
o-Xylene	50.0	46.8	93.6	50.0	50.5	101	7.61	75-125	<20	
m,p-Xylenes	100	94.2	94.2	100	104	104	9.89	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	49.4	98.8	50.0	48.5	97.0	1.82	75-125	<20	
Dibromofluoromethane	50.0	50.0	100	50.0	48.6	97.2	2.80	75-125	<20	
Toluene-d8	50.0	47.1	94.1	50.0	47.1	94.2	<1	75-125	<20	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A1; Dup or Spiked Sample: 65251.04; LCS: Clean Sand; QC Prepared: 03/30/2012; QC Analyzed: 03/30/2012; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Benzene	0.00	50.0	40.2	80.4	50.0	40.9	81.8	1.73	75-125	<20
Chlorobenzene	0.00	50.0	43.2	86.4	50.0	38.8	77.6	10.7	75-125	<20
1,1-Dichloroethene	0.00	50.0	44.3	88.6	50.0	39.3	78.6	12.0	75-125	<20
Methyl-tert-butyl ether (MTBE)	0.00	50.0	43.0	86.0	50.0	40.7	81.4	5.50	75-125	<20
Toluene (Methyl benzene)	0.00	50.0	41.0	82.0	50.0	38.5	77.0	6.29	75-125	<20
Trichloroethene	0.00	50.0	47.0	94.0	50.0	41.0	82.0	13.6	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	50.0	47.4	94.8	50.0	47.5	94.9	<1	75-125	<20
Dibromofluoromethane	0.00	50.0	47.9	95.8	50.0	46.8	93.6	2.30	75-125	<20
Toluene-d8	0.00	50.0	48.8	97.6	50.0	49.1	98.1	<1	75-125	<20

QC Batch No: 0330122A1; Dup or Spiked Sample: 65251.04; LCS: Clean Sand; QC Prepared: 03/30/2012; QC Analyzed: 03/30/2012; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Benzene	50.0	54.5	109	50.0	56.5	113	3.60	75-125	<20	
Chlorobenzene	50.0	61.0	122	50.0	57.0	114	6.78	75-125	<20	
1,1-Dichloroethene	50.0	57.0	114	50.0	59.0	118	3.45	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	59.0	118	50.0	61.0	122	3.33	75-125	<20	
Toluene (Methyl benzene)	50.0	57.5	115	50.0	59.0	118	2.58	75-125	<20	
Trichloroethene	50.0	61.5	123	50.0	58.5	117	5.00	75-125	<20	
LCS										
Chloroform (Trichloromethane)	50.0	57.0	114	50.0	60.0	120	5.13	75-125	<20	
Ethylbenzene	50.0	60.0	120	50.0	61.5	123	2.47	75-125	<20	
1,1,1-Trichloroethane	50.0	60.5	121	50.0	59.0	118	2.51	75-125	<20	
o-Xylene	50.0	60.5	121	50.0	61.0	122	<1	75-125	<20	
m,p-Xylenes	100	121	121	100	123	123	1.64	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	47.2	94.4	50.0	47.4	94.7	<1	75-125	<20	
Dibromofluoromethane	50.0	48.2	96.4	50.0	48.7	97.3	<1	75-125	<20	
Toluene-d8	50.0	48.8	97.5	50.0	48.9	97.7	<1	75-125	<20	

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524 & 530 Avenida Pico
San Clemente, CA 92672

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (8260B), Volatile Organic Compounds by GC/MS (SW846)

QC Batch No: 0330122A2; Dup or Spiked Sample: B0330122A2; LCS: Clean Sand; QC Prepared: 03/30/2012; QC Analyzed: 03/31/2012; Units: ug/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Benzene	0.00	50.0	45.4	90.8	50.0	46.5	93.0	2.39	75-125	<20
Chlorobenzene	0.00	50.0	51.0	102	50.0	50.0	100	1.98	75-125	<20
1,1-Dichloroethene	0.00	50.0	49.0	98.0	50.0	48.0	96.0	2.06	75-125	<20
Methyl-tert-butyl ether (MTBE)	0.00	50.0	51.0	102	50.0	50.5	101	<1	75-125	<20
Toluene (Methyl benzene)	0.00	50.0	48.4	96.8	50.0	47.5	95.0	1.88	75-125	<20
Trichloroethene	0.00	50.0	51.5	103	50.0	52.0	104	<1	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	50.0	47.7	95.4	50.0	47.5	95.0	<1	75-125	<20
Dibromofluoromethane	0.00	50.0	48.0	96.0	50.0	47.2	94.3	1.77	75-125	<20
Toluene-d8	0.00	50.0	49.7	99.3	50.0	49.2	98.4	<1	75-125	<20

QC Batch No: 0330122A2; Dup or Spiked Sample: B0330122A2; LCS: Clean Sand; QC Prepared: 03/30/2012; QC Analyzed: 03/31/2012; Units: ug/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Benzene	50.0	44.8	89.6	50.0	44.9	90.0	<1	75-125	<20	
Chlorobenzene	50.0	49.3	98.6	50.0	50.2	100	1.41	75-125	<20	
1,1-Dichloroethene	50.0	46.2	92.4	50.0	46.2	92.0	<1	75-125	<20	
Methyl-tert-butyl ether (MTBE)	50.0	50.3	101	50.0	51.0	102	<1	75-125	<20	
Toluene (Methyl benzene)	50.0	47.0	94.0	50.0	47.5	95.0	1.06	75-125	<20	
Trichloroethene	50.0	49.9	99.8	50.0	49.8	100	<1	75-125	<20	
LCS										
Chloroform (Trichloromethane)	50.0	45.8	91.6	50.0	46.0	92.0	<1	75-125	<20	
Ethylbenzene	50.0	48.3	96.6	50.0	48.6	97.0	<1	75-125	<20	
1,1,1-Trichloroethane	50.0	46.4	92.8	50.0	46.7	93.0	<1	75-125	<20	
o-Xylene	50.0	47.9	95.8	50.0	49.1	98.0	2.27	75-125	<20	
m,p-Xylenes	100	97.4	97.4	100	97.4	97.4	<1	75-125	<20	
Surrogates										
Bromofluorobenzene	50.0	47.1	94.3	50.0	49.0	98.0	3.92	75-125	<20	
Dibromofluoromethane	50.0	46.9	93.8	50.0	47.8	95.6	1.92	75-125	<20	
Toluene-d8	50.0	48.1	96.2	50.0	48.9	97.7	1.56	75-125	<20	

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 032912DB1; Dup or Spiked Sample: 65228.01; LCS: Clean Sand; QC Prepared: 03/29/2012; QC Analyzed: 03/29/2012; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Diesel (C13-C22)	0.00	500	520	104	500	527	105	<1	75-125	<20
Surrogates										
Chlorobenzene	0.00	100	106	106	100	103	103	2.83	75-125	<20

QC Batch No: 032912DB1; Dup or Spiked Sample: 65228.01; LCS: Clean Sand; QC Prepared: 03/29/2012; QC Analyzed: 03/29/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Diesel (C13-C22)	500	547	109	75-125						
Surrogates										
Chlorobenzene	100	108	108	75-125						

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015D), TPH as Diesel and Heavy Hydrocarbons Using GC/FID

QC Batch No: 033012DB1; Dup or Spiked Sample: 65251.01; LCS: Clean Sand; QC Prepared: 03/30/2012; QC Analyzed: 03/30/2012; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Diesel (C13-C22)	0.00	500	509	102	500	517	103	<1	75-125	<20
Surrogates										
Chlorobenzene	0.00	100	103	103	100	94.5	94.5	8.25	75-125	<20

QC Batch No: 033012DB1; Dup or Spiked Sample: 65251.01; LCS: Clean Sand; QC Prepared: 03/30/2012; QC Analyzed: 03/30/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Diesel (C13-C22)	500	516	103	75-125						
Surrogates										
Chlorobenzene	100	109	109	75-125						

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Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032812NB1; Dup or Spiked Sample: 65229.07A; LCS: Clean Sand; QC Prepared: 03/28/2012; QC Analyzed: 03/29/2012; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.271	1.00	1.17	89.9	1.00	1.18	90.9	1.11	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0595	119	0.0500	0.0558	112	5.88	75-125	<20

QC Batch No: 032812NB1; Dup or Spiked Sample: 65229.07A; LCS: Clean Sand; QC Prepared: 03/28/2012; QC Analyzed: 03/29/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	1.00	0.970	96.6	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0517	103	75-125						

American Environmental Testing Laboratory Inc.
2834 & 2908 North Naomi Street Burbank, CA 91504 • DOHS NO: 1541, LACSD NO: 10181
Tel: (888) 288-AETL • (818) 845-8200 • Fax: (818) 845-8840 • www.aetlab.com

QUALITY CONTROL RESULTS

Ordered By

Group Delta Consultants
32 Mauchly
Suite B
Irvine, CA 92618-

Telephone: (949)450-2100
Attn: Vesna Glisic

Site

524 & 530 Avenida Pico
San Clemente, CA 92672

Page: **67**

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 032912NB1; Dup or Spiked Sample: B032912NB1; LCS: Clean Sand; QC Prepared: 03/29/2012; QC Analyzed: 03/29/2012; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.00	1.00	0.940	93.8	1.00	0.940	93.8	<1	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0555	111	0.0500	0.0501	100	9.91	75-125	<20

QC Batch No: 032912NB1; Dup or Spiked Sample: B032912NB1; LCS: Clean Sand; QC Prepared: 03/29/2012; QC Analyzed: 03/29/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	1.00	1.10	110	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0511	102	75-125						

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524 & 530 Avenida Pico
San Clemente, CA 92672

Page: **68**

Project ID: I-540
Project Name: Avenida Pico SI

AETL Job Number	Submitted	Client
65229	03/28/2012	GROUP

Method: (M8015G), TPH as Gasoline and Light Hydrocarbons Using GC/FID

QC Batch No: 033012NB1; Dup or Spiked Sample: 65251.04A; LCS: Clean Sand; QC Prepared: 03/30/2012; QC Analyzed: 03/30/2012; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
TPH as Gasoline and Light HC. (C4-C12)	0.00	1.00	0.900	90.3	1.00	0.890	88.9	1.56	75-125	<20
Surrogates										
Bromofluorobenzene	0.00	0.0500	0.0568	114	0.0500	0.0595	119	4.39	75-125	<20

QC Batch No: 033012NB1; Dup or Spiked Sample: 65251.04A; LCS: Clean Sand; QC Prepared: 03/30/2012; QC Analyzed: 03/30/2012; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS/LCSD % Limit						
TPH as Gasoline and Light HC. (C4-C12)	1.00	0.820	82.0	75-125						
Surrogates										
Bromofluorobenzene	0.0500	0.0495	99.0	75-125						

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Data Qualifiers and Descriptors

Data Qualifier:

*:	In the QC section, sample results have been taken directly from the ICP reading. No preparation factor has been applied.
B:	Analyte was present in the Method Blank.
D:	Result is from a diluted analysis.
E:	Result is beyond calibration limits and is estimated.
H:	Analysis was performed over the allowed holding time due to circumstances which were beyond laboratory control.
J:	Analyte was detected . However, the analyte concentration is an estimated value, which is between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL).
M:	Matrix spike recovery is outside control limits due to matrix interference. Laboratory Control Sample recovery was acceptable.
MCL:	Maximum Contaminant Level
NS:	No Standard Available
S6:	Surrogate recovery is outside control limits due to matrix interference.
S8:	The analysis of the sample required a dilution such that the surrogate concentration was diluted below the method acceptance criteria.
X:	Results represent LCS and LCSD data.

Definition:

%Limi:	Percent acceptable limits.
%REC:	Percent recovery.
Con.L:	Acceptable Control Limits
Conce:	Added concentration to the sample.
LCS:	Laboratory Control Sample
MDL:	Method Detection Limit is a statistically derived number which is specific for each instrument, each method, and each compound. It indicates a distinctively detectable quantity with 99% probability.

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Data Qualifiers and Descriptors

MS:	Matrix Spike
MS DU:	Matrix Spike Duplicate
ND:	Analyte was not detected in the sample at or above MDL.
PQL:	Practical Quantitation Limit or ML (Minimum Level as per RWQCB) is the minimum concentration that can be quantified with more than 99% confidence. Taking into account all aspects of the entire analytical instrumentation and practice.
Recov:	Recovered concentration in the sample.
RPD:	Relative Percent Difference

APPENDIX C
Building Materials Investigation Report, Panacea 2012

PANACEA, INC.
Environmental Services
14905 Paramount Blvd., Suite H • Paramount, CA 90723 • Tel. 562.860.2869 • Fax 562.633.3180

Final

April 23, 2012

Vesna Glisic Petrilla, P.E.
Project Engineer
Group Delta Consultants, Inc.
32 Mauchy, Suite B
Irvine, CA 92618

via Email
VesnaG@GroupDelta.com

SUBJECT: Asbestos Survey for Burger Stop and Shell Gas Station Located at 524 and 530 East Avenida Pico, San Clemente, California

In response to your request, Panacea, Inc. (Panacea) conducted an asbestos survey on March 26, 2012, at the above-referenced site. The survey was requested as part of the proposed demolition of the subject buildings.

Burger Stop (Building 524) is a 750-square-foot (SF) single-story restaurant built in 1966, and Shell Gas Station (Building 530) is a 1,380-SF single-story building built in 1964.

1.0 OBJECTIVES

The objective of the work was to assess the likelihood that asbestos is present in suspect and readily accessible construction materials in concentrations greater than 1 percent.

2.0 GUIDELINES, TERMINOLOGY, AND EVALUATION CRITERIA

2.1 SAMPLING STRATEGY

This asbestos survey was performed in general accordance with standard procedures recommended by the U.S. Environmental Protection Agency (EPA) and the requirements of the State of California Division of Occupational Safety and Health (DOSH). Standard procedures for asbestos surveys do not include inspecting areas or collecting samples that would require complete destruction of walls, floors, or ceilings of a building, except in cases in which the survey is performed concurrently with demolition and renovation activities.

The sample collection strategy in this survey was based on the EPA's publication, *Guidance for Controlling Asbestos-Containing Materials in Buildings* (EPA, 1985). This document specifies the methodology for sampling of friable materials, defined by the EPA as those materials that can be crumbled, pulverized, or reduced to powder by hand pressure when dry (EPA, 1985).

In addition, samples were collected from nonfriable materials judged to potentially contain asbestos. Nonfriable asbestos-containing material (ACM) can become friable when disturbed through work practices and/or handling (EPA, 1987). Such work practices can include grinding, sanding, and handling the material during removal activities.

The EPA specifies that ACM classified as friable, or that could become friable, is to be removed prior to demolition activities (EPA, 1990). According to the EPA (1985), nonfriable ACM represents a minimal hazard to the occupants of a building as long as the material is in a generally undamaged condition and used for its intended purpose. In addition, the National Emission Standards for Hazardous Air Pollutants (NESHAPs) require that both friable ACM and nonfriable ACM that could become friable (greater than 1 percent asbestos) be removed prior to renovation or demolition of buildings.

2.2 DEFINITIONS AND LABORATORY ANALYTICAL METHOD

When a material is found to contain asbestos in concentrations greater than 1 percent, it is defined by the EPA as an ACM (EPA, 1987). The California Construction Safety Orders for asbestos (Article 4 of Title 8, California Code of Regulations [CCR], Section 1529 [8 CCR 1529]) also define ACM as containing greater than 1 percent asbestos (DOSH, 1996). However, Section 25919 of the California Health and Safety Code defines an asbestos-containing construction material (ACCM) as one that contains greater than 0.1 percent asbestos (California Health and Safety Code).

Under the California Health and Safety Code, asbestos notification to employees, occupants, and others working in buildings is required for materials containing greater than 0.1 percent asbestos. In addition, removal of more than 100 SF of ACCM (less than 1 but greater than 0.1 percent asbestos) still requires a State of California-licensed asbestos abatement contractor.

Under DOSH requirements, worker/employee notification and training are required when a material contains greater than 1 percent asbestos in an area where workers/employees perform work (DOSH, 1996).

The analytical laboratory used for this project is accredited pursuant to Section 206(d) of the Toxic Substances Control Act (TSCA, 1976) to detect asbestos in bulk samples. The polarized light microscopy (PLM) method used by that laboratory has a detection limit of 1 percent. In our experience, quantification of asbestos in bulk samples at a level below 1 percent is not technically possible with a high degree of confidence when PLM is used. Therefore, a material reported to have a trace percentage (less than 1 percent) of asbestos should be treated as an ACCM (greater than 0.1 percent) due to the detection limit of the laboratory method used.

Transmission electron microscopy-quantitative (TEM-quantitative) analysis has a detection limit below 0.1 percent by weight, and it can be performed on a material for further quantification. Because the TEM-quantitative analytical cost is 20 to 30 times the PLM analytical cost, it is not typically used for the initial analysis of collected materials. Under situations where PLM reported a material containing less 1 percent asbestos and there is a significant impact on the abatement operations and/or maintenance (O&M) costs, additional TEM-quantitative analysis would be justified.

2.3 ACM CONDITIONS AND TERMINOLOGY

For purposes of discussion, the terms "undamaged" (good), "damaged," and "significantly damaged" refer to the condition of the construction materials from which the samples were collected at the time the survey was conducted. The terms are applied based on the judgment of personnel from Panacea who used the definitions in Title 40, Code of Federal Regulations (CFR), Part 763 (40 CFR 763) (EPA, 1987). The term "homogeneous area" is used herein in general accordance with its definition by the EPA as an area of surfacing material, thermal system insulation (TSI) material, or other miscellaneous material that is uniform in color and texture.

2.4 ESTIMATED AREA COVERED AND COSTS

When a material was reported to contain asbestos, the areas that appeared to be homogeneous with that material, in the judgment of Panacea's asbestos consultant, were included in the area estimation. The estimated area covered by ACM was obtained by linearly extrapolating the plot plans prepared by Panacea. In addition, corners of floor covering and ceiling material, such as carpeting and suspended ceiling tiles, were lifted and checked for potential ACM under or above. When an underlying or overlying layer of potential ACM was observed, it was sampled and analyzed. When the sample was reported to contain asbestos, the covered areas were assumed to be ACM. These areas are included as part of the area estimates.

When applicable, our estimate of wall materials (e.g., drywall, joint compound, and plaster) is based on the actual floor area covered. The actual wall/surface area of the material can be expected to be two to five times the floor area for the following reasons:

- It is presumed that a typical building (commercial and/or residential) has approximately the same square footage for the wall area as for the floor area and that a wall has two sides.

- In buildings with smaller partitioned rooms throughout, the actual wall area would be expected to exceed at least two times the floor area.

- The ceiling area could be covered with material homogeneous to that on the wall, which would increase the overall square footage of the material.

2.5 ABATEMENT PRIORITY SYSTEM

An abatement priority system was developed and priorities were assigned to various materials reported to contain asbestos (see survey summary table). The priority system is provided for O&M purposes only. Any ACM that is friable or has a potential to become friable should be removed prior to renovating or demolishing the building. The priorities are classified as follows:

- **Priority No. 1** - ACM should be removed immediately. This priority is typically used for friable and significantly damaged ACM.

- **Priority No. 2** - ACM should be removed as soon as possible. This priority is typically used for friable and damaged or nonfriable and significantly damaged ACM.

- **Priority No. 3** - ACM should be removed for potential liability reasons but can remain in place as long as materials remain in good condition. This priority is typically used for either friable and good or nonfriable and damaged ACM.

- **Priority No. 4** - ACM judged to pose a minimal health hazard and should be managed in place as long as materials remain in good condition. This priority is typically used for nonfriable ACM in good condition.

- **Priority No. 5** - ACCM (less than 1 percent) is judged to pose a minimal health hazard and is not regulated as ACM under DOSH and EPA. Therefore, no action is recommended for the materials.

For O&M purposes, we generally recommend that Priority Nos. 1 and 2 ACM be removed as soon as possible and that Priority Nos. 3 and 4 ACM be managed in place. No action is required for Priority No. 5 ACCM, except for notification requirements (see Section 2.2). However, the client's policies may differ.

For renovation and demolition purposes, we recommend that both friable ACM and nonfriable ACM that can become friable be removed by a qualified State of California-licensed asbestos contractor prior to renovation or demolition where disturbance to ACM is likely. Although Priority No. 5 material (ACCM) is not classified as ACM, the demolition of more than 100 SF of such material still requires a State of California-licensed asbestos contractor.

3.0 ASBESTOS SURVEY RESULTS

3.1 BUILDING 524

A total of 22 bulk samples of accessible suspect materials were collected and submitted to Forensic Analytical Specialties, Inc., located at 2959 Pacific Commerce Drive, Rancho Dominguez, California, for analysis using PLM. Copies of the laboratory analytical report and chain-of-custody records are attached.

Based on the scope of work, site observations, accessibility of the materials and building area, laboratory analytical results, current regulatory guidelines and laws, state-of-the-industry practices, and the professional judgment of Panacea personnel, the presence, location, and estimated quantity of identified ACM and/or ACCM are noted below.

PRESENCE, LOCATIONS, AND QUANTITIES OF ACM and/or ACCM

PRESENCE	LOCATION (HOMOGENEOUS AREA)	ESTIMATED QUANTITY
ACM (>1% Asbestos)		
Plastic roof cement (roof mastic), black and light gray	Included PRC on penetrations and seals scattered throughout the roofs and components of this building.	<20 SF
Joint compound, off-white	Included JC on walls and/or ceilings in Rooms #1, #3, #4, #5, and #7. See Figure 1.	~2,200 SF

Notes:

"<" = less than; "~" = approximately; PRC = plastic roof cement (roof mastic); JC = joint compound; SF = square feet

The accompanying asbestos survey summary table presents detailed descriptions of materials sampled, sample locations, laboratory analytical results, and estimated quantities. Figure 1 depicts the approximate locations where samples were collected.

3.2 BUILDING 530

A total of 18 bulk samples of accessible suspect materials were collected and submitted to Forensic Analytical Specialties, Inc., located at 2959 Pacific Commerce Drive, Rancho Dominguez, California, for analysis using PLM. Copies of the laboratory analytical report and chain-of-custody records are attached.

Based on the scope of work, site observations, accessibility of the materials and building area, laboratory analytical results, current regulatory guidelines and laws, state-of-the-industry practices, and the professional judgment of Panacea personnel, asbestos was not detected in the samples.

The accompanying asbestos survey summary table presents detailed descriptions of materials sampled, sample locations, laboratory analytical results, and estimated quantities. Figure 2 depicts the approximate locations where samples were collected.

4.0 CONCLUSIONS AND/OR RECOMMENDATIONS

The following conclusions/recommendations are based on the information obtained during this survey, laboratory analytical results, current regulatory guidelines and laws, state-of-the-industry practices, and the judgment of Panacea's personnel:

- There is a high likelihood that asbestos is present in concentrations greater than 1 percent in Building 524. The appendix contains an explanation of likelihood statements.

- Priority No. 1 Material – None present.
- Priority No. 2 Material – None present.
- Priority No. 3 Material – None present.
- Priority No. 4 Material – Plastic roof cement (roof mastic) and joint compound can be managed in place as long as they remain in good condition and should be removed prior to renovation or demolition.
- Priority No. 5 Material – None present.
- Friable ACM and nonfriable ACM that could become friable should be removed prior to renovation or demolition.
- Outside contractors and tenants working in the subject buildings should be notified regarding the presence and locations of the friable and nonfriable ACM. Applicable notification laws should be followed.
- The building owner and/or property manager should obtain an "asbestos-free certification" from any contractors installing or removing building materials and should notify the maintenance staff to use only "asbestos-free" products for any repair and maintenance work.
- No judgment was made for inaccessible construction materials or materials that had not been sampled and analyzed.

5.0 LIMITATIONS

The judgments and conclusions described in this report pertain to conditions judged to be present or applicable at the time the work was performed and within the scope of work. Future conditions may differ from those described herein, and this report is not intended for use in future evaluations of the site unless an update is conducted by a Certified Asbestos Consultant (CAC).

Certain materials not sampled may contain asbestos in concentrations greater than 1 percent. These materials include concrete, electrical wrapping, materials inside electrical fixtures, brake shoes, and other building materials that may be hidden behind building components. However, these materials are judged to have a very low likelihood of containing greater than 1 percent asbestos.

Although personnel who conducted the survey are certified under the Asbestos Hazard Emergency Response Act (AHERA) and an accredited laboratory performed the analysis, the asbestos survey described herein may not identify all ACM onsite. Possible reasons for this include inaccessible building features, unavailability of as-built drawings (specifying all building materials used in the structure), practical limitations as to the number of samples that can be collected, and analytical method used (PLM). Furthermore, although a sample was collected

from each material that appeared to be different (based on color and texture), homogeneity of content of similar materials cannot be guaranteed because similarity of color and texture does not assure that the same ingredients were used in their manufacturing. It is possible that of two apparently similar materials, one may contain asbestos and one may not. Therefore, additional sampling and testing may be necessary to provide a higher confidence level regarding the presence of ACM in the building.

Services performed by Panacea were conducted in a manner consistent with state-of-the-industry practices, recognizing that even the most comprehensive survey may not detect all ACM in the building. Therefore, Panacea cannot act as an insurer or certify that the site is free of asbestos.

6.0 REFERENCES

California Division of Occupational Safety and Health (DOSH), 1996, *Construction Safety Orders*: Title 8, California Code of Regulations, Section 1529.

California Health and Safety Code, Division 20, Chapter 10.4, Section 25919.

Toxic Substances Control Act (TSCA), 1976, *Asbestos Hazard Emergency Response*: Title II, Section 206, 15 United States Code 2601-2671.

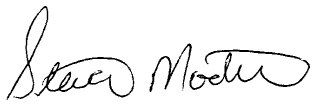
U.S. Environmental Protection Agency (EPA), 1990, Federal Register, *National Emission Standards for Hazardous Air Pollutants (NESHAPs), Asbestos Revision, Final Rule*: U.S. Environmental Protection Agency, Title 40, Code of Federal Regulations, Part 61, 20 November 1990, pp. 48406 to 48433.

EPA,1987, Federal Register, *Asbestos Hazard Emergency Response Act (AHERA), Asbestos-Containing Materials in Schools, Final Rule and Notice:* U.S. Environmental Protection Agency, Title 40, Code of Federal Regulations, Part 763, 30 October 1987, pp. 41826 to 41905.

EPA, 1985, Guidance for Controlling Asbestos-Containing Materials in Buildings: Office of Pesticides and Toxic Substances, U.S. Environmental Protection Agency, Publication Number 560/5/85-024, May 1985.

If you have any questions regarding this letter report, please feel free to contact me at your convenience.

Very truly yours,
PANACEA, INC.



Steven Modtland, CAC
Certification No. 08-4373

ATTACHMENTS:

- Asbestos Survey Summary Tables
- Figures 1 and 2
- Building Inspector's Certification
- Laboratory Accreditation
- Laboratory Analytical Reports and Chain-of-Custody Record
- Likelihood Statements

ATTACHMENTS

ASBESTOS SURVEY SUMMARY TABLE

Building No. 524

Sample No.	Analytical Results	Description of Material	Sample Location	Est. Area Covered	Homogeneous Area	Additional Comments
524-B-001 **Priority No.**	ND	Rolled-on roofing material, vertical surface, light gray, black matrix	Roof, Section #2			
524-B-002 **Priority No.**	ND	Rolled-on roofing material, vertical surface, light gray, black matrix	Roof, Section #2			
524-B-003 **Priority No.**	ND	Built-up roofing material, horizontal surface, black	Roof, Section #2			
524-B-004 **Priority No.**	ND	Built-up roofing material, horizontal surface, black	Roof, Section #2			
524-B-005 **Priority No.**	ND	Built-up roofing material, horizontal surface, black	Roof, Section #1			
524-B-006 **Priority No.** 4	5% CH	Plastic roof cement (roof mastic), black and light gray	Roof, Section #2, on HVAC duct	<20 SF	Included PRC on penetrations and seals scattered throughout the roofs and components of this building.	Nonfriable and in good condition.
524-B-007 **Priority No.**	ND	Plastic roof cement (roof mastic), black and light gray	Roof, Section #1, on vent pipe			
524-B-008 **Priority No.**	ND	HVAC duct sealant material, beige	Roof, Section #1			
524-B-009 **Priority No.**	ND	Cove base and clear/white mastic, 3", dark brown	First floor, Room #7			
524-B-010 **Priority No.**	ND	Linoleum and yellow mastic, brown rock pattern	First floor, Room #7			

ASBESTOS SURVEY SUMMARY TABLE

Building No. 524

Sample No.	Analytical Results	Description of Material	Sample Location	Est. Area Covered	Homogeneous Area	Additional Comments
524-B-011 **Priority No.**	ND	Linoleum and yellow mastic, brown rock pattern	First floor, Room #4			
524-B-012 **Priority No.**	ND	Cove base and white mastic, 3", black	First floor, Room #4			
524-B-013 **Priority No.**	ND	Linoleum and yellow mastic, brown	First floor, Room #5			
524-B-014 **Priority No.** 4	JC=2% CH, COMP=<1% CH	Joint compound, off-white	First floor, Room #4	~2,200 SF	Included JC on walls and/or ceilings in Rooms #1, #3, #4, #5, and #7. See Figure 1.	Friable and in good condition. JC >1% CH (or <1% CH), as a wall system composite with DW, assumed <1% CH. Not considered as ACM under EPA, but must comply with DOSH regulations as ACM.
524-B-015 **Priority No.**	ND	Wallboard (drywall), white	First floor, Room #3			
524-B-016 **Priority No.**	ND	Wallboard (drywall), white	First floor, Room #2			
524-B-017 **Priority No.**	ND	Silver foil paper	First floor, Room #2, behind drywall			
524-B-018 **Priority No.** 4	JC=2% CH, COMP=<1% CH	Joint compound, off-white	First floor, Room #3	0	Included in 524-B-014.	Friable and in good condition. JC >1% CH (or <1% CH), as a wall system composite with DW, assumed <1% CH. Not considered as ACM under EPA, but must comply with DOSH regulations as ACM.
524-B-019 **Priority No.**	ND	Joint compound, off-white	First floor, Room #7, behind light switch			
524-B-020 **Priority No.**	ND	Joint compound, off-white	First floor, Room #1			

ASBESTOS SURVEY SUMMARY TABLE

Building No.	524

Sample No.	Analytical Results	Description of Material	Sample Location	Est. Area Covered	Homogeneous Area	Additional Comments
524-B-021 **Priority No.** 4	JC=2% CH, COMP=<1% CH	Joint compound, off-white	First floor, Room #1, on ceiling	0	Included in 524-B-014.	Friable and in good condition. JC >1% CH (or <1% CH), as a wall system composite with DW, assumed <1% CH. Not considered as ACM under EPA, but must comply with DOSH regulations as ACM.
524-B-022 **Priority No.**	ND	Felt, black	Exterior, behind wood paneling			

NOTES (where applicable):

1. This summary table is intended to be used with the figure(s) prepared by Panacea, Inc. Please refer to the figure(s) for the room or area designations.
2. Estimated area covered is intended for discussion and management purposes only. Actual square footage may vary. Other asbestos-containing materials (ACMs) may be present in inaccessible areas of the building.
3. CH = chrysotile; AM = amosite; CR = crocidolite; AN = anthophyllite; TR = tremolite; AC = actinolite; ND = none detected; <1% = trace amount of asbestos.
4. HVAC = heating, ventilation, and air conditioning unit; FP = floor plan; OD = outside diameter; LF = linear feet; SF = square feet; "~" = approximately; "<" = less than; ">" = greater than; OH = overhang; TEM = transmission electron microscopy; "+" = positive, "x" = times.
5. DW = wallboard (drywall); FM = flooring material; FT = floor tile; MAS = mastic; LN = linoleum; CB = cove base; CBM = cove base and mastic; SP = silver paint sealant; DS = duct sealant; RM = roofing material; PRC = plastic roof cement; FLC = floor leveling compound; CT = ceiling tile; HDW = HVAC duct wrapping material; DI = duct insulation; SFP = silver foil paper; PI = pipe insulation.
6. JC = asbestos concentration for joint compound; COMP = assumed asbestos concentrations for the composited system (walls and/or ceiling) consisting of wallboard (drywall) and joint compound.
7. ACM = asbestos-containing material; ACCM = asbestos-containing construction material.
8. EPA = U.S. Environmental Protection Agency; DOSH = Division of Occupational Safety and Health.

ASBESTOS SURVEY SUMMARY TABLE

Building No. 530

Sample No.	Analytical Results	Description of Material	Sample Location	Est. Area Covered	Homogeneous Area	Additional Comments
530-B-001 **Priority No.**	ND	Joint compound, off-white	First floor, Room #3			
530-B-002 **Priority No.**	ND	Joint compound, off-white	First floor, Room #5			
530-B-003 **Priority No.**	ND	Joint compound, off-white	First floor, Room #6, behind light switch			
530-B-004 **Priority No.**	ND	Wallboard (drywall), white	First floor, Room #6			
530-B-005 **Priority No.**	ND	Wallboard (drywall), white	First floor, Room #1			
530-B-006 **Priority No.**	ND	Gasket, black	Exterior			
530-B-007 **Priority No.**	ND	Finish coat, off-white	Exterior, on concrete wall			
530-B-008 **Priority No.**	ND	Finish coat, off-white	Exterior, on concrete wall			
530-B-009 **Priority No.**	ND	Finish coat, off-white	Exterior, on concrete wall			
530-B-010 **Priority No.**	ND	Finish coat, off-white	Exterior, gas pump area, on concrete wall			

ASBESTOS SURVEY SUMMARY TABLE

Building No. 530

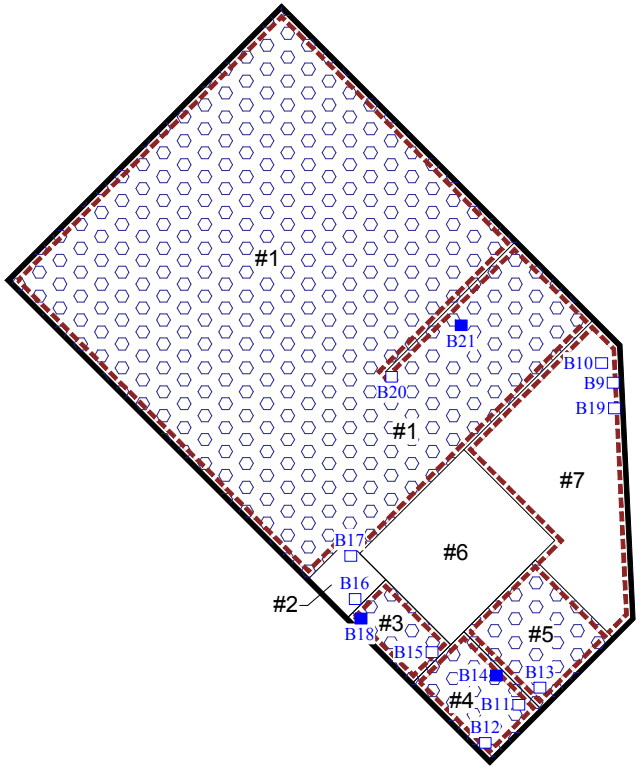
Sample No.	Analytical Results	Description of Material	Sample Location	Est. Area Covered	Homogeneous Area	Additional Comments
530-B-011 **Priority No.**	ND	Finish coat, off-white	Exterior, gas pump area, on concrete wall			
530-B-012 **Priority No.**	ND	Felt, black	Exterior, gas pump area			
530-B-013 **Priority No.**	ND	Ceiling tile, 2'X4', white, drywall matrix	First floor, Room #1			
530-B-014 **Priority No.**	ND	Ceiling tile, 2'X4', white, drywall matrix	First floor, Room #1			
530-B-015 **Priority No.**	ND	Felt, black	Roof, under ceramic shingle			
530-B-016 **Priority No.**	ND	Felt, black	Roof, under ceramic shingle			
530-B-017 **Priority No.**	ND	Roof sealant, off-white	Roof			
530-B-018 **Priority No.**	ND	Roof sealant, off-white	Roof			

ASBESTOS SURVEY SUMMARY TABLE

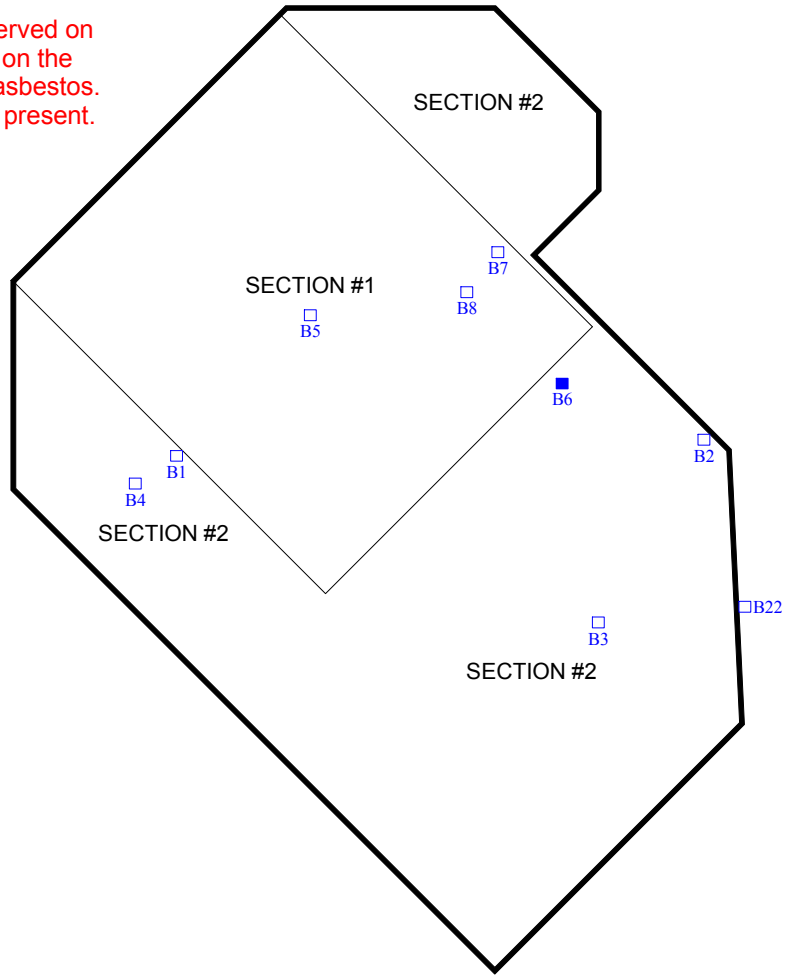
NOTES (where applicable):

1. This summary table is intended to be used with the figure(s) prepared by Panacea, Inc. Please refer to the figure(s) for the room or area designations.
2. Estimated area covered is intended for discussion and management purposes only. Actual square footage may vary. Other asbestos-containing materials (ACMs) may be present in inaccessible areas of the building.
3. CH = chrysotile; AM = amosite; CR = crocidolite; AN = anthophyllite; TR = tremolite; AC = actinolite; ND = none detected; <1% = trace amount of asbestos.
4. HVAC = heating, ventilation, and air conditioning unit; FP = floor plan; OD = outside diameter; LF = linear feet; SF = square feet; "~" = approximately; "<" = less than; ">" = greater than; OH = overhang; TEM = transmission electron microscopy; "+" = positive, "x" = times.
5. DW = wallboard (drywall); FM = flooring material; FT = floor tile; MAS = mastic; LN = linoleum; CB = cove base; CBM = cove base and mastic; SP = silver paint sealant; DS = duct sealant; RM = roofing material; PRC = plastic roof cement; FLC = floor leveling compound; CT = ceiling tile; HDW = HVAC duct wrapping material; DI = duct insulation; SFP = silver foil paper; PI = pipe insulation.
6. JC = asbestos concentration for joint compound; COMP = assumed asbestos concentrations for the composited system (walls and/or ceiling) consisting of wallboard (drywall) and joint compound.
7. ACM = asbestos-containing material; ACCM = asbestos-containing construction material.
8. EPA = U.S. Environmental Protection Agency; DOSH = Division of Occupational Safety and Health.

Special Note: Plastic roof cement (roof mastic) observed on penetrations, seals, and components on the roof(s) of this building contains >1% asbestos. Assumed <20 SF of the material was present.



FLOOR PLAN



ROOF AND EXTERIOR PLAN

N

LEGEND

- Bulk Sample Location (Negative)
- Bulk Sample Location (Positive, >1% Asbestos)
- Wall With Asbestos-Containing Joint Compound (>1% Asbestos). As A Composite Wall System, It Is Assumed to Contain <1% Asbestos.
- Ceiling With Asbestos-Containing Joint Compound (>1% Asbestos). As A Composite Ceiling System, It Is Assumed to Contain <1% Asbestos.

GENERAL NOTES

1. All locations are approximate. No scale or dimension is implied.
2. Base map obtained from field measurements.
3. Room numbers or area designations are arbitrarily assigned for discussion purposes only.
4. Sample numbers are shortened for graphic presentation purposes (e.g., sample number [BLDG NO.]-B-001 is shortened to B1).

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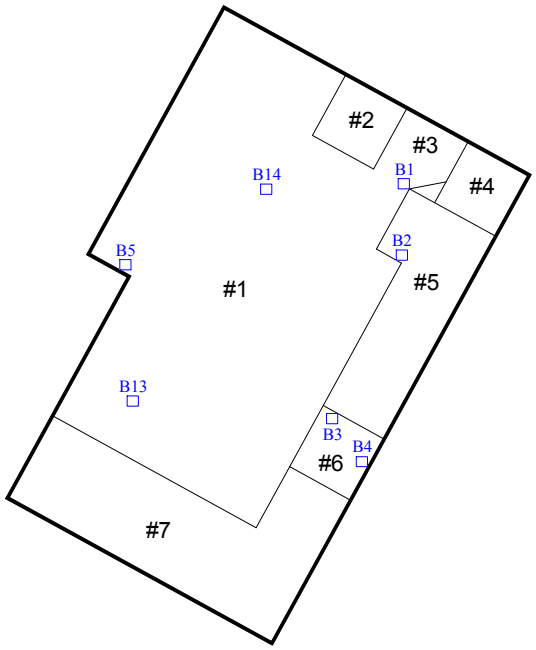
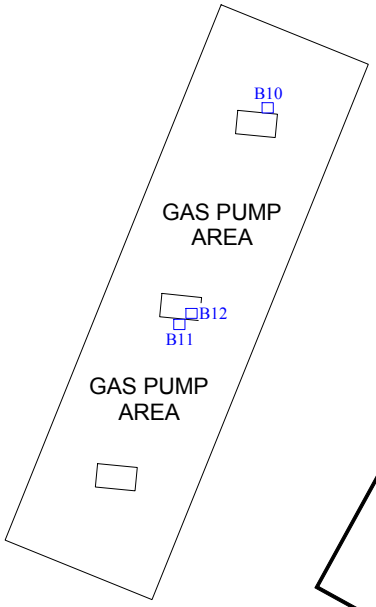
Environmental Services

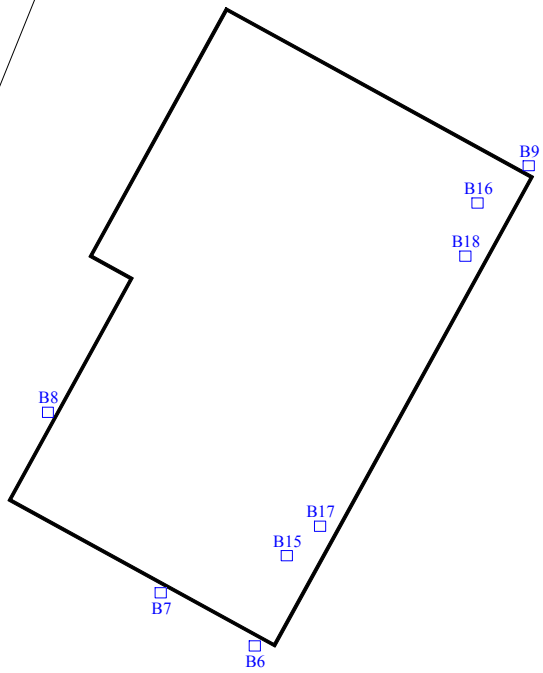
ACM AND BULK SAMPLE LOCATIONS
BURGER STOP
524 EAST AVENIDA PICO
SAN CLEMENTE, CALIFORNIA

PROJECT NO. C12-745 | FIGURE 1



FLOOR PLAN





ROOF AND EXTERIOR PLAN

N

LEGEND

□ Bulk Sample Location (Negative)

GENERAL NOTES

1. All locations are approximate. No scale or dimension is implied.
2. Base map obtained from field measurements.
3. Room numbers or area designations are arbitrarily assigned for discussion purposes only.
4. Sample numbers are shortened for graphic presentation purposes (e.g., sample number [BLDG NO.]-B-001 is shortened to B1).

PANACEA, INC.
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BULK SAMPLE LOCATIONS
SHELL GAS STATION
530 EAST AVENIDA PICO
SAN CLEMENTE, CALIFORNIA

PROJECT NO. C12-745 | FIGURE 2

State of California
Division of Occupational Safety and Health

Certified Asbestos Consultant

Steven L Modtland
Name

Certification No. ~~08-4373~~

Expires on ~~05/15/12~~

This certification was issued by the Division of Occupational Safety and Health as authorized by Sections 7180 et seq. of the Business and Professions Code.

NVLAP® National Voluntary Laboratory Accreditation Program

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

Forensic Analytical Laboratories, Inc
2959 Pacific Commerce Drive
Rancho Dominguez, CA 90221
Steven Takahashi
Phone: 310-763-2374 Fax: 310-763-8684
E-Mail: Daves@forensica.com
URL: http://www.forensica.com

BULK ASBESTOS FIBER ANALYSIS (PLM) **NVLAP LAB CODE 101459-1**

NVLAP Code	*Designation / Description*
18/A01	EPA-600/M4-82-020: Interim Method for the Determination of Asbestos in Bulk Insulation Samples

2011-07-01 through 2012-06-30
Effective dates

Sally S. Bruce
For the National Institute of Standards and Technology

United States Department of Commerce
National Institute of Standards and Technology

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 101459-1

Forensic Analytical Laboratories, Inc

Rancho Dominguez, CA

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

BULK ASBESTOS FIBER ANALYSIS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2011-07-01 through 2012-06-30

Effective dates

Sally S. Bruce

For the National Institute of Standards and Technology

NVLAP-01C (REV. 2009-01-28)

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Panacea Inc.
Steven Modtland
14905 Paramount Blvd.
Suite - H
Paramount, CA 90723

Client ID: 5572
Report Number: B161563
Date Received: 03/26/12
Date Analyzed: 03/28/12
Date Printed: 03/28/12
First Reported: 03/28/12

Job ID/Site: C12-745; Avenida Pico

Date(s) Collected: 03/26/2012

FALI Job ID: 5572
Total Samples Submitted: 22
Total Samples Analyzed: 22

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
524-B-1	50725843						
Layer: Grey Roof Shingle			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (45 %)							
524-B-2	50725844						
Layer: Grey Roof Shingle			**ND**				
Layer: Black Tar			**ND**				
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (45 %)							
524-B-3	50725845						
Layer: Black Tars			**ND**				
Layer: Black Felts			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (55 %)							
524-B-4	50725846						
Layer: Black Tars			**ND**				
Layer: Black Felts			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (40 %)							
524-B-5	50725847						
Layer: Black Tars			**ND**				
Layer: Black Felts			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace) Fibrous Glass (55 %)							
524-B-6	50725848						
Layer: Black Semi-Fibrous Tar		Chrysotile	**5 %**				
Total Composite Values of Fibrous Components:		**Asbestos (5%)**					
Cellulose (Trace)							

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Report Number: B161563
Client Name: Panacea Inc. **Date Printed:** 03/28/12

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
524-B-7	50725849						
Layer: Black Semi-Fibrous Tar			**ND**				
Total Composite Values of Fibrous Components: **Asbestos (ND)** Cellulose (5 %)							
524-B-8	50725850						
Layer: Grey Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: **Asbestos (ND)**							
524-B-9	50725851						
Layer: Brown Non-Fibrous Material			**ND**				
Layer: Clear Mastic			**ND**				
Layer: Off-White Mastic			**ND**				
Total Composite Values of Fibrous Components: **Asbestos (ND)** Cellulose (Trace)							
524-B-10	50725852						
Layer: Beige Sheet Flooring			**ND**				
Layer: Fibrous Backing/Tan Mastic			**ND**				
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: **Asbestos (ND)** Cellulose (25 %) Fibrous Glass (5 %) Synthetic (2 %)							
524-B-11	50725853						
Layer: Beige Sheet Flooring			**ND**				
Layer: Fibrous Backing/Tan Mastic			**ND**				
Total Composite Values of Fibrous Components: **Asbestos (ND)** Cellulose (15 %) Fibrous Glass (10 %) Synthetic (7 %)							
524-B-12	50725854						
Layer: Black Non-Fibrous Material			**ND**				
Layer: White Mastic			**ND**				
Total Composite Values of Fibrous Components: **Asbestos (ND)** Cellulose (Trace)							
524-B-13	50725855						
Layer: Tan Sheet Flooring			**ND**				
Layer: Fibrous Backing/Beige Mastic			**ND**				
Total Composite Values of Fibrous Components: **Asbestos (ND)** Cellulose (15 %) Fibrous Glass (5 %) Synthetic (20 %)							
524-B-14	50725856						
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: **Asbestos (2%)** Cellulose (Trace)							
524-B-15	50725857						
Layer: White Drywall			**ND**				
Total Composite Values of Fibrous Components: **Asbestos (ND)** Cellulose (20 %) Fibrous Glass (Trace)							

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Report Number: B161563

Client Name: Panacea Inc. **Date Printed:** 03/28/12

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
524-B-16	50725858						
Layer: White Drywall			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (70 %) Fibrous Glass (Trace)							
524-B-17	50725859						
Layer: Tan Fibrous Material with Foil			**ND**				
Layer: Black Tar			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (85 %) Fibrous Glass (Trace)							
524-B-18	50725860						
Layer: Drywall Tape			**ND**				
Layer: Off-White Skimcoat/Joint Compounds		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
Cellulose (10 %)							
524-B-19	50725861						
Layer: Off-White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
524-B-20	50725862						
Layer: Grey Plaster			**ND**				
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (Trace)							
524-B-21	50725863						
Layer: Off-White Skimcoat/Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (2%)**					
Cellulose (Trace)							
524-B-22	50725864						
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components:		**Asbestos (ND)**					
Cellulose (80 %)							

Steven Takahashi, Laboratory Supervisor, Rancho Dominguez Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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Report Number: B161563

Client Name: Panacea Inc. **Date Printed:** 03/28/12

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer

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PANACEA, INC.

Environmental Services

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CHAIN OF CUSTODY RECORD

Date: 3/26/12 PM: Steven Maitland Page: 1 of 2

Project Name: Avenida P.co Sampled By: SM

Project No.: C12-745 Shipped To: Forn. Anc. by: Dropped off

SAMPLE NUMBER	SAMPLING DATE / TIME	PRESERVATION METHOD	CONTAINER TYPE/SIZE	SAMPLE MATRIX	ANALYSES REQUIRED PLM	
524-B-1	3/26/12	None	Plastic Bag	Bulk	✓	
2						
3						
4						
5						
6						
7						
8						
9						CBM
10						LNM
11						LNM
12						CBM
13						LNM
14						
15						
16						
17						
18						
19						
20						

TOTAL NUMBER OF SAMPLES 20 2-Day Turnaround

COMMENTS: Return signed chain-of-custody forms with final report(s). Email the report to Lorraina at lvalencia@panenv.com

FTM = floor tile and mastic; LNM = linoleum and mastic; CBM = cove base and mastic;
CTM = ceiling tile and mastic; DWJ = wallboard and joint compound; ML = other multiple-layered materials.

Relinquished By:		Company: Panacea, Inc	Date: 3/26/12	Time: —
Received By: (Relinquished)		Company: Panacea Inc.	Date: 3/26/12	Time: 4:30
Relinquished By: (Received)		Company: FAC D/O	Date: 3/26/12	Time: 4:30 pm
Received By:		Company:	Date:	Time:
Relinquished By:		Company:	Date:	Time:
Received By:		Company:	Date:	Time:

Revision : 07-09-28

PANACEA, INC.

Environmental Services

14905 Paramount Blvd., Suite H • Paramount, CA 90723 • Tel. 562.860.2869 • Fax 562.633.3180

CHAIN OF CUSTODY RECORD

Date: 3/26/12 PM: Steven Medtland

Page: 2 of 2

Project Name: Avenida Pico

Sampled By: SM

Project No.: C12-745

Shipped To: Fou. Ang. by: Dropped Off

SAMPLE NUMBER	SAMPLING DATE / TIME	PRESERVATION METHOD	CONTAINER TYPE/SIZE	SAMPLE MATRIX	ANALYSES REQUIRED PLM	
524-B-21	3/26/12	None	Plastic Bag	Bulk	✓	
↓ 22	↓	↓	↓	↓	↓	

TOTAL NUMBER OF SAMPLES 2 2-Day Turnaround

COMMENTS: Return signed chain-of-custody forms with final report(s). Email the report to Lorraina at lvalencia@panenv.com

FTM = floor tile and mastic; LNM = linoleum and mastic; CBM = cove base and mastic;
CTM = ceiling tile and mastic; DWJ = wallboard and joint compound; ML = other multiple-layered materials.

Relinquished By:		Company: Panacea, Inc	Date: 3/26/12	Time: —	
Received By: Relinq.		Company: Panacea Inc.	Date: 3/26/12	Time: 4:30	
Relinquished By: Received		Company: FAU D/O	Date: 3/26/12	Time: 4:30 pm	
Received By:		Company:	Date:	Time:	
Relinquished By:		Company:	Date:	Time:	
Received By:		Company:	Date:	Time:	

Revision : 07-09-28

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Panacea Inc.
Steven Modtland
14905 Paramount Blvd.
Suite - H
Paramount, CA 90723

Client ID: 5572
Report Number: B161562
Date Received: 03/26/12
Date Analyzed: 03/28/12
Date Printed: 03/28/12
First Reported: 03/28/12

Job ID/Site: C12-745; Avenida Pico

Date(s) Collected: 03/26/2012

FALI Job ID: 5572
Total Samples Submitted: 18
Total Samples Analyzed: 18

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
530-B-1	50725825						
Layer: Off-White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
530-B-2	50725826						
Layer: Off-White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
530-B-3	50725827						
Layer: Off-White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
530-B-4	50725828						
Layer: White Drywall			**ND**				
Layer: Off-White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (15 %) Fibrous Glass (2 %)		**Asbestos (ND)**					
530-B-5	50725829						
Layer: White Drywall			**ND**				
Layer: Off-White Skimcoat/Joint Compound			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (15 %) Fibrous Glass (2 %)		**Asbestos (ND)**					
530-B-6	50725830						
Layer: Black Non-Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

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Report Number: B161562
Client Name: Panacea Inc. **Date Printed:** 03/28/12

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
530-B-7	50725831						
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
530-B-8	50725832						
Layer: Light Grey Plaster			**ND**				
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
530-B-9	50725833						
Layer: Light Grey Plaster			**ND**				
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
530-B-10	50725834						
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
530-B-11	50725835						
Layer: White Plaster			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
530-B-12	50725836						
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components: Cellulose (80 %)		**Asbestos (ND)**					
530-B-13	50725837						
Layer: White Drywall			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (2 %)		**Asbestos (ND)**					
530-B-14	50725838						
Layer: White Drywall			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Fibrous Components: Cellulose (20 %) Fibrous Glass (2 %)		**Asbestos (ND)**					

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Report Number: B161562

Client Name: Panacea Inc. **Date Printed:** 03/28/12

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
530-B-15	50725839						
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components: Cellulose (80 %)		**Asbestos (ND)**					
530-B-16	50725840						
Layer: Black Felt			**ND**				
Total Composite Values of Fibrous Components: Cellulose (80 %)		**Asbestos (ND)**					
530-B-17	50725841						
Layer: Off-White Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
530-B-18	50725842						
Layer: Off-White Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

Steven Takahashi, Laboratory Supervisor, Rancho Dominguez Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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PANACEA, INC.

Environmental Services

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CHAIN OF CUSTODY RECORD

Date: 3/26/12 PM: Steven Modtland

Project Name: Avenida Pico

Project No.: C12-745

Page: 1 of 1

Sampled By: RZ

Shipped To: Forn. Anal. by: Dropped off

SAMPLE NUMBER	SAMPLING DATE / TIME	PRESERVATION METHOD	CONTAINER TYPE/SIZE	SAMPLE MATRIX	ANALYSES REQUIRED PLM	
530-B-1	3/26/12	None	Plastic Bag	Bulk	✓	
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						

TOTAL NUMBER OF SAMPLES 18 2-Day Turnaround

COMMENTS: Return signed chain-of-custody forms with final report(s). Email the report to Lorraina at lvalencia@panenv.com

FTM = floor tile and mastic; LNM = linoleum and mastic; CBM = cove base and mastic;
CTM = ceiling tile and mastic; DWJ = wallboard and joint compound; ML = other multiple-layered materials.

Relinquished By:	Company: Panacea, Inc.	Date: 3/26/12	Time: —	
~~Received~~ Relinq. By:	Company: Panacea Inc.	Date: 3/26/12	Time: 4:30	
~~Relinquished~~ Received By:	Company: FAL D/D	Date: 3/26/12	Time: 4:30 pm	
Received By:	Company:	Date:	Time:	
Relinquished By:	Company:	Date:	Time:	
Received By:	Company:	Date:	Time:	

Revision : 07-09-28

APPENDIX – Likelihood Statements

Many statements have been made in this report regarding the likelihood of the occurrence of certain adverse events. The term "likelihood," as used here, pertains to chances of a match between the prediction for the event and its actual occurrence. Likelihood statements are based on the professional judgment of Panacea, Inc. staff. A prediction made for the occurrence of an event will either match the actual occurrence or not. Uncertainty about the natural processes, lack of adequate scientific understanding of the physical and chemical interactions at the site, and insufficient data and information about the specific site conditions usually preclude a perfect or 100-percent likelihood of match between predictions and actual occurrences. Therefore, where a perfect match is not possible, the likelihood statement assigns a measure for a "degree of belief" or a "betting score" for the match between the prediction for the event and the actual event outcome.

The likelihood statements can be made either qualitatively, expressed verbally, or quantitatively, expressed in percent ranges. The qualitative terms expressed verbally, however, can be approximately related to percent ranges. Panacea, Inc. has used the following approximate percent ranges for the qualitative terms used in likelihood statements:

QUALITATIVE TERM	APPROXIMATE PERCENT RANGE
Very Low	Less than 10
Low	10 to 20
Low to Moderate	20 to 40
Moderate	40 to 60
Moderate to High	60 to 80
High	80 to 90
Very High	More than 90

The following is a typical likelihood statement and its interpretation:

- Statement: Based on site conditions, data collected, and current regulatory guidelines delineating a hazardous waste, it is the judgment of Panacea, Inc. that there is a low likelihood that hazardous waste from the landfill has migrated to the site.

- Interpretation of Statement: The statement reflects an extrapolation of a discrete data set to the entire site. This statement is made within the context of regulatory guidelines delineating hazardous wastes in effect at the time the statement is made. It is important to note that these guidelines periodically change; consequently, the judgment made corresponds to the guidelines cited in the report.

An extrapolation made from a discrete data set precludes making a statement with certainty that the event has occurred (i.e., one cannot really say with 100-percent certainty that hazardous waste from the landfill has not migrated to the site). Therefore, a professional judgment is made for the event that is expressed in terms of the likelihood (less than 100 percent) that the event either has or has not occurred.

The statement given above renders a professional judgment that there is a low likelihood that the event has occurred. The above statement could also have been expressed as "there is a high likelihood that hazardous waste from the landfill has not migrated to the site."

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Final

April 23, 2012

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SUBJECT: Lead-Based Paint (LBP) Survey for Burger Stop and Shell Gas Station Located at 524 and 530 East Avenida Pico, San Clemente, California

In response to your request, Panacea, Inc. (Panacea) conducted a LBP survey on March 26, 2012, at the above-referenced site. The survey was requested as part of the proposed demolition of the subject buildings.

Burger Stop (Building 524) is a 750-square-foot (SF) single-story restaurant built in 1966, and the Shell gas station (Building 530) is a 1,380-SF single-story building built in 1964.

It is our understanding that the site is used for commercial use; therefore, Panacea is required to submit Form 8552 "Lead Hazard Evaluation Form" to the California Department of Department of Public Health (DPH).

1.0 GUIDELINES AND METHODOLOGY

1.1 DEFINITIONS AND REGULATORY GUIDELINES

1.1.1 Lead-Based Paint Definitions

In 1978, the Consumer Product Safety Commission (CPSC) established a maximum lead content in paint of less than 0.06 percent by weight in a dry film of newly applied paint (U.S. Department of Housing and Urban Development [HUD], 1995). HUD specifies that LBP is present when paint contains lead equal to or greater than 1.0 milligram per square centimeter (mg/cm^2) by area or 0.5 percent by weight (HUD, 1995).

Typically, the area concentrations are based on field x-ray fluorescent (XRF) analysis, whereas the weight concentrations are based on one of several laboratory analytical methods such as atomic absorption spectrometry (AAS) and inductively coupled plasma-atomic emission spectrometry (ICP-AES).

1.1.2 Lead-Containing Hazardous Waste Definitions

Title 22 of the California Code of Regulations, Section 66261.24 (22 CCR 66261.24) states that when representative samples of a waste exhibit certain toxic characteristics then the waste is considered hazardous. Lead-containing waste is regulated as a hazardous waste if it exhibits one of the three threshold concentrations: total threshold limit concentration (TTLC), soluble threshold limit concentration (STLC), and/or Toxic Characteristic Leaching Procedures (TCLP). Interpretations of the waste concentrations are presented below.

- TTLC equal to or greater than 1,000 milligrams per kilogram (mg/kg) (or 0.1 percent)

  The TTLC for lead is 1,000 mg/kg. If the sample concentration is at or above 1,000 mg/kg, then the represented material/waste when demolished will be considered as a California hazardous waste.

  Additional TCLP analysis is required to determine whether the California-regulated waste is a Resource Conservation and Recovery Act (RCRA) hazardous waste. If the TCLP result is at or above 5 milligrams per liter (mg/L) of solution, then the waste is a California-regulated and RCRA hazardous waste. If the TCLP is below 5 mg/L, then the waste is considered to be a California-regulated waste but a non-RCRA hazardous waste.

- TTLC between 50 and 1,000 mg/kg (or 0.05 to 0.1 percent)

  If the sample concentration is between 50 and 1,000 mg/kg, then additional testing using the California-mandated waste extraction test (WET) can be conducted to further characterize the STLC of the waste. The STLC for lead is 5 mg/L. At or above 5 mg/L of lead, the material would need to be disposed of as a California hazardous waste. Below 5 mg/L of lead, the waste is considered as construction debris or nonhazardous waste.

  If the sample concentration is between 100 to 1,000 mg/kg, then additional testing using the TCLP can be conducted to further characterize the TCLP of the waste. The TCLP for lead is 5 mg/L. At or above 5 mg/L of lead, the material is classified as RCRA hazardous waste. Below 5 mg/L of lead, the waste is considered as non-RCRA hazardous waste; however, the STLC analysis is still required to determine if the waste is a California-regulated waste.

- TTLC less than 50 mg/kg (or 0.05 percent)

  If the sample concentrations are less than 50 mg/kg, then the waste is considered as construction debris or nonhazardous waste.

1.1.3 Lead Worker Exposure Standards

Due to the growing concerns related to workplace lead exposure, the Federal Occupational Safety and Health Administration (OSHA) promulgated a lead standard for the construction industry in Title 29, Code of Federal Regulations (CFR), Part 1926.62 (29 CFR 1926.62), on May 4, 1993 (OSHA, 1993). The California Division of Occupational Safety and Health (DOSH) adopted and revised the OSHA standard under CCR, Title 8, Section 1532.1 (8 CCR 1532.1) (DOSH, 1997). Under 29 CFR 1926.62 and 8 CCR 1532.1, lead is defined as metallic lead, all inorganic lead compounds, and organic lead soaps. Lead paint is included in this regulation; however, it is not defined with any given concentration.

DOSH established exposure levels for lead in the construction industry at an action level (AL) of 30 micrograms of lead per cubic meter ($\mu g/m^3$) of air and a permissible exposure level (PEL) of 50 $\mu g/m^3$ calculated as an 8-hour time-weighted average (TWA) (DOSH, 1997). For certain construction activities involving lead paint, OSHA requires that an employer treat employees as if they were exposed to lead at a certain level and implement employee protective measures until exposure assessment using air sampling indicates otherwise. These activities and assumed levels of exposure are summarized in the table below.

ACTIVITIES	ASSUMED LEVELS OF EXPOSURE ($\mu g/m^3$)
– Manual demolition of structure – Manual scraping – Manual sanding – Heat gun applications – Power tool cleaning with dust collection systems – Lead-based paint spraying	50 < Exposure < 500
– Use of lead containing mortar, lead burning – Rivet busting – Power tool cleaning without dust collection system – Cleanup activities where dry expendable abrasives are used – Abrasive blasting, enclosure movement and removal	Exposure > 500

ACTIVITIES	ASSUMED LEVELS OF EXPOSURE (µg/m^3)
– Abrasive blasting – Welding – Cutting – Torch burning	Exposure > 2,500

The detection limit of the XRF analyzer is generally considered to be accurate when concentrations of lead in paint are greater than 1.0 mg/cm^2. The accuracy of the laboratory analytical methods is typically expressed in parts per million (or below the CPSC of 0.06 percent by weight). It has been the experience of Panacea that when an XRF analyzer does not detect lead in paint, it is highly likely that the same paint will be reported as containing lead at concentrations exceeding the detection limits of laboratory analytical methods such as AAS and ICP-AES. OSHA and DOSH regulations are not based on the concentrations in paint but rather on the exposure levels in air and/or blood.

1.2 TESTING METHODOLOGY

No published strategies currently exist for field XRF testing at commercial/industrial buildings. Consequently, Panacea used available information, its experience and judgment, and the following four assumptions, together with XRF technology, to develop a testing strategy and provide information about potential presence of LBP:

- *Color* - Lead is added to paints for pigmentation and corrosion resistance. Panacea assumed that paints of similar color contained similar amounts of lead and therefore tested each color observed.

- *Substrate* - Lead is used as a primer for different substrates. However, similar to topcoats, the undercoat primer and other paint layers could be different. It was assumed that, on each substrate type in the building (e.g., metal, wood, wallboard, stucco), primer and undercoat paint were equally applied and contained similar quantities of lead, if any. Thus, Panacea tested each substrate observed.

- *Building Components* - Different building components (e.g., walls, floor, ceiling) could have been painted with different colors of paint throughout the history of the building. It was assumed that the different components had different primers and undercoats applied even though the topcoat colors appeared similar. It was also assumed that similar primer and paint had been applied underneath the top layer on similar building components. Thus, Panacea tested each building component observed.

- *Functional Areas* - A functional area consists of a group of areas put to similar use where similar topcoats of paint are observed (e.g., exterior walls, offices, warehouses, or laboratories). Because the primer and paint in the same functional area probably contain similar amounts of lead, Panacea tested each functional area rather than every individual area within.

In general, at least one reading was taken for each building component of a room, except when similar functional areas with similar components had already been tested. Additional readings were taken for various colors, substrates, building components, and/or functional areas as the building inspector deemed necessary.

A spectrum XRF analyzer was used to conduct the LBP testing. The instrument was calibrated according to the manufacturer's specifications and was periodically verified (i.e., at the beginning and end of each shift and during each break) against known lead paint film samples produced by the National Institute of Standards and Testing (NIST). The duration of each test was determined by a combination of the actual reading relative to the designated AL, the age of the radioactive source, and the substrate on which the testing was conducted.

Representative XRF testing was conducted in general accordance with the manufacturer's specifications, the four assumptions listed above, and revised Chapter 7 of the HUD guidelines (HUD, 1997).

1.3 DATA EVALUATION CRITERIA

When an XRF analyzer is used to test painted surfaces, the HUD guidelines specify an AL of 1.0 mg/cm^2. This AL and the performance characteristic sheet (PCS) for the specific XRF instrument were used as Panacea's data evaluation criteria.

Because the number of locations tested is limited by practical considerations, certain painted surfaces judged to pose a minimal potential hazard during renovation/demolition were excluded from the survey. These surfaces include miscellaneous artwork, graffiti, trash, debris, some areas smaller than 50 SF, movable fixtures (e.g., chairs, tables, lights, and cabinets), and building components that can be removed with little or no disturbance to the LBP.

1.4 TERMINOLOGY

In this report, the terms "intact," "fair," and "poor" refer to the condition of LBP observed at the time of the survey. These terms are qualitatively applied within the framework of Panacea's judgment and the modified version of definitions in the HUD guidelines (HUD, 1997). Panacea defines these terms as follows:

- *Intact:* paint generally in good condition
- *Fair:* paint generally intact with minor, normal wear and tear
- *Poor:* paint not intact, severely worn or damaged, or chalking

As previously stated, the CPSC defines LBP as paint containing lead in concentrations greater than or equal to 0.06 percent by weight, whereas the HUD AL is 1.0 mg/cm^2. For discussion purposes in this report, the term "LBP" is used for or defined as any paint reported to contain lead in concentrations greater than or equal to 1.0 mg/cm^2 as determined by the field XRF analyzer.

Typically, three classifications were used for results: positive, inconclusive, and negative. A positive classification is defined as LBP at or above 1.0 mg/cm^2. Negative and inconclusive classifications, which are based on the PCS as published by each manufacturer, are substrate-dependent. Because no inconclusive reading was recorded, a negative classification is defined as any paint reported to contain less than 1.0 mg/cm^2. These classifications are used in the summary tables and figures.

1.5 ESTIMATED QUANTITY

When a reading indicated that the surface contained LBP, the surface area quantity was obtained based on Panacea's site observations, site assumptions, the professional judgment of Panacea personnel, and the four assumptions described in Section 1.2. The estimated area and linear footage covered were obtained by linearly extrapolating the dimensions from the drawings obtained during Panacea's site visit. Alternatively, the area estimation is based on the judgment of the surveyor with respect to the overall floor plan occupied by LBP surfaces during the site reconnaissance.

The estimated quantities given in this report for the extent of LBP are intended for discussion and management purposes only. Qualified contractors should verify the actual quantities present before the materials are removed or bids are requested.

2.0 LEAD SURVEY RESULTS

XRF Analyzer Used:	Key Master/Map-4, Serial No. M41316
Calibration Conducted:	Before and after testing
Calibration Method:	Calibrated against known lead concentration samples from NIST
Calibration Acceptable:	Yes
Building(s) Occupied	Yes
Any Bulk Samples:	No

Detailed XRF Testing Result Summary Table Included in This Report?	Yes
Detailed Floor Plan(s) With Room Designations Included in This Report?	Yes
Inaccessible Area(s) Encountered During Site Visit?	No
Positive LBP Components Summarized Below?	Yes

2.1 BUILDING 524

Testing Results: No. Positive: 0 No. Negative: 108 No. Inconclusive: 0

The accompanying XRF testing results summary table presents detailed descriptions of components, substrates, and colors. Refer to Figure 1 for area designations.

2.2 BUILDING 530

Testing Results: No. Positive: 6 No. Negative: 122 No. Inconclusive: 0

READING NO.	COMPONENT	SUBSTRATE	COLOR	LOCATIONS	QUANTITY	CONDITION
71, 73	Bollard	Metal	White	Included ~5 bollards on the north portion of this building. See Figure 2.	~5 bollards	Intact
104, 108, 111, 118	Wall	Ceramic Tile	Red	Included ceramic tile on exterior walls of this building and columns in gas pump area. See Figure 2.	~150 SF	Intact

Notes:

"~" = approximately; SF = square feet

The accompanying XRF testing results summary table presents detailed descriptions of components, substrates, and colors. Refer to Figure 2 for area designations.

3.0 CONCLUSIONS/RECOMMENDATIONS

The following conclusions and recommendations are based on the information obtained during this survey, laboratory analytical results, current regulatory guidelines and laws, state-of-the-industry practices, and the judgment of Panacea's personnel:

- There is a high likelihood that LBP is present in concentrations greater than 1.0 mg/cm^2 for Building 530. The appendix contains an explanation of likelihood statements.

- Excluding the materials described in this report, summary tables, and figures, there is a low likelihood that LBP is present in concentrations greater than 1.0 mg/cm^2 in the remaining accessible areas of the buildings.

- No judgment was made for inaccessible or hidden components or components that had not been tested.

- LBP in poor condition should be removed, repaired, and/or stabilized as soon as practical to avoid potential exposure to the occupants. Any LBP removed should be disposed of as lead-containing hazardous waste.

- Depending on the local and state hazardous waste disposal restrictions, LBP in fair to good condition and remaining intact during the removal may be removed and disposed of as construction waste. It is recommended that renovation and/or demolition contractors check with the local regulatory agencies prior to disposal of components with intact LBP.

- During renovation or demolition of the buildings, when potential disturbance to LBP is likely, DOSH regulations requiring the protection of workers from lead hazards should be followed. Any non-intact LBP removed should be disposed of as lead-containing hazardous waste.

- DOSH does not regulate lead in terms of concentrations in paint but rather in terms of airborne concentrations and blood lead levels independent of concentrations in paint (DOSH, 1997). During renovation or demolition of the buildings during which disturbance to the paint is likely to occur and no LBP has been detected, Panacea recommends that, regardless of the negative XRF testing results, air monitoring be conducted to document airborne lead concentrations.

- The client may prefer to obtain legal counsel familiar with environmental issues, specifically LBP, to review the findings of this report and provide recommendations particularly with regard to abatement and notification regulations, guidelines, and laws.

The above conclusions/recommendations are intended to guide procedures that, in Panacea's experience, are appropriate within the regulatory environment. These recommendations are not intended to constitute legal advice; it is possible that legal counsel familiar with lead issues and laws might provide recommendations that differ from those cited above and/or would advise compliance with regulations, guidelines, and laws not cited herein.

4.0 LIMITATIONS

Certain painted surfaces were not tested because of practical considerations and/or because they were judged to be a minimal potential hazard during renovation or demolition activities. These surfaces can include miscellaneous artwork, areas smaller than 50 SF, movable fixtures (e.g., chairs, table, lights, cabinets), and/or other building components that could be removed with minimal disturbance to LBP.

Although personnel who conducted the survey are certified and the measuring instrument was calibrated before, during, and after testing, the survey described might not identify all LBP at the site. Possible reasons for this include inaccessible building features, unavailability of data for the paint used on the building, practical limitations to the number of tests, limitations of the field XRF analyzer, and testing methods used. Furthermore, although testing was performed on each painted surface that appeared different (based on stated assumptions), homogeneity or similar paint content is not guaranteed because similarity of color, substrates, and/or components does not ensure that the same amount of lead was used in paint manufacture and application. In addition, topcoats, components, and substrates of similar color could have different undercoats. It is possible that, given two apparently similar paints on similar components and substrates, one might contain lead whereas as the other might not. Therefore, additional sampling and/or testing could be necessary to provide a higher confidence level regarding the presence of LBP.

The estimated areas representing the extent of LBP presented in this report are intended for discussion and management purposes only. It is understood and recommended that the actual square footage and material conditions be verified by qualified contractors prior to abating the materials.

The information provided in this report is based on the scope of work authorized by the client, information obtained during the survey, laboratory analytical results, current regulatory guidelines and laws, state-of-the-industry practices, and the professional judgment of Panacea personnel.

Services performed by Panacea were conducted in a manner consistent with state-of-the-industry-practices, recognizing that even the most comprehensive survey may not detect all LBP in the buildings or structures. Therefore, Panacea cannot act as an insurer or certify that the site is free of LBP. Except as expressly set forth herein, no representation or warranty is included in our report. The services described herein were performed within the limit of the scope of work authorized by the client and the encountered site conditions.

Panacea relied on the information collected during the site visit discussed and/or provided by the client or others to arrive at the conclusions stated herein. Panacea assumes that information provided by others is accurate and makes no assertions as to the accuracy thereof.

5.0 REFERENCES

California Division of Occupational Safety and Health (DOSH), 1997. *Title 8, California Code of Regulations,* Section 1532.1. Revised 1997.

Occupational Safety and Health Administration (OSHA), 1993. *Occupational Safety and Health Standards*. Title 29, Code of Federal Regulations, Part 1926.62.

U.S. Department of Housing and Urban Development (HUD), 1995. *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing.* June 1995.

_____, 1997. *Revised Chapter 7, Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*. October 1997.

If you have any questions, please feel free to contact me at (562) 860-2869.

Very truly yours,
PANACEA, INC.

Hsin H. Chou, CIH, REA II, CAC
DPH Certification No. 17

Attachments:

- XRF Testing Results Summary Tables
- Figures 1 and 2
- Building Inspector's Certification
- Calibration Form
- California Department of Health Services Form 8552
- Likelihood Statements

ATTACHMENTS

XRF TESTING RESULTS SUMMARY TABLE

Building No.: 524

No.	Interior/ Exterior	Area/Room	Portion/ Side	Component	Substrate	Color	XRF Reading	Classification	Condition	Estimated Quantity	Comment
1	Exterior		N	Wall	Wood	White	0.49	Negative			
2	Exterior		N	Wall	Wood	Red	0.02	Negative			
3	Exterior		N	Wall	Wood	Red	0.30	Negative			
4	Exterior		N	Wall	Wood	White	0.19	Negative			
5	Exterior		N	Window Casing	Wood	Red	-1.15	Negative			
6	Exterior		N	Overhang Deck	Wood	White	0.05	Negative			
7	Exterior		N	Overhang Beam	Wood	White	-0.50	Negative			
8	Exterior		N	Fascia	Wood	Red	-0.11	Negative			
9	Exterior		N	Fascia	Wood	Red	0.17	Negative			
10	Exterior		N	Wall	Wood	Red	0.49	Negative			
11	Exterior		E	Wall	Wood	Red	0.40	Negative			
12	Exterior		E	Wall	Wood	White	0.31	Negative			
13	Exterior		E	Door Casing	Wood	Red	0.58	Negative			
14	Exterior		E	Menu Box Frame	Wood	Red	0.28	Negative			
15	Exterior		E	Menu Box Frame	Wood	White	0.37	Negative			
16	Exterior		E	Gutter	Metal	Red	-0.12	Negative			
17	Exterior		E	Gutter	Metal	Red	0.17	Negative			
18	Exterior		E	Fascia	Wood	Red	0.14	Negative			
19	Exterior		S	Door	Wood	Red	0.60	Negative			
20	Exterior		S	Door Frame	Wood	Red	0.39	Negative			
21	Exterior		S	Door Casing	Wood	Green	0.01	Negative			
22	Exterior		S	Wall	Wood	White	0.03	Negative			
23	Exterior		S	Door	Wood	Red	0.62	Negative			
24	Exterior		S	Door Frame	Wood	Red	0.18	Negative			
25	Exterior		S	Door Casing	Wood	Orange	0.08	Negative			
26	Exterior		S	Wall	Wood	Red	0.41	Negative			
27	Exterior		S	Overhang Beam	Wood	White	0.27	Negative			
28	Exterior		S	Overhang Deck	Wood	White	0.43	Negative			
29	Exterior		S	Counter	Wood	Red	0.21	Negative			
30	Exterior		S	Fascia	Wood	Red	0.52	Negative			

XRF TESTING RESULTS SUMMARY TABLE

Building No.: 524

No.	Interior/ Exterior	Area/Room	Portion/ Side	Component	Substrate	Color	XRF Reading	Classification	Condition	Estimated Quantity	Comment
31	Exterior		S	Window Frame	Wood	Red	0.24	Negative			
32	Exterior		S	Window Frame	Wood	Red	0.41	Negative			
33	Exterior		S	Parking Stop	Concrete	White	0.53	Negative			
34	Exterior		S	Parking Stop	Concrete	Blue	0.64	Negative			
35	Exterior		S	Parking Lines	Asphalt	White	0.57	Negative			
36	Exterior		S	Parking Lines	Asphalt	Blue	0.39	Negative			
37	Exterior		S	Counter Top	Wood	Yellow	0.31	Negative			
38	Exterior		S	Door	Metal	Gray	-0.28	Negative			
39	Exterior		S	Door Casing	Metal	Gray	0.34	Negative			
40	Exterior		S	Bollard	Metal	Gray	0.07	Negative			
41	Exterior		S	Gas Pipe	Metal	Gray	-0.92	Negative			
42	Exterior		S	Conduit	Metal	White	0.09	Negative			
43	Exterior		S	Electrical Panel	Metal	White	0.15	Negative			
44	Exterior		N	Window Frame	Metal	White	-0.21	Negative			
45	Exterior		W	Window Frame	Wood	Red	0.56	Negative			
46	Exterior		W	Wall	Wood	Red	0.46	Negative			
47	Exterior		W	Window Frame	Metal	White	-0.13	Negative			
48	Exterior		W	Counter	Wood	Yellow	0.25	Negative			
49	Exterior		W	Fascia	Wood	Red	0.31	Negative			
50	Exterior		W	Fascia	Wood	Red	0.42	Negative			
51	Exterior		W	Wall	Wood	Red	0.27	Negative			
52	Exterior		W	Window Frame	Wood	Red	0.34	Negative			
53	Exterior		W	Fascia	Metal	Brown	0.31	Negative			
54	Exterior		N	Fascia	Metal	Brown	0.42	Negative			
55	Exterior		W	Overhang Beam	Wood	White	-0.68	Negative			
56	Exterior		W	Overhang Deck	Wood	White	-0.19	Negative			
57	Exterior		W	Beam	Wood	Red	0.27	Negative			
58	Exterior		W	Floor	Concrete	Red	0.47	Negative			

XRF TESTING RESULTS SUMMARY TABLE

Building No.: 524

No.	Interior/ Exterior	Area/Room	Portion/ Side	Component	Substrate	Color	XRF Reading	Classification	Condition	Estimated Quantity	Comment
59	Interior	Room #1	S	Wall	Gypsum	White	0.65	Negative			
60	Interior	Room #1	S	Window Frame	Wood	White	-0.64	Negative			
61	Interior	Room #1	S	Counter Top	Vinyl	Yellow	0.28	Negative			
62	Interior	Room #1	W	Window Frame	Wood	White	0.38	Negative			
63	Interior	Room #1	N	Wall	Gypsum	White	0.17	Negative			
64	Interior	Room #1	N	Window Frame	Wood	White	0.24	Negative			
65	Interior	Room #1	C	Menu Frame	Wood	Red	-0.43	Negative			
66	Interior	Room #1	C	Ceiling	Gypsum	White	0.05	Negative			
67	Interior	Room #1	C	Beam	Wood	White	0.31	Negative			
68	Interior	Room #1	C	Pipe	Metal	White	0.10	Negative			
69	Interior	Room #1	C	Floor	Ceramic	Brown	0.48	Negative			
70	Interior	Room #1	C	Floor	Ceramic	Brown	0.57	Negative			
71	Interior	Room #1	S	Door	Wood	White	0.26	Negative			
72	Interior	Room #1	E	Wall	Gypsum	White	-0.12	Negative			
73	Interior	Room #1	E	Wall	Plastic	White	0.22	Negative			
74	Interior	Room #1	E	Wall	Wood	White	-0.20	Negative			
75	Interior	Room #1	E	Vent	Metal	White	-0.20	Negative			
76	Interior	Room #1	E	Door Frame	Wood	White	0.57	Negative			
77	Interior	Room #1	E	Door Jamb	Wood	Off-white	0.16	Negative			
78	Interior	Room #7	N	Wall	Gypsum	Off-white	-0.44	Negative			
79	Interior	Room #7	W	Wall	Gypsum	Off-white	0.10	Negative			
80	Interior	Room #7	S	Wall	Gypsum	Off-white	0.07	Negative			
81	Interior	Room #7	S	Wall	Wood	Off-white	0.49	Negative			
82	Interior	Room #7	C	Ceiling	Wood	Off-white	0.07	Negative			
83	Interior	Room #7	C	Beam	Wood	Off-white	0.35	Negative			
84	Interior	Room #7	N	Conduit	Metal	Off-white	0.47	Negative			
85	Interior	Room #7	S	Freezer Door	Metal	Off-white	-0.16	Negative			
86	Interior	Room #6	C	Ceiling	Metal	White	-0.11	Negative			
87	Interior	Room #6	S	Wall	Metal	White	-0.18	Negative			
88	Interior	Room #6	W	Wall	Metal	White	0.12	Negative			
89	Interior	Room #6	S	Pipe	Metal	White	0.34	Negative			
90	Interior	Room #3	W	Wall	Gypsum	White	0.24	Negative			
91	Interior	Room #3	W	Wall	Gypsum	White	-0.01	Negative			

XRF TESTING RESULTS SUMMARY TABLE

Building No.: 524

No.	Interior/ Exterior	Area/Room	Portion/ Side	Component	Substrate	Color	XRF Reading	Classification	Condition	Estimated Quantity	Comment
92	Interior	Room #3	C	Ceiling	Gypsum	White	0.04	Negative			
93	Interior	Room #4	S	Wall	Gypsum	Off-white	-0.18	Negative			
94	Interior	Room #4	N	Wall	Gypsum	Off-white	0.02	Negative			
95	Interior	Room #4	E	Wall	Gypsum	Off-white	0.25	Negative			
96	Interior	Room #4	C	Ceiling	Gypsum	Off-white	0.51	Negative			
97	Interior	Room #4	W	Lower Wall	Vinyl	White	0.23	Negative			
98	Interior	Room #4	E	Lower Wall	Vinyl	White	-0.53	Negative			
99	Interior	Room #4	E	Door	Metal	White	0.19	Negative			
100	Exterior		E	Door	Metal	Red	0.42	Negative			
101	Interior	Room #4	E	Door Frame	Wood	Off-white	0.22	Negative			
102	Interior	Room #5	S	Wall	Gypsum	Off-white	0.33	Negative			
103	Interior	Room #5	N	Wall	Gypsum	Off-white	0.31	Negative			
104	Interior	Room #5	C	Ceiling	Gypsum	Off-white	-0.15	Negative			
105	Interior	Room #5	N	Lower Wall	Plastic	Off-white	-0.45	Negative			
106	Interior	Room #5	E	Door Frame	Wood	Off-white	-1.89	Negative			
107	Interior	Room #5	E	Door Casing	Wood	Green	0.22	Negative			
108	Exterior		E	Door	Wood	White	0.13	Negative			

NOTES (where applicable):

1. The estimated areas covered are intended for discussion and management purposes only. The actual square footage and quantities present may differ.
2. A Key Master/MAP-4 XRF analyzer was used for the lead-based paint (LBP) testing.
3. The U.S. Department of Housing and Urban Development level (1.0 milligram per square centimeter [mg/cm2]) was used to evaluate the presence of LBP.
4. A positive classification is defined as LBP at or above 1.0 mg/cm2, and a negative classification is defined as LBP below 1.0 mg/cm2.
5. N = north; E = east; S = south; W = west; NE = northeast; NW = northwest; SE = southeast; SW = southwest; C = central.
6. HVAC = heating, ventilation, and air conditioning unit; FP = floor plan; LF = linear feet; OD = outside diameter; SF = square feet; "~" = approximately; "<" = less than.

XRF TESTING RESULTS SUMMARY TABLE

Building No.: 530

No.	Interior/ Exterior	Area/Room	Portion/ Side	Component	Substrate	Color	XRF Reading	Classification	Condition	Estimated Quantity	Comment
1	Interior	Room #1	W	Wall	Gypsum	Yellow	0.35	Negative			
2	Interior	Room #1	N	Wall	Gypsum	Yellow	0.40	Negative			
3	Interior	Room #1	E	Wall	Gypsum	Yellow	0.41	Negative			
4	Interior	Room #1	S	Wall	Metal	Yellow	0.29	Negative			
5	Interior	Room #1	C	Floor	Ceramic Tile	Gray	0.68	Negative			
6	Interior	Room #1	E	Counter Top	Wood	Blue	0.06	Negative			
7	Interior	Room #1	E	Cabinet	Wood	White	0.37	Negative			
8	Interior	Room #1	E	Ceiling	Gypsum	White	0.57	Negative			
9	Interior	Room #1	N	Counter Top	Wood	Blue	0.15	Negative			
10	Interior	Room #1	N	Cabinet	Wood	White	-0.95	Negative			
11	Interior	Room #2	S	Wall	Ceramic Tile	White	0.23	Negative			
12	Interior	Room #2	N	Wall	Ceramic Tile	White	0.53	Negative			
13	Interior	Room #2	W	Access Hatch	Metal	White	0.13	Negative			
14	Interior	Room #2	C	Ceiling	Metal	White	-0.08	Negative			
15	Interior	Room #2	E	Door	Metal	Gray	0.30	Negative			
16	Interior	Room #2	E	Door Casing	Metal	Gray	-0.05	Negative			
17	Interior	Room #2	C	Floor	Ceramic Tile	Beige	0.67	Negative			
18	Interior	Room #4	E	Wall	Ceramic Tile	White	0.55	Negative			
19	Interior	Room #4	W	Wall	Ceramic Tile	White	0.46	Negative			
20	Interior	Room #4	C	Ceiling	Metal	White	0.09	Negative			
21	Interior	Room #4	W	Door	Metal	Gray	0.37	Negative			
22	Interior	Room #4	W	Door Casing	Metal	Gray	0.60	Negative			
23	Interior	Room #4	C	Floor	Ceramic Tile	Beige	0.07	Negative			
24	Interior	Room #4	E	Access Hatch	Metal	White	0.37	Negative			
25	Interior	Room #3	E	Door	Metal	Yellow	0.78	Negative			
26	Interior	Room #3	E	Door Casing	Metal	Yellow	-0.43	Negative			
27	Interior	Room #3	N	Door	Metal	Yellow	0.48	Negative			
28	Interior	Room #3	N	Door Casing	Metal	Yellow	0.25	Negative			
29	Interior	Room #3	C	Floor	Ceramic Tile	Gray	0.49	Negative			
30	Interior	Room #3	W	Door	Metal	Yellow	0.10	Negative			
31	Interior	Room #3	W	Door Casing	Metal	Yellow	0.64	Negative			
32	Interior	Room #5	N	Wall	Gypsum	White	0.31	Negative			
33	Interior	Room #5	E	Wall	Vinyl	White	0.40	Negative			
34	Interior	Room #5	W	Wall	Gypsum	White	-0.12	Negative			
35	Interior	Room #5	C	Floor	Ceramic Tile	Gray	0.22	Negative			

XRF TESTING RESULTS SUMMARY TABLE

Building No.: 530

No.	Interior/ Exterior	Area/Room	Portion/ Side	Component	Substrate	Color	XRF Reading	Classification	Condition	Estimated Quantity	Comment
36	Interior	Room #5	C	Ceiling	Metal	White	0.37	Negative			
37	Interior	Room #5	W	Vent	Metal	White	-0.12	Negative			
38	Interior	Room #5	E	Wall	Gypsum	White	0.03	Negative			
39	Interior	Room #5	S	Wall	Gypsum	White	-0.20	Negative			
40	Interior	Room #5	E	Pipe	Metal	White	-0.27	Negative			
41	Interior	Room #5	E	Electrical Panel	Metal	Gray	0.35	Negative			
42	Interior	Room #5	S	Door	Metal	Gray	0.39	Negative			
43	Interior	Room #5	S	Door Casing	Metal	Gray	0.54	Negative			
44	Interior	Room #5	C	Vent	Metal	White	0.12	Negative			
45	Interior	Room #6	E	Wall	Gypsum	White	0.12	Negative			
46	Interior	Room #6	E	Column	Metal	White	0.67	Negative			
47	Interior	Room #6	W	Wall	Gypsum	White	0.06	Negative			
48	Interior	Room #6	C	Ceiling	Metal	White	-0.22	Negative			
49	Interior	Room #6	C	Floor	Ceramic Tile	Gray	0.61	Negative			
50	Interior	Room #1	C	Ceiling Tile	Gypsum	White	-0.07	Negative			
51	Interior	Room #1	C	Ceiling Tile Grid	Metal	White	-0.12	Negative			
52	Interior	Room #1	C	Beam	Metal	Gray	0.43	Negative			
53	Interior	Room #1	C	Bracket Above Ceiling Tile	Metal	Gray	0.36	Negative			
54	Interior	Room #1	C	Beam	Metal	Brown	-0.27	Negative			
55	Interior	Room #1	C	Ceiling	Metal	White	-0.08	Negative			
56	Interior	Room #1	C	Beam	Metal	White	0.35	Negative			
57	Interior	Room #1	C	Beam	Metal	White	-0.31	Negative			
58	Interior	Room #1	N	Beam	Metal	Gray	0.13	Negative			
59	Interior	Room #1	N	Beam	Metal	Brown	-0.05	Negative			
60	Interior	Room #1	N	Ceiling Tile Grid	Metal	White	0.12	Negative			
61	Exterior		N	Downspout	Metal	White	-0.59	Negative			
62	Exterior		N	Door	Metal	White	0.17	Negative			
63	Exterior		N	Electrical Box	Metal	White	-0.06	Negative			
64	Exterior		N	Pipe	Metal	White	0.36	Negative			
65	Exterior		N	Gutter	Metal	White	0.21	Negative			
66	Exterior		N	Fascia	Metal	White	-0.12	Negative			

XRF TESTING RESULTS SUMMARY TABLE

Building No.: 530

No.	Interior/ Exterior	Area/Room	Portion/ Side	Component	Substrate	Color	XRF Reading	Classification	Condition	Estimated Quantity	Comment
67	Exterior		N	Upper Wall	Metal	White	0.36	Negative			
68	Exterior		N	Spout	Metal	White	0.16	Negative			
69	Exterior		N	Shell Sign Pole	Metal	Gray	-1.19	Negative			
70	Exterior		N	Door	Metal	Gray	-0.17	Negative			
71	Exterior		N	Bollard	Metal	White	1.75	Positive	Intact	~5 bollards	Included ~5 bollards on the north portion of this building. See Figure 2.
72	Exterior		N	Bollard	Metal	White	-0.88	Negative			
73	Exterior		N	Bollard	Metal	White	1.33	Positive	Intact	0	Included in 71.
74	Exterior		N	Bollard	Metal	White	0.29	Negative			
75	Exterior		N	Electrical Box	Metal	Gray	0.14	Negative			
76	Exterior		N	Propane Tank	Metal	White	0.20	Negative			
77	Exterior		N	Light Pole	Metal	White	-0.01	Negative			
78	Exterior		N	Light Pole	Metal	White	-0.12	Negative			
79	Exterior		N	Small Bollard	Metal	White	0.01	Negative			
80	Exterior		N	Shell Sign	Metal	Gray	0.05	Negative			
81	Exterior		W	Door Frame	Metal	Black	0.07	Negative			
82	Exterior		W	Window Frame	Metal	Black	0.12	Negative			
83	Exterior		W	Bollard	Metal	Yellow	0.45	Negative			
84	Exterior		W	Propane Tank Cage	Metal	White	-0.05	Negative			
85	Exterior		S	Pipe	Metal	White	0.10	Negative			
86	Exterior		S	Support Strut	Metal	White	0.16	Negative			
87	Exterior		S	Electrical Box	Metal	White	-0.32	Negative			
88	Exterior		S	Pipe	Metal	White	0.18	Negative			
89	Exterior		S	Door	Metal	Gray	0.07	Negative			
90	Exterior		S	Locker	Metal	Gray	0.21	Negative			
91	Exterior		S	Door Casing	Metal	Gray	0.03	Negative			
92	Exterior		S	Pipe	Metal	White	0.23	Negative			
93	Exterior		S	Pipe	Metal	Red	0.16	Negative			
94	Exterior		S	Spout	Metal	White	0.33	Negative			
95	Exterior		S	Gutter	Metal	White	0.27	Negative			
96	Exterior		S	Fascia	Metal	White	0.47	Negative			
97	Exterior		S	Pipe	Metal	White	0.30	Negative			
98	Exterior		S	Bollard	Metal	White	0.07	Negative			

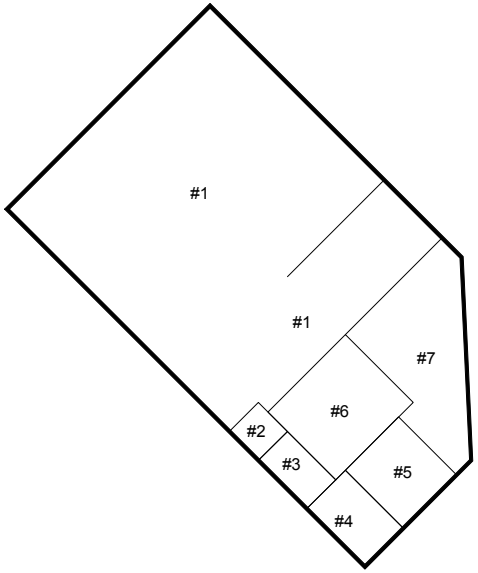
XRF TESTING RESULTS SUMMARY TABLE

Building No.: 530

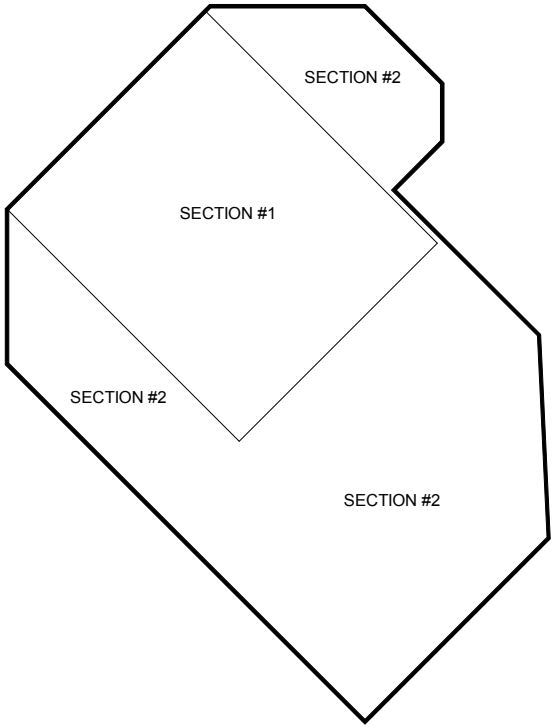
No.	Interior/ Exterior	Area/Room	Portion/ Side	Component	Substrate	Color	XRF Reading	Classification	Condition	Estimated Quantity	Comment
99	Exterior		S	Tank Storage	Metal	White	-0.22	Negative			
100	Exterior		S	Tank	Metal	Off-white	0.06	Negative			
101	Exterior		S	Upper Wall	Metal	White	0.33	Negative			
102	Exterior		S	Light Post	Metal	White	-0.72	Negative			
103	Exterior		S	Wall	Concrete	White	0.53	Negative			
104	Exterior		S	Wall	Ceramic Tile	Red	13.23	Positive	Intact	~150 SF	Included ceramic tile on exterior walls of this building and columns in gas pump area. See Figure 2.
105	Exterior		S	Wall	Concrete	White	0.50	Negative			
106	Exterior		S	Parking Stripe on Asphalt	Wood	White	0.59	Negative			
107	Exterior		S	Curb	Concrete	Gray	0.44	Negative			
108	Exterior		W	Wall	Ceramic Tile	Red	11.70	Positive	Intact	0	Included in 104.
109	Exterior		W	Wall	Concrete Block	White	0.47	Negative			
110	Exterior		W	Curb	Concrete	Red	0.70	Negative			
111	Exterior		N	Wall	Ceramic Tile	Red	12.55	Positive	Intact	0	Included in 104.
112	Exterior		N	Wall	Concrete	White	0.39	Negative			
113	Exterior		E	Wall	Brick	Beige	0.56	Negative			
114	Exterior		N	Parking Stripe	Concrete	Blue	0.40	Negative			
115	Exterior		N	Parking Stripe	Asphalt	White	0.27	Negative			
116	Exterior		N	Window Frame	Metal	Black	0.03	Negative			
117	Exterior		W	Bollard	Metal	White	0.23	Negative			
118	Exterior		W	Wall	Ceramic Tile	Red	12.90	Positive	Intact	0	Included in 104.
119	Exterior		W	Column	Concrete	White	-0.55	Negative			
120	Exterior		W	Curb	Concrete	Gray	0.64	Negative			
121	Exterior		W	Bollard	Metal	White	0.12	Negative			
122	Exterior		W	Access Panel	Metal	White	0.02	Negative			
123	Exterior		W	Gas Pump	Metal	White	-0.06	Negative			
124	Exterior		W	Gas Pump	Metal	White	-0.04	Negative			
125	Exterior		W	Bollard	Metal	White	-0.36	Negative			
126	Exterior		W	Column	Gypsum	White	0.45	Negative			
127	Exterior	Roof	E	Vent	Metal	Red	0.27	Negative			
128	Exterior	Roof	E	Pipe	Metal	Red	0.16	Negative			

NOTES (where applicable):

1. The estimated areas covered are intended for discussion and management purposes only. The actual square footage and quantities present may differ.
2. A Key Master/MAP-4 XRF analyzer was used for the lead-based paint (LBP) testing.
3. The U.S. Department of Housing and Urban Development level (1.0 milligram per square centimeter [mg/cm2]) was used to evaluate the presence of LBP.
4. A positive classification is defined as LBP at or above 1.0 mg/cm2, and a negative classification is defined as LBP below 1.0 mg/cm2.
5. N = north; E = east; S = south; W = west; NE = northeast; NW = northwest; SE = southeast; SW = southwest; C = central.
6. HVAC = heating, ventilation, and air conditioning unit; FP = floor plan; LF = linear feet; OD = outside diameter; SF = square feet; "~" = approximately; "<" = less than.



FLOOR PLAN



ROOF AND EXTERIOR PLAN

NO LEAD DETECTED. REFER TO XRF TESTING RESULTS SUMMARY TABLE FOR MATERIALS INCLUDED IN SURVEY.

N

LEGEND

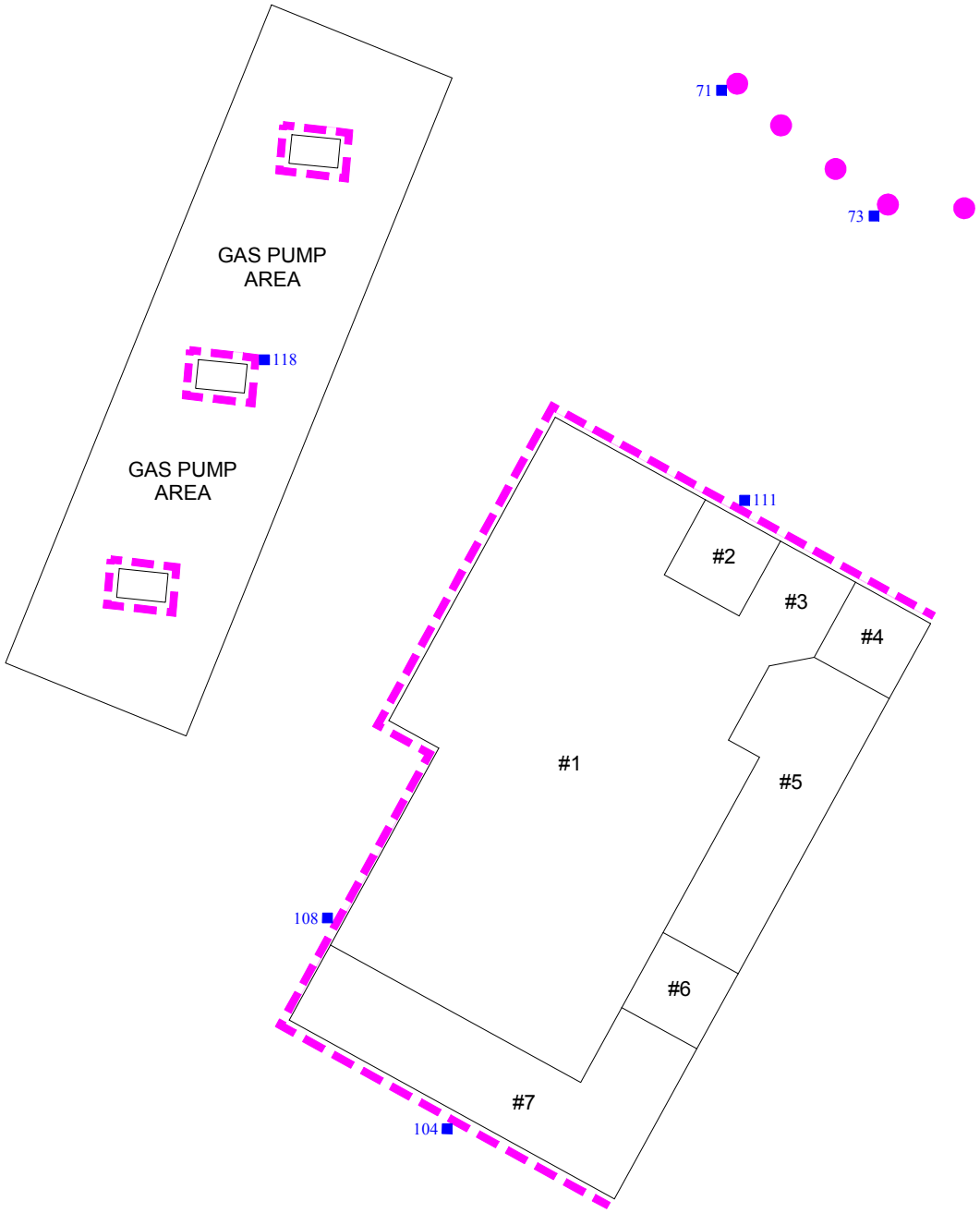
GENERAL NOTES

1. All locations are approximate. No scale or dimension is implied.
2. Base map obtained from field measurements.
3. Room numbers or area designations are arbitrarily assigned for discussion purposes only.
4. This survey gives general indications and locations of lead-based paint (LBP). Absence of positive samples does not guarantee that an area is lead-free.
5. LBP is defined as paint containing lead in concentrations >=1.0 miligram per square centimeter (mg/cm^2).
6. Only the positive LBP testing locations are presented in this figure.

PANACEA, INC.
Environmental Services

POSITIVE XRF TESTING LOCATIONS
BURGER STOP
524 EAST AVENIDA PICO
SAN CLEMENTE, CALIFORNIA

PROJECT NO. C12-745	FIGURE 1



N

LEGEND

- Testing Location (Positive, >=1.0 mg/cm^2)
- Ceramic Tile on Wall and Columns Containing LBP
- Bollard Containing LBP

GENERAL NOTES

1. All locations are approximate. No scale or dimension is implied.
2. Base map obtained from field measurements.
3. Room numbers or area designations are arbitrarily assigned for discussion purposes only.
4. This survey gives general indications and locations of lead-based paint (LBP). Absence of positive samples does not guarantee that an area is lead-free.
5. LBP is defined as paint containing lead in concentrations >=1.0 miligram per square centimeter (mg/cm^2).
6. Only the positive LBP testing locations are presented in this figure.

PANACEA, INC.
Environmental Services

POSITIVE XRF TESTING LOCATIONS
SHELL GAS STATION
530 EAST AVENIDA PICO
SAN CLEMENTE, CALIFORNIA

PROJECT NO. C12-745	FIGURE 2

State of California Department of Public Health
Lead-Related Construction Certificate
Certificate Type
Expiration Date
Inspector/Assessor 01/16/2013
Supervisor 01/16/2013
Project Designer 01/16/2013
Project Monitor 01/16/2013
21478
Hsin H. Chou
ID #: 17

State of California Department of Public Health
Lead-Related Construction Certificate
Certificate Type
Expiration Date
Sampling Technician 02/07/2013
21607
Ricardo Zambrano
ID #: 19458

PANACEA, INC.
Environmental Services

XRF CALIBRATION FORM

Project No.: C12-745
Project Name: Avenida Pico
Date: 3-26-12
Device: MAP4
Serial No.: M41316
Inspector: Ricardo Zambrano

Calibration Check Tolerance Used: _____
Use Level III (1.02 mg/cm^2) NIST SRM Paint Film

First Calibration Check Time: 8:20am

1st Reading	2nd Reading	3rd Reading	Average	Average – 1.02 mg/cm^2
1.76	1.81	1.89	1.82	passed

Second Calibration Check Time: 12:40pm

1st Reading	2nd Reading	3rd Reading	Average	Average – 1.02 mg/cm^2
1.24	1.16	1.18	1.19	passed

Third Calibration Check (if needed) Time: _____

1st Reading	2nd Reading	3rd Reading	Average	Average – 1.02 mg/cm^2

Fourth Calibration Check (if needed) Time: _____

1st Reading	2nd Reading	3rd Reading	Average	Average – 1.02 mg/cm^2

- Use the test mode reading Minus Value = 0.6 mg/cm^2
- Tolerance values for ✓: Positive Value = 1.2 mg/cm^2

LEAD HAZARD EVALUATION REPORT

Submitted via Facsimile

Section 1 – Date of Lead Hazard Evaluation **March 26, 2012**

Section 2 – Type of Lead Hazard Evaluation (Check one box only)

☑ Lead inspection ❒ Risk assessment ❒ Clearance inspection ❒ Other (specify) _____.

Section 3 – Structure Where Lead Hazard Evaluation Was Conducted

Address (number, street, apartment (if applicable)	City	County	ZIP code
524 and 530 East Avenida Pico	***San Clemente***	***Orange County***	***92672***

Construction date (year) of structure	Type of structure (check one box only)
1964/1966	❒ Single family dwelling ❒ Multi-unit building ❒ Child-occupied facility ☑ Other (specify) *fast-food restaurant and gas station*

Section 4 – Owner of Structure (If business/agency, list contact person)

Name	Telephone Number
Robert M. Miller	***619-239-2611***

Address [number, street, apartment (if applicable)]	City	State	ZIP code
401 West "A" Street, Suite 1720	***San Diego***	***CA***	***92101***

Section 5 – Results of Lead Hazard Evaluation (Check one box only)

❒ **No lead-based paint detected.**

A lead inspection was conducted following the procedures outlined in Title 17, California Code of Regulations, Division 1, Chapter 8. No lead-based paint was detected during this lead inspection. This structure is found to be lead-based paint free.

❒ **No lead hazards detected.**

Lead hazard evaluation was conducted following the procedures outlined in Title 17, California Code of Regulations, Division 1, Chapter 8. No lead hazards were detected.

■ **Lead-based paint and/or lead hazards detected.**

Lead hazard evaluation was conducted following the procedures outlined in Title 17, California Code of Regulations, Division 1, Chapter 8. Lead-based paint and/or lead hazards were detected.

Section 6 – Individual Conducting Lead Hazard Evaluation

Name	Telephone Number
Ricardo Zambrano	***(562) 860-2869***

Address [number, street, apartment (if applicable)]	City	State	ZIP code
14905 Paramount Blvd., Suite H	***Paramount***	***California***	***90723***

Brand name and serial number of any portable x-ray fluorescence (XRF) instrument used (if applicable)

Key Master/Map-4, Serial No. M41316

DHS certification number	Signature	Date
19458	Ricardo Zambrano	***4/23/2012***

Section 7 – Attachments

A. A foundation diagram or sketch of the structure indicating the specific locations of each lead hazard or presence of lead-based paint;

B. Each testing method, device, and sampling procedure used;

C. All data collected, including quality control data, laboratory results, including laboratory name, address, and phone number.

First copy and attachments retained by inspector

Second copy and attachments retained by owner

Third copy only (no attachments) mailed to:
Department of Public Health
Childhood Lead Poisoning Prevention Branch
LHE Report
850 Marina Bay Parkway, Building P, 3rd Floor
Richmond, CA 94804-6403
Phone (510) 620-5000 Fax (510) 620-5656

APPENDIX – Likelihood Statements

Many statements have been made in this report regarding the likelihood of the occurrence of certain adverse events. The term "likelihood," as used here, pertains to chances of a match between the prediction for the event and its actual occurrence. Likelihood statements are based on the professional judgment of Panacea, Inc. staff. A prediction made for the occurrence of an event will either match the actual occurrence or not. Uncertainty about the natural processes, lack of adequate scientific understanding of the physical and chemical interactions at the site, and insufficient data and information about the specific site conditions usually preclude a perfect or 100-percent likelihood of match between predictions and actual occurrences. Therefore, where a perfect match is not possible, the likelihood statement assigns a measure for a "degree of belief" or a "betting score" for the match between the prediction for the event and the actual event outcome.

The likelihood statements can be made either qualitatively, expressed verbally, or quantitatively, expressed in percent ranges. The qualitative terms expressed verbally, however, can be approximately related to percent ranges. Panacea, Inc. has used the following approximate percent ranges for the qualitative terms used in likelihood statements:

QUALITATIVE TERM	APPROXIMATE PERCENT RANGE
Very Low	Less than 10
Low	10 to 20
Low to Moderate	20 to 40
Moderate	40 to 60
Moderate to High	60 to 80
High	80 to 90
Very High	More than 90

The following is a typical likelihood statement and its interpretation:

- Statement: Based on site conditions, data collected, and current regulatory guidelines delineating a hazardous waste, it is the judgment of Panacea, Inc. that there is a low likelihood that hazardous waste from the landfill has migrated to the site.

- Interpretation of Statement: The statement reflects an extrapolation of a discrete data set to the entire site. This statement is made within the context of regulatory guidelines delineating hazardous wastes in effect at the time the statement is made. It is important to note that these guidelines periodically change; consequently, the judgment made corresponds to the guidelines cited in the report.

An extrapolation made from a discrete data set precludes making a statement with certainty that the event has occurred (i.e., one cannot really say with 100-percent certainty that hazardous waste from the landfill has not migrated to the site). Therefore, a professional judgment is made for the event that is expressed in terms of the likelihood (less than 100 percent) that the event either has or has not occurred.

The statement given above renders a professional judgment that there is a low likelihood that the event has occurred. The above statement could also have been expressed as "there is a high likelihood that hazardous waste from the landfill has not migrated to the site."

PANACEA, INC.
Environmental Services
14905 Paramount Blvd., Suite H • Paramount, CA 90723 • Tel. 562.860.2869 • Fax 562.633.3180

April 23, 2012

Vesna Glisic Petrilla, P.E.
Project Engineer
Group Delta Consultants, Inc.
32 Mauchy, Suite B
Irvine, CA 92618

via Email
VesnaG@GroupDelta.com

SUBJECT: Quantify Fluorescent Light Tubes and Ballasts for Burger Stop and Shell Gas Station Located at 524 and 530 East Avenida Pico, San Clemente, California

As you requested, Panacea, Inc. (Panacea) visited the subject site on March 27, 2012 and estimated the number of fluorescent light tubes and ballast.

The ballast investigated for both buildings stated no polychlorinated biphenyls (PCBs) on all ballast and were not quantified. Below are our estimated quantities.

DESCRIPTION	ESTIMATED QUANTITY
Burger Stop	
8-foot fluorescent light tubes	~2
4-foot fluorescent light tubes	~44
Shell Gas Station	
8-foot (u-shaped) fluorescent light tubes	~4
4-foot fluorescent light tubes	~40
Round fluorescent light tubes	~8

Very truly yours,

PANACEA, INC.

Steven Modtland,
Project Manager

APPENDIX D
Previous Site Reports

Wayne
Chiou/D12/Caltrans/CAGov
08/29/2011 03:15 PM

To "kncohoe@transystems.com" <kncohoe@transystems.com>
cc
bcc
Subject I-5 HOV Lane Extension (EA 0F9600) - Review of Limited Phase II Site Assessment Report

Hi Karen,

Based on our review, two comments are provided:

1. Page 1, Section 1.1 Backgroud Information:
Please summarize the historical testing results of soil and "groudwater" sampling beneath the site based on the site investigation done in 1997 and 2007. Accordingly, based on the review of these historical results and the additional results show in this report, please re-visit the Section 4.0 Conclusion and Recommendations.

2. Since this property will be full-take and residual groudwater contaimination has been detected beneath the site in 2007, we need to find out the groundwater condition beneath the site at this time. Groundwater can be sampled at the existing groudwater monitoring well nos. MW-1, MW-2, and MW-3 if the wells are not sealed. Additional groundwate monitoring can be done during the PS&E phase. Please forwared this comment to PS&E consultant for this Segment.

LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT INTERSTATE 5 HOV LANE EXTENSION PROJECT 530 AVENIDA PICO SAN CLEMENTE, ORANGE COUNTY, CALIFORNIA 12-ORA-5; EA#0F9600

August 16, 2011

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A Report Prepared for:

TranSystems/RMC, Inc.
6 Hutton Centre Drive, Suite 1250
Santa Ana, California 92707

LIMITED PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT
INTERSTATE 5 HOV LANE EXTENSION PROJECT
530 AVENIDA PICO
SAN CLEMENTE, CALIFORNIA
12-ORA-5; EA# 0F9600

Kleinfelder Project No. 105751-4.2.8

Prepared by:

Margaret Carroll

Margaret R. Carroll, REA
Staff Environmental Professional

Lizanne Simmons

Lizanne Simmons
California Professional Geologist No. 7431

PROFESSIONAL GEOLOGIST
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1 INTRODUCTION

This Limited Phase II Environmental Site Assessment (ESA) report summarizes the results of the soil investigation performed for TranSystems/RMC, Inc. (the Client), at an existing Shell gasoline service station located at 530 Avenida Pico (the Site) in San Clemente, California. The Site was identified in an Initial Site Assessment (ISA) Report prepared by Kleinfelder West, Inc. (Kleinfelder, 2010), as having potential hazardous waste impacts to the Interstate 5 (I-5) High Occupancy Vehicle (HOV) Lane Extension Project. The Limited Phase II ESA was performed consistent with the scope of services provided in Kleinfelder's *Site Assessment Work Plan, Interstate 5 HOV Lane Extension Project, 530 and 600 Avenida Pico, San Clemente, Orange County, California, 12-ORA-5; EA#0F9600*, dated December 15, 2010, and which was subsequently approved by the State of California Department of Transportation (Caltrans) in an email to the Client dated December 17, 2010.

1.1 BACKGROUND INFORMATION

The Site, currently occupied by an active Shell gasoline service station, is planned to be fully acquired as part of the I-5 HOV Lane Extension Project. Based on information obtained during Kleinfelder's ISA (Kleinfelder, 2010), a release of petroleum hydrocarbons occurred that affected soil and groundwater beneath the Site. Residual soil and groundwater contamination remained on the property at the time of case closure by the Orange County Health Care Agency (OCHCA). Soil sampling was recommended by Kleinfelder (2010) at this facility to evaluate current conditions. Although residual groundwater contamination remained at the Site, construction activities as part of the I-5 HOV Lane Extension Project are not expected to reach groundwater at the Site. Therefore, groundwater sampling was not proposed at the Shell gasoline service station.

The December 15, 2010, *Site Assessment Work Plan* also included proposed soil sampling at a Mobil gasoline service station at 600 Avenida Pico. However, the Client indicated that this parcel is no longer planned to be acquired as part of the I-5 HOV Lane Extension Project. Therefore, sampling at this property was not performed as part of the scope of services summarized in this report.

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1.2 PURPOSE AND SCOPE OF SERVICES

The purpose of this Limited Phase II ESA was to assess current soil conditions at the Site and assist in assessing the extent of potential residual soil contamination. The results of the sampling are representative of the soils encountered in each soil boring. There may be areas between the boring locations where the soils have different characteristics, different concentrations of the chemicals of concern, and/or other chemicals of concern that were not identified during our investigation.

The services performed as part of this investigation included the following:

- Prepare a Site-Specific Health and Safety Plan (HASP) to address worker health and safety and contingency plans for emergencies that may arise, as required by the California Department of Occupational Safety and Health;
- Obtain required well permits through the City of San Clemente Engineering Division;
- Mark out nine boring locations, notify Underground Service Alert of Southern California (USASC) of proposed drilling activities, and perform a subcontracted geophysical survey of the proposed boring locations to assess the potential presence of underground utilities at each boring location;
- Advance nine soil borings, each to a maximum depth of 30 feet below ground surface (bgs), using direct-push drilling methods;
- Collect up to six soil samples from each of the nine soil borings at approximately 5-foot intervals to the total depth of each boring;
- Screen soil samples during field activities using a photo-ionization detector (PID) to assess the presence of total volatile organic vapors;
- Environmental laboratory testing of up to six soil samples from each of the nine borings; and
- Review the field and analytical data and prepare this written report.

1.3 AUTHORIZATION

Our services on this project have been performed consistent with our December 15, 2010, *Site Assessment Work Plan, Interstate 5 HOV Lane Extension Project, 530 and 600 Avenida Pico, San Clemente, Orange County, California, 12-ORA-5; EA#0F960*

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that was submitted to Caltrans for review and approval. Caltrans approved the work plan in an email dated December 17, 2011. A *Permit to Enter for Other Testing for Hazardous Materials* (for right-of-entry to perform sampling at the Shell station), dated May 23, 2011, and fully executed by June 10, 2011, was received by Kleinfelder in an email dated June 23, 2011, from the Client, who authorized performance of the Limited Phase II ESA at that time.

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2 ENVIRONMENTAL SAMPLING

2.1 SITE-SPECIFIC HEALTH AND SAFETY PLAN

The various activities required to perform field work and drilling may involve exposure to recognized and potential hazards. A Site-Specific Health and Safety Plan was prepared to establish the necessary personal protective equipment (PPE) for identified hazards, the appropriate response should a hazardous condition be encountered, and emergency contacts and procedures.

2.2 PERMITS AND NOTIFICATIONS

Kleinfelder notified the City of San Clemente Engineering Division of the proposed soil sampling activities and obtained the required well permit to complete the field work. Permit number E11-0222 was issued on July 1, 2011, for the scope of services summarized herein.

2.3 FIELD RECONNAISSANCE AND UTILITY CLEARANCE

The initial field reconnaissance and selection of boring locations was performed on July 13, 2011. Kleinfelder's geophysical services subcontractor, GEOVision, Inc. (GEOVision), performed a survey to identify subsurface utilities in proximity of the nine proposed boring locations on July 13, 2011, using a combination of electromagnetic induction (EM-61), magnetometry (M-scope), and ground penetrating radar (GPR). Where necessary, proposed boring locations were adjusted slightly to avoid surface conflicts, utilities, and subsurface anomalies. The boring locations were marked at the approximate locations shown on Plate 2.

On July 13, 2011, Kleinfelder contacted USASC, notified it of the proposed intrusive drilling activities, and obtained USASC Ticket No. A11940164. Representatives of USASC's subscribing utilities then visited the Site to mark locations of existing underground utilities in the public right-of-way adjacent to the Site and leading onto the Site.

2.4 ENVIRONMENTAL SAMPLE COLLECTION

From July 18 through 20, 2011, nine soil borings were advanced to a depth of 30 feet within the Site boundaries at 530 Avenida Pico (Plate 2). Soil samples were collected

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for analysis from an initial depth of approximately 5 feet bgs and at 5-foot intervals beneath that to the total depth of the boring. A total of 54 soil samples were collected. Kleinfelder's direct-push drilling subcontractor, J&H Drilling, hand-augured 5 to 8 feet bgs at each boring location as a precaution to avoid potential utilities or other subsurface features, then collected the soil samples using a sampler lined with 4-foot long by 1-inch diameter acetate liners from its direct-push drilling equipment. Kleinfelder's environmental professional cut the acetate liners into approximately 12-inch long sections and covered the ends with Teflon® film, followed by tight-fitting plastic end caps. Water-proof labels pre-printed with sample identification numbers were applied to each sample. The samples were stored in Ziploc® bags. For soil samples intended for analysis of volatile organic compounds (VOCs), a portion of the soil sample was placed into pre-preserved, laboratory-prepared volatile organic analysis (VOA) vials, consistent with United States Environmental Protection Agency (USEPA) Method 5035.

The environmental samples were placed into a cooler with ice and transported, via a laboratory-supplied courier, under chain-of-custody (COC) documentation to Enviro-Chem Inc. (Enviro-Chem), a State of California Environmental Laboratory Accreditation Program-accredited laboratory. The samples were picked up daily from the Site by a laboratory courier.

Where sample recovery was adequate, the soil lithology was recorded consistent with ASTM International Designation D 2488-09a, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)* (ASTM, 2009). Based on this logging (see Appendix A), the Site generally overlies Holocene alluvium consisting of lean and fat clay and clayey silt/silty clay with trace amounts of fine-grained sand.

Soil samples were screened for the presence of total VOCs in the field using a PID calibrated as recommended by the manufacturer. Soil classifications and PID readings were recorded on logs of borings in the field (Appendix A). No measureable total VOC concentrations were detected during PID screening, and none of the collected soil samples exhibited staining, noticeable chemical odors, or other apparent indications of contamination.

After sampling of each borehole was completed, it was abandoned by backfilling with bentonite granules that were hydrated in lifts, and the asphalt surface at the borehole location was then completed to surface grade with cement containing a black dye.

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The soil cuttings from the hand auger were placed in a Department of Transportation (DOT)-approved 55-gallon drum for off-Site disposal pending receipt of laboratory analytical results.

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3 ANALYTICAL RESULTS

3.1 LABORATORY TESTING

As previously noted, soil samples were collected from the soil borings at approximate 5-foot intervals to the total depth of the boring. Upon receipt of the samples, the laboratory checked and recorded the condition of the sample containers, including temperature of the samples, on a laboratory sample receipt form. Temperatures recorded by the laboratory were within the USEPA's specified range of less than or equal to 6 degrees Celsius, but not freezing.

Soil samples were analyzed for environmental contaminants by Enviro-Chem using the following tests:

- Total petroleum hydrocarbons (TPH) with carbon chain analysis using USEPA Method 8015B and
- VOCs (including methyl *tertiary*-butyl ether [M*t*BE] and other fuel oxygenates) using USEPA Method 8260B.

3.2 LABORATORY ANALYTICAL RESULTS

Analytical results are summarized in Table 1. The laboratory analytical reports (including COCs) are included in Appendix B.

3.3 TOTAL PETROLEUM HYDROCARBONS

The TPH carbon chain analysis speciated C_4 through C_{35} hydrocarbons into three carbon ranges: gasoline-range hydrocarbons (TPH-g) in the C_4 through C_{10} carbon range; diesel-range hydrocarbons (TPH-d) in the C_{11} through C_{22} carbon range; and oil-range hydrocarbons (TPH-o) in the C_{23} through C_{35} carbon range. As is shown in Table 1, TPH-g, TPH-d, and TPH-o were not detected at concentrations equal to or above the laboratory's practical quantitation limits (PQLs) in the soil samples analyzed for TPH.

3.4 VOLATILE ORGANIC COMPOUNDS

The soil samples were analyzed for VOCs, which were not detected at concentrations at or above the laboratory's PQLs, as shown in Table 1.

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4 CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

Soil samples were collected at approximate 5-foot intervals to the total depth of each of the nine borings. Based on logging of the soil samples, the Site generally overlies recent alluvium consisting of lean and fat clay and clayey silt/silty clay with trace amounts of fine-grained sand. No measureable total VOC concentrations were detected during field screening, and the collected soil samples did not exhibit staining, noticeable chemical odors, or other apparent indications of contamination.

The sampling protocol resulted in a total of 54 soil samples being collected. The soil samples were submitted to Enviro-Chem for environmental testing of samples. Results of the environmental testing are summarized in Table 1, and the laboratory reports are presented in Appendix B.

TPH (in the gasoline, diesel, and oil carbon ranges) and VOCs were not detected in the analyzed soil samples.

4.2 RECOMMENDATIONS

Based on the results of this Limited Phase II ESA, Kleinfelder recommends no further assessment of the Site at this time. Following Site acquisition, the USTs and associated appurtenances should be removed in accordance with applicable regulatory guidelines. Confirmation soil samples should be obtained following removal of the USTs and associated appurtenances.

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5 LIMITATIONS

This report was prepared in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions and at the date the services were provided. Our conclusions, opinions, and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no other representation, guarantee, or warranty, expressed or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This report may be used only by the Client and the registered design professional in responsible charge and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than 2 years from the date of the report.

The scope of services described here is not intended to be inclusive, to identify all potential concerns, or to eliminate the possibility of other environmental problems. Within current technology, no level of assessment can show conclusively that a property or its structures are completely free of hazardous substances. Therefore, Kleinfelder cannot offer a certification that the property is free of environmental liability. Kleinfelder will assume no responsibility or liability whatsoever for any claim, loss of property value, damage, or injury which results from pre-existing hazardous materials being encountered or present on the Site, or from the discovery of such hazardous materials.

Kleinfelder offers various levels of investigative and engineering services to suit the varying needs of different clients. It should be recognized that definition and evaluation of geologic and environmental conditions comprise a difficult and inexact science. Judgments leading to conclusions and recommendations are generally made with incomplete knowledge of the subsurface conditions present due to the limitations of data from field studies. Although risk can never be eliminated, more-detailed and extensive studies yield more information, which may help understand and manage the level of risk. Since detailed study and analysis involves greater expense, our clients participate in determining levels of service that provide adequate information for their purposes at acceptable levels of risk. More extensive studies, including subsurface studies or field tests, should be performed to reduce uncertainties. Acceptance of this

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report will indicate that the Client has reviewed the document and determined that it does not need or want a greater level of service than provided.

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6 REFERENCES

ASTM International Designation D 2488-09a, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)*, 2009.

Kleinfelder, 2010. *Initial Site Assessment, Interstate 5 HOV Lane Extension Project, Avenida Pico (PM 3.0) to San Juan Creek Road (PM 8.7, Orange County, California, 12-ORA-5, EA # 0F9600*, dated August 18.

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TABLES

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Table 1 – Soil Sample Analytical Results
I-5 HOV Lane Extension Project
530 Avenida Pico
San Clemente, Orange County, California

Boring Number	Sample Number	Sample Depth (feet)	Date Sampled	TPH Carbon Chain Analysis				VOCs[1] (mg/kg)
				TPH-g C_4-C_{10} (mg/kg)	TPH-d C_{11}-C_{22} (mg/kg)	TPH-o C_{23}-C_{35} (mg/kg)	Total TPH (mg/kg)	
KLFSB-01	KLSB-01-05	5	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-01-10	10	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-01-15	15	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-01-20	20	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-01-25	25	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-01-30	30	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
KLFSB-02	KLSB-02-05	5	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-02-10	10	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-02-15	15	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-02-20	20	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-02-25	25	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-02-30	30	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
KLFSB-03	KLSB-03-05	5	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-03-10	10	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-03-15	15	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-03-20	20	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-03-25	25	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-03-30	30	7-18-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
KLFSB-04	KLSB-04-05	5	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-04-10	10	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-04-15	15	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-04-20	20	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-04-25	25	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-04-30	30	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020

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Table 1 – Soil Sample Analytical Results
I-5 HOV Lane Extension Project
530 Avenida Pico
San Clemente, Orange County, California

Boring Number	Sample Number	Sample Depth (feet)	Date Sampled	TPH Carbon Chain Analysis				VOCs[1] (mg/kg)
				TPH-g C_4-C_{10} (mg/kg)	TPH-d C_{11}-C_{22} (mg/kg)	TPH-o C_{23}-C_{35} (mg/kg)	Total TPH (mg/kg)	
KLFSB-05	KLSB-05-05	5	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-05-10	10	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-05-15	15	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-05-20	20	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-05-25	25	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-05-30	30	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
KLFSB-06	KLSB-06-05	5	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-06-10	10	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-06-15	15	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-06-20	20	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-06-25	25	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-06-30	30	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
KLFSB-07	KLSB-07-05	5	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-07-10	10	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-07-15	15	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-07-20	20	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-07-25	25	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-07-30	30	7-19-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
KLFSB-08	KLSB-08-05	5	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-08-10	10	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-08-15	15	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-08-20	20	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-08-25	25	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-08-30	30	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020

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Table 1 – Soil Sample Analytical Results
I-5 HOV Lane Extension Project
530 Avenida Pico
San Clemente, Orange County, California

Boring Number	Sample Number	Sample Depth (feet)	Date Sampled	TPH Carbon Chain Analysis				VOCs[1] (mg/kg)
				TPH-g C_4-C_{10} (mg/kg)	TPH-d C_{11}-C_{22} (mg/kg)	TPH-o C_{23}-C_{35} (mg/kg)	Total TPH (mg/kg)	
KLFSB-09	KLSB-09-10	10	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-09-15	15	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-09-20	20	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-09-25	25	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
	KLSB-09-30	30	7-20-11	ND<10	ND<10	ND<50	ND<70	ND<0.005 – 0.020
TTLC				NV	NV	NV	NV	NV
STLC (mg/L)				NV	NV	NV	NV	NV
TCLP (mg/L)				NV	NV	NV	NV	0.2-200
CHHSLs				NV	NV	NV	NV	NV

Notes:

TPH – Total petroleum hydrocarbons, analyzed using United States Environmental Protection Agency (USEPA) Method 8015B and carbon chain identification.
TPH-g – Gasoline-range TPH.
TPH-d – Diesel-range TPH.
TPH-o – Oil-range TPH.
VOCs – Volatile organic compounds, including fuel oxygenates, analyzed using USEPA Method 8260B.
mg/kg – Milligrams per kilogram.
mg/L – Milligrams per liter.
ND< – Not detected above the indicated practical quantitation limit (PQL).
TTLC – California Code of Regulations (CCR) Title 22 Total Threshold Limit Concentration.
STLC – CCR Title 22 Soluble Threshold Limit Concentration (the screening level for assessing whether soluble compound analysis should be performed is 10 times the STLC).
TCLP – Toxicity Characteristic Leaching Procedure Value (the screening level for assessing whether soluble compound analysis should be performed is 20 times the TCLP).
CHHSL – California Human Health Screening Level for Commercial/Industrial Land Use Only (California Environmental Protection Agency).
NV – No value published.
[1] See laboratory reports in Appendix B for listing of specific compounds and PQLs.

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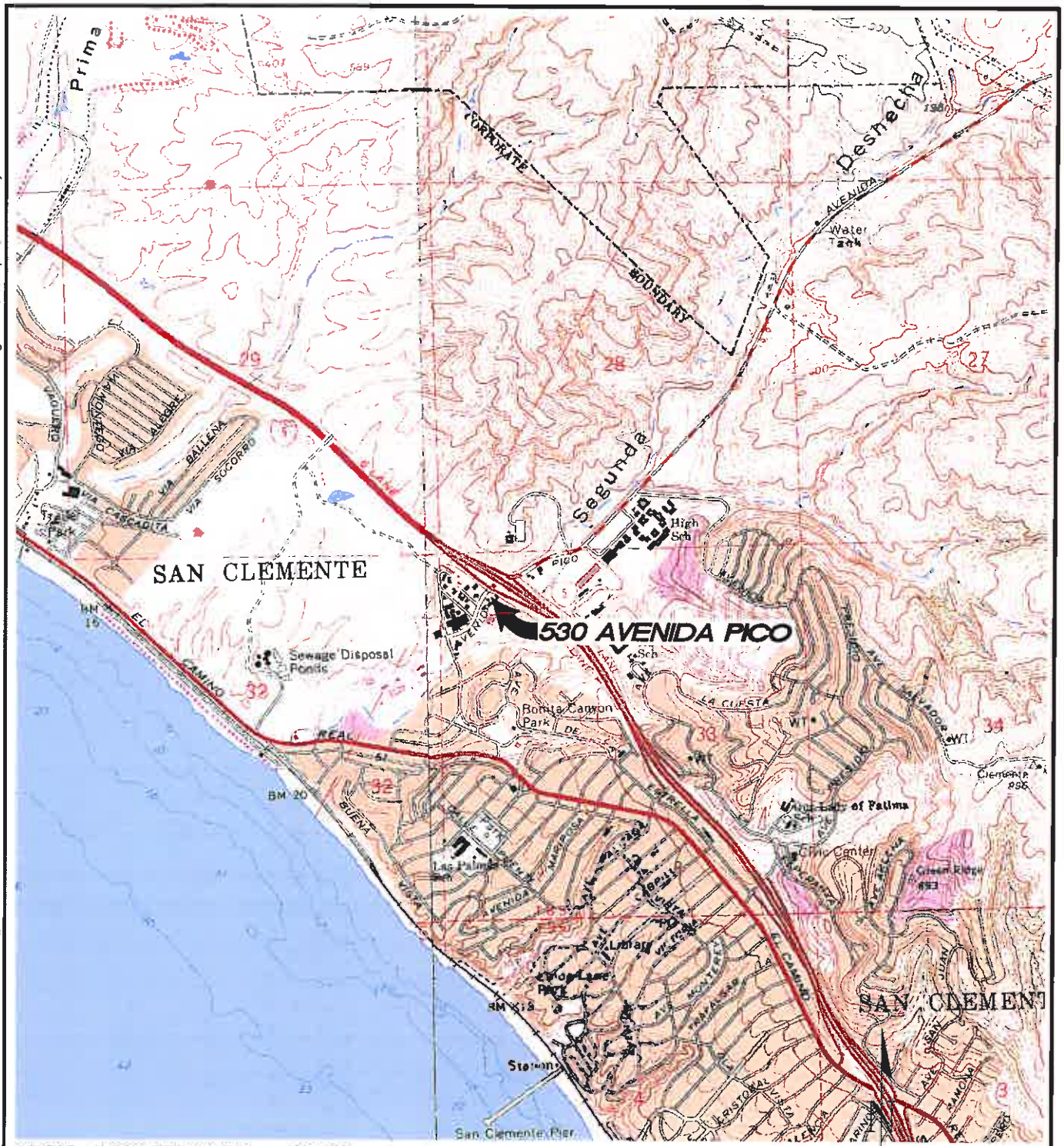
PLATES



SOURCE: U S G S 7.5' topographic series, Dana Point and San Clemente, California quadrangle dated 1968, photorevised 1975

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2,000 1,000 0 2,000

APPROXIMATE SCALE (feet)

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PROJECT NO.	105751
DRAWN:	8/2011
DRAWN BY:	DMF
CHECKED BY:	MC
FILE NAME:	105751p1.dwg

SITE VICINITY MAP

INTERSTATE 5 HOV LANE EXTENSION PROJECT
530 AVENIDA PICO
SAN CLEMENTE, ORANGE COUNTY, CALIFORNIA

PLATE
1

ATTACHED IMAGES: Images: o33117d5.tif Images: o33117d6.tif
ATTACHED XREFS:
DIAMOND BAR, CA

CAD FILE: L:\2011\CADD\105751\I-5 HOV_8-2011\ LAYOUT: 1

PLOTTED: 02 Aug 2011, 1:29pm, dfahmey

SOURCE: GOOGLE EARTH PRO, 2009.

LEGEND

KLFSB-09 ⊕ BORING LOCATION

N

60 30 0 60

APPROXIMATE SCALE (feet)

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PROJECT NO.	105751
DRAWN:	8/2011
DRAWN BY:	DMF
CHECKED BY:	MC
FILE NAME:	105751p2_SLM.dwg

SAMPLE LOCATION MAP
(530 AVENIDA PICO)

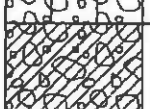
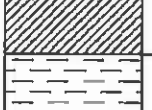
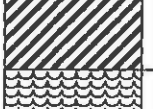
INTERSTATE 5 HOV LANE EXTENSION PROJECT
530 AVENIDA PICO
SAN CLEMENTE, ORANGE COUNTY, CALIFORNIA

PLATE
2

ATTACHED IMAGES: Images: 530-AVE-PICO_scale-156.jpg
ATTACHED XREFS: DIAMOND BAR, CA
CAD FILE: L:\2011\CADD\105751\I-5 HOV_8-2011\ LAYOUT: 2
PLOTTED: 02 Aug 2011, 2:33pm. dfahrney

APPENDIX A

Logs of Borings

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
	HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

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NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

PLOTTED: 10 Aug 2011, 1:39pm, Jpatay
CAD FILE: G:\2011\105751\ LAYOUT: Soil Classification Chart
ATTACHED IMAGES:
ATTACHED XREFS:

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PROJECT NO.	105751
DRAWN:	8/10/11
DRAWN BY:	JP
CHECKED BY:	MH
FILE NAME:	105751Key.dwg

SOIL CLASSIFICATION CHART

INTERSTATE 5 HOV LANE EXTENSION
530 AVENIDA PICO
SAN CLEMENTE, ORANGE COUNTY, CALIFORNIA

Plate
A1

LOG SYMBOLS

BULK/BAG SAMPLE

MODIFIED CALIFORNIA SAMPLER
(2-1/2 inch outside diameter)

CALIFORNIA SAMPLER
(3 inch outside diameter)

STANDARD PENETRATION
SPLIT SPOON SAMPLER
(2 inch outside diameter)

NO SAMPLE RECOVERY

SHELBY TUBE

WATER LEVEL (level after completion)

WATER LEVEL (level where first encountered)

ABBREVIATIONS

SA - (38%) SIEVE ANALYSIS (PERCENT PASSING #200 SIEVE)
WA - (38%) - ONE POINT GRAIN SIZE ANALYSIS (PERCENT PASSING #200 SIEVE)
PI - PLASTICITY INDEX
LL - LIQUID LIMIT
DS - DIRECT SHEAR TEST
'R' - R-VALUE TEST
CORR - CORROSIVITY TEST
EI - UBC EXPANSION INDEX
LC - LABORATORY COMPACTION TEST
M&D - MOISTURE & DENSITY
PP - POCKET PENETROMETER
NR - NO SAMPLE RECOVERY
CONSOL - CONSOLIDATION TEST

RELATIVE DENSITY

RELATIVE DENSITY	ABBREVIATION	SPT* (# blows/ft)	RELATIVE DENSITY (%)
Very Loose	Vl	<4	0 - 15
Loose	L	4 - 10	15 - 35
Medium Dense	Md	10 - 30	35 - 65
Dense	D	30 - 50	65 - 85
Very Dense	Vd	>50	85 - 100

PLASTICITY

ABBREVIATION	DESCRIPTION
Np	NON PLASTIC
Lp	LOW PLASTICITY
Mp	MEDIUM PLASTICITY
Hp	HIGH PLASTICITY

CONSISTENCY

CONSISTENCY	ABBREVIATION	SPT (# blows/ft)	TORVANE UNDRAINED SHEAR STRENGTH (tsf)	POCKET** PENETROMETER UNCONFINED COMPRESSIVE STRENGTH
Very Soft	Vs	<2	<0.13	<0.25
Soft	S	2 - 4	0.13 - 0.25	0.25 - 0.5
Medium Stiff	Ms	4 - 8	0.25 - 0.5	0.5 - 1 0
Stiff	S	8 - 15	0.5 - 1.0	1.0 - 2.0
Very Stiff	Vs	15 - 30	1.0 - 2.0	2.0 - 4 0
Hard	H	>30	>2.0	>4

* NUMBER OF BLOWS OF 140 POUNDS HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D (1 3/8 INCH I.D.) SPLIT BARREL SAMPLER (ASTM-1586 STANDARD PENETRATION TEST)

** UNCONFINED COMPRESSIVE STRENGTH IN TONS/SQ. FT. READ FROM POCKET PENETROMETER

MOISTURE CONTENT

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

CEMENTATION

DESCRIPTION	FIELD TEST
Weakly	Crumbles or breaks with handling or slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

GENERAL NOTES

1. *Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual.*
2. *No warranty is provided as to the continuity of soil conditions between individual sample locations.*
3. *Logs represent general soil conditions observed at the point of exploration on the date indicated.*
4. *In general, Unified Soil Classification designations presented on the logs were evaluated by visual methods only. Therefore, actual designations (based on laboratory tests) may vary.*

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PROJECT NO.	105751
DRAWN:	8/10/11
DRAWN BY:	JP
CHECKED BY:	MH
FILE NAME:	105751Key.dwg

KEY TO LOGS

INTERSTATE 5 HOV LANE EXTENSION
530 AVENIDA PICO
SAN CLEMENTE, ORANGE COUNTY, CALIFORNIA

Plate
A2

PLOTTED: 10 Aug 2011, 1:39pm, Jpatay
CAD FILE: G:\2011\105751\ LAYOUT: Key to Logs
ATTACHED IMAGES:
ATTACHED XREFS:

Comments	Chemical Analyses: Lab.	Chemical Analyses: Field PID/OVA (ppmv)	Depth (feet)	Sample Number	Sample Type	Blows per Foot	Lithology Symbol	U.S.C.S. Designation	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION
									CLAY (CL), brown, damp, firm; trace fine to medium-grained sand.
		0.0	5	KLFSB -01 -05					
		0.0	10	KLFSB -01 -10					
		0.0	15	KLFSB -01 -15					scattered carbonate flecks.
		0.0	20	KLFSB -01 -20					becomes firm to hard.
		0.0	25	KLFSB -01 -25					becomes moist.
		0.0	30	KLFSB -01 -30					trace to little silt.
									Total boring depth - 30 feet bgs. Groundwater not encountered. Boring backfilled with hydrated bentonite granules and capped with asphalt cold patch.

SURFACE ELEVATION: NOT MEASURED
TOTAL DEPTH (feet): 30
DATE DRILLED: 7-18-11

LOGGED BY: MH
DIAMETER OF BORING (inches): 2 inches
DEPTH OF STATIC WATER (feet): NOT ENCOUNTERED

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PROJECT NO. 105751

Interstate 5 HOV Lane Extension Project
530 Avenida Pico, San Clemente, Orange County, CA

LOG OF BORING KLFSB-01

PLATE
A-3

ENVIRONMENTAL (MODIFIED 081211) 115751_530 AVE PICO.GPJ KA_RDLND.GDT 8/12/11

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

Comments	Chemical Analyses: Lab.	Chemical Analyses: Field PID/OVA (ppmv)	Depth (feet)	Sample Number	Sample Type	Blows per Foot	Lithology Symbol	U.S.C.S. Designation	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION
		0.0	5	KLFSB -02 -05					CLAY (CL), brown, damp, firm; trace fine to medium-grained sand.
		0.0	10	KLFSB -02 -10					CLAY (CH), brown to dark brown, damp to moist, firm to hard; high plasticity.
		0.0	15	KLFSB -02 -15					CLAY (CL), brown, damp, firm.
		0.0	20	KLFSB -02 -20					CLAY (CH), brown to dark brown, damp, hard; high plasticity.
		0.0	25	KLFSB -02 -25					Clayey SAND (SC), brown, damp to moist, medium dense, fine-grained sand.
		0.0	30	KLFSB -02 -30					Total boring depth - 30 feet bgs. Groundwater not encountered. Boring backfilled with hydrated bentonite granules and capped with concrete.

SURFACE ELEVATION: NOT MEASURED
TOTAL DEPTH (feet): 30
DATE DRILLED: 7-18-11

LOGGED BY: MH
DIAMETER OF BORING (inches): 2 inches
DEPTH OF STATIC WATER (feet): NOT ENCOUNTERED

KLEINFELDER
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Interstate 5 HOV Lane Extension Project
530 Avenida Pico, San Clemente, Orange County, CA

PLATE
A-4

PROJECT NO. 105751

LOG OF BORING KLFSB-02

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

ENVIRONMENTAL (MODIFIED 061211) 115751_533 AVE PICO GPJ KA_ROLND GDT 8/12/11

Comments	Chemical Analyses: Lab.	Chemical Analyses: Field PID/OVA (ppmv)	Depth (feet)	Sample Number	Sample Type	Blows per Foot	Lithology Symbol	U.S.C.S. Designation	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION
		0.0	5	KLFSB-03-05					Sandy CLAY (CL), brown, damp, firm, fine-grained sand.
		0.0	10	KLFSB-03-10					CLAY (CH), brown, damp, hard; high plasticity, trace silt and fine-grained sand.
		0.0	15	KLFSB-03-15					scattered carbonate fleck.
		0.0	20	KLFSB-03-20					CLAY (CL), brown, damp to moist, hard; trace fine-grained sand.
		0.0	25	KLFSB-03-25					
		0.0	30	KLFSB-03-30					Total boring depth - 30 feet bgs. Groundwater not encountered. Boring backfilled with hydrated bentonite granules and capped with concrete.

SURFACE ELEVATION: NOT MEASURED
TOTAL DEPTH (feet): 30
DATE DRILLED: 7-18-11

LOGGED BY: MH
DIAMETER OF BORING (inches): 2 inches
DEPTH OF STATIC WATER (feet): NOT ENCOUNTERED

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PROJECT NO. 105751

Interstate 5 HOV Lane Extension Project
530 Avenida Pico, San Clemente, Orange County, CA

LOG OF BORING KLFSB-03

PLATE
A-5

ENVIRONMENTAL (MODIFIED 081211) 115751_530 AVE PICO.GPJ KA_RDLND.GDT 8/12/11

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

Comments	Chemical Analyses: Lab.	Chemical Analyses: Field PID/OVA (ppmv)	Depth (feet)	Sample Number	Sample Type	Blows per Foot	Lithology Symbol	U.S.C.S. Designation	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION
		0.0	5	KLFSB-04-05					CLAY (CL), brown, damp, firm, fine-grained sand.
		0.0	10	KLFSB-04-10					CLAY (CH), brown, damp, hard; high plasticity, trace silt and fine-grained sand.
		0.0	15	KLFSB-04-15					
		0.0	20	KLFSB-04-20					
		0.0	25	KLFSB-04-25					Sandy CLAY (CL), brown, damp to moist, hard, fine-grained sand.
		0.0	30	KLFSB-04-30					Total boring depth - 30 feet bgs. Groundwater not encountered. Boring backfilled with hydrated bentonite granules and capped with concrete.

SURFACE ELEVATION: NOT MEASURED
TOTAL DEPTH (feet): 30
DATE DRILLED: 7-19-11

LOGGED BY: MH
DIAMETER OF BORING (inches): 2 inches
DEPTH OF STATIC WATER (feet): NOT ENCOUNTERED

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PROJECT NO. 105751

Interstate 5 HOV Lane Extension Project
530 Avenida Pico, San Clemente, Orange County, **CA**

LOG OF BORING KLFSB-04

PLATE
A-6

ENVIRONMENTAL (MODIFIED 081211) 115751 530 AVE PICO GPJ KA_RDLND GDT 8/12/11

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

Comments	Chemical Analyses: Lab.	Chemical Analyses: Field PID/OVA (ppmv)	Depth (feet)	Sample Number	Sample Type	Blows per Foot	Lithology Symbol	U.S.C.S. Designation	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION
									CLAY (CL), brown, damp, firm; trace fine to medium-grained sand.
		0.0	5	KLFSB-05-05					
		0.0	10	KLFSB-05-10					
		0.0	15	KLFSB-05-15					becomes firm to hard.
		0.0	20	KLFSB-05-20					
		0.0	25	KLFSB-05-25					becomes moist, trace to little silt.
		0.0	30	KLFSB-05-30					
									Total boring depth - 30 feet bgs. Groundwater not encountered. Boring backfilled with hydrated bentonite granules and capped with concrete.

SURFACE ELEVATION: NOT MEASURED
TOTAL DEPTH (feet): 30
DATE DRILLED: 7-19-11

LOGGED BY: MH
DIAMETER OF BORING (inches): 2 inches
DEPTH OF STATIC WATER (feet): NOT ENCOUNTERED

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Interstate 5 HOV Lane Extension Project
530 Avenida Pico, San Clemente, Orange County, CA

PLATE
A-7

PROJECT NO. 105751

LOG OF BORING KLFSB-05

ENVIRONMENTAL (MODIFIED 081211) 115751_530 AVE PICO GPJ KA_RDLND GDT 8/12/11

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

Comments	Chemical Analyses: Lab.	Chemical Analyses: Field PID/OVA (ppmv)	Depth (feet)	Sample Number	Sample Type	Blows per Foot	Lithology Symbol	U.S.C.S. Designation	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION
									CLAY (CL), brown, damp, firm, fine-grained sand.
		0.0	5	KLFSB -06 -05					Few scattered gravel-sized pieces of asphalt to approximately 4'.
		0.0	10	KLFSB -06 -10					CLAY (CH), brown, damp, hard; high plasticity, trace silt and fine-grained sand.
		0.0	15	KLFSB -06 -15					firm @ 15' to 18'.
		0.0	20	KLFSB -06 -20					
		0.0	25	KLFSB -06 -25					Silty CLAY/Clayey SILT (CL-ML), brown, moist, firm.
		0.0	30	KLFSB -06 -30					Total boring depth - 30 feet bgs. Groundwater not encountered. Boring backfilled with hydrated bentonite granules and capped with concrete.

SURFACE ELEVATION: NOT MEASURED
TOTAL DEPTH (feet): 30
DATE DRILLED: 7-19-11

LOGGED BY: MH
DIAMETER OF BORING (inches): 2 inches
DEPTH OF STATIC WATER (feet): NOT ENCOUNTERED

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PROJECT NO. 105751

Interstate 5 HOV Lane Extension Project
530 Avenida Pico, San Clemente, Orange County, CA

LOG OF BORING KLFSB-06

PLATE
A-8

ENVIRONMENTAL (MODIFIED 081211) 115751_530 AVE PICO.GPJ KA_RDLND.GDT 8/12/11

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

Comments	Chemical Analyses: Lab.	Chemical Analyses: Field PID/OVA (ppmv)	Depth (feet)	Sample Number	Sample Type	Blows per Foot	Lithology Symbol	U.S.C.S. Designation	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION
									CLAY (CL), brown, damp, firm; little fine to medium-grained sand; few scattered gravel up to 2" diameter.
		0.0	5	KLFSB-07-05					CLAY (CH), brown, damp to moist, firm to hard; high plasticity.
		0.0	10	KLFSB-07-10					Silty CLAY/Clayey SILT (CL-ML), brown, damp to moist, firm.
		0.0	15	KLFSB-07-15					
		0.0	20	KLFSB-07-20					Clayey SILT (ML), brown, moist, firm; trace fine-grained sand.
		0.0	25	KLFSB-07-25					Clayey SAND (SC), brown, damp to moist, medium dense, fine-grained sand with little silt.
		0.0	30	KLFSB-07-30					Total boring depth - 30 feet bgs. Groundwater not encountered. Boring backfilled with hydrated bentonite granules and capped with concrete.

SURFACE ELEVATION: NOT MEASURED
TOTAL DEPTH (feet): 30
DATE DRILLED: 7-19-11

LOGGED BY: MH
DIAMETER OF BORING (inches): 2 inches
DEPTH OF STATIC WATER (feet): NOT ENCOUNTERED

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PROJECT NO. 105751

Interstate 5 HOV Lane Extension Project
530 Avenida Pico, San Clemente, Orange County, CA

LOG OF BORING KLFSB-07

PLATE
A-9

ENVIRONMENTAL (MODIFIED 081211) 115751_530 AVE PICO GPJ KA_RDLND GDT 8/12/11

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

Comments	Chemical Analyses: Lab.	Chemical Analyses: Field PID/OVA (ppmv)	Depth (feet)	Sample Number	Sample Type	Blows per Foot	Lithology Symbol	U.S.C.S. Designation	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION
									Clayey SAND (SC), brown, damp, medium dense, fine to medium-grained sand.
		0.0	5	KLFSB-08-05					CLAY (CL), brown to reddish brown, damp, firm; trace fine grained-sand.
		0.0	10	KLFSB-08-10					
		0.0	15	KLFSB-08-15					Clayey SILT (ML), brown to dark brown, damp to moist, firm.
		0.0	20	KLFSB-08-20					
		0.0	25	KLFSB-08-25					CLAY (CH), brown, damp, firm; high plastcity.
		0.0	30	KLFSB-08-30					
									Total boring depth - 30 feet bgs. Groundwater not encountered. Boring backfilled with hydrated bentonite granules and capped with concrete.

SURFACE ELEVATION: NOT MEASURED
TOTAL DEPTH (feet): 30
DATE DRILLED: 7-20-11

LOGGED BY: MH
DIAMETER OF BORING (inches): 2 inches
DEPTH OF STATIC WATER (feet): NOT ENCOUNTERED

KLEINFELDER
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PROJECT NO. 105751

Interstate 5 HOV Lane Extension Project
530 Avenida Pico, San Clemente, Orange County, CA

LOG OF BORING KLFSB-08

PLATE
A-10

ENVIRONMENTAL (MODIFIED 081211) 115751_530 AVE PICO.GPJ KA_RDLND.GDT 8/12/11

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

Comments	Chemical Analyses: Lab.	Chemical Analyses: Field PID/OVA (ppmv)	Depth (feet)	Sample Number	Sample Type	Blows per Foot	Lithology Symbol	U.S.C.S. Designation	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION
									Clayey SAND (SC), brown, damp, medium dense, fine to medium-grained sand.
		0.0	5	KLFSB -09 -05					CLAY (CL), brown to reddish brown, damp, firm; trace fine grained-sand.
		0.0	10	KLFSB -09 -10					
		0.0	15	KLFSB -09 -15					
		0.0	20	KLFSB -09 -20					CLAY (CH), brown, damp, hard; high plasticity, trace fine-grained sand.
		0.0	25	KLFSB -09 -25					becomes damp to moist; scattered carbonate flecks.
		0.0	30	KLFSB -09 -30					Total boring depth - 30 feet bgs. Groundwater not encountered. Boring backfilled with hydrated bentonite granules and capped with concrete.

SURFACE ELEVATION: NOT MEASURED
TOTAL DEPTH (feet): 30
DATE DRILLED: 7-20-11

LOGGED BY: MH
DIAMETER OF BORING (inches): 2 inches
DEPTH OF STATIC WATER (feet): NOT ENCOUNTERED

KLEINFELDER
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Interstate 5 HOV Lane Extension Project
530 Avenida Pico, San Clemente, Orange County, CA

PLATE
A-11

PROJECT NO. 105751

LOG OF BORING KLFSB-09

Note: The boundaries between soil types shown on the logs are approximate as the transition between different soil layers may be gradual.

ENVIRONMENTAL (MODIFIED 081211) 115751_530 AVE PICO GPJ KA_RDLND.GDT 8/12/11

APPENDIX B

Analytical Laboratory Reports

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Date: July 22, 2011

Mr. Gerald (Jerry) Kellar
Kleinfelder
5015 Shoreham Place
San Diego, CA 92122
Tel(858)320-2000 E-Mail: Gkellar@kleinfelder.com

Project: **530 Ave. Pico**
Project No.: **105751**
Lab I.D.: **110719-1 through -19**

Dear Mr. Kellar:

The **analytical results** for the soil and water samples, received by our lab on July 18, 2011, are attached. The samples were received chilled at four degrees Celsius, intact and accompanying chain of custody.

Enviro-Chem appreciates the opportunity to provide you and your company this and other services. Please do not hesitate to call us if you have any questions.

Sincerely,

Curtis Desilets
Vice President/Program Manager

Andy Wang
Laboratory Manager

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: Kleinfelder
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: 530 Ave Pico
PROJECT No.: 105751
DATE RECEIVED: 07/18/11
MATRIX: SOIL
DATE EXTRACTED: 07/19/11
DATE SAMPLED: 07/18/11
DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR
DATE REPORTED: 07/22/11

TOTAL PETROLEUM HYDROCARBONS (TPH) - CARBON CHAIN ANALYSIS
METHOD: EPA 8015B
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

SAMPLE I.D.	LAB I.D.	C4-C10	C11-C22	C23-C35	DF
KLFSB-01-15	110719-3	ND	ND	ND	1
KLFSB-01-20	110719-4	ND	ND	ND	1
KLFSB-01-30	110719-6	ND	ND	ND	1
KLFSB-02-15	110719-9	ND	ND	ND	1
KLFSB-02-20	110719-10	ND	ND	ND	1
KLFSB-02-30	110719-13	ND	ND	ND	1
KLFSB-03-05	110719-14	ND	ND	ND	1
KLFSB-03-10	110719-15	ND	ND	ND	1
KLFSB-03-25	110719-18	ND	ND	ND	1
METHOD BLANK		ND	ND	ND	1
	PQL	**10**	**10**	**50**	

COMMENTS
C4-C10 = GASOLINE RANGE
C11-C22 = DIESEL RANGE
C23-C35 = MOTOR OIL RANGE
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = DF X PQL
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

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8015B Soil/Solid QC

Date Analyzed: 7/19/2011 **Units:** mg/Kg (PPM)

Matrix: Solid/Sludge/Soil

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)
Batch I.D. : 110719-18

Spiked Sample Lab I.D.: 110719-18 MS/MSD

Analyte	SR	spk conc	MS	%MS	MSD	%MSD	%RPD	ACP %MS	ACP RPD
C11~C22 Range	0	2500	2480	99%	2800	112%	12%	75-125	0-20%

LCS STD RECOVERY:

Analyte	spk conc	LCS	% REC	ACP
C11~C22 Range	200	224	112%	75-125

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.		MB	110719-3	110719-4	110719-6	110719-9	110719-10	110719-13	110719-14
O-Terphenyl	60-140%	89%	95%	88%	89%	93%	92%	92%	95%
Octacosane	60-140%	78%	88%	72%	78%	81%	83%	78%	81%

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.		110719-15	110719-18						
O-Terphenyl	60-140%	86%	116%						
Octacosane	60-140%	72%	120%						

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC			
Sample I.D.									
O-Terphenyl	60-140%								
Octacosane	60-140%								

Analyzed and Reviewed By: _____

Final Reviewer: _____

** = Surrogate fail due to matrix interference*

Note: *LCS, MS, MSD are in control therefore results are in control.*

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: 105751
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11

EPA 5035/8260B FOR FUEL OXYGENATES
UNITS: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

SAMPLE I.D.	LAB I.D.	ETBE	DIPE	MTBE	TAME	TBA	DF
KLFSB-01-15	110719-3	ND	ND	ND	ND	ND	1
KLFSB-01-20	110719-4	ND	ND	ND	ND	ND	1
KLFSB-01-30	110719-6	ND	ND	ND	ND	ND	1
KLFSB-02-15	110719-9	ND	ND	ND	ND	ND	1
KLFSB-02-20	110719-10	ND	ND	ND	ND	ND	1
KLFSB-02-30	110719-13	ND	ND	ND	ND	ND	1
KLFSB-03-05	110719-14	ND	ND	ND	ND	ND	1
KLFSB-03-10	110719-15	ND	ND	ND	ND	ND	1
KLFSB-03-25	110719-18	ND	ND	ND	ND	ND	1
Method Blank		ND	ND	ND	ND	ND	1
PQL		0.01	0.01	0.005	0.01	0.05	

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = DF X PQL
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
ETBE = ETHYL tert-BUTYL ETHER DIPE = ISOPROPYL ETHER
MTBE = METHYL tert-BUTYL ETHER TAME = TERT-AMYL METHYL ETHER
TBA = TERTIARY BUTYL ALCOHOL

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

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LABORATORY REPORT

CUSTOMER: Kleinfelder
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Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/18/11
REPORT TO: Mr. GERALD (JERRY) KELLAR
SAMPLE I.D.: KLFSB-01-15

PROJECT No.: 105751
DATE RECEIVED: 07/18/11
DATE ANALYZED: 07/19/11
DATE REPORTED: 07/22/11
LAB I.D.: 110719-3

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

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PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 | DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR | DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-01-15** | LAB I.D.: 110719-3

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 | DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR | DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-01-20** | LAB I.D.: 110719-4

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/18/11
DATE SAMPLED:07/18/11 DATE ANALYZED:07/19/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **KLFSB-01-20** LAB I.D.: 110719-4

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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Tel(858)320-2000
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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-01-30** LAB I.D.: 110719-6

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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Tel (858) 320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-01-30** LAB I.D.: 110719-6

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 | DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR | DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-02-15** | LAB I.D.: 110719-9

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- **TO BE** CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED **BY:**_____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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Tel(858)320-2000
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PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 | DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR | DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-02-15** | LAB I.D.: 110719-9

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-02-20** LAB I.D.: 110719-10

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/18/11
DATE SAMPLED:07/18/11 DATE ANALYZED:07/19/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **KLFSB-02-20** LAB I.D.: 110719-10

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-02-30** LAB I.D.: 110719-13

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 | DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR | DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-02-30** | LAB I.D.: 110719-13

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

CUSTOMER: Kleinfelder
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Tel(858)320-2000
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PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/18/11
REPORT TO: Mr. GERALD (JERRY) KELLAR
SAMPLE I.D.: KLFSB-03-05

PROJECT No.: 105751
DATE RECEIVED: 07/18/11
DATE ANALYZED: 07/19/11
DATE REPORTED: 07/22/11
LAB I.D.: 110719-14

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: Kleinfelder
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/18/11
REPORT TO: Mr. GERALD (JERRY) KELLAR
SAMPLE I.D.: KLFSB-03-05

PROJECT No.: 105751
DATE RECEIVED: 07/18/11
DATE ANALYZED: 07/19/11
DATE REPORTED: 07/22/11
LAB I.D.: 110719-14

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel (858) 320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 | DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR | DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-03-10** | LAB I.D.: 110719-15

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-03-10** LAB I.D.: 110719-15

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/18/11
DATE SAMPLED:07/18/11 DATE ANALYZED:07/19/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **KLFSB-03-25** LAB I.D.: 110719-18

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
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E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-03-25** LAB I.D.: 110719-18

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

METHOD BLANK REPORT

CUSTOMER: Kleinfelder
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/18/11
REPORT TO: Mr. GERALD (JERRY) KELLAR

PROJECT No.: 105751
DATE RECEIVED: 07/18/11
DATE ANALYZED: 07/19/11
DATE REPORTED: 07/22/11

METHOD BLANK FOR LAB I.D.:
110719-3, -4, -6, -9, -10, -13, -14, -15, -18

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

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METHOD BLANK REPORT

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11

METHOD BLANK FOR LAB I.D.:
110719-3, -4, -6, -9, -10, -13, -14, -15, -18

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro-Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

8260B QA/QC Report

Date Analyzed: 7/19/2011 **Matrix:** Solid/Soil/Liquid
Machine: C **Unit:** mg/Kg (PPM)

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)

Spiked Sample Lab I.D.: 110719-3 MS/MSD **BATCH I.D. : 110719-3**

Analyte	S.R.	spk conc	MS	%RC	MSD	%RC	%RPD	ACP %RC	ACP RPD
Benzene	0	0.050	0.051	102%	0.051	102%	0%	75-125	0-20
Chlorobenzene	0	0.050	0.055	110%	0.053	106%	4%	75-125	0-20
1,1-Dichloroethene	0	0.050	0.050	100%	0.054	108%	8%	75-125	0-20
Toluene	0	0.050	0.053	106%	0.053	106%	0%	75-125	0-20
Trichloroethene (TCE)	0	0.050	0.056	112%	0.057	114%	2%	75-125	0-20

Lab Control Spike (LCS):

Analyte	spk conc	LCS	%RC	ACP %RC
Benzene	0.050	0.050	100%	75-125
Chlorobenzene	0.050	0.051	102%	75-125
Chloroform	0.050	0.057	114%	75-125
1,1-Dichlorothene	0.050	0.055	110%	75-125
Ethylbenzene	0.050	0.052	104%	75-125
o-Xylene	0.050	0.055	110%	75-125
m,p-Xylene	0.100	0.107	107%	75-125
Toluene	0.050	0.057	114%	75-125
1,1,1-Trichloroethane	0.050	0.053	106%	75-125
Trichloroethene (TCE)	0.050	0.054	108%	75-125

Surrogate Recovery	spk conc	ACP %RC	MB %RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			M-BLK	110719-3	110719-4	110719-6	110719-9	110719-10	110719-13
Dibromofluoromethane	50.0	70-130	91%	111%	115%	108%	114%	116%	116%
Toluene-d8	50.0	70-130	99%	107%	104%	103%	107%	105%	107%
4-Bromofluorobenzene	50.0	70-130	86%	77%	77%	77%	82%	73%	73%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110719-14	110719-15	110719-18				
Dibromofluoromethane	50.0	70-130	115%	123%	100%				
Toluene-d8	50.0	70-130	106%	109%	104%				
4-Bromofluorobenzene	50.0	70-130	71%	70%	81%				

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.									
Dibromofluoromethane	50.0	70-130							
Toluene-d8	50.0	70-130							
4-Bromofluorobenzene	50.0	70-130							

** = Surrogate fail due to matrix interference; LCS, MS, MSD are in control therefore the analysis is in control.*
S.R. = Sample Results *%RC = Percent Recovery*
spk conc = Spike Concentration *ACP %RC = Accepted Percent Recovery*
MS = Matrix Spike *MSD = Matrix Spike Duplicate*

Analyzed/Reviewed By: SLH

Final Reviewer:

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:WATER DATE RECEIVED:07/18/11
DATE SAMPLED:07/18/11 DATE ANALYZED:07/20/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **110718-QCTB** LAB I.D.: 110719-11

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 1 OF 2
UNIT: ug/L = MICROGRAM PER LITER = PPB

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	10
BENZENE	ND	1
BROMOBENZENE	ND	1
BROMOCHLOROMETHANE	ND	1
BROMODICHLOROMETHANE	ND	1
BROMOFORM	ND	1
BROMOMETHANE	ND	1
2-BUTANONE (MEK)	ND	10
N-BUTYLBENZENE	ND	1
SEC-BUTYLBENZENE	ND	1
TERT-BUTYLBENZENE	ND	1
CARBON DISULFIDE	ND	5
CARBON TETRACHLORIDE	ND	1
CHLOROBENZENE	ND	1
CHLOROETHANE	ND	1
CHLOROFORM	ND	1
CHLOROMETHANE	ND	1
2-CHLOROTOLUENE	ND	1
4-CHLOROTOLUENE	ND	1
DIBROMOCHLOROMETHANE	ND	1
1,2-DIBROMO-3-CHLOROPROPANE	ND	1
1,2-DIBROMOETHANE	ND	1
DIBROMOMETHANE	ND	1
1,2-DICHLOROBENZENE	ND	1
1,3-DICHLOROBENZENE	ND	1
1,4-DICHLOROBENZENE	ND	1
DICHLORODIFLUOROMETHANE	ND	1
1,1-DICHLOROETHANE	ND	1
1,2-DICHLOROETHANE	ND	1
1,1-DICHLOROETHENE	ND	1
CIS-1,2-DICHLOROETHENE	ND	1
TRANS-1,2-DICHLOROETHENE	ND	1
1,2-DICHLOROPROPANE	ND	1
1,3-DICHLOROPROPANE	ND	1

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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REPORT TO:Mr. GERALD (JERRY) KELLAR
SAMPLE I.D.: 110718-QCTB

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LAB I.D.: 110719-11

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 2 OF 2
UNIT: ug/L = MICROGRAM PER LITER = PPB

PARAMETER	SAMPLE RESULT	PQL X1
2,2-DICHLOROPROPANE	ND	1
1,1-DICHLOROPROPENE	ND	1
CIS-1,3-DICHLOROPROPENE	ND	1
TRANS-1,3-DICHLOROPROPENE	ND	1
ETHYLBENZENE	ND	1
2-HEXANONE	ND	10
HEXACHLOROBUTADIENE	ND	1
ISOPROPYLBENZENE	ND	1
4-ISOPROPYLTOLUENE	ND	1
4-METHYL-2-PENTANONE (MIBK)	ND	10
METHYL tert-BUTYL ETHER (MTBE)	ND	3
METHYLENE CHLORIDE	ND	5
NAPHTHALENE	ND	1
N-PROPYLBENZENE	ND	1
STYRENE	ND	1
1,1,1,2-TETRACHLOROETHANE	ND	1
1,1,2,2-TETRACHLOROETHANE	ND	1
TETRACHLOROETHENE (PCE)	ND	1
TOLUENE	ND	1
1,2,3-TRICHLOROBENZENE	ND	1
1,2,4-TRICHLOROBENZENE	ND	1
1,1,1-TRICHLOROETHANE	ND	1
1,1,2-TRICHLOROETHANE	ND	1
TRICHLOROETHENE (TCE)	ND	1
TRICHLOROFLUOROMETHANE	ND	1
1,2,3-TRICHLOROPROPANE	ND	1
1,2,4-TRIMETHYLBENZENE	ND	1
1,3,5-TRIMETHYLBENZENE	ND	1
VINYL CHLORIDE	ND	1
M/P-XYLENE	ND	2
O-XYLENE	ND	1

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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METHOD BLANK REPORT

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METHOD BLANK FOR LAB I.D.: 110719-11

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 1 OF 2
UNIT: ug/L = MICROGRAM PER LITER = PPB

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	10
BENZENE	ND	1
BROMOBENZENE	ND	1
BROMOCHLOROMETHANE	ND	1
BROMODICHLOROMETHANE	ND	1
BROMOFORM	ND	1
BROMOMETHANE	ND	1
2-BUTANONE (MEK)	ND	10
N-BUTYLBENZENE	ND	1
SEC-BUTYLBENZENE	ND	1
TERT-BUTYLBENZENE	ND	1
CARBON DISULFIDE	ND	5
CARBON TETRACHLORIDE	ND	1
CHLOROBENZENE	ND	1
CHLOROETHANE	ND	1
CHLOROFORM	ND	1
CHLOROMETHANE	ND	1
2-CHLOROTOLUENE	ND	1
4-CHLOROTOLUENE	ND	1
DIBROMOCHLOROMETHANE	ND	1
1,2-DIBROMO-3-CHLOROPROPANE	ND	1
1,2-DIBROMOETHANE	ND	1
DIBROMOMETHANE	ND	1
1,2-DICHLOROBENZENE	ND	1
1,3-DICHLOROBENZENE	ND	1
1,4-DICHLOROBENZENE	ND	1
DICHLORODIFLUOROMETHANE	ND	1
1,1-DICHLOROETHANE	ND	1
1,2-DICHLOROETHANE	ND	1
1,1-DICHLOROETHENE	ND	1
CIS-1,2-DICHLOROETHENE	ND	1
TRANS-1,2-DICHLOROETHENE	ND	1
1,2-DICHLOROPROPANE	ND	1
1,3-DICHLOROPROPANE	ND	1

----- TO BE CONTINUED ON PAGE #2 -----

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REPORT TO: Mr. GERALD (JERRY) KELLAR — DATE REPORTED: 07/22/11

METHOD BLANK FOR LAB I.D.: 110719-11

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 2 OF 2
UNIT: ug/L = MICROGRAM PER LITER = PPB

PARAMETER	SAMPLE RESULT	PQL X1
2,2-DICHLOROPROPANE	ND	1
1,1-DICHLOROPROPENE	ND	1
CIS-1,3-DICHLOROPROPENE	ND	1
TRANS-1,3-DICHLOROPROPENE	ND	1
ETHYLBENZENE	ND	1
2-HEXANONE	ND	10
HEXACHLOROBUTADIENE	ND	1
ISOPROPYLBENZENE	ND	1
4-ISOPROPYLTOLUENE	ND	1
4-METHYL-2-PENTANONE (MIBK)	ND	10
METHYL tert-BUTYL ETHER (MTBE)	ND	3
METHYLENE CHLORIDE	ND	5
NAPHTHALENE	ND	1
N-PROPYLBENZENE	ND	1
STYRENE	ND	1
1,1,1,2-TETRACHLOROETHANE	ND	1
1,1,2,2-TETRACHLOROETHANE	ND	1
TETRACHLOROETHENE (PCE)	ND	1
TOLUENE	ND	1
1,2,3-TRICHLOROBENZENE	ND	1
1,2,4-TRICHLOROBENZENE	ND	1
1,1,1-TRICHLOROETHANE	ND	1
1,1,2-TRICHLOROETHANE	ND	1
TRICHLOROETHENE (TCE)	ND	1
TRICHLOROFLUOROMETHANE	ND	1
1,2,3-TRICHLOROPROPANE	ND	1
1,2,4-TRIMETHYLBENZENE	ND	1
1,3,5-TRIMETHYLBENZENE	ND	1
VINYL CHLORIDE	ND	1
M/P-XYLENE	ND	2
O-XYLENE	ND	1

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro-Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

8260B QA/QC Report

Matrix: WATER
Unit: ug/L (PPB)

Date Analyzed: 7/20/2011
Machine: B

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)

Spiked Sample Lab I.D.: 110720-90 MS/MSD BATCH I.D. : 110720-90

Analyte	S.R.	spk conc	MS	%RC	MSD	%RC	%RPD	ACP %RC	ACP RPD
Benzene	0	25.0	24.5	98%	24.2	97%	1%	75-125	0-20
Chlorobenzene	0	25.0	27.4	110%	26.3	105%	4%	75-125	0-20
1,1-Dichloroethene	0	25.0	24.7	99%	26.9	108%	9%	75-125	0-20
Toluene	0	25.0	25.0	100%	28.5	114%	14%	75-125	0-20
Trichloroethene (TCE)	0	25.0	26.9	108%	26.3	105%	2%	75-125	0-20

Lab Control Spike (LCS):

Analyte	spk conc	LCS	%RC	ACP %RC
Benzene	25.0	23.3	93%	75-125
Chlorobenzene	25.0	24.5	98%	75-125
Chloroform	25.0	26.4	106%	75-125
1,1-Dichlorothene	25.0	22.3	89%	75-125
Ethylbenzene	25.0	23.8	95%	75-125
o-Xylene	25.0	25.8	103%	75-125
m,p-Xylene	50.0	49.8	100%	75-125
Toluene	25.0	24.0	96%	75-125
1,1,1-Trichloroethane	25.0	26.7	107%	75-125
Trichloroethene (TCE)	25.0	25.2	101%	75-125

Surrogate Recovery	spk conc	ACP %RC	MB %RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			M-BLK	110720-63	110720-64	110720-65	110720-66	110720-67	110720-68
Dibromofluoromethane	25.0	70-130	101%	98%	96%	116%	125%	121%	122%
Toluene-d8	25.0	70-130	102%	104%	80%	111%	109%	108%	110%
4-Bromofluorobenzene	25.0	70-130	80%	77%	75%	79%	81%	77%	80%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110719-11	110720-35	110720-36	110720-37	110720-56	110720-85	110720-86
Dibromofluoromethane	25.0	70-130	121%	115%	120%	109%	117%	109%	109%
Toluene-d8	25.0	70-130	109%	110%	109%	109%	109%	107%	109%
4-Bromofluorobenzene	25.0	70-130	81%	104%	83%	80%	79%	88%	87%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110720-87	110720-88	110720-89	110720-90	110720-91	110720-92	110720-83
Dibromofluoromethane	25.0	70-130	126%	113%	118%	113%	114%	110%	110%
Toluene-d8	25.0	70-130	111%	109%	110%	108%	108%	110%	107%
4-Bromofluorobenzene	25.0	70-130	91%	87%	90%	89%	88%	87%	89%

** = Surrogate fail due to matrix interference; LCS, MS, MSD are in control therefore the analysis is in control.*
S.R. = Sample Results *%RC = Percent Recovery*
spk conc = Spike Concentration *ACP %RC = Accepted Percent Recovery*
MS = Matrix Spike *MSD = Matrix Spike Duplicate*

Analyzed/Reviewed By: Suh

Final Reviewer:

Enviro-Chem, Inc.
1214 E. Lexington Avenue
Pomona, CA 91766
Tel(909)590-5905 Fax(909)590-5907

Sample Receiving
Container Verification/Sample Anomaly Form

Client	Enviro-Chem Lab I.D.	Number of Sample(s)	Date	Time
Kleinfelder-SD	110719-1 through -19	19	07/19/11	7:15

Chain of Custody Check		Sample Shipping Information		Enviro-Chem Field Representative/Field Tech:	
		Samples arrived by:			
x	Client has signed Chain of Custody	0	Hand Delivery by Client	John Ackerman	
		0	Mail/Cardboard Box		
x	Field Services Representative has signed Chain of Custody	0	Cooler, Not Chilled	Date and Time of Pick-up	
x	All Samples are labeled correctly matching COC	x	Cooler, Chilled with Ice	07/18/11	16:00

Temperature		
Cooler or box temperature	4 °C	(Acceptable range ≤6)

Sample Condition Check List		Comments:
Was Custody Seal Present?	No	
If Yes -- Was the Seal Intect:	N/A	
Did all Samples arrive intact? If no, Indicate below	Yes	
Was sufficient amount of sample received for analysis indicated? If no, indicate below	Yes	
Was Space seen in VOAs?	N/A	Soil Samples in 5035
Were correct preservatives used?	Yes	

	Inorganic Analytes Containers	Comments:
0	All containers are properly sealed with no cracks or leaks	
0	Samples requiring preservation has been preserved	
0	Samples are within proper holding times	
0	Samples match up to identification on Chain of Custody	
0	Samples are properly chilled	

	Organic Analytes Containers	Comments:
0	All containers are properly sealed with no cracks or leaks	
0	Samples requiring preservation has been preserved	
0	Samples are within proper holding times	
0	Samples match up to identification on Chain of Custody	
0	Samples are properly chilled	

Comments:

Lab I.D. for subout item:	Analysis	Subout Lab

Print Name of Log In Person	Signature of Log in Person
Edward Liu	Liu

KLEINFELDER

PROJECT NO	PROJECT NAME
105751	530 Ave. Pico

LP NO. (PC NO.)	SAMPLERS: (Signature/Number)

RECEIVING LAB: Enviro Chem

	DATE MM/DD/YY	SAMPLE I.D TIME HH:MM:SS	SAMPLE I.D	MATRIX	NO OF CONTAINERS	TYPE OF CONTAINERS	ANALYSIS: VOC + OXY 8260B; TPH-(C7-C20) 8015B; VOC + OXY, TPH-CC 5035								INSTRUCTIONS/REMARKS
1	07.18.11	1010	KLFSB-01-05	Soil	1 per Type	Acetate	X	X					110719	-1	Hold
2		1010	KLFSB-01-05	Soil	4	VOA			X					-1	preserved - see VOAs/Hold
3		1000	KLFSB-01-10	Soil	1	Acetate	X	X						-2	Hold
4		1020	KLFSB-01-10	Soil	4	VOA			X					-2	preserved - see VOAs/Hold
5		1045	KLFSB-01-15	Soil	1	Acetate	X	X						-3	
6		1045	KLFSB-01-15	Soil	4	VOA			X					-3	preserved - see VOAs
7		1100	KLFSB-01-20	Soil	1	Acetate	X	X						-4	
8		1100	KLFSB-01-20	Soil	4	VOA			X					-4	preserved - see VOAs
9		1110	KLFSB-01-25	Soil	1	Acetate	X	X						-5	Hold
10		1110	KLFSB-01-25	Soil	4	VOA			X					-5	preserved - see VOAs/Hold
11		1125	KLFSB-01-30	Soil	1	Acetate	X	X						-6	
12		1125	KLFSB-01-30	Soil	4	VOA			X					-6	preserved - see VOAs
13		1330	KLFSB-02-05		1	Acetate	X	X						-7	Hold
14		1330	KLFSB-02-05		4	VOA			X					-7	preserved - see VOAs/Hold
15		1340	KLFSB-02-10		1	Acetate	X	X						-8	Hold
16		1340	KLFSB-02-10		4	VOA			X					-8	preserved - see VOAs/Hold
17		1350	KLFSB-02-15		1	Acetate	X	X						-9	
18		1350	KLFSB-02-15		4	VOA			X					-9	preserved - see VOAs
19		1400	KLFSB-02-20		1	Acetate	X	X						-10	
20	V	1400	KLFSB-02-20	V	4	VOA			X					-10	Preserved - see VOAs

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	7.18.11 / 1600	
Relinquished by: (Signature)	7/19/11 / 08:00	Received by: (Signature) Lily 7/19/11 8:00
Relinquished by: (Signature)	Date/Time	Received for Laboratory by (Signature)

Instructions/Remarks: STANDARD TAT

Send Results To: JKeller@KleinFelder.com
LSimmons "
Attn: JWissler "

White – Sampler Canary – Return Copy To Shipper Pink – Lab Copy

ENV-02 REV 05/08)

CHAIN OF CUSTODY

COC № 04313

KLEINFELDER

PROJECT NO	PROJECT NAME	NO OF CONTAINERS	TYPE OF CONTAINERS	ANALYSES	RECEIVING LAB
105751	530 Ave. Pico				Enviro Chem
L.P. NO. (PO. NO.)	SAMPLERS (Signature/Number)				INSTRUCTIONS/REMARKS
					"HOLD" - Do not run sample until notice from Liz Jimmon

	DATE MM/DD/YY	SAMPLE I.D. TIME HH:MM:SS	SAMPLE I.D.	MATRIX	NO OF CONTAINERS	TYPE OF CONTAINERS	VOC + OXY 8260B	TPH-DC 8015B	VOC + OXY + TPH-DC 5035								
1	7.18.11	0800	HC-HB-GCTB	H2O	2	VOA	X								1107	19-11	
2		1410	KLFSB-02-25	Soil	1	1Gal Amber	X	X								-12	HOLD
3		1410	KLFSB-02-25		4	VOA			X							-12	preserved - see VOA/HOLD
4		1425	KLFSB-02-30		1	1Gal Amber	X	X								-13	
5		1425	KLFSB-02-30		4	VOA			X							-13	preserved - see VOA
6		1515	KLFSB-03-05		1	1Gal Amber	X	X								-14	
7		1515	KLFSB-03-05		4	VOA			X							-14	preserved - see VOA
8		1525	KLFSB-03-10		1	1Gal Amber	X	X								-15	
9		1525	KLFSB-03-10		4	VOA			X							-15	preserved - see VOA
10		1530	KLFSB-03-15		1	1Gal Amber	X	X								-16	HOLD
11		1530	KLFSB-03-15		4	VOA			X							-16	preserved - see VOA / HOLD
12		1540	KLFSB-03-20		1	1Gal Amber	X	X								-17	HOLD
13		1540	KLFSB-03-20		4	VOA			X							-17	preserved - see VOA / HOLD
14		1550	KLFSB-03-25		1	1Gal Amber	X	X								-18	
15		1550	KLFSB-03-25		9	VOA			X							-18	preserved - see VOA
16		1100	KLFSB-03-30		1	1Gal Amber	X	X								-19	HOLD
17	↓	1400	KLFSB-03-30	↓	4	VOA			X							-19	preserved - see VOA / HOLD
18																	
19																	
20																	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Instructions/Remarks	Send Results To:
	7.18.11 1600		STANDARD TAT	JKellar@KleinFelder.com
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		LJimmons "
	7/19/11 08:00	7/19/11		Attn: JWissler "
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)		

ENV-02 REV 05/08)

White – Sampler Canary – Return Copy To Shipper Pink – Lab Copy

CHAIN OF CUSTODY

COC № 04317

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Date: July 22, 2011

Mr. Gerald (Jerry) Kellar
Kleinfelder
5015 Shoreham Place
San Diego, CA 92122
Tel(858)320-2000 E-Mail: Gkellar@kleinfelder.com

Project: **530 Ave. Pico**
Project No.: **105751**
Lab I.D.: **110720-38 through -62**

Dear Mr. Kellar:

The **analytical results** for the soil and water samples, received by our lab on July 19, 2011, are attached. The samples were received chilled at four degrees Celsius, intact and accompanying chain of custody.

Enviro-Chem appreciates the opportunity to provide you and your company this and other services. Please do not hesitate to call us if you have any questions.

Sincerely,

Curtis Desilets
Vice President/Program Manager

Andy Wang
Laboratory Manager

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel (858) 320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
DATE RECEIVED: 07/19/11
MATRIX: SOIL DATE EXTRACTED: 07/21/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 07/21/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11

TOTAL PETROLEUM HYDROCARBONS (TPH) - CARBON CHAIN ANALYSIS
METHOD: EPA 8015B
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

SAMPLE I.D.	LAB I.D.	C4-C10	C11-C22	C23-C35	DF
KLFSB-04-05	110720-38	ND	ND	ND	1
KLFSB-04-10	110720-39	ND	ND	ND	1
KLFSB-04-25	110720-42	ND	ND	ND	1
KLFSB-05-05	110720-44	ND	ND	ND	1
KLFSB-05-10	110720-45	ND	ND	ND	1
KLFSB-05-25	110720-48	ND	ND	ND	1
KLFSB-06-05	110720-50	ND	ND	ND	1
KLFSB-06-10	110720-51	ND	ND	ND	1
KLFSB-06-25	110720-54	ND	ND	ND	1
KLFSB-07-05	110720-57	ND	ND	ND	1
KLFSB-07-10	110720-58	ND	ND	ND	1
KLFSB-07-25	110720-61	ND	ND	ND	1
METHOD BLANK		ND	ND	ND	1
	PQL	10	10	50	

COMMENTS
C4-C10 = GASOLINE RANGE
C11-C22 = DIESEL RANGE
C23-C35 = MOTOR OIL RANGE
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = DF X PQL
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro Chem, Inc

1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

8015B Soil/Solid QC

Date Analyzed: 7/21/2011 **Units:** mg/Kg (PPM)

Matrix: **Solid/Sludge/Soil**

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)
Batch I.D. : 110720-58

Spiked Sample Lab I.D.: **110720-58 MS/MSD**

Analyte	SR	spk conc	MS	%MS	MSD	%MSD	%RPD	ACP %MS	ACP RPD
C11~C22 Range	0	2500	2060	82%	2070	83%	0%	75-125	0-20%

LCS STD RECOVERY:

Analyte	spk conc	LCS	% REC	ACP
C11~C22 Range	200	191	96%	75-125

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.		MB	110720-38	110720-39	110720-42	110720-44	110720-45	110720-48	110720-50
O-Terphenyl	60-140%	92%	102%	106%	100%	100%	98%	105%	101%
Octacosane	60-140%	93%	105%	112%	101%	102%	99%	103%	102%

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.		110720-51	110720-54	110720-57	110720-58	110720-61	110720-73	110720-74	110720-77
O-Terphenyl	60-140%	105%	104%	109%	104%	103%	100%	96%	98%
Octacosane	60-140%	111%	109%	119%	124%	108%	101%	97%	97%

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC			
Sample I.D.		110720-80	110720-81	110720-84					
O-Terphenyl	60-140%	95%	95%	100%					
Octacosane	60-140%	98%	96%	100%					

Analyzed and Reviewed By: _____

Final Reviewer: _____

** = Surrogate fail due to matrix interference*

Note: *LCS, MS, MSD are in control therefore results are in control.*

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/19/11
DATE SAMPLED:07/19/11 DATE ANALYZED:07/20/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11

EPA 5035/8260B FOR FUEL OXYGENATES
UNITS: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

SAMPLE I.D.	LAB I.D.	ETBE	DIPE	MTBE	TAME	TBA	DF
KLFSB-04-05	110720-38	ND	ND	ND	ND	ND	1
KLFSB-04-10	110720-39	ND	ND	ND	ND	ND	1
KLFSB-04-25	110720-42	ND	ND	ND	ND	ND	1
KLFSB-05-05	110720-44	ND	ND	ND	ND	ND	1
KLFSB-05-10	110720-45	ND	ND	ND	ND	ND	1
KLFSB-05-25	110720-48	ND	ND	ND	ND	ND	1
KLFSB-06-05	110720-50	ND	ND	ND	ND	ND	1
KLFSB-06-10	110720-51	ND	ND	ND	ND	ND	1
KLFSB-06-25	110720-54	ND	ND	ND	ND	ND	1
KLFSB-07-05	110720-57	ND	ND	ND	ND	ND	1
KLFSB-07-10	110720-58	ND	ND	ND	ND	ND	1
KLFSB-07-25	110720-61	ND	ND	ND	ND	ND	1
Method Blank		ND	ND	ND	ND	ND	1
PQL		0.01	0.01	0.005	0.01	0.05	

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = DF X PQL
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
ETBE = ETHYL tert-BUTYL ETHER DIPE = ISOPROPYL ETHER
MTBE = METHYL tert-BUTYL ETHER TAME = TERT-AMYL METHYL ETHER
TBA = TERTIARY BUTYL ALCOHOL

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: Kleinfelder
5015 Shoreham Place, San Diego, CA 92122
Tel (858) 320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: 530 Ave Pico
PROJECT No.: 105751
MATRIX: SOIL
DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11
DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR
DATE REPORTED: 07/22/11
SAMPLE I.D.: KLFSB-04-05
LAB I.D.: 110720-38

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel (858) 320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 | DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR | DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-04-05** | LAB I.D.: 110720-38

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-04-10** LAB I.D.: 110720-39

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- **TO BE** CONTINUED **ON PAGE #2** -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/19/11
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REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **KLFSB-04-10** LAB I.D.: 110720-39

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-04-25** LAB I.D.: 110720-42

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- **TO BE** CONTINUED ON PAGE **#2** -----

DATA REVIEWED AND APPROVED **BY:**

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
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REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-04-25** LAB I.D.: 110720-42

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/19/11
DATE SAMPLED:07/19/11 DATE ANALYZED:07/20/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **KLFSB-05-05** LAB I.D.: 110720-44

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/19/11
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REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **KLFSB-05-05** LAB I.D.: 110720-44

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-05-10** LAB I.D.: 110720-45

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

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SAMPLE I.D.: **KLFSB-05-10** LAB I.D.: 110720-45

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
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CAL-DHS CERTIFICATE # 1555

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
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REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-05-25** LAB I.D.: 110720-48

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

Enviro – Chem, Inc.
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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/19/11
DATE SAMPLED:07/19/11 DATE ANALYZED:07/20/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **KLFSB-05-25** LAB I.D.: 110720-48

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-06-05** LAB I.D.: 110720-50

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- **TO BE** CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-06-05** LAB I.D.: 110720-50

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY: _____
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/19/11
DATE SAMPLED:07/19/11 DATE ANALYZED:07/20/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **KLFSB-06-10** LAB I.D.: 110720-51

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- **TO BE** CONTINUED **ON PAGE #2** -----

DATA REVIEWED AND APPROVED **BY:** _____

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-06-10** LAB I.D.: 110720-51

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

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PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR
SAMPLE I.D.: KLFSB-06-25

PROJECT No.: 105751
DATE RECEIVED: 07/19/11
DATE ANALYZED: 07/20/11
DATE REPORTED: 07/22/11
LAB I.D.: 110720-54

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

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5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 | DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR | DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-06-25** | LAB I.D.: 110720-54

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 | DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR | DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-07-05** | LAB I.D.: 110720-57

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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Tel (858) 320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 | DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR | DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-07-05** | LAB I.D.: 110720-57

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-07-10** LAB I.D.: 110720-58

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-07-10** LAB I.D.: 110720-58

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-07-25** LAB I.D.: 110720-61

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-07-25** LAB I.D.: 110720-61

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY: *ccb*
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

METHOD BLANK REPORT

CUSTOMER: Kleinfelder
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: 530 Ave Pico — PROJECT No.: 105751
MATRIX: SOIL — DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 — DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR — DATE REPORTED: 07/22/11

METHOD BLANK FOR LAB I.D.:
110720-38, -39, -42, -44, -45, -48, -50, -51, -54, -57, -58, -61

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

METHOD BLANK REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel (858) 320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11

METHOD BLANK FOR LAB I.D.:
110720-38, -39, -42, -44, -45, -48, -50, -51, -54, -57, -58, -61

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY: _____
CAL-DHS CERTIFICATE # 1555

Enviro-Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

8260B QA/QC Report

Date Analyzed: 7/20/2011 **Matrix:** Solid/Soil/Liquid
Machine: C **Unit:** mg/Kg (PPM)

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)

Spiked Sample Lab I.D.: 110720-38 MS/MSD BATCH I.D. : 110720-38

Analyte	S.R.	spk conc	MS	%RC	MSD	%RC	%RPD	ACP %RC	ACP RPD
Benzene	0	0.050	0.052	104%	0.052	104%	0%	75-125	0-20
Chlorobenzene	0	0.050	0.050	100%	0.051	102%	2%	75-125	0-20
1,1-Dichloroethene	0	0.050	0.046	92%	0.055	110%	18%	75-125	0-20
Toluene	0	0.050	0.051	102%	0.055	110%	8%	75-125	0-20
Trichloroethene (TCE)	0	0.050	0.055	110%	0.056	112%	2%	75-125	0-20

Lab Control Spike (LCS):

Analyte	spk conc	LCS	%RC	ACP %RC
Benzene	0.050	0.054	108%	75-125
Chlorobenzene	0.050	0.053	106%	75-125
Chloroform	0.050	0.043	86%	75-125
1,1-Dichlorothene	0.050	0.048	96%	75-125
Ethylbenzene	0.050	0.050	100%	75-125
o-Xylene	0.050	0.052	104%	75-125
m,p-Xylene	0.100	0.102	102%	75-125
Toluene	0.050	0.049	98%	75-125
1,1,1-Trichloroethane	0.050	0.045	90%	75-125
Trichloroethene (TCE)	0.050	0.054	108%	75-125

Surrogate Recovery	spk conc	ACP %RC	MB %RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			M-BLK	110720-38	110720-39	110720-42	110720-44	110720-45	110720-48
Dibromofluoromethane	50.0	70-130	79%	95%	110%	84%	98%	101%	86%
Toluene-d8	50.0	70-130	97%	93%	103%	106%	99%	103%	108%
4-Bromofluorobenzene	50.0	70-130	86%	73%	77%	78%	72%	73%	98%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110720-50	110720-51	110720-54	110720-57	110720-58	110720-61	110720-73
Dibromofluoromethane	50.0	70-130	119%	113%	97%	105%	108%	105%	109%
Toluene-d8	50.0	70-130	117%	102%	107%	110%	111%	108%	113%
4-Bromofluorobenzene	50.0	70-130	77%	83%	80%	80%	71%	84%	72%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110720-74	110720-77	110720-80	110720-81	110720-84	110720-135	110720-136
Dibromofluoromethane	50.0	70-130	114%	107%	109%	104%	109%	105%	114%
Toluene-d8	50.0	70-130	109%	104%	109%	106%	108%	86%	98%
4-Bromofluorobenzene	50.0	70-130	71%	71%	78%	74%	77%	92%	81%

** = Surrogate fail due to matrix interference; LCS, MS, MSD are in control therefore the analysis is in control.*
S.R. = Sample Results *%RC = Percent Recovery*
spk conc = Spike Concentration *ACP %RC = Accepted Percent Recovery*
MS = Matrix Spike *MSD = Matrix Spike Duplicate*

Analyzed/Reviewed By: SLh

Final Reviewer: CM

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:WATER DATE RECEIVED:07/19/11
DATE SAMPLED:07/19/11 DATE ANALYZED:07/20/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **110719-QCTB** LAB I.D.: 110720-56

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 1 OF 2
UNIT: ug/L = MICROGRAM PER LITER = PPB

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	10
BENZENE	ND	1
BROMOBENZENE	ND	1
BROMOCHLOROMETHANE	ND	1
BROMODICHLOROMETHANE	ND	1
BROMOFORM	ND	1
BROMOMETHANE	ND	1
2-BUTANONE (MEK)	ND	10
N-BUTYLBENZENE	ND	1
SEC-BUTYLBENZENE	ND	1
TERT-BUTYLBENZENE	ND	1
CARBON DISULFIDE	ND	5
CARBON TETRACHLORIDE	ND	1
CHLOROBENZENE	ND	1
CHLOROETHANE	ND	1
CHLOROFORM	ND	1
CHLOROMETHANE	ND	1
2-CHLOROTOLUENE	ND	1
4-CHLOROTOLUENE	ND	1
DIBROMOCHLOROMETHANE	ND	1
1,2-DIBROMO-3-CHLOROPROPANE	ND	1
1,2-DIBROMOETHANE	ND	1
DIBROMOMETHANE	ND	1
1,2-DICHLOROBENZENE	ND	1
1,3-DICHLOROBENZENE	ND	1
1,4-DICHLOROBENZENE	ND	1
DICHLORODIFLUOROMETHANE	ND	1
1,1-DICHLOROETHANE	ND	1
1,2-DICHLOROETHANE	ND	1
1,1-DICHLOROETHENE	ND	1
CIS-1,2-DICHLOROETHENE	ND	1
TRANS-1,2-DICHLOROETHENE	ND	1
1,2-DICHLOROPROPANE	ND	1
1,3-DICHLOROPROPANE	ND	1

----- **TO BE** CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED **BY:**

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: Kleinfelder
5015 Shoreham Place, San Diego, CA 92122
Tel (858) 320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: 530 Ave Pico
MATRIX: WATER
DATE SAMPLED: 07/19/11
REPORT TO: Mr. GERALD (JERRY) KELLAR
SAMPLE I.D.: 110719-QCTB

PROJECT No.: 105751
DATE RECEIVED: 07/19/11
DATE ANALYZED: 07/20/11
DATE REPORTED: 07/22/11
LAB I.D.: 110720-56

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 2 OF 2
UNIT: ug/L = MICROGRAM PER LITER = PPB

PARAMETER	SAMPLE RESULT	PQL X1
2,2-DICHLOROPROPANE	ND	1
1,1-DICHLOROPROPENE	ND	1
CIS-1,3-DICHLOROPROPENE	ND	1
TRANS-1,3-DICHLOROPROPENE	ND	1
ETHYLBENZENE	ND	1
2-HEXANONE	ND	10
HEXACHLOROBUTADIENE	ND	1
ISOPROPYLBENZENE	ND	1
4-ISOPROPYLTOLUENE	ND	1
4-METHYL-2-PENTANONE (MIBK)	ND	10
METHYL tert-BUTYL ETHER (MTBE)	ND	3
METHYLENE CHLORIDE	ND	5
NAPHTHALENE	ND	1
N-PROPYLBENZENE	ND	1
STYRENE	ND	1
1,1,1,2-TETRACHLOROETHANE	ND	1
1,1,2,2-TETRACHLOROETHANE	ND	1
TETRACHLOROETHENE (PCE)	ND	1
TOLUENE	ND	1
1,2,3-TRICHLOROBENZENE	ND	1
1,2,4-TRICHLOROBENZENE	ND	1
1,1,1-TRICHLOROETHANE	ND	1
1,1,2-TRICHLOROETHANE	ND	1
TRICHLOROETHENE (TCE)	ND	1
TRICHLOROFLUOROMETHANE	ND	1
1,2,3-TRICHLOROPROPANE	ND	1
1,2,4-TRIMETHYLBENZENE	ND	1
1,3,5-TRIMETHYLBENZENE	ND	1
VINYL CHLORIDE	ND	1
M/P-XYLENE	ND	2
O-XYLENE	ND	1

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

METHOD BLANK REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:WATER DATE RECEIVED:07/19/11
DATE SAMPLED:07/19/11 DATE ANALYZED:07/20/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11

METHOD BLANK FOR LAB I.D.: 110720-56

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 1 OF 2
UNIT: ug/L = MICROGRAM PER LITER = PPB

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	10
BENZENE	ND	1
BROMOBENZENE	ND	1
BROMOCHLOROMETHANE	ND	1
BROMODICHLOROMETHANE	ND	1
BROMOFORM	ND	1
BROMOMETHANE	ND	1
2-BUTANONE (MEK)	ND	10
N-BUTYLBENZENE	ND	1
SEC-BUTYLBENZENE	ND	1
TERT-BUTYLBENZENE	ND	1
CARBON DISULFIDE	ND	5
CARBON TETRACHLORIDE	ND	1
CHLOROBENZENE	ND	1
CHLOROETHANE	ND	1
CHLOROFORM	ND	1
CHLOROMETHANE	ND	1
2-CHLOROTOLUENE	ND	1
4-CHLOROTOLUENE	ND	1
DIBROMOCHLOROMETHANE	ND	1
1,2-DIBROMO-3-CHLOROPROPANE	ND	1
1,2-DIBROMOETHANE	ND	1
DIBROMOMETHANE	ND	1
1,2-DICHLOROBENZENE	ND	1
1,3-DICHLOROBENZENE	ND	1
1,4-DICHLOROBENZENE	ND	1
DICHLORODIFLUOROMETHANE	ND	1
1,1-DICHLOROETHANE	ND	1
1,2-DICHLOROETHANE	ND	1
1,1-DICHLOROETHENE	ND	1
CIS-1,2-DICHLOROETHENE	ND	1
TRANS-1,2-DICHLOROETHENE	ND	1
1,2-DICHLOROPROPANE	ND	1
1,3-DICHLOROPROPANE	ND	1

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

METHOD BLANK REPORT

CUSTOMER: Kleinfelder
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: 530 Ave Pico — PROJECT No.: 105751
MATRIX: WATER — DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 — DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR — DATE REPORTED: 07/22/11

METHOD BLANK FOR LAB I.D.: 110720-56

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 2 OF 2
UNIT: ug/L = MICROGRAM PER LITER = PPB

PARAMETER	SAMPLE RESULT	PQL X1
2,2-DICHLOROPROPANE	ND	1
1,1-DICHLOROPROPENE	ND	1
CIS-1,3-DICHLOROPROPENE	ND	1
TRANS-1,3-DICHLOROPROPENE	ND	1
ETHYLBENZENE	ND	1
2-HEXANONE	ND	10
HEXACHLOROBUTADIENE	ND	1
ISOPROPYLBENZENE	ND	1
4-ISOPROPYLTOLUENE	ND	1
4-METHYL-2-PENTANONE (MIBK)	ND	10
METHYL tert-BUTYL ETHER (MTBE)	ND	3
METHYLENE CHLORIDE	ND	5
NAPHTHALENE	ND	1
N-PROPYLBENZENE	ND	1
STYRENE	ND	1
1,1,1,2-TETRACHLOROETHANE	ND	1
1,1,2,2-TETRACHLOROETHANE	ND	1
TETRACHLOROETHENE (PCE)	ND	1
TOLUENE	ND	1
1,2,3-TRICHLOROBENZENE	ND	1
1,2,4-TRICHLOROBENZENE	ND	1
1,1,1-TRICHLOROETHANE	ND	1
1,1,2-TRICHLOROETHANE	ND	1
TRICHLOROETHENE (TCE)	ND	1
TRICHLOROFLUOROMETHANE	ND	1
1,2,3-TRICHLOROPROPANE	ND	1
1,2,4-TRIMETHYLBENZENE	ND	1
1,3,5-TRIMETHYLBENZENE	ND	1
VINYL CHLORIDE	ND	1
M/P-XYLENE	ND	2
O-XYLENE	ND	1

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro-Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

8260B QA/QC Report

Date Analyzed: 7/20/2011
Machine: B

Matrix: WATER
Unit: ug/L (PPB)

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)

Spiked Sample Lab I.D.: 110720-90 MS/MSD **BATCH I.D. : 110720-90**

Analyte	S.R.	spk conc	MS	%RC	MSD	%RC	%RPD	ACP %RC	ACP RPD
Benzene	0	25.0	24.5	98%	24.2	97%	1%	75-125	0-20
Chlorobenzene	0	25.0	27.4	110%	26.3	105%	4%	75-125	0-20
1,1-Dichloroethene	0	25.0	24.7	99%	26.9	108%	9%	75-125	0-20
Toluene	0	25.0	25.0	100%	28.5	114%	14%	75-125	0-20
Trichloroethene (TCE)	0	25.0	26.9	108%	26.3	105%	2%	75-125	0-20

Lab Control Spike (LCS):

Analyte	spk conc	LCS	%RC	ACP %RC
Benzene	25.0	23.3	93%	75-125
Chlorobenzene	25.0	24.5	98%	75-125
Chloroform	25.0	26.4	106%	75-125
1,1-Dichlorothene	25.0	22.3	89%	75-125
Ethylbenzene	25.0	23.8	95%	75-125
o-Xylene	25.0	25.8	103%	75-125
m,p-Xylene	50.0	49.8	100%	75-125
Toluene	25.0	24.0	96%	75-125
1,1,1-Trichloroethane	25.0	26.7	107%	75-125
Trichloroethene (TCE)	25.0	25.2	101%	75-125

Surrogate Recovery	spk conc	ACP %RC	MB %RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			M-BLK	110720-63	110720-64	110720-65	110720-66	110720-67	110720-68
Dibromofluoromethane	25.0	70-130	101%	98%	96%	116%	125%	121%	122%
Toluene-d8	25.0	70-130	102%	104%	80%	111%	109%	108%	110%
4-Bromofluorobenzene	25.0	70-130	80%	77%	75%	79%	81%	77%	80%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110719-11	110720-35	110720-36	110720-37	110720-56	110720-85	110720-86
Dibromofluoromethane	25.0	70-130	121%	115%	120%	109%	117%	109%	109%
Toluene-d8	25.0	70-130	109%	110%	109%	109%	109%	107%	109%
4-Bromofluorobenzene	25.0	70-130	81%	104%	83%	80%	79%	88%	87%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110720-87	110720-88	110720-89	110720-90	110720-91	110720-92	110720-83
Dibromofluoromethane	25.0	70-130	126%	113%	118%	113%	114%	110%	110%
Toluene-d8	25.0	70-130	111%	109%	110%	108%	108%	110%	107%
4-Bromofluorobenzene	25.0	70-130	91%	87%	90%	89%	88%	87%	89%

** = Surrogate fail due to matrix interference; LCS, MS, MSD are in control therefore the analysis is in control.*
S.R. = Sample Results *%RC = Percent Recovery*
spk conc = Spike Concentration *ACP %RC = Accepted Percent Recovery*
MS = Matrix Spike *MSD = Matrix Spike Duplicate*

Analyzed/Reviewed By: Sch

Final Reviewer: _____

Enviro-Chem, Inc.
1214 E. Lexington Avenue
Pomona, CA 91766
Tel(909)590-5905 Fax(909)590-5907

Sample Receiving
Container Verification/Sample Anomaly Form

Client	Enviro-Chem Lab I.D.	Number of Sample(s)	Date	Time
Kleinfelder-SD	110720-38 through -62	25	07/20/11	9:30

Chain of Custody Check		Sample Shipping Information		Enviro-Chem Field Representative/Field Tech:	
		Samples arrived by:			
Yes	Client has signed Chain of Custody	0	Hand Delivery by Client	John Ackerman	
		0	Mail/Cardboard Box		
Yes	Field Services Representative has signed Chain of Custody	0	Cooler, Not Chilled	Date and Time of Pick-up	
Yes	All Samples are labeled correctly matching COC	x	Cooler, Chilled with Ice	07/19/11	16:00

Temperature		
Cooler or box temperature	4 °C	(Acceptable range ≤6)

Sample Condition Check List		Comments:
Was Custody Seal Present?	No	
If Yes -- Was the Seal Intect:	N/A	
Did all Samples arrive intact? If no, Indicate below	Yes	
Was sufficient amount of sample received for analysis indicated? If no, indicate below	Yes	
Was Space seen in VOAs?	N/A	
Were correct preservatives used?	Yes	

	Inorganic Analytes Containers	Comments:
0	All containers are properly sealed with no cracks or leaks	
0	Samples requiring preservation has been preserved	
0	Samples are within proper holding times	
0	Samples match up to identification on Chain of Custody	
0	Samples are properly chilled	

	Organic Analytes Containers	Comments:
0	All containers are properly sealed with no cracks or leaks	
0	Samples requiring preservation has been preserved	
0	Samples are within proper holding times	
0	Samples match up to identification on Chain of Custody	
0	Samples are properly chilled	

Comments:

Lab I.D. for subout item:	Analysis	Subout Lab

Print Name of Log In Person	Signature of Log in Person
Ping Wang	Ping Wang

KLEINFELDER

PROJECT NO	PROJECT NAME
105751	530 Ave. Pico

P.O. NO. (PO. NO.) | SAMPLERS: (Signature/Number)

RECEIVING LAB: Envirotech

	DATE MM/DD/YY	SAMPLE I.D TIME HH:MM:SS	SAMPLE I.D	MATRIX	NO OF CONTAINERS	TYPE OF CONTAINERS	ANALYSES: VOC + OXY 8260B; TPH-CC 8015B; VOC + OXY; TPH-CC 5035	INSTRUCTIONS/REMARKS
1	7.18.11	0905	KLFSB-04-05	Soil	1	Acetate	X X	"Hold" - Do not run sample until notice from Liz Simmons
2		0905	KLFSB-04-05		4	VOA	X	preserv - see VOA
3		0915	KLFSB-04-10		1	Acetate	X X	
4		0915	KLFSB-04-10		4	VOA	X	Preserv - see VOA
5		0920	KLFSB-04-15		1	Acetate	X X	HOLD
6		0920	KLFSB-04-15		4	VOA	X	preserv - see VOA / HOLD
7		0927	KLFSB-04-20		1	Acetate	X X	Hold
8		0927	KLFSB-04-20		4	VOA	X	preserv - see VOA / Hold
9		0940	KLFSB-04-25		1	Acetate	X X	
10		0940	KLFSB-04-25		4	VOA	X	preserv - see VOA
11		0950	KLFSB-04-30		1	Acetate	X X	HOLD
12		0950	KLFSB-04-30		4	VOA	X	preserv - see VOA / Hold
13		1100	KLFSB-05-05		1	Acetate	X X	
14		1100	KLFSB-05-05		4	VOA	X	preserv - see VOA
15		1105	KLFSB-05-10		1	Acetate	X X	
16		1105	KLFSB-05-10		4	VOA	X	preserv - see VOA
17		1110	KLFSB-05-15		1	Acetate	X X	Hold
18		1110	KLFSB-05-15		4	VOA	X	Preserved - see VOA / Hold
19		1124	KLFSB-05-20		1	Acetate	X X	Hold
20		1124	KLFSB-05-20		4	VOA	X	Preserved - see VOA / Hold

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	7.19.11 16:00	
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	7/20/11 9:50	7/20/11 9:50
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)

Instructions/Remarks: Standard TAT

Send Results To:
JTitlow@Kleinfelder.com
LSimmons "
Attn: JSwissler "

White - Sampler | Canary - Return Copy To Shipper | Pink - Lab Copy

ENV-02 REV 05/08)

CHAIN OF CUSTODY

COC № 04289

KLEINFELDER

PROJECT NO.: 105751 | PROJECT NAME: 530 Ave. Pico

L.P.NO (PO. NO.): | SAMPLERS (Signature/Number):

RECEIVING LAB: Enviro Chem

	DATE MM/DD/YY	SAMPLE I.D. TIME HH-MM-SS	SAMPLE I.D.	MATRIX	NO. OF CONTAINERS	TYPE OF CONTAINERS	ANALYSIS: VOC + oxy 8260B	TPH-CC 8015B	Vactory TPH-CC 5035	INSTRUCTIONS/REMARKS
110770-48	1	7.19.11 1135	KLFSB-05-25	Soil	1	Acetate	X	X		"Hold" - Do not run sample until notice from Liz Simmons
	2	1135	KLFSB-05-25		4	VOA			X	Preserved - See VOA
-49	3	1150	KLFSB-05-30		1	Acetate	X	X		Hold
	4	1150	KLFSB-05-30		4	VOA			X	Preserved - See VOA / Hold
-50	5	1325	KLFSB-06-05		1	Acetate	X	X		
	6	1325	KLFSB-06-05		4	VOA			X	preserved - see VOAs
-51	7	1335	KLFSB-06-10		1	Acetate	X	X		
	8	1335	KLFSB-06-10		4	VOA			X	Preserved - See VOA
-52	9	1340	KLFSB-06-15		1	Acetate	X	X		Hold
	10	1340	KLFSB-06-15		4	VOA			X	Preserved - see VOA / Hold
-53	11	1350	KLFSB-06-20		1	Acetate	X	X		Hold
	12	1350	KLFSB-06-20		4	VOA			X	preserv - see VOA / Hold
-54	13	1400	KLFSB-06-25		1	Acetate	X	X		
	14	1400	KLFSB-06-25		4	VOA			X	Preserved - see VOA
-55	15	1410	KLFSB-06-30		1	Acetate	X	X		Hold
	16	1410	KLFSB-06-30	↓	4	VOA			X	preserved see VOA / Hold
-56	17	0800	TRIP-QCTB	H2O	12	VOA	X			
-57	18	1500	KLFSB-07-05	Soil	1	Acetate	X	X		
	19	1500	KLFSB-07-05		4	VOA			X	Preserved - see VOA
-58	20	1505	KLFSB-07-10	↓	1	Acetate	X	X		

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Instructions/Remarks:	Send Results To:
	7.19.11 16:00	Schiesma	Standard TAT	JKellar@KleinFelder.com
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		LWimmons "
	7/20/11 9:50	WP		Attn: DWisslet "
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)		

ENV-02 REV 05/08)

White - Sampler | Canary - Return Copy To Shipper | Pink - Lab Copy

CHAIN OF CUSTODY

COC № 04431

KLEINFELDER

PROJECT NO.	PROJECT NAME	RECEIVING LAB:
105751	530 Ave. Pico	Enviro Chem
P.O. NO. (PO. NO.)	SAMPLERS (Signature/Number)	INSTRUCTIONS/REMARKS: See pg. 1

	DATE MM/DD/YY	SAMPLE I.D. TIME HH-MM-SS	SAMPLE I.D.	MATRIX	NO. OF CON-TAINERS	TYPE OF CON-TAINERS	ANALYSIS: VOC + OXY 8260B	TPH-GC 8015M	VOC + OXY TPH-GC 5035	
110720	1	7.19.11	1505	KLFSB-07-10	Soil	4	VOA			X	Preserved - See VOA
59	2		1515	KLFSB-07-15		1	Ace.	X	X		Hold
	3		1515	KLFSB-07-15		4	VOA			X	Preserved - See VOA/Hold
-60	4		1520	KLFSB-07-20		1	Ace.	X	X		Hold
	5		1522	KLFSB-07-20		4	VOA			X	preserved - See VOA/Hold
-61	6		1530	KLFSB-07-25		1	Ace.	X	X		
	7		1530	KLFSB-07-25		4	VOA			X	Pres. - See VOA
-62	8		1545	KLFSB-07-30		1	Ace.	X	X		Hold
	9		1545	KLFSB-07-30		4	VOA			X	preserved - See VOA/Hold
	10										
	11										
	12										
	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Instructions/Remarks:	Send Results To:
	7.19.11 16:00	Ackerman	See page 1	See pg. 1
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		Attn:
	7/20/11 9:50	JP		
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)		

ENV-C2 REV 05/08)

White – Sampler Canary – Return Copy To Shipper Pink – Lab Copy

CHAIN OF CUSTODY

COC № 04468

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Date: July 22, 2011

Mr. Gerald (Jerry) Kellar
Kleinfelder
5015 Shoreham Place
San Diego, CA 92122
Tel(858)320-2000 E-Mail: Gkellar@kleinfelder.com

Project: **530 Ave. Pico**
Project No.: **105751**
Lab I.D.: **110720-73 through -84**

Dear Mr. Kellar:

The **analytical results** for the soil and water samples, received by our lab on July 20, 2011, are attached. The samples were received chilled at four degrees Celsius, intact and accompanying chain of custody.

Enviro-Chem appreciates the opportunity to provide you and your company this and other services. Please do not hesitate to call us if you have any questions.

Sincerely,

Curtis Desilets
Vice President/Program Manager

Andy Wang
Laboratory Manager

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
DATE RECEIVED: 07/20/11
MATRIX: SOIL DATE EXTRACTED: 07/21/11
DATE SAMPLED: 07/20/11 DATE ANALYZED: 07/21/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11

TOTAL PETROLEUM HYDROCARBONS(TPH) - CARBON CHAIN ANALYSIS
METHOD: EPA 8015B
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

SAMPLE I.D.	LAB I.D.	C4-C10	C11-C22	C23-C35	DF
KLFSB-08-05	110720-73	ND	ND	ND	1
KLFSB-08-10	110720-74	ND	ND	ND	1
KLFSB-08-25	110720-77	ND	ND	ND	1
KLFSB-09-15	110720-80	ND	ND	ND	1
KLFSB-09-20	110720-81	ND	ND	ND	1
KLFSB-09-30	110720-84	ND	ND	ND	1
METHOD BLANK		ND	ND	ND	1
	PQL	**10**	**10**	**50**	

COMMENTS
C4-C10 = GASOLINE RANGE
C11-C22 = DIESEL RANGE
C23-C35 = MOTOR OIL RANGE
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = DF X PQL
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro Chem, Inc

1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

8015B Soil/Solid QC

Date Analyzed: 7/21/2011 **Units:** mg/Kg (PPM)

Matrix: Solid/Sludge/Soil

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)
Batch I.D. : 110720-58

Spiked Sample Lab I.D.: 110720-58 MS/MSD

Analyte	SR	spk conc	MS	%MS	MSD	%MSD	%RPD	ACP %MS	ACP RPD
C11~C22 Range	0	2500	2060	82%	2070	83%	0%	75-125	0-20%

LCS STD RECOVERY:

Analyte	spk conc	LCS	% REC	ACP
C11~C22 Range	200	191	96%	75-125

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.		MB	110720-38	110720-39	110720-42	110720-44	110720-45	110720-48	110720-50
O-Terphenyl	60-140%	92%	102%	106%	100%	100%	98%	105%	101%
Octacosane	60-140%	93%	105%	112%	101%	102%	99%	103%	102%

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.		110720-51	110720-54	110720-57	110720-58	110720-61	110720-73	110720-74	110720-77
O-Terphenyl	60-140%	105%	104%	109%	104%	103%	100%	96%	98%
Octacosane	60-140%	111%	109%	119%	124%	108%	101%	97%	97%

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC			
Sample I.D.		110720-80	110720-81	110720-84					
O-Terphenyl	60-140%	95%	95%	100%					
Octacosane	60-140%	98%	96%	100%					

Analyzed and Reviewed By: _____

Final Reviewer: CM

** = Surrogate fail due to matrix interference*

Note: ***LCS, MS, MSD are in control therefore results are in control.***

Enviro – Chem, Inc.
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LABORATORY REPORT

CUSTOMER: Kleinfelder
5015 Shoreham Place, San Diego, CA 92122
Tel (858) 320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: 530 Ave Pico — PROJECT No.: 105751
MATRIX: SOIL — DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 — DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR — DATE REPORTED: 07/22/11

EPA 5035/8260B FOR FUEL OXYGENATES
UNITS: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

SAMPLE I.D.	LAB I.D.	ETBE	DIPE	MTBE	TAME	TBA	DF
KLFSB-08-05	110720-73	ND	ND	ND	ND	ND	1
KLFSB-08-10	110720-74	ND	ND	ND	ND	ND	1
KLFSB-08-25	110720-77	ND	ND	ND	ND	ND	1
KLFSB-09-15	110720-80	ND	ND	ND	ND	ND	1
KLFSB-09-20	110720-81	ND	ND	ND	ND	ND	1
KLFSB-09-30	110720-84	ND	ND	ND	ND	ND	1
Method Blank		ND	ND	ND	ND	ND	1
PQL		0.01	0.01	0.005	0.01	0.05	

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = DF X PQL
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
ETBE = ETHYL tert-BUTYL ETHER — DIPE = ISOPROPYL ETHER
MTBE = METHYL tert-BUTYL ETHER — TAME = TERT-AMYL METHYL ETHER
TBA = TERTIARY BUTYL ALCOHOL

Data Reviewed and Approved by: _____

CAL-DHS ELAP CERTIFICATE No.: 1555

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LABORATORY REPORT

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Tel (858) 320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR
SAMPLE I.D.: KLFSB-08-05

PROJECT No.: 105751
DATE RECEIVED: 07/20/11
DATE ANALYZED: 07/20/11
DATE REPORTED: 07/22/11
LAB I.D.: 110720-73

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

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PROJECT: 530 Ave Pico
PROJECT No.: 105751
MATRIX: SOIL
DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11
DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR
DATE REPORTED: 07/22/11
SAMPLE I.D.: KLFSB-08-05
LAB I.D.: 110720-73

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-08-10** LAB I.D.: 110720-74

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/20/11
DATE SAMPLED:07/20/11 DATE ANALYZED:07/20/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **KLFSB-08-10** LAB I.D.: 110720-74

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-08-25** LAB I.D.: 110720-77

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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MATRIX:SOIL DATE RECEIVED:07/20/11
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REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **KLFSB-08-25** LAB I.D.: 110720-77

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/20/11
DATE SAMPLED:07/20/11 DATE ANALYZED:07/20/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **KLFSB-09-15** LAB I.D.: 110720-80

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY:

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LABORATORY REPORT

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E-Mail: Gkellar@kleinfelder.com

PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR
SAMPLE I.D.: KLFSB-09-15

PROJECT No.: 105751
DATE RECEIVED: 07/20/11
DATE ANALYZED: 07/20/11
DATE REPORTED: 07/22/11
LAB I.D.: 110720-80

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: Kleinfelder
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: 530 Ave Pico — PROJECT No.: 105751
MATRIX: SOIL — DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 — DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR — DATE REPORTED: 07/22/11
SAMPLE I.D.: KLFSB-09-20 — LAB I.D.: 110720-81

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel (858) 320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11
SAMPLE I.D.: **KLFSB-09-20** LAB I.D.: 110720-81

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/20/11
DATE SAMPLED:07/20/11 DATE ANALYZED:07/20/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **KLFSB-09-30** LAB I.D.: 110720-84

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- **TO BE** CONTINUED ON **PAGE #2** -----

DATA REVIEWED AND APPROVED BY:

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LABORATORY REPORT

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/20/11
DATE SAMPLED:07/20/11 DATE ANALYZED:07/20/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11
SAMPLE I.D.: **KLFSB-09-30** LAB I.D.: 110720-84

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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METHOD BLANK REPORT

CUSTOMER: Kleinfelder
5015 Shoreham Place, San Diego, CA 92122
Tel (858) 320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: 530 Ave Pico — PROJECT No.: 105751
MATRIX: SOIL — DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 — DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR — DATE REPORTED: 07/22/11

METHOD BLANK FOR LAB I.D.: 110720-73, -74, -77, -80, -81, -84

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

METHOD BLANK REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 DATE ANALYZED: 07/20/11
REPORT TO: Mr. GERALD (JERRY) KELLAR DATE REPORTED: 07/22/11

METHOD BLANK FOR LAB I.D.: 110720-73, -74, -77, -80, -81, -84

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro-Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

8260B QA/QC Report

Date Analyzed: 7/20/2011 **Matrix:** Solid/Soil/Liquid
Machine: C **Unit:** mg/Kg (PPM)

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)

Spiked Sample Lab I.D.: 110720-38 MS/MSD **BATCH I.D. : 110720-38**

Analyte	S.R.	spk conc	MS	%RC	MSD	%RC	%RPD	ACP %RC	ACP RPD
Benzene	0	0.050	0.052	104%	0.052	104%	0%	75-125	0-20
Chlorobenzene	0	0.050	0.050	100%	0.051	102%	2%	75-125	0-20
1,1-Dichloroethene	0	0.050	0.046	92%	0.055	110%	18%	75-125	0-20
Toluene	0	0.050	0.051	102%	0.055	110%	8%	75-125	0-20
Trichloroethene (TCE)	0	0.050	0.055	110%	0.056	112%	2%	75-125	0-20

Lab Control Spike (LCS):

Analyte	spk conc	LCS	%RC	ACP %RC
Benzene	0.050	0.054	108%	75-125
Chlorobenzene	0.050	0.053	106%	75-125
Chloroform	0.050	0.043	86%	75-125
1,1-Dichlorothene	0.050	0.048	96%	75-125
Ethylbenzene	0.050	0.050	100%	75-125
o-Xylene	0.050	0.052	104%	75-125
m,p-Xylene	0.100	0.102	102%	75-125
Toluene	0.050	0.049	98%	75-125
1,1,1-Trichloroethane	0.050	0.045	90%	75-125
Trichloroethene (TCE)	0.050	0.054	108%	75-125

Surrogate Recovery	spk conc	ACP %RC	MB %RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			M-BLK	110720-38	110720-39	110720-42	110720-44	110720-45	110720-48
Dibromofluoromethane	50.0	70-130	79%	95%	110%	84%	98%	101%	86%
Toluene-d8	50.0	70-130	97%	93%	103%	106%	99%	103%	108%
4-Bromofluorobenzene	50.0	70-130	86%	73%	77%	78%	72%	73%	98%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110720-50	110720-51	110720-54	110720-57	110720-58	110720-61	110720-73
Dibromofluoromethane	50.0	70-130	119%	113%	97%	105%	108%	105%	109%
Toluene-d8	50.0	70-130	117%	102%	107%	110%	111%	108%	113%
4-Bromofluorobenzene	50.0	70-130	77%	83%	80%	80%	71%	84%	72%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110720-74	110720-77	110720-80	110720-81	110720-84	110720-135	110720-136
Dibromofluoromethane	50.0	70-130	114%	107%	109%	104%	109%	105%	114%
Toluene-d8	50.0	70-130	109%	104%	109%	106%	108%	86%	98%
4-Bromofluorobenzene	50.0	70-130	71%	71%	78%	74%	77%	92%	81%

**= Surrogate fail due to matrix interference; LCS, MS, MSD are in control therefore the analysis is in control.*
S.R. = Sample Results *%RC = Percent Recovery*
spk conc = Spike Concentration *ACP %RC = Accepted Percent Recovery*
MS = Matrix Spike *MSD = Matrix Spike Duplicate*

Analyzed/Reviewed By: SLH

Final Reviewer: QP

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LABORATORY REPORT

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Tel (858) 320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: WATER | DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 | DATE ANALYZED: 07/21/11
REPORT TO: Mr. GERALD (JERRY) KELLAR | DATE REPORTED: 07/22/11
SAMPLE I.D.: **110720-QCTB** | LAB I.D.: 110720-83

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 1 OF 2
UNIT: ug/L = MICROGRAM PER LITER = PPB

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	10
BENZENE	ND	1
BROMOBENZENE	ND	1
BROMOCHLOROMETHANE	ND	1
BROMODICHLOROMETHANE	ND	1
BROMOFORM	ND	1
BROMOMETHANE	ND	1
2-BUTANONE (MEK)	ND	10
N-BUTYLBENZENE	ND	1
SEC-BUTYLBENZENE	ND	1
TERT-BUTYLBENZENE	ND	1
CARBON DISULFIDE	ND	5
CARBON TETRACHLORIDE	ND	1
CHLOROBENZENE	ND	1
CHLOROETHANE	ND	1
CHLOROFORM	ND	1
CHLOROMETHANE	ND	1
2-CHLOROTOLUENE	ND	1
4-CHLOROTOLUENE	ND	1
DIBROMOCHLOROMETHANE	ND	1
1,2-DIBROMO-3-CHLOROPROPANE	ND	1
1,2-DIBROMOETHANE	ND	1
DIBROMOMETHANE	ND	1
1,2-DICHLOROBENZENE	ND	1
1,3-DICHLOROBENZENE	ND	1
1,4-DICHLOROBENZENE	ND	1
DICHLORODIFLUOROMETHANE	ND	1
1,1-DICHLOROETHANE	ND	1
1,2-DICHLOROETHANE	ND	1
1,1-DICHLOROETHENE	ND	1
CIS-1,2-DICHLOROETHENE	ND	1
TRANS-1,2-DICHLOROETHENE	ND	1
1,2-DICHLOROPROPANE	ND	1
1,3-DICHLOROPROPANE	ND	1

----- **TO BE** CONTINUED ON **PAGE #2** -----

DATA REVIEWED AND APPROVED BY: _____

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PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: WATER | DATE RECEIVED: 07/20/11
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REPORT TO: Mr. GERALD (JERRY) KELLAR | DATE REPORTED: 07/22/11
SAMPLE I.D.: **110720-QCTB** | LAB I.D.: 110720-83

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 2 OF 2
UNIT: ug/L = MICROGRAM PER LITER = PPB

PARAMETER	SAMPLE RESULT	PQL X1
2,2-DICHLOROPROPANE	ND	1
1,1-DICHLOROPROPENE	ND	1
CIS-1,3-DICHLOROPROPENE	ND	1
TRANS-1,3-DICHLOROPROPENE	ND	1
ETHYLBENZENE	ND	1
2-HEXANONE	ND	10
HEXACHLOROBUTADIENE	ND	1
ISOPROPYLBENZENE	ND	1
4-ISOPROPYLTOLUENE	ND	1
4-METHYL-2-PENTANONE (MIBK)	ND	10
METHYL tert-BUTYL ETHER (MTBE)	ND	3
METHYLENE CHLORIDE	ND	5
NAPHTHALENE	ND	1
N-PROPYLBENZENE	ND	1
STYRENE	ND	1
1,1,1,2-TETRACHLOROETHANE	ND	1
1,1,2,2-TETRACHLOROETHANE	ND	1
TETRACHLOROETHENE (PCE)	ND	1
TOLUENE	ND	1
1,2,3-TRICHLOROBENZENE	ND	1
1,2,4-TRICHLOROBENZENE	ND	1
1,1,1-TRICHLOROETHANE	ND	1
1,1,2-TRICHLOROETHANE	ND	1
TRICHLOROETHENE (TCE)	ND	1
TRICHLOROFLUOROMETHANE	ND	1
1,2,3-TRICHLOROPROPANE	ND	1
1,2,4-TRIMETHYLBENZENE	ND	1
1,3,5-TRIMETHYLBENZENE	ND	1
VINYL CHLORIDE	ND	1
M/P-XYLENE	ND	2
O-XYLENE	ND	1

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

METHOD BLANK REPORT

CUSTOMER: Kleinfelder
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: 530 Ave Pico — PROJECT No.: 105751
MATRIX:WATER — DATE RECEIVED:07/20/11
DATE SAMPLED:07/20/11 — DATE ANALYZED:07/21/11
REPORT TO:Mr. GERALD (JERRY) KELLAR — DATE REPORTED:07/22/11

METHOD BLANK FOR LAB I.D.: 110718-83

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 1 OF 2
UNIT: ug/L = MICROGRAM PER LITER = PPB

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	10
BENZENE	ND	1
BROMOBENZENE	ND	1
BROMOCHLOROMETHANE	ND	1
BROMODICHLOROMETHANE	ND	1
BROMOFORM	ND	1
BROMOMETHANE	ND	1
2-BUTANONE (MEK)	ND	10
N-BUTYLBENZENE	ND	1
SEC-BUTYLBENZENE	ND	1
TERT-BUTYLBENZENE	ND	1
CARBON DISULFIDE	ND	5
CARBON TETRACHLORIDE	ND	1
CHLOROBENZENE	ND	1
CHLOROETHANE	ND	1
CHLOROFORM	ND	1
CHLOROMETHANE	ND	1
2-CHLOROTOLUENE	ND	1
4-CHLOROTOLUENE	ND	1
DIBROMOCHLOROMETHANE	ND	1
1,2-DIBROMO-3-CHLOROPROPANE	ND	1
1,2-DIBROMOETHANE	ND	1
DIBROMOMETHANE	ND	1
1,2-DICHLOROBENZENE	ND	1
1,3-DICHLOROBENZENE	ND	1
1,4-DICHLOROBENZENE	ND	1
DICHLORODIFLUOROMETHANE	ND	1
1,1-DICHLOROETHANE	ND	1
1,2-DICHLOROETHANE	ND	1
1,1-DICHLOROETHENE	ND	1
CIS-1,2-DICHLOROETHENE	ND	1
TRANS-1,2-DICHLOROETHENE	ND	1
1,2-DICHLOROPROPANE	ND	1
1,3-DICHLOROPROPANE	ND	1

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

METHOD BLANK REPORT

CUSTOMER: **Kleinfelder**
5015 Shoreham Place, San Diego, CA 92122
Tel(858)320-2000
E-Mail: Gkellar@kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:WATER DATE RECEIVED:07/20/11
DATE SAMPLED:07/20/11 DATE ANALYZED:07/21/11
REPORT TO:Mr. GERALD (JERRY) KELLAR DATE REPORTED:07/22/11

METHOD BLANK FOR LAB I.D.: 110718-83

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5030B/8260B, PAGE 2 OF 2
UNIT: ug/L = MICROGRAM PER LITER = PPB

PARAMETER	SAMPLE RESULT	PQL X1
2,2-DICHLOROPROPANE	ND	1
1,1-DICHLOROPROPENE	ND	1
CIS-1,3-DICHLOROPROPENE	ND	1
TRANS-1,3-DICHLOROPROPENE	ND	1
ETHYLBENZENE	ND	1
2-HEXANONE	ND	10
HEXACHLOROBUTADIENE	ND	1
ISOPROPYLBENZENE	ND	1
4-ISOPROPYLTOLUENE	ND	1
4-METHYL-2-PENTANONE (MIBK)	ND	10
METHYL tert-BUTYL ETHER (MTBE)	ND	3
METHYLENE CHLORIDE	ND	5
NAPHTHALENE	ND	1
N-PROPYLBENZENE	ND	1
STYRENE	ND	1
1,1,1,2-TETRACHLOROETHANE	ND	1
1,1,2,2-TETRACHLOROETHANE	ND	1
TETRACHLOROETHENE (PCE)	ND	1
TOLUENE	ND	1
1,2,3-TRICHLOROBENZENE	ND	1
1,2,4-TRICHLOROBENZENE	ND	1
1,1,1-TRICHLOROETHANE	ND	1
1,1,2-TRICHLOROETHANE	ND	1
TRICHLOROETHENE (TCE)	ND	1
TRICHLOROFLUOROMETHANE	ND	1
1,2,3-TRICHLOROPROPANE	ND	1
1,2,4-TRIMETHYLBENZENE	ND	1
1,3,5-TRIMETHYLBENZENE	ND	1
VINYL CHLORIDE	ND	1
M/P-XYLENE	ND	2
O-XYLENE	ND	1

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro-Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

8260B QA/QC Report

Date Analyzed: 7/20~21/2011
Machine: B

Matrix: WATER
Unit: ug/L (PPB)

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)

Spiked Sample Lab I.D.: 110720-90 MS/MSD **BATCH I.D. : 110720-90**

Analyte	S.R.	spk conc	MS	%RC	MSD	%RC	%RPD	ACP %RC	ACP RPD
Benzene	0	25.0	24.5	98%	24.2	97%	1%	75-125	0-20
Chlorobenzene	0	25.0	27.4	110%	26.3	105%	4%	75-125	0-20
1,1-Dichloroethene	0	25.0	24.7	99%	26.9	108%	9%	75-125	0-20
Toluene	0	25.0	25.0	100%	28.5	114%	14%	75-125	0-20
Trichloroethene (TCE)	0	25.0	26.9	108%	26.3	105%	2%	75-125	0-20

Lab Control Spike (LCS):

Analyte	spk conc	LCS	%RC	ACP %RC
Benzene	25.0	23.3	93%	75-125
Chlorobenzene	25.0	24.5	98%	75-125
Chloroform	25.0	26.4	106%	75-125
1,1-Dichlorothene	25.0	22.3	89%	75-125
Ethylbenzene	25.0	23.8	95%	75-125
o-Xylene	25.0	25.8	103%	75-125
m,p-Xylene	50.0	49.8	100%	75-125
Toluene	25.0	24.0	96%	75-125
1,1,1-Trichloroethane	25.0	26.7	107%	75-125
Trichloroethene (TCE)	25.0	25.2	101%	75-125

Surrogate Recovery	spk conc	ACP %RC	MB %RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			M-BLK	110720-63	110720-64	110720-65	110720-66	110720-67	110720-68
Dibromofluoromethane	25.0	70-130	101%	98%	96%	116%	125%	121%	122%
Toluene-d8	25.0	70-130	102%	104%	80%	111%	109%	108%	110%
4-Bromofluorobenzene	25.0	70-130	80%	77%	75%	79%	81%	77%	80%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110719-11	110720-35	110720-36	110720-37	110720-56	110720-85	110720-86
Dibromofluoromethane	25.0	70-130	121%	115%	120%	109%	117%	109%	109%
Toluene-d8	25.0	70-130	109%	110%	109%	109%	109%	107%	109%
4-Bromofluorobenzene	25.0	70-130	81%	104%	83%	80%	79%	88%	87%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110720-87	110720-88	110720-89	110720-90	110720-91	110720-92	110720-83
Dibromofluoromethane	25.0	70-130	126%	113%	118%	113%	114%	110%	110%
Toluene-d8	25.0	70-130	111%	109%	110%	108%	108%	110%	107%
4-Bromofluorobenzene	25.0	70-130	91%	87%	90%	89%	88%	87%	89%

** = Surrogate fail due to matrix interference; LCS, MS, MSD are in control therefore the analysis is in control.*

S.R. = Sample Results *%RC = Percent Recovery*

spk conc = Spike Concentration *ACP %RC = Accepted Percent Recovery*

MS = Matrix Spike *MSD = Matrix Spike Duplicate*

Analyzed/Reviewed By: Sch

Final Reviewer: NA

Enviro-Chem, Inc.
1214 E. Lexington Avenue
Pomona, CA 91766
Tel(909)590-5905 Fax(909)590-5907

Sample Receiving
Container Verification/Sample Anomaly Form

Client	Enviro-Chem Lab I.D.	Number of Sample(s)	Date	Time
Kleinfelder-SD	110720-73 through -84	12	07/20/11	14:00

Chain of Custody Check		Sample Shipping Information		Enviro-Chem Field Representative/Field Tech:	
		Samples arrived by:			
Yes	Client has signed Chain of Custody	0	Hand Delivery by Client	John Ackerman	
		0	Mail/Cardboard Box		
Yes	Field Services Representative has signed Chain of Custody	0	Cooler, Not Chilled	Date and Time of Pick-up	
Yes	All Samples are labeled correctly matching COC	x	Cooler, Chilled with Ice	07/20/11	11:59

Temperature		
Cooler or box temperature	4 °C	(Acceptable range ≤6)

Sample Condition Check List		Comments:
Was Custody Seal Present?	No	
If Yes -- Was the Seal Intact:	N/A	
Did all Samples arrive intact? If no, Indicate below	Yes	
Was sufficient amount of sample received for analysis indicated? If no, indicate below	Yes	
Was Space seen in VOAs?	N/A	5035 Kits
Were correct preservatives used?	Yes	

	Inorganic Analytes Containers	Comments:
0	All containers are properly sealed with no cracks or leaks	
0	Samples requiring preservation has been preserved	
0	Samples are within proper holding times	
0	Samples match up to identification on Chain of Custody	
0	Samples are properly chilled	

	Organic Analytes Containers	Comments:
0	All containers are properly sealed with no cracks or leaks	
0	Samples requiring preservation has been preserved	
0	Samples are within proper holding times	
0	Samples match up to identification on Chain of Custody	
0	Samples are properly chilled	

Comments:

Lab I.D. for subout item:	Analysis	Subout Lab

Print Name of Log In Person	Signature of Log in Person
Ping Wang	Ping Wang

KLEIN... DER

1/2

PROJECT NO	PROJECT NAME	RECEIVING LAB.
10975	530 Ave. Pico	Enviro Orem

L.P NO (P.O. NO.)

SAMPLERS: (Signature/Number) [signature]

INSTRUCTIONS/REMARKS: "Hold" - Do not run sample until notice from Liz Simmons

ANALYSIS: VOC + Oxy 8260B; TPH - CC 8015B; VOC + Oxy, TPH-CC 8015

		DATE MM/DD/YY	SAMPLE I.D TIME HH-MM-SS	SAMPLE I.D	MATRIX	NO OF CONTAINERS	TYPE OF CONTAINERS	VOC + Oxy 8260B	TPH - CC 8015B	VOC + Oxy, TPH-CC 8015	INSTRUCTIONS/REMARKS
110770 -73	1	4.20.11	0915	KLFJB-08-05	Soil	1	Ace.	X	X		
-74	2		0915	KLFJB-08-05		4	VOA			X	
-74	3		0925	KLFJB-08-10		1	Ace.	X	X		
	4		0925	KLFJB-08-10		4	VOA			X	
-75	5		0930	KLFJB-08-15		1	Ace.	X	X		Hold
	6		0930	KLFJB-08-15		4	VOA			X	Hold - pres.
-76	7		0940	KLFJB-08-20		1	Ace.	X	X		Hold
	8		0940	KLFJB-08-20		4	VOA			X	Hold - preserved
-77	9		1000	KLFJB-08-25		1	Ace.	X	X		
	10		1000	KLFJB-08-25		4	VOA			X	preserved
-78	11		1010	KLFJB-08-30		1	Ace.	X	X		Hold
	12		1010	KLFJB-08-30		4	VOA			X	Hold - preserved
-79	13		1111	KLFJB-09-10		1	Ace.	X	X		Hold
	14		1111	KLFJB-[illegible]10		4	VOA			X	Hold - preserved
-80	15		1120	KLFJB-09-15		1	Ace.	X	X		
	16		1120	KLFJB-09-15		4	VOA			X	preserved
-81	17		1130	KLFJB-09-20		1	Ace.	X	X		
	18		1130	KLFJB-09-20		4	VOA			X	preserved
-82	19		1140	KLFJB-09-25		1	Ace.	X	X		Hold
	20		1140	KLFJB-09-25		4	VOA			X	Hold

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature]	4.20.11 11:59	[signature]
[signature]	7/30/11 14:00	[signature]

Instructions/Remarks: STANDARD TAT

Send Results To: JKeller@Kleinfelder.com, LSimmons@ ", JWinter@ "

Attn:

ENV-02 REV 05/08)

White - Sampler Canary - Return Copy To Shipper Pink - Lab Copy

CHAIN OF CUSTODY

COC № 04429

KLEINFELDER

PROJECT NO.	PROJECT NAME
105751	530 Ave. Pico

L.P. NO. (PO NO.):

SAMPLERS (Signature/Number): MV

RECEIVING LAB: Enviro Chem

INSTRUCTIONS/REMARKS: See pg. 1

	DATE MM/DD/YY	SAMPLE I.D. TIME HH-MM-SS	SAMPLE I.D.	MATRIX	NO. OF CONTAINERS	TYPE OF CONTAINERS	VOC + oxy 8260B	TPH-cc 8015B	VOC + oxy, TPH-cc 8035	INSTRUCTIONS/REMARKS
110720-83 1	7.20.11	0800	110720-QCTB	H_2O	2	VOA	X			
-84 2	↓	1200	KLTJB-09-30	Soil	1	Ace.	X	X		
3	↓	1200	KLTJB-09-30	Soil	1	VOA			X	preserved - see VIA

Relinquished by: (Signature)	Date/Time	Received by: (Signature)
MV	7.20.11 11:59	[signature]
[signature]	7/20/11 1400	[signature]
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)

Instructions/Remarks: Standard TAT

Send Results To: See pg. 1

Attn:

ENV-02 REV 05/08) White - Sampler Canary - Return Copy To Shipper Pink - Lab Copy

CHAIN OF CUSTODY

COC № 04318

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Date: August 3, 2011

Ms. Margaret Carroll
Kleinfelder
620 W. 16th Street, Unit **#F**
Long Beach, CA 90813
Tel(562)432-1696 E-Mail: MCarroll@Kleinfelder.com

Project: **530 Ave. Pico**
Project No.: **105751**
Lab I.D.: **110719-1 through -19**

Dear Ms. Carroll:

The **additional analytical results** for the soil and water samples, received by our lab on July 18, 2011, are attached. The samples were received chilled at four degrees Celsius, intact, accompanying chain of custody and also stored per the EPA protocols.

Enviro-Chem appreciates the opportunity to provide you and your company this and other services. Please do not hesitate to call us if you have any questions.

Sincerely,

Curtis Desilets
Vice President/Program Manager

Andy Wang
Laboratory Manager

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: Kleinfelder
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico — PROJECT No.: 105751
DATE RECEIVED: 07/18/11
MATRIX: SOIL — DATE EXTRACTED: 08/01/11
DATE SAMPLED: 07/18/11 — DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL — DATE REPORTED: 08/03/11

TOTAL PETROLEUM HYDROCARBONS (TPH) - CARBON CHAIN ANALYSIS
METHOD: EPA 8015B
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

SAMPLE I.D.	LAB I.D.	C4-C10	C11-C22	C23-C35	DF
KLFSB-01-05	110719-1	ND	ND	ND	1
KLFSB-01-10	110719-2	ND	ND	ND	1
KLFSB-01-25	110719-5	ND	ND	ND	1
KLFSB-02-05	110719-7	ND	ND	ND	1
KLFSB-02-10	110719-8	ND	ND	ND	1
KLFSB-02-25	110719-12	ND	ND	ND	1
KLFSB-03-15	110719-16	ND	ND	ND	1
KLFSB-03-20	110719-17	ND	ND	ND	1
KLFSB-03-30	110719-19	ND	ND	ND	1
METHOD BLANK		ND	ND	ND	1
	PQL	10	10	50	

COMMENTS
C4-C10 = GASOLINE RANGE
C11-C22 = DIESEL RANGE
C23-C35 = MOTOR OIL RANGE
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = DF X PQL
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro Chem, Inc

1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

8015B Soil/Solid QC

Date Analyzed: 8/2/2011 **Units:** mg/Kg (PPM)

Matrix: Solid/Sludge/Soil

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)
Batch I.D. : 110719-1

Spiked Sample Lab I.D.: 110719-1 MS/MSD

Analyte	SR	spk conc	MS	%MS	MSD	%MSD	%RPD	ACP %MS	ACP RPD
C11~C22 Range	0	2500	1930	77%	2000	80%	4%	75-125	0-20%

LCS STD RECOVERY:

Analyte	spk conc	LCS	% REC	ACP
C11~C22 Range	200	221	111%	75-125

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.		MB	110719-1	110719-2	110719-5	110719-7	110719-8	110719-12	110719-16
O-Terphenyl	60-140%	89%	109%	97%	89%	112%	107%	121%	81%
Octacosane	60-140%	98%	110%	99%	90%	116%	111%	127%	81%

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.		110719-17	110719-19						
O-Terphenyl	60-140%	87%	92%						
Octacosane	60-140%	93%	94%						

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC			
Sample I.D.									
O-Terphenyl	60-140%								
Octacosane	60-140%								

Analyzed and Reviewed By: An

Final Reviewer: e

** = Surrogate fail due to matrix interference*

Note: LCS, MS, MSD are in control therefore results are in control.

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11

EPA 5035/8260B FOR FUEL OXYGENATES
UNITS: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

SAMPLE I.D.	LAB I.D.	ETBE	DIPE	MTBE	TAME	TBA	DF
KLFSB-01-05	110719-1	ND	ND	ND	ND	ND	1
KLFSB-01-10	110719-2	ND	ND	ND	ND	ND	1
KLFSB-01-25	110719-5	ND	ND	ND	ND	ND	1
KLFSB-02-05	110719-7	ND	ND	ND	ND	ND	1
KLFSB-02-10	110719-8	ND	ND	ND	ND	ND	1
KLFSB-02-25	110719-12	ND	ND	ND	ND	ND	1
KLFSB-03-15	110719-16	ND	ND	ND	ND	ND	1
KLFSB-03-20	110719-17	ND	ND	ND	ND	ND	1
KLFSB-03-30	110719-19	ND	ND	ND	ND	ND	1
Method Blank		ND	ND	ND	ND	ND	1
PQL		0.01	0.01	0.005	0.01	0.05	

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = DF X PQL
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
ETBE = ETHYL tert-BUTYL ETHER DIPE = ISOPROPYL ETHER
MTBE = METHYL tert-BUTYL ETHER TAME = TERT-AMYL METHYL ETHER
TBA = TERTIARY BUTYL ALCOHOL

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 **Fax (909) 590-5907**

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-01-05** LAB I.D.: 110719-1

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

Enviro – Chem, Inc.
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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel (562) 432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-01-05** LAB I.D.: 110719-1

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
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LABORATORY REPORT

CUSTOMER: Kleinfelder
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Tel (562) 432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/18/11
REPORT TO: Ms. MARGARET CARROLL
SAMPLE I.D.: KLFSB-01-10

PROJECT No.: 105751
DATE RECEIVED: 07/18/11
DATE ANALYZED: 08/01/11
DATE REPORTED: 08/03/11
LAB I.D.: 110719-2

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: Kleinfelder
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PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/18/11
REPORT TO: Ms. MARGARET CARROLL
SAMPLE I.D.: KLFSB-01-10

PROJECT No.: 105751
DATE RECEIVED: 07/18/11
DATE ANALYZED: 08/01/11
DATE REPORTED: 08/03/11
LAB I.D.: 110719-2

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

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PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/18/11
REPORT TO: Ms. MARGARET CARROLL
SAMPLE I.D.: KLFSB-01-25

PROJECT No.: 105751
DATE RECEIVED: 07/18/11
DATE ANALYZED: 08/01/11
DATE REPORTED: 08/03/11
LAB I.D.: 110719-5

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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CUSTOMER: **Kleinfelder**
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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-01-25** LAB I.D.: 110719-5

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 | DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL | DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-02-05** | LAB I.D.: 110719-7

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
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E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-02-05** LAB I.D.: 110719-7

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: Kleinfelder
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico — PROJECT No.: 105751
MATRIX: SOIL — DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 — DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL — DATE REPORTED: 08/03/11
SAMPLE I.D.: KLFSB-02-10 — LAB I.D.: 110719-8

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** | PROJECT No.: 105751
MATRIX: SOIL | DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 | DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL | DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-02-10** | LAB I.D.: 110719-8

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-02-25** LAB I.D.: 110719-12

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-02-25** LAB I.D.: 110719-12

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-03-15** LAB I.D.: 110719-16

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 | DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL | DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-03-15** | LAB I.D.: 110719-16

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
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LABORATORY REPORT

CUSTOMER: Kleinfelder
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico
MATRIX:SOIL
DATE SAMPLED:07/18/11
REPORT TO:Ms. MARGARET CARROLL
SAMPLE I.D.: KLFSB-03-20

PROJECT No.: 105751
DATE RECEIVED:07/18/11
DATE ANALYZED:08/01/11
DATE REPORTED:08/03/11
LAB I.D.: 110719-17

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 | DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL | DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-03-20** | LAB I.D.: 110719-17

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: Kleinfelder
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel (562) 432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/18/11
REPORT TO: Ms. MARGARET CARROLL
SAMPLE I.D.: KLFSB-03-30

PROJECT No.: 105751
DATE RECEIVED: 07/18/11
DATE ANALYZED: 08/01/11
DATE REPORTED: 08/03/11
LAB I.D.: 110719-19

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel (562) 432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: 105751
MATRIX: SOIL DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-03-30** LAB I.D.: 110719-19

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

METHOD BLANK REPORT

CUSTOMER: Kleinfelder
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel (562) 432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico — PROJECT No.: 105751
MATRIX: SOIL — DATE RECEIVED: 07/18/11
DATE SAMPLED: 07/18/11 — DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL — DATE REPORTED: 08/03/11

METHOD BLANK FOR LAB I.D.:
110719-1, -2, -5, -7, -8, -12, -16, -17, -19

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

METHOD BLANK REPORT

CUSTOMER: Kleinfelder
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel (562) 432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/18/11
REPORT TO: Ms. MARGARET CARROLL

PROJECT No.: 105751
DATE RECEIVED: 07/18/11
DATE ANALYZED: 08/01/11
DATE REPORTED: 08/03/11

METHOD BLANK FOR LAB I.D.:
110719-1, -2, -5, -7, -8, -12, -16, -17, -19

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro-Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

8260B QA/QC Report

Date Analyzed: 8/1/2011 **Matrix:** Solid/Soil/Liquid
Machine: C **Unit:** mg/Kg (PPM)

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)
Spiked Sample Lab I.D.: 110801-1 MS/MSD **BATCH I.D. : 110801-1**

Analyte	S.R.	spk conc	MS	%RC	MSD	%RC	%RPD	ACP %RC	ACP RPD
Benzene	0	0.050	0.055	110%	0.051	102%	8%	75-125	0-20
Chlorobenzene	0	0.050	0.055	110%	0.054	108%	2%	75-125	0-20
1,1-Dichloroethene	0	0.050	0.049	98%	0.051	102%	4%	75-125	0-20
Toluene	0	0.050	0.050	100%	0.044	88%	12%	75-125	0-20
Trichloroethene (TCE)	0	0.050	0.044	88%	0.049	98%	10%	75-125	0-20

Lab Control Spike (LCS):

Analyte	spk conc	LCS	%RC	ACP %RC
Benzene	0.050	0.052	104%	75-125
Chlorobenzene	0.050	0.049	98%	75-125
Chloroform	0.050	0.055	110%	75-125
1,1-Dichlorothene	0.050	0.054	108%	75-125
Ethylbenzene	0.050	0.052	104%	75-125
o-Xylene	0.050	0.055	110%	75-125
m,p-Xylene	0.100	0.110	110%	75-125
Toluene	0.050	0.047	94%	75-125
1,1,1-Trichloroethane	0.050	0.049	98%	75-125
Trichloroethene (TCE)	0.050	0.042	84%	75-125

Surrogate Recovery	spk conc	ACP %RC	MB %RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			M-BLK	110801-1	110801-2	110801-3	110801-4	110801-5	110801-6
Dibromofluoromethane	50.0	70-130	88%	115%	113%	111%	112%	124%	118%
Toluene-d8	50.0	70-130	102%	95%	103%	102%	102%	106%	106%
4-Bromofluorobenzene	50.0	70-130	85%	81%	79%	77%	81%	77%	77%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110801-13	110801-20	110801-21	110801-17-19	110719-1	110719-2	110719-5
Dibromofluoromethane	50.0	70-130	107%	72%	115%	108%	104%	110%	115%
Toluene-d8	50.0	70-130	112%	106%	80%	109%	95%	110%	109%
4-Bromofluorobenzene	50.0	70-130	111%	75%	85%	79%	80%	81%	76%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110719-7	110719-8	110719-12	110719-16	110719-17	110719-19	
Dibromofluoromethane	50.0	70-130	98%	118%	112%	108%	114%	118%	
Toluene-d8	50.0	70-130	92%	108%	108%	107%	106%	106%	
4-Bromofluorobenzene	50.0	70-130	88%	72%	72%	72%	74%	73%	

** = Surrogate fail due to matrix interference; LCS, MS, MSD are in control therefore the analysis is in control.*
S.R. = Sample Results *%RC = Percent Recovery*
spk conc = Spike Concentration *ACP %RC = Accepted Percent Recovery*
MS = Matrix Spike *MSD = Matrix Spike Duplicate*

Analyzed/Reviewed By: Sch

Final Reviewer:

Enviro-Chem, Inc.

From: Margaret Carroll [MCarroll@kleinfelder.com]
Sent: Monday, August 01, 2011 2:35 PM
To: envirocheminc@yahoo.com
Cc: Liz Simmons
Subject: SAN-CLEMENTE LAB DATA - FURTHER TESTING

Jessica,

As we discussed, we need all of the "HOLD" samples to be analyzed for each of the chemicals indicated on the COCs associated with the following:

1. Lab I.D. # 110719-1 through -19 (Samples collected on July 18, 2011 at 530 Avenue Pico)
2. Lab I.D. # 110720-38 through -62 (Samples collected on July 19, 2011 at 530 Avenue Pico)
3. Lab I.D. # 110720-73 through -84 (Samples collected on July 20, 2011 at 530 Avenue Pico)

Please forward the laboratory results directly to my attention. Thank you.

Sincerely,

Margaret R. Carroll, REA
Staff Environmental Scientist
620 West 16th Street, #F
Long Beach, CA 90813
o: 562.432.1696, ext. 210
f: 562.432.1796
c: 949.337.5582

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3 - 1/2

PROJECT NO.	PROJECT NAME	NO. OF CONTAINERS	TYPE OF CONTAINERS	ANALYSIS: VOC + OXY 8260B; TPH-GC 8015B; VOC + OXY; TPH-GC 5035	RECEIVING LAB: Enviro Chem
105751	530 Ave. Pico				
L.P. NO. (PO. NO.)	SAMPLERS: (Signature/Number)				

	DATE MM/DD/YY	SAMPLE I.D. TIME HH-MM-SS	SAMPLE I.D.	MATRIX	NO. OF CONTAINERS	TYPE OF CONTAINERS	VOC + OXY 8260B	TPH-GC 8015B	VOC + OXY; TPH-GC 5035							INSTRUCTIONS/REMARKS
1	07.18.11	1010	KLFSB-01-05	Soil	1	Acetate	X	X					1107	19	-1	HOLD
2		1010	KLFSB-01-05	Soil	4	VOA			X						-1	preserved - see VOAs/HOLD
3		1020	KLFSB-01-10	Soil	1	Acetate	X	X							-2	HOLD
4		1020	KLFSB-01-10	Soil	4	VOA			X						-2	preserved - see VOAs/HOLD
5		1045	KLFSB-01-15	Soil	1	Acetate	X	X							-3	
6		1045	KLFSB-01-15	Soil	4	VOA			X						-3	preserved - see VOAs
7		1100	KLFSB-01-20	Soil	1	Acetate	X	X							-4	
8		1100	KLFSB-01-20	Soil	4	VOA			X						-4	preserved - see VOAs
9		1110	KLFSB-01-25	Soil	1	Acetate	X	X							-5	HOLD
10		1110	KLFSB-01-25	Soil	4	VOA			X						-5	preserved - see VOAs/HOLD
11		1125	KLFSB-01-30	Soil	1	Acetate	X	X							-6	
12		1125	KLFSB-01-30	Soil	4	VOA			X						-6	preserved - see VOAs
13		1330	KLFSB-02-05		1	Acetate	X	X							-7	HOLD
14		1330	KLFSB-02-05		4	VOA			X						-7	preserved - see VOAs/HOLD
15		1340	KLFSB-02-10		1	Acetate	X	X							-8	HOLD
16		1340	KLFSB-02-10		4	VOA			X						-8	preserved - see VOAs/HOLD
17		1350	KLFSB-02-15		1	Acetate	X	X							-9	
18		1350	KLFSB-02-15		4	VOA			X						-9	preserved - see VOAs
19		1400	KLFSB-02-20		1	Acetate	X	X							-10	
20	V	1400	KLFSB-02-20	V	4	VOA			X						-10	Preserved - see VOAs

HOLD - Do not run sample until notice from Liz Jimenez

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Instructions/Remarks:	Send Results To:
	7.18.11/1600		Standard TAT	JKeller@KleinFelder.com
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		LSimmons "
	7/19/11 0800	Liz 7/19/11 8:00		Attn: JWissler "
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)		

ENV-02 REV 05/08)

White – Sampler Canary – Return Copy To Shipper Pink – Lab Copy

CHAIN OF CUSTODY

COC № 04313

KLEIN LDER

PROJECT NO.	PROJECT NAME	NO. OF CONTAINERS	TYPE OF CONTAINERS	ANALYSIS	RECEIVING LAB:
105751	530 Ave. P Ice			VOC + OXY 8260B; TPH-DRO 8015B; VOC + OXY + TPH-GRO 5035	Enviro Chem
LP NO (PO. NO.)	SAMPLERS: (Signature/Number)				"HOLD" - Do not run sample until notice from Liz Timmons

	DATE MM/DD/YY	SAMPLE I.D TIME HH-MM-SS	SAMPLE I.D.	MATRIX	NO. OF CONTAINERS	TYPE OF CONTAINERS	VOC + OXY 8260B	TPH-DRO 8015B	VOC + OXY + TPH-GRO 5035									INSTRUCTIONS/REMARKS
1	7.18.11	0800	KLFMB-QCTB	H2O	2	VOA	X									110719-11		
2		1410	KLFMB-02-25	Soil	1	4oz-Jar	X	X								-12		HOLD
3		1410	KLFMB-02-25		4	VOA			X							-12		preserved-see VOA/HOLD
4		1425	KLFMB-02-30		1	4oz-Jar	X	X								-13		
5		1425	KLFMB-02-30		4	VOA			X							-13		preserved-see VOA
6		1515	KLFSB-03-05		1	4oz-Jar	X	X								-14		
7		1515	KLFSB-03-05		4	VOA			X							-14		preserved-see VOA
8		1525	KLFSB-03-10		1	4oz-Jar	X	X								-15		
9		1525	KLFSB-03-10		4	VOA			X							-15		preserved-see VOA
10		1530	KLFSB-03-15		1	4oz-Jar	X	X								-16		HOLD
11		1530	KLFSB-03-15		4	VOA			X							-16		preserved-see VOA / HOLD
12		1540	KLFSB-03-20		1	4oz-Jar	X	X								-17		HOLD
13		1540	KLFSB-03-20		4	VOA			X							-17		preserved-see VOA / HOLD
14		1550	KLFSB-03-25		1	4oz-Jar	X	X								-18		
15		1550	KLFSB-03-25		4	VOA			X							-18		preserved-see VOA
16		1600	KLFSB-03-30		1	4oz-Jar	X	X								-19		HOLD
17	↓	1600	KLFSB-03-30	↓	4	VOA			X							-19		preserved-see VOA / HOLD
18																		
19																		
20																		

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Instructions/Remarks:	Send Results To:
	7.18.11 / 1600		Standard TAT	JKellar@KleinFelder.com
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		LTimmons "
	7/19/11 @ 08:00	7/19/11		Attn: JWissler "
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)		

White – Sampler Canary - Return Copy To Shipper Pink – Lab Copy

ENV-02 REV 05/08)

CHAIN OF CUSTODY

COC № 04317

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Date: August 3, 2011

Ms. Margaret Carroll
Kleinfelder
620 W. 16th Street, Unit #F
Long Beach, CA 90813
Tel(562)432-1696 E-Mail: MCarroll@Kleinfelder.com

Project: **530 Ave. Pico**
Project No.: **105751**
Lab I.D.: **110720-73 through -84**

Dear Ms. Carroll:

The **additional analytical results** for the soil and water samples, received by our lab on July 20, 2011, are attached. The samples were received chilled at four degrees Celsius, intact, accompanying chain of custody and also stored per the EPA protocols.

Enviro-Chem appreciates the opportunity to provide you and your company this and other services. Please do not hesitate to call us if you have any questions.

Sincerely,

Curtis Desilets
Vice President/Program Manager

Andy Wang
Laboratory Manager

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: Kleinfelder
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel (562) 432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico — PROJECT No.: 105751
DATE RECEIVED: 07/20/11
MATRIX: SOIL — DATE EXTRACTED: 08/01/11
DATE SAMPLED: 07/20/11 — DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL — DATE REPORTED: 08/03/11

TOTAL PETROLEUM HYDROCARBONS (TPH) - CARBON CHAIN ANALYSIS
METHOD: EPA 8015B
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

SAMPLE I.D.	LAB I.D.	C4-C10	C11-C22	C23-C35	DF
KLFSB-08-15	110720-75	ND	ND	ND	1
KLFSB-08-20	110720-76	ND	ND	ND	1
KLFSB-08-30	110720-78	ND	ND	ND	1
KLFSB-09-10	110720-79	ND	ND	ND	1
KLFSB-09-25	110720-82	ND	ND	ND	1
METHOD BLANK		ND	ND	ND	1
	PQL	10	10	50	

COMMENTS
C4-C10 = GASOLINE RANGE
C11-C22 = DIESEL RANGE
C23-C35 = MOTOR OIL RANGE
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = DF X PQL
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro Chem, Inc

1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

8015B Soil/Solid QC

Date Analyzed: 8/2/2011 **Units:** mg/Kg (PPM)

Matrix: **Solid/Sludge/Soil**

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)
Batch I.D. : 110720-82

Spiked Sample Lab I.D.: 110720-82 MS/MSD

Analyte	SR	spk conc	MS	%MS	MSD	%MSD	%RPD	ACP %MS	ACP RPD
C11~C22 Range	0	2500	2080	83%	2230	89%	7%	75-125	0-20%

LCS STD RECOVERY:

Analyte	spk conc	LCS	% REC	ACP
C11~C22 Range	200	221	111%	75-125

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.		MB	110720-40	110720-41	110720-43	110720-46	110720-47	110720-49	110720-52
O-Terphenyl	60-140%	113%	121%	99%	116%	101%	113%	99%	119%
Octacosane	60-140%	120%	118%	97%	115%	104%	111%	98%	118%

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.		110720-53	110720-55	110720-59	110720-60	110720-62	110720-75	110720-76	110720-78
O-Terphenyl	60-140%	116%	90%	95%	91%	110%	130%	135%	107%
Octacosane	60-140%	116%	91%	94%	89%	107%	136%	137%	105%

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC			
Sample I.D.		110720-79	110720-82						
O-Terphenyl	60-140%	109%	103%						
Octacosane	60-140%	107%	101%						

Analyzed and Reviewed By:

Final Reviewer:

** = Surrogate fail due to matrix interference*

Note: ***LCS, MS, MSD are in control therefore results are in control.***

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

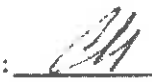
CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel (562) 432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 DATE ANALYZED: 08/01-02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11

EPA 5035/8260B FOR FUEL OXYGENATES
UNITS: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

SAMPLE I.D.	LAB I.D.	ETBE	DIPE	MTBE	TAME	TBA	DF
KLFSB-08-15	110720-75	ND	ND	ND	ND	ND	1
KLFSB-08-20	110720-76	ND	ND	ND	ND	ND	1
KLFSB-08-30	110720-78	ND	ND	ND	ND	ND	1
KLFSB-09-10	110720-79	ND	ND	ND	ND	ND	1
KLFSB-09-25	110720-82	ND	ND	ND	ND	ND	1
Method Blank		ND	ND	ND	ND	ND	1
PQL		0.01	0.01	0.005	0.01	0.05	

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = DF X PQL
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
ETBE = ETHYL tert-BUTYL ETHER DIPE = ISOPROPYL ETHER
MTBE = METHYL tert-BUTYL ETHER TAME = TERT-AMYL METHYL ETHER
TBA = TERTIARY BUTYL ALCOHOL

Data Reviewed and Approved by: 
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: Kleinfelder
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel (562) 432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico
PROJECT No.: 105751
MATRIX: SOIL
DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11
DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL
DATE REPORTED: 08/03/11
SAMPLE I.D.: KLFSB-08-15
LAB I.D.: 110720-75

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel (562) 432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-08-15** LAB I.D.: 110720-75

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 | DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL | DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-08-20** | LAB I.D.: 110720-76

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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Tel (562) 432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: 105751
MATRIX: SOIL DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-08-20** LAB I.D.: 110720-76

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

CUSTOMER: Kleinfelder
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PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/20/11
REPORT TO: Ms. MARGARET CARROLL
SAMPLE I.D.: KLFSB-08-30

PROJECT No.: 105751
DATE RECEIVED: 07/20/11
DATE ANALYZED: 08/02/11
DATE REPORTED: 08/03/11
LAB I.D.: 110720-78

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/20/11
DATE SAMPLED:07/20/11 DATE ANALYZED:08/02/11
REPORT TO:Ms. MARGARET CARROLL DATE REPORTED:08/03/11
SAMPLE I.D.: **KLFSB-08-30** LAB I.D.: 110720-78

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 | DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL | DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-09-10** | LAB I.D.: 110720-79

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-09-10** LAB I.D.: 110720-79

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
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LABORATORY REPORT

CUSTOMER: Kleinfelder
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico
MATRIX:SOIL
DATE SAMPLED:07/20/11
REPORT TO:Ms. MARGARET CARROLL
SAMPLE I.D.: KLFSB-09-25

PROJECT No.: 105751
DATE RECEIVED:07/20/11
DATE ANALYZED:08/02/11
DATE REPORTED:08/03/11
LAB I.D.: 110720-82

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-09-25** LAB I.D.: 110720-82

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

METHOD BLANK REPORT

CUSTOMER: Kleinfelder
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico — PROJECT No.: 105751
MATRIX: SOIL — DATE RECEIVED: 07/20/11
DATE SAMPLED: 07/20/11 — DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL — DATE REPORTED: 08/03/11

METHOD BLANK FOR LAB I.D.: 110720-75, -76, -78, -79, -82

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

METHOD BLANK REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/20/11
DATE SAMPLED:07/20/11 DATE ANALYZED:08/01/11
REPORT TO:Ms. MARGARET CARROLL DATE REPORTED:08/03/11

METHOD BLANK FOR LAB I.D.: 110720-75, -76, -78, -79, -82

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro-Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

8260B QA/QC Report

Date Analyzed: 8/1~2/2011 **Matrix:** Solid/Soil/Liquid
Machine: C **Unit:** mg/Kg (PPM)

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)

Spiked Sample Lab I.D.: 110720-40 MS/MSD **BATCH I.D. : 110720-40**

Analyte	S.R.	spk conc	MS	%RC	MSD	%RC	%RPD	ACP %RC	ACP RPD
Benzene	0	0.050	0.052	104%	0.050	100%	4%	75-125	0-20
Chlorobenzene	0	0.050	0.049	98%	0.048	96%	2%	75-125	0-20
1,1-Dichloroethene	0	0.050	0.050	100%	0.054	108%	8%	75-125	0-20
Toluene	0	0.050	0.047	94%	0.047	94%	0%	75-125	0-20
Trichloroethene (TCE)	0	0.050	0.050	100%	0.043	86%	14%	75-125	0-20

Lab Control Spike (LCS):

Analyte	spk conc	LCS	%RC	ACP %RC
Benzene	0.050	0.054	108%	75-125
Chlorobenzene	0.050	0.044	88%	75-125
Chloroform	0.050	0.053	106%	75-125
1,1-Dichlorothene	0.050	0.052	104%	75-125
Ethylbenzene	0.050	0.047	94%	75-125
o-Xylene	0.050	0.050	100%	75-125
m,p-Xylene	0.100	0.098	98%	75-125
Toluene	0.050	0.057	114%	75-125
1,1,1-Trichloroethane	0.050	0.056	112%	75-125
Trichloroethene (TCE)	0.050	0.055	110%	75-125

Surrogate Recovery	spk conc	ACP %RC	MB %RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			M-BLK	110720-40	110720-41	110720-43	110720-46	110720-47	110720-49
Dibromofluoromethane	50.0	70-130	100%	98%	113%	108%	107%	118%	112%
Toluene-d8	50.0	70-130	102%	107%	104%	109%	109%	109%	109%
4-Bromofluorobenzene	50.0	70-130	74%	81%	80%	88%	71%	78%	92%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110720-52	110720-53	110720-55	110720-59	110720-60	110720-62	110720-75
Dibromofluoromethane	50.0	70-130	107%	115%	103%	118%	99%	104%	110%
Toluene-d8	50.0	70-130	114%	109%	108%	111%	110%	107%	109%
4-Bromofluorobenzene	50.0	70-130	83%	81%	74%	72%	79%	83%	72%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110720-76	110720-78	110720-79	110720-82	110801-24	110801-25	110801-26
Dibromofluoromethane	50.0	70-130	108%	123%	115%	101%	116%	115%	104%
Toluene-d8	50.0	70-130	106%	109%	111%	110%	111%	94%	95%
4-Bromofluorobenzene	50.0	70-130	80%	71%	73%	77%	72%	74%	76%

** = Surrogate fail due to matrix interference; LCS, MS, MSD are in control therefore the analysis is in control.*
S.R. = Sample Results *%RC = Percent Recovery*
spk conc = Spike Concentration *ACP %RC = Accepted Percent Recovery*
MS = Matrix Spike *MSD = Matrix Spike Duplicate*

Analyzed/Reviewed By: Sch

Final Reviewer: E

Enviro-Chem, Inc.

From: Margaret Carroll [MCarroll@kleinfelder.com]
Sent: Monday, August 01, 2011 2:35 PM
To: envirocheminc@yahoo.com
Cc: Liz Simmons
Subject: SAN-CLEMENTE LAB DATA - FURTHER TESTING

Jessica,

As we discussed, we need all of the "HOLD" samples to be analyzed for each of the chemicals indicated on the COCs associated with the following:

1. Lab I.D. # 110719-1 through -19 (Samples collected on July 18, 2011 at 530 Avenue Pico)
2. Lab I.D. # 110720-38 through -62 (Samples collected on July 19, 2011 at 530 Avenue Pico)
3. Lab I.D. # 110720-73 through -84 (Samples collected on July 20, 2011 at 530 Avenue Pico)

Please forward the laboratory results directly to my attention. Thank you.

Sincerely,

Margaret R. Carroll, REA
Staff Environmental Scientist
620 West 16th Street, #F
Long Beach, CA 90813
o: 562.432.1696, ext. 210
f: 562.432.1796
c: 949.337.5582

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1 1/2

PROJECT NO: 105751 | PROJECT NAME: 530 Ave. Pico

L.P. NO. (PO. NO.) | SAMPLERS: (Signature/Number)

RECEIVING LAB: Enviro Chem

	DATE MM/DD/YY	SAMPLE I.D. TIME HH-MM-SS	SAMPLE I.D.	MATRIX	NO OF CONTAINERS	TYPE OF CONTAINERS	ANALYSIS: VOC + OVG 8260B; TPH-cc 8015B; VOC + OVG TPH-cc 8015B	INSTRUCTIONS/REMARKS
10/20								"Hold" - Do not run samples until notice from Lee Simmons
73 1	7.20.11	0915	KLFJB-08-05	Soil	1	ACE	X X	
74 2		0915	KLFJB-08-05		4	VOA	X	
-74 3		0925	KLFJB-08-10		1	ACE.	X X	
4		0925	KLFJB-08-10		4	VOA	X	
-75 5		0930	KLFJB-08-15		1	ACE.	X X	Hold
6		0930	KLFJB-08-15		4	VOA.	X	Hold - pres.
-76 7		0940	KLFJB-08-20		1	ACE.	X X	Hold
8		0940	KLFJB-08-20		4	VOA	X	Hold - preservtn
-77 9		1000	KLFJB-08-25		1	ACE.	X X	
10		1000	KLFJB-08-25		4	VOA	X	Preserved
-78 11		1010	KLFJB-08-30		1	ACE.	X X	Hold
12		1010	KLFJB-08-30		4	VOA	X	Hold - preserved
-79 13		1111	KLFJB-09-10		1	ACE.	X X	Hold
14		1111	KLFJB-09-10		4	VOA	X	Hold - preservtn
-80 15		1120	KLFJB-09-15		1	ACE.	X X	
16		1120	KLFJB-09-15		4	VOA	X	preserved
-81 17		1130	KLFJB-09-20		1	ACE.	X X	
18		1130	KLFJB-09-20		4	VOA	X	preserved
-82 19		1140	KLFJB-09-25		1	ACE.	X X	Hold
20	V	1140	KLFJB-09-25	V	4	VOA	X	Hold

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Instructions/Remarks:	Send Results To:
	7.20.11 11:59		Standard TAT	JKeller@Kleinfelder.com
Relinquished by: (Signature)	7/20/11 14:00	Received by: (Signature)		LSimmons@ "
				Attn: JWisler@ "
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)		

White - Sampler | Canary - Return Copy To Shipper | Pink - Lab Copy

ENV-02 REV 05/08)

CHAIN OF CUSTODY

COC № 04429

KLEIN FELDER

1 of 2

PROJECT NO.	PROJECT NAME	NO. OF CONTAINERS	TYPE OF CONTAINERS	ANALYSIS	RECEIVING LAB
10571	530 Ave. Pico				Enviro Chem
P.O. NO.	SAMPLERS (Signature/Number)				INSTRUCTIONS/REMARKS
	MD				See pg. 1

	DATE MM/DD/YY	SAMPLE I.D TIME HH-MM-SS	SAMPLE I.D.	MATRIX	NO. OF CONTAINERS	TYPE OF CONTAINERS	VOC + OXY 8260B	TPH-D 8015B	VOC + OXY + TPH-G 8260B	
110720-83	1	7.20.11	0800	110720-QCTB	H2O	1L	VOA	X			
-84	2	↓	1200	KLFJB-A-20	Soil	1	Acc.	X	X		
	3	↓	1200	KLFJB-D-20	Soil	1	VOA			X	preserved - see VOA
	4										
	5										
	6										
	7										
	8										
	9										
	10										
	11										
	12										
	13										
	14										
	15										
	16										
	17										
	18										
	19										
	20										

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Instructions/Remarks:	Send Results To:
MD	7.20.11 11:59	Ackerman	Standard TAT	See pg. 1
Relinquished by: (Signature)	7/20/11 1400	Received by: (Signature)		
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)		Attn:

ENV-02 REV 05/08)

White - Sampler Canary – Return Copy To Shipper Pink – Lab Copy

CHAIN OF CUSTODY

COC № 04318

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

Date: August 3, 2011

Ms. Margaret Carroll
Kleinfelder
620 W. 16th Street, Unit #F
Long Beach, CA 90813
Tel(562)432-1696 E-Mail: MCarroll@Kleinfelder.com

Project: **530 Ave. Pico**
Project No.: **105751**
Lab I.D.: **110720-38 through -62**

Dear Ms. Carroll:

The **additional analytical results** for the soil and water samples, received by our lab on July 19, 2011, are attached. The samples were received chilled at four degrees Celsius, intact, accompanying chain of custody and also stored per the EPA protocols.

Enviro-Chem appreciates the opportunity to provide you and your company this and other services. Please do not hesitate to call us if you have any questions.

Sincerely,

Curtis Desilets
Vice President/Program Manager

Andy Wang
Laboratory Manager

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
DATE RECEIVED: 07/19/11
MATRIX: SOIL DATE EXTRACTED: 08/01/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11

TOTAL PETROLEUM HYDROCARBONS(TPH) - CARBON CHAIN ANALYSIS
METHOD: EPA 8015B
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

SAMPLE I.D.	LAB I.D.	C4-C10	C11-C22	C23-C35	DF
KLFSB-04-15	110720-40	ND	ND	ND	1
KLFSB-04-20	110720-41	ND	ND	ND	1
KLFSB-04-30	110720-43	ND	ND	ND	1
KLFSB-05-15	110720-46	ND	ND	ND	1
KLFSB-05-20	110720-47	ND	ND	ND	1
KLFSB-05-30	110720-49	ND	ND	ND	1
KLFSB-06-15	110720-52	ND	ND	ND	1
KLFSB-06-20	110720-53	ND	ND	ND	1
KLFSB-06-30	110720-55	ND	ND	ND	1
KLFSB-07-15	110720-59	ND	ND	ND	1
KLFSB-07-20	110720-60	ND	ND	ND	1
KLFSB-07-30	110720-62	ND	ND	ND	1
METHOD BLANK		ND	ND	ND	1
	PQL	**10**	**10**	**50**	

COMMENTS
C4-C10 = GASOLINE RANGE
C11-C22 = DIESEL RANGE
C23-C35 = MOTOR OIL RANGE
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = DF X PQL
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro Chem, Inc

1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909)590-5905 Fax (909)590-5907

8015B Soil/Solid QC

Date Analyzed: 8/2/2011 **Units:** mg/Kg (PPM)

Matrix: Solid/Sludge/Soil

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)
Batch I.D. : 110720-82

Spiked Sample Lab I.D.: 110720-82 MS/MSD

Analyte	SR	spk conc	MS	%MS	MSD	%MSD	%RPD	ACP %MS	ACP RPD
C11~C22 Range	0	2500	2080	83%	2230	89%	7%	75-125	0-20%

LCS STD RECOVERY:

Analyte	spk conc	LCS	% REC	ACP
C11~C22 Range	200	221	111%	75-125

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.		MB	110720-40	110720-41	110720-43	110720-46	110720-47	110720-49	110720-52
O-Terphenyl	60-140%	113%	121%	99%	116%	101%	113%	99%	119%
Octacosane	60-140%	120%	118%	97%	115%	104%	111%	98%	118%

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC	%REC	%REC	%REC
Sample I.D.		110720-53	110720-55	110720-59	110720-60	110720-62	110720-75	110720-76	110720-78
O-Terphenyl	60-140%	116%	90%	95%	91%	110%	130%	135%	107%
Octacosane	60-140%	116%	91%	94%	89%	107%	136%	137%	105%

Surrogate Recovery	ACP%	%REC	%REC	%REC	%REC	%REC			
Sample I.D.		110720-79	110720-82						
O-Terphenyl	60-140%	109%	103%						
Octacosane	60-140%	107%	101%						

Analyzed and Reviewed By: _____

Final Reviewer: _____

** = Surrogate fail due to matrix interference*

Note: *LCS, MS, MSD are in control therefore results are in control.*

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 08/01-02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11

EPA 5035/8260B FOR FUEL OXYGENATES
UNITS: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

SAMPLE I.D.	LAB I.D.	ETBE	DIPE	MTBE	TAME	TBA	DF
KLFSB-04-15	110720-40	ND	ND	ND	ND	ND	1
KLFSB-04-20	110720-41	ND	ND	ND	ND	ND	1
KLFSB-04-30	110720-43	ND	ND	ND	ND	ND	1
KLFSB-05-15	110720-46	ND	ND	ND	ND	ND	1
KLFSB-05-20	110720-47	ND	ND	ND	ND	ND	1
KLFSB-05-30	110720-49	ND	ND	ND	ND	ND	1
KLFSB-06-15	110720-52	ND	ND	ND	ND	ND	1
KLFSB-06-20	110720-53	ND	ND	ND	ND	ND	1
KLFSB-06-30	110720-55	ND	ND	ND	ND	ND	1
KLFSB-07-15	110720-59	ND	ND	ND	ND	ND	1
KLFSB-07-20	110720-60	ND	ND	ND	ND	ND	1
KLFSB-07-30	110720-62	ND	ND	ND	ND	ND	1
Method Blank		ND	ND	ND	ND	ND	1
PQL		0.01	0.01	0.005	0.01	0.05	

COMMENTS:
DF = DILUTION FACTOR
PQL = PRACTICAL QUANTITATION LIMIT
ACTUAL DETECTION LIMIT = DF X PQL
ND = NON-DETECTED OR BELOW THE ACTUAL DETECTION LIMIT
ETBE = ETHYL tert-BUTYL ETHER DIPE = ISOPROPYL ETHER
MTBE = METHYL tert-BUTYL ETHER TAME = TERT-AMYL METHYL ETHER
TBA = TERTIARY BUTYL ALCOHOL

Data Reviewed and Approved by: _____
CAL-DHS ELAP CERTIFICATE No.: 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 **Ave Pico** PROJECT No.: 105751
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-04-15** LAB I.D.: 110720-40

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

Enviro – Chem, Inc.
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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel (562) 432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-04-15** LAB I.D.: 110720-40

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-04-20** LAB I.D.: 110720-41

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-04-20** LAB I.D.: 110720-41

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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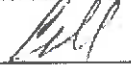
PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 | DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL | DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-04-30** | LAB I.D.: 110720-43

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: 

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-04-30** LAB I.D.: 110720-43

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

CUSTOMER: Kleinfelder
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Tel(562)432-1696
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PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/19/11
REPORT TO: Ms. MARGARET CARROLL
SAMPLE I.D.: KLFSB-05-15

PROJECT No.: 105751
DATE RECEIVED: 07/19/11
DATE ANALYZED: 08/02/11
DATE REPORTED: 08/03/11
LAB I.D.: 110720-46

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
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E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-05-15** LAB I.D.: 110720-46

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

CUSTOMER: Kleinfelder
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PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/19/11
REPORT TO: Ms. MARGARET CARROLL
SAMPLE I.D.: KLFSB-05-20

PROJECT No.: 105751
DATE RECEIVED: 07/19/11
DATE ANALYZED: 08/02/11
DATE REPORTED: 08/03/11
LAB I.D.: 110720-47

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-05-20** LAB I.D.: 110720-47

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-05-30** LAB I.D.: 110720-49

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: Kleinfelder
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Tel (562) 432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/19/11
REPORT TO: Ms. MARGARET CARROLL
SAMPLE I.D.: KLFSB-05-30

PROJECT No.: 105751
DATE RECEIVED: 07/19/11
DATE ANALYZED: 08/02/11
DATE REPORTED: 08/03/11
LAB I.D.: 110720-49

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-06-15** LAB I.D.: 110720-52

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

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PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX:SOIL DATE RECEIVED:07/19/11
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SAMPLE I.D.: **KLFSB-06-15** LAB I.D.: 110720-52

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
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PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
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REPORT TO: Ms. MARGARET CARROLL | DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-06-20** | LAB I.D.: 110720-53

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: Kleinfelder
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel (562) 432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico
PROJECT No.: 105751
MATRIX: SOIL
DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11
DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL
DATE REPORTED: 08/03/11
SAMPLE I.D.: KLFSB-06-20
LAB I.D.: 110720-53

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-06-30** LAB I.D.: 110720-55

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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LABORATORY REPORT

CUSTOMER: Kleinfelder
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Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico — PROJECT No.: 105751
MATRIX: SOIL — DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 — DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL — DATE REPORTED: 08/03/11
SAMPLE I.D.: KLFSB-06-30 — LAB I.D.: 110720-55

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
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DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

Enviro – Chem, Inc.
1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
620 W. 16th Street, Unit #F, Long Beach, CA 90813
Tel(562)432-1696
E-Mail: MCarroll@Kleinfelder.com

PROJECT: **530 Ave Pico** PROJECT No.: **105751**
MATRIX: SOIL DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-07-15** LAB I.D.: 110720-59

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

DATA REVIEWED AND APPROVED BY: _____

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1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

LABORATORY REPORT

CUSTOMER: **Kleinfelder**
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PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/19/11
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REPORT TO: Ms. MARGARET CARROLL | DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-07-15** | LAB I.D.: 110720-59

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE **PQL**
DATA REVIEWED AND APPROVED BY:
CAL-DHS CERTIFICATE # 1555

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1214 E. Lexington Avenue, Pomona, CA 91766 Tel (909) 590-5905 Fax (909) 590-5907

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PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 | DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL | DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-07-20** | LAB I.D.: 110720-60

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

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LABORATORY REPORT

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PROJECT: **530 Ave Pico** | PROJECT No.: **105751**
MATRIX: SOIL | DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 | DATE ANALYZED: 08/02/11
REPORT TO: Ms. MARGARET CARROLL | DATE REPORTED: 08/03/11
SAMPLE I.D.: **KLFSB-07-20** | LAB I.D.: 110720-60

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
ND = NON-DETECTED OR BELOW THE PQL
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CAL-DHS CERTIFICATE # 1555

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CUSTOMER: Kleinfelder
620 W. 16th Street, Unit #F, Long Beach, CA 90813
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PROJECT: 530 Ave Pico
MATRIX: SOIL
DATE SAMPLED: 07/19/11
REPORT TO: Ms. MARGARET CARROLL
SAMPLE I.D.: KLFSB-07-30

PROJECT No.: 105751
DATE RECEIVED: 07/19/11
DATE ANALYZED: 08/02/11
DATE REPORTED: 08/03/11
LAB I.D.: 110720-62

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
2-BUTANONE (MEK)	ND	0.020
N-BUTYLBENZENE	ND	0.005
SEC-BUTYLBENZENE	ND	0.005
TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

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ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

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METHOD BLANK REPORT

CUSTOMER: Kleinfelder
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E-Mail: MCarroll@Kleinfelder.com

PROJECT: 530 Ave Pico — PROJECT No.: 105751
MATRIX: SOIL — DATE RECEIVED: 07/19/11
DATE SAMPLED: 07/19/11 — DATE ANALYZED: 08/01/11
REPORT TO: Ms. MARGARET CARROLL — DATE REPORTED: 08/03/11

METHOD BLANK FOR LAB I.D.:
110720-40, -41, -43, -46, -47, -49, -52, -53, -55, -59, -60, -62

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 1 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
ACETONE	ND	0.020
BENZENE	ND	0.005
BROMOBENZENE	ND	0.005
BROMOCHLOROMETHANE	ND	0.005
BROMODICHLOROMETHANE	ND	0.005
BROMOFORM	ND	0.005
BROMOMETHANE	ND	0.005
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TERT-BUTYLBENZENE	ND	0.005
CARBON DISULFIDE	ND	0.010
CARBON TETRACHLORIDE	ND	0.005
CHLOROBENZENE	ND	0.005
CHLOROETHANE	ND	0.005
CHLOROFORM	ND	0.005
CHLOROMETHANE	ND	0.005
2-CHLOROTOLUENE	ND	0.005
4-CHLOROTOLUENE	ND	0.005
DIBROMOCHLOROMETHANE	ND	0.005
1,2-DIBROMO-3-CHLOROPROPANE	ND	0.005
1,2-DIBROMOETHANE	ND	0.005
DIBROMOMETHANE	ND	0.005
1,2-DICHLOROBENZENE	ND	0.005
1,3-DICHLOROBENZENE	ND	0.005
1,4-DICHLOROBENZENE	ND	0.005
DICHLORODIFLUOROMETHANE	ND	0.005
1,1-DICHLOROETHANE	ND	0.005
1,2-DICHLOROETHANE	ND	0.005
1,1-DICHLOROETHENE	ND	0.005
CIS-1,2-DICHLOROETHENE	ND	0.005
TRANS-1,2-DICHLOROETHENE	ND	0.005
1,2-DICHLOROPROPANE	ND	0.005

----- TO BE CONTINUED ON PAGE #2 -----

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110720-40, -41, -43, -46, -47, -49, -52, -53, -55, -59, -60, -62

ANALYSIS: VOLATILE ORGANICS, EPA METHOD 5035/8260B, PAGE 2 OF 2
UNIT: mg/Kg = MILLIGRAM PER KILOGRAM = PPM

PARAMETER	SAMPLE RESULT	PQL X1
1,3-DICHLOROPROPANE	ND	0.005
2,2-DICHLOROPROPANE	ND	0.005
1,1-DICHLOROPROPENE	ND	0.005
CIS-1,3-DICHLOROPROPENE	ND	0.005
TRANS-1,3-DICHLOROPROPENE	ND	0.005
ETHYLBENZENE	ND	0.005
2-HEXANONE	ND	0.020
HEXACHLOROBUTADIENE	ND	0.005
ISOPROPYLBENZENE	ND	0.005
4-ISOPROPYLTOLUENE	ND	0.005
4-METHYL-2-PENTANONE (MIBK)	ND	0.020
METHYL tert-BUTYL ETHER (MTBE)	ND	0.005
METHYLENE CHLORIDE	ND	0.010
NAPHTHALENE	ND	0.005
N-PROPYLBENZENE	ND	0.005
STYRENE	ND	0.005
1,1,1,2-TETRACHLOROETHANE	ND	0.005
1,1,2,2-TETRACHLOROETHANE	ND	0.005
TETRACHLOROETHENE (PCE)	ND	0.005
TOLUENE	ND	0.005
1,2,3-TRICHLOROBENZENE	ND	0.005
1,2,4-TRICHLOROBENZENE	ND	0.005
1,1,1-TRICHLOROETHANE	ND	0.005
1,1,2-TRICHLOROETHANE	ND	0.005
TRICHLOROETHENE (TCE)	ND	0.005
TRICHLOROFLUOROMETHANE	ND	0.005
1,2,3-TRICHLOROPROPANE	ND	0.005
1,2,4-TRIMETHYLBENZENE	ND	0.005
1,3,5-TRIMETHYLBENZENE	ND	0.005
VINYL CHLORIDE	ND	0.005
M/P-XYLENE	ND	0.010
O-XYLENE	ND	0.005

COMMENTS PQL = PRACTICAL QUANTITATION LIMIT
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CAL-DHS CERTIFICATE # 1555

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8260B QA/QC Report

Date Analyzed: 8/1~2/2011 **Matrix:** Solid/Soil/Liquid
Machine: C **Unit:** mg/Kg (PPM)

Matrix Spike (MS)/Matrix Spike Duplicate (MSD)

Spiked Sample Lab I.D.: 110720-40 MS/MSD **BATCH I.D. : 110720-40**

Analyte	S.R.	spk conc	MS	%RC	MSD	%RC	%RPD	ACP %RC	ACP RPD
Benzene	0	0.050	0.052	104%	0.050	100%	4%	75-125	0-20
Chlorobenzene	0	0.050	0.049	98%	0.048	96%	2%	75-125	0-20
1;1-Dichloroethene	0	0.050	0.050	100%	0.054	108%	8%	75-125	0-20
Toluene	0	0.050	0.047	94%	0.047	94%	0%	75-125	0-20
Trichloroethene (TCE)	0	0.050	0.050	100%	0.043	86%	14%	75-125	0-20

Lab Control Spike (LCS):

Analyte	spk conc	LCS	%RC	ACP %RC
Benzene	0.050	0.054	108%	75-125
Chlorobenzene	0.050	0.044	88%	75-125
Chloroform	0.050	0.053	106%	75-125
1,1-Dichlorothene	0.050	0.052	104%	75-125
Ethylbenzene	0.050	0.047	94%	75-125
o-Xylene	0.050	0.050	100%	75-125
m,p-Xylene	0.100	0.098	98%	75-125
Toluene	0.050	0.057	114%	75-125
1,1,1-Trichloroethane	0.050	0.056	112%	75-125
Trichloroethene (TCE)	0.050	0.055	110%	75-125

Surrogate Recovery	spk conc	ACP %RC	MB %RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			M-BLK	110720-40	110720-41	110720-43	110720-46	110720-47	110720-49
Dibromofluoromethane	50.0	70-130	100%	98%	113%	108%	107%	118%	112%
Toluene-d8	50.0	70-130	102%	107%	104%	109%	109%	109%	109%
4-Bromofluorobenzene	50.0	70-130	74%	81%	80%	88%	71%	78%	92%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110720-52	110720-53	110720-55	110720-59	110720-60	110720-62	110720-75
Dibromofluoromethane	50.0	70-130	107%	115%	103%	118%	99%	104%	110%
Toluene-d8	50.0	70-130	114%	109%	108%	111%	110%	107%	109%
4-Bromofluorobenzene	50.0	70-130	83%	81%	74%	72%	79%	83%	72%

Surrogate Recovery	spk conc	ACP %RC	%RC	%RC	%RC	%RC	%RC	%RC	%RC
Sample I.D.			110720-76	110720-78	110720-79	110720-82	110801-24	110801-25	110801-26
Dibromofluoromethane	50.0	70-130	108%	123%	115%	101%	116%	115%	104%
Toluene-d8	50.0	70-130	106%	109%	111%	110%	111%	94%	95%
4-Bromofluorobenzene	50.0	70-130	80%	71%	73%	77%	72%	74%	76%

** = Surrogate fail due to matrix interference; LCS, MS, MSD are in control therefore the analysis is in control.*
S.R. = Sample Results *%RC = Percent Recovery*
spk conc = Spike Concentration *ACP %RC = Accepted Percent Recovery*
MS = Matrix Spike *MSD = Matrix Spike Duplicate*

Analyzed/Reviewed By: Sch

Final Reviewer:

Enviro-Chem, Inc.

From: Margaret Carroll [MCarroll@kleinfelder.com]
Sent: Monday, August 01, 2011 2:35 PM
To: envirocheminc@yahoo.com
Cc: Liz Simmons
Subject: SAN-CLEMENTE LAB DATA - FURTHER TESTING

Jessica,

As we discussed, we need all of the "HOLD" samples to be analyzed for each of the chemicals indicated on the COCs associated with the following:

1. **Lab I.D. # 110719-1 through -19 (Samples collected on July 18, 2011 at 530 Avenue Pico)**
2. Lab I.D. # 110720-38 through -62 (Samples collected on July 19, 2011 at 530 Avenue Pico)
3. **Lab I.D. # 110720-73 through -84 (Samples collected on July 20, 2011 at 530 Avenue Pico)**

Please forward the laboratory results directly to my attention. Thank you.

Sincerely,

Margaret R. Carroll, REA
Staff Environmental Scientist
620 West 16th Street, #F
Long Beach, CA 90813
o: 562.432.1696, ext. 210
f: 562.432.1796
c: 949.337.5582

KLEINFELDER
Bright People. Right Solutions.

KLEINFELDER

1/3

PROJECT NO.	PROJECT NAME	RECEIVING LAB.
105751	530 Ave. Pico	Envirotech

L.P. NO. (PO. NO.) | SAMPLERS: (Signature/Number)

	DATE MM/DD/YY	SAMPLE I.D. TIME HH-MM-SS	SAMPLE I.D.	MATRIX	NO OF CONTAINERS	TYPE OF CONTAINERS	ANALYSIS: VOC + OXY 8260B	TPH-GC 8015B	VOC+OXY, TPH-GC 5035	INSTRUCTIONS/REMARKS
1	7.19.11	0905	KLFSB-04-05	Soil	1	Acetate	X	X		HOLD - Do not run sample until notice from Liz Simmons
2		0905	KLFJB-04-05		4	VOA			X	preserv - see VOA
3		0915	KLFSB-04-10		1	Acetate	X	X		
4		0915	KLFSB-04-10		4	VOA			X	Preserv - see VOA
5		0920	KLFSB-04-15		1	Acetate	X	X		HOLD
6		0920	KLFSB-04-15		4	VOA			X	preserv - see VOA / HOLD
7		0927	KLFSB-04-20		1	Acetate	X	X		HOLD
8		0927	KLFSB-04-20		4	VOA			X	preserv - see VOA / HOLD
9		0940	KLFSB-04-25		1	Acetate	X	X		
10		0940	KLFJB-04-25		4	VOA			X	preserv - see VOA
11		0950	KLFJB-04-30		1	Acetate	X	X		HOLD
12		0950	KLFJB-04-30		4	VOA			X	preserv - see VOA / HOLD
13		1100	KLFJB-05-05		1	Acetate	X	X		
14		1100	KLFJB-05-05		4	VOA			X	preserv - see VOA
15		1105	KLFJB-05-10		1	Acetate	X	X		
16		1105	KLFJB-05-10		4	VOA			X	preserv - see VOA
17		1110	KLFJB-05-15		1	Acetate	X	X		HOLD
18		1110	KLFJB-05-15		4	VOA			X	Preserved - see VOA / HOLD
19	V	1124	KLFJB-05-20	V	1	Acetate	X	X		HOLD
20		1124	KLFJB-05-20		4	VOA			X	preserved - see VOA / HOLD

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Instructions/Remarks:	Send Results To:
	7.19.11 / 16:00		STANDARD TAT	JKellar@kleinfelder.com
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		LSimmons "
	7/20/11 9:50	7/20/11 9:50		Attn: Swissler "
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)		

White – Sampler Canary – Return Copy To Shipper Pink – Lab Copy

ENV-02 REV 05/08)

CHAIN OF CUSTODY

COC № 04289

KLEIN...DER

PROJECT NO.: 105751 | PROJECT NAME: 520 Ave. Pico

L.P. NO. (PO. NO.): | SAMPLERS: (Signature/Number)

RECEIVING LAB: Enviro Chem

	DATE MM/DD/YY	SAMPLE I.D. TIME HH-MM-SS	SAMPLE I.D.	MATRIX	NO OF CON-TAINERS	TYPE OF CON-TAINERS	ANALYSIS: Voc + oxy 8260B; TPH-CC 8015B; Voc+oxy TPH-cc 5035	INSTRUCTIONS/REMARKS: "HOLD" - Do not run sample until notice from Liz Simms.
10470-48	1	4.19.11 1135	KLFJB-05-25	Soil	1	4oz. Jar	X X	
	2	1135	KLFJB-05-25		4	VOA	X	Preserved - See VOA
-49	3	1150	KLFJB-05-30		1	4oz. Jar	X X	Hold
	4	1150	KLFJB-05-30		4	VOA	X	Preserved - See VOA/Hold
-50	5	1325	KLFJB-01A-05		1	4oz. Jar	X X	
	6	1325	KLFJB-01A-05		4	VOA	X	preserved - see VOAs
-51	7	1335	KLFJB-01A-10		1	4oz. Jar	X X	
	8	1335	KLFJB-01A-10		4	VOA	X	Preserved - See VOA
-52	9	1340	KLFJB-01A-15		1	4oz.	X X	Hold
	10	1340	KLFJB-01A-15		4	VOA	X	preserved - see VOA/Hold
-53	11	1350	KLFJB-01A-20		1	4oz.	X X	Hold
	12	1350	KLFJB-01A-20		4	VOA	X	preserv - see VOA/Hold
-54	13	1400	KLFJB-01A-25		1	4oz.	X X	
	14	1400	KLFJB-01A-25		4	VOA	X	Preserved - see VOA
-55	15	1410	KLFJB-01A-30		1	4oz.	X X	Hold
	16	1410	KLFJB-01A-30		4	VOA	X	preserved - see VOA/Hold
-56	17	0800	TRIP BLANK	H2O	12	VOA	X	
-57	18	1500	KLFJB-03-05	Soil	1	4oz.	X X	
	19	1500	KLFJB-03-05		4	VOA	X	Preserved - see VOA
-58	20	1505	KLFJB-04-10		1	4oz.	X X	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Instructions/Remarks	Send Results to:
	4.19.11 16:00	Acleerma	Standard TAT	kkellar@kleinfelder.com
Relinquished by: (Signature)	Date/Time	Received by: (Signature)		lwimmons "
	4/20/11 9:50	WP		Attn: JWisslet "
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)		

White – Sampler | Canary – Return Copy To Shipper | Pink – Lab Copy

ENV-02 REV 05/08)

CHAIN OF CUSTODY

COC № 04431

3/3

KLEINFELDER

PROJECT NO. 105751	PROJECT NAME 530 Ave. Pico	NO OF CON-TAINERS	TYPE OF CON-TAINERS	ANALYSIS: VOC + OXY 8260B	TPH-CC 8015B	VOC + OXY, TPH-CC 5035A	RECEIVING LAB: EnviroChem
L.P. NO (PO NO.)	SAMPLERS (Signature/Number) [signature]						INSTRUCTIONS/REMARKS: See pg. 1

	DATE MM/DD/YY	SAMPLE I.D. TIME HH-MM-SS	SAMPLE I.D.	MATRIX	NO OF CONTAINERS	TYPE OF CONTAINERS	VOC + OXY 8260B	TPH-CC 8015B	VOC + OXY, TPH-CC 5035A	INSTRUCTIONS/REMARKS
11070- 1	7.19.11	1505	KLFSB-07-10	Soil	4	VOA			X	Preserved - See VOA
-59 2	↓	1515	KLFSB-07-15	↓	1	Ace.	X	X		Hold
3		1515	KLFSB-07-15		4	VOA			X	Preserved - See VOA / Hold
-60 4		1520	KLFSB-07-20		1	Ace.	X	X		Hold
5		1522	KLFSB-07-20		4	VOA			X	Preserved - See VOA / Hold
-61 6		1530	KLFSB-07-25		1	Ace.	X	X		
7		1530	KLFSB-07-25		4	VOA			X	Pres. - See VOA
-62 8		1545	KLFSB-07-30		1	Ace.	X	X		Hold
9	↓	1545	KLFSB-07-30	↓	4	VOA			X	Preserved - See VOA / Hold
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Instructions/Remarks:	Send Results To:
[signature]	7.19.11 16:00	[signature] Ackerman	See page 1	See pg. 1
Relinquished by: (Signature) [signature]	7/20/11 9:50	Received by: (Signature) WP		
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)		Attn

ENV-02 REV 05/06)

White – Sampler Canary – Return Copy To Shipper Pink – Lab Copy

CHAIN OF CUSTODY

COC № 04468

URS

May 1, 2007

Mr. Marvin Katz
Staff Project Manager
Shell Oil Products US
20945 Wilmington Avenue
Carson, California 90810

Re: **Phase II Environmental Site Assessment Report**
Shell Service Station
530 Avenida Pico
San Clemente, CA
SAP No. 121371

Dear Mr. Katz

INTRODUCTION

URS Corporation (URS) is pleased to present this letter report entitled "Phase II Environmental Site Assessment Report" for the Shell service station located at 530 Avenida Pico, San Clemente, CA ("the Site") as illustrated on Figure 1. This investigation was conducted for Shell Oil Products US (Shell) as part of the due diligence program of specific retail assets in southern California and was not overseen by any local oversight agency. The primary purpose of the investigation was conducted to evaluate subsurface conditions at the Site.

EXECUTIVE SUMMARY

On March 29 and 30, 2007, URS drilled and sampled total of seven (7) soil borings at the Site; three soil borings (B01 through B03) located adjacent to the gasoline/diesel underground storage tank (UST) complex and four soil borings B04 through B07 located adjacent to the dispenser island area. Soil borings B02 and B03 were drilled as "combo" borings to assess both the gasoline UST and dispenser islands. Soil borings advanced adjacent to the USTs were drilled to 45 feet below ground surface (bgs), as groundwater was encountered during drilling at a depth of 40 feet bgs. Borings advanced adjacent to the dispensers were drilled to 31.5 feet bgs. A summary of the results of this subsurface investigation is presented below

- Fuel hydrocarbon impacts including Total Petroleum Hydrocarbons calculated as gasoline (TPH-g) and Total Petroleum Hydrocarbons calculated as diesel (TPH-d) were identified in one soil sample collected adjacent to the gasoline/diesel UST complex and dispenser islands. One TPH-g concentration of 420 mg/kg and one TPH-d concentration of 46 mg/kg were detected in soil sample 121371-B02-40, collected at 40 feet bgs,

URS Corporation
915 Wilshire Boulevard, Suite 700
Los Angeles, CA 90017-3437
Tel: 213.996.2200
Fax: 213.996.2290

located adjacent to the southern most dispenser island. No other concentrations of TPH-G and TPH-D were detected at the site.

- No volatile organic compound (VOC) constituents consisting of Benzene, Toluene, Ethylbenzene, or Xylenes were identified in the soil samples collected below the gasoline/diesel UST complex and dispenser islands.
- No fuel oxygenate constituents consisting of Diisopropyl Ether (DIPE), Ethyl-t-Butyl Ether (ETBE), and Tert-Amyl-Methyl Ether (TAME) were identified in the soil samples collected below the gasoline/diesel UST complex and dispenser islands. However, Methyl-t-Butyl Ether (MTBE) concentrations were detected in these areas, specifically Borings B01 through B03, B05, and B07. The maximum MTBE concentration of 520 ug/kg was detected in soil sample 121371-B02-35, collected at 35 feet bgs, located on the north side of the gasoline/diesel UST complex and southernmost dispenser island. Two concentrations of t-butyl alcohol (TBA), 59 ug/kg and 350 ug/kg, were detected in Boring B02 at depths of 30 and 35 feet bgs, respectively. Also, one concentration of Ethanol at 380 ug/kg was detected in Boring B02 at a depth of 40 feet bgs.
- Soil encountered at the Site generally consisted of clays, silts, sands, and sandy clays to the total depth explored of 45 feet bgs.
- Groundwater was measured in three (3) of the seven (7) soil borings advanced at the site at depths ranging from 39 to 41 feet bgs.
- Fuel hydrocarbon impacts including TPH-g and TPH-d were identified in groundwater grab samples collected from borings located adjacent to the gasoline/diesel UST complex and dispenser islands. The maximum TPH-g and TPH-d concentrations of 5,800 and 1,600 ug/L, respectively, were detected in soil boring B02 located adjacent to the southern most dispenser island and north of the gasoline/diesel UST complex.
- VOC constituents consisting of Benzene, Toluene, Ethylbenzene, and Xylenes were identified in the groundwater grab sample collected from Boring B02, located adjacent to the gasoline/diesel UST complex and southernmost dispenser island. These Benzene, Toluene, Ethylbenzene, and Xylenes concentrations were 10 ug/L, 6.4 ug/L, 650 ug/L, and 159 ug/L, respectively.
- No fuel oxygenate constituents consisting of TBA, DIPE, ETBE, TAME, and Ethanol were identified in groundwater grab samples collected from borings located adjacent to the gasoline/diesel UST complex and dispenser islands. However, two MTBE concentrations were detected, 20 ug/L in soil boring B02 and 6.6 ug/L in soil boring B03

located on the north and west corners of the gasoline/diesel UST complex, respectively, and adjacent to the southernmost dispenser island.

SITE BACKGROUND

The Site is currently an active Shell service retail station. Site structures include a service station building, located on the southeast side of the lot, and canopy/dispenser islands, located northwest of the building. Site facilities include two 12,000-gallon gasoline underground storage tanks (UST), one 10,000-gallon diesel UST, and three dispenser islands. Vehicle parking is located on the southeast and east sides of the site as illustrated on Figure 2.

Surrounding land use consists of commercial properties to the north, a Chevron gas station to the northwest, the Interstate 5 Freeway to the northeast, a shopping center to the southeast, and a post office and restaurant to the southwest.

PROJECT OBJECTIVE

The objective of this investigation was to evaluate the subsurface conditions for the presence of petroleum hydrocarbons around the existing USTs and dispenser islands associated with the current service station operations.

SCOPE OF WORK

The scope of work for this investigation included drilling a total of seven (7) soil borings including three (3) soil borings (B01 through B03) located adjacent to the gasoline/diesel UST complex, and four soil borings (B04 through B07) located adjacent to the dispenser island area. Soil borings advanced adjacent to the USTs were drilled to 45 feet below ground surface (bgs) and those advanced adjacent to the dispensers were drilled to 31.5 feet bgs. Additionally, groundwater-grab samples were collected from three (3) of the seven (7) soil borings.

PRE-DRILLING ACTIVITIES

Utility Clearance

On March 2, 2007, the entire site area was marked for underground service alert (USA) clearance, each soil boring location was marked on-site, and a geophysical survey was conducted to identify subsurface utilities in the vicinity of the proposed soil boring locations. If utilities were located within seven (7) feet of the proposed boring location, then the boring was relocated. Subsequently, on March 2, 2007, USA was notified 48-hours in advance of drilling activities and ticket number A70650900 was issued to URS as compliance of proper notification.

Soil Boring Permits

No local permits were required to advance soil borings at the Site as part of this investigation.

Health and Safety Plan

A site specific health and safety plan dated February 27, 2007 was prepared for the Site in accordance with the HSE Contractor Safety Program. Prior to each field activity, URS performed a safety tailgate meeting with all staff and subcontractors working on the project.

Borehole Clearance

On March 26 and 27, 2007, URS cleared each soil boring to seven (7) feet bgs using air-vacuum technology. Air vacuum technology consists of removing soil from the borehole location using high vacuum air suction. Removed soil is captured in a steel tank. Upon completion of borehole clearance activities, captured soil was used to backfill the open borehole. Temporary asphalt patch was placed over each cleared borehole and finished flush with existing grade surface. If an obstruction was identified in the borehole, then the borehole surface was backfilled with existing soil and finished flush to existing grade with black concrete.

Survey X and Y Coordinates

On April 14, 2007, URS surveyed the X and Y coordinates for each proposed boring location using a hand held Global Positioning System unit to +/- 10 feet accuracy. The coordinates for each boring location are presented in Attachment A.

DRILLING ACTIVITIES

On March 29 and 30, 2007, URS advanced a total of seven (7) soil borings, B01 through B07, at the site. Originally, eight borings were proposed to be advanced at the site, however, the proposed boring located adjacent to the east corner of the gasoline/diesel UST complex was canceled due to consistently encountering pea gravel and utilities after three attempts during airknifing. Moreover, additional boring locations were impossible with the presence of the UST cavity in close proximity. With approval from Shell via email on March 28, 2007, this soil boring was removed from the scope of work.

Soil borings were drilled using a CME 85 hollow stem auger drill rig. The auger was used to drill the soil boring to the target depth. Upon reaching the desired sample depth, the modified split soon sampler is driven 18-inches into the center of the auger using a 140 pound hammer to collect relatively undisturbed soil samples. The sampler is lined with 6-inch brass rings, which are used to collect the soil samples. Blow counts were recorded on the boring logs to estimate

soil density. Each soil sample was collected in a brass sample sleeve. For all samples, sample labels with the following information were affixed to each container: soil boring number, sample depth, sampling date and time, and collector name. Sealed and labeled soil sleeves were immediately placed in plastic bags and stored in a chilled ice chest.

Sampling and Logging

The initial soil sample was collected from 10 feet below grade surface; thereafter, soil samples were collected at five-foot intervals to the maximum depth explored. During drilling operations, boring logs were completed by a field geologist working under the supervision of a California Registered Geologist. The following sampling information was recorded on each boring log: boring number and location; drilling method; sample identification numbers; date and time; sample depth; lithologic description in general accordance with the Unified Soil Classification System (USCS) including soil type, particle size and distribution, color (using the Munsell soil color chart), and moisture content; description of any visible evidence of soil contamination (i.e., discoloration, unusual odors, etc.); and PID readings. Copies of the boring logs are provided in Attachment B.

In order to obtain headspace readings of a discreet soil sample, the following procedures were used when field screening with the PID. A portion of the sample was placed into a sealed plastic bag. The sample was then agitated to break up any large pieces of soil, and allowed to equilibrate for approximately 10 minutes. Finally the PID probe was inserted into the bag and a volatile measurement was then recorded.

Groundwater grab samples were collected using a new hand bailer dedicated to each borehole. Samples were collected in laboratory supplied 40 milliliters VOA vials (3 each), preserved with hydrochloric acid (HCL), and one 500 milliliter amber glass bottle preserved with HCL. VOA containers were completely filled to prevent void space within the containers into which volatile compounds might escape.

URS sampling personnel wore clean, nitrile or equivalent protective gloves while collecting and handling the samples. Samples were tightly sealed, uniquely labeled, and stored on ice for transportation to the laboratory.

Decontamination

Drilling equipment and sampling tools were decontaminated with an Alconox™ (or equivalent) detergent solution to minimize cross-contamination. Clean, disposable nitrile gloves were worn when decontaminating the sampling equipment. Decontamination water was stored onsite in a properly labeled Department of Transportation (DOT) approved 55-gallon drum.

Backfill and Disposal

Following drilling and sampling activities, borings were back filled with cement-bentonite grout. The top of the borehole was finished at-grade with concrete. Soil cuttings and decontamination water were placed on-site in properly labeled DOT approved 55-gallon drums. The soil was profiled and transported to TPST Soil Recyclers of California located in Adelanto, California for disposal by Belshire Environmental of Lake Forest, California. Decontamination water was profiled and transported to Crosby and Overton Environmental Services, Inc. located in Long Beach, California for disposal also by Belshire Environmental of Lake Forest, California. Waste disposal manifests will be submitted at a future date.

LABORATORY ANALYSES

During the Site investigation, soil samples were collected from borings B01 through B07 beginning at approximately 10 feet bgs and typically at 5 foot intervals thereafter to the maximum depth of the boring. In addition, Groundwater grab samples were collected from borings B01 through B03. A summary of the constituents analyzed for the soil and groundwater samples is presented below.

Soil Samples

Soil samples collected from borings B01 through B07 located adjacent to the gasoline/diesel UST complex and dispenser islands were analyzed for the following constituents.

- TPH-g using EPA Method 8015M;
- TPH-d using EPA Method 8015M;
- VOCs consisting of Benzene, Toluene, Ethylbenzene, and Xylenes using EPA Method 8260B; and
- Fuel Oxygenate Compounds consisting of MTBE, TBA, DIPE, ETBE, TAME and Ethanol using EPA Method 8260B.

The samples were submitted to Calscience Environmental Laboratories Inc. Chain-of-custody procedures were followed from sample collection to sample analysis. Certified laboratory analytical reports are presented in Attachment C.

Groundwater Samples

Groundwater grab samples collected from borings B01 through B03 located around the gasoline/diesel UST complex and adjacent to the southernmost dispenser island were analyzed for the following constituents.

- TPH-g using EPA Method 8015M;
- TPH-d using EPA Method 8015M;
- VOCs consisting of Benzene, Toluene, Ethylbenzene, and Xylenes using EPA Method 8260B; and
- Fuel Oxygenate Compounds consisting of MTBE, TBA, DIPE, ETBE, TAME, and Ethanol using EPA Method 8260B.

The samples were submitted to Calscience Environmental Laboratories Inc. Chain-of-custody procedures were followed from sample collection to sample analysis. Certified laboratory analytical reports are presented in Attachment C.

LIMITED DATA VALIDATION

Limited data validation was completed for the soil and groundwater samples collected as part of this site investigation. The limited data validation includes a 100 percent completeness check of the following quality control parameters:

- Chain of Custody documentation;
- Sample Receipt Times;
- Laboratory Holding Times;
- Method Blanks;
- Surrogate Recoveries;
- Laboratory Control Sample/ Laboratory Control Sample Duplicate (LCS/LCSD); and
- Matrix Spike/ Matrix Spike Duplicate (MS/MSD).

The limited data validation memorandum is included as Attachment D.

INVESTIGATION RESULTS

This section presents the results of the due diligence program conducted at the Site.

Subsurface Conditions

During the investigation, seven (7) soil borings (B01 through B07) were completed to depths ranging from 31.5 to 45 feet bgs. Soil encountered at the Site generally consisted of clays, silts, sands, and sandy clays to the total depth explored of 45 feet bgs. Groundwater was encountered in Boring B02 at a depth of 40 feet bgs. Groundwater was not encountered while drilling Borings B01 and B03, but upon recharge, the static groundwater level reached at 41 and 39 feet bgs, respectively. Groundwater was not encountered in Borings B04 through B07.

There was some slight staining and mild noticeable odors observed from Borings B01, B02, and B05 at various depths. PID readings were generally less than one ppmv or zero with the exception of soil borings B02, B04, and B07.

Soil Analytical Results

Laboratory analytical results for soil samples are summarized in Tables 1 and 2. Soil analytical results are also illustrated on Figure 3. The certified analytical laboratory report and chain-of-custody documentation is presented in Attachment C.

TPH-g and TPH-d concentrations were detected in soil samples collected from soil boring B02 located adjacent to the gasoline/diesel UST complex and southernmost dispenser island at the Site. The TPH-g concentration was 420 mg/kg and the TPH-d concentration was 46 mg/kg.

VOCs consisting of benzene, toluene, xylenes, and ethylbenzene were not detected in soil samples collected from soil borings B01 through B07.

Fuel oxygenate compounds consisting of MTBE, TBA, and Ethanol were detected in soil samples collected from soil borings B01 through B03, B05, and B07, located adjacent to the gasoline/diesel UST complex and dispenser islands at the Site. MTBE concentrations ranged from 5.1 ug/kg to 520 ug/kg. Two TBA concentrations of 59 ug/kg and 350 ug/kg were detected in Boring B02 at depths of 30 and 35 feet bgs, respectively. One concentration of Ethanol was detected at 380 ug/kg in Boring B02 at a depth of 40 feet bgs.

Groundwater Analytical Results

Laboratory analytical results for groundwater grab samples are summarized in Table 3. Groundwater analytical results are also illustrated on Figure 4. The certified analytical laboratory report and chain-of-custody documentation is presented in Attachment C.

TPH-g and TPH-d concentrations were detected in groundwater grab samples collected from borings B01 through B03 located adjacent to the gasoline/diesel UST complex and dispenser

islands at the Site. TPH-d concentrations ranged from 69 ug/L to 1,600 ug/L. Two TPH-g concentrations, 5,800 ug/L and 3,600 ug/L, were detected in Borings B02 and B03, respectively.

VOCs consisting of benzene, toluene, xylenes, and ethylbenzene were detected in groundwater grab samples collected from soil boring B02 located adjacent to the gasoline/diesel UST complex and southernmost dispenser island at the Site. These Benzene, Toluene, Ethylbenzene, and Xylenes concentrations were 10 ug/L, 6.4 ug/L, 650 ug/L, and 159 ug/L, respectively.

Fuel oxygenate compounds consisting of TBA, DIPE, ETBE, TAME, and Ethanol concentrations were not detected in groundwater grab samples collected from soil borings B01 through B03 located adjacent to the gasoline/diesel UST complex and southernmost dispenser island at the Site. However, two MTBE concentrations of 20 ug/L and 6.6 ug/L were detected in soil borings B02 and B03 located on the north and west corners of the gasoline/diesel UST complex, and adjacent to the southernmost dispenser island, respectively.

UNAUTHORIZED RELEASE REPORTING

Concentrations detected in soil and groundwater samples collected during this investigation are comparable in magnitude to concentrations at the site at the time of closure. Based on this information, a new URR was not filed, and discussions with the lead regulatory agency are still underway.

CONCLUSIONS

Based on the results of this subsurface investigation, URS concludes the following.

- Fuel hydrocarbon impacts including Total Petroleum Hydrocarbons calculated as gasoline (TPH-g) and Total Petroleum Hydrocarbons calculated as diesel (TPH-d) were identified in one soil sample collected adjacent to the gasoline/diesel UST complex and dispenser islands. One TPH-g concentration of 420 mg/kg and one TPH-d concentration of 46 mg/kg were detected in soil sample 121371-B02-40, collected at 40 feet bgs, located adjacent to the southern most dispenser island. No other concentrations of TPH-G and TPH-D were detected at the site.
- No volatile organic compound (VOC) constituents consisting of Benzene, Toluene, Ethylbenzene, or Xylenes were identified in the soil samples collected below the gasoline/diesel UST complex and dispenser islands.
- No fuel oxygenate constituents consisting of Diisopropyl Ether (DIPE), Ethyl-t-Butyl Ether (ETBE), and Tert-Amyl-Methyl Ether (TAME) were identified in the soil samples collected below the gasoline/diesel UST complex and dispenser islands. However,

Methyl-t-Butyl Ether (MTBE) concentrations were detected in these areas, specifically Borings B01 through B03, B05, and B07. The maximum MTBE concentration of 520 ug/kg was detected in soil sample 121371-B02-35, collected at 35 feet bgs, located on the north side of the gasoline/diesel UST complex and southernmost dispenser island. Two concentrations of t-butyl alcohol (TBA), 59 ug/kg and 350 ug/kg, were detected in Boring B02 at depths of 30 and 35 feet bgs, respectively. Also, one concentration of Ethanol at 380 ug/kg was detected in Boring B02 at a depth of 40 feet bgs.

- Soil encountered at the Site generally consisted of clays, silts, sands, and sandy clays to the total depth explored of 45 feet bgs.
- Groundwater was measured in three (3) of the seven (7) soil borings advanced at the site at depths ranging from 39 to 41 feet bgs.
- Fuel hydrocarbon impacts including TPH-g and TPH-d were identified in groundwater grab samples collected from borings located adjacent to the gasoline/diesel UST complex and dispenser islands. The maximum TPH-g and TPH-d concentrations of 5,800 and 1,600 ug/L, respectively, were detected in soil boring B02 located adjacent to the southern most dispenser island and north of the gasoline/diesel UST complex.
- VOC constituents consisting of Benzene, Toluene, Ethylbenzene, and Xylenes were identified in the groundwater grab sample collected from Boring B02, located adjacent to the gasoline/diesel UST complex and southernmost dispenser island. These Benzene, Toluene, Ethylbenzene, and Xylenes concentrations were 10 ug/L, 6.4 ug/L, 650 ug/L, and 159 ug/L, respectively.
- No fuel oxygenate constituents consisting of TBA, DIPE, ETBE, TAME, and Ethanol were identified in groundwater grab samples collected from borings located adjacent to the gasoline/diesel UST complex and dispenser islands. However, two MTBE concentrations were detected, 20 ug/L in soil boring B02 and 6.6 ug/L in soil boring B03 located on the north and west corners of the gasoline/diesel UST complex, respectively, and adjacent to the southernmost dispenser island.

If you have any questions regarding this letter report, please do not hesitate to call the undersigned at (213) 996-2200.

Sincerely,

URS CORPORATION

Marie Cardona
Senior Environmental Engineer

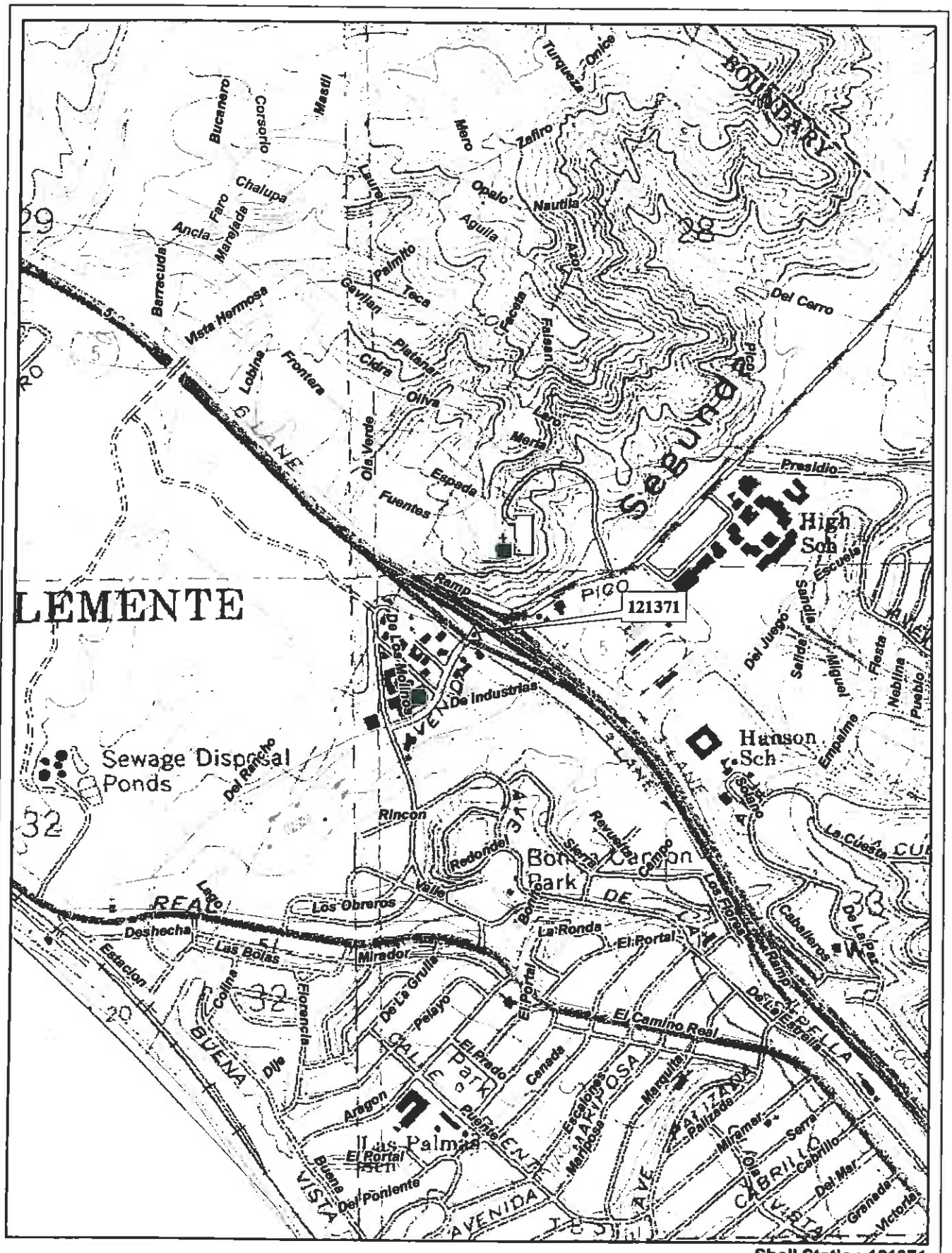
Jorge R. Penalba, P.E.
Senior Project Engineer

Brian J. Jacobs, P.G.
Shell Due Diligence Project Manager

List of Attachments:

Figure 1 - Site Location Map
Figure 2 - Site Plan Map
Figure 3 - Soil Analytical Results Map
Figure 4 - Groundwater Analytical Results Map
Table 1 - Summary Soil Analytical Results – BTEX, TPH, and Lead
Table 2 - Summary of Soil Analytical Results – Fuel Oxygenates and Ethanol
Table 3 - Summary of Groundwater Analytical Results – BTEX and TPH
Table 4 - Summary of Groundwater Analytical Results – Fuel Oxygenates and Ethanol
Attachment A - Survey X- and Y- Data
Attachment B - Boring Logs
Attachment C - Certified Laboratory Analytical Reports for Soil Samples
Attachment D - Data Validation Memorandum

FIGURES



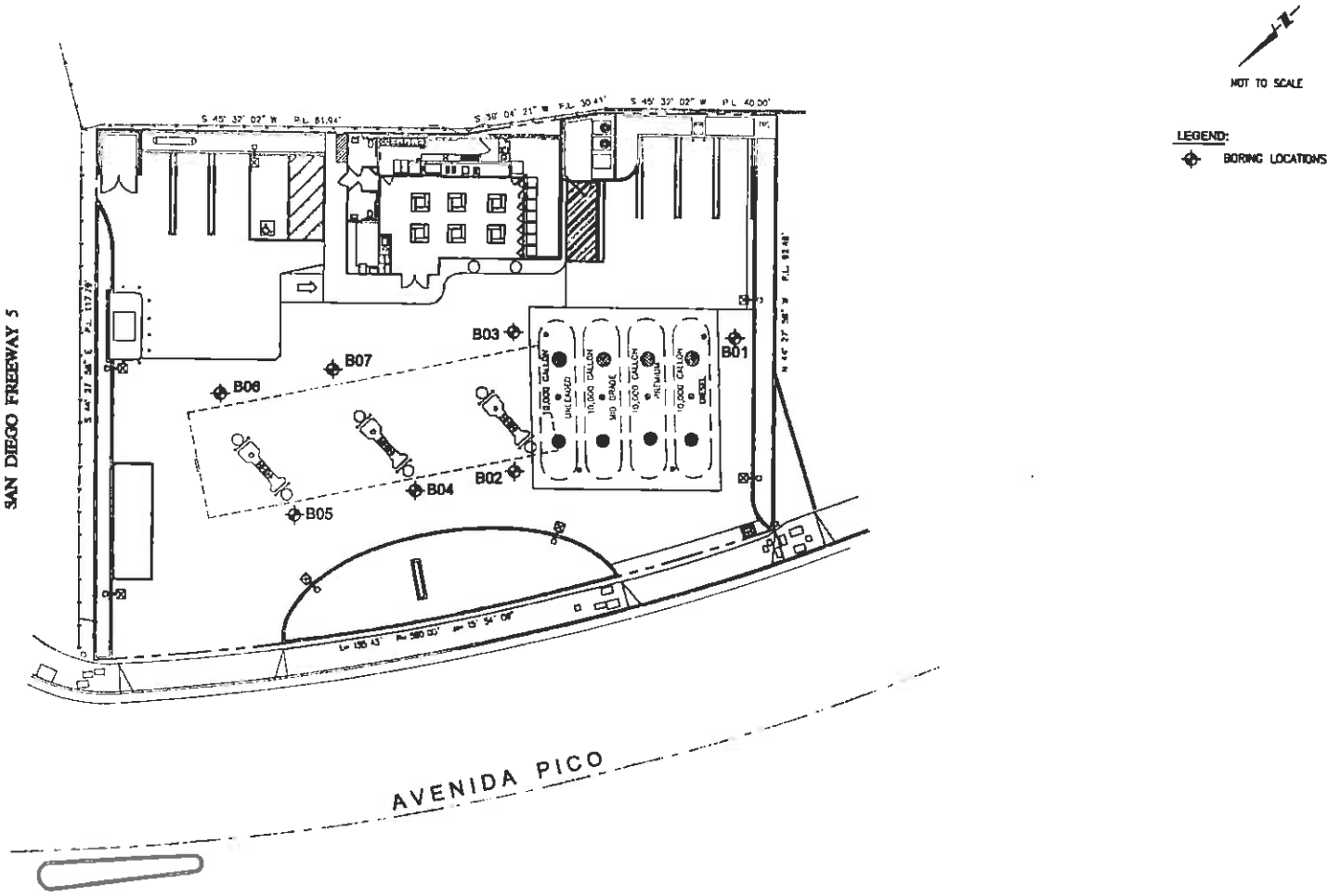
0 500 1,000 1,500

Feet

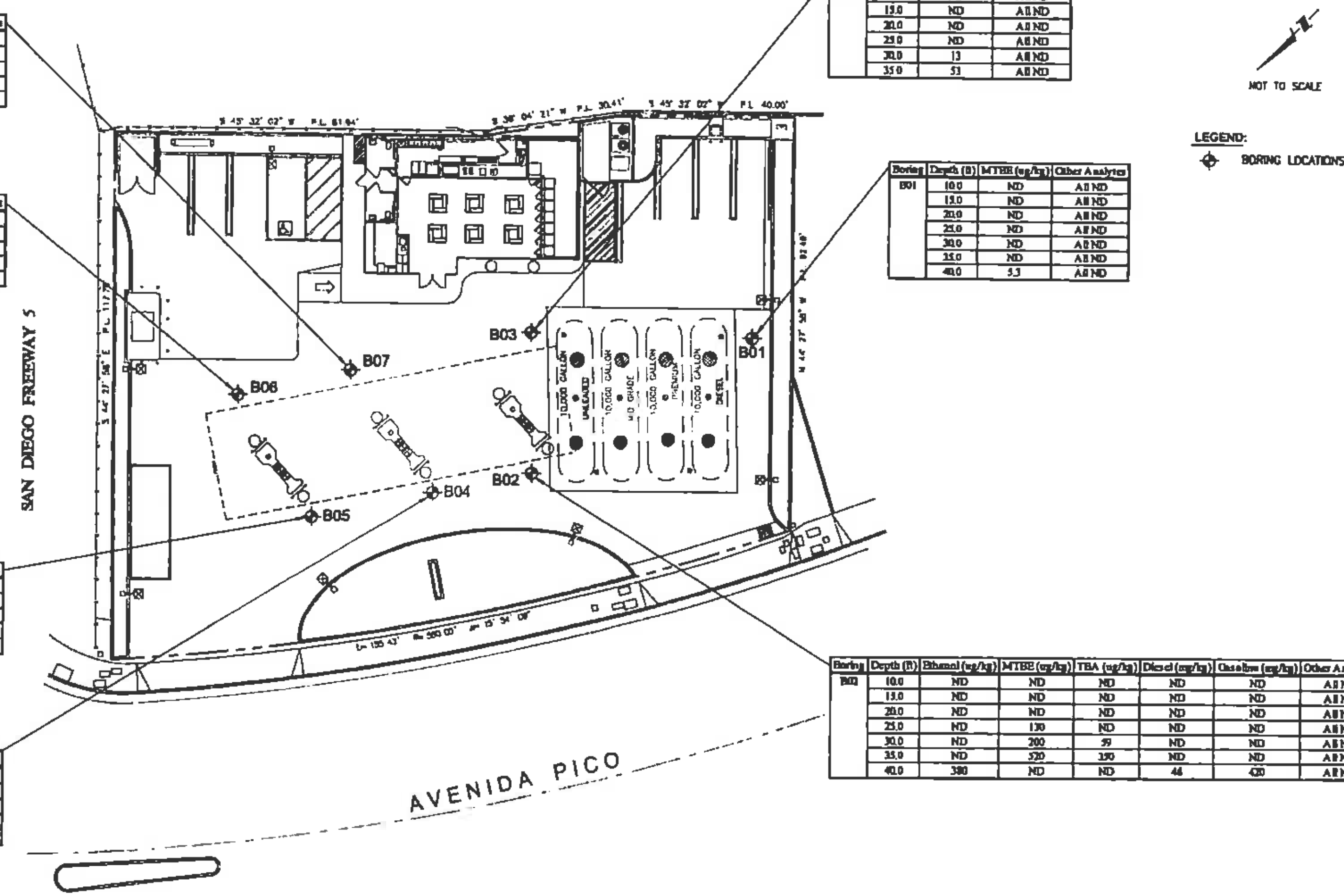
URS

Shell Station 121371
Phase II Environmental Site Assessment
Orange County, California

FIGURE 1



Project No. 49194400.03000		BORING LOCATIONS	
URS	April 2007	SHELL SERVICE STATION 121371 – 530 Avenida Pico / Interstate 5, San Clemente, California	FIGURE 2



Boring	Depth (ft)	MTBE (ug/kg)	Other Analytes
B07	10.0	ND	All ND
	15.0	ND	All ND
	20.0	5.1	All ND
	25.0	24	All ND
	30.0	8.3	All ND

Boring	Depth (ft)	Analytes
B06	10.0	All ND
	15.0	All ND
	20.0	All ND
	25.0	All ND
	30.0	All ND

Boring	Depth (ft)	MTBE (ug/kg)	Other Analytes
B05	10.0	ND	All ND
	15.0	ND	All ND
	20.0	ND	All ND
	25.0	ND	All ND
	30.0	6.9	All ND

Boring	Depth (ft)	Analytes
B04	10.0	All ND
	15.0	All ND
	20.0	All ND
	25.0	All ND
	30.0	All ND

Boring	Depth (ft)	MTBE (ug/kg)	Other Analytes
B03	10.0	ND	All ND
	15.0	ND	All ND
	20.0	ND	All ND
	25.0	ND	All ND
	30.0	13	All ND
	35.0	53	All ND

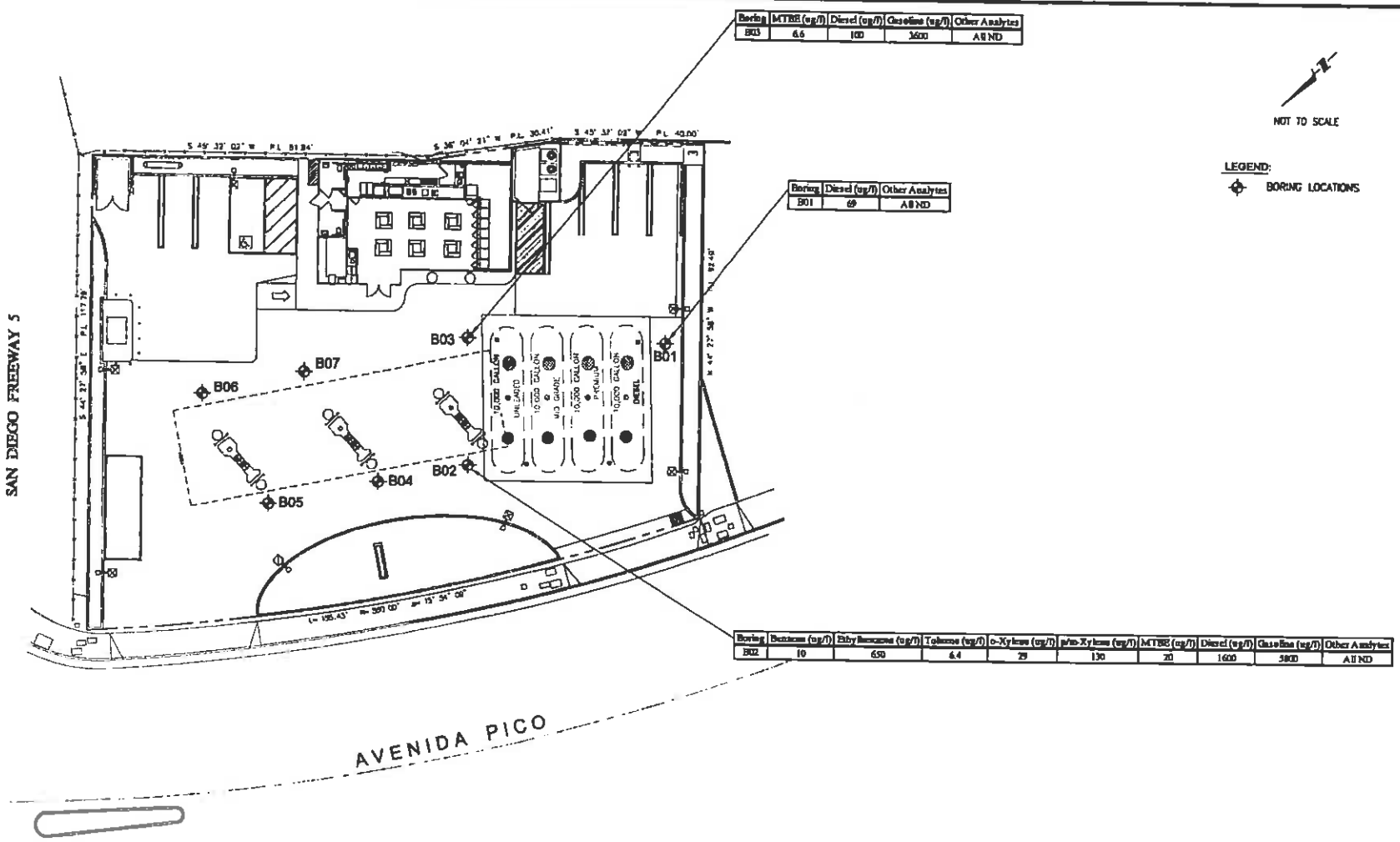
Boring	Depth (ft)	MTBE (ug/kg)	Other Analytes
B01	10.0	ND	All ND
	15.0	ND	All ND
	20.0	ND	All ND
	25.0	ND	All ND
	30.0	ND	All ND
	35.0	ND	All ND
	40.0	5.3	All ND

Boring	Depth (ft)	Ethanol (ug/kg)	MTBE (ug/kg)	TBA (ug/kg)	Diesel (mg/kg)	Gasoline (mg/kg)	Other Analytes
B02	10.0	ND	ND	ND	ND	ND	All ND
	15.0	ND	ND	ND	ND	ND	All ND
	20.0	ND	ND	ND	ND	ND	All ND
	25.0	ND	130	ND	ND	ND	All ND
	30.0	ND	200	59	ND	ND	All ND
	35.0	ND	520	390	ND	ND	All ND
	40.0	380	ND	ND	44	420	All ND

Project No. 49194400.03000

SOIL ANALYTICAL RESULTS

URS | April 2007 | SHELL SERVICE STATION 121371 - 530 Avenida Pico / Interstate 5, San Clemente, California | FIGURE 3



Project No. 49194400.03000	GROUNDWATER ANALYTICAL RESULTS	
URS / April 2007	SHELL SERVICE STATION 121371 – 530 Avenida Pico / Interstate 5, San Clemente, California	FIGURE 4

TABLES

TABLE 1
SUMMARY OF SOIL ANALYTICAL RESULTS - BTEX, TPH, AND LEAD
Shell Service Station 121371
530 Avenida Pico
San Clemente, California
Page 1 of 2

Sample ID	Sample Date	Sample Depth (feet)	Benzene (ug/kg)	Ethylbenzene (ug/kg)	Toluene (ug/kg)	o-Xylene (ug/kg)	p/m-Xylene (ug/kg)	Lead (mg/kg)	TPH (as Gasoline) (mg/kg)	TPH as Diesel (mg/kg)
121371-B01-10	03/29/07	10.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B01-15	03/29/07	15.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B01-20	03/29/07	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B01-25	03/29/07	25.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B01-30	03/29/07	30.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B01-35	03/29/07	35.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B01-40	03/29/07	40.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B02-10	03/30/07	10.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B02-15	03/30/07	15.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B02-20	03/30/07	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B02-25	03/30/07	25.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B02-30	03/30/07	30.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B02-35	03/30/07	35.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B02-40	03/30/07	40.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	420	46 Jm
121371-B03-10	03/29/07	10.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B03-15	03/29/07	15.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B03-20	03/29/07	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B03-25	03/29/07	25.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B03-30	03/29/07	30.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B03-35	03/29/07	35.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B04-10	03/30/07	10.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B04-15	03/30/07	15.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B04-20	03/30/07	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B04-25	03/30/07	25.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B04-30	03/30/07	30.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B05-10	03/30/07	10.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B05-15	03/30/07	15.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B05-20	03/30/07	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm

TABLE 1
SUMMARY OF SOIL ANALYTICAL RESULTS - BTEX, TPH, AND LEAD
Shell Service Station 121371
530 Avenida Pico
San Clemente, California
Page 2 of 2

Sample ID	Sample Date	Sample Depth (feet)	Benzene (ug/kg)	Ethylbenzene (ug/kg)	Toluene (ug/kg)	o-Xylene (ug/kg)	p/m-Xylene (ug/kg)	Lead (mg/kg)	TPH (as Gasoline) (mg/kg)	TPH as Diesel (mg/kg)
121371-B05-25	03/30/07	25.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B05-30	03/30/07	30.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B06-10	03/30/07	10.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B06-15	03/30/07	15.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B06-20	03/30/07	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B06-25	03/30/07	25.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B06-30	03/30/07	30.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B07-10	03/30/07	10.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0) UJm
121371-B07-15	03/30/07	15.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B07-20	03/30/07	20.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B07-25	03/30/07	25.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-B07-30	03/30/07	30.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	--	ND (<0.50)	ND (<5.0)
121371-D1-04	03/29/07	0.0	ND (<5.0)	27	ND (<5.0)	83	150	4.03	1.5	160
121371-D2-04	03/30/07	0.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	1.75	ND (<0.50)	ND (<5.0)
121371-D3-04	03/30/07	0.0	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	1.92	ND (<0.50)	11

Notes:

ND = Not detected above laboratory reporting limit.

-- = Not Analyzed

ug/kg = micrograms per kilogram

mg/kg = milligrams per kilogram

TPH = Total Petroleum Hydrocarbons as gasoline and/or diesel per EPA Method 8015M

Benzene, Toluene, Ethylbenzene, Xylenes per EPA Method 8260B

Lead per EPA Method 6010B

J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ = The analyte was not detected above reported sample quantitation limit. However, the reported quantitation limit may or may not represent actual limit of quantitation needed to accurately and precisely measure the analyte in sample.

m = Matrix spike/matrix spike duplicate recovery failure.

TABLE 2
SUMMARY OF SOIL ANALYTICAL RESULTS - FUEL OXYGENATES AND ETHANOL
Shell Service Station 121371
530 Avenida Pico
San Clemente, California
Page 1 of 2

Sample ID	Sample Date	Sample Depth (feet)	Diisopropyl Ether (DIPE) (ug/kg)	Ethanol (ug/kg)	Ethyl-t-Butyl Ether (ETBE) (ug/kg)	Methyl-t-Butyl Ether (MTBE) (ug/kg)	Tert-Amyl-Methyl Ether (TAME) (ug/kg)	Tert-Butyl Alcohol (TBA) (ug/kg)
121371-B01-10	03/29/07	10.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B01-15	03/29/07	15.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B01-20	03/29/07	20.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B01-25	03/29/07	25.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B01-30	03/29/07	30.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B01-35	03/29/07	35.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B01-40	03/29/07	40.0	ND (<10)	ND (<250)	ND (<10)	5.3	ND (<10)	ND (<50)
121371-B02-10	03/30/07	10.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B02-15	03/30/07	15.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B02-20	03/30/07	20.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B02-25	03/30/07	25.0	ND (<10)	ND (<250)	ND (<10)	130	ND (<10)	ND (<50)
121371-B02-30	03/30/07	30.0	ND (<10)	ND (<250)	ND (<10)	200	ND (<10)	59
121371-B02-35	03/30/07	35.0	ND (<10)	ND (<250)	ND (<10)	520	ND (<10)	350
121371-B02-40	03/30/07	40.0	ND (<10)	380	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B03-10	03/29/07	10.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B03-15	03/29/07	15.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B03-20	03/29/07	20.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B03-25	03/29/07	25.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B03-30	03/29/07	30.0	ND (<10)	ND (<250)	ND (<10)	13	ND (<10)	ND (<50)
121371-B03-35	03/29/07	35.0	ND (<10)	ND (<250)	ND (<10)	53	ND (<10)	ND (<50)
121371-B04-10	03/30/07	10.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B04-15	03/30/07	15.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B04-20	03/30/07	20.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B04-25	03/30/07	25.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B04-30	03/30/07	30.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B05-10	03/30/07	10.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B05-15	03/30/07	15.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B05-20	03/30/07	20.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)

TABLE 2
SUMMARY OF SOIL ANALYTICAL RESULTS - FUEL OXYGENATES AND ETHANOL
Shell Service Station 121371
530 Avenida Pico
San Clemente, California
Page 2 of 2

Sample ID	Sample Date	Sample Depth (feet)	Diisopropyl Ether (DIPE) (ug/kg)	Ethanol (ug/kg)	Ethyl-t-Butyl Ether (ETBE) (ug/kg)	Methyl-t-Butyl Ether (MTBE) (ug/kg)	Tert-Amyl-Methyl Ether (TAME) (ug/kg)	Tert-Butyl Alcohol (TBA) (ug/kg)
121371-B05-25	03/30/07	25.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B05-30	03/30/07	30.0	ND (<10)	ND (<250)	ND (<10)	6.9	ND (<10)	ND (<50)
121371-B06-10	03/30/07	10.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B06-15	03/30/07	15.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B06-20	03/30/07	20.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B06-25	03/30/07	25.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B06-30	03/30/07	30.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B07-10	03/30/07	10.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B07-15	03/30/07	15.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-B07-20	03/30/07	20.0	ND (<10)	ND (<250)	ND (<10)	5.1	ND (<10)	ND (<50)
121371-B07-25	03/30/07	25.0	ND (<10)	ND (<250)	ND (<10)	24	ND (<10)	ND (<50)
121371-B07-30	03/30/07	30.0	ND (<10)	ND (<250)	ND (<10)	8.3	ND (<10)	ND (<50)
121371-D1-04	03/29/07	0.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)
121371-D2-04	03/30/07	0.0	ND (<10)	ND (<250)	ND (<10)	5.4	ND (<10)	ND (<50)
121371-D3-04	03/30/07	0.0	ND (<10)	ND (<250)	ND (<10)	ND (<5.0)	ND (<10)	ND (<50)

Notes:
ND = Not detected above laboratory reporting limit.
-- = Not Analyzed
ug/kg = micrograms per kilogram

Fuel Oxygenate Compounds per EPA Method 8260B

TABLE 3
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - BTEX AND TPH
Shell Service Station 121371
530 Avenida Pico
San Clemente, California
Page 1 of 1

Sample ID	Sample Date	Benzene (ug/l)	Ethylbenzene (ug/l)	Toluene (ug/l)	o-Xylene (ug/l)	p/m-Xylene (ug/l)	TPH (as Gasoline) (ug/l)	TPH as Diesel (ug/l)
121371-B01-W	03/29/07	ND (<0.50)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<1.0)	ND (<50) UJm	69
121371-B02-W	03/30/07	10	650	6.4	29	130	5800	1600 Jm
121371-B03-W	03/29/07	ND (<2.5)	ND (<5.0)	ND (<5.0)	ND (<5.0)	ND (<5.0)	3600 Jm	100

Notes:
ND = Not detected above laboratory reporting limit.
-- = Not Analyzed
ug/l = micrograms per liter
mg/l = milligrams per liter

TPH = Total Petroleum Hydrocarbons as gasoline and/or diesel per EPA Method 8015M
Benzene, Toluene, Ethylbenzene, Xylenes per EPA Method 8260B

J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
UJ = The analyte was not detected above reported sample quantitation limit. However, the reported quantitation limit may or may not represent actual limit of quantitation needed to accurately and precisely measure the analyte in sample.
m = Matrix spike/matrix spike duplicate recovery failure.

TABLE 4
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS - FUEL OXYGENATES AND ETHANOL
Shell Service Station 121371
530 Avenida Pico
San Clemente, California

Sample ID	Sample Date	Diisopropyl Ether (DIPE) (ug/l)	Ethanol (ug/l)	Ethyl-t-Butyl Ether (ETBE) (ug/l)	Methyl-t-Butyl Ether (MTBE) (ug/l)	Tert-Amyl-Methyl Ether (TAME) (ug/l)	Tert-Butyl Alcohol (TBA) (ug/l)
121371-B01-W	03/29/07	ND (<2.0)	ND (<100)	ND (<2.0)	ND (<1.0)	ND (<2.0)	ND (<10)
121371-B02-W	03/30/07	ND (<10)	ND (<500)	ND (<10)	20	ND (<10)	ND (<50)
121371-B03-W	03/29/07	ND (<10)	ND (<500)	ND (<10)	6.6	ND (<10)	ND (<50)

Notes:
ND = Not detected above laboratory reporting limit.
-- = Not Analyzed
ug/l = micrograms per liter

Fuel Oxygenate Compounds per EPA Method 8260B

ATTACHMENT A
SURVEY X- AND Y- COORDINATES

SURVEY X - AND Y - COORDINATES
SHELL SAP# 121371

Location ID	Latitude	Longitude	Position Quality (ft)
B01	33° 26' 16.67009" N	117° 37' 23.19754" W	0.7283
B02	33° 26' 16.92774" N	117° 37' 23.51664" W	0.7093
B03	33° 26' 17.30146" N	117° 37' 23.27719" W	1.3706
B04	33° 26' 17.09030" N	117° 37' 22.83055" W	1.4446
B05	33° 26' 17.54674" N	117° 37' 23.08467" W	1.5721
B06	33° 26' 17.75083" N	117° 37' 22.92689" W	1.308
B07	33° 26' 17.65035" N	117° 37' 22.42179" W	0.8469
B08	33° 26' 17.38683" N	117° 37' 22.60630" W	0.9435 - not completed/ cancelled
REF	33° 26' 16.98956" N	117° 37' 23.65895" W	1.5129

Notes:

REF - reference point located at west corner of property line

Survey x - and y - coordinates were collected on April 14, 2007

ATTACHMENT B
BORING LOGS

Project: Shell Retail Due Diligence Program
Project Location: 92 Shell Retail Stations in Southern California
Project Number: 49194400

Key to Log of Borings

Sheet 1 of 1

Elevation, feet MSL	Depth, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Blows per 6"	SAMPLES: Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample time	REMARKS
1	2	3	4	5	6	7	8	9	10	11	12

COLUMN DESCRIPTIONS

1. **Elevation:** Elevation in feet referenced to mean sea level (MSL) or site datum.
2. **Depth:** Depth in feet below the ground surface.
3. **Sample Type:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.
4. **Sample Number:** Sample identification number.
5. **Blows per 6":** Number of blows required to advance driven sampler 6 inches using a 140-lb hammer with a 30-inch drop.
6. **Inches Recovered** Inches recovered in sampler over inches driven.
7. **Graphic Log:** Graphic depiction of subsurface material encountered; typical symbols are explained below.
8. **Material Description:** Description of material encountered; may include color, moisture, grain size, and density/consistency.
9. **Headspace PID:** Photo Ionization Detector field sample headspace reading in parts per million (ppm)
10. **Background PID:** Photo Ionization Detector background reading in parts per million (ppm)
11. **Sample Time:** Time in 24-hour clock during downhole advance recorded when samples collected and other field activities performed.
12. **Remarks:** Comments and observations regarding drilling or sampling made by driller or field personnel.

TYPICAL MATERIAL GRAPHIC SYMBOLS

SAND (SP)

Sand with silt (SP-SM)

Silty SAND (SM)

CLAY (CL)

Clayey SAND (SC)

SILT (ML)

Clayey GRAVEL (GC)

GRAVEL (GP)

Silty GRAVEL (GM)

TYPICAL SAMPLER GRAPHIC SYMBOLS

Laboratory Sample

Sample Run

No Recovery

OTHER GRAPHIC SYMBOLS

Inferred contact between strata or gradational change in lithology

Visually identifiable change in lithology

First water encountered at time of drilling

Static water level measured in well

GENERAL NOTES

1. Soil Classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive; actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

URS

Project: Shell Retail Due Diligence Program
Project Location: 121371 - 530 Avenida Pico San Clemente, CA
Project Number: 49194400

Log of Boring B01

Sheet 1 of 2

Date(s) Drilled	3/29/2007	Logged By	J. Letts	Checked By	M. Cardona
Drilling Method	Hollow Stem Auger	Drilling Contractor	BC² Environmental	Total Depth of Borehole ft bgs	45.0
Drill Rig Type	CME 85	Borehole Diameter (inches)	8.25"	Approx. Surface Elevation ft msl	Not Measured
Approx. Depth Groundwater Encountered	41 feet bgs (Static)	Sampler Type	California Modified Split Spoon	Borehole Backfill	Cement Bentonite Grout
Comments					

Feet MSL	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6"	SAMPLES Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	0						Asphalt Air Knife to 7' bgs.				
	5										
	10		121371-B01-10	5 6 8	18/18		Very dark grayish brown (10YR 3/2), CLAY with Silt (CL), stiff, dry, trace fine sand, no staining or unusual odor	0.0	0.0	1246	
	15		121371-B01-15	9 10 15	18/18		Brown (10YR 4/3), CLAY with Silt (CL-ML), very stiff, dry, trace root fragments, no staining or unusual odor	0.0	0.0	1249	
	20		121371-B01-20	7 10 14	18/18		Brown (10YR 5/3), SILT with Clay (ML), very stiff, dry, trace fine sand, no staining or unusual odor	0.0	0.0	1252	
	25		121371-B01-25	8 15 20	18/18		Becomes silt with fine sand, trace clay	0.0	0.0	1256	
	30										

URS

Project: Shell Retail Due Diligence Program
Project Location: 121371 - 530 Avenida Pico San Clemente, CA
Project Number: 49194400

Log of Boring B01

Sheet 2 of 2

Feet MSL	Depth, feet	SAMPLES Type	SAMPLES Number	Blows per 6"	Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	30		121371-B01-30	7 12 16	18/18		Decreasing fine sand	0.0	0.0	1259	
	35		121371-B01-35	9 8 10	18/18		Becomes very dark brown (10YR 3/2)	0.0	0.0	1301	
	40		121371-B01-40	8 6 4	18/18		Greenish gray (GLEY 1 5/10Y), Sandy CLAY to CLAY with Silt (CL), stiff, moist, no staining, slight solvent odor ▼	0.0	0.0	1306	
	45						Boring terminated at 45' bgs. Groundwater not encountered during drilling. Static water level at 41' bgs upon recharge. Backfilled with cement-bentonite grout and finished with concrete.				
	50										
	55										
	60										
	65										

URS

Project: Shell Retail Due Diligence Program
Project Location: 121371 - 530 Avenida Pico San Clemente, CA
Project Number: 49194400

Log of Boring B02

Sheet 1 of 2

Date(s) Drilled	3/29/2007	Logged By	J. Letts	Checked By	M. Cardona
Drilling Method	Hollow Stem Auger	Drilling Contractor	BC² Environmental	Total Depth of Borehole ft bgs	45.0
Drill Rig Type	CME 85	Borehole Diameter (inches)	8.25"	Approx. Surface Elevation ft msl	Not Measured
Approx. Depth Groundwater Encountered	40 feet bgs	Sampler Type	California Modified Split Spoon	Borehole Backfill	Cement Bentonite Grout
Comments					

Feet MSL	Depth, feet	SAMPLES Type	SAMPLES Number	Blows per 6"	Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	0						Asphalt Air Knife to 7' bgs.				
	10		121371-B02-10	10 8 6	18/18		Very dark grayish brown (10YR 3/2), CLAY with Silt (CL), stiff, dry, trace fine sand, no staining or unusual odor	2.0	0.0	0721	
	15		121371-B02-15	7 11 15	18/18		Becomes dark grayish brown (10YR 4/2), very stiff, moist	1.3	0.0	0730	
	20		121371-B02-20	5 10 14	18/18		Brown (10YR 5/3), medium SAND with Silt (SP), medium dense, dry to moist, no staining or unusual odor	0.5	0.0	0734	
	25		121371-B02-25	8 10 16	18/18		Very dark grayish brown (10YR 3/2), CLAY with Silt (CL), very stiff, moist, no staining or unusual odor	2.7	0.0	0737	
	30										

URS

Project: Shell Retail Due Diligence Program
Project Location: 121371 - 530 Avenida Pico San Clemente, CA
Project Number: 49194400

Log of Boring B02

Sheet 2 of 2

Feet MSL / Depth, feet	SAMPLES: Type / Number	Blows per 6"	Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
30	121371-B02-30	10 12 13	18/18		Becomes clay with silt and fine sand	0.8	0.0	0742	
35	121371-B02-35	8 12 19	18/18		Becomes very dark gray (10YR 3/1), clay with silt and very fine sand, stiff	2.8	0.0	0747	
40	121371-B02-40	9 16 18	18/18		Brown (10YR 5/3), medium SAND with Silt (SP-SM), medium dense, wet, no staining, slight unusual odor	12.2	0.0	0752	
45					Boring terminated at 45' bgs. Groundwater encountered at 40' bgs. Backfilled with cement-bentonite grout and finished with concrete.				
50									
55									
60									
65									

URS

Project: Shell Retail Due Diligence Program
Project Location: 121371 - 530 Avenida Pico San Clemente, CA
Project Number: 49194400

Log of Boring B03

Sheet 1 of 2

Date(s) Drilled	3/29/2007	Logged By	J. Letts	Checked By	M. Cardona
Drilling Method	Hollow Stem Auger	Drilling Contractor	BC² Environmental	Total Depth of Borehole ft bgs	45.0
Drill Rig Type	CME 85	Borehole Diameter (inches)	8.25"	Approx. Surface Elevation ft msl	Not Measured
Approx. Depth Groundwater Encountered	39 feet bgs (Static)	Sampler Type	California Modified Split Spoon	Borehole Backfill	Cement Bentonite Grout
Comments					

Feet MSL	Depth, feet	SAMPLES Type	SAMPLES Number	Blows per 6"	Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	0						Asphalt Air Knife to 7' bgs.				
	5										
	10		121371-B03-10	5 12 14	18/18		Very dark grayish brown (10YR 3/2), SILT with Clay (ML), very stiff, dry, trace fine sand, no staining or unusual odor	0.0	0.0	1355	
	15		121371-B03-15	7 9 10	18/18		Very dark grayish brown (10YR 3/2), SILT and CLAY (ML-CL), very stiff, dry, no staining or unusual odor	0.0	0.0	1358	
	20		121371-B03-20	9 12 12	18/18		Yellowish brown (10YR 5/4), SILT (ML), very stiff, dry, trace clay and very fine sand, no staining or unusual odor	0.0	0.0	1401	
	25		121371-B03-25	10 11 12	18/18		Brown (10YR 4/3), medium SAND with Silt and Clay (SP-SM) with dark brown (10YR 2/1) silt lenses, medium dense, dry to moist, no staining or unusual odor	0.0	0.0	1404	
	30										

URS

Project: Shell Retail Due Diligence Program
Project Location: 121371 - 530 Avenida Pico San Clemente, CA
Project Number: 49194400

Log of Boring B03

Sheet 2 of 2

Feet MSL / Depth, feet	SAMPLES: Type / Number	Blows per 6"	Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
30	121371-B03-30	6 7 12	18/18		Brown (10YR 4/3), SILT with Clay (ML), very stiff, dry, no staining or unusual odor	0.0	0.0	1407	
35	121371-B03-35	8 11 16	18/18		Very dark gray (10YR 3/1), CLAY with Silt (CL), very stiff, moist, no staining or unusual odor	0.0	0.0	1412	
40					▼				
45					Boring terminated at 45' bgs. Groundwater not encountered during drilling. Static water level at 39' bgs upon recharge. Backfilled with cement-bentonite grout and finished with concrete.				
50									
55									
60									
65									

URS

Project: Shell Retail Due Diligence Program
Project Location: 121371 - 530 Avenida Pico San Clemente, CA
Project Number: 49194400

Log of Boring B04

Sheet 1 of 1

Date(s) Drilled	3/29/2007	Logged By	J. Letts	Checked By	M. Cardona
Drilling Method	Hollow Stem Auger	Drilling Contractor	BC² Environmental	Total Depth of Borehole ft bgs	31.5
Drill Rig Type	CME 85	Borehole Diameter (inches)	8.25"	Approx. Surface Elevation ft msl	Not Measured
Approx. Depth Groundwater Encountered	Not Encountered	Sampler Type	California Modified Split Spoon	Borehole Backfill	Cement Bentonite Grout
Comments					

Feet MSL	Depth, feet	SAMPLES Type	SAMPLES Number	Blows per 6"	Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	0						Asphalt Air Knife to 7' bgs.				
	5						Clayey SILT (ML)				
	10		121371-B04-10	8 10 15	18/18		Dark grayish brown (10YR 4/2), CLAY with Silt (CL), very stiff, dry, root traces, no staining or unusual odor	0.0	0.0	0848	
	15		121371-B04-15	9 20 21	18/18		Dark grayish brown (10YR 4/2), SILT with Clay (ML), very stiff, dry, root traces, iron staining, no unusual odor	0.0	0.0	0851	
	20		121371-B04-20	8 9 14	18/18		Dark grayish brown (10YR 4/2), medium SAND with Silt (SP-SM), medium dense, moist, trace clay and coarse sand, no staining or unusual odor	0.3	0.0	0855	
	25		121371-B04-25	10 13 19	18/18		Very dark grayish brown (10YR 3/2), CLAY with Silt, very stiff, dry to moist, trace fine sand, no staining or unusual odor	1.1	0.0	0857	
	30		121371-B04-30	10 12 15	18/18		Brown (10YR 4/3), SILT with Clay (ML), SILT with Clay (ML), very stiff, moist, no staining or unusual odor	4.8	0.0	0900	
							Boring terminated at 31.5' bgs. Groundwater not encountered. Backfilled with cement-bentonite grout and finished with concrete.				

URS

Project: Shell Retail Due Diligence Program
Project Location: 121371 - 530 Avenida Pico San Clemente, CA
Project Number: 49194400

Log of Boring B05

Sheet 1 of 1

Date(s) Drilled	3/30/2007	Logged By	J. Letts	Checked By	M. Cardona
Drilling Method	Hollow Stem Auger	Drilling Contractor	BC² Environmental	Total Depth of Borehole ft bgs	31.5
Drill Rig Type	CME 85	Borehole Diameter (inches)	8.25"	Approx. Surface Elevation ft msl	Not Measured
Approx. Depth Groundwater Encountered	Not Encountered	Sampler Type	California Modified Split Spoon	Borehole Backfill	Cement Bentonite Grout
Comments					

Feet MSL	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6"	SAMPLES Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	0						Asphalt Air Knife to 7' bgs.				
	5										
	10		121371-B05-10	12 17 21	18/18		Very dark grayish brown (10YR 3/2), CLAY with Silt (CL), very stiff, dry, root traces, no staining or unusual odor	0.0	0.0	0930	
	15		121371-B05-15	8 11 15	18/18		Becomes dark grayish brown (10YR 4/2), moist, iron staining	0.0	0.0	0934	
	20		121371-B05-20	10 12 13	18/18		Dark yellowish brown (10YR 4/4), medium SAND (SP), moist, trace silt, coarse sand and fine gravel, root fragments, no staining or unusual odor	0.0	0.0	0937	
	25		121371-B05-25	13 14 16	18/18		Very dark grayish brown (10YR 3/2), CLAY with Silt (CL), very stiff, dry to moist, no staining or unusual odor	0.0	0.0	0942	
	30		121371-B05-30	8 14 15	18/18		Brown (10YR 4/3), SILT with Clay (ML), very stiff, moist, no staining or unusual odor	0.7	0.0	0945	
							Boring terminated at 31.5' bgs. Groundwater not encountered. Backfilled with cement-bentonite grout and finished with concrete.				

URS

Project: Shell Retail Due Diligence Program
Project Location: 121371 - 530 Avenida Pico San Clemente, CA
Project Number: 49194400

Log of Boring B06

Sheet 1 of 1

Date(s) Drilled	3/30/2007	Logged By	J. Letts	Checked By	M. Cardona
Drilling Method	Hollow Stem Auger	Drilling Contractor	BC² Environmental	Total Depth of Borehole ft bgs	31.5
Drill Rig Type	CME 85	Borehole Diameter (inches)	8.25"	Approx. Surface Elevation ft msl	Not Measured
Approx. Depth Groundwater Encountered	Not Encountered	Sampler Type	California Modified Split Spoon	Borehole Backfill	Cement Bentonite Grout
Comments					

Feet MSL	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows per 6"	SAMPLES Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	0						Asphalt Air Knife to 7' bgs.				
	5										
	10		121371-B06-10	12 14 16	18/18		Very dark grayish brown (10YR 3/2), CLAY with Silt (CL), very stiff, dry, root traces, no staining or unusual odor	0.0	0.0	1112	
	15		121371-B06-15	16 17 21	18/18		Very dark grayish brown (10YR 3/2), SILT and CLAY (CL-ML), very stiff, dry, no staining or unusual odor	0.0	0.0	1115	
	20		121371-B06-20	6 10 17	18/18		Brown (10YR 4/3), SILT with Clay (ML), very stiff, dry, no staining or unusual odor	0.0	0.0	1118	
	25		121371-B06-25	9 15 16	18/18		Very dark brown (10YR 2/2), CLAY with Silt (CL), very stiff, dry, trace fine sand, no staining or unusual odor	0.0	0.0	1123	
	30		121371-B06-30	7 14 16	18/18		Brown (10YR 4/3), SILT with Clay (ML), very stiff, dry, no staining or unusual odor	0.7	0.0	1127	
							Boring terminated at 31.5' bgs. Groundwater not encountered. Backfilled with cement-bentonite grout and finished with concrete.				

URS

Project: Shell Retail Due Diligence Program
Project Location: 121371 - 530 Avenida Pico San Clemente, CA
Project Number: 49194400

Log of Boring B07

Sheet 1 of 1

Date(s) Drilled	3/30/2007	Logged By	J. Letts	Checked By	M. Cardona
Drilling Method	Hollow Stem Auger	Drilling Contractor	BC² Environmental	Total Depth of Borehole ft bgs	31.5
Drill Rig Type	CME 85	Borehole Diameter (inches)	8.25"	Approx. Surface Elevation ft msl	Not Measured
Approx. Depth Groundwater Encountered	Not Encountered	Sampler Type	California Modified Split Spoon	Borehole Backfill	Cement-Bentonite Grout
Comments					

Feet MSL	Depth, feet	SAMPLES Type	Number	Blows per 6"	Inches Recovered	Graphic Log	MATERIAL DESCRIPTION	PID Headspace (ppm)	PID Background (ppm)	Sample Time	REMARKS
	0						Asphalt Air Knife to 7' bgs.				
	5										
	10		121371-B07-10	9 18 21	18/18		Very dark grayish brown (10YR 3/2), CLAY with Silt (CL), very stiff, dry, root traces, no staining or unusual odor	0.0	0.0	1023	
	15		121371-B07-15	12 16 17	18/18		Dark grayish brown (10YR 4/2), SILT and CLAY (CL-ML), very stiff, dry, no staining or unusual odor	0.0	0.0	1026	
	20		121371-B07-20	10 12 16	18/18		Dark grayish brown (10YR 4/2), SILT (ML), very stiff, dry to moist, trace clay, no staining, slight unusual odor	16.8	0.0	1030	
	25		121371-B07-25	8 15 17	18/18		Very dark brown (10YR 3/2), CLAY with Silt (CL), very stiff, dry, no staining or unusual odor	1.6	0.0	1033	
	30		121371-B07-30	11 13 15	18/18		Brown (10YR 4/3), SILT with Clay (ML), very stiff, dry to moist, no staining or unusual odor	2.0	0.0	1036	
							Boring terminated at 31.5' bgs. Groundwater not encountered. Backfilled with cement-bentonite grout and finished with concrete.				

URS

COUNTY OF ORANGE CERTIFIED UNIFIED PROGRAM AGENCY - CUPA

HEALTH CARE AGENCY / ENVIRONMENTAL HEALTH
2009 E. EDINGER AVENUE, SANTA ANA, CA 92705-4720
Telephone: (714) 667-3600 / FAX: (714) 568-5116

UST FACILITY MODIFICATION APPLICATION

SUBMIT A SEPARATE FORM FOR EACH TYPE OF CONSTRUCTION ACTIVITY

(e.g. Installations, Removals, System Modifications, Repairs, etc.)

SITE INFORMATION

FACILITY NAME: SHELL STATION — SUBMITTAL DATE: 11/15/04

ADDRESS: 530 AVENIDA PICO

CITY: SAN CLEMENTE — CITY CODE — TELEPHONE NO 714-731-8337

ZIP CODE: — CONTACT NAME GARY WING

APPLICANT REQUESTOR

APPLICANTS NAME: SHELL OIL CO. — COMPANY NAME SHELL OIL

ADDRESS: 20945 S. WILMINGTON AVE.

CITY: CARSON

X _____
APPLICANTS SIGNATURE (TANK OWNER OR DESIGNEE)

STATE: CA ZIP: 91810

TELEPHONE NO: 714-731-8337

ALTERNATE # (CELL, PAGER)

UPC UST Forms are required to be submitted prior to pick up of approved UST plans. Forms provided at Plan Check Counter or at http://www.oc.ca.gov/hca/regulatory/cupa/forms.htm

TYPE OF CONSTRUCTION

UST PLAN TYPE:	CODE
☐ INSTALLATION (S) #	T01
☐ CLOSURE (S) – REMOVAL (S) #	T02
☐ SYSTEM MODIFICATION (REPIPE, REPAIR TO PIPING)	T03
☐ REPAIR (S) OR RELINE (S) USTs	T04
☑ OTHER (SPECIFY) 1. INSTALL NEW EOS100 BEAUDREU SENSORS FOR F/U/VAPOR, TURBINE SUMPS, & DISPENSER PANS. 2. INSTALL NEW 6 I/SPOT FLAPPOR. 3. REMOVE EXISTING OVERFILL ALARM. 4. INSTALL NEW 522T MONITORING PANEL.	T05

CONTRACTOR INFORMATION

(Persons performing work on USTs must meet specific State Contractors Licensing Board requirements)

CONTACT PERSON GARY LEDGER

BUSINESS NAME GL CONSTRUCTION

ADDRESS 15622 GRAHAM ST.

CITY HUNTINGTON BEACH

STATE CA ZIP 92649

TELEPHONE NO 714-903-6866

CONTRACTORS LICENSE TYPE

CONTRACTORS STATE LICENSE #

NOTES: NEW INSTALLATIONS, CLOSURES, REPAIRS AND SYSTEM MODIFICATIONS OF UNDERGROUND STORAGE TANKS REQUIRE THE SUBMITTAL OF (4) SETS OF PLANS TO THIS DIVISION. THESE PLANS MUST BE APPROVED PRIOR TO THE INITIATION OF ANY CONSTRUCTION OR MODIFICATION. ALL PLANS OR REPORTS REQUIRED MUST ACCOMPANY THIS FORM AT THE TIME OF SUBMITTAL.

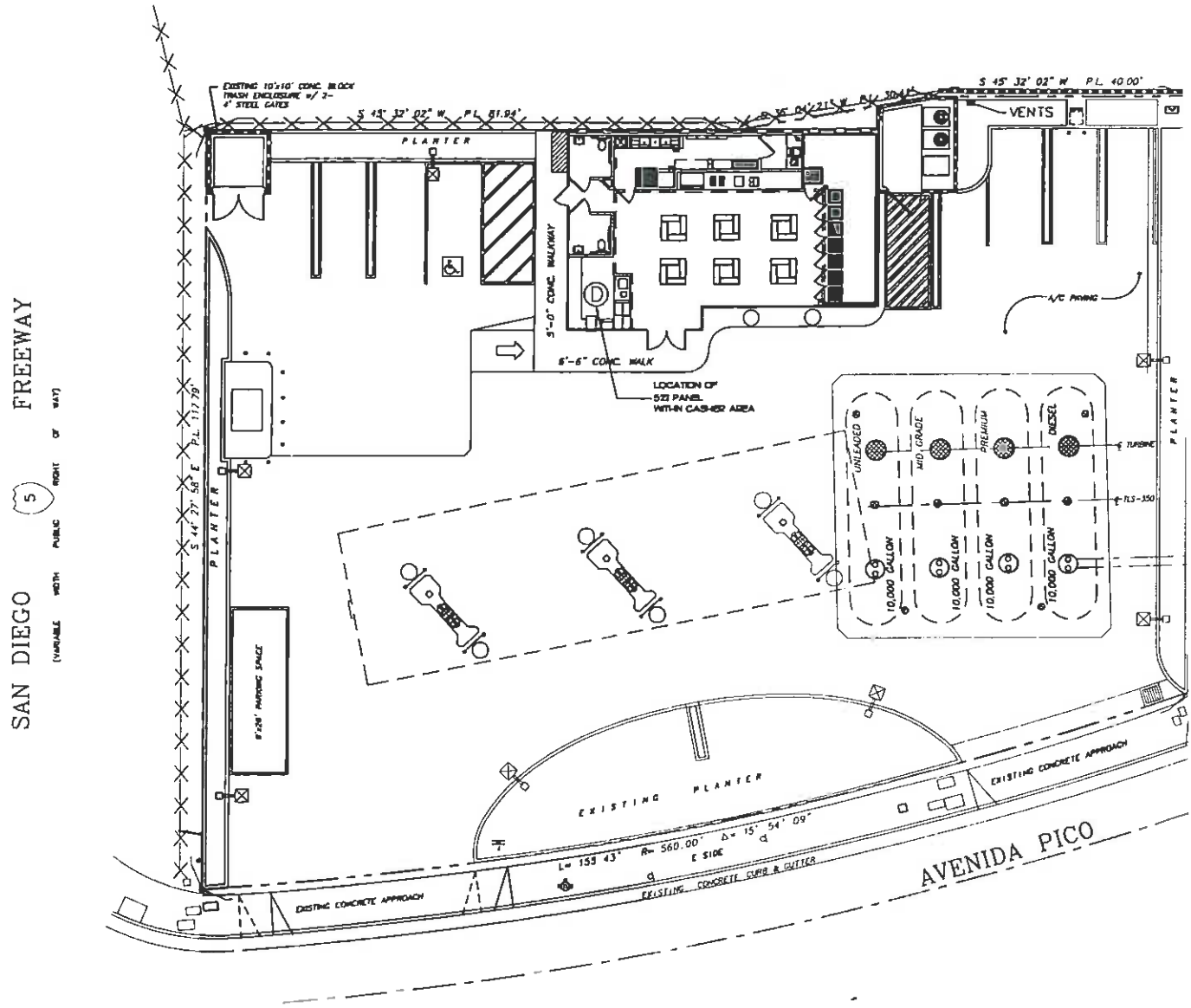
PLAN APPROVAL AND FEES ARE VALID FOR ONE YEAR. IF TANKS HAVE NOT BEEN REMOVED, INSTALLED OR MODIFIED WITHIN ONE YEAR OF THE APPROVAL DATE, NEW PLANS AND FEES MUST BE SUBMITTED 1.880066 11-15-04

OFFICE USE ONLY

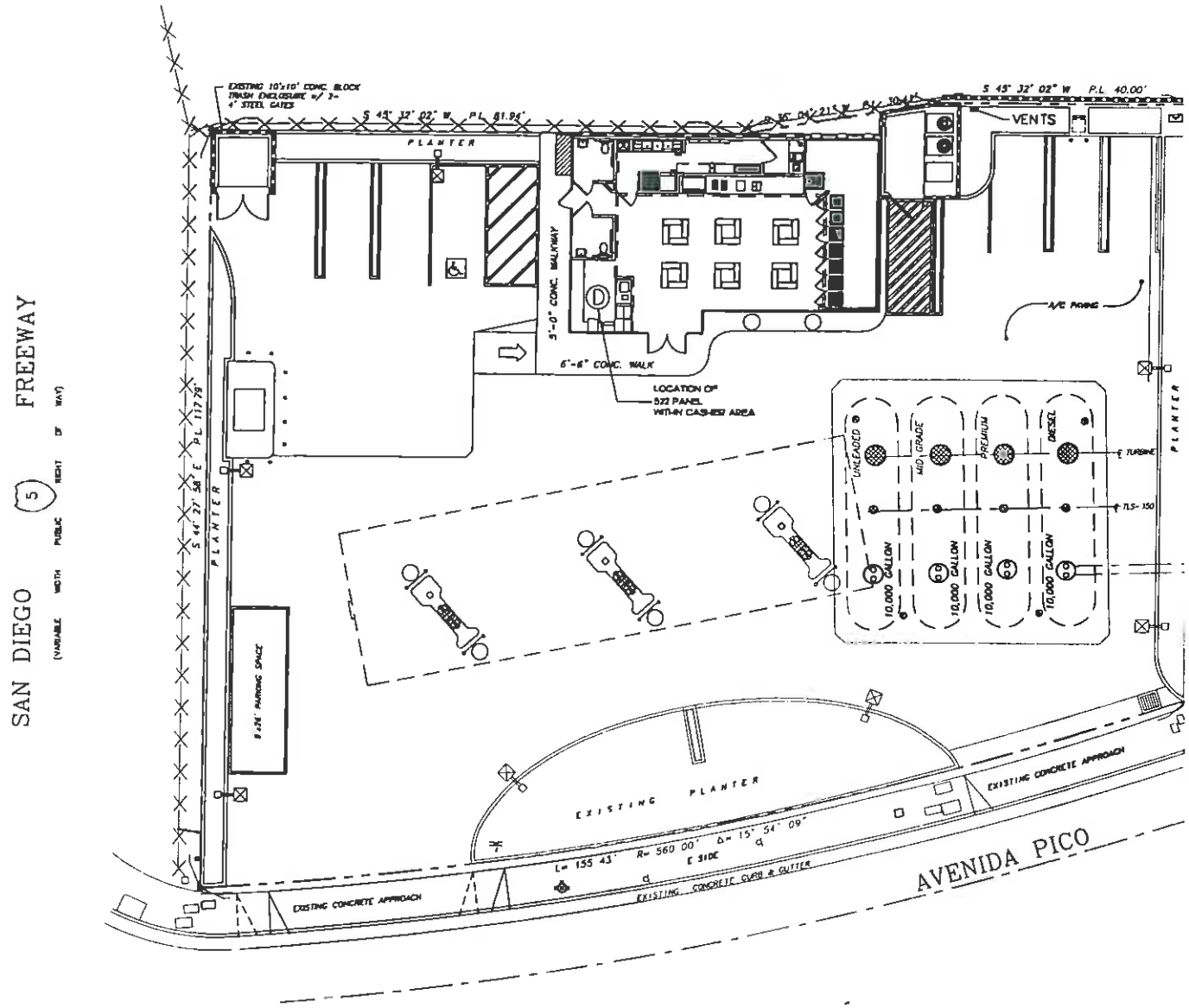
SR # 010641.5 PE 7025 FEES PAID: 348 CHECK # 1315 RCVD BY: AV

PLAN APPROVAL DATE _____ BY _____ FA # 24796

10/28/04 Distribution: White – OC CUPA Pink – Data Entry

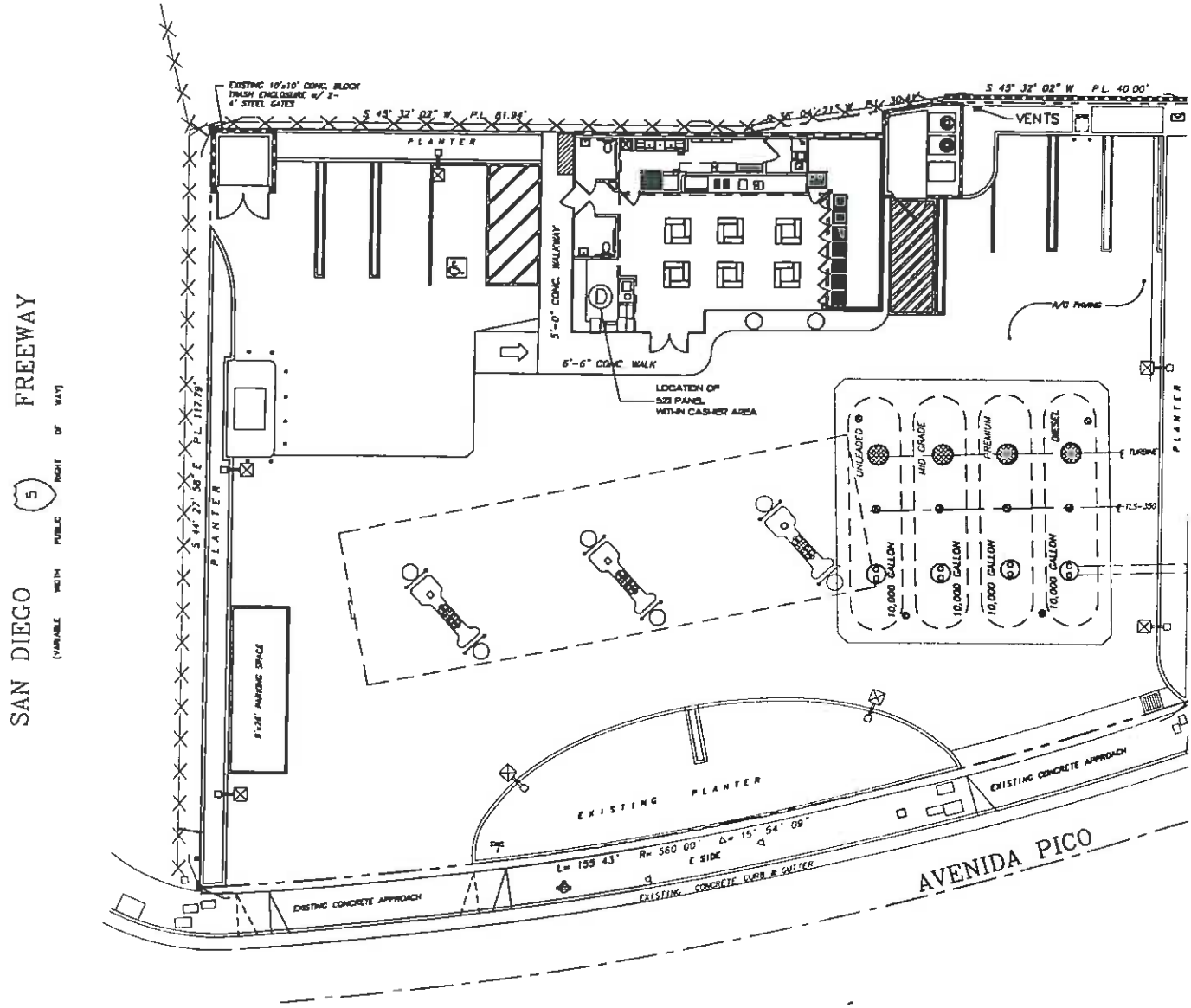


ENVIRONMENTAL HEALTH



ENVIRONMENTAL HEALTH

LAVA-S1



ENVIRONMENTAL HEALTH

LAVA-S1

GRANT

COUNTY OF ORANGE CERTIFIED UNIFIED PROGRAM AGENCY - CUPA

HEALTH CARE AGENCY / ENVIRONMENTAL HEALTH
2009 E. EDINGER AVENUE, SANTA ANA, CA 92705-4720
Telephone: (714) 667-3600 / FAX: (714) 568-5116

Closed TK-2720

UST FACILITY MODIFICATION APPLICATION

SUBMIT A SEPARATE FORM FOR EACH TYPE OF CONSTRUCTION ACTIVITY
(e.g. Installations, Removals, System Modifications, Repairs, etc.)

SITE INFORMATION

FACILITY NAME: Texaco gas station SUBMITTAL DATE: _____

ADDRESS: 530 Avenida Pico

CITY: San Clemente CITY CODE TELEPHONE NO: _____

ZIP CODE: 92673 CONTACT NAME: _____

APPLICANT REQUESTOR Carmen C. Begay

APPLICANTS NAME: Ambience Engineering COMPANY NAME: Ambience Engineering

ADDRESS: 2131 S. Dupont Dr.

CITY: Anaheim

x Carmen C. Begay

APPLICANTS SIGNATURE (TANK OWNER OR DESIGNEE)

STATE: CA. ZIP: 915 92806

TELEPHONE NO: (714) 978-7771

ALTERNATE # (CELL, PAGER) _____

UPC UST forms are required to be submitted prior to pick up of approved UST plans. Forms provided at Plan Check Counter or at http://www.oc.ca.gov/hca/regulatory/cupa/forms.htm

TYPE OF CONSTRUCTION

UST PLAN TYPE:	CODE
☑ INSTALLATION (S) # 4	T01
☐ CLOSURE (S) – REMOVAL (S) # _____	T02
☐ SYSTEM MODIFICATION (REPIPE, REPAIR TO PIPING)	T03
☐ REPAIR (S) OR RELINE (S) USTs	T04
☐ OTHER (SPECIFY) _____	T05

CONTRACTOR INFORMATION
(Persons performing work on USTs must meet specific State Contractors Licensing Board requirements)

CONTACT PERSON _____

BUSINESS NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

TELEPHONE NO. _____

CONTRACTORS LICENSE TYPE _____

CONTRACTORS STATE LICENSE # _____

NOTES: NEW INSTALLATIONS, CLOSURES, REPAIRS AND SYSTEM MODIFICATIONS OF UNDERGROUND STORAGE TANKS REQUIRE THE SUBMITTAL OF (4) SETS OF PLANS TO THIS DIVISION. THESE PLANS MUST BE APPROVED PRIOR TO THE INITIATION OF ANY CONSTRUCTION OR MODIFICATION. ALL PLANS OR REPORTS REQUIRED MUST ACCOMPANY THIS FORM AT THE TIME OF SUBMITTAL.

PLAN APPROVAL AND FEES ARE VALID FOR ONE YEAR. IF TANKS HAVE NOT BEEN REMOVED, INSTALLED OR MODIFIED WITHIN ONE YEAR OF THE APPROVAL DATE, NEW PLANS AND FEES MUST BE SUBMITTED. HSO# 174069 4-15-02

OFFICE USE ONLY

SR # 01031 PAID PE: 7021 FEES PAID: $147.00 CHECK # 3358 RCVD.BY: mm

PLAN APPROVAL DATE: 7/29/02 BY: J. Grant FA # 0024796

UST INSTALLATION/MODIFICATION PLAN CHECK LIST

FACILITY NAME: Texaco Gas Station **PLAN CHECK NO:** SR0102118

ADDRESS: 530 Avenida Pico, San Clemente

CONTRACTOR NAME: _____ **COMPANY:** _____

CONTRACTOR PHONE NUMBER: _____

CHECK ONE: ☒ **INSTALLATION** ☐ **MODIFICATION**

NUMBER AND VOLUME OF TANKS INSTALLED (1) 10K (2) 12K (1) 20K

MODIFICATION IS FOR: _____

		DATE COMPLETED	INITIAL
PLANS REVIEWED AND APPROVED		7/29/02	JG
COPY OF PRIMARY CONTRACTOR AND SUBCONTRACTOR LICENSE AND HAZ. SUBSTANCE CERTIFICATION RECEIVED			
PASSED VACUUM TEST *(IF APPLICABLE)*		NA	
PASSED HOLIDAY TEST *(COMPOSITE TANKS ONLY)*		NA	
PASSED TANK PRESSURE TEST OR OTHER TEST AS SPECIFIED BY THE MANUFACTURER	Primary	7/14/03	JN
	Secondary	Brine	
PASSED PIPELINE PRESSURE TEST OR OTHER TEST AS SPECIFIED BY THE MANUFACTURER	Primary	7/14/03	JN
	Secondary	7/16/03	JG
PASSED WATER TEST – TURBINE AND/OR FILL SUMPS		7/16/03	JG
PASSED WATER TEST – DISPENSER PANS AND/OR SUMPS		7/16/03	JG
PASSED MONITORING SYSTEM INSPECTION – SENSORS (ANNULAR, SUMP, DISPENSERS, ETC.), LINE LEAK DETECTORS AND POSITIVE SHUTDOWN *(IF APPLICABLE)* DEMONSTRATED OPERATIONAL		7/3/03	JG
PASSED FINAL INSPECTION - ALL INFO REQUESTED FOR OPERATING PERMIT (INSTALLATION MATCHES PLANS - CONSTRUCTION IS COMPLETE)		1/21/03	JG
SOIL SAMPLE RESULTS RECEIVED AND FORWARDED TO GROUNDWATER *(IF APPLICABLE)*		10/6/03	JG
SYSTEM PASSED TANK/LINE INTEGRITY TEST AND RECEIVED RESULTS		7/30/03	JG
INSPECTION REPORT COMPLETED AND SUBMITTED TO SUPERVISOR WITH UPDATED TANK PAGE		8/21/03	JG
INSTALLATION CERTIFICATION FORM RECEIVED, SIGNED BY OWNER		8/21/03	JG
DATE UST(S) AT SITE WERE REMOVED *(PLAN CHECK #)*		6/03	JS
FUEL COMPLIANCE CERTIFICATE ISSUED *(IF APPLICABLE)*			

_____

INSPECTOR ON-SITE FOR INSTALLATION/MODIFICATION *(PRINT NAME)*

COUNTY OF ORANGE
HEALTH CARE AGENCY

REGULATORY HEALTH SERVICES
ENVIRONMENTAL HEALTH

JULIETTE A. POULSON, RN, MN
DIRECTOR

MIKE SPURGEON
DEPUTY AGENCY DIRECTOR
REGULATORY HEALTH SERVICES

STEVEN K. WONG, REHS, MPH
DIRECTOR
ENVIRONMENTAL HEALTH

MAILING ADDRESS:
2009 EAST EDINGER AVENUE
SANTA ANA, CA 92705-4720

TELEPHONE (714) 667-3600
FAX (714) 972-0749
E-MAIL: environhealth@hca co orange.ca us

Excellence
Integrity
Service

October 27, 2003

Marvin Katz
Shell Oil Products US
P. O. Box 7869
Burbank, CA 91510-7869

Subject: Completion Of Tank Removal Project

Re: Texaco Station
530 Avenida Pico,
San Clemente, CA
Plan Check #SR0104068

Dear Mr. Katz:

This is in response to your request for a confirmation of the completion of the tank removal project. With the provision that the results for the soil samples obtained during the tank removals and piping sampling on June 20, 2003 and July 7, 2003 were accurate and representative of existing conditions, it is the position of this office that no significant new soil contamination has occurred at the above noted facility location.

It should be pointed out that this letter does not relieve you of any responsibilities mandated under the California Health and Safety Code if additional or previously unidentified contamination is discovered at the subject site.

If you have any questions regarding this matter, please contact James Strozier at (714) 667-3711.

Sincerely,

Seth J. Daugherty
Supervising Hazardous Waste Specialist
Hazardous Materials Management Section
Environmental Health

cc: Erica Takach, Wayne Perry, Inc.

Orange County Health Care Agency
Environmental Health Division
Underground Tank Removal Form

Shell Station, 530 Avenida Pico, San Clemente 92672
Facility Name

SR # 0104068 TI # _____ LUST # _____ IR # _____

Inspector: Nghawan Rashidi-Yard Date: 6-20-03 Time: 11:00 am

5 Fwy & Avenida Pico
Cross Street Site Telephone Number

Shell
Owner Address

Contact Person Telephone Number

Operator *(if different than owner)* Telephone Number

Jauregui & Culver John Culver (760)743-0518
Consultant or Contractor Company Contact Person Telephone Number

	Size	Const. Mat.	Mat. Stored		Size	Const. Mat.	Mat. Stored
Tank #1:	10,000g	fiberglass	gasoline	Tank #4:	10,000g	fiberglass	diesel
Tank #2:	10,000g	fiberglass	gasoline	Tank #5:			
Tank #3:	10,000g	fiberglass	gasoline	Tank #6:			

Depth to Groundwater: _____ Fate of Piping: Will be removed later

Proposition 65 Required? NA Prop. 65 Form Submitted on: _____

Fire Dept. Personnel On-site: T. Verdenne

Ambient Air Readings on Field Instrument: _____

Other Information: All tanks appeared to be in good shape.
No obvious signs of contamination.

FIELD ACTIVITY DESCRIPTION

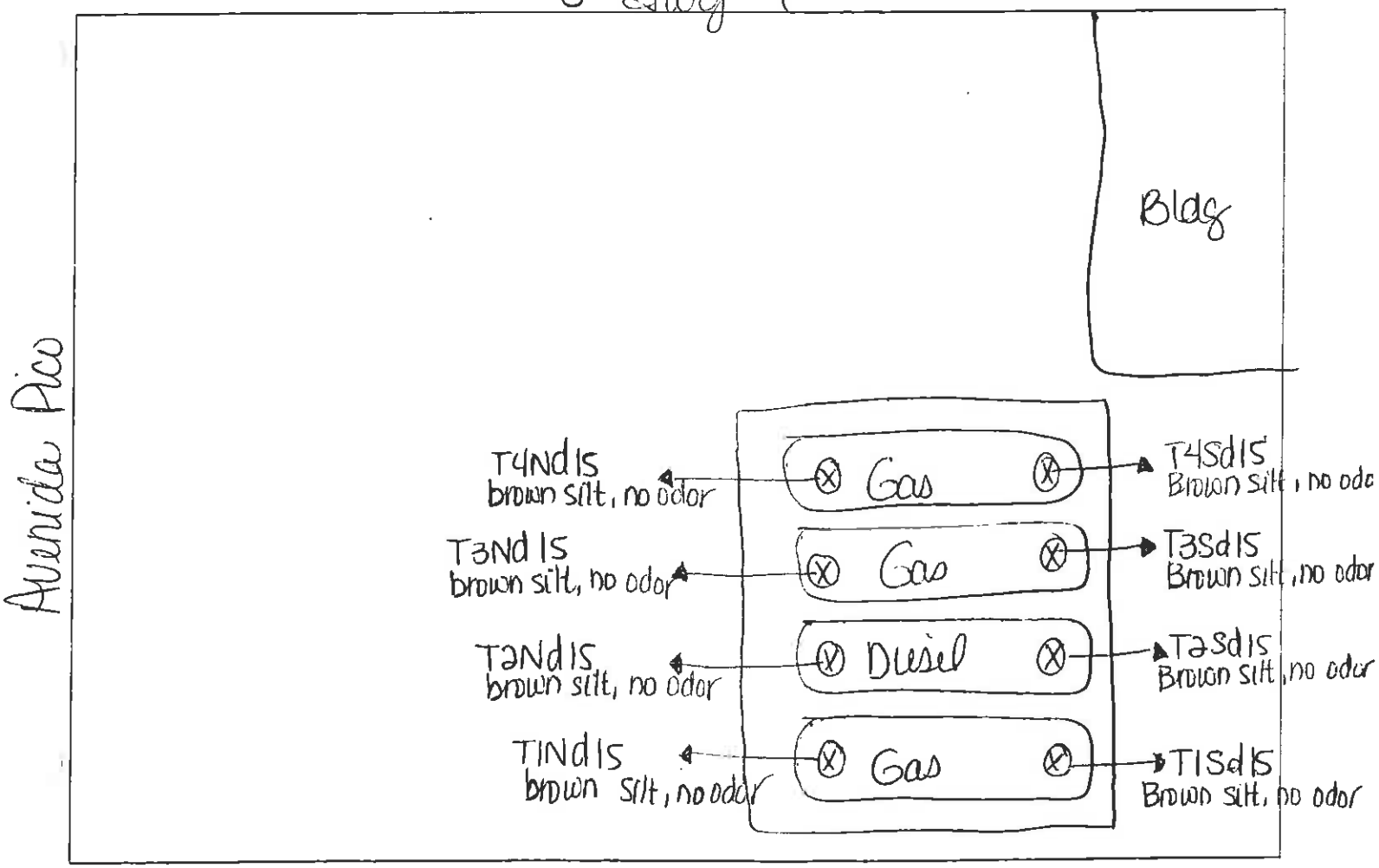
Shell Station, 530 Avenida Pico, San Clemente
Facility Name

SA # 0104068 TI # _____ LUST # _____ IR # _____

Inspector: Arghavan Parhidi-Jard Date: 6-20-03 Time: 11:00 am & 1:30pm

Field Activity: On-site to witness the removal of tanks and direct sampling beneath them. The dispenser & piping will be removed and sampled at a later date.
All soil samples collected from beneath the tanks appeared clean with no obvious signs of contamination

S Hwy



INSPECTION REPORT

County of Orange, Health Care Agency, Environmental Health
2009 E. Edinger Ave., Santa Ana, CA 92705
(714) 667-3600

SHELL 121371
530 E AVENIDA PICO, SAN CLEMENTE, 92672
Service(s): A06
Regulatory Health Specialist: Lance Malis, (714) 667-3727

Inspection Date: 07/07/03
FA0024796
UST PLAN CHECK - INSTALL
Reinspection Date:

On site for piping pre removal inspection. Piping and dispensers were in place upon arrival. Piping had proper corrosion protection. Facility appeared to have met 1998 upgrade requirements. Five soil samples taken under piping and dispensers. See UST activity report for details of the sampling.

I declare that I have examined and received a copy of this inspection report.

Print Name and Title: Jim Jauregui

Signature: Jim Jauregui ENTERED JUL 10 2003 Date: 7/7/03

F272-09 373Ae DISTRIBUTION Operator One Copy Environmental Health One Copy

FIELD ACTIVITY DESCRIPTION

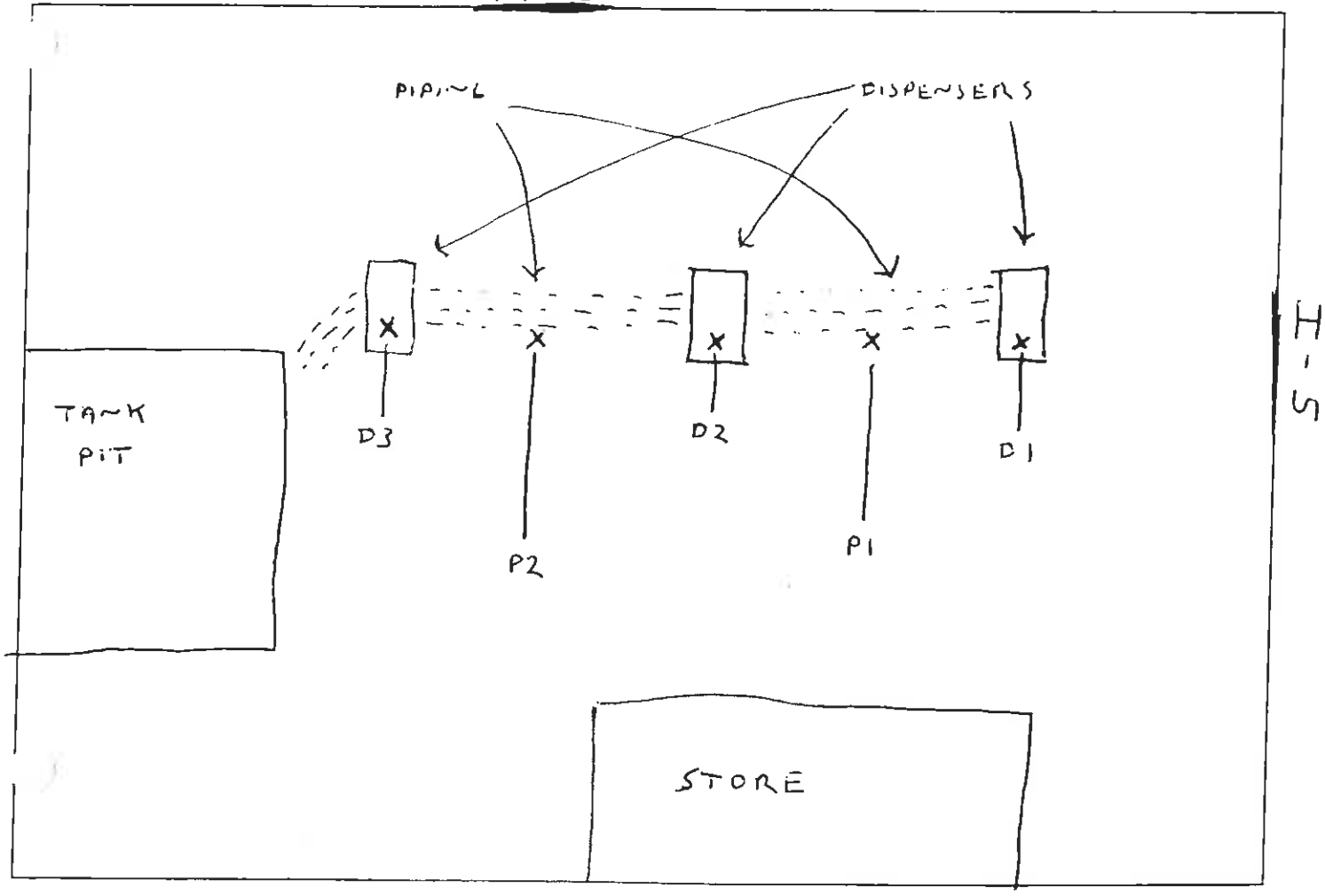
SHELL 530 E AVE PICO SAN CLEMENTE 92672
Facility Name

PC # SR0102118 TI # _____ LUST # _____ IR # _____

Inspector: LANCE MALIS Date: 7-7-03 Time: _____

Field Activity: ON SITE FOR PRE/REMOVAL INSPECTION FOR PIPING AND DISPENSERS. I WAS SCHEDULED FOR A PIPING INSPECTION. I ASSUMED IT WAS A PRIMARY OR SECONDARY BECAUSE TANKS WERE REMOVED AND SOIL SAMPLES TAKEN. HOWEVER, PIPING WAS STILL IN PLACE. SOIL SAMPLING WAS DONE WITHOUT A GAS TECH AND WITH WAYNE PERRY'S CHAIN OF CUSTODY. 5 SOIL SAMPLES TAKEN. EACH SAMPLE WAS TAKEN APPROX 1 FOOT INTO NATIVE SOIL, 4 TO 5 FEET TOTAL DEPTH SEE BELOW DIAGRAM FOR LOCATIONS. NO PETROLEUM ODOR WAS DETECTED ON ANY OF THE SAMPLES. NO STAINING IN SOIL NOTICED. SOIL TEXTURE RANGED FROM SANDY TO CLAY LIKE

PICO



7440 Lincoln Way
Garden Grove, CA 92841-1432
(714) 895-5494 (714) 894-7501 fax

Shell Project Manager to be Invoiced:
☐ SCIENCE & ENGINEERING
☒ TECHNICAL SERVICES Don McDaniel
☐ CRMT HOUSTON

INCIDENT NUMBER (SE ONLY): —
SAP or CRMT NUMBER (TS/CRMT): 1 2 1 3 7 1

DATE: 7/7/03
PAGE: 1 of 1

SAMPLING COMPANY: Wayne Perry, Inc.	LOG CODE: WPBP
ADDRESS: 8281 Commonwealth Avenue	SITE ADDRESS (Street and City): 530 Avenida Pico San Clemente
PROJECT CONTACT (Hardcopy or PDF Report to): Erica Takach	EDF DELIVERABLE TO (Responsible Party or Designee): Trudi Balsitis · PHONE NO.: (714) 826-0352 · E-MAIL: TBalsitis@WPINC.com · CONSULTANT PROJECT NO.: D3.107E
TELEPHONE: (714) 826-0352 · FAX: (714) 523-7641 · E-MAIL: etakach@wpinc.com	SAMPLER NAME(S) (Print): Crish Farrell

TURNAROUND TIME (BUSINESS DAYS): ☐ 10 DAYS ☐ 5 DAYS ☐ 72 HOURS ☐ 48 HOURS ☒ 24 HOURS ☐ LESS THAN 24 HOURS

☐ RWQCB REPORT FORMAT ☐ UST AGENCY:

GC/MS MTBE CONFIRMATION: HIGHEST ____ HIGHEST per BORING ____ ALL ____

SPECIAL INSTRUCTIONS OR NOTES: CHECK BOX IF EDD IS NOT NEEDED ☐

REQUESTED ANALYSIS

Field Sample Identification	Sampling Date	Sampling Time	Matrix	No. of Cont.	TPH - Gas, Purgeable	BTEX by 8260B	MTBE (8021B - 5ppb RL)	MTBE (8260B - 0.5ppb RL)	Oxygenates (5) by (8260B)	Ethanol (8260B)	Methanol	EDB & 1,2-DCA (8260B)	EPA 5035 Extraction for Volatiles	VOCs Halogenated/Aromatic (8021B)	TRPH (418.1)	Vapor VOCs BTEX / MTBE (TO-15)	Vapor VOCs Full List (TO-15)	Vapor TPH (ASTM 3416m)	Vapor Fixed Gases (ASTM D1946)	Test for Disposal (48-28)		TPH - Diesel, Extractable (8015m)		MTBE (8260B) Confirmation, See Note	FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes
D-1d4	7/7	1415	soil	1	X	X		X	X											X		X			
P-1d5	7/7	1430	soil	1	X	X		X	X											X		X			
D-2d4	7/7	1435	soil	1	X	X		X	X											X		X			
P-2d4	7/7	1440	soil	1	X	X		X	X											X		X			
D-3d4	7/7	1445	soil	1	X	X		X	X											X		X			

TEMPERATURE ON RECEIPT C°

Relinquished by: (Signature) Date: 7/7/03 Time:
Relinquished by: (Signature) Date: Time:
Relinquished by: (Signature) Date: Time:

HEALTH CARE AGENCY
ENVIRONMENTAL HEALTH

LANCE MALIS
HAZARDOUS WASTE SPECIALIST

OFFICE ADDRESS:
2009 E. EDINGER AVE.
SANTA ANA, CA 92705

(714) 667-3727
FAX: (714) 568-5116
lmalis@hca.co.orange.ca.us

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client

JUL 08 2003
HEALTH CARE AGENCY
REGULATORY HEALTH SERVICES

Orange County Health Care Agency
Environmental Health Division
Underground Tank Removal Form

Shell Station, 530 Avenida Pico, San Clemente 92673
Facility Name

SR # 0104D068 TI # _____ LUST # _____ IR # _____

Inspector: Mghawar Piashidi - Yazd Date: 6-30-03 Time: 11:00 am

5 Hwy + Avenida Pico
Cross Street Site Telephone Number

Shell
Owner Address

Contact Person Telephone Number

Operator *(if different than owner)* Telephone Number

Jauregui + Culver John Culver (760) 743-0518
Consultant or Contractor Company Contact Person Telephone Number

Tank #1: 10,000g fiberglass gasoline
Size Const. Mat. Mat. Stored

Tank #2: 10,000g fiberglass gasoline
Size Const. Mat. Mat. Stored

Tank #3: 10,000g fiberglass gasoline
Size Const. Mat. Mat. Stored

Tank #4: 10,000g fiberglass diesel
Size Const. Mat. Mat. Stored

Tank #5: _____
Size Const. Mat. Mat. Stored

Tank #6: _____
Size Const. Mat. Mat. Stored

Depth to Groundwater: _____ Fate of Piping: will be removed later

Proposition 65 Required? NA Prop. 65 Form Submitted on: _____

Fire Dept. Personnel On-site: T. Verdenne

Ambient Air Readings on Field Instrument: _____

Other Information: All tanks appeared to be in good shape
No obvious signs of contamination

FIELD ACTIVITY DESCRIPTION

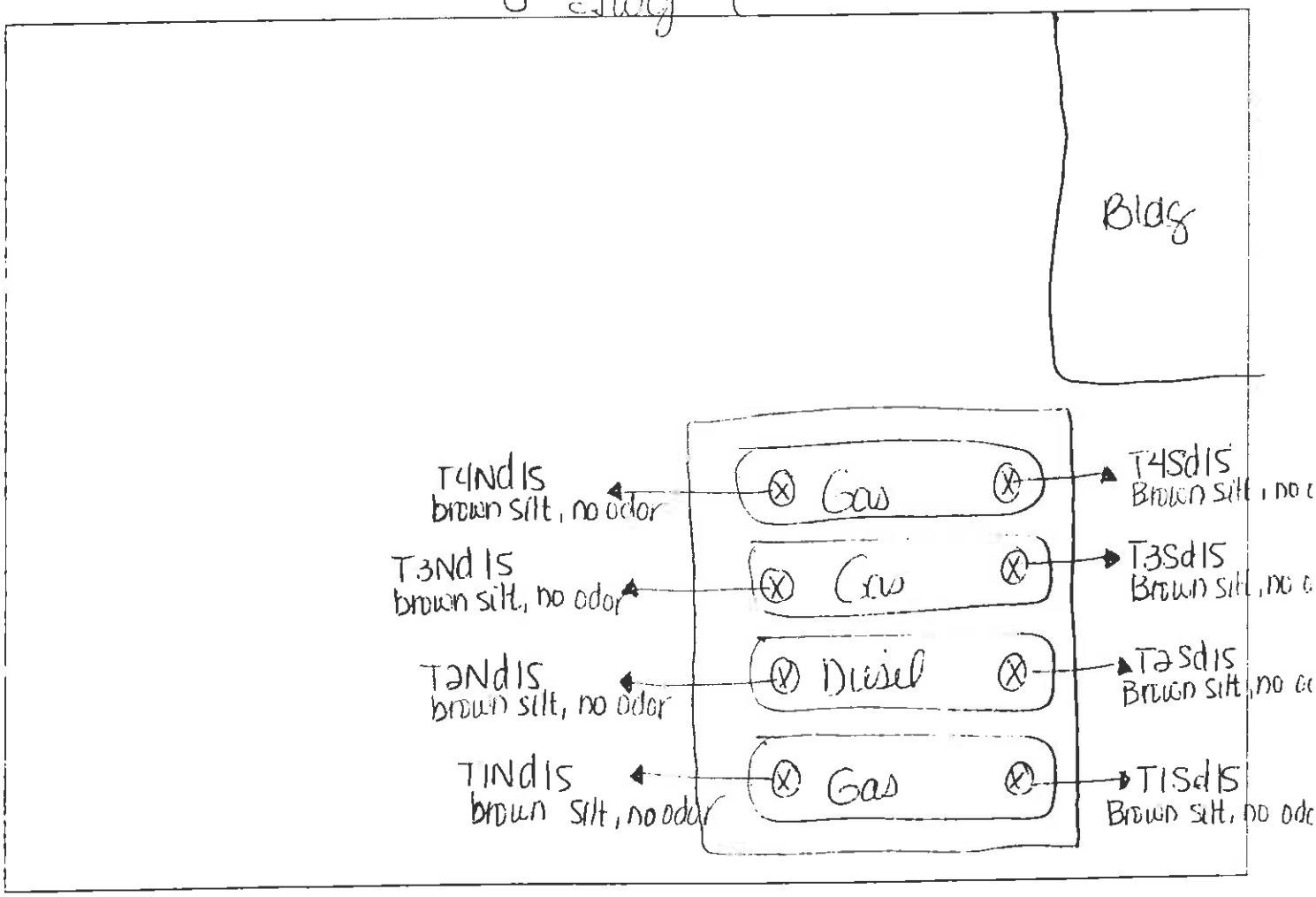
Facility Name: Chevron Station, 530 Alvarado Place, San Clemente

SA # 0104068 TI # _____ LUST # _____ IR # _____

Inspector: Afshawn Rashidi-Yazd Date: 6-30-03 Time: 11:00 am + 1:30 pm

Field Activity: On-site to witness the removal of tanks and direct sampling beneath them. The dispenser & piping will be removed and sampled at a later date.
All soil samples collected from beneath the tanks appeared clean with no obvious signs of contamination

S Hwy (



WAYNE PERRY, INC.
Environmental Remediation, Construction and Consulting

September 23, 2003

County of Orange
Health Care Agency – Environmental Health
2009 E. Edinger Avenue
Santa Ana, CA 92705
Attn.: Mr. Lance Malis

SUBJECT: TANK REMOVAL AND SB989 UPGRADE SOIL SAMPLING REPORT
SHELL SERVICE STATION
530 AVENIDA PICO (AT INTERSTATE 5)
SAN CLEMENTE, CALIFORNIA
WPI PROJECT NO. 03.107E

Environmental Engineer: Mr. Marvin Katz — Tel. No.: (949) 888-0903
Consultant Contact: Ms. Erica Takach — Tel. No.: (714) 826-0352

Dear Mr. Malis:

On behalf of Equilon Enterprises LLC dba Shell Oil Products US (SHELL), Wayne Perry, Inc. (WPI) is pleased to submit this Tank Removal and SB989 Upgrade Soil Sampling Report for the Shell Service Station (site) located at 530 Avenida Pico (at Interstate 5) in the city of San Clemente, California (Figure 1).

RECEIVED HCA/RH
SEP 25 2003
ENVIRONMENTAL HLTH

BACKGROUND

SITE DESCRIPTION

The site is located on Avenida Pico in San Clemente, California (Figure 1). Prior to removal there were four 10,000-gallon single-walled fiberglass underground storage tanks (USTs) at the site. One 10,000-gallon, one 12,000-gallon and one 20,000-gallon double-walled USTs were installed as part of the SB989 upgrade activities. In addition, there are three dispenser islands with associated piping and a gas station building at the site (Figure 2). The surrounding land use is a combination of commercial and residential.

ENVIRONMENTAL OVERSIGHT ACTIVITIES

TANK REMOVAL ACTIVITIES

As part of the SB989 upgrade activities, the existing USTs and product piping were removed and replaced. On June 20, 2003, the four 10,000-gallon USTs and the associated product piping were removed by Jauregui & Culver of Escondido, California. All work was performed in accordance with Orange County Health Care Agency Permit SR0102118. A copy of the permit is in Appendix A.

Vapor monitoring was conducted during tank and product line excavation activities by WPI personnel as per the conditions stated in the South Coast Air Quality Management District (SCAQMD) Rule 1166 soil mitigation plan. Written records of OVA monitoring and calibrations are in Appendix B and will be forwarded to the SCAQMD under separate cover.

Prior to removal, the USTs were triple-rinsed and degassed by Adams Services, Inc. of Gardena, California. The rinsate was transported for disposal as hazardous waste by ECI to Demenno Kerdoon in Compton, California. The USTs were removed under the supervision of Mr. Lance Malis of the Orange County Health Care Agency. Upon removal, the tanks were visually inspected. All four tanks appeared to be in good condition. The USTs were transported for destruction as non-RCRA hazardous waste to the ECI facility in Fontana, California. Rinsate and UST disposal documents, manifests and destruction certificates are in Appendix C.

SOIL SAMPLING ACTIVITIES

WPI personnel collected 13 soil samples from beneath the dispensers, tanks and piping on June 20, 2003 under the direction of Ms. Arghavan Rashidi-Fard and on July 7, 2003, under the direct supervision of Mr. Lance Malis, both of the Orange County Health Care Agency. Soil Samples T1Nd15, T1Sd15, T2Nd15, T2Sd15, T3Nd15, T3Sd15, T4Nd15 and T4Sd15 were collected from the bottom of the UST excavation on June 20, 2003. Soil Samples D-1d4, D-2d4 and

RECEIVED HCA/RH
SEP 25 2003
ENVIRONMENTAL HLTH

D-3d4 were collected from beneath the dispenser islands. Soil Samples P-1d5 and P-2d4 were collected from beneath the product piping on July 7, 2003. Sample locations are shown on Figure 2.

Soil samples were packed into brass tubes. The ends of the tubes were sealed with Teflon® sheets and plastic caps. The samples were labeled, recorded on a chain-of-custody document, and placed in cold storage until analyzed by a state-certified laboratory. All sampling equipment was washed with an approved non-phosphate detergent and water, double-rinsed, and air dried prior to the sampling event.

Soil sampling activities and report generation were conducted under the supervision of a California Registered Geologist.

ANALYTICAL METHODS

Soil samples were delivered to CalScience Environmental Laboratories in Garden Grove, California. The samples were analyzed for total petroleum hydrocarbons as gasoline (TPH-G) and diesel (TPH-D) using EPA Method 8015M; and for benzene, toluene, ethylbenzene and total xylenes (BTEX), and oxygenated compounds using EPA Method 8260B.

ANALYTICAL RESULTS

TPH-G, TPH-D, BTEX and oxygenated compounds were not detected in any of the samples collected.

Analytical results are in Table 1 and shown on Figure 2. A copy of the laboratory report and chain-of-custody documentation is in Appendix D.

SOIL STOCKPILE DISPOSAL

Approximately 602 tons of soil were removed from the site and transported for recycling to TPS Technologies in Adelanto, California. Copies of the non-hazardous waste manifests are in Appendix E.

WARRANTY STATEMENT

This Tank Removal and SB989 Upgrade Soil Sampling Report has been prepared by WPI for the exclusive use of SHELL, as it pertains to the Shell Service Station at 530 Avenida Pico (at Interstate 5) in the city of San Clemente, California. Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by

other geologists, hydrogeologists, and engineers practicing in this field. No other warranty, express or implied, is made as to the professional advice in this report.

If you have any questions regarding this report, please contact Mr. Marvin Katz of SHELL at (949) 888-0903 or Ms. Erica Takach of WPI at (714) 826-0352.

Respectfully submitted,
WAYNE PERRY, INC.

Caroline A. Dollemore
Project Coordinator

David M. Henry
California Registered Geologist 4085

Attachments: Table 1, Soil Analytical Data

Figure 1, Site Location Map
Figure 2, Hydrocarbon Distribution Map

Appendix A, Orange County Health Care Agency Permit
Appendix B, Rule 1166 Soil Monitoring Records
Appendix C, Rinsate and UST Disposal Documents
Appendix D, Laboratory Reports and Chain-of-Custody Documentation
Appendix E, Soil Transportation Documents

cy: Mr. Marvin Katz, SHELL
Mr. Gary Wing, SHELL
Mr. James Strozier, OCHCA

TABLE

TABLE 1
SOIL ANALYTICAL DATA
Shell Service Station
530 Avenida Pico, San Clemente

Sample ID and Depth (feet)	TPH-G (mg/kg)	TPH-D (mg/kg)	Benzene (µg/kg)	Toluene (µg/kg)	Ethyl-benzene (µg/kg)	Total Xylenes (µg/kg)	MTBE (µg/kg)	TBA (µg/kg)	DIPE (µg/kg)	ETBE (µg/kg)	TAME (µg/kg)	COMMENTS
T1Nd15	06/20/03											
15	ND<0.50	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<50	ND<10	ND<10	ND<10	
T1Sd15	06/20/03											
15	ND<0.50	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<50	ND<10	ND<10	ND<10	
T2Nd15	06/20/03											
15	ND<0.50	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<50	ND<10	ND<10	ND<10	
T2Sd15	06/20/03											
15	ND<0.50	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<50	ND<10	ND<10	ND<10	
T3Nd15	06/20/03											
15	ND<0.50	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<50	ND<10	ND<10	ND<10	
T3Sd15	06/20/03											
15	ND<0.50	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<50	ND<10	ND<10	ND<10	
T4Nd15	06/20/03											
15	ND<0.50	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<50	ND<10	ND<10	ND<10	
T4Sd15	06/20/03											
15	ND<0.50	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<50	ND<10	ND<10	ND<10	
D-1d4	07/07/03											
4	ND<0.50	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<50	ND<10	ND<10	ND<10	
D-2d4	07/07/03											
4	ND<0.50	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<50	ND<10	ND<10	ND<10	

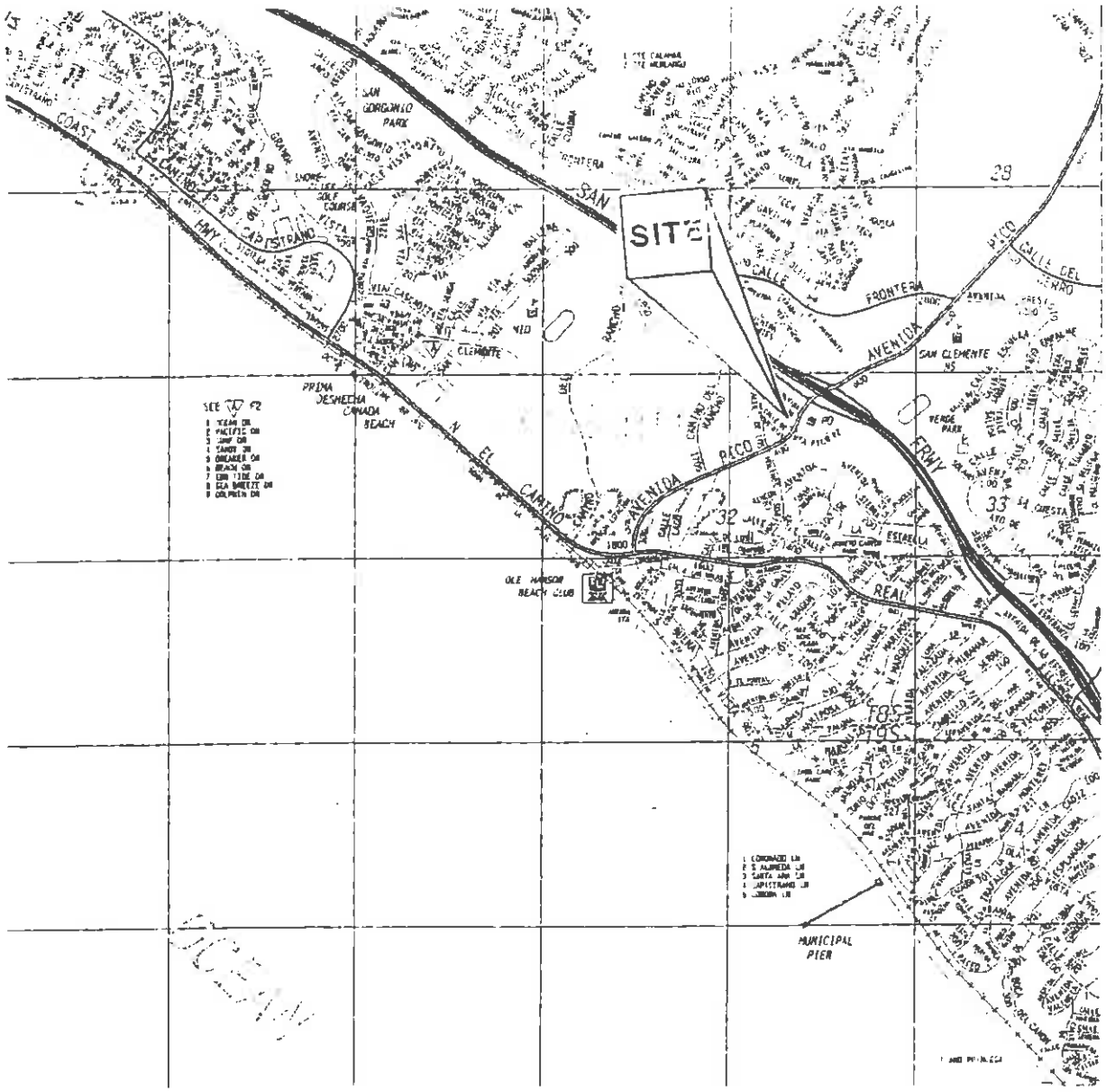
Notes:
NA - Not analyzed
ND - Not detected (less than detection limit)
MTBE - methyl tertiary butyl ether
TBA - tertiary butyl alcohol
DIPE - diisopropyl ether
ETBE - ethyl tertiary butyl ether
TAME - tertiary amyl methyl ether

TABLE 1
SOIL ANALYTICAL DATA
Shell Service Station
530 Avenida Pico, San Clemente

Sample ID and Depth (feet)	TPH-G (mg/kg)	TPH-D (mg/kg)	Benzene (µg/kg)	Toluene (µg/kg)	Ethyl-benzene (µg/kg)	Total Xylenes (µg/kg)	MTBE (µg/kg)	TBA (µg/kg)	DIPE (µg/kg)	ETBE (µg/kg)	TAME (µg/kg)	COMMENTS
D-3d4	07/07/03											
4	ND<0.50	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<50	ND<10	ND<10	ND<10	
P-1d5	07/07/03											
5	ND<0.50	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<50	ND<10	ND<10	ND<10	
P-2d4	07/07/03											
4	ND<0.50	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<5.0	ND<50	ND<10	ND<10	ND<10	

Notes:
NA - Not analyzed
ND - Not detected (less than detection limit)
MTBE - methyl tertiary butyl ether
TBA - tertiary butyl alcohol
DIPE - diisopropyl ether
ETBE - ethyl tertiary butyl ether
TAME - tertiary amyl methyl ether

FIGURES



REFERENCE: THOMAS BROS. MAPS, 2002
COUNTY: ORANGE
PAGE: 992
GRID: H-3

0 2,400 FEET
SCALE

NORTH

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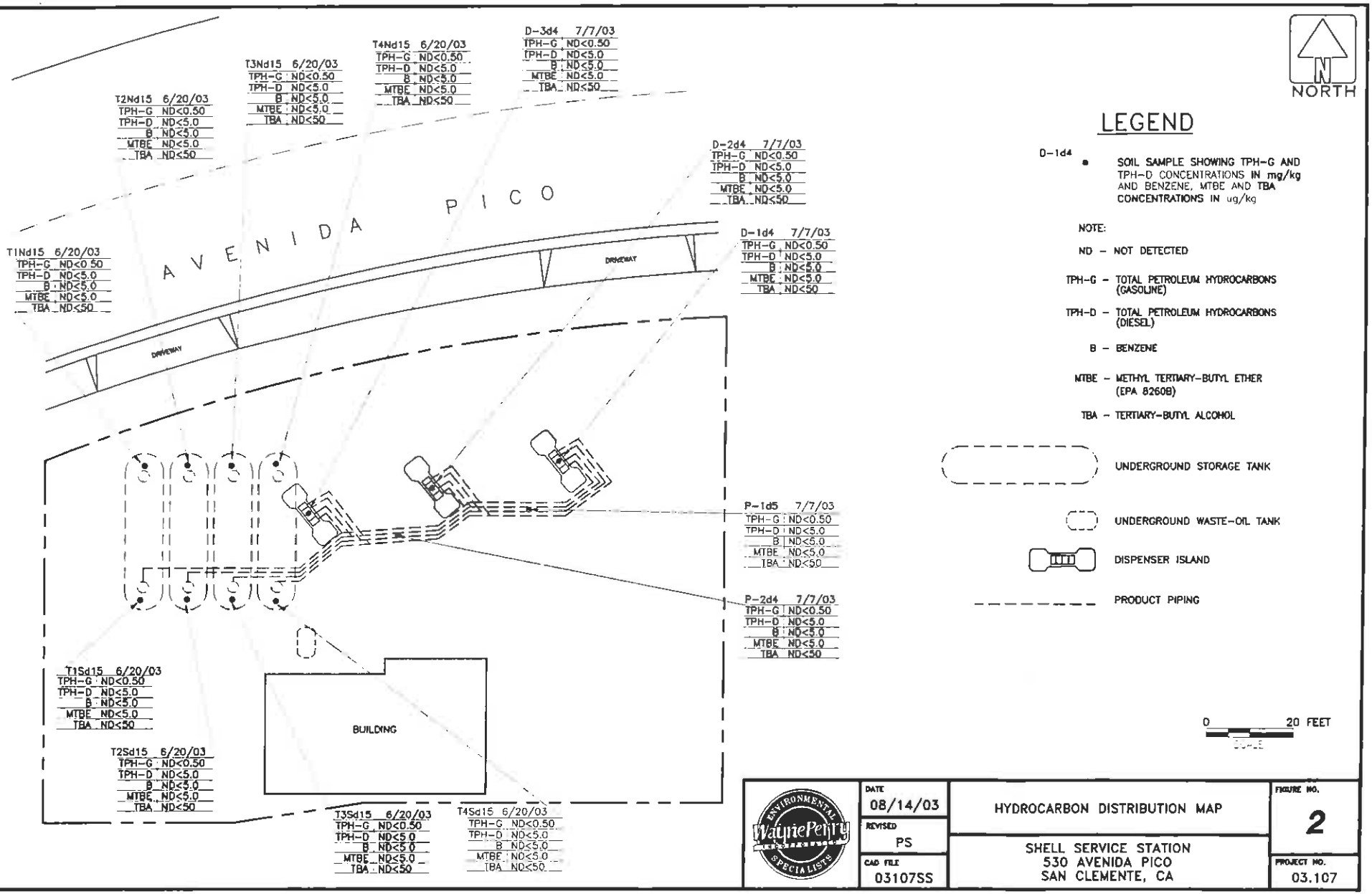
WHETHER FOR PERSONAL USE OR RESALE, WITHOUT PERMISSION.

Wayne Perry SINCE 1986	DATE	SITE LOCATION MAP	FIGURE NO. 1
	REVISED	SHELL SERVICE STATION 530 AVENIDA PICO SAN CLEMENTE, CA	
	CAD FILE 03107LM		PROJECT NO. 03.107



Wayne Perry Environmental Specialists	DATE 08/14/03	HYDROCARBON DISTRIBUTION MAP	FIGURE NO. 2
	REVISED PS	SHELL SERVICE STATION 530 AVENIDA PICO SAN CLEMENTE, CA	
	CAD FILE 03107SS		PROJECT NO. 03.107

COUNTY OF ORANGE
HEALTH CARE AGENCY

REGULATORY HEALTH SERVICES
ENVIRONMENTAL HEALTH

JULIETTE A. POULSON, RN, MN
DIRECTOR

MIKE SPURGEON
DEPUTY AGENCY DIRECTOR
REGULATORY HEALTH SERVICES

STEVEN K. WONG, REHS, MPH
DIRECTOR
ENVIRONMENTAL HEALTH

MAILING ADDRESS
2009 EAST EDINGER AVENUE
SANTA ANA, CA 92705-4720

TELEPHONE: (714) 667-3600
FAX: (714) 972-0749
E-MAIL environhealth@hca co orange ca us

Excellence
Integrity
Service

September 11, 2002

Marvin Katz
Shell Oil Products US
2255 N. Ontario St
Burbank, CA 91504

Subject: **Remedial Action Completion Certification**

Re: Underground Storage Tank (UST) Case
Texaco Station
530 Avenida Pico, San Clemente, CA
O.C.H.C.A. Case #96UT048

Dear Mr. Katz:

This letter confirms the completion of site investigation and corrective action for the underground storage tanks located at the above-described location. Thank you for your cooperation throughout this investigation. Your willingness and promptness in responding to our inquiries concerning the underground storage tanks are greatly appreciated.

Based on information in the above-referenced file and with the provision that the information provided to this Agency was accurate and representative of site conditions, this Agency finds that the site investigation and corrective action carried out at your underground storage tank site is in compliance with the requirements of subdivisions (a) and (b) of Section 25299.37 of the Health and Safety Code and with corrective action regulations adopted pursuant to Section 25299.77 of the Health and Safety Code and that no further action related to the petroleum release at the site is required.

This notice is issued pursuant to subdivision (h) of Section 25299.37 of the Health and Safety Code.

Please contact James Strozier of our office at (714) 667-3711 if you have any questions regarding this matter.

Sincerely,

Steven Wong, REHS, MPH, Director
Environmental Health

SW:jcs
Attachment: Case Closure Summary

cc: Barry Pulver, San Diego Regional Water Quality Control Board
SB 562 Database, State Water Resources Control Board
Cleanup Fund Manager, State Water Resources Control Board
Larry Honeybourne, Environmental Health

Case Closure Summary
Leaking Underground Fuel Tank Program

I. Agency Information

Date: November 14, 2001

Agency Name: **Orange County Health Care Agency**	Address: **2009 East Edinger Avenue**
City/State/Zip: **Santa Ana, CA 92705**	Phone: **(714) 667-3600**
Responsible staff person: **James Strozier**	Title: **Hazardous Waste Specialist**

II. Case Information

Site Facility Name: **Texaco Station**			
Site Facility Address: **530 Avenida Pico, San Clemente, CA**			
RB LUSTIS Case No.:	Local Case No.: **96UT48**	LOP Case No.:	
URF Filing Date:	SWEEPS No.		
Responsible Party	Address		Phone Number
Equilon Enterprises LLC	**20945 S. Wilmington Ave., Carson, CA**		**(949) 888-0903**
Marvin Katz			

Tank No	Size in Gal.	Contents	Closed in-Place/Removed?	Date
	Not Applicable			

III. Release and Site Characterization Information

Cause and type of release: **piping/dispenser**			
Site characterization complete? **Yes**	Date approved by oversight agency: **9-5-01**		
Monitoring wells installed? **Yes**	Number: **5**	Proper screened interval? **Yes**	
Highest GW depth BGS: **35 ft.**	Lowest depth: **38**	Flow direction: **South**	
Most sensitive current use: **Excepted from all beneficial use designations.**			
Are drinking water wells affected? **No**	Aquifer name:		
Is surface water affected? **No**	Nearest/affected SW name:		
Off-site beneficial use impacts (addresses/locations):			
Report(s) on file? **Yes**	Where is report(s) filed? **OCHCA**		

Treatment and Disposal of Affected Material

Material	Amount (include Units)	Action (treatment or disposal/destination)	Date
Tank			
Piping			
Soil	**600 tons**	**TPS Technologies, Adelanto, Ca**	**February 1997**
Groundwater			

Case Closure Summary
Leaking Underground Fuel Storage Tank Program

Case#: 96UT48
Date: November 14, 2001

III. Release and Site Characterization Information (Continued)

Maximum Documented Contaminant Concentrations - - Before and After Cleanup

Contaminant	Soil (ppm)		Water (ppm)		Contaminant	Soil (ppm)		Water (ppm)	
	Before	After	Before	After		Before	After	Before	After
TPH (gas)	25,000	25,000	41	21	MTBE (8020)	<200	<200	1.49	not analyzed
Benzene	112	112	10	6	MTBE (8260)	not analyzed	not analyzed	not analyzed	.130
Toluene	1,912	1,912	3.6	2.5					
Xylene	5,381	5,381	12	3.1					
Ethylbenzene	852	852	3.0	1.5					

Comments (Depth of Remediation, etc.): **During piping and dispenser upgrade activities during 1996, soil contamination was identified around the piping and dispenser areas. Contaminated soil was excavated from the dispenser and piping areas to depths ranging from 5 to 10 feet. 600 tons of contaminated soil was transported to a thermal treatment plant for disposal. Significant soil contamination remained so six soil borings were drilled to determine the extent of the soil contamination. The soil contamination appeared to be mainly limited to an area around the southern dispenser island. However, the contamination extended to groundwater so three monitoring wells were installed at the site. Two of the wells were nested wells (two wells installed within the same borehole) with screened intervals from 5 to 25 ft. and 30 to 45 ft. The shallow wells were installed for possible future vapor extraction pilot testing, if necessary. A groundwater monitoring program was then initiated to monitor the effects of the release on the groundwater. The groundwater monitoring showed non-detectable concentrations in one well,** **(continued next page)**

IV. Closure

Does completed corrective action protect *existing* beneficial uses per the Regional Board Basin Plan? **Yes**		
Does completed corrective action protect *potential* beneficial uses per the Regional Board Basin Plan? **Yes**		
Does corrective action protect public health for current land use? **Yes (Gasoline station)**		
Site management requirements: **None**		
Should corrective action be reviewed if land use changes? **Yes**		
Monitoring wells decommissioned: **No**	Number decommissioned:	Number Retained: **5**
List enforcement actions taken: **None**		
List enforcement actions rescinded:		

V. Local Agency Representative Data

Name: **James Strozier**	Title: **Hazardous Waste Specialist**	
Signature:		Date: **11-14-01**

VI. RWQCB Notification

The San Diego Regional Board staff has informed this Agency that they are no longer able to continue to review LOP case closure summaries for UST sites located in basins or portions of basins with no beneficial use designations. (See Regional Board letter dated November 13, 1998)

VII. Additional Comments, Data, etc.

high concentrations of BTXE in the two deep nested wells, and no significant water present in the two shallow nested wells. No free product was ever detected in the monitoring wells. To further delineate the down-gradient extent of the groundwater contamination, four geoprobe borings were conducted during June 2000. Soil and groundwater samples collected from the borings did not detect any significant contamination.

The consultant estimates that there is approximately ten thousand pounds of gasoline remaining in the soil at the site. They also state that it appears unlikely that free product will ever occur at the site. A fire and explosion survey was conducted in the area around the site and no detectable levels of vapors were discovered in utility vaults, storm drains, etc.

The site is located in a groundwater basin that is excepted from all beneficial use designations. There are no municipal wells within several miles of the site, and the local water district obtains the majority of the water from the Metropolitan Water District. The local water district has no current plans to develop the groundwater resources in this area.

The Pacific Ocean is located approximately 3,700 feet southwest of the site. It does not appear likely that the contamination would ever impact the ocean. However, a concrete lined stream channel (Segunda Deshecha) is located approximately 530 feet down-gradient of the site. The consultant states that based upon elevation differences in the onsite groundwater and the bottom of the stream channel (the groundwater at the site is at an elevation of 20 feet above sea level while the bottom of the concrete lined channel is 50 feet above sea level), it is unlikely that the first groundwater at the site is a contributor to the surface water in the channel in the immediate site vicinity (the groundwater may enter the channel at a much farther point downstream). In addition, three down-gradient geoprobe groundwater samples were non-detect for all contamination, demonstrating that there has been no significant migration of the contamination towards the stream channel.

The RP has made a significant effort to remove the shallow soil contamination from the dispenser and piping areas. However, high concentrations of soil and groundwater contamination remain at the site. Based upon the site assessment and groundwater monitoring data gathered at the site over the past five years, it appears that the remaining soil and groundwater contamination is stable and not expanding, and do not pose a threat to public health and safety or groundwater resources. Therefore, it appears that additional corrective action is not warranted/cost effective, and it is recommended that the case be closed.

Jeremy

AMBIENCE
Engineering Services
PLANNING ENGINEERING ARCHITECTURAL

May 6, 2002

Orange County Health Care Agency
2009 E. Edinger Ave.
Santa Ana, CA. 92705
Attn: Jeremy Grant

SUBJECT: TEXACO STATION; 530 Avenida Pico, San Clemente
SR#0102118

Dear Mr. Grant,

Please find attached, four (4) sets of revised drawings for the above listed location for your review and comments/approval.

Shell Oil Products Company is proposing to remove the existing underground storage tanks with all related piping and install one (1) 10,000, two (2) 12,000, and one (1) 20,000 gallon double wall fiberglass Xerxes underground storage tanks with double wall fiberglass product/vent/vapor piping.

All new tanks will be installed with new turbine sumps and Philtite full sumps, which will be monitored by Veeder Root sensors connecting to existing Veeder Root monitoring system.

All existing dispenser containments will be replaced by deep Fiberlite dispenser containment boxes, which will be monitored by Beaudreau EBI Model 406-5.

Should you have any other questions regarding the enclosed drawings or the above given information, please do not hesitate to call me at (714)987-7771. Thank you.

Sincerely,

Carmen C. Begay

Carmen C. Begay
Ambience Engineering

Over fill ?

Rigid piping

Pg E-0/03 1/00 shows use of BEI 406-5 Discriminating Sensor — not allowed

ENVIRONMENTAL HEALTH DIVISION
HAZARDOUS MATERIALS MANAGEMENT SECTION
2009 East Edinger Avenue
Santa Ana, California 92705
(714) 667-3700

UNIFORM SUMMARY SHEET FOR TANK TEST RESULTS

CHECK APPROPRIATE BOX:

[X] ALL OF TANKS/ASSOCIATED PIPING HAVE BEEN TESTED TIGHT.

[ ] SOME OF THE TANKS AND ASSOCIATED PIPING HAVE FAILED TIGHTNESS TEST.

DATE: 07/30/2003

REASON FOR TEST: ____ ANNUAL TEST ____ SUSPECTED LEAK X RETEST AFTER REPAIR ____ NEW TANK

X OTHER (EXPLAIN) POST CONSTRUCTION TESTING

TEST METHOD IS: ____ VOLUMETRIC X NON-VOLUMETRIC (EXPLAIN) VACUUM

TANK FACILITY LOCATION	NAME: SHELL 121371		
	ADDRESS: 530 AVENIDA PICO		
	CITY: SAN CLEMENTE, CA		ZIP: 92672
TANK OPERATOR	NAME:		PHONE:
TANK OWNER	NAME SHELL OIL COMPANY US		PHONE: [714] 731-8337
	ADDRESS: 4790 IRVINE BLVD.		
	CITY: IRVINE	STATE: CA	ZIP: 92620

TANK NO.	AGE OF TANK MO/YR	TANK CAPACITY	PRODUCT TYPE	TEST RESULTS					TEST DATE
				TANK		PRODUCT LINE		FILL, VENT, VAPOR	
				GAL/HR	PASS/FAIL	GAL/HR	PASS/FAIL	PASS/FAIL	
1		19703	Unleaded	0.000	Pass	0.000	Pass	Pass	07/30/2003
2		9684	Diesel	0.000	Pass	0.000	Pass	Pass	07/30/2003
3		11527	Premium	0.000	Pass	0.000	Pass	Pass	07/30/2003
4									
5									
6									

METHOD OF PRODUCT LINE TEST: TLD1

METHOD OF VENT/VAPOR/REMOTE FILL LINE TEST: VACUTECH

INDICATE WHICH (IF ANY) TANKS ARE MANIFOLDED: NONE

PRESSURE LOSS LEAK DETECTOR WAS TESTED AND IS OPERATIONAL. DATE TESTED 07/30/2003 RESULTS ARE ATTACHED.

THE TEST RESULTS HAVE BEEN CONDUCTED AND PERFORMED BY A TESTER CERTIFIED ACCORDING TO THE REQUIREMENTS OF THE TANK TEST EQUIPMENT MANUFACTURER. THE TESTER IS LICENSED BY THE WATER RESOURCES CONTROL BOARD OFFICE OF TANK TESTER LICENSING AND MEETS THE REQUIREMENTS OF SUBCHAPTER 17, TITLE 23 OF THE CALIFORNIA CODE OF REGULATIONS. THE TANK OWNER HAS BEEN NOTIFIED OF THESE RESULTS, AND HAS BEEN ADVISED OF THE REPORTING REQUIREMENTS FOR INTEGRITY TESTING. THE DATA AND CALCULATIONS NECESSARY TO PRODUCE THE TEST RESULTS ARE ATTACHED TO THIS FORM.

TESTING COMPANY Tanknology-NDE NAME OF TEST METHOD VACUTECH

PRINTED NAME OF TESTER DAVID M. JOHNSON LICENSE NO. 1586 EXP. DATE 04/30/2004

SIGNATURE OF TESTER _____ DATE 07/30/2003

REV: 11/02/90

RECEIVED HCA/RH

SEP 29 2003

Tanknology
8900 SHOAL CREEK, BUILDING 200
AUSTIN, TEXAS 78757
(512) 451-6334
FAX (512) 459-1459

TEST DATE: 07/30/03

WORK ORDER NUMBER: 3130217

CLIENT: SHELL OIL COMPANY US

SITE: SHELL 121371

COMMENTS

post contruction, unable to ceritify the veeder root, no power to the panel.

PARTS REPLACED

QUANTITY	DESCRIPTION

HELIUM PINPOINT TEST RESULTS (IF APPLICABLE)

ITEMS TESTED

HELIUM PINPOINT LEAK TEST RESULTS

Tanknology

TANKNOLOGY CERTIFICATE OF T ING

8900 SHOAL CREEK, BUILDING 200 AUSTIN, TEXAS 78757
TELEPHONE (512) 451-6334 FAX (512) 459-1459

TEST RESULT SUMMARY REPORT

PURPOSE: POST CONST
TEST DATE: 07/30/03

WORK ORDER NUMBER: 3130217
CUSTOMER PO:

CLIENT: SHELL OIL COMPANY US
4790 IRVINE BLVD.
SUITE 105
IRVINE, CA 92620
GARY WING
(714)731-8337

SITE: SHELL 121371
530 AVENIDA PICO
TEXACO
SAN CLEMENTE, CA 92672
MANAGER
(949)492-2375

Tank Tightness Tests Results

TEST TYPE: VacuTect

TANK ID	PRODUCT	TANK CAPACITY	TANK DIAMETER	TANK MATERIAL	PRODUCT LEVEL	EXTERNAL* WATER LEVEL	TEST RESULT WET	TEST RESULT DRY
1	UNLEADED	19,703	117.0	DW FIBERG	81.00		PASS	PASS
2	DIESEL	9,684	90.00	DW FIBERG	65.25		PASS	PASS
6	PREMIUM	11,527	90.00	DW FIBERG	71.00		PASS	PASS

*Where regulations require, for VacuTect external water level may be depth of dry well or water is assumed at lowest point that can be confirmed dry.

Product Pipe Tightness Test Results

LINE ID	LINE MATERIAL	DELIVERY TYPE	TEST RESULT A	B	C	D	FINAL LEAK RATE (gph) A	B	C	D	TEST METHOD	IMPACT VALVE FUNCTION
1	DW FIBERG	PRESSURE	P				0.000				TLD-1	Y
2	DW FIBERG	PRESSURE	P				0.000				TLD-1	Y
6	DW FIBERG	PRESSURE	P				0.000				TLD-1	Y

Existing Line Leak Detector Test

LINE ID	EXISTING LEAK DETECTOR #1 MANUFACTURER	MODEL #	SERIAL #	RESULT	EXISTING LEAK DETECTOR #2 MANUFACTURER	MODEL #	SERIAL #	RESULT
1								
2								
6								

New Replacement Line Leak Detector Test

LINE ID	REPLACED LEAK DETECTOR #1 MANUFACTURER	MODEL #	SERIAL #	RESULT	REPLACED LEAK DETECTOR #2 MANUFACTURER	MODEL #	SERIAL #	RESULT

For owner detailed report information, visit www.tanknology.com and select On-Line Reports-WRAP, or contact your local Tanknology office.

Tester Name: DAVID M. JOHNSON

Technician Certification Number: 1586

INDIVIDUAL TANK INFORMATION AND TEST RESULTS

Tanknology
8900 SHOAL CREEK, BUILDING 200
AUSTIN, TEXAS 78757 (512) 451-6334

TEST DATE: 07/30/03
CLIENT: SHELL OIL COMPANY US

WORK ORDER NUMBER 3130217
SITE: SHELL 121371

TANK INFORMATION

Tank ID:	1	Tank manifolded:	NO	Bottom to top fill in inches:	146.0
Product:	UNLEADED	Vent manifolded:	YES	Bottom to grade in inches:	148.0
Capacity in gallons:	19,703	Vapor recovery manifolded:	YES	Fill pipe length in inches:	54.0
Diameter in inches:	117.00	Overfill protection:	YES	Fill pipe diameter in inches:	4.0
Length in inches:	345	Overspill protection:	YES	Stage I vapor recovery:	DUAL
Material:	DW FIBERG	Installed:	ATG	Stage II vapor recovery:	ASSIST
		CP installed on:	/ /		

COMMENTS

TANK TEST RESULTS Test Method: VacuTect

	Start (in)	End (in)
Dipped Water Level:	0.00	0.00
Dipped Product Level:	81.00	81.00
Probe Water Level:	-0.032	-0.032

Ingress Detected: Waler N Bubble N Ullage N
Test time: 10:48-12:06
Inclinometer reading: 0.00
VacuTect Test Type: Multiple tanks
VacuTect Probe Entry Point: Fill
Pressure Set Point: -0.90
Tank water level in inches: 0.00
Water table depth in inches:
Determined by (method): NO WELL
Result: PASS

COMMENTS

LEAK DETECTOR TEST RESULTS Test method: FTA

	New/passed L.D. #1	Failed/replaced L.D. #1	New/passed L.D. #2	Failed/replaced L.D. #2
Make:				
Model:				
S/N:				
Open time in sec:				
Holding psi:				
Resiliency cc:	NOT		NOT	
Test leak rate ml/m:	TESTED		TESTED	
Metering psi:				
Calib. leak in gph:				
Results:				

COMMENTS

LINE TEST RESULTS Test type: TLD-1

LINE	A	B	C	D
Material:	DW FIBERG			
Diameter (in):	2.0			
Length (ft):	100.0			
Test psi:	50			
Bleedback cc:	0			
Test time (min):	30			
Start time:	11:07	NOT TESTED	NOT TESTED	NOT TESTED
End time:	11:37			
Final gph:	0.000			
Result:	PASS			
Pump type:	PRESSURE			
Pump make:	FE PETRO			

COMMENTS

Impact Valves Operational: YES

Printed 09/18/2003 11:54

INDIVIDUAL TANK INFORMATION AND TEST RESULTS

Tanknology
8900 SHOAL CREEK, BUILDING 200
AUSTIN, TEXAS 78757 (512) 451-6334

TEST DATE: 07/30/03
CLIENT: SHELL OIL COMPANY US

WORK ORDER NUMBER 3130217
SITE: SHELL 121371

TANK INFORMATION

Tank ID:	2	Tank manifolded:	NO	Bottom to top fill in inches:	147.0
Product:	DIESEL	Vent manifolded:	NO	Bottom to grade in inches:	149.0
Capacity in gallons:	9,684	Vapor recovery manifolded:	NO	Fill pipe length in inches:	55.0
Diameter in inches:	90.00	Overfill protection:	YES	Fill pipe diameter in inches:	4.0
Length in inches:	345	Overspill protection:	YES	Stage I vapor recovery:	NONE
Material:	DW FIBERG	Installed:	ATG	Stage II vapor recovery:	NONE
		CP installed on:	/ /		

COMMENTS

TANK TEST RESULTS Test Method: VacuTect

	Start (in)	End (in)
Dipped Water Level:	0.00	0.00
Dipped Product Level:	65.25	65.25
Probe Water Level:	-0.009	-0.035

Ingress Detected: Water N Bubble N Ullage N

Test time:	08:01-13:29
Inclinometer reading:	0.00
VacuTect Test Type:	Single tank
VacuTect Probe Entry Point:	Fill
Pressure Set Point:	-0.80
Tank water level in inches:	0.00
Water table depth in inches:	
Determined by (method):	NO WELL
Result:	PASS

COMMENTS

LEAK DETECTOR TEST RESULTS Test method: FTA

	New/passed L.D. #1	Failed/replaced L.D. #1	New/passed L.D. #2	Failed/replaced L.D. #2
Make:				
Model:				
S/N:				
Open time in sec:				
Holding psi:				
Resiliency cc:	NOT		NOT	
Test leak rate ml/m:	TESTED		TESTED	
Metering psi:				
Calib. leak in gph:				
Results:				

COMMENTS

LINE TEST RESULTS Test type: TLD-1

LINE	A	B	C	D
Material:	DW FIBERG			
Diameter (in):	2.0			
Length (ft):	100.0			
Test psi:	50			
Bleedback cc:	0			
Test time (min):	30	NOT	NOT	NOT
Start time:	11:07	TESTED	TESTED	TESTED
End time:	11:37			
Final gph:	0.000			
Result:	PASS			
Pump type:	PRESSURE			
Pump make:	FE PETRO			

COMMENTS

Impact Valves Operational: YES

INDIVIDUAL TANK INFORMATION AND TEST RESULTS

Tanknology
8900 SHOAL CREEK, BUILDING 200
AUSTIN, TEXAS 78757 (512) 451-6334

TEST DATE: 07/30/03
CLIENT: SHELL OIL COMPANY US

WORK ORDER NUMBER 3130217
SITE: SHELL 121371

TANK INFORMATION

Tank ID:	6	Tank manifolded:		Bottom to top fill in inches:	
Product:	PREMIUM	Vent manifolded:		Bottom to grade in inches:	159.0
Capacity in gallons:	11,527	Vapor recovery manifolded:		Fill pipe length in inches:	
Diameter in inches:	90.00	Overfill protection:		Fill pipe diameter in inches:	4.0
Length in inches:	424	Overspill protection:		Stage I vapor recovery:	
Material:	DW FIBERG	Installed:		Stage II vapor recovery:	
		CP installed on:	/ /		

COMMENTS

TANK TEST RESULTS Test Method: VacuTect

	Start (in)	End (in)
Dipped Water Level:	0.00	0.00
Dipped Product Level:	71.00	71.00
Probe Water Level:	0.003	-0.006

Ingress Detected: Water N Bubble N Ullage N
Test time: 08:18-12:06
Inclinometer reading: 0.00
VacuTect Test Type: Multiple tanks
VacuTect Probe Entry Point: Fill
Pressure Set Point: -0.90
Tank water level in inches: 0.00
Water table depth in inches:
Determined by (method): NO WELL
Result: PASS

COMMENTS

LEAK DETECTOR TEST RESULTS Test method: FTA

	New/passed L.D. #1	Failed/replaced L.D. #1	New/passed L.D. #2	Failed/replaced L.D. #2
Make:				
Model:				
S/N:				
Open time in sec:				
Holding psi:				
Resiliency cc:	NOT		NOT	
Test leak rate ml/m:	TESTED		TESTED	
Metering psi:				
Calib. leak in gph:				
Results:				

COMMENTS

LINE TEST RESULTS Test type: TLD-1

LINE	A	B	C	D
Material:	DW FIBERG			
Diameter (in):	2.0			
Length (ft):	110.0			
Test psi:	50			
Bleedback cc:	0			
Test time (min):	30	NOT	NOT	NOT
Start time:	11:07	TESTED	TESTED	TESTED
End time:	11:37			
Final gph:	0.000			
Result:	PASS			
Pump type:	PRESSURE			
Pump make:	FE PETRO			

COMMENTS

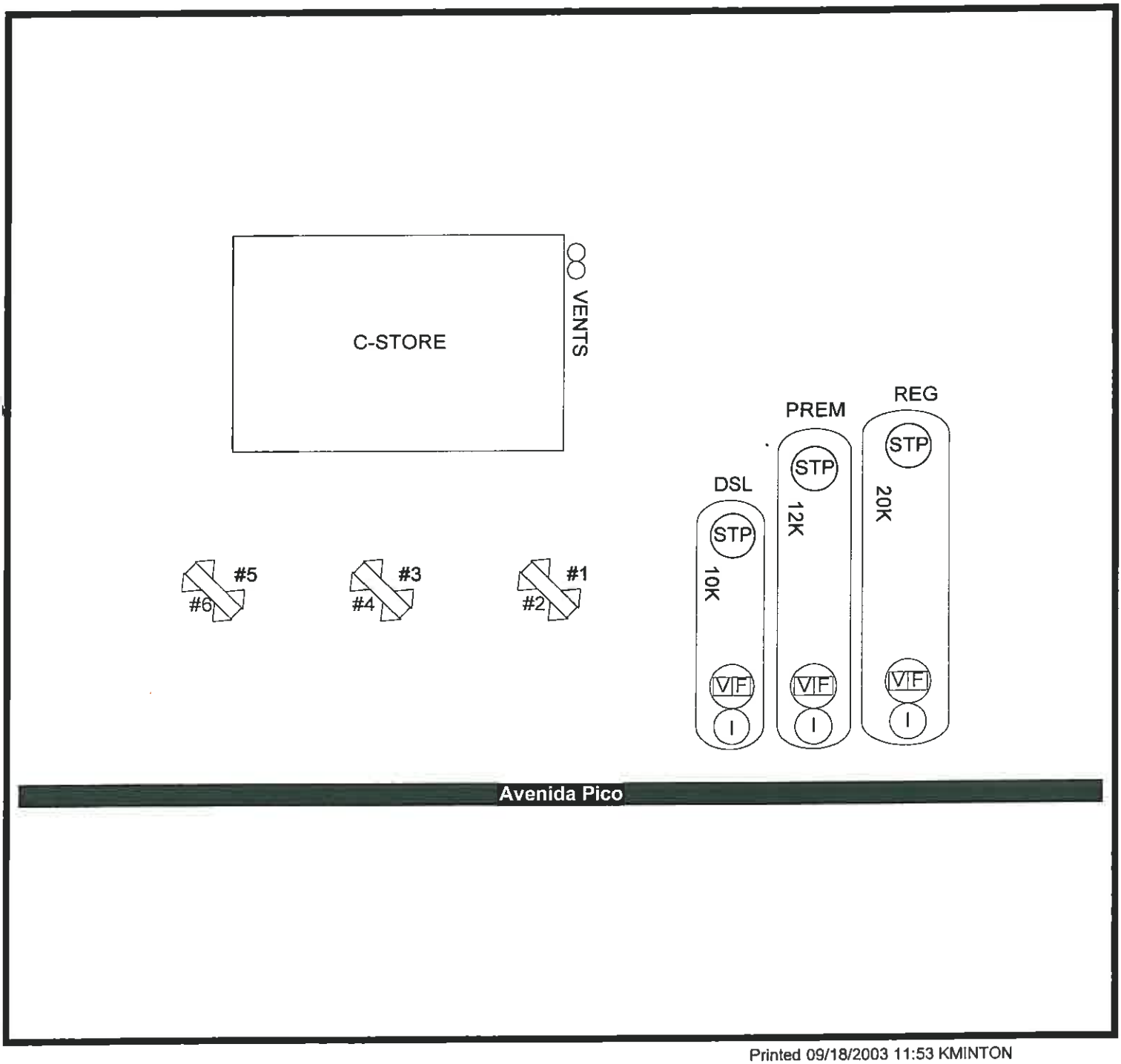
Impact Valves Operational: YES

Printed 09/18/2003 11:54

SITE DIAGRAM

Tanknology
8900 SHOAL CREEK, BUILDING 200
AUSTIN, TEXAS 78757
(512) 451-6334
FAX (512) 459-1459

TEST DATE: 07/30/03
WORK ORDER NUMBER: 3130217
CLIENT: SHELL OIL COMPANY US
SITE: SHELL 121371



Printed 09/18/2003 11:53 KMINTON

INSPECTION REPORT

County of Orange, Health Care Agency, Environmental Health
2009 E. Edinger Ave., Santa Ana, CA 92705
(714) 667-3600

SHELL 121371

530 E AVENIDA PICO, SAN CLEMENTE, 92672	Inspection Date: 07/07/03
Service(s): A06	FA0024796
Regulatory Health Specialist: Lance Malis, (714) 667-3727	UST PLAN CHECK - INSTALL
	Reinspection Date:

On site for piping pre removal inspection. Piping and dispensers were in place upon arrival. Piping had proper corrosion protection. Facility appeared to have met 1998 upgrade requirements. Five soil samples taken under piping and dispensers. See UST activity report for details of the sampling.

I declare that I have examined and received a copy of this inspection report.

Print Name and Title Jim Jawregui

Signature [signature] Date 7/7/03

ENTERED JUL 10 2003

F272-09.373Ae DISTRIBUTION: Operator One Copy Environmental Health One Copy

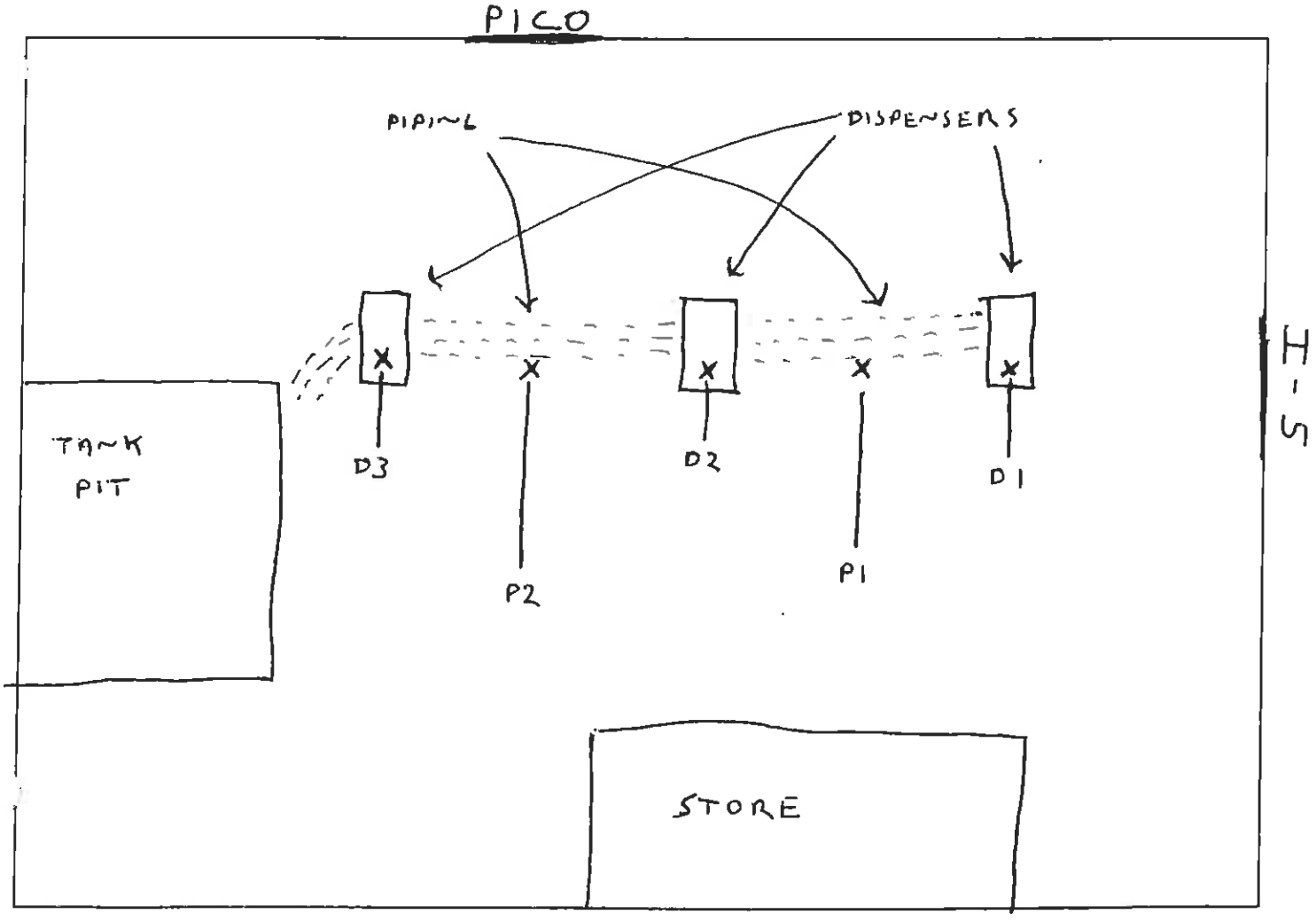
FIELD ACTIVITY DESCRIPTION

SHELL 530 E AVE PICO SAN CLEMENTE 92672
Facility Name

PC # SR0102118 TI # _____ LUST # _____ IR # _____

Inspector: LANCE MALIS Date: 7-7-03 Time: _____

Field Activity: ON SITE FOR PRE/REMOVAL INSPECTION FOR PIPING AND DISPENSERS. I WAS SCHEDULED FOR A PIPING INSPECTION, I ASSUMED IT WAS A PRIMARY OR SECONDARY BECAUSE TANKS WERE REMOVED AND SOIL SAMPLES TAKEN. HOWEVER, PIPING WAS STILL IN PLACE, SOIL SAMPLING WAS DONE WITHOUT A GAS TECH AND "WAYNE WITH PERRY'S" CHAIN OF CUSTODY, 5 SOIL SAMPLES TAKEN, EACH SAMPLE WAS TAKEN APPROX 1 FOOT INTO NATIVE SOIL, 4 TO 5 FEET TOTAL DEPTH. SEE BELOW DIAGRAM FOR LOCATIONS. NO PETROLEUM ODOR WAS DETECTED ON ANY OF THE SAMPLES. NO STAINING IN SOIL NOTICED. SOIL TEXTURE RANGED FROM SANDY TO CLAY LITE



Received Jul-07-2003 04:17pm From- To-ENV HEALTH SECOND FL Page 001

JUL 07 2003 4:13PM HP LASERJET 3200

LABORATORIES, INC.

Shell Chain Of Custody Record

7440 Lincoln Way
Garden Grove, CA 92841-1432
(714) 895-5494 (714) 894-7501 fax

Shell Project Manager to be Invoiced:
- [ ] SCIENCE & ENGINEERING
- [x] TECHNICAL SERVICES: Don McDaniel
- [ ] RMT: HOUSTON

SHELL FACILITY NUMBER (SAP): 1213711

DATE: 7/7/03

PAGE: 1 of 1

SAMPLING COMPANY: Wayne Perry, Inc.

LOG CODE: WPBP

SITE ADDRESS (Street and City): 530 Avenida Pico San Clemente

GLOBAL ID NO.:

ADDRESS: 8281 Commonwealth Avenue

EDF DELIVERABLE TO (Responsible Party or Designee): Trupti Balsills

PHONE NO.: (714) 826-0352

E-MAIL: TBalsills@WPINC.com

CONSULTANT PROJECT NO.: D3.107E

PROJECT CONTACT (Hardcopy or PDF Report to): Erica Takach

TELEPHONE: (714) 828-0352

FAX: (714) 523-7641

E-MAIL: etakach@wpinc.com

SAMPLER NAME(S) (Print): Cash Farrell

TURNAROUND TIME (BUSINESS DAYS)
- [ ] 10 DAYS [ ] 5 DAYS [ ] 72 HOURS [ ] 48 HOURS [x] 24 HOURS [ ] LESS THAN 24 HOURS

- [ ] RWQCB REPORT FORMAT [ ] UST AGENCY:

GEMS MTBE CONFIRMATION: HIGHEST _____ HIGHEST per BORING _____ ALL _____

SPECIAL INSTRUCTIONS OR NOTES: CHECK BOX IF EDD IS NOT NEEDED [ ]

EDF
LAVE

REQUESTED ANALYSIS

Field Sample Identification	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH - Gas, Purgeable	BTEX by 8260B	MTBE (8021B - 5ppb RL)	MTBE (8260B - 0.5ppb RL)	Oxygenates (5) by (8260B)	Ethanol (8260B)	Methanol	EDB & 1,2-DCA (8260B)	EPA 5035 Extraction for Volatiles	VOCs Halogenated/Aromatic (8021B)	TRPH (418.1)	Vapor VOCs BTEX / MTBE (TO-15)	Vapor VOCs Full List (TO-15)	Vapor TPH (ASTM 3416m)	Vapor Fixed Gases (ASTM D1946)	Test for Disposal (48-hr)	TPH - Diesel, Extractable (8015m)	MTBE (8260B) Confirmation, See Note	TEMPERATURE ON RECEIPT C°
D-1d4	7/7	1415	soil	1	X	X		X	X											X	X		
P-1d5	7/7	1430	soil	1	X	X		X	X											X	X		
D-2d4	7/7	1435	soil	1	X	X		X	X											X	X		
P-2d4	7/7	1440	soil	1	X	X		X	X											X	X		
D-3d4	7/7	1445	soil	1	X	X		X	X											X	X		

FIELD NOTES: Container/Preservative or PID Readings or Laboratory Notes

Relinquished by: (Signature)

Relinquished by: (Signature)

Relinquished by: (Signature)

Date: 7/7/03 Time:

Date: Time:

Date: Time:

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

Revision

HEALTH CARE AGENCY
REGULATORY HEALTH SERVICES

JUL 08 2003

HEALTH CARE AGENCY
ENVIRONMENTAL HEALTH

LANCE MALIS
HAZARDOUS WASTE SPECIALIST

OFFICE ADDRESS:
2009 E. EDINGER AVE.
SANTA ANA, CA 92705

(714) 667-3727
FAX: (714) 568-5116
lmalis@hca.co.orange.ca.us

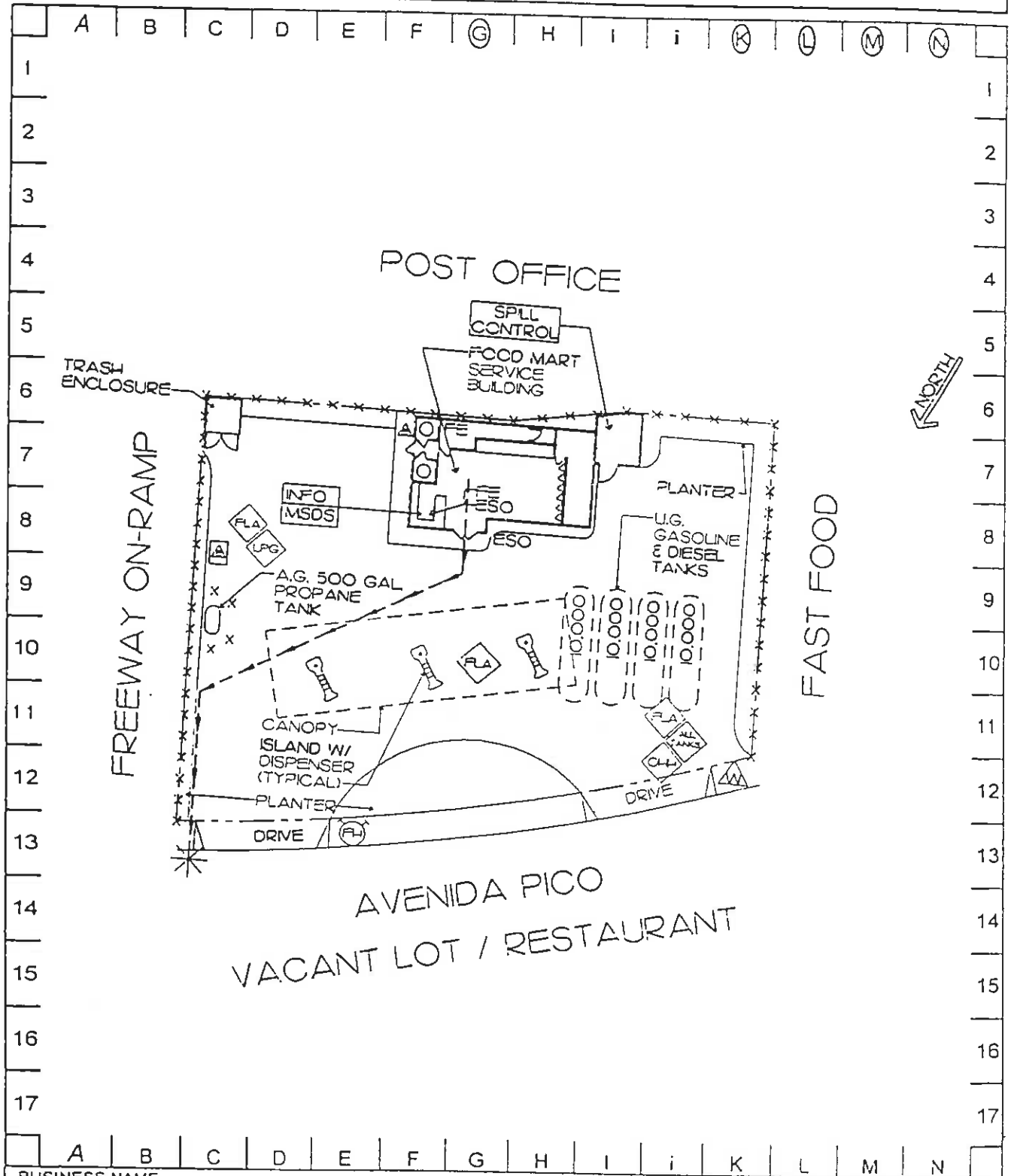
2045-888 (1/) Graphic DSD

121371

HAZARDOUS MATERIALS DISCLOSURE

Chemical Inventoiy and Business Emergency Plan

Section D - Site Map



BUSINESS NAME		DATE
Ramirez Bros. Texaco		12/2/98
ADDRESS	**CITY**	**ZIP**
530 Avenida Pico	San Clemente	92671

Site map page 1 of 1

(page number you assign is to be entered on chemical inventory sheet)

THIRD QUARTER 2001
GROUNDWATER MONITORING REPORT

Texaco Service Station
530 Avenida Pico at Interstate 5
San Clemente, California

INTRODUCTION

The site is an operational Texaco service station located on the west side and adjacent to Interstate 5 in the City of San Clemente, California in a commercial district with heavy traffic density. A site vicinity map is shown as **Figure 1.** The Texaco Station is located lies along the south side of Avenida Pico adjacent to and just west of the southbound interstate onramp. A fast food restaurant is located directly west of the station and a parking lot for the US Postal Service mail delivery vehicles is located directly south of the subject property. An operational Chevron Station is located northwest of the site across Avenida Pico.

The site is currently operated as a retail petroleum motor fuel dispensing service and a convenience mart. Three 10,000-gallon operational double wall fiberglass underground storage tanks (UST's) are currently located on the northwest portion of the property. There are currently three groundwater monitoring wells that are monitored at the facility (**Figure 2**). Groundwater monitoring and sampling was conducted by Blaine Tech Services on September 26th for the third quarter 2001 monitoring period. This report documents the methods and presents the findings of this event.

GROUNDWATER MONITORING PROCEDURES AND RESULTS

Prior to sampling each well, the depth to water and/or liquid phase hydrocarbons were measured for three groundwater monitoring wells using an oil/water interface probe. A copy of the gauging/well no purge field data sheet is attached as **Appendix A**.

Based on the depth to water data, groundwater flow is currently to the south. Liquid phase petroleum hydrocarbon (free product) was not observed in any of the wells. Results of the groundwater monitoring data collected on September 26, 2001 are presented in the table included in **Appendix A** and in **Table 1** (Attachments). The relative groundwater elevations are plotted and contoured on **Figure 3** (Attachments). Copies of the monitoring and sampling field data records are included in the **Appendix A**.

GROUNDWATER SAMPLING PROCEDURES

On September 26, 2001 groundwater samples were collected from wells MW-1, MW-2D, and MW-3D. Wells MW-2S and MW-3S were dry. A copy of the gauging/well no purge field data sheet is attached in **Appendix A**. The samples were collected using a new, disposable polyethylene bailer for each well. The samples were chilled and shipped to a California State-certified laboratory for analysis. Each of the samples was analyzed for total petroleum hydrocarbons as gasoline (TPH-G) by modified EPA Method 8015 and for benzene, toluene, ethylbenzene, total xylenes (BTEX), methyl tert-butyl-ether (MTBE), and oxygenates by EPA Method 8260B.

ANALYTICAL RESULTS OF GROUNDWATER SAMPLES

The analytical results for the groundwater samples collected during the third quarter of 2001, are summarized in the table included in **Appendix A**. The maximum TPH-g and benzene concentrations were detected in the sample collected from well MW-3D at concentrations of 21,000 ug/L and 6,000 ug/L respectively. The maximum MTBE concentration was detected in the sample collected from well MW-1 at a concentration of 130 ug/L. The dissolved TPH, benzene, and MTBE concentrations detected in the wells on September 26, 2001, are plotted on **Figures 4**, **5**, and **6** respectively **(Attachments)**. The laboratory reports and chain-of-custody records for the groundwater samples are included in **Appendix A**.

A summary of the historical groundwater data is included as **Table 1 (Attachments)**. Groundwater trend summaries are included in **Appendix B**.

GROUNDWATER DISPOSAL

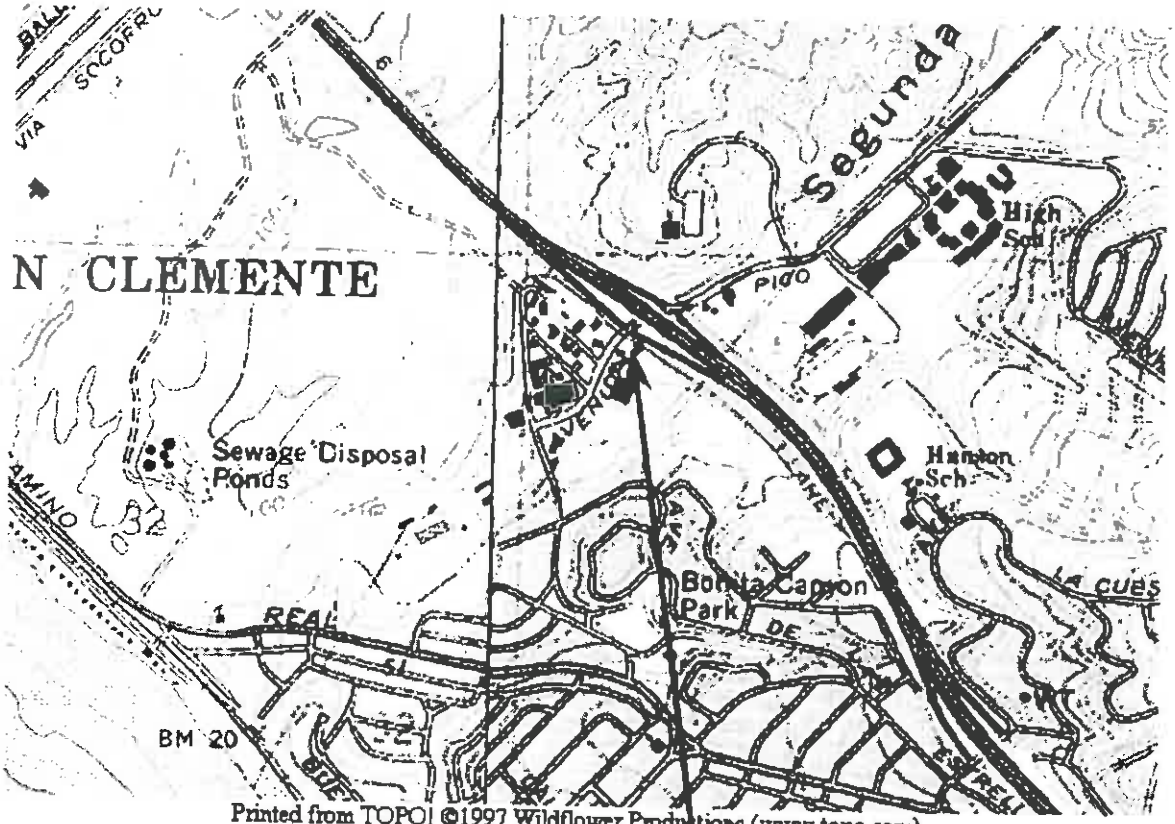
No wastewater was generated during the monitoring/sampling event on September 26, 2001.

SUMMARY

During the third quarter of 2001, depth to water was monitored and groundwater samples were collected from three monitoring wells at the site. The maximum TPH-g and benzene concentrations were detected in the sample collected from well MW-3D at concentrations of 21,000 ug/L and 6,000 ug/L respectively. The maximum MTBE concentration was detected in the sample collected from well MW-1 at a concentration of 130 ug/L. The estimated groundwater flow direction beneath the site is to the south.

ATTACHMENTS

Figures 1 through 6
Table 1



Site Location

N

Legend

Source: 1997 Topo CD-ROM

WGR Southwest, Inc.
11021 Winners Circle Suite 101
Los Alamitos CA 90720

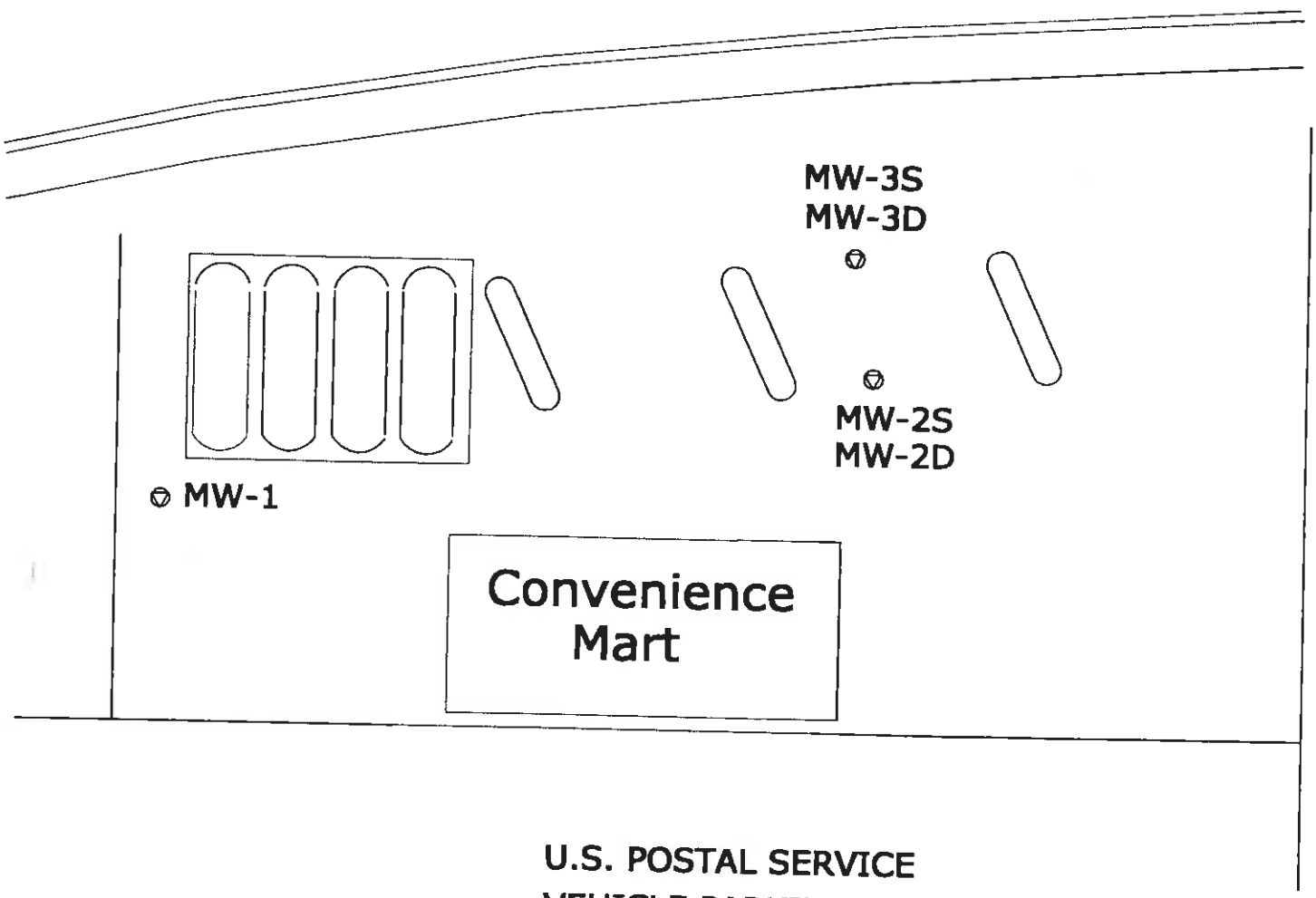
Equiva Services, LLC

Site Vicinity Map

530 Avenida Pico San Clemente, CA

Figure **1**

DATE	PROJECT NUMBER	DWN BY	DWG #
10/31/01	088EQL.00	JGM	



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DRAWING NOT TO SCALE

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MONITORING WELL LOCATION

WGR Southwest, Inc.
11021 Winners Circle, Suite 101
Los Alamitos, CA 90720

Equiva Services

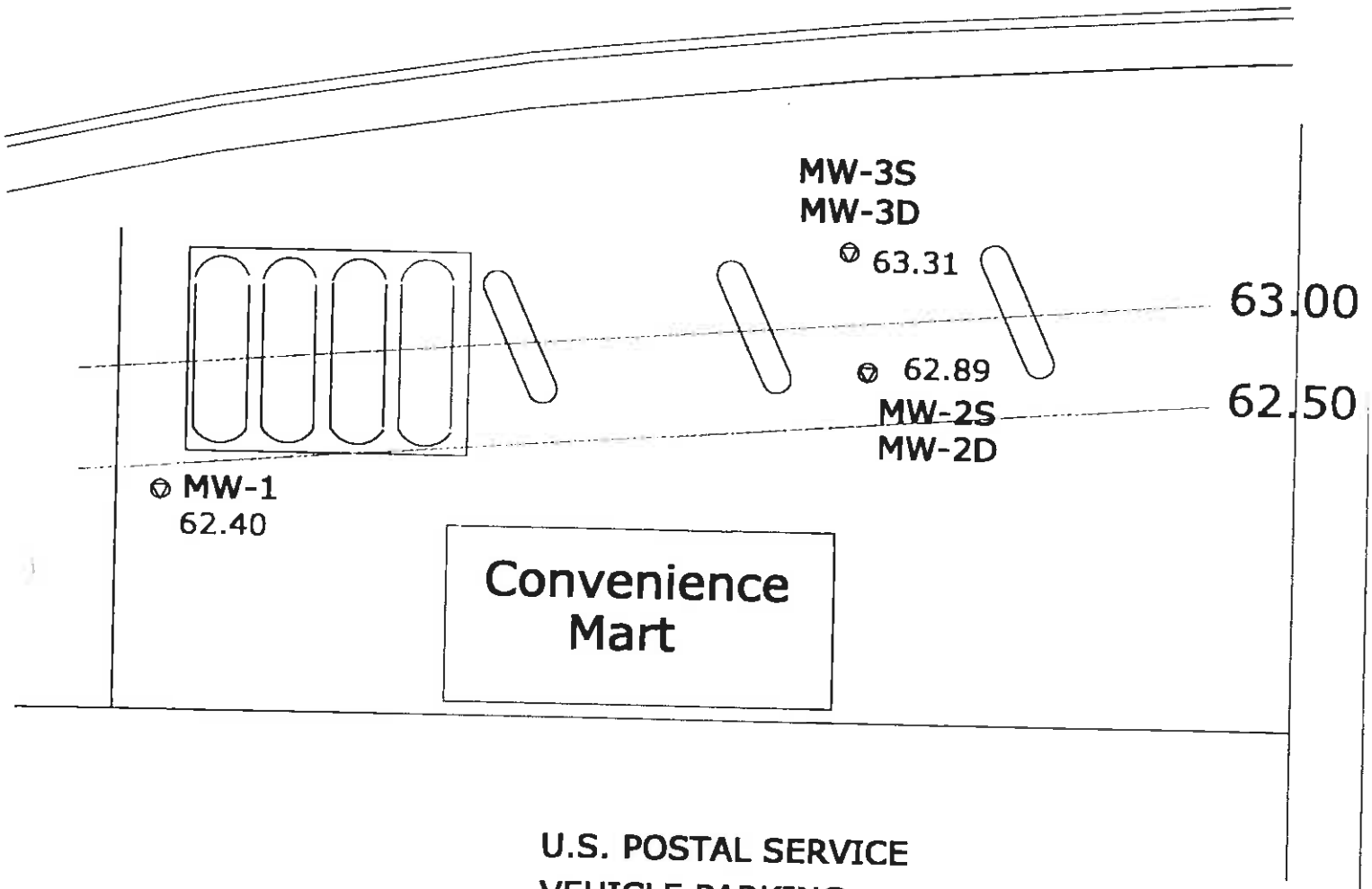
SITE PLAN

530 Avenida Pico San Clemente, California

Figure 2

DATE	PROJECT NUMBER	DWN BY	DWG #
10/31/01	088.EQL.00	DW	

AVENIDA PICO



U.S. POSTAL SERVICE
VEHICLE PARKING

N

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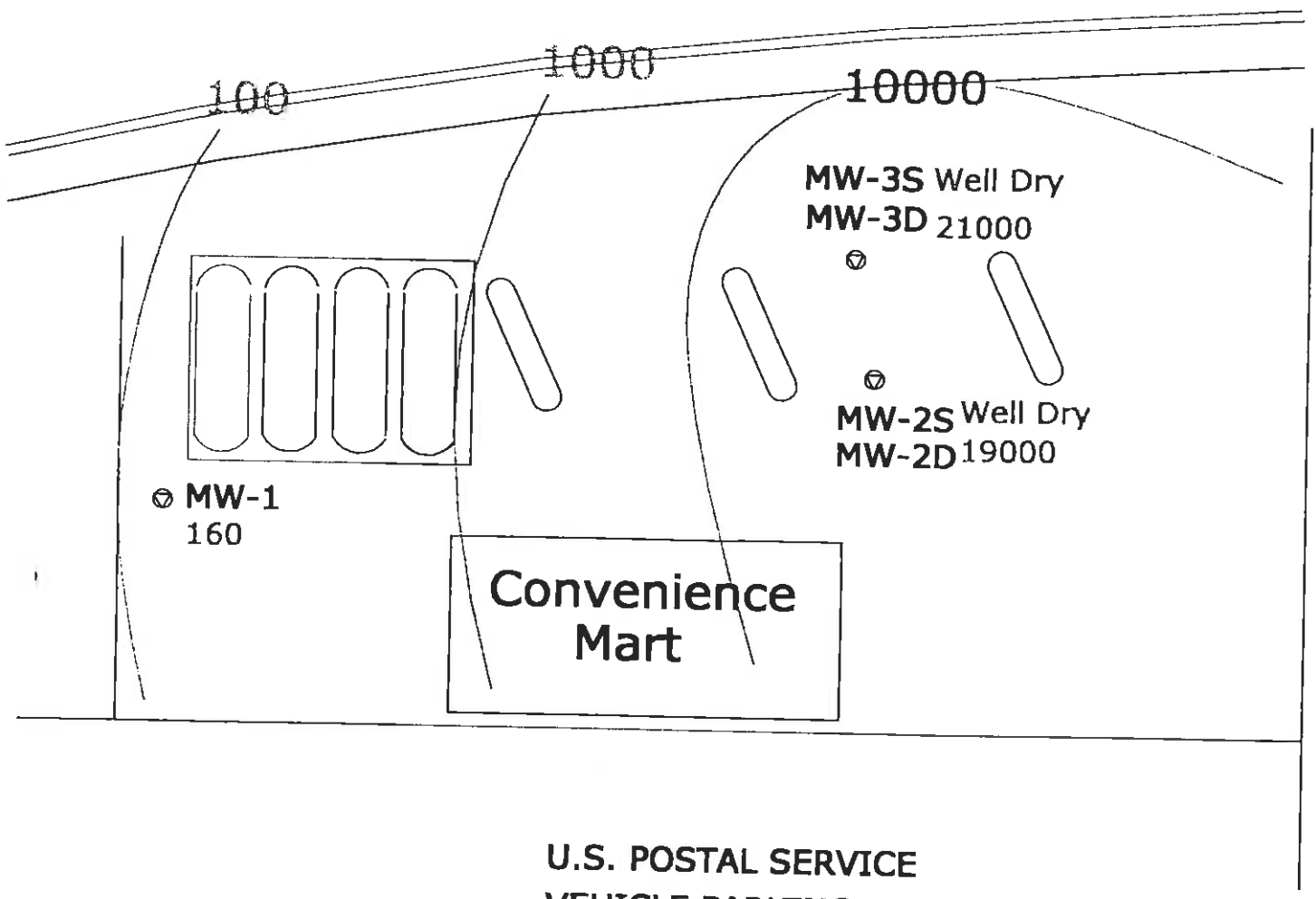
MONITORING WELL LOCATION

WGR Southwest, Inc. 11021 Winners Circle, Suite 101 Los Alamitos, CA 90720	Equiva Services			Figure 3
	Groundwater Elevation (Ft) 9/26/01 530 Avenida Pico San Clemente, California			
	DATE 10/31/01	PROJECT NUMBER 088.EQL.00	DWN BY DW	DWG #



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MONITORING WELL LOCATION

WGR Southwest, Inc.
11021 Winners Circle, Suite 101
Los Alamitos, CA 90720

Equiva Services

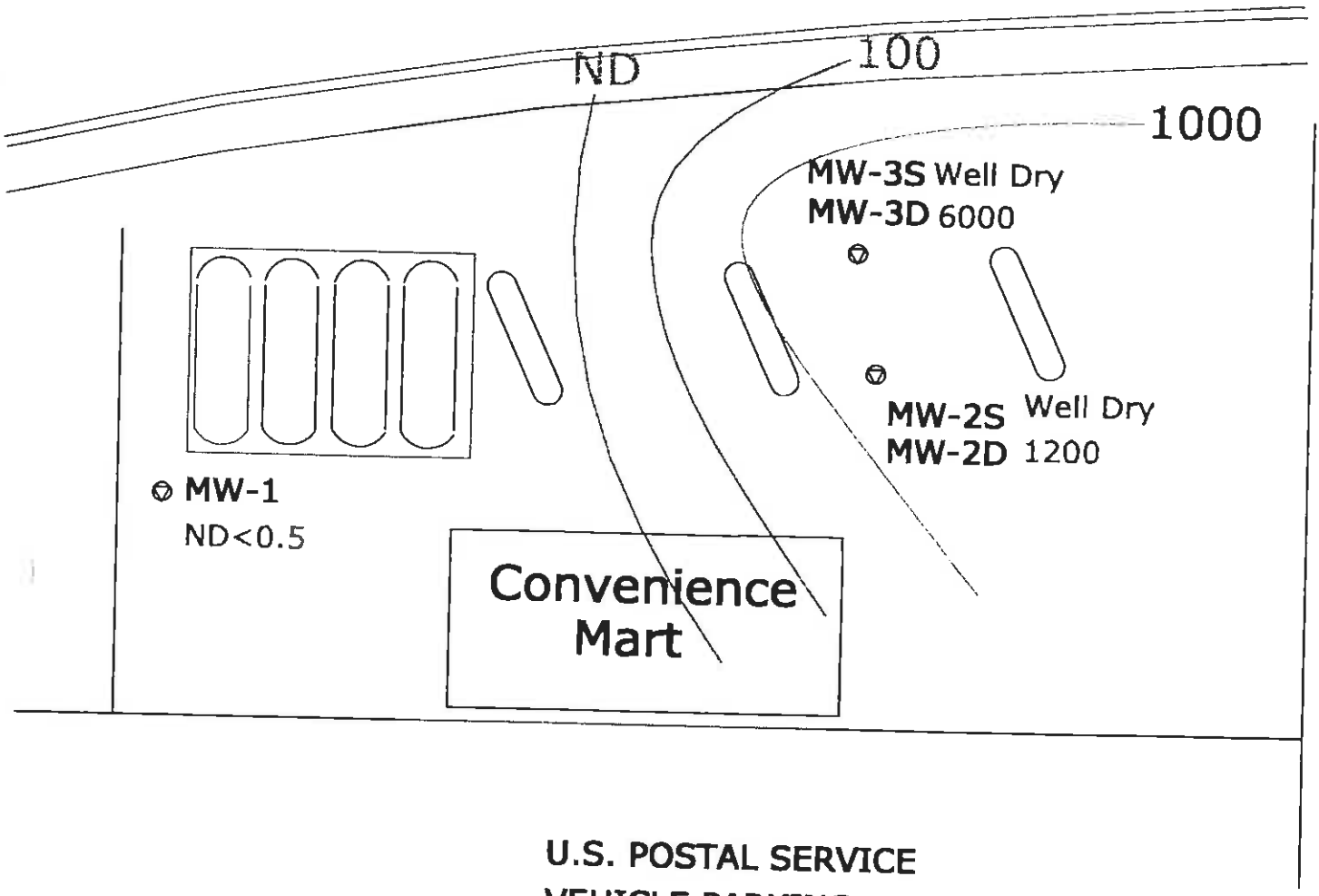
TPH-g Concentrations (ug/L) 9/26/01

530 Avenida Pico San Clemente, California

Figure 4

DATE	PROJECT NUMBER	DWN BY	DWG #
10/31/01	088.EQL.00	DW	

AVENIDA PICO



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Legend

MONITORING WELL LOCATION

WGR Southwest, Inc.
11021 Winners Circle, Suite 101
Los Alamitos, CA 90720

Equiva Services

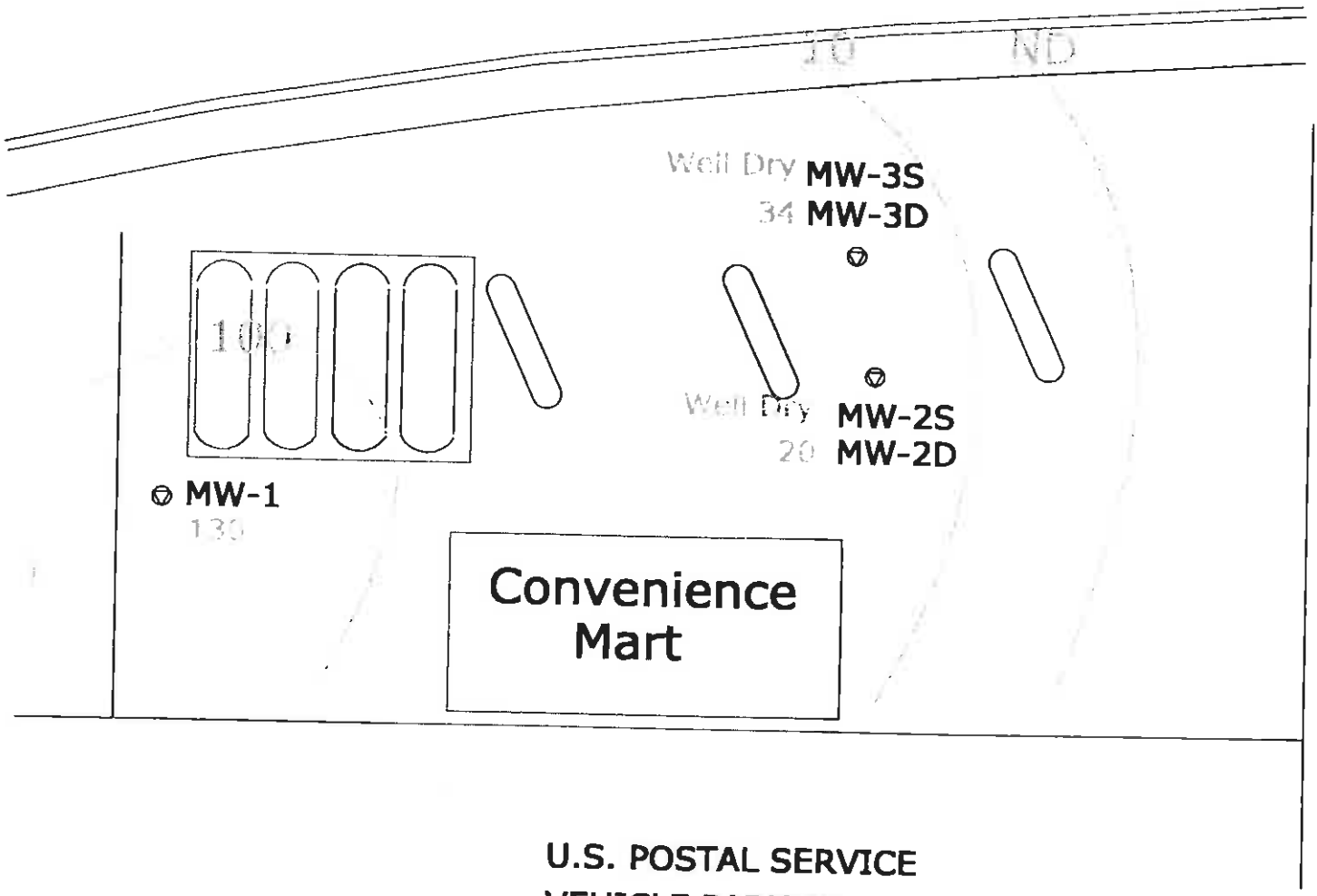
Benzene Concentrations (ug/L) 9/26/01

530 Avenida Pico San Clemente, California

Figure 5

DATE	PROJECT NUMBER	DWN BY	DWG #
10/31/01	088.EQL.00	DW	

AVENIDA PICO



U.S. POSTAL SERVICE
VEHICLE PARKING

N

DRAWING NOT TO SCALE

Legend

MONITORING WELL LOCATION

WGR Southwest, Inc.
11021 Winners Circle, Suite 101
Los Alamitos, CA 90720

Equiva Services

MTBE Concentrations (ug/L) 5/10/01

530 Avenida Pico San Clemente, California

Figure 6

DATE	PROJECT NUMBER	DWN BY	DWG #
10/31/01	088.EQL.00	DW	

WGR

Southwest, Inc.

May 8, 2001

County of Orange
Health Care Agency
Division of Environmental Health
2009 East Edinger Avenue
Santa Ana, CA 92705-4720
Attn: Mr. James Strozier

RE: Response to Request for Closure Letter dated August 1, 2000
O.C.H.C.A. Case #96UT48

Texaco Station
530 Avenida Pico
San Clemente, California
WGR Project No., 088.EQL.00

Dear Mr. Strozier:

On behalf of Equiva Services LLC, we are providing information pertinent to your request included in the above referenced letter.

1. Based on previous soil sampling investigations we estimate the remaining volume of hydrocarbon impacted soil beneath the site to be approximately 681.5 cubic yards. The remaining amount of gasoline as TPH-g is estimated to be approximately 8950 lbs. and the remaining amount of benzene to be approximately 41 lbs. Calculations are provided in Attachment 1.

2. Based on historical groundwater sampling results there has been no measurable free product in any of the site monitoring wells to date. Groundwater samples collected from downgradient onsite hydropunch borings (WGR –1 through WGR-4) advanced in June 2000 contained no detectable hydrocarbon concentrations. It appears unlikely that residual source area hydrocarbon impaction that currently exists beneath the site presents a threat to public health and safety and/or the environment or to the occurrence of any significant amount of free product which would present a threat to public health and safety or the environment.

3. WGR conducted monitoring of all existing and accessible storm drain, sewer system and utility vaults at the above referenced station on December 9, 2001utilizing an organic vapor analyzer calibrated to hexane. Results of the monitoring indicated no detectable hydrocarbons or other organic vapors. Location of the utility vaults and/or manholes and OVA measurements are included in Attachment 2.

4. Historical benzene and MTBE concentrations and well hydrographs are included in Attachmnet 3 for wells MW-1, MW-2D and MW-3D. The following table summarizes historical groundwater sampling results of each of the wells for benzene and MTBE.

Well No.	Benzene	MTBE
MW-1	Not detected to date	Maximum MTBE=80 ug/l in January 2001
MW-2D	Maximum benzene of 3100 ug/l occurred in 7/99	Not detected for last 4 sampling events.
MW-3D	Maximum benzene =10000 ug/l occurred in January 01	Not detected for last 4 sampling events

5. Based on soil sampling results the source zone for benzene contamination is interpreted to be adjacent to and beneath the former southern product island. Hydrocarbon impacted soil estimates are provided in Item 1. Well MW-2D is located within the immediate source zone area of benzene impaction. Well 3D is located approximately 20 feet north of well MW-2D. Well MW-1 is located approximately 90 feet southwest of well MW-2D. Graphs of historical dissolved benzene concentrations for each of these wells was presented and discussed in Item 4.

   Recent groundwater sampling analyses indicates the only groundwater samples, which currently contain MTBE, are from well MW-1, located adjacent to the existing UST area. Therefore the current source area of dissolved MTBE is likely to be located from the UST rather than the former product island area. Groundwater samples collected from well MW-2D and MW-3D, located within the product island area of the site have not contained detectable MTBE concentrations for the last four sampling events. MTBE concentrations versus time for well MW-1 were previously discussed and presented in Item 4.

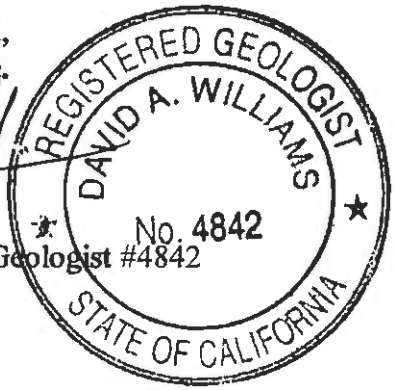
6. Segunda Deshecha (the local stream channel) is located approximately 530 feet south of the subject site. Existing groundwater beneath the site is located at a depth of approximately 37 to 38 feet bgs (or an approximate elevation of 20 feet above mean seal level based on USGS San Clemente quadrangle map). Elevation of the stream channel adjacent to the site is approximately 50 feet bgs. Based on these elevation differences it appears unlikely that first encountered groundwater beneath the site is or

will be a contributor to surface water in the stream channel in the immediate site vicinity. Additionally, analyses of groundwater samples collected from hydropunch borings WGR-1 through WGR-3 (located along the southern property line of the Texaco Station) indicated no detectable hydrocarbon or MTBE concentrations. This indicates there has been no significant migration of dissolved hydrocarbons or MTBE constituents from remaining residual contamination. Based on analytical results, distance from the site to the stream, and differences in water elevations between the stream and local groundwater it appears unlikely that impacted groundwater from the subject property could migrate into the stream channel and/or affect the local environment. A map showing location of the stream channel and the site and a site plan showing the location of hydropunch borings are included in Attachment 4.

If you have any questions please do not hesitate to call me at (562) 799-8510.

Respectfully submitted,
WGR Southwest, Inc.

David A. Williams
Project Manager
California Registered Geologist #4842



Cc Mr. Marvin Katz, Equiva Services, LLC

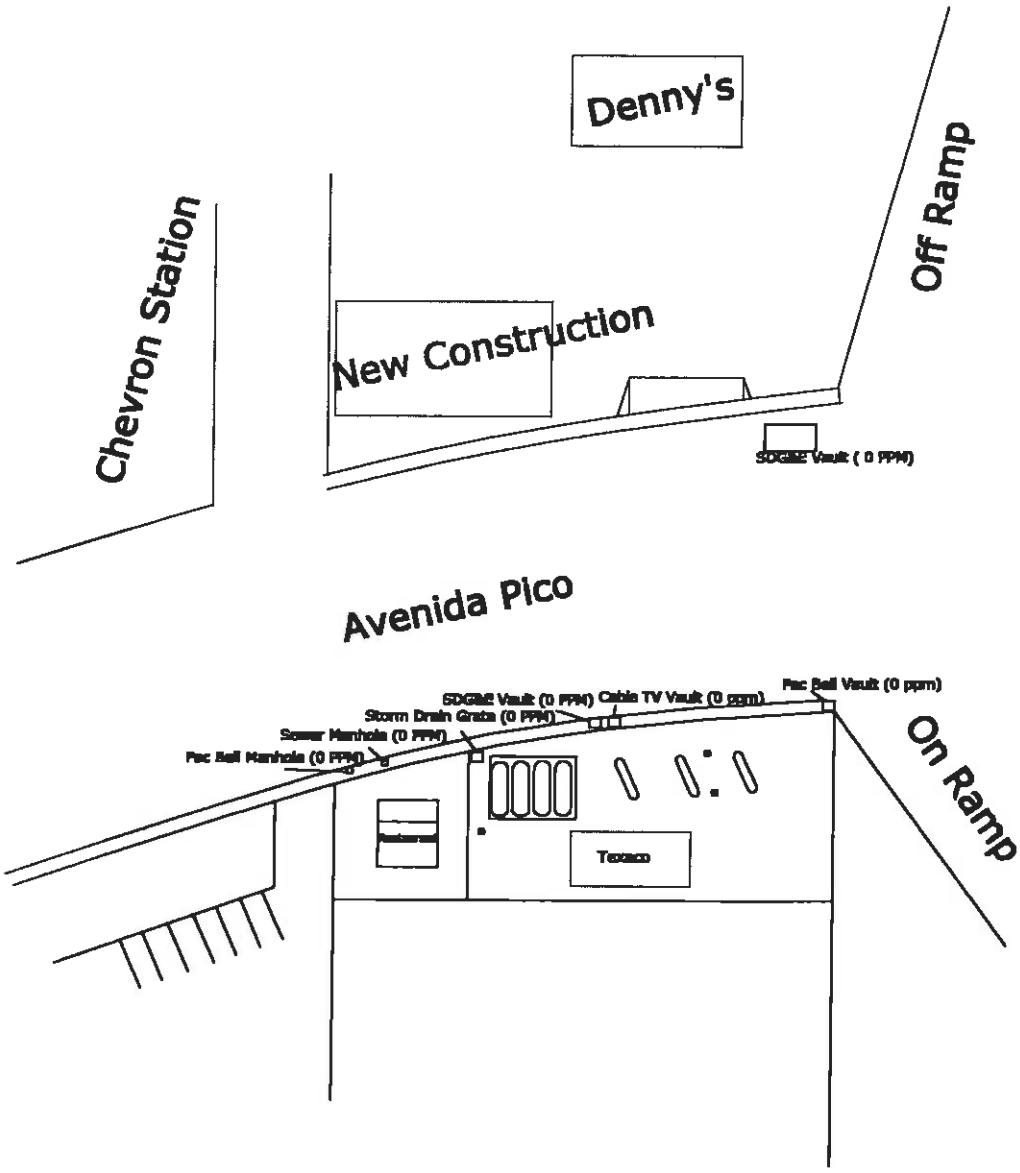
c: \projects\texaco\530 Avenida Pico\ closure ltr response

ATTACHMENT 1.

IMPACTED SOIL VOLUME CALCULATIONS

ATTACHMENT 2.

UTILITY VAULT LOCATIONS/OVA MEASUREMENTS



FEET

Legend

- EXISTING WELL
- PROPOSED ONSITE BORING
- PROPOSED OFFSITE BORING

WGR
Southwest, Inc.
11021 Winners Circle, Suite 101
Los Alamitos, CA 90720

Equiva Services

UTILITY LOCATIONS/ OVA READINGS

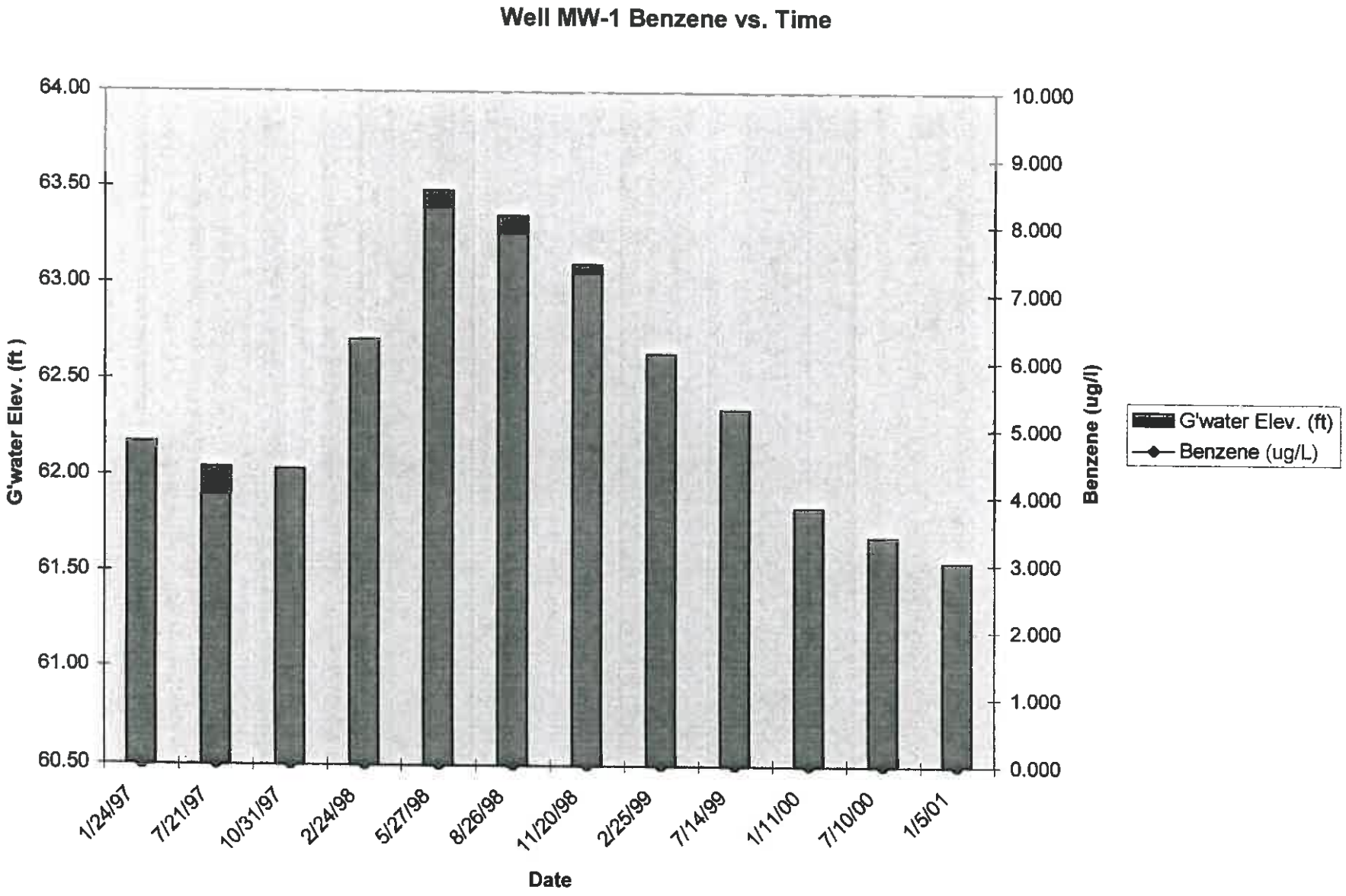
630 Avenida Pico San Clemente, California

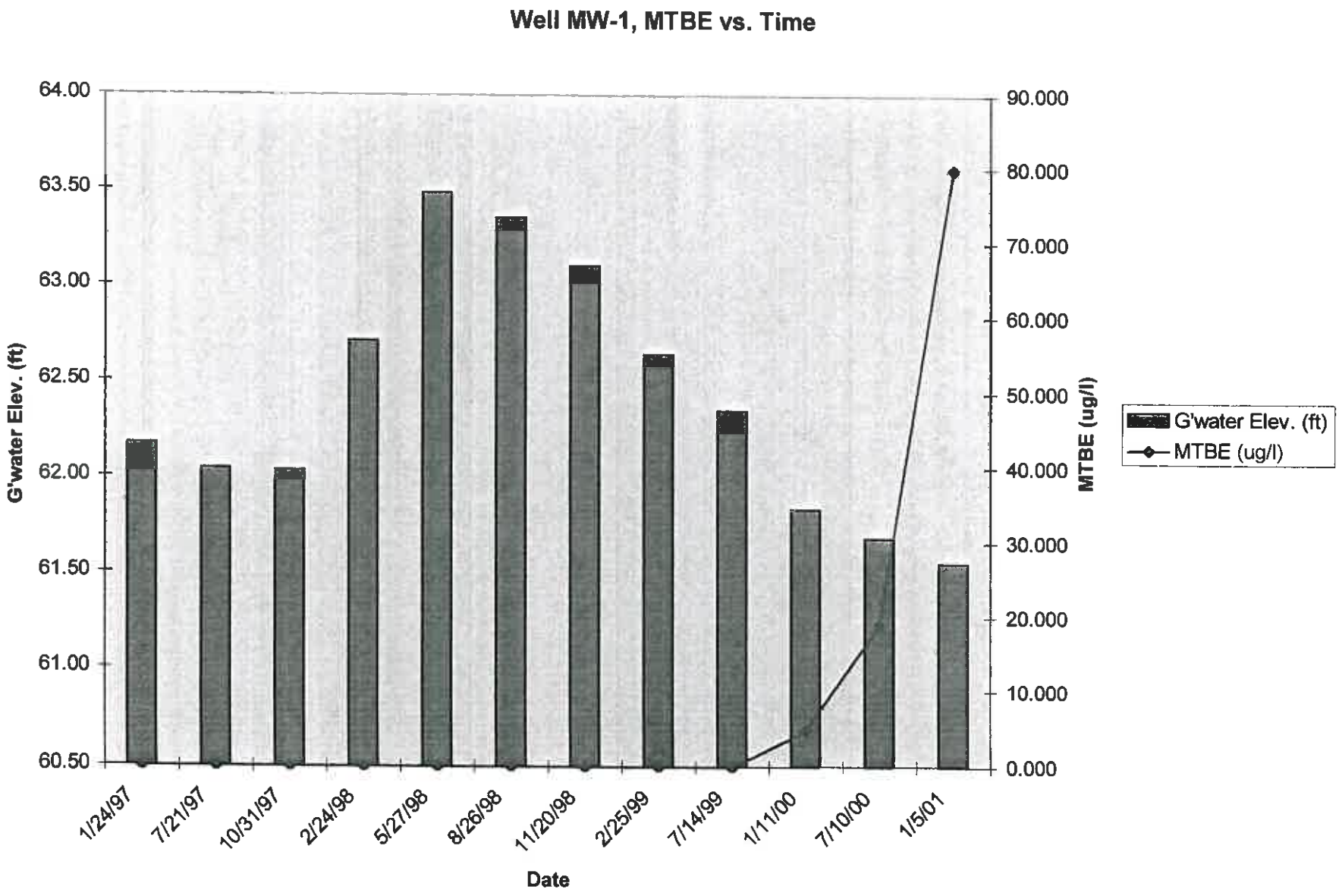
Figure 2

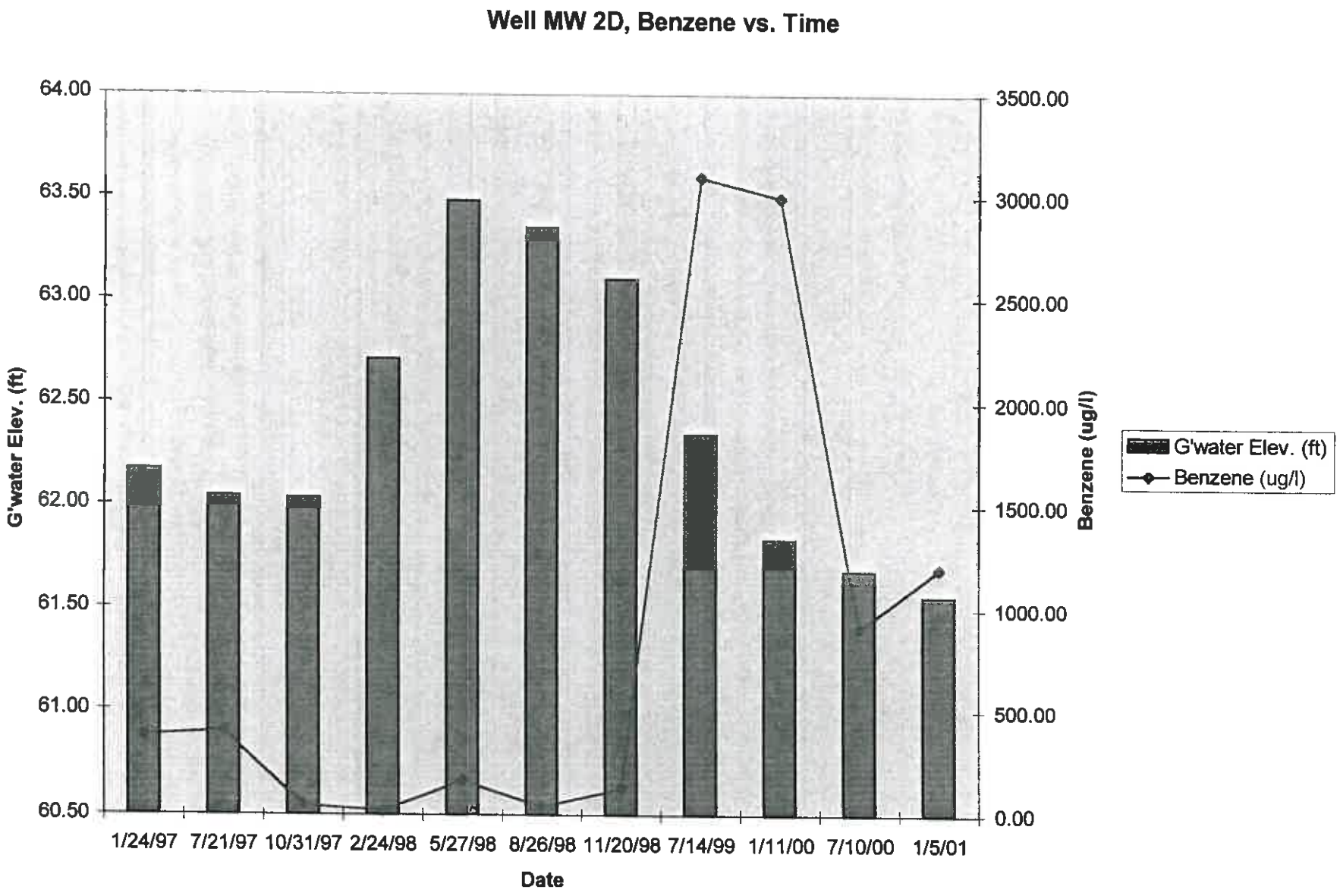
DATE	PROJECT NUMBER	DWN BY	DWG #
12/17/00	088.EQL.00	DW	

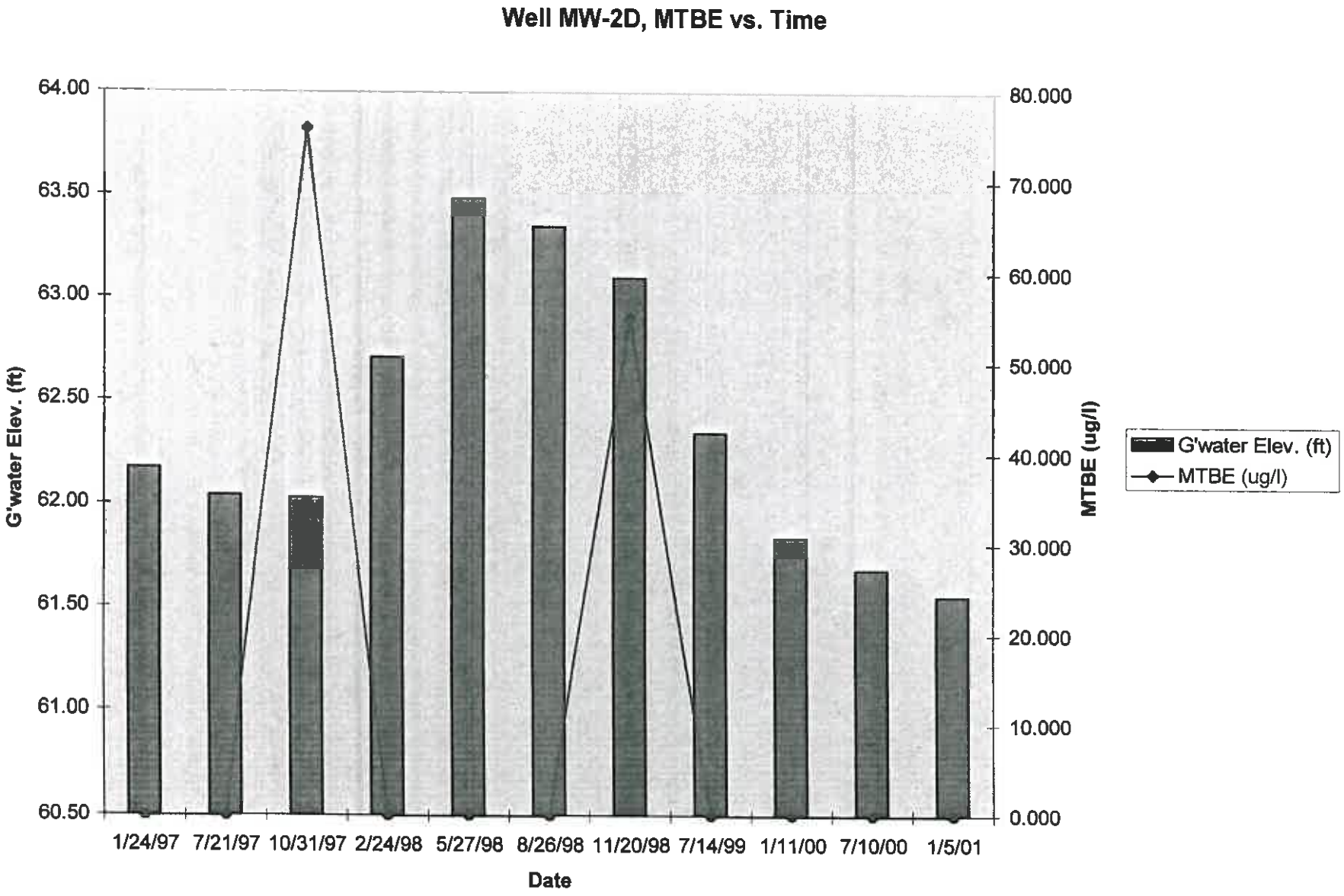
ATTACHMENT 3.

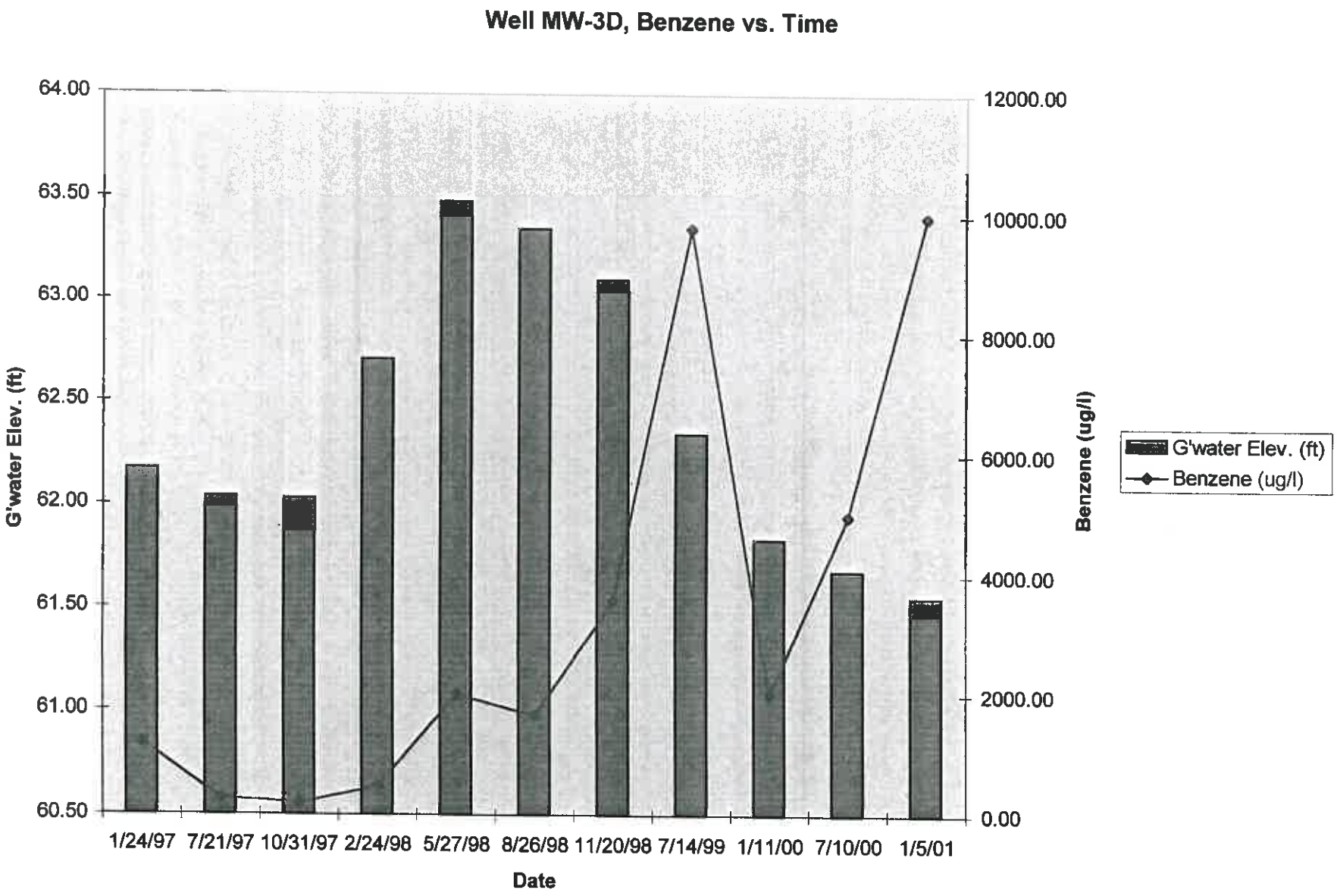
GRAPHS OF HISTORICAL BENZENE/MTBE CONCENTRATIONS AND GROUNDWATER LEVELS


Well MW-1 Benzene vs. Time
64.00
63.50
63.00
62.50
62.00
61.50
61.00
60.50
G'water Elev. (ft.)
10.000
9.000
8.000
7.000
6.000
5.000
4.000
3.000
2.000
1.000
0.000
Benzene (ug/l)
1/24/97
7/21/97
10/31/97
2/24/98
5/27/98
8/26/98
11/20/98
2/25/99
7/14/99
1/11/00
7/10/00
1/5/01
Date
G'water Elev. (ft)
Benzene (ug/L)


Well MW-1, MTBE vs. Time
G'water Elev. (ft)
MTBE (ug/l)
Date
64.00
63.50
63.00
62.50
62.00
61.50
61.00
60.50
90.000
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.000
1/24/97
7/21/97
10/31/97
2/24/98
5/27/98
8/26/98
11/20/98
2/25/99
7/14/99
1/11/00
7/10/00
1/5/01
G'water Elev. (ft)
MTBE (ug/l)


Well MW 2D, Benzene vs. Time
64.00
63.50
63.00
62.50
62.00
61.50
61.00
60.50
G'water Elev. (ft)
3500.00
3000.00
2500.00
2000.00
1500.00
1000.00
500.00
0.00
Benzene (ug/l)
1/24/97
7/21/97
10/31/97
2/24/98
5/27/98
8/26/98
11/20/98
7/14/99
1/11/00
7/10/00
1/5/01
Date
G'water Elev. (ft)
Benzene (ug/l)


Well MW-2D, MTBE vs. Time
64.00
63.50
63.00
62.50
62.00
61.50
61.00
60.50
G'water Elev. (ft)
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.000
MTBE (ug/l)
1/24/97
7/21/97
10/31/97
2/24/98
5/27/98
8/26/98
11/20/98
7/14/99
1/11/00
7/10/00
1/5/01
Date
G'water Elev. (ft)
MTBE (ug/l)


Well MW-3D, Benzene vs. Time
64.00
63.50
63.00
62.50
62.00
61.50
61.00
60.50
G'water Elev. (ft)
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
Benzene (ug/l)
G'water Elev. (ft)
Benzene (ug/l)
1/24/97
7/21/97
10/31/97
2/24/98
5/27/98
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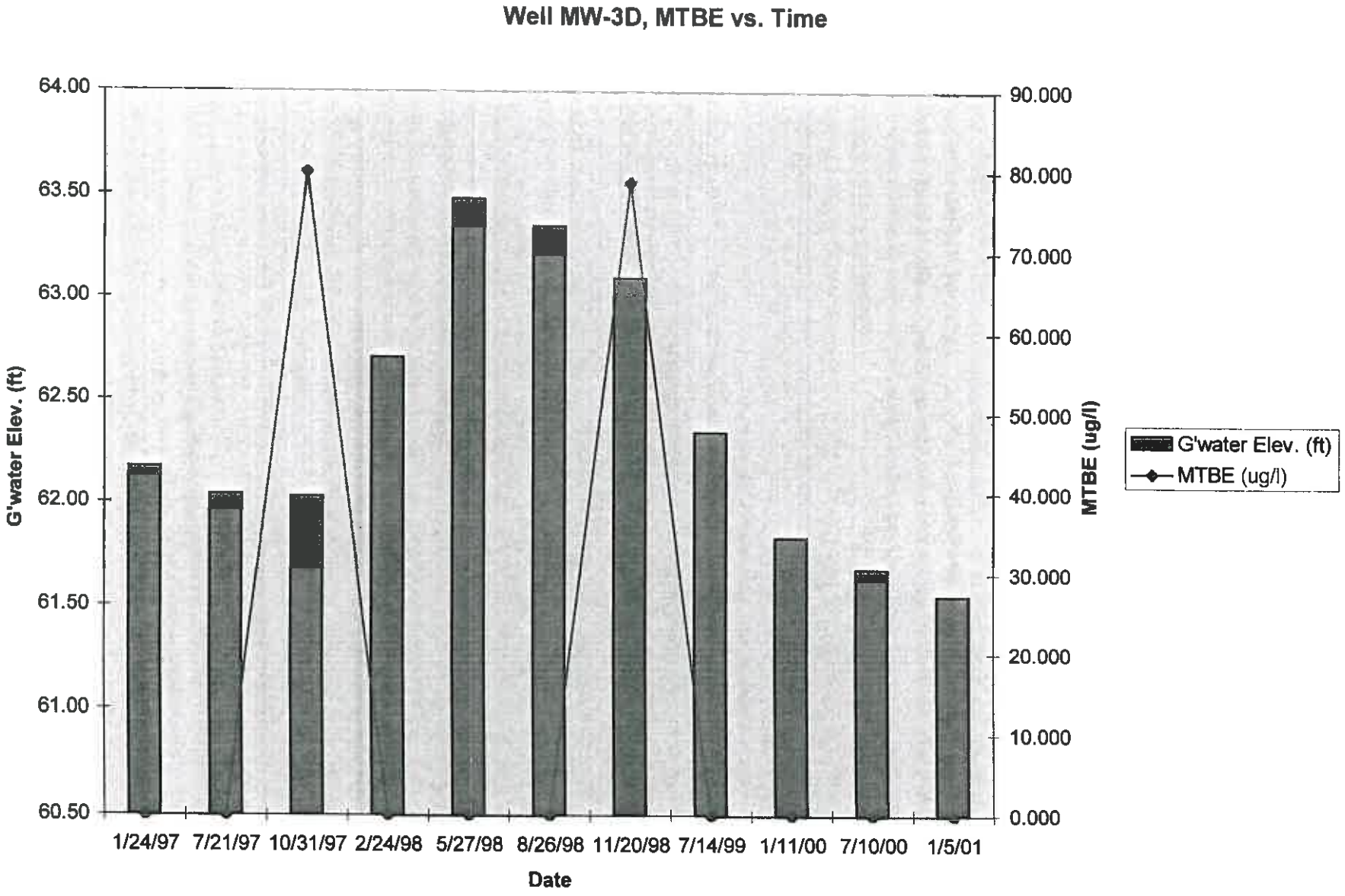
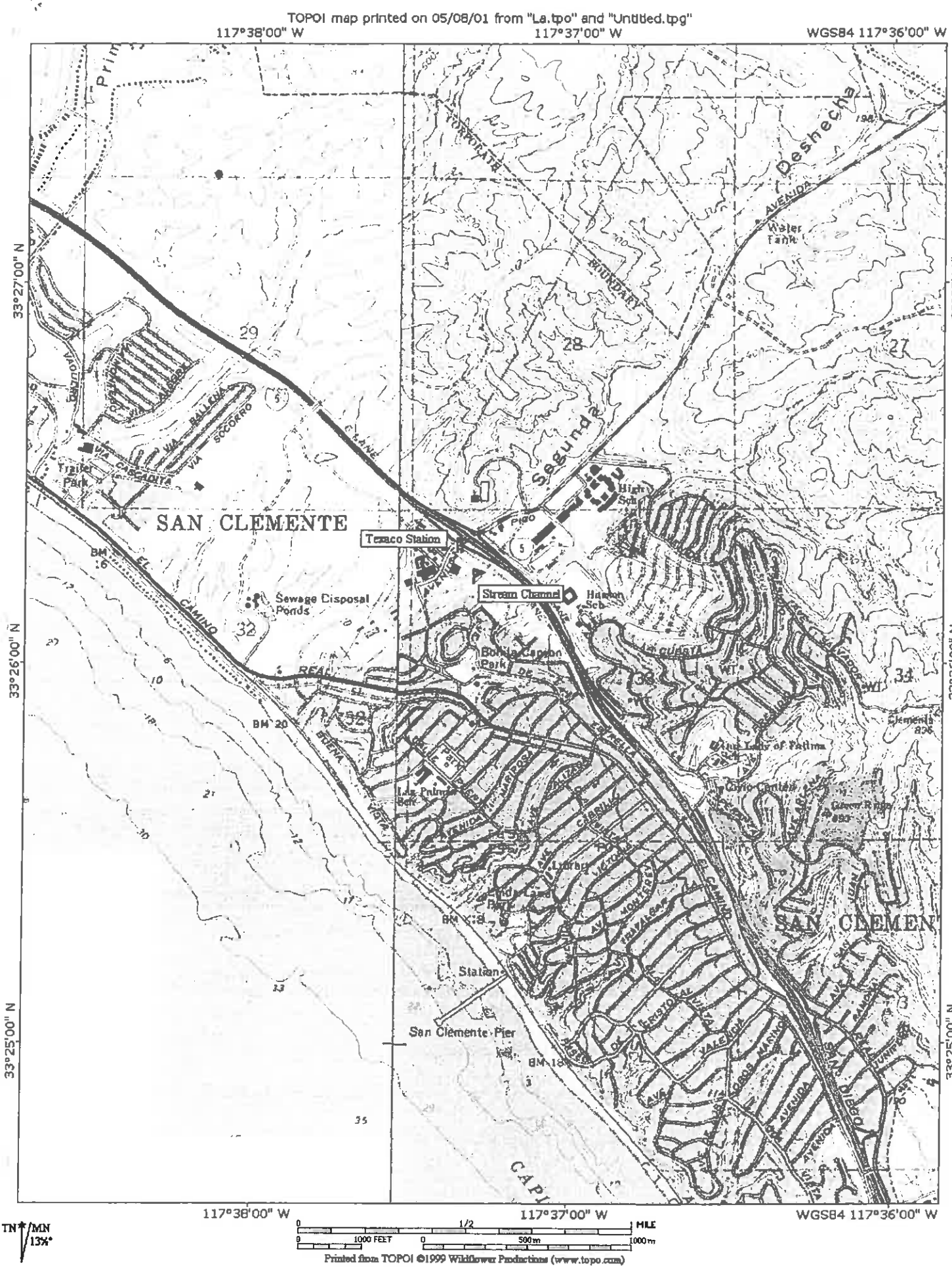
11/20/98
7/14/99
1/11/00
7/10/00
1/5/01
Date

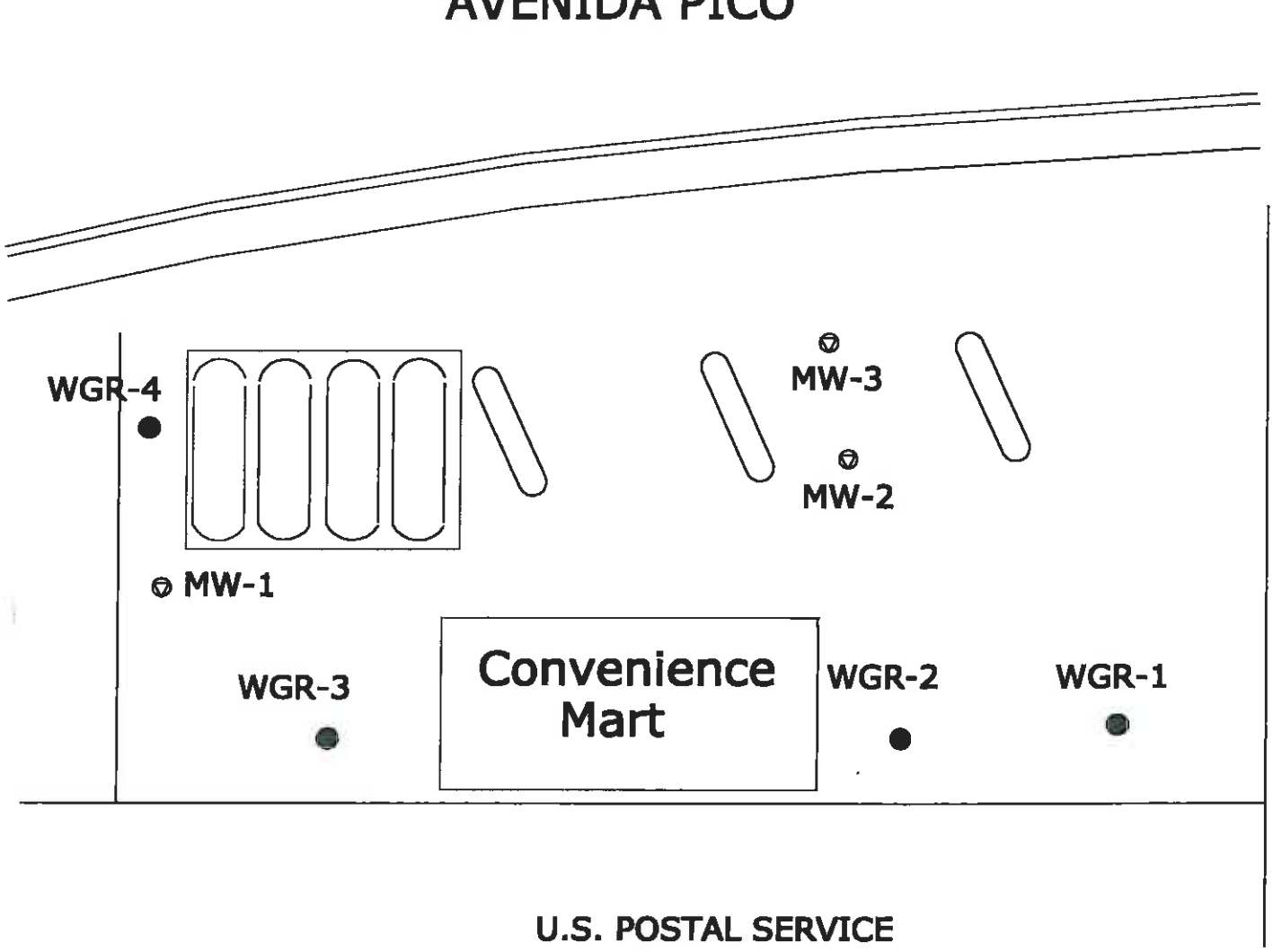

Well MW-3D, MTBE vs. Time
G'water Elev. (ft)
MTBE (ug/l)
64.00
63.50
63.00
62.50
62.00
61.50
61.00
60.50
90.000
80.000
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0.000
1/24/97
7/21/97
10/31/97
2/24/98
5/27/98
8/26/98
11/20/98
7/14/99
1/11/00
7/10/00
1/5/01
Date
G'water Elev. (ft)
MTBE (ug/l)

ATTACHMENT 4.

MAP SHOWING LOCATION OF SITE AND STREAM CHANNEL

FIGURE SHOWING LOCATION OF HYDROPUNCH BORINGS


TOPO! map printed on 05/08/01 from "La.tpo" and "Untitled.tpg"
117°38'00" W
117°37'00" W
WGS84 117°36'00" W
33°27'00" N
33°26'00" N
33°25'00" N
SAN CLEMENTE
Texaco Station
Stream Channel
Sewage Disposal Ponds
Boy's Canyon Park
Los Prinos Park
Trailer Park
High Sch
Water Tank
Segunda
Deshecha
AVENIDA
FORBES RANCH
BOUNDARY
PRINCIPAL
CAMINO
REAL
VIA
BALLENA
SOCORRO
CABRILLO
MARIPOSA
PELELIA
BUENA
VISTA
LOS
PINOS
CALLE
Station
San Clemente Pier
BM 6
BM 20
BM 18
Our Lady of Fatima
Civic Center
SAN CLEMEN
CAPI
TN 13½° MN
0 1/2 MILE
0 1000 FEET 0 500m 1000m
Printed from TOPO! ©1999 Wildflower Productions (www.topo.com)



Legend

- EXISTING WELL
- ONSITE BORING

WGR Southwest, Inc.
11021 Winners Circle, Suite 101
Los Alamitos, CA 90720

Equiva Services

SITE PLAN/BORING LOCATIONS

630 Avenida Pico San Clemente, California

Figure 2

DATE	PROJECT NUMBER	DWN BY	DWG #
6/17/00	088.EQL.00	DW	

Table 2. Summary of Water Sample Analyses

Texaco Station

530 Avenida Pico

San Clemente, California

Sample Number	Sample Date	8015g	8021B				
		TPH ug/l	Benzene ug/l	Toluene ug/l	Ethyl Benzene ug/l	Total Xylenes ug/l	MTBE ug/l
WGR-1	6/1/00	ND<500	ND<0.3	ND<0.3	ND<0.3	ND<0.6	ND<5
WGR-2	6/1/00	ND<500	ND<0.3	ND<0.3	ND<0.3	ND<0.6	ND<5
WGR-3	6/1/00	ND<500	ND<0.3	ND<0.3	ND<0.3	ND<0.6	ND<5
WGR-4	6/1/00	ND<500	ND<0.3	ND<0.3	ND<0.3	ND<0.6	ND<5

WGR
Southwest, Inc.

October 18, 2000

County of Orange
Health Care Agency
Division of Environmental Health
2009 East Edinger Avenue
Santa Ana, CA 92705-4720
Attn: Mr. James Strozier

RE: **Quarterly Status Report, Third Quarter 2000**
Texaco Station
530 Avenida Pico
San Clemente, California
WGR Project No., 088.EQL.00

Dear Mr. Strozier:

On behalf of Equiva Services LLC, attached is the quarterly status report for the above referenced site. If you have any questions please do not hesitate to call me at (562) 799-8510.

Respectfully submitted,
WGR Southwest, Inc.

David A. Williams, RG
Project Manager

Cc Mr. Marvin Katz, Equiva Services, LLC

c: \projects\texaco\530 Avenida Pico\ qtrly status rpt. Doc

QUARTERLY STATUS REPORT

THIRD QUARTER 2000
530 AVENIDA PICO
SAN CLEMENTE, CALIFORNIA

OVERVIEW

The property has served as the location of an active Texaco Service Station since the 1930's. The previous station configuration included a garage with two dispenser islands fronting Avenida Pico. The former steel gasoline UST's were removed and replaced with double-wall fiberglass tanks in the 1980's.

Further remodeling occurred in late 1996 and early 1997. Fluor Daniel GTI (FDGTI) observed the removal of one waste oil tank, two hydraulic hoists, one clarifier, and gasoline piping. At this same time FDGTI performed a site assessment investigation to evaluate the extent of petroleum hydrocarbons in the soil and groundwater. The assessment included grab-sampling soil beneath the aforementioned structures, collecting soil samples from exploratory excavations, and drilling and sampling six soil borings and the installation of three groundwater monitoring wells.

Analytical results indicate TPH-g concentrations in the soil up to 25,000 mg/kg beneath the east end of the former south dispenser island. Liquid phase hydrocarbons were observed in a shallow excavation at the east end of the former north dispenser island. Limited soil excavation was performed adjacent to the former southern dispenser island and from the product line areas in December 1996. The excavated soil (a total of approximately 450 yards) was transported to the TPS Facility in Adelanto, California under a non-hazardous waste manifest. Impacted soil remaining at the site containing TPH-g concentrations greater than 100 mg/kg has been identified between approximately 5 and 42 feet bgs near the former southern dispenser island. FDGTI estimated the adsorbed plume contains between 10,000 pounds to 40,000 pounds of gasoline hydrocarbons.

Semi-annual groundwater sampling is performed without purging by Wayne Perry Inc.

Depth to groundwater at the site ranges from 35 to 40 feet bgs. The groundwater gradient was indicated to be to the west in the 1997 assessment investigation but is currently indicated to be to the south-southeast based on 1999 monitoring results. The site is located within the Segunda Hydrologic Subarea, which has no designated beneficial uses for groundwater.

Current dissolved TPH-g concentrations range from ND<500 ug/l to 39000 ug/l. Benzene ranges from ND<0.3ug/l to 3000 ug/l and MTBE is found in concentrations less than 100 ug/l.

SUMMARY OF REMEDIATION

Currently, there is no remediation equipment in operation at the site. Groundwater monitoring wells are not purged prior to sampling consequently no waste water is produced at the site.

WORK CONDUCTED DURING THE THIRD QUARTER 2000

Wayne Perry Inc. (WPI) Consultants conducted the second of two semi-annual groundwater-sampling events on July 11, 2000. The report was submitted to the OCHCA on September 8, 2000. A site assessment report prepared by WGR Southwest, Inc describing drilling activities conducted in the second quarter was submitted to the County on July 17, 2000. Based on the results of the investigation which indicated no significant contamination in soil or groundwater samples collected along the downgradient side of the site, WGR requested site closure. After review of the report, the County issued a response letter on August 1, 2000, reuqesting additional information.

WORK PROPOSED FOR FOURTH QUARTER 2000

.WGR will submit additional information requested by the County.

WGR
Southwest, Inc.

August 17, 1999

County of Orange
Health Care Agency
Division of Environmental Health
2009 East Edinger Avenue
Santa Ana, CA 92705-4720
Attn: Mr. James Strozier

RE: Quarterly Status Report, Second Quarter 1999
Texaco Station
530 Avenida Pico
San Clemente, California

Dear Mr. Strozier:

On behalf of Equiva Services LLC, attached is the quarterly status report for the above referenced site. If you have any questions please do not hesitate to call me at (562) 799-8510.

Respectfully submitted,
WGR Southwest, Inc.

David A. Williams, RG
Project Manager

Cc Mr. Marvin Katz, Equiva Services, LLC

c: \projects\texaco\530 Avenida Pico\ qtrly status rpt. Doc

11021 Winners Circle, Suite 101 • Los Alamitos, CA 90720 • (562) 799-8510 • Fax (562) 799-8556
Los Alamitos, CA • Bothell, WA • Jackson, MO

QUARTERLY STATUS REPORT
SECOND QUARTER
530 AVENIDA PICO
SAN CLEMENTE, CALIFORNIA

OVERVIEW

The site is located on the west side and adjacent to Interstate 5 in the City of San Clemente, California. The property has served as the location of an active Texaco Service Station since the 1930's. The previous station configuration included a garage with two dispenser islands fronting Avenida Pico. The former steel gasoline UST's were removed and replaced with double-wall fiberglass tanks in the 1980's.

Further remodeling occurred in late 1996 and early 1997. Fluor Daniel GTI (FDGTI) observed the removal of one waste oil tank, two hydraulic hoists, one clarifier, and gasoline piping. At this same time FDGTI performed a site assessment investigation to evaluate the extent of petroleum hydrocarbons in the soil and groundwater. The assessment included grab-sampling soil beneath the aforementioned structures, collecting soil samples from exploratory excavations, and drilling and sampling six soil borings and three groundwater monitoring wells.

RESULTS OF INVESTIGATION

Lithologies at the site include discontinuous interbedded sandy clay, silt, silty sand and poorly graded sand. The permeability of such deposits is typically low.

Analytical results indicate TPH-g concentrations in the soil up to 25,000 mg/kg beneath the east end of the former south dispenser island. Liquid phase hydrocarbons were observed in a shallow excavation at the east end of the former north dispenser island. Construction activities removed the top 5 to 10 feet of soil (approximately 45o cubic yards) from the dispenser area. Adsorbed hydrocarbons near the former north dispenser were removed by bailing and excavation. Soil containing TPH-g concentrations greater than 100 mg/kg is currently present between approximately 5 and 42 feet bgs near the former southern dispenser island. FDGTI estimated the adsorbed plume contains between10,000 to 40,000 pounds of gasoline hydrocarbons.

Depth to groundwater at the site ranges from 35 to 40 feet bgs with flow to the west at a gradient of 0.004 feet per foot. The site is located within the Segunda Hydrologic Subarea, which has no designated beneficial uses for groundwater.

Current dissolved TPH-g concentrations range from ND<500 ug/l to 8600 ug/l. Benzene ranges from ND<0.3 ug/l to 3,940 ug/l and MTBE ranges from ND <5 ug/l.

METHOD OF CLEANUP

No remediation has been conducted at the site to date. Natural attenuation of the dissolved product plume is indicated by reduction of dissolved product concentrations. Future groundwater monitoring data will be reviewed to determine if this trend continues.

METHOD AND LOCATION OF DISPOSAL

Bi-annual groundwater sampling is performed without purging. There was no soil or groundwater removed from the site during the Second Quarter 1999.

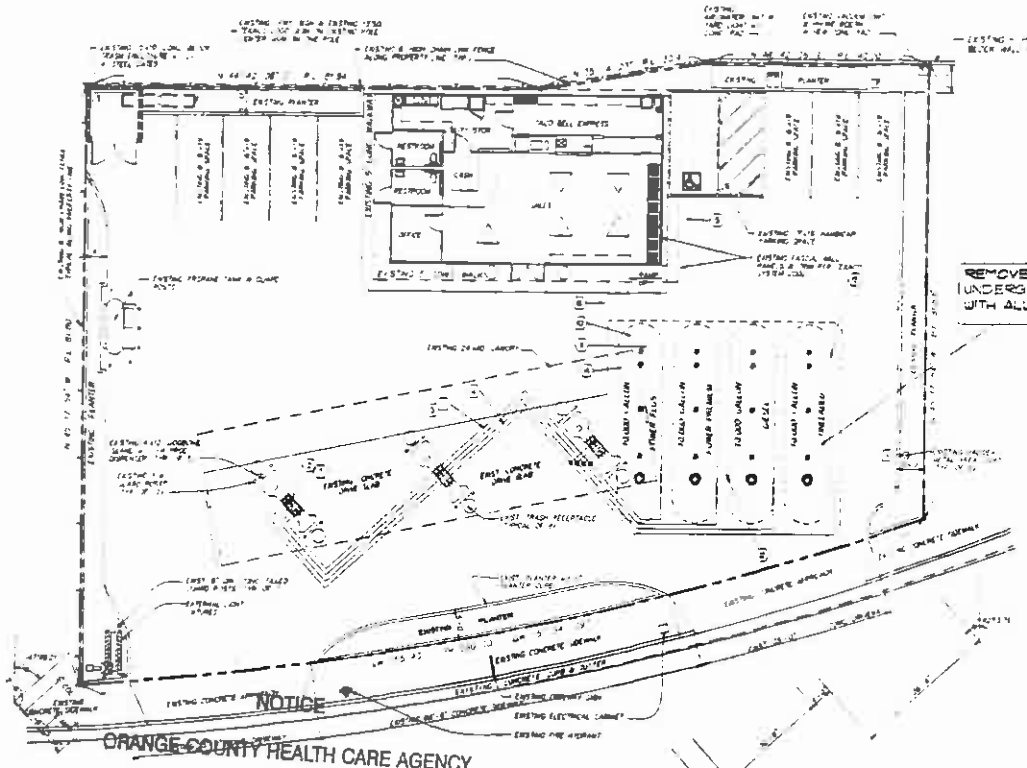
WORK CONDUCTED DURING THE SECOND QUARTER 1999

Semi-annual groundwater sampling was performed at the site on February 25, 1999.

WORK PROPOSED FOR THIRD QUARTER 1999

A meeting will be conducted with Orange County DEH, Equiva, and WGR Southwest, Inc. to discuss possible strategies to bring about closure for the site.

All piping associated with underground storage tanks shall be removed and properly disposed



NOTICE

ORANGE COUNTY HEALTH CARE AGENCY

ENVIRONMENTAL HEALTH

HAZARDOUS MATERIALS MANAGEMENT SECTION

All tanks, piping and associated equipment must be exposed/cleared of **overburden** and left in place. An **Environmental Health** Specialist must inspect the exposed tank, piping and associated **equipment** prior to continuing with the removal/modification project. **Contact** this office at (714) 667-3600 to schedule an inspection at least 48 hours in advance.

APPROVED

ORANGE COUNTY HEALTH CARE AGENCY
ENVIRONMENT HEALTH DIVISION
HAZARDOUS MATERIALS MANAGEMENT SECTION
THIS APPROVAL IS VALID FOR 12 MONTHS FROM THE APPROVAL DATE

J Green 5/16/03 SRA 02-22 4068
Plan Reviewed By Date Plan #

This approval shall not be construed to permit the violation of any law, nor does it prevent further corrections of errors found on the plans. Plans must be resubmitted for approval if any additional changes are made by the applicant.

In addition to this approval, all applicable permits required by the local fire department, Underground Storage Tank Regulations and the Air Quality Management District must be obtained.

Underground tank installation, removal, and repair inspections are required and must be scheduled 48 hours in advance. Contact (714) 667 - 3600 for an appointment.

A copy of these approved plans must be available at the site at all times.

REMOVE EXISTING UNDERGROUND STORAGE TANKS AND PIPING WITH ALL RELATED EQUIPMENT

GENERAL NOTES

1. ALL WORK SHALL COMPLY WITH CURRENT CODES AND REGULATIONS. CONTRACTOR IS RESPONSIBLE FOR SCHEDULING ALL AGENCY INSPECTIONS.
2. REFER TO CIVIL DRAWINGS FOR REFERENCE ONLY. CONTRACTOR IS RESPONSIBLE FOR LOCATION AND SUPERSEDING OF UNDERGROUND IMPROVEMENTS.
3. CONTRACTOR SHALL EXERCISE EXTREME CAUTION WHEN EXCAVATING IN CLOSE PROXIMITY TO TANK FIELD.
4. ALL PIPING SHALL HAVE A MINIMUM OF 24" PER FOOT SLOPE TOWARDS PRODUCT TANKS. SLOPE SHOULD MATCH EXISTING CONDITIONS IF POSSIBLE.
5. CONTRACTOR SHALL PERFORM A PRESSURE TEST OF THE NEW PIPING AND SHALL BE WITNESSED BY THE SHELL ENGINEER AND GOVERNMENT AGENCY REPRESENTATIVE.
6. ALL STEEL PIPING SHALL BE PROTECTED WITH 30 MIL SINGLE WRAP OR 10 MIL DOUBLE WRAP PROTECTION.
7. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING PHONE COMPANY FOR MODEM AND CONDUIT INSTALLATION.
8. THE REVISED MATCH INDICATES THE BEST APPROXIMATION OF THE EXISTING SYSTEM. AVAILABLE INFORMATION IS PROVIDED FOR GENERAL ESTIMATION ONLY.
9. CONTRACTOR IS RESPONSIBLE FOR ON-SITE EXCAVATION AND DETERMINATION OF PIPING ASBUILT CONDITIONS AND SHALL COMPLETE WORK ACCORDINGLY.
10. CONTRACTOR SHALL SIGN PROVIDING SHOVEL NOTIFYING DIFFERENCE IN UNMARKED CONDITIONS AND PROVIDING VEHICLE NOTICES TO THE STORING SURFACE IF NO OPERATIONS SHALL BE POSTED WITHIN 100 FT OF EACH CUSTOMER SERVICE OPENING OF TRUCKS.

GENERAL NOTES

1. CONTRACTOR SHALL SAWCUT, BREAK OUT AND REMOVE PORTION OF EXISTING CONCRETE DRIVE SLAB AS NECESSARY. ALL EXISTING MONITORING WELLS AND OTHER WELLS IN PLACE.
2. CONTRACTOR SHALL REMOVE & DISPOSE ALL EXISTING CONDUCTORS AS REQUIRED FOR INSTALLATION OF NEW DISPENSER CONTAINMENT BOXES AND PIPING.
3. CONTRACTOR SHALL INSTALL NEW 6" CONCRETE DRIVE SLAB. NEW SLAB SHALL BE REINFORCED TO MATCH EXISTING AND SHALL NOT LAYER THICKNESS OF CONCRETE AND PRIOR TO PLACEMENT OF CONCRETE AND PRIOR TO RECEIVING ANY VEHICULAR TRAFFIC. NEW SLAB SHALL BE LAYOUT BY MATRIX SPECIALTY AS SHOWN ON PLAN. FIC OF LAKE WOOD, CA 90630 (562) 630-0555 AND CERTIFIED BY SLAB DESIGNER.
4. CONTRACTOR SHALL INSTALL NEW DOUBLE WALL FIBERGLASS PRODUCT LINES AND DOUBLE WALL FIBERGLASS UNREFOLDED VAPOR RECOVERY LINES AND VENT LINES.
5. CONTRACTOR SHALL CONNECT NEW DOUBLE WALL FIBERGLASS VENT LINES TO NEW VENT RISER AND EXISTING NEW VENT RISER MIN 4' ABOVE FINISHED GRADE.
6. CONTRACTOR SHALL INSTALL NEW ELECTRICAL CONDUITS AT SUMP SUMPS AND TANKS TO HOME RUN/LINE IN BELOW. FULL MIN CONDUCTORS FROM DISPENSERS AND TANKS TO ELECTRICAL PANEL AREA. CONNECT TO EXISTING PANEL.
7. CONTRACTOR SHALL INSTALL DISPENSERS ON NEW CONTAINMENT BOXES.
8. CONTRACTOR SHALL INSTALL OR INSTALL NEW SENSORS AS DIRECTED BY SHELL ENGINEER AND CONNECT TO EXISTING VEEDER ROOT MONITORING SYSTEM.
9. CONTRACTOR SHALL INSTALL A/S VENT IN "LEEMS SUMP.
10. CONTRACTOR SHALL REMOVE EXISTING SINGLE WALL FIBERGLASS UNDERGROUND TANKS AND ALL RELATED HARDWARE.
11. CONTRACTOR TO INSTALL ONE 8,000 GAL TWO (2) NEW 8,000 & 10,000 GALLON DOUBLE WALL FIBERGLASS UNDERGROUND TANKS WITH ALL RELATED HARDWARE.
12. CONTRACTOR SHALL INSTALL NEW "LEEMS SUMP. SPILL CONTAINMENT BOX AND MANIFOLD DETECTOR PRIOR TO ALL NEW PRODUCT LINES.
13. CONTRACTOR SHALL INSTALL NEW "FILL SUMP. SPILL CONTAINMENT BOX AND WELL BOX TO ALL NEW PRODUCT LINES.
14. CONTRACTOR SHALL BACKFILL TANK HOLES WITH WASHED PEA GRAVEL PER SHELL SPECIFICATION AND INSTALL NEW CONCRETE TANK SLAB. PROVIDE AND TIE REINFORCING DETAILS.
15. CONTRACTOR SHALL PATCH NEW ASPHALT AROUND NEW CONCRETE SLAB TO MATCH EXISTING.
16. CONTRACTOR SHALL PATCH SEAL COAT LOT AND STRIPE ADJ. TO PROVIDE ALTERNATE PRICE TO SHELL.
17. CONTRACTOR SHALL PAINT ALL AFFECTED AREAS BY THE PROJECT AS PER SHELL SPECIFICATION.

All OCHCA Guidelines must be followed. J Green 5/16/03.

LEGEND

- NEW VENT LINE
- NEW VAPOR RECOVERY LINE
- NEW PRODUCT LINE
- NEW ASPHALT PAVING
- NEW CONCRETE PAVING

APR 1 5 2002

REVISIONS

AMERICAN ENGINEERING SERVICES, INC. 3131 S. DUPONT ROAD, ANAHEIM, CA 92806

EQUILON ENTERPRISES LLC

PROJECT: 530 AVENIDA PICO • I-5
SAN CLEMENTE, CALIFORNIA

PROPOSED PLOT PLAN

WGR
Southwest, Inc.

July 17, 2000

Mr. James Strozier
County of Orange Health Care Agency
2009 East Edinger Avenue
Santa Ana, California 92705-4720

RE: ***Site Assessment Report***
Texaco Station
530 Avenida Pico
San Clemente, California

Dear Mr. Strozier:

On behalf of Equiva Services, LLC, attached is the above referenced report. Results of the investigation indicate there were no detectable dissolved hydrocarbon or MTBE concentrations in any of the groundwater samples collected from the geoprobe borings. Since the site is located within a nonbeneficial use area and there appear to be no dissolved hydrocarbons or MTBE migrating outside the property boundaries, WGR Southwest, Inc., on behalf of Equiva Services requests that no further assessment, remediation or monitoring activiity be required for the property and site closure be granted.

If you have any questions or need any further information, please do not hesitate to call me at (562) 799-8510, ext 202, or Mr. Marvin Katz of Equiva Services, LLC at (949) 888-0903.

Sincerely,

David A. Williams, RG
Project Manager

Cc Mr. Marvin Katz, Equiva Services, LLC

037texSiteASS2.doc

SITE ASSESSMENT REPORT

TEXACO SERVICE STATION
530 Avenida Pico
San Clemente, California

July 17, 2000

PREPARED FOR

EQUIVA SERVICES LLC

Mr. Marvin Katz
EQUIVA SERVICES, LLC
P.O. BOX 7869
BURBANK, CALIFORNIA 91510-7869

BY

WGR
Southwest, Inc.
11021 Winners Circle, Suite 101
Los Alamitos, CA 90720

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SITE ASSESSMENT REPORT

TEXACO SERVICE STATION
530 Avenida Pico
San Clemente, California

July 17, 2000

1.0 INTRODUCTION

The site is located on the west side and adjacent to Interstate 5 in the City of San Clemente, California in a commercial district with heavy traffic density. A site vicinity map is shown as **Figure 1.** The Texaco Station is located lies along the south side of Avenida Pico adjacent to and just west of the southbound interstate onramp. A fast food restaurant is located directly west of the station and a parking lot for the US Postal Service mail delivery vehicles is located directly south of the subject property. An operational Chevron Station is located northwest of the site across Avenida Pico. Neighboring properties are shown as **Figure 2.**

The site is currently operated as a retail petroleum motor fuel dispensing service and a convenience mart. Three 10,000-gallon operational double wall fiberglass underground storage tanks (UST's) are currently located on the northwest portion of the property. A site plan is shown as **Figure 3.**

Due to the relatively high dissolved MTBE concentrations in two existing groundwater monitoring wells (MW-2 and MW-3), located adjacent to the existing product islands, the County of Orange Health Care Agency requested Equiva Services to conduct a site assessment investigation to determine the downgradient extent of dissolved phase hydrocarbons and MTBE.

2.0 SITE BACKGROUND

The property has served as the location of an active Texaco Service Station since the 1930's. The previous station configuration included a garage with two dispenser islands fronting Avenida Pico. The former steel gasoline UST's were removed and replaced with double-wall fiberglass tanks in the 1980's.

Further remodeling occurred in late 1996 and early 1997. Fluor Daniel GTI (FDGTI) observed the removal of one waste oil tank, two hydraulic hoists, one clarifier, and gasoline piping. At this same time FDGTI performed a site assessment investigation to evaluate the extent of petroleum hydrocarbons in the soil and groundwater. The assessment included grab-sampling soil beneath the aforementioned structures, collecting soil samples from exploratory excavations, and drilling and sampling six soil borings and the installation of three groundwater monitoring wells.

Analytical results indicate TPH-g concentrations in the soil up to 25,000 mg/kg beneath the east end of the former south dispenser island. Liquid phase hydrocarbons were observed in a shallow excavation at the east end of the former north dispenser island. Limited soil excavation was performed adjacent to the former southern dispenser island and from the product line areas in December 1996. The excavated soil (a total of approximately 450 yards) was transported to the TPS Facility in Adelanto, California under a non-hazardous waste manifest. Impacted soil remaining at the site containing TPH-g concentrations greater than 100 mg/kg has been identified between approximately 5 and 42 feet bgs near the former southern dispenser island. FDGTI estimated the adsorbed plume contains between 10,000 pounds to 40,000 pounds of gasoline hydrocarbons.

Semi-annual groundwater sampling is performed without purging by Wayne Perry Inc.

3.0 GEOLOGY/HYDROGEOLOGY

The site lies at an elevation of approximately 100 feet above mean sea level. Underlying sediments beneath the site include discontinuous interbedded sandy clay, silt, silty sand and poorly graded sand.

Depth to groundwater at the site ranges from 35 to 40 feet bgs. The groundwater gradient was indicated to be to the west in the 1997 assessment investigation but monitoring data collected since that time indicates it to be to the south. The site is located within the Segunda Hydrologic Subarea, which has no designated beneficial uses for groundwater.

Current dissolved TPH-g concentrations range from ND<500 ug/l to 39,000 ug/l. Benzene ranges from ND to 3,000 ug/l and MTBE ranges from ND to 4.8 ug/l.

4.0 FIELD ACTIVITIES

In response to the Orange County Health Care Agency's request for additional assessment, four sampling points (WGR-1 through WGR-4) were advanced at the project location adjacent to the southern and western property boundaries of the property. The sampling points were advanced utilizing a Geoprobe hydraulic rig. Soil boring and sampling methodology are described below.

4.1. HEALTH AND SAFETY PLAN

A site specific Health and Safety Plan detailing all known or potential hazards and emergency response procedures was prepared prior to field operations. All on-site personnel reviewed and signed the plan and a "tailgate" safety meeting was conducted prior to initiation of field activities. The plan was maintained on-site throughout the duration of field activities.

4.2 DRILL SITE CLEARANCE

The boring locations were marked with white paint and Underground Service Alert (USA) was contacted to identify any potential subsurface obstructions and/or conflicts at least 48 hours prior to initiation of field activities. In order to further insure that no underground utilities or obstructions existed at the specific boring location a geophysical survey was conducted utilizing ground penetrating radar methods to clear the proposed drilling locations. Additionally, the initial five feet of drilling in each borehole was advanced utilizing hand auger techniques.

4.3 DRILLING AND SOIL SAMPLING PROCEDURES

The borings were advanced to total depths ranging from 45 to 51 feet bgs utilizing a hydraulic push rig. Pre-cleaned drill rods were used throughout the operation to prevent potential cross contamination. All work was performed under the supervision of a California Registered Geologist. Standard practices and procedures for field sampling as outlined in Publication SW-846, Second Edition, United States Environmental Protection Agency were followed throughout the investigation.

Soil samples were collected at five-foot depth intervals and described in the field using the Unified Soil Classification System (USCS). Other information recorded included sample collection depth, blow count, odor, and borehole completion information.

Samples were collected utilizing a 24-inch long, one inch I.D., barrel sampler with one-inch O.D. brass tube liners. Immediately upon collection of soil samples, each end of the selected sample tube was covered with Teflon film and capped with a polyethylene lid. The lids were sealed with toluene free polyethylene tape and an identification label with all pertinent sampling information was affixed to the tube. The samples were then placed immediately on ice and chilled to 4°C for storage and subsequent delivery to a State certified laboratory.

All sampling equipment was decontaminated between sampling episodes utilizing a triple rinse method consisting of a wash with trisodium phosphate (TSP), rinsed with tap water followed by a final rinse with distilled water.

4.4 WATER SAMPLING

Temporary well casings were set into each of the boreholes prior to water sample collection due to slow percolation of groundwater and to prevent the collapse of sediments into the borehole. Ground water samples were then collected from each borehole location after at least 30 minutes had ellapsed for formation water to recharge inside the well casings. The static groundwater level after this recharge period was approximately 39 feet bgs. A precleaned stainless steel bailer was then lowered into the well casing to a depth of approximately 2 feet below the ground water interface to collect the water sample. Immediately subsequent to collection, the water samples were transferred to 40-ml volumetric vials, leaving no headspace and immediately placed in a cooler and chilled with ice for storage. Samples were delivered to a State Certified laboratory for analyses under chain of custody documentation procedures.

4.5 LABORATORY ANALYSES

Soil and water samples were submitted to a State certified laboratory for analysis by Cal DHS modified EPA Method 8015 for gasoline and by EPA Method 8021B for BTEX and MTBE components.

Additionally all samples with detectable quantities of MTBE by EPA Method 8021B were analyzed by EPA Method 8260 for verification.

5.0 SOIL DISPOSAL

Soil cuttings generated by the investigation were placed immediately in a DOT approved 55-gallon steel drum. Each drum was labeled with the site name and address, generation date, and type and source of the material it contains. After characterization, the drum was removed from the facility and disposed at an appropriate facility. Disposal documentation is shown in **Appendix C.**

6.0 RESULTS OF INVESTIGATION

In summary, sediments encountered during this investigation consisted predominantly of silts, clays and very fine to fine-grained silty sands. No hydrocarbon odors were noted in any of the samples. Groundwater occurred within each borehole (after a period for recharge) at a depth of approximately 39 feet bgs. Boring logs are attached as **Appendix A.**

Analytical results of soil sampling indicated no detectable TPH-g or BTEX or MTBE with the exception of a trace MTBE concentration of 0.031 mg/kg in sample WGR-4-40,' located adjacent to the existing underground storage tanks. None of the groundwater samples contained any detectable concentrations of TPH-g, BTEX, or MTBE. Analytical results of soil sampling are summarized in **Table 1** and analytical results of the groundwater samples are summarized in **Table 2.** Laboratory reports and chain of custody documentation are provided in **Appendix B.**

7.0 SUMMARY AND CONCLUSIONS

- Four soil/groundwater-sampling points (WGR-1 through WGR-4) were advanced at the site on June 1, 2000 adjacent to the southern and western property boundaries to delineate the downgradient extent of dissolved hydrocarbons.
- Analytical results of soil sampling indicate that no detectable hydrocarbons were found in any of the samples analyzed.

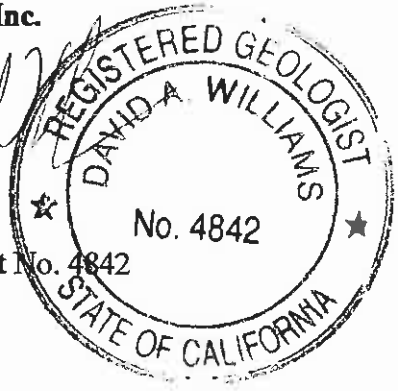
- None of the groundwater samples collected contained detectable hydrocarbons and/or MTBE concentrations, indicating the plume has not significantly migrated.
- Based on the results of this investigation and the non-beneficial groundwater use area in which the site is located, WGR Southwest, Inc, on behalf of Equiva, requests that no further assessment, monitoring, or remedial activities be required and the site be considered for closure.

Respectfully submitted,

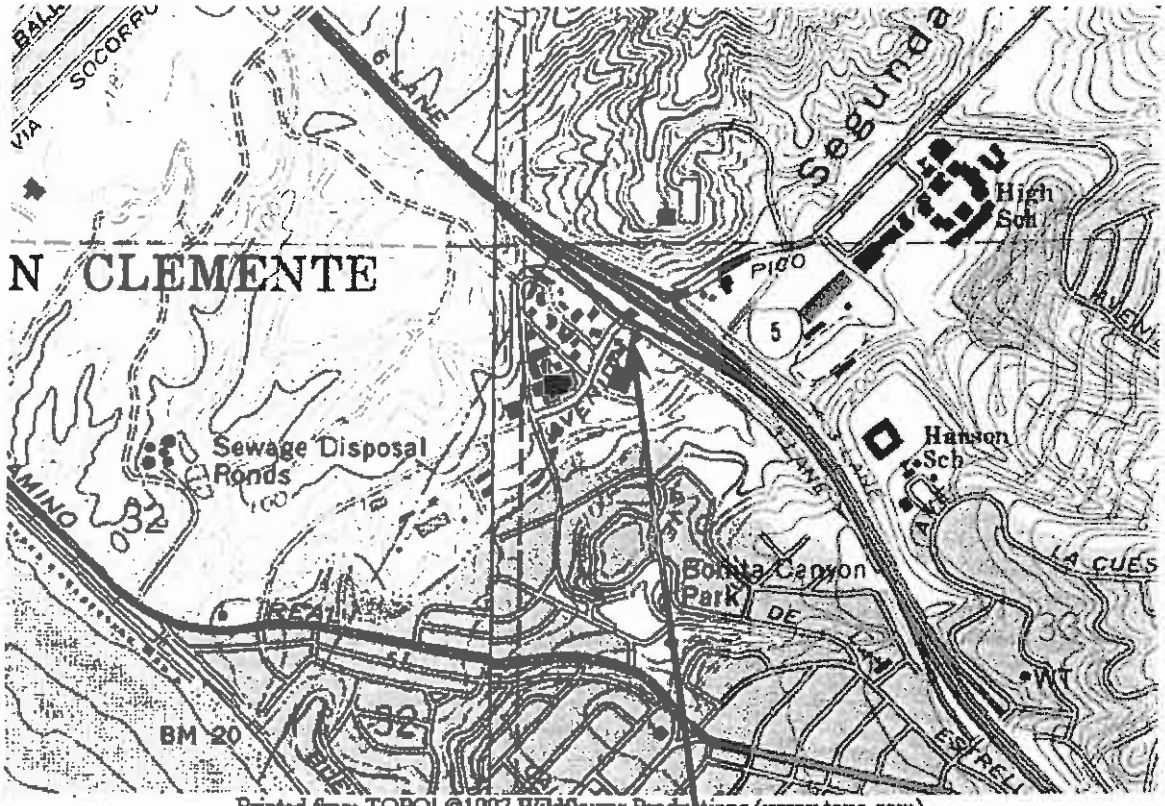
WGR Southwest, Inc.

David A. Williams

Calif. Reg. Geologist No. 4842



FIGURES



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Site Location

N

Legend

Source: 1997 Topo CD-ROM

WGR

Southwest, Inc.

11021 Winners Circle, Suite 101
Los Alamitos, CA 90720

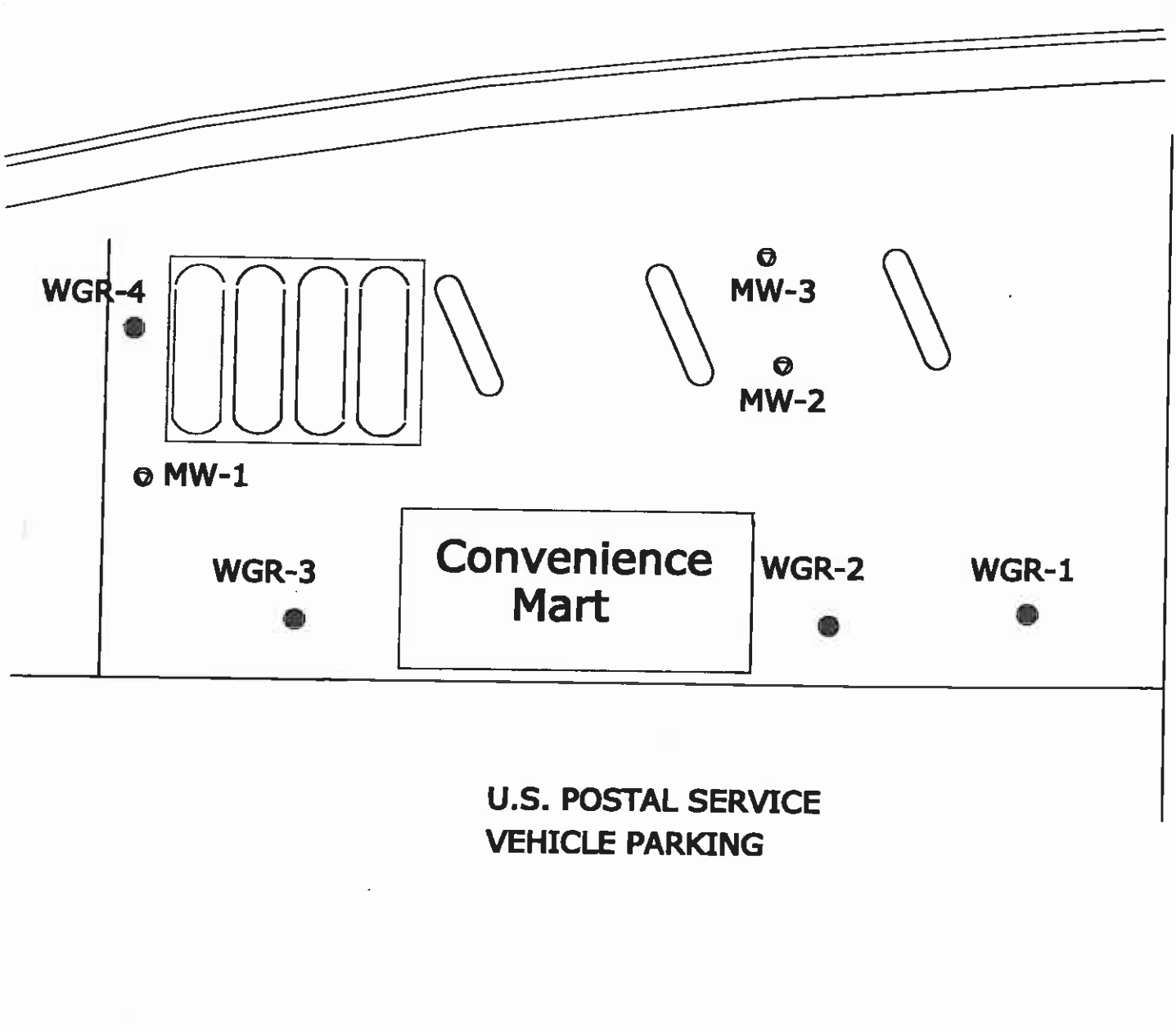
Equiva Services, LLC

Site Vicinity Map

530 Avenida Pico San Clemente, CA

Figure **1**

DATE	PROJECT NUMBER	DWN BY	DWG #
11/24/99	088EQL.00	JGM	



WGR Southwest, Inc. 11021 Winners Circle, Suite 101 Los Alamitos, CA 90720	Equiva Services			Figure
	SITE PLAN/BORING LOCATIONS 630 Avenida Pico San Clemente, California			2
	DATE 6/17/00	PROJECT NUMBER 088.EQL.00	DWN BY DW	DWG #

TABLES

Table 1

Texaco Station
530 Avenida Pico
San Clemente, California

Soil Sample Analytical Summary

Sample Number	Sample Date	8015g TPH mg/Kg	8021B Benzene mg/Kg	8021B Toluene mg/Kg	8021B Ethyl Benzene mg/Kg	8021B Total Xylenes mg/Kg	8021 B MTBE mg/Kg
WGR-1-6'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-10'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-15'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-20'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-25'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-30'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-35'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-40'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-1-45'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-2-6'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-2-10'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-2-15'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-2-20'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-2-25'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025

Table 1

Texaco Station
530 Avenida Pico
San Clemente, California

Soil Sample Analytical Summary

Sample Number	Sample Date	8015g TPH mg/Kg	8021B Benzene mg/Kg	8021B Toluene mg/Kg	8021B Ethyl Benzene mg/Kg	8021B Total Xylenes mg/Kg	8021 B MTBE mg/Kg
WGR-2-30'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-2-35'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-2-40	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-6'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-10'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-15'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-20'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-25'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-30'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-35'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-3-40'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-4-6'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-4-10'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025

Table 1

Texaco Station
530 Avenida Pico
San Clemente, California

Soil Sample Analytical Summary

Sample Number	Sample Date	8015g TPH mg/Kg	8021B Benzene mg/Kg	8021B Toluene mg/Kg	8021B Ethyl Benzene mg/Kg	8021B Total Xylenes mg/Kg	8021 B MTBE mg/Kg
WGR-4-15'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-4-20'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-4-25'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-4-30'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-4-35'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	ND<.025
WGR-4-40'	6/1/00	ND<0.5	ND<0.005	ND<0.005	ND<0.005	ND<0.01	0.031

Table 2. Summary of Water Sample Analyses

Texaco Station
530 Avenida Pico
San Clemente, California

Sample Number	Sample Date	8015g TPH ug/l	8021B Benzene ug/l	Toluene ug/l	Ethyl Benzene ug/l	Total Xylenes ug/l	MTBE ug/l
WGR-1	6/1/00	ND<500	ND<0.3	ND<0.3	ND<0.3	ND<0.6	ND<5
WGR-2	6/1/00	ND<500	ND<0.3	ND<0.3	ND<0.3	ND<0.6	ND<5
WGR-3	6/1/00	ND<500	ND<0.3	ND<0.3	ND<0.3	ND<0.6	ND<5
WGR-4	6/1/00	ND<500	ND<0.3	ND<0.3	ND<0.3	ND<0.6	ND<5

APPENDIX A

SOIL BORING LOGS

WGR Southwest, Inc.

BORING LOG

Drill Rig:	Geoprobe	Date Drilled:	6-1-00	Logged By:
Boring Dia:	3 Inches	Boring Number:	WGR-1	Kevin Clark

Sample	Blow Counts	Completion	OVA (ppm)	Depth Feet	Lithology	Description
						Medium brown silty very fine sand, no odor, slightly moist
	NA		NR	5		
	NA		NR	10		
	NA		NR	15		
	NA		NR	20		Medium brown silty very fine sand/sandy silt, no odor, slightly moist
	NA		NR	25		Dark brown clay, moist, dense, no odor
	NA		NR	30		Medium brown silty very fine sand/sandy silt, no odor, slightly moist
	NA		NR	35		Medium brown sandy silt/silty very fine sand, no odor, soft, moist to wet
	NA		NR	40		Medium to dark brown silty very fine sand/sandy silt, no odor, moist to wet
	NA		NR	45		Medium brown very fine sandy silt/silty very fine sand, no odor, wet

Completion Notes:

Boring backfilled with bentonite from TD to 1 foot bgs, completed to surface with concrete

Site:

Texaco Station
530 Avenida Pico
San Clemente, CA, CA

Project No.:

WGR Southwest, Inc.

BORING LOG

Drill Rig:	Geoprobe	Date Drilled:	6-1-00	Logged By:
Boring Dia:	3 Inches	Boring Number:	WGR-1	Kevin Clark

Sample	Blow Counts	Completion	OVA (ppm)	Depth Feet	Lithology	Description
				55		
				60		
				65		
				70		
				75		
				80		
				85		
				90		
				95		

Completion Notes:

Boring backfilled with bentonite from TD to 1 foot bgs, completed to surface with concrete

Site:

Texaco Station
530 Avenida Pico
San Clemente, CA, CA

Project No.:

WGR Southwest, Inc.

BORING LOG

Drill Rig:	Geoprobe	Date Drilled:	6-1-00	Logged By:
Boring Dia:	3 Inches	Boring Number:	WGR-2	Kevin Clark

Sample	Blow Counts	Completion	OVA (ppm)	Depth Feet	Lithology	Description
						Medium brown silty very fine to fine sand, no odor, slightly moist
	NA		NR	5		
	NA		NR	10		Dark brown very fine sandy silt, no odor, slightly moist
	NA		NR	15		Medium brown very fine sandy silt, no odor, slightly moist
	NA		NR	20		Medium brown fine to moist sand, no odor, slightly moist
	NA		NR	25		Dark brown silty clay/clayey silt, no odor, slightly moist, caliche pattern
	NA		NR	30		Medium brown silty fine sand, no odor, moist
	NA		NR	35		Medium to dark brown silty clay/clayey silt, no odor, moist
	NA		NR	40		Medium brown silty very fine sand/sandy silt, no odor, wet
				45		

Completion Notes:

Boring backfilled with bentonite from TD to 1 foot bgs, completed to surface with concrete.

Site:

Texaco Station
530 Avenida Pico
San Clemente, CA, CA

Project No.:

WGR Southwest, Inc.

BORING LOG

Drill Rig:	Geoprobe	Date Drilled:	6-1-00	Logged By:
Boring Dia:	3 Inches	Boring Number:	WGR-3	Kevin Clark

Sample	Blow Counts	Completion	OVA (ppm)	Depth Feet	Lithology	Description
						Medium brown silty fine sand, no odor, slightly moist
	NA		NR	5		
	NA		NR	10		Medium to dark brown very fine sandy silt, no odor, slightly moist
	NA		NR	15		Dark brown clayey silt, no odor, slightly moist, with caliche pattern
	NA		NR	20		Light brown fine to medium sand, no odor, slightly moist
	NA		NR	25		Light brown silty, very fine sand, no odor, slightly moist to moist
	NA		NR	30		Medium brown clayey silt/silty clay, no odor, moist
	NA		NR	35		Dark brown clayey silt, no odor, moist
	NA		NR	40		Medium grayish brown silty very fine sand, no odor, moist to wet
				45		

Completion Notes:

Boring backfilled with bentonite from TD to 1 foot bgs, completed to surface with concrete

Site:

Texaco Station
530 Avenida Pico
San Clemente, CA, CA

Project No.:

WGR Southwest, Inc.

BORING LOG

Drill Rig:	Geoprobe	Date Drilled:	6-1-00	Logged By:
Boring Dia:	3 Inches	Boring Number:	WGR-4	Kevin Clark

Sample	Blow Counts	Completion	OVA (ppm)	Depth Feet	Lithology	Description
						Medium brown silty very fine sand, no odor, slightly moist
	NA		NR	5		
	NA		NR	10		Medium to dark brown clayey silt, no odor, moist
	NA		NR	15		Medium brown clayey silt, with caliche, no odor, moist to wet
	NA		NR	20		Medium brown silty fine to medium sand, no odor, moist to wet
	NA		NR	25		Medium brown silty clay, moist, no odor
	NA		NR	30		Medium brown silty very fine sand, no odor, moist to wet
	NA		NR	35		Medium to dark brown clayey silt, no odor, moist to wet
	NA		NR	40		Medium brown silty clay, no odor, wet
				45		

Completion Notes:

Boring backfilled with bentonite from TD to 1 foot bgs, completed to surface with concrete

Site:

Texaco Station
530 Avenida Pico
San Clemente, CA, CA

Project No.:

Page 1

WGR

Southwest, Inc.

April 14, 2000

County of Orange Health Care Agency
Division of Environmental Health
2009 East Edinger Avenue
Santa Ana, CA 92705-4720
Attn: Mr. James Strozier

SUBJECT: SITE ASSESSMENT WORKPLAN
TEXACO STATION
530 Avenida Pico
San Clemente, California

Dear Mr. Strozier:

WGR Southwest, Inc., on behalf of Equiva Services, LLC, is forwarding the attached workplan for the above referenced site. If you have any questions please do not hesitate to call me at (562) 799-8510.

Sincerely,
WGR Southwest, Inc.

David A. Williams, RG
Project Manager

C/088eql.00wkpl.doc

Cc. Marvin Katz, Equiv. Services LLC

0

SITE ASSESSMENT WORK PLAN

At

TEXACO STATION
530 Avenida Pico
San Clemente, California

April 10, 2000

for

EQUIVA SERVICES LLC

Mr. Marvin Katz
Equiva Services LLC
P.O. Box 7869
Burbank, California 91510-7869

prepared by:

WGR
Southwest, Inc.
11021 Winners Circle, Suite 101
Los Alamitos, CA 90720

SITE ASSESSMENT WORK PLAN

TEXACO SERVICE STATION
530 Avenida Pico
San Clemente, California

1.0 INTRODUCTION

The site is located on the west side and adjacent to Interstate 5 in the City of San Clemente, California in a commercial district with heavy traffic density. A site vicinity map is shown as **Figure 1.** The Texaco Station is located lies along the south side of Avenida Pico adjacent to and just west of the southbound interstate onramp. A fast food restaurant is located directly west of the station and a parking lot for the US Postal Service mail delivery vehicles is located directly south of the subject property. An operational Chevron Station is located northwest of the site across Avenida Pico. Neighboring properties are shown as **Figure 2.**

2.0 SITE HISTORY

The property has served as the location of an active Texaco Service Station since the 1930's. The previous station configuration included a garage with two dispenser islands fronting Avenida Pico. The former steel gasoline UST's were removed and replaced with double-wall fiberglass tanks in the 1980's.

Further remodeling occurred in late 1996 and early 1997. Fluor Daniel GTI (FDGTI) observed the removal of one waste oil tank, two hydraulic hoists, one clarifier, and gasoline piping. At this same time FDGTI performed a site assessment investigation to evaluate the extent of petroleum hydrocarbons in the soil and groundwater. The assessment included grab-sampling soil beneath the aforementioned structures, collecting soil samples from exploratory excavations, and drilling and sampling six soil borings and three groundwater monitoring wells.

Analytical results indicate TPH-g concentrations in the soil up to 25,000 mg/kg beneath the east end of the former south dispenser island. Liquid phase hydrocarbons were observed in a shallow excavation at the east end of the former north dispenser island. Limited soil excavation was performed adjacent to the former southern dispenser island and from the product line areas in December 1996. The excavated soil (a total of approximately 450 yards was transported to the TPS Facility in Adelanto, California under a non-hazardous waste manifest. Impacted soil remaining at the site containing TPH-g concentrations greater than 100 mg/kg is currently present between approximately 5 and 42 feet bgs near the former southern dispenser island. FDGTI estimated the adsorbed plume contains between10,000 to 40,000 pounds of gasoline hydrocarbons.

Semi-annual groundwater sampling is performed without purging by Wayne Perry Inc.

3.0 GEOLOGY/HYDROGEOLOGY

Lithologies at the site include discontinuous interbedded sandy clay, silt, silty sand and poorly graded sand. The permeability of such deposits is typically low.

Depth to groundwater at the site ranges from 35 to 40 feet bgs. The groundwater gradient was indicated to be to the west in the 1997 assessment investigation but monitoring data collected since that time indicates it to be to the south-southeast. The site is located within the Segunda Hydrologic Subarea, which has no designated beneficial uses for groundwater.

Current dissolved TPH-g concentrations range from ND<500 ug/l to 39,000 ug/l. Benzene ranges from ND<0.3ug/l to 3,000 ug/l and MTBE ranges from ND to 4.8 ug/l.

4.0 PROPOSED INVESTIGATIVE FIELD ACTIVITIES

A Geoprobe/Hydropunch™ investigation will be conducted at the subject property consisting of a minimum of four onsite borings drilled to a maximum depth of approximately 40 feet bgs. If impacted groundwater is encountered in any of the borings additional offsite "step-out" borings may be necessary to determine the extent of dissolved hydrocarbon impaction. Drilling and sampling procedures are described in the following sections:

4.1 DRILL SITE CLEARANCE

Prior to the initiation of field operations, the drilling locations will be marked in white and Underground Service Alert (USA) will be contacted to identify any potential subsurface obstructions and/or conflicts. In order to further insure that no underground utilities or obstructions exist at the proposed drilling locations, a geophysical survey will be conducted at each location and the initial 5 feet of drilling will be conducted utilizing hand auger techniques. Adjustments to the surface location may be required based on the results of the USA, geophysical survey and/or hand augering.

4.2 HYDRAULIC PUSH RIG/HYDROPUNCH™

The installation of four onsite and possible additional offsite hydropunch groundwater sampling points utilizing a hydraulic push rig are proposed in the locations indicated on **Figure 2.** Groundwater samples will be collected from the saturated zone utilizing a Hydropunch™ sampling device at a depth of approximately 33 to 35 feet bgs.

A Geoprobe™ rig will be utilized to advance the borings into the saturated zone to a depth of approximately 35 feet bgs where a groundwater sample will be extracted utilizing a hydropunch™ sampling device. Following sample collection, the dill rods will be withdrawn and the boring will be backfilled with bentonite grout to a depth of approximately 1-foot bgs. Native soil or concrete (depending on adjacent surface grade material) will then be utilized to match surface grade material from 1 feet bgs to surface. Pre-cleaned drill pipe and other downhole

equipment will be used throughout the operation to prevent potential cross contamination. The work will be performed under the supervision of a California Registered Geologist.

4.3 SOIL SAMPLING AND ANALYSES

Soil samples will be collected for analyses at 5-foot depth intervals during advancement of the borings and submitted for analyses. The soil samples submitted for analyses will be collected in accordance with EPA SW-846 procedures using a sampler lined with metal sample tubes. One of the sample tubes from each sample interval will be immediately sealed with Teflon film, a polyethylene cap, and toluene-free polyethylene tape. The samples will be labeled with all pertinent sampling information, and then immediately delivered to a California Department of Health Services (CDHS)-certified onsite mobile laboratory for analyses.

Soil samples will be screened for hydrocarbon vapors with a portable organic vapor analyzer (OVA), and described and logged by the field geologist in accordance with the Unified Soil Classification System (USCS). Sampling equipment will be decontaminated between sampling episodes utilizing a triple rinse method consisting of a wash with Alconox (or equivalent) solution, an initial rinse with tap water, and a final rinse with distilled water.

Each of the samples submitted for analyses will be analyzed for TPH-G by the CDHS-approved method (modified EPA Method 8015) and for BTEX and MTBE components by EPA Method 8021B. If MTBE is detected by Method 8021B, the sample will be analyzed by EPA Method 8260 for verification.

4.4 GROUNDWATER SAMPLES AND ANALYSES

Groundwater samples will be collected at depth of approximately 34 feet bgs or where the top of the lower saturated zone is encountered. Following collection, samples will be immediately delivered to the onsite laboratory for analyses. Samples will be analyzed for TPH-g concentrations by the CDHS approved method (modified EPA Method 8015) and for BTEX

and MTBE components by EPA Method 8021B. All samples with detectable MTBE concentrations by EPA Method 8021B will be analyzed by EPA method 8260 for verification.

5.0 HEALTH AND SAFETY PLAN

A site specific Health and Safety Plan detailing known or potential hazards and emergency response procedures will be prepared prior to field operations. All on-site personnel will review the plan and conduct a "tailgate" safety meeting prior to initiation of field activities. The plan will be maintained on-site throughout the duration of field activities. The plan will be modified if warranted due to on-site conditions.

6.0 MINIMUM DEALER INTERFERENCE

All fieldwork will be conducted in accordance with Equilon and/or Equiva Services Minimal Dealer Interference program.

7.0 DISPOSITION OF DRILL CUTTINGS AND WASTE WATER

Drill cuttings and wastewater generated by drilling, sampling, or steam cleaning will be stored on-site in 55-gallon DOT-approved steel drums pending characterization. Each drum will be labeled with the site name and address, generation date, and type and source of the material it

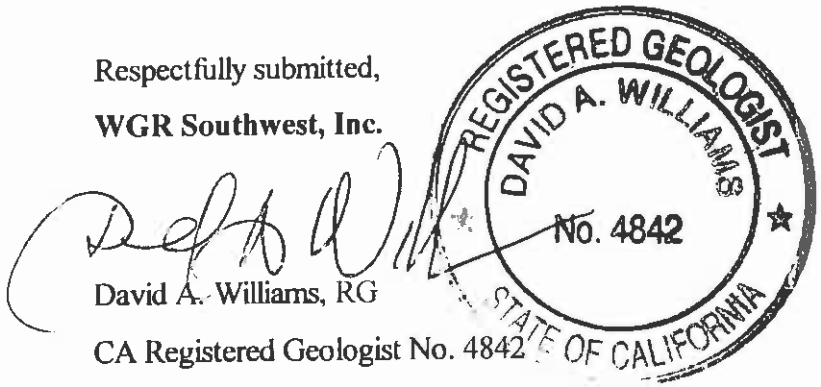
contains. Within 60 days of the generation date, the drummed soil and water will be transported to an appropriate facility for disposal.

8.0 ENVIRONMENTAL ASSESSMENT REPORT

Upon completion of field activities, a report documenting the work will be submitted. The report will include a detailed description of the field activities, a summary of the analytical data, analytical reports with QA/QC documentation, soil boring logs, and investigation findings and conclusions.

Respectfully submitted,

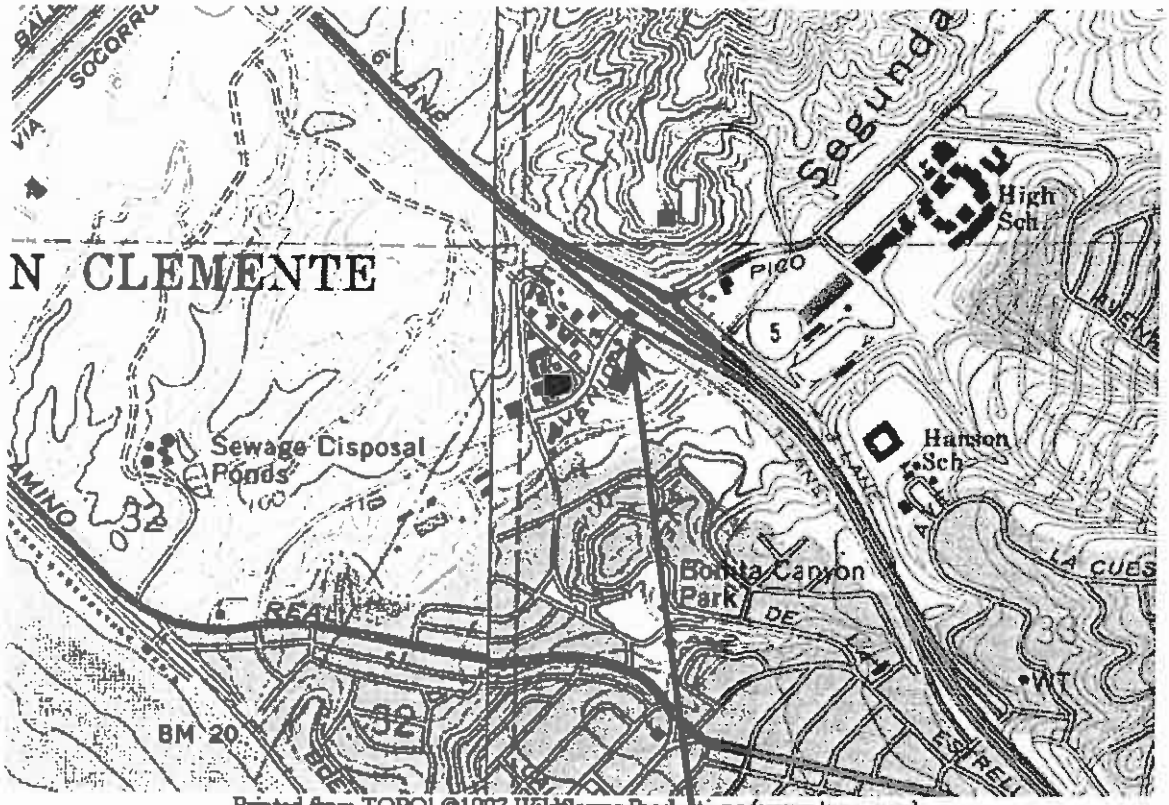
WGR Southwest, Inc.



David A. Williams, RG

CA Registered Geologist No. 4842

ATTACHMENTS



Site Location

N

Legend

Source: 1997 Topo CD-ROM

WGR

Southwest, Inc.

11021 Winners Circle, Suite 101
Los Alamitos CA 90720

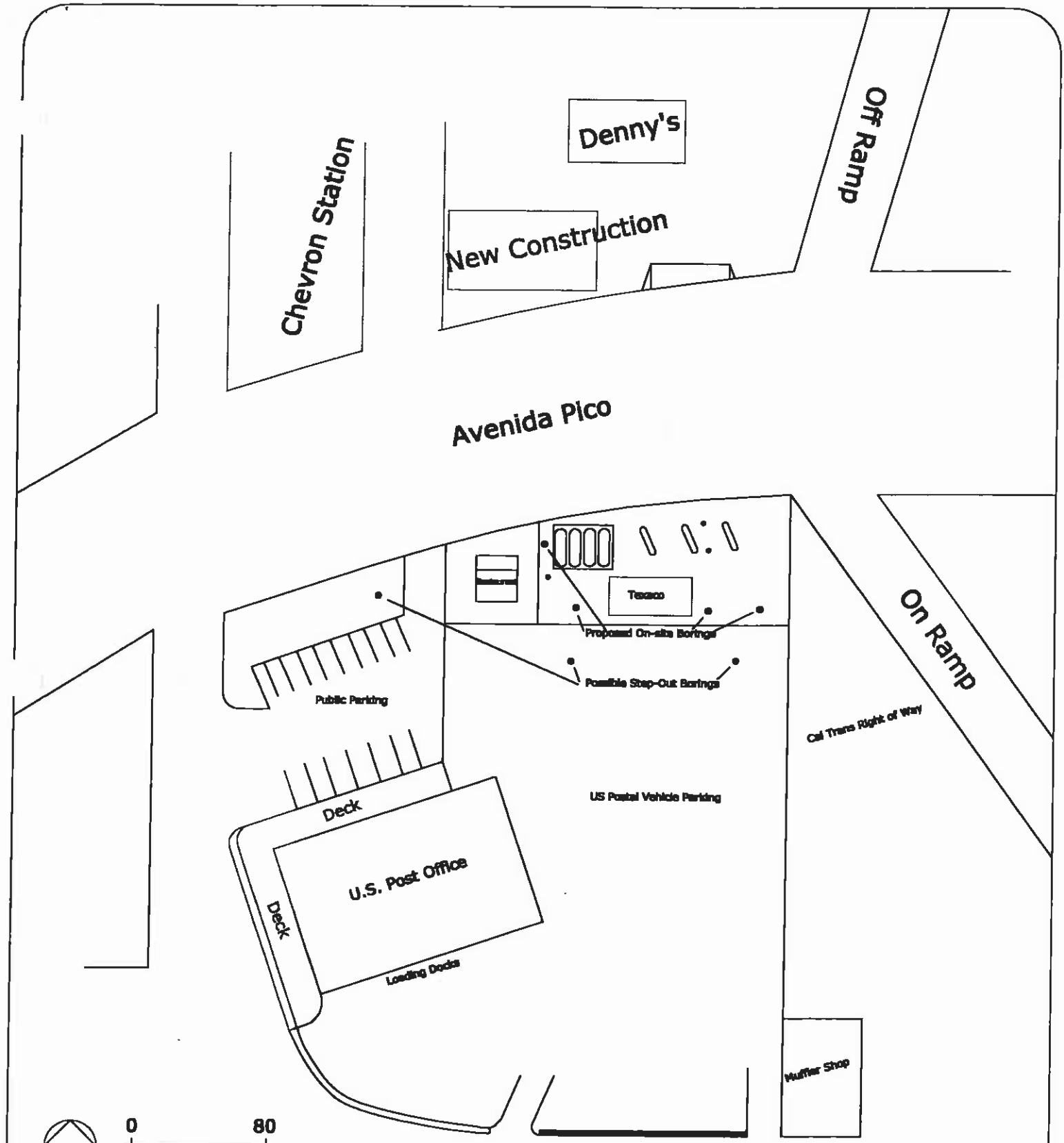
Equiva Services, LLC

Site Vicinity Map

530 Avenida Pico San Clemente, CA

Figure 1

DATE	PROJECT NUMBER	DWN BY	DWG #
11/24/99	088EQL.00	JGM	



Legend

- EXISTING WELL
- PROPOSED ONSITE BORING
- PROPOSED OFFSITE BORING

WGR Southwest, Inc.
11021 Winners Circle, Suite 101
Los Alamitos, CA 90720

Equiva Services

Proposed Boring Locations

530 Avenida Pico San Clemente, California

Figure 2

DATE	PROJECT NUMBER	DWN BY	DWG #
4/8/00	088.EQL.00	ZP	

FLUOR DANIEL GTI

January 16, 1998

Ms. Feryal Sarrafian
Texaco Refining and Marketing
10 Universal City Plaza, 7th Floor
Universal City, CA 91608

Subject: Findings of Recent Groundwater Monitoring Activities
Texaco Service Station, 530 Avenida Pico, San Clemente, California
Site No. 61-106-1117
Fluor Daniel GTI Project 023400309

Dear Ms. Sarrafian:

As requested, Fluor Daniel GTI, Inc. (Fluor Daniel GTI) has reviewed recent groundwater monitoring and sampling data collected from the San Clemente site. The data were presented in a December 31, 1997 monitoring report prepared by Alton Geoscience. This is the third groundwater monitoring episode.

On October 13, 1997, 3 wells were gauged and 3 wells were sampled by Alton Geoscience (MW-1, MW-2D and MW-3D). Two of the wells are dual completed (MW-2 and MW-3) with shallow vapor extraction wells set above the water table. No liquid phase hydrocarbons (LPH) were present in any of the wells. Depths to water during monitoring were between 37.32 feet (well MW-1) and 37.98 feet (well MW-2D). Groundwater elevations were consistent with data collected in July 1997. The groundwater gradient direction was southeast at 0.016 ft/ft and was consistent with the previous quarter.

Groundwater samples were analyzed by EPA method modified 8015 and 8020. A comparison of groundwater analytical data from July 1997 to October 1997 show benzene concentrations decreased from 400 µg/L to 49 µg/L in MW-2D, 280 µg/L to 200 µg/L in MW-3D, and remained not detected in MW-1. Concentrations of total petroleum hydrocarbons as gasoline (TPH_g) decreased from 19,000 µg/L to 6,400 µg/L in well MW-2D, 5,600 µg/L to 3,600 µg/L in well MW-3D, and remained not detected in well MW-1. Methyl-tertiary-butyl ether (MTBE) was detected for the first time in wells MW-2D (76 µg/L) and MW-3D (80 µg/L) and remained not detected in well MW-1. The laboratory reviewed the chromatograms and confirmed the MTBE results; however, EPA method 8020 can result in false positive MTBE results.

6450 Lusk Boulevard, Suite E208 / San Diego, CA 92121 USA (619) 453-8415 FAX (619) 453-2688

Benzene and TPH_g concentrations in groundwater show a decreasing trend. This is likely due to natural attenuation and the removal of 250 cubic yards of soil containing hydrocarbons around the dispenser islands (*Fluor Daniel GTI, April 30, 1997; Site Assessment Report, Texaco Service Station, 530 Avenida Pico, San Clemente, California*).

The site is in a nonbeneficial groundwater use area (HSA 901.32). Cleanup goals for this site follow the Regional Water Quality Control Board (RWQCB) interim guidance at low-risk fuel contaminated sites, according to James Strozier of the Orange County Health Care Agency (OCHCA). The interim cleanup goals are 400 µg/L benzene, 3,700 µg/L toluene, 430 µg/L ethylbenzene, and 10,000 µg/L xylenes. The data shows this site meets all but the ethylbenzene requirement. Ethylbenzene concentrations were 1,100 µg/L in MW-2D and have been declining since monitoring and sampling were started in January 1997.

Fluor Daniel GTI recommends confirming MTBE results in samples MW-2D and MW-3D by EPA method 8260 next quarter. If MTBE is confirmed, then a tightness test on the tanks and lines is also recommended.

Should you have any questions or comments, please call Jim Molesworth at (619) 453-8415.

Sincerely,

Fluor Daniel GTI, Inc.
Submitted by:

James L. Molesworth
Project Manager

Attachment: Fourth Quarter 1997, Fluid Level Monitoring and Groundwater Sampling Report, Alton Geoscience, December 31, 1997.

JLM

c: JLM
file/chron

ALTON GEOSCIENCE

OCT 3 1997

THIRD QUARTER 1997
FLUID LEVEL MONITORING AND GROUNDWATER SAMPLING REPORT

September 30, 1997

TEXACO STATION
530 Avenida Pico
San Clemente, California
Site No. 61-106-1117

Prepared For:

Ms. Feryal Sarrafian
TEXACO REFINING AND MARKETING
ENVIRONMENT, HEALTH, AND SAFETY
10 Universal City Plaza
Universal City, California 91608-7812

By:

Joseph K. Williams
Project Manager

REGISTERED GEOLOGIST
RONALD J. KOFRON
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Associate, Irvine Operations

ALTON GEOSCIENCE
25A Technology Drive
Irvine, California 92618

GROUNDWATER MONITORING REPORT

LIST OF ATTACHMENTS	
Summary Sheet	Summary of Gauging and Sampling Activities
Table	Table Key and Abbreviations Historic Gauging and Groundwater Analysis Results
Figures	Figure 1: Vicinity Map Figure 2: Groundwater Elevation Contour Map Figure 3: Dissolved-Phase TPH-G Concentration Map Figure 4: Dissolved-Phase Benzene Concentration Map
Graphs	Groundwater Elevation vs. Benzene Graphs Groundwater Elevation vs. TPH-G Graphs
Field Activities	General Field Procedures Groundwater Sampling Field Notes
Laboratory Reports	Official Laboratory Reports Quality Control Reports Chain of Custody Records
Disposal Documents	Disposal/Treatment Manifests
Statement	Limitations

Summary of Gauging and Sampling Activities
July 1997 through September 1997
Texaco Station 611061117
530 Avenida Pico
San Clemente, CA

Site Information:

Site:	Texaco Station 530 Avenida Pico San Clemente, CA
Project Coordinator/Phone Number:	Feryal Sarrafian/818-505-2724
Groundwater wells onsite:	5
Groundwater wells offsite:	0

Field Activity:

Sampling consultant:	Alton Geoscience
Date(s) sampled:	7/21/97
Groundwater wells gauged:	5
Groundwater wells sampled:	3
Purging method:	vacuum truck
Treatment/disposal method:	Crosby and Overton treatment facility
Manual free product pumpouts:	No

Site Hydrogeology:

Minimum depth to groundwater (feet bgs):	22.74
Maximum depth to groundwater (feet bgs):	37.92
Average groundwater elevation (feet relative to mean sea level):	69.51
Average change in groundwater elevations since previous event (feet):	1.16
Groundwater gradient and flow direction:	0.02 ft/ft, southeast
Previous gradient and/or flow direction (and date):	(1/24/97)

Groundwater Condition (Benzene Maximum Contaminant Level (MCL) = 1.0 µg/l)

Wells with benzene concentrations below MCL:	1
Wells with benzene concentrations at or above MCL:	2
Minimum benzene concentration (µg/l):	ND
Maximum benzene concentration (µg/l):	400 (MW-2D)
Minimum MTBE concentration (µg/l):	ND
Maximum MTBE concentration (µg/l):	ND ()
Minimum TPH-G concentration (µg/l):	ND
Maximum TPH-G concentration (µg/l):	19000 (MW-2D)
Groundwater wells with free product:	0
Minimum free product thickness (feet):	0
Maximum free product thickness (feet):	0

Additional Information:

MW-2S=not enough water to sample, MW-3S=not enough water to sample,

This report presents the results of groundwater monitoring and sampling activities performed by Alton Geoscience. Please contact the primary consultant for other specific information on this site.

TABLE KEY

ABBREVIATIONS / SYMBOLS:

BTEX	=	benzene, toluene, ethylbenzene, and total xylenes
DHS	=	Department of Health Services
HVOC	=	halogenated volatile organic compounds
LPH	=	liquid-phase hydrocarbons
mg/l	=	milligrams per liter
MTBE	=	methyl tertiary butyl ether
NGVD	=	National Geodetic Vertical Datum
NA	=	not applicable
ND	=	not detected at or above laboratory detection limit
ppb	=	parts per billion
ppm	=	parts per million
TPH-G	=	total petroleum hydrocarbons with gasoline distinction
TPH-D	=	total petroleum hydrocarbons with diesel distinction
TRPH	=	total recoverable petroleum hydrocarbons
Trace	=	less than 0.01 foot of LPH in well
µg/kg	=	micrograms per kilogram
µg/l	=	micrograms per liter
1,1-DCA	=	1,1-Dichloroethane
1,2-DCA	=	1,2-Dichloroethane
1,1-DCE	=	1,1-Dichloroethene
1,2-DCE	=	cis- and trans-1,2-Dichloroethene
PCE	=	tetrachloroethene
TCA	=	trichloroethane
TCE	=	trichloroethene
PCB	=	polychlorinated biphenyls
USTs	=	underground storage tanks
–	=	not analyzed, measured, or collected

NOTES

Elevations are in feet above mean sea level (NGVD-1929).

Groundwater elevation for wells with LPH is calculated as follows:
Surface elevation - depth to water + (0.75 x LPH thickness).

HISTORIC GAUGING AND GROUNDWATER ANALYSIS RESULTS

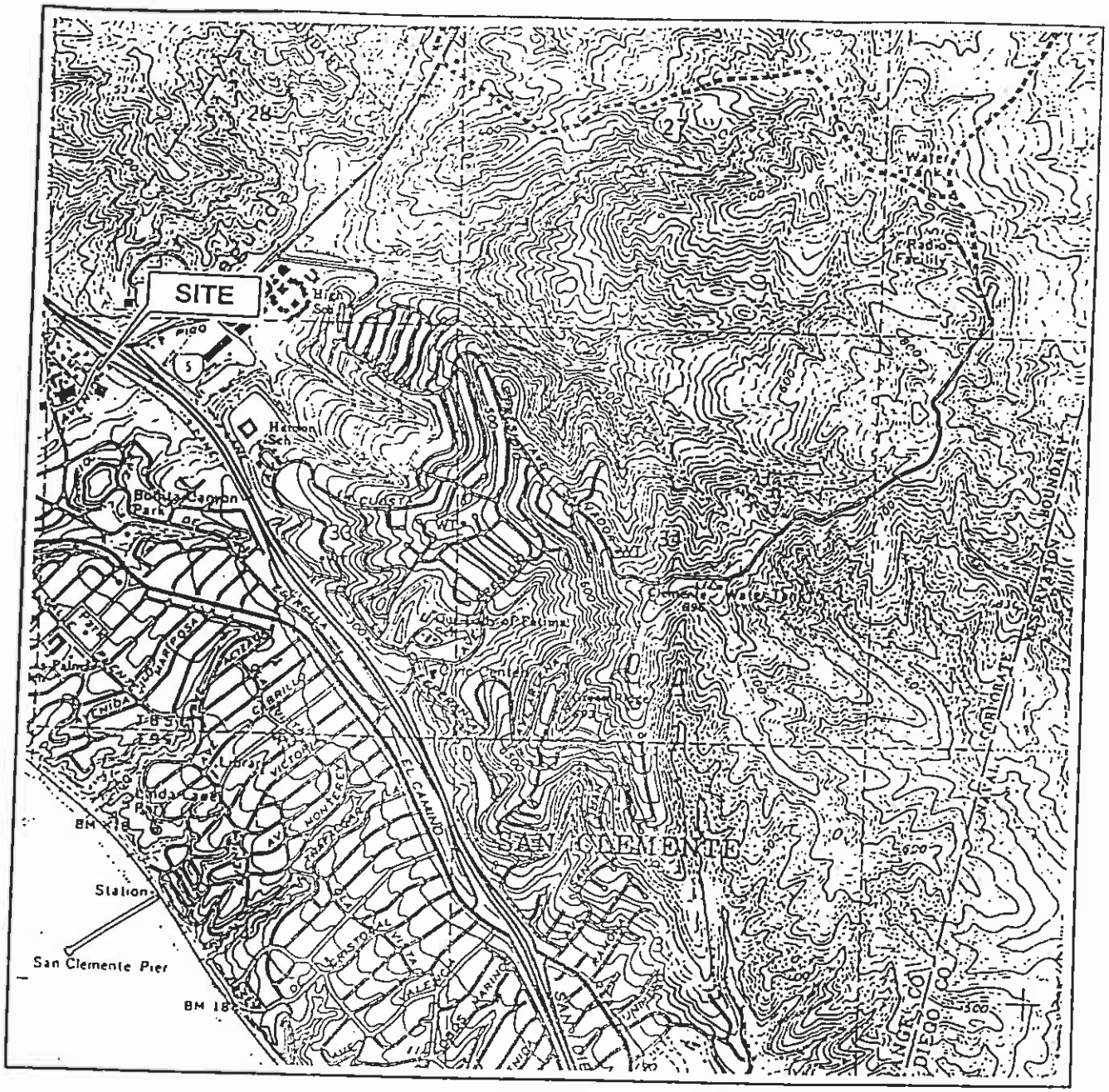
January 1997 through July 1997

Texaco Station 611061117

530 Avenida Pico

San Clemente, CA

Sampling Date	Casing Elevation (feet)	Depth to Water (feet)	LPH Thickness (feet)	Ground-water Elevation (feet)	Change in Elevation (feet)	Dissolved Oxygen (mg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylenes (µg/l)	TPH-G (µg/l)	MTBE 8020 (µg/l)	Comments
MW-1													
01/24/97	99.35	37.18	0.00	62.17	--	--	ND	ND	ND	ND	ND	ND	
07/21/97	99.35	37.31	0.00	62.04 ✓	-0.13	1.56	ND	ND	ND	ND	ND	ND	
MW-2D													
01/24/97	100.41	37.92	0.00	62.49	--	--	380	3600	2600	12000	41000	ND	
07/21/97	100.41	37.92	0.00	62.49 ✓	0.00	1.04	400	590	2400	3900	19000	ND	
MW-2S													
01/24/97	103.45	26.50	0.00	76.95	--	--	--	--	--	--	--	--	
07/21/97	103.45	24.10	0.00	79.35 ✓	2.40	--	--	--	--	--	--	--	not enough water to sample
MW-3D													
01/24/97	100.70	38.26	0.00	62.44	--	--	1200	2900	1400	4800	29000	ND	
07/21/97	100.70	37.72	0.00	62.98 ✓	0.54	0.00	280	320	410	3500	5600	ND	
MW-3S													
01/24/97	103.45	25.75	0.00	77.70	--	--	--	--	--	--	--	--	
07/21/97	103.45	22.74	0.00	80.71 ✓	3.01	--	--	--	--	--	--	--	not enough water to sample



1 MILE 3/4 1/2 1/4 0 1 MILE

SCALE 1: 24,000

N

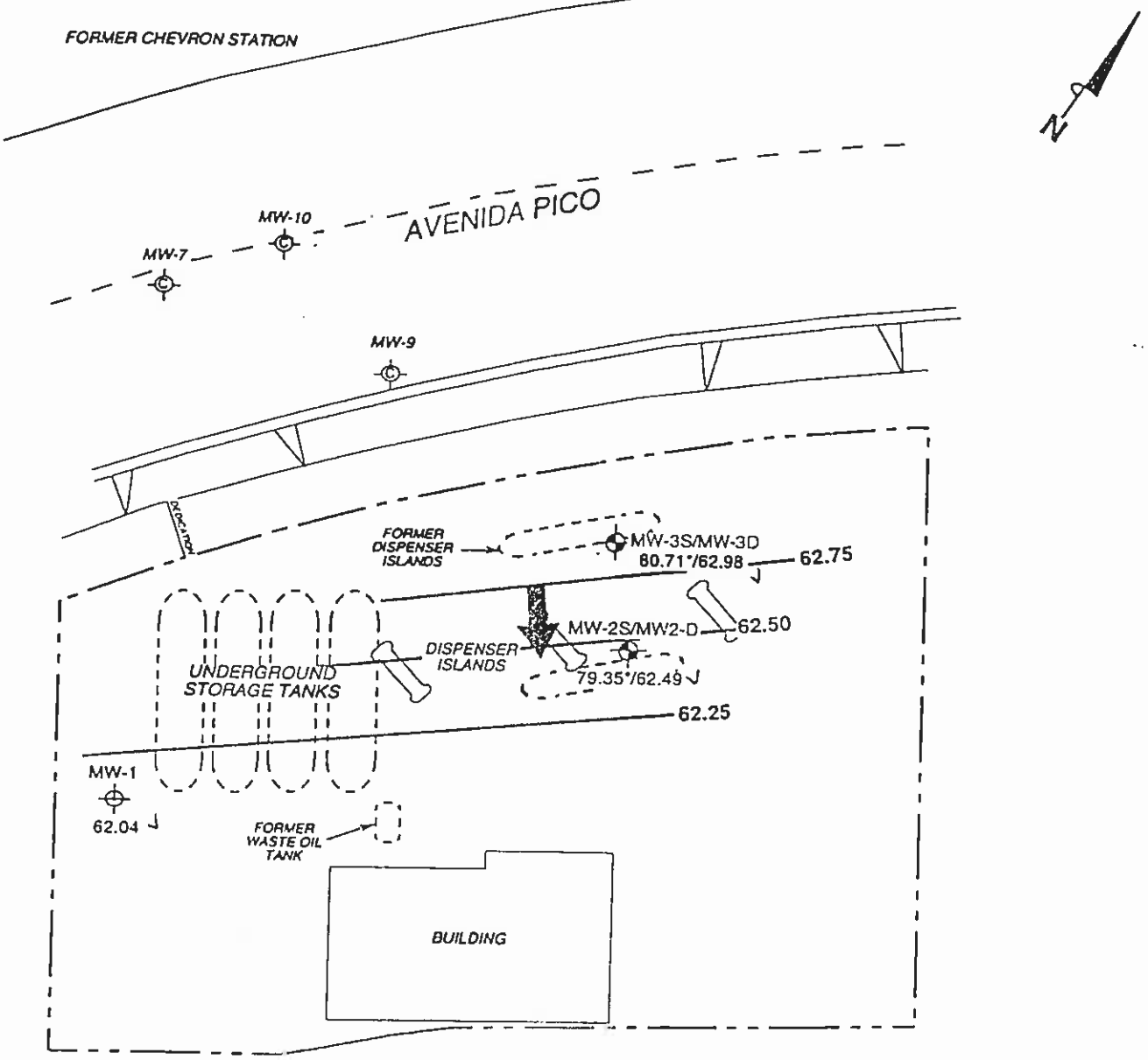
SOURCE:
United States Geological Survey
7.5 Minute Topographic Map:
San Clemente Quadrangle

VICINITY MAP
Texaco Service Station
530 Avenida Pico
San Clemente, California
Site No.:61-106-1117

FIGURE 1

ALTON GEOSCIENCE
Irvine, California

24-0019 9/2/97



LEGEND

MW-1 — Groundwater Monitoring Well with Groundwater Elevation (feet)

MW-3S/MW-3D — Dual Completion Well

62.75 — Groundwater Elevation Contour Line (Contour Interval = 0.25 foot)

General Direction of Groundwater Flow

NOTES:

Contour lines are interpretive based on fluid levels measured in wells. Elevations are in feet above mean sea level (NGVD - 1929). * = MW-3S & MW-2S are in upper groundwater zone and are not used in groundwater contour interpretation.

GROUNDWATER ELEVATION CONTOUR MAP
July 21, 1997

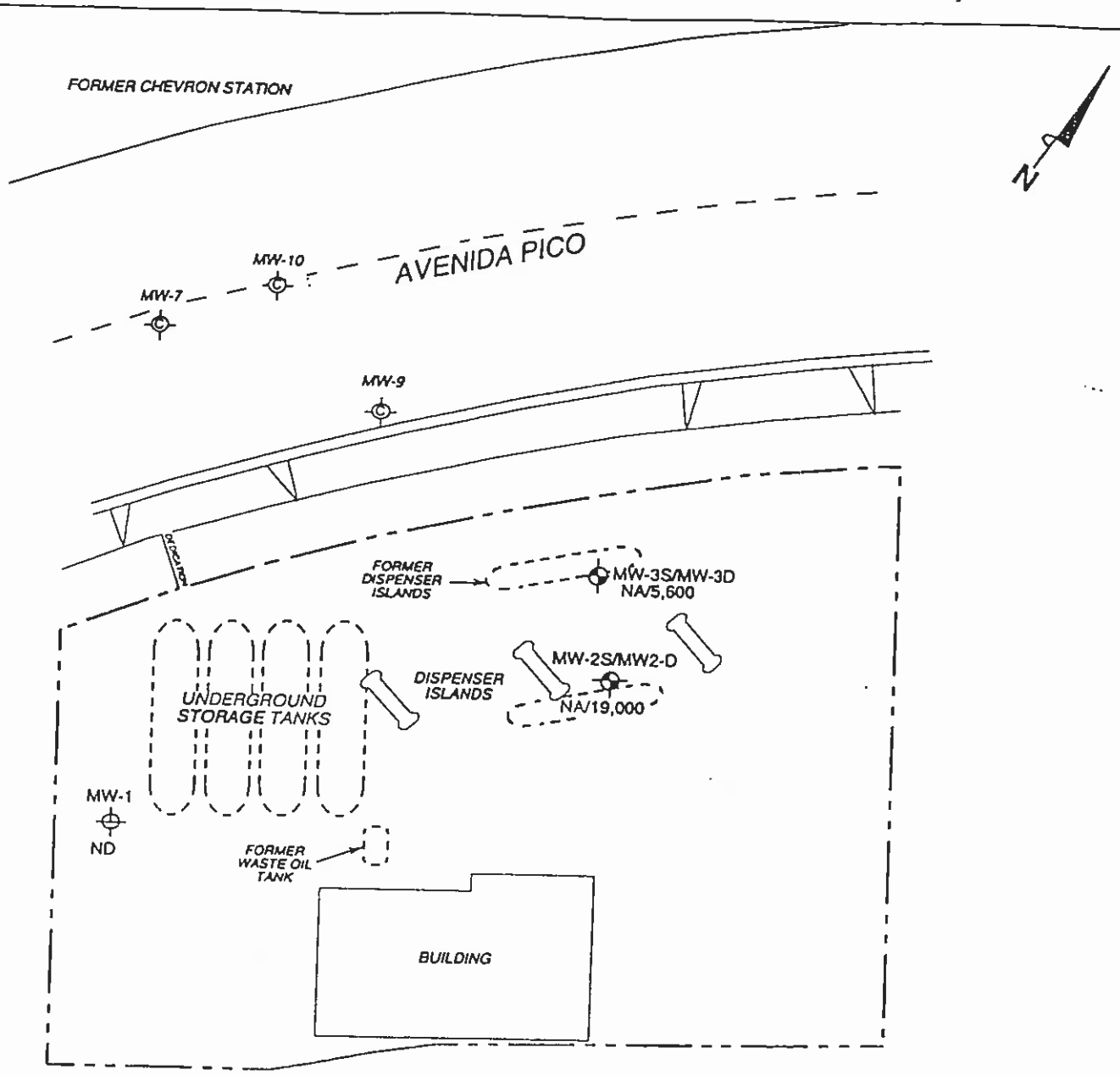
Texaco Service Station
530 Avenida Pico
San Clemente, California
Site No.:61-106-1117

ALTON GEOSCIENCE
Irvine, California

SCALE (FEET)
0 30

FIGURE 2

24-0019 1117 8/13/97 fk



NOTES:

TPH-G = total petroleum hydrocarbons as gasoline. ug/l = micrograms per liter. ND = not detected at limit indicated on official laboratory report. NA = not analyzed, measured, or collected.

LEGEND

MW-1 — Monitoring Well with Dissolved-Phase TPH-G Concentrations (ug/l)

MW-3S/MW-3D — Dual Completion Well

DISSOLVED-PHASE TPH-G CONCENTRATION MAP
July 21, 1997

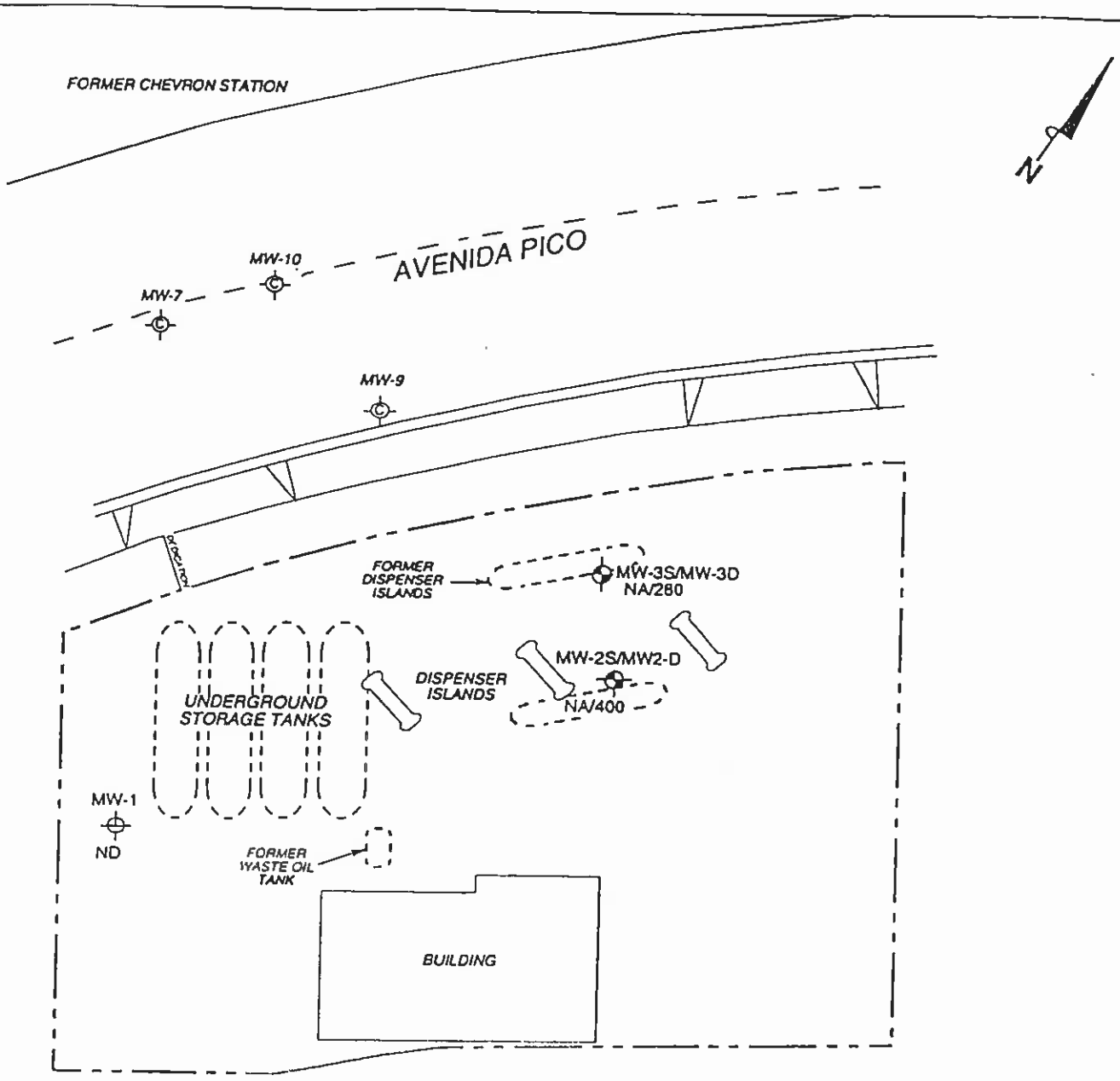
Texaco Service Station
530 Avenida Pico
San Clemente, California
Site No.:61-106-1117

ALTON GEOSCIENCE
Irvine, California

SCALE (FEET)
0 30

FIGURE 3

24-0019 1117 8/18/97 tk



NOTES:

ug/l = micrograms per liter.
ND = not detected at limit indicated on official laboratory report.
NA = not analyzed, measured, or collected.

LEGEND

MW-1 — Monitoring Well with Dissolved-Phase Benzene Concentrations (ug/l)

MW-3S/MW-3D — Dual Completion Well

DISSOLVED-PHASE BENZENE CONCENTRATION MAP
July 21, 1997

Texaco Service Station
530 Avenida Pico
San Clemente, California
Site No.:61-106-1117

ALTON GEOSCIENCE
Irvine, California

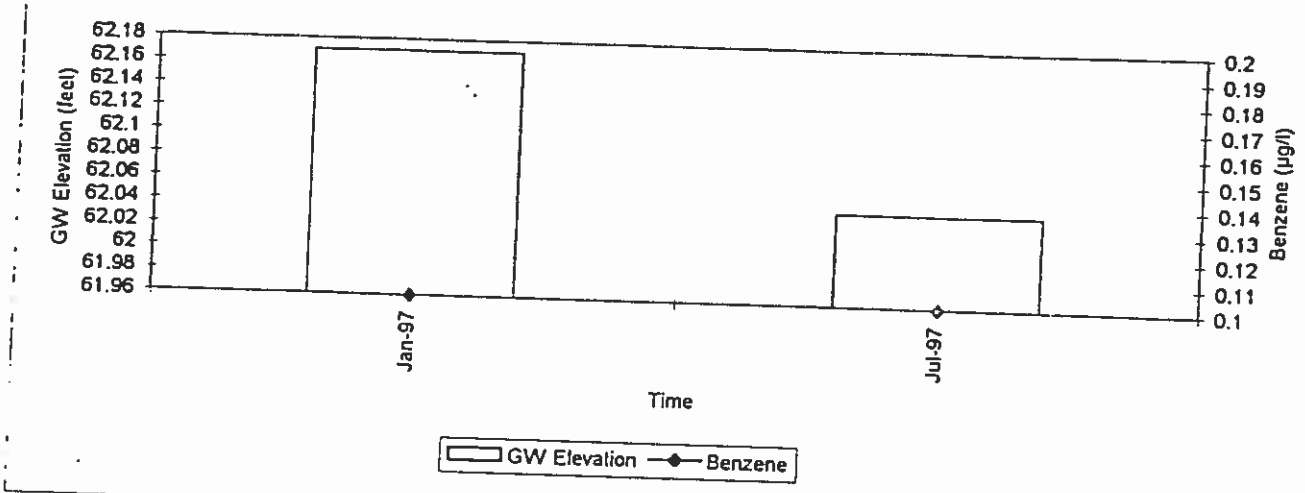
SCALE (FEET)
0 30

FIGURE 4

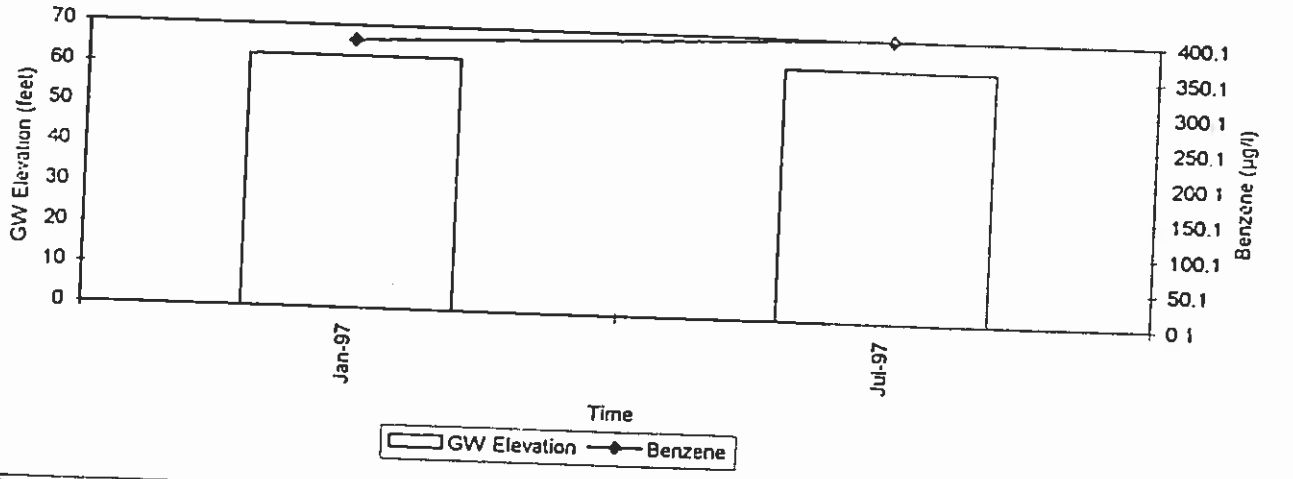
24-0019 1117 8/15/97 tk

Groundwater Elevation vs. Benzene Graphs
Texaco Station 611061117
530 Avenida Pico, San Clemente, CA

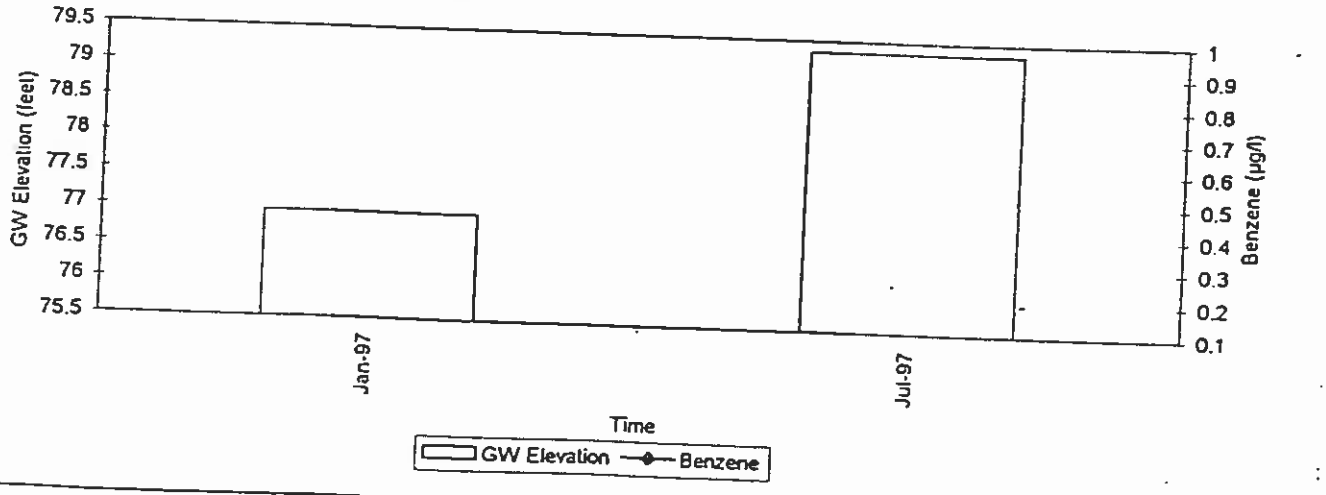
Graph 1: MW-1



Graph 2: MW-2D



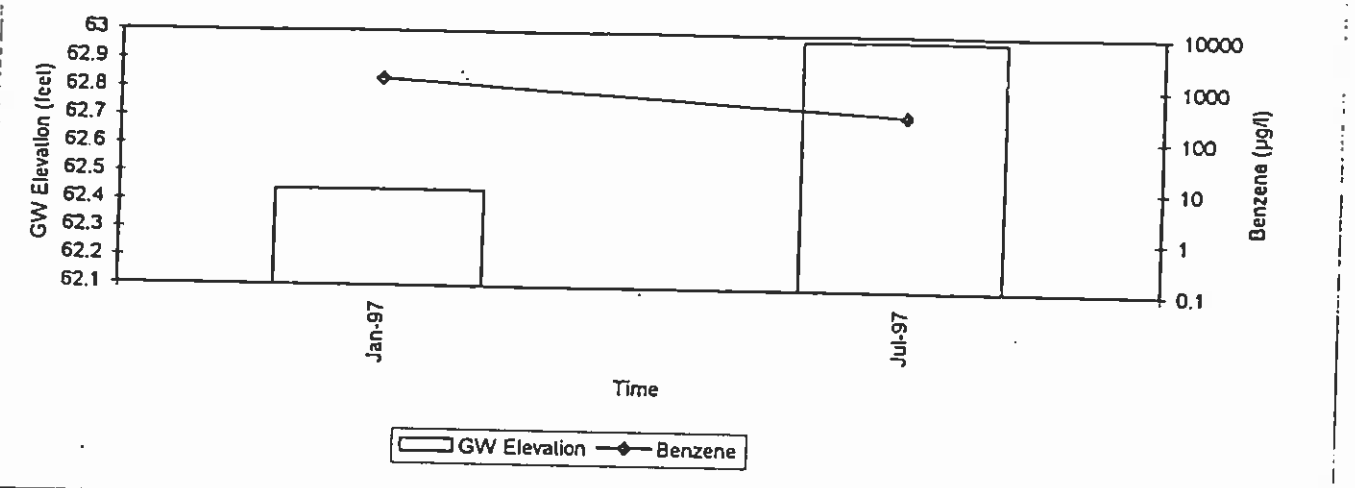
Graph 3: MW-2S



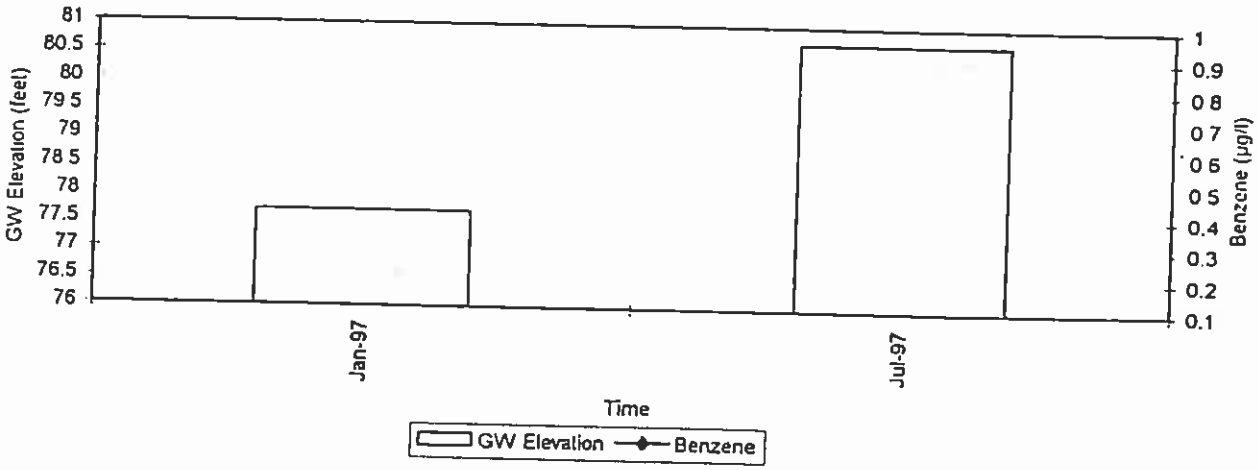
Note: ND values are plotted as 0.1 µg/l for graphical display

Groundwater Elevation vs. Benzene Graphs
Texaco Station 611061117
530 Avenida Pico, San Clemente, CA

Graph 4: MW-3D



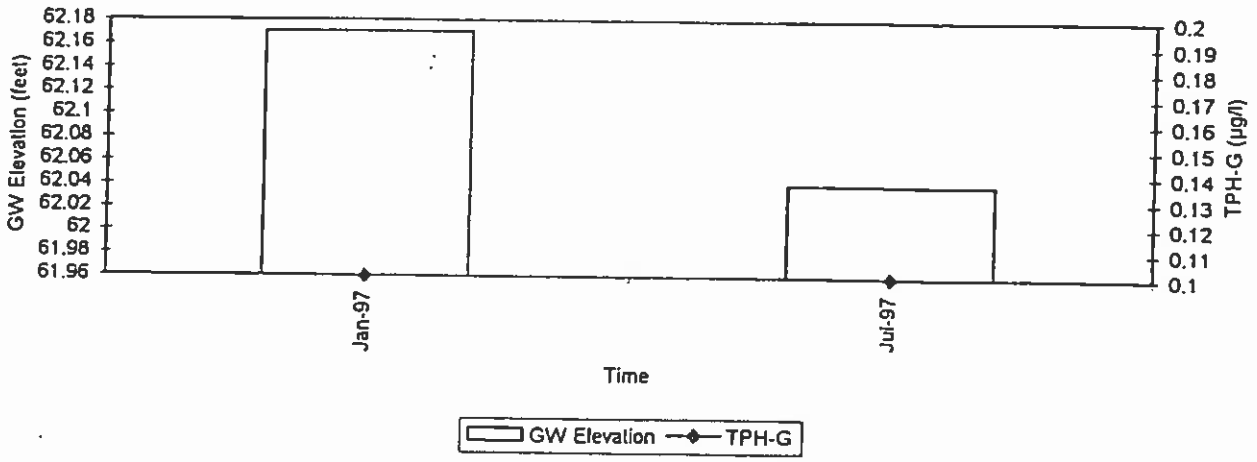
Graph 5: MW-3S



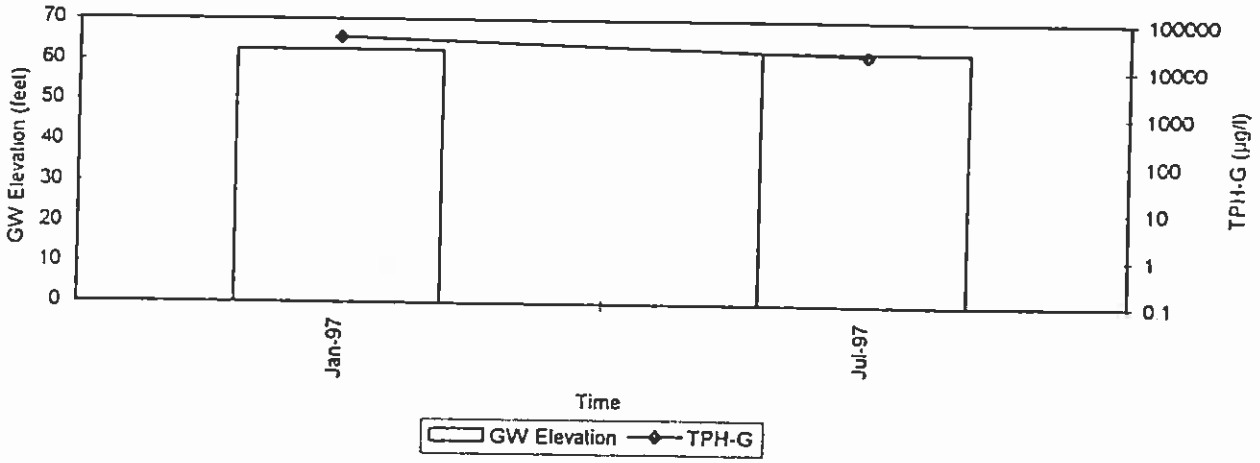
Note: ND values are plotted as 0.1 µg/l for graphical display

Groundwater Elevation vs. TPH-G Graphs
Texaco Station 611061117
530 Avenida Pico, San Clemente, CA

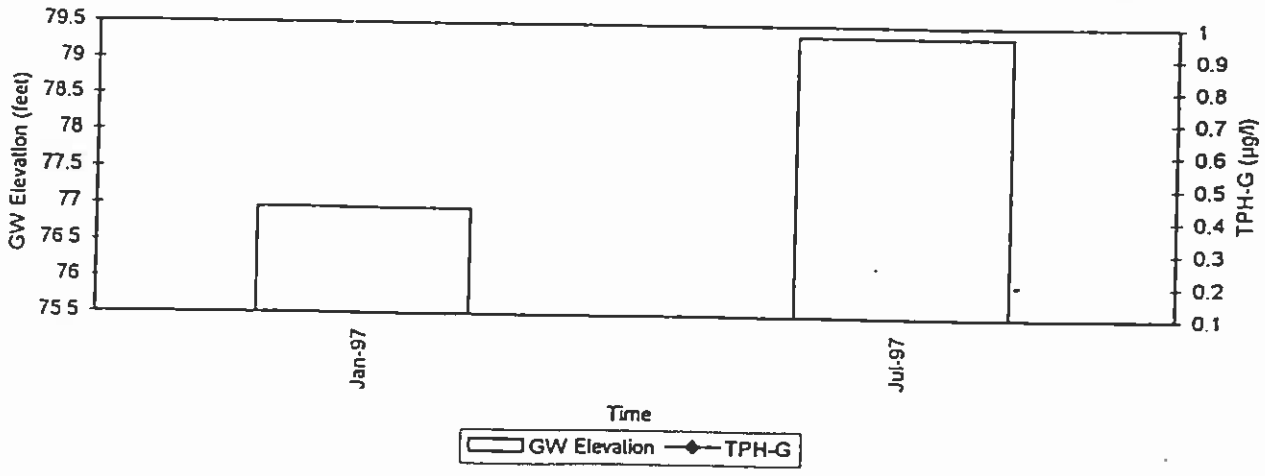
Graph 1: MW-1



Graph 2: MW-2D



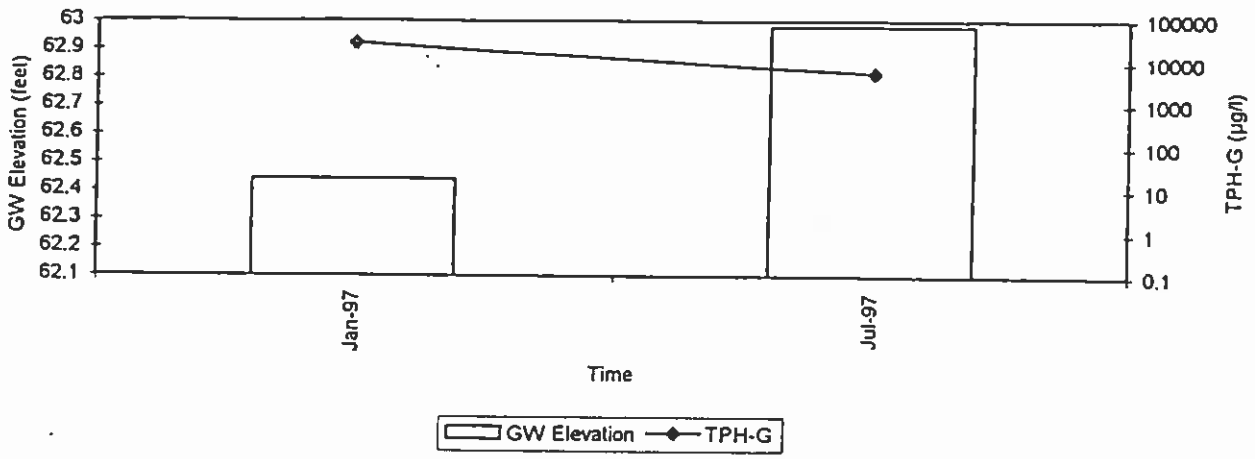
Graph 3: MW-2S



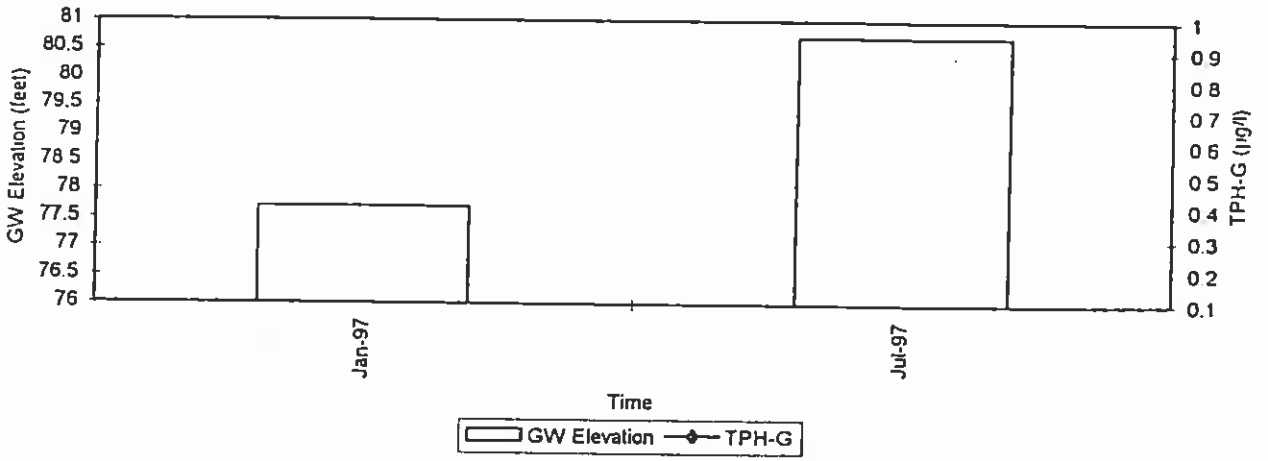
Note: ND values are plotted as 0.1 µg/l for graphical display

Groundwater Elevation vs. TPH-G Graphs
Texaco Station 611061117
530 Avenida Pico, San Clemente, CA

Graph 4: MW-3D



Graph 5: MW-3S



Note: ND values are plotted as 0.1 µg/l for graphical display

GENERAL FIELD PROCEDURES

General field procedures used during fluid level monitoring and groundwater sampling activities are described below.

FLUID LEVEL MONITORING

Fluid levels are monitored in the wells using an electronic interface probe with conductance sensors. The depth to liquid-phase hydrocarbons and water is measured relative to the well box top or top of casing. Well box or casing elevations are surveyed to within 0.02 foot relative to a county or city bench mark.

GROUNDWATER SAMPLING

Groundwater monitoring wells are purged and sampled in accordance with standard regulatory protocol. Typically, monitoring wells that contain no liquid-phase hydrocarbons are purged of groundwater prior to sampling so that fluids collected are representative of fluids within the formation. Temperature, pH, and specific conductance are typically measured after each well casing volume has been removed. Purging is considered complete when the specified number of casing volumes of fluid have been removed (see Groundwater Sampling Field Notes for volume removed). Samples for laboratory analysis are collected without further purging if the well does not recharge within 2 hours to 80% of its volume before purging.

The purged water is either (1) pumped directly into a licensed vacuum truck; or (2) treated and disposed onsite using the Alton Geoscience Mobile Groundwater Treatment Trailer; or (3) temporarily stored in labeled drums prior to transport to a treatment/recycling facility. If an automatic recovery system (ARS) is operating at the site, purged water may be pumped into the ARS for treatment.

Groundwater samples are collected by lowering a 1.5-inch-diameter, bottom-fill, disposable polyethylene bailer just below the static water level in the well. The samples are carefully transferred from the check-valve-equipped bailer to 1-liter and 40-milliliter glass containers. The sample containers are filled to zero headspace and fitted with Teflon-sealed caps. Each sample is labeled with the project number, well number, sample date, and sampler's initials, then transported to a state-certified laboratory for analysis. Samples remain chilled at approximately 4°C prior to laboratory analysis.

Chain of custody protocol is followed for all groundwater samples selected for laboratory analysis. The chain of custody form(s) accompanies the samples from the sampling locality to the laboratory, providing a continuous record of possession prior to analysis. Purging and sampling equipment that might come in contact with well fluids is either dedicated to a particular well or cleaned prior to each use in a Liqui-nox solution followed by two tap water rinses.

GROUNDWATER SAMPLING FIELD NOTES

Site: 61106 1117 Project No.: 24-0019-03 Sampled By: Thomas Velazquez Date: 7-21-97

Well No. MW-2S Purge Method: Vac-truck
Depth to Water (feet): 24.10 Depth to Product (feet): Ø
Total Depth (feet) 24.65 LPH & Water Recovered (gallons): Ø
Water Column (feet): 0.55 Casing Diameter (inches): 2"
80% Recharge Depth (feet) ____ 1 Well Volume (gallons): ____

Time Start	Time Stop	Depth To Water (feet)	Volume Purged (gallons)	Conductivity (uS/cm)	Temperature (F, C)	pH

Static at Time Sampled	Total Purged	Time Sampled

Comments: Dry well
"not enoght WATER"

Well No. MW-2D Purge Method Vac-truck
Depth to Water (feet): 37.92 Depth to Product (feet): Ø
Total Depth (feet) 44.30 LPH & Water Recovered (gallons): Ø
Water Column (feet): 6.38 Casing Diameter (inches): 2"
80% Recharge Depth (feet): 39.19 1 Well Volume (gallons) 1

Time Start	Time Stop	Depth To Water (feet)	Volume Purged (gallons)	Conductivity (uS/cm)	Temperature (F, C)	pH
1:05			1	2.58	76.7	7.05
			2	2.49	75.9	7.10
	1:09		3	2.54	76.4	7.13

Static at Time Sampled	Total Purged	Time Sampled
37.94	3	2:01

Comments: DO # 1.04

Well No. MW-3S Purge Method Vac-truck
Depth to Water (feet) 22.74 Depth to Product (feet) Ø
Total Depth (feet) 24.30 LPH & Water Recovered (gallons) Ø
Water Column (feet) 1.56 Casing Diameter (inches) 2"
80% Recharge Depth (feet) ____ 1 Well Volume (gallons) ____

Time Start	Time Stop	Depth To Water (feet)	Volume Purged (gallons)	Conductivity (uS/cm)	Temperature (F, C)	pH

Static at Time Sampled	Total Purged	Time Sampled

Comments: not sample
not enoght WATER.

Well No. MW-3D Purge Method Vac-truck
Depth to Water (feet) 37.72 Depth to Product (feet) Ø
Total Depth (feet): 43.05 LPH & Water Recovered (gallons) Ø
Water Column (feet) 5.33 Casing Diameter (inches). 2"
80% Recharge Depth (feet): 38.78 1 Well Volume (gallons) 1

Time Start	Time Stop	Depth To Water (feet)	Volume Purged (gallons)	Conductivity (uS/cm)	Temperature (F, C)	pH
1:14			1	2.56	76.1	7.12
			2	2.48	75.5	7.15
	1:19		3	2.52	75.8	7.21

Static at Time Sampled	Total Purged	Time Sampled
37.74	3	2:05

Comments DO # 0.00

Well No. MW-1 Purge Method Vac-truck
Depth to Water (feet) 37.31 Depth to Product (feet): Ø
Total Depth (feet): 43.90 LPH & Water Recovered (gallons) Ø
Water Column (feet) 6.59 Casing Diameter (inches) 4"
80% Recharge Depth (feet) 38.62 1 Well Volume (gallons) 4

Time Start	Time Stop	Depth To Water (feet)	Volume Purged (gallons)	Conductivity (uS/cm)	Temperature (F, C)	pH
1:24			4	2.61	74.1	7.36
			8	2.57	74.5	7.35
	1:32		12	2.64	75.1	7.38

Static at Time Sampled	Total Purged	Time Sampled
37.86	12	2:12

Comments: DO # 1.56

Well No. ____ Purge Method ____
Depth to Water (feet) ____ Depth to Product (feet) ____
Total Depth (feet): ____ LPH & Water Recovered (gallons): ____
Water Column (feet) ____ Casing Diameter (inches) ____
80% Recharge Depth (feet) ____ 1 Well Volume (gallons) ____

Time Start	Time Stop	Depth To Water (feet)	Volume Purged (gallons)	Conductivity (uS/cm)	Temperature (F, C)	pH

Static at Time Sampled	Total Purged	Time Sampled

Comments:

VOC Analytical

801 Western Avenue
Glendale, CA 91201
818/247-5737
Fax: 818/247-9797

ANALYTICAL REPORT

LOG NO: G97-07-464
Received: 23 JUL 97
Mailed: JUL 30 1997

Mr. John Lopez
Alton Geoscience
25A Technology Drive, Suite 200
Irvine, CA 92618

Requisition: 611061117
Project: TFS0068/TEXACO

REPORT OF ANALYTICAL RESULTS

AQUEOUS

SAMPLE DESCRIPTION	DATE SAMPLED	TPH/BTEX (CADHS/8020) Date Analyzed Date	Dilution Factor Times	Benzene ug/L	Toluene ug/L	Ethyl-Benzene ug/L	Total Xylenes Isomers ug/L	Methyl-tert-butylether ug/L	TPH-g ug/L	Carbon Range
RDL			1	0.3	0.3	0.3	0.6	30	100	
1*MW-2D	07/21/97	07/25/97	20	400	590	2400	3900	<600	19000	C6-C12
2*MW-3D	07/21/97	07/25/97	5	280	320	410	3500	<200	5600	C6-C12
3*MW-1	07/21/97	07/24/97	1	<0.3	<0.3	<0.3	<0.6	<30	<100	C6-C12

Ms. Feryal Sarrafian
530 Avenida Pico, San Clemente

Greta Galoustian, Laboratory Director

The analytical results within this report relate only to the specific compounds and samples investigated and may not necessarily reflect other apparently similar material from the same or a similar location.

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ELAP

: ORDER PLACED FOR CLIENT: Alton Geoscience 9707464 :
: VOC ANALYTICAL : GLEN LAB : 09:50:12 29 JUL 1997 - P. 2 :

SAMPLES...	SAMPLE DESCRIPTION..	DETERM.....	DATE..... ANALYZED	METHOD.....	EQUIP.	BATCH..	ID.NO
)707464*1	MW-2D	GAS.TPH.MTBE	07.25.97	8015M	536-21	976095	7424
)707464*2	MW-3D	GAS.TPH.MTBE	07.25.97	8015M	536-21	976095	7424
)707464*3	MW-1	GAS.TPH.MTBE	07.24.97	8015M	536-21	976094	7424

Notes: Equipment = VOC Analytical identification number for a particular piece of analytical equipment.

ID.NO = VOC Analytical employee identification number of analyst.

QC REPORT 9707464
DATE PRINTED: 29 JUL 1997

AQUEOUS SAMPLES

		------ METHOD BLANK ------			---------- LAB CONTROL ----------								---------- MATRIX QC ----------							
	UNITS	RESULT	RDL	FLG	LCS %REC	FLG	LCSD %REC	FLG	LCL	UCL	RPD	RPD UCL	RPD FLG	MS %REC	FLG	MSD %REC	FLG	LCL	UCL	RPD	RPD UCL	FLG
Batch: GAS*976094 Method: 8015M - Modified 8015																						
Benzene	ug/L	0	0.3	-	100	-	93	-	76	155	7	-	-	101	-	101	-	70	153	0	25	-
Toluene	ug/L	0	0.3	-	99	-	92	-	76	122	7	-	-	79	-	80	-	70	124	0	25	-
Ethylbenzene	ug/L	0	0.3	-	97	-	91	-	76	119	6	-	-	85	-	85	-	71	119	0	25	-
Methyl-tert-butylether	ug/L	0	30	-	101	-	108	-	58	147	7	-	-	-	NC	-	NC	53	177	-	30	NC
Total Xylene Isomers	ug/L	0	0.6	-	99	-	93	-	74	118	7	-	-	73	-	73	-	72	117	0	25	-
TPH (Gasoline Range)	ug/L	0	100	-	102	-	108	-	80	124	6	-	-	100	-	106	-	71	130	6	25	-
[a,a,a-Trifluorotoluene]	Percent	109	-	-	101	-	102	-	76	126	-	-	-	111	-	108	-	76	126	-	-	-
Batch: GAS*976095 Method: 8015M - Modified 8015																						
Benzene	ug/L	0	0.3	-	94	-	-	-	76	155	-	-	-	103	-	102	-	70	153	1	25	-
Toluene	ug/L	0	0.3	-	94	-	-	-	76	122	-	-	-	80	-	73	-	70	124	9	25	-
Ethylbenzene	ug/L	0	0.3	-	93	-	-	-	76	119	-	-	-	87	-	85	-	71	119	2	25	-
Methyl-tert-butylether	ug/L	0	30	-	102	-	-	-	58	147	-	-	-	117	-	118	-	53	177	1	30	-
Total Xylene Isomers	ug/L	0	0.6	-	93	-	-	-	74	118	-	-	-	75	-	74	-	72	117	1	25	-
TPH (Gasoline Range)	ug/L	0	100	-	109	-	-	-	80	124	-	-	-	97	-	100	-	71	130	3	25	-
[a,a,a-Trifluorotoluene]	Percent	110	-	-	104	-	-	-	76	126	-	-	-	108	-	107	-	76	126	-	-	-

VOC ANALYTICAL GLENDALE
SUPPLEMENTAL REPORT FOR 9707464
DATE PRINTED: 29 JUL 1997

PA

AQUEOUS SAMPLES

Batch: GAS-976094 Method: 8015M - Modified 8015

		B7071126-1	C7072197-1	.....	C7072264-1	.....	9707462-8	.....	.....	.....	.....
	UNITS	MB	LC	LT	LC	LT	R1	R2	S1	S2	T
Date Analyzed	Date	07/23/97	07/23/97	07/23/97	07/24/97	07/24/97	07/24/97	-	07/24/97	07/24/97	07/24/97
Dilution Factor	Times	1	1	1	1	1	1	-	1	1	1
Benzene	ug/L	0	49.8	50.0	46.6	50.0	<0.3	-	15.3	15.3	15.2
Toluene	ug/L	0	49.3	50.0	46.1	50.0	<0.3	-	77.2	77.5	97.4
Ethylbenzene	ug/L	0	48.6	50.0	45.6	50.0	<0.3	-	17.3	17.3	20.4
Methyl-tert-butylether	ug/L	0	50.6	50.0	54.0	50.0	3600	-	O_NC	O_NC	3720
Total Xylene Isomers	ug/L	0	149	150	139	150	<0.6	-	87.2	87.3	119
Carbon Range	.	C6-C12	C6-C12	C6-C12	C6-C12	C6-C12	C6-C12	-	C6-C12	C6-C12	C6-C12
TPH (Gasoline Range)	ug/L	0	1120	1100	1190	1100	<100	-	1100	1170	1100
a,a,a-Trifluorotoluene Rep.	ug/L	54.4	50.3	50.0	50.8	50.0	48.9	-	55.5	53.9	50.0
a,a,a-Trifluorotoluene Th.	ug/L	50.0	50.0	50.0	50.0	50.0	50.0	-	50.0	50.0	50.0

Batch: GAS-976095 Method: 8015M - Modified 8015

		B7071264-1	C7072481-1	.....	N/A	.....	9707462-15	.....	.....	.....	.....
	UNITS	MB	LC	LT	LC	LT	R1	R2	S1	S2	T
Date Analyzed	Date	07/25/97	07/25/97	07/25/97	-	-	07/25/97	-	07/25/97	07/25/97	07/25/97
Dilution Factor	Times	1	1	1	-	-	1	-	1	1	1
Benzene	ug/L	0	47.1	50.0	-	-	<0.3	-	15.7	15.5	15.2
Toluene	ug/L	0	46.8	50.0	-	-	<0.3	-	78.0	71.2	97.4
Ethylbenzene	ug/L	0	46.3	50.0	-	-	<0.3	-	17.7	17.4	20.4
Methyl-tert-butylether	ug/L	0	50.9	50.0	-	-	<30	-	141	143	121
Total Xylene Isomers	ug/L	0	140	150	-	-	<0.6	-	88.7	87.5	119
Carbon Range	.	C6-C12	C6-C12	C6-C12	-	-	C6-C12	-	C6-C12	C6-C12	C6-C12
TPH (Gasoline Range)	ug/L	0	1200	1100	-	-	<100	-	1070	1100	1100
a,a,a-Trifluorotoluene Rep.	ug/L	55.2	52.1	50.0	-	-	50.7	-	53.9	53.3	50.0
a,a,a-Trifluorotoluene Th.	ug/L	50.0	50.0	50.0	-	-	50.0	-	50.0	50.0	50.0

FLUOR DANIEL GTI

SITE ASSESSMENT REPORT
TEXACO SERVICE STATION
530 AVENIDA PICO
SAN CLEMENTE, CALIFORNIA
OCHCA #96UT48

April 30, 1997

Fluor Daniel GTI Project 023400247

Prepared for:
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1.0 INTRODUCTION

This report summarizes tank and product piping removal and subsurface environmental investigation at the Texaco service station at 530 Avenida Pico, San Clemente, California (Figures 1 and 2). The service station underwent remodeling during late 1996 and early 1997. Texaco Refining and Marketing, Inc. (Texaco) retained Fluor Daniel GTI, Inc. (Fluor Daniel GTI) to observe the removal of one waste oil tank, two hydraulic hoists, one clarifier, and gasoline piping, and to perform a site assessment to define the extent of petroleum hydrocarbons in soil and groundwater. The assessment included grab-sampling soil beneath the aforementioned structures, collecting soil samples from exploratory excavations, and drilling and sampling six soil borings and three groundwater monitoring wells.

2.0 SITE IDENTIFICATION

Site Address:	530 Avenida Pico, San Clemente, California 92672
A.P.N.:	057-013-09
Responsible Party:	Texaco Refining and Marketing, Inc.
Contact:	Ms. Feryal Sarrafian Texaco Refining and Marketing, Inc. Environment, Health and Safety Department 10 Universal City Plaza Universal City, California 91608-7812 (818) 505-2000
Regulatory Contact:	Mr. James Strozier County of Orange Health Care Agency 2009 East Edinger Avenue Santa Ana, California 92705 OCHCA # 96UT48

3.0 SITE BACKGROUND AND WORKSCOPE

3.1 Historical and Current Site Configuration

The site has been an active Texaco service station since the 1930's. The previous station configuration included a garage with two dispenser islands fronting Avenida Pico (Figure 2). The former and current underground storage tanks (USTs) are located northwest of the station building. The former steel gasoline USTs were removed and replaced with double-wall fiberglass tanks in the 1980's. At that time, the old steel product lines were replaced with single-wall fiberglass piping. These pipes were replaced with double-wall fiberglass piping in December 1996. One fiberglass 550-gallon waste oil UST, one concrete clarifier, and two self-contained hydraulic hoists were removed in December 1996 and were not replaced. The current configuration consists of a mini-market, four 10,000-gallon gasoline and diesel USTs, and three dispenser islands (Figure 2).

3.2 Adjacent Site Uses

The site is in a commercial and light industrial zone. The station is bounded on the north by Avenida Pico, on the east by Interstate 5, on the south by the U.S. Post Office, and on the west by a fast food restaurant. A Chevron service station, north of the site across Avenida Pico, was razed in the 1980's (Figure 2). The Chevron site underwent environmental assessment and remediation due to gasoline-impacted soil and groundwater (Groundwater Technology, 1992). The former Chevron site is currently on a quarterly groundwater monitoring and sampling regimen (Holguin, 1996).

3.3 Summary of Previous Investigations

No previous environmental investigations have been conducted at the site.

3.4 Scope of Work

The following is a chronology of activities conducted during the investigation:

- On December 9, 1996, Fluor Daniel GTI observed the exposure of the waste oil UST and removal of the product lines. Fluor Daniel GTI personnel collected five soil samples (S1 through S5) and one liquid-phase hydrocarbon (LPH) sample (P1) from beneath the

former product lines. Samples were collected under the supervision of the County of Orange Health Care Agency (OCHCA).

- On December 11, 1996, Fluor Daniel GTI witnessed the removal of the waste oil UST. One soil sample from the tank overburden (WO-1) and two soil samples beneath the tank invert (WO-2-9' and WO-3-10') were collected.

- On December 13, 1996, Fluor Daniel GTI supervised the excavation of four trenches near the east ends of the former dispenser islands. Five soil samples were collected (S6 through S10).

- On December 16, 1996, Fluor Daniel GTI observed dispenser island overexcavation, backfilling, and compaction. Vapor monitoring was performed per South Coast Air Quality Management District (SCAQMD) guidelines. No soil samples were collected.

- On December 17, 1996, Fluor Daniel GTI witnessed hoist and clarifier removal. Two soil samples were collected beneath each of the structures (six total samples).

- On December 19 and 23, 1996, Fluor Daniel GTI supervised the drilling of six direct-push borings (B1 through B6). Thirty-eight soil and three groundwater samples were collected while drilling. Results?

- On December 24, 1996, January 10, 1997, February 21, 1997, and March 7, 1997, Fluor Daniel GTI observed contaminated soil loading for disposal and performed vapor monitoring.

- On January 7, 1997, Fluor Daniel GTI observed the excavation of holes for dispenser island canopy footings. Three soil samples (S11, S12, and S13) were collected.

- On January 21, 1997, Fluor Daniel GTI supervised the drilling and installation of three on-site groundwater monitoring wells (MW-1, MW-2, and MW-3). Eight soil samples were collected.

- On January 24, 1997, Fluor Daniel GTI gauged, purged and sampled MW-1, MW-2, and MW-3.

- On January 29, 1997, Floyd Huber and Associates professionally surveyed MW-1, MW-2, and MW-3.

- During February 1997, Fluor Daniel GTI ordered and reviewed OCHCA environmental files for the former Chevron at 525 Avenida Pico.

- Between February 18 and 25, 1997, Fluor Daniel GTI personnel observed trenching activities and performed vapor monitoring. Four soil samples (SP-1 through SP-4) were collected from stockpiled soil on site for disposal characterization.

- On March 4, 1997, Fluor Daniel GTI collected four additional soil samples (also designated SP-1 through SP-4) from stockpiled soil on site under the direction of OCHCA.

4.0 FIELD INVESTIGATION

4.1 Site Safety

A current health and safety plan for the site is on file with Fluor Daniel GTI. The plan is kept on site during all work supervised by Fluor Daniel GTI. All Fluor Daniel GTI field personnel and subcontractors are required to comply with the plan. The plan identifies work hazards including drilling, sample collection, excavation and trenching, chemicals of concern, and action levels. The plan also includes emergency information, hospital directions, and contact numbers. Plan implementation protects on-site workers and the public. Besides reviewing the health and safety plan, daily safety meetings are conducted to identify and discuss the workscope, task-specific hazards, and emergency procedures.

4.2 Permitting

Fluor Daniel GTI submitted three workplans to OCHCA for UST and product line removal and site assessment (Appendix 1). Mr. James Strozier of OCHCA approved the workplans on January 23, 1997. Before drilling, Fluor Daniel GTI obtained drilling permits for six borings and three monitoring wells from the City of San Clemente (Appendix 1).

4.3 Waste Oil Tank Removal

On December 9, 1996, Fluor Daniel GTI personnel observed the exposure of one 550-gallon, double-wall fiberglass waste oil UST (Figure 2). Waste oil staining was observed in pea gravel beneath the fill port but not in adjacent soil. Pea gravel and soil surrounding the UST were removed and stockpiled east of the excavation. Waste oil-impacted pea gravel was stockpiled separately. The UST was removed on December 11, 1997. Prior to removal, the UST was drained, washed and triple-rinsed by Adams Services, Inc. Rinsate was hauled under a hazardous waste manifest to Demenno-Kerdoon in Compton, California for disposal (Appendix 2). The tank was in good condition with no visible holes or damage. No staining or hydrocarbon odors were observed in the

excavation. Unstained soil and pea gravel were replaced in the excavation following tank removal. The tank was transported to Adams Steel in Anaheim, California where it was destroyed (Appendix 2).

Under the direction of OCHCA, one soil sample of the waste oil tank overburden (WO-1) was collected by hand in a 6-inch brass sleeve. Two soil samples were collected beneath the UST after removal (WO-2-9' and WO-3-10'). Sample locations are shown on Figure 2. Samples were obtained using a backhoe in 6-inch brass sleeves. Soil sampling techniques are summarized in Appendix 3. The soil samples were submitted to an on-site mobile laboratory operated by Transglobal Environmental Geochemistry, Inc. (TEG) and were analyzed for total recoverable petroleum hydrocarbons (TRPH) using EPA Method 418.1.

4.4 Product Line Removal

Gasoline product piping was removed on December 9, 1996. The location of the former piping runs is shown on Figure 2. Product lines consisted of 2-inch, single-wall fiberglass pipes. Hydrocarbon-stained soil was observed at the east end of both former dispenser islands. Dark-colored LPH seeped into a 3-foot deep trench at the east end of the north dispenser island (Figure 3). The construction contractor bailed approximately 3 gallons of LPH from the trench.

Under the direction of OCHCA, Fluor Daniel GTI personnel collected five soil samples (S1 through S5) and one LPH sample (P1) from beneath the former product lines (Figure 2). Soil samples were collected by hand in 6-inch brass sleeves between 2 and 3.5 feet below grade (bg). The soil samples were submitted to an on-site mobile laboratory and were analyzed for total petroleum hydrocarbons as gasoline (TPH_g) using modified EPA Method 8015 and methyl-tertiary-butyl ether (MTBE) using EPA Method 8020. The LPH sample was held for visual observation.

On December 16, 1997, Fluor Daniel GTI observed dispenser island overexcavation, backfilling, and compaction. The purpose was to ensure adequate compaction for construction. The area near the former south dispenser island was excavated to 5 to 10 feet bg. Soil emitting less than 100 ppmv volatile organic compounds (VOC), measured with a photoionization detector (PID), was replaced and compacted. Soil producing higher VOC emissions was stockpiled on site. Clean, commercial fill was imported to make up the balance. On December 24, 1997, approximately 100 cubic yards of soil was transported to TPS Technologies Soil Recycling (TPS) in Adelanto, California under a non-hazardous waste manifest for disposal (Appendix 2).

Samples were collected from soil adjacent to the bottom of each structure (Clarifier-3½', E-Hoist-8½', and W-Hoist-9') and 2 feet beneath (Clarifier-5½', E-Hoist-10½', and W-Hoist-11'). Samples were collected with a backhoe and 6-inch brass sleeves were driven into the soil to collect samples. The soil samples were submitted to BCA and were analyzed for TRPH using EPA Method 418.1. The deeper hoist samples were also analyzed for hydrocarbon screen (C_{10} to C_{32}) using modified EPA Method 8015. The deeper clarifier sample was analyzed for CAM metals, PCBs, halocarbons, and volatile organics using EPA Methods 6010/7000 series, 8080, 8010, and 8020, respectively.

4.7 Soil Boring

On December 19, 1996, Fluor Daniel GTI supervised the drilling of four direct-push borings (B1 through B4) using a Strataprobe™ rig operated by TEG. Two additional borings (B5 and B6) were advanced on December 23, 1996. Drilling locations are on Figure 2. The borings extended between 40 and 45 feet bg. Soil samples were collected at 5 foot intervals using a steel split-spoon sampler with brass ring inserts. The samples were used for lithologic description, field organic vapor screening, and laboratory analysis. Drilling logs are in Appendix 4. Groundwater samples were collected from borings B1, B2, and B5 using a ½-inch stainless steel bailer. The borings were abandoned with hydrated bentonite chips.

Soil samples were selected for laboratory analysis based on field PID readings. Thirty-eight soil samples were submitted to an on-site State-certified mobile laboratory operated by TEG and analyzed for total petroleum hydrocarbons as diesel (TPH_d), TPH_g, and BTEX using modified EPA Method 8015/8020. The soil sample containing the highest TPH_g concentration (or the deepest sample if no TPH_g was detected) was also analyzed for MTBE using EPA Method 8020. The three groundwater samples were analyzed for TPH_d, TPH_g, BTEX, and MTBE using EPA Methods 8015 and 8020, respectively.

4.8 Groundwater Monitoring Well Installation

On January 21, 1997, Fluor Daniel GTI supervised the drilling of three borings using a CME-75 hollow-stem auger drilling rig operated by West Hazmat Corporation. The borings extended to 46.5 feet bg. Soil samples were collected at 5-foot intervals using a steel split-spoon sampler with brass ring inserts. The samples were used for lithologic description, field organic vapor screening, and laboratory analysis. Drilling logs are in Appendix 4.

The borings were completed as monitoring wells MW-1, MW-2, and MW-3. Well MW-1 extends to 45 feet bg and consists of 30 feet of 4-inch, Schedule 40 PVC casing and 15 feet of 0.020-inch slotted PVC screen. Wells MW-2 and MW-3 are double-completed. The deeper strings extend to 45 feet bg and consist of 30 feet of 2-inch, Schedule 40 PVC casing and 15 feet of 0.020-inch slotted PVC screen. The shallower strings extend to 25 feet bg and consist of 5 feet of 2-inch, Schedule 40 PVC casing and 20 feet of 0.020-inch slotted PVC screen. The shallow well strings were installed for possible future vapor extraction pilot testing (if required). A 3-foot bentonite seal separates the screened intervals. Well logs are in Appendix 4.

Soil samples were selected for laboratory analysis based on field PID readings. Eight soil samples were submitted to BCA and analyzed for TPH_g, BTEX, and MTBE using modified EPA Methods 8015 and 8020, respectively.

Soil cuttings from drilling were placed in 55-gallon drums, labeled, sealed, and stored on site. The soil cuttings were disposed of at TPS under a nonhazardous waste manifest (Appendix 2).

4.9 Gauging, Purging, and Sampling

On January 24, 1997, Fluor Daniel GTI personnel gauged wells MW-1 through MW-3. Well MW-1 and the deep strings of MW-2 and MW-3 were purged and sampled under the protocol outlined in Appendix 3. Monitoring and purging data sheets are in Appendix 5. The three groundwater samples were submitted to BCA and analyzed for TPH_g, BTEX, and MTBE using modified EPA Methods 8015 and 8020, respectively.

Purge water was placed in 55-gallon drums, labeled, sealed, and stored on site. The water was later disposed of at Demenno/Kerdoon in Compton, California under a nonhazardous waste manifest (Appendix 2).

4.10 Surveying

On January 29, 1997, Floyd Huber and Associates professionally surveyed the horizontal and vertical coordinates of wells MW-1, MW-2, and MW-3. The wells were surveyed to an arbitrary vertical datum of 100 feet. The survey data are in Appendix 6.

5.0 WASTE DISPOSAL

A total of approximately 450 cubic yards of bulk soil was excavated and removed from the site during construction activities. Table 1 summarizes soil and water disposal dates, volumes, and origin. Areas excavated are shown on Figure 2.

On February 25, 1997, Fluor Daniel GTI collected four stockpile samples (SP-1 through SP-4) to characterize soil excavated from new product line trenches. The OCHCA supervised the collection of four additional stockpile samples (also designated SP-1 through SP-4) from the same soil pile. The purpose of the characterization was to demonstrate that the approximately 200 cubic yards of soil from the new product line trenches met hydrocarbon concentration limits for disposal in a Class III landfill. However, one of the eight soil samples contained TPHg at 1,509 mg/kg which was higher than the allowable limit for Class III disposal (Appendix 7). The new product line trench soil was disposed of at TPS.

6.0 SITE GEOLOGY AND HYDROGEOLOGY

The site is located near the bottom of a northeast-southwest trending canyon. Surface drainage is to the southwest toward Segunda Deshecha Creek, a transient stream approximately 650 feet south of the site (Figure 1). Subsurface storm drains in the area flow to the southwest along Avenida Pico.

Soil samples collected while drilling indicate a lithology of discontinuously interbedded sandy clay, silt, silty sand, and poorly graded sand beneath the site (Figure 4, Appendix 4). This lithology probably represents Pleistocene to recent alluvium. Upper Miocene marine deposits of similar lithology underlie the recent deposits at an unknown depth beneath the site (California Division of Mines and Geology, 1965).

Depth to groundwater in the area is approximately 35 to 40 feet bg. Groundwater flow is generally to the southwest.

The site is located in the Segunda Deshecha Hydrologic Subarea (HSA 901.32) of the San Clemente Hydrologic Area (901.30). The California Regional Water Quality Control Board (RWQCB) has designated this hydrologic subarea as having no beneficial uses (RWQCB, 1994).

7.0 FINDINGS

7.1 Soil Chemical Analytical Results

Soil sampling results are summarized in Figures 3 and 4 and Table 2. Laboratory analytical reports are in Appendix 7.

Total petroleum hydrocarbons as gasoline were detected in soil samples from borings B2, B3, B4, MW-2, and MW-3 and grab samples S1, S2, S4, S6, S7, S10, and S11 at concentrations ranging from 0.054 milligrams per kilogram (mg/kg) to 25,000 mg/kg. Detectable TPH_g concentrations were found between 2 and 40 feet bg. Benzene was detected in soil samples from borings B1 through B5 and MW-3 at concentrations ranging from 0.056 mg/kg to 112.5 mg/kg. Detectable benzene concentrations were found between 5 and 40 feet bg. Methyl-tertiary-butyl ether was detected in soil samples from borings B2, B4, and MW-2 and grab samples S1 through S4 at concentrations ranging from 0.025 mg/kg to 6.316 mg/kg. Detectable MTBE concentrations were found between 2 and 40 feet bg. None of the samples submitted for analysis contained detectable TPH_d.

Samples related to the waste oil tank removal contained no detectable TRPH (Table 1).

Hoist and clarifier samples contained detectable TRPH at concentrations ranging from 12 mg/kg to 42 mg/kg (Table 2). None of the hoist or clarifier samples submitted for analysis contained detectable total petroleum hydrocarbons with a carbon range from C_{10} to C_{32} , PCBs, halocarbons, or volatile organics (Appendix 7). Title 22 metals concentrations were within normal ranges for western United States soil except molybdenum at 3.2 mg/kg (Shacklette and Boerngen, 1984).

7.2 Groundwater Monitoring and Gradient

Results of groundwater level readings are summarized in Figure 5 and Table 3.

On January 24, 1997, depth to water ranged from 37.18 to 38.26 feet below the top of casing in the deep-string wells. Groundwater elevation relative to an assumed datum of 100.0 ranged between 62.17 to 62.44 feet. Approximately 1.5 to 2 feet of water was present in the shallow strings of MW-2 and MW-3. Water in the shallow wells was probably left over from drilling and well development.

Gauging data were used to prepare a groundwater gradient map (Figure 5). Data contouring indicates westerly groundwater flow at 0.004 feet/foot.

7.3 Groundwater Analytical Results

Figure 6 and Table 4 summarize groundwater analytical results from the borings and wells. Laboratory analytical reports are in Appendix 7.

Total petroleum hydrocarbons as gasoline were detected in groundwater samples from borings B1, B2, and B5 (all borings sampled), and wells MW-2, and MW-3 at concentrations ranging from 6,035 micrograms per liter (μg/L) to 41,000 μg/L. Benzene was detected in samples from borings B1, B2, and B5, and wells MW-2, and MW-3 at concentrations ranging from 54.3 μg/L to 1,721 μg/L. None of the samples submitted for analysis contained detectable TPH_d.

7.4 File Review Results

Site assessment at the former Chevron service station at 525 Avenida Pico began in 1985 with the discovery of benzene and TPH_g in soil and groundwater (Groundwater Technology, 1992). A gasoline release of unknown volume occurred at the site. It is unclear whether the site underwent remediation based on the reports provided by OCHCA. However, a compound on the site with signage referring to remedial equipment inside (now gone) indicates vapor extraction may have occurred sometime in 1995 and/or 1996. The site is currently on a quarterly groundwater monitoring and sampling routine (Holguin, 1996).

Depth to water at the former Chevron site ranges from 35 to 40 feet bg with historical fluctuations of up to 5 feet in individual wells (Holguin, 1996). The water table is currently at or near its lowest elevation since 1991. Groundwater gradient is generally to the southwest at approximately 0.005 feet/foot (Geraghty and Miller, 1994). Liquid-phase hydrocarbons with an apparent thickness of 2.4 feet were present in a well in the south-central portion of the site when last gauged on March 5, 1996. Detectable benzene in wells sampled ranged from 0.4 μg/L to 88 μg/L when last sampled on September 4, 1996. On that date, monitoring wells in the middle of Avenida Pico (between the Chevron and Texaco sites) contained <0.3 μg/L to 1.4 μg/L benzene while the Chevron well on the south side of the street (next to Texaco) contained 88 μg/L benzene (Holguin, 1996). Dissolved hydrocarbon data from the September 1996 sampling of Chevron wells is included on Figure 6 for comparison.

8.0 DELINEATION OF CONTAMINATION

8.1 Extent of Soil Contamination

As shown on Figure 3, soil currently containing TPH_g concentrations greater than 100 mg/kg are found within 11 to 14 feet laterally from well MW-2, at the east end of the former south dispenser island. These concentrations extend from approximately 5 to 42 feet bg (Figure 4). Overexcavation removed the upper 5 to 7 feet of soil in the area. Analytical data from surrounding borings indicate minimal horizontal spreading of the adsorbed plume at the water table.

Based on a plume radius of 12 feet from MW-2 and the plume extending from 5 to 42 feet bg, the approximate volume of soil with TPH_g concentrations greater than 100 mg/kg is 16,700 cubic feet (ft^3). Using a range of TPH_g soil concentrations from 5,000 to 20,000 mg/kg and an assumed soil density of 120 lb/ft^3, the above soil volume contains an estimated 10,000 to 40,000 pounds of petroleum hydrocarbons.

Near-surface soil at the east end of the former north dispenser island contained high petroleum saturations as evidenced by LPH in a shallow trench during product line removal (Figure 3). Data and observations from borings B1 and MW-3 indicate the hydrocarbon impact was localized to within approximately 5 feet of the surface. Overexcavation in the area removed the upper 3 to 5 feet of contaminated soil (Figure 4).

Analytical results from soil samples beneath the waste oil tank, clarifier, and hoists indicate no significant hydrocarbon contamination. Pea gravel stained with hydrocarbons beneath the waste oil tank fill port was excavated and disposed of with other soil from the site.

8.2 Horizontal Extent of Groundwater Contamination

Figure 6 presents the estimated lateral extent of groundwater containing greater than 1 $\mu g/L$ benzene. Plume configuration is consistent with a gasoline release at the east end of the former south dispenser island and possibly the east end of the former north dispenser island. The plume extends downgradient to the west beneath Avenida Pico.

9.0 DESCRIPTION OF RELEASE

9.1 Substance Released

Based on soil and groundwater analytical data, the substance released at the Texaco facility was gasoline. Analytical data from soil beneath the waste oil tank, clarifier, and hoists indicate no significant waste oil or hydraulic oil releases.

9.2 How and When Release Occurred

Gasoline releases probably originated from the product piping unions or elbows at the east ends of both former dispenser islands. The timing of the releases is not known. Based on the dark-colored, degraded LPH found in soil at the end of the north dispenser island, the release there probably occurred a number of years ago. The amount of gasoline released at the site is unknown.

10.0 SUMMARY AND CONCLUSIONS

The workscope Fluor Daniel GTI completed at the site consisted of observing the removal of one waste oil tank, one clarifier, two hoists, and product piping, and conducting an environmental investigation. The purpose of the investigation was to assess hydrocarbon concentrations in soil and groundwater related to gasoline releases from the former dispenser islands. The investigation consisted of collecting thirteen soil grab samples, drilling six soil borings, installing three groundwater monitoring wells, and reviewing environmental assessment files for the former Chevron station north of the site. Activities related to waste oil tank, hoist, and clarifier removal included observation and soil sampling. No previous environmental investigations have been completed at the site.

Lithologies at the Texaco site included discontinuously interbedded sandy clay, silt, silty sand, and poorly graded sand. The permeability of such deposits is typically low.

Analytical results show TPH_g concentrations in soil up to 25,000 mg/kg beneath the east end of the former south dispenser island. Liquid-phase hydrocarbons were observed in a shallow excavation at the east end of the former north dispenser island. Construction activities removed the top 5 to 10 feet of soil (approximately 450 cubic yards) from the dispenser island area. Adsorbed hydrocarbons near the former north dispenser were removed by bailing and excavation. Soil containing TPH_g

concentrations greater than 100 mg/kg is currently present between approximately 5 and 42 feet bg near the former southern dispenser island (Figures 3 and 4). The adsorbed plume contains an estimated 10,000 to 40,000 pounds of gasoline hydrocarbons. Analytical results from soil borings surrounding the plume provide adequate delineation of adsorbed TPH_g.

Depth to groundwater at the site ranged from 37 to 38 feet bg on January 24, 1997. The water table at the nearby Chevron station has reportedly fluctuated between 35 and 40 feet bg historically (Holguin, 1996). Groundwater gradient is westerly at 0.004 ft/ft (Figure 5). The site is located in the Segunda Deshecha Hydrologic Subarea which has no designated beneficial uses for groundwater (RWQCB, 1994).

Benzene concentrations up to 1,721 μg/L are present in groundwater at the site. The dissolved benzene plume is centered near the dispenser islands and extends downgradient beneath Avenida Pico (Figure 6). Data from Chevron wells is helpful for defining the downgradient extent of the benzene plume. Additional wells east and west of the interpreted plume would better delineate the benzene plume. However, based on all data presented in this report, the adsorbed and dissolved phase plumes appear to be limited in extent.

Active remediation of the remaining hydrocarbon mass at this site is not recommended based on the above findings. No LPH has been observed on the water table. The source for LPH in shallow soil near the north dispenser island was removed. The site is located in a non-beneficial use area. Regulatory requirements for such cases typically include only the removal of LPH. The OCHCA should not require remediation beyond natural hydrocarbon attenuation.

This statement is not rigorous

11.0 REFERENCES

California Division of Mines and Geology, 1965, Geologic Map of California, Santa Ana sheet, 1:250,000.

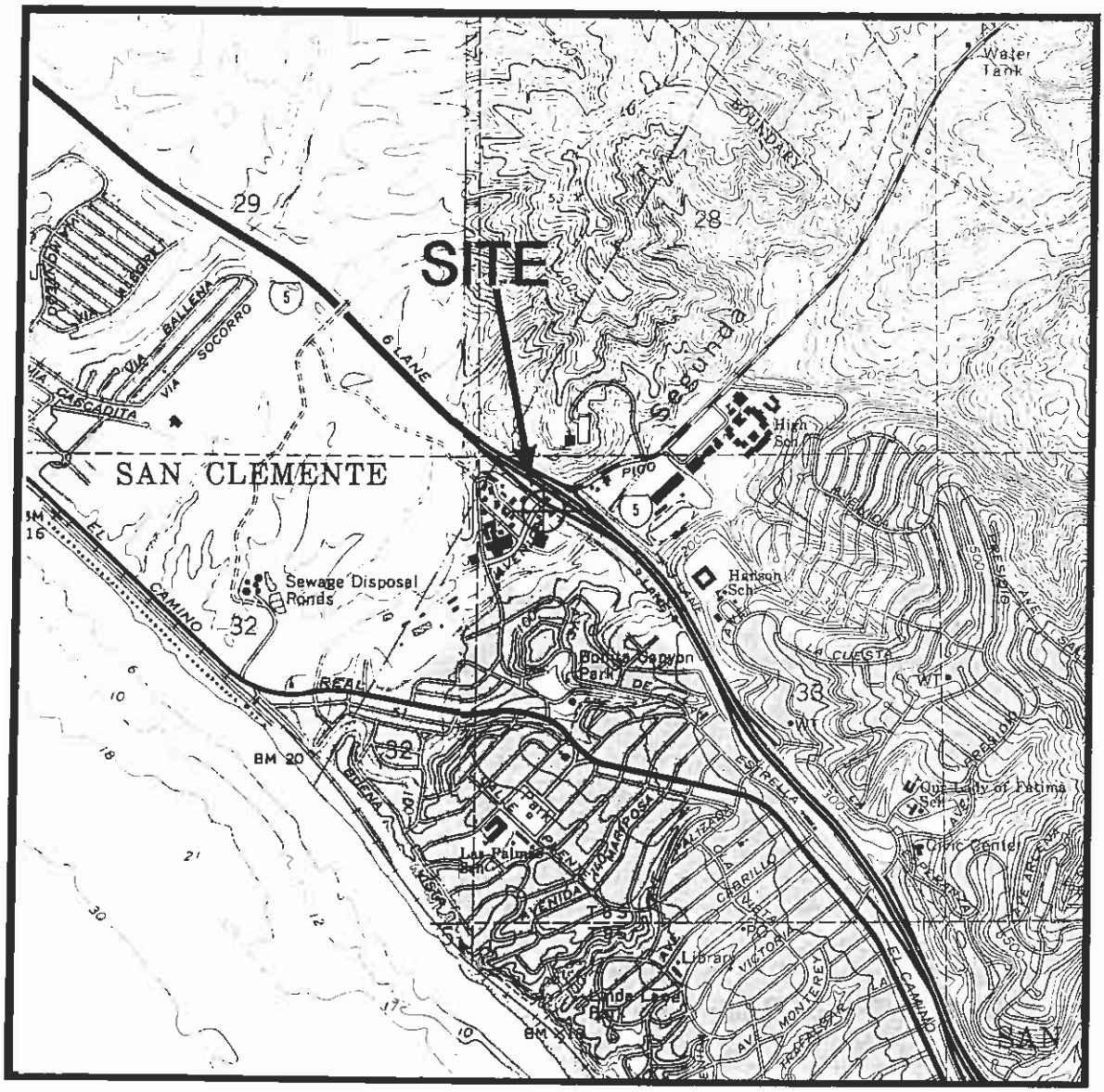
Geraghty and Miller, Inc., April 5, 1994, *Site Assessment Report, Former Chevron Service Station No. 9-8151, 525 Avenida Pico, San Clemente, California.*

Groundwater Technology, Inc., September 10, 1992, *Remediation Action Plan for Site Remediation, Former Chevron Service Station No. 9-8151, 525 Avenida Pico, San Clemente, California.*

Holguin, Fahan and Associates, November 1, 1996, *Third Quarter 1996 Groundwater Monitoring Report, Chevron Products Company Service Station No. 9-8151, 525 Avenida Pico, San Clemente, California.*

Regional Water Quality Control Board, June 1994, *Water Quality Control Plan, San Diego Basin (9).*

Shacklette, H.T., and Boerngen, J.G., 1984, *Element Concentrations in Soils and other Superficial Materials of the Conterminous United States.* USGS, Professional Paper 127.



SOURCE: U.S.G.S. TOPOGRAPHIC QUADRANGLE
SAN CLEMENTE, CA AND DANA POINT, CA
7.5 MINUTE SERIES
1968/1975

SITE LOCATION

SCALE 1:24,000

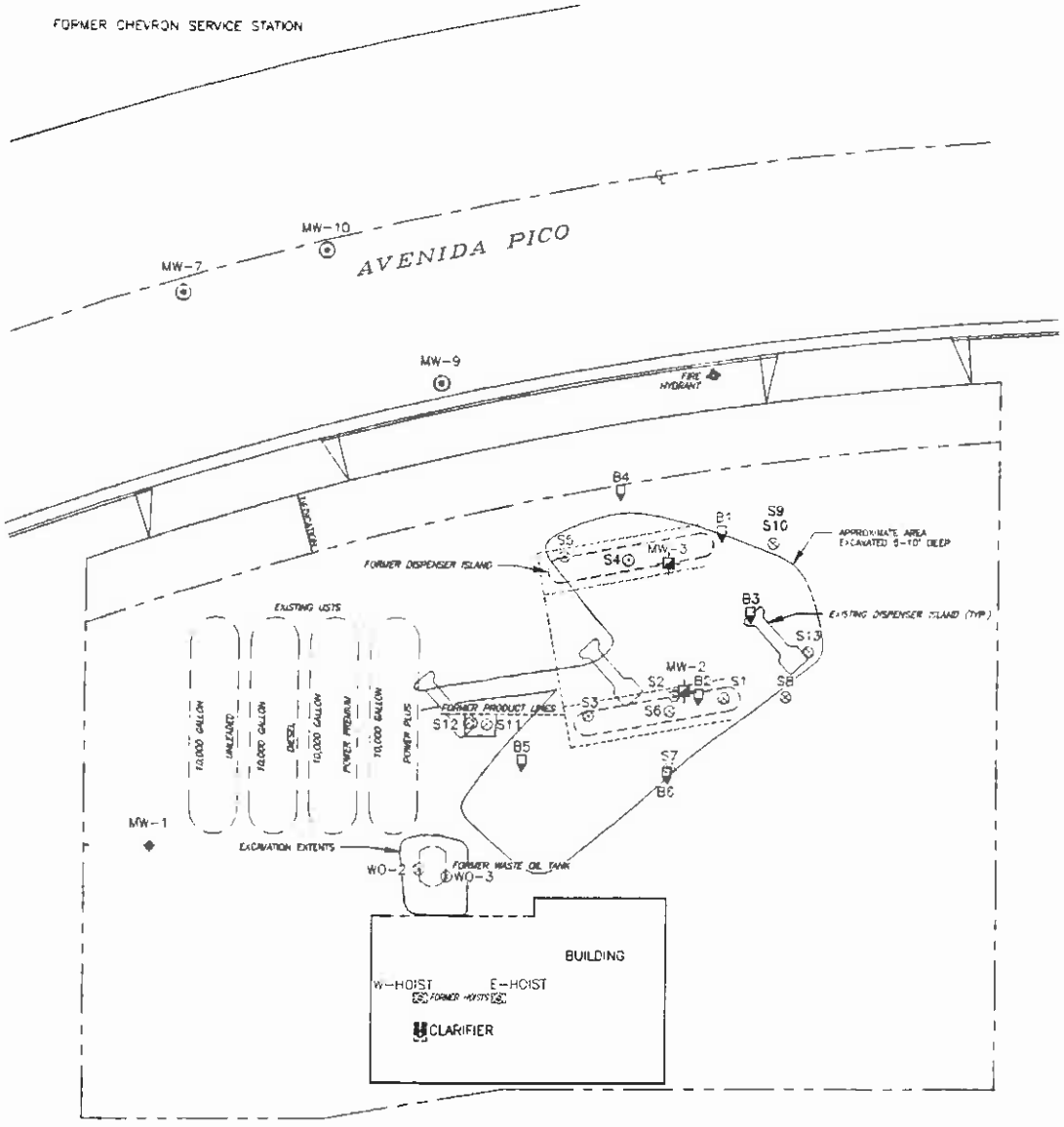
0 2,000 4,000

SCALE FEET

FLUOR DANIEL GTI

SITE LOCATION MAP

CLIENT: TEXACO REFINING AND MARKETING INC.	FILE: 0240SL (1:1)	PROJECT NO.: 023400247	PM	PE/RG	
	REV.				
LOCATION: 530 AVENIDA PICO SAN CLEMENTE, CA	DES. PJWH	DET. CCG	DATE: 03/03/97	FIGURE: 1	



PROJECT NORTH

EXPLANATION

- CHEVRON MONITORING WELL – DRILLED 1991
- MONITORING WELL LOCATION
- DUAL-COMPLETION WELL LOCATION
- GRAB SAMPLE LOCATION
- GEOPROBE BORING LOCATION

NOTES:

1. MAP ADAPTED FROM SITE PLAN, S-1, TRMI, 12/04/91, FILE: SANCLMTO.DWG.
2. WELLS MW-1, MW-2 AND MW-3 SURVEYED BY FLOYD HUBER AND ASSOCIATES, 01/28/97.
3. LOCATION OF CHEVRON WELLS APPROXIMATE.

FLUOR DANIEL GTI

0 FEET 20
SCALE

SITE PLAN

CLIENT: TEXACO REFINING AND MARKETING INC.

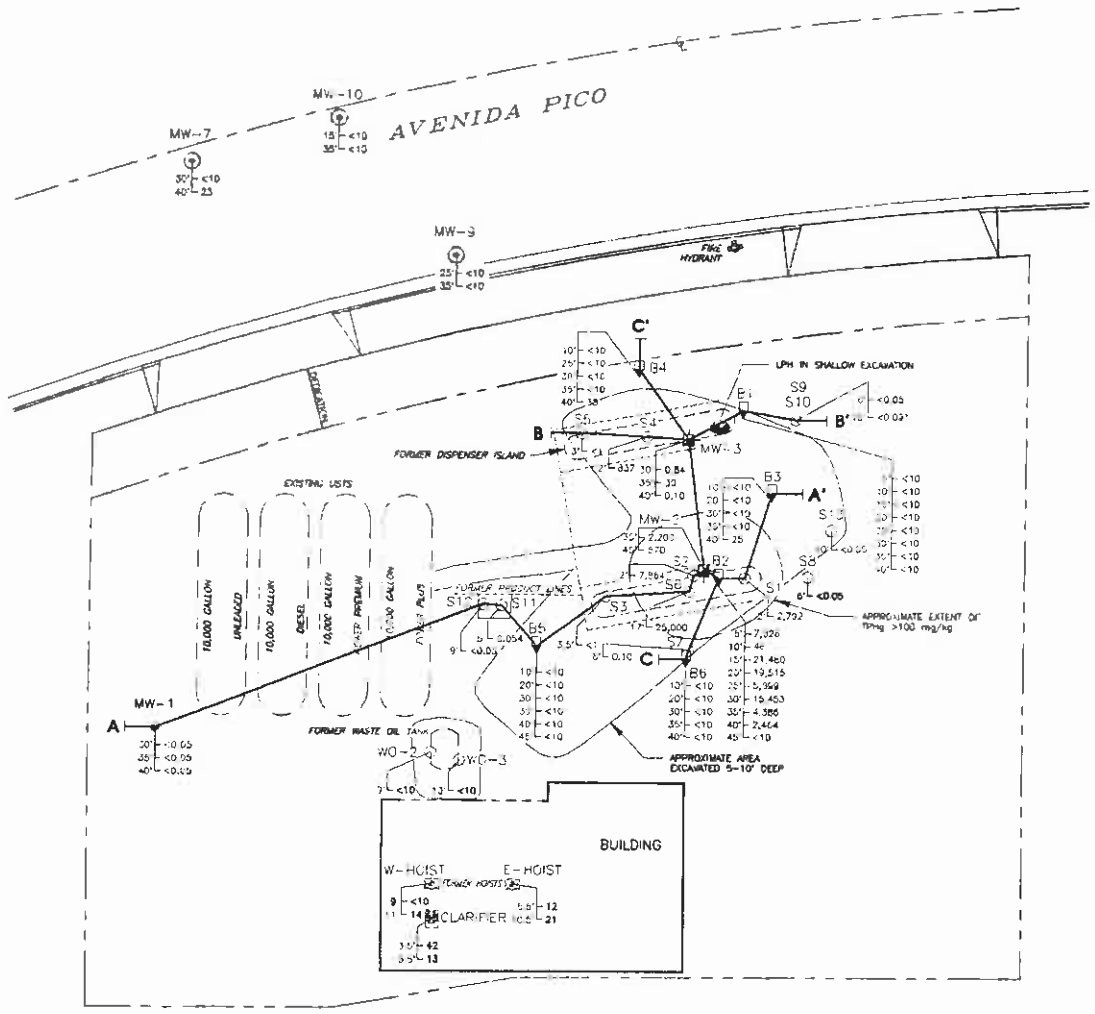
LOCATION: 530 AVENIDA PICO
SAN CLEMENTE, CA

FILE:	PROJECT NO.:
0240SM3 (1 240)	023400240

REV.:

DES.:	DET.:	DATE:	FIGURE:
PJWH	CCG	03/03/97	2

PM: PE/RG



EXPLANATION

- CHEVRON MONITORING WELL – DRILLED 1991
- MONITORING WELL LOCATION
- DUAL-COMPLETION WELL LOCATION
- GRAB SAMPLE LOCATION
- GEOPROBE BORING LOCATION
- 5' 7,826 — TPH AS GASOLINE (mg/kg)
- 10' <10 — TPH AS GASOLINE DETECTION LIMIT (mg/kg)
- 9' 12 — TRPH (mg/kg)
- 10' <10 — TRPH DETECTION LIMIT (mg/kg)

CHEVRON DATA FROM 1991 (GTI, 1992)

PROJECT NORTH

NOTES:

1. MAP ADAPTED FROM SITE PLAN, S-1, TRW, 12/04/91, FILE: SANCLM10.DWG
2. WELLS MW-1, MW-2, AND MW-3 SURVEYED BY FLOYD NUBER AND ASSOCIATES, 01/29/97
3. LOCATION OF CHEVRON WELLS APPROXIMATE.

FLUOR DANIEL GTI

0 FEET 20
SCALE

HYDROCARBON CONCENTRATIONS IN SOIL

CLIENT: TEXACO REFINING AND MARKETING INC

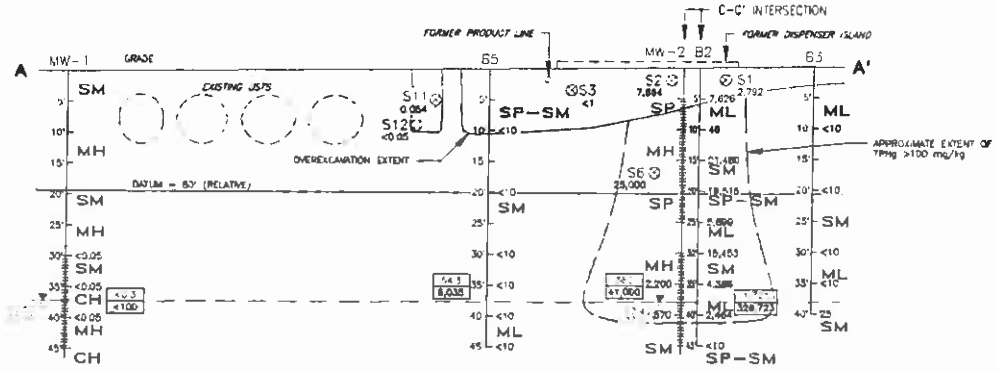
LOCATION: 530 AVENIDA PICO
SAN CLEMENTE, CA

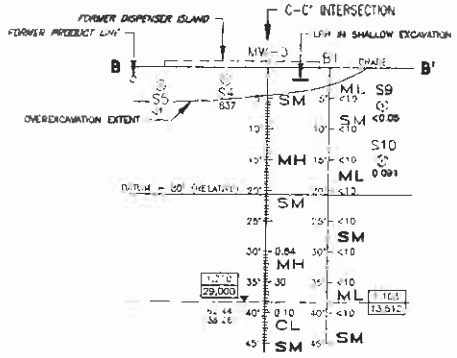
FILE:	PROJECT NO.:
0240HCS (1.240)	023400240

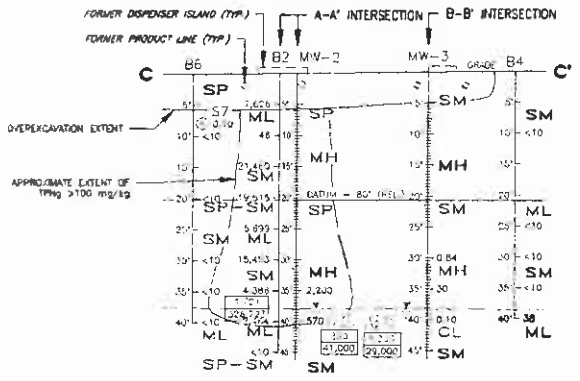
REV.:

DES.:	DET.:	DATE:	FIGURE:
PJWH	CCG	03/03/97	3

PM: PE/RG.







EXPLANATION

- MW-3 — WELL, BORING, OR SAMPLE IDENTIFICATION
- ⊘ — GRAB SAMPLE LOCATION
- BLANK CASING/BORING TRACE
- 25,000 — TPH AS GASOLINE IN SOIL (mg/kg)
- <10 — TPH AS GASOLINE IN SOIL DETECTION LIMIT (mg/kg)
- <0.5 / 41,000 — BENZENE IN GROUNDWATER (ug/L) / TPH AS GASOLINE IN GROUNDWATER (ug/L)
- <0.5 / <100 — BENZENE IN GROUNDWATER DETECTION LIMIT (ug/L) / TPH AS GASOLINE IN GROUNDWATER DETECTION LIMIT (ug/L)
- SCREENED CASING
- ▼ WATER TABLE
- RELATIVE GROUNDWATER ELEVATION
- DEPTH TO GROUNDWATER

USCS SYMBOLS

SP	SAND
SM	SILTY SAND
ML/MH	SILT
CL/CH	CLAY

WELLS GAUGED ON 01/24/97

NO VERTICAL EXAGGERATION

0 FEET 20
VERTICAL SCALE

0 FEET 20
HORIZONTAL SCALE

FLUOR DANIEL GTI

CROSS SECTIONS A-A', B-B', AND C-C'

CLIENT: TEXACO REFINING AND MARKETING INC

LOCATION: 530 AVENIDA PICO, SAN CLEMENTE, CA

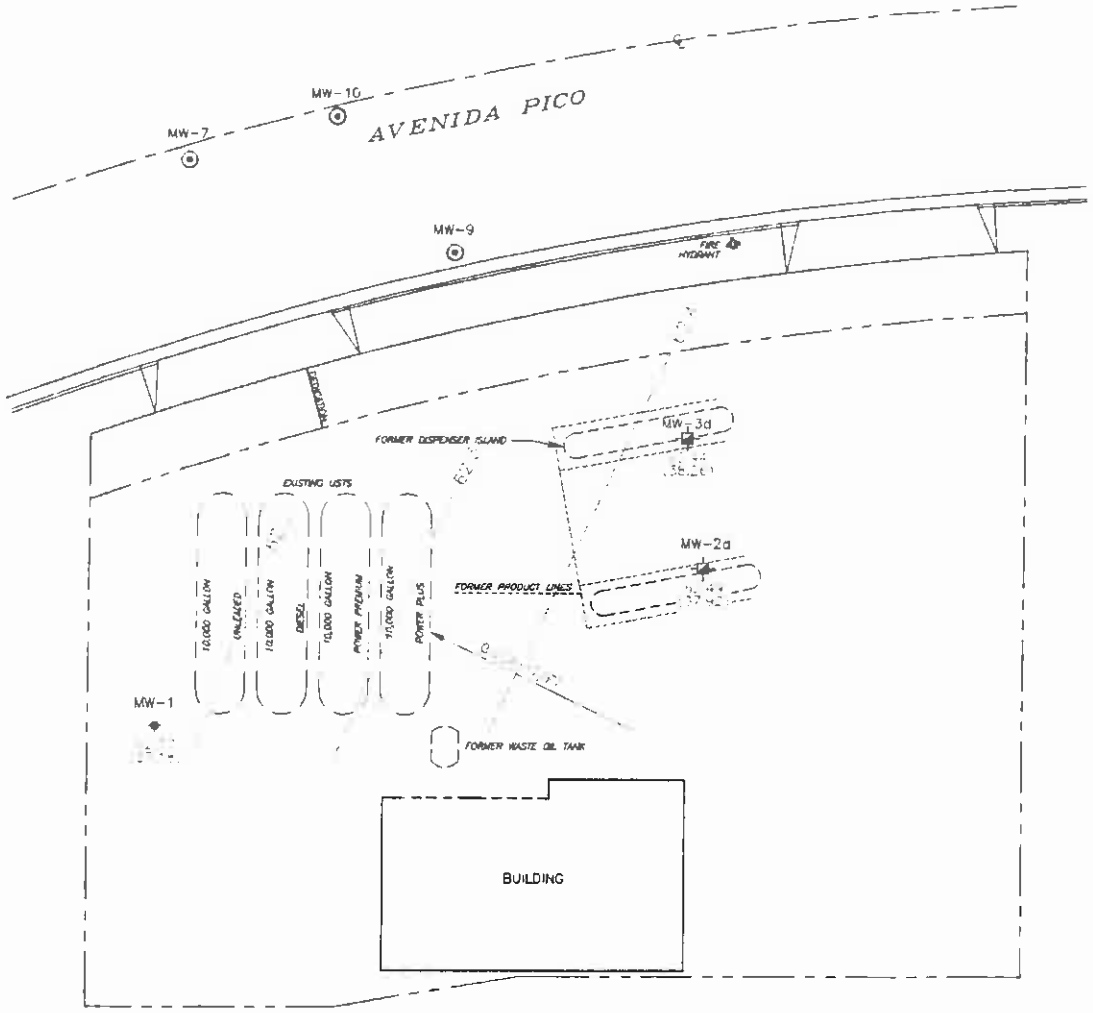
FILE: 0240CSAC (1:240)

PROJECT NO.: 023400240

REV.:

DES.:	DET.:	DATE:	FIGURE:
PJWH	CDS	03/06/97	4

PM: PE/RG



PROJECT NORTH

EXPLANATION

- CHEVRON MONITORING WELL – DRILLED 1991
- MONITORING WELL LOCATION
- DUAL-COMPLETION WELL LOCATION
- GROUNDWATER CONTOUR
- RELATIVE GROUNDWATER ELEVATION
- DEPTH TO GROUNDWATER
- GENERAL FLOW DIRECTION

WELLS GAUGED ON 01/24/97
DATA FROM DEEP-SCREENED WELLS

NOTES:

1. MAP ADAPTED FROM SITE PLAN, S-1, TRW 12/04/91, FILE SANCLM10.DWG
2. WELLS MW-1, MW-2, AND MW-3 SURVEYED BY FLOYD HUBER AND ASSOCIATES, 01/29/97
3. LOCATION OF CHEVRON WELLS APPROXIMATE

FLUOR DANIEL GTI

0 FEET 20
SCALE

GROUNDWATER GRADIENT

CLIENT: TEXACO REFINING AND MARKETING INC.

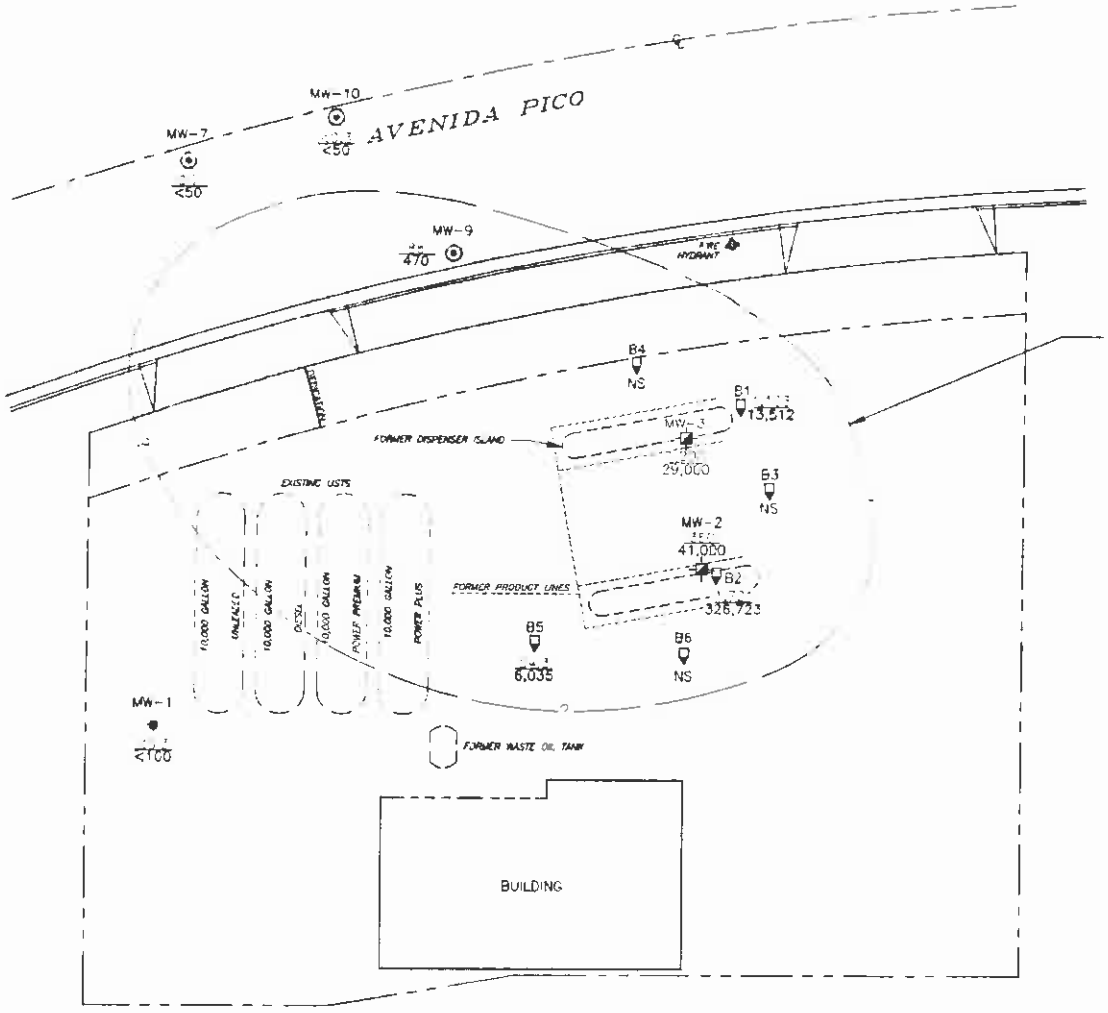
LOCATION: 530 AVENIDA PICO
SAN CLEMENTE, CA

FILE:	PROJECT NO.:
0240GW (1:240)	023400240

REV.:

DES.:	DFT.:	DATE:	FIGURE:
PJWH	CCG	03/03/97	5

PM: PE/RG:



PROJECT NORTH

EXPLANATION

- CHEVRON MONITORING WELL – DRILLED 1991
- MONITORING WELL LOCATION
- DUAL-COMPLETION WELL LOCATION
- GEOPROBE BORING LOCATION
- 41,000 BENZENE (ug/L) / TPH AS GASOLINE (ug/L)
- <100 BENZENE DETECTION LIMIT (ug/L) / TPH AS GASOLINE DETECTION LIMIT (ug/L)
- NS GROUNDWATER NOT SAMPLED

CHEVRON WELLS SAMPLED 03/04/96 (HOLGUIN, 1996)
BORINGS SAMPLED 12/19,23/96
TEXACO WELLS SAMPLED 01/24/97

NOTES

1. MAP ADAPTED FROM SITE PLAN, 1-8 TRM 12/04/91, FILE SANCLMTD.DWG
2. WELLS MW-1, MW-2, AND MW-3 SURVEYED BY FLOYD HUBER AND ASSOCIATES, 01/29/97
3. LOCATION OF CHEVRON WELLS APPROXIMATE.
4. GEOPROBES B1 AND B2 SAMPLED ON 12/19/96. GEOPROBE B5 SAMPLED ON 12/23/96. WELLS MW-1, MW-2, AND MW-3 SAMPLED ON 01/24/97.

FLUOR DANIEL GTI

0 FEET 20
SCALE

HYDROCARBON CONCENTRATIONS IN GROUNDWATER

CLIENT: TEXACO REFINING AND MARKETING INC.

LOCATION: 530 AVENIDA PICO
SAN CLEMENTE, CA

FILE:	PROJECT NO.:
0240DHC (1.240)	023400240

REV.:

DES.:	DET.:	DATE:	FIGURE:
PJWH	CDC	03/03/97	6

PM: PE/RG:

TABLE 1
Waste Disposal
Texaco Service Station, 530 Avenida Pico, San Clemente, California

Disposal Date	Medium	Approximate Volume	Origin
12/24/96	soil	100 yd^3	Dispenser island overexcavation
01/10/97	soil	150 yd^3	Footing excavation, dispenser island overexcavation
02/20/97	soil	1.5 yd^3	Monitoring well soil cuttings
02/21/97	soil	50 yd^3	New product line trenches, tank pit
03/07/97	soil	150 yd^3	New product line trenches
03/19/97	water	220 gal.	Purged groundwater, auger rinsate

TABLE 2
Soil Analytical Data
Texaco Service Station, 530 Avenida Pico, San Clemente, California

Well ID	Date	Depth	TPH_g	TPH_d	TRPH	B	T	E	X	MTBE
Fuel Release Investigation Samples										
B1-5'	12/19/96	5	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B1-10'	12/19/96	10	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B1-15'	12/19/96	15	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B1-20'	12/19/96	20	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B1-25'	12/19/96	25	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B1-30'	12/19/96	30	<10	<10	--	0.056	<0.050	<0.050	0.118	--
B1-35'	12/19/96	35	<10	<10	--	0.740	2.304	0.082	1.647	--
B1-35' dup	12/19/96	35	<10	<10	--	0.842	2.654	0.089	1.879	--
B1-40'	12/19/96	40	<10	<10	--	1.068	0.944	0.379	1.943	<0.020
B2-5'	12/19/96	5	7,626	<10	--	7.2	180.1	118	1,268	--
B2-10'	12/19/96	10	46	<10	--	0.199	3.232	0.960	7.562	--
B2-15'	12/19/96	15	21,480	<10	--	93.2	1,839	852	5,381	6.316
B2-20'	12/19/96	20	19,515	<10	--	112.5	1,912	637	3,883	--
B2-25'	12/19/96	25	5,699	<100	--	6.7	646.1	183	1,185	--
B2-30'	12/19/96	30	15,453	<100	--	91.8	1,850	530	3,553	--
B2-35'	12/19/96	35	4,386	<100	--	5.2	432.0	171	1,068	--
B2-40'	12/19/96	40	2,464	<100	--	21.8	43.3	74.9	463.0	--
B2-45'	12/19/96	45	<10	<10	--	<0.050	0.087	0.155	0.873	--
B2-45' dup	12/19/96	45	<10	<10	--	<0.050	0.092	0.156	0.879	--
B3-10'	12/19/96	10	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B3-20'	12/19/96	20	<10	<10	--	0.085	0.175	0.057	0.476	--
B3-30'	12/19/96	30	<10	<10	--	<0.050	0.206	<0.050	0.245	--
B3-35'	12/19/96	35	<10	<10	--	0.087	1.745	0.253	1.517	--
B3-40'	12/19/96	40	25	<10	--	1.100	0.268	0.455	0.064	<0.020

Notes:
1) All results reported in mg/kg
2) TPH_g = total petroleum hydrocarbons as gasoline, TPH_d = total petroleum hydrocarbons as diesel; analyzed using Modified EPA Method 8015
3) TRPH = total recoverable petroleum hydrocarbons; analyzed using EPA Method 418.1
4) B = benzene, T = toluene, E = ethylbenzene, X = xylenes, MTBE = methyl-tertiary-butyl ether; analyzed using EPA Method 8020
< number = analyte below reported detection limit
-- = not analyzed
7) dup = laboratory duplicate sample

TABLE 2
Soil Analytical Data
Texaco Service Station, 530 Avenida Pico, San Clemente, California
(Page 2 of 4)

Well ID	Date	Depth	TPH_g	TPH_d	TRPH	B	T	E	X	MTBE
Fuel Release Investigation Samples (continued)										
B4-10'	12/19/96	10	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B4-25'	12/19/96	25	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B4-30'	12/19/96	30	<10	<10	--	0.083	<0.050	<0.050	<0.050	--
B4-35'	12/19/96	35	<10	<10	--	0.842	<0.050	<0.050	0.121	--
B4-40'	12/19/96	40	38	<10	--	1.607	0.141	1.347	3.919	0.046
B5-10'	12/23/96	10	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B5-20'	12/23/96	20	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B5-20' dup	12/23/96	20	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B5-30'	12/23/96	30	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B5-35'	12/23/96	35	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B5-40'	12/23/96	40	<10	<10	--	0.267	<0.050	<0.050	<0.050	<0.020
B5-45'	12/23/96	45	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B6-10'	12/23/96	10	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B6-20'	12/23/96	20	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B6-30'	12/23/96	30	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B6-35'	12/23/96	35	<10	<10	--	<0.050	<0.050	<0.050	<0.050	--
B6-40'	12/23/96	40	<10	<10	--	<0.050	<0.050	<0.050	<0.050	<0.020
MW-1-30'	01/21/97	30	<0.05	--	--	<0.005	<0.005	<0.005	<0.01	<0.3
MW-1-35'	01/21/97	35	<0.05	--	--	<0.005	<0.005	<0.005	<0.01	<0.3
MW-1-40'	01/21/97	40	<0.05	--	--	<0.005	<0.005	<0.005	<0.01	<0.3
MW-2-35'	01/21/97	35	2,200	--	--	<3	15	34	250	<200
MW-2-40'	01/21/97	40	570	--	--	<0.5	2.4	13	3.5	5.9

Notes:
1) All results reported in mg/kg
2) TPH_g = total petroleum hydrocarbons as gasoline, TPH_d = total petroleum hydrocarbons as diesel; analyzed using Modified EPA Method 8015
3) TRPH = total recoverable petroleum hydrocarbons; analyzed using EPA Method 418.1
4) B = benzene, T = toluene, E = ethylbenzene, X = xylenes, MTBE = methyl-tertiary-butyl ether; analyzed using EPA Method 8020
5) < number = analyte below reported detection limit
6) -- = not analyzed
7) dup = laboratory duplicate sample

TABLE 2
Soil Analytical Data
Texaco Service Station, 530 Avenida Pico, San Clemente, California
(Page 3 of 4)

Well ID	Date	Depth	TPH_g	TPH_d	TRPH	B	T	E	X	MTBE
Fuel Release Investigation Samples (continued)										
MW-3-30'	01/21/97	30	0.84	--	--	0.12	0.17	<0.03	0.11	<2
MW-3-35'	01/21/97	35	30	--	--	3.1	5.9	<1	4.2	<60
MW-3-40'	01/21/97	40	0.10	--	--	<0.005	0.0070	<0.005	0.0061	<0.3
S1-2'	12/09/96	2	2,792	--	--	--	--	--	--	0.498
S2-2'	12/09/96	2	7,864	--	--	--	--	--	--	0.175
S3-3.5'	12/09/96	3.5	<1	--	--	--	--	--	--	0.025
S4-2'	12/09/96	2	837	--	--	--	--	--	--	0.065
S5-3'	12/09/96	3	<1	--	--	--	--	--	--	<0.020
S6-17'	12/13/96	17	25,000	--	--	--	--	--	--	--
S7-8'	12/13/96	8	0.10	--	--	--	--	--	--	--
S8-6'	12/13/96	6	<0.05	--	--	--	--	--	--	--
S9-6'	12/13/96	6	<0.05	--	--	--	--	--	--	--
S10-15'	12/13/96	15	0.091	--	--	--	--	--	--	--
S11-5'	01/07/97	5	0.054	--	-	<0.005	<0.005	<0.005	<0.01	<0.3
S12-9'	01/07/97	9	<0.05	--	--	<0.005	<0.005	<0.005	<0.01	<0.3
S13-10'	01/07/97	10	<0.05	--	--	<0.005	<0.005	<0.005	<0.01	<0.3
Hoist and Clarifier Samples										
Clarifier-3 1/2'	12/17/96	3.5	--	--	42	--	--	--	--	--
Clarifier-5 1/2'	12/17/96	5.5	--	--	13	<0.005	<0.005	<0.005	<0.01	--
E-Hoist-8 1/2'	12/17/96	8.5	--	--	12	--	--	--	--	--
E-Hoist-10 1/2'	12/17/96	10.5	--	<10	21	--	--	--	--	--
W-Hoist-9'	12/17/96	9	--	--	<10	--	--	--	--	--
W-Hoist-11'	12/17/96	11	--	<10	14	--	--	--	--	--

Notes:
1) All results reported in mg/kg
2) TPH_g = total petroleum hydrocarbons as gasoline, TPH_d = total petroleum hydrocarbons as diesel; analyzed using Modified EPA Method 8015
3) TRPH = total recoverable petroleum hydrocarbons; analyzed using EPA Method 418.1
4) B = benzene, T = toluene, E = ethylbenzene, X = xylenes, MTBE = methyl-tertiary-butyl ether; analyzed using EPA Method 8020
< number = analyte below reported detection limit
5) -- = not analyzed
7) dup = laboratory duplicate sample

TABLE 2
Soil Analytical Data
Texaco Service Station, 530 Avenida Pico, San Clemente, California
(Page 4 of 4)

Well ID	Date	Depth	TPH_g	TPH_d	TRPH	B	T	E	X	MTBE
Waste Oil Tank Samples										
WO-1	12/11/96	Stockpile	--	--	<10	--	--	--	--	--
WO-2-9'	12/11/96	9	--	--	<10	--	--	--	--	--
WO-3-10'	12/11/96	10	--	--	<10	--	--	--	--	--

Notes:
1) All results reported in mg/kg
2) TPH_g = total petroleum hydrocarbons as gasoline, TPH_d = total petroleum hydrocarbons as diesel; analyzed using Modified EPA Method 8015
3) TRPH = total recoverable petroleum hydrocarbons; analyzed using EPA Method 418.1
4) B = benzene, T = toluene, E = ethylbenzene, X = xylenes, MTBE = methyl-tertiary-butyl ether; analyzed using EPA Method 8020
< number = analyte below reported detection limit
-- = not analyzed
7) dup = laboratory duplicate sample

TABLE 3
Monitoring Data
Texaco Service Station, 530 Avenida Pico, San Clemente, California
Gauged January 24, 1997

Well ID	DTW	DTB	SWE	Elev-W	Comments
MW-1	37.18	44.7	99.35	62.17	Deep Screened Well
MW-2S	26.50	27.8	103.45	*76.95	Shallow Screened Well
MW-2D	37.92	45.9	100.41	62.49	Deep Screened Well
MW-3S	25.75	27.8	103.45	*77.70	Shallow Screened Well
MW-3D	38.26	43.7	100.70	62.44	Deep Screened Well

Notes:

1) All depths reported in feet
2) DTW = depth to water
3) DTB = depth to bottom
4) SWE = surveyed well elevation
5) Elev-W = elevation of water
6) * = Data not used in gradient map; water is perched and likely left over from drilling and development.

TABLE 4
Groundwater Analytical Data
Texaco Service Station, 530 Avenida Pico, San Clemente, California

Well ID	Date Sampled	TPH_g	TPH_d	B	T	E	X	MTBE
B1-W	12/19/96	13,512	<500	1,103	4,083	286	3,184	106
B1-W dup	12/19/96	16,751	<500	1,109	4,269	301	3,340	–
B2-W	12/19/96	326,723	<5,000	1,721	42,946	11,662	76,230	257
B5-W	12/23/96	6,035	<500	54.3	4.8	4.7	75.3	<20
B5-W dup	12/23/96	5,468	<500	54.6	4.9	4.5	75.4	--
MW-1	01/24/97	<100	--	<0.3	<0.3	<0.3	<0.6	<30
MW-2D	01/24/97	41,000	--	380	3,600	2,600	12,000	<2,000
MW-3D	01/24/97	29,000	--	1,200	2,900	1,400	4,800	<600

Notes:

1) All results reported in µg/L
2) TPH_g = total petroleum hydrocarbons as gasoline, TPH_d = total petroleum hydrocarbons as diesel; analyzed using CADHS Method
3) B = benzene, T = toluene, E = ethylbenzene, X = xylenes, MTBE = methyl-tertiary-butyl ether; analyzed using EPA Method 8020
4) < number = analyte below reported detection limit
5) – = not analyzed
6) dup = laboratory duplicate sample

UNIFIED SOIL CLASSIFICATION SYSTEM

CLASSIFICATION CHART

MAJOR DIVISIONS		SYMBOLS	TYPICAL NAMES	GTGS FILL PATTERN
COARSE GRAINED SOILS OVER 50%>No.200 SIEVE SIZE	GRAVELS MORE THAN 1/2 OF COARSE FRACTION> NO.4 SIEVE SIZE	GW	Well graded gravels or gravel-sand mixtures, little or no fines	26
		GP	Poorly graded gravels or gravel-sand mixtures, little or no fines	25
		GM	Silty gravels, gravel-sand mixtures	26=11
		GC	Clayey gravels, gravel-sand-clay mixtures	26=14
	SANDS MORE THAN 1/2 OF COARSE FRACTION< NO.4 SIEVE SIZE	SW	Well graded sands or gravelly sands, little or no fines	8
		SP	Poorly graded sands or gravelly sands, little or no fines	6
		SM	Silty sands, sand-silt mixtures	9
		SC	Clayey sands, sand-clay mixtures	10
FINE GRAINED SOILS OVER 50%<No.200 SIEVE SIZE	SILTS & CLAYS LL<50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	11
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	14
		OL	Organic silts and organic silty clays of low plasticity	18
	SILTS & CLAYS LL>50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	12
		CH	Inorganic clays of high plasticity, fat clays	15
		OH	Organic clays of medium to high plasticity, organic silty clays, organic silts	35
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils	20

GRAIN SIZE CHART

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVEL COARSE FINE	3" to No.4 3" to 3/4" 3/4" to No.4	76.2 to 4.75 76.2 to 19.1 10.1 to 4.75
SAND COARSE MEDIUM FINE	No.4 to No.200 No.4 to No.10 No.10 to No.40 No.40 to No.200	4.75 to 0.074 4.76 to 2.00 2.00 to 0.420 0.420 to 0.074
SILT & CLAY	Below No.200	Below No.0.074

WELL CONSTRUCTION MATERIALS

- Asphalt (68)
- Concrete (55)
- Neat Cement (54)
- Base Course (30)
- Sluff (64)
- Bentonite (21)
- Filter Pack (7)
- Pea Gravel (2)
- Liner (33)
- Geocloth (36)

SCREENS

- Solid (1s)
- Slotted PVC (3w)
- Slot. PVC High Flow (8w)
- Wire Wound PVC (18w)
- Wire Wound Steel (15w)
- Saw Cut (12w)
- Stainless Steel (13w)

SAMPLE TYPES

SS – Split Spoon
CC – Continuous Core
CG – Cuttings Grab

SYMBOLS

- Initial Water Level
- Static Water Level

FLUOR DANIEL GTI

Drilling Log

FLUOR DANIEL GTI

Monitoring Well **MW-1**

Project *TRMI/530 Avenida Pico* Owner *Texaco Refining and Marketing, Inc*
Location *530 Avenida Pico, San Clemente, CA* Proj. No. *02340024.7*
Surface Elev. _____ Total Hole Depth *46.5 ft.* Diameter *10 in.*
Top of Casing _____ Water Level Initial *36 ft.* Static _____
Screen: Dia *4 in.* Length *15 ft.* Type/Size *0.020 in.*
Casing: Dia *4 in.* Length *30 ft.* Type *Sch 40 PVC*
Fill Material _____ Rig/Core *CME-75*
Drill Co. *West Hazmat* Method *Hollow Stem Auger*
Driller *Rick Hastings* Log By *Fred Essig* Date *01/21/97* Permit # *26733*
Checked By *KYLE RHEUBOTTOM* License No. *5100*

See Site Map For Boring Location

COMMENTS:

No cement in boring. Wait on grading to complete.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count / % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2 to 24			MW1-				
4		20	5	10 12 13		SM	**5-6.5', Silty SAND (SM)** 70% fine grained sand, 20% silt, 10% clay, trace medium grained sand, slightly plastic to plastic, moderately dense, grayish brown, moist, no hydrocarbon odor.
10		40	10	7 19 12		MH	**10-11.5', Sandy SILT (MH)** 40% silt, 30% fine grained sand, 20% clay, plastic, hard, grayish brown, moist, no hydrocarbon odor.
15		20	15	13 15 24			**15-16.5', Sandy SILT (MH)** 50% silt, 30% fine grained sand, 20% clay, plastic, hard, brown, moist to wet, no hydrocarbon odor.
20		10	20	10 13 25		SM	**20-21.5', Silty SAND (SM)** 80% fine grained sand, 20% silt, trace clay, dense, yellowish green, moist to wet, no hydrocarbon odor.
24						MH	

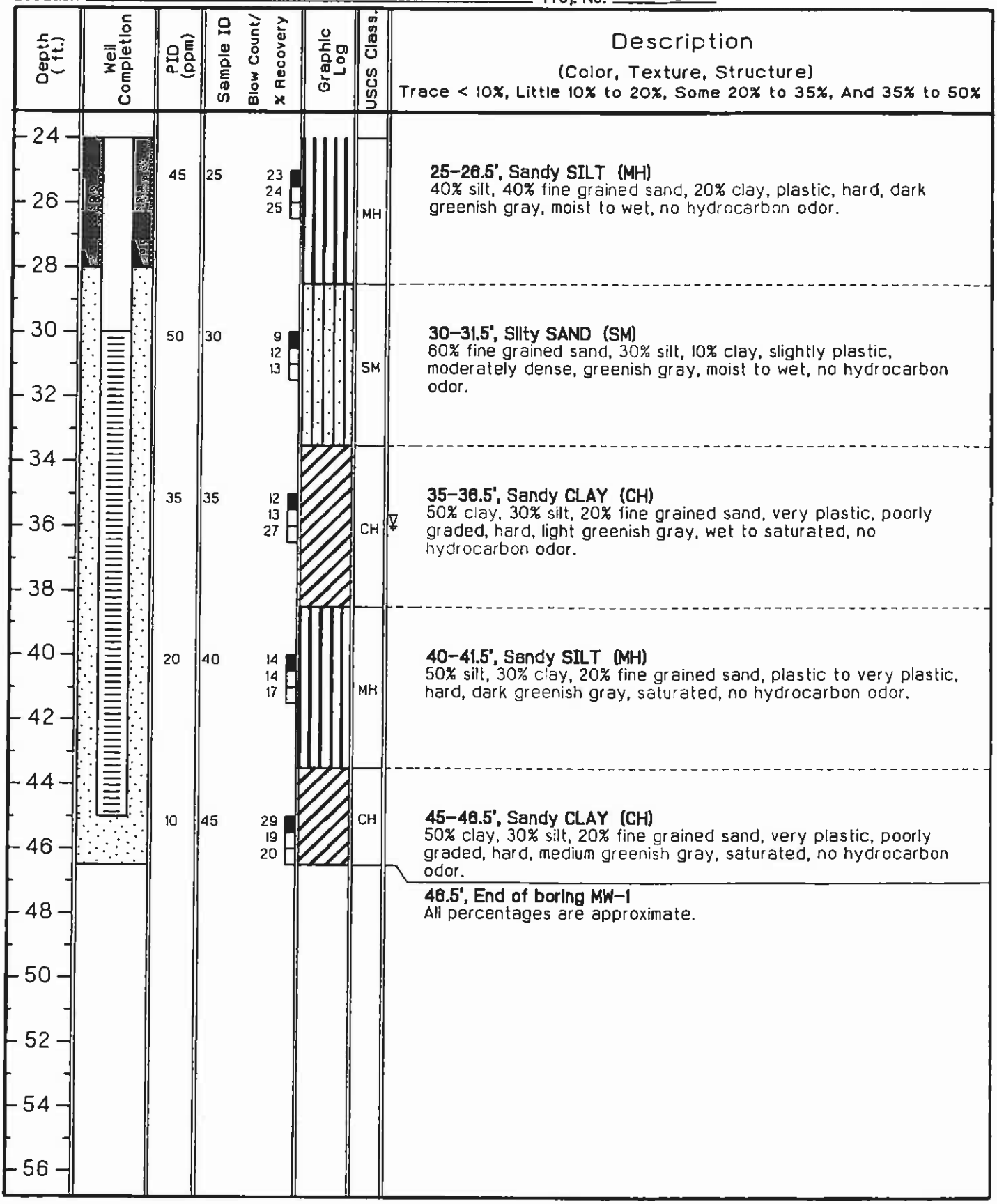
Drilling Log

FLUOR DANIEL GTI

Monitoring Well **MW-1**

Project *TRMI/530 Avenida Pico* Owner *Texaco Refining and Marketing, Inc.*

Location *530 Avenida Pico, San Clemente, CA* Proj. No. *023400247*



Drilling Log

FLUOR DANIEL GTI

Monitoring Well MW-2

Project TRMI/530 Avenida Pico Owner Texaco Refining and Marketing, Inc.
Location 530 Avenida Pico, San Clemente, CA Proj. No. 023400247
Surface Elev. ____ Total Hole Depth 46.5 ft. Diameter 10 in.
Top of Casing ____ Water Level Initial 36 ft. Static ____
Screen: Dia 2, 2 in. Length 20, 15 ft. Type/Size 0.020 in.
Casing: Dia 2, 2 in. Length 5, 30 ft. Type Sch 40 PVC
Fill Material ____ Rig/Core CME-75
Drill Co. West Hazmat Method Hollow Stem Auger
Driller Rick Hastings Log By Fred Essig Date 01/21/97 Permit # 26733
Checked By KYLE RHEUBOTTOM License No. 5100

See Site Map For Boring Location

COMMENTS:

NR = no recovery.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							
0			MW2-				
2							
4						SP	
6		90	5	6 6 9			**5-6.5', Poorly Graded SAND (SP)** 90% fine grained sand, 10% silt, trace clay, grayish brown, moist, none to weak hydrocarbon odor.
8							
10		1900	10	8 9 12			**10-11.5', Sandy SILT (MH)** 50% silt, 40% fine grained sand, 10% clay, plastic, dark brown, moist, moderate to strong hydrocarbon odor.
12							
14						MH	
16		2100	15	6 6 10			**15-16.5', Sandy SILT (MH)** 50% silt, 40% fine grained sand, 10% clay, plastic, very stiff, light brown, moist, moderate to strong hydrocarbon odor.
18							
20		1200	20	13 15 15		SP	**20-21.5', Poorly Graded SAND (SP)** 90% fine grained sand, 10% silt, trace clay, nonplastic, poorly graded, dense, yellowish brown, moist, moderate to strong hydrocarbon odor.
22							
24						MH	

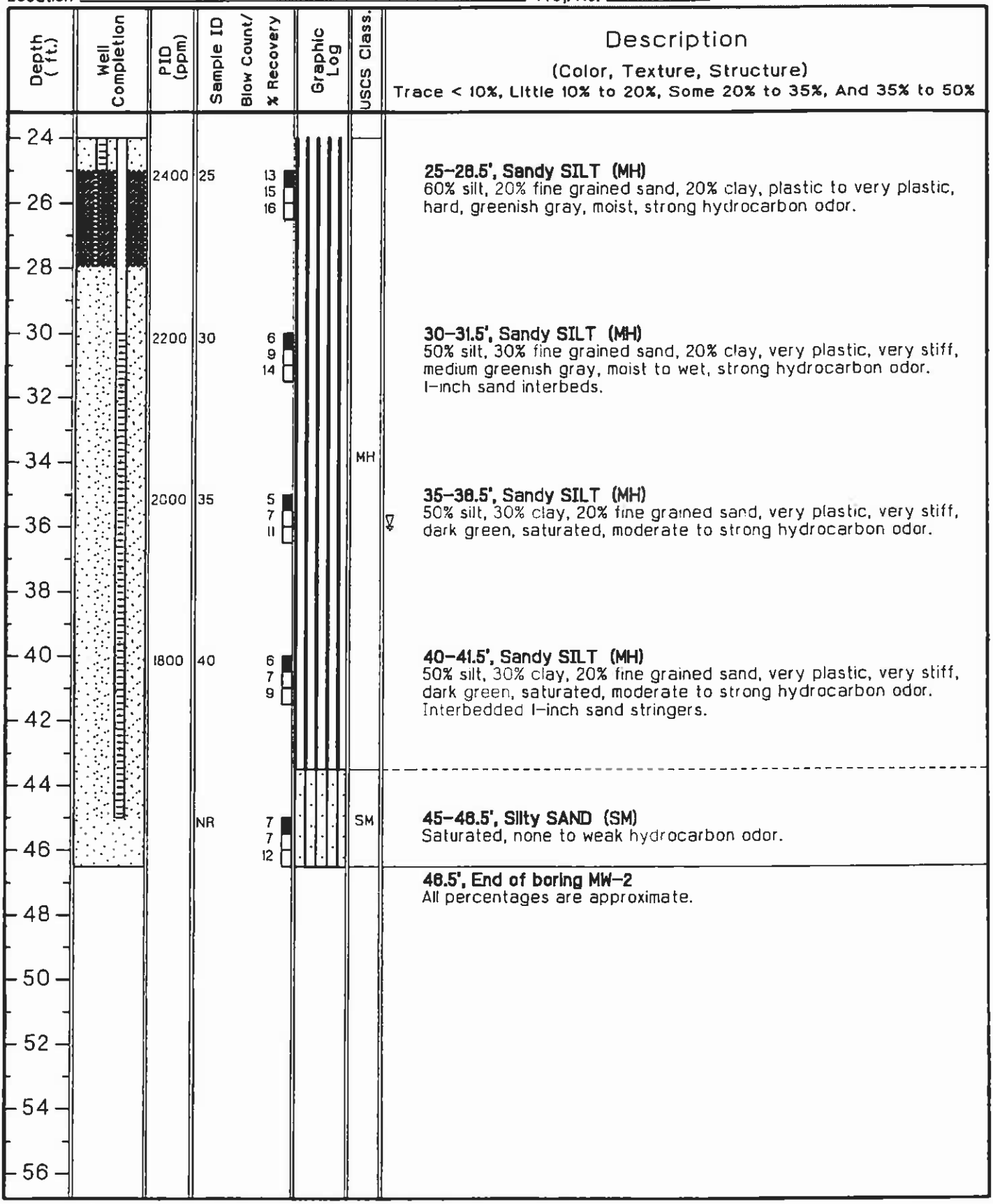
Drilling Log

FLUOR DANIEL GTI

Monitoring Well **MW-2**

Project *TRMI/530 Avenida Pico* Owner *Texaco Refining and Marketing, Inc.*

Location *530 Avenida Pico, San Clemente, CA* Proj. No. *023400247*



Drilling Log

FLUOR DANIEL GTI

Monitoring Well MW-3

Project TRMI/530 Avenida Pico Owner Texaco Refining and Marketing, Inc.
Location 530 Avenida Pico, San Clemente, CA Proj. No. 023400247
Surface Elev. ____ Total Hole Depth 46.5 ft. Diameter 10 in.
Top of Casing ____ Water Level Initial 36 ft. Static ____
Screen: Dia 2, 2 in. Length 20, 15 ft. Type/Size 0.020 in.
Casing: Dia 2, 2 in. Length 5, 30 ft. Type Sch 40 PVC
Fill Material ____ Rig/Core CME-75
Drill Co. West Hazmat Method Hollow Stem Auger
Driller Rick Hastings Log By Fred Essig Date 01/21/97 Permit # 26733
Checked By KYLE RHEUBOTTOM License No. 5100

See Site Map For Boring Location

COMMENTS:

NR = no recovery.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							
0			MW3-				
2							
4							
6		0	5	7 7 9			**5-6.5', Sandy SILT (SM)** 60% silt, 30% fine grained sand, 10% clay, plastic, very stiff, grayish-brown, moist, no hydrocarbon odor.
8							
10		10	10	6 8 12		MH	**10-11.5', Sandy SILT (MH)** 60% silt, 30% fine grained sand, 10% clay, plastic, very stiff, greenish brown, moist, no hydrocarbon odor.
12							
14							
16		90	15	8 8 11			**15-16.5', Sandy SILT (MH)** 60% silt, 20% fine grained sand, 20% clay, plastic to very plastic, very stiff, greenish gray, moist, no hydrocarbon odor.
18							
20		100	20	8 9 10		SM	**20-21.5', Silty SAND (SM)** 80% fine grained sand, 20% silt, trace clay, slightly plastic to very plastic, moderately dense, greenish gray, moist, none to weak hydrocarbon odor. Faint odor similar to alcohol.
22							
24						MH	

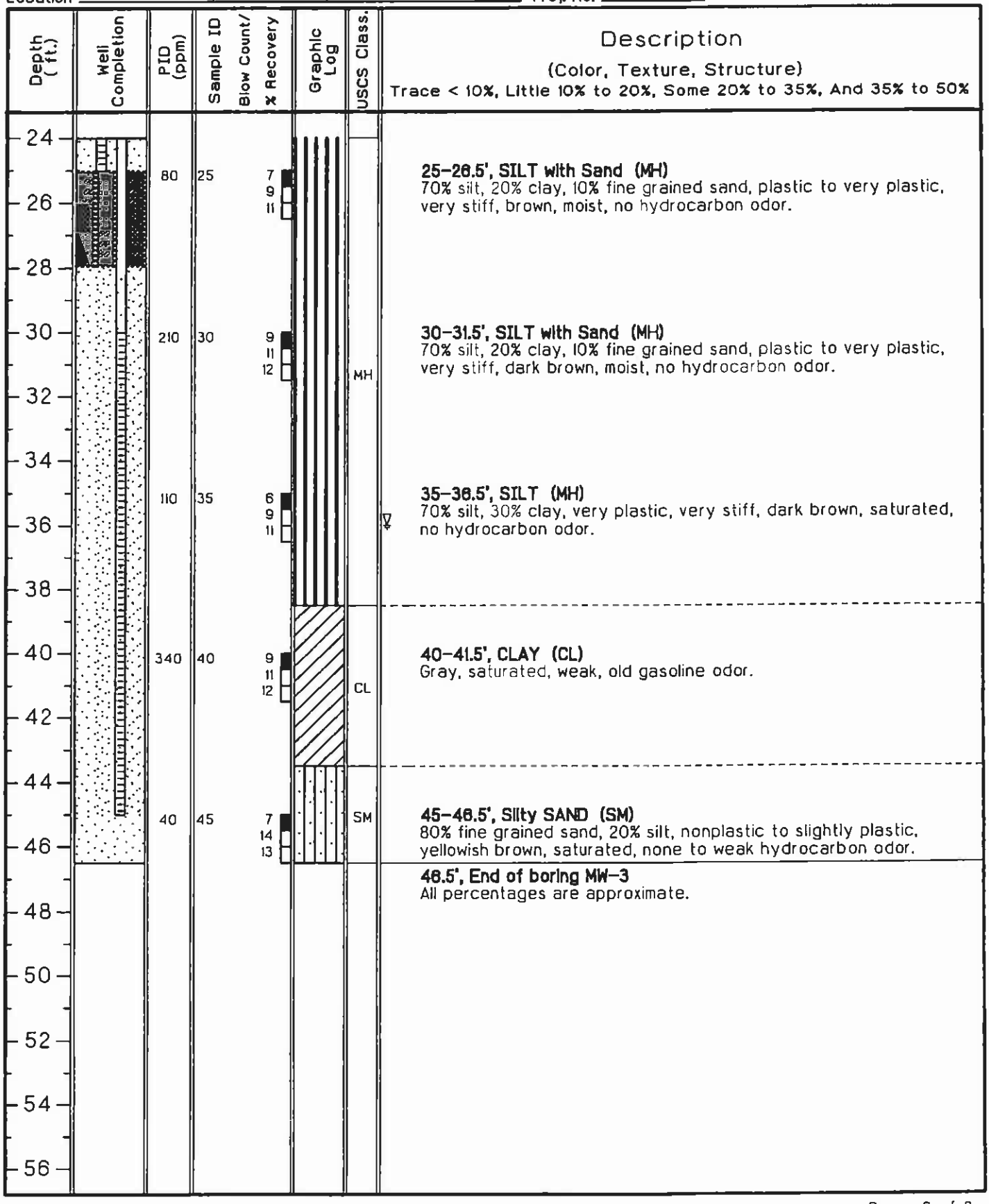
Drilling Log

FLUOR DANIEL GTI

Monitoring Well **MW-3**

Project *TRMI/530 Avenida Pico* Owner *Texaco Refining and Marketing, Inc.*

Location *530 Avenida Pico, San Clemente, CA* Proj. No. *023400247*



Description

(Color, Texture, Structure)

Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%

25–28.5', SILT with Sand (MH)
70% silt, 20% clay, 10% fine grained sand, plastic to very plastic, very stiff, brown, moist, no hydrocarbon odor.

30–31.5', SILT with Sand (MH)
70% silt, 20% clay, 10% fine grained sand, plastic to very plastic, very stiff, dark brown, moist, no hydrocarbon odor.

35–38.5', SILT (MH)
70% silt, 30% clay, very plastic, very stiff, dark brown, saturated, no hydrocarbon odor.

40–41.5', CLAY (CL)
Gray, saturated, weak, old gasoline odor.

45–46.5', Silty SAND (SM)
80% fine grained sand, 20% silt, nonplastic to slightly plastic, yellowish brown, saturated, none to weak hydrocarbon odor.

46.5', End of boring MW-3
All percentages are approximate.

Drilling Log

FLUOR DANIEL GTI

Soil Boring B1

Project TRMI/530 Avenida Pico Owner Texaco Refining and Marketing, Inc.
Location 530 Avenida Pico, San Clemente, CA Proj. No. 023400240
Surface Elev. _____ Total Hole Depth 45 ft. Diameter 2 in.
Top of Casing _____ Water Level Initial 36 ft. Static _____
Screen: Dia _____ Length _____ Type/Size _____
Casing: Dia _____ Length _____ Type _____
Fill Material Bentonite Rig/Core Strata Probe
Drill Co. TEG Method Direct Push
Driller Frank Case Log By Patrick Hamner Date 12/19/96 Permit # 34531
Checked By KYLE RHEUBOTTOM License No. 5100

See Site Map For Boring Location

COMMENTS:

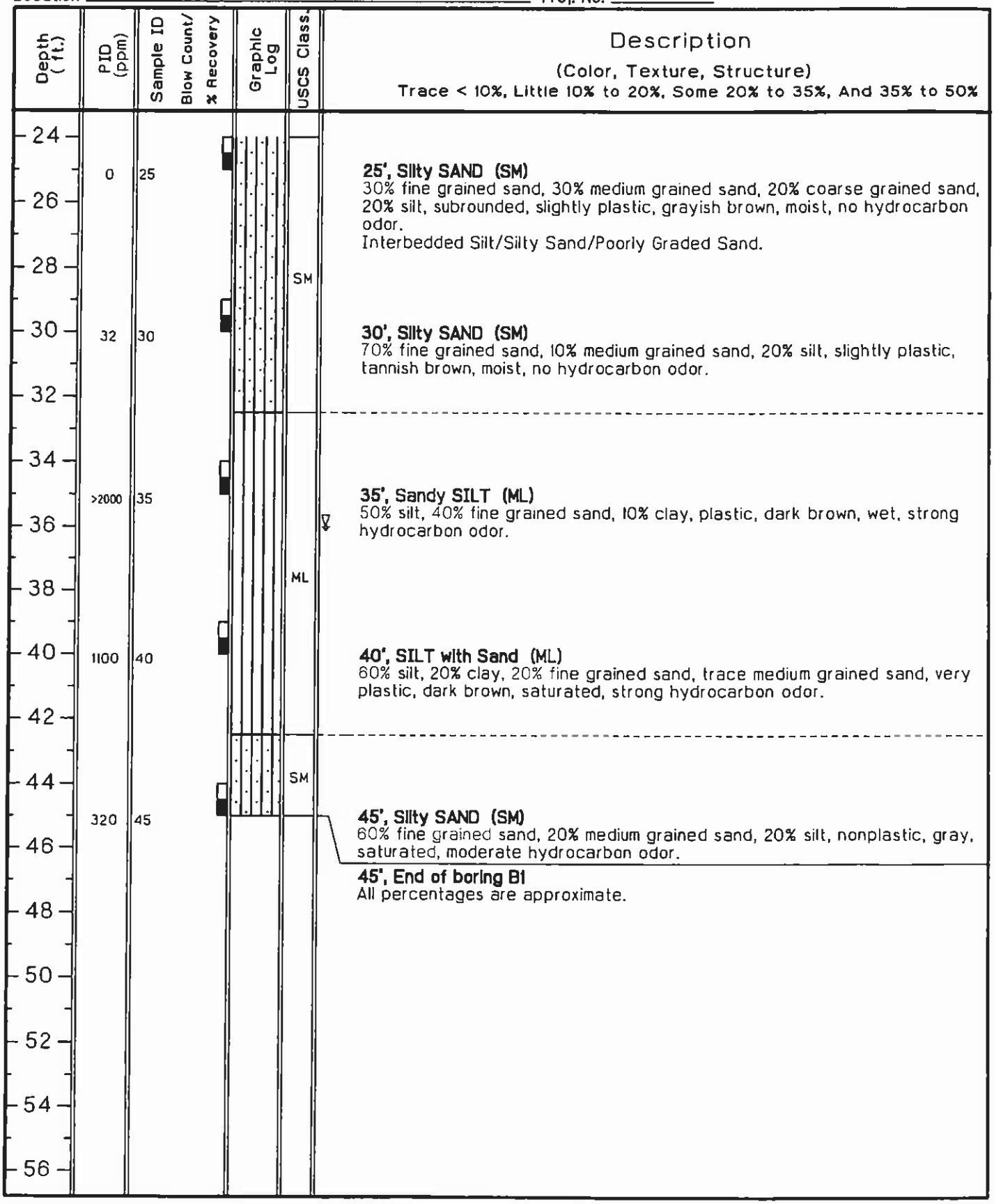
Depth (ft.)	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2 to 0						
0 to 8	48	B1-5			ML	**5', Sandy SILT (ML)** 50% silt, 30% fine grained sand, 5% medium grained sand, 5% coarse grained sand, 10% clay, trace gravel, plastic, dark brown, moist, weak hydrocarbon odor.
8 to 12	116	10			SM	**10', Silty SAND (SM)** 60% fine grained sand, 40% silt, slightly plastic, dark brown, moist, no hydrocarbon odor.
12 to 18	40	15			ML	**15', Sandy SILT (ML)** 60% silt, 30% fine grained sand, 10% clay, plastic, grayish brown, moist, no hydrocarbon odor.
18 to 22	0	20			ML	**20', Sandy SILT (ML)** 50% silt, 50% fine grained sand, plastic, grayish brown, wet, no hydrocarbon odor.
22 to 24					SM	

Drilling Log

FLUOR DANIEL GTI

Soil Boring B1

Project TRMI/530 Avenida Pico Owner Texaco Refining and Marketing, Inc.
Location 530 Avenida Pico, San Clemente, CA Proj. No. 023400240



Drilling Log

FLUOR DANIEL GTI

Soil Boring B2

Project TRMI/530 Avenida Pico Owner Texaco Refining and Marketing, Inc.
Location 530 Avenida Pico, San Clemente, CA Proj. No. 023400240
Surface Elev. ____ Total Hole Depth 45 ft. Diameter 2 in.
Top of Casing ____ Water Level Initial 35 ft. Static ____
Screen: Dia ____ Length ____ Type/Size ____
Casing: Dia ____ Length ____ Type ____
Fill Material Bentonite Rig/Core Strata Probe
Drill Co. TEG Method Direct Push
Driller Frank Case Log By Patrick Hamner Date 12/19/96 Permit # 34531
Checked By KYLE RHEUBOTTOM License No. 5100

See Site Map For Boring Location

COMMENTS:

Depth (ft.)	PID (ppm)	Sample ID / Blow Count / % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2					
0					
2		B2-			
4					
6	>2000	5		ML	**5', Sandy SILT (ML)** 50% silt, 30% fine grained sand, 10% medium grained sand, 10% clay, trace coarse grained sand, plastic, dark gray, moist, strong hydrocarbon odor.
8					
10	>2000	10			**10', Sandy SILT (ML)** 40% silt, 35% fine grained sand, 10% medium grained sand, 10% clay, 5% coarse grained sand, trace gravel, plastic, dark gray, moist, strong hydrocarbon odor.
12					
14					
16	>2000	15		SM	**15', Silty SAND (SM)** 60% fine grained sand, 40% silt, nonplastic, grayish brown, moist, strong hydrocarbon odor.
18					
20	>2000	20		SP-SM	**20', Poorly Graded SAND with Silt (SP-SM)** 85% fine grained sand, 5% medium grained sand, 10% silt, nonplastic, tan, moist, strong hydrocarbon odor.
22					
24				ML	

Drilling Log

FLUOR DANIEL GTI

Soil Boring **B2**

Project *TRMI/530 Avenida Pico* Owner *Texaco Refining and Marketing, Inc.*

Location *530 Avenida Pico, San Clemente, CA* Proj. No. *023400240*

Depth (ft.)	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26	>2000	25			ML	**25', Sandy SILT (ML)** 50% silt, 50% fine grained sand, trace medium grained sand, trace coarse grained sand, plastic, dark brown, moist, strong hydrocarbon odor.
28						
30	>2000	30			SM	**30', Silty SAND (SM)** 80% fine grained sand, 20% silt, nonplastic, grayish tan, moist, strong hydrocarbon odor.
32						
34						
36	>2000	35				**35', Silty SAND (SM)** 60% fine grained sand, 40% silt, slightly plastic, grayish brown, wet, strong hydrocarbon odor.
38						
40	>2000	40			ML	**40', Sandy SILT (ML)** 50% silt, 30% fine grained sand, 20% clay, trace coarse grained sand, plastic, dark gray, saturated, strong hydrocarbon odor.
42						
44					SP-SM	
46	600	45				**45', Pooly Graded SAND with Silt (SP–SM)** 40% fine grained sand, 30% medium grained sand, 20% coarse grained sand, 10% silt, nonplastic, tannish gray, saturated, strong hydrocarbon odor. Interbedded Poorly Graded Sand/Sandy Silt.
48						**45', End of boring B2** All percentages are approximate.
50						
52						
54						
56						

Drilling Log

FLUOR DANIEL GTI

Soil Boring B3

Project TRMI/530 Avenida Pico Owner Texaco Refining and Marketing, Inc.
Location 530 Avenida Pico, San Clemente, CA Proj. No. 023400240
Surface Elev. ____ Total Hole Depth 40 ft. Diameter 2 in.
Top of Casing ____ Water Level Initial ____ Static ____
Screen: Dia ____ Length ____ Type/Size ____
Casing: Dia ____ Length ____ Type ____
Fill Material Bentonite Rig/Core Strata Probe
Drill Co. TEG Method Direct Push
Driller Frank Case Log By Patrick Hamner Date 12/19/96 Permit # 34531
Checked By KYLE RHEUBOTTOM License No. 5100

See Site Map For Boring Location

COMMENTS:

Depth (ft.)	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2 to 0						
0 to 14	0	B3-10			ML	**10', Sandy SILT (ML)** 50% silt, 40% fine grained sand, 10% clay, plastic, grayish tan, moist, no hydrocarbon odor.
14 to 24	400	20			SM	**20', Silty SAND (SM)** 55% fine grained sand, 45% silt, slightly plastic, grayish tan, moist, no hydrocarbon odor.

Drilling Log

FLUOR DANIEL GTI

Soil Boring B3

Project TRMI/530 Avenida Pico Owner Texaco Refining and Marketing, Inc.
Location 530 Avenida Pico, San Clemente, CA Proj. No. 023400240

Depth (ft.)	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26						
28					SM	
30	150	30				**30', Silty SAND (SM)** 50% fine grained sand, 30% medium grained sand, 20% silt, trace coarse grained sand, nonplastic, grayish tan, moist, weak hydrocarbon odor.
32						
34					ML	**35', Sandy SILT (ML)** 40% silt, 10% clay, 50% fine grained sand, plastic, brown, wet, weak hydrocarbon odor.
36	974	35				
38					SM	
40	>2000	40				**40', Silty SAND (SM)** 30% fine grained sand, 20% medium grained sand, 20% coarse grained sand, 30% silt, slightly plastic, dark gray, saturated, strong hydrocarbon odor.
42						**40', End of boring B3** All percentages are approximate.
44						
46						
48						
50						
52						
54						
56						

Drilling Log

FLUOR DANIEL GTI

Soil Boring B4

Project TRMI/530 Avenida Pico Owner Texaco Refining and Marketing, Inc.
Location 530 Avenida Pico, San Clemente, CA Proj. No. 023400240
Surface Elev. ____ Total Hole Depth 40 ft. Diameter 2 in.
Top of Casing ____ Water Level Initial ____ Static ____
Screen: Dia ____ Length ____ Type/Size ____
Casing: Dia ____ Length ____ Type ____
Fill Material Bentonite Rig/Core Strata Probe
Drill Co. TEG Method Direct Push
Driller Frank Case Log By Patrick Hamner Date 12/19/96 Permit # 34531
Checked By KYLE RHEUBOTTOM License No. 5100

See Site Map For Boring Location

COMMENTS:

Depth (ft.)	PID (ppm)	Sample ID	Blow Count / % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						
2		B4-				
4						
6						
8						
10	0	10			SM	**10', Silty SAND (SM)** 80% fine grained sand, 20% silt, slightly plastic, grayish brown, moist, weak hydrocarbon odor.
12						
14						
16						
18						
20					ML	
22						
24						

Drilling Log

FLUOR DANIEL GTI

Soil Boring B4

Project *TRMI/530 Avenida Pico* Owner *Texaco Refining and Marketing, Inc.*

Location *530 Avenida Pico, San Clemente, CA* Proj. No. *023400240*

Depth (ft.)	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24						
26	0	25			ML	**25', SILT with Sand (ML)** 60% silt, 20% clay, 20% fine grained sand, very plastic, dark brown, wet, no hydrocarbon odor.
28						
30	66	30			SM	**30', Silty SAND (SM)** 60% fine grained sand, 10% medium grained sand, 30% silt, nonplastic, grayish tan, wet, no hydrocarbon odor.
32						
34						
36	225	35				**35', Silty SAND (SM)** 60% fine grained sand, 40% silt, slightly plastic, grayish brown, wet, weak hydrocarbon odor.
38					ML	
40	>2000	40				**40', SILT with Sand (ML)** 60% silt, 20% clay, 20% fine grained sand, very plastic, dark brown, saturated, strong hydrocarbon odor.
42						**40', End of boring B4** All percentages are approximate.
44						
46						
48						
50						
52						
54						
56						

Drilling Log

FLUOR DANIEL GTI

Soil Boring B5

Project TRMI/530 Avenida Pico Owner Texaco Refining and Marketing, Inc.
Location 530 Avenida Pico, San Clemente, CA Proj. No. 023400240
Surface Elev. ____ Total Hole Depth 45 ft. Diameter 2 in.
Top of Casing ____ Water Level Initial 34 ft. Static ____
Screen: Dia ____ Length ____ Type/Size ____
Casing: Dia ____ Length ____ Type ____
Fill Material Bentonite Rig/Core Strata Probe
Drill Co. TEG Method Direct Push
Driller Robby Bray Log By Patrick Hamner Date 12/23/96 Permit # 34531
Checked By KYLE RHEUBOTTOM License No. 5100

See Site Map For Boring Location

COMMENTS:

Depth (ft.)	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2						
0						
2		B5-				
4						
6						
8					SP-SM	
10		10				**10', Poorly Graded SAND with Silt (SP-SM)** 50% fine grained sand, 30% medium grained sand, 10% coarse grained sand, 10% silt, grayish tan; moist, no hydrocarbon odor.
12						
14						
16						
18						
20		20			SM	**20', Silty SAND (SM)** 60% fine grained sand, 40% silt, slightly plastic, brown, wet, no hydrocarbon odor.
22						
24						

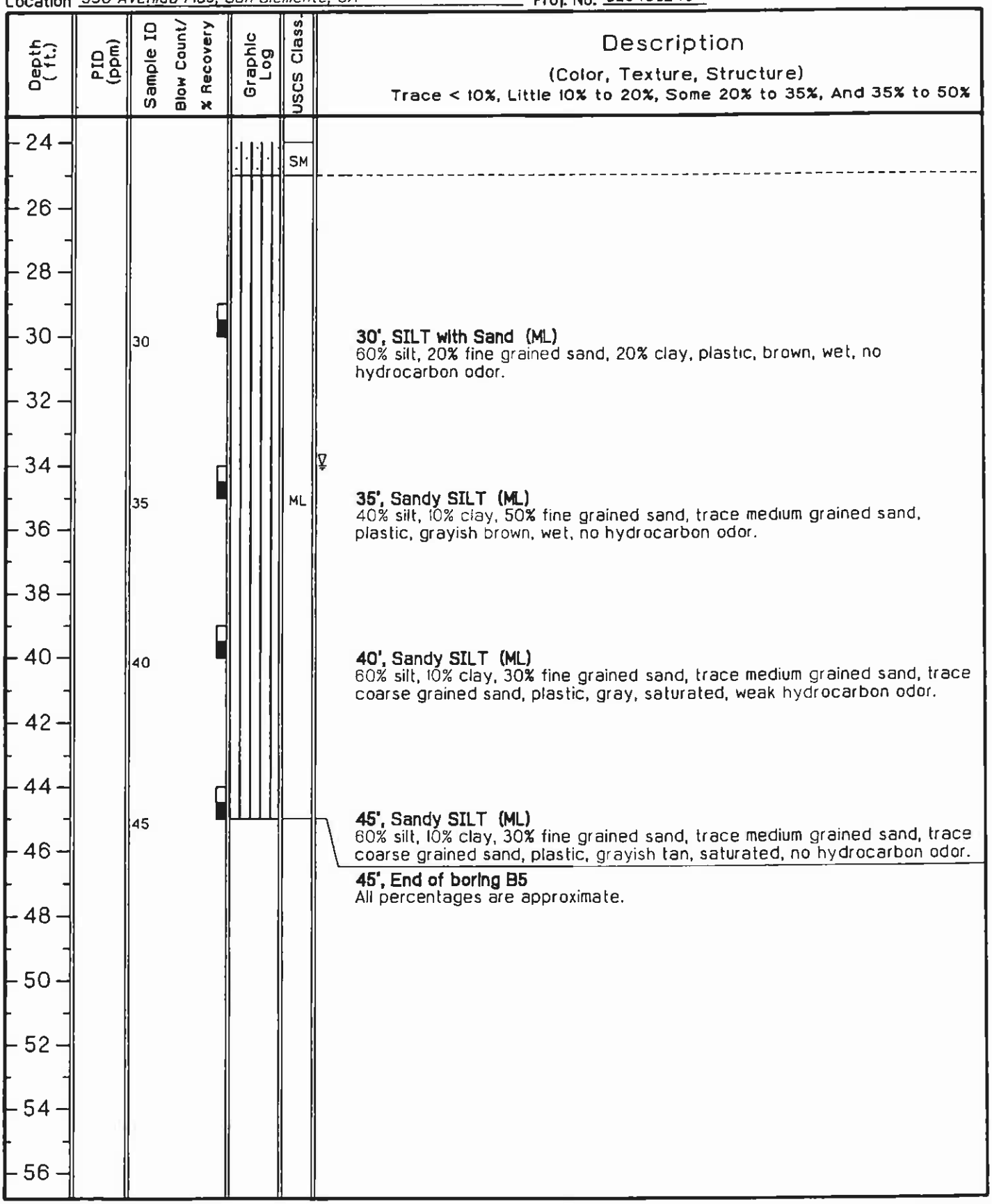
Drilling Log

FLUOR DANIEL GTI

Soil Boring **B5**

Project *TRMI/530 Avenida Pico* Owner *Texaco Refining and Marketing, Inc.*

Location *530 Avenida Pico, San Clemente, CA* Proj. No. *023400240*



Drilling Log

FLUOR DANIEL GTI

Soil Boring B6

Project TRMI/530 Avenida Pico Owner Texaco Refining and Marketing, Inc.
Location 530 Avenida Pico, San Clemente, CA Proj. No. 023400240
Surface Elev. ____ Total Hole Depth 40 ft. Diameter 2 in.
Top of Casing ____ Water Level Initial ____ Static ____
Screen: Dia ____ Length ____ Type/Size ____
Casing: Dia ____ Length ____ Type ____
Fill Material Bentonite Rig/Core Strata Probe
Drill Co. TEG Method Direct Push
Driller Robby Bray Log By Patrick Hamner Date 12/23/96 Permit # 34631
Checked By KYLE RHEUBOTTOM License No. 5100

See Site Map For Boring Location

COMMENTS:

Depth (ft.)	PID (ppm)	Sample ID / Blow Count / % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2					
0		B6-		SP	**10', Poorly Graded SAND (SP)** 50% medium grained sand, 40% fine grained sand, 5% coarse grained sand, 5% silt, subrounded, nonplastic, tan, moist, no hydrocarbon odor.
2					
4					
6					
8					
10		10			
12					
14					
16				SM	**20', Silty SAND (SM)** 60% fine grained sand, 20% medium grained sand, 20% silt, slightly plastic, grayish tan, moist, no hydrocarbon odor.
18					
20		20			
22					
24					

Drilling Log

FLUOR DANIEL GTI

Soil Boring **B6**

Project *TRMI/530 Avenida Pico* Owner *Texaco Refining and Marketing, Inc.*

Location *530 Avenida Pico, San Clemente, CA* Proj. No. *023400240*

Depth (ft.)	PID (ppm)	Sample ID / Blow Count / % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
24					
26					
28				SM	
30		30			**30', Silty SAND (SM)** 60% fine grained sand, 10% medium grained sand, 30% silt, slightly plastic, grayish tan, moist, no hydrocarbon odor.
32					
34					
36		35		ML	**35', Sandy SILT (ML)** 40% silt, 10% clay, 40% fine grained sand, 10% medium grained sand, slightly plastic, grayish brown, wet, no hydrocarbon odor. Interbedded Sandy Silt/Silty Sand.
38					
40		40			**40', SILT with Sand (ML)** 70% silt, 10% clay, 20% fine grained sand, trace medium grained sand, trace coarse grained sand, plastic, brown, saturated, no hydrocarbon odor.
42					**40', End of boring B6** All percentages are approximate.
44					
46					
48					
50					
52					
54					
56					

Permit Fee: 7168.69
Receipt No. 26733
Date: 1/13/97

PERMIT TO CONSTRUCT A WELL

Applicant: Fluor Daniel GTI for Texaco Refining & Marketing
Address: 6450 Lusk Blvd., Ste E208
San Diego, CA 92121
Fax: (619) 453-2688
Authorized Representative: Patrick Hamner or Anthony Kouzen Phone: (619) 453-8441 Ext 239
Description and purpose of proposed well: Three wells to better define the horizontal and vertical extent of hydrocarbons in soil and groundwater at the site. One well is 4-inch PVC for groundwater monitoring only. The other 2 wells will be dual-completed 2-inch PVC for monitoring groundwater and soil vapor. The wells will be backfilled with sand pack, hydrated bentonite and cement in accordance with DWR Bulletins 74-88, 74-91
Location/Legal Description: 530 Avenida Pico, San Clemente, CA

Permittee agrees to save, indemnify and keep harmless the City of San Clemente and its agents, officers, employees and officials against all liabilities, judgments, costs and expenses which may in any manner or form arise in consequent of the issuance of this permit or any work performed in consequence thereof.

Signature of Applicant or Authorized Agent — Date: 1/10/97

==========

PERMIT APPROVAL:

Permit is hereby granted for the construction of the above described well in accordance with Sections 32.53-62 of the Code of the City of San Clemente and State of California standards and procedures. Inspection office to be notified at least 48 hours before work is to start by phoning 498-2535 between 8:00 am and 4:00 pm.

Special Provisions: SHOULD THIS WORK INVOLVE THE PUBLIC RIGHT OF WAY, ANOTHER PERMIT WILL BE REQUIRED FROM ENGINEERING DIVISION

Approved: T. Simon — Date: 1/13/97
City Engineer
City of San Clemente

CITY OF SAN CLEMENTE, CALIFORNIA **CASHIER'S RECEIPT** 26733

Received of FLOUR DANIEL GTI Date 1/13/97

Address 6450 LUSK BLVD STE E208, SAN DIEGO, CA 92121

DESCRIPTION	ACCOUNT NUMBER	AMOUNT
BUSINESS LICENSE NO. _____	001-000-11339	$ _____
WATER DEPOSIT _____	052-000-21511	$ _____
REC. PROGRAM FEES _____	001-000-34720	$ _____
REFUNDABLE DEPOSIT _____	_____	$ _____
REPRODUCTION _____	001-000-34141	$ _____
WELL PERMIT	001-000-34132	$ 168.69
_____	_____	$ _____

PAID JAN 13 1997

JAN 24 1997

ISSUED BY TCS CASHIER _____ TOTAL $ 168.69

Permit Fee: 56.00
Receipt No. 26719
Date: 12/30/96

PERMIT TO CONSTRUCT A WELL

Applicant: Fluor Daniel GTI

Address: 6450 Lusk Blvd. Ste. E208
San Diego, CA 92121

Authorized Representative: Patrick Hammer (619)453-8415, (619)453-2688(fax)

Description and purpose of proposed well: To delineate hydrocarbons in soil. One boring will be advanced using a geoprobe rig. Soil samples will be collected at 10' intervals to 40 feet below grade. Boring will be abandoned with hydrated bentonite in accordance with PWR Bul. 74-88, and 74-91

Location/Legal Description: 530 Avenida Pico, San Clemente, CA

Permittee agrees to save, indemnify and keep harmless the City of San Clemente and its agents, officers, employees and officials against all liabilities, judgments, costs and expenses which may in any manner of form arise in consequent of the issuance of this permit or any work performed in consequence thereof.

Signature of Applicant or Authorized Agent — Date: 12/20/96

==========

PERMIT APPROVAL:

Permit is hereby granted for the construction of the above described well in accordance with Sections 32.53-62 of the Code of the City of San Clemente and State of California standards and procedures. Inspection office to be notified at least 48 hours before work is to start by phoning 498-2533 between 8:00 am and 4:00 pm.

Special Provisions: IF THIS WORK IN ANY WAY INVOLVES THE PUBLIC RIGHT OF WAY AN ENCROACHMENT PERMIT WILL BE REQUIRED.

Approved: TBS FOR — Date: 12/20/96
City Engineer
City of San Clemente

CITY OF SAN CLEMENTE, CALIFORNIA **CASHIER'S RECEIPT** 26719

Received of FLUOR DANIEL G.T.I. Date 12/30/96

Address 6450 Lusk BLVD. STE E208 SD. CA 92121

DESCRIPTION	ACCOUNT NUMBER	AMOUNT
BUSINESS LICENSE NO. _____	001-000-11339	$ _____
WATER DEPOSIT _____	052-000-21511	$ _____ 1996
REC. PROGRAM FEES _____	001-000-34720	$ _____
REFUNDABLE DEPOSIT _____	_____	$ _____
REPRODUCTION _____	001-000-34141	$ _____
WELL/BORING PERMIT	001-000-34531	$ 56.23
_____	_____	$ _____

ISSUED BY J. R. CASHIER _____ TOTAL $ 56.23

Permit Fee: 281.15
Receipt No. 26712
Date: 12/18/96

PERMIT TO CONSTRUCT A WELL

Applicant: Fluor Daniel GTI for Texaco Environmental Services
Address: 6450 Lusk Blvd. Ste. E208
San Diego, CA 92121

Authorized Representative: Patrick Hamner (619) 453-8415 fax (619) 453-2688

Description and purpose of proposed well: Five proposed borings will help define the vertical and horizontal extent of hydrocarbons in soil. Borings will extend to groundwater, approx 40 to 45 feet below grade. Backfill borings with hydrated bentonite grout per DWR bul. 74-88, 74-91

Location/Legal Description: 530 Avenida Pico, San Clemente, CA

Permittee agrees to save, indemnify and keep harmless the City of San Clemente and its agents, officers, employees and officials against all liabilities, judgments, costs and expenses which may in any manner of form arise in consequent of the issuance of this permit or any work performed in consequence thereof.

Signature of Applicant or Authorized Agent — Date: 12/17/96

==========

PERMIT APPROVAL:

Permit is hereby granted for the construction of the above described well in accordance with Sections 32.53-62 of the Code of the City of San Clemente and State of California standards and procedures. Inspection office to be notified at least 48 hours before work is to start by phoning 498-2533 between 8:00 am and 4:00 pm.

Special Provisions: IF WORK ENCROACHES INTO THE PUBLIC RIGHT OF WAY AN ADDITIONAL PERMIT WILL BE NECESSARY

Approved: R Simon for — Date: 12/17/96
City Engineer
City of San Clemente

CITY OF SAN CLEMENTE, CALIFORNIA **CASHIER'S RECEIPT** 26712

Received of FLUOR DANIEL GTI Date 12/18/96

Address 6450 Lusk Blvd Ste 208 San Diego CA 92121

DESCRIPTION	ACCOUNT NUMBER	AMOUNT
BUSINESS LICENSE NO.	001-000-11339	$
WATER DEPOSIT ~~5 1996~~	052-000-21511	$
REC. PROGRAM FEES	001-000-34720	$
REFUNDABLE DEPOSIT		$
REPRODUCTION	001-000-34141	$
Well/Boring Permit (5 Borings)	001-000-34531	$ 281.15
		$

ISSUED BY [signature] CASHIER

TOTAL $ 281.15

FLUOR DANIEL GTI

January 9, 1997

Mr. James Streozer
County of Orange Environmental Health Department
2009 East Edinger Avenue
Santa Ana, CA 92705

Subject: Work Plan for Monitoring Well Installation
Texaco Service Station, 530 Avenida Pico, San Clemente, California
Fluor Daniel GTI Project 023400240

Dear Mr. Streozer:

This letter will serve as a brief work plan discussing proposed well installation at the Pico site. Three monitoring wells will be installed at the locations shown on Figure 1 to better define the vertical and lateral extent of hydrocarbons in soil and groundwater. The presence of shallow liquid-phase hydrocarbons (LPH) in the piping trench near the former northern dispenser island and high total petroleum hydrocarbon (TPH_g) concentrations in soil beneath the former southern dispenser island location may indicate LPH occurrence at the water table in these areas. The dispenser island wells will be dual-completed; the lower well string will be used to evaluate groundwater quality and the upper completion vadose well will be used for potential vapor extraction testing and treatment in the future.

Groundwater at the site was observed at 35 to 45 feet below grade during the Geoprobe investigation. Groundwater flow at the former Chevron site north of Ave Pico has been reported to be in the southwest direction.

The proposed scope of work is summarized as follows:

- Obtain permits from the City of San Clemente for the drilling and installation of three monitoring wells.
- Drill and sample three borings to an anticipated maximum depth of 45 feet in the locations shown on Figure 1. Drilling will be performed using a hollow stem auger with a split-spoon sampler. Soil samples will be collected at approximate 5-foot intervals or less for lithologic evaluation and potential hydrocarbon analyses. One single-string groundwater monitoring well will be installed in the boring along the southwest boundary of the site (downgradient direction) and dual-completed wells will be installed in the two dispenser island borings. The

6450 Lusk Boulevard, Suite E208 / San Diego, CA 92121 USA (619) 453-8415 FAX (619) 453-2688

single string monitoring well will be constructed with approximately 30 feet of PVC blank casing and 15 feet of 0.020-inch slot screen. The annular space will be filled with #3 sand from the borehole bottom to approximately 28 feet below grade, a bentonite slurry from 28 to 3 feet below grade, and cement from 3 feet below grade to paving surface. The well will be fitted with a waterproof roadbox and locking well plug for security.

The dual-completed wells will be constructed as follows:

Lower String - Approximately 30 feet of PVC blank casing and 15 feet of 0.020-inch slot screen. The annular space will be filled with #3 sand from the borehole bottom to approximately 28 feet below grade, a bentonite seal from 25 to 28 feet below grade.

Upper String - Approximately 7 feet of PVC blank casing and 18 feet of 0.020-inch slot screen. The annular space will be filled with #3 sand from 5 feet to 25 feet below grade, a bentonite seal from 3 to 5 feet below grade, and cement from 3 feet below grade to paving surface. The dual-completed well will be fitted with a waterproof roadbox and locking well plug for security.

The well constructions may vary slightly depending on the vertical extent of hydrocarbons observed in the field and depth to groundwater measured during drilling.

- Gauge and collect groundwater samples from the groundwater monitoring wells; wells containing LPH will be gauged for water level and product thickness only.

- Analyze a minimum of three soil samples from each boring for TPH_g and benzene, toluene, ethylbenzene, and xylenes (BTEX) by Modified EPA Methods 8015 and 8020. The sample with the highest TPH_g from each boring will also be analyzed for MTBE by EPA Method 8020. Groundwater samples from each well will also be analyzed for TPH_g, MTBE and BTEX constituents.

- Prepare an assessment report which will include a table of soil analytical data, a hydrocarbons in soil map, and a discussion of the investigation findings. Data from the post-tank removal and the Geoprobe investigations will also be included in the report.

The drilling investigation is scheduled to begin on Tuesday, January 14, 1997. The assessment report will be submitted approximately 8 weeks after field work is completed.

Should you have any questions or comments, please call.

Sincerely,

Fluor Daniel GTI, Inc.
Submitted by:

Anthony D. Konzen
Senior Project Manager
Geologist

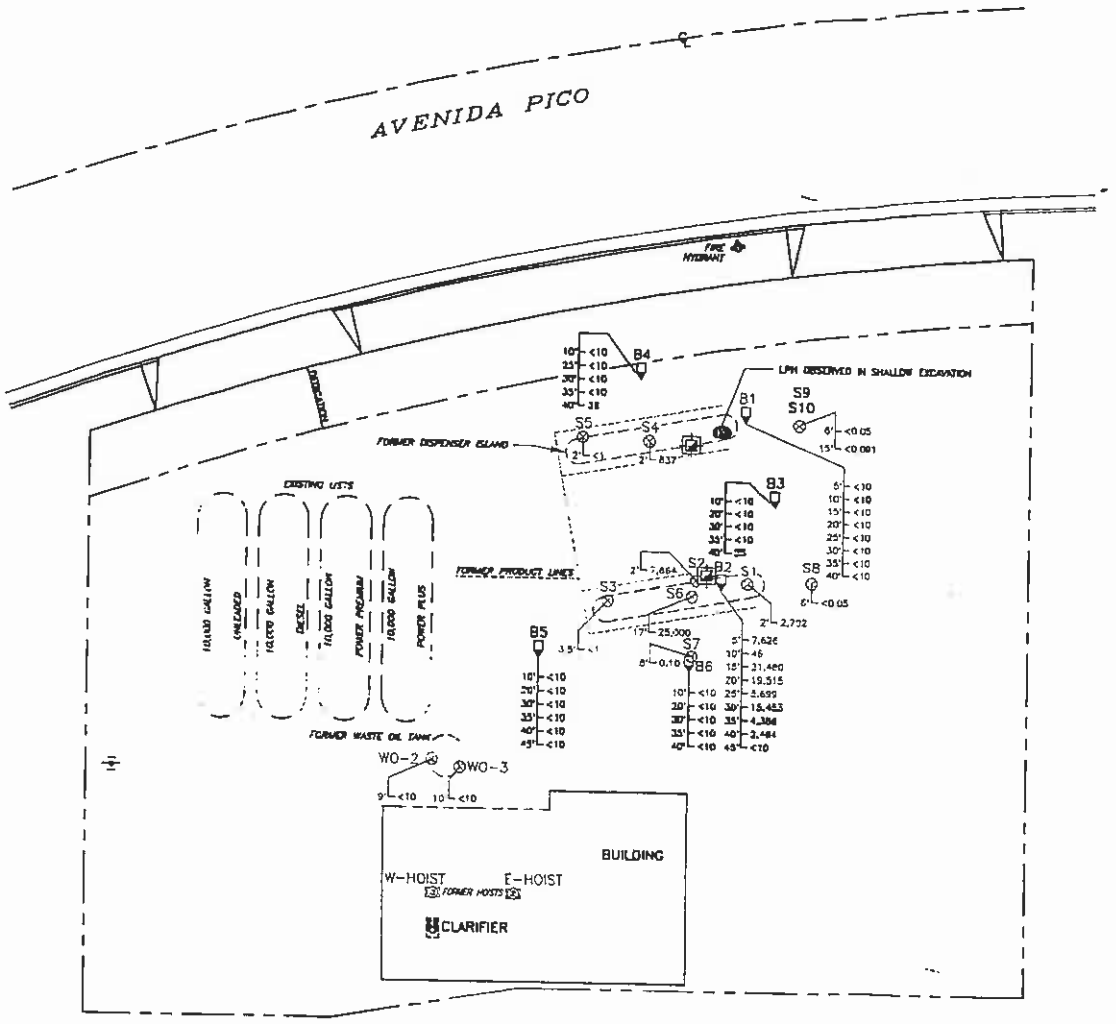
Fluor Daniel GTI, Inc.
Approved by:

Kyle S. Rheubottom, RG
Operations Manager

ADK:kae

Attachment: Figure 1 - Site Plan with Well Locations

c: Mr. Mike Norrell, Texaco
Ms. Feryal Sarrafian, Texaco
ADK
file/chron



PROJECT NORTH

EXPLANATION

- GRAB SAMPLE LOCATION
- GEOPROBE BORING LOCATION
- PROPOSED MONITORING WELL LOCATION
- PROPOSED DUAL-COMPLETION WELL LOCATION
- TPH AS GASOLINE (mg/kg)
- TPH AS GASOLINE DETECTION LIMIT (mg/kg)
- TRPH (mg/kg)
- TRPH DETECTION LIMIT (mg/kg)

NOTES:

1. MAP ADAPTED FROM SITE PLAN, S-1, TRM, 12/04/91, FILE: SANCLM10.DWG.

FLUOR DANIEL GTI

0 FEET 20 SCALE

PROPOSED WELL LOCATIONS

CLIENT: TEXACO REFINING AND MARKETING INC.

LOCATION: 530 AVENIDA PICO SAN CLEMENTE, CA

FILE: 0240PWL (1:240)

PROJECT NO.: 023400240

REV.:

DES.:	DFT.:	DATE:	FIGURE:
ADK	KAE	01/09/97	1

PM: PE/RG:

FLUOR DANIEL GTI

December 18, 1996

Mr. James Streozer
County of Orange Environmental Health Department
2009 East Edinger Avenue
Santa Ana, CA 92705

Subject: Work Plan for Geoprobe Boring Assessment
Texaco Service Station, 530 Avenida Pico, San Clemente, California
Fluor Daniel GTI Project 023400240

Dear Mr. Streozer:

This letter will serve as a brief work plan discussing a proposed geoprobe boring investigation at the Pico site. Because of fuel contaminated soil encountered at approximately 17 feet below grade at the southernmost dispenser island during backhoe exploration on December 13, 1996 (see attached figure) and liquid-phase hydrocarbons (LPH) encountered in the piping trench along the northernmost island during December 9, 1996 product line removal, additional site assessment is proposed. The geoprobe investigation will consist of five borings at the locations shown on the attached figure. Analytical data from the borings will better define the vertical and horizontal extent of hydrocarbons in the aforementioned areas, and will aide in the development of a remedial strategy. Since the service station lot paving has been removed, Texaco is considering limited soil excavation of the areas in question, however, data from the geoprobe investigation will better determine the feasibility of this remedial approach.

The proposed scope of work is summarized as follows:

- Obtain boring permits from the City of San Clemente for drilling and sampling five borings.
- Drill and sample five borings using a geoprobe-type drill rig to an anticipated maximum depth of 40 feet in the locations shown on the attached figure. Soil samples will be collected with a drive point sampler at approximate 5-foot intervals. Total boring depth may vary depending on the vertical extent of hydrocarbons observed in the field. The borings will be backfilled with hydrated bentonite chips or a cement/bentonite grout.

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If mobile laboratory results and field screening with a portable photoionization detector (PID) indicate the presence of gasoline hydrocarbons in soil samples, additional boring(s) may be drilled laterally outward, within property boundaries, in an attempt to fully delineate the horizontal extent of hydrocarbons.

- Collect at least two groundwater samples using the geoprobe. Samples will be collected from the borings closest to the "hot spots" identified during inspection sampling and backhoe assessment. Water sampling will be accomplished by removing groundwater with through a screened opening located at the end of the geoprobe sampler.

- Analyze a minimum of eight soil samples from each boring for total petroleum hydrocarbons as gasoline (TPH_g) and benzene, toluene, ethylbenzene, and xylenes (BTEX) by Modified EPA Methods 8015 and 8020. The sample with the highest TPH_g from each boring will also be analyzed for TPH as diesel (TPH_d). If groundwater samples do not contain LPH, these samples will also be analyzed for TPH_g and BTEX constituents.

- Prepare an assessment report which will include a table of soil analytical data, a hydrocarbons in soil map, and a discussion of the investigation findings.

An application for boring permits has been submitted to the City of San Clemente; the application will be approved on December 18, 1996. The drilling investigation is scheduled to begin on December 19, 1996. The assessment report will be submitted approximately 8 weeks after field work is completed.

Should you have any questions or comments, please call.

Sincerely,

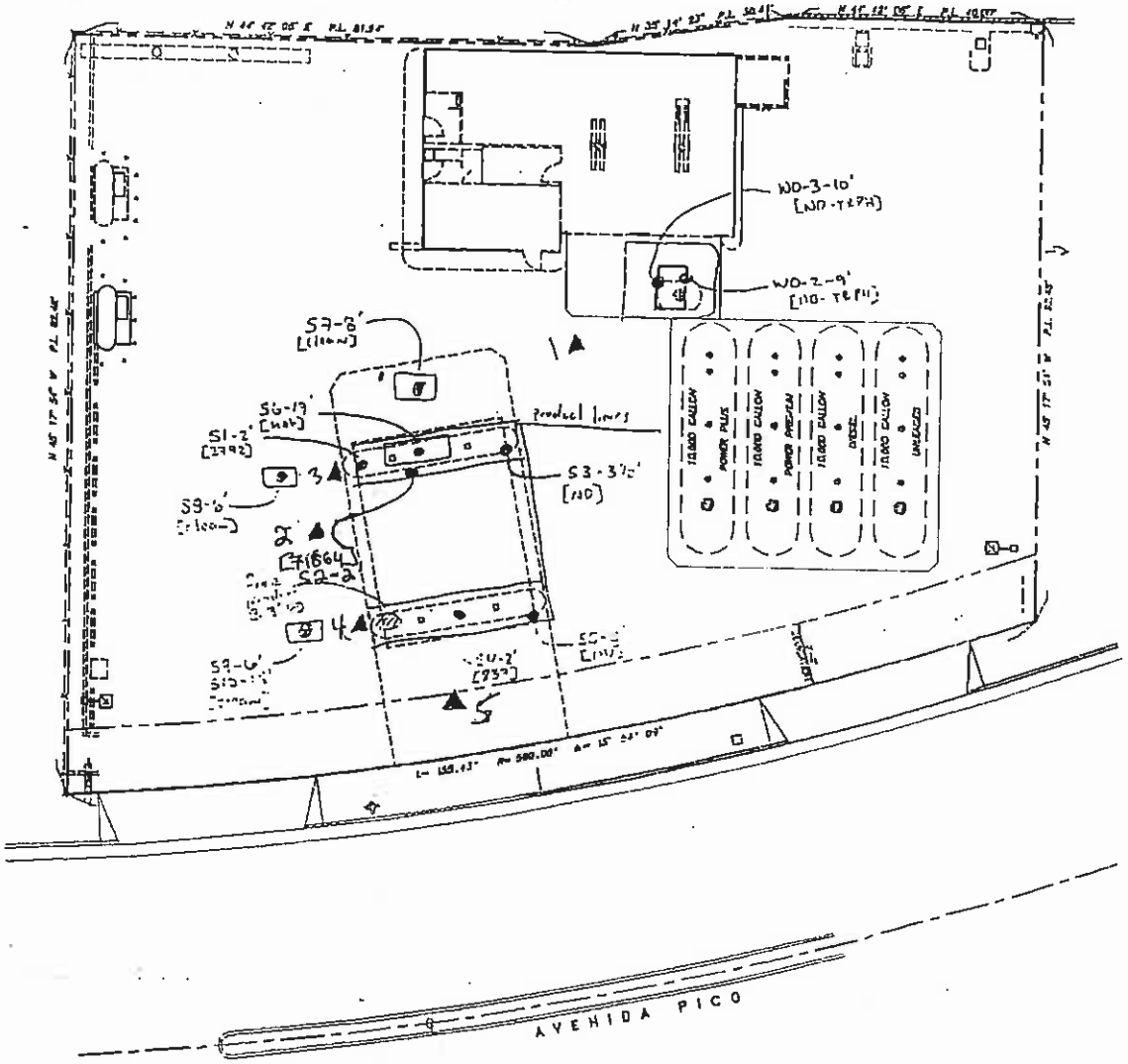
Fluor Daniel GTI, Inc.

Anthony D. Konzen
Senior Project Manager
Geologist

ADK:kae

Attachment: Figure

c: Mr. Mike Norrell, Texaco
Ms. Feryal Sarrafian, Texaco
ADK/file/chron



N

● grab samples

▭ test trenches

[xx] analytical results (mg/kg) at trench elevations

▲ proposed Geoprobe Location

FLUOR DANIEL GTI	0 FEET 30 SCALE	CLIENT: TEXACO ENVIRONMENTAL SERVICES	SITE PLAN
0240SM (1:360)	PROJECT NO.: 023400240	LOCATION: 530 AVENIDA PICO SAN CLEMENTE, CA	PM: / PE/RG: / FIGURE:

FLUOR DANIEL GTI

FAX COVER SHEET

RE: Texaco
530 Ave Pico

TO: James Streozer
COMPANY:
FAX NO.:
FROM: Tony Kruzer
DATE: 12/18/96
NO. OF PAGES (including cover sheet): 4

Here is the workplan for geoprobe work @ the Pico site. The work is scheduled for tomorrow. PLS give Feryal Garratia a verbal on this today. PLS call me if you have questions.

Tks for your help,

Tony K

If you do not receive any of the pages, please call (619) 453-8415
FAX No. (619) 453-2688

6450 Lusk Boulevard, Suite E208 / San Diego, CA 92121 USA (619) 453-8415 FAX (619) 453-2688

Orange County Health Care Agency
Environmental Health Division
Underground Tank Removal Form

Texaco 530 Avenida Pico, San Clemente
Facility Name

PC # 96PC157 TI # _____ LUST # _____ IR # _____

Inspector: J. Shozier Date: 12/19/96 Time: _____

I-5
Cross Street Site Telephone Number

Texaco 10 Universal City, Univ. City, Ca.
Owner Address

Contact Person Telephone Number

Operator *(if different than owner)* Telephone Number

Filson Daniel - GTT Patrick Hamner
Consultant or Contractor Company Contact Person Telephone Number

Tank #1: 550 Fiberglass coated Steel wasted
Size Const. Mat. Mat. Stored

Tank #2: _____
Size Const. Mat. Mat. Stored

Tank #3: _____
Size Const. Mat. Mat. Stored

Tank #4: _____
Size Const. Mat. Mat. Stored

Tank #5: _____
Size Const. Mat. Mat. Stored

Tank #6: _____
Size Const. Mat. Mat. Stored

Depth to Groundwater: _____ Fate of Piping: _____

Proposition 65 Required? _____ Prop. 65 Form Submitted on: _____

Fire Dept. Personnel On-site: Todd Rubottis of OCFA

Ambient Air Readings on Field Instrument: _____

Other Information: _____

FIELD ACTIVITY DESCRIPTION

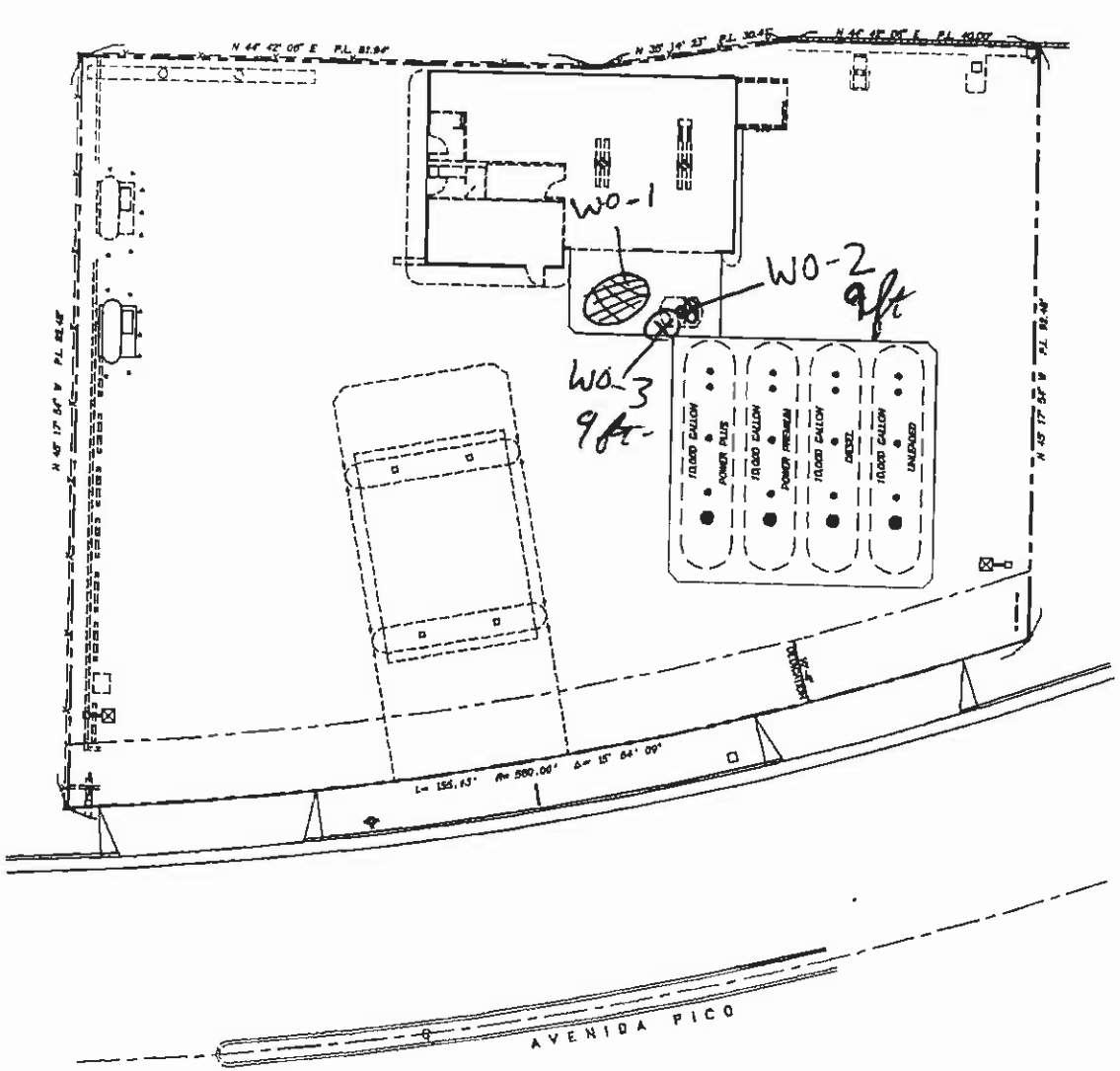
Texaco 530 Avenida Pico, San Clemente
Facility Name

PC # 96PC157 TI # _____ LUST # _____ IR # _____

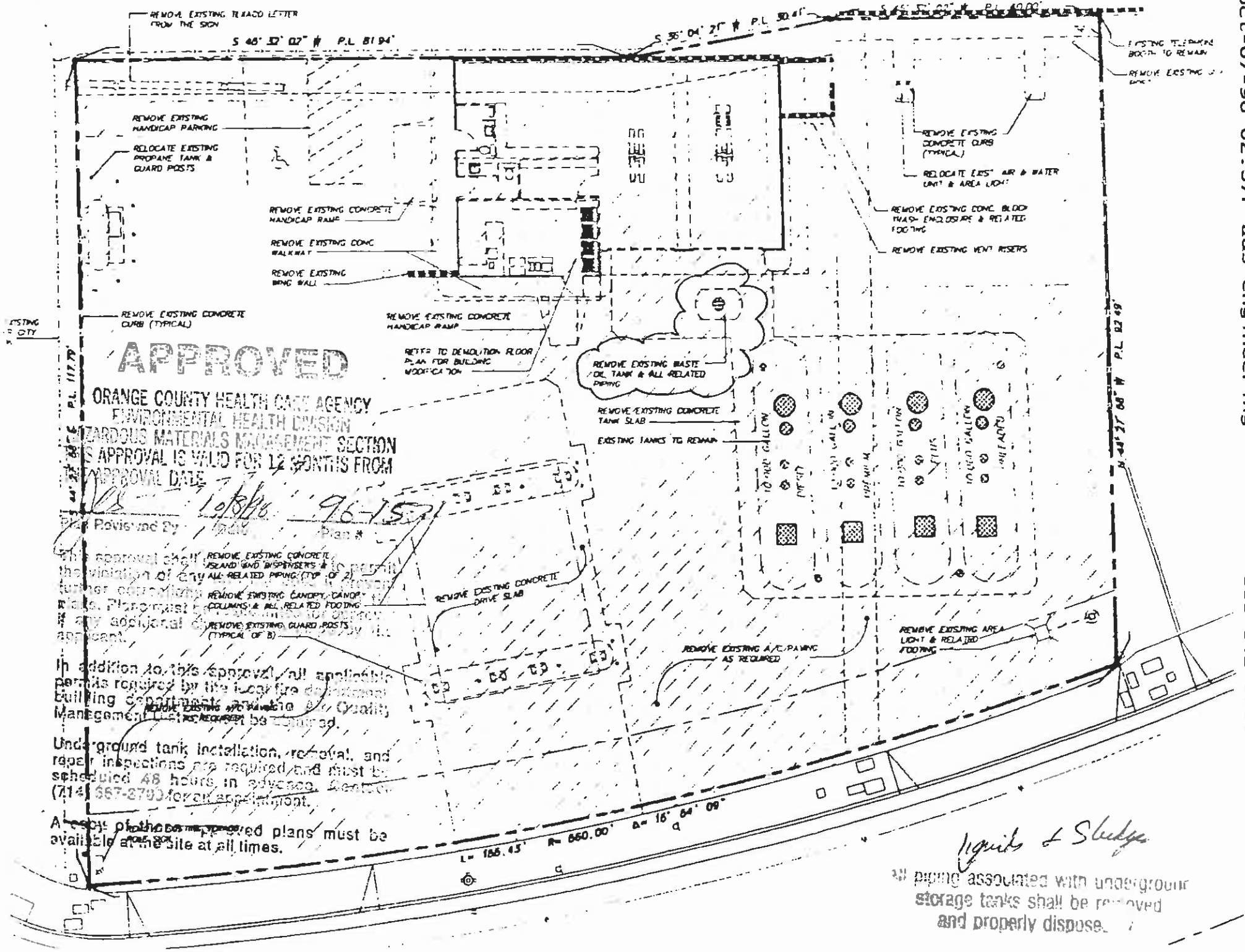
Inspector: J. Stozier Date: 12/16/96 Time: _____

Field Activity: Sampling of Waste Oil TANK:
The day was a very wet rainy day. The soil was saturated with water. No obvious signs of contamination was observed. One sample was collected from the spoils pile and two from the excavation as shown on the plot plan. A mobile lab from Toxic Global Env. was onsite so no chain of custody was used. Patrick Hamm of Fluor Daniel GTI was onsite for the sampling

See attached plot plan.



FLUOR DANIEL GTI	0 FEET 30 SCALE	CLIENT: TEXACO ENVIRONMENTAL SERVICES	SITE PLAN	
0240SM (1:360)	PROJECT NO.: 023400240	LOCATION: 530 AVENIDA PICO SAN CLEMENTE, CA	PM:	PE/RG:
REV.:		DES.: PJWH / DET.: PJW / DATE: 12/06/96		FIGURE: 2


REMOVE EXISTING TEXACO LETTER FROM THE SIGN
S 48° 32' 07" W P.L. 81.94'
S 35° 04' 21" W P.L. 30.41'
EXISTING TELEPHONE BOOTH TO REMAIN
REMOVE EXISTING HANDICAP PARKING
RELOCATE EXISTING PROPANE TANK & GUARD POSTS
REMOVE EXISTING CONCRETE HANDICAP RAMP
REMOVE EXISTING CONC WALKWAY
REMOVE EXISTING WING WALL
REMOVE EXISTING CONCRETE CURB (TYPICAL)
REMOVE EXISTING CONCRETE HANDICAP RAMP
REFER TO DEMOLITION FLOOR PLAN FOR BUILDING MODIFICATION
REMOVE EXISTING CONCRETE CURB (TYPICAL)
RELOCATE EXIST. AIR & WATER UNIT & AREA LIGHT
REMOVE EXISTING CONC. BLOCK TRASH ENCLOSURE & RELATED FOOTING
REMOVE EXISTING VENT RISERS
REMOVE EXISTING WASTE OIL TANK & ALL RELATED PIPING
REMOVE EXISTING CONCRETE TANK SLAB
EXISTING TANKS TO REMAIN
10,000 GALLON (TYP.)
REMOVE EXISTING CONCRETE ISLAND AND DISPENSERS & ALL RELATED PIPING (TYP. OF 2)
REMOVE EXISTING CANOPY, CANOPY COLUMNS & ALL RELATED FOOTING
REMOVE EXISTING GUARD POSTS (TYPICAL OF 8)
REMOVE EXISTING CONCRETE DRIVE SLAB
REMOVE EXISTING A/C PAVING AS REQUIRED
REMOVE EXISTING AREA LIGHT & RELATED FOOTING
L= 186.45' R= 660.00' Δ= 16° 04' 09"
APPROVED
ORANGE COUNTY HEALTH CARE AGENCY
ENVIRONMENTAL HEALTH DIVISION
HAZARDOUS MATERIALS MANAGEMENT SECTION
THIS APPROVAL IS VALID FOR 12 MONTHS FROM
APPROVAL DATE
10/8/96
96-15
Plan Reviewed By
Plan #
this approval shall
the violation of any
further corrective
plans. Plan must
any additional
applicant.
In addition to this approval, all applicable
permits required by the local fire department,
building department, and the Air Quality
Management District must be obtained.
Underground tank installation, removal, and
repair inspections are required and must be
scheduled 48 hours in advance. Contact
(714) 567-6790 for an appointment.
A copy of the approved plans must be
available at the site at all times.
liquids & Sludges
All piping associated with underground
storage tanks shall be removed
and properly disposed

FLUOR DANIEL GTI

December 6, 1996

Mr. James Streozer
County of Orange Environmental Health Department
2009 East Edinger Avenue
Santa Ana, CA 92705

Subject: Work Plan for Assessment and Soil Excavation Related to Waste-Oil Tank and Product Piping Removal
Texaco Service Station, 530 Avenida Plco, San Clemente, California
Fluor Daniel GTI Project 023400240

Dear Mr. Streozer:

Fluor Daniel GTI, Inc. (Fluor Daniel GTI) is submitting this work plan to address additional assessment and/or excavation once the waste-oil tank and product lines are removed at the Texaco Service Station, 530 Avenida Pico, San Clemente, California (Figure 1). As you know, the existing underground waste-oil tank will be decommissioned and the product line piping at the site will be removed and replaced. The fuel dispensing system up-grade is part of a comprehensive remodeling project that Texaco plans to undertake beginning the month of December 1996.

To date, there has been no site assessment work performed at this location. Because the site has been operational since the 1930's, waste-oil and/or fuel contaminated soil may be encountered during this phase of work. Fluor Daniel GTI, Inc. proposes to conduct a limited subsurface assessment as dictated by field observations in the areas of the waste-oil tank and dispenser island.

The following scope of work is proposed in association with waste-oil tank and product line removal:

- Perform soil screening during overburden and backfill removal from the waste-oil tank pit and from the product line trenching as per SCAQMD 1166 protocol. Using a portable photoionization detector (PID), soil will be segregated into clean and hydrocarbon impacted stockpiles for characterization and disposal.

- After removal of the waste-oil tank and the product lines, soil samples will be collected beneath the tank and within the product line trenches in accordance with Orange County tank closure permit requirements. Additional samples will be collected at the direction of Orange County Department of Health Personnel or at the discretion of Fluor Daniel GTI personnel.

6450 Lusk Boulevard, Suite E208 / San Diego, CA 92121 USA (619) 453-8415 FAX (619) 453-2688

- Perform soil screening with a PID and mobile laboratory during excavation in the dispenser island areas and in the waste-oil tank excavation. The soil will be stockpiled into clean and hydrocarbon impacted stockpiles for characterization and disposal purposes. The limited excavation and soil sampling in these areas is proposed to better define the vertical and lateral extent of hydrocarbons in soil and to remove the readily accessible source material in the dispenser island and waste-oil tank areas (if needed). Because there is no assessment data from the site, it is not possible to accurately estimate the volume of soil generated during backhoe assessment and limited soil removal activities.

- All soil samples collected during backhoe assessment will be analyzed for total petroleum hydrocarbons as gasoline (TPH_g), and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using the California DHS method and EPA Method 8020. Soil samples from the vicinity of the waste-oil tank will be analyzed for total recoverable petroleum hydrocarbons using EPA method 418.1. Soil samples will be analyzed by a California State certified mobile or stationary laboratory.

- Clean stockpiled soil will be covered with visqueen and characterized by additional soil sampling and analysis, as needed. Contaminated soil will be temporarily stockpiled, covered with visqueen, and loaded for hauling and disposal within 72 hours after removal. All excavated soil will remain on-site within a secured area until loaded onto trucks and transported to an appropriate treatment or disposal facility.

- During soil excavation and subsequent loading for disposal, ambient vapor monitoring will be performed and vapor abatement measures will be implemented, as needed, to reduce volatile organic vapor emissions and prevent public nuisance. Vapor abatement measures will include application of water or a water and Simple Green solution and covering the soil with visqueen.

Product line and tank uncovering, and waste-oil tank removal will begin on December 9, 1996. Any additional assessment and excavation with the backhoe is expected to occur on December 10 and 11, 1996. Should you have any questions or comments, please call.

Sincerely,

Fluor Daniel GTI, Inc.
Submitted by:

Fred Essig
Staff Geologist

Fluor Daniel GTI, Inc.
Approved by:

Anthony D. Konzen
Senior Project Manager

ADK:kae

Attachment: Figure 1

c: Mr. Mike Norrell, Texaco
Ms. Feryal Sarrafian, Texaco
ADK/file/chron

COUNTY OF ORANGE
HEALTH CARE AGENCY

PUBLIC HEALTH
DIVISION OF ENVIRONMENTAL HEALTH

TOM URAM
DIRECTOR

HUGH F. STALLWORTH, M.D.
HEALTH OFFICER

ROBERT E. MERRYMAN, REHS, MPH
DEPUTY DIRECTOR

MAILING ADDRESS:
2009 EAST EDINGER AVENUE
SANTA ANA, CA 92705-4720

TELEPHONE: (714) 667-3600
FAX: (714) 972-0749

January 23, 1997

Feryal Sarrafian
Texaco Refining and Marketing
10 Universal City, 10th Floor
Universal City, CA 91708-7812

Subject: Workplans For Initial Soil And Groundwater Investigations

Re: Texaco Station
530 Avenida Pico
San Clemente, CA
O.C.H.C.A. Case #96UT48

JAN [illegible]97

Dear Ms. Sarrafian:

This Agency has reviewed the December 18, 1996, Workplan for Geoprobe Boring Assessment and the January 9, 1997, Workplan for Monitoring Well Installation prepared by Fluor Daniel GTI. Due to Texaco's desire to proceed rapidly with site assessment, the proposals were reviewed and approved verbally by this Agency during several telephone conversations in December and January with the provision that the following conditions would be addressed:

1. The soil samples from the Geoprobe assessment would be analyzed for MTBE in addition to the other hydrocarbon constituents.

2. The monitoring well screens must not exceed ten feet into the saturated zone. The well screens above the saturated zone may be any length needed.

3. Further assessment may be required depending on the results of the work.

Please call me if you have any questions at (714) 667-3711.

Sincerely,

James C. Strozier, REHS
Hazardous Waste Specialist
Hazardous Materials Management Section
Environmental Health

JCS
cc: Anthony Konzen, Fluor Daniel GTI, Inc.

SOIL SAMPLING
QUALITY ASSURANCE AND QUALITY CONTROL FOR SPLIT-SPOON, HAND AUGER, AND GRAB SAMPLES

Soil samples were collected using one of the following methods:

1. By hand using a steel hand auger
2. By hand with a trowel from a backhoe bucket
3. Mechanically using a steel split-spoon sampler

To prevent cross-contamination between samples, the sampling device (hand auger, trowel, or split-spoon sampler) was washed prior to each sampling using the "three-bucket" system. This system involves:

1. Washing the device with a non-toxic, non-phosphate detergent and water solution
2. Rinsing the device with tap water
3. Rinsing the device with distilled water

To maintain the integrity of each soil sample, the following procedures were performed following sample collection. Samples were:

1. Collected in pre-washed, 6-inch, brass or steel sample rings or new glass sample jars
2. Sealed with Teflon™ sheeting or with lids with Teflon™ seals
3. Wrapped with tape
4. Properly labeled and logged in to a chain-of-custody form
5. Placed in a cooler and chilled on ice
6. Delivered the same day or overnight via courier or air mail to a State-certified laboratory

All samples were refrigerated and stored at the laboratory for 30 days in case additional analysis was needed.

GROUNDWATER MONITORING, PURGING AND SAMPLING TECHNIQUES
QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

MONITORING

Liquid levels were measured in all wells with an ORS Interface Probe™, capable of measuring depth to liquid-phase hydrocarbons and depth to water to within 0.01 feet. Depth measurements were referenced to a survey mark located on the top-of-casing of each well. Liquid from each well was visually inspected for the presence of liquid-phase hydrocarbons using an acrylic bailer.

PURGING

A hand-bailer was used to purge groundwater from each well using the San Diego County *Site Assessment and Mitigation (SA/M)* manual guidelines, wells to be sampled were classified as slow or fast recharging. A well is considered fast recharging if the water level returns to at least 80% of static within two hours after purging. Slow recharging wells are those that do not recover to 80% of static in two hours.

Two options are acceptable for purging a fast recharging well. Option 1 requires the removal of three borehole volumes of water and recovery to 80 percent of static prior to sampling. Borehole volumes are calculated using the formula found in the *SA/M* manual. Option 2 requires the removal of one borehole volume of water. Conductivity, pH, temperature, and visual turbidity are then recorded. An additional one-half volume is removed and water quality readings are again recorded. If the two sets of water quality readings vary by less than 10 percent, the well is allowed to recharge to 80 percent of its initial static level and is then sampled. If this condition is not met, purging continues, taking one-half volume at a time until readings stabilize, or until three borehole volumes have been removed. For slow recharging wells, one borehole volume is removed and the water is allowed to recharge for 2 hours. The well is then sampled regardless of the elevation of groundwater.

SAMPLING

A disposable polyethylene bailer was used to collect groundwater samples which were poured into appropriate, pre-cleaned containers. As required, each sample was preserved by the appropriate method. The vials were sealed using a lid with a Teflon™ septum, labeled, and placed on ice in an ice chest and delivered (same day or overnight) to a State-certified laboratory. A chain of custody, which accompanied the samples to the laboratory, was filled out as each sample was collected. Samples were only collected from wells with no observable liquid-phase hydrocarbons. All water samples were refrigerated and stored at the laboratory for 30 days in case subsequent analyses were needed.

DECONTAMINATION PROCEDURES

The Interface probe and hand-bailers were cleaned using the three bucket wash system: bailers were washed with Simple-Green™ solution and double rinsed with distilled water. Decontamination of the sampling bailer was not necessary since a new disposable polyethylene bailer was used to collect groundwater samples for each well.

COUNTY OF ORANGE
HEALTH CARE AGENCY

TOM URAM
DIRECTOR

L. REX EHLING, M.D.
HEALTH OFFICER

1725 WEST 17TH STREET
SANTA ANA, CA 92706

TELEPHONE: 714/834-7601

MAILING ADDRESS: P.O. BOX 355
SANTA ANA, CA 92702

SW.

PUBLIC HEALTH
ENVIRONMENTAL HEALTH

APPLICATION FOR: (Check One)

[ ] PERMIT TO OPERATE/INSTALLATION (COMPLETE PAGE 1 & 2)

[ ] FACILITY MODIFICATION (COMPLETE PAGE 1)

DATE: 6/28

FACILITY INFORMATION

NAME: TEXACO

STREET ADDRESS: 530 AVENIDA RICO

CITY: SAN CLEMENTE

TOTAL NUMBER OF TANKS (AFTER INSTALLATION/REMOVAL) AT THIS LOCATION: 5

TYPE OF BUSINESS:

✓ GASOLINE STATION ____ FARM

____ GOVERNMENT ____ OTHER

TYPE OF CONSTRUCTION

INDICATE NO. OF TANK(S):

____ INSTALLATION(S) (COMPLETE PAGE 2)

____ REPAIR(S)/RELINE(S)

____ CLOSURE(S)/REMOVAL(S)

1 SYSTEM MODIFICATION (E.G., REPIPE)

X OTHER (SPECIFY) ALTER PIPING ON ISLANDS

TANK OWNER

NAME (CORP., INDIVIDUAL, PUBLIC AGENCY)

TEXACO

STREET ADDRESS: 10 UNIVERSAL CITY PLAZA

CITY: LOS ANGELES

STATE: CA ZIP: 91608

TELEPHONE NO.: 818-505-2000

24 HOUR EMERGENCY CONTACT PERSON

DAYS: JOE TAN (NAME) 818-505-2478 (TELEPHONE)

NIGHTS: JOE TAN (NAME) 818-505-2478 (TELEPHONE)

BILLING ADDRESS INFORMATION

BILL TO NAME: TEXACO

BILL TO ADDRESS: 10 UNIVERSAL CITY PLAZA

CITY: LOS ANGELES

STATE: CA ZIP: 91608

TELEPHONE NO.: 818-505-2000

APPLICANT

NAME: Bob Rydell (PLEASE PRINT)

SIGNATURE: Bob Rydell

COMPANY NAME: W.W. ERWIN, INC

TELEPHONE: 213-426-3338

FACILITY OPERATOR (CONTACT PERSON)

NAME: ____

BUSINESS TELEPHONE NO.: ____

NOTE: NEW INSTALLATIONS, CLOSURES, REPAIRS AND SYSTEM MODIFICATIONS OF UNDERGROUND STORAGE TANKS REQUIRE THE SUBMITTAL OF (4) SETS OF PLANS TO THIS DIVISION. THESE PLANS MUST BE APPROVED PRIOR TO THE INITIATION OF ANY CONSTRUCTION OR MODIFICATION.

OFFICE USE ONLY

FACILITY PERMIT NO.: ____ PLAN APPROVAL DATE: ____ BY: ____ NO.: ____

PLAN CHECK NO.: 88-404 FEES: $ 130.00 FINAL FIELD INSPECTION DATE: ____

NUMBER OF TANKS TO BE ADDED TO BILLING: ____ NUMBER OF TANKS TO RECEIVE A SURCHARGE BILL: ____

REV: 03/04/88

CK# 1131 HSCK# 79304 (AD)

APPROVED

ORANGE COUNTY HEALTH CARE AGENCY
ENVIRONMENTAL HEALTH
WASTE MANAGEMENT SECTION

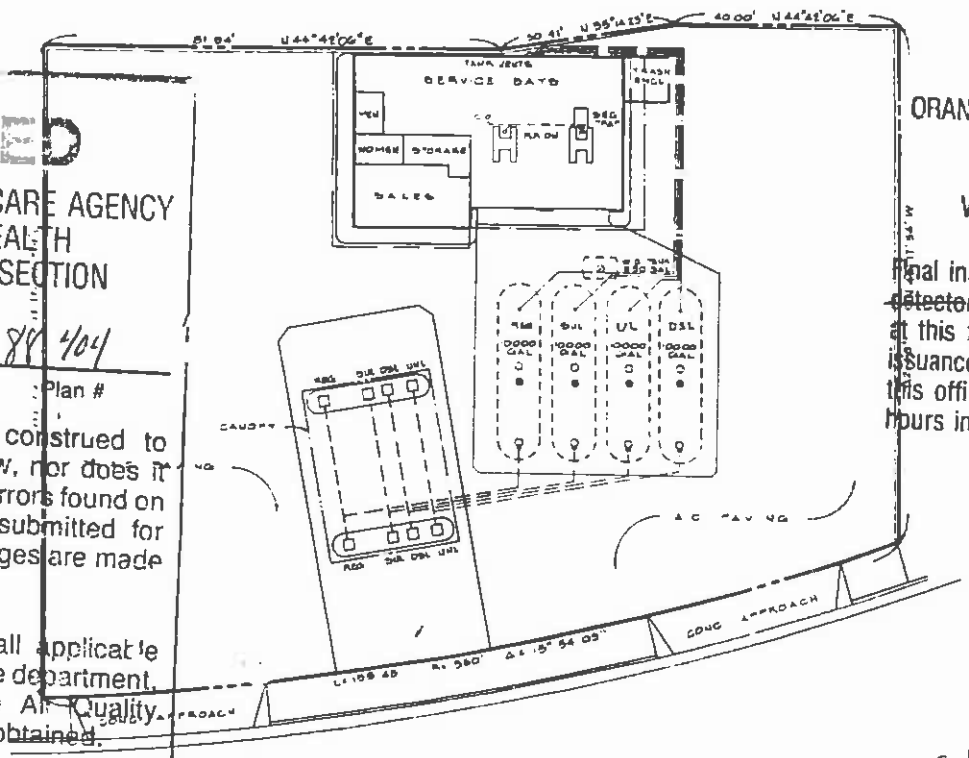
Plan Reviewed By | Date | Plan #

This approval shall not be construed to permit the violation of any law, nor does it prevent further corrections of errors found on the plans. Plans must be resubmitted for approval if any additional changes are made by the applicant.

In addition to this approval, all applicable permits required by the local fire department, building department, and the Air Quality Management District must be obtained.

Underground tank installation, removal, and repair inspections are required and must be scheduled 48 hours in advance. Telephone (714) 834-8175.

A copy of these approved plans must be



NOTICE

ORANGE COUNTY HEALTH CARE AGENCY
ENVIRONMENTAL HEALTH
WASTE MANAGEMENT SECTION

Final inspection of the ~~continuous leak detector~~ piping system for the underground tank at this facility is required prior to the issuance of a Permit to Operate. Contact this office to schedule an inspection 48 hours in advance. Telephone (714) 834-8175.

DESCRIPTION OF PROJECT

TYPE 76 2-BAY
W/ 28'-ACMES CANOPY

REVISED

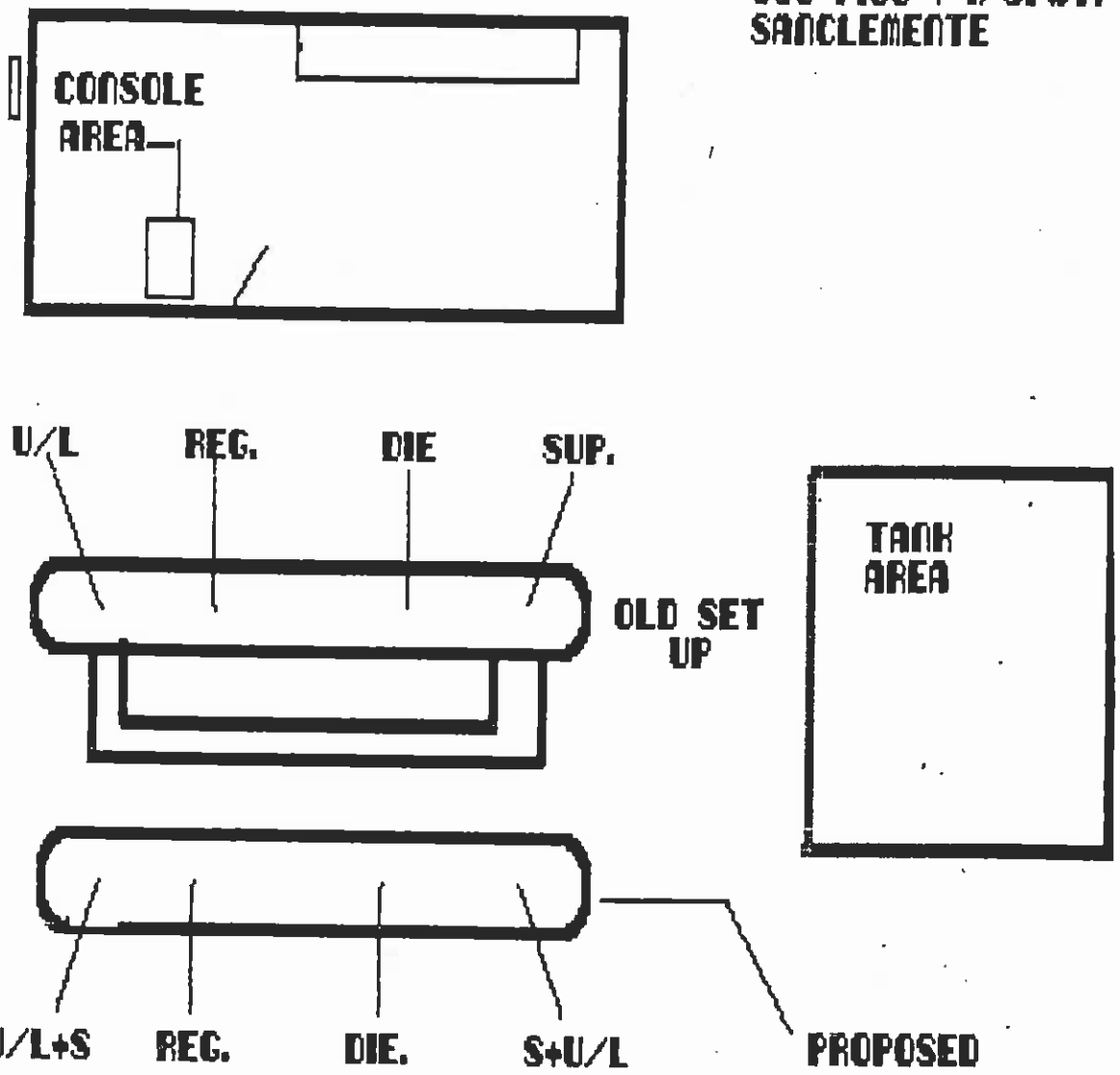
REDRAWN

TEXACO USA

GENERAL ARRANGEMENT
930 AVENIDA PICO INTERSTATE 5
SAN CLEMENTE, CALIFORNIA

DP. 7842

TEXACO
530 PICO + I/5FWY.
SANCLEMENTE



SCOPE OF WORK
ALTER PROUDUCT PIPING TO ACCOMMODATE NEW TOKHEIM ELEC.DISP.
APPROX. 10' OF PIPING. EXTEND END'S OF ISLAND APPROX.3 TO 3.5'
INSTALL NEW DISP. ALL THE TO END'S OF ISLAND'S
INSTALL 2 6" BUMPER POLES ON EACH END OF ISLAND
REMOVE UNDERGROUND A/W REELS .
SUPPLY 1 CABINET FOR SALES ROOM 5' X42" X36"
CHANGE ELEC. IN SALES ROOM FOR A M S .
ALSO WANTS SEPERATE PRICE TO INSTALL ABOVE GROUND A/W
NEXT TO VACUME

KLEINFELDER
Bright People. Right Solutions.

REVISED
LIMITED ASBESTOS SURVEY REPORT
INTERSTATE 5 BRIDGE STRUCTURES
INTERSTATE 5 HIGH OCCUPANCY VEHICLE LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA
12-ORA-5-PM-3.0/8.7

REVISED
LIMITED ASBESTOS SURVEY REPORT
INTERSTATE 5 BRIDGE STRUCTURES
INTERSTATE 5 HIGH OCCUPANCY VEHICLE LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA
12-ORA-5-PM-3.0/8.7
CALTRANS EA NO. 0F9600

July 20, 2011

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Only the client or its designated representatives may use this document and only for the specific project for which this report was prepared.

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A Report Prepared for:

Transystems/RMC, Inc.
6 Hutton Center Drive, Suite 1250
Santa Ana, California 92707

REVISED LIMITED ASBESTOS SURVEY REPORT
INTERSTATE 5 BRIDGE STRUCTURES
INTERSTATE 5 HIGH OCCUPANCY VEHICLE LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA
12-ORA-5-PM-3.0/8.7
CALTRANS EA NO. 0F9600

Kleinfelder Project No. 105751

Prepared by:

Richard H. Stevenson
Certified Asbestos Consultant No. 06-3992

Reviewed by:

Don D'Amico
Certified Asbestos Consultant No.96-2014

KLEINFELDER WEST, INC.
2 Ada, Suite 250
Irvine, California 92618
(949) 727-4466

July 20, 2011

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1 INTRODUCTION AND SITE DESCRIPTION

1.1 INTRODUCTION

This report presents the results of a limited asbestos survey conducted on April 27, 2011 at five bridge structures located along Interstate 5 (I-5) in Orange County, California (site, Plate 1). The purpose of the surveys was to evaluate the locations, conditions, and quantities of potentially hazardous asbestos-containing materials (ACM) that may present a worker safety hazard and/or might require special handling and waste disposal as part of the Orange County Transportation Authority's (OCTA) I-5 High Occupancy Vehicle (HOV) Lane Extension Project. The limited asbestos survey was performed consistent with the scope of work outlined in Kleinfelder's "Revised Workplan to Conduct Asbestos Surveys at Five Bridge Structures", dated October 21, 2010. The survey is considered "limited" because only areas accessible by foot were included in the survey.

This report supersedes Kleinfelder's previous survey report dated June 10, 2011 and addresses comments to the report provided in the July 6, 2011 email from Mr. Wayne Chiou with California Department of Transportation (Caltrans) District 12. Kleinfelder's Response to Comments matrix is presented in Appendix D.

1.2 SITE DESCRIPTIONS

The limited asbestos survey was conducted at the following five locations along I-5 in Orange County, California.

- Avenida Pico Undercrossing (UC), Bridge Number (No.) 55-0207;
- Avenida Vaquero UC, Bridge No. 55-0223;
- North I-5/North Highway 1 Connector Separation, Bridge No. 55-0226;
- I-5/Highway 1 Separation, Bridge No. 55-0510; and
- Camino Capistrano UC, Bridge No. 55-0227.

1.3 PHYSICAL LIMITATIONS

The survey only included areas accessible by foot at each of the five bridge structures, and no sampling was conducted which could compromise the integrity of the bridge structures. Therefore, the possibility exists that additional ACM may be encountered in

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inaccessible areas (e.g. between bridge abutments) of the bridge structures during construction activities associated with the I-5 HOV Lane Extension Project.

In the future, suspect materials encountered at these bridge structures during future construction activities associated with the I-5 HOV Lane Extension Project, which have not been assessed as part of this survey, should either be assumed to be hazardous ACM and handled accordingly, or may be sampled and analyzed to assess whether they are hazardous.

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2 ASBESTOS SURVEY

2.1 ASBESTOS SURVEY METHODS

Kleinfelder personnel conducted a visual survey of each of the five bridge structures at the site. Based on observations made during the visual surveys, representative bulk samples of suspect ACM were collected from four of the five bridge structures. Inaccessible suspect ACM were observed at Camino Capistrano UC; therefore, no samples were collected from this bridge structure by Kleinfelder's inspector, and observed suspect materials were assumed to be ACM.

Mr. Richard Stevenson, a California Division of Occupational Safety and Health (DOSH, also known as Cal-OSHA) Certified Asbestos Consultant (CAC) No. 06-3992 performed the survey. The surveys were completed consistent with federal Asbestos Hazard Emergency Response Act (AHERA) methods (40 Code of Federal Regulations [CFR] Part 763) as a guideline. Bulk samples were collected using various hand tools (e.g. utility knives, chisels, or pliers). Destructive inspection and sampling methods were not used, since the bridges are still in use.

The building material samples collected during the survey were delivered to Forensic Analytical Laboratory in Rancho Dominguez, California, a U.S. Environmental Protection Agency (US EPA) and California State certified laboratory and National Voluntary Laboratory Accreditation Program participant for analysis by Polarized Light Microscopy (PLM).

A summary of building material samples collected, sample locations, asbestos content, condition, friability, and area estimates are summarized in Table 1. Sample location maps, indicating the locations of building material samples collected, are provided as Plates 2 through 5. Photographs of the bridge structures and representative sample locations are presented in Appendix A. Copies of the analytical laboratory report and chain-of-custody forms are included in Appendix B.

2.2 ASBESTOS SURVEY RESULTS

Eleven bulk samples of suspect ACM were collected from four of the five bridge structures on April 27, 2011. Suspect ACMs assessed and sampled were observed to be substantially intact at the time of inspections.

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Based on site observations and review of laboratory analysis reports, the following building materials at the site were confirmed or assumed to have an asbestos content greater than 1 percent, and are classified as ACM.

2.2.1 North I-5/North Highway 1 Connector Separation, Bridge No. 55-0226

- Grey rectangular shims located beneath various metal guard rail posts on the northbound and southbound sides of the connector separation (Samples N1C-3 and N1C-4) contain 45 to 60 percent chrysotile asbestos. These materials were observed to be in good condition. Approximately 20 shims were observed, and are estimated to encompass approximately 20 square feet (1 square foot per shim). These materials are classified as Category I non-friable ACM.

2.2.2 I-5/Highway 1 Separation, Bridge No. 55-0510

- Grey rectangular shims located beneath various metal guard rail posts on the northbound and southbound sides of the undercrossing were observed, but were inaccessible for sampling. These materials were observed to be in good condition and are assumed to be ACM. Approximately 15 shims were observed, and are estimated to encompass approximately 15 square feet (1 square foot per shim). These materials are classified as Category I non-friable ACM.

2.2.3 Camino Capistrano Undercrossing, Bridge No. 55-0227

- Grey rectangular shims located beneath various metal guard rail posts on the northbound and southbound sides of the undercrossing were observed, but were inaccessible for sampling. These materials were observed to be in good condition and are assumed to be ACM. Approximately 10 shims were observed, and are estimated to encompass approximately 10 square feet (1 square foot per shim). These materials are classified as Category I non-friable ACM.

Asbestos was not detected by the laboratory in other building material samples collected by Kleinfelder. Table 2 provides a summary of these building materials that were confirmed or assumed to contain asbestos. Table 3, prepared in response to comments by Mr. Wayne Chiou with Caltrans District 12, provides a summary of suspect ACM that could not be sampled due to accessibility, but may be encountered during planned construction activities. The materials noted in this table were based on a review of available as-built drawings for each bridge structure. It should be noted that

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the materials listed in Table 3 are not all inclusive with respect to suspect ACM that may be encountered during planned construction activities.

2.3 REGULATORY OVERVIEW FOR ASBESTOS

Regulatory oversight for the management, removal, and disposal of ACMs is provided by a variety of Federal, State, and local agencies.

The three primary regulations that govern various activities (e.g., inspection, assessment, abatement, etc.) relating to ACMs include the following: AHERA, National Emission Standard for Hazardous Air Pollutants (NESHAP), and the Asbestos Standard for the Construction Industry (as codified in Federal OSHA and Cal-OSHA regulations). US EPA regulations concerning the identification, handling, management, and abatement of ACMs (as found in the AHERA and NESHAP) are implemented locally by the South Coast Air Quality Management District (SCAQMD). Both Cal-OSHA and Federal OSHA regulate asbestos as a worker health and safety issue. In addition, the transportation and disposal of asbestos-containing wastes are overseen by the California EPA Department of Toxic Substance Control (DTSC). The Federal OSHA, EPA, DTSC, and SCAQMD define ACM as materials containing greater than one-percent asbestos.

The following is a brief description of the three major regulations relating to ACMs.

2.3.1 Asbestos Hazard Emergency Response Act (AHERA)

AHERA (40 CFR part 763), as implemented by the EPA, primarily pertains to the assessment and management of ACMs in Kindergarten (K) through 12, non-profit schools. However, many of the procedures, training requirements, and certifications defined by AHERA have become the industry standard for other facilities. For this survey, AHERA protocols were generally utilized in the observation, assessment, and sampling of suspect ACM.

2.3.2 National Emission Standard for Hazardous Air Pollutants (NESHAP)

NESHAP (40 CFR Part 61) is an asbestos standard that protects the general public from asbestos exposure due to renovation or demolition activities. NESHAP requires surveying for suspect materials (as defined above), notifying of intent to renovate or demolish, removal of regulated ACM (RACM) prior to renovation or demolition, and

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proper management of asbestos containing wastes. RACM is defined by NESHAP as follows:

- Any friable ACM;
- A Category I non-friable ACM (such as vinyl floor tiles and asphalt roofing products) that has become friable or will be subject to sanding, grinding, cutting, or abrading during renovation or demolition activities; or,
- A Category II non-friable ACM (all other non-friable ACMs) that has a high probability of becoming friable during demolition or renovation activities.

NESHAP requires that demolition activities be conducted with no visible emissions using wet methods. It should be noted that while NESHAP regulates renovation and demolition activities, it does not protect individual workers conducting asbestos abatement, or provide instructions for how asbestos abatement projects should be conducted.

2.3.3 Asbestos Standard for the Construction Industry

The Asbestos Standard for the Construction Industry (Federal OSHA, 29 CFR 1926.1101, and Cal-OSHA Title 8 California Code of Regulations [CCR] 1529) regulates asbestos exposure in the work place. This includes both persons working in a building containing ACMs and asbestos workers/contractors. For asbestos workers and contractors, the Asbestos Standard for Construction (Construction Standard) regulates the following:

- Protection of workers and the public during removal;
- Medical surveillance requirements for workers;
- Detailed requirements for how asbestos is to be removed; and,
- Training requirements for abatement personnel.

Cal-OSHA defines asbestos-containing construction material (ACCM) as any building material that contains more than 0.1 percent (one-tenth of one percent) asbestos by weight. In addition, building materials presumed or known to contain at least "trace" amounts (less than 1 percent but greater than 0.1 percent by weight) of asbestos should be considered as ACCM, and should be managed according to Cal-OSHA regulations (as presented in Title 8, CCR, and Section 1529).

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3 CONCLUSIONS AND RECOMMENDATIONS

Based upon the limited asbestos survey and subsequent laboratory analysis of suspect ACMs, the following building materials were confirmed or assumed to contain asbestos within the survey areas of the Site:

- Guard rail post shims, located beneath metal guard rail posts of the following bridge structures:
  - North I-5/North Highway 1 Connector Separation, Bridge No. 55-0226;
  - I-5/Highway 1 Separation, Bridge No. 55-0510;
  - Camino Capistrano Undercrossing, Bridge No. 55-0227;

Based on the estimated quantities of ACM identified during the survey, and assuming that the abatement practices described in the Asbestos Abatement Specification in Appendix C are followed, Kleinfelder estimates that removal and disposal of the confirmed and assumed ACM would roughly cost approximately $10,000, or approximately $3,000-$3,500 per bridge. This estimate assumes that removal activities at each bridge would be conducted separately and would each require a single mobilization. This estimate does not include additional costs associated with preparing a traffic control plan or obtaining encroachment permits.

Future demolition and construction activities that could disturb the above-noted or assumed ACM, either directly or indirectly, should be performed by properly trained and qualified personnel only, and in accordance with all Federal, State, and local regulations, as implemented by Cal-OSHA, Federal OSHA, EPA, DTSC, and SCAQMD.

Prior to future construction activities at the bridge structures associated with the I-5 HOV Lane Extension Project, Kleinfelder recommends that the following actions be taken:

- If additional suspect ACM are observed in areas that were not accessed (e.g. between bridge abutments) by Kleinfelder during the surveys, these materials should be sampled and analyzed by a State-certified laboratory for asbestos content prior to disturbance and proposed roadway extension activities. Alternatively, these materials may be assumed to be ACM and be handled accordingly.

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- OCTA should provide notification to employees, contractors and subcontractors of the results of this survey, including the presence, locations, and quantities of ACMs at each bridge structure where they were noted. Notification should be provided to workers who may contact these materials or if the materials will be disturbed. At this time, and in their current physical state, the ACMs do not pose a significant health risk as long as they are not disturbed.
- ACM and assumed ACM associated with each bridge structure have the potential to be disturbed during planned construction activities. Prior to planned construction activities, the ACM and assumed ACM associated with each bridge structure should be removed and disposed of in accordance with applicable federal, state, and local regulations governing asbestos-related work including, but not limited to those promulgated by OSHA, Cal-OSHA, EPA, DOSH, DTSC and SCAQMD.
- A 10-working-day advance written notification and payment of appropriate fees is required by SCAQMD for every demolition project within their jurisdiction even when no ACM are present, and for each abatement project where the quantity of ACM to be removed is greater than 100 square feet. Prior to the initiation of demolition or abatement work, the general contractor or asbestos contractor must complete a *Notification of Demolition or Asbestos Removal* form and submit it with the appropriate permit fee to SCAQMD. SCAQMD will return the Notification form with a "notification number" to the abatement contractor.
- A 24-hour advance written notification to the local Cal-OSHA office is required from the asbestos contractor regarding their "Intent to Conduct Asbestos Related Work", regardless of the amount of ACM that will be disturbed.
- Square footage estimates for the ACM and assumed ACM are rough estimates only. Prospective bidders must conduct a site walk and review the contents of this report in its entirety to obtain their own estimates of the materials being removed.

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4 LIMITATIONS

This work was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions, opinions and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no other representation, guarantee or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This report may be used only by Transystems/RMC Inc., and the registered design professional in responsible charge and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than two years from the date of the report.

The work performed was based on project information provided by Transystems/RMC Inc. If Transystems/RMC Inc. does not retain Kleinfelder to review any plans and specifications, including any revisions or modifications to the plans and specifications, Kleinfelder assumes no responsibility for the suitability of our recommendations. In addition, if there are any changes in the field to the plans and specifications, Transystems/RMC Inc. must obtain written approval from Kleinfelder's engineer that such changes do not affect our recommendations. Failure to do so will vitiate Kleinfelder's recommendations.

Kleinfelder offers various levels of investigative and engineering services to suit the varying needs of different clients. It should be recognized that definition and evaluation of environmental conditions are a difficult and inexact science. Judgments leading to conclusions and recommendations are generally made with incomplete knowledge of the site conditions present due to the limitations of data from field studies. Although risk can never be eliminated, more-detailed and extensive studies yield more information, which may help understand and manage the level of risk. Since detailed study and analysis involves greater expense, our clients participate in determining levels of service that provide adequate information for their purposes at acceptable levels of risk. More extensive studies, including field tests, should be performed to reduce uncertainties. Acceptance of this report will indicate that Transystems/RMC Inc.

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has reviewed the document and determined that it does not need or want a greater level of service than provided.

During the course of the performance of Kleinfelder's services, hazardous materials may have been discovered. Kleinfelder assumes no responsibility or liability whatsoever for any claim, loss of property value, damage, or injury that results from pre-existing hazardous materials being encountered or present on the project site, or from the discovery of such hazardous materials. Nothing contained in this report should be construed or interpreted as requiring Kleinfelder to assume the status of an owner, operator, or generator, or person who arranges for disposal, transport, storage, or treatment of hazardous materials within the meaning of any governmental statute, regulation, or order. The property Owner is solely responsible for directing notification of all governmental agencies, and the public at large, of the existence, release, treatment, or disposal of any hazardous materials observed at the project site, either before or during performance of Kleinfelder's services. The property Owner is responsible for directing all arrangements to lawfully store, treat, recycle, dispose, or otherwise handle hazardous materials, including samples resulting from Kleinfelder's services.

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TABLES

Table 1
Summary of Asbestos Survey Results
Interstate 5 Bridge Structures
Interstate 5 HOV Lane Extension Project
Orange County, California

Sample No.	Sample Description	Sample Location	Sample Layer Description	Asbestos Content	Condition/ Friability	Amount of Material
Avenida Pico Undercrossing						
AP-1	Expansion joint packing	East side of southern bridge abutment	Black fibrous material	ND	NA	NA
AP-2	Expansion joint packing	East side of side of southern bridge abutment	Black fibrous material	ND	NA	NA
Avenida Vaquero Undercrosing						
AV-1	Expansion joint packing	Northern bridge abutment, between bridge sections	Black fibrous material	ND/ND	NA	NA
AV-2	Expansion joint packing	Northern bridge abutment, between bridge sections	Black fibrous material	ND	NA	NA
North Interstate 5/North Highway 1 Connector Separation						
N1C-1	Expansion joint packing	Northern bridge abutment, between bridge sections	Black fibrous material/Grey cementitious material	ND	NA	NA
N1C-2	Expansion joint packing	Northern bridge abutment, between bridge sections	Black fibrous material/Grey cementitious material	ND	NA	NA
N1C-3	**Metal guard rail post shim**	**Beneath metal guard rail post on southbound side of overcrossing**	**Beige fibrous material**	**60% Chrysotile**	**Good/NF**	**20 SF**
N1C-4	**Metal guard rail post shim**	**Beneath metal guard rail post on southbound side of overcrossing**	**Black semi-fibrous material/Beige fibrous material**	**45% Chrysotile/ 60% Chrysotile**	**Good/NF**	**See Sample N1C-3**
N1C-5	Expansion joint packing	West side of northern bridge abutment	Black fibrous material	ND	NA	NA
Interstate 5/Highway 1 Separation						
I5S-1	Expansion joint packing	Southern bridge abutment, between bridge sections	Black non-fibrous material	ND/ND	NA	NA
I5S-2	Expansion joint packing	Southern bridge abutment, between bridge sections	Black non-fibrous material	ND	NA	NA
Assumed	**Metal guard rail post shim**	**Observed under various metal guard rail posts on northbound and southbound sides of undercrossing**	**NA**	**Assumed ACM**	**Good/NF**	**15 SF**
Camino Capistrano Undercrossing						
Assumed	**Metal guard rail post shim**	**Observed under various metal guard rail posts on northbound side of undercrossing**	**NA**	**Assumed ACM**	**Good/NF**	**10 SF**

Notes:
BOLD = Asbestos-containing material (ACM). Sampled material has a reported asbestos content greater than 1%.
ND = None Detected
SF = Square feet
NA = Not Applicable
NF = Non-friable
Assumed ACM= Suspect material observed but was not sampled due to accesibility.
Based on current design plans, materials reported or assumed to be ACM have the potential to be disurbed during construction activities.
Material quantities are estimates only, and are not intended for bidding purposes. Contractors are responsible for verifying their own quantities prior to bid.

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Table 2
Summary of Asbestos-Containing Materials
Interstate 5 Bridge Structures
Interstate 5 HOV Lane Extension Project
Orange County, California

Asbestos Containing Material	Material Location	Asbestos Content	Condition/Friability/ Category	Estimated Quantity
Interstate 5/Northbound Highway 1 Connector Separator				
Metal guard rail post shims	Under metal guard rail posts on northbound and southbound sides of undercrossing	45-60%	Good/NF/Category I	20 SF (approximately 20 shims observed)
Interstate 5/Highway 1 Separation				
Metal guard rail post shims	Under metal guard rail posts on northbound and southbound sides of undercrossing	Assumed ACM	Good/NF/Category I	15 SF (approximately 15 shims observed)
Camino Capistrano Overcrossing				
Metal guard rail post shims	Under metal guard rail posts on northbound and southbound sides of undercrossing	Assumed ACM	Good/NF/Category I	10 SF (approximately 10 shims observed)

Notes:
ACM = Asbestos-containing material
SF = Square feet
NF= Non-friable
Category = Designated NESHAPS Regulated ACM Category
Material quantities are estimates only, and are not intended for bidding purposes. Contractors are responsible for verifying their own quantities prior to bid.

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Table 3
Summary of Inaccessible Suspect
Asbestos-Containing Materials
Interstate 5 Bridge Structures
Interstate 5 HOV Lane Extension Project
Orange County, California

Suspect Asbestos-Containing Material	Potential Material Location	Reason for Not Sampling	As-Built Comments
Avenida Pico Undercrossing			
Expansion Joint Filler or Packing	Expansion joints in curbs, rails, bridge walls, bridge footings	Material is either encased in or covered by bridge structure components that would require damage to bridge integrity to inspect and sample.	Use of asbestos-containing materials was not explicitly indicated on as-built drawings.
Avenida Vaquero Undercrossing			
Expansion Joint Filler or Packing	Expansion joints in abutment joints and footings	Material is either encased in or covered by bridge structure components that would require damage to bridge integrity to inspect and sample.	Use of asbestos-containing materials was not explicitly indicated on as-built drawings.
Interstate 5/Northbound Highway 1 Connector Separator			
Expansion Joint Filler or Packing	Expansion joints in abutment footings, bent footings, curb and wall expansion joints on bridge deck	Material is either encased in or covered by bridge structure components that would require damage to bridge integrity to inspect and sample.	Use of asbestos-containing materials was not explicitly indicated on as-built drawings.
Interstate 5/Highway 1 Separation			
Expansion Joint Filler or Packing	Expansion joints in abutment joints and footings, bent footings, and btween girders	Material is either encased in or covered by bridge structure components that would require damage to bridge integrity to inspect and sample.	Use of asbestos-containing materials was not explicitly indicated on as-built drawings.
Camino Capistrano Overcrossing			
Expansion Joint Filler or Packing	Expansion joints in abutment and bent footings	Material is either encased in or covered by bridge structure components that would require damage to bridge integrity to inspect and sample.	1/16-inch asbestos sheet packing was noted in abutment joints on as-built drawing for Abutment 5-R dated 1956.

Notes:

Only suspect asbestos-containing materials (ACM) noted on available as-built drawings have been listed in this table. There is the potential for other suspect ACM to be present in or on bridge structures that were either inaccessible during the survey or were not called out on the available as-built drawings.

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PLATES

ATTACHED IMAGES: Images: Figure1_ProjLoc_1.tif
ATTACHED XREFS:
DIAMOND BAR, CA CAD FILE: L:\2011\CADD\105751\ LAYOUT: Layout1 PLOTTED: 16 May 2011, 2:43pm, dfahrney

LSA

LEGEND

Project Location

Bridge Location

0 1500 3000
FEET

SOURCE: USGS 7.5' QUAD - Dana Point ('75); San Clemente ('75)

FIGURE 1

I-5 HOV Extension
Project Location
12-ORA-005 PM 3.30/8.70
12840-0F960K
EA# OF9600

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DRAWN BY:	DMF
CHECKED BY:	MC
FILE NAME:	105751p1-ASB.dwg

SITE VICINITY MAP

INTERSTATE 5 HOV LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA

PLATE
1

SOURCE: GOOGLE EARTH PRO, DATED 11/15/09

EXPLANATION

AP-2 ● APPROXIMATE LOCATION OF BULK MATERIAL SAMPLE

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N

200 100 0 200

APPROXIMATE SCALE (feet)

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CHECKED BY:	RS
FILE NAME:	105751p2.dwg

SAMPLE LOCATION MAP

AVENIDA PICO UNDERCROSSING
INTERSTATE 5 HOV LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA

PLATE **2**

ATTACHED IMAGES: Images: ave_pico_791.jpg
ATTACHED XREFS:
DIAMOND BAR, CA

CAD FILE: L:\2011\CADD\105751\ LAYOUT: Layout1

PLOTTED: 26 May 2011, 8:41am, dfahrney

SOURCE: GOOGLE EARTH PRO, DATED 11/15/09

EXPLANATION

AV-2 ● APPROXIMATE LOCATION OF BULK MATERIAL SAMPLE

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200 100 0 200

APPROXIMATE SCALE (feet)

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FILE NAME:	105751p3.dwg

SAMPLE LOCATION MAP

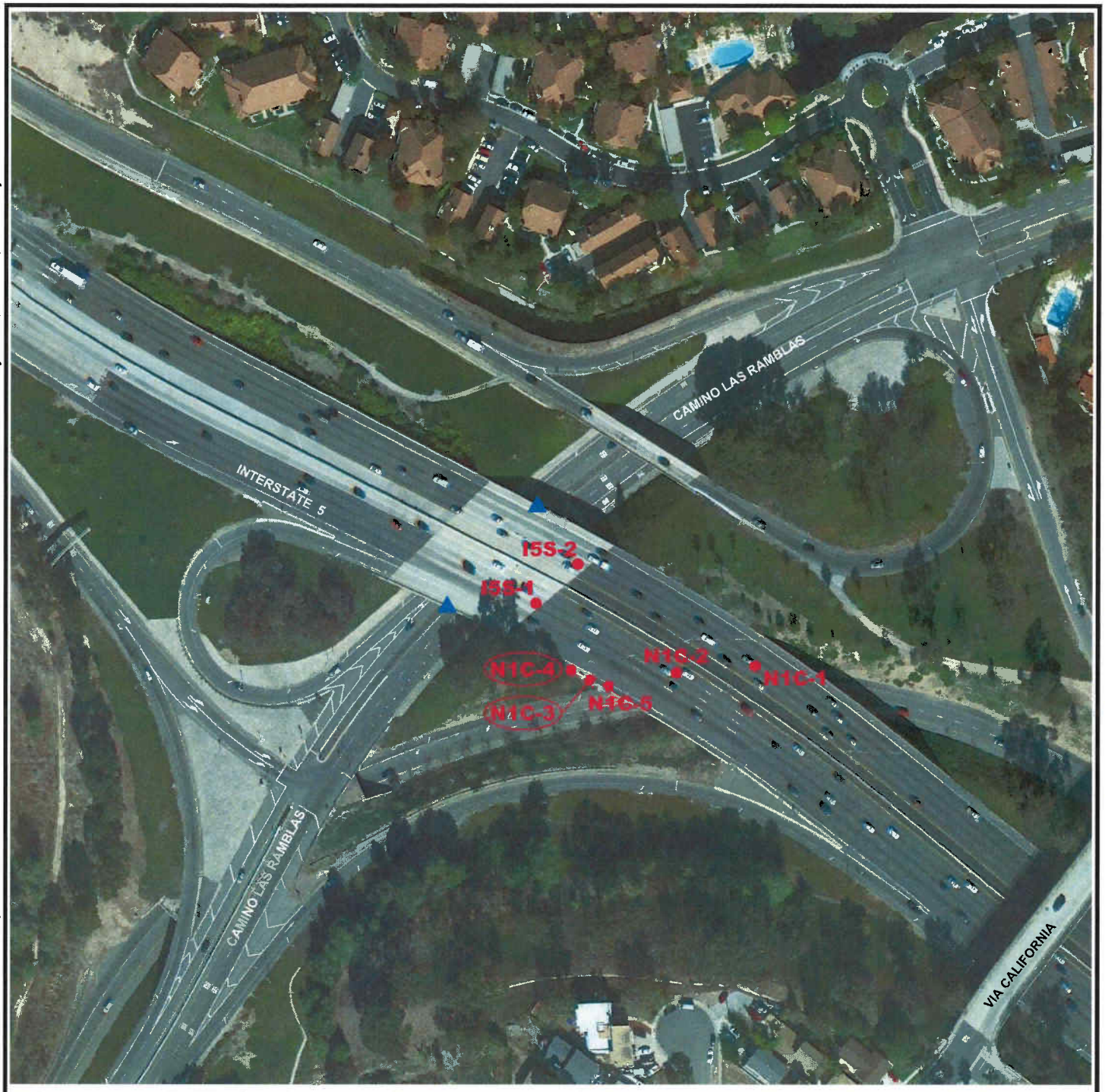
AVENIDA VAQUERO UNDERCROSSING
INTERSTATE 5 HOV LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA

PLATE 3

ATTACHED IMAGES: Images: Vaquero_906.jpg
ATTACHED XREFS:
DIAMOND BAR, CA

CAD FILE: L:\2011\CADD\105751\ LAYOUT: Layout1

PLOTTED: 26 May 2011, 8:43am, dfahrney



SOURCE: GOOGLE EARTH PRO, DATED 11/15/09

EXPLANATION

I5S-2 ● APPROXIMATE LOCATION OF BULK MATERIAL SAMPLE

N1C-4 ● APPROXIMATE LOCATION OF BULK MATERIAL SAMPLE CONTAINING ASBESTOS

▲ GUARD RAIL POST SHIMS ASSUMED ACM

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N

200 100 0 200

APPROXIMATE SCALE (feet)

PLOTTED: 26 May 2011, 8:46am, dfahrney
CAD FILE: L:\2011\CADD\105751\ LAYOUT: Layout1
ATTACHED IMAGES: Images: Ramblas_787.jpg
ATTACHED XREFS:
DIAMOND BAR, CA

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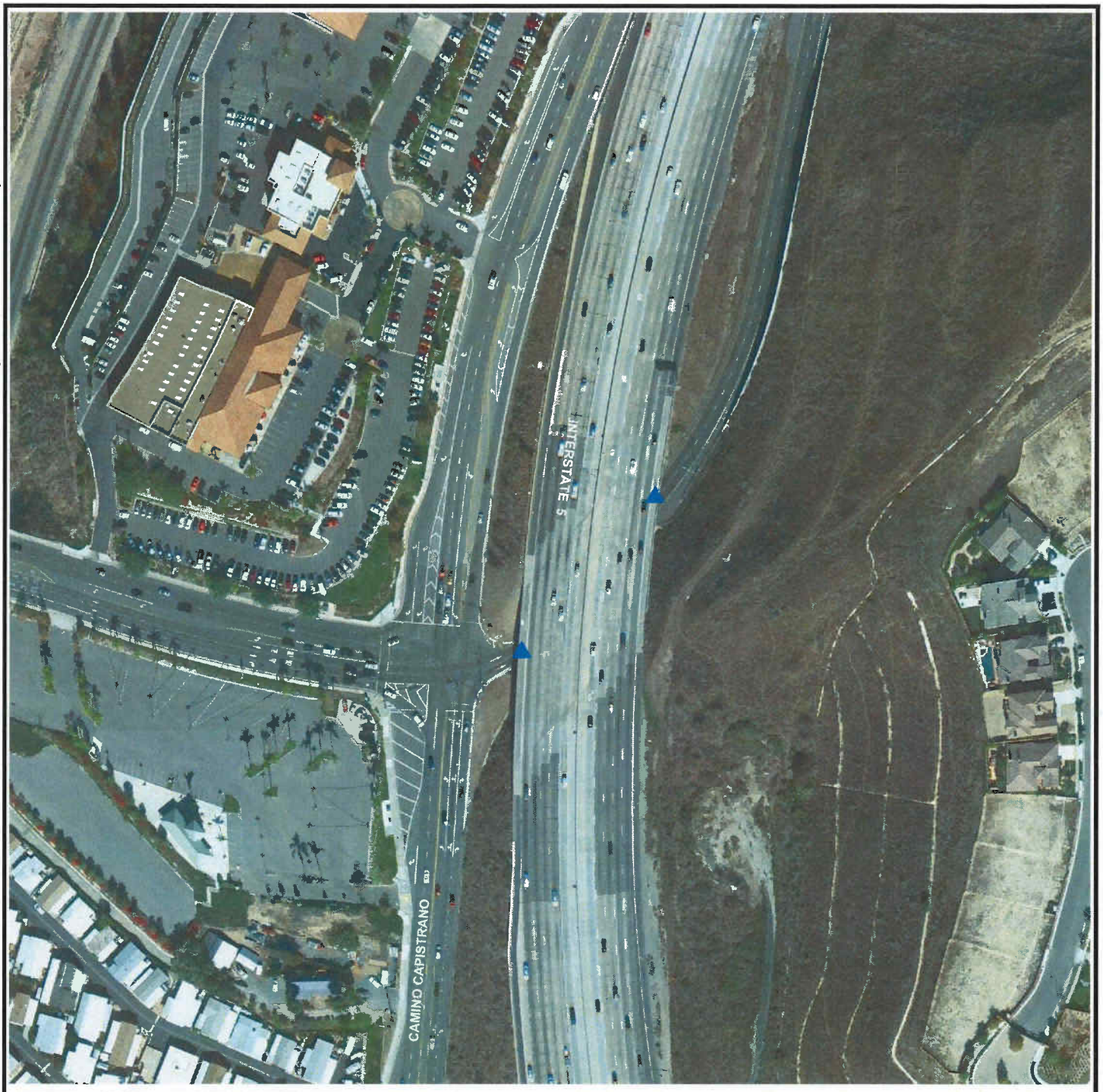
DRAWN BY:	DMF
CHECKED BY:	RS
FILE NAME:	105751p4.dwg

SAMPLE LOCATION MAP

NORTH I-5 / NORTH HWY. 1 CONNECTOR SEPARATION
AND I-5 / HWY. 1 SEPARATION
INTERSTATE 5 HOV LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA

PLATE

4



SOURCE: GOOGLE EARTH PRO, DATED 11/15/09

EXPLANATION

▲ GUARD RAIL POST SHIMS ASSUMED ACM

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N

200 100 0 200

APPROXIMATE SCALE (feet)

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FILE NAME:	105751p5.dwg

SAMPLE LOCATION MAP

CAMINO CAPISTRANO UNDERCROSSING
INTERSTATE 5 HOV LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA

PLATE

5

ATTACHED IMAGES: Images: san_Juan_cap_635.jpg
ATTACHED XREFS:
DIAMOND BAR, CA
CAD FILE: L:\2011\CADD\105751\ LAYOUT: Layout1
PLOTTED: 26 May 2011, 8:47am, dfahrney

APPENDIX A

Photographs

VIEW OF AVENIDA PICO UNDERCROSSING LOOKING SOUTHWEST

VIEW OF UNDERSIDE OF AVENIDA PICO UNDERCROSSING

VIEW OF SOUTHERN BRIDGE ABUTMENT

VIEW OF EXPANSION JOINT PACKING MATERIAL, SAMPLE AP-1

ATTACHED IMAGES: Images: 1. View of Avenida Pico Undercrossing, looking southwest..jpg Images: 2. View of underside of Avenida Pico Undercrossing..jpg Images: 3. View of southern bridge abutment.jpg Imag
ATTACHED XREFS: PLOTTED: 26 May 2011, 9:11am, dfahrney
DIAMOND BAR, CA CAD FILE: L:\2011\CADD\105751\A-1-Avenida Pico UC\ LAYOUT: C-1

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FILE NAME:	105751pA-1.dwg

SITE PHOTOGRAPHS

AVENIDA PICO UNDERCROSSING
INTERSTATE 5 HOV LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA

PLATE

A-1

VIEW OF AVENIDA VAQUERO UNDERCROSSING LOOKING SOUTHWEST

VIEW OF UNDERSIDE OF BRIDGE AND NORTHERN BRIDGE ABUTMENT

VIEW OF EXPANSION JOINT PACKING MATERIAL, SAMPLE AV-1

ATTACHED IMAGES: Images: 1. View of Avenida Vaquero Undercrossing, looking southwest..jpg Images: 2. View of underside of bridge and northern bridge abutment..jpg Images: 3. View of expansion joint packin
ATTACHED XREFS:
DIAMOND BAR, CA
CAD FILE: L:\2011\CADD\105751\A-2-Avenida Vaquero UC\ LAYOUT: C-2
PLOTTED: 26 May 2011, 9:14am, dfahrney

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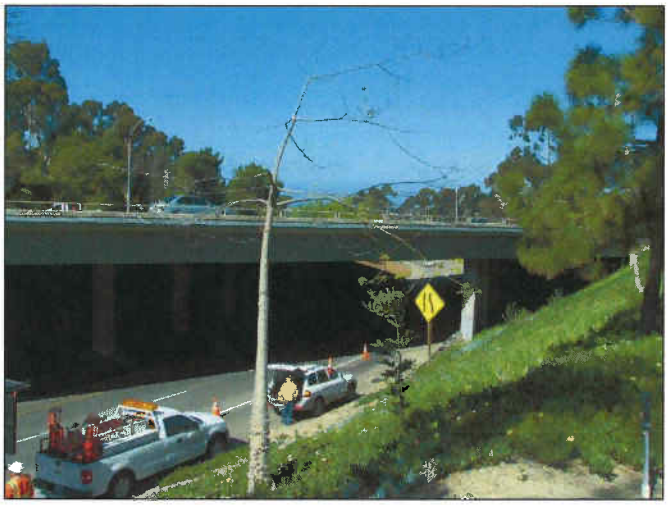
SITE PHOTOGRAPHS

AVENIDA VAQUERO UNDERCROSSING
INTERSTATE 5 HOV LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA

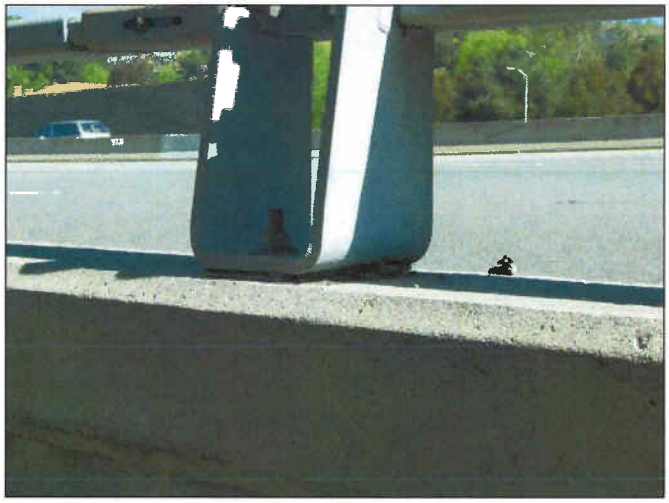
PLATE

A-2



VIEW OF NORTH I-5/NORTH HIGHWAY 1
CONNECTOR SEPARATION LOOKING WEST

VIEW OF UNDERSIDE OF
CONNECTOR SEPARATION



VIEW OF METAL GUARD RAIL POST
WITH SHIM, SAMPLE N1C-3

VIEW OF EXPANSION JOINT PACKING
MATERIAL, SAMPLE N1C-5

ATTACHED IMAGES: Images: 1. View of North I5-North Highway 1 Connector Separation, looking west..jpg Images: 2. View of underside of connector separation..jpg Images: 3. View of guard rail post with shim, sa
ATTACHED XREFS:
DIAMOND BAR, CA CAD FILE: L:\2011\CADD\105751\A-3- North I5-North Highway 1 Connector Separation\ LAYOUT: C-3 PLOTTED: 26 May 2011, 9:15am, dfahrney

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FILE NAME:	105751pA-3.dwg

SITE PHOTOGRAPHS

NORTH I-5 / NORTH HWY. 1 CONNECTOR SEPARATION
INTERSTATE 5 HOV LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA

PLATE

A-3

VIEW OF I-5/HIGHWAY 1 SEPARATION
LOOKING NORTHWEST

VIEW OF UNDERSIDE OF SEPARATION

VIEW OF EXPANSION JOINT PACKING
MATERIAL, SAMPLE I5S-1

VIEW OF METAL GUARD RAIL POST WITH SHIM

ATTACHED IMAGES: Images: 1. View of I5-Highway 1 Separation,looking northwest..jpg Images: 2. View of underside of separation..jpg Images: 3. View of expansion joint packing, Sample I5S-1..jpg Images: 4. Vie
ATTACHED XREFS:
DIAMOND BAR, CA
CAD FILE: L:\2011\CADD\105751\A-4-I5- Highway 1 Separation\ LAYOUT: C-4
PLOTTED: 26 May 2011, 9:15am, dfahrney

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FILE NAME:	105751pA-4.dwg

SITE PHOTOGRAPHS

I-5 / HWY. 1 SEPARATION
INTERSTATE 5 HOV LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA

PLATE
A-4

VIEW OF CAMINO CAPISTRANO UNDERCROSSING LOOKING WEST

VIEW OF UNDERSIDE OF UNDERCROSSING

VIEW OF CAMINO CAPISTRANO UNDERCROSSING LOOKING NORTH

VIEW OF METAL GUARD RAIL POST WITH SHIM

ATTACHED IMAGES: Images: 1. View of Camino Capistrano Undercrossing, looking west..jpg Images: 2. View of underside of undercrossing.jpg Images: 3. View of Camino Capistrano Undercrossing, looking north
ATTACHED XREFS:
DIAMOND BAR, CA CAD FILE: L:\2011\CADD\105751\A-5-Camino Capistrano UC\ LAYOUT: C-5 PLOTTED: 26 May 2011, 9:16am, dfahrney

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FILE NAME:	105751pA-5.dwg

SITE PHOTOGRAPHS

CAMINO CAPISTRANO UNDERCROSSING
INTERSTATE 5 HOV LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA

PLATE

A-5

APPENDIX B

Analytical Data Report and Chain-of-Custody Forms

Bulk Asbestos Analysis

(EPA Method 600/R-93-116, Visual Area Estimation)

Kleinfelder, Inc.
Rich Stevenson
2 Ada
Suite 250
Irvine, CA 92618

Client ID: 6640
Report Number: B148555
Date Received: 04/28/11
Date Analyzed: 05/02/11
Date Printed: 05/02/11
First Reported: 05/02/11

Job ID/Site: 105751/4.2.8; I-5 HOV Expansion Project, San Clemente, CA

FALI Job ID: 6640

Date(s) Collected: 04/27/2011

Total Samples Submitted: 11
Total Samples Analyzed: 11

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
AP-1	50652101						
Layer: Black Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %)		**Asbestos (ND)**					
AP-2	50652102						
Layer: Black Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %)		**Asbestos (ND)**					
AV-1	50652103						
Layer: Black Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %)		**Asbestos (ND)**					
AV-2	50652104						
Layer: Black Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %)		**Asbestos (ND)**					
N1C-1	50652105						
Layer: Black Fibrous Material			**ND**				
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (75 %)		**Asbestos (ND)**					
N1C-2	50652106						
Layer: Black Fibrous Material			**ND**				
Layer: Grey Cementitious Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (75 %)		**Asbestos (ND)**					
N1C-3	50652107						
Layer: Beige Fibrous Material		Chrysotile	**60 %**				
Total Composite Values of Fibrous Components: Cellulose (2 %)		**Asbestos (60%)**					

2959 Pacific Commerce Drive, Rancho Dominguez, CA 90221 / Telephone: (310) 763-2374 (888) 813-9417 / Fax: (310) 763-8684

Client Name: Kleinfelder, Inc.

Report Number: B148555
Date Printed: 05/02/11

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
N1C-4	50652108						
Layer: Black Semi-Fibrous Material		Chrysotile	**45 %**				
Layer: Beige Fibrous Material		Chrysotile	**60 %**				
Total Composite Values of Fibrous Components: Cellulose (2 %)		**Asbestos (56%)**					
N1C-5	50652109						
Layer: Black Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (90 %)		**Asbestos (ND)**					
I5S-1	50652110						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					
I5S-2	50652111						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Fibrous Components: Cellulose (Trace)		**Asbestos (ND)**					

Steven Takahashi, Laboratory Supervisor, Rancho Dominguez Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

Analytical results and reports are generated by Forensic Analytical Laboratories Inc. (FALI) at the request of and for the exclusive use of the person or entity (client) named on such report. Results, reports or copies of same will not be released by FALI to any third party without prior written request from client. This report applies only to the sample(s) tested. Supporting laboratory documentation is available upon request. This report must not be reproduced except in full, unless approved by FALI. The client is solely responsible for the use and interpretation of test results and reports requested from FALI. Forensic Analytical Laboratories Inc. is not able to assess the degree of hazard resulting from materials analyzed. FALI reserves the right to dispose of all samples after a period of thirty (30) days, according to all state and federal guidelines, unless otherwise specified. All samples were received in acceptable condition unless otherwise noted.

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Forensic Analytical Laboratories, Inc.

Analysis Request Form (COC)

Client Name & Address:
Kleinfelder
2 Ada, Suite 250
Irvine, CA 92618

PO / Job#: 105751/4.2.8 **Date:** 4/27/11

Turn Around Time: Same Day / 1Day / 2Day / 3Day / 4Day / 5Day

☐ PCM: ☐ NIOSH 7400A / ☐ NIOSH 7400B ☐ Rotometer

☒ PLM: ☒ Standard / ☐ Point Count 400 / 1000 / ☐ CARB 435

Contact: Rich Stevenson

Phone: (949) 727-4466 **Fax:** (949) 727-9242

E-mail: rhstevenson@kleinfelder.com

Site: I-5 HOV Expansion Project

Site Location: San Clemente, CA

☐ TEM Air: ☐ AHERA / ☐ Yamate2 / ☐ NIOSH 7402
☐ TEM Bulk: ☐ Quantitative / ☐ Qualitative / ☐ Chatfield
☐ TEM Water: ☐ Potable / ☐ Non-Potable / ☐ Weight %
☐ TEM Microvac: ☐ Qual(+/-) / ☐ D5755(str/area) / ☐ D5756(str/mass)

☐ IAQ Particle Identification (PLM LAB) ☐ PLM Opaques/Soot
☐ Particle Identification (TEM LAB) ☐ Special Project

☐ Metals Analysis: Method:
Matrix:
Analytes:

Comments: **See attached sample data sheet for sample information.**

Report Via: ☐ Fax ☒ E-Mail ☐ Verbal

Sample ID	Date / Time	Sample Location / Description	FOR AIR SAMPLES ONLY: Type	Time On/Off	Avg. LPM	Total Time	Sample Area / Air Volume
			A P C				
			A P C				
			A P C				
			A P C				
			A P C				
			A P C				
			A P C				
			A P C				
			A P C				
			A P C				

Sampled By: Rich Stevenson **Date:** 4/27/11 **Time:**

Shipped Via: ☒ Fed Ex ☐ DHL ☐ UPS ☐ US Mail ☐ Courier ☐ Drop Off ☐ Other:

Relinquished By:	Relinquished By:	Relinquished By:
Rich Stevenson	Date / Time:	Date / Time:
Date / Time: 4/27/11 15:00		
Received By: FIE	**Received By:**	**Received By:**
Date / Time: 4-28-11 10:16am	Date / Time:	Date / Time:
Condition Acceptable? ☒ Yes ☐ No	Condition Acceptable? ☐ Yes ☐ No	Condition Acceptable? ☐ Yes ☐ No

San Francisco Office: 3777 Depot Road, Suite 409, Hayward, California 94545-2761 / Ph: (510)887-8828 * (800)827-3274 / Fax: (510)887-4218
Los Angeles Office: 2959 Pacific Commerce Drive, Rancho Dominguez, California 90221 / Ph: (310)763-2374 * (888)813-9417 / Fax: (310)763-4450
Las Vegas Office: 6765 S. Eastern Avenue, Suite 3, Las Vegas, Nevada 89119 / Ph: (702)784-0040 / Fax: (702)784-0030

ASBESTOS BULK SAMPLE DATA SHEET

Sheet 1 of 1

Kleinfelder, Inc. 2 Ada, Suite 250 Irvine, CA 92618 Tel: (949)727-4466 Fax: (949)727-9242	**Project Name:** I-5 HOV Project No.: 105751 Project Manager: MARK PEABODY Site Address: I-5, SAN CLEMENTE	Sampled By: RICH STEVENSON Sampled By: MARGIE CARROLL Sampled By: Date Sampled: 4/27/11	**Laboratory:** FORENSIC ANALYTICAL

CHAIN OF CUSTODY INFORMATION:

Relinquished By: (sign/print)	Company	Date	Time (24 hr.)	Received By: (sign/print)	Laboratory
R Stevenson / Rich Stevenson	Kleinfelder	4/27/11	15:00	J Carrillo / J Carrillo	FAL FE

Sample ID	Building Number	Room Number	Sample Location	Sample Description	Quantity (SF/LF/E	Friable (Y/N)	Condition
AP-1			Avenida Pico Undercrossing	Vertical Expansion Joint Material			
AP-2							
AV-1			Avenida Vaquero Undercrossing	Vertical Expansion Joint Material			
AV-2							
N1C-1			I-5/N1 Connector Separator	Vertical Expansion Joint Material			
N1C-2							
N1C-3				Guard Rail Post Shim			
N1C-4							
N1C-5				Vertical Expansion Joint Material			
I5S-1			I-5/N1 Separation	Vertical Expansion Joint Material			
I5S-2							

Asbestos Sample

APPENDIX C

Asbestos Abatement Specification

ASBESTOS ABATEMENT SPECIFICATION
INTERSTATE 5 BRIDGE STRUCTURES
INTERSTATE 5
HIGH OCCUPANCY VEHICLE (HOV)
LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA
12-ORA-5-PM-3.0/8.7
CALTRANS EA NO. 0F9600

July 20, 2011

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A report prepared for:

Transystems/RMC, Inc.
6 Hutton Center Drive, Suite 1250
Santa Ana, California 92707

ASBESTOS ABATEMENT SPECIFICATION
INTERSTATE 5 BRIDGE STRUCTURES
INTERSTATE 5
HIGH OCCUPANCY VEHICLE (HOV)
LANE EXTENSION PROJECT
ORANGE COUNTY, CALIFORNIA
12-ORA-5-PM-3.0/8.7
CALTRANS EA NO. 0F9600

Kleinfelder Job No. 105751

Prepared by:

Richard H. Stevenson
Certified Asbestos Consultant No. 06-3992

Reviewed By:

Don D'Amico
Certified Asbestos Consultant No. 96-2014

KLEINFELDER WEST, INC.
2 Ada, Suite 250
Irvine, California 92618

July 20, 2011

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1 INTRODUCTION

Kleinfelder has prepared this asbestos abatement specification for the removal of asbestos-containing materials (ACMs) associated with bridge widening activities proposed as part of the Interstate 5 (I-5) High Occupancy Vehicle (HOV) Lane Extension Project in Orange County, California (site). The specification is a performance-based document and is not intended to replace Federal, State, or local requirements and regulations. Regulations are referenced in this document as points of emphasis and are not intended to delete or replace regulations not referenced. The purpose of this specification is to provide a guideline for the asbestos abatement contractor on the proper removal of ACMs that will be affected by future bridge widening activities at five bridge structures within the boundaries of the site. Sections 2 through 5 discuss abatement of ACMs at the five bridge structures. No other hazardous materials are included in this Specification.

Materials to be Abated: Please refer to the table in Section 5.1 (Asbestos-Containing Materials) for a summary of ACMs identified at the site.

Restrict Access: Restrict access to the work area by erecting barricades at entrances and cordoning off work area perimeter with appropriate barricade tape and Asbestos Work warning signs. Place "DO NOT ENTER" tape or post signs across all access points to the regulated work area of ACM removal. The contractor shall regulate the work area and establish engineering controls necessary to comply with Federal, State, and local regulations. All polyethylene sheeting utilized on this project must be fire-rated and have a minimum thickness of six mils.

Work Practices/ Procedures: All ACM abatement and cleaning activities must take place within regulated work areas. Prior to commencing abatement activity, the contractor shall regulate the work area. Guard rail post shims may be removed using glove bag methods. A high efficiency particulate air (HEPA) filtered vacuum must be present at each work location when asbestos and/or clean-up activities are being performed. All asbestos abatement activity must be performed utilizing wet methods, and per attached Asbestos Abatement

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Execution Requirements summarized in Section 4.

Clearance Criteria: Asbestos abatement clearances will be conducted by a Certified Asbestos Site Surveillance Technician (CSST) or Certified Asbestos Consultant (CAC) and will be conducted by visual inspection only.

Respiratory Protection: Shall be per the Federal Division of Occupational Safety and Health Administration (OSHA) regulations, and not less than half-face air purifying respirators equipped with P100 cartridges.

Equipment Certification: The contractor shall smoke test glove bags prior to their use. Smoke tests results should be documented in daily field logs and, if feasible, observed by the consultant.

Prior to beginning abatement work, the contractor must show proof that all HEPA filtered equipment, such as vacuums, has been efficiency leak-tested within the last 6 months by a firm independent of the abatement contractor. All such equipment used on site must meet ANSI Z9.2 standards.

Project Manager: To Be Determined

Asbestos Consultant: To Be Determined

1.1 PRE-ABATEMENT SUBMITTAL ITEMS CHECKLIST

The following shall be submitted to the Project Manager prior to commencement of abatement activities:

1. Abatement work plan.
2. Notification of Asbestos Renovation or Demolition Operations to South Coast Air Quality Management District (SCAQMD) if quantity of ACM to be removed is greater than 100 square feet.
3. Notification of Intent to Conduct Asbestos Work to California Division of Occupational Safety and Health (DOSH, also known as Cal-OSHA).

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4. California Contractors License.
5. Division of Occupational Safety & Health (DOSH) Asbestos Contractor Certification.
6. General Liability Insurance.
7. Worker's Compensation Insurance.
8. Negative exposure assessments (NEA), when applicable.
9. Asbestos Worker/Supervisor Asbestos Hazard Emergency Response Act (AHERA) training accreditation.
10. Worker's medical surveillance reports.
11. Worker's respirator fit testing documentation.
12. Material Safety Data Sheets (MSDS) for all supplies to be used on the job site.

1.2 POST-ABATEMENT SUBMITTAL

The abatement contractor shall submit a post-abatement package summarizing the abatement work plan for the project to the above-mentioned parties. Documents to be included within the post-abatement submittal include, but are not limited to: worker exposure personal air sampling results conducted during the course of the project, daily progress log, and copies of waste manifests with signatures of receipt from the waste disposal facility.

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2 GENERAL REQUIREMENTS – ASBESTOS ABATEMENT

2.1 DESCRIPTION OF WORK

The work covered by this specification includes abatement and disposal of non-friable ACMs from bridge structures associated with the site, as detailed in Section 5.0 of this specification.

In addition to the scope and application of applicable Federal, State, and local regulations, this document includes a summary of the incidental procedures and equipment required to protect workers, surrounding area, and nearby populations from exposure to airborne asbestos fibers. This specification is not a comprehensive manual on the state-of-the-art practice for asbestos abatement procedures, equipment, or materials. The selected Contractor represents, by acceptance of this work, that the Contractor is aware of the various state-of-the-practice procedures, equipment, and materials acceptable by regulatory agencies that are also efficient, effective, and protective of human health and the environment.

2.2 CODES AND REGULATIONS

General Applicability of Codes and Regulations and Standards: Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, all applicable Federal, State, and local codes, regulations, and standards have the same force and effect (and are made a part of the contract documents) as if copied directly into the contract documents, or as if published copies are bound here within. Regulation references in the text are federal regulations except where the State of California codes are listed in this section. Where the federal and state regulations differ, the more stringent regulation shall be relevant to this specification.

Contractor Responsibility: The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Contractor shall hold the Owner and Consultant harmless for failure to comply with any applicable work,

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hauling, disposal, safety, health or other regulation on the part of the Contractor, the Contractor's employees, and the Contractor's subcontractors.

Federal Requirements: which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following:

OSHA: United States Department of Labor, OSHA, including but not limited to:

Code of Federal Regulations (CFR):

Occupational Exposure to Asbestos, Tremolite,

Anthophyllite, and Actinolite; Final Rules:

29CFR1910.1001	General Industry Standard
29CFR1926.1101	Construction Industry Standard
29CFR1910.134	Respiratory Protection
29CFR1910.20	Access to Employee Exposure and Medical Records
29CFR1910.1200	Hazard Communication
29CFR1910.145	Specifications for Accident Prevention Signs and Tags

DOT: United States Department of Transportation (DOT), including but not limited to:

49CFR171 and 172	Hazardous Substances

EPA: United States Environmental Protection Agency (EPA), including but not limited to:

40CFR763 Sub-part E	Asbestos Abatement Projects; Worker Protection Rule
40CFR763 Sub-part E	Asbestos Hazard Emergency Response Act (AHERA) Regulation Asbestos Containing Materials in Schools Final Rule & Notice
40CFR763 Sub-part E	Training Requirements of (AHERA)

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Appendix C	Regulation Asbestos Containing Materials in Schools Final Rule & Notice
40CFR61 Sub-part A and Sub-part M (Revised Sub-part B)	National Emission Standard for Hazardous Air Pollutants (NESHAPS) National Emission Standard for Asbestos
Public Law 101-637	Asbestos School Hazard Abatement Reauthorization Act (ASHARA), enacted November 28, 1990

State Requirements:

California DOSH: California Division of Occupational Safety and Health (also known as Cal-OSHA), including but not limited to:

California Code of Regulations (CCR):

8 CCR 1529	Construction Standard
8 CCR 3203	Injury, Illness Prevention Plan
8 CCR 5144	Respiratory Protection
8 CCR 5194	Hazard Communication
8 CCR 5208	General Industry Safety Orders, Asbestos Regulations
Title 8, Article 2.5	Asbestos Related Work Registration
Title 22, Division 4, Chapter 30	Minimum Standards for Management of Hazardous and Extremely Hazardous Waste

California Department of Toxic Substances Control:

Transport and Disposal Regulations

Local Requirements: Abide by all local requirements, which govern asbestos abatement work or hauling and disposal of asbestos waste materials, including:

South Coast Air Quality Management District (SCAQMD)

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Send written notice at least 10-business (working) days prior to beginning removal of greater than 100 square feet of friable and Class I non-friable ACM to SCAQMD as required by EPA NESHAPS Regulations (40 CFR 61, Subpart M):

South Coast Air Quality Management District
Asbestos Notifications
File # 55641
Los Angeles, California 90074

Send written notice at least 24 hours prior to beginning any asbestos-related work to the local Cal-OSHA office:

Santa Ana Cal-OSHA District Office
2000 East McFadden Avenue,
Ste. 122,
Santa Ana, CA 92705
(714) 558-4451
fax (714) 558-2035

Other Standards:

ANSI
25 West 43rd Street, 4th Floor
New York, NY 10036
(212) 642-4900

Fundamentals Governing the Design and Operation of Local Exhaust Systems Publication Z9.2-79

Practices for Respiratory Protection Publication Z88.2-80

2.3 DEFINITIONS

Refer to Appendix A for terms and definitions applicable to this specification.

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2.4 QUALITY ASSURANCE

Laboratory Qualification: The laboratory shall be regularly engaged in asbestos testing and personnel used for monitoring airborne concentrations of asbestos fibers, shall be proficient in this field. This proficiency shall be demonstrated by current acceptable participation in the Proficiency Analytical Testing (PAT) program and each analyst shall have taken the National Institute for Occupational Safety and Health (NIOSH) 582 Course (Sampling and Analysis for Asbestos) or the equivalent. The laboratory that performs the Transmission Electron Microscopy (TEM) sample analysis must be accredited by National Voluntary Laboratory Accreditation Program (NVLAP).

2.4.1 Asbestos Fiber Concentration Control Limits:

Inside Enclosed Work Area: Air concentrations of asbestos shall not exceed an eight-hour time weighted average (TWA) of 1.0 fiber per cubic centimeter (fibers/cc) of air by Phase Contrast Microscopy (PCM) for personnel selected as Most Contaminated Worker. Air concentrations of asbestos shall not exceed the 30-minute excursion level of 1.0 fibers/cc of air.

Outside Asbestos Work Area: Air concentrations of asbestos fibers shall be maintained at an eight-hour TWA at or below 0.01 fibers/cc of air (by PCM). This applies to all areas outside the buildings and/ or contained work areas while work is in progress, except for the asbestos work area.

Glove bag Removal: Maintain a TWA of 0.01 fibers/cc of air (by PCM) for the Most Contaminated Worker. Glove bag removal operations will be performed by a minimum of two workers.

Area Clearance Sampling: Clearance air sampling will not be performed where non-friable ACMs will be removed. Asbestos abatement clearance may be conducted by a third party a CAC or CSST and will include a visual inspection of the regulated area only.

2.4.2 Contractor and/or Contractor's Certified Industrial Hygienist (CIH):

The Contractor or Contractor's CIH is responsible for the following:

1. Review of the specification.

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2. Assign air monitoring personnel to sample Contractor's employee exposure and an analytical laboratory that conforms to this section.

3. Maintain complete air sampling records, keep a daily activity log, and provide a report, which contains all personal air sampling results.

4. Monitor air fiber concentrations inside and outside regulated work areas daily. Breaches to the regulated work areas are to be immediately repaired.

The Contractor will provide to the Consultant, on a regular basis, any observations regarding the integrity of all barriers; decontamination facilities and protective coverings; work and safety plans; emergency evacuation procedures; proper performance of measures used to protect the facility and employees, including; isolation, removal techniques, encapsulation, patching, disposal and state of the art procedures. The Consultant shall be informed immediately of operational problems or deviations from the specification, initially by telephone and then in writing.

Violations: If, at any time the Contractor's Competent Person or CIH determines that practices are in violation of pertinent and applicable regulations or that air results exceed specified allowable levels, they will notify the Consultant supervising the project immediately. All work activity in the affected area(s) will cease until corrective actions have been taken. The Consultant shall notify the Owner.

Any cost resulting from such a stop work order issued by the CIH or Consultant will be borne by the Contractor and will not be considered as a basis for an increase in the contract amount.

The Contractor is responsible for the safety of all persons in or around the regulated area or within the areas the Contractor is using for ingress and egress.

2.5 TITLE OF WASTE MATERIAL

All asbestos and asbestos contaminated materials resulting from abatement activities, except as specified otherwise shall be the property of the generator (Owner) and shall be disposed of by the Contractor as required in applicable Federal, State and local regulations. Copies of all hazardous waste manifests are to be maintained by the contractor, as part of the required "Close-Out" documents and forwarded to the owner

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after completion of the project. Contractor will submit name, location and EPA identification number for waste disposal site chosen by the Contractor. In addition, the Contractor will submit a letter from the disposal site certifying that the disposal site is legally authorized by the Regional Water Quality Control Board to receive ACMs scheduled to be removed from the site.

2.6 PROTECTION OF EXISTING STRUCTURES

The contractor shall perform asbestos abatement work without damage or contamination of adjacent areas. If feasible, bridge components adjacent to regulated work areas shall be covered with two layers of six-mil fire-rated polyethylene sheeting and sealed to preclude contamination during removal.

2.7 MEDICAL REQUIREMENTS

The Contractor shall provide workers with a comprehensive medical examination as required (29 CFR 1926.1101(m) and (n)(3)). Contractor will submit one copy of most recent physical examination for each employee the Contractor will employ on the project. Physician's certificate must permit employee to work using a respirator and be dated within the last 12 months.

2.8 TRAINING

The Contractor will ensure and certify that all workers performing asbestos abatement activities shall have successfully completed an EPA approved asbestos training/refresher course and have in their possession a valid Asbestos Worker Training Certificate or Contractor/Supervisor Certificate, issued by an EPA accredited trainer within the past 12 months. All certifications must be in compliance with the recent Model Accreditation Plan (MAP) provisions (29 CFR 1926.1101(n) and (o)). Contractor will be required to submit a copy of each employee's training records to the Consultant **prior** to start of project and maintain a copy of all certifications on site for the duration of the project.

2.9 PERMITS, LICENSES, NOTIFICATIONS, AND PATENTS

Secure necessary permits for asbestos removal, hauling, and disposal and provide timely notification of such actions as may be required by Federal, State, regional, and local authorities. Copies of such notification shall be provided to the Owner and

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Consultant prior to commencement and following completion of work (see pre-abatement and post-abatement submittal checklist in Section 1.1 and 1.2). Post all notices required by applicable Federal, State and local regulations at the jobsite where asbestos abatement work will be performed. Maintain two (2) copies of applicable Federal, State and local regulations and standards. Maintain one copy of each at job site. Keep on file in Contractor's office one copy of each.

The Contractor is responsible for retaining written permission from the Owners Consultant for use of equipment, engineering controls, and designs, etc. All associated costs for these items shall be borne by the Contractor. The Contractor shall notify the Consultant that the contractor does maintain such documentation prior to the commencement of work, and produce such documentation in a timely manner (but within five business days) upon request.

2.10 SAFETY COMPLIANCE

In addition to the requirements of this specification, the Contractor shall comply with laws, ordinances, rules, and regulations of Federal, State, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work.

1. Emergency Evacuation: The Contractor shall develop and submit an Emergency Evacuation Plan for each area of work or area in which the Contractor expects to use for ingress and egress. After approval of this plan by the Consultant, it shall be distributed and read by all personnel required to enter the enclosed abatement area. In addition, the Contractor shall post this plan at the entrance to the abatement areas.

2. Hazard Communications: Post warning signs and labels and ensure the employees are properly trained and outside contractors are properly notified. Contractor will conduct "tail-gate" health and safety meetings prior to work each shift to review the health and safety plan and discuss new hazards, if applicable.

3. The Contractor is hereby notified that the bridge structures may be in use during abatement activities. The Contractor will institute all necessary precautions so that no unauthorized personnel enter the regulated areas by mistake or design.

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The site will be fenced and security personnel will be onsite after work hours. When the work site is unattended, the regulated area shall be locked so that unauthorized personnel cannot enter the area.

2.11 RESPIRATOR PROTECTION

The employer shall comply with the above regulations at a minimum and provide and ensure the proper use and selection of respirators, perform required respiratory fit tests and institute a respiratory program. The Contractor will be required to submit one copy of most recent fit test results for each employee who the Contractor will employ on the project. Evidence of successful fit test within the last year (from the start date of the project) must be provided for each employee.

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3 PRODUCTS

3.1 RESPIRATORS

Respirators shall be used as specified in 29 CFR 1926.1101. Initial selection of a respirator must follow regulations regarding a negative exposure assessment for the work described in this specification. The prior data must be from "workplace conditions that 'closely resembles' the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the contractors current operations, the operations were conducted by employees whose training and experience are no more extensive than that of employees performing the current job, and these data show that under the conditions prevailing and which will prevail in the current workplace there is a high degree of certainty that employee exposures will not exceed the TWA and excursion limit (29 CFR 1926.1101 (f)). The minimum level of respiratory protection for this project is a half-face negative pressure respirator with P100 cartridges.

3.2 POLYETHYLENE SHEETING

All poly sheeting must be six-mil and fire retardant and shall be polyethylene material sized in lengths and widths to minimize the frequency of joints. Polyethylene drop sheets must be fire retardant material.

3.3 POLYETHYLENE BAGS

Poly bags shall be a minimum six-mil polyethylene printed with warning labels per DOT and EPA regulations.

3.4 DISPOSABLE CONTAINERS

Based on the estimated quantity of ACM waste material, waste containers are not anticipated to be used during the project. The Contractor will be required to remove waste bags from the bridge structures after each work shift.

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3.5 GLOVE BAGS

Glove bags shall be a minimum of six-mil polyvinyl chloride (PVC) or polyethylene and specially designed for removal of asbestos-bearing insulation as defined in 29 CFR 1926.1101.

3.6 EYE PROTECTION

Full-face masks or goggles must be provided to personnel engaged in asbestos operations. Eye protection must be worn during abatement of any materials or operations that may present risk or damage to the eyes.

3.7 SPECIAL CLOTHING

Abatement workers must be provided with fire retardant disposable protective whole body clothing, head coverings, gloves (including disposable poly or rubber gloves to protect hands, when necessary) and foot coverings. Cloth gloves may be worn inside the poly or rubber gloves for comfort, but shall not be used alone. Sleeves must be secure (at the wrists) and foot coverings secured (at the ankles) by the use of duct tape. Patch all tears with duct tape as soon as discovered.

3.8 WARNING SIGNS

Warning signs should be printed and used at a minimum as described in 29 CFR 1926.1101 (e) and (k)(7) and any local regulations (see example below). Warning signs shall be posted at all approaches to regulated areas, and as required by Federal, State, regional and local regulations. Locate signs that can be clearly visible from twenty (20) feet so that personnel may read the sign and take the necessary protective steps required before entering the area. Postings shall be in English and Spanish, and in any language used by any of the Contractor's employees as the primary language of communication. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos. All labels affixed to waste bags will be original adhesive labels. Photocopying of labels and affixing to waste bags will not be acceptable.

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Vacuum Equipment: All vacuum equipment utilized in the work area shall use HEPA filters on the discharge and shall be suitable for wet/dry usage.

Scaffolding: Scaffolding, as required to accomplish the specified work, shall meet all applicable safety regulations.

Transportation Equipment: Transportation equipment, as required, shall be suitable for loading, temporary storage, transit, and unloading of contaminated waste without exposure to persons or property.

Other Tools and Equipment: The Contractor shall provide other suitable tools for the removal, enclosure, encapsulation, patching, and disposal activities, including but not limited to, hand-held scrapers, brushes, sponges, and rounded edge shovels.

Electrical: Electrical tools and equipment shall meet all applicable codes and regulations. Ground fault protection or assured grounding programs, as required by OSHA shall be in effect at all times. The Contractor shall take all additional precautions and measures to insure a safe working environment during wet removal. This includes shutting off all live electrical lines in the work area and locking the service box. **At this time it is not known if sources for water or electrical power will be available to the Contractor during abatement activities.** It will be the responsibility of the abatement Contractor to secure adequate electric power available prior to commencing abatement activities. As such, it will be the responsibility of the Contractor to provide electric generators during abatement activities, if needed.

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4 ASBESTOS ABATEMENT SPECIFICATION - EXECUTION

4.1 WORK PROCEDURE

Perform asbestos related work in accordance with 29 CFR 1926.1101 and as specified herein. Use wet removal procedures. Properly notified and trained personnel shall wear and utilize protective clothing and equipment. Eating, smoking, or drinking shall not be permitted in regulated work areas of the site. Personnel of other trades not engaged in the abatement of asbestos shall be notified of the presence of asbestos in accordance with Title 8 CCR Section 1529 Subsection K. Radios are not allowed within regulated areas, other than two-way radios for communication purposes.

Disconnect electrical service (if any to the abatement area). Contractor shall be responsible for knowing how and where emergency shut off valves for water, gas, and electrical utilities are located. **At this time it is not known if sources for water or electrical power will be available to the Contractor during abatement activities. It will be the Contractor's responsibility to provide the necessary water supply and electrical power during each phase of asbestos removal for the project if not supplied at the site.**

Smoke testing of all glove bags used on the project should be conducted by the contractor prior to each use. Contractor will provide certification labels on all HEPA filtration equipment. Equipment that does not have appropriate documentation and labeling will be removed from the work area.

4.2 REGULATED AREA--OPEN

Where establishment of a closed regulated area is not possible, an open (regulated) area may be considered. In no event shall the use of an open regulated area be in conflict with applicable Federal, State, regional, or local regulations, unless a waiver of the specific activity proposed is provided by the appropriate regulatory agency.

Establish designated limits for the asbestos work area and barricade the designated area from non-asbestos workers with the use of rope, caution tape or other continuous barriers. Maintain all other requirements associated with removal and disposal of asbestos as applicable. Also, where an enclosure is not provided, area monitoring of

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airborne asbestos fibers will be taken during the work shift at the designated limits of the asbestos work area, and at such frequency as specified herein.

If the quantity of airborne asbestos fibers monitored at the designated limits at any time reaches the (time weighted average) maximum allowed in this specification, stop work immediately. Notify key personnel and proceed with clean-up activities. If adjacent areas are contaminated, clean the contaminated areas, and monitor and visually inspect the area as specified herein.

4.3 DECONTAMINATION

Decontamination procedures shall not include HEPA filtered vacuuming of workers in lieu of a shower room. HEPA filtered vacuuming and double suiting is allowed if a remote shower facility must be utilized. All workers shall remove protective clothing and wash all exposed parts of their person before leaving the area. Eating, smoking, drinking or other activities are prohibited since these activities may potentially result in exposure to asbestos fibers. Showers, washbasins or buckets shall be provided with towels to clean respirators daily. The Contractor shall ensure that the workers take proper care of their assigned respirators and safety equipment.

Provide a decontamination room to provide a storage area for workers clothes that are used in the regulated work area. A separate decontamination area can be constructed for larger equipment and waste bags; however, use of this area still requires proper decontamination procedures. Personnel ingress and/or egress from the regulated work area through the equipment decontamination area will be prohibited. The decontamination systems shall consist of a clean changing area (outer-chamber), and dirty equipment storage area (inner-chamber). Double layers of plastic sheeting (fire retardant) shall be taped/spray-glued securely in place. Plastic sheeting minimum thickness six-mil, each layer, shall be used throughout. Construction shall conform to requirements of 29 CFR 1926.58, AHERA, and Title 8 CCR Section 1529, Cal/OSHA Asbestos Standard.

A remote decontamination unit may be used for workers involved in glove bag or mini-enclosure operations. Remote units must be placed within the regulated area where unauthorized personnel will not cross the path from the work area to the remote unit. Consultant reserves the right to approve use and placement of remote units for asbestos abatement.

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4.4 ACCESS TO WORK AREA

The asbestos abatement Contractor shall make available to the Consultant any personal protective equipment (not including respirators unless supplied air respirators are required) as required herein for entry to the regulated area at all times for observation of the regulated area. Access to the work area shall be regulated as follows:

Access to Isolated Work Areas by Others: Except for an emergency and the Contractor's authorized personnel, the Contractor shall limit access to the work area to authorized representatives of the Consultant. At no time shall any personnel enter an enclosure without notifying the on-site Competent Person first and signing the site entry log.

Visitor Communications: All inquiries concerning the work site, asbestos abatement project and other job activities shall be directed to the on-site Competent Person. The Contractor shall notify the Consultant of visitors (i.e. regulatory inspectors, OSHA personnel, law enforcement, personnel, press, etc.) that visit the site during the project. If the Contractor is cited by a regulatory agency, the Contractor shall immediately notify the Owner and Consultant.

Audio-Visual Surveillance: The contractor shall provide an observation window (in accordance with applicable regulations) for enclosures so that the supervisor can monitor work activity. In areas where visual access is not possible, the Consultant may require headsets or walkie-talkies for audio communications.

4.5 AIR MONITORING

Monitoring of airborne concentrations of asbestos fibers shall be in accordance with the specified regulations, Section 2.4 of this document, and as specified hereafter (29 CFR 1926.1101 (f)). An initial exposure assessment shall be performed for each area unless previously sampled or in areas shown not to present concentrations exceeding the PEL under the given work conditions.

Area air monitoring may be conducted by the Consultant based on observations of abatement work practices. Clearance air monitoring will not be performed for this project.

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4.5.1 Records

Documentation shall be kept for each filter sample procured as to worker sampled, respiratory protection equipment used, work area location, date and time taken, volume of air drawn through filter, pump identification number and calibration. Documentation shall indicate whether tests were taken in isolated work areas, in glove bag work areas, in occupied public spaces, etc., and shall be part of the permanent record provided at project completion.

4.5.2 Air Samples

The following refers to the different type of air samples that may be collect during the abatement project:

Area Air Sampling: Area air samples shall be collected by the Contractor's Competent Person to evaluate the integrity of the containment structure. Area air samples for glove bag operations shall be conducted at each bridge structure where glove bags are used. The sampling protocol shall conform to the NIOSH 582 standards and 40 CFR Part 763. The Consultant may conduct area air monitoring based on observations of work practices during abatement.

Personal Air Samples: The Contractor is responsible for monitoring its employees' exposure and maintaining the proper records (29 CFR 1926.1101 and 1910.1001).

Results of all area air monitoring shall be made available to the Consultant within 48 hours of sampling. Results of all personal air monitoring shall be made available to the Consultant within one week of the completion of the project, unless, as stated in 36.4.2, the PEL is exceeded.

If the results of PCM analysis exceed the established limits, the Contractor will be required to initiate additional air and surface cleaning procedures, as instructed by the Consultant to reduce fiber concentration below these limits. Contractor shall notify Consultant immediately by phone and fax if the PEL is exceeded. The Contractor may resume abatement work in that area only after he receives authorization from the Consultant. Any costs resulting from high air sampling results above the regulatory criteria shall be borne by the Contractor and will not be a basis for an increase in the contract amount.

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4.6 ASBESTOS HANDLING PROCEDURES DURING REMOVAL

General Procedures: Follow procedures described in Sections 4.1 through 4.9. Sufficiently wet asbestos material with a fine spray of amended water during removal, cutting, or other handling to reduce the emission of airborne fibers. Remove material and immediately place in poly disposal bags. Where unusual circumstances prohibit the use of poly bags, submit an alternate proposal for containment of asbestos fibers to the Consultant for approval. Contractor shall properly notify their employees of the ACM content and train them in the standard of practice procedures for removal of the ACMs in accordance with Federal, State, and local regulations. Reference 29 CFR 1926.1101 (g), Methods of Compliance.

Cleaning objects prior to abatement: All moveable objects must be HEPA vacuumed and wet wiped prior to scheduled removal and prior to abatement cleaning, temporary storage and relocation must be conducted according to Consultant instructions. All immovable objects must be pre-cleaned by HEPA vacuum and wet wiping. Fixed building materials that may be damaged by wet wiping shall be HEPA vacuumed only.

Abatement methods for various types of ACMs (containing at least one percent asbestos) at the Site to be affected by the bridge widening activities included in this scope of work are described below:

Category I Non-friable ACM (guard rail post shims): The removal of guard rail post shims is considered OSHA Class II work since the intent of this project is not for repair and maintenance. Guard rail post shims shall be removed using glove bag methods. Guard rail post shims must be removed and disposed using wet methods and other dust control methods necessary to comply with Federal, State, and local regulations. No containment will be required. However, the contractor must still comply with the requirements listed in Paragraphs 4.2 and 4.3. Power tools shall not be used for removal of ACM guard rail post shims. Only chisels, scrapers and other hand tools may be used.

4.7 ENCAPSULATION / LOCKDOWN

Contractor shall apply encapsulant or fiber lockdown material to all surfaces from which asbestos was removed. Adjacent surfaces, which are not intended to be sprayed, shall be protected except for in demolition situations. Encapsulant shall be compatible with

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the substrate upon which it will be sprayed. Encapsulant shall be applied as specified by the manufacturer.

4.8 DISPOSAL

The Contractor shall determine current waste handling, transportation, and disposal regulations for the work site and for each waste disposal landfill. The Contractor must comply fully with these regulations and all DOT and EPA requirements. Material will be delivered directly to the pre-designated disposal site within five days for burial. All labels and signs shall be in accordance with EPA, OSHA, and DOT regulations as described in Sections 3.8 and 3.9. The Contractor shall fill out manifest forms for the Owner's (Generator) signature. Original disposal receipts and manifests must be turned in at project completion to the Owner. Copies shall be forwarded to the Consultant.

Containers: Sealed containers may be stored in the bag holding and decontamination enclosure system until a sufficient volume of waste has accumulated for disposal but not to exceed five days. This storage area will be prominently designated and waste containers will be covered with polyethylene sheeting. Waste should be stored out of sight of the public in a secure area.

Disposal containers shall then be labeled, sponge cleaned, and removed to the Contractor's staging area.

Transportation and Disposal: Decontaminated waste bags and/or containers shall be removed from site staging area and work site at the end of each workday. Workers unloading the sealed bags and machinery operators shall wear respirators when handling material at the disposal site and shall be a state certified asbestos worker.

Disposal Site: The disposal site chosen for friable materials (hazardous waste) shall be permitted to receive this type of waste. Non-friable materials may be disposed as non-friable, non-hazardous asbestos waste at a disposal site permitted to receive ACM waste. The Contractor shall notify the receiving non-hazardous waste landfill of the type and nature of the asbestos debris to be disposed.

4.9 GENERAL PROCEDURES

The Contractor shall implement procedures that comply with or exceed Federal, State, and local regulations. The procedures, while not specifically described here, shall be

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protective of employees, site occupants, other contractors, and site improvements and equipment.

Coordinate all electrical and water service connections with the Owner. The Contractor shall coordinate with the Owner with respect to site security, emergency shut off of water, and building fire suppression systems. The Contractor shall not violate the fire code as it relates to the Project Site.

Setup, abatement, disposal, and demobilization shall be performed so that ACMs are not disturbed unless they are in a regulated area in the process of being abated. Setup procedures may require the use of respirators with P100 filters, HEPA filtered vacuums, critical barriers, and decontamination facilities.

The use of drugs, alcohol, or prescription medication that may impair judgment or otherwise compromise the safety of workers or any persons on the site is strictly prohibited. Smoking is not allowed on the job site.

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Material	Friability (at time of survey)	Location	Chrysotile Asbestos %	Type of Regulated Area * (Removal Methods)	Estimated Area **
Guard rail post shims	Non-friable	Camino Capistrano Undercrossing-Beneath guard rail posts	Assumed	Glove-bag in open regulated area (amended water, immediate disposal in bag, detail wipe and HEPA vacuum)	10 sq. ft.

sq. ft. = square feet

* = Minimum regulated area types have been indicated.

** = Quantities of ACMs listed above are approximate but should be appropriate for the base bid. Differences in areas (± 15%) for ACMs identified by Kleinfelder shall not be cause for a change in condition.

5.2 SPECIAL INSTRUCTIONS AND REQUIREMENTS

Applicable Regulations: The Contractor is responsible for proper performance under all applicable Federal, State and local regulations for the removal and disposal of asbestos at this facility. The most stringent requirements will govern.

Execution: In addition to the work procedures in these specifications, the following shall apply:

1. Compliance with the work schedule is critical to allow the complete demolition of the structures in a timely fashion. The Contractor shall coordinate with the appropriate Owner representatives on the specific days and times work is to be performed. The Contractor shall coordinate closely with the Owner and Kleinfelder representatives during the abatement project.
2. No unauthorized persons allowed on the site. The Contractor is responsible for security of their containment areas and equipment during the project.
3. Final clearance of open regulated areas will consist of visual observation only. The regulated area demarcations must be left in place until visual clearance has been conducted and the supervisor is instructed to tear down by the Consultant.
4. The Contractor shall make all necessary notifications to the appropriate regulatory agencies of the abatement project and pay the appropriate fees for permits.
5. The Contractor is required to provide personnel and area air monitoring per OSHA regulations. The air monitoring outlined in Section 4.5 is for owner protection and considered part of surveillance for proper performance and contract compliance.

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6 LIMITATIONS

This work was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions and at the date the services are provided. Our conclusions, opinions and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no other representation, guarantee or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This report may be used only by Transystems/RMC, Inc. and the registered design professional in responsible charge and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than two (2) years from the date of the report.

The work performed was based on project information provided by Transystems/RMC, Inc. If Transystems/RMC, Inc. does not retain Kleinfelder to review any plans and specifications, including any revisions or modifications to the plans and specifications, Kleinfelder assumes no responsibility for the suitability of our recommendations. In addition, if there are any changes in the field to the plans and specifications, Transystems/RMC, Inc. must obtain written approval from Kleinfelder's engineer that such changes do not affect our recommendations. Failure to do so will vitiate Kleinfelder's recommendations.

Kleinfelder offers various levels of investigative and engineering services to suit the varying needs of different clients. It should be recognized that definition and evaluation of environmental conditions are a difficult and inexact science. Judgments leading to conclusions and recommendations are generally made with incomplete knowledge of the site conditions present due to the limitations of data from field studies. Although risk can never be eliminated, more-detailed and extensive studies yield more information, which may help understand and manage the level of risk. Since detailed study and analysis involves greater expense, our clients participate in determining levels of service that provide adequate information for their purposes at acceptable levels of risk. More extensive studies, including subsurface studies or field tests, should be performed to reduce uncertainties. Acceptance of this report will indicate that Transystems/RMC, Inc.

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has reviewed the document and determined that it does not need or want a greater level of service than provided.

During the course of the performance of Kleinfelder's services, hazardous materials may have been discovered. Kleinfelder assumes no responsibility or liability whatsoever for any claim, loss of property value, damage, or injury that results from pre-existing hazardous materials being encountered or present on the project site, or from the discovery of such hazardous materials. Nothing contained in this report should be construed or interpreted as requiring Kleinfelder to assume the status of an owner, operator, or generator, or person who arranges for disposal, transport, storage, or treatment of hazardous materials within the meaning of any governmental statute, regulation, or order. The Owner is solely responsible for directing notification of all governmental agencies, and the public at large, of the existence, release, treatment or disposal of any hazardous materials observed at the project site, either before or during performance of Kleinfelder's services. The Owner is responsible for directing all arrangements to lawfully store, treat, recycle, dispose, or otherwise handle hazardous materials, including cuttings and samples resulting from Kleinfelder's services.

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APPENDIX A

Terms and Definitions

APPENDIX A
TERMS AND DEFINITIONS

Abatement: Controls and procedures used to lessen fiber release from ACM, which include encapsulation, enclosure and removal, but especially removal.

Accredited or Accreditation: (when referring to a person or laboratory): A person or laboratory accredited in accordance with section 206 of Title II of the Toxic Substances Control Act (TSCA). Also refer to 40 CFR Part 763, Asbestos Model Accreditation Plan (Federal Register, Thurs., February 3, 1994) text dealing with training requirements and possession of valid accreditation.

Action Level: An airborne concentration of asbestos of 0.1 fibers per cubic centimeter (fibers/cc) of air calculated as an eight hour Time Weighted Average (TWA). Above this level, employers must initiate certain compliance activities such as employee training and medical surveillance. See also Permissible Exposure Limit.

Aerosol: A system consisting of particles, solid or liquid suspended in air.

Air Cell: Insulation normally used on pipes and ductwork that is comprised of corrugated cardboard which frequently is comprised of asbestos combined with cellulose or refractory binders.

Air Monitoring: The process of measuring the airborne asbestos fiber content of a specific volume of air in a stated period of time.

Air Sampling Professional: Professional employed to provide technical advice and information and to conduct personal and area air monitoring or analysis schemes. Supervision of air sampling shall be conducted by a Certified Industrial Hygienist (CIH), or personnel under the direct supervision of the CIH, with specialized experience in asbestos control. All personal and air sampling results shall be evaluated by the CIH.

Airlock: A system for ingress or egress without permitting air movement between a contaminated area and an uncontaminated area, consisting of two curtained doorways at least six feet apart.

Amended Water: Water to which a surfactant has been added to decrease the surface tension to 35 dynes or less.

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Area Air Monitoring: Air monitoring of asbestos fiber concentrations outside the regulated area. Area air monitoring will conducted on each shift by the Contractor. Consultant will conduct baseline air sampling and clearance air sampling.

Asbestos: The asbestiform varieties of serpentinite (chrysotile), riebeckite (crocidolite), cummingtonite-grunerite (commonly known as amosite), anthophyllite, and actinolite-tremolite. For purposes of establishing respiratory and worker protection both the asbestiform and non-asbestiform varieties of the above minerals and any of these materials that have been chemically treated and/or altered shall be considered as asbestos.

Asbestos-Containing Building Material (ACBM): Surfacing ACBM, thermal system insulation ACBM, or miscellaneous ACBM that is found in or on interior structural members or other parts of a building that contains more than 1% by area (40 CFR Part 763).

Asbestos-Containing Material (ACM): Any material containing more than 1% by area of asbestos of any type or mixture of types. Federal OSHA defines "Asbestos Material" as any material containing at least one percent (1%) asbestos as determined by polarized light microscopy using the Interim Method of the Determination of Asbestos in Bulk Insulation Samples contained in Appendix A of Sub-part F in 40 CFR Part 763. Cal OSHA, however, has defined an ACM (referred to as an asbestos containing construction material or ACCM) more stringently as a building material containing more than 0.1% by weight.

Asbestos-Containing Waste Material: Any material, which is or is suspected of being or any material contaminated with an asbestos-containing material, which is to be removed from a work area for disposal.

Asbestos Debris: Pieces of ACM that can be identified by color, texture, or composition, or means dust, if the dust is established by an accredited consultant to be ACM. This also includes non-asbestos objects contaminated by damaged ACM prior to abatement and objects contaminated during abatement.

Asbestos Fibers: For this specification, asbestos fibers are those fibers having an aspect ratio (length to width) of 3:1 and 5 microns or longer (Phase Contrast Microscopy [PCM] methodology). For Yamate Level II Transmission Electron Microscopy (TEM)

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methodology a fiber refers to a structure as all fiber lengths and an aspect ratio of 5:1 or greater.

Authorized Visitor: The Owner, the Abatement Consultant, testing lab personnel, the Architect/Engineer, emergency personnel or a representative of any federal, state and local regulatory or other agency having authority over the project.

Barrier: Any surface that seals off the work area to inhibit the movement of fibers.

Breathing Zone: A hemisphere forward of the shoulders with a radius of approximately 6 to 9 inches.

Consultant: The Consultant is assigned to record and report on the progress of the asbestos abatement project. The Consultant, as the Owner's representative, is retained to conduct site visits, pre and post abatement visual surveys, and baseline and clearance air monitoring. The Consultant is also responsible for preparing addenda for change orders and reviewing change order requests by the Contractor.

Certified Industrial Hygienist (CIH): An industrial hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene or in specific aspects covering asbestos removal with experience in asbestos management.

Class I Asbestos Work: Activities involving the removal of thermal systems insulation (TSI) and surfacing ACM.

Class II Asbestos Work: Activities involving the removal of ACM, which is not TSI or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.

Class III Asbestos Work: Repair and maintenance operations where ACM, including TSI and surfacing ACM, may be disturbed.

Class IV Asbestos Work: Maintenance and custodial activities during which employees contact but do not disturb ACM and activities to clean up dust, waste, and debris resulting from Class I, II, and III activities.

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Clean Room: An uncontaminated area or room, which is part of the worker decontamination enclosure system, with storage for workers street clothes and uncontaminated protective equipment.

Closely Resemble: The major workplace conditions, which have contributed to the levels of historic asbestos exposure, are no more protective than conditions of the current workplace.

Competent Person: One who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, as defined by OSHA, and who has the authority to take prompt corrective measures to eliminate them (as specified in 29 CFR 1926.32 (F)). Additionally, for Class I and Class II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR Part 763) for supervisor, or its equivalent and, for Class III and Class IV work, who is trained in a manner consistent with EPA requirements for training of local education agency maintenance and custodial staff set forth at [40 CFR 793l92 (a)(2)].

Curtained Doorway: A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms, constructed by placing two overlapping sheets of poly over an existing or temporarily framed doorway, securing each along the top of the doorway, securing the vertical edge of one along one vertical side of the doorway, and securing the vertical edge of the other sheet along the opposite vertical side of the doorway.

Critical Barrier: One or more layers of poly sealed over all openings into a work area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a work area from migrating to an adjacent area.

Decontamination Area: An enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

Demolition: The wrecking or taking out of any building component, system, finish or assembly of a facility and any related razing, removing, or stripping of asbestos products.

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Disposal Bag: A properly labeled 6-mil thick leak-tight poly bags used for transporting asbestos waste from the work area to the disposal site.

Disposal: Procedures necessary to transport and deposit the asbestos contaminated material stripped and removed from the building, piping, and equipment in an approved waste disposal site in compliance with the EPA regulations.

Encapsulant: A material that surrounds or embeds asbestos fibers in an adhesive matrix, to prevent release of fibers.

Bridging Encapsulant: An encapsulant that forms a discrete layer on the surface of an in situ asbestos matrix.

Penetrating Encapsulant: an encapsulant that is absorbed by the in situ asbestos matrix without leaving a discrete surface layer.

Encapsulation: Procedures necessary to coat all ACM with an encapsulant to control the possible release of asbestos fibers into the ambient air.

Enclosure: The construction of an airtight, impermeable, permanent barrier around asbestos-containing materials to control the release of asbestos fibers into the air. The purpose is to protect employees and others outside the regulated area. Also, with proper engineering controls and planning to minimize the possible exposure to asbestos by workers inside the barrier (29 CFR 1926.1101, Appendix F).

Equipment Room: A contaminated area or "dirty" room, which is part of the worker decontamination enclosure system, with storage for contaminated clothing and equipment.

Exhaust Air Filtration System: A P100 filtered portable ventilation system designed to exhaust and clean particulate from the enclosure before releasing it to the outside. A sufficient amount of air is exhausted to create a pressure of 0.02 inches of water within the enclosure with respect to the area outside the enclosure (preferably, outside the building). This ventilation system is operated 24 hours per day or until final clean up is completed and clearance observation and acceptable air monitoring results are received from the laboratory (29 CFR 1926.1101).

Filter: A media component used in respirators to remove solid or liquid particles from the inspired air.

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Friable Asbestos Containing Material: A building material that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.

Glove bag System: A portable asbestos abatement system designed for isolation of small groups of pipe and fittings, etc., requiring asbestos removal. The bags are single use, transparent polyethylene poly with arms and protective gloves. The bags come with OSHA and EPA prescribed warning labels for bags used to dispose of asbestos.

Glove bag: An impervious poly bag-like enclosure no greater than 60x60 inches in size, typically constructed of 6-mil transparent polyethylene or polyvinylchloride poly with inward projecting long sleeved gloves, which are designed to enclose an object from which an asbestos-containing material is to be removed.

HEPA Filter Vacuum Collection Equipment (or vacuum cleaner): High efficiency particulate air filtered vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97% efficiency for retaining fibers of 0.3 microns or larger. See P100 Filter Vacuum Collection Equipment (or vacuum cleaner).

HEPA Filter: A High Efficiency Particulate Air (HEPA) filter capable of trapping and retaining 99.97 percent of mono-dispersed particles greater than 0.3 microns in diameter. See P100 Filter.

Homogeneous Area: An area of surfacing material or TSI that is uniform in color and texture and appears to have been installed at the same time.

Negative Pressure Respirator: A respirator in which the air pressure inside the respiratory-inlet covering is positive during exhalation in relation to the air pressure of the outside atmosphere and negative during inhalation in relation to the air pressure of the outside atmosphere.

Most Contaminated Worker (MCW): The employee assigned the breathing zone air sample representing the highest daily exposure in each work area (8 hour Time Weighted Average, TWA).

Negative Pressure Enclosure (NPE) System: The construction of an airtight, impermeable, barrier of any configuration around asbestos-containing materials to control the release of asbestos fibers into the air. The purpose is to protect employees

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and others outside the regulated area. Specifications deemed by OSHA regulations include: at least 4 air changes per hour; a minimum of –0.02 column inches of water pressure differential, relative to outside pressure shall be maintained within the NPE as evidenced by manometric measurements; the NPE shall be kept under negative pressure throughout the period of its use; and air movement shall be directed away from employees performing asbestos work within the enclosure, and toward a HEPA filtration or collection device. Also, use proper engineering controls and planning to minimize the possible exposure to asbestos by workers inside the barrier (29 CFR 1926.1101, Appendix F).

Negative Initial Exposure Assessment: A demonstration by the Contractor, which complies with the criteria in 29 CFR 1926-1101 (f)(2)(iii), that employee exposure during an operation is expected to be consistently below the PEL.

Negative Pressure Ventilation System: A pressure differential and ventilation system.

Non-friable Asbestos Material: Where a binder is still encapsulating the asbestos fibers and the material is not friable.

> **Category I Non-friable ACM ("non-cementatious"):** Asbestos containing packing, gaskets, resilient floor coverings, and asphalt roofing products.
>
> **Category II Non-friable ACM ("cementatious"):** ACM, excluding Category I non-friable ACM, that, when dry and in its present form, cannot be crumbled, pulverized, or reduced to powder by hand pressure. Examples include "Transite" board, pipe and asbestos cement products, plaster, stucco, paint and mastics.

P100 Filter Vacuum Collection Equipment (or vacuum cleaner): High efficiency particulate air filtered (formerly known as a HEPA filter, currently known as a P100 filter) vacuum collection equipment with a filter system capable of collecting and retaining asbestos fibers. Filters should be of 99.97% efficiency for retaining fibers of 0.3 microns or larger.

P100 Filter: A high efficiency particulate air filter (formerly known as a HEPA filter, currently known as a P100 filter) capable of trapping and retaining 99.97 percent of mono-dispersed particles greater than 0.3 microns in diameter.

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Permissible Exposure Limit (PEL): The airborne concentration of asbestos (0.1 fibers/cc) at which the employer shall ensure that no employee is exposed. Where the PEL is exceeded the employer shall establish and implement a written program to reduce employee exposure to or below the limit by (1) engineering and work practice controls, and (2) use of required proper respiratory protection. No employee shall be exposed at any time to airborne concentrations of asbestos in excess of 1.0 fibers/cc during any 30-minute period, which is the excursion limit.

Personal Monitoring: Air monitoring for asbestos fiber concentrations within the breathing zone (within 9 inches of the mouth) of an employee.

Pressure Differential and Ventilation System: A local exhaust system, utilizing P100 (HEPA) filtration capable of maintaining a pressure differential with the inside of the Work Area at a lower pressure than any adjacent area, and which cleans recirculated air or generates a constant air flow from adjacent areas into the Work Area.

Protection Factor: The ratio of the ambient concentration of an airborne substance to the concentration of the substance inside the respirator at the breathing zone of the wearer. The protection factor is a measure of the degree of protection provided by a respirator to the wearer.

Regulated Area: An area established by the Contractor to demarcate areas where Class I, II, and III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work accumulate; and a work area within which airborne concentrations of asbestos, exceed or there is a reasonable possibility they may exceed the PEL. Requirements for regulated areas are set out in 29 CFR 1926.1101 (e).

Removal: The taking out or stripping of asbestos.

Repair: Returning damaged ACM to an undamaged condition or to an intact state so as to prevent fiber release.

Respirator: A device designed to protect the wearer from the inhalation of harmful atmospheres.

Shower Room: A room between the clean room and the equipment room in the worker decontamination enclosure system, with hot and cold or warm running water and

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arranged for complete showering during decontamination. The shower room may comprise an airlock between contaminated and clean areas.

Surfacing Material: Material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes. **Surfacing ACM** is surfacing material which contains more than 1% asbestos.

Surfactant: A chemical wetting agent added to water to improve penetration, thus reducing the quantity of water required for a given operation or area.

Tack Coat: A coat of penetrating encapsulant applied to all surfaces from which ACM has been removed.

Thermal System Insulation (TSI): ACM applied to pipes, fittings, boilers, breaching, tanks, ducts or other structural components to prevent heat loss or gain.

Time Weighted Average (TWA): One or more samples representing full shift exposure for an employee in each work area. Samples should be averaged over an eight-hour workday.

Visible Emissions: Any emissions containing particulate asbestos material that are visually detectable without the aid of instruments. This does not include condensed uncombined water vapor.

Wet Cleaning: The process of eliminating asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning utensils which have been dampened with amended water or diluted removal encapsulant and afterwards thoroughly decontaminated or disposed of as asbestos-contaminated waste.

Wetting Agents: Amended water (surfactant) is used for all asbestos removal and disposal activities. Airless sprayers are used to apply amended water during removal procedures. Elimination of asbestos from building or equipment surfaces is by wetted cloths, mops and other cleaning tools.

Work Area: The area where asbestos-related work or removal operations are performed which is defined and/or isolated to prevent the spread of asbestos dust,

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fibers or debris, and entry by unauthorized personnel. Work area is a Regulated Area as defined by 29 CFR 1926.

Work Hygiene Facilities: A decontamination system for workers, equipment and clothing. It consists of a clean room; shower room and decontamination room and is normally contiguous with an enclosure.

Wrap and Cut: Removal of TSI by first double wrapping insulated pipe section with 6-mil poly sheeting and sealing both ends. The pipe section can then be cut at either end and then removed. The wrapped waste must be properly labeled.

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APPENDIX D

Response to Comments

I-5 HOV Lane Extension Project

This matrix was prepared in response to comments provided by Mr. Wayne Chiou with California Department of Transportation (Caltrans) District 12 regarding Kleinfelder's *Limited Asbestos Survey Report, Interstate 5 Bridge Structures, Interstate 5 High Occupancy Vehicle (HOV) Lane Extension Project, Orange County, California* dated June 10, 2011. Comments were provided to Ms. Karen Cohoe with Transystems/RMC in an email from Mr. Chiou dated July 6, 2011, and were subsequently forwarded by Ms. Cohoe to Kleinfelder on July 6, 2011 for response.

***EA*: OF9600**
CO-Rte-KP (PM) **12-ORA-005 PM 3.30/8.70** ***PROJECT NAME*** **I-5 HOV Lane Extension Project**
REVIEWED BY: **Mr. Wayne Chiou, Caltrans District 12** ***DATE:*** **July 6, 2011**

Comment #	Page/Sheet No.	Section	Paragraph	Comment	Kleinfelder Response
1		--		*Will these 11 sample areas on the bridges "be disturbed" during the construction (based on the current design plan)? If yes, state that in the report and in the footnote in Table 1.*	A statement has been added to the report (Section 3-Conclusions and Recommendations, bullet point 3), "ACM and assumed ACM associated with each bridge structure have the potential to be disturbed during planned construction activities". A similar statement was added to the footnotes of Table 1.
2				*Are ALL disturbed areas accessible by foot sampled at this time? If yes, state that in the report.*	While attempts were made to sample all suspect asbestos-containing materials that were observed, accessible by foot, and may be disturbed by construction activities, there is the possibility that additional suspect ACMs may be encountered during construction activities. Therefore the statement in the comment has not been added to the report. Section 1.3 (Physical Limitations) and 3 (Conclusions and Recommendations, bullet point 1) address the need to sample additional suspect ACM if observed during construction activities.
3				*For other disturbed areas that cannot be accessible by foot, cannot be surveyed by using destructive inspection and sampling methods at this time, and need to be further surveyed during the construction, please prepare a separate table to list those specific areas (based on the current design plan) and state the reason why the survey cannot be done at this time. If possible, highlight those areas in the photos and location maps.*	Table 3, "Summary of Inaccessible Suspect Asbestos-Containing Materials", was prepared to address this comment. Suspect ACM listed in Table 3 were noted based on a review of available as-built drawings for each bridge structure.

REVISED FINAL FOUNDATION REPORT

Avenida Pico Undercrossing (Replace)
Bridge No. 55-0207
San Clemente, Orange County, California
12-ORA-5, PM 3.39
Caltrans Project No. 1200020277 (EA 12-0F96A1)
EMI Project No. 11-135

EARTH MECHANICS, INC.

Geotechnical and Earthquake Engineering

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

June 21, 2013

EMI Project No. 11-135

Parsons
2201 Dupont Drive, Suite 200
Irvine, California 92612

Attention: Mr. M. Mohseni

Subject: Revised Final Foundation Report for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project, No. 1200020277, EA 12-0F96A1

Dear Mr. Mohseni:

Attached please find the Revised Final Foundation Report for the subject bridge replacement project. This report contains the findings and conclusions of our field investigation and laboratory testing program. This report also contains our recommendations for design and construction of the bridge foundations.

A Draft Foundation Report for the proposed bridge replacement, dated May 29, 2012, was submitted to Caltrans for review. The Caltrans Office of Geotechnical Design South 1 (OGDS-1) reviewed the report and provided comments in a memorandum dated Aug. 13, 2012. EMI prepared responses to the OGDS-1 review comments, which were reviewed by the Caltrans Oversight Geo-Professional Dr. Sharid Amiri at the over-the-shoulder (OTS) review meeting conducted at the EMI office on Sep. 20, 2012 with the EMI oversight engineers Lino Cheang and Mike Kapuskar. Responses to Caltrans comments were incorporated into a Final Foundation Report dated Oct. 1, 2012.

The Final Report was reviewed by Caltrans OGDS and comments were received dated Dec. 28, 2012. At an OTS review meeting at the EMI office on Jan. 9, 2013 with M. Kapuskar present, EMI's response dated Jan. 8, 2013 was discussed and was then submitted. The responses were incorporated into a Revised Final Foundation Report dated Jan. 29, 2013 and the report was reviewed by Caltrans OGDS. After an OTS review meeting on Apr. 19, 2013 with L. Cheang and M. Kapuskar present, Caltrans comments dated were received that day. EMI prepared a response dated Apr. 23, 2013. The responses were incorporated into Revised Report dated April 29, 2013. After over-the-shoulder review between May 8 and 17, 2013, review comments were received May 21, 2013. The EMI responses and Caltrans email requests received to date were incorporated into the subject report. All Caltrans review memoranda and EMI responses and requested backup are attached in Appendix D.

The subject report was approved by OGDS-1 on June 20, 2013. The approval letter is included in the beginning of Appendix D.

We appreciate the opportunity to provide geotechnical design services for this project. If you have any questions, please call us.

Sincerely,

EARTH MECHANICS, INC.

Mike Kapuskar, PE, GE
Senior Engineer 6/21/13
MK/wd/lcc

6/21/13

Lino Cheang, GE 2345
Project Manager

17800 Newhope Street, Suite B, Fountain Valley, California 92708 Tel: (714) 751-3826 Fax: (714) 751-3928

REVISED FINAL FOUNDATION REPORT

AVENIDA PICO UNDERCROSSING (REPLACE)
BRIDGE NO. 55-0207
SAN CLEMENTE, ORANGE COUNTY, CA
12-ORA-5, PM 3.39
CALTRANS PROJECT NO. 1200020277 (EA 12-0F96A1)

Prepared for:

Parsons
2201 Dupont Drive, Suite 200
Irvine, California 92612

Prepared By:

Earth Mechanics, Inc.
17800 Newhope Street, Suite B
Fountain Valley, California 92708

EMI Project No. 11-135

May 30, 2013

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF STUDY

This Revised Final Foundation Report presents the findings and conclusions of a geotechnical investigation conducted by Earth Mechanics, Inc. (EMI). It presents foundation design and construction recommendations for proposed replacement of the Interstate 5 (I-5)/Avenida Pico Undercrossing (UC) in San Clemente, Orange County, California. A site location map is presented in Figure 1.

EMI is a subconsultant to Parsons. The geotechnical services provided for this project included the following tasks:

- Collection and review of existing geotechnical information,
- Site-specific field exploration consisting of drilling and logging exploratory borings and cone penetration test,
- Laboratory testing of selected bulk and relatively undisturbed soil/bedrock samples,
- Engineering calculations and analysis to develop foundation design and construction recommendations, and
- Preparation of this report presenting our findings, conclusions, and recommendations.

1.2 PROJECT DESCRIPTION

The California Department of Transportation (Caltrans), in cooperation with the Orange County Transportation Authority (OCTA) and the City of San Clemente proposes to improve the I-5 corridor. The project extends along I-5 from approximately 0.47 miles south to 0.37 miles north of Avenida Pico (I-5 Mainline Sta. 167+00 to 210+00).

Major proposed improvements to the interchange include widening of the I-5 and addition of an HOV lane in both directions, reestablishing auxiliary lanes, realignment of the four ramps, realignment and widening of Avenida Pico roadway, new retaining walls, and new sign structures. This project proposes to replace the existing bridge structure to accommodate additional traffic lanes on I-5 and Avenida Pico.

The existing bridge was built in 1958 and widened in 1979. The existing UC is a three-span structure over Avenida Pico. The existing bridge has a total length of approximately 164 ft measured along the centerline of I-5 and a total width of approximately 140 ft. The bridge currently carries four lanes of traffic each way. Avenida Pico currently has two traffic lanes each way. The original bridge is supported on spread footing, and the widened bridge is supported on 16" diameter cast-in-drilled-hole (CIDH) piles. Pertinent foundation data as shown on the as-built plans is summarized in Table 1.

The new bridge will be constructed with cast-in-place prestressed concrete box girder. It will be built in two stages. In Stage 1, the southbound bridge will be constructed, followed by Stage 2 in which the northbound bridge will be constructed.

Table 1. As-Built Foundation Data

For Existing Bridge

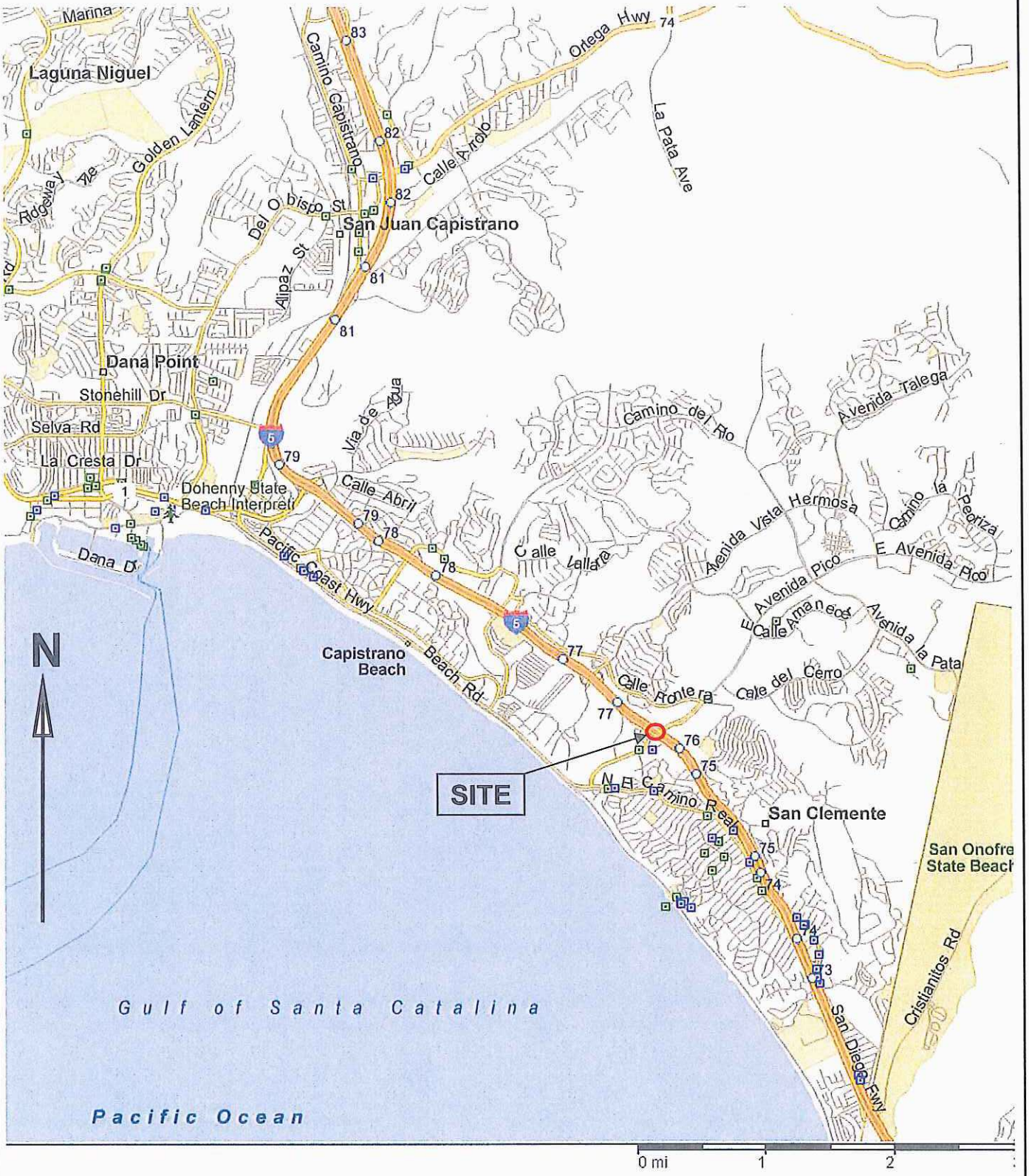
Support Location	Footing Bottom El.* (ft)	Foundation Type	Allowable Footing Pressure (tsf)
Abutment 1	104.0 to 105.5	Spread Footing	3
Bent 2	88.0	Spread Footing	3
Bent 3	88.0	Spread Footing	3
Abutment 4	108.0 to 109.5	Spread Footing	3

Note: * Based on 1958 Datum on As-Built Plans.

For Widened Bridge

Support Location	Footing Bottom El.* (ft)	Foundation Type	Design Load (tons)	Specified Tip El. (ft)
Abutment 1	104.0 to 105.5	16-inch CIDH piles	70	65
Bent 2	86.7	16-inch CIDH piles	70	65
Bent 3	86.7	16-inch CIDH piles	70	70
Abutment 4	108.0 to 109.5	16-inch CIDH piles	70	70

Note: * Based on 1979 Datum on As-Built Plans.



I-5 HOV Improvement Project, Segment 1 Avenida Pico Bridge (Replace)	SITE LOCATION MAP Figure 1
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Project No. 11-135 | Date: 03-29-12

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 EXISTING INFORMATION

As-built Log-of-Test-Borings (LOTB) sheets are included in Appendix A. The as-built LOTB sheet for the original bridge construction shows two penetrometer borings and two rotary borings performed in 1955. The as-built LOTB sheet for the bridge widening shows one penetrometer boring, four soil tube borings, and two rotary borings performed in 1967. The top-of-hole elevations of these borings vary from about +91 to +101 ft, and the deepest boring was advanced to about El. +30 ft.

2.2 SUPPLEMENTAL FIELD INFORMATION

To supplement existing subsurface information, a site-specific field investigation was conducted at the bridge site between September 26 and October 16, 2011. During this investigation, four soil borings and one cone penetration test (CPT) were conducted at the subject bridge site. Locations of the borings and the CPT are shown on the LOTB sheets provided in Appendix A. The locations and elevations were provided by the project surveyor based on California Coordinate System (CCS) 83 (1991.35) Zone 6 and vertical datum NAVD 1988. The borehole data is summarized in Table 2.

Table 2. Geotechnical Exploration Information

Boring	Easting (ft)	Northing (ft)	"A" Station (ft)	Offset (ft)	Top of Boring El. (ft)	Depth (ft)	Ground-water El. (ft)	Drilling Method
A-11-114	6,143,022	2,105,978	190+05	29 Lt.	+117.5	101.5	+49.5	HSA
A-11-115	6,143,249	2,106,012	188+36	126 Rt.	+113.5	100.4	+53.0	HSA
CPT-11-115	6,143,249	2,106,012	188+36	126 Rt.	+113.5	84.8	NM	CPT
A-11-116	6,142,997	2,106,170	191+34	115 Rt.	+121.0	89.2	NE	HSA
A-11-117	6,142,778	2,106,149	193+04	25 Lt.	+125.5	101.4	NE	HSA

Notes: NE=Not Encountered; NM=Not Measured; HSA=Hollow-Stem Auger Boring; CPT=Cone Penetration Test

Boring A-11-115 and CPT-11-115 were performed at the same location in order to calibrate the CPT data.

2.2.1 Soil Borings

Hollow-stem auger (HSA) borings were drilled using a CME 75 truck-mounted drill rig equipped with 8" diameter hollow-stem augers. Sampling was performed by alternating the Modified California Drive (MCD) sampler and Standard Penetration Test (SPT) sampler. The soil sampling interval was 5 ft. Relatively undisturbed soil samples were obtained using a 3.25"

outer diameter MCD sampler lined with brass rings. Each of these brass rings is 1" long with a 2.5" outside diameter. The SPT sampler (1.4" inside diameter) was also used to obtain soil samples. The MCD and SPT samplers were driven 18" into the ground or until refusal was encountered using a 140-lb hammer free falling from a height of 30". The numbers of blows to advance the sampler each 6" of penetration were recorded. The number of blows for the final 12" or shorter of driving was recorded on the boring logs. Charts published by Winterkorn and Fang (1975) were used to obtain a reduction factor of 0.5 for this project to convert MCD sampler blowcounts to SPT-equivalent blowcounts. The SPT hammer energy measurements for this drill rig were performed by SPT CAL under subcontract with 2R Drilling on April 14, 2011. The SPT hammer energy report is provided in Appendix D.

2.2.2 Cone Penetration Testing

The CPT sounding was performed adjacent to the location of soil boring for calibration purposes. The CPT used an electronic cone penetrometer in general accordance with current ASTM Standards (ASTM D5778 and D3441). The CPT equipment used hollow sounding rods with a probe with a conical tip with a 60° apex angle and a projected cross sectional area of 1.55 in² and a cylindrical friction sleeve with a surface area of 23.25 in². The interior of the cone penetrometer is instrumented with strain gauges that for cone tip and friction sleeve resistance measurement during penetration. The cone penetrometer assembly is continuously pushed into the soil by a set of hydraulic rams at a standard rate of 0.79" per second while the cone tip resistance and sleeve friction resistance are recorded every 1.967". The 25-ton dead weight of the truck provides the required reaction weight for pushing the rods and is used to transport and house the testing equipment. The computer generated graphical logs include tip resistance, friction resistance, and friction ratio. Soil behavior type interpretations are based on guidelines by Robertson and Campanella (1989).

2.3 LABORATORY TESTING

Laboratory tests were performed on representative samples of soil and bedrock to determine or derive their relevant physical and engineering properties. A list of tests performed, the corresponding test methods, and purpose of testing is presented in Table 3.

The laboratory tests were conducted in general accordance with California Test Methods or American Society for Testing and Materials (ASTM) Standards. Laboratory test results are included in Appendix B.

R-value and compaction tests indicated on the LOTB's in Appendix A were performed for pavement design. Those tests were not used for the purpose of this report and are omitted from Appendix B.

Table 3. Explanation of Laboratory Tests Performed

Type of Test	Applicable Test Method	Purpose
Unit Weight	ASTM D 4767	Estimate in-situ unit soil weight
Moisture Content	ASTM D 2216	Estimate in-situ soil moisture content
No. 200 Wash	ASTM D 1140	Determine the percentage of fine grained particles of soil
Atterberg Limits	ASTM D 4318	Determine plasticity of fine-grained soil
Consolidation	ASTM D 2435	Determine compressibility of fine-grained soil
Direct Shear	ASTM D 3080	Determine strength parameters of coarse-grained soil
Unconsolidated-Undrained Triaxial	ASTM D 2850	Estimate strength parameters of fine-grained soil
R-Value	ASTM D2844	Estimate resistance for pavement design
Compaction	CT 216	Determine maximum density and optimum moisture of soil
Soil pH	CT 532/643	Determine corrosion potential of soil
Minimum Resistivity	CT 532/643	Determine corrosion potential of soil
Sulfate Content	CT 417	Determine corrosion potential of soil
Chloride Content	CT 422	Determine corrosion potential of soil

Notes: 1. ASTM = American Society for Testing and Materials.
2. CT = California Test Method.

3.0 GEOLOGY

3.1 PHYSIOGRAPHY

The project area is in the northwestern part of the Peninsular Ranges physiographic province. The Peninsular Ranges comprise a northwest-southeast trending group of fault-bounded ranges between the Salton Trough and the Pacific Ocean. The Santa Ana Mountains, Puente Hills, and San Joaquin Hills are ranges within the Peninsular Ranges. The site is located on the low lying rolling hills westerly of the Santa Ana Mountains at the southerly end of the San Joaquin Hills in an area referred to as the Capistrano Embayment.

3.2 GEOLOGIC STRUCTURE

The Peninsular Ranges are characterized by northwest-southeast trending mountains and valleys that have been faulted and uplifted by northwest-southwest trending faults. The Capistrano Embayment is a relatively flat structural trough of Miocene to Pliocene age. The trough is bordered on the east by the Cristianitos Fault. Active geologic faults in the region are shown on Figure 2. California Geological Survey maps do not show any active faults at the site (Jennings, 2010). The nearest known major active faults are the Newport-Inglewood Structural Zone about 5 miles southwest of the site in the offshore area, the Palos Verdes fault about 19 miles to the west, also in the offshore area, and the Elsinore fault about 35 miles to the northeast. A subsurface fault, the San Joaquin Hills blind thrust, is postulated west of the site at a depth of about 2.5 to 3 miles. Other nearby faults such as the Cristianitos fault and Mission Viejo faults are about 3.5 to 7 miles east of the site but are not believed to be active.

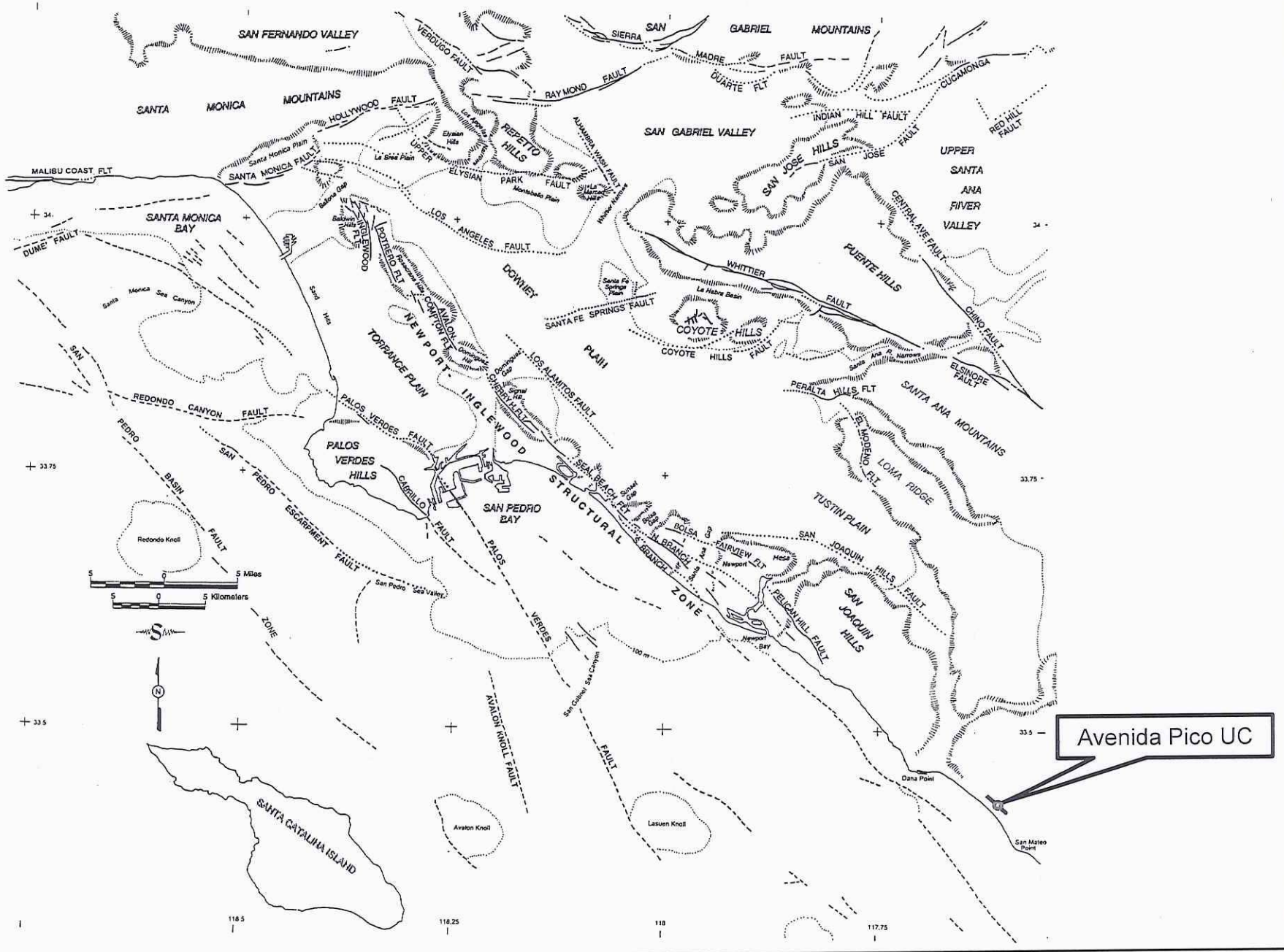
3.3 GEOLOGIC HAZARD

The geological hazards present in the project area include landsliding, liquefaction and earthquake shaking. The area lies outside identified tsunami inundation zones (California Geological Survey, 2009), and there are no large bodies of water within the site area that could generate a standing wave (seiche). There are no volcanos in the region and there are no known active surface faults within the project area, therefore ground rupture is not a hazard.

The project area is composed of predominantly medium to high-plasticity fine-grained soils (lean and fat clays and silts) and sedimentary bedrock. The California Geological Survey Seismic Hazard Zone map (2002a, b) shows that the area of the Segunda Deshecha Canada (Avenida Pico) underlain by young alluvium may be susceptible to liquefaction during a strong earthquake (see Figure 3). Soil liquefaction is expected to be low and is evaluated further in Section 5.4.

An area of Capistrano Formation bedrock identified as having potential for landslides as a result of earthquake shaking exists on the slopes descending to Avenida Pico and the northbound On-Ramp from Avenida Pico (EMI, 2012). Several existing landslides have been identified in this area by Leighton and Associates (1979, 1980 1991, 1999, and 2001) during investigations for the tract development at the top of these slopes and the surrounding area. The landslides originate on the slopes descending from the Saint Andrew's by the Sea United Methodist Church located at 2001 Calle Frontera. This church property is located approximately 500 ft to the north of the project site. The closest landslide is on the slopes to the east of the northbound I-5 on-ramp. The

closest point of the landslide is approximately 200 ft north of proposed Abutment 2. This landslide is considered old and inactive (Leighton, 1979). These landslides do not have an impact on the design and construction of the proposed bridge foundations due to the large distances from the proposed construction.



I-5 HOV Improvement Project, Segment 1
Avenida Pico UC (Replace)

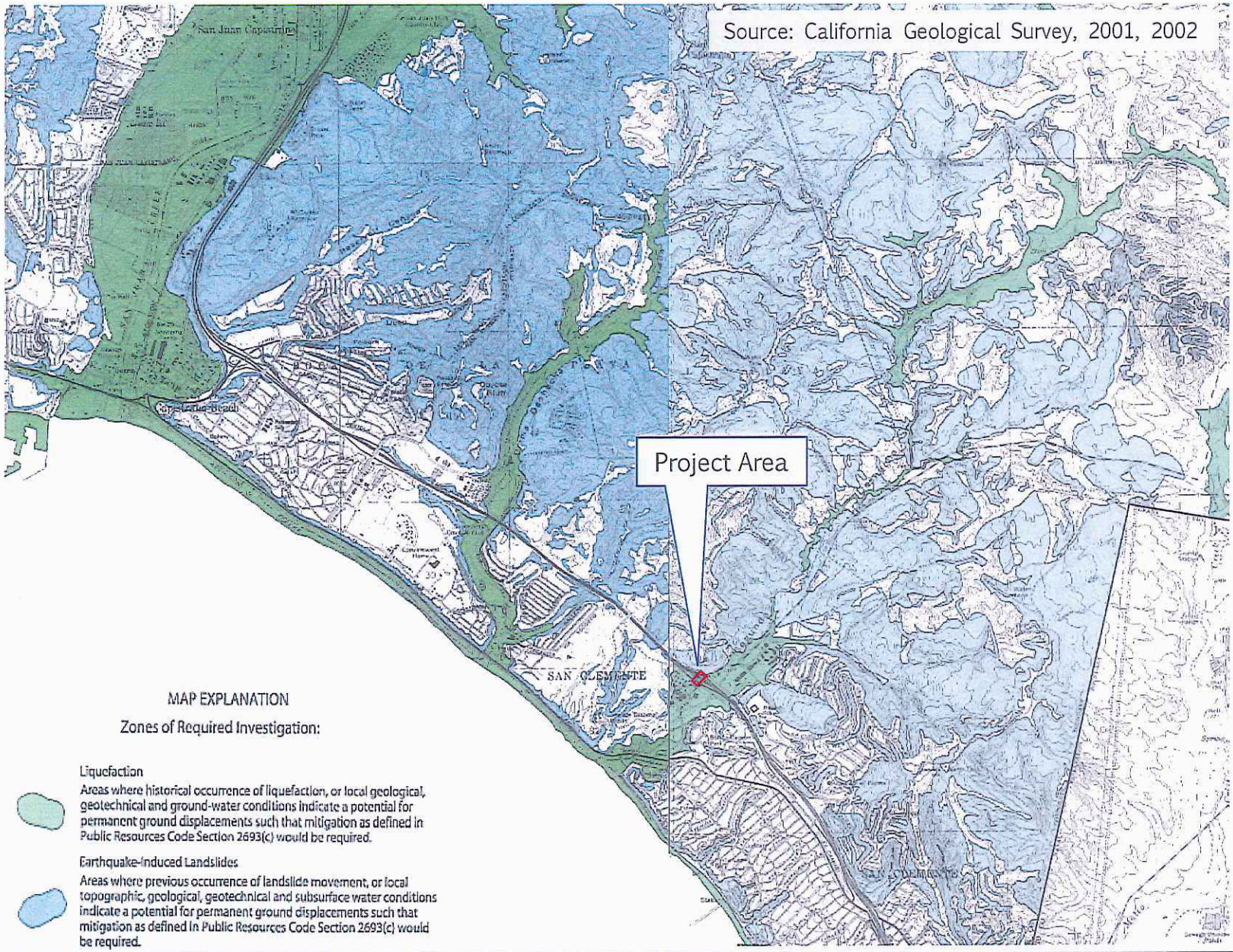
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

REGIONAL MAP OF ACTIVE FAULTS AND PHYSIOGRAPHY

Figure 2

Project No. 11-135

Date: 06-29-12



Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-5 HOV Improvement Project, Segment 1
Avenida Pico UC (Replace)

Project No. 11-135

Date: 06-29-12

Seismic Hazard Map
Figure 3

4.0 SUBSURFACE CONDITIONS

4.1 SUBSURFACE CONDITIONS

The existing I-5 roadway grade elevation at the bridge abutments is between +122.5 ft and +125.5 ft. Existing Avenida Pico roadway grade is near El. +97 ft. Based on the recent field investigation and as-built LOTB sheets (see Appendix A), the site is underlain primarily by about 35 ft of fill materials followed by Terrace Deposits and bedrock of the Capistrano Formation. The fill materials primarily consist of lean clays and silts with occasional pockets of sand. The Terrace Deposits consist of medium stiff to stiff lean clays and silt. The bedrock of Capistrano Formation consists of claystone and siltstone. The upper part of the bedrock is typically weathered and has the consistency of stiff fat clay. The bedrock contact was found at about El. +36 ft at Abutment 1 and about +80 ft at Abutment 2.

4.2 GROUNDWATER CONDITIONS

The as-built plans for existing Avenida Pico UC include LOTB sheets that show groundwater was not encountered above El. +40 ft in 1955 and El. +37 ft in 1967. The California Geological Survey (2002b) quadrangle map for San Clemente indicate a highest historical groundwater depth of 5 to 10 ft below original bottom of nearby Segunda Desecha canyon which significantly lower than current roadway grades within the project extents. Groundwater was encountered at borings A-11-114 and A-11-115 at about El. +49.5 and +53 ft during drilling in September and October, 2011, but not in other nearby borings. The soil borings indicate a lack of continuous pervious soil units. These findings suggest that groundwater in the project area is perched. Nevertheless, groundwater during construction may be different from those reported above because groundwater level can fluctuate due to variations in seasonal precipitation, construction activities, or other man-made and natural influences. The highest measured groundwater elevation of +53 ft was used for subsequent analyses.

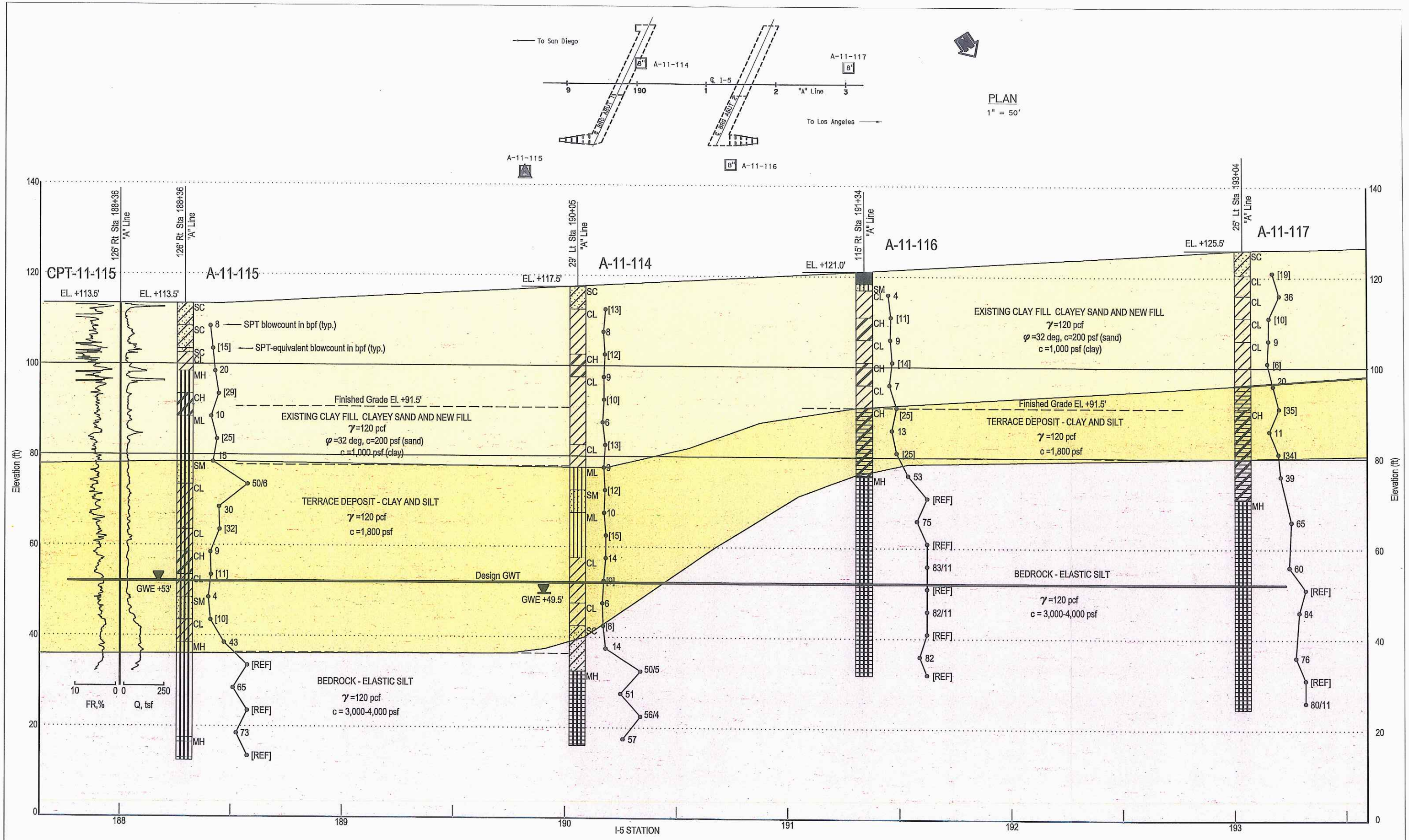
4.3 IDEALIZED SOIL PROFILE

The idealized soil profile is shown in Figure 4 and design strength parameters for foundation design are presented in Table 4. The soil unit weights are averages of the laboratory-measured values. The soil strength parameters were based on laboratory test results (direct shear, unconsolidated undrained, and pocket penetrometer), and interpretation of the CPT data (Robertson and Campanella, 1989). They were also compared to strength correlations with SPT blowcounts (Lam and Martin, 1986). Undrained shear strengths of the bedrock obtained from the laboratory tests ranged from 1,800 psf for shallow stiff clay to greater than 9,000 psf for hard deep siltstone. Undrained shear strengths of the bedrock obtained from correlation with CPT-11-115 varied from 2,000 psf for stiff claystone to 9,000 psf for hard siltstone. The soil strengths correlated from CPT data were found to be slightly higher than laboratory-measured strengths. The design undrained shear strength values shown in the table are conservative values for the purpose of pile capacity evaluation for the subject foundations.

Table 4. Idealized Soil Profile and Strength Parameters

Approx. Elevation (ft)	Predominant Soil/Bedrock Type	Equivalent SPT Blowcount (blows/ft)	Total Unit Weight (pcf)	Friction Angle	Undrained Shear Strength/ Cohesion (psf)
Abutment 1 (Based on Borings A-11-114 and A-11-115 and CPT-11-115)					
+117.5 to +78	Existing Fill – Clay Clayey Sand & New Fill	10 to 36 (Average=17)	120	- 32°	1,000 200
+78 to +36	Terrace Deposit – Clay and Silt	11 to 40 (Average=16)	120	-	1,800
+36 to +16	Bedrock – Elastic Silt	65 to 91 (Average=76)	125	-	3,000-4,000
Abutment 2 (Based on Borings A-11-116 and A-11-117)					
+125.5 to +90	Existing Fill – Clay Clayey Sand & New Fill	5 to 45 (Average=16)	120	- 32°	1,000 200
+90 to +80	Terrace Deposit – Fat Clay	14 to 44 (Average=28)	120	-	1,800
+80 to +24	Bedrock – Elastic Silt	48 to >100 (Average=85)	125	-	3,000-4,000

Notes:
(1) SPT blowcounts were corrected for sampler size as described in Section 2.1.
(2) Refusal blowcounts were ignored for determining average equivalent SPT blowcounts.



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-5 HOV Widening Segment 1		IDEALIZED SOIL PROFILE
	Project No. 11-135	Date: May 21, 2013	FIGURE 4

5.0 SEISMICITY AND GEO-SEISMIC HAZARDS

5.1 SEISMIC STUDIES

The project is in seismically active southern California. The present-day seismotectonic stress field in the Los Angeles region is one of north-northeasterly compression. This is indicated by the geologic structures, by earthquake focal-mechanism solutions, and by geodetic measurements. These data suggest crustal shortening of between 5 and 9 mm per year (0.2" and 0.35" per year) across the greater Los Angeles area (Argus et al., 1999).

Historical earthquake epicenter maps show widespread seismicity throughout the region. Although historical earthquakes occur in proximity to known faults, they are difficult to directly associate with mapped faults. Part of this difficulty is due to the fact that the basin is underlain by several poorly known subsurface thrust faults, generally referred to as blind thrust faults. Ward (1994) estimated that about 40% of seismic moment cannot be associated with known faults. Earthquakes occur primarily as loose clusters along the Newport-Inglewood Structural Zone (NISZ), the southern margin of the Santa Monica Mountains, the margin between the Santa Susana-San Fernando Valley and the southern margin of the San Gabriel Mountains, and in the Coyote Hills-Puente Hills area. There is no clustering or alignment of earthquakes in proximity to the site. There are fewer earthquakes in the site region than anywhere else in the Los Angeles Basin area. This apparent lack of earthquake activity suggests that the site area is tectonically stable and suggests that there are no unrecognized active faults at the site.

The largest historical earthquake within the Los Angeles Basin was the 1933 Long Beach event which had a magnitude of about moment magnitude $M_W = 6.4$ ($M_L = 6.3$). This earthquake did not rupture the surface but is believed to have been associated with the Newport-Inglewood Structural Zone (Benioff, 1938). The association was based on abundant ground failures along the NISZ trend but no unequivocal surface rupture was identified. Reevaluation of the seismicity data by Hauksson and Gross (1991) relocated the 1933 earthquake hypocenter to a depth of about 6 miles below the Huntington Beach-Newport Beach city boundary.

Other major earthquakes in the region include the 1994 Northridge and the 1971 San Fernando earthquake both of which occurred in the San Fernando Valley region. The 1994 earthquake had a MW of about 6.7 ($M_S = 6.8$, $M_L = 6.4$), and occurred on a southerly dipping subsurface fault which was unknown prior to the earthquake. The main shock occurred at a depth of about 19 km (11.9 miles). Earthquake aftershocks clearly defined the rupture surface dipping about 35° southerly from a depth of about 2 or 3 km to 23 km (1.25 or 1.8 miles to 14.3 miles) (Hauksson et al, 1995). The causative fault was never identified with certainty. The event may have occurred on an eastern extension of the Oakridge fault (Yeats and Huftile, 1995), a southerly dipping feature fault bounding the Ventura Basin and the Santa Susana Mountains.

The 1971 San Fernando earthquake was of similar size ($M_W = 6.7$, $M_S = 6.4$, $M_L = 6.4$) to the 1994 event but did involve surface rupture. The 1971 event occurred on a northerly dipping thrust fault that dips from the northern side of the San Fernando Valley to a depth of about 15 km (9.4 miles) under the San Gabriel Mountains. Several mapped surface faults were involved such as the Sylmar fault, Tujunga fault, and Lakeview fault. These faults are commonly considered to

be part of the Sierra Madre fault system which extends easterly from the San Fernando Valley, along the base of the San Gabriel Mountains on the north side of the San Gabriel Valley, and to the Cucamonga fault in the San Bernardino area. The 1987 Whittier earthquake (M_L = 5.9, M_W = 5.9) occurred on a subsurface fault dipping under the Puente Hills to about 10 miles beneath the San Gabriel Basin (Shaw and Shearer, 1999; Shaw et al., 2002). This event did not rupture the ground surface.

A magnitude 5.4 earthquake occurred at a depth of about 9 miles (15 km) on 29 July 2008. The epicenter was in the Chino Hills area between the Chino fault and the Whittier fault. Preliminary data were inconclusive with regard to the causative fault. Detailed analysis by Shao and Hauksson (2009) indicated a rupture plane striking N71°W, dipping 62° northeast. They suggested a preference for the Whittier fault being the causative fault but were uncertain, primarily because the Whittier fault is supposed to dip much steeper (~80°). The aftershock pattern formed a subhorizontal alignment indicating the possibility that the event could have been associated with a subsurface thrust fault such as one of the blind faults of the Puente Hills Blind Thrust Fault System or with a blind fault under the Peralta Hills.

Another significant earthquake was the 1812 earthquake which caused damage at the San Juan Capistrano Mission. The location and magnitude of the 1812 earthquake are unknown because of the sparse population at the time, but geological studies (Jacoby et al., 1987; Fumal et al., 1993; Weldon et al., 2004) postulate that it did not occur in the Capistrano area, but rather was a large (M>7.0) distant event on the San Andreas fault in the Wrightwood area of the San Gabriel Mountains.

The earliest documented earthquake in the region was reported by the Portola´ expedition as they camped near the Santa Ana River in 1769. This event has been attributed by various geoscientists to just about every fault in the Los Angeles area but it could just as well have been a distant event that shook a wide area as did the 1971 San Fernando, the 1987 Whittier, and the 1994 Northridge events, as well as many other more-distant events (for example, 1992 Landers event).

5.2 GROUND RUPTURE

No active faults are mapped at this site. Therefore, the potential for surface fault rupture is considered to be low.

5.3 CALTRANS ARS CURVE

5.3.1 Development of Vs30

Small-strain shear wave velocities (V_{s30}) were calculated using correlations with SPT blowcounts per Caltrans Geotechnical Services Design Manual (2009d) for the upper 100 ft of subsurface materials obtained from the four soil borings. The calculated values are presented in Table 6.

5.3.2 Development of Caltrans ARS Curve

ARS curves were developed in accordance with Caltrans Seismic Design Criteria (SDC) (2010a) and Geotechnical Services Design Manual (2009d) procedures. The resulting ARS curve is the envelope of the following spectra:

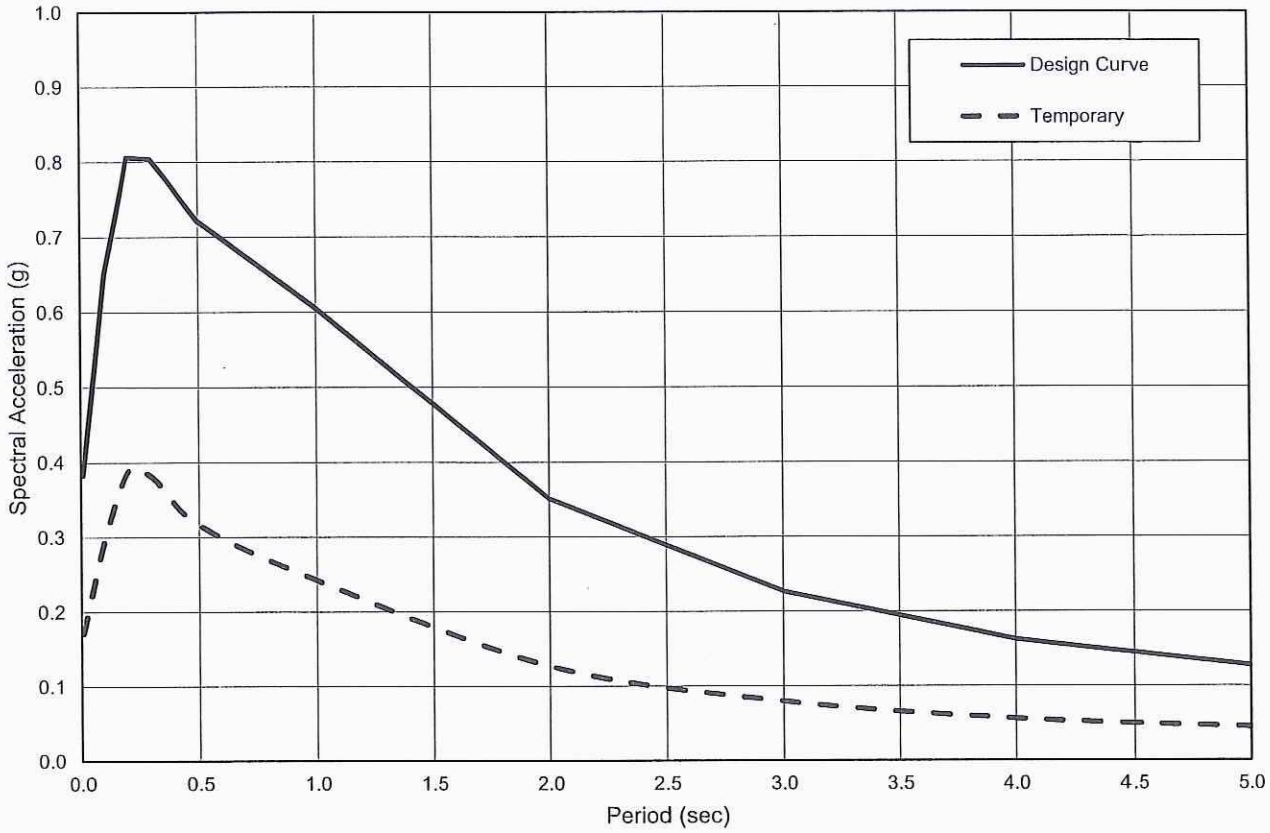
- Deterministic criteria based on late-Quaternary faults listed in the 2007 fault database with current updates (Shantz and Merriam, 2009; Caltrans, 2009a),
- Probabilistic criteria based on 5% in 50 years probability of exceedance ground motion, and
- Minimum (floor) deterministic spectrum based on a M_W=6.5 strike-slip event occurring at a distance of 7.5 miles (12 km) from the site.

Deterministic ARS curves were first developed using the Caltrans, Geotechnical Services Design Manual (2009d). The spreadsheet uses the arithmetic average of two Next Generation Attenuation (NGA) relationships developed by Chiou-Youngs (2008) and Campbell-Bozorgnia (2008) with the parameters listed in Table 5. The controlling fault nearest the project area is the Newport-Inglewood-Rose Canyon fault which is a Right Lateral Strike-Slip fault with a maximum earthquake magnitude of 7.5. The site-to-fault distance is about 7.5 km (4.7 miles). A near-fault factor was applied since the bridge location is within 15 km (9.4 miles) of the fault. A basin factor was not applied since the bridge is located outside of the limits of the Los Angeles Basin. The results were then verified against the Caltrans ARS Online web tool (2009b).

The probabilistic response spectrum was then developed based on data from the 2008 United States Geological Survey (2008a) National Seismic Hazard Map for the 5% in 50 years probability of exceedance (975-year return period) ground motion. To develop the probabilistic spectrum, the Caltrans Probabilistic Response Spectrum Spreadsheet and the USGS Interactive Deaggregation Tool (2008a) were used. Results obtained from both the spreadsheet and deaggregation tool were then verified with the Caltrans ARS Online web tool (2009b).

ARS curves were developed for each V_{s30} value. The design ARS curve based on the arithmetic mean of the ARS curves for each V_{s30} value is presented in Figure 5 together with the digitized coordinates. As shown in Figure 5, a peak ground acceleration (PGA) of 0.382g is obtained from the design ARS curve.

Figure 5 also shows a curve for temporary bridge and stage construction based on 10% probability of exceedance in 10 years following the requirements of Memo To Designers 20-2 (2011).



Latitude = 33.4389 °
Longitude = -117.6225 °
Damping Ratio = 5%

Spectral Coordinates		
	Acc. (g)	
Period (sec)	Design	Temporary
0.010	0.382	0.171
0.100	0.651	0.298
0.200	0.806	0.388
0.300	0.804	0.381
0.500	0.720	0.316
1.000	0.605	0.242
2.000	0.351	0.127
3.000	0.227	0.079
4.000	0.162	0.056
5.000	0.127	0.045

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**Avenida Pico UC (Replace)**	**Design ARS Curves**
	Project: 11-135 **Date: 06/29/12**	**Figure 5**

Table 5. Seismic Site Characteristics and Deterministic Controlling Fault Parameters

Site Characteristics	
Site Coordinates	Latitude = 33.4389° Longitude = -117.6225°
Depth to V_s=1.0 km/s, $Z_{1.0}$	Site is not in deep sedimentary basin, therefore basin amplification factors = 1
Depth to V_s=2.5 km/s, $Z_{2.5}$	
Deterministic Controlling Fault Parameters	
Fault Name	Newport-Inglewood-Rose Canyon Fault (Offshore or Dana Point)
Fault ID	222
Fault Type	Right Lateral Strike Slip (RLSS)
Fault Dip	90°
Dip Direction	Vertical
Top of Rupture Plane	0 miles (0 km)
Bottom of Rupture Plane	8.12 miles (13.0 km)
R_{RUP}[1]	4.68 miles (7.48 km)
R_{JB}[2]	4.68 miles (7.48 km)
R_X[3]	4.68 miles (7.48 km)
F_{rv} (1 for reverse, 0 for others)	0
F_{nm} (1 for normal, 0 for others)	0
Hang Wall	No
Near-Field Factor Required	Yes, up to 1.2

Notes: (1) R_{RUP} = closest distance from the site to the fault rupture plane.
(2) R_{JB} = Joyner-Boore distance (shortest horizontal distance to surface projection of rupture area).
(3) R_X = horizontal distance from site to fault trace or surface projection of top of rupture plane.

Table 6. Small-Strain Shear-Wave Velocity

Boring	Source of Shear-Wave Velocity	Small Strain Shear-Wave Velocity V_{S30} (ft/sec)
A-11-114	SPT Correlations	734
A-11-115	SPT Correlations	869
A-11-116	SPT Correlations	1,046
A-11-117	SPT Correlations	1,072

5.4 LIQUEFACTION

The liquefaction potential of saturated, granular materials below the groundwater table was evaluated using the procedures outlined by Seed et al. (1983), Seed and Harder (1990), and updated by NCEER (1997). Results of the liquefaction analyses for the controlling soil condition are included in Appendix C. Soil liquefaction analysis was performed using the available site-specific subsurface information from borings and CPT presented in Table 2. As discussed in Section 4.2, a groundwater elevation of +53 ft (corresponding to a groundwater depth of 38 ft below lowest proposed Avenida Pico finished road grade near El. +91 ft) was used for the

liquefaction analyses. For the controlling soil condition, no liquefiable soil layers were identified due to low groundwater, high blowcount, and/or high fines content. Similarly, the other soil borings in the bridge area also do not have liquefiable layers. As described in Section 3.3, the California Geological Survey (CGS, 2002b) also indicates that the project area has a low susceptibility to liquefaction during a strong earthquake. As a result, the liquefaction potential of the site soils is found to be low and not considered a design issue.

5.5 LATERAL SPREADING

Due to the low liquefaction potential, lateral ground spreading is not considered a design issue.

5.6 SEISMIC SETTLEMENT

The seismically-induced settlements are presented in Appendix C. Liquefaction-induced settlement is negligible. Seismically-induced dry sand settlements were calculated from SPT and CPT data. For the controlling soil condition and an assumed high groundwater condition, seismically-induced dry sand settlements were about 1/3" or less. As a result, seismically-induced dry sand settlements for the bridge site are considered negligible and not expected to adversely impact the proposed structure foundations.

6.0 SOIL CORROSIVITY

A total of three (3) soil samples were tested to determine minimum resistivity, pH, soluble sulfate content, and soluble chloride content using procedures described in California Test Methods 417, 422, and 643, respectively. The test results are shown in Table 7.

According to Caltrans Corrosion Guidelines (2003), soils are considered corrosive if the pH is 5.5 or less, or the sulfate concentration is 2,000 ppm or greater, or the chloride concentration is 500 ppm or greater. Based on the test results and the Caltrans criteria, the on-site earth materials are corrosive to concrete and bare metals. Consequently, proposed structures in contact with the on-site earth materials should be designed for the corrosive environment.

Based on the measured chloride concentrations, the minimum concrete cover over reinforcement for structural elements in contact with onsite soils should be in accordance with Table 8.22.1 of the Caltrans BDS (2004) for "Corrosive soil above MLLW level with chloride concentration between 500 and 5,000 ppm." Based on the sulfate concentrations, a cement type in accordance with Table 8.22.2 of Caltrans BDS for "Sulfate Concentration from 2,000 to 15,000 ppm" is recommended. Additional corrosion protection requirements for concrete structural members are presented in Section 8.22 of Caltrans BDS.

Table 7. Soil Corrosion Test Results

Boring	Location		Sample Depth (ft)	Soil Type (USCS)	Minimum Resistivity (ohm-cm)	pH	Soluble Sulfate Content (ppm)	Soluble Chloride Content (ppm)
	"A" Sta. (ft)	Offset (ft)						
A-11-115	188+36	126 Rt.	5	SC	410	7.2	560	1,281
A-11-116	191+34	115 Rt.	5	CL	250	7.3	950	2,029
A-11-117	193+03	25 Lt.	35	CH	170	5.6	5,060	1,950

7.0 SCOUR

The bridge site does not cross a channel or basin. Therefore, scour potential is not considered a design issue.

8.0 FOUNDATION RECOMMENDATIONS

8.1 FOUNDATION DESIGN

The abutments have a southbound portion (Stage-1) and a northbound portion (Stage 2). The two proposed wing walls are located at the north side of the Stage-2 abutments. A stand-alone pilaster is proposed at the tail end of each wingwall. Two mechanically stabilized embankment (MSE) walls with two pilasters are proposed at the south side of the Stage-2 abutments and are addressed in a separate EMI project report (2013).

8.1.1 Foundation Type

The foundation data of the existing bridge shown in the as-built plans are summarized in Table 8.

Table 8. As-Built Foundation Data for Original Bridge

Bridge	Support	Foundation Type	Bottom of Footing El. (ft)	Design Load	Spec. Pile Tip El. (ft)
Original Bridge in 1958	Abut 1	Shallow Footing	+104.0 and +105.5	3 tsf	NA
	Bents 2 and 3	Shallow Footing	+88.0	3 tsf	NA
	Abut 4	Shallow Footing	+108.0 and +109.5	3 tsf	NA
1979 Widening	Abut 1	16" CIDH	+104.0 to +105.5	70 tons	+65
	Bent 2	16" CIDH	+86.7	70 tons	+65
	Bent 3	16" CIDH	+86.7	70 tons	+70
	Abut 4	16" CIDH	+108.0 to +109.5	70 tons	+70

Spread footings were evaluated and found to be unsuitable to meet permissible settlements. Deep foundations are recommended for the proposed bridge and wing wall foundations. Both driven and Cast-in-Drilled-Hole (CIDH) piles are feasible.

Driven piles were selected because this pile type can be battered to provide large lateral resistance to the tall cantilevered abutments, and the wing walls and pilasters in sloping ground. Due to anticipated hard driving, steel HP piles are preferred over concrete piles. As a result, steel HP14x117 piles are recommended for the abutments and HP10x57 are recommended for the wing walls and pilasters. The conventional Caltrans pile types for the prescribed nominal resistances are HP14x89 for the abutments and HP10x42 for the wing walls and pilasters. A heavier section was used to account for sacrificial steel thickness due to soil corrosion.

8.1.2 Foundation Data

Per Caltrans policy, LRFD Service-I Limit State load combinations and Working Stress Design (WSD) method provided in the Caltrans Bridge Design Specifications (2004) are used for design

of the abutment piles. The LRFD Service-I Limit State, Strength Limit State, and Extreme Event Limit State load combinations are used for the design of wing wall and pilaster piles.

The foundation design data sheets are presented in Table 9. Foundation loads were provided by Parsons following the latest Caltrans Memo To Designers (2008) format and are presented in Table 10.

Table 9. Foundation Design Data Sheet

Support		Design Method	Pile Type	Finished Grade El. (ft)	Cut-off El. (ft)	Pile Cap Size (ft) B	Pile Cap Size (ft) L	Permissible Settlement under Service Load (inch)	No. of Piles per Support
Stage 1 Bridge (I-5 Southbound)									
Abut 1		WSD	HP14x117	+91.5	+86.00	17.00	103.48	2	84
Abut 2		WSD	HP14x117	+91.0	+84.50	20.00	103.48	2	84
Stage 2 Bridge (I-5 Northbound)									
Abut 1		WSD	HP14x117	+91.5	+89.00	17.00	65.48	2	56
Abut 2		WSD	HP14x117	+91.0	+87.50	20.00	65.48	2	56
Wing Walls (I-5 Northbound)									
Abut 1 Wing Wall	H=8'	LRFD	HP10x57	+114.4	+111.59	7.25	8.00	1	3
	H=12'	LRFD	HP10x57	+110.4	+107.59	8.33	8.00	1	3
	H=16'	LRFD	HP10x57	+106.6	+103.42	10.75	8.00	1	3
	H=20'	LRFD	HP10x57	+102.3	+99.17	13.25	8.00	1	4
	H=24'	LRFD	HP10x57	+98.4	+94.67	15.75	9.50	1	6
Abut 2 Wing Wall	H=14'	LRFD	HP10x57	+113.6	+110.42	9.58	8.00	1	3
	H=18'	LRFD	HP10x57	+109.3	+106.17	12.00	8.00	1	3
	H=22'	LRFD	HP10x57	+105.6	+101.92	14.50	8.00	1	4
	H=26'	LRFD	HP10x57	+101.3	+97.42	17.08	8.00	1	6
	H=28'	LRFD	HP10x57	+97.3	+93.17	18.42	8.00	1	7
Pilasters (I-5 Northbound)									
Abut 1		LRFD	HP10x57	+114.4	+111.59	7.25	10.00	1	4
Abut 2		LRFD	HP10x57	+113.6	+110.42	9.58	10.00	1	4

Table 10. Foundation Design Loads

Support		Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Event Limit State (Controlling Group, kips)			
		Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
		Per Support	Max. Per Pile	Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Stage 1 Bridge (I-5 Southbound)												
Abut 1		10,153	184	9,095	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abut 2		11,723	197	10,665	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Stage 2 Bridge (I-5 Northbound)												
Abut 1		6,284	169	5,627	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Abut 2		7,254	179	6,507	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wing Walls (I-5 Northbound)												
Abut 1 Wing Wall	H=8'	75	30	N/A	98	42	N/A	N/A	75	35	N/A	0
	H=12'	114	40	N/A	149	56	N/A	N/A	114	64	N/A	8
	H=16'	174	64	N/A	228	94	N/A	N/A	174	93	N/A	3
	H=20'	246	79	N/A	324	120	N/A	N/A	246	104	N/A	16
	H=24'	404	73	N/A	532	104	N/A	N/A	404	133	N/A	17
Abut 2 Wing Wall	H=14'	144	50	N/A	189	74	N/A	N/A	144	79	N/A	5
	H=18'	209	79	N/A	275	117	N/A	N/A	209	110	N/A	0
	H=22'	289	78	N/A	381	121	N/A	N/A	289	136	N/A	21
	H=26'	393	75	N/A	518	106	N/A	N/A	393	139	N/A	19
	H=28'	456	68	N/A	601	107	N/A	N/A	456	130	N/A	24
Pilasters (I-5 Northbound)												
Abut 1		82	23	N/A	104	33	N/A	N/A	82	33	N/A	9
Abut 2		140	44	N/A	180	62	N/A	N/A	140	62	N/A	11

8.1.3 Axial Pile Capacity

Foundation design recommendations are presented in Table 11 for the abutments and Table 12 for the wing walls and pilasters. The Pile Data Table for the contract plans is presented in Table 13.

Based on the pile layout provided by Parsons and Caltrans requirements, an axial group efficiency factor of 1.0 was used for pile design (Section 10.7.1.2 of 2011 California Amendments to AASHTO 2007).

The HP piles were designed using skin friction and end bearing for reduced sections (HP14x89 for abutments and HP10x42 for wing walls and pilasters) to address steel corrosion. The pile

capacities are based on soil resistance only and may be further limited by and the strength of the pile materials and pile-head connection details. The pile capacity calculations are presented in Appendix C. The controlling nominal resistances for the abutments presented in Table 11 were the Service-I Limit State Maximum Per Pile Total Load from Table 10. The controlling nominal resistances for wing walls and pilasters shown in Table 12 were the Strength-I Limit State Maximum Per Pile Total Load for Compression and the Extreme Limit State Maximum Per Pile Total Load for Tension from Table 10.

Per Caltrans practice, downdrag loads on abutment piles is to be avoided. Measures to avoid the effect of ground settlement due to new fills are described in Section 8.3.

Table 11. Abutment Foundation Design Recommendations

Support	Pile Type	Pile Cut-Off El. (ft)	LRFD Service-I Limit State Load per Support (kips)		LRFD Service-I Limit State Total Load per Pile (Compr.) (kips)	Nominal Resistance (kips)	Design Tip El. (ft)	Spec. Tip El. (ft)	Nominal Driving Resistance Required (kips)
			Total	Perma-nent					
Stage 1 Bridge (I-5 Southbound)									
Abut 1	HP14x117	+86.0	10,153	9,095	184	370	+20 (a) +50 (c) +41 (d)	+20	370
Abut 2	HP14x117	+84.5	11,723	10,665	197	400	+38 (a) +59 (c) +44 (d)	+38	400
Stage 2 Bridge (I-5 Northbound)									
Abut 1	HP14x117	+89.0	6,284	5,627	169	340	+24 (a) +50 (c) +44 (d)	+24	340
Abut 2	HP14x117	+87.5	7,254	6,507	179	360	+42 (a) +59 (c) +47 (d)	+42	360

Notes:
1. Design tip elevations are controlled by the following demands: (a) Compression, (c) Settlement, and (d) Lateral Load.
2. There are no design tip elevations for Tension.
3. The specified tip elevations shall not be raised above the design tip elevations for Settlement and Lateral Load.

Table 12. Wing Wall and Pilaster Foundation Design Recommendations

Support		Pile Type	Pile Cut-Off El. (ft)	Service-I Limit State Loads per Support (kips)	Total Permissible Support Settlement (inch)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Spec. Tip El. (ft)	Nominal Driving Resistance Required (kips)
						Strength Limit		Extreme Event				
						Comp. (ϕ=0.7)	Tension (ϕ=0.7)	Comp. (ϕ=1.0)	Tension (ϕ=1.0)			
Wing Walls												
Abut 1 Wing Wall	H=8'	HP10x57	+111.59	75	1	42	N/A	35	0	+82 (a-I); +99 (a-II) +82 (c); +86 (d)	+82	60
	H=12'	HP10x57	+107.59	114	1	56	N/A	64	8	+78 (a-I); +82 (a-II) +95 (b-II) +82 (c); +82 (d)	+78	80
	H=16'	HP10x57	+103.42	174	1	94	N/A	93	3	+49 (a-I); +61 (a-II) +84 (b-II) +82 (c); +78 (d)	+49	140
	H=20'	HP10x57	+99.17	246	1	120	N/A	104	16	+36 (a-I); +57 (a-II) +79 (b-II) +82 (c); +74 (d)	+36	180
	H=24'	HP10x57	+94.67	404	1	104	N/A	133	17	+41 (a-I); +47 (a-II) +79 (b-II) +82 (c); +69 (d)	+41	150
Abut 2 Wing Wall	H=14'	HP10x57	+110.42	144	1	74	N/A	79	5	+69 (a-I); +76 (a-II) +93 (b-II) +80 (c); +85 (d)	+69	110
	H=18'	HP10x57	+106.17	209	1	117	N/A	110	0	+60 (a-I); +68 (a-II) +80 (c); +81 (d)	+60	170
	H=22'	HP10x57	+101.92	289	1	121	N/A	136	21	+54 (a-I); +65 (a-II) +83 (b-II) +80 (c); +77 (d)	+54	180
	H=26'	HP10x57	+97.42	393	1	106	N/A	139	19	+56 (a-I); +60 (a-II) +83 (b-II) +80 (c); +72 (d)	+56	160
	H=28'	HP10x57	+93.17	456	1	107	N/A	130	24	+52 (a-I); +58 (a-II) +80 (b-II) +80 (c); +68 (d)	+52	160
Pilasters												
Abut 1		HP10x57	+111.59	82	1	33	N/A	33	9	+86 (a-I); +93 (a-II); +97 (b-II, c); +82 (d)	+86	50
Abut 2		HP10x57	+110.42	140	1	62	N/A	62	11	+75 (a-I); +86 (a-II); +92 (b-II, c); +85 (d)	+75	90

Notes:

1. Design tip elevations are controlled by the following demands: (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), (c) Settlement, and (d) Lateral Load.
2. The Specified Tip Elevations shall not be raised above the design tip elevations for Tension, Settlement, and Lateral Load.

Table 13. Pile Data Table

Location		Pile Type	Nominal Resistance (kips)		Design Tip El. (ft)	Spec. Tip El. (ft)	Nominal Driving Resistance Required (kips)
			Compression	Tension			
Stage 1 Bridge (I-5 Southbound)							
Abut 1		HP14x117	370	0	+20 (a); +50 (c); +41 (d)	+20	370
Abut 2		HP14x117	400	0	+38 (a); +59 (c); +44 (d)	+38	400
Stage 2 Bridge (I-5 Northbound)							
Abut 1		HP14x117	340	0	+24 (a); +50 (c); +44 (d)	+24	340
Abut 2		HP14x117	360	0	+42 (a); +59 (c); +47 (d)	+42	360
Wing Walls (I-5 Northbound)							
Abut 1 Wing Wall	H=8'	HP10x57	60	0	+82 (a, c); +86 (d)	+82	60
	H=12'	HP10x57	80	10	+78 (a); +95 (b); +82 (c, d)	+78	80
	H=16'	HP10x57	140	10	+49 (a); +84 (b); +82 (c); +78 (d)	+49	140
	H=20'	HP10x57	180	20	+36 (a); +79 (b); +82 (c); +74 (d)	+36	180
	H=24'	HP10x57	150	20	+41 (a); +79 (b); +82 (c); +69 (d)	+41	150
Abut 2 Wing Wall	H=14'	HP10x57	110	10	+69 (a); +93 (b); +80 (c); +85 (d)	+69	110
	H=18'	HP10x57	170	0	+60 (a); +80 (c); +81 (d)	+60	170
	H=22'	HP10x57	180	30	+54 (a); +83 (b); +80 (c); +77 (d)	+54	180
	H=26'	HP10x57	160	20	+56 (a); +83 (b); +80 (c); +72 (d)	+56	160
	H=28'	HP10x57	160	30	+52 (a); +80 (b, c); +68 (d)	+52	160
Pilasters (I-5 Northbound)							
Abut 1		HP10x57	50	10	+86 (a); +97 (b, c); +82 (d)	+86	50
Abut 2		HP10x57	90	20	+75 (a); +90 (b, c); +85 (d)	+75	90

Notes:
1. Design Tip Elevations are controlled by the following demands: (a) Compression, b) Tension, (c) Settlement, and (d) Lateral Load.
2. The Specified Tip Elevations shall not be raised above the Design Tip Elevations for Tension, Settlement, and Lateral Load.

8.1.4 Lateral Pile Capacity

Lateral pile analysis was performed for the reduced HP pile sections (HP14x89 for abutments and HP10x42 for wing walls and pilasters) to address steel corrosion. Analyses were conducted for a free-head condition and for the strong and weak lateral loading directions. Lateral pile

group effects were included in the evaluations following Section 10.7.2.4 of 2011 California Amendments to AASHTO 2007. Resulting pile shear and bending moment solutions are presented in Appendix C. Pile-head shear, maximum bending moment, and the location of maximum moment are summarized in Table 14. Lateral solutions are provided for pile-head deflections from 0.25" to 5" at each support. Solutions for intermediate deflections can be linearly interpolated.

The solutions presented in Table 14 are entirely based on soil resistance and linear pile properties. Therefore, these values may be limited by the flexural strength (plastic moment) of the piles and pile-head connection details.

Table 14. Lateral Pile Solutions

Support Location (Proposed Pile Type)	Lateral Deflection at Pile Head (inch)	Shear at Pile Head (kips)		Maximum Bending Moment (kip-in)		Depth from Pile Top to Maximum Moment (ft)	
		Strong	Weak	Strong	Weak	Strong	Weak
Abutment 1 (HP14x117)	¼	15.3	11.2	650	380	7	6
	½	21.9	16.0	1,045	615	7	6
	1	31.2	22.7	1,680	995	9	7
	3	54.9	39.1	3,630	2,125	10	8
	5	68.7	48.2	5,205	3,025	11	9
Abutment 2 (HP14x117)	¼	20.9	15.1	825	480	6	6
	½	30.2	21.7	1,340	780	6	7
	1	43.6	31.1	2,160	1,260	7	8
	3	77.2	54.8	4,600	2,710	8	9
	5	97.0	68.6	6,505	3,860	9	10
Wing Walls & Pilasters (HP10x57)	¼	7.4	5.2	252	145	5	4
	½	10.5	7.3	410	235	6	5
	1	14.9	10.3	670	385	7	5
	3	26.0	17.3	1,460	840	8	6
	5	32.2	20.9	2,090	1,210	8	7

8.2 ABUTMENT WALLS

The new replacement bridge is proposed to be realigned to the south of the existing structure. The south side of the existing approach embankments behind both existing abutments will be extended with new fill retained by two MSE walls (RW 183 behind Abutment 1, and RW 193 at Abutment 2). The north side of both embankments will be cut back and retained by wing walls and pilasters in sloping ground.

Earth pressure recommendations for the two concrete abutment walls, and the two stepped concrete retaining wing walls and the pilasters at the north side of the bridge are provided below. The two MSE walls (RW 183 and RW 193) and stand-alone pilasters proposed at the south side of the bridge are addressed in a separate EMI project report for retaining walls (EMI, 2013).

8.2.1 Earth Pressures

If abutment walls are free to move laterally at the top, a static active lateral earth pressure of 36 psf per foot of depth is recommended for a free draining, level and compacted backfill. If lateral movement at the top of abutment walls is restrained, the lateral earth pressure for a free draining, level and compacted backfill should follow Section 5.5.5.11 of the Caltrans BDS (Caltrans, 2004). For this condition, a soil unit weight of 120 pcf, coefficient of active lateral earth pressure of 0.3, and coefficient of at-rest lateral earth pressure of 0.46 is recommended. A uniform lateral pressure of at least 72 psf due to vehicle loads, equivalent to a vertical pressure produced by at least 2 ft of earth, should be added to the above lateral earth pressure.

Seismic active earth pressure was determined using the Monobe-Okabe method. As presented in Section 11.8.6 of AASHTO (2007), the seismic earth pressures can be computed using a seismic coefficient equal to one-half of the peak acceleration. Therefore, a seismic coefficient of 0.19g can be used for the computation of seismic earth pressures. For level free-draining granular backfill, an incremental seismic active earth pressure of 15 psf per foot of depth can be used following Appendix A11.1.1.1 of the Caltrans Amendments 2011 in AASHTO 2007.

8.2.2 Passive Resistance of Abutment Backfill

Under seismic loading, an ultimate passive earth pressure of 5 ksf may be used for the approach backfill and abutment walls with a height equal to or greater than 5.5 ft. For abutment walls with heights less than 5.5 ft, the passive pressure may be calculated proportionally (e.g., for a 4-ft high wall, the passive pressure is 5 ksf x 4 ft / 5.5 ft = 3.64 ksf). The horizontal movement at which the maximum passive pressure is expected to be fully mobilized can be determined following the procedure outlined in Section 7.8.1 of the Caltrans SDC (2010a).

8.3 APPROACH EMBANKMENTS

The new replacement bridge is proposed to be realigned to the south of the existing structure. The bridge will be built in two stages. In Stage 1, the southbound bridge will be constructed, followed by Stage 2 in which the northbound bridge will be constructed.

In Stage 1, the south side of the existing approach embankments behind both abutments will be extended with new fill retained by two MSE walls (RW 183 behind Abutment 1, and RW 193 at Abutment 2). At Abutment 1, the new approach embankment will add up to about 19 ft of new fill behind the south side of the abutment wall. At Abutment 2, the new approach embankment will add up to about 23 ft of new fill behind the south side of the abutment wall, and up to about 8 ft of new fills behind the remaining width of the wall.

In Stage 2, the north side of both embankments will be cut back and retained by wing walls in sloping ground.

8.3.1 Stage-1 Settlement and Settlement Period

As mentioned earlier, the southern one-half of the new bridge will be constructed first (Stage 1). At the current proposed configuration, the bridge abutments will need to be constructed before the MSE walls (otherwise, temporary shoring will be required for the MSE wall backfill). If so, the abutment piles will be subjected to static downdrag forces when settlement occurs during MSE wall fill placement. Caltrans standard pile design practice is to eliminate all static downdrag forces. At the same time, the MSE walls adjacent to the abutments are about 35 and 40 ft high adjacent to Abutments 1 and 2, respectively. Relatively large settlements will occur due to the MSE wall fill. A relatively conventional practice which would minimize downdrag forces on the abutment piles and reduce soil settlement at the MSE walls is to place earth material to preload the bridge approach and MSE wall area. The process involves placing earthen materials at the approaches. The weight of the earth will induce soil settlement. This settlement will be monitored in time until it is determined that the residual settlement is within a tolerable limit (generally ½" or less). Once this settlement period is complete, the earthen material used in the preloading will be completely removed and the approach area will become available for abutment foundation and abutment wall construction.

An approximate proposed preload foot-print and a typical section are presented in Figure 6. The top of preload embankment should be equal to or greater than the finished grade elevation. To minimize traffic impact, temporary shoring will need to be placed at the I-5 shoulder, ramps and Avenida Pico to maximize the foot-print of the preload area. Settlement monitoring will be required in order to estimate the residual settlement and duration of the preload.

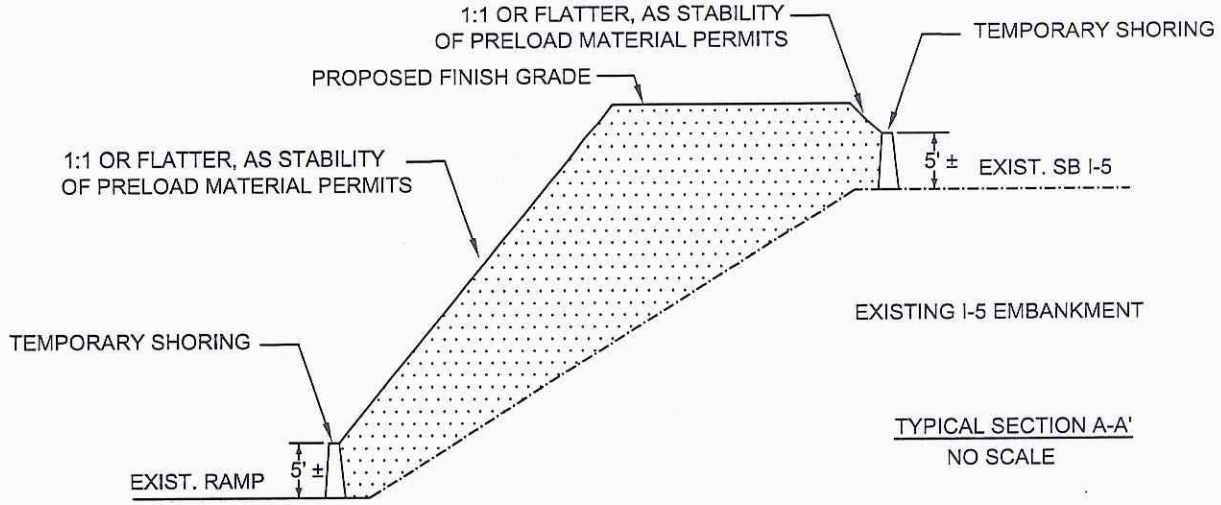
A minimum settlement period of about 3 months is recommended to reduce the long-term post-construction settlement to less than ½". The settlement period can be reduced to 2 months if 5 ft of surcharge (above the proposed finished surface) is placed. After preloading, the maximum total ground settlement induced by the new permanent embankment fills at Abutments 1 and 2 is estimated to be less than about 0.6".

Settlement Monitoring Recommendations: Based on our past experience, calculated settlements and settlement periods are usually approximations of actual field observations. Due to the variability of subsurface conditions, it is recommended that settlement monitoring be conducted for the preloading. Surface settlement hubs should be placed at the locations shown in Figure 6. At Abutment 1, we recommend placing a pair of settlement hubs immediately behind the proposed abutment centerline, and another pair about 150 ft behind the proposed abutment centerline. At Abutment 2, we recommend placing a pair of settlement hubs immediately behind the proposed abutment centerline, and a second and third pair about 150 and 400 ft, respectively, behind the proposed abutment centerline. The settlement hubs should be installed in a timely manner upon completion of embankment construction. Special care should be exercised in the field to survey and protect these settlement devices. The hubs should be monitored at the time of installation, on a weekly basis for a month, and then once every 2 weeks thereafter until it has been verified by the Engineer that the remaining settlement for the embankment is acceptable. The pile driving should not begin until the long-term residual settlement becomes ½" or less.

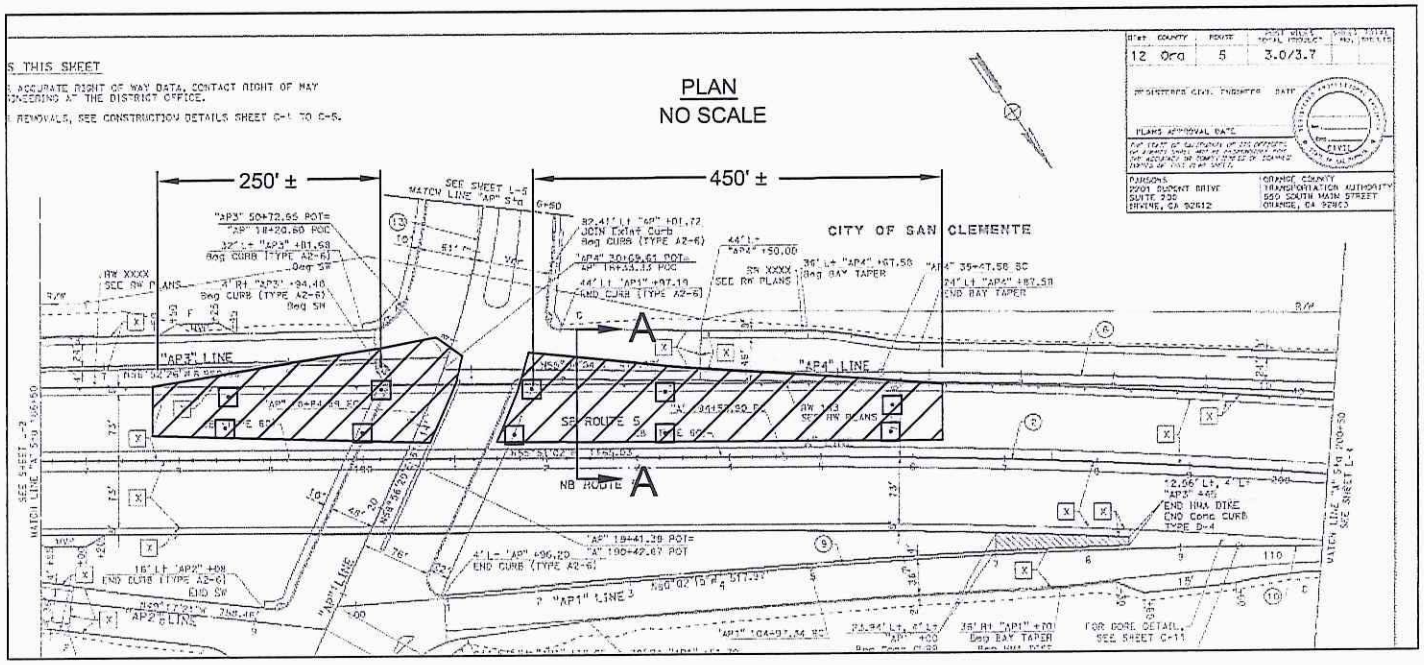
LEGEND

PROPOSED PRELOAD FOOT-PRINT

PROPOSED APPROX. LOCATION OF SETTLEMENT HUB



TYPICAL SECTION A-A'
NO SCALE



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-5 HOV Improvement Project, Segment 1 Avenida Pico UC (Replace)		PRELOADING CONFIGURATION
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8.3.2 Stage-2 Settlement and Settlement Period

After completion of the Stage-1 construction, the I-5 traffic can be shifted to the southern half of the new bridge, and the approach embankment area will be available for Stage-2 construction.

Based on cross-sections provided by Parsons, the proposed finished grade and the existing grade is the same at the approach to Abutment 1. As a result, settlement should be negligible and a settlement period for pile driving is not required. At Abutment 2, about 8 ft of fill will be placed at the northern edge and about 16 ft of fill will be placed at the future I-5 centerline. Placement of the above embankment fill will generate ground subsidence. The calculated maximum soil settlement is about 3". We recommend a minimum settlement period of 3 months. This settlement period can be reduced to 2 months if 5 ft of surcharge (above the proposed finished surface) is placed. Pile driving is not allowed until completion of the settlement period.

8.3.3 Slope Stability

Both abutments endwalls extend below Avenida Pico roadway. There is no sloping ground in front of the abutment walls.

Approach embankments for the new bridge will be retained by either an MSE wall or a Caltrans Standard Type 1 retaining wall supported on pile foundations. MSE wall and Caltrans Standard Type 1 retaining wall are required to be designed such that the slope stability meets the minimum required factor-of-safety for deep-seated failure of 1.5 for the static condition and 1.1 for the seismic condition per Caltrans for Structures Foundation Reports (2009a). The MSE wall design and stability is addressed in a separate Foundation Report (EMI, 2013).

Global stability analyses were conducted for the retaining wing wall in cut slope at the northern side of the bridge approach embankment for both static and pseudo-static conditions. The controlling finished cut slope configuration was based from cross sections provided by Parsons and analyzed using the computer program SLIDE 5.0 (Rocscience, 2006). The soil strength parameters in Table 4 were used in the static and pseudo-static analysis. The material used for new structure backfill was assumed to have a friction angle of 32° and a minimum cohesion of 200 psf.

The calculated factor of safety (FOS) for deep-seated failure was found to be greater than the minimum required value of 1.5 per Caltrans Guidelines under static condition with a 2 ft soil surcharge to represent I-5 traffic loading. Slope stability analysis under pseudo-static condition was performed using a seismic coefficient equal to 0.13 (which is the smaller of either one-third the horizontal peak ground acceleration or 0.2g) in accordance with guidelines provided in Section 3.10 of the Caltrans guidelines (2009c). Analysis indicates that the calculated factor of safety exceeded the required minimum FOS of 1.1 under pseudo-static condition.

8.3.4 Surficial Stability

Where approach embankments are retained by walls, surficial stability is not a design issue.

The proposed embankment slopes at the north side with 2H:1V gradients or flatter, constructed with compacted fill materials, are surficially stable with a factor-of-safety greater than 1.5.

If slope paving is proposed for embankment slopes with a gradient of 1.5H:1V, then surficial stability is also not a design concern. If slope paving is not used for the 1.5H:1V slopes, it is recommended that the upper 4 ft of any new 1.5H:1V slope face be covered with materials with a minimum internal friction angle of 27° and a minimum cohesion of 200 psf. This select material should be properly keyed and benched into the sloping ground. In all cases, proper maintenance with erosion protection and drainage control in accordance with Section 21 of Caltrans Standard Specifications (2010c) are also recommended.

9.0 CONSTRUCTION RECOMMENDATIONS

9.1 EARTHWORK

9.1.1 General

Earthwork should be performed in accordance with Section 19 of the Caltrans Standard Specifications (2010c). Appropriate measures should be taken to prevent damage to adjacent structures and utilities. Any design and construction of temporary sloping, sheeting, or shoring should be made the contractor's responsibility. It should be noted that it is the responsibility of the contractor to oversee the safety of the workers in the field during construction. The contractor shall conform to all applicable occupational and health standards, rules, regulations, and orders established by the State of California. In addition, other State, County, or Municipal regulations may supersede the recommendations presented in this section. If a trench shoring design and safety plan is required, the geotechnical consultant should review the plan to confirm that recommendations presented in this report have been applied to the design.

Heavy construction equipment should not be used immediately adjacent to shoring due to large lateral pressures induced by such equipment unless the shoring is designed to accommodate resulting pressures. Excavated soil or construction materials should not be stockpiled adjacent to shoring or open excavations. Stockpiled soil and construction materials should be set back a distance at least equal to the height of the excavation.

9.1.2 Groundwater Control

Section 4.2 discussed observations on groundwater evaluation. Based on the findings, shallow groundwater is not expected to be encountered during pilecap construction. However, groundwater level can fluctuate due to seasonal rainfall amount and man-made influences. If groundwater is encountered during excavations for pilecap construction, it can be controlled in accordance with Section 19-3.03D of the Caltrans Standard Specifications (2010c). Any seepage or groundwater removed from an excavation should be tested and disposed of in compliance with all applicable local, state, and federal requirements. Free water should not be allowed to stand in any excavation.

9.2 PILE INSTALLATION

Pile installation should be performed in accordance with Section 49 of the Caltrans Standard Specifications (2010c). Piles should be driven at least to the specified tip elevation and the bearing value should be checked with the pile-driving formula given in Section 49-2.01A(4)(b) of the Caltrans Standard Specifications. However, if the specified tip elevation is reached without achieving the nominal resistance, pile driving should continue until bearing is attained. In this case, it may be prudent to allow the pile to set up before continuing the driving.

Abutment piles are anticipated to penetrate a maximum of about 40 ft into bedrock materials. Based on the soil boring data, hard driving is anticipated below approximately El. +36 ft at Abutment 1 and approximately El. +70 ft at Abutment 2. Hard to very hard driving conditions is anticipated above the specified pile tip elevations, and production rate will be slow. Contractors

should review the LOTB sheets and follow the requirements in the Caltrans Standard Specification (2010c) in selecting the pile driving equipment.

Predrilling in native soils is not allowed. Vibratory hammers and jetting are not allowed for pile installation.

9.3 BACKDRAIN AND BACKFILL REQUIREMENTS FOR ABUTMENT WALLS

Caltrans Structure Backfill should be used as backfill material behind the bridge abutment walls as shown in Figure 7. Backfill should be compacted in accordance with Section 19-5 of the Caltrans Standard Specifications (2010c). Backfill should be placed in loose lifts not exceeding 8" in thickness, moisture-conditioned to near optimum moisture content, and compacted to at least 95% relative compaction. The relative compaction should be based on the maximum density determined by California Test Method 216. Jetting or flooding to compact backfill is not recommended. Heavy compaction equipment, such as vibratory rollers, dozers, or loaders, should not be used adjacent to the abutment walls in order to avoid damaging the walls due to large lateral earth pressures.

Backdrains should be installed behind abutment walls to relieve hydrostatic pressure. Backdrains should be constructed in accordance with Bridge Detail 3-1 on Sheet B0-3 per Caltrans Standard Plans (2010b) or the geocomposite drain alternative per Section 6 of the Caltrans Bridge Design Details (1992).

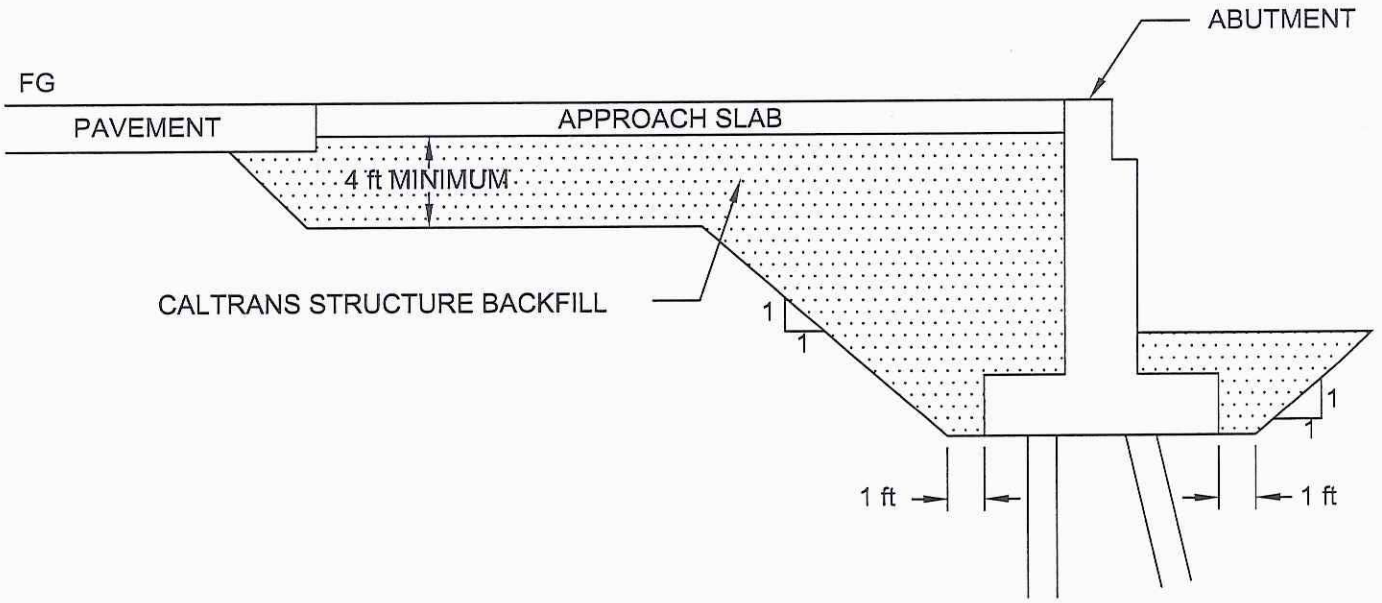
9.4 REVIEW OF CONSTRUCTION PLANS

Recommendations contained in this report are based on draft plans. The geotechnical consultant should review the final construction plans and specifications in order to confirm that the general intent of the recommendations contained in this report have been incorporated into the final construction documents. Recommendations contained in this report may require modification or additional recommendations may be necessary based on the final design.

9.5 GEOTECHNICAL OBSERVATION AND TESTING

It is recommended that inspections and testing be performed by the geotechnical consultant during the following stages of construction:

- Grading operations, including excavations and placement of compacted fill,
- Shoring installation,
- Excavations for pilecap and pile installation,
- Backdrain installation and backfilling of bridge abutment walls,
- Removal or installation of support of buried utilities or structures, and
- When any unusual subsurface conditions are encountered.



NO SCALE

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-5 HOV Improvement Project, Segment 1 Avenida Pico UC (Replace)	BRIDGE ABUTMENT WALL BACKFILL
	Project No. 11-135 Date: 06-29-12	FIGURE 7

10.0 LIMITATIONS

This report is intended for the use of OCTA, Parsons, and Caltrans for design and construction of the I-5/Avenida Pico Undercrossing Bridge Replacement Project (Bridge No. 55-0207). This report is based on the project as described and the information obtained from the exploratory borings at the approximate locations indicated on the attached LOTB sheets. The findings and recommendations contained in this report are based on the results of the field investigation, laboratory tests, and engineering analyses. In addition, soils and subsurface conditions encountered in the exploratory borings are presumed to be representative of the project site. However, subsurface conditions and characteristics of soils between exploratory borings can vary. The findings reflect an interpretation of the direct evidence obtained. The recommendations presented in this report are based on the assumption that an appropriate level of quality control and quality assurance (inspections and tests) will be provided during construction. EMI should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations contained in this report are applicable to the specific design element(s) and location(s) which is (are) the subject of this report. They have no applicability to any other design elements or to any other locations and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of EMI.

EMI has no responsibility for construction means, methods, techniques, sequences, or procedures; for safety precautions or programs in connection with the construction; for the acts or omissions of the CONTRACTOR or any other person performing any of the construction; or for the failure of any worker to carry out the construction in accordance with the Final Construction Drawings and Specifications.

Services performed by EMI have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty or guarantee is included or intended.

11.0 REFERENCES

American Association of State Highway and Transportation Officials (AASHTO), 2007. AASHTO LRFD Bridge Design Specification, 4th Edition with 2008 and 2009 Interim Changes. Washington, DC: AASHTO.

American Society for Testing and Materials (ASTM), 2007, Annual Book of Standards. Soil and Rock; Dimension Stone; Geosynthetics, Vol. 04.08.

Argus, D.F., Heflin, M.B., Donnellan, A., Webb, F.H., Dong, D., Hurst, K.J., Jefferson, D.C., Lyzenga, G.A., Watkins, M.M., and Zumberge, J.F., 1999, Shortening and thickening of metropolitan Los Angeles measured and inferred by using geodesy: Geology, v. 27, p. 703-706.

Benioff, H., 1938, The Determination of The Extent of Faulting With Application To The Long Beach Earthquake, Bulletin of The Seismological Society of America, v. 28, p. 77-84.

California Department of Transportation (Caltrans), California Test Methods.

_____, 2011, Memo To Designers 20-2.

_____, 2010a, Seismic Design Criteria, Version 1.6.

_____, 2010b, Standard Plans.

_____, 2010c, Standard Specifications.

_____, 2009a, 2007 Fault Database and Fault Errata Report, http://dap3.dot.ca.gov/shake_stable/technical.php.

_____, 2009b, Caltrans ARS Online Version 1.0.4, http://dap3.dot.ca.gov/shake_stable/

_____, 2009c, Foundation Report Preparation for Bridge Foundations, Division of Engineering Services, Geotechnical Services.

_____, 2009d, Geotechnical Services Design Manual, Division of Engineering Services, Geotechnical Services, Version 1.0.

_____, 2008, Memo to Designers 3-1, Supersedes Memo to Designers 3-1 Dated December 2000.

_____, 2004, Bridge Design Specifications.

_____, 2003, Corrosion Guidelines, Version 1.0.

_____, 1992, Bridge Design Details, Section 6.

California Geological Survey, 2009, Tsunami Inundation Map for Emergency Planning, San Clemente Quadrangle: Division of Mines and Geology.

_____, 2002a, Seismic Hazard Zone Report for the San Clemente 7.5-Minute Quadrangle, Orange County, California, Seismic Hazard Zone Report 062; Department of Conservation.

_____, 2002b, Seismic hazard zones, San Clemente Quadrangle: Division of Mines and Geology, Official Map.

Campbell, K., and Bozorgnia, Y., 2008, NGA ground motion model for the geometric mean horizontal component of PGA, PGV, PGD, and 5% damped linear elastic response spectra for periods ranging from 0.01 to 10 s.; Earthquake Spectra, Vol. 24, pp. 139-172.

Chiou, B., and Youngs, R., 2008, An NGA model for the average horizontal component of peak ground motion and response spectra: Earthquake Spectra, vol. 24, pp. 173-216.

Earth Mechanics (EMI), 2013, Final Foundation Report, Wall 181 (Bridge No. 55E-0139), PM 3.0/3.7, Wall 183 (Bridge No. 55E-0140), PM 3.0/3.7, Wall 193 (Bridge No. 55E-0142), PM 3.47/3.66, and Wall 203 (Bridge No. 55-0143), PM 3.0/3.7, Interstate 5 HOV Improvement Project (Segment 1), San Clemente, Orange County, CA, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B).

Ensoft, Inc. 2010, LPILE Plus Version 6.0, A Program for Analyzing Stress and Deformation of a Pile or Drilled Shaft under Lateral Loading, Austin, Texas.

_____, 2007, SHAFT Version 6.0, A Program for the Study of Drilled Shafts under Axial Loading, Austin, Texas.

Fumal, T.E., Pezzopane, S.K., Weldon, R.J. II, and Schwartz D.P., 1993, A 100-year Average Recurrence Interval for the San Andreas Fault at Wrightwood, California, Science, v. 259, p. 199-203.

Hauksson, E., Jones, L.M., and Hutton, K., 1995, The 1994 Northridge Earthquake Sequence in California: Seismological and Tectonic Aspects, Journal of Geophysical Research, v. 100, p. 12335-12355.

Hauksson, E. and Gross, S., 1991, Source Parameters of the 1933 Long Beach earthquake: Bulletin of the Seismological Society of American, v. 81, p. 81-98.

Jacoby, G., Sheppard, P., and Sieh, K., 1987, Was the 8 December 1812 California earthquake Produced by the San Andreas Fault? Evidence From Trees Near Wrightwood: Seismological Research Letters, v. 58, p. 14.

Jennings, C.W., 2010, Fault Activity Map of California and Adjacent Areas, Geologic Data Map No. 6, Department of Conservation, Division of Mines and Geology.

Lam, I.P., and Martin, G.R., 1986, Seismic Design of Highway Bridge Foundations, FHWA Report Nos. FHWA A/RD-86/102.

Leighton and Associates, 2001, Geotechnical Report of Keystone Wall Construction for the Avenida Pico Widening Project, City of San Clemente, California.

_____, 1999, Geotechnical Engineering Investigation for the Proposed Avenida Pico Widening to the East of the On-Ramp to North-bound San Diego Freeway (I-5), San Clemente, California.

_____, 1991, Final Geotechnical Report of Rough- and Postgrading Operations, Parcels 1, 2, and 3 of Parcel Map No. 89311, St. Andrews by the Sea United Methodist Church, San Clemente, California.

_____, 1980, Geotechnical Investigation of Proposed Cut Slope at the Intersection of Avenida Pico and the Northbound San Diego Freeway On-Ramp, Tentative Tract 8818, Reeves Ranch (Marblehead), San Clemente, California.

_____, 1979, Geotechnical Investigation of Tentative Tract 8818 and Grading Plan Review of Phase I, Reeves Ranch (Marblehead), San Clemente, California.

NAVFAC, 1986, Foundations and Earth Structures, Design Manual 7.02, Department of Naval, Naval Facilities Engineering Command.

NCEER, 1997, Proceeding of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils, T. L. Youd and I. M. Idriss Editors, Technical Report NCEER-97-0022, NCEER, Buffalo, NY.

Rocscience, 2006, SLIDE 5.0 – 2D Limit Equilibrium Slope Stability Program, Toronto, Canada.

Robertson, P.K., 2009, Interpretation of Cone Penetration Tests – A Unified Approach, Canadian Geotechnical Journal, Vol. 46, p. 1337-1355.

Robertson, P. K. and Campanella, R. G., 1989, Guidelines for Geotechnical Design Using CPT and CPTU, Civil Engineering Department, University of British Columbia, Vancouver, Canada.

Seed, R.B. and Harder, L.F., Jr., 1990, SPT-Based Analysis of Cyclic Pore Pressure Generation and Undrained Residual Strength, in Proceedings, H. Bolton Seed Memorial Symposium, BiTech Publishers, Ltd., p. 351-376.

Seed, H. B., Idriss, I. M., and Arango, I., 1983, Evaluation of Liquefaction Potential Using Field Performance Data, Journal of Geotechnical Engineering, ASCE, Vol. 109, No. 3, p. 458-482.

Shantz, T., Merriam, M., 2009, Dev elopment of the Caltrans Deterministic PGA Map and Caltrans ARS Online, California Department of Transportation, Sacramento, CA.

Shao, G., and Hauksson, E., 2009, A Finite Fault Study of the 29 July 2008 Mw5.4 Chino Hills Earthquake: Seismological Research Letters, v. 80, p.320-321.

Shaw, J.H., and Shearer, P.M., 1999, An Elusive Blind-Thrust Fault Beneath Metropolitan Los Angeles: Science, v. 283, p.1516.

Shaw, J.H., Plesch, A., Dolan, J.F., Pratt, T.L., and Fiore, P., 2002, Puente Hills blind-thrust system, Los Angeles, California: Bulletin of the Seismological Society of America, v. 92, p. 2946-2960.

U.S. Geological Survey (USGS), 2008a, Documentation for the 2008 Update of the United States National Seismic Hazard Maps, U.S. Geological Survey Open-File Report 2008-1128, 61p.

_____, 2008b, USGS Probabilistic Seismic Hazard Analysis, http://eqint.cr.usgs.gov/deaggint/2008/index.php.

Ward, S.N., 1994, A Multidisciplinary Approach to Seismic Hazard in Southern California: Bulletin of the Seismological Society of America, v. 84, p. 1293-1309.

Weldon, R., Scharer, K., Fumal, T., and Biasi, G., 2004, Wrightwood and the Earthquake Cycle: What a Long Recurrence Record Tells Us About How Faults Work: Geological Society of America, GSA Today, v. 14, no. 9, p. 4-10.

Winterkorn, H.F. and Fang, H.Y., 1975, Foundation Design Handbook, Van Nostrand Reinhold Company, New York, NY.

Youd, T. L. et al., 2001, Liquefaction Resistance of Soils, Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils, Journal of Geotechnical and Geoenvironmental Engineering, ASCE, Vol. 127, No. 10.

Yeats, R.S., and Huftile, G.J., 1995, The Oak Ridge fault system and the 1994 Northridge earthquake, Nature, v. 373, p. 418-420.

APPENDIX A

LOG OF TEST BORING SHEETS

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

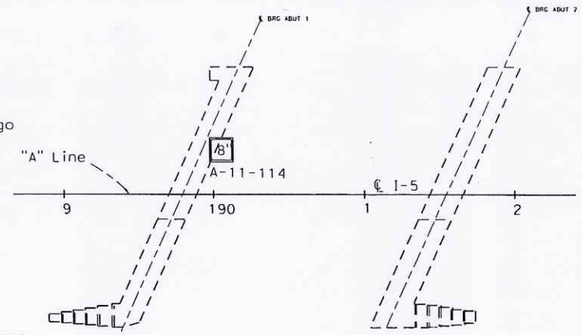
NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

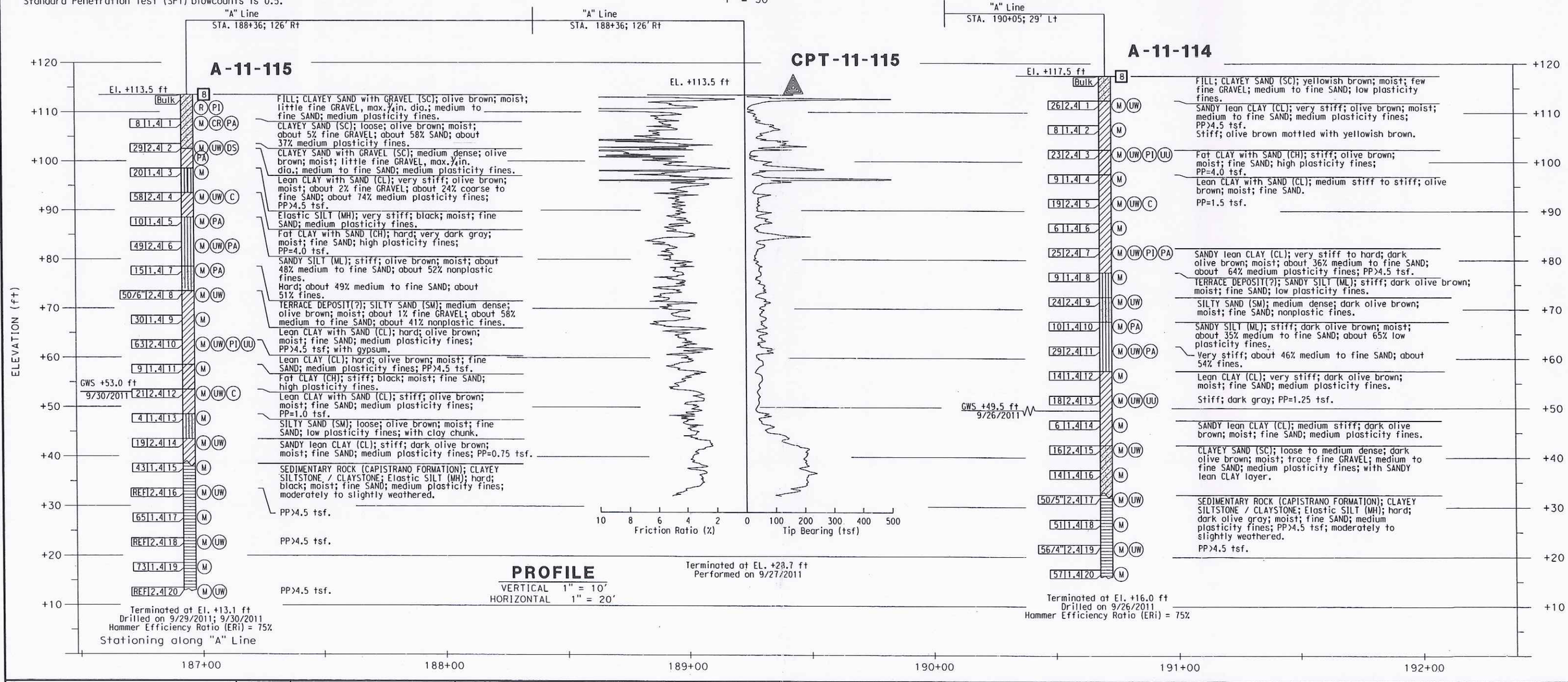
(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



PLAN

1" = 50'



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL — 5/21/13 DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-14 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. 55-0207	AVENIDA PICO UC (REPLACE)
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011			POST MILES 3.39	LOG OF TEST BORINGS 1 OF 6

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771 CONTRACT NO.: 12-0F96B1

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES | SHEET | OF

FILE => $REQUEST

DATE PLOTTED => 6/7/13 TIME PLOTTED => 07:46

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¾" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL 5/21/13 DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR NO. GE 2564 EXP. 12-31-14 GEOTECHNICAL STATE OF CALIFORNIA

PLANS APPROVAL DATE

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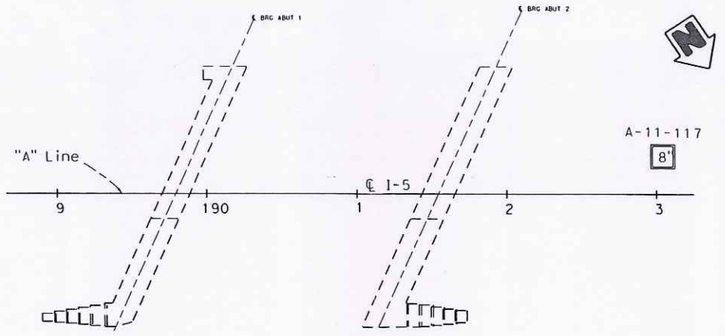
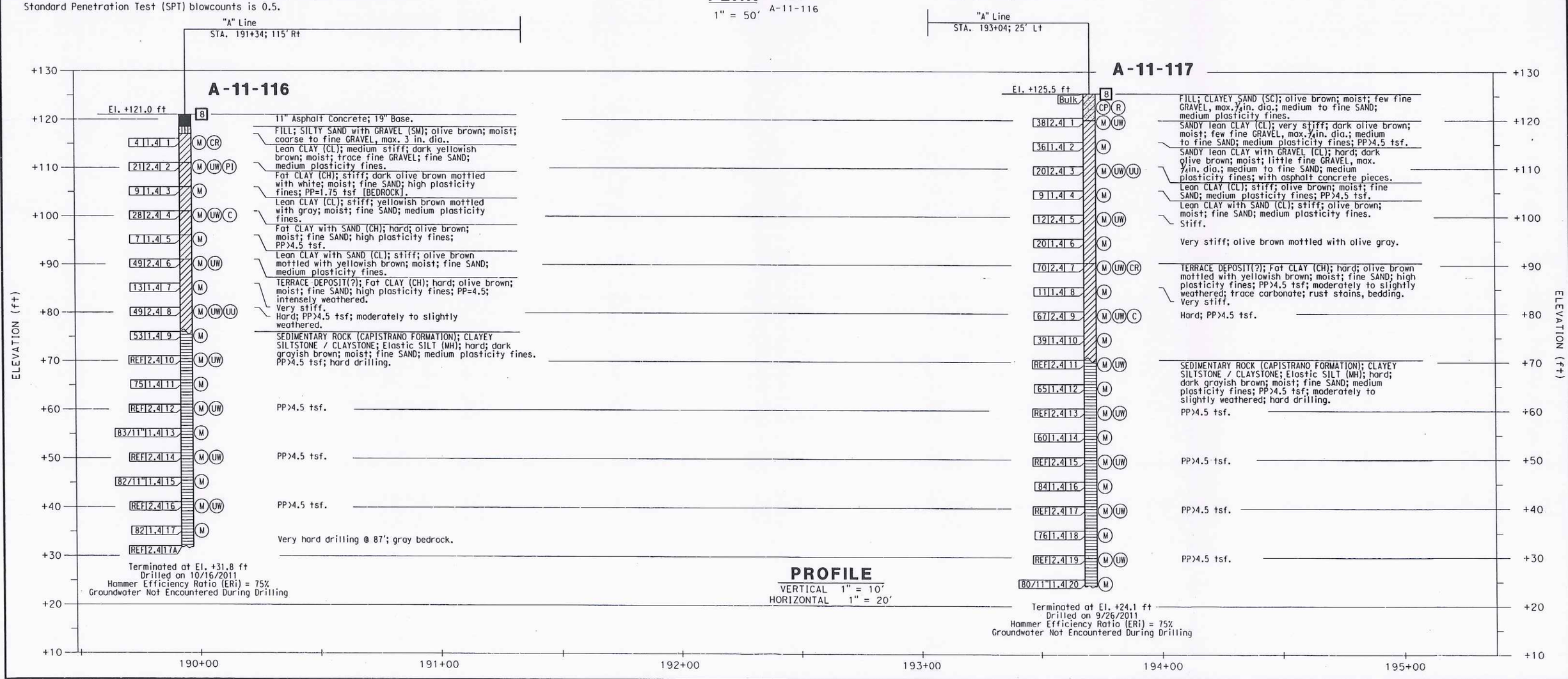


PLAN 8'
1" = 50' A-11-116

To Los Angeles



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. 55-0207	AVENIDA PICO UC (REPLACE)
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011, 10/2011			POST MILES 3.39	LOG OF TEST BORINGS 2 OF 6

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT:
PROJECT NUMBER & PHASE: 12000202771 CONTRACT NO.: 12-0F96B1

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

FILE => \$REQUEST

TIME PLOTTED => 07:17

DATE PLOTTED => 07/17/13

LICENSURE => SIGNED

DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
VII	ORA	5	3.0/3.7		

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
VII	ORA	[illegible]	[illegible]	11/0	[illegible]

DECEMBER 15 1958

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

GEOTECHNICAL PROFESSIONAL — DATE 5/21/13

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-14 — GEOTECHNICAL — STATE OF CALIFORNIA

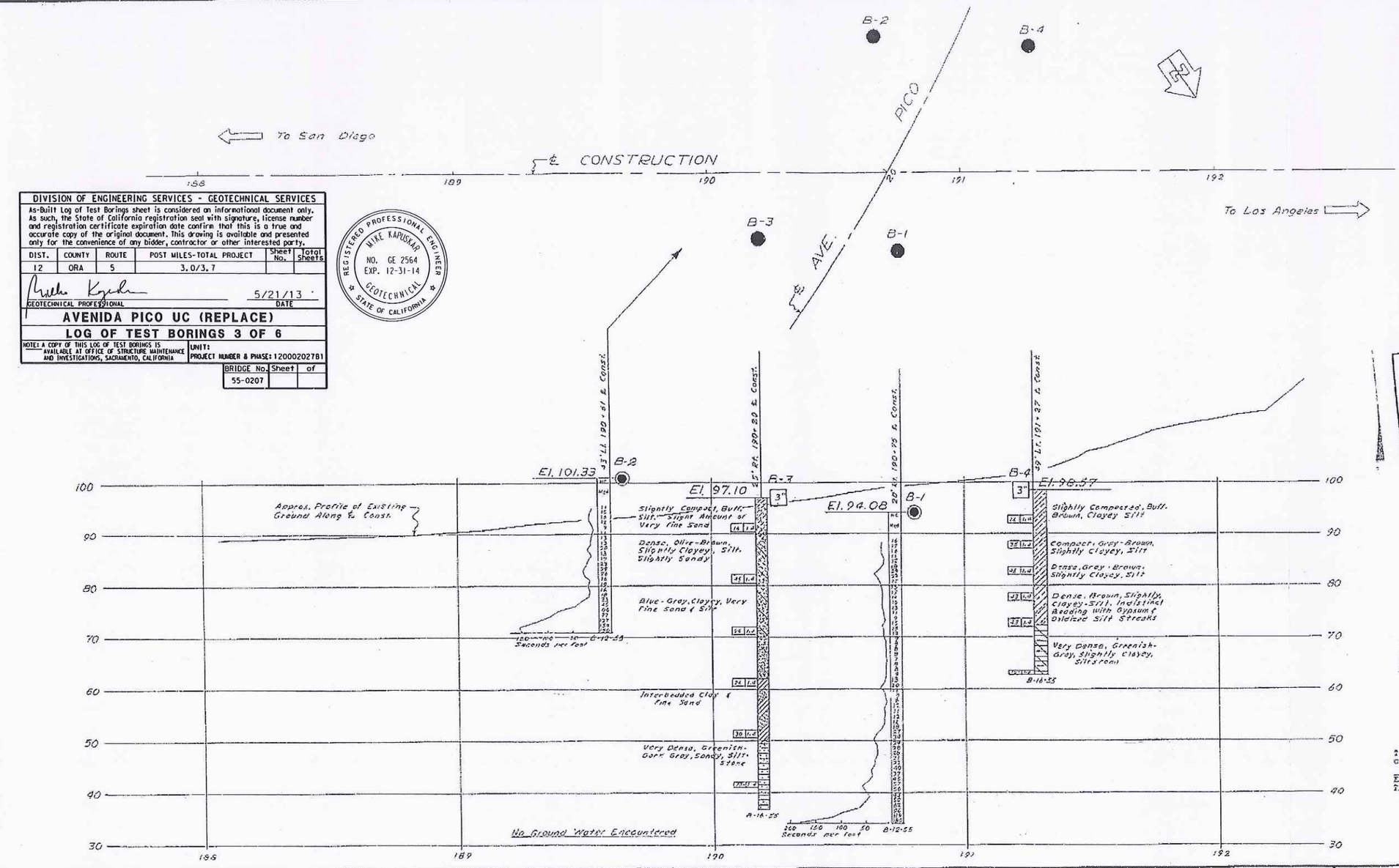
AVENIDA PICO UC (REPLACE)

LOG OF TEST BORINGS 3 OF 6

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

UNIT: PROJECT NUMBER & PHASE: 1200020781

BRIDGE No.	Sheet	of
55-0207		



AS BUILT PLANS
Contract No. 060-7VC2
Date Completed
Document No. 7000 2283

B.M.# 19-SCle-54
3" I.P. & M. on Bk. Tong Prod. Abd. 113' N'ly of C.M. Tank; on Fence Line By 3 Fen. Posts with White Stripes; 200 ± Rt. of Sta. 190+00 L. Fwy.
Elev. 102.80

THIS SET OF PLANS HAS BEEN CORRECTED TO CORRESPOND TO THE "AS BUILT" CONDITIONS AS SUBMITTED BY RESIDENT ENGINEER [illegible]
TRACINGS CORRECTED BY [illegible] DATE: June 19, 62

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

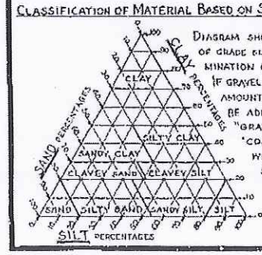


DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES.

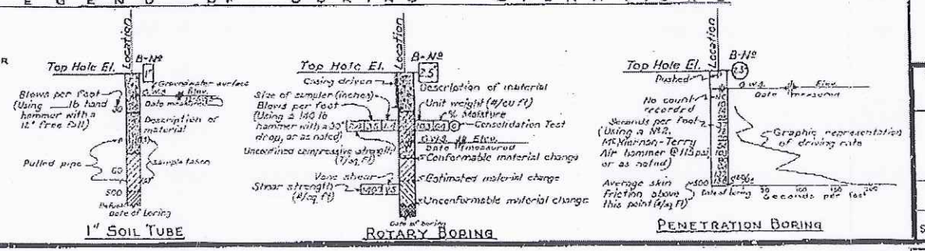
IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND." THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

LEGEND OF EARTH MATERIALS

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PLAN OF ANY BORING
- PENETROMETER
- 2½" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



NOTES

The contractor's attention is directed to Section 2, Article (c) of the Standard Specifications and to the Special Provisions accompanying this set of plans.

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

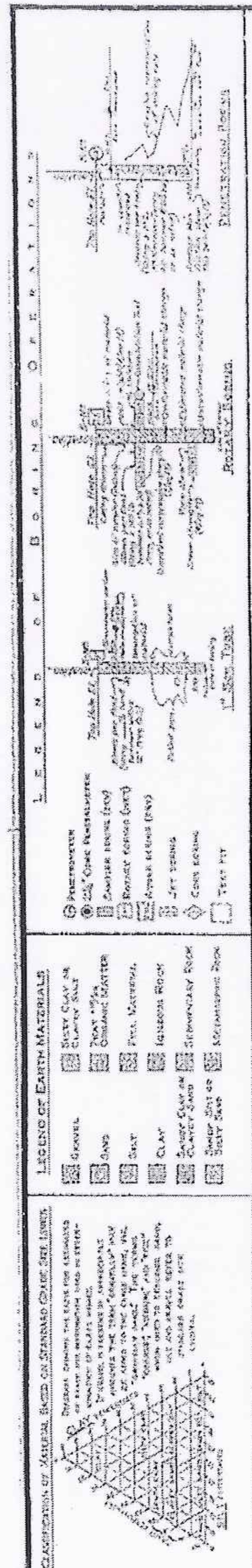
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

AVE. PICO UNDERCROSSING

LOG OF TEST BORINGS

SCALE Horiz. 1"=10' Vert. 1"=10' | BRIDGE 55-207 | FILE E-5.1" | DRAWING C-3723-10

PREL. DRAWING NO. B-3723 9



NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

BENCH MARK

B.M.# 193-R-.5 Clo.-60 — Elev. 123.64
Set a std. brass cap monument 4' right of ⊄ Frwy. Sta. 193+00.

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES					
As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.					
DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL — DATE 5/21/13

AVENIDA PICO UC (REPLACE)

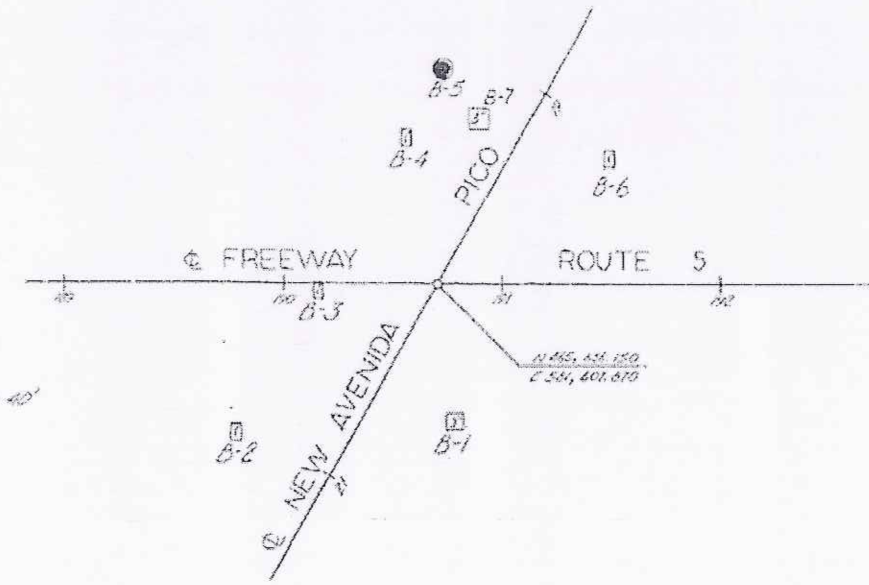
LOG OF TEST BORINGS 4 OF 6

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

UNIT:
PROJECT NUMBER & PHASE: 12000202781

BRIDGE No.	Sheet	of
55-0207		

REGISTERED PROFESSIONAL ENGINEER
MIKE KAPUSKAR
NO. GE 2564
EXP. 12-31-14
GEOTECHNICAL
STATE OF CALIFORNIA

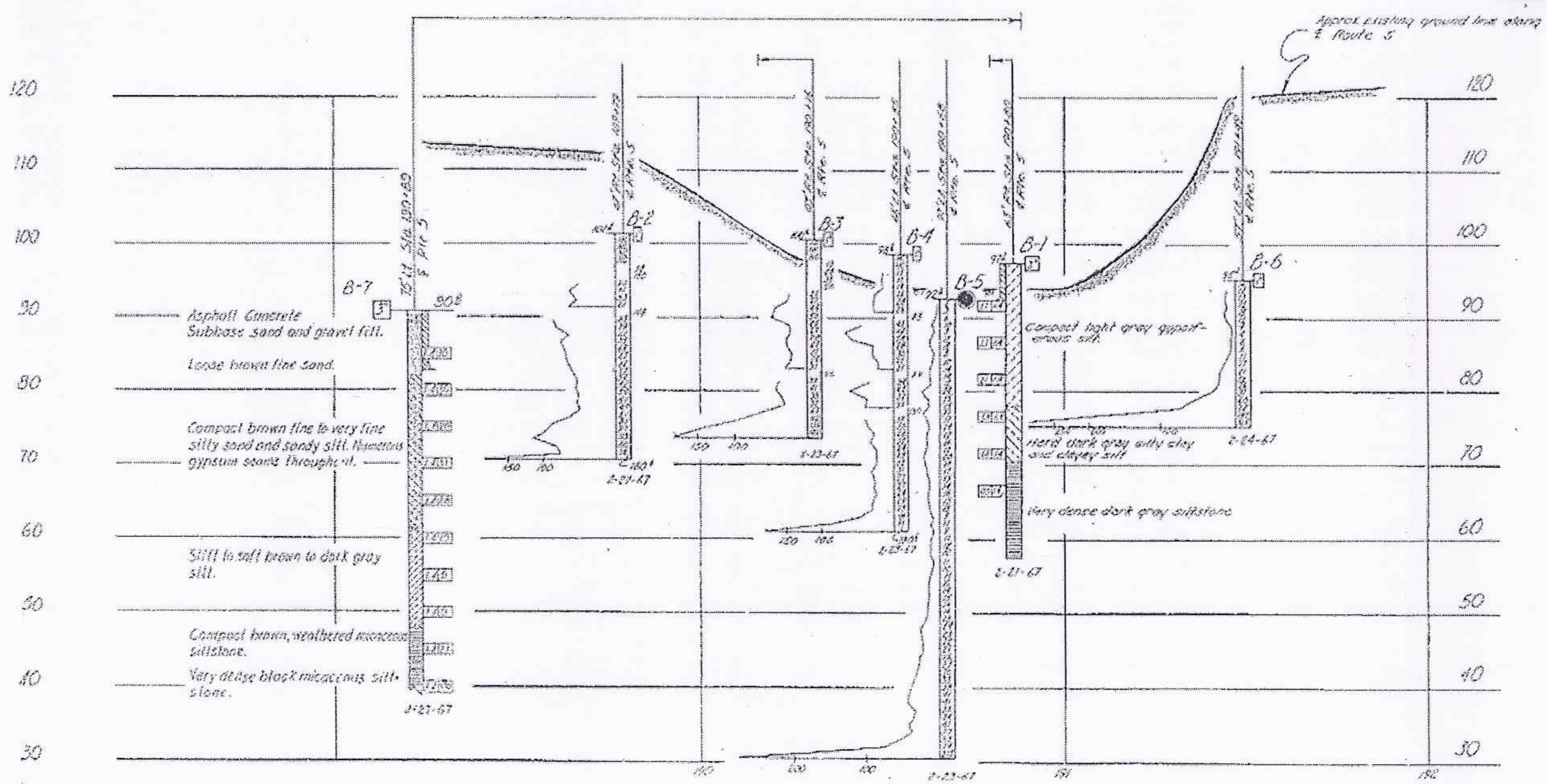


PLAN
Scale: 1" = 40'

March 15, 1973

[redacted]

NO GROUND WATER ENCOUNTERED DURING THIS INVESTIGATION BY BRIDGE DEPT. GEOLOGY SECTION
DATE Feb. 1967 - May 1967



NOTE
All 2" Soil Tube borings (Closed Tip) driven with Cobra.

PROFILE
Scale: Vert. 1" = 10'
Horiz. 1" = 20'

NO AS BUILT CORRECTION
AS BUILT
CORRECTIONS BY W. Lobse
CONTRACT NO. 07-105274
DATE 4-1-83 and 10-17-83

SHEET	OF
70	70

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

AVENIDA PICO UNDERCROSSING
(WIDENING)

LOG OF TEST BORINGS

SCALE As Noted | BRIDGE 55-207 | FILE | DRAWING 55207-8

PREL. DRAWING No. PR-

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL 5/21/13 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-14 — GEOTECHNICAL — STATE OF CALIFORNIA

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ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

CEMENTATION

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

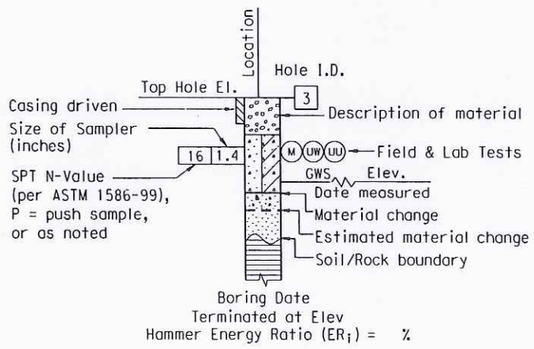
BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring (hollow or solid stem bucket)
Size	R	Rotary drilled boring (conventional)
Size	RW	Rotary drilled with self-casing wire-line
Size	RC	Rotary core with continuously-sampled, self-casing wire-line
Size	P	Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD	Hand driven (1-inch soil tube)
Size	HA	Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778)
[ ]	O	Other (note on LOTB)

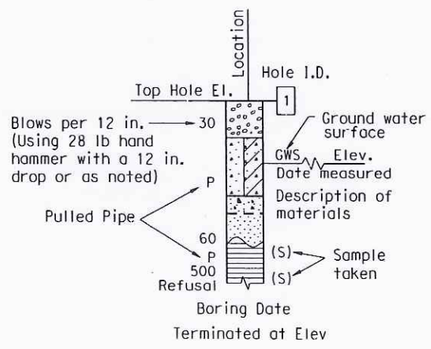
Note: Size in inches.

CONSISTENCY OF COHESIVE SOILS

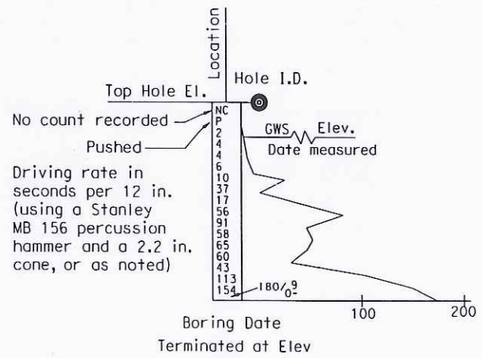
Description	Shear Strength (tsf)	Pocket Penetrometer Measurement, PP, (tsf)	Torvane Measurement, TV, (tsf)	Vane Shear Measurement, VS, (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2



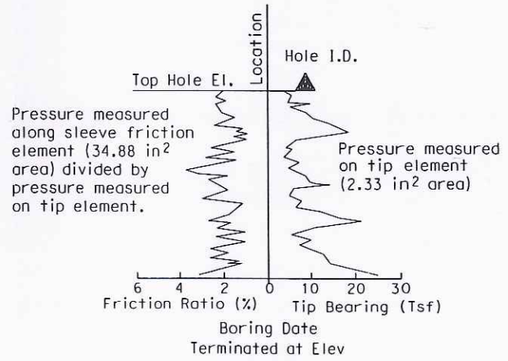
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) BORING

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. 55-0207
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011, 10/2011			POST MILES 3.39

AVENIDA PICO UC (REPLACE)

LOG OF TEST BORINGS 5 OF 6

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771 CONTRACT NO.: 12-0F96B1

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

FILE => $REQUEST

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

GROUP SYMBOLS AND NAMES

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

FIELD AND LABORATORY TESTING

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

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

5/21/13
GEOTECHNICAL PROFESSIONAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-14 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 in.)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE

Description	Criteria
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS

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

PARTICLE SIZE

Description		Size (in.)
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

DESIGN OVERSIGHT
SIGN OFF DATE
DRAWN BY: J. FANG
CHECKED BY: M. KAPUSKAR
R. JIE; K. KAEKUL; C. PONGSAKORNPATARA
FIELD INVESTIGATION BY:
DATE: 9/2011, 10/2011

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. KAPUSKAR
PROJECT ENGINEER

BRIDGE NO. 55-0207
POST MILES 3.39

AVENIDA PICO UC (REPLACE)
LOG OF TEST BORINGS 6 OF 6

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 12000202771
CONTRACT NO.: 12-0F96B1

DISREGARD PRINTS BEARING EARLIER REVISION DATES

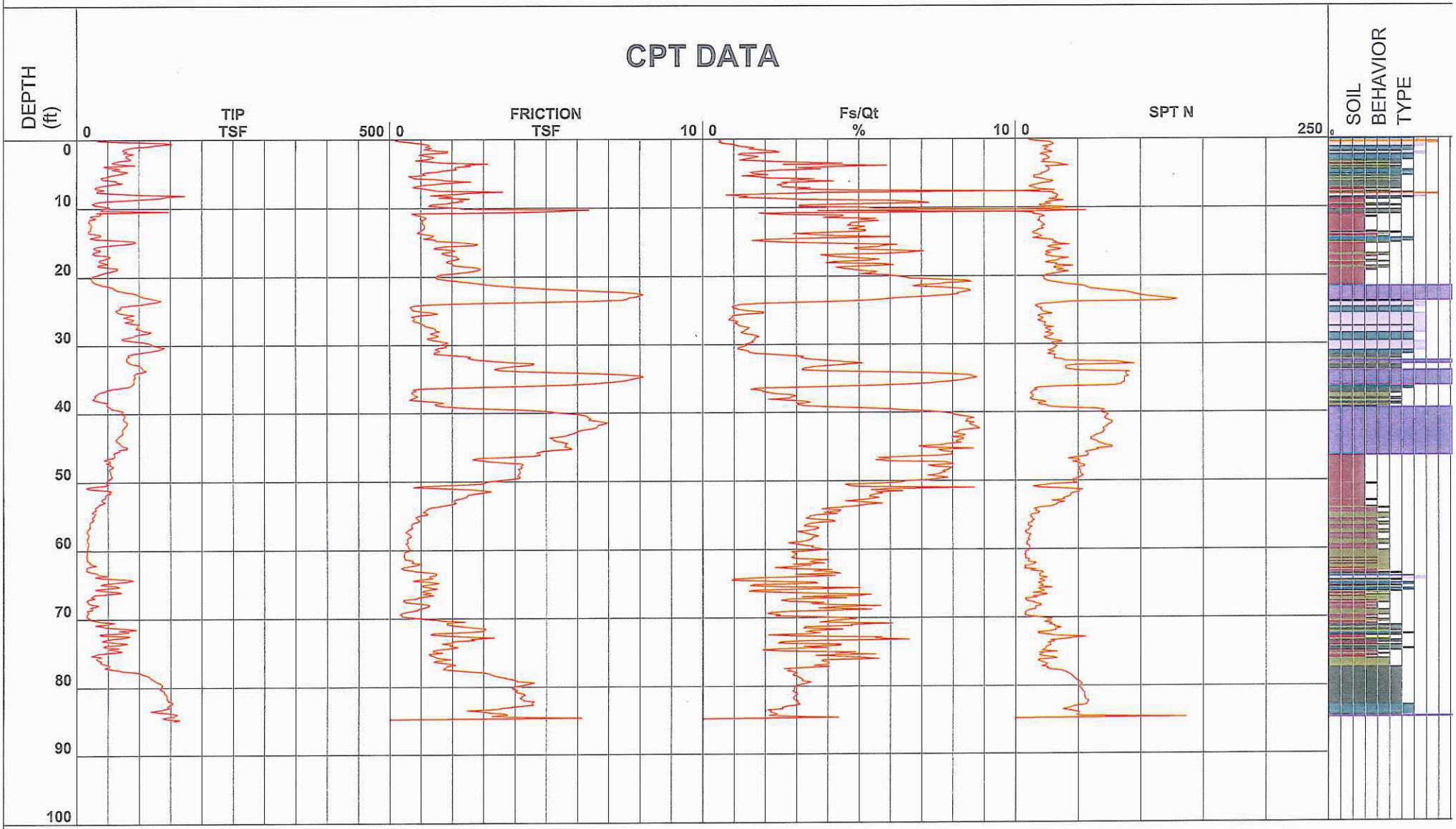
REVISION DATES | SHEET | OF

FILE => REQUEST

Earth Mechanics

Location	I-5 HOV Widening Segment 1	Operator	BH-JB	Filename	SDF(528).cpt
Job Number	11-135	Cone Number	DSG1104	GPS	
Hole Number	CPT-11-115	Date and Time	9/27/2011 7:32:50 AM	Maximum Depth	84.97 ft
Water Table Depth	60.50 ft				

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin 1c %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
0.33	67.6	108.4	115.6	0.4	-0.1	0.6	6	clean SAND to silty SAND	125	5.0	14	22	70	48	-	-	7	16	N/A	0.00	N/A	N/A
0.49	138.6	222.3	222.3	0.7	-0.2	0.5	6	clean SAND to silty SAND	125	5.0	28	44	93	48	-	-	5	16	N/A	0.00	N/A	N/A
0.66	152.0	243.8	243.8	1.0	0.0	0.7	6	clean SAND to silty SAND	125	5.0	30	49	95	48	-	-	5	16	N/A	0.00	N/A	N/A
0.82	127.3	204.2	208.5	1.2	-0.1	1.0	6	clean SAND to silty SAND	125	5.0	25	41	91	48	-	-	6	16	N/A	0.00	N/A	N/A
0.98	116.9	187.4	198.9	1.3	-0.1	1.1	6	clean SAND to silty SAND	125	5.0	23	37	88	48	-	-	7	16	N/A	0.00	N/A	N/A
1.15	90.4	145.0	167.2	1.1	0.0	1.3	6	clean SAND to silty SAND	125	5.0	18	29	79	48	-	-	9	16	N/A	0.00	N/A	N/A
1.31	81.2	130.2	165.2	1.3	0.0	1.6	6	clean SAND to silty SAND	125	5.0	16	26	76	48	-	-	12	16	N/A	0.00	N/A	N/A
1.48	74.6	119.6	150.7	1.1	0.0	1.5	6	clean SAND to silty SAND	125	5.0	15	24	73	48	-	-	12	16	N/A	0.00	N/A	N/A
1.64	73.2	117.4	160.5	1.4	0.0	1.9	5	silty SAND to sandy SILT	120	4.0	18	29	72	48	-	-	14	16	N/A	0.00	N/A	N/A
1.80	80.9	129.7	184.8	1.8	0.0	2.3	5	silty SAND to sandy SILT	120	4.0	20	32	76	48	-	-	15	16	N/A	0.00	N/A	N/A
1.97	75.2	120.6	181.2	1.8	0.0	2.4	5	silty SAND to sandy SILT	120	4.0	19	30	73	48	-	-	17	16	N/A	0.00	N/A	N/A
2.13	90.4	145.0	166.9	1.1	0.1	1.3	6	clean SAND to silty SAND	125	5.0	18	29	79	48	-	-	9	16	N/A	0.00	N/A	N/A
2.30	82.3	132.0	152.4	0.9	0.1	1.2	6	clean SAND to silty SAND	125	5.0	16	26	76	48	-	-	9	16	N/A	0.00	N/A	N/A
2.46	78.4	125.7	156.7	1.2	0.1	1.5	6	clean SAND to silty SAND	125	5.0	16	25	75	48	-	-	12	16	N/A	0.00	N/A	N/A
2.62	78.9	126.5	166.2	1.4	0.1	1.8	5	silty SAND to sandy SILT	120	4.0	20	32	75	48	-	-	13	16	N/A	0.00	N/A	N/A
2.79	84.3	135.2	169.0	1.4	-0.1	1.6	6	clean SAND to silty SAND	125	5.0	17	27	77	48	-	-	12	16	N/A	0.00	N/A	N/A
2.95	85.7	137.5	163.8	1.2	0.0	1.4	6	clean SAND to silty SAND	125	5.0	17	27	78	48	-	-	10	16	N/A	0.00	N/A	N/A
3.12	69.5	111.5	135.3	0.8	0.0	1.2	6	clean SAND to silty SAND	125	5.0	14	22	71	47	-	-	11	16	N/A	0.00	N/A	N/A
3.28	61.2	98.2	151.3	1.3	0.0	2.1	5	silty SAND to sandy SILT	120	4.0	15	25	66	46	-	-	17	16	0.15	-	0.37	0.8
3.45	56.0	89.9	170.0	1.7	0.0	3.0	5	silty SAND to sandy SILT	120	4.0	14	22	63	46	-	-	22	16	0.00	-	0.37	0.0
3.61	70.4	112.8	238.0	3.1	0.1	4.5	9	very stiff fine SOIL	120	2.0	35	56	71	46	-	-	24	30	0.00	-	0.37	0.0
3.77	93.4	149.7	213.8	2.4	0.3	2.6	5	silty SAND to sandy SILT	120	4.0	23	37	80	48	-	-	15	16	0.00	-	0.37	0.0
3.94	43.9	70.4	221.7	2.6	0.1	5.9	9	very stiff fine SOIL	120	2.0	22	35	55	44	-	-	34	30	0.00	-	0.37	0.0
4.10	49.9	80.1	192.9	2.1	0.1	4.2	4	clayy SILT to silty CLAY	115	2.0	25	40	-	-	3.5	9.9	27	15	0.00	-	0.37	0.0
4.27	68.4	109.7	190.5	2.1	0.1	3.1	5	silty SAND to sandy SILT	120	4.0	17	27	70	46	-	-	20	16	0.00	-	0.37	0.0
4.43	56.6	90.8	192.6	2.1	-0.2	3.8	4	clayy SILT to silty CLAY	115	2.0	28	45	-	-	4.0	9.9	24	15	0.00	-	0.37	0.0
4.59	69.4	111.4	173.9	1.7	-0.2	2.5	5	silty SAND to sandy SILT	120	4.0	17	28	71	46	-	-	17	16	0.00	-	0.37	0.0
4.76	81.0	129.9	173.0	1.5	-0.1	1.9	5	silty SAND to sandy SILT	120	4.0	20	32	76	46	-	-	14	16	0.00	-	0.37	0.0
4.92	74.2	119.0	151.7	1.1	-0.1	1.5	6	clean SAND to silty SAND	125	5.0	15	24	73	46	-	-	12	16	0.23	-	0.37	1.7
5.09	65.0	104.3	141.2	1.0	-0.1	1.6	5	silty SAND to sandy SILT	120	4.0	16	26	68	45	-	-	14	16	0.51	-	0.36	2.7
5.25	54.7	87.7	140.3	1.1	-0.1	2.1	5	silty SAND to sandy SILT	120	4.0	14	22	63	44	-	-	18	16	0.56	-	0.36	3.0
5.41	48.3	77.4	108.1	0.6	-0.2	1.3	5	silty SAND to sandy SILT	120	4.0	12	19	59	44	-	-	15	16	2.19	-	0.36	24.3
5.58	39.4	63.2	111.5	0.7	-0.1	1.8	5	silty SAND to sandy SILT	120	4.0	10	16	52	43	-	-	20	16	2.13	-	0.36	32.0
5.74	39.6	63.5	116.2	0.8	-0.2	2.0	5	silty SAND to sandy SILT	120	4.0	10	16	52	43	-	-	21	16	2.01	-	0.36	31.3
5.91	43.3	69.4	163.8	1.5	-0.2	3.6	4	clayy SILT to silty CLAY	115	2.0	22	35	-	-	3.0	9.9	27	15	0.00	-	0.35	0.0
6.07	63.7	101.8	175.8	1.8	0.0	2.8	5	silty SAND to sandy SILT	120	4.0	16	25	68	45	-	-	20	16	0.00	-	0.35	0.0
6.23	62.3	98.3	213.4	2.6	-0.1	4.2	9	very stiff fine SOIL	120	2.0	31	49	66	45	-	-	25	30	0.00	-	0.35	0.0
6.40	72.5	113.0	177.4	1.8	-0.4	2.5	5	silty SAND to sandy SILT	120	4.0	18	28	71	45	-	-	18	16	0.00	-	0.35	0.0
6.56	55.4	85.2	156.0	1.5	-0.3	2.7	5	silty SAND to sandy SILT	120	4.0	14	21	62	44	-	-	21	16	0.27	-	0.35	1.5
6.73	43.3	65.7	129.0	1.0	-0.3	2.4	5	silty SAND to sandy SILT	120	4.0	11	16	53	42	-	-	23	16	1.43	-	0.35	16.0
6.89	34.9	52.4	119.7	0.9	-0.2	2.5	5	silty SAND to sandy SILT	120	4.0	9	13	46	41	-	-	26	16	1.93	-	0.35	41.5
7.05	29.2	43.4	111.3	0.7	-0.3	2.6	5	silty SAND to sandy SILT	120	4.0	7	11	39	40	-	-	29	16	2.14	-	0.35	51.2
7.22	31.4	46.1	134.5	1.1	-0.2	3.5	4	clayy SILT to silty CLAY	115	2.0	16	23	-	-	2.2	9.9	32	15	1.17	-	0.34	45.4
7.38	43.7	63.4	142.4	1.3	-0.3	3.0	5	silty SAND to sandy SILT	120	4.0	11	16	52	42	-	-	26	16	0.76	-	0.34	5.3
7.55	32.2	51.7	168.6	1.5	-0.3	4.8	4	clayy SILT to silty CLAY	115	2.0	16	26	-	-	2.3	9.9	35	15	0.00	-	0.34	0.0
7.71	32.7	52.4	-	3.6	-0.4	9.9	3	silty CLAY to CLAY	115	1.5	22	35	-	-	2.3	9.9	48	15	-	-	0.34	-
7.87	62.6	88.1	195.7	2.5	-0.8	4.0	4	clayy SILT to silty CLAY	115	2.0	31	44	-	-	4.4	9.9	25	15	0.00	-	0.34	0.0
8.04	94.0	131.1	185.5	2.1	0.1	2.3	5	silty SAND to sandy SILT	120	4.0	24	33	76	46	-	-	15	16	0.00	-	0.34	0.0
8.20	172.4	237.9	237.9	1.3	-0.5	0.8	6	clean SAND to silty SAND	125	5.0	34	48	95	48	-	-	5	16	0.00	-	0.34	0.0
8.37	140.1	191.3	214.6	2.0	-0.7	1.4	6	clean SAND to silty SAND	125	5.0	28	38	88	47	-	-	9	16	0.00	-	0.34	0.0
8.53	135.0	182.5	198.0	1.6	-0.6	1.2	6	clean SAND to silty SAND	125	5.0	27	36	87	47	-	-	7	16	0.00	-	0.34	0.0
8.69	102.1	136.7	198.4	2.5	-0.5	2.5	5	silty SAND to sandy SILT	120	4.0	26	34	77	46	-	-	16	16	0.00	-	0.34	0.0
8.86	71.3	94.6	177.5	2.2	-0.5	3.1	5	silty SAND to sandy SILT	120	4.0	18	24	65	44	-	-	22	16	0.00	-	0.34	0.0
9.02	39.6	63.5	-	2.4	-0.4	6.0	4	clayy SILT to silty CLAY	115	2.0	20	32	-	-	2.8	9.9	36	15	-	-	0.34	-
9.19	29.6	47.5	-	2.0	-0.5	7.0	3	silty CLAY to CLAY	115	1.5	20	32	-	-	2.1	9.9	43	15	-	-	0.34	-
9.35	25.3	40.6	-	1.8	-0.8	7.4	3	silty CLAY to CLAY	115	1.5	17	27	-	-	1.8	9.9	46	15	-	-	0.34	-
9.51	29.0	46.5	-	1.3	-0.8	4.7	4	clayy SILT to silty CLAY	115	2.0	14	23	-	-	2.0	9.9	36	15	-	-	0.34	-
9.68	40.6	51.7	133.2	1.3	-0.9	3.1	4	clayy SILT to silty CLAY	115	2.0	20	26	-	-	2.8	9.9	29	15	1.44	-	0.34	36.7
9.84	52.0	65.6	147.6	1.6	-0.8	3.1	4	clayy SILT to silty CLAY	115	2.0	26	33	-	-	3.6	9.9	26	15	0.71	-	0.34	5.0
10.01	42.0	58.9	190.7	2.2	-0.6	5.3	4	clayy SILT to silty CLAY	115	2.0	21	29	-	-	2.9	9.9	35	15	0.00	-	0.34	0.0
10.17	42.3	58.6	-	2.3	-0.7	5.6	4	clayy SILT to silty CLAY	115	2.0	21	29	-	-	3.0	9.9	36	15	-	-	0.34	-
10.34	37.9	60.8	-	6.4	-0.8	9.9	9	very stiff fine SOIL	120	2.0	19	30	51	40	-	-	45	30	-	-	0.34	-
10.50	146.3	178.9	283.2	5.4	-0.4	3.7	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	9.7	9.9	18	16	0.00	-	0.34	0.0
10.66	32.1	50.1	-	4.1	-0.6	9.9	3	silty CLAY to CLAY	115	1.5	21	33	-	-	2.2	9.9	48	15	-	-	0.34	-
10.83	39.1	47.1	97.8	0.7	-0.4	1.8	5	silty SAND to sandy SILT	120	4.0	10	12	42	40	-	-	24	16	2.38	-	0.34	47.5
10.99	36.2	43.3	104.3	0.8	-0.5	2.3	5	silty SAND to sandy SILT	120	4.0	9	11	39	40	-	-	27	16	2.26	-	0.33	51.2
11.16	21.6	32.2	-	1.0	-0.4	4.6	3	silty CLAY to CLAY	115	1.5	14	21	-	-	1.5	9.9	42	15	-	-	0.33	-
11.32	24.2	35.6	-	1.1	-0.5	4.6	3	silty CLAY to CLAY	115	1.5	16	24	-	-	1.7	9.9	40	15	-	-	0.33	-
11.48	30.0	38.3	-	1.2	-0.4	4.0	4	clayy SILT to silty CLAY	115	2.0	15	19	-	-	2.1	9.9	37	15	-	-	0.33	-
11.65	20.1	28.7	-	1.1	-0.3	5.7	3	silty CLAY to CLAY	115	1.5	13	19	-	-	1.4	9.9	48	15	-	-	0.33	-
11.81	19.8	27.9	-	1.0	-0.6	5.2	3	silty CLAY to CLAY	115	1.5	13	19	-	-	1.4	9.9	47	15	-	-	0.33	-
11.98	18.8	26.2	-	1.1	-0.6	5.8	3	silty CLAY to CLAY	115	1.5	13	17	-	-	1.3	9.9	50	15	-	-	0.33	-
12.14	20.6	28.4	-	1.0	-0.7	5.2	3	silty CLAY to CLAY	115	1.5	14	19	-	-	1.4	9.9	46	15	-	-	0.33	-
12.30	22.2	30.1	-	1.0	-0.7	4.9	3	silty CLAY to CLAY	115	1.5	15	20	-	-	1.5	9.9	44	15	-	-	0.33	-
12.47	23.3	31.3	-	1.1	-0.7	4.9	3	silty CLAY to CLAY	115	1.5	16	21	-	-	1.6	9.9	43	15	-	-	0.33	-
12.63	23.7	31.4	-	1.1	-0.7	4.8	3	silty CLAY to CLAY	115	1.5	16	21	-	-	1.6	9.9	43	15	-	-	0.33	-
12.80	21.5	28.1	-	1.1	-0.8	5.4	3	silty CLAY to CLAY	115	1.5	14	19	-	-	1.5	9.9	47	15	-	-	0.33	-
12.96	22.0	28.5	-	1.1	-0.8	5.2	3	silty CLAY to CLAY	115	1.5	15	19	-	-	1.5	9.9	46	15	-	-	0.33	-
13.12	22.5	28.8	-	1.1	-0.9	4.8	3	silty CLAY to CLAY	115	1.5	15	19	-	-	1.6	9.9	45	15	-	-	0.33	-
13.29	19.3	24.3	-	1.0	-0.9	5.4	3	silty CLAY to CLAY	115	1.5	13	16	-	-	1.3	9.9	50	15	-	-	0.33	-
13.45	18.2	22.7	-	0.9	-0.9	5.4	3	silty CLAY to CLAY	115	1.5	12	15	-	-	1.3	9.9	52	15	-	-	0.33	-
13.62	21.7	26.8	-	0.9	-0.9	4.2	3	silty CLAY to CLAY	115	1.5	14	18	-	-	1.5	9.9	44	15	-	-	0.33	-
13.78	36.5	39.2	115.6	1.1	-1.0	3.0	4	clayy SILT to silty CLAY	115	2.0	18	20	-	-	2.5	9.9	32	15	2.08	-	0.33	51.2
13.94	38.4	41.0	131.6	1.4	-1.0	3.7	4	clayy SILT to silty CLAY	115	2.0	19	20	-	-	2.7	9.9	34	15	1.69	-	0.32	51.2
14.11	32.0	38.2	-	1.4	-1.0	4.4	4	clayy SILT to silty CLAY	115	2.0	16	19	-	-	2.2	9.9	39	15	-	-	0.32	-
14.27	21.7	25.6	-	1.3	-1.0	6.2	3	silty CLAY to CLAY	115	1.5	14	17	-	-	1.5	9.9	52	15	-	-	0.32	-
14.44	29.2	34.0	-	1.1	-0.9	3.8	4	clayy SILT to silty CLAY	115	2.0	15	17	-	-	2.0	9.9	38	15	-	-	0.32	-
14.60	67.8	70.7	127.5	1.5	-1.1	2.2	5	silty SAND to sandy SILT	120	4.0	17	18	56	42	-	-	21	16	1.85	-	0.32	27.8
14.76	92.5	95.9	133.3	1.5	-1.2	1.6	5	silty SAND to sandy SILT	120	4.0	23	24	66	44	-	-	15	16	1.63	-	0.32	12.6
14.93	93.9	96.8	150.0	2.0	-1.2	2.1	5	silty SAND to sandy SILT	120	4.0	23	24	66	44	-	-	17	16	0.82	-	0.31	4.6
15.09	85.0	87.1	164.7	2.5	-1.3	2.9	5	silty SAND to sandy SILT	120	4.0	21	22	62	43	-	-	22	16	0.00	-	0.31	0.0
15.26	63.5	64.8	180.7	2.8	-1.2	4.5	4	clayy SILT to silty CLAY	115	2.0	32	32	-	-	4.5	9.9	31	15	0.00	-	0.31	0.0
15.42	44.5	48.6	-	2.8	-1.1	6.3	3	silty CLAY to CLAY	115	1.5	30	32	-	-	3.1	9.9	41	15	-	-	0.31	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
15.58	31.4	33.9	-	1.8	-1.0	5.9	3	silty CLAY to CLAY	115	1.5	21	23	-	-	2.2	9.9	45	15	-	-	0.31	-
15.75	27.0	28.8	-	1.5	-1.0	5.8	3	silty CLAY to CLAY	115	1.5	18	19	-	-	1.9	9.9	48	15	-	-	0.31	-
15.91	29.1	30.7	-	1.4	-1.0	5.0	3	silty CLAY to CLAY	115	1.5	19	20	-	-	2.0	9.9	44	15	-	-	0.31	-
16.08	37.9	39.8	-	1.9	-0.9	5.0	3	silty CLAY to CLAY	115	1.5	25	27	-	-	2.6	9.9	40	15	-	-	0.31	-
16.24	35.5	36.9	-	2.1	-1.0	6.0	3	silty CLAY to CLAY	115	1.5	24	25	-	-	2.5	9.9	44	15	-	-	0.31	-
16.40	27.3	28.0	-	1.9	-0.9	7.3	3	silty CLAY to CLAY	115	1.5	18	19	-	-	1.9	9.9	53	15	-	-	0.31	-
16.57	25.4	25.8	-	1.7	-0.9	6.9	3	silty CLAY to CLAY	115	1.5	17	17	-	-	1.8	9.9	53	15	-	-	0.31	-
16.73	29.2	29.4	-	1.7	-0.9	6.1	3	silty CLAY to CLAY	115	1.5	19	20	-	-	2.0	9.9	49	15	-	-	0.31	-
16.90	50.0	48.5	145.9	1.9	-0.9	3.9	4	clayy SILT to silty CLAY	115	2.0	25	24	-	-	3.5	9.9	33	15	1.05	-	0.31	39.2
17.06	53.1	51.3	154.0	2.1	-0.9	4.1	4	clayy SILT to silty CLAY	115	2.0	27	26	-	-	3.7	9.9	33	15	0.69	-	0.31	28.7
17.23	48.9	47.4	-	2.2	-0.9	4.5	4	clayy SILT to silty CLAY	115	2.0	24	24	-	-	3.4	9.9	35	15	-	-	0.31	-
17.39	43.4	42.1	-	2.2	-0.9	5.2	3	silty CLAY to CLAY	115	1.5	29	28	-	-	3.0	9.9	40	15	-	-	0.31	-
17.55	36.2	34.9	-	2.0	-0.9	5.8	3	silty CLAY to CLAY	115	1.5	24	23	-	-	2.5	9.9	45	15	-	-	0.31	-
17.72	35.5	33.9	-	1.9	-0.9	5.4	3	silty CLAY to CLAY	115	1.5	24	23	-	-	2.5	9.9	44	15	-	-	0.31	-
17.88	42.7	40.4	-	1.8	-0.9	4.4	4	clayy SILT to silty CLAY	115	2.0	21	20	-	-	3.0	9.9	37	15	-	-	0.31	-
18.05	49.5	46.5	147.1	2.0	-0.9	4.0	4	clayy SILT to silty CLAY	115	2.0	25	23	-	-	3.5	9.9	34	15	1.02	-	0.31	44.3
18.21	34.8	32.3	-	2.0	-1.0	5.9	3	silty CLAY to CLAY	115	1.5	23	22	-	-	2.4	9.9	46	15	-	-	0.31	-
18.37	33.6	31.0	-	2.0	-1.1	6.3	3	silty CLAY to CLAY	115	1.5	22	21	-	-	2.3	9.9	48	15	-	-	0.31	-
18.54	47.6	43.5	-	2.4	-1.0	5.2	3	silty CLAY to CLAY	115	1.5	32	29	-	-	3.3	9.9	39	15	-	-	0.31	-
18.70	65.3	60.3	172.1	2.8	-1.0	4.3	4	clayy SILT to silty CLAY	115	2.0	33	30	-	-	4.6	9.9	31	15	0.00	-	0.31	0.0
18.87	64.7	59.5	175.8	2.9	-1.0	4.6	4	clayy SILT to silty CLAY	115	2.0	32	30	-	-	4.5	9.9	32	15	0.00	-	0.31	0.0
19.03	58.9	53.9	176.1	2.8	-1.0	4.9	4	clayy SILT to silty CLAY	115	2.0	29	27	-	-	4.1	9.9	35	15	0.00	-	0.31	0.0
19.19	52.3	46.1	-	2.7	-1.0	5.2	3	silty CLAY to CLAY	115	1.5	35	31	-	-	3.7	9.9	38	15	-	-	0.31	-
19.36	43.7	38.2	-	2.4	-1.0	5.7	3	silty CLAY to CLAY	115	1.5	29	25	-	-	3.0	9.9	43	15	-	-	0.31	-
19.52	37.8	32.8	-	2.1	-0.8	5.6	3	silty CLAY to CLAY	115	1.5	25	22	-	-	2.6	9.9	45	15	-	-	0.31	-
19.69	32.8	28.3	-	1.7	-0.8	5.2	3	silty CLAY to CLAY	115	1.5	22	19	-	-	2.3	9.9	47	15	-	-	0.31	-
19.85	25.7	22.0	-	1.5	-2.2	6.2	3	silty CLAY to CLAY	115	1.5	17	15	-	-	1.8	9.9	55	15	-	-	0.31	-
20.01	23.7	20.1	-	1.5	-1.8	6.5	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.6	9.9	58	15	-	-	0.31	-
20.18	22.8	19.1	-	1.5	-1.2	6.9	3	silty CLAY to CLAY	115	1.5	15	13	-	-	1.6	9.9	60	15	-	-	0.31	-
20.34	24.2	20.1	-	1.6	-1.4	7.0	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.7	9.9	59	15	-	-	0.31	-
20.51	24.5	20.3	-	1.9	-1.4	8.0	3	silty CLAY to CLAY	115	1.5	16	14	-	-	1.7	9.9	62	15	-	-	0.31	-
20.67	26.3	21.6	-	2.2	-1.2	8.8	3	silty CLAY to CLAY	115	1.5	18	14	-	-	1.8	9.9	62	15	-	-	0.31	-
20.83	29.4	24.0	-	2.5	-1.2	9.0	3	silty CLAY to CLAY	115	1.5	20	16	-	-	2.0	9.9	60	15	-	-	0.31	-
21.00	36.3	29.3	-	2.8	-1.3	8.1	3	silty CLAY to CLAY	115	1.5	24	20	-	-	2.5	9.9	54	15	-	-	0.31	-
21.16	40.5	32.5	-	3.1	-1.4	7.8	3	silty CLAY to CLAY	115	1.5	27	22	-	-	2.8	9.9	51	15	-	-	0.31	-
21.33	49.8	39.6	-	3.4	-1.3	7.1	3	silty CLAY to CLAY	115	1.5	33	26	-	-	3.5	9.9	46	15	-	-	0.31	-
21.49	57.7	45.6	-	3.9	-1.1	6.9	3	silty CLAY to CLAY	115	1.5	38	30	-	-	4.0	9.9	43	15	-	-	0.31	-
21.65	59.2	46.4	-	4.5	-1.0	7.8	3	silty CLAY to CLAY	115	1.5	39	31	-	-	4.1	9.9	45	15	-	-	0.31	-
21.82	62.1	48.4	-	5.1	-0.9	8.3	3	silty CLAY to CLAY	115	1.5	41	32	-	-	4.3	9.9	46	15	-	-	0.31	-
21.98	68.8	53.2	-	5.8	-0.7	8.7	3	silty CLAY to CLAY	115	1.5	46	35	-	-	4.8	9.9	45	15	-	-	0.31	-
22.15	78.4	60.1	-	6.7	-0.6	8.7	9	very stiff fine SOIL	120	2.0	39	30	50	41	-	-	43	30	-	-	0.31	-
22.31	89.5	68.1	-	7.5	-0.5	8.5	9	very stiff fine SOIL	120	2.0	45	34	54	42	-	-	41	30	-	-	0.31	-
22.47	96.3	72.8	-	7.8	-0.5	8.2	9	very stiff fine SOIL	120	2.0	48	36	57	42	-	-	39	30	-	-	0.31	-
22.64	99.0	74.3	-	8.1	-0.3	8.3	9	very stiff fine SOIL	120	2.0	50	37	57	42	-	-	39	30	-	-	0.31	-
22.80	103.1	76.8	-	8.0	-0.1	7.8	9	very stiff fine SOIL	120	2.0	52	38	58	42	-	-	38	30	-	-	0.31	-
22.97	109.6	81.0	-	7.9	-0.3	7.3	9	very stiff fine SOIL	120	2.0	55	41	60	43	-	-	36	30	-	-	0.31	-
23.13	118.5	98.6	281.0	7.6	-0.1	6.5	9	very stiff fine SOIL	120	2.0	59	49	67	43	-	-	31	30	0.00	-	0.31	0.0
23.30	127.9	106.0	277.2	7.6	0.2	6.0	9	very stiff fine SOIL	120	2.0	64	53	69	43	-	-	29	30	0.00	-	0.31	0.0
23.46	134.4	111.0	271.6	7.4	0.4	5.6	9	very stiff fine SOIL	120	2.0	67	56	70	44	-	-	28	30	0.00	-	0.31	0.0
23.62	127.5	105.0	242.3	6.2	0.7	4.9	9	very stiff fine SOIL	120	2.0	64	52	69	43	-	-	26	30	0.00	-	0.31	0.0
23.79	114.6	94.0	189.3	4.0	0.8	3.5	5	silty SAND to sandy SILT	120	4.0	29	23	65	43	-	-	23	16	0.00	-	0.31	0.0
23.95	105.2	86.0	135.7	2.1	-0.6	2.0	5	silty SAND to sandy SILT	120	4.0	26	22	62	42	-	-	18	16	1.75	-	0.31	20.6
24.12	87.6	71.4	103.0	1.1	-0.9	1.3	5	silty SAND to sandy SILT	120	4.0	22	18	56	41	-	-	16	16	2.28	-	0.30	27.4
24.28	71.4	57.9	87.5	0.8	-0.6	1.1	5	silty SAND to sandy SILT	120	4.0	18	14	49	40	-	-	17	16	2.61	-	0.30	35.8
24.44	68.5	55.4	82.2	0.7	-0.6	1.0	5	silty SAND to sandy SILT	120	4.0	17	14	48	40	-	-	16	16	2.74	-	0.30	38.3
24.61	70.3	56.7	83.1	0.7	-0.7	1.0	5	silty SAND to sandy SILT	120	4.0	18	14	48	40	-	-	16	16	2.72	-	0.29	37.0
24.77	66.3	53.3	83.4	0.7	-0.7	1.1	5	silty SAND to sandy SILT	120	4.0	17	13	46	40	-	-	18	16	2.71	-	0.29	40.5
24.94	62.1	49.7	84.4	0.7	-0.6	1.2	5	silty SAND to sandy SILT	120	4.0	16	12	44	39	-	-	19	16	2.69	-	0.28	44.4
25.10	64.3	51.3	92.5	0.9	-0.7	1.5	5	silty SAND to sandy SILT	120	4.0	16	13	45	39	-	-	21	16	2.49	-	0.28	42.7
25.26	67.7	53.9	107.1	1.3	-0.7	2.0	5	silty SAND to sandy SILT	120	4.0	17	13	47	40	-	-	23	16	2.21	-	0.27	39.9
25.43	78.3	62.1	114.5	1.5	-0.8	2.0	5	silty SAND to sandy SILT	120	4.0	20	16	51	40	-	-	21	16	2.09	-	0.27	32.7
25.59	90.7	71.7	107.7	1.3	-0.8	1.4	5	silty SAND to sandy SILT	120	4.0	23	18	56	41	-	-	17	16	2.20	-	0.27	27.2
25.76	82.7	65.1	92.4	0.9	-0.7	1.1	5	silty SAND to sandy SILT	120	4.0	21	16	53	41	-	-	15	16	2.49	-	0.26	30.9
25.92	75.3	59.2	84.6	0.7	-0.7	1.0	5	silty SAND to sandy SILT	120	4.0	19	15	50	40	-	-	15	16	2.68	-	0.26	34.6
26.08	82.5	64.6	89.2	0.8	-0.7	1.0	5	silty SAND to sandy SILT	120	4.0	21	16	53	41	-	-	15	16	2.57	-	0.26	31.2
26.25	91.2	71.2	92.4	0.8	-0.7	0.9	6	clean SAND to silty SAND	125	5.0	18	14	56	41	-	-	13	16	2.49	-	0.25	27.5
26.41	88.2	68.6	89.4	0.7	-0.7	0.8	6	clean SAND to silty SAND	125	5.0	18	14	55	41	-	-	13	16	2.56	-	0.25	28.9
26.58	76.9	59.6	87.5	0.8	-0.7	1.0	5	silty SAND to sandy SILT	120	4.0	19	15	50	40	-	-	16	16	2.61	-	0.24	34.3
26.74	83.4	64.5	94.0	0.9	-0.7	1.1	5	silty SAND to sandy SILT	120	4.0	21	16	53	40	-	-	16	16	2.46	-	0.24	31.2
26.90	98.8	76.1	100.9	1.0	-0.8	1.0	6	clean SAND to silty SAND	125	5.0	20	15	58	41	-	-	13	16	2.32	-	0.24	25.0
27.07	97.7	75.0	102.3	1.1	-0.8	1.1	5	silty SAND to sandy SILT	120	4.0	24	19	58	41	-	-	14	16	2.29	-	0.23	25.5
27.23	96.9	74.2	103.0	1.1	-0.8	1.2	5	silty SAND to sandy SILT	120	4.0	24	19	57	41	-	-	15	16	2.28	-	0.23	25.9
27.40	96.6	73.7	106.9	1.3	-0.8	1.3	5	silty SAND to sandy SILT	120	4.0	24	18	57	41	-	-	16	16	2.21	-	0.22	26.2
27.56	94.8	72.1	110.4	1.4	-0.8	1.5	5	silty SAND to sandy SILT	120	4.0	24	18	56	41	-	-	17	16	2.15	-	0.22	27.0
27.72	101.9	77.3	113.3	1.5	-0.8	1.5	5	silty SAND to sandy SILT	120	4.0	25	19	58	41	-	-	16	16	2.11	-	0.22	24.4
27.89	106.4	80.5	113.9	1.4	-0.8	1.4	5	silty SAND to sandy SILT	120	4.0	27	20	60	42	-	-	15	16	2.10	-	0.21	22.9
28.05	118.7	89.5	120.9	1.6	-0.9	1.4	5	silty SAND to sandy SILT	120	4.0	30	22	63	42	-	-	14	16	2.00	-	0.21	20.0
28.22	114.2	85.8	114.7	1.4	-0.9	1.2	6	clean SAND to silty SAND	125	5.0	23	17	62	42	-	-	14	16	2.09	-	0.21	21.1
28.38	100.5	75.3	107.8	1.3	-0.8	1.3	5	silty SAND to sandy SILT	120	4.0	25	19	58	41	-	-	15	16	2.20	-	0.20	25.4
28.54	93.2	69.6	109.6	1.4	-0.8	1.6	5	silty SAND to sandy SILT	120	4.0	23	17	55	41	-	-	18	16	2.17	-	0.20	28.3
28.71	91.6	68.3	112.8	1.5	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	23	17	54	41	-	-	19	16	2.12	-	0.20	29.1
28.87	83.2	61.8	110.4	1.5	-0.8	1.8	5	silty SAND to sandy SILT	120	4.0	21	15	51	40	-	-	21	16	2.15	-	0.19	32.8
29.04	72.2	53.5	100.0	1.2	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	18	13	46	39	-	-	22	16	2.34	-	0.19	40.4
29.20	73.8	54.5	100.9	1.2	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	18	14	47	39	-	-	21	16	2.32	-	0.18	39.3
29.36	88.1	64.9	108.9	1.4	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	22	16	53	40	-	-	19	16	2.18	-	0.18	31.0
29.53	105.4	77.5	117.4	1.7	-0.9	1.6	5	silty SAND to sandy SILT	120	4.0	26	19	59	41	-	-	17	16	2.05	-	0.18	24.3
29.69	114.7	84.0	124.1	1.8	-0.9	1.6	5	silty SAND to sandy SILT	120	4.0	29	21	61	42	-	-	16	16	1.96	-	0.17	21.7
29.86	119.0	87.0	122.7	1.7	-0.9	1.5	5	silty SAND to sandy SILT	120	4.0	30	22	62	42	-	-	15	16	1.98	-	0.17	20.7
30.02	121.4	88.5	120.3	1.6	-0.9	1.4	5	silty SAND to sandy SILT	120	4.0	30	22	63	42	-	-	14	16	2.01	-	0.17	20.3
30.19	128.5	93.3	125.9	1.8	-0.9	1.4	5	silty SAND to sandy SILT	120	4.0	32	23	65	42	-	-	14	16	1.94	-	0.16	18.8
30.35	139.8	101.3	129.8	1.8	-0.9	1.3	6	clean SAND to silty SAND	125	5.0	28	20	67	43	-	-	13	16	1.89	-	0.16	16.6
30.51	135.2	97.7	122.9	1.6	-0.9	1.2	6	clean SAND to silty SAND	125	5.0	27	20	66	42	-	-	12	16	1.97	-	0.16	17.6
30.68	130.8	94.3	118.8	1.5	-0.9	1.1	6	clean SAND to silty SAND	125	5.0	26	19	65	42	-	-	12	16	2.03	-	0.15	18.6
30.84	121.4	87.2	117.4	1.5	-0.9	1.3	5	silty SAND to sandy SILT	120	4.0	30	22	62	42	-	-	14	16	2.05	-	0.15	20.7

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
31.01	109.0	78.1	114.7	1.6	-0.8	1.5	5	silty SAND to sandy SILT	120	4.0	27	20	59	41	-	-	16	16	2.09	-	0.15	24.0
31.17	96.1	68.7	107.4	1.4	-0.8	1.5	5	silty SAND to sandy SILT	120	4.0	24	17	55	40	-	-	18	16	2.20	-	0.14	28.9
31.33	86.2	61.4	106.2	1.4	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	22	15	51	40	-	-	20	16	2.22	-	0.14	33.1
31.50	81.1	57.7	119.8	1.8	-0.8	2.3	5	silty SAND to sandy SILT	120	4.0	20	14	49	39	-	-	24	16	2.02	-	0.14	36.1
31.66	84.6	59.9	135.0	2.3	-0.8	2.8	5	silty SAND to sandy SILT	120	4.0	21	15	50	40	-	-	26	16	1.83	-	0.13	34.0
31.83	80.1	56.6	143.4	2.6	-0.8	3.3	4	clayy SILT to silty CLAY	115	2.0	40	28	-	-	5.6	9.9	29	15	1.53	-	0.13	37.1
31.99	79.8	56.3	140.8	2.5	-0.8	3.2	4	clayy SILT to silty CLAY	115	2.0	40	28	-	-	5.6	9.9	28	15	1.63	-	0.13	37.5
32.15	79.7	56.0	145.0	2.6	-0.9	3.4	4	clayy SILT to silty CLAY	115	2.0	40	28	-	-	5.6	9.9	29	15	1.46	-	0.13	37.7
32.32	79.9	56.1	154.1	2.9	-1.0	3.8	4	clayy SILT to silty CLAY	115	2.0	40	28	-	-	5.6	9.9	31	15	1.06	-	0.12	23.9
32.48	82.3	42.8	-	3.4	-1.2	4.3	4	clayy SILT to silty CLAY	115	2.0	41	21	-	-	5.7	9.9	36	15	-	-	0.12	-
32.65	84.7	43.8	-	3.9	-1.0	4.7	4	clayy SILT to silty CLAY	115	2.0	42	22	-	-	5.9	9.9	37	15	-	-	0.12	-
32.81	90.2	46.4	-	4.6	-1.4	5.2	3	silty CLAY to CLAY	115	1.5	60	31	-	-	6.3	9.9	38	15	-	-	0.12	-
32.97	99.3	69.0	192.3	4.6	-1.3	4.7	4	clayy SILT to silty CLAY	115	2.0	50	35	-	-	6.9	9.9	31	15	0.00	-	0.12	0.0
33.14	101.0	70.0	181.9	4.2	-1.3	4.2	4	clayy SILT to silty CLAY	115	2.0	51	35	-	-	7.1	9.9	29	15	0.00	-	0.12	0.0
33.30	103.7	71.7	169.7	3.7	-1.3	3.7	4	clayy SILT to silty CLAY	115	2.0	52	36	-	-	7.3	9.9	27	15	0.00	-	0.12	0.0
33.47	105.0	72.4	163.0	3.5	-1.3	3.4	4	clayy SILT to silty CLAY	115	2.0	52	36	-	-	7.3	9.9	26	15	0.00	-	0.12	0.0
33.63	105.2	72.4	158.9	3.4	-1.2	3.2	4	clayy SILT to silty CLAY	115	2.0	53	36	-	-	7.4	9.9	25	15	0.92	-	0.12	9.3
33.79	111.0	76.2	162.4	3.5	-1.1	3.2	5	silty SAND to sandy SILT	120	4.0	28	19	58	41	-	-	25	16	0.00	-	0.12	0.0
33.96	105.6	72.3	179.1	4.2	-1.1	4.0	4	clayy SILT to silty CLAY	115	2.0	53	36	-	-	7.4	9.9	28	15	0.00	-	0.12	0.0
34.12	94.9	47.0	-	5.5	-1.0	5.9	3	silty CLAY to CLAY	115	1.5	63	31	-	-	6.6	9.9	40	15	-	-	0.12	-
34.29	91.9	45.3	-	6.7	-0.6	7.4	3	silty CLAY to CLAY	115	1.5	61	30	-	-	6.4	9.9	45	15	-	-	0.12	-
34.45	91.8	45.1	-	7.4	-0.7	8.2	3	silty CLAY to CLAY	115	1.5	61	30	-	-	6.4	9.9	47	15	-	-	0.12	-
34.61	92.9	45.4	-	8.0	-0.5	8.8	3	silty CLAY to CLAY	115	1.5	62	30	-	-	6.5	9.9	48	15	-	-	0.12	-
34.78	93.6	45.5	-	8.1	-0.4	8.8	3	silty CLAY to CLAY	115	1.5	62	30	-	-	6.5	9.9	48	15	-	-	0.12	-
34.94	90.4	43.7	-	7.9	-0.5	9.0	3	silty CLAY to CLAY	115	1.5	60	29	-	-	6.3	9.9	49	15	-	-	0.12	-
35.11	91.2	43.9	-	7.8	-0.5	8.7	3	silty CLAY to CLAY	115	1.5	61	29	-	-	6.4	9.9	48	15	-	-	0.12	-
35.27	91.2	43.8	-	7.6	-0.5	8.5	3	silty CLAY to CLAY	115	1.5	61	29	-	-	6.4	9.9	48	15	-	-	0.12	-
35.43	91.2	43.5	-	7.3	-0.5	8.2	3	silty CLAY to CLAY	115	1.5	61	29	-	-	6.4	9.9	47	15	-	-	0.12	-
35.60	90.9	43.2	-	6.9	-0.6	7.8	3	silty CLAY to CLAY	115	1.5	61	29	-	-	6.3	9.9	46	15	-	-	0.12	-
35.76	89.1	42.1	-	6.5	-0.7	7.4	3	silty CLAY to CLAY	115	1.5	59	28	-	-	6.2	9.9	46	15	-	-	0.12	-
35.93	87.3	41.1	-	5.6	-0.6	6.6	3	silty CLAY to CLAY	115	1.5	58	27	-	-	6.1	9.9	44	15	-	-	0.12	-
36.09	82.4	38.6	-	4.2	-0.9	5.3	3	silty CLAY to CLAY	115	1.5	55	26	-	-	5.7	9.9	41	15	-	-	0.12	-
36.26	69.4	32.4	-	2.5	-1.9	3.8	4	clayy SILT to silty CLAY	115	2.0	35	16	-	-	4.8	9.9	39	15	-	-	0.12	-
36.42	55.4	36.7	89.8	1.0	-0.8	1.9	5	silty SAND to sandy SILT	120	4.0	14	9	34	37	-	-	28	16	2.55	-	0.12	51.2
36.58	48.2	31.8	79.9	0.7	-0.8	1.6	5	silty SAND to sandy SILT	120	4.0	12	8	29	36	-	-	28	16	2.81	-	0.12	51.2
36.75	44.2	20.4	-	0.8	-0.7	2.0	4	clayy SILT to silty CLAY	115	2.0	22	10	-	-	3.0	9.9	38	15	-	-	0.11	-
36.91	37.6	17.2	-	0.7	-0.8	2.0	4	clayy SILT to silty CLAY	115	2.0	19	9	-	-	2.6	9.9	42	15	-	-	0.11	-
37.08	33.1	15.1	-	0.7	-0.8	2.3	4	clayy SILT to silty CLAY	115	2.0	17	8	-	-	2.3	9.0	46	15	-	-	0.11	-
37.24	32.1	14.6	-	0.7	-0.7	2.5	4	clayy SILT to silty CLAY	115	2.0	16	7	-	-	2.2	8.7	48	15	-	-	0.11	-
37.40	28.2	12.7	-	0.8	-0.7	3.1	3	silty CLAY to CLAY	115	1.5	19	8	-	-	1.9	7.5	55	15	-	-	0.11	-
37.57	29.7	13.4	-	0.9	-0.8	3.2	3	silty CLAY to CLAY	115	1.5	20	9	-	-	2.0	7.9	54	15	-	-	0.11	-
37.73	28.5	12.8	-	0.8	-0.9	3.1	3	silty CLAY to CLAY	115	1.5	19	9	-	-	1.9	7.5	55	15	-	-	0.11	-
37.90	25.4	11.4	-	0.7	-0.9	3.1	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	6.6	58	15	-	-	0.11	-
38.06	30.1	13.4	-	0.6	-0.9	2.3	4	clayy SILT to silty CLAY	115	2.0	15	7	-	-	2.0	7.9	49	15	-	-	0.11	-
38.22	36.6	16.2	-	1.0	-0.9	3.0	3	silty CLAY to CLAY	115	1.5	24	11	-	-	2.5	9.8	49	15	-	-	0.11	-
38.39	46.0	20.3	-	1.5	-1.0	3.5	3	silty CLAY to CLAY	115	1.5	31	14	-	-	3.2	9.9	46	15	-	-	0.11	-
38.55	50.0	22.0	-	1.7	-1.4	3.6	4	clayy SILT to silty CLAY	115	2.0	25	11	-	-	3.5	9.9	45	15	-	-	0.11	-
38.72	48.2	21.1	-	1.4	-1.1	3.2	4	clayy SILT to silty CLAY	115	2.0	24	11	-	-	3.3	9.9	44	15	-	-	0.11	-
38.88	48.4	21.1	-	1.5	-1.1	3.2	4	clayy SILT to silty CLAY	115	2.0	24	11	-	-	3.3	9.9	44	15	-	-	0.11	-
39.04	51.5	22.4	-	1.7	-1.2	3.4	4	clayy SILT to silty CLAY	115	2.0	26	11	-	-	3.6	9.9	44	15	-	-	0.11	-
39.21	54.1	23.4	-	2.1	-1.6	4.1	3	silty CLAY to CLAY	115	1.5	36	16	-	-	3.7	9.9	46	15	-	-	0.11	-
39.37	56.3	24.2	-	2.8	-1.2	5.3	3	silty CLAY to CLAY	115	1.5	38	16	-	-	3.9	9.9	50	15	-	-	0.11	-
39.54	66.9	28.7	-	4.0	-1.3	6.2	3	silty CLAY to CLAY	115	1.5	45	19	-	-	4.6	9.9	49	15	-	-	0.11	-
39.70	74.5	31.8	-	4.8	-1.1	6.6	3	silty CLAY to CLAY	115	1.5	50	21	-	-	5.2	9.9	49	15	-	-	0.11	-
39.86	71.7	30.5	-	5.2	-0.7	7.5	3	silty CLAY to CLAY	115	1.5	48	20	-	-	5.0	9.9	52	15	-	-	0.11	-
40.03	70.9	30.1	-	5.4	-0.7	7.9	3	silty CLAY to CLAY	115	1.5	47	20	-	-	4.9	9.9	53	15	-	-	0.11	-
40.19	74.3	31.4	-	5.9	-0.4	8.2	3	silty CLAY to CLAY	115	1.5	50	21	-	-	5.2	9.9	53	15	-	-	0.11	-
40.36	77.1	32.4	-	6.2	-0.6	8.3	3	silty CLAY to CLAY	115	1.5	51	22	-	-	5.4	9.9	53	15	-	-	0.11	-
40.52	76.4	32.0	-	6.3	-0.5	8.5	3	silty CLAY to CLAY	115	1.5	51	21	-	-	5.3	9.9	53	15	-	-	0.11	-
40.68	74.8	31.2	-	6.3	-0.3	8.8	3	silty CLAY to CLAY	115	1.5	50	21	-	-	5.2	9.9	54	15	-	-	0.11	-
40.85	74.2	30.8	-	6.4	-0.3	8.9	3	silty CLAY to CLAY	115	1.5	49	21	-	-	5.2	9.9	55	15	-	-	0.11	-
41.01	75.2	31.1	-	6.4	-0.2	8.7	3	silty CLAY to CLAY	115	1.5	50	21	-	-	5.2	9.9	54	15	-	-	0.11	-
41.18	77.4	31.9	-	6.5	-0.3	8.7	3	silty CLAY to CLAY	115	1.5	52	21	-	-	5.4	9.9	54	15	-	-	0.11	-
41.34	80.8	33.2	-	6.8	-0.2	8.7	3	silty CLAY to CLAY	115	1.5	54	22	-	-	5.6	9.9	53	15	-	-	0.11	-
41.50	80.1	32.8	-	6.9	-0.2	8.9	3	silty CLAY to CLAY	115	1.5	53	22	-	-	5.6	9.9	54	15	-	-	0.11	-
41.67	79.8	32.5	-	6.8	0.1	8.8	3	silty CLAY to CLAY	115	1.5	53	22	-	-	5.6	9.9	54	15	-	-	0.11	-
41.83	77.7	31.5	-	6.7	0.2	8.8	3	silty CLAY to CLAY	115	1.5	52	21	-	-	5.4	9.9	54	15	-	-	0.11	-
42.00	76.3	30.8	-	6.6	0.1	9.0	3	silty CLAY to CLAY	115	1.5	51	21	-	-	5.3	9.9	55	15	-	-	0.11	-
42.16	75.4	30.4	-	6.6	0.3	9.1	3	silty CLAY to CLAY	115	1.5	50	20	-	-	5.2	9.9	56	15	-	-	0.11	-
42.32	73.0	29.3	-	6.5	0.3	9.1	3	silty CLAY to CLAY	115	1.5	49	20	-	-	5.1	9.9	57	15	-	-	0.11	-
42.49	72.7	29.1	-	6.2	0.4	8.8	3	silty CLAY to CLAY	115	1.5	48	19	-	-	5.0	9.9	56	15	-	-	0.11	-
42.65	73.6	29.3	-	6.0	0.5	8.5	3	silty CLAY to CLAY	115	1.5	49	20	-	-	5.1	9.9	55	15	-	-	0.11	-
42.82	73.1	29.0	-	6.0	0.7	8.5	3	silty CLAY to CLAY	115	1.5	49	19	-	-	5.1	9.9	55	15	-	-	0.11	-
42.98	73.2	29.0	-	5.9	0.5	8.3	3	silty CLAY to CLAY	115	1.5	49	19	-	-	5.1	9.9	55	15	-	-	0.11	-
43.15	70.6	27.8	-	5.7	0.6	8.4	3	silty CLAY to CLAY	115	1.5	47	19	-	-	4.9	9.9	56	15	-	-	0.11	-
43.31	67.5	26.5	-	5.7	0.7	8.7	3	silty CLAY to CLAY	115	1.5	45	18	-	-	4.7	9.9	58	15	-	-	0.11	-
43.47	65.8	25.7	-	5.5	0.8	8.6	3	silty CLAY to CLAY	115	1.5	44	17	-	-	4.6	9.9	58	15	-	-	0.11	-
43.64	64.3	25.0	-	5.1	0.9	8.3	3	silty CLAY to CLAY	115	1.5	43	17	-	-	4.4	9.9	58	15	-	-	0.11	-
43.80	62.6	24.3	-	5.2	1.0	8.7	3	silty CLAY to CLAY	115	1.5	42	16	-	-	4.3	9.9	59	15	-	-	0.11	-
43.97	63.1	24.4	-	5.2	0.9	8.6	3	silty CLAY to CLAY	115	1.5	42	16	-	-	4.4	9.9	59	15	-	-	0.11	-
44.13	65.6	25.3	-	5.3	0.9	8.5	3	silty CLAY to CLAY	115	1.5	44	17	-	-	4.5	9.9	58	15	-	-	0.11	-
44.29	68.2	26.2	-	5.5	0.9	8.4	3	silty CLAY to CLAY	115	1.5	45	17	-	-	4.7	9.9	57	15	-	-	0.11	-
44.46	68.8	26.3	-	5.7	1.0	8.6	3	silty CLAY to CLAY	115	1.5	46	18	-	-	4.8	9.9	57	15	-	-	0.11	-
44.62	71.8	27.4	-	5.6	1.0	8.1	3	silty CLAY to CLAY	115	1.5	48	18	-	-	5.0	9.9	55	15	-	-	0.11	-
44.79	73.7	28.0	-	5.6	1.1	7.9	3	silty CLAY to CLAY	115	1.5	49	19	-	-	5.1	9.9	55	15	-	-	0.11	-
44.95	80.8	30.6	-	5.6	1.3	7.1	3	silty CLAY to CLAY	115	1.5	54	20	-	-	5.6	9.9	51	15	-	-	0.11	-
45.11	80.1	30.2	-	5.8	1.3	7.4	3	silty CLAY to CLAY	115	1.5	53	20	-	-	5.6	9.9	52	15	-	-	0.11	-
45.28	67.4	25.4	-	5.8	1.4	9.0	3	silty CLAY to CLAY	115	1.5	45	17	-	-	4.7	9.9	59	15	-	-	0.11	-
45.44	68.8	26.0	-	5.2	1.3	7.8	3	silty CLAY to CLAY	115	1.5	46	17	-	-	4.8	9.9	56	15	-	-	0.11	-
45.61	63.8	24.1	-	4.9	1.4	8.0	3	silty CLAY to CLAY	115	1.5	43	16	-	-	4.4	9.9	58	15	-	-	0.11	-
45.77	58.8	22.2	-	4.7	1.0	8.4	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.1	9.9	61	15	-	-	0.11	-
45.93	60.0	22.6	-	4.8	1.2	8.3	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.1	9.9	60	15	-	-	0.11	-
46.10	60.2	22.7	-	4.8	1.2	8.4	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.2	9.9	60	15	-	-	0.11	-
46.26	60.8	22.9	-	4.6	1.2	8.0	3	silty CLAY to CLAY	115	1.5	41	15	-	-	4.2	9.9	59	15	-	-	0.11	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
46.43	58.2	22.0	-	3.9	1.2	7.0	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	9.9	57	15	-	-	0.11	-
46.59	50.4	19.0	-	2.8	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	9.9	57	15	-	-	0.11	-
46.75	44.1	16.7	-	2.6	-1.4	6.4	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	9.9	62	15	-	-	0.11	-
46.92	52.4	19.8	-	2.9	-1.3	5.8	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	56	15	-	-	0.11	-
47.08	53.7	20.3	-	3.2	-0.9	6.3	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	57	15	-	-	0.11	-
47.25	47.7	18.0	-	3.7	-1.5	8.2	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	65	15	-	-	0.11	-
47.41	53.3	20.1	-	4.2	-1.2	8.3	3	silty CLAY to CLAY	115	1.5	36	13	-	-	3.7	9.9	63	15	-	-	0.11	-
47.57	53.2	20.1	-	4.3	-1.1	8.4	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.7	9.9	63	15	-	-	0.11	-
47.74	57.9	21.9	-	4.2	-1.1	7.6	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	9.9	59	15	-	-	0.11	-
47.90	57.3	21.6	-	4.2	-1.1	7.7	3	silty CLAY to CLAY	115	1.5	38	14	-	-	3.9	9.9	60	15	-	-	0.11	-
48.07	52.9	20.0	-	4.2	-1.1	8.4	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	63	15	-	-	0.11	-
48.23	52.1	19.7	-	4.1	-1.0	8.3	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	63	15	-	-	0.11	-
48.39	52.8	19.9	-	4.1	-1.0	8.3	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	63	15	-	-	0.11	-
48.56	54.3	20.5	-	4.2	-0.8	8.1	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	62	15	-	-	0.11	-
48.72	53.8	20.3	-	4.2	-0.7	8.2	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	62	15	-	-	0.11	-
48.89	54.4	20.5	-	4.1	-0.7	8.0	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	62	15	-	-	0.11	-
49.05	54.6	20.6	-	4.1	-0.7	7.9	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.8	9.9	61	15	-	-	0.11	-
49.22	56.8	21.4	-	4.1	-0.6	7.6	3	silty CLAY to CLAY	115	1.5	38	14	-	-	3.9	9.9	59	15	-	-	0.11	-
49.38	55.6	21.0	-	4.2	-0.6	7.9	3	silty CLAY to CLAY	115	1.5	37	14	-	-	3.8	9.9	61	15	-	-	0.11	-
49.54	52.8	19.9	-	4.1	-0.6	8.3	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	63	15	-	-	0.11	-
49.71	50.8	19.2	-	3.8	-0.2	8.0	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	9.9	63	15	-	-	0.11	-
49.87	47.6	18.0	-	3.5	-0.2	7.7	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	64	15	-	-	0.11	-
50.04	48.2	18.2	-	3.1	-0.2	6.9	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	61	15	-	-	0.11	-
50.20	47.6	18.0	-	3.0	-0.2	6.7	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	61	15	-	-	0.11	-
50.36	50.8	19.2	-	2.9	-0.2	6.1	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	9.9	58	15	-	-	0.11	-
50.53	45.2	17.1	-	2.1	-0.2	4.9	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.4	56	15	-	-	0.11	-
50.69	23.8	9.0	-	1.1	-0.6	5.3	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.6	75	15	-	-	0.11	-
50.86	15.1	5.7	-	0.8	-0.9	6.2	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.7	95	15	-	-	0.11	-
51.02	20.1	7.6	-	1.7	-1.0	9.9	2	Organic SOILS - Peats	100	1.0	20	8	-	-	2.0	3.8	95	10	-	-	0.11	-
51.18	43.0	16.2	-	2.6	-0.5	6.5	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	8.8	63	15	-	-	0.11	-
51.35	55.4	20.9	-	3.0	-0.5	5.7	3	silty CLAY to CLAY	115	1.5	37	14	-	-	3.8	9.9	54	15	-	-	0.11	-
51.51	50.7	19.1	-	3.2	-0.6	6.8	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	9.9	60	15	-	-	0.11	-
51.68	53.6	20.2	-	3.0	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	36	13	-	-	3.7	9.9	56	15	-	-	0.11	-
51.84	47.8	18.0	-	2.7	-0.5	6.1	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.7	59	15	-	-	0.11	-
52.00	45.4	17.1	-	2.5	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.2	60	15	-	-	0.11	-
52.17	46.4	17.5	-	2.5	-0.5	5.7	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.4	59	15	-	-	0.11	-
52.33	45.2	17.1	-	2.4	-0.4	5.7	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.1	59	15	-	-	0.11	-
52.50	41.4	15.6	-	2.3	-0.4	6.1	3	silty CLAY to CLAY	115	1.5	28	10	-	-	2.8	8.2	62	15	-	-	0.11	-
52.66	39.5	14.9	-	2.1	-0.4	5.8	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.7	7.8	63	15	-	-	0.11	-
52.82	40.4	15.3	-	2.0	-0.5	5.5	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	8.0	61	15	-	-	0.11	-
52.99	45.2	17.1	-	2.1	-0.5	4.9	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.0	56	15	-	-	0.11	-
53.15	40.6	15.3	-	2.1	-0.5	5.6	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.8	8.0	61	15	-	-	0.11	-
53.32	35.2	13.3	-	2.0	-0.4	6.3	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	6.8	67	15	-	-	0.11	-
53.48	34.6	13.0	-	1.8	-0.4	5.7	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	6.6	66	15	-	-	0.11	-
53.64	32.1	12.1	-	1.6	-0.4	5.5	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.2	6.1	67	15	-	-	0.11	-
53.81	28.9	10.9	-	1.3	-0.4	5.2	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	69	15	-	-	0.11	-
53.97	29.9	11.3	-	1.2	-0.4	4.6	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	5.6	66	15	-	-	0.11	-
54.14	30.7	11.6	-	1.2	-0.4	4.3	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.1	5.8	63	15	-	-	0.11	-
54.30	26.1	9.8	-	1.1	-0.4	5.0	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.8	71	15	-	-	0.11	-
54.46	24.4	9.2	-	1.1	-0.4	5.0	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.4	73	15	-	-	0.11	-
54.63	30.2	11.4	-	1.2	-0.4	4.3	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	5.6	64	15	-	-	0.11	-
54.79	28.3	10.7	-	1.2	-0.4	4.8	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.2	68	15	-	-	0.11	-
54.96	27.7	10.5	-	1.0	-0.3	4.2	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.1	66	15	-	-	0.11	-
55.12	25.0	9.4	-	0.9	-0.4	3.9	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	4.5	68	15	-	-	0.11	-
55.28	24.2	9.1	-	0.8	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.3	69	15	-	-	0.11	-
55.45	26.7	10.1	-	0.9	-0.3	3.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.8	65	15	-	-	0.11	-
55.61	26.2	9.9	-	0.9	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.7	67	15	-	-	0.11	-
55.78	22.9	8.6	-	0.9	-0.3	4.8	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	4.0	75	15	-	-	0.11	-
55.94	20.7	7.8	-	0.9	-0.3	5.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.5	79	15	-	-	0.11	-
56.11	20.2	7.6	-	0.7	-0.3	4.4	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.4	77	15	-	-	0.11	-
56.27	20.9	7.9	-	0.7	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.6	74	15	-	-	0.11	-
56.43	20.8	7.9	-	0.7	-0.3	3.9	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.5	74	15	-	-	0.11	-
56.60	21.3	8.0	-	0.7	-0.3	3.8	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.6	73	15	-	-	0.11	-
56.76	19.8	7.5	-	0.7	-0.3	4.4	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.3	78	15	-	-	0.11	-
56.93	17.8	6.7	-	0.7	-0.3	4.5	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.9	82	15	-	-	0.11	-
57.09	16.8	6.3	-	0.6	-0.3	4.5	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.7	84	15	-	-	0.11	-
57.25	15.9	6.0	-	0.5	-0.3	4.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.5	85	15	-	-	0.11	-
57.42	16.9	6.4	-	0.5	-0.3	3.8	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.7	81	15	-	-	0.11	-
57.58	17.7	6.7	-	0.6	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.8	80	15	-	-	0.11	-
57.75	19.2	7.3	-	0.6	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.1	77	15	-	-	0.11	-
57.91	18.9	7.1	-	0.7	-0.3	4.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.0	79	15	-	-	0.11	-
58.07	18.0	6.8	-	0.7	-0.3	4.6	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.9	82	15	-	-	0.11	-
58.24	16.8	6.4	-	0.6	-0.3	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.6	84	15	-	-	0.11	-
58.40	16.1	6.1	-	0.6	-0.2	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.5	86	15	-	-	0.11	-
58.57	16.2	6.1	-	0.6	-0.2	4.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.5	85	15	-	-	0.11	-
58.73	17.2	6.5	-	0.6	-0.2	4.2	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.7	82	15	-	-	0.11	-
58.89	18.5	7.0	-	0.6	-0.2	3.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.9	78	15	-	-	0.11	-
59.06	18.8	7.1	-	0.5	-0.2	3.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.0	75	15	-	-	0.11	-
59.22	18.4	6.9	-	0.6	-0.2	3.7	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.9	77	15	-	-	0.11	-
59.39	18.0	6.8	-	0.6	-0.2	3.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	2.8	79	15	-	-	0.11	-
59.55	16.7	6.3	-	0.6	-0.2	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.5	85	15	-	-	0.11	-
59.71	16.9	6.4	-	0.6	-0.2	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.6	84	15	-	-	0.11	-
59.88	17.4	6.6	-	0.6	-0.2	4.6	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.6	84	15	-	-	0.11	-
60.04	16.8	6.3	-	0.6	-0.2	4.9	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.5	87	15	-	-	0.11	-
60.21	15.9	6.0	-	0.5	-0.2	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.3	87	15	-	-	0.11	-
60.37	16.3	6.2	-	0.5	-0.1	3.6	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.4	82	15	-	-	0.11	-
60.53	16.1	6.1	-	0.5	-0.1	3.7	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.4	83	15	-	-	0.11	-
60.70	15.7	5.9	-	0.5	-0.1	3.8	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.3	84	15	-	-	0.11	-
60.86	15.3	5.8	-	0.4	-0.1	3.8	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.2	85	15	-	-	0.11	-
61.03	15.7	5.9	-	0.5	-0.1	3.8	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.3	84	15	-	-	0.11	-
61.19	16.6	6.3	-	0.5	-0.1	3.6	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.4	81	15	-	-	0.11	-
61.35	16.4	6.2	-	0.5	-0.1	3.9	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.4	83	15	-	-	0.11	-
61.52	17.8	6.7	-	0.7	-0.1	5.0	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.6	85	15	-	-	0.11	-
61.68	21.2	8.0	-	0.7	-0.1	4.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.3	75	15	-	-	0.11	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic -	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
61.85	20.3	7.7	-	0.7	-0.1	4.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.1	76	15	-	-	0.11	-
62.01	24.4	9.2	-	0.9	-0.1	4.5	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	3.8	72	15	-	-	0.11	-
62.17	31.1	11.7	-	0.9	-0.2	3.3	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	5.1	59	15	-	-	0.11	-
62.34	19.1	7.2	-	0.7	-0.2	4.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	2.8	79	15	-	-	0.11	-
62.50	15.6	5.9	-	0.5	-0.1	3.9	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.2	85	15	-	-	0.11	-
62.67	15.8	6.0	-	0.4	-0.1	3.0	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.2	80	15	-	-	0.11	-
62.83	15.2	5.7	-	0.4	-0.1	3.9	3	silty CLAY to CLAY	115	1.5	10	4	-	-	0.9	2.1	86	15	-	-	0.11	-
63.00	16.8	6.3	-	0.7	-0.1	5.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.4	88	15	-	-	0.11	-
63.16	25.7	9.7	-	0.9	-0.1	4.1	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	4.0	69	15	-	-	0.11	-
63.32	33.4	12.6	-	1.4	-0.1	4.7	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	5.4	63	15	-	-	0.11	-
63.49	33.8	12.7	-	1.5	-0.2	4.9	3	silty CLAY to CLAY	115	1.5	23	8	-	-	2.3	5.4	64	15	-	-	0.11	-
63.65	49.5	18.7	-	1.5	-0.7	3.2	3	silty CLAY to CLAY	115	1.5	33	12	-	-	3.4	8.3	47	15	-	-	0.11	-
63.82	30.1	11.4	-	1.3	-2.7	4.8	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.8	67	15	-	-	0.11	-
63.98	39.3	14.8	-	1.3	-2.6	3.6	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	6.4	54	15	-	-	0.11	-
64.14	77.5	39.5	92.8	1.4	-3.0	1.8	5	silty SAND to sandy SILT	120	4.0	19	10	36	36	-	-	27	16	2.48	-	0.11	51.2
64.31	89.6	45.6	77.9	0.9	-3.9	1.1	5	silty SAND to sandy SILT	120	4.0	22	11	41	36	-	-	20	16	2.87	-	0.11	49.3
64.47	79.1	40.3	71.5	0.7	-4.6	1.0	5	silty SAND to sandy SILT	120	4.0	20	10	37	36	-	-	20	16	3.08	-	0.10	51.2
64.64	60.3	22.7	-	1.3	-4.6	2.3	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.1	9.9	39	15	-	-	0.10	-
64.80	43.2	16.3	-	1.6	-4.6	3.9	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	7.0	54	15	-	-	0.10	-
64.96	37.9	14.3	-	1.4	-4.5	4.1	3	silty CLAY to CLAY	115	1.5	25	10	-	-	2.6	6.0	58	15	-	-	0.10	-
65.13	63.6	32.3	84.5	1.0	-4.6	1.8	5	silty SAND to sandy SILT	120	4.0	16	8	30	34	-	-	29	16	2.68	-	0.10	51.2
65.29	68.3	34.7	83.0	1.0	-4.8	1.6	5	silty SAND to sandy SILT	120	4.0	17	9	32	35	-	-	27	16	2.72	-	0.09	51.2
65.46	49.8	18.8	-	1.3	-4.6	2.8	4	clayy SILT to silty CLAY	115	2.0	25	9	-	-	3.4	8.1	45	15	-	-	0.09	-
65.62	29.9	11.3	-	1.5	-4.6	5.8	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.6	71	15	-	-	0.09	-
65.78	37.9	14.3	-	1.3	-4.5	3.7	3	silty CLAY to CLAY	115	1.5	25	10	-	-	2.5	5.9	56	15	-	-	0.09	-
65.95	63.9	32.4	85.4	1.1	-4.6	1.8	5	silty SAND to sandy SILT	120	4.0	16	8	30	34	-	-	29	16	2.66	-	0.09	51.2
66.11	71.1	36.0	83.0	1.0	-4.6	1.6	5	silty SAND to sandy SILT	120	4.0	18	9	33	35	-	-	26	16	2.72	-	0.08	51.2
66.28	52.7	19.9	-	1.3	-4.5	2.7	4	clayy SILT to silty CLAY	115	2.0	26	10	-	-	3.6	8.5	43	15	-	-	0.08	-
66.44	28.8	10.9	-	1.0	-4.4	4.2	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	4.3	66	15	-	-	0.08	-
66.60	25.9	9.8	-	1.4	-4.4	6.3	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	3.8	77	15	-	-	0.08	-
66.77	23.0	8.7	-	1.1	-4.4	6.0	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.3	80	15	-	-	0.08	-
66.93	28.9	10.9	-	0.9	-4.3	3.7	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	4.3	63	15	-	-	0.08	-
67.10	18.3	6.9	-	0.8	-4.3	5.8	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.5	88	15	-	-	0.08	-
67.26	15.9	6.0	-	0.5	-4.3	3.7	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.1	84	15	-	-	0.08	-
67.42	17.3	6.5	-	0.4	-4.3	3.3	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.3	78	15	-	-	0.08	-
67.59	18.5	7.0	-	0.5	-4.3	3.5	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.5	77	15	-	-	0.08	-
67.75	21.9	8.3	-	0.8	-4.3	4.7	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.0	77	15	-	-	0.08	-
67.92	34.1	12.8	-	1.2	-4.3	3.9	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	5.1	60	15	-	-	0.08	-
68.08	30.8	11.6	-	1.3	-4.3	4.7	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.0	4.5	66	15	-	-	0.08	-
68.24	21.3	8.0	-	1.2	-4.3	7.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	2.9	86	15	-	-	0.08	-
68.41	25.4	9.6	-	1.1	-4.2	5.1	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	3.6	74	15	-	-	0.08	-
68.57	24.8	9.4	-	0.9	-4.3	4.4	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.6	3.5	71	15	-	-	0.08	-
68.74	16.3	6.2	-	0.9	-4.2	7.1	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.1	95	15	-	-	0.08	-
68.90	17.2	6.5	-	0.7	-4.2	5.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.2	89	15	-	-	0.08	-
69.07	19.0	7.2	-	0.5	-4.2	3.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	2.5	75	15	-	-	0.08	-
69.23	17.4	6.5	-	0.4	-4.2	2.9	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.2	76	15	-	-	0.08	-
69.39	15.8	6.0	-	0.3	-4.2	2.8	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.0	79	15	-	-	0.08	-
69.56	15.6	5.9	-	0.4	-4.2	3.3	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	1.9	83	15	-	-	0.08	-
69.72	16.6	6.3	-	0.4	-4.2	3.1	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.1	79	15	-	-	0.08	-
69.89	20.6	7.8	-	0.8	-4.2	4.6	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	2.7	79	15	-	-	0.08	-
70.05	22.0	8.3	-	1.0	-4.1	5.7	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.0	81	15	-	-	0.08	-
70.21	30.0	11.3	-	1.5	-4.1	5.7	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.3	71	15	-	-	0.08	-
70.38	38.7	14.6	-	1.7	-4.2	4.9	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	5.7	61	15	-	-	0.08	-
70.54	59.6	22.5	-	2.4	-4.2	4.3	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.1	9.1	48	15	-	-	0.08	-
70.71	48.8	18.4	-	1.8	-4.1	4.1	3	silty CLAY to CLAY	115	1.5	33	12	-	-	3.3	7.3	52	15	-	-	0.08	-
70.87	30.1	11.4	-	1.8	-4.1	7.0	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.2	75	15	-	-	0.08	-
71.03	42.4	16.0	-	2.0	-4.1	5.2	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	6.2	60	15	-	-	0.08	-
71.20	48.6	18.3	-	2.3	-4.1	5.2	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	7.2	56	15	-	-	0.08	-
71.36	80.8	30.5	-	2.6	-4.1	3.4	4	clayy SILT to silty CLAY	115	2.0	40	15	-	-	5.6	9.9	39	15	-	-	0.08	-
71.53	94.7	35.7	-	3.1	-4.2	3.4	4	clayy SILT to silty CLAY	115	2.0	47	18	-	-	6.5	9.9	36	15	-	-	0.08	-
71.69	67.4	25.4	-	3.0	-4.2	4.8	3	silty CLAY to CLAY	115	1.5	45	17	-	-	4.6	9.9	47	15	-	-	0.08	-
71.85	83.5	31.5	-	3.0	-4.1	3.7	4	clayy SILT to silty CLAY	115	2.0	42	16	-	-	5.8	9.9	39	15	-	-	0.08	-
72.02	72.3	27.3	-	2.4	-4.3	3.5	4	clayy SILT to silty CLAY	115	2.0	36	14	-	-	5.0	9.9	41	15	-	-	0.08	-
72.18	37.1	14.0	-	1.4	-5.0	4.2	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	5.3	59	15	-	-	0.08	-
72.35	38.3	14.4	-	1.3	-4.9	3.8	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	5.5	56	15	-	-	0.08	-
72.51	84.3	41.7	103.4	1.8	-5.2	2.2	5	silty SAND to sandy SILT	120	4.0	21	10	38	35	-	-	28	16	2.27	-	0.08	51.2
72.67	78.6	29.7	-	2.4	-5.6	3.2	4	clayy SILT to silty CLAY	115	2.0	39	15	-	-	5.4	9.9	38	15	-	-	0.08	-
72.84	58.1	21.9	-	3.3	-5.6	6.2	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	8.6	55	15	-	-	0.08	-
73.00	47.1	17.8	-	2.6	-5.6	6.1	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	6.8	60	15	-	-	0.08	-
73.17	41.0	15.5	-	2.7	-5.6	7.4	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	5.8	67	15	-	-	0.08	-
73.33	59.2	22.3	-	2.0	-5.6	3.6	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	8.7	46	15	-	-	0.08	-
73.49	80.5	39.7	111.3	2.0	-5.7	2.6	4	clayy SILT to silty CLAY	115	2.0	40	20	-	-	5.5	9.9	31	15	2.14	-	0.08	51.2
73.66	69.1	26.1	-	1.7	-6.5	2.6	4	clayy SILT to silty CLAY	115	2.0	35	13	-	-	4.7	9.9	38	15	-	-	0.07	-
73.82	44.4	16.7	-	2.0	-6.5	4.9	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.0	6.3	57	15	-	-	0.07	-
73.99	43.4	16.4	-	1.9	-6.5	4.9	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	6.1	58	15	-	-	0.07	-
74.15	67.2	25.3	-	2.2	-6.6	3.4	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.6	9.8	42	15	-	-	0.07	-
74.31	49.9	18.8	-	2.0	-6.9	4.3	3	silty CLAY to CLAY	115	1.5	33	13	-	-	3.4	7.1	52	15	-	-	0.07	-
74.48	64.0	24.1	-	1.6	-6.9	2.6	4	clayy SILT to silty CLAY	115	2.0	32	12	-	-	4.4	9.3	39	15	-	-	0.07	-
74.64	71.6	35.2	94.0	1.4	-7.3	2.0	5	silty SAND to sandy SILT	120	4.0	18	9	33	34	-	-	30	16	2.46	-	0.07	51.2
74.81	54.4	20.5	-	1.4	-7.8	2.8	4	clayy SILT to silty CLAY	115	2.0	27	10	-	-	3.7	7.8	43	15	-	-	0.07	-
74.97	34.2	12.9	-	1.7	-7.7	5.6	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	4.6	67	15	-	-	0.07	-
75.13	29.5	11.1	-	1.2	-7.7	5.0	3	silty CLAY to CLAY	115	1.5	20	7	-	-	1.9	3.9	69	15	-	-	0.07	-
75.30	23.4	8.8	-	1.3	-7.6	6.8	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.5	2.9	83	15	-	-	0.07	-
75.46	38.7	14.6	-	1.4	-7.7	4.1	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	5.3	57	15	-	-	0.07	-
75.63	33.4	12.6	-	1.5	-7.6	5.0	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	4.5	65	15	-	-	0.07	-
75.79	31.4	11.8	-	1.6	-7.6	6.0	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	4.1	71	15	-	-	0.07	-
75.96	34.6	13.0	-	1.9	-7.7	6.4	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	4.6	69	15	-	-	0.07	-
76.12	39.4	14.9	-	1.5	-7.7	4.3	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	5.3	58	15	-	-	0.07	-
76.28	37.1	14.0	-	1.4	-7.7	4.3	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	5.0	60	15	-	-	0.07	-
76.45	41.4	15.6	-	1.7	-7.6	4.5	3	silty CLAY to CLAY	115	1.5	28	10	-	-	2.8	5.6	57	15	-	-	0.07	-
76.61	48.9	18.5	-	2.0	-7.6	4.4	3	silty CLAY to CLAY	115	1.5	33	12	-	-	3.3	6.8	53	15	-	-	0.07	-
76.78	52.6	19.9	-	2.1	-7.6	4.3	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	7.3	51	15	-	-	0.07	-
76.94	51.4	19.4	-	1.8	-7.6	3.9	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	7.1	50	15	-	-	0.07	-
77.10	44.9	16.9	-	1.8	-7.6	4.5	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.0	6.1	55	15	-	-	0.07	-

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A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
77.27	53.5	20.2	-	1.7	-7.6	3.6	3	silty CLAY to CLAY	115	1.5	36	13	-	-	3.6	7.4	48	15	-	-	0.07	-
77.43	65.8	24.8	-	1.7	-7.6	2.8	4	clayy SILT to silty CLAY	115	2.0	33	12	-	-	4.5	9.2	40	15	-	-	0.07	-
77.60	73.0	27.6	-	2.1	-7.6	3.0	4	clayy SILT to silty CLAY	115	2.0	37	14	-	-	5.0	9.9	39	15	-	-	0.07	-
77.76	93.0	45.2	121.7	2.5	-7.6	2.8	4	clayy SILT to silty CLAY	115	2.0	47	23	-	-	6.4	9.9	30	15	1.94	-	0.07	49.8
77.92	102.5	49.8	131.6	3.0	-7.5	3.1	4	clayy SILT to silty CLAY	115	2.0	51	25	-	-	7.1	9.9	30	15	1.56	-	0.07	42.8
78.09	105.9	51.4	135.2	3.2	-7.5	3.1	4	clayy SILT to silty CLAY	115	2.0	53	26	-	-	7.3	9.9	29	15	1.38	-	0.06	36.2
78.25	112.2	54.5	135.6	3.3	-7.5	3.0	4	clayy SILT to silty CLAY	115	2.0	56	27	-	-	7.8	9.9	28	15	1.39	-	0.06	31.1
78.42	115.9	56.3	136.9	3.3	-7.5	3.0	4	clayy SILT to silty CLAY	115	2.0	58	28	-	-	8.0	9.9	28	15	1.33	-	0.06	26.3
78.58	116.9	56.7	140.7	3.5	-7.5	3.1	4	clayy SILT to silty CLAY	115	2.0	58	28	-	-	8.1	9.9	28	15	1.14	-	0.06	20.2
78.74	119.5	57.9	143.8	3.7	-7.4	3.2	4	clayy SILT to silty CLAY	115	2.0	60	29	-	-	8.3	9.9	28	15	1.00	-	0.05	14.3
78.91	122.9	59.6	147.0	3.9	-7.4	3.3	4	clayy SILT to silty CLAY	115	2.0	61	30	-	-	8.5	9.9	28	15	0.85	-	0.05	8.1
79.07	125.5	60.7	149.2	4.0	-7.4	3.3	4	clayy SILT to silty CLAY	115	2.0	63	30	-	-	8.7	9.9	28	15	0.76	-	0.05	6.1
79.24	129.3	62.6	150.5	4.1	-7.4	3.3	4	clayy SILT to silty CLAY	115	2.0	65	31	-	-	9.0	9.9	27	15	0.72	-	0.05	5.5
79.40	133.7	64.7	160.2	4.6	-7.4	3.6	4	clayy SILT to silty CLAY	115	2.0	67	32	-	-	9.3	9.9	28	15	0.00	-	0.05	0.0
79.56	135.5	65.5	157.1	4.5	-7.3	3.4	4	clayy SILT to silty CLAY	115	2.0	68	33	-	-	9.4	9.9	27	15	0.50	-	0.05	3.0
79.73	137.2	66.3	154.0	4.3	-7.3	3.3	4	clayy SILT to silty CLAY	115	2.0	69	33	-	-	9.5	9.9	27	15	0.60	-	0.05	4.1
79.89	134.9	65.2	149.7	4.1	-7.3	3.1	4	clayy SILT to silty CLAY	115	2.0	67	33	-	-	9.4	9.9	26	15	0.77	-	0.05	6.0
80.06	134.5	64.9	146.8	4.0	-7.3	3.0	4	clayy SILT to silty CLAY	115	2.0	67	32	-	-	9.3	9.9	26	15	0.90	-	0.05	7.9
80.22	133.0	64.2	146.1	3.9	-7.2	3.0	4	clayy SILT to silty CLAY	115	2.0	67	32	-	-	9.2	9.9	26	15	0.93	-	0.04	8.4
80.38	136.3	65.7	147.0	4.0	-7.2	3.0	5	silty SAND to sandy SILT	120	4.0	34	16	53	38	-	-	26	16	0.90	-	0.04	7.7
80.55	139.3	67.1	148.8	4.1	-7.2	3.0	5	silty SAND to sandy SILT	120	4.0	35	17	54	38	-	-	25	16	0.83	-	0.04	6.6
80.71	139.1	67.0	147.1	4.0	-7.2	3.0	5	silty SAND to sandy SILT	120	4.0	35	17	54	38	-	-	25	16	0.90	-	0.04	7.6
80.88	140.9	67.8	149.1	4.1	-7.2	3.0	5	silty SAND to sandy SILT	120	4.0	35	17	54	38	-	-	25	16	0.82	-	0.04	6.3
81.04	142.6	68.6	152.1	4.3	-7.2	3.1	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.69	-	0.04	4.9
81.20	143.5	69.0	152.8	4.3	-7.2	3.1	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.66	-	0.04	4.6
81.37	143.2	68.8	151.3	4.2	-7.2	3.1	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.72	-	0.04	5.2
81.53	143.9	69.1	150.5	4.2	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.76	-	0.03	5.6
81.70	144.0	69.1	149.8	4.2	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.79	-	0.03	5.9
81.86	146.4	70.2	150.9	4.2	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	37	18	55	38	-	-	25	16	0.75	-	0.03	5.4
82.02	146.0	70.0	151.9	4.3	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.70	-	0.03	4.9
82.19	152.3	73.0	157.3	4.6	-7.1	3.1	5	silty SAND to sandy SILT	120	4.0	38	18	57	38	-	-	25	16	0.52	-	0.03	3.2
82.35	152.7	73.1	155.9	4.5	-7.1	3.1	5	silty SAND to sandy SILT	120	4.0	38	18	57	38	-	-	25	16	0.56	-	0.03	3.6
82.52	148.6	71.1	156.1	4.5	-7.1	3.2	5	silty SAND to sandy SILT	120	4.0	37	18	56	38	-	-	25	16	0.55	-	0.03	3.4
82.68	148.3	70.9	157.1	4.6	-7.1	3.2	4	clayy SILT to silty CLAY	115	2.0	74	35	-	-	10.3	9.9	25	15	0.52	-	0.03	3.2
82.85	144.4	69.0	150.3	4.2	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.76	-	0.03	5.6
83.01	147.7	70.6	143.6	3.9	-7.0	2.7	5	silty SAND to sandy SILT	120	4.0	37	18	55	38	-	-	23	16	1.09	-	0.02	10.1
83.17	140.8	67.2	137.9	3.6	-7.0	2.6	5	silty SAND to sandy SILT	120	4.0	35	17	54	38	-	-	24	16	1.35	-	0.02	17.6
83.34	131.8	62.9	134.4	3.4	-6.9	2.6	5	silty SAND to sandy SILT	120	4.0	33	16	52	37	-	-	25	16	1.49	-	0.02	25.9
83.50	118.2	56.4	116.0	2.5	-6.9	2.2	5	silty SAND to sandy SILT	120	4.0	30	14	48	37	-	-	24	16	2.07	-	0.02	37.4
83.67	134.8	64.2	125.6	2.9	-6.9	2.3	5	silty SAND to sandy SILT	120	4.0	34	16	52	37	-	-	23	16	1.88	-	0.01	31.4
83.83	148.9	70.9	130.3	3.2	-6.4	2.2	5	silty SAND to sandy SILT	120	4.0	37	18	56	38	-	-	21	16	1.74	-	0.01	26.3
83.99	160.1	76.2	138.8	3.7	-6.4	2.4	5	silty SAND to sandy SILT	120	4.0	40	19	58	38	-	-	21	16	1.36	-	0.01	14.0
84.16	158.0	75.2	140.7	3.8	-6.4	2.5	5	silty SAND to sandy SILT	120	4.0	40	19	58	38	-	-	22	16	1.26	-	0.01	12.2
84.32	154.9	73.7	131.7	3.3	-6.4	2.2	5	silty SAND to sandy SILT	120	4.0	39	18	57	38	-	-	21	16	1.69	-	0.00	23.6
84.49	137.6	65.4	148.1	4.1	-6.4	3.1	4	clayy SILT to silty CLAY	115	2.0	69	33	-	-	9.6	9.9	26	15	0.82	-	0.00	6.5
84.65	141.7	67.3	186.3	6.1	-6.4	4.5	4	clayy SILT to silty CLAY	115	2.0	71	34	-	-	9.8	9.9	31	15	0.00	-	0.00	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

APPENDIX B

LABORATORY TEST RESULTS

TABLE B-1 SUMMARY OF SOIL LABORATORY TEST RESULTS

Note: See Section 3.3 of the main text for details.

Boring No.	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetrometer	Grain Size Distribution (Gravel:Sand: Fines) ASTM D1140	Atterberg Limits ASTM D4318	Soil Minimum Resistivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Soluble Chloride Content (Moisture-Free) CT-422
		(ft)		(%)	(pcf)	(tsf)	(%)	(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-114	*D-1*	5	CL	11.4	132.9	>4.5						
A-11-114	*S-2*	10	CL	18.8								
A-11-114	*D-3*	15	CH	23.3	123.5	4.0		52/19/33				
A-11-114	*S-4*	20	CL	23.6								
A-11-114	*D-5*	25	CL	23.0	116.6	1.5						
A-11-114	*S-6*	30	CL	18.0								
A-11-114	*D-7*	35	CL	7.6	103.0	>4.5	0:36:64	35/20/15				
A-11-114	*S-8*	40	ML	8.1								
A-11-114	*D-9*	45	SM	6.0	105.1							
A-11-114	*S-10*	50	ML	9.9			0:35:65					
A-11-114	*D-11*	55	ML	9.8	111.0		0:46:54					
A-11-114	*S-12*	60	CL	40.5								
A-11-114	*D-13*	65	CL	30.9	115.0	1.25						
A-11-114	*S-14*	70	CL	25.7								
A-11-114	*D-15*	75	SC to CL	27.6	121.3	1.25						
A-11-114	*S-16*	80	SC to CL	26.1								
A-11-114	*D-17*	85	MH	19.7	127.8	>4.5						
A-11-114	*S-18*	90	MH	25.4								
A-11-114	*D-19*	95	MH	16.1	127.0	>4.5						
A-11-114	*S-20*	100	MH	24.4								
A-11-115	*Bulk*	0-5	CL					29/13/16				
A-11-115	*S-1*	5	SC	9.4			5:58:37		410	7.2	560	1,281
A-11-115	*D-2*	10	SC to CL	17.6	129.1	>4.5	2:24:74					
A-11-115	*S-3*	15	MH	24.7								
A-11-115	*D-4*	20	CH	15.9	122.3	4.0						
A-11-115	*S-5*	25	ML	5.3			0:49:51					
A-11-115	*D-6*	30	ML	5.4	100.8		0:48:52					
A-11-115	*S-7*	35	SM	6.6			1:58:41					
A-11-115	*D-8*	40	CL	12.1	128.3	>4.5						
A-11-115	*S-9*	45	CL	15.3								
A-11-115	*D-10*	50	CL	16.3	127.5	>4.5		48/19/29				
A-11-115	*S-11*	55	CH	30.4								
A-11-115	*D-12*	60	CL	29.8	121.6	1.0						
A-11-115	*S-13*	65	SM	25.2								
A-11-115	*D-14*	70	CL	28.6	122.7	0.75						
A-11-115	*S-15*	75	MH	25.0								
A-11-115	*D-16*	80	MH	17.3	127.0	>4.5						
A-11-115	*S-17*	85	MH	22.7								
A-11-115	*D-18*	90	MH	21.5	125.0	>4.5						
A-11-115	*S-19*	95	MH	22.8								
A-11-115	*D-20*	100	MH	23.7	128.7	>4.5						

Note: See Section 3.3 of the main text for details.

Boring No.	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetrometer	Grain Size Distribution (Gravel:Sand: Fines) ASTM D1140	Atterberg Limits ASTM D4318	Soil Minimum Resistivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Soluble Chloride Content (Moisture-Free) CT-422
		(ft)		(%)	(pcf)	(tsf)	(%)	(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-116	S-1	5	CL	20.2					250	7.3	950	2,029
A-11-116	D-2	10	CH	25.8	118.8	1.75		56/25/31				
A-11-116	S-3	15	CL	25.1								
A-11-116	D-4	20	CH	24.8	120.7	>4.5						
A-11-116	S-5	25	CL	29.1								
A-11-116	D-6	30	CH	29.6	120.5	4.5						
A-11-116	S-7	35	CH	28.2								
A-11-116	D-8	40	CH	29.0	117.4	>4.5						
A-11-116	S-9	45	MH	22.6								
A-11-116	D-10	50	MH	21.4	124.2	>4.5						
A-11-116	S-11	55	MH	21.2								
A-11-116	D-12	60	MH	20.4	121.1	>4.5						
A-11-116	S-13	65	MH	20.2								
A-11-116	D-14	70	MH	19.7	126.3	>4.5						
A-11-116	S-15	75	MH	20.4								
A-11-116	D-16	80	MH	20.6	126.7	>4.5						
A-11-116	S-17	85	MH	19.0								
A-11-117	D-1	5	SC to CL	14.3	126.6	>4.5						
A-11-117	S-2	10	CL	10.5								
A-11-117	D-3	15	CL	18.1	110.5	>4.5						
A-11-117	S-4	20	CL	19.9								
A-11-117	D-5	25	CL	17.4	110.4	>4.5						
A-11-117	S-6	30	CL	23.4								
A-11-117	D-7	35	CH	29.5	120.2	>4.5			170	5.6	5060.0	1,950
A-11-117	S-8	40	CH	37.4								
A-11-117	D-9	45	CH	30.4	118.2	>4.5						
A-11-117	S-10	50	CH	24.6								
A-11-117	D-11	55	MH	22.8	126.0	>4.5						
A-11-117	S-12	60	MH	24.7								
A-11-117	D-13	65	MH	21.7	125.0	>4.5						
A-11-117	S-14	70	MH	23.0								
A-11-117	D-15	75	MH	20.9	121.8	>4.5						
A-11-117	S-16	80	MH	20.6								
A-11-117	D-17	85	MH	18.8	126.8	>4.5						
A-11-117	S-18	90	MH	20.0								
A-11-117	D-19	95	MH	19.5	121.3	>4.5						
A-11-117	S-20	100	MH	19.9								

TABLE B-2 SUMMARY OF UNCONSOLIDATED UNDRAINED TEST RESULTS

Boring No.	Sample No.	Sample Depth	Soil Classification (ASTM D2488/ D2487)	S_u @ 5% Strain	S_u @ Failure (10% Strain)
		(ft)		(ksf)	(ksf)
A-11-114	*D-3*	15	CH	2.2	2.8
A-11-114	*D-13*	65	CL	1.3	1.8
A-11-115	*D-10*	50	CL	8.2	9.0
A-11-116	*D-8*	40	CH	4.2	4.8
A-11-117	*D-3*	15	CL	5.2	5.0

TABLE B-3 SUMMARY OF CONSOLIDATION TEST RESULTS

Boring No.	Sample No.	Sample Depth	Soil Classification (ASTM D2488/ D2487)	Geologic Unit	C_C	C_R	$C_{C\varepsilon}$	$C_{R\varepsilon}$	e_o	σ'_p	t_{50}	t_{90}
		(ft)								(ksf)	(min)	(min)
A-11-114	*D-5*	25	CL	Fill	0.20	0.03	0.11	0.017	0.82	2.0	10.0	16.0
A-11-115	*D-4*	20	CH	Fill	0.07	0.03	0.047	0.014	0.53	7.0	-	9.0
A-11-115	*D-12*	60	CL	Terrace Deposits	0.21	0.04	0.115	0.028	0.79	3.5	14.0	61.0
A-11-116	*D-4*	20	CH	Fill	0.13	0.05	0.075	0.027	0.75	7.0	3.0	8.0
A-11-117	*D-9*	45	CH	Terrace Deposits	0.10	0.06	0.055	0.032	0.84	7.0	2.7	11.0

Moisture, Density and Classification of Soil (ASTM D-2937 / 2487 / 2488)

Project No. : 11-135 Project Name : PTG/I-5 HOV Widening Segment 1

Test Standard : ☑ CAL. TRAN. ☐ ASTM ☐ Other Unit Used (English / SI) : E

Sampled By : Kiat	Received By :	Tested By : JF			Computed By : JF			Checked By : RJ			
Date :	Date :	Date : 11/27/11			Date : 1/15/12			Date :			
Boring No .		A-11-114	A-11-114	A-11-114	A-11-114	A-11-114	A-11-114	A-11-114	A-11-114	A-11-114
Sample No. (B-Bulk, S-SPT, D-Drive, T-Tube)		D-1	S-2	D-3	S-4	D-5	S-6	D-7	S-8	D-9
Sample Depth (ft/m)		5.0 | 1.53	10.0 | 3.05	15.0 | 4.58	20.0 | 6.10	25.0 | 7.63	30.0 | 9.15	35.0 | 10.68	40.0 | 12.20	45.0 | 13.73
Sample Type (R-Ring, B-Bulk, MB-Medium , SB-Small Bag)		R	SB	R	SB	R	SB	R	SB	R
U.S.C.S.		CL	CL	CH	CL	CL	CL	CL	ML	SM
Moisture Content (%)		11.41	18.81	23.30	23.58	22.95	17.99	7.64	8.09	5.99
Wet Density (pcf)		132.9		123.5		116.6		103.0		105.1
Dry Density (pcf)		119.3		100.2		94.8		95.7		99.2
Container Number		X	3	8	4	54	5	S-58	6	9
Total Wet Wt. Soil + (Ring / Tube),(gm)		1231.52		969.51		1113.29		845.59		1030.26
Total Length of Sample (inch)		6		5		6		5		6
Wet Weight of Soil + Container (gm)		476.07	175.46	205.92	190.33	198.32	136.56	341.11	163.00	180.28
Dry Weight of Soil + Container (gm)		428.03	156.94	177.87	165.26	172.31	124.57	321.36	155.08	173.35
Weight of Container (gm)		6.99	58.47	57.47	58.96	58.99	57.92	62.72	57.20	57.67
Unit Weight of Tube or Ring (gm/inch)		44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80
Average Interior Diameter (inch)		2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416
Unit Volume (ft^3)		0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182

Moisture, Density and Classification of Soil (ASTM D-2937 / 2487 / 2488)

Project No. : 11-135 Project Name : PTG/I-5 HOV Widening Segment 1

Test Standard : ☑ CAL. TRAN. ☐ ASTM ☐ Other Unit Used (English / SI) : E

Sampled By : Kiat	Received By :	Tested By : JF		Computed By : JF			Checked By : RJ		
Date :	Date :	Date : 11/27/11		Date : 1/15/12			Date :		
Boring No .	A-11-114	A-11-114	A-11-114	A-11-114	A-11-114	A-11-114	A-11-114	A-11-114	A-11-114	A-11-114
Sample No. (B-Bulk, S-SPT, D-Drive, T-Tube)	S-10	D-11	S-12	D-13	S-14	D-15	S-16	D-17	S-18	D-19
Sample Depth (ft/m)	50.0 | 15.25	55.0 | 16.78	60.0 | 18.30	65.0 | 19.83	70.0 | 21.35	75.0 | 22.88	80.0 | 24.40	85.0 | 25.93	90.0 | 27.45	95.0 | 28.98
Sample Type (R-Ring, B-Bulk, MB-Medium , SB-Small Bag)	SB	R	SB	R	SB	R	SB	R	SB	R
U.S.C.S.	ML	ML	CL	CL	CL	SC to CL	SC to CL	MH	MH	MH
Moisture Content (%)	9.90	9.82	40.46	30.86	25.67	27.57	26.08	19.72	25.40	16.05
Wet Density (pcf)		111.0		115.0		121.3		127.8		127.0
Dry Density (pcf)		101.0		87.9		95.1		106.7		109.4
Container Number	S-53	S-62	10	50	11	12	13	2	14	15
Total Wet Wt. Soil + (Ring / Tube),(gm)		1072.70		918.22		1147.41		1194.36		990.67
Total Length of Sample (inch)		6		5		6		6		5
Wet Weight of Soil + Container (gm)	269.68	216.97	182.17	181.28	168.63	218.68	208.44	218.33	213.35	231.94
Dry Weight of Soil + Container (gm)	251.14	203.22	146.80	152.35	146.16	183.79	177.29	192.03	181.66	207.76
Weight of Container (gm)	63.92	63.25	59.38	58.60	58.64	57.23	57.87	58.65	56.88	57.14
Unit Weight of Tube or Ring (gm/inch)	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80
Average Interior Diameter (inch)	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416
Unit Volume (ft^3)	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182

Moisture, Density and Classification of Soil (ASTM D-2937 / 2487 / 2488)

Project No. : 11-135 Project Name : PTG/I-5 HOV Widening Segment 1

Test Standard : ☑ CAL. TRAN. ☐ ASTM ☐ Other Unit Used (English / SI) : E

Sampled By : Kiat Received By : Tested By : JF Computed By : JF Checked By : RJ

Date : Date : Date : 11/27/11 Date : 1/15/12 Date :

Boring No.	A-11-114	A-11-115	A-11-115	A-11-115	A-11-115	A-11-115	A-11-115	A-11-115	A-11-115	A-11-115
Sample No. (B-Bulk, S-SPT, D-Drive, T-Tube)	S-20	S-1	D-2	S-3	D-4	S-5	D-6	S-7	D-8	S-9
Sample Depth (ft/m)	100.0 | 30.50	5.0 | 1.53	10.0 | 3.05	15.0 | 4.58	20.0 | 6.10	25.0 | 7.63	30.0 | 9.15	35.0 | 10.68	40.0 | 12.20	45.0 | 13.73
Sample Type (R-Ring, B-Bulk, MB-Medium , SB-Small Bag)	SB	SB	R	SB	R	SB	R	SB	R	SB
U.S.C.S.	MH	SC	SC to CL	MH	CH	ML	ML	SM	CL	CL
Moisture Content (%)	24.39	9.44	17.60	24.69	15.90	5.29	5.40	6.63	12.06	15.34
Wet Density (pcf)			129.1		122.3		100.8		128.3	
Dry Density (pcf)			109.7		105.5		95.7		114.5	
Container Number	16	S-15	X	17	55	S-54	S-60	S-23	18	19
Total Wet Wt. Soil + (Ring / Tube),(gm)			1003.13		1154.59		999.31		998.63	
Total Length of Sample (inch)			5		6		6		5	
Wet Weight of Soil + Container (gm)	191.38	450.63	468.49	196.00	217.70	313.59	277.06	433.07	183.30	148.79
Dry Weight of Soil + Container (gm)	165.11	421.65	399.42	168.51	195.83	301.02	266.10	413.22	169.76	136.74
Weight of Container (gm)	57.41	114.68	6.99	57.19	58.32	63.27	63.05	113.81	57.48	58.21
Unit Weight of Tube or Ring (gm/inch)	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80
Average Interior Diameter (inch)	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416
Unit Volume (ft^3)	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182

Moisture, Density and Classification of Soil (ASTM D-2937 / 2487 / 2488)

Project No. : 11-135 Project Name : PTG/I-5 HOV Widening Segment 1

Test Standard : ☑ CAL. TRAN. ☐ ASTM ☐ Other Unit Used (English / SI) : E

Sampled By : Kiat Received By : Tested By : JF Computed By : JF Checked By : RJ

Date : Date : Date : 11/27/11 Date : 1/15/12 Date :

Boring No.	A-11-115	A-11-115	A-11-115	A-11-115	A-11-115	A-11-115	A-11-115	A-11-115	A-11-115	A-11-115
Sample No. (B-Bulk, S-SPT, D-Drive, T-Tube)	D-10	S-11	D-12	S-13	D-14	S-15	D-16	S-17	D-18	S-19
Sample Depth (ft/m)	50.0 | 15.25	55.0 | 16.78	60.0 | 18.30	65.0 | 19.83	70.0 | 21.35	75.0 | 22.88	80.0 | 24.40	85.0 | 25.93	90.0 | 27.45	95.0 | 28.98
Sample Type (R-Ring, B-Bulk, MB-Medium , SB-Small Bag)	R	SB	R	SB	R	SB	R	SB	R	SB
U.S.C.S.	CL	CH	CL	SM	CL	MH	MH	MH	MH	MH
Moisture Content (%)	16.28	30.41	29.78	25.24	28.55	25.05	17.34	22.68	21.50	22.80
Wet Density (pcf)	127.5		121.6		122.7		127.0		125.0	
Dry Density (pcf)	109.7		93.7		95.5		108.3		102.9	
Container Number	31	20	59	21	22	23	24	25	46	47
Total Wet Wt. Soil + (Ring / Tube),(gm)	1192.56		1149.91		964.82		990.92		1174.48	
Total Length of Sample (inch)	6		6		5		5		6	
Wet Weight of Soil + Container (gm)	215.27	197.72	210.64	193.61	195.92	160.43	202.53	216.90	204.75	202.26
Dry Weight of Soil + Container (gm)	193.34	164.92	176.18	166.24	165.51	139.96	181.17	187.76	178.96	175.66
Weight of Container (gm)	58.61	57.06	60.45	57.81	59.00	58.24	58.00	59.28	58.98	58.98
Unit Weight of Tube or Ring (gm/inch)	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80
Average Interior Diameter (inch)	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416
Unit Volume (ft^3)	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182

Moisture, Density and Classification of Soil (ASTM D-2937 / 2487 / 2488)

Project No. : 11-135 Project Name : PTG/I-5 HOV Widening Segment 1

Test Standard : ☑ CAL. TRAN. ☐ ASTM ☐ Other Unit Used (English / SI) : E

Sampled By : Kiat Received By : Tested By : JF Computed By : JF Checked By : RJ

Date : Date : Date : 11/27/11 Date : 1/15/12 Date :

Boring No.	A-11-115	A-11-116	A-11-116	A-11-116	A-11-116	A-11-116	A-11-116	A-11-116	A-11-116	A-11-116
Sample No. (B-Bulk, S-SPT, D-Drive, T-Tube)	D-20	S-1	D-2	S-3	D-4	S-5	D-6	S-7	D-8	S-9
Sample Depth (ft/m)	100.0 | 30.50	5.0 | 1.53	10.0 | 3.05	15.0 | 4.58	20.0 | 6.10	25.0 | 7.63	30.0 | 9.15	35.0 | 10.68	40.0 | 12.20	45.0 | 13.73
Sample Type (R-Ring, B-Bulk, MB-Medium , SB-Small Bag)	R	SB	R	SB	R	SB	R	SB	R	SB
U.S.C.S.	MH	CL	CH	CL	CH	CL	CH	CH	CH	MH
Moisture Content (%)	23.65	20.18	25.78	25.14	24.83	29.12	29.55	28.21	29.02	22.60
Wet Density (pcf)	128.7		118.8		120.7		120.5		117.4	
Dry Density (pcf)	104.1		94.5		96.7		93.0		91.0	
Container Number	48	86	50	51	56	52	53	54	32	55
Total Wet Wt. Soil + (Ring / Tube),(gm)	1001.16		941.38		1143.56		1141.88		1119.65	
Total Length of Sample (inch)	5		5		6		6		6	
Wet Weight of Soil + Container (gm)	172.39	287.66	172.92	221.43	210.47	187.48	190.05	182.89	203.67	195.62
Dry Weight of Soil + Container (gm)	150.64	249.44	149.49	188.63	180.39	158.33	159.73	155.63	171.05	170.31
Weight of Container (gm)	58.69	60.01	58.59	58.18	59.25	58.21	57.14	59.00	58.65	58.32
Unit Weight of Tube or Ring (gm/inch)	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80
Average Interior Diameter (inch)	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416
Unit Volume (ft^3)	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182

Moisture, Density and Classification of Soil (ASTM D-2937 / 2487 / 2488)

Project No. : 11-135 Project Name : PTG/I-5 HOV Widening Segment 1

Test Standard : ☑ CAL. TRAN. ☐ ASTM ☐ Other Unit Used (English / SI) : **E**

Sampled By : Kiat	Received By :	Tested By : JF		Computed By : JF			Checked By : RJ			
Date :	Date :	Date : 11/27/11		Date : 1/15/12			Date :			
Boring No.	A-11-116	A-11-116	A-11-116	A-11-116	A-11-116	A-11-116	A-11-116	A-11-116	A-11-117	A-11-117
Sample No. (B-Bulk, S-SPT, D-Drive, T-Tube)	D-10	S-11	D-12	S-13	D-14	S-15	D-16	S-17	D-1	S-2
Sample Depth (ft/m)	50.0 | 15.25	55.0 | 16.78	60.0 | 18.30	65.0 | 19.83	70.0 | 21.35	75.0 | 22.88	80.0 | 24.40	85.0 | 25.93	5.0 | 1.53	10.0 | 3.05
Sample Type (R-Ring, B-Bulk, MB-Medium , SB-Small Bag)	R	SB	R	SB	R	SB	R	SB	R	SB
U.S.C.S.	MH	MH	MH	MH	MH	MH	MH	MH	SC to CL	CL
Moisture Content (%)	21.35	21.20	20.38	20.23	19.66	20.42	20.59	18.98	14.28	10.48
Wet Density (pcf)	124.2		121.1		126.3		126.7		126.6	
Dry Density (pcf)	102.4		100.6		105.6		105.1		110.7	
Container Number	56	57	58	64	65	66	67	68	69	70
Total Wet Wt. Soil + (Ring / Tube),(gm)	779.27		763.94		592.05		988.85		988.01	
Total Length of Sample (inch)	4		4		3		5		5	
Wet Weight of Soil + Container (gm)	187.51	252.53	220.49	250.44	178.79	191.95	225.70	178.01	206.12	173.55
Dry Weight of Soil + Container (gm)	164.94	218.61	193.22	217.97	159.12	169.52	197.18	159.02	187.86	162.67
Weight of Container (gm)	59.25	58.64	59.40	57.45	59.07	59.65	58.64	58.97	59.96	58.87
Unit Weight of Tube or Ring (gm/inch)	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80
Average Interior Diameter (inch)	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416
Unit Volume (ft^3)	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182

Moisture, Density and Classification of Soil (ASTM D-2937 / 2487 / 2488)

Project No. : 11-135 Project Name : PTG/I-5 HOV Widening Segment 1

Test Standard : ☑ CAL. TRAN. ☐ ASTM ☑ Other Unit Used (English / SI) : E

Sampled By : Kiat Received By : Tested By : JF Computed By : JF Checked By : RJ

Date : Date : Date : 11/27/11 Date : 1/15/12 Date :

Boring No.	A-11-117	A-11-117	A-11-117	A-11-117	A-11-117	A-11-117	A-11-117	A-11-117	A-11-117	A-11-117
Sample No. (B-Bulk, S-SPT, D-Drive, T-Tube)	D-3	S-4	D-5	S-6	D-7	S-8	D-9	S-10	D-11	S-12
Sample Depth (ft/m)	15.0 | 4.58	20.0 | 6.10	25.0 | 7.63	30.0 | 9.15	35.0 | 10.68	40.0 | 12.20	45.0 | 13.73	50.0 | 15.25	55.0 | 16.78	60.0 | 18.30
Sample Type (R-Ring, B-Bulk, MB-Medium , SB-Small Bag)	R	SB	R	SB	R	SB	R	SB	R	SB
U.S.C.S.	CL	CL	CL	CL	CH	CH	CH	CH	MH	MH
Moisture Content (%)	18.09	19.89	17.39	23.44	29.49	37.44	30.41	24.64	22.84	24.74
Wet Density (pcf)	110.5		110.4		120.2		118.2		126.0	
Dry Density (pcf)	93.6		94.1		92.9		90.6		102.6	
Container Number	31	71	72	73	87	74	60	75	76	77
Total Wet Wt. Soil + (Ring / Tube),(gm)	890.94		712.52		1139.84		1124.96		984.76	
Total Length of Sample (inch)	5		4		6		6		5	
Wet Weight of Soil + Container (gm)	104.49	157.60	148.47	174.30	215.98	219.9	207.22	237.71	240.55	193.53
Dry Weight of Soil + Container (gm)	97.46	141.15	135.25	152.11	180.40	176.16	172.54	202.60	206.95	166.87
Weight of Container (gm)	58.60	58.46	59.22	57.46	59.74	59.32	58.51	60.11	59.81	59.11
Unit Weight of Tube or Ring (gm/inch)	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80
Average Interior Diameter (inch)	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416
Unit Volume (ft^3)	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182

Moisture, Density and Classification of Soil (ASTM D-2937 / 2487 / 2488)

Project No. : 11-135 Project Name : PTG/I-5 HOV Widening Segment 1

Test Standard : ☑ CAL. TRAN. ☐ ASTM ☑ Other Unit Used (English / SI) : E

Sampled By : Kiat	Received By :	Tested By : JF		Computed By : JF			Checked By : RJ	
Date :	Date :	Date : 11/27/11		Date : 1/15/12			Date :	
Boring No .	A-11-117	A-11-117	A-11-117	A-11-117	A-11-117	A-11-117	A-11-117	A-11-117		
Sample No. (B-Bulk, S-SPT, D-Drive, T-Tube)	D-13	S-14	D-15	S-16	D-17	S-18	D-19	S-20		
Sample Depth (ft/m)	65.0 | 19.83	70.0 | 21.35	75.0 | 22.88	80.0 | 24.40	85.0 | 25.93	90.0 | 27.45	95.0 | 28.98	100.0 | 30.50		
Sample Type (R-Ring, B-Bulk, MB-Medium , SB-Small Bag)	R	SB	R	SB	R	SB	R	SB		
U.S.C.S.	MH	MH	MH	MH	MH	MH	MH	MH		
Moisture Content (%)	21.74	22.99	20.92	20.59	18.85	20.00	19.46	19.88		
Wet Density (pcf)	125.0		121.8		126.8		121.3			
Dry Density (pcf)	102.7		100.7		106.7		101.6			
Container Number	78	79	80	81	82	83	84	85		
Total Wet Wt. Soil + (Ring / Tube),(gm)	1174.42		767.41		791.40		956.39			
Total Length of Sample (inch)	6		4		4		5			
Wet Weight of Soil + Container (gm)	188.57	202.07	263.82	211.07	126.08	256.08	240.92	192.38		
Dry Weight of Soil + Container (gm)	165.42	175.47	228.38	185.28	115.36	223.20	211.50	170.31		
Weight of Container (gm)	58.92	59.75	58.96	60.01	58.48	58.79	60.30	59.30		
Unit Weight of Tube or Ring (gm/inch)	44.80	44.80	44.80	44.80	44.80	44.80	44.80	44.80		
Average Interior Diameter (inch)	2.416	2.416	2.416	2.416	2.416	2.416	2.416	2.416		
Unit Volume (ft^3)	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182	0.00266182		

Amount of Material in Soil Finer Than No. 200 Sieve
(ASTM D-1140-97)

Project No. : 11-135 **Project Name** : PTG/I-5 HOV Widening Segment 1

Boring No.	: A-11-114	Prepared By : JF	Date : 11/29/11	Percentage of			Maximum Size		
Sample No.	: D-7	Washed By : JF	Date : 11/30/11	Gravel	Sand	Fine			
Depth (ft)	: 40.0	Tested By : JF	Date : 12/01/11	0	36	64	#4		
Depth (m)	:	Checked By :	Date :						
Description	: Dark olive-brown, SANDY SILT (ML)			Sample		Retained On			
X	Method (A) - Soaked by Water					No. 200	No. 4		
	Method (B) - Soaked by Deflocculating Agent (Minimum 2 Hours)			Tested	Moisture	Sieve			
Container Number				S-58	S-58	S-58	S-58		
Wet Weight of Soil + Container (gm)				341.11	341.11				
Dry Weight of Soil + Container (gm)					321.36	154.82			
Weight of Container (gm)				62.72	62.72	62.72			
Weight of Dry Soil (gm)				258.64	258.64	92.1	1.28		
Moisture Content (%)					7.64				
(%) of Soil Passing No. 200 Sieve and Retained on No. 4 Sieve						64.39	0.49		
Remark :									1

Boring No.	: A-11-114	Prepared By : JF	Date : 11/29/11	Percentage of			Maximum Size		
Sample No.	: S-10	Washed By : JF	Date : 11/30/11	Gravel	Sand	Fine			
Depth (ft)	: 50.0	Tested By : KK	Date : 12/01/11	0	35	65	#20		
Depth (m)	:	Checked By :	Date :						
Description	: Olive-brown, SANDY SILT (ML)			Sample		Retained On			
	Method (A) - Soaked by Water					No. 200	No. 4		
	Method (B) - Soaked by Deflocculating Agent (Minimum 2 Hours)			Tested	Moisture	Sieve			
Container Number				S-53	S-53	S-53	S-53		
Wet Weight of Soil + Container (gm)				269.68	269.68				
Dry Weight of Soil + Container (gm)					251.14	130.1			
Weight of Container (gm)				63.92	63.92	63.92			
Weight of Dry Soil (gm)				187.22	187.22	66.18	0.00		
Moisture Content (%)					9.90				
(%) of Soil Passing No. 200 Sieve and Retained on No. 4 Sieve						64.65	0.00		
Remark :									2

Boring No.	: A-11-114	Prepared By : JF	Date : 11/29/11	Percentage of			Maximum Size		
Sample No.	: D-11	Washed By : JF	Date : 11/30/11	Gravel	Sand	Fine			
Depth (ft)	: 55.0	Tested By : JF	Date : 12/01/11	0	46	54	#20		
Depth (m)	:	Checked By :	Date :						
Description	: Olive-brown, SANDY SILT (ML)			Sample		Retained On			
	Method (A) - Soaked by Water					No. 200	No. 4		
	Method (B) - Soaked by Deflocculating Agent (Minimum 2 Hours)			Tested	Moisture	Sieve			
Container Number				S-62	S-62	S-62	S-62		
Wet Weight of Soil + Container (gm)				216.97	216.97				
Dry Weight of Soil + Container (gm)					203.22	127.89			
Weight of Container (gm)				63.25	63.25	63.25			
Weight of Dry Soil (gm)				139.97	139.97	64.64	0.00		
Moisture Content (%)					9.82				
(%) of Soil Passing No. 200 Sieve and Retained on No. 4 Sieve						53.82	0.00		
Remark :									

Amount of Material in Soil Finer Than No. 200 Sieve
(ASTM D-1140-97)

Project No. : 11-135 **Project Name** : PTG/I-5 HOV Widening Segment 1

Boring No.	: A-11-115	Prepared By : JF	Date : 11/29/11	Percentage of			Maximum Size	
Sample No.	: S-5	Washed By : JF	Date : 11/30/11	Gravel	Sand	Fine		
Depth (ft)	: 25.0	Tested By : JF	Date : 12/01/11	0	49	51	#10	
Depth (m)	:	Checked By :	Date :					
Description	: Dark olive-brown, SANDY SILT (ML)			Sample		Retained On		
X	Method (A) - Soaked by Water					No. 200	No. 4	
	Method (B) - Soaked by Deflocculating Agent (Minimum 2 Hours)			Tested	Moisture	Sieve		
Container Number				S-54	S-54	S-54	S-54	
Wet Weight of Soil + Container (gm)				313.59	313.59			
Dry Weight of Soil + Container (gm)					301.02	179.89		
Weight of Container (gm)				63.27	63.27	63.27		
Weight of Dry Soil (gm)				237.75	237.75	116.62	0.00	
Moisture Content (%)					5.29			
(%) of Soil Passing No. 200 Sieve and Retained on No. 4 Sieve						50.95	0.00	
Remark :								1

Boring No.	: A-11-115	Prepared By : JF	Date : 11/29/11	Percentage of			Maximum Size	
Sample No.	: D-6	Washed By : JF	Date : 11/30/11	Gravel	Sand	Fine		
Depth (ft)	: 30.0	Tested By : KK	Date : 12/01/11	0	48	52	#20	
Depth (m)	:	Checked By :	Date :					
Description	: Olive-brown, SANDY SILT (ML)			Sample		Retained On		
	Method (A) - Soaked by Water					No. 200	No. 4	
	Method (B) - Soaked by Deflocculating Agent (Minimum 2 Hours)			Tested	Moisture	Sieve		
Container Number				S-60	S-60	S-60	S-60	
Wet Weight of Soil + Container (gm)				277.06	277.06			
Dry Weight of Soil + Container (gm)					266.10	161.04		
Weight of Container (gm)				63.05	63.05	63.05		
Weight of Dry Soil (gm)				203.05	203.05	97.99	0.00	
Moisture Content (%)					5.40			
(%) of Soil Passing No. 200 Sieve and Retained on No. 4 Sieve						51.74	0.00	
Remark :								2

Boring No.	: A-11-115	Prepared By : JF	Date : 11/29/11	Percentage of			Maximum Size	
Sample No.	: S-7	Washed By : JF	Date : 11/30/11	Gravel	Sand	Fine		
Depth (ft)	: 35.0	Tested By : JF	Date : 12/01/11	1	58	41	#4	
Depth (m)	:	Checked By :	Date :					
Description	: Olive-brown, SILTY SAND (SM)			Sample		Retained On		
	Method (A) - Soaked by Water					No. 200	No. 4	
	Method (B) - Soaked by Deflocculating Agent (Minimum 2 Hours)			Tested	Moisture	Sieve		
Container Number				S-23	S-23	S-23	S-23	
Wet Weight of Soil + Container (gm)				433.07	433.07			
Dry Weight of Soil + Container (gm)					413.22	289.14		
Weight of Container (gm)				113.81	113.81	113.81		
Weight of Dry Soil (gm)				299.41	299.41	175.33	3.39	
Moisture Content (%)					6.63			
(%) of Soil Passing No. 200 Sieve and Retained on No. 4 Sieve						41.44	1.13	
Remark :								

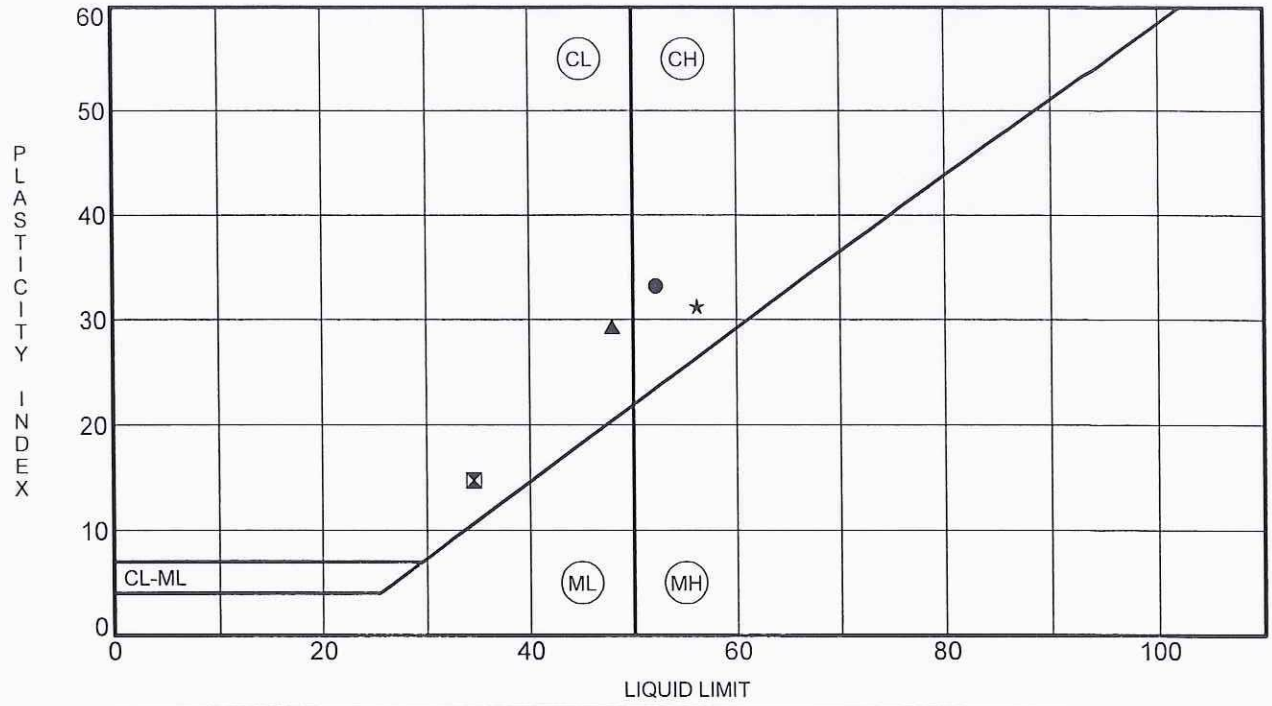
Amount of Material in Soil Finer Than No. 200 Sieve
(ASTM D-1140-97)

Project No. : 11-135 Project Name : PTG/I-5 HOV Widening Segment 1

Boring No. :		Prepared By :	Date :	Percentage of			Maximum Size
Sample No. :		Washed By :	Date :	Gravel	Sand	Fine	
Depth (ft) :		Tested By :	Date :				
Depth (m) :		Checked By :	Date :				
Description :				Sample		Retained On	
X Method (A) - Soaked by Water						No. 200	No. 4
Method (B) - Soaked by Deflocculating Agent (Minimum 2 Hours)				Tested	Moisture	Sieve	
Container Number							
Wet Weight of Soil + Container (gm)							
Dry Weight of Soil + Container (gm)							
Weight of Container (gm)							
Weight of Dry Soil (gm)							
Moisture Content (%)							
(%) of Soil Passing No. 200 Sieve and Retained on No. 4 Sieve							
Remark :							1

Boring No. : A-11-115		Prepared By : JF	Date : 11/29/11	Percentage of			Maximum Size
Sample No. : S-1		Washed By : JF	Date : 11/30/11	Gravel	Sand	Fine	
Depth (ft) : 5.0		Tested By : KK	Date : 12/01/11	5	58	37	#4
Depth (m) :		Checked By :	Date :				
Description : Dark yellowish brown, CLAYEY SAND (SC)				Sample		Retained On	
Method (A) - Soaked by Water						No. 200	No. 4
Method (B) - Soaked by Deflocculating Agent (Minimum 2 Hours)				Tested	Moisture	Sieve	
Container Number				S-15	S-15	S-15	S-15
Wet Weight of Soil + Container (gm)				450.63	450.63		
Dry Weight of Soil + Container (gm)					421.65	307.11	
Weight of Container (gm)				114.68	114.68	114.68	
Weight of Dry Soil (gm)				306.97	306.97	192.43	15.12
Moisture Content (%)					9.44		
(%) of Soil Passing No. 200 Sieve and Retained on No. 4 Sieve						37.31	4.93
Remark :							2

Boring No. : A-11-115		Prepared By : JF	Date : 11/29/11	Percentage of			Maximum Size
Sample No. : D-2		Washed By : JF	Date : 11/30/11	Gravel	Sand	Fine	
Depth (ft) : 10.0		Tested By : JF	Date : 12/01/11	2	24	74	3/8"
Depth (m) :		Checked By :	Date :				
Description : Olive-brown, Lean CLAY with SAND (CL)				Sample		Retained On	
Method (A) - Soaked by Water						No. 200	No. 4
Method (B) - Soaked by Deflocculating Agent (Minimum 2 Hours)				Tested	Moisture	Sieve	
Container Number				S-24	S-24	S-24	S-24
Wet Weight of Soil + Container (gm)				505.55	505.55		
Dry Weight of Soil + Container (gm)					505.55	215.78	
Weight of Container (gm)				113.08	113.08	113.08	
Weight of Dry Soil (gm)				392.47	392.47	102.7	7.98
Moisture Content (%)					0.00		
(%) of Soil Passing No. 200 Sieve and Retained on No. 4 Sieve						73.83	2.03
Remark :							



Specimen Identification			LL	PL	PI	Fines	Classification
● A-11-114	D-3	15.0 ft.	52	19	33		Fat CLAY with SAND (CH)
⊠ A-11-114	D-7	35.0 ft.	35	20	15		SANDY lean CLAY (CL)
▲ A-11-115	D-10	50.0 ft.	48	19	29		Lean CLAY (CL)
★ A-11-116	D-2	10.0 ft.	56	25	31		Fat CLAY (CH)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

ATTERBERG LIMITS RESULTS

DIST.	COUNTY	ROUTE	POSTMILE	EA
12	Orange	I5	3.4	12-11-135

PROJECT OR BRIDGE NAME: I-5 HOV Widening Segment 1

BRIDGE NUMBER	PREPARED BY	DATE	SHEET
			1 of 1

CALTRANS ATTERBERG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2010.GLB 5/28/13

ATTERBERG LIMITS

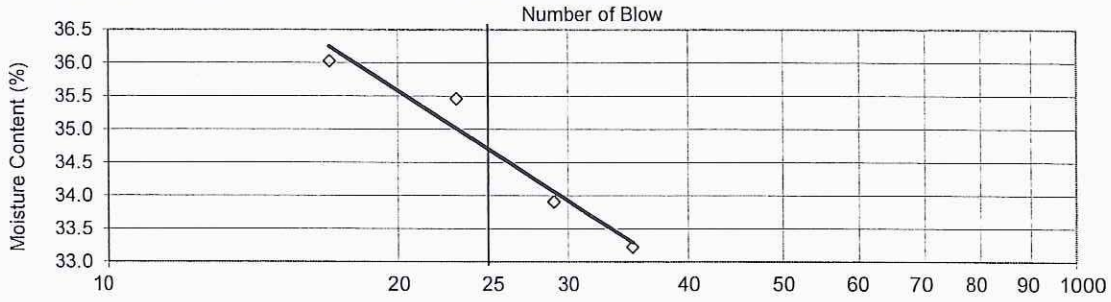
ASTM D-4318-84 / CT-204

Project No: 11-135 Project Name: Parsons/I-5 HOV Widening Segment 1

Boring Number: A-11-114	Depth (ft/m): 35 ft	10.5 m					1
Sample Number: D-7	Description: CL						
Prepared By: CP	Date: 11/28/11	Checked By: R.J.				Date:	
Pulverized By:	Date:					Container Number	
Tested By: KK	Date: 11/30/11					Air:	
Computed By: JF	Date: 12/19/11					Field:	

Trial Number	Field Moisture	1	2	3	4	Plastic Limit 1	Plastic Limit 2
Number of Blow		35	29	23	17		
Can Number		19	20	21	22	23	24
Wt. Wet Soil +Can (gm)		35.94	35.26	36.17	36.01	35.07	37.32
Wt. Dry Soil +Can (gm)		33.97	33.10	33.67	33.87	33.37	35.44
Weight of Can (gm)		28.04	26.73	26.62	27.93	24.83	26.00
Water Content (%)		33.2	33.9	35.5	36.0	19.9	19.9

Liquid Limit (LL, %):	35	Plastic Limit (PL, %):	20	Plastic Index (PI, %):	15

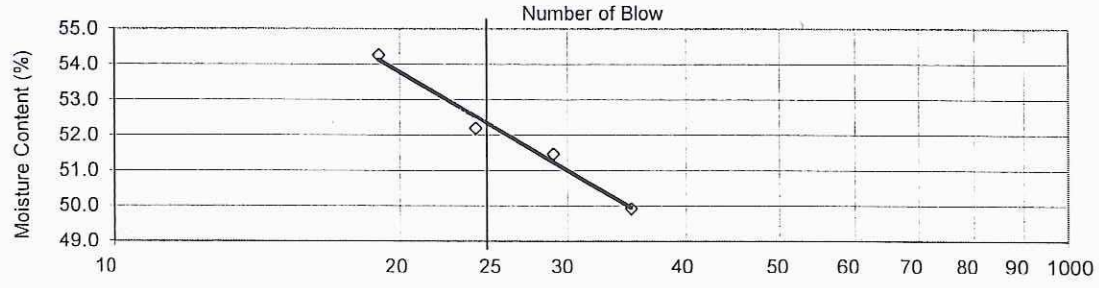


Remark:

Boring Number: A-11-114	Depth (ft/m): 15 ft	4.58 m					1
Sample Number: D-3	Description: CH						
Prepared By: KK	Date: 12/08/11	Checked By:				Date:	
Pulverized By:	Date:					Container Number	
Tested By: KK	Date: 12/12/11					Air:	G-8
Computed By: JF	Date:					Field:	

Trial Number	Field Moisture	1	2	3	4	Plastic Limit 1	Plastic Limit 2
Number of Blow		35	29	24	19		
Can Number		25	26	27	28	29	30
Wt. Wet Soil +Can (gm)		39.10	39.42	35.74	38.40	37.15	35.99
Wt. Dry Soil +Can (gm)		36.15	36.61	33.60	35.28	35.60	34.38
Weight of Can (gm)		30.24	31.15	29.50	29.53	27.57	25.95
Water Content (%)		49.9	51.5	52.2	54.3	19.3	19.1

Liquid Limit (LL,%)	52	Plastic Limit PL,%)	19	Plastic Index (PI,%)	33



Remark:

ATTERBERG LIMITS

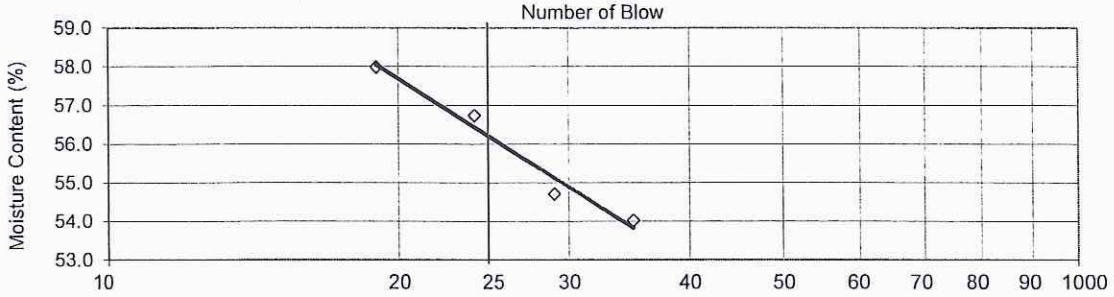
ASTM D-4318-84 / CT-204

Project No: 11-135 Project Name: Parsons/I-5 HOV Widening Segment 1

Boring Number: A-11-116	Depth (ft/m): 10 ft	3 m					1
Sample Number: D-2	Description: CH						
Prepared By: KK	Date: 11/28/11	Checked By: R.J.				Date:	
Pulverized By:	Date:					Container Number	
Tested By: KK	Date: 11/30/11					Air:	G-2
Computed By: JF	Date: 12/19/11					Field:	

Trial Number	Field Moisture	1	2	3	4	Plastic Limit 1	Plastic Limit 2
Number of Blow		35	29	24	19		
Can Number		37	38	39	40	41	42
Wt. Wet Soil +Can (gm)		29.79	29.75	34.40	32.17	36.33	35.93
Wt. Dry Soil +Can (gm)		26.83	26.67	31.20	28.07	33.59	33.07
Weight of Can (gm)		21.35	21.04	25.56	21.00	22.59	21.60
Water Content (%)		54.0	54.7	56.7	58.0	24.9	24.9

Liquid Limit (LL, %):	56	Plastic Limit (PL, %):	25	Plastic Index (PI, %):	31

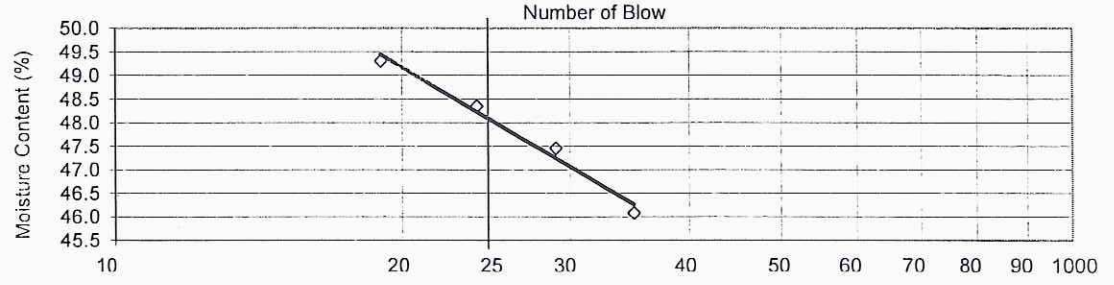


Remark:

Boring Number: A-11-115	Depth (ft/m): 50 ft	15 m					1
Sample Number: D-10	Description: CL						
Prepared By: KK	Date: 12/21/11	Checked By: R.J.				Date:	
Pulverized By:	Date:					Container Number	
Tested By: KK	Date: 12/22/11					Air:	
Computed By: JF	Date: 12/30/11					Field:	

Trial Number	Field Moisture	1	2	3	4	Plastic Limit 1	Plastic Limit 2
Number of Blow		35	29	24	19		
Can Number		25	26	27	28	29	30
Wt. Wet Soil +Can (gm)		37.30	41.57	38.46	38.09	36.82	35.54
Wt. Dry Soil +Can (gm)		35.07	38.21	35.54	35.26	35.35	34.02
Weight of Can (gm)		30.23	31.13	29.50	29.52	27.47	25.95
Water Content (%)		46.1	47.5	48.3	49.3	18.7	18.8

Liquid Limit (LL,%)	48	Plastic Limit PL,%)	19	Plastic Index (PI,%)	29

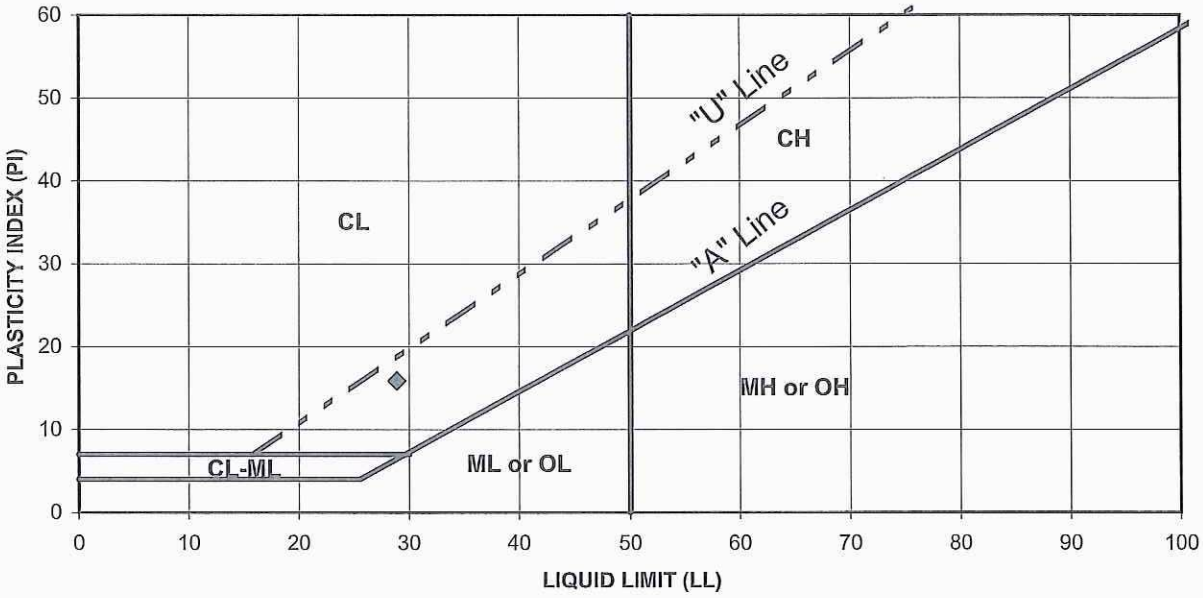


Remark:

AP Engineering & Testing, Inc.

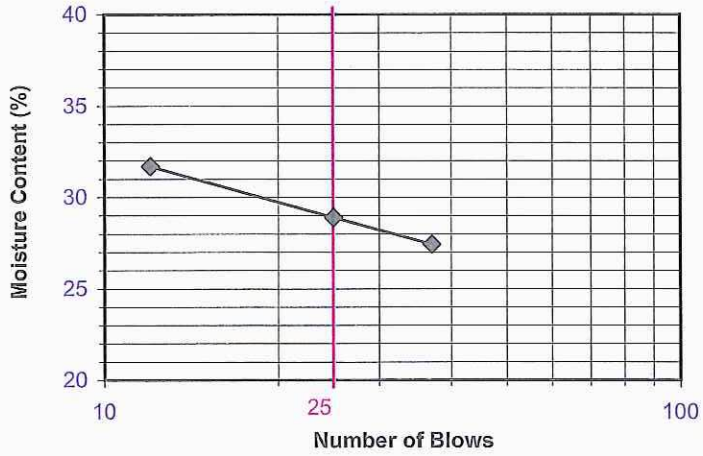
ATTERBERG LIMITS
ASTM D 4318

Project Name: I-5 HOV Widening Segment 1 **Tested By:** DK Date: 07/18/12
Project No.: 11-135 **Checked By:** AP Date: 07/27/12



PROCEDURE USED

- ☐ Wet Preparation
- ☒ Dry Preparation
- ☒ Procedure A Multipoint Test
- ☐ Procedure B One-point Test



Symbol	Boring Number	Sample Number	Depth (feet)	LL	PL	PI	U.S.C.S Symbol
◆	A-11-115	Bulk	0-5	29	13	16	CL

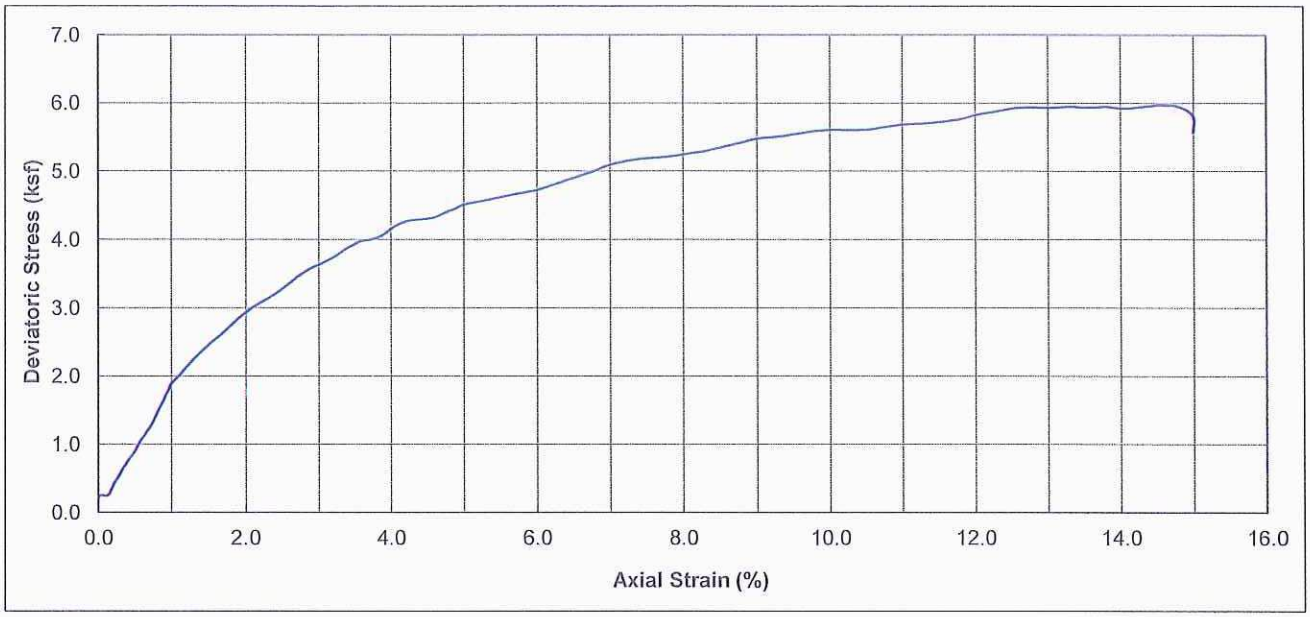
DATA ENTRY

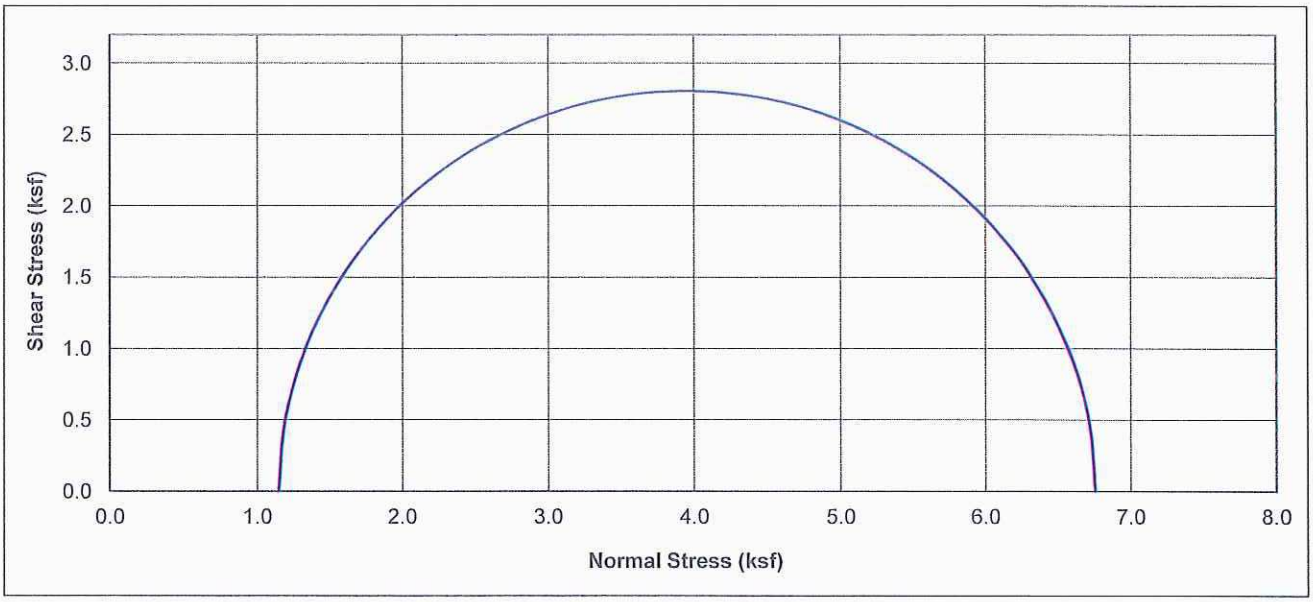
Client Name: EMI
Project Name: I-5 HOV Widening Segment 1
Project No.: 11-135
Test By: Dusit Kongtong **Date:** 07/18/13

28.89182058 10
Data Point #7 100
☐ Non Plastic

Symbol	*Boring #*	*Sample #*	*Depth*	*LL*	*PL*	*PI*
◆	A-11-115	Bulk	0-5	29	13	16
		Suggested LL at 25 blow counts		***25***		

	PLASTIC LIMIT		LIQUID LIMIT		
Blows			12	25	37
Wt. Cont.	2.53	2.63	2.57	2.55	2.57
Wet Wt + cont	10.74	10.98	13.5	12.32	14.45
Dry Wt + cont	9.78	9.98	10.87	10.13	11.89
MC (%)	13.24	13.61	31.69	28.89	27.47





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-114	D-3	15	Olive Brown ,FAT CLAY (CH)	81.8	50.30	1.15	5.61	128.0

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**AECOM/I-5 HOV Widening Segment 1**
Project No. : 11-135 Date : 12/06/11	**UNCONSOLIDATED UNDRAINED TEST** **(ASTM D2850)**

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	AECOM/I-5 HOV Widening Segment 1			**Project No:**	11-135
Boring No.:	A-11-114	**Tested by:**	KK	**Date:**	12/06/11
Depth (ft):	15	**Checked by:**		**Date:**	
Sample No.	D-3	**Sample Type:**	R		

Sample Description: Olive Brown , FAT CLAY (CH)

	1	2	3		
Diameter (in.):	2.415	2.41	2.422	Average:	2.416
Height (in.):	5.013	5.010	5.060	Average:	5.028

Moisture Content Calculation		
Wt. Wet Sample + Container (gms):		205.92
Wt. Dry Sample + Container (gms):		156.24
Container (gms)	No. 8	57.47
Moisture Content (%)		**50.3**

Density and Saturation	
Wt. Wet Sample + Container (gms)	973.15
Container (gms)	228.92
Wet Density (pcf)	**122.9**
Dry Density (pcf)	**81.8**
Void Ratio	**1.061**
% Saturation	**128.0**

Assume Gs=2.70

Test Data Filename:	11135B114D3.xls

SKETCH / PHOTO AFTER TEST:

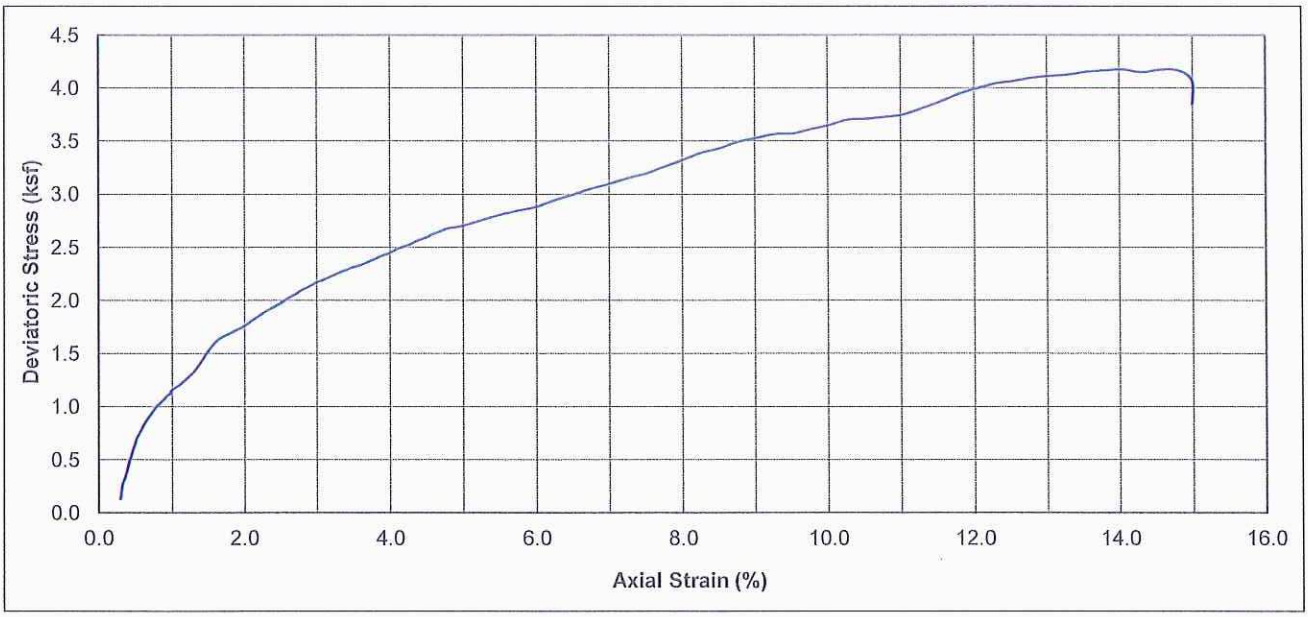
PHOTO FILE NAME: 3, I-5 HOV Widening - Segment 1

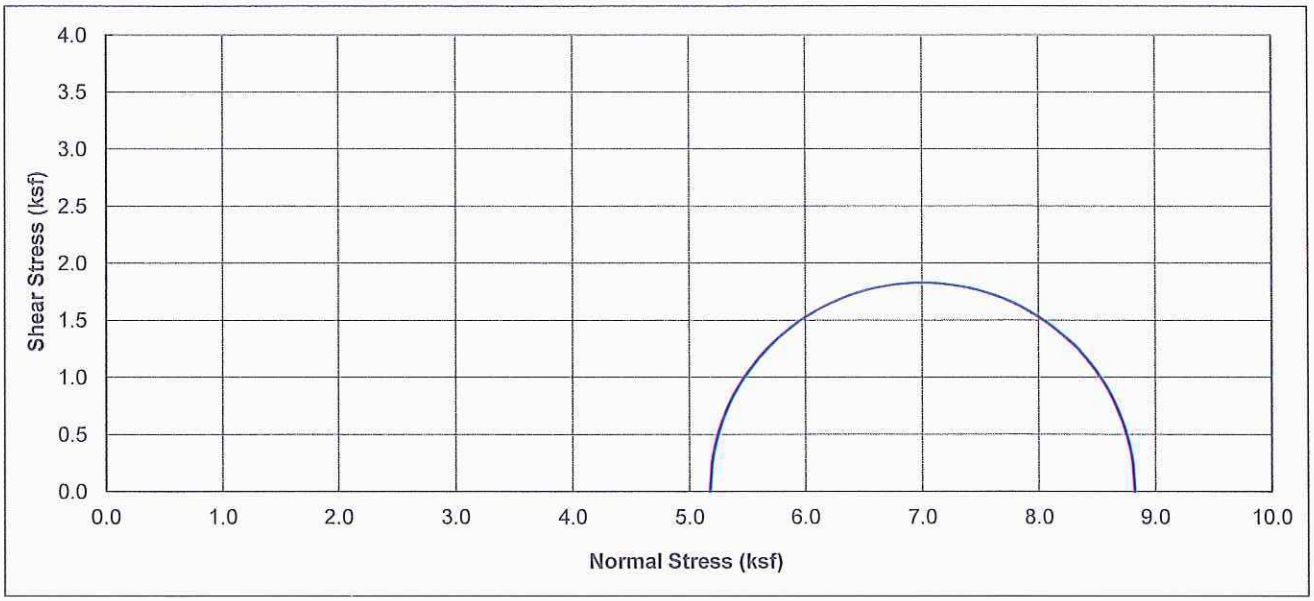
Shear	
Rate of Deformation (% strain / min) =	**1**
Confining Stress (ksf):	**1.15**

Failure Criterion: **criterion 2 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**5.61**
Eff. Minor Principal Stress (ksf)=	**1.15**
Eff. Major Principal Stress (ksf)=	**6.76**
Axial Strain (%)=	**10.03**





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-114	D-13	65	Dk. Gray , SANDY CLAY (CL)	91.6	29.65	5.18	3.65	95.4

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

AECOM/I-5 HOV Widening Segment 1

UNCONSOLIDATED UNDRAINED TEST
(ASTM D2850)

Project No. : 11-135 **Date :** 12/06/11

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	AECOM/I-5 HOV Widening Segment 1			**Project No:**	11-135
Boring No.:	A-11-114	**Tested by:**	KK	**Date:**	12/06/11
Depth (ft):	65	**Checked by:**		**Date:**	
Sample No.	D-13	**Sample Type:**	R		

Sample Description: Dk. Gray , SANDY CLAY (CL)

	1	2	3		
Diameter (in.):	2.424	2.4	2.415	Average:	2.413
Height (in.):	5.035	5.060	5.010	Average:	5.035

Moisture Content Calculation		
Wt. Wet Sample + Container (gms):		204.17
Wt. Dry Sample + Container (gms):		171.34
Container (gms)	No. 30	60.62
Moisture Content (%)		**29.7**

Density and Saturation	
Wt. Wet Sample + Container (gms)	947.94
Container (gms)	228.92
Wet Density (pcf)	**118.8**
Dry Density (pcf)	**91.6**
Void Ratio	**0.839**
% Saturation	**95.4**

Assume Gs=2.70

Test Data Filename:	11135B114D13.xls

SKETCH / PHOTO AFTER TEST:

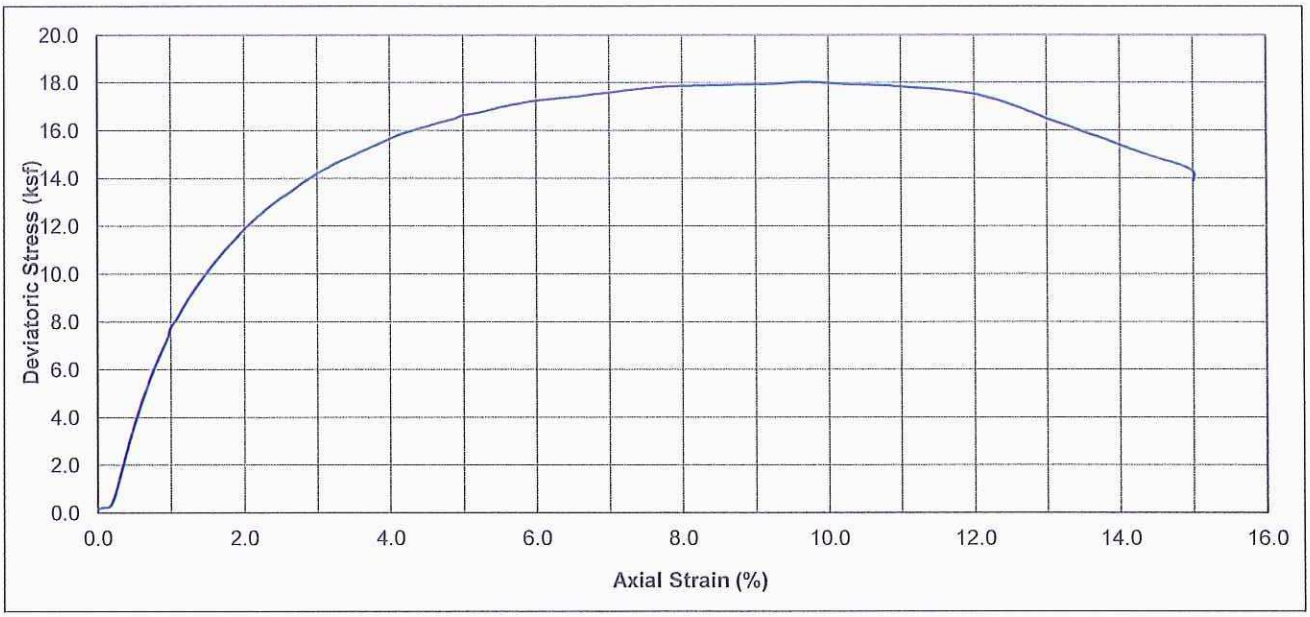
PHOTO FILE NAME: n Process\11-135 PTG I-5 HOV Widening Segment 1\U

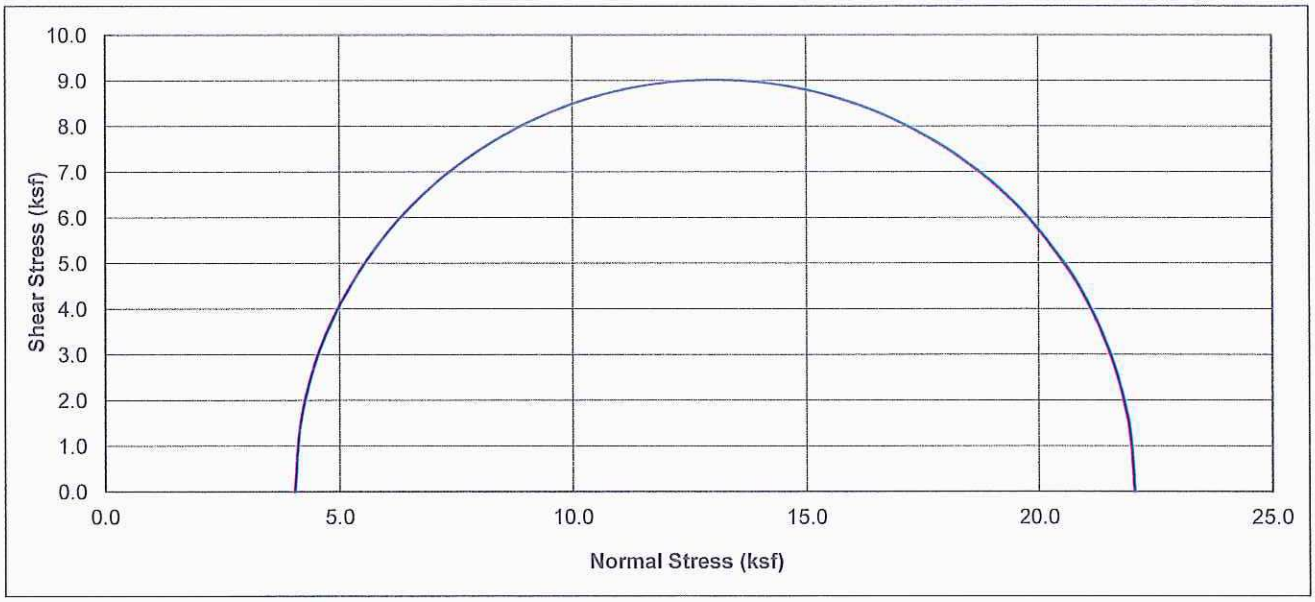
Shear	
Rate of Deformation (% strain / min) =	**1**
Confining Stress (ksf):	**5.18**

Failure Criterion: **criterion 2 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**3.65**
Eff. Minor Principal Stress (ksf)=	**5.18**
Eff. Major Principal Stress (ksf)=	**8.83**
Axial Strain (%)=	**10.03**





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-115	D-10	50	Olive Brown , LEAN CLAY (CL)	110.0	15.85	4.03	18.03	80.6

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

AECOM/I-5 HOV Widening Segment 1

UNCONSOLIDATED UNDRAINED TEST
(ASTM D2850)

Project No. : 11-135 **Date :** 12/20/11

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST
ASTM D2850

Project Name:	AECOM/I-5 HOV Widening Segment 1			**Project No:**	11-135
Boring No.:	A-11-115	**Tested by:**	KK	**Date:**	12/20/11
Depth (ft):	50	**Checked by:**		**Date:**	
Sample No.	D-10	**Sample Type:**	R		

Sample Description: Olive Brown , LEAN CLAY (CL)

	1	2	3		
Diameter (in.):	2.428	2.424	2.414	Average:	2.422
Height (in.):	4.990	5.015	4.993	Average:	4.999

Moisture Content Calculation	
Wt. Wet Sample + Container (gms):	215.27
Wt. Dry Sample + Container (gms):	193.84
Container (gms) No. 31	58.61
Moisture Content (%)	**15.8**

Density and Saturation	
Wt. Wet Sample + Container (gms)	1000.35
Container (gms)	228.92
Wet Density (pcf)	**127.5**
Dry Density (pcf)	**110.0**
Void Ratio	**0.531**
% Saturation	**80.6**

Assume Gs=2.70

Test Data Filename:	11135B115D10.trx

SKETCH / PHOTO AFTER TEST:

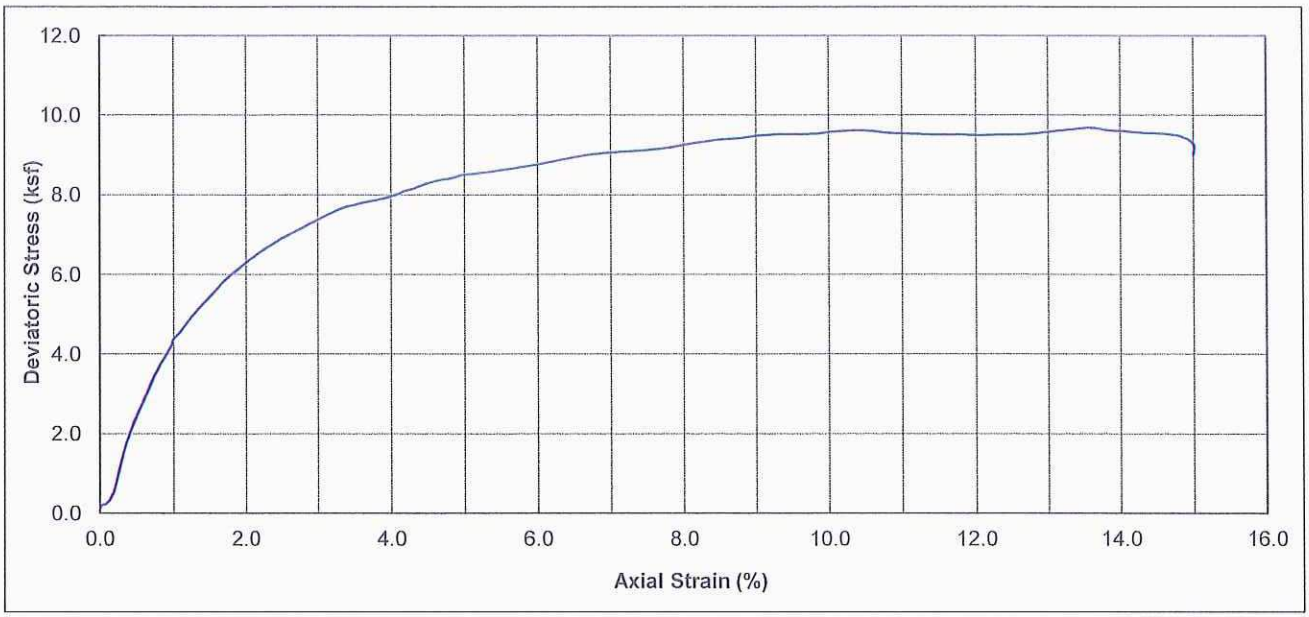
PHOTO FILE NAME: n Process\11-135 PTG I-5 HOV Widening Segment 1\U

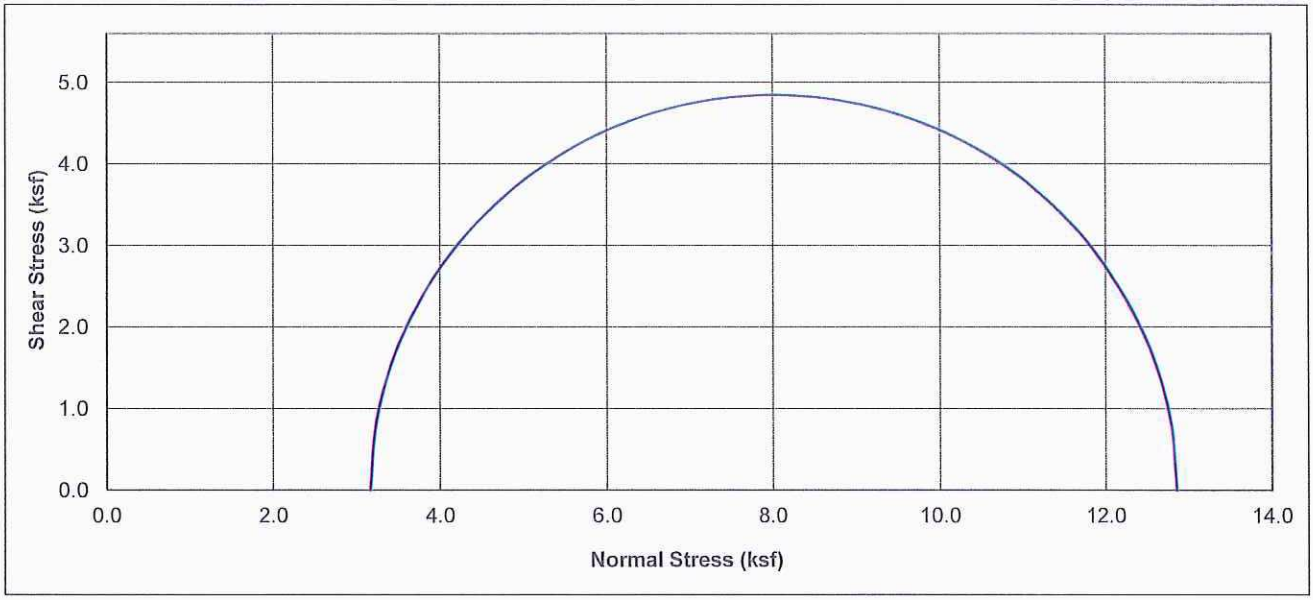
Shear	
Rate of Deformation (% strain / min) =	**1**
Confining Stress (ksf):	**4.03**

Failure Criterion: **criterion 1 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**18.03**
Eff. Minor Principal Stress (ksf)=	**4.03**
Eff. Major Principal Stress (ksf)=	**22.06**
Axial Strain (%)=	**9.78**





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-116	D-8	40	Dark Olive , FAT CLAY (CH)	92.6	29.02	3.17	9.69	95.6

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

AECOM/I-5 HOV Widening Segment 1

UNCONSOLIDATED UNDRAINED TEST
(ASTM D2850)

Project No. : 11-135 **Date :** 12/20/11

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	AECOM/I-5 HOV Widening Segment 1			**Project No:**	11-135
Boring No.:	A-11-116	**Tested by:**	KK	**Date:**	12/20/11
Depth (ft):	40	**Checked by:**		**Date:**	
Sample No.	D-8	**Sample Type:**	R		

Sample Description: Dark Olive , FAT CLAY (CH)

	1	2	3		
Diameter (in.):	2.401	2.408	2.406	Average:	2.405
Height (in.):	5.012	5.002	4.982	Average:	4.999

Moisture Content Calculation		
Wt. Wet Sample + Container (gms):		203.67
Wt. Dry Sample + Container (gms):		171.05
Container (gms)	No. 32	58.65
Moisture Content (%)		**29.0**

Density and Saturation	
Wt. Wet Sample + Container (gms)	941.83
Container (gms)	228.92
Wet Density (pcf)	**119.5**
Dry Density (pcf)	**92.6**
Void Ratio	**0.819**
% Saturation	**95.6**

Assume Gs=2.70

Test Data Filename:	11135B116D8.trx

SKETCH / PHOTO AFTER TEST:

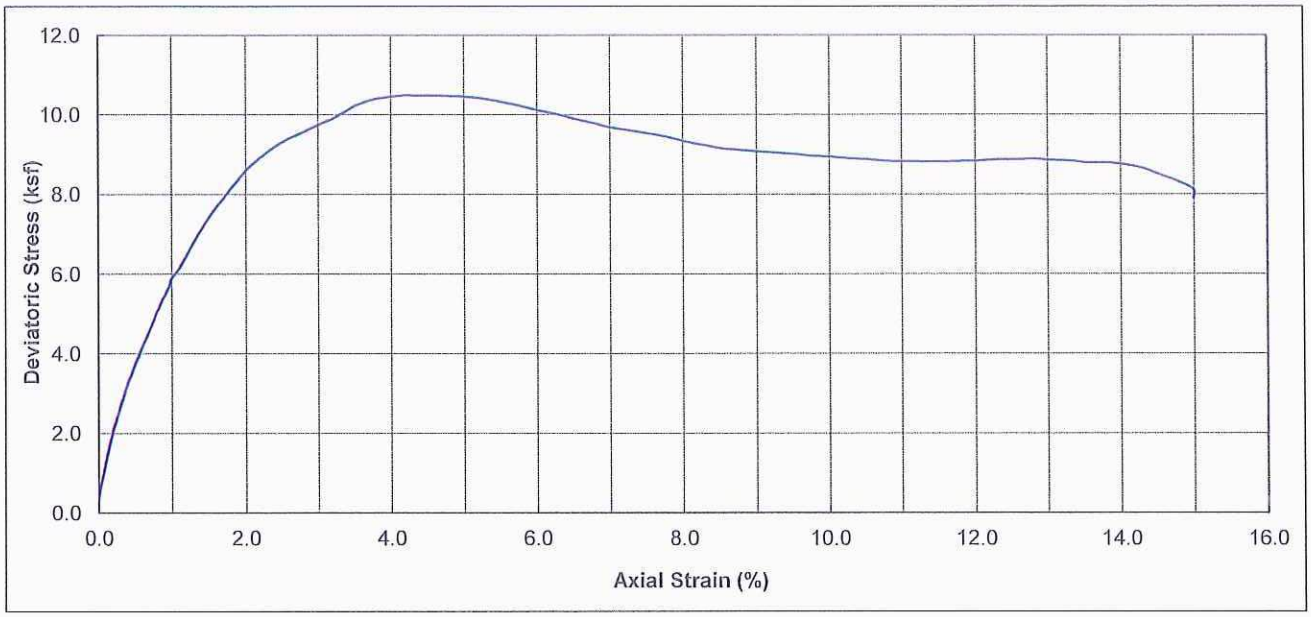
PHOTO FILE NAME: In Process\11-135 PTG I-5 HOV Widening Segment 1\

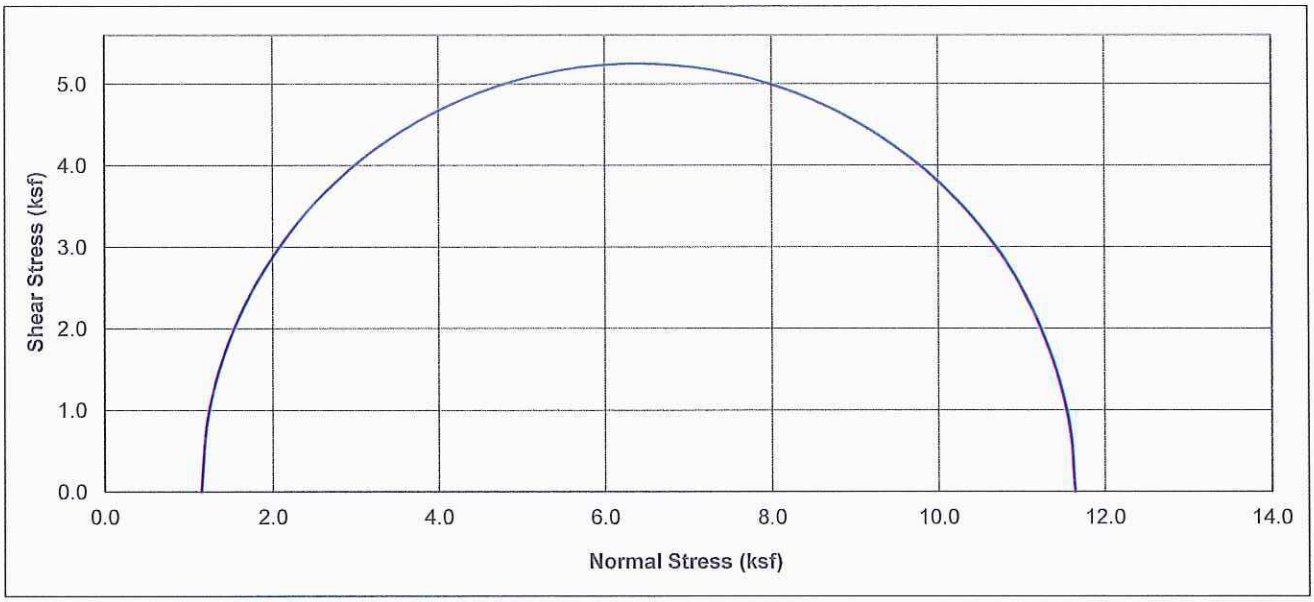
Shear	
Rate of Deformation (% strain / min) =	**1**
Confining Stress (ksf):	**3.17**

Failure Criterion: **criterion 1 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**9.69**
Eff. Minor Principal Stress (ksf)=	**3.17**
Eff. Major Principal Stress (ksf)=	**12.86**
Axial Strain (%)=	**13.58**





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-117	D-3	15	Olive Brown , LEAN CLAY (CL)	96.7	18.09	1.14	10.49	65.8

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	AECOM/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/06/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	AECOM/I-5 HOV Widening Segment 1			**Project No:**	11-135
Boring No.:	A-11-117	**Tested by:**	KK	**Date:**	12/06/11
Depth (ft):	15	**Checked by:**		**Date:**	
Sample No.	D-3	**Sample Type:**	R		

Sample Description: Olive Brown , LEAN CLAY (CL)

	1	2	3		
Diameter (in.):	2.421	2.42	2.422	Average:	2.421
Height (in.):	4.795	4.777	4.810	Average:	4.794

Moisture Content Calculation		
Wt. Wet Sample + Container (gms):		104.49
Wt. Dry Sample + Container (gms):		97.46
Container (gms)	No. 31	58.6
Moisture Content (%)		**18.1**

Density and Saturation	
Wt. Wet Sample + Container (gms)	890.94
Container (gms)	228.92
Wet Density (pcf)	**114.2**
Dry Density (pcf)	**96.7**
Void Ratio	**0.743**
% Saturation	**65.8**

Assume Gs=2.70

Test Data Filename:	11135B117D3.trx

SKETCH / PHOTO AFTER TEST:

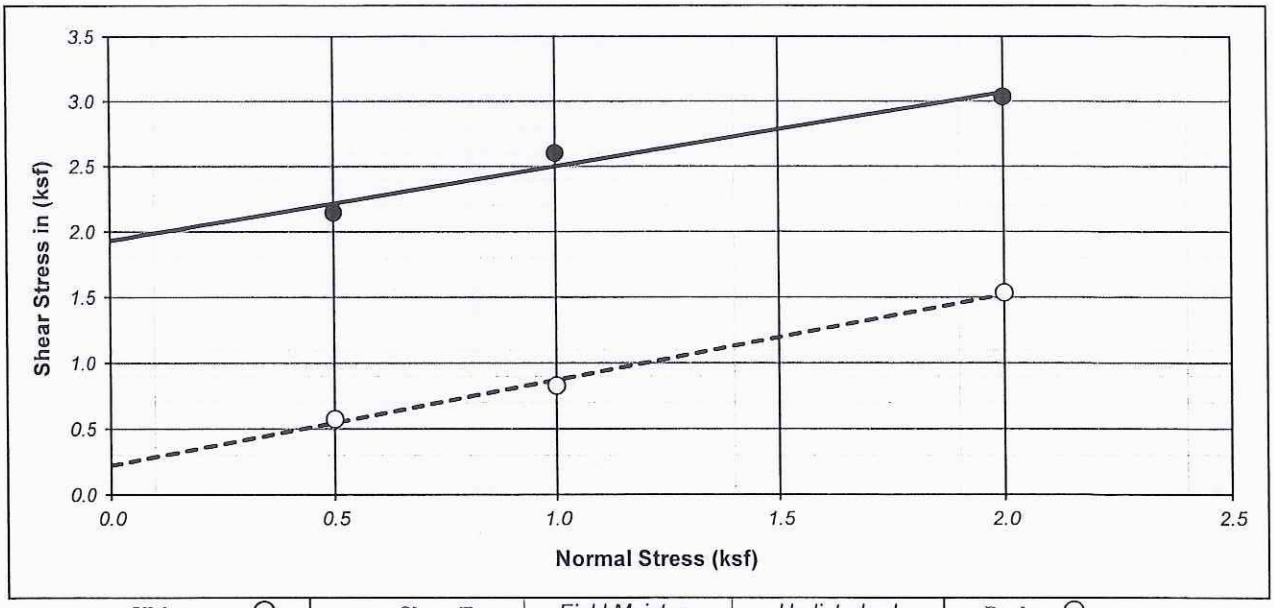
PHOTO FILE NAME: In Process\11-135 PTG I-5 HOV Widening Segment 1\

Shear	
Rate of Deformation (% strain / min) =	**1**
Confining Stress (ksf):	**1.14**

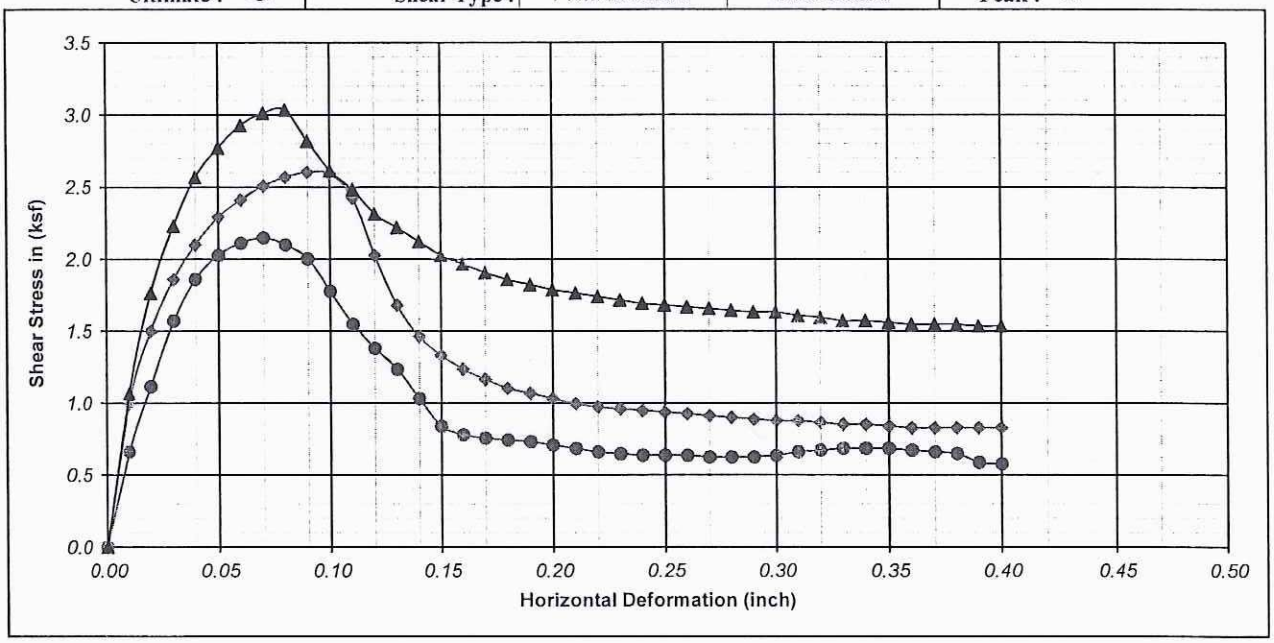
Failure Criterion: **criterion 1 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**10.49**
Eff. Minor Principal Stress (ksf)=	**1.14**
Eff. Major Principal Stress (ksf)=	**11.64**
Axial Strain (%)=	**4.20**



Ultimate : ○	Shear Type :	Field Moisture	Undisturbed	Peak : ○



Boring No.	: A-11-115	Strength Intercept (C) :	1.93	(ksf)	Peak	0.22	(ksf)	Ultimate	
Sample No.	: D-2		92.50	(kPa)		10.63	(kPa)		
Depth (ft/m)	: 10.0 | 0.00	Friction Angle (ϕ) :	29.65	Degree		33.01	Degree		
Description	: Olive-brown, Lean CLAY with SAND (CL)						Shear Rate (inch/minute) :	0.02	

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
○	17.09	108.61	17.10	0.55	0.50	23.94	2.15	102.85	0.58	27.58
◇	18.40	109.40	17.22	0.54	1.00	47.88	2.60	124.68	0.83	39.64
△	17.30	107.85	16.98	0.56	2.00	95.76	3.04	145.36	1.54	73.54
					0.00	0.00	1.93	92.50	0.22	10.63
					2.0	95.76	3.07	147.01	1.52	72.85

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

PTG/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST (ASTM D-3080)

Project No. : 11-135 | Date : 11/29/11

DIRECT SHEAR TEST

ASTM D-3080

Project No. : 11-135 **Project Name :** PTG/I-5 HOV Widening Segment 1

Boring No. :	A-11-115		Saturated	X	Field Moisture		Inundated
Sample No. :	D-2	X	Undisturbed		Remolded		Consolidated-Drained
Depth (ft/m) :	10.0	x	Shear Once		Reshear		Residual

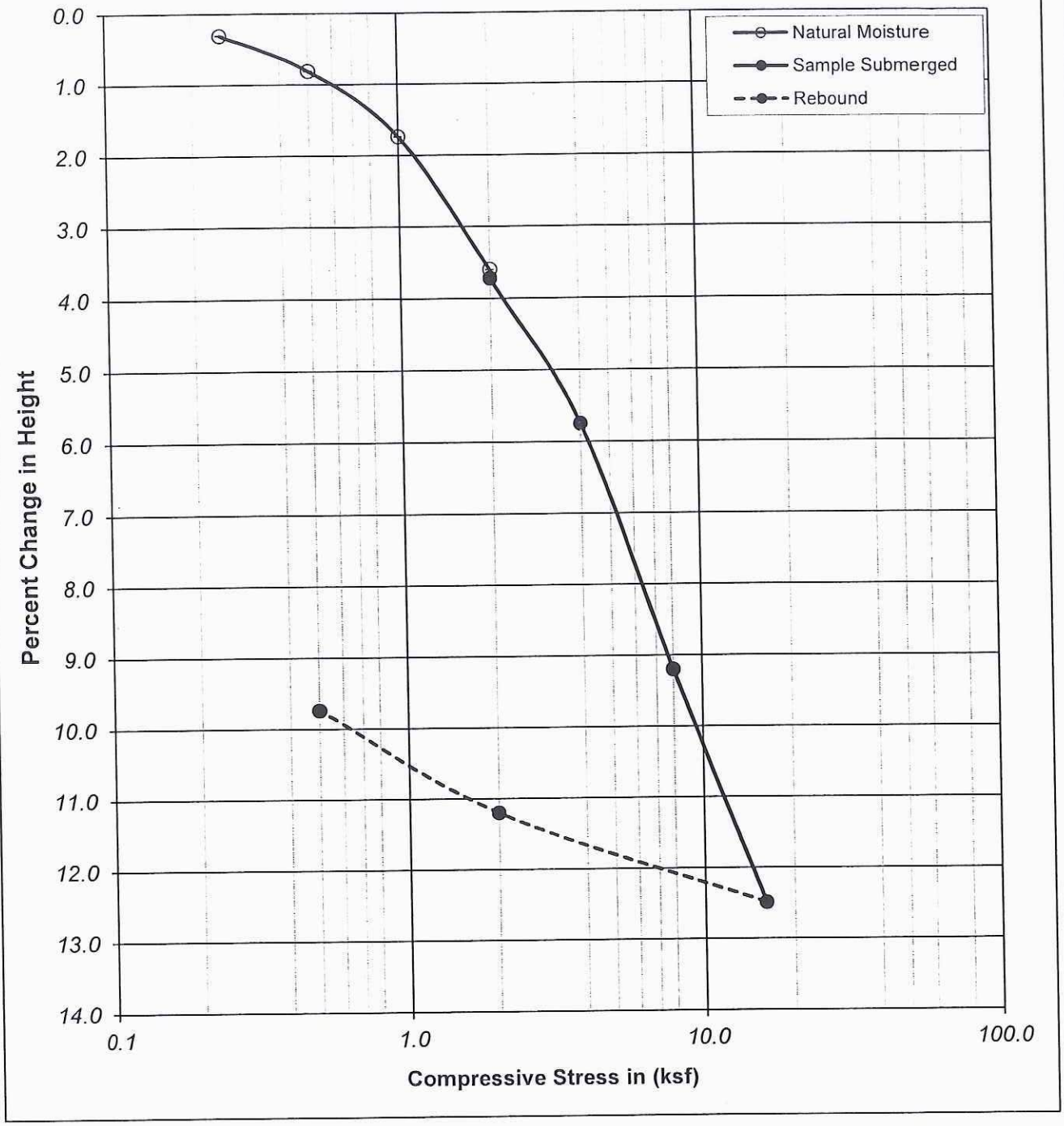
Specific Gravity (Assumed) : 2.70
Shear Rate (inch/min) : 0.02
Data File Number : 1113504

Description : Olive-brown, Lean CLAY with SAND (CL)

Percent Saturation (%)	83.61	File No. : 1113504 1		
Prepared By : JF	Date : 11/29/11	Normal Stress		
Tested By : JF	Date : 11/29/11			
Computed By : JF	Date : 01/31/12	0.50	(ksf)	
Checked By :	Date :			
Percent Consolidation (%)	0.00	Before		After
Height of Sample (inch)		1.00		1.0000
Diameter of Sample (inch)		2.42		2.42
Dial Reading-Consolidation (inch)				0.0000
Weight of Soil + Ring (gm)		199.16		
Weight of Ring (gm)		45.61		
Weight of Wet Soil + Cont. (gm)				155.48
Weight of Dry Soil + Cont. (gm)				133.12
Weight of Cont. (gm) No.	4			2.31
Moisture Content (%)				17.09
Wet Density (pcf / kN/m³)		127.17	20.02	
Dry Density (pcf / kN/m³)		108.61	17.10	
Percent Saturation (%)	91.85	File No. : 1113504 2		
Prepared By : JF	Date : 11/29/11	Normal Stress		
Tested By : JF	Date : 11/29/11	1.00	(ksf)	
Percent Consolidation (%)	0.00	Before		After
Height of Sample (inch)		1.00		1.0000
Diameter of Sample (inch)		2.42		2.42
Dial Reading-Consolidation (inch)		0.0000		0.0000
Weight of Soil + Ring (gm)		201.10		
Weight of Ring (gm)		44.71		
Weight of Wet Soil + Cont. (gm)				158.47
Weight of Dry Soil + Cont. (gm)				134.21
Weight of Cont. (gm) No.	5			2.34
Moisture Content (%)				18.40
Wet Density (pcf / kN/m³)		129.53	20.39	
Dry Density (pcf / kN/m³)		109.40	17.22	
Percent Saturation (%)	82.99	File No. : 1113504 3		
Prepared By : JF	Date : 11/29/11	Normal Stress		
Tested By : JF	Date : 11/29/11	2.00	(ksf)	
Percent Consolidation (%)	0.00	Before		After
Height of Sample (inch)		1.00		1.0000
Diameter of Sample (inch)		2.42		2.42
Dial Reading-Consolidation (inch)		0.0000		0.0000
Weight of Soil + Ring (gm)		196.30		
Weight of Ring (gm)		43.55		
Weight of Wet Soil + Cont. (gm)				154.54
Weight of Dry Soil + Cont. (gm)				132.09
Weight of Cont. (gm) No.	6			2.34
Moisture Content (%)				17.30
Wet Density (pcf / kN/m³)		126.51	19.91	
Dry Density (pcf / kN/m³)		107.85	16.98	

Strength	(ksf)	(kPa)	(ksf)	(kPa)	(ksf)	(kPa)
Peak	2.15	102.85	2.60	124.68	3.04	145.36
Ultimate	0.58	27.58	0.83	39.64	1.54	73.54

Shear Deflection		Normal Stress (psf/ksf/kPa)								
		500	0.50	23.9	1000	1.0	47.9	2000	2.0	95.8
(inch)	(mm)	Shear Stress (psf/ksf/kPa)								
0.00	0.00	0.0	0.0	0.0	0.00	0.0	0.00	0.00	0.0	0.0
0.010	0.03	660	0.66	31.6	996	1.00	47.7	1068	1.07	50.9
0.020	0.05	1116	1.12	53.4	1500	1.50	71.8	1764	1.76	84.1
0.030	0.08	1572	1.57	75.3	1860	1.86	89.1	2232	2.23	106.5
0.040	0.10	1860	1.86	89.1	2100	2.10	100.5	2568	2.57	122.5
0.050	0.13	2028	2.03	97.1	2292	2.29	109.7	2772	2.77	132.2
0.060	0.15	2112	2.11	101.1	2412	2.41	115.5	2928	2.93	139.7
0.070	0.18	2148	2.15	102.8	2508	2.51	120.1	3012	3.01	143.7
0.080	0.20	2100	2.10	100.5	2568	2.57	123.0	3036	3.04	144.8
0.090	0.23	2004	2.00	96.0	2604	2.60	124.7	2820	2.82	134.5
0.100	0.25	1776	1.78	85.0	2592	2.59	124.1	2616	2.62	124.8
0.110	0.28	1548	1.55	74.1	2424	2.42	116.1	2484	2.48	118.5
0.120	0.30	1380	1.38	66.1	2028	2.03	97.1	2316	2.32	110.5
0.130	0.33	1236	1.24	59.2	1680	1.68	80.4	2220	2.22	105.9
0.140	0.36	1032	1.03	49.4	1464	1.46	70.1	2124	2.12	101.3
0.150	0.38	840	0.84	40.2	1332	1.33	63.8	2028	2.03	96.7
0.160	0.41	780	0.78	37.3	1236	1.24	59.2	1968	1.97	93.9
0.170	0.43	756	0.76	36.2	1164	1.16	55.7	1908	1.91	91.0
0.180	0.46	744	0.74	35.6	1104	1.10	52.9	1860	1.86	88.7
0.190	0.48	732	0.73	35.0	1068	1.07	51.1	1824	1.82	87.0
0.200	0.51	708	0.71	33.9	1032	1.03	49.4	1788	1.79	85.3
0.210	0.53	684	0.68	32.7	996	1.00	47.7	1764	1.76	84.1
0.220	0.56	660	0.66	31.6	972	0.97	46.5	1740	1.74	83.0
0.230	0.58	648	0.65	31.0	960	0.96	46.0	1716	1.72	81.9
0.240	0.61	636	0.64	30.5	948	0.95	45.4	1692	1.69	80.7
0.250	0.64	636	0.64	30.5	936	0.94	44.8	1680	1.68	80.1
0.260	0.66	636	0.64	30.5	924	0.92	44.2	1668	1.67	79.6
0.270	0.69	624	0.62	29.9	912	0.91	43.7	1656	1.66	79.0
0.280	0.71	624	0.62	29.9	900	0.90	43.1	1644	1.64	78.4
0.290	0.74	624	0.62	29.9	888	0.89	42.5	1632	1.63	77.8
0.300	0.76	636	0.64	30.5	876	0.88	41.9	1632	1.63	77.8
0.310	0.79	660	0.66	31.6	876	0.88	41.9	1608	1.61	76.7
0.320	0.81	672	0.67	32.2	864	0.86	41.4	1596	1.60	76.1
0.330	0.84	684	0.68	32.7	852	0.85	40.8	1572	1.57	75.0
0.340	0.86	684	0.68	32.7	852	0.85	40.8	1572	1.57	75.0
0.350	0.89	684	0.68	32.7	840	0.84	40.2	1560	1.56	74.4
0.360	0.91	672	0.67	32.2	828	0.83	39.6	1548	1.55	73.8
0.370	0.94	660	0.66	31.6	828	0.83	39.6	1548	1.55	73.8
0.380	0.97	648	0.65	31.0	828	0.83	39.6	1548	1.55	73.8
0.390	0.99	588	0.59	28.2	828	0.83	39.6	1536	1.54	73.3
0.400	1.02	576	0.58	27.6	828	0.83	39.6	1536	1.54	73.3



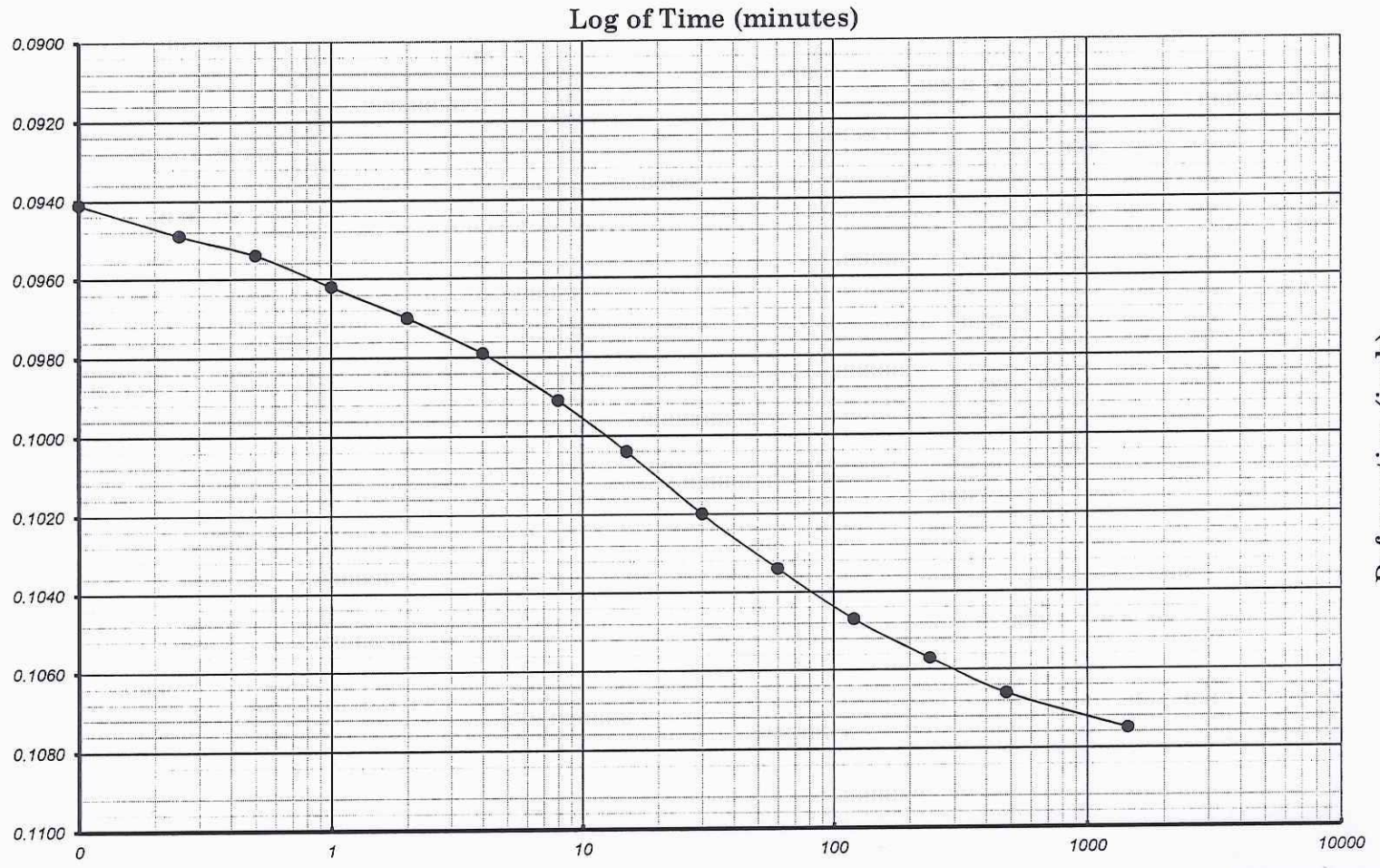
Boring No. : A-11-114			Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No. : D-5			Plastic Limit :	-						
Depth	(ft) : 25.0	26.5	Plastic Index :	-	Initial	25.96	92.56	14.57	85.36	0.82
	(m) : 7.63	8.08	Specific Gravity :	2.70	Final	23.00	102.63	16.15	96.69	0.64
Description : Olive-brown, Lean CLAY with SAND (CL)										

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

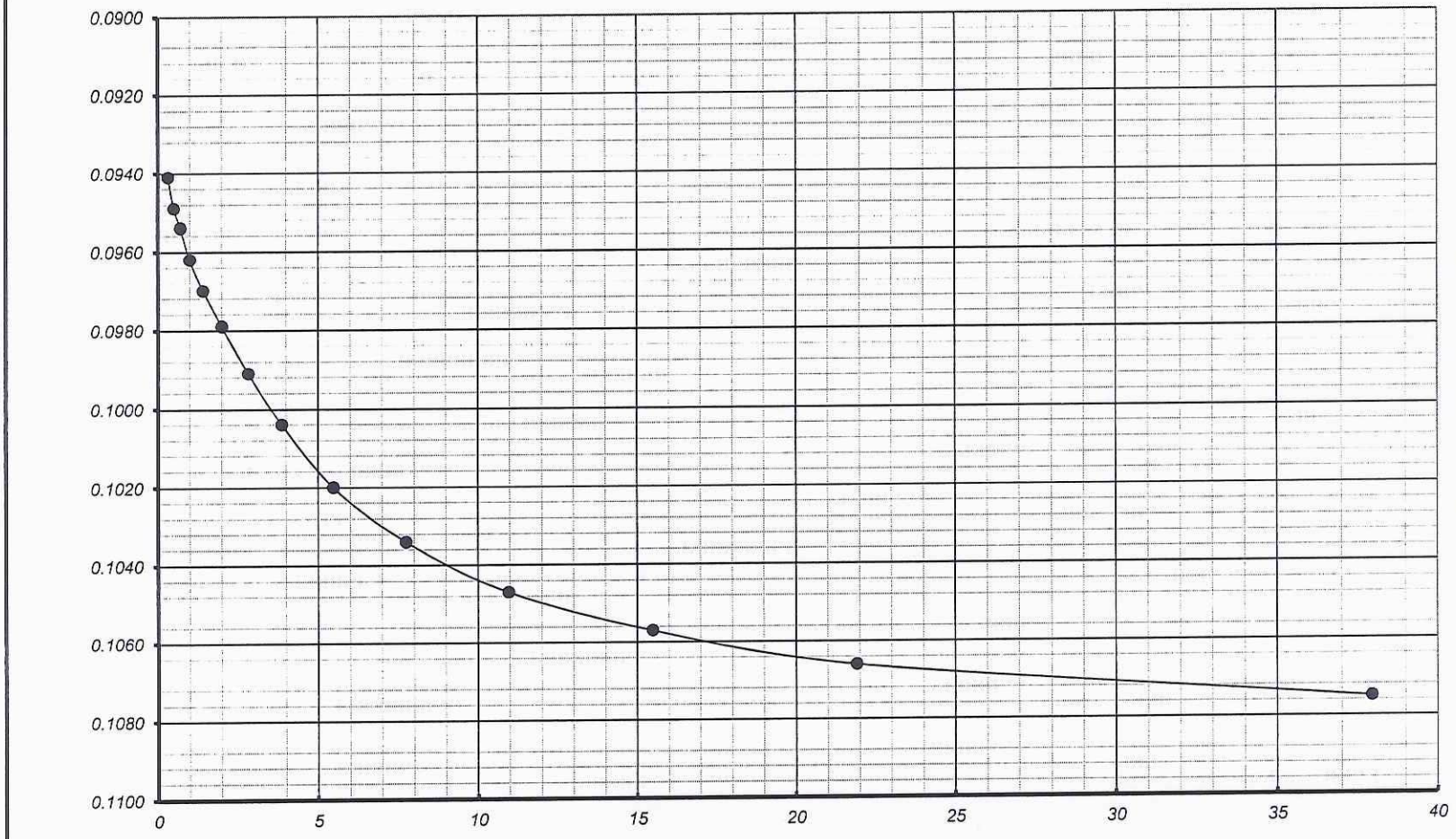
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-114*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-5*	
EMI Project No. : *11-135*		Depth (ft/m) : *25.0* *7.6*	Veritcal Load (ksf/kpa) : *4.00* *191.5*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-114*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-5*	
EMI Project No. : *11-135*		Depth (ft/m) : *25.0* *7.6*	Veritcal Load (ksf/kpa) : *4.0* *191.5*

ONE-DIMENSIONAL CONSOLIDATION OF SOIL

ASTM D-2435 / CT-219

Device No. : 2

Project Name : Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135
Boring No. : A-11-114
Sample No. : D-5
Depth (ft / m) : 25.0 | 7.63
File No. :
Soil Description : Olive-brown, Lean CLAY with SAND (CL)

Set up By : JF Date : 11/28/2011
Tested By : J.F/R.J. Date : 11/28~12/8/11
Time Rate Took By : J.F Date : 12/2/2011
Computer By : JF Date : 1/30/2012
Checked By : R.J. Date :

Method (A) : [✓] Constant load increment duration of 24 hours or multiples there for. Minium of two Time -deformation reading are required.
Method (B) : [ ] Time-deformation reading are required on all load increments. Successive load increments are applied after 100 % primary consolidation is reached, or at constant time increments are described in Test Method (A)

Sample	(inch)	(mm)
Internal Diameter	2.42	61.47
Height (Intial)	1.00	25.40
Height (Final)	0.9019	22.91

Vertical Load	(ksf)	(kPa)
Add Water at	2.00	95.76
Load to	16.00	766.08
Rebound to	0.50	23.94

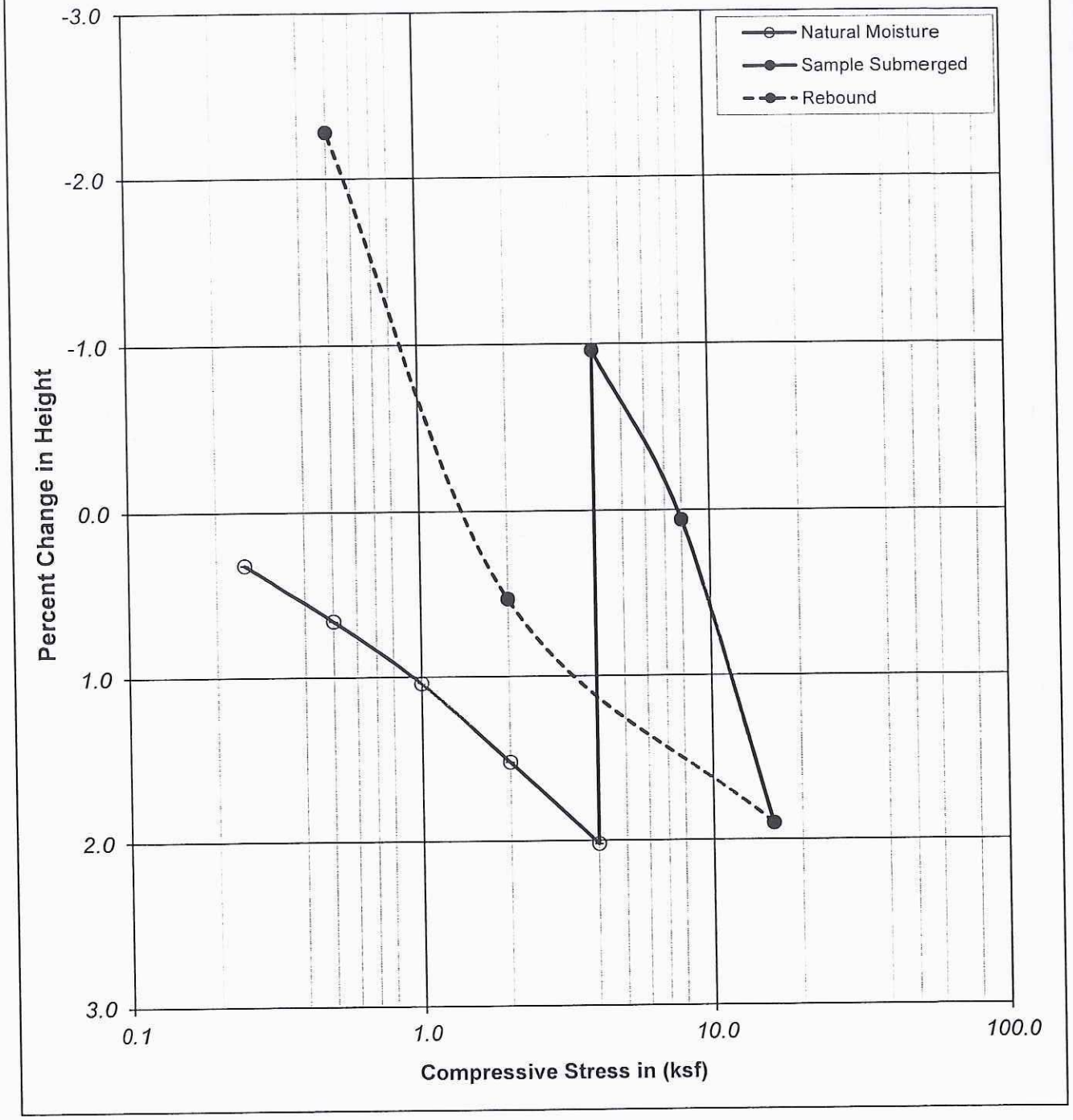
Vertical Load	(ksf)	(kPa)
Reload to		
Rebound to		
Time rate taking at	4.00	190.81

	Before	After
Weight of wet soil + ring (gm)	183.84	
Weight of ring (gm)	43.07	
Weight of wet soil + ring + container (gm)		240.28
Weight of dry soil + ring + container (gm)		214.57
No. 79 Weight of container (gm)		59.74
Weight of ring + container (gm)		102.81
Moisture Content (%)	25.96	23.00
Dial Reading (inch)	0.05	0.04
Sample Volume (ft^3)	0.0027	0.0024
Wet Density (pcf)	116.6	126.2
Dry Density (pcf)	92.56	102.63

Date	Time	Elapsed Time (min.)	Load (ksf)	Load (kPa)	Dial Reading (in)	Dial Reading (mm)	Consol. (%)	SQRT Time
11/28/11	14:15	0:00:00	Seating Load		0.04930	1.25		
	14:25		0.1	4.8	0.05000	1.27	0.00	
11/29/11	8:55	0:00:00	0.25	12.0	0.05310	1.35	0.31	
11/30/11	8:58	0:00:00	0.50	23.9	0.05810	1.48	0.81	
12/01/11	8:57	0:00:00	1.00	47.9	0.06740	1.71	1.74	
12/02/11	8:10	0.00	2.0	95.8	0.08600	2.18	3.60	
			Add Water					
12/03/11	8:30	0.00	2.0	95.8	0.08720	2.21	3.72	
12/03/11	8:30	0.00	4.0	191.5	0.08720	2.21	3.72	0.00
		0.10	4.0	191.5	0.09410	2.39	4.41	0.32
		0.25	4.0	191.5	0.09490	2.41	4.49	0.50
		0.50	4.0	191.5	0.09540	2.42	4.54	0.71
		1	4.0	191.5	0.09620	2.44	4.62	1.00
		2	4.0	191.5	0.09700	2.46	4.70	1.41
		4	4.0	191.5	0.09790	2.49	4.79	2.00
		8	4.0	191.5	0.09910	2.52	4.91	2.83
		15	4.0	191.5	0.10040	2.55	5.04	3.87
		30	4.0	191.5	0.10200	2.59	5.20	5.48
		60	4.0	191.5	0.10340	2.63	5.34	7.75
		120	4.0	191.5	0.10470	2.66	5.47	10.95
		240	4.0	191.5	0.10570	2.68	5.57	15.49
		480	4.0	191.5	0.1066	2.71	5.66	21.91
12/04/11	8:30	1440	4.0	191.5	0.1075	2.73	5.75	37.95
12/05/11	8:50	0:00:00	8.00	383.0	0.1420	3.61	9.20	
12/06/11	8:27	0:00:00	16.00	766.1	0.1749	4.44	12.49	
12/07/11	8:42	0:00:00	2.00	95.8	0.1620	4.11	11.20	
12/08/11	8:59	0:00:00	0.50	23.9	0.1474	3.74	9.74	

Date	Time	Elapsed Time (min.)	Load (ksf)	Load (kPa)	Dial Reading (in)	Dial Reading (mm)	Consol. (%)

Remark : Final Dial Reading 0.1474



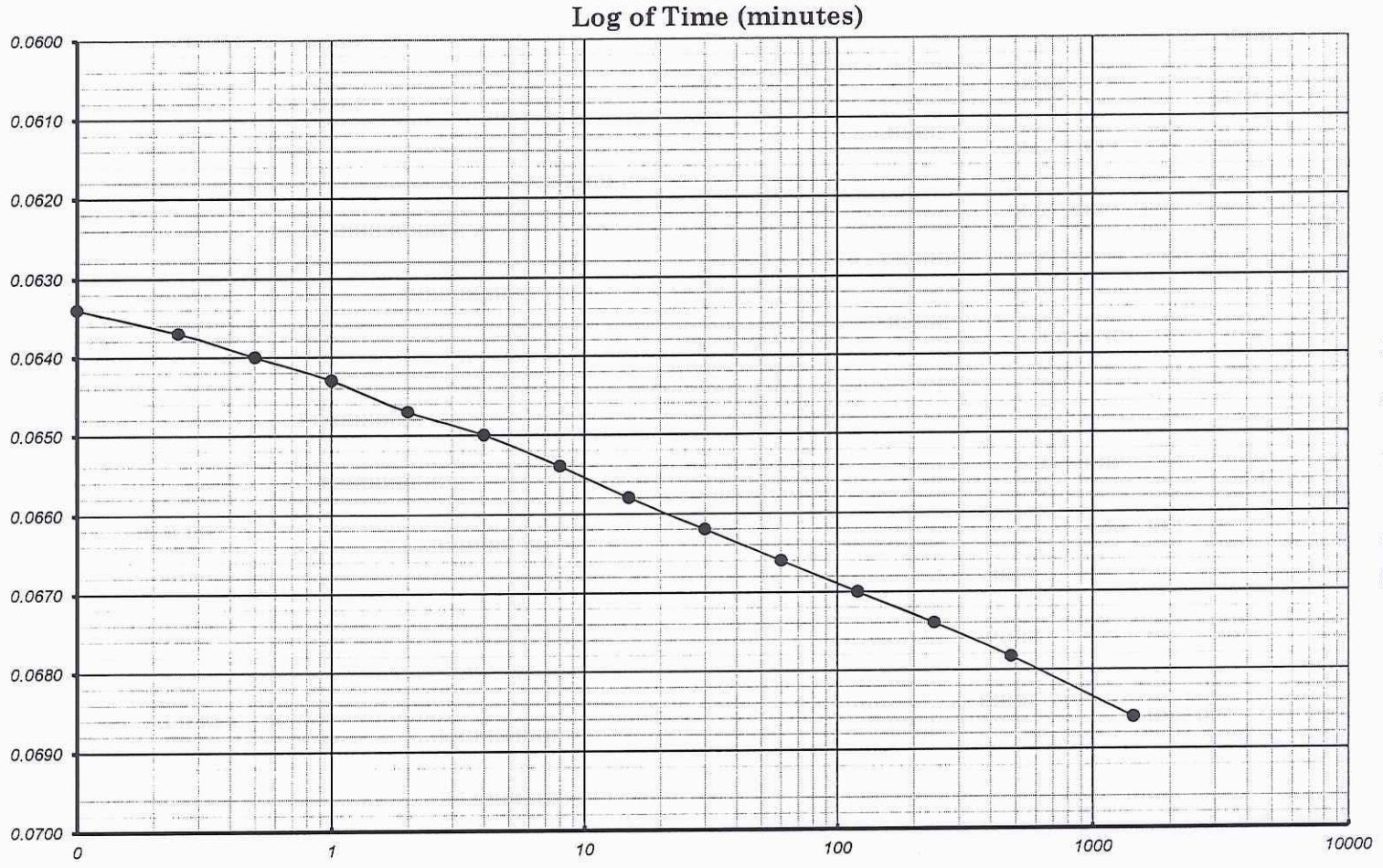
Boring No.	: A-11-115			Liquid Limit :	-		Moisture Content (%)	Dry Density		Percent Saturation	Void Ratio
Sample No.	: D-4			Plastic Limit :	-			(pcf)	(kN/m³)		
Depth	(ft) :	20.0	21.5	Plastic Index :	-	Initial	17.01	110.16	17.34	86.62	0.53
	(m) :	6.10	6.56	Specific Gravity :	2.70	Final	20.31	107.72	16.95	97.10	0.56
Description	: Dark brown, Fat CLAY with SAND (CH)										

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

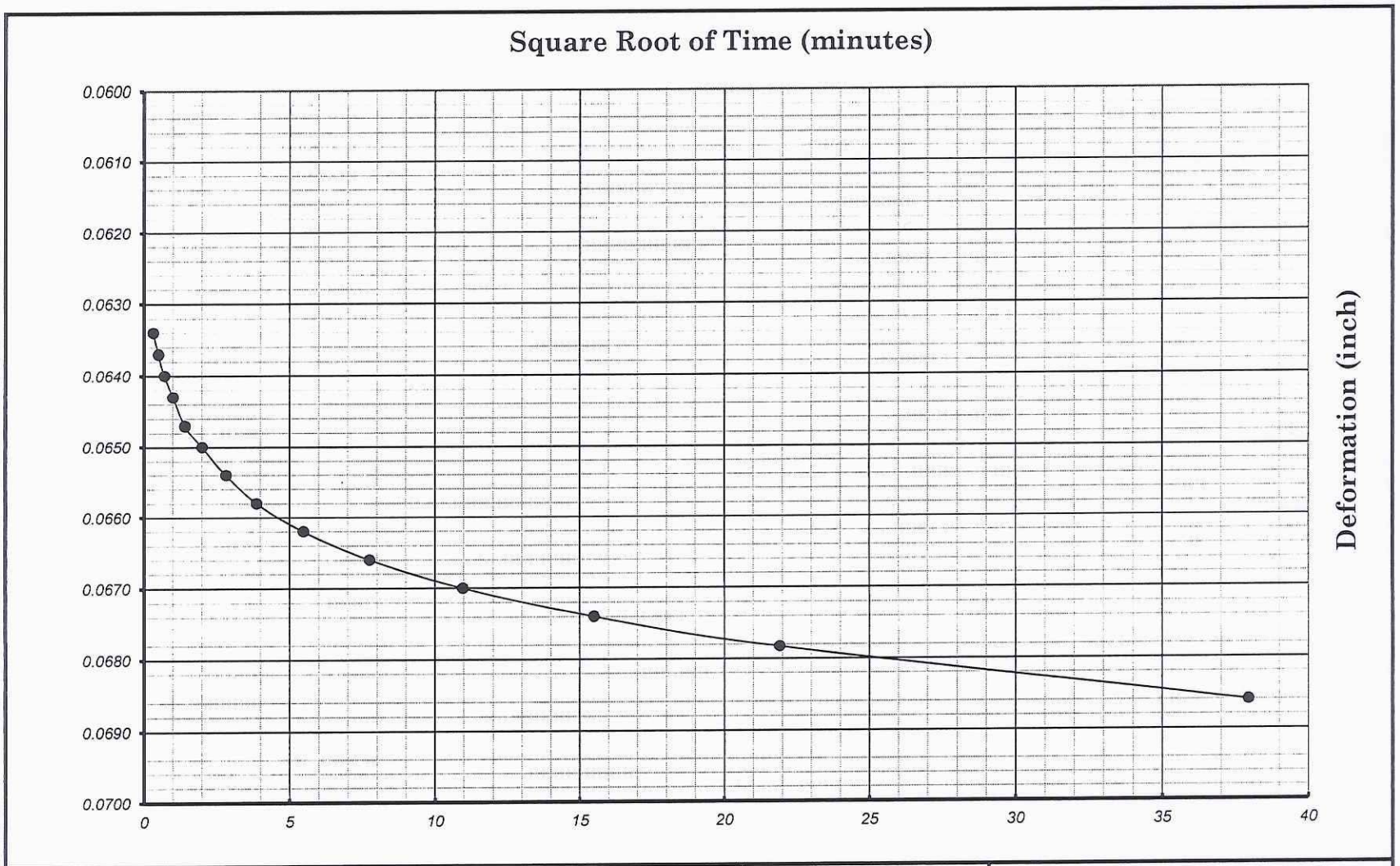
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-115*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-4*	
EMI Project No. : *11-135*		Depth (ft/m) : *20.0* *6.1*	Veritcal Load (ksf/kpa) : *8.00* *383.0*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-115*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-4*	
EMI Project No. : *11-135*		Depth (ft/m) : *20.0* *6.1*	Veritcal Load (ksf/kpa) : *8.0* *383.0*

ONE-DIMENSIONAL CONSOLIDATION OF SOIL

ASTM D-2435 / CT-219

Device No. : 7

Project Name	: Parsons/I-5 HOV Widening Segment 1				
Project No.	: 11-135	Set up By :	JF	Date :	12/5/2011
Boring No.	: A-11-115	Tested By :	J.F/R.J.	Date :	12/5~12/15/11
Sample No.	: D-4	Time Rate Took By :	J.F	Date :	12/13/2011
Depth (ft / m)	: 20.0 | 6.10	Computer By :	JF	Date :	1/30/2012
File No.	:	Checked By :	R.J.	Date :	
Soil Description	: Dark brown, Fat CLAY with SAND (CH)				

Method (A) : ☑ Constant load increment duration of 24 hours or multiples there for. Minium of two Time -deformation reading are required.

Method (B) : ☐ Time-deformation reading are required on all load increments. Successive load increments are applied after 100 % primary consolidation is reached, or at constant time increments are described in Test Method (A)

Sample	(inch)	(mm)	Vertical Load	(ksf)	(kPa)
Internal Diameter	2.42	61.47	Add Water at	4.00	191.52
Height (Intial)	1.00	25.40	Load to	16.00	766.08
Height (Final)	1.0227	25.98	Rebound to	0.50	23.94

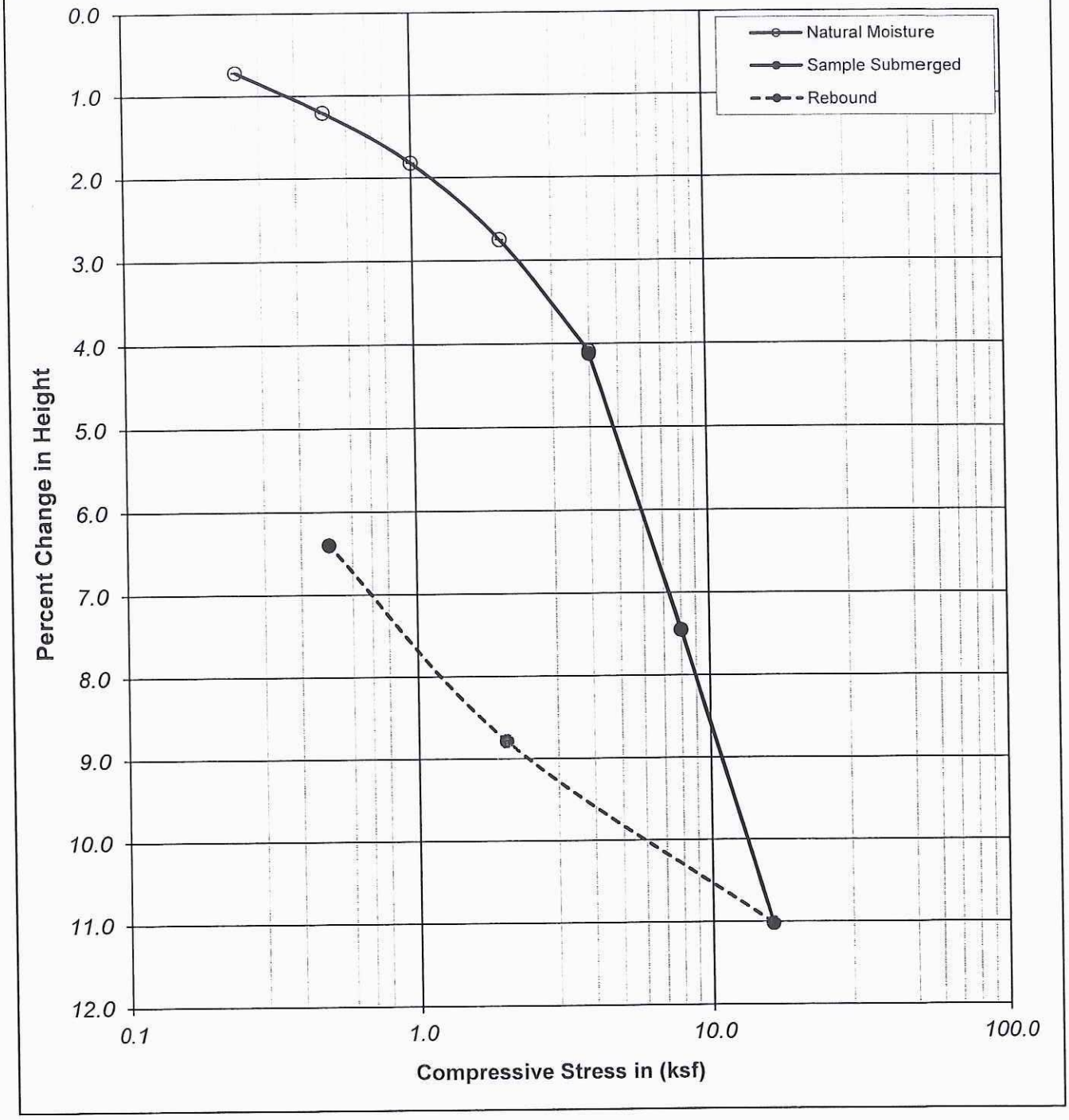
Vertical Load	(ksf)	(kPa)
Reload to		
Rebound to		
Time rate taking at	8.00	381.62

	Before	After
Weight of wet soil + ring (gm)	200.33	
Weight of ring (gm)	44.70	
Weight of wet soil + ring + container (gm)		261.98
Weight of dry soil + ring + container (gm)		234.96
No. 1 Weight of container (gm)		57.25
Weight of ring + container (gm)		101.95
Moisture Content (%)	17.01	20.31
Dial Reading (inch)	0.07	0.04
Sample Volume (ft³)	0.0027	0.0027
Wet Density (pcf)	128.9	129.6
Dry Density (pcf)	110.16	107.72

Date	Time	Elapsed Time (min.)	Load (ksf)	Load (kPa)	Dial Reading (in)	Dial Reading (mm)	Consol. (%)	SQRT Time
12/05/11	14:15	0:00:00	Seating Load		0.06990	1.78		
	14:25		0.1	4.8	0.07000	1.78	0.00	
12/06/11	8:55	0:00:00	0.25	12.0	0.07320	1.86	0.32	
12/07/11	8:58	0:00:00	0.50	23.9	0.07660	1.95	0.66	
12/08/11	8:57	0:00:00	1.00	47.9	0.08040	2.04	1.04	
12/09/11	8:10	0.00	2.0	95.8	0.08520	2.16	1.52	
12/10/11	8:30	0.00	4.0	191.5	0.09020	2.29	2.02	
			Add Water					
12/11/11	8:30	0.00	4.0	191.5	0.06040	1.53	-0.96	
12/11/11	8:30	0.00	8.0	383.0	0.06040	1.53	-0.96	0.00
		0.10	8.0	383.0	0.06340	1.61	-0.66	0.32
		0.25	8.0	383.0	0.06370	1.62	-0.63	0.50
		0.50	8.0	383.0	0.06400	1.63	-0.60	0.71
		1	8.0	383.0	0.06430	1.63	-0.57	1.00
		2	8.0	383.0	0.06470	1.64	-0.53	1.41
		4	8.0	383.0	0.06500	1.65	-0.50	2.00
		8	8.0	383.0	0.06540	1.66	-0.46	2.83
		15	8.0	383.0	0.06580	1.67	-0.42	3.87
		30	8.0	383.0	0.06620	1.68	-0.38	5.48
		60	8.0	383.0	0.06660	1.69	-0.34	7.75
		120	8.0	383.0	0.06700	1.70	-0.30	10.95
		240	8.0	383.0	0.06740	1.71	-0.26	15.49
		480	8.0	383.0	0.0678	1.72	-0.22	21.91
12/12/11	8:30	1440	8.0	383.0	0.0686	1.74	-0.14	37.95
12/13/11	8:27	0:00:00	16.00	766.1	0.0890	2.26	1.90	
12/14/11	8:42	0:00:00	2.00	95.8	0.0753	1.91	0.53	
12/15/11	8:59	0:00:00	0.50	23.9	0.0472	1.20	-2.28	

Date	Time	Elapsed Time (min.)	Load (ksf)	Load (kPa)	Dial Reading (in)	Dial Reading (mm)	Consol. (%)

Remark : Final Dial Reading 0.0472



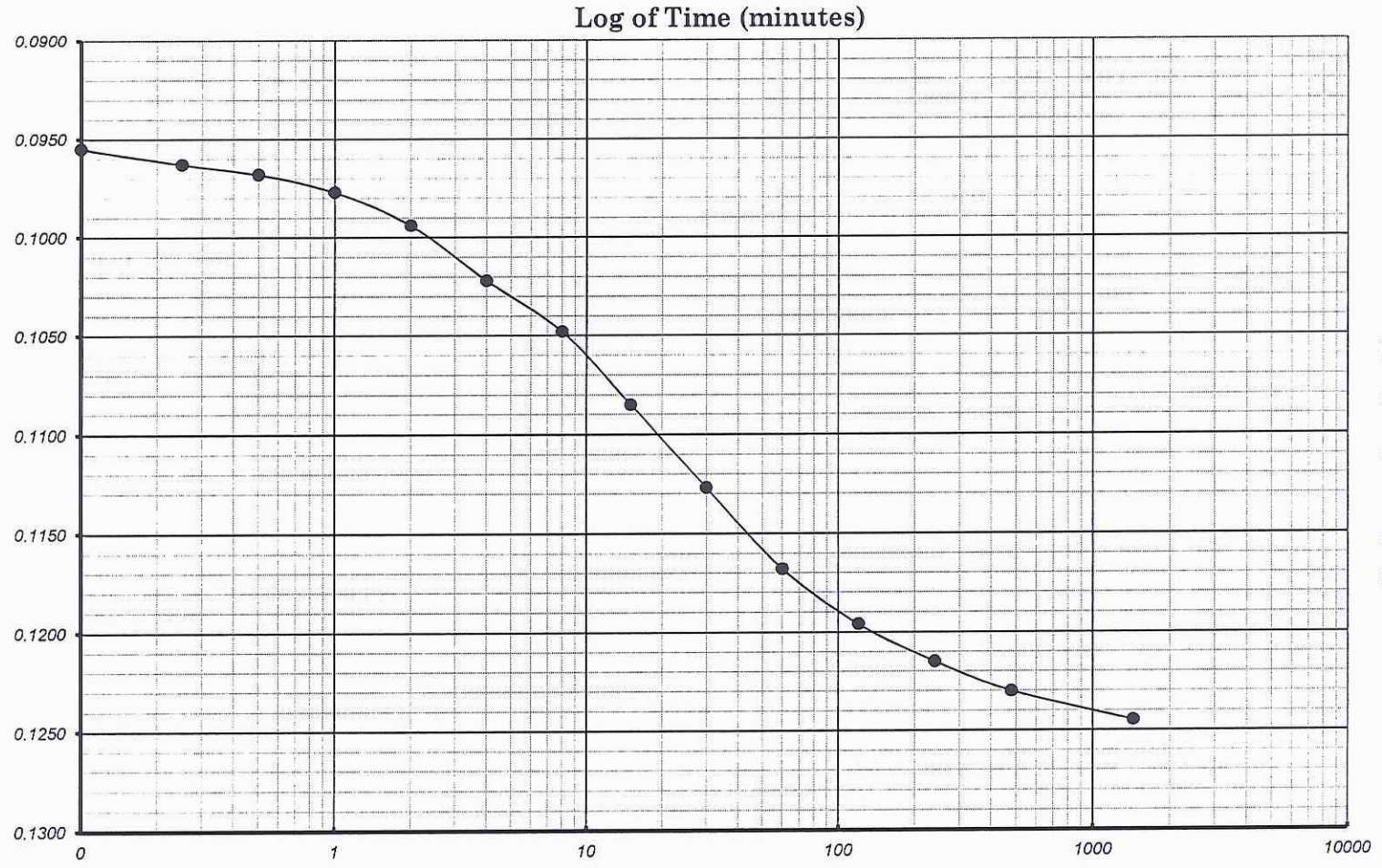
Boring No.	: A-11-115		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-12		Plastic Limit :	-						
Depth (ft)	: 60.0	61.5	Plastic Index :	-	Initial	28.91	94.07	14.81	98.59	0.79
Depth (m)	: 18.30	18.76	Specific Gravity :	2.70	Final	25.66	100.58	15.83	102.52	0.68
Description	: Olive-brown, Lean CLAY with SAND (CL)									

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

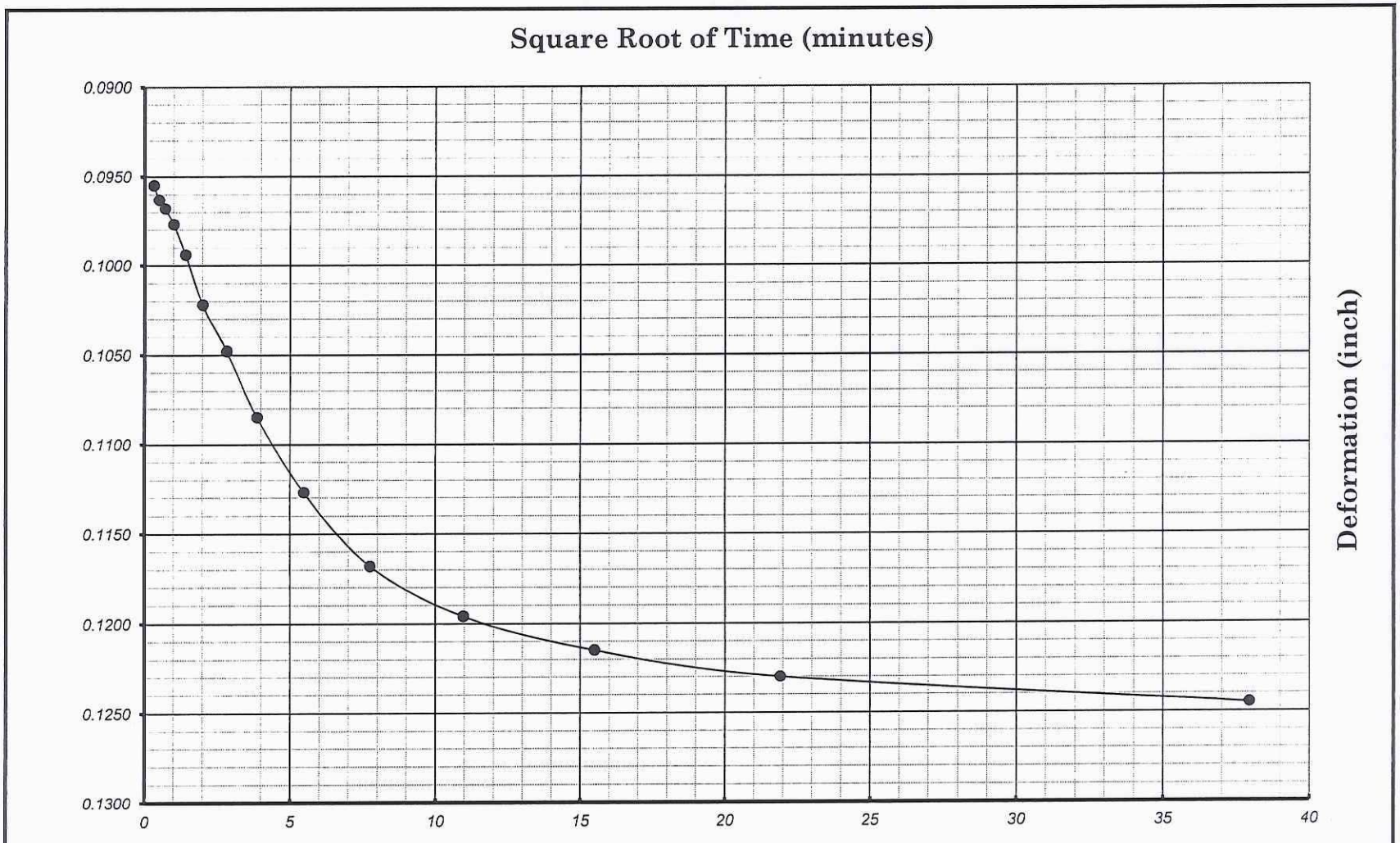
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 Date: 01/30/12

CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-115*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-12*	
EMI Project No. : *11-135*		Depth (ft/m) : *60.0* *18.3*	Veritcal Load (ksf/kpa) : *8.00* *383.0*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-115*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-12*	
EMI Project No. : *11-135*		Depth (ft/m) : *60.0* *18.3*	Veritcal Load (ksf/kpa) : *8.0* *383.0*

ONE-DIMENSIONAL CONSOLIDATION OF SOIL

ASTM D-2435 / CT-219

Device No. : 7

Project Name : Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135
Boring No. : A-11-115
Sample No. : D-12
Depth (ft / m) : 60.0 | 18.30
File No. :
Soil Description : Olive-brown, Lean CLAY with SAND (CL)

Set up By : JF Date : 11/30/2011
Tested By : J.F/R.J. Date : 11/30~12/10/11
Time Rate Took By : J.F Date : 12/6/2011
Computer By : JF Date : 1/30/2012
Checked By : R.J. Date :

Method (A) : [✓] Constant load increment duration of 24 hours or multiples there for. Minium of two Time -deformation reading are required.
Method (B) : [ ] Time-deformation reading are required on all load increments. Successive load increments are applied after 100 % primary consolidation is reached, or at constant time increments are described in Test Method (A)

Sample	(inch)	(mm)
Internal Diameter	2.42	61.47
Height (Intial)	1.00	25.40
Height (Final)	0.9353	23.76

	(ksf)	(kPa)
Vertical Load		
Add Water at	4.00	191.52
Load to	16.00	766.08
Rebound to	0.50	23.94

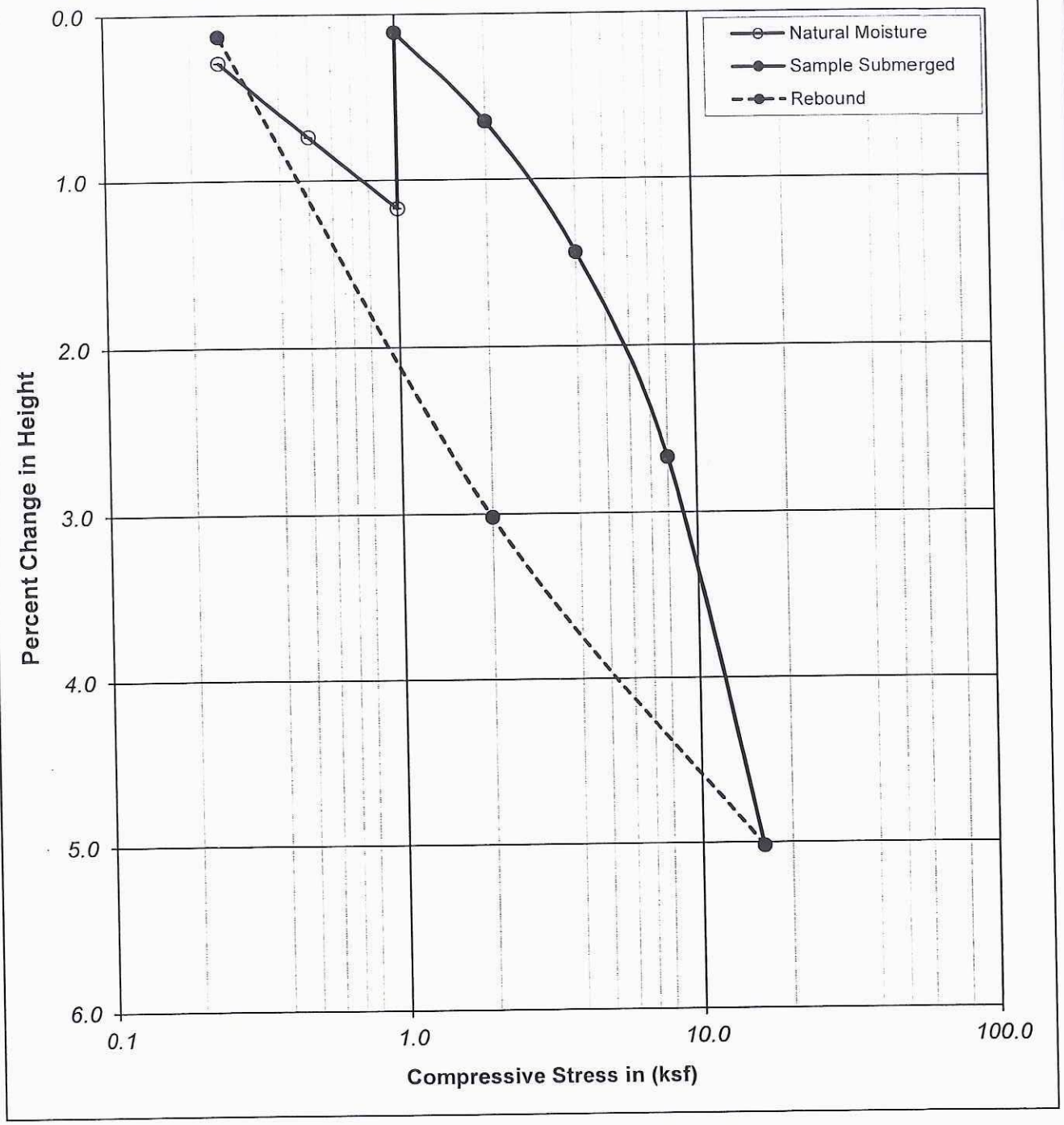
	(ksf)	(kPa)
Vertical Load		
Reload to		
Rebound to		
Time rate taking at	8.00	381.62

	Before	After
Weight of wet soil + ring (gm)	190.65	
Weight of ring (gm)	44.23	
Weight of wet soil + ring + container (gm)		245.75
Weight of dry soil + ring + container (gm)		216.60
No. 83 Weight of container (gm)		58.79
Weight of ring + container (gm)		103.02
Moisture Content (%)	28.91	25.66
Dial Reading (inch)	0.05	0.04
Sample Volume (ft³)	0.0027	0.0025
Wet Density (pcf)	121.3	126.4
Dry Density (pcf)	94.07	100.58

Date	Time	Elapsed Time (min.)	Load (ksf)	Load (kPa)	Dial Reading (in)	Dial Reading (mm)	Consol. (%)	SQRT Time
11/30/11	14:15	0:00:00	Seating Load		0.04930	1.25		
	14:25		0.1	4.8	0.05000	1.27	0.00	
12/01/11	8:55	0:00:00	0.25	12.0	0.05720	1.45	0.72	
12/02/11	8:58	0:00:00	0.50	23.9	0.06210	1.58	1.21	
12/03/11	8:57	0:00:00	1.00	47.9	0.06820	1.73	1.82	
12/04/11	8:10	0.00	2.0	95.8	0.07750	1.97	2.75	
12/05/11	8:30	0.00	4.0	191.5	0.09090	2.31	4.09	
			Add Water					
12/06/11	8:30	0.00	4.0	191.5	0.09120	2.32	4.12	
12/06/11	8:30	0.00	8.0	383.0	0.09120	2.32	4.12	0.00
		0.10	8.0	383.0	0.09550	2.43	4.55	0.32
		0.25	8.0	383.0	0.09630	2.45	4.63	0.50
		0.50	8.0	383.0	0.09680	2.46	4.68	0.71
		1	8.0	383.0	0.09770	2.48	4.77	1.00
		2	8.0	383.0	0.09940	2.52	4.94	1.41
		4	8.0	383.0	0.10220	2.60	5.22	2.00
		8	8.0	383.0	0.10480	2.66	5.48	2.83
		15	8.0	383.0	0.10850	2.76	5.85	3.87
		30	8.0	383.0	0.11270	2.86	6.27	5.48
		60	8.0	383.0	0.11680	2.97	6.68	7.75
		120	8.0	383.0	0.11960	3.04	6.96	10.95
		240	8.0	383.0	0.12150	3.09	7.15	15.49
		480	8.0	383.0	0.1230	3.12	7.30	21.91
12/07/11	8:30	1440	8.0	383.0	0.1245	3.16	7.45	37.95
12/08/11	8:27	0:00:00	16.00	766.1	0.1602	4.07	11.02	
12/09/11	8:42	0:00:00	2.00	95.8	0.1379	3.50	8.79	
12/10/11	8:59	0:00:00	0.50	23.9	0.1140	2.90	6.40	

Date	Time	Elapsed Time (min.)	Load (ksf)	Load (kPa)	Dial Reading (in)	Dial Reading (mm)	Consol. (%)

Remark : Final Dial Reading 0.1140



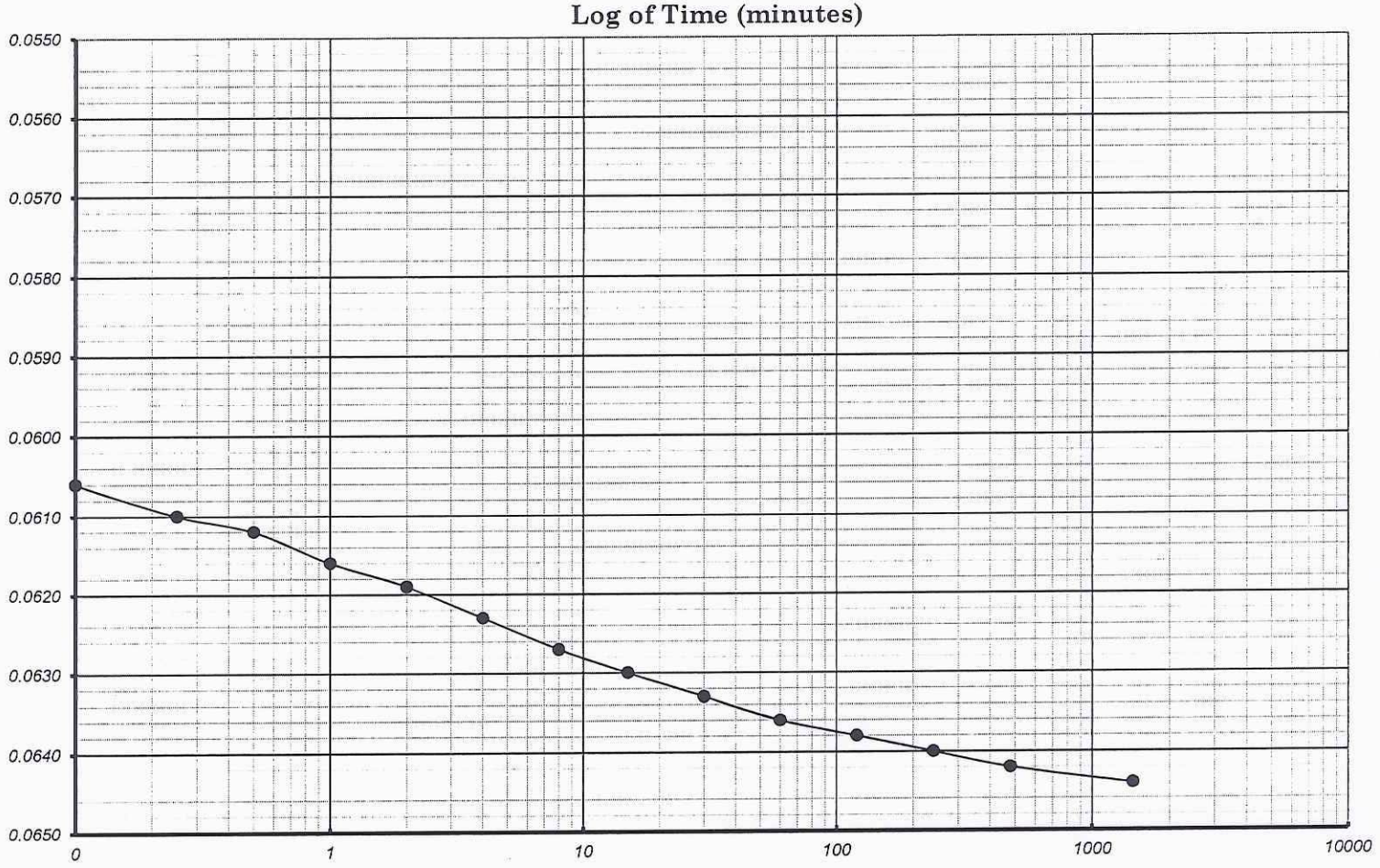
Boring No.	: A-11-116		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m^3)	Percent Saturation	Void Ratio
Sample No.	: D-4		Plastic Limit :	-						
Depth (ft)	: 20.0	21.5	Plastic Index :	-	Initial	25.87	96.45	15.18	93.40	0.75
Depth (m)	: 6.10	6.56	Specific Gravity :	2.70	Final	28.20	96.61	15.21	102.24	0.74
Description	: Olive-brown, Fat CLAY with SAND (CH)									

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

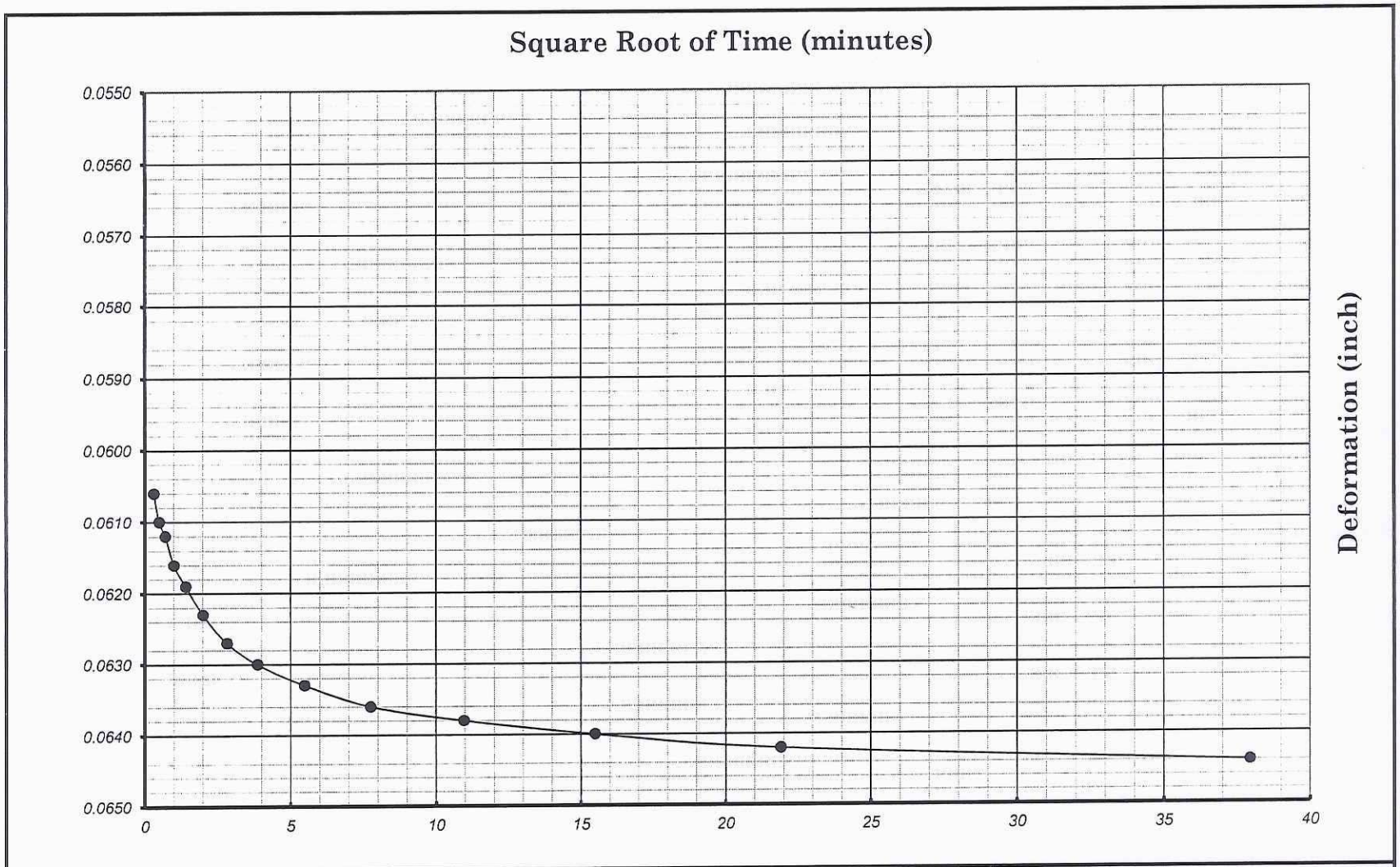
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-116*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-4*	
EMI Project No. : *11-135*		Depth (ft/m) : *20.0* *6.1*	Veritcal Load (ksf/kpa) : *4.00* *191.5*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-116*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-4*	
EMI Project No. : *11-135*		Depth (ft/m) : *20.0* *6.1*	Veritcal Load (ksf/kpa) : *4.0* *191.5*

ONE-DIMENSIONAL CONSOLIDATION OF SOIL

ASTM D-2435 / CT-219

Device No. : 2

Project Name	: Parsons/I-5 HOV Widening Segment 1				
Project No.	: 11-135	Set up By :	JF	Date :	11/29/2011
Boring No.	: A-11-116	Tested By :	J.F/R.J.	Date :	11/29~12/9/11
Sample No.	: D-4	Time Rate Took By :	J.F	Date :	12/4/2011
Depth (ft / m)	: 20.0 | 6.10	Computer By :	JF	Date :	1/30/2012
File No.	:	Checked By :	R.J.	Date :	
Soil Description	: Olive-brown, Fat CLAY with SAND (CH)				

Method (A) : ☑ Constant load increment duration of 24 hours or multiples there for. Minium of two Time -deformation reading are required.

Method (B) : ☐ Time-deformation reading are required on all load increments. Successive load increments are applied after 100 % primary consolidation is reached, or at constant time increments are described in Test Method (A)

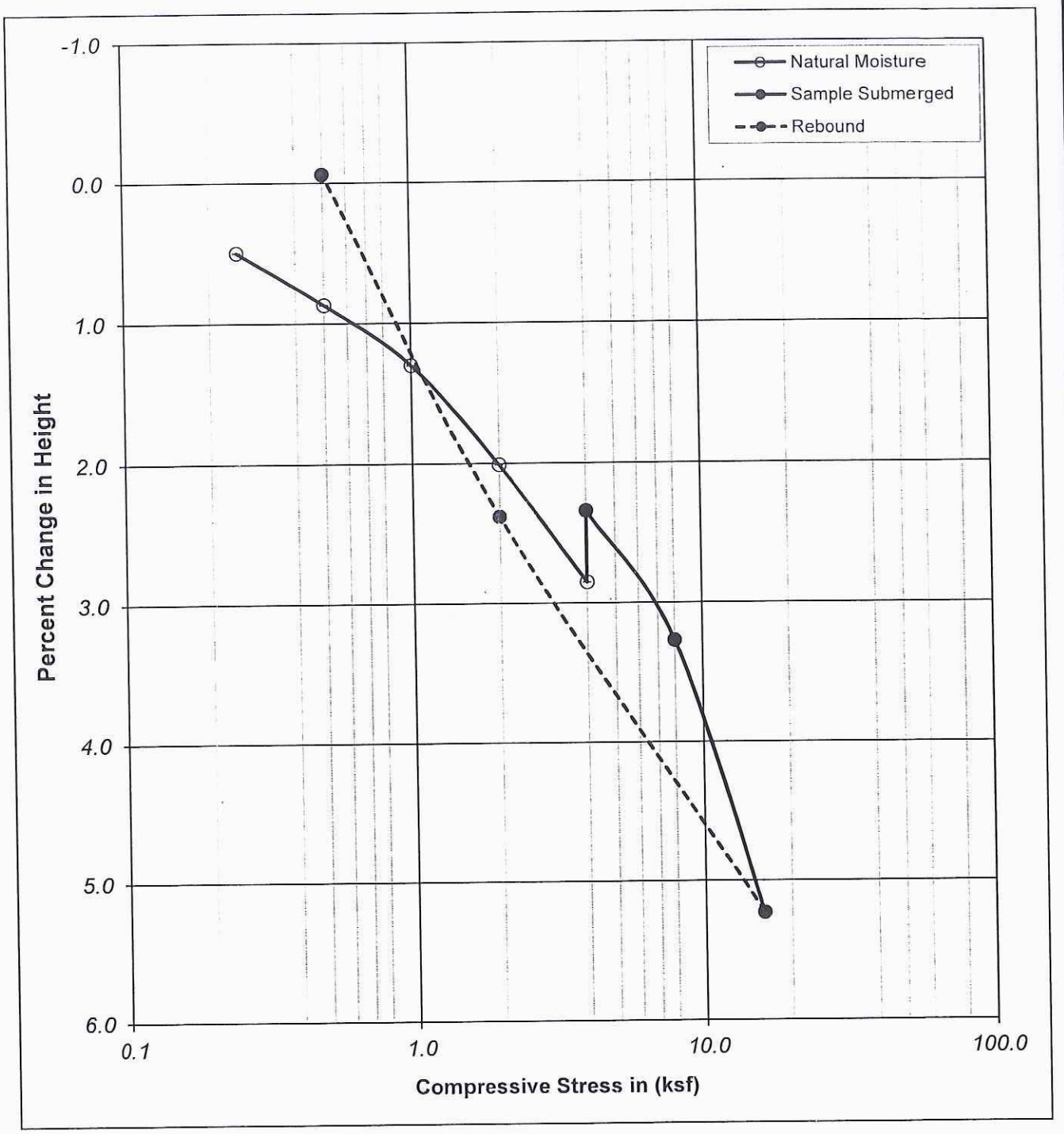
Sample	(inch)	(mm)	Vertical Load	(ksf)	(kPa)	Vertical Load	(ksf)	(kPa)
Internal Diameter	2.42	61.47	Add Water at	1.00	47.88	Reload to		
Height (Intial)	1.00	25.40	Load to	16.00	766.08	Rebound to		
Height (Final)	0.9983	25.36	Rebound to	0.25	11.97	Time rate taking at	4.00	190.81

Date	Time	Elapsed Time (min.)	Load (ksf)	Load (kPa)	Dial Reading (in)	Dial Reading (mm)	Consol. (%)	SQRT Time
11/29/11	14:15	0:00:00	Seating Load		0.04960	1.26		
	14:25		0.1	4.8	0.05000	1.27	0.00	
11/30/11	8:55	0:00:00	0.25	12.0	0.05290	1.34	0.29	
12/01/11	8:58	0:00:00	0.50	23.9	0.05740	1.46	0.74	
12/02/11	8:57	0:00:00	1.00	47.9	0.06170	1.57	1.17	
			Add Water					
12/03/11	8:10	0.00	1.0	47.9	0.05110	1.30	0.11	
12/04/11	8:30	0.00	2.0	95.8	0.05650	1.44	0.65	
12/04/11	8:30	0.00	4.0	191.5	0.05650	1.44	0.65	0.00
		0.10	4.0	191.5	0.06060	1.54	1.06	0.32
		0.25	4.0	191.5	0.06100	1.55	1.10	0.50
		0.50	4.0	191.5	0.06120	1.55	1.12	0.71
		1	4.0	191.5	0.06160	1.56	1.16	1.00
		2	4.0	191.5	0.06190	1.57	1.19	1.41
		4	4.0	191.5	0.06230	1.58	1.23	2.00
		8	4.0	191.5	0.06270	1.59	1.27	2.83
		15	4.0	191.5	0.06300	1.60	1.30	3.87
		30	4.0	191.5	0.06330	1.61	1.33	5.48
		60	4.0	191.5	0.06360	1.62	1.36	7.75
		120	4.0	191.5	0.06380	1.62	1.38	10.95
		240	4.0	191.5	0.06400	1.63	1.40	15.49
		480	4.0	191.5	0.0642	1.63	1.42	21.91
12/05/11	8:30	1440	4.0	191.5	0.0644	1.64	1.44	37.95
12/06/11	8:50	0:00:00	8.00	383.0	0.0767	1.95	2.67	
12/07/11	8:27	0:00:00	16.00	766.1	0.1002	2.55	5.02	
12/08/11	8:42	0:00:00	2.00	95.8	0.0802	2.04	3.02	
12/09/11	8:59	0:00:00	0.25	12.0	0.0513	1.30	0.13	

	Before	After
Weight of wet soil + ring (gm)	191.19	
Weight of ring (gm)	44.62	
Weight of wet soil + ring + container (gm)		252.86
Weight of dry soil + ring + container (gm)		220.02
No. 80 Weight of container (gm)		58.95
Weight of ring + container (gm)		103.57
Moisture Content (%)	25.87	28.20
Dial Reading (inch)	0.05	0.04
Sample Volume (ft^3)	0.0027	0.0027
Wet Density (pcf)	121.4	123.9
Dry Density (pcf)	96.45	96.61

Date	Time	Elapsed Time (min.)	Load (ksf)	Load (kPa)	Dial Reading (in)	Dial Reading (mm)	Consol. (%)

Remark : Final Dial Reading 0.0513



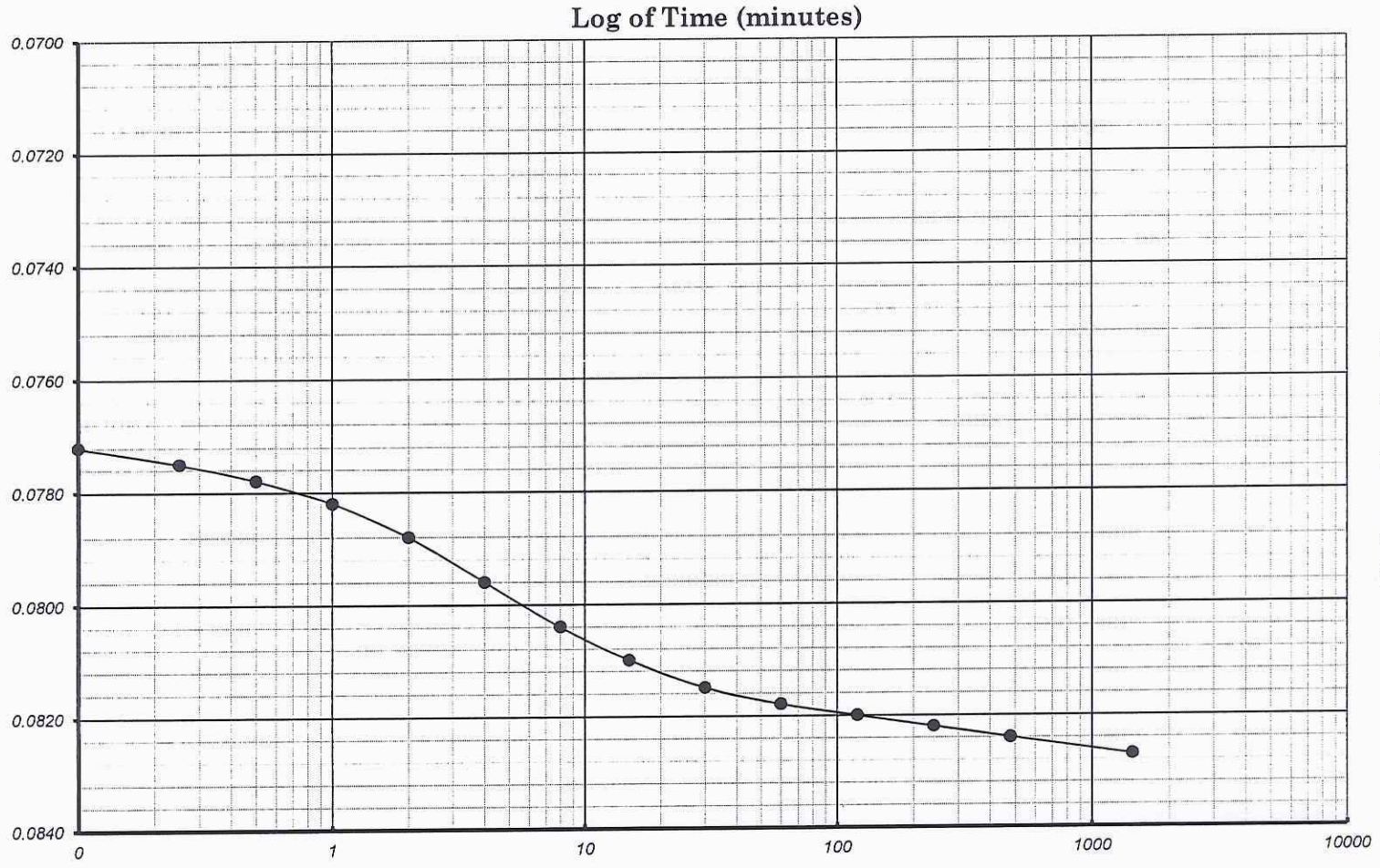
Boring No.	: A-11-117		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m^3)	Percent Saturation	Void Ratio
Sample No.	: D-9		Plastic Limit :	-						
Depth (ft)	: 45.0	46.5	Plastic Index :	-	Initial	31.10	91.39	14.39	99.46	0.84
Depth (m)	: 13.73	14.18	Specific Gravity :	2.70	Final	32.84	91.39	14.39	105.02	0.84
Description	: Olive-brown, Fat CLAY (CH)									

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

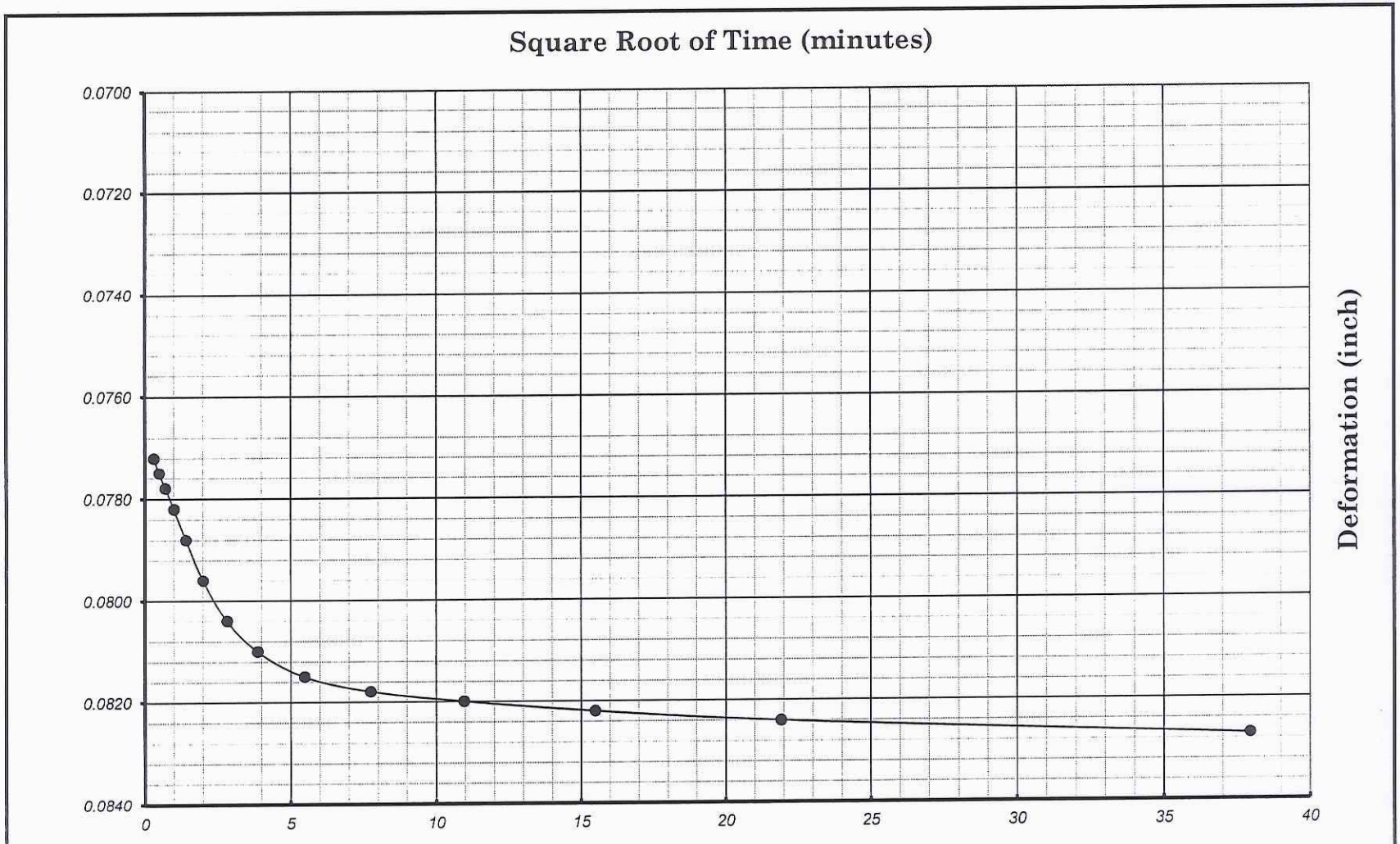
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-117*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-9*	
EMI Project No. : *11-135*		Depth (ft/m) : *45.0* *13.7*	Veritcal Load (ksf/kpa) : *8.00* *383.0*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-117*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-9*	
EMI Project No. : *11-135*		Depth (ft/m) : *45.0* *13.7*	Veritcal Load (ksf/kpa) : *8.0* *383.0*

ONE-DIMENSIONAL CONSOLIDATION OF SOIL

ASTM D-2435 / CT-219

Device No. : 8

Project Name : Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135
Boring No. : A-11-117
Sample No. : D-9
Depth (ft / m) : 45.0 | 13.73
File No. :
Soil Description : Olive-brown, Fat CLAY (CH)

Set up By : JF Date : 11/30/2011
Tested By : J.F/R.J. Date : 11/30~12/10/11
Time Rate Took By : J.F Date : 12/6/2011
Computer By : JF Date : 1/30/2012
Checked By : R.J. Date :

Method (A) : [✓] Constant load increment duration of 24 hours or multiples there for. Minium of two Time -deformation reading are required.
Method (B) : [ ] Time-deformation reading are required on all load increments. Successive load increments are applied after 100 % primary consolidation is reached, or at constant time increments are described in Test Method (A)

Sample	(inch)	(mm)
Internal Diameter	2.42	61.47
Height (Intial)	1.00	25.40
Height (Final)	1.0000	25.40

Vertical Load	(ksf)	(kPa)
Add Water at	4.00	191.52
Load to	16.00	766.08
Rebound to	0.50	23.94

Vertical Load	(ksf)	(kPa)
Reload to		
Rebound to		
Time rate taking at	8.00	381.62

	Before	After
Weight of wet soil + ring (gm)	186.79	
Weight of ring (gm)	42.12	
Weight of wet soil + ring + container (gm)		247.19
Weight of dry soil + ring + container (gm)		210.95
No. 82 Weight of container (gm)		58.48
Weight of ring + container (gm)		100.60
Moisture Content (%)	31.10	32.84
Dial Reading (inch)	0.05	0.04
Sample Volume (ft^3)	0.0027	0.0027
Wet Density (pcf)	119.8	121.4
Dry Density (pcf)	91.39	91.39

Date	Time	Elapsed Time (min.)	Load (ksf)	Load (kPa)	Dial Reading (in)	Dial Reading (mm)	Consol. (%)	SQRT Time
11/30/11	14:15	0:00:00	Seating Load		0.04940	1.25		
	14:25		0.1	4.8	0.05000	1.27	0.00	
12/01/11	8:55	0:00:00	0.25	12.0	0.05500	1.40	0.50	
12/02/11	8:58	0:00:00	0.50	23.9	0.05870	1.49	0.87	
12/03/11	8:57	0:00:00	1.00	47.9	0.06300	1.60	1.30	
12/04/11	8:10	0.00	2.0	95.8	0.07010	1.78	2.01	
12/05/11	8:30	0.00	4.0	191.5	0.07850	1.99	2.85	
			Add Water					
12/06/11	8:30	0.00	4.0	191.5	0.07340	1.86	2.34	
12/06/11	8:30	0.00	8.0	383.0	0.07340	1.86	2.34	0.00
		0.10	8.0	383.0	0.07720	1.96	2.72	0.32
		0.25	8.0	383.0	0.07750	1.97	2.75	0.50
		0.50	8.0	383.0	0.07780	1.98	2.78	0.71
		1	8.0	383.0	0.07820	1.99	2.82	1.00
		2	8.0	383.0	0.07880	2.00	2.88	1.41
		4	8.0	383.0	0.07960	2.02	2.96	2.00
		8	8.0	383.0	0.08040	2.04	3.04	2.83
		15	8.0	383.0	0.08100	2.06	3.10	3.87
		30	8.0	383.0	0.08150	2.07	3.15	5.48
		60	8.0	383.0	0.08180	2.08	3.18	7.75
		120	8.0	383.0	0.08200	2.08	3.20	10.95
		240	8.0	383.0	0.08220	2.09	3.22	15.49
		480	8.0	383.0	0.0824	2.09	3.24	21.91
12/07/11	8:30	1440	8.0	383.0	0.0827	2.10	3.27	37.95
12/08/11	8:27	0:00:00	16.00	766.1	0.1023	2.60	5.23	
12/09/11	8:42	0:00:00	2.00	95.8	0.0738	1.87	2.38	
12/10/11	8:59	0:00:00	0.50	23.9	0.0494	1.25	-0.06	

Date	Time	Elapsed Time (min.)	Load (ksf)	Load (kPa)	Dial Reading (in)	Dial Reading (mm)	Consol. (%)

Remark :

Final Dial Reading 0.0494

MEASUREMENT OF SOIL CORROSIVITY

Project No.	: 11-135	**Project Name :** PTG/I-5 HOV Widening Segment 1	
Boring No.	: A-11-115	**Depth (ft):** 5.00	
Sample No.	: S-1	**Description :** Dark yellowish brown, CLAYEY SAND (SC)	

**** Sample for Corrosivity tests must screen through No. 8 Sieve*

Measurement of Soil Resistivity (ASTM G-57-78 / CT- 643)

Test Standard	X ASTM	CAL. TRAN.	**Wt of Wet Soil + Cont. (gm)**		450.63	**Weight of Total**
Soil Box Diamension (cm)	22.86 X 3.81 X 2.54	15.31 X 10.04 X4.41	**Wt of Dry Soil + Cont. (gm)**		421.65	**Sample for Test (gm)**
(L X W X H) / (inch)	9.0 X 1.5 X 1.0	6.04X 3.95 X 1.74	**Wt. of Cont. No.**	S-15	114.68	106.11
Soil Box Constant (C)	1.0	6.72	**Setup Moisture Content (%)**		9.44	

Trial	**Resistivity Meter Reading (ohm-cm)**						**Prepared By :** CP	**Date :** 11/28/11
	As received	**1**	**2**	**3**	**4**	**5**	**Tested By :** CP	**Date :** 11/29/11
Water added	**0.0**	10.00	10.00	10.00	10.00		**Calculated By :** JF	**Date :** 1/15/12
Meter reading	1700	450	410	420			**Checked By :** RJ	**Date :** 5/15/12
Resistivity	1700.0	450.0	410.0	420.0			**Minimum Resistivity :**	**410.0**

Measurement of Soil pH (ASTM G-51-77 / CT- 643)

Weight 30 gm soil sample and add 30 ml distilled water, stir to a soil slurry and settle at least 1 hr.

Prepared By	: CP	**Date :** 11/28/11	**Time :** 10:20	**Beaker No. :** 25	**pH Reading**				
Tested By	: CP	**Date :** 11/29/11	**Weigh of Wetsoil (gm)**	30.00	**Trial**	**1**	**2**	**3**	**Average**
Calculated By	: JF	**Date :** 1/15/12	**Distilled Water added (ml)**	30.00	**Test Time**	10:30:00	10:33:00	10:35:00	
Checked By	: RJ	**Date :**	**Moisture Content (%)**	9.44	**Reading**	7.17	7.21	7.22	**7.20**

Measurement of Soil Soluble Sulfate Content (CT - 417)

*Weight **100.0 gm** of sample soil & add **300 ml.** of distilled water. Stopper and shake well. Allow to settle overnight. Prepare two **30 (ml.)** of water layer into a **150 (ml.)** beaker, dilute to **100 (ml.)**, add **5 (ml.)** conditioning reagent. Turbidity Blank - Adjust the stirrer to the maximum speed, add **1** spoonfull Barium Chloride & start timing. Stir for exactly **1** minute.*

Flask No. : 33	**Prepared By :** CP	**Date :** 11/28/11
Weight of Soil (gm) : 100.00	**Tested By :** CP	**Date :** 11/29/11
Distilled Water (ml.) : 300.00	**Calculated By :** JF	**Date :** 1/15/12
Shaking at : 9:36:00	**Checked By :** RJ	**Date :**
Reshaking at : 9:40:00		

Total Water Sample Prepared	60.00	**With BaCL**		23	< **Beaker Number** >			24	**Blank**
Distilled Water added (ml)	200			100	**Tested Sample Volume**			100	
Time Intervals	0:00:00	0:00:30	0:01:00	0:01:30	0:02:00	0:02:30	0:03:00	0:04:00	**Maximum**
With BaCL (time)	13:57:00	13:57:30	13:58:00	13:58:30	13:59:00	13:59:30	14:00:00	14:01:00	
Turbidity with BaCL (NTV)		328.00	330.00	325.00	324.00	324.00	323.00	323.00	330.00
Blank (time)	13:53:00	13:53:30	13:54:00	13:54:30	13:55:00	13:55:30	13:56:00	13:57:00	
Turbidity Blank (NTV)		52.90	42.20	44.60	41.80	42.30	41.70	40.60	52.90
Difference (ppm)		275.10	287.80	280.40	282.20	281.70	281.30	282.40	277.10
SO_4 (from graph) (ppm)									**560**

Measurement of Soil Chloride Content (CT - 422)

*1. Weight 100.0 gm sample soil & add 300 ml. of distilled water. Stopper and shake vigorously for 20 seconds, reshaking after one hour and let it settle over night. 2. Pour 30 ml aliquot of filtered solution into a 150 ml beaker, then check pH. If pH is in the range 6 through 8, go to step 4. If ph below 6, add Sodium Hydroxide and if above 8, add Acetic Acid to adjust to the range. 4. Add two drops of Potassium Chromate solution before titrate with Silver Nitrate and change color from Yellow to Red. ** If the titration is over 30 ml., take a smaller sample. Dilute any smaller sample to about 50 ml..*

Flask No. : 33	**Prepared By :** CP	**Date :** 11/28/11
Wt. of Soil (gm) : 100.00	**Tested By :** CP	**Date :** 11/29/11
Distilled Water (ml.) : 300.00	**Calculated By :** JF	**Date :** 1/15/12
Shaking at : 9:36:00	**Checked By :** RJ	**Date :**
Reshaking at : 9:40:00	**Vaccum & Filter at :**	
Remark :		

Titration of (I ml.) Sample Diluted to (F ml.)		24	< **Beaker No.** >			25	
Total Sample Prepared :	60	**Initial**	**Final**	**Total**	**Initial**	**Final**	**Total**	
Sample Volume (ml)		30.00	30.00		30.00	30.00		
pH of Liquid Sample		6.15	6.15		6.15	6.15		
Sodium Hydroxide added (ml)		-	-	-	-	-	-	
Acetic Acid added (ml)		-	-	-	-	-	-	**Average**
Silver Nitrate added (ml)		8.20	19.90	11.70	7.00	18.90	11.90	
ppm CL= 100x(ml of Sil.Ni.-0.2 ml blank)*F/I				1150.00			1170.00	1160.00
Moisture - Free CL = ppm CL X 100 / (100 - w)				**1269.89**			**1291.97**	**1281**

MEASUREMENT OF SOIL CORROSIVITY

Project No.	: 11-135	**Project Name :** PTG/I-5 HOV Widening Segment 1	
Boring No.	: A-11-116	**Depth (ft):** 5.00	
Sample No.	: S-1	**Description :** Dark yellowish brown, LEAN CLAY (CL)	

**** Sample for Corrosivity tests must screen through No. 8 Sieve*

Measurement of Soil Resistivity (ASTM G-57-78 / CT- 643)

Test Standard	X ASTM	CAL. TRAN.	Wt of Wet Soil + Cont. (gm)		287.66	Weight of Total
Soil Box Diamension (cm)	22.86 X 3.81 X 2.54	15.31 X 10.04 X4.41	Wt of Dry Soil + Cont. (gm)		249.44	Sample for Test (gm)
(L X W X H) / (inch)	9.0 X 1.5 X 1.0	6.04X 3.95 X 1.74	Wt. of Cont. No.	86	60.01	113.11
Soil Box Constant (C)	1.0	6.72	Setup Moisture Content (%)		20.18	

Trial	Resistivity Meter Reading (ohm-cm)					
	As received	1	2	3	4	5
Water added	**0.0**	10.00	10.00	10.00	10.00	
Meter reading	320	260	250	260		
Resistivity	320.0	260.0	250.0	260.0		

Prepared By : CP	Date : 11/28/11
Tested By : CP	Date : 11/29/11
Calculated By : JF	Date : 1/15/12
Checked By : RJ	Date : 1/15/12
Minimum Resistivity :	**250.0**

Measurement of Soil pH (ASTM G-51-77 / CT- 643)

Weight 30 gm soil sample and add 30 ml distilled water, stir to a soil slurry and settle at least 1 hr.

Prepared By	: CP	**Date :** 11/28/11	**Time :** 9:39	**Beaker No. :**	32
Tested By	: CP	**Date :** 11/29/11	**Weigh of Wetsoil** (gm)		30.00
Calculated By	: JF	**Date :** 1/15/12	**Distilled Water** added (ml)		30.00
Checked By	: RJ	**Date :**	**Moisture Content** (%)		20.18

pH Reading				
Trial	1	2	3	Average
Test Time	9:04:00	9:06:00	9:08:00	
Reading	7.19	7.28	7.31	**7.26**

Measurement of Soil Soluble Sulfate Content (CT - 417)

*Weight **100.0 gm** of sample soil & add **300 ml.** of distilled water. Stopper and shake well. Allow to settle overnight. Prepare two **30 (ml.)** of water layer into a **150 (ml.)** beaker, dilute to **100 (ml.)**, add **5 (ml.)** conditioning reagent. Turbidity Blank - Adjust the stirrer to the maximum speed, add **1** spoonfull Barium Chloride & start timing. Stir for exactly **1** minute.*

Flask No. : 33	**Prepared By :** CP	**Date :** 11/28/11	
Weight of Soil (gm) : 100.00	**Tested By :** CP	**Date :** 11/29/11	
Distilled Water (ml.) : 300.00	**Calculated By :** JF	**Date :** 1/15/12	
Shaking at : 9:36:00	**Checked By :** RJ	**Date :**	
Reshaking at : 9:40:00			

Total Water Sample Prepared	60.00	**With BaCL**		23	< **Beaker Number** >			24	**Blank**
Distilled Water added (ml)	200			100	**Tested Sample Volume**			100	
Time Intervals	0:00:00	0:00:30	0:01:00	0:01:30	0:02:00	0:02:30	0:03:00	0:04:00	**Maximum**
With BaCL (time)	13:57:00	13:57:30	13:58:00	13:58:30	13:59:00	13:59:30	14:00:00	14:01:00	
Turbidity with BaCL (NTV)		479.00	439.00	440.00	440.00	440.00	440.00	439.00	479.00
Blank (time)	13:53:00	13:53:30	13:54:00	13:54:30	13:55:00	13:55:30	13:56:00	13:57:00	
Turbidity Blank (NTV)		6.97	6.87	5.69	5.67	5.60	5.34	5.36	6.97
Difference (ppm)		472.03	432.13	434.31	434.33	434.40	434.66	433.64	472.03
SO_4 (from graph) (ppm)									**950**

Measurement of Soil Chloride Content (CT - 422)

*1. Weight 100.0 gm sample soil & add 300 ml. of distilled water. Stopper and shake vigorously for 20 seconds, reshaking after one hour and let it settle over night. 2. Pour 30 ml aliquot of filtered solution into a 150 ml beaker, then check pH. If pH is in the range 6 through 8, go to step 4. If ph below 6, add Sodium Hydroxide and if above 8, add Acetic Acid to adjust to the range. 4. Add two drops of Potassium Chromate solution before titrate with Silver Nitrate and change color from Yellow to Red. ** If the titration is over 30 ml., take a smaller sample. Dilute any smaller sample to about 50 ml..*

Flask No. : 33	**Prepared By :** CP	**Date :** 11/28/11	
Wt. of Soil (gm) : 100.00	**Tested By :** CP	**Date :** 11/29/11	
Distilled Water (ml.) : 300.00	**Calculated By :** JF	**Date :** 1/15/12	
Shaking at : 9:36:00	**Checked By :** RJ	**Date :**	
Reshaking at : 9:40:00	**Vaccum & Filter at :**		
Remark :			

Titration of (I ml.) Sample Diluted to (F ml.)	24	< Beaker No.			> 25	
Total Sample Prepared : 60	**Initial**	**Final**	**Total**	**Initial**	**Final**	**Total**	
Sample Volume (ml)	30.00	30.00		30.00	30.00		
pH of Liquid Sample	6.15	6.15		6.15	6.15		
Sodium Hydroxide added (ml)	-	-	-	-	-	-	
Acetic Acid added (ml)	-	-	-	-	-	-	Average
Silver Nitrate added (ml)	5.20	21.50	16.30	21.50	38.00	16.50	
ppm CL= 100x(ml of Sil.Ni.-0.2 ml blank)*F/I			1610.00			1630.00	1620.00
Moisture - Free CL = ppm CL X 100 / (100 - w)			**2016.95**			**2042.00**	**2029**

MEASUREMENT OF SOIL CORROSIVITY

Project No.	: 11-135	**Project Name :** PTG/I-5 HOV Widening Segment 1	
Boring No.	: A-11-117	**Depth (ft):** 35.00	
Sample No.	: D-7	**Description :** Olive-brown, Fat CLAY (CH)	

**** Sample for Corrosivity tests must screen through No. 8 Sieve*

Measurement of Soil Resistivity (ASTM G-57-78 / CT- 643)

Test Standard	X ASTM	CAL. TRAN.	Wt of Wet Soil + Cont. (gm)	215.98	Weight of Total Sample for Test (gm)
Soil Box Diamension (cm)	22.86 X 3.81 X 2.54	15.31 X 10.04 X4.41	Wt of Dry Soil + Cont. (gm)	180.40	
(L X W X H) / (inch)	9.0 X 1.5 X 1.0	6.04X 3.95 X 1.74	Wt. of Cont. No. 87	59.74	99.31
Soil Box Constant (C)	1.0	6.72	Setup Moisture Content (%)	29.49	

Trial	Resistivity Meter Reading (ohm-cm)						Prepared By : CP	Date : 11/28/11
	As received	1	2	3	4	5	Tested By : CP	Date : 11/29/11
Water added	0.0	10.00	10.00	10.00	10.00		Calculated By : JF	Date : 1/15/12
Meter reading	330	190	170	170	180		Checked By : RJ	Date : 1/15/12
Resistivity	330.0	190.0	170.0	170.0	180.0		Minimum Resistivity :	170.0

Measurement of Soil pH (ASTM G-51-77 / CT- 643)

Weight 30 gm soil sample and add 30 ml distilled water, stir to a soil slurry and settle at least 1 hr.

						pH Reading				
Prepared By	: CP	Date : 11/28/11	Time : 9:39	Beaker No. :	25	Trial	1	2	3	Average
Tested By	: CP	Date : 11/29/11	Weigh of Wetsoil (gm)		30.00	Test Time	9:04:00	9:06:00	9:08:00	
Calculated By	: JF	Date : 1/15/12	Distilled Water added (ml)		30.00	Reading	5.62	5.61	5.66	5.63
Checked By	: RJ	Date :	Moisture Content (%)		29.49					

Measurement of Soil Soluble Sulfate Content (CT - 417)

Weight 100.0 gm of sample soil & add 300 ml. of distilled water. Stopper and shake well. Allow to settle overnight. Prepare two 30 (ml.) of water layer into a 150 (ml.) beaker, dilute to 100 (ml.), add 5 (ml.) conditioning reagent. Turbidity Blank - Adjust the stirrer to the maximum speed, add 1 spoonfull Barium Chloride & start timing. Stir for exactly 1 minute.

Flask No. : 33	Prepared By : CP	Date : 11/28/11
Weight of Soil (gm) : 100.00	Tested By : CP	Date : 11/29/11
Distilled Water (ml.) : 300.00	Calculated By : JF	Date : 1/15/12
Shaking at : 9:36:00	Checked By : RJ	Date :
Reshaking at : 9:40:00		

Total Water Sample Prepared	60.00	With BaCL		23	< Beaker Number >			24	Blank
Distilled Water added (ml)	200			100	Tested Sample Volume			100	
Time Intervals	0:00:00	0:00:30	0:01:00	0:01:30	0:02:00	0:02:30	0:03:00	0:04:00	Maximum
With BaCL (time)	13:57:00	13:57:30	13:58:00	13:58:30	13:59:00	13:59:30	14:00:00	14:01:00	
Turbidity with BaCL (NTV)		2526.00	2535.00	2518.00	2501.00	2485.00	2470.00	2456.00	2535.00
Blank (time)	13:53:00	13:53:30	13:54:00	13:54:30	13:55:00	13:55:30	13:56:00	13:57:00	
Turbidity Blank (NTV)		7.59	6.03	5.68	5.68	5.52	5.32	5.08	7.59
Difference (ppm)		2518.41	2528.97	2512.32	2495.32	2479.48	2464.68	2450.92	2527.41
SO_4 (from graph) (ppm)									5060

Measurement of Soil Chloride Content (CT - 422)

*1. Weight 100.0 gm sample soil & add 300 ml. of distilled water. Stopper and shake vigorously for 20 seconds, reshaking after one hour and let it settle over night. 2. Pour 30 ml aliquot of filtered solution into a 150 ml beaker, then check pH. If pH is in the range 6 through 8, go to step 4. If ph below 6, add Sodium Hydroxide and if above 8, add Acetic Acid to adjust to the range. 4. Add two drops of Potassium Chromate solution before titrate with Silver Nitrate and change color from Yellow to Red. ** If the titration is over 30 ml., take a smaller sample. Dilute any smaller sample to about 50 ml..*

Flask No. : 33	Prepared By : CP	Date : 11/28/11
Wt. of Soil (gm) : 100.00	Tested By : CP	Date : 11/29/11
Distilled Water (ml.) : 300.00	Calculated By : JF	Date : 1/15/12
Shaking at : 9:36:00	Checked By : RJ	Date :
Reshaking at : 9:40:00	Vaccum & Filter at :	

Remark :

Titration of (I ml.) Sample Diluted to (F ml.)	24	< Beaker No. >			25	
Total Sample Prepared : 60	Initial	Final	Total	Initial	Final	Total	
Sample Volume (ml)	30.00	30.00		30.00	30.00		
pH of Liquid Sample	6.15	6.15		6.15	6.15		
Sodium Hydroxide added (ml)	-	-	-	-	-	-	
Acetic Acid added (ml)	-	-	-	-	-	-	Average
Silver Nitrate added (ml)	5.10	19.10	14.00	19.10	33.00	13.90	
ppm CL= 100x(ml of Sil.Ni.-0.2 ml blank)*F/I			1380.00			1370.00	1375.00
Moisture - Free CL = ppm CL X 100 / (100 - w)			**1957.11**			**1942.93**	**1950**

APPENDIX C

DESIGN CALCULATIONS

I-5 HOV Segment 1, Avenida Pico Bridge
LIQUEFACTION ANALYSIS for the worst case using the soil boring containing the most potentially susceptible soils

MK 11-135
29-Mar-12

Liquefaction analysis is performed following Seed's Procedure, outlined by Seed et al (1985), Seed and Harder (1990), updated NCEER (1997)

Emean/E60 = Energy Ratio to correct to standard 60% Energy
Surcharge = Any surcharge on top of the ground (psf)
acc. max = maximum peak acceleration at the ground surface (g's)
$^{1}C_N$ = square root of (100 kPa or 1.04427 tsf/effective overburden)
The induced cyclic stress ratio (CSR i) by a given peak ground acceleration (acc. max) is:

CSR i = 0.65 x acc max. x total normal stress x rd / (effective normal stress x g)

where: rd = stress reduction factor (Robertson and Wride (1996), Marcuson (USArmy Eng), per NCEER (1997))
g = acceleration of gravity

The resisting cyclic stress ratio (CSR r) is equal to:

CSR r = CSR x Cm x K sigma

where: Cm = Earthquake Magnitude Correction Factor (Blake, NCEER Table 3, Eq.4)
K sigma = Normalized resistance factor (Fig. 14 from NCEER Liquefaction workshop, Harder Boulanger)
CSR = Resisting Cyclic Stress Ratio. It is a function of the content of fines
(Figure 2, NCEER Workshop, after Seed et al 1985))

Factor of Safety, F sub L is:

F sub L = CSR r / CSR i

A-11-115

Emean (%) 75 Sur.= 0.001 psf 113.5 =top of ground el. Borehole Diamet 8
C_E 1.25 C_B 1.15
81 =water table El. acc. max = 0.38 g Earthq. M= 7.5
Cm= 1.00

ELEVATION TOP OF LAYER (ft.)	USCS	LAYER THICKNESS L (ft.)	TOTAL OVERBUR. PRESS. (tsf)	EFFEC. OVERBUR. PRESS. (tsf)	DEPTH BELOW SURFACE (ft)	C_N	C_R	C_S	C_{ST}	TOTAL UNIT WEIGHT (pcf)	SAMPLER TYPE 1=SPT 2=CA.MOD.	SAMPLER LINED 1=UNLINED 2=LINED	FIELD BLOW COUNT N	STRESS REDUC. COEFF. rd	INDUCED CYCLIC STRESS RATIO	CORRECT BLOW COUNT Nc	EST. PERCENT OF FINES (%)	(N1)60cs	K sigma	RESIST. CYCLIC STRESS RATIO M=7.5	RESIST. CYCLIC STRESS RATIO Overburd Cor Mag Corr	FACTOR OF SAFETY (F sub L)	WILL IT LIQUEFY?
-		-	-	-	-	-				-	-		-	-	-	-	-	-	-	-	-	-	-
113.5	SC	0	0.00	0.00	0.00	2.00	0.75	1.20	1.00	120	1	1	8	1.00	0.25	21	37.0	31	1.00	high N	high N	LARGE	AboveWT
108.5	SC/CL	5	0.30	0.30	5.00	1.87	0.75	1.00	0.50	120	2	2	29	0.99	0.25	30	74.0	41	1.00	high N	high N	LARGE	AboveWT
103.5	MH	5	0.60	0.60	10.00	1.32	0.75	1.20	1.00	120	1	1	20	0.98	0.24	35	85.0	47	1.00	high N	high N	LARGE	AboveWT
98.5	CH	5	0.90	0.90	15.00	1.08	0.85	1.00	0.50	120	2	2	58	0.97	0.24	39	95.0	52	1.00	high N	high N	LARGE	AboveWT
93.5	ML	5	1.20	1.20	20.00	0.93	0.85	1.20	1.00	120	1	1	10	0.95	0.24	14	51.0	22	0.97	0.24	0.24	0.99	AboveWT
88.5	ML	5	1.50	1.50	25.00	0.83	0.95	1.00	0.50	120	2	2	49	0.94	0.23	28	52.0	39	0.93	high N	high N	LARGE	AboveWT
83.5	SM	5	1.80	1.80	30.00	0.76	0.95	1.20	1.00	120	1	1	15	0.93	0.23	19	41.0	28	0.89	0.37	0.33	1.42	AboveWT
78.5	CL	5	2.10	1.94	35.00	0.73	1.00	1.00	0.50	120	2	2	100	0.89	0.24	53	80.0	69	0.87	high N	high N	LARGE	high N/fines
73.5	CL	5	2.40	2.09	40.00	0.71	1.00	1.20	1.00	120	1	1	30	0.85	0.24	37	95.0	50	0.87	high N	high N	LARGE	high N/fines
68.5	CL	5	2.70	2.23	45.00	0.68	1.00	1.00	0.50	120	2	2	63	0.81	0.24	31	90.0	43	0.86	high N	high N	LARGE	high N/fines
63.5	CH	5	3.00	2.38	50.00	0.66	1.00	1.20	1.00	120	1	1	9	0.77	0.24	11	95.0	19	0.85	0.20	0.17	0.72	fines
58.5	CL	5	3.30	2.52	55.00	0.64	1.00	1.00	0.50	120	2	2	21	0.73	0.24	10	90.0	17	0.84	0.18	0.15	0.64	fines
53.5	MH	5	3.60	2.66	60.00	0.63	1.00	1.20	1.00	120	1	1	4	0.69	0.23	5	80.0	11	0.83	0.12	0.10	0.44	fines
48.5	MH	5	3.90	2.81	65.00	0.61	1.00	1.00	0.50	120	2	2	19	0.64	0.22	9	95.0	16	0.82	0.17	0.14	0.62	fines
43.5	MH	5	4.20	2.95	70.00	0.59	1.00	1.20	1.00	120	1	1	43	0.60	0.21	45	80.0	59	0.80	high N	high N	LARGE	high N/fines
38.5	MH	5	4.50	3.10	75.00	0.58	1.00	1.00	0.50	120	2	2	100	0.56	0.20	42	80.0	56	0.77	high N	high N	LARGE	high N/fines
33.5	MH	5	4.80	3.24	80.00	0.57	1.00	1.20	1.00	120	1	1	65	0.55	0.20	64	95.0	82	0.77	high N	high N	LARGE	high N/fines
28.5	MH	5	5.10	3.38	85.00	0.56	1.00	1.00	0.50	120	2	2	100	0.54	0.20	40	95.0	53	0.76	high N	high N	LARGE	high N/fines
23.5	MH	5	5.40	3.53	90.00	0.54	1.00	1.20	1.00	120	1	1	73	0.52	0.20	69	95.0	88	0.75	high N	high N	LARGE	high N/fines
18.5	MH	5	5.69	3.66	95.00	0.53	1.00	1.00	0.50	115	2	2	100	0.51	0.20	39	95.0	52	0.74	high N	high N	LARGE	high N/fines

SEISMIC SETTLEMENT CALCULATIONS

I-5 HOV Seg 1, Avenida Pico Bridge
Controlling Boring (most susceptible soil condition)
3/29/12 MK

EMI Project No. 11-135

FORMULAE:

Corrected blow count $(N_1)_{60}$ = $C_N * C_s * C_E * C_R * C_B * C_{ST} * N_{field}$

where:

- N_{field} = Uncorrected field blow count
- C_N = Overburden correction factor (See Reference 1)
- C_E = Energy correction (Reference 2) = (Efficiency/60%)
- C_R = Rod Length correction
- C_s = Sampler correction (lined/unlined) (Reference 3)
- C_B = Borehole diameter correction
- C_{ST} = Sampler correction (Sampler diameter)

Efficiency = 75% C_E 1.25
Borehole Dia. (in) = 8.0 C_B 1.15
Soil Unit Weight (pcf) = 120

$K_o = (1-\sin(\phi))$
$\sigma_m' = (1+2K_o)/3*\sigma_{of}'$
$(K_2)_{max} = 20*(N_1)^{(1/3)}$
$G_{max} = 1000*(K_2)_{max}*(\sigma_m')^{(1/2)}$
$\gamma_{eff}*G_{eff}/G_{max} = 0.65*(a_{max}/g)*(\sigma_{of}/G_{max})*r_d$
r_d = 1.0 at the ground surface,
= 0.9 at 30 feet below the ground surface
= 0.6 at 70 feet below the ground surface
= 0.5 at 100 feet below the ground surface
$\tau_{av}/\sigma_{of}' = 0.65*(a_{max}/g)*(\sigma_{of}/\sigma_{of}')*r_d$
γ_{eff} for a given $\gamma_{eff}*G_{eff}/G_{max}$ and σ_m' is read from Figure 11 (Tokimatsu and Seed,
ε_c for a given γ_{eff} and N_1 is read from Figure 13 (Tokimatsu and Seed, 1987)

CALCULATIONS:

Boring: A-11-115

Water depth (ft bgs): (during drilling) 60.0
Water depth (ft bgs): (design depth) 60.0

Boring Elevation (ft MLLW): 113.5
Groundwater Elevation (ft MLLW): 53.0
Finished Grade Elevn. (ft MLLW): 113.5

Design GW El. (ft MLLW): 53.5

EQ Mag = 7.5
Mag Scale Factor= 1.000
a_{max} = 0.382
Height of Fill (ft): 0.0

Original Depth (ft bgs)	Final Depth (ft bgs)	Elev (ft msl)	Total Stress at Mid depth (psf)	Original Effective Stress at Mid depth (psf)	Sampler SPT = 1 CDS = 2	Uncorrected Blow Count (N)*	Sampler 1=Unlined 2=Lined	Soil Type (1=fine-grained, 2=coarse-grained)	C_N	C_{ST}	C_s	C_r	$(N_1)_{60}$	Estimated Percentage of Fines (%)	(N1)60-CS (NCEER - used if layer does not liquefy)	(N1)60-CS (Seed - used if layer liquefies)	Design Effective Stress at Mid depth (psf)	σ_m' (psf)	$(K_2)_{max}$	G_{max} (psf)	r_d	γ_{eff} G_{eff}/G_{max}	τ_{av}/σ_{of}'	Cyclic Shear Strain, γ_{eff} (%)	Volumetric Strain (Dry Sand) ε_c (%)	Volumetric Strain (Saturated Sand) ε_c (%)	$2*\varepsilon_c$ (dry); ε_c (saturtd.)	Settlement of Each Layer (inches)	Sum.	$CRR_{7.5}$	
0			0																												
5.0	5.0	108.5	600	600	1	8	1	2	1.70	1.00	1.20	0.75	18	37.0	26	-	600	400	5.93E+01	1.19E+06	0.99	1.24E-04	-	2.53E-02	1.85E-02	-	3.70E-02	0.0222	0.02	0.32	
10.0	10.0	103.5	1200	1200	2	29	2	1	1.29	0.50	1.00	0.80	-	74.0	-	-	1200	800	-	-	0.98	-	-	-	-	-	-	-	0.02	1.00	
15.0	15.0	98.5	1800	1800	1	20	1	1	1.05	1.00	1.20	0.85	-	85.0	-	-	1800	1200	-	-	0.97	-	-	-	-	-	-	-	0.02	1.00	
20.0	20.0	93.5	2400	2400	2	58	2	1	0.91	0.50	1.00	0.95	-	95.0	-	-	2400	1600	-	-	0.95	-	-	-	-	-	-	-	0.02	1.00	
25.0	25.0	88.5	3000	3000	1	10	1	1	0.82	1.00	1.20	0.95	-	51.0	-	-	3000	2000	-	-	0.94	-	-	-	-	-	-	-	0.02	1.00	
30.0	30.0	83.5	3600	3600	2	49	2	1	0.75	0.50	1.00	1.00	-	52.0	-	-	3600	2400	-	-	0.93	-	-	-	-	-	-	-	0.02	1.00	
35.0	35.0	78.5	4200	4200	1	15	1	2	0.69	1.00	1.20	1.00	18	41.0	26	-	4200	2800	5.96E+01	3.15E+06	0.89	2.94E-04	-	5.42E-02	3.96E-02	-	7.92E-02	0.0475	0.07	0.32	
40.0	40.0	73.5	4800	4800	2	100	2	1	0.65	0.50	1.00	1.00	-	80.0	-	-	4800	3200	-	-	0.85	-	-	-	-	-	-	-	0.07	1.00	Per Chinese Criteria, doesnot liquefy
45.0	45.0	68.5	5400	5400	1	30	1	1	0.61	1.00	1.20	1.00	-	95.0	-	-	5400	3600	-	-	0.81	-	-	-	-	-	-	-	0.07	1.00	
50.0	50.0	63.5	6000	6000	2	63	2	1	0.58	0.50	1.00	1.00	-	90.0	-	-	6000	4000	-	-	0.77	-	-	-	-	-	-	-	0.07	1.00	
55.0	55.0	58.5	6600	6600	1	9	1	1	0.55	1.00	1.20	1.00	-	95.0	-	-	6600	4400	-	-	0.73	-	-	-	-	-	-	-	0.07	1.00	
60.0	60.0	53.5	7200	7200	2	21	2	1	0.53	0.50	1.00	1.00	-	90.0	-	-	7200	4800	-	-	0.69	-	0.17	-	-	-	-	-	0.07	1.00	
65.0	65.0	48.5	7800	7488	1	4	1	1	0.52	1.00	1.20	1.00	-	80.0	-	-	7488	4992	-	-	0.64	-	0.17	-	-	-	-	-	0.07	1.00	
70.0	70.0	43.5	8400	7776	2	19	2	1	0.51	0.50	1.00	1.00	-	95.0	-	-	7776	5184	-	-	0.60	-	0.16	-	-	-	-	-	0.07	1.00	
75.0	75.0	38.5	9000	8064	1	43	1	1	0.50	1.00	1.20	1.00	-	80.0	-	-	8064	5376	-	-	0.56	-	0.16	-	-	-	-	-	0.07	1.00	
80.0	80.0	33.5	9600	8352	2	100	2	1	0.49	0.50	1.00	1.00	-	80.0	-	-	8352	5568	-	-	0.55	-	0.16	-	-	-	-	-	0.07	1.00	
85.0	85.0	28.5	10200	8640	1	65	1	1	0.48	1.00	1.20	1.00	-	95.0	-	-	8640	5760	-	-	0.54	-	0.16	-	-	-	-	-	0.07	1.00	
90.0	90.0	23.5	10800	8928	2	100	2	1	0.47	0.50	1.00	1.00	-	95.0	-	-	8928	5952	-	-	0.52	-	0.16	-	-	-	-	-	0.07	1.00	
95.0	95.0	18.5	11400	9216	1	73	1	1	0.47	1.00	1.20	1.00	-	95.0	-	-	9216	6144	-	-	0.51	-	0.16	-	-	-	-	-	0.07	1.00	
100.0	100.0	13.5	12000	9504	2	100	2	1	0.46	0.50	1.00	1.00	-	95.0	-	-	9504	6336	-	-	0.50	-	0.16	-	-	-	-	-	0.07	1.00	

Total (in) 0.1

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineers
17800 Newhope Street
Suite B
Fountain Valley, CA 92708

CPT Number: CPT-11-115
Project Name: I-5 HOV Seg 1, Avenida Pico Bridge
Project Number: 11-135
Location: I-5, San Clemente CA

Computed by: MK
Checked by:

Date: 03/28/12
Date:

Figure No.:

Reference:

1) Seed, R.B., et al, *Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework*, Keynote Presentation, 26th Annual ASCE Los Angeles Geotechnical Spring Seminar, April 30, 2003.
2) Youd, T.L. & Idriss, I.M., et al, *Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils*, ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 817-833, October 2001.
3) Pradel D., *Procedure to Evaluate Earthquake-induced Settlements in Dry Sandy Soils*, ASCE Journal of Geotechnical and Geoenvironmental Engineering, Pp. 364-368, April 1998.
4) Tokimatsu, K. & Seed, H.B., *Evaluation of Settlements in Sands due to Earthquake Shaking*, ASCE Journal of Geotechnical Engineering, Pp. 861-878, August 1987.
5) Jefferies, M.G. & Davies, M.P., *Use of CPT to Estimate Equivalent SPT N_{60}*, ASTM Geotechnical Testing Journal, Vol.17, No. 4, Pp. 458-567, 1993.
6) Robertson, P.K. et al, *Use of Piezometer Cone Data*, Proceedings of the ASCE Specialty Conference In Situ 86: Use of In Situ Tests in Geotechnical Engineering, Blacksburg, Pp. 1263-1280, 1986.

Surface Elevation = 114 ft MSL
Design Magnitude, M_w = 7.50
PGA, a_{max} = 0.38 g
Earthquake Scaling Factor, MSF = 1.000 for M_w = 7.5
Design Water Level = 53 ft MSL
Water Level at Investigation = 0.5 ft MSL
Req'd Factor of Safety = 1

Summary of Seismically Induced Settlement:

Dry Settlement (in)	0.314
Post-liquefaction Settlement (in)	0.000
Total Settlement (in)	**0.314**

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max}	Cyclic Shear Strain γ	Norm. Vol. Strain ε_{Nc}	Dry Settle. ΔS	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε	Layer Post-Liq. Settle. ΔS
		γ'_{MOIST}	γ'_{SAT}										σ_v	σ'_v	σ_v	σ'_v			n	C_Q	q_{c1N}	Kc	$(q_{c1N})_{cs}$														
(ft)	(ft, MSL)			(tsf)	(tsf)	(%)							(tsf)	(tsf)	(tsf)	(tsf)														(tsf)	(%)	(%)	(in)		(%)	(in)
0.16	113.3	115.0	115.0	33.4	0.2	0.5	1	5	56	0.00	1.00	56	0.009	0.009	0.009	0.009	1.33	SAND	0.5	1.70	53.6	1.00	53.6	0.09	1.000	0.25	0.250	Above Water	0.12	135601	134.2	0.00	0.00	0.000	NA	NA	0.000
0.33	113.2	115.0	115.0	67.6	0.4	0.6	0	10	77	0.00	1.00	77	0.019	0.019	0.019	0.019	1.27	SAND	0.5	1.70	108.6	1.00	108.6	0.20	0.999	0.25	0.250	Above Water	0.12	87827	214.8	0.00	0.00	0.000	NA	NA	0.000
0.49	113.0	115.0	115.0	136.6	0.7	0.5	0	20	124	0.00	1.00	124	0.028	0.028	0.028	0.028	1.10	SAND	0.5	1.70	222.7	1.00	222.7	non-LIQ	0.999	0.25	0.250	Above Water	0.12	69281	306.4	0.00	0.00	0.000	NA	NA	0.000
0.66	112.8	115.0	115.0	152.0	1.0	0.7	0	23	120	0.00	1.00	120	0.038	0.038	0.038	0.038	1.19	SAND	0.5	1.70	244.3	1.00	244.3	non-LIQ	0.998	0.25	0.250	Above Water	0.12	57944	352.0	0.00	0.00	0.000	NA	NA	0.000
0.82	112.7	115.0	115.0	127.3	1.2	1.0	2	20	97	0.00	1.00	97	0.047	0.047	0.047	0.047	1.40	SAND	0.5	1.70	204.6	1.00	204.6	non-LIQ	0.998	0.25	0.250	Above Water	0.13	50858	364.4	0.00	0.00	0.000	NA	NA	0.000
0.98	112.5	115.0	115.0	116.9	1.3	1.1	3	19	83	0.00	1.00	83	0.056	0.056	0.056	0.056	1.48	SAND	0.5	1.70	187.8	1.00	187.8	non-LIQ	0.998	0.25	0.250	Above Water	0.13	45709	379.0	0.01	0.00	0.000	NA	NA	0.000
1.15	112.4	115.0	115.0	90.4	1.1	1.3	5	16	62	0.00	1.00	62	0.066	0.066	0.066	0.066	1.62	SAND	0.5	1.70	145.3	1.00	145.3	0.37	0.997	0.25	0.250	Above Water	0.13	41526	372.5	0.01	0.00	0.000	NA	NA	0.000
1.31	112.2	115.0	115.0	81.2	1.3	1.6	7	15	55	0.15	1.01	55	0.075	0.075	0.075	0.075	1.76	SAND	0.5	1.70	130.4	1.08	140.4	0.34	0.997	0.25	0.250	Above Water	0.13	38404	381.3	0.01	0.00	0.000	NA	NA	0.000
1.48	112.0	115.0	115.0	74.6	1.1	1.5	7	13	47	0.15	1.01	48	0.085	0.085	0.085	0.085	1.76	SAND	0.5	1.70	119.8	1.08	129.0	0.26	0.997	0.25	0.250	Above Water	0.13	35693	386.0	0.01	0.00	0.000	NA	NA	0.000
1.64	111.9	115.0	115.0	73.2	1.4	1.9	9	14	46	0.68	1.02	47	0.094	0.094	0.094	0.094	1.86	SAND	0.5	1.70	117.6	1.15	135.4	0.31	0.996	0.25	0.250	Above Water	0.13	33560	401.8	0.01	0.00	0.000	NA	NA	0.000
1.80	111.7	115.0	115.0	80.9	1.8	2.3	11	15	49	1.12	1.03	52	0.104	0.104	0.104	0.104	1.91	SAND	0.5	1.70	129.9	1.20	156.3	0.44	0.996	0.25	0.250	Above Water	0.13	31737	431.5	0.01	0.00	0.000	NA	NA	0.000
1.97	111.5	115.0	115.0	75.2	1.8	2.4	12	15	45	1.59	1.03	48	0.113	0.113	0.113	0.113	1.97	SAND	0.5	1.70	120.8	1.26	152.2	0.41	0.995	0.25	0.250	Above Water	0.13	30065	436.8	0.01	0.00	0.000	NA	NA	0.000
2.13	111.4	115.0	115.0	90.4	1.1	1.3	6	16	47	0.03	1.00	47	0.122	0.122	0.122	0.122	1.70	SAND	0.5	1.70	145.3	1.04	150.5	0.40	0.995	0.25	0.250	Above Water	0.13	28688	461.5	0.01	0.00	0.000	NA	NA	0.000
2.30	111.2	115.0	115.0	82.3	0.9	1.1	6	15	41	0.05	1.01	41	0.132	0.132	0.132	0.132	1.71	SAND	0.5	1.70	132.2	1.04	137.9	0.32	0.995	0.25	0.250	Above Water	0.13	27397	459.4	0.01	0.01	0.000	NA	NA	0.000
2.46	111.0	115.0	115.0	78.4	1.2	1.5	8	14	39	0.42	1.01	40	0.141	0.141	0.141	0.141	1.82	SAND	0.5	1.70	125.9	1.12	140.9	0.34	0.994	0.25	0.250	Above Water	0.13	26313	468.2	0.01	0.01	0.000	NA	NA	0.000
2.62	110.9	115.0	115.0	78.9	1.4	1.8	10	15	39	0.87	1.02	41	0.151	0.151	0.151	0.151	1.88	SAND	0.5	1.70	126.8	1.17	148.8	0.39	0.994	0.25	0.250	Above Water	0.13	25337	483.1	0.01	0.01	0.000	NA	NA	0.000
2.79	110.7	115.0	115.0	84.3	1.4	1.6	9	16	40	0.56	1.02	41	0.160	0.160	0.160	0.160	1.84	SAND	0.5	1.70	135.5	1.14	154.1	0.42	0.993	0.25	0.250	Above Water	0.13	24399	501.6	0.01	0.01	0.000	NA	NA	0.000
2.95	110.6	115.0	115.0	85.7	1.2	1.4	8	16	39	0.28	1.01	40	0.170	0.170	0.170	0.170	1.79	SAND	0.5	1.70	137.7	1.10	151.4	0.40	0.993	0.25	0.250	Above Water	0.13	23596	510.8	0.01	0.01	0.000	NA	NA	0.000
3.12	110.4	115.0	115.0	69.5	0.8	1.2	6	13	31	0.39	1.01	32	0.179	0.179	0.179	0.179	1.81	SAND	0.5	1.70	111.7	1.12	124.7	0.26	0.993	0.25	0.250	Above Water	0.13	22816	486.8	0.02	0.01	0.000	NA	NA	0.000
3.28	110.2	115.0	115.0	61.2	1.3	2.1	14	12	29	2.28	1.04	33	0.189	0.189	0.189	0.189	2.05	SAND	0.5	1.70	98.3	1.37	134.4	0.31	0.992	0.25	0.250	Above Water	0.13	22142	488.4	0.02	0.01	0.000	NA	NA	0.000
3.44	110.1	115.0	115.0	56.0	1.7	3.0	19	12	28	3.40	1.07	33	0.198	0.198	0.198	0.198	2.19	SAND	0.5	1.70	90.0	1.65	148.8	0.39	0.992	0.25	0.250	Above Water	0.13	21518	491.5	0.02	0.01	0.000	NA	NA	0.000
3.61	109.9	115.0	115.0	70.4	3.1	4.4	22	15	35	3.86	1.09	42	0.208	0.208	0.208	0.208	2.27	SAND	0.5	1.70	113.0	1.87	211.2	non-LIQ	0.992	0.25	0.250	Above Water	0.13	20904	544.9	0.02	0.01	0.000	NA	NA	0.000
3.77	109.7	115.0	115.0	93.4	2.4	2.6	13	18	41	2.01	1.04	44	0.217	0.217	0.217	0.217	2.02	SAND	0.5	1.70	150.0	1.32	198.1	non-LIQ	0.991	0.25	0.250	Above Water	0.13	20367	586.5	0.02	0.01	0.000	NA	NA	0.000
3.94	109.6	115.0	115.0	43.9	2.6	5.9	31	11	23	4.76	1.16	32	0.227	0.227	0.227	0.227	2.51	SAND	0.5	1.70	70.5	2.79	197.0	non-LIQ	0.991	0.25	0.250	Above Water	0.13	19835	496.3	0.02	0.02	0.001	NA	NA	0.000
4.10	109.4	115.0	115.0	49.9	2.1	4.2	25	11	24	4.28	1.11	31	0.236	0.236	0.236	0.236	2.36	SAND	0.5	1.70	80.2	2.16	173.5	non-LIQ	0.990	0.25	0.250	Above Water	0.13	19367	513.6	0.02	0.02	0.001	NA	NA	0.000
4.27	109.2	115.0	115.0	68.4	2.1	3.1	18	14	30	3.25	1.07	35	0.246	0.246	0.246	0.246	2.17	SAND	0.5	1.70	109.9	1.60	175.9	non-LIQ	0.990	0.25	0.250	Above Water	0.13	18901	562.8	0.02	0.01	0.000	NA	NA	0.000
4.43	109.1	115.0	115.0	56.6	2.1	3.8	23	13	26	3.99	1.10	32	0.255	0.255	0.255	0.255	2.30	SAND	0.5	1.70	91.0	1.95	177.2	non-LIQ	0.990	0.25	0.250	Above Water	0.13	18488	544.7	0.02	0.02	0.001	NA	NA	0.000
4.59	108.9	115.0	115.0	69.4	1.7	2.5	16	14	29	2.77	1.05	33	0.264	0.264	0.264	0.264	2.11	SAND	0.5	1.70	111.5	1.47	163.7	non-LIQ	0.989	0.25	0.250	Above Water	0.13	18099	574.3	0.02	0.01	0.001	NA	NA	0.000
4.76	108.7	115.0	115.0	81.0	1.5	1.9	12	16	31	1.70	1.03	34	0.274	0.274	0.274	0.274	1.98	SAND	0.5	1.70	130.1	1.28	166.0	non-LIQ	0.989	0.25	0.250	Above Water	0.13	17708	601.9	0.02	0.01	0.000	NA	NA	0.000
4.92	108.6	115.0	115.0	74.2	1.1	1.5	11	14	28	1.34	1.03	30	0.283	0.283	0.283	0.283	1.94	SAND	0.5	1.70	119.3	1.23	146.6	0.37	0.989	0.25	0.250	Above Water	0.13	17360	588.2	0.02	0.01	0.001	NA	NA	0.000
5.09	108.4	115.0	115.0	65.0	1.0	1.5	13	13	24	1.90	1.04	27	0.293	0.293	0.293	0.293	2.00	SAND	0.5	1.70	104.5	1.30	136.3	0.32	0.988	0.25	0.250	Above Water	0.13	17010	573.8	0.02	0.02	0.001	NA	NA	0.000
5.25	108.3	115.0	115.0	54.7	1.1	2.1	17	11	21	3.03	1.06	26	0.302	0.302	0.302	0.302	2.14	SAND	0.5	1.70	87.9	1.54	134.9	0.31	0.988	0.25	0.250	Above Water	0.13	16699	557.3	0.03	0.03	0.001	NA	NA	0.000
5.41	108.1	115.0	115.0	48.3	0.6	1.3	14	10	18	2.20	1.04	21	0.311	0.311	0.311	0.311	2.04	SAND	0.5	1.70	77.6	1.35	104.9	0.19	0.987	0.25	0.250	Above Water	0.13	16399	532.6	0.03	0.04	0.001	NA	NA	0.000
5.58	107.9	115.0	115.0	39.4	0.7	1.8	20	8	15	3.53	1.08	20	0.321	0.321	0.321	0.321	2.22	SAND	0.5	1.70	63.3	1.71	108.0	0.20	0.987	0.25	0.250	Above Water	0.13	16097	515.1	0.04	0.05	0.002	NA	NA	0.000
5.74	107.8	115.0	115.0	39.6	0.8	2.0	20	9	15	3.70	1.08	20	0.330	0.330	0.330	0.330	2.24	SAND	0.5	1.70	63.6	1.78	113.3	0.22	0.987	0.24	0.240	Above Water	0.13	15827	522.8	0.03	0.05	0.002	NA	NA	0.000
5.91	107.6	115.0	115.0	43.3	1.5	3.6	26	10	18	4.43	1.13	24	0.340	0.340	0.340	0.340	2.40	SAND	0.5	1.70	69.5	2.31	160.8	non-LIQ	0.986	0.24	0.240	Above Water	0.13	15552	556.4	0.03	0.03	0.001	NA	NA	0.000
6.07	107.4	115.0	115.0	63.7	1.8	2.8	20	14	24	3.53	1.08	29	0.349	0.349	0.349	0.349	2.22	SAND	0.5	1.70	102.3	1.71	174.4	non-LIQ	0.986	0.24	0.240	Above Water	0.13	15305	621.6	0.02	0.02	0.001	NA	NA	0.000
6.23	107.3	115.0	115.0	62.3	2.6	4.2	25	14	24	4.25	1.11	31	0.358	0.358	0.358	0.358	2.36	SAND	0.5	1.70	100.1	2.14	214.3	non-LIQ	0.985	0.24	0.240	Above Water	0.13	15068	635.2	0.02	0.02	0.001	NA	NA	0.000
6.40	107.1	115.0	115.0	72.5	1.8	2.5	17	15	26	3.09	1.06	30	0.368	0.368	0.368	0.368	2.15	SAND	0.5	1.70	116.2	1.55	180.5	non-LIQ	0.985	0.24	0.240	Above Water	0.13	14826	654.8	0.02	0.02	0.001	NA	NA	0.000
6.56	106.9	115.0	115.0	55.4	1.5	2.7	21	12	20	3.75	1.08	26	0.377	0.377	0.377	0.377	2.25	SAND	0.5	1.67	87.6	1.81	158.3	0.45	0.985	0.24	0.240	Above Water	0.13	14608	612.1	0.03	0.03	0.001	NA	NA	0.000
6.73	106.8	115.0	115.0	43.3	1.0	2.4	22	10	16	3.97	1.10	21	0.387	0.387	0.387	0.387	2.30	SAND	0.5	1.65	67.6	1.93	130.7	0.29	0.984	0.24	0.240	Above Water	0.13	14386	572.0	0.03	0.05	0.002	NA	NA	0.000
6.89	106.6	115.0	115.0	34.9	0.9	2.5	26	8	13	4.36	1.12	19	0.396	0.396	0.396	0.396	2.38	SAND	0.5	1.63	53.9	2.25	121.1	0.25	0.984	0.24	0.240	Above Water	0.13	14184	543.7	0.04	0.07	0.003	NA	NA	0.000
7.05	106.5	115.0	115.0	29.2	0.7	2.5	26	7	11	4.60	1.14	17	0.405	0.405	0.405	0.405	2.45	SAND	0.5	1.62	44.6	2.52	112.5	0.21	0.984	0.24	0.240	Above Water	0.13	13990	521.5	0.05	0.09	0.004	NA	NA	0.000
7.22	106.3	115.0	115.0	31.4	1.1	3.4	32	8	12	4.80	1.17	19	0.415	0.415	0.415	0.415	2.52	SAND	0.5	1.60	47.4	2.87	136.0	0.31	0.983	0.24	0.240	Above Water	0.13	13792	544.7	0.04	0.08	0.003	NA	NA	0.000
7.38	106.1	115.0	115.0	43.7	1.3	3.0	25	10	16	4.33	1.12	22	0.424	0.424	0.424	0.424	2.37	SAND	0.5	1.58	65.2	2.21	144.1	0.36	0.983	0.24	0.240	Above Water	0.14	13611	598.7	0.04	0.05	0.002	NA	NA	0.000
7.55	106.0	115.0	115.0	32.2	1.5	4.7	33	8	13	4.91	1.18	20	0.434	0.434	0.434	0.434	2.56	SILT	0.7	1.70	51.8	3.10	160.4	non-LIQ	0.982	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.71	105.8	115.0	115.0	32.7	3.6	11.1	45	NA	NA	5.00	1.20	#VALUE!	0.443	0.443	0.443	0.443	2.78	non-LIQ CLAY	1	1.70	NA	4.64	non-LIQ	non-LIQ	0.982	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
7.87	105.6	115.0	115.0	62.6	2.5	4.0	25	14	22	4.31	1.12	29	0.453	0.453	0.453	0.453	2.37	SAND	0.5	1.53	90.5	2.19	198.3	non-LIQ	0.982	0.24	0.240	Above Water	0.14	13096	689.1	0.03	0.03	0.001	NA	NA	0.000
8.04	105.5	115.0	115.0	94.0	2.1	2.3	15	19	29	2.48	1.05	33	0.462	0.462	0.462	0.462	2.07	SAND	0.5	1.51	134.4	1.40	188.7	non-LIQ	0.981	0.24	0.240	Above Water	0.14	12929	762.2	0.02	0.02	0.001	NA	NA	0.000
8.20	105.3	115.0	115.0	172.4	1.3	0.8	3	29	43	0.00	1.00	43	0.472	0.472	0.472	0.472	1.54	SAND	0.5	1.50	244.0	1.00	244.0	non-LIQ	0.981	0.24	0.240	Above Water	0.14	12778	881.6	0.02	0.01	0.000	NA	NA	0.000
8.37	105.1	115.0	115.0	140.1	2.0	1.4	8	26	38	0.39	1.01	39	0.481	0.481	0.481	0.481	1.81	SAND	0.5	1.48	196.3	1.12	219.1	non-LIQ	0.980	0.24	0.240	Above Water	0.14	12621	854.2	0.02	0.01	0.000	NA	NA	0.000

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth (ft)	Elev. (ft, MSL)	Unit Weight (pcf) γ'_{MOIST}	Unit Weight (pcf) γ'_{SAT}	q_c (tsf)	f_s (tsf)	Frict. Ratio (%)	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level σ_v (tsf)	Stresses at Exploration Water Level σ_v' (tsf)	Stresses at Design Water Level σ_v (tsf)	Stresses at Design Water Level σ_v' (tsf)	I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance n	C_Q	q_{c1N}	Fines Correction Kc	Fines Correction $(q_{c1N})_{cs}$	$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max} (tsf)	Cyclic Shear Strain γ (%)	Norm. Vol. Strain ε_{Nc} (%)	Dry Settle. ΔS (in)	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε (%)	Layer Post-Liq. Settle. ΔS (in)
8.53	105.0	115.0	115.0	135.0	1.6	1.2	7	24	36	0.17	1.01	36	0.490	0.490	0.490	0.490	1.76	SAND	0.5	1.47	187.3	1.08	202.2	non-LIQ	0.980	0.24	0.240	Above Water	0.14	12479	843.8	0.02	0.01	0.000	NA	NA	0.000
8.69	104.8	115.0	115.0	102.1	2.5	2.5	16	21	30	2.64	1.05	34	0.500	0.500	0.500	0.500	2.09	SAND	0.5	1.46	140.4	1.44	201.9	non-LIQ	0.980	0.24	0.240	Above Water	0.14	12340	806.2	0.02	0.01	0.001	NA	NA	0.000
8.86	104.6	115.0	115.0	71.3	2.2	3.1	21	16	23	3.84	1.09	28	0.509	0.509	0.509	0.509	2.27	SAND	0.5	1.44	97.1	1.85	180.0	non-LIQ	0.979	0.24	0.240	Above Water	0.14	12196	737.8	0.03	0.03	0.001	NA	NA	0.000
9.02	104.5	115.0	115.0	39.6	2.4	5.9	36	10	15	5.00	1.20	22	0.519	0.519	0.519	0.519	2.62	SILT	0.7	1.65	61.6	3.42	210.9	non-LIQ	0.979	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.19	104.3	115.0	115.0	29.6	2.0	6.9	40	8	11	5.00	1.20	18	0.528	0.528	0.528	0.528	2.69	non-LIQ CLAY	1	1.70	NA	3.95	non-LIQ	non-LIQ	0.979	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.35	104.2	115.0	115.0	25.3	1.8	7.2	44	7	10	5.00	1.20	17	0.538	0.538	0.538	0.538	2.76	non-LIQ CLAY	1	1.70	NA	4.46	non-LIQ	non-LIQ	0.978	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.51	104.0	115.0	115.0	29.0	1.3	4.6	37	8	11	5.00	1.20	18	0.547	0.547	0.547	0.547	2.64	SILT	0.7	1.59	43.5	3.57	155.2	0.43	0.978	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
9.68	103.8	115.0	115.0	40.6	1.3	3.1	29	10	13	4.61	1.14	20	0.557	0.557	0.557	0.557	2.45	SAND	0.5	1.38	52.9	2.54	134.5	0.31	0.977	0.24	0.240	Above Water	0.14	11567	647.4	0.05	0.07	0.003	NA	NA	0.000
9.84	103.7	115.0	115.0	52.0	1.6	3.1	25	12	16	4.34	1.12	23	0.566	0.566	0.566	0.566	2.38	SAND	0.5	1.37	67.2	2.22	149.3	0.39	0.977	0.24	0.240	Above Water	0.14	11453	698.6	0.04	0.05	0.002	NA	NA	0.000
10.01	103.5	115.0	115.0	42.0	2.2	5.2	34	11	14	4.94	1.19	22	0.576	0.576	0.576	0.576	2.58	SILT	0.7	1.53	60.8	3.18	193.5	non-LIQ	0.977	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.17	103.3	115.0	115.0	42.3	2.3	5.5	35	11	15	5.00	1.20	22	0.585	0.585	0.585	0.585	2.60	SILT	0.7	1.51	60.5	3.32	200.7	non-LIQ	0.976	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.33	103.2	115.0	115.0	37.9	6.4	16.8	56	NA	NA	5.00	1.20	#VALUE!	0.594	0.594	0.594	0.594	2.97	non-LIQ CLAY	1	1.70	NA	6.39	non-LIQ	non-LIQ	0.976	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.50	103.0	115.0	115.0	146.3	5.4	3.7	18	31	41	3.15	1.06	46	0.604	0.604	0.604	0.604	2.16	SAND	0.5	1.32	183.1	1.57	287.5	non-LIQ	0.976	0.24	0.240	Above Water	0.14	11016	976.9	0.02	0.01	0.000	NA	NA	0.000
10.66	102.8	115.0	115.0	32.1	4.1	12.7	53	NA	NA	5.00	1.20	#VALUE!	0.613	0.613	0.613	0.613	2.92	non-LIQ CLAY	1	1.70	NA	5.92	non-LIQ	non-LIQ	0.975	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
10.83	102.7	115.0	115.0	39.1	0.7	1.8	24	9	11	4.14	1.10	17	0.623	0.623	0.623	0.623	2.33	SAND	0.5	1.30	48.2	2.05	98.6	0.17	0.975	0.24	0.240	Above Water	0.14	10813	651.4	0.05	0.11	0.004	NA	NA	0.000
10.99	102.5	115.0	115.0	36.2	0.8	2.2	27	8	11	4.48	1.13	17	0.632	0.632	0.632	0.632	2.42	SAND	0.5	1.29	44.2	2.38	105.2	0.19	0.974	0.24	0.240	Above Water	0.14	10719	646.1	0.06	0.12	0.004	NA	NA	0.000
11.15	102.4	115.0	115.0	21.6	1.0	4.5	41	6	8	5.00	1.20	14	0.641	0.641	0.641	0.641	2.72	non-LIQ CLAY	1	1.65	NA	4.12	non-LIQ	non-LIQ	0.974	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.32	102.2	115.0	115.0	24.2	1.1	4.5	40	6	8	5.00	1.20	15	0.651	0.651	0.651	0.651	2.68	non-LIQ CLAY	1	1.63	NA	3.87	non-LIQ	non-LIQ	0.974	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.48	102.0	115.0	115.0	30.0	1.2	3.9	36	8	10	5.00	1.20	17	0.660	0.660	0.660	0.660	2.62	SILT	0.7	1.39	39.5	3.43	135.5	0.31	0.973	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.65	101.9	115.0	115.0	20.1	1.1	5.5	47	6	7	5.00	1.20	14	0.670	0.670	0.670	0.670	2.82	non-LIQ CLAY	1	1.58	NA	4.95	non-LIQ	non-LIQ	0.973	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.81	101.7	115.0	115.0	19.8	1.0	5.0	46	6	7	5.00	1.20	13	0.679	0.679	0.679	0.679	2.80	non-LIQ CLAY	1	1.56	NA	4.78	non-LIQ	non-LIQ	0.972	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
11.98	101.5	115.0	115.0	18.8	1.1	5.6	49	6	7	5.00	1.20	13	0.689	0.689	0.689	0.689	2.85	non-LIQ CLAY	1	1.54	NA	5.26	non-LIQ	non-LIQ	0.972	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.14	101.4	115.0	115.0	20.6	1.0	5.0	46	6	7	5.00	1.20	14	0.698	0.698	0.698	0.698	2.80	non-LIQ CLAY	1	1.52	NA	4.74	non-LIQ	non-LIQ	0.972	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.30	101.2	115.0	115.0	22.2	1.0	4.7	43	6	8	5.00	1.20	14	0.707	0.707	0.707	0.707	2.76	non-LIQ CLAY	1	1.50	NA	4.42	non-LIQ	non-LIQ	0.971	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.47	101.0	115.0	115.0	23.3	1.1	4.7	43	6	8	5.00	1.20	14	0.717	0.717	0.717	0.717	2.74	non-LIQ CLAY	1	1.48	NA	4.32	non-LIQ	non-LIQ	0.971	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.63	100.9	115.0	115.0	23.7	1.1	4.6	42	6	8	5.00	1.20	14	0.726	0.726	0.726	0.726	2.74	non-LIQ CLAY	1	1.46	NA	4.28	non-LIQ	non-LIQ	0.971	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.80	100.7	115.0	115.0	21.5	1.1	5.2	46	6	7	5.00	1.20	14	0.736	0.736	0.736	0.736	2.81	non-LIQ CLAY	1	1.44	NA	4.65	non-LIQ	non-LIQ	0.970	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
12.96	100.5	115.0	115.0	22.0	1.1	5.0	46	6	7	5.00	1.20	14	0.745	0.745	0.745	0.745	2.79	non-LIQ CLAY	1	1.42	NA	4.71	non-LIQ	non-LIQ	0.970	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.12	100.4	115.0	115.0	22.5	1.1	4.7	44	6	7	5.00	1.20	14	0.754	0.754	0.754	0.754	2.77	non-LIQ CLAY	1	1.40	NA	4.53	non-LIQ	non-LIQ	0.969	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.29	100.2	115.0	115.0	19.3	1.0	5.2	49	6	7	5.00	1.20	13	0.764	0.764	0.764	0.764	2.86	non-LIQ CLAY	1	1.38	NA	5.30	non-LIQ	non-LIQ	0.969	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.45	100.1	115.0	115.0	18.2	0.9	5.2	51	5	6	5.00	1.20	13	0.773	0.773	0.773	0.773	2.88	non-LIQ CLAY	1	1.37	NA	5.52	non-LIQ	non-LIQ	0.969	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.62	99.9	115.0	115.0	21.7	0.9	4.1	43	6	7	5.00	1.20	13	0.783	0.783	0.783	0.783	2.75	non-LIQ CLAY	1	1.35	NA	4.41	non-LIQ	non-LIQ	0.968	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
13.78	99.7	115.0	115.0	36.5	1.1	2.9	32	9	10	4.83	1.17	17	0.792	0.792	0.792	0.792	2.53	SAND	0.5	1.16	39.9	2.92	116.3	0.23	0.968	0.24	0.240	Above Water	0.14	9358	711.4	0.06	0.14	0.005	NA	NA	0.000
13.94	99.6	115.0	115.0	38.4	1.4	3.6	34	10	11	4.94	1.19	18	0.802	0.802	0.802	0.802	2.58	SAND	0.5	1.15	41.7	3.18	132.5	0.30	0.967	0.24	0.240	Above Water	0.14	9293	731.7	0.06	0.12	0.005	NA	NA	0.000
14.11	99.4	115.0	115.0	32.0	1.4	4.3	38	8	10	5.00	1.20	17	0.811	0.811	0.811	0.811	2.65	non-LIQ CLAY	1	1.30	NA	3.67	non-LIQ	non-LIQ	0.967	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.27	99.2	115.0	115.0	21.7	1.3	6.0	51	6	7	5.00	1.20	14	0.821	0.821	0.821	0.821	2.88	non-LIQ CLAY	1	1.29	NA	5.54	non-LIQ	non-LIQ	0.967	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.44	99.1	115.0	115.0	29.2	1.1	3.7	38	8	9	5.00	1.20	15	0.830	0.830	0.830	0.830	2.65	non-LIQ CLAY	1	1.27	NA	3.62	non-LIQ	non-LIQ	0.966	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
14.60	98.9	115.0	115.0	67.8	1.5	2.1	21	15	17	3.71	1.08	22	0.839	0.839	0.839	0.839	2.25	SAND	0.5	1.12	71.9	1.79	128.5	0.28	0.966	0.24	0.240	Above Water	0.15	9039	854.1	0.05	0.06	0.002	NA	NA	0.000
14.76	98.7	115.0	115.0	92.5	1.5	1.6	15	19	21	2.36	1.05	24	0.849	0.849	0.849	0.849	2.06	SAND	0.5	1.12	97.6	1.38	134.8	0.31	0.966	0.24	0.240	Above Water	0.15	8960	926.6	0.04	0.04	0.001	NA	NA	0.000
14.93	98.6	115.0	115.0	93.8	2.0	2.1	17	20	22	3.05	1.06	26	0.858	0.858	0.858	0.858	2.14	SAND	0.5	1.11	98.5	1.54	151.5	0.40	0.965	0.24	0.240	Above Water	0.15	8919	945.4	0.04	0.04	0.001	NA	NA	0.000
15.09	98.4	115.0	115.0	85.0	2.5	2.9	22	19	21	3.87	1.09	26	0.868	0.868	0.868	0.868	2.28	SAND	0.5	1.10	88.7	1.87	166.2	non-LIQ	0.965	0.24	0.240	Above Water	0.15	8862	935.0	0.04	0.04	0.001	NA	NA	0.000
15.26	98.2	115.0	115.0	63.5	2.8	4.4	31	15	17	4.75	1.16	24	0.877	0.877	0.877	0.877	2.50	SAND	0.5	1.10	65.9	2.76	182.1	non-LIQ	0.964	0.24	0.240	Above Water	0.15	8802	880.9	0.05	0.06	0.002	NA	NA	0.000
15.42	98.1	115.0	115.0	44.5	2.8	6.2	40	12	13	5.00	1.20	21	0.887	0.887	0.887	0.887	2.69	non-LIQ CLAY	1	1.19	NA	3.94	non-LIQ	non-LIQ	0.964	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.58	97.9	115.0	115.0	31.4	1.8	5.7	45	9	10	5.00	1.20	16	0.896	0.896	0.896	0.896	2.78	non-LIQ CLAY	1	1.18	NA	4.61	non-LIQ	non-LIQ	0.964	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.75	97.8	115.0	115.0	27.0	1.5	5.6	47	8	8	5.00	1.20	15	0.906	0.906	0.906	0.906	2.82	non-LIQ CLAY	1	1.17	NA	4.98	non-LIQ	non-LIQ	0.963	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
15.91	97.6	115.0	115.0	29.0	1.4	4.8	44	8	9	5.00	1.20	15	0.915	0.915	0.915	0.915	2.76	non-LIQ CLAY	1	1.16	NA	4.45	non-LIQ	non-LIQ	0.963	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.08	97.4	115.0	115.0	37.9	1.9	4.9	39	10	11	5.00	1.20	16	0.925	0.925	0.925	0.925	2.68	non-LIQ CLAY	1	1.14	NA	3.65	non-LIQ	non-LIQ	0.963	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.24	97.3	115.0	115.0	35.5	2.1	5.9	44	10	11	5.00	1.20	18	0.934	0.934	0.934	0.934	2.76	non-LIQ CLAY	1	1.13	NA	4.45	non-LIQ	non-LIQ	0.962	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.40	97.1	115.0	115.0	27.3	1.9	7.0	52	8	9	5.00	1.20	15	0.943	0.943	0.943	0.943	2.90	non-LIQ CLAY	1	1.12	NA	5.74	non-LIQ	non-LIQ	0.962	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.57	96.9	115.0	115.0	25.3	1.7	6.6	53	8	8	5.00	1.20	15	0.953	0.953	0.953	0.953	2.91	non-LIQ CLAY	1	1.11	NA	5.81	non-LIQ	non-LIQ	0.961	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.73	96.8	115.0	115.0	29.2	1.7	5.9	48	8	9	5.00	1.20	16	0.962	0.962	0.962	0.962	2.83	non-LIQ CLAY	1	1.10	NA	5.08	non-LIQ	non-LIQ	0.961	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
16.90	96.6	115.0	115.0	50.0	1.9	3.6	33	12	13	4.86	1.18	20	0.972	0.972	0.972	0.972	2.54	SAND	0.5	1.04	49.3	2.98	146.8	0.37	0.961	0.24	0.240	Above Water	0.15	8279	846.9	0.06	0.10	0.004	NA	NA	0.000
17.06	96.4	115.0	115.0	53.1	2.1	4.0	32	13	14	4.85	1.18	21	0.981	0.981	0.981	0.981	2.54	SAND	0.5	1.04	52.1	2.98	155.0	0.43	0.960	0.24	0.240	Above Water	0.15	8233	866.6	0.06	0.09	0.003	NA	NA	0.000
17.22	96.3	115.0	115.0	48.9	2.2	4.4	35	12	13	5.00	1.20	20	0.990	0.990	0.990	0.990	2.60	SAND	0.5	1.03	47.8	3.31	158.3	0.45	0.960	0.24	0.240	Above Water	0.15	8187	854.2	0.06	0.10	0.004	NA	NA	0.000
17.39	96.1	115.0	115.0	43.4	2.2	5.1	39	12	12	5.00	1.20	19	1.000	1.000	1.000	1.000	2.67	non-LIQ CLAY	1	1.06	NA	3.81	non-LIQ	non-LIQ	0.959	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.55	96.0	115.0	115.0	36.2	2.0	5.6	44	10	10	5.00	1.20	17	1.009	1.009	1.009	1.009	2.77	non-LIQ CLAY	1	1.05	NA	4.50	non-LIQ	non-LIQ	0.959	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.72	95.8	115.0	115.0	35.5	1.9	5.2	43	10	10	5.00	1.20	17	1.019	1.019	1.019	1.019	2.75	non-LIQ CLAY	1	1.04	NA	4.39	non-LIQ	non-LIQ	0.959	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
17.88	95.6	115.0	115.0	42.7	1.8	4.3	37	11	11	5.00	1.20	19	1.028	1.028	1.028	1.028	2.63	non-LIQ CLAY	1	1.03	NA	3.52	non-LIQ	non-LIQ	0.958	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.04	95.5	115.0	115.0	49.5	2.0	4.0	34	12	13	4.92	1.19	20	1.037	1.037	1.037	1.037	2.57	SAND	0.5	1.01	47.2	3.13	148.0	0.38	0.958	0.24	0.240	Above Water	0.15	7961	866.7	0.06	0.11	0.004	NA	NA	0.000
18.21	95.3	115.0	115.0	34.8	2.0	5.8	46	10	10	5.00	1.20	17	1.047	1.047	1.047	1.047	2.80	non-LIQ CLAY	1	1.01	NA	4.76	non-LIQ	non-LIQ	0.958	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.37	95.1	115.0	115.0	33.6	2.0	6.1	48	10	10	5.00	1.20	17	1.056	1.056	1.056	1.056	2.83	non-LIQ CLAY	1	1.00	NA	5.03	non-LIQ	non-LIQ	0.957	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.54	95.0	115.0	115.0	47.6	2.4	5.1	39	13	13	5.00	1.20	20	1.066	1.066	1.066	1.066	2.66	non-LIQ CLAY	1	0.99	NA	3.75	non-LIQ	non-LIQ	0.957	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
18.70	94.8	115.0	115.0	65.3	2.8	4.3	31	16	16	4.78	1.16	23	1.075	1.075	1.075	1.075	2.51	SAND	0.5	0.99	61.2	2.83	173.2	non-LIQ	0.956	0.24	0.240	Above Water	0.15	7792	953.4	0.05	0.07	0.003	NA	NA	0.000
18.86	94.6	115.0	115.0	64.7	2.9	4.5	32	16	16	4.83	1.17	23	1.084	1.084	1.084	1.084	2.53	SAND	0.5	0.99	60.4	2.93	176.9	non-LIQ	0.956	0.24	0.240	Above Water	0.15	7752	956.0	0.05	0.07	0.003	NA	NA	0.000
19.03	94.5	115.0	115.0	58.9	2.8	4.8	35	15	15	4.96	1.19	23	1.094	1.094	1.094	1.094	2.59	SAND	0.5	0.98	54.7	3.24	177.1	non-LIQ	0.956	0.24	0.240	Above Water	0.15	7710	937.5	0.06	0.08	0.003	NA	NA	0.000
19.19	94.3	115.0	115.0	52.3	2.7	5.1	38	14	13	5.00	1.20	21	1.103	1.103	1.103	1.103	2.64	non-LIQ CLAY	1	0.96	NA	3.61	non-LIQ	non-LIQ	0.955	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.36	94.1	115.0	115.0	43.7	2.4	5.6	42	12	12	5.00	1.20	19	1.113	1.113	1.113	1.113	2.73	non-LIQ CLAY	1	0.95	NA	4.25	non-LIQ	non-LIQ	0.955	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.52	94.0	115.0	115.0	37.8	2.1	5.5	45	11	10	5.00	1.20	17	1.122	1.122	1.122	1.122	2.78	non-LIQ CLAY	1	0.94	NA	4.59	non-LIQ	non-LIQ	0.954	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.69	93.8	115.0	115.0	32.8	1.7	5.1	46	9	9	5.00	1.20	16	1.132	1.132	1.132	1.132	2.80	non-LIQ CLAY	1	0.93	NA	4.80	non-LIQ	non-LIQ	0.954	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
19.85	93.7	115.0	115.0	25.7	1.5	5.9	54	8	8	5.00	1.20	14	1.141	1.141	1.141	1.141	2.94	non-LIQ CLAY	1	0.93	NA	6.07	non-LIQ	non-LIQ	0.954	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.01	93.5	115.0	115.0	23.7	1.5	6.2	57	7	7	5.00	1.20	14	1.151	1.151	1.151	1.151	2.98	non-LIQ CLAY	1	0.92	NA	6.55	non-LIQ	non-LIQ	0.953	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.18	93.3	115.0	115.0	22.8	1.5	6.5	59	7	7	5.00	1.20	13	1.160	1.160	1.160	1.160	3.01	non-LIQ CLAY	1	0.91	NA	6.87	non-LIQ	non-LIQ	0.953	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.34	93.2	115.0	115.0	24.1	1.6	6.6	58	8	7	5.00	1.20	14	1.170	1.170	1.170	1.170	3.00	non-LIQ CLAY	1	0.90	NA	6.73	non-LIQ	non-LIQ	0.953	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.51	93.0	115.0	115.0	24.5	1.9	7.6	61	8	8	5.00	1.20	14	1.179	1.179	1.179	1.179	3.04	non-LIQ CLAY	1	0.90	NA	7.17	non-LIQ	non-LIQ	0.952	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.67	92.8	115.0	115.0	26.3	2.2	8.4	62	9	8	5.00	1.20	15	1.189	1.189	1.189	1.189	3.05	non-LIQ CLAY	1	0.89	NA	7.30	non-LIQ	non-LIQ	0.952	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
20.83	92.7	115.0	115.0	29.4	2.5	8.6	60	10	9	5.00	1.20	16	1.198	1.198	1.198	1.198	3.02	non-LIQ CLAY	1	0.88	NA	6.97	non-LIQ	non-LIQ	0.951	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.00	92.5	115.0	115.0	36.3	2.8	7.8	54	11	10	5.00	1.20	17	1.208	1.208	1.208	1.208	2.92	non-LIQ CLAY	1	0.88	NA	5.94	non-LIQ	non-LIQ	0.951	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.16	92.3	115.0	115.0	40.5	3.1	7.6	51	12	11	5.00	1.20	18	1.217	1.217	1.217	1.217	2.88	non-LIQ CLAY	1	0.87	NA	5.53	non-LIQ	non-LIQ	0.951	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.33	92.2	115.0	115.0	49.7	3.4	6.9	46	14	13	5.00	1.20	21	1.226	1.226	1.226	1.226	2.79	non-LIQ CLAY	1	0.86	NA	4.72	non-LIQ	non-LIQ	0.950	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.49	92.0	115.0	115.0	57.7	3.9	6.7	43	16	15	5.00	1.20	23	1.236	1.236	1.236	1.236	2.74	non-LIQ CLAY	1	0.86	NA	4.30	non-LIQ	non-LIQ	0.950	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.65	91.9	115.0	115.0	59.2	4.5	7.6	45	17	15	5.00	1.20	23	1.245	1.245	1.245	1.245	2.78	non-LIQ CLAY	1	0.85	NA	4.58	non-LIQ	non-LIQ	0.950	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.82	91.7	115.0	115.0	62.1	5.1	8.2	45	18	16	5.00	1.20	24	1.255	1.255	1.255	1.255	2.79	non-LIQ CLAY	1	0.84	NA	4.67	non-LIQ	non-LIQ	0.949	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
21.98	91.5	115.0	115.0	68.6	5.8	8.5	44	19	18	5.00	1.20	26	1.264	1.264	1.264	1.264	2.77	non-LIQ CLAY	1	0.84	NA	4.56	non-LIQ	non-LIQ	0.949	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.15	91.4	115.0	115.0	76.4	6.7	8.6	43	22	20	5.00	1.20	29	1.274	1.274	1.274	1.274	2.74	non-LIQ CLAY	1	0.83	NA	4.30	non-LIQ	non-LIQ	0.948	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.31	91.2	115.0	115.0	89.5	7.5	8.3	40	24	22	5.00	1.20	31	1.283	1.283	1.283	1.283	2.70	non-LIQ CLAY	1	0.82	NA	3.98	non-LIQ	non-LIQ	0.948	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.47	91.0	115.0	115.0	96.3	7.8	8.1	39	26	23	5.00	1.20	33	1.292	1.292	1.292	1.292	2.67	non-LIQ CLAY	1	0.82	NA	3.79	non-LIQ	non-LIQ	0.948	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000

Liquefaction Analysis with Cone Penetration Test (CPT) Data

Depth	Elev.	Unit Weight (pcf)		q_c	f_s	Frict. Ratio	% Fines	Equiv. N_{60}	Equiv. $(N_1)_{60}$	α	β	Equiv. $(N_1)_{60cs}$	Stresses at Exploration Water Level		Stresses at Design Water Level		I_c	Soil Type Character (SAND, SILT or non-LIQ CLAY)	Normalization of Tip Resistance			Fines Correction		$CRR_{7.5}$	r_d	CSR_M	$CSR_{7.5}$	FS	a	b	Max Shear Modulus G_{max}	Cyclic Shear Strain γ	Norm. Vol. Strain ε_{Nc}	Dry Settle. ΔS	Post-Liq. $(N_1)_{60cs}$	Post-Liq. Vol. Strain ε	Layer Post-Liq. Settle. ΔS
		γ'_{MOIST}	γ'_{SAT}										σ'_v	σ_v	σ'_v	σ_v			n	C_Q	q_{c1N}	Kc	$(q_{c1N})_{cs}$														
(ft)	(ft, MSL)			(tsf)	(tsf)	(%)							(tsf)	(tsf)	(tsf)	(tsf)														(tsf)	(%)	(%)	(in)		(%)	(in)
22.64	90.9	115.0	115.0	99.0	8.1	8.2	39	26	24	5.00	1.20	33	1.302	1.302	1.302	1.302	2.67	non-LIQ CLAY	1	0.81	NA	3.76	non-LIQ	non-LIQ	0.947	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.80	90.7	115.0	115.0	103.1	8.0	7.7	37	27	24	5.00	1.20	34	1.311	1.311	1.311	1.311	2.64	non-LIQ CLAY	1	0.81	NA	3.58	non-LIQ	non-LIQ	0.947	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
22.97	90.5	115.0	115.0	109.6	7.9	7.2	35	28	25	5.00	1.20	35	1.321	1.321	1.321	1.321	2.60	non-LIQ CLAY	1	0.80	NA	3.33	non-LIQ	non-LIQ	0.946	0.24	0.240	Above Water	NA	NA	NA	NA	NA	0.000	NA	NA	0.000
23.13	90.4	115.0	115.0	118.5	7.6	6.4	31	29	26	4.76	1.16	35	1.330	1.330	1.330	1.330	2.51	SAND	0.5	0.89	99.9	2.83	282.9	non-LIQ	0.946	0.23	0.230	Above Water	0.16	6858	1248.3	0.04	0.03	0.001	NA	NA	0.000
23.29	90.2	115.0	115.0	127.9	7.6	5.9	29	31	27	4.65	1.15	36	1.339	1.339	1.339	1.339	2.46	SAND	0.5	0.89	107.4	2.60	279.1	non-LIQ	0.946	0.23	0.230	Above Water	0.16	6830	1273.9	0.04	0.03	0.001	NA	NA	0.000
23.46	90.0	115.0	115.0	134.4	7.4	5.5	28	32	28	4.53	1.13	36	1.349	1.349	1.349	1.349	2.43	SAND	0.5	0.89	112.5	2.43	273.4	non-LIQ	0.945	0.23	0.230	Above Water	0.16	6800	1290.9	0.04	0.03	0.001	NA	NA	0.000
23.62	89.9	115.0	115.0	127.6	6.2	4.8	26	30	26	4.41	1.12	34	1.358	1.358	1.358	1.358	2.40	SAND	0.5	0.88	106.4	2.29	243.9	non-LIQ	0.945	0.23	0.230	Above Water	0.16	6773	1265.1	0.04	0.03	0.001	NA	NA	0.000
23.79	89.7	115.0	115.0	114.6	4.0	3.5	23	26	23	4.07	1.10	29	1.368	1.368	1.368	1.368	2.32	SAND	0.5	0.88	95.2	2.00	190.6	non-LIQ	0.945	0.23	0.230	Above Water	0.16	6744	1209.3	0.04	0.04	0.002	NA	NA	0.000
23.95	89.6	115.0	115.0	105.2	2.1	1.9	18	22	19	3.15	1.06	24	1.377	1.377	1.377	1.377	2.16	SAND	0.5	0.88	67.2	1.57	136.7	0.32	0.944	0.23	0.230	Above Water	0.16	6717	1152.0	0.05	0.05	0.002	NA	NA	0.000
24.11	89.4	115.0	115.0	87.6	1.1	1.2	15	18	16	2.63	1.05	19	1.386	1.386	1.386	1.386	2.09	SAND	0.5	0.87	72.4	1.43	103.8	0.18	0.944	0.23	0.230	Above Water	0.16	6690	1076.2	0.06	0.07	0.003	NA	NA	0.000
24.28	89.2	115.0	115.0	71.3	0.8	1.1	17	15	13	2.91	1.06	16	1.396	1.396	1.396	1.396	2.12	SAND	0.5	0.87	58.7	1.50	88.1	0.14	0.943	0.23	0.230	Above Water	0.16	6662	1012.1	0.06	0.11	0.004	NA	NA	0.000
24.44	89.1	115.0	115.0	68.5	0.7	1.0	16	14	12	2.80	1.05	16	1.405	1.405	1.405	1.405	2.11	SAND	0.5	0.87	56.2	1.47	82.8	0.13	0.943	0.23	0.230	Above Water	0.16	6636	998.8	0.07	0.12	0.005	NA	NA	0.000

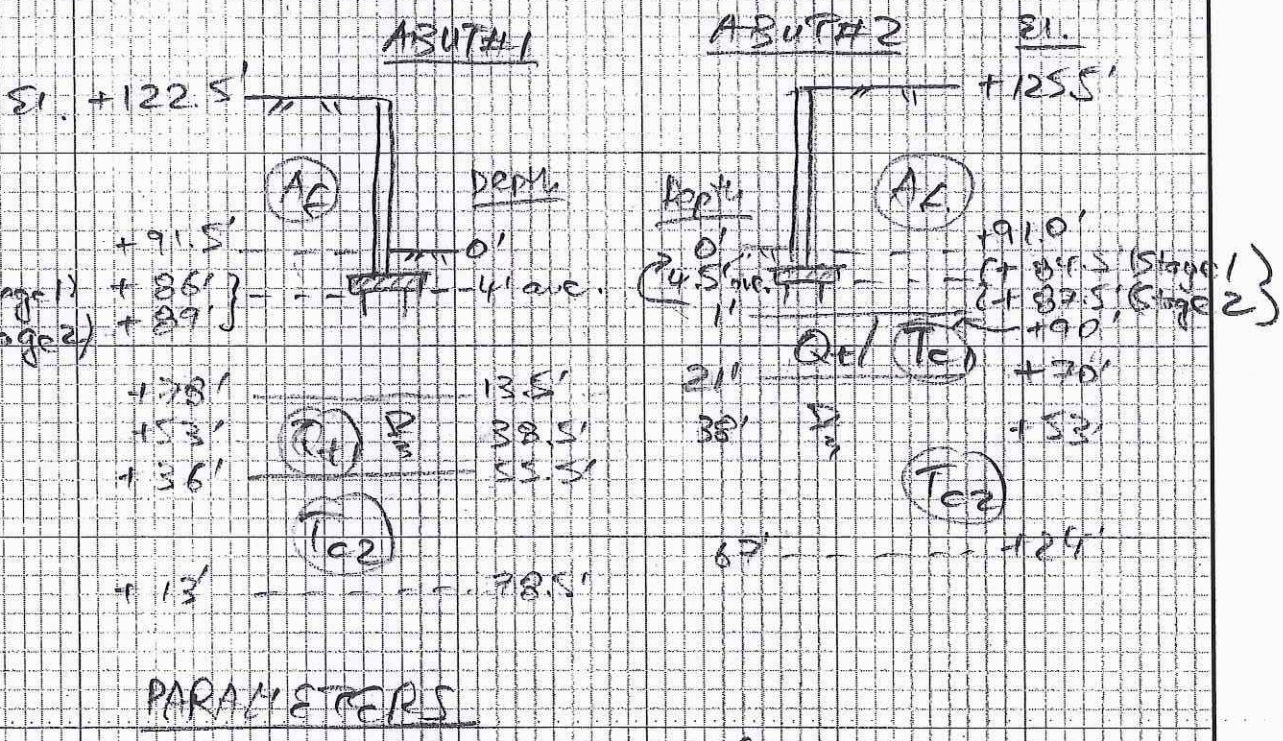
ABUTMENTS

Project I-5 HOV SEG. 1
BRIDGE #C
Project No. 11-135

By MK Date 3/29/12 Checked By MC Date 5/4/12 Sheet 1 of 4

PILE AXIAL DESIGN — ABUTS

1) CONFIG.



PARAMETERS

UNIT	TYPE	pbw	ϕ	c (psf)	K	K	ε_{50}
AE	CL/ML	120	32°	200	1/1.5	–	.02
Tc1	STIFF CH	120	0	1,800	–	.5	.01
Tc2	HARD CH	125	0	4,000	–	.5	.005

2) PILE DATA

HP 14 x 89 (design section for HP 14 x 117)

$A_{steel} = .182\ ft^2$ $A_{conc.\ plug} = .705\ ft^2$

$A_{steel\ (outside\ flg)} = 4.76'$

$z_g = 5\%$ of $14'' = .058'$

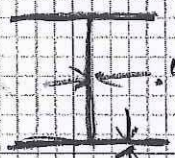
$I_{xx} = 904\ in^4$

$I_{yy} = 326\ in^4$

3) PILE SECTIONS

HP 10x42 (CLASS 90)

$t_{req}^{web} = .415" + .001"/yr \times 50 yrs$
$= .465"$

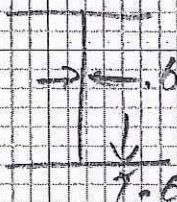


$t_{req}^{flange} = .42" + .001" \times 50$
$= .47"$

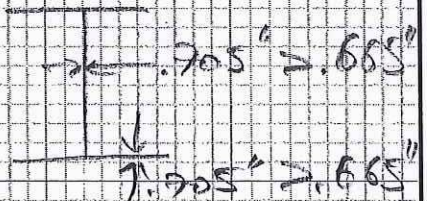
∴ HP 10x57 has the req. sacrificial steel.

HP 14x89 (CLASS 200)

$t_{req} = .615" + .001 \times 50$
$= .665"$

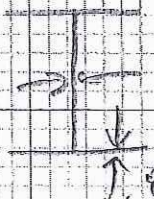


∴ HP 14x102 has the req. sacrificial steel.



HP 14x117 also meets.

∴ recommend for hard driving conditions.



4) AXIAL PILE CAPACITY

a) LOADS & TIPS

ABUT	STAGE	SERVICE-1 LOAD	NOMINAL x2 = R_u	EGE	PILE LENGTH	TIP El.	DESIGN SPEC. TIP El.
1	1	184^K	368^K → 370^K	+91.5'	- 71'	= +20.5'	+20'
	2	169^K	338^K → 340^K	+91.0'	- 67'	= +24.0'	+24'
2	1	197^K	394^K → 400^K	+91.5'	- 53'	= +38.5'	+38'
	2	179^K	358^K → 360^K	+91.0'	- 49'	= +42.0'	+42'

NO TENSION DESIGN El. @ ABUTS.

b) CHECK PILEGROUP CAPACITY:

ABUT	STAGE	ΣR_u (single piles)	PILEGROUP L	W	D	$\bar{S}_u$	Q_g
1	1	84×370^K = 31,080^K	99'8"	14'	65.5'	2.15^{ksf}	32,000^K > 31,080^K
	2	56×340^K = 19,040^K	62'6"	12'	65.5'	2.15	22,500^K > 19,040^K
2	1	84×400^K = 33,600^K	99'8"	14'	46'	3.23^{ksf}	33,700^K > 33,600^K
	2	56×360^K = 20,160^K	62'6"	12'	46'	3.23	23,625^K > 20,160^K

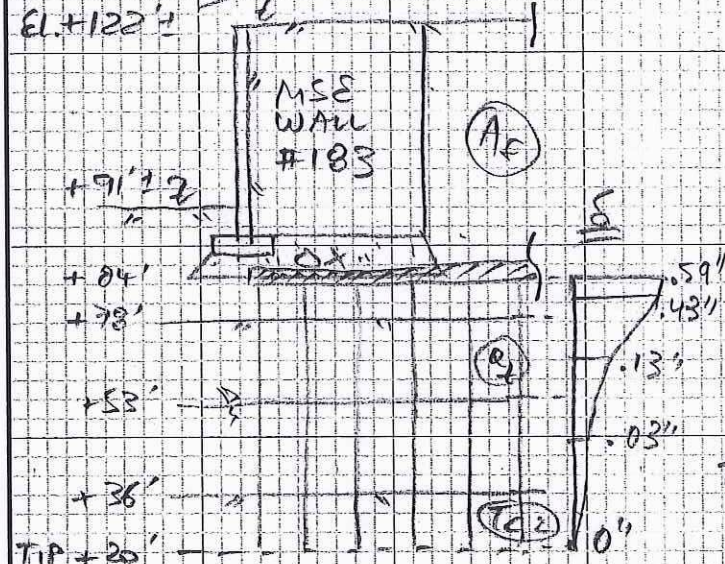
$\bar{S}_u = (1^{ksf} \times 9.5'(\text{avg}) + 1.8^{ksf} \times 42' + 4^{ksf} \times 14'(\text{avg}))/65.5' = 2.15^{ksf}$

$\bar{S}_u = (1.8^{ksf} \times 16'(\text{avg}) + 4^{ksf} \times 30')/46' = 3.23^{ksf}$

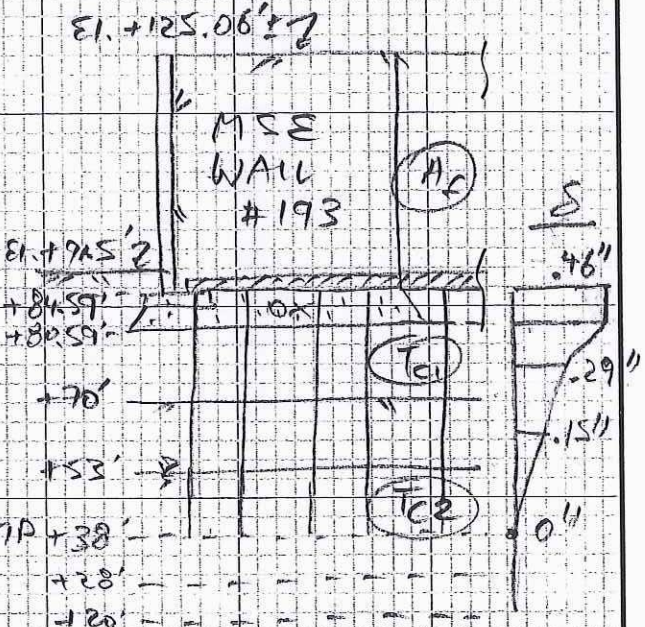
∴ SINGLE PILE DESIGN TIPS ARE OK.

c) CHECK FOR PILE DOWNDRAG

ABUT #1



ABUT #2



"δ" = soil settlement due to MSE wall backfills

Soil movement required relative to pile to cause downdrag ≥ 0.6" per NAVFAC DM 7.2-21 criteria

∴ All δ are ≤ 0.6" → no pile downdrag/negative skin friction on piles.

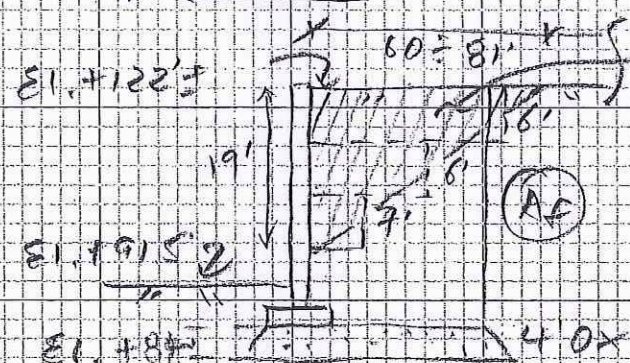
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project I-5 HOV SEG. 1
MSE RW 183 Project No. 11F125

By MK Date 7/23/12 Checked By LLC Date 9/12/12 Sheet 5 of 16

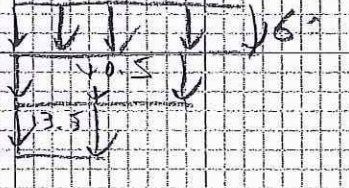
b) SETTLEMENT DUE TO NEW ROADWAY FILL @ MSE WALL 183

1) CONFIG.



	γ (pcf)	Cc (preloaded)
AC	120	.02
Qal	120	.03
Tc2	125	.01

2) LOADING



$P_1 = 6' \times .12 = .72$ ksf
$P_2 = 6' \times .12 = .72$ ksf
$P_3 = 7' \times .12 = .84$ ksf

3) SETTLEMENT ESTIMATE

@ WALL BASE (SEE ATTACHED CALC)

$\delta = .59''$

SOURCE: FOUNDATION REPORT FOR RW 181/183/193/203, I-5 HOV SEG. 1 (EMI, 2012)

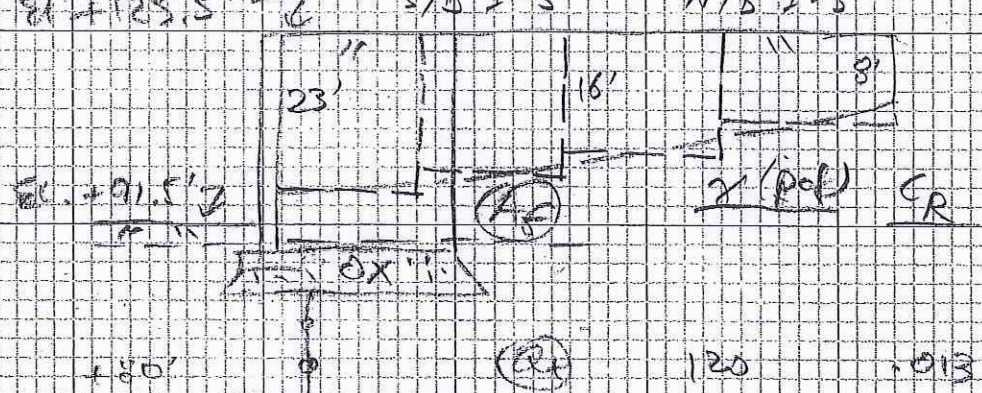
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project I-5 HOV SEG. 1
MSE RW 193 Project No. 11-155

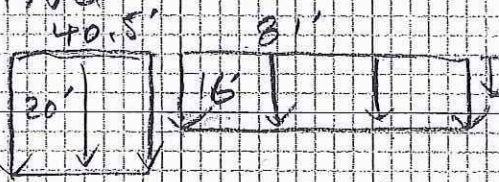
By MK Date 7/23/12 Checked By LL Date 9/14/12 Sheet 6 of 16

c) SETTLEMENT DUE TO NEW ROADWAY FILL @ MSE 193

1) CONFIG.



2) LOADING



$P_1 = 20' \times .12 = 2.4$ KSF
$P_2 = 16' \times .12 = 1.92$ KSF
$P_3 = 12' \times .12 = 1.44$ KSF

3) SETTLEMENT ESTIMATE @ WALL BASE (SEE ATTACHED CALC)

$\delta = .46''$

SOURCE: SEE page 2c/4

AXIAL PILE CAPACITY

PILAX 4.1

Project: I-5 HOV SEGMENT 1
EMI Project No.: 11-135
Description: Avenida Pico UC
Abut 1, HP14x89
Date: 3/29/12 by: MK checked:

UNITS	
Length	Force
ft	K

GWE	GWD
ft	ft
-38.50	38.50

PILE PARAMETERS			
Pile Elev.		Displ. to Mobilize	
Top	Tip	Friction	Bearing
ft	ft	ft	ft
-4.00	-78.50	0.02	0.058

○ Open section
○ HP section
◉ Full section
☐ Allow plugging

E-Modulus	
Top	Tip
K/ft2	K/ft2
4.32E+06	4.32E+06

Circumference		Sectional Area	
Skin	(Unused)	Pile	(Unused)
ft	ft	ft2	ft2
4.760	4.760	0.705	0.705
4.760	4.760	0.705	0.705
4.760	4.760	0.705	0.705

SOIL LAYERS				GRANULAR SOIL-PILE PARAMETERS					COHESIVE SOIL-PILE PARAMETERS			
Description	Top El.	Depth	Total Unit Weight	Friction Angle	Bearing Capacity Factor	Lateral Earth Pressure Coefficients		Skin Friction Angle	Cohesion	Bearing Capacity Factor	Adhesion Factors or "API"	
			γ	ϕ	N_q	K_C	K_T	δ	c	N_C	α_C	α_T
-	ft	ft	K/ft2	deg	-	-	-	deg	K/ft2	-	-	-
Af- Clay/Silt	0.00	0.00	0.120	32.00	0	1.00	0.50	27.00				
TC - stiff CH	-13.50	13.50	0.120						1.800	9	0.50	0.50
TC-hard MH	-55.50	55.50	0.125						4.000	9	0.50	0.50

SOIL LAYERS			OVERBURDEN		PILE SKIN FRICTION						PILE END BEARING			TOTAL PILE CAPACITY		
Description	Top El.	Depth	Total Stress	Effect. Stress	Unit Stress		Outside Friction Capacity		Inside Friction Capacity		Unit Stress	Section Capacity	Plug Capacity	Plugged?	Compression	Tension
			σ_V	σ'_V	f_C	f_T	Q_{FC}	Q_{FT}	Q'_{FC}	Q'_{FT}	q_E	Q_E	Q'_E		Q_C	Q_T
-	-	☑ Interval 2.00	-	-	max: 2.40	max: 2.40	FOS: 1.00	FOS: 1.00	FOS: 1.00	FOS: 1.00	max: 200.00	FOS: 1.00	FOS: 1.00	-	-	-
text	ft	ft	K/ft2	K/ft2	K/ft2	K/ft2	K	K	K	K	K/ft2	K	K	Yes/No	K	K
1-Af- Clay/Sil	0.00	0.00	0.00	0.00												
1-Af- Clay/Sil	-2.00	2.00	0.24	0.24												
1-Af- Clay/Sil	-4.00	4.00	0.48	0.48	0.24	0.12	0.0	0.0			0.00	0.0		N/A	0.0	0.0
1-Af- Clay/Sil	-6.00	6.00	0.72	0.72	0.37	0.18	2.9	1.5			0.00	0.0		N/A	2.9	1.5
1-Af- Clay/Sil	-8.00	8.00	0.96	0.96	0.49	0.24	7.0	3.5			0.00	0.0		N/A	7.0	3.5
1-Af- Clay/Sil	#######	10.00	1.20	1.20	0.61	0.31	12.2	6.1			0.00	0.0		N/A	12.2	6.1
1-Af- Clay/Sil	#######	12.00	1.44	1.44	0.73	0.37	18.6	9.3			0.00	0.0		N/A	18.6	9.3
1-Af- Clay/Sil	#######	13.50	1.62	1.62	0.83	0.41	24.2	12.1			0.00	0.0		N/A	24.2	12.1
2-TC - stiff C	#######	13.50	1.62	1.62	0.90	0.90	24.2	12.1			16.20	11.4		N/A	35.6	12.1
2-TC - stiff C	#######	14.00	1.68	1.68	0.90	0.90	26.3	14.2			16.20	11.4		N/A	37.8	14.2
2-TC - stiff C	#######	16.00	1.92	1.92	0.90	0.90	34.9	22.8			16.20	11.4		N/A	46.3	22.8
2-TC - stiff C	#######	18.00	2.16	2.16	0.90	0.90	43.5	31.4			16.20	11.4		N/A	54.9	31.4
2-TC - stiff C	#######	20.00	2.40	2.40	0.90	0.90	52.0	39.9			16.20	11.4		N/A	63.5	39.9
2-TC - stiff C	#######	22.00	2.64	2.64	0.90	0.90	60.6	48.5			16.20	11.4		N/A	72.0	48.5
2-TC - stiff C	#######	24.00	2.88	2.88	0.90	0.90	69.2	57.1			16.20	11.4		N/A	80.6	57.1
2-TC - stiff C	#######	26.00	3.12	3.12	0.90	0.90	77.7	65.6			16.20	11.4		N/A	89.2	65.6
2-TC - stiff C	#######	28.00	3.36	3.36	0.90	0.90	86.3	74.2			16.20	11.4		N/A	97.7	74.2
2-TC - stiff C	#######	30.00	3.60	3.60	0.90	0.90	94.9	82.8			16.20	11.4		N/A	106.3	82.8
2-TC - stiff C	#######	32.00	3.84	3.84	0.90	0.90	103.4	91.4			16.20	11.4		N/A	114.9	91.4
2-TC - stiff C	#######	34.00	4.08	4.08	0.90	0.90	112.0	99.9			16.20	11.4		N/A	123.4	99.9
2-TC - stiff C	#######	36.00	4.32	4.32	0.90	0.90	120.6	108.5			16.20	11.4		N/A	132.0	108.5
2-TC - stiff C	#######	38.00	4.56	4.56	0.90	0.90	129.2	117.1			16.20	11.4		N/A	140.6	117.1
2-TC - stiff C	#######	40.00	4.80	4.71	0.90	0.90	137.7	125.6			16.20	11.4		N/A	149.1	125.6
2-TC - stiff C	#######	42.00	5.04	4.82	0.90	0.90	146.3	134.2			16.20	11.4		N/A	157.7	134.2
2-TC - stiff C	#######	44.00	5.28	4.94	0.90	0.90	154.9	142.8			16.20	11.4		N/A	166.3	142.8
2-TC - stiff C	#######	46.00	5.52	5.05	0.90	0.90	163.4	151.3			16.20	11.4		N/A	174.8	151.3
2-TC - stiff C	#######	48.00	5.76	5.17	0.90	0.90	172.0	159.9			16.20	11.4		N/A	183.4	159.9
2-TC - stiff C	#######	50.00	6.00	5.28	0.90	0.90	180.6	168.5			16.20	11.4		N/A	192.0	168.5
2-TC - stiff C	#######	52.00	6.24	5.40	0.90	0.90	189.1	177.0			16.20	11.4		N/A	200.5	177.0
2-TC - stiff C	#######	54.00	6.48	5.51	0.90	0.90	197.7	185.6			16.20	11.4		N/A	209.1	185.6
2-TC - stiff C	#######	55.50	6.66	5.60	0.90	0.90	204.1	192.0			16.20	11.4		N/A	215.5	192.0
3-TC-hard MH	#######	55.50	6.66	5.60	2.00	2.00	204.1	192.0			36.00	25.4		N/A	229.5	192.0
3-TC-hard MH	#######	56.00	6.72	5.63	2.00	2.00	208.9	196.8			36.00	25.4		N/A	234.3	196.8
3-TC-hard MH	#######	58.00	6.97	5.76	2.00	2.00	227.9	215.8			36.00	25.4		N/A	253.3	215.8
3-TC-hard MH	#######	60.00	7.22	5.88	2.00	2.00	247.0	234.9			36.00	25.4		N/A	272.3	234.9
3-TC-hard MH	#######	62.00	7.47	6.01	2.00	2.00	266.0	253.9			36.00	25.4		N/A	291.4	253.9
3-TC-hard MH	#######	64.00	7.72	6.13	2.00	2.00	285.0	272.9			36.00	25.4	340	N/A	310.4	272.9
3-TC-hard MH	#######	66.00	7.97	6.26	2.00	2.00	304.1	292.0			36.00	25.4		N/A	329.5	292.0
3-TC-hard MH	#######	68.00	8.22	6.38	2.00	2.00	323.1	311.0			36.00	25.4		N/A	348.5	311.0
3-TC-hard MH	#######	70.00	8.47	6.51	2.00	2.00	342.2	330.1			36.00	25.4		N/A	367.5	330.1
3-TC-hard MH	#######	72.00	8.72	6.63	2.00	2.00	361.2	349.1			36.00	25.4	320	N/A	386.6	349.1
3-TC-hard MH	#######	74.00	8.97	6.76	2.00	2.00	380.2	368.1			36.00	25.4		N/A	405.6	368.1
3-TC-hard MH	#######	76.00	9.22	6.88	2.00	2.00	399.3	387.2			36.00	25.4		N/A	424.7	387.2
3-TC-hard MH	#######	78.00	9.47	7.01	2.00	2.00	418.3	406.2			36.00	25.4		N/A	443.7	406.2
3-TC-hard MH	#######	78.50	9.54	7.04	2.00	2.00	423.1	411.0			36.00	25.4		N/A	448.5	411.0

Notes: [a] Specified maximum limit reached (max fc, max ft, max q).
[b] Plugged condition: Q'E exceeds Q'FC. Q'FC is not used in total compressive capacity QC. [c] Plug traveled downward (Q'FC exceeds Q'E).
[d] Q'E is less than Q'FC and not used in total compressive capacity QC. [e] Inside soil dead weight reached.

ABUT #1 AXIAL

NOTE: EL. 0" REFERS TO ACTUAL FG EL. +91.5'

AXIAL PILE CAPACITY

PILAX 4.1

Project: I-5 HOV SEGMENT 1
EMI Project No.: 11-135
Description: Avenida Pico UC
Abut 2, HP14x89
Date: 3/29/12 by: MK checked:

UNITS	
Length	Force
ft	K

GWE	GWD
ft	ft
-38.00	38.00

PILE PARAMETERS			
Pile Elev.		Displ. to Mobilize	
Top	Tip	Friction	Bearing
ft	ft	ft	ft
-4.50	-55.00	0.02	0.058

○ Open section
○ HP section
◉ Full section
☐ Allow plugging

E-Modulus	
Top	Tip
K/ft2	K/ft2
4.32E+06	4.32E+06

SOIL LAYERS				GRANULAR SOIL-PILE PARAMETERS					COHESIVE SOIL-PILE PARAMETERS				Circumference		Sectional Area	
Description	Top El.	Depth	Total Unit Weight	Friction Angle	Bearing Capacity Factor	Lateral Earth Pressure Coefficients		Skin Friction Angle	Cohesion	Bearing Capacity Factor	Adhesion Factors or "API"		Skin	(Unused)	Pile	(Unused)
			γ	ϕ	N_q	K_C	K_T	δ	c	N_C	α_C	α_T				
-	ft	ft	K/ft2	deg	-	-	-	deg	K/ft2	-	-	-	ft	ft	ft2	ft2
Af- Clay/Silt	0.00	0.00	0.120	32.00	0	1.00	0.50	27.00					4.760	4.760	0.705	0.705
TC - stiff CH	-1.00	1.00	0.120						1.800	9	0.50	0.50	4.760	4.760	0.705	0.705
TC-hard MH	-21.00	21.00	0.126						4.000	9	0.50	0.50	4.760	4.760	0.705	0.705

SOIL LAYERS			OVERBURDEN		PILE SKIN FRICTION						PILE END BEARING			TOTAL PILE CAPACITY		
Description	Top El.	Depth	Total Stress	Effect. Stress	Unit Stress		Outside Friction Capacity		Inside Friction Capacity		Unit Stress	Section Capacity	Plug Capacity	Plugged?	Compression	Tension
			σ_V	σ'_V	f_C	f_T	Q_{FC}	Q_{FT}	Q'_{FC}	Q'_{FT}	q_E	Q_E	Q'_E		Q_C	Q_T
-	-	☑ Interval 2.00	-	-	max: 2.40	max: 2.40	FOS: 1.00	FOS: 1.00	FOS: 1.00	FOS: 1.00	max: 200.00	FOS: 1.00	FOS: 1.00	-	-	-
text	ft	ft	K/ft2	K/ft2	K/ft2	K/ft2	K	K	K	K	K/ft2	K	K	Yes/No	K	K
1-Af- Clay/Sil	0.00	0.00	0.00	0.00												
1-Af- Clay/Sil	-1.00	1.00	0.12	0.12												
2-TC - stiff C	-1.00	1.00	0.12	0.12												
2-TC - stiff C	-2.00	2.00	0.24	0.24												
2-TC - stiff C	-4.00	4.00	0.48	0.48												
2-TC - stiff C	-4.50	4.50	0.54	0.54	0.90	0.90	0.0	0.0			16.20	11.4		N/A	11.4	0.0
2-TC - stiff C	-6.00	6.00	0.72	0.72	0.90	0.90	6.4	6.4			16.20	11.4		N/A	17.8	6.4
2-TC - stiff C	-8.00	8.00	0.96	0.96	0.90	0.90	15.0	15.0			16.20	11.4		N/A	26.4	15.0
2-TC - stiff C	#######	10.00	1.20	1.20	0.90	0.90	23.6	23.6			16.20	11.4		N/A	35.0	23.6
2-TC - stiff C	#######	12.00	1.44	1.44	0.90	0.90	32.1	32.1			16.20	11.4		N/A	43.6	32.1
2-TC - stiff C	#######	14.00	1.68	1.68	0.90	0.90	40.7	40.7			16.20	11.4		N/A	52.1	40.7
2-TC - stiff C	#######	16.00	1.92	1.92	0.90	0.90	49.3	49.3			16.20	11.4		N/A	60.7	49.3
2-TC - stiff C	#######	18.00	2.16	2.16	0.90	0.90	57.8	57.8			16.20	11.4		N/A	69.3	57.8
2-TC - stiff C	#######	20.00	2.40	2.40	0.90	0.90	66.4	66.4			16.20	11.4		N/A	77.8	66.4
2-TC - stiff C	#######	21.00	2.52	2.52	0.90	0.90	70.7	70.7			16.20	11.4		N/A	82.1	70.7
3-TC-hard MH	#######	21.00	2.52	2.52	2.00	2.00	70.7	70.7			36.00	25.4		N/A	96.1	70.7
3-TC-hard MH	#######	22.00	2.65	2.65	2.00	2.00	80.2	80.2			36.00	25.4		N/A	105.6	80.2
3-TC-hard MH	#######	24.00	2.90	2.90	2.00	2.00	99.2	99.2			36.00	25.4		N/A	124.6	99.2
3-TC-hard MH	#######	26.00	3.15	3.15	2.00	2.00	118.3	118.3			36.00	25.4		N/A	143.7	118.3
3-TC-hard MH	#######	28.00	3.40	3.40	2.00	2.00	137.3	137.3			36.00	25.4		N/A	162.7	137.3
3-TC-hard MH	#######	30.00	3.65	3.65	2.00	2.00	156.4	156.4			36.00	25.4		N/A	181.7	156.4
3-TC-hard MH	#######	32.00	3.91	3.91	2.00	2.00	175.4	175.4			36.00	25.4		N/A	200.8	175.4
3-TC-hard MH	#######	34.00	4.16	4.16	2.00	2.00	194.4	194.4			36.00	25.4		N/A	219.8	194.4
3-TC-hard MH	#######	36.00	4.41	4.41	2.00	2.00	213.5	213.5			36.00	25.4		N/A	238.9	213.5
3-TC-hard MH	#######	38.00	4.66	4.66	2.00	2.00	232.5	232.5			36.00	25.4		N/A	257.9	232.5
3-TC-hard MH	#######	40.00	4.91	4.79	2.00	2.00	251.6	251.6			36.00	25.4		N/A	276.9	251.6
3-TC-hard MH	#######	42.00	5.17	4.92	2.00	2.00	270.6	270.6			36.00	25.4		N/A	296.0	270.6
3-TC-hard MH	#######	44.00	5.42	5.04	2.00	2.00	289.6	289.6			36.00	25.4	360	N/A	315.0	289.6
3-TC-hard MH	#######	46.00	5.67	5.17	2.00	2.00	308.7	308.7			36.00	25.4		N/A	334.1	308.7
3-TC-hard MH	#######	48.00	5.92	5.30	2.00	2.00	327.7	327.7			36.00	25.4		N/A	353.1	327.7
3-TC-hard MH	#######	50.00	6.17	5.43	2.00	2.00	346.8	346.8			36.00	25.4		N/A	372.1	346.8
3-TC-hard MH	#######	52.00	6.43	5.55	2.00	2.00	365.8	365.8			36.00	25.4		N/A	391.2	365.8
3-TC-hard MH	#######	54.00	6.68	5.68	2.00	2.00	384.8	384.8			36.00	25.4	400	N/A	410.2	384.8
3-TC-hard MH	#######	55.00	6.80	5.74	2.00	2.00	394.4	394.4			36.00	25.4		N/A	419.7	394.4

Notes: [a] Specified maximum limit reached (max fc, max ft, max q).
[b] Plugged condition: Q'E exceeds Q'FC. Q'FC is not used in total compressive capacity QC. [c] Plug traveled downward (Q'FC exceeds Q'E).
[d] Q'E is less than Q'FC and not used in total compressive capacity QC. [e] Inside soil dead weight reached.

ABUT #2 AXIAL

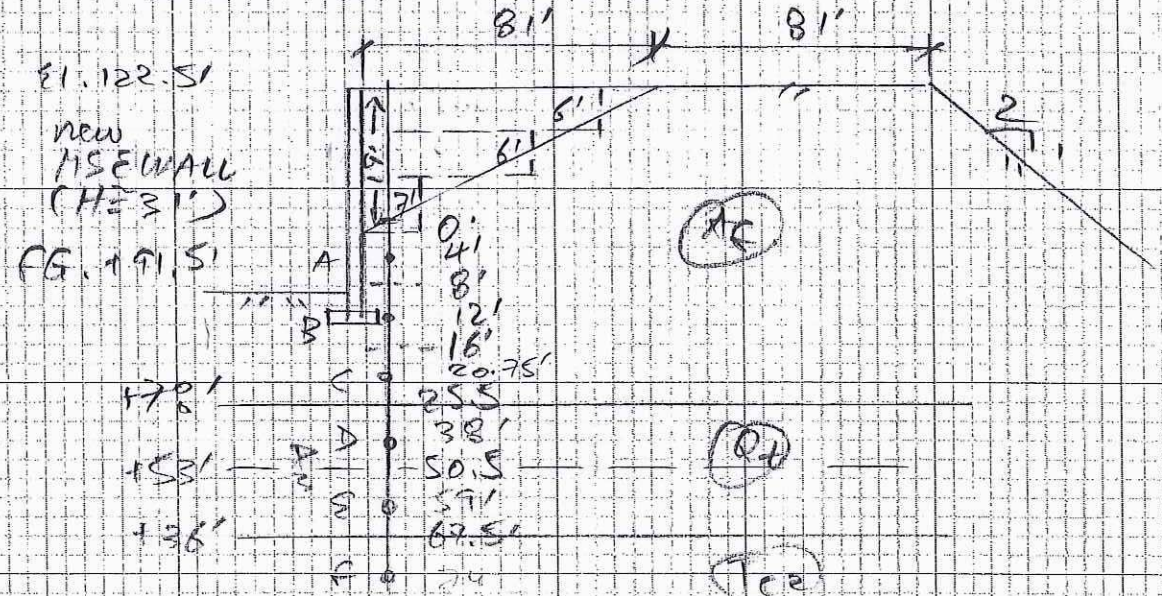
NOTE: EL. 0" REFERS TO ACTUAL FG EL. +91.0'

Project I-5 HOV SEG. 1
BRIDGE #C Project No. 11-155

By MK Date 5/3/12 Checked By _____ Date _____ Sheet 1 of 10

4d) SETTLEMENT CALC DUE TO NEW ROADWAY FILL
ABUT #1

1) CONFIG.



2) SETTLEMENT PARAMETERS

CONSTRUCTION STAGING (250' LONG ±)

- SB I-5 WILL BE PRELOADED UNTIL RESIDUAL SETTLEMENT ~ 1/2"
  → USE OVERCONSOLIDATED C_c VALUES

UNIT	γ (pcf)	C_c (no preload)	preloaded
AC	120	.025	.02
QL	120	≤ .03	.02
TC	125	.025	.01

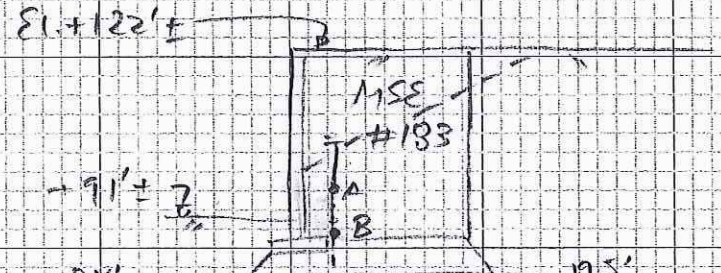
3) SETTLEMENT ESTIMATE
(see attached calc.)

S_{TOT} = 2.75" .57"

Project I-5 HOV Seg. 1
BRIDGE UC
Project No. 11-135

By MK Date 7/23/12 Checked By _____ Date _____ Sheet 16 of 10

Note: The settlement est. of 2.75" @ south side is if no preloading were to occur first.
If preloading occurs first and MSE wall is built, the settlement reduces!



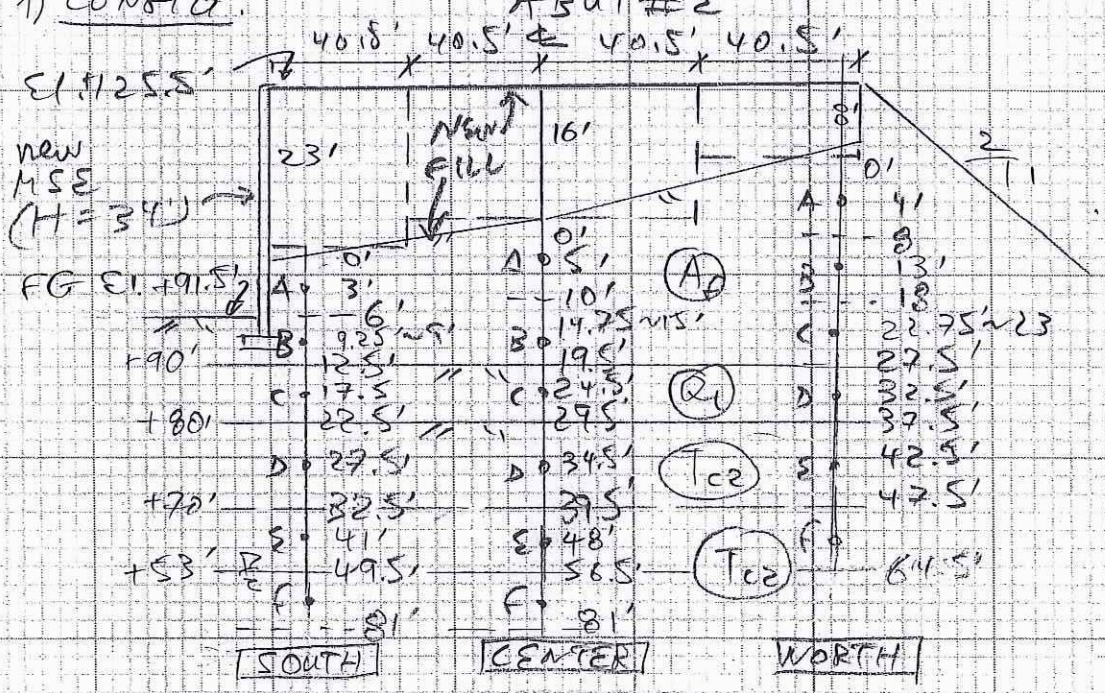
SOURCE:
GR for Walls 181, 183, 193 and 205
I-5 HOV Seg. 1
Appendix C
(EMI, 2012)

δ_{Total} = .59"

See attached calc (Page 36/10)

SETTLEMENT CALC DUE TO NEW ROAD FILL

1) CONFIG.



2) SETTLEMENT PARAMETERS

CONSTRUCTION STAGING (450' ± LONG)
- SB I-5 WILL BE PRELOADED UNTIL RESIDUAL SETTLEMENT ≈ 1/2"
  - → USE OVERCONSOLIDATED C_c VALUES
- NB I-5 WILL BE CUT-BACK THEN NEW FILL PLACED
  - → USING NORMAL C_c VALUES WILL BE CONSERV.

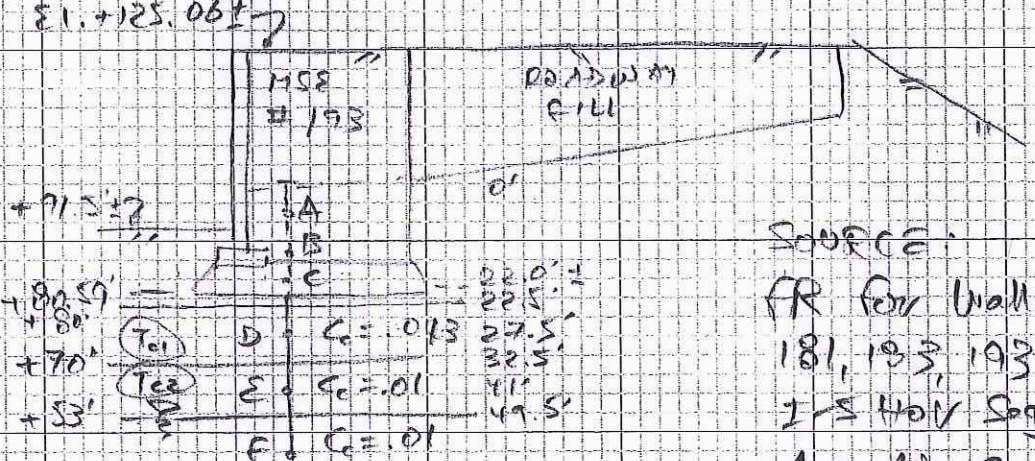
UNIT	γ (pcf)	C_c H = 23'	18'	8'
A_f	120	.025	.025	.025
Q_T	120	≈ .030	.030	.022
T_c	125	.01 (dry) / .025 wet →		

3) SETTLEMENT ESTIMATES

(SEE ATTACHED CALC'S) NO PRELOAD @ SOUTH

S_{TOT} = 3.53" 3.04" 2.58"
3.5" 3" 2.6"

Note: The settlement est. of 3.5" @ south side is if no preloading were to occur first.
If preloading occurs first, then MSE wall is built, the settlement estimate reduces:



SOURCE:
FR for walls 181, 183, 193 and 205, I-5 HOV Seg. 1, Appendix C (EMI, 2012)

$\delta_{TOP} = \frac{1}{2}$" @ South side (see attached calc page 5 of 10)

$\delta_{TOE} \pm 0$" @ center

$\delta_{TOE} \pm 0$" @ north side

SETTLEMENT CALCULATION FOR SERVICE-1 CASE

Project Title: 11-135/I-5 HOV Seg 1 MSE 183
@ UC Abutment 1, south side
By: M. Kapuskar, 5/3/12

applied pressure p: 2.28

Layer	USCS	Depth (ft)	Unit Weight (pcf)	C_c	ΔH (ft)	Middepth (ft)	σ'_v (ksf)	Δp (ksf)	δ (in)
A	Af	0.0	0.120	0.025	-	-	0.00	2.28	0.00
B	Af	8.0	0.120	0.025	8.0	4.0	0.48	1.20	1.31
C	Qt	16.0	0.120	0.025	8.0	12.0	1.44	0.93	0.52
D	Qt	25.5	0.120	0.025	9.5	20.8	2.49	0.77	0.33
E	Qt	50.5	0.060	0.025	25.0	38.0	4.56	0.55	0.37
F	Tc	67.5	0.065	0.030	17.0	59.0	6.57	0.40	0.13
	Tc	81.0		0.030	13.5	74.3	7.52	0.33	0.09
								δ_{tot}=	2.75

Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

SETTLEMENT CALCULATION FOR SERVICE-1 CASE

Project Title: 11-135/I-5 HOV Seg 1 MSE 183
@ UC Abutment 1, south side, after preloading and MSE construction
By: M. Kapuskar, 5/3/12, 7/23/12

applied pressure p: 2.28

Layer	USCS	Depth (ft)	Unit Weight (pcf)	C_c	ΔH (ft)	Middepth (ft)	σ'_v (ksf)	Δp (ksf)	δ (in)
A	Af	0.0	0.120	0	-	-	0.00	2.28	0.00
B	Af	8.0	0.120	0.000	8.0	4.0	0.48	1.20	0.00
C	Qt	19.5	0.120	0.020	11.5	13.8	1.65	0.93	0.00
D	Qt	25.5	0.120	0.020	6.0	22.5	2.70	0.77	0.16
E	Qt	50.5	0.060	0.020	25.0	38.0	4.56	0.55	0.30
F	Tc	67.5	0.065	0.010	17.0	59.0	6.57	0.40	0.10
	Tc	81.0		0.010	13.5	74.3	7.52	0.33	0.03
								δ_{tot}=	0.59

Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

ELASTIC STRESS CALCULATION

Project Title: 11-135/I-5 HOV Seg 1 MSE 183
@ UC Abutment 1, south side
By: M. Kapuskar, 5/3/12

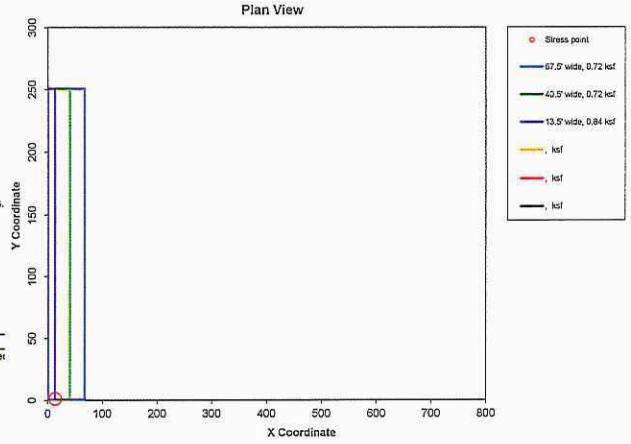
Notes:
1. This spreadsheet calculates 3D pressures in elastic (x,y,z) halfspace medium due to rectangular pressures on its surface using elastic 3D Boussinesq solutions (Poulos 19XX).
2. Input is in yellow cells. All worksheets can be edited freely. Save as Macro-Enabled file (*.xlsm).
3. PLAN shows the horizontal plane of X and Y. X and Y may be negative. Z is depth (always positive). Plan shows a stress point and up to 6 rectangular surface pressures.
4. STRESS POINT is located anywhere on x-y plane, including inside and outside pressure rectangles. The coordinates may be negative. Stresses due to loads will superimposed at this location.
5. PRESSURE RECTANGLE is placed by its (small-x, small-y) corner. The coordinates may be anywhere on x-y plane, including negative.
   Length (always positive) is parallel to X. Width W (always positive) is parallel to Y axis.
   Pressure is vertical and uniform. It is positive in Z (downward) and may be negative (upward).
   Loads may be superimposed and overlapped.
6. STRESS PROFILES are calculated at specified depths below stress point. Stresses are positive if pressure is positive, negative if pressure is negative. Stresses are 1/2 the input pressure under borders, and 1/4 under corners.

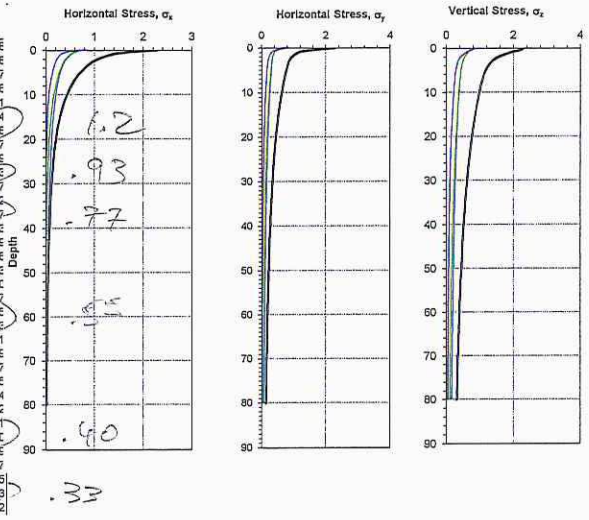
UNITS
length unit= ft
pressure unit= ksf

STRESS POINT LOCATION
X = 13 ft
Y = 1 ft

	Load No. 1	Load No. 2	Load No. 3	Load No. 4	Load No. 5	Load No. 6	Total
Load name =	67.5' wide	40.5' wide	13.5' wide				All Loads Superimpose
Pressure, p =	0.72 ksf	Pressure= 0.72 ksf	Pressure= 0.84 ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	
Length along X =	67.5 ft	Length= 40.5 ft	Length= 13.5 ft	Length= ft	Length= ft	Length= ft	
Width along Y =	250 ft	Width= 250 ft	Width= 250 ft	Width= ft	Width= ft	Width= ft	
Lower left corner X =	0 ft	X = 0 ft	X = 0 ft	X = ft	X = ft	X = ft	
Lower left corner Y =	0 ft	Y = 0 ft	Y = 0 ft	Y = ft	Y = ft	Y = ft	

Depth	Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Total Stresses		
z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
0.00	0.72	0.72	0.72	0.72	0.72	0.72	0.84	0.84	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.28	2.28	2.28
0.10	0.69	0.67	0.72	0.69	0.67	0.72	0.72	0.75	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.11	2.10	2.28
0.20	0.67	0.63	0.72	0.67	0.63	0.72	0.61	0.67	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.95	1.92	2.27
0.50	0.60	0.52	0.71	0.60	0.52	0.71	0.42	0.47	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.62	1.51	2.18
1.00	0.52	0.41	0.65	0.51	0.41	0.65	0.31	0.32	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.34	1.15	1.91
2.50	0.39	0.34	0.53	0.38	0.34	0.53	0.21	0.22	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.98	0.89	1.44
5.00	0.30	0.31	0.45	0.28	0.30	0.44	0.14	0.17	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	0.78	1.16
7.50	0.24	0.28	0.41	0.21	0.27	0.41	0.09	0.15	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.70	1.07
10.00	0.20	0.26	0.38	0.17	0.24	0.38	0.06	0.13	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.63	0.98
12.50	0.18	0.24	0.36	0.13	0.22	0.36	0.04	0.11	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.58	0.93
15.00	0.15	0.23	0.35	0.11	0.20	0.34	0.03	0.10	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.53	0.87
17.50	0.14	0.21	0.33	0.09	0.19	0.32	0.02	0.09	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.49	0.82
20.00	0.12	0.20	0.31	0.07	0.17	0.30	0.02	0.08	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.45	0.77
22.50	0.11	0.19	0.30	0.06	0.16	0.28	0.01	0.07	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.42	0.72
25.00	0.10	0.18	0.29	0.05	0.15	0.27	0.01	0.07	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.39	0.68
27.50	0.09	0.17	0.28	0.04	0.14	0.25	0.01	0.06	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.37	0.66
30.00	0.08	0.16	0.27	0.03	0.13	0.24	0.01	0.06	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.35	0.63
32.50	0.07	0.16	0.26	0.03	0.12	0.23	0.00	0.05	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.33	0.60
35.00	0.07	0.15	0.25	0.02	0.11	0.22	0.00	0.05	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.31	0.57
37.50	0.06	0.14	0.25	0.02	0.11	0.21	0.00	0.04	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.29	0.55
40.00	0.06	0.14	0.24	0.02	0.10	0.20	0.00	0.04	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.28	0.53
42.50	0.05	0.13	0.23	0.02	0.10	0.19	0.00	0.04	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.27	0.51
45.00	0.05	0.13	0.23	0.01	0.09	0.18	0.00	0.04	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.25	0.48
47.50	0.04	0.12	0.22	0.01	0.09	0.17	0.00	0.04	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.24	0.47
50.00	0.04	0.12	0.21	0.01	0.08	0.17	0.00	0.03	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.23	0.46
52.50	0.04	0.11	0.21	0.01	0.08	0.16	0.00	0.03	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.22	0.44
55.00	0.03	0.11	0.20	0.01	0.07	0.16	0.00	0.03	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.21	0.42
57.50	0.03	0.10	0.20	0.01	0.07	0.15	0.00	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.20	0.41
60.00	0.03	0.10	0.19	0.01	0.07	0.14	0.00	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.19	0.40
62.50	0.03	0.10	0.19	0.01	0.06	0.14	0.00	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.19	0.39
65.00	0.02	0.09	0.18	0.01	0.06	0.13	0.00	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.18	0.37
70.00	0.02	0.09	0.18	0.00	0.06	0.13	0.00	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.16	0.35
75.00	0.02	0.08	0.17	0.00	0.05	0.12	0.00	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.15	0.33
80.00	0.02	0.07	0.16	0.00	0.05	0.11	0.00	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.14	0.32





load #1 67.5' × 6'
#2 40.5' × 6'
#3 13.5' × 7'

$p_1 = 6' \times .12 = .72$ ksf
$p_2 = 6' \times .12 = .72$ ksf
$p_3 = 7' \times .12 = .84$ ksf

SETTLEMENT CALCULATION FOR SERVICE-1 CASE

Project Title: 11-135/I-5 HOV Seg 1 MSE 193
@ UC Abutment 2, south side
By: M. Kapuskar, 5/3/12

applied pressure p: 2.4

Layer	USCS	Depth (ft)	Unit Weight (pcf)	C_c	ΔH (ft)	Middepth (ft)	σ'_v (ksf)	Δp (ksf)	δ (in)
A	Af	0.0	0.120	0.025	-	-	0.00	2.40	0.00
B	Af	6.0	0.120	0.025	6.0	3.0	0.36	1.70	1.36
C	Qt	12.5	0.120	0.030	6.5	9.3	1.11	1.30	0.66
D	Tc	22.5	0.120	0.025	10.0	17.5	2.10	1.10	0.66
E	Tc	32.5	0.120	0.010	10.0	27.5	3.30	0.94	0.33
F	Tc	49.5	0.060	0.025	17.0	41.0	4.92	0.81	0.14
	Tc	81.0		0.025	31.5	65.3	6.89	0.68	0.39
								δ_{tot}=	3.53

Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

SETTLEMENT CALCULATION FOR SERVICE-1 CASE

Project Title: 11-135/I-5 HOV Seg 1 MSE 193
@ UC Abutment 2, south side, after preloading and MSE construction
By: M. Kapuskar, 7/23/12

applied pressure p: 2.4

Layer	USCS	Depth (ft)	Unit Weight (pcf)	C_c	ΔH (ft)	Middepth (ft)	σ'_v (ksf)	Δp (ksf)	δ (in)
A	Af	0.0	0.120	0	-	-	0.00	2.40	0.00
B	Af	6.0	0.120	0.000	6.0	3.0	0.36	1.70	0.00
C	Qt	12.5	0.120	0.000	6.5	9.3	1.11	1.30	0.00
D	Tc	22.5	0.120	0.013	10.0	17.5	2.10	1.10	0.00
E	Tc	32.5	0.120	0.010	10.0	27.5	3.30	0.94	0.17
F	Tc	49.5	0.060	0.010	17.0	41.0	4.92	0.81	0.14
	Tc	81.0		0.010	31.5	65.3	6.89	0.68	0.15
								δ_{tot}=	0.46

Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

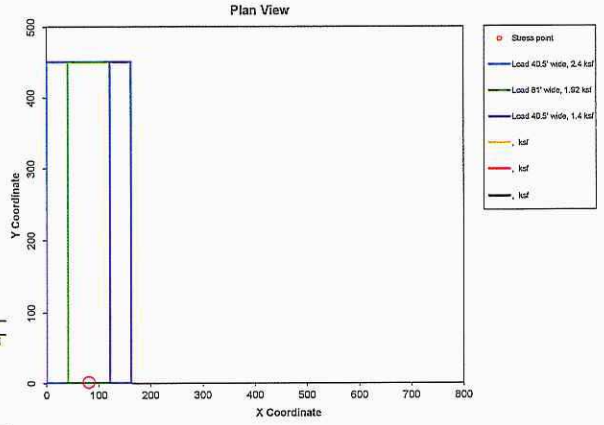
ELASTIC STRESS CALCULATION

Project Title: 11-135/I-5 HOV Seg 1 MSE 193
@ UC Abutment 2, centerline
By: M. Kapuskar, 4/16/12

Notes:
1. This spreadsheet calculates 3D pressures in elastic (x,y,z) halfspace medium due to rectangular pressures on its surface using elastic 3D Boussinesq solutions (Poulos 19XX).
2. Input is in yellow cells. All worksheets can be edited freely. Save as Macro-Enabled file (*.xlsm).
3. PLAN shows the horizontal plane of X and Y. X and Y may be negative. Z is depth (always positive). Plan shows a stress point and up to 6 rectangular surface pressures.
4. STRESS POINT is located anywhere on x-y plane, including inside and outside pressure rectangles. The coordinates may be negative. Stresses due to loads will superimposed at this location.
5. PRESSURE RECTANGLE is placed by its (small-x, small-y) corner. The coordinates may be anywhere on x-y plane, including negative.
   Length (always positive) is parallel to X. Width W (always positive) is parallel to Y axis.
   Pressure is vertical and uniform. It is positive in Z (downward) and may be negative (upward).
   Loads may be superimposed and overlapped.
6. STRESS PROFILES are calculated at specified depths below stress point. Stresses are positive if pressure is positive, negative if pressure is negative. Stresses are 1/2 the input pressure under borders, and 1/4 under corners.

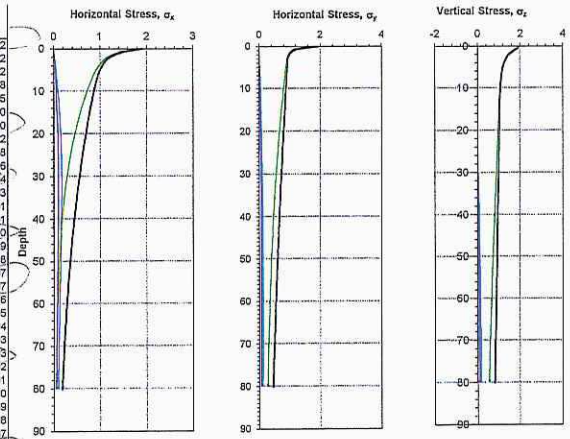
UNITS
length unit= ft
pressure unit= ksf

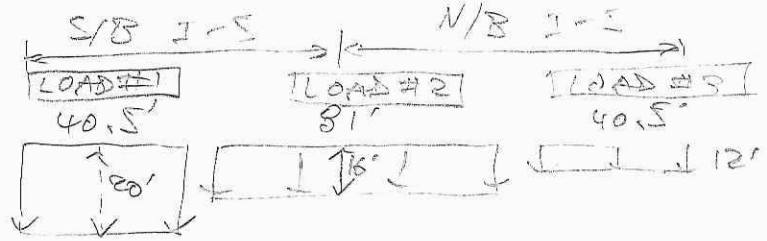
STRESS POINT LOCATION
X = 81 ft
Y = 1 ft



	Load No. 1	Load No. 2	Load No. 3	Load No. 4	Load No. 5	Load No. 6	Total
Load name =	Load 40.5' wide	Load 81' wide	Load 40.5' wide				All Loads Superimposed
Pressure, p =	2.40 ksf	Pressure= 1.92 ksf	Pressure= 1.40 ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	
Length along X =	40.5 ft	Length= 81 ft	Length= 40.5 ft	Length= ft	Length= ft	Length= ft	
Width along Y =	450 ft	Width= 450 ft	Width= 450 ft	Width= ft	Width= ft	Width= ft	
Lower left corner X =	0 ft	X = 40.5 ft	X = 121.5 ft	X = ft	X = ft	X = ft	
Lower left corner Y =	0 ft	Y = 0 ft	Y = 0 ft	Y = ft	Y = ft	Y = ft	

Depth	Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Total Stresses		
z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
0.00	0.00	0.00	0.00	1.92	1.92	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92	1.92	1.92
0.10	0.00	0.00	0.00	1.86	1.80	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.86	1.80	1.92
0.20	0.00	0.00	0.00	1.79	1.68	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.80	1.68	1.92
0.50	0.00	0.00	0.00	1.62	1.38	1.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.63	1.39	1.88
1.00	0.01	0.00	0.00	1.41	1.12	1.75	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.42	1.13	1.75
2.50	0.02	0.01	0.00	1.12	0.94	1.40	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.15	0.96	1.40
5.00	0.05	0.02	0.00	0.93	0.89	1.20	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.92	1.20
7.50	0.07	0.03	0.00	0.82	0.85	1.12	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.93	0.90	1.12
10.00	0.09	0.04	0.00	0.73	0.81	1.08	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87	0.88	1.08
12.50	0.11	0.05	0.01	0.65	0.77	1.05	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.86	1.06
15.00	0.12	0.06	0.01	0.58	0.74	1.02	0.07	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.84	1.04
17.50	0.14	0.07	0.01	0.52	0.71	1.00	0.08	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.82	1.03
20.00	0.15	0.08	0.02	0.46	0.68	0.98	0.09	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.80	1.01
22.50	0.16	0.09	0.03	0.41	0.65	0.96	0.09	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.78	1.01
25.00	0.16	0.09	0.03	0.36	0.62	0.94	0.10	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.77	1.00
27.50	0.17	0.10	0.04	0.32	0.59	0.92	0.10	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.75	0.99
30.00	0.17	0.10	0.05	0.29	0.56	0.90	0.10	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.73	0.98
32.50	0.17	0.11	0.06	0.26	0.54	0.88	0.10	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.71	0.97
35.00	0.17	0.11	0.07	0.23	0.52	0.86	0.10	0.07	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.70	0.97
37.50	0.17	0.12	0.08	0.21	0.50	0.84	0.10	0.07	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.68	0.96
40.00	0.17	0.12	0.08	0.18	0.48	0.82	0.10	0.07	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.66	0.95
42.50	0.16	0.12	0.09	0.16	0.46	0.80	0.09	0.07	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.65	0.94
45.00	0.16	0.12	0.10	0.15	0.44	0.77	0.09	0.07	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.63	0.93
47.50	0.15	0.12	0.11	0.13	0.42	0.75	0.09	0.07	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.62	0.93
50.00	0.15	0.12	0.11	0.12	0.41	0.73	0.09	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.60	0.92
52.50	0.14	0.12	0.12	0.11	0.39	0.72	0.08	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.59	0.91
55.00	0.14	0.12	0.13	0.10	0.38	0.70	0.08	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.57	0.90
57.50	0.13	0.12	0.13	0.09	0.36	0.68	0.08	0.07	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.56	0.89
60.00	0.13	0.12	0.14	0.08	0.35	0.66	0.07	0.07	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.55	0.88
62.50	0.12	0.12	0.14	0.07	0.34	0.64	0.07	0.07	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.53	0.87
65.00	0.12	0.12	0.15	0.07	0.33	0.63	0.07	0.07	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.52	0.86
70.00	0.11	0.12	0.15	0.06	0.31	0.60	0.06	0.07	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.50	0.84
75.00	0.10	0.12	0.16	0.05	0.29	0.57	0.06	0.07	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.48	0.82
80.00	0.09	0.11	0.16	0.04	0.27	0.54	0.05	0.07	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.45	0.80





$P_1 = 20' \times .12 = 2.4\ ksf$

$P_2 = 16' \times .12 = 1.92\ ksf$

$P_3 = 12' \times .12 = 1.4\ ksf$

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SETTLEMENT CALCULATION FOR SERVICE-1 CASE

Project Title: 11-135/I-5 HOV Seg 1 MSE 193
@ UC Abutment 2, North side
By: M. Kapuskar, 5/3/12

applied pressure p: 1.4

Layer	USCS	Depth (ft)	Unit Weight (pcf)	C_c	ΔH (ft)	Middepth (ft)	σ'_v (ksf)	Δp (ksf)	δ (in)
A	Af	0.0	0.120	0.025	-	-	0.00	1.40	0.00
B	Af	8.0	0.120	0.025	8.0	4.0	0.48	0.90	1.10
C	Af	18.0	0.120	0.025	10.0	13.0	1.56	0.70	0.48
D	Af	27.5	0.120	0.030	9.5	22.8	2.73	0.60	0.25
E	Qt	37.5	0.120	0.072	10.0	32.5	3.90	0.55	0.21
F	Tc	47.5	0.120	0.010	10.0	42.5	5.10	0.53	0.37
G	Tc	64.5	0.065	0.025	17.0	56.0	6.72	0.51	0.06
	Tc	81.0			33.5	64.3	7.71	0.50	0.11
								δ_{tot}=	2.58

Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

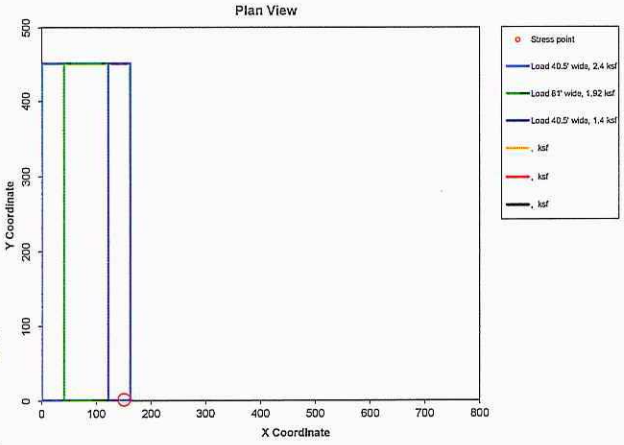
ELASTIC STRESS CALCULATION

Project Title: 11-135/I-5 HOV Seg 1 MSE 193
@ UC Abutment 2, north side
By: M. Kapuskar, 5/3/12

Notes:
1. This spreadsheet calculates 3D pressures in elastic (x,y,z) halfspace medium due to rectangular pressures on its surface using elastic 3D Boussinesq solutions (Poulos 19XX).
2. Input is in yellow cells. All worksheets can be edited freely. Save as Macro-Enabled file (*.xlsm).
3. PLAN shows the horizontal plane of X and Y. X and Y may be negative. Z is depth (always positive). Plan shows a stress point and up to 6 rectangular surface pressures.
4. STRESS POINT is located anywhere on x-y plane, including inside and outside pressure rectangles. The coordinates may be negative. Stresses due to loads will superimposed at this location.
5. PRESSURE RECTANGLE is placed by its (small-x, small-y) corner. The coordinates may be anywhere on x-y plane, including negative.
   Length (always positive) is parallel to X. Width W (always positive) is parallel to Y axis.
   Pressure is vertical and uniform. It is positive in Z (downward) and may be negative (upward).
   Loads may be superimposed and overlapped.
6. STRESS PROFILES are calculated at specified depths below stress point. Stresses are positive if pressure is positive, negative if pressure is negative. Stresses are 1/2 the input pressure under borders, and 1/4 under corners.

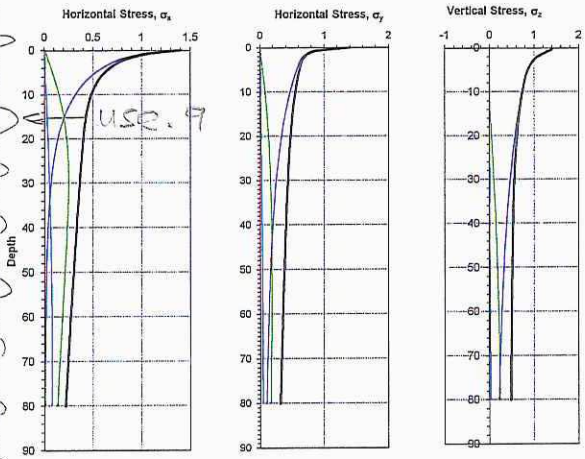
UNITS
length unit= ft
pressure unit= ksf

STRESS POINT LOCATION
X = 150 ft
Y = 1 ft



	Load No. 1	Load No. 2	Load No. 3	Load No. 4	Load No. 5	Load No. 6	Total
Load name =	Load 40.5' wide	Load 81' wide	Load 40.5' wide				All Loads Superimposed
Pressure, p =	2.40 ksf	Pressure= 1.92 ksf	Pressure= 1.40 ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	
Length along X =	40.5 ft	Length= 81 ft	Length= 40.5 ft	Length= ft	Length= ft	Length= ft	
Width along Y =	450 ft	Width= 450 ft	Width= 450 ft	Width= ft	Width= ft	Width= ft	
Lower left corner X =	0 ft	X = 40.5 ft	X = 121.5 ft	X = ft	X = ft	X = ft	
Lower left corner Y =	0 ft	Y = 0 ft	Y = 0 ft	Y = ft	Y = ft	Y = ft	

Depth	Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Total Stresses		
z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.40	1.40	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.40	1.40	1.40
0.10	0.00	0.00	0.00	0.00	0.00	0.00	1.35	1.31	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.35	1.31	1.40
0.20	0.00	0.00	0.00	0.00	0.00	0.00	1.30	1.22	1.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.30	1.22	1.40
0.50	0.00	0.00	0.00	0.01	0.00	0.00	1.17	1.00	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.17	1.01	1.37
1.00	0.00	0.00	0.00	0.02	0.01	0.00	0.99	0.80	1.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.01	0.81	1.27
2.50	0.00	0.00	0.00	0.04	0.02	0.00	0.73	0.65	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.67	1.02
5.00	0.01	0.00	0.00	0.08	0.04	0.00	0.53	0.58	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.62	0.86
7.50	0.01	0.01	0.00	0.12	0.06	0.00	0.41	0.52	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	0.58	0.79
10.00	0.02	0.01	0.00	0.15	0.07	0.01	0.32	0.47	0.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.49	0.55	0.74
12.50	0.02	0.01	0.00	0.17	0.09	0.01	0.25	0.43	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.53	0.70
15.00	0.03	0.01	0.00	0.20	0.10	0.02	0.21	0.39	0.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.51	0.67
17.50	0.03	0.01	0.00	0.21	0.12	0.03	0.17	0.36	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.49	0.64
20.00	0.04	0.02	0.00	0.23	0.13	0.04	0.14	0.33	0.57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.48	0.62
22.50	0.04	0.02	0.00	0.24	0.14	0.06	0.12	0.31	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.39	0.47	0.60
25.00	0.04	0.02	0.00	0.24	0.15	0.07	0.10	0.29	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.45	0.58
27.50	0.05	0.02	0.00	0.25	0.15	0.08	0.08	0.27	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.45	0.57
30.00	0.05	0.02	0.00	0.25	0.16	0.09	0.07	0.25	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.44	0.56
32.50	0.05	0.03	0.00	0.25	0.17	0.11	0.06	0.24	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.43	0.55
35.00	0.06	0.03	0.00	0.24	0.17	0.12	0.05	0.22	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.42	0.54
37.50	0.06	0.03	0.01	0.24	0.17	0.13	0.04	0.21	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.34	0.41	0.54
40.00	0.06	0.03	0.01	0.23	0.18	0.14	0.04	0.20	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.41	0.53
42.50	0.07	0.03	0.01	0.23	0.18	0.15	0.03	0.19	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.40	0.53
45.00	0.07	0.03	0.01	0.22	0.18	0.16	0.03	0.18	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.39	0.52
47.50	0.07	0.03	0.01	0.22	0.18	0.17	0.03	0.17	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.39	0.52
50.00	0.07	0.04	0.01	0.21	0.18	0.18	0.02	0.16	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.38	0.51
52.50	0.07	0.04	0.01	0.20	0.18	0.19	0.02	0.16	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.38	0.51
55.00	0.07	0.04	0.01	0.20	0.18	0.19	0.02	0.15	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.37	0.51
57.50	0.07	0.04	0.02	0.19	0.18	0.20	0.02	0.14	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.37	0.50
60.00	0.08	0.04	0.02	0.18	0.18	0.21	0.01	0.14	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.36	0.50
62.50	0.08	0.04	0.02	0.18	0.18	0.21	0.01	0.13	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.35	0.50
65.00	0.08	0.04	0.02	0.17	0.18	0.22	0.01	0.13	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.35	0.50
70.00	0.08	0.04	0.02	0.16	0.18	0.22	0.01	0.12	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.34	0.49
75.00	0.08	0.04	0.03	0.15	0.17	0.23	0.01	0.11	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.33	0.49
80.00	0.08	0.05	0.03	0.14	0.17	0.23	0.01	0.10	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.32	0.48



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SETTLEMENT CALCULATION FOR SERVICE-1 CASE

Project Title: 11-135/I-5 HOV Seg 1 MSE 193
@ UC Abutment 2, centerline
By: M. Kapuskar, 5/3/12

applied pressure p: 1.92

Layer	USCS	Depth (ft)	Unit Weight (pcf)	C_c	ΔH (ft)	Middepth (ft)	σ'_v (ksf)	Δp (ksf)	δ (in)
A	Af	0.0	0.120	0.025	-	-	0.00	1.92	0.00
B	Af	10.0	0.120	0.025	10.0	5.0	0.60	1.20	1.43
C	Qt	19.5	0.120	0.030	9.5	14.8	1.77	1.04	0.57
D	Tc	29.5	0.125	0.010	10.0	24.5	2.94	1.00	0.46
E	Tc	39.5	0.125	0.010	10.0	34.5	4.17	0.97	0.11
F	Tc	56.5	0.065	0.025	17.0	48.0	5.85	0.93	0.13
	Tc	81.0			24.5	68.8	7.71	0.86	0.34
								δ_{tot}=	3.04

Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

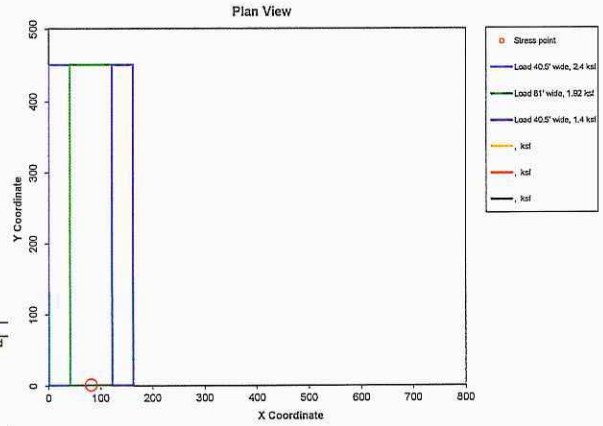
ELASTIC STRESS CALCULATION

Project Title: 11-135/I-5 HOV Seg 1 MSE 193
@ UC Abutment 2, centerline
By: M. Kapuskar, 4/16/12

Notes:
1. This spreadsheet calculates 3D pressures in elastic (x,y,z) halfspace medium due to rectangular pressures on its surface using elastic 3D Boussinesq solutions (Poulos 19XX).
2. Input is in yellow cells. All worksheets can be edited freely. Save as Macro-Enabled file (*.xlsm).
3. PLAN shows the horizontal plane of X and Y. X and Y may be negative. Z is depth (always positive). Plan shows a stress point and up to 6 rectangular surface pressures.
4. STRESS POINT is located anywhere on x-y plane, including inside and outside pressure rectangles. The coordinates may be negative. Stresses due to loads will superimposed at this location.
5. PRESSURE RECTANGLE is placed by its (small-x, small-y) corner. The coordinates may be anywhere on x-y plane, including negative.
   Length (always positive) is parallel to X. Width W (always positive) is parallel to Y axis.
   Pressure is vertical and uniform. It is positive in Z (downward) and may be negative (upward).
   Loads may be superimposed and overlapped.
6. STRESS PROFILES are calculated at specified depths below stress point. Stresses are positive if pressure is positive, negative if pressure is negative. Stresses are 1/2 the input pressure under borders, and 1/4 under corners.

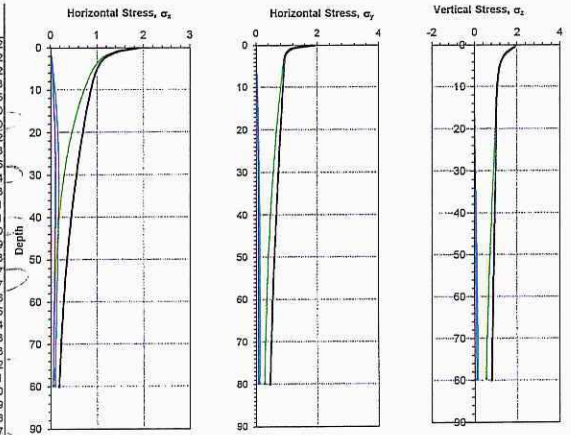
UNITS
length unit= ft
pressure unit= ksf

STRESS POINT LOCATION
X = 81 ft
Y = 1 ft



	Load No. 1	Load No. 2	Load No. 3	Load No. 4	Load No. 5	Load No. 6	Total
	Load name = Load 40.5' wide	Load 81' wide	Load 40.5' wide				All Loads Superimposed
	Pressure, p = 2.40 ksf	Pressure= 1.92 ksf	Pressure= 1.40 ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	
	Length along X = 40.5 ft	Length= 81 ft	Length= 40.5 ft	Length= ft	Length= ft	Length= ft	
	Width along Y = 450 ft	Width= 450 ft	Width= 450 ft	Width= ft	Width= ft	Width= ft	
	Lower left corner X = 0 ft	X = 40.5 ft	X = 121.5 ft	X = ft	X = ft	X = ft	
	Lower left corner Y = 0 ft	Y = 0 ft	Y = 0 ft	Y = ft	Y = ft	Y = ft	

Depth	Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Total Stresses		
z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
0.00	0.00	0.00	0.00	1.92	1.92	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92	1.92	1.92			
0.10	0.00	0.00	0.00	1.86	1.80	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.85	1.80	1.92			
0.20	0.00	0.00	0.00	1.79	1.68	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.80	1.68	1.92			
0.50	0.00	0.00	0.00	1.62	1.38	1.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.63	1.39	1.88			
1.00	0.01	0.00	0.00	1.41	1.12	1.75	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.42	1.13	1.75			
2.50	0.02	0.01	0.00	1.12	0.94	1.40	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.15	0.96	1.40			
5.00	0.05	0.02	0.00	0.93	0.89	1.20	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.92	1.20			
7.50	0.07	0.03	0.00	0.82	0.85	1.12	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.93	0.90	1.12			
10.00	0.09	0.04	0.00	0.73	0.81	1.08	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87	0.88	1.08			
12.50	0.11	0.05	0.01	0.65	0.77	1.05	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.85	1.05			
15.00	0.12	0.06	0.01	0.58	0.74	1.02	0.07	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.84	1.04			
17.50	0.14	0.07	0.01	0.52	0.71	1.00	0.08	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.82	1.03			
20.00	0.15	0.08	0.02	0.46	0.68	0.98	0.09	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.80	1.01			
22.50	0.16	0.09	0.03	0.41	0.65	0.96	0.09	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.78	1.01			
25.00	0.16	0.09	0.03	0.36	0.62	0.94	0.10	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.77	1.00			
27.50	0.17	0.10	0.04	0.32	0.59	0.92	0.10	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.75	0.99			
30.00	0.17	0.10	0.05	0.29	0.56	0.90	0.10	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.73	0.98			
32.50	0.17	0.11	0.06	0.26	0.54	0.88	0.10	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.71	0.97			
35.00	0.17	0.11	0.07	0.23	0.52	0.86	0.10	0.07	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.70	0.97			
37.50	0.17	0.12	0.08	0.21	0.50	0.84	0.10	0.07	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.68	0.96			
40.00	0.17	0.12	0.08	0.18	0.48	0.82	0.10	0.07	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.66	0.95			
42.50	0.16	0.12	0.09	0.16	0.46	0.80	0.09	0.07	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.65	0.94			
45.00	0.16	0.12	0.10	0.15	0.44	0.77	0.09	0.07	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.63	0.93			
47.50	0.15	0.12	0.11	0.13	0.42	0.75	0.09	0.07	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.62	0.93			
50.00	0.15	0.12	0.11	0.12	0.41	0.73	0.09	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.60	0.92			
52.50	0.14	0.12	0.12	0.11	0.39	0.72	0.08	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.59	0.91			
55.00	0.14	0.12	0.13	0.10	0.38	0.70	0.08	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.57	0.90			
57.50	0.13	0.12	0.13	0.09	0.36	0.68	0.08	0.07	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.56	0.89			
60.00	0.13	0.12	0.14	0.08	0.35	0.66	0.07	0.07	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.55	0.88			
62.50	0.12	0.12	0.14	0.07	0.34	0.64	0.07	0.07	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.53	0.87			
65.00	0.12	0.12	0.15	0.07	0.33	0.63	0.07	0.07	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.52	0.86			
70.00	0.11	0.12	0.15	0.06	0.31	0.60	0.06	0.07	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.50	0.84			
75.00	0.10	0.12	0.16	0.05	0.29	0.57	0.06	0.07	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.48	0.82			
80.00	0.09	0.11	0.16	0.04	0.27	0.54	0.05	0.07	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.45	0.80			

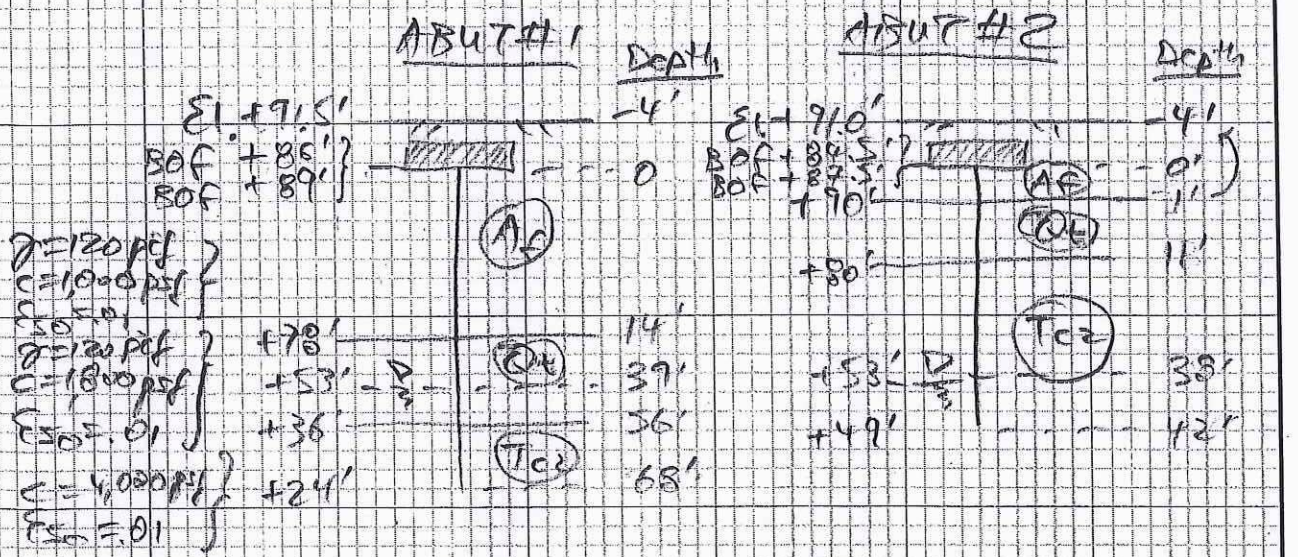


Project I-5 HOV SEG. 1
BRIDGE UC
Project No. 11-135

By MC Date 3/30/12 Checked By LCC Date 5/4/12 Sheet 1 of 9

5) LATERAL PILE CAPACITY

a) CONFIG.



b) LPILE ANALYSES (attached)

FOR PILE-HEAD DEFLECTIONS OF:
1/4" 1/2" 1" 3" 5"
FOR GROUP EFFICIENCY FACTOR = 0.89

c) DESIGN TIP ELEV'S

ABUT	STAGE	PILE TOP EL.	PILE LENGTH REQ'D	DESIGN FINAL TIP EL.
1	1	+86'	- 45' = +41'	+41'
	2	+89'	- 45' = +44'	+44'
2	1	+84.5'	- 40' = +44.5'	+44'
	2	+87.5'	- 40' = +42.5'	+42'

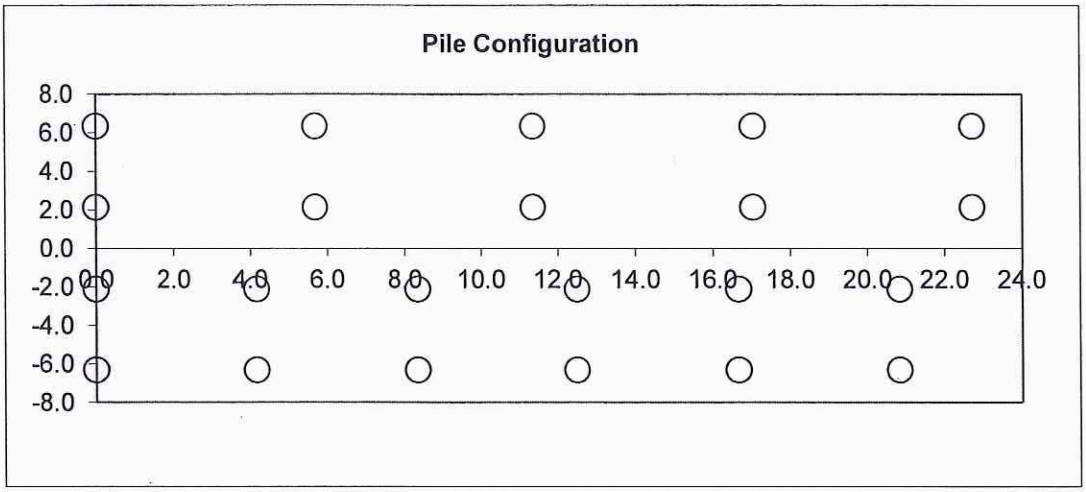
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

17800 Newhope Street, Suite B, Fountain Valley, CA 92708
phone: (714)751-3826, Fax (714)751-3928

Project: I-5 HOV Seg 1, Bridge Avenida Pico UC Project No. 11-135
By MK Date 03/29/12 Check by Date Sheet 2/9

Calculation of Pile Group Efficiency for Lateral Load Capacity

(using formula in Group 7.0 Technical Manual)



Pile Dia. (feet): 1.1667 = 14/12
No. of Piles: 22

Group Efficiency	X-Dir	Y-Dir
	0.79	0.79

→ 0.79

Coordinates

Pile No.	X	Y
1	0.0	-6.3
2	4.2	-6.3
3	8.3	-6.3
4	12.5	-6.3
5	16.7	-6.3
6	20.8	-6.3
7	0.0	-2.1
8	4.2	-2.1
9	8.3	-2.1
10	12.5	-2.1
11	16.7	-2.1
12	20.8	-2.1
13	0.0	2.1
14	5.7	2.1
15	11.4	2.1
16	17.0	2.1
17	22.7	2.1
18	0.0	6.3
19	5.7	6.3
20	11.4	6.3
21	17.0	6.3
22	22.7	6.3

Reduction Factors in X-dir	Reduction Factors in Y-dir
0.729	0.729
0.711	0.680
0.711	0.680
0.711	0.680
0.711	0.680
0.964	0.729
0.703	0.743
0.696	0.744
0.676	0.758
0.676	0.737
0.691	0.723
0.937	0.761
0.791	0.752
0.802	0.752
0.798	0.747
0.791	0.740
0.989	0.768
0.840	0.977
0.840	0.977
0.840	0.977
0.840	0.977
0.989	0.977

RIGHT BRIDGE

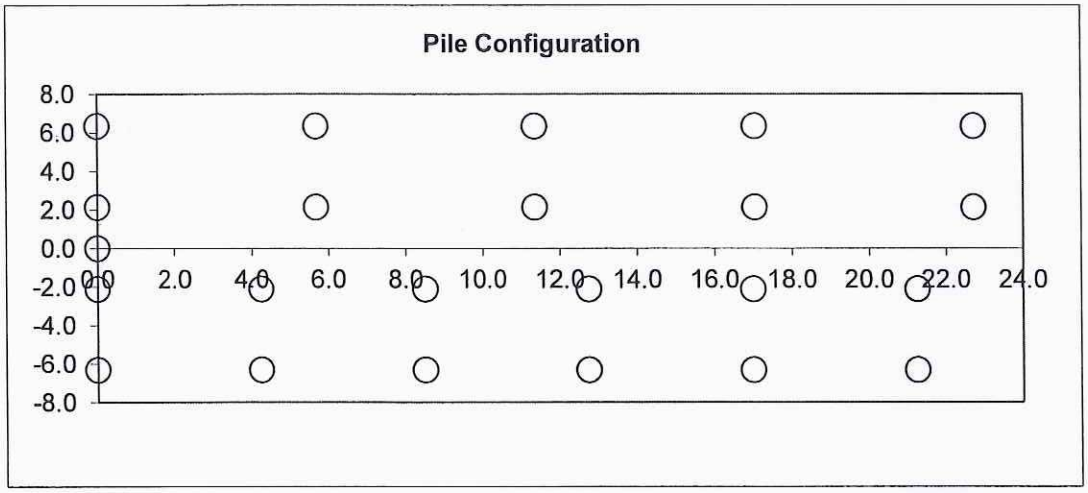
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

17800 Newhope Street, Suite B, Fountain Valley, CA 92708
phone: (714)751-3826, Fax (714)751-3928

Project: I-5 HOV Seg 1, Bridge Avenida Pico UC Project No. 11-135
By MK Date 03/29/12 Check by Date Sheet 3/9

Calculation of Pile Group Efficiency for Lateral Load Capacity

(using formula in Group 7.0 Technical Manual)



Pile Dia. (feet): 1.1667
No. of Piles: 22

Group Efficiency	X-Dir	Y-Dir
	0.80	0.79

→ USE .79

Coordinates

Pile No.	X	Y
1	0.0	-6.3
2	4.3	-6.3
3	8.5	-6.3
4	12.8	-6.3
5	17.0	-6.3
6	21.3	-6.3
7	0.0	-2.1
8	4.3	-2.1
9	8.5	-2.1
10	12.8	-2.1
11	17.0	-2.1
12	21.3	-2.1
13	0.0	2.1
14	5.7	2.1
15	11.4	2.1
16	17.0	2.1
17	22.7	2.1
18	0.0	6.3
19	5.7	6.3
20	11.4	6.3
21	17.0	6.3
22	22.7	6.3

Reduction Factors in X-dir	Reduction Factors in Y-dir
0.735	0.736
0.720	0.693
0.720	0.693
0.720	0.693
0.720	0.693
0.969	0.736
0.709	0.748
0.707	0.753
0.687	0.769
0.683	0.752
0.695	0.731
0.950	0.759
0.791	0.752
0.801	0.750
0.800	0.750
0.791	0.740
0.989	0.764
0.840	0.977
0.840	0.977
0.840	0.977
0.840	0.977
0.989	0.977

LEFT BRIDGE

LPILE Output, Abut 1, HP14x89, Strong Direction

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	4	y = 0.2500	M = 0.000	184000.	0.25000000	648829.	15341.	0.00000000
2	4	y = 0.5000	M = 0.000	184000.	0.50000000	1042234.	21896.	0.00000000
3	4	y = 1.0000	M = 0.000	184000.	1.00000000	1681906.	31261.	0.00000000
4	4	y = 3.0000	M = 0.000	184000.	3.00000000	3630849.	54965.	0.00000000
5	4	y = 5.0000	M = 0.000	184000.	5.00000000	5203528.	68695.	0.00000000

LPILE Output, Abut 1, HP14x89, Strong Direction

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	4	y = 0.2500	M = 0.000	184000.	0.25000000	378400.	11240.	0.00000000
2	4	y = 0.5000	M = 0.000	184000.	0.50000000	613203.	16010.	0.00000000
3	4	y = 1.0000	M = 0.000	184000.	1.00000000	993896.	22704.	0.00000000
4	4	y = 3.0000	M = 0.000	184000.	3.00000000	2125992.	39123.	0.00000000
5	4	y = 5.0000	M = 0.000	184000.	5.00000000	3026732.	48167.	0.00000000

LPILE Output, Abut 2, HP14x89, Strong Direction

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	4	y = 0.2500	M = 0.000	184000.	0.25000000	826823.	20949.	0.00000000
2	4	y = 0.5000	M = 0.000	184000.	0.50000000	1337385.	30238.	0.00000000
3	4	y = 1.0000	M = 0.000	184000.	1.00000000	2159608.	43555.	0.00000000
4	4	y = 3.0000	M = 0.000	184000.	3.00000000	4599910.	77223.	0.00000000
5	4	y = 5.0000	M = 0.000	184000.	5.00000000	6505071.	97074.	0.00000000

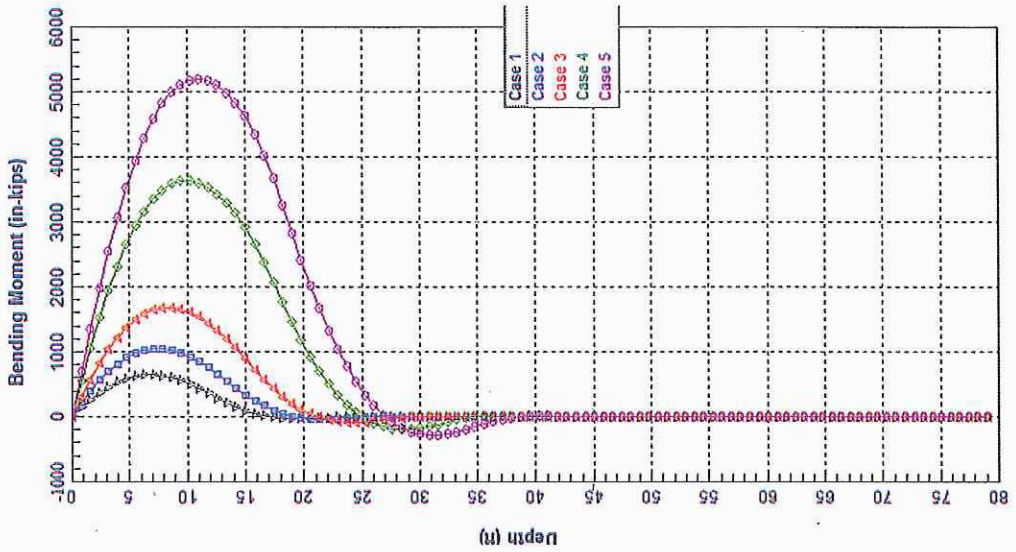
LPILE Output, Abut 2, HP14x89, Weak Direction

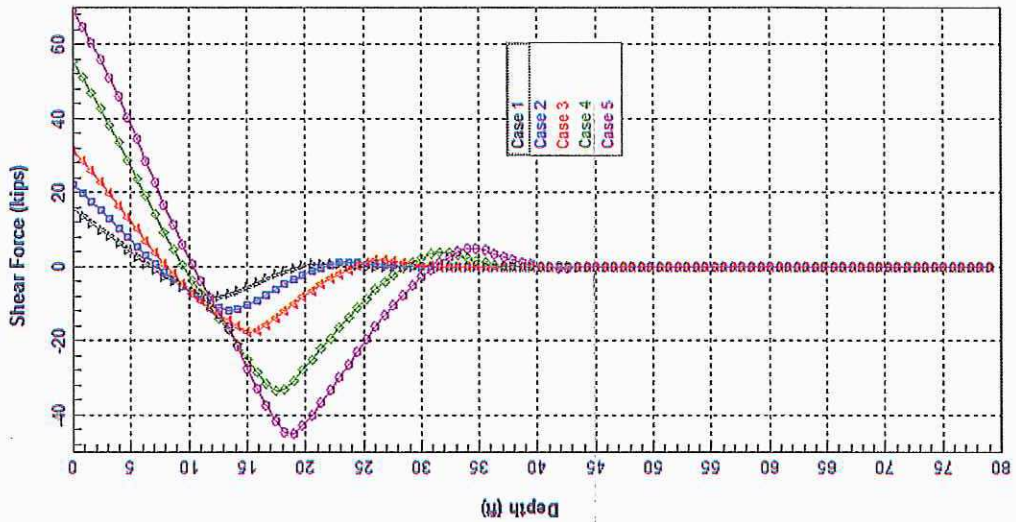
Definitions of Pile-Head Loading Conditions:

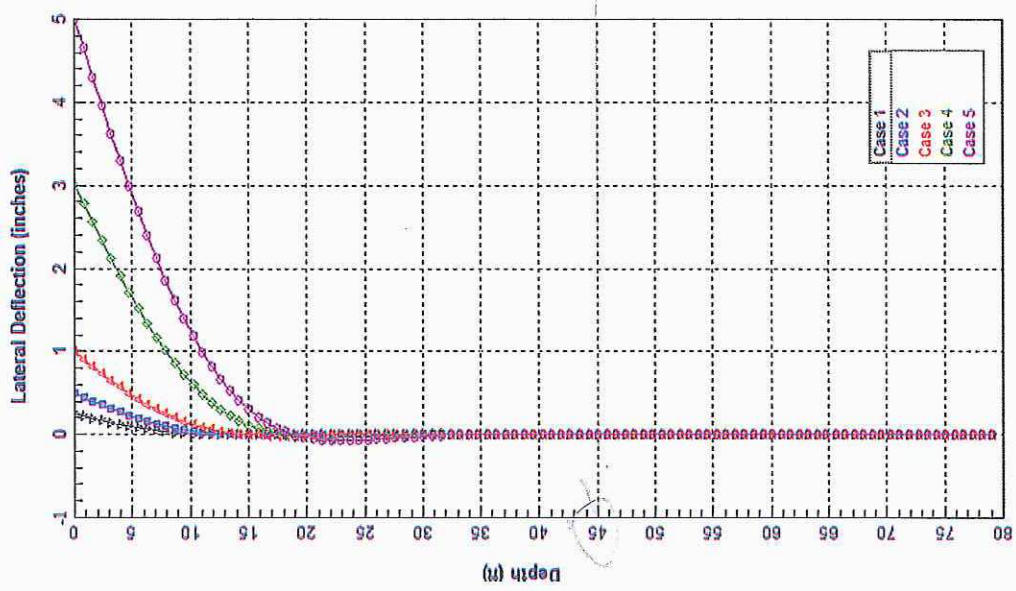
Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	4	y = 0.2500	M = 0.000	184000.	0.25000000	479844.	15089.	0.00000000
2	4	y = 0.5000	M = 0.000	184000.	0.50000000	777433.	21709.	0.00000000
3	4	y = 1.0000	M = 0.000	184000.	1.00000000	1259181.	31157.	0.00000000
4	4	y = 3.0000	M = 0.000	184000.	3.00000000	2709285.	54848.	0.00000000
5	4	y = 5.0000	M = 0.000	184000.	5.00000000	3858955.	68621.	0.00000000

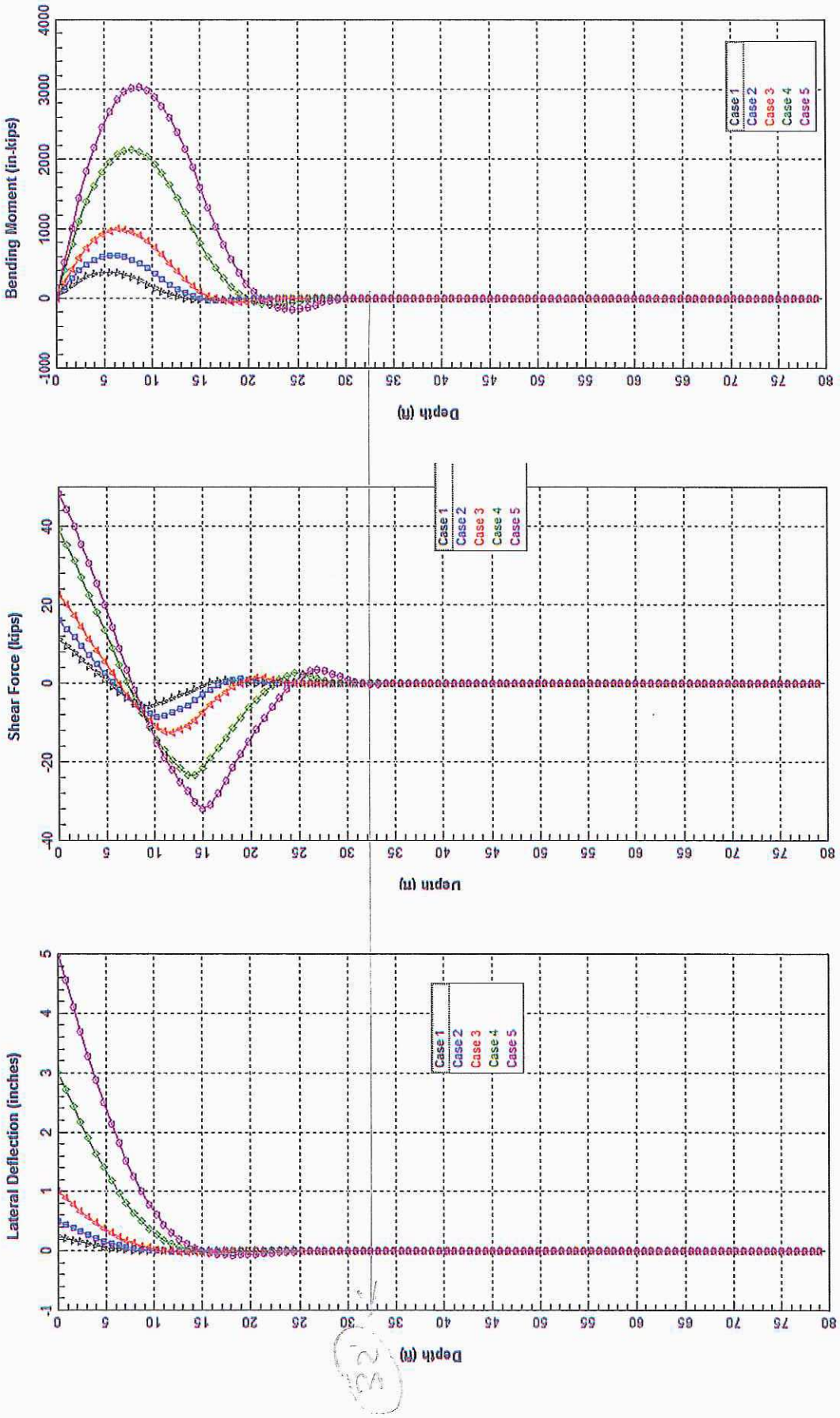
Lateral solutions for
Abut 1 Wall, HP14x89, strong axis







Lateral solutions for
Abut 1 Wall, HP14x89, weak axis



LPILE Output, Wing Walls, HP10x42, Strong Direction

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	4	y = 0.2500	M = 0.000	130000.	0.25000000	252143.	7361.4851	0.00000000
2	4	y = 0.5000	M = 0.000	130000.	0.50000000	410010.	10501.	0.00000000
3	4	y = 1.0000	M = 0.000	130000.	1.00000000	668666.	14960.	0.00000000
4	4	y = 3.0000	M = 0.000	130000.	3.00000000	1456064.	26036.	0.00000000
5	4	y = 5.0000	M = 0.000	130000.	5.00000000	2087469.	32261.	0.00000000

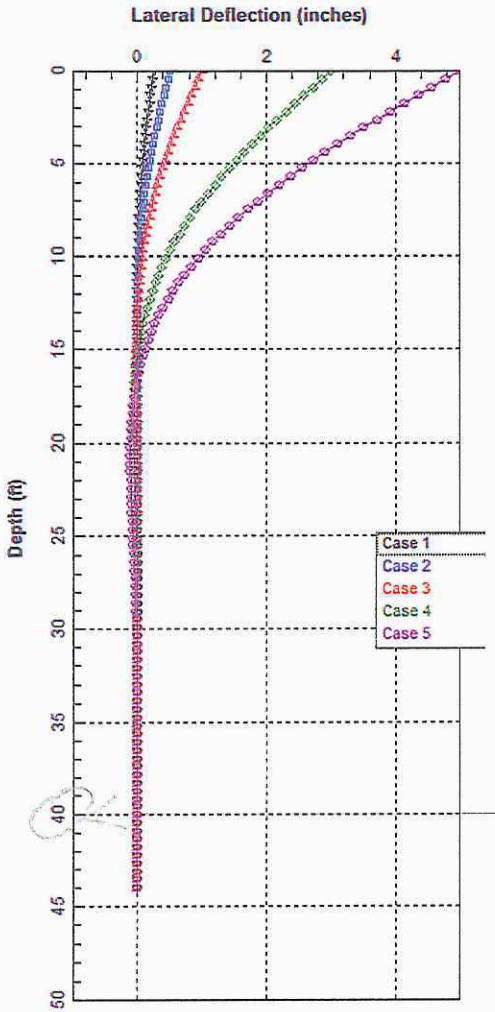
LPILE Output, Wing Walls, HP10x42, Weak Direction

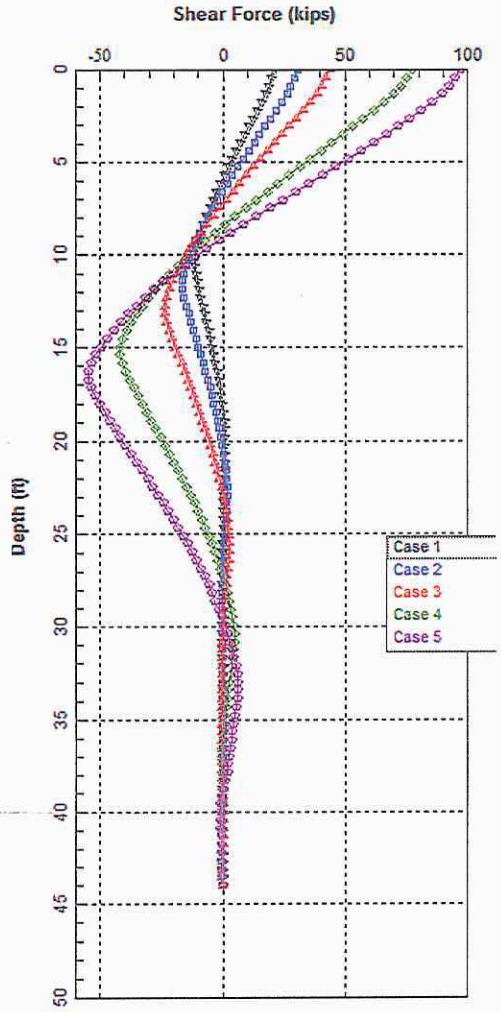
Definitions of Pile-Head Loading Conditions:

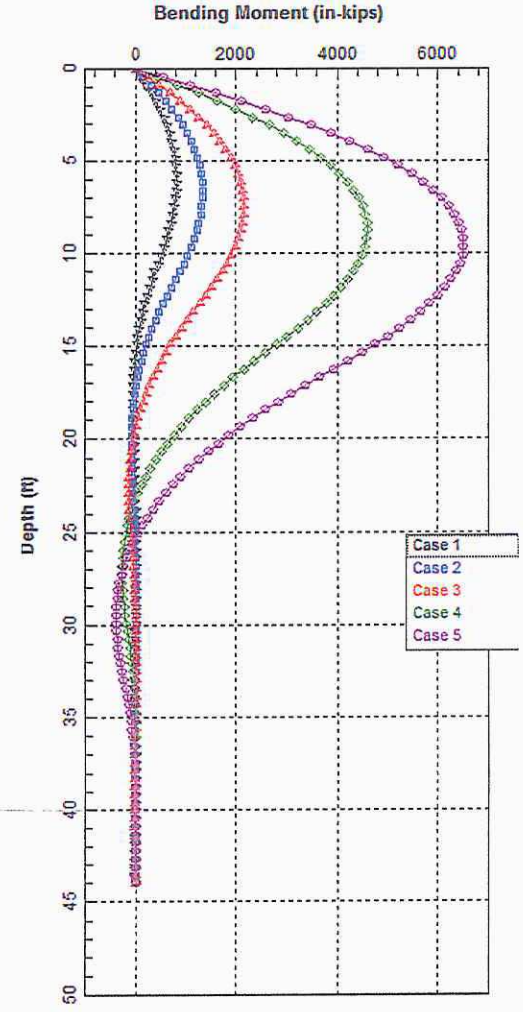
Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	4	y = 0.2500	M = 0.000	130000.	0.25000000	143691.	5222.5802	0.00000000
2	4	y = 0.5000	M = 0.000	130000.	0.50000000	234047.	7354.8872	0.00000000
3	4	y = 1.0000	M = 0.000	130000.	1.00000000	382113.	10309.	0.00000000
4	4	y = 3.0000	M = 0.000	130000.	3.00000000	837648.	17345.	0.00000000
5	4	y = 5.0000	M = 0.000	130000.	5.00000000	1206373.	20925.	0.00000000

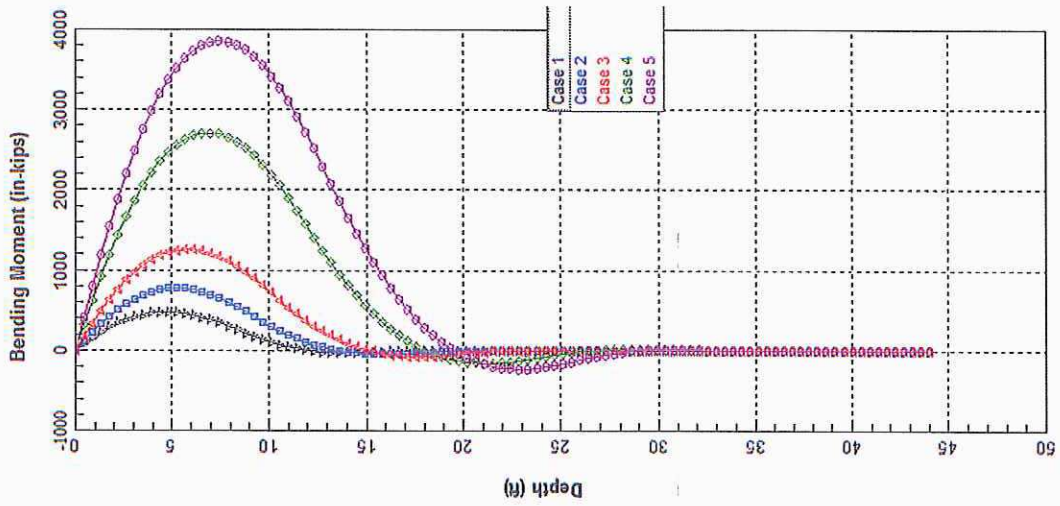
Lateral solutions for
Abut 2 Wall, HP14x89, strong axis

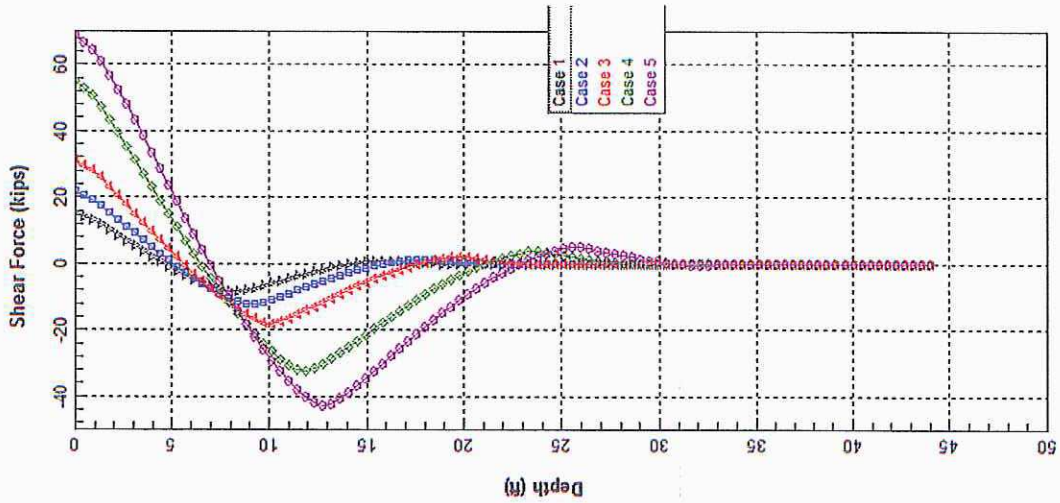


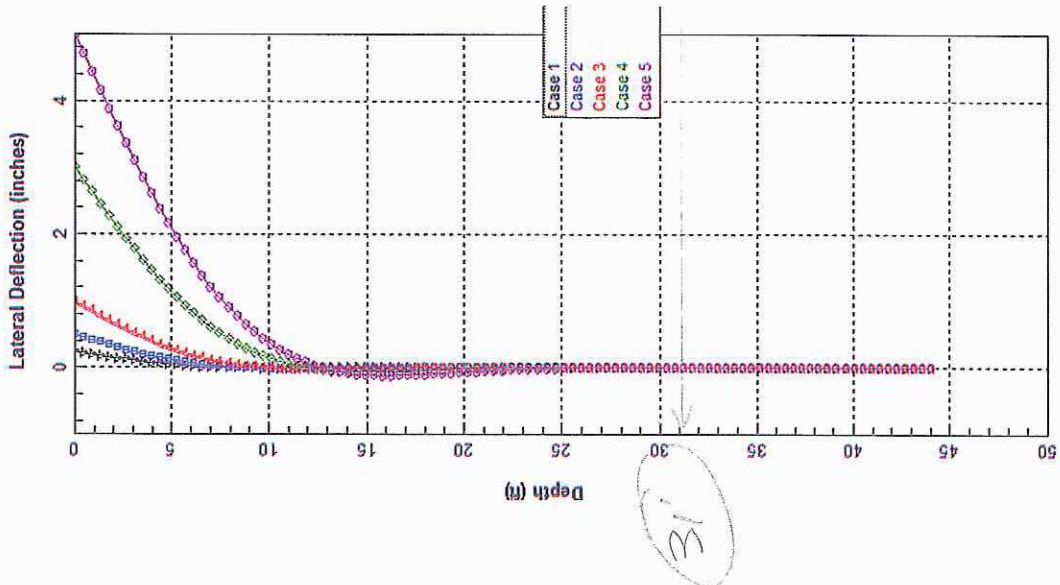




Lateral solutions for
Abut 2 Wall, HP14x89, weak axis





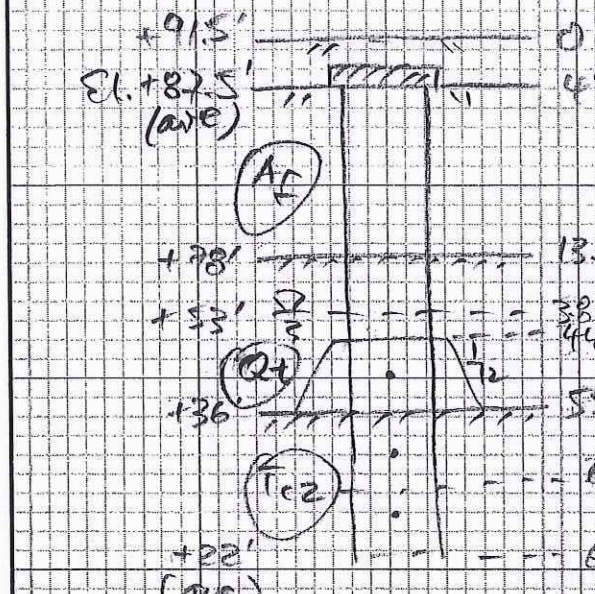


Project I-5 HOV SEG. 1
AV. PICO UC
Project No. 11-135

By MK Date 4/2/12 Checked By LCC Date 5/4/12 Sheet 1 of 5

PILE GROUP SETTLEMENT

1) ABUT #1



Parameters

- $\gamma = 120$ pcf
- $C_c = .025$

- CH
- $N = 16$ bpf $\gamma = 120$ pcf
- $C_c = \frac{1}{40} = .025$ (drained)
- $C_c = .03$ (sat.)

- MH
- $N = 76$ $\gamma = 125$ pcf
- $C_c = .025$

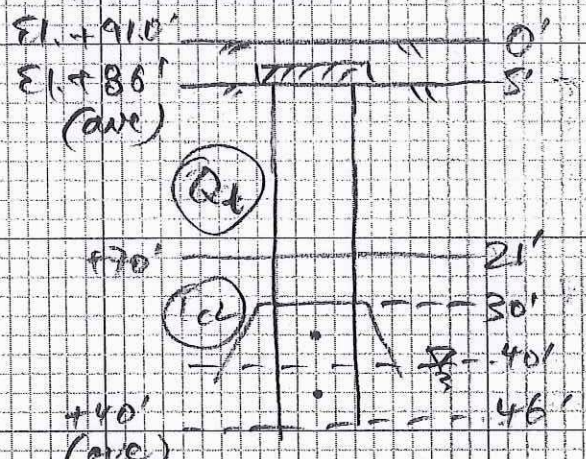
Pile cap: W = 17'
L = 99'8" (Stage-1)
(Stage-2 will lead to same settlement result)
$P_1 = 10153^K$ (total load per support for 2nd → permanent load)

Settlements:

Pile length	S
65.5'	.82"
60'	1.82"
40'	.98" ~ 2" (Parsons' permissible)
37'	

Design tip el.
+87.5' − 37' = +50.5 ~ +50' (for S=2")

2) ABUT #2



CH $\gamma = 120$ pcf
$C_c = .03$

MH $\gamma = 125$ pcf
$C_c = .025$ (dry)
$.03$ (sat.)

Pile cap W = 20'
L = 99'8" (Stage 1)
(Stage-2 width is similar following)
P = 11,723 k (total load/support for 2")
> 10,665 k (perm. load)

Settlements

Pile length	δ
44'	.97"
43	1"
30'	1.73"
27'	2" → Parsons permissible

Design Tip El.:
+86'(ave) − 27' = +59' (for δ = 2")

σ'_o = initial vertical effective stress at the midpoint of layer *i* (ksf)

$\Delta\sigma_v$ = increase in vertical stress at the midpoint of layer *i* (ksf)

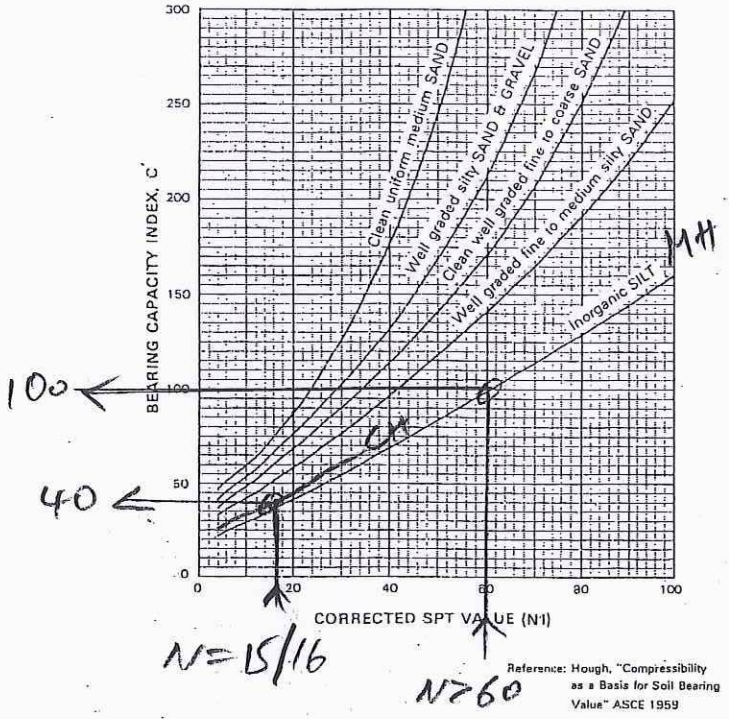


Figure 10.6.2.4.2-1—Bearing Capacity Index versus Corrected SPT (modified from Cheney and Chassie, 2000, after Hough, 1959)

The Hough method is applicable to cohesionless soil deposits. The "Inorganic Silt" curve should generally not be applied to soils that exhibit plasticity. The settlement characteristics of cohesive soils that exhibit plasticity should be investigated using undisturbed samples and laboratory consolidation tests as prescribed in Article 10.6.2.4.3.

10.6.2.4.3—Settlement of Footings on Cohesive Soils

Spread footings in which cohesive soils are located within the zone of stress influence shall be investigated for consolidation settlement. Elastic and secondary settlement shall also be investigated in consideration of the timing and sequence of construction loading and the tolerance of the structure to total and differential movements.

Where laboratory test results are expressed in terms of void ratio, e, the consolidation settlement of footings shall be taken as:

- For overconsolidated soils where $\sigma'_p > \sigma'_o$, see Figure 10.6.2.4.3-1:

$$S_c = \left[\frac{H_c}{1+e_o}\right]\left[C_r \log\left(\frac{\sigma'_p}{\sigma'_o}\right) + C_c \log\left(\frac{\sigma'_f}{\sigma'_p}\right)\right] \quad (10.6.2.4.3\text{-}1)$$

- For normally consolidated soils where $\sigma'_p = \sigma'_o$:

C10.6.2.4.3

In practice, footings on cohesive soils are most likely founded on overconsolidated clays, and settlements can be estimated using elastic theory (Baguelin et al., 1978), or the tangent modulus method (Janbu, 1963, 1967). Settlements of footings on overconsolidated clay usually occur at approximately one order of magnitude faster than soils without preconsolidation, and it is reasonable to assume that they take place as rapidly as the loads are applied. Infrequently, a layer of cohesive soil may exhibit a preconsolidation stress less than the calculated existing overburden stress. The soil is then said to be underconsolidated because a state of equilibrium has not yet been reached under the applied overburden stress. Such a condition may have been caused by a recent lowering of the groundwater table. In this case, consolidation settlement will occur due to the additional load of the structure and the settlement that is occurring to reach a state of equilibrium. The total consolidation settlement due to these two components can be estimated by Eq. 10.6.2.4.3-3 or Eq. 10.6.2.4.3-6.

4/5

PILEGROUP SETTLEMENT CALCULATION

I-5 HOV Seg 1, Abut 1, Stage 1

Pile Load =	10153	kips
Pile Cap Width =	17	ft
Pile Cap Length =	99.666667	ft
Bottom of Footing =	0	ft
Pile Length for the Calculation =	37	ft
Equivalent Pile Cap Width =	29.333333	ft
Bottom of b Length =	112	ft
Equivalent Footing Bottom of Footing =	-24.666667	ft
Bearing Pressure =	3.1	ksf

Load distribution 0.5 :1 (H:V)

Layer	Elevations 0	Thickness below equivakent footing ft	Thicknes s below bottom of footing ft	γ psf	σvo ksf	Δσ ksf	Cc'	Settlement
1	-13.5	0.0	13.5	120	1.62	3.09	0.025	0.00 "
2	-34.5	9.8	21.0	120	3.55	2.54	0.030	0.83 "
3	-38.5	4.0	4.0	60	4.26	1.99	0.030	0.24 "
4	-55.5	17.0	17.0	65	4.93	1.46	0.030	0.69 "
5	-60.0	4.5	4.5	65	5.63	1.12	0.025	0.11 "
6	-65.5	5.5	5.5	65	5.96	1.00	0.025	0.11 "
7	0.0	-65.5		6.14	0.95			0.00 "
	307.0							
		40.8	0.0		**Total secondary settlement=**			1.98 " ≈ 2"

PILEGROUP SETTLEMENT CALCULATION

I-5 HOV Seg 1, Abut 2, Stage 1

Pile Load =	11723	kips
Pile Cap Width =	20	ft
Pile Cap Length =	99.666667	ft
Bottom of Footing =	0	ft
Pile Length for the Calculation =	27	ft
Equivalent Pile Cap Width =	29	ft
Bottom of Ib Length =	108.66667	ft
Equivalent Footing Bottom of Footing =	-18	ft
Bearing Pressure =	3.7	ksf

Load distribution 0.5 :1 (H:V)

Layer	Elevations 0	Thickness below equivakent footing ft	Thicknes s below bottom of footing ft	γ psf	σvo ksf	Δσ ksf	Cc'	Settlement
1	-10.0	0.0	10.0	120	1.20	3.72	0.025	0.00 "
2	-21.0	3.0	11.0	120	2.34	3.49	0.030	0.43 "
3	-30.0	9.0	9.0	120	3.06	2.76	0.025	0.75 "
4	-35.0	5.0	5.0	120	3.90	2.19	0.025	0.29 "
5	-40.0	5.0	5.0	65	4.36	1.89	0.025	0.23 "
6	-46.0	6.0	6.0	65	4.72	1.62	0.030	0.28 "
7	307.0	0.0	-46.0		4.92	1.50		0.00 "
		28.0	0.0		**Total secondary settlement=**			**1.98 "**

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

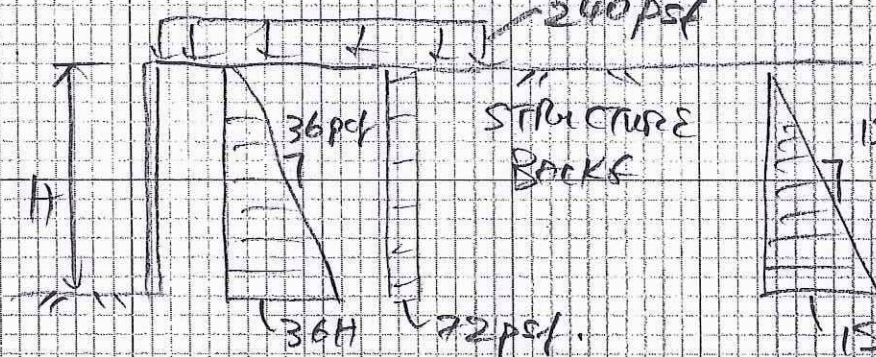
Project I-5 HOV SEG. 1

Project No. 11-135

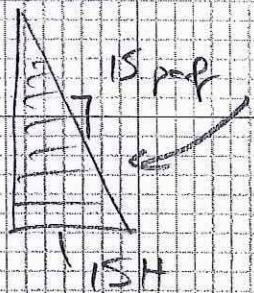
By MK Date 4/2/12 Checked By KC Date 5/4/12 Sheet 1 of 2

WALL EARTH PRESSURE

Static



Seismic



Distribution per AASHTO Section A11.1.1.1

STRUCTURE BACKFILL

Static $\gamma = 120$ pcf

$\phi = 32.4°$

$K_a = .3$

$\gamma K_a = \underline{36 \text{ pcf}}$ EFP

Traffic

$P = .3 \times 240 \text{ psf}$

$= \underline{72 \text{ psf}}$

Seismic $PGA = .382g$

$K_h = \frac{1}{2} PGA = .191$

M.O. $K_{ae} = .425$

AASHTO Section A11.1.1.1

incremental earth pressure

$P_E = \gamma (K_{ae} - K_a) H$

$= 120 (.425 - .3) H$

$= 15H$

$= \underline{15 \text{ pcf}}$ EFP

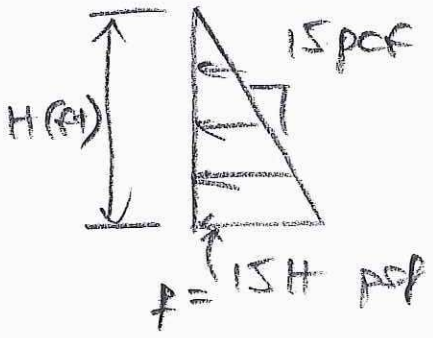
17800 Newhope St., Suite B, Fountain Valley, CA 92708, Phone (714) 751-3826, Fax (714) 751-3928

EARTH PRESSURES BEHIND WALLS
3/29/12 MK/EMI

structure backfill

Static				Seismic			
Input parameters							
soil density gamma=	120 pcf			soil density gamma=	120 pcf		
soil friction phi=	32.6 deg =	0.569 rad		soil friction phi=	32.6 deg =	0.569 rad	
wall alpha=	0 deg =	0 rad		wall alpha=	0 deg =	0 rad	
backslope beta=	0 deg =	0 rad		backslope beta=	0 deg =	0 rad	
wall/soil friction delta=	0 deg =	0 rad		wall/soil friction delta=	0 deg =	0 rad	
				Kh=	0.191 g =	0.1887 rad	
				Kv=	0 g		
Cantilever walls						pcf EFP (H in ft)	uniform (psf) (H in ft)
		EPF					
Coulomb Ka =	0.30	36.0	pcf	Monobe-Okabe Kae (tot)=	0.42	50.9	25.5 H
Coulomb Kah=	0.30	36.0	pcf	Monobe-Okabe Kaeh(tot)=	0.42	50.9	25.5 H
				Monobe-Okabe Kae (inc)=		15.0	7.5 H
				Monobe-Okabe Kaeh(inc)=		15.0	7.5 H
Coulomb Kp =	3.34	400.3	pcf	Monobe Okabe Kpe (tot)=	2.97	356.1	178.0 H
Coulomb Kph=	3.34	400.3	pcf	Monobe Okabe Kpeh(tot)=	2.97	356.1	178.0 H
At-rest/unyielding walls						EPF pcf	uniform (psf) (H in ft)
		EPF					
Jaky Ko =	0.46	55.3	pcf	Yong Koe (tot)=	0.85	101.8	50.9 H
Jaky Koh=	0.46	55.3	pcf	Yong Koeh(tot)=	0.85	101.8	50.9 H
				Yong Koe (inc)=		46.5	23.2 H
				Yong Koeh(inc)=		46.5	23.2 H
Zhang-Tokimatsu Ko =	0.46	55.3	pcf	Zhang-Tokimatsu Koe(tot)=	0.60	71.5	35.8 H
Zhang-Tokimatsu Koh=	0.46	55.3	pcf	Zhang-Tokimatsu Koeh(tot)=	0.60	71.5	35.8 H
AASHTO Ka =		50.4	pcf	BART OAC Ka(inc)=	0.59	71.3	13.1 H
AASHTO Kah=		50.4	pcf	BART OAC Kah(inc)=	0.59	71.3	13.1 H

References:
Zhang/Shamoto/Tokimatsu, 1998 - eq. (27)
AASHTO - 40-45% increase on static
BART OAC - 75% increase on seismic increment
Yong 1985 (in Whitman) - 100% to 200% increase on seismic Monobe-Okabe



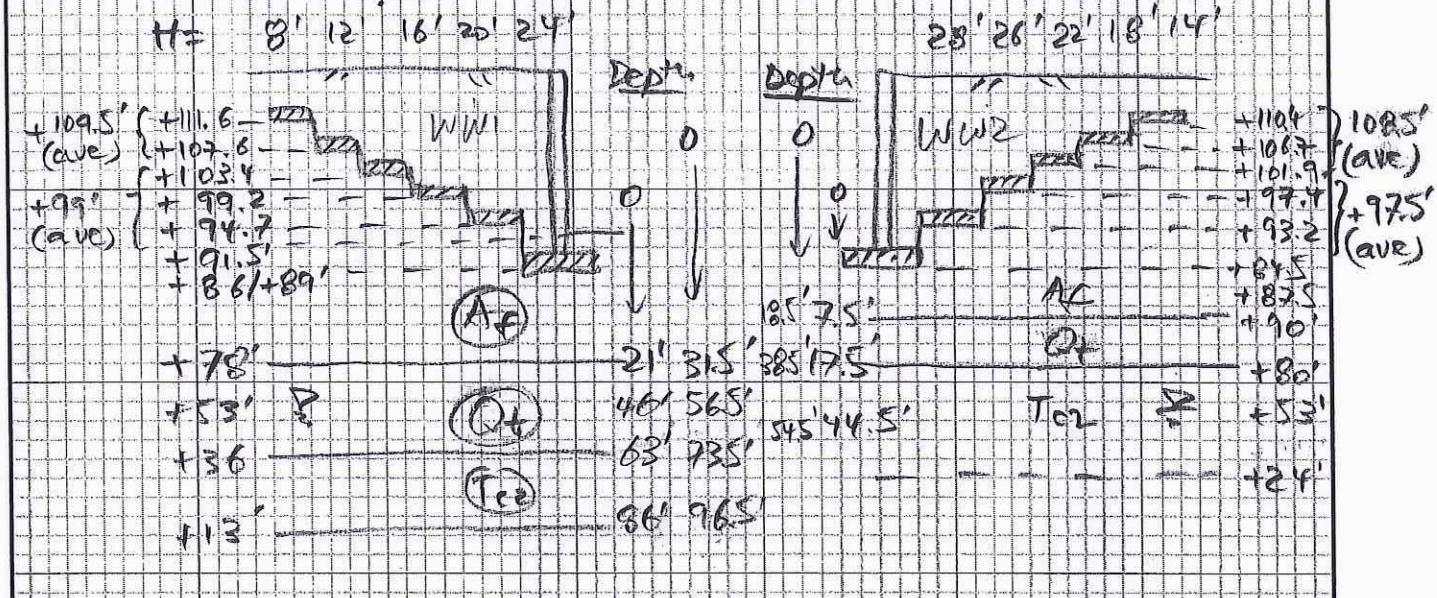
WING WALLS

Project I-5 HOV SEG. 1
BRIDGE UC
Project No. 11-135

By MK Date 4/23/12 Checked By LCC Date 5/4/12 Sheet 1 of 6

PILE AXIAL DESIGN – WING WALLS

1) CONFIG.

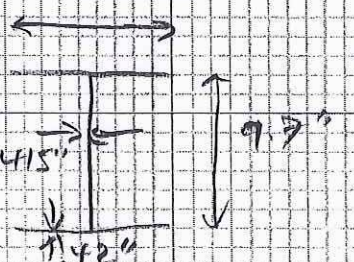


PARAMETERS

UNIT	TYPE	γ (pcf)	c (psf)	α	ε_{50}
AC	CL/ML	120	1,000	.5	.01
Tc1	CH	120	1,800	.5	.01
Tc2	MH	125	4000	.5	.005

2) PILE DATA

"CLASS 90" HP10x42



A_s = .086 ft²

$A_{50\% Plug}$ = .339 ft²

$A_{skin\ (out\ side)}$ = 3.3'

$2g$ = 57.4 / 10" = .042'

I_{xx} = 210 in⁴

I_{yy} = 71.7 in⁴

corrosion → use HP10x57.

3) a) DESIGN TIP EL. — COMPRESSION (a-I) (a-II)

WW	H	STRENGTH / NOM. RES.	PILE CUT-OFF	REQ. LENGTH	DESIGN TIP	EXTR RES.	REQ LENGTH	DESIGN TIP
1	8'	60K	+109.5'	- 25' =	+84.5' (use 82')	35K → 40	20'	+99.5' (use 99')
	12'	80K	+109.5'	- 29' =	+80.5' (use 78')	64K → 70	27	+82.5' (use 82')
	16'	135K → 140	+99'	- 52' =	+47' (use 49')	93K → 100	38	+61'
	20'	172K → 180	+99'	- 63' =	+36'	104K → 110	42	+57'
	24'	149K → 150	+99'	- 55' =	+44' (use 41')	133K → 140	52	+47'
2	14'	106K → 110	+108.5'	- 39' =	+69.5' (use 69')	79K → 80	32.5'	+76.0'
	18'	168K → 170	+108.5'	- 48.5' =	+60'	110K	40'	+68.5' (use 68')
	22'	133K → 180	+101.9'	- 47' =	+54'	136K → 140	39'	+62'
	26'	152K → 160	+97.4'	- 41' =	+56'	139K → 140	37'	+60'
	28'	133K → 160	+93.2'	- 41' =	+52'	130K	35'	+58.0'

b) DESIGN TIP EL. — TENSION (b-II)

1	8'	0K	+109.5'	N/A	N/A			
	12'	8K → 10	+109.5'	14'	+95.5' (use 95')			
	16'	3K → 10	+99'	15'	+84'			
	20'	16K → 20	+99'	20'	+79'			
	24'	17K → 20	+99'	20'	+79'			
2	14'	5K → 10	+108.5'	15'	+93.5' (use 93')			
	18'	0K	+108.5'	N/A	N/A			
	22'	21K → 30	+101.9'	17.5'	+84'	92.5 - 12.5 = 80.5'		(use 83')
	26'	19K → 20	+97.4'	15'	+82.5'	97.5 - 14.5' = +83'		
	28'	24K → 30	+93.2'	17.5'	+76'	93.5 - 12.5 = +81'		

AXIAL PILE CAPACITY

PILAX 4.1

Project: I-5 HOV SEGMENT 1
EMI Project No.: 11-135
Description: Avenida Pico UC
WW 1, H=16'/20'/24', HP10x42
Date: 4/23/12 by: MK checked:

UNITS	
Length	Force
ft	K

GWE	GWD
ft	ft
-46.00	46.00

PILE PARAMETERS			
Pile Elev.		Displ. to Mobilize	
Top	Tip	Friction	Bearing
ft	ft	ft	ft
-2.00	-65.00	0.02	0.042

○ Open section
○ HP section
◉ Full section
☐ Allow plugging

E-Modulus	
Top	Tip
K/ft2	K/ft2
4.32E+06	4.32E+06

Circumference		Sectional Area	
Skin	(Unused)	Pile	(Unused)
ft	ft	ft2	ft2
3.300	3.300	0.339	0.705
3.300	3.300	0.339	0.705
3.300	3.300	0.339	0.705

SOIL LAYERS				GRANULAR SOIL-PILE PARAMETERS					COHESIVE SOIL-PILE PARAMETERS			
Description	Top El.	Depth	Total Unit Weight	Friction Angle	Bearing Capacity Factor	Lateral Earth Pressure Coefficients		Skin Friction Angle	Cohesion	Bearing Capacity Factor	Adhesion Factors or "API"	
			γ	ϕ	N_q	K_C	K_T	δ	c	N_C	α_C	α_T
-	ft	ft	K/ft2	deg	-	-	-	deg	K/ft2	-	-	-
Af- Clay/Silt	0.00	0.00	0.120	32.00	0	1.00	0.50	27.00				
TC - stiff CH	-21.00	21.00	0.120						1.800	9	0.50	0.50
TC-hard MH	-63.00	63.00	0.125						4.000	9	0.50	0.50

SOIL LAYERS			OVERBURDEN		PILE SKIN FRICTION						PILE END BEARING			TOTAL PILE CAPACITY		
Description	Top El.	Depth	Total Stress	Effect. Stress	Unit Stress		Outside Friction Capacity		Inside Friction Capacity		Unit Stress	Section Capacity	Plug Capacity	Plugged?	Compression	Tension
-	-	-	σ_V	σ'_V	f_C	f_T	Q_{FC}	Q_{FT}	Q'_{FC}	Q'_{FT}	q_E	Q_E	Q'_E	-	Q_C	Q_T
-	-	☑ Interval 2.00	-	-	max: 2.40	max: 2.40	FOS: 1.00	FOS: 1.00	FOS: 1.00	FOS: 1.00	max: 200.00	FOS: 1.00	FOS: 1.00	-	-	-
text	ft	ft	K/ft2	K/ft2	K/ft2	K/ft2	K	K	K	K	K/ft2	K	K	Yes/No	K	K
1-Af- Clay/Sil	0.00	0.00	0.00	0.00												
1-Af- Clay/Sil	-2.00	2.00	0.24	0.24	0.12	0.06	0.0	0.0			0.00	0.0		N/A	0.0	0.0
1-Af- Clay/Sil	-4.00	4.00	0.48	0.48	0.24	0.12	1.2	0.6			0.00	0.0		N/A	1.2	0.6
1-Af- Clay/Sil	-6.00	6.00	0.72	0.72	0.37	0.18	3.2	1.6			0.00	0.0		N/A	3.2	1.6
1-Af- Clay/Sil	-8.00	8.00	0.96	0.96	0.49	0.24	6.1	3.0			0.00	0.0		N/A	6.1	3.0
1-Af- Clay/Sil	########	10.00	1.20	1.20	0.61	0.31	9.7	4.8			0.00	0.0		N/A	9.7	4.8
1-Af- Clay/Sil	########	12.00	1.44	1.44	0.73	0.37	14.1	7.1			0.00	0.0		N/A	14.1	7.1
1-Af- Clay/Sil	########	14.00	1.68	1.68	0.86	0.43	19.4	9.7			0.00	0.0		N/A	19.4	9.7
1-Af- Clay/Sil	########	16.00	1.92	1.92	0.98	0.49	25.4	12.7			0.00	0.0		N/A	25.4	12.7
1-Af- Clay/Sil	########	18.00	2.16	2.16	1.10	0.55	32.3	16.1			0.00	0.0		N/A	32.3	16.1
1-Af- Clay/Sil	########	20.00	2.40	2.40	1.22	0.61	40.0	20.0			0.00	0.0		N/A	40.0	20.0
1-Af- Clay/Sil	########	21.00	2.52	2.52	1.28	0.64	44.1	22.0			0.00	0.0		N/A	44.1	22.0
2-TC - stiff C	########	21.00	2.52	2.52	0.90	0.90	44.1	22.0			16.20	5.5		N/A	49.6	22.0
2-TC - stiff C	########	22.00	2.64	2.64	0.90	0.90	47.1	25.0			16.20	5.5		N/A	52.5	25.0
2-TC - stiff C	########	24.00	2.88	2.88	0.90	0.90	53.0	31.0			16.20	5.5		N/A	58.5	31.0
2-TC - stiff C	########	26.00	3.12	3.12	0.90	0.90	58.9	36.9			16.20	5.5		N/A	64.4	36.9
2-TC - stiff C	########	28.00	3.36	3.36	0.90	0.90	64.9	42.8			16.20	5.5		N/A	70.4	42.8
2-TC - stiff C	########	30.00	3.60	3.60	0.90	0.90	70.8	48.8			16.20	5.5		N/A	76.3	48.8
2-TC - stiff C	########	32.00	3.84	3.84	0.90	0.90	76.8	54.7			16.20	5.5		N/A	82.2	54.7
2-TC - stiff C	########	34.00	4.08	4.08	0.90	0.90	82.7	60.7			16.20	5.5		N/A	88.2	60.7
2-TC - stiff C	########	36.00	4.32	4.32	0.90	0.90	88.6	66.6			16.20	5.5		N/A	94.1	66.6
2-TC - stiff C	########	38.00	4.56	4.56	0.90	0.90	94.6	72.5			16.20	5.5		N/A	100.1	72.5
2-TC - stiff C	########	40.00	4.80	4.80	0.90	0.90	100.5	78.5			16.20	5.5		N/A	106.0	78.5
2-TC - stiff C	########	42.00	5.04	5.04	0.90	0.90	106.5	84.4			16.20	5.5		N/A	111.9	84.4
2-TC - stiff C	########	44.00	5.28	5.28	0.90	0.90	112.4	90.4			16.20	5.5		N/A	117.9	90.4
2-TC - stiff C	########	46.00	5.52	5.52	0.90	0.90	118.3	96.3			16.20	5.5		N/A	123.8	96.3
2-TC - stiff C	########	48.00	5.76	5.64	0.90	0.90	124.3	102.2			16.20	5.5		N/A	129.8	102.2
2-TC - stiff C	########	50.00	6.00	5.75	0.90	0.90	130.2	108.2			16.20	5.5		N/A	135.7	108.2
2-TC - stiff C	########	52.00	6.24	5.87	0.90	0.90	136.2	114.1			16.20	5.5		N/A	141.6	114.1
2-TC - stiff C	########	54.00	6.48	5.98	0.90	0.90	142.1	120.1			16.20	5.5		N/A	147.6	120.1
2-TC - stiff C	########	56.00	6.72	6.10	0.90	0.90	148.0	126.0			16.20	5.5		N/A	153.5	126.0
2-TC - stiff C	########	58.00	6.96	6.21	0.90	0.90	154.0	131.9			16.20	5.5		N/A	159.5	131.9
2-TC - stiff C	########	60.00	7.20	6.33	0.90	0.90	159.9	137.9			16.20	5.5		N/A	165.4	137.9
2-TC - stiff C	########	62.00	7.44	6.44	0.90	0.90	165.9	143.8			16.20	5.5		N/A	171.3	143.8
2-TC - stiff C	########	63.00	7.56	6.50	0.90	0.90	168.8	146.8			16.20	5.5		N/A	174.3	146.8
3-TC-hard MH	########	63.00	7.56	6.50	2.00	2.00	168.8	146.8			36.00	12.2		N/A	181.0	146.8
3-TC-hard MH	########	64.00	7.69	6.56	2.00	2.00	175.4	153.4			36.00	12.2		N/A	187.6	153.4
3-TC-hard MH	########	65.00	7.81	6.62	2.00	2.00	182.0	160.0			36.00	12.2		N/A	194.2	160.0

Notes:
[a] Specified maximum limit reached (max fc, max ft, max q).
[b] Plugged condition: Q'E exceeds Q'FC. Q'FC is not used in total compressive capacity QC.
[c] Plug traveled downward (Q'FC exceeds Q'E).
[d] Q'E is less than Q'FC and not used in total compressive capacity QC.
[e] Inside soil dead weight reached.

WW1 H = 16'÷24'

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AXIAL PILE CAPACITY

PILAX 4.1

Project: I-5 HOV SEGMENT 1
EMI Project No.: 11-135
Description: Avenida Pico UC
WW 1, H=8'/12', HP10x42
Date: 4/23/12 by: MK checked:

UNITS	
Length	Force
ft	K

GWE	GWD
ft	ft
-56.50	56.50

PILE PARAMETERS			
Pile Elev.		Displ. to Mobilize	
Top	Tip	Friction	Bearing
ft	ft	ft	ft
-2.00	-50.00	0.02	0.042

○ Open section
○ HP section
◉ Full section
☐ Allow plugging

E-Modulus	
Top	Tip
K/ft2	K/ft2
4.32E+06	4.32E+06

SOIL LAYERS				GRANULAR SOIL-PILE PARAMETERS					COHESIVE SOIL-PILE PARAMETERS				Circumference		Sectional Area	
Description	Top El.	Depth	Total Unit Weight	Friction Angle	Bearing Capacity Factor	Lateral Earth Pressure Coefficients		Skin Friction Angle	Cohesion	Bearing Capacity Factor	Adhesion Factors or "API"		Skin	(Unused)	Pile	(Unused)
			γ	ϕ	N_q	K_C	K_T	δ	c	N_C	α_C	α_T				
-	ft	ft	K/ft2	deg	-	-	-	deg	K/ft2	-	-	-	ft	ft	ft2	ft2
Af- Clay/Silt	0.00	0.00	0.120	32.00	0	1.00	0.50	27.00					3.300	3.300	0.339	0.705
TC - stiff CH	-31.50	31.50	0.120						1.800	9	0.50	0.50	3.300	3.300	0.339	0.705
TC-hard MH	-73.50	73.50	0.125						4.000	9	0.50	0.50	3.300	3.300	0.339	0.705

SOIL LAYERS			OVERBURDEN		PILE SKIN FRICTION						PILE END BEARING			TOTAL PILE CAPACITY		
Description	Top El.	Depth	Total Stress	Effect. Stress	Unit Stress		Outside Friction Capacity		Inside Friction Capacity		Unit Stress	Section Capacity	Plug Capacity	Plugged?	Compression	Tension
			σ_V	σ'_V	f_C	f_T	Q_{FC}	Q_{FT}	Q'_{FC}	Q'_{FT}	q_E	Q_E	Q'_E		Q_C	Q_T
-	-	☑ Interval 2.00	-	-	max: 2.40	max: 2.40	FOS: 1.00	FOS: 1.00	FOS: 1.00	FOS: 1.00	max: 200.00	FOS: 1.00	FOS: 1.00	-	-	-
text	ft	ft	K/ft2	K/ft2	K/ft2	K/ft2	K	K	K	K	K/ft2	K	K	Yes/No	K	K
1-Af- Clay/Sil	0.00	0.00	0.00	0.00												
1-Af- Clay/Sil	-2.00	2.00	0.24	0.24	0.12	0.06	0.0	0.0			0.00	0.0		N/A	0.0	0.0
1-Af- Clay/Sil	-4.00	4.00	0.48	0.48	0.24	0.12	1.2	0.6			0.00	0.0		N/A	1.2	0.6
1-Af- Clay/Sil	-6.00	6.00	0.72	0.72	0.37	0.18	3.2	1.6			0.00	0.0		N/A	3.2	1.6
1-Af- Clay/Sil	-8.00	8.00	0.96	0.96	0.49	0.24	6.1	3.0			0.00	0.0		N/A	6.1	3.0
1-Af- Clay/Sil	########	10.00	1.20	1.20	0.61	0.31	9.7	4.8			0.00	0.0		N/A	9.7	4.8
1-Af- Clay/Sil	########	12.00	1.44	1.44	0.73	0.37	14.1	7.1			0.00	0.0		N/A	14.1	7.1
1-Af- Clay/Sil	########	14.00	1.68	1.68	0.86	0.43	19.4	9.7			0.00	0.0		N/A	19.4	9.7
1-Af- Clay/Sil	########	16.00	1.92	1.92	0.98	0.49	25.4	12.7			0.00	0.0		N/A	25.4	12.7
1-Af- Clay/Sil	########	18.00	2.16	2.16	1.10	0.55	32.3	16.1			0.00	0.0		N/A	32.3	16.1
1-Af- Clay/Sil	########	20.00	2.40	2.40	1.22	0.61	40.0	20.0			0.00	0.0		N/A	40.0	20.0
1-Af- Clay/Sil	########	22.00	2.64	2.64	1.35	0.67	48.4	24.2			0.00	0.0		N/A	48.4	24.2
1-Af- Clay/Sil	########	24.00	2.88	2.88	1.47	0.73	57.7	28.9			0.00	0.0		N/A	57.7	28.9
1-Af- Clay/Sil	########	26.00	3.12	3.12	1.59	0.79	67.8	33.9			0.00	0.0		N/A	67.8	33.9
1-Af- Clay/Sil	########	28.00	3.36	3.36	1.71	0.86	78.7	39.3			0.00	0.0		N/A	78.7	39.3
1-Af- Clay/Sil	########	30.00	3.60	3.60	1.83	0.92	90.4	45.2			0.00	0.0		N/A	90.4	45.2
1-Af- Clay/Sil	########	31.50	3.78	3.78	1.93	0.96	99.7	49.9			0.00	0.0		N/A	99.7	49.9
2-TC - stiff C	########	31.50	3.78	3.78	0.90	0.90	99.7	49.9			16.20	5.5		N/A	105.2	49.9
2-TC - stiff C	########	32.00	3.84	3.84	0.90	0.90	101.2	51.3			16.20	5.5		N/A	106.7	51.3
2-TC - stiff C	########	34.00	4.08	4.08	0.90	0.90	107.1	57.3			16.20	5.5		N/A	112.6	57.3
2-TC - stiff C	########	36.00	4.32	4.32	0.90	0.90	113.1	63.2			16.20	5.5		N/A	118.6	63.2
2-TC - stiff C	########	38.00	4.56	4.56	0.90	0.90	119.0	69.2			16.20	5.5		N/A	124.5	69.2
2-TC - stiff C	########	40.00	4.80	4.80	0.90	0.90	124.9	75.1			16.20	5.5		N/A	130.4	75.1
2-TC - stiff C	########	42.00	5.04	5.04	0.90	0.90	130.9	81.0			16.20	5.5		N/A	136.4	81.0
2-TC - stiff C	########	44.00	5.28	5.28	0.90	0.90	136.8	87.0			16.20	5.5		N/A	142.3	87.0
2-TC - stiff C	########	46.00	5.52	5.52	0.90	0.90	142.8	92.9			16.20	5.5		N/A	148.3	92.9
2-TC - stiff C	########	48.00	5.76	5.76	0.90	0.90	148.7	98.9			16.20	5.5		N/A	154.2	98.9
2-TC - stiff C	########	50.00	6.00	6.00	0.90	0.90	154.6	104.8			16.20	5.5		N/A	160.1	104.8

Notes:
[a] Specified maximum limit reached (max fc, max ft, max q).
[b] Plugged condition: Q'E exceeds Q'FC. Q'FC is not used in total compressive capacity QC.
[c] Plug traveled downward (Q'FC exceeds Q'E).
[d] Q'E is less than Q'FC and not used in total compressive capacity QC.
[e] Inside soil dead weight reached.

WW1 H=8'/12'

AXIAL PILE CAPACITY

PILAX 4.1

Project: I-5 HOV SEGMENT 1
EMI Project No.: 11-135
Description: Avenida Pico UC
WW 2, H=14'/18', HP10x42
Date: 4/23/12 by: MK checked:

UNITS	
Length	Force
ft	K

GWE	GWD
ft	ft
-54.50	54.50

PILE PARAMETERS			
Pile Elev.		Displ. to Mobilize	
Top	Tip	Friction	Bearing
ft	ft	ft	ft
-2.00	-50.00	0.02	0.042

○ Open section
○ HP section
◉ Full section
☐ Allow plugging

E-Modulus	
Top	Tip
K/ft2	K/ft2
4.32E+06	4.32E+06

SOIL LAYERS				GRANULAR SOIL-PILE PARAMETERS					COHESIVE SOIL-PILE PARAMETERS							
Description	Top El.	Depth	Total Unit Weight	Friction Angle	Bearing Capacity Factor	Lateral Earth Pressure Coefficients		Skin Friction Angle	Cohesion	Bearing Capacity Factor	Adhesion Factors or "API"		Circumference		Sectional Area	
			γ	ϕ	N_q	K_C	K_T	δ	c	N_C	α_C	α_T	Skin	(Unused)	Pile	(Unused)
-	ft	ft	K/ft2	deg	-	-	-	deg	K/ft2	-	-	-	ft	ft	ft2	ft2
Af- Clay/Silt	0.00	0.00	0.120	32.00	0	1.00	0.50	27.00					3.300	3.300	0.339	0.705
TC - stiff CH	-18.50	18.50	0.120						1.800	9	0.50	0.50	3.300	3.300	0.339	0.705
TC-hard MH	-38.50	38.50	0.125						4.000	9	0.50	0.50	3.300	3.300	0.339	0.705

SOIL LAYERS			OVERBURDEN		PILE SKIN FRICTION						PILE END BEARING			TOTAL PILE CAPACITY		
Description	Top El.	Depth	Total Stress	Effect. Stress	Unit Stress		Outside Friction Capacity		Inside Friction Capacity		Unit Stress	Section Capacity	Plug Capacity	Plugged?	Compression	Tension
-	-	-	σ_V	σ'_V	f_C	f_T	Q_{FC}	Q_{FT}	Q'_{FC}	Q'_{FT}	q_E	Q_E	Q'_E	-	Q_C	Q_T
-	-	☑ Interval 2.00	-	-	max: 2.40	max: 2.40	FOS: 1.00	FOS: 1.00	FOS: 1.00	FOS: 1.00	max: 200.00	FOS: 1.00	FOS: 1.00	-	-	-
text	ft	ft	K/ft2	K/ft2	K/ft2	K/ft2	K	K	K	K	K/ft2	K	K	Yes/No	K	K
1-Af- Clay/Sil	0.00	0.00	0.00	0.00												
1-Af- Clay/Sil	-2.00	2.00	0.24	0.24	0.12	0.06	0.0	0.0			0.00	0.0		N/A	0.0	0.0
1-Af- Clay/Sil	-4.00	4.00	0.48	0.48	0.24	0.12	1.2	0.6			0.00	0.0		N/A	1.2	0.6
1-Af- Clay/Sil	-6.00	6.00	0.72	0.72	0.37	0.18	3.2	1.6			0.00	0.0		N/A	3.2	1.6
1-Af- Clay/Sil	-8.00	8.00	0.96	0.96	0.49	0.24	6.1	3.0			0.00	0.0		N/A	6.1	3.0
1-Af- Clay/Sil	########	10.00	1.20	1.20	0.61	0.31	9.7	4.8			0.00	0.0		N/A	9.7	4.8
1-Af- Clay/Sil	########	12.00	1.44	1.44	0.73	0.37	14.1	7.1			0.00	0.0		N/A	14.1	7.1
1-Af- Clay/Sil	########	14.00	1.68	1.68	0.86	0.43	19.4	9.7			0.00	0.0		N/A	19.4	9.7
1-Af- Clay/Sil	########	16.00	1.92	1.92	0.98	0.49	25.4	12.7			0.00	0.0		N/A	25.4	12.7
1-Af- Clay/Sil	########	18.00	2.16	2.16	1.10	0.55	32.3	16.1			0.00	0.0		N/A	32.3	16.1
1-Af- Clay/Sil	########	18.50	2.22	2.22	1.13	0.57	34.1	17.1			0.00	0.0		N/A	34.1	17.1
2-TC - stiff C	########	18.50	2.22	2.22	0.90	0.90	34.1	17.1			16.20	5.5		N/A	39.6	17.1
2-TC - stiff C	########	20.00	2.40	2.40	0.90	0.90	38.6	21.5			16.20	5.5		N/A	44.1	21.5
2-TC - stiff C	########	22.00	2.64	2.64	0.90	0.90	44.5	27.5			16.20	5.5		N/A	50.0	27.5
2-TC - stiff C	########	24.00	2.88	2.88	0.90	0.90	50.5	33.4			16.20	5.5		N/A	56.0	33.4
2-TC - stiff C	########	26.00	3.12	3.12	0.90	0.90	56.4	39.3			16.20	5.5		N/A	61.9	39.3
2-TC - stiff C	########	28.00	3.36	3.36	0.90	0.90	62.3	45.3			16.20	5.5		N/A	67.8	45.3
2-TC - stiff C	########	30.00	3.60	3.60	0.90	0.90	68.3	51.2			16.20	5.5		N/A	73.8	51.2
2-TC - stiff C	########	32.00	3.84	3.84	0.90	0.90	74.2	57.2			16.20	5.5		N/A	79.7	57.2
2-TC - stiff C	########	34.00	4.08	4.08	0.90	0.90	80.2	63.1			16.20	5.5		N/A	85.7	63.1
2-TC - stiff C	########	36.00	4.32	4.32	0.90	0.90	86.1	69.0			16.20	5.5		N/A	91.6	69.0
2-TC - stiff C	########	38.00	4.56	4.56	0.90	0.90	92.0	75.0			16.20	5.5		N/A	97.5	75.0
2-TC - stiff C	########	38.50	4.62	4.62	0.90	0.90	93.5	76.5			16.20	5.5		N/A	99.0	76.5
3-TC-hard MH	########	38.50	4.62	4.62	2.00	2.00	93.5	76.5			36.00	12.2		N/A	105.7	76.5
3-TC-hard MH	########	40.00	4.81	4.81	2.00	2.00	103.4	86.4			36.00	12.2		N/A	115.6	86.4
3-TC-hard MH	########	42.00	5.06	5.06	2.00	2.00	116.6	99.6			36.00	12.2		N/A	128.8	99.6
3-TC-hard MH	########	44.00	5.31	5.31	2.00	2.00	129.8	112.8			36.00	12.2		N/A	142.0	112.8
3-TC-hard MH	########	46.00	5.56	5.56	2.00	2.00	143.0	126.0			36.00	12.2		N/A	155.2	126.0
3-TC-hard MH	########	48.00	5.81	5.81	2.00	2.00	156.2	139.2			36.00	12.2		N/A	168.4	139.2
3-TC-hard MH	########	50.00	6.06	6.06	2.00	2.00	169.4	152.4			36.00	12.2		N/A	181.6	152.4

Notes:
[a] Specified maximum limit reached (max fc, max ft, max q).
[b] Plugged condition: Q'E exceeds Q'FC. Q'FC is not used in total compressive capacity QC.
[c] Plug traveled downward (Q'FC exceeds Q'E).
[d] Q'E is less than Q'FC and not used in total compressive capacity QC.
[e] Inside soil dead weight reached.

WW 2 H = 14'/18'

AXIAL PILE CAPACITY

PILAX 4.1

Project: I-5 HOV SEGMENT 1
EMI Project No.: 11-135
Description: Avenida Pico UC
WW 2, H=22'/26'/28', HP10x42
Date: 4/30/12 by: MK checked:

UNITS	
Length	Force
ft	K

GWE	GWD
ft	ft
-44.50	44.50

PILE PARAMETERS			
Pile Elev.		Displ. to Mobilize	
Top	Tip	Friction	Bearing
ft	ft	ft	ft
-2.00	-50.00	0.02	0.042

○ Open section
○ HP section
◉ Full section
☐ Allow plugging

E-Modulus	
Top	Tip
K/ft2	K/ft2
4.32E+06	4.32E+06

Circumference		Sectional Area	
Skin	(Unused)	Pile	(Unused)
ft	ft	ft2	ft2
3.300	3.300	0.339	0.705
3.300	3.300	0.339	0.705
3.300	3.300	0.339	0.705

SOIL LAYERS				GRANULAR SOIL-PILE PARAMETERS					COHESIVE SOIL-PILE PARAMETERS			
Description	Top El.	Depth	Total Unit Weight	Friction Angle	Bearing Capacity Factor	Lateral Earth Pressure Coefficients		Skin Friction Angle	Cohesion	Bearing Capacity Factor	Adhesion Factors or "API"	
			γ	ϕ	N_q	K_C	K_T	δ	c	N_C	α_C	α_T
-	ft	ft	K/ft2	deg	-	-	-	deg	K/ft2	-	-	-
1-Af- Clay/Silt (predrilled	0.00	0.00	0.120						1.000	9	0.25	0.25
2-TC - stiff CH	-7.50	7.50	0.120						1.800	9	0.50	0.50
3-TC-hard MH	-17.50	17.50	0.125						3.000	9	0.50	0.50

SOIL LAYERS			OVERBURDEN		PILE SKIN FRICTION						PILE END BEARING			TOTAL PILE CAPACITY		
Description	Top El.	Depth	Total Stress	Effect. Stress	Unit Stress		Outside Friction Capacity		Inside Friction Capacity		Unit Stress	Section Capacity	Plug Capacity	Plugged?	Compression	Tension
-	-	-	σ_V	σ'_V	f_C	f_T	Q_{FC}	Q_{FT}	Q'_{FC}	Q'_{FT}	q_E	Q_E	Q'_E	-	Q_C	Q_T
-	-	☑ Interval 2.00	-	-	max: 2.40	max: 2.40	FOS: 1.00	FOS: 1.00	FOS: 1.00	FOS: 1.00	max: 200.00	FOS: 1.00	FOS: 1.00	-	-	-
text	ft	ft	K/ft2	K/ft2	K/ft2	K/ft2	K	K	K	K	K/ft2	K	K	Yes/No	K	K
1-Af- Clay/Silt (pred	0.00	0.00	0.00	0.00												
1-Af- Clay/Silt (pred	-2.00	2.00	0.24	0.24	0.25	0.25	0.0	0.0			9.00	3.1		N/A	3.1	0.0
1-Af- Clay/Silt (pred	-4.00	4.00	0.48	0.48	0.25	0.25	1.7	1.7			9.00	3.1		N/A	4.7	1.7
1-Af- Clay/Silt (pred	-6.00	6.00	0.72	0.72	0.25	0.25	3.3	3.3			9.00	3.1		N/A	6.4	3.3
1-Af- Clay/Silt (pred	-7.50	7.50	0.90	0.90	0.25	0.25	4.5	4.5			9.00	3.1		N/A	7.6	4.5
2-TC - stiff CH	-7.50	7.50	0.90	0.90	0.90	0.90	4.5	4.5			16.20	5.5		N/A	10.0	4.5
2-TC - stiff CH	-8.00	8.00	0.96	0.96	0.90	0.90	6.0	6.0			16.20	5.5		N/A	11.5	6.0
2-TC - stiff CH	-10.00	10.00	1.20	1.20	0.90	0.90	12.0	12.0			16.20	5.5		N/A	17.5	12.0
2-TC - stiff CH	-12.00	12.00	1.44	1.44	0.90	0.90	17.9	17.9			16.20	5.5	20	N/A	23.4	17.9
2-TC - stiff CH	-14.00	14.00	1.68	1.68	0.90	0.90	23.8	23.8			16.20	5.5		N/A	29.3	23.8
2-TC - stiff CH	-16.00	16.00	1.92	1.92	0.90	0.90	29.8	29.8			16.20	5.5		N/A	35.3	29.8
2-TC - stiff CH	-17.50	17.50	2.10	2.10	0.90	0.90	34.2	34.2			16.20	5.5	30	N/A	39.7	34.2
3-TC-hard MH	-17.50	17.50	2.10	2.10	1.50	1.50	34.2	34.2			27.00	9.2		N/A	43.4	34.2
3-TC-hard MH	-18.00	18.00	2.16	2.16	1.50	1.50	36.7	36.7			27.00	9.2		N/A	45.9	36.7
3-TC-hard MH	-20.00	20.00	2.41	2.41	1.50	1.50	46.6	46.6			27.00	9.2		N/A	55.8	46.6
3-TC-hard MH	-22.00	22.00	2.66	2.66	1.50	1.50	56.5	56.5			27.00	9.2		N/A	65.7	56.5
3-TC-hard MH	-24.00	24.00	2.91	2.91	1.50	1.50	66.4	66.4			27.00	9.2		N/A	75.6	66.4
3-TC-hard MH	-26.00	26.00	3.16	3.16	1.50	1.50	76.3	76.3			27.00	9.2		N/A	85.5	76.3
3-TC-hard MH	-28.00	28.00	3.41	3.41	1.50	1.50	86.2	86.2			27.00	9.2		N/A	95.4	86.2
3-TC-hard MH	-30.00	30.00	3.66	3.66	1.50	1.50	96.1	96.1			27.00	9.2	130	N/A	105.3	96.1
3-TC-hard MH	-32.00	32.00	3.91	3.91	1.50	1.50	106.0	106.0			27.00	9.2		N/A	115.2	106.0
3-TC-hard MH	-34.00	34.00	4.16	4.16	1.50	1.50	115.9	115.9			27.00	9.2	140	N/A	125.1	115.9
3-TC-hard MH	-36.00	36.00	4.41	4.41	1.50	1.50	125.8	125.8			27.00	9.2		N/A	135.0	125.8
3-TC-hard MH	-38.00	38.00	4.66	4.66	1.50	1.50	135.7	135.7			27.00	9.2	160	N/A	144.9	135.7
3-TC-hard MH	-40.00	40.00	4.91	4.91	1.50	1.50	145.6	145.6			27.00	9.2		N/A	154.8	145.6
3-TC-hard MH	-42.00	42.00	5.16	5.16	1.50	1.50	155.5	155.5			27.00	9.2		N/A	164.7	155.5
3-TC-hard MH	-44.00	44.00	5.41	5.41	1.50	1.50	165.4	165.4			27.00	9.2	190	N/A	174.6	165.4
3-TC-hard MH	-46.00	46.00	5.66	5.57	1.50	1.50	175.3	175.3			27.00	9.2		N/A	184.5	175.3
3-TC-hard MH	-48.00	48.00	5.91	5.69	1.50	1.50	185.2	185.2			27.00	9.2		N/A	194.4	185.2
3-TC-hard MH (Pile Ti	-50.00	50.00	6.16	5.82	1.50	1.50	195.1	195.1			27.00	9.2		N/A	204.3	195.1

15
35
37
41'
47

Notes:
[a] Specified maximum limit reached (max fc, max ft, max q).
[b] Plugged condition: Q'E exceeds Q'FC. Q'FC is not used in total compressive capacity QC.
[c] Plug traveled downward (Q'FC exceeds Q'E).
[d] Q'E is less than Q'FC and not used in total compressive capacity QC.
[e] Inside soil dead weight reached.

Project I-5 HOV SEG. 1
BRIDGE #C
Project No. 11-135

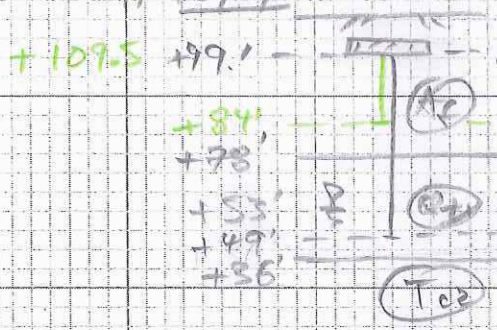
By MK Date 4/23/12 Checked By LC Date 5/4/12 Sheet 1 of 6

4) LATERAL PILE DESIGN

a) CONFIG.

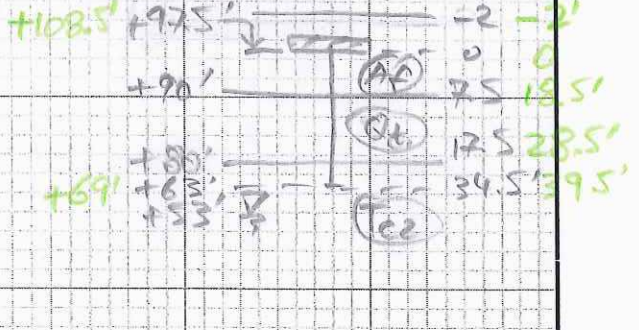
W.W.#1

H = 8'/12'
H = 16'/20'/24'

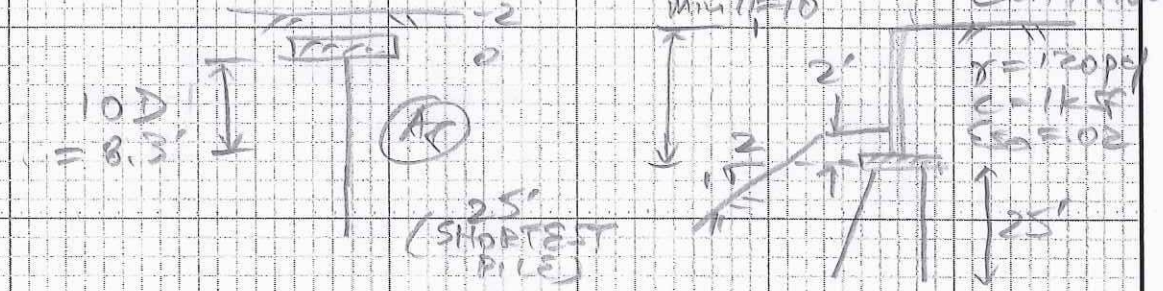


W.W.#2

H = 14'/18'
H = 22/26/28'



SIMPLIFY TO ONE CONFIG. FOR ALL W.W.'S:



GROUP EFFICIENCY = .94
SIDE SLOPE = 26.565°
MINIMUM EQUIV. SHEAR STRENGTH
$T = 10' \times .12 \times \tan 32° + 2\,ksf \cong 1\,ksf$

b) LPILE RUNS FOR

¼" ½" 1" 3" 5"

see attached S/V/M solutions

Project I-5 HOV SEG. 1
BRIDGE #C Project No. 11-135

By MC Date 4/23/12 Checked By LC Date 5/4/12 Sheet 2 of 6

c) DESIGN TIP EL.

WW	H	PILE CUT-OFF	REQ. PILE LENGTH	DESIGN TIP (d) ELEV.	USE
1	8'	+111.6'	25'	+86.6'	+86'
	12'	+107.6'		+82.6'	+82'
	16'	+103.4'		+78.4'	+78'
	20'	+99.2'		+74.2'	+74'
	24'	+94.7'		+69.7'	+69'
2	14'	+110.4'		+85.4'	+85'
	18'	+106.2'		+81.2'	+81'
	22'	+101.9'		+76.9'	+77'
	26'	+97.4'		+72.4'	+72'
	28'	+93.2'		+68.2'	+68'

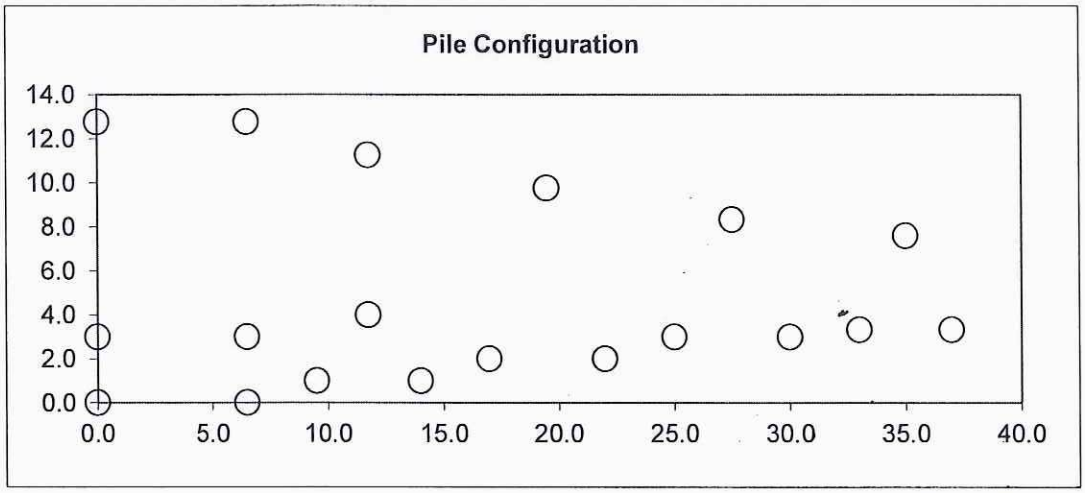
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

17800 Newhope Street, Suite B, Fountain Valley, CA 92708
phone: (714)751-3826, Fax (714)751-3928

Project: I-5 HOV Seg 1, Bridge Avenida Pico UC, WW1 Project No. 11-135
By MK Date 04/20/12 Check by Date Sheet 3/6

Calculation of Pile Group Efficiency for Lateral Load Capacity

(using formula in Group 7.0 Technical Manual)



Pile Dia. (feet): 0.824
No. of Piles: 19

Group Efficiency	X-Dir	Y-Dir
	0.93	0.95

(use .94 like WW2)

Coordinates

Pile No.	X	Y
1	0.0	0.0
2	0.0	3.0
3	0.0	12.8
4	6.5	0.0
5	6.5	3.0
6	6.5	12.8
7	9.5	1.0
8	11.8	4.0
9	11.8	11.3
10	14.0	1.0
11	17.0	2.0
12	19.5	9.8
13	22.0	2.0
14	25.0	3.0
15	27.5	8.3
16	30.0	3.0
17	33.0	3.3
18	35.0	7.6
19	37.0	3.3
20		
21		
22		

Reduction Factors in X-dir	Reduction Factors in Y-dir
0.993	0.784
0.993	0.980
1.000	1.000
0.817	0.770
0.867	0.979
0.986	1.000
0.864	0.867
0.946	1.000
1.000	0.999
0.822	0.893
0.946	0.999
1.000	1.000
0.822	0.982
0.946	0.999
1.000	1.000
0.789	0.993
0.848	0.939
0.988	1.000
1.000	0.944

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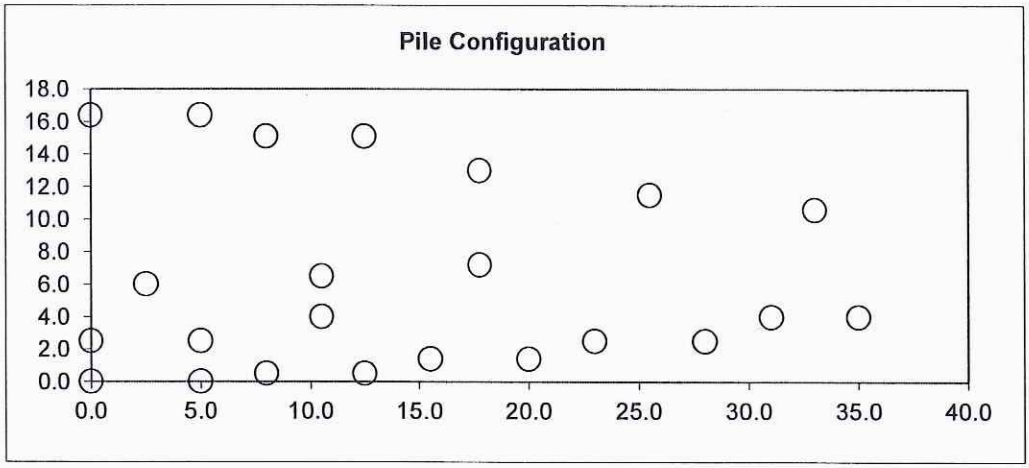
Project: I-5 HOV Seg 1, Bridge Avenida Pico UC, WW2 Project No. 11-135
By MK Date 04/20/12 Check by Date Sheet 4/6

Calculation of Pile Group Efficiency for Lateral Load Capacity

(using formula in Group 7.0 Technical Manual)



Pile Dia. (feet): 0.824
No. of Piles: 23

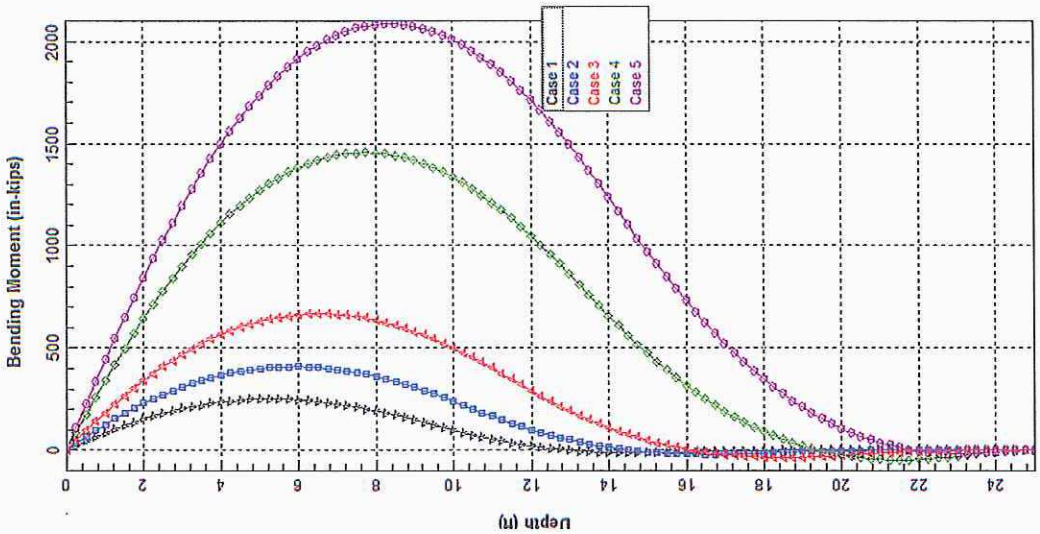
Group Efficiency	X-Dir	Y-Dir
	0.91	0.94

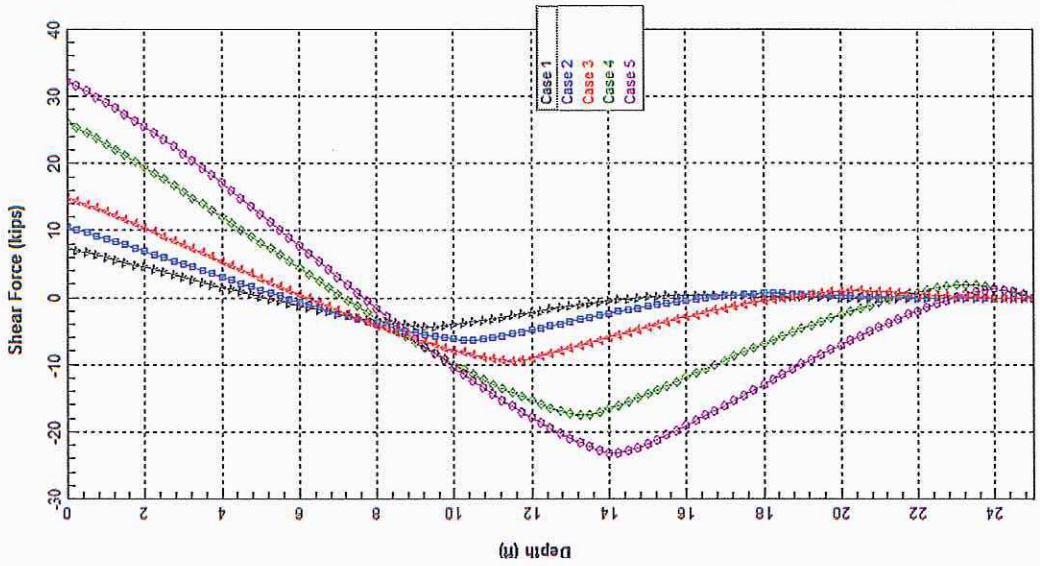
Coordinates

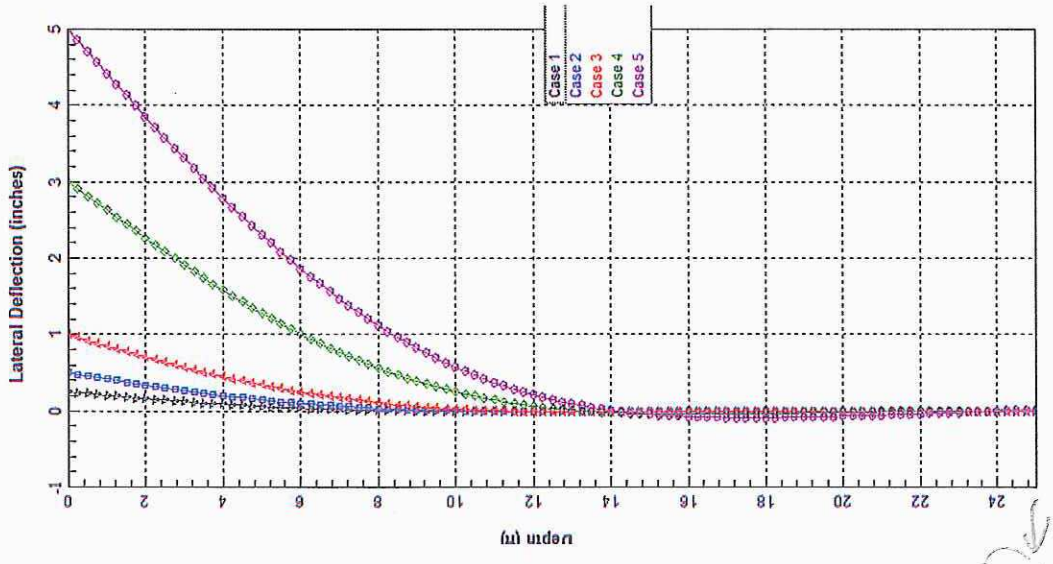
Pile No.	X	Y
1	0.0	0.0
2	0.0	2.5
3	0.0	16.4
4	2.5	6.0
5	5.0	0.0
6	5.0	2.5
7	5.0	16.4
8	8.0	0.5
9	8.0	15.1
10	10.5	4.0
11	10.5	6.5
12	12.5	0.5
13	12.5	15.1
14	15.5	1.4
15	17.8	7.2
16	17.8	13.0
17	20.0	1.4
18	23.0	2.5
19	25.5	11.5
20	28.0	2.5
21	31.0	4.0
22	33.0	10.6
23	35.0	4.0

Reduction Factors in X-dir	Reduction Factors in Y-dir
0.884	0.731
0.855	0.873
0.952	1.000
0.967	1.000
0.742	0.726
0.834	0.873
0.843	1.000
0.870	0.889
0.915	0.972
0.904	0.732
0.933	0.934
0.816	0.895
0.998	1.000
0.907	0.999
1.000	1.000
1.000	1.000
0.829	0.979
0.949	0.999
1.000	1.000
0.858	0.966
0.875	1.000
1.000	1.000
1.000	1.000

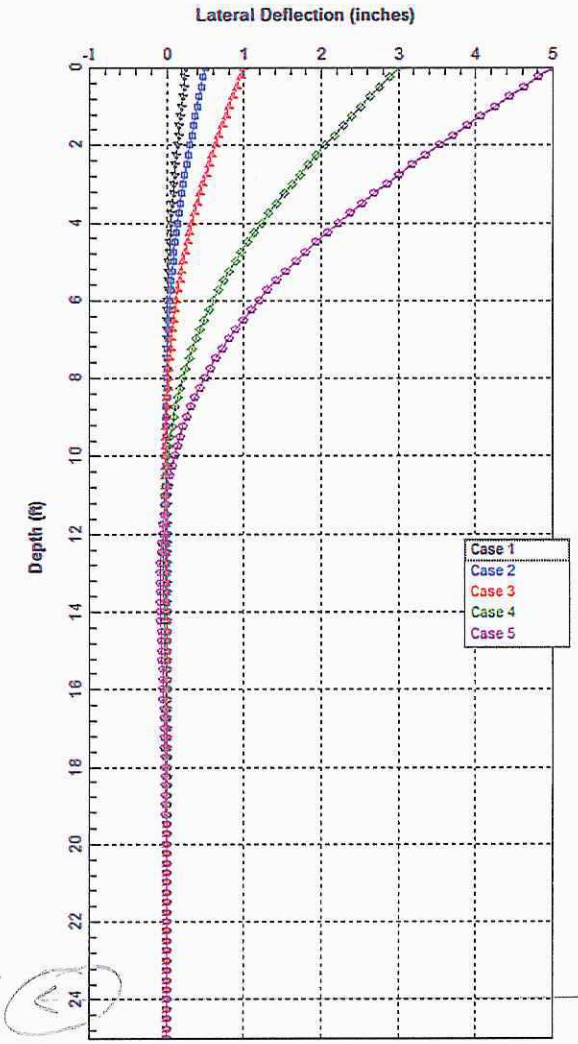
Lateral solutions for
Wing Walls, HP10x42, strong axis

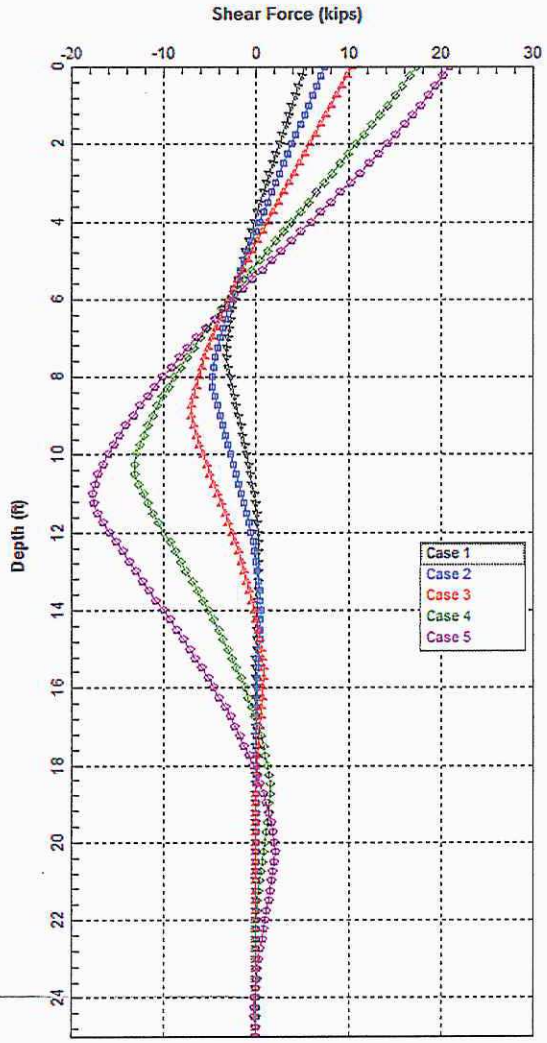


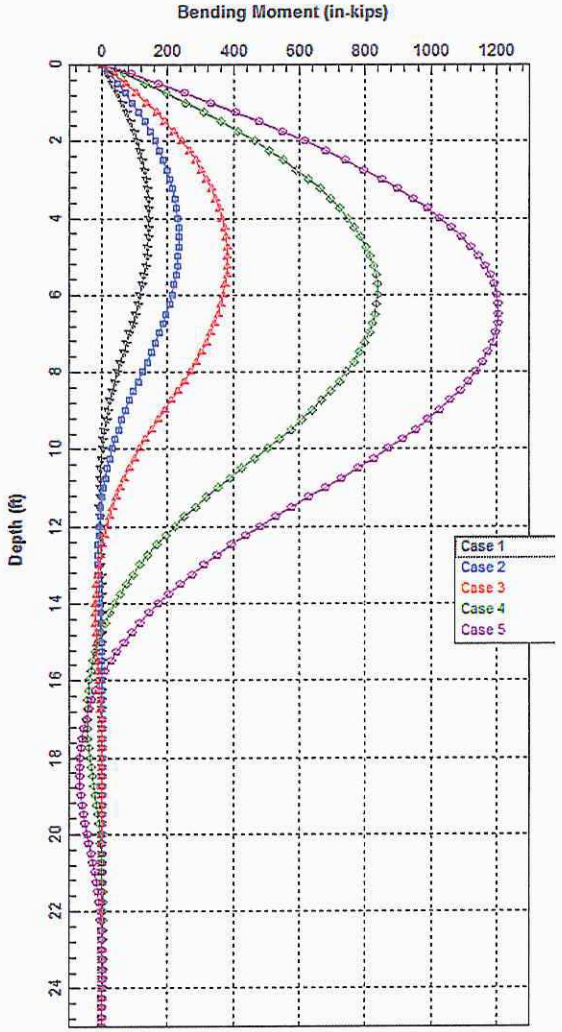




Lateral solutions for
Wing Walls, HP10x42, weak axis





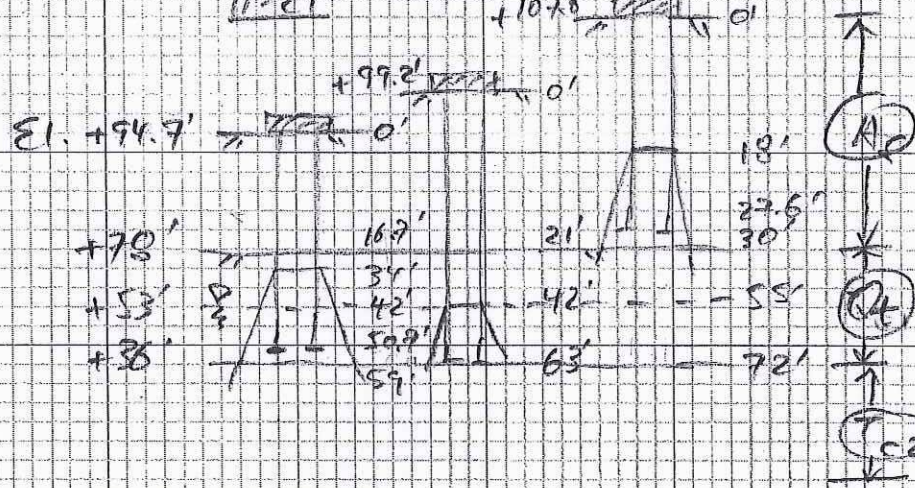


Project I-5 HOV SEG. 1
AV. PICO UC
Project No. 11-135

By MK. Date 4/23/12 Checked By LC Date 5/4/12 Sheet 1 of 6

PILE GROUP SETTLEMENT

1) WW #1



PILECAP DATA:

W =	9.5'	8'	8'	(Width)
L =	15.25'	13.25'	8.33'	(Length)
P =	404^k	246^k	114^k	Total load per support (Service-I)

SETTLEMENT:

Pile length for δ = 1"

12' < 12' < 12'

DESIGN TIP EL.

+94.7' − 12' = +82.7' → +82'

Use for all piles: +82'

Project I-5 HOV SEG. 1
AV. PICO UC
Project No. 11-135

By MK Date 4/23/12 Checked By KL Date 5/4/12 Sheet 2 of 6

2) WW #2

H=28' 14'

+110.4' +93.2' 0'
+90' 8' 3' 2/3L
+80' 13' 3'
+53' 40' 57'

(Ac) (Qt) (Tc2)

D=120pf
C_c=.025
D=120pf
C_c=.03
D=125pf
C_c=.025

Pile cap:
W= 8' 8'
L= 13.42' 9.58'
P= 456K 144K

Settlement:
Pile length for ε=1":
L=12.5' L<8'

Design Tip El.
+93.2' - 12.5' = +80.7' → +80'
Use for all piles +80'

3/6

PILEGROUP SETTLEMENT CALCULATION
I-5 HOV Seg 1, WW 1 H=24'

Pile Load =	404	kips
Pile Cap Width =	9.5	ft
Pile Cap Length =	15.75	ft
Bottom of Footing =	0	ft
Pile Length for the Calculation =	12	ft
Equivalent Pile Cap Width =	13.5	ft
Bottom of Ib Length =	19.75	ft
Equivalent Footing Bottom of Footing =	-8	ft
Bearing Pressure =	1.5	ksf

Load distribution 0.5 :1 (H:V)

Layer	Elevations 0	Thickness below equivakent footing ft	Thicknes s below bottom of footing ft	γ psf	σvo ksf	Δσ ksf	Cc'	Settlement
1	-10.0	2.0	10.0	120	1.08	1.34	0.025	0.21 "
2	-17.0	7.0	7.0	120	1.62	0.84	0.025	0.38 "
3	-34.0	17.0	17.0	120	3.06	0.35	0.025	0.24 "
4	-42.0	8.0	8.0	120	4.56	0.19	0.025	0.04 "
5	-51.0	9.0	9.0	65	5.33	0.13	0.030	0.03 "
6	-59.0	8.0	8.0	65	5.89	0.10	0.030	0.02 "
7	-70.0	11.0	11.0	65	6.50	0.08	0.025	0.02 "
	307.0							
		62.0	70.0		**Total secondary settlement=**			**0.95 "**

H=20' similar → S=.72"

PILEGROUP SETTLEMENT CALCULATION
I-5 HOV Seg 1, WW 1 H=12'

Pile Load =	114	kips
Pile Cap Width =	8	ft
Pile Cap Length =	8.33	ft
Bottom of Footing =	0	ft
Pile Length for the Calculation =	12	ft
Equivalent Pile Cap Width =	12	ft
Bottom of Footing Length =	12.33	ft
Equivalent Footing Bottom of Footing =	-8	ft
Bearing Pressure =	0.8	ksf

Load distribution 0.5 :1 (H:V)

Layer	Elevations 0	Thickness below equivakent footing ft	Thicknes s below bottom of footing ft	γ psf	σvo ksf	Δσ ksf	Cc'	Settlement
1	-10.0	2.0	10.0	120	1.08	0.66	0.025	0.12 "
2	-18.0	8.0	8.0	120	1.68	0.35	0.025	0.19 "
3	-30.0	12.0	12.0	120	2.88	0.14	0.025	0.08 "
4	-55.0	25.0	25.0	120	5.10	0.05	0.025	0.03 "
5	-60.0	5.0	5.0	65	6.76	0.03	0.030	0.00 "
6	-72.0	12.0	12.0	65	7.32	0.02	0.025	0.00 "
7		0.0	-72.0		7.71	0.02		0.00 "
	307.0							
		64.0	0.0		**Total secondary settlement=**			**0.44 "**

< 1"

PILEGROUP SETTLEMENT CALCULATION

I-5 HOV Seg 1, WW 2 H=28'

Pile Load =	456	kips
Pile Cap Width =	8	ft
Pile Cap Length =	18.42	ft
Bottom of Footing =	0	ft
Pile Length for the Calculation =	12.5	ft
Equivalent Pile Cap Width =	12.166667	ft
Bottom of Footing Length =	22.586667	ft
Equivalent Footing Bottom of Footing =	-8.3333333	ft
Bearing Pressure =	1.7	ksf

Load distribution 0.5 :1 (H:V)

Layer	Elevations 0	Thickness below equivakent footing ft	Thicknes s below bottom of footing ft	γ psf	σvo ksf	Δσ ksf	Cc'	Settlement
1	-3.0	0.0	3.0	120	0.36	1.66	0.025	0.00 "
2	-13.0	4.7	10.0	120	1.28	1.26	0.025	0.42 "
3	-20.0	7.0	7.0	120	1.98	0.73	0.025	0.29 "
4	-40.0	20.0	20.0	120	3.60	0.30	0.025	0.21 "
5	-63.0	23.0	23.0	65	5.55	0.13	0.025	0.07 "
6	-73.0	10.0	10.0	65	6.62	0.08	0.025	0.02 "
7		0.0	-73.0		6.95	0.07		0.00 "
	307.0							
		64.7	0.0		**Total secondary settlement=**			**1.00 "**

PILEGROUP SETTLEMENT CALCULATION

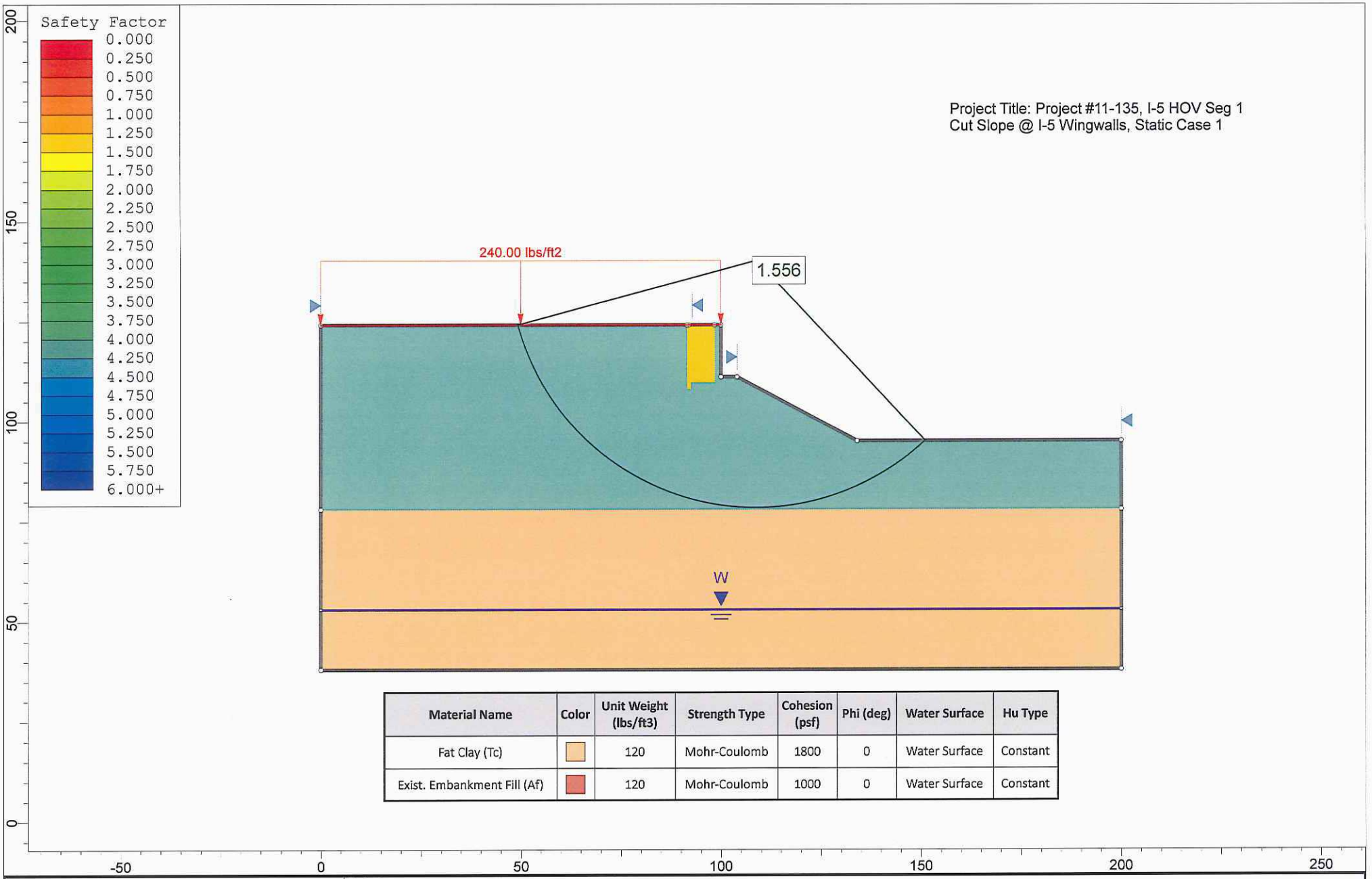
I-5 HOV Seg 1, WW 2 H=14'

Pile Load =	144	kips
Pile Cap Width =	8	ft
Pile Cap Length =	9.58	ft
Bottom of Footing =	0	ft
Pile Length for the Calculation =	8	ft
Equivalent Pile Cap Width =	10.666667	ft
Bottom of Ib Length =	12.246667	ft
Equivalent Footing Bottom of Footing =	-5.3333333	ft
Bearing Pressure =	1.1	ksf

Load distribution 0.5 :1 (H:V)

Layer	Elevations 0	Thickness below equivakent footing ft	Thicknes s below bottom of footing ft	γ psf	σvo ksf	Δσ ksf	Cc'	Settlement
1	-20.0	14.7	20.0	120	1.52	0.41	0.025	0.45 "
2	-30.0	10.0	10.0	120	3.00	0.15	0.040	0.10 "
3	-37.0	7.0	7.0	120	4.02	0.09	0.025	0.02 "
4	-57.0	20.0	20.0	120	5.64	0.05	0.025	0.02 "
5	-70.0	13.0	13.0	65	7.26	0.03	0.025	0.01 "
6	-80.0	10.0	10.0	65	8.01	0.02	0.025	0.00 "
7		0.0	-80.0		8.34	0.02		0.00 "
	307.0							
		74.7	0.0		**Total secondary settlement=**			**0.61 "**

≈ 1"



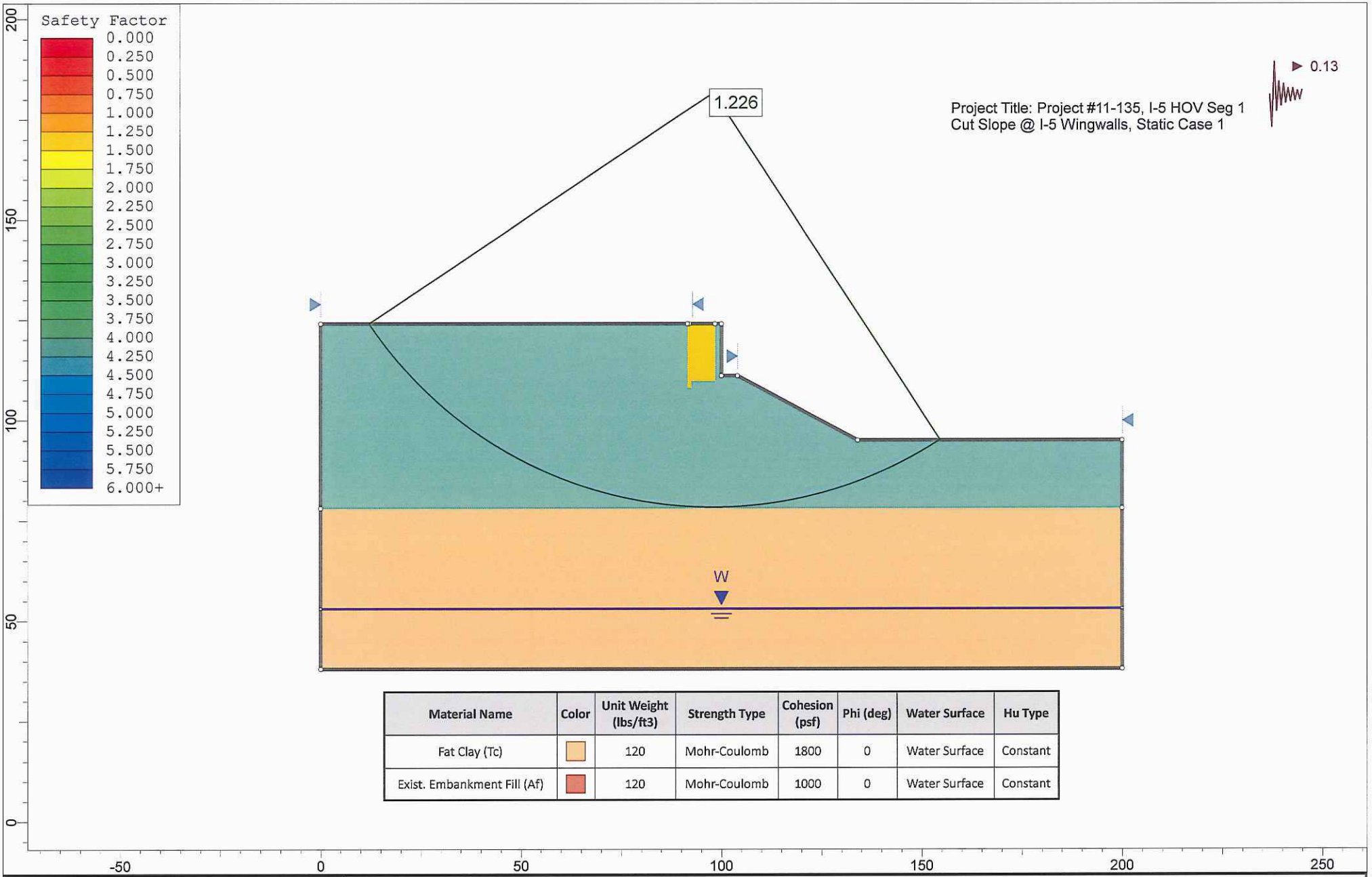
Project Title: Project #11-135, I-5 HOV Seg 1
Cut Slope @ I-5 Wingwalls, Static Case 1

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
Fat Clay (Tc)		120	Mohr-Coulomb	1800	0	Water Surface	Constant
Exist. Embankment Fill (Af)		120	Mohr-Coulomb	1000	0	Water Surface	Constant

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1				
Analysis Description	Cut Slope @ I-5 Wingwalls, Static Case 1				
Drawn By	MK	Scale	1:389	Company	Earth Mechanics
Date	4/6/12			File Name	Static1.slim

SLIDEINTERPRET 6.015



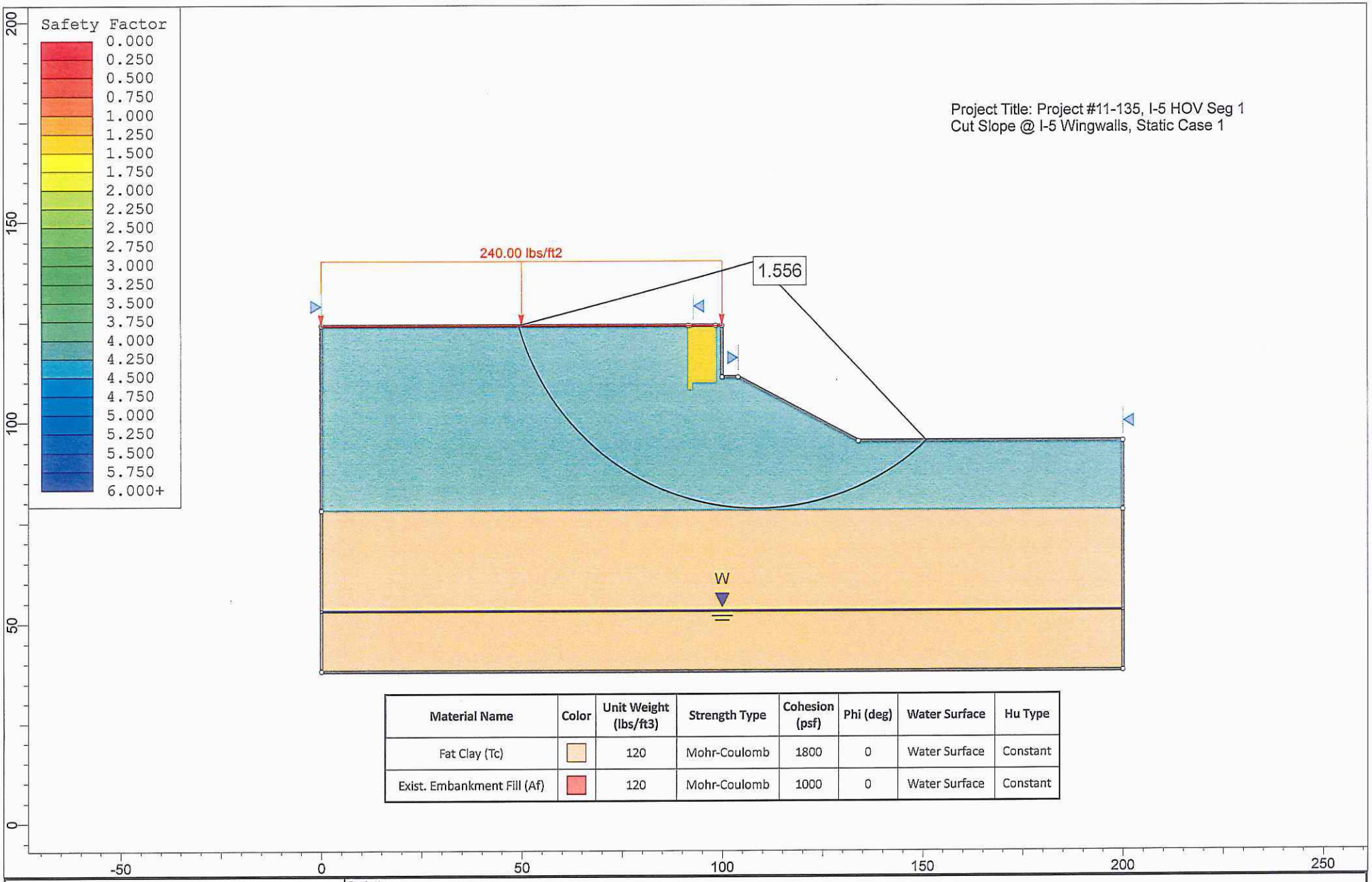
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
Fat Clay (Tc)		120	Mohr-Coulomb	1800	0	Water Surface	Constant
Exist. Embankment Fill (Af)		120	Mohr-Coulomb	1000	0	Water Surface	Constant

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1				
Analysis Description	Cut Slope @ I-5 Wingwalls, Pseudostatic Case 1				
Drawn By	MK	Scale	1:389	Company	Earth Mechanics
Date	4/6/12			File Name	Pseudostatic1.slim

SLIDEINTERPRET 6.015

Project Title: Project #11-135, I-5 HOV Seg 1
Cut Slope @ I-5 Wingwalls, Static Case 1

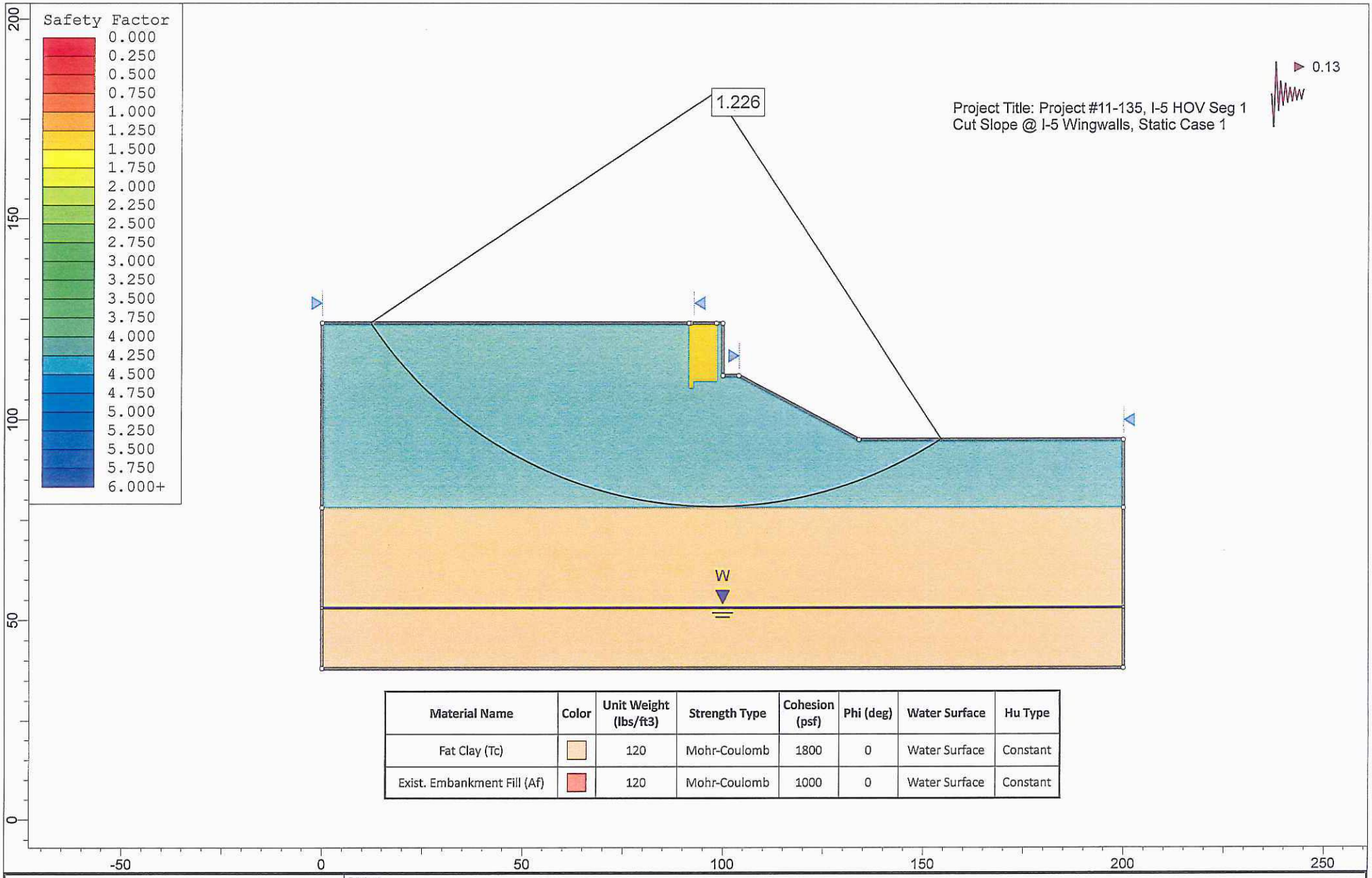


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
Fat Clay (Tc)		120	Mohr-Coulomb	1800	0	Water Surface	Constant
Exist. Embankment Fill (Af)		120	Mohr-Coulomb	1000	0	Water Surface	Constant

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1				
Analysis Description	Cut Slope @ I-5 Wingwalls, Static Case 1				
Drawn By	MK	Scale	1:389	Company	Earth Mechanics
Date	4/6/12			File Name	Static1.slim

SLIDEINTERPRET 6.015



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
Fat Clay (Tc)		120	Mohr-Coulomb	1800	0	Water Surface	Constant
Exist. Embankment Fill (Af)		120	Mohr-Coulomb	1000	0	Water Surface	Constant

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1				
Analysis Description	Cut Slope @ I-5 Wingwalls, Pseudostatic Case 1				
Drawn By	MK	Scale	1:389	Company	Earth Mechanics
Date	4/6/12			File Name	Pseudostatic1.slim

SLIDEINTERPRET 6.015

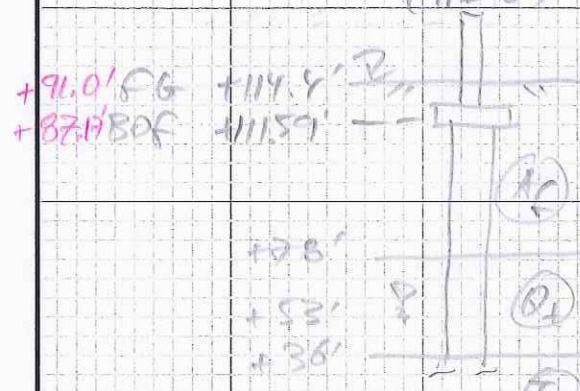
PILASTERS

Project I-5 HOV SEG. 1
PILASTER DESIGN
Project No. 11-135

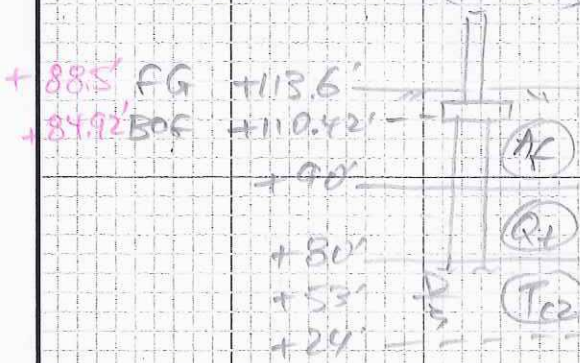
By MK Date 9/11/12 Checked By _____ Date _____ Sheet 1 of 8

1) CONFIGURATION

ABUT 1 - NE PILASTER (SE PILASTER)
(H=8') (H=32')



ABUT 2 - NW PILASTER (SW PILASTER)
(H=14') (H=36')



2) SOIL PARAMS - SEE WINGWALL DESIGN

3) PILE DATA - MAX R_u = 160 K COMPR. (SEE P. 2/12)
∴ USE "CLASS 90" HP 10x42
(SAME AS WINGWALLS)

PILE DATA - SEE WINGWALL DESIGN

Project I-5 HOV SEG. 1
PILASTER DESIGN
Project No. 11-135

By MK Date 9/11/12 Checked By _____ Date _____ Sheet 2 of 8

4) AXIAL PILE CAPACITY

a) DESIGN TIP EL. FOR COMPRESSION

ABUT CORNER	ABUT	H	STRENGTH R_u	FG	REQ. LENGTH	DESIGN a-I TIP	EXTR. REQ. R_u	EXTR. REQ. LENGTH	DESIGN a-II TIP
SE	1	32'	95/1.7 → 140^K	+91.0'	54'	+37'	104 → 110^K	43'	+48'
NE	1	8'	33/1.7 → 50^K	+114.4'	23' (use 28')	+86'	33 → 40^K	21'	+93'
SW	2	36'	112/1.7 → 160^K	+88.5'	29' (use 33')	+55'	130^K	25'	+63'
NW	2	14'	62/1.7 → 90^K	+113.6'	34' (use 30')	+75'	62 → 70^K	27'	+86'

** Pile tips in Tc by 21'.

b) DESIGN TIP EL. FOR TENSION

ABUT	H	STRENGTH R_u	FG	REQ. LENGTH	DESIGN b-I TIP	EXTR. REQ. R_u	EXTR. REQ. LENGTH	DESIGN b-II TIP
SE 1	32'	N/A	+91.0'	N/A	N/A	12 → 20^K	18'	+73'
NE 1	8'	"	+114.4'	"	"	9 → 10^K	15' (use 19')	+97'
SW 2	36'	"	+88.5'	"	"	5 → 10^K	10'	+78'
NW 2	14'	"	+113.6'	"	"	11 → 20^K	21' (use 25')	+90' (use 92')

5) LATERAL PILE DESIGN

DESIGNER'S LATERAL PILE SPACINGS + DEMANDS MATCH THESE FROM W.W. WALLS.

ABUT	H	PILE CUTOFF	REQ. LENGTH	DESIGN 6) TIP EL.
SE 1	32'	+97.17'	25' *	+62'
NE 1	8'	+111.57'	25' *	+86' (use 82')
SW 2	36'	+84.72'	25' *	+60'
NW 2	14'	+110.42'	25' *	+85'

* FROM W.W. DESIGN

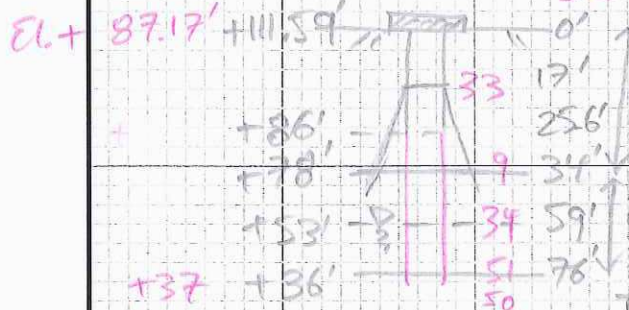
Project I-5 HOV SEG. 1
PILASTER DESIGN
Project No. 11-135

By MK Date 9/11/12 Checked By ____ Date ____ Sheet 3 of 8

5) PILE GROUP SETTLEMENT

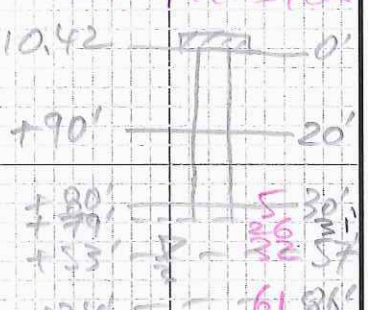
ABUT 1

CONFIG. @ NE PILASTER
SE PILASTER



ABUT 2

NW PILASTER
SW PILASTER



PILE CAP DATA

W = 7.25' 21.7' (width)
L = 10' 10' (length)
P = 82 K/support (total load service-I)
626 K

W = 9.58' 24'
L = 10' 10'
P = 140 K/support
816 K

SETTLEMENT

Pile length req. for ε = 1":
Lreq = N/A 11'

Lreq = N/A 17'

DESIGN TIP EL.

PILASTER	PILE CUT-OFF EL.	REQ. LENGTH	DESIGN TIP EL.
SE	+87.17'	11' *	+76'
NE	+111.59'	0' (use 11')	+100'
SW	+84.92'	17' *	+68'
NW	+110.42'	0' (use 17')	+93'

* IN EMI RPT FOR RW 181, 185, 193 (2012)

Rcd 9/11/12

FOUNDATION DESIGN DATA														
HOLLOW CONCRETE PILASTERS (10' long x 4' deep)														
Design Height	Design Method	Pile Type	Cut-off Elev (ft)	Pile Cap Size (ft) W	Pile Cap Size (ft) L	No. of Piles	Service I-Limit State (kips) Support	Service I-Limit State (kips) Per Pile	Strength I-Limit State (kips) Support	Strength I-Limit State (kips) Per Pile	Extreme Event-Limit State (kips) Support	Extreme Event-Limit State (kips) Per Pile (C)	Extreme Event-Limit State (kips) Per Pile (T)	
SE (MSE 185)						"A" LINE STA 189+63.05 (82.33' LT)								
H = 32'	LRFD	CLASS 90	87.17	21.17	10.00	10	626	66	822	95	626	104	12	
SW (MSE 193)						"A" LINE STA 192+54.51 (82.33' LT)								
H = 36'	LRFD	CLASS 90	84.92	24.00	10.00	12	816	77	1072	112	816	130	-5	use +5
NE (ABUT 1 WW)						"A" LINE STA 188+86.08 (82.48' RT)								
H = 8'	LRFD	CLASS 90	111.59	7.25	10.00	4	82	23	104	33	82	33	9	
NW (ABUT 2 WW)						"A" LINE STA 191+76.33 (82.48' RT)								
H = 14'	LRFD	CLASS 90	110.42	9.58	10.00	4	140	44	180	62	140	62	11	

LATERAL DEMAND
10.5K/.5"
14.9K/1"

PASSIVE RESISTANCE @ PILECAP
~400 pcf.

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AXIAL PILE CAPACITY

PILAX 4.1

Project: I-5 HOV SEGMENT 1
EMI Project No.: 11-135
Description: Avenida Pico UC
WW 2, NW Pilaster, H=14', HP10x42
Date: 9/11/12 by: MK checked:

UNITS	
Length	Force
ft	K

GWE	GWD
ft	ft
-61.00	61.00

PILE PARAMETERS			
Pile Elev.		Displ. to Mobilize	
Top	Tip	Friction	Bearing
ft	ft	ft	ft
-3.20	-40.00	0.02	0.042

○ Open section
○ HP section
◉ Full section
☐ Allow plugging

E-Modulus	
Top	Tip
K/ft2	K/ft2
4.32E+06	4.32E+06

Circumference		Sectional Area	
Skin	(Unused)	Pile	(Unused)
ft	ft	ft2	ft2
3.300	3.300	0.339	0.705
3.300	3.300	0.339	0.705
3.300	3.300	0.339	0.705

SOIL LAYERS				GRANULAR SOIL-PILE PARAMETERS					COHESIVE SOIL-PILE PARAMETERS			
Description	Top El.	Depth	Total Unit Weight	Friction Angle	Bearing Capacity Factor	Lateral Earth Pressure Coefficients		Skin Friction Angle	Cohesion	Bearing Capacity Factor	Adhesion Factors or "API"	
			γ	ϕ	N_q	K_C	K_T	δ	c	N_C	α_C	α_T
-	ft	ft	K/ft2	deg	-	-	-	deg	K/ft2	-	-	-
Af- Clay/Silt	0.00	0.00	0.120	32.00	0	1.00	0.50	27.00				
Qt/TC - stiff CH	-24.00	24.00	0.120						1.800	9	0.50	0.50
TC-hard MH	-34.00	34.00	0.125						4.000	9	0.50	0.50

SOIL LAYERS			OVERBURDEN		PILE SKIN FRICTION						PILE END BEARING			TOTAL PILE CAPACITY		
Description	Top El.	Depth	Total Stress	Effect. Stress	Unit Stress		Outside Friction Capacity		Inside Friction Capacity		Unit Stress	Section Capacity	Plug Capacity	Plugged?	Compression	Tension
-	-	-	σ_V	σ'_V	f_C	f_T	Q_{FC}	Q_{FT}	Q'_{FC}	Q'_{FT}	q_E	Q_E	Q'_E	-	Q_C	Q_T
-	-	☑ Interval 1.00	-	-	max: 2.40	max: 2.40	FOS: 1.00	FOS: 1.00	FOS: 1.00	FOS: 1.00	max: 200.00	FOS: 1.00	FOS: 1.00	-	-	-
text	ft	ft	K/ft2	K/ft2	K/ft2	K/ft2	K	K	K	K	K/ft2	K	K	Yes/No	K	K
1-Af- Clay/Silt	0.00	0.00	0.00	0.00												
1-Af- Clay/Silt	-1.00	1.00	0.12	0.12												
1-Af- Clay/Silt	-2.00	2.00	0.24	0.24												
1-Af- Clay/Silt	-3.00	3.00	0.36	0.36												
1-Af- Clay/Silt (Pi	-3.20	3.20	0.38	0.38	0.20	0.10	0.0	0.0			0.00	0.0		N/A	0.0	0.0
1-Af- Clay/Silt	-4.00	4.00	0.48	0.48	0.24	0.12	0.6	0.3			0.00	0.0		N/A	0.6	0.3
1-Af- Clay/Silt	-5.00	5.00	0.60	0.60	0.31	0.15	1.5	0.7			0.00	0.0		N/A	1.5	0.7
1-Af- Clay/Silt	-6.00	6.00	0.72	0.72	0.37	0.18	2.6	1.3			0.00	0.0		N/A	2.6	1.3
1-Af- Clay/Silt	-7.00	7.00	0.84	0.84	0.43	0.21	3.9	2.0			0.00	0.0		N/A	3.9	2.0
1-Af- Clay/Silt	-8.00	8.00	0.96	0.96	0.49	0.24	5.4	2.7			0.00	0.0		N/A	5.4	2.7
1-Af- Clay/Silt	-9.00	9.00	1.08	1.08	0.55	0.28	7.1	3.6			0.00	0.0		N/A	7.1	3.6
1-Af- Clay/Silt	-10.00	10.00	1.20	1.20	0.61	0.31	9.1	4.5			0.00	0.0		N/A	9.1	4.5
1-Af- Clay/Silt	-11.00	11.00	1.32	1.32	0.67	0.34	11.2	5.6			0.00	0.0		N/A	11.2	5.6
1-Af- Clay/Silt	-12.00	12.00	1.44	1.44	0.73	0.37	13.5	6.7			0.00	0.0		N/A	13.5	6.7
1-Af- Clay/Silt	-13.00	13.00	1.56	1.56	0.79	0.40	16.0	8.0			0.00	0.0		N/A	16.0	8.0
1-Af- Clay/Silt	-14.00	14.00	1.68	1.68	0.86	0.43	18.7	9.4			0.00	0.0		N/A	18.7	9.4
1-Af- Clay/Silt	-15.00	15.00	1.80	1.80	0.92	0.46	21.7	10.8			0.00	0.0		N/A	21.7	10.8
1-Af- Clay/Silt	-16.00	16.00	1.92	1.92	0.98	0.49	24.8	12.4			0.00	0.0		N/A	24.8	12.4
1-Af- Clay/Silt	-17.00	17.00	2.04	2.04	1.04	0.52	28.1	14.1			0.00	0.0		N/A	28.1	14.1
1-Af- Clay/Silt	-18.00	18.00	2.16	2.16	1.10	0.55	31.7	15.8			0.00	0.0		N/A	31.7	15.8
1-Af- Clay/Silt	-19.00	19.00	2.28	2.28	1.16	0.58	35.4	17.7			0.00	0.0		N/A	35.4	17.7
1-Af- Clay/Silt	-20.00	20.00	2.40	2.40	1.22	0.61	39.3	19.7			0.00	0.0	10K	N/A	39.3	19.7
1-Af- Clay/Silt	-21.00	21.00	2.52	2.52	1.28	0.64	43.5	21.7			0.00	0.0		N/A	43.5	21.7
1-Af- Clay/Silt	-22.00	22.00	2.64	2.64	1.35	0.67	47.8	23.9			0.00	0.0		N/A	47.8	23.9
1-Af- Clay/Silt	-23.00	23.00	2.76	2.76	1.41	0.70	52.3	26.2			0.00	0.0		N/A	52.3	26.2
1-Af- Clay/Silt	-24.00	24.00	2.88	2.88	1.47	0.73	57.1	28.5			0.00	0.0		N/A	57.1	28.5
2-Qt/TC - stiff CH	-24.00	24.00	2.88	2.88	0.90	0.90	57.1	28.5			16.20	5.5		N/A	62.6	28.5
2-Qt/TC - stiff CH	-25.00	25.00	3.00	3.00	0.90	0.90	60.0	31.5			16.20	5.5		N/A	65.5	31.5
2-Qt/TC - stiff CH	-26.00	26.00	3.12	3.12	0.90	0.90	63.0	34.5			16.20	5.5	90K	N/A	68.5	34.5
2-Qt/TC - stiff CH	-27.00	27.00	3.24	3.24	0.90	0.90	66.0	37.4			16.20	5.5		N/A	71.5	37.4
2-Qt/TC - stiff CH	-28.00	28.00	3.36	3.36	0.90	0.90	69.0	40.4			16.20	5.5		N/A	74.4	40.4
2-Qt/TC - stiff CH	-29.00	29.00	3.48	3.48	0.90	0.90	71.9	43.4			16.20	5.5		N/A	77.4	43.4
2-Qt/TC - stiff CH	-30.00	30.00	3.60	3.60	0.90	0.90	74.9	46.4			16.20	5.5		N/A	80.4	46.4
2-Qt/TC - stiff CH	-31.00	31.00	3.72	3.72	0.90	0.90	77.9	49.3			16.20	5.5		N/A	83.4	49.3
2-Qt/TC - stiff CH	-32.00	32.00	3.84	3.84	0.90	0.90	80.8	52.3			16.20	5.5		N/A	86.3	52.3
2-Qt/TC - stiff CH	-33.00	33.00	3.96	3.96	0.90	0.90	83.8	55.3			16.20	5.5	90K	N/A	89.3	55.3
2-Qt/TC - stiff CH	-34.00	34.00	4.08	4.08	0.90	0.90	86.8	58.2			16.20	5.5		N/A	92.3	58.2
3-TC-hard MH	-34.00	34.00	4.08	4.08	2.00	2.00	86.8	58.2			36.00	12.2		N/A	99.0	58.2
3-TC-hard MH	-35.00	35.00	4.21	4.21	2.00	2.00	93.4	64.8			36.00	12.2		N/A	105.6	64.8
3-TC-hard MH	-36.00	36.00	4.33	4.33	2.00	2.00	100.0	71.4			36.00	12.2		N/A	112.2	71.4
3-TC-hard MH	-37.00	37.00	4.46	4.46	2.00	2.00	106.6	78.0			36.00	12.2		N/A	118.8	78.0
3-TC-hard MH	-38.00	38.00	4.58	4.58	2.00	2.00	113.2	84.6			36.00	12.2		N/A	125.4	84.6
3-TC-hard MH	-39.00	39.00	4.71	4.71	2.00	2.00	119.8	91.2			36.00	12.2		N/A	132.0	91.2
3-TC-hard MH (Pile T	-40.00	40.00	4.83	4.83	2.00	2.00	126.4	97.8			36.00	12.2		N/A	138.6	97.8

Notes:
[a] Specified maximum limit reached (max fc, max ft, max q).
[b] Plugged condition: Q'E exceeds Q'FC. Q'FC is not used in total compressive capacity QC.
[c] Plug traveled downward (Q'FC exceeds Q'E).
[d] Q'E is less than Q'FC and not used in total compressive capacity QC.
[e] Inside soil dead weight reached.

AXIAL PILE CAPACITY

PILAX 4.1

Project: I-5 HOV SEGMENT 1
EMI Project No.: 11-135
Description: Avenida Pico UC
WW 1, NE Pilaster, H=14', HP10x42
Date: 9/11/12 by: MK checked:

UNITS	
Length	Force
ft	K

GWE	GWD
ft	ft
-61.00	61.00

PILE PARAMETERS			
Pile Elev.		Displ. to Mobilize	
Top	Tip	Friction	Bearing
ft	ft	ft	ft
-2.80	-80.00	0.02	0.042

○ Open section
○ HP section
◉ Full section
☐ Allow plugging

E-Modulus	
Top	Tip
K/ft2	K/ft2
4.32E+06	4.32E+06

SOIL LAYERS				GRANULAR SOIL-PILE PARAMETERS					COHESIVE SOIL-PILE PARAMETERS				Circumference		Sectional Area	
Description	Top El.	Depth	Total Unit Weight	Friction Angle	Bearing Capacity Factor	Lateral Earth Pressure Coefficients		Skin Friction Angle	Cohesion	Bearing Capacity Factor	Adhesion Factors or "API"		Skin	(Unused)	Pile	(Unused)
			γ	ϕ	N_q	K_C	K_T	δ	c	N_C	α_C	α_T				
-	ft	ft	K/ft2	deg	-	-	-	deg	K/ft2	-	-	-	ft	ft	ft2	ft2
Af- Clay/Silt	0.00	0.00	0.120	32.00	0	1.00	0.50	27.00					3.300	3.300	0.339	0.705
Qt/TC - stiff CH	-36.00	36.00	0.120						1.800	9	0.50	0.50	3.300	3.300	0.339	0.705
TC-hard MH	-78.00	78.00	0.125						4.000	9	0.50	0.50	3.300	3.300	0.339	0.705

SOIL LAYERS			OVERBURDEN		PILE SKIN FRICTION						PILE END BEARING			TOTAL PILE CAPACITY		
Description	Top El.	Depth	Total Stress	Effect. Stress	Unit Stress		Outside Friction Capacity		Inside Friction Capacity		Unit Stress	Section Capacity	Plug Capacity	Plugged?	Compression	Tension
-	-	-	σ_V	σ'_V	f_C	f_T	Q_{FC}	Q_{FT}	Q'_{FC}	Q'_{FT}	q_E	Q_E	Q'_E	-	Q_C	Q_T
-	-	☑ Interval 2.00	-	-	max: 2.40	max: 2.40	FOS: 1.00	FOS: 1.00	FOS: 1.00	FOS: 1.00	max: 200.00	FOS: 1.00	FOS: 1.00	-	-	-
text	ft	ft	K/ft2	K/ft2	K/ft2	K/ft2	K	K	K	K	K/ft2	K	K	Yes/No	K	K
1-Af- Clay/Silt	0.00	0.00	0.00	0.00												
1-Af- Clay/Silt	-2.00	2.00	0.24	0.24												
1-Af- Clay/Silt (Pi	-2.80	2.80	0.34	0.34	0.17	0.09	0.0	0.0			0.00	0.0		N/A	0.0	0.0
1-Af- Clay/Silt	-4.00	4.00	0.48	0.48	0.24	0.12	0.8	0.4			0.00	0.0		N/A	0.8	0.4
1-Af- Clay/Silt	-6.00	6.00	0.72	0.72	0.37	0.18	2.8	1.4			0.00	0.0		N/A	2.8	1.4
1-Af- Clay/Silt	-8.00	8.00	0.96	0.96	0.49	0.24	5.7	2.8			0.00	0.0		N/A	5.7	2.8
1-Af- Clay/Silt	-10.00	10.00	1.20	1.20	0.61	0.31	9.3	4.6			0.00	0.0		N/A	9.3	4.6
1-Af- Clay/Silt	-12.00	12.00	1.44	1.44	0.73	0.37	13.7	6.9			0.00	0.0	10K	N/A	13.7	6.9
1-Af- Clay/Silt	-14.00	14.00	1.68	1.68	0.86	0.43	19.0	9.5			0.00	0.0		N/A	19.0	9.5
1-Af- Clay/Silt	-16.00	16.00	1.92	1.92	0.98	0.49	25.0	12.5			0.00	0.0		N/A	25.0	12.5
1-Af- Clay/Silt	-18.00	18.00	2.16	2.16	1.10	0.55	31.9	15.9			0.00	0.0	40K	N/A	31.9	15.9
1-Af- Clay/Silt	-20.00	20.00	2.40	2.40	1.22	0.61	39.6	19.8			0.00	0.0		N/A	39.6	19.8
1-Af- Clay/Silt	-22.00	22.00	2.64	2.64	1.35	0.67	48.0	24.0			0.00	0.0		N/A	48.0	24.0
1-Af- Clay/Silt	-24.00	24.00	2.88	2.88	1.47	0.73	57.3	28.7			0.00	0.0	50K	N/A	57.3	28.7
1-Af- Clay/Silt	-26.00	26.00	3.12	3.12	1.59	0.79	67.4	33.7			0.00	0.0		N/A	67.4	33.7
1-Af- Clay/Silt	-28.00	28.00	3.36	3.36	1.71	0.86	78.3	39.2			0.00	0.0		N/A	78.3	39.2
1-Af- Clay/Silt	-30.00	30.00	3.60	3.60	1.83	0.92	90.0	45.0			0.00	0.0		N/A	90.0	45.0
1-Af- Clay/Silt	-32.00	32.00	3.84	3.84	1.96	0.98	102.5	51.3			0.00	0.0		N/A	102.5	51.3
1-Af- Clay/Silt	-34.00	34.00	4.08	4.08	2.08	1.04	115.8	57.9			0.00	0.0		N/A	115.8	57.9
1-Af- Clay/Silt	-36.00	36.00	4.32	4.32	2.20	1.10	130.0	65.0			0.00	0.0		N/A	130.0	65.0
2-Qt/TC - stiff CH	-36.00	36.00	4.32	4.32	0.90	0.90	130.0	65.0			16.20	5.5		N/A	135.4	65.0
2-Qt/TC - stiff CH	-38.00	38.00	4.56	4.56	0.90	0.90	135.9	70.9			16.20	5.5		N/A	141.4	70.9
2-Qt/TC - stiff CH	-40.00	40.00	4.80	4.80	0.90	0.90	141.8	76.9			16.20	5.5		N/A	147.3	76.9
2-Qt/TC - stiff CH	-42.00	42.00	5.04	5.04	0.90	0.90	147.8	82.8			16.20	5.5		N/A	153.3	82.8
2-Qt/TC - stiff CH	-44.00	44.00	5.28	5.28	0.90	0.90	153.7	88.7			16.20	5.5		N/A	159.2	88.7
2-Qt/TC - stiff CH	-46.00	46.00	5.52	5.52	0.90	0.90	159.7	94.7			16.20	5.5		N/A	165.1	94.7
2-Qt/TC - stiff CH	-48.00	48.00	5.76	5.76	0.90	0.90	165.6	100.6			16.20	5.5		N/A	171.1	100.6
2-Qt/TC - stiff CH	-50.00	50.00	6.00	6.00	0.90	0.90	171.5	106.6			16.20	5.5		N/A	177.0	106.6
2-Qt/TC - stiff CH	-52.00	52.00	6.24	6.24	0.90	0.90	177.5	112.5			16.20	5.5		N/A	183.0	112.5
2-Qt/TC - stiff CH	-54.00	54.00	6.48	6.48	0.90	0.90	183.4	118.4			16.20	5.5		N/A	188.9	118.4
2-Qt/TC - stiff CH	-56.00	56.00	6.72	6.72	0.90	0.90	189.4	124.4			16.20	5.5		N/A	194.8	124.4
2-Qt/TC - stiff CH	-58.00	58.00	6.96	6.96	0.90	0.90	195.3	130.3			16.20	5.5		N/A	200.8	130.3
2-Qt/TC - stiff CH	-60.00	60.00	7.20	7.20	0.90	0.90	201.2	136.3			16.20	5.5		N/A	206.7	136.3
2-Qt/TC - stiff CH	-62.00	62.00	7.44	7.38	0.90	0.90	207.2	142.2			16.20	5.5		N/A	212.7	142.2
2-Qt/TC - stiff CH	-64.00	64.00	7.68	7.49	0.90	0.90	213.1	148.1			16.20	5.5		N/A	218.6	148.1
2-Qt/TC - stiff CH	-66.00	66.00	7.92	7.61	0.90	0.90	219.1	154.1			16.20	5.5		N/A	224.5	154.1
2-Qt/TC - stiff CH	-68.00	68.00	8.16	7.72	0.90	0.90	225.0	160.0			16.20	5.5		N/A	230.5	160.0
2-Qt/TC - stiff CH	-70.00	70.00	8.40	7.84	0.90	0.90	230.9	166.0			16.20	5.5		N/A	236.4	166.0
2-Qt/TC - stiff CH	-72.00	72.00	8.64	7.95	0.90	0.90	236.9	171.9			16.20	5.5		N/A	242.4	171.9
2-Qt/TC - stiff CH	-74.00	74.00	8.88	8.07	0.90	0.90	242.8	177.8			16.20	5.5		N/A	248.3	177.8
2-Qt/TC - stiff CH	-76.00	76.00	9.12	8.18	0.90	0.90	248.8	183.8			16.20	5.5		N/A	254.2	183.8
2-Qt/TC - stiff CH	-78.00	78.00	9.36	8.30	0.90	0.90	254.7	189.7			16.20	5.5		N/A	260.2	189.7
3-TC-hard MH	-78.00	78.00	9.36	8.30	2.00	2.00	254.7	189.7			36.00	12.2		N/A	266.9	189.7
3-TC-hard MH (Pile T	-80.00	80.00	9.61	8.42	2.00	2.00	267.9	202.9			36.00	12.2		N/A	280.1	202.9

Notes:
[a] Specified maximum limit reached (max fc, max ft, max q).
[b] Plugged condition: Q'E exceeds Q'FC. Q'FC is not used in total compressive capacity QC.
[c] Plug traveled downward (Q'FC exceeds Q'E).
[d] Q'E is less than Q'FC and not used in total compressive capacity QC.
[e] Inside soil dead weight reached.

PILEGROUP SETTLEMENT CALCULATION
I-5 HOV Seg 1, NW PILASTER, 9/11/12

Pile Load =	140	kips
Pile Cap Width =	9.58	ft
Pile Cap Length =	10	ft
Bottom of Footing =	0	ft
Pile Length for the Calculation =	0	ft
Equivalent Pile Cap Width =	9.58	ft
Bottom of Ib Length =	10	ft
Equivalent Footing Bottom of Footing =	0	ft
Bearing Pressure =	1.5	ksf

Load distribution 0.5 :1 (H:V)

Layer	Elevations 0	Thickness below equivakent footing ft	Thicknes s below bottom of footing ft	γ psf	σvo ksf	Δσ ksf	Cc'	Settlement
1	-20.0	20.0	20.0	120	1.20	0.36	0.025	0.68 "
2	-30.0	10.0	10.0	120	3.00	0.12	0.040	0.08 "
3	-37.0	7.0	7.0	120	4.02	0.07	0.025	0.02 "
4	-57.0	20.0	20.0	120	5.64	0.04	0.025	0.02 "
5	-70.0	13.0	13.0	65	7.26	0.03	0.025	0.01 "
6	-80.0	10.0	10.0	65	8.01	0.02	0.025	0.00 "
7		-80.0	-80.0		8.34	0.06		0.00 "
	307.0							
		0.0	0.0		**Total secondary settlement=**			**0.80 "**

< 1"

PILEGROUP SETTLEMENT CALCULATION
I-5 HOV Seg 1, WW 1 NE PILASTER, 9/11/12

Pile Load =	82	kips
Pile Cap Width =	7.25	ft
Pile Cap Length =	10	ft
Bottom of Footing =	0	ft
Pile Length for the Calculation =	0	ft
Equivalent Pile Cap Width =	7.25	ft
Bottom of Footing Length =	10	ft
Equivalent Footing Bottom of Footing =	0	ft
Bearing Pressure =	1.1	ksf

Load distribution 0.5 :1 (H:V)

Layer	Elevations 0	Thickness below equivakent footing ft	Thicknes s below bottom of footing ft	γ psf	σvo ksf	Δσ ksf	Cc'	Settlement
1	-10.0	10.0	10.0	120	0.60	0.45	0.025	0.72 "
2	-17.0	7.0	7.0	120	1.62	0.17	0.025	0.09 "
3	-34.0	17.0	17.0	120	3.06	0.07	0.025	0.05 "
4	-59.0	25.0	25.0	120	5.58	0.03	0.025	0.02 "
5	-60.0	1.0	1.0	65	7.11	0.02	0.030	0.00 "
6	-76.0	16.0	16.0	65	7.67	0.01	0.025	0.00 "
7		-76.0	-76.0		8.19	0.04		0.00 "
	307.0							
		0.0	0.0		**Total secondary settlement=**			**0.88 "**

< 1 "

APPENDIX D

CALTRANS REVIEW COMMENTS AND EMI RESPONSES

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. RAMIN RASHEDI
Office of Special Funded Projects (OSFP)
Attention: Ms. LUQI YANG
Fax: (916) 227-8683

DATE: June 20, 2013

FILE: 12 ORA 05 3.39
District County Route Post mile

FDN REPORT BY: Earth Mechanics, Inc DATED: May 21, 2013

Avenida Pico UC (Replace)
Structure Name

GENERAL PLAN DATED: April. 26, 2013 FDN PLAN DATED: April 26, 2013

12-00020277 55-0207
EFIS Project ID Bridge Number

Submittal (*Check One*): [ ] 1st [ ] 2nd [ ] 3rd [ ] 4th [X] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled "Revised Final Foundation Report for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-Ora-05, PM 3.39, Caltrans Project ID 1200020277, EA No 12-0F96A1", prepared by Earth Mechanics, Inc, dated May 21, 2013 and Bridge Plans with the revised LOTB (dated May 21, 2013) and received by our office on June 19, 2013.

During our review we made reference to the following:

- Caltrans Review Comment Memorandum dated May 17, 2013.
- Caltrans Review Comment Memorandum dated April 19, 2013.
- Caltrans Review Comment Memorandum dated August 13, 2012.
- Caltrans Review Comment Memorandum dated December 28, 2012.
- "Foundation Report prepared for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96B", prepared by Earth Mechanics, Inc. dated May 29, 2012.
- "Final Foundation Report prepared for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96B", prepared by Earth Mechanics, Inc. dated October 1, 2012.
- "Revised Final Foundation Report prepared for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96B", prepared by Earth Mechanics, Inc. dated January 29, 2013.
- "Revised Final Foundation Report prepared for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96A1", prepared by Earth Mechanics, Inc. dated April 29, 2013.
- Over the shoulder review meetings conducted on September 20, 2012 and January 9, 2013.
- Over the shoulder review meeting conducted on April 19, 2013.
- Over the shoulder review (via email) conducted from May 8th thru May 17, 2013.
- Over the shoulder review (via email) and design support conducted thru June 19, 2013.

We have the following comment:

The proposed Foundation (i.e. Piles) for the subject structure is acceptable from "design" point of view but possibly over-conservative (i.e. by selecting pile foundation instead of spread footing) leading to potentially unwarranted additional cost for the project.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval: Reviewed By: Sharid Amiri, PhD, P.E.
Geotechnical Design South-1

(C2): Approved subject to OSFP/District Project Engineer Verification - optional for OSFP to send to GS/METS for another round of review after OSPF verification of the comments are addressed
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

MEMORANDUM

DATE: May 21, 2013 EMI Project No. 11-135

TO: Mr. M. Mohseni / Parsons

From: Mike Kapuskar, Lino Cheang / Earth Mechanics, Inc. (EMI)

Subject: Response to Caltrans Review Comments dated 05/17/13 on Revised Final Foundation Report for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96A1 dated April 29, 2013

Earth Mechanics, Inc. submitted the subject structure foundation report (FR) to Caltrans for review. Caltrans Office of Geotechnical Design South 1 (OGDS-1) provided review comments in a memorandum dated May 17, 2013 (see Attachment 1). Our responses are as follows:

1. We will comply. Calculations are attached in Attachment 2.
2. We will comply.
3. We will comply.
4. The sample is fill consisting of clay, sand and gravel up to ¾" size. We think the friction angle is artificially high because of the large gravel. The test data itself is correct. We did not use this friction angle in design. We will remove this test result from of the report and LOTB.
5. We will comply. We added discussion and justification in Section 3.3 of the FR.
6. We acknowledge.
7. We will comply. We have added Tables B-2 and B-3 in Appendix B of the FR.
8. We have added laboratory raw data and test forms in Appendix B. We have updated Tables 6 and B-1. R-value and compaction tests indicated on the LOTB's in Appendix A were performed for pavement design. Those tests were not used in this report and are omitted from Appendix B.
9. The soil samples were collected with ring samplers and are "relatively undisturbed". Use of ring samples in this environment is standard practice. We have used professional care to minimize soil disturbance. Per Comment No. 7, the Table B-3 in Appendix B shows our consolidation coefficients. We are aware of soil disturbance and also we did not these values. For the footing settlement calculations, we used a consolidation coefficient of 0.02 for the soils and 0.01 for the bedrock. Both of these values are much lower than the laboratory test results. Using these low design values, we found the footing settlement due to the structural demands still to be excessive.

Attachments

ATTACHMENT 1

Caltrans Review Comments

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. LAM NGUYEN
Office of Special Funded Projects (OSFP)
Attention: Ms. LUQI YANG
Fax: (916) 227-8683

DATE: May 17, 2013

FILE: 12 ORA 05 3.39
District County Route Post mile

FDN REPORT BY: Earth Mechanics, Inc DATED: April 29, 2013

Avenida Pico UC (Replace)
Structure Name

GENERAL PLAN DATED: April. 26, 2013 FDN PLAN DATED: April 26, 2013

12-00020277 55-0207
EFIS Project ID Bridge Number

Submittal (*Check One*): [ ] 1st [ ] 2nd [ ] 3rd [X] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled "Revised Final Foundation Report for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-Ora-05, PM 3.39, Caltrans Project ID 1200020277, EA No 12-0F96A1", prepared by Earth Mechanics, Inc, dated April 29, 2013, and received by our office on May 3, 2013.

During our review we made reference to the following:

- Caltrans Review Comment Memorandum dated April 19, 2013.
- Caltrans Review Comment Memorandum dated August 13, 2012.
- Caltrans Review Comment Memorandum dated December 28, 2012.
- "Foundation Report prepared for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96B", prepared by Earth Mechanics, Inc. dated May 29, 2012.
- "Final Foundation Report prepared for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96B", prepared by Earth Mechanics, Inc. dated October 1, 2012.
- "Revised Final Foundation Report prepared for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96B", prepared by Earth Mechanics, Inc. dated January 29, 2013.
- "Revised Final Foundation Report prepared for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96A1", prepared by Earth Mechanics, Inc. dated April 29, 2013.
- Over the shoulder review meetings conducted on September 20, 2012 and January 9, 2013.
- Over the shoulder review meeting conducted on April 19, 2013.
- Over the shoulder review (via email) conducted from May 8th thru May 17, 2013.

We have the following comments:

1. Revise the lateral pile capacity calculations not to include "soft" clay. Refer to the corresponding over the shoulder review comment.
2. Include the LOTB legend sheet(s) in the subject report. Refer to the corresponding over the shoulder review comment.
3. Revise the LOTB to include "Fill" per the latest Caltrans Soil Logging Manual. Refer to the corresponding over the shoulder review comment.
4. Laboratory testing of the sample material classified as CL retrieved at the project site (Sample D-1 Boring A-11-114) shows a friction angle of 64 degrees. The soil sample cannot be classified as CL. Explain and reconcile. Refer to the corresponding over the shoulder review comment.
5. Revise the subject report to discuss the landslide hazard and its impact on the proposed bridge structure. If there is no impact, state so and provide justification, consistent with other geotechnical/geological hazards discussed in the subject report. Refer to the corresponding over the shoulder review comment.
6. For the record, the cone penetrometer testing (CPT) equipment currently available in the industry can penetrate to depths beyond what was achieved during the investigation for the subject project. Refer to the corresponding over the shoulder note.
7. The appendix of the subject report does not include the tabulated results for the subject tests, include them as follows and refer to the corresponding over the shoulder review comment.
   Table for Unconsolidated Undrained Tests:

   Boring Number, Sample number, Sample depth, predominant soil type, Strength at 5% and at failure.

   Table for 1D consolidation tests:

   Boring Number, Sample number, Sample depth, predominant soil type, t50, t90,Cc, Cr,Ccε, Crε,e0, σ'p.
8. The laboratory actual test results are missing. That includes all tests that have been performed. Include them in the Appendix. Refer to the corresponding over the shoulder review comment.
9. Consolidation tests have been performed on samples that are completely disturbed, which in turn impacts the results of the consolidation tests and lead to inaccurate evaluation of the soil compressibility and soil settlement calculation. Explain and comment on the calculated settlement for the spread footing given the latter.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, PhD, P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

ATTACHMENT 2

BACKUP CALCULATIONS FOR COMMENT NO. 1

Mike Kapuskar

From: Amiri, Sharid@DOT <sharid.amiri@dot.ca.gov>
Sent: Wednesday, May 08, 2013 2:36 PM
To: Mike Kapuskar
Subject: RE: LPILE Modeling of 24 inch CIDH, (Ref: Caltrans Review Memorandum, Dated April 19, 2013, Response to Caltrans Review Comment No.3), Avenida Pico UC, Bridge 55-0207

Hi Mike

I am in receipt of your email. I will follow up with you if necessary. Thank you

Sharid Khan Amiri (PhD, PE)
Senior Technical Specialist
D-12 Geotechnical Oversight

Caltrans Geotechnical Services
3347 Michelson Dr. Suite 100
Irvine,Ca,92612
(949) 724-2599

From: Mike Kapuskar [mailto:M.Kapuskar@earthmech.com]
Sent: Wednesday, May 08, 2013 2:12 PM
To: Amiri, Sharid@DOT
Cc: Lino Cheang
Subject: RE: LPILE Modeling of 24 inch CIDH, (Ref: Caltrans Review Memorandum, Dated April 19, 2013, Response to Caltrans Review Comment No.3), Avenida Pico UC, Bridge 55-0207

Hi Sharid...
I left you a phone message. I have attached LPILE calc's using Reese Stiff Clay criteria. The pile-top deflections go down only a little bit. This is because of the shape of the Reese p-y curve. The shape includes some degradation behind the peak.

Pile size	Soft Clay Criteria	Stiff Clay Criteria
24"	0.67"	0.62"
48"	1.01"	0.95"

Note that all LPILE check runs for the CIDH pile were done for the LOWEST demands given Parsons and the HIGHEST p-multipliers we calculated.
My cell # is below.
Thanks
Mike

Mike Kapuskar, PE, GE
Geotechnical Engineer
Cell: (714) 478-5660
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering
17800 Newhope Street, Suite B, Fountain Valley, CA 92708
Phone: (714) 751-3826, Fax: (714) 751-3928

3541 Investment Blvd, Suite #4, Hayward, CA 94545

From: Lino Cheang
Sent: Wednesday, May 08, 2013 11:27 AM
To: Mike Kapuskar
Subject: FW: LPILE Modeling of 24 inch CIDH, (Ref: Caltrans Review Memorandum, Dated April 19, 2013, Response to Caltrans Review Comment No.3), Avenida Pico UC, Bridge 55-0207

From: Amiri, Sharid@DOT [mailto:sharid.amiri@dot.ca.gov]
Sent: Wednesday, May 08, 2013 10:56 AM
To: Lino Cheang
Subject: LPILE Modeling of 24 inch CIDH, (Ref: Caltrans Review Memorandum, Dated April 19, 2013, Response to Caltrans Review Comment No.3), Avenida Pico UC, Bridge 55-0207

Lino/Mike

I am reviewing the subject item and noted that the pile head deflection is shown as excessive and surpassing the threshold Caltrans acceptable limit of 0.25 inch. The analysis appears to be based on modeling the soil as "soft clay". The top of the pile assumed at elevation of 85 to 90 feet would be embedded in hard and/or very stiff highly over-consolidated clay and/or in the sedimentary Capistrano formation (bedrock)

Please explain.

P.S.: I do not have Mike Kapuskar's email to have it included in this correspondence. Please forward this email to him.

Sharid Khan Amiri (PhD, PE)
Senior Technical Specialist
D-12 Geotechnical Oversight

Caltrans Geotechnical Services
3347 Michelson Dr. Suite 100
Irvine,Ca,92612
(949) 724-2599

24" ϕ CIDH

LPile Plus for Windows, Version 6 (6.0.28)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

© 1985-2011 by Ensoft, Inc.
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This copy of LPile is licensed to:

Mike Kapuskar
EMI

Serial Number of Security Device: 157693804
Company Name Stored in Security Device: Earth Mechanics, Inc

Files Used for Analysis

Path to file locations: X:\Projects\2011\11-135 - PTG, I-5 HOV Widening - Segment 1\Reports\FR Bridge\Appendix C Analysis\Lateral\CIDH\
Name of input data file: Abut 1 CIDH 24'' Stiff Clay.lp6d
Name of output report file: Abut 1 CIDH 24'' Stiff Clay.lp6o
Name of plot output file: Abut 1 CIDH 24'' Stiff Clay.lp6p
Name of runtime messeage file: Abut 1 CIDH 24'' Stiff Clay.lp6r

Date and Time of Analysis

Date: May 8, 2013 Time: 13:41:44

Problem Title

I-5 HOV Seg 1, Bridge 55-0207

Job Number: 11-135

Client: Parsons

Engineer: MK

Description: Abut 1, 24'' dia CIDH

Program Options

Engineering units are US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes pile response to lateral loading and will compute nonlinear moment-curvature and nominal moment capacity for selected section types.

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multipliers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 68.00 ft

Depth of ground surface below top of pile = -4.00 ft

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	24.0000000
2	68.000000	24.0000000

Input Structural Properties:

Pile Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	68.000 ft
Top Width	=	24.000 in
Bottom Width	=	24.000 in
Top Area	=	452.000000 sq. in
Bottom Area	=	452.000000 sq. in
Moment of Inertia at Top	=	16285.000 in^4
Moment of Inertia at Bottom	=	16285.000 in^4
Elastic Modulus	=	3600000. lbs/in^2

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	0.000 degrees
	=	0.000 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is stiff clay without free water

Distance from top of pile to top of layer	=	-4.000 ft
Distance from top of pile to bottom of layer	=	14.000 ft

Layer 2 is stiff clay without free water

Distance from top of pile to top of layer	=	14.000 ft
Distance from top of pile to bottom of layer	=	39.000 ft

Layer 3 is stiff clay with water-induced erosion

Distance from top of pile to top of layer	=	39.000 ft
Distance from top of pile to bottom of layer	=	56.000 ft

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is stiff clay with water-induced erosion

Distance from top of pile to top of layer	=	56.000 ft
Distance from top of pile to bottom of layer	=	80.000 ft

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 12.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-4.00	120.00000
2	14.00	120.00000
3	14.00	120.00000
4	39.00	120.00000
5	39.00	60.00000
6	56.00	60.00000
7	56.00	65.00000
8	80.00	65.00000

Summary of Soil Properties

Layer J Num.	Soil Type (p-y Curve Criteria)	kpy pci	Rock Emass psi	krm	Depth Test Type ft	Eff. Unit Wt., pcf	Cohesion Elas. Subgr. psf	Friction Test Prop. Ang., deg.	qu psi	RQD percent	Epsilon 50 pci
1	Stiff Clay w/o Free Water	--	--	--	-4.000	120.000	1000.000	--	--	--	0.01000
					14.000	120.000	1000.000	--	--	--	0.01000
2	Stiff Clay w/o Free Water	--	--	--	14.000	120.000	1800.000	--	--	--	0.01000
					39.000	120.000	1800.000	--	--	--	0.01000

3	Stiff Clay with Free Water			39.000	60.000	1800.000	--	--	--	0.01000
--	default	--	--	--	--	--				
				56.000	60.000	1800.000	--	--	--	0.01000
--	default	--	--	--	--	--				
4	Stiff Clay with Free Water			56.000	65.000	4000.000	--	--	--	0.00500
--	default	--	--	--	--	--				
				80.000	65.000	4000.000	--	--	--	0.00500
--	default	--	--	--	--	--				

---

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	0.000	0.8000	1.0000
2	79.000	0.8000	1.0000

Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1		Condition 2		Axial Thrust Force, lbs
1	1	V =	38000. lbs	M =	0.0000 in-lbs	0.0000000

V = perpendicular shear force applied to pile head
M = bending moment applied to pile head
y = lateral deflection relative to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applie to pile head
Axial thrust is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

---

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-Curvature properties derived from elastic section properties

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Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Horizontal shear force at pile head = 38000.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 0.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.6215	-3.910E-07	38000.	-0.005527	2.881E-10	5.863E+10	-301.3092	1978.0525	0.000
8.160	0.5764	300049.	35496.	-0.005506	221.0981	5.863E+10	-312.2937	4421.1587	0.000
16.320	0.5316	579303.	32907.	-0.005445	426.8735	5.863E+10	-322.3201	4947.2761	0.000
24.480	0.4875	837095.	30240.	-0.005346	616.8341	5.863E+10	-331.3425	5545.8080	0.000
32.640	0.4444	1072825.	27504.	-0.005213	790.5374	5.863E+10	-339.3151	6230.7129	0.000
40.800	0.4024	1285961.	24707.	-0.005049	947.5921	5.863E+10	-346.1908	7019.3104	0.000
48.960	0.3620	1476046.	21859.	-0.004857	1087.6608	5.863E+10	-351.9217	7933.2987	0.000
57.120	0.3232	1642698.	18969.	-0.004640	1210.4625	5.863E+10	-356.4581	9000.1463	0.000
65.280	0.2863	1785616.	16047.	-0.004401	1315.7744	5.863E+10	-359.7483	10255.	0.000
73.440	0.2514	1904579.	13103.	-0.004145	1403.4352	5.863E+10	-361.7378	11744.	0.000
81.600	0.2186	1999455.	10149.	-0.003873	1473.3473	5.863E+10	-362.3684	13526.	0.000
89.760	0.1881	2070203.	7194.8617	-0.003590	1525.4797	5.863E+10	-361.5770	15682.	0.000
97.920	0.1600	2116875.	4253.7085	-0.003298	1559.8712	5.863E+10	-359.2939	18320.	0.000
106.080	0.1343	2139624.	1337.5915	-0.003002	1576.6339	5.863E+10	-355.4407	21593.	0.000
114.240	0.1110	2138705.	-1540.3055	-0.002704	1575.9568	5.863E+10	-349.9263	25715.	0.000
122.400	0.0902	2114486.	-4365.9834	-0.002408	1558.1105	5.863E+10	-342.6419	31001.	0.000
130.560	0.0717	2067452.	-7124.4470	-0.002117	1523.4524	5.863E+10	-333.4521	37929.	0.000
138.720	0.0556	1998215.	-9799.4269	-0.001834	1472.4334	5.863E+10	-322.1802	47254.	0.000
146.880	0.0418	1907525.	-12372.	-0.001562	1405.6065	5.863E+10	-308.2797	60177.	0.000
155.040	0.0301	1796309.	-14788.	-0.001305	1323.6539	5.863E+10	-284.0698	76918.	0.000
163.200	0.0205	1666177.	-17000.	-0.001064	1227.7632	5.863E+10	-258.0230	102656.	0.000
171.360	0.0128	1518865.	-19352.	-0.000842	1119.2127	5.863E+10	-318.3849	203351.	0.000
179.520	0.006767	1350353.	-21794.	-0.000642	995.0405	5.863E+10	-280.0772	337716.	0.000
187.680	0.002292	1163192.	-23835.	-0.000467	857.1262	5.863E+10	-220.2121	783916.	0.000

195.840	-0.000862	961368.	-24011.	-0.000320	708.4072	5.863E+10	176.9512	1675694.	0.000
204.000	-0.002924	771326.	-22280.	-0.000199	568.3704	5.863E+10	247.3452	690329.	0.000
212.160	-0.004110	597754.	-20142.	-0.000104	440.4696	5.863E+10	276.8075	549610.	0.000
220.320	-0.004617	442613.	-17818.	-3.134E-05	326.1504	5.863E+10	292.6500	517245.	0.000
228.480	-0.004621	306959.	-15399.	2.083E-05	226.1902	5.863E+10	300.3835	530410.	0.000
236.640	-0.004277	191306.	-12940.	5.550E-05	140.9683	5.863E+10	302.1383	576452.	0.000
244.800	-0.003715	95771.	-10488.	7.548E-05	70.5710	5.863E+10	298.9419	656554.	0.000
252.960	-0.003045	20141.	-8092.4860	8.355E-05	14.8413	5.863E+10	288.2060	772310.	0.000
261.120	-0.002352	-36299.	-5814.2604	8.242E-05	26.7476	5.863E+10	270.1826	937402.	0.000
269.280	-0.001700	-74748.	-3695.5051	7.469E-05	55.0798	5.863E+10	249.1202	1195805.	0.000
277.440	-0.001133	-96609.	-1760.7573	6.277E-05	71.1889	5.863E+10	225.0827	1621215.	0.000
285.600	-0.000676	-103483.	-35.4383	4.884E-05	76.2543	5.863E+10	197.7896	2389050.	0.000
293.760	-0.000336	-97188.	1419.5254	3.488E-05	71.6151	5.863E+10	158.8192	3859715.	0.000
301.920	-0.000106	-80317.	2272.7470	2.253E-05	59.1834	5.863E+10	50.3038	3859715.	0.000
310.080	3.185E-05	-60096.	2416.5275	1.275E-05	44.2835	5.863E+10	-15.0635	3859715.	0.000
318.240	0.000102	-40879.	2158.6347	5.726E-06	30.1228	5.863E+10	-48.1455	3859715.	0.000
326.400	0.000125	-24868.	1720.3942	1.151E-06	18.3242	5.863E+10	-59.2664	3859715.	0.000
334.560	0.000121	-12802.	1245.9142	-1.471E-06	9.4337	5.863E+10	-57.0278	3859715.	0.000
342.720	0.000101	-4534.2102	817.7619	-2.677E-06	3.3411	5.863E+10	-47.9115	3859715.	0.000
350.880	7.687E-05	543.6190	473.9368	-2.955E-06	0.4006	5.863E+10	-36.3594	3859715.	0.000
359.040	5.306E-05	3200.4387	223.1857	-2.695E-06	2.3583	5.863E+10	-25.0993	3859715.	0.000
367.200	3.289E-05	4186.0096	57.3021	-2.181E-06	3.0846	5.863E+10	-15.5585	3859715.	0.000
375.360	1.748E-05	4135.6084	-39.9042	-1.601E-06	3.0474	5.863E+10	-8.2666	3859715.	0.000
383.520	6.758E-06	3534.7728	-86.6731	-1.068E-06	2.6047	5.863E+10	-3.1964	3859715.	0.000
391.680	5.320E-08	2721.1039	-99.8170	-6.322E-07	2.0051	5.863E+10	-0.0252	3859715.	0.000
399.840	-3.561E-06	1905.7593	-93.0481	-3.102E-07	1.4043	5.863E+10	1.6842	3859715.	0.000
408.000	-5.010E-06	1202.5591	-76.5078	-9.393E-08	0.8861	5.863E+10	2.3698	3859715.	0.000
416.160	-5.094E-06	657.1516	-57.0093	3.550E-08	0.4842	5.863E+10	2.4093	3859715.	0.000
424.320	-4.431E-06	272.1681	-38.6286	1.002E-07	0.2006	5.863E+10	2.0958	3859715.	0.000
432.480	-3.459E-06	26.7326	-23.4029	1.210E-07	0.0197	5.863E+10	1.6360	3859715.	0.000
440.640	-2.457E-06	-109.7666	-11.9871	1.152E-07	0.0809	5.863E+10	1.1619	3859715.	0.000
448.800	-1.579E-06	-168.8976	-4.1995	9.580E-08	0.1245	5.863E+10	0.7468	3859715.	0.000
456.960	-8.931E-07	-178.3019	0.5710	7.164E-08	0.1314	5.863E+10	0.4224	3859715.	0.000
465.120	-4.097E-07	-159.5793	3.0852	4.812E-08	0.1176	5.863E+10	0.1938	3859715.	0.000
473.280	-1.077E-07	-127.9516	4.4857	2.811E-08	0.0943	5.863E+10	0.1495	11324296.	0.000
481.440	4.904E-08	-86.3726	4.8171	1.320E-08	0.0636	5.863E+10	-0.0682	11350930.	0.000
489.600	1.077E-07	-49.3361	3.9262	3.752E-09	0.0364	5.863E+10	-0.1501	11377565.	0.000
497.760	1.103E-07	-22.2965	2.6849	-1.233E-09	0.0164	5.863E+10	-0.1541	11404199.	0.000
505.920	8.755E-08	-5.5192	1.5556	-3.169E-09	0.004067	5.863E+10	-0.1226	11430833.	0.000
514.080	5.856E-08	3.0915	0.7198	-3.338E-09	0.002278	5.863E+10	-0.0822	11457467.	0.000
522.240	3.308E-08	6.2272	0.1943	-2.689E-09	0.004589	5.863E+10	-0.0466	11484102.	0.000
530.400	1.467E-08	6.2629	-0.0801	-1.820E-09	0.004615	5.863E+10	-0.0207	11510736.	0.000
538.560	3.377E-09	4.9205	-0.1840	-1.042E-09	0.003626	5.863E+10	-0.004775	11537370.	0.000
546.720	-2.330E-09	3.2601	-0.1900	-4.725E-10	0.002402	5.863E+10	0.003301	11564004.	0.000
554.880	-4.334E-09	1.8196	-0.1514	-1.189E-10	0.001341	5.863E+10	0.006155	11590639.	0.000
563.040	-4.271E-09	0.7889	-0.1015	6.260E-11	0.000581	5.863E+10	0.006080	11617273.	0.000
571.200	-3.312E-09	0.1631	-0.0574	1.289E-10	0.000120	5.863E+10	0.004726	11643907.	0.000
579.360	-2.168E-09	-0.1480	-0.0255	1.299E-10	0.000109	5.863E+10	0.003101	11670541.	0.000
587.520	-1.192E-09	-0.2527	-0.005857	1.020E-10	0.000186	5.863E+10	0.001709	11697176.	0.000
595.680	-5.029E-10	-0.2436	0.004063	6.748E-11	0.000179	5.863E+10	0.000723	11723810.	0.000
603.840	-9.057E-11	-0.1864	0.007543	3.756E-11	0.000137	5.863E+10	0.000130	11750444.	0.000
612.000	1.101E-10	-0.1205	0.007426	1.621E-11	8.878E-05	5.863E+10	-0.000159	11777078.	0.000
620.160	1.739E-10	-0.0652	0.005752	3.286E-12	4.802E-05	5.863E+10	-0.000252	11803712.	0.000
628.320	1.637E-10	-0.0266	0.003757	-3.102E-12	1.961E-05	5.863E+10	-0.000237	11830347.	0.000
636.480	1.233E-10	-0.003864	0.002057	-5.223E-12	2.847E-06	5.863E+10	-0.000179	11856981.	0.000
644.640	7.849E-11	0.006959	0.000860	-5.008E-12	5.128E-06	5.863E+10	-0.000114	11883615.	0.000
652.800	4.158E-11	0.0102	0.000146	-3.816E-12	7.494E-06	5.863E+10	-6.069E-05	11910249.	0.000
660.960	1.622E-11	0.009340	-0.000198	-2.458E-12	6.883E-06	5.863E+10	-2.372E-05	11936884.	0.000
669.120	1.467E-12	0.006931	-0.000304	-1.325E-12	5.107E-06	5.863E+10	-2.151E-06	11963518.	0.000
677.280	-5.411E-12	0.004379	-0.000283	0.000	3.227E-06	5.863E+10	7.240E-06	10917938.	0.000
685.440	-7.317E-12	0.002308	-0.000214	0.000	1.701E-06	5.863E+10	9.838E-06	10971207.	0.000
693.600	-6.601E-12	0.000893	-0.000137	0.000	6.580E-07	5.863E+10	8.918E-06	11024475.	0.000
701.760	-4.871E-12	7.141E-05	-7.370E-05	0.000	5.262E-08	5.863E+10	6.612E-06	11077744.	0.000
709.920	-3.059E-12	-0.000310	-2.969E-05	0.000	2.283E-07	5.863E+10	4.173E-06	11131012.	0.000
718.080	-1.600E-12	-0.000413	-3.719E-06	0.000	3.045E-07	5.863E+10	2.193E-06	11184281.	0.000
726.240	0.000	-0.000371	8.654E-06	0.000	2.730E-07	5.863E+10	8.397E-07	11237549.	0.000
734.400	0.000	-0.000272	1.231E-05	0.000	2.004E-07	5.863E+10	5.586E-08	11290818.	0.000
742.560	0.000	-0.000170	1.129E-05	0.000	1.250E-07	5.863E+10	-3.061E-07	11344086.	0.000
750.720	0.000	-8.772E-05	8.398E-06	0.000	6.464E-08	5.863E+10	-4.023E-07	11397355.	0.000
758.880	0.000	-3.259E-05	5.290E-06	0.000	2.402E-08	5.863E+10	-3.595E-07	11450623.	0.000
767.040	0.000	-1.398E-06	2.745E-06	0.000	1.030E-09	5.863E+10	-2.642E-07	11503892.	0.000
775.200	0.000	1.220E-05	9.906E-07	0.000	8.992E-09	5.863E+10	-1.657E-07	11557160.	0.000
783.360	0.000	1.477E-05	-3.675E-08	0.000	1.088E-08	5.863E+10	-8.606E-08	11610429.	0.000
791.520	0.000	1.160E-05	-5.087E-07	0.000	8.550E-09	5.863E+10	-2.962E-08	11663697.	0.000
799.680	0.000	6.465E-06	-5.867E-07	0.000	4.764E-09	5.863E+10	1.051E-08	14646207.	0.000
807.840	0.000	2.027E-06	-3.961E-07	0.000	1.494E-09	5.863E+10	3.620E-08	11770234.	0.000
816.000	0.000	0.000	0.000	0.000	0.000	5.863E+10	6.090E-08	5911751.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the
actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

```
Pile-head deflection              =      0.6214909 inches
Computed slope at pile head       =     -0.0055269 radians
Maximum bending moment            =      2139624. inch-lbs
Maximum shear force               =        38000. lbs
Depth of maximum bending moment   =    106.0800000 inches below pile head
Depth of maximum shear force      =      0.000000 inches below pile head
Number of iterations              =             31
Number of zero deflection points  =              9
```

Summary of Pile Response(s)

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Pile-head Condition 1 V(lbs) or y(inches)	Pile-head Condition 2 in-lb, rad., or in-lb/rad.	Axial Loading lbs	Pile-head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-head Rotation radians
1	1	V = 38000.	M = 0.000	0.0000000	0.62149092	2139624.	38000.	-0.00552693

The analysis ended normally.

1/5

48" ϕ CIDH

LPile Plus for Windows, Version 6 (6.0.28)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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Mike Kapuskar
EMI

Serial Number of Security Device: 157693804
Company Name Stored in Security Device: Earth Mechanics, Inc

Files Used for Analysis

Path to file locations: X:\Projects\2011\11-135 - PTG, I-5 HOV Widening - Segment 1\Reports\FR Bridge\Appendix C Analysis\Lateral\CIDH\
Name of input data file: Abut 1 CIDH 48'' Stiff Clay.lp6d
Name of output report file: Abut 1 CIDH 48'' Stiff Clay.lp6o
Name of plot output file: Abut 1 CIDH 48'' Stiff Clay.lp6p
Name of runtime messeage file: Abut 1 CIDH 48'' Stiff Clay.lp6r

Date and Time of Analysis

Date: May 8, 2013 Time: 14:08:58

Problem Title

I-5 HOV Seg 1, Bridge 55-0207

Job Number: 11-135

Client: Parsons

Engineer: MK

Description: Abut 1, 48'' dia CIDH

Program Options

Engineering units are US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes pile response to lateral loading and will compute nonlinear moment-curvature and nominal moment capacity for selected section types.

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multipliers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 68.00 ft

Depth of ground surface below top of pile = -4.00 ft

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	48.0000000
2	68.000000	48.0000000

Input Structural Properties:

Pile Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	68.000 ft
Top Width	=	48.000 in
Bottom Width	=	48.000 in
Top Area	=	1810.000000 sq. in
Bottom Area	=	1810.000000 sq. in
Moment of Inertia at Top	=	260568.000 in^4
Moment of Inertia at Bottom	=	260568.000 in^4
Elastic Modulus	=	3600000. lbs/in^2

Ground Slope and Pile Batter Angles

Ground Slope Angle	=	0.000 degrees
	=	0.000 radians
Pile Batter Angle	=	0.000 degrees
	=	0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is stiff clay without free water

Distance from top of pile to top of layer	=	-4.000 ft
Distance from top of pile to bottom of layer	=	14.000 ft

Layer 2 is stiff clay without free water

Distance from top of pile to top of layer	=	14.000 ft
Distance from top of pile to bottom of layer	=	39.000 ft

Layer 3 is stiff clay with water-induced erosion

Distance from top of pile to top of layer	=	39.000 ft
Distance from top of pile to bottom of layer	=	56.000 ft

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

Layer 4 is stiff clay with water-induced erosion

Distance from top of pile to top of layer	=	56.000 ft
Distance from top of pile to bottom of layer	=	80.000 ft

NOTE: Internal default values for p-y subgrade modulus will be computed for the above soil layer.

(Depth of lowest layer extends 12.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-4.00	120.00000
2	14.00	120.00000
3	14.00	120.00000
4	39.00	120.00000
5	39.00	60.00000
6	56.00	60.00000
7	56.00	65.00000
8	80.00	65.00000

Summary of Soil Properties

Layer J Num.	Soil Type (p-y Curve Criteria)	kpy pci	Rock Emass psi	krm	Depth Test Type ft	Eff. Unit Wt., pcf	Cohesion Test Prop. psf	Friction Elas. Subgr. pci	Ang., deg.	qu psi	RQD percent	Epsilon 50
1	Stiff Clay w/o Free Water	--	--	--	-4.000	120.000	1000.000	--	--	--	--	0.01000
					14.000	120.000	1000.000	--	--	--	--	0.01000
2	Stiff Clay w/o Free Water	--	--	--	14.000	120.000	1800.000	--	--	--	--	0.01000
					39.000	120.000	1800.000	--	--	--	--	0.01000

3	Stiff Clay with Free Water			39.000	60.000	1800.000	--	--	--	0.01000
--	default	--	--	--	--	--				
				56.000	60.000	1800.000	--	--	--	0.01000
--	default	--	--	--	--	--				
4	Stiff Clay with Free Water			56.000	65.000	4000.000	--	--	--	0.00500
--	default	--	--	--	--	--				
				80.000	65.000	4000.000	--	--	--	0.00500
--	default	--	--	--	--	--				

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p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	0.000	0.8000	1.0000
2	79.000	0.8000	1.0000

Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1		Condition 2		Axial Thrust Force, lbs
1	1	V =	140000. lbs	M =	0.0000 in-lbs	0.0000000

V = perpendicular shear force applied to pile head
M = bending moment applied to pile head
y = lateral deflection relative to pile axis
S = pile slope relative to original pile batter angle
R = rotational stiffness applie to pile head
Axial thrust is assumed to be acting axially for all pile batter angles.

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

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Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Moment-Curvature properties derived from elastic section properties

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Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (Loading Type 1)

Horizontal shear force at pile head = 140000.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 0.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.9569	1.564E-06	140000.	-0.004619	1.441E-10	9.380E+11	-501.4763	2138.0837	0.000
8.160	0.9192	1125704.	135844.	-0.004614	103.6847	9.380E+11	-517.2452	4591.4840	0.000
16.320	0.8816	2216968.	131561.	-0.004600	204.1971	9.380E+11	-532.4367	4927.9741	0.000
24.480	0.8442	3272779.	127157.	-0.004576	301.4441	9.380E+11	-547.0331	5287.7145	0.000
32.640	0.8070	4292165.	122636.	-0.004543	395.3362	9.380E+11	-561.0162	5673.0236	0.000
40.800	0.7700	5274195.	118003.	-0.004501	485.7875	9.380E+11	-574.3680	6086.4967	0.000
48.960	0.7335	6217981.	113265.	-0.004451	572.7163	9.380E+11	-587.0701	6531.0467	0.000
57.120	0.6974	7122677.	108425.	-0.004393	656.0447	9.380E+11	-599.1040	7009.9530	0.000
65.280	0.6618	7987481.	103490.	-0.004328	735.6987	9.380E+11	-610.4508	7526.9180	0.000
73.440	0.6268	8811637.	98466.	-0.004255	811.6089	9.380E+11	-621.0915	8086.1347	0.000
81.600	0.5924	9594438.	93357.	-0.004175	883.7099	9.380E+11	-631.0064	8692.3668	0.000
89.760	0.5586	10335223.	88171.	-0.004088	951.9410	9.380E+11	-640.1758	9351.0445	0.000
97.920	0.5256	11033382.	82912.	-0.003995	1016.2459	9.380E+11	-648.5793	10068.	0.000
106.080	0.4934	11688354.	77589.	-0.003896	1076.5731	9.380E+11	-656.1960	10852.	0.000
114.240	0.4621	12299633.	72207.	-0.003792	1132.8759	9.380E+11	-663.0044	11709.	0.000
122.400	0.4316	12866766.	66772.	-0.003682	1185.1125	9.380E+11	-668.9824	12649.	0.000
130.560	0.4020	13389354.	61292.	-0.003568	1233.2462	9.380E+11	-674.1071	13684.	0.000
138.720	0.3733	13867056.	55774.	-0.003450	1277.2457	9.380E+11	-678.3547	14827.	0.000
146.880	0.3457	14299590.	50225.	-0.003327	1317.0848	9.380E+11	-681.7006	16092.	0.000
155.040	0.3190	14686732.	44653.	-0.003201	1352.7431	9.380E+11	-684.1191	17498.	0.000
163.200	0.2934	15028322.	39064.	-0.003072	1384.2057	9.380E+11	-685.5834	19065.	0.000
171.360	0.2689	15324261.	32618.	-0.002940	1411.4637	9.380E+11	-894.4817	27144.	0.000
179.520	0.2455	15560641.	25315.	-0.002805	1433.2358	9.380E+11	-895.3501	29765.	0.000
187.680	0.2231	15737404.	18011.	-0.002669	1449.5168	9.380E+11	-894.7843	32725.	0.000

195.840	0.2019	15854587.	10718.	-0.002532	1460.3101	9.380E+11	-892.7367	36082.	0.000
204.000	0.1818	15912326.	3448.1644	-0.002394	1465.6283	9.380E+11	-889.1551	39910.	0.000
212.160	0.1628	15910861.	-3786.2333	-0.002255	1465.4933	9.380E+11	-883.9816	44300.	0.000
220.320	0.1450	15850535.	-10972.	-0.002117	1459.9369	9.380E+11	-877.1509	49365.	0.000
228.480	0.1283	15731804.	-18094.	-0.001980	1449.0010	9.380E+11	-868.5882	55252.	0.000
236.640	0.1127	15555237.	-25140.	-0.001844	1432.7380	9.380E+11	-858.2069	62148.	0.000
244.800	0.0982	15321525.	-32092.	-0.001709	1411.2117	9.380E+11	-845.9037	70298.	0.000
252.960	0.0848	15031489.	-38936.	-0.001577	1384.4975	9.380E+11	-831.5542	80031.	0.000
261.120	0.0724	14686084.	-45654.	-0.001448	1352.6834	9.380E+11	-815.0035	91796.	0.000
269.280	0.0612	14286410.	-52227.	-0.001322	1315.8709	9.380E+11	-796.0547	106222.	0.000
277.440	0.0509	13833731.	-58635.	-0.001200	1274.1762	9.380E+11	-774.4487	124223.	0.000
285.600	0.0416	13329485.	-64854.	-0.001082	1227.7319	9.380E+11	-749.8331	147178.	0.000
293.760	0.0332	12775311.	-70858.	-0.000968	1176.6889	9.380E+11	-721.7067	177274.	0.000
301.920	0.0258	12173081.	-76615.	-0.000860	1121.2196	9.380E+11	-689.3183	218233.	0.000
310.080	0.0192	11524953.	-82085.	-0.000756	1061.5228	9.380E+11	-651.4611	276978.	0.000
318.240	0.0134	10833447.	-87216.	-0.000659	997.8306	9.380E+11	-605.9992	368235.	0.000
326.400	0.008434	10101590.	-91926.	-0.000568	930.4219	9.380E+11	-548.5425	530721.	0.000
334.560	0.004156	9333208.	-96071.	-0.000484	859.6489	9.380E+11	-467.2094	917272.	0.000
342.720	0.000541	8533717.	-98923.	-0.000406	786.0106	9.380E+11	-231.8511	3496874.	0.000
350.880	-0.002468	7718788.	-98141.	-0.000335	710.9503	9.380E+11	423.3666	1399525.	0.000
359.040	-0.004930	6932048.	-94328.	-0.000272	638.4865	9.380E+11	511.2550	846208.	0.000
367.200	-0.006900	6179351.	-89938.	-0.000214	569.1583	9.380E+11	564.6978	667859.	0.000
375.360	-0.008430	5464255.	-85175.	-0.000164	503.2933	9.380E+11	602.7716	583434.	0.000
383.520	-0.009573	4789295.	-80139.	-0.000119	441.1251	9.380E+11	631.5921	538341.	0.000
391.680	-0.0104	4156389.	-74894.	-8.034E-05	382.8304	9.380E+11	653.9816	514284.	0.000
399.840	-0.0109	3567030.	-69506.	-4.674E-05	328.5465	9.380E+11	666.5907	499734.	0.000
408.000	-0.0111	3022055.	-64051.	-1.808E-05	278.3509	9.380E+11	670.4604	491137.	0.000
416.160	-0.0112	2521724.	-58577.	6.028E-06	232.2671	9.380E+11	671.0679	489809.	0.000
424.320	-0.0110	2066076.	-53110.	2.598E-05	190.2990	9.380E+11	668.9784	494418.	0.000
432.480	-0.0108	1654973.	-47669.	4.217E-05	152.4337	9.380E+11	664.6150	504224.	0.000
440.640	-0.0104	1288123.	-42271.	5.497E-05	118.6445	9.380E+11	658.3041	518869.	0.000
448.800	-0.009859	965107.	-36932.	6.477E-05	88.8926	9.380E+11	650.3035	538261.	0.000
456.960	-0.009296	685391.	-31664.	7.195E-05	63.1290	9.380E+11	640.8187	562521.	0.000
465.120	-0.008684	448345.	-26479.	7.688E-05	41.2955	9.380E+11	630.0124	591971.	0.000
473.280	-0.008041	253249.	-22515.	7.993E-05	23.3259	9.380E+11	341.7013	346752.	0.000
481.440	-0.007380	80905.	-19785.	8.138E-05	7.4519	9.380E+11	327.3514	361954.	0.000
489.600	-0.006713	-69642.	-17176.	8.143E-05	6.4145	9.380E+11	312.2094	379509.	0.000
497.760	-0.006051	-199400.	-14692.	8.026E-05	18.3660	9.380E+11	296.4156	399732.	0.000
505.920	-0.005403	-309421.	-12340.	7.805E-05	28.4997	9.380E+11	280.0986	423019.	0.000
514.080	-0.004777	-400792.	-10123.	7.496E-05	36.9156	9.380E+11	263.3763	449879.	0.000
522.240	-0.004180	-474626.	-8043.1124	7.115E-05	43.7161	9.380E+11	246.3575	480960.	0.000
530.400	-0.003616	-532056.	-6103.0739	6.677E-05	49.0058	9.380E+11	229.1421	517096.	0.000
538.560	-0.003090	-574228.	-4303.9401	6.196E-05	52.8901	9.380E+11	211.8220	559381.	0.000
546.720	-0.002605	-602296.	-2646.2236	5.685E-05	55.4754	9.380E+11	194.4810	609262.	0.000
554.880	-0.002162	-617414.	-1129.7870	5.154E-05	56.8679	9.380E+11	177.1946	668705.	0.000
563.040	-0.001764	-620734.	246.0858	4.615E-05	57.1736	9.380E+11	160.0291	740439.	0.000
571.200	-0.001409	-613398.	1482.6088	4.079E-05	56.4980	9.380E+11	143.0402	828391.	0.000
579.360	-0.001098	-596538.	2581.3908	3.552E-05	54.9450	9.380E+11	126.2691	938432.	0.000
587.520	-0.000829	-571270.	3544.2940	3.045E-05	52.6177	9.380E+11	109.7366	1079834.	0.000
595.680	-0.000601	-538695.	4373.2129	2.562E-05	49.6173	9.380E+11	93.4298	1268337.	0.000
603.840	-0.000411	-499899.	5069.6876	2.110E-05	46.0440	9.380E+11	77.2747	1533561.	0.000
612.000	-0.000257	-455958.	5634.1117	1.694E-05	41.9967	9.380E+11	61.0645	1940808.	0.000
620.160	-0.000135	-407950.	6063.7142	1.318E-05	37.5749	9.380E+11	44.2302	2679943.	0.000
628.320	-4.156E-05	-356998.	6344.4644	9.858E-06	32.8818	9.380E+11	24.5811	4825843.	0.000
636.480	2.620E-05	-304409.	6365.2323	6.981E-06	28.0380	9.380E+11	-19.4909	6069309.	0.000
644.640	7.237E-05	-253117.	6153.4859	4.556E-06	23.3138	9.380E+11	-32.4077	3654301.	0.000
652.800	0.000101	-203984.	5865.3800	2.568E-06	18.7882	9.380E+11	-38.2065	3100288.	0.000
660.960	0.000114	-157394.	5543.3182	9.961E-07	14.4970	9.380E+11	-40.7303	2908429.	0.000
669.120	0.000117	-113517.	5209.1171	-1.822E-07	10.4556	9.380E+11	-41.1818	2876679.	0.000
677.280	0.000111	-72382.	4525.6629	-9.908E-07	6.6668	9.380E+11	-126.3315	9261986.	0.000
685.440	0.000101	-39658.	3520.0803	-1.478E-06	3.6528	9.380E+11	-120.1348	9739981.	0.000
693.600	8.718E-05	-14934.	2596.2291	-1.716E-06	1.3755	9.380E+11	-106.2993	9949754.	0.000
701.760	7.265E-05	2712.2967	1799.1706	-1.769E-06	0.2498	9.380E+11	-89.0582	10003023.	0.000
709.920	5.831E-05	14429.	1142.6059	-1.694E-06	1.3290	9.380E+11	-71.8646	10056291.	0.000
718.080	4.500E-05	21360.	621.9276	-1.538E-06	1.9674	9.380E+11	-55.7527	10109560.	0.000
726.240	3.321E-05	24578.	225.7269	-1.339E-06	2.2638	9.380E+11	-41.3553	10162828.	0.000
734.400	2.315E-05	25043.	-61.2747	-1.123E-06	2.3067	9.380E+11	-28.9882	10216097.	0.000
742.560	1.488E-05	23578.	-255.9530	-9.114E-07	2.1717	9.380E+11	-18.7271	10269365.	0.000
750.720	8.281E-06	20866.	-375.0981	-7.181E-07	1.9219	9.380E+11	-10.4752	10322634.	0.000
758.880	3.162E-06	17457.	-434.2403	-5.514E-07	1.6079	9.380E+11	-4.0205	10375902.	0.000
767.040	-7.177E-07	13780.	-446.9010	-4.155E-07	1.2692	9.380E+11	0.9173	10429171.	0.000
775.200	-3.619E-06	10163.	-424.1892	-3.114E-07	0.9361	9.380E+11	4.6493	10482439.	0.000
783.360	-5.799E-06	6856.7666	-374.6705	-2.373E-07	0.6316	9.380E+11	7.4876	10535708.	0.000
791.520	-7.493E-06	4048.7399	-304.4516	-1.899E-07	0.3729	9.380E+11	9.7229	10588976.	0.000
799.680	-8.898E-06	1888.1166	-217.4323	-1.641E-07	0.1739	9.380E+11	11.6054	10642245.	0.000
807.840	-1.017E-05	500.2454	-115.6934	-1.537E-07	0.0461	9.380E+11	13.3306	10695513.	0.000
816.000	-1.141E-05	0.000	0.000	-1.515E-07	0.000	9.380E+11	15.0256	5374391.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships. The above values of total stress are computed for combined axial stress and do not equal the actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.9569426 inches
Computed slope at pile head	=	-0.0046192 radians
Maximum bending moment	=	15912326. inch-lbs
Maximum shear force	=	140000. lbs
Depth of maximum bending moment	=	204.0000000 inches below pile head
Depth of maximum shear force	=	0.000000 inches below pile head
Number of iterations	=	28
Number of zero deflection points	=	3

Summary of Pile Response(s)

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Pile-head Condition 1 V(lbs) or y(inches)	Pile-head Condition 2 in-lb, rad., or in-lb/rad.	Axial Loading lbs	Pile-head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-head Rotation radians
1	1	V = 140000.	M = 0.000	0.0000000	0.95694264	15912326.	140000.	-0.00461922

The analysis ended normally.

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

MEMORANDUM

DATE: April 23, 2013 EMI Project No. 11-135

TO: Mr. M. Mohseni / Parsons

From: Mike Kapuskar, Lino Cheang / Earth Mechanics, Inc. (EMI)

Subject: Response to Caltrans Review Comments dated 04/19/13 on Revised Final Foundation Report for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96A1 dated Jan. 29, 2013

Earth Mechanics, Inc. (EMI) submitted the subject structure foundation report to Caltrans for review and comments. Caltrans Office of Geotechnical Design South 1 (OGDS-1) provided additional review comments in a memorandum dated April 21, 2013. This memorandum is provided in Attachment 1. The following provides our responses to the comments:

1. We will comply.
2. Parsons will respond.
3. We will comply. Calculations are attached.
4. We support the Reviewer's enthusiasm in innovation and desire to minimize conservatism in geotechnical assumptions. The existing 3-span bridge will be replaced by a single-span bridge with tall cantilevered abutments. These abutments have large foundation demands and the foundation is underlain by fine-grained soils. Our calculations using these large demands and laboratory-determined soil compressibility behavior show excessive settlement for spread footing foundation even after a deep overexcavation of 10 feet below the footing bottom. The new required bearing pressures are higher than those for the spread footings shown in the as-built plans for the original bridge. In addition, as-built plans from the 1979 widening show pile foundations were used at all support locations. As a result, we recommend using pile foundations to meet the high demands. A large number of soil borings have been drilled at this site. Adding more CPT soundings may or may not improve the site characterization. More importantly, the added CPT soundings will not alter the results of soil consolidation tests used in our settlement calculations.
5. We will comply.
6. Parsons will provide.
7. We will comply.

Please send this response to Caltrans for review and approval. After approval of this response, we will incorporate the comments into the final report.

Attachments

Attachment 1 – Caltrans Review Comments

17800 Newhope Street, Suite B, Fountain Valley, California 92708 Tel: (714) 751-3826 Fax: (714) 751-3928

ATTACHMENT 1

Caltrans Review Comments

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. LAM NGUYEN
Office of Special Funded Projects (OSFP)
Attention: Ms. LUQI YANG
Fax: (916) 227-8683

DATE: April 19, 2013

FILE: 12 ORA 05 3.39
District County Route Post mile

FDN REPORT BY: Earth Mechanics, Inc DATED: Jan. 19, 2013

Avenida Pico UC (Replace)
Structure Name

GENERAL PLAN DATED: March. 04, 2013 FDN PLAN DATED: March. 04, 2013

12-0F96B 55-0207
EA Number Bridge Number

Submittal (*Check One*): [ ] 1st [ ] 2nd [X] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled "Revised Final Foundation Report for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-Ora-05, PM 3.39, Caltrans Project ID 1200020277, EA No 12-0F96B", prepared by Earth Mechanics, Inc, dated January 29, 2013, and received by our office on March 13, 2013.

During our review we made reference to the following:

- Caltrans Review Comment Memorandum dated August 13, 2012.
- Caltrans Review Comment Memorandum dated December 28, 2012.
- "Foundation Report prepared for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96B", prepared by Earth Mechanics, Inc. dated May 29, 2012.
- "Final Foundation Report prepared for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96B", prepared by Earth Mechanics, Inc. dated October 1, 2012.
- "Revised Final Foundation Report prepared for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96B", prepared by Earth Mechanics, Inc. dated January 29, 2013.
- Over the shoulder review meetings conducted on September 20, 2012 and January 9, 2013.
- Over the shoulder review meeting conducted on April 19, 2013.

We have the following comments:

1. Table 1 and/or Table 8 have inconsistent design pile loads and are in error. Revise and reconcile.
2. We have not received a response to our comment No.2 of our previous review comment memorandum dated December 28, 2012 by the consultant structure design team: "Resubmit the structure bridge design calculations (pdf) for the entire bridge (current pdf

electronic file is corrupted) and software input files corresponding to the seismic analysis of the abutments.

3. The supporting geotechnical calculation justifying not using CIDH as a foundation of choice is not included in the subject report. Provide the engineering calculations and include them in the subject report for our review.
4. The spread footing NOT selected as the foundation choice is based on quite conservative geotechnical assumptions. Adequate site specific and innovative (i.e. CPT) site characterization could have been performed and data used to reduce the level of site characterization uncertainties thus leading to a potential use of spread footing as the foundation of choice.
5. Include the 2009 CPT reference by Robertson in the subject report.
6. We have not received the latest special provisions for our review.
7. Revise the idealized soil profile to bring consistencies to the subject report vis a vis the bedrock characterization and description. Refer to the over the shoulder review meeting conducted on April 19, 2013.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, PhD, P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

ATTACHMENT 2

BACKUP CALCULATIONS FOR COMMENT NO. 3

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project I-5 HOV SEG. 1 (BACKUP FOR CT COMMENT #2)
BRIDGE #C

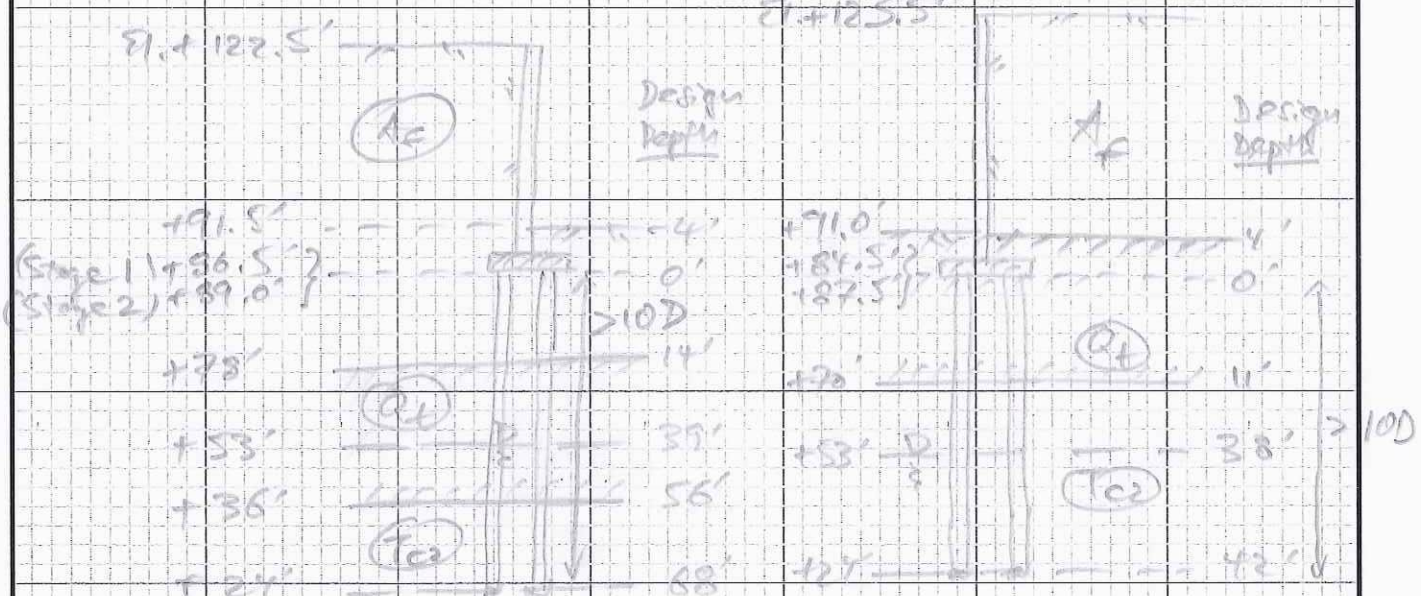
Project No. 11-135

By MK. Date 8/15/12 Checked By LCC Date 9/19/12 Sheet 1 of 13

PILE DESIGN @ ABUTS

CIDH PILE TYPE

1) ABUT PILE/SOIL CONFIG.



2) PARAMETERS FOR LATERAL DESIGN

UNIT	SOIL TYPE	γ (pcf)	φ	c (psf)	ε50	
Ac	CLAY	120	32°/1,500		.01	
Qt	SAND	120	0	1,500	.01	← controls
Tc2	CLAY	125	0	4,000	.005	

Project I-5 HOV SEG. 1
BRIDGE UC
Project No. 11-125

By MK Date 8/15/12 Checked By LC Date 9/19/12 Sheet 2 of 13

3) PILE DATA + LOAD DEMANDS

ABUT	STAGE	MAX. LOAD 24" ϕ CIDH	MAX. LOAD 48" ϕ
1	1	38 K @ 1/4"	150 K @ 1/4"
	2	47 K @ 1"	140 K @ 1/4"
2	1	38 K @ 1/4"	186 K @ 1/4"
	2	48 K @ 1/4"	174 K @ 1/4"

24" ϕ

$I = \frac{\pi}{64}(24)^4 = 16285\ in^4$, $A = 452\ in^2$

$f'_c = 4{,}000\ psi$

$E = 57000\sqrt{4000} = 3{,}606\ psi$

$EI_c = \frac{1}{2}(3{,}606)(16285) = 2.931 E10\ lb\text{-}in^2$

48" ϕ

$I = \frac{\pi}{64}(48)^4 = 260{,}563\ in^4$, $A = 1810\ in^2$

$EI_c = 4.690 E11\ lb\text{-}in^2$

4) LPILE ANALYSES

ABUT 1 WITH THICKER Qt LAYER CONTROLS.
(USE A GROUP EFF. FACTOR = .8)

PILE ϕ	SHEAR APPLIED	PILE HEAD DEFLECTION (LPILE)
24"	38 K	.67" > 1/4" N.G.
48"	140 K	1" > 1/4" N.G.

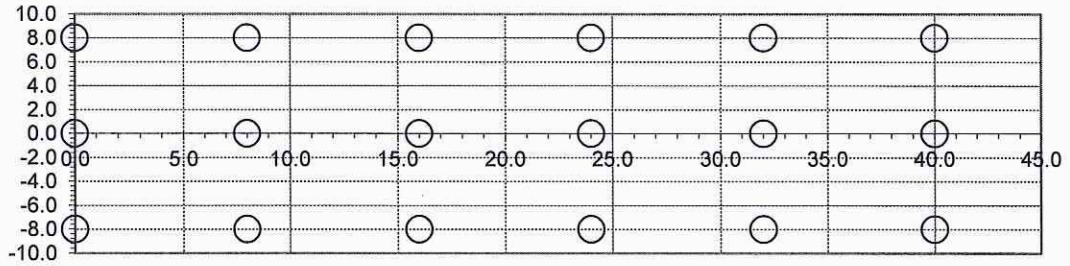
∴ CONCLUSION: 24" ϕ AND 48" ϕ CIDH DO NOT MEET LATERAL DEMANDS.

3a/13

Project: I-5 HOV Seg 1, Bridge Avenida Pico UC
By: MK 8/15/2012

Calculation of Pile Group Efficiency (using formula in Group 7.0 Technical Manual)

Pile Configuration



24" ϕ PILE @ 4D SPACING

Pile Dia.:	2.00
No. of Piles:	18

	X-Dir	Y-Dir
Group Efficiency	0.780	0.84

~ .81

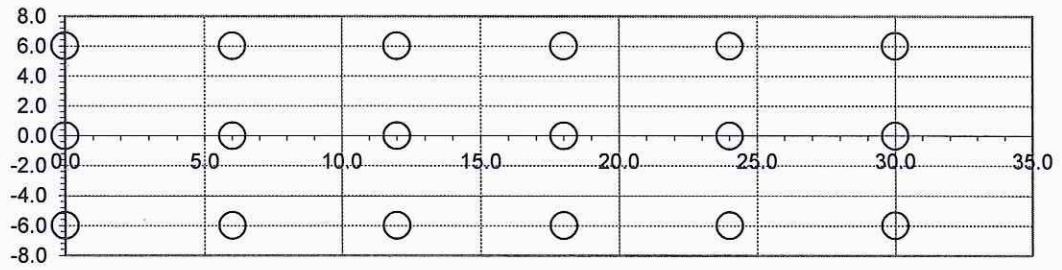
Pile No.	X	Y	Reduction Factors in X-dir	Reduction Factors in Y-dir
1	0.000	-8.000	0.784	0.784
2	8.000	-8.000	0.784	0.756
3	16.000	-8.000	0.784	0.756
4	24.000	-8.000	0.784	0.756
5	32.000	-8.000	0.784	0.756
6	40.000	-8.000	1.000	0.784
7	0.000	0.000	0.756	0.784
8	8.000	0.000	0.756	0.756
9	16.000	0.000	0.756	0.756
10	24.000	0.000	0.756	0.756
11	32.000	0.000	0.756	0.756
12	40.000	0.000	1.000	0.784
13	0.000	8.000	0.784	1.000
14	8.000	8.000	0.784	1.000
15	16.000	8.000	0.784	1.000
16	24.000	8.000	0.784	1.000
17	32.000	8.000	0.784	1.000
18	40.000	8.000	1.000	1.000
19			0.546	0.805
20			0.546	0.805
21			0.580	0.805
22			0.866	0.866

36/13

Project: I-5 HOV Seg 1, Bridge Avenida Pico UC
By: MK 8/15/2012

Calculation of Pile Group Efficiency (using formula in Group 7.0 Technical Manual)

Pile Configuration



24" ϕ PILE @ 3D O.C. SPACING.

Pile Dia.:	2.00
No. of Piles:	18

	X-Dir	Y-Dir
Group Efficiency	0.590	0.66

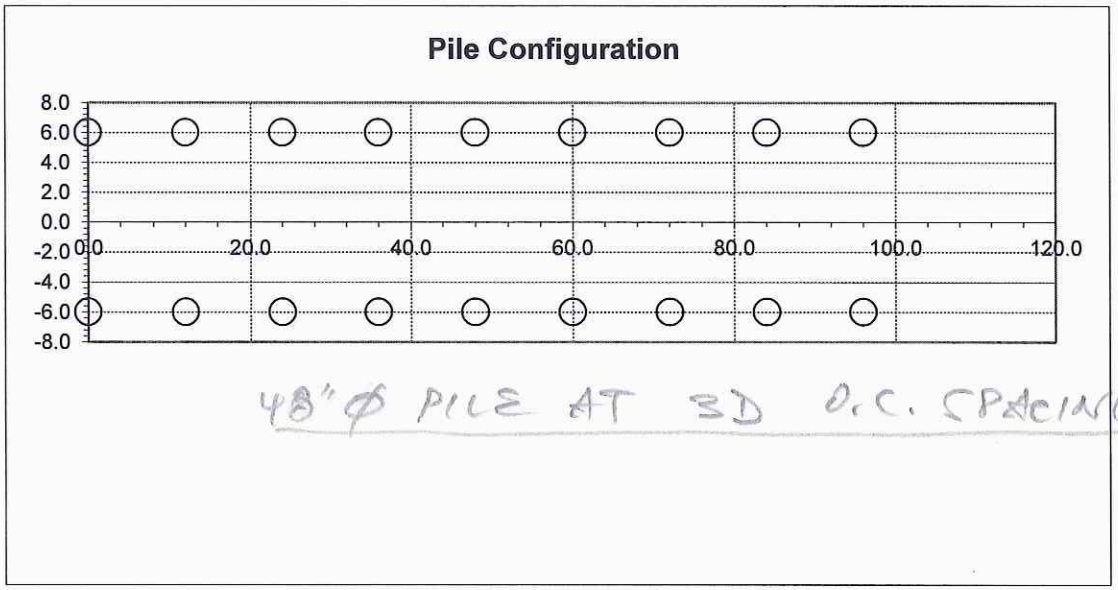
~.63

Pile No.	X	Y
1	0.000	-6.000
2	6.000	-6.000
3	12.000	-6.000
4	18.000	-6.000
5	24.000	-6.000
6	30.000	-6.000
7	0.000	0.000
8	6.000	0.000
9	12.000	0.000
10	18.000	0.000
11	24.000	0.000
12	30.000	0.000
13	0.000	6.000
14	6.000	6.000
15	12.000	6.000
16	18.000	6.000
17	24.000	6.000
18	30.000	6.000
19		
20		
21		
22		

Reduction Factors in X-dir	Reduction Factors in Y-dir
0.585	0.585
0.544	0.496
0.544	0.494
0.544	0.494
0.579	0.496
0.866	0.585
0.497	0.579
0.463	0.495
0.463	0.494
0.463	0.494
0.496	0.495
0.805	0.579
0.585	0.866
0.544	0.805
0.544	0.805
0.544	0.805
0.579	0.805
0.866	0.866
0.546	0.805
0.546	0.805
0.580	0.805
0.866	0.866

Project: I-5 HOV Seg 1, Bridge Avenida Pico UC
By: MK 8/15/2012

Calculation of Pile Group Efficiency (using formula in Group 7.0 Technical Manual)

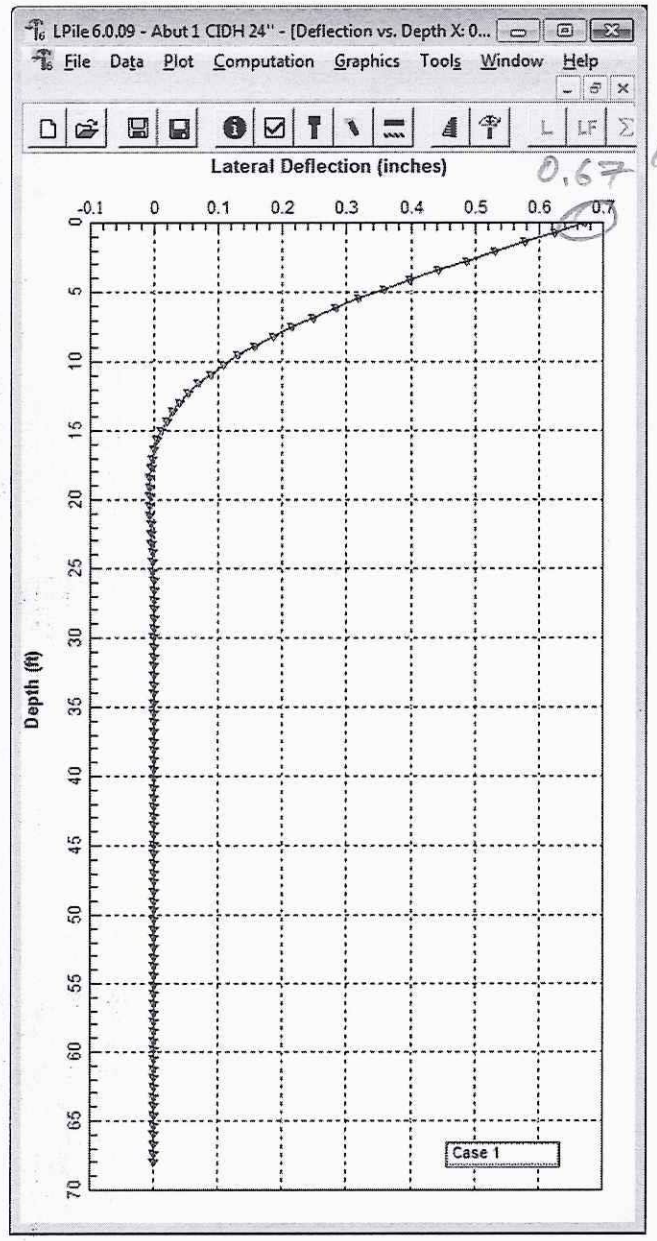


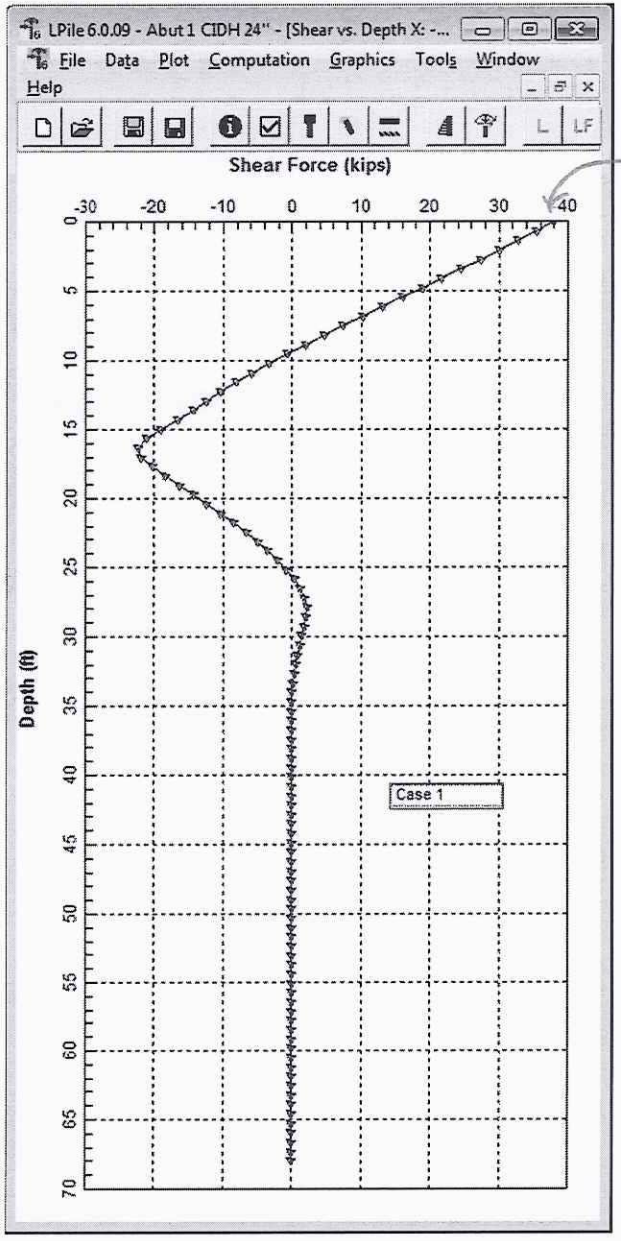
Pile Dia.: 4.00
No. of Piles: 18

Group Efficiency	X-Dir	Y-Dir
	0.560	0.65

~ 0.6

Pile No.	X	Y	Reduction Factors in X-dir	Reduction Factors in Y-dir
1	0.000	-6.000	0.586	0.622
2	12.000	-6.000	0.546	0.532
3	24.000	-6.000	0.546	0.530
4	36.000	-6.000	0.546	0.530
5	48.000	-6.000	0.546	0.530
6	60.000	-6.000	0.546	0.530
7	72.000	-6.000	0.546	0.530
8	84.000	-6.000	0.580	0.532
9	96.000	-6.000	0.866	0.622
10	0.000	6.000	0.586	0.866
11	12.000	6.000	0.546	0.805
12	24.000	6.000	0.546	0.805
13	36.000	6.000	0.546	0.805
14	48.000	6.000	0.546	0.805
15	60.000	6.000	0.546	0.805
16	72.000	6.000	0.546	0.805
17	84.000	6.000	0.580	0.805
18	96.000	6.000	0.866	0.866
19			0.450	0.611
20			0.697	0.657
21			0.324	0.389
22			0.324	0.389





Lateral solutions, Abut 1, 24" CIDH

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

(c) 1985-2010 by Ensoft, Inc.
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This program is licensed to:

Earth Mechanics
Earth Mechanics

Files Used for Analysis

Path to file locations: X:\Projects\2011\11-135 - PTG, I-5 HOV Widening - Segment 1\Reports\FR Bridge\Appendix C Analysis\Lateral\CIDH\
Name of input data file: Abut 1 CIDH 24''.lp6d
Name of output file: Abut 1 CIDH 24''.lp6o
Name of plot output file: Abut 1 CIDH 24''.lp6p
Name of runtime file: Abut 1 CIDH 24''.lp6r

Date and Time of Analysis

Date: September 19, 2012 Time: 17:08:34

Problem Title

I-5 HOV Seg 1, Bridge 55-0207

Job Number: 11-135

Client: Parsons

Engineer: MK

Description: Abut 1, 48'' dia CIDH

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multipliers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and
soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 68.00 ft

Depth of ground surface below top of pile = -4.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over
the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	24.0000000
2	68.000000	24.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	68.000 in
Top Width	=	24.000 in
Bottom Width	=	24.000 in
Top Area	=	452.000000 sq. in
Bottom Area	=	452.000000 sq. in
Moment of Inertia at Top	=	1.628E+04 in^4
Moment of Inertia at Bottom	=	1.628E+04 in^4
Elastic Modulus	=	3600000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees = 0.000 radians

Pile Batter Angle = 0.000 degrees = 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = -4.000 ft
Distance from top of pile to bottom of layer = 14.000 ft

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 14.000 ft
Distance from top of pile to bottom of layer = 39.000 ft

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 39.000 ft
Distance from top of pile to bottom of layer = 56.000 ft

Layer 4 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 56.000 ft
Distance from top of pile to bottom of layer = 80.000 ft

(Depth of lowest layer extends 12.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-4.00	120.00000
2	14.00	120.00000
3	14.00	120.00000
4	39.00	120.00000
5	39.00	60.00000
6	56.00	60.00000
7	56.00	65.00000
8	80.00	65.00000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Test Type	Test Prop.	Elas. Subgr. pci	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm
1	Soft Clay	--	--	--	-4.000	120.000	1000.000	--	--	--	0.01000	--	--	--
		--	--	--	14.000	120.000	1000.000	--	--	--	0.01000	--	--	--
2	Soft Clay	--	--	--	14.000	120.000	1800.000	--	--	--	0.01000	--	--	--
		--	--	--	39.000	120.000	1800.000	--	--	--	0.01000	--	--	--
3	Soft Clay	--	--	--	39.000	60.000	1800.000	--	--	--	0.01000	--	--	--
		--	--	--	56.000	60.000	1800.000	--	--	--	0.01000	--	--	--
4	Soft Clay	--	--	--	56.000	65.000	4000.000	--	--	--	0.00500	--	--	--
		--	--	--	80.000	65.000	4000.000	--	--	--	0.00500	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	0.000	0.8000	1.0000
2	79.000	0.8000	1.0000

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 38000.000 lbs	M = 0.000 in-lbs	0.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

---

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 38000.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 0.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.6719	2.933E-07	38000.	-0.005786	2.161E-10	5.863E+10	-310.1495	1883.3730	0.000
8.160	0.6247	299754.	35430.	-0.005765	220.8812	5.863E+10	-319.7083	4176.2945	0.000
16.320	0.5778	578221.	32787.	-0.005704	426.0759	5.863E+10	-328.0673	4633.1259	0.000
24.480	0.5316	834842.	30081.	-0.005605	615.1739	5.863E+10	-335.1867	5145.1994	0.000
32.640	0.4863	1069145.	27322.	-0.005473	787.8259	5.863E+10	-341.0283	5722.1266	0.000
40.800	0.4423	1280741.	24521.	-0.005309	943.7452	5.863E+10	-345.5557	6375.6099	0.000
48.960	0.3997	1469327.	21688.	-0.005118	1082.7098	5.863E+10	-348.7341	7120.0222	0.000
57.120	0.3587	1634693.	18835.	-0.004902	1204.5637	5.863E+10	-350.5297	7973.1831	0.000
65.280	0.3197	1776719.	15973.	-0.004665	1309.2187	5.863E+10	-350.9098	8957.4143	0.000
73.440	0.2826	1895379.	13114.	-0.004409	1396.6563	5.863E+10	-349.8421	10101.	0.000
81.600	0.2477	1990745.	10270.	-0.004139	1466.9288	5.863E+10	-347.2939	11440.	0.000
89.760	0.2151	2062985.	7452.6614	-0.003856	1520.1612	5.863E+10	-343.2318	13022.	0.000
97.920	0.1848	2112372.	4674.7854	-0.003566	1556.5529	5.863E+10	-337.6202	14910.	0.000
106.080	0.1569	2139278.	1949.1823	-0.003270	1576.3792	5.863E+10	-330.4198	17187.	0.000
114.240	0.1314	2144183.	-710.9964	-0.002972	1579.9934	5.863E+10	-321.5848	19969.	0.000
122.400	0.1084	2127675.	-3292.1847	-0.002675	1567.8289	5.863E+10	-311.0594	23420.	0.000
130.560	0.0878	2090454.	-5780.2935	-0.002381	1540.4023	5.863E+10	-298.7712	27779.	0.000
138.720	0.0695	2033340.	-8160.5334	-0.002094	1498.3163	5.863E+10	-284.6209	33408.	0.000
146.880	0.0536	1957274.	-10416.	-0.001816	1442.2654	5.863E+10	-268.2017	40841.	0.000
155.040	0.0399	1863350.	-12502.	-0.001550	1373.0551	5.863E+10	-243.0434	49734.	0.000
163.200	0.0283	1753243.	-14378.	-0.001299	1291.9198	5.863E+10	-216.7481	62533.	0.000
171.360	0.0187	1628703.	-16616.	-0.001063	1200.1497	5.863E+10	-331.7933	144928.	0.000
179.520	0.0109	1482071.	-19129.	-0.000847	1092.1002	5.863E+10	-284.1708	212175.	0.000
187.680	0.004860	1316517.	-21173.	-0.000652	970.1077	5.863E+10	-216.9031	364198.	0.000
195.840	0.000286	1136520.	-22363.	-0.000481	837.4728	5.863E+10	-74.6653	2130490.	0.000
204.000	-0.002997	951552.	-21914.	-0.000336	701.1744	5.863E+10	184.6169	502656.	0.000
212.160	-0.005199	778877.	-20256.	-0.000216	573.9343	5.863E+10	221.8347	348158.	0.000
220.320	-0.006517	620972.	-18375.	-0.000118	457.5786	5.863E+10	239.1841	299488.	0.000
228.480	-0.007129	478994.	-16394.	-4.171E-05	352.9585	5.863E+10	246.4541	282086.	0.000
236.640	-0.007198	353426.	-14379.	1.622E-05	260.4307	5.863E+10	247.2404	280299.	0.000
244.800	-0.006865	244321.	-12378.	5.782E-05	180.0339	5.863E+10	243.3678	289297.	0.000
252.960	-0.006254	151421.	-10422.	8.536E-05	111.5779	5.863E+10	235.9287	307834.	0.000
261.120	-0.005471	74230.	-8539.0354	0.000101	54.6978	5.863E+10	225.6485	336531.	0.000
269.280	-0.004605	12063.	-6749.1765	0.000107	8.8893	5.863E+10	213.0424	377547.	0.000
277.440	-0.003724	-35917.	-5070.1123	0.000105	26.4663	5.863E+10	198.4929	434941.	0.000
285.600	-0.002884	-70681.	-3516.5258	9.799E-05	52.0828	5.863E+10	182.2881	515733.	0.000
293.760	-0.002125	-93307.	-2101.0752	8.658E-05	68.7553	5.863E+10	164.6361	632293.	0.000
301.920	-0.001471	-104970.	-835.0857	7.278E-05	77.3499	5.863E+10	145.6555	807889.	0.000
310.080	-0.000937	-106935.	270.4916	5.804E-05	78.7979	5.863E+10	125.3194	1091499.	0.000
318.240	-0.000524	-100556.	1203.1056	4.360E-05	74.0971	5.863E+10	103.2625	1607934.	0.000
326.400	-0.000225	-87301.	1864.5291	3.052E-05	64.3296	5.863E+10	58.8511	2130490.	0.000
334.560	-2.593E-05	-70127.	2132.2582	1.957E-05	51.6746	5.863E+10	6.7688	2130490.	0.000
342.720	9.391E-05	-52502.	2059.8402	1.103E-05	38.6875	5.863E+10	-24.5183	2130490.	0.000
350.880	0.000154	-36510.	1795.6402	4.837E-06	26.9034	5.863E+10	-40.2366	2130490.	0.000
359.040	0.000173	-23197.	1447.3520	6.816E-07	17.0935	5.863E+10	-45.1282	2130490.	0.000
367.200	0.000165	-12889.	1087.2140	-1.830E-06	9.4979	5.863E+10	-43.1409	2130490.	0.000
375.360	0.000143	-5454.0097	758.8866	-3.106E-06	4.0189	5.863E+10	-37.3315	2130490.	0.000
383.520	0.000115	-504.3650	484.5628	-3.521E-06	0.3717	5.863E+10	-29.9047	2130490.	0.000
391.680	8.552E-05	2454.0556	271.4516	-3.385E-06	1.8083	5.863E+10	-22.3284	2130490.	0.000
399.840	5.929E-05	3925.7259	117.1942	-2.941E-06	2.8928	5.863E+10	-15.4798	2130490.	0.000
408.000	3.752E-05	4366.6643	14.0717	-2.364E-06	3.2177	5.863E+10	-9.7953	2130490.	0.000
416.160	2.070E-05	4155.3754	-47.9486	-1.771E-06	3.0620	5.863E+10	-5.4057	2130490.	0.000
424.320	8.611E-06	3584.1433	-79.1772	-1.233E-06	2.6411	5.863E+10	-2.2483	2130490.	0.000
432.480	5.891E-07	2863.2039	-88.9779	-7.839E-07	2.1098	5.863E+10	-0.1538	2130490.	0.000
440.640	-4.181E-06	2132.0238	-85.1513	-4.362E-07	1.5710	5.863E+10	1.0917	2130490.	0.000
448.800	-6.530E-06	1473.5352	-73.7408	-1.853E-07	1.0858	5.863E+10	1.7050	2130490.	0.000
456.960	-7.206E-06	928.5733	-59.1089	-1.814E-08	0.6842	5.863E+10	1.8813	2130490.	0.000
465.120	-6.826E-06	508.8782	-44.1616	8.190E-08	0.3750	5.863E+10	1.7822	2130490.	0.000
473.280	-5.869E-06	207.8552	-30.6383	1.318E-07	0.1532	5.863E+10	1.5323	2130490.	0.000
481.440	-4.676E-06	8.8617	-19.4059	1.469E-07	0.006530	5.863E+10	1.2207	2130490.	0.000
489.600	-3.472E-06	-108.8489	-10.7267	1.399E-07	0.0802	5.863E+10	0.9065	2130490.	0.000
497.760	-2.392E-06	-166.1982	-4.4798	1.208E-07	0.1225	5.863E+10	0.6246	2130490.	0.000
505.920	-1.501E-06	-181.9588	-0.3323	9.653E-08	0.1341	5.863E+10	0.3919	2130490.	0.000
514.080	-8.168E-07	-171.6215	2.1369	7.193E-08	0.1265	5.863E+10	0.2133	2130490.	0.000
522.240	-3.273E-07	-147.0841	3.3557	4.975E-08	0.1084	5.863E+10	0.0855	2130490.	0.000
530.400	-4.916E-09	-116.8562	3.7096	3.138E-08	0.0861	5.863E+10	0.001284	2130490.	0.000
538.560	1.848E-07	-86.5428	3.5180	1.722E-08	0.0638	5.863E+10	-0.0482	2130490.	0.000
546.720	2.762E-07	-59.4417	3.0270	7.064E-09	0.0438	5.863E+10	-0.0721	2130490.	0.000
554.880	3.001E-07	-37.1419	2.4132	3.429E-10	0.0274	5.863E+10	-0.0783	2130490.	0.000
563.040	2.818E-07	-20.0588	1.7934	-3.638E-09	0.0148	5.863E+10	-0.0736	2130490.	0.000
571.200	2.407E-07	-7.8744	1.2368	-5.582E-09	0.005802	5.863E+10	-0.0628	2130490.	0.000
579.360	1.907E-07	0.1256	0.7773	-6.121E-09	9.253E-05	5.863E+10	-0.0498	2130490.	0.000
587.520	1.408E-07	4.8106	0.4242	-5.778E-09	0.003545	5.863E+10	-0.0368	2130490.	0.000
595.680	9.639E-08	7.0478	0.1715	-4.952E-09	0.005193	5.863E+10	-0.0252	2130490.	0.000
603.840	5.998E-08	7.6094	0.004926	-3.932E-09	0.005607	5.863E+10	-0.0157	2130490.	0.000
612.000	3.221E-08	7.1282	-0.0933	-2.907E-09	0.005253	5.863E+10	-0.008410	2130490.	0.000
620.160	1.254E-08	6.0871	-0.1410	-1.987E-09	0.004485	5.863E+10	-0.003274	2130490.	0.000
628.320	-2.160E-10	4.8279	-0.1541	-1.227E-09	0.003558	5.863E+10	5.641E-05	2130490.	0.000
636.480	-7.490E-09	3.5724	-0.1459	-6.428E-10	0.002632	5.863E+10	0.001956	2130490.	0.000
644.640	-1.071E-08	2.4472	-0.1265	-2.238E-10	0.001803	5.863E+10	0.002795	2130490.	0.000
652.800	-1.114E-08	1.5081	-0.1032	5.142E-11	0.001111	5.863E+10	0.002909	2130490.	0.000
660.960	-9.867E-09	0.7628	-0.0808	2.095E-10	0.000562	5.863E+10	0.002576	2130490.	0.000
669.120	-7.725E-09	0.1889	-0.0621	2.757E-10	0.000139	5.863E+10	0.002017	2130490.	0.000
677.280	-5.368E-09	-0.2506	-0.0379	2.714E-10	0.000185	5.863E+10	0.003924	5964997.	0.000
685.440	-3.295E-09	-0.4289	-0.0120	2.241E-10	0.000316	5.863E+10	0.002409	5964997.	0.000
693.600	-1.710E-09	-0.4468	0.002911	1.632E-10	0.000329	5.863E+10	0.001250	5964997.	0.000
701.760	-6.325E-10	-0.3814	0.009899	1.055E-10	0.000281	5.863E+10	0.000462	5964997.	0.000
709.920	1.208E-11	-0.2852	0.0117	5.915E-11	0.000210	5.863E+10	-8.829E-06	5964997.	0.000
718.080	3.328E-10	-0.1896	0.0107	2.610E-11	0.000140	5.863E+10	-0.000243	5964997.	0.000
726.240	4.381E-10	-0.1102	0.008422	5.232E-12	8.124E-05	5.863E+10	-0.000320	5964997.	0.000
734.400	4.181E-10	-0.0522	0.005868	-6.072E-12	3.845E-05	5.863E+10	-0.000306	5964997.	0.000
742.560	3.390E-10	-0.0145	0.003610	-1.071E-11	1.067E-05	5.863E+10	-0.000248	5964997.	0.000
750.720	2.433E-10	0.006735	0.001874	-1.125E-11	4.963E-06	5.863E+10	-0.000178	5964997.	0.000
758.880	1.554E-10	0.0161	0.000684	-9.661E-12	1.186E-05	5.863E+10	-0.000114	5964997.	0.000
767.040	8.567E-11	0.0179	-3.438E-05	-7.294E-12	1.319E-05	5.863E+10	-6.263E-05	5964997.	0.000
775.200	3.632E-11	0.0155	-0.000398	-4.966E-12	1.145E-05	5.863E+10	-2.655E-05	5964997.	0.000
783.360	4.624E-12	0.0114	-0.000520	-3.091E-12	8.405E-06	5.863E+10	-3.380E-06	5964997.	0.000
791.520	-1.412E-11	0.007048	-0.000492	-1.806E-12	5.194E-06	5.863E+10	1.032E-05	5964997.	0.000
799.680	-2.486E-11	0.003377	-0.000376	-1.081E-12	2.488E-06	5.863E+10	1.817E-05	5964997.	0.000
807.840	-3.176E-11	0.000916	-0.000207	0.000	6.747E-07	5.863E+10	2.322E-05	5964997.	0.000

Page 3

816.000 -3.762E-11 0.000 0.000 0.000 0.000 5.863E+10 2.750E-05 2982498. 0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the
actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.6718850 inches
Computed slope at pile head	=	-0.0057858 radians
Maximum bending moment	=	2144183. inch-lbs
Maximum shear force	=	38000. lbs
Depth of maximum bending moment	=	114.2400000 inches below pile head
Depth of maximum shear force	=	0.000000 inches below pile head
Number of iterations	=	23
Number of zero deflection points	=	7

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

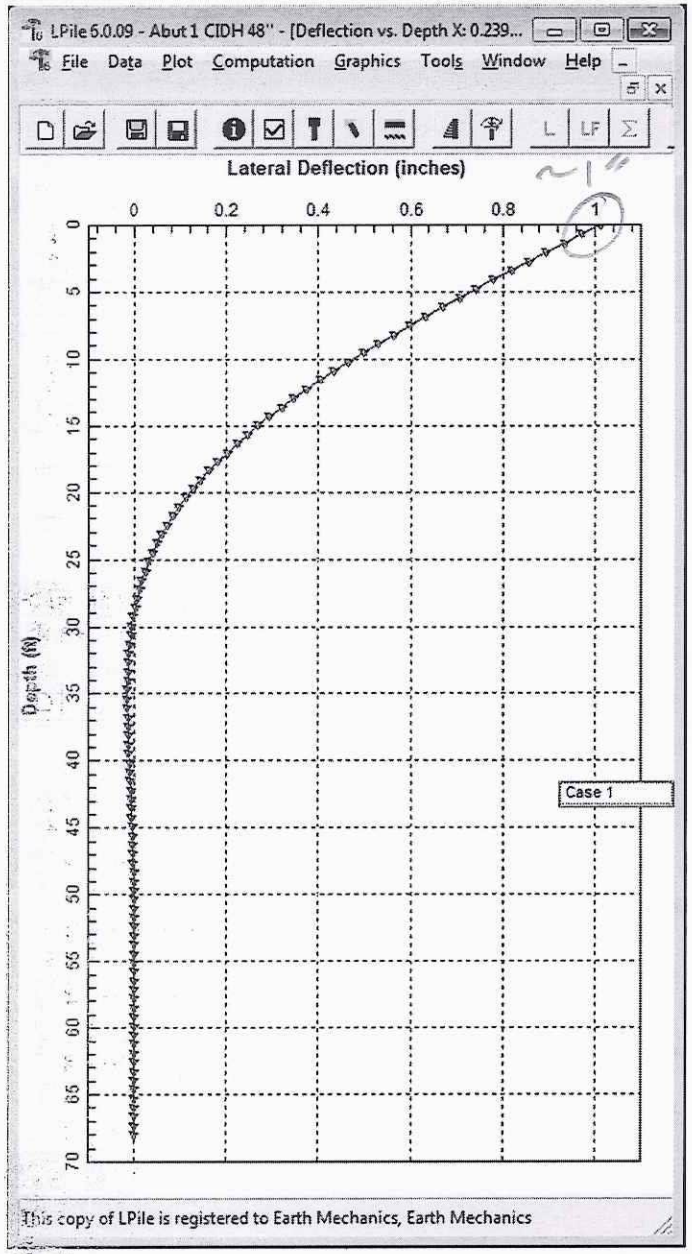
Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 38000.	M = 0.000	0.0000000	0.67188504	2144183.	38000.	0.00000000

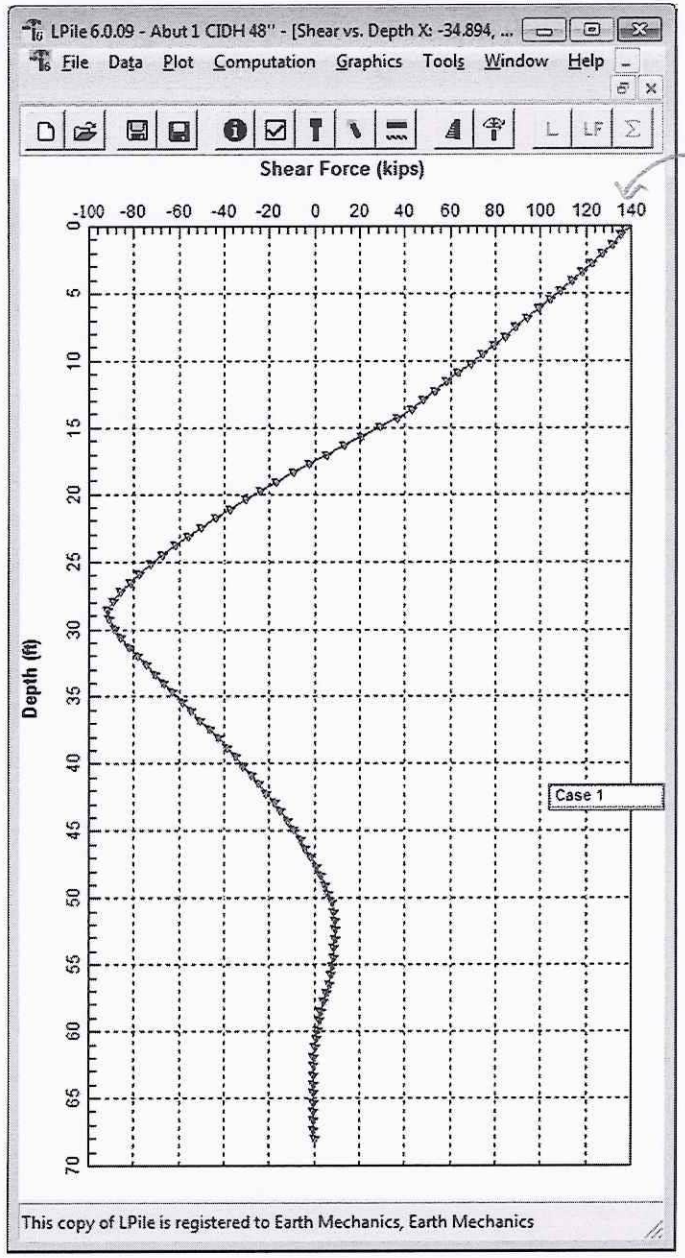
Summary of Warning Messages

The following warning was reported 1760 times

**** Warning ****

An unreasonable input value for shear strength has been specified for a soil
defined using the soft clay criteria. The input value is greater than 8.68
psi (1,250 psf). You should check your input data for correctness.





Lateral solutions, Abut 1, 48" CIDH

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This program is licensed to:

Earth Mechanics
Earth Mechanics

Files Used for Analysis

Path to file locations: X:\Projects\2011\11-135 - PTG, I-5 HOV Widening - Segment 1\Reports\FR Bridge\Appendix C Analysis\Electronic files for Sharid\Piles\Lateral\CIDH\
Name of input data file: Abut 1 CIDH 48''.lp6d
Name of output file: Abut 1 CIDH 48''.lp6o
Name of plot output file: Abut 1 CIDH 48''.lp6p
Name of runtime file: Abut 1 CIDH 48''.lp6r

Date and Time of Analysis

Date: September 19, 2012 Time: 17:43:04

Problem Title

I-5 HOV Seg 1, Bridge 55-0207

Job Number: 11-135

Client: Parsons

Engineer: MK

Description: Abut 1, 48'' dia CIDH

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multipliers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 68.00 ft

Depth of ground surface below top of pile = -4.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	48.0000000
2	68.000000	48.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	68.000 in
Top Width	=	48.000 in
Bottom Width	=	48.000 in
Top Area	=	1810.000000 sq. in
Bottom Area	=	1810.000000 sq. in
Moment of Inertia at Top	=	2.606E+05 in^4
Moment of Inertia at Bottom	=	2.606E+05 in^4
Elastic Modulus	=	3600000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees = 0.000 radians

Pile Batter Angle = 0.000 degrees = 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = -4.000 ft
Distance from top of pile to bottom of layer = 14.000 ft

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 14.000 ft
Distance from top of pile to bottom of layer = 39.000 ft

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 39.000 ft
Distance from top of pile to bottom of layer = 56.000 ft

Layer 4 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 56.000 ft
Distance from top of pile to bottom of layer = 80.000 ft

(Depth of lowest layer extends 12.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-4.00	120.00000
2	14.00	120.00000
3	14.00	120.00000
4	39.00	120.00000
5	39.00	60.00000
6	56.00	60.00000
7	56.00	65.00000
8	80.00	65.00000

Summary of Soil Properties

Layer Num.	Soil Type	Test Type (p-y Curve Criteria)	Test Prop. pci	Elas. Subgr.	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm
1	Soft Clay	--	--	--	-4.000	120.000	1000.000	--	--	--	0.01000	--	--	--
					14.000	120.000	1000.000	--	--	--	0.01000	--	--	--
2	Soft Clay	--	--	--	14.000	120.000	1800.000	--	--	--	0.01000	--	--	--
					39.000	120.000	1800.000	--	--	--	0.01000	--	--	--
3	Soft Clay	--	--	--	39.000	60.000	1800.000	--	--	--	0.01000	--	--	--
					56.000	60.000	1800.000	--	--	--	0.01000	--	--	--
4	Soft Clay	--	--	--	56.000	65.000	4000.000	--	--	--	0.00500	--	--	--
					80.000	65.000	4000.000	--	--	--	0.00500	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	0.000	0.8000	1.0000
2	79.000	0.8000	1.0000

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 140000.000 lbs	M = 0.000 in-lbs	0.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 140000.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 0.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	1.0128	4.379E-05	140000.	-0.004802	4.034E-09	9.380E+11	-501.5083	2020.2066	0.000
8.160	0.9737	1125703.	135850.	-0.004797	103.6846	9.380E+11	-515.6739	4321.7445	0.000
16.320	0.9346	2217070.	131587.	-0.004783	204.2065	9.380E+11	-529.1128	4619.9298	0.000
24.480	0.8956	3273206.	127218.	-0.004759	301.4835	9.380E+11	-541.8071	4936.5073	0.000
32.640	0.8569	4293265.	122748.	-0.004726	395.4375	9.380E+11	-553.7392	5273.1817	0.000
40.800	0.8185	5276453.	118184.	-0.004684	485.9955	9.380E+11	-564.8918	5631.8469	0.000
48.960	0.7804	6222027.	113532.	-0.004634	573.0890	9.380E+11	-575.2476	6014.6133	0.000
57.120	0.7428	7129299.	108799.	-0.004576	656.6546	9.380E+11	-584.7899	6423.8379	0.000
65.280	0.7058	7997631.	103992.	-0.004511	736.6336	9.380E+11	-593.5018	6862.1616	0.000
73.440	0.6692	8826445.	99117.	-0.004437	812.9727	9.380E+11	-601.3668	7332.5509	0.000
81.600	0.6333	9615217.	94181.	-0.004357	885.6237	9.380E+11	-608.3684	7838.3489	0.000
89.760	0.5981	10363480.	89192.	-0.004270	954.5436	9.380E+11	-614.4904	8383.3340	0.000
97.920	0.5636	11070826.	84156.	-0.004177	1019.6948	9.380E+11	-619.7165	8971.7914	0.000
106.080	0.5300	11736909.	79082.	-0.004078	1081.0453	9.380E+11	-624.0307	9608.5966	0.000
114.240	0.4971	12361440.	73976.	-0.003973	1138.5687	9.380E+11	-627.4167	10299.	0.000
122.400	0.4651	12944194.	68846.	-0.003863	1192.2441	9.380E+11	-629.8586	11050.	0.000
130.560	0.4341	13485009.	63700.	-0.003748	1242.0566	9.380E+11	-631.3404	11869.	0.000
138.720	0.4039	13983785.	58547.	-0.003628	1287.9972	9.380E+11	-631.8459	12764.	0.000
146.880	0.3748	14440490.	53393.	-0.003505	1330.0626	9.380E+11	-631.3593	13744.	0.000
155.040	0.3467	14855155.	48247.	-0.003377	1368.2560	9.380E+11	-629.8645	14823.	0.000
163.200	0.3197	15227880.	43118.	-0.003247	1402.5864	9.380E+11	-627.3456	16012.	0.000
171.360	0.2938	15558834.	36574.	-0.003113	1433.0693	9.380E+11	-976.4421	27123.	0.000
179.520	0.2689	15824770.	28644.	-0.002976	1457.5638	9.380E+11	-967.0976	29346.	0.000
187.680	0.2452	16026311.	20797.	-0.002838	1476.1270	9.380E+11	-956.2028	31823.	0.000
195.840	0.2226	16164183.	13046.	-0.002698	1488.8259	9.380E+11	-943.7317	34594.	0.000
204.000	0.2012	16239216.	5402.2368	-0.002557	1495.7370	9.380E+11	-929.6552	37710.	0.000
212.160	0.1809	16252348.	-2119.6310	-0.002415	1496.9464	9.380E+11	-913.9399	41231.	0.000
220.320	0.1617	16204624.	-9506.4178	-0.002274	1492.5508	9.380E+11	-896.5471	45230.	0.000
228.480	0.1438	16097203.	-16744.	-0.002134	1482.6566	9.380E+11	-877.4304	49803.	0.000
236.640	0.1269	15931358.	-23819.	-0.001994	1467.3812	9.380E+11	-856.5338	55067.	0.000
244.800	0.1112	15708480.	-30715.	-0.001857	1446.8527	9.380E+11	-833.7877	61177.	0.000
252.960	0.0966	15430083.	-37418.	-0.001721	1421.2106	9.380E+11	-809.1041	68332.	0.000
261.120	0.0831	15097813.	-43912.	-0.001589	1390.6063	9.380E+11	-782.3693	76805.	0.000
269.280	0.0707	14713447.	-50178.	-0.001459	1355.2037	9.380E+11	-753.4332	86966.	0.000
277.440	0.0593	14278914.	-56198.	-0.001333	1315.1804	9.380E+11	-722.0927	99343.	0.000
285.600	0.0489	13796300.	-61951.	-0.001211	1270.7285	9.380E+11	-688.0647	114717.	0.000
293.760	0.0396	13267870.	-67414.	-0.001093	1222.0568	9.380E+11	-650.9414	134291.	0.000
301.920	0.0311	12696097.	-72559.	-0.000980	1169.3928	9.380E+11	-610.1082	160050.	0.000
310.080	0.0236	12083700.	-77352.	-0.000872	1112.9870	9.380E+11	-564.5847	195551.	0.000
318.240	0.0169	11433710.	-81747.	-0.000770	1053.1187	9.380E+11	-512.6736	247977.	0.000
326.400	0.0110	10749583.	-85679.	-0.000674	990.1062	9.380E+11	-451.0392	334805.	0.000
334.560	0.005879	10035428.	-89017.	-0.000583	924.2274	9.380E+11	-366.9732	509387.	0.000
342.720	0.001477	9296828.	-91460.	-0.000499	856.2981	9.380E+11	-231.7714	1280714.	0.000
350.880	-0.002265	8542801.	-91317.	-0.000421	786.8473	9.380E+11	266.7356	960838.	0.000
359.040	-0.005401	7806534.	-88774.	-0.000350	719.0323	9.380E+11	356.5115	538641.	0.000
367.200	-0.007982	7094006.	-85663.	-0.000286	653.4039	9.380E+11	406.1432	415183.	0.000
375.360	-0.0101	6408521.	-82216.	-0.000227	590.2662	9.380E+11	438.7270	355857.	0.000
383.520	-0.0117	5752249.	-78544.	-0.000174	529.8193	9.380E+11	461.1674	322096.	0.000
391.680	-0.0129	5126684.	-74718.	-0.000127	472.2008	9.380E+11	476.6346	301547.	0.000
399.840	-0.0137	4532856.	-70786.	-8.455E-05	417.5054	9.380E+11	486.8985	288979.	0.000
408.000	-0.0143	3971448.	-66788.	-4.756E-05	365.7961	9.380E+11	493.0695	281798.	0.000
416.160	-0.0145	3442872.	-62753.	-1.531E-05	317.1108	9.380E+11	495.9013	278595.	0.000
424.320	-0.0145	2947316.	-58707.	1.248E-05	271.4669	9.380E+11	495.9350	278561.	0.000
432.480	-0.0143	2484781.	-54669.	3.611E-05	228.8645	9.380E+11	493.5762	281233.	0.000
440.640	-0.0139	2055112.	-50660.	5.586E-05	189.2891	9.380E+11	489.1396	286361.	0.000
448.800	-0.0134	1658013.	-46694.	7.201E-05	152.7137	9.380E+11	482.8758	293840.	0.000
456.960	-0.0128	1293066.	-42786.	8.484E-05	119.0997	9.380E+11	474.9893	303681.	0.000
465.120	-0.0120	959746.	-38948.	9.464E-05	88.3989	9.380E+11	465.6498	315986.	0.000
473.280	-0.0112	657433.	-35192.	0.000102	60.5538	9.380E+11	455.0004	330952.	0.000
481.440	-0.0104	385415.	-31527.	0.000106	35.4992	9.380E+11	443.1634	348868.	0.000
489.600	-0.009485	142906.	-27964.	0.000109	13.1626	9.380E+11	430.2444	370134.	0.000
497.760	-0.008595	-70955.	-24510.	0.000109	6.5354	9.380E+11	416.3353	395278.	0.000
505.920	-0.007709	-257094.	-21173.	0.000107	23.6800	9.380E+11	401.5164	424994.	0.000
514.080	-0.006842	-416498.	-17960.	0.000104	38.3622	9.380E+11	385.8578	460186.	0.000
522.240	-0.006004	-550209.	-14879.	0.000100	50.6778	9.380E+11	369.4206	502048.	0.000
530.400	-0.005206	-659322.	-11935.	9.500E-05	60.7279	9.380E+11	352.2571	552162.	0.000
538.560	-0.004454	-744980.	-9132.9042	8.889E-05	68.6175	9.380E+11	334.4105	612667.	0.000
546.720	-0.003755	-808371.	-6479.5812	8.214E-05	74.4562	9.380E+11	315.9138	686506.	0.000
554.880	-0.003113	-850727.	-3979.7592	7.492E-05	78.3575	9.380E+11	296.7877	777835.	0.000
563.040	-0.002532	-873321.	-1638.5581	6.742E-05	80.4385	9.380E+11	277.0361	892694.	0.000
571.200	-0.002013	-877468.	538.8351	5.981E-05	80.8205	9.380E+11	256.6387	1040224.	0.000
579.360	-0.001556	-864527.	2546.9098	5.223E-05	79.6286	9.380E+11	235.5365	1234951.	0.000
587.520	-0.001161	-835903.	4379.4050	4.483E-05	76.9921	9.380E+11	213.6045	1501543.	0.000
595.680	-0.000825	-793055.	6129.3590	3.775E-05	73.0455	9.380E+11	215.3058	2130490.	0.000
603.840	-0.000545	-735872.	7588.1173	3.110E-05	67.7785	9.380E+11	142.2330	2130490.	0.000
612.000	-0.000317	-669217.	8506.2444	2.499E-05	61.6392	9.380E+11	82.7981	2130490.	0.000
620.160	-0.000137	-597050.	8989.9857	1.948E-05	54.9921	9.380E+11	35.7659	2130490.	0.000
628.320	7.707E-07	-522501.	9135.0895	1.461E-05	48.1257	9.380E+11	-0.2012	2130490.	0.000
636.480	0.000101	-447965.	9026.2104	1.039E-05	41.2605	9.380E+11	-26.4848	2130490.	0.000
644.640	0.000170	-375193.	8736.7298	6.808E-06	34.5577	9.380E+11	-44.4663	2130490.	0.000
652.800	0.000213	-305382.	8328.8905	3.848E-06	28.1276	9.380E+11	-55.4943	2130490.	0.000
660.960	0.000233	-239265.	7854.1540	1.479E-06	22.0379	9.380E+11	-60.8627	2130490.	0.000
669.120	0.000237	-177202.	7353.7035	-3.323E-07	16.3214	9.380E+11	-61.7967	2130490.	0.000
677.280	0.000228	-119253.	6422.4962	-1.622E-06	10.9840	9.380E+11	-166.4404	5964997.	0.000
685.440	0.000210	-72387.	5116.4346	-2.455E-06	6.6673	9.380E+11	-153.6728	5964997.	0.000
693.600	0.000188	-35753.	3929.8815	-2.926E-06	3.2931	9.380E+11	-137.1491	5964997.	0.000
701.760	0.000162	-8251.0721	2885.7309	-3.117E-06	0.7600	9.380E+11	-118.7702	5964997.	0.000
709.920	0.000137	11342.	1993.2988	-3.104E-06	1.0447	9.380E+11	-99.9632	5964997.	0.000
718.080	0.000112	24280.	1251.9307	-2.949E-06	2.2363	9.380E+11	-81.7447	5964997.	0.000
726.240	8.863E-05	31774.	654.0851	-2.705E-06	2.9266	9.380E+11	-64.7861	5964997.	0.000
734.400	6.768E-05	34954.	187.8952	-2.415E-06	3.2195	9.380E+11	-49.4762	5964997.	0.000
742.560	4.922E-05	34840.	-160.7660	-2.111E-06	3.2090	9.380E+11	-35.9800	5964997.	0.000
750.720	3.323E-05	32331.	-406.6744	-1.819E-06	2.9779	9.380E+11	-24.2917	5964997.	0.000
758.880	1.954E-05	28203.	-564.0506	-1.556E-06	2.5977	9.380E+11	-14.2809	5964997.	0.000
767.040	7.844E-06	23125.	-645.7101	-1.332E-06	2.1300	9.380E+11	-5.7337	5964997.	0.000
775.200	-2.207E-06	17665.	-662.5197	-1.155E-06	1.6271	9.380E+11	1.6137	5964997.	0.000
783.360	-1.100E-05	12313.	-623.1149	-1.025E-06	1.1341	9.380E+11	8.0444	5964997.	0.000
791.520	-1.893E-05	7496.1074	-533.8424	-9.384E-07	0.6904	9.380E+11	13.8361	5964997.	0.000
799.680	-2.632E-05	3600.5972	-398.8960	-8.901E-07	0.3316	9.380E+11	19.2390	5964997.	0.000

807.840	-3.345E-05	986.1249	-220.6248	-8.701E-07	0.0908	9.380E+11	24.4549	5964997.	0.000
816.000	-4.052E-05	0.000	0.000	-8.659E-07	0.000	9.380E+11	29.6198	2982498.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = 1.0128438 inches
Computed slope at pile head = -0.0048022 radians
Maximum bending moment = 16252348. inch-lbs
Maximum shear force = 140000. lbs
Depth of maximum bending moment = 212.1600000 inches below pile head
Depth of maximum shear force = 0.000000 inches below pile head
Number of iterations = 25
Number of zero deflection points = 3

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 140000.	M = 0.000	0.0000000	1.01284378	16252348.	140000.	0.00000000

Summary of Warning Messages

The following warning was reported 1920 times

**** Warning ****

An unreasonable input value for shear strength has been specified for a soil
defined using the soft clay criteria. The input value is greater than 8.68
psi (1,250 psf). You should check your input data for correctness.

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

MEMORANDUM

DATE: Jan. 8, 2013 EMI Project No. 11-135

TO: Mr. M. Mohseni / Parsons

From: Mike Kapuskar, Lino Cheang / Earth Mechanics, Inc. (EMI)

Subject: Response to Caltrans Review Comments on Final Foundation Report for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96A1

Earth Mechanics, Inc. (EMI) submitted the subject structure foundation report, dated Dec. Oct. 21, 2012, to Caltrans for review and comments. Caltrans Office of Geotechnical Design South 1 (OGDS-1) has reviewed the report and provided comments in a memorandum dated December 28, 2012. A copy of this memorandum is provided in Attachment 1.

This following provides our responses to Caltrans OGDS-1 comments and amends the noted sections of the Final Structure Foundation Report (dated September 28, 2012). This document is an addendum to the Final Foundation Report and should be attached to the front of the Final Structure Foundation Report. For convenience, Caltrans comments are provided in italics followed by EMI responses.

1. *Title Sheet addressed to PARSONS: It refers to Caltrans OGDS-1 August 13, 2012 review comments. Include the date of the meeting where over the shoulder meeting was conducted and the name of the Caltrans oversight geo-professional. Revise "Reviewer" to "Oversight Geo-Professional where appropriate."*

   Comply. We will update the main paragraph of the letter as follows:

   "A Structure Foundation Report for the proposed bridge replacement, dated October 1, 2012, was submitted to Caltrans for review. The Caltrans Office of Geotechnical Design South 1 (OGDS-1) reviewed the report and provided comments in a memorandum dated August 13, 2012. EMI prepared responses to the OGDS-1 review comments, which were reviewed by the Caltrans Oversight Geo-Professional Dr. Sharid Amiri at the over-the-shoulder review meeting conducted at the EMI office on September 20, 2012 and January 9, 2013 with the EMI oversight engineers Lino Cheang and Mike Kapuskar."

2. *The EA on the bridge plans dated November 13th, 2012 does not match with the EA in the subject foundation report, reconcile.*

   Comply. Parsons has provided the correct EA number (12-0F96A1). We will update the cover pages as required.

3. *Revise Section 1.0 to also include a subsection for existing bridge information.*

   Existing bridge information is provided in Section 1.2, paragraph 3.

4. *Existing geotechnical information was reviewed and collected to prepare the subject report. Revise Section 1.2 of the subject report accordingly.*

   This task is listed in Section 1.1 first bullet and provided in Section 2.1 para 1.

5. *The site investigation must be site specific and stated as such in the report. Revise Section 1.1 of the subject report accordingly.*

   Comply. We will amend Section 1.1 bullet 2 as follows: "*Site-specific* field investigation consisting of drilling and logging exploratory borings and cone penetration test".

6. *Project description does not make any reference to the other bridge structures that are part of the subject project. Revise Section 1.2 accordingly.*

   There are no other bridges in Segment 1. The bridges in other segments are in different subsurface conditions and far away.

7. *Revise Section 1.0 to also include a table for "As-Built Foundation Data" with the relevant information.*

   Comply.

8. *Revise Section 2.0 to include subsections for existing information, supplemental field exploration. The latter to include subsections for soil borings and CPT soundings.*

   Comply. This changes formatting but not content. Break text into "Sections 2.1 Existing Information", and "2.2 Supplemental Investigation" with two subsections.

9. *Revise Section 2 to include survey conducted for each boring and CPT.*

   Section 2 para 2 is replaced as follows:

   "**2.2 Field Investigation**

   ~~A geotechnical field investigation was conducted in September and October 2011 for all proposed improvements for Segment 1.~~ To supplement existing subsurface information, a site-specific field investigation was conducted at the bridge site between September 26 and October 16, 2011. During this investigation, four soil borings and one cone penetration test (CPT) were conducted at the subject bridge site. Locations of the borings and the CPT are shown on the LOTB sheets provided in Appendix A. The locations and elevations were provided by the project surveyor based on California Coordinate System (CCS) 83 (1991.35) Zone 6 and vertical datum NAVD 1988. The borehole data is summarized in Table ~~1~~2."

10. *Revise Section 2.0 of the subject report to include a narrative as to how the hammer efficiency is assessed per Caltrans Guidelines.*

    Comply. We will add the following to the end of para 4: "The SPT hammer energy measurements for this drill rig were performed by SPT CAL under subcontract with 2R Drilling on April 14, 2011. The SPT hammer energy report is provided in Appendix D."

    The hammer report is provided in Attachment 2 of this response letter.

11. *Revise to include a Table for the laboratory tests performed with type of test, applicable test method (i.e. ASTM, CT designation) and purpose of the test.*

    Comply.

12. *Revise Section 4.0 to be titled subsurface conditions and to include subsections for subsurface conditions, groundwater conditions and a separate subsection (i.e. 4.3) for Idealized Soil Profile along with the Table 2 and the corresponding narrative.*

    Comply. All this information is contained in Section 3.5. Sections, tables and figures in entire report will be renumbered. This does not change the findings and recommendations.

13. *Insert the Idealized Soil Profile in the main report where appropriate.*

    Comply.

14. *Revise the Idealized Soil Profile to include station line.*

    Comply as part of Comment 13.

15. *Designate where the supports are located on the Idealized Soil Profile.*

    Comply as part of Comment 13.

16. *Revise the Table of Contents accordingly.*

    Comply as part of Comment 13.

17. *Was the CPT calibrated against the borings performed at the site? Explain and provide justification.*

    Yes. Section 2.1 para 3 and 5 state that CPT-11-115 was performed adjacent to the soil boring A-11-115 and calibrated against it. The LOTB 3 of 4 provided in Appendix A shows the CPT measurements next the boring for comparison. The stratigraphy consists of about 35 ft of fills (stiff to hard clayey and silty soils), terrace deposits medium (stiff to stiff clays and silts) down to about El. +36 feet, and sedimentary bedrock of Capistrano formation (stiff clay/stilt). The CPT soil behavior type is consistent with the soil boring.

    The CPT output data file with the estimated undrained shear strength using CPT correlations is provided in Appendix C. We found the correlated shear strength values are a bit higher than the undrained shear strength values obtained from unconsolidated-undrained triaxial tests. We selected the design strength parameters shown in Table 3 based on the results of the unconsolidated-undrained triaxial tests for a conservative design.

    Furthermore, the small-strain shear wave velocity (Vs30) measured by the seismic cone penetrometer used in the CPT was used to normalize the Vs30 values calculated using correlations with SPT blowcounts obtained from other soil borings drilled for this bridge.

18. *How was the cone factor Nk as it relates to the subject CPT investigation evaluated? Explain and provide justification.*

    The CPT data interpretation is included in Appendix A. It shows N_k values of 15 and 16 for all depths (0-81.65') except for a small interval (22.1-23.6') shows Nk of 30. These values are provided by the CPT professional based on CPT guidelines by Robertson et al. (2009) as well as their local database and experience. We do not have enough laboratory tests or CPT information to correlate local N_k values for all soil units at this site. A design N_k value of 15 was used in estimating the undrained shear strength values using CPT correlations.

19. *Explain why Nk values typically used for normally consolidated clay is used for the subject site where the soil is over-consolidated clay.*

    The consolidation tests indicated the deeper soils tend to be overconsolidated and the shallower soils tend to be slightly underconsolidated to normally consolidated. Also see response to Comment No. 18.

20. *Include the legend LOTB (Log of Test Boring) sheet in the subject report where appropriate.*

    The legend sheets are now 2010 Caltrans Standard Plan Sheet Nos. A10F and A10G and do not need to be included in the plan set anymore.

21. *Refer to the CPT data and calculate the bearing capacity and the consolidation settlement magnitude when spread footing is considered. Explain why spread footing cannot be considered based on the engineering calculation derived from the CPT.*

    Only one CPT sounding performed at one of four corners of the new bridge. The CPT sounding was used to estimate shear wave velocity and assess liquefaction potential. It was not used to evaluate bearing capacity or consolidation settlement. Due to the presence of compressible soils, ground settlement controls over soil bearing capacity. Spread footing settlement calculations were provided as part of our response to the first Caltrans review comments. Spread footings are not recommended to support the bridge due to very high settlement estimates caused by high footing pressure demands provided by the designer.

22. *Why CPT data was not used in part for evaluation of the design parameters?*

    We used CPT data for comparison. Section 3.5.1 states "The soil strength parameters were based on laboratory test results (direct shear, unconsolidated undrained, and pocket penetrometer), and interpretation of the CPT data (Robertson and Campanella, 1989). (…) The soil strengths correlated from CPT data were found to be slightly higher than laboratory-measured strengths." The correlated strengths correlated from CPT data are included in Appendix C.

23. *Compare the in-situ data interpreted by CPT with the laboratory tests values and come up with idealized strength parameters.*

    See response to Comment No. 22.

24. *Why idealized soil profile soil strength characterization in Table 2 is based only on the SPT, when CPT was also conducted to characterize the subsurface soil?*

    See response to Comment No. 22.

25. *Resubmit the structure calcs (pdf) for the entire bridge (current pdf electronic file is corrupted) and software input files corresponding to the seismic analyses of the abutments.*

    Comply. We will make a new CD and check the files.

26. *Revise the subject report to include Section 3.0 for only "Geology".*

    Comply. Sections, tables and figures will be renumbered in the entire report. This revision does not impact the geotechnical analyses and recommendations.

27. *Take out Seismicity from Section 3.0.*

    See response to Comment No. 26.

28. *Revise the subject report to include Section 5 as "Seismicity and Geo-Seismic Hazards" to have subsections 5-1 for "Seismic Study", 5-2 for "Ground Rupture", 5-3 for "Caltrans ARS Curve", 5-3-1 for "Development of Vs30", 5-3-2 for "Development of Caltrans ARS Curve", 5-4 for "Liquefaction", 5-5 for "Lateral Spread", 5-6 for "Seismic Settlement".*

    See response to Comment No. 26.

29. *Revise the subject report to include Section 6 for "Soil Corrosion".*

    See response to Comment No. 26.

30. *Revise the subject report to include Section 7 for "Scour".*

    See response to Comment No. 26.

31. *Revise the subject report to include Section 8.0 for "Foundation Recommendations".*

    See response to Comment No. 26.

32. *Resubmit the calcs in Appendix D. Some of the pages are not legible.*

    Comply.

We appreciate the opportunity to provide geotechnical services for this project. If you have any questions please call us.

Sincerely,

EARTH MECHANICS, INC.

Mike Kapuskar, GE
Senior Engineer

Lino Cheang, GE
Project Manager

MK/lcc/wd

Attachments

Attachment 1 – Caltrans Review Comments

Attachment 2 – The SPT Hammer Energy Report

ATTACHMENT 1

Caltrans Review Comments

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. JEFF DEFEVERE
Office of Special Funded Projects (OSFP)
Attention: Ms. LUQI YANG
Fax: (916) 227-8683

DATE: December 28, 2012

FILE: 12 ORA 05 3.39
District County Route Post mile

FDN REPORT BY: Earth Mechanics, Inc DATED: Oct. 01, 2012

Avenida Pico UC (Replace)
Structure Name

GENERAL PLAN DATED: Nov. 13, 2012 FDN PLAN DATED: Nov. 13, 2012

12-0F96B 55-0207
EA Number Bridge Number

Submittal (*Check One*): [ ] 1st [X] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled "Final Foundation Report for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-Ora-05, PM 3.39, Caltrans Project ID 1200020277, EA No 12-0F96B", prepared by Earth Mechanics, Inc, dated October 01, 2012.

We have the following comments:

1. Title Sheet addressed to PARSONS: It refers to Caltrans OGDS-1 August 13, 2012 review comments. Include the date of the meeting where over the shoulder meeting was conducted and the name of the Caltrans oversight geo-professional. Revise "Reviewer" to "Oversight Geo-Professional" where appropriate.
2. The EA on the bridge plans dated November 13th, 2012 does not match with the EA in the subject foundation report, reconcile.
3. Revise Section 1.0 to also include a subsection for existing bridge information.
4. Existing geotechnical information was reviewed and collected to prepare the subject report. Revise Section 1.2 of the subject report accordingly.
5. The site investigation must be site specific and stated as such in the report. Revise Section 1.1 of the subject report accordingly.
6. Project description does not make any reference to the other bridge structures that are part of the subject project. Revise Section 1.2 accordingly.
7. Revise Section 1.0 to also include a table for "As-Built Foundation Data" with the relevant information.
8. Revise Section 2.0 to include subsections for existing information, supplemental field exploration. The latter to include subsections for soil borings and CPT soundings.
9. Revise Section 2 to include survey conducted for each boring and CPT.
10. Revise Section 2.0 of the subject report to include a narrative as to how the hammer efficiency is assessed per Caltrans Guidelines.
11. Revise to include a Table for the laboratory tests performed with type of test, applicable test method (i.e. ASTM, CT designation) and purpose of the test.
12. Revise Section 4.0 to be titled subsurface conditions and to include subsections for subsurface conditions, groundwater conditions and a separate subsection (i.e. 4.3) for Idealized Soil Profile along with the Table 2 and the corresponding narrative.

13. Insert the Idealized Soil Profile in the main report where appropriate.
14. Revise the Idealized Soil Profile to include station line.
15. Designate where the supports are located on the Idealized Soil Profile.
16. Revise the Table of Contents accordingly.
17. Was the CPT calibrated against the borings performed at the site? Explain and provide justification.
18. How was the cone factor Nk as it relates to the subject CPT investigation evaluated? Explain and provide justification.
19. Explain why Nk values typically used for normally consolidated clay is used for the subject site where the soil is over-consolidated clay.
20. Include the legend LOTB (Log of Test Boring) sheet in the subject report where appropriate.
21. Refer to the CPT data and calculate the bearing capacity and the consolidation settlement magnitude when spread footing is considered. Explain why spread footing cannot be considered based on the engineering calculation derived from the CPT.
22. Why CPT data was not used in part for evaluation of the design parameters?
23. Compare the in-situ data interpreted by CPT with the laboratory tests values and come up with idealized strength parameters.
24. Why idealized soil profile soil strength characterization in Table 2 is based only on the SPT, when CPT was also conducted to characterize the subsurface soil?
25. Resubmit the structure calcs (pdf) for the entire bridge (current pdf electronic file is corrupted) and software input files corresponding to the seismic analysis of the abutments.
26. Revise the subject report to include Section 3.0 for only "Geology".
27. Take out Seismicity from Section 3.0.
28. Revise the subject report to include Section 5 as "Seismicity and Geo-Seismic Hazards" to have subsections 5-1 for "Seismic Study", 5-2 for "Ground Rupture", 5-3 for "Caltrans ARS Curve", 5-3-1 for "Development of Vs30", 5-3-2 for "Development of Caltrans ARS Curve", 5-4 for "Liquefaction", 5-5 for "Lateral Spread", 5-6 for "Seismic Settlement".
29. Revise the subject report to include Section 6 for "Soil Corrosion".
30. Revise the subject report to include Section 7 for "Scour".
31. Revise the subject report to include Section 8.0 for "Foundation Recommendations"
32. Resubmit the calcs in Appendix D. Some of the pages are not legible.

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, PhD, P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

ATTACHMENT 2

SPT Hammer Energy Report

SPT Hammer Energy Measurements

Hammer Calibration done on:
April 14, 2011
in Los Angeles, CA

CME 75LC Drill – 2R #7
Operator: Jeff Callaway

Prepared for:

2R Drilling Inc.
3968 Chino Ave.
Chino, CA 91710
909.465.1765

Prepared by:

Brian Serl
Calibration Engineer

SPT CAL
6979 Canosa Place
Rancho Cucamonga, CA 91701
bc@sptcal.com
http://www.sptcal.com
909.730.2161

TABLE OF CONTENTS

1 INTRODUCTION

2 FIELD EQUIPMENT & PROCEDURES

3 INSTRUMENTATION

4 OBSERVATIONS

5 RESULTS

TABLE 1

REFERENCES

Presentation of SPT Analyzer Test Data

1. Introduction

This report presents the results of SPT Hammer Energy Measurements recorded with an SPT Analyzer from Pile Dynamics carried out on April 14, 2011 in Los Angeles, CA.

2. Field Equipment and Procedures

The CME 75LC drill is known as 2R #7. The operator of this drill and attached hydraulic CME automatic trip hammer was Jeff Callaway of 2R Drilling Inc.

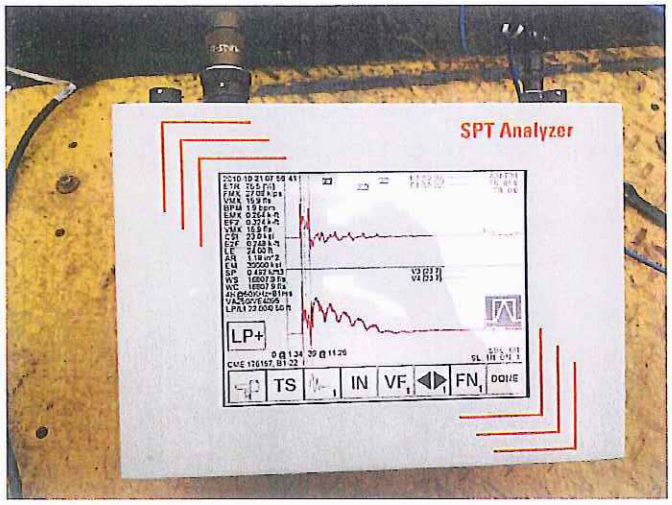
The CME Auto Hammer uses a 140 lb. weight and is dropped approximately 30" on to an anvil above the bore hole. AWJ drill rod connects the anvil to a split spoon type soil sampler inside an 8" o.d. hollow stem auger at the designated sample depth. After the sampler is lowered to the designated sample depth it is driven into the subsurface 18". The number of blows required to penetrate the last 12" is referred to as the "N value", which is related to soil strength.

The first sample that was recorded for this report was taken at 30' below ground surface and then every 5' to the final sample depth of 50'. We performed measurements conforming to ASTM D4633-05 which states that;

- Perform measurements for at least 3 depths of quality data, with 5 depths preferred
- Tests should be limited to moderate N-values ranges between 5 and 50
- Energy evaluation of the hammer system is more reliable when the length (LE) is (30 ft to 40 ft) or more

3. Instrumentation

An SPT Analyzer from Pile Dynamics was used to record and the process the data. The raw data was stored directly in the SPT Analyzer computer with subsequent analysis in the office with PDA-W and PDIPlot software. The measurements and analysis were conducted in general accordance with ASTM D4945 and ASTM D6066 test standards.



The SPT Analyzer is fully compliant with the minimum digital sampling frequency requirements of ASTM D4633-05 (50 kHz) and EN ISO 22476-3:2005 (100 kHz), as well as with the low pass filter, (cutoff frequency of 5000 Hz instead of 3000 Hz) requirements of ASTM D4633-05. All equipment and analysis also conform to ASTM D6066.

A 2' instrumented section of AWJ rod, with two sets of accelerometers and strain transducers mounted on opposite sides of the drill rod, was placed below the anvil. It measured strain and acceleration of every hammer blow. The SPT Analyzer then calculates the amount of energy transferred to the rod by force and velocity measurements.

4. Observations

The drill rig motor was operating around 1400 rpms during each sample interval. The motor is diesel fueled. The throttle control is electronic and digitally modulated. The rpms did not wander or adjust and that is reflected in the consistent 52 blows per minute at each sample interval. The drill and sample equipment looked to be well maintained and operated. The operator, Jeff Callaway, has used this type of drill and autohammer since 2001.

5. Results

Results from the SPT Hammer Energy Measurements are summarized in Table 1. It shows the Energy Transfer Ratio (ETR) at each sampling depth. ETR is the ratio of the measured maximum transferred energy to rated energy of the hammer which is the product of the weight of the hammer times the height of the fall. 140 lb x 30" = 4200 lb-in = 0.350 kip-ft.

The ETR for all of the blow counts measured averaged 82%

Table 1 – Summary of SPT Hammer Energy Measurements

Sample Depth	Average SPT Hammer Efficiency (ETR)
30'	79%
35'	81%
40'	84%
45'	83%
50'	83%
Average	**82%**

Please call or email me with any questions or if you need additional information.

Brian Serl
909-730-2161
bc@sptcal.com

References

- *Stress Wave Methods in Civil Engineering*. Proceedings of The Fifth Highway Geophysics - NDE Conference: Charlotte, NC; 472-480.
- Abou-matar, H., Goble, G. G., October, 1997. *SPT Dynamic Analysis and Measurements*. Journal of Geotechnical and Geoenvironmental Engineering. ASCE. October 1997: Reston, VA; 921-926.
- Rausche, F., Thendean, G., Abou-matar, H., Likins, G. E., Goble, G. G., September, 1995.*Robinson, B., Webster, S., Alvarez, C., December, 2008.* . PDA Users Day: Cleveland, OH.
- Batchelor, C., Goble, G. G., Berger, J. A., Miner, R., May, 1995. *Standard Penetration Test Energy Measurements on the Seattle ASCE Field Testing Program*. Seminar In Situ Testing for Seismic Evaluation: University of Washington.
- Goble, G. G., Abou-matar, H., September, 1992. *Determination of wave equation soil constants from the standard penetration test*. Proceedings of the Fourth International Conference on the Application of Stress-Wave Theory to Piles: The Netherlands; 99-103.
- Morgano, C.M., Liang, R., September, 1992. *Energy transfer in SPT - Rod length effect*. Proceedings of the Fourth International Conference on the Application of Stress-Wave Theory to Piles: The Netherlands; 121-127.

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

MEMORANDUM

DATE: Sept. 21, 2012 EMI Project No. 11-135

TO: Mr. M. Mohseni / Parsons

From: Mike Kapuskar, Lino Cheang / Earth Mechanics, Inc. (EMI)

Subject: Response to Caltrans Review Comments on Foundation Report for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277, EA 12-0F96B

We have received review comments from Caltrans Office of Geotechnical Design South-1 on the subject Foundation Report in a memorandum dated August 13, 2012, and discussed with the reviewer. The comments are attached. Below are our responses:

1. We will comply.
2. We evaluated the spread footing foundation type and found it to be unsuitable due to excessive settlements. We also evaluated the drilled pile type and found it to be unsuitable due to insufficient lateral resistance because this pile type cannot be battered. Calculations for controlling locations are attached.
3. Per Table 10.4.2-1 of AASHTO 2010, the 20-ft guideline applies to piles in soil. The table gives a 10-ft guideline for piles driven into rock to check for boulder obstructions. Boulders are not expected to be encountered in the bedrock formation at this site. The specified pile tips are 14-18 ft above borehole tip at Abutment 2, and 7-11 ft above borehole tip at Abutment 1.
4. The piles need to be driven into the bedrock to obtain the required nominal resistances. The bedrock contact elevation is different between Abutments 1 and 2 because the contact dips from north-west to south-east. Abutment-1 piles are anticipated to penetrate 14-18 ft into bedrock, and pile driveability should not become a problem. Abutment-2 piles are anticipated to penetrate 28-32 ft into bedrock. Driving resistance will increase as piles achieve deeper penetrations into bedrock. Hard driving is anticipated which means the production rate will be slower than normal. However, the abutment piles are heavy HP14x117 sections and an experienced pile driving contractor should be able to mobilize a pile driving hammer with sufficient energy to drive them down to specified tip elevation. A worst-case scenario would be to cut off the piles above the specified tip elevation which is relatively straight-forward. We will add the following in the final foundation report: "Abutment piles are anticipated to penetrate a maximum of about 40 ft into bedrock materials. Hard to very hard driving conditions is anticipated above the specified pile tip elevations, and production rate will be slow. Contractors should review the LOTB sheets and follow the requirements in the Caltrans Standard Specification (2010) in selecting the pile driving equipment."

Attachment A – Caltrans Review Comments
Attachment B – Backup Calculations for Comment 2
Attachment C – ARS Calculations

ATTACHMENT A

Caltrans Review Comments

DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

TO: MR. JEFF DEFEVERE
Office of Special Funded Projects (OSFP)
Attention: Ms. LUQI YANG
Fax: (916) 227-8683

DATE: August 13, 2012

FILE: 12 ORA 05 3.39
District County Route Post mile

FDN REPORT BY: Earth Mechanics, Inc DATED: May 29, 2012

Avenida Pico UC (Replace)
Structure Name

GENERAL PLAN DATED: May 29, 2012 FDN PLAN DATED: May 29, 2012

12-0F96B 55-0207
EA Number Bridge Number

Submittal (*Check One*): [x] 1st [ ] 2nd [ ] 3rd [ ] 4th [ ] Other:

The Office of Geotechnical Design South 1 (OGDS-1) has reviewed the submittal titled "Foundation Report for Avenida Pico UC (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-Ora-05, PM 3.39, Caltrans Project ID 1200020277, EA No 12-0F96B", prepared by Earth Mechanics, Inc, dated May 29, 2012.

We have the following comments:

1. Provide all input software files and actual spread sheets (not PDF) in a CD for our review.
2. Justify why spread footing and/or CIDH are not selected as foundation of choice. Provide supporting documentation and engineering calculation.
3. Explain why the borings are not drilled to the required depth per Caltrans LRFD guidelines.
4. Why are you proposing driving piles into the bedrock, given the high blow count material at the site and potential drivability problems?

Please call Sharid Amiri at (949)724-2599, if you have any questions.

Approval:

Reviewed By: Sharid Amiri, PhD, P.E.
Geotechnical Design South-1

(C3) Not Approved
Office of Special Funded projects

Cc: OGDS (Sacramento) DES Office of Specifications and Estimates (All Reviews) OSC R.E Pending File

ATTACHMENT B

Backup Calculations for Comment 2

	PRELIMINARY FOUNDATION DESIGN DATA SHEET			
	Support No.	**Foundations Types Considered**	**Maximum Compression Load (kips)**	**Maximum Lateral Load (kips)**
Stage 1 Construction	**Abutment 1**	HP 14x89 Steel Piles Spread Footing 24" CIDH Piles 48" CIDH Piles	184 kips (84 piles) 8.5 ksf (20' wide footing) 198 kips (72 piles) 760 kips (18 piles)	32 kips (w/ Battered Piles) N/A 38 kips 150 kips
	Abutment 2	HP 14x89 Steel Piles Spread Footing 24" CIDH Piles 48" CIDH Piles	197 kips (84 piles) 9.0 ksf (22' wide footing) 237 kips (72 piles) 900 kips (18 piles)	40 kips (w/ Battered Piles) N/A 38 kips 186 kips
Stage 2 Construction	**Abutment 1**	HP 14x89 Steel Piles Spread Footing 24" CIDH Piles 48" CIDH Piles	169 kips (56 piles) 8.5 ksf (20' wide footing) 199 kips (44 piles) 700 kips (12 piles)	30 kips (w/ Battered Piles) N/A 47 kips 140 kips
	Abutment 2	HP 14x89 Steel Piles Spread Footing 24" CIDH Piles 48" CIDH Piles	179 kips (56 piles) 9.0 ksf (22' wide footing) 236 kips (44 piles) 830 kips (12 piles)	37 kips (w/ Battered Piles) N/A 48 kips 174 kips

from Parsons

Project I-5 HOV SEG. 1 (BACKUP FOR CT COMMENT #2)
BRIDGE #C Project No. 11-1.35

By MK Date 9/18/12 Checked By KC Date 9/19/12 Sheet 1 of 3

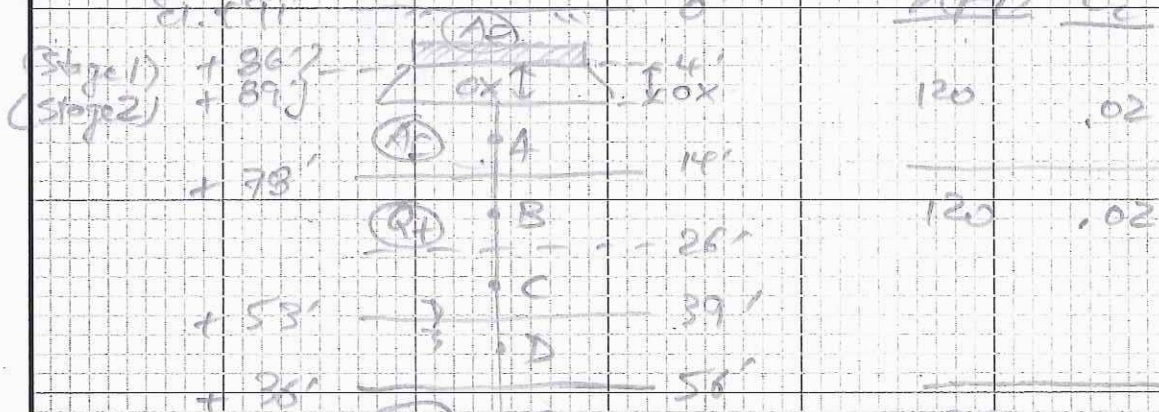
SPREAD FTG. FEASIBILITY RE-EVALUATION

1) FTG. DATA @ ABUTS

ABUT	STAGE	FTG. SIZE	BRG. PRESS.
1	1	103.5' x 20'	8.5 ksf
	2	65.5' x 22'	9.0 ksf ← governs
2	1	103.5' x 20'	8.5 ksf
	2	65.5' x 22'	9.0 ksf

2) CONFIG.

DESIGN DEPTH FOR ABUT #1 STAGE 2



	ϕ' (DEG)	C'
	120	.02
	120	.02
	123	.01

3) SETTLEMENT CALC (SEE ATTACHED)

	0X	S
TRY	10'	3.3" ... EXCESSIVE

SETTLEMENT CALCULATION FOR SERVICE CASE

Project Title: 11-135/I-5 HOV Seg 1
Abut 1, with 10' OX
By: M. Kapuskar, 9/18/12

applied pressure p_o: 9.00 ksf
applied at depth: 4 ft

USCS	Stress Point	Depth (ft)	Unit Weight (kcf)	C_c	ΔH (ft)	Layer middepth (ft)	σ'_v (ksf)	Depth below load (ft)	Δp (ksf)	δ (in)	$\Delta p/\sigma'_v$	δ (in)
OB		0.0	0.120	0	-	-	0.00	0.0	0.00	0.00	0%	0.00
OX		4.0	0.120	0.000	4.0	2.0	0.24	0.0	0.00	0.00	0%	0.00
Af	A	14.0	0.120	0.020	10.0	9.0	1.08	5.0	8.84	0.00	818%	0.00
Qt	B	26.0	0.120	0.020	12.0	20.0	2.40	16.0	6.01	1.57	251%	1.57
Qt	C	39.0	0.120	0.020	13.0	32.5	3.90	28.5	3.75	0.91	96%	0.91
Qt	D	56.0	0.060	0.020	17.0	47.5	5.70	43.5	2.23	0.59	39%	0.59
Tc2	E	68.0	0.065	0.010	12.0	62.0	7.08	58.0	1.51	0.24	21%	0.24
Tc2	F	100.0			32.0	84.0	8.48	80.0	1.11	0.20	13%	0.00
									δ_{tot}=	3.51	δ_{tot}=	3.31 "

Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

ELASTIC STRESS CALCULATION

Project Title: 11-135/I-5 HOV Seg 1
Abut 1, with 10' OX
By: M. Kapuskar, 9/18/12

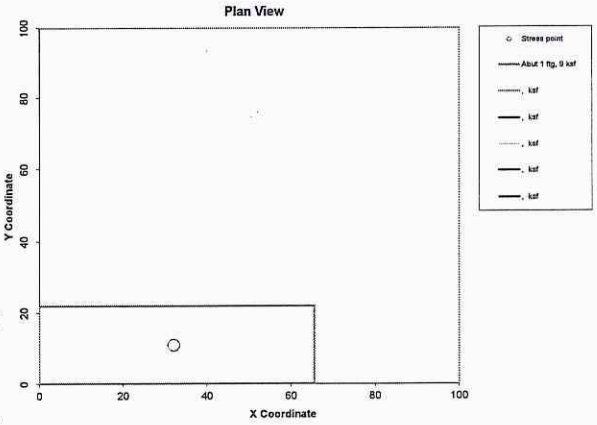
Notes:
1. This spreadsheet calculates 3D pressures in elastic (x,y,z) halfspace medium due to rectangular pressures on its surface using elastic 3D Boussinesq solutions (Poulos 19XX).
2. Input is in yellow cells. All worksheets can be edited freely. Save as Macro-Enabled file (*.xlsm).
3. PLAN shows the horizontal plane of X and Y. X and Y may be negative. Z is depth (always positive). Plan shows a stress point and up to 6 rectangular surface pressures.
4. STRESS POINT is located anywhere on x-y plane, including inside and outside pressure rectangles. The coordinates may be negative. Stresses due to loads will superimposed at this location.
5. PRESSURE RECTANGLE is placed by its (small-x, small-y) corner. The coordinates may be anywhere on x-y plane, including negative.
   Length (always positive) is parallel to X. Width W (always positive) is parallel to Y axis.
   Pressure is vertical and uniform. It is positive in Z (downward) and may be negative (upward).
   Loads may be superimposed and overlapped.
6. STRESS PROFILES are calculated at specified depths below stress point. Stresses are positive if pressure is positive, negative if pressure is negative. Stresses are 1/2 the input pressure under borders, and 1/4 under corners.

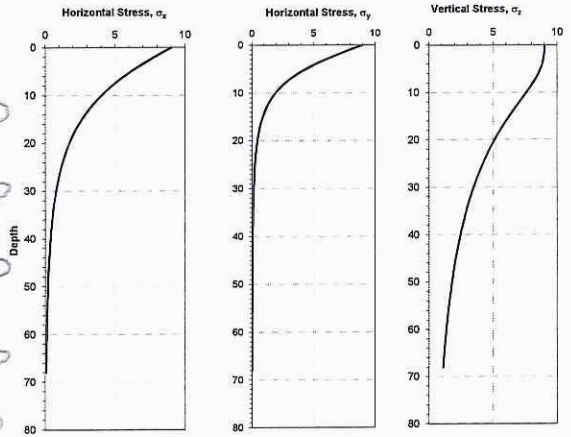
UNITS
length unit= ft
pressure unit= ksf

STRESS POINT LOCATION
X = 32 ft
Y = 11 ft

	Load No. 1	Load No. 2	Load No. 3	Load No. 4	Load No. 5	Load No. 6	Total
							All Loads Superimposed
Load name =	Abut 1 ftg						
Pressure, p =	9 ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	
Length along X =	65.5 ft	Length= ft	Length= ft	Length= ft	Length= ft	Length= ft	
Width along Y =	22 ft	Width= ft	Width= ft	Width= ft	Width= ft	Width= ft	
Lower left corner X =	0 ft	X = ft	X = ft	X = ft	X = ft	X = ft	
Lower left corner Y =	0 ft	Y = ft	Y = ft	Y = ft	Y = ft	Y = ft	

Depth	Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Total Stresses		
z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
0.00	9.00	9.00	9.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.00	9.00	**9.00**
0.10	8.94	8.90	9.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.94	8.90	**9.00**
0.20	8.88	8.79	9.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.88	8.79	**9.00**
0.50	8.70	8.48	9.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.70	8.48	**9.00**
1.00	8.40	7.96	9.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.40	7.96	**9.00**
2.00	7.80	6.96	8.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.80	6.96	**8.98**
4.00	6.67	5.16	8.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.67	5.16	**8.84**
6.00	5.65	3.72	8.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.65	3.72	**8.54**
8.00	4.77	2.66	8.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.77	2.66	**8.10**
10.00	4.01	1.91	7.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.01	1.91	**7.59**
12.00	3.38	1.38	7.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.38	1.38	**7.05**
14.00	2.85	1.02	6.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.85	1.02	**6.52**
16.00	2.41	0.76	6.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.41	0.76	**6.01**
18.00	2.04	0.58	5.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.04	0.58	**5.54**
20.00	1.73	0.44	5.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.73	0.44	**5.12**
22.00	1.47	0.35	4.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.47	0.35	**4.72**
24.00	1.25	0.27	4.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.25	0.27	**4.37**
26.00	1.07	0.22	4.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07	0.22	**4.04**
28.00	0.91	0.18	3.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.18	**3.75**
30.00	0.78	0.15	3.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.15	**3.48**
32.00	0.68	0.12	3.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.12	**3.24**
34.00	0.58	0.10	3.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	0.10	**3.02**
36.00	0.51	0.08	2.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.08	**2.81**
39.00	0.41	0.06	2.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.06	**2.54**
41.00	0.36	0.05	2.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.05	**2.38**
43.00	0.31	0.05	2.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.05	**2.23**
45.00	0.27	0.04	2.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.04	**2.09**
47.00	0.24	0.03	1.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.24	0.03	**1.97**
49.00	0.21	0.03	1.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.03	**1.85**
51.00	0.19	0.03	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.03	**1.75**
56.00	0.14	0.02	1.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.02	**1.51**
61.00	0.11	0.01	1.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.01	**1.32**
64.00	0.09	0.01	1.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.01	**1.22**
68.00	0.07	0.01	1.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.01	**1.11**





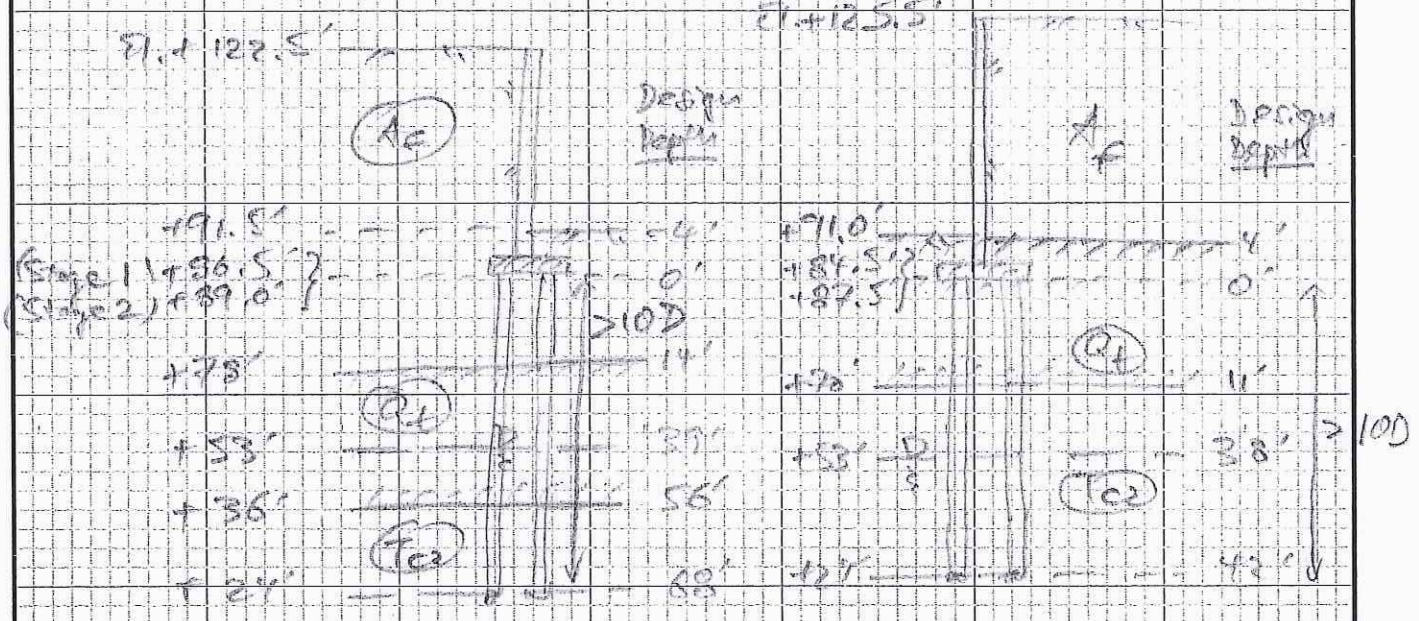
Project I-5 HOV SEG. 1 (BACKUP FOR CT COMMENT #2)
BRIDGE NC
Project No. 11-135

By MK. Date 8/15/12 Checked By LCC Date 9/19/12 Sheet 1 of 13

PILE DESIGN @ ABUTS

CIDH PILE TYPE

1) CONFIG.



2) PARAMETERS FOR LATERAL DESIGN

UNIT	SOIL TYPE	γ (pcf)	φ	c (psf)	ε50	
A_c	CLAY	120	32°/1,200		.01	
Q_t	SAND	120	0	1,300	.001	← controls
T_{c2}	HARD MH	125	0	4,000	.005	

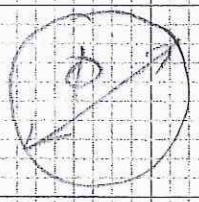
Project I-5 HOV SEG. 1
BRIDGE UC
Project No. 11-195

By MK Date 8/15/12 Checked By LC Date 9/19/12 Sheet 2 of 13

3) PILE DATA + LOAD DEMANDS

24"Ø CIDH 48"Ø

ABUT	STAGE	MAX. LOAD	MAX. LOAD
1	1	38 K @ 1/4"	150 K @ 1/4"
	2	47 K @ 1/4"	140 K @ 1/4"
2	1	38 K @ 1/4"	186 K @ 1/4"
	2	48 K @ 1/4"	174 K @ 1/4"



24"Ø

$I = \frac{\pi}{64}(24)^4 = 16,285\ in^4$, $A = 452\ in^2$

$f'_c = 4,000\ psi$

$E = 57,000\sqrt{4,000} = 3,605\ ksi$

$EI_c = \frac{1}{2}(3,605)(16,285) = 2.931E10\ lb\text{-}in^2$

48"Ø

$I = \frac{\pi}{64}(48)^4 = 260,563\ in^4$, $A = 1810\ in^2$

$EI_c = 4.687E11\ lb\text{-}in^2$

4) PILE MOMENTS

ABUT 1 WITH THICKER Q_L LAYER CONTROLS:
(USE A GROUP EFF. FACTOR = .8)

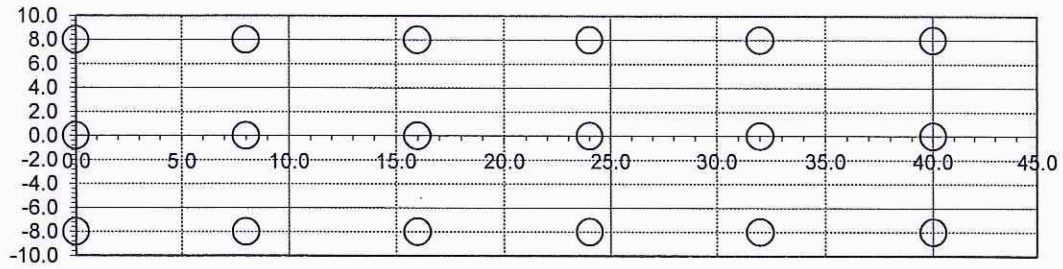
PILE Ø	SHEAR APPLIED	PILE HEAD DEFLECTION (CRACK)
24"	38 K	.67" > 1/4" N.G.
48"	140 K	1" > 1/4" N.G.

∴ CONCLUSION: 24"Ø AND 48"Ø CIDH DO NOT MEET LATERAL DEMANDS.

Project: I-5 HOV Seg 1, Bridge Avenida Pico UC
By: MK 8/15/2012

Calculation of Pile Group Efficiency (using formula in Group 7.0 Technical Manual)

Pile Configuration



24" ϕ PILE @ 4D SPACING

Pile Dia.: 2.00
No. of Piles: 18

Group Efficiency	X-Dir	Y-Dir
	0.780	0.84

~ .81

Pile No.	X	Y
1	0.000	-8.000
2	8.000	-8.000
3	16.000	-8.000
4	24.000	-8.000
5	32.000	-8.000
6	40.000	-8.000
7	0.000	0.000
8	8.000	0.000
9	16.000	0.000
10	24.000	0.000
11	32.000	0.000
12	40.000	0.000
13	0.000	8.000
14	8.000	8.000
15	16.000	8.000
16	24.000	8.000
17	32.000	8.000
18	40.000	8.000
19		
20		
21		
22		

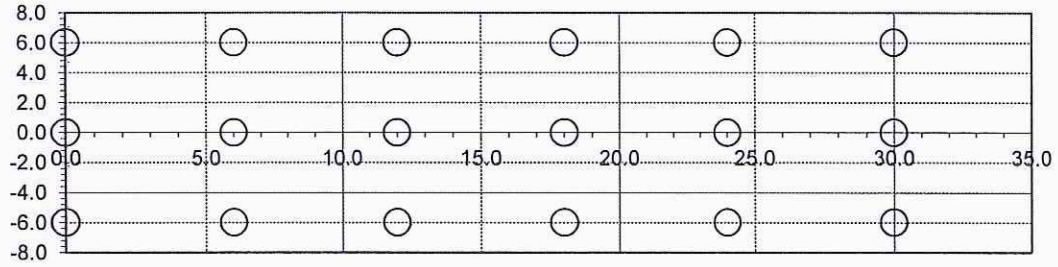
Reduction Factors in X-dir	Reduction Factors in Y-dir
0.784	0.784
0.784	0.756
0.784	0.756
0.784	0.756
0.784	0.756
1.000	0.784
0.756	0.784
0.756	0.756
0.756	0.756
0.756	0.756
0.756	0.756
1.000	0.784
0.784	1.000
0.784	1.000
0.784	1.000
0.784	1.000
0.784	1.000
1.000	1.000
0.546	0.805
0.546	0.805
0.580	0.805
0.866	0.866

36/13

Project: I-5 HOV Seg 1, Bridge Avenida Pico UC
By: MK 8/15/2012

Calculation of Pile Group Efficiency (using formula in Group 7.0 Technical Manual)

Pile Configuration



24" ø PILE @ 3D O.C. SPACING.

Pile Dia.: 2.00
No. of Piles: 18

Group Efficiency	X-Dir	Y-Dir
	0.590	0.66

~.63

Pile No.	X	Y
1	0.000	-6.000
2	6.000	-6.000
3	12.000	-6.000
4	18.000	-6.000
5	24.000	-6.000
6	30.000	-6.000
7	0.000	0.000
8	6.000	0.000
9	12.000	0.000
10	18.000	0.000
11	24.000	0.000
12	30.000	0.000
13	0.000	6.000
14	6.000	6.000
15	12.000	6.000
16	18.000	6.000
17	24.000	6.000
18	30.000	6.000
19		
20		
21		
22		

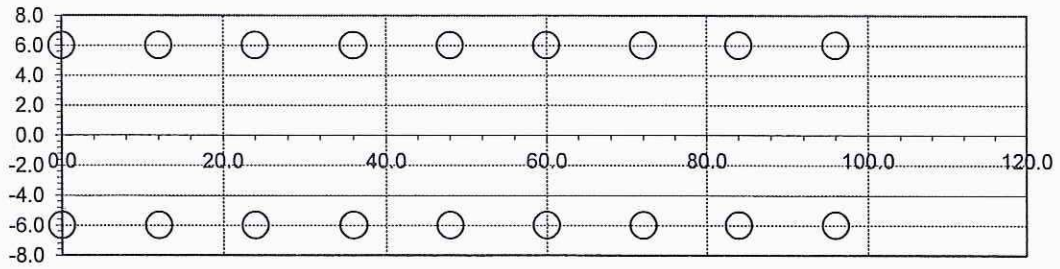
Reduction Factors in X-dir	Reduction Factors in Y-dir
0.585	0.585
0.544	0.496
0.544	0.494
0.544	0.494
0.579	0.496
0.866	0.585
0.497	0.579
0.463	0.495
0.463	0.494
0.463	0.494
0.496	0.495
0.805	0.579
0.585	0.866
0.544	0.805
0.544	0.805
0.544	0.805
0.579	0.805
0.866	0.866
0.546	0.805
0.546	0.805
0.580	0.805
0.866	0.866

3c/13

Project: I-5 HOV Seg 1, Bridge Avenida Pico UC
By: MK 8/15/2012

Calculation of Pile Group Efficiency (using formula in Group 7.0 Technical Manual)

Pile Configuration



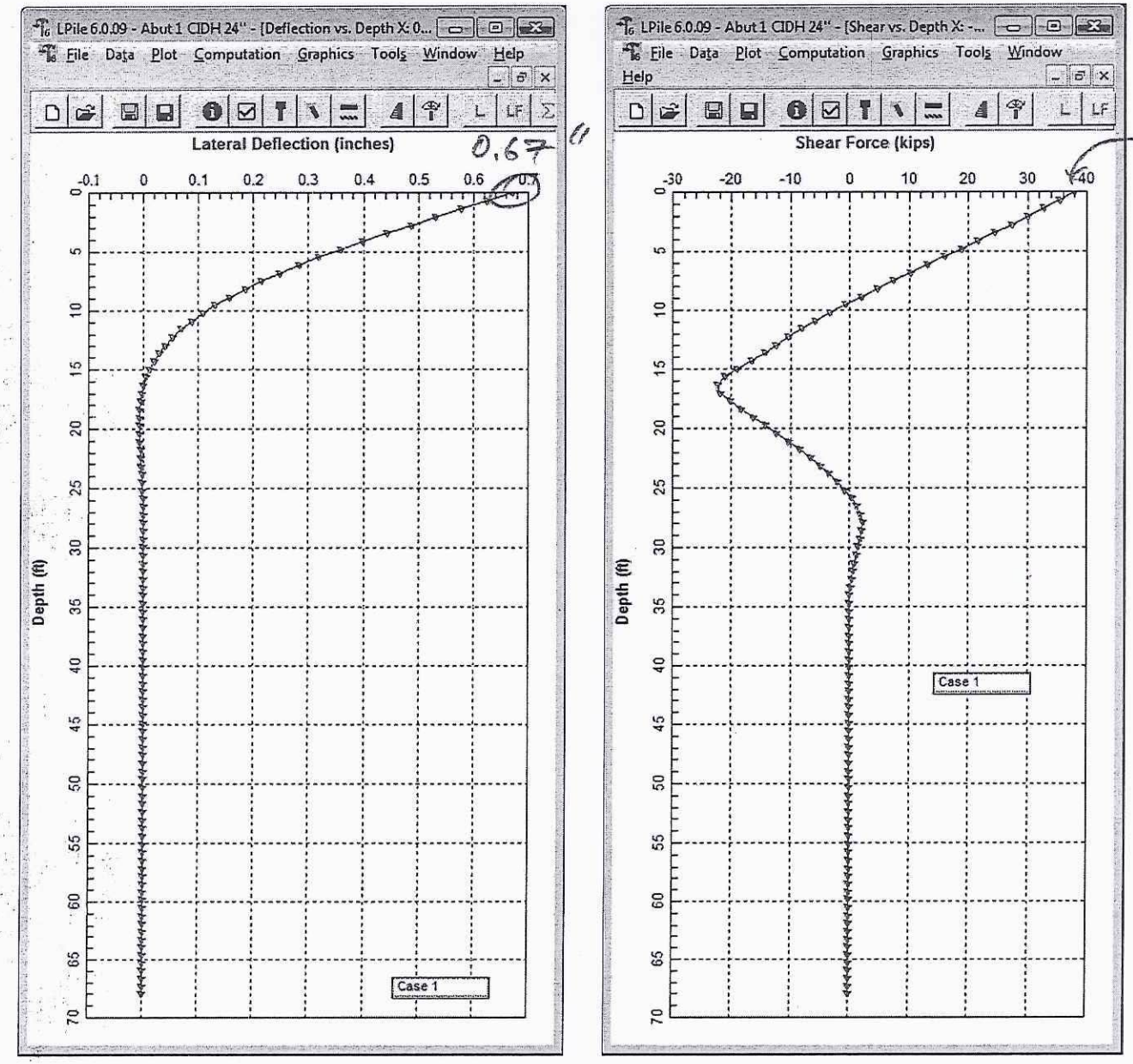
48" Ø PILE AT 3D O.C. SPACING.

Pile Dia.: 4.00
No. of Piles: 18

Group Efficiency	X-Dir	Y-Dir
	0.560	0.65

~ 0.6

Pile No.	X	Y	Reduction Factors in X-dir	Reduction Factors in Y-dir
1	0.000	-6.000	0.586	0.622
2	12.000	-6.000	0.546	0.532
3	24.000	-6.000	0.546	0.530
4	36.000	-6.000	0.546	0.530
5	48.000	-6.000	0.546	0.530
6	60.000	-6.000	0.546	0.530
7	72.000	-6.000	0.546	0.530
8	84.000	-6.000	0.580	0.532
9	96.000	-6.000	0.866	0.622
10	0.000	6.000	0.586	0.866
11	12.000	6.000	0.546	0.805
12	24.000	6.000	0.546	0.805
13	36.000	6.000	0.546	0.805
14	48.000	6.000	0.546	0.805
15	60.000	6.000	0.546	0.805
16	72.000	6.000	0.546	0.805
17	84.000	6.000	0.580	0.805
18	96.000	6.000	0.866	0.866
19			0.450	0.611
20			0.697	0.657
21			0.324	0.389
22			0.324	0.389



Lateral solutions, Abut 1, 24" CIDH

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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This program is licensed to:

Earth Mechanics
Earth Mechanics

Files Used for Analysis

Path to file locations: X:\Projects\2011\11-135 - PTG, I-5 HOV Widening - Segment 1\Reports\FR Bridge\Appendix C Analysis\Lateral\CIDH\
Name of input data file: Abut 1 CIDH 24''.lp6d
Name of output file: Abut 1 CIDH 24''.lp6o
Name of plot output file: Abut 1 CIDH 24''.lp6p
Name of runtime file: Abut 1 CIDH 24''.lp6r

Date and Time of Analysis

Date: September 19, 2012 Time: 17:08:34

Problem Title

I-5 HOV Seg 1, Bridge 55-0207

Job Number: 11-135

Client: Parsons

Engineer: MK

Description: Abut 1, 48'' dia CIDH

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multipliers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 68.00 ft

Depth of ground surface below top of pile = -4.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over
the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	24.0000000
2	68.000000	24.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	68.000 in
Top Width	=	24.000 in
Bottom Width	=	24.000 in
Top Area	=	452.000000 sq. in
Bottom Area	=	452.000000 sq. in
Moment of Inertia at Top	=	1.628E+04 in^4
Moment of Inertia at Bottom	=	1.628E+04 in^4
Elastic Modulus	=	3600000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees = 0.000 radians

Pile Batter Angle = 0.000 degrees = 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = -4.000 ft
Distance from top of pile to bottom of layer = 14.000 ft

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 14.000 ft
Distance from top of pile to bottom of layer = 39.000 ft

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 39.000 ft
Distance from top of pile to bottom of layer = 56.000 ft

Layer 4 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 56.000 ft
Distance from top of pile to bottom of layer = 80.000 ft

(Depth of lowest layer extends 12.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-4.00	120.00000
2	14.00	120.00000
3	14.00	120.00000
4	39.00	120.00000
5	39.00	60.00000
6	56.00	60.00000
7	56.00	65.00000
8	80.00	65.00000

Summary of Soil Properties

Layer Num.	Soil Type	Test Type (p-y Curve Criteria)	Test Prop.	Elas. Subgr. pci	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm
1	Soft Clay	--	--	--	-4.000	120.000	1000.000	--	--	--	0.01000	--	--	--
		--	--	--	14.000	120.000	1000.000	--	--	--	0.01000	--	--	--
2	Soft Clay	--	--	--	14.000	120.000	1800.000	--	--	--	0.01000	--	--	--
		--	--	--	39.000	120.000	1800.000	--	--	--	0.01000	--	--	--
3	Soft Clay	--	--	--	39.000	60.000	1800.000	--	--	--	0.01000	--	--	--
		--	--	--	56.000	60.000	1800.000	--	--	--	0.01000	--	--	--
4	Soft Clay	--	--	--	56.000	65.000	4000.000	--	--	--	0.00500	--	--	--
		--	--	--	80.000	65.000	4000.000	--	--	--	0.00500	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	0.000	0.8000	1.0000
2	79.000	0.8000	1.0000

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 38000.000 lbs	M = 0.000 in-lbs	0.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

---

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 38000.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 0.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.6719	2.933E-07	38000.	-0.005786	2.161E-10	5.863E+10	-310.1495	1883.3730	0.000
8.160	0.6247	299754.	35430.	-0.005765	220.8812	5.863E+10	-319.7083	4176.2945	0.000
16.320	0.5778	578221.	32787.	-0.005704	426.0759	5.863E+10	-328.0673	4633.1259	0.000
24.480	0.5316	834842.	30081.	-0.005605	615.1739	5.863E+10	-335.1867	5145.1994	0.000
32.640	0.4863	1069145.	27322.	-0.005473	787.8259	5.863E+10	-341.0283	5722.1266	0.000
40.800	0.4423	1280741.	24521.	-0.005309	943.7452	5.863E+10	-345.5557	6375.6099	0.000
48.960	0.3997	1469327.	21688.	-0.005118	1082.7098	5.863E+10	-348.7341	7120.0222	0.000
57.120	0.3587	1634693.	18835.	-0.004902	1204.5637	5.863E+10	-350.5297	7973.1831	0.000
65.280	0.3197	1776719.	15973.	-0.004665	1309.2187	5.863E+10	-350.9098	8957.4143	0.000
73.440	0.2826	1895379.	13114.	-0.004409	1396.6563	5.863E+10	-349.8421	10101.	0.000
81.600	0.2477	1990745.	10270.	-0.004139	1466.9288	5.863E+10	-347.2939	11440.	0.000
89.760	0.2151	2062985.	7452.6614	-0.003856	1520.1612	5.863E+10	-343.2318	13022.	0.000
97.920	0.1848	2112372.	4674.7854	-0.003566	1556.5529	5.863E+10	-337.6202	14910.	0.000
106.080	0.1569	2139278.	1949.1823	-0.003270	1576.3792	5.863E+10	-330.4198	17187.	0.000
114.240	0.1314	2144183.	-710.9964	-0.002972	1579.9934	5.863E+10	-321.5848	19969.	0.000
122.400	0.1084	2127675.	-3292.1847	-0.002675	1567.8289	5.863E+10	-311.0594	23420.	0.000
130.560	0.0878	2090454.	-5780.2935	-0.002381	1540.4023	5.863E+10	-298.7712	27779.	0.000
138.720	0.0695	2033340.	-8160.5334	-0.002094	1498.3163	5.863E+10	-284.6209	33408.	0.000
146.880	0.0536	1957274.	-10416.	-0.001816	1442.2654	5.863E+10	-268.2017	40841.	0.000
155.040	0.0399	1863350.	-12502.	-0.001550	1373.0551	5.863E+10	-243.0434	49734.	0.000
163.200	0.0283	1753243.	-14378.	-0.001299	1291.9198	5.863E+10	-216.7481	62533.	0.000
171.360	0.0187	1628703.	-16616.	-0.001063	1200.1497	5.863E+10	-331.7933	144928.	0.000
179.520	0.0109	1482071.	-19129.	-0.000847	1092.1002	5.863E+10	-284.1708	212175.	0.000
187.680	0.004860	1316517.	-21173.	-0.000652	970.1077	5.863E+10	-216.9031	364198.	0.000
195.840	0.000286	1136520.	-22363.	-0.000481	837.4728	5.863E+10	-74.6653	2130490.	0.000
204.000	-0.002997	951552.	-21914.	-0.000336	701.1744	5.863E+10	184.6169	502656.	0.000
212.160	-0.005199	778877.	-20256.	-0.000216	573.9343	5.863E+10	221.8347	348158.	0.000
220.320	-0.006517	620972.	-18375.	-0.000118	457.5786	5.863E+10	239.1841	299488.	0.000
228.480	-0.007129	478994.	-16394.	-4.171E-05	352.9585	5.863E+10	246.4541	282086.	0.000
236.640	-0.007198	353426.	-14379.	1.622E-05	260.4307	5.863E+10	247.2404	280299.	0.000
244.800	-0.006865	244321.	-12378.	5.782E-05	180.0339	5.863E+10	243.3678	289297.	0.000
252.960	-0.006254	151421.	-10422.	8.536E-05	111.5779	5.863E+10	235.9287	307834.	0.000
261.120	-0.005471	74230.	-8539.0354	0.000101	54.6978	5.863E+10	225.6485	336531.	0.000
269.280	-0.004605	12063.	-6749.1765	0.000107	8.8893	5.863E+10	213.0424	377547.	0.000
277.440	-0.003724	-35917.	-5070.1123	0.000105	26.4663	5.863E+10	198.4929	434941.	0.000
285.600	-0.002884	-70681.	-3516.5258	9.799E-05	52.0828	5.863E+10	182.2881	515733.	0.000
293.760	-0.002125	-93307.	-2101.0752	8.658E-05	68.7553	5.863E+10	164.6361	632293.	0.000
301.920	-0.001471	-104970.	-835.0857	7.278E-05	77.3499	5.863E+10	145.6555	807889.	0.000
310.080	-0.000937	-106935.	270.4916	5.804E-05	78.7979	5.863E+10	125.3194	1091499.	0.000
318.240	-0.000524	-100556.	1203.1056	4.360E-05	74.0971	5.863E+10	103.2625	1607934.	0.000
326.400	-0.000225	-87301.	1864.5291	3.052E-05	64.2296	5.863E+10	58.8511	2130490.	0.000
334.560	-2.593E-05	-70127.	2132.2582	1.957E-05	51.6746	5.863E+10	6.7688	2130490.	0.000
342.720	9.391E-05	-52502.	2059.8402	1.103E-05	38.6875	5.863E+10	-24.5183	2130490.	0.000
350.880	0.000154	-36510.	1795.6402	4.837E-06	26.9034	5.863E+10	-40.2366	2130490.	0.000
359.040	0.000173	-23197.	1447.3520	6.816E-07	17.0935	5.863E+10	-45.1282	2130490.	0.000
367.200	0.000165	-12889.	1087.2140	-1.830E-06	9.4979	5.863E+10	-43.1409	2130490.	0.000
375.360	0.000143	-5454.0097	758.8866	-3.106E-06	4.0189	5.863E+10	-37.3315	2130490.	0.000
383.520	0.000115	-504.3650	484.5628	-3.521E-06	0.3717	5.863E+10	-29.9047	2130490.	0.000
391.680	8.552E-05	2454.0556	271.4516	-3.385E-06	1.8083	5.863E+10	-22.3284	2130490.	0.000
399.840	5.929E-05	3925.7259	117.1942	-2.941E-06	2.8928	5.863E+10	-15.4798	2130490.	0.000
408.000	3.752E-05	4366.6643	14.0717	-2.364E-06	3.2177	5.863E+10	-9.7953	2130490.	0.000
416.160	2.070E-05	4155.3754	-47.9486	-1.771E-06	3.0620	5.863E+10	-5.4057	2130490.	0.000
424.320	8.611E-06	3584.1433	-79.1772	-1.233E-06	2.6411	5.863E+10	-2.2483	2130490.	0.000
432.480	5.891E-07	2863.2039	-88.9779	-7.839E-07	2.1098	5.863E+10	-0.1538	2130490.	0.000
440.640	-4.181E-06	2132.0238	-85.1513	-4.362E-07	1.5710	5.863E+10	1.0917	2130490.	0.000
448.800	-6.530E-06	1473.5352	-73.7408	-1.853E-07	1.0858	5.863E+10	1.7050	2130490.	0.000
456.960	-7.206E-06	928.5733	-59.1089	-1.814E-08	0.6842	5.863E+10	1.8813	2130490.	0.000
465.120	-6.826E-06	508.8782	-44.1616	8.190E-08	0.3750	5.863E+10	1.7822	2130490.	0.000
473.280	-5.869E-06	207.8552	-30.6383	1.318E-07	0.1532	5.863E+10	1.5323	2130490.	0.000
481.440	-4.676E-06	8.8617	-19.4059	1.469E-07	0.006530	5.863E+10	1.2207	2130490.	0.000
489.600	-3.472E-06	-108.8489	-10.7267	1.399E-07	0.0802	5.863E+10	0.9065	2130490.	0.000
497.760	-2.392E-06	-166.1982	-4.4798	1.208E-07	0.1225	5.863E+10	0.6246	2130490.	0.000
505.920	-1.501E-06	-181.9588	-0.3323	9.653E-08	0.1341	5.863E+10	0.3919	2130490.	0.000
514.080	-8.168E-07	-171.6215	2.1369	7.193E-08	0.1265	5.863E+10	0.2133	2130490.	0.000
522.240	-3.273E-07	-147.0841	3.3557	4.975E-08	0.1084	5.863E+10	0.0855	2130490.	0.000
530.400	-4.916E-09	-116.8562	3.7096	3.138E-08	0.0861	5.863E+10	0.001284	2130490.	0.000
538.560	1.848E-07	-86.5428	3.5180	1.722E-08	0.0638	5.863E+10	-0.0482	2130490.	0.000
546.720	2.762E-07	-59.4417	3.0270	7.064E-09	0.0438	5.863E+10	-0.0721	2130490.	0.000
554.880	3.001E-07	-37.1419	2.4132	3.429E-10	0.0274	5.863E+10	-0.0783	2130490.	0.000
563.040	2.818E-07	-20.0588	1.7934	-3.638E-09	0.0148	5.863E+10	-0.0736	2130490.	0.000
571.200	2.407E-07	-7.8744	1.2368	-5.582E-09	0.005802	5.863E+10	-0.0628	2130490.	0.000
579.360	1.907E-07	0.1256	0.7773	-6.121E-09	9.253E-05	5.863E+10	-0.0498	2130490.	0.000
587.520	1.408E-07	4.8106	0.4242	-5.778E-09	0.003545	5.863E+10	-0.0368	2130490.	0.000
595.680	9.639E-08	7.0478	0.1715	-4.952E-09	0.005193	5.863E+10	-0.0252	2130490.	0.000
603.840	5.998E-08	7.6094	0.004926	-3.932E-09	0.005607	5.863E+10	-0.0157	2130490.	0.000
612.000	3.221E-08	7.1282	-0.0933	-2.907E-09	0.005253	5.863E+10	-0.008410	2130490.	0.000
620.160	1.254E-08	6.0871	-0.1410	-1.987E-09	0.004485	5.863E+10	-0.003274	2130490.	0.000
628.320	-2.160E-10	4.8279	-0.1541	-1.227E-09	0.003558	5.863E+10	5.641E-05	2130490.	0.000
636.480	-7.490E-09	3.5724	-0.1459	-6.428E-10	0.002632	5.863E+10	0.001956	2130490.	0.000
644.640	-1.071E-08	2.4472	-0.1265	-2.238E-10	0.001803	5.863E+10	0.002795	2130490.	0.000
652.800	-1.114E-08	1.5081	-0.1032	5.142E-11	0.001111	5.863E+10	0.002909	2130490.	0.000
660.960	-9.867E-09	0.7628	-0.0808	2.095E-10	0.000562	5.863E+10	0.002576	2130490.	0.000
669.120	-7.725E-09	0.1889	-0.0621	2.757E-10	0.000139	5.863E+10	0.002017	2130490.	0.000
677.280	-5.368E-09	-0.2506	-0.0379	2.714E-10	0.000185	5.863E+10	0.003924	5964997.	0.000
685.440	-3.295E-09	-0.4289	-0.0120	2.241E-10	0.000316	5.863E+10	0.002409	5964997.	0.000
693.600	-1.710E-09	-0.4468	0.002911	1.632E-10	0.000329	5.863E+10	0.001250	5964997.	0.000
701.760	-6.325E-10	-0.3814	0.009899	1.055E-10	0.000281	5.863E+10	0.000462	5964997.	0.000
709.920	1.208E-11	-0.2852	0.0117	5.915E-11	0.000210	5.863E+10	-8.829E-06	5964997.	0.000
718.080	3.328E-10	-0.1896	0.0107	2.610E-11	0.000140	5.863E+10	-0.000243	5964997.	0.000
726.240	4.381E-10	-0.1102	0.008422	5.232E-12	8.124E-05	5.863E+10	-0.000320	5964997.	0.000
734.400	4.181E-10	-0.0522	0.005868	-6.072E-12	3.845E-05	5.863E+10	-0.000306	5964997.	0.000
742.560	3.390E-10	-0.0145	0.003610	-1.071E-11	1.067E-05	5.863E+10	-0.000248	5964997.	0.000
750.720	2.433E-10	0.006735	0.001874	-1.125E-11	4.963E-06	5.863E+10	-0.000178	5964997.	0.000
758.880	1.554E-10	0.0161	0.000684	-9.661E-12	1.186E-05	5.863E+10	-0.000114	5964997.	0.000
767.040	8.567E-11	0.0179	-3.438E-05	-7.294E-12	1.319E-05	5.863E+10	-6.263E-05	5964997.	0.000
775.200	3.632E-11	0.0155	-0.000398	-4.966E-12	1.145E-05	5.863E+10	-2.655E-05	5964997.	0.000
783.360	4.624E-12	0.0114	-0.000520	-3.091E-12	8.405E-06	5.863E+10	-3.380E-06	5964997.	0.000
791.520	-1.412E-11	0.007048	-0.000492	-1.806E-12	5.194E-06	5.863E+10	1.032E-05	5964997.	0.000
799.680	-2.486E-11	0.003377	-0.000376	-1.081E-12	2.488E-06	5.863E+10	1.817E-05	5964997.	0.000
807.840	-3.176E-11	0.000916	-0.000207	0.000	6.747E-07	5.863E+10	2.322E-05	5964997.	0.000

Page 3

816.000 -3.762E-11 0.000 0.000 0.000 0.000 5.863E+10 2.750E-05 2982498. 0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the
actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection = 0.6718850 inches
Computed slope at pile head = -0.0057858 radians
Maximum bending moment = 2144183. inch-lbs
Maximum shear force = 38000. lbs
Depth of maximum bending moment = 114.2400000 inches below pile head
Depth of maximum shear force = 0.000000 inches below pile head
Number of iterations = 23
Number of zero deflection points = 7

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

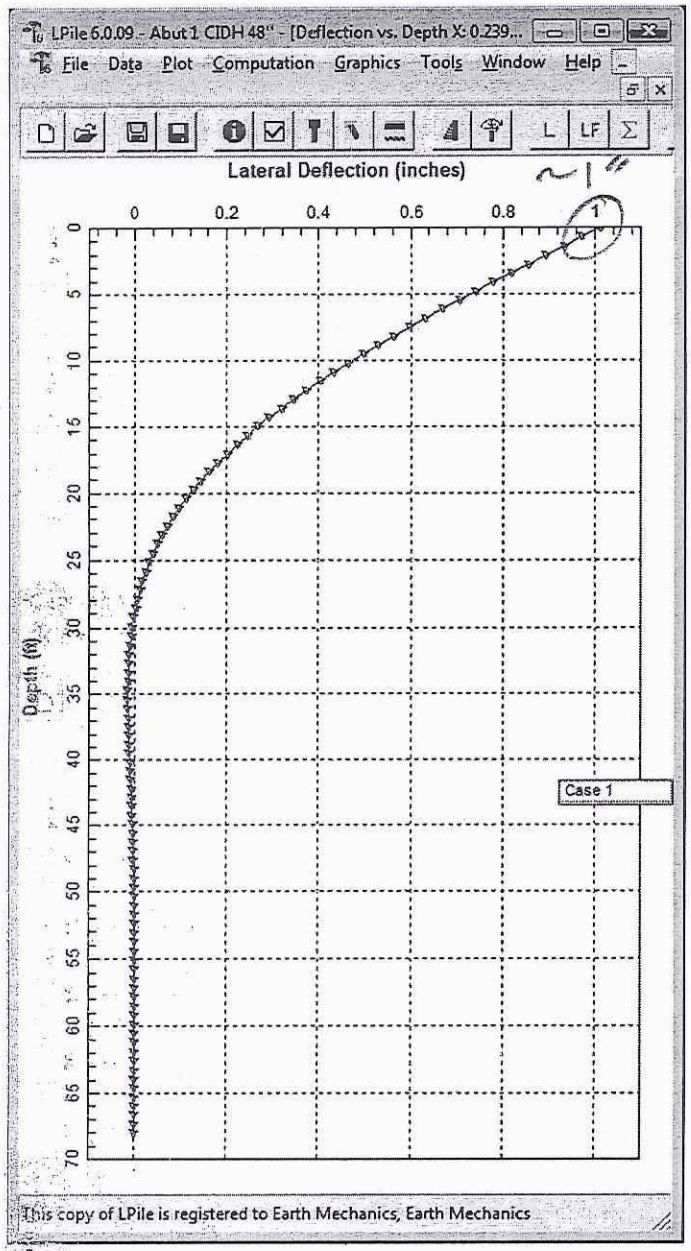
Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 38000.	M = 0.000	0.0000000	0.67188504	2144183.	38000.	0.00000000

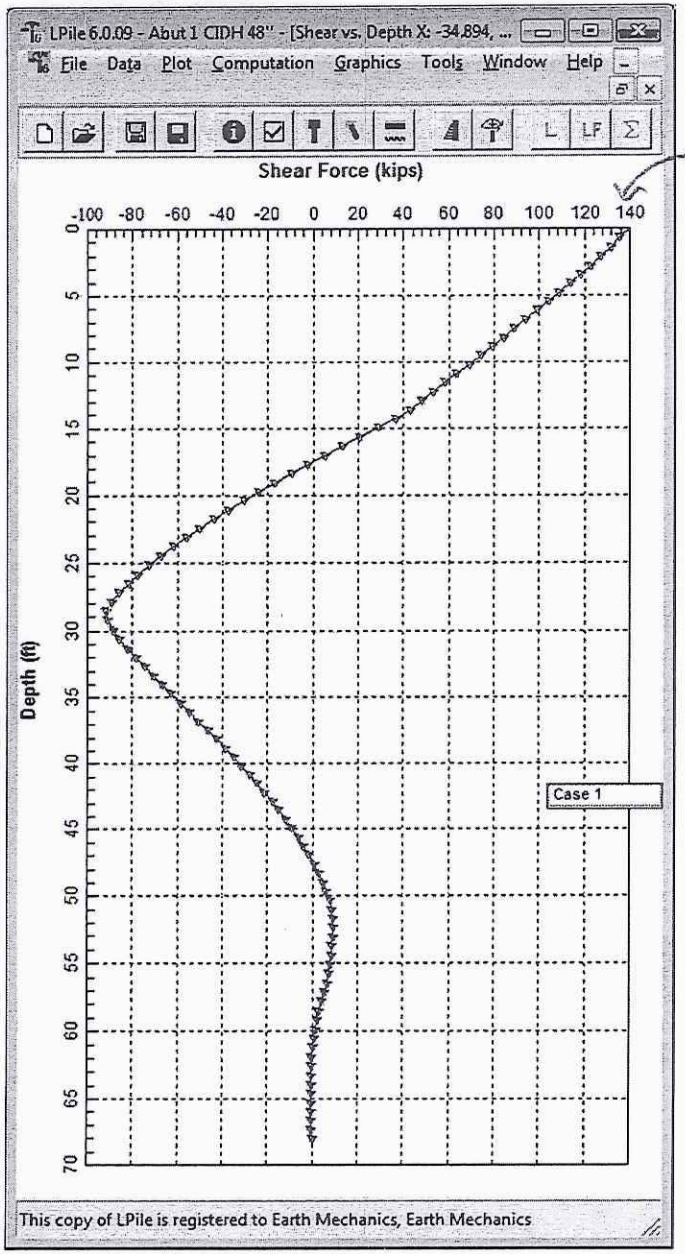
Summary of Warning Messages

The following warning was reported 1760 times

**** Warning ****

An unreasonable input value for shear strength has been specified for a soil
defined using the soft clay criteria. The input value is greater than 8.68
psi (1,250 psf). You should check your input data for correctness.





Lateral solutions, Abut 1, 48" CIDH

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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Earth Mechanics
Earth Mechanics

Files Used for Analysis

Path to file locations: X:\Projects\2011\11-135 - PTG, I-5 HOV Widening - Segment 1\Reports\FR Bridge\Appendix C Analysis\Electronic files for Sharid\Piles\Lateral\CIDH\
Name of input data file: Abut 1 CIDH 48''.lp6d
Name of output file: Abut 1 CIDH 48''.lp6o
Name of plot output file: Abut 1 CIDH 48''.lp6p
Name of runtime file: Abut 1 CIDH 48''.lp6r

Date and Time of Analysis

Date: September 19, 2012 Time: 17:43:04

Problem Title

I-5 HOV Seg 1, Bridge 55-0207

Job Number: 11-135

Client: Parsons

Engineer: MK

Description: Abut 1, 48'' dia CIDH

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis uses p-y multipliers for group action
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 68.00 ft

Depth of ground surface below top of pile = -4.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	48.0000000
2	68.000000	48.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	68.000 in
Top Width	=	48.000 in
Bottom Width	=	48.000 in
Top Area	=	1810.000000 sq. in
Bottom Area	=	1810.000000 sq. in
Moment of Inertia at Top	=	2.606E+05 in^4
Moment of Inertia at Bottom	=	2.606E+05 in^4
Elastic Modulus	=	3600000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 4 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = -4.000 ft
Distance from top of pile to bottom of layer = 14.000 ft

Layer 2 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 14.000 ft
Distance from top of pile to bottom of layer = 39.000 ft

Layer 3 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 39.000 ft
Distance from top of pile to bottom of layer = 56.000 ft

Layer 4 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 56.000 ft
Distance from top of pile to bottom of layer = 80.000 ft

(Depth of lowest layer extends 12.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 8 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	-4.00	120.00000
2	14.00	120.00000
3	14.00	120.00000
4	39.00	120.00000
5	39.00	60.00000
6	56.00	60.00000
7	56.00	65.00000
8	80.00	65.00000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	Test Type	Test Prop.	Elas. Subgr. pci	Depth ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50	kpy pci	Rock Emass psi	krm
1	Soft Clay	--	--	--	-4.000	120.000	1000.000	--	--	--	0.01000	--	--	--
		--	--	--	14.000	120.000	1000.000	--	--	--	0.01000	--	--	--
2	Soft Clay	--	--	--	14.000	120.000	1800.000	--	--	--	0.01000	--	--	--
		--	--	--	39.000	120.000	1800.000	--	--	--	0.01000	--	--	--
3	Soft Clay	--	--	--	39.000	60.000	1800.000	--	--	--	0.01000	--	--	--
		--	--	--	56.000	60.000	1800.000	--	--	--	0.01000	--	--	--
4	Soft Clay	--	--	--	56.000	65.000	4000.000	--	--	--	0.00500	--	--	--
		--	--	--	80.000	65.000	4000.000	--	--	--	0.00500	--	--	--

p-y Modification Factors for Group Action

Distribution of p-y modifiers with depth defined using 2 points

Point No.	Depth X ft	p-mult	y-mult
1	0.000	0.8000	1.0000
2	79.000	0.8000	1.0000

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 140000.000 lbs	M = 0.000 in-lbs	0.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

Computed Values of Pile Loading and Deflection
for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 140000.000 lbs
Applied moment at pile head = 0.000 in-lbs
Axial thrust load on pile head = 0.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	1.0128	4.379E-05	140000.	-0.004802	4.034E-09	9.380E+11	-501.5083	2020.2066	0.000
8.160	0.9737	1125703.	135850.	-0.004797	103.6846	9.380E+11	-515.6739	4321.7445	0.000
16.320	0.9346	2217070.	131587.	-0.004783	204.2065	9.380E+11	-529.1128	4619.9298	0.000
24.480	0.8956	3273206.	127218.	-0.004759	301.4835	9.380E+11	-541.8071	4936.5073	0.000
32.640	0.8569	4293265.	122748.	-0.004726	395.4375	9.380E+11	-553.7392	5273.1817	0.000
40.800	0.8185	5276453.	118184.	-0.004684	485.9955	9.380E+11	-564.8918	5631.8469	0.000
48.960	0.7804	6222027.	113532.	-0.004634	573.0890	9.380E+11	-575.2476	6014.6133	0.000
57.120	0.7428	7129299.	108799.	-0.004576	656.6546	9.380E+11	-584.7899	6423.8379	0.000
65.280	0.7058	7997631.	103992.	-0.004511	736.6336	9.380E+11	-593.5018	6862.1616	0.000
73.440	0.6692	8826445.	99117.	-0.004437	812.9727	9.380E+11	-601.3668	7332.5509	0.000
81.600	0.6333	9615217.	94181.	-0.004357	885.6237	9.380E+11	-608.3684	7838.3489	0.000
89.760	0.5981	10363480.	89192.	-0.004270	954.5436	9.380E+11	-614.4904	8383.3340	0.000
97.920	0.5636	11070826.	84156.	-0.004177	1019.6948	9.380E+11	-619.7165	8971.7914	0.000
106.080	0.5300	11736909.	79082.	-0.004078	1081.0453	9.380E+11	-624.0307	9608.5966	0.000
114.240	0.4971	12361440.	73976.	-0.003973	1138.5687	9.380E+11	-627.4167	10299.	0.000
122.400	0.4651	12944194.	68846.	-0.003863	1192.2441	9.380E+11	-629.8586	11050.	0.000
130.560	0.4341	13485009.	63700.	-0.003748	1242.0566	9.380E+11	-631.3404	11869.	0.000
138.720	0.4039	13983785.	58547.	-0.003628	1287.9972	9.380E+11	-631.8459	12764.	0.000
146.880	0.3748	14440490.	53393.	-0.003505	1330.0626	9.380E+11	-631.3593	13744.	0.000
155.040	0.3467	14855155.	48247.	-0.003377	1368.2560	9.380E+11	-629.8645	14823.	0.000
163.200	0.3197	15227880.	43118.	-0.003247	1402.5864	9.380E+11	-627.3456	16012.	0.000
171.360	0.2938	15558834.	36574.	-0.003113	1433.0693	9.380E+11	-976.4421	27123.	0.000
179.520	0.2689	15824770.	28644.	-0.002976	1457.5638	9.380E+11	-967.0976	29346.	0.000
187.680	0.2452	16026311.	20797.	-0.002838	1476.1270	9.380E+11	-956.2028	31823.	0.000
195.840	0.2226	16164183.	13046.	-0.002698	1488.8259	9.380E+11	-943.7317	34594.	0.000
204.000	0.2012	16239216.	5402.2368	-0.002557	1495.7370	9.380E+11	-929.6552	37710.	0.000
212.160	0.1809	16252348.	-2119.6310	-0.002415	1496.9464	9.380E+11	-913.9399	41231.	0.000
220.320	0.1617	16204624.	-9506.4178	-0.002274	1492.5508	9.380E+11	-896.5471	45230.	0.000
228.480	0.1438	16097203.	-16744.	-0.002134	1482.6566	9.380E+11	-877.4304	49803.	0.000
236.640	0.1269	15931358.	-23819.	-0.001994	1467.3812	9.380E+11	-856.5338	55067.	0.000
244.800	0.1112	15708480.	-30715.	-0.001857	1446.8527	9.380E+11	-833.7877	61177.	0.000
252.960	0.0966	15430083.	-37418.	-0.001721	1421.2106	9.380E+11	-809.1041	68332.	0.000
261.120	0.0831	15097813.	-43912.	-0.001589	1390.6063	9.380E+11	-782.3693	76805.	0.000
269.280	0.0707	14713447.	-50178.	-0.001459	1355.2037	9.380E+11	-753.4332	86966.	0.000
277.440	0.0593	14278914.	-56198.	-0.001333	1315.1804	9.380E+11	-722.0927	99343.	0.000
285.600	0.0489	13796300.	-61951.	-0.001211	1270.7285	9.380E+11	-688.0647	114717.	0.000
293.760	0.0396	13267870.	-67414.	-0.001093	1222.0568	9.380E+11	-650.9414	134291.	0.000
301.920	0.0311	12696097.	-72559.	-0.000980	1169.3928	9.380E+11	-610.1082	160050.	0.000
310.080	0.0236	12083700.	-77352.	-0.000872	1112.9870	9.380E+11	-564.5847	195551.	0.000
318.240	0.0169	11433710.	-81747.	-0.000770	1053.1187	9.380E+11	-512.6736	247977.	0.000
326.400	0.0110	10749583.	-85679.	-0.000674	990.1062	9.380E+11	-451.0392	334805.	0.000
334.560	0.005879	10035423.	-89017.	-0.000583	924.3274	9.380E+11	-366.9732	509387.	0.000
342.720	0.001477	9296828.	-91460.	-0.000499	856.2981	9.380E+11	-231.7714	1280714.	0.000
350.880	-0.002265	8542801.	-91317.	-0.000421	786.8473	9.380E+11	266.7356	960838.	0.000
359.040	-0.005401	7806534.	-88774.	-0.000350	719.0323	9.380E+11	356.5115	538641.	0.000
367.200	-0.007982	7094006.	-85663.	-0.000286	653.4039	9.380E+11	406.1432	415183.	0.000
375.360	-0.0101	6408521.	-82216.	-0.000227	590.2662	9.380E+11	438.7270	355857.	0.000
383.520	-0.0117	5752249.	-78544.	-0.000174	529.8193	9.380E+11	461.1674	322096.	0.000
391.680	-0.0129	5126684.	-74718.	-0.000127	472.2008	9.380E+11	476.6346	301547.	0.000
399.840	-0.0137	4532856.	-70786.	-8.455E-05	417.5054	9.380E+11	486.8985	288979.	0.000
408.000	-0.0143	3971448.	-66788.	-4.756E-05	365.7961	9.380E+11	493.0695	281798.	0.000
416.160	-0.0145	3442872.	-62753.	-1.531E-05	317.1108	9.380E+11	495.9013	278595.	0.000
424.320	-0.0145	2947316.	-58707.	1.248E-05	271.4669	9.380E+11	495.9350	278561.	0.000
432.480	-0.0143	2484781.	-54669.	3.611E-05	228.8645	9.380E+11	493.5762	281233.	0.000
440.640	-0.0139	2055112.	-50660.	5.586E-05	189.2891	9.380E+11	489.1396	286361.	0.000
448.800	-0.0134	1658013.	-46694.	7.201E-05	152.7137	9.380E+11	482.8758	293840.	0.000
456.960	-0.0128	1293066.	-42786.	8.484E-05	119.0997	9.380E+11	474.9893	303681.	0.000
465.120	-0.0120	959746.	-38948.	9.464E-05	88.3989	9.380E+11	465.6498	315986.	0.000
473.280	-0.0112	657433.	-35192.	0.000102	60.5538	9.380E+11	455.0004	330952.	0.000
481.440	-0.0104	385415.	-31527.	0.000106	35.4992	9.380E+11	443.1634	348868.	0.000
489.600	-0.009485	142906.	-27964.	0.000109	13.1626	9.380E+11	430.2444	370134.	0.000
497.760	-0.008595	-70955.	-24510.	0.000109	6.5354	9.380E+11	416.3353	395278.	0.000
505.920	-0.007709	-257094.	-21173.	0.000107	23.6800	9.380E+11	401.5164	424994.	0.000
514.080	-0.006842	-416498.	-17960.	0.000104	38.3622	9.380E+11	385.8578	460186.	0.000
522.240	-0.006004	-550209.	-14879.	0.000100	50.6778	9.380E+11	369.4206	502048.	0.000
530.400	-0.005206	-659322.	-11935.	9.500E-05	60.7279	9.380E+11	352.2571	552162.	0.000
538.560	-0.004454	-744980.	-9132.9042	8.889E-05	68.6175	9.380E+11	334.4105	612667.	0.000
546.720	-0.003755	-808371.	-6479.5812	8.214E-05	74.4562	9.380E+11	315.9138	686506.	0.000
554.880	-0.003113	-850727.	-3979.7592	7.492E-05	78.3575	9.380E+11	296.7877	777835.	0.000
563.040	-0.002532	-873321.	-1638.5581	6.742E-05	80.4385	9.380E+11	277.0361	892694.	0.000
571.200	-0.002013	-877468.	538.8351	5.981E-05	80.8205	9.380E+11	256.6387	1040224.	0.000
579.360	-0.001556	-864527.	2546.9098	5.223E-05	79.6286	9.380E+11	235.5365	1234951.	0.000
587.520	-0.001161	-835903.	4379.4050	4.483E-05	76.9921	9.380E+11	213.6045	1501543.	0.000
595.680	-0.000825	-793055.	6129.3590	3.775E-05	73.0455	9.380E+11	215.3058	2130490.	0.000
603.840	-0.000545	-735872.	7588.1173	3.110E-05	67.7785	9.380E+11	142.2330	2130490.	0.000
612.000	-0.000317	-669217.	8506.2444	2.499E-05	61.6392	9.380E+11	82.7981	2130490.	0.000
620.160	-0.000137	-597050.	8989.9857	1.948E-05	54.9921	9.380E+11	35.7659	2130490.	0.000
628.320	7.707E-07	-522501.	9135.0895	1.461E-05	48.1257	9.380E+11	-0.2012	2130490.	0.000
636.480	0.000101	-447965.	9026.2104	1.039E-05	41.2605	9.380E+11	-26.4848	2130490.	0.000
644.640	0.000170	-375193.	8736.7298	6.808E-06	34.5577	9.380E+11	-44.4663	2130490.	0.000
652.800	0.000213	-305382.	8328.8905	3.848E-06	28.1276	9.380E+11	-55.4943	2130490.	0.000
660.960	0.000233	-239265.	7854.1540	1.479E-06	22.0379	9.380E+11	-60.8627	2130490.	0.000
669.120	0.000237	-177202.	7353.7035	-3.323E-07	16.3214	9.380E+11	-61.7967	2130490.	0.000
677.280	0.000228	-119253.	6422.4962	-1.622E-06	10.9840	9.380E+11	-166.4404	5964997.	0.000
685.440	0.000210	-72387.	5116.4346	-2.455E-06	6.6673	9.380E+11	-153.6728	5964997.	0.000
693.600	0.000188	-35753.	3929.8815	-2.926E-06	3.2931	9.380E+11	-137.1491	5964997.	0.000
701.760	0.000162	-8251.0721	2885.7309	-3.117E-06	0.7600	9.380E+11	-118.7702	5964997.	0.000
709.920	0.000137	11342.	1993.2988	-3.104E-06	1.0447	9.380E+11	-99.9632	5964997.	0.000
718.080	0.000112	24280.	1251.9307	-2.949E-06	2.2363	9.380E+11	-81.7447	5964997.	0.000
726.240	8.863E-05	31774.	654.0851	-2.705E-06	2.9266	9.380E+11	-64.7861	5964997.	0.000
734.400	6.768E-05	34954.	187.8952	-2.415E-06	3.2195	9.380E+11	-49.4762	5964997.	0.000
742.560	4.922E-05	34840.	-160.7660	-2.111E-06	3.2090	9.380E+11	-35.9800	5964997.	0.000
750.720	3.323E-05	32331.	-406.6744	-1.819E-06	2.9279	9.380E+11	-24.2917	5964997.	0.000
758.880	1.954E-05	28203.	-564.0506	-1.556E-06	2.5977	9.380E+11	-14.2809	5964997.	0.000
767.040	7.844E-06	23125.	-645.7101	-1.332E-06	2.1300	9.380E+11	-5.7337	5964997.	0.000
775.200	-2.207E-06	17665.	-662.5197	-1.155E-06	1.6271	9.380E+11	1.6137	5964997.	0.000
783.360	-1.100E-05	12313.	-623.1149	-1.025E-06	1.1341	9.380E+11	8.0444	5964997.	0.000
791.520	-1.893E-05	7496.1074	-533.8424	-9.384E-07	0.6904	9.380E+11	13.8361	5964997.	0.000
799.680	-2.632E-05	3600.5972	-398.8960	-8.901E-07	0.3316	9.380E+11	19.2390	5964997.	0.000

807.840	-3.345E-05	986.1249	-220.6248	-8.701E-07	0.0908	9.380E+11	24.4549	5964997.	0.000
816.000	-4.052E-05	0.000	0.000	-8.659E-07	0.000	9.380E+11	29.6198	2982498.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	1.0128438 inches
Computed slope at pile head	=	-0.0048022 radians
Maximum bending moment	=	16252348. inch-lbs
Maximum shear force	=	140000. lbs
Depth of maximum bending moment	=	212.1600000 inches below pile head
Depth of maximum shear force	=	0.000000 inches below pile head
Number of iterations	=	25
Number of zero deflection points	=	3

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 140000.	M = 0.000	0.0000000	1.01284378	16252348.	140000.	0.00000000

Summary of Warning Messages

The following warning was reported 1920 times

**** Warning ****

An unreasonable input value for shear strength has been specified for a soil
defined using the soft clay criteria. The input value is greater than 8.68
psi (1,250 psf). You should check your input data for correctness.

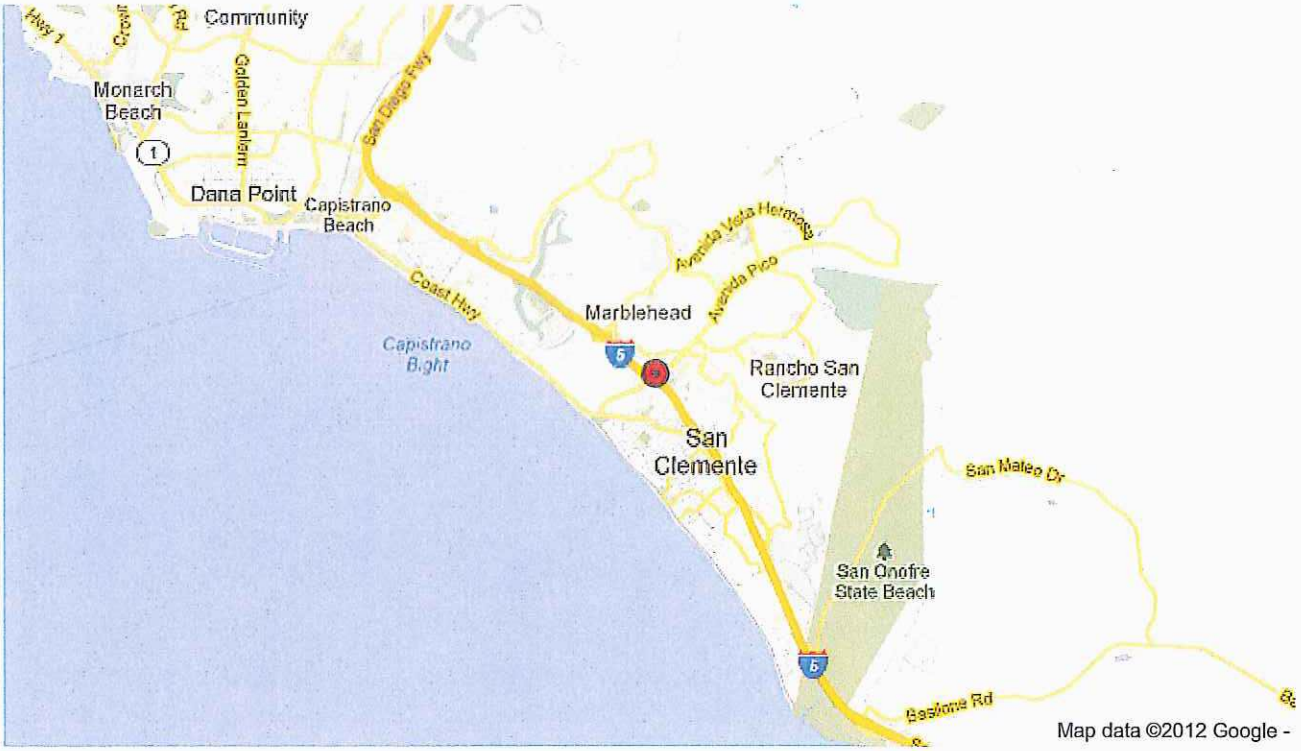
ATTACHMENT C

ARS Calculations

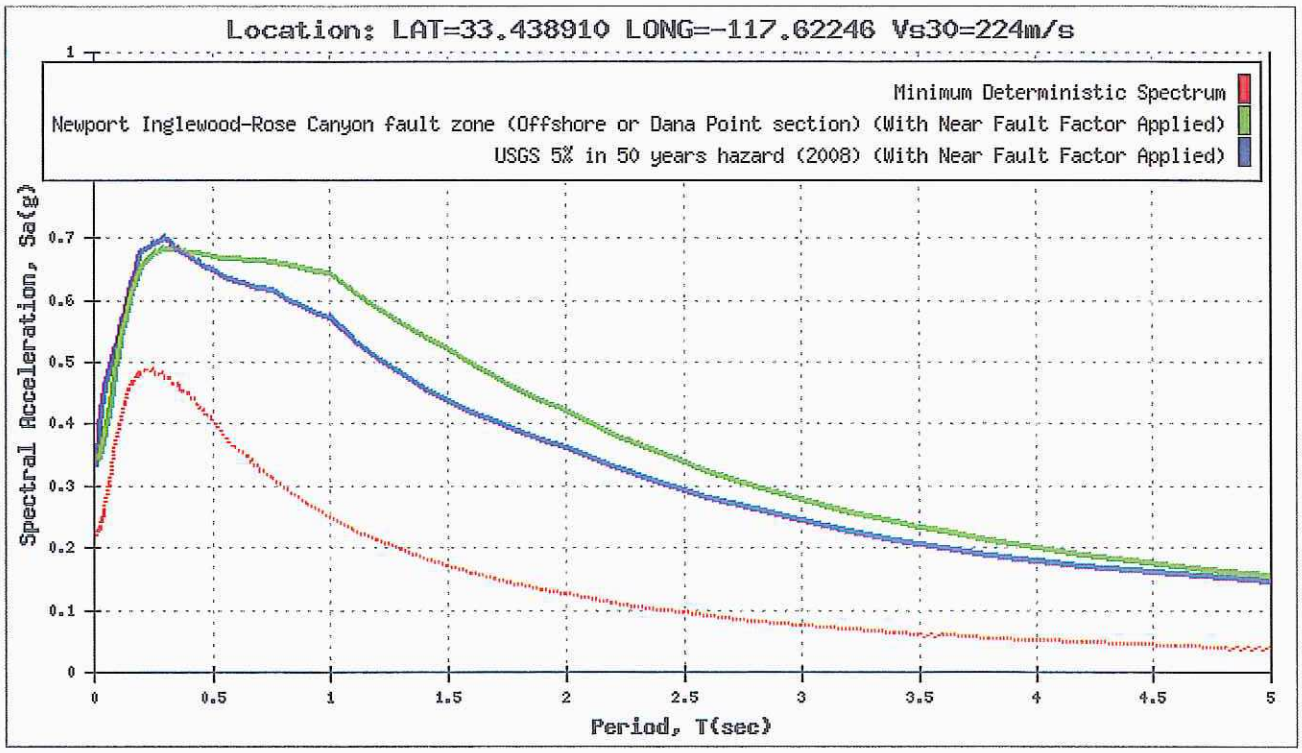
Contents

1. ARS online Fault Map & Output
2. Basin Maps
3. Fault and Site data input sheet
4. Deterministic Fault Information and Seismic Procedure QC/QA Checklist
5. Estimation of Vs30
6. Deterministic spread sheet calculation and comparison to ARS online
7. Probabilistic Spread Sheet Calculation and Comparison to ARS on-line and USGS 2008 Interactive Deaggregation (Beta) website

SELECT SITE LOCATION



CALCULATED SPECTRA



SITE DATA

Shear Wave Velocity, Vs_{30}:	224 m/s
Latitude:	33.438910
Longitude:	-117.622460
Depth to Vs = 1.0 km/s:	335 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

Newport Inglewood-Rose Canyon fault zone (Offshore or Dana Point section)	
Fault ID:	222
Maximum Magnitude (MMax):	7.5
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	13.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	7.48 km
Rjb:	7.48 km
Rx:	7.48 km
Fnorm:	0
Frev:	0

Period	SA(Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA(Final Spectrum)
0.01	0.339	1.000	1.000	0.339
0.02	0.343	1.000	1.000	0.343
0.022	0.346	1.000	1.000	0.346
0.025	0.349	1.000	1.000	0.349
0.029	0.353	1.000	1.000	0.353
0.03	0.355	1.000	1.000	0.355
0.032	0.359	1.000	1.000	0.359
0.035	0.364	1.000	1.000	0.364
0.036	0.366	1.000	1.000	0.366
0.04	0.372	1.000	1.000	0.372
0.042	0.375	1.000	1.000	0.375
0.044	0.379	1.000	1.000	0.379
0.045	0.381	1.000	1.000	0.381
0.046	0.383	1.000	1.000	0.383
0.048	0.387	1.000	1.000	0.387
0.05	0.390	1.000	1.000	0.390
0.055	0.401	1.000	1.000	0.401
0.06	0.413	1.000	1.000	0.413

0.065	0.424	1.000	1.000	0.424
0.067	0.429	1.000	1.000	0.429
0.07	0.436	1.000	1.000	0.436
0.075	0.448	1.000	1.000	0.448
0.08	0.461	1.000	1.000	0.461
0.085	0.473	1.000	1.000	0.473
0.09	0.486	1.000	1.000	0.486
0.095	0.498	1.000	1.000	0.498
0.1	0.510	1.000	1.000	0.510
0.11	0.532	1.000	1.000	0.532
0.12	0.551	1.000	1.000	0.551
0.13	0.569	1.000	1.000	0.569
0.133	0.574	1.000	1.000	0.574
0.14	0.585	1.000	1.000	0.585
0.15	0.600	1.000	1.000	0.600
0.16	0.612	1.000	1.000	0.612
0.17	0.623	1.000	1.000	0.623
0.18	0.633	1.000	1.000	0.633
0.19	0.643	1.000	1.000	0.643
0.2	0.651	1.000	1.000	0.651
0.22	0.662	1.000	1.000	0.662
0.24	0.670	1.000	1.000	0.670
0.25	0.673	1.000	1.000	0.673
0.26	0.676	1.000	1.000	0.676
0.28	0.680	1.000	1.000	0.680
0.29	0.682	1.000	1.000	0.682
0.3	0.683	1.000	1.000	0.683
0.32	0.684	1.000	1.000	0.684
0.34	0.683	1.000	1.000	0.683
0.35	0.683	1.000	1.000	0.683
0.36	0.682	1.000	1.000	0.682
0.38	0.680	1.000	1.000	0.680
0.4	0.677	1.000	1.000	0.677
0.42	0.677	1.000	1.000	0.677
0.44	0.676	1.000	1.000	0.676
0.45	0.675	1.000	1.000	0.675
0.46	0.675	1.000	1.000	0.675
0.48	0.673	1.000	1.000	0.673
0.5	0.672	1.000	1.000	0.672
0.55	0.656	1.000	1.020	0.669
0.6	0.641	1.000	1.040	0.667
0.65	0.627	1.000	1.060	0.665
0.667	0.623	1.000	1.067	0.664
0.7	0.614	1.000	1.080	0.663
0.75	0.602	1.000	1.100	0.662
0.8	0.588	1.000	1.120	0.658
0.85	0.574	1.000	1.140	0.655
0.9	0.561	1.000	1.160	0.651
0.95	0.549	1.000	1.180	0.648

1	0.537	1.000	1.200	0.644
1.1	0.512	1.000	1.200	0.615
1.2	0.490	1.000	1.200	0.588
1.3	0.470	1.000	1.200	0.564
1.4	0.451	1.000	1.200	0.541
1.5	0.433	1.000	1.200	0.520
1.6	0.414	1.000	1.200	0.496
1.7	0.396	1.000	1.200	0.475
1.8	0.379	1.000	1.200	0.455
1.9	0.364	1.000	1.200	0.437
2	0.351	1.000	1.200	0.421
2.2	0.320	1.000	1.200	0.384
2.4	0.293	1.000	1.200	0.352
2.5	0.281	1.000	1.200	0.338
2.6	0.270	1.000	1.200	0.324
2.8	0.250	1.000	1.200	0.300
3	0.232	1.000	1.200	0.278
3.2	0.216	1.000	1.200	0.259
3.4	0.201	1.000	1.200	0.242
3.5	0.195	1.000	1.200	0.234
3.6	0.189	1.000	1.200	0.226
3.8	0.177	1.000	1.200	0.213
4	0.167	1.000	1.200	0.200
4.2	0.158	1.000	1.200	0.190
4.4	0.150	1.000	1.200	0.180
4.6	0.142	1.000	1.200	0.171
4.8	0.135	1.000	1.200	0.162
5	0.129	1.000	1.200	0.155

PROBABILISTIC

Probabilistic Model USGS Seismic Hazard Map(2008) 975 Year Return Period				
Period	**SA(Base Spectrum)**	**Basin Factor**	**Near Fault Factor (Applied)**	**SA(Final Spectrum)**
0.01	0.333	1.000	1.000	0.333
0.02	0.384	1.000	1.000	0.384
0.022	0.392	1.000	1.000	0.392
0.025	0.402	1.000	1.000	0.402
0.029	0.414	1.000	1.000	0.414
0.03	0.417	1.000	1.000	0.417
0.032	0.423	1.000	1.000	0.423
0.035	0.430	1.000	1.000	0.430
0.036	0.433	1.000	1.000	0.433
0.04	0.442	1.000	1.000	0.442
0.042	0.447	1.000	1.000	0.447
0.044	0.451	1.000	1.000	0.451

0.045	0.453	1.000	1.000	0.453
0.046	0.455	1.000	1.000	0.455
0.048	0.459	1.000	1.000	0.459
0.05	0.463	1.000	1.000	0.463
0.055	0.472	1.000	1.000	0.472
0.06	0.480	1.000	1.000	0.480
0.065	0.488	1.000	1.000	0.488
0.067	0.491	1.000	1.000	0.491
0.07	0.496	1.000	1.000	0.496
0.075	0.503	1.000	1.000	0.503
0.08	0.509	1.000	1.000	0.509
0.085	0.516	1.000	1.000	0.516
0.09	0.522	1.000	1.000	0.522
0.095	0.527	1.000	1.000	0.527
0.1	0.533	1.000	1.000	0.533
0.11	0.551	1.000	1.000	0.551
0.12	0.568	1.000	1.000	0.568
0.13	0.584	1.000	1.000	0.584
0.133	0.589	1.000	1.000	0.589
0.14	0.600	1.000	1.000	0.600
0.15	0.614	1.000	1.000	0.614
0.16	0.628	1.000	1.000	0.628
0.17	0.642	1.000	1.000	0.642
0.18	0.655	1.000	1.000	0.655
0.19	0.667	1.000	1.000	0.667
0.2	0.679	1.000	1.000	0.679
0.22	0.684	1.000	1.000	0.684
0.24	0.688	1.000	1.000	0.688
0.25	0.691	1.000	1.000	0.691
0.26	0.693	1.000	1.000	0.693
0.28	0.696	1.000	1.000	0.696
0.29	0.698	1.000	1.000	0.698
0.3	0.700	1.000	1.000	0.700
0.32	0.693	1.000	1.000	0.693
0.34	0.687	1.000	1.000	0.687
0.35	0.684	1.000	1.000	0.684
0.36	0.681	1.000	1.000	0.681
0.38	0.676	1.000	1.000	0.676
0.4	0.670	1.000	1.000	0.670
0.42	0.665	1.000	1.000	0.665
0.44	0.661	1.000	1.000	0.661
0.45	0.659	1.000	1.000	0.659
0.46	0.656	1.000	1.000	0.656
0.48	0.652	1.000	1.000	0.652
0.5	0.648	1.000	1.000	0.648
0.55	0.627	1.000	1.020	0.639
0.6	0.607	1.000	1.040	0.632
0.65	0.590	1.000	1.060	0.626

0.667	0.585	1.000	1.067	0.624
0.7	0.575	1.000	1.080	0.621
0.75	0.561	1.000	1.100	0.617
0.8	0.541	1.000	1.120	0.605
0.85	0.522	1.000	1.140	0.595
0.9	0.506	1.000	1.160	0.586
0.95	0.490	1.000	1.180	0.578
1	0.476	1.000	1.200	0.571
1.1	0.447	1.000	1.200	0.537
1.2	0.423	1.000	1.200	0.507
1.3	0.401	1.000	1.200	0.481
1.4	0.382	1.000	1.200	0.458
1.5	0.365	1.000	1.200	0.438
1.6	0.350	1.000	1.200	0.420
1.7	0.336	1.000	1.200	0.404
1.8	0.324	1.000	1.200	0.389
1.9	0.313	1.000	1.200	0.375
2	0.302	1.000	1.200	0.363
2.2	0.276	1.000	1.200	0.331
2.4	0.254	1.000	1.200	0.304
2.5	0.244	1.000	1.200	0.293
2.6	0.235	1.000	1.200	0.282
2.8	0.219	1.000	1.200	0.262
3	0.205	1.000	1.200	0.246
3.2	0.190	1.000	1.200	0.229
3.4	0.178	1.000	1.200	0.214
3.5	0.172	1.000	1.200	0.207
3.6	0.167	1.000	1.200	0.200
3.8	0.157	1.000	1.200	0.189
4	0.149	1.000	1.200	0.178
4.2	0.143	1.000	1.200	0.171
4.4	0.137	1.000	1.200	0.164
4.6	0.132	1.000	1.200	0.158
4.8	0.127	1.000	1.200	0.153
5	0.123	1.000	1.200	0.148

MINIMUM DETERMINISTIC SPECTRUM

Period	SA
0.01	0.223
0.02	0.226
0.022	0.228
0.025	0.230
0.029	0.234
0.03	0.235
0.032	0.238

0.035	0.242
0.036	0.243
0.04	0.249
0.042	0.252
0.044	0.255
0.045	0.257
0.046	0.258
0.048	0.262
0.05	0.265
0.055	0.276
0.06	0.287
0.065	0.298
0.067	0.303
0.07	0.310
0.075	0.321
0.08	0.333
0.085	0.345
0.09	0.356
0.095	0.368
0.1	0.379
0.11	0.397
0.12	0.415
0.13	0.430
0.133	0.434
0.14	0.444
0.15	0.456
0.16	0.464
0.17	0.470
0.18	0.475
0.19	0.480
0.2	0.484
0.22	0.484
0.24	0.484
0.25	0.484
0.26	0.482
0.28	0.480
0.29	0.479
0.3	0.477
0.32	0.471
0.34	0.465
0.35	0.462
0.36	0.459
0.38	0.452
0.4	0.446
0.42	0.438
0.44	0.430
0.45	0.426
0.46	0.422
0.48	0.415

0.5	0.407
0.55	0.383
0.6	0.362
0.65	0.344
0.667	0.338
0.7	0.327
0.75	0.312
0.8	0.297
0.85	0.283
0.9	0.271
0.95	0.259
1	0.249
1.1	0.229
1.2	0.212
1.3	0.197
1.4	0.183
1.5	0.171
1.6	0.160
1.7	0.149
1.8	0.140
1.9	0.132
2	0.124
2.2	0.111
2.4	0.099
2.5	0.094
2.6	0.090
2.8	0.082
3	0.075
3.2	0.069
3.4	0.063
3.5	0.061
3.6	0.059
3.8	0.055
4	0.051
4.2	0.048
4.4	0.045
4.6	0.042
4.8	0.040
5	0.038

Envelope Data

Period	SA
0.01	0.339
0.02	0.384
0.022	0.392
0.025	0.402
0.029	0.414
0.03	0.417

0.032	0.423
0.035	0.430
0.036	0.433
0.04	0.442
0.042	0.447
0.044	0.451
0.045	0.453
0.046	0.455
0.048	0.459
0.05	0.463
0.055	0.472
0.06	0.480
0.065	0.488
0.067	0.491
0.07	0.496
0.075	0.503
0.08	0.509
0.085	0.516
0.09	0.522
0.095	0.527
0.1	0.533
0.11	0.551
0.12	0.568
0.13	0.584
0.133	0.589
0.14	0.600
0.15	0.614
0.16	0.628
0.17	0.642
0.18	0.655
0.19	0.667
0.2	0.679
0.22	0.684
0.24	0.688
0.25	0.691
0.26	0.693
0.28	0.696
0.29	0.698
0.3	0.700
0.32	0.693
0.34	0.687
0.35	0.684
0.36	0.682
0.38	0.680
0.4	0.677
0.42	0.677
0.44	0.676
0.45	0.675
0.46	0.675

0.48	0.673
0.5	0.672
0.55	0.669
0.6	0.667
0.65	0.665
0.667	0.664
0.7	0.663
0.75	0.662
0.8	0.658
0.85	0.655
0.9	0.651
0.95	0.648
1	0.644
1.1	0.615
1.2	0.588
1.3	0.564
1.4	0.541
1.5	0.520
1.6	0.496
1.7	0.475
1.8	0.455
1.9	0.437
2	0.421
2.2	0.384
2.4	0.352
2.5	0.338
2.6	0.324
2.8	0.300
3	0.278
3.2	0.259
3.4	0.242
3.5	0.234
3.6	0.226
3.8	0.213
4	0.200
4.2	0.190
4.4	0.180
4.6	0.171
4.8	0.162
5	0.155

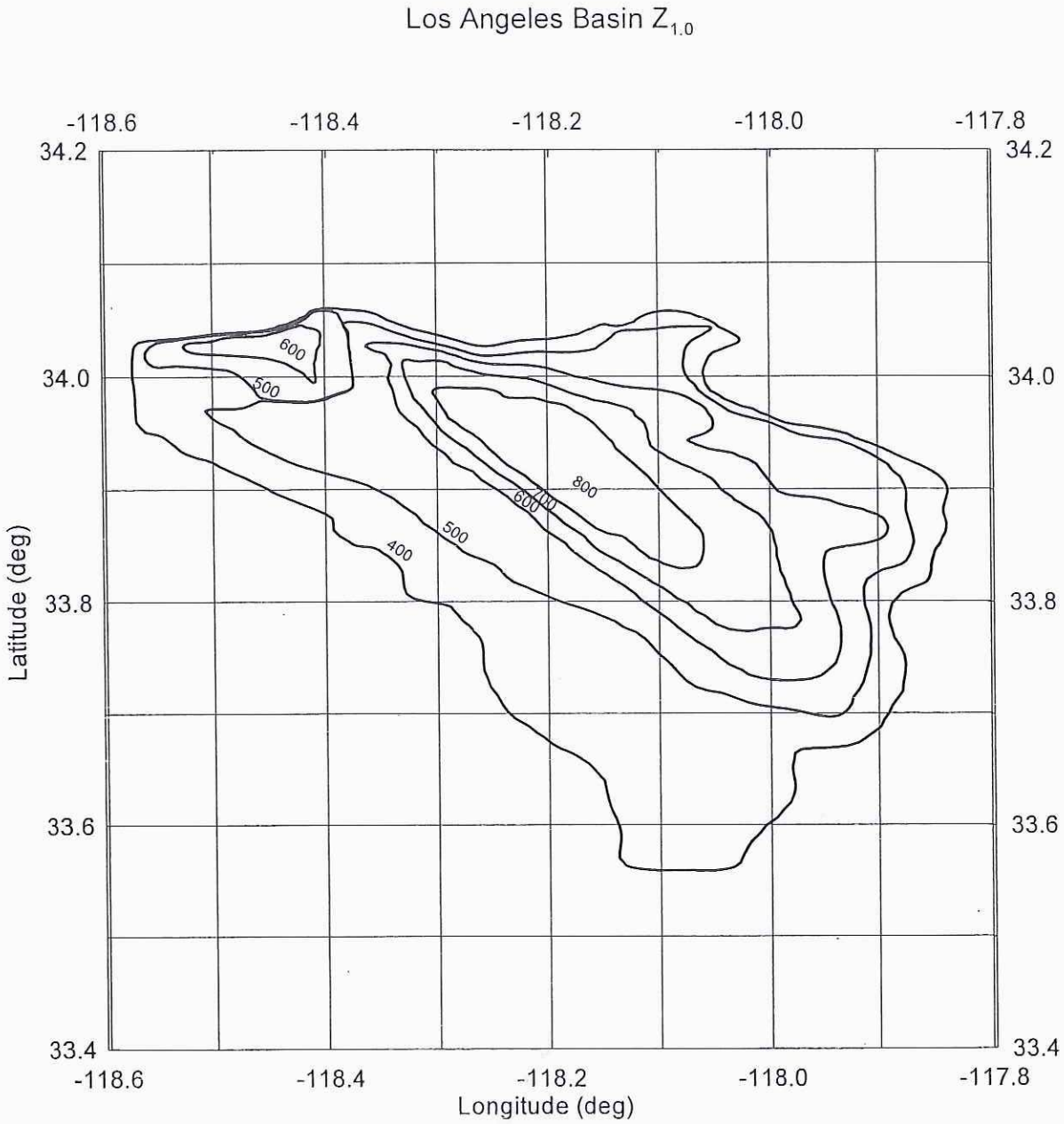


Figure B.5. Contours of depth (meters) to shear wave velocity 1 km/s ($Z_{1.0}$) in the Los Angeles basin.

SITE COORDINATES ARE OFF THIS MAP
LAT 33.43°
LONG -117.62° } → $Z_{1.0} = 0$ m

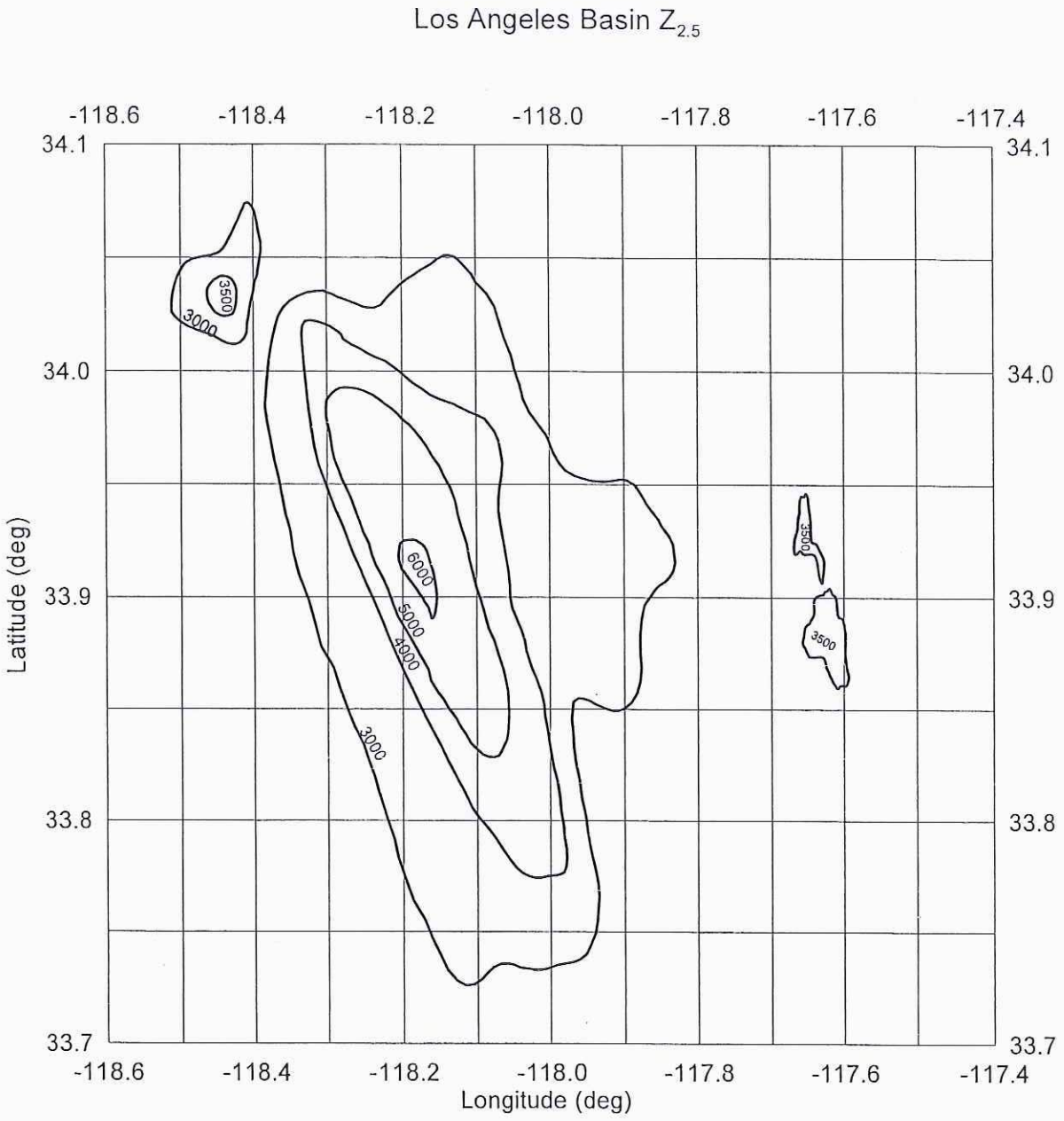


Figure B.6. Contours of depth (km) to shear wave velocity 2.5 km/s ($Z_{2.5}$) in the Los Angeles basin.

SITE COORD'S ARE OFF THIS MAP.

→ $Z_{2.5} = 0$ KM

Fault & Site Data Input Sheet

The input sheet is to help the user organize the site data for developing the design response spectrum. Beta-Testers: If you fill out the fault and site information for each location, please provide this document and the *checker* to facilitate the QC/QA procedures listed in the 2009 Deterministic Fault Information & Seismic Procedures QC/QA checklist.

Project Information

Dist – EA: 12 - 0F406B County: Orange Route: 5 PM: 3.4

Bridge/Facility Name: Avenida Pico Bridge/Facility No.: 55-0207

Latitude: 33.4389 Longitude: -117.6225

Fault Information (#1)

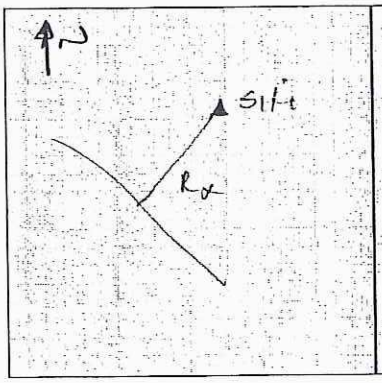
Fault Name: Newport Inglewood-Rose Canyon fault zone (Coltharp or Damapont segment) Fault ID#: 222

MMax: 7.5 Fault Type: RLSS

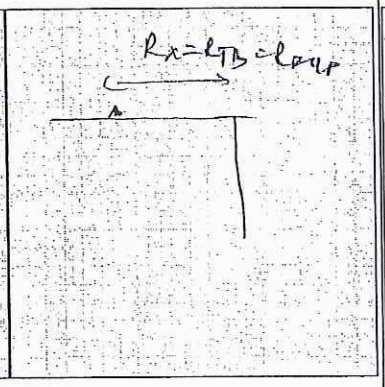
Fault Dip: 90 Dip Direction: V

Top of Rupture: 0 Bottom of Rupture: 13

Plan View



Elevation View



Calculated or Measure Distances

R_{RUP}: 7.5 km

R_{JB}: 7.5 km

R_X: 7.5 km

Determination of V_{S30}

V_{S30} (m/s): 224

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): 0

$Z_{2.5}$ (km/s): 0

Notes:
Similar calculations for other V_{S30}.

$V_{S30} = 214.2$ m/s.

Fault Information (#2)

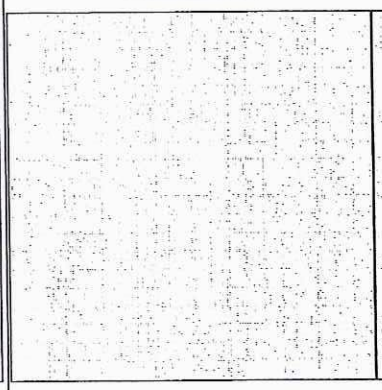
Fault Name: _____ Fault ID#: _____

MMax: _____ Fault Type: _____

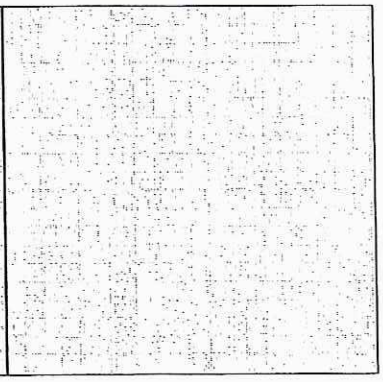
Fault Dip: _____ Dip Direction: _____

Top of Rupture: _____ Bottom of Rupture: _____

Plan View



Elevation View



Calculated or Measure Distances

R_{RUP}: _____

R_{JB}: _____

R_X: _____

Determination of V_{S30}

V_{S30} (m/s): _____

Determination of Z1.0 and Z2.5

$Z_{1.0}$ (m/s): _____

$Z_{2.5}$ (km/s): _____

Notes:

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

This document is to be filled out by *checker* to evaluate the fault parameters and design response spectrum used for seismic design recommendations for bridge structures. To facilitate the quality check, the designer shall provide the checker all pertinent project information, geologic information and approved exceptions (if applicable) needed to complete this form. The *checker* must be familiar with the Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and Geotechnical Services Design Manual in order to successfully perform a quality check. Tools available to checkers include the Deterministic Response Spectrum Spreadsheet, Probabilistic Response Spectrum Spreadsheet (after USGS), 2008 USGS National Seismic Hazard Map and the ARS Online web tool. The above documents and tools are available at http://dap3.dot.ca.gov/shake_stable/technical.php.

Project Information

Dist – EA: 12 – 0F96B County: ORA Route: 5 PM: 3.4

Bridge/Facility Name: Avenida Pico Bridge/Facility No.: 55 - 0207

Latitude: 33.4389 Longitude: -117.6225

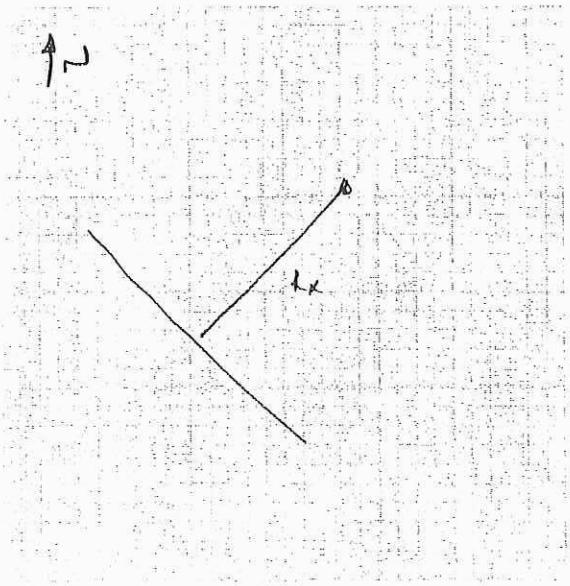
Deterministic Fault Information

Fault Name: Newport Inglewood Rose Canyon Fault ID#: 222 M_{MAX}: 7.5 Fault Type: BLSS

Fault Dip: 90 Dip Direction: V Top of Rupture: 0 Bottom of Rupture: 13

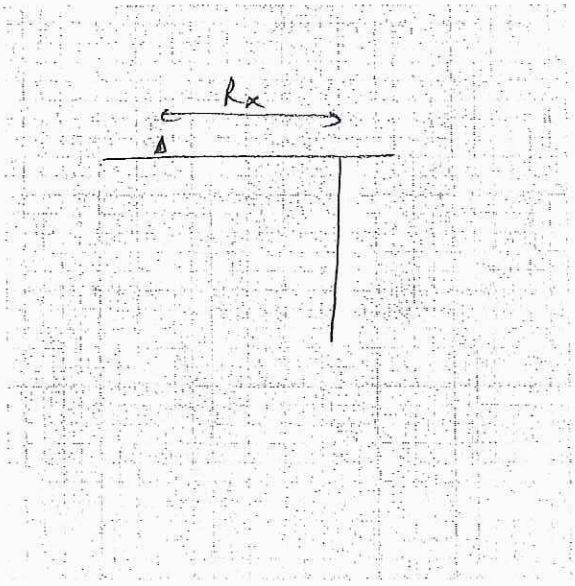
Plan View

(rough sketch; show dimensions)



Elevation View

(rough sketch; show dimensions)



Calculated or Measured Distances

R_{RUP}:	7.5 km	☒	Calculated / graphically	☒	Same as Rx (by definition)
R_{JB}:	7.5 km	☒	Calculated / graphically	☒	Same as Rx (by definition)
R_X:	7.5 km	☒	"Ruler" function on ARS Online	☐	Deterministic PGA Map

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Determination of V_{S30}

V_{S30} (m/s): 224

Method of Determining V_{S30}: SPT (e.g. P-S logging, Geophysics, SPT correlations, etc)

Additional Explanation (if needed): _____

Determination of Z1.0 and Z2.5 (if site located in designated California deep basin)

$Z_{1.0}$ (m/s): 0 $Z_{2.5}$ (km/s): 0

Method of Determining $Z_{1.0}$ & $Z_{2.5}$: ARS online (e.g. ARS Online, SDC figure, other)

Additional Explanation (if needed): _____

Deterministic - Special Conditions

Yes	No	N/A	
☒	☐		Was the Errata Deterministic Fault Database Spreadsheet reviewed to ensure that the correct fault parameters used in the analysis.
☒	☐	☐	Were the Near-Fault Factors applied correctly? *Applies to sites with a R_{RUP} distance of 25 km or less, as defined in the SDC.*
☒	☐	☐	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☐	☐	☒	If the site is located within the Eastern California Shear Zone (ECSZ), was the design ARS larger than the minimum spectrum for the ECSZ (as defined in the SDC, Appendix B, Figure B.2)?
☐	☐	☒	If the controlling fault is the Cascadia Subduction Zone, was the alternate seismic procedure applied correctly (as defined in the SDC, Appendix B)?
☐	☐	☒	If the deterministic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the deterministic design spectrum?
☒	☐		Did the ARS Online deterministic spectrum correspond within 10% of the calculated deterministic spectrum? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Probabilistic - Special Conditions

Yes	No	N/A	
☒	☐	☐	Were Near-Fault Factors applied correctly (as defined by SDC)? *Applies to sites with a deaggregation R distance of 25 km or less.*
☒	☐	☐	Were deep basin depths ($Z_{1.0}$ & $Z_{2.5}$) estimated correctly? *Applies to sites located in deep basins as shown in Figures B.5 - B.11 of the SDC or ARS Online.*
☒	☐	☐	If the site has a V_{S30} of less than 300 m/s, was the resulting ARS curve checked against spectral acceleration from USGS Interactive Deaggregation tool?
☒	☐	☐	If the USGS Interactive Deaggregation tool and spectral acceleration data were used, were the appropriate near-fault and basin correction factors applied?

2009 Deterministic Fault Information & Seismic Procedure QC/QA Checklist

Yes	No	N/A	
☐	☐	☒	If the probabilistic ARS falls below the Minimum Deterministic Spectra (as defined in the SDC), did the Minimum Deterministic Spectra control the design spectrum?
☒	☐		Did the ARS Online design spectrum correspond within 10% of the USGS spectral acceleration data from the verification spreadsheet? If not, note it in the comments section of this document and email a copy to the ARS Online development team, ARS_Online@dot.ca.gov, so that they may address the potential bug.

Comments / Observations Encountered during QC/QA process:

ARS curves were generated for other V_{s30} = 265, 319 & 327. Design ARS curve is average of ARS curves.

I certify that I have performed a quality check of the referenced fault information and design response spectrum provided by the geotechnical designer. The quality check is based on Seismic Design Criteria (Appendix B), Deterministic PGA Map and ARS Online Report, and the Geotechnical Services Design Manual.

LING CHEANG — PRINCIPAL
Checker (Print) — Title

[signature] — 1/24/2012
Checker (Signature) — Date

I certify that the referenced project complies with Geotechnical Service's Quality Control/Quality Assurance procedures, as described in the memorandum, "Quality Control/Quality Assurance for the 2009 Seismic Design Procedures", dated August 12, 2009.

LING CHEANG — PRINCIPAL
Functional Supervisor (Print) — Title

[signature] — 1/24/2012
Functional Supervisor (Signature) — Date

(This original checklist and signature sheet shall be placed in the geotechnical project file, and a copy sent to the Mark Willian of the Geotechnical Services Corporate Unit).

Location and Summary Information

Avenida Pico UC

Site		Latitude degree	Longitude degree
1	Road Bridge	33.43891	-117.62246

Summary of V_{s30}:

Boring Label	Calculated V_{s30} (m/sec)	Calculated V_{s30} (ft/sec)
A-11-114	224	734
A-11-115	265	869
A-11-116	319	1046
A-11-117	327	1072

Soil Boring Label A-11-114 **SHEAR WAVE VELOCITY (Vs30) CALCULATION**
Boring Type: Hollow Stem Boring Date: Logged by:
Site Represented: I-5 Seg 1

Determination of V_{s30} (m/sec) according to Section 1.1.7 of Geotechnical Services - Design Manual, Ver. 1.0, August 2009 (Caltrans)

i) $V_{s30} = \{1.45\text{-}0.015*d\}*V_{s(d)}$ in unit of m/sec

where d is the soil boring depth less than 30m or 100ft, and $V_{s(d)}$ is the time averaged V_s for the soil column upto d.

ii) $V_{s(d)} = d/\{\Sigma D_i/V_{s,i}\}$

where D_i 33.439 -117.62

Note: if d=30m, $V_{s(d)}=V_{s30}$.

Correlations between V_s and SPT-N value

i) Cohessionless Soils (like sand; Sykora, 1987)

$V_s = 100.5*(N_{60})^{0.29}$ <= 380m/sec

where N_{60} is the SPT-N value corrected only for the hammer energy, i.e., $N_{60}=N*H_{EG}/60$ (H_{EG}: hammer energy percentage).

ii) Cohesive Soils (like clay; Ohta and Goto, 1978)

$V_s = 86.9*(N_{60})^{0.333}$ <= 310m/sec

iii) Young Sedimentary Rock (Tertiary deposits)

$V_s = 109*(N_{60})^{0.319}$ <= 560m/sec

iv) Competent Rock

V_s = f(hardness, fracture) <= 760m/sec

Tabulated Calculation Performed by: CTY #######

H_{EG} (%)= 75

Depth (ft)	BC	SPT, MCD	N_{60}	Soil Type	V_s (m/sec)	Thickness (ft)		$D_i/V_{s,i}$
5	26	0.5	16	Sand	226	5		0.0222
10	8	1	10	Clay	187	5		0.0267
15	23	0.5	14	Clay	211	5		0.0237
20	9	1	11	Clay	195	5		0.0257
25	19	0.5	12	Clay	198	5		0.0252
30	6	1	8	Clay	170	5		0.0294
35	25	0.5	16	Clay	217	5		0.023
40	9	1	11	Clay	195	5		0.0257
45	24	0.5	15	Sand	220	5		0.0227
50	10	1	13	Sand	209	5		0.0239
55	29	0.5	18	Sand	233	5		0.0215
60	14	1	18	Clay	225	5		0.0222
65	18	0.5	11	Clay	195	5		0.0257
70	6	1	8	Clay	170	5		0.0294
75	16	0.5	10	Clay	187	5		0.0267
80	14	1	18	Clay	225	5		0.0222
85	120	0.5	75	Clay	310	5		0.0161
90	51	1	64	Bedrock	410	5		0.0122
95	150	0.5	94	Bedrock	464	5		0.0108
100	57	1	71	Bedrock	425	5		0.0118
					d (ft) =	100	$\Sigma D_i/V_{s,i}$=	0.4468

$V_{s(d)} = d/\{\Sigma D_i/V_{s,i}\}$= 224

$V_{s30} = \{1.45\text{-}0.015*d*.3048\}*V_{s(d)}$= 224 m/sec = 734.3 fpss

Soil Boring Label A-11-115 SHEAR WAVE VELOCITY (Vs30) CALCULATION
Boring Type: Hollow Stem Boring Date: Logged by:
Site Represented: I-5 Seg 1

Determination of V_{s30} (m/sec) according to Section 1.1.7 of Geotechnical Services - Design Manual, Ver. 1.0, August 2009 (Caltrans)

i) $V_{s30} = \{1.45\text{-}0.015*d\}*V_{s(d)}$ in unit of m/sec

where d is the soil boring depth less than 30m or 100ft, and $V_{s(d)}$ is the time averaged V_s for the soil column upto d.

ii) $V_{s(d)} = d/\{\Sigma D_i/V_{s,i}\}$

where D_i 33.439 -117.62

Note: if d=30m, $V_{s(d)}=V_{s30}$.

Correlations between V_s and SPT-N value

i) Cohessionless Soils (like sand; Sykora, 1987)

$V_s = 100.5*(N_{60})^{0.29}$ <= 380m/sec

where N_{60} is the SPT-N value corrected only for the hammer energy, i.e., $N_{60}=N*H_{EG}/60$ (H_{EG}: hammer energy percentage).

ii) Cohesive Soils (like clay; Ohta and Goto, 1978)

$V_s = 86.9*(N_{60})^{0.333}$ <= 310m/sec

iii) Young Sedimentary Rock (Tertiary deposits)

$V_s = 109*(N_{60})^{0.319}$ <= 560m/sec

iv) Competent Rock

V_s = f(hardness, fracture) <= 760m/sec

Tabulated Calculation Performed by: CTY #######

H_{EG} (%)= 75

Depth (ft)	BC	SPT, MCD	N_{60}	Soil Type	V_s (m/sec)	Thickness (ft)		$D_i/V_{s,i}$
5	8	1	10	Sand	196	5		0.0255
10	29	0.5	18	Sand	233	5		0.0215
15	20	1	25	Clay	254	5		0.0197
20	58	0.5	36	Clay	287	5		0.0174
25	10	1	13	Sand	209	5		0.0239
30	49	0.5	31	Sand	271	5		0.0184
35	15	1	19	Sand	235	5		0.0213
40	109	0.5	68	Clay	310	5		0.0161
45	30	1	38	Clay	291	5		0.0172
50	63	0.5	39	Clay	295	5		0.0169
55	9	1	11	Clay	195	5		0.0257
60	21	0.5	13	Clay	205	5		0.0244
65	4	1	5	Sand	160	5		0.0312
70	19	0.5	12	Clay	198	5		0.0252
75	43	1	54	Clay	310	5		0.0161
80	120	0.5	75	Bedrock	432	5		0.0116
85	65	1	81	Bedrock	443	5		0.0113
90	120	0.5	75	Bedrock	432	5		0.0116
95	73	1	91	Bedrock	460	5		0.0109
100	120	0.5	75	Bedrock	432	5		0.0116
					d (ft) =	100	$\Sigma D_i/V_{s,i}$=	0.3775

$V_{s(d)} = d/\{\Sigma D_i/V_{s,i}\}$= 265

$V_{s30} = \{1.45\text{-}0.015*d*.3048\}*V_{s(d)}$= 265 m/sec = 869.0 fpss

Soil Boring Label A-11-116 SHEAR WAVE VELOCITY (Vs30) CALCULATION
Boring Type: Hollow Stem Boring Date: Logged by:
Site Represented: I-5 Seg 1

Determination of V_{s30} (m/sec) according to Section 1.1.7 of Geotechnical Services - Design Manual, Ver. 1.0, August 2009 (Caltrans)

i) V_{s30} = {1.45-0.015*d}*$V_{s(d)}$ in unit of m/sec

where d is the soil boring depth less than 30m or 100ft, and $V_{s(d)}$ is the time averaged V_s for the soil column upto d.

ii) $V_{s(d)} = d/\{\Sigma D_i/V_{s,i}\}$

where D_i 33.439 -117.62

Note: if d=30m, $V_{s(d)}=V_{s30}$.

Correlations between V_s and SPT-N value

i) Cohessionless Soils (like sand; Sykora, 1987)

$V_s = 100.5*(N_{60})^{0.29}$ <= 380m/sec

where N_{60} is the SPT-N value corrected only for the hammer energy, i.e., $N_{60}=N*H_{EG}/60$ (H_{EG}: hammer energy percentage).

ii) Cohesive Soils (like clay; Ohta and Goto, 1978)

$V_s = 86.9*(N_{60})^{0.333}$ <= 310m/sec

iii) Young Sedimentary Rock (Tertiary deposits)

$V_s = 109*(N_{60})^{0.319}$ <= 560m/sec

iv) Competent Rock

V_s = f(hardness, fracture) <= 760m/sec

Tabulated Calculation Performed by: CTY #######

H_{EG} (%)= 75

Depth (ft)	BC	SPT, MCD	N_{60}	Soil Type	V_s (m/sec)	Thickness (ft)		$D_i/V_{s,i}$
5	4	1	5	Clay	149	5		0.0337
10	21	0.5	13	Clay	205	5		0.0244
15	9	1	11	Clay	195	5		0.0257
20	28	0.5	18	Clay	225	5		0.0222
25	7	1	9	Clay	179	5		0.0279
30	49	0.5	31	Bedrock	325	5		0.0154
35	13	1	16	Bedrock	265	5		0.0188
40	49	0.5	31	Bedrock	325	5		0.0154
45	53	1	66	Bedrock	415	5		0.012
50	100	0.5	63	Bedrock	408	5		0.0123
55	75	1	94	Bedrock	464	5		0.0108
60	120	0.5	75	Bedrock	432	5		0.0116
65	91	1	114	Bedrock	493	5		0.0101
70	120	0.5	75	Bedrock	432	5		0.0116
75	90	1	113	Bedrock	492	5		0.0102
80	120	0.5	75	Bedrock	432	5		0.0116
85	82	1	103	Bedrock	477	5		0.0105
90	150	1	188	Bedrock	560	5		0.0089
					d (ft) =	90	$\Sigma D_i/V_{s,i}$=	0.293

$V_{s(d)} = d/\{\Sigma D_i/V_{s,i}\}$= 307

V_{s30} = {1.45-0.015*d*.3048}*$V_{s(d)}$= 319 m/sec = 1046.4 fpss

Soil Boring Label A-11-117 SHEAR WAVE VELOCITY (Vs30) CALCULATION
Boring Type: Hollow Stem Boring Date: Logged by:
Site Represented: I-5 Seg 1

Determination of V_{s30} (m/sec) according to Section 1.1.7 of Geotechnical Services - Design Manual, Ver. 1.0, August 2009 (Caltrans)

i) $V_{s30} = \{1.45\text{-}0.015*d\}*V_{s(d)}$ in unit of m/sec

where d is the soil boring depth less than 30m or 100ft, and $V_{s(d)}$ is the time averaged V_s for the soil column upto d.

ii) $V_{s(d)} = d/\{\Sigma D_i/V_{s,i}\}$

where D_i 33.439 -117.62

Note: if d=30m, $V_{s(d)}=V_{s30}$.

Correlations between V_s and SPT-N value

i) Cohessionless Soils (like sand; Sykora, 1987)

$V_s = 100.5*(N_{60})^{0.29}$ <= 380m/sec

where N_{60} is the SPT-N value corrected only for the hammer energy, i.e., $N_{60}=N*H_{EG}/60$ (H_{EG}: hammer energy percentage).

ii) Cohesive Soils (like clay; Ohta and Goto, 1978)

$V_s = 86.9*(N_{60})^{0.333}$ <= 310m/sec

iii) Young Sedimentary Rock (Tertiary deposits)

$V_s = 109*(N_{60})^{0.319}$ <= 560m/sec

iv) Competent Rock

V_s = f(hardness, fracture) <= 760m/sec

Tabulated Calculation Performed by: CTY #######

H_{EG} (%)= 75

Depth (ft)	BC	SPT, MCD	N_{60}	Soil Type	V_s (m/sec)	Thickness (ft)		$D_i/V_{s,i}$
5	38	0.5	24	Clay	250	5		0.02
10	36	1	45	Clay	309	5		0.0162
15	20	0.5	13	Clay	202	5		0.0248
20	9	1	11	Clay	195	5		0.0257
25	12	0.5	8	Clay	170	5		0.0294
30	20	1	25	Bedrock	304	5		0.0164
35	70	0.5	44	Bedrock	364	5		0.0137
40	11	1	14	Bedrock	252	5		0.0199
45	67	0.5	42	Bedrock	359	5		0.0139
50	35	1	44	Bedrock	364	5		0.0137
55	120	0.5	75	Bedrock	432	5		0.0116
60	65	1	81	Bedrock	443	5		0.0113
65	120	0.5	75	Bedrock	432	5		0.0116
70	60	1	75	Bedrock	432	5		0.0116
75	120	0.5	75	Bedrock	432	5		0.0116
80	84	1	105	Bedrock	481	5		0.0104
85	120	0.5	75	Bedrock	432	5		0.0116
90	76	1	95	Bedrock	466	5		0.0107
95	120	0.5	75	Bedrock	432	5		0.0116
100	88	1	110	Bedrock	488	5		0.0102
					d (ft) =	100	$\Sigma D_i/V_{s,i}$=	0.306

$V_{s(d)} = d/\{\Sigma D_i/V_{s,i}\}$= 327

$V_{s30} = \{1.45\text{-}0.015*d*.3048\}*V_{s(d)}$= 327 m/sec = 1072.3 fpss

1/2

Comparison of ARS Curves
(unlock sheet with "shmi")

Model Inputs

Fault

Magnitude	7.5	(5 to 8.5)
F_{RV}	0	(input 1 = Rev)
F_{NM}	0	(input 1 = Normal)
Dip (degree)	90	(0 to 90)
Z_{TOR} (km)	0	

Distance

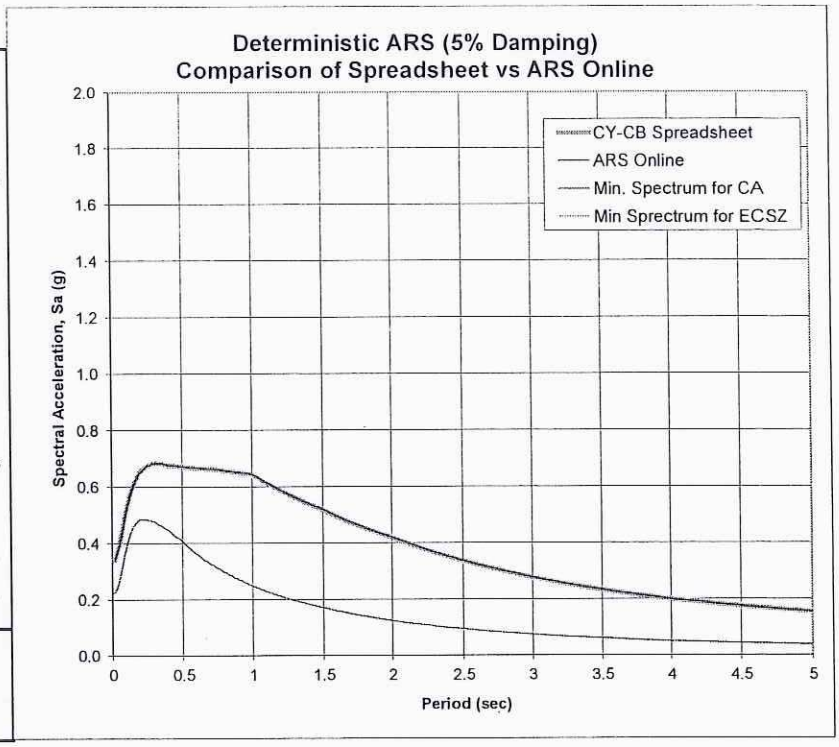
R_{RUP} (km)	7.5	
R_{JB} (km)	7.5	
R_{X} (km)	7.5	
Hanging Wall?	☐ Yes?	
Near-Field Factor?	☑ Yes?	

Site

V_{S30} (m/sec)	224	(270 to 1500 m/s)
$Z_{1.0}$ (m)	0	(0 - No Basin)
$Z_{2.5}$ (km)	0	(0 - No Basin)
No. Cal. Basin?	☐ Yes ?	(Check only for sites located within a Basin)
So. Cal. Basin?	☐ Yes ?	

Analysis

ARS Online vs CY-CB Spreadsheet Results
MAX. % Diff. = 0%



CY-CB Spreadsheet Results	
T (sec)	CB-CY S(a)
0.010	0.33881
0.020	0.34259
0.022	0.34551
0.025	0.34906
0.029	0.35317
0.030	0.35457
0.032	0.35835
0.035	0.36363
0.036	0.36527
0.040	0.37154
0.042	0.37514
0.044	0.37883
0.045	0.38081
0.046	0.38277
0.048	0.38644
0.050	0.39003
0.055	0.40111
0.060	0.41239
0.065	0.42386
0.067	0.42868
0.070	0.43583
0.075	0.44771
0.080	0.46046
0.085	0.47303
0.090	0.48557
0.095	0.49797
0.100	0.50997
0.110	0.53128
0.120	0.55101
0.130	0.56907
0.133	0.57400
0.140	0.58483
0.150	0.59923
0.160	0.61171
0.170	0.62280
0.180	0.63312
0.190	0.64250
0.200	0.65105
0.220	0.66125
0.240	0.66963
0.250	0.67307
0.260	0.67538

Place ARS Online Deterministic Data Here "Paste"					
T (sec)	Base S(a)	Basin Factor	Near Fault Factor	Final Adj. S(a)	Diff. (%)
0.01	0.339	1	1	0.339	0%
0.02	0.343	1	1	0.343	0%
0.022	0.346	1	1	0.346	0%
0.025	0.349	1	1	0.349	0%
0.029	0.353	1	1	0.353	0%
0.03	0.355	1	1	0.355	0%
0.032	0.359	1	1	0.359	0%
0.035	0.364	1	1	0.364	0%
0.036	0.366	1	1	0.366	0%
0.04	0.372	1	1	0.372	0%
0.042	0.375	1	1	0.375	0%
0.044	0.379	1	1	0.379	0%
0.045	0.381	1	1	0.381	0%
0.046	0.383	1	1	0.383	0%
0.048	0.387	1	1	0.387	0%
0.05	0.39	1	1	0.39	0%
0.055	0.401	1	1	0.401	0%
0.06	0.413	1	1	0.413	0%
0.065	0.424	1	1	0.424	0%
0.067	0.429	1	1	0.429	0%
0.07	0.436	1	1	0.436	0%
0.075	0.448	1	1	0.448	0%
0.08	0.461	1	1	0.461	0%
0.085	0.473	1	1	0.473	0%
0.09	0.486	1	1	0.486	0%
0.095	0.498	1	1	0.498	0%
0.1	0.51	1	1	0.51	0%
0.11	0.532	1	1	0.532	0%
0.12	0.551	1	1	0.551	0%
0.13	0.569	1	1	0.569	0%
0.133	0.574	1	1	0.574	0%
0.14	0.585	1	1	0.585	0%
0.15	0.6	1	1	0.6	0%
0.16	0.612	1	1	0.612	0%
0.17	0.623	1	1	0.623	0%
0.18	0.633	1	1	0.633	0%
0.19	0.643	1	1	0.643	0%
0.2	0.651	1	1	0.651	0%
0.22	0.662	1	1	0.662	0%
0.24	0.67	1	1	0.67	0%
0.25	0.673	1	1	0.673	0%
0.26	0.676	1	1	0.676	0%

For Comparsion Plots of Min. Sprectra, Paste Special into Cells			
Min. Spectrum for CA		Min Sprectrum for ECSZ	
T (sec)	S (a)	T (sec)	S (a)
0.01	0.2234038		
0.02	0.2256376		
0.022	0.2276547		
0.025	0.2303013		
0.029	0.233556		
0.03	0.2345497		
0.032	0.2375797		
0.035	0.2419556		
0.036	0.2434042		
0.04	0.2489994		
0.042	0.2520481		
0.044	0.2551576		
0.045	0.2567693		
0.046	0.2583927		
0.048	0.2615121		
0.05	0.2646314		
0.055	0.2757551		
0.06	0.2869636		
0.065	0.2981952		
0.067	0.3027642		
0.07	0.3095666		
0.075	0.3208272		
0.08	0.3327975		
0.085	0.3446017		
0.09	0.3562597		
0.095	0.367705		
0.1	0.378821		
0.11	0.3974865		
0.12	0.4146552		
0.13	0.4302351		
0.133	0.4344693		
0.14	0.4438699		
0.15	0.456247		
0.16	0.4635215		
0.17	0.4696333		
0.18	0.475001		
0.19	0.4795607		
0.2	0.4834958		
0.22	0.4844541		
0.24	0.4841874		
0.25	0.483591		
0.26	0.4824947		

0.280	0.67988
0.290	0.68124
0.300	0.68266
0.320	0.68325
0.340	0.68279
0.350	0.68218
0.360	0.68142
0.380	0.67926
0.400	0.67671
0.420	0.67618
0.440	0.67506
0.450	0.67469
0.460	0.67405
0.480	0.67270
0.500	0.67142
0.550	0.66827
0.600	0.66614
0.650	0.66420
0.660	0.66261
0.700	0.66259
0.750	0.66147
0.800	0.65753
0.850	0.65384
0.900	0.65008
0.950	0.64695
1.000	0.64358
1.100	0.61397
1.200	0.58706
1.300	0.56254
1.400	0.53992
1.500	0.51832
1.600	0.49500
1.700	0.47338
1.800	0.45376
1.900	0.43591
2.000	0.41941
2.200	0.38282
2.400	0.35098
2.500	0.33662
2.600	0.32320
2.800	0.29892
3.000	0.27769
3.200	0.25830
3.400	0.24110
3.500	0.23323
3.600	0.22578
3.800	0.21201
4.000	0.19968
4.200	0.18912
4.400	0.17932
4.600	0.17034
4.800	0.16209
5.000	0.15444

0.28	0.68	1	1	0.68	0%
0.29	0.682	1	1	0.682	0%
0.3	0.683	1	1	0.683	0%
0.32	0.684	1	1	0.684	0%
0.34	0.683	1	1	0.683	0%
0.35	0.683	1	1	0.683	0%
0.36	0.682	1	1	0.682	0%
0.38	0.68	1	1	0.68	0%
0.4	0.677	1	1	0.677	0%
0.42	0.677	1	1	0.677	0%
0.44	0.676	1	1	0.676	0%
0.45	0.675	1	1	0.675	0%
0.46	0.675	1	1	0.675	0%
0.48	0.673	1	1	0.673	0%
0.5	0.672	1	1	0.672	0%
0.55	0.656	1	1.02	0.669	0%
0.6	0.641	1	1.04	0.667	0%
0.65	0.627	1	1.06	0.665	0%
0.667	0.623	1	1.067	0.664	0%
0.7	0.614	1	1.08	0.663	0%
0.75	0.602	1	1.1	0.662	0%
0.8	0.588	1	1.12	0.658	0%
0.85	0.574	1	1.14	0.655	0%
0.9	0.561	1	1.16	0.651	0%
0.95	0.549	1	1.18	0.648	0%
1	0.537	1	1.2	0.644	0%
1.1	0.512	1	1.2	0.615	0%
1.2	0.49	1	1.2	0.588	0%
1.3	0.47	1	1.2	0.564	0%
1.4	0.451	1	1.2	0.541	0%
1.5	0.433	1	1.2	0.52	0%
1.6	0.414	1	1.2	0.496	0%
1.7	0.396	1	1.2	0.475	0%
1.8	0.379	1	1.2	0.455	0%
1.9	0.364	1	1.2	0.437	0%
2	0.351	1	1.2	0.421	0%
2.2	0.32	1	1.2	0.384	0%
2.4	0.293	1	1.2	0.352	0%
2.5	0.281	1	1.2	0.338	0%
2.6	0.27	1	1.2	0.324	0%
2.8	0.25	1	1.2	0.3	0%
3	0.232	1	1.2	0.278	0%
3.2	0.216	1	1.2	0.259	0%
3.4	0.201	1	1.2	0.242	0%
3.5	0.195	1	1.2	0.234	0%
3.6	0.189	1	1.2	0.226	0%
3.8	0.177	1	1.2	0.213	0%
4	0.167	1	1.2	0.2	0%
4.2	0.158	1	1.2	0.19	0%
4.4	0.15	1	1.2	0.18	0%
4.6	0.142	1	1.2	0.171	0%
4.8	0.135	1	1.2	0.162	0%
5	0.129	1	1.2	0.155	0%

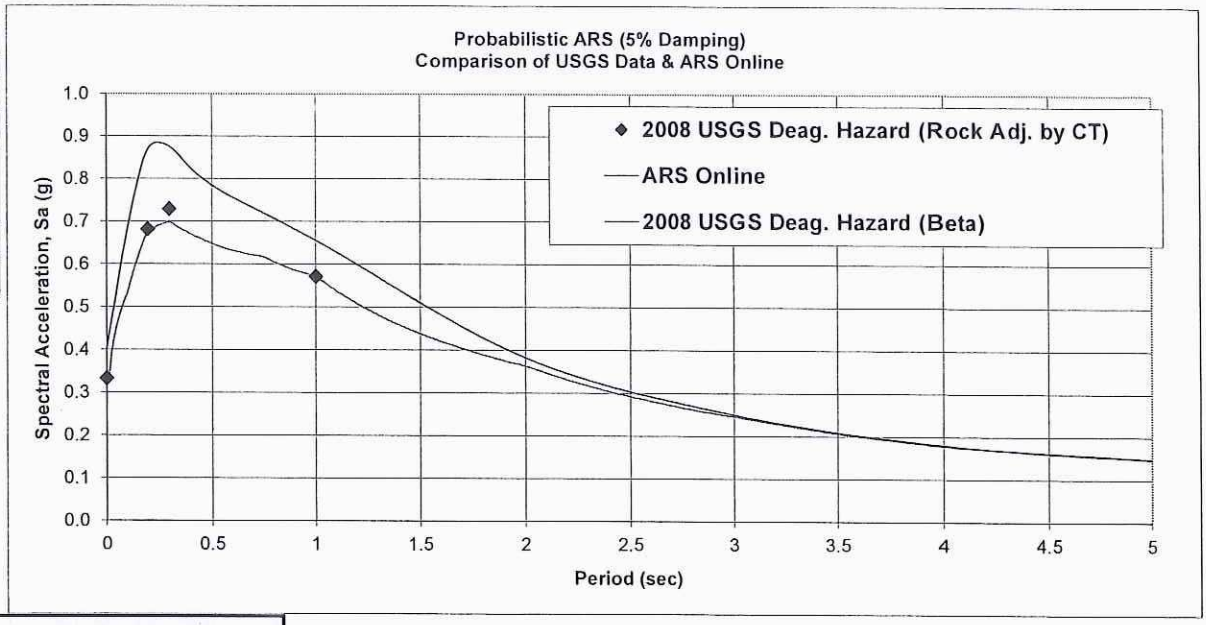
0.28	0.4802423		
0.29	0.4786355		
0.3	0.4770196		
0.32	0.4712743		
0.34	0.4651923		
0.35	0.4620307		
0.36	0.4588719		
0.38	0.4523977		
0.4	0.4459665		
0.42	0.4377747		
0.44	0.4296952		
0.45	0.4258622		
0.46	0.4219931		
0.48	0.4145305		
0.5	0.407355		
0.55	0.3833327		
0.6	0.3623743		
0.65	0.3436883		
0.66	0.3391291		
0.7	0.326995		
0.75	0.3119787		
0.8	0.2970197		
0.85	0.2833707		
0.9	0.2708168		
0.95	0.2593664		
1	0.2486899		
1.1	0.2286379		
1.2	0.2113585		
1.3	0.1962825		
1.4	0.1829211		
1.5	0.1708797		
1.6	0.1593326		
1.7	0.1489779		
1.8	0.1397407		
1.9	0.1314733		
2	0.1240595		
2.2	0.1105038		
2.4	0.0991762		
2.5	0.0942053		
2.6	0.0896319		
2.8	0.0814984		
3	0.0745246		
3.2	0.0685047		
3.4	0.0632381		
3.5	0.0608516		
3.6	0.0586042		
3.8	0.0544779		
4	0.0508067		
4.2	0.047684		
4.4	0.0448398		
4.6	0.0422527		
4.8	0.0398806		
5	0.0377048		

Comparison spreadsheet of the 2008 USGS Probabilistic Seismic Hazard Data and ARS Online Probabilistic Data
Spectral Accelerations Points from USGS Website at http://earthquake.usgs.gov/research/hazmaps/products_data/2008/data/

(unlock spreadsheet "shmi")

*** Note: This spreadsheet uses the given latitude and longitude data provided by the user to estimate spectral acceleration values with a probability of exceedence 5% in 50 yrs (or 975 yr return period). The four spectral acceleration data points plotted on the graph are from the USGS website and are based on a 0.05 degree grid. Basic interpolation is used to estimate intermediate values inside each grid. Raw Data points are provided in the tabs of this spreadsheet. Corner grid spectral acceleration data are shown in the "calculation" tab.**

Input Site Information	
Latitude	Longitude
33.4389	-117.6225
V_{S30} (m/s) =	224
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	7.4
$Z_{1.0}$ (m) =	0
$Z_{2.5}$ (km) =	0



Place ARS Online Probabilistic Data Here "Paste"				
T (sec)	Base Spectrum S(a)	Basin Factor	Near Fault Factor	Final Adj. Spectrum S(a)
0.01	0.333	1	1	0.333
0.02	0.384	1	1	0.384
0.022	0.392	1	1	0.392
0.025	0.402	1	1	0.402
0.029	0.414	1	1	0.414
0.03	0.417	1	1	0.417
0.032	0.423	1	1	0.423
0.035	0.43	1	1	0.43
0.036	0.433	1	1	0.433
0.04	0.442	1	1	0.442
0.042	0.447	1	1	0.447
0.044	0.451	1	1	0.451
0.045	0.453	1	1	0.453
0.046	0.455	1	1	0.455
0.048	0.459	1	1	0.459
0.05	0.463	1	1	0.463
0.055	0.472	1	1	0.472
0.06	0.48	1	1	0.48
0.065	0.488	1	1	0.488
0.067	0.491	1	1	0.491
0.07	0.496	1	1	0.496
0.075	0.503	1	1	0.503
0.08	0.509	1	1	0.509
0.085	0.516	1	1	0.516
0.09	0.522	1	1	0.522
0.095	0.527	1	1	0.527
0.1	0.533	1	1	0.533
0.11	0.551	1	1	0.551
0.12	0.568	1	1	0.568
0.13	0.584	1	1	0.584
0.133	0.589	1	1	0.589
0.14	0.6	1	1	0.6
0.15	0.614	1	1	0.614
0.16	0.628	1	1	0.628
0.17	0.642	1	1	0.642
0.18	0.655	1	1	0.655
0.19	0.667	1	1	0.667
0.2	0.679	1	1	0.679
0.22	0.684	1	1	0.684
0.24	0.688	1	1	0.688
0.25	0.691	1	1	0.691
0.26	0.693	1	1	0.693

Analysis of ARS Online Results vs USGS Deaggregation Hazard (Adj. By CT)							
Period (sec)	USGS Interpolated Spectral Accel.	Adj. for Near Fault Effect	Adj. for Soil Amplification	Adj. For Basin Effect	Final Adj. USGS Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.342	1.000	0.973	1.000	0.333	0.333	0.0%
0.2	0.816	1.000	0.836	1.000	0.682	0.679	0.4%
0.3	0.675	1.000	1.080	1.000	0.729	0.7	4.0%
1	0.257	1.200	1.857	1.000	0.572	0.571	0.2%
					Max % Difference =		4.0%

USGS Deaggregation Hazard (Beta) with Near Field and Basin Factors						
Period (sec)	INPUT USGS Deagg. Spec Accel	Adj. for Near Fault Effect	Adj. For Basin Effect	Final Adj. USGS Deagg Spec Accel	ARS Online Final Adj. Spect. Accel.	% Difference (bet. USGS & ARS Online)
0	0.4077	1.000	1.000	0.408	0.333	*18.3%*
0.1	0.6833	1.000	1.000	0.683	0.533	*22.0%*
0.2	0.8699	1.000	1.000	0.870	0.679	*21.9%*
0.3	0.8762	1.000	1.000	0.876	0.7	*20.1%*
0.5	0.7843	1.000	1.000	0.784	0.648	17.4%
1	0.5464	1.200	1.000	0.656	0.571	12.9%
2	0.3185	1.200	1.000	0.382	0.363	5.0%
3	0.2087	1.200	1.000	0.251	0.246	1.8%
4	0.1503	1.200	1.001	0.180	0.178	1.4%
5	0.124	1.200	1.001	0.149	0.148	0.6%
				Max % Difference =		17.4%

0.28	0.696	1	1	0.696
0.29	0.698	1	1	0.698
0.3	0.7	1	1	0.7
0.32	0.693	1	1	0.693
0.34	0.687	1	1	0.687
0.35	0.684	1	1	0.684
0.36	0.681	1	1	0.681
0.38	0.676	1	1	0.676
0.4	0.67	1	1	0.67
0.42	0.665	1	1	0.665
0.44	0.661	1	1	0.661
0.45	0.659	1	1	0.659
0.46	0.656	1	1	0.656
0.48	0.652	1	1	0.652
0.5	0.648	1	1	0.648
0.55	0.627	1	1.02	0.639
0.6	0.607	1	1.04	0.632
0.65	0.59	1	1.06	0.626
0.667	0.585	1	1.067	0.624
0.7	0.575	1	1.08	0.621
0.75	0.561	1	1.1	0.617
0.8	0.541	1	1.12	0.605
0.85	0.522	1	1.14	0.595
0.9	0.506	1	1.16	0.586
0.95	0.49	1	1.18	0.579
1	0.476	1	1.2	0.571
1.1	0.447	1	1.2	0.537
1.2	0.423	1	1.2	0.507
1.3	0.401	1	1.2	0.481
1.4	0.382	1	1.2	0.458
1.5	0.365	1	1.2	0.438
1.6	0.35	1	1.2	0.42
1.7	0.336	1	1.2	0.404
1.8	0.324	1	1.2	0.389
1.9	0.313	1	1.2	0.375
2	0.302	1	1.2	0.363
2.2	0.276	1	1.2	0.331
2.4	0.254	1	1.2	0.304
2.5	0.244	1	1.2	0.293
2.6	0.235	1	1.2	0.282
2.8	0.219	1	1.2	0.262
3	0.205	1	1.2	0.246
3.2	0.19	1	1.2	0.229
3.4	0.178	1	1.2	0.214
3.5	0.172	1	1.2	0.207
3.6	0.167	1	1.2	0.2
3.8	0.157	1	1.2	0.189
4	0.149	1	1.2	0.178
4.2	0.143	1	1.2	0.171
4.4	0.137	1	1.2	0.164
4.6	0.132	1	1.2	0.158
4.8	0.127	1	1.2	0.153
5	0.123	1	1.2	0.148

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

July 10, 2013

EMI Project No. 11-135

Parsons
2201 Dupont Drive, Suite 200
Irvine, California 92612

Attention: Mr. M. Mohseni

Subject: Addendum to Foundation Report for Tieback Wall 190 (Bridge No. 55E-0141), I-5 HOV Improvement Project (Segment 1), San Clemente, California, 12-ORA-5, PM 3.4, Caltrans Project No. 1200020277 (EA 12-0F96B)

Dear Mr. Mohseni:

Per your request, this letter is prepared to address a request dated July 9, 2013 by Caltrans OSFP to provide a wall friction coefficient between the soil and the geocomposite drain (see attachment). At the soil/fabric interface of the geocomposite drain, we recommend using a frictional coefficient of 0.28 for both temporary and permanent conditions. This frictional coefficient does not apply to the shotcrete/plastic interface of the geocomposite drain.

If you have any questions, please call us.

Sincerely,

EARTH MECHANICS, INC.

7/10/13
Mike Kapuskar, GE
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
MIKE KAPUSKAR
No. GE2564
Expires 12-31-14
GEOTECHNICAL
STATE OF CALIFORNIA

7/10/13
Lino Cheang, GE
Project Manager

REGISTERED PROFESSIONAL ENGINEER
LINO C. CHEANG
NO. GE 2345
EXP. 9/30/13
GEOTECHNICAL
STATE OF CALIFORNIA

17800 Newhope Street, Suite B, Fountain Valley, California 92708 Tel: (714) 751-3826 Fax: (714) 751-3928

ATTACHMENT

Office of Special Funded Projects
Comment & Response Form

(Revised 08/2011)

General Project Information (OSFP Liaison to complete)		Review Phase (OSFP Liaison to complete)	Reviewer Information (Reviewer Liaison to complete)	
Dist:	12	☐ PSR/PDS (Review No.)	Reviewer Name:	Kumi J
Proj ID (Phase):		☐ APS/PSR (Review No.)	Functional Unit:	OSFP
Project Name:		☐ APS/PR (Review No.)	Cost Center:	
OSFP Liaison:	Lugi Yang	☐ Type Selection	Phone Number:	227-8903
Phone:	227-8400	☐ 65% PS&E Unchecked Details	e-mail:	Kumi_jayananth@dot.ca.gov
E-mail:	Lugi_yang@dot.ca.gov	☑ PS&E (Review No. 4)	Date of Review:	7/09/2013
		☐ Construction	Structure Name*:	
		☐ Other: CCO	Br No*:	55E-0141
			(*Use if necessary to when comment sheets are by individual structure)	

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	Structure Consultant Firm	Phone Number	E-mail	Response Date

Response to consultant's response

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	DC	13	Per your calculation, transverse reinforcement Smax 6.91" but you have provided 12"spacing. Per page 13, Vu=21.95k is less than Φ(vc+Vp)=15.68Kip, so stirrups are needed. Therefore, Smax of 6.91 need to be applied.	Should transverse shear was required; Smax of 6.91" would have applied. However, the transverse shear reinforcement was not required. We provided a minimum of reinforcing spaced at 12" regardless.	
2	DC/CC		Have you checked the wall for punching shear. If so, please let me know the page numbers.		
3	DC		Provide addendum to Foundation Report to address the friction coefficient of 0.28 between the soil and geocomposite drain.	Complied.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved (for Reviewer's use)

Submittal Data (Reviewer to complete)

Project ID: Reviewer: Str Name*:

Date of Review: Functional Unit:__ Br No*. *=if applicable

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved
(for Reviewer's use)

FINAL FOUNDATION REPORT

Wall 190 (Bridge No. 55E-0141), PM 3.4

Interstate 5 HOV Improvement Project (Segment 1)
San Clemente, Orange County, CA
12-ORA-5, PM 3.0/3.7
Caltrans Project No. 1200020277 (EA 12-0F96B
EMI Project No. 11-135
Date: October 1, 2012

EARTH MECHANICS, INC.

Geotechnical and Earthquake Engineering

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

October 1, 2012

EMI Project No. 11-135

Parsons
2201 Dupont Drive, Suite 200
Irvine, California 92612

Attention: Mr. M. Mohseni

Subject: Final Foundation Report for Tieback Wall 190 (Bridge No. 55E-0141), I-5 HOV Improvement Project (Segment 1), San Clemente, California, 12-ORA-5, PM 3.4, Caltrans Project No. 1200020277 (EA 12-0F96B)

Dear Mr. Mohseni:

Attached please find the Final Foundation Report for the proposed tieback Wall 190 for the subject I-5 HOV Improvement Project (Segment 1). This report contains our findings of our geotechnical investigation and laboratory testing, conclusions, and recommendations for the design and construction of the proposed wall. Caltrans review comments and our responses are attached in Appendix D. The comments are incorporated into this Final Report.

We appreciate the opportunity to provide geotechnical design services for this project. If you have any questions, please call us.

Sincerely,
EARTH MECHANICS, INC.

10/11/12

Mike Kapuskar, GE
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
MIKE KAPUSKAR
No. GE2564
Expires 12-31-12
GEOTECHNICAL
STATE OF CALIFORNIA

10/1/12

Lino Cheang, GE
Project Manager

REGISTERED PROFESSIONAL ENGINEER
LINO C. CHEANG
NO. GE 2345
EXP. 9/30/13
GEOTECHNICAL
STATE OF CALIFORNIA

10/1/12

Wendy A. Drummond, CEG
Certified Engineering Geologist
MK/lcc/wd

CERTIFIED ENGINEERING GEOLOGIST
WENDY A. DRUMMOND
CEG No. 2049
EXP. 8/31/2013
STATE OF CALIFORNIA

17800 Newhope Street, Suite B, Fountain Valley, California 92708 Tel: (714) 751-3826 Fax: (714) 751-3928

FINAL FOUNDATION REPORT

WALL 190 (BRIDGE NO. 55E-0141)

INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)
SAN CLEMENTE, ORANGE COUNTY, CA
12-ORA-5, PM 3.4
CALTRANS PROJECT NO. 1200020277 (EA 12-0F96B)

Prepared for:

Parsons
2201 Dupont Drive, Suite 200
Irvine, California 92612

Prepared By:

Earth Mechanics, Inc.
17800 Newhope Street, Suite B
Fountain Valley, California 92708

EMI Project No. 11-135

October 1, 2012

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

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Appendix A. Log of Test Borings Sheets
Appendix B. Laboratory Test Results
Appendix C. Design Calculations
Appendix D. Caltrans Review Comments and EMI Responses

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF STUDY

This Foundation Report presents findings and conclusions of a geotechnical investigation conducted by Earth Mechanics, Inc. (EMI) for proposed tieback Wall 190 for the Interstate 5 (I-5) High-Occupancy Vehicle (HOV) Lanes Improvement Project (Segment 1) located in San Clemente, California. The project location is shown on the Site Location Map in Figure 1. The purpose of the geotechnical investigation was to obtain subsurface information to develop design and construction recommendations to assist Parsons in the preparation of the Project Plans, Specifications, and Estimates (PS&E) for the proposed wall.

The following geotechnical services were completed for this project:

- Geotechnical field exploration consisting of drilling and logging exploratory borings and cone penetrometer sounding,
- Laboratory testing of selected soil/bedrock samples,
- Engineering calculations and analysis to develop foundation design and construction recommendations for the proposed retaining wall, and
- Preparation of this report presenting our findings, conclusions, and recommendations.

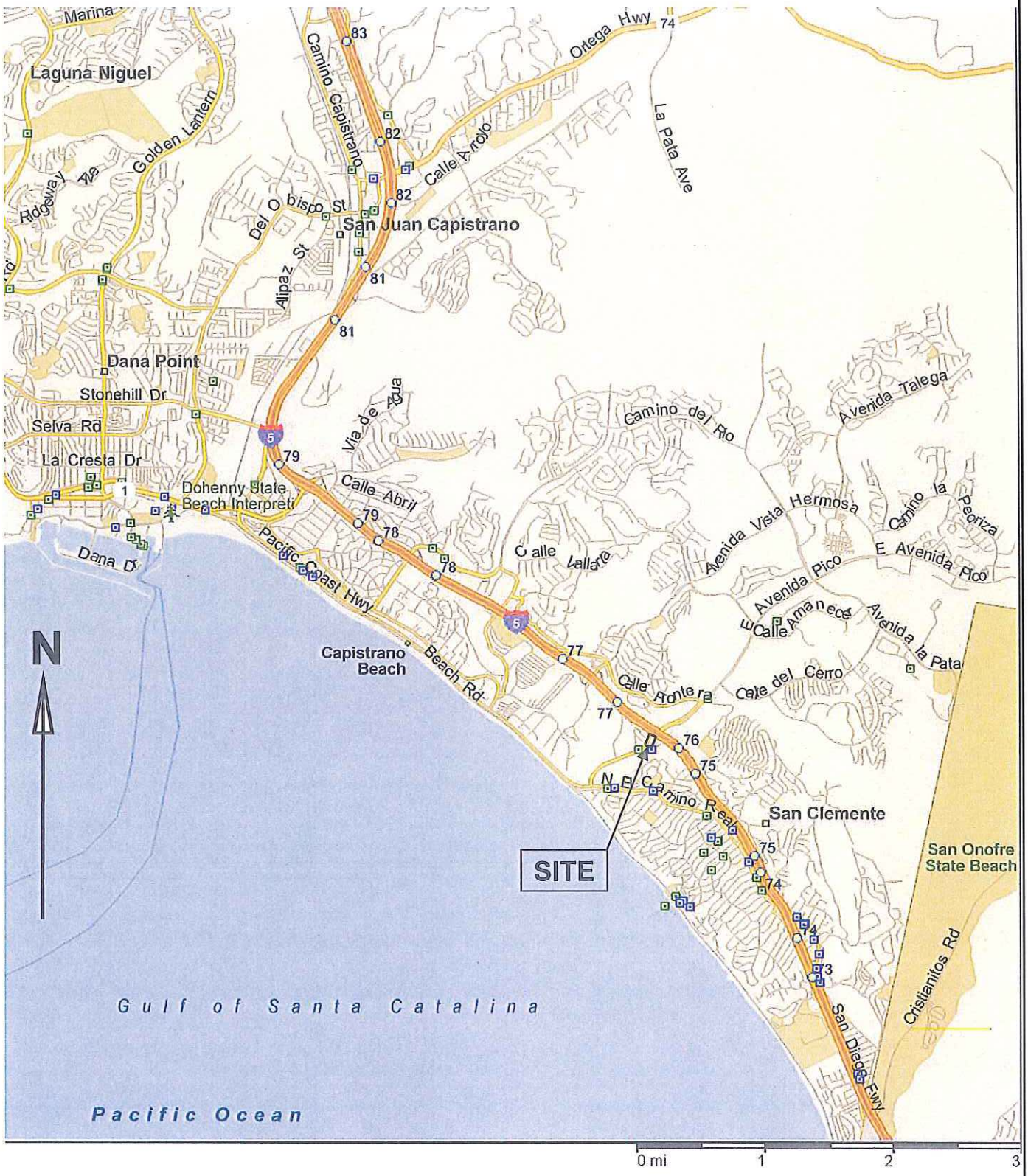
The purpose of this report is to document subsurface geotechnical conditions, provide analyses, and recommendations for design and construction of the proposed wall. There are other walls in this project and foundation design for those walls is addressed in a separate Foundation Report (EMI, 2012c).

1.2 PROJECT DESCRIPTION

The I-5 freeway is a major north-south freeway in the State of California that serves local, regional, interstate, and international traffic to and from Canada and Mexico. The I-5 freeway is a major commuter route between Los Angeles and Orange Counties.

The project is located along the I-5 corridor in San Clemente and includes the Avenida Pico UC (Bridge No. 55-0207), and two on-ramps and two off-ramp connections to Avenida Pico. The project limits along the I-5 corridor are approximately 2,400 ft south to 1,900 ft north of Avenida Pico (I-5 Mainline Sta. 167+00 to 210+00) with a total project length of 4,300 ft. The segment of I-5 within the project limits currently provides 5 general-purpose lanes (four through-lanes and one auxiliary lane) in each direction and inside and outside shoulders. The existing interchange has four ramps (direct NB and SB on-ramps and direct NB and SB off-ramps) with one to three lanes.

According to the Project Report, the Preferred Alternative provides continuous access HOV lanes along I-5 and improves the Avenida Pico interchange which is a signature access roadway in San Clemente. The Preferred Alternative specifically includes:



I-5 HOV Improvement Project
Wall 190

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

SITE LOCATION MAP

Figure 1

Project No. 11-135

Date: 06-29-2012

- Add one HOV lane per direction on I-5 throughout project limits,
- Reestablish existing auxiliary lanes,
- Replace the existing Avenida Pico Undercrossing (Bridge No. 55-0207),
- Realign the four interchange ramps, and construct four retaining walls along I-5 On- and Off-Ramps, and widen the I-5 NB On-Ramp to three lanes,
- Realign and widen Avenida Pico, including a new EB through lane, new sidewalk and bicycle lanes, and construct a new retaining wall to replace the existing keystone wall,
- Drainage and pavement work, and
- Construct sign structures at multiple locations throughout the project limits.

On the north side of I-5, the existing Avenida Pico roadway will be widened towards the west to accommodate through lanes and turn lanes to the northbound I-5 on-ramp. This will require backcut into an existing hill located at the northwest quadrant of the interchange. The proposed cut will require removal of an existing retaining wall which will be replaced by the subject wall.

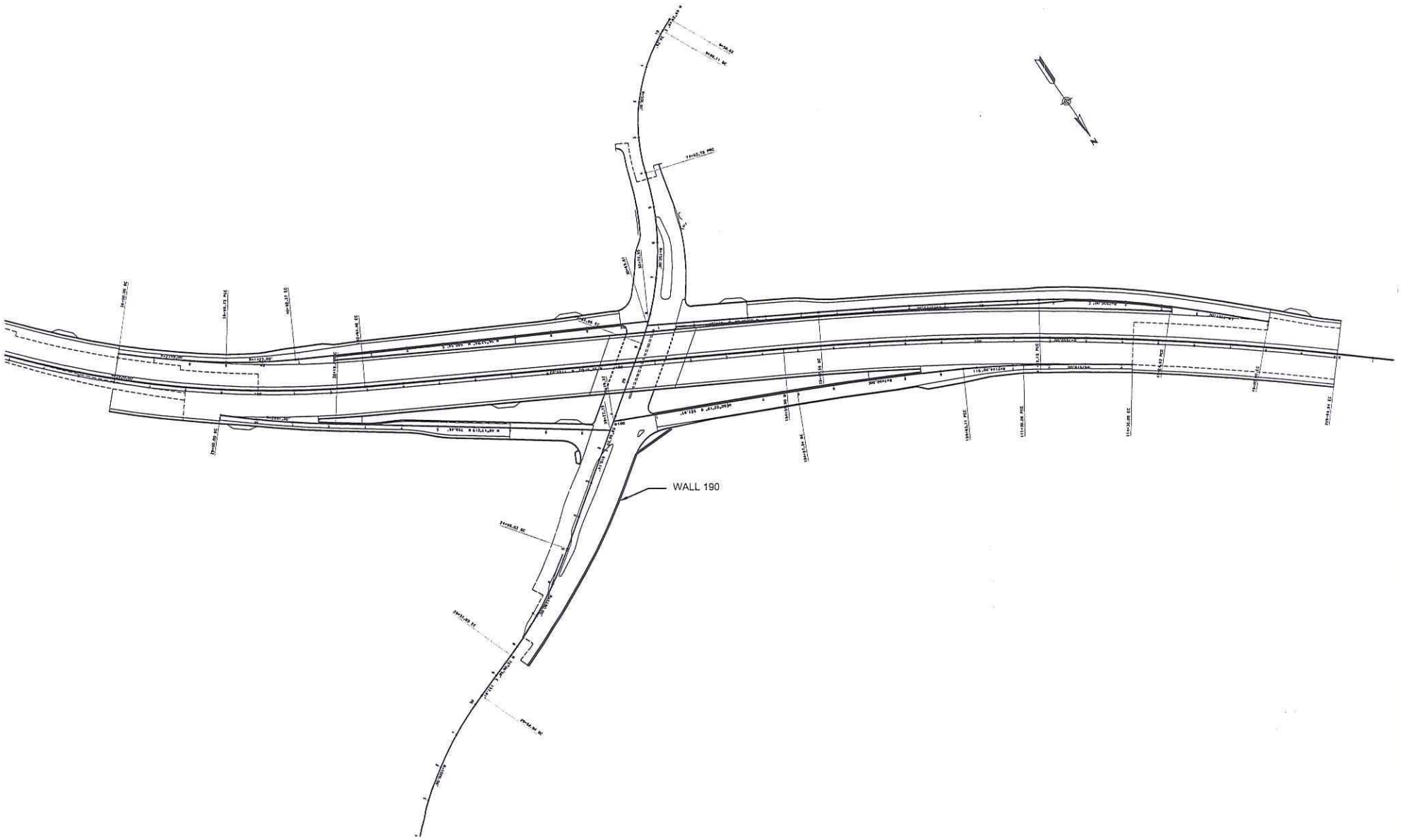
The proposed wall structure consists of a tieback wall approximately 767.5-ft long along the east side of the new Avenida Pico roadway alignment. The wall location is shown on Figure 2. This wall will accommodate the proposed Avenida Pico roadway realignment and widening. Pertinent wall data is summarized in Table 1.

Existing Avenida Pico roadway grade at the wall location is about El. +96 to +98 ft. The building site of Saint Andrews By The Sea United Methodist Church is located on the hill far upslope of the wall near El. +172 ft.

Table 1. Retaining Wall Pertinent Data

Wall Station		Approx. "AP" Station		Approx. Length (ft)	Approx. Wall Height (ft)	Approx. Bottom of Wall El. (ft)	Approx. Slope Gradient (H:V)	Materials Retained at Back of Wall
Start	End	Start	End					
10+00	10+20	20+91	21+19	20	6	+99.4	1.6:1 to 2.65:1	Af, Qls
10+20	11+32	21+19	22+12	112	12	+99	1.6:1 to 2.65:1	
11+32	11+82.5	22+12	22+62	50.5	20	+99	1.6:1 to 2.65:1	
11+82.5	12+09.5	22+62	22+85	27	26	+98	1.6:1 to 2.65:1	
12+09.5	12+85.5	22+85	23+62	76	30	+98	2.65:1 to 2:1	
12+85.5	14+56.5	23+62	25+34	171	34	+98	2.65:1 to 2:1	
14+56.5	14+98.5	25+34	25+70	42	30	+98	2.3:1	Af (reinforced), Tc
14+98.5	15+40.5	25+70	26+12	42	28	+97	2.3:1	
15+40.5	15+82.5	26+12	26+51	42	24	+96	2.3:1	
15+82.5	16+24.5	26+51	26+90	42	20	+96	2.3:1	
16+24.5	16+66.5	26+90	27+26	42	16	+95	2.3:1	
16+66.5	17+08.5	27+26	27+68	42	12	+94	2.3:1	
17+08.5	17+67.5	27+68	28+27	59	8	+93.8	2.3:1	

Notes:
Af = artificial fill
Af (reinforced) = soil backfill reinforced by geogrids placed behind existing keystone wall (see Section 2.1).
Tc = stiff to hard clays (Capistrano Formation)
Qls = landslide debris



NO SCALE

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-5 HOV Improvement Project, Segment 1	WALL LOCATION PLAN
	Project No. 11-135 / Date: 06-25-12	FIGURE 2

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 EXISTING INFORMATION

Boring logs from prior field investigations in the area conducted by Leighton and Associates (L&A) (1980, 1999) were reviewed. Approximate locations of existing borings are shown on the geologic map of Figure 3. LOTB's were prepared and are included in Appendix A.

Wall information for the existing keystone block wall is provided in Table 2. According to As-built Plans (San Clemente, 2000), the existing wall is 459 ft long and consists of Loffelstein keystone blocks that retain reinforced soil backfill, and the reinforcement consists of up to 12 levels of Marafi 8XT geogrids with lengths of 28 to 35 ft.

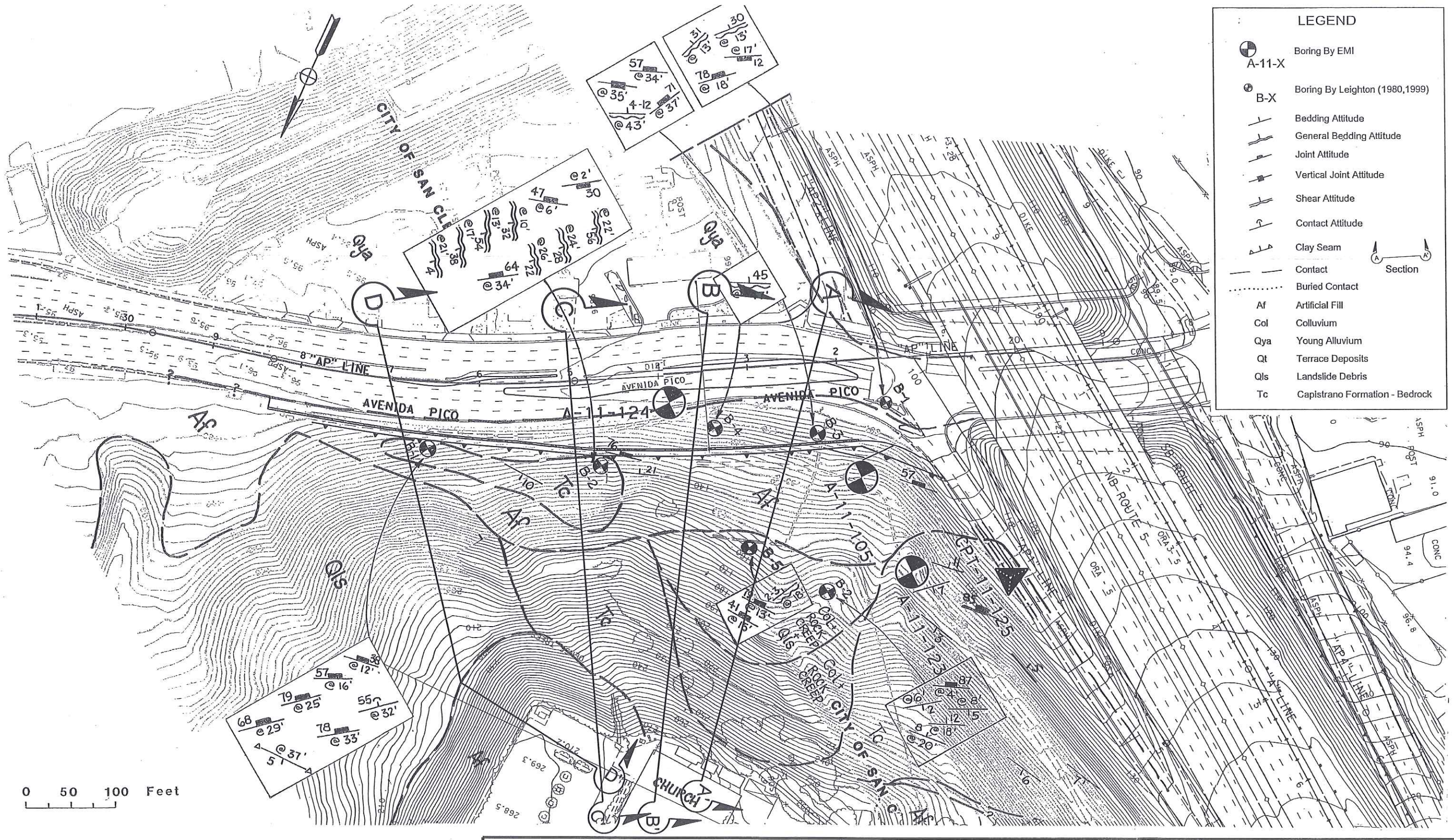
Table 2. Data for Existing Keystone Wall

Approx. "AP" Line Station		Approx. Length (ft)	Approx. Wall Height (ft)	Approx. Finished Road Grade El. (ft)	Approx. Backfill Slope Gradient
Begin Wall	End Wall				
23+70	28+27.5	457.5	6 to 24	+96 to +98	1.6H:1V to 4H:1V

2.2 FIELD INVESTIGATION

A geotechnical field investigation was conducted in September to November 2011 for all proposed I-5 Segment 1 improvements consisting of exploratory borings and cone penetrometer tests (CPT's). Among these, three borings and one CPT were performed in the proposed wall and hill area. Boring information, including exploration number, stations, offsets, ground surface elevations, bottom of boring elevations and water level measurements are summarized in Table 3. Locations of the exploratory borings and the CPT are shown on the LOTB sheets provided in Appendix A. All locations were surveyed. Approximate locations of borings are shown on the Figure 3.

Hollow-stem auger (HSA) borings were drilled using a CME 75 truck-mounted drill rig equipped with 8-inch diameter hollow-stem augers. Sampling was performed by alternating the Modified California Drive (MCD) sampler and Standard Penetration Test (SPT) sampler. The soil sampling interval is 5 ft. Relatively undisturbed soil samples were obtained using a 3.25" outer diameter MCD sampler lined with brass rings. Each of these brass rings is 1" long with a 2.5-inch outside diameter. The SPT sampler (1.4" inside diameter) was also used to obtain soil samples. The MCD and SPT samplers were driven 18" into the ground or until refusal was encountered using a 140-lb hammer free falling from a height of 30". The numbers of blows to advance the sampler each 6" of penetration were recorded. The number of blows for the final 12" or shorter of driving was recorded on the boring logs. Charts published by Winterkorn and Fang (1975) were used to obtain a reduction factor of 0.5 for this project to convert MCD sampler blowcounts to SPT-equivalent blowcounts.



Earth Mechanics, Inc.
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Wall 190

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GEOLOGICAL MAP

Figure 3

Table 3. Geotechnical Exploration Information

Boring	Easting (ft)	Northing (ft)	Top of Boring El. (ft)	Depth (ft)	Groundwater El. (ft)	Drilling Method
A-11-105	6,143,144	2,106,261	+126.4	36.5	NE	SSA
A-11-123	6,143,046	2,106,330	+147.2	50.9	NE	SSA
A-11-124	6,143,375	2,106,283	+97.9	31.5	NE	HSA
CPT-11-125	6,142,946	2,106,286	+111.0	29.0	NM	CPT

Notes: NE=Not Encountered HSA=Hollow-Stem Auger Boring SSA=Solid Stem Auger Boring
NM=Not Measured CPT=Cone Penetration Test

The CPT sounding was performed using an electronic cone penetrometer in general accordance with current ASTM Standards (ASTM D5778 and D3441). The CPT equipment used hollow sounding rods with a probe with a conical tip with a 60° apex angle and a projected cross sectional area of 1.55 in² and a cylindrical friction sleeve with a surface area of 23.25 in². The interior of the cone penetrometer is instrumented with strain gauges for cone tip and friction sleeve resistance measurements during penetration. The cone penetrometer assembly is continuously pushed into the soil by a set of hydraulic rams at a standard rate of 0.79" per second while the cone tip resistance and sleeve friction resistance are recorded every 1.967". The 25-ton dead weight of the truck provides the required reaction weight for pushing the rods and is used to transport and house the testing equipment. The computer generated graphical logs include tip resistance, friction resistance, and friction ratio. Soil behavior type interpretations are based on guidelines by Robertson and Campanella (1989).

2.3 GEOLOGIC MAPPING

The hillside slopes facing Avenida Pico in the northeast quadrant of the interchange were field-mapped by EMI's Certified Engineering Geologist. Small trenches were hand-dug at various locations for the purpose of evaluating geologic exposures.

2.4 LABORATORY TESTING

Soil and bedrock samples considered representative of the subsurface conditions were tested to obtain or derive relevant physical and engineering soil and bedrock properties. The following laboratory tests were conducted to supplement the observations recorded during the field investigation:

- In-situ Moisture Content and Unit Weight
- Percent Passing No. 200 Sieve
- Atterberg Limit
- Direct Shear
- Unconsolidated Undrained Triaxial

- Pocket Penetrometer
- Minimum Resistivity, pH, Sulfate Content and Chloride Content

The laboratory tests were conducted in general accordance with California Test Methods or American Society for Testing and Materials (ASTM) Standards. Laboratory test results are included in Appendix B. An R-value test is indicated on the LOTB's in Appendix A which was performed for pavement design. That test was not used for the purpose of this report.

3.0 GEOLOGY AND SEISMICITY

3.1 PHYSIOGRAPHY

The project area is in the northwestern part of the Peninsular Ranges physiographic province. The Peninsular Ranges comprise a northwest-southeast trending group of fault-bounded ranges between the Salton Trough and the Pacific Ocean. The Santa Ana Mountains, Puente Hills, and San Joaquin Hills are ranges within the Peninsular Ranges.

The site is located on the low lying rolling hills westerly of the Santa Ana Mountains at the southerly end of the San Joaquin Hills in an area referred to as the Capistrano Embayment.

3.2 GEOLOGIC STRUCTURE

The Peninsular Ranges are characterized by northwest-southeast trending mountains and valleys that have been faulted and uplifted by northwest-southwest trending faults. The Capistrano Embayment is a relatively flat structural trough of Miocene to Pliocene age. The trough is bordered on the east by the Cristianitos Fault. Active geologic faults in the region are shown on Figure 4. The California Geological Survey does not show any active faults at the site (Jennings, 2010). The nearest known major active faults are the Newport-Inglewood Structural Zone about 5 miles southwest of the site in the offshore area, the Palos Verdes fault about 19 miles to the west, also in the offshore area, and the Elsinore fault about 35 miles to the northeast. A subsurface fault, the San Joaquin Hills blind thrust, is postulated west of the site at a depth of about 2.5 to 3 miles. These faults are discussed in more detail later. Other nearby faults such as the Cristianitos fault and Mission Viejo faults are about 3.5 to 7 miles east of the site but are not believed to be active.

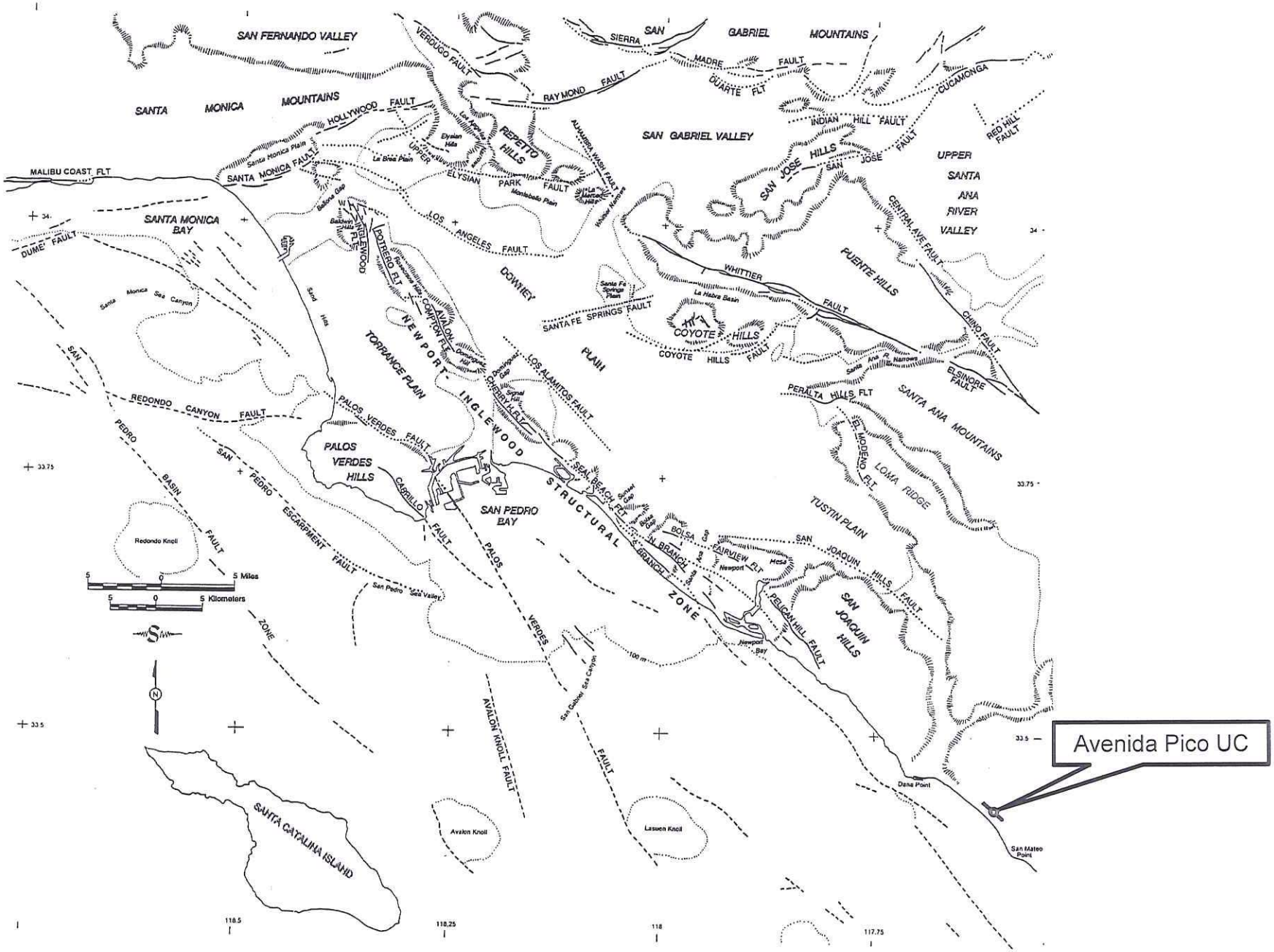
3.3 GEOLOGICAL HAZARDS

The geological hazards present in the project area include landsliding, liquefaction and earthquake shaking. The area lies outside identified tsunami inundation zones (California Geological Survey, 2009), and there are no large bodies of water within the site area that could generate a standing wave (seiche).

There are no volcanos in the region and there are no known active surface faults within the project area, therefore ground rupture is not a hazard.

The project area is composed of predominantly medium to high-plasticity fine-grained soils (lean and fat clays) and sedimentary bedrock. The California Geological Survey Seismic Hazard Zone map (2002) shows that the site generally has a low liquefaction potential. The area of the Segunda Deshecha Canada (Avenida Pico) underlain by young alluvium may be susceptible to liquefaction during a strong earthquake (see Figure 5). The potential for liquefaction is further discussed in details in Section 5.2.

Currently, the existing cut and fill slopes along the project corridor are generally graded at 1V:2H. Minor seepage was observed in areas on slopes however the slopes were generally well vegetated and appear to be performing well.



I-5 HOV Improvement Project, Segment 1

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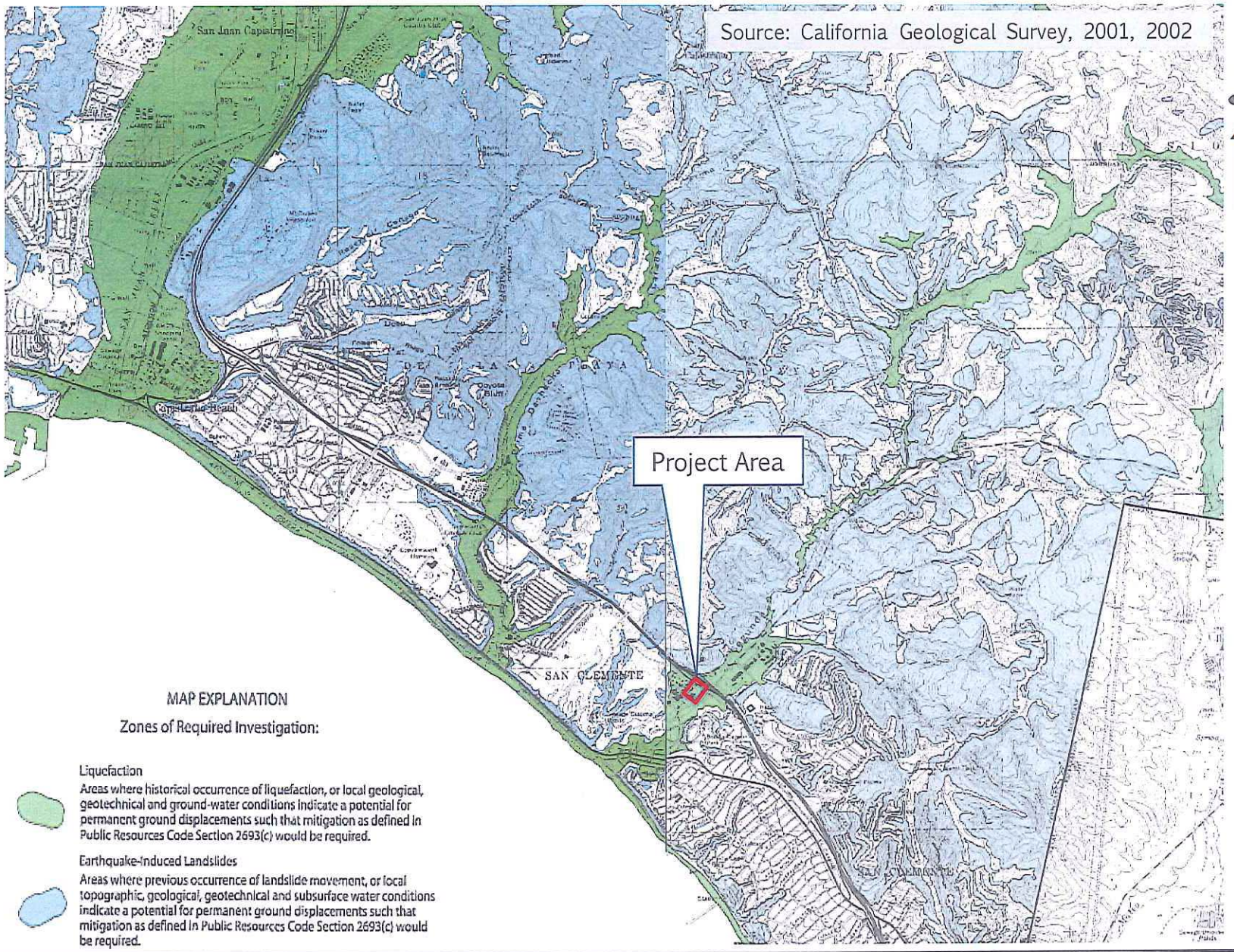
REGIONAL MAP OF ACTIVE FAULTS AND PHYSIOGRAPHY

Figure 4

Project No. 11-135

Date: 06-29-12



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-5 HOV Improvement Project, Segment 1	Seismic Hazard Map Figure 5
	Project No. 11-135 / Date: 06-29-12	

Landslides have been identified at the eastern and western portions of the proposed retaining wall along Avenida Pico as well as on the slope descending to the Avenida Pico northbound onramp. The landslides affecting the project area originate on the slopes descending from the Saint Andrews Church by the Sea United Methodist Church on Avenida Frontera to the north. Numerous grading operations have been performed over the last 30+ years as part of development of the church and Avenida Pico. Available geotechnical reports relating to the landslides and grading operations have been reviewed as part of this study.

The landslide on the slope to the east of the northbound on-ramp to the I-5 Freeway is considered old and inactive and remedial grading was recommended (Leighton, 1979). This landslide is not considered to have an impact on the design and construction of the proposed wall due to its distance from the proposed construction.

Boring logs from five bucket auger borings in the landslide at the western end of the proposed retaining wall (Leighton, 1980) were reviewed. Later reports (Leighton 1999) prepared during the widening of Avenida Pico and construction of the existing keystone wall do not show a landslide being present in this area. It appears that this is an ancient landslide formed as a result of undercutting by the ancestral Segunda Deschecha drainage during a period of lower sea level and much wetter climatic conditions. Leighton (1980) postulates that the basal rupture surface of this landslide is located at an elevation of approximately 60 to 70 ft above sea level (30 to 40 ft below the toe of the proposed wall). Subsequent to the landslide failure alluvial deposits from the Segunda Deshecha drainage have infilled the valley and formed a natural buttress for the toe of the slide mass. Further upslope from the landslide, Leighton (1979, 1980, 1999) indicates the slope is mantled by a zone of shallow landslide and/or rock creep less than 20 ft thick. Observations made during our field mapping support this finding.

Two bucket auger borings were drilled to the east of the previously mentioned landslide as part of the investigation for the previous widening of Avenida Pico (Leighton, 1999). The borings encountered bedrock of the Capistrano Formation.

An old, inactive landslide has been mapped at the eastern end of the proposed wall (Leighton, 1979, 1991). It is understood that artificial fill was placed over portions of this landslide during grading for the church parking lot and access road.

3.4 SEISMICITY

The project is in seismically active southern California. The present-day seismotectonic stress field in the Los Angeles region is one of north-northeasterly compression. This is indicated by the geologic structures, by earthquake focal-mechanism solutions, and by geodetic measurements. These data suggest crustal shortening of between 0.2" and 0.35" per year (5 and 9 mm/yr) across the greater Los Angeles area (Argus et al., 1999).

Historical earthquake epicenter maps show widespread seismicity throughout the region. Although historical earthquakes occur in proximity to known faults, they are difficult to directly associate with mapped faults. Part of this difficulty is due to the fact that the basin is underlain by several poorly known subsurface thrust faults, generally referred to as blind thrust faults. Ward (1994) estimated that about 40% of seismic moment cannot be associated with known faults. Earthquakes occur primarily as loose clusters along the Newport-Inglewood Structural

Zone, the southern margin of the Santa Monica Mountains, the margin between the Santa Susana-San Fernando Valley and the southern margin of the San Gabriel Mountains, and in the Coyote Hills-Puente Hills area. There is no clustering or alignment of earthquakes in proximity to the site. There are fewer earthquakes in the site region than anywhere else in the Los Angeles Basin area. This apparent lack of earthquake activity suggests that the site area is tectonically stable and suggests that there are no unrecognized active faults at the site.

The largest historical earthquake within the Los Angeles Basin was the 1933 Long Beach event which had a magnitude of about moment magnitude $M_W = 6.4$ ($M_L = 6.3$). This earthquake did not rupture the surface but is believed to have been associated with the Newport-Inglewood Structural Zone (Benioff, 1938). The association was based on abundant ground failures along the NISZ trend but no unequivocal surface rupture was identified. Reevaluation of the seismicity data by Hauksson and Gross (1991) relocated the 1933 earthquake hypocenter to a depth of about 6 miles below the Huntington Beach-Newport Beach city boundary.

Other major earthquakes in the region include the 1994 Northridge and the 1971 San Fernando earthquake both of which occurred in the San Fernando Valley region. The 1994 earthquake had a M_W of about 6.7 ($M_S = 6.8$, $M_L = 6.4$), and occurred on a southerly dipping subsurface fault which was unknown prior to the earthquake. The main shock occurred at a depth of about 11.8 miles. Earthquake aftershocks clearly defined the rupture surface dipping about 35° southerly from a depth of about 1.2 or 1.9 miles to 23 miles (Hauksson et al, 1995). The causative fault was never identified with certainty. The event may have occurred on an eastern extension of the Oakridge fault (Yeats and Huftile, 1995), a southerly dipping feature fault bounding the Ventura Basin and the Santa Susana Mountains.

The 1971 San Fernando earthquake was of similar size ($M_W = 6.7$, $M_S = 6.4$, $M_L = 6.4$) to the 1994 event but did involve surface rupture. The 1971 event occurred on a northerly dipping thrust fault that dips from the northern side of the San Fernando Valley to a depth of about 15 km under the San Gabriel Mountains. Several mapped surface faults were involved such as the Sylmar fault, Tujunga fault, and Lakeview fault. These faults are commonly considered to be part of the Sierra Madre fault system which extends easterly from the San Fernando Valley, along the base of the San Gabriel Mountains on the north side of the San Gabriel Valley, and to the Cucamonga fault in the San Bernardino area.

The 1987 Whittier earthquake ($M_L = 5.9$, $M_W = 5.9$) occurred on a subsurface fault dipping under the Puente Hills to about 10 miles beneath the San Gabriel Basin (Shaw and Shearer, 1999; Shaw et al., 2002). This event did not rupture the ground surface.

A magnitude 5.4 earthquake occurred at a depth of about 9 miles on 29 July 2008. The epicenter was in the Chino Hills area between the Chino fault and the Whittier fault. Preliminary data were inconclusive with regard to the causative fault. Detailed analysis by Shao and Hauksson (2009) indicated a rupture plane striking N71° W, dipping 62° northeast. They suggested a preference for the Whittier fault being the causative fault but were uncertain, primarily because the Whittier fault is supposed to dip much steeper (~80°). The aftershock pattern formed a subhorizontal alignment indicating the possibility that the event could have been associated with a subsurface thrust fault such as one of the blind faults of the Puente Hills Blind Thrust Fault System or with a blind fault under the Peralta Hills.

Another significant earthquake was the 1812 earthquake which caused damage at the San Juan Capistrano Mission. The location and magnitude of the 1812 earthquake are unknown because of the sparse population at the time, but geological studies (Jacoby et al., 1988; Fumal et al., 1993; Weldon et al., 2004) postulate that it did not occur in the Capistrano area, but rather was a large (M>7.0) distant event on the San Andreas fault in the Wrightwood area of the San Gabriel Mountains.

The earliest documented earthquake in the region was reported by the Portola´ expedition as they camped near the Santa Ana River in 1769. This event has been attributed by various geoscientists to just about every fault in the Los Angeles area but it could just as well have been a distant event that shook a wide area as did the 1971 San Fernando, the 1987 Whittier, and the 1994 Northridge events, as well as many other more-distant events (for example, 1992 Landers event).

4.0 SUBSURFACE CONDITIONS

4.1 GEOLOGIC UNITS

Published geological maps (Morton and Miller, 1981; Tan, 1999; Kennedy et al, 2007) show the overall project area is underlain by Pleistocene marine and non-marine terrace deposits (Qt), Quaternary-age alluvium (Qal) and landslide deposits (Qls) and Miocene to Pliocene-age Capistrano Formation bedrock. The geologic units encountered at the site are described as follows. The approximate distribution and location of the surficial units are shown in Figure 3. It can be noted there no terrace deposits (Qt) were identified within the area of this wall.

Capistrano Formation (Tc): The Capistrano formation is a late Miocene-age, marine, sedimentary, deposit generally comprised of brown to gray silty claystone, claystone and siltstone. Secondary gypsum is commonly found deposited along joints, fractures and shears. The formation is generally soft when moist and has engineering properties similar to stiff to very stiff soils. The formation consists generally of soft, weakly cemented to uncemented material that can be disaggregated with finger pressure. A few hard beds occur throughout the formation.

Within the project area, the Capistrano formation consists of an oxidized (weathered) zone defined by a light brown to brown color with a mottled appearance, underlain by an unoxidized zone that is generally dark brown to dark gray with a greater degree of induration. When excavated, can be broken by hand and carved or gouged with a knife. The upper part of the formation is commonly weathered and locally decomposed into clay and silt.

Landslide Deposits (Qls): Landslide deposits are present on the slopes descending to the northerly side of Avenida Pico and the Avenida Pico northbound I-5 on-ramp. Leighton and Associates (1979, 1980, 1991, 1999, and 2001) identified three landslides, two of which are within the proposed wall limits. These landslide deposits (Qls) are ancient landslide deposits consisting of displaced blocks of Capistrano Formation bedrock. The lithology of the deposits is similar to the undisturbed bedrock however the degree of weathering and oxidation of the landslide deposits is considerably greater. One of the two ancient inactive landslides is mapped towards the eastern end of the proposed wall (L&A, 1979, 1980). Fill materials have been placed on portions of this landslide (L&A, 1980, 1999) during grading for the church parking lot and access road (L&A, 1979, 1991) but the extent and nature of the grading is uncertain. The landslide deposits are derived from units of the Capistrano Formation.

Based on the attached LOTB's and geologic mapping, most of the slopes behind the proposed wall consist of bedrock and bedrock-derived materials except in areas where grading and fill placement has occurred. The bedding of the Capistrano Formation in this area dips from about 4° above horizontal (into slope) to generally 12° (locally 21°) below horizontal (out-of-slope).

Alluvium (Qal, Qya): Alluvium underlies Avenida Pico roadway. These deposits are generally derived from the surrounding bedrock units and are located in the lower elevations of the site. Where encountered in the borings, the alluvium was observed to predominantly consist of non-indurated silty sand to sandy clay.

Colluvium (Qcol) is found in some hillside areas and consists of thick soil-like materials derived from the underlying Capistrano Formation and slide debris. Colluvium was encountered in the borings as clay and silt.

Artificial Fill (Af): Artificial fill placed during construction of the I-5 Freeway and adjacent residential and commercial developments is located in the project area. The fill materials were most likely derived from excavation of the Capistrano Formation bedrock and local surficial deposits. The fills are predominantly composed of cohesive soils, and generally overlie Capistrano formation bedrock (Tc).

4.2 GROUNDWATER CONDITIONS

Soil borings performed during L&A's or EMI's investigations in the wall area and within the adjacent I-5/Avenida Pico UC area did not encounter a static continuous groundwater table within the depths explored. Groundwater was encountered at three borings between about El. +49.5 and +53 ft during drilling in September and October, 2011 (see Foundation Report for Avenida Pico UC replacement, EMI 2012a). The As-built plans for Avenida Pico UC include LOTB sheets that show groundwater was not encountered above El. +40 ft in 1955 and El. +37 ft in 1967. These borings are located along within the Segunda Deshecha drainage path. The California Geological Survey (2002) quadrangle map for San Clemente indicate a highest historical groundwater of 5 to 10 ft below original bottom of nearby Segunda Deshecha canyon which is significantly lower than current roadway grades within the project extents.

The recent soil borings also indicate a lack of continuous pervious soil units, and groundwater was encountered in very few borings in September to November of 2011 but not in other nearby borings. These findings suggest that groundwater within the I-5 HOV project is perched. Nevertheless, groundwater during construction may be different from those reported above because groundwater level can fluctuate due to variations in seasonal precipitation, construction activities, or other man-made and natural influences. The highest measured groundwater elevation of +53 ft was used for subsequent analyses. The highest groundwater level of El. +53 ft is well below Avenida Pico final road grades near El. +96 to +99 ft. Groundwater levels are not expected to affect the wall design.

4.3 IDEALIZED SOIL PROFILES

The soils behind the proposed wall are existing fills, clay colluvium, bedrock, and landslide-derived materials. Shear strength parameters for the on-site materials were obtained using results of direct shear tests and unconsolidated-undrained triaxial tests, correlations with CPT sounding (Robertson and Campanella, 1989), and SPT blowcounts (Lam and Martin, 1986). The shear strength parameters used for geotechnical analyses are shown in Table 4.

The fill and alluvium layer thicknesses vary with depth and location as shown in the borehole logs in Appendix A (refer to the borehole logs in Appendix A for SPT blowcount information, and the laboratory test results in Appendix B).

Table 4. Idealized Soil Profile and Strength Parameters

Predominant Soil Type	Equivalent SPT Blowcount (blows/ft)	Total Unit Weight (pcf)	Friction Angle	Cohesion (psf)
Fill – Clay and Silt	18 to 26	120	33°	200
Alluvium - Clay and Silt	5 to 15	120	30°	200
Landslide Rupture Surface	21 to 26	122	15°	0
Bedrock – Siltstone/Claystone	32 to 50+	125	23° (along bedding) 28° (across bedding)	200 (along bedding) 300 (across bedding)

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 SEISMIC DESIGN CRITERIA

The fault controlling the strong ground motion is the Newport-Inglewood-Rose Canyon/East fault, southwest of the project area. The design ARS curve was based on the 2010 Seismic Design Criteria (SDC) (Caltrans, 2010a) procedures (see Foundation Report for Avenida Pico UC Replacement (EMI, 2012a) for details). The peak ground acceleration (PGA) is the zero-period spectral acceleration in the ARS curve. A PGA of 0.382g was obtained from the design ARS curve.

For analyzing global slope stability, Section 3.10 of the Caltrans Guidelines for Structures Foundation Reports (Caltrans, 2009) recommends using a horizontal seismic coefficient equal to one-third of the peak acceleration but not exceeding 0.2. Therefore, a horizontal seismic coefficient of 0.13 was used in the pseudo-static slope stability analysis.

As presented in Section 11.8.6 of AASHTO (2007), seismic earth pressures can be computed using a seismic coefficient equal to half of the peak acceleration. Therefore, a seismic coefficient of 0.19g can be used for the computation of seismic earth pressures.

5.2 SOIL LIQUEFACTION

Liquefaction Potential. Liquefaction is the loss of shear strength in generally cohesionless, saturated soils when the pore-water pressure induced in the soil by a seismic event becomes equal to or exceeds the overburden pressure. The primary factors influencing the potential for liquefaction include: groundwater elevation, soil type and grain-size characteristics, relative density of the soil, initial confining pressure, and intensity and duration of ground shaking. Soils most susceptible to liquefaction are saturated low-density sands and silty sands within 50 ft of the ground surface.

The vast majority of earth materials within the project area are fine-grained. The earth materials throughout the area include sedimentary bedrock of the Capistrano formation, terrace deposits, alluvium, and artificial fills that are derived from the bedrock and terrace materials. The boreholes drilled for Wall 190 did not encounter groundwater. No consistent shallow groundwater table or relevant continuous unit of saturated loose sand soils was identified within the site area. Based on the fines content and strength of soil materials found throughout the area and a lack of a shallow groundwater table (see Section 4.2), liquefaction of the present earth materials is unlikely. A liquefaction evaluation performed for the Avenida Pico UC (EMI, 2012a) using the highest groundwater elevation of +53 ft encountered there concluded that no liquefiable layers were identified due to low groundwater, high blowcount, and/or high fines content. Similarly, the soil borings drilled for Wall 190 are not found to have liquefiable layers due to lack of groundwater, high blowcount, and high fines content. As a result, the liquefaction potential of the site soils is found to be low and not considered a design issue.

Seismically-Induced Settlement. Because of the stiff to hard nature of the subsurface materials, and because the materials are composed predominantly of medium to highly plastic fine-grained

particles, seismic settlement of in-situ earth material is expected to be negligible. Seismically-induced dry sand settlements were not calculated because there is no significant and continuous layer of sandy deposits.

5.3 TIEBACK WALL DESIGN

On the north side of I-5, Avenida Pico roadway will be widened towards the west to accommodate through lanes and turn lanes to the northbound I-5 on-ramp. This will require cutting into an existing hill located at the northwest quadrant of the interchange. The proposed cut will require removal of an existing retaining wall which will be replaced by the proposed tieback wall.

The proposed new wall has a maximum exposed height of about 34 ft and will retain sloping ground. Pertinent wall data was given in Table 1. The soils behind the proposed wall will be existing fills, clay colluvium, bedrock, and landslide-derived materials. Table 1 also summarized the soil units expected to be retained.

The tieback wall can be designed per Caltrans Memo To Designers 5-12 (2012) supplemented by Geotechnical Engineering Circular No. 4 (FHWA, 1999).

5.3.1 Lateral Earth Pressures

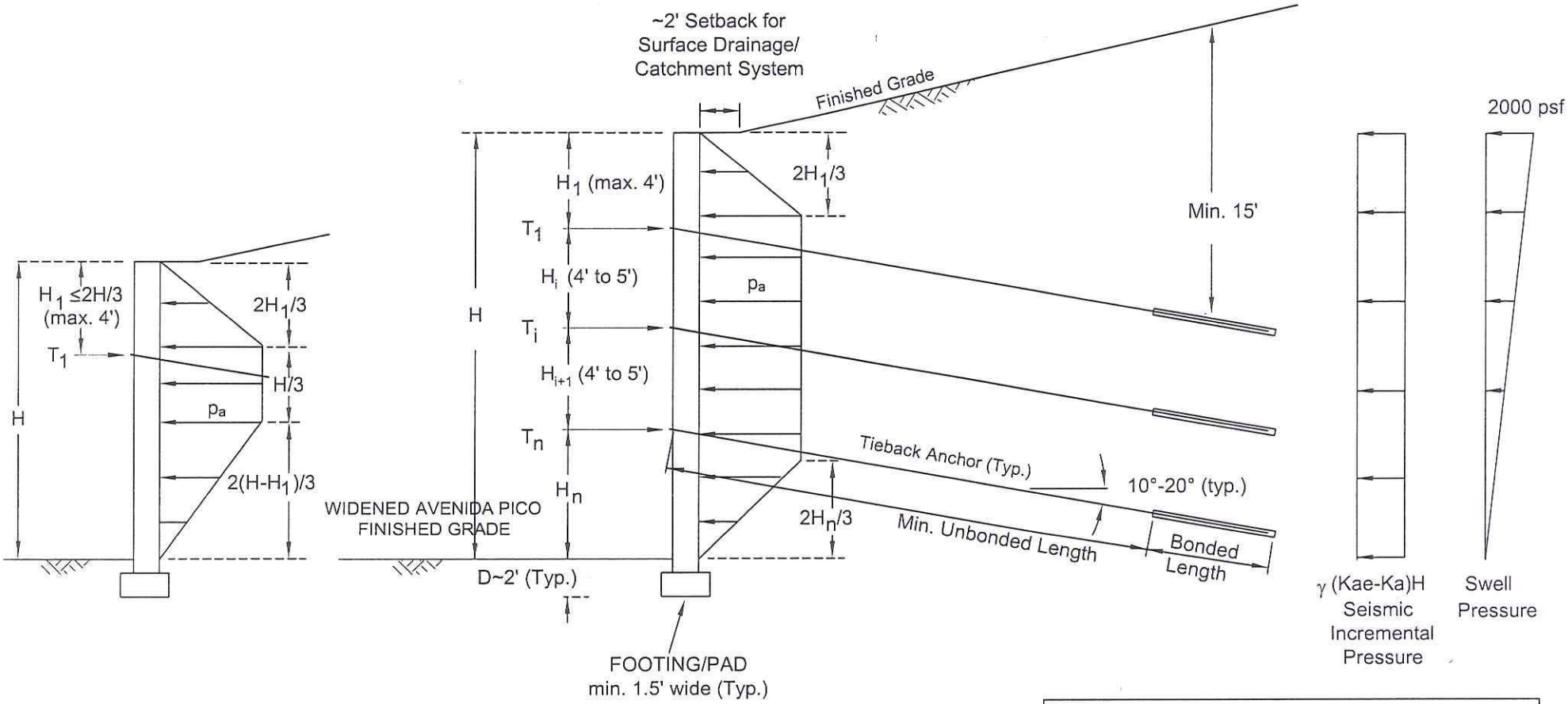
Tieback anchors should be designed to resist all lateral pressures against the back of the tieback walls including earth pressures and surcharge pressures. Figure 6 shows the static and incremental seismic lateral earth pressures for a 2H:1V backslope behind the wall. The native clayey soils were determined to be expansive. As a result, Figure 6 includes a lateral swell pressure of 2 ksf.

Under the static condition, the tieback wall should be designed to accommodate the active static earth pressure, soil swell pressure, and any other surcharge or live load. Under the seismic condition, the tieback wall should be designed to accommodate the active static and seismic incremental earth pressures and any other permanent surcharge (i.e., no soil swell pressure and no live load).

Seismic active earth pressure was determined using the Monobe-Okabe method using a seismic coefficient of 0.19g per Section 11.8.6 of AASHTO (2007) based on one-half of the peak acceleration.

5.3.2 Anchors

Unbonded Length. The unbonded length should extend behind the extents of active earth pressure soil wedge, or potential landslide or adverse bedding zones, whichever is greater. As a result, the unbonded lengths vary along the wall stationline to address the extents of the geological formations and soil units retained by the wall as depicted in Figure 3. Minimum recommended unbonded lengths are provided in Section 5.4.



$$p_a = 1.075\, K_a\, \gamma\, H$$

Single-Level Tieback Wall

$$p_a = \frac{0.72\, K_a\, \gamma\, H^2}{H - \frac{1}{3} H_1 - \frac{1}{3} H_{n+1}}$$

Multi-Level Tieback Wall

Design Soil Paramaters:

K_a = 0.43 (Active earth pressure coefficient)

K_{ae} = 0.71 (Seismic earth pressure coefficient)

γ = 122 pcf (Soil unit weight)

Note: All pressures are in psf per ft of wall width.

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-5 HOV IMPROVEMENT, SEGMENT 1 WALL 190	LATERAL WALL PRESSURES
	Project No. 11-135 / Date: 10-01-12	FIGURE 6

Bonded Length. The bonded length is determined by the Contractor and depends on anchor type and installation method. A minimum bonded length of 20 ft is recommended. For initial design and cost estimating purposes, an ultimate soil-grout bond strength of 8 psi can be used for gravity-grouted anchors. The maximum allowable bond strength is the ultimate value divided by a factor of safety of 2 against pull-out failure per Section 5.8.6.3 of the Caltrans Bridge Design Specifications (2003a). Drilled hole diameters of 4" to 8" are common.

Based on the approximate tieback anchor elevations and the idealized subsurface profiles used, the bonded length of the anchors is anticipated to be embedded in the siltstone bedrock.

Inclination. Anchor inclinations should be at least 10° from horizontal to facilitate tendon installation and grouting. Anchor inclinations of 10° to 20° are common.

Spacing. Tieback anchors should not be spaced closer than five diameters of the bonded (grouted) zone or 5 ft, whichever is greater. A minimum ground cover to midpoint of the bonded length of 15 ft is recommended.

5.3.3 Bearing Capacity and Wall Friction

The allowable bearing capacity for the footing or leveling pad at the bottom of the tieback wall is 2 ksf, which is based on a minimum footing width of 1.5 ft and a minimum embedment depth of 2 ft.

The vertical component of the tieback forces is also resisted by friction between back of wall and soil retained. A friction coefficient of 0.30 can be used between the back of wall and the soil retained for the permanent condition. For temporary construction, a friction coefficient of 0.35 is recommended. It should be noted that the frictional coefficient is applicable only when the concrete wall is in full contact with the earth behind the wall.

5.4 GLOBAL STABILITY ANALYSES

Global stability analyses were performed for both static and pseudostatic conditions using the program SLIDE 5.0 (Rocscience, 2012). The soil strength parameters in Table 4 were used in the static and pseudo-static analysis. Four controlling slope cross sections were analyzed:

- Section at "AP" Sta. 22+25 (for wall heights of 12 to 20 ft),
- Section at "AP" Sta. 23+50 (for wall heights of 26 to 30, and 34 ft south half),
- Section at "AP" Sta. 25+00 (for wall heights of 34 ft (north half) to 28 ft), and
- Section at "AP" Sta. 27+00 (for wall heights of 24 to 8 ft).

These sections are included in Appendix C.

Global slope stability analyses were conducted with two goals: (1) to verify that after construction of the proposed tieback system, the modified slope meets global slope stability requirements (i.e., that the calculated factor of safety against deep-seated failure meets external minimum required factors of safety), and (2) to determine the minimum unbonded and bonded lengths and anchor lock-off force for external stability of the tieback wall.

The methodology of the global slope stability evaluation for each section consisted of the following steps:

(1) Develop the slope geometry for the existing slope condition based on contour plans provided by the designer and as-built plans for the existing keystone wall; assign the soil and bedrock strengths shown in Table 4; and perform a slope stability analysis to verify that the existing slope is globally stable for this condition.

(2) Determine the minimum unbonded length for all anchor levels. The minimum unbonded length will extend behind the critical failure surface for external slope stability requirements. In this process, the minimum bonded length and the minimum tieback lock-off force will also be determined because external slope stability is sensitive to all of the above.

Slope stability analyses for the static condition included a 2 ft soil surcharge (i.e., 240 psf) to represent traffic loading at the church property parking lot. The building was assumed to have a 1 tsf (2,000 psf) loading. For slope stability analysis for the pseudo-static condition, a horizontal seismic coefficient (k_h) of 0.13 (one-third of the PGA limited to 0.2 in accordance with Caltrans practice per Section 5.2.2.3 of Caltrans guidelines for Foundation Reports, 2009) was used. The required minimum factors of safety from Caltrans BDS (2003a) for permanent slopes were used (1.5 for the static condition and 1.1 for the pseudo-static condition).

Using the above methodology, the recommendations for minimum unbonded length, minimum bonded lengths, and minimum required anchor forces after lock-off are provided in Table 5.

Table 5. Recommendations for Tiebacks

Proposed Wall Height (ft)	Tieback Level	Minimum Unbonded Length (ft)	Minimum Bonded Length (ft)	Minimum Tieback Lock-Off Force (kips)
6	One Level	25	20	45
12	All Higher Levels Bottom Level	45 25	30 20	70 45
20	All Higher Levels Bottom 2 Levels	45 30	30 25	70 60
26 to 30	All Higher Levels Bottom level	30 30	25 25	60 60
34 to 28	All Levels	30	35	80
24 to 8	All higher Levels Bottom Level	25 25	20 20	45 45

Note: Wall heights are listed in increasing wall station.

The above recommendations are applicable for a tieback inclination of 15° from horizontal. The above recommended minimum tieback lock-off force should be compared with the tieback lock-off force determined by the structural (wall) designer, and the larger of the two forces should be used for design. The controlling tieback lock-off force and the above recommended minimum unbonded and minimum bonded lengths should be included on the Contract Plans. It should be noted that the minimum recommended bonded length should not be reduced even if field proof testing shows that the required tieback forces can be achieved using a shorter bonded length.

5.5 SOIL CORROSIVITY

Representative soil and bedrock samples were tested to determine corrosivity including minimum resistivity, pH, soluble sulfate content, and soluble chloride content. Two soil samples were tested to determine minimum resistivity, pH, soluble sulfate content, and soluble chloride content using procedures described in California Test Methods 417, 422, and 643, respectively. The test results are presented in Table 6.

Table 6. Soil Corrosion Test Results

Boring	Sample Depth (ft)	Soil Type	Minimum Resistivity (ohm-cm)	pH	Soluble Sulfate Content (ppm)	Soluble Chloride Content (ppm)
A-11-123	10	CH	190	7.0	1,700	680
A-11-124	2.5	CL	310	6.5	1,950	407

Based on the Caltrans Corrosion Guidelines (2003b), soils are considered corrosive if the pH is 5.5 or less, or the chloride concentration is 500 ppm or greater, or the sulfate concentration is 2,000 ppm or greater. Based on the test results presented in Table 6, and the above Caltrans criteria, the on-site soils are considered to be corrosive to bare metals and concrete. Based on the measured chloride concentrations, the minimum concrete cover over reinforcement for structural elements in contact with onsite soils should be in accordance with Table 8.22.1 of the Caltrans BDS (2003a) for "Corrosive soil above MLLW level with chloride concentration between 500 and 5,000 ppm." Based on the measured sulfate concentrations and additional soluble sulfate content test results documented in the Materials Report for this project (EMI, 2012b), a cement type in accordance with Table 8.22.2 of Caltrans BDS for "Sulfate Concentration from 2,000 to 15,000 ppm" may be used. Additional corrosion protection requirements for structural members are presented in Section 8.22 of Caltrans BDS and in Section 6.4 of this report.

6.0 CONSTRUCTION RECOMMENDATIONS

6.1 EARTHWORK

Earthwork should be performed in accordance with Caltrans Standard Specifications, Section 19 (Caltrans, 2010b). Appropriate measures should be taken to prevent damage to adjacent structures and utilities. Any design and construction of temporary sloping, sheeting, or shoring should be made the contractor's responsibility. It should be noted that it is the responsibility of the contractor to oversee the safety of the workers in the field during construction. The contractor shall conform to all applicable occupational and health standards, rules, regulations, and orders established by the State of California. In addition, other State, County, or Municipal regulations may supersede the recommendations presented in this section. If a trench shoring design and safety plan is required, the geotechnical consultant should review the plan to confirm that recommendations presented in this report have been applied to the design.

Groundwater was discussed in Section 4.2. Groundwater is not expected to be encountered during wall construction. The Engineer should be contacted if groundwater is encountered during construction. If wet subgrade conditions are encountered during construction, the soft bottom will require stabilization prior to any earthwork. Subgrade stabilization can be accomplished by using a combination of geotextile, geogrid, gravel, or aggregate base. In addition, low ground pressure earthmoving equipment may be necessary during excavation and relatively lightweight equipment may be needed to compact the select material to minimize the potential for soil pumping.

6.2 TEMPORARY EXCAVATIONS

Temporary excavations must be properly sloped or shored in accordance with all applicable codes and regulations including OSHA standards.

Qualified geotechnical personnel should inspect temporary slopes for erosion and sloughing, and should inspect temporary shoring for signs of instability and deformations, during construction on a daily basis.

Soil or other construction materials should not be stockpiled adjacent to excavations. Stockpiles should be set back a minimum distance which is equal to the height of the excavation. Shoring should be designed for site specific conditions using input from qualified geotechnical personnel during construction.

The contractor is responsible for worker safety in the field during construction. The contractor should conform to all applicable occupational safety and health standards, rules, regulations, and orders established by the State of California. Also, other state, county, or municipal agency requirements may supersede recommendations presented in this report. If a trench shoring design plan is required, the geotechnical consultant should review the plan to confirm that recommendations presented herein were used for design or provide additional recommendations.

6.3 TIEBACK INSTALLATION

Tieback anchors should be constructed and proof-tested in the field in accordance with Caltrans procedures and specifications. Tieback anchors should not be spaced closer than five diameters of the bonded (grouted) zone or 5 ft, whichever is greater. The minimum unbonded lengths are given in Table 5. The contractor is responsible for determining the bonded length of the tieback anchors, but the bonded length should not be less than the minimum bonded lengths also given in Table 5.

6.4 CORROSION MITIGATION

Based on low pH and minimum resistivity values, and high chloride and sulfate content determined by tests conducted on samples collected from throughout the project area, the corrosion environment is found to be "aggressive." Consequently, corrosion mitigation should be provided for the proposed tieback walls and ground anchors. Requirements for corrosion mitigation provided in Section 46-2.03A of the Caltrans Standard Specifications (2010) should be applied to the proposed ground anchors. All steel components of the tieback anchors and walls should be protected against corrosion. Type V cement should be used in concrete that is in contact with the earth materials.

6.5 SURFACE AND SUBSURFACE DRAINAGE

The design earth pressures do not include hydrostatic pressures due to water. Also, the wall will retain native soils that are expansive. Controlling surface water behind the wall is important for eliminating hydrostatic pressures and minimizing the expansion of the materials.

As a result, the wall should be provided with a subdrainage system. Surface water should be controlled and guided away from the wall. If effective drainage cannot be provided over the full height of the wall, hydrostatic pressure should be added in the undrained zone. EMI recommends constructing a V-ditch at the top and behind the wall and guiding surface water to approved drainage devices. In addition, a minimum 5-ft length of the slope face, measured upslope from the upslope edge of the V-ditch, should be paved to minimize infiltration of surface water run-off from the slope face.

6.6 WALL BACKFILL

Excavation and construction of the new wall will need to address concurrent removal of the existing wall and its geogrid-reinforced backfill, particularly in the eastern portion where the two walls are near each other.

Mirafi geogrids were placed behind the existing keystone wall to reinforce the soil backfill. Contractor may elect to remove these geogrids because there is a good likelihood that they may interfere with tieback installation. If the geogrids are removed, the existing slope will need to be reconstructed and backfilled to reestablish finished grades.

Simultaneously, it is prudent that the contractor take precautionary measures to prevent movements of the existing slope during removal of the existing geogrids. Contractor can utilize the recommended instrumentation and monitoring program (see Section 6.7), or install additional

monitoring devices to ensure that any movements of the existing slope can be detected immediately. The Engineer should be contacted if slope movement is encountered during construction.

On-site soils are not expected to be suitable for use as wall backfill. Materials placed behind the new wall should be Structure Backfill per Section 19-3.0E of the Caltrans Standard Specifications (2010). Backfill should be compacted in accordance with Section 19-5 of the Caltrans Standard Specifications, placed in loose lifts not exceeding 8" in thickness, moisture-conditioned to near-optimum moisture content, and compacted to at least 90% relative compaction. The relative compaction should be based on the maximum density determined by California Test Method 216. Jetting or flooding to compact backfill is not be used. Heavy compaction equipment, such as vibratory rollers, dozers, or loaders, should not be used adjacent to the walls in order to avoid damaging the walls due to large lateral earth pressures.

6.7 WALL CONSTRUCTION AND MONITORING

This wall will retain a slope with mapped landsliding features. Residential structures and a church building are located at the top of the slope. Thus, special precautions should be used during construction of this tieback wall.

The tieback walls should be constructed in segments (slot cuts) to minimize the length of temporary excavation. EMI recommends limiting each vertical lift height be slot-cut to no more than 5 ft. EMI also recommends that the maximum length of slot cut at any given time not exceed one-quarter of the total wall length or 120 ft, whichever is less. This will allow Contractor to excavate a 5-ft lift for a horizontal distance of maximum 120 ft or less at one time, then install and test the tieback anchor prior to excavating another 120-ft wide slot.

Prior to excavations, stability tests are recommended to be performed near the proposed wall zones outlined in Table 7. The stability tests should be performed according to Section 19-3.01A(3) of the Caltrans Standard Specifications (2010b).

Table 7. Stability Tests for Vertical Cuts

Wall Zone				Minimum Recommended Number of Stability Tests	Materials Retained at Back of Wall
Wall LOL Station		Approx. "AP" Station			
Start	End	Start	End		
10+00	11+32	20+91	22+00	1	Qls
11+32	13+80	22+00	24+50	1	Af
13+80	16+33	24+50	27+00	2	Tc
16+33	17+67.5	27+00	28+27	1	Af (reinforced)

The contractor should exercise care to minimize construction impacts to areas surrounding the new wall. EMI recommends that a monitoring program be implemented during construction to monitor movement of the ground and slopes behind the new wall. The purpose of the monitoring program is to alert the Resident Engineer of any slope movements and to protect against

potential claims from owners of adjacent properties. EMI recommends installing at least four settlement hubs and four slope indicators (inclinometers) at locations shown in Figure 7. This program includes one settlement hubs and one slope inclinometer near the perimeter of the church property. The slope inclinometers should extend to depths shown on Figure 7.

The settlement hubs and slope inclinometers should be installed prior to start of any construction pertaining to the new wall and any construction activities in the vicinity of the new wall. The settlement hubs should be monitored by licensed surveyors. The inclinometer casings should be measured by qualified geotechnical personnel. Special care should be exercised in the field to survey and protect these devices. The settlement hubs should be surveyed and the inclinometers should be monitored at the time of installation prior to any excavating or wall construction to establish a baseline.

During wall construction, the settlement hubs and inclinometers casings should be regularly measured to detect any ground movement. If the measured ground or slope movement is excessive, construction should be stopped and measures to mitigate the ground movement should be implemented immediately.

Records should be kept to track the response of the church premises and nearby buildings and structures located at the top of slope to construction activities along Avenida Pico and the I-5 NB On-Ramp. These records should include at a minimum photographs and surveys of potential movements of structural elements including buildings, residential structures, fences, and roadway pavements. These records should be collected pre-construction, during construction, and post-construction, and will be used to protect against potential claims from property owners.

LEGEND

○ Proposed Inclinometer Location
65′ (Termination Depth in feet below existing ground)

⊡ Proposed Settlement Hub

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)
WALL 190

Project No.: 11-135 | Date: 06-25-2012

Proposed Survey Monument and Slope Inclinometer Locations

Figure 7

6.8 REVIEW OF CONSTRUCTION PLANS

Recommendations contained in this report are based on preliminary plans. The geotechnical consultant should review the final construction plans and specifications in order to confirm that the general intent of the recommendations contained in this report have been incorporated into the final construction documents. Recommendations contained in this report may require modification or additional recommendations may be necessary based on the final design.

6.9 GEOTECHNICAL OBSERVATION AND TESTING

It is recommended that inspections and testing be performed by the geotechnical consultant during the following stages of construction:

- Grading operations, including excavations and placement of compacted fill,
- Temporary shoring installation,
- Removal or installation of support of buried utilities or structures,
- Excavation and drilling of holes for installation of tieback anchors,
- Backdrain installation and backfilling of walls, and
- When any unusual conditions are encountered.

7.0 LIMITATIONS

This report is intended for the use of OCTA, Parsons, and Caltrans for design and construction of Wall 190 proposed as part of the I-5 HOV Improvement Project (Segment 1). This report is based on the project as described and the information obtained from the exploratory borings at the approximate locations indicated on the attached plans. The findings and recommendations contained in this report are based on the results of the field investigation, laboratory tests, and engineering analyses. In addition, soils and subsurface conditions encountered in the exploratory borings are presumed to be representative of the project site. However, subsurface conditions and characteristics of soils between exploratory borings can vary. The findings reflect an interpretation of the direct evidence obtained. The recommendations presented in this report are based on the assumption that an appropriate level of quality control and quality assurance (inspections and tests) will be provided during construction. EMI should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations contained in this report are applicable to the specific design element(s) and location(s) which is (are) the subject of this report. They have no applicability to any other design elements or to any other locations and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of EMI.

EMI has no responsibility for construction means, methods, techniques, sequences, or procedures; for safety precautions or programs in connection with the construction; for the acts or omissions of the CONTRACTOR or any other person performing any of the construction; or for the failure of any worker to carry out the construction in accordance with the Final Construction Drawings and Specifications.

Services performed by EMI have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty or guarantee is included or intended.

8.0 REFERENCES

American Society for Testing and Materials (ASTM), 2008. Annual Book of Standards. Soil and Rock; Vol. 04.08.

American Association of State Highway and Transportation Officials (AASHTO), 2007, AASHTO LRFD Bridge Design Specifications, Fourth Edition, with 2008 and 2009 Interim Revisions, Washington, DC.

Argus, D.F., Heflin, M.B., Donnellan, A., Webb, F.H., Dong, D., Hurst, K.J., Jefferson, D.C., Lyzenga, G.A., Watkins, M.M., and Zumberge, J.F., 1999, Shortening and thickening of metropolitan Los Angeles measured and inferred by using geodesy: Geology, v. 27, p. 703-706.

Benioff, H., 1938, The determination of the extent of faulting with application to the Long Beach earthquake: Bulletin of the Seismological Society of America, v. 28, p. 77-84.

California Geological Survey, 2009, Tsunami Inundation Map for Emergency Planning, San Clemente quadrangle: Division of Mines and Geology.

_____, 2002, Division of Mines and Geology, Seismic Hazard Zone Report for the San Clemente 7.5-Minute Quadrangle, Orange County, Report 062.

California Department of Transportation (Caltrans), California Test Methods, various dates.

_____, 2012, Memo To Designers 5-12.

_____, 2011a, California Amendments to the AASHTO LRFD Bridge Design Specifications, Fourth Edition.

_____, 2011b, Caltrans Bridge Design Aids 3-8.

_____, 2010a, Seismic Design Criteria, Version 1.6.

_____, 2010b, Standard Specifications.

_____, 2009, Foundation Report Preparation for Bridge Foundations, Division of Engineering Services, Geotechnical Services.

_____, 2003a, Bridge Design Specifications.

_____, 2003b, Corrosion Guidelines, Version 1.0; Office of Materials Engineering and Testing Services, Corrosion Technology Branch.

City of San Clemente, 2000, Project Plans for Construction and Rehabilitation on Avenida Pico, In San Clemente From Calle de Industrias to 0.5 KM East of I-5 in Orange County, Street Widening and Ramp Modifications, City Project No. 19901, Drawing No. TTL-1 (1 of 38), R-1 (Sheet 26 of 38).

Earth Mechanics (EMI), 2012a, Final Foundation Report, Avenida Pico Undercrossing (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277 (EA 12-0F96B).

_____, 2012b, Final Materials Report, Interstate 5 HOV Improvement Project (Segment 1), San Clemente, Orange County, California, 12-ORA-5, 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B).

_____, 2012c, Final Foundation Report, Wall 181 (Bridge No. 55E-0139), PM 3.0/3.7, Wall 183 (Bridge No. 55E-0140), PM 3.0/3.7, Wall 193 (Bridge No. 55E-0142), PM 3.47/3.66, and Wall 203 (Bridge No. 55-0143), PM 3.0/3.7, Interstate 5 HOV Improvement Project (Segment 1), San Clemente, Orange County, CA, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B).

FHWA, 1999, Geotechnical Engineering Circular No. 4, Ground Anchors and Anchored Systems, Washington, DC, FHWA Publication No. FHWA-IF-99-015.

Fumal, T.E., Pezzopane, S.K., Weldon, R.J. II, and Schwartz D.P., 1993, A 100-year average recurrence interval for the San Andreas fault at Wrightwood, California: Science, v. 259, p. 199-203.

Hauksson, E. and Gross, S., 1991, Source parameters of the 1933 Long Beach earthquake: Bulletin of the Seismological Society of American, v. 81, p. 81-98.

Hauksson, E., Jones, L.M., and Hutton, K., 1995, The 1994 Northridge earthquake sequence in California: seismological and tectonic aspects: Journal of Geophysical Research, v. 100, p. 12,335-12,355.

Jacoby, G., Sheppard, P., and Sieh, K., 1987, Was the 8 December 1812 California earthquake produced by the San Andreas fault? Evidence from trees near Wrightwood: Seismological Research Letters, v. 58, p. 14.

Jennings, C.W., 2010, Fault Activity Map of California and Adjacent Areas, Geologic Data Map No. 6, Department of Conservation, Division of Mines and Geology.

Kennedy, M.P., Tan, S.S., Bovard, K.R., Watson, M.J., and Guitierrez, C.I., 2007, Geologic Map of the Oceanside 30x60-minute quadrangle, California; California Geologic Survey, Regional Geologic Map No. 2, Scale 1:100 000.

Lam, I.P., and Martin, G.R., 1986, Seismic Design of Highway Bridge Foundations, FHWA Report Nos. FHWA A/RD-86/102.

Leighton and Associates, 2001, Geotechnical Report of Keystone Wall Construction for the Avenida Pico Widening Project, City of San Clemente, California.

_____, 1999, Geotechnical Engineering Investigation for the Proposed Avenida Pico Widening to the East of the On-Ramp to North-bound San Diego Freeway (I-5), San Clemente, California.

_____, 1991, Final Geotechnical Report of Rough- and Postgrading Operations, Parcels 1, 2, and 3 of Parcel Map No. 89311, St. Andrews By The Sea United Methodist Church, San Clemente, California.

_____, 1980, Geotechnical Investigation of Proposed Cut Slope at the Intersection of Avenida Pico and the Northbound San Diego Freeway On-Ramp, Tentative Tract 8818, Reeves Ranch (Marblehead), San Clemente, California.

_____, 1979, Geotechnical Investigation of Tentative Tract 8818 and Grading Plan Review of Phase I, Reeves Ranch (Marblehead), San Clemente, California.

Morton, P.K. and Miller, R.V., 1981, Geologic map of Orange County, California showing mines and mineral deposits: California Division of Mines and Geology, Bulletin 204.

Robertson, P. K. and Campanella, R. G., 1989, Guidelines for Geotechnical Design Using CPT and CPTU, Civil Engineering Department, University of British Columbia, Vancouver, Canada.

Rocscience, 2012, SLIDE 6.0 – 2D Limit Equilibrium Slope Stability Program, Toronto, Canada.

Shao, G., and Hauksson, E., 2009, A finite fault study of the 29 July 2008 Mw5.4 Chino Hills Earthquake: Seismological Research Letters, v. 80, p.320-321.

Shaw, J.H., and Shearer, P.M., 1999, An elusive blind-thrust fault beneath metropolitan Los Angeles: Science, v. 283, p.1516 (5 March).

Shaw, J.H., Plesch, A., Dolan, J.F., Pratt, T.L., and Fiore, P., 2002, Puente Hills blind-thrust system, Los Angeles, California: Bulletin of the Seismological Society of America, v. 92, p. 2946-2960.

Tan, S.S., 1999, Geologic map of the San Clemente 7.5' quadrangle, San Diego and Orange counties, California: A digital database: California Geological Survey, Preliminary Geologic Map, scale 1:24,000.

Ward, S.N., 1994, A multidisciplinary approach to seismic hazard in southern California: Bulletin of the Seismological Society of America, v. 84, p. 1293-1309.

Weldon, R., Scharer, K., Fumal, T., and Biasi, G., 2004, Wrightwood and the earthquake cycle: what a long recurrence record tells us about how faults work: Geological Society of America, GSA Today, v. 14, no. 9, p. 4-10.

Yeats, R.S., and Huftile, G.J., 1995, The Oak Ridge fault system and the 1994 Northridge earthquake: Nature, v. 373, p. 418-420.

Winterkorn, H.F. and Fang, H.Y., 1975, Foundation Design Handbook, Van Nostrand Reinhold Company, New York, NY.

Appendix A

LOG OF TEST BORINGS SHEETS

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

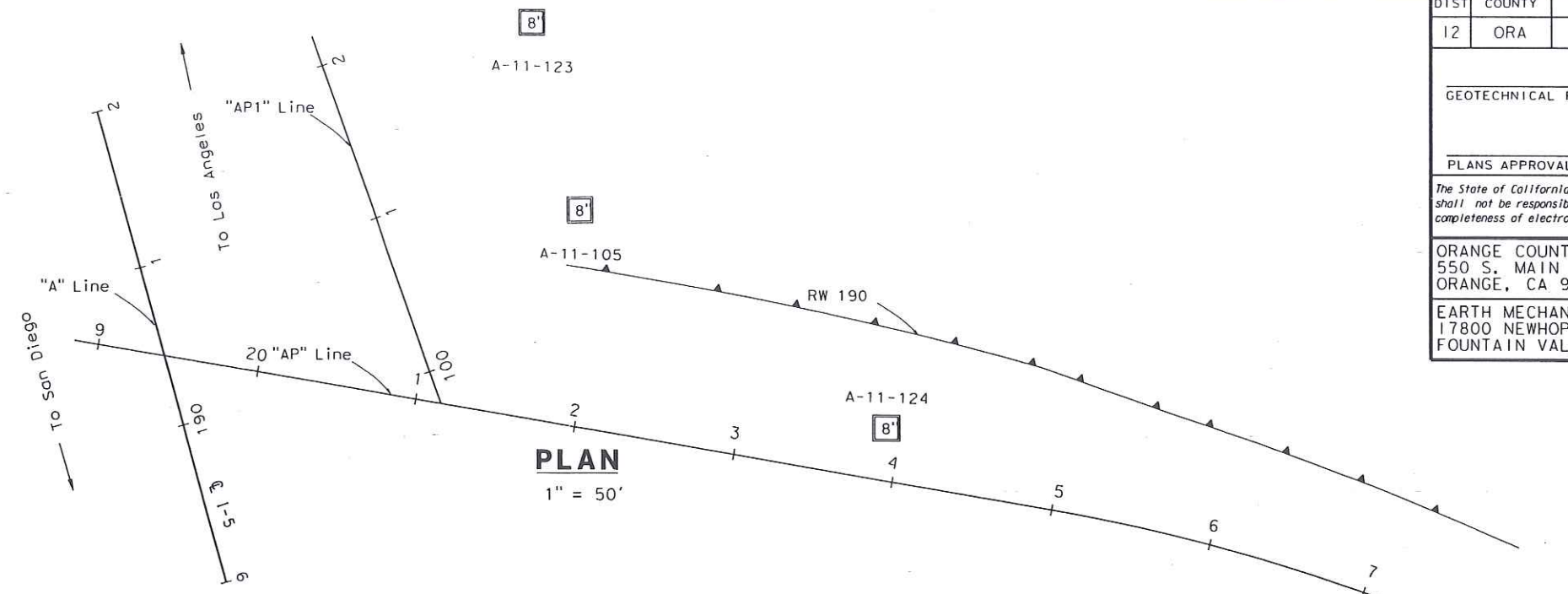
NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system or a rope and pulley hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

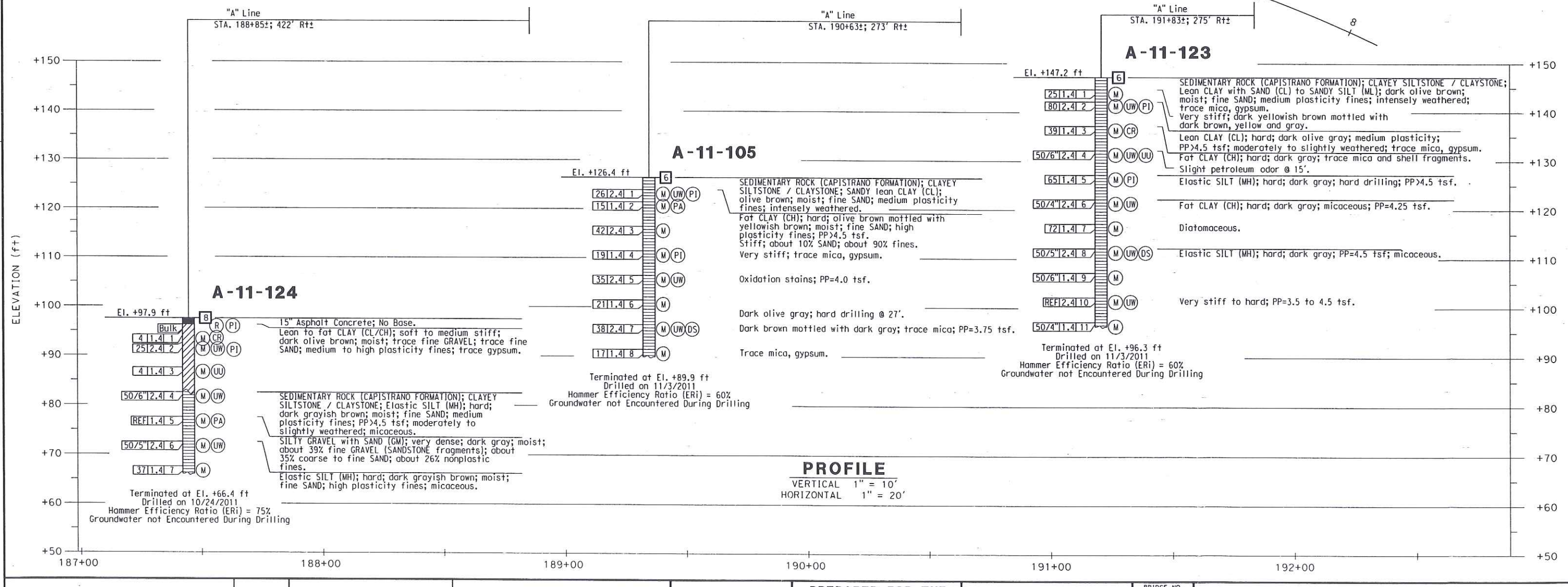
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 10/2011, 11/2011				POST MILES -

RETAINING WALL 190

LOG OF TEST BORINGS 1 OF 7

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 12000202771 CONTRACT NO.: 12-0F96B1

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => $REQUEST

GEOTECHNICAL BORING LOG B-1

Date 3-13-99 Sheet 1 of 2
Project U.M.A. Pico Project No. 1980306-01
Drilling Co. Peter Drilling Type of Rig Bucket
Hole Diameter 24 Drive Weight 140 lb Drop 30"
Elevation Top of Hole 114' Location Pico Slope, East

Logged By KTS/DRT
Sampled By DPJ

Elevation Feet	Depth Feet	Graphic Log (N–S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
115	0								@0-50' - Capistrano Formation (Tc) -	
120	5			R-1 (B-1)	13	83.9	19.9		@5' Sample: Medium brown, fine sandy SILTSTONE, slightly moist, slightly stiff; some pores and carbonates, faint horizontal laminations, oxidation staining @7-10' Bag Sample (B-1) (as above)	MD, CR, AL, DS
125	10		@12' J:N75E, 38SE	R-2	30/10				@10' Sample: Medium gray, mottled with brown fine sandy SILTSTONE, slightly moist, stiff; gypsum lined joints with iron oxide staining @12' Planar gypsum lined joint	DS
130	15		@16' J:N65E, 57SE	R-3	45	84.3	29.6	Tc	@15' Sample: Medium gray and maroon SILTSTONE, slightly moist, very stiff to hard; iron oxide staining on surface @16' Joint, no gypsum	
135	20			R-4	50	85.8	27.1		@20' Sample: Medium gray SILTSTONE, slightly moist, very stiff to hard; planar gypsum lined joints to 21' @23' Gypsum lined joint	
140	25		@26' J:N48E, 79SE	R-5 (B-2)	45	93.9	26.9		@25' Sample Olive green gray SILTSTONE, slightly moist, very stiff; iron oxide staining along fractures, subparallel joints @26-29' Increased oxidation @26-29' Bag Sample (B-2) Orangish brown mottled with gray, moist, soft to slightly stiff	
	30		@29'						@29' Seepage along joint	

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG B-1

Date 3-13-99 Sheet 2 of 2
Project U.M.A. Pico Project No. 1980306-01
Drilling Co. Peter Drilling Type of Rig Bucket
Hole Diameter 24 Drive Weight 140 lb Drop 30"
Elevation Top of Hole 114' Location Pico Slope, East

Logged By KTS/DRT
Sampled By DPJ

Elevation Feet	Depth Feet	Graphic Log (N–S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
145	30		J:N50E, 68SE	R-6	45	96.3	26.3		@30' Sample: Medium brown mottled with medium gray SILTSTONE, Slightly moist, stiff; gypsum lined joints, iron staining @31' oxidized/unoxidized contact, maroon SILTSTONE, slightly moist, stiff; contact with dark gray SILTSTONE, slightly moist, stiff to very stiff @32' Near horizontal 2 inch long sand pockets	
150	35		@32' C:N48E, 55SE @33' J:N50E, 77SE	R-7	55	97.8	22.7		@35' Sample: Dark gray SILTSTONE, slightly moist, very stiff	
155	40		@37' B:E-W, 5N	B-3					@36-38' Bag Sample B-3: Dark gray SILTSTONE, slightly moist, very stiff to hard @37' CLAY bed, slightly undulatory, very thin, slightly broken and sheared	
				R-8	50			Tc		DS
160	45								@45' Dark gray SILTSTONE, slightly moist, very stiff to hard; homogeneous, massive	
165	50			R-9	60				@50' Sample: Dark gray, SILTSTONE, slightly moist, very stiff to hard	
170	55								Total depth 51 feet Seep at 29 feet No caving Downhole logged to 46 feet Backfilled and tamped 4/13/99	
	60									

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

RETAINING WALL 190
LOG OF TEST BORINGS 2 OF 7

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

UNIT: PROJECT NUMBER & PHASE: 12000202771

BRIDGE No.	Sheet	of

NOTES:

1. These boring logs are from a soil report entitled "GEOTECHNICAL ENGINEERING INVESTIGATION FOR THE PROPOSED AVENIDA PICO WIDENING TO THE EAST OF THE ON-RAMP TO NORTH-BOUND SAN DIEGO FREEWAY (I-5) CITY OF SAN CLEMENTE, CALIFORNIA, Project No. 1980306-1" dated June 8, 1999, by Leighton and Associates, Inc., Irvine, California.
2. Elevation Top of Hole is 114'. All other elevations shown on this log should be ignored.

DESIGN OVERSIGHT	DRAWN BY	J. FANG	FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR, PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	DATE:		

BRIDGE NO. -
POST MILES -

RETAINING WALL 190
LOG OF TEST BORINGS 2 OF 7

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771 CONTRACT NO.: 12-0F96B1

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF

FILE => $REQUEST

DATE PLOTTED => 07/JUL/2010 TIME PLOTTED => 07:47:18

GEOTECHNICAL BORING LOG B-2

Date 3-14-99 Sheet 1 of 2
Project U.M.A. Pico Project No. 1980306-01
Drilling Co. Peter Drilling Type of Rig Bucket
Hole Diameter 24 Drive Weight 140 lb Drop 30"
Elevation Top of Hole 133' Location Pico Slope, West

Logged By KTS/DPJ
Sampled By DPJ

Elevation Feet	Depth Feet	Graphic Log (N–S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
135	0								@0-40' Capistrano Formation (Tc)	
			@2' J:N55E, 30NW							
	5			R-1	32	101.2	22.1		@5' Sample: Medium to dark gray mottled with medium brown SILTSTONE, moist, stiff to very stiff	
140			@6' J:N71E, 47SE							
	10		@10' S:N26W, 52NE	R-2	35	101.2	22.0		@10' Sample: Dark gray SILTSTONE, slightly moist very stiff; 1/16" clay lined microshear, from8.5 to 11 feet	
145			@13' S:N27W, 54NE						@13' 1/16" Clay lined microshear	
	15			R-3	40			Tc	@15' Sample: Dark gray with olive green SILTSTONE, Slightly moist, very stiff, drilling harder	DS
150			@17' S:N30W, 38NE	B-1					@17-23' Bag sample (B-1) as above except hard, 1/16" clay lined microshear, from 17 to 19 feet	
	20			R-4	65	98.5	24.7		@20' Sample: Dark gray with olive green SILTSTONE, slightly moist, very stiff to hard; sulfur odor to 26', thin near horizontal sand pockets	
155			@21.5' GB: N45W, 4NE @22' S:N32W, 56NE						@22' Material becomes fine sandy SILTSTONE, 1/16" clay lined microshear, some small white sand pockets	
	25		@25' S:N35W, 28NE	R-5	60/10	96.4	25.1		@24.5' 1/16" Clay lined microshear @25' Sample: Dark gray with olive green fine sandy SILTSTONE, slightly moist, hard; homogeneous @26' 1/16" clay lined microshear, less continuous than prior shears	
160	30									

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

GEOTECHNICAL BORING LOG B-2

Date 3-14-99 Sheet 2 of 2
Project U.M.A. Pico Project No. 1980306-01
Drilling Co. Peter Drilling Type of Rig Bucket
Hole Diameter 24 Drive Weight 140 lb Drop 30"
Elevation Top of Hole 133' Location Pico Slope, West

Logged By KTS/DPJ
Sampled By DPJ

Elevation Feet	Depth Feet	Graphic Log (N–S)	Attitudes	Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	DESCRIPTION	Type of Tests
165	30			R-6	60	90.5	27.3		@30' Sample: Dark gray with olive green fine sandy SILTSTONE, slightly moist, hard; massive	
	35		@34' J:N55E, 64SE	R-7	60			Tc	@35' Sample: Dark gray with olive green fine sandy SILTSTONE, slightly moist, hard	DS
170	40			R-8	50	98.1	20.8		@40' Sample: Dark gray with olive green fine sandy SILTSTONE, slightly moist, hard; homogeneous, massive material	
175	45								Total depth 41 feet No groundwater Downhole logged to 36' Backfilled and tamped 4/14/99	
180	50									
185	55									
190	60									

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
SA SIEVE ANALYSIS
AL ATTERBERG LIMITS
EI EXPANSION INDEX
RV R-VALUE

LEIGHTON AND ASSOCIATES, INC.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

RETAINING WALL 190

LOG OF TEST BORINGS 3 OF 7

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

UNIT:
PROJECT NUMBER & PHASE: 12000202771

BRIDGE No.	Sheet	of

NOTES:

1. These boring logs are from a soil report entitled "GEOTECHNICAL ENGINEERING INVESTIGATION FOR THE PROPOSED AVENIDA PICO WIDENING TO THE EAST OF THE ON-RAMP TO NORTH-BOUND SAN DIEGO FREEWAY (I-5) CITY OF SAN CLEMENTE, CALIFORNIA, Project No. 1980306-1" dated June 8, 1999, by Leighton and Associates, Inc., Irvine, California.
2. Elevation Top of Hole is 114'. All other elevations shown on this log should be ignored.

DESIGN OVERSIGHT	DRAWN BY	J. FANG	FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR, PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	DATE:		

BRIDGE NO. -
POST MILES -

RETAINING WALL 190

LOG OF TEST BORINGS 3 OF 7

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 12000202771 CONTRACT NO.: 12-0F96B1

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF

FILE => $REQUEST

DATE PLOTTED => 9-MAY-12

TIME PLOTTED => 07:46

GEOTECHNICAL BORING LOG

DATE 12-12-79 DRILL HOLE No. B-1 SHEET 1 OF 2
PROJECT Reeves Ranch (I-5 - Avenida Pico Cut Slope) PROJECT No. 177307-05
DRILLING CO. Bo-Jac TYPE OF RIG Bucket Auger
HOLE DIAMETER 24" DRIVE WEIGHT 1500 lbs (0-25), 750 lbs (25-45) DROP 12 IN.
ELEVATION TOP OF HOLE 99' REF. OR DATUM 40 scale T.T. map

LOGGED BY LC
SAMPLED BY DRH

DEPTH FEET	GRAPHIC LOG	ATTITUDES	TUBE SAMPLE No.	BLOWS PER FOOT	DRY DENSITY PCF	MOISTURE CONTENT, %	SOIL CLASS. (U.S.C.S.)
0	S-N						
5			D 1	push 6" 1/6"	96.8	24.8	CL/ML
10			2	3	95.2	29.3	CL/ML
15		irreg. C. surf. C. N40E 90S C. N17E 91SE J. N60E 12N J. N47E 78S	(2) 3		90.8	32.6	ML
20			(3) 4	15	99.6	26.3	CL/ML
25			5	11 (5 rings)	103.9	22.8	CL/ML
30							

GEOTECHNICAL DESCRIPTION

Qals: Brn., moist - v/ moist, soft, sl/ sandy, clayey silt

very bkn. + fragmented

Olive grn. brn., v/ moist to wet, clayey silt - silty clay, matt. olive gry + brn., roots, gyp. seam (½" th.) FeO stng.

very bkn. + mashed

Slide material

Slt: gradual change to harder material
@ 12' change to blocky, silty ss/sandy siltstone

Bedrock:
FeO stng., broken + fractured.
@ 14' increase in clay to silty clay
@ 17' white granular gyp. in olive grn., silty clay
@ 17.7' H_2O along gyp. joint
@ 19' harder drilling, gyp. xls. dk. brn.-blk., moist, stiff, clayey sandy slt., massive
@ 20' Grada. change to dk. gry. grn., moist, stiff, clayey siltstone.

BEDROCK

505A(11/77)

GEOTECHNICAL BORING LOG

DATE 12-12-79 DRILL HOLE No. B-1 SHEET 2 OF 2
PROJECT Reeves Ranch (I-5 - Avenida Pico Cut Slope) PROJECT No. 177307-05
DRILLING CO. Bo-Jac TYPE OF RIG Bucket Auger
HOLE DIAMETER 24" DRIVE WEIGHT 1500 lbs (0-25), 750 lbs (25-45) DROP 12 IN.
ELEVATION TOP OF HOLE 99' REF. OR DATUM 40 scale T.T. map

LOGGED BY LC
SAMPLED BY DRH

DEPTH FEET	GRAPHIC LOG	ATTITUDES	TUBE SAMPLE No.	BLOWS PER FOOT	DRY DENSITY PCF	MOISTURE CONTENT, %	SOIL CLASS. (U.S.C.S.)
30			6	240 @ 750#	96.5	20.0	ML
35			7	32	108.3	20.7	ML
40			8	35 (5 rings)	99.5	21.0	ML/CL

GEOTECHNICAL DESCRIPTION

very uniform a.a., no structure, little gyp., massive

BEDROCK

Notes:
1) Change to unoxidized @ 19'
2) seepage @ 17.7'
3) Total Depth 40'

505A(11/77)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

RETAINING WALL 190
LOG OF TEST BORINGS 4 OF 7

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

UNIT:
PROJECT NUMBER & PHASE: 12000202771

BRIDGE No.	Sheet	of

NOTES:

1. These boring logs are from a soil report entitled "GEOTECHNICAL INVESTIGATION OF PROPOSED INTERSECTION OF AVENIDA PICO AND NORTHBOUND SAN DIEGO FREEWAY ON-RAMP, TENTATIVE TRACT 8818, REEVES RANCH (MARBLEHEAD), SAN CLEMENTE, CALIFORNIA, Project No. 177307-05" dated March 24, 1980, by Leighton and Associates, Inc., Irvine, California.

DESIGN OVERSIGHT	DRAWN BY	J. FANG	FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	DATE:		

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 12000202771 CONTRACT NO.: 12-0F96B1

BRIDGE NO. -
POST MILES -

RETAINING WALL 190
LOG OF TEST BORINGS 4 OF 7

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF

FILE => $REQUEST

DATE PLOTTED => 8/1/12

TIME PLOTTED => 07:37

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 — EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

GEOTECHNICAL BORING LOG

DATE 12-20-79 DRILL HOLE NO. B-2 SHEET 1 OF 1
PROJECT REEVES RANCH (I-5 - Avenida Pico Cut Slope) PROJECT NO. 177307-05
DRILLING CO. B + W TYPE OF RIG Bucket Auger
HOLE DIAMETER 24" DRIVE WEIGHT 350 lbs. (0-10'), 250 lbs (10'-15'), 150 lbs (15-22') DROP 12 IN.
ELEVATION TOP OF HOLE 168' REF. OR DATUM

LOGGED BY LC
SAMPLED BY JW

DEPTH FEET	ATTITUDES	TUBE SAMPLE NO.	BLOWS PER FOOT	DRY DENSITY PCF	MOISTURE CONTENT, %	SOIL CLASS. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION
0–5	J. N70E 87S	1	29	102.5	18.1	ML	Siltstone; lt. brn-olive gry., moist, sl/ stiff, silt, FeO stng., mott., broken, scatt. gyp., occasional sand beds. @ 3.3' to 6.7' J. w/ open struct., rt. hairs, FeO stng.
5	B. N40-60E 2N	(1) 2	21	100.0	22.1	ML	@ 5.6' - 10' well bedded
		(2S)					@ 8.1'-8.8' yl. brn. concretion bed, hard, continuous, above and below concretion bed is gnarled, plastic clay, moist
10	B. N60E 5N	3	50/8"	102.8	23.7	ML	@ 9' slt.; med. brn., moist, silt, mica., w/ blebs of dk. gry. unoxidized slt. @ 10' becomes massive. @ 12' lt. brn. slt. w/ chunks of dk. gry. slt. (cuttings)
15		(3) 4	40	102.3	24.0	ML	@ 14.7' grades to unoxidized slt., gry., sandy, unfractured, v/ firm. @ 17' localized seepage. @ 18.2' seepage through thin sand bed (1/8" th.)
20	B. N70E 12S; B. N85E 8S	(4) 5	90/8"	99.9	23.5	ML/CL	@ 21.1 end of reamed section
		6	50/6"	102.6	21.6	CL	Notes: 1) Total Depth 23ft. 2) Seepage @ 17' 3) Unoxidized siltstone @ 15'

Slide Material (0 to approx. 14.7'); Bedrock (below)

505A(11/77)

GEOTECHNICAL BORING LOG

DATE 12-28-79 DRILL HOLE NO. B-5 SHEET 1 OF 1
PROJECT Reeves Ranch (I-5 - Avenida Pico Cut Slope) PROJECT NO. 177307-05
DRILLING CO. B + W TYPE OF RIG Bucket Auger
HOLE DIAMETER 24" DRIVE WEIGHT 900 lbs (0-14'), 600 lbs (14-28') DROP 12 IN.
ELEVATION TOP OF HOLE 158' REF. OR DATUM

LOGGED BY RW
SAMPLED BY JW

Graphic log: N-6

DEPTH FEET	ATTITUDES	TUBE SAMPLE NO.	BLOWS PER FOOT	DRY DENSITY PCF	MOISTURE CONTENT, %	SOIL CLASS. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION
0–5		1	15	102.7	19.5	CL	Col.; med. brn., moist, soft, silt - sandy silt, abund. caliche stringers + blebs, root tubules
5		2	12(?)	96.3	15.4	CL	@ 7' grades from Col. to slt. (slide debris), traces of gyp. along irregular contact, mashed above, bkn. slt. below
10	C. N68W 35S; B(?) N72W 28S; B(?) N72W 31S	3	20	101.9	20.8	CL	Slst: @ 8' lt. gry + brn., moist, stiff, mica., slt. w/ discon. ss. lenses, mod. fract. w/ short discon. fract. @ 9' poss. bedding on mica parting (num. surfs. like this) @ 11' poss. bedding on gyp. coated surf. @ 12.5' gyp. seam, some open struc., poss. RS., some clay coating @ 14.5' gyp. seam
15	J. E-W 19S; J. N86W 41S	4	20	101.5	23.2	CL	@ 17.5' silty sand layers, traces of free H_2O, w/ thin clay layer, sl/ softer, subhorizontal stratification
20	RS Horiz. (N26E 2-3S)	5	50	103.1	22.5	CL	@ 18.5' dk. gry (unox.) slt., fissle, massive to TD. mica partings appear to have flat dip to S. @ 19' forams
25							Notes: 1) T.D. = 25' 2) No free H_2O, No Caving

Slide Material (0 to approx. 18.5'); Bedrock (below)

505A(11/77)

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

RETAINING WALL 190
LOG OF TEST BORINGS 5 OF 7

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA. UNIT: PROJECT NUMBER & PHASE: 12000202771. BRIDGE No. Sheet of

NOTES:

1. These boring logs are from a soil report entitled "GEOTECHNICAL INVESTIGATION OF PROPOSED INTERSECTION OF AVENIDA PICO AND NORTHBOUND SAN DIEGO FREEWAY ON-RAMP, TENTATIVE TRACT 8818, REEVES RANCH (MARBLEHEAD), SAN CLEMENTE, CALIFORNIA, Project No. 177307-05" dated March 24, 1980, by Leighton and Associates, Inc., Irvine, California.

DESIGN OVERSIGHT — DRAWN BY J. FANG — FIELD INVESTIGATION BY: — DATE:
SIGN OFF DATE — CHECKED BY M. KAPUSKAR

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. KAPUSKAR, PROJECT ENGINEER — BRIDGE NO. - — POST MILES -

RETAINING WALL 190
LOG OF TEST BORINGS 5 OF 7

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: PROJECT NUMBER & PHASE: 12000202771 CONTRACT NO.: 12-0F96B1

DISREGARD PRINTS BEARING EARLIER REVISION DATES — REVISION DATES — SHEET — OF

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 — EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

GEOTECHNICAL BORING LOG

DATE 12-24-79 DRILL HOLE No. B-3 SHEET 1 OF 2
PROJECT Reeves Ranch (I-5 - Avenida Pico Cut Slope) PROJECT No. 177307-05
DRILLING Co. B + W TYPE OF RIG Bucket Auger
HOLE DIAMETER 24" DRIVE WEIGHT 350 lbs (0-10'), 250 lbs (10-15'), 150 lbs (15-22'), ~200 lbs (@ 25') DROP 12 IN.
ELEVATION TOP OF HOLE 118' REF. OR DATUM 40 scale T.T. map

LOGGED BY LC + RW
SAMPLED BY JW

DEPTH FEET	ATTITUDES	TUBE SAMPLE No.	BLOWS PER FOOT	DRY DENSITY PCF	MOISTURE CONTENT, %	SOIL CLASS. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION
0							Col.; med brn., moist, sl/ soft - sl. stiff, silt, (close to optimum moisture), w/ num. stringers and blebs of caliche, gyp. xls. and stringers
	S. N55W 34S	1	50	103.0	22.2	CL	@ 3.6' poorly dev. shear
5		2	35	95.7	14.6	CL/ML	
10		3	40	99.5	14.2	ML/CL	Qalo: @ 11.7' poss. horiz. stratification
							@ 13.7-13.9' subrounded shale pebbles
15		4	40	98.0	19.4	CL	@ 16.8 grades to frags of slt. (B.R.?) in earthy matrix. @ 17.' poss. horiz. stratification @ 18.5' more subrounded shale pebbles @ 19.6' fragmented + v/ bkn. B.R.
20		5	30	89.2	19.8	CL	@ 21' back to fragmented material (not B.R.) @ 21.2' soft Fe oxidized nodule
25		6	55	96.8	21.9	CL	
30							@ 30' no B.R. yet

SLIDE MATERIAL

505A(11/77)

GEOTECHNICAL BORING LOG

DATE 12-24-79 DRILL HOLE No. B-3 SHEET 2 OF 2
PROJECT Reeves Ranch (I-5 - Avenida Pico Cut Slope) PROJECT No. 177307-05
DRILLING Co. B + W TYPE OF RIG Bucket Auger
HOLE DIAMETER 24" DRIVE WEIGHT ~200 lbs @ 30', and 35', ~275 lbs @ 40', 650 lbs @ 45' DROP 12 IN.
ELEVATION TOP OF HOLE 118' REF. OR DATUM 40 scale T.T. map

LOGGED BY LC + RW
SAMPLED BY JW

DEPTH FEET	ATTITUDES	TUBE SAMPLE No.	BLOWS PER FOOT	DRY DENSITY PCF	MOISTURE CONTENT, %	SOIL CLASS. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION
30		7	40/10"	98.6	21.9	CL	Slst: @ 34.3' Contact betn. material above and harder material below gyp. + clay lined surf., (olive grn-gry. clay), FeO stng., poss. grooves
35	RS. N64W 63; N80E 4-5S; J. N70E vert.; J. N67E vert.; S. N5E 15E; J. N26E 71E	8	40/10"	92.1	29.4	CL	@ 36' end of reamed section bottom of hole (12-26-79) @ 36.3' 1/16 - 1/8" gyp. seam, shear surf. clay coated, polished below becomes v/ stiff - material is gry. brn., siltstone, micaceous @ 39' fract. w/ 1/16" gyp filling
40	J. N61E 57S	9	40	94.3	27.7	CL	@ 40' sl/ less fractured @ 40.6' rounded volcanic pbls. below w. dev. gyp. seam @ 41.8' on N. wall, 42.5 on S. wall; grades to unox. slt. (.7' grada. change)
	RS. N76E 12S; N80W 4S						@ 43.1' 1/8" th. surf. w/ gyp. + plastic clay, surf. truncates gyp. filled joints from above below is med. gry., unox. slt., damp, stiff, mica., clayey, no gyp., no fract., traces of forams @ 45.6'
45		10	70	104.2	22.6	ML	@ 46' sl/ more mica., massive
50							

SLIDE MATERIAL / BEDROCK

Notes:
1) T.D. = 50' (former T.D - 36' hole was deepened) 12-27-79
2) Unoxidized siltstone @ 43 ft.
3) No caving, no free H2O

505A(11/77)

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES
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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

RETAINING WALL 190
LOG OF TEST BORINGS 6 OF 7

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — UNIT: PROJECT NUMBER & PHASE: 12000202771 — BRIDGE No. Sheet of

NOTES:
1. These boring logs are from a soil report entitled "GEOTECHNICAL INVESTIGATION OF PROPOSED INTERSECTION OF AVENIDA PICO AND NORTHBOUND SAN DIEGO FREEWAY ON-RAMP, TENTATIVE TRACT 8818, REEVES RANCH (MARBLEHEAD), SAN CLEMENTE, CALIFORNIA, Project No. 177307-05" dated March 24, 1980, by Leighton and Associates, Inc., Irvine, California.

DESIGN OVERSIGHT — DRAWN BY J. FANG — FIELD INVESTIGATION BY:
SIGN OFF DATE — CHECKED BY M. KAPUSKAR — DATE:

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. KAPUSKAR, PROJECT ENGINEER — BRIDGE NO. - — POST MILES -

RETAINING WALL 190
LOG OF TEST BORINGS 6 OF 7

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: PROJECT NUMBER & PHASE: 12000202771 CONTRACT NO.: 12-0F96B1

DISREGARD PRINTS BEARING EARLIER REVISION DATES — REVISION DATES — SHEET OF

FILE => $REQUEST

GEOTECHNICAL BORING LOG

DATE 12-27-79 DRILL HOLE No. B-4 SHEET 1 OF 2
PROJECT Reeves Ranch (I-5 - Avenida Pico Cut Slope) PROJECT No. 177307-05
DRILLING Co. B+W TYPE OF RIG Bucket Auger
HOLE DIAMETER 24" DRIVE WEIGHT 900 lbs (0-14'), 600 lbs (14-28'), 300 lbs (28-40'), DROP 12 IN.
ELEVATION TOP OF HOLE 117' REF. OR DATUM 310 lbs @ 40', 350 lbs @ 45'

DEPTH FEET	GRAPHIC LOG N-S	ATTITUDES	TUBE SAMPLE No.	BLOWS PER FOOT	DRY DENSITY PCF	MOISTURE CONTENT, %	SOIL CLASS. (U.S.C.S.)
0							
			1	14	102.2	21.6	CL
5			2	10	101.6	15.5	CL
10			3	10	97.9	16.0	CL
15			4	30	105.2	17.4	CL
20			(1) 5	30	100.9	18.9	CL
25			6	40	88.4	22.1	CL
30							

GEOTECHNICAL DESCRIPTION

LOGGED BY RW
SAMPLED BY JW

Col.; med. brn., moist - v/ moist, soft, sandy silt, num. caliche blebs + stringers, scatt. FeO stng.

Qalo:

@ 5' abund. caliche matt., more stiff, sl/ less moist slide debris

@ 7' oxidized slt. blebs w/ caliche matt.

@ 9.5' grades to mashed and disturbed slt., gry.-gry. brn., abund. matt. + caliche stringers

@ 12' scatt. charcoal
@ 12-13' gyp. blebs

@ 14' gyp. xls.

@ 15.5' scatt. volcanic pbls. + slt. pbls, gyp. pocket

@ 18' rt. hairs + fibers, gyp. increases v/ much

@ 19' decayed roots (½ root, ½ charcoal)

@ 22.8' ss. bed, 1" thick

@ 25.-26' subrounded shale cobble in silty matrix, (in sample) root tubules are v/ num., sm. FeO stained blebs, caliche blebs and sm. stringers, abund. gyp.

@ 27-28 grades to lt. brn. + gry. slt., laminated or FeO stained joints

Slst: concretionary layer 2" in diam.

@ 29.8' slt. becomes stiff + v/ moist - wet, slt. is v/ fragmented

SLIDE MATERIAL

505A(11/77)

GEOTECHNICAL BORING LOG

DATE 12-27-79 DRILL HOLE No. B-4 SHEET 2 OF 2
PROJECT Reeves Ranch (I-5 - Avenida Pico Cut Slope) PROJECT No. 177307-05
DRILLING Co. B+W TYPE OF RIG Bucket Auger
HOLE DIAMETER 24" DRIVE WEIGHT 400 lbs @ 50' DROP 12 IN.
ELEVATION TOP OF HOLE 117' REF. OR DATUM

DEPTH FEET	GRAPHIC LOG N-S	ATTITUDES	TUBE SAMPLE No.	BLOWS PER FOOT	DRY DENSITY PCF	MOISTURE CONTENT, %	SOIL CLASS. (U.S.C.S.)
30			7	35	99.9	20.8	CL
35			8	30	98.2	24.3	CL
40			9	35	98.7	24.5	CL/ML
45		RS. N64°E 44-45 S striae. N18E 34S	(2) 10	30	97.9	26.2	CL
50			11	30	107.0	20.6	ML

GEOTECHNICAL DESCRIPTION

LOGGED BY RW
SAMPLED BY JW

@ 31' slt. still fragmented, (sandy slt.); v/ jumbled

@ 42' mica becomes more abundant

above RS. material is clayey silt - silty clay, gry.-brn., mashed + jumbled, abund. FeO stng. + oxidation, sl/ compressible
@ 46.7 on N. wall, mica parting att. N76E31S
@ 45-46' root tubules in sample
@ 47' sm. rounded volcanic pbls. in mica. slt. matrix
@ 46-48' RS.; ⅛" th., brn. silty clay, mod. plastic, mica., no free water, sm. poorly dev. striae., moist, w. dev. surface, polished
below RS. slt. is dk. gry., matt. brn. w/ FeO oxidation, mica., sl/ frac.
@ 48.2' unoxidized slt., dk. gry, mica., massive

SLIDE MATERIAL

bedrock

Notes:
1) TD. = 50'
2) No Free H2O Encountered
3) Unoxidized Siltstone @ 48 ft.

505A(11/77)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	Sheet No.	Total Sheets
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

RETAINING WALL 190

LOG OF TEST BORINGS 7 OF 7

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

UNIT: PROJECT NUMBER & PHASE: 12000202771

BRIDGE No.	Sheet	of

NOTES:

1. These boring logs are from a soil report entitled "GEOTECHNICAL INVESTIGATION OF PROPOSED INTERSECTION OF AVENIDA PICO AND NORTHBOUND SAN DIEGO FREEWAY ON-RAMP, TENTATIVE TRACT 8818, REEVES RANCH (MARBLEHEAD), SAN CLEMENTE, CALIFORNIA, Project No. 177307-05" dated March 24, 1980, by Leighton and Associates, Inc., Irvine, California.

DESIGN OVERSIGHT	DRAWN BY	J. FANG	FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR, PROJECT ENGINEER
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	DATE:		

BRIDGE NO. -
POST MILES -

RETAINING WALL 190

LOG OF TEST BORINGS 7 OF 7

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771 CONTRACT NO.: 12-0F96B1

DISREGARD PRINTS BEARING EARLIER REVISION DATES

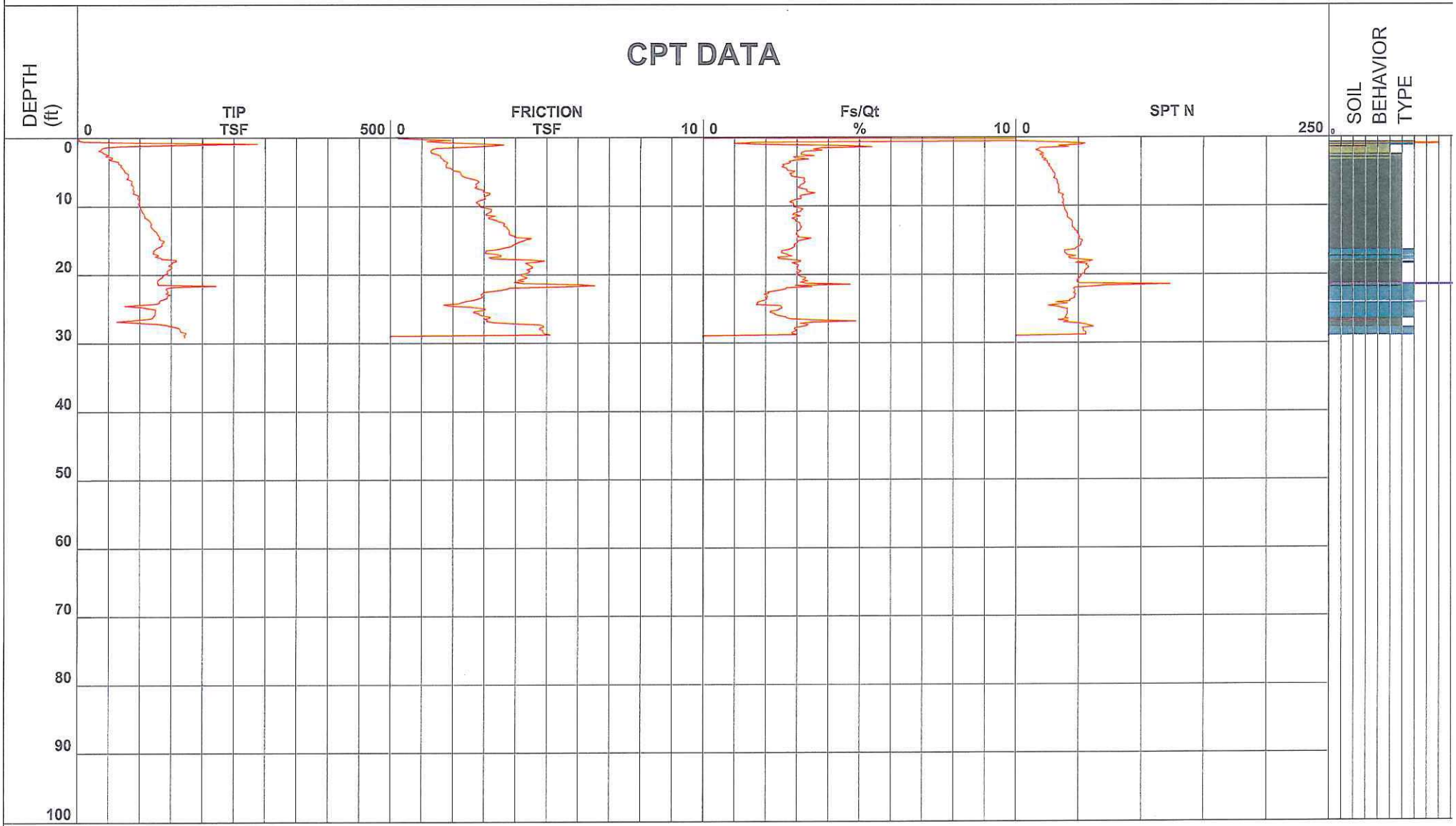
REVISION DATES | SHEET | OF

FILE => $REQUEST

Earth Mechanics

Location	I-5 HOV Widening Segment 1	Operator	BH-JB	Filename	SDF(533).cpt
Job Number	11-135	Cone Number	DSG1104	GPS	
Hole Number	CPT-11-125	Date and Time	9/28/2011 9:41:24 AM	Maximum Depth	29.20 ft
Water Table Depth		>29.20 ft			

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(533).cpt
CPT Date: 9/28/2011 9:41:24 AM
GW During Test: No GW

Sounding ID: CPT-11-125
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic -	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.03	Cycl SStn %
0.33	2.6	4.2	-	1.0	0.0	9.9	2	Organic SOILS - Peats	100	1.0	3	4	-	-	0.3	9.9	95	10	N/A	0.00	N/A	N/A
0.49	1.8	2.8	-	1.9	0.1	9.9	2	Organic SOILS - Peats	100	1.0	2	3	-	-	0.2	9.9	95	10	N/A	0.00	N/A	N/A
0.66	9.6	15.4	-	1.2	0.1	9.9	3	silty CLAY to CLAY	115	1.5	6	10	-	-	0.7	9.9	72	15	N/A	0.00	N/A	N/A
0.82	99.0	158.8	194.2	1.7	-0.1	1.7	6	clean SAND to silty SAND	125	5.0	20	32	82	48	-	-	11	16	N/A	0.00	N/A	N/A
0.98	287.3	460.7	460.7	2.8	-0.5	1.0	6	clean SAND to silty SAND	125	5.0	57	92	95	48	-	-	5	16	N/A	0.00	N/A	N/A
1.15	162.3	260.3	307.0	3.6	-0.1	2.2	6	clean SAND to silty SAND	125	5.0	32	52	95	48	-	-	10	16	N/A	0.00	N/A	N/A
1.31	70.6	113.2	241.0	3.2	0.1	4.6	9	very stiff fine SOIL	120	2.0	35	57	71	48	-	-	25	30	N/A	0.00	N/A	N/A
1.48	44.1	70.7	209.6	2.4	0.2	5.4	4	clayy SILT to silty CLAY	115	2.0	22	35	-	-	3.1	9.9	32	15	N/A	0.00	N/A	N/A
1.64	39.0	62.6	160.2	1.5	-0.2	3.8	4	clayy SILT to silty CLAY	115	2.0	20	31	-	-	2.8	9.9	29	15	N/A	0.00	N/A	N/A
1.80	38.2	61.3	152.6	1.3	-0.4	3.5	4	clayy SILT to silty CLAY	115	2.0	19	31	-	-	2.7	9.9	28	15	N/A	0.00	N/A	N/A
1.97	34.2	54.9	151.2	1.3	-0.9	3.8	4	clayy SILT to silty CLAY	115	2.0	17	27	-	-	2.4	9.9	31	15	N/A	0.00	N/A	N/A
2.13	39.5	63.4	147.9	1.3	-0.8	3.2	4	clayy SILT to silty CLAY	115	2.0	20	32	-	-	2.8	9.9	27	15	N/A	0.00	N/A	N/A
2.30	41.7	66.9	149.3	1.3	-0.8	3.2	4	clayy SILT to silty CLAY	115	2.0	21	33	-	-	2.9	9.9	26	15	N/A	0.00	N/A	N/A
2.46	45.8	73.5	155.5	1.4	-1.0	3.1	5	silty SAND to sandy SILT	120	4.0	11	18	57	46	-	-	24	16	N/A	0.00	N/A	N/A
2.62	49.0	78.5	161.0	1.5	-1.0	3.1	5	silty SAND to sandy SILT	120	4.0	12	20	59	46	-	-	24	16	N/A	0.00	N/A	N/A
2.79	45.3	72.7	165.9	1.6	-1.1	3.5	4	clayy SILT to silty CLAY	115	2.0	23	36	-	-	3.2	9.9	26	15	N/A	0.00	N/A	N/A
2.95	55.4	88.8	164.2	1.6	-1.1	2.9	5	silty SAND to sandy SILT	120	4.0	14	22	63	46	-	-	21	16	N/A	0.00	N/A	N/A
3.12	55.8	89.5	166.5	1.6	-1.1	2.9	5	silty SAND to sandy SILT	120	4.0	14	22	63	46	-	-	21	16	N/A	0.00	N/A	N/A
3.28	50.3	80.7	169.6	1.7	-1.3	3.4	5	silty SAND to sandy SILT	120	4.0	13	20	60	45	-	-	24	16	0.00	-	0.03	0.0
3.45	58.0	93.0	170.1	1.7	-1.3	2.9	5	silty SAND to sandy SILT	120	4.0	15	23	65	46	-	-	21	16	0.00	-	0.03	0.0
3.61	65.3	104.8	175.5	1.8	-1.3	2.7	5	silty SAND to sandy SILT	120	4.0	16	26	69	46	-	-	19	16	0.00	-	0.03	0.0
3.77	65.7	105.4	177.8	1.8	-1.3	2.8	5	silty SAND to sandy SILT	120	4.0	16	26	69	46	-	-	19	16	0.00	-	0.03	0.0
3.94	66.2	106.2	176.4	1.8	-1.3	2.7	5	silty SAND to sandy SILT	120	4.0	17	27	69	46	-	-	19	16	0.00	-	0.03	0.0
4.10	70.3	112.7	176.7	1.8	-1.3	2.5	5	silty SAND to sandy SILT	120	4.0	18	28	71	46	-	-	18	16	0.00	-	0.03	0.0
4.27	68.9	110.6	176.3	1.8	-1.2	2.6	5	silty SAND to sandy SILT	120	4.0	17	28	70	46	-	-	18	16	0.00	-	0.03	0.0
4.43	71.1	114.0	177.4	1.8	-1.2	2.5	5	silty SAND to sandy SILT	120	4.0	18	28	71	46	-	-	17	16	0.00	-	0.03	0.0
4.59	72.9	116.8	184.4	1.9	-1.2	2.7	5	silty SAND to sandy SILT	120	4.0	18	29	72	46	-	-	18	16	0.00	-	0.03	0.0
4.76	73.9	118.5	186.6	2.0	-1.2	2.7	5	silty SAND to sandy SILT	120	4.0	18	30	73	46	-	-	18	16	0.00	-	0.03	0.0
4.92	74.9	120.2	189.0	2.0	-1.2	2.7	5	silty SAND to sandy SILT	120	4.0	19	30	73	46	-	-	18	16	0.00	-	0.03	0.0
5.09	75.8	121.5	197.9	2.2	-1.1	2.9	5	silty SAND to sandy SILT	120	4.0	19	30	73	46	-	-	18	16	0.00	-	0.03	0.0
5.25	78.4	125.7	200.2	2.2	-1.1	2.9	5	silty SAND to sandy SILT	120	4.0	20	31	75	46	-	-	18	16	0.00	-	0.03	0.0
5.41	81.4	130.6	201.5	2.2	-1.1	2.8	5	silty SAND to sandy SILT	120	4.0	20	33	76	46	-	-	17	16	0.00	-	0.03	0.0
5.58	80.9	129.7	202.2	2.3	-1.1	2.8	5	silty SAND to sandy SILT	120	4.0	20	32	76	46	-	-	17	16	0.00	-	0.03	0.0
5.74	81.9	131.3	203.8	2.3	-1.1	2.8	5	silty SAND to sandy SILT	120	4.0	20	33	76	46	-	-	17	16	0.00	-	0.03	0.0
5.91	81.1	130.1	207.2	2.4	-1.0	3.0	5	silty SAND to sandy SILT	120	4.0	20	33	76	46	-	-	18	16	0.00	-	0.03	0.0
6.07	78.8	126.4	212.8	2.5	-1.0	3.2	5	silty SAND to sandy SILT	120	4.0	20	32	75	46	-	-	19	16	0.00	-	0.03	0.0
6.23	83.2	133.4	220.4	2.7	-1.0	3.2	5	silty SAND to sandy SILT	120	4.0	21	33	77	46	-	-	19	16	0.00	-	0.03	0.0
6.40	87.3	138.1	223.9	2.8	-1.0	3.2	5	silty SAND to sandy SILT	120	4.0	22	35	78	46	-	-	18	16	0.00	-	0.03	0.0
6.56	87.0	136.0	223.4	2.8	-1.0	3.3	5	silty SAND to sandy SILT	120	4.0	22	34	77	46	-	-	19	16	0.00	-	0.03	0.0
6.73	86.2	133.0	219.8	2.8	-1.0	3.2	5	silty SAND to sandy SILT	120	4.0	22	33	76	46	-	-	19	16	0.00	-	0.03	0.0
6.89	85.7	130.7	215.7	2.7	-1.0	3.2	5	silty SAND to sandy SILT	120	4.0	21	33	76	46	-	-	19	16	0.00	-	0.03	0.0
7.05	88.4	133.1	215.5	2.7	-1.0	3.1	5	silty SAND to sandy SILT	120	4.0	22	33	76	46	-	-	18	16	0.00	-	0.03	0.0
7.22	89.5	133.2	215.2	2.8	-1.0	3.1	5	silty SAND to sandy SILT	120	4.0	22	33	76	46	-	-	18	16	0.00	-	0.03	0.0
7.38	89.4	131.6	211.4	2.7	-1.0	3.0	5	silty SAND to sandy SILT	120	4.0	22	33	76	46	-	-	18	16	0.00	-	0.03	0.0
7.55	88.6	129.0	213.0	2.8	-1.0	3.2	5	silty SAND to sandy SILT	120	4.0	22	32	75	46	-	-	19	16	0.00	-	0.03	0.0
7.71	88.8	127.9	217.3	2.9	-0.9	3.3	5	silty SAND to sandy SILT	120	4.0	22	32	75	46	-	-	19	16	0.00	-	0.03	0.0
7.87	90.4	128.7	218.0	3.0	-0.9	3.3	5	silty SAND to sandy SILT	120	4.0	23	32	75	46	-	-	19	16	0.00	-	0.03	0.0
8.04	89.6	126.3	216.0	3.0	-0.9	3.3	5	silty SAND to sandy SILT	120	4.0	22	32	75	46	-	-	20	16	0.00	-	0.03	0.0
8.20	89.3	124.6	222.6	3.2	-0.9	3.6	5	silty SAND to sandy SILT	120	4.0	22	31	74	45	-	-	21	16	0.00	-	0.03	0.0
8.37	94.2	130.1	221.6	3.2	-0.9	3.4	5	silty SAND to sandy SILT	120	4.0	24	33	76	46	-	-	19	16	0.00	-	0.03	0.0
8.53	98.4	134.5	218.1	3.1	-1.0	3.1	5	silty SAND to sandy SILT	120	4.0	25	34	77	46	-	-	18	16	0.00	-	0.03	0.0
8.69	97.4	131.9	213.8	3.0	-0.9	3.1	5	silty SAND to sandy SILT	120	4.0	24	33	76	46	-	-	18	16	0.00	-	0.03	0.0
8.86	96.3	129.2	212.6	3.0	-0.9	3.1	5	silty SAND to sandy SILT	120	4.0	24	32	75	46	-	-	19	16	0.00	-	0.03	0.0
9.02	97.3	129.4	212.7	3.0	-0.9	3.1	5	silty SAND to sandy SILT	120	4.0	24	32	75	46	-	-	19	16	0.00	-	0.03	0.0
9.19	99.1	130.5	207.4	2.9	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	25	33	76	46	-	-	18	16	0.00	-	0.03	0.0
9.35	99.2	129.5	203.0	2.8	-0.9	2.8	5	silty SAND to sandy SILT	120	4.0	25	32	76	46	-	-	18	16	0.00	-	0.03	0.0
9.51	99.2	128.4	199.8	2.7	-0.9	2.8	5	silty SAND to sandy SILT	120	4.0	25	32	75	45	-	-	17	16	0.00	-	0.03	0.0
9.68	97.1	124.5	199.7	2.8	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	24	31	74	45	-	-	18	16	0.00	-	0.03	0.0
9.84	98.7	125.5	201.3	2.9	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	25	31	75	45	-	-	18	16	0.00	-	0.03	0.0
10.01	98.9	124.7	199.7	2.8	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	25	31	74	45	-	-	18	16	0.00	-	0.03	0.0
10.17	100.5	125.7	201.1	2.9	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	25	31	75	45	-	-	18	16	0.00	-	0.03	0.0
10.34	100.6	124.8	205.4	3.1	-0.9	3.1	5	silty SAND to sandy SILT	120	4.0	25	31	74	45	-	-	19	16	0.00	-	0.03	0.0
10.50	101.9	125.4	210.7	3.2	-0.9	3.2	5	silty SAND to sandy SILT	120	4.0	25	31	74	45	-	-	19	16	0.00	-	0.03	0.0
10.66	102.8	125.6	209.2	3.2	-0.9	3.1	5	silty SAND to sandy SILT	120	4.0	26	31	75	45	-	-	19	16	0.00	-	0.03	0.0
10.83	103.6	125.6	208.7	3.2	-0.9	3.1	5	silty SAND to sandy SILT	120	4.0	26	31	75	45	-	-	19	16	0.00	-	0.03	0.0
10.99	104.7	125.9	205.9	3.2	-0.9	3.0	5	silty SAND to sandy SILT	120	4.0	26	31	75	45	-	-	19	16	0.00	-	0.03	0.0
11.16	106.5	127.2	202.6	3.1	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	27	32	75	45	-	-	18	16	0.00	-	0.03	0.0
11.32	106.5	126.2	201.0	3.0	-0.8	2.9	5	silty SAND to sandy SILT	120	4.0	27	32	75	45	-	-	18	16	0.00	-	0.03	0.0
11.48	107.8	126.8	209.5	3.3	-0.8	3.1	5	silty SAND to sandy SILT	120	4.0	27	32	75	45	-	-	19	16	0.00	-	0.03	0.0
11.65	107.5	125.6	203.0	3.2	-0.8	3.0	5	silty SAND to sandy SILT	120	4.0	27	31	75	45	-	-	18	16	0.00	-	0.03	0.0
11.81	110.6	128.3	202.2	3.1	-0.8	2.9	5	silty SAND to sandy SILT	120	4.0	28	32	75	45	-	-	18	16	0.00	-	0.03	0.0
11.98	112.7	129.8	206.2	3.3	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	28	32	76	45	-	-	18	16	0.00	-	0.03	0.0
12.14	115.2	131.7	209.2	3.4	-0.8	3.0	5	silty SAND to sandy SILT	120	4.0	29	33	76	45	-	-	18	16	0.00	-	0.03	0.0
12.30	116.5	132.3	210.6	3.5	-0.8	3.0	5	silty SAND to sandy SILT	120	4.0	29	33	76	45	-	-	18	16	0.00	-	0.03	0.0
12.47	117.5	132.6	214.3	3.6	-0.8	3.1	5	silty SAND to sandy SILT	120	4.0	29	33	76	45	-	-	18	16	0.00	-	0.03	0.0
12.63	118.3	132.7	215.0	3.7	-0.8	3.1	5	silty SAND to sandy SILT	120	4.0	30	33	76	45	-	-	18	16	0.00	-	0.03	0.0
12.80	117.3	130.7	212.9	3.6	-0.8	3.1	5	silty SAND to sandy SILT	120	4.0	29	33	76	45	-	-	18	16	0.00	-	0.03	0.0
12.96	117.3	129.8	212.6	3.6	-0.7	3.1	5	silty SAND to sandy SILT	120	4.0	29	32	76	45	-	-	19	16	0.00	-	0.03	0.0
13.12	118.5	130.3	214.5	3.7	-0.7	3.2	5	silty SAND to sandy SILT	120	4.0	30	33	76	45	-	-	19	16	0.00	-	0.03	0.0
13.29	120.1	131.2	214.0	3.7	-0.7	3.1	5	silty SAND to sandy SILT	120	4.0	30	33	76	45	-	-	19	16	0.00	-	0.03	0.0
13.45	121.7	132.2	214.9	3.8	-0.7	3.1	5	silty SAND to sandy SILT	120	4.0	30	33	76	45	-	-	18	16	0.00	-	0.03	0.0
13.62	123.8	133.6	215.1	3.8	-0.7	3.1	5	silty SAND to sandy SILT	120	4.0	31	33	77	45	-	-	18	16	0.00	-	0.03	0.0
13.78	126.6	135.9	215.1	3.8	-0.7	3.0	5	silty SAND to sandy SILT	120	4.0	32	34	77	45	-	-	18	16	0.00	-	0.03	0.0
13.94	126.8	135.2	214.3	3.8	-0.7	3.0	5	silty SAND to sandy SILT	120	4.0	32	34	77	45	-	-	18	16	0.00	-	0.03	0.0
14.11	127.9	135.6	213.8	3.8	-0.6	3.0	5	silty SAND to sandy SILT	120	4.0	32	34	77	45	-	-	18	16	0.00	-	0.03	0.0
14.27	129.3	136.3	214.7	3.8	-0.6	3.0	5	silty SAND to sandy SILT	120	4.0	32	34	77	45	-	-	18	16	0.00	-	0.03	0.0
14.44	130.6	136.8	217.8	4.0	-0.6	3.1	5	silty SAND to sandy SILT	120	4.0	33	34	77	45	-	-	18	16	0.00	-	0.03	0.0
14.60	132.1	137.6	217.4	4.0	-0.6	3.0	5	silty SAND to sandy SILT	120	4.0	33	34	78	45	-	-	18	16	0.00	-	0.03	0.0
14.76	130.8	135.5	230.1	4.5	-0.6	3.5	5	silty SAND to sandy SILT	120	4.0	33	34	77	45	-	-	19	16	0.00	-	0.03	0.0
14.93	133.0	137.1	225.4	4.3	-0.6	3.3	5	silty SAND to sandy SILT	120	4.0	33	34	77	45	-	-	19	16	0.00	-	0.03	0.0
15.09	138.7	142.1	224.0	4.3	-0.5	3.1	5	silty SAND to sandy SILT	120	4.0	35	36	79	45	-	-	18	16	0.00	-	0.03	0.0
15.26	138.0	140.7	220.2	4.1	-0.5	3.0	5	silty SAND to sandy SILT	120	4.0	35	35	78	45	-	-	18	16	0.00	-	0.03	0.0
15.42	135.0	136.9	216.4	4.1	-0.5	3.0	5	silty SAND to sandy SILT	120	4.0	34	34	77	45	-	-	18	16	0.00	-	0.03	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Earth Mechanics
Data File: SDF(533).cpt
CPT Date: 9/28/2011 9:41:24 AM
GW During Test: No GW

Sounding ID: CPT-11-125
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	*qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	*Mat Typ Zon	*Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	*SPT R-N1 60%	*Rel Den %	*Ftn Ang deg	Und Shr tsf	OCR -	*Fin Ic %	*Nk -	*Vol Strn %	Dry Stlmt 0.00	*Liq Stlmt 0.03	*Cycl SStn %
15.58	135.2	136.3	213.9	4.0	-0.5	3.0	5	silty SAND to sandy SILT	120	4.0	34	34	77	45	-	-	18	16	0.00	-	0.03	0.0
15.75	135.5	135.9	211.6	3.9	-0.5	2.9	5	silty SAND to sandy SILT	120	4.0	34	34	77	45	-	-	17	16	0.00	-	0.03	0.0
15.91	131.8	131.5	208.7	3.9	-0.5	3.0	5	silty SAND to sandy SILT	120	4.0	33	33	76	45	-	-	18	16	0.00	-	0.03	0.0
16.08	128.7	127.8	203.1	3.7	-0.5	2.9	5	silty SAND to sandy SILT	120	4.0	32	32	75	45	-	-	18	16	0.00	-	0.03	0.0
16.24	125.7	124.2	198.3	3.6	-0.5	2.9	5	silty SAND to sandy SILT	120	4.0	31	31	74	45	-	-	18	16	0.00	-	0.03	0.0
16.40	123.5	121.4	192.2	3.4	-0.5	2.8	5	silty SAND to sandy SILT	120	4.0	31	30	73	44	-	-	18	16	0.00	-	0.03	0.0
16.57	121.4	118.7	183.0	3.1	-0.4	2.5	5	silty SAND to sandy SILT	120	4.0	30	30	73	44	-	-	17	16	0.00	-	0.03	0.0
16.73	122.1	118.8	182.3	3.0	-0.5	2.5	5	silty SAND to sandy SILT	120	4.0	31	30	73	44	-	-	17	16	0.00	-	0.03	0.0
16.90	121.1	117.2	180.9	3.0	-0.5	2.5	5	silty SAND to sandy SILT	120	4.0	30	29	72	44	-	-	17	16	0.00	-	0.03	0.0
17.06	126.6	122.0	190.6	3.4	-0.5	2.7	5	silty SAND to sandy SILT	120	4.0	32	30	74	44	-	-	18	16	0.00	-	0.03	0.0
17.23	129.8	124.4	194.7	3.5	-0.3	2.7	5	silty SAND to sandy SILT	120	4.0	32	31	74	45	-	-	18	16	0.00	-	0.03	0.0
17.39	125.0	119.3	193.6	3.5	-0.3	2.9	5	silty SAND to sandy SILT	120	4.0	31	30	73	44	-	-	18	16	0.00	-	0.03	0.0
17.55	132.7	126.0	185.2	3.2	-0.2	2.4	5	silty SAND to sandy SILT	120	4.0	33	31	75	45	-	-	16	16	0.00	-	0.03	0.0
17.72	135.0	127.6	187.6	3.2	-0.2	2.4	5	silty SAND to sandy SILT	120	4.0	34	32	75	45	-	-	16	16	0.00	-	0.03	0.0
17.88	157.4	148.1	220.0	4.4	-0.2	2.8	5	silty SAND to sandy SILT	120	4.0	39	37	80	45	-	-	16	16	0.00	-	0.03	0.0
18.05	158.6	148.5	231.4	4.9	-0.2	3.1	5	silty SAND to sandy SILT	120	4.0	40	37	80	45	-	-	17	16	0.00	-	0.03	0.0
18.21	151.9	141.6	224.5	4.7	-0.2	3.1	5	silty SAND to sandy SILT	120	4.0	38	35	78	45	-	-	18	16	0.00	-	0.03	0.0
18.37	151.8	140.9	215.1	4.3	-0.2	2.9	5	silty SAND to sandy SILT	120	4.0	38	35	78	45	-	-	17	16	0.00	-	0.03	0.0
18.54	148.7	137.4	215.2	4.4	-0.2	3.0	5	silty SAND to sandy SILT	120	4.0	37	34	77	45	-	-	18	16	0.00	-	0.03	0.0
18.70	146.0	134.3	215.6	4.5	-0.1	3.1	5	silty SAND to sandy SILT	120	4.0	37	34	77	45	-	-	18	16	0.00	-	0.03	0.0
18.87	150.1	137.5	217.7	4.5	-0.1	3.0	5	silty SAND to sandy SILT	120	4.0	38	34	78	45	-	-	18	16	0.00	-	0.03	0.0
19.03	150.9	137.6	217.5	4.5	-0.1	3.0	5	silty SAND to sandy SILT	120	4.0	38	34	78	45	-	-	18	16	0.00	-	0.03	0.0
19.19	148.8	135.1	214.5	4.5	-0.1	3.0	5	silty SAND to sandy SILT	120	4.0	37	34	77	45	-	-	18	16	0.00	-	0.03	0.0
19.36	145.9	131.9	211.3	4.4	-0.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	33	76	45	-	-	18	16	0.00	-	0.03	0.0
19.52	143.3	129.0	212.6	4.5	-0.1	3.1	5	silty SAND to sandy SILT	120	4.0	36	32	75	44	-	-	19	16	0.00	-	0.03	0.0
19.69	144.2	129.3	211.3	4.4	-0.1	3.1	5	silty SAND to sandy SILT	120	4.0	36	32	75	44	-	-	19	16	0.00	-	0.03	0.0
19.85	144.3	128.8	209.2	4.4	-0.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	32	75	44	-	-	18	16	0.00	-	0.03	0.0
20.01	139.4	124.0	203.4	4.2	0.0	3.0	5	silty SAND to sandy SILT	120	4.0	35	31	74	44	-	-	19	16	0.00	-	0.03	0.0
20.18	136.7	121.0	202.9	4.2	0.0	3.1	5	silty SAND to sandy SILT	120	4.0	34	30	73	44	-	-	19	16	0.00	-	0.03	0.0
20.34	136.4	120.3	204.1	4.3	0.0	3.1	5	silty SAND to sandy SILT	120	4.0	34	30	73	44	-	-	19	16	0.00	-	0.03	0.0
20.51	133.7	117.4	206.1	4.4	0.0	3.3	5	silty SAND to sandy SILT	120	4.0	33	29	72	44	-	-	20	16	0.00	-	0.03	0.0
20.67	131.1	114.7	203.0	4.3	0.1	3.3	5	silty SAND to sandy SILT	120	4.0	33	29	72	44	-	-	20	16	0.00	-	0.03	0.0
20.83	128.8	112.3	197.8	4.1	0.1	3.2	5	silty SAND to sandy SILT	120	4.0	32	28	71	44	-	-	20	16	0.00	-	0.03	0.0
21.00	127.9	111.0	201.9	4.3	0.2	3.4	5	silty SAND to sandy SILT	120	4.0	32	28	70	44	-	-	21	16	0.00	-	0.03	0.0
21.16	127.8	110.4	194.0	4.0	0.2	3.1	5	silty SAND to sandy SILT	120	4.0	32	28	70	44	-	-	20	16	0.00	-	0.03	0.0
21.33	129.3	111.4	200.2	4.2	0.2	3.3	5	silty SAND to sandy SILT	120	4.0	32	28	71	44	-	-	21	16	0.00	-	0.03	0.0
21.49	128.8	110.5	244.6	6.0	0.3	4.7	9	very stiff fine SOIL	120	2.0	64	55	70	44	-	-	25	30	0.00	-	0.03	0.0
21.65	221.4	189.2	265.9	6.5	251.0	3.0	5	silty SAND to sandy SILT	120	4.0	55	47	88	46	-	-	15	16	0.00	-	0.03	0.0
21.82	155.0	131.9	227.9	5.4	256.2	3.5	5	silty SAND to sandy SILT	120	4.0	39	33	76	44	-	-	20	16	0.00	-	0.03	0.0
21.98	143.6	121.8	190.6	3.8	257.5	2.7	5	silty SAND to sandy SILT	120	4.0	36	30	74	44	-	-	18	16	0.00	-	0.03	0.0
22.15	141.6	119.6	187.4	3.7	257.6	2.6	5	silty SAND to sandy SILT	120	4.0	35	30	73	44	-	-	18	16	0.00	-	0.03	0.0
22.31	143.4	120.7	183.4	3.5	256.9	2.5	5	silty SAND to sandy SILT	120	4.0	36	30	73	44	-	-	17	16	0.00	-	0.03	0.0
22.47	144.3	121.0	177.2	3.3	256.9	2.3	5	silty SAND to sandy SILT	120	4.0	36	30	73	44	-	-	16	16	0.00	-	0.03	0.0
22.64	144.9	121.1	170.4	3.0	256.8	2.1	5	silty SAND to sandy SILT	120	4.0	36	30	73	44	-	-	15	16	0.00	-	0.03	0.0
22.80	141.4	117.7	168.8	3.0	256.6	2.1	5	silty SAND to sandy SILT	120	4.0	35	29	72	44	-	-	15	16	0.00	-	0.03	0.0
22.97	148.2	122.9	169.0	2.9	255.6	2.0	5	silty SAND to sandy SILT	120	4.0	37	31	74	44	-	-	14	16	0.00	-	0.03	0.0
23.13	143.7	118.8	167.4	2.9	255.6	2.0	5	silty SAND to sandy SILT	120	4.0	36	30	73	44	-	-	15	16	0.00	-	0.03	0.0
23.30	144.0	118.7	168.2	3.0	255.5	2.1	5	silty SAND to sandy SILT	120	4.0	36	30	73	44	-	-	15	16	0.00	-	0.03	0.0
23.46	142.7	117.2	165.9	2.9	255.2	2.0	5	silty SAND to sandy SILT	120	4.0	36	29	72	44	-	-	15	16	0.00	-	0.03	0.0
23.62	137.8	112.7	161.7	2.8	254.9	2.0	5	silty SAND to sandy SILT	120	4.0	34	28	71	43	-	-	15	16	0.00	-	0.03	0.0
23.79	132.4	107.9	156.7	2.6	254.4	2.0	5	silty SAND to sandy SILT	120	4.0	33	27	70	43	-	-	16	16	0.86	-	0.03	4.7
23.95	131.0	106.4	150.2	2.4	254.0	1.8	5	silty SAND to sandy SILT	120	4.0	33	27	69	43	-	-	15	16	1.15	-	0.03	6.7
24.12	131.4	106.4	147.3	2.3	253.8	1.8	5	silty SAND to sandy SILT	120	4.0	33	27	69	43	-	-	15	16	1.28	-	0.02	7.8
24.28	125.5	101.2	142.9	2.2	253.4	1.8	5	silty SAND to sandy SILT	120	4.0	31	25	67	43	-	-	15	16	1.48	-	0.02	11.1
24.44	101.3	81.4	124.3	1.7	281.9	1.7	5	silty SAND to sandy SILT	120	4.0	25	20	60	42	-	-	17	16	1.96	-	0.02	22.5
24.61	76.4	61.2	128.1	1.9	281.3	2.5	5	silty SAND to sandy SILT	120	4.0	19	15	51	40	-	-	24	16	1.91	-	0.02	33.2
24.77	102.7	82.0	148.1	2.6	246.6	2.5	5	silty SAND to sandy SILT	120	4.0	26	20	60	42	-	-	21	16	1.23	-	0.01	11.4
24.94	112.9	89.9	156.1	2.8	237.9	2.5	5	silty SAND to sandy SILT	120	4.0	28	22	63	42	-	-	20	16	0.90	-	0.01	6.2
25.10	124.0	98.4	161.7	3.0	239.5	2.5	5	silty SAND to sandy SILT	120	4.0	31	25	66	43	-	-	19	16	0.00	-	0.01	0.0
25.26	125.3	99.1	160.4	3.0	239.9	2.4	5	silty SAND to sandy SILT	120	4.0	31	25	67	43	-	-	18	16	0.00	-	0.01	0.0
25.43	124.3	98.0	152.6	2.7	240.1	2.2	5	silty SAND to sandy SILT	120	4.0	31	24	66	43	-	-	17	16	1.08	-	0.01	7.2
25.59	124.6	97.9	152.1	2.7	240.4	2.2	5	silty SAND to sandy SILT	120	4.0	31	24	66	43	-	-	17	16	1.11	-	0.01	7.5
25.76	124.3	97.3	155.6	2.8	240.7	2.3	5	silty SAND to sandy SILT	120	4.0	31	24	66	43	-	-	18	16	0.96	-	0.01	6.2
25.92	123.9	96.8	156.0	2.9	241.0	2.3	5	silty SAND to sandy SILT	120	4.0	31	24	66	43	-	-	18	16	0.95	-	0.00	6.1
26.08	122.2	95.1	158.3	3.0	241.2	2.5	5	silty SAND to sandy SILT	120	4.0	31	24	65	42	-	-	19	16	0.86	-	0.00	5.5
26.25	121.0	93.8	163.2	3.2	241.1	2.7	5	silty SAND to sandy SILT	120	4.0	30	23	65	42	-	-	20	16	0.00	-	0.00	0.0
26.41	119.2	92.2	162.9	3.2	241.1	2.7	5	silty SAND to sandy SILT	120	4.0	30	23	64	42	-	-	20	16	0.00	-	0.00	0.0
26.58	106.2	81.9	157.7	3.0	240.5	2.9	5	silty SAND to sandy SILT	120	4.0	27	20	60	42	-	-	22	16	0.87	-	0.00	6.6
26.74	86.5	66.5	163.3	3.1	238.8	3.7	4	clayy SILT to silty CLAY	115	2.0	43	33	-	-	6.1	9.9	28	15	0.00	-	0.00	0.0
26.90	63.1	39.3	-	3.1	232.0	5.0	3	silty CLAY to CLAY	115	1.5	42	26	-	-	4.4	9.9	40	15	-	-	0.00	-
27.07	95.6	73.0	167.2	3.3	233.3	3.5	4	clayy SILT to silty CLAY	115	2.0	48	37	-	-	6.7	9.9	26	15	0.00	-	0.00	0.0
27.23	127.0	96.8	180.5	3.9	235.6	3.1	5	silty SAND to sandy SILT	120	4.0	32	24	66	42	-	-	22	16	0.00	-	0.00	0.0
27.40	142.4	108.1	199.5	4.8	238.2	3.4	5	silty SAND to sandy SILT	120	4.0	36	27	70	43	-	-	21	16	0.00	-	0.00	0.0
27.56	147.9	112.0	202.2	4.9	239.6	3.3	5	silty SAND to sandy SILT	120	4.0	37	28	71	43	-	-	21	16	0.00	-	0.00	0.0
27.72	157.7	119.1	202.8	4.9	242.0	3.1	5	silty SAND to sandy SILT	120	4.0	39	30	73	43	-	-	19	16	0.00	-	0.00	0.0
27.89	162.8	122.5	200.5	4.8	242.8	3.0	5	silty SAND to sandy SILT	120	4.0	41	31	74	44	-	-	19	16	0.00	-	0.00	0.0
28.05	164.2	123.2	200.2	4.8	243.6	2.9	5	silty SAND to sandy SILT	120	4.0	41	31	74	44	-	-	18	16	0.00	-	0.00	0.0
28.22	164.2	122.9	202.2	4.9	244.3	3.0	5	silty SAND to sandy SILT	120	4.0	41	31	74	44	-	-	19	16	0.00	-	0.00	0.0
28.38	165.8	123.8	201.6	4.9	245.2	3.0	5	silty SAND to sandy SILT	120	4.0	41	31	74	44	-	-	18	16	0.00	-	0.00	0.0
28.54	173.3	129.0	203.0	4.9	246.3	2.9	5	silty SAND to sandy SILT	120	4.0	43	32	75	44	-	-	18	16	0.00	-	0.00	0.0
28.71	173.4	128.6	203.2	4.9	247.1	2.9	5	silty SAND to sandy SILT	120	4.0	43	32	75	44	-	-	18	16	0.00	-	0.00	0.0
28.87	170.6	126.2	206.1	5.1	247.6	3.0	5	silty SAND to sandy SILT	120	4.0	43	32	75	44	-	-	19	16	0.00	-	0.00	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Appendix B

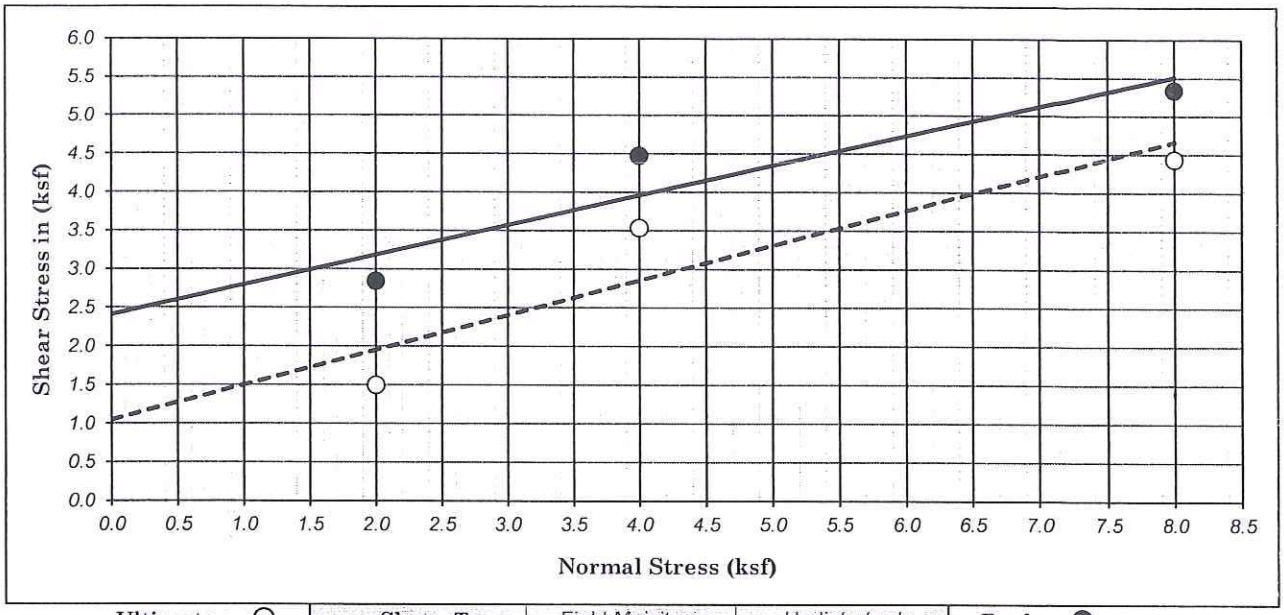
LABORATORY TEST RESULTS

TABLE B-1 SUMMARY OF SOIL LABORATORY TEST RESULTS

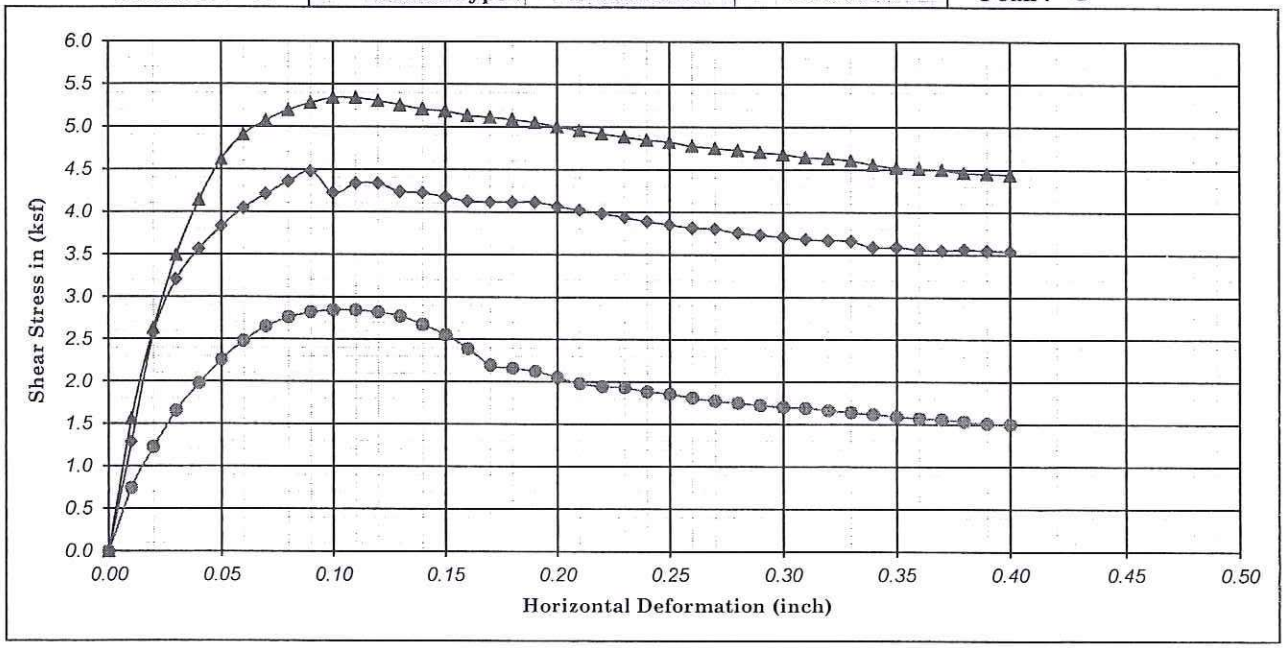
Update

Project No.: *11-135* Project Name: Parsons/I-5 HOV Widening Segment 1

Boring No .	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-105	*D-1*	2.5	CH	21.6	115.1	>4.5				55/26/29				
A-11-105	*S-2*	5	CL	21.7				0:10:90						
A-11-105	*D-3*	10	CL	23.9										
A-11-105	*S-4*	15	CH	23.8						57/27/30				
A-11-105	*D-5*	20	CL	27.2	121.2	4.0								
A-11-105	*S-6*	25	CL	28.7										
A-11-105	*D-7*	30	CH	29.8	116.9	3.75								
A-11-105	*S-8*	35	CH	33.5										
A-11-123	*S-1*	2.5	CL/ML	22.0										
A-11-123	*D-2*	5	CL	22.1	126.9	>4.5				48/25/23				
A-11-123	*S-3*	10	CH	21.3							190	7.0	1700	680
A-11-123	*D-4*	15	MH	21.4	125.7	>4.5								
A-11-123	*S-5*	20	CH	23.2						65/30/35				
A-11-123	*D-6*	25	CH	22.7	124.6	4.25								
A-11-123	*S-7*	30	CH	23.7										
A-11-123	*D-8*	35	MH	22.3	127.3	4.5								
A-11-123	*S-9*	40	MH	24.1										
A-11-123	*D-10*	45	MH	25.5	118.3	3.5 to >4.5								
A-11-123	*S-11*	50	MH	26.1		-								
A-11-124	*S-1*	2.5	CL	21.3							310	6.5	1950	407
A-11-124	*D-2*	5	CH	30.9	114.4					63/28/35				
A-11-124	*S-3*	10	CL	32.5										
A-11-124	*D-4*	15	MH	26.1	125.2	>4.5								
A-11-124	*S-5*	20	GM	3.8				39:35:26						
A-11-124	*D-6*	25	MH	20.4	127.0									
A-11-124	*S-7*	30	MH	21.5										



Ultimate : ○	Shear Type :	Field Moisiture	Undisturbed	Peak : ●



Boring No. : A-11-105	Strength Intercept (C) :	2.41	(ksf)	Peak	1.05	(ksf)	Ultimate
Sample No. : D-7		115.49	(kPa)		50.27	(kPa)	
Depth (ft/m) : 35.0 | 0.00	Friction Angle (ϕ) :	21.18	Degree		24.33	Degree	
Description : Dark yellowish brown, yellowish gray. Fat CLAY (CH)					Shear Rate (inch/minute) :		0.02

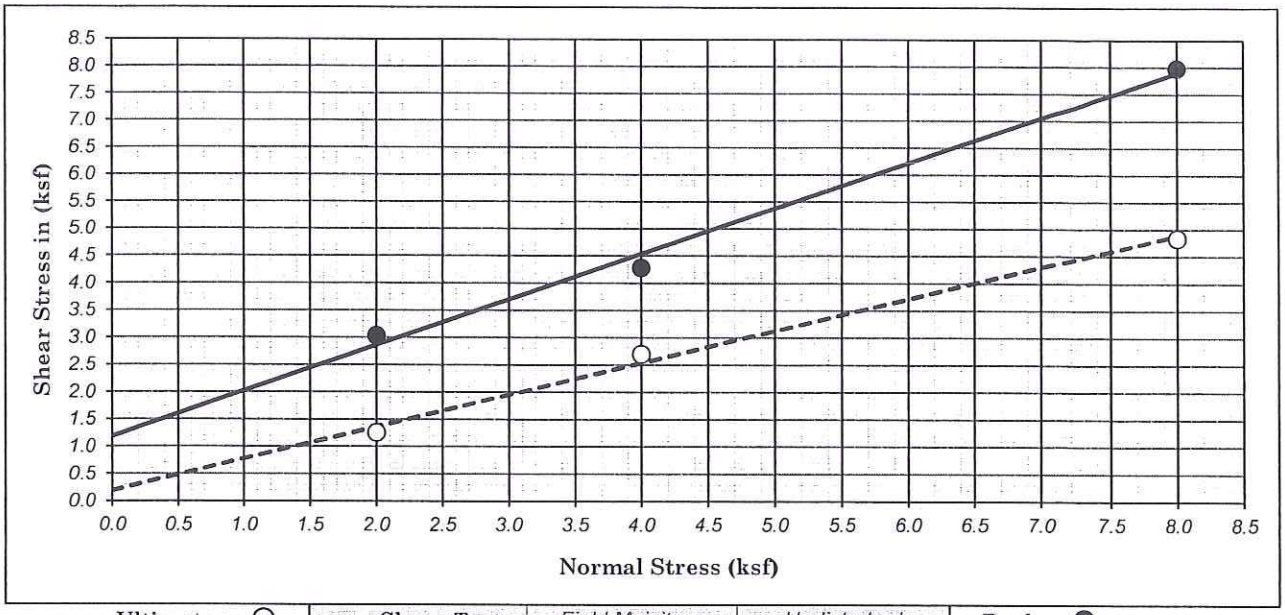
SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	26.82	86.94	13.68	0.94	2.00	95.76	2.84	136.17	1.50	71.82
◆	25.63	92.11	14.50	0.83	4.00	191.52	4.48	214.31	3.54	169.50
▲	25.24	93.22	14.67	0.81	8.00	383.04	5.34	255.68	4.44	212.59

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

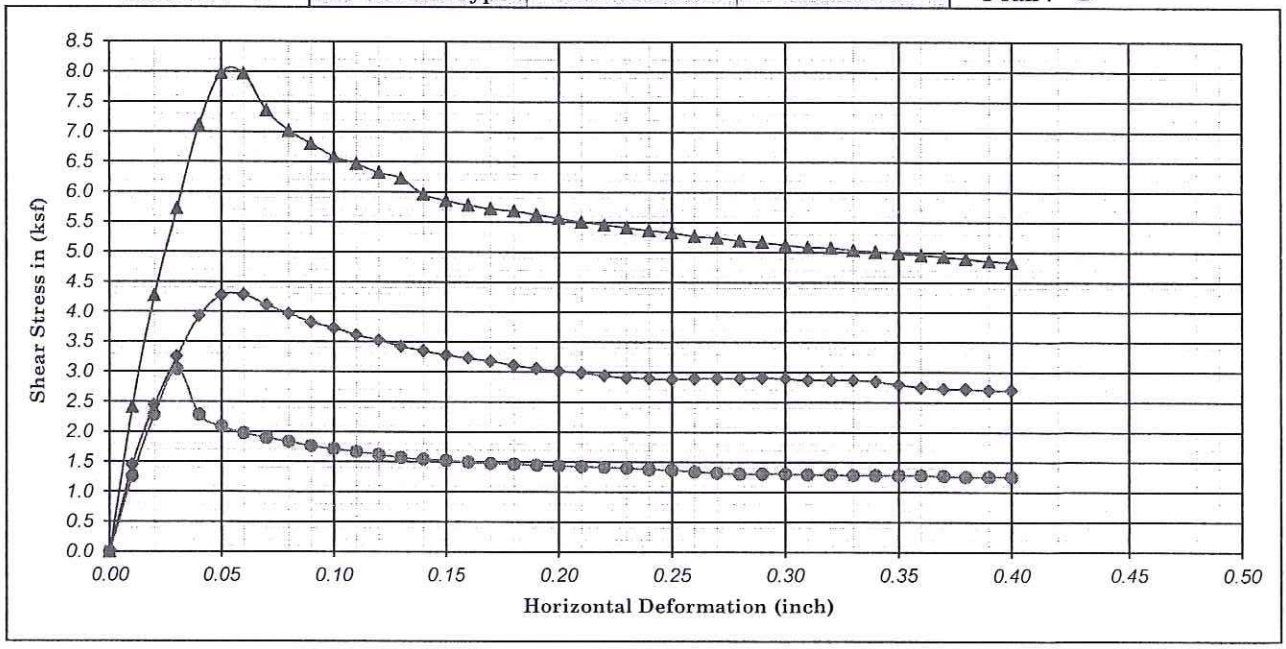
PTG/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST (ASTM D-3080)

Project No. : 11-135 | Date : 05/15/12 | Figure No. :



Ultimate : ○	Shear Type :	Field Moisiture	Undisturbed	Peak : ●



Boring No. : A-11-123		Strength Intercept (C) :	1.19	(ksf)		0.19	(ksf)		
Sample No. : D-8			56.91	(kPa)	Peak	9.19	(kPa)	Ultimate	
Depth (ft/m) : 35.0	0.00	Friction Angle (ϕ) :	39.97	Degree		30.42	Degree		
Description : Dark grayish brown, Elastic SILT (MH)						Shear Rate (inch/minute) :		0.02	

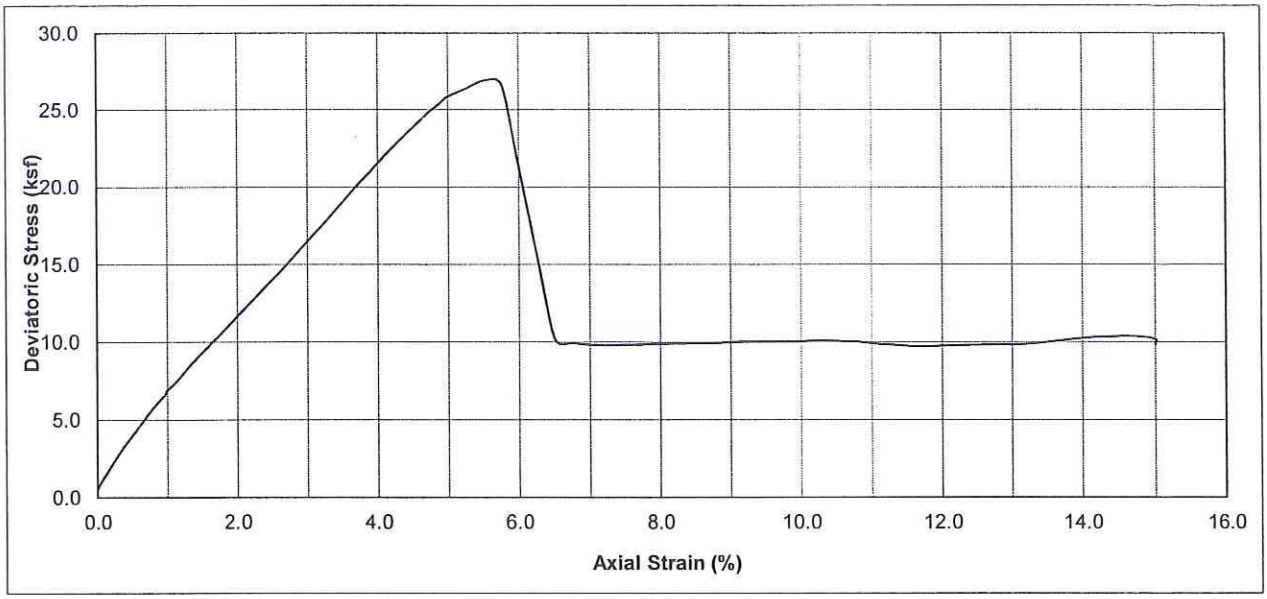
SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	21.60	102.57	16.14	0.64	2.00	95.76	3.04	145.36	1.26	60.33
◆	21.32	100.58	15.83	0.68	4.00	191.52	4.28	205.12	2.70	129.28
▲	21.11	102.15	16.08	0.65	8.00	383.04	7.98	382.03	4.84	231.55

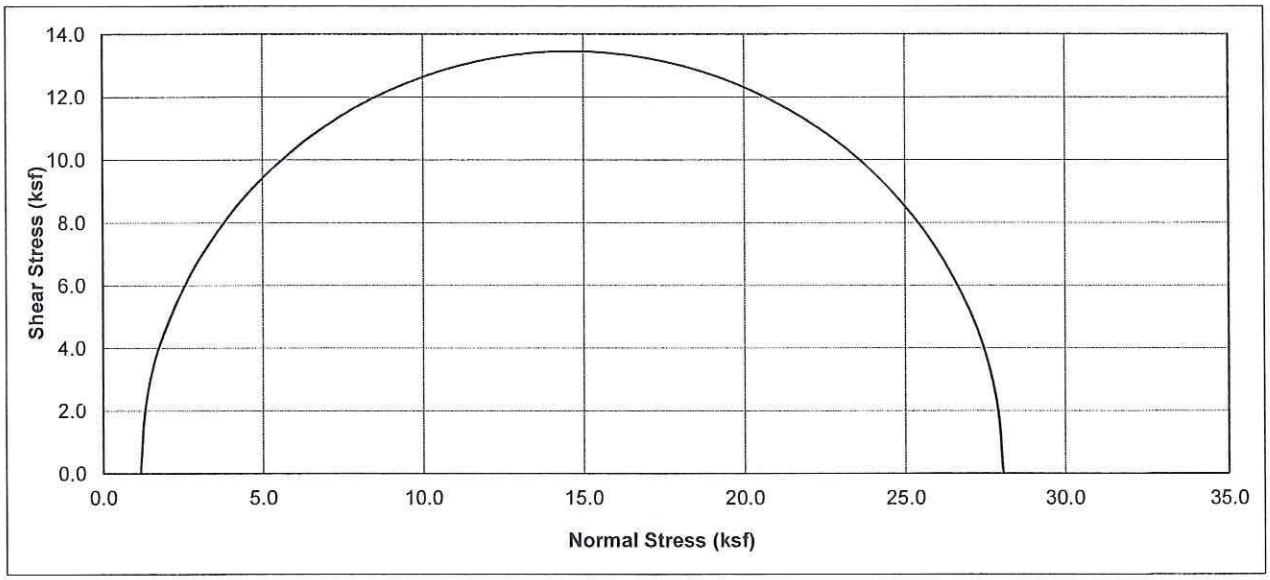
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

PTG/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST (ASTM D-3080)

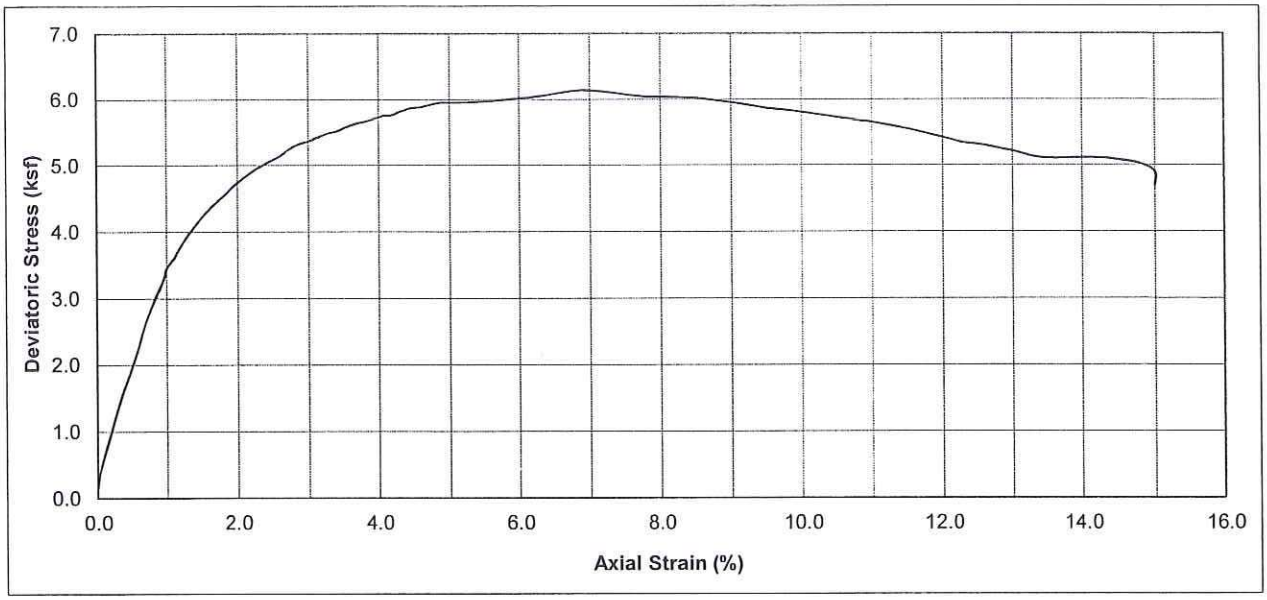
Project No. : 11-135 | Date : 05/15/12 | Figure No. :

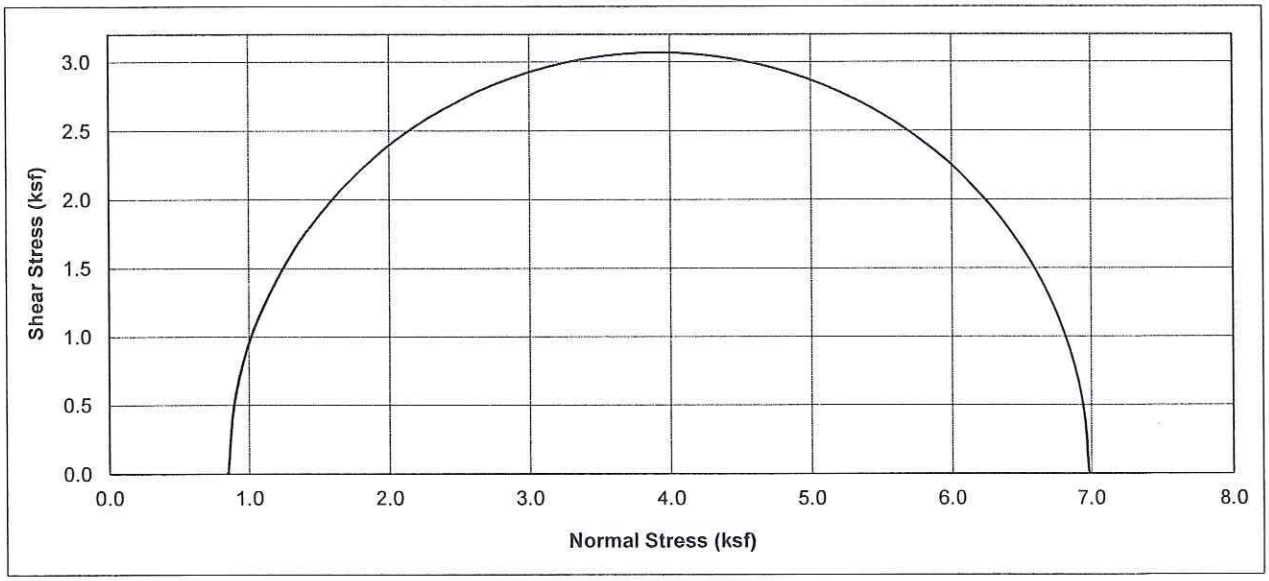




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-123	D-4	15	Gray , ELASTIC SILT (MH)	103.3	21.37	1.14	26.90	91.4

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 / Date : 12/20/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-124	D-2	10	Olive Brown , FAT CLAY (CH)	88.3	30.90	0.85	6.13	91.8

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/06/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

Appendix C

DESIGN CALCULATIONS

A

A'

N11°W

Elevation (ft)

350
300
250
200
150
100
50
0

Avenida Pico
℄ Widen

Avenida Pico
STA 22+25

L&A B-3
(Projected 21')

A-11-105
(Projected 190')

Proposed New Wall

A-11-123
(Projected 170')

L&A B-5
(Projected 12')

L&A B-2
(Projected 150')

Colluvium and
Rock Creep

Colluvium,
Rock Creep , Qls

Church Building

Af

Qls

Qya

Tc

TD = 50'

TD = 36.5'

TD = 50.9'

TD = 25'

TD = 23'

LEGEND

Af	Artificial Fill
Qls	Landslide Material
Qcol	Colluvium
Qya	Young Alluvium
Tc	Capistrano Formation
?	Geologic Contact Queried where uncertain

0
100
200
300
400
500
600
700

Feet

Design Cross Section A-A'
"AP" STA 22+25

Scale 1"=50'

B

B'

N20°W

Elevation (ft)

350
300
250
200
150
100
50
0

Avenida Pico
℄ Widen

Avenida Pico
STA 23+50

L&A B-4
(Projected 6')

A-11-124
(Projected 60')

Proposed New Wall

L&A B-5
(Projected)

Colluvium and
Rock Creep

Colluvium,
Rock Creep, and
Landslide Mat'l

Church Building

Tc

Af

Existing Keyblock Wall

Af

Qya

Qls

TD = 34.5'

TD = 55'

TD = 23'

Tc

Tc

?

?

?

0
100
200
300
400
500
600
700

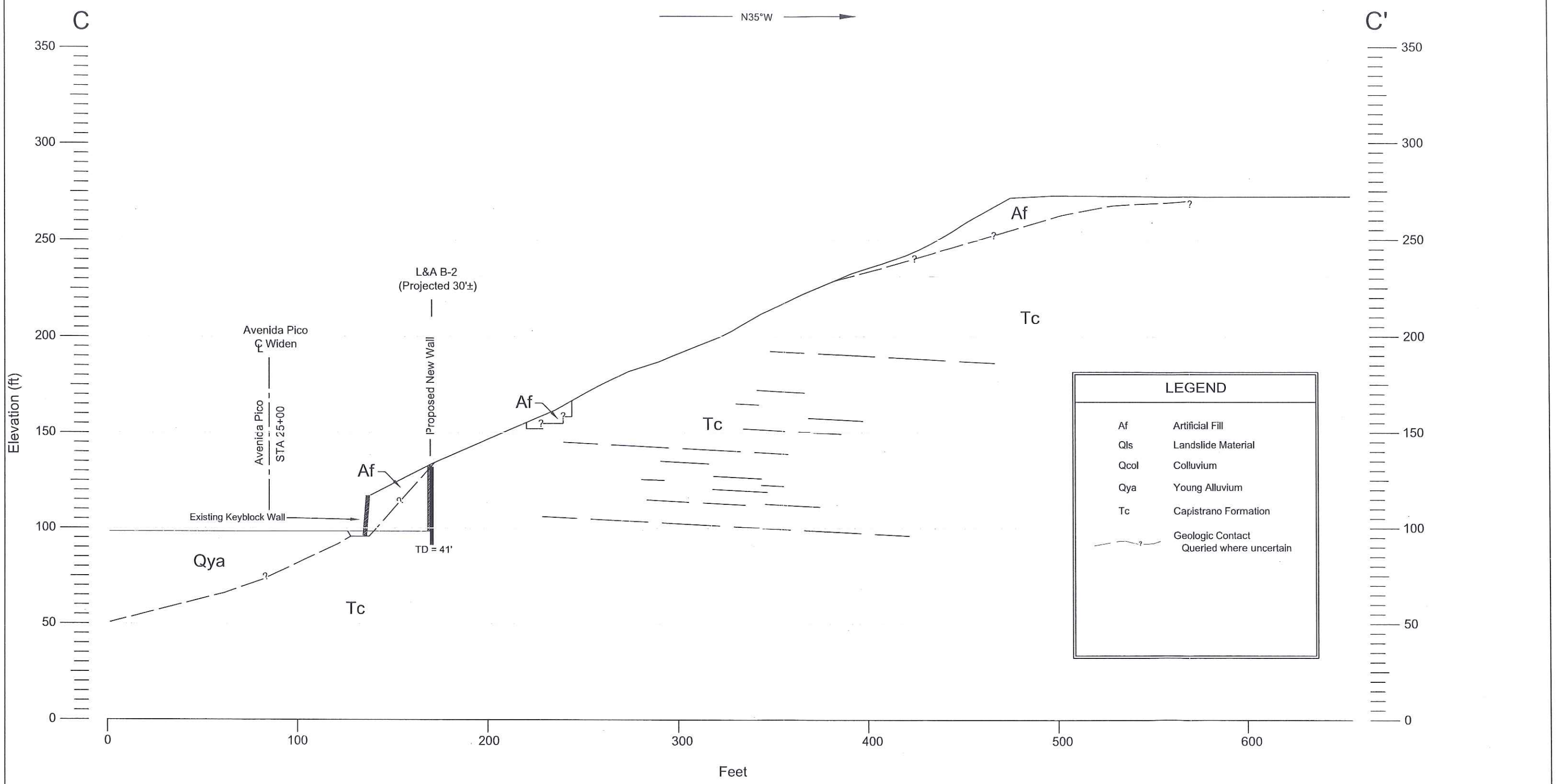
Feet

LEGEND

Af	Artificial Fill
Qls	Landslide Material
Qcol	Colluvium
Qya	Young Alluvium
Tc	Capistrano Formation
?—	Geologic Contact Queried where uncertain

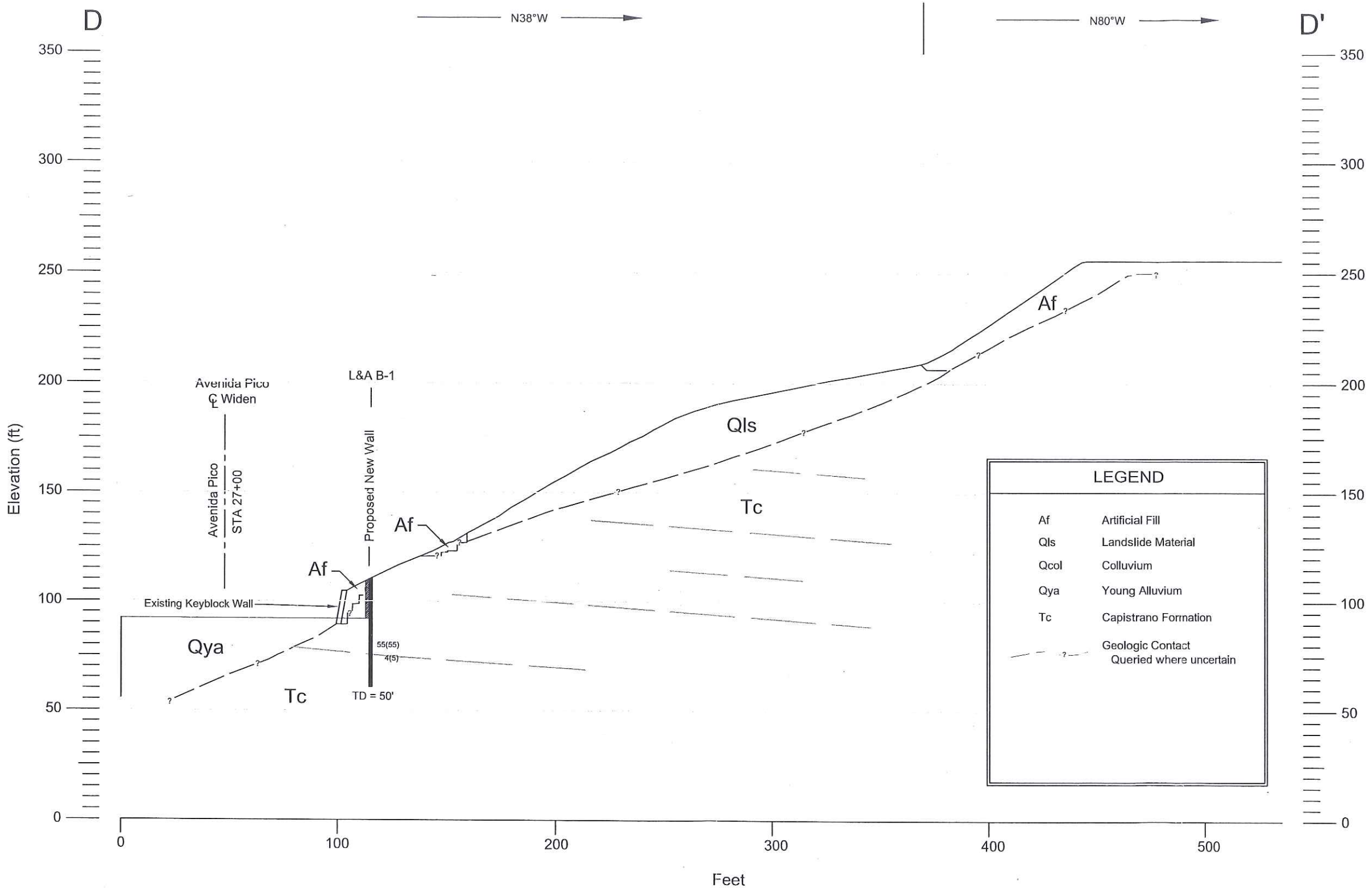
Cross Section B-B'
"AP" STA 23+50

Scale 1"=50'



Cross Section C-C'
"AP" STA 25+00

Scale 1"=50'



Cross Section D-D'
"AP" STA 27+00

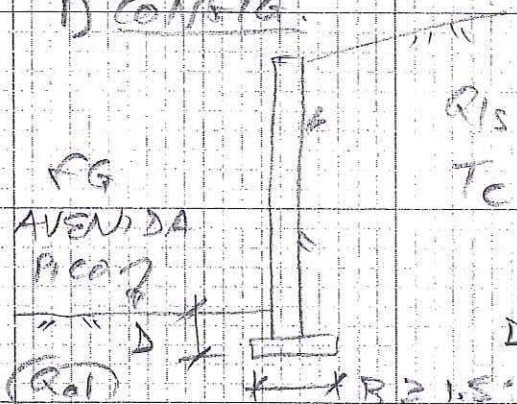
Scale 1"=50'

Project I-5 HOV SEG. 1
RW 190
Project No. 11-135

By MK Date 5/16/12 Checked By LCC Date 5/24/12 Sheet 1 of 5

TIEBACK WALL LEVELING PAD

1) CONFIG.



N_{SPT} = 5 to 15 bpf from A-11-124, N_{ave} = 8 bpf
S_u = 3 ksf
ϕ = 28° (conservative design)
γ = 120 pcf.

2) Bearing capacity q_u

N_γ = 11, N_q = 14 (e.g. U.S. Navy, DM 7.2-81)

$q_{ult} = \frac{1}{2}\gamma B N_\gamma + \gamma D N_q$

$= .5 \times .12 \times 1.5' \times 11 + .12 \times 2' \times 14$

$= 1$ ksf $+ 3.36$ ksf.

$= 4.36$ ksf.

$q_{strength} = 4.36 \times (\phi = .45) = 1.962 \sim 2$ ksf.

3) Sliding coefficient

$\delta = \tan \frac{2}{3}\phi = \tan \frac{2}{3} 28° = .34$

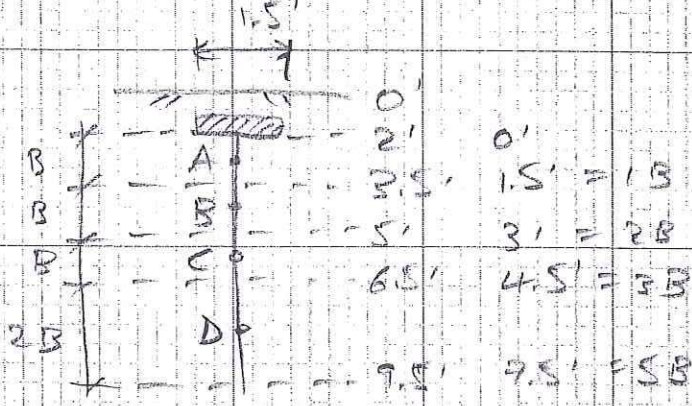
$\delta = .30$ (concrete against fine grained soil, U.S. Navy DM 7.2-83)

∴ Recommend: .3 for permanent condition.
.35 for temp. condition.

Project I-5 HOV SEG. 1
RW 190
Project No. 11-135

By MK Date 5/16/12 Checked By LCC Date 5/24/12 Sheet 2 of 5

4) Check settlement (service)

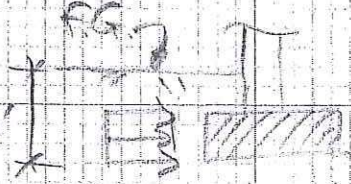


Applied "service" load = 2 ksf.
Settlement rate. (See attached)

$S = .96^{\circ} \sim 1"$

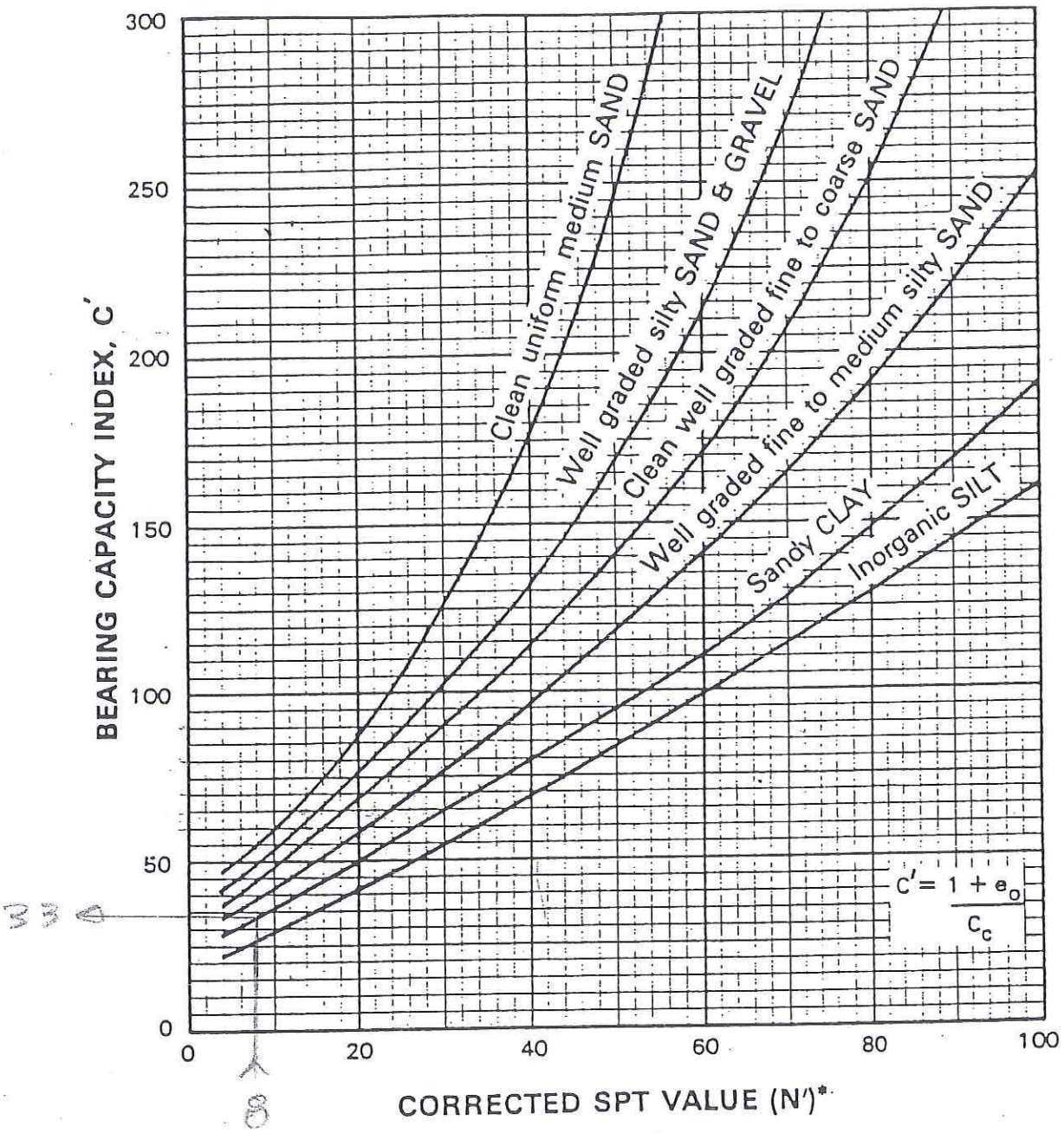
∴ Qall for service = 2 ksf.

5) PASSIVE RESISTANCE



S_u = 3.0 ksf from A-11-12 @ 10'
γ = 120 pcf.
S_u (reduced) = $\frac{3.0}{2}$ = 1.5 ksf = c
$P_p = 2c + \gamma \cdot 1.5 = 3$ ksf. *

Recommend to ignore P_p 12".
* to be reduced for design (eg CT BDS 5.6.4).



*N'—*SPT (N) Value Corrected for Overburden Pressure.*

Reference: Hough, "Compressibility as a Basis for Soil Bearin Value" ASCE 1959

$C_c = \frac{1}{C'} = \frac{1}{33} = 0.03$

FIGURE 13

BEARING CAPACITY INDEX (C') VALUES FOR GRANULAR SOIL.

4/15

SETTLEMENT CALCULATION FOR SERVICE CASE

Project Title: 11-135/I-5 HOV Seg 1 Wall 190
leveling pad
By: M. Kapuskar, 5/15/12

applied pressure p_o: 2.00 ksf
applied at depth: 2 ft

USCS	Stress Point	Depth (ft)	Unit Weight (kcf)	C_c	ΔH (ft)	Layer middepth (ft)	σ'_v (ksf)	Depth below load (ft)	Δp (ksf)	δ (in)	$\Delta p/\sigma'_v$	δ (in)
Qal		0.0	0.120	0	-	-	0.00	0.0	0.00	0.00	0%	0.00
Qal		2.0	0.120	0.030	2.0	1.0	0.12	0.0	0.00	0.00	0%	0.00
Qal	A	3.5	0.120	0.030	1.5	2.8	0.33	0.8	1.84	0.44	557%	0.44
Qal	B	5.0	0.120	0.030	1.5	4.3	0.51	2.3	0.88	0.23	172%	0.23
Qal	C	6.5	0.120	0.030	1.5	5.8	0.69	3.8	0.61	0.15	89%	0.15
Qal	D	9.5	0.120	0.030	3.0	8.0	0.96	6.0	0.32	0.13	33%	0.13
Qal	E	15.0	0.120	0.030	5.5	12.3	1.47	10.3	0.19	0.10	13%	0.00
Qal	F	30.0			15.0	22.5	2.70	20.5	0.10	0.08	4%	0.00
									δ_{tot}=	1.14	δ_{tot}=	0.96 "

Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

ELASTIC STRESS CALCULATION

Project Title: 11-135/I-5 HOV Seg 1 Wall 190
leveling pad
By: M. Kapuskar, 5/15/12

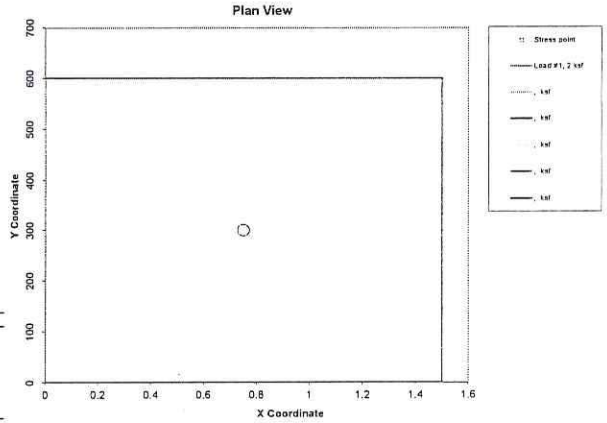
Notes:
1. This spreadsheet calculates 3D pressures in elastic (x,y,z) halfspace medium due to rectangular pressures on its surface using elastic 3D Boussinesq solutions (Poulos 19XX).
2. Input is in yellow cells. All worksheets can be edited freely. Save as Macro-Enabled file (*.xlsm).
3. PLAN shows the horizontal plane of X and Y. X and Y may be negative. Z is depth (always positive). Plan shows a stress point and up to 6 rectangular surface pressures.
4. STRESS POINT is located anywhere on x-y plane, including inside and outside pressure rectangles. The coordinates may be negative. Stresses due to loads will superimposed at this location.
5. PRESSURE RECTANGLE is placed by its (small-x, small-y) corner. The coordinates may be anywhere on x-y plane, including negative.
   Length (always positive) is parallel to X. Width W (always positive) is parallel to Y axis.
   Pressure is vertical and uniform. It is positive in Z (downward) and may be negative (upward).
   Loads may be superimposed and overlapped.
6. STRESS PROFILES are calculated at specified depths below stress point. Stresses are positive if pressure is positive, negative if pressure is negative. Stresses are 1/2 the input pressure under borders, and 1/4 under corners.

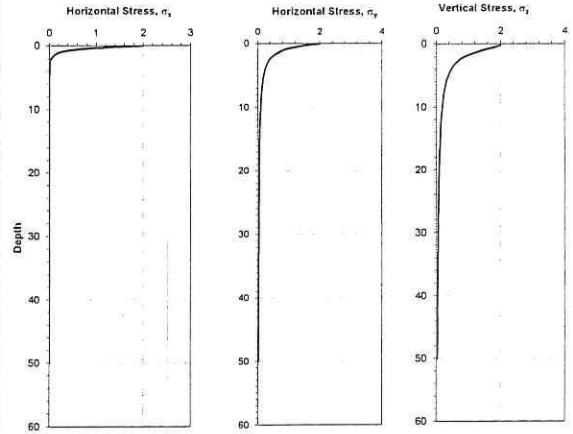
UNITS
length unit= ft
pressure unit= ksf

STRESS POINT LOCATION
X = 0.75 ft
Y = 300 ft

	Load No. 1	Load No. 2	Load No. 3	Load No. 4	Load No. 5	Load No. 6	Total
Load name =	Load #1						All Loads Superimposed
Pressure, p =	2.00 ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	
Length along X =	1.5 ft	Length= ft	Length= ft	Length= ft	Length= ft	Length= ft	
Width along Y =	600 ft	Width= ft	Width= ft	Width= ft	Width= ft	Width= ft	
Lower left corner X =	0 ft	X = ft	X = ft	X = ft	X = ft	X = ft	
Lower left corner Y =	0 ft	Y = ft	Y = ft	Y = ft	Y = ft	Y = ft	

Depth	Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Total Stresses		
z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
0.00	2.00	2.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	2.00	**2.00**
0.10	1.66	1.83	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.66	1.83	**2.00**
0.20	1.35	1.67	1.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.35	1.67	**1.99**
0.50	0.66	1.25	1.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	1.25	**1.84**
1.00	0.21	0.82	1.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.82	**1.43**
2.00	0.04	0.46	0.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.46	**0.88**
3.00	0.01	0.31	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.31	**0.61**
4.00	0.01	0.24	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.24	**0.47**
5.00	0.00	0.19	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	**0.38**
6.00	0.00	0.16	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	**0.32**
7.00	0.00	0.14	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	**0.27**
8.00	0.00	0.12	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	**0.24**
9.00	0.00	0.11	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	**0.21**
10.00	0.00	0.10	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	**0.19**
12.00	0.00	0.08	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	**0.16**
14.00	0.00	0.07	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	**0.14**
16.00	0.00	0.06	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	**0.12**
18.00	0.00	0.05	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	**0.11**
20.00	0.00	0.05	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	**0.10**
22.00	0.00	0.04	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	**0.09**
24.00	0.00	0.04	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	**0.08**
26.00	0.00	0.04	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	**0.07**
28.00	0.00	0.03	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	**0.07**
30.00	0.00	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	**0.06**
32.00	0.00	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	**0.06**
34.00	0.00	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	**0.06**
36.00	0.00	0.03	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	**0.05**
38.00	0.00	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	**0.05**
40.00	0.00	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	**0.05**
42.00	0.00	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	**0.05**
44.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	**0.04**
46.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	**0.04**
48.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	**0.04**
50.00	0.00	0.02	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	**0.04**





Project I-5 HOV SEG. 1
RW 190 Project No. 11-185

By MK Date 5/19/12 Checked By LC Date 5/24/12 Sheet 1 of 9

GLOBAL STABILITY ANALYSIS / TIEBACK DESIGN FORCE CHECK FOR SECTION A-A' (H=20-24')

1) EXISTING SLOPE, STATIC CONDITION

SLIDE 6.0 ANALYSIS

→ FOS ≅ 1.64 > 1.0 (G.W. STABLE)

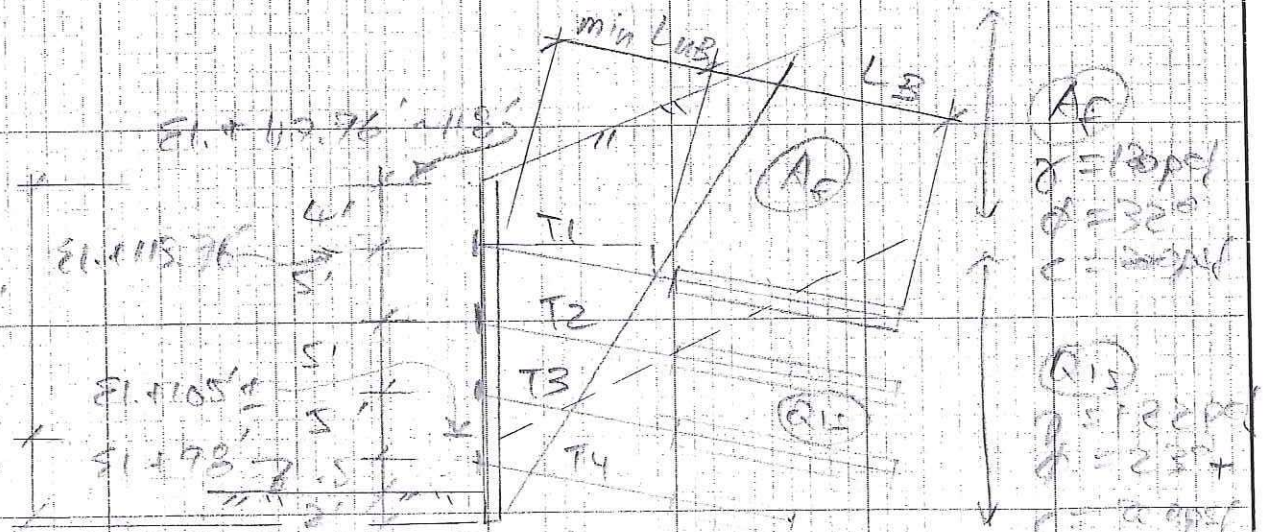
2) NEW CONDITION WITH SLOPE CUTBACK TO H=20'

a) SLIDE ANALYSIS

WITH DESIGNER'S TIEBACK GEOMETRY

4 LEVELS @ SH=5'

CONFIG.:



c) MIN. UNBONDED LENGTH (L_{UB})

SOIL RESTRAINED IS A_F + Q_{1S}

$\gamma_{ave} = \frac{120+122}{2} = 121$ pcf

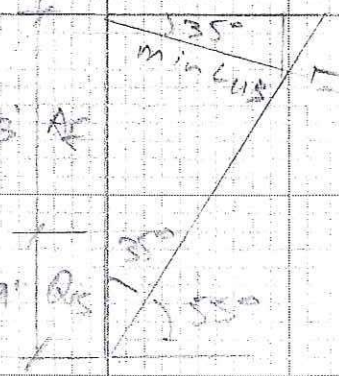
$C = 200$ psf

$\tan \phi_{ave} = \frac{13' \times \tan 32° + 9' \times \tan 23°}{13' + 9'} = 0.514$

$\therefore \phi_{ave} = 28.5°$

SLOPE (TRANSVERSE) AAM 4:1

$\rightarrow \alpha = 5°$



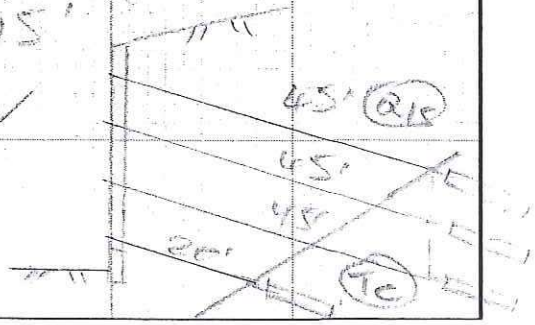
min $L_{UB} = 21.2' \tan 35°$

$= 15.2' > 15'$ O.K.

From Q_{1S}/TE contact geometry

min $L_{UB} = 45' > 15'$

$\therefore$ USE $L_{UB} = 45'$ ✓



d) Initial Lock-Off Anchor Loads (T):

Tieback Level	Service Load (horiz.)	Design Anchor Load T (for slope calc.)
T1	51.57 k	45 k
T2	44.28 k	45 k
T3	41.51 k	45 k
T4	22.25 k	20 k

$T_{ave} = \frac{T_1 + T_2 + T_3}{3} = 45.8$ k

along anchor alignment

$T = \frac{45.8\ k}{\cos 15^\circ} = 47.4$ k → use 45 k

e) Bonded Length (L_B)

min L_B = 15' (FHWA Gdc. #4, 1999)

$T = \pi \phi L_B \tau_{all}$

$\tau_{all} = \tau_{ult} / F.S.$

τ_{ult} = 8 psi (ult. bond strength of SM/SP in a Gravelly alluvium)

F.S. = 2.0 per CT BDS 5.8.6.3

τ_{all} = 8 psi / 2 = 4 psi (min.)

$T = \pi \times 6" \times L_B \times 4$ psi = 75 L_B #/in $\times \left[\frac{k}{1000\#}\right] \times \left[\frac{12"}{1'}\right]$

= .905 L_B k/ft use 1 L_B k/ft (min.)

∴ for $T_1 - T_3$: L_B = 45' ✓

for T_4: L_B = 20' ✓ (min.)

Project I-5 HOV SEG. 1
RW 190 Project No. 11-135

By MK Date 5/9/12 Checked By LSC Date 5/24/12 Sheet 4 of 7

3) SLOPE STABILITY ITERATION WITH TIEBACKS

Level	L_{us}	L_B	T (lock off)	Static FOS	Seismic FOS
T1-T3	45'	40'	40K	< 1.5	-
T4	20'	20'			
T1-T3	45'	45	45K	< 1.5	-
T4	30'	20			
T1-T3	45'	50'	50K	< 1.5	-
T4	25'	45			
T1-T2	45'	30'	68K	1.5 (O.K.)	1.15 > 1.1 (O.K.)
T3-T4	30'	25'	50K		

∴ RECOMMENDATIONS FOR H: 20'-24'

Level	min L_{us}	L_B with T (lock-off)
T1-T2	45'	30' 70K/anchor
T3-T4	30'	25' 60K/anchor ✓

Seismic Earth Pressure, Trial wedge method, (c, ϕ) material

c/γh= 0.083

T_c (ft) 5.557

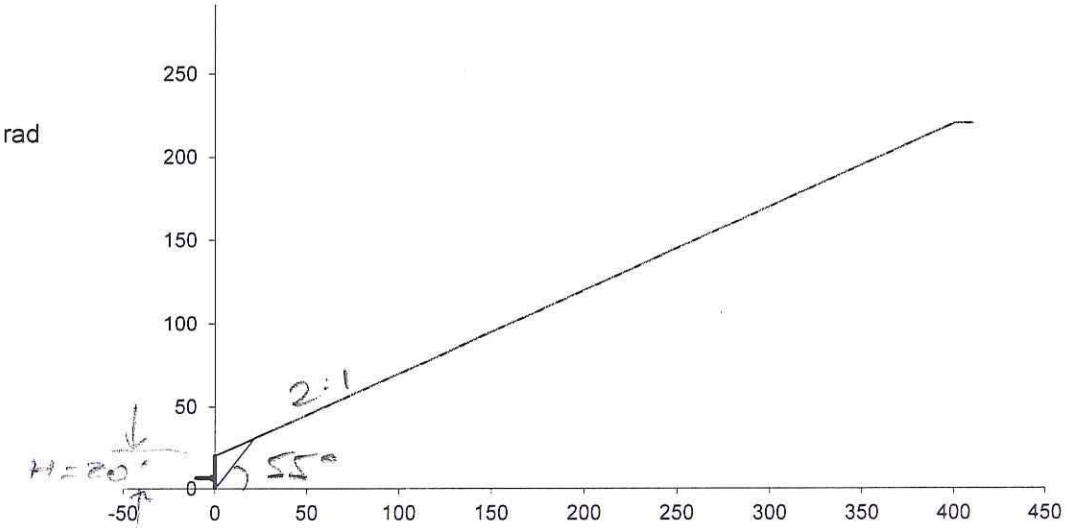
Project: I-5 HOV Seg 1, Pico Wall, 2H:1V backslope Date: 5/19/2012

soil friction, ϕ =	28.5	deg =	0.49742	rad	adhesion, c_a=	0	psf
soil cohesion, c =	200	psf			loading start=	0	ft
hor. seismic coeff., k_h =	0				loading end=	30	ft
vert. seismic coeff., k_v =	0				loading magnitude	0	psf
wall batter angle, β =	0	deg =	0	rad	slope length, L_s=	400.0	ft
backslope angle, i =	26.565	deg =	0.46365	rad	tension crack depth=	0.00	ft
wall height, H =	20	ft			water-filled tension crack?	no	yes/no
soil unit weight, γ =	121	pcf			unit weight of water=	62.4	psf
wall-soil friction, δ =	0	deg =	0	rad	note: distances for loading and slope measured horizontally from top of wall.		
α_{AE} =	54.9486	deg	0.95903	rad			
ΔW_{load} =	0	lbs/ft					
ΔW_{Tc} =	0	lbs/ft					
W =	26,150	lbs/ft					
θ =	0.000	deg =	0	rad			
L =	37.631	ft					
criteria:	0.63						

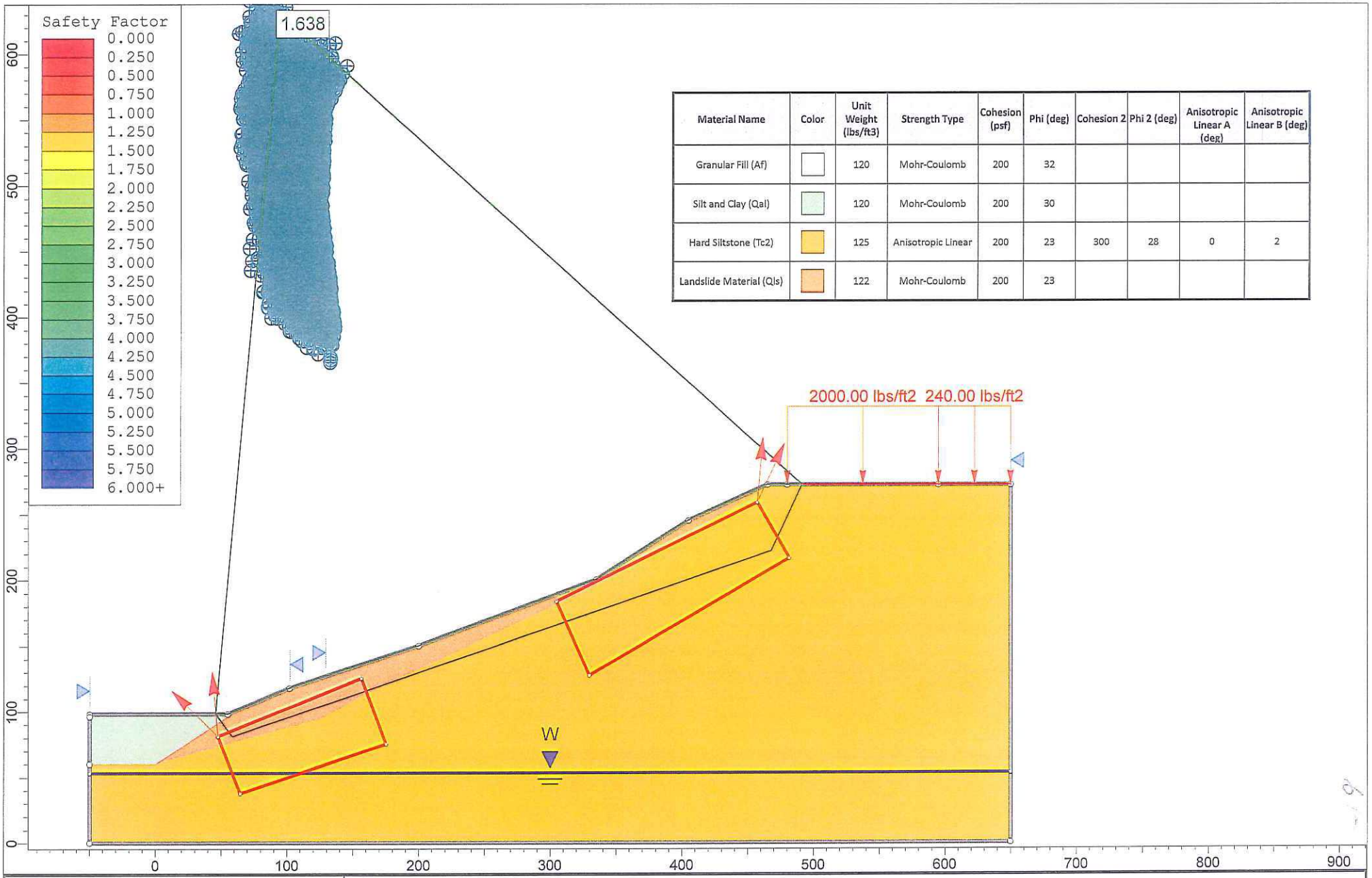
Mouth.
α = 55°

Solution: Update!

hor. seismic active force, P_{AEH} =	**5,621**	lbs
hor. seismic active coeff., K_{AEH} =	**0.232**	
total seismic active force, P_{AE} =	**5,621**	lbs
total seismic active coeff., K_{AE} =	**0.232**	



6/5



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	32				
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30				
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28	0	2
Landslide Material (Qls)		122	Mohr-Coulomb	200	23				

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico				
Analysis Description	Pico Wall, Sta. 22+25, Static				
Drawn By	MK	Scale	1:1185	Company	Earth Mechanics
Date	4/25/12			File Name	1 Static Exist.slim

SLIDEINTERPRET 6.015

these assumptions to develop a preliminary estimate of the anchor bond length, it must be verified that for the required excavation height the minimum unbonded length can be developed.

Soil Anchors

For the purposes of preliminary design, the ultimate load transferred from the bond length to the soil may be estimated for a small diameter, straight shaft gravity-grouted anchor from the soil type and density (or SPT blowcount value) (table 6). The maximum allowable anchor design load in soil may be determined by multiplying the bond length by the ultimate transfer load and dividing by a factor of safety of 2.0.

Table 6. Presumptive ultimate values of load transfer for preliminary design of small diameter straight shaft gravity-grouted ground anchors in soil.

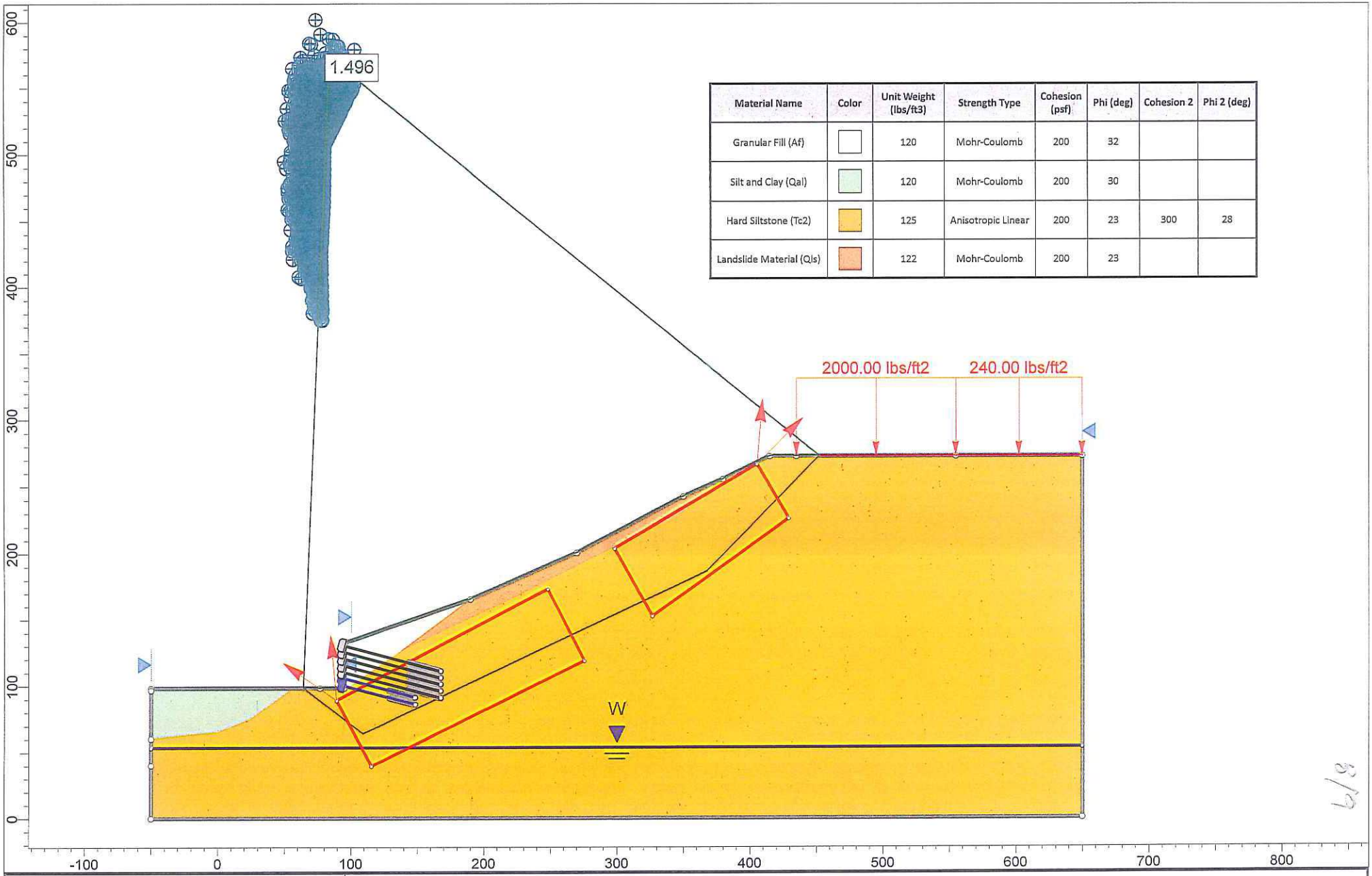
Soil type	Relative density/Consistency (SPT range)[1]	Estimated ultimate transfer load (kN/m) (K/ft)
Sand and Gravel	Loose (4-10) Medium dense (11-30) Dense (31-50)	145 220 290
Sand	Loose (4-10) Medium dense (11-30) Dense (31-50)	100 145 190
Sand and Silt	Loose (4-10) Medium dense (11-30) Dense (31-50)	70 100 130
Silt-clay mixture with low plasticity or fine micaceous sand or silt mixtures	Stiff (10-20) Hard (21-40)	30 2.05 60 4.1

Note: (1) SPT values are corrected for overburden pressure.

$T_{all} = 1 \div 2$ K/ft.
($p = 8.3 - 12.6$ psi)

Anchor bond lengths for gravity-grouted, pressure-grouted, and post-grouted soil anchors are typically 4.5 to 12 m since significant increases in capacity for bond lengths greater than approximately 12 m cannot be achieved unless specialized methods are used to transfer load from the top of the anchor bond zone towards the end of the anchor. For anchor bond zones that function in tension, initial load increments transferred to the anchor bond zone are resisted by the soil near the top of the anchor bond zone as strains occur in the upper grout body (figure 36). As additional increments of load are transferred to the anchor bond zone, the strains in the top of the anchor bond zone may exceed the peak strain for strain sensitive soils. In that case, the bond stress begins to decrease at the top and the peak strain shifts down the anchor body. In strain sensitive soils, the shape of the stress-strain diagram will determine the actual bond length where significant load is mobilized. Attempts to mobilize larger portions of the bond length will result in small increases in

REF: FHWA, 1999 GEOT. ENG. CIRC. #4 GROUND ANCHORS & ANCHORED SYSTEMS



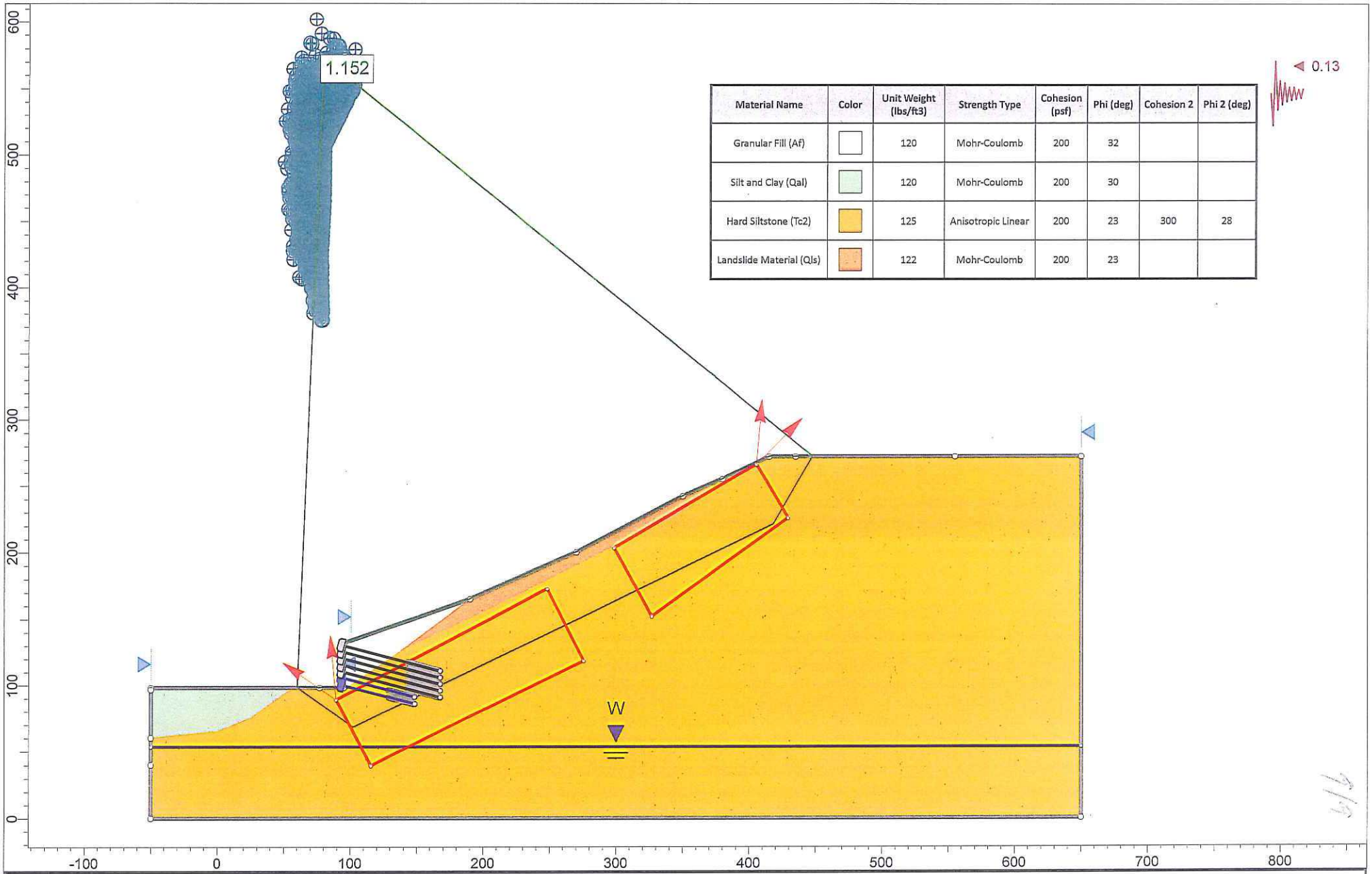
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	32		
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30		
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28
Landslide Material (Qls)		122	Mohr-Coulomb	200	23		

6/8

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico				
Analysis Description	Pico Wall, Sta. 22+50, Static				
Drawn By	MK	Scale	1:1173	Company	Earth Mechanics
Date	4/25/12			File Name	3 Static Lub=30.slim

SLIDEINTERPRET 6.015



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	32		
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30		
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28
Landslide Material (Qls)		122	Mohr-Coulomb	200	23		

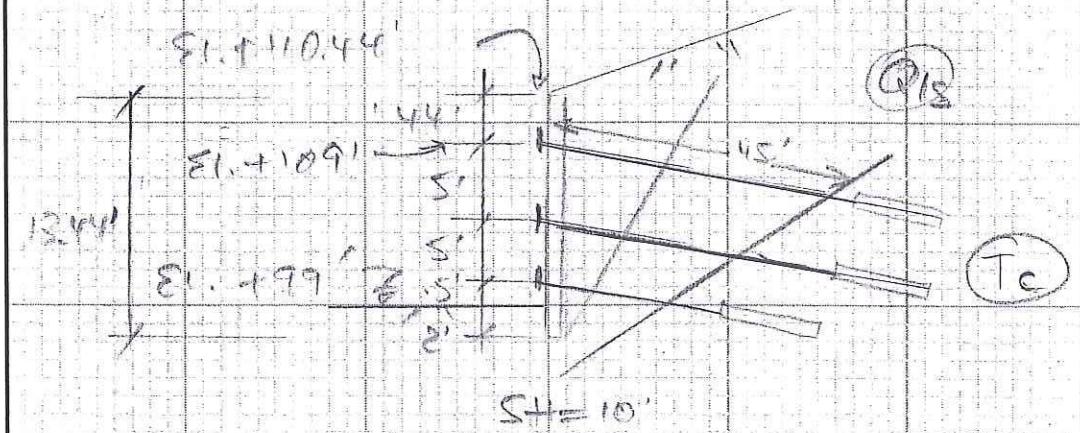
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico				
Analysis Description	Pico Wall, Sta. 22+50, seismic				
Drawn By	MK	Scale	1:1173	Company	Earth Mechanics
Date	4/25/12			File Name	3 Seismic Lub=30.slim

SLIDEINTERPRET 6.015

GLOBAL SLOPE STABILITY ANALYSIS FOR H=12'

1) CONFIG.
(ANALOG TO H='∞' @ SECTION A-A)



2) From Trial wedge:
Min L_{UB} = 13.44' tan 35° = 9.4' } use
From Q18 grapting: min L_{UB} = 45' } L_{UB} ≥ 45'

3) Initial Anchor forces:

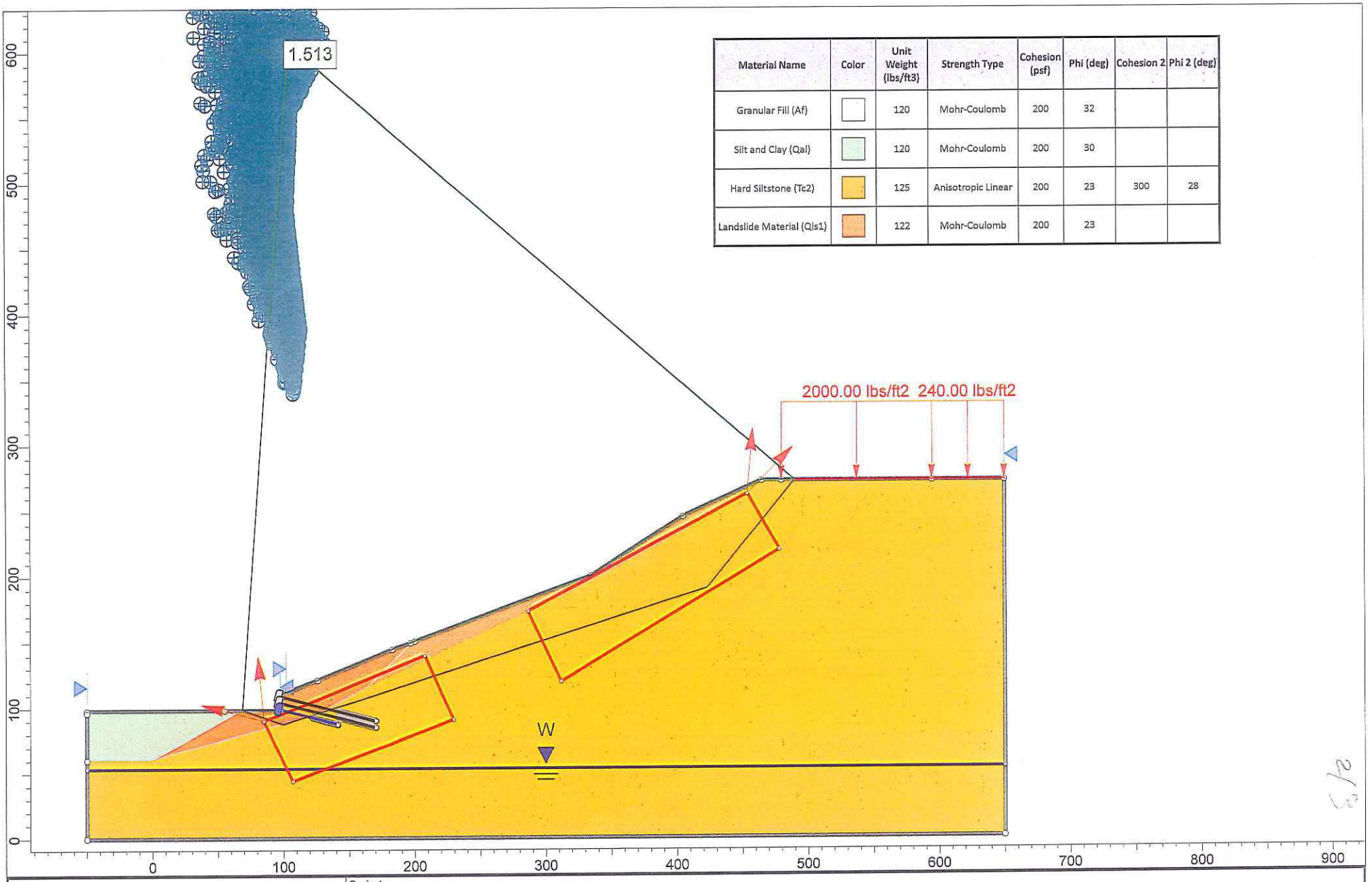
Tieback level	Design/Service load	Design load for Slope calc.	L_B
T1	40.23	40 K/Ft	40'
T2	41.35	40 K/Ft	40'
T3	20.30	20 K/Ft	20'

T = (40.23 + 41.35)/2 = 40.3 K

40.8/cos 5° = 42.2 K

3)

Level	L_{UB}	L_B	T (lock-off)	Static FOS	Seismic FOS
T1-T2	45'	30'	68K ≈ 70K	1.51 > 1.5 (O.K.)	1.13 > 1.1 (O.K.)
T3	25'	20'	45K		

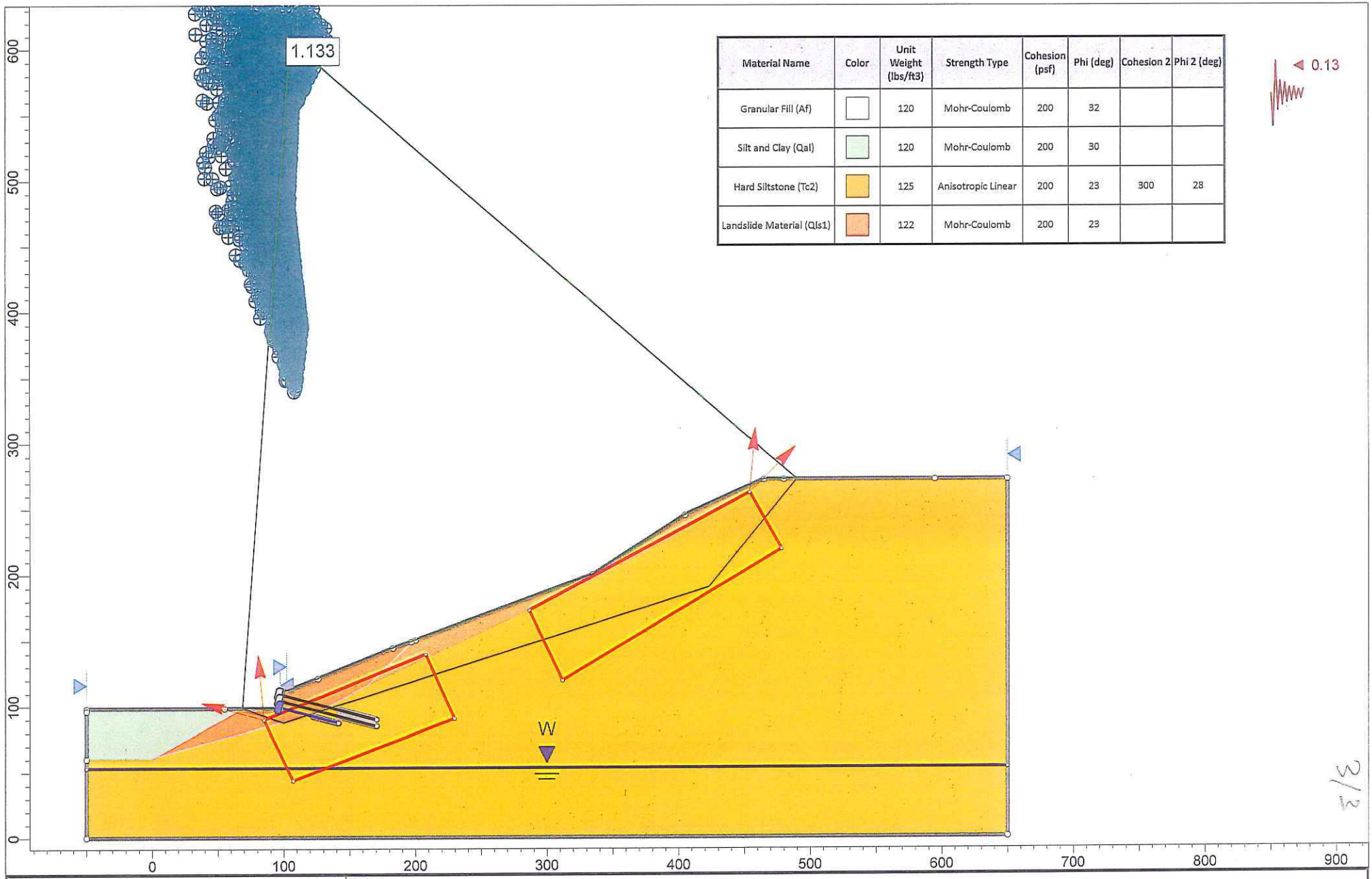


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	32		
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30		
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28
Landslide Material (Qls1)		122	Mohr-Coulomb	200	23		

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico				
Analysis Description	Pico Wall, On-Ramp, H=12', Static				
Drawn By	MK	Scale	1:1185	Company	Earth Mechanics
Date	5-22-12			File Name	3 Static New Lub=30.slim

SLIDEINTERPRET 6.015



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	32		
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30		
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28
Landslide Material (Qls1)		122	Mohr-Coulomb	200	23		

3/3

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico				
Analysis Description	Pico Wall, On-Ramp, H=12', Seismic				
Drawn By	MK	Scale	1:1185	Company	Earth Mechanics
Date	5-22-12			File Name	3 Seismic New Lub=30.slim

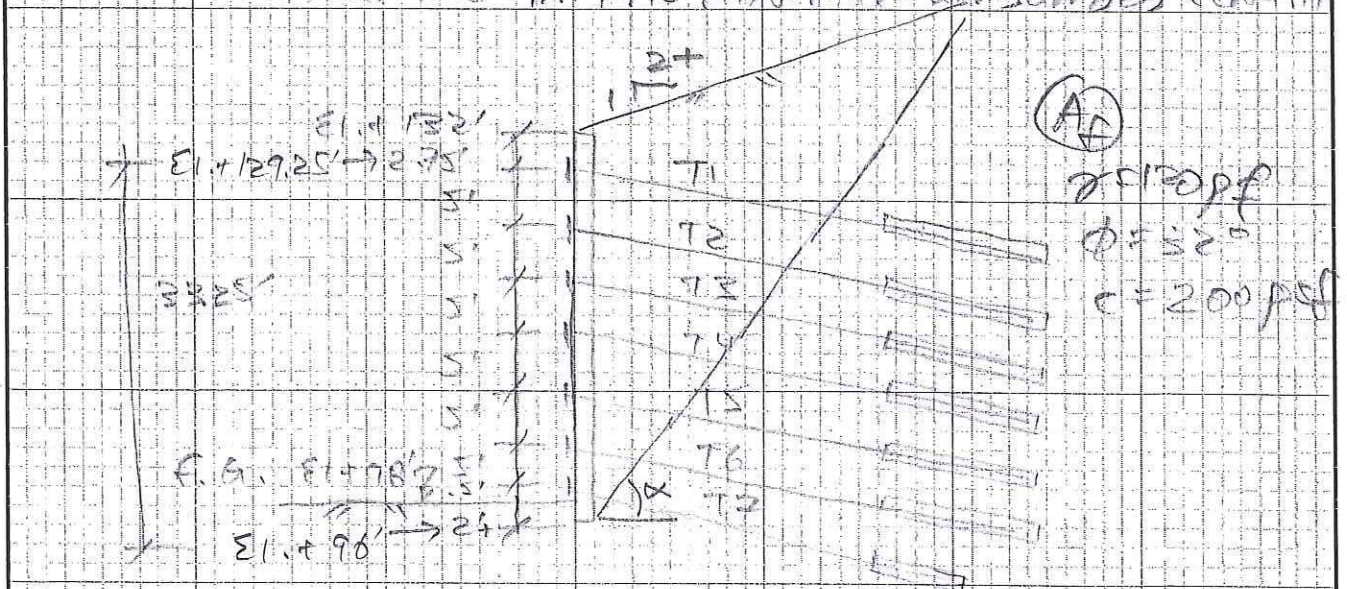
Project I-5 HOV SEG. 1
RW 190 Project No. 11-135

By MK Date 5/19/12 Checked By MC Date 5/24/12 Sheet 1 of 7

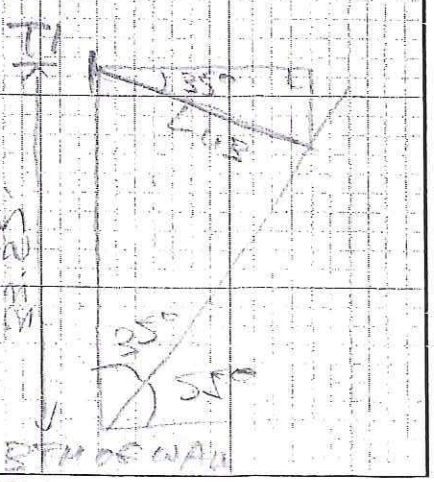
GLOBAL SLOPE STABILITY ANALYSIS FOR
SECTION B-B' (H = 26' ÷ 34' SOUTH HALF)

1) EXISTING SLOPE W/ KEYSTONE WALL
STATIC CONDITION
SLOPE ANALYSIS → FOS ≅ 1.4 >> 1.0 (STABLE)

2) NEW CONDITION W/ WALL (H = 34' CONTROLS)
DETERMINE INITIAL MINIMUM UNBONDED LENGTH



SLOPE (TRIAL WEDGE) ANALYSIS
→ α = 55.2° ~ 55°



→ nominal L = 33.25' tan 35°
= 23.3'
use min L = 25'
(for all levels)

3) GLOBAL SLOPE STABILITY ANALYSIS

Level	Designer's Service-Load	Design T
T1	50.28^k	$T_{ave} = 49.91$
T2	53.04	$T = \frac{49.91}{\cos 15°} = 51.67^k$
T3	51.44	
T4	47.84	use 50^k
T5	48.24	
T6	46.63	
T7	25.52	→ 25^k

BONDED LENGTH

$T_i = \pi \phi L_{Bi} \, C_{all}$

$C_{all} = C_{ult} / FS$

$C_{ult} = 8$ psi (ultimate bond strength of siltstone for [illegible] grouted anchors)

$\phi = 6''$ (use of 4" to 8")

$FS = 2.0$ per CT BDS 5.8.6.3

$\therefore C_{all} = 8\text{ psi}/2 = 4$ psi

$T = \pi \times 6'' \times 1'' \times 4\text{ psi} = 75^{\#}/\text{in} \times \left[\frac{k}{1000^{\#}}\right] \times \left[\frac{12''}{ft}\right]$

$= 0.905^{k/ft} \sim 1^{k/ft}$

$\therefore$ for T1 to T6:

$L_B = 50^k \times 1^{k/ft} = 50'$

for T7:

$L_B = 25^k \times 1^{k/ft} = 25'$

Project I-5 HOV SEG. 1
RW 190
Project No. 11-135

By MK Date 5/18/12 Checked By LLL Date 5/24/12 Sheet 3 of 7

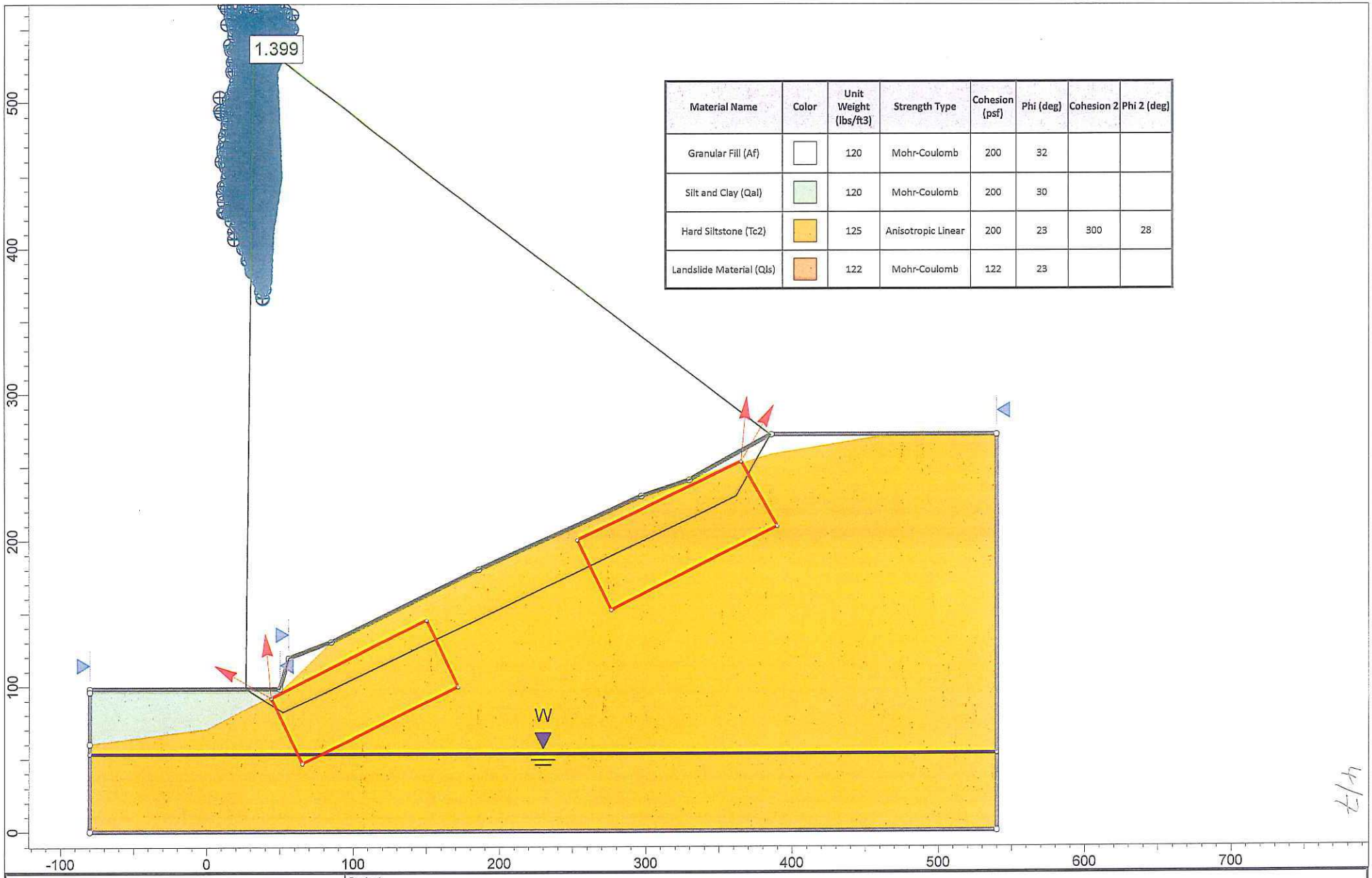
SLOPE STABILITY ITERATION

Levels	L_{UB}	L_B	T	F.O.S. (Static)	F.O.S. (Seis.)
T1-T6	25'	50	50K	< 1.5	–
T7	25'	25	25K		
T1-T5	30'	25'	56K	1.5 (O.K.)	1.15 > 1.1 (O.K.)
T6-T8	30'	25'	56K		

RECOMMENDATIONS FOR H = 26-30'

Level	min L_{UB}	L_B	T (rock-anch.) – min.
T1-T5	30'	25'	60 K/anchor
T6-T8	30'	25'	60 K/anchor

CHECK SECTION C-C' @ H=34' NORTH
MAKE RECOM.



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	32		
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30		
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28
Landslide Material (Qls)		122	Mohr-Coulomb	122	23		

4/7

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico				
Analysis Description	Pico Wall, Sta. 25+00, Static Exist				
Drawn By	MK	Scale	1:1067	Company	Earth Mechanics
Date	5/15/12			File Name	1 Static Exist.slim

SLIDEINTERPRET 6.015

Seismic Earth Pressure, Trial wedge method, (c, ϕ) material

$c/\gamma h$= 0.049

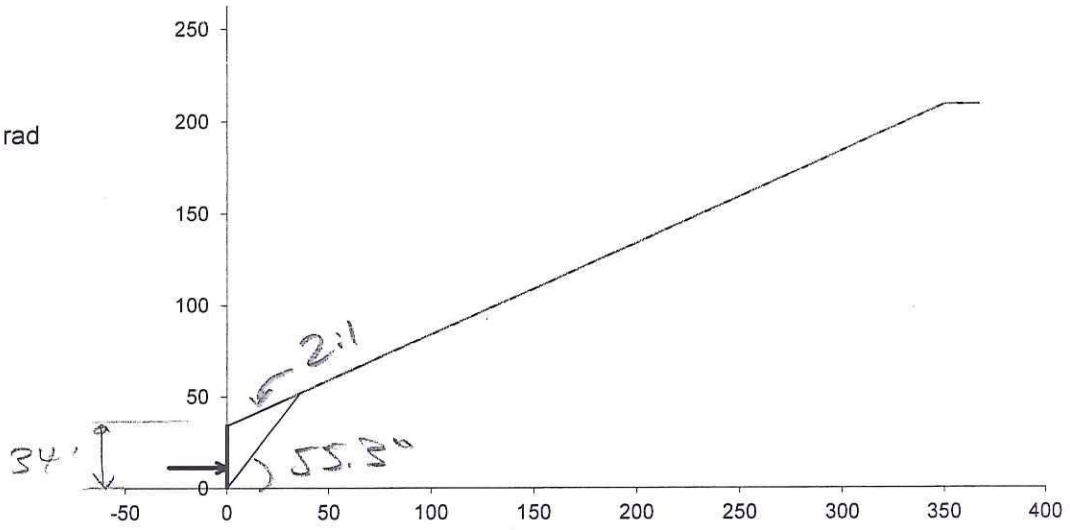
T_c (ft) 6.013

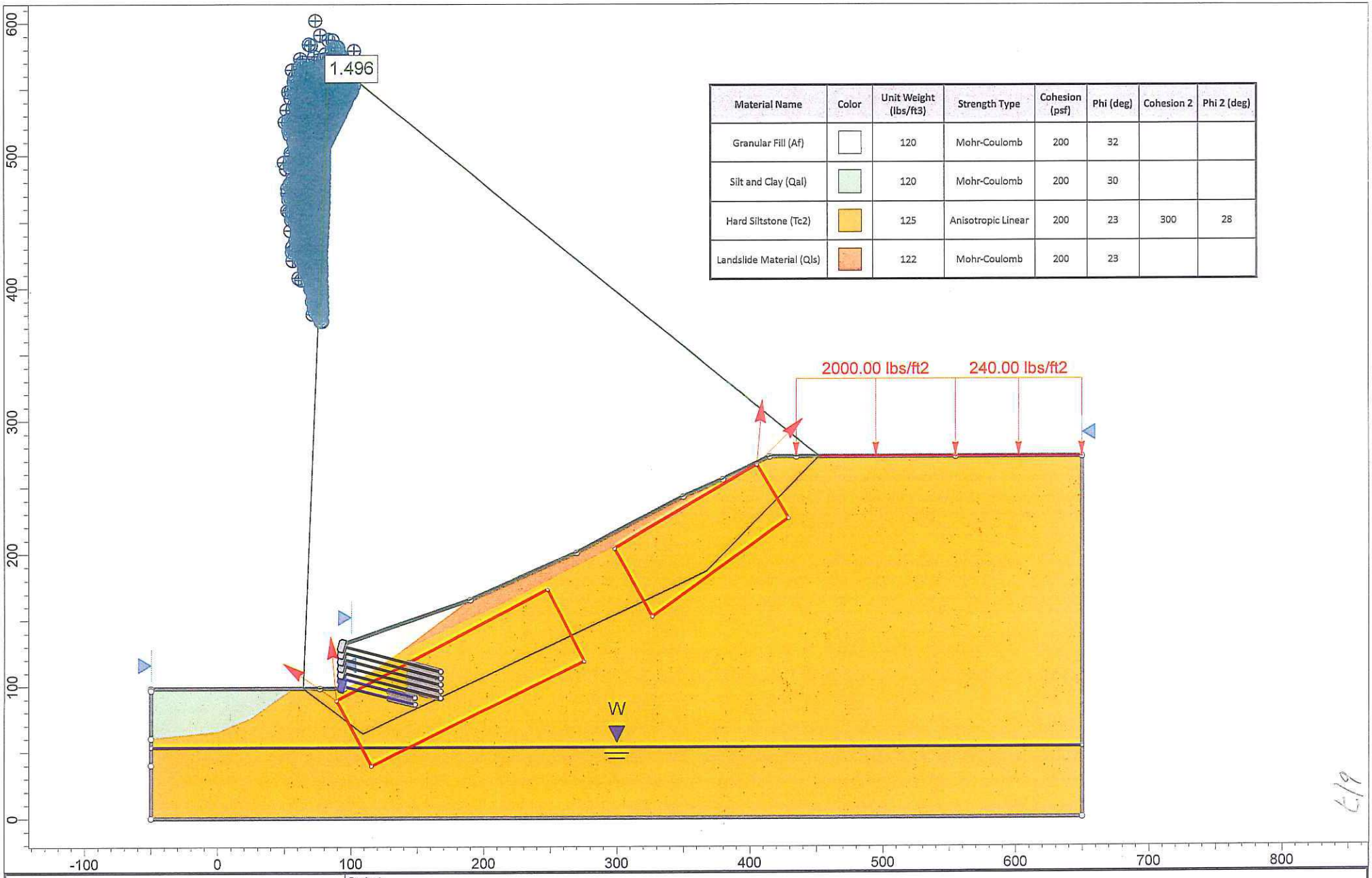
Project: I-5 HOV Seg 1, Pico Wall, 2H:1V backslope Date: 5/19/2012

soil friction, ϕ =	32	deg =	0.55851	rad	adhesion, c_a=	0	psf
soil cohesion, c =	200	psf			loading start=	0	ft
hor. seismic coeff., k_h =	0				loading end=	30	ft
vert. seismic coeff., k_v =	0				loading magnitude	0	psf
wall batter angle, β =	0	deg =	0	rad	slope length, L_s=	350.0	ft
backslope angle, i =	26.565	deg =	0.46365	rad	tension crack depth=	0.00	ft
wall height, H =	34	ft			water-filled tension crack?	no	yes/no
soil unit weight, γ =	120	pcf			unit weight of water=	62.4	psf
wall-soil friction, δ =	0	deg =	0	rad	note: distances for loading and slope measured horizontally from top of wall.		
RESULT → α_{AE} =	55.2910	deg	0.96501	rad			
ΔW_{load} =	0	lbs/ft					
ΔW_{Tc} =	0	lbs/ft					
W =	73,498	lbs/ft					
θ =	0.000	deg =	0	rad			
L =	63.273	ft					
criteria:	0.67						

Solution: Update!

hor. seismic active force, P_{AEH} =	**19,956**	lbs
hor. seismic active coeff., K_{AEH} =	**0.288**	
total seismic active force, P_{AE} =	**19,956**	lbs
total seismic active coeff., K_{AE} =	**0.288**	





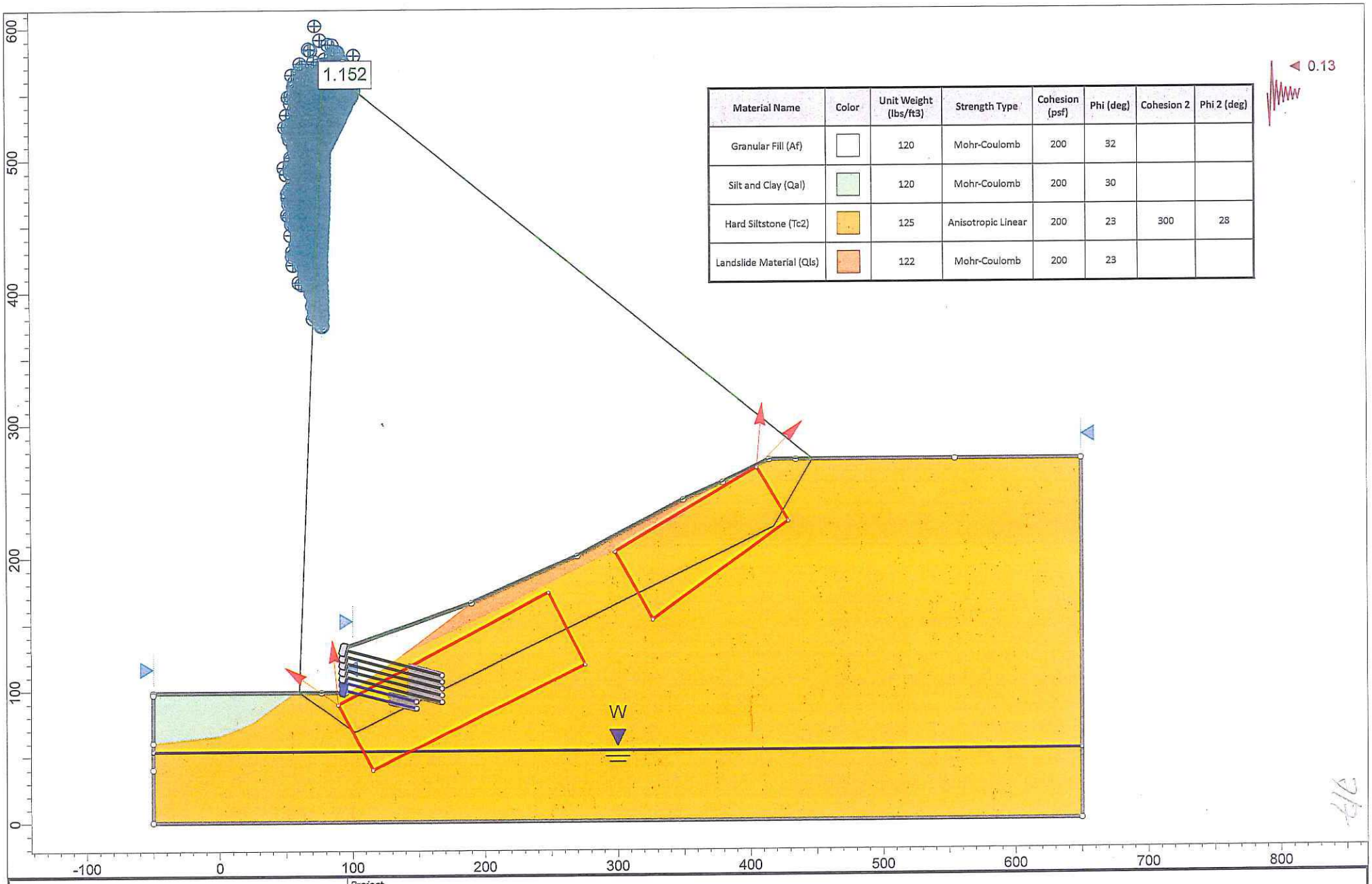
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	32		
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30		
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28
Landslide Material (Qls)		122	Mohr-Coulomb	200	23		

E/9

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico				
Analysis Description	Pico Wall, Sta. 23+50, Static				
Drawn By	MK	Scale	1:1173	Company	Earth Mechanics
Date	4/25/12			File Name	3 Static Lub=25.slim

SLIDEINTERPRET 6.015



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	32		
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30		
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28
Landslide Material (Qls)		122	Mohr-Coulomb	200	23		

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico				
Analysis Description	Pico Wall, Sta. 23+50, SEISMIC				
Drawn By	MK	Scale	1:1173	Company	Earth Mechanics
Date	4/25/12			File Name	3 Seismic Lub=25.slim

SLIDEINTERPRET 6.015

Project I-5 HOV SEG.1
Rev 190

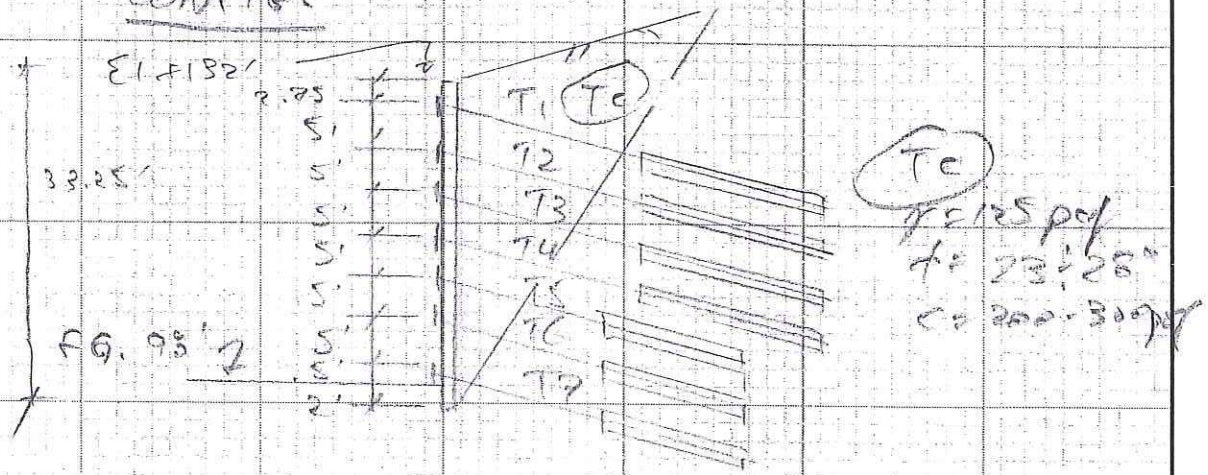
Project No. 11-135

By MK Date 4/25/12 Checked By LC Date 5/24/12 Sheet 1 of 6

GLOBAL SLOPE STABILITY FOR SECTION C-C. (H=34' NORTHMALE = 28')

1) EXISTING SLOPE W/ KEYSTONE WALL
STATIC CONDITION
SLIDE ANALYSIS → FOSE 1.43 ≥ 1.0
(STABLE)

2) NEW CONDITION (H=34' CONTROLS)
CONFIG.



min unbounded length:
SLOPE TRIAL WEDGE:
→ α = 53.3° ~ 53°
min L_{UB} = 33.25 tan 53° ≈ 25'
(all levels)

Initial T - Values

Level	Surface-level load	Initial T
T1	50.25 K	55 K
T2	53.04	"
T3	51.44	"
T4	49.84	"
T5	48.24	"
T6	46.63	"
T7	25.52	25

Take (T1 - T6) = 49.91 → 50 K

3) SLOPE STABILITY (CONTINUED)

Level	Lub	LB	FOS (Static)	FOS (Seismic)
T1-T6	25'	50'	50.4 < 1.5	—
T7	25	25'	25.4	
T1-T6	25'	55'	55.4 < 1.5	—
T7	25'	55'	55.4	
T1-T7	25	35'	78K 1.50 (O.K.)	1.159 1.1 (O.K.)

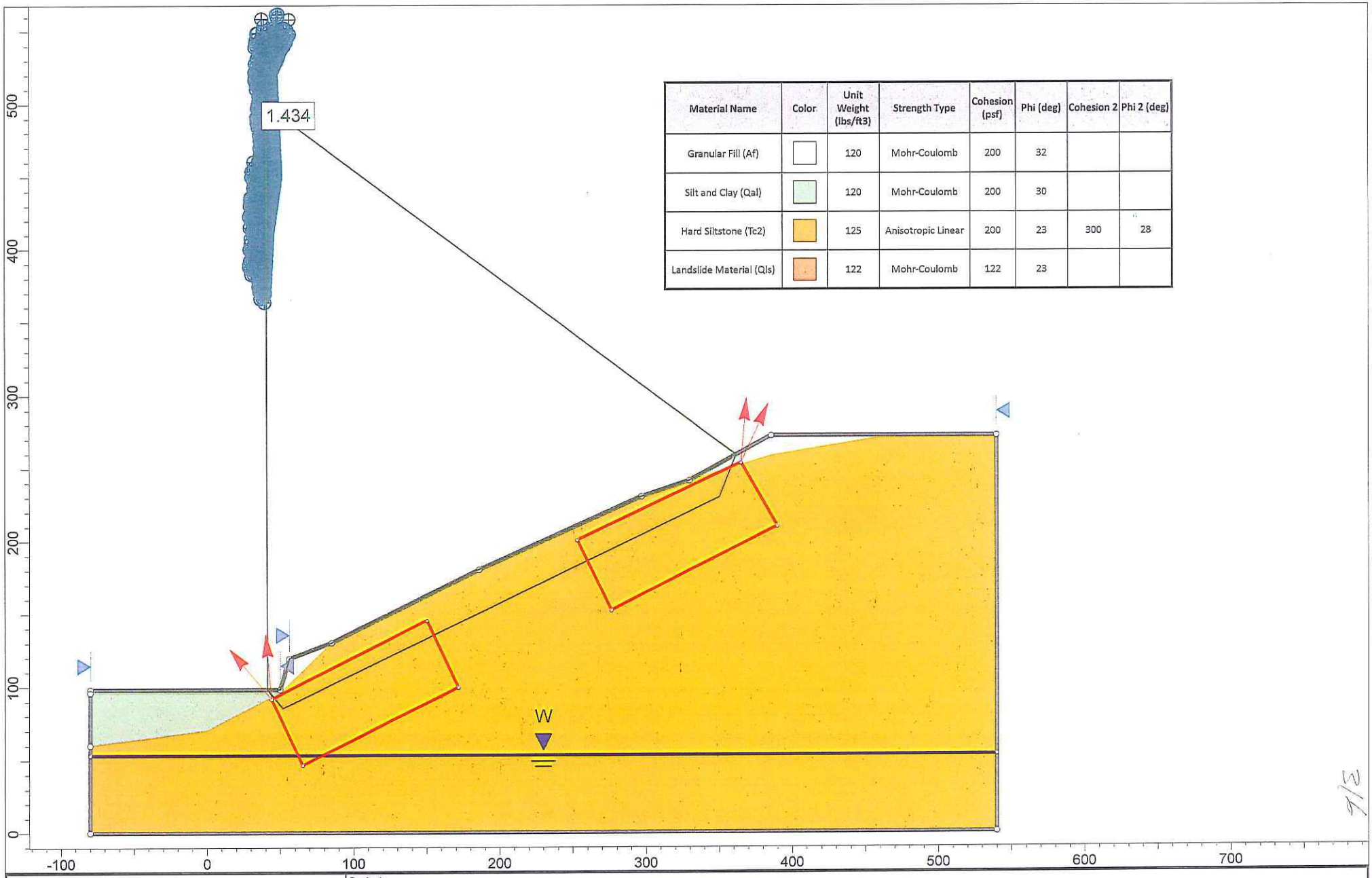
∴ RECOMMENDATIONS FOR FAILURE

1) Anc H = 34'

Lub = 80'+ } all levels

LB = 35'+

T = 80 K/anchor



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	32		
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30		
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28
Landslide Material (Qls)		122	Mohr-Coulomb	122	23		

9/12

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico				
Analysis Description	Pico Wall, Sta. 25+00, Static Exist				
Drawn By	MK	Scale	1:1067	Company	Earth Mechanics
Date	5/15/12			File Name	1 Static Exist.slim

SLIDEINTERPRET 6.015

Seismic Earth Pressure, Trial wedge method, (c, ϕ) material

c/γh= 0.071

T_c (ft) 7.989

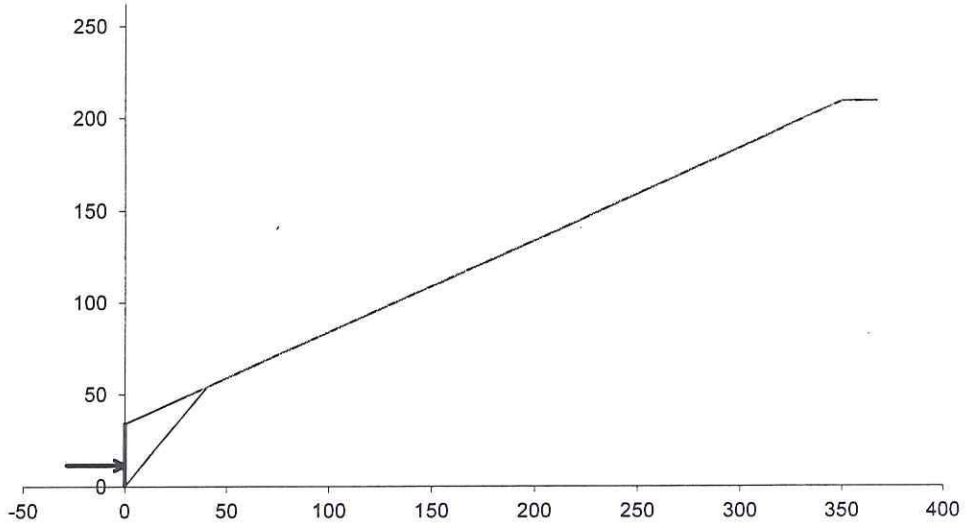
Project: I-5 HOV Seg 1, Pico Wall, 2H:1V backslope

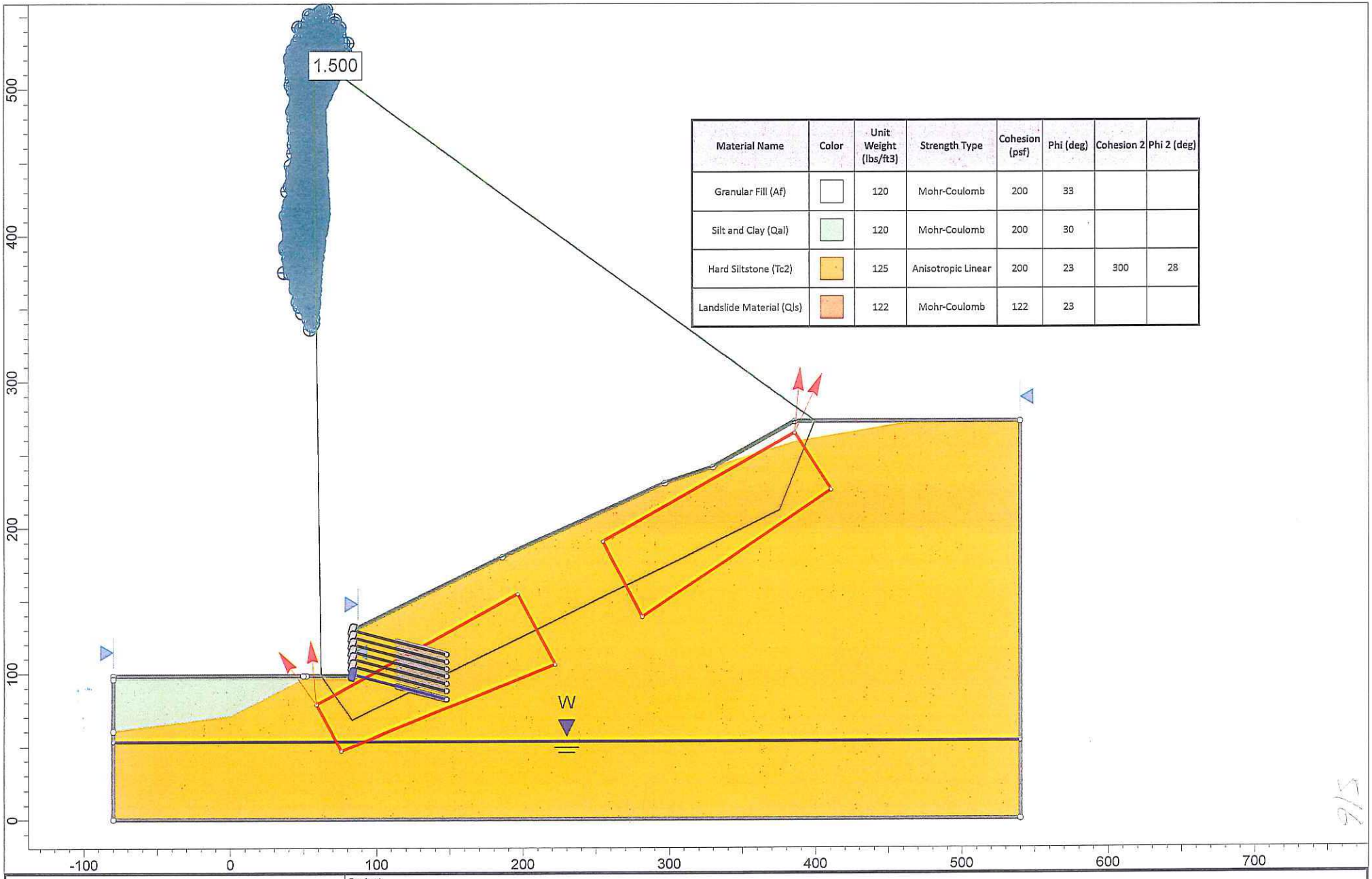
Date: 5/19/2012

soil friction, ϕ =	28	deg =	0.48869	rad	adhesion, c_a=	0	psf
soil cohesion, c =	300	psf			loading start=	0	ft
hor. seismic coeff., k_h =	0				loading end=	30	ft
vert. seismic coeff., k_v =	0				loading magnitude	0	psf
wall batter angle, β =	0	deg =	0	rad	slope length, L_s=	350.0	ft
backslope angle, i =	26.565	deg =	0.46365	rad	tension crack depth=	0.00	ft
wall height, H =	34	ft			water-filled tension crack?	no	yes/no
soil unit weight, γ =	125	pcf			unit weight of water=	62.4	psf
wall-soil friction, δ =	0	deg =	0	rad	note: distances for loading and slope measured horizontally from top of wall.		
α_{AE} =	53.2958	deg	0.93019	rad			
ΔW_{load} =	0	lbs/ft					
ΔW_{Tc} =	0	lbs/ft					
W =	85,869	lbs/ft					
θ =	0.000	deg =	0	rad			
L =	67.609	ft					
criteria:	0.60						

Solution: Update!

hor. seismic active force, P_{AEH} =	**20,774**	lbs
hor. seismic active coeff., K_{AEH} =	**0.288**	
total seismic active force, P_{AE} =	**20,774**	lbs
total seismic active coeff., K_{AE} =	**0.288**	





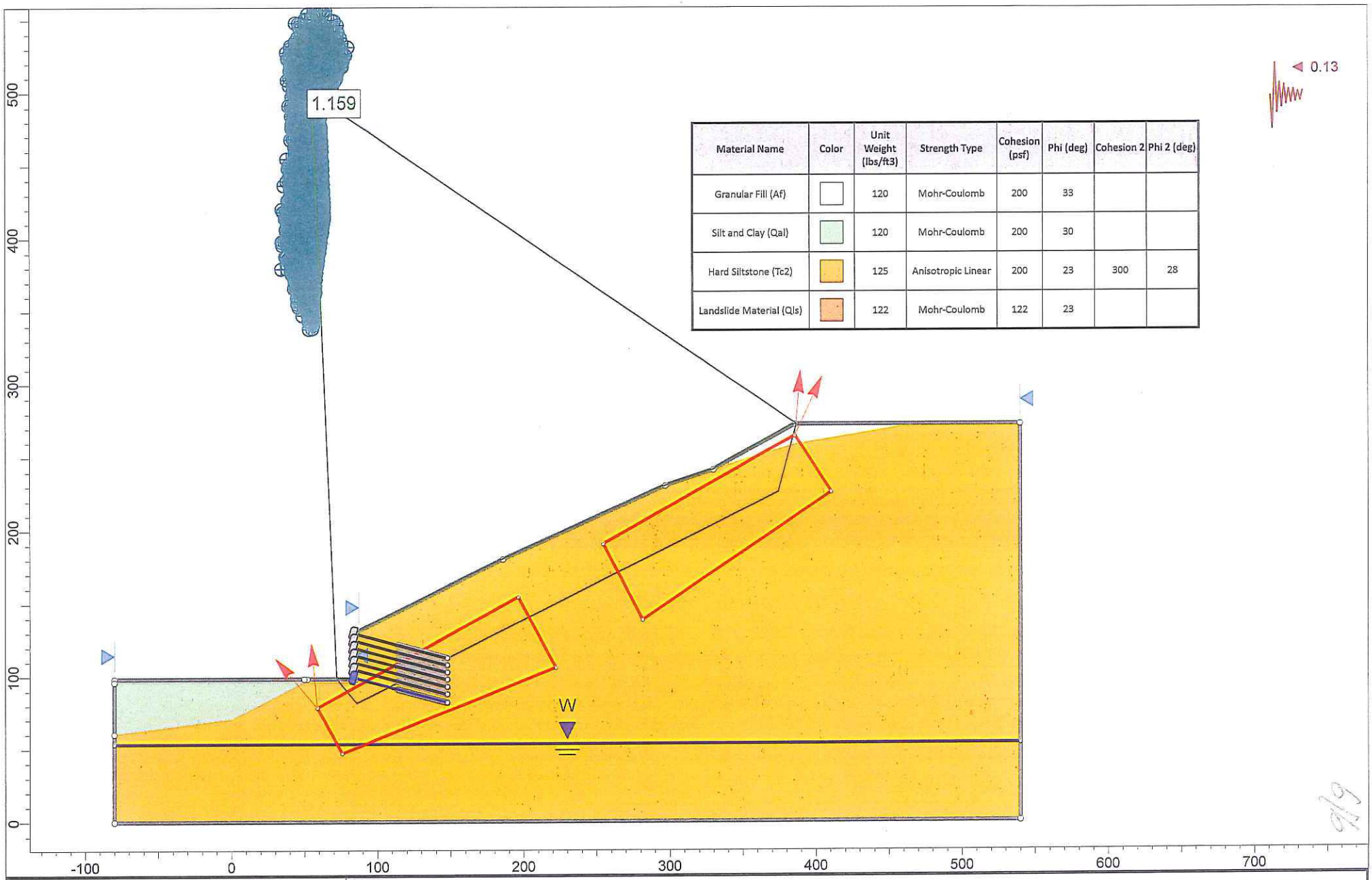
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	33		
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30		
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28
Landslide Material (Qls)		122	Mohr-Coulomb	122	23		

2/5

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico				
Analysis Description	Pico Wall, Sta. 25+00, Static				
Drawn By	MK	Scale	1:1067	Company	Earth Mechanics
Date	5/15/12			File Name	3 Static New Lub=30 Lb=35.slim

SLIDEINTERPRET 6.015



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	33		
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30		
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28
Landslide Material (Qls)		122	Mohr-Coulomb	122	23		

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico				
Analysis Description	Pico Wall, Sta. 25+00, Seismic				
Drawn By	MK	Scale	1:1067	Company	Earth Mechanics
Date	5/15/12			File Name	3 Seismic New Lub=30 Lb=35.slim

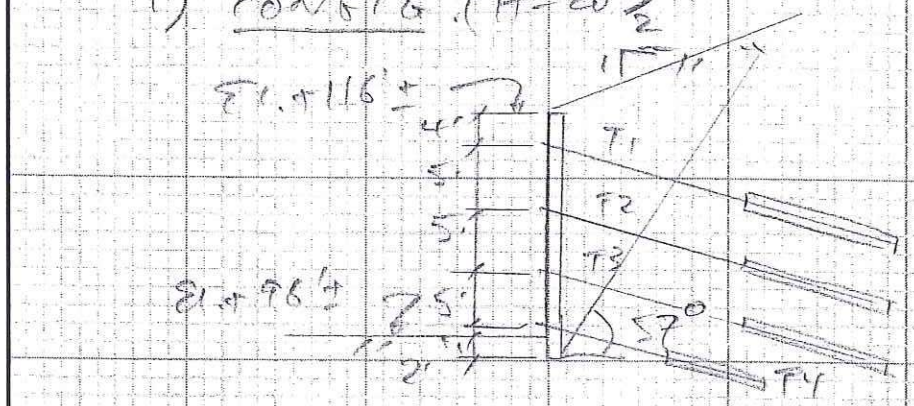
SLIDEINTERPRET 6.015

Project I-5 HOV SEG 1
RTE 190 Project No. 11-135

By MK Date 5/22/12 Checked By KC Date 5/24/12 Sheet 1 of 4

ANALYSIS FOR SECTION D-D' H=(8'÷24')

1) CONFIG. (H=20')



2) Min L_{UB} = 22' tan 35° = 15.4' > 15'

3) Applied anchor loads:

TIEBACK LEVEL	DESIGNER SPECIFIED LOCK-OFF LOAD	INITIAL LOCK-OFF LOAD
T1	51.5 K	45 K
T2	44.8 K	45 K
T3	41.5 K	45 K
T4	22.5 K	20 K

$T_{ave} = \frac{T1+T2+T3}{3} = 44.8^k$

44.8 K / cos 15° = 46.4 K → 45 K → L_{UB} = 45'

22.5 K / cos 15° = 23.4 K → 20 K → L_{UB} = 20'

3)

Trial Run	Level	L_{UB}	L_B	T	Yield FOS	Ultimate FOS
1	T1-T3	15'	45'	45 K	≥ 1.5	-
	T4	15'	20'	25 K		
2	T1-T3	25'	20'	45 K	1.52 (O.K.)	1.2 > 1.1 (O.K.)
	T4	25'	20'	45 K		

4) Recommend: L_{UB} = 25', L_B = 20', T = 45 K/anchor

Seismic Earth Pressure, Trial wedge method, (c, ϕ) material

c/γh= 0.120

Project: I-5 HOV Seg 1, Pico Wall, 2H:1V backslope

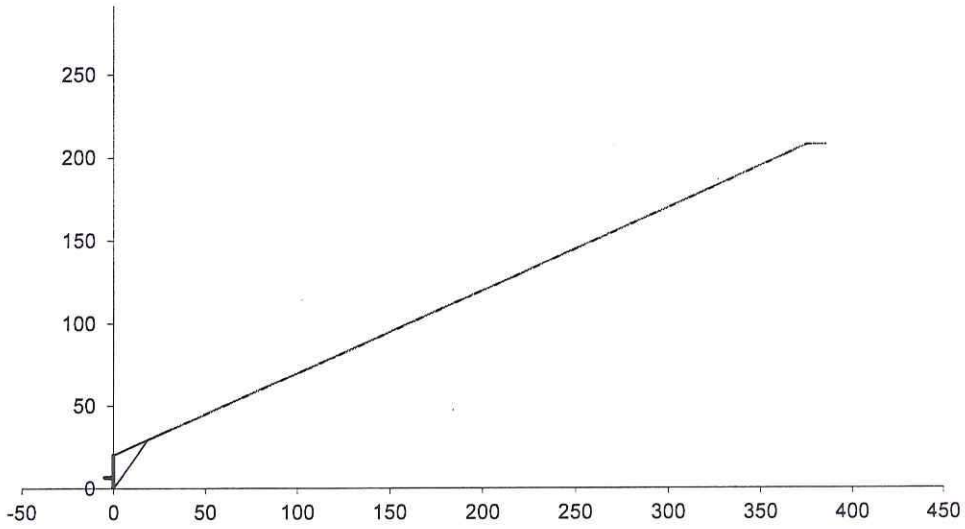
Date: 5/21/2012

T_c (ft) 7.989

soil friction, ϕ =	28	deg =	0.48869	rad	adhesion, c_a=	0	psf
soil cohesion, c =	300	psf			loading start=	0	ft
hor. seismic coeff., k_h =	0				loading end=	30	ft
vert. seismic coeff., k_v =	0				loading magnitude	0	psf
wall batter angle, β =	0	deg =	0	rad	slope length, L_s=	375.0	ft
backslope angle, i =	26.565	deg =	0.46365	rad	tension crack depth=	0.00	ft
wall height, H =	20	ft			water-filled tension crack?	no	yes/no
soil unit weight, γ =	125	pcf			unit weight of water=	62.4	psf
wall-soil friction, δ =	0	deg =	0	rad	note: distances for loading and slope measured horizontally from top of wall.		
α_{AE} =	57.3159	deg	1.00035	rad			
ΔW_{load} =	0	lbs/ft					
ΔW_{Tc} =	0	lbs/ft					
W =	23,616	lbs/ft					
θ =	0.000	deg =	0	rad			
L =	34.986	ft					
criteria:	0.65						

Solution: Update!

hor. seismic active force, P_{AEH} =	**2,633**	lbs
hor. seismic active coeff., K_{AEH} =	**0.105**	
total seismic active force, P_{AE} =	**2,633**	lbs
total seismic active coeff., K_{AE} =	**0.105**	



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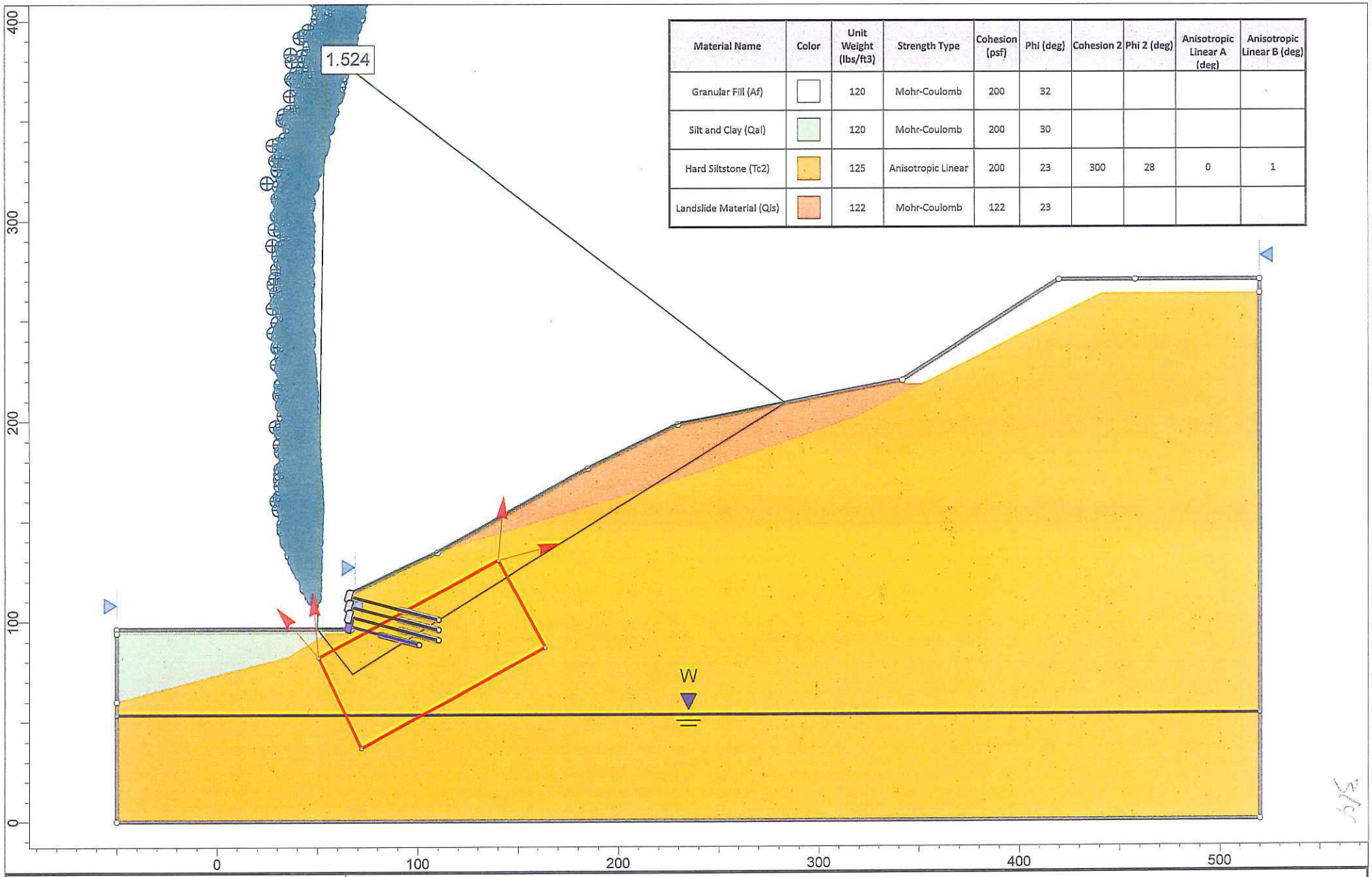
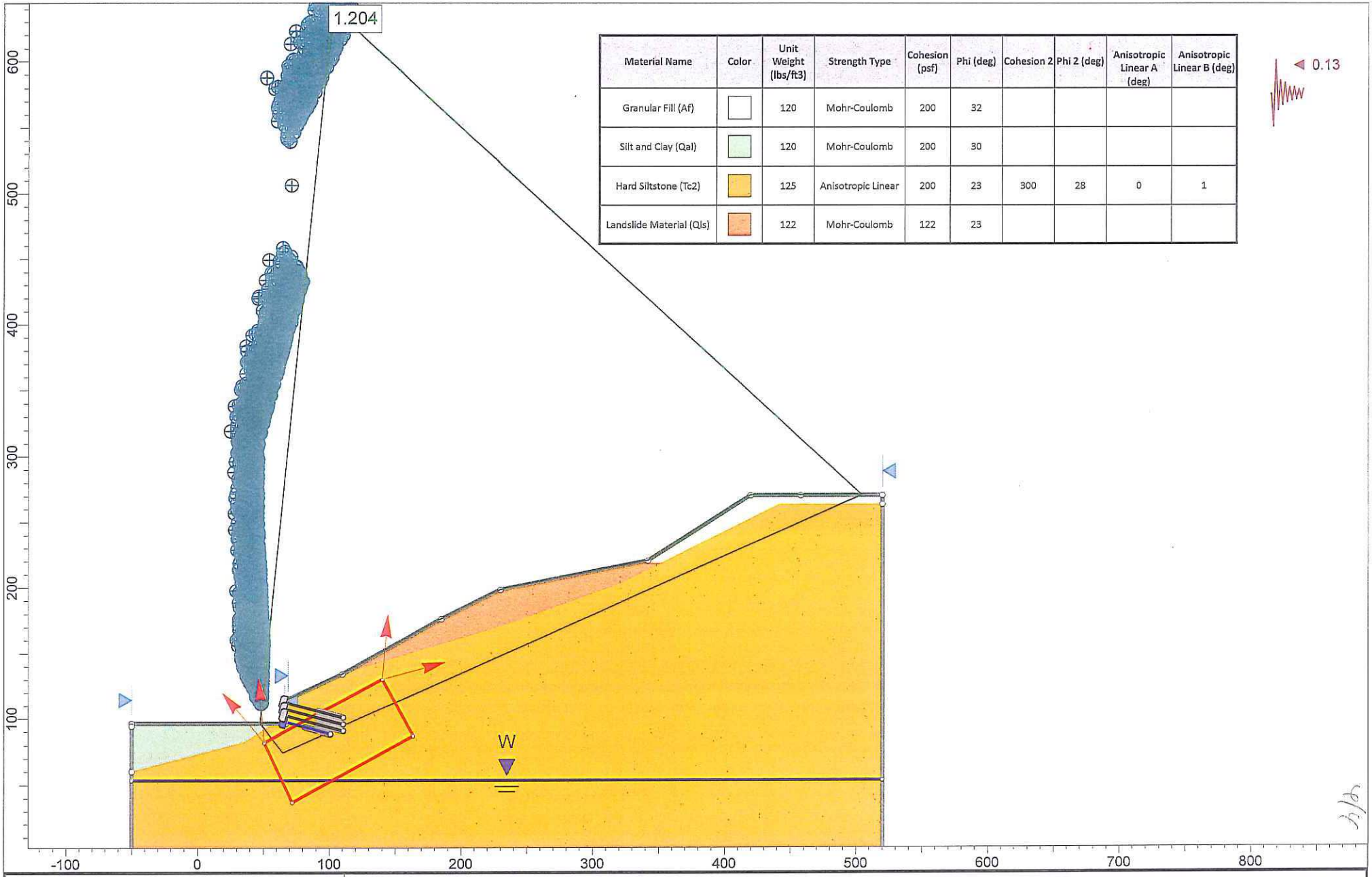


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	32				
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30				
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28	0	1
Landslide Material (Qls)		122	Mohr-Coulomb	122	23				

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico				
Analysis Description	Pico Wall, Sta. 27+00, Static				
Drawn By	MK	Scale	1:778	Company	Earth Mechanics
Date	5/15/12			File Name	3 Static New Lub=20.slim

SLIDEINTERPRET 6.015



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)	Anisotropic Linear A (deg)	Anisotropic Linear B (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	32				
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30				
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28	0	1
Landslide Material (Qls)		122	Mohr-Coulomb	122	23				

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico				
Analysis Description	Pico Wall, Sta. 27+00, Seismic				
Drawn By	MK	*Scale*	1:1185	*Company*	Earth Mechanics
Date	5/15/12			*File Name*	3 Seismic New Lub=20.slim

SLIDEINTERPRET 6.015

APPENDIX D

CALTRANS REVIEW COMMENTS AND EMI RESPONSES

EXTERNAL SUBMITTAL REVIEW

PROJECT: INTERSTATE 5 HOV IMPROVEMENT
PROJECT No. 1200020277

EA No.: 12-0F96A	
Agency: CalTrans	
Submittal No.	Title: FR for RW190 (I-5 HOV, Segment 1) by EMI, 5/25/2012

Lead:	Date: 8/24/2012
Technical Discipline: Geotechnical	

ACTION (30, 60, 85%): RL = Revise in Later Submittal RI = Revise Immediately & OTS Review

30, 60, 85% SUBMITTAL DISPOSITION (check one): ( )Approved, ( ) Approved as Noted for Correction, ( ) Rejected, Revise & Resubmit, ( ) Record Only

CODE: A - Accept/will comply, B - Agency Action, C - Clarify/Discuss, D - Delete Comment, E - Different Submittal

FINAL SUBMITTAL (100%) DISPOSITION (check one): ( ) Approved, (X) Approved as Noted for Correction, ( ) Rejected, Revise & Resubmit, ( ) Record Only

FILLED OUT BY REVIEWER						FILLED OUT BY RESPONDER		FILLED OUT AT RESOLUTION MEETING			For RFC Use Only	
No.	Plan/SSP/ Page No.	Reviewer	Reviewer Comment No.	Comments	Action	Initial Code	Response	Final Code	Verify (1)	Verify (2)	Verify (3)	Verify (4)
1	Page 4, Table 1	H.Liu	1	Please use "AP-Line" station to replace wall station, as it was presented in geological map, layout/topo map, and LOTBS as the single reference station.	RI		Comply					
2	Section 2.3, Figure 3, Geological Map	H.Liu	2	Please show cross section lines (e.g. A-A', B-B') on plan view (geological map).	RI		Comply					
3	Section 5.3.1, Figure 6	H.Liu	3	The minimum overburden cover above the bond zone should be 15 feet, instead of 12 feet, according to FHWA recommendation.	RI		Comply					
4	Section 5.3.1, Figure 6	H.Liu	4	Seismic pressure should be in inverted triangle, and swell pressure should be uniformly distributed. Please revise.	RI		Seismic - The uniform distribution is OK as is. It is conservative for a restrained wall and better reflects AASHTO/CA State Amendments. This distribution is similar to Segment 2. The effect on wall design would be small. Swell - we don't think the swell potential extends that far down the wall which is 30+ ft high. Uniform distribution would raise the anchor loads in middle and lower rows. Anchors particularly at short walls would become too long. The current distribution is within reason and the design is workable.					

(1) Responder's Initials - concur with response.
(2) Reviewer's Initials - concur with response.
(3) Kiewit/HNTB initials that comment was satisfied.
(4) Agency initials that comment was satisfied.

EA No.: 12-0F96A	
Agency: CalTrans	
Submittal No.	Title: FR for RW190 (I-5 HOV, Segment 1) by EMI, 5/25/2012

Lead:	Date: 8/24/2012
Technical Discipline: Geotechnical	

ACTION (30, 60, 85%): RL = Revise in Later Submittal RI = Revise Immediately & OTS Review

30, 60, 85% SUBMITTAL DISPOSITION (check one): ( )Approved, ( ) Approved as Noted for Correction, ( ) Rejected, Revise & Resubmit, ( ) Record Only

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FINAL SUBMITTAL (100%) DISPOSITION (check one): ( ) Approved, (X) Approved as Noted for Correction, ( ) Rejected, Revise & Resubmit, ( ) Record Only

												For RFC Use Only	
FILLED OUT BY REVIEWER						FILLED OUT BY RESPONDER		FILLED OUT AT RESOLUTION MEETING					
No.	Plan/SSP/ Page No.	Reviewer	Reviewer Comment No.	Comments	Action	Initial Code	Response	Final Code	Verify (1)	Verify (2)		Verify (3)	Verify (4)
5	PP. 22, 26, Sections 5.3.2 and 6.3	H.Liu	5	The minimum spacing between ground anchor should be 5 feet based on Section 5.8.6.3 of Caltrans' BDS and MTD 5-12 (2012).	RI		Comply						
6	Page 27, Section 6.7	H.Liu	6	The wall zone should be defined for the ground anchor construction based on geologic stratum of the cut slope. It is fundemental for planning the stability tests (Std Specs 19-3.01A(3)), which could be needed for temporary excavation during wall installation.	RI		Comply. We will define wall zones by Wall Sta. and state that stability tests should be performed in accordance with CT Std. Spec 19-3.01A(3).						
7	Appendix A LOTBS	H. Liu	7	Boring# A-11-124, 1) Elev. +96', please define the percentage of fine SAND in CL/CH materials; 2) Elev.+73', high plasticity should not be used to describe MH materials, based on Section 14.7.4 of ASTM D-2488.	RI		1) Comply 2) We will change to medium plasticity.						
8	Appendix A LOTBS	H. Liu	8	Boring #A-11-123: Elev.+142', Medium plasticity should be used to describe CL materials, based on Section 14.7 of ASTM D-2488.	RI		Comply. We will change to medium plasticity.						
9	Appendix A LOTBS	H. Liu	9	The elevation should be decreased with the increase of the borehole depth in boring records from L&A downhole loggings.	RI		No change. We are aware of the elevation error in L&A logs. We could not change the content of these logs because they are not by EMI. We show a Note 2 on each LOTB stating to ignore the wrong elevations.						

(1) Responder's Initials - concur with response.
(2) Reviewer's Initials - concur with response.
(3) Kiewit/HNTB initials that comment was satisfied.
(4) Agency initials that comment was satisfied.

EA No.: 12-0F96A	
Agency: CalTrans	
Submittal No.	Title: FR for RW190 (I-5 HOV, Segment 1) by EMI, 5/25/2012

Lead:	Date: 8/24/2012
Technical Discipline: Geotechnical	

ACTION (30, 60, 85%): RL = Revise in Later Submittal RI = Revise Immediately & OTS Review

30, 60, 85% SUBMITTAL DISPOSITION (check one): ( )Approved, ( ) Approved as Noted for Correction, ( ) Rejected, Revise & Resubmit, ( ) Record Only

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FINAL SUBMITTAL (100%) DISPOSITION (check one): ( ) Approved, (X) Approved as Noted for Correction, ( ) Rejected, Revise & Resubmit, ( ) Record Only

FILLED OUT BY REVIEWER						FILLED OUT BY RESPONDER		FILLED OUT AT RESOLUTION MEETING			For RFC Use Only	
No.	Plan/SSP/ Page No.	Reviewer	Reviewer Comment No.	Comments	Action	Initial Code	Response	Final Code	Verify (1)	Verify (2)	Verify (3)	Verify (4)
10	Appendix C, Calculations	H.Liu	10	In ASD design (static case), should FOS of 2.0 for internal stabilty (IS) be used for anchor against pull-out, similar factor should also be used for the strength of bar/strand against tension failure. Please find FOS for steel, and use the reduced tendon strength in global stability (GS) analysis.	RI		No change. The allowable steel tendon and the allowable head assembly are designed by structural designer. Their tendon and assembly capacities are designed to exceed our anchor pull-out capacity. Our SLIDE analyses we chose a high tendon bar and head assembly capacity so that they do not control.					
11	Appendix C, Calculations	H.Liu	11	Repeat the above process for pseudo static case. Please note, FOS for pull-out strength and tendon strength should be changed under seismic condition.	RI		Same response as item 10					
12	Appendix C Calculations	H.Liu	12	Should FOS of 1.5 be selected as acceptable minimum in global stability analysis for static case, bond stress factor, if used, should be taken as 1.5/2.0 to avoid double-factoring strength parameter in the analysis. Same concept should also be applied to the pseudo static case, where FOS for IS and GS could be different.	RI		We are aware of static and seismic bond strength bond stress factor applied in WINSNAIL type analyses on the ultimate bond strength for static and for seismic analyses. There is no bond stress factor input. We will back-check the global stability at controlling slope section using the final anchor loads from the designer as resisting external forces and include the calculations in the final report.					

(1) Responder's Initials - concur with response.
(2) Reviewer's Initials - concur with response.
(3) Kiewit/HNTB initials that comment was satisfied.
(4) Agency initials that comment was satisfied.

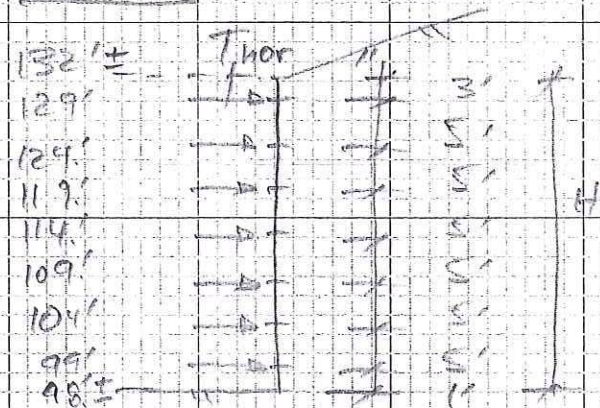
Project I-5 HOV SEG. 1

DESIGNER ANCHOR FORCE BACK CHECK. Project No. 11-185

By MK Date 9/26/12 Checked By LCC Date 9/27/12 Sheet 1 of 5

SECTION C-C' - H = 54' (CONTROLS)

1) CONFIG.



ANCHOR LAYOUT PER 95% PLANS.
3 LEVELS
SH = SV = 5'
15° INCLINATION

2) LOCK-OFF FORCES PER PLANS

T(LO) = 80^K (all bonds) FROM 95% PLANS

T_{hor} = 80^K x cos 15° = 77.27^K (HORIZ. COMPONENT)

@ SH = 5', T_{hor} = 77.27 / 5 = 15.45 K/FT.

3) GLOBAL SLOPE STABILITY CHECK

APPLY T_{hor} FORCES EXTERNALLY OUTBOARD AS RESISTANCES

STATIC → FOS = 1.506 ≥ 1.5 O.K.

SEISMIC → FOS = 1.145 ≥ 1.1 O.K.

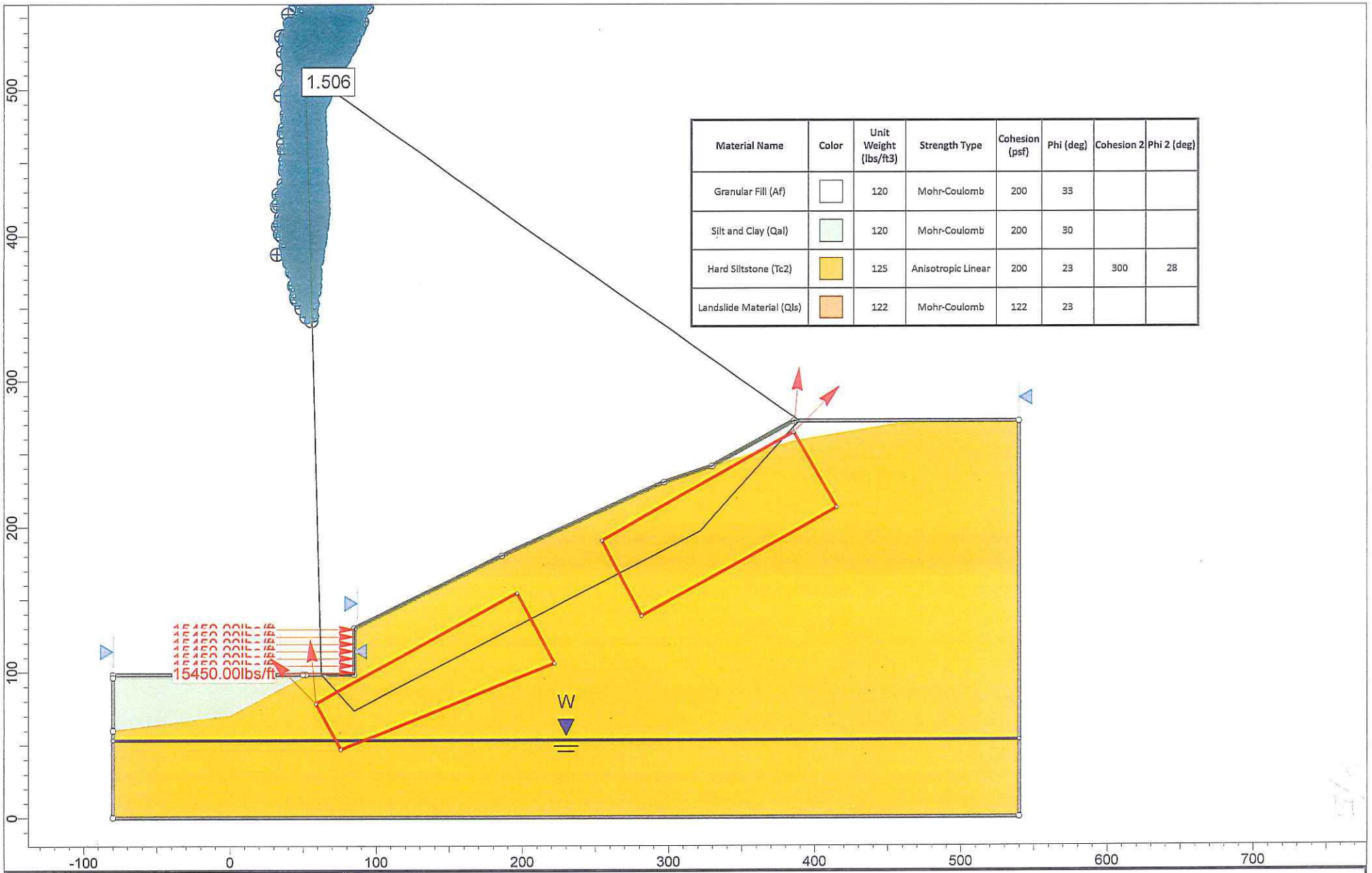
4) SECTION B-B H = 30'

CONFIGURATION OF WALL & ANCHORS IS SIMILAR.

GLOBAL SLOPE STABILITY CHECK:

STATIC → FOS = 1.58 ≥ 1.5 O.K.

SEISMIC → FOS = 1.16 ≥ 1.1 O.K.

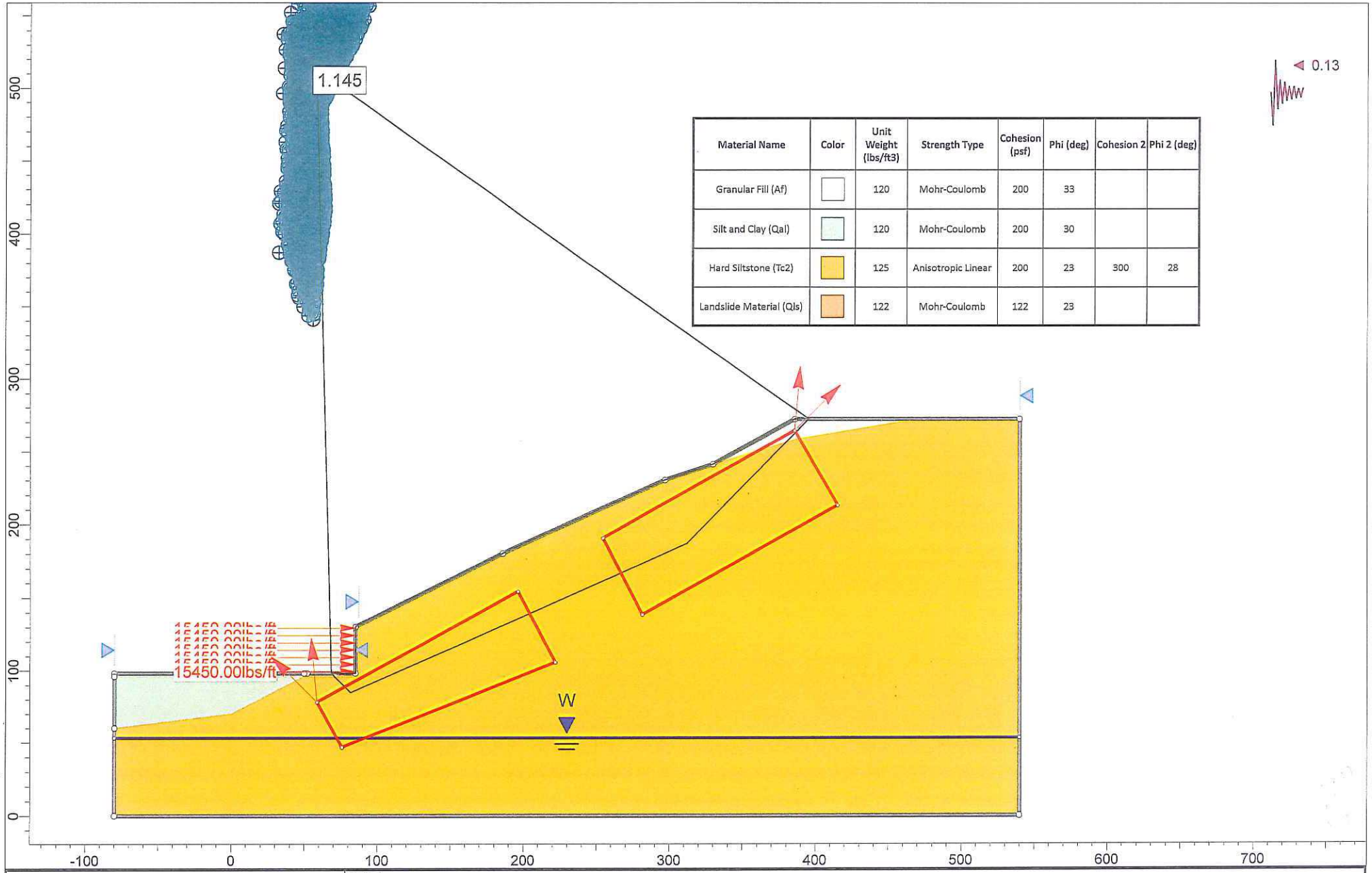


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	33		
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30		
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28
Landslide Material (Qls)		122	Mohr-Coulomb	122	23		

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico				
Analysis Description	Pico Wall, Sta. 25+00, Static Anchor Force Back Check				
Drawn By	MK	*Scale*	1:1067	*Company*	Earth Mechanics
Date	9/25/12			*File Name*	3 Static 1.slim

SLIDEINTERPRET 6.015



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	33		
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30		
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28
Landslide Material (Qls)		122	Mohr-Coulomb	122	23		

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico			
Analysis Description	Pico Wall, Sta. 25+00, Seismic Anchor Force Back Check			
Drawn By	MK	Scale	1:1067	Company: Earth Mechanics
Date	9/25/12			File Name: 3 Seismic 2.slim

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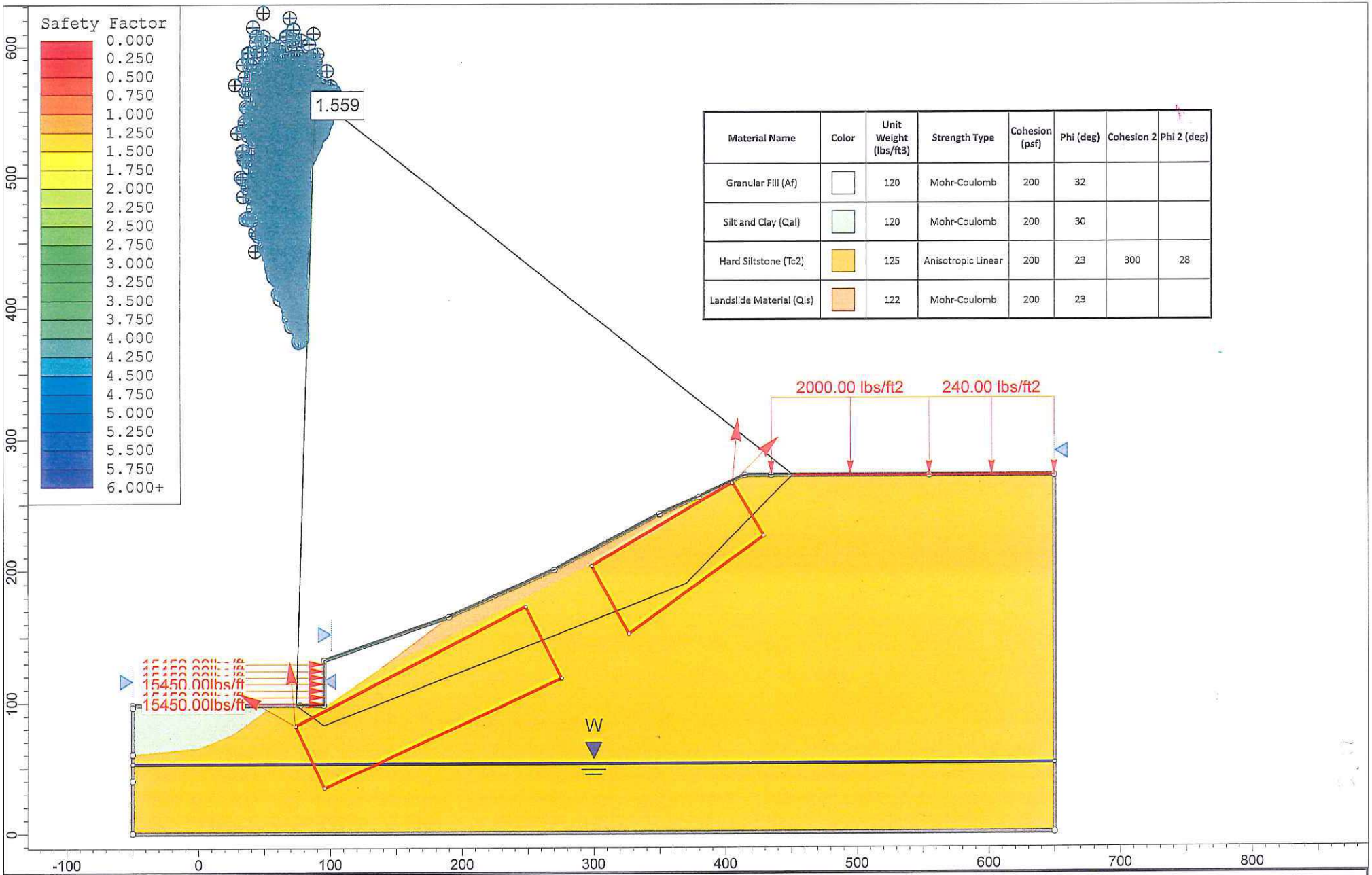
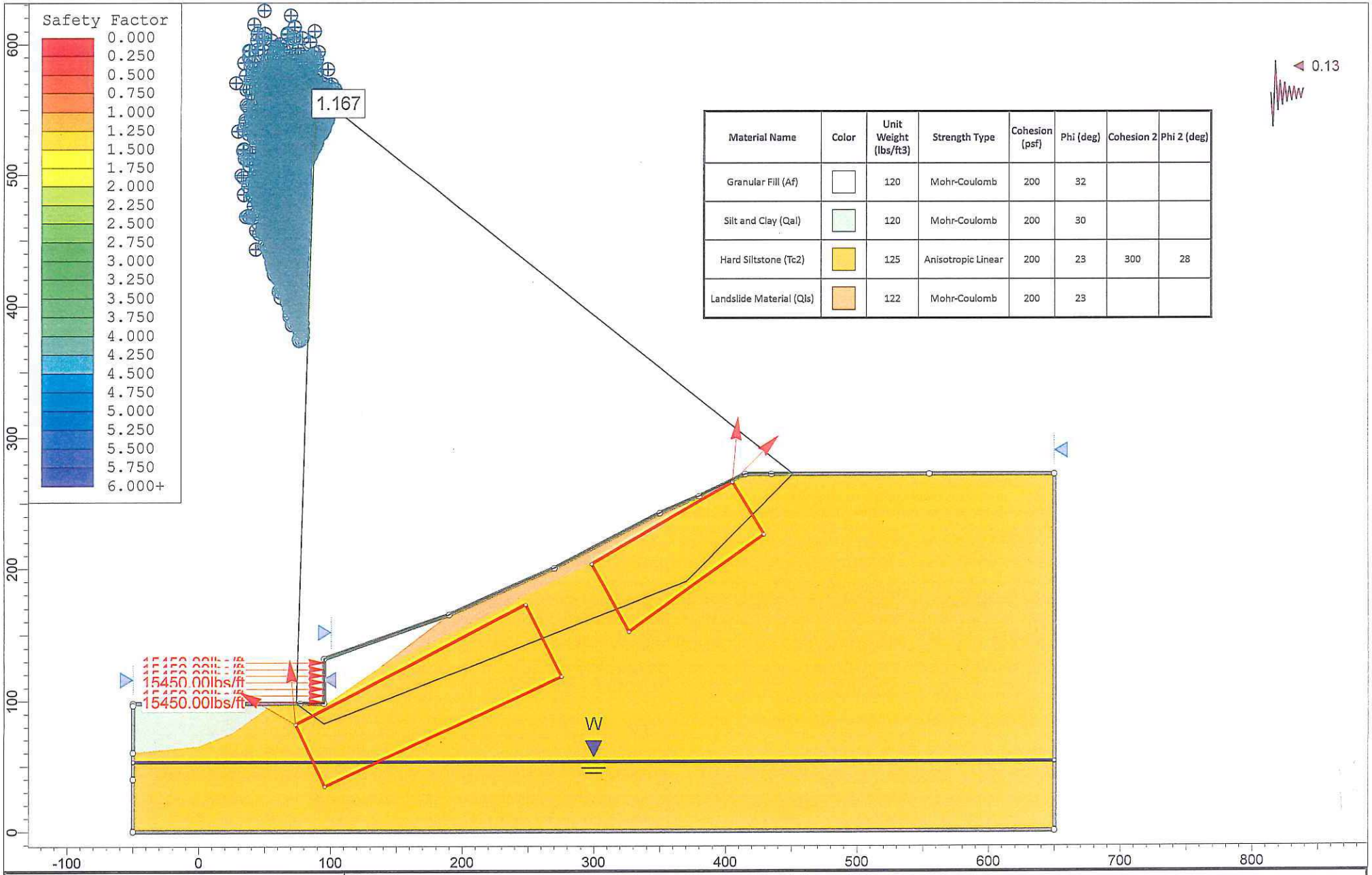


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	32		
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30		
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28
Landslide Material (Qls)		122	Mohr-Coulomb	200	23		

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico			
Analysis Description	Pico Wall, Sta. 23+50, Static Anchor Force Back Check			
Drawn By	MK	Scale	1:1185	Company: Earth Mechanics
Date	9/26/12			File Name: 3 Static Anchor Force Back Check.slim

SLIDEINTERPRET 6.015



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion 2	Phi 2 (deg)
Granular Fill (Af)		120	Mohr-Coulomb	200	32		
Silt and Clay (Qal)		120	Mohr-Coulomb	200	30		
Hard Siltstone (Tc2)		125	Anisotropic Linear	200	23	300	28
Landslide Material (Qls)		122	Mohr-Coulomb	200	23		

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1, Avenida Pico			
Analysis Description	Pico Wall, Sta. 23+50, Seismic Anchor Force Back Check			
Drawn By	MK	Scale	1:1185	Company: Earth Mechanics
Date	9/26/12			File Name: 3 Seismic Anchor Force Back Check.slim

SLIDEINTERPRET 6.015

FINAL FOUNDATION REPORT

Wall 181 (Bridge No. 55E-0139), PM 3.2
Wall 183 (Bridge No. 55E-0140), PM 3.3
Wall 193 (Bridge No. 55E-0142), PM 3.4
And Wall 203 (Bridge No. 55-0143), PM 3.6

Interstate 5 HOV Improvement Project (Segment 1)
San Clemente, CA, 12-ORA-5, PM 3.0/3.7
Caltrans Project No. 1200020277 (EA 12-0F96B)
EMI Project No. 11-135 (Date: January 2, 2013)

EARTH MECHANICS, INC.

Geotechnical and Earthquake Engineering

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

January 2, 2013

EMI Project No. 11-135

Parsons
2201 Dupont Drive, Suite 200
Irvine, California 92612

Attention: Mr. M. Mohseni

Subject: Final Foundation Report for Retaining Walls 181, 183, 193, and 203, I-5 HOV Improvement Project (Segment 1), San Clemente, California, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B)

Dear Mr. Mohseni:

Attached please find the Final Foundation Report for the nonstandard retaining walls including mechanically stabilized earth (MSE) walls proposed for the subject I-5 HOV Improvement Project (Segment 1). This report contains the findings of our geotechnical investigation and laboratory testing, conclusions, and recommendations for the design and construction of the proposed walls. Caltrans review comments on the draft and final reports and our responses are attached in Appendix D. All comments are incorporated into this Final Report.

We appreciate the opportunity to provide geotechnical design services for this project. If you have any questions, please call us.

Sincerely,
EARTH MECHANICS, INC.

1-2-13
Mike Kapuskar, GE
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
MIKE KAPUSKAR
No. GE2564
Expires 12-31-14
GEOTECHNICAL
STATE OF CALIFORNIA

1-2-13
Lino Cheang, GE
Project Manager

REGISTERED PROFESSIONAL ENGINEER
LINO C. CHEANG
NO. GE 2345
EXP. 9/30/13
GEOTECHNICAL
STATE OF CALIFORNIA

MK/lcc/wd

17800 Newhope Street, Suite B, Fountain Valley, California 92708 Tel: (714) 751-3826 Fax: (714) 751-3928

FINAL FOUNDATION REPORT

WALL 181 (BRIDGE NO. 55E-0139), PM 3.2
WALL 183 (BRIDGE NO. 55E-0140), PM 3.3
WALL 193 (BRIDGE NO. 55E-0142), PM 3.4
AND
WALL 203 (BRIDGE NO. 55-0143), PM 3.6

INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)
SAN CLEMENTE, ORANGE COUNTY, CA
12-ORA-5, PM 3.0/3.7
CALTRANS PROJECT NO. 1200020277 (EA 12-0F96B)

Prepared for:

Parsons
2201 Dupont Drive, Suite 200
Irvine, California 92612

Prepared By:

Earth Mechanics, Inc.
17800 Newhope Street, Suite B
Fountain Valley, California 92708

EMI Project No. 11-135

January 2, 2013

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF STUDY

This Final Foundation Report presents findings and conclusions of a geotechnical investigation conducted by Earth Mechanics, Inc. (EMI) for proposed earth retaining Walls 181, 183, 193, and 203 for the Interstate 5 (I-5) High-Occupancy Vehicle (HOV) Lanes Improvement Project (Segment 1) located in San Clemente, California. The project location is shown on the Site Location Map in Figure 1. The purpose of the geotechnical investigation was to obtain subsurface information to develop design and construction recommendations to assist Parsons in the preparation of the Project Plans, Specifications, and Estimates (PS&E) for the proposed walls.

The following geotechnical services were completed for this project:

- Geotechnical field exploration consisting of drilling and logging exploratory borings and cone penetrometer tests,
- Laboratory testing of selected soil/bedrock samples,
- Engineering calculations and analysis to develop foundation design and construction recommendations for proposed retaining walls; and
- Preparation of this report presenting our findings, conclusions, and recommendations.

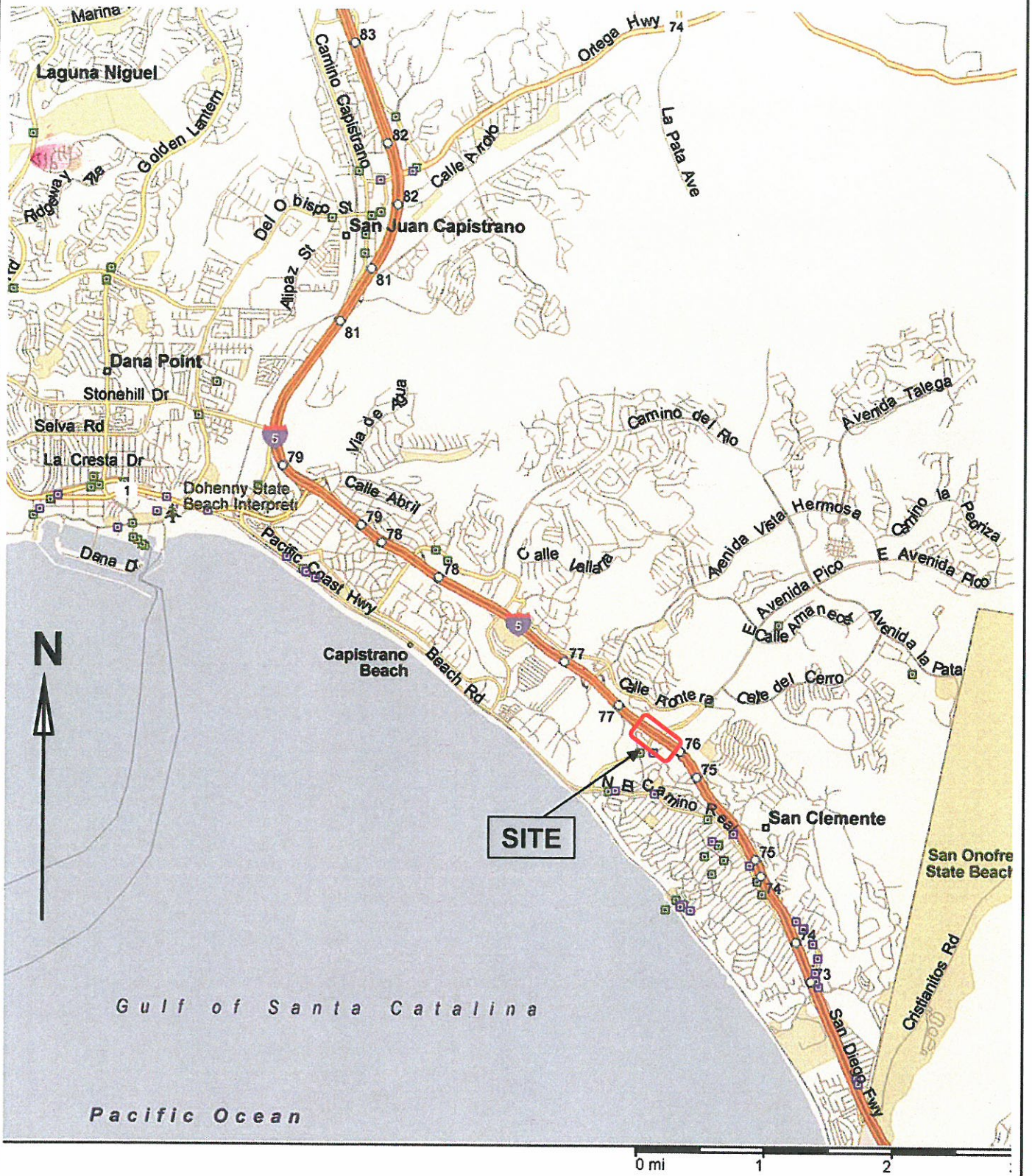
The purpose of this report is to document subsurface geotechnical conditions, provide analyses, and recommendations for design and construction of proposed mechanically stabilized earth (MSE) walls, and nonstandard Caltrans Type-1 retaining walls. The proposed tieback wall for Avenida Pico realignment and widening is addressed in a separate Foundation Report (EMI, 2012a).

1.2 PROJECT DESCRIPTION

The I-5 freeway is a major north-south freeway in the State of California that serves local, regional, interstate, and international traffic to and from Canada and Mexico. The I-5 freeway is a major commuter route between Los Angeles and Orange Counties.

The project is located along the I-5 corridor in San Clemente and includes the Avenida Pico UC (Bridge No. 55-0207), and two on-ramps and two off-ramp connections to Avenida Pico. The project limits along the I-5 corridor are approximately 2,400 ft south to 1,900 ft north of Avenida Pico (I-5 Mainline Sta. 167+00 to 210+00) with a total project length of 4,300 ft. The segment of I-5 within the project limits currently provides 5 general-purpose lanes (four through-lanes and one auxiliary lane) in each direction and inside and outside shoulders. The existing interchange has four ramps (direct NB and SB on-ramps and direct NB and SB off-ramps) with one to three lanes.

According to the Project Report, the Preferred Alternative provides continuous access HOV lanes along I-5 and improves the Avenida Pico interchange which is a signature access roadway in San Clemente. The Preferred Alternative specifically includes:



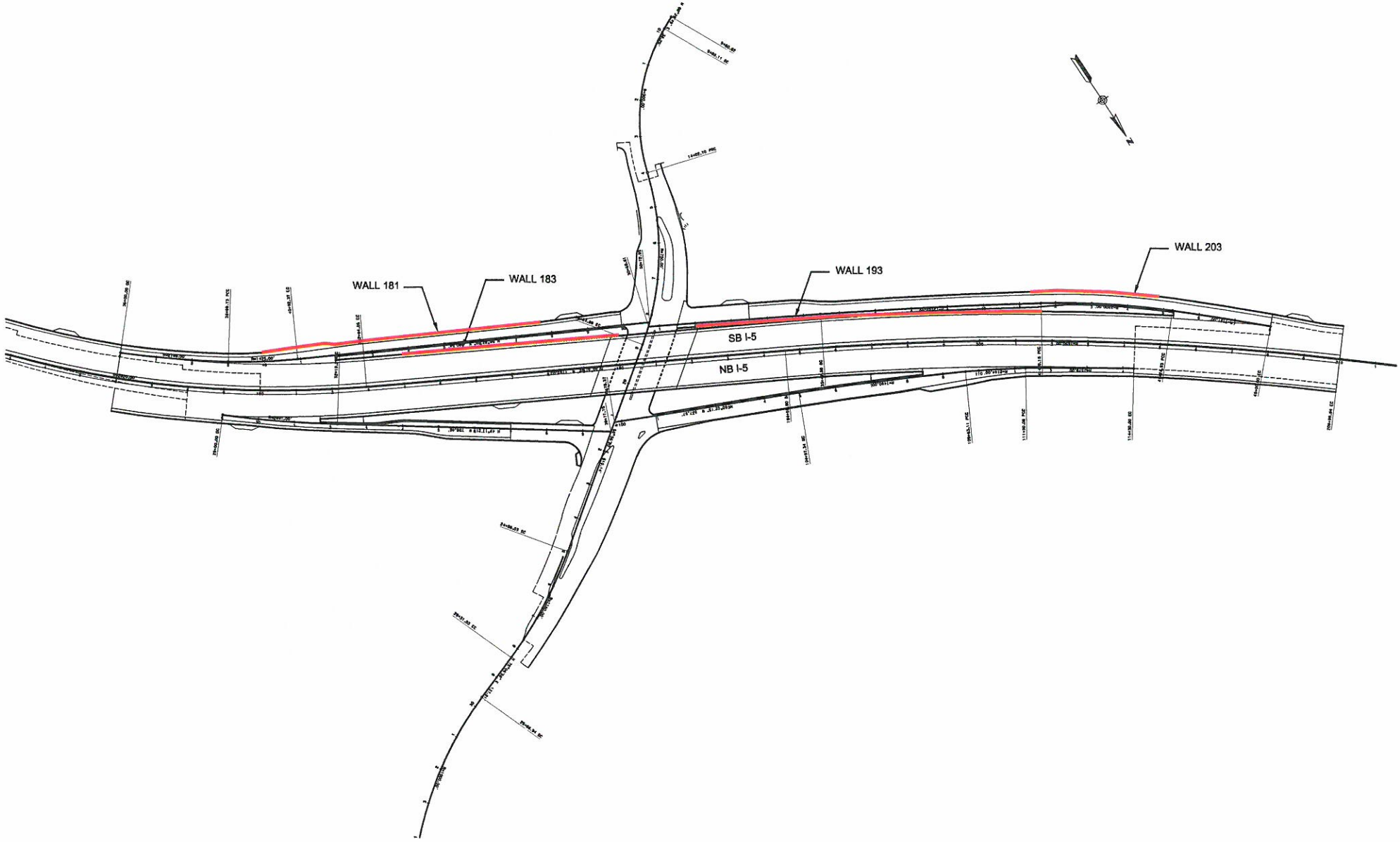
I-5 HOV Improvement Project Segment 1	SITE LOCATION MAP Figure 1
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Project No. 11-135 | Date: 02-22-12

- Add one HOV lane per direction on I-5 throughout project limits,
- Reestablish existing auxiliary lanes,
- Replace the existing Avenida Pico Undercrossing (Bridge No. 55-0207),
- Realign the four interchange ramps, and construct four retaining walls along I-5 On- and Off-Ramps, and widen the I-5 NB On-Ramp to three lanes,
- Realign and widen Avenida Pico, including a new EB through lane, new sidewalk and bicycle lanes, and construct a new retaining wall to replace the existing keystone wall,
- Drainage and pavement work, and
- Construct sign structures at multiple locations throughout the project limits.

The wall locations are shown on Figure 2. The proposed wall structures consist of mechanically stabilized earth (MSE) walls, and a Type 1 cantilevered wall. Retaining Walls 181, 183, and 193 are proposed to be Mechanically Stabilized Embankment (MSE) walls. Wall 203 is proposed to be a Caltrans Type 1 cantilevered wall. Pertinent wall data is summarized in Table 1.

Table 1. Retaining Wall Pertinent Data

Wall	Wall Type	Approx. Sta. Location		Length (ft)	Retaining Wall Height (ft)	Approx. Bottom of Footing / Top of Leveling Pad El. (ft)	Backfill Slope Condition
		Ramp	"A"-Line				
181	MSE	"AP3" 39+53 to "AP3" 47+10	"A" 179+64 to 187+28	755	9.12 to 31.67	+88.8 to +118.8	Level
183	MSE	"AP3" 43+73 to "AP3" 49+78	"A" 183+92 to 190+00	605	7.5 to 34.2	+88.0 to +110.5	Level
193	MSE	"AP4" 31+96 to "AP4" 41+52	"A" 192+03 to 201+60	956	10 to 44.2	+84.6 to +142.1	Level
203	Type 1 Modified	"AP4" 41+31 to "AP4" 44+81	"A" 201+40 to 204+88	356	4 to 28	+144.0 to +159.3	2H:1V to Level



NO SCALE

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-5 HOV Improvement Project, Segment 1		WALL LOCATION PLAN
	Project No. 11-135	Date: 10-01-12	FIGURE 2

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 FIELD INVESTIGATION

A geotechnical field investigation was conducted in September to November 2011 for all proposed improvements consisting of exploratory borings and cone penetrometer tests (CPT's). Among these, a total of 8 borings and 3 CPT's were performed in the areas of the proposed walls. Boring information, including exploration number, stations, offsets, ground surface elevations, bottom of boring elevations and water level measurements are summarized in Table 2. Locations of the exploratory borings and CPTs are shown on the LOTB sheets provided in Appendix A. All locations were surveyed.

Table 2. Geotechnical Exploration Information

Boring	"A"-Line Station	Offset (ft)	Top of Boring El. (ft)	Depth (ft)	Groundwater El. (ft)	Drilling Method
A-11-109	177+65.06	73.720 Lt.	+137.2	70.8	NE	HSA
CPT-11-110	183+00.71	73.340 Lt.	+111.8	81.5	NM	CPT
A-11-111	187+07.37	115.228 Lt.	+95.4	71.5	+50.4	HSA
A-11-113	186+17.96	41.848 Lt.	+110.9	51.5	NE	HSA
A-11-114	190+05.43	29.309 Lt.	+117.5	101.5	+49.5	HSA
A-11-117	193+03.57	24.986 Lt.	+125.5	101.4	NE	HSA
A-11-118	198+08.71	39.463 Lt.	+140.4	70.9	NE	HSA
CPT-11-129	196+74.55	117.730 Lt.	+118.7	65.6	NM	CPT
A-11-130	200+61.38	122.047 Lt.	+148.1	70.5	NE	HSA
CPT-11-131	205+37.32	94.387 Lt.	+163.9	21.2	NM	CPT
A-11-134	208+60.09	82.050 Lt.	+170.5	30.8	NE	HSA

Notes: NE=Not Encountered; NM=Not Measured; HSA=Hollow-Stem Auger Boring; CPT=Cone Penetration Test

Hollow-stem auger (HSA) borings were drilled using a CME 75 truck-mounted drill rig equipped with 8-inch diameter hollow-stem augers. Sampling was performed by alternating the Modified California Drive (MCD) sampler and Standard Penetration Test (SPT) sampler. The soil sampling interval is 5 ft. Relatively undisturbed soil samples were obtained using a 3.25" outer diameter MCD sampler lined with brass rings. Each of these brass rings is 1" long with a 2.5-inch outside diameter. The SPT sampler (1.4" inside diameter) was also used to obtain soil samples. The MCD and SPT samplers were driven 18" into the ground or until refusal was encountered using a 140-lb hammer free falling from a height of 30". The numbers of blows to advance the sampler each 6" of penetration were recorded. The number of blows for the final 12" or shorter of driving was recorded on the boring logs. Charts published by Winterkorn and Fang

(1975) were used to obtain a reduction factor of 0.5 for this project to convert MCD sampler blowcounts to SPT-equivalent blowcounts.

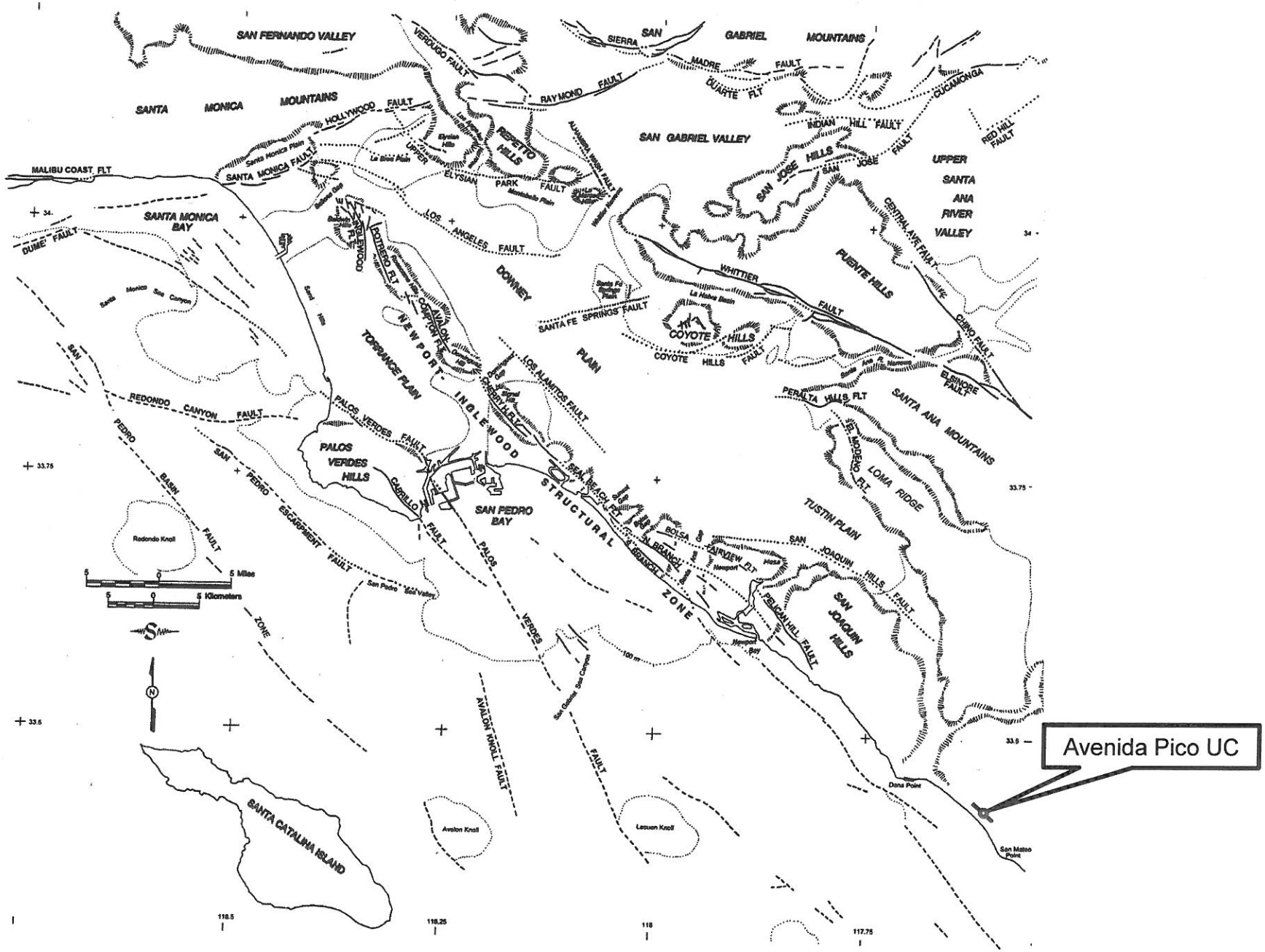
The CPT sounding's were performed using an electronic cone penetrometer in general accordance with current ASTM Standards (ASTM D5778 and D3441). The CPT equipment used hollow sounding rods with a probe with a conical tip with a 60° apex angle and a projected cross sectional area of 1.55 in² and a cylindrical friction sleeve with a surface area of 23.25 in². The interior of the cone penetrometer is instrumented with strain gauges for cone tip and friction sleeve resistance measurements during penetration. The cone penetrometer assembly is continuously pushed into the soil by a set of hydraulic rams at a standard rate of 0.79" per second while the cone tip resistance and sleeve friction resistance are recorded every 1.967". The 25-ton dead weight of the truck provides the required reaction weight for pushing the rods and is used to transport and house the testing equipment. The computer generated graphical logs include tip resistance, friction resistance, and friction ratio. Soil behavior type interpretations are based on guidelines by Robertson and Campanella (1989).

2.2 LABORATORY TESTING

Soil samples considered representative of the subsurface conditions were tested to obtain or derive relevant physical and engineering soil properties. The following laboratory tests were conducted to supplement the observations recorded during the field investigation:

- In-situ Moisture Content and Unit Weight
- Grain Size Distribution
- Percent Passing No. 200 Sieve
- Atterberg Limit
- Direct Shear
- Unconsolidated Undrained Triaxial
- Pocket Penetrometer
- Consolidation
- Maximum Density
- Minimum Resistivity, pH, Sulfate Content and Chloride Content

The laboratory tests were conducted in general accordance with California Test Methods or American Society for Testing and Materials (ASTM) Standards. Laboratory test results are included in Appendix B. R-value tests indicated on the LOTB's in Appendix A were performed for pavement design. Those tests were not used for the purpose of this report.



I-5 HOV Improvement Project, Segment 1
Avenida Pico UC (Replace)

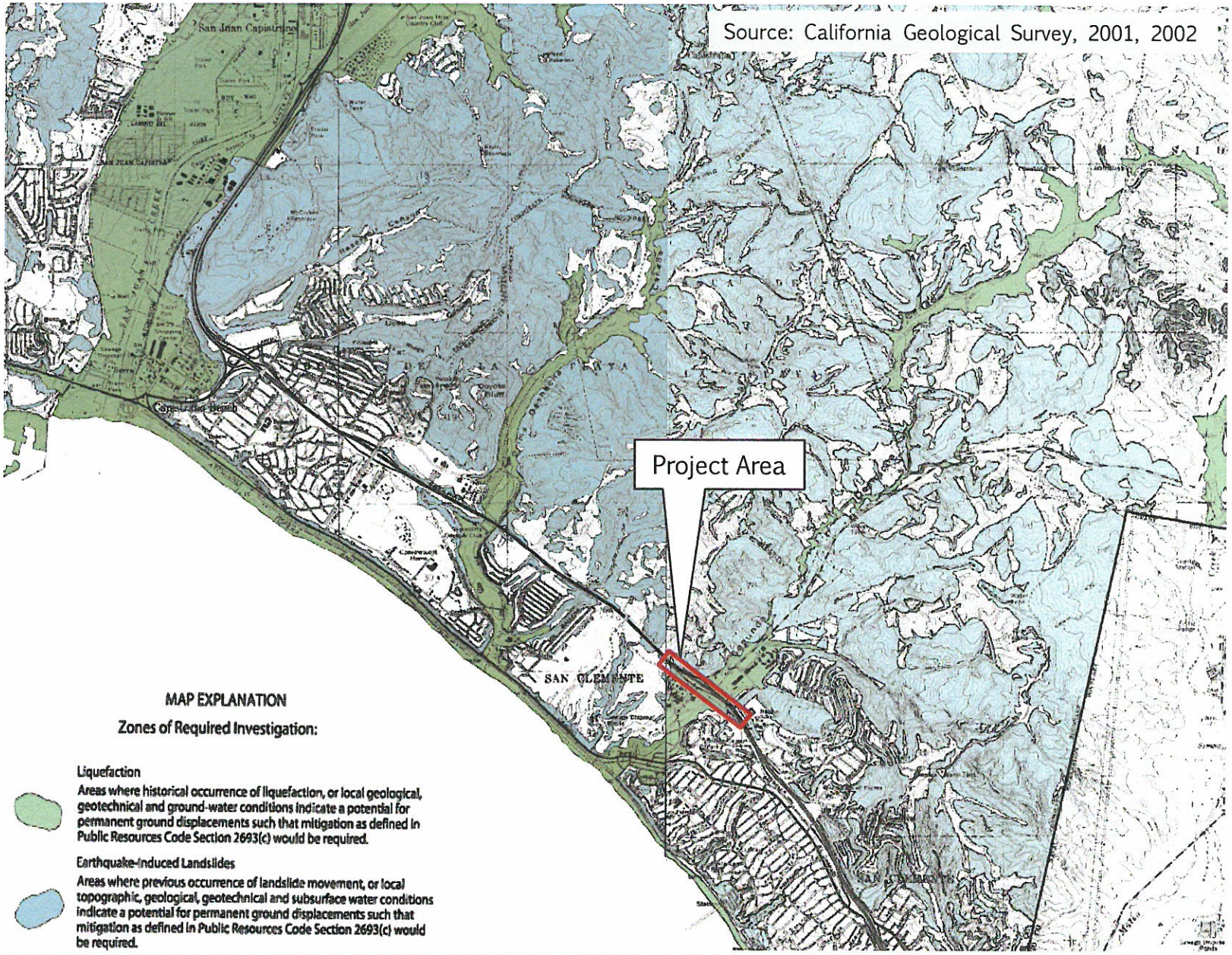
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

REGIONAL MAP OF ACTIVE FAULTS AND PHYSIOGRAPHY

Figure 3

Project No. 11-135

Date: 06-29-12



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-5 HOV IMPROVEMENT PROJECT, SEGMENT 1	Seismic Hazard Map Figure 4
	Project No. 11-135 / Date: 10-01-12	

tract development at the top of these slopes and the surrounding area (see Foundation Report for the proposed tieback wall Avenida Pico realignment and widening in EMI, 2012a). The proposed walls are not located in this area and are not affected.

3.4 SEISMICITY

The project is in seismically active southern California. The present-day seismotectonic stress field in the Los Angeles region is one of north-northeasterly compression. This is indicated by the geologic structures, by earthquake focal-mechanism solutions, and by geodetic measurements. These data suggest crustal shortening of between 0.2" and 0.35" per year (5 and 9 mm/yr) across the greater Los Angeles area (Argus et al., 1999).

Historical earthquake epicenter maps show widespread seismicity throughout the region. Although historical earthquakes occur in proximity to known faults, they are difficult to directly associate with mapped faults. Part of this difficulty is due to the fact that the basin is underlain by several poorly known subsurface thrust faults, generally referred to as blind thrust faults. Ward (1994) estimated that about 40% of seismic moment cannot be associated with known faults. Earthquakes occur primarily as loose clusters along the Newport-Inglewood Structural Zone, the southern margin of the Santa Monica Mountains, the margin between the Santa Susana-San Fernando Valley and the southern margin of the San Gabriel Mountains, and in the Coyote Hills-Puente Hills area. There is no clustering or alignment of earthquakes in proximity to the site. There are fewer earthquakes in the site region than anywhere else in the Los Angeles Basin area. This apparent lack of earthquake activity suggests that the site area is tectonically stable and suggests that there are no unrecognized active faults at the site.

The largest historical earthquake within the Los Angeles Basin was the 1933 Long Beach event which had a magnitude of about moment magnitude M_W = 6.4 (M_L = 6.3). This earthquake did not rupture the surface but is believed to have been associated with the Newport-Inglewood Structural Zone (Benioff, 1938). The association was based on abundant ground failures along the NISZ trend but no unequivocal surface rupture was identified. Reevaluation of the seismicity data by Hauksson and Gross (1991) relocated the 1933 earthquake hypocenter to a depth of about 6 miles below the Huntington Beach-Newport Beach city boundary.

Other major earthquakes in the region include the 1994 Northridge and the 1971 San Fernando earthquake both of which occurred in the San Fernando Valley region. The 1994 earthquake had a M_W of about 6.7 (M_S = 6.8, M_L = 6.4), and occurred on a southerly dipping subsurface fault which was unknown prior to the earthquake. The main shock occurred at a depth of about 11.8 miles. Earthquake aftershocks clearly defined the rupture surface dipping about 35° southerly from a depth of about 1.2 or 1.9 miles to 23 miles (Hauksson et al, 1995). The causative fault was never identified with certainty. The event may have occurred on an eastern extension of the Oakridge fault (Yeats and Huftile, 1995), a southerly dipping feature fault bounding the Ventura Basin and the Santa Susana Mountains.

The 1971 San Fernando earthquake was of similar size (M_W = 6.7, M_S = 6.4, M_L = 6.4) to the 1994 event but did involve surface rupture. The 1971 event occurred on a northerly dipping thrust fault that dips from the northern side of the San Fernando Valley to a depth of about 9.3 miles under the San Gabriel Mountains. Several mapped surface faults were involved such as the Sylmar fault, Tujunga fault, and Lakeview fault. These faults are commonly considered to

be part of the Sierra Madre fault system which extends easterly from the San Fernando Valley, along the base of the San Gabriel Mountains on the north side of the San Gabriel Valley, and to the Cucamonga fault in the San Bernardino area.

The 1987 Whittier earthquake (M_L = 5.9, M_W = 5.9) occurred on a subsurface fault dipping under the Puente Hills to about 10 miles beneath the San Gabriel Basin (Shaw and Shearer, 1999; Shaw et al., 2002). This event did not rupture the ground surface.

A magnitude 5.4 earthquake occurred at a depth of about 9 miles on 29 July 2008. The epicenter was in the Chino Hills area between the Chino fault and the Whittier fault. Preliminary data were inconclusive with regard to the causative fault. Detailed analysis by Shao and Hauksson (2009) indicated a rupture plane striking N71° W, dipping 62° northeast. They suggested a preference for the Whittier fault being the causative fault but were uncertain, primarily because the Whittier fault is supposed to dip much steeper (~80°). The aftershock pattern formed a subhorizontal alignment indicating the possibility that the event could have been associated with a subsurface thrust fault such as one of the blind faults of the Puente Hills Blind Thrust Fault System or with a blind fault under the Peralta Hills.

Another significant earthquake was the 1812 earthquake which caused damage at the San Juan Capistrano Mission. The location and magnitude of the 1812 earthquake are unknown because of the sparse population at the time, but geological studies (Jacoby et al., 1988; Fumal et al., 1993; Weldon et al., 2004) postulate that it did not occur in the Capistrano area, but rather was a large (M>7.0) distant event on the San Andreas fault in the Wrightwood area of the San Gabriel Mountains.

The earliest documented earthquake in the region was reported by the Portola´ expedition as they camped near the Santa Ana River in 1769. This event has been attributed by various geoscientists to just about every fault in the Los Angeles area but it could just as well have been a distant event that shook a wide area as did the 1971 San Fernando, the 1987 Whittier, and the 1994 Northridge events, as well as many other more-distant events (for example, 1992 Landers event).

4.0 SUBSURFACE CONDITIONS

4.1 SOIL CONDITIONS

Idealized soil profiles are developed based on the recent soil borings and CPT soundings. The profiles and shear strength parameters used for geotechnical analyses are shown in Table 3. Based on the correlations with CPT soundings (Robertson and Campanella, 1989), SPT blowcounts (Lam and Martin, 1986) and laboratory test results, material shear strength parameters were selected and are included in Table 3. The properties of the fill and alluvium vary with depth and location.

4.2 GROUNDWATER CONDITIONS

Groundwater was encountered at three borings between about El. +49.5 and +53 ft during drilling in September and October, 2011 (see Foundation Report for Avenida Pico UC replacement, EMI 2012a). The As-built plans for Avenida Pico UC include LOTB sheets that show groundwater was not encountered above El. +40 ft in 1955 and El. +37 ft in 1967. These borings are located within the Segunda Deshecha drainage path. The California Geological Survey (2002) quadrangle map for San Clemente indicate a highest historical groundwater of 5 to 10 ft below original bottom of nearby Segunda Deshecha canyon which is significantly lower than current roadway grades within the project extents. The soil borings indicate a lack of continuous pervious soil units, and groundwater was encountered in very few borings in September to November of 2011 but not in other nearby borings. These findings suggest that groundwater within the I-5 HOV improvement project is perched. Nevertheless, groundwater during construction may be different from those reported above because groundwater level can fluctuate due to variations in seasonal precipitation, construction activities, or other man-made and natural influences. The highest measured groundwater elevation of +53 ft was used for subsequent analyses.

Table 3. Idealized Soil Profile and Strength Parameters

Approx. Elevations* (ft) South 1/3 (Along Wall Layout Line)	Approx. Elevations* (ft) Center 1/3 (Along Wall Layout Line)	Approx. Elevations* (ft) North 1/3 (Along Wall Layout Line)	Predominant Soil Type	Equivalent SPT Blowcount (blows/ft)	Total Unit Weight (pcf)	Friction Angle	Cohesion / Undrained Shear Strength (psf)
Walls 181 & 183 (Borings A-11-109, A-11-111, A-11-113, A-11-114 and CPT-11-110) Approx. Exist. Ground Surface: El. +118 to +122 ft							
+120 to 98	+118 to 83	+120 to 80	Existing Fill Embankment – Clay & Clayey Sand	7 to 55 (Average=20)	120	- 32°	1,000 200
+98 to 45	+83 to 38	+80 to 32	Terrace Deposits/Young Alluvium	7 to 45 (Average=18)	120	-	1,800-2,000
Below +45	Below +38	Below +32	Bedrock - Sandy Silt	30 to 50+	125	-	3,000
Wall 193 (Borings A-11-117, A-11-118, A-11-128, A-11-130 and CPT A-11-129) Approx. Exist. Ground Surface: El. +125 to +148 ft							
+130 to 97	+138 to 106	+145 to 120	Existing Fill Embankment – Clay & Clayey Sand	6 to 45 (Average=18)	120	- 32°	1,000 200
+97 to 78	+106 to 80	+120 to 90	Terrace Deposits – Lean Clay	13 to 43 (Average=19)	120	-	1,000-1,800
+78 to 70	+80 to 70	+90 to 80	Bedrock - Fat Clay	42 to 57 (Average=50)	120	-	2,000
Below +70	Below +70	Below +80	Bedrock - Sandy Silt	50+	125	-	3,000
Wall 203 (Borings A-11-130, A-11-134 and CPT-11-131) Approx. Exist. Ground Surface: El. +152 to +167 ft							
+155 to 143	+158 to 148	+164 to 156	Existing Fill – Clay & Clayey Sand	9 to 37	120	- 30-32°	1,000 200
+143 to 115	+148 to 123	+156 to 135	Terrace Deposit & Bedrock - Fat Clay	17 to 23 (Average=21)	120	-	1,800
Below +115	Below +123	Below +135	Bedrock - Sandy Silt	44 to 50+	125	-	3,000

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 SEISMIC DESIGN CRITERIA

The fault controlling the strong ground motion is the Newport-Inglewood-Rose Canyon/East fault, southwest of the project area. The design ARS curve was based on the 2010 Seismic Design Criteria (SDC) (Caltrans, 2010a) procedures (see Foundation Report for Avenida Pico UC Replacement (EMI, 2013) for details). The peak ground acceleration (PGA) is the zero-period spectral acceleration in the ARS curve. A PGA of 0.382g was obtained from the design ARS curve.

For analyzing global slope stability, Section 3.10 of the Caltrans Guidelines for Structures Foundation Reports (Caltrans, 2009) recommends using a horizontal seismic coefficient equal to one-third of the peak acceleration but not exceeding 0.2. Therefore, a horizontal seismic coefficient of 0.13 was used in the pseudo-static slope stability analysis.

As presented in Section 11.8.6 of AASHTO (2007), seismic earth pressures can be computed using a seismic coefficient equal to half of the peak acceleration. Therefore, a seismic coefficient of 0.19g can be used for the computation of seismic earth pressures.

5.2 LIQUEFACTION

Liquefaction Potential. Liquefaction is the loss of shear strength in generally cohesionless, saturated soils when the pore-water pressure induced in the soil by a seismic event becomes equal to or exceeds the overburden pressure. The primary factors influencing the potential for liquefaction include: groundwater elevation, soil type and grain-size characteristics, relative density of the soil, initial confining pressure, and intensity and duration of ground shaking. Soils most susceptible to liquefaction are saturated low-density sands and silty sands within 50 ft of the ground surface.

The vast majority of earth materials within the project area are fine-grained. The earth materials throughout the area include sedimentary bedrock of the Capistrano formation, terrace deposits, alluvium, and artificial fills that are derived from the bedrock and terrace materials. No consistent shallow groundwater table or relevant continuous unit of saturated loose sandy soils was identified within the project area. Based on the fines content and strength of soil materials found throughout the area and a lack of a shallow groundwater table (see Section 4.2), liquefaction of the present earth materials is unlikely. A liquefaction evaluation was performed based on the highest groundwater elevation of +53 ft. For the controlling soil condition, no liquefiable soil layers were identified due to low groundwater, high blowcount, and/or high fines content. Similarly, the other soil borings in the wall areas also do not have liquefiable layers. As a result, the liquefaction potential of the site soils is found to be low and not considered a design issue.

Seismically-Induced Settlement. Because of the stiff to hard nature of the subsurface materials (sedimentary bedrock, terrace deposits, compacted fill), and because the materials are composed predominantly of medium to highly plastic fine-grained particles, seismic settlement of in-situ earth material is expected to be negligible. Seismically-induced dry sand settlements were calculated from SPT and CPT data. For the controlling soil condition and an assumed high

groundwater condition, seismically-induced dry sand settlements were about 1/3" or less. As a result, seismically-induced dry sand settlements for the wall areas are considered negligible and not expected to adversely impact the proposed wall foundations.

5.3 SOIL CORROSIVITY

Representative soil and bedrock samples were tested to determine corrosivity including minimum resistivity, pH, soluble sulfate content, and soluble chloride content. Two soil samples from the wall areas were tested to determine minimum resistivity, pH, soluble sulfate content, and soluble chloride content using procedures described in California Test Methods 417, 422, and 643, respectively. The test results are presented in Table 4.

Table 4. Soil Corrosion Test Results

Boring	Sample Depth (ft)	Soil Type	Minimum Resistivity (ohm-cm)	pH	Soluble Sulfate Content (ppm)	Soluble Chloride Content (ppm)
A-11-117	35	CH	170	5.6	5,060	1,950
A-11-118	2.5	CH	270	6.7	550	1,986

Based on the Caltrans Corrosion Guidelines (2003), soils are considered corrosive if the pH is 5.5 or less, or the chloride concentration is 500 ppm or greater, or the sulfate concentration is 2,000 ppm or greater. Based on the test results presented in Table 4 and the Materials Report (EMI, 2012c), and the above Caltrans criteria, the on-site soils are considered to be corrosive to bare metals and concrete. Based on the measured chloride concentrations, the minimum concrete cover over reinforcement for structural elements in contact with onsite soils should be in accordance with Table 8.22.1 of the Caltrans BDS (2004) for "Corrosive soil above MLLW level with chloride concentration between 500 and 5,000 ppm." Based on the sulfate concentrations, a cement type in accordance with Table 8.22.2 of Caltrans BDS for "Sulfate Concentration from 2,000 to 15,000 ppm" is recommended. Additional corrosion protection requirements for structural members are presented in Section 8.22 of Caltrans BDS as well as applicable sections of the Caltrans Standard Specifications (2010c) and Special Provisions.

5.4 FOUNDATION DESIGN

Retaining Walls 181, 183, and 193 are proposed to be Mechanically Stabilized Embankment (MSE) walls. Wall 203 is proposed to be a Caltrans Type 1 cantilevered wall. Pertinent wall data was presented earlier in Table 1.

5.4.1 Mechanically Stabilized Embankment (MSE) Walls 181, 183, and 193

Per Caltrans policy, MSE walls should be designed based on Caltrans Design Aids 3-8 (2011b) and Load and Resistant Factor Design (LRFD) guidelines provided in AASHTO (2007) with California Amendments (2011a). MSE wall backfill gradation and property requirements shall conform to Section 47-2.02C of the Caltrans Standard Specifications (2010c). The MSE wall base should be embedded a minimum depth of 0.1H (where H is the height of wall in feet), but

no less than 2 ft, below the lowest adjacent grade. A minimum horizontal berm width of 0.1H, but no less than 4 ft, should also be provided in front of MSE walls founded on slopes (if applicable) per Section 5.9.1 of the Caltrans BDS.

5.4.1.1 Preloading at Walls 183 and 193

The south side of the approach embankments will be retained by RW 183 at Abutment 1 and RW 193 at Abutment 2 of the new replacement bridge for the Avenida Pico Undercrossing.

At the current proposed configuration, the bridge abutments will need to be constructed before the MSE walls (otherwise, temporary shoring will be required for the MSE wall backfill). If so, the abutment piles will be subjected to static downdrag forces when settlement occurs during MSE wall fill placement. Caltrans standard pile design practice is to eliminate all static downdrag forces. At the same time, the MSE walls are about 35 and 40 ft high adjacent to Abutments 1 and 2, respectively. Relatively large settlements will occur due to the MSE wall fill. A relatively conventional practice which would minimize downdrag forces on the abutment piles and reduce soil settlement at the MSE walls is to place earth material to preload the bridge approach and MSE wall area. The process involves placing earthen materials at the approaches. The weight of the earth will induce soil settlement. This settlement will be monitored in time until it is determined that the residual settlement is within a tolerable limit. Once this settlement period is complete, the earthen material used in the preloading will be completely removed and the approach area will become available for abutment and MSE wall construction.

An approximate proposed preload foot-print and a typical section are presented in Figure 5. The top of preload embankment should be equal to or greater than the finished grade elevation. To minimize traffic impact, temporary shoring will need to be placed at the I-5 shoulder, ramps and Avenida Pico to maximize the foot-print of the preload area. Settlement monitoring will be required in order to estimate the residual settlement and duration of the preload. Duration of the preload is estimated to be about 3 months. This duration can be reduced to 2 months if 5 ft of surcharge (above the proposed finished surface) is placed for the preloading. The above settlement duration may be accelerated if the settlement between two consecutive settlement readings (see next paragraph) is relatively stabilized. The Engineer should be notified to determine whether or not the settlement has stabilized.

Settlement Monitoring within the Preload Areas: Surface settlement hubs should be installed at locations shown in Figure 5. The settlement hubs should be installed in a timely manner upon completion of earth placement for preloading. Special care should be exercised in the field to survey and protect these settlement devices. The hubs should be monitored at the time of installation, on a weekly basis for a month, and then once every 2 weeks thereafter until it has been verified by the Engineer that the remaining settlement is acceptable.

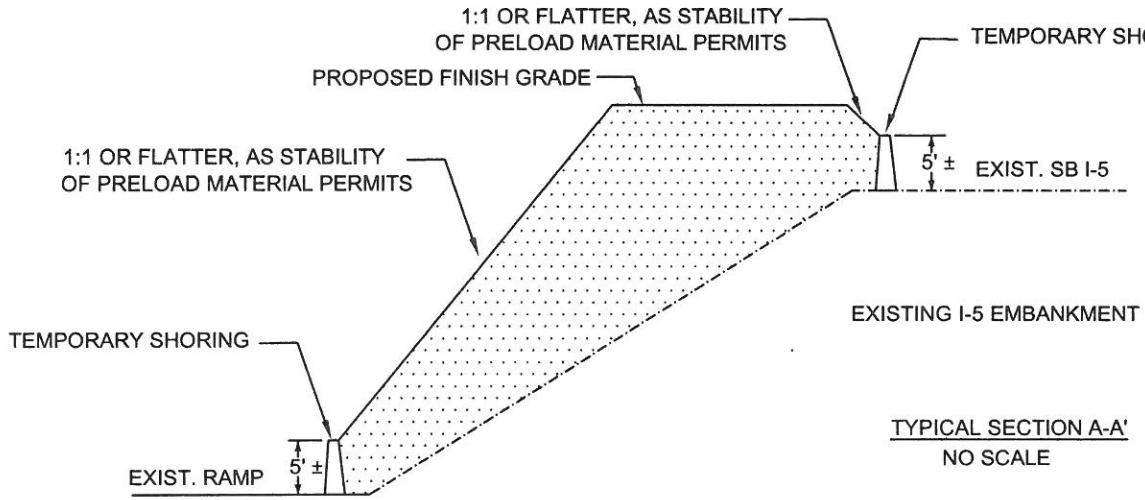
5.4.1.2 Bearing Capacity and Settlement

Per Caltrans policy, LRFD Service, Strength and Extreme Event Limit State load combinations are used for design of the MSE wall. Soil settlement calculations were performed for the MSE wall with a level backfill, using the Service bearing stress for Load Case 1 as shown in Caltrans Bridge Design Aids (BDA) Section 3-8 (Caltrans, 2011b). The calculated settlements, the wall heights (H) and the base widths (BW) are presented in Table 5 along with the recommended minimum overexcavation depths. The base widths (BW) are the same as those listed in Caltrans BDA Section 3-8 (Caltrans, 2011b) for the same wall heights. Table 5 also shows the estimated maximum differential settlement for each wall along the wall layout line.

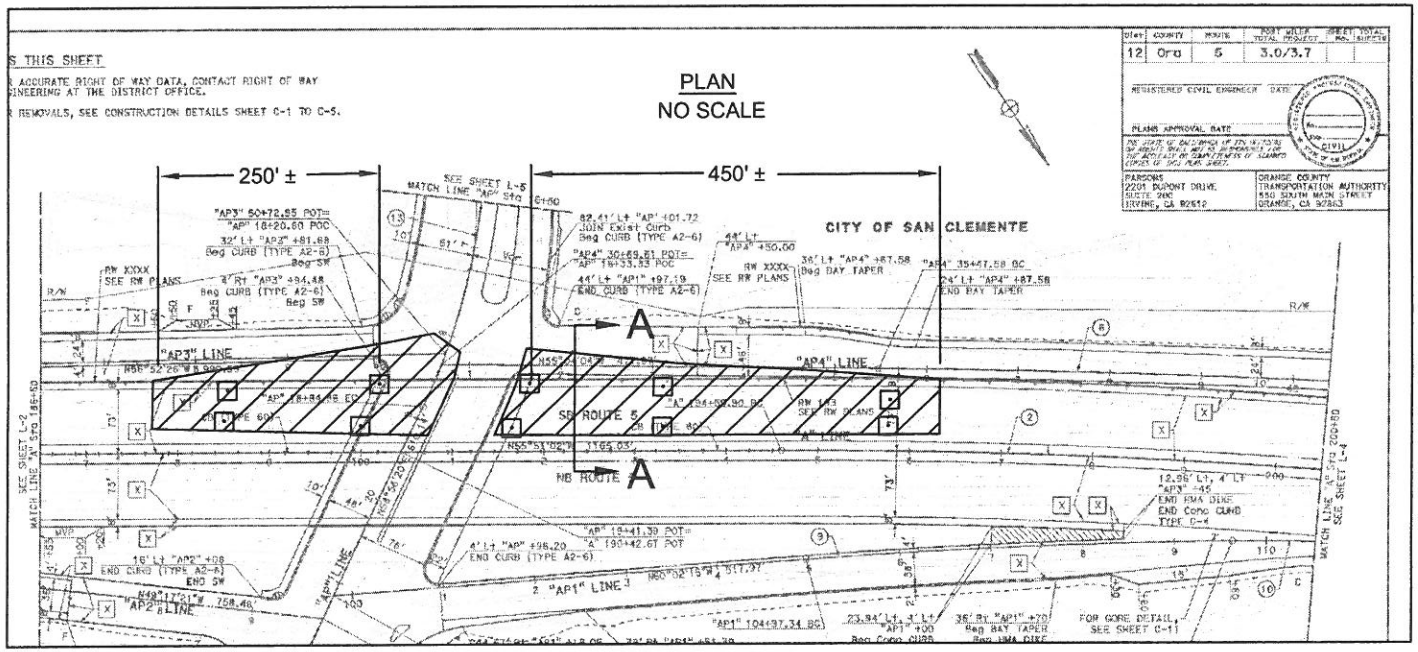
LEGEND

PROPOSED PRELOAD FOOT-PRINT

PROPOSED APPROX. LOCATION OF SETTLEMENT HUB



TYPICAL SECTION A-A'
NO SCALE



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-5 HOV Improvement Project, Segment 1	PRELOADING CONFIGURATION
	Project No. 11-135 / Date: 06-29-12	FIGURE 5

As mentioned earlier, portions of the MSE walls will be preloaded with earth, and this preload will be removed when settlement monitoring data indicates that residual settlement within the preloaded areas is projected to be ½" or less. However, the Service bearing stress induced by the MSE wall is higher than the bearing stress exerted by the preload soils; thus, calculated MSE wall settlements in excess of ½" are expected. The calculated settlements in Table 5 include the beneficial effects of preloading, otherwise, settlement magnitudes will be larger.

Table 5. Minimum Overexcavation Depths for MSE Walls 181, 183, and 193

Wall No.	Wall Height, H (ft)	Base Width, BW (ft)	Minimum Overexcavation Depth Below MSE Wall Base (ft)	Calculated Settlement With Over-excavation (in)	Maximum Differential Settlement
181	6'8" to 14'2"	9.5 to 11.5	2.0	1.2	Less Than 1/500
	16'8" to 24'2"	13.5 to 18.5	2.5	2.4	
	26'8" to 29'2"	20.5 to 21.5	3.5	3.0	
183	6'8" to 14'2"	9.5 to 11.5	2.0	1.1	1/100
	16'8" to 24'2"	13.5 to 18.5	2.5	1.9	
	26'8" to 34'2"	20.5 to 25.5	4.0	2.8	
193	9'2" to 14'2"	9.5 to 11.5	2.0	1.4	1/225
	16'8" to 24'2"	13.5 to 18.5	2.5	1.0	
	26'8" to 31'8"	20.5 to 23.5	3.0	2.0	
	34'2" to 44'2"	25.5 to 33.5	3.0	2.0	

Note: Wall Height H is from top of wall to top of leveling pad (Caltrans Bridge Design Aids 3-8, 2011b).

Soil bearing capacity calculations were also performed using the base elevation shown on the wall plans, the recommended minimum overexcavation depth presented in Table 5, and the soil strength parameters presented in Table 3. Based on these calculations, the soil bearing capacity exceeds the applied bearing stresses for the Strength and Extreme Event Limit State presented in Caltrans BDS Section 3-8 for Load Case 1.

The horizontal limits of the overexcavation should begin one foot from the outside bottom edge of the leveling pad and one foot from the inside edge of the MSE wall base, and extending downward at a 45° imaginary plane until the plane intersects the recommended minimum excavation depth presented in Table 5. Caltrans Structure Backfill should be used for backfilling with a minimum relative compaction of 95% of maximum density as determined by Caltrans Test Method 216. The overexcavation bottom should be proof rolled prior to backfilling. Further, the overexcavation bottom should be inspected by a qualified geotechnical engineer or technician to confirm the presence of an unyielding and competent surface.

After the overexcavation and recompaction is implemented, the allowable bearing capacity of the leveling pad footing supporting the MSE wall panels is 1.5 ksf provided the width of the pad is at least 1 ft and the embedment (measured from the lowest adjacent grade) is at least 2 ft.

The uppermost level of wall facing, coping, roadway pavement, hardscape, and any other structures sensitive to settlement should not be constructed until remaining settlement is within acceptable limits (i.e., ½" or less). A minimum waiting period of one month is recommended.

5.4.1.3 Pilaster Foundations

A pilaster with a height of 45.3 ft to top of wall is proposed at MSE Wall 183. Another pilaster with a height of 47.4 ft to top of wall is proposed at MSE Wall 193. Both pilasters are 10 ft wide in the wall direction and 4 ft deep in the wall transverse direction. The pilasters will contact the MSE panels on both sides and will retain the new embankment fill.

5.4.1.3.1 Foundation Type

Spread footings were evaluated and found to be unsuitable to meet permissible settlements, and therefore deep foundations are recommended. Both driven and Cast-in-Drilled-Hole (CIDH) piles are feasible. Driven piles were selected because this pile type can be battered to provide large lateral resistance to the tall pilaster columns. Due to anticipated hard driving, steel HP piles are preferred over concrete piles. As a result, steel HP10x57 are recommended to support the pilasters. The conventional Caltrans pile type to meet the required nominal resistances is HP10x42. A heavier section (HP10x57) was used to account for sacrificial steel thickness due to soil corrosion.

5.4.1.3.2 Foundation Data

Per Caltrans policy, LRFD Service-I Limit State load combinations provided in the Caltrans Bridge Design Specifications (2004) are used for design of the pilaster piles. The LRFD Service-I Limit State, Strength Limit State, and Extreme Event Limit State load combinations are used for the design of the piles. The foundation design data sheets are presented in Table 6. Foundation loads were provided by Parsons following the latest Caltrans Memo To Designers (2008) format and are presented in Table 7.

Table 6. Pilaster Foundation Design Data Sheet

Location	Design Method	Pile Type	Finished Grade El. (ft)	Cut-off El. (ft)	Pile Cap Size (ft)		Permissible Settlement under Service Load (inch)	No. of Piles per Support
					B	L		
H=45.3'	LRFD	HP10x57	+91.0	+87.17	21.17	10.00	1	10
H=47.4'	LRFD	HP10x57	+88.5	+84.92	24.00	10.00	1	12

Table 7. Pilaster Foundation Design Loads

Location	Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Event Limit State (Controlling Group, kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. Per Pile	Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
H=45.3'	626	66	N/A	822	95	N/A	N/A	626	104	N/A	12
H=47.4'	816	77	N/A	1072	112	N/A	N/A	816	130	N/A	5

5.4.1.3.3 Axial Pile Capacity

Pilaster foundation design recommendations are presented in Table 8. The Pile Data Table for the contract plans is presented in Table 9.

Based on the pile layout provided by Parsons and Caltrans requirements, an axial group efficiency factor of 1.0 was used for pile design (Section 10.7.1.2 of 2011 California Amendments to AASHTO 2007).

The HP piles were designed using skin friction and end bearing. The pile capacities are based on soil resistance only and may be further limited by and the strength of the pile materials and pile-head connection details. The pile capacity calculations are presented in Appendix C. The controlling nominal resistances for the pilasters shown in Table 8 were the Strength-I Limit State Maximum Per Pile Total Load for Compression and the Extreme Limit State Maximum Per Pile Total Load for Tension from Table 7. Per Caltrans practice, downdrag loads on piles is to be avoided. Preloading of the wall area to avoid the effect of downdrag due to ground settlement from new fills is addressed in Section 5.4.1.1. Pile driving should occur after preloading has been completed and residual settlement is less than ½" as indicated by settlement monitoring.

Table 8. Pilaster Foundation Design Recommendations

Location	Pile Type	Pile Cut-Off El. (ft)	Service-I Limit State Loads per Support (kips)	Total Permissible Support Settlement (inch)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (ft)	Spec. Tip El. (ft)	Nominal Driving Resistance Required (kips)
					Strength Limit		Extreme Event				
					Comp. (ϕ=0.7)	Tension (ϕ=0.7)	Comp. (ϕ=1.0)	Tension (ϕ=1.0)			
H=45.3'	HP10x57	+87.17	626	1	95	N/A	104	12	+37 (a-I); +48 (a-II); +73 (b-II);+76(c);+62(d)	+37	140
H=47.4'	HP10x57	+84.92	816	1	112	N/A	130	5	+55 (a-I); +63 (a-II); +78(b-II);+68(c);+60(d)	+55	160

Notes:
1. Design tip elevations are controlled by the following demands: (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), (c) Settlement, and (d) Lateral Load.
2. The Specified Tip Elevations shall not be raised above the design tip elevations for Tension, Settlement, and Lateral Load.

Table 9. Pilaster Pile Data Table

Location	Pile Type	Nominal Resistance (kips)		Design Tip El. (ft)	Spec. Tip El. (ft)	Nominal Driving Resistance Required (kips)
		Compression	Tension			
H=32'	HP10x57	140	20	+37 (a); +73 (b); +76(c); +62 (d)	+37	140
H=36'	HP10x57	160	10	+55 (a); +78 (b); +68(c); +60 (d)	+55	160

Notes:
1. Design Tip Elevations are controlled by the following demands: (a) Compression, b) Tension, (c) Settlement, and (d) Lateral Load.
2. The Specified Tip Elevations shall not be raised above the Design Tip Elevations for Tension, Settlement, and Lateral Load.

5.4.1.3.4 Lateral Pile Capacity

Lateral pile analysis was performed for the recommended HP10x57 section using a smaller HP10x42 section to address steel corrosion. Analyses were conducted for a free-head condition and for the strong and weak lateral loading directions. Lateral pile group effects were included in the evaluations following Section 10.7.2.4 of 2011 California Amendments to AASHTO 2007. Resulting pile shear and bending moment solutions are presented in Appendix C. Pile-head shear, maximum bending moment, and the location of maximum moment are summarized in Table 10. Lateral solutions are provided for pile-head deflections from 0.25" to 5" at each support. Solutions for intermediate deflections can be linearly interpolated.

The solutions presented in Table 10 are entirely based on soil resistance and linear pile properties. Therefore, these values may be limited by the flexural strength (plastic moment) of the piles and pile-head connection details.

Table 10. Pilaster Lateral Pile Solutions

Proposed Pile Type	Lateral Deflection at Pile Head (inch)	Shear at Pile Head (kips)		Maximum Bending Moment (kip-in)		Depth from Pile Top to Maximum Moment (ft)	
		Strong	Weak	Strong	Weak	Strong	Weak
HP10x57	¼	7.4	5.2	252	145	5	4
	½	10.5	7.3	410	235	6	5
	1	14.9	10.3	670	385	7	5
	3	26.0	17.3	1,460	840	8	6
	5	32.2	20.9	2,090	1,210	8	7

5.4.1.3.5 Earth Pressures

The pilasters will retain new fill. For pilasters free to move laterally at the top, a static active lateral earth pressure of 36 psf per foot of depth is recommended for a free draining, level and compacted backfill. If lateral movement at the top of pilaster is restrained, the lateral earth pressure for level, free-draining, compacted granular backfill should follow Section 5.5.5.11 of the Caltrans BDS (Caltrans, 2004). For this condition, a soil unit weight of 120 pcf, coefficient of active lateral earth pressure of 0.3, and coefficient of at-rest lateral earth pressure of 0.44 is recommended. A uniform lateral pressure of at least 72 psf due to vehicle loads, equivalent to a vertical pressure produced by at least 2 ft of earth, should be added to the above lateral earth pressure. Under static loading, a maximum lateral passive earth pressure of 400 pcf per foot of depth can be used at the pilecap placed against level compacted backfill.

Seismic active earth pressure was determined using the Monobe-Okabe method. As presented in Section 11.8.6 of AASHTO (2007), the seismic earth pressures can be computed using a seismic coefficient equal to one-half of the peak acceleration. Therefore, a seismic coefficient of 0.19g can be used for the computation of seismic earth pressures. For level, free-draining, granular backfill, an incremental seismic active earth pressure of 15 psf per foot of depth can be used following Appendix A11.1.1.1 of the Caltrans Amendments 2011 in AASHTO 2007.

5.4.1.4 Pilaster Backfill

The pilaster walls will retain the same MSE wall backfill described in Section 5.4.1. The backfill should be free draining and meet Caltrans Standard Plans (2010b) and Section 19-3.02C of the Standard Specifications (2010c). Jetting or flooding to compact backfill is not recommended. Heavy compaction equipment, such as vibratory rollers, dozers, or loaders, should not be used adjacent to the walls in order to avoid damage due to earth pressures.

Backdrains should be installed behind the walls to relieve hydrostatic pressure in accordance with Bridge Detail 3-1 on Sheet B0-3 per Caltrans Standard Plans (2010b) or the geocomposite drain alternative per Section 6 of the Caltrans Bridge Design Details (1992).

5.4.2 Caltrans Type 1 Retaining Wall 203

5.4.2.1 Foundation Type

Wall 203 is proposed to be Caltrans cantilevered Type 1 Modified retaining walls (Caltrans, 2010b). This wall will be supported on spread footings and piles.

5.4.2.2 Spread Footings

The idealized soil profile and design strength parameters for retaining wall foundation design have been presented in Table 3. Soil settlement calculations were performed for the wall foundations using the footing bottom elevation shown on the wall plans, the Service Limit State bearing stress and footing width as shown in the Caltrans Standard Plans (Caltrans, 2010b). The recommended minimum overexcavation depths to limit footing settlements are presented in Table 11. Settlement calculations are presented in Appendix C.

Soil bearing capacity calculations were also performed for a level backfill using the footing bottom elevation shown on the wall plans and the recommended overexcavation and

recompaction depths. Based on these calculations included in Appendix C, the factored gross nominal bearing resistance for Strength Limit State exceeds the bearing stresses for the Strength Limit State presented in the Caltrans Standard Plans (Caltrans, 2010b).

The horizontal limits of the overexcavation should begin one foot from each edge of the footing bottom and extending downward at a 45-degree imaginary plane until the plane intersects the recommended minimum overexcavation depth. In some areas, the 45-degree imaginary plane could intersect temporary shoring. In this case only, the horizontal limit of the overexcavation should begin from the edge of the footing bottom and extending out a minimum of 1 foot and down until the plane intersects the recommended minimum overexcavation depth. Caltrans Structure Backfill should be used for backfilling with a minimum relative compaction of 95% of maximum density as determined by Caltrans Test Method 216. The overexcavation bottom should be proof rolled prior to backfilling. Further, the overexcavation bottom should be inspected by a qualified geotechnical engineer or technician to confirm the presence of an unyielding and competent surface.

Minimum footing embedment and offset (from a slope face) should conform to Section 4.4.5.1 of the Caltrans Bridge Design Specifications (2003).

Table 11. Overexcavation Depth for Caltrans Type 1 Wall 203

Wall No.	Wall Height (ft)	Approx. Road Grade El. (ft)	Bottom of Footing El. (ft)	Recommended Minimum Overexcavation Depth (ft)
203	14	+147.4	+144.0	2.0
	12	+161.5	+158.3	1.5
	8	+162.5	+159.3	1.0
	4	+162.5	+159.3	1.0

5.4.2.3 Piles

5.4.2.4 Foundation Data

For wall heights greater than 14 ft, Caltrans Class-90 driven pile foundations are recommended. Both driven and Cast-in-Drilled-Hole (CIDH) piles are constructible. HP10x57 steel piles are recommended because they can be battered and hard driving is anticipated. This pile size also includes a corrosion allowance (sacrificial steel) for corrosive soil conditions (Caltrans Memo to Designers 3-1, 2008).

Per Caltrans policy, the LRFD Service Limit State I load and Strength and Extreme Event Limit State load combinations are used for the design of Caltrans Type 1 Retaining Wall (Caltrans, 2010b) on pile footing.

The foundation design data sheet is presented in Table 12. Foundation loads were provided by the structural designers following the latest Caltrans Memo-to-Designers (Caltrans, 2008) and these loads are presented in Table 13.

Table 12. Foundation Design Data Sheet for Caltrans Type 1 Wall 203

Wall Height (ft)	Design Method	Pile Type	Finished Grade El. (ft)	Cut-off El. (ft)	Pile Cap Size (ft)		Permissible Settlement under Service Load (inch)	No. of Piles per Support
					B	L		
18	LRFD	HP10x57		+144.42	12.00	8	1	4
20	LRFD	HP10x57		+145.42	13.25	8	1	5
24	LRFD	HP10x57		+145.02	15.75	8	1	6
24	LRFD	HP10x57		+146.02	15.75	8	1	6
26	LRFD	HP10x57		+145.72	17.08	8	1	7
26	LRFD	HP10x57		+146.72	17.08	8	1	6
28	LRFD	HP10x57		+146.32	18.42	16	1	15
28	LRFD	HP10x57		+146.32	18.42	24	1	23
28	LRFD	HP10x57		+148.32	18.42	24	1	23
28	LRFD	HP10x57		+149.32	18.42	24	1	23
28	LRFD	HP10x57		+150.32	18.42	24	1	23
28	LRFD	HP10x57		+151.32	18.42	24	1	23
28	LRFD	HP10x57		+152.32	18.42	24	1	23
28	LRFD	HP10x57		+153.32	18.42	24	1	23
28	LRFD	HP10x57		+154.32	18.42	24	1	23
28	LRFD	HP10x57		+155.32	18.42	24	1	23
26	LRFD	HP10x57		+156.72	17.08	24	1	18
24	LRFD	HP10x57		+158.22	15.75	8	1	6
20	LRFD	HP10x57		+158.42	13.25	8	1	5
16	LRFD	HP10x57		+158.52	150.75	8	1	3

Table 13. Pile Foundation Design Loads for Caltrans Type 1 Wall 203

Support	Service-I Limit State (kips)			Strength Limit State (Controlling Group, kips)				Extreme Event Limit State (Controlling Group, kips)			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Max. Per Pile	Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
18	224	82	N/A	295	115	N/A	0	224	136	N/A	17
20	268	73	N/A	352	104	N/A	0	268	132	N/A	31
24	753	77	N/A	991	111	N/A	0	753	148	N/A	48
24	753	77	N/A	991	111	N/A	0	753	148	N/A	48
26	875	78	N/A	1152	114	N/A	0	875	168	N/A	84
26	875	78	N/A	1152	114	N/A	0	875	168	N/A	84
28	1020	81	N/A	1344	118	N/A	0	1020	171	N/A	75
28	1530	80	N/A	2017	116	N/A	0	1530	169	N/A	77
28	1530	80	N/A	2017	116	N/A	0	1530	169	N/A	77
28	1530	80	N/A	2017	116	N/A	0	1530	169	N/A	77
28	1530	80	N/A	2017	116	N/A	0	1530	169	N/A	77
28	1530	80	N/A	2017	116	N/A	0	1530	169	N/A	77
28	1530	80	N/A	2017	116	N/A	0	1530	169	N/A	77
28	1530	80	N/A	2017	116	N/A	0	1530	169	N/A	77
28	1530	80	N/A	2017	116	N/A	0	1530	169	N/A	77
28	1530	80	N/A	2017	116	N/A	0	1530	169	N/A	77
26	1312	81	N/A	1729	119	N/A	0	1312	175	N/A	90
24	376	77	N/A	496	111	N/A	0	376	148	N/A	48
20	268	73	N/A	352	104	N/A	0	268	132	N/A	31
16	184	68	N/A	241	97	N/A	0	184	113	N/A	31

5.4.2.5 Axial Capacity

Foundation design recommendations are presented in Table 14. The Pile Data Table for the contract plans is presented in Table 15.

Based on the pile layout provided by the structural designers, an axial pile group efficiency factor of 0.9 or 1.0 was used for foundation analysis following Section 10.8.3.6.3 of AASHTO 2007 with California Amendments (2011a). Calculations are documented in Appendix C.

The pile capacity is based on soil resistance only and may be further limited by the pile-head connection details and the strength of the pile materials.

Table 14. Pile Foundation Design Recommendations for Caltrans Type 1 Wall 203

Wall Height (ft)	Pile Type	Cut-off El. (ft)	Service-I Limit State Loads per Pile (kips)	Total Wall Settle-ment (in)	Required Factored Nominal Resistance (kips)				Design Tip El. (ft)	Spec. Tip El. (ft)	Nominal Driving Resistance Required (kips)
					Strength Limit		Extreme Event				
					Comp. (ϕ=0.7)	Tension (ϕ=0.7)	Comp. (ϕ=1.0)	Tension (ϕ=1.0)			
18	HP10x57	+144.42	82	1	115	0	136	17	+94 (a-I), +100 (a-II); +130 (b-II); +120 (c); +114 (d)	+94	170
20	HP10x57	+145.42	73	1	104	0	132	31	+99 (a-I); +101 (a-II); +127 (b-II); +121 (c); +115 (d)	+99	150
24	HP10x57	+145.02	77	1	111	0	148	48	+93 (a-I); +96 (a-II); +122 (b-II); +122 (c); +115 (d)	+93	160
24	HP10x57	+146.02	77	1	111	0	148	48	+94 (a-I); +97 (a-II); +123 (b-II); +122 (c); +116 (d)	+94	160
26	HP10x57	+145.72	78	1	114	0	168	84	+92 (a-I, a-II); +108 (b-II); +122 (c); +116 (d)	+92	170
26	HP10x57	+146.72	78	1	114	0	168	84	+93 (a-I, a-II); +109 (b-II); +122 (c); +116 (d)	+93	170
28	HP10x57	+146.32	81	1	118	0	171	75	+88 (a-I); +90 (a-II); +112 (b-II); +122 (c); +116 (d)	+88	180
28	HP10x57	+146.32	80	1	116	0	169	77	+90 (a-I, a-II); +112 (b-II); +122 (c); +116 (d)	+90	170
28	HP10x57	+148.32	80	1	116	0	169	77	+92 (a-I, a-II); +114 (b-II); +124 (c); +118 (d)	+92	170
28	HP10x57	+149.32	80	1	116	0	169	77	+94 (a-I, a-II); +116 (b-II); +125 (c); +119 (d)	+94	170
28	HP10x57	+150.32	80	1	116	0	169	77	+97 (a-I, a-II); +117 (b-II); +126 (c); +120 (d)	+97	170
28	HP10x57	+151.32	80	1	116	0	169	77	+99 (a-I, a-II); +119 (b-II); +127 (c); +121 (d)	+99	170
28	HP10x57	+152.32	80	1	116	0	169	77	+100 (a-I, a-II); +120 (b-II); +128 (c); +122 (d)	+100	170
28	HP10x57	+153.32	80	1	116	0	169	77	+101 (a-I, a-II); +121 (b-II); +129 (c); +123 (d)	+101	170
28	HP10x57	+154.32	80	1	116	0	169	77	+103 (a-I, a-II); +123 (b-II); +130 (c); +124 (d)	+103	170
28	HP10x57	+155.32	80	1	116	0	169	77	+104 (a-I, a-II); +124 (b-II); +131 (c); +125 (d)	+104	170
26	HP10x57	+156.72	81	1	119	0	175	90	+105 (a-I); +103 (a-II); +123 (b-II); +132 (c); +126 (d)	+103	180
24	HP10x57	+158.22	77	1	111	0	148	48	+113 (a-I); +115 (a-II); +136 (b-II); +134 (c); +128 (d)	+113	160
20	HP10x57	+158.42	73	1	104	0	132	31	+115 (a-I); +117 (a-II); +138 (b-II); +134 (c); +128 (d)	+115	150
16	HP10x57	+158.52	68	1	97	0	113	31	+117 (a-I); +121 (a-II); +138 (b-II); +134 (c); +128 (d)	+117	140

Notes:

1. Design tip elevations are controlled by the following demands: (a-I) Compression (Strength Limit), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), (c) Settlement, and (d) Lateral Load.
2. The specified tip elevations shall not be raised above the design tip elevation for Tension, Settlement, or Lateral Load.

Table 15. Pile Data Table for Caltrans Type 1 Wall 203

Wall Height (ft	Pile Type	Nominal Resistance (kips)		Design Tip El. (ft)	Specified Tip El. (ft)	Nominal Driving Resistance Required (kips)
		Compr.	Tension			
18	HP 10x57	170	20	+94 (a); +130 (b); +120 (c); +114 (d)	+94	170
20	HP 10x57	150	40	+99 (a); +127 (b); +121 (c); +115 (d)	+99	150
24	HP 10x57	160	50	+93 (a); +122 (b); +122 (c); +115 (d)	+93	160
24	HP 10x57	160	50	+94 (a); +123 (b); +122 (c); +116 (d)	+94	160
26	HP 10x57	170	90	+92 (a); +108 (b); +122 (c); +116 (d)	+92	170
26	HP 10x57	170	90	+93 (a); +109 (b); +122 (c); +116 (d)	+93	170
28	HP 10x57	180	80	+88 (a); +112 (b); +122 (c); +116 (d)	+88	180
28	HP 10x57	170	80	+90 (a); +112 (b); +122 (c); +116 (d)	+90	170
28	HP 10x57	170	80	+92 (a); +114 (b); +124 (c); +118 (d)	+92	170
28	HP 10x57	170	80	+94 (a); +116 (b); +125 (c); +119 (d)	+94	170
28	HP 10x57	170	80	+97 (a); +117 (b); +126 (c); +120 (d)	+97	170
28	HP 10x57	170	80	+99 (a); +119 (b); +127 (c); +121 (d)	+99	170
28	HP 10x57	170	80	+100 (a); +120 (b); +128 (c); +122 (d)	+100	170
28	HP 10x57	170	80	+101 (a); +121 (b); +129 (c); +123 (d)	+101	170
28	HP 10x57	170	80	+103 (a); +123 (b); +130 (c); +124 (d)	+103	170
28	HP 10x57	170	80	+104 (a); +124 (b); +131 (c); +125 (d)	+104	170
26	HP 10x57	180	90	+103 (a); +123 (b); +132 (c); +126 (d)	+103	180
24	HP 10x57	160	50	+113 (a); +136 (b); +134 (c); +128 (d)	+113	160
20	HP 10x57	150	40	+115 (a); +138 (b); +134 (c); +128 (d)	+115	150
16	HP 10x57	140	40	+117 (a); +138 (b); +134 (c); +128 (d)	+117	140

Notes:

1. Design tip elevations are controlled by the following demands: (a) Compression, (b) Tension, (c) Settlement, and (d) Lateral Load.
2. The specified tip elevations shall not be raised above the design tip elevations for Tension, Settlement, and Lateral Load.

5.4.2.6 Lateral Capacity

Results of lateral pile analysis along the strong-axis and weak-axis of a single steel pile with a free-head condition are presented in Appendix C and summarized in Table 16. Lateral pile analysis was performed for the recommended HP10x57 section using a smaller HP10x42 section to address steel corrosion. Lateral pile group effects were included in the evaluations following Section 10.7.2.4 of AASHTO (2007) with California Amendments (Caltrans, 2011a).

The maximum bending moment and the location of maximum moment are also presented. The solutions presented in Table 16 are entirely based on soil resistance and linear pile properties. Therefore, these values may be limited by the flexural strength (plastic moment) of the piles and pile-head connection details. The structural designer should compare the lateral pile demands with the results in Table 16 to determine whether the wall deflections are within tolerable limits.

Table 16. Lateral Pile Solutions for Caltrans Type 1 Wall 203

Wall Heights	Lateral Deflection at Pile Head (inch)	Shear at Pile Head (kips)		Maximum Bending Moment (kip-in)		Depth from Pile Top to Maximum Moment (ft)	
		Strong	Weak	Strong	Weak	Strong	Weak
H=16 to 28 ft	¼	10.7	7.8	315	180	5	3
	½	15.3	10.9	510	290	5	4
	1	21.8	15.4	830	475	6	4
	2	38.0	26.0	1,790	1,030	7	5
	5	47.0	31.7	2,550	1,480	7	5

5.4.2.7 Lateral Earth Pressures

For retaining wall design, static active lateral earth pressure of 36 psf per foot of depth is recommended for a free draining, level and compacted backfill. For retaining wall design, a static active lateral earth pressure of 48 psf per foot of depth is recommended for free-draining granular and compacted backfill with a backslope gradient of 2H:1V. If applicable, a uniform lateral pressure due to traffic loading, equivalent to a vertical pressure produced by at least 2 ft of earth with a soil unit weight of 120 pcf, should be added to the above lateral earth pressure. Using an active earth pressure of 0.3, the recommended uniform lateral earth pressure due to traffic loading is 72 psf.

Seismic active earth pressure was determined using the Monobe-Okabe method. As presented in Section 11.8.6 of AASHTO (2007), the seismic earth pressures can be computed using a seismic coefficient equal to half of the peak acceleration. Therefore, a seismic coefficient of 0.19g can be used for the computation of seismic earth pressures. For level free-draining granular and compacted backfill, an incremental seismic active earth pressure of 15 psf per foot of depth can be used following Appendix A11.1.1.1 of the California Amendments (2011a) in AASHTO (2007). For free-draining granular and compacted backfill with a backslope gradient of 2H:1V, an incremental seismic active earth pressure of 20 psf per foot of depth can be used.

5.4.2.8 Wall Backfill

Materials placed behind the retaining wall should be Structure Backfill per Section 19-3.02B (Caltrans, 2010c). The Structure Backfill requirement should be supplemental to the pervious backfill requirement as described in Caltrans Standard Plans (Caltrans, 2010b) and Caltrans Standard Specifications (Caltrans, 2010c) under Section 19-3.02C. Backfill should be placed in loose lifts not exceeding 8 inches in thickness, moisture-conditioned to near optimum moisture content, and compacted to at least 90 percent relative compaction. The relative compaction should be based on the maximum density determined by California Test 216. Jetting or flooding to compact backfill is not recommended. Heavy compaction equipment, such as vibratory rollers, dozers, or loaders, should not be used adjacent to the retaining walls in order to avoid damaging the walls due to large lateral earth pressures.

5.5 GLOBAL STABILITY ANALYSES

Global stability analyses were performed for both static and pseudostatic conditions and the results are presented in Appendix C. The soil strength parameters in Table 3 were used in the static and pseudo-static analysis. The maximum wall heights (H) at each of the following controlling wall sections were analyzed:

- RW 181 at about "A" Sta. 185+00 (H=29'2"),
- RW 183 at about "A" Sta. 189+50 (H=34'2"),
- RW 193 at about "A" Sta. 192+50 (H=44'2"), and
- RW 203 at about "A" Sta. 203+00 (H=28').

For each section, slope stability analyses were conducted for the static condition including a 2 ft soil surcharge (i.e., 240 psf) to represent traffic loading. Results of the analyses indicate that the calculated factor of safety for a deep-seated failure (global stability) met the required minimum factor-of-safety of 1.5 for a deep-seated failure.

For evaluation of global slope stability under pseudo-static conditions, Caltrans practice uses a horizontal seismic coefficient (k_h) equal to one-third of the PGA limited to 0.2 in accordance with Section 5.2.2.3 of Caltrans guidelines for Foundation Reports (2009). Therefore, a horizontal seismic coefficient of 0.13 was used in evaluating the global stability of the subject walls and slopes. Analysis indicates that the calculated factor of safety is greater than the required minimum of 1.1.

6.0 CONSTRUCTION RECOMMENDATIONS

6.1 EARTHWORK

Earthwork should be performed in accordance with Caltrans Standard Specifications, Section 19 (Caltrans, 2010c). Appropriate measures should be taken to prevent damage to adjacent structures and utilities. Any design and construction of temporary sloping, sheeting, or shoring should be made the contractor's responsibility. It should be noted that it is the responsibility of the contractor to oversee the safety of the workers in the field during construction. The contractor shall conform to all applicable occupational and health standards, rules, regulations, and orders established by the State of California. In addition, other State, County, or Municipal regulations may supersede the recommendations presented in this section. If a trench shoring design and safety plan is required, the geotechnical consultant should review the plan to confirm that recommendations presented in this report have been applied to the design.

Groundwater was discussed in Section 4.2. Groundwater is not expected to be encountered during footing construction. Should groundwater be encountered, it may be controlled in accordance with Section 19-3.03D of the Caltrans Standard Specifications (Caltrans, 2010c). If wet subgrade conditions are encountered during construction, the soft bottom will require stabilization prior to any earthwork. Subgrade stabilization can be accomplished by using a combination of geotextile, geogrid, gravel, or aggregate base. In addition, low ground pressure earthmoving equipment may be necessary during excavation and relatively lightweight equipment may be needed to compact the select material to minimize the potential for soil pumping.

6.2 PILE CONSTRUCTION

Piles should be driven at least to the specified tip elevation and the nominal driving resistance should be checked with the pile-driving formula given in Section 49-2.01A(4)(b) of the Caltrans Standard Specifications (2010b). However, if the specified tip elevation is reached without achieving the nominal driving resistance, pile driving should continue until the nominal driving resistance is attained. In this case, it may be prudent to allow the pile to "set up" before continuing the driving.

Pile driving at pilasters should occur after preloading (see Section 5.4.1.1) has been completed and residual settlement is less than ½" as indicated by settlement monitoring.

The selected pile-driving hammer such as diesel-type hammers should be able to deliver sufficient energy to drive the piles at a penetration rate of not less than 1/8 inch per blow at the required bearing value. Vibratory hammers, pre-drilling in native soils, and jetting are not allowed for pile installation.

Steel piles are anticipated to penetrate into bedrock materials. Based on the soil borehole data, hard driving is anticipated below approximately El. +36 ft for the pilaster at Wall 183 and approximately El. +70 ft for the pilaster at Wall 193. Hard driving is anticipated below approximately 25 to 45 ft depth below existing grades at Wall 203. Hard to very hard driving conditions are anticipated above the specified pile tip elevations, and the production rate will be

slow. Contractors should review the LOTB sheets and follow the requirements in the Caltrans Standard Specification (2010c) in selecting the pile driving equipment.

6.3 REVIEW OF CONSTRUCTION PLANS

Recommendations contained in this report are based on preliminary plans. The geotechnical consultant should review the final construction plans and specifications in order to confirm that the general intent of the recommendations contained in this report have been incorporated into the final construction documents. Recommendations contained in this report may require modification or additional recommendations may be necessary based on the final design.

6.4 GEOTECHNICAL OBSERVATION AND TESTING

It is recommended that inspections and testing be performed by the geotechnical consultant during the following stages of construction:

- Grading operations, including excavations and placement of compacted fill
- Shoring installation
- Spread and pile footing excavations and construction
- Pile installation
- Backdrain installation and backfilling of walls
- Removal or installation of support of buried utilities or structures, and
- When any unusual subsurface conditions are encountered.

7.0 LIMITATIONS

This report is intended for the use of OCTA, Parsons, and Caltrans for design and construction of Walls 181, 183, 193 and 203 proposed as part of the I-5 HOV Improvement Project (Segment 1). This report is based on the project as described and the information obtained from the exploratory borings at the approximate locations indicated on the attached plans. The findings and recommendations contained in this report are based on the results of the field investigation, laboratory tests, and engineering analyses. In addition, soils and subsurface conditions encountered in the exploratory borings are presumed to be representative of the project site. However, subsurface conditions and characteristics of soils between exploratory borings can vary. The findings reflect an interpretation of the direct evidence obtained. The recommendations presented in this report are based on the assumption that an appropriate level of quality control and quality assurance (inspections and tests) will be provided during construction. EMI should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations contained in this report are applicable to the specific design element(s) and location(s) which is (are) the subject of this report. They have no applicability to any other design elements or to any other locations and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of EMI.

EMI has no responsibility for construction means, methods, techniques, sequences, or procedures; for safety precautions or programs in connection with the construction; for the acts or omissions of the CONTRACTOR or any other person performing any of the construction; or for the failure of any worker to carry out the construction in accordance with the Final Construction Drawings and Specifications.

Services performed by EMI have been conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty or guarantee is included or intended.

8.0 REFERENCES

American Society for Testing and Materials (ASTM), 2008. Annual Book of Standards. Soil and Rock; Vol. 04.08.

American Association of State Highway and Transportation Officials (AASHTO), 2007, AASHTO LRFD Bridge Design Specifications, Fourth Edition, with 2008 and 2009 Interim Revisions, Washington, DC.

Argus, D.F., Heflin, M.B., Donnellan, A., Webb, F.H., Dong, D., Hurst, K.J., Jefferson, D.C., Lyzenga, G.A., Watkins, M.M., and Zumberge, J.F., 1999, Shortening and thickening of metropolitan Los Angeles measured and inferred by using geodesy: Geology, v. 27, p. 703-706.

Benioff, H., 1938, The determination of the extent of faulting with application to the Long Beach earthquake: Bulletin of the Seismological Society of America, v. 28, p. 77-84.

California Geological Survey, 2009, Tsunami Inundation Map for Emergency Planning, San Clemente quadrangle: Division of Mines and Geology.

_____, 2002, Division of Mines and Geology, Seismic Hazard Zone Report for the San Clemente 7.5-Minute Quadrangle, Orange County, Report 062.

California Department of Transportation (Caltrans), California Test Methods, various dates.

_____, 2011a, California Amendments to the AASHTO LRFD Bridge Design Specifications, Fourth Edition.

_____, 2011b, Caltrans Bridge Design Aids 3-8.

_____, 2010a, Seismic Design Criteria, Version 1.6.

_____, 2010b, Standard Plans.

_____, 2010c, Standard Specifications.

_____, 2009, Foundation Report Preparation for Bridge Foundations, Division of Engineering Services, Geotechnical Services.

_____, 2008, Memo to Designers 3-1, Supersedes Memo to Designers 3-1 Dated December 2000.

_____, 2004, Bridge Design Specifications.

_____, 2003, Corrosion Guidelines, Version 1.0; Office of Materials Engineering and Testing Services, Corrosion Technology Branch.

_____, 1992, Bridge Design Details, Section 6.

Earth Mechanics (EMI), 2013, Revised Final Foundation Report, Avenida Pico Undercrossing (Widen), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277 (EA 12-0F96A1).

_____, 2012a, Final Foundation Report, RW 190, Interstate 5 HOV Improvement Project, San Clemente, Orange County, California, 12-ORA-5, 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B).

_____, 2012b, Final Geotechnical Design Report, Interstate 5 HOV Improvement Project, San Clemente, Orange County, California, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B).

_____, 2012c, Final Materials Report, Interstate 5 HOV Improvement Project, San Clemente, Orange County, California, 12-ORA-5, 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B).

Ensoft, Inc., 2010, LPILE Plus Version 6.0, A Program for Analyzing Stress and Deformation of a Pile or Drilled Shaft under Lateral Loading, Austin, Texas.

Fumal, T.E., Pezzopane, S.K., Weldon, R.J. II, and Schwartz D.P., 1993, A 100-year average recurrence interval for the San Andreas fault at Wrightwood, California: Science, v. 259, p. 199-203.

Hauksson, E. and Gross, S., 1991, Source parameters of the 1933 Long Beach earthquake: Bulletin of the Seismological Society of American, v. 81, p. 81-98.

Hauksson, E., Jones, L.M., and Hutton, K., 1995, The 1994 Northridge earthquake sequence in California: seismological and tectonic aspects: Journal of Geophysical Research, v. 100, p. 12,335-12,355.

Jacoby, G., Sheppard, P., and Sieh, K., 1987, Was the 8 December 1812 California earthquake produced by the San Andreas fault? Evidence from trees near Wrightwood: Seismological Research Letters, v. 58, p. 14.

Jennings, C.W., 2010, Fault Activity Map of California and Adjacent Areas, Geologic Data Map No. 6, Department of Conservation, Division of Mines and Geology.

Lam, I.P., and Martin, G.R., 1986, Seismic Design of Highway Bridge Foundations, FHWA Report Nos. FHWA A/RD-86/102.

Robertson, P. K. and Campanella, R. G., 1989, Guidelines for Geotechnical Design Using CPT and CPTU, Civil Engineering Department, University of British Columbia, Vancouver, Canada.

Shao, G., and Hauksson, E., 2009, A finite fault study of the 29 July 2008 Mw5.4 Chino Hills Earthquake: Seismological Research Letters, v. 80, p.320-321.

Shaw, J.H., and Shearer, P.M., 1999, An elusive blind-thrust fault beneath metropolitan Los Angeles: Science, v. 283, p.1516 (5 March).

Shaw, J.H., Plesch, A., Dolan, J.F., Pratt, T.L., and Fiore, P., 2002, Puente Hills blind-thrust system, Los Angeles, California: Bulletin of the Seismological Society of America, v. 92, p. 2946-2960.

Ward, S.N., 1994, A multidisciplinary approach to seismic hazard in southern California: Bulletin of the Seismological Society of America, v. 84, p. 1293-1309.

Weldon, R., Scharer, K., Fumal, T., and Biasi, G., 2004, Wrightwood and the earthquake cycle: what a long recurrence record tells us about how faults work: Geological Society of America, GSA Today, v. 14, no. 9, p. 4-10.

Yeats, R.S., and Huftile, G.J., 1995, The Oak Ridge fault system and the 1994 Northridge earthquake: Nature, v. 373, p. 418-420.

Winterkorn, H.F. and Fang, H.Y., 1975, Foundation Design Handbook, Van Nostrand Reinhold Company, New York, NY.

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

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NOTES:

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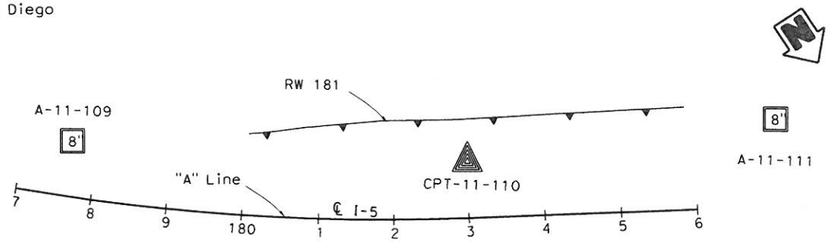
(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



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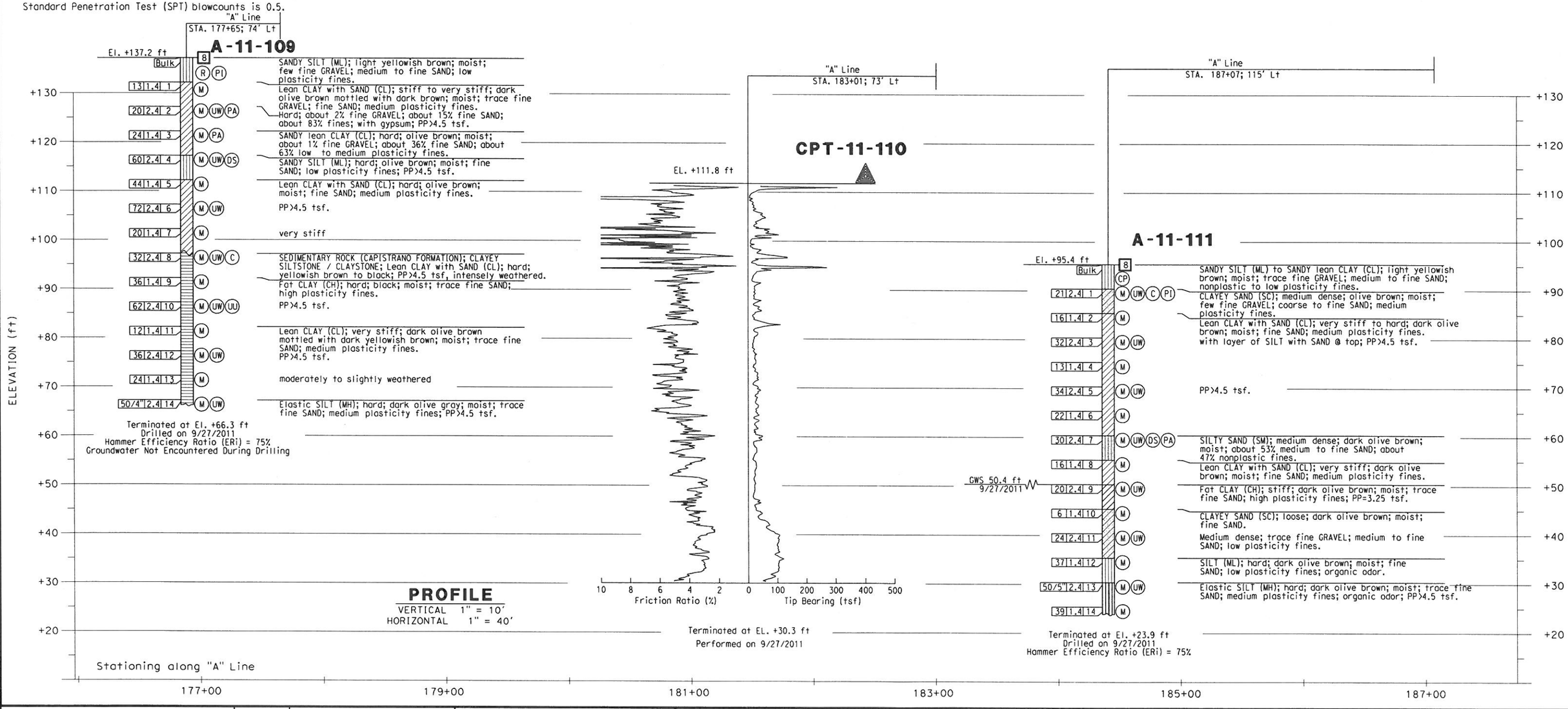

PROFILE

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NOTES:

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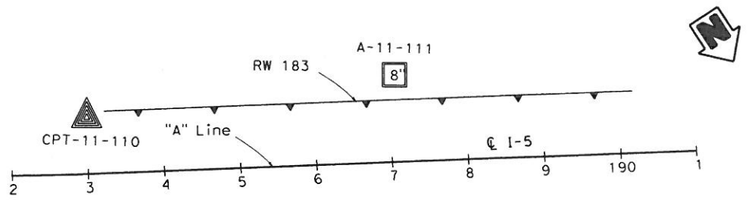
(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



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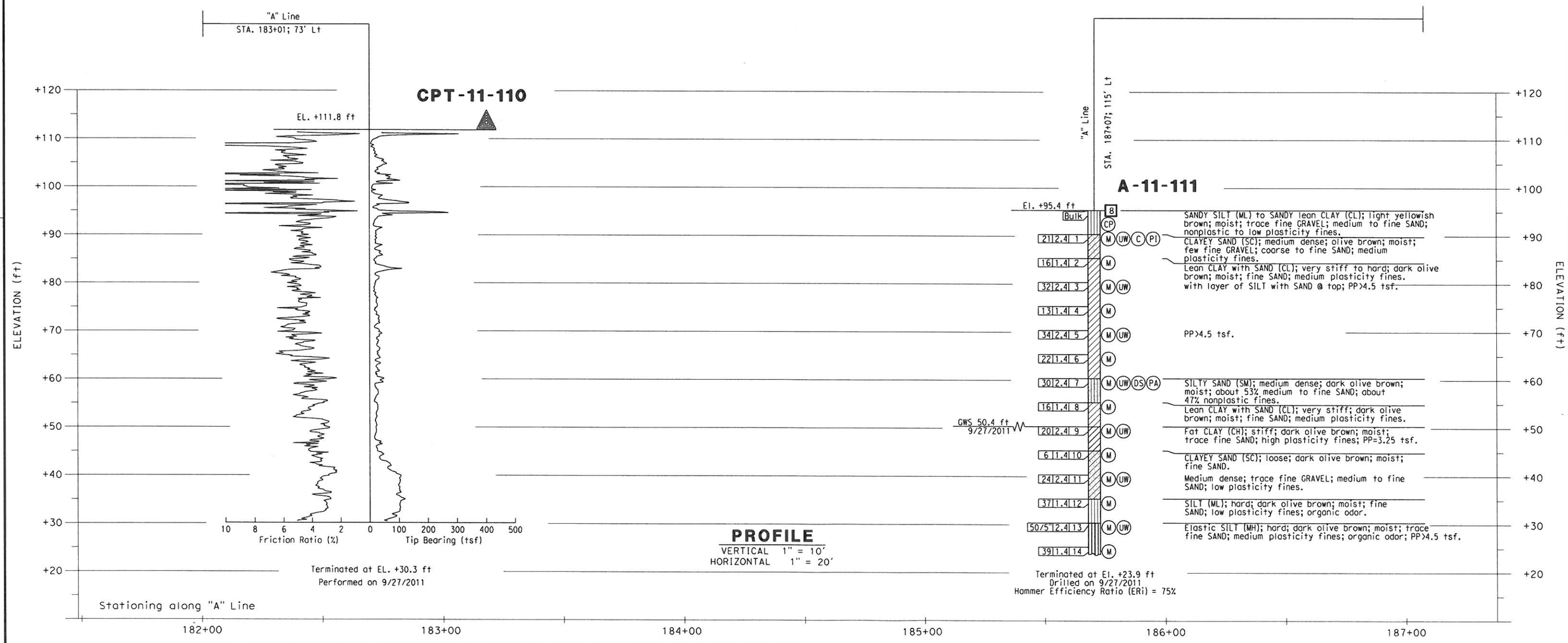

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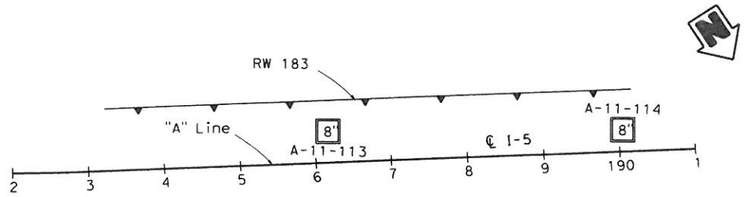

PLAN
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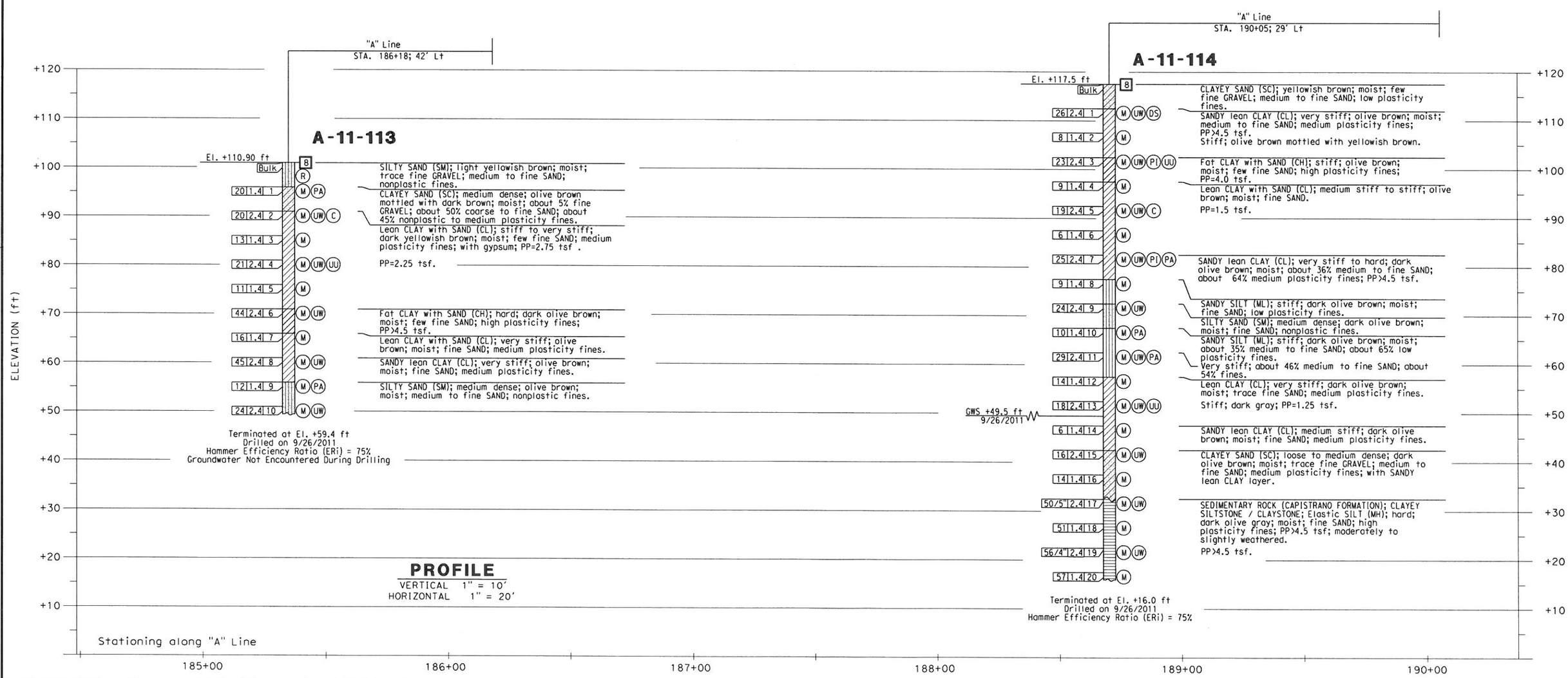

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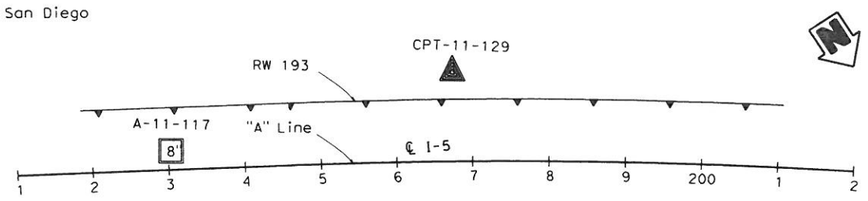

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1" = 100'

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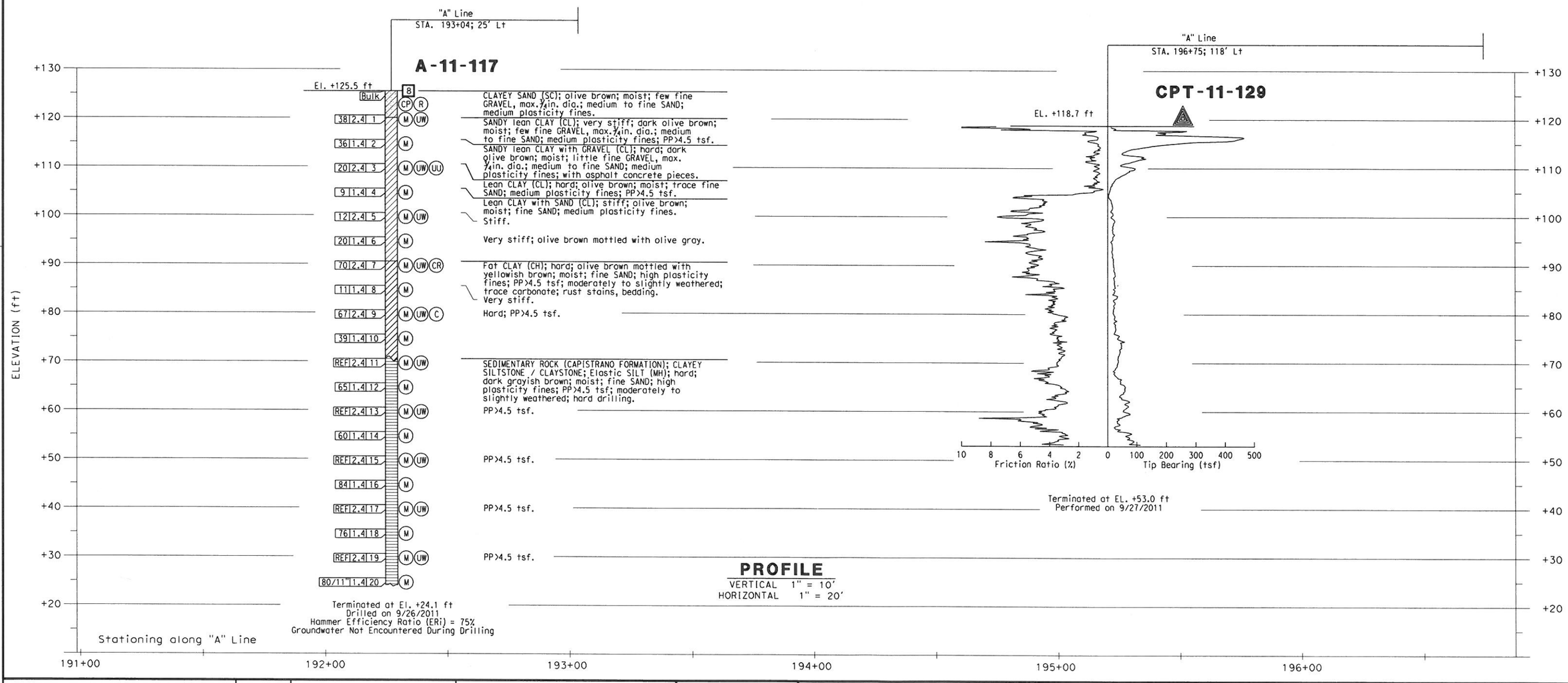
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR	BRIDGE NO. -	RETAINING WALL 193
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011		PROJECT ENGINEER	POST MILES -	LOG OF TEST BORINGS 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771 CONTRACT NO.: 12-OF96B1

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => $REQUEST

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¾" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

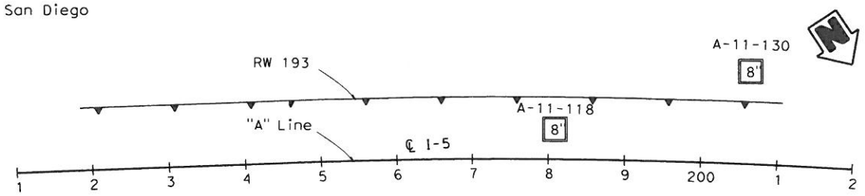
NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



PLAN

1" = 100'

To Los Angeles

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL — 10/01/12 DATE

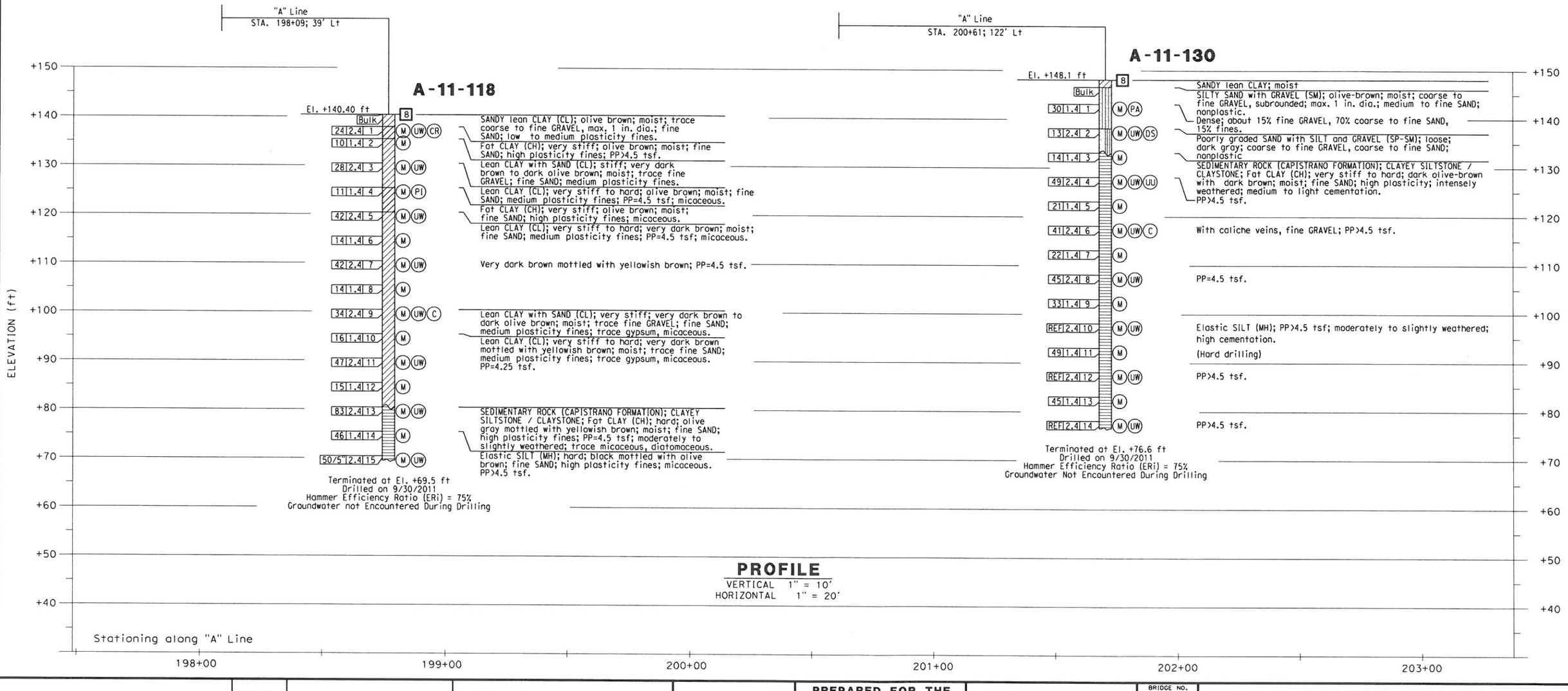
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-14 — GEOTECHNICAL — STATE OF CALIFORNIA

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011				POST MILES -

RETAINING WALL 193

LOG OF TEST BORINGS 2 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 12000202771 CONTRACT NO.: 12-0F96B1

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => $REQUEST

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL 10/01/12 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-14 — GEOTECHNICAL — STATE OF CALIFORNIA

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ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

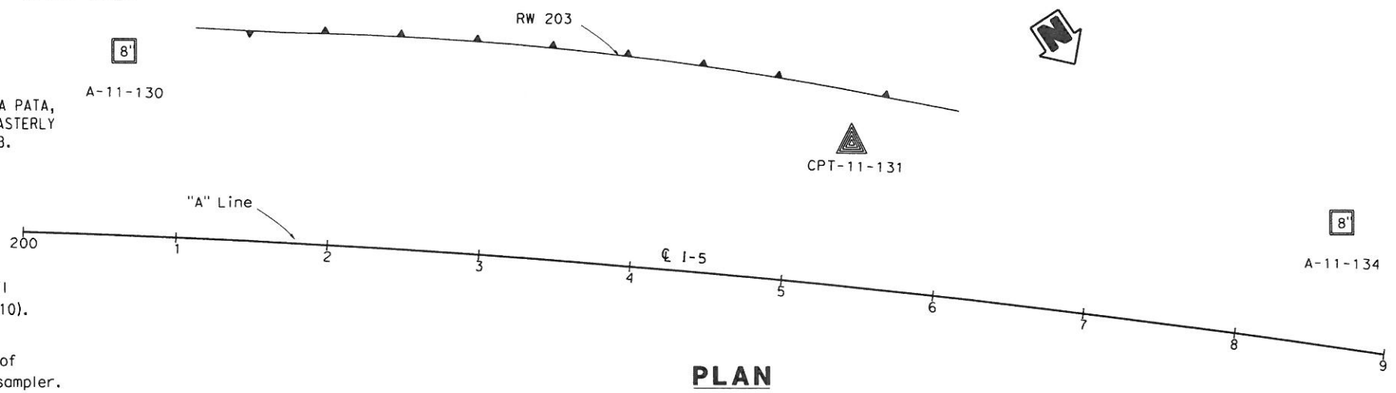
NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

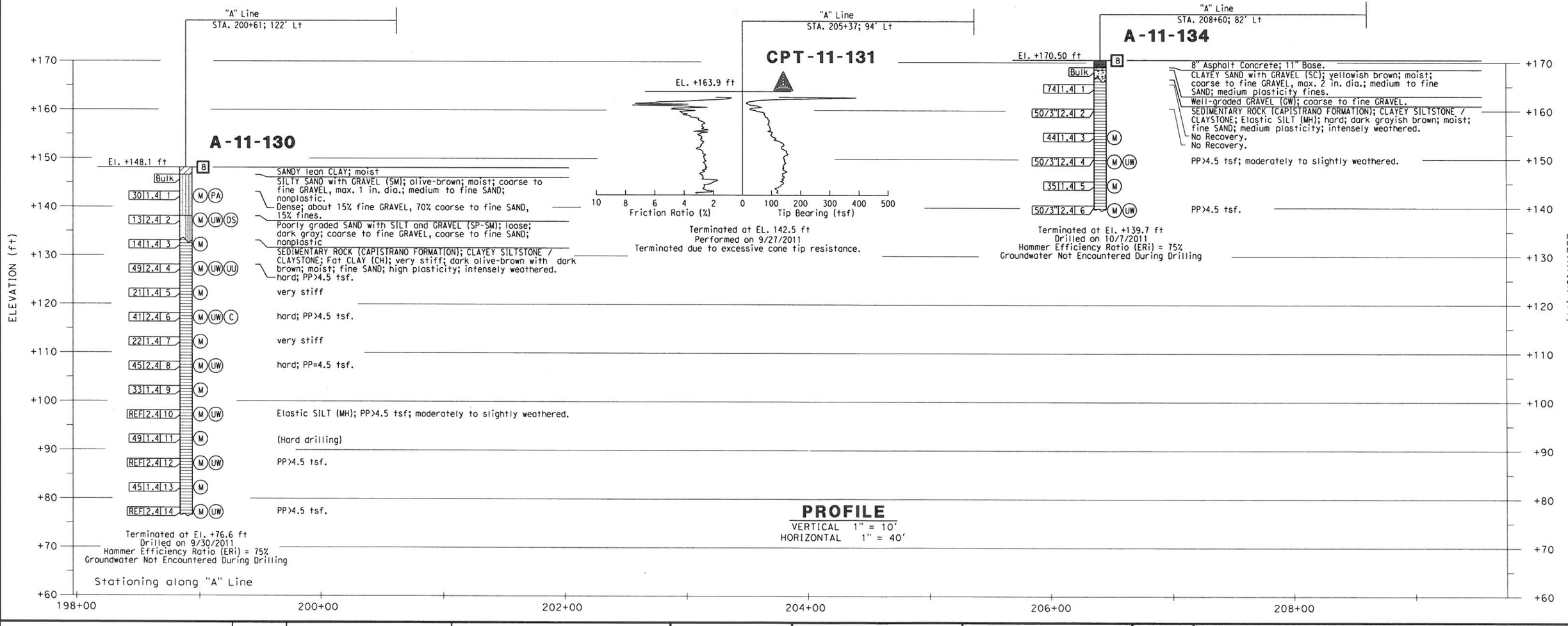
(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



PLAN
1" = 50'



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 40'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR	BRIDGE NO. -	RETAINING WALL 203
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011, 10/2011		PROJECT ENGINEER	POST MILES -	LOG OF TEST BORINGS 1 OF 1

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771 CONTRACT NO.: 12-0F96B1

DISREGARD PRINTS BEARING EARLIER REVISION DATES

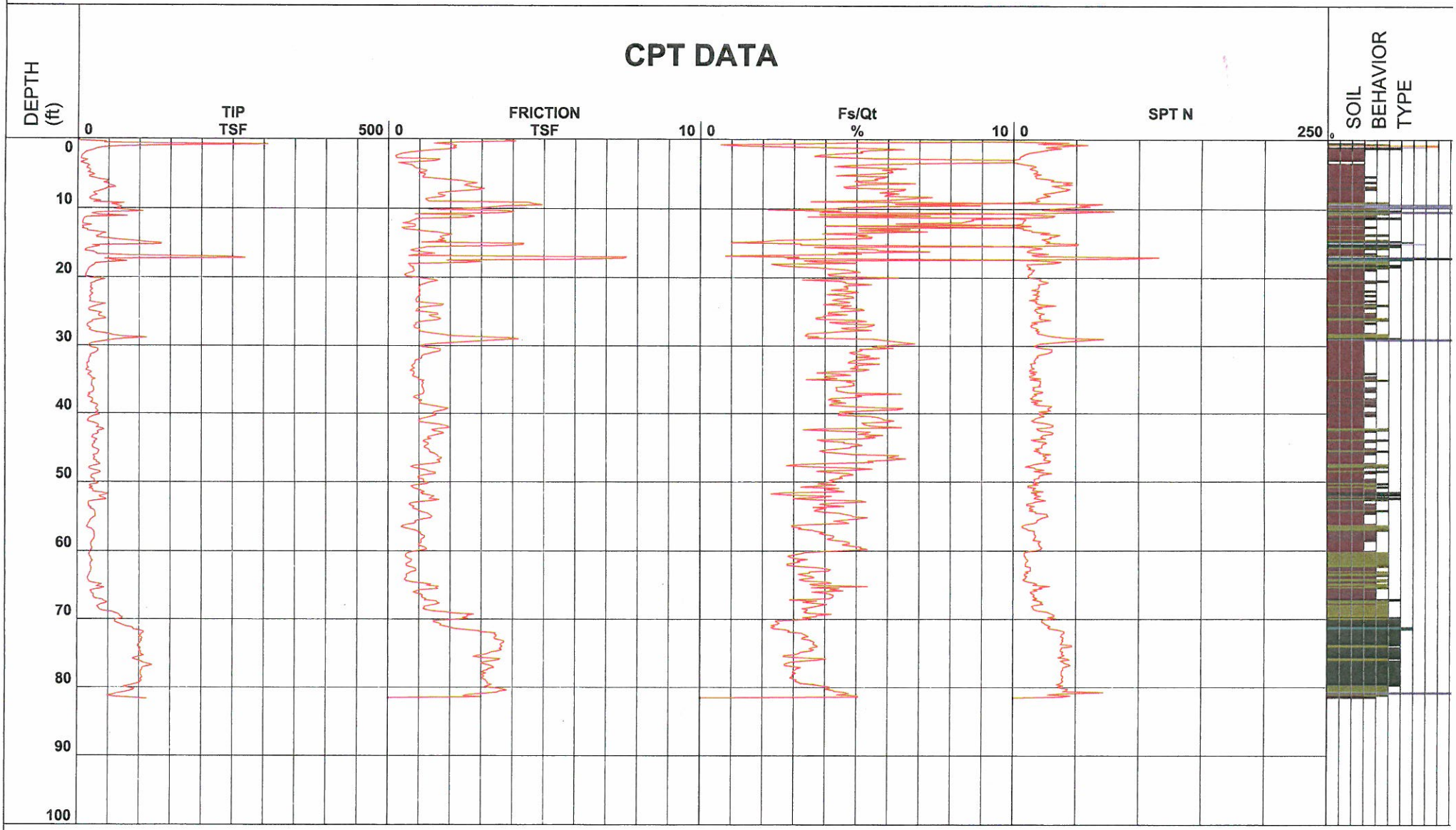
REVISION DATES				SHEET	OF

FILE => $REQUEST

Earth Mechanics

Location	I-5 HOV Widening Segment 1	Operator	BH-JB	Filename	SDF(530).cpt
Job Number	11-135	Cone Number	DSG1104	GPS	
Hole Number	CPT-11-110	Date and Time	9/27/2011 10:05:52 AM	Maximum Depth	81.69 ft
Water Table Depth	45.00 ft				

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln * PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT * R-N1 60%	Rel Den %	Ftn * Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk * -	Vol * Strn %	Dry Stlmt 0.00	Liq Stlmt 0.10	Cycl * SStn %
0.33	3.4	5.4	-	4.1	0.0	9.9	2	Organic SOILS - Peats	100	1.0	3	5	-	-	0.4	9.9	95	10	N/A	0.00	N/A	N/A
0.49	45.5	73.0	204.2	2.3	-0.1	5.0	4	clayy SILT to silty CLAY	115	2.0	23	36	-	-	3.2	9.9	31	15	N/A	0.00	N/A	N/A
0.66	42.6	68.3	158.6	1.5	-0.1	3.5	4	clayy SILT to silty CLAY	115	2.0	21	34	-	-	3.0	9.9	27	15	N/A	0.00	N/A	N/A
0.82	306.1	490.9	490.9	2.0	-0.2	0.7	7	grvly SAND to dense SAND	130	6.0	51	82	95	48	-	-	5	16	N/A	0.00	N/A	N/A
0.98	156.7	251.3	266.7	2.2	0.1	1.4	6	clean SAND to silty SAND	125	5.0	31	50	95	48	-	-	7	16	N/A	0.00	N/A	N/A
1.15	67.7	108.6	189.8	2.1	0.2	3.1	5	silty SAND to sandy SILT	120	4.0	17	27	70	48	-	-	20	16	N/A	0.00	N/A	N/A
1.31	39.4	63.2	201.8	2.2	0.2	5.5	4	clayy SILT to silty CLAY	115	2.0	20	32	-	-	2.8	9.9	34	15	N/A	0.00	N/A	N/A
1.48	30.2	48.5	-	2.0	0.2	6.5	3	silty CLAY to CLAY	115	1.5	20	32	-	-	2.1	9.9	41	15	N/A	0.00	N/A	N/A
1.64	26.4	42.4	-	1.4	-0.3	5.4	3	silty CLAY to CLAY	115	1.5	18	28	-	-	1.9	9.9	40	15	N/A	0.00	N/A	N/A
1.80	20.2	32.4	-	1.0	-1.6	5.1	3	silty CLAY to CLAY	115	1.5	13	22	-	-	1.4	9.9	43	15	N/A	0.00	N/A	N/A
1.97	13.5	21.6	-	0.7	-0.6	5.2	3	silty CLAY to CLAY	115	1.5	9	14	-	-	0.9	9.9	51	15	N/A	0.00	N/A	N/A
2.13	10.6	17.0	-	0.5	0.0	4.5	3	silty CLAY to CLAY	115	1.5	7	11	-	-	0.7	9.9	53	15	N/A	0.00	N/A	N/A
2.30	8.5	13.6	-	0.3	0.2	3.9	3	silty CLAY to CLAY	115	1.5	6	9	-	-	0.6	9.9	56	15	N/A	0.00	N/A	N/A
2.46	6.3	10.2	-	0.2	0.2	3.7	3	silty CLAY to CLAY	115	1.5	4	7	-	-	0.4	9.9	62	15	N/A	0.00	N/A	N/A
2.62	5.4	8.7	-	0.2	0.3	4.5	3	silty CLAY to CLAY	115	1.5	4	6	-	-	0.4	9.9	70	15	N/A	0.00	N/A	N/A
2.79	4.9	7.9	-	0.3	0.2	5.8	3	silty CLAY to CLAY	115	1.5	3	5	-	-	0.3	9.8	78	15	N/A	0.00	N/A	N/A
2.95	4.8	7.7	-	1.6	0.2	9.9	2	Organic SOILS - Peats	100	1.0	5	8	-	-	0.5	9.1	91	10	N/A	0.00	N/A	N/A
3.12	15.3	24.6	-	1.6	0.3	9.9	3	silty CLAY to CLAY	115	1.5	10	16	-	-	1.1	9.9	61	15	N/A	0.00	N/A	N/A
3.28	9.9	15.9	-	1.1	0.2	9.9	3	silty CLAY to CLAY	115	1.5	7	11	-	-	0.7	9.9	71	15	-	-	0.11	-
3.45	4.4	7.1	-	0.3	0.1	7.7	3	silty CLAY to CLAY	115	1.5	3	5	-	-	0.3	7.5	88	15	-	-	0.11	-
3.61	9.8	15.7	-	0.5	0.0	5.7	3	silty CLAY to CLAY	115	1.5	7	10	-	-	0.7	9.9	60	15	-	-	0.11	-
3.77	15.2	24.4	-	0.7	0.0	4.9	3	silty CLAY to CLAY	115	1.5	10	16	-	-	1.1	9.9	48	15	-	-	0.11	-
3.94	18.8	30.1	-	0.8	0.0	4.3	3	silty CLAY to CLAY	115	1.5	13	20	-	-	1.3	9.9	42	15	-	-	0.11	-
4.10	15.3	24.5	-	0.8	-0.2	5.5	3	silty CLAY to CLAY	115	1.5	10	16	-	-	1.1	9.9	50	15	-	-	0.11	-
4.27	13.9	22.2	-	0.9	-0.1	6.7	3	silty CLAY to CLAY	115	1.5	9	15	-	-	1.0	9.9	55	15	-	-	0.11	-
4.43	18.2	29.2	-	1.1	-1.3	5.9	3	silty CLAY to CLAY	115	1.5	12	19	-	-	1.3	9.9	48	15	-	-	0.11	-
4.59	20.2	32.5	-	1.2	-0.6	6.2	3	silty CLAY to CLAY	115	1.5	13	22	-	-	1.4	9.9	47	15	-	-	0.11	-
4.76	19.4	31.1	-	1.2	-0.3	6.2	3	silty CLAY to CLAY	115	1.5	13	21	-	-	1.4	9.9	48	15	-	-	0.11	-
4.92	16.4	26.4	-	1.0	-0.3	6.0	3	silty CLAY to CLAY	115	1.5	11	18	-	-	1.1	9.9	50	15	-	-	0.11	-
5.09	23.1	37.1	-	1.2	-0.3	5.2	3	silty CLAY to CLAY	115	1.5	15	25	-	-	1.6	9.9	41	15	-	-	0.11	-
5.25	27.0	43.3	-	1.2	-7.7	4.4	4	clayy SILT to silty CLAY	115	2.0	14	22	-	-	1.9	9.9	36	15	-	-	0.11	-
5.41	18.6	29.8	-	1.1	-9.2	6.1	3	silty CLAY to CLAY	115	1.5	12	20	-	-	1.3	9.9	48	15	-	-	0.11	-
5.58	18.8	30.2	-	1.1	-9.1	6.0	3	silty CLAY to CLAY	115	1.5	13	20	-	-	1.3	9.9	47	15	-	-	0.11	-
5.74	26.8	43.0	-	1.5	-9.0	5.6	3	silty CLAY to CLAY	115	1.5	18	29	-	-	1.9	9.9	40	15	-	-	0.11	-
5.91	33.4	53.5	-	1.9	-9.0	5.7	3	silty CLAY to CLAY	115	1.5	22	36	-	-	2.3	9.9	37	15	-	-	0.11	-
6.07	47.8	76.6	208.1	2.4	-9.0	5.0	4	clayy SILT to silty CLAY	115	2.0	24	38	-	-	3.4	9.9	30	15	0.00	-	0.11	0.0
6.23	49.7	79.7	216.7	2.5	-9.0	5.1	4	clayy SILT to silty CLAY	115	2.0	25	40	-	-	3.5	9.9	30	15	0.00	-	0.11	0.0
6.40	41.5	66.5	-	2.8	-8.9	6.9	9	very stiff fine SOIL	120	2.0	21	33	54	43	-	-	37	30	-	-	0.11	-
6.56	49.1	77.8	215.6	2.5	-8.9	5.2	4	clayy SILT to silty CLAY	115	2.0	25	39	-	-	3.5	9.9	31	15	0.00	-	0.11	0.0
6.73	49.1	76.8	209.7	2.4	-8.9	5.0	4	clayy SILT to silty CLAY	115	2.0	25	38	-	-	3.5	9.9	30	15	0.00	-	0.11	0.0
6.89	57.0	88.0	213.3	2.6	-8.9	4.6	4	clayy SILT to silty CLAY	115	2.0	28	44	-	-	4.0	9.9	28	15	0.00	-	0.11	0.0
7.05	60.6	92.6	221.0	2.8	-8.9	4.7	9	very stiff fine SOIL	120	2.0	30	46	64	44	-	-	27	30	0.00	-	0.11	0.0
7.22	47.1	75.5	246.9	3.1	-8.8	6.6	9	very stiff fine SOIL	120	2.0	24	38	58	43	-	-	35	30	0.00	-	0.11	0.0
7.38	44.0	70.6	-	2.9	-8.8	6.5	9	very stiff fine SOIL	120	2.0	22	35	56	43	-	-	36	30	-	-	0.11	-
7.55	38.0	61.0	-	2.3	-8.7	6.2	3	silty CLAY to CLAY	115	1.5	25	41	-	-	2.7	9.9	37	15	-	-	0.11	-
7.71	32.5	52.2	-	1.9	-8.7	5.8	3	silty CLAY to CLAY	115	1.5	22	35	-	-	2.3	9.9	38	15	-	-	0.11	-
7.87	25.2	40.5	-	1.6	-8.6	6.5	3	silty CLAY to CLAY	115	1.5	17	27	-	-	1.8	9.9	44	15	-	-	0.11	-
8.04	27.0	43.3	-	1.6	-8.6	6.1	3	silty CLAY to CLAY	115	1.5	18	29	-	-	1.9	9.9	42	15	-	-	0.11	-
8.20	30.9	49.5	-	1.8	-8.6	6.0	3	silty CLAY to CLAY	115	1.5	21	33	-	-	2.2	9.9	39	15	-	-	0.11	-
8.37	23.7	38.0	-	1.8	-8.6	7.6	3	silty CLAY to CLAY	115	1.5	16	25	-	-	1.7	9.9	48	15	-	-	0.11	-
8.53	20.4	32.7	-	1.4	-8.7	7.0	3	silty CLAY to CLAY	115	1.5	14	22	-	-	1.4	9.9	49	15	-	-	0.11	-
8.69	18.7	30.1	-	1.2	-8.7	6.5	3	silty CLAY to CLAY	115	1.5	12	20	-	-	1.3	9.9	49	15	-	-	0.11	-
8.86	22.0	35.3	-	1.2	-8.7	5.7	3	silty CLAY to CLAY	115	1.5	15	24	-	-	1.5	9.9	44	15	-	-	0.11	-
9.02	36.7	49.5	140.9	1.3	-8.6	3.6	4	clayy SILT to silty CLAY	115	2.0	18	25	-	-	2.6	9.9	31	15	1.05	-	0.11	35.9
9.19	25.9	41.5	-	4.5	-8.7	9.9	3	silty CLAY to CLAY	115	1.5	17	28	-	-	1.8	9.9	52	15	-	-	0.10	-
9.35	74.5	98.7	274.2	4.6	-8.7	6.3	9	very stiff fine SOIL	120	2.0	37	49	67	44	-	-	31	30	0.00	-	0.10	0.0
9.51	55.1	88.4	-	4.9	-8.8	9.1	9	very stiff fine SOIL	120	2.0	28	44	63	43	-	-	38	30	-	-	0.10	-
9.68	64.3	83.6	239.0	3.7	-8.5	5.8	9	very stiff fine SOIL	120	2.0	32	42	61	44	-	-	31	30	0.00	-	0.10	0.0
9.84	70.9	91.5	220.3	3.3	-8.5	4.7	9	very stiff fine SOIL	120	2.0	35	46	64	44	-	-	27	30	0.00	-	0.10	0.0
10.01	67.6	86.4	202.1	2.9	-8.4	4.3	4	clayy SILT to silty CLAY	115	2.0	34	43	-	-	4.7	9.9	27	15	0.00	-	0.10	0.0
10.17	59.6	75.6	132.5	1.3	-8.4	2.2	5	silty SAND to sandy SILT	120	4.0	15	19	58	43	-	-	20	16	1.56	-	0.10	18.2
10.34	83.9	105.4	231.7	3.8	-2.4	4.5	9	very stiff fine SOIL	120	2.0	42	53	69	45	-	-	25	30	0.00	-	0.10	0.0
10.50	105.3	131.3	238.7	4.0	-2.0	3.8	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	7.0	9.9	21	16	0.00	-	0.10	0.0
10.66	33.7	54.1	-	3.5	-0.7	9.9	3	silty CLAY to CLAY	115	1.5	22	36	-	-	2.4	9.9	47	15	-	-	0.10	-
10.83	22.6	36.1	-	0.9	-0.4	3.9	4	clayy SILT to silty CLAY	115	2.0	11	18	-	-	1.6	9.9	38	15	-	-	0.10	-
10.99	34.5	54.3	-	2.5	-0.2	7.5	3	silty CLAY to CLAY	115	1.5	23	36	-	-	2.4	9.9	42	15	-	-	0.10	-
11.16	80.1	97.0	190.6	2.8	-0.5	3.5	5	silty SAND to sandy SILT	120	4.0	20	24	66	44	-	-	23	16	0.00	-	0.10	0.0
11.32	14.8	22.6	-	2.5	-0.3	9.9	3	silty CLAY to CLAY	115	1.5	10	15	-	-	1.0	9.9	64	15	-	-	0.10	-
11.48	10.7	16.2	-	0.9	-0.6	9.2	3	silty CLAY to CLAY	115	1.5	7	11	-	-	0.7	8.3	70	15	-	-	0.10	-
11.65	9.7	14.4	-	0.8	-0.8	9.4	3	silty CLAY to CLAY	115	1.5	6	10	-	-	0.7	7.3	74	15	-	-	0.10	-
11.81	8.8	12.8	-	0.7	-1.0	9.2	3	silty CLAY to CLAY	115	1.5	6	9	-	-	0.6	6.5	76	15	-	-	0.10	-
11.98	8.4	12.1	-	0.7	-2.0	9.1	3	silty CLAY to CLAY	115	1.5	6	8	-	-	0.6	6.1	78	15	-	-	0.10	-
12.14	7.7	10.9	-	0.5	-2.3	6.9	3	silty CLAY to CLAY	115	1.5	5	7	-	-	0.5	5.5	74	15	-	-	0.10	-
12.30	8.4	11.8	-	0.8	-3.8	9.9	3	silty CLAY to CLAY	115	1.5	6	8	-	-	0.6	5.9	81	15	-	-	0.10	-
12.47	22.0	30.5	-	0.9	-6.1	4.1	4	clayy SILT to silty CLAY	115	2.0	11	15	-	-	1.5	9.9	41	15	-	-	0.10	-
12.63	7.6	10.4	-	0.9	-0.6	9.9	3	silty CLAY to CLAY	115	1.5	5	7	-	-	0.5	5.3	84	15	-	-	0.10	-
12.80	8.8	11.9	-	0.4	-1.2	5.5	3	silty CLAY to CLAY	115	1.5	6	8	-	-	0.6	6.1	67	15	-	-	0.10	-
12.96	7.9	10.5	-	0.5	-1.5	7.4	3	silty CLAY to CLAY	115	1.5	5	7	-	-	0.5	5.3	77	15	-	-	0.10	-
13.12	16.0	21.1	-	0.8	-1.4	5.3	3	silty CLAY to CLAY	115	1.5	11	14	-	-	1.1	9.9	53	15	-	-	0.10	-
13.29	15.6	20.3	-	1.1	-1.4	7.6	3	silty CLAY to CLAY	115	1.5	10	14	-	-	1.1	9.9	61	15	-	-	0.10	-
13.45	30.1	38.8	-	1.6	-1.2	5.4	3	silty CLAY to CLAY	115	1.5	20	26	-	-	2.1	9.9	42	15	-	-	0.10	-
13.62	45.7	50.1	150.3	1.8	-1.3	4.0	4	clayy SILT to silty CLAY	115	2.0	23	25	-	-	3.2	9.9	33	15	0.81	-	0.10	32.9
13.78	38.3	48.2	-	2.0	-1.2	5.5	3	silty CLAY to CLAY	115	1.5	26	32	-	-	2.7	9.9	38	15	-	-	0.10	-
13.94	36.0	44.7	-	1.8	-1.1	5.1	3	silty CLAY to CLAY	115	1.5	24	30	-	-	2.5	9.9	38	15	-	-	0.10	-
14.11	30.3	37.2	-	1.7	-1.2	5.6	3	silty CLAY to CLAY	115	1.5	20	25	-	-	2.1	9.9	43	15	-	-	0.10	-
14.27	31.2	37.9	-	1.7	-1.1	5.6	3	silty CLAY to CLAY	115	1.5	21	25	-	-	2.2	9.9	43	15	-	-	0.10	-
14.44	47.8	50.9	148.7	1.8	-1.0	3.9	4	clayy SILT to silty CLAY	115	2.0	24	25	-	-	3.3	9.9	32	15	0.92	-	0.10	31.5
14.60	66.8	70.7	135.1	1.6	-1.1	2.5	5	silty SAND to sandy SILT	120	4.0	17	18	56	42	-	-	22	16	1.58	-	0.10	24.4
14.76	90.5	95.2	146.4	1.8	-1.5	2.1	5	silty SAND to sandy SILT	120	4.0	23	24	65	44	-	-	17	16	1.03	-	0.10	6.2
14.93	108.8	113.8	132.5	1.1	-2.9	1.0	6	clean SAND to silty SAND	125	5.0	22	23	71	44	-	-	10	16	1.70	-	0.09	9.6
15.09	135.1	140.5	227.6	4.4	-1.4	3.2	5	silty SAND to sandy SILT	120	4.0	34	35	78	45	-	-	18	16	0.00	-	0.09	0.0
15.26	134.3	138.8	225.5	4.3	-1.9	3.2	5	silty SAND to sandy SILT	120	4.0	34	35	78	45	-	-	18	16	0.00	-	0.09	0.0
15.42	23.9	26.8	-	3.7	-0.4	9.9	3	silty CLAY to CLAY	115	1.5	16	18	-	-	1.7	9.9	60	15	-	-	0.09	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.10	Cycl SStn %
15.58	34.9	38.7	-	1.3	-0.6	3.8	4	clayy SILT to silty CLAY	115	2.0	17	19	-	-	2.4	9.9	36	15	-	-	0.09	-
15.75	24.0	26.3	-	1.1	-0.9	4.9	3	silty CLAY to CLAY	115	1.5	16	18	-	-	1.7	9.9	47	15	-	-	0.09	-
15.91	15.7	17.0	-	0.9	-0.4	6.0	3	silty CLAY to CLAY	115	1.5	10	11	-	-	1.1	9.3	60	15	-	-	0.09	-
16.08	12.7	13.6	-	0.7	-0.8	6.2	3	silty CLAY to CLAY	115	1.5	8	9	-	-	0.9	7.4	66	15	-	-	0.09	-
16.24	11.8	12.5	-	0.9	-2.5	8.0	3	silty CLAY to CLAY	115	1.5	8	8	-	-	0.8	6.7	74	15	-	-	0.09	-
16.40	25.6	27.0	-	1.1	-2.6	4.6	3	silty CLAY to CLAY	115	1.5	17	18	-	-	1.8	9.9	45	15	-	-	0.09	-
16.57	29.1	30.4	-	1.5	-2.6	5.3	3	silty CLAY to CLAY	115	1.5	19	20	-	-	2.0	9.9	46	15	-	-	0.09	-
16.73	31.8	32.9	-	1.0	-2.6	3.3	4	clayy SILT to silty CLAY	115	2.0	16	16	-	-	2.2	9.9	36	15	-	-	0.09	-
16.90	81.8	80.3	98.5	0.7	-2.5	0.8	6	clean SAND to silty SAND	125	5.0	16	16	60	43	-	-	11	16	2.37	-	0.09	23.0
17.06	241.9	236.4	321.2	7.6	-0.3	3.2	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	16.0	9.9	14	16	0.00	-	0.09	0.0
17.23	270.2	262.9	332.2	7.5	-0.4	2.8	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	17.9	9.9	12	16	0.00	-	0.09	0.0
17.39	43.9	43.6	-	5.9	-0.4	9.9	3	silty CLAY to CLAY	115	1.5	29	29	-	-	3.1	9.9	51	15	-	-	0.09	-
17.55	56.5	54.4	142.7	1.9	-0.4	3.4	4	clayy SILT to silty CLAY	115	2.0	28	27	-	-	4.0	9.9	29	15	1.26	-	0.09	29.9
17.72	79.4	76.2	176.8	3.0	-0.5	3.8	4	clayy SILT to silty CLAY	115	2.0	40	38	-	-	5.6	9.9	26	15	0.00	-	0.08	0.0
17.88	49.5	47.8	-	2.5	-0.4	5.1	4	clayy SILT to silty CLAY	115	2.0	25	24	-	-	3.5	9.9	37	15	-	-	0.08	-
18.05	28.4	27.1	-	0.7	-0.3	2.4	4	clayy SILT to silty CLAY	115	2.0	14	14	-	-	2.0	9.9	35	15	-	-	0.08	-
18.21	28.0	26.6	-	0.7	-0.3	2.6	4	clayy SILT to silty CLAY	115	2.0	14	13	-	-	1.9	9.9	37	15	-	-	0.08	-
18.37	25.0	23.5	-	0.7	-0.3	3.0	4	clayy SILT to silty CLAY	115	2.0	12	12	-	-	1.7	9.9	41	15	-	-	0.08	-
18.54	22.1	20.6	-	0.8	-0.3	3.9	3	silty CLAY to CLAY	115	1.5	15	14	-	-	1.5	9.9	48	15	-	-	0.08	-
18.70	19.1	17.7	-	0.8	-0.4	4.4	3	silty CLAY to CLAY	115	1.5	13	12	-	-	1.3	9.9	53	15	-	-	0.08	-
18.87	17.7	16.2	-	0.8	-0.3	5.0	3	silty CLAY to CLAY	115	1.5	12	11	-	-	1.2	9.1	58	15	-	-	0.08	-
19.03	17.1	15.5	-	0.8	-1.1	5.2	3	silty CLAY to CLAY	115	1.5	11	10	-	-	1.2	8.7	59	15	-	-	0.08	-
19.19	15.6	14.0	-	0.8	-0.9	5.5	3	silty CLAY to CLAY	115	1.5	10	9	-	-	1.1	7.8	63	15	-	-	0.08	-
19.36	15.2	13.6	-	0.7	-0.7	4.9	3	silty CLAY to CLAY	115	1.5	10	9	-	-	1.0	7.6	61	15	-	-	0.08	-
19.52	14.0	12.4	-	0.6	-1.1	4.5	3	silty CLAY to CLAY	115	1.5	9	8	-	-	0.9	6.9	62	15	-	-	0.08	-
19.69	12.9	11.3	-	0.5	-0.4	4.5	3	silty CLAY to CLAY	115	1.5	9	8	-	-	0.9	6.3	65	15	-	-	0.08	-
19.85	13.0	11.3	-	0.6	-0.4	5.1	3	silty CLAY to CLAY	115	1.5	9	8	-	-	0.9	6.2	67	15	-	-	0.08	-
20.01	14.4	12.5	-	0.9	-0.2	6.9	3	silty CLAY to CLAY	115	1.5	10	8	-	-	1.0	6.9	71	15	-	-	0.08	-
20.18	23.4	20.1	-	1.1	0.0	5.2	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.6	9.9	53	15	-	-	0.08	-
20.34	44.1	39.5	124.5	1.4	-0.1	3.4	4	clayy SILT to silty CLAY	115	2.0	22	20	-	-	3.1	9.9	34	15	1.95	-	0.08	51.2
20.51	36.2	30.5	-	1.6	-4.3	4.6	3	silty CLAY to CLAY	115	1.5	24	20	-	-	2.5	9.9	43	15	-	-	0.08	-
20.67	29.4	24.6	-	1.4	-3.9	4.9	3	silty CLAY to CLAY	115	1.5	20	16	-	-	2.0	9.9	48	15	-	-	0.08	-
20.83	26.8	22.2	-	1.2	-3.9	4.9	3	silty CLAY to CLAY	115	1.5	18	15	-	-	1.8	9.9	50	15	-	-	0.08	-
21.00	20.9	17.2	-	1.1	-4.0	5.8	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	9.9	59	15	-	-	0.08	-
21.16	21.5	17.6	-	1.0	-4.0	5.0	3	silty CLAY to CLAY	115	1.5	14	12	-	-	1.5	9.9	56	15	-	-	0.08	-
21.33	22.3	18.1	-	1.0	-4.0	4.9	3	silty CLAY to CLAY	115	1.5	15	12	-	-	1.5	9.9	55	15	-	-	0.08	-
21.49	21.1	17.0	-	1.0	-4.0	5.0	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	9.8	57	15	-	-	0.08	-
21.65	20.9	16.7	-	1.0	-4.0	5.0	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	9.6	57	15	-	-	0.08	-
21.82	24.3	19.2	-	1.0	-3.9	4.4	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.7	9.9	52	15	-	-	0.08	-
21.98	21.8	17.1	-	1.0	-4.0	5.0	3	silty CLAY to CLAY	115	1.5	15	11	-	-	1.5	9.9	56	15	-	-	0.08	-
22.15	20.0	15.7	-	1.0	-3.9	5.4	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.4	9.0	60	15	-	-	0.08	-
22.31	21.2	16.4	-	1.0	-3.9	5.0	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	9.5	57	15	-	-	0.08	-
22.47	24.8	19.1	-	1.0	-3.8	4.3	3	silty CLAY to CLAY	115	1.5	17	13	-	-	1.7	9.9	51	15	-	-	0.08	-
22.64	22.2	17.0	-	1.0	-3.9	4.9	3	silty CLAY to CLAY	115	1.5	15	11	-	-	1.5	9.9	56	15	-	-	0.08	-
22.80	20.0	15.2	-	1.0	-3.9	5.2	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.4	8.8	60	15	-	-	0.08	-
22.97	19.0	14.3	-	0.9	-3.9	5.3	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.3	8.3	62	15	-	-	0.08	-
23.13	20.9	15.6	-	0.9	-3.9	4.7	3	silty CLAY to CLAY	115	1.5	14	10	-	-	1.4	9.0	57	15	-	-	0.08	-
23.30	21.1	15.7	-	0.9	-3.9	4.5	3	silty CLAY to CLAY	115	1.5	14	10	-	-	1.4	9.1	57	15	-	-	0.08	-
23.46	20.1	14.8	-	0.9	-3.9	4.8	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.4	8.6	59	15	-	-	0.08	-
23.62	19.1	14.0	-	0.9	-3.9	5.2	3	silty CLAY to CLAY	115	1.5	13	9	-	-	1.3	8.1	62	15	-	-	0.08	-
23.79	30.1	21.9	-	1.3	-3.9	4.6	3	silty CLAY to CLAY	115	1.5	20	15	-	-	2.1	9.9	50	15	-	-	0.08	-
23.95	45.0	32.5	-	1.8	-3.8	4.1	4	clayy SILT to silty CLAY	115	2.0	22	16	-	-	3.1	9.9	40	15	-	-	0.08	-
24.12	35.7	25.6	-	1.7	-3.9	5.0	3	silty CLAY to CLAY	115	1.5	24	17	-	-	2.5	9.9	48	15	-	-	0.08	-
24.28	29.4	20.9	-	1.3	-3.8	4.8	3	silty CLAY to CLAY	115	1.5	20	14	-	-	2.0	9.9	51	15	-	-	0.08	-
24.44	23.6	16.7	-	1.1	-3.8	4.8	3	silty CLAY to CLAY	115	1.5	16	11	-	-	1.6	9.8	56	15	-	-	0.08	-
24.61	18.5	13.0	-	1.0	-3.8	5.6	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.3	7.5	65	15	-	-	0.08	-
24.77	17.5	12.2	-	0.9	-3.8	5.7	3	silty CLAY to CLAY	115	1.5	12	8	-	-	1.2	7.0	67	15	-	-	0.08	-
24.94	19.5	13.6	-	0.9	-3.9	5.0	3	silty CLAY to CLAY	115	1.5	13	9	-	-	1.3	7.9	62	15	-	-	0.08	-
25.10	30.1	20.7	-	1.2	-3.8	4.3	3	silty CLAY to CLAY	115	1.5	20	14	-	-	2.1	9.9	49	15	-	-	0.08	-
25.26	38.7	26.5	-	1.6	-3.8	4.3	3	silty CLAY to CLAY	115	1.5	26	18	-	-	2.7	9.9	44	15	-	-	0.08	-
25.43	34.1	23.2	-	1.6	-3.8	4.9	3	silty CLAY to CLAY	115	1.5	23	15	-	-	2.4	9.9	49	15	-	-	0.08	-
25.59	33.2	22.5	-	1.3	-3.8	4.1	3	silty CLAY to CLAY	115	1.5	22	15	-	-	2.3	9.9	47	15	-	-	0.08	-
25.76	35.0	23.5	-	1.4	-3.7	4.2	3	silty CLAY to CLAY	115	1.5	23	16	-	-	2.4	9.9	46	15	-	-	0.08	-
25.92	43.1	28.8	-	1.6	-3.7	3.8	4	clayy SILT to silty CLAY	115	2.0	22	14	-	-	3.0	9.9	41	15	-	-	0.08	-
26.08	45.5	30.2	-	1.7	-3.7	3.8	4	clayy SILT to silty CLAY	115	2.0	23	15	-	-	3.2	9.9	40	15	-	-	0.08	-
26.25	31.5	20.8	-	1.6	-3.6	5.3	3	silty CLAY to CLAY	115	1.5	21	14	-	-	2.2	9.9	53	15	-	-	0.08	-
26.41	22.9	15.0	-	1.2	-3.5	5.7	3	silty CLAY to CLAY	115	1.5	15	10	-	-	1.6	8.9	62	15	-	-	0.08	-
26.58	23.9	15.6	-	1.0	-3.5	4.4	3	silty CLAY to CLAY	115	1.5	16	10	-	-	1.6	9.2	56	15	-	-	0.08	-
26.74	19.5	12.6	-	0.9	-3.5	4.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	7.4	63	15	-	-	0.08	-
26.90	16.2	10.4	-	0.9	-3.5	6.2	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	5.9	73	15	-	-	0.08	-
27.07	15.1	9.7	-	0.8	-3.5	6.1	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	5.5	75	15	-	-	0.08	-
27.23	15.8	10.1	-	0.8	-3.5	5.9	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	5.7	73	15	-	-	0.08	-
27.40	19.1	12.0	-	0.9	-3.4	4.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	7.0	65	15	-	-	0.08	-
27.56	21.3	13.4	-	1.0	-3.4	5.1	3	silty CLAY to CLAY	115	1.5	14	9	-	-	1.4	7.8	63	15	-	-	0.08	-
27.72	18.5	11.6	-	1.0	-3.4	6.0	3	silty CLAY to CLAY	115	1.5	12	8	-	-	1.3	6.7	70	15	-	-	0.08	-
27.89	22.5	14.0	-	1.0	-3.4	4.9	3	silty CLAY to CLAY	115	1.5	15	9	-	-	1.5	8.2	61	15	-	-	0.08	-
28.05	29.3	18.1	-	1.2	-3.4	4.4	3	silty CLAY to CLAY	115	1.5	20	12	-	-	2.0	9.9	53	15	-	-	0.08	-
28.22	42.3	25.9	-	1.5	-3.3	3.6	4	clayy SILT to silty CLAY	115	2.0	21	13	-	-	2.9	9.9	42	15	-	-	0.08	-
28.38	51.9	31.7	-	1.8	-3.2	3.5	4	clayy SILT to silty CLAY	115	2.0	26	16	-	-	3.6	9.9	38	15	-	-	0.08	-
28.54	58.6	35.5	-	2.0	-3.0	3.5	4	clayy SILT to silty CLAY	115	2.0	29	18	-	-	4.1	9.9	36	15	-	-	0.08	-
28.71	72.8	54.9	154.9	2.8	-2.9	3.9	4	clayy SILT to silty CLAY	115	2.0	36	27	-	-	5.1	9.9	31	15	1.03	-	0.08	25.1
28.87	111.3	83.7	177.9	3.8	-2.7	3.5	4	clayy SILT to silty CLAY	115	2.0	56	42	-	-	7.8	9.9	24	15	0.00	-	0.08	0.0
29.04	75.4	45.0	-	4.2	-2.9	5.7	3	silty CLAY to CLAY	115	1.5	50	30	-	-	5.3	9.9	40	15	-	-	0.08	-
29.20	58.2	34.5	-	3.4	-2.7	6.1	3	silty CLAY to CLAY	115	1.5	39	23	-	-	4.0	9.9	45	15	-	-	0.08	-
29.36	46.1	27.2	-	2.9	-2.9	6.4	3	silty CLAY to CLAY	115	1.5	31	18	-	-	3.2	9.9	51	15	-	-	0.08	-
29.53	34.1	20.0	-	2.2	-2.6	6.9	3	silty CLAY to CLAY	115	1.5	23	13	-	-	2.3	9.9	59	15	-	-	0.08	-
29.69	23.2	13.5	-	1.6	-2.0	7.4	3	silty CLAY to CLAY	115	1.5	15	9	-	-	1.6	8.0	70	15	-	-	0.08	-
29.86	19.5	11.3	-	1.2	-2.0	6.8	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.6	73	15	-	-	0.08	-
30.02	18.2	10.5	-	1.0	-2.0	6.3	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.2	6.1	74	15	-	-	0.08	-
30.19	19.8	11.3	-	1.1	-2.0	6.1	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.6	71	15	-	-	0.08	-
30.35	23.5	13.4	-	1.5	-2.0	6.7	3	silty CLAY to CLAY	115	1.5	16	9	-	-	1.6	8.0	68	15	-	-	0.08	-
30.51	32.8	18.6	-	1.7	-2.1	5.4	3	silty CLAY to CLAY	115	1.5	22	12	-	-	2.3	9.9	56	15	-	-	0.08	-
30.68	32.5	18.4	-	1.7	-2.1	5.5	3	silty CLAY to CLAY	115	1.5	22	12	-	-	2.2	9.9	56	15	-	-	0.08	-
30.84	32.6	18.3	-	1.6	-2.1	5.3	3	silty CLAY to CLAY	115	1.5	22	12	-	-	2.2	9.9	56	15	-	-	0.08	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	* SPT R-N1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR -	* Fin Ic %	* Nk -	* Vol Strn %	* Dry Stlmt 0.00	* Liq Stlmt 0.10	* Cycl SStn %
31.01	30.3	17.0	-	1.4	-2.4	5.1	3	silty CLAY to CLAY	115	1.5	20	11	-	-	2.1	9.9	57	15	-	-	0.08	-
31.17	27.3	15.2	-	1.3	-2.1	5.2	3	silty CLAY to CLAY	115	1.5	18	10	-	-	1.9	9.1	60	15	-	-	0.08	-
31.33	22.2	12.3	-	1.2	-2.2	5.7	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	7.2	67	15	-	-	0.08	-
31.50	20.0	11.0	-	1.1	-2.1	6.0	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	6.4	71	15	-	-	0.08	-
31.66	21.3	11.6	-	1.1	-2.3	5.5	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	6.9	68	15	-	-	0.08	-
31.83	19.0	10.3	-	1.1	-2.5	6.3	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	6.0	74	15	-	-	0.08	-
31.99	18.8	10.2	-	1.0	-2.4	5.9	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	5.9	73	15	-	-	0.08	-
32.15	17.9	9.7	-	0.9	-2.3	5.5	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	5.6	73	15	-	-	0.08	-
32.32	17.9	9.6	-	0.9	-2.3	5.4	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	5.5	73	15	-	-	0.08	-
32.48	18.4	9.8	-	0.9	-2.4	5.3	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.2	5.7	72	15	-	-	0.08	-
32.65	14.9	7.9	-	0.9	-2.5	6.6	3	silty CLAY to CLAY	115	1.5	10	5	-	-	1.0	4.5	83	15	-	-	0.08	-
32.81	15.7	8.3	-	0.8	-2.5	5.8	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	4.7	79	15	-	-	0.08	-
32.97	15.4	8.1	-	0.8	-2.5	5.7	3	silty CLAY to CLAY	115	1.5	10	5	-	-	1.0	4.6	79	15	-	-	0.08	-
33.14	15.6	8.2	-	0.8	-2.6	5.8	3	silty CLAY to CLAY	115	1.5	10	5	-	-	1.0	4.6	79	15	-	-	0.08	-
33.30	17.7	9.2	-	0.9	-3.1	5.4	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	5.3	74	15	-	-	0.08	-
33.47	14.2	7.4	-	0.8	-3.0	6.3	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	4.1	85	15	-	-	0.08	-
33.63	13.7	7.1	-	0.7	-2.9	6.1	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	3.9	85	15	-	-	0.08	-
33.79	19.4	10.0	-	0.8	-2.9	4.7	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	5.8	69	15	-	-	0.08	-
33.96	22.3	11.4	-	0.8	-2.8	4.1	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	6.7	63	15	-	-	0.08	-
34.12	18.5	9.4	-	0.8	-2.8	5.0	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	5.5	72	15	-	-	0.08	-
34.29	16.5	8.3	-	0.8	-2.9	5.5	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.1	4.8	78	15	-	-	0.08	-
34.45	20.0	10.0	-	0.8	-2.9	4.4	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	5.9	68	15	-	-	0.08	-
34.61	22.0	11.0	-	0.9	-2.8	4.5	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.5	65	15	-	-	0.08	-
34.78	22.5	11.2	-	1.0	-2.7	4.8	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.6	66	15	-	-	0.08	-
34.94	28.8	14.3	-	1.0	-3.0	3.7	3	silty CLAY to CLAY	115	1.5	19	10	-	-	2.0	8.6	55	15	-	-	0.08	-
35.11	23.3	11.5	-	1.2	-3.1	5.5	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	6.8	68	15	-	-	0.08	-
35.27	23.2	11.4	-	1.1	-3.2	5.1	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.6	6.8	67	15	-	-	0.08	-
35.43	22.9	11.2	-	1.1	-2.9	5.4	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.6	69	15	-	-	0.08	-
35.60	22.9	11.2	-	1.1	-2.8	5.4	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.6	69	15	-	-	0.08	-
35.76	22.1	10.7	-	1.1	-2.6	5.5	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.3	70	15	-	-	0.08	-
35.93	22.9	11.0	-	1.1	-2.5	5.3	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.5	68	15	-	-	0.08	-
36.09	25.2	12.1	-	1.1	-2.5	4.7	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	7.3	64	15	-	-	0.08	-
36.26	26.0	12.4	-	1.1	-2.5	4.8	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.8	7.5	63	15	-	-	0.08	-
36.42	25.8	12.3	-	1.1	-2.5	4.8	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	7.4	64	15	-	-	0.08	-
36.58	26.3	12.5	-	1.1	-2.5	4.7	3	silty CLAY to CLAY	115	1.5	18	8	-	-	1.8	7.5	63	15	-	-	0.08	-
36.75	25.5	12.1	-	1.2	-2.5	5.0	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	7.2	65	15	-	-	0.08	-
36.91	23.9	11.2	-	1.1	-2.5	5.2	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	6.7	68	15	-	-	0.08	-
37.08	17.5	8.2	-	1.1	-2.4	7.3	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	4.7	85	15	-	-	0.08	-
37.24	20.0	9.3	-	1.0	-2.3	5.6	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.5	75	15	-	-	0.08	-
37.40	16.7	7.8	-	0.9	-2.3	5.9	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.1	4.4	82	15	-	-	0.08	-
37.57	16.6	7.6	-	0.8	-2.3	5.7	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.1	4.4	81	15	-	-	0.08	-
37.73	21.6	9.9	-	0.9	-2.3	4.7	3	silty CLAY to CLAY	115	1.5	14	7	-	-	1.4	5.8	69	15	-	-	0.08	-
37.90	24.6	11.2	-	1.0	-2.6	4.5	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.7	6.7	65	15	-	-	0.08	-
38.06	24.4	11.1	-	1.1	-2.6	4.9	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	6.6	67	15	-	-	0.08	-
38.22	24.1	10.9	-	1.0	-2.6	4.6	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	6.5	66	15	-	-	0.08	-
38.39	21.1	9.5	-	1.0	-2.3	5.2	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.6	72	15	-	-	0.08	-
38.55	26.0	11.7	-	1.1	-2.3	4.6	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.8	7.0	64	15	-	-	0.08	-
38.72	31.5	14.1	-	1.3	-2.3	4.5	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.1	8.6	59	15	-	-	0.08	-
38.88	32.8	14.6	-	1.5	-2.1	5.0	3	silty CLAY to CLAY	115	1.5	22	10	-	-	2.2	8.9	60	15	-	-	0.08	-
39.04	31.4	13.9	-	1.7	-2.4	5.8	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.1	8.5	64	15	-	-	0.08	-
39.21	29.7	13.1	-	1.9	-2.2	7.0	3	silty CLAY to CLAY	115	1.5	20	9	-	-	2.0	8.0	70	15	-	-	0.08	-
39.37	29.2	12.9	-	1.8	-1.8	6.9	3	silty CLAY to CLAY	115	1.5	19	9	-	-	2.0	7.8	70	15	-	-	0.08	-
39.54	31.8	13.9	-	1.7	-1.7	5.8	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.2	8.5	64	15	-	-	0.08	-
39.70	33.7	14.7	-	1.5	-1.6	4.8	3	silty CLAY to CLAY	115	1.5	22	10	-	-	2.3	9.0	59	15	-	-	0.08	-
39.86	29.5	12.8	-	1.4	-1.0	5.3	3	silty CLAY to CLAY	115	1.5	20	9	-	-	2.0	7.8	64	15	-	-	0.08	-
40.03	33.2	14.4	-	1.5	-0.9	4.8	3	silty CLAY to CLAY	115	1.5	22	10	-	-	2.3	8.8	60	15	-	-	0.08	-
40.19	34.7	15.0	-	1.5	-1.4	4.8	3	silty CLAY to CLAY	115	1.5	23	10	-	-	2.4	9.2	58	15	-	-	0.08	-
40.36	26.0	11.2	-	1.4	-0.8	5.9	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.8	6.7	71	15	-	-	0.08	-
40.52	22.1	9.5	-	1.3	-0.8	6.4	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	5.6	77	15	-	-	0.08	-
40.68	18.8	8.0	-	1.1	-0.6	6.6	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	4.6	83	15	-	-	0.08	-
40.85	17.3	7.3	-	1.0	-0.5	6.8	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	4.2	87	15	-	-	0.08	-
41.01	15.8	6.7	-	1.0	-0.5	7.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	3.7	92	15	-	-	0.08	-
41.18	17.3	7.3	-	1.0	-0.1	6.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	4.1	87	15	-	-	0.08	-
41.34	24.9	10.4	-	1.3	-0.1	5.7	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.2	72	15	-	-	0.08	-
41.50	30.6	12.8	-	1.6	-0.4	5.7	3	silty CLAY to CLAY	115	1.5	20	9	-	-	2.1	7.8	66	15	-	-	0.08	-
41.67	33.8	14.1	-	1.8	-0.2	5.8	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	8.6	64	15	-	-	0.08	-
41.83	33.8	14.0	-	1.9	-0.4	6.1	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	8.6	65	15	-	-	0.08	-
42.00	30.3	12.5	-	2.0	-0.1	7.0	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.1	7.6	71	15	-	-	0.08	-
42.16	39.9	16.4	-	1.6	0.1	4.3	3	silty CLAY to CLAY	115	1.5	27	11	-	-	2.7	9.9	55	15	-	-	0.08	-
42.32	42.4	17.4	-	1.4	-0.1	3.5	3	silty CLAY to CLAY	115	1.5	28	12	-	-	2.9	9.9	50	15	-	-	0.08	-
42.49	34.2	14.0	-	1.5	0.1	4.7	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	8.6	60	15	-	-	0.08	-
42.65	31.4	12.8	-	1.7	0.1	5.9	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.1	7.8	67	15	-	-	0.08	-
42.82	33.7	13.7	-	1.8	-0.1	5.7	3	silty CLAY to CLAY	115	1.5	22	9	-	-	2.3	8.4	64	15	-	-	0.08	-
42.98	31.9	12.9	-	1.6	-0.4	5.5	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.2	7.9	65	15	-	-	0.08	-
43.15	25.3	10.2	-	1.5	-0.3	6.5	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.1	75	15	-	-	0.08	-
43.31	24.5	9.8	-	1.3	0.0	5.9	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	5.8	74	15	-	-	0.08	-
43.47	22.6	9.0	-	1.3	0.0	6.3	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	5.3	78	15	-	-	0.08	-
43.64	27.0	10.7	-	1.4	-0.1	5.6	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.4	71	15	-	-	0.08	-
43.80	31.7	12.5	-	1.2	-0.2	4.1	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.2	7.7	60	15	-	-	0.08	-
43.97	28.7	11.3	-	1.1	-0.2	4.3	3	silty CLAY to CLAY	115	1.5	19	8	-	-	1.9	6.9	64	15	-	-	0.08	-
44.13	26.0	10.2	-	1.2	0.0	5.1	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.1	70	15	-	-	0.08	-
44.29	28.0	11.0	-	1.3	0.0	5.1	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	6.6	68	15	-	-	0.08	-
44.46	25.5	10.0	-	1.3	0.0	5.6	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.0	73	15	-	-	0.08	-
44.62	23.6	9.2	-	1.2	0.0	5.8	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.4	76	15	-	-	0.08	-
44.79	24.0	9.3	-	1.2	0.0	5.4	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.5	74	15	-	-	0.08	-
44.95	24.5	9.5	-	1.2	0.0	5.4	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.6	73	15	-	-	0.08	-
45.11	28.4	10.9	-	1.3	0.0	5.0	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	6.6	68	15	-	-	0.08	-
45.28	32.6	12.5	-	1.3	0.0	4.4	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	7.6	62	15	-	-	0.08	-
45.44	34.8	13.4	-	1.3	-0.3	4.1	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	8.2	59	15	-	-	0.08	-
45.61	33.8	12.9	-	1.3	-0.3	4.3	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	7.9	60	15	-	-	0.08	-
45.77	33.1	12.7	-	1.5	-0.4	4.9	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	7.7	63	15	-	-	0.08	-
45.93	31.5	12.0	-	1.5	-0.3	5.3	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	7.3	66	15	-	-	0.08	-
46.10	25.2	9.6	-	1.6	-0.4	7.1	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	5.7	79	15	-	-	0.08	-
46.26	26.0	9.9	-	1.6	-0.4	6.9	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	5.8	77	15	-	-	0.08	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	*qcln PS -	qIncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	*Mat Typ Zon	*Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	*SPT R-N1 60%	*Rel Den %	*Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	*Nk -	*Vol Strn %	*Dry Stlmt 0.00	*Liq Stlmt 0.10	*Cycl SStn %
46.43	28.4	10.8	-	1.7	-0.3	6.7	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	6.4	74	15	-	-	0.08	-
46.59	25.8	9.8	-	1.7	-0.2	7.3	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	5.7	79	15	-	-	0.08	-
46.75	25.9	9.8	-	1.6	0.1	6.8	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	5.7	77	15	-	-	0.08	-
46.92	30.8	11.7	-	1.7	0.0	5.9	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	6.9	69	15	-	-	0.08	-
47.08	30.1	11.4	-	1.7	0.0	6.1	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	6.7	71	15	-	-	0.08	-
47.25	34.6	13.1	-	1.4	-0.3	4.5	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	7.8	61	15	-	-	0.08	-
47.41	36.0	13.6	-	1.1	-0.6	3.4	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	8.1	55	15	-	-	0.08	-
47.57	29.8	11.3	-	0.8	-0.4	3.1	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	6.6	58	15	-	-	0.08	-
47.74	20.9	7.9	-	0.7	0.0	4.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	4.4	73	15	-	-	0.08	-
47.90	18.0	6.8	-	0.9	0.1	5.6	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	3.7	85	15	-	-	0.08	-
48.07	19.2	7.2	-	1.1	0.0	6.4	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	4.0	86	15	-	-	0.08	-
48.23	25.6	9.7	-	1.2	0.0	5.4	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	5.5	73	15	-	-	0.08	-
48.39	34.6	13.0	-	1.3	-0.2	4.1	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	7.6	59	15	-	-	0.08	-
48.56	36.8	13.9	-	1.5	-0.3	4.5	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	8.1	59	15	-	-	0.08	-
48.72	32.1	12.1	-	1.5	-0.2	5.2	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.2	7.0	66	15	-	-	0.08	-
48.89	24.7	9.3	-	1.2	-0.1	5.5	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.2	75	15	-	-	0.08	-
49.05	22.0	8.3	-	1.0	0.0	5.2	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	4.5	77	15	-	-	0.08	-
49.22	21.5	8.1	-	1.0	0.0	5.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	4.4	78	15	-	-	0.08	-
49.38	21.7	8.2	-	1.0	-0.1	5.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	4.4	78	15	-	-	0.08	-
49.54	26.7	10.1	-	1.1	-0.1	4.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.6	69	15	-	-	0.08	-
49.71	27.3	10.3	-	1.1	-0.1	4.6	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.7	68	15	-	-	0.08	-
49.87	26.3	9.9	-	1.1	-0.1	4.9	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.5	70	15	-	-	0.08	-
50.04	32.5	12.2	-	1.3	-0.1	4.5	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	6.9	63	15	-	-	0.08	-
50.20	32.9	12.4	-	1.2	-0.2	4.1	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	6.9	61	15	-	-	0.08	-
50.36	20.7	7.8	-	0.9	-0.1	5.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	4.1	79	15	-	-	0.08	-
50.53	19.2	7.2	-	0.7	-0.1	4.5	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.7	79	15	-	-	0.08	-
50.69	24.1	9.1	-	0.8	-0.1	3.7	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.9	67	15	-	-	0.08	-
50.86	19.0	7.2	-	0.8	-0.1	5.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.7	82	15	-	-	0.08	-
51.02	24.8	9.4	-	1.0	-0.1	4.6	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	5.0	71	15	-	-	0.08	-
51.18	24.6	9.3	-	1.1	-0.1	4.9	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.9	73	15	-	-	0.08	-
51.35	25.3	9.6	-	1.2	-0.1	5.2	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	5.1	73	15	-	-	0.08	-
51.51	38.8	14.7	-	1.0	-0.1	2.9	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	8.1	51	15	-	-	0.08	-
51.68	48.9	18.4	-	1.1	-0.1	2.4	4	clayy SILT to silty CLAY	115	2.0	24	9	-	-	3.3	9.9	43	15	-	-	0.08	-
51.84	45.3	17.1	-	1.3	-0.1	3.1	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.5	48	15	-	-	0.08	-
52.00	35.2	13.3	-	1.5	-0.1	4.6	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	7.2	61	15	-	-	0.08	-
52.17	36.9	13.9	-	1.4	0.0	4.1	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	7.6	58	15	-	-	0.08	-
52.33	44.2	16.7	-	1.3	-0.2	3.2	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	9.2	49	15	-	-	0.08	-
52.50	46.2	17.4	-	1.6	-0.1	3.8	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.6	51	15	-	-	0.08	-
52.66	27.6	10.4	-	1.4	-0.1	5.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.4	72	15	-	-	0.08	-
52.82	18.3	6.9	-	1.0	0.0	6.4	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	3.4	88	15	-	-	0.08	-
52.99	17.1	6.5	-	0.7	0.0	5.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	3.1	86	15	-	-	0.08	-
53.15	17.6	6.6	-	0.7	0.1	4.6	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	3.2	83	15	-	-	0.08	-
53.32	18.0	6.8	-	0.7	0.1	4.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	3.3	83	15	-	-	0.08	-
53.48	18.1	6.8	-	0.8	0.1	5.5	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	3.3	85	15	-	-	0.08	-
53.64	22.0	8.3	-	0.8	0.1	4.2	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	4.1	73	15	-	-	0.08	-
53.81	20.3	7.7	-	0.8	0.1	4.8	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.7	78	15	-	-	0.08	-
53.97	25.2	9.5	-	0.9	0.2	4.3	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	4.8	69	15	-	-	0.08	-
54.14	27.6	10.4	-	1.0	0.2	4.1	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.3	66	15	-	-	0.08	-
54.30	28.1	10.6	-	1.1	0.2	4.4	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	67	15	-	-	0.08	-
54.46	28.4	10.7	-	1.3	0.2	5.0	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	69	15	-	-	0.08	-
54.63	28.5	10.8	-	1.3	0.2	5.2	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	69	15	-	-	0.08	-
54.79	28.5	10.7	-	1.4	0.3	5.4	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	70	15	-	-	0.08	-
54.96	28.8	10.9	-	1.4	0.2	5.5	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.5	70	15	-	-	0.08	-
55.12	25.5	9.6	-	1.4	0.2	6.1	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	4.7	76	15	-	-	0.08	-
55.28	22.9	8.7	-	1.2	0.2	5.9	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	4.2	79	15	-	-	0.08	-
55.45	21.0	7.9	-	1.0	0.3	5.4	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.8	80	15	-	-	0.08	-
55.61	20.1	7.6	-	0.9	0.2	5.1	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.6	80	15	-	-	0.08	-
55.78	19.3	7.3	-	0.9	0.2	5.6	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.4	84	15	-	-	0.08	-
55.94	17.5	6.6	-	0.8	0.3	5.8	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	3.0	88	15	-	-	0.08	-
56.11	17.0	6.4	-	0.6	0.3	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.9	83	15	-	-	0.08	-
56.27	16.2	6.1	-	0.5	0.2	3.7	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.7	82	15	-	-	0.08	-
56.43	14.7	5.5	-	0.4	0.2	3.8	3	silty CLAY to CLAY	115	1.5	10	4	-	-	0.9	2.4	86	15	-	-	0.08	-
56.60	17.0	6.4	-	0.6	0.2	4.0	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.9	81	15	-	-	0.08	-
56.76	22.4	8.4	-	0.7	0.3	3.7	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.9	70	15	-	-	0.08	-
56.93	24.3	9.2	-	0.9	0.3	4.1	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.3	70	15	-	-	0.08	-
57.09	26.0	9.8	-	1.0	0.3	4.2	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.7	68	15	-	-	0.08	-
57.25	26.5	10.0	-	1.1	0.3	4.5	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.8	69	15	-	-	0.08	-
57.42	27.1	10.2	-	1.0	0.3	4.4	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.9	68	15	-	-	0.08	-
57.58	26.7	10.1	-	1.1	0.3	4.6	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.8	69	15	-	-	0.08	-
57.75	27.4	10.3	-	1.2	0.3	4.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.9	69	15	-	-	0.08	-
57.91	27.5	10.4	-	1.2	0.3	4.9	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.9	69	15	-	-	0.08	-
58.07	26.9	10.2	-	1.1	0.3	4.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.8	70	15	-	-	0.08	-
58.24	26.3	9.9	-	1.1	0.3	4.7	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.7	4.6	70	15	-	-	0.08	-
58.40	24.8	9.4	-	1.1	0.3	4.9	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.6	4.3	73	15	-	-	0.08	-
58.57	23.1	8.7	-	1.1	0.3	5.4	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	4.0	77	15	-	-	0.08	-
58.73	22.4	8.4	-	1.1	0.3	5.6	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.8	79	15	-	-	0.08	-
58.89	21.3	8.0	-	1.0	0.3	5.7	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.6	81	15	-	-	0.08	-
59.06	21.6	8.1	-	1.0	0.3	5.4	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.6	79	15	-	-	0.08	-
59.22	21.9	8.2	-	1.0	0.4	5.7	3	silty CLAY to CLAY	115	1.5	15	5	-	-	1.4	3.7	80	15	-	-	0.08	-
59.39	22.7	8.6	-	1.2	0.3	6.1	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.8	80	15	-	-	0.08	-
59.55	24.0	9.1	-	1.2	0.4	6.0	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.1	78	15	-	-	0.08	-
59.71	23.0	8.7	-	1.2	0.4	6.3	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.9	81	15	-	-	0.08	-
59.88	21.3	8.1	-	1.0	0.4	5.8	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.5	81	15	-	-	0.08	-
60.04	20.2	7.6	-	0.8	0.4	4.7	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.3	79	15	-	-	0.08	-
60.21	19.6	7.4	-	0.7	0.4	4.1	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.2	77	15	-	-	0.08	-
60.37	18.3	6.9	-	0.6	0.4	4.0	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.9	79	15	-	-	0.08	-
60.53	19.0	7.2	-	0.6	0.4	3.7	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.0	76	15	-	-	0.08	-
60.70	19.7	7.4	-	0.6	0.3	3.4	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.2	73	15	-	-	0.08	-
60.86	20.9	7.9	-	0.6	0.4	3.5	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.4	72	15	-	-	0.08	-
61.03	21.9	8.3	-	0.7	0.4	3.6	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.5	71	15	-	-	0.08	-
61.19	22.1	8.3	-	0.8	0.3	4.1	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.6	73	15	-	-	0.08	-
61.35	24.1	9.1	-	0.8	0.4	3.7	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	3.9	68	15	-	-	0.08	-
61.52	22.3	8.4	-	0.7	0.4	3.8	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.6	71	15	-	-	0.08	-
61.68	21.0	7.9	-	0.6	0.4	3.6	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.3	72	15	-	-	0.08	-

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The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic -	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.10	Cycl SStn %
61.85	20.8	7.8	-	0.6	0.4	3.4	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.3	72	15	-	-	0.08	-
62.01	20.7	7.8	-	0.6	0.4	3.4	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.3	72	15	-	-	0.08	-
62.17	20.8	7.8	-	0.6	0.4	3.8	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.3	74	15	-	-	0.08	-
62.34	21.9	8.3	-	0.8	0.4	4.4	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.5	75	15	-	-	0.08	-
62.50	21.9	8.3	-	0.9	0.4	4.8	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.4	77	15	-	-	0.08	-
62.67	21.7	8.2	-	0.9	0.4	5.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.4	78	15	-	-	0.08	-
62.83	21.3	8.0	-	0.9	0.4	5.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.3	78	15	-	-	0.08	-
63.00	20.9	7.9	-	0.7	0.4	4.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.2	76	15	-	-	0.08	-
63.16	19.3	7.3	-	0.7	0.5	4.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	2.9	79	15	-	-	0.08	-
63.32	18.7	7.1	-	0.6	0.5	3.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.8	78	15	-	-	0.08	-
63.49	17.9	6.8	-	0.6	0.5	4.2	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	2.7	81	15	-	-	0.08	-
63.65	17.0	6.4	-	0.6	0.5	4.5	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.5	85	15	-	-	0.08	-
63.82	16.1	6.1	-	0.6	0.5	4.7	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.3	88	15	-	-	0.08	-
63.98	15.8	6.0	-	0.5	0.5	4.5	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.2	87	15	-	-	0.08	-
64.14	16.7	6.3	-	0.5	0.5	4.1	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.4	84	15	-	-	0.08	-
64.31	17.9	6.8	-	0.6	0.5	4.2	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	2.6	82	15	-	-	0.08	-
64.47	19.5	7.4	-	0.8	0.6	5.0	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	2.9	82	15	-	-	0.08	-
64.64	26.8	10.1	-	1.1	0.6	4.9	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.2	71	15	-	-	0.08	-
64.80	38.7	14.6	-	1.4	0.6	3.9	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	6.4	56	15	-	-	0.08	-
64.96	34.3	13.0	-	1.2	0.5	4.1	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	5.6	60	15	-	-	0.08	-
65.13	30.3	11.4	-	1.6	0.6	6.1	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.8	72	15	-	-	0.08	-
65.29	43.0	16.2	-	1.5	0.6	3.9	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	7.1	54	15	-	-	0.08	-
65.46	36.1	13.6	-	1.6	0.6	5.0	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	5.8	62	15	-	-	0.08	-
65.62	25.1	9.5	-	1.0	0.5	4.9	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.6	3.8	73	15	-	-	0.08	-
65.78	20.3	7.6	-	0.9	0.5	5.6	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.0	83	15	-	-	0.08	-
65.95	22.7	8.6	-	0.8	0.6	4.3	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.4	74	15	-	-	0.08	-
66.11	22.2	8.4	-	0.9	0.6	4.8	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.3	77	15	-	-	0.08	-
66.28	25.3	9.6	-	1.0	0.7	4.9	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	3.8	72	15	-	-	0.08	-
66.44	26.0	9.8	-	1.1	0.7	5.0	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.0	72	15	-	-	0.08	-
66.60	25.5	9.6	-	1.1	0.7	5.0	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	3.8	73	15	-	-	0.08	-
66.77	26.1	9.9	-	1.1	0.7	5.0	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.0	72	15	-	-	0.08	-
66.93	29.6	11.2	-	1.2	0.8	4.7	3	silty CLAY to CLAY	115	1.5	20	7	-	-	2.0	4.6	67	15	-	-	0.08	-
67.10	40.8	15.4	-	1.2	0.8	3.2	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	6.5	52	15	-	-	0.08	-
67.26	41.6	15.7	-	1.6	0.9	4.1	3	silty CLAY to CLAY	115	1.5	28	10	-	-	2.8	6.6	56	15	-	-	0.08	-
67.42	47.4	17.9	-	1.6	0.9	3.6	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.2	7.6	50	15	-	-	0.08	-
67.59	45.6	17.2	-	1.7	1.0	4.0	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	7.3	53	15	-	-	0.08	-
67.75	37.6	14.2	-	1.5	0.9	4.5	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	5.9	60	15	-	-	0.08	-
67.92	34.7	13.1	-	1.3	0.9	4.3	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	5.4	61	15	-	-	0.08	-
68.08	31.4	11.9	-	1.2	1.0	4.2	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	4.8	63	15	-	-	0.08	-
68.24	33.4	12.6	-	1.2	1.0	4.0	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	5.1	61	15	-	-	0.08	-
68.41	34.4	13.0	-	1.1	1.0	3.7	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	5.3	58	15	-	-	0.08	-
68.57	35.8	13.5	-	1.2	1.1	3.9	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	5.5	58	15	-	-	0.08	-
68.74	41.1	15.5	-	1.4	1.1	3.8	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.8	6.4	54	15	-	-	0.08	-
68.90	55.9	21.1	-	1.9	1.1	3.6	3	silty CLAY to CLAY	115	1.5	37	14	-	-	3.8	8.9	47	15	-	-	0.08	-
69.07	60.7	22.9	-	2.1	1.1	3.7	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.2	9.8	45	15	-	-	0.08	-
69.23	65.5	24.7	-	2.8	1.3	4.5	3	silty CLAY to CLAY	115	1.5	44	16	-	-	4.5	9.9	47	15	-	-	0.08	-
69.39	68.1	25.7	-	2.5	1.4	4.0	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.7	9.9	44	15	-	-	0.08	-
69.56	68.6	25.9	-	2.6	1.3	4.0	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.7	9.9	44	15	-	-	0.08	-
69.72	72.7	27.4	-	2.4	1.4	3.5	4	clayy SILT to silty CLAY	115	2.0	36	14	-	-	5.0	9.9	41	15	-	-	0.08	-
69.89	71.5	27.0	-	2.5	1.5	3.8	4	clayy SILT to silty CLAY	115	2.0	36	13	-	-	4.9	9.9	42	15	-	-	0.08	-
70.05	62.0	23.4	-	1.9	1.4	3.3	4	clayy SILT to silty CLAY	115	2.0	31	12	-	-	4.2	9.8	43	15	-	-	0.08	-
70.21	60.2	22.7	-	1.5	1.4	2.6	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.1	9.5	40	15	-	-	0.08	-
70.38	60.3	22.8	-	1.5	1.4	2.6	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.1	9.5	40	15	-	-	0.08	-
70.54	64.2	24.2	-	1.6	1.4	2.7	4	clayy SILT to silty CLAY	115	2.0	32	12	-	-	4.4	9.9	40	15	-	-	0.08	-
70.71	68.8	25.9	-	1.7	1.5	2.6	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.7	9.9	38	15	-	-	0.08	-
70.87	73.3	27.6	-	1.7	1.5	2.4	4	clayy SILT to silty CLAY	115	2.0	37	14	-	-	5.0	9.9	36	15	-	-	0.08	-
71.03	77.9	41.8	111.3	1.9	1.5	2.5	4	clayy SILT to silty CLAY	115	2.0	39	21	-	-	5.4	9.9	30	15	2.14	-	0.08	51.2
71.20	87.4	46.8	113.0	2.0	1.6	2.4	5	silty SAND to sandy SILT	120	4.0	22	12	42	36	-	-	27	16	2.11	-	0.07	47.8
71.36	89.9	48.2	116.1	2.1	1.6	2.5	5	silty SAND to sandy SILT	120	4.0	22	12	43	36	-	-	27	16	2.07	-	0.07	46.3
71.53	90.7	48.6	125.8	2.5	1.7	2.9	4	clayy SILT to silty CLAY	115	2.0	45	24	-	-	6.3	9.9	29	15	1.85	-	0.07	45.8
71.69	101.5	54.3	134.6	2.9	1.7	3.0	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.0	9.9	28	15	1.50	-	0.06	36.2
71.85	106.7	57.0	136.2	3.0	1.8	2.9	4	clayy SILT to silty CLAY	115	2.0	53	29	-	-	7.4	9.9	27	15	1.43	-	0.06	29.9
72.02	106.6	56.9	146.9	3.5	1.8	3.4	4	clayy SILT to silty CLAY	115	2.0	53	28	-	-	7.4	9.9	29	15	0.90	-	0.06	15.3
72.18	103.1	55.0	146.8	3.4	1.9	3.5	4	clayy SILT to silty CLAY	115	2.0	52	28	-	-	7.1	9.9	30	15	0.88	-	0.06	19.8
72.35	102.5	54.7	148.3	3.5	2.0	3.5	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	30	15	0.80	-	0.05	19.7
72.51	100.2	37.8	-	3.5	2.0	3.6	4	clayy SILT to silty CLAY	115	2.0	50	19	-	-	6.9	9.9	36	15	-	-	0.05	-
72.67	103.8	55.3	146.3	3.4	2.0	3.4	4	clayy SILT to silty CLAY	115	2.0	52	28	-	-	7.2	9.9	30	15	0.89	-	0.05	19.1
72.84	104.8	55.8	146.3	3.4	2.0	3.4	4	clayy SILT to silty CLAY	115	2.0	52	28	-	-	7.3	9.9	29	15	0.89	-	0.05	17.9
73.00	102.1	38.5	-	3.6	2.0	3.7	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.1	9.9	36	15	-	-	0.05	-
73.17	103.7	39.1	-	3.7	2.1	3.7	4	clayy SILT to silty CLAY	115	2.0	52	20	-	-	7.2	9.9	36	15	-	-	0.05	-
73.33	101.9	38.5	-	3.7	2.1	3.8	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.1	9.9	36	15	-	-	0.05	-
73.49	101.1	38.1	-	3.7	2.1	3.8	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.0	9.9	36	15	-	-	0.05	-
73.66	99.4	37.5	-	3.6	2.1	3.8	4	clayy SILT to silty CLAY	115	2.0	50	19	-	-	6.9	9.9	37	15	-	-	0.05	-
73.82	97.4	36.8	-	3.6	2.1	3.9	4	clayy SILT to silty CLAY	115	2.0	49	18	-	-	6.7	9.9	37	15	-	-	0.05	-
73.99	97.6	36.8	-	3.7	2.2	3.9	4	clayy SILT to silty CLAY	115	2.0	49	18	-	-	6.8	9.9	38	15	-	-	0.05	-
74.15	101.1	38.2	-	3.6	2.2	3.7	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.0	9.9	36	15	-	-	0.05	-
74.31	102.4	38.6	-	3.6	2.2	3.7	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.1	9.9	36	15	-	-	0.05	-
74.48	100.3	37.8	-	3.7	2.2	3.8	4	clayy SILT to silty CLAY	115	2.0	50	19	-	-	6.9	9.9	37	15	-	-	0.05	-
74.64	100.0	37.8	-	3.5	2.2	3.7	4	clayy SILT to silty CLAY	115	2.0	50	19	-	-	6.9	9.9	36	15	-	-	0.05	-
74.81	103.2	54.5	144.1	3.3	2.2	3.4	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.1	9.9	30	15	0.93	-	0.05	21.5
74.97	101.6	53.7	142.2	3.2	2.2	3.3	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.0	9.9	30	15	1.01	-	0.05	24.8
75.13	102.6	54.2	139.4	3.1	2.2	3.2	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.16	-	0.05	25.8
75.30	107.0	56.4	132.2	2.9	2.2	2.8	5	silty SAND to sandy SILT	120	4.0	27	14	48	37	-	-	27	16	1.55	-	0.05	34.4
75.46	102.6	54.1	129.7	2.7	2.2	2.8	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	27	15	1.66	-	0.04	39.7
75.63	93.9	35.4	-	3.0	2.2	3.4	4	clayy SILT to silty CLAY	115	2.0	47	18	-	-	6.5	9.9	36	15	-	-	0.04	-
75.79	89.3	33.7	-	3.6	2.2	4.2	4	clayy SILT to silty CLAY	115	2.0	45	17	-	-	6.2	9.9	40	15	-	-	0.04	-
75.96	93.4	35.2	-	3.6	2.2	4.0	4	clayy SILT to silty CLAY	115	2.0	47	18	-	-	6.5	9.9	39	15	-	-	0.04	-
76.12	100.1	52.7	144.3	3.3	2.2	3.5	4	clayy SILT to silty CLAY	115	2.0	50	26	-	-	6.9	9.9	30	15	0.89	-	0.04	25.9
76.28	104.5	54.9	136.8	3.0	2.2	3.0	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	28	15	1.29	-	0.04	27.1
76.45	107.5	56.5	135.1	3.0	2.2	2.9	4	clayy SILT to silty CLAY	115	2.0	54	28	-	-	7.4	9.9	27	15	1.39	-	0.04	27.3
76.61	115.5	60.6	136.7	3.1	2.2	2.8	5	silty SAND to sandy SILT	120	4.0	29	15	50	37	-	-	26	16	1.34	-	0.03	19.8
76.78	120.6	63.3	139.5	3.3	2.3	2.8	5	silty SAND to sandy SILT	120	4.0	30	16	52	37	-	-	25	16	1.21	-	0.03	14.5
76.94	112.9	59.2	142.5	3.4	2.3	3.1	4	clayy SILT to silty CLAY	115	2.0	56	30	-	-	7.8	9.9	27	15	1.02	-	0.03	11.9
77.10	105.6	55.3	145.0	3.4	2.5	3.4	4	clayy SILT to silty CLAY	115	2.0	53	28	-	-	7.3	9.9	29	15	0.87	-	0.03	18.6

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	*qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	*Mat Typ Zon	*Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	*SPT R-N1 60%	*Rel Den %	*Ftn Ang deg	Und Shr tsf	OCR -	*Fin Ic %	*Nk -	*Vol Strn %	*Dry Stlmt 0.00	*Liq Stlmt 0.10	*Cycl SStn %
77.27	104.5	54.7	141.1	3.2	2.5	3.2	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	29	15	1.06	-	0.03	22.8
77.43	104.7	54.8	140.3	3.2	2.6	3.2	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	29	15	1.10	-	0.03	23.2
77.60	102.7	53.7	137.7	3.1	2.7	3.1	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.23	-	0.02	28.1
77.76	102.0	53.3	136.6	3.0	2.7	3.1	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.28	-	0.02	30.0
77.92	102.7	53.6	139.5	3.2	2.8	3.2	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.13	-	0.02	26.3
78.09	101.6	53.0	136.5	3.0	2.8	3.1	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.0	9.9	29	15	1.28	-	0.02	30.6
78.25	103.0	53.7	136.9	3.1	2.9	3.1	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.1	9.9	29	15	1.26	-	0.02	28.7
78.42	104.0	54.2	137.7	3.1	2.9	3.1	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	29	15	1.22	-	0.01	27.0
78.58	104.9	54.6	135.9	3.0	3.0	3.0	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.3	9.9	28	15	1.32	-	0.01	28.3
78.74	102.3	53.3	136.9	3.1	3.0	3.1	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.26	-	0.01	29.6
78.91	101.6	52.8	139.3	3.1	3.0	3.2	4	clayy SILT to silty CLAY	115	2.0	51	26	-	-	7.0	9.9	29	15	1.13	-	0.01	28.2
79.07	103.5	53.8	139.2	3.2	3.1	3.2	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	29	15	1.14	-	0.01	26.2
79.24	101.4	52.7	140.8	3.2	3.2	3.3	4	clayy SILT to silty CLAY	115	2.0	51	26	-	-	7.0	9.9	30	15	1.05	-	0.00	27.5
79.40	98.8	51.3	141.1	3.2	3.3	3.4	4	clayy SILT to silty CLAY	115	2.0	49	26	-	-	6.8	9.9	31	15	1.01	-	0.00	30.7
79.56	91.6	34.5	-	3.3	3.3	3.8	4	clayy SILT to silty CLAY	115	2.0	46	17	-	-	6.3	9.9	38	15	-	-	0.00	-
79.73	84.0	31.7	-	3.2	3.4	4.1	4	clayy SILT to silty CLAY	115	2.0	42	16	-	-	5.8	9.9	41	15	-	-	0.00	-
79.89	75.0	28.3	-	3.1	3.3	4.4	3	silty CLAY to CLAY	115	1.5	50	19	-	-	5.1	9.9	44	15	-	-	0.00	-
80.06	82.1	31.0	-	3.4	3.4	4.4	3	silty CLAY to CLAY	115	1.5	55	21	-	-	5.6	9.9	42	15	-	-	0.00	-
80.22	91.6	34.6	-	3.7	3.4	4.2	4	clayy SILT to silty CLAY	115	2.0	46	17	-	-	6.3	9.9	40	15	-	-	0.00	-
80.38	89.8	33.9	-	3.8	3.6	4.5	3	silty CLAY to CLAY	115	1.5	60	23	-	-	6.2	9.9	41	15	-	-	0.00	-
80.55	83.3	31.4	-	3.6	3.6	4.6	3	silty CLAY to CLAY	115	1.5	56	21	-	-	5.7	9.9	43	15	-	-	0.00	-
80.71	75.3	28.4	-	3.5	3.6	5.0	3	silty CLAY to CLAY	115	1.5	50	19	-	-	5.2	9.9	46	15	-	-	0.00	-
80.88	64.2	24.2	-	3.1	3.6	5.1	3	silty CLAY to CLAY	115	1.5	43	16	-	-	4.4	8.8	50	15	-	-	0.00	-
81.04	58.2	22.0	-	2.6	3.5	4.8	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	7.9	51	15	-	-	0.00	-
81.20	48.3	18.2	-	2.4	3.5	5.6	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	6.4	58	15	-	-	0.00	-
81.37	59.0	22.3	-	3.0	3.6	5.5	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	8.0	53	15	-	-	0.00	-

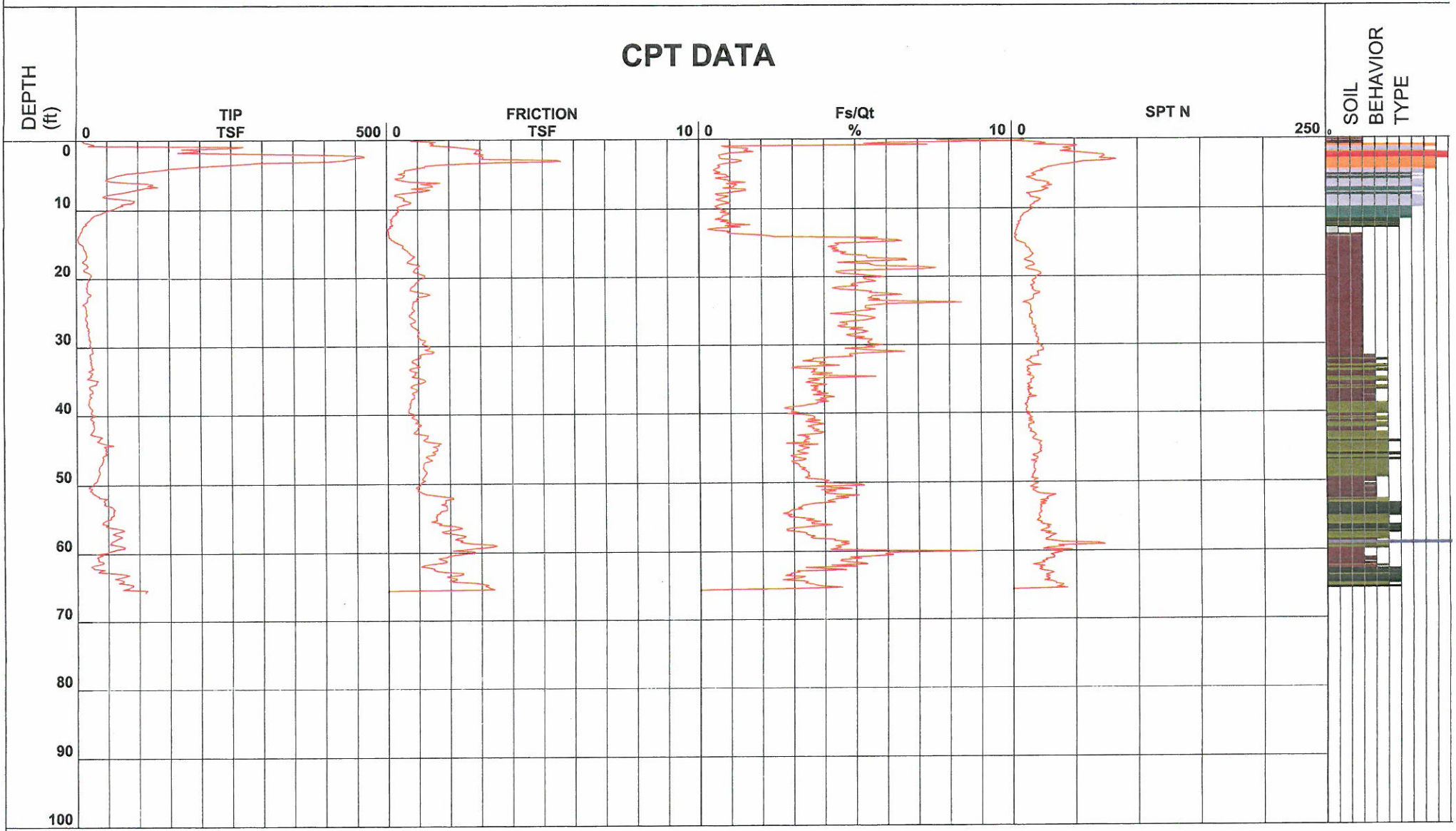
* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Earth Mechanics

Location	I-5 HOV Widening Segment 1	Operator	BH-JB	Filename	SDF(532).cpt
Job Number	11-135	Cone Number	DSG1104	GPS	
Hole Number	CPT-11-129	Date and Time	9/27/2011 1:41:34 PM	Maximum Depth	65.78 ft
Water Table Depth		>65.78 ft			

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(532).cpt
CPT Date: 9/27/2011 1:41:34 PM
GW During Test: No GW

Sounding ID: CPT-11-129
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qc1n PS -	qi1ncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.17	Cycl SStn %
0.33	13.0	20.9	-	1.6	0.3	9.9	3	silty CLAY to CLAY	115	1.5	9	14	-	-	0.9	9.9	65	15	N/A	0.00	N/A	N/A
0.49	22.7	36.4	-	1.4	0.4	6.1	3	silty CLAY to CLAY	115	1.5	15	24	-	-	1.6	9.9	44	15	N/A	0.00	N/A	N/A
0.66	28.6	45.8	-	1.5	0.6	5.3	3	silty CLAY to CLAY	115	1.5	19	31	-	-	2.0	9.9	38	15	N/A	0.00	N/A	N/A
0.82	19.3	30.9	-	1.4	0.5	7.3	3	silty CLAY to CLAY	115	1.5	13	21	-	-	1.4	9.9	50	15	N/A	0.00	N/A	N/A
0.98	270.0	433.0	433.0	2.0	-0.1	0.7	6	clean SAND to silty SAND	125	5.0	54	87	95	48	-	-	5	16	N/A	0.00	N/A	N/A
1.15	253.0	405.8	405.8	2.4	-0.3	0.9	6	clean SAND to silty SAND	125	5.0	51	81	95	48	-	-	5	16	N/A	0.00	N/A	N/A
1.31	170.1	272.9	293.8	2.7	0.0	1.6	6	clean SAND to silty SAND	125	5.0	34	55	95	48	-	-	7	16	N/A	0.00	N/A	N/A
1.48	198.2	317.8	332.2	3.1	0.1	1.6	6	clean SAND to silty SAND	125	5.0	40	64	95	48	-	-	6	16	N/A	0.00	N/A	N/A
1.64	196.4	314.9	325.2	2.9	0.3	1.5	6	clean SAND to silty SAND	125	5.0	39	63	95	48	-	-	6	16	N/A	0.00	N/A	N/A
1.80	164.3	263.4	291.5	2.9	0.2	1.7	6	clean SAND to silty SAND	125	5.0	33	53	95	48	-	-	8	16	N/A	0.00	N/A	N/A
1.97	275.1	441.2	441.2	2.8	0.0	1.0	6	clean SAND to silty SAND	125	5.0	55	88	95	48	-	-	5	16	N/A	0.00	N/A	N/A
2.13	391.2	627.4	627.4	3.1	-0.2	0.8	7	grvly SAND to dense SAND	130	6.0	65	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
2.30	459.2	736.4	736.4	3.0	-0.2	0.6	7	grvly SAND to dense SAND	130	6.0	77	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
2.46	465.1	745.8	745.8	3.1	-0.2	0.7	7	grvly SAND to dense SAND	130	6.0	78	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
2.62	452.4	725.5	725.5	3.1	-0.2	0.7	7	grvly SAND to dense SAND	130	6.0	75	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
2.79	440.0	705.7	705.7	3.1	0.0	0.7	7	grvly SAND to dense SAND	130	6.0	73	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
2.95	432.8	694.1	694.1	5.5	0.2	1.3	6	clean SAND to silty SAND	125	5.0	87	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
3.12	404.4	648.6	648.6	5.6	0.1	1.4	6	clean SAND to silty SAND	125	5.0	81	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
3.28	295.2	473.4	473.4	3.5	0.3	1.2	6	clean SAND to silty SAND	125	5.0	59	95	95	48	-	-	5	16	0.00	-	0.18	0.0
3.45	269.3	431.8	431.8	2.4	0.2	0.9	6	clean SAND to silty SAND	125	5.0	54	86	95	48	-	-	5	16	0.00	-	0.18	0.0
3.61	238.3	382.1	382.1	1.6	0.2	0.7	6	clean SAND to silty SAND	125	5.0	48	76	95	48	-	-	5	16	0.00	-	0.18	0.0
3.77	205.6	329.7	329.7	1.3	0.2	0.6	6	clean SAND to silty SAND	125	5.0	41	66	95	48	-	-	5	16	0.00	-	0.18	0.0
3.94	179.0	287.0	287.0	1.2	0.2	0.7	6	clean SAND to silty SAND	125	5.0	36	57	95	48	-	-	5	16	0.00	-	0.18	0.0
4.10	153.8	246.6	246.6	1.0	0.2	0.7	6	clean SAND to silty SAND	125	5.0	31	49	95	48	-	-	5	16	0.00	-	0.18	0.0
4.27	140.2	224.8	224.8	0.8	0.3	0.5	6	clean SAND to silty SAND	125	5.0	28	45	94	48	-	-	5	16	0.00	-	0.18	0.0
4.43	120.9	193.8	193.8	0.6	0.3	0.5	6	clean SAND to silty SAND	125	5.0	24	39	89	48	-	-	5	16	0.00	-	0.18	0.0
4.59	106.1	170.2	170.2	0.6	0.3	0.6	6	clean SAND to silty SAND	125	5.0	21	34	85	48	-	-	5	16	0.00	-	0.18	0.0
4.76	82.3	132.1	138.6	0.6	0.1	0.7	6	clean SAND to silty SAND	125	5.0	16	26	76	46	-	-	6	16	0.54	-	0.18	2.8
4.92	74.1	118.9	121.6	0.4	0.2	0.5	6	clean SAND to silty SAND	125	5.0	15	24	73	46	-	-	6	16	1.58	-	0.18	6.2
5.09	64.9	104.1	120.4	0.6	0.1	0.9	6	clean SAND to silty SAND	125	5.0	13	21	68	45	-	-	10	16	1.69	-	0.18	8.0
5.25	60.8	97.5	115.1	0.5	0.1	0.9	6	clean SAND to silty SAND	125	5.0	12	20	66	45	-	-	10	16	2.02	-	0.17	13.0
5.41	53.1	85.1	107.1	0.5	0.2	1.0	6	clean SAND to silty SAND	125	5.0	11	17	62	44	-	-	12	16	2.21	-	0.17	21.3
5.58	49.6	79.5	90.6	0.3	0.2	0.6	6	clean SAND to silty SAND	125	5.0	10	16	59	44	-	-	9	16	2.53	-	0.17	23.4
5.74	48.0	77.0	92.3	0.3	0.2	0.7	6	clean SAND to silty SAND	125	5.0	10	15	58	43	-	-	11	16	2.50	-	0.16	24.5
5.91	56.2	90.2	110.1	0.5	0.2	0.9	6	clean SAND to silty SAND	125	5.0	11	18	64	44	-	-	11	16	2.16	-	0.16	19.4
6.07	77.8	123.2	139.3	0.7	0.1	1.0	6	clean SAND to silty SAND	125	5.0	16	25	74	45	-	-	9	16	0.72	-	0.16	3.4
6.23	114.6	179.0	205.6	1.7	0.1	1.5	6	clean SAND to silty SAND	125	5.0	23	36	86	47	-	-	9	16	0.00	-	0.15	0.0
6.40	124.6	192.1	194.7	1.1	0.2	0.9	6	clean SAND to silty SAND	125	5.0	25	38	89	47	-	-	5	16	0.00	-	0.15	0.0
6.56	115.9	176.3	194.5	1.4	0.2	1.2	6	clean SAND to silty SAND	125	5.0	23	35	86	47	-	-	8	16	0.00	-	0.15	0.0
6.73	131.8	198.1	209.8	1.5	0.0	1.1	6	clean SAND to silty SAND	125	5.0	26	40	90	47	-	-	7	16	0.00	-	0.15	0.0
6.89	111.5	165.6	181.7	1.3	0.2	1.1	6	clean SAND to silty SAND	125	5.0	22	33	84	47	-	-	8	16	0.00	-	0.15	0.0
7.05	102.3	150.1	156.8	0.8	0.1	0.8	6	clean SAND to silty SAND	125	5.0	20	30	80	46	-	-	6	16	0.27	-	0.15	2.1
7.22	92.0	133.5	164.4	1.4	0.2	1.5	6	clean SAND to silty SAND	125	5.0	18	27	77	46	-	-	11	16	0.00	-	0.15	0.0
7.38	82.7	118.6	151.1	1.2	0.3	1.5	6	clean SAND to silty SAND	125	5.0	17	24	73	45	-	-	12	16	0.41	-	0.15	2.4
7.55	73.8	104.8	129.2	0.9	-0.1	1.2	6	clean SAND to silty SAND	125	5.0	15	21	69	45	-	-	11	16	1.48	-	0.15	7.3
7.71	58.8	82.5	103.5	0.6	-0.1	0.9	6	clean SAND to silty SAND	125	5.0	12	16	61	43	-	-	12	16	2.27	-	0.15	22.2
7.87	50.7	70.4	83.1	0.3	-0.1	0.6	6	clean SAND to silty SAND	125	5.0	10	14	55	43	-	-	10	16	2.72	-	0.15	27.9
8.04	43.1	59.3	75.5	0.3	-0.1	0.6	6	clean SAND to silty SAND	125	5.0	9	12	50	42	-	-	12	16	2.94	-	0.14	34.5
8.20	46.0	62.5	87.1	0.4	0.0	1.0	5	silty SAND to sandy SILT	120	4.0	11	16	52	42	-	-	15	16	2.62	-	0.14	32.4
8.37	64.2	86.5	104.0	0.5	0.0	0.8	6	clean SAND to silty SAND	125	5.0	13	17	62	44	-	-	11	16	2.26	-	0.13	20.9
8.53	82.8	110.5	121.0	0.6	-0.1	0.7	6	clean SAND to silty SAND	125	5.0	17	22	70	45	-	-	8	16	1.93	-	0.13	10.8
8.69	94.4	124.8	128.2	0.5	-0.2	0.6	6	clean SAND to silty SAND	125	5.0	19	25	74	45	-	-	6	16	1.62	-	0.13	7.1
8.86	93.5	122.4	131.6	0.7	-0.2	0.7	6	clean SAND to silty SAND	125	5.0	19	24	74	45	-	-	7	16	1.44	-	0.12	6.3
9.02	89.6	116.2	131.2	0.8	-0.2	0.9	6	clean SAND to silty SAND	125	5.0	18	23	72	45	-	-	9	16	1.47	-	0.12	6.7
9.19	73.1	93.9	115.1	0.7	-0.2	1.0	6	clean SAND to silty SAND	125	5.0	15	19	65	44	-	-	11	16	2.08	-	0.12	18.6
9.35	75.3	96.0	109.7	0.6	-0.2	0.7	6	clean SAND to silty SAND	125	5.0	15	19	66	44	-	-	9	16	2.17	-	0.12	18.1
9.51	68.6	86.7	98.6	0.4	-0.1	0.6	6	clean SAND to silty SAND	125	5.0	14	17	62	43	-	-	9	16	2.36	-	0.11	20.8
9.68	64.7	81.0	91.5	0.3	-0.1	0.5	6	clean SAND to silty SAND	125	5.0	13	16	60	43	-	-	9	16	2.51	-	0.11	22.7
9.84	60.6	75.3	87.8	0.3	-0.1	0.6	6	clean SAND to silty SAND	125	5.0	12	15	58	43	-	-	10	16	2.60	-	0.10	25.4
10.01	54.7	67.4	85.9	0.4	-0.1	0.8	6	clean SAND to silty SAND	125	5.0	11	13	54	42	-	-	12	16	2.65	-	0.10	29.6
10.17	48.9	59.7	78.9	0.4	-0.1	0.7	6	clean SAND to silty SAND	125	5.0	10	12	50	41	-	-	13	16	2.84	-	0.10	34.1
10.34	43.6	52.9	77.6	0.4	0.0	0.9	5	silty SAND to sandy SILT	120	4.0	11	13	46	41	-	-	16	16	2.88	-	0.09	41.0
10.50	40.9	49.2	70.0	0.3	0.0	0.7	5	silty SAND to sandy SILT	120	4.0	10	12	44	40	-	-	15	16	3.13	-	0.09	45.0
10.66	34.0	40.5	71.2	0.3	0.0	1.0	5	silty SAND to sandy SILT	120	4.0	8	10	37	39	-	-	20	16	3.09	-	0.08	51.2
10.83	28.7	34.0	65.3	0.3	0.0	1.0	5	silty SAND to sandy SILT	120	4.0	7	8	31	38	-	-	22	16	3.32	-	0.08	51.2
10.99	26.7	31.4	59.0	0.2	0.0	0.8	5	silty SAND to sandy SILT	120	4.0	7	8	29	38	-	-	22	16	3.60	-	0.07	51.2
11.16	24.4	28.5	56.8	0.2	-0.1	0.8	5	silty SAND to sandy SILT	120	4.0	6	7	26	37	-	-	23	16	3.71	-	0.06	51.2
11.32	23.3	27.0	54.8	0.2	-0.1	0.7	5	silty SAND to sandy SILT	120	4.0	6	7	24	37	-	-	23	16	3.83	-	0.06	51.2
11.48	21.6	24.9	48.4	0.1	0.0	0.6	5	silty SAND to sandy SILT	120	4.0	5	6	21	36	-	-	23	16	4.24	-	0.05	51.2
11.65	18.9	21.6	56.9	0.2	0.0	1.0	5	silty SAND to sandy SILT	120	4.0	5	5	16	35	-	-	30	16	3.71	-	0.04	51.2
11.81	17.1	19.5	49.7	0.1	-0.1	0.7	5	silty SAND to sandy SILT	120	4.0	4	5	13	35	-	-	29	16	4.15	-	0.04	51.2
11.98	14.1	17.1	55.6	0.1	-0.1	1.1	4	clayy SILT to silty CLAY	115	2.0	7	9	-	-	1.0	9.5	35	15	3.78	-	0.03	51.2
12.14	16.9	19.0	53.6	0.2	-0.2	0.9	5	silty SAND to sandy SILT	120	4.0	4	5	12	35	-	-	31	16	3.89	-	0.03	51.2
12.30	12.2	16.0	-	0.2	-0.2	1.7	4	clayy SILT to silty CLAY	115	2.0	6	8	-	-	0.8	8.0	41	15	-	-	0.02	-
12.47	11.6	15.0	-	0.1	-0.2	0.9	4	clayy SILT to silty CLAY	115	2.0	6	8	-	-	0.8	7.4	36	15	-	-	0.02	-
12.63	9.6	12.4	-	0.1	-0.2	1.5	4	clayy SILT to silty CLAY	115	2.0	5	6	-	-	0.6	6.1	45	15	-	-	0.02	-
12.80	10.2	11.8	-	0.1	-0.2	0.6	4	clayy SILT to silty CLAY	115	2.0	5	6	-	-	0.7	6.4	37	15	-	-	0.02	-
12.96	9.1	10.4	34.4	0.0	-0.2	0.3	5	silty SAND to sandy SILT	120	4.0	2	3	5	30	-	-	35	16	5.61	-	0.01	51.2
13.12	8.3	10.3	-	0.0	-0.3	0.6	4	clayy SILT to silty CLAY	115	2.0	4	5	-	-	0.6	5.0	40	15	-	-	0.00	-
13.29	7.1	8.6	-	0.1	-0.3	1.1	4	clayy SILT to silty CLAY	115	2.0	4	4	-	-	0.5	4.1	51	15	-	-	0.00	-
13.45	6.4	7.8	-	0.1	-0.3	1.1	4	clayy SILT to silty CLAY	115	2.0	3	4	-	-	0.4	3.7	53	15	-	-	0.00	-
13.62	5.7	6.8	-	0.1	-0.3	1.2	3	silty CLAY to CLAY	115	1.5	4	5	-	-	0.4	3.2	59	15	-	-	0.00	-
13.78	4.4	5.2	-	0.1	-0.3	2.2	3	silty CLAY to CLAY	115	1.5	3	3	-	-	0.3	2.3	77	15	-	-	0.00	-
13.94	3.7	4.3	-	0.1	-0.4	2.9	3	silty CLAY to CLAY	115	1.5	2	3	-	-	0.2	1.8	90	15	-	-	0.00	-
14.11	3.0	3.5	-	0.1	-0.4	3.4	3	silty CLAY to CLAY	115	1.5	2	2	-	-	0.2	1.4	95	15	-	-	0.00	-
14.27	2.3	2.6	-	0.1	-0.4	9.3	2	Organic SOILS - Peats	100	1.0	2	3	-	-	0.2	0.9	95	10	-	-	0.00	-
14.44	2.9	3.3	-	0.1	-0.4	7.4	2	Organic SOILS - Peats	100	1.0	3	3	-	-	0.3	1.3	95	10	-	-	0.00	-
14.60	3.6	4.0	-	0.2	-0.7	8.4	2	Organic SOILS - Peats	100	1.0	4	4	-	-	0.3	1.7	95	10	-	-	0.00	-
14.76	4.1	4.6	-	0.3	-0.7	8.3	2	Organic SOILS - Peats	100	1.0	4	5	-	-	0.4	2.0	95	10	-	-	0.00	-
14.93	6.4	7.1	-	0.3	-0.5	6.3	3	silty CLAY to CLAY	115	1.5	4	5	-	-	0.4	3.4	86	15	-	-	0.00	-
15.09	9.8	10.6	-	0.4	-0.7	4.8	3	silty CLAY to CLAY	115	1.5	7	7	-	-	0.7	5.4	68	15	-	-	0.00	-
15.26	11.4	12.3	-	0.5	-0.5	4.9	3	silty CLAY to CLAY	115	1.5	8	8	-	-	0.8	6.3	64	15	-	-	0.00	-
15.42	12.0	12.8	-	0.5	-0.5	4.8	3	silty CLAY to CLAY	115	1.5	8	9	-	-	0.8	6.6	63	15	-	-	0.00	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Earth Mechanics
Data File: SDF(532).cpt
CPT Date: 9/27/2011 1:41:34 PM
GW During Test: No GW

Sounding ID: CPT-11-129
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.17	Cycl SStn %
15.58	11.9	12.6	-	0.5	-0.4	4.5	3	silty CLAY to CLAY	115	1.5	8	8	-	-	0.8	6.5	62	15	-	-	0.00	-
15.75	12.6	13.2	-	0.6	-0.4	4.8	3	silty CLAY to CLAY	115	1.5	8	9	-	-	0.9	6.9	62	15	-	-	0.00	-
15.91	14.2	14.8	-	0.6	-0.4	4.6	3	silty CLAY to CLAY	115	1.5	9	10	-	-	1.0	7.8	58	15	-	-	0.00	-
16.08	15.1	15.5	-	0.7	-0.3	4.8	3	silty CLAY to CLAY	115	1.5	10	10	-	-	1.0	8.2	58	15	-	-	0.00	-
16.24	15.8	16.1	-	0.7	-0.3	4.6	3	silty CLAY to CLAY	115	1.5	11	11	-	-	1.1	8.5	56	15	-	-	0.00	-
16.40	15.8	15.9	-	0.7	-0.3	5.0	3	silty CLAY to CLAY	115	1.5	11	11	-	-	1.1	8.4	58	15	-	-	0.00	-
16.57	16.6	16.6	-	0.8	-0.3	4.8	3	silty CLAY to CLAY	115	1.5	11	11	-	-	1.1	8.9	56	15	-	-	0.00	-
16.73	17.3	17.1	-	0.8	-0.2	5.0	3	silty CLAY to CLAY	115	1.5	12	11	-	-	1.2	9.2	56	15	-	-	0.00	-
16.90	16.7	16.4	-	0.9	-0.3	5.7	3	silty CLAY to CLAY	115	1.5	11	11	-	-	1.1	8.8	60	15	-	-	0.00	-
17.06	15.7	15.2	-	0.8	-0.3	5.7	3	silty CLAY to CLAY	115	1.5	10	10	-	-	1.1	8.1	62	15	-	-	0.00	-
17.23	14.9	14.3	-	0.8	-0.3	5.8	3	silty CLAY to CLAY	115	1.5	10	10	-	-	1.0	7.6	63	15	-	-	0.00	-
17.39	11.6	11.1	-	0.8	-0.2	7.2	3	silty CLAY to CLAY	115	1.5	8	7	-	-	0.8	5.8	75	15	-	-	0.00	-
17.55	10.1	9.5	-	0.7	-0.2	7.4	3	silty CLAY to CLAY	115	1.5	7	6	-	-	0.7	4.9	80	15	-	-	0.00	-
17.72	12.3	11.5	-	0.7	-0.2	5.8	3	silty CLAY to CLAY	115	1.5	8	8	-	-	0.8	6.0	69	15	-	-	0.00	-
17.88	17.0	15.8	-	0.8	-0.5	4.7	3	silty CLAY to CLAY	115	1.5	11	11	-	-	1.2	8.6	57	15	-	-	0.00	-
18.05	17.4	16.0	-	0.9	-0.5	5.8	3	silty CLAY to CLAY	115	1.5	12	11	-	-	1.2	8.7	61	15	-	-	0.00	-
18.21	19.2	17.5	-	1.1	-0.7	5.8	3	silty CLAY to CLAY	115	1.5	13	12	-	-	1.3	9.5	59	15	-	-	0.00	-
18.37	17.7	16.0	-	1.0	-0.5	6.0	3	silty CLAY to CLAY	115	1.5	12	11	-	-	1.2	8.7	61	15	-	-	0.00	-
18.54	13.5	12.1	-	1.0	-0.8	7.8	3	silty CLAY to CLAY	115	1.5	9	8	-	-	0.9	6.5	74	15	-	-	0.00	-
18.70	11.8	10.5	-	0.9	-0.9	8.4	3	silty CLAY to CLAY	115	1.5	8	7	-	-	0.8	5.5	80	15	-	-	0.00	-
18.87	12.4	11.0	-	0.9	-1.1	7.9	3	silty CLAY to CLAY	115	1.5	8	7	-	-	0.8	5.8	77	15	-	-	0.00	-
19.03	17.1	14.9	-	0.8	-0.8	5.3	3	silty CLAY to CLAY	115	1.5	11	10	-	-	1.2	8.1	61	15	-	-	0.00	-
19.19	20.6	17.8	-	0.9	-0.8	4.6	3	silty CLAY to CLAY	115	1.5	14	12	-	-	1.4	9.8	54	15	-	-	0.00	-
19.36	23.0	19.8	-	1.0	-0.7	4.6	3	silty CLAY to CLAY	115	1.5	15	13	-	-	1.6	9.9	52	15	-	-	0.00	-
19.52	24.3	20.8	-	1.1	-0.7	4.8	3	silty CLAY to CLAY	115	1.5	16	14	-	-	1.7	9.9	51	15	-	-	0.00	-
19.69	23.8	20.2	-	1.2	-0.7	5.4	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.6	9.9	54	15	-	-	0.00	-
19.85	21.9	18.4	-	1.2	-0.7	5.8	3	silty CLAY to CLAY	115	1.5	15	12	-	-	1.5	9.9	57	15	-	-	0.00	-
20.01	20.3	16.9	-	1.2	-0.7	6.3	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	9.4	61	15	-	-	0.00	-
20.18	20.0	16.5	-	1.1	-0.7	5.6	3	silty CLAY to CLAY	115	1.5	13	11	-	-	1.4	9.2	59	15	-	-	0.00	-
20.34	19.4	16.0	-	1.0	-0.6	5.7	3	silty CLAY to CLAY	115	1.5	13	11	-	-	1.3	8.8	60	15	-	-	0.00	-
20.51	18.2	14.8	-	1.0	-0.6	5.9	3	silty CLAY to CLAY	115	1.5	12	10	-	-	1.2	8.2	63	15	-	-	0.00	-
20.67	16.9	13.7	-	1.0	-0.6	6.1	3	silty CLAY to CLAY	115	1.5	11	9	-	-	1.1	7.5	66	15	-	-	0.00	-
20.83	17.5	14.0	-	0.9	-0.6	5.6	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	7.7	63	15	-	-	0.00	-
21.00	18.3	14.6	-	0.9	-0.6	5.3	3	silty CLAY to CLAY	115	1.5	12	10	-	-	1.2	8.1	61	15	-	-	0.00	-
21.16	17.5	13.8	-	0.9	-0.6	5.2	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	7.6	62	15	-	-	0.00	-
21.33	15.7	12.3	-	0.8	-0.5	5.5	3	silty CLAY to CLAY	115	1.5	10	8	-	-	1.1	6.7	66	15	-	-	0.00	-
21.49	17.1	13.3	-	0.8	-0.5	4.8	3	silty CLAY to CLAY	115	1.5	11	9	-	-	1.2	7.3	62	15	-	-	0.00	-
21.65	17.6	13.6	-	0.8	-0.5	4.6	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	7.5	60	15	-	-	0.00	-
21.82	16.6	12.7	-	0.7	-0.5	4.9	3	silty CLAY to CLAY	115	1.5	11	8	-	-	1.1	7.0	63	15	-	-	0.00	-
21.98	17.7	13.5	-	0.9	-0.5	5.5	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	7.5	64	15	-	-	0.00	-
22.15	19.1	14.5	-	1.1	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.3	8.1	64	15	-	-	0.00	-
22.31	23.3	17.5	-	1.3	-0.6	5.8	3	silty CLAY to CLAY	115	1.5	16	12	-	-	1.6	9.9	58	15	-	-	0.00	-
22.47	22.8	17.0	-	1.4	-0.6	6.4	3	silty CLAY to CLAY	115	1.5	15	11	-	-	1.6	9.6	61	15	-	-	0.00	-
22.64	19.2	14.2	-	1.2	-0.7	7.0	3	silty CLAY to CLAY	115	1.5	13	9	-	-	1.3	8.0	67	15	-	-	0.00	-
22.80	17.8	13.1	-	1.0	-0.6	6.0	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	7.3	66	15	-	-	0.00	-
22.97	17.5	12.8	-	1.0	-0.6	6.0	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	7.1	67	15	-	-	0.00	-
23.13	17.5	12.7	-	0.9	-0.6	5.9	3	silty CLAY to CLAY	115	1.5	12	8	-	-	1.2	7.0	67	15	-	-	0.00	-
23.30	17.6	12.7	-	1.0	-0.5	6.3	3	silty CLAY to CLAY	115	1.5	12	8	-	-	1.2	7.0	68	15	-	-	0.00	-
23.46	15.3	11.0	-	0.8	-0.6	6.0	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.0	6.0	71	15	-	-	0.00	-
23.62	12.7	9.1	-	0.9	-0.6	7.6	3	silty CLAY to CLAY	115	1.5	8	6	-	-	0.8	4.9	82	15	-	-	0.00	-
23.79	9.8	6.9	-	0.8	-0.7	9.8	2	Organic SOILS - Peats	100	1.0	10	7	-	-	1.0	3.6	95	10	-	-	0.00	-
23.95	13.6	9.5	-	0.8	-0.7	6.8	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	5.2	78	15	-	-	0.00	-
24.12	14.5	10.1	-	0.8	-0.7	6.3	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.0	5.5	75	15	-	-	0.00	-
24.28	15.3	10.6	-	0.8	-0.7	5.9	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.0	5.8	72	15	-	-	0.00	-
24.44	15.3	10.5	-	0.8	-0.7	5.9	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.0	5.8	72	15	-	-	0.00	-
24.61	15.8	10.8	-	0.8	-0.7	5.8	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	6.0	71	15	-	-	0.00	-
24.77	15.7	10.7	-	0.9	-0.7	6.2	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.1	5.9	73	15	-	-	0.00	-
24.94	15.7	10.6	-	0.8	-0.7	5.9	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.1	5.8	72	15	-	-	0.00	-
25.10	15.8	10.6	-	0.8	-0.7	5.5	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	5.9	71	15	-	-	0.00	-
25.26	16.6	11.1	-	0.8	-0.7	5.3	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	6.2	68	15	-	-	0.00	-
25.43	17.0	11.2	-	0.7	-0.7	4.6	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	6.3	65	15	-	-	0.00	-
25.59	14.7	9.7	-	0.7	-0.7	5.3	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	5.3	72	15	-	-	0.00	-
25.76	14.2	9.3	-	0.7	-0.7	5.9	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	5.1	76	15	-	-	0.00	-
25.92	14.6	9.5	-	0.8	-0.7	6.2	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	5.2	76	15	-	-	0.00	-
26.08	15.0	9.7	-	0.8	-0.6	6.3	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	5.4	76	15	-	-	0.00	-
26.25	16.7	10.7	-	0.9	-0.6	6.0	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	6.0	72	15	-	-	0.00	-
26.41	17.1	10.9	-	0.9	-0.7	5.8	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	6.1	71	15	-	-	0.00	-
26.58	17.2	10.9	-	0.8	-0.6	5.3	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.2	6.1	69	15	-	-	0.00	-
26.74	16.5	10.4	-	0.7	-0.6	5.0	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	5.8	69	15	-	-	0.00	-
26.90	16.3	10.2	-	0.8	-0.6	5.2	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	5.7	71	15	-	-	0.00	-
27.07	16.6	10.3	-	0.8	-0.6	5.3	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	5.8	70	15	-	-	0.00	-
27.23	18.8	11.7	-	0.8	-0.6	4.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.6	65	15	-	-	0.00	-
27.40	19.9	12.3	-	0.9	-0.6	4.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	7.0	64	15	-	-	0.00	-
27.56	18.1	11.1	-	0.9	-0.6	5.8	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.2	6.2	70	15	-	-	0.00	-
27.72	20.1	12.3	-	1.0	-0.5	5.2	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.4	7.0	65	15	-	-	0.00	-
27.89	19.7	11.9	-	1.0	-0.5	5.7	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.8	68	15	-	-	0.00	-
28.05	18.9	11.4	-	1.0	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.5	70	15	-	-	0.00	-
28.22	19.1	11.4	-	1.0	-0.5	5.7	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.5	69	15	-	-	0.00	-
28.38	19.5	11.6	-	1.0	-0.5	5.5	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.6	68	15	-	-	0.00	-
28.54	20.6	12.2	-	1.0	-0.5	5.1	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	7.0	65	15	-	-	0.00	-
28.71	20.4	12.0	-	1.0	-0.5	5.3	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	6.8	66	15	-	-	0.00	-
28.87	19.8	11.6	-	1.0	-0.5	5.8	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.6	69	15	-	-	0.00	-
29.04	21.5	12.5	-	1.1	-0.5	5.4	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.5	7.2	66	15	-	-	0.00	-
29.20	22.3	12.9	-	1.2	-0.5	6.0	3	silty CLAY to CLAY	115	1.5	15	9	-	-	1.5	7.4	67	15	-	-	0.00	-
29.36	22.3	12.8	-	1.2	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	15	9	-	-	1.5	7.4	67	15	-	-	0.00	-
29.53	21.5	12.3	-	1.2	-0.4	5.9	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.5	7.1	68	15	-	-	0.00	-
29.69	20.6	11.7	-	1.1	-0.4	5.9	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	6.7	69	15	-	-	0.00	-
29.86	22.1	12.5	-	1.2	-0.4	6.0	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	7.2	67	15	-	-	0.00	-
30.02	23.3	13.1	-	1.4	-0.4	6.3	3	silty CLAY to CLAY	115	1.5	16	9	-	-	1.6	7.6	68	15	-	-	0.00	-
30.19	25.3	14.2	-	1.3	-0.4	5.7	3	silty CLAY to CLAY	115	1.5	17	9	-	-	1.7	8.3	64	15	-	-	0.00	-
30.35	24.4	13.6	-	1.4	-0.4	6.1	3	silty CLAY to CLAY	115	1.5	16	9	-	-	1.7	7.9	66	15	-	-	0.00	-
30.51	25.9	14.4	-	1.2	-0.4	5.0	3	silty CLAY to CLAY	115	1.5	17	10	-	-	1.8	8.4	61	15	-	-	0.00	-
30.68	25.6	14.2	-	1.3	-0.3	5.6	3	silty CLAY to CLAY	115	1.5	17	9	-	-	1.7	8.3	63	15	-	-	0.00	-
30.84	26.3	14.4	-	1.5	-0.4	6.1	3	silty CLAY to CLAY	115	1.5	18	10	-	-	1.8	8.5	64	15	-	-	0.00	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(532).cpt
CPT Date: 9/27/2011 1:41:34 PM
GW During Test: No GW

Sounding ID: CPT-11-129
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qc1n PS -	qIncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.17	Cycl SStn %
31.01	22.2	12.1	-	1.5	-0.5	7.2	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	7.0	72	15	-	-	0.00	-
31.17	20.7	11.3	-	1.1	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	6.5	70	15	-	-	0.00	-
31.33	21.5	11.6	-	1.0	-0.5	5.3	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	6.7	67	15	-	-	0.00	-
31.50	22.2	12.0	-	1.1	-0.4	5.3	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	6.9	66	15	-	-	0.00	-
31.66	21.6	11.6	-	1.1	-0.4	5.4	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.5	6.7	67	15	-	-	0.00	-
31.83	23.7	12.6	-	1.0	-0.4	4.5	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	7.3	62	15	-	-	0.00	-
31.99	23.2	12.3	-	0.8	-0.4	4.0	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.6	7.1	60	15	-	-	0.00	-
32.15	21.7	11.5	-	0.8	-0.4	4.0	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.5	6.6	62	15	-	-	0.00	-
32.32	23.9	12.6	-	0.8	-0.4	3.6	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	7.3	58	15	-	-	0.00	-
32.48	22.2	11.6	-	0.9	-0.4	4.4	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	6.7	64	15	-	-	0.00	-
32.65	24.2	12.6	-	0.9	-0.4	4.2	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	7.3	61	15	-	-	0.00	-
32.81	24.8	12.8	-	1.0	-0.4	4.2	3	silty CLAY to CLAY	115	1.5	17	9	-	-	1.7	7.5	60	15	-	-	0.00	-
32.97	23.6	12.1	-	1.1	-0.4	4.9	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	7.1	64	15	-	-	0.00	-
33.14	27.3	14.0	-	0.9	-0.4	3.4	3	silty CLAY to CLAY	115	1.5	18	9	-	-	1.9	8.2	54	15	-	-	0.00	-
33.30	24.1	12.3	-	0.7	-0.3	3.2	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	7.2	57	15	-	-	0.00	-
33.47	19.0	9.6	-	0.7	-0.3	4.2	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.5	68	15	-	-	0.00	-
33.63	22.2	11.2	-	0.8	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.5	63	15	-	-	0.00	-
33.79	25.7	12.9	-	1.0	-0.2	4.0	3	silty CLAY to CLAY	115	1.5	17	9	-	-	1.7	7.6	59	15	-	-	0.00	-
33.96	24.4	12.2	-	0.9	-0.2	3.9	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	7.1	60	15	-	-	0.00	-
34.12	21.4	10.6	-	0.9	-0.1	4.7	3	silty CLAY to CLAY	115	1.5	14	7	-	-	1.4	6.1	67	15	-	-	0.00	-
34.29	23.7	11.7	-	0.9	-0.2	4.0	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	6.8	61	15	-	-	0.00	-
34.45	19.0	9.4	-	0.8	-0.2	4.6	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.3	71	15	-	-	0.00	-
34.61	16.9	8.3	-	1.0	-0.2	6.4	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.1	4.7	81	15	-	-	0.00	-
34.78	27.2	13.3	-	1.1	-0.2	4.4	3	silty CLAY to CLAY	115	1.5	18	9	-	-	1.8	7.8	60	15	-	-	0.00	-
34.94	34.5	16.8	-	1.2	-0.3	3.7	3	silty CLAY to CLAY	115	1.5	23	11	-	-	2.4	9.9	51	15	-	-	0.00	-
35.11	32.0	15.5	-	1.2	-0.4	4.1	3	silty CLAY to CLAY	115	1.5	21	10	-	-	2.2	9.3	55	15	-	-	0.00	-
35.27	32.3	15.6	-	1.2	-0.2	3.8	3	silty CLAY to CLAY	115	1.5	22	10	-	-	2.2	9.3	54	15	-	-	0.00	-
35.43	30.4	14.6	-	1.0	-0.2	3.7	3	silty CLAY to CLAY	115	1.5	20	10	-	-	2.1	8.7	54	15	-	-	0.00	-
35.60	23.1	11.0	-	0.9	-0.2	4.1	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.6	6.4	64	15	-	-	0.00	-
35.76	19.6	9.3	-	0.8	-0.1	4.6	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.3	71	15	-	-	0.00	-
35.93	20.6	9.7	-	0.7	-0.2	4.0	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.6	67	15	-	-	0.00	-
36.09	21.8	10.3	-	0.8	-0.2	4.2	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	5.9	66	15	-	-	0.00	-
36.26	25.6	12.0	-	0.9	-0.1	4.0	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	7.0	61	15	-	-	0.00	-
36.42	25.1	11.7	-	1.0	-0.1	4.1	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	6.9	62	15	-	-	0.00	-
36.58	25.7	12.0	-	0.9	-0.1	3.9	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	7.0	61	15	-	-	0.00	-
36.75	20.9	9.7	-	0.8	-0.1	4.3	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.6	68	15	-	-	0.00	-
36.91	21.1	9.7	-	0.8	-0.1	4.2	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.6	68	15	-	-	0.00	-
37.08	20.8	9.5	-	0.9	0.0	4.6	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.5	70	15	-	-	0.00	-
37.24	23.7	10.8	-	0.9	0.1	4.0	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	6.3	64	15	-	-	0.00	-
37.40	21.1	9.6	-	0.9	0.2	4.6	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.5	70	15	-	-	0.00	-
37.57	19.9	9.0	-	0.9	0.1	4.8	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.1	73	15	-	-	0.00	-
37.73	19.8	8.9	-	0.8	0.1	4.4	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.1	71	15	-	-	0.00	-
37.90	19.0	8.5	-	0.8	0.1	4.6	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	4.8	73	15	-	-	0.00	-
38.06	20.0	9.0	-	0.7	0.1	4.2	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.1	70	15	-	-	0.00	-
38.22	18.2	8.1	-	0.8	0.1	4.7	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	4.6	75	15	-	-	0.00	-
38.39	18.7	8.3	-	0.7	0.1	4.3	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	4.7	73	15	-	-	0.00	-
38.55	19.6	8.6	-	0.7	0.1	4.3	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	4.9	71	15	-	-	0.00	-
38.72	21.2	9.3	-	0.7	0.1	3.9	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.4	67	15	-	-	0.00	-
38.88	22.2	9.7	-	0.7	0.1	3.7	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	5.6	65	15	-	-	0.00	-
39.04	24.5	10.7	-	0.7	0.1	3.2	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	6.3	60	15	-	-	0.00	-
39.21	25.3	11.0	-	0.7	0.2	3.0	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.4	58	15	-	-	0.00	-
39.37	23.2	10.0	-	0.7	0.3	3.3	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.6	5.8	62	15	-	-	0.00	-
39.54	22.8	9.8	-	0.7	0.3	3.3	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	5.7	63	15	-	-	0.00	-
39.70	23.0	9.9	-	0.7	0.3	3.3	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	5.8	63	15	-	-	0.00	-
39.86	25.6	10.9	-	0.8	0.3	3.5	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.4	61	15	-	-	0.00	-
40.03	31.5	13.4	-	0.9	0.3	3.1	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.1	8.0	54	15	-	-	0.00	-
40.19	25.2	10.7	-	0.8	0.3	3.7	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.3	63	15	-	-	0.00	-
40.36	21.5	9.1	-	0.8	0.4	4.1	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.2	69	15	-	-	0.00	-
40.52	22.2	9.3	-	0.8	0.4	4.1	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	5.4	69	15	-	-	0.00	-
40.68	25.3	10.6	-	0.9	0.5	4.1	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.2	65	15	-	-	0.00	-
40.85	27.5	11.5	-	1.0	0.5	3.8	3	silty CLAY to CLAY	115	1.5	18	8	-	-	1.9	6.8	61	15	-	-	0.00	-
41.01	24.7	10.3	-	1.0	0.5	4.3	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.7	6.0	66	15	-	-	0.00	-
41.18	26.4	10.9	-	0.9	0.5	3.7	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.4	62	15	-	-	0.00	-
41.34	27.0	11.1	-	1.0	0.5	4.1	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.6	64	15	-	-	0.00	-
41.50	27.1	11.2	-	1.1	0.5	4.4	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.6	65	15	-	-	0.00	-
41.67	28.2	11.5	-	1.0	0.5	4.0	3	silty CLAY to CLAY	115	1.5	19	8	-	-	1.9	6.8	62	15	-	-	0.00	-
41.83	27.8	11.3	-	1.0	0.6	3.8	3	silty CLAY to CLAY	115	1.5	19	8	-	-	1.9	6.7	62	15	-	-	0.00	-
42.00	26.5	10.8	-	1.0	0.6	4.0	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.4	64	15	-	-	0.00	-
42.16	26.3	10.6	-	1.0	0.6	4.0	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.3	64	15	-	-	0.00	-
42.32	23.9	9.6	-	0.9	0.6	4.3	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.6	68	15	-	-	0.00	-
42.49	23.4	9.4	-	0.9	0.6	4.1	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.5	68	15	-	-	0.00	-
42.65	21.2	8.5	-	0.8	0.6	4.5	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	4.9	73	15	-	-	0.00	-
42.82	27.4	10.9	-	1.1	0.7	4.3	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.5	65	15	-	-	0.00	-
42.98	36.6	14.5	-	1.3	0.7	3.8	3	silty CLAY to CLAY	115	1.5	24	10	-	-	2.5	8.8	55	15	-	-	0.00	-
43.15	40.7	16.1	-	1.3	0.7	3.3	3	silty CLAY to CLAY	115	1.5	27	11	-	-	2.8	9.8	51	15	-	-	0.00	-
43.31	36.9	14.5	-	1.3	0.7	3.8	3	silty CLAY to CLAY	115	1.5	25	10	-	-	2.5	8.8	55	15	-	-	0.00	-
43.47	35.8	14.1	-	1.2	0.8	3.6	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	8.5	55	15	-	-	0.00	-
43.64	32.7	12.8	-	1.2	0.8	3.8	3	silty CLAY to CLAY	115	1.5	22	9	-	-	2.2	7.7	59	15	-	-	0.00	-
43.80	36.1	14.1	-	1.2	0.8	3.6	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.5	8.5	55	15	-	-	0.00	-
43.97	42.1	16.4	-	1.4	0.9	3.6	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	9.9	51	15	-	-	0.00	-
44.13	48.9	18.9	-	1.7	0.9	3.7	3	silty CLAY to CLAY	115	1.5	33	13	-	-	3.4	9.9	49	15	-	-	0.00	-
44.29	58.6	22.6	-	1.6	0.9	2.9	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	42	15	-	-	0.00	-
44.46	43.6	16.8	-	1.6	1.0	4.0	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	9.9	53	15	-	-	0.00	-
44.62	46.0	17.6	-	1.5	1.0	3.4	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.9	49	15	-	-	0.00	-
44.79	47.5	18.1	-	1.6	1.0	3.5	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	49	15	-	-	0.00	-
44.95	45.6	17.3	-	1.6	1.1	3.7	3	silty CLAY to CLAY	115	1.5	30	12	-	-	3.1	9.9	51	15	-	-	0.00	-
45.11	48.1	18.2	-	1.6	1.1	3.5	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	49	15	-	-	0.00	-
45.28	46.3	17.5	-	1.5	1.1	3.5	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.9	50	15	-	-	0.00	-
45.44	46.0	17.4	-	1.4	1.1	3.3	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.9	49	15	-	-	0.00	-
45.61	48.0	18.1	-	1.5	1.1	3.4	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	48	15	-	-	0.00	-
45.77	43.4	16.4	-	1.5	1.1	3.7	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	9.9	52	15	-	-	0.00	-
45.93	41.0	15.5	-	1.3	1.2	3.4	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.8	9.3	52	15	-	-	0.00	-
46.10	41.9	15.8	-	1.2	1.2	3.1	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	9.5	50	15	-	-	0.00	-
46.26	43.1	16.2	-	1.3	1.1	3.2	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	9.8	50	15	-	-	0.00	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(532).cpt
CPT Date: 9/27/2011 1:41:34 PM
GW During Test: No GW

Sounding ID: CPT-11-129
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.17	Cycl SStn %
46.43	41.8	15.8	-	1.3	1.1	3.4	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	9.4	52	15	-	-	0.00	-
46.59	42.2	15.9	-	1.4	1.2	3.6	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	9.5	52	15	-	-	0.00	-
46.75	40.1	15.1	-	1.3	1.2	3.6	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	9.0	53	15	-	-	0.00	-
46.92	40.3	15.2	-	1.2	1.2	3.2	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	9.0	51	15	-	-	0.00	-
47.08	38.9	14.7	-	1.2	1.2	3.2	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.7	8.6	52	15	-	-	0.00	-
47.25	36.9	13.9	-	1.1	1.2	3.4	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	8.1	54	15	-	-	0.00	-
47.41	36.2	13.7	-	1.1	1.2	3.4	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.5	7.9	55	15	-	-	0.00	-
47.57	35.9	13.6	-	1.1	1.2	3.5	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	7.8	55	15	-	-	0.00	-
47.74	35.0	13.2	-	1.1	1.2	3.5	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	7.6	56	15	-	-	0.00	-
47.90	34.8	13.1	-	1.2	1.3	3.7	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	7.5	57	15	-	-	0.00	-
48.07	36.2	13.7	-	1.2	1.3	3.5	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.5	7.8	56	15	-	-	0.00	-
48.23	36.7	13.8	-	1.2	1.2	3.7	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.5	7.9	56	15	-	-	0.00	-
48.39	36.6	13.8	-	1.3	1.2	3.7	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.5	7.9	56	15	-	-	0.00	-
48.56	35.0	13.2	-	1.2	1.2	3.8	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	7.5	58	15	-	-	0.00	-
48.72	34.7	13.1	-	1.2	1.2	3.8	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	7.4	58	15	-	-	0.00	-
48.89	33.8	12.8	-	1.2	1.2	3.8	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	7.1	59	15	-	-	0.00	-
49.05	32.5	12.3	-	1.1	1.2	3.9	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	6.8	60	15	-	-	0.00	-
49.22	32.6	12.3	-	1.1	1.2	3.7	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	6.8	59	15	-	-	0.00	-
49.38	32.1	12.1	-	1.1	1.2	3.8	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.2	6.7	60	15	-	-	0.00	-
49.54	30.6	11.5	-	1.2	1.2	4.3	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.1	6.3	64	15	-	-	0.00	-
49.71	27.1	10.2	-	1.1	1.2	4.6	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.5	68	15	-	-	0.00	-
49.87	26.3	9.9	-	1.1	1.3	4.5	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.3	69	15	-	-	0.00	-
50.04	25.3	9.6	-	1.0	1.3	4.6	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	5.1	70	15	-	-	0.00	-
50.20	20.4	7.7	-	1.0	1.3	5.9	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.9	82	15	-	-	0.00	-
50.36	18.2	6.9	-	1.0	1.3	6.3	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	3.4	88	15	-	-	0.00	-
50.53	24.4	9.2	-	0.9	1.3	4.2	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.8	70	15	-	-	0.00	-
50.69	22.5	8.5	-	0.9	1.3	4.9	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	4.4	75	15	-	-	0.00	-
50.86	20.6	7.8	-	1.0	1.2	5.7	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.9	81	15	-	-	0.00	-
51.02	24.6	9.3	-	1.0	1.2	4.4	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.8	70	15	-	-	0.00	-
51.18	24.6	9.3	-	1.1	1.3	4.9	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.8	73	15	-	-	0.00	-
51.35	28.4	10.7	-	1.1	1.2	4.5	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.6	67	15	-	-	0.00	-
51.51	30.5	11.5	-	1.2	1.2	4.5	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	6.0	64	15	-	-	0.00	-
51.68	34.8	13.1	-	1.5	1.3	4.8	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	7.0	62	15	-	-	0.00	-
51.84	35.5	13.4	-	1.8	1.3	5.6	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	7.1	65	15	-	-	0.00	-
52.00	47.9	18.1	-	2.1	1.4	4.7	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.8	54	15	-	-	0.00	-
52.17	44.3	16.7	-	2.1	1.4	5.1	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.0	9.0	57	15	-	-	0.00	-
52.33	42.3	16.0	-	1.8	1.4	4.7	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	8.5	57	15	-	-	0.00	-
52.50	43.9	16.6	-	1.9	1.5	4.5	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	8.8	56	15	-	-	0.00	-
52.66	45.1	17.0	-	1.8	1.6	4.4	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.1	54	15	-	-	0.00	-
52.82	43.0	16.2	-	1.9	1.6	4.7	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	8.6	56	15	-	-	0.00	-
52.99	46.4	17.5	-	1.7	1.7	4.0	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.3	52	15	-	-	0.00	-
53.15	54.5	20.6	-	1.9	1.6	3.7	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	47	15	-	-	0.00	-
53.32	57.6	21.7	-	1.9	1.6	3.5	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	45	15	-	-	0.00	-
53.48	58.2	21.9	-	1.9	1.7	3.5	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	45	15	-	-	0.00	-
53.64	60.6	22.9	-	1.9	1.7	3.3	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.2	9.9	43	15	-	-	0.00	-
53.81	58.0	21.9	-	1.9	1.7	3.5	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	45	15	-	-	0.00	-
53.97	58.7	22.1	-	1.7	1.7	3.1	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	43	15	-	-	0.00	-
54.14	58.0	21.9	-	1.7	1.8	3.0	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	43	15	-	-	0.00	-
54.30	58.8	22.2	-	1.7	1.8	3.0	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	42	15	-	-	0.00	-
54.46	58.5	22.1	-	1.6	1.8	2.8	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	42	15	-	-	0.00	-
54.63	54.1	20.4	-	1.6	1.8	3.1	4	clayy SILT to silty CLAY	115	2.0	27	10	-	-	3.7	9.9	45	15	-	-	0.00	-
54.79	54.3	20.5	-	1.5	1.8	3.0	4	clayy SILT to silty CLAY	115	2.0	27	10	-	-	3.7	9.9	44	15	-	-	0.00	-
54.96	54.1	20.4	-	1.6	1.8	3.1	4	clayy SILT to silty CLAY	115	2.0	27	10	-	-	3.7	9.9	45	15	-	-	0.00	-
55.12	46.9	17.7	-	1.6	1.7	3.6	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.0	50	15	-	-	0.00	-
55.28	43.5	16.4	-	1.6	1.6	3.9	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	8.3	53	15	-	-	0.00	-
55.45	40.8	15.4	-	1.4	1.6	3.7	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.8	7.7	54	15	-	-	0.00	-
55.61	40.6	15.3	-	1.6	1.8	4.2	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.8	7.7	56	15	-	-	0.00	-
55.78	48.2	18.2	-	1.7	1.8	3.8	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.2	51	15	-	-	0.00	-
55.94	46.0	17.4	-	1.6	1.8	3.9	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.1	8.7	52	15	-	-	0.00	-
56.11	49.6	18.7	-	2.1	1.9	4.5	3	silty CLAY to CLAY	115	1.5	33	12	-	-	3.4	9.4	53	15	-	-	0.00	-
56.27	62.0	23.4	-	2.3	1.9	3.9	3	silty CLAY to CLAY	115	1.5	41	16	-	-	4.3	9.9	46	15	-	-	0.00	-
56.43	71.5	27.0	-	2.4	2.0	3.5	4	clayy SILT to silty CLAY	115	2.0	36	13	-	-	4.9	9.9	41	15	-	-	0.00	-
56.60	75.4	28.5	-	2.2	2.1	3.0	4	clayy SILT to silty CLAY	115	2.0	38	14	-	-	5.2	9.9	38	15	-	-	0.00	-
56.76	70.0	26.4	-	1.9	2.1	2.9	4	clayy SILT to silty CLAY	115	2.0	35	13	-	-	4.8	9.9	39	15	-	-	0.00	-
56.93	62.0	23.4	-	1.7	2.1	2.9	4	clayy SILT to silty CLAY	115	2.0	31	12	-	-	4.3	9.9	41	15	-	-	0.00	-
57.09	57.1	21.5	-	1.8	2.0	3.4	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	3.9	9.9	45	15	-	-	0.00	-
57.25	61.6	23.2	-	2.1	2.0	3.6	4	clayy SILT to silty CLAY	115	2.0	31	12	-	-	4.2	9.9	44	15	-	-	0.00	-
57.42	69.0	26.0	-	2.3	2.1	3.6	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.8	9.9	42	15	-	-	0.00	-
57.58	71.9	27.1	-	2.5	2.0	3.6	4	clayy SILT to silty CLAY	115	2.0	36	14	-	-	5.0	9.9	42	15	-	-	0.00	-
57.75	66.6	25.1	-	2.4	2.0	3.9	4	clayy SILT to silty CLAY	115	2.0	33	13	-	-	4.6	9.9	44	15	-	-	0.00	-
57.91	63.2	23.9	-	2.2	2.1	3.7	4	clayy SILT to silty CLAY	115	2.0	32	12	-	-	4.4	9.9	44	15	-	-	0.00	-
58.07	59.8	22.6	-	2.2	2.0	3.8	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.1	9.9	46	15	-	-	0.00	-
58.24	55.3	20.8	-	2.4	2.0	4.6	3	silty CLAY to CLAY	115	1.5	37	14	-	-	3.8	9.9	51	15	-	-	0.00	-
58.40	54.1	20.4	-	2.3	2.1	4.6	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	51	15	-	-	0.00	-
58.57	52.4	19.8	-	2.5	2.2	5.1	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.6	54	15	-	-	0.00	-
58.73	60.6	22.9	-	2.7	2.2	4.8	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.2	9.9	49	15	-	-	0.00	-
58.89	70.6	26.7	-	3.4	2.4	5.0	3	silty CLAY to CLAY	115	1.5	47	18	-	-	4.9	9.9	47	15	-	-	0.00	-
59.06	76.1	28.7	-	3.5	2.3	4.8	3	silty CLAY to CLAY	115	1.5	51	19	-	-	5.3	9.9	45	15	-	-	0.00	-
59.22	75.9	28.6	-	3.3	2.2	4.5	3	silty CLAY to CLAY	115	1.5	51	19	-	-	5.2	9.9	44	15	-	-	0.00	-
59.39	63.0	23.8	-	2.8	2.3	4.8	3	silty CLAY to CLAY	115	1.5	42	16	-	-	4.3	9.9	49	15	-	-	0.00	-
59.55	58.3	22.0	-	2.5	2.3	4.6	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	9.9	50	15	-	-	0.00	-
59.71	49.8	18.8	-	2.1	2.4	4.5	3	silty CLAY to CLAY	115	1.5	33	13	-	-	3.4	8.9	53	15	-	-	0.00	-
59.88	48.5	18.3	-	2.8	2.2	6.1	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	8.6	59	15	-	-	0.00	-
60.04	31.6	11.9	-	2.8	1.8	9.9	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	5.4	81	15	-	-	0.00	-
60.21	40.3	15.2	-	2.4	1.6	6.6	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	7.0	65	15	-	-	0.00	-
60.37	35.9	13.5	-	2.1	1.2	6.6	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	6.2	68	15	-	-	0.00	-
60.53	31.5	11.9	-	1.9	1.1	6.9	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	5.3	73	15	-	-	0.00	-
60.70	33.5	12.7	-	1.9	1.2	6.2	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	5.7	69	15	-	-	0.00	-
60.86	34.0	12.8	-	1.6	1.5	5.4	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	5.8	65	15	-	-	0.00	-
61.03	33.4	12.6	-	1.7	1.4	5.8	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	5.6	67	15	-	-	0.00	-
61.19	41.0	15.5	-	1.9	1.2	5.0	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.8	7.0	59	15	-	-	0.00	-
61.35	42.1	15.9	-	1.9	1.2	4.9	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	7.2	58	15	-	-	0.00	-
61.52	36.0	13.6	-	1.7	1.3	5.3	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	6.1	64	15	-	-	0.00	-
61.68	26.3	9.9	-	1.4	1.3	6.0	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.7	4.2	75	15	-	-	0.00	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(532).cpt
CPT Date: 9/27/2011 1:41:34 PM
GW During Test: No GW

Sounding ID: CPT-11-129
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	*qc1n PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	*Mat Typ Zon	*Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	*SPT R-N1 60%	*Rel Den %	*Ftn Ang deg	Und Shr tsf	OCR -	*Fin Ic %	*Nk -	*Vol Strn %	*Dry Stlmt 0.00	*Liq Stlmt 0.17	*Cycl SStn %
61.85	21.9	8.2	-	1.2	1.3	6.4	3	silty CLAY to CLAY	115	1.5	15	5	-	-	1.4	3.4	83	15	-	-	0.00	-
62.01	25.1	9.5	-	1.1	1.2	4.9	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	4.0	73	15	-	-	0.00	-
62.17	26.5	10.0	-	1.3	1.3	5.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.7	4.2	74	15	-	-	0.00	-
62.34	43.8	16.5	-	1.5	1.3	3.7	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	7.4	52	15	-	-	0.00	-
62.50	35.8	13.5	-	1.5	1.0	4.6	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	5.9	61	15	-	-	0.00	-
62.67	33.5	12.6	-	1.6	1.1	5.2	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	5.5	65	15	-	-	0.00	-
62.83	58.9	22.2	-	1.8	1.2	3.3	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	44	15	-	-	0.00	-
63.00	75.7	28.6	-	2.4	1.2	3.3	4	clayy SILT to silty CLAY	115	2.0	38	14	-	-	5.2	9.9	39	15	-	-	0.00	-
63.16	83.0	31.3	-	2.4	1.3	3.0	4	clayy SILT to silty CLAY	115	2.0	42	16	-	-	5.7	9.9	36	15	-	-	0.00	-
63.32	76.3	28.8	-	2.2	1.3	3.1	4	clayy SILT to silty CLAY	115	2.0	38	14	-	-	5.3	9.9	38	15	-	-	0.00	-
63.49	69.0	26.0	-	1.9	1.4	2.9	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.7	9.9	39	15	-	-	0.00	-
63.65	60.2	22.7	-	2.0	1.6	3.6	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.1	9.9	45	15	-	-	0.00	-
63.82	68.6	25.9	-	2.2	1.6	3.4	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.7	9.9	41	15	-	-	0.00	-
63.98	74.2	28.0	-	2.2	1.5	3.1	4	clayy SILT to silty CLAY	115	2.0	37	14	-	-	5.1	9.9	39	15	-	-	0.00	-
64.14	74.5	28.1	-	2.0	1.5	2.8	4	clayy SILT to silty CLAY	115	2.0	37	14	-	-	5.1	9.9	37	15	-	-	0.00	-
64.31	66.1	24.9	-	2.2	1.6	3.5	4	clayy SILT to silty CLAY	115	2.0	33	12	-	-	4.5	9.9	43	15	-	-	0.00	-
64.47	80.9	30.5	-	2.8	1.7	3.6	4	clayy SILT to silty CLAY	115	2.0	40	15	-	-	5.6	9.9	39	15	-	-	0.00	-
64.64	89.5	33.8	-	3.0	1.7	3.5	4	clayy SILT to silty CLAY	115	2.0	45	17	-	-	6.2	9.9	37	15	-	-	0.00	-
64.80	89.4	33.7	-	3.2	1.7	3.8	4	clayy SILT to silty CLAY	115	2.0	45	17	-	-	6.2	9.9	38	15	-	-	0.00	-
64.96	84.1	31.7	-	3.1	1.7	3.9	4	clayy SILT to silty CLAY	115	2.0	42	16	-	-	5.8	9.9	40	15	-	-	0.00	-
65.13	81.6	30.8	-	3.2	1.8	4.1	4	clayy SILT to silty CLAY	115	2.0	41	15	-	-	5.6	9.9	41	15	-	-	0.00	-
65.29	72.4	27.3	-	3.3	1.8	4.8	3	silty CLAY to CLAY	115	1.5	48	18	-	-	5.0	9.9	46	15	-	-	0.00	-
65.46	112.3	55.9	139.5	3.4	1.9	3.1	4	clayy SILT to silty CLAY	115	2.0	56	28	-	-	7.8	9.9	28	15	1.48	-	0.00	37.9

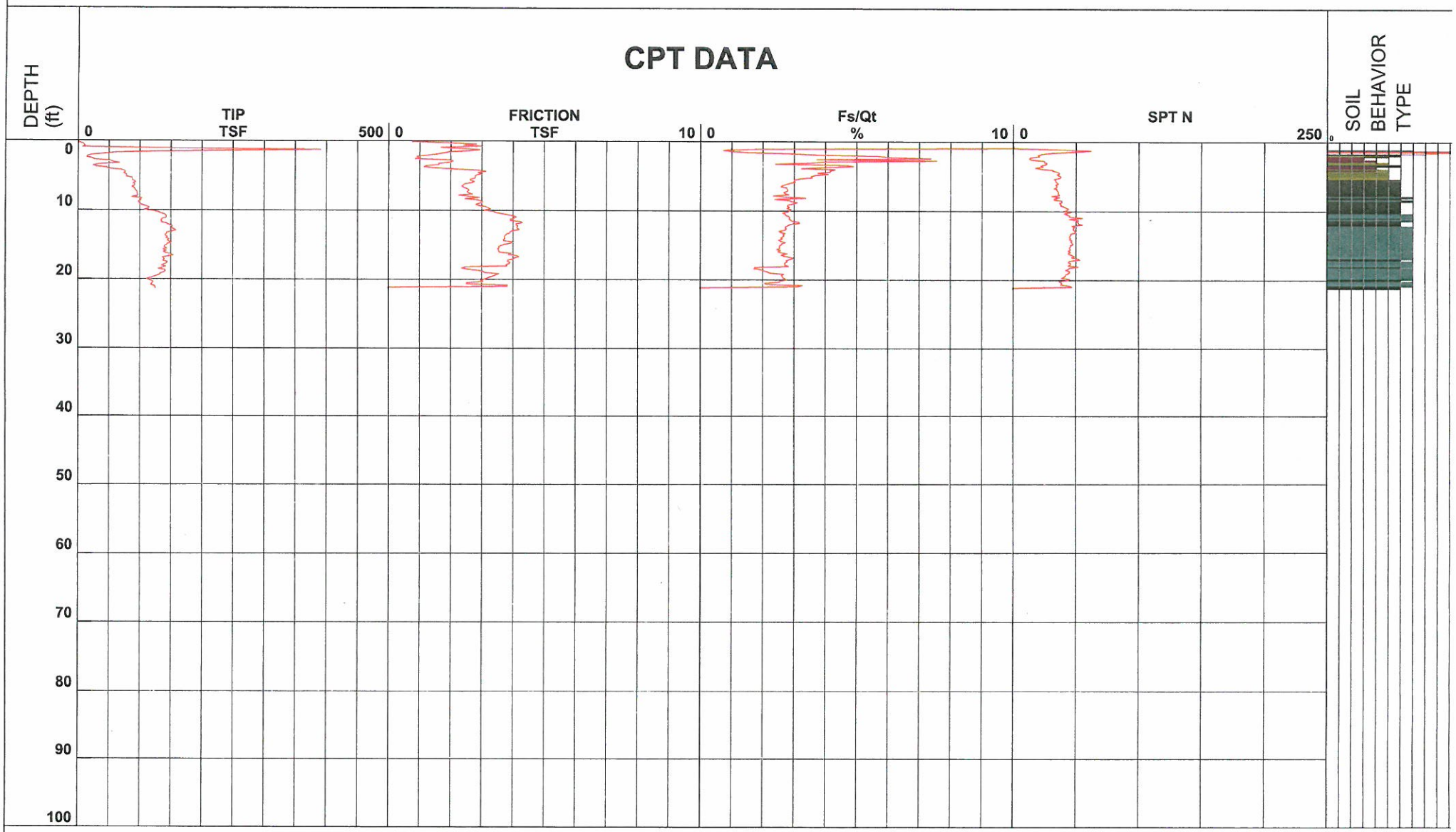
* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Earth Mechanics

Location	I-5 HOV Widening Segment 1	Operator	BH-JB	Filename	SDF(531).cpt
Job Number	11-135	Cone Number	DSG1104	GPS	
Hole Number	CPT-11-131	Date and Time	9/27/2011 12:07:53 PM	Maximum Depth	21.33 ft
Water Table Depth		>21.33 ft			

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(531).cpt
CPT Date: 9/27/2011 12:07:53 PM
GW During Test: No GW

Sounding ID: CPT-11-131
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.00	Cycl SStn %
0.33	1.1	1.4	-	1.9	0.1	9.9	2	Organic SOILS - Peats	100	1.0	1	1	-	-	0.1	9.9	95	10	N/A	0.00	N/A	N/A
0.49	7.4	11.9	-	2.8	0.2	9.9	3	silty CLAY to CLAY	115	1.5	5	8	-	-	0.5	9.9	78	15	N/A	0.00	N/A	N/A
0.66	9.2	14.7	-	2.4	0.3	9.9	3	silty CLAY to CLAY	115	1.5	6	10	-	-	0.6	9.9	73	15	N/A	0.00	N/A	N/A
0.82	11.1	17.7	-	3.0	0.4	9.9	3	silty CLAY to CLAY	115	1.5	7	12	-	-	0.8	9.9	68	15	N/A	0.00	N/A	N/A
0.98	7.3	11.6	-	1.7	0.4	9.9	3	silty CLAY to CLAY	115	1.5	5	8	-	-	0.5	9.9	79	15	N/A	0.00	N/A	N/A
1.15	125.2	200.8	237.2	2.3	0.3	1.9	6	clean SAND to silty SAND	125	5.0	25	40	90	48	-	-	10	16	N/A	0.00	N/A	N/A
1.31	390.4	626.2	626.2	2.9	-0.6	0.7	7	grvly SAND to dense SAND	130	6.0	65	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
1.48	250.2	401.2	401.2	2.5	0.0	1.0	6	clean SAND to silty SAND	125	5.0	50	80	95	48	-	-	5	16	N/A	0.00	N/A	N/A
1.64	129.9	208.4	232.0	1.9	0.2	1.5	6	clean SAND to silty SAND	125	5.0	26	42	91	48	-	-	8	16	N/A	0.00	N/A	N/A
1.80	60.7	97.4	173.0	1.8	0.2	2.9	5	silty SAND to sandy SILT	120	4.0	15	24	66	48	-	-	20	16	N/A	0.00	N/A	N/A
1.97	41.7	67.0	163.3	1.5	0.2	3.7	4	clayy SILT to silty CLAY	115	2.0	21	33	-	-	2.9	9.9	28	15	N/A	0.00	N/A	N/A
2.13	21.5	34.4	-	1.2	0.2	5.7	3	silty CLAY to CLAY	115	1.5	14	23	-	-	1.5	9.9	44	15	N/A	0.00	N/A	N/A
2.30	14.9	23.9	-	0.9	0.2	6.1	3	silty CLAY to CLAY	115	1.5	10	16	-	-	1.0	9.9	52	15	N/A	0.00	N/A	N/A
2.46	13.9	22.3	-	1.0	0.1	7.4	3	silty CLAY to CLAY	115	1.5	9	15	-	-	1.0	9.9	57	15	N/A	0.00	N/A	N/A
2.62	22.9	36.7	-	0.9	-0.1	3.8	4	clayy SILT to silty CLAY	115	2.0	11	18	-	-	1.6	9.9	36	15	N/A	0.00	N/A	N/A
2.79	26.1	41.9	-	2.0	-0.2	7.6	3	silty CLAY to CLAY	115	1.5	17	28	-	-	1.8	9.9	46	15	N/A	0.00	N/A	N/A
2.95	51.6	82.7	190.5	2.1	-0.3	4.0	4	clayy SILT to silty CLAY	115	2.0	26	41	-	-	3.6	9.9	26	15	N/A	0.00	N/A	N/A
3.12	56.7	90.9	184.8	2.0	-0.3	3.5	5	silty SAND to sandy SILT	120	4.0	14	23	64	46	-	-	23	16	N/A	0.00	N/A	N/A
3.28	66.7	107.0	167.7	1.6	-1.3	2.4	5	silty SAND to sandy SILT	120	4.0	17	27	69	47	-	-	18	16	0.00	-	0.00	0.0
3.45	34.6	55.5	172.6	1.6	-0.7	4.7	4	clayy SILT to silty CLAY	115	2.0	17	28	-	-	2.4	9.9	34	15	0.00	-	0.00	0.0
3.61	24.7	39.6	-	1.2	-0.4	4.9	3	silty CLAY to CLAY	115	1.5	16	26	-	-	1.7	9.9	39	15	-	-	0.00	-
3.77	28.5	45.7	144.8	1.1	-0.2	4.0	4	clayy SILT to silty CLAY	115	2.0	14	23	-	-	2.0	9.9	34	15	0.24	-	0.00	0.5
3.94	45.9	73.6	159.4	1.5	-0.7	3.3	5	silty SAND to sandy SILT	120	4.0	11	18	57	45	-	-	25	16	0.13	-	0.00	0.4
4.10	48.5	77.7	192.7	2.1	-1.5	4.3	4	clayy SILT to silty CLAY	115	2.0	24	39	-	-	3.4	9.9	28	15	0.00	-	0.00	0.0
4.27	69.4	111.3	227.3	2.9	-1.3	4.2	9	very stiff fine SOIL	120	2.0	35	56	71	46	-	-	24	30	0.00	-	0.00	0.0
4.43	75.5	121.0	237.7	3.1	-1.1	4.2	9	very stiff fine SOIL	120	2.0	38	61	73	47	-	-	23	30	0.00	-	0.00	0.0
4.59	76.6	122.8	227.0	2.9	-1.0	3.8	8	stiff SAND to clayy SAND	115	1.0	77	100	-	-	5.1	9.9	21	16	0.00	-	0.00	0.0
4.76	73.8	118.3	232.8	3.0	-1.0	4.1	9	very stiff fine SOIL	120	2.0	37	59	73	46	-	-	23	30	0.00	-	0.00	0.0
4.92	77.6	124.5	225.8	2.9	-1.0	3.7	8	stiff SAND to clayy SAND	115	1.0	78	100	-	-	5.1	9.9	21	16	0.00	-	0.00	0.0
5.09	78.6	126.0	223.5	2.8	-1.0	3.6	5	silty SAND to sandy SILT	120	4.0	20	31	75	46	-	-	20	16	0.00	-	0.00	0.0
5.25	78.1	125.2	223.4	2.8	-1.0	3.6	5	silty SAND to sandy SILT	120	4.0	20	31	74	46	-	-	21	16	0.00	-	0.00	0.0
5.41	86.9	139.3	224.8	2.8	-1.0	3.2	5	silty SAND to sandy SILT	120	4.0	22	35	78	47	-	-	18	16	0.00	-	0.00	0.0
5.58	87.5	140.3	219.1	2.6	-0.9	3.0	5	silty SAND to sandy SILT	120	4.0	22	35	78	47	-	-	17	16	0.00	-	0.00	0.0
5.74	87.5	140.4	219.8	2.6	-1.0	3.0	5	silty SAND to sandy SILT	120	4.0	22	35	78	47	-	-	18	16	0.00	-	0.00	0.0
5.91	90.9	145.8	225.7	2.8	-1.0	3.0	5	silty SAND to sandy SILT	120	4.0	23	36	79	47	-	-	17	16	0.00	-	0.00	0.0
6.07	93.2	149.5	223.6	2.7	-1.0	2.9	5	silty SAND to sandy SILT	120	4.0	23	37	80	47	-	-	16	16	0.00	-	0.00	0.0
6.23	89.1	142.9	213.3	2.5	-0.9	2.8	5	silty SAND to sandy SILT	120	4.0	22	36	79	46	-	-	16	16	0.00	-	0.00	0.0
6.40	91.9	145.7	211.7	2.4	-0.9	2.6	5	silty SAND to sandy SILT	120	4.0	23	36	79	46	-	-	16	16	0.00	-	0.00	0.0
6.56	91.3	142.9	207.8	2.4	-0.9	2.6	5	silty SAND to sandy SILT	120	4.0	23	36	79	46	-	-	16	16	0.00	-	0.00	0.0
6.73	87.3	135.0	206.0	2.4	-0.9	2.8	5	silty SAND to sandy SILT	120	4.0	22	34	77	46	-	-	17	16	0.00	-	0.00	0.0
6.89	90.1	137.6	208.9	2.5	-0.9	2.8	5	silty SAND to sandy SILT	120	4.0	23	34	78	46	-	-	17	16	0.00	-	0.00	0.0
7.05	92.0	138.8	211.0	2.6	-0.8	2.8	5	silty SAND to sandy SILT	120	4.0	23	35	78	46	-	-	17	16	0.00	-	0.00	0.0
7.22	92.9	138.4	210.2	2.6	-0.8	2.8	5	silty SAND to sandy SILT	120	4.0	23	35	78	46	-	-	17	16	0.00	-	0.00	0.0
7.38	94.6	139.4	207.2	2.5	-0.8	2.7	5	silty SAND to sandy SILT	120	4.0	24	35	78	46	-	-	16	16	0.00	-	0.00	0.0
7.55	95.1	138.6	207.7	2.6	-0.8	2.7	5	silty SAND to sandy SILT	120	4.0	24	35	78	46	-	-	17	16	0.00	-	0.00	0.0
7.71	95.4	137.5	210.8	2.7	-0.8	2.8	5	silty SAND to sandy SILT	120	4.0	24	34	78	46	-	-	17	16	0.00	-	0.00	0.0
7.87	96.6	137.8	194.9	2.3	-0.8	2.4	5	silty SAND to sandy SILT	120	4.0	24	34	78	46	-	-	15	16	0.00	-	0.00	0.0
8.04	96.5	136.3	205.0	2.6	-0.8	2.7	5	silty SAND to sandy SILT	120	4.0	24	34	77	46	-	-	17	16	0.00	-	0.00	0.0
8.20	86.8	121.3	212.8	2.9	0.2	3.4	5	silty SAND to sandy SILT	120	4.0	22	30	73	45	-	-	20	16	0.00	-	0.00	0.0
8.37	103.1	142.6	200.9	2.5	0.2	2.4	5	silty SAND to sandy SILT	120	4.0	26	36	79	46	-	-	15	16	0.00	-	0.00	0.0
8.53	100.9	138.1	211.4	2.9	0.2	2.8	5	silty SAND to sandy SILT	120	4.0	25	35	78	46	-	-	17	16	0.00	-	0.00	0.0
8.69	101.5	137.6	214.4	3.0	0.2	2.9	5	silty SAND to sandy SILT	120	4.0	25	34	78	46	-	-	17	16	0.00	-	0.00	0.0
8.86	97.6	131.2	213.6	3.0	0.2	3.1	5	silty SAND to sandy SILT	120	4.0	24	33	76	46	-	-	18	16	0.00	-	0.00	0.0
9.02	98.4	131.0	209.6	2.9	0.2	3.0	5	silty SAND to sandy SILT	120	4.0	25	33	76	46	-	-	18	16	0.00	-	0.00	0.0
9.19	100.3	132.2	204.9	2.8	0.2	2.8	5	silty SAND to sandy SILT	120	4.0	25	33	76	46	-	-	17	16	0.00	-	0.00	0.0
9.35	103.8	135.6	207.7	2.9	0.2	2.8	5	silty SAND to sandy SILT	120	4.0	26	34	77	46	-	-	17	16	0.00	-	0.00	0.0
9.51	109.7	142.1	216.1	3.1	0.2	2.9	5	silty SAND to sandy SILT	120	4.0	27	36	79	46	-	-	17	16	0.00	-	0.00	0.0
9.68	115.2	148.0	219.3	3.2	0.2	2.8	5	silty SAND to sandy SILT	120	4.0	29	37	80	46	-	-	16	16	0.00	-	0.00	0.0
9.84	113.2	144.2	219.7	3.3	0.2	2.9	5	silty SAND to sandy SILT	120	4.0	28	36	79	46	-	-	17	16	0.00	-	0.00	0.0
10.01	107.6	135.9	210.6	3.1	0.2	2.9	5	silty SAND to sandy SILT	120	4.0	27	34	77	46	-	-	17	16	0.00	-	0.00	0.0
10.17	120.8	151.3	223.2	3.4	0.3	2.8	5	silty SAND to sandy SILT	120	4.0	30	38	81	46	-	-	16	16	0.00	-	0.00	0.0
10.34	129.6	161.0	227.3	3.4	0.3	2.7	5	silty SAND to sandy SILT	120	4.0	32	40	83	46	-	-	15	16	0.00	-	0.00	0.0
10.50	133.1	164.1	232.9	3.6	0.3	2.7	5	silty SAND to sandy SILT	120	4.0	33	41	83	46	-	-	15	16	0.00	-	0.00	0.0
10.66	139.6	170.7	240.0	3.8	0.4	2.8	5	silty SAND to sandy SILT	120	4.0	35	43	85	47	-	-	15	16	0.00	-	0.00	0.0
10.83	141.9	172.1	244.4	4.0	0.4	2.8	5	silty SAND to sandy SILT	120	4.0	35	43	85	47	-	-	15	16	0.00	-	0.00	0.0
10.99	143.0	172.1	246.0	4.1	0.4	2.9	5	silty SAND to sandy SILT	120	4.0	36	43	85	47	-	-	15	16	0.00	-	0.00	0.0
11.16	142.2	169.9	242.9	4.0	0.4	2.9	5	silty SAND to sandy SILT	120	4.0	36	42	85	47	-	-	15	16	0.00	-	0.00	0.0
11.32	135.6	160.8	235.6	3.9	0.4	2.9	5	silty SAND to sandy SILT	120	4.0	34	40	83	46	-	-	16	16	0.00	-	0.00	0.0
11.48	134.3	158.1	234.5	3.9	0.5	2.9	5	silty SAND to sandy SILT	120	4.0	34	40	82	46	-	-	16	16	0.00	-	0.00	0.0
11.65	134.5	157.3	241.8	4.2	0.5	3.2	5	silty SAND to sandy SILT	120	4.0	34	39	82	46	-	-	17	16	0.00	-	0.00	0.0
11.81	135.4	157.2	242.5	4.3	0.5	3.2	5	silty SAND to sandy SILT	120	4.0	34	39	82	46	-	-	17	16	0.00	-	0.00	0.0
11.98	142.6	164.4	238.8	4.1	0.5	2.9	5	silty SAND to sandy SILT	120	4.0	36	41	83	46	-	-	16	16	0.00	-	0.00	0.0
12.14	145.8	166.9	239.0	4.1	0.6	2.8	5	silty SAND to sandy SILT	120	4.0	36	42	84	46	-	-	15	16	0.00	-	0.00	0.0
12.30	152.0	172.8	242.1	4.2	0.6	2.8	5	silty SAND to sandy SILT	120	4.0	38	43	85	47	-	-	15	16	0.00	-	0.00	0.0
12.47	151.7	171.4	240.0	4.1	0.6	2.7	5	silty SAND to sandy SILT	120	4.0	38	43	85	46	-	-	15	16	0.00	-	0.00	0.0
12.63	150.7	169.1	238.9	4.1	0.6	2.8	5	silty SAND to sandy SILT	120	4.0	38	42	84	46	-	-	15	16	0.00	-	0.00	0.0
12.80	154.4	172.1	240.7	4.2	0.7	2.7	5	silty SAND to sandy SILT	120	4.0	39	43	85	46	-	-	15	16	0.00	-	0.00	0.0
12.96	157.8	174.8	236.5	4.0	0.6	2.5	5	silty SAND to sandy SILT	120	4.0	39	44	85	46	-	-	14	16	0.00	-	0.00	0.0
13.12	151.9	167.2	230.9	3.9	0.7	2.6	5	silty SAND to sandy SILT	120	4.0	38	42	84	46	-	-	15	16	0.00	-	0.00	0.0
13.29	143.7	157.2	226.0	3.9	0.7	2.7	5	silty SAND to sandy SILT	120	4.0	36	39	82	46	-	-	16	16	0.00	-	0.00	0.0
13.45	143.4	155.9	222.6	3.8	0.7	2.7	5	silty SAND to sandy SILT	120	4.0	36	39	82	46	-	-	15	16	0.00	-	0.00	0.0
13.62	140.4	151.7	219.6	3.8	0.8	2.7	5	silty SAND to sandy SILT	120	4.0	35	38	81	46	-	-	16	16	0.00	-	0.00	0.0
13.78	141.7	152.2	218.5	3.7	0.8	2.7	5	silty SAND to sandy SILT	120	4.0	35	38	81	46	-	-	15	16	0.00	-	0.00	0.0
13.94	144.8	154.5	218.8	3.7	0.8	2.6	5	silty SAND to sandy SILT	120	4.0	36	39	81	46	-	-	15	16	0.00	-	0.00	0.0
14.11	142.4	151.1	217.4	3.7	0.8	2.6	5	silty SAND to sandy SILT	120	4.0	36	38	81	46	-	-	16	16	0.00	-	0.00	0.0
14.27	147.3	155.4	217.3	3.7	0.8	2.5	5	silty SAND to sandy SILT	120	4.0	37	39	82	46	-	-	15	16	0.00	-	0.00	0.0
14.44	144.0	151.1	215.6	3.7	0.8	2.6	5	silty SAND to sandy SILT	120	4.0	36	38	81	46	-	-	15	16	0.00	-	0.00	0.0
14.60	146.7	153.0	222.3	4.0	0.9	2.7	5	silty SAND to sandy SILT	120	4.0	37	38	81	46	-	-	16	16	0.00	-	0.00	0.0
14.76	150.6	156.2	221.7	3.9	0.9	2.6	5	silty SAND to sandy SILT	120	4.0	38	39	82	46	-	-	15	16	0.00	-	0.00	0.0
14.93	144.4	148.9	213.9	3.7	0.9	2.6	5	silty SAND to sandy SILT	120	4.0	36	37	80	46	-	-	16	16	0.00	-	0.00	0.0
15.09	143.0	146.7	210.1	3.6	1.0	2.6	5	silty SAND to sandy SILT	120	4.0	36	37	80	45	-	-	15	16	0.00	-	0.00	0.0
15.26	140.1	142.9	206.2	3.6	1.0	2.6	5	silty SAND to sandy SILT	120	4.0	35	36	79	45	-	-	16	16	0.00	-	0.00	0.0
15.42	139.6	141.7	205.6	3.6	1.0	2.6	5	silty SAND to sandy SILT	120	4.0	35	35	78	45	-	-	16	16	0.00	-	0.00	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Earth Mechanics
Data File: SDF(531).cpt
CPT Date: 9/27/2011 12:07:53 PM
GW During Test: No GW

Sounding ID: CPT-11-131
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.00	Cycl SStn %
15.58	143.5	144.8	205.2	3.5	1.0	2.5	5	silty SAND to sandy SILT	120	4.0	36	36	79	45	-	-	15	16	0.00	-	0.00	0.0
15.75	137.5	138.1	203.1	3.5	1.1	2.6	5	silty SAND to sandy SILT	120	4.0	34	35	78	45	-	-	16	16	0.00	-	0.00	0.0
15.91	142.7	142.5	204.4	3.6	1.1	2.5	5	silty SAND to sandy SILT	120	4.0	36	36	79	45	-	-	15	16	0.00	-	0.00	0.0
16.08	138.2	137.3	202.9	3.6	1.1	2.6	5	silty SAND to sandy SILT	120	4.0	35	34	77	45	-	-	16	16	0.00	-	0.00	0.0
16.24	141.6	140.0	212.1	4.0	1.2	2.8	5	silty SAND to sandy SILT	120	4.0	35	35	78	45	-	-	17	16	0.00	-	0.00	0.0
16.40	148.7	146.3	211.6	3.9	1.2	2.6	5	silty SAND to sandy SILT	120	4.0	37	37	80	45	-	-	16	16	0.00	-	0.00	0.0
16.57	153.7	150.3	218.4	4.1	1.3	2.7	5	silty SAND to sandy SILT	120	4.0	38	38	80	45	-	-	16	16	0.00	-	0.00	0.0
16.73	146.5	142.6	217.3	4.2	1.4	2.9	5	silty SAND to sandy SILT	120	4.0	37	36	79	45	-	-	17	16	0.00	-	0.00	0.0
16.90	136.3	132.1	210.7	4.1	1.5	3.0	5	silty SAND to sandy SILT	120	4.0	34	33	76	45	-	-	18	16	0.00	-	0.00	0.0
17.06	138.9	133.9	209.3	4.0	1.6	2.9	5	silty SAND to sandy SILT	120	4.0	35	33	77	45	-	-	18	16	0.00	-	0.00	0.0
17.23	139.5	133.8	205.1	3.8	1.6	2.8	5	silty SAND to sandy SILT	120	4.0	35	33	77	45	-	-	17	16	0.00	-	0.00	0.0
17.39	137.2	131.0	203.5	3.8	1.6	2.8	5	silty SAND to sandy SILT	120	4.0	34	33	76	45	-	-	17	16	0.00	-	0.00	0.0
17.55	144.2	137.0	206.8	3.9	1.7	2.7	5	silty SAND to sandy SILT	120	4.0	36	34	77	45	-	-	17	16	0.00	-	0.00	0.0
17.72	143.9	136.1	205.6	3.9	1.8	2.7	5	silty SAND to sandy SILT	120	4.0	36	34	77	45	-	-	17	16	0.00	-	0.00	0.0
17.88	139.2	131.1	201.3	3.8	1.8	2.7	5	silty SAND to sandy SILT	120	4.0	35	33	76	45	-	-	17	16	0.00	-	0.00	0.0
18.05	135.1	126.6	200.6	3.8	1.9	2.8	5	silty SAND to sandy SILT	120	4.0	34	32	75	45	-	-	18	16	0.00	-	0.00	0.0
18.21	141.7	132.2	171.0	2.5	2.0	1.8	6	clean SAND to silty SAND	125	5.0	28	26	76	45	-	-	13	16	0.00	-	0.00	0.0
18.37	136.7	126.9	165.5	2.4	2.0	1.7	6	clean SAND to silty SAND	125	5.0	27	25	75	45	-	-	13	16	0.00	-	0.00	0.0
18.54	130.3	120.4	166.7	2.6	3.5	2.0	5	silty SAND to sandy SILT	120	4.0	33	30	73	44	-	-	15	16	0.00	-	0.00	0.0
18.70	140.8	129.5	177.7	2.9	3.5	2.1	5	silty SAND to sandy SILT	120	4.0	35	32	76	45	-	-	14	16	0.00	-	0.00	0.0
18.87	141.4	129.5	181.4	3.1	3.5	2.2	5	silty SAND to sandy SILT	120	4.0	35	32	76	45	-	-	15	16	0.00	-	0.00	0.0
19.03	139.2	126.9	181.5	3.1	3.4	2.3	5	silty SAND to sandy SILT	120	4.0	35	32	75	44	-	-	15	16	0.00	-	0.00	0.0
19.19	133.0	120.7	189.9	3.6	3.4	2.7	5	silty SAND to sandy SILT	120	4.0	33	30	73	44	-	-	18	16	0.00	-	0.00	0.0
19.36	132.9	120.1	187.3	3.5	3.3	2.6	5	silty SAND to sandy SILT	120	4.0	33	30	73	44	-	-	17	16	0.00	-	0.00	0.0
19.52	128.7	115.9	183.8	3.4	3.3	2.7	5	silty SAND to sandy SILT	120	4.0	32	29	72	44	-	-	18	16	0.00	-	0.00	0.0
19.69	123.3	110.5	179.4	3.3	3.3	2.7	5	silty SAND to sandy SILT	120	4.0	31	28	70	44	-	-	18	16	0.00	-	0.00	0.0
19.85	117.9	105.3	176.1	3.2	3.4	2.7	5	silty SAND to sandy SILT	120	4.0	29	26	69	43	-	-	19	16	0.00	-	0.00	0.0
20.01	110.9	98.6	171.6	3.1	3.5	2.8	5	silty SAND to sandy SILT	120	4.0	28	25	67	43	-	-	20	16	0.00	-	0.00	0.0
20.18	115.3	102.1	169.2	3.0	3.5	2.6	5	silty SAND to sandy SILT	120	4.0	29	26	68	43	-	-	19	16	0.00	-	0.00	0.0
20.34	120.1	106.0	171.6	3.0	3.5	2.6	5	silty SAND to sandy SILT	120	4.0	30	26	69	43	-	-	18	16	0.00	-	0.00	0.0
20.51	121.6	106.8	157.8	2.5	3.6	2.1	5	silty SAND to sandy SILT	120	4.0	30	27	69	43	-	-	16	16	0.68	-	0.00	3.7
20.67	118.9	104.1	156.7	2.5	3.7	2.1	5	silty SAND to sandy SILT	120	4.0	30	26	68	43	-	-	17	16	0.73	-	0.00	4.1
20.83	117.5	102.4	190.8	3.8	6.0	3.3	5	silty SAND to sandy SILT	120	4.0	29	26	68	43	-	-	22	16	0.00	-	0.00	0.0
21.00	123.2	106.9	190.5	3.8	6.1	3.1	5	silty SAND to sandy SILT	120	4.0	31	27	69	43	-	-	21	16	0.00	-	0.00	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Appendix B

LABORATORY TEST RESULTS

TABLE B-1 SUMMARY OF SOIL LABORATORY TEST RESULTS

Project No.: *11-135* **Project Name:** Parsons/I-5 HOV Widening Segment 1

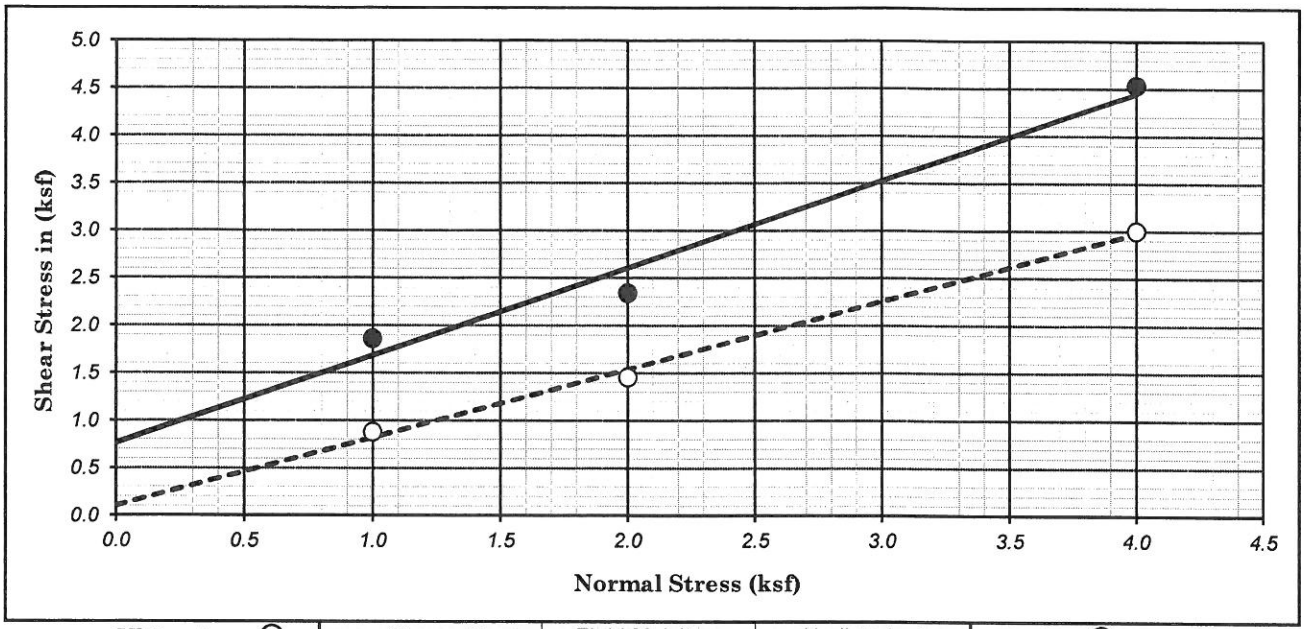
Boring No .	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-109	*Bulk*	0-5	CL							40/15/25				
A-11-109	*S-1*	2.5	CL	21.1										
A-11-109	*D-2*	5	CL	17.8	117.2	>4.5		2:15:83						
A-11-109	*S-3*	10	CL to ML	14.0				1:36:63						
A-11-109	*D-4*	15	ML	8.6	120.2	>4.5								
A-11-109	*S-5*	20	CL	17.8										
A-11-109	*D-6*	25	CL	17.2	125.4	>4.5								
A-11-109	*S-7*	30	CL	16.6										
A-11-109	*D-8*	40	CL	13.1	119.9	>4.5								
A-11-109	*S-9*	45	CH	17.8										
A-11-109	*D-10*	50	CH	18.4	128.6	>4.5								
A-11-109	*S-11*	55	CL	27.1										
A-11-109	*D-12*	60	CL	28.3	118.4	>4.5								
A-11-109	*S-13*	65	CL	25.7										
A-11-109	*D-14*	70	MH	21.5	125.5	>4.5								
A-11-111	*D-1*	5	SC	13.7	135.8					31/16/15				
A-11-111	*S-2*	10	CL	11.9		>4.5								
A-11-111	*D-3*	15	ML to CL	10.8	115.4									
A-11-111	*S-4*	20	CL	15.4										
A-11-111	*D-5*	25	CL	10.7	115.9	>4.5								
A-11-111	*S-6*	30	CL	8.9										
A-11-111	*D-7*	35	SM	7.4	112.7			0:53:47						
A-11-111	*S-8*	40	CL	18.2										
A-11-111	*D-9*	45	CH	26.8	111.3	3.25								
A-11-111	*S-10*	50	SC	28.4										
A-11-111	*D-11*	55	SC	21.0	127.7									
A-11-111	*S-12*	60	ML	19.4										
A-11-111	*D-13*	65	MH	23.0	125.2	>4.5								
A-11-111	*S-14*	70	MH	22.5										
A-11-113	*S-1*	5	SC	10.1				5:50:45						
A-11-113	*D-2*	10	CL	24.7	124.2	2.75								
A-11-113	*S-3*	15	CL	26.0										
A-11-113	*D-4*	20	CL	25.8	114.4	2.25								
A-11-113	*S-5*	25	CL	27.3										
A-11-113	*D-6*	30	CH	17.5	128.8	>4.5								
A-11-113	*S-7*	35	CL	14.0										
A-11-113	*D-8*	40	CL	10.5	105.1									
A-11-113	*S-9*	45	SM	8.2				0:51:49						
A-11-113	*D-10*	50	SM	9.3	111.9									
A-11-114	*D-1*	5	CL	11.4	132.9	>4.5								
A-11-114	*S-2*	10	CL	18.8										
A-11-114	*D-3*	15	CH	23.3	123.5	4.0				52/19/33				
A-11-114	*S-4*	20	CL	23.6										
A-11-114	*D-5*	25	CL	23.0	116.6	1.5								

Project No.: *11-135* **Project Name:** Parsons/I-5 HOV Widening Segment 1

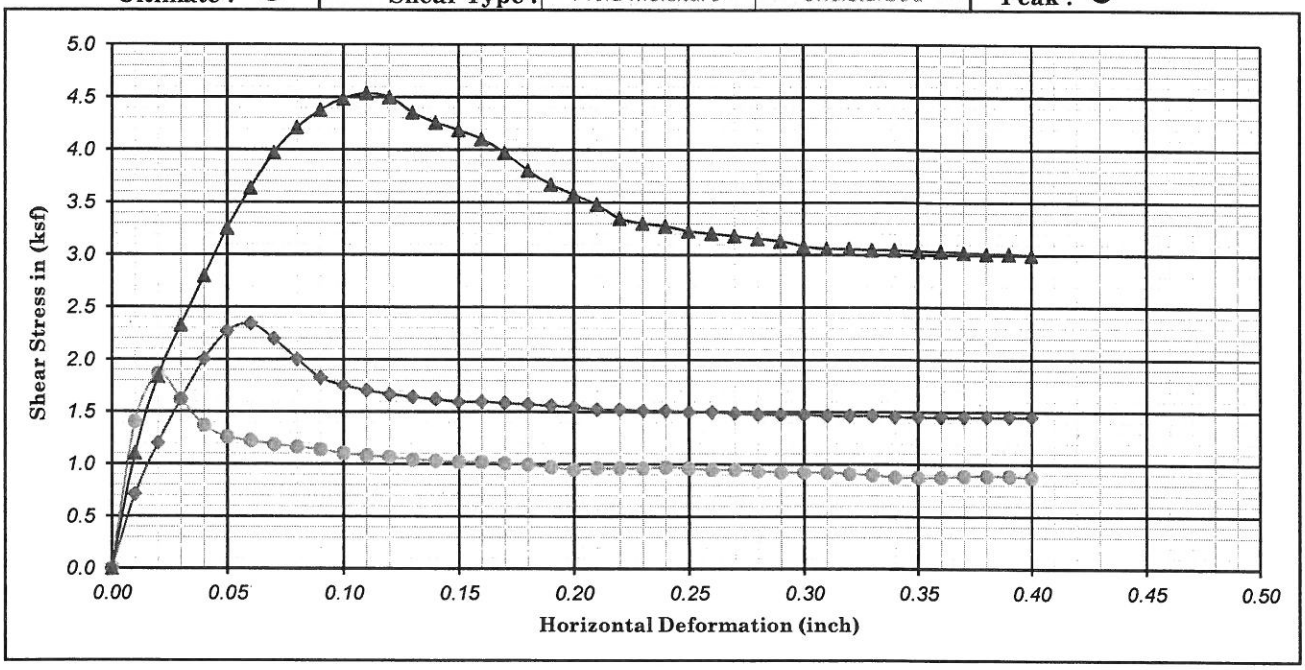
Boring No .	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-114	*S-6*	30	CL	18.0										
A-11-114	*D-7*	35	CL	7.6	103.0	>4.5		0:36:64		35/20/15				
A-11-114	*S-8*	40	ML	8.1										
A-11-114	*D-9*	45	SM	6.0	105.1									
A-11-114	*S-10*	50	ML	9.9				0:35:65						
A-11-114	*D-11*	55	ML	9.8	111.0			0:46:54						
A-11-114	*S-12*	60	CL	40.5										
A-11-114	*D-13*	65	CL	30.9	115.0	1.25								
A-11-114	*S-14*	70	CL	25.7										
A-11-114	*D-15*	75	SC to CL	27.6	121.3	1.25								
A-11-114	*S-16*	80	SC to CL	26.1										
A-11-114	*D-17*	85	MH	19.7	127.8	>4.5								
A-11-114	*S-18*	90	MH	25.4										
A-11-114	*D-19*	95	MH	16.1	127.0	>4.5								
A-11-114	*S-20*	100	MH	24.4										
A-11-117	*D-1*	5	SC to CL	14.3	126.6	>4.5								
A-11-117	*S-2*	10	CL	10.5										
A-11-117	*D-3*	15	CL	18.1	110.5	>4.5								
A-11-117	*S-4*	20	CL	19.9										
A-11-117	*D-5*	25	CL	17.4	110.4	>4.5								
A-11-117	*S-6*	30	CL	23.4										
A-11-117	*D-7*	35	CH	29.5	120.2	>4.5					170	5.6	5060	1950
A-11-117	*S-8*	40	CH	37.4										
A-11-117	*D-9*	45	CH	30.4	118.2	>4.5								
A-11-117	*S-10*	50	CH	24.6										
A-11-117	*D-11*	55	MH	22.8	126.0	>4.5								
A-11-117	*S-12*	60	MH	24.7										
A-11-117	*D-13*	65	MH	21.7	125.0	>4.5								
A-11-117	*S-14*	70	MH	23.0										
A-11-117	*D-15*	75	MH	20.9	121.8	>4.5								
A-11-117	*S-16*	80	MH	20.6										
A-11-117	*D-17*	85	MH	18.8	126.8	>4.5								
A-11-117	*S-18*	90	MH	20.0										
A-11-117	*D-19*	95	MH	19.5	121.3	>4.5								
A-11-117	*S-20*	100	MH	19.9										
A-11-118	*D-1*	2.5	CH	30.2	116.7	>4.5					270	6.7	550	1986
A-11-118	*S-2*	5	CL	23.5										
A-11-118	*D-3*	10	CL	25.7	122.1	4.5								
A-11-118	*S-4*	15	CH	33.7						59/28/31				
A-11-118	*D-5*	20	CL	28.0	117.9	4.5								
A-11-118	*S-6*	25	CL	27.8										
A-11-118	*D-7*	30	CL	25.5	115.5	4.5								
A-11-118	*S-8*	35	CL	30.3										
A-11-118	*D-9*	40	CL	30.9	117.3	2.25								
A-11-118	*S-10*	45	CL	28.4										
A-11-118	*D-11*	50	CL	28.0	121.7	4.25								

Project No.: *11-135* **Project Name:** Parsons/I-5 HOV Widening Segment 1

Boring No .	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-118	*S-12*	55	CL	30.5										
A-11-118	*D-13*	60	CH	28.0	121.3	4.5								
A-11-118	*S-14*	65	MH	25.4										
A-11-118	*D-15*	70	MH	25.3	122.7	>4.5								
A-11-130	*S-1*	5	SM	6.9				15:70:15						
A-11-130	*D-2*	10	SP-SM	4.6	113.9									
A-11-130	*S-3*	15	CH	22.2										
A-11-130	*D-4*	20	CH	23.8	117.6	>4.5								
A-11-130	*S-5*	25	CH	19.0										
A-11-130	*D-6*	30	CH	19.1	125.5	>4.5								
A-11-130	*S-7*	35	CH	22.2										
A-11-130	*D-8*	40	CH	24.5	119.8	4.5								
A-11-130	*S-9*	45	CH	23.0										
A-11-130	*D-10*	50	MH	23.2	123.8	>4.5								
A-11-130	*S-11*	55	MH	21.8										
A-11-130	*D-12*	60	MH	20.4	127.5	>4.5								
A-11-130	*S-13*	65	MH	20.3										
A-11-130	*D-14*	70	MH	21.3	122.0	>4.5								
A-11-134	*S-3*	15	MH	25.3										
A-11-134	*D-4*	20	MH	19.7	122.8	>4.5								
A-11-134	*S-5*	25	MH	27.7										
A-11-134	*D-6*	30	MH	13.6	121.3	>4.5								



Ultimate : ○ | Shear Type : Field Moisiture | Undisturbed | Peak : ●



Boring No. : A-11-109	Strength Intercept (C) :	0.76	(ksf)	Peak	0.10	(ksf)	Ultimate
Sample No. : D-4		36.48	(kPa)		4.88	(kPa)	
Depth (ft/m) : 20.0 | 0.00	Friction Angle (ϕ) :	42.66	Degree		35.66	Degree	

Description : Olive-brown, SANDY SILT (ML) — Shear Rate (inch/minute) : 0.02

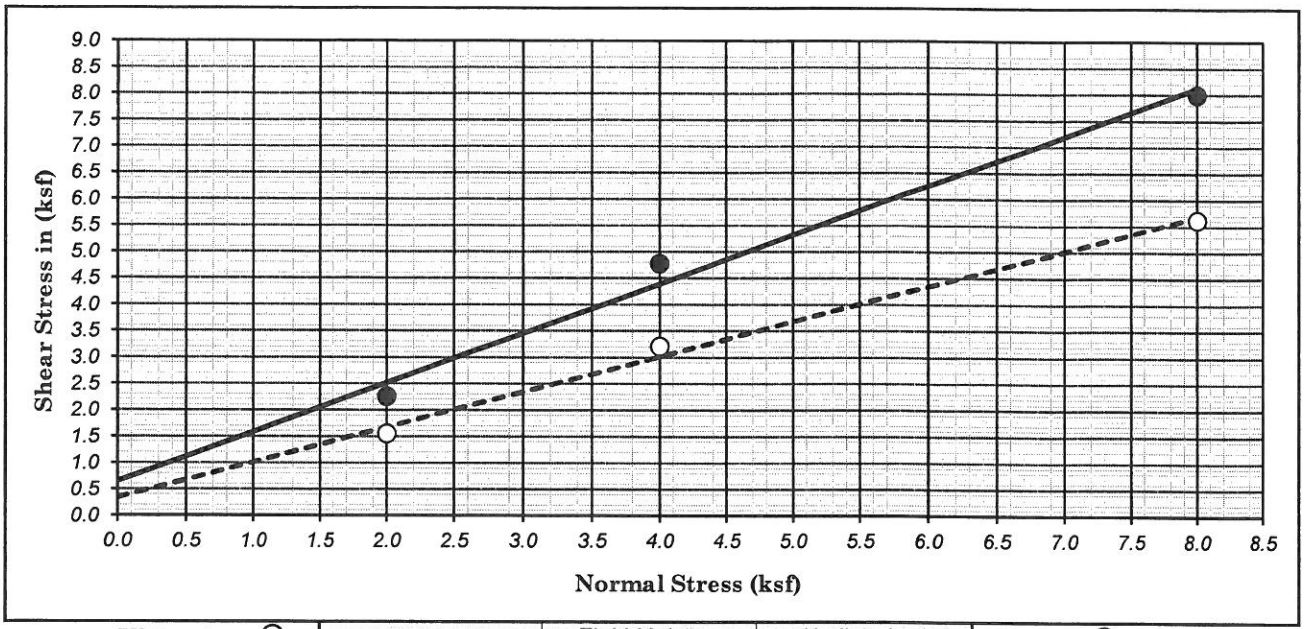
SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	8.54	113.34	17.84	0.49	1.00	47.88	1.86	89.06	0.88	41.94
◆	6.99	105.60	16.62	0.60	2.00	95.76	2.34	112.04	1.45	69.52
▲	10.18	114.97	18.10	0.47	4.00	191.52	4.54	217.18	3.00	143.64
					0.00	0.00	0.76	36.48	0.10	4.88

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

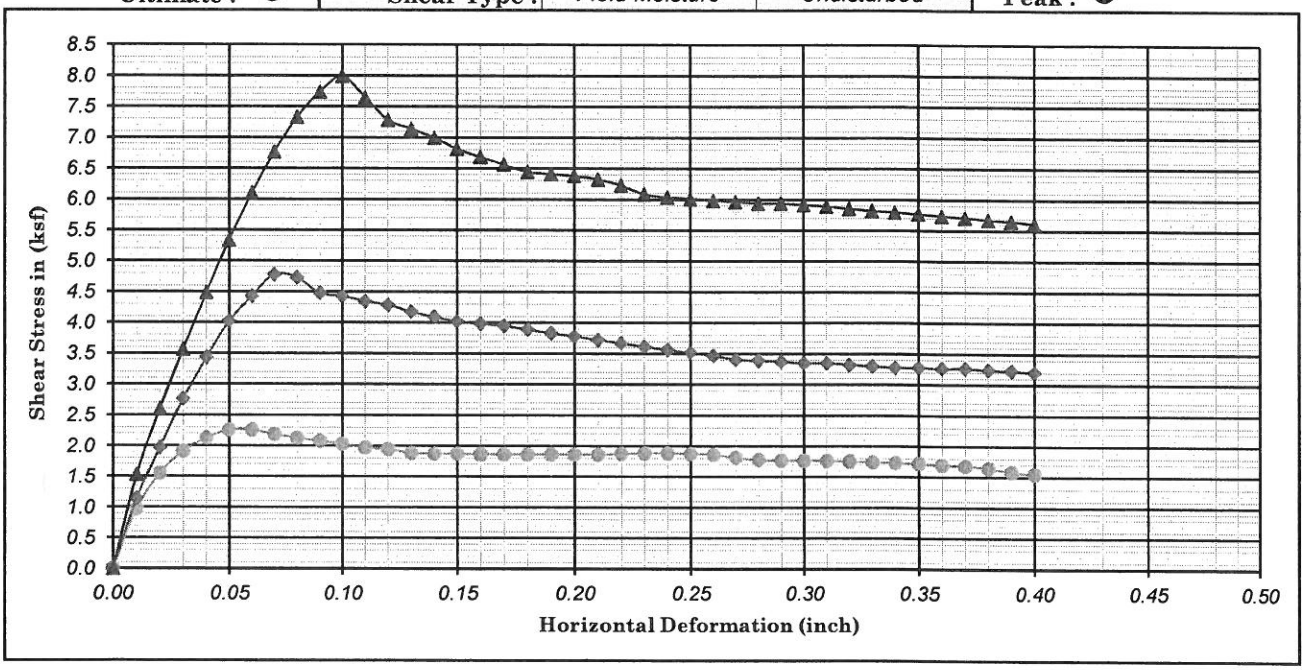
PTG/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST
(ASTM D-3080)

Project No. : 11-135 | Date : 11/29/11



Ultimate : ○	Shear Type :	Field Moisture	Undisturbed	Peak : ●



Boring No. : A-11-111	Strength Intercept (C) :	0.65	(ksf)	Peak	0.34	(ksf)	Ultimate
Sample No. : D-7		31.05	(kPa)		16.40	(kPa)	
Depth (ft/m) : 35.0 / 0.00	Friction Angle (ϕ) :	43.05	Degree		33.71	Degree	

Description : Dark Olive-brown, SILTY SAND (SM) — Shear Rate (inch/minute) : 0.02

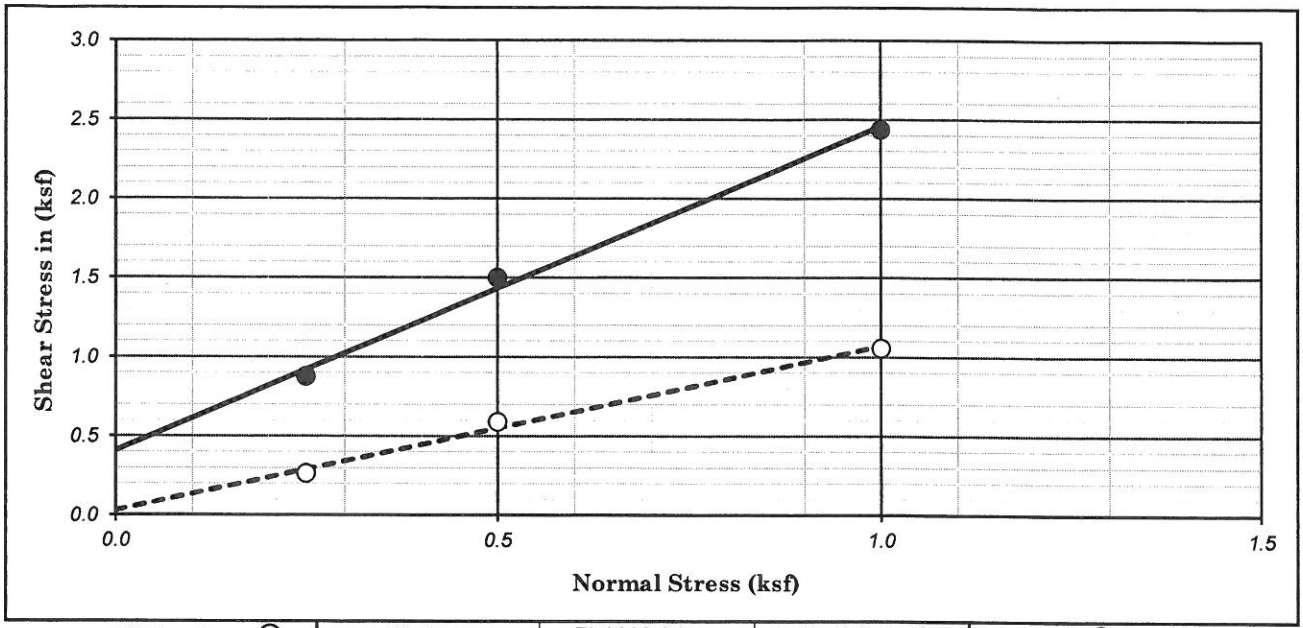
SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	7.97	104.30	16.42	0.62	2.00	95.76	2.26	108.02	1.55	74.12
◆	10.47	107.06	16.85	0.57	4.00	191.52	4.78	228.67	3.20	153.41
▲	12.93	111.75	17.59	0.51	8.00	383.04	7.99	382.61	5.62	268.85

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

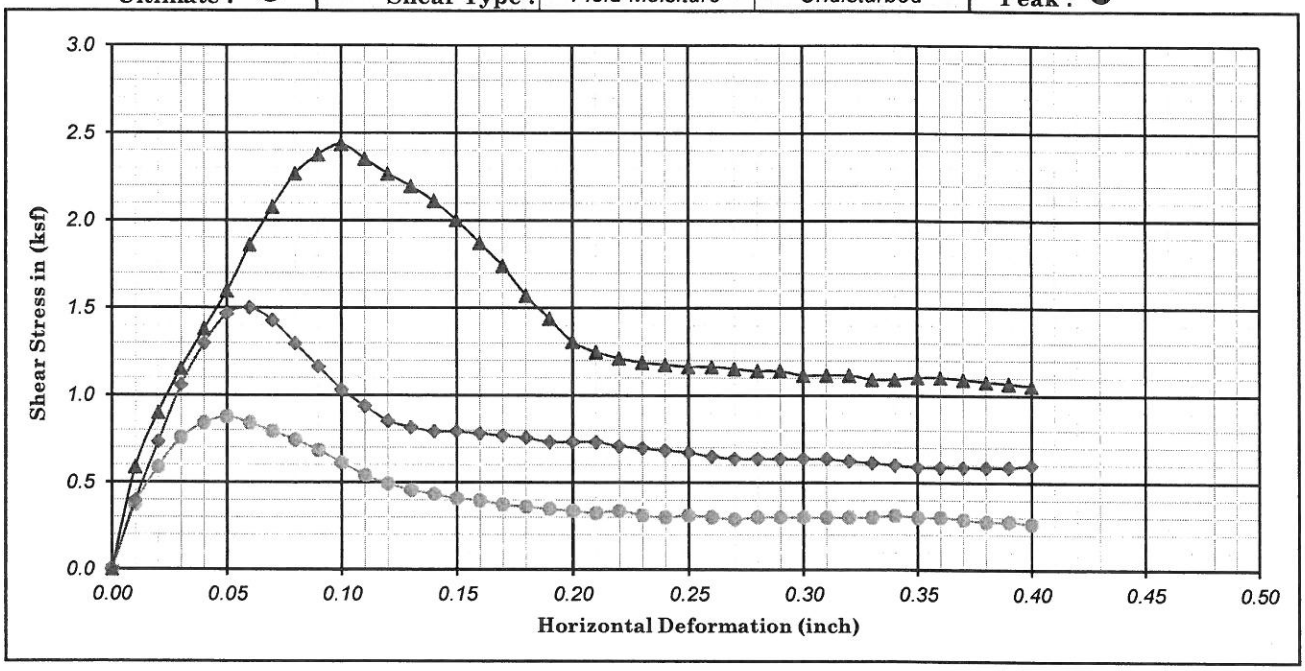
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 | Date : 11/29/11

DIRECT SHEAR TEST
(ASTM D-3080)



Ultimate : ○	Shear Type :	Field Moisiture	Undisturbed	Peak : ●



Boring No. : A-11-114		Strength Intercept (C) :	0.41	(ksf)	Peak	0.03	(ksf)	Ultimate	
Sample No. : D-1			19.54	(kPa)		1.44	(kPa)		
Depth (ft/m) : 2.5	0.00	Friction Angle (ϕ) :	64.00	Degree		46.09	Degree		
Description : Olive-brown, SANDY lean CLAY (CL)						Shear Rate (inch/minute) :		0.02	

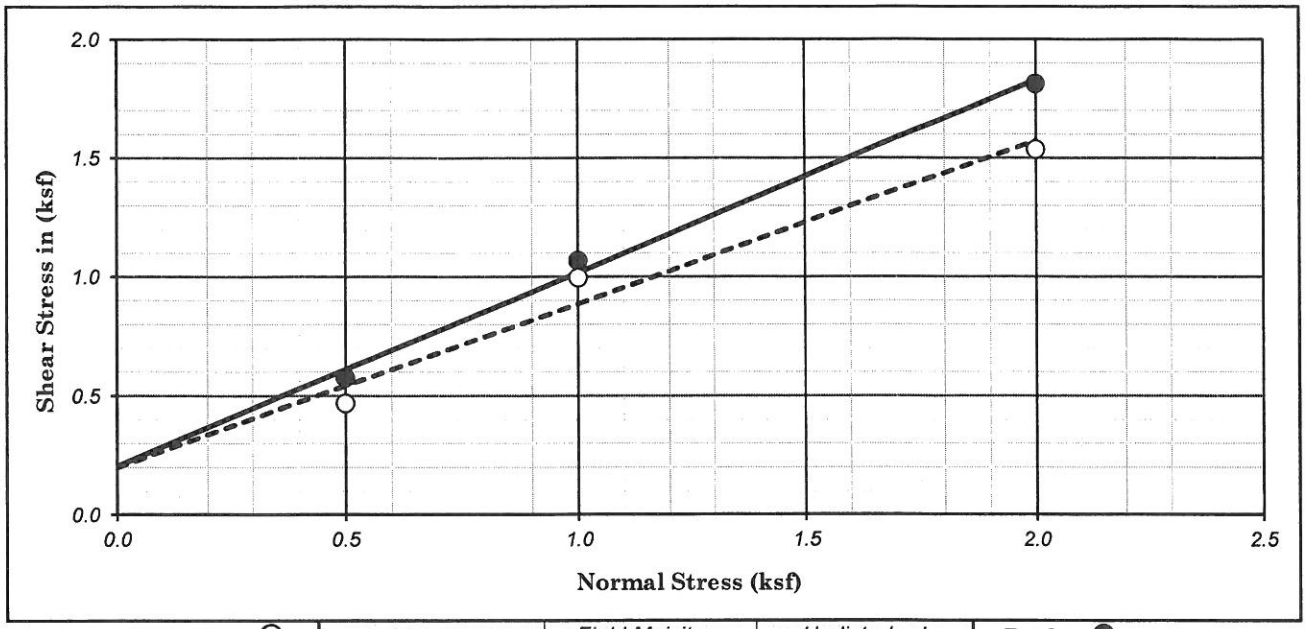
SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	10.98	112.67	17.73	0.50	0.25	11.97	0.88	41.94	0.26	12.64
◆	12.01	117.68	18.52	0.43	0.50	23.94	1.50	71.82	0.59	28.15
▲	11.23	119.11	18.75	0.42	1.00	47.88	2.44	116.64	1.06	50.56
					0.00	0.00	0.41	19.54	0.03	1.44
					1.0	47.88	2.46	117.70	1.07	51.18

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

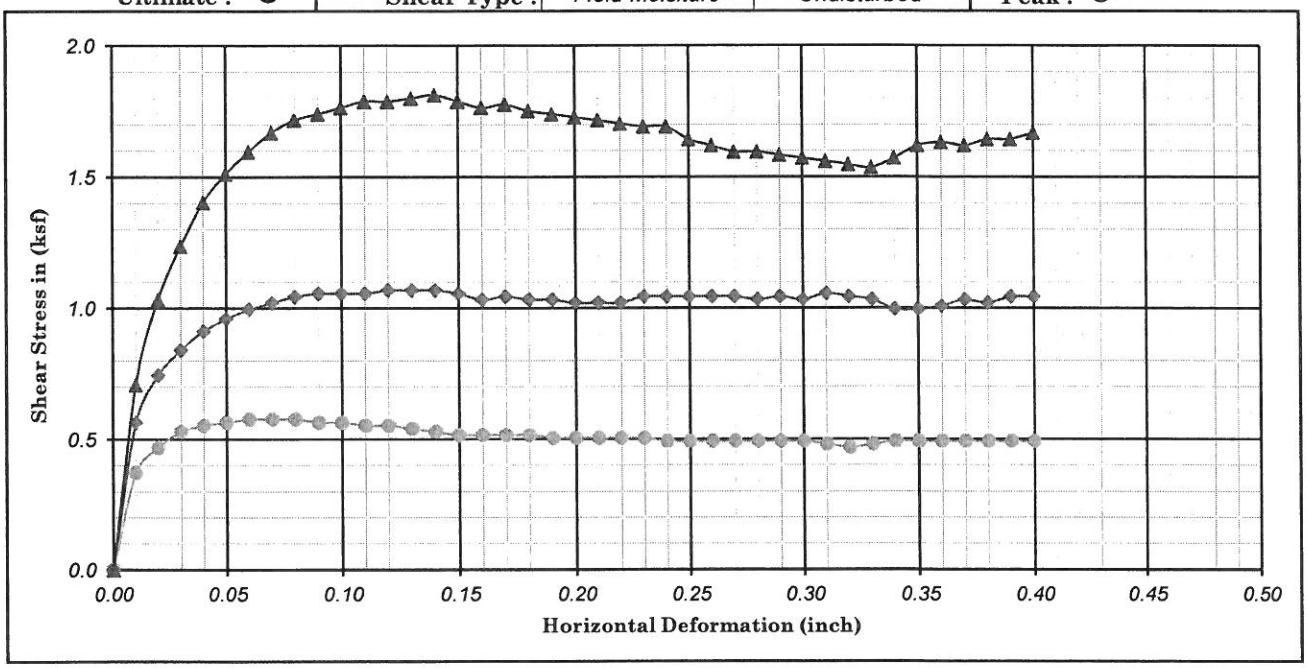
PTG/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST
(ASTM D-3080)

Project No. : *11-135* | **Date :** *11/29/11*



Ultimate : ○	Shear Type :	Field Moisiture	Undisturbed	Peak : ●



Boring No. : A-11-130		Strength Intercept (C) :	0.20	(ksf)	Peak	0.20	(ksf)	Ultimate
Sample No. : D-2			9.77	(kPa)		9.48	(kPa)	
Depth (ft/m) : 10.0	0.00	Friction Angle (ϕ) :	39.10	Degree		34.51	Degree	

Description : Olive-brown, Poorly graded SAND with SILT and GRAVEL (SP-SM) Shear Rate (inch/minute) : 0.02

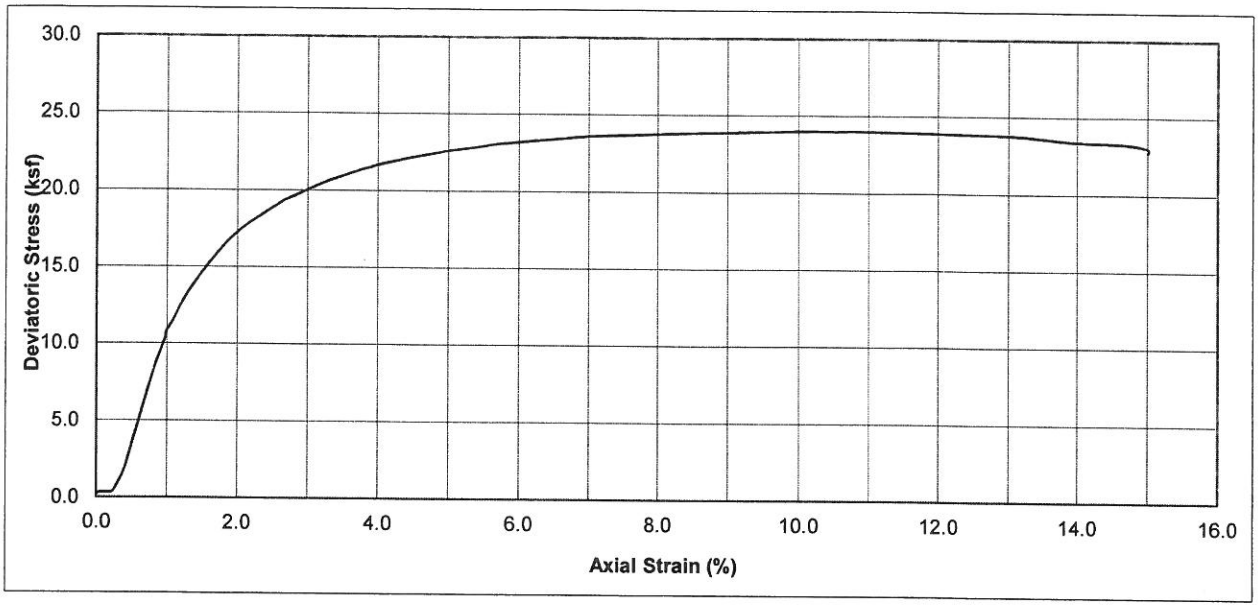
SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	5.93	109.91	17.30	0.53	0.50	23.94	0.58	27.58	0.47	22.41
◆	4.46	110.89	17.45	0.52	1.00	47.88	1.07	51.14	1.00	47.69
▲	4.15	110.11	17.33	0.53	2.00	95.76	1.81	86.76	1.54	73.54
					0.00	0.00	0.20	9.77	0.20	9.48
					2.0	95.76	1.83	87.58	1.57	75.31

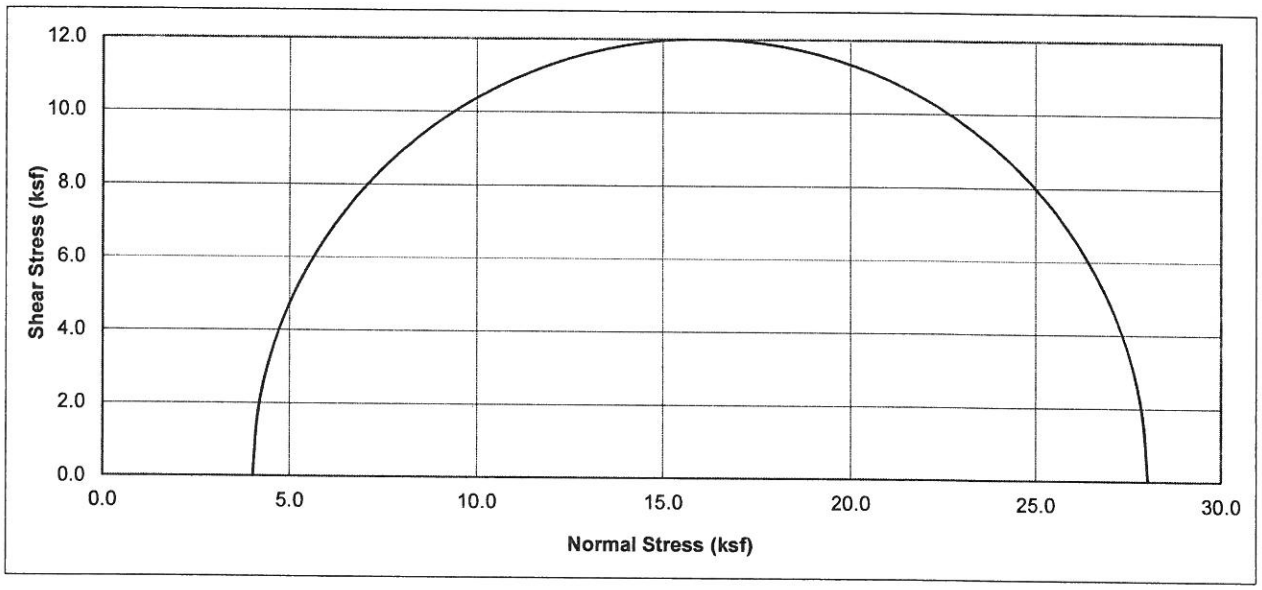
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

PTG/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST
(ASTM D-3080)

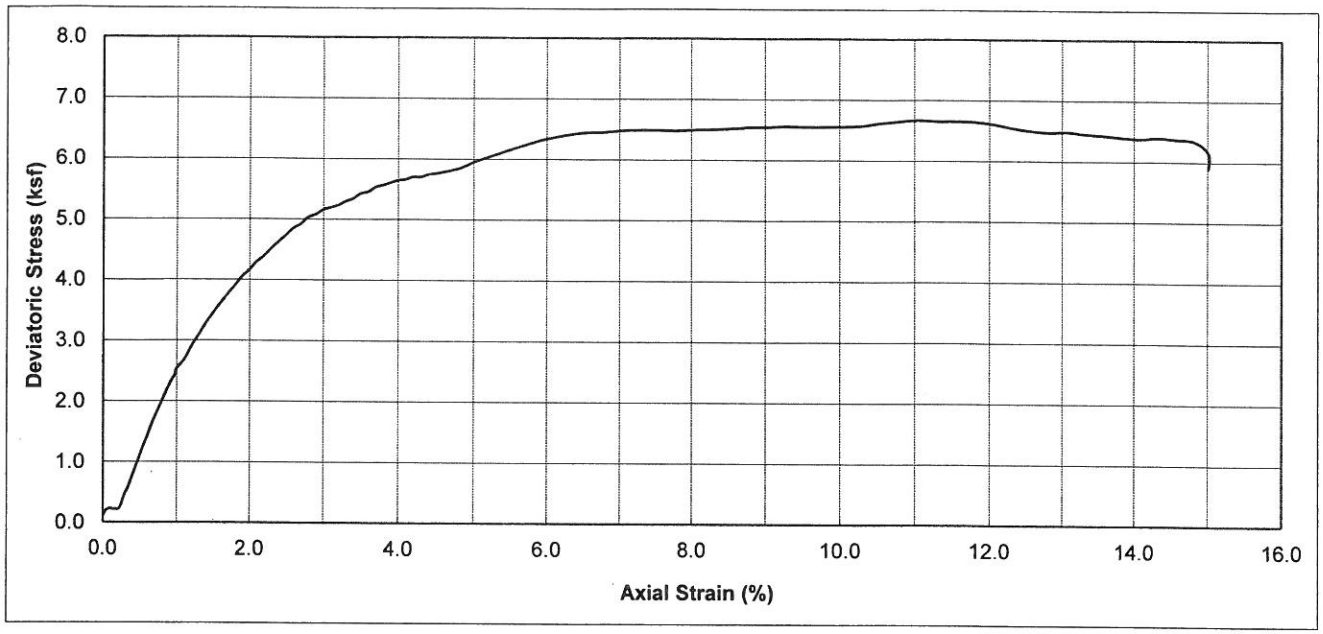
Project No. : 11-135 | Date : 11/29/11

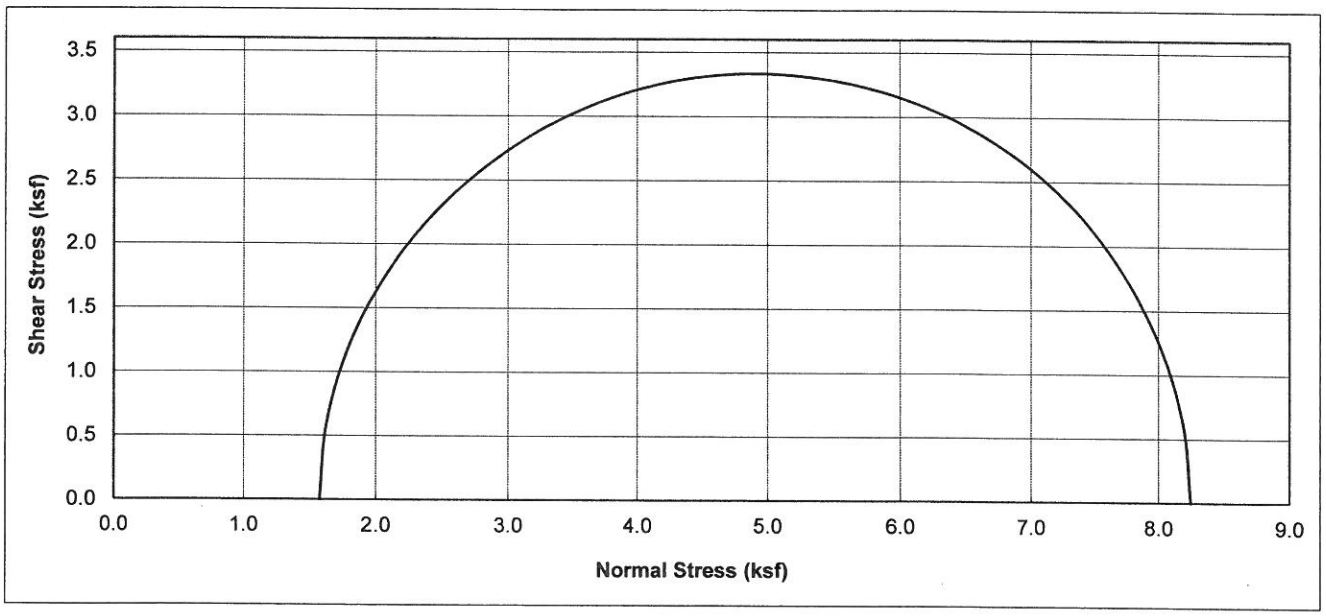




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-109	D-10	50	Very Dk. Gray , FAT CLAY (CH)	111.9	17.01	4.03	24.02	90.9

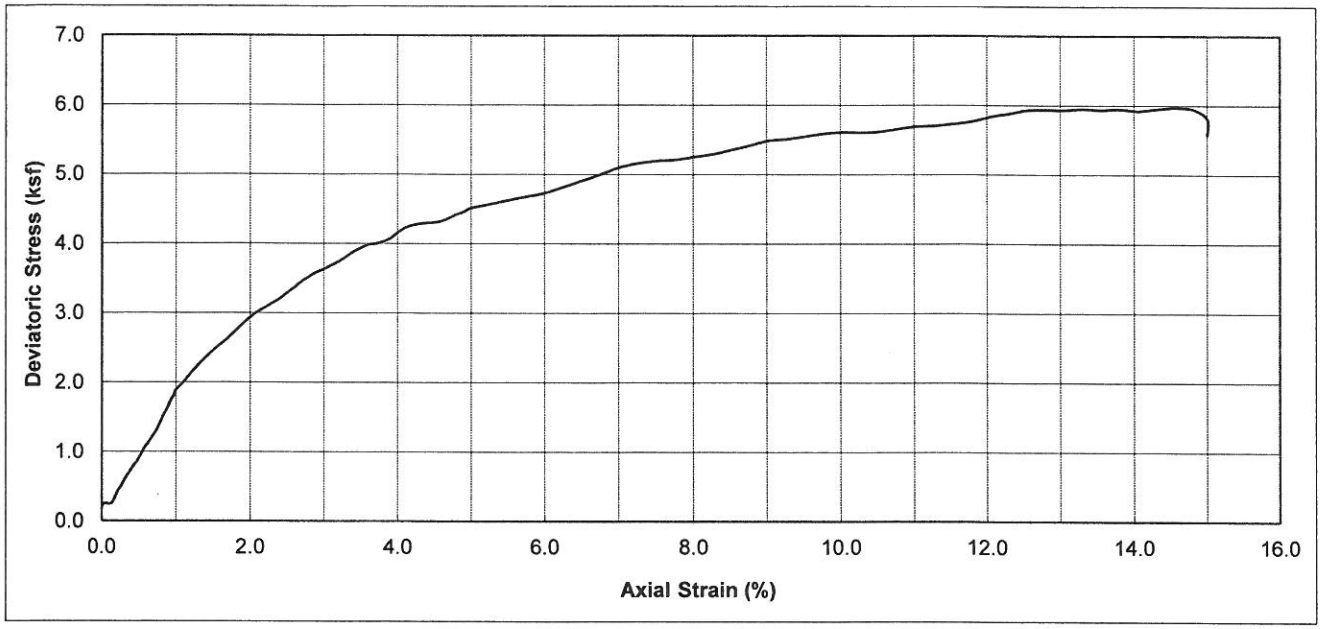
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/20/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

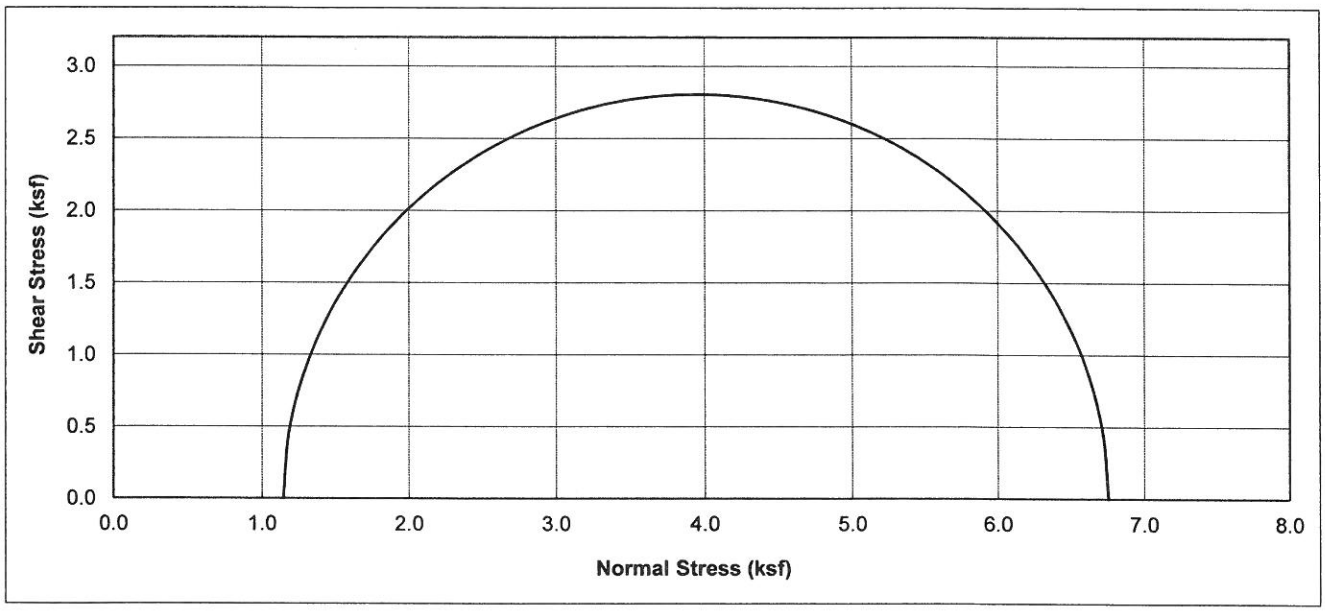




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-113	D-4	20	Dk. Gray , LEAN CLAY (CL)	92.2	25.83	1.58	6.67	84.4

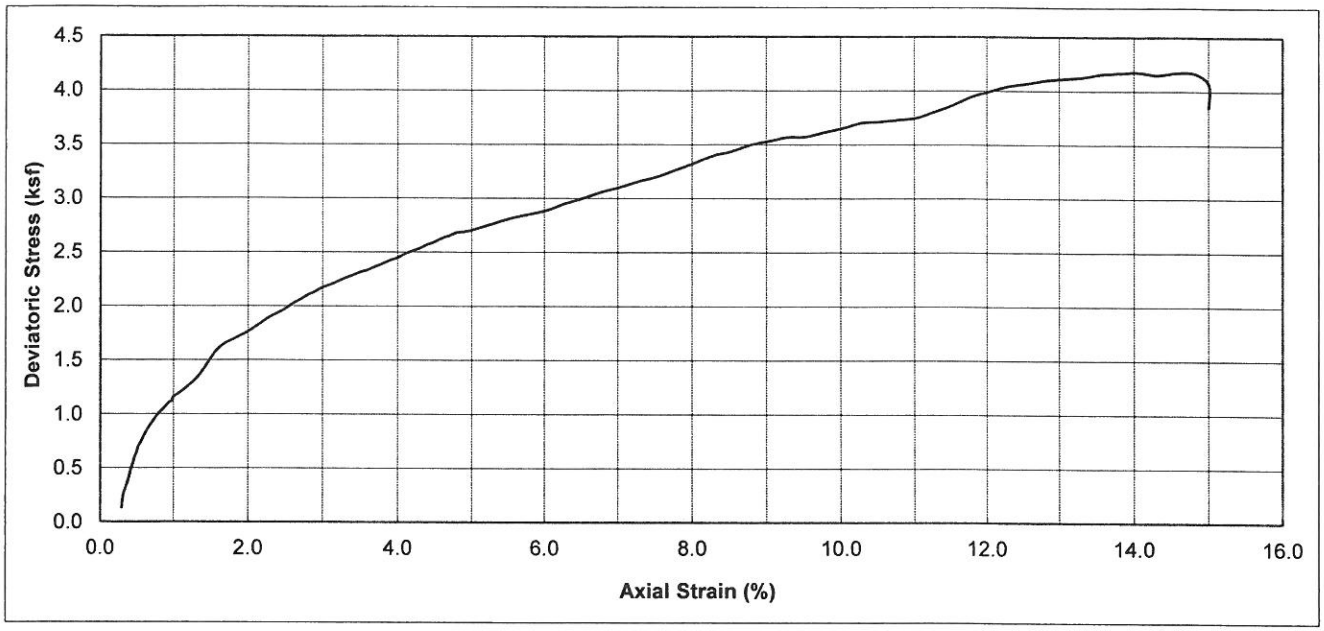
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**Parsons/I-5 HOV Widening Segment 1**
Project No. : 11-135 **Date :** 12/02/11	**UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)**

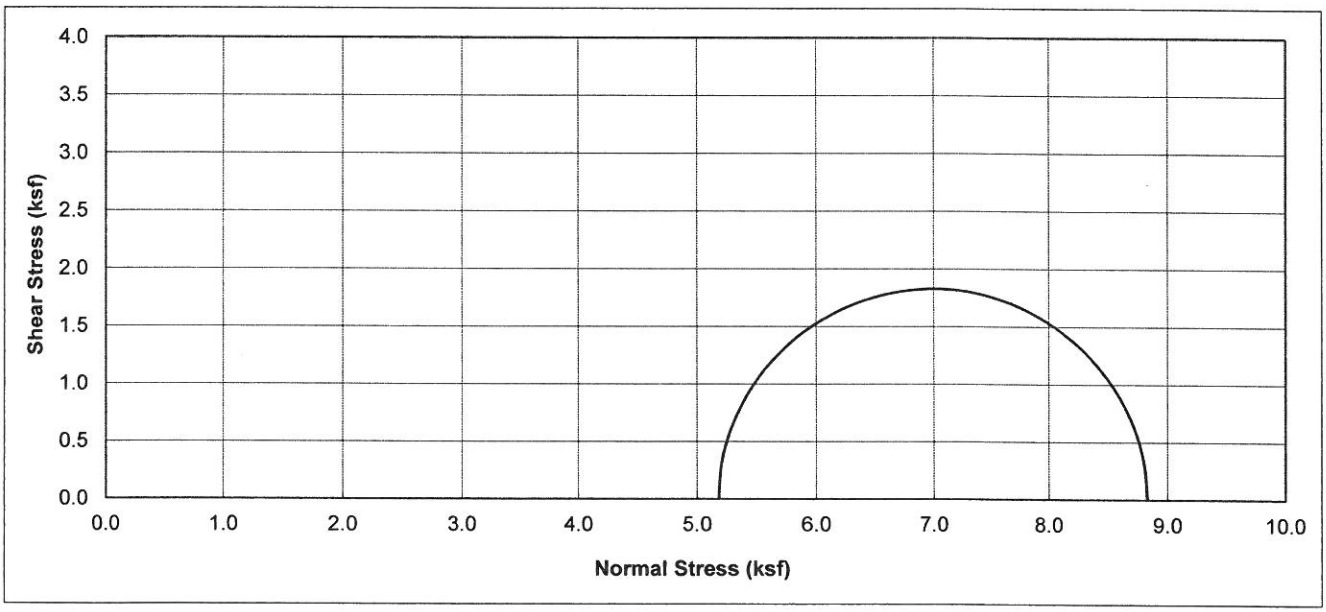




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-114	D-3	15	Olive Brown ,FAT CLAY (CH)	81.8	50.30	1.15	5.61	128.0

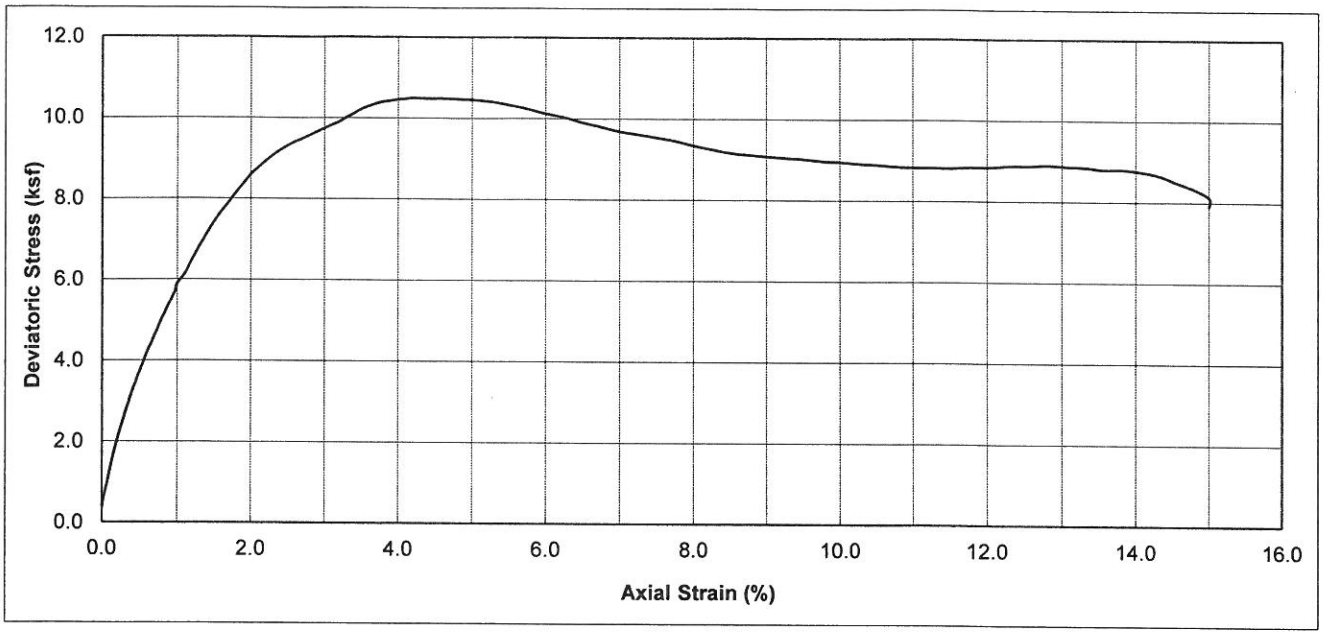
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/06/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

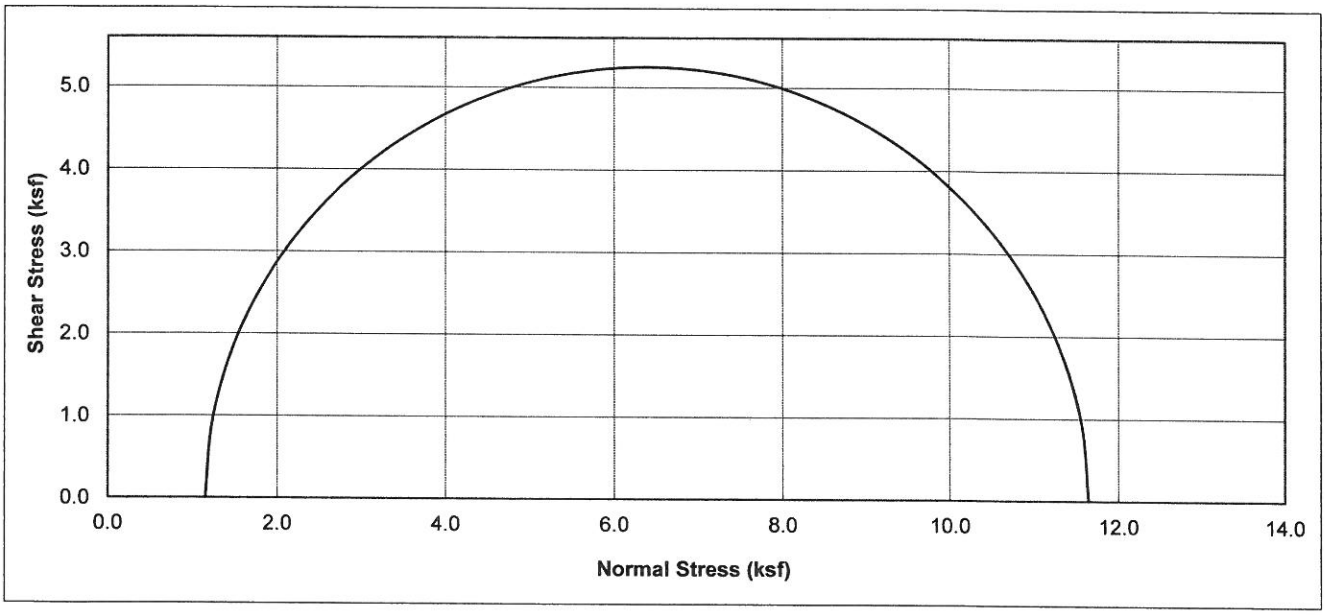




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-114	D-13	65	Dk. Gray , SANDY CLAY (CL)	91.6	29.65	5.18	3.65	95.4

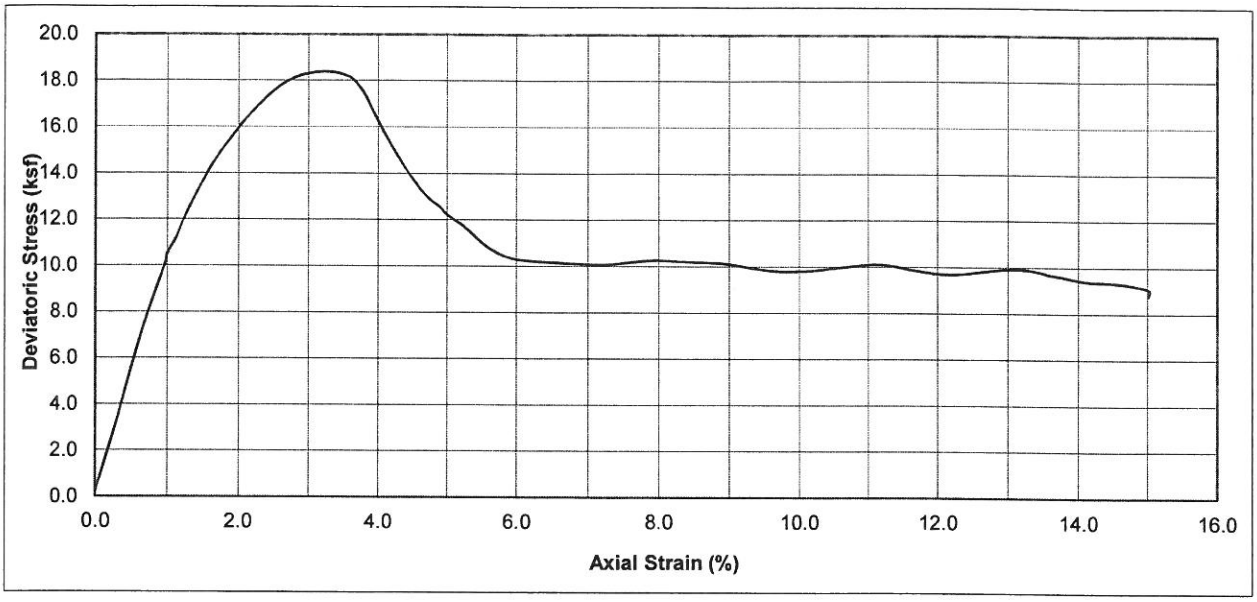
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/06/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

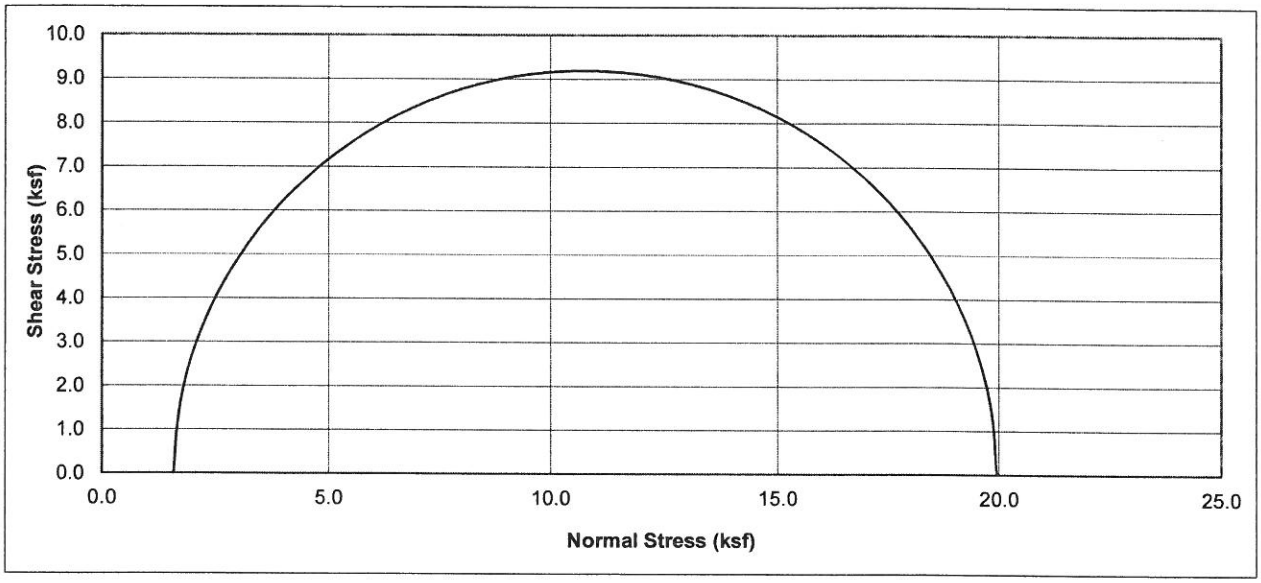




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-117	D-3	15	Olive Brown , LEAN CLAY (CL)	96.7	18.09	1.14	10.49	65.8

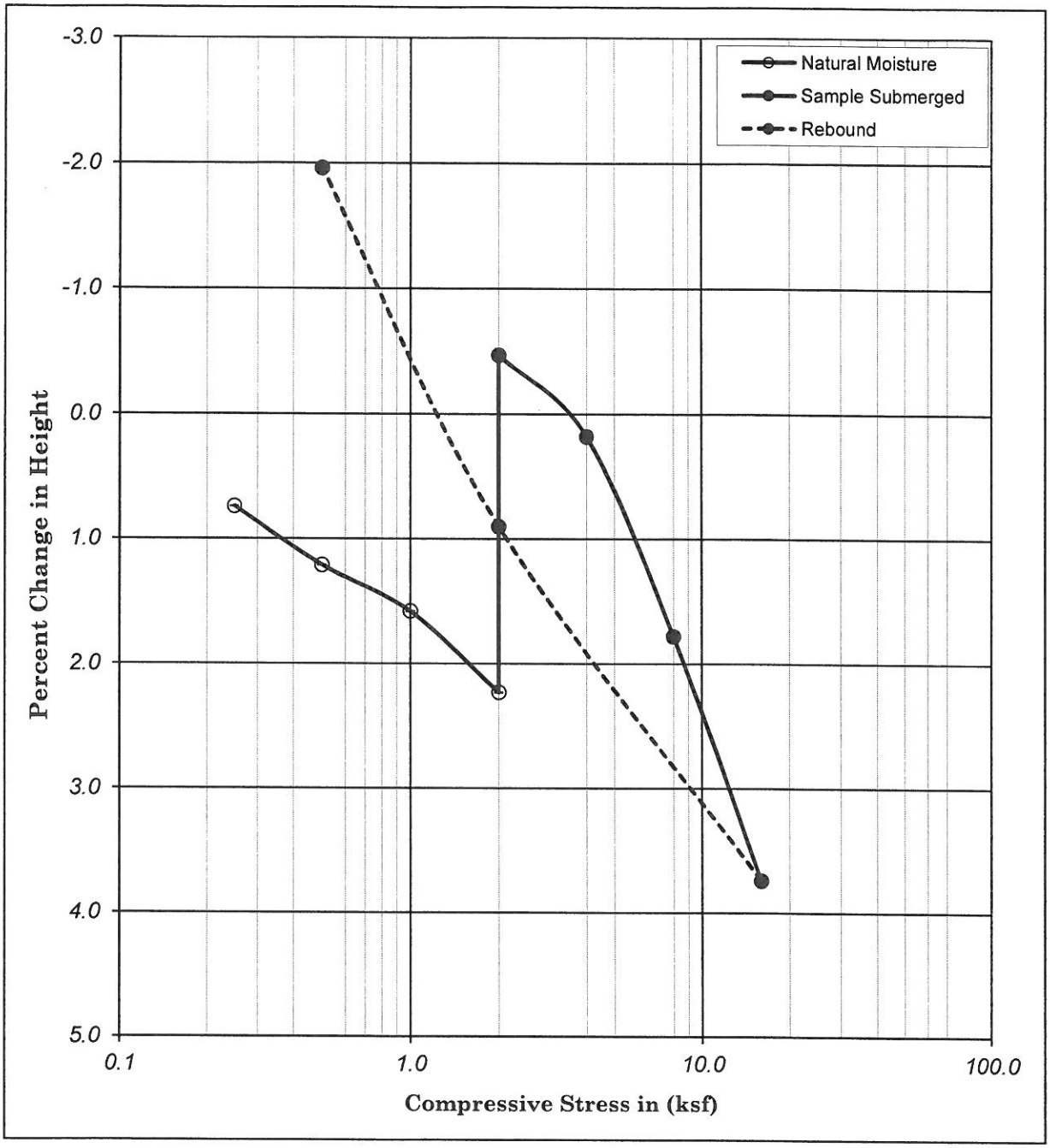
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/06/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-130	D-4	20	Olive Brown , FAT CLAY (CH)	96.4	23.77	1.57	18.38	85.8

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 / Date : 12/20/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)



Boring No. : A-11-109				Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No. : D-8				Plastic Limit :	-						
Depth	(ft) :	40.0	41.5	Plastic Index :	-	Initial	14.73	109.39	17.22	73.55	0.54
	(m) :	12.20	12.66	Specific Gravity :	2.70	Final	21.61	107.35	16.90	102.32	0.57

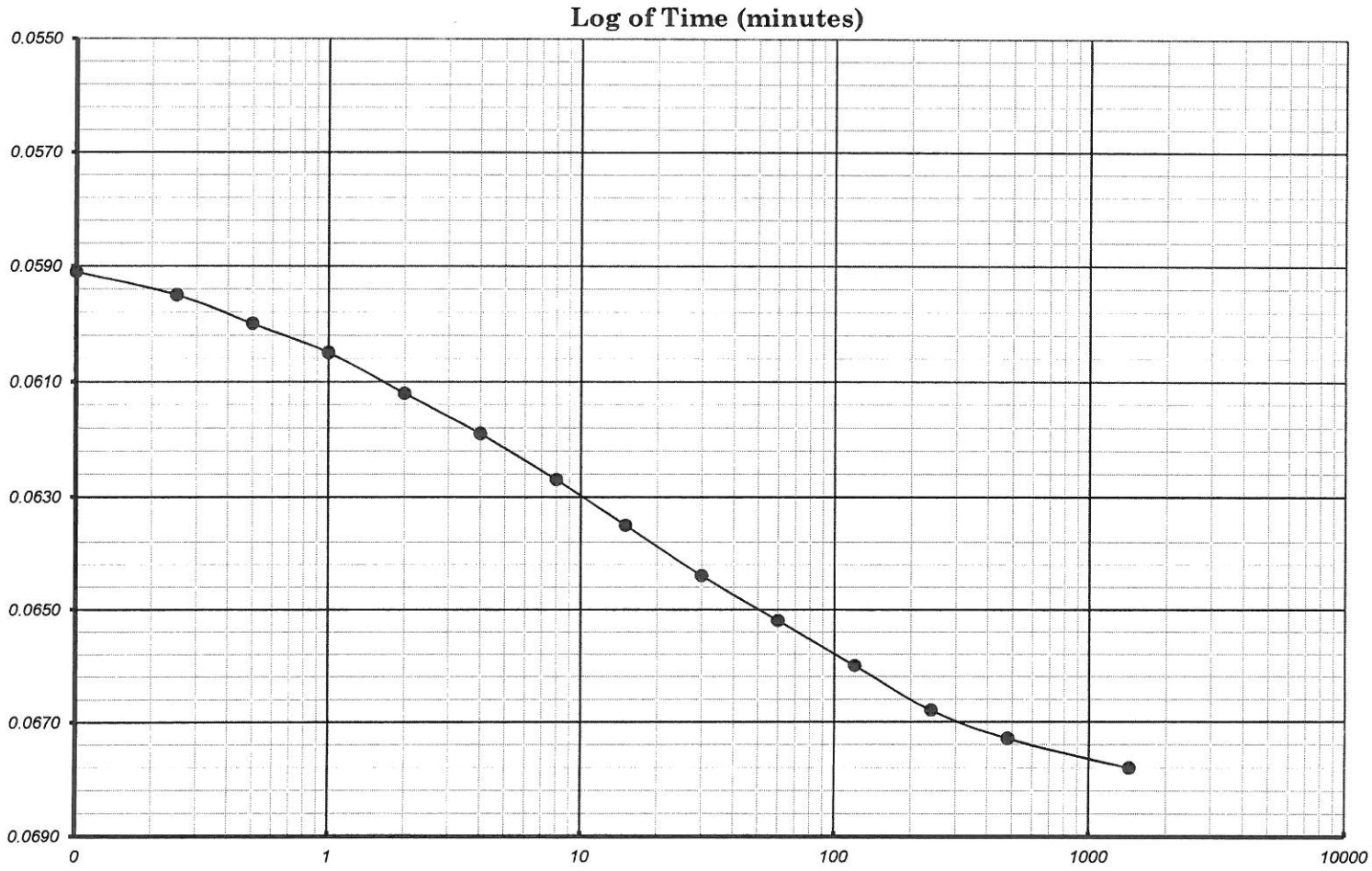
Description : Olive-brown with dark brown, Lean CLAY with SAND (CL)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

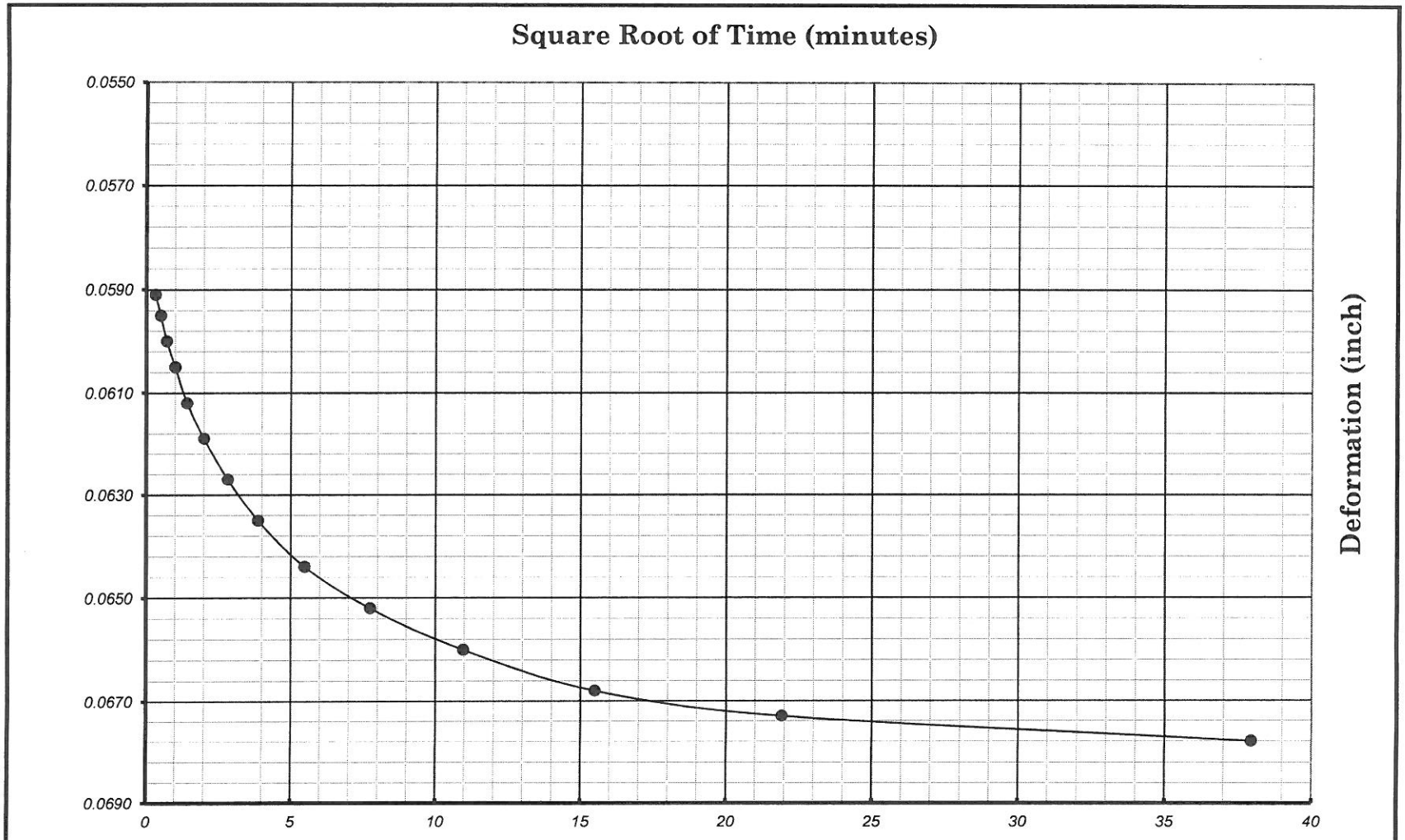
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

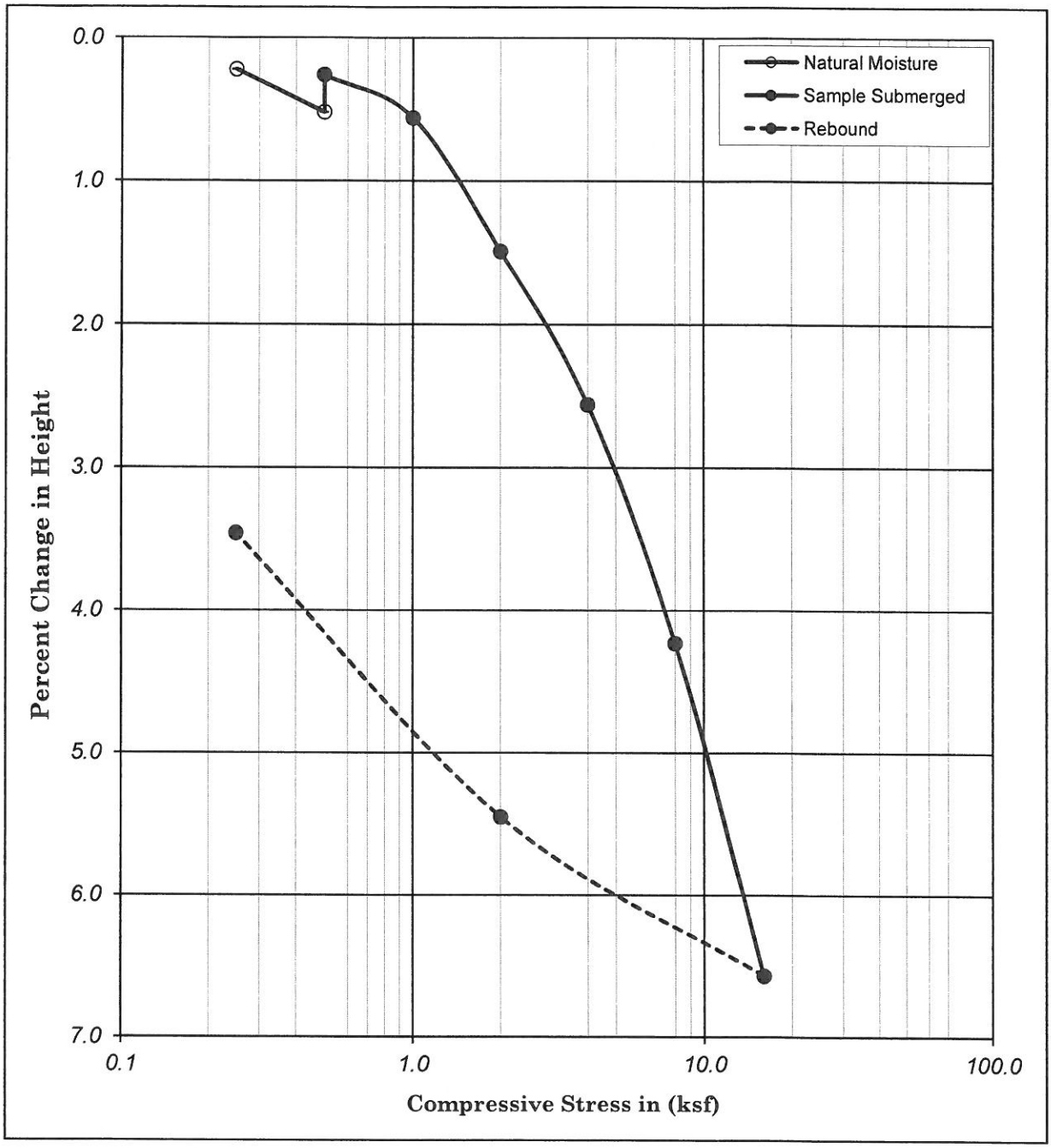
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	**Boring No. :** *A-11-109*	**One-Dimensional Consolidation of Soil** Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-8*	
EMI Project No. : *11-135*		**Depth (ft/m) :** *40.0* *12.2*	**Veritcal Load (ksf/kpa) :** *8.00* *383.0*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	**Boring No. :** *A-11-109*	**One-Dimensional Consolidation of Soil** Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-8*	
EMI Project No. : *11-135*		**Depth (ft/m) :** *40.0* *12.2*	**Veritcal Load (ksf/kpa) :** *8.0* *383.0*



Boring No.	: A-11-111		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-1		Plastic Limit :	-						
Depth (ft)	: 5.0	6.5	Plastic Index :	-	Initial	12.22	116.71	18.37	74.26	0.44
Depth (m)	: 1.53	1.98	Specific Gravity :	2.70	Final	15.70	120.90	19.03	107.52	0.39

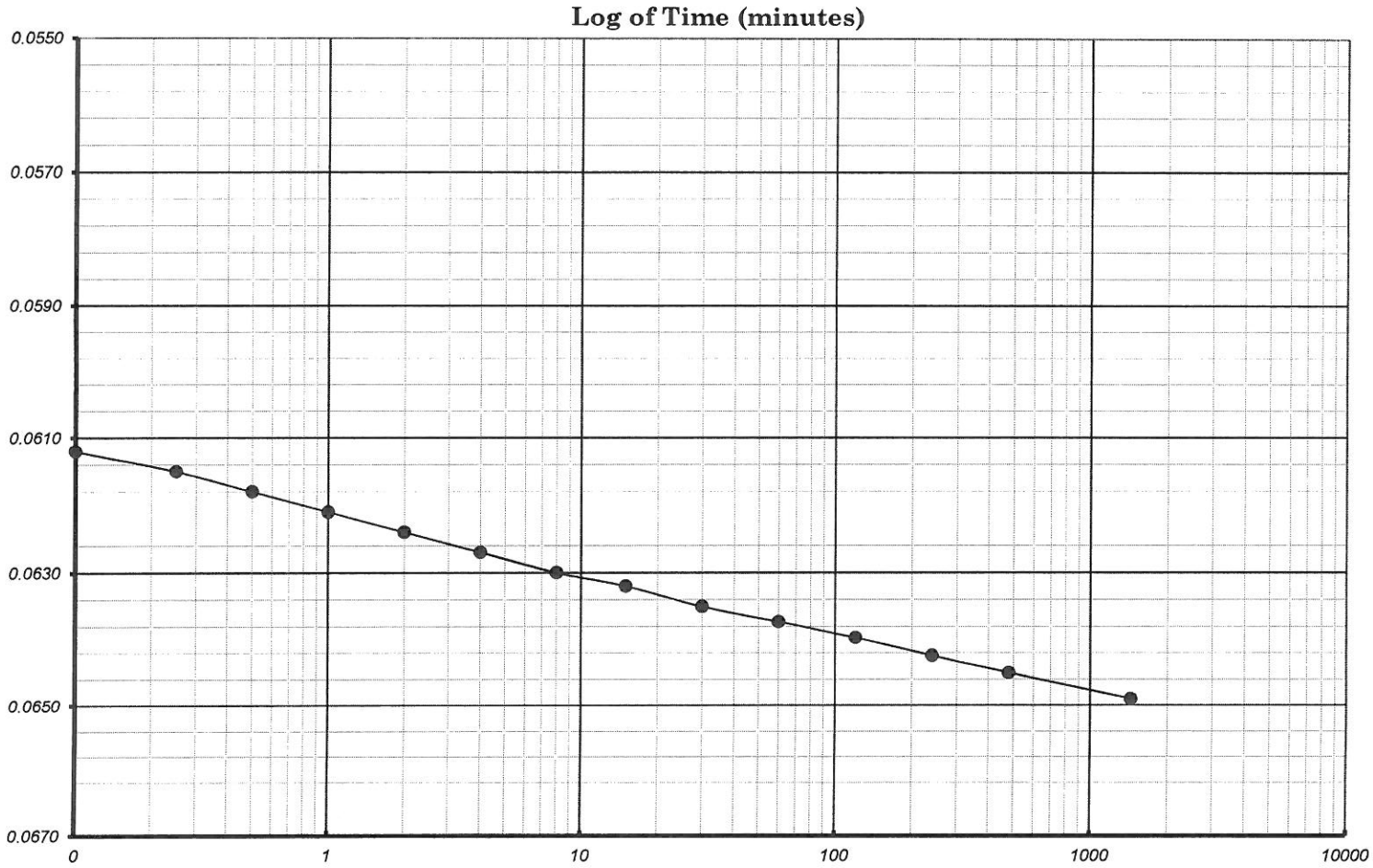
Description : Olive-brown, CLAYEY SAND (SC)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

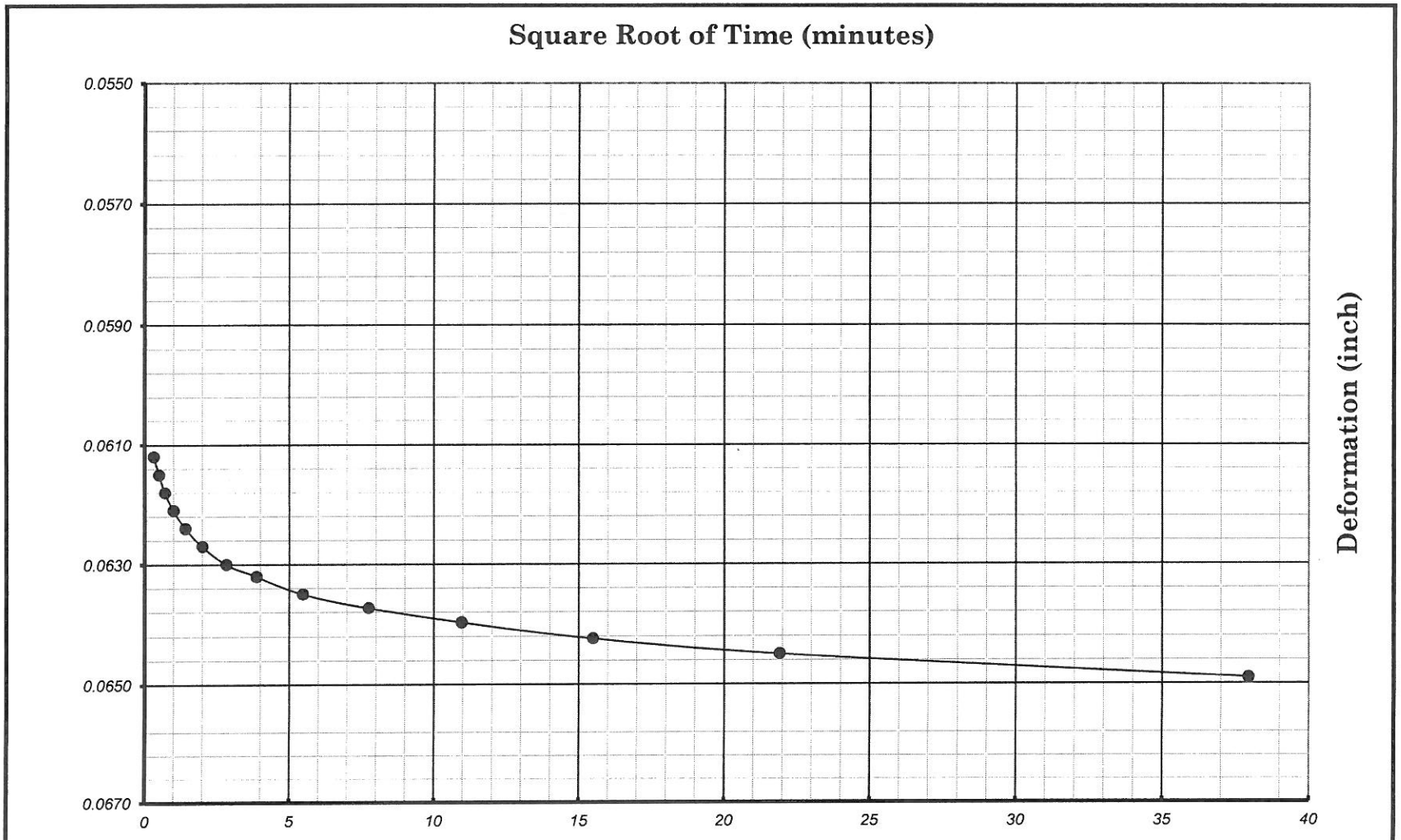
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

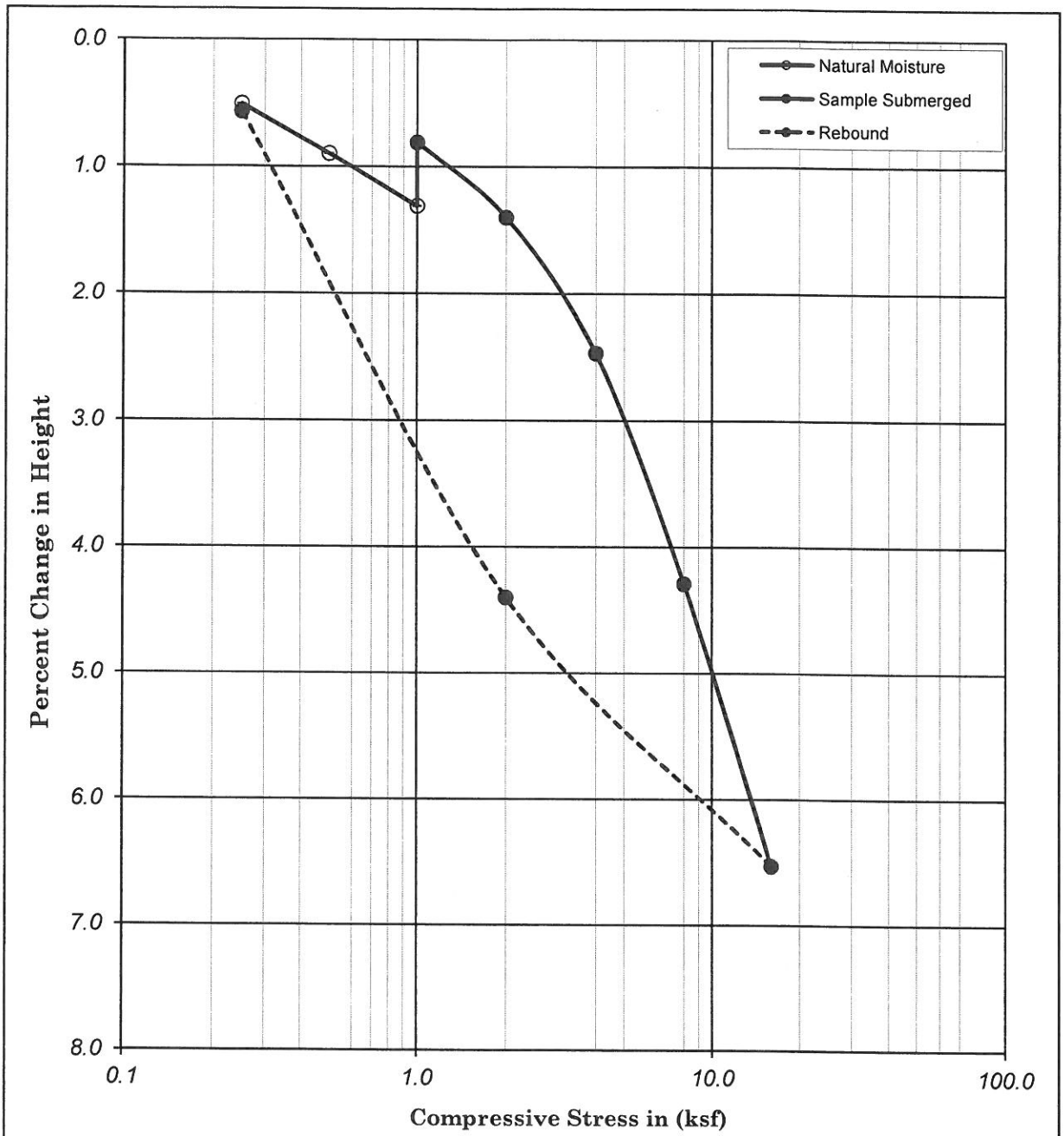
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	**Boring No. :** *A-11-111*	**One-Dimensional Consolidation of Soil** Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-1*	
EMI Project No. : *11-135*		**Depth (ft/m) :** *5.0* *1.5*	**Veritcal Load (ksf/kpa) :** *2.00* *95.8*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-111*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-1*	
EMI Project No. : *11-135*		Depth (ft/m) : *5.0* *1.5*	Veritcal Load (ksf/kpa) : *2.0* *95.8*



Boring No. : A-11-113				Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No. : D-2				Plastic Limit :	-						
Depth	(ft) :	10.0	11.5	Plastic Index :	-	Initial	24.75	100.80	15.87	99.39	0.67
	(m) :	3.05	3.51	Specific Gravity :	2.70	Final	25.32	101.43	15.97	103.32	0.66

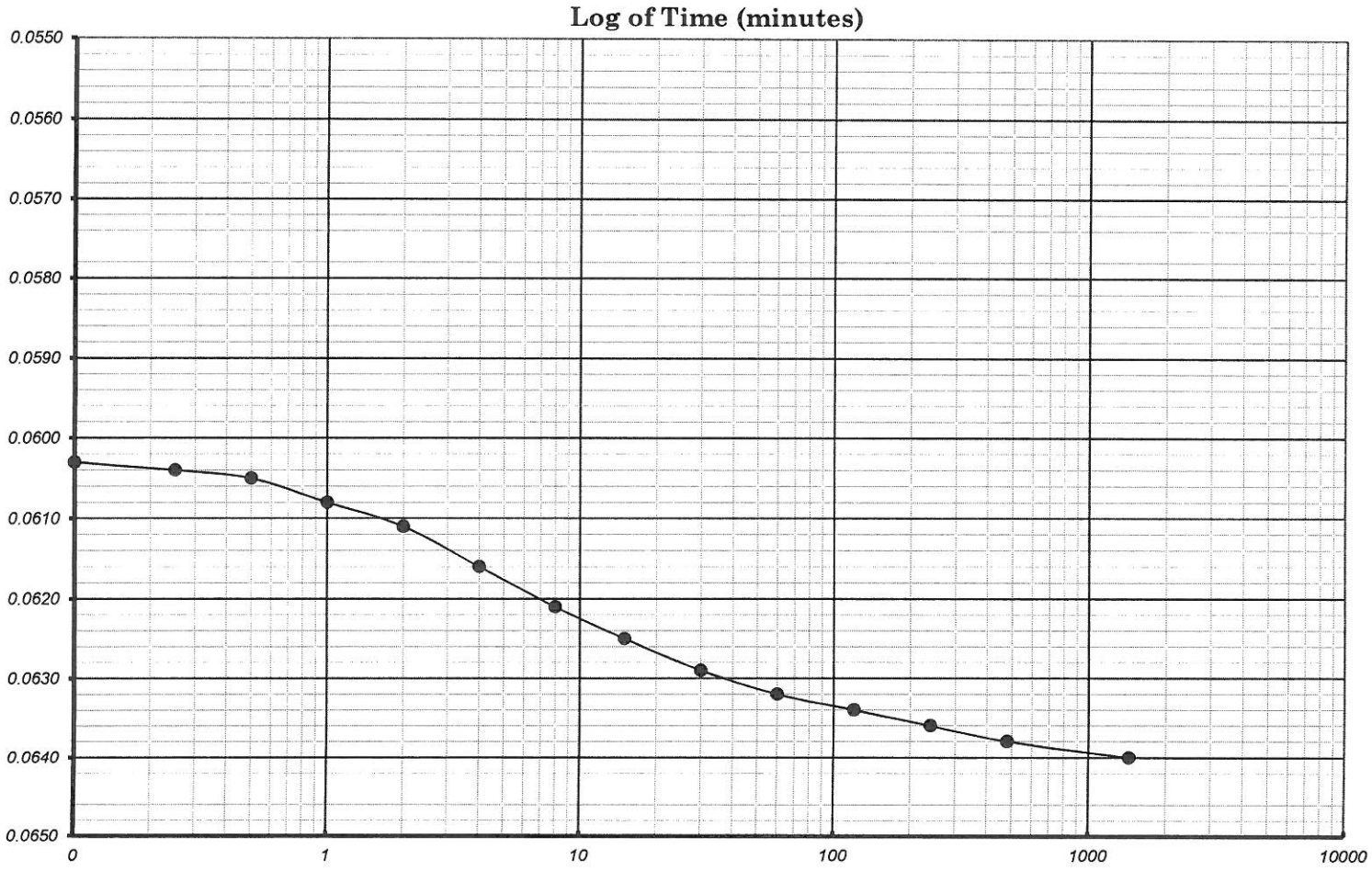
Description : Yellowish brown with gray, Lean CLAY with gypsum (CL)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

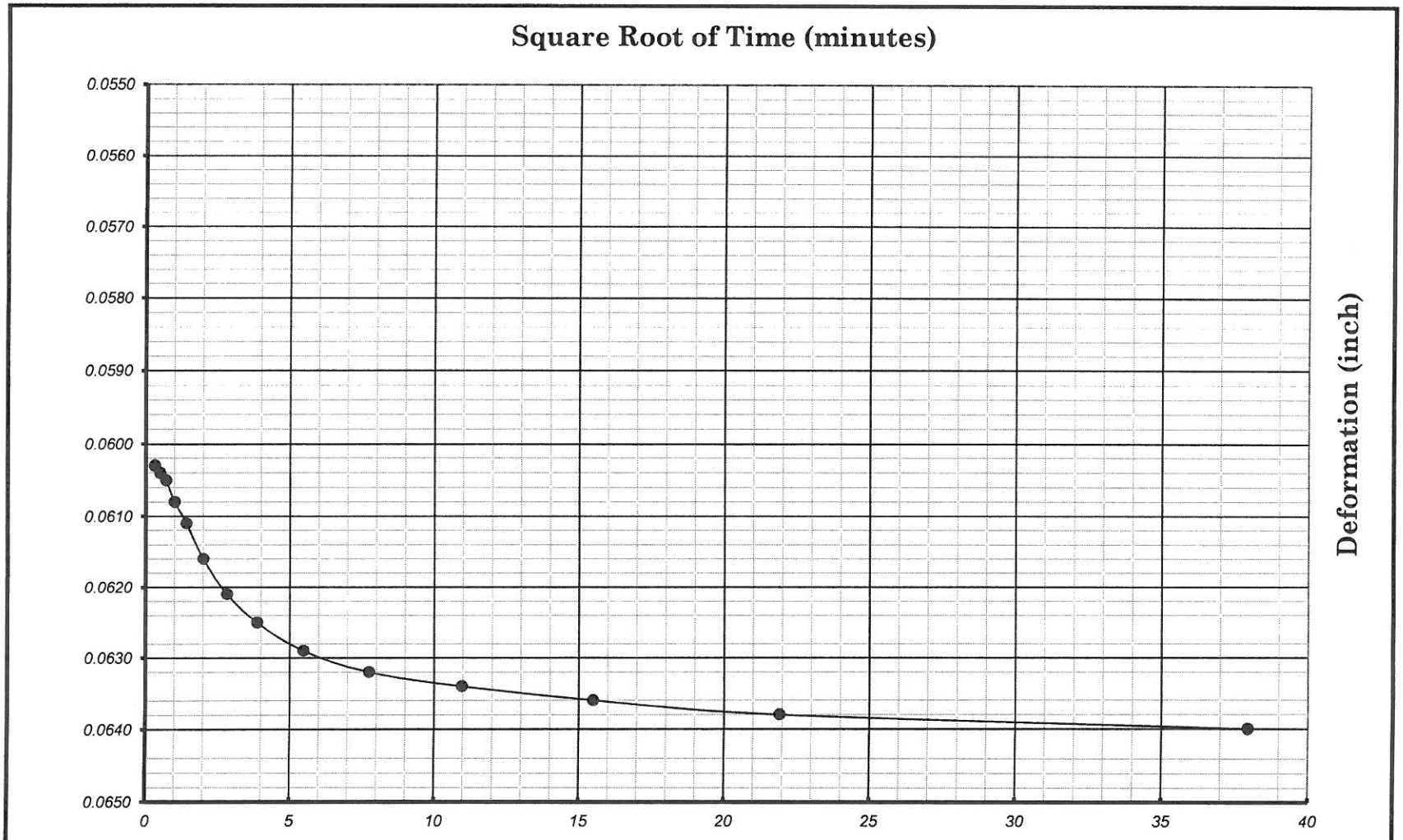
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

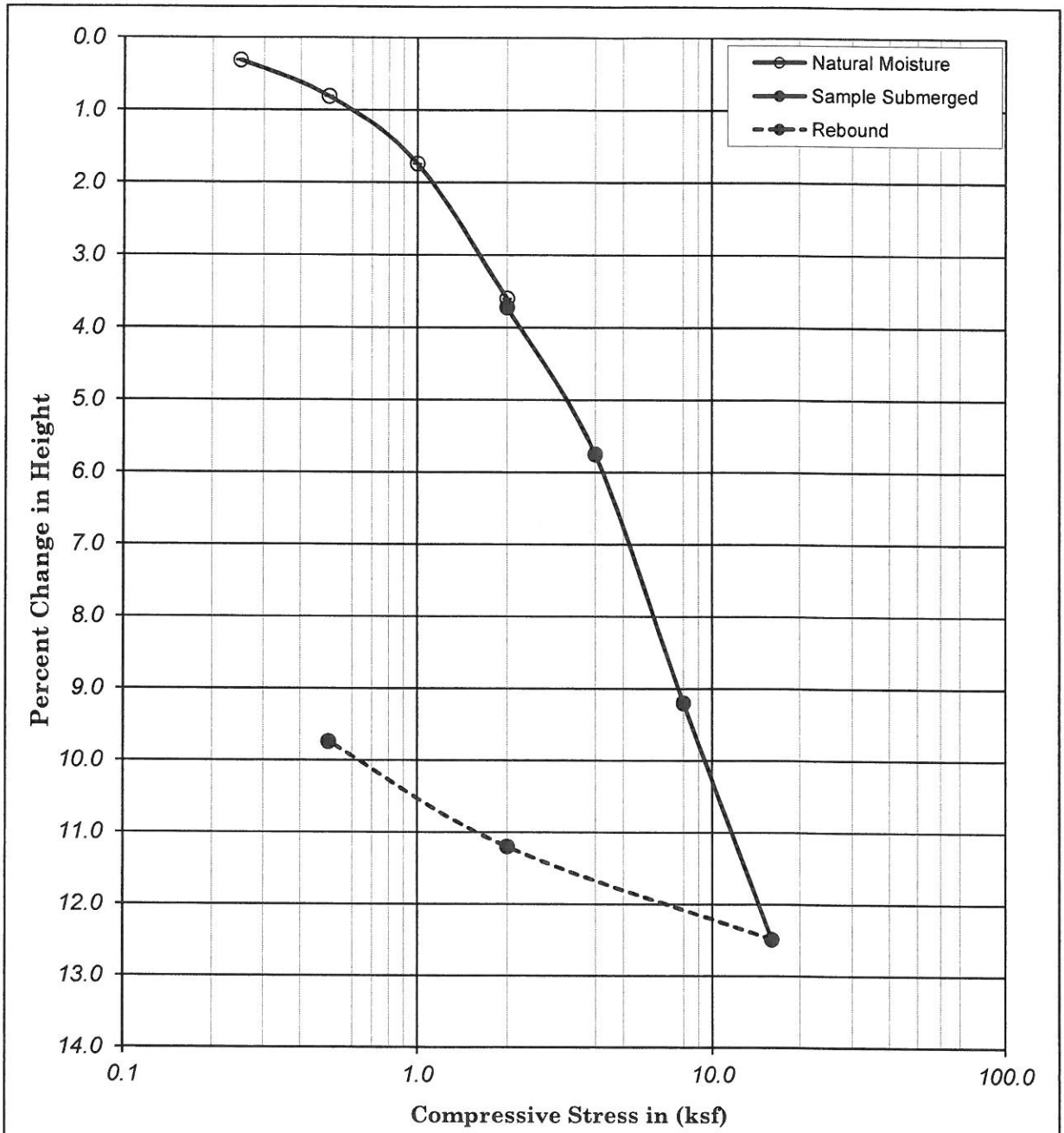
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	**Boring No. :** *A-11-113*	**One-Dimensional Consolidation of Soil** Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-2*	
EMI Project No. : *11-135*		**Depth (ft/m) :** *10.0* *3.1*	**Veritcal Load (ksf/kpa) :** *2.00* *95.8*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	**Boring No. :** *A-11-113*	**One-Dimensional Consolidation of Soil** Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-2*	
EMI Project No. : *11-135*		**Depth (ft/m) :** *10.0* *3.1*	**Veritcal Load (ksf/kpa) :** *2.0* *95.8*



Boring No.	: A-11-114		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-5		Plastic Limit :	-						
Depth (ft)	: 25.0	26.5	Plastic Index :	-	Initial	25.96	92.56	14.57	85.36	0.82
Depth (m)	: 7.63	8.08	Specific Gravity :	2.70	Final	23.00	102.63	16.15	96.69	0.64

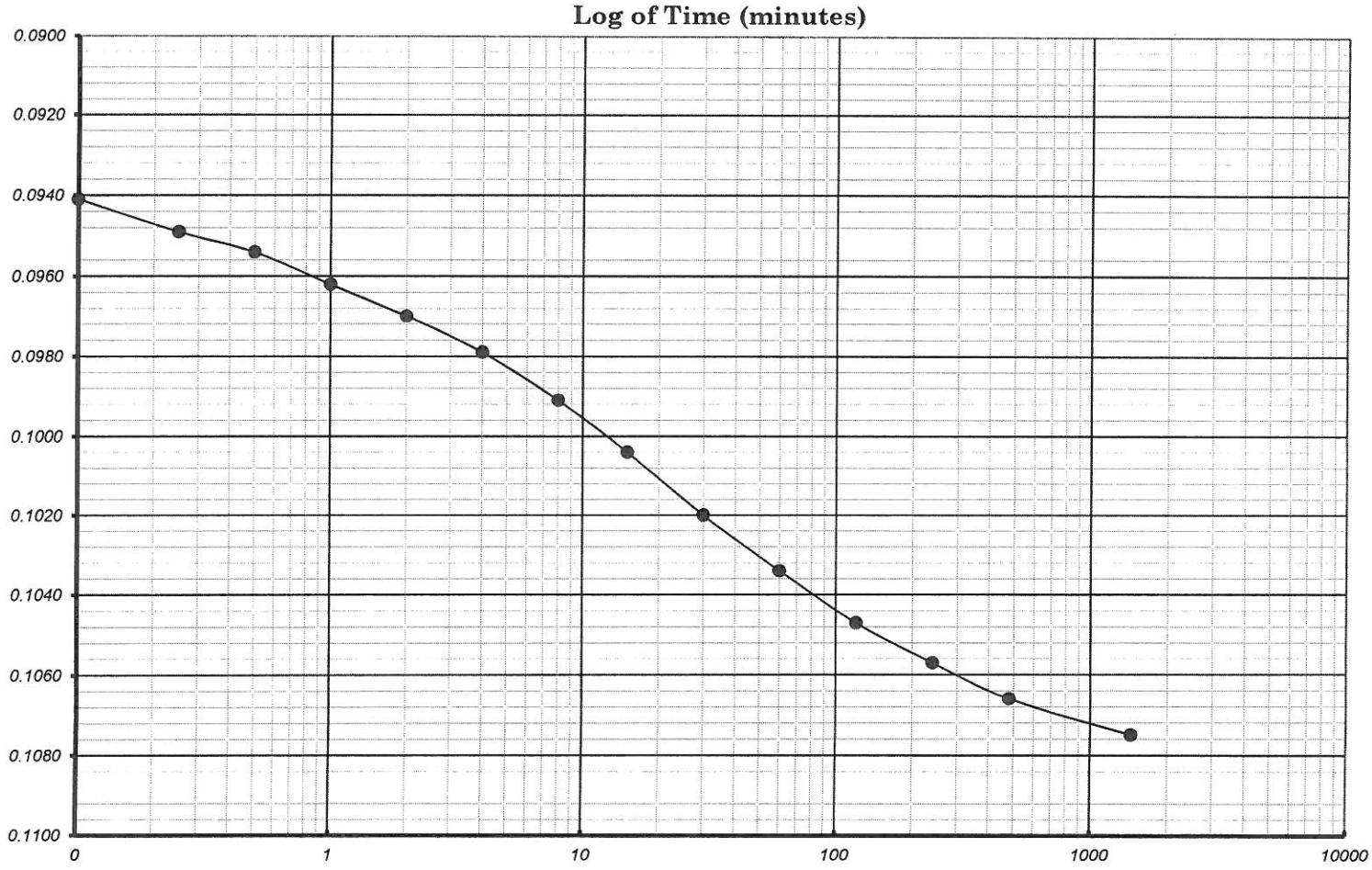
Description : Olive-brown, Lean CLAY with SAND (CL)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

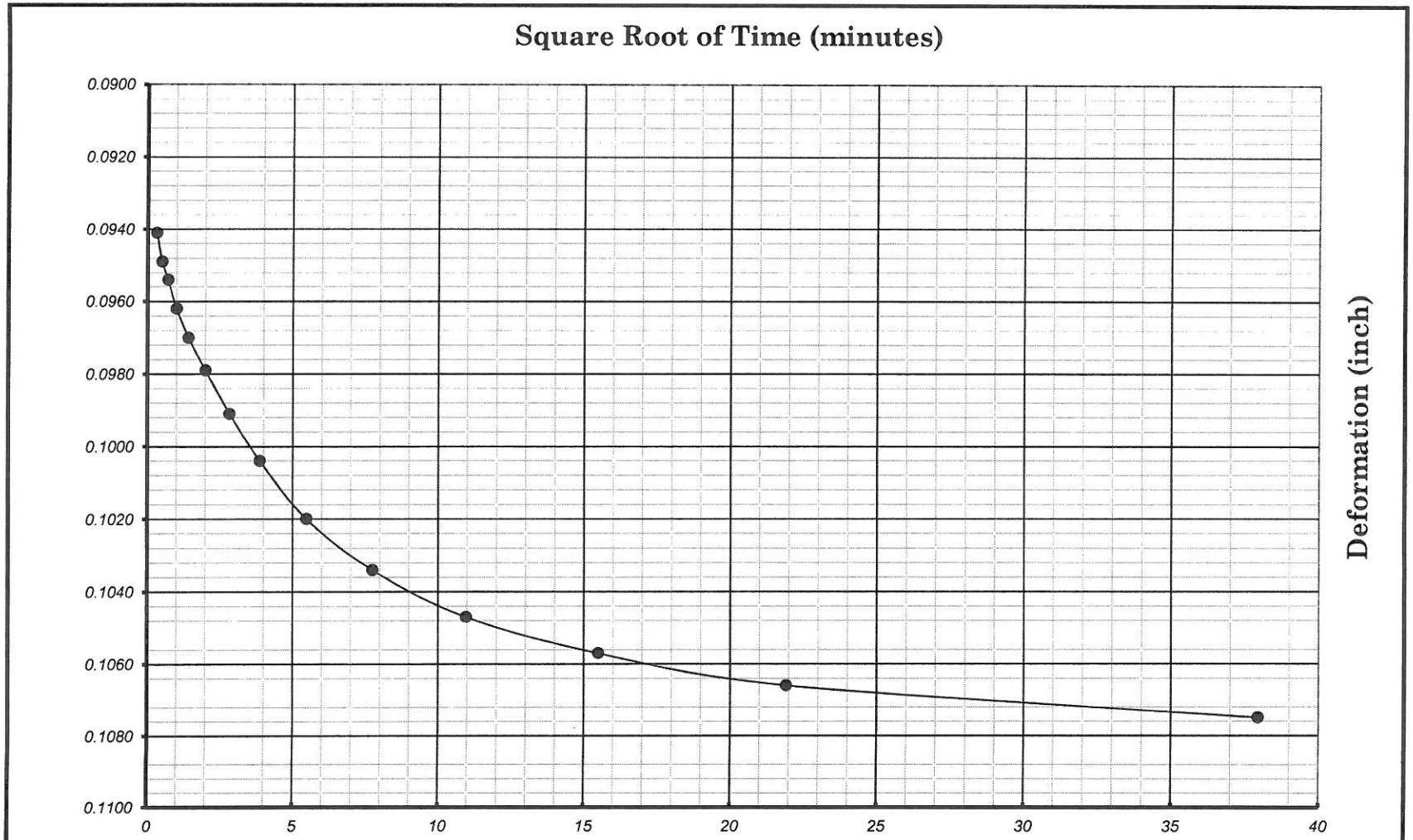
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

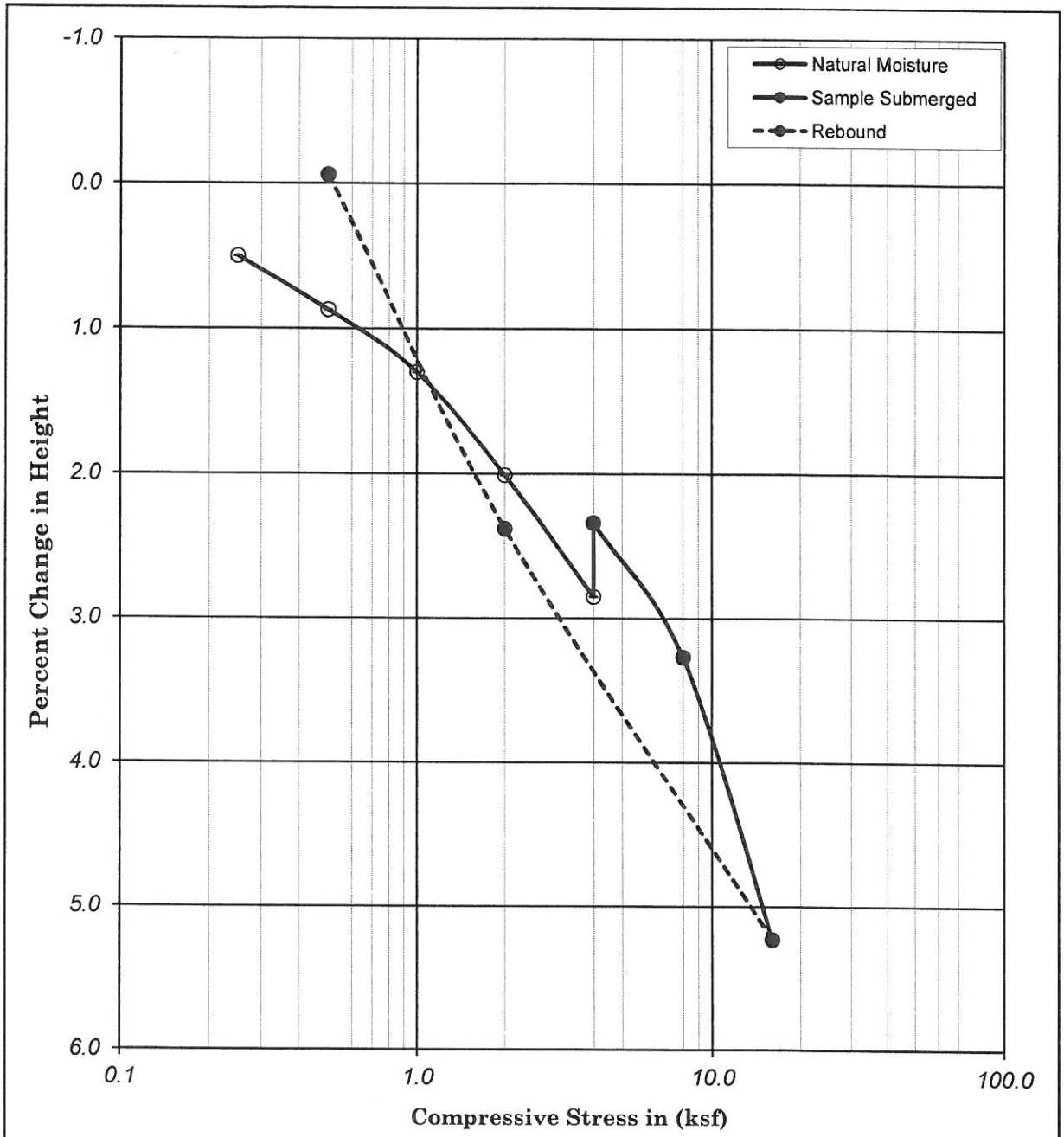
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	**Boring No. :** *A-11-114*	**One-Dimensional Consolidation of Soil** Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-5*	
EMI Project No. : *11-135*		**Depth (ft/m) :** *25.0* *7.6*	**Veritcal Load (ksf/kpa) :** *4.00* *191.5*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	**Boring No. :** *A-11-114*	**One-Dimensional Consolidation of Soil** **Time-Deformation Curve (Square Root of Time Method)**
		Sample No. : *D-5*	
EMI Project No. : *11-135*		**Depth (ft/m) :** *25.0* *7.6*	**Veritcal Load (ksf/kpa) :** *4.0* *191.5*



Boring No.	: A-11-117		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-9		Plastic Limit :	-						
Depth (ft)	: 45.0	46.5	Plastic Index :	-	Initial	31.10	91.39	14.39	99.46	0.84
Depth (m)	: 13.73	14.18	Specific Gravity :	2.70	Final	32.84	91.39	14.39	105.02	0.84

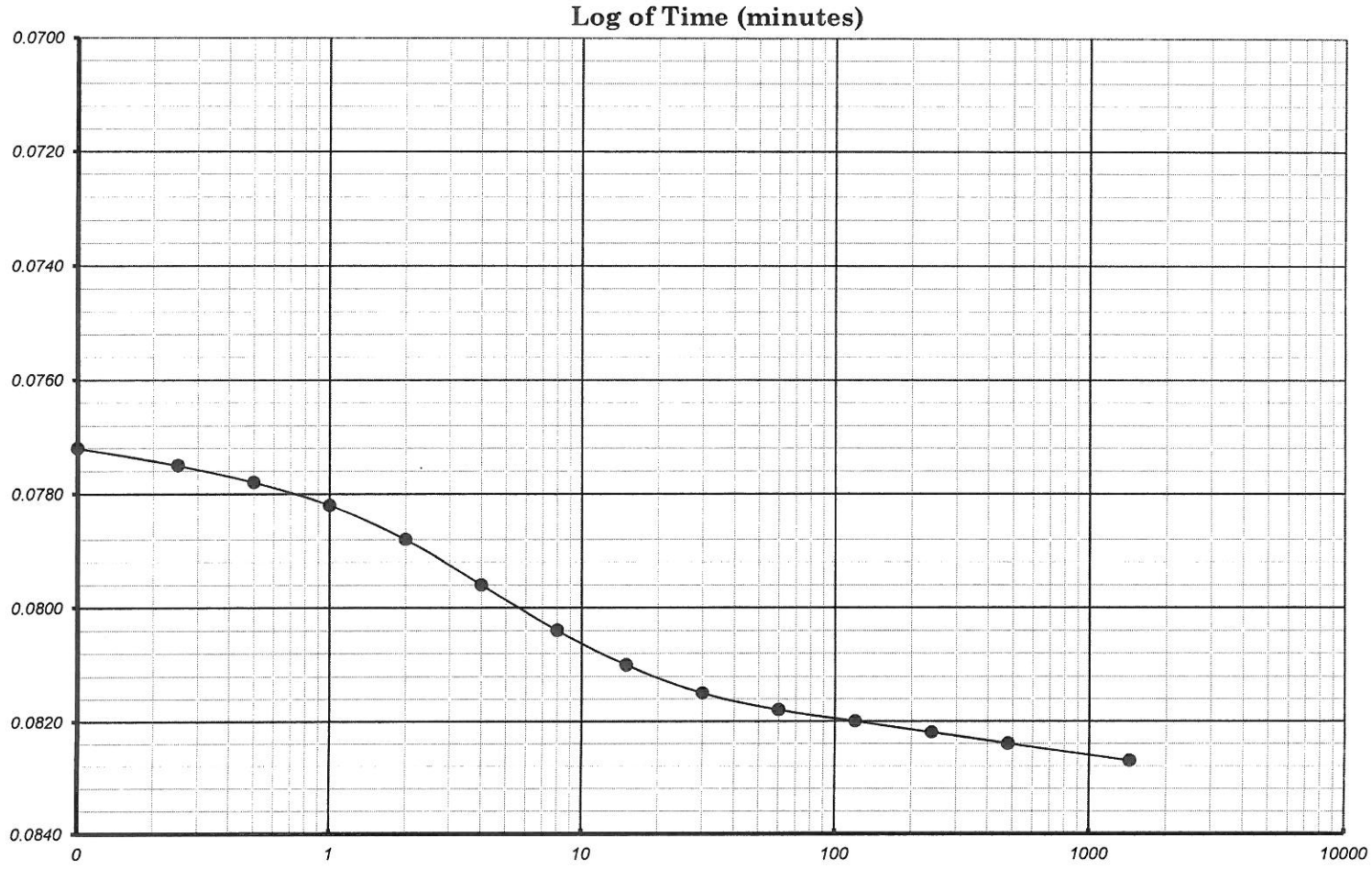
Description : Olive-brown, Fat CLAY (CH)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

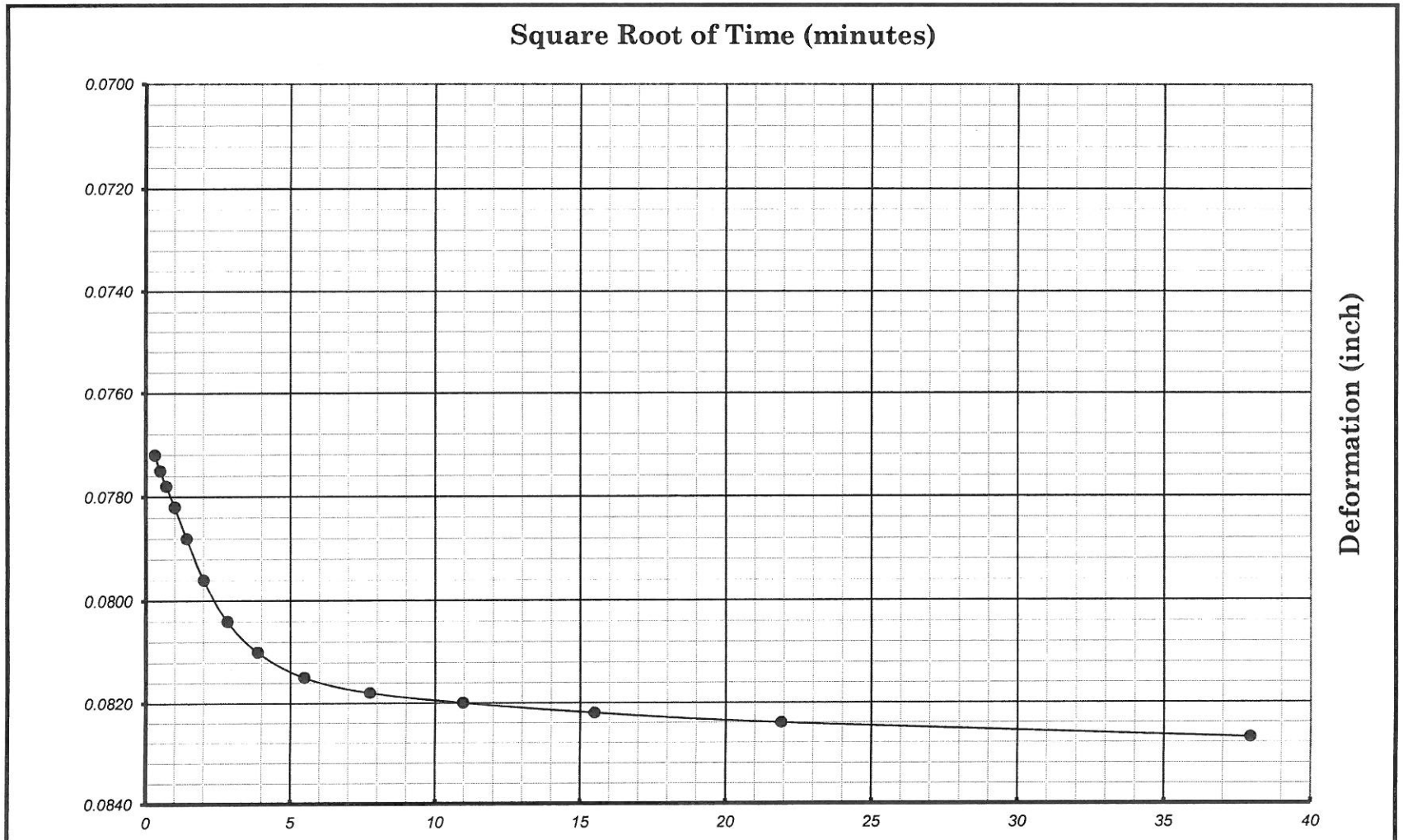
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

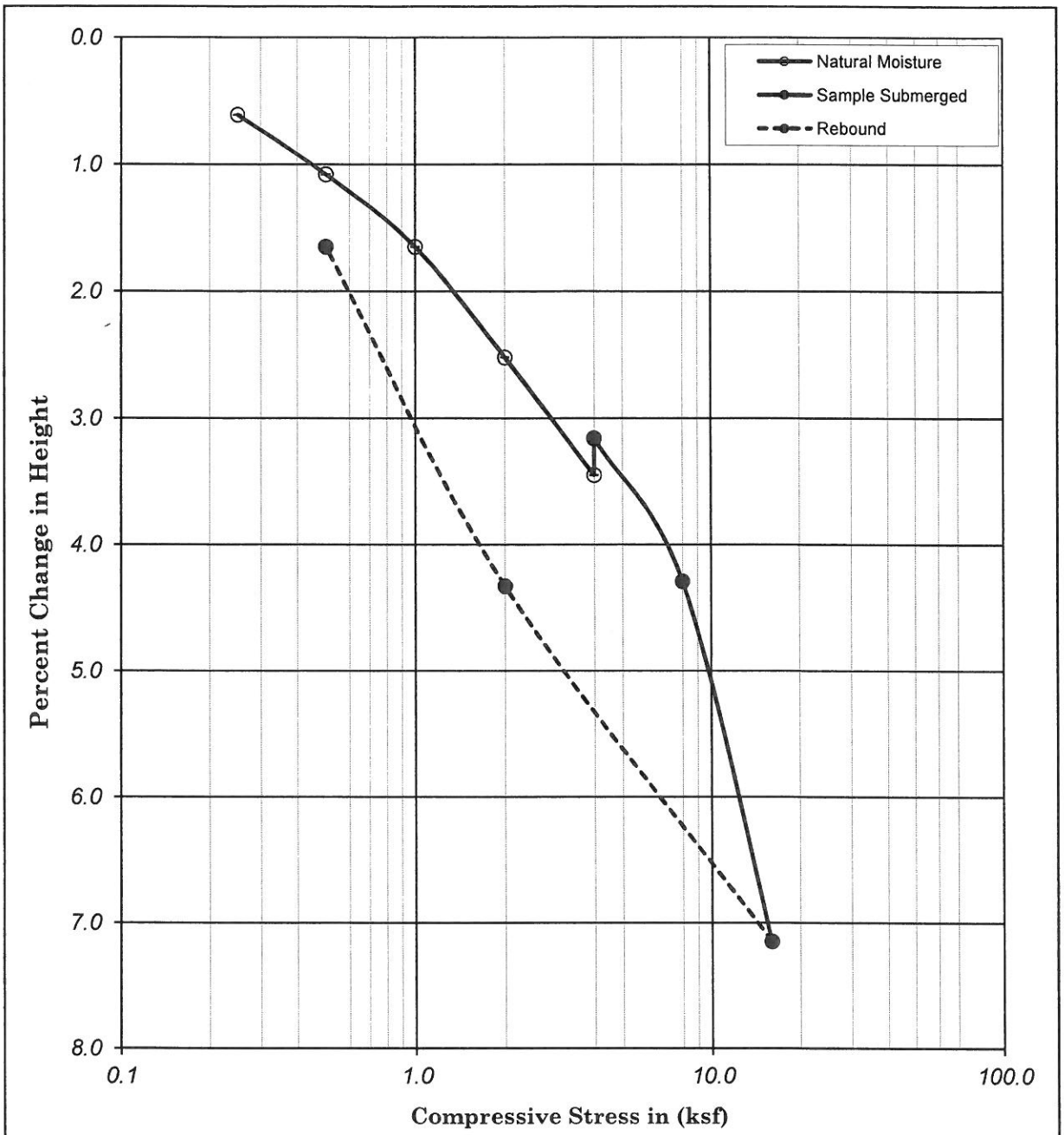
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	**Boring No. :** *A-11-117*	**One-Dimensional Consolidation of Soil** Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-9*	
EMI Project No. : *11-135*		**Depth (ft/m) :** *45.0* *13.7*	**Veritcal Load (ksf/kpa) :** *8.00* *383.0*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	**Boring No. :** *A-11-117*	**One-Dimensional Consolidation of Soil** **Time-Deformation Curve (Square Root of Time Method)**
		Sample No. : *D-9*	
EMI Project No. : *11-135*		**Depth (ft/m) :** *45.0* *13.7*	**Veritcal Load (ksf/kpa) :** *8.0* *383.0*



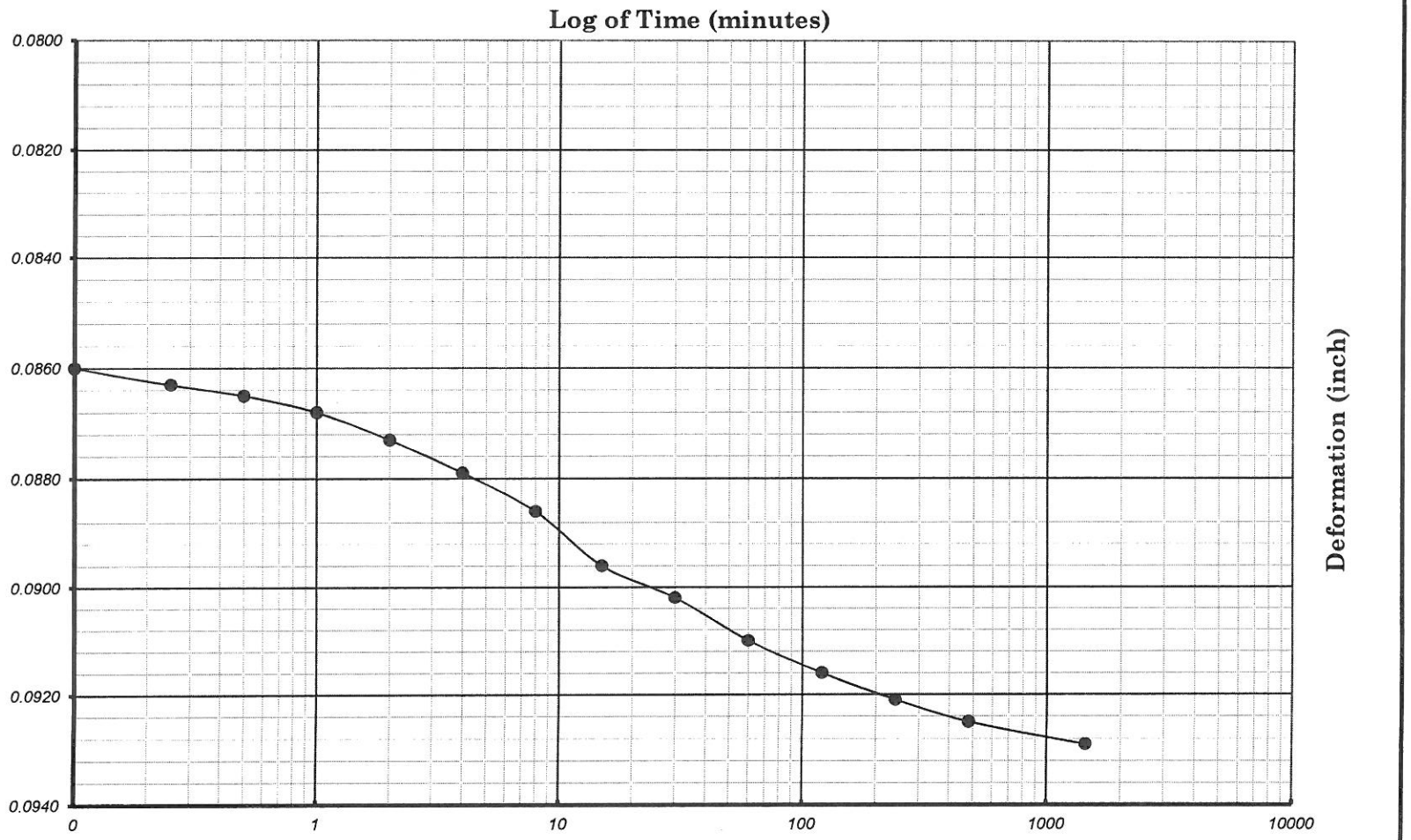
Boring No. : A-11-118				Liquid Limit :	-		Moisture Content (%)	Dry Density		Percent Saturation	Void Ratio
Sample No. : D-9				Plastic Limit :	-			(pcf)	(kN/m³)		
Depth	(ft) :	40.0	41.5	Plastic Index :	-	Initial	31.24	90.87	14.30	98.67	0.85
	(m) :	12.20	12.66	Specific Gravity :	2.70	Final	32.39	92.44	14.55	106.19	0.82
Description : Olive-brown with olive-gray, Lean CLAY with SAND (CL)											

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

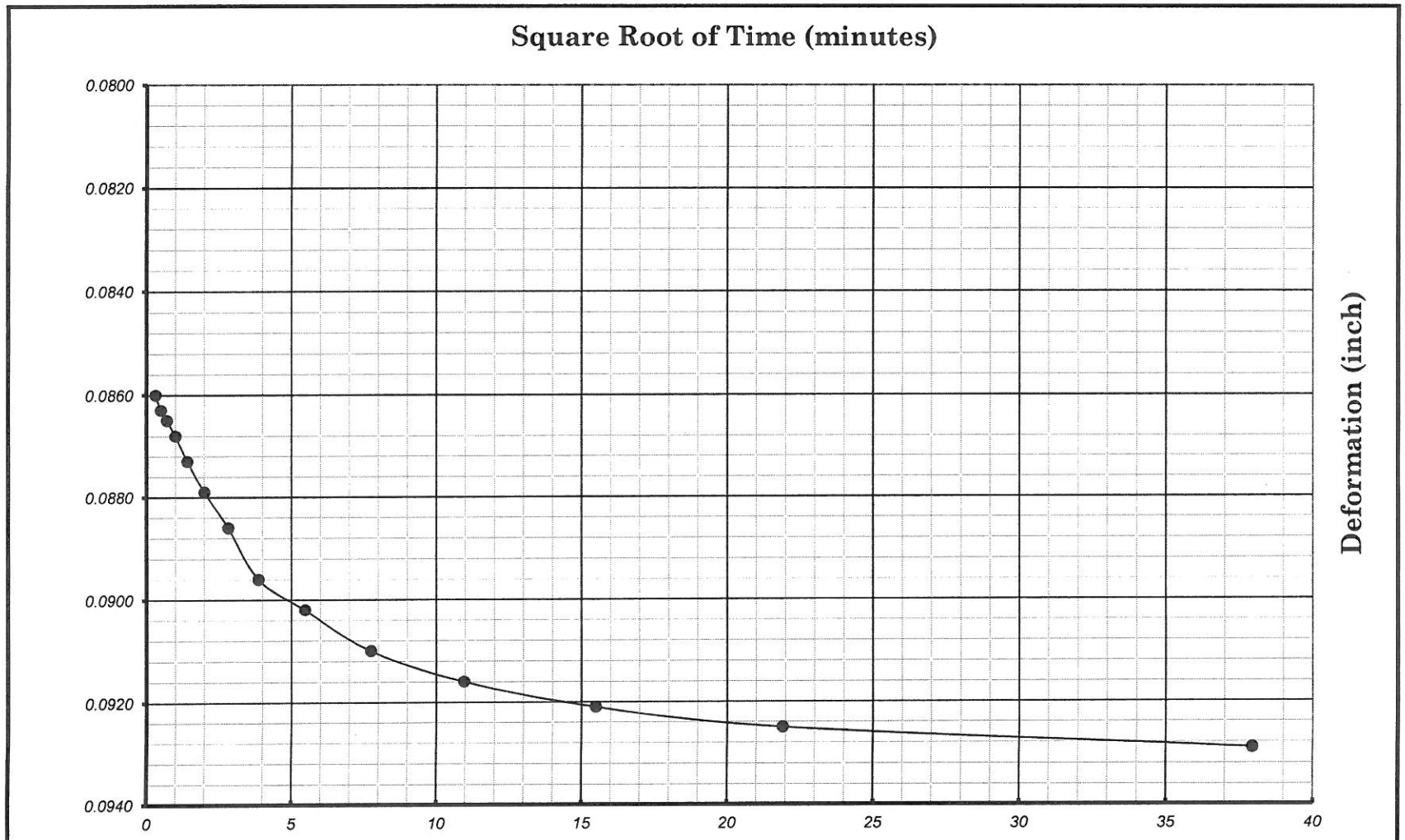
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

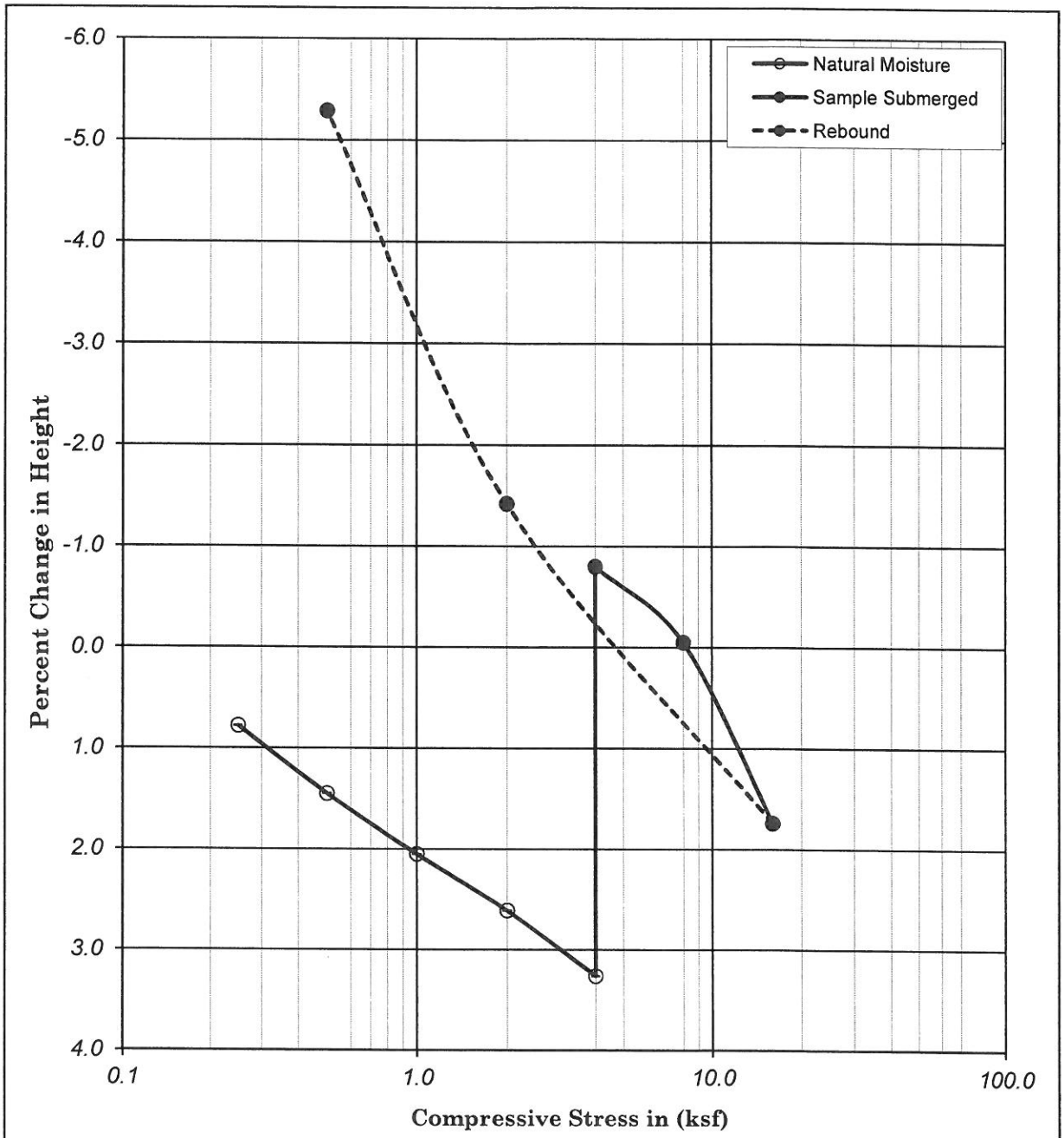
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	**Boring No. :** *A-11-118*	**One-Dimensional Consolidation of Soil** Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-9*	
EMI Project No. : *11-135*		**Depth (ft/m) :** *40.0* *12.2*	**Veritcal Load (ksf/kpa) :** *8.00* *383.0*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	**Boring No. :** *A-11-118*	**One-Dimensional Consolidation of Soil** Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-9*	
EMI Project No. : *11-135*		**Depth (ft/m) :** *40.0* *12.2*	**Veritcal Load (ksf/kpa) :** *8.0* *383.0*



Boring No.	: A-11-130		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-6		Plastic Limit :	-						
Depth (ft)	: 30.0	31.5	Plastic Index :	-	Initial	19.87	106.39	16.75	91.79	0.58
Depth (m)	: 9.15	9.61	Specific Gravity :	2.70	Final	25.32	101.05	15.91	102.32	0.67

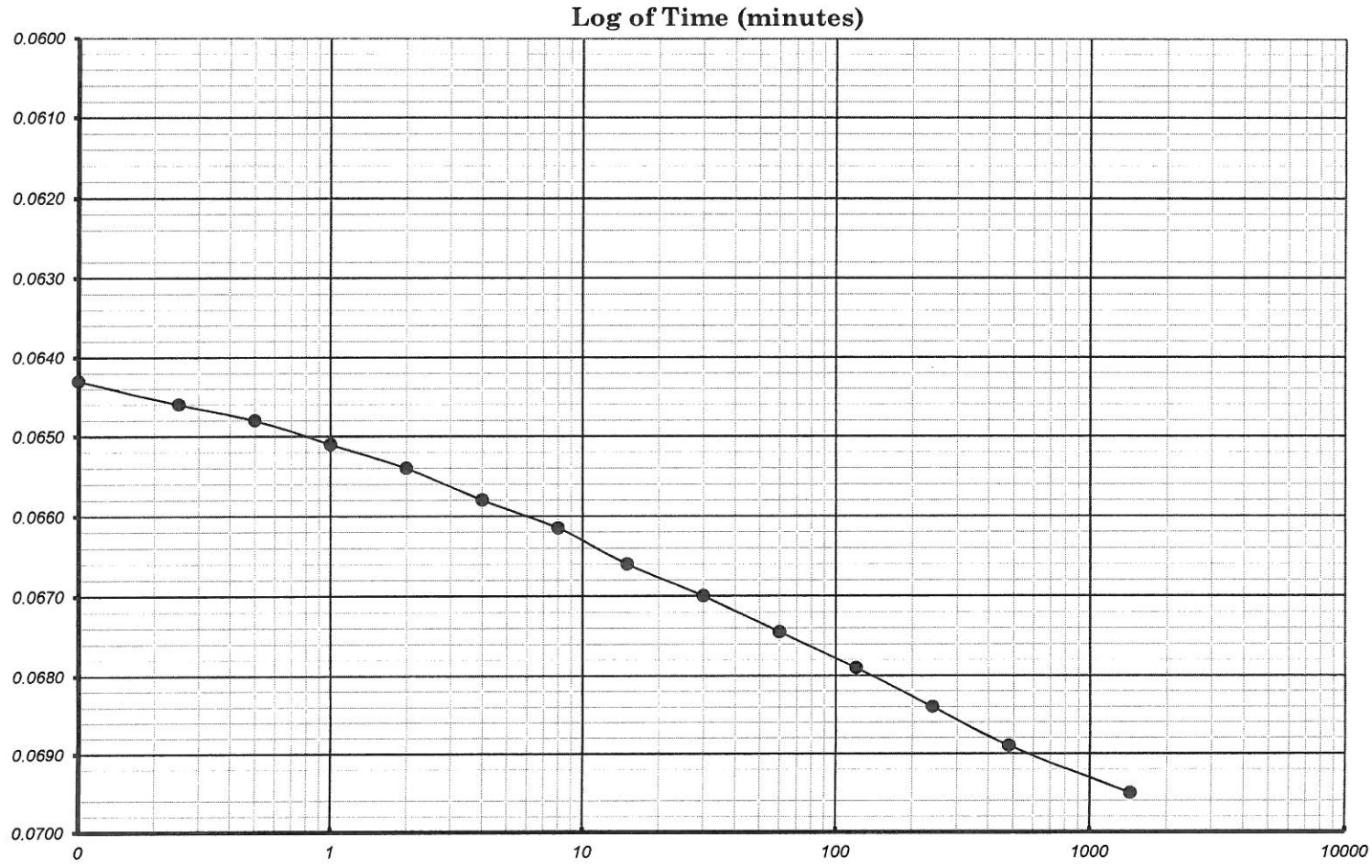
Description : Dark brown, Fat CLAY with SAND (CH)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

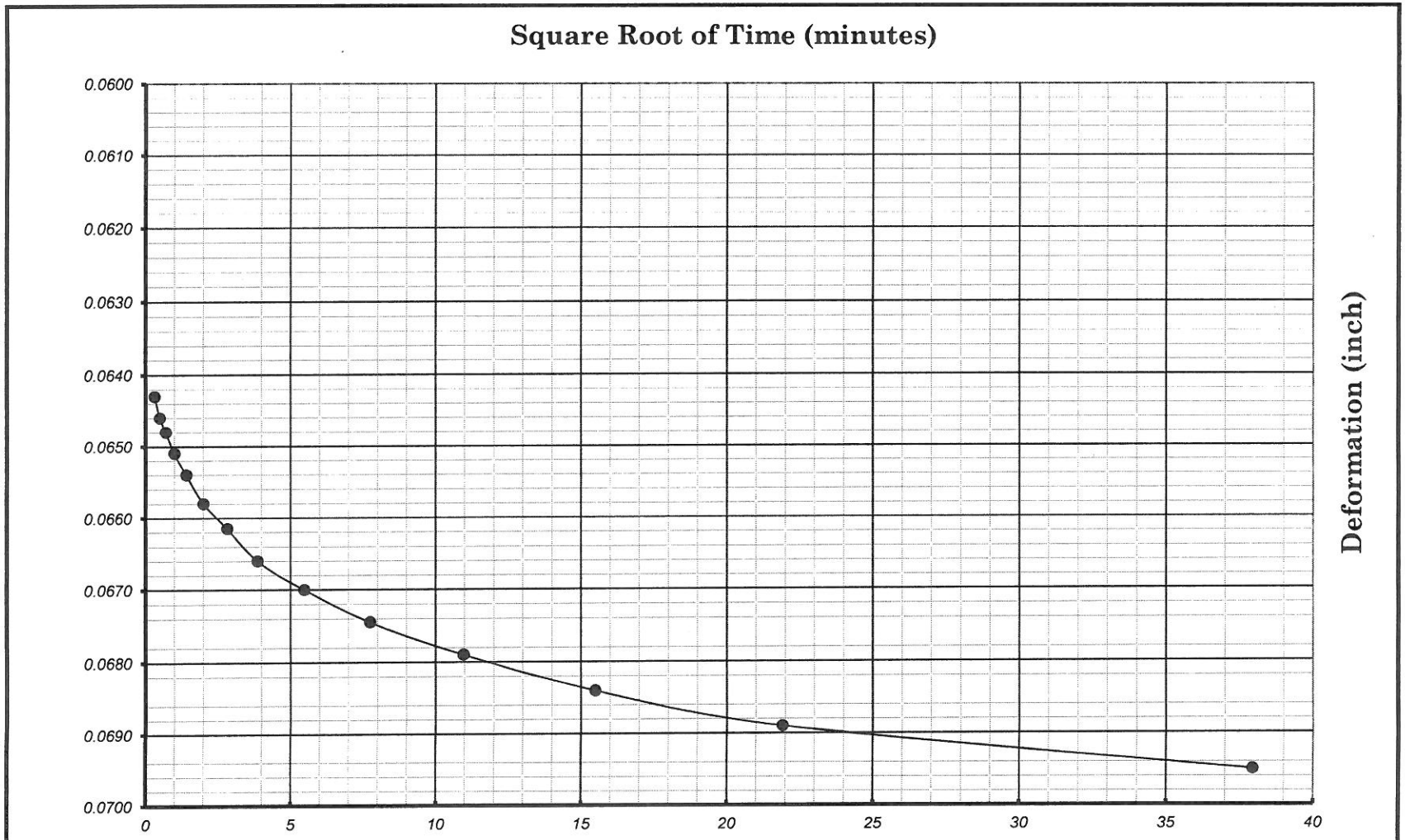
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	**Boring No. :** *A-11-130*	**One-Dimensional Consolidation of Soil** Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-6*	
EMI Project No. : *11-135*		**Depth (ft/m) :** *30.0* *9.2*	**Veritcal Load (ksf/kpa) :** *8.00* *383.0*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	**Boring No. :** *A-11-130*	**One-Dimensional Consolidation of Soil** **Time-Deformation Curve (Square Root of Time Method)**
		Sample No. : *D-6*	
EMI Project No. : *11-135*		**Depth (ft/m) :** *30.0* *9.2*	**Veritcal Load (ksf/kpa) :** *8.0* *383.0*

AP Engineering & Testing, Inc.

CAL 216 PART 2

LABORATORY COMPACTED TEST MAXIMUM WET DENSITY

Client: Earth Mechanics, Inc.
Project Name: I-5 HOV Widening Segment 1
Project No. : 11-135
Boring No.: A-11-111
Sample No. : B-0
Visual Sample Description: Sandy Clay w/gravel

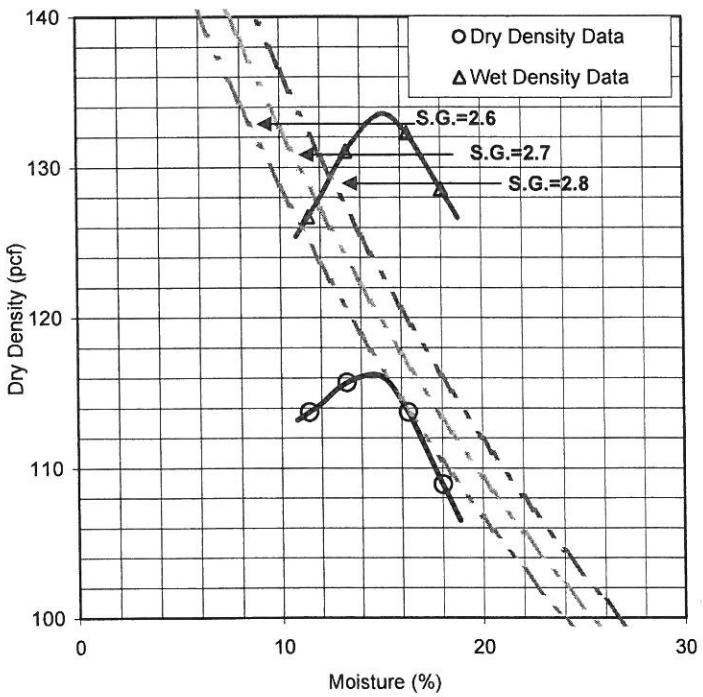
Tested By: CC
Calculated By: KM
Checked By: AP
Depth (ft): 0-5

AP Number: 11-1059
Date: 12/05/11
Date: 12/13/11
Date: 12/18/11

IMPACT TEST DATA							
I	Initial Wet Weight of Test Specimen (Grams)	2350					
	Increment No.	1	2	3	4	5	6
	Water Adjustment (grams)	0	47	-47	94		
J	Tamper Reading	10.5	10.8	10.6	11.0		
K	Wet Density (gm/cc) from Table 1	2.12	2.06	2.10	2.03		
	Dry Density (gm/cc)	1.82	1.75	1.85	1.82		
	Dry Density (pcf)	**113.7**	**108.9**	**115.7**	**113.7**		
	Wt. of Container (gm.)	147.21	181.39	150.36	162.80		
	Wet Wt. of Soil + Cont. (gm.)	597.83	736.32	592.97	637.51		
	Dry Wt. of Soil + Cont. (gm.)	534.54	651.49	541.04	588.93		
	Moisture Content (%)	**16.34**	**18.05**	**13.29**	**11.40**		

ROCK CORRECTION				
L	Total Sample Weight		(grams)	19307
M	+19 mm (¾") Weight in Air		(grams)	852.8
N	+19 mm (¾") Weight in Water		(grams)	495.4
O	+19 mm (¾") Volume		(M-N)	357.4
P	% +19 mm (¾")	100*	(M/L)	4.42
Q	% -19 mm (¾")		(100-P)	95.58
R	Density of +19 mm (¾")		(M/O)	2.39
S	(%+19 mm)/Density of +19 mm		(P/RY)	1.85
T	(%-19 mm)/Density of -19 mm		(Q/K)	45.09
U	Sum of S and T		(S+T)	46.94
V	Average Adjusted Density		(100/U)	2.13
Percent Relative* Compaction		Spec	Failed	or less
			Passed	
*(H/K) for 10% or less +19 mm; (H/V) for > 10% +19 mm				
Note: 62.4 x (gm/cc) = P.C.F.				

Maximum Dry Density (pcf)	**116.0**
Optimum Moisture Content (%)	**15.0**
Maximum Wet Density (pcf)	**133.4**



AP Engineering & Testing, Inc.

CAL 216 PART 2

LABORATORY COMPACTED TEST MAXIMUM WET DENSITY

Client: Earth Mechanics, Inc.
Project Name: I-5 HOV Widening Segment 1
Project No. : 11-135
Boring No.: A-11-117
Sample No. : B-0
Visual Sample Description: Sandy Lean Clay w/gravel

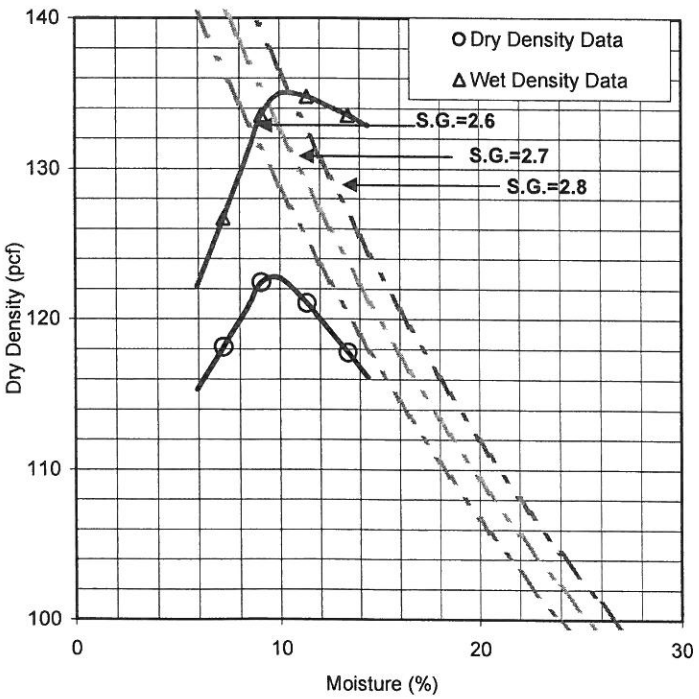
Tested By: CC
Calculated By: KM
Checked By: AP
Depth (ft): 0-5

AP Number: 11-1059
Date: 11/30/11
Date: 12/13/11
Date: 12/18/11

IMPACT TEST DATA

I	Initial Wet Weight of Test Specimen (Grams)		2350				
	Increment No.	1	2	3	4	5	6
	Water Adjustment (grams)	0	47	-47	-94		
J	Tamper Reading	10.3	10.4	10.4	11.0		
K	Wet Density (gm/cc) from Table 1	2.16	2.14	2.14	2.03		
	Dry Density (gm/cc)	1.94	1.89	1.96	1.89		
	Dry Density (pcf)	**121.0**	**117.8**	**122.4**	**118.1**		
	Wt. of Container (gm.)	149.55	181.14	149.88	160.52		
	Wet Wt. of Soil + Cont. (gm.)	566.92	688.05	448.93	449.98		
	Dry Wt. of Soil + Cont. (gm.)	524.36	628.15	424.01	430.49		
	Moisture Content (%)	**11.36**	**13.40**	**9.09**	**7.22**		

ROCK CORRECTION				
L	Total Sample Weight		(grams)	25770
M	+19 mm (¾") Weight in Air		(grams)	836.4
N	+19 mm (¾") Weight in Water		(grams)	482.6
O	+19 mm (¾") Volume		(M-N)	353.8
P	% +19 mm (¾")	100*	(M/L)	3.25
Q	% -19 mm (¾")		(100-P)	96.75
R	Density of +19 mm (¾")		(M/O)	2.36
S	(%+19 mm)/Density of +19 mm		(P/RY)	1.37
T	(%-19 mm)/Density of -19 mm		(Q/K)	44.79
U	Sum of S and T		(S+T)	46.17
V	Average Adjusted Density		(100/U)	2.17
Percent Relative* Compaction		Spec	Failed	or less
			Passed	
*(H/K) for 10% or less +19 mm; (H/V) for > 10% +19 mm				
Note: 62.4 x (gm/cc) = P.C.F.				



Maximum Dry Density (pcf)	**122.5**
Optimum Moisture Content (%)	**10.0**
Maximum Wet Density (pcf)	**134.8**

AP Engineering & Testing, Inc.

CAL 216 PART 2

LABORATORY COMPACTED TEST MAXIMUM WET DENSITY

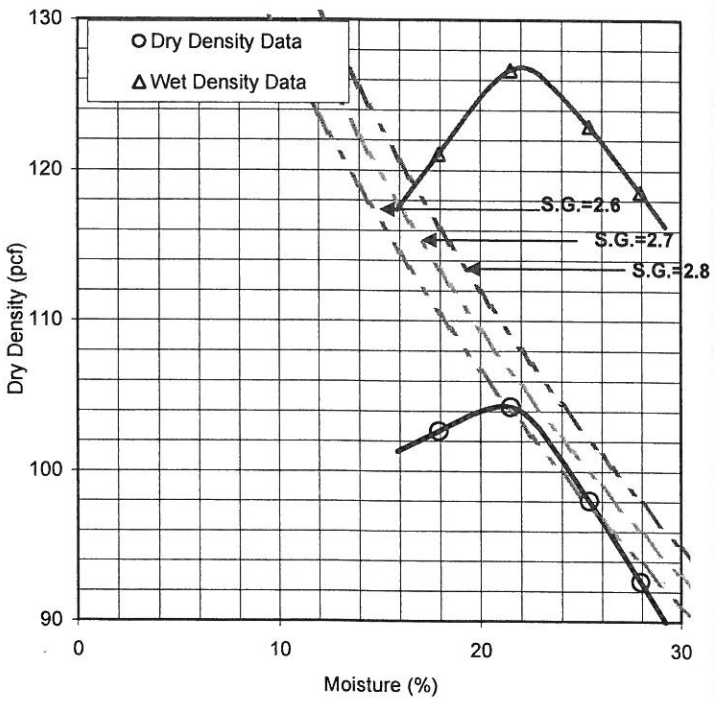
Client: Earth Mechanics, Inc.
Project Name: I-5 HOV Widening Segment 1
Project No. : 11-135
Boring No.: A-11-134
Sample No. : B-0
Visual Sample Description: Sandy Clay w/gravel

AP Number: 11-1059
Tested By: CC — Date: 12/03/11
Calculated By: KM — Date: 12/13/11
Checked By: AP — Date: 12/18/11
Depth (ft): 0-5

IMPACT TEST DATA

I	Initial Wet Weight of Test Specimen (Grams)		2350				
	Increment No.	1	2	3	4	5	6
	Water Adjustment (grams)	0	47	-47	-94		
J	Tamper Reading	11.3	11.7	11.0	11.5		
K	Wet Density (gm/cc) from Table 1	1.97	1.90	2.03	1.94		
	Dry Density (gm/cc)	1.57	1.49	1.67	1.64		
	Dry Density (pcf)	**98.0**	**92.7**	**104.3**	**102.6**		
	Wt. of Container (gm.)	149.63	150.66	179.12	149.49		
	Wet Wt. of Soil + Cont. (gm.)	410.28	466.71	475.71	506.28		
	Dry Wt. of Soil + Cont. (gm.)	357.50	397.68	423.27	452.01		
	Moisture Content (%)	**25.39**	**27.95**	**21.48**	**17.94**		

ROCK CORRECTION				
L	Total Sample Weight		(grams)	19400
M	+19 mm (¾") Weight in Air		(grams)	135.9
N	+19 mm (¾") Weight in Water		(grams)	83.1
O	+19 mm (¾") Volume		(M-N)	52.8
P	% +19 mm (¾")	100*	(M/L)	0.70
Q	% -19 mm (¾")		(100-P)	99.30
R	Density of +19 mm (¾")		(M/O)	2.57
S	(%+19 mm)/Density of +19 mm		(P/RY)	0.27
T	(%-19 mm)/Density of -19 mm		(Q/K)	48.92
U	Sum of S and T		(S+T)	49.19
V	Average Adjusted Density		(100/U)	2.03
Percent Relative* Compaction		Spec	Failed	or less
			Passed	
*(H/K) for 10% or less +19 mm; (H/V) for > 10% +19 mm				
Note: 62.4 x (gm/cc) = P.C.F.				



Maximum Dry Density (pcf)	**104.5**
Optimum Moisture Content (%)	**21.0**
Maximum Wet Density (pcf)	**126.4**

Appendix C

DESIGN CALCULATIONS

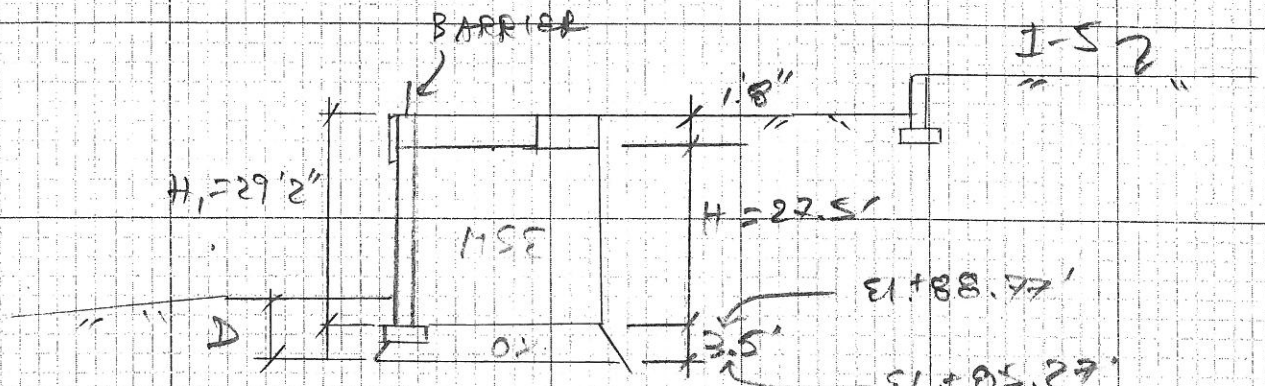
RETAINING WALL 181

17800 Newhope Street, Suite B, Fountain Valley, California 92708 Tel: (714) 751-3826 Fax: (714) 751-3928

Project I-5 HOV SEG. 1
MSE RW 181 Project No. 11-135

By MK Date 5/10/12 Checked By SP Date 05/11/12 Sheet 1 of 9

1) CONTROLLING MSE WALL CONFIG. @ "A" STA 185+00



$H_1 = 29'2"$
$H = 27.5'$
$L = 40'$
} from CT BDA 3-8 (2011) $B_W = 21.5'$

Embed = .1H = 2.75' ≈ 2' O.K.
Bottom of MSE taken 3.5' OX
El. 188.77' − 3' = 185.77'
D = 2.75' + 3' = 5.75'
L_{ex} = 40' + 3' + 2' = 45'

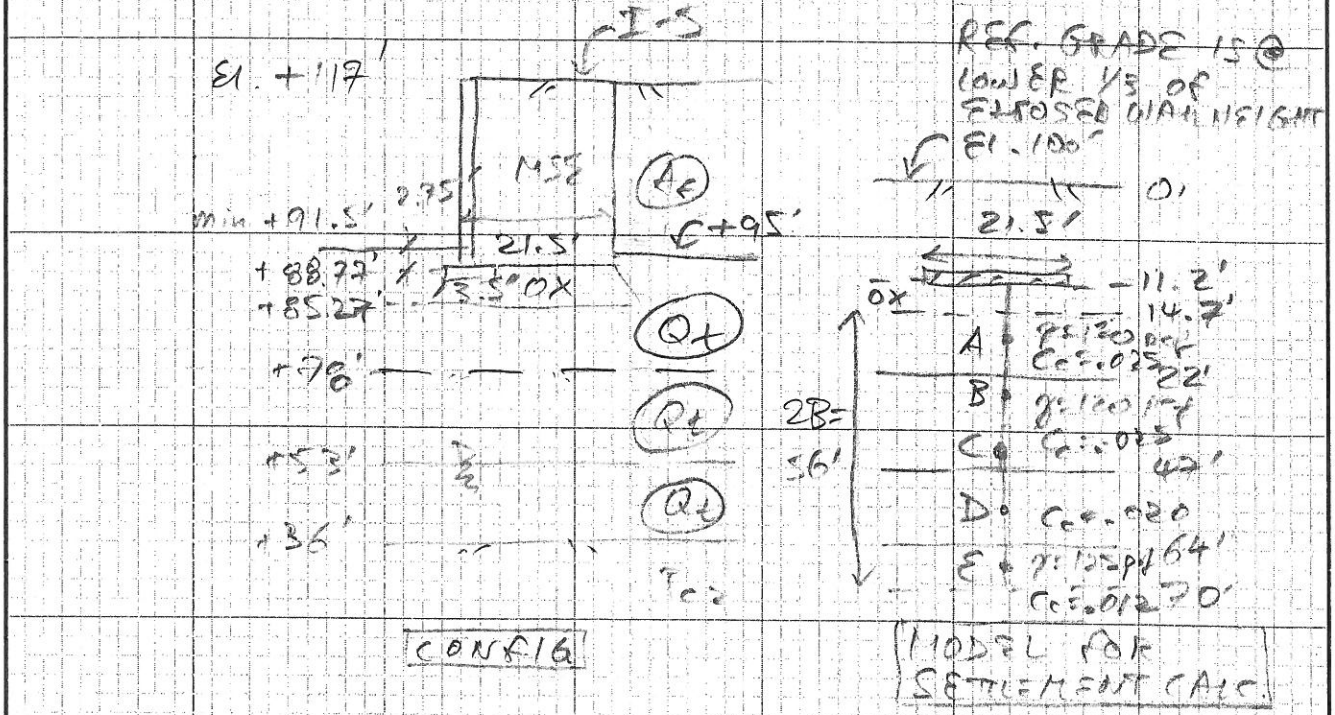
Req. Service: 4.86 ksf
Strength: 7.29 ksf
Extreme = 9.72 ksf
} from BDA 3-8

Project I-5 HOV SEG. 1
MSE RW 181 Project No. 11-135

By MK Date 5/10/12 Checked By SP Date 05/11/12 Sheet 2 of 9

UPDATED 9/18/12 MK

2) SETTLEMENT CALC. FOR H = 29'2"



SETTLEMENT DUE TO BEARING PRESSURE FOR SERVICE CASE:

L = 25'
B = 21.5'
p = 4.86 ksf

(From settlement calc (see attached)
p = 4.86 ksf causes S = 3.0"

∴ Recommend 3.5' OX.

Project I-5 HOV SEG. 1
RW 181 Project No. 11-135

By JK Date 9/27/12 Checked By LCC Date 10/1/12 Sheet 3 of 9

CALCULATIONS ARE ANALOG FOR OTHER SMALLER WALL HEIGHTS.

SUMMARY FOR 3 DESIGN HEIGHTS:

H_1	H	BW	OX	SERVICE Σ	Δ	BRG. CHECK STRENGTH	BRG. CHECK EXTR.
29'2"	27.5'	21.5'	3.5'	3.0"	-	✓	✓
19'2"	17.5'	15.5'	2.5'	2.4"	0.6"	✓	✓
11'8"	10.0'	9.5'	2.0'	1.2"	1.4"	✓	✓

Δ = DIFF. WALL SETTLEMENT

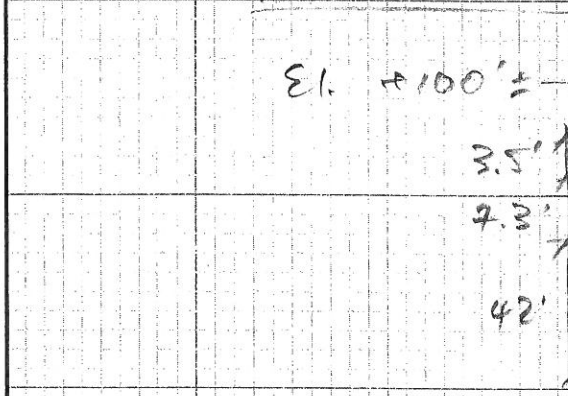
MAX. DIFF. SETTLEMENT = 1.4" ~ 1.5"

Project I-5 HOV SEG. 1
MSE RW 181
Project No. 11-135

By MK Date 5/10/12 Checked By SP Date 05/11/12 Sheet 4 of 9

UPDATED 9/18/2 MK.

3) BEARING NOMINAL RESISTANCE CHECK FOR STRENGTH CASE



AVERAGE SHEAR STRENGTH:

$\bar{S}_u = 1.8$ to $2.0 \rightarrow 1.9$ ksf

NOM. BRG. RESISTANCE (AASHTO eqn, p. 11-24)

$q_u = q_2 c^{.67(1+B/L)^{A'/B}}$

q_2 = nom. brg resistance on clay layer below OX (@ 18.2')

$= cN_c(1+.3\,B/L) + \gamma D$

$= 1.9 \times 5.53\left(1+.3\,\frac{14.12'}{75'}\right) + .12 \times 14.7'$

$= 12.8$ ksf

$q_u = 12.8\, e^{.67(1+\frac{14.12'}{75'})\,35'/14.12'}$

$= 15.6$ ksf

$q_{str} = 15.6 \times (\phi = .65) = 10.1$ ksf > 9 ksf

O.K.

similar calc. for other wall heights.

Project I-5 HOV SEG. 1
MSE RW 183
Project No. 11-135

By MK Date 5/10/12 Checked By SP Date 05/11/12 Sheet 5 of 9

UPDATED 9/18/12

4) BEARING NOM. RESISTANCE CHECK FOR EXTREME CASE

like strength case but use B = 9.59' (from SDA 3-8)

$q_2 = 1.9 \times 5.55\left(1+.3\frac{7.59}{7.5}\right) + .12 \times 14.7'$

$= 12.7$ ksf

$q_n = 12.7 \times e^{.67\left(1+\frac{9.59}{7.5}\right)^{3.5}/9.59}$

$= 16.7$ ksf

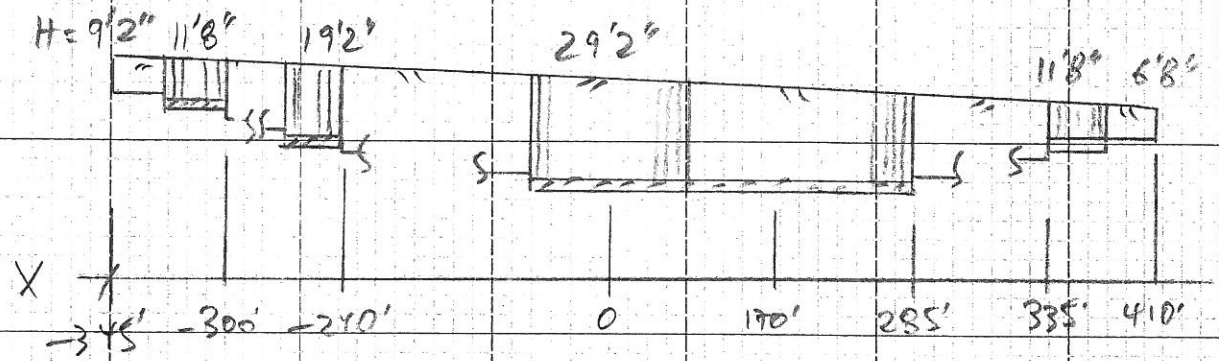
$q_{CDN} = 16.7 \times (\phi = 1) = 16.7 > 7.30$ ksf

"strength" case controls

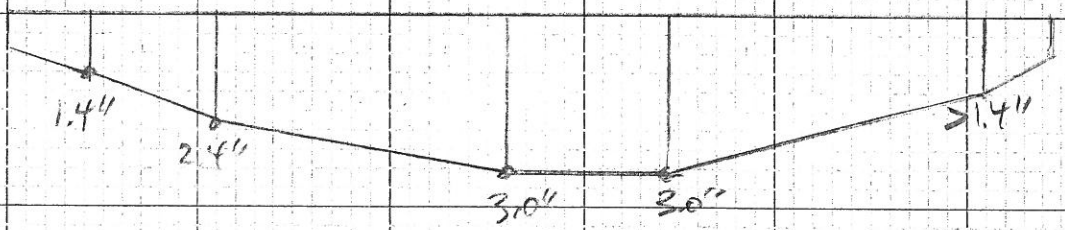
MK 12-31-12

5) DIFFERENTIAL SETTLEMENT ALONG WALL

CONFIG.



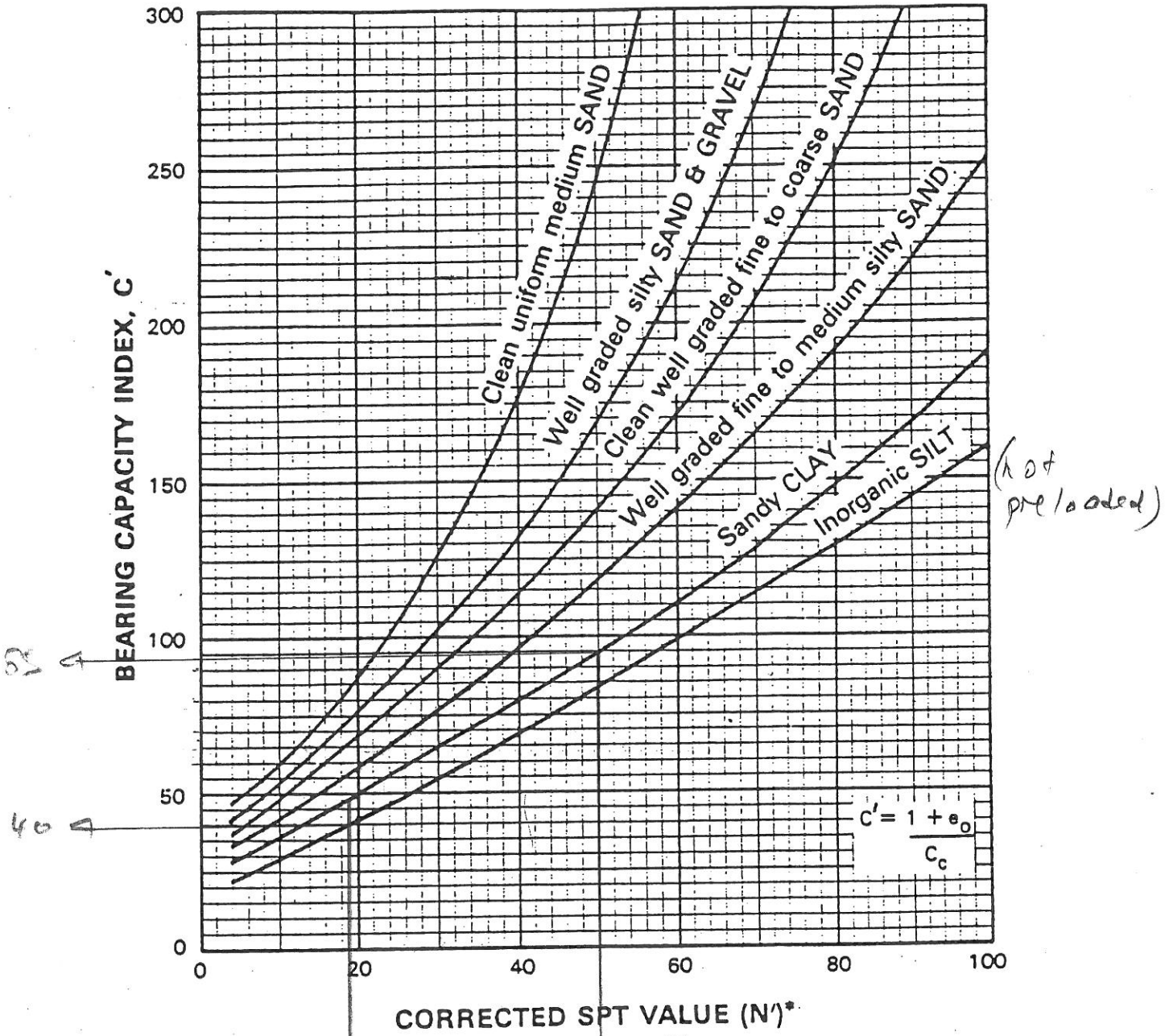
SETTLEMENT ALONG WALL
(DUE TO DESIGN BASE PRESSURES PER CT SDA 3-8)



DIFFERENTIAL SETTLEMENT

	H	X	δdiff.
SOUTH EAD	11'8"	-300'	(3" - 1.4")/[12"/FT]/300' = .00044 = 1/2,250
	19'2"	-240'	(3" - 2.4")/[12]/240' = .00021 ≈ 1/4,800
	11'8"	335'	(3" - 1.4")/[12]/335' = .00040 = 1/2,500

MAX. DIFFERENTIAL SETTLEMENT = 1/2,250
(< 1/500)



*N'—SPT (N) Value Corrected for Overburden Pressure.

Reference: Hough, "Compressibility as a Basis for Soil Bearin Value" ASCE 1959

(Q_t/A_f) 19

$C_c = \frac{1}{40} = .025$

(T_{c2}) 50

$C_c = \frac{1}{85} = .012$

FIGURE 13

BEARING CAPACITY INDEX (C') VALUES FOR GRANULAR SOIL.

SETTLEMENT CALCULATION FOR SERVICE CASE

Project Title: 11-135/I-5 HOV Seg 1 MSE 181
height H1=29'2" with 3.5' OX
By: M. Kapuskar, 9/18/12

applied pressure p_o: 4.86 ksf
applied at depth: 11.2 ft

USCS	Stress Point	Depth (ft)	Unit Weight (kcf)	C_c	ΔH (ft)	Layer middepth (ft)	σ'_v (ksf)	Depth below load (ft)	Δp (ksf)	δ (in)	$\Delta p/\sigma'_v$	δ (in)
OB		0.0	0.120	0	-	-	0.00	0.0	0.00	0.00	0%	0.00
OX		11.2	0.120	0.000	11.2	5.6	0.67	0.0	0.00	0.00	0%	0.00
Af/Qt	A	14.7	0.120	0.025	3.5	13.0	1.55	1.8	4.86	0.00	313%	0.00
Qt	B	22.0	0.120	0.025	7.3	18.4	2.20	7.2	4.69	1.09	213%	1.09
Qt	C	31.0	0.120	0.025	9.0	26.5	3.18	15.3	3.36	0.84	106%	0.84
Qt	D	47.0	0.060	0.020	16.0	39.0	4.68	27.8	2.08	0.77	44%	0.77
Qt	E	64.0	0.060	0.012	17.0	55.5	6.15	44.3	1.27	0.33	21%	0.33
Tc2	F	70.0			6.0	67.0	6.84	55.8	0.89	0.05	13%	0.00
									δ_{tot}=	3.07	δ_{tot}=	3.03 "

Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

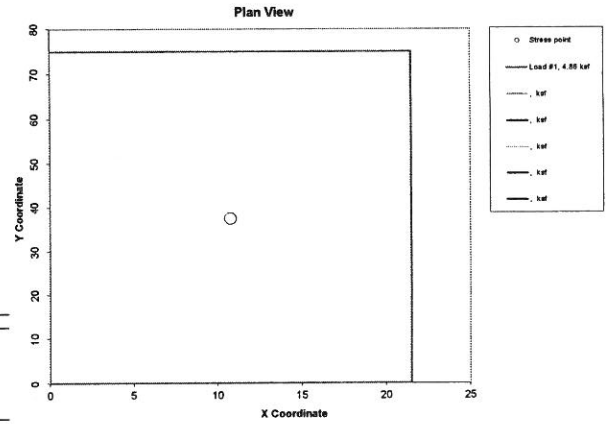
ELASTIC STRESS CALCULATION

Project Title: 11-135/I-5 HOV Seg 1 MSE 193
height H1=29'2" with 3.5' OX
By: M. Kapuskar, 5/10/12

Notes:
1. This spreadsheet calculates 3D pressures in elastic (x,y,z) halfspace medium due to rectangular pressures on its surface using elastic 3D Boussinesq solutions (Poulos 19XX).
2. Input is in yellow cells. All worksheets can be edited freely. Save as Macro-Enabled file (*.xlsm).
3. PLAN shows the horizontal plane of X and Y. X and Y may be negative. Z is depth (always positive). Plan shows a stress point and up to 6 rectangular surface pressures.
4. STRESS POINT is located anywhere on x-y plane, including inside and outside pressure rectangles. The coordinates may be negative. Stresses due to loads will superimposed at this location.
5. PRESSURE RECTANGLE is placed by its (small-x, small-y) corner. The coordinates may be anywhere on x-y plane, including negative.
   Length (always positive) is parallel to X. Width W (always positive) is parallel to Y axis.
   Pressure is vertical and uniform. It is positive in Z (downward) and may be negative (upward).
   Loads may be superimposed and overlapped.
6. STRESS PROFILES are calculated at specified depths below stress point. Stresses are positive if pressure is positive, negative if pressure is negative. Stresses are 1/2 the input pressure under borders, and 1/4 under corners.

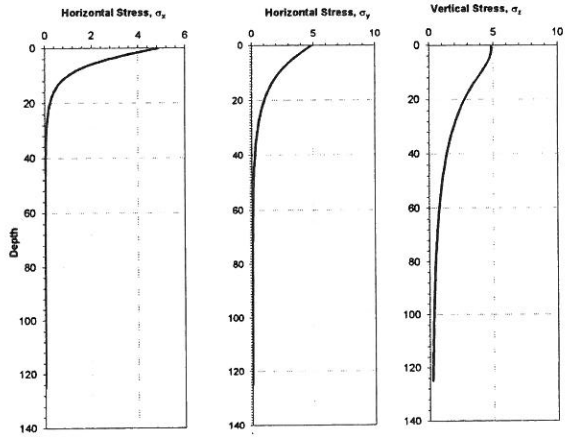
UNITS
length unit= ft
pressure unit= ksf

STRESS POINT LOCATION
X = 10.75 ft
Y = 37.5 ft

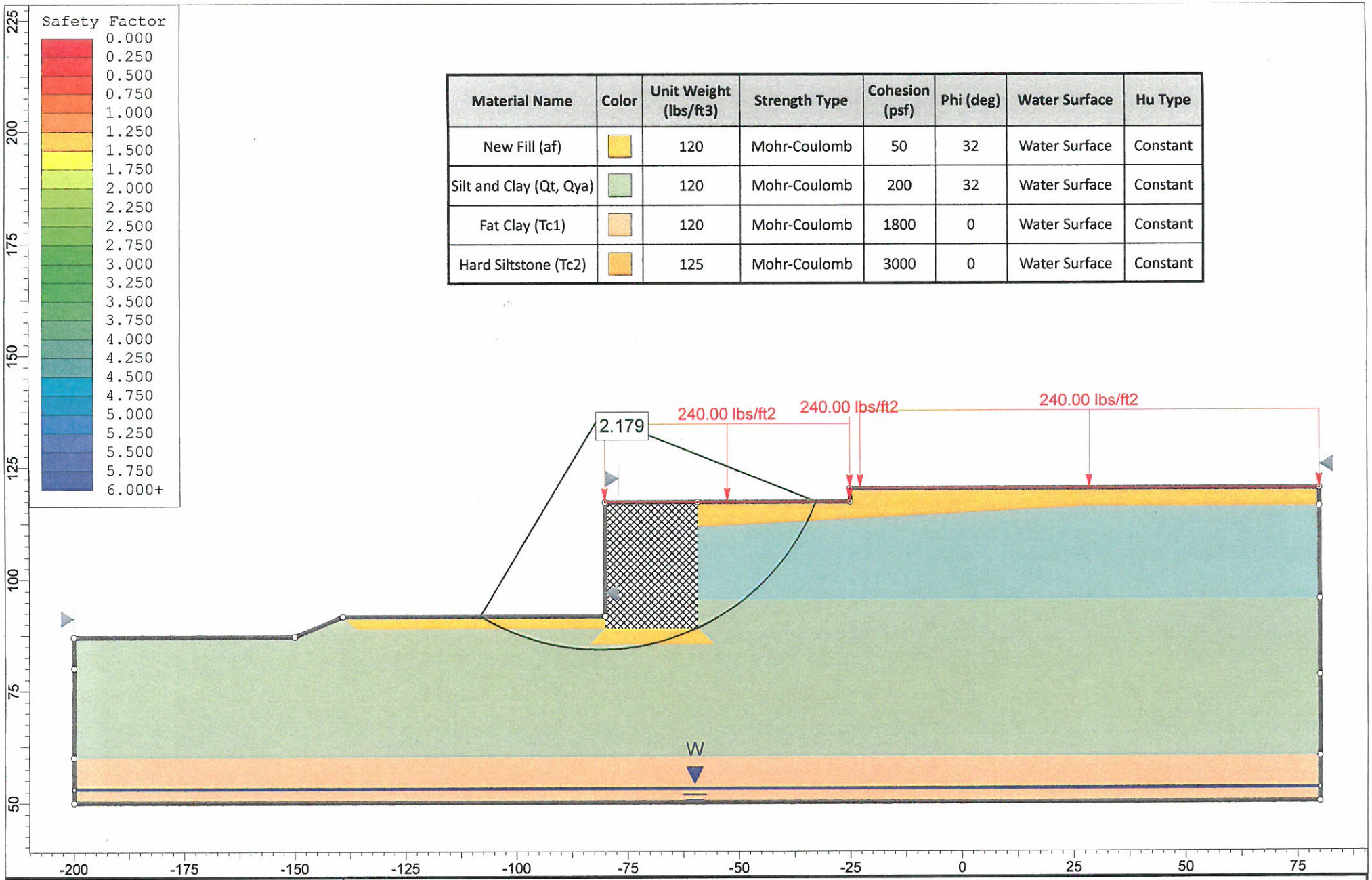


	Load No. 1	Load No. 2	Load No. 3	Load No. 4	Load No. 5	Load No. 6	Total
	Load #1						All Loads Superimposed
Load name =							
Pressure, p =	4.86 ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	
Length along X =	21.5 ft	Length= ft	Length= ft	Length= ft	Length= ft	Length= ft	
Width along Y =	75 ft	Width= ft	Width= ft	Width= ft	Width= ft	Width= ft	
Lower left corner X =	0 ft	X = ft	X = ft	X = ft	X = ft	X = ft	
Lower left corner Y =	0 ft	Y = ft	Y = ft	Y = ft	Y = ft	Y = ft	

Depth	Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Total Stresses		
z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
0.00	4.86	4.86	4.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.86	4.86	**4.86**
0.10	4.80	4.83	4.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.80	4.83	**4.86**
0.20	4.74	4.80	4.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.74	4.80	**4.86**
0.50	4.57	4.70	4.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.57	4.70	**4.86**
1.00	4.29	4.54	4.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.29	4.54	**4.86**
2.50	3.47	4.07	4.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.47	4.07	**4.84**
5.00	2.33	3.35	4.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.33	3.35	**4.69**
7.50	1.52	2.73	4.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.52	2.73	**4.42**
10.00	0.99	2.23	4.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.99	2.23	**4.07**
12.50	0.66	1.82	3.71	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	1.82	**3.71**
15.00	0.45	1.49	3.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	1.49	**3.36**
17.50	0.32	1.23	3.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	1.23	**3.04**
20.00	0.23	1.02	2.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	1.02	**2.75**
22.50	0.17	0.85	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.85	**2.50**
25.00	0.13	0.70	2.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	0.70	**2.28**
27.50	0.10	0.59	2.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.59	**2.08**
30.00	0.08	0.50	1.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.50	**1.90**
32.50	0.06	0.42	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.42	**1.75**
35.00	0.05	0.35	1.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.35	**1.61**
37.50	0.04	0.30	1.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.30	**1.48**
40.00	0.03	0.26	1.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.26	**1.37**
42.50	0.03	0.22	1.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.22	**1.27**
45.00	0.02	0.19	1.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.19	**1.18**
47.50	0.02	0.16	1.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.16	**1.09**
50.00	0.02	0.14	1.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.14	**1.02**
52.50	0.01	0.12	0.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.12	**0.95**
55.00	0.01	0.11	0.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.11	**0.89**
60.00	0.01	0.08	0.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.08	**0.78**
65.00	0.01	0.06	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.06	**0.69**
70.00	0.00	0.05	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	**0.61**
80.00	0.00	0.03	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	**0.49**
90.00	0.00	0.02	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	**0.40**
100.00	0.00	0.01	0.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	**0.33**
125.00	0.00	0.01	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	**0.22**



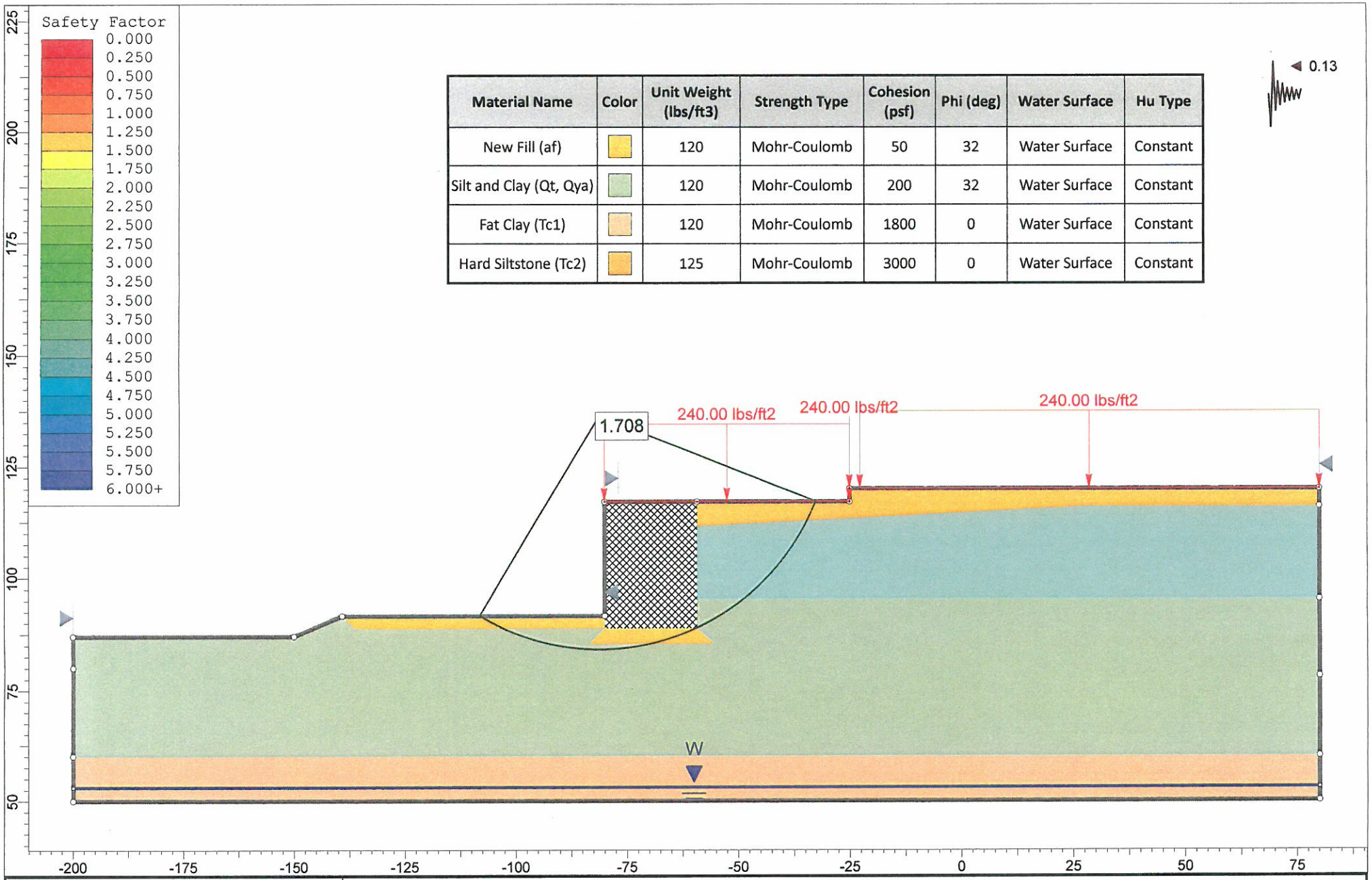
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
New Fill (af)		120	Mohr-Coulomb	50	32	Water Surface	Constant
Silt and Clay (Qt, Qya)		120	Mohr-Coulomb	200	32	Water Surface	Constant
Fat Clay (Tc1)		120	Mohr-Coulomb	1800	0	Water Surface	Constant
Hard Siltstone (Tc2)		125	Mohr-Coulomb	3000	0	Water Surface	Constant



Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1		
Analysis Description	MSE Wall 181 @ I-5 Sta. 185+00 South Side, Static Case		
Drawn By	MK	Scale 1:350	Company Earth Mechanics
Date	4/16/12		File Name Static1.slim

SLIDEINTERPRET 6.015



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
New Fill (af)		120	Mohr-Coulomb	50	32	Water Surface	Constant
Silt and Clay (Qt, Qya)		120	Mohr-Coulomb	200	32	Water Surface	Constant
Fat Clay (Tc1)		120	Mohr-Coulomb	1800	0	Water Surface	Constant
Hard Siltstone (Tc2)		125	Mohr-Coulomb	3000	0	Water Surface	Constant

Earth Mechanics, Inc.
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Project	Project #11-135, I-5 HOV Seg 1			
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Drawn By	MK	Scale	1:350	Company: Earth Mechanics
Date	4/16/12			File Name: Static1.slim

SLIDEINTERPRET 6.015

RETAINING WALL 183

17800 Newhope Street, Suite B, Fountain Valley, California 92708 Tel: (714) 751-3826 Fax: (714) 751-3928

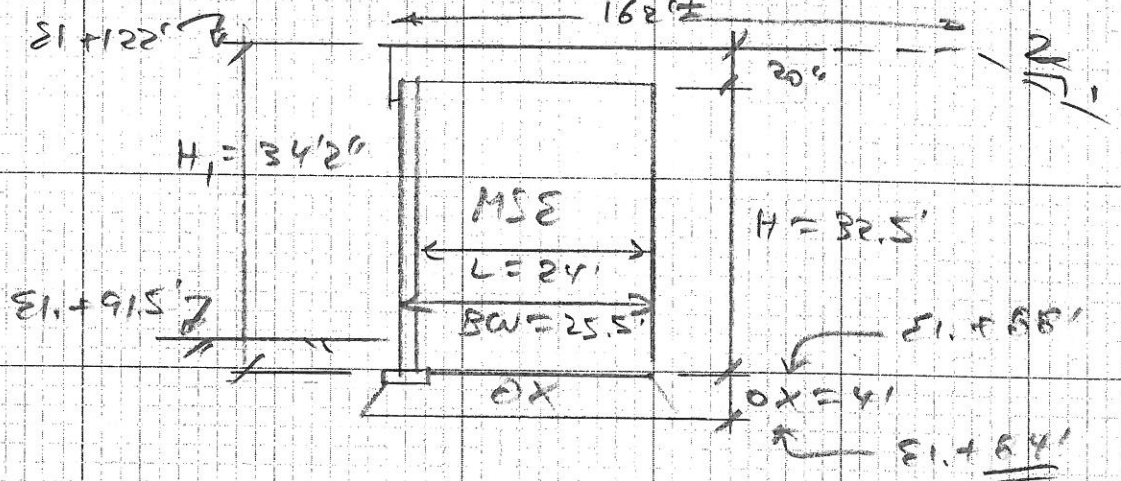
Project I-5 HOV SEG. 1
MSE RW 183 Project No. 11-135

By MK Date 4/16/12 Checked By SP Date 05/11/12 Sheet 1 of 10

5/8/12

1) CONTROLLING MSE WALL CONFIG.

@ "A" STA. 189+50±



H1 = 34'2"
H = 32.5'
L = 24' } from CT BDA 3-8 (2011)

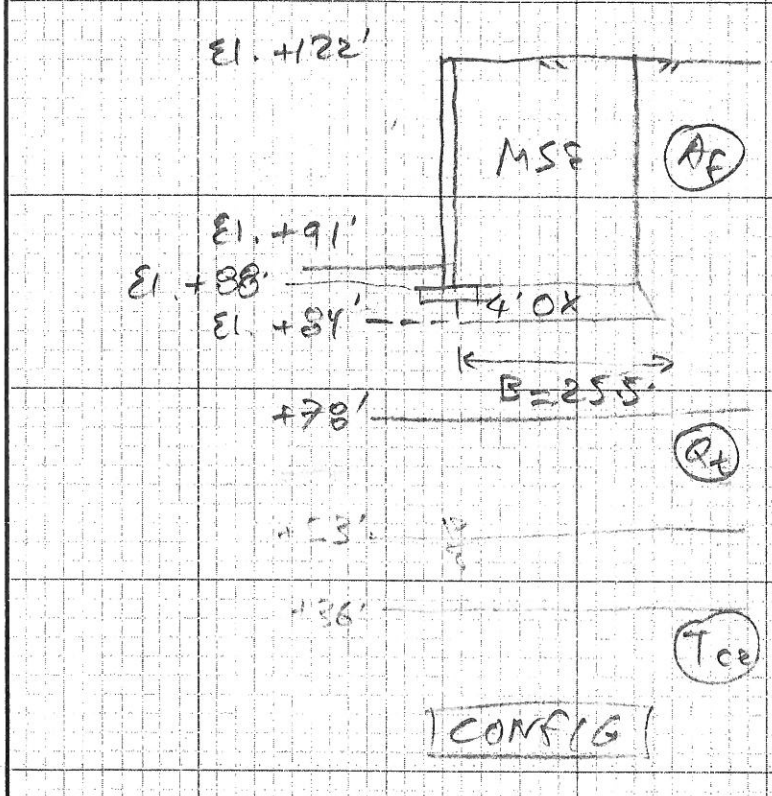
Embed.: .1H = 3.25' ≥ 2' O.K.

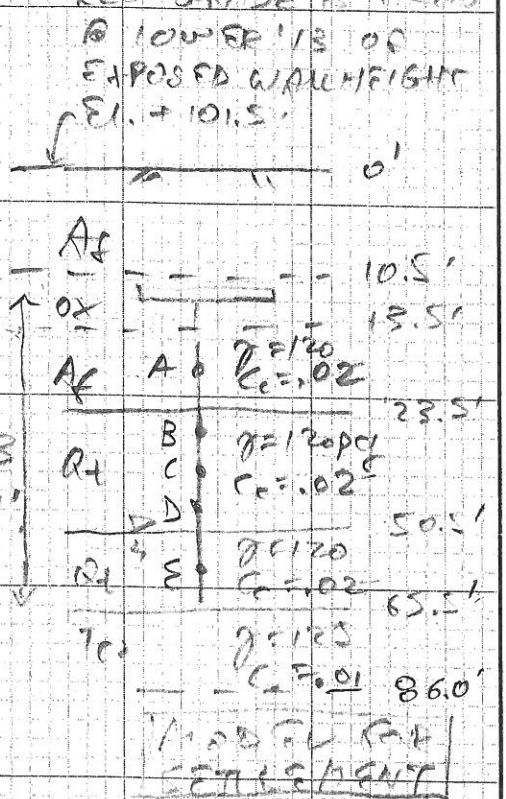
D = 91.5' - 84' = 7.5' > 3.25' - 4' O.K.

BRG PRESSURES:
SERVICE = 5.54 ksf
STRENGTH = 8.22 ksf
EXTREME = 8.13 ksf
} from CT BDA 3-8 (2011)

UPDATED 9/18/12

2) SETTLEMENT CALC.





STRENGTH PARAMETERS

UNIT	γ(pcf)	ϕ	c(ksf)	C_c (preload)	C_c (not preload)
A_f	120	35°	0	0	0
OX	120	35°	0	0	0
Q_t	120	0	1.5-2	.12	.025
T_{cz}	125	0	3	.01	.012

SETTLEMENT CALC FOR SERVICE CASE:

P = 5.5 ksf
(see attached calc.)
→ δ = 2.8"
RECOMMEND 4'OX.

Project I-5 HOV SEG. 1
RW 183 Project No. 11-135

By MC Date 9/27/12 Checked By LCC Date 10/1/12 Sheet 3 of 10

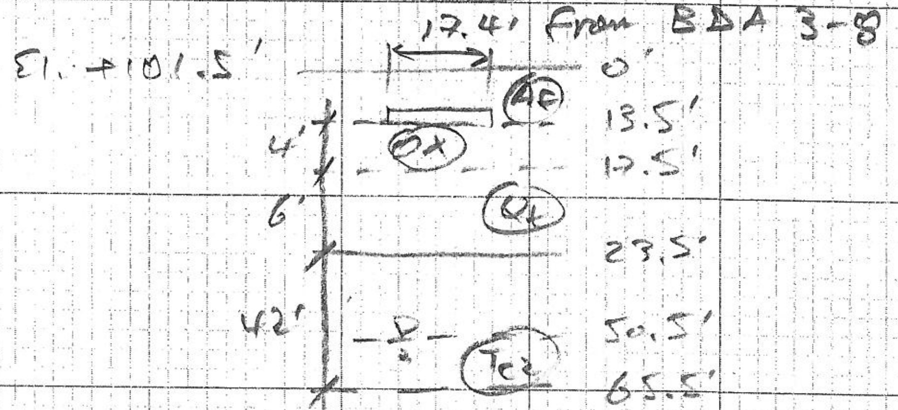
CALCULATIONS FOR OTHER WALL HEIGHTS ARE SIMILAR.

SUMMARY FOR 3 WALL HEIGHTS:

H_1	H	BW	OT	SERVICE δ	BRG CHECK STRENGTH	BRG CHECK EXTR.
34'2"	32.5'	25.5'	4'	2.8"	✓	✓
21'8"	20.0'	21.5'	2.5'	1.9"	✓	✓
11'8"	10.0'	9.5'	2'	1.1"	✓	✓

UPDATED 9/13/12

3) BEARING NOMINAL RESISTANCE CHECK FOR STRENGTH CASE



AVERAGE SHEAR STRENGTH:

$$\bar{S}_u = \frac{6 \times 1.8 + 42' \times 2.0}{6+42} = 1.975 \text{ ksf}.$$

NOM. BRG. RESISTANCE: (AASHTO 2007, P 11-74)

$$q_u = q_2 e^{.67(1+B/L)\Delta H/B}$$

q_2 = nom. brg resistance of ftg on clay layer (@ 22.5' depth)

$$= cN_c(1+.3B/L) + \gamma D$$

$$= 1.975 \times 5.53(1+.3\ 17.4/115) + .12 \times 13.5'$$

$$= 13.0 \text{ ksf}$$

$$q_u = 13.0 e^{.67(1+17.4/115)\, 4'/17.4} = 15.5 \text{ ksf}.$$

$$q_{str} = 15.5 \times (\phi = .65) = 10.1 \text{ ksf} > 8.22 \text{ OK.}$$

✓

Project I-5 HOV SEG. 1
RW 183
Project No. 11-135

By MK Date 5/10/12 Checked By SP Date 05/11/12 Sheet 5 of 10

UPDATED 9/18/12 MK

4) BEARING NOM. RESISTANCE CHECK FOR EXTREME CASE:

Like strength case but use $B = 8.13'$ from BDA 3-8

$$q_2 = 1.975 + 5.53(1 + .3\,^{8.13}/_{11.5}) + .12 \times 13.5'$$
$$= 12.8 \text{ KSF}$$

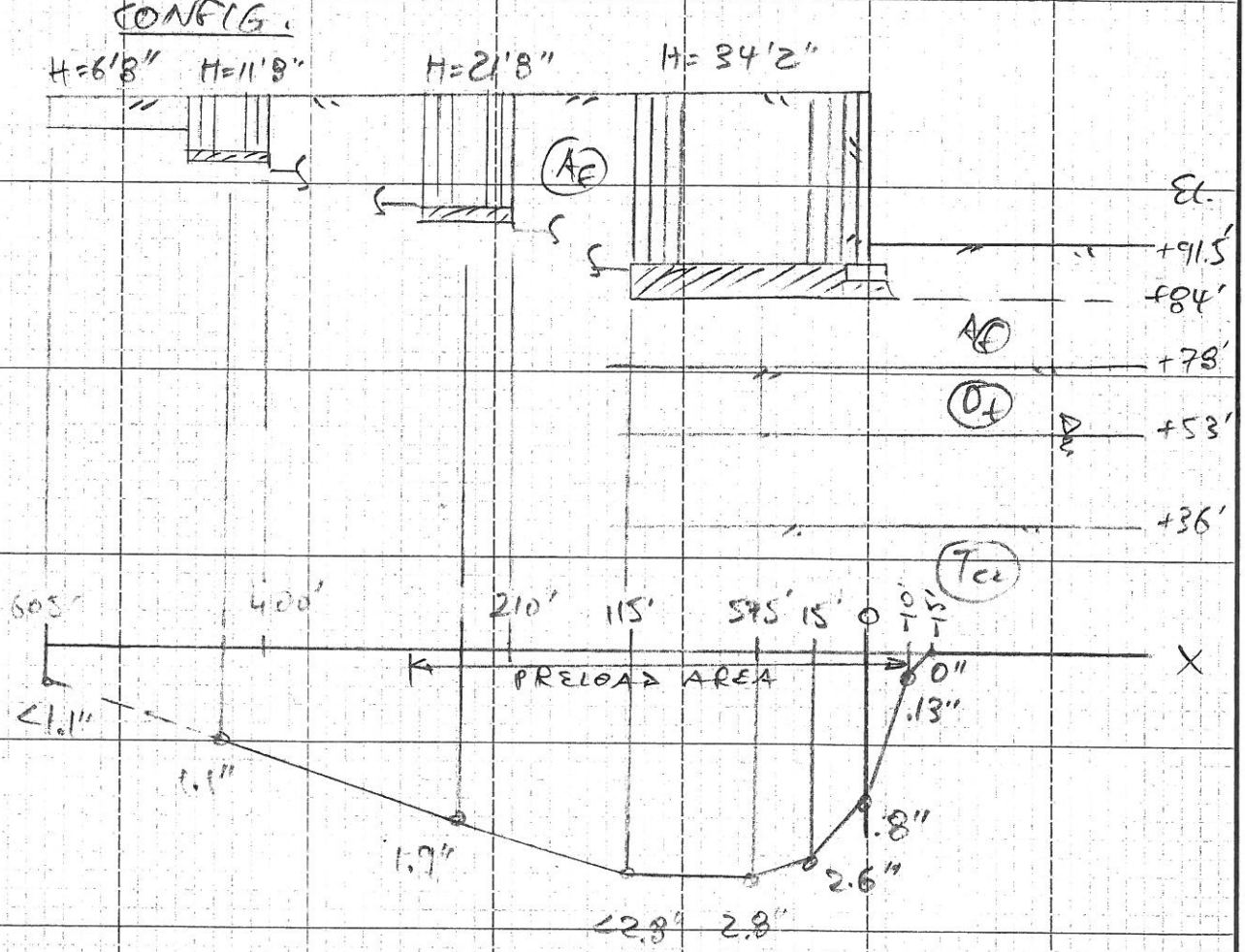
$$q_n = 12.8\, e^{.67(1 + 8.13/11.5)\,4/8.13}$$
$$= 18.2$$

$$q_{extr} = 18.2 \times (\phi = 1) = \underline{18.2 \text{ KSF} > 8.13 \text{ KSF}.}$$
O.K.

Project I-5 HOV SEG. 1
RW 183
Project No. 11-135

By MK Date 10/11/12 Checked By _____ Date _____ Sheet 6 of 10

5) DIFFERENTIAL SETTLEMENT ALONG WALL



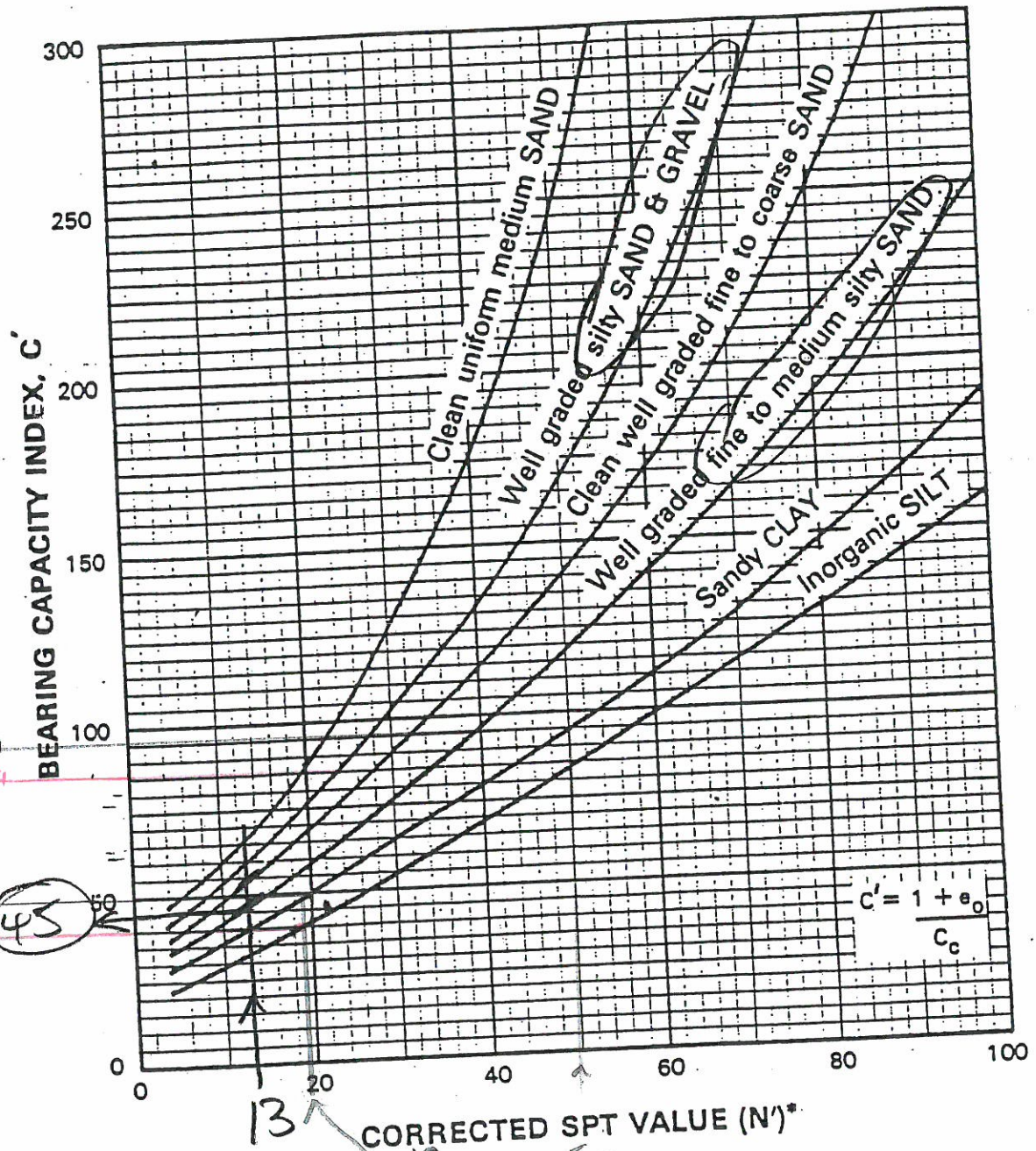
SETTLEMENT ALONG WALL
(DUE TO DESIGN BASE PRESSURES PER BDA 3-8)

DIFFERENTIAL SETTLEMENT:

H	X	δdiff
34'2"	0'	1.78"/[12in/ft]/15' = .0099 ≅ 1/100 ← MAX.
34'2"	57.5'	2.8"/12/(15'+57.5') = .0035 ≅ 1/310
21'8"	210'	1.9"/12/(15'+210') = .0002 ≅ 1/1430
11'8"	400'	1.1"/12/(15'+400') = .00022 ≅ 1/4500
7'6"	605	1.1"/12/(15'+605') = .00015 ≅ 1/6650

7/10

SOURCE: FHWA.



95
85
50
45
40
13
19
50
$(Q_u / \Delta C)$ (T_{c2})
$C_c = \frac{1}{50} = .02$
$C_c = \frac{1}{95} \approx .01$
$\frac{1}{85}$ ~.012

*'N'—SPT (N) Value Corrected for Overburden Pressure.

Reference: Hough, "Compressibility as a Basis for Soil Bearing Value" ASCE 1959

– preloaded
– not preloaded

FIGURE 13

BEARING CAPACITY INDEX (C') VALUES FOR GRANULAR SOILS

SETTLEMENT CALCULATION FOR SERVICE CASE

Project Title: 11-135/I-5 HOV Seg 1 MSE 183
maximum height H1=34'2" with 4' OX
By: M. Kapuskar, 9/18/12

applied pressure p_o: 5.54 ksf
applied at depth: 13.5 ft

USCS	Stress Point	Depth (ft)	Unit Weight (kcf)	C_c	ΔH (ft)	Layer middepth (ft)	σ'_v (ksf)	Depth below load (ft)	Δp (ksf)	δ (in)	$\Delta p/\sigma'_v$	δ (in)
OB		0.0	0.120	0	-	-	0.00	0.0	0.00	0.00	0%	0.00
OX		13.5	0.120	0.000	13.5	6.8	0.81	0.0	0.00	0.00	0%	0.00
Af		17.5	0.120	0.020	4.0	15.5	1.86	2.0	5.54	0.00	298%	0.00
Qt		23.5	0.120	0.020	6.0	20.5	2.46	7.0	5.42	0.73	220%	0.73
Qt		30.0	0.120	0.020	6.5	26.8	3.21	13.3	4.56	0.60	142%	0.60
Qt		40.0	0.120	0.020	10.0	35.0	4.20	21.5	3.58	0.64	85%	0.64
Tc2		50.5	0.060	0.020	10.5	45.3	5.43	31.8	2.63	0.43	48%	0.43
Tc2		65.5	0.065	0.010	15.0	58.0	6.51	44.5	1.89	0.40	29%	0.40
Tc2		86.0			20.5	75.8	7.63	62.3	1.27	0.16	17%	0.00
									δ_{tot}=	2.96	δ_{tot}=	2.80 "

Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

ELASTIC STRESS CALCULATION

Project Title: 11-135/I-5 HOV Seg 1 MSE 193
maximum height H1=34'2" with 4' OX
By: M. Kapuskar, 5/10/12

Notes:

1. This spreadsheet calculates 3D pressures in elastic (x,y,z) halfspace medium due to rectangular pressures on its surface using elastic 3D Boussinesq solutions (Poulos 19XX).
2. Input is in yellow cells. All worksheets can be edited freely. Save as Macro-Enabled file (*.xlsm).
3. PLAN shows the horizontal plane of X and Y. X and Y may be negative. Z is depth (always positive). Plan shows a stress point and up to 6 rectangular surface pressures.
4. STRESS POINT is located anywhere on x-y plane, including inside and outside pressure rectangles. The coordinates may be negative. Stresses due to loads will superimposed at this location.
5. PRESSURE RECTANGLE is placed by its (small-x, small-y) corner. The coordinates may be anywhere on x-y plane, including negative.
   Length (always positive) is parallel to X. Width W (always positive) is parallel to Y axis.
   Pressure is vertical and uniform. It is positive in Z (downward) and may be negative (upward).
   Loads may be superimposed and overlapped.
6. STRESS PROFILES are calculated at specified depths below stress point. Stresses are positive if pressure is positive, negative if pressure is negative. Stresses are 1/2 the input pressure under borders, and 1/4 under corners.

UNITS

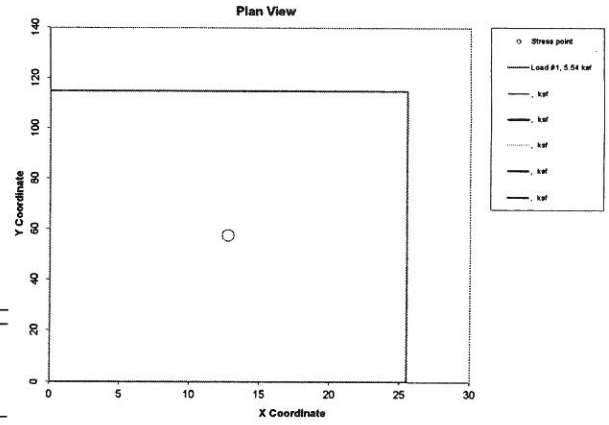
length unit= ft
pressure unit= ksf

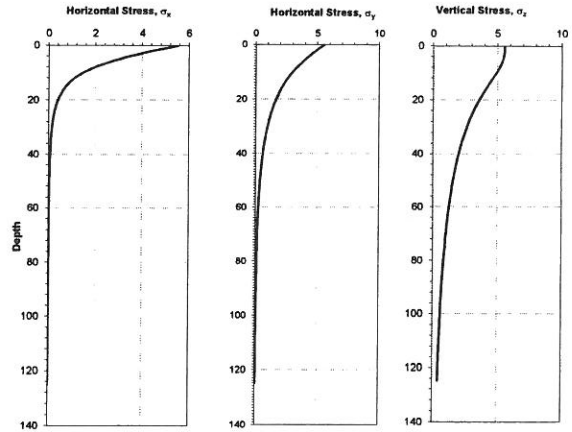
STRESS POINT LOCATION

X = 12.75 ft
Y = 57.5 ft

	Load No. 1	Load No. 2	Load No. 3	Load No. 4	Load No. 5	Load No. 6	Total
Load name =	Load #1						All Loads Superimposed
Pressure, p =	5.54 ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	
Length along X =	25.5 ft	Length= ft	Length= ft	Length= ft	Length= ft	Length= ft	
Width along Y =	115 ft	Width= ft	Width= ft	Width= ft	Width= ft	Width= ft	
Lower left corner X =	0 ft	X = ft	X = ft	X = ft	X = ft	X = ft	
Lower left corner Y =	0 ft	Y = ft	Y = ft	Y = ft	Y = ft	Y = ft	

Depth	Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Total Stresses		
z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
0.00	5.54	5.54	5.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.54	5.54	**5.54**
0.10	5.48	5.51	5.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.48	5.51	**5.54**
0.20	5.43	5.48	5.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.43	5.48	**5.54**
0.50	5.26	5.39	5.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.26	5.39	**5.54**
1.00	4.99	5.24	5.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.99	5.24	**5.54**
2.50	4.19	4.81	5.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.19	4.81	**5.52**
5.00	3.02	4.12	5.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.02	4.12	**5.42**
7.50	2.12	3.52	5.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.12	3.52	**5.20**
10.00	1.48	3.00	4.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.48	3.00	**4.90**
12.50	1.04	2.57	4.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.04	2.57	**4.56**
15.00	0.74	2.21	4.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.74	2.21	**4.22**
17.50	0.54	1.91	3.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.54	1.91	**3.89**
20.00	0.40	1.65	3.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	1.65	**3.58**
22.50	0.30	1.44	3.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	1.44	**3.30**
25.00	0.23	1.26	3.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	1.26	**3.06**
27.50	0.18	1.10	2.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	1.10	**2.83**
30.00	0.14	0.97	2.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.97	**2.63**
32.50	0.12	0.85	2.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.85	**2.45**
35.00	0.09	0.75	2.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.75	**2.29**
37.50	0.08	0.67	2.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.67	**2.14**
40.00	0.06	0.59	2.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.59	**2.01**
42.50	0.05	0.53	1.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.53	**1.89**
45.00	0.05	0.47	1.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.47	**1.78**
47.50	0.04	0.42	1.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.42	**1.67**
50.00	0.03	0.37	1.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.37	**1.58**
52.50	0.03	0.33	1.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.33	**1.49**
55.00	0.02	0.30	1.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.30	**1.41**
60.00	0.02	0.24	1.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.24	**1.27**
65.00	0.01	0.20	1.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.20	**1.14**
70.00	0.01	0.16	1.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.16	**1.03**
80.00	0.01	0.11	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.11	**0.86**
90.00	0.00	0.08	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	**0.72**
100.00	0.00	0.06	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	**0.61**
125.00	0.00	0.03	0.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	**0.42**





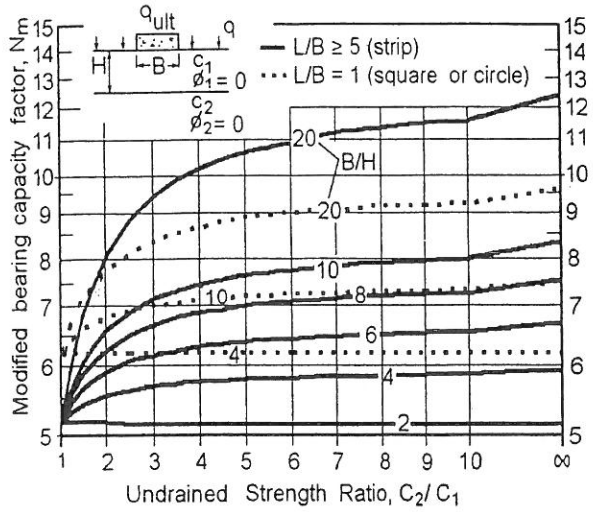


Figure 10.6.3.1.2e-2 Modified Bearing Factor for Two-Layer Cohesive Soil with Weaker Soil Overlying Stronger Soil (*EPRI, 1983*).

10.6.3.1.2f Two-Layered Soil System in Drained Loading

Where a footing supported on a two-layered soil system is subjected to a drained loading, the nominal bearing resistance, in ksf, may be taken as:

$$q_n = \left[q_2 + \left(\frac{1}{K}\right)c'_1 \cot\phi'_1\right] e^{2\left[1+\left(\frac{B}{L}\right)\right]K\tan\phi'_1\left(\frac{H}{B}\right)} - \left(\frac{1}{K}\right)c'_1 \cot\phi'_1 \qquad (10.6.3.1.2f\text{-}1)$$

in which:

$$K = \frac{1-\sin^2\phi'_1}{1+\sin^2\phi'_1} \qquad (10.6.3.1.2f\text{-}2)$$

where:

c'_1 = drained shear strength of the top layer of soil as depicted in Figure 10.6.3.1.2e-1 (ksf)

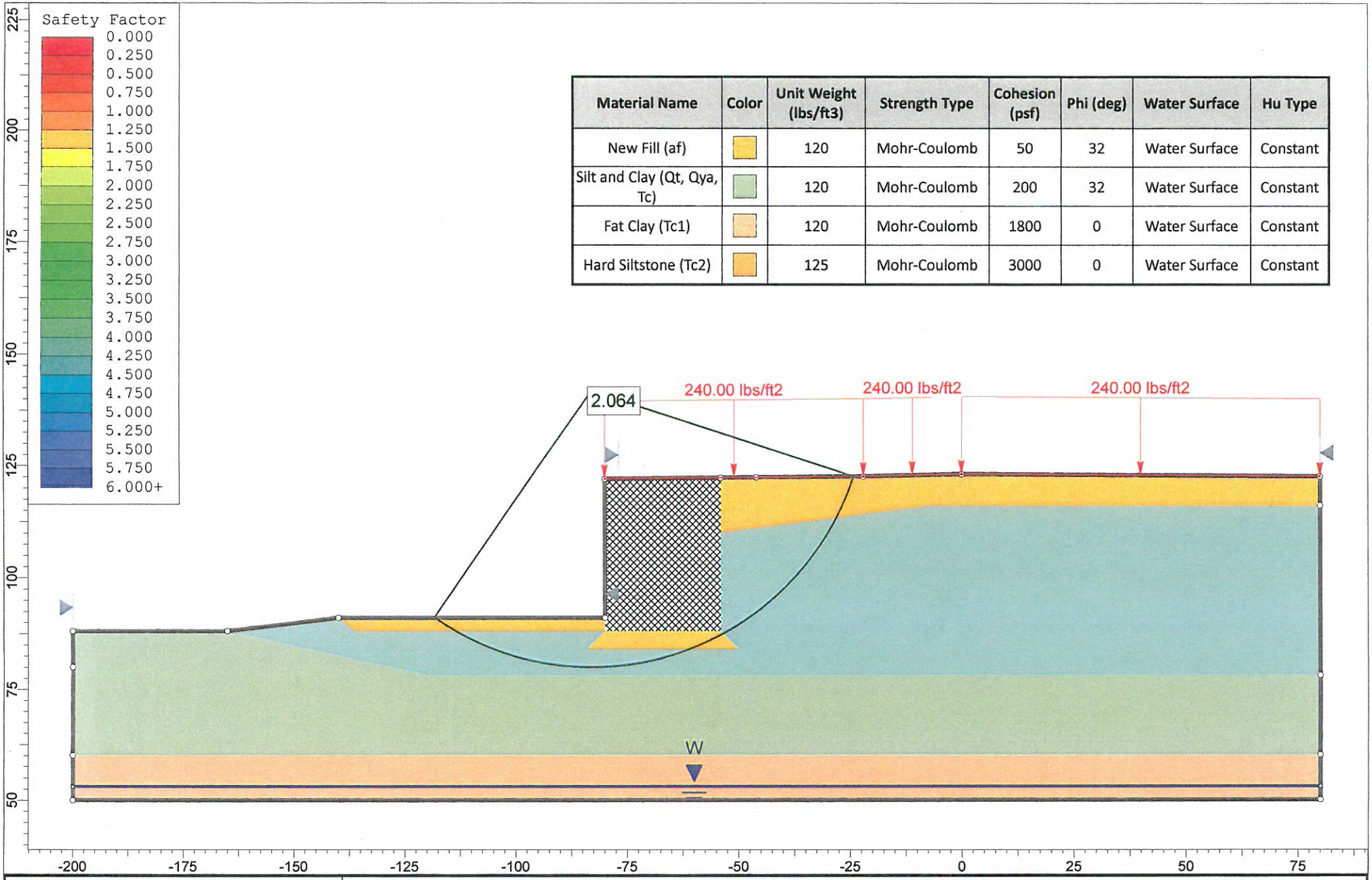
q_2 = nominal bearing resistance of a fictitious footing of the same size and shape as the actual footing but supported on surface of the second (lower) layer of a two-layer system (ksf)

ϕ'_1 = effective stress angle of internal friction of the top layer of soil (deg.)

C10.6.3.1.2f

If the upper layer is a cohesionless soil and ϕ' equals 25° to 50°, Eq. 1 reduces to:

$$q_n = q_2 e^{0.67\left[1+\left(\frac{B}{L}\right)\right]\frac{H}{B}} \qquad (C10.6.3.1.2f\text{-}1)$$

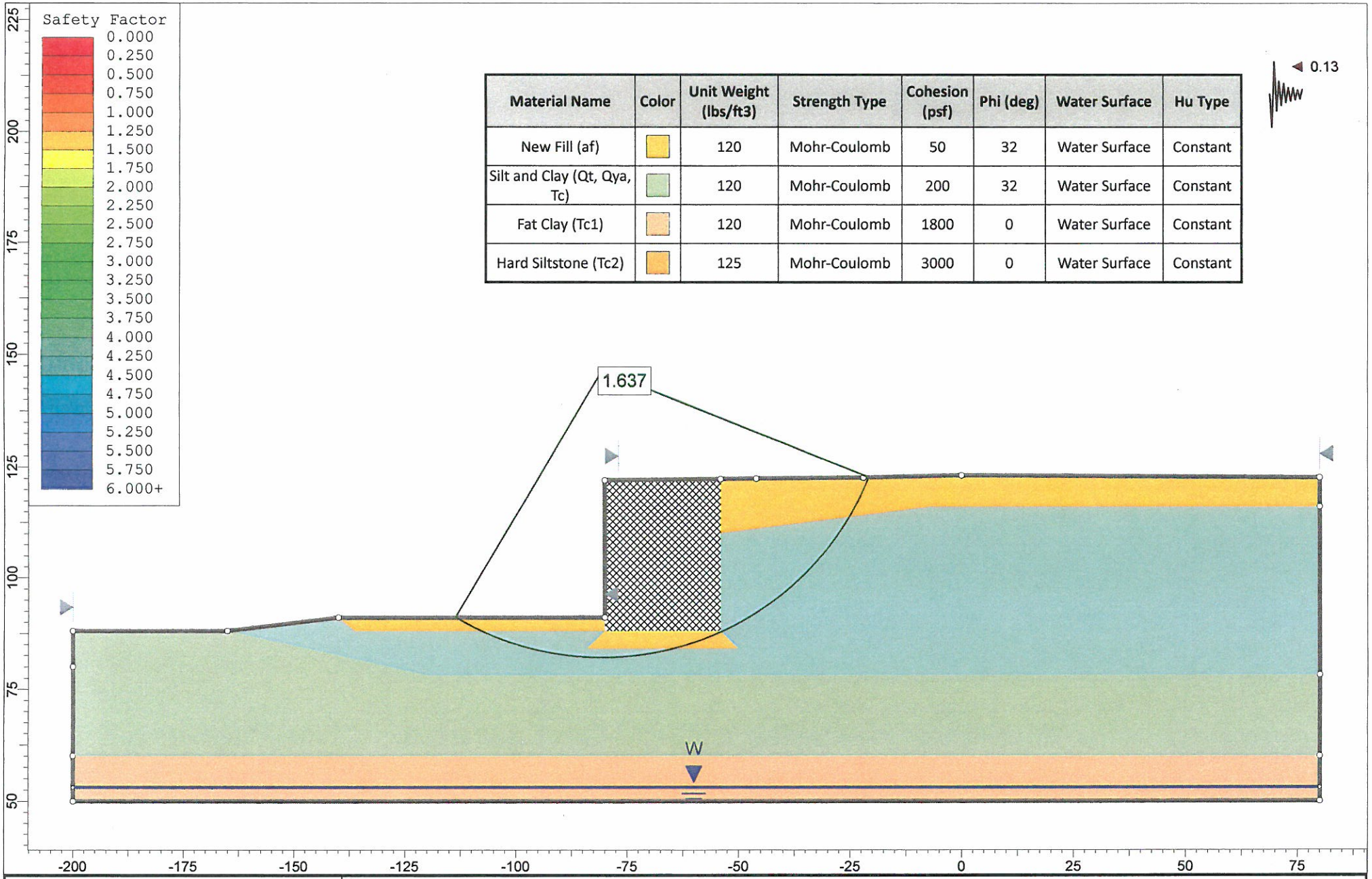


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
New Fill (af)		120	Mohr-Coulomb	50	32	Water Surface	Constant
Silt and Clay (Qt, Qya, Tc)		120	Mohr-Coulomb	200	32	Water Surface	Constant
Fat Clay (Tc1)		120	Mohr-Coulomb	1800	0	Water Surface	Constant
Hard Siltstone (Tc2)		125	Mohr-Coulomb	3000	0	Water Surface	Constant

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1				
Analysis Description	MSE Wall 183 @ I-5 Sta. 189+50 South Side, Static Case				
Drawn By	MK	Scale	1:350	Company	Earth Mechanics
Date	4/16/12			File Name	Static1.slim

SLIDEINTERPRET 6.015



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
New Fill (af)		120	Mohr-Coulomb	50	32	Water Surface	Constant
Silt and Clay (Qt, Qya, Tc)		120	Mohr-Coulomb	200	32	Water Surface	Constant
Fat Clay (Tc1)		120	Mohr-Coulomb	1800	0	Water Surface	Constant
Hard Siltstone (Tc2)		125	Mohr-Coulomb	3000	0	Water Surface	Constant

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1			
Analysis Description	MSE Wall 183 @ I-5 Sta. 189+50 South Side, Seismic Case			
Drawn By	MK	Scale	1:350	Company: Earth Mechanics
Date	4/16/12			File Name: PseudoStatic1.slim

SLIDEINTERPRET 6.015

RETAINING WALL 193

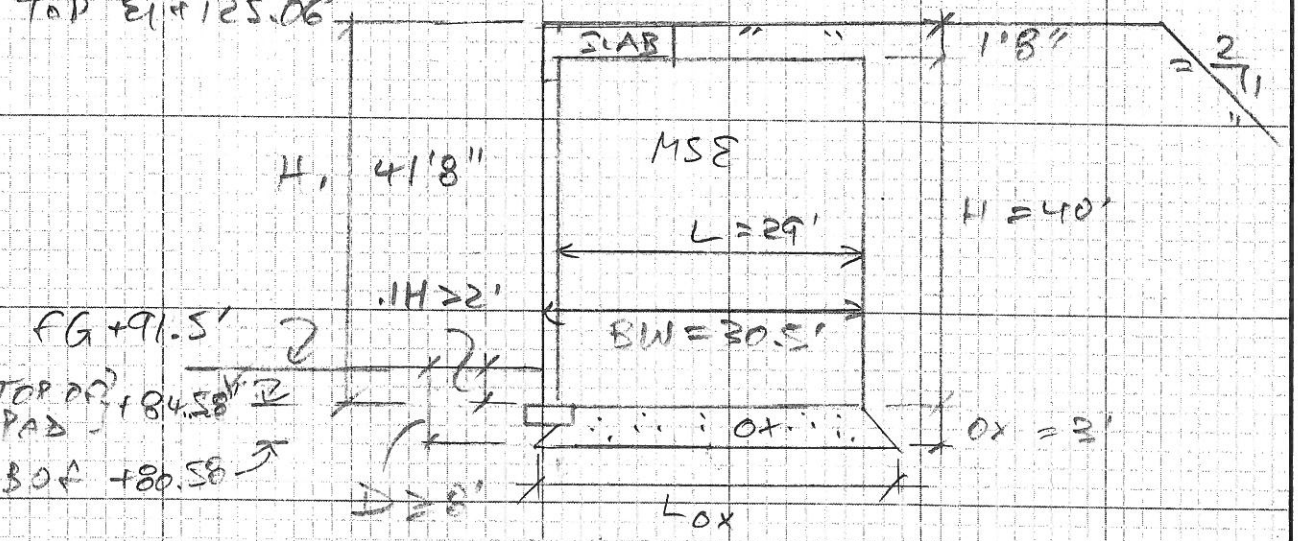
17800 Newhope Street, Suite B, Fountain Valley, California 92708 Tel: (714) 751-3826 Fax: (714) 751-3928

Project I-5 HOV SEG. 1
MSE RW 193 Project No. 11-135

By MK Date 4/16/12 Checked By SP Date 05/11/12 Sheet 1 of 8

UPDATED 9/18/12 MK

1) WALL CONFIGURATION
(H_1 = 41'8")



Eq. H_1 = +125.06' − 84.59' = 40.47'

Use H_1 = 41'8" } PER CT BDA 3-8
H = 40'
L = 29'

Embedment + .1H = 4' > 2' O.K.

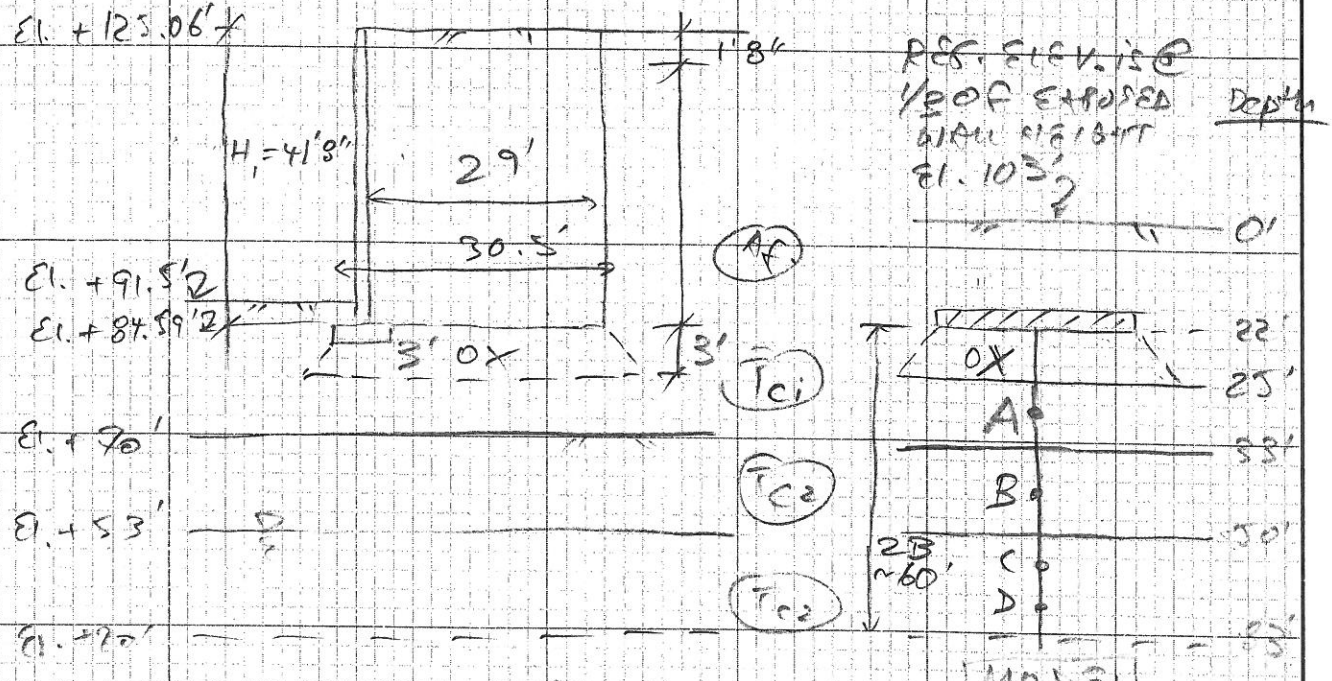
Bottom of MSE Block: (3' Ox)

El. 84.59 − 3' = +81.59'
D = 91.5' − 80.59 = 10.9' > 8'

Brg: service = 6.74 ksf } from BDA 3-8
Strength = 9.90 ksf
Extreme = 10.11 ksf

UPDATED 9/18/12

2) SETTLEMENT CALC FOR MAX. HEIGHT $H_1 = 41'8"$



STRENGTH PARAMETERS

UNIT	γ (pcf)	ϕ	c	C_c preload	C_c (not preload)
Af	120	≥34°	0	0	0
OX	120	36°	0	0	0
Qt	120	0	1 ÷ 1.8	.02	.023
Tc1	120	0	1.8 ÷ 2	.013	.015
Tc2	125	0	5.0	.010	.012

C_c from FHWA/AASHTO chart (preloaded)

Settlement calculation for service case:

P = 6.2 ksf

See attached settlement calc

→ δ = 1.73, recommend 2'

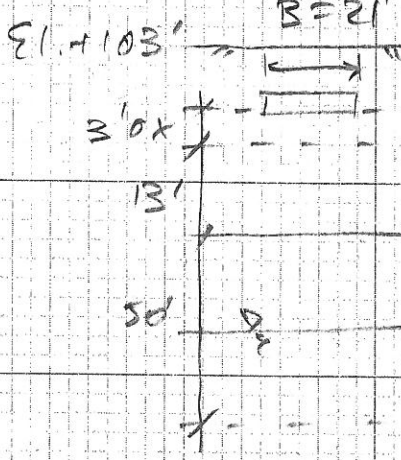
RECOMMEND 3' OX.

Project I-5 HOV SEG. 1
RW 193
Project No. 11-135

By MK Date 5/10/12 Checked By SP Date 05/11/12 Sheet 3 of 8

UPDATED 9/18/12

3) BEARING NOMINAL RESISTANCE FOR ST RENGTH CASE



AVERAGE SOIL SHEAR STRENGTH

$c_a = \frac{13' \times 2.0 + 50' \times 3.0}{13+50} = 2.8$ ksf

(use 2.5 ksf)

NOM. BRG RESISTANCE (AASHTO & 10-7.4)

$q_n = q_2 E$

q_2 = NOM. RESIST. OF FDN ON CLAY LAYER (@ 21' DEPTH)

$= cN_c (1+.3 B/L) + \gamma D$

$= 2.8 \times 5.53 \times (1+.3\ ^{21}/_{160}) + .12 \times 22$

$= 18.8$ ksf

$b = (1+\ ^{21}/_{160})\ ^{4}/_{21}$

$q_n = 18.8 E$

$= 21.7$ ksf.

$q_{str} = 21.7 \times (\phi = .65) = 14.1$ ksf ≥ 9.9 ksf.

(other wall heights similar) O.K.

Project I-5 HOV SEG. 1
RW 193
Project No. 11-135

By MK Date 5/10/12 Checked By SP Date 05/11/12 Sheet 4 of 8

UPDATED 9/18/12

4) BEARING NOM. RESISTANCE FOR EXTREME CASE

similar to STRENGTH CASE b)
but use B = 14.34' from EDA 5.8

$q_2 = 2.8 \times 5.53\left(1 + .3\,\frac{14.34}{180}\right) + .12 \times 22'$

$= 18.5$ ksf

$q_n = 18.5 \cdot .63\left(1 + \frac{14.34}{180}\right)^{4'/14.34'}$

$= 22.6$ ksf.

$q_{allow} = 22.6 \times (\phi - 1) = 22.6$ ksf $\Rightarrow$ 10.1 ksf ✓

Strength case controls. 0.1 ✓

5) CALCULATIONS ARE SHOWING FOR OTHER SUMMER WALL HEIGHTS

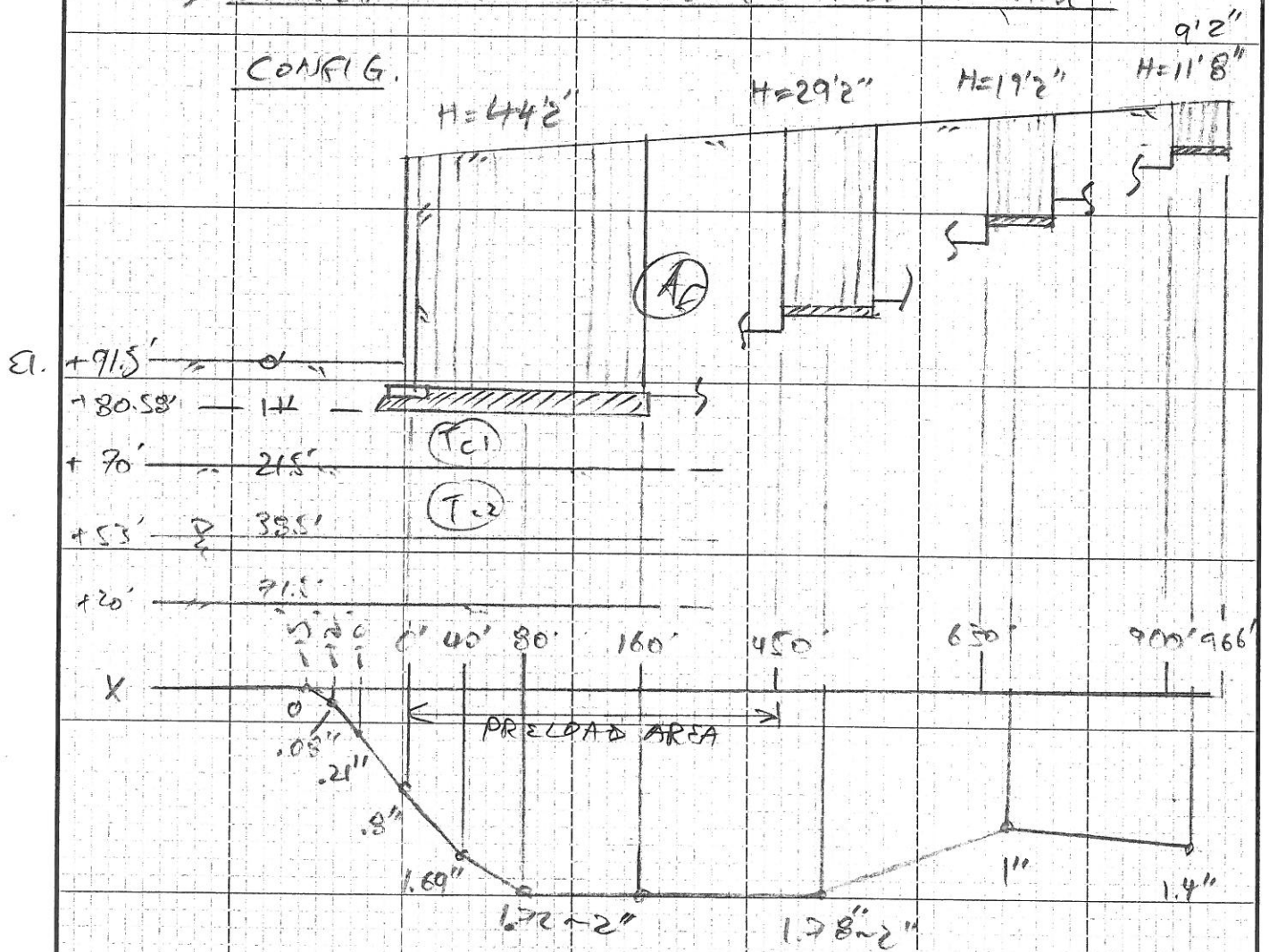
SUMMARY FOR 4 WALL HEIGHTS

H_1	H	SW	OH	SERVICE δ	BRG. CHECK STRENGTH	STR.
41'8"	40'	50.5	3'	1.75" → 2"	✓	✓
29'2"	27.5'	21.5	3'	1.78" → 2"	✓	✓
19'2"	18.5	15.5	2.5'	1.0"	✓	✓
11'8"	10'	11.5	2'	1.4"	✓	✓

Project I-5 HOV SEG. 1
RW 193 Project No. 11-135

By MK Date 10/1/12 Checked By _____ Date _____ Sheet 4a of 8

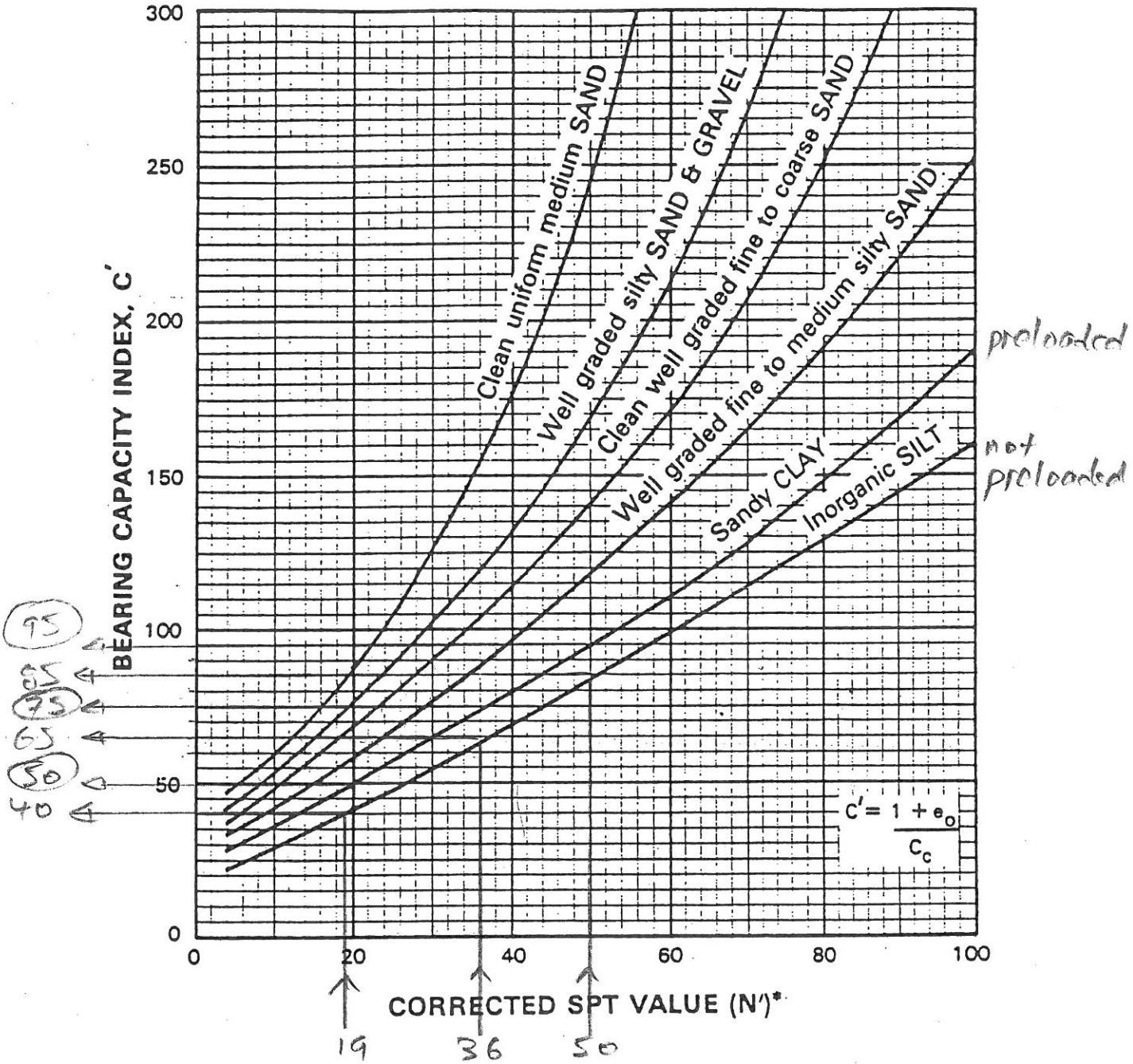
6) DIFFERENTIAL SETTLEMENT ALONG WALL



SETTLEMENT
(DUE TO DESIGN BASE PRESSURES PER CT RD A 7-8)

DIFFERENTIAL SETTLEMENT

X	ε_{diff}	
0'	.8"/[12in/ft/15' = .0044	= 1/225 ← MAX.
80'	2"/12/(15'+80') = .00175	= 1/570
450'	2"/12/(15'+450') = .00036	= 1/2,780
630'	1"/12/(15'+630') = .00013	= 1/7,740
900'	1.4"/12/(15'+900') = .00013	= 1/7,840



preloaded: $C_c = \frac{1}{50} = .02$ (Rt)

$C_c = \frac{1}{75} = .013$ (Tc1)

$C_c = \frac{1}{95} = .01$ (Tc2)

FIGURE 13

BEARING CAPACITY INDEX (C') VALUES FOR GRANULAR SOIL.

not preloaded: $C_c = \frac{1}{40} = .025$ (QU)

$C_c = \frac{1}{75} = .013$ (Tc1)

$C_c = \frac{1}{85} = .012$ (Tc2)

SETTLEMENT CALCULATION FOR SERVICE CASE

Project Title: 11-135/I-5 HOV Seg 1 MSE 193
maximum height H1=41'8" with 3' OX
By: M. Kapuskar, 9/18/12

applied pressure p_o: 6.74 ksf
applied at depth: 22 ft

USCS	Stress Point	Depth (ft)	Unit Weight (kcf)	C_c	ΔH (ft)	Layer middepth (ft)	σ'_v (ksf)	Depth below load (ft)	Δp (ksf)	δ (in)	$\Delta p/\sigma'_v$	δ (in)
OB		0.0	0.120	0	-	-	0.00	0.0	0.00	0.00	0%	0.00
OX		22.0	0.120	0.000	22.0	11.0	1.32	0.0	0.00	0.00	0%	0.00
Tc1	A	25.0	0.120	0.013	3.0	23.5	2.82	1.5	6.74	0.00	239%	0.00
Tc2	B	33.0	0.125	0.010	8.0	29.0	3.48	7.0	6.65	0.58	191%	0.58
Tc2	C	50.0	0.125	0.010	17.0	41.5	5.02	19.5	5.20	0.63	103%	0.63
Tc2	D	75.0	0.125	0.010	25.0	62.5	7.65	40.5	2.94	0.42	38%	0.42
Tc2	E	83.0	0.065	0.010	8.0	79.0	9.71	57.0	2.16	0.08	22%	0.08
Tc2	F	120.0			37.0	101.5	11.41	79.5	1.66	0.26	15%	0.00
									δ_{tot}=	1.98	δ_{tot}=	1.72 "

Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

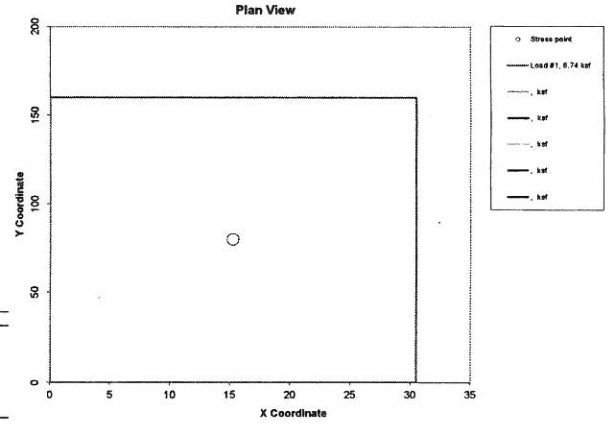
ELASTIC STRESS CALCULATION

Project Title: 11-135/I-5 HOV Seg 1 MSE 193
maximum height H1=41'8" with 4' OX
By: M. Kapuskar, 5/10/12

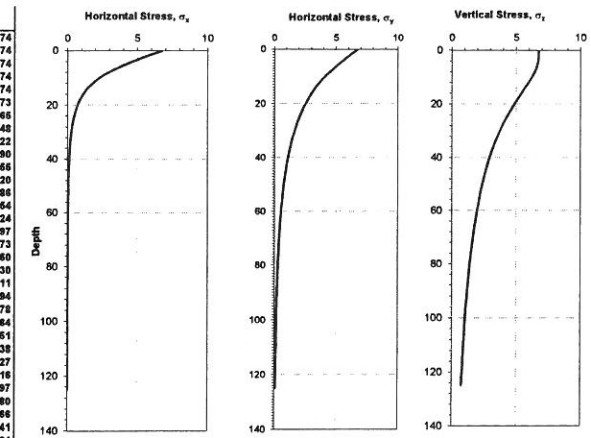
Notes:
1. This spreadsheet calculates 3D pressures in elastic (x,y,z) halfspace medium due to rectangular pressures on its surface using elastic 3D Boussinesq solutions (Poulos 19XX).
2. Input is in yellow cells. All worksheets can be edited freely. Save as Macro-Enabled file (*.xlsm).
3. PLAN shows the horizontal plane of X and Y. X and Y may be negative. Z is depth (always positive). Plan shows a stress point and up to 6 rectangular surface pressures.
4. STRESS POINT is located anywhere on x-y plane, including inside and outside pressure rectangles. The coordinates may be negative. Stresses due to loads will superimposed at this location.
5. PRESSURE RECTANGLE is placed by its (small-x, small-y) corner. The coordinates may be anywhere on x-y plane, including negative.
Length (always positive) is parallel to X. Width W (always positive) is parallel to Y axis.
Pressure is vertical and uniform. It is positive in Z (downward) and may be negative (upward).
Loads may be superimposed and overlapped.
6. STRESS PROFILES are calculated at specified depths below stress point. Stresses are positive if pressure is positive, negative if pressure is negative. Stresses are 1/2 the input pressure under borders, and 1/4 under corners.

UNITS
length unit= ft
pressure unit= ksf

STRESS POINT LOCATION
X = 15.25 ft
Y = 80 ft



	Load No. 1			Load No. 2			Load No. 3			Load No. 4			Load No. 5			Load No. 6			Total		
Load name =	Load #1																	All Loads Superimposed		
Pressure, p =	6.74 ksf			Pressure= ksf			Pressure= ksf			Pressure= ksf			Pressure= ksf			Pressure= ksf					
Length along X =	30.5 ft			Length= ft			Length= ft			Length= ft			Length= ft			Length= ft					
Width along Y =	160 ft			Width= ft			Width= ft			Width= ft			Width= ft			Width= ft					
Lower left corner X =	0 ft			X = ft			X = ft			X = ft			X = ft			X = ft					
Lower left corner Y =	0 ft			Y = ft			Y = ft			Y = ft			Y = ft			Y = ft					
Depth	Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Total Stresses		
z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
0.00	6.74	6.74	6.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.74	6.74	**6.74**
0.10	6.68	6.71	6.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.68	6.71	**6.74**
0.20	6.63	6.68	6.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.63	6.68	**6.74**
0.50	6.46	6.59	6.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.46	6.59	**6.74**
1.00	6.18	6.44	6.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.18	6.44	**6.74**
2.50	5.36	6.01	6.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.36	6.01	**6.73**
5.00	4.11	5.31	6.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.11	5.31	**6.65**
7.50	3.08	4.67	6.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.08	4.67	**6.48**
10.00	2.28	4.10	6.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.28	4.10	**6.22**
12.50	1.69	3.61	5.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.69	3.61	**5.90**
15.00	1.26	3.19	5.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.26	3.19	**5.55**
17.50	0.95	2.83	5.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.95	2.83	**5.20**
20.00	0.72	2.51	4.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	2.51	**4.86**
22.50	0.56	2.25	4.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	2.25	**4.54**
25.00	0.44	2.01	4.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	2.01	**4.24**
27.50	0.35	1.81	3.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	1.81	**3.97**
30.00	0.28	1.63	3.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	1.63	**3.73**
32.50	0.23	1.48	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.23	1.48	**3.50**
35.00	0.19	1.34	3.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	1.34	**3.30**
37.50	0.16	1.21	3.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	1.21	**3.11**
40.00	0.13	1.10	2.94	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13	1.10	**2.94**
42.50	0.11	1.00	2.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	1.00	**2.78**
45.00	0.10	0.92	2.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.92	**2.64**
47.50	0.08	0.84	2.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.84	**2.51**
50.00	0.07	0.76	2.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.76	**2.38**
52.50	0.06	0.70	2.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.70	**2.27**
55.00	0.05	0.64	2.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.64	**2.16**
60.00	0.04	0.54	1.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.54	**1.97**
65.00	0.03	0.46	1.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.46	**1.80**
70.00	0.03	0.39	1.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.39	**1.66**
80.00	0.02	0.28	1.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.28	**1.41**
90.00	0.01	0.21	1.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.21	**1.21**
100.00	0.01	0.16	1.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.16	**1.06**
125.00	0.00	0.08	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	**0.76**



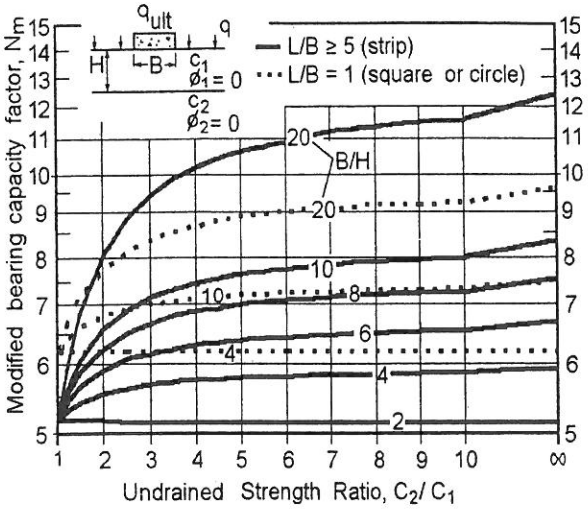


Figure 10.6.3.1.2e-2 Modified Bearing Factor for Two-Layer Cohesive Soil with Weaker Soil Overlying Stronger Soil (*EPRI, 1983*).

10.6.3.1.2f Two-Layered Soil System in Drained Loading

Where a footing supported on a two-layered soil system is subjected to a drained loading, the nominal bearing resistance, in ksf, may be taken as:

$$q_n = \left[q_2 + \left(\frac{1}{K}\right) c_1' \cot \phi_1' \right] e^{2\left[1+\left(\frac{B}{L}\right)\right] K \tan \phi_1' \left(\frac{H}{B}\right)} - \left(\frac{1}{K}\right) c_1' \cot \phi_1' \qquad (10.6.3.1.2f\text{-}1)$$

in which:

$$K = \frac{1-\sin^2 \phi_1'}{1+\sin^2 \phi_1'} \qquad (10.6.3.1.2f\text{-}2)$$

where:

c'_1 = drained shear strength of the top layer of soil as depicted in Figure 10.6.3.1.2e-1 (ksf)

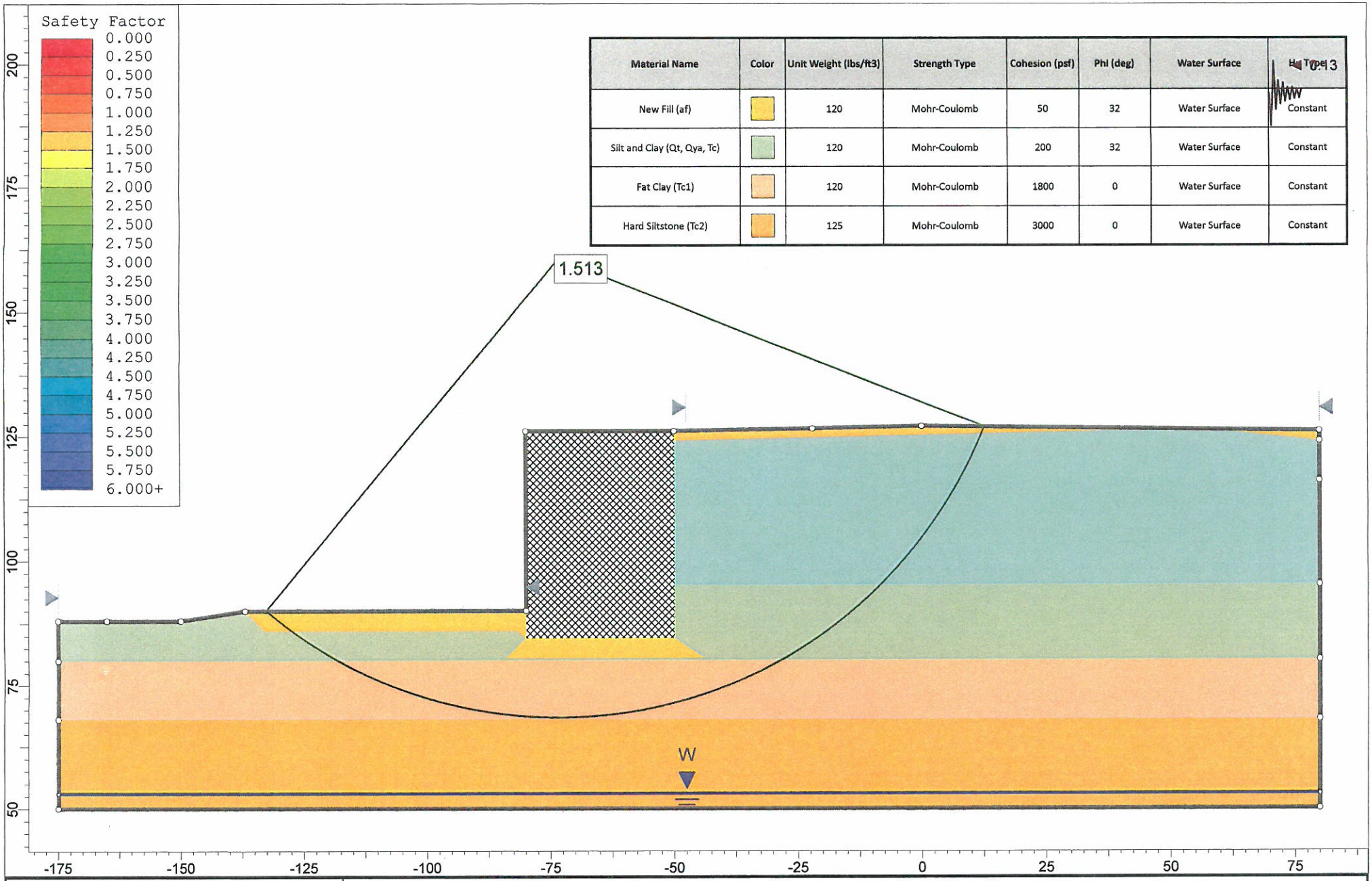
q_2 = nominal bearing resistance of a fictitious footing of the same size and shape as the actual footing but supported on surface of the second (lower) layer of a two-layer system (ksf)

ϕ'_1 = effective stress angle of internal friction of the top layer of soil (deg.)

C10.6.3.1.2f

If the upper layer is a cohesionless soil and ϕ' equals 25° to 50°, Eq. 1 reduces to:

$$q_n = q_2 e^{0.67\left[1+\left(\frac{B}{L}\right)\right]\frac{H}{B}} \qquad (C10.6.3.1.2f\text{-}1)$$

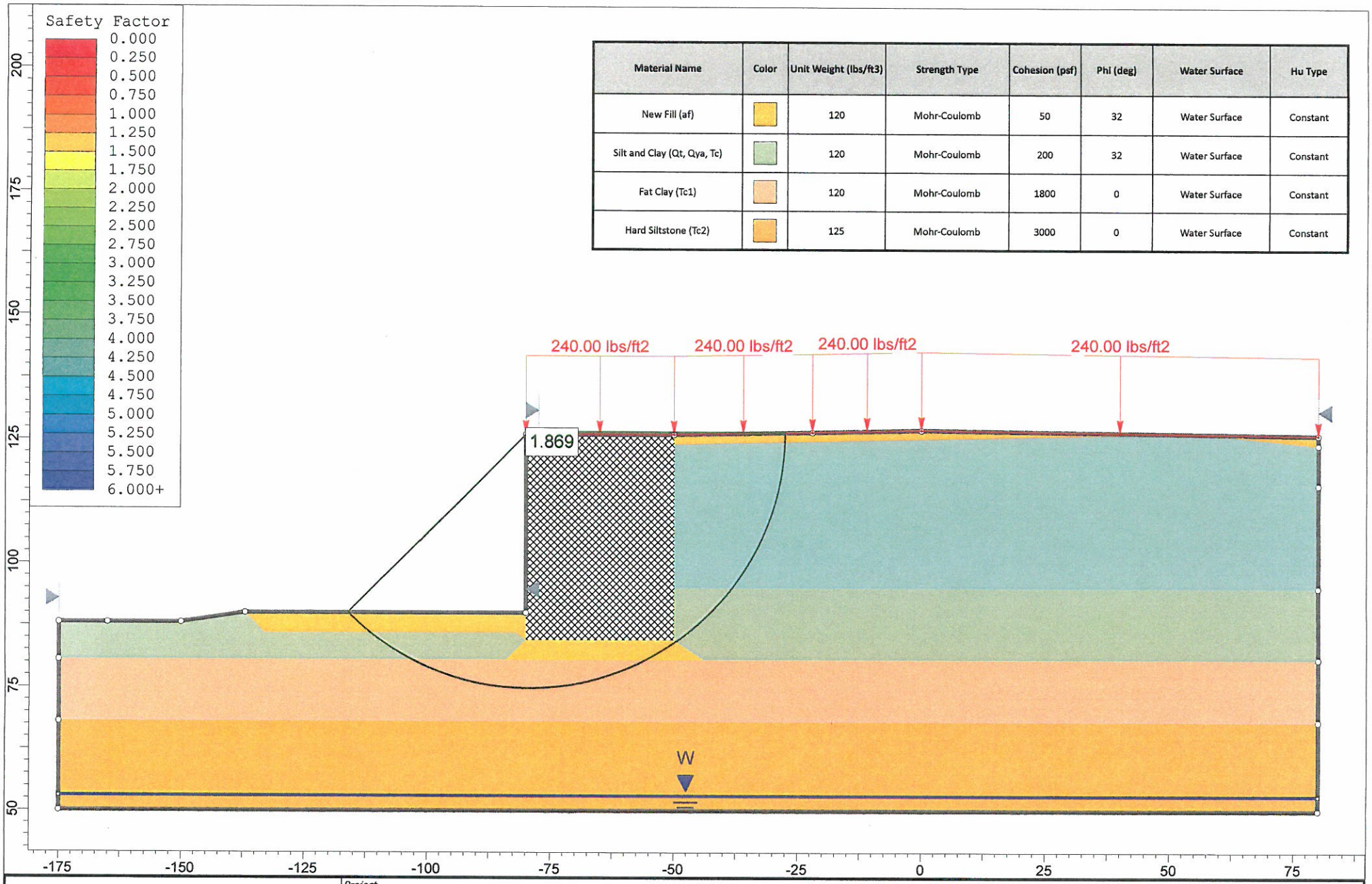


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Ru Type
New Fill (af)		120	Mohr-Coulomb	50	32	Water Surface	Constant
Silt and Clay (Qt, Qya, Tc)		120	Mohr-Coulomb	200	32	Water Surface	Constant
Fat Clay (Tc1)		120	Mohr-Coulomb	1800	0	Water Surface	Constant
Hard Siltstone (Tc2)		125	Mohr-Coulomb	3000	0	Water Surface	Constant

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1			
Analysis Description	MSE Wall 193 @ I-5 Sta. 192+50 South Side, Seismic Case			
Drawn By	MK	Scale	1:315	Company: Earth Mechanics
Date	4/16/12			File Name: Pseudostatic1.slim

SLIDEINTERPRET 6.015



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
New Fill (af)		120	Mohr-Coulomb	50	32	Water Surface	Constant
Silt and Clay (Qt, Qya, Tc)		120	Mohr-Coulomb	200	32	Water Surface	Constant
Fat Clay (Tc1)		120	Mohr-Coulomb	1800	0	Water Surface	Constant
Hard Siltstone (Tc2)		125	Mohr-Coulomb	3000	0	Water Surface	Constant

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

SLIDEINTERPRET 6.015

Project	Project #11-135, I-5 HOV Seg 1		
Analysis Description	MSE Wall 193 @ I-5 Sta. 192+50 South Side, Static Case		
Drawn By: MK	Scale: 1:315	Company: Earth Mechanics	
Date: 4/16/12		File Name: Static1.slim	

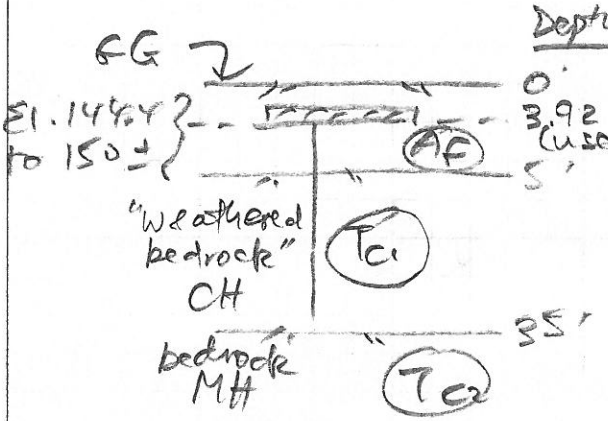
RETAINING WALL 203

AMPAD 22-141 50 SHEETS 22-142 100 SHEETS 22-144 200 SHEETS

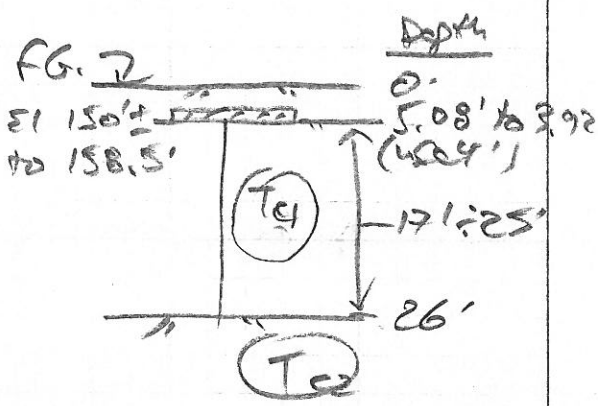
PILE DESIGN

1) CONFIG.

SOUTH HALF OF WALL (164')



NORTH HALF OF WALL (208')



PARAMETERS

UNIT	TYPE	γ (pcf)	ϕ	c (psf)	α^*	ε_{50}
AF	SM/SC	120	32	0	-	-
Tc1	CH	120	0	1,800	.5	.007
Tc2	MH	125	0	3500	.5	.005

*incorporate group eff. = 0.9 → α = .45

2) PILE DATA

"CLASS 90" HP10x42

A_s = .0861 ft²

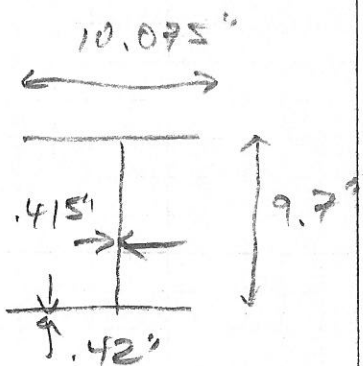
$A_{50\%\ plug}$ = .3379 ft²

$A_{skin\ (outside)}$ = 3.3'

P_g = 5% of 10" = .042'

I_{xx} = 210 in⁴

I_{yy} = 71.7 in⁴

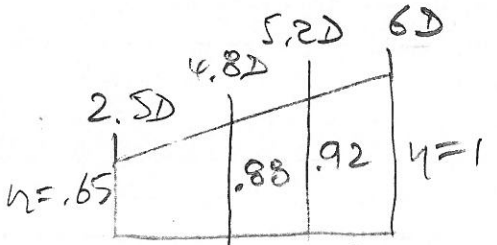


corrosion → HP10x57

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS
AMPAD

3) AXIAL GROUP EFFECTS

WALL SEGMENT	PILE SPACING	η
18'	5'	1.0
22'	5'	1.0
24'	4'-4"	.92
26'	4'-4"	.92
28'	229'/57 = 4.01'	.88
⋮	⋮	⋮
28'	4.01'	.88
26'	4.2'	.92
24'	5'	1.0
20'	5'	1.0
16'	5'	1.0



2.08' 4' 4'-4" 5' ← SMALLEST PILE SPACING O.C.

$$D \approx \frac{10''}{12''} = .83'$$

AXIAL PILE CAPACITY

PILAX 4.1

Project: I-5 HOV SEGMENT 1
EMI Project No.: 11-135
Description: Wall 203 Group I
HP10x42, ~~West Group~~, H=18-28' (Q=1)
Date: 5/3/12 by: MK checked:

UNITS	
Length	Force
ft	K

GWE	GWD
ft	ft
########	100.00

PILE PARAMETERS			
Pile Elev.		Displ. to Mobilize	
Top	Tip	Friction	Bearing
ft	ft	ft	ft
-4.00	-55.00	0.02	0.042

(•) Open section
( ) HP section
( ) Full section
[x] Allow plugging

E-Modulus	
Top	Tip
K/ft2	K/ft2
4.32E+06	4.32E+06

Circumference		Sectional Area	
Outside	Inside	Annulus	Plug
ft	ft	ft2	ft2
3.390	3.390	0.086	
3.390	3.390	0.086	
3.390	3.390	0.086	

SOIL LAYERS				GRANULAR SOIL-PILE PARAMETERS					COHESIVE SOIL-PILE PARAMETERS			
Description	Top El.	Depth	Total Unit Weight	Friction Angle	Bearing Capacity Factor	Lateral Earth Pressure Coefficients		Skin Friction Angle	Cohesion	Bearing Capacity Factor	Adhesion Factors or "API"	
-	ft	ft	γ K/ft2	ϕ deg	N_q -	K_C -	K_T -	δ deg	c K/ft2	N_C -	α_C -	α_T -
Clay/Silt (Af)	0.00	0.00	0.120	32.00	0	1.00	0.50	27.00				
Stiff CH (Qt)	-5.00	5.00	0.120						1.800	9	0.50	0.50
Hard MH (Tc2)	-35.00	35.00	0.125						3.000	9	0.50	0.50

SOIL LAYERS			OVERBURDEN		PILE SKIN FRICTION						PILE END BEARING			TOTAL PILE CAPACITY		
Description	Top El.	Depth	Total Stress	Effect. Stress	Unit Stress		Outside Friction Capacity		Inside Friction Capacity		Unit Stress	Section Capacity	Plug Capacity	Plugged?	Compression	Tension
-	-	-	σ_V	σ'_V	f_C	f_T	Q_{FC}	Q_{FT}	Q'_{FC}	Q'_{FT}	q_E	Q_E	Q'_E	-	Q_C	Q_T
-	-	[x] Interval 2.00	-	-	max: 2.40	max: 2.40	FOS: 1.00	FOS: 1.00	FOS: 1.00	FOS: 1.00	max: 200.00	FOS: 1.00	FOS: 1.00	-	-	-
text	ft	ft	K/ft2	K/ft2	K/ft2	K/ft2	K	K	K	K	K/ft2	K	K	Yes/No	K	K
1-Clay/Silt (A	0.00	0.00	0.00	0.00												
1-Clay/Silt (A	-2.00	2.00	0.24	0.24												
1-Clay/Silt (A	-4.00	4.00	0.48	0.48	0.24	0.12	0.0	0.0	0.00[bc]	0.0	0.00	0.0	0.0	Yes	0.0	0.0
1-Clay/Silt (A	-5.00	5.00	0.60	0.60	0.31	0.15	0.9	0.5	0.00[bc]	[bce]	0.00	0.0	0.0	Yes	0.9	0.5
2-Stiff CH (Qt	-5.00	5.00	0.60	0.60	0.90	0.90	0.9	0.5	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	2.3	0.5
2-Stiff CH (Qt	-6.00	6.00	0.72	0.72	0.90	0.90	4.0	3.5	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	5.4	3.5
2-Stiff CH (Qt	-8.00	8.00	0.96	0.96	0.90	0.90	10.1	9.6	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	11.5	9.6
2-Stiff CH (Qt	########	10.00	1.20	1.20	0.90	0.90	16.2	15.7	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	17.6	15.7
2-Stiff CH (Qt	########	12.00	1.44	1.44	0.90	0.90	22.3	21.8	0.00[bc]	[bce]	16.20	20 1.4	0.0	Yes	23.7	21.8
2-Stiff CH (Qt	########	14.00	1.68	1.68	0.90	0.90	28.4	27.9	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	29.8	27.9
2-Stiff CH (Qt	########	16.00	1.92	1.92	0.90	0.90	34.5	34.0	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	35.9	34.0
2-Stiff CH (Qt	########	18.00	2.16	2.16	0.90	0.90	40.6	40.1	0.00[bc]	[bce]	16.20	40 1.4	0.0	Yes	42.0	40.1
2-Stiff CH (Qt	########	20.00	2.40	2.40	0.90	0.90	46.7	46.2	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	48.1	46.2
2-Stiff CH (Qt	########	22.00	2.64	2.64	0.90	0.90	52.8	52.3	0.00[bc]	[bce]	16.20	50 1.4	0.0	Yes	54.2	52.3
2-Stiff CH (Qt	########	24.00	2.88	2.88	0.90	0.90	58.9	58.4	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	60.3	58.4
2-Stiff CH (Qt	########	26.00	3.12	3.12	0.90	0.90	65.0	64.5	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	66.4	64.5
2-Stiff CH (Qt	########	28.00	3.36	3.36	0.90	0.90	71.1	70.6	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	72.5	70.6
2-Stiff CH (Qt	########	30.00	3.60	3.60	0.90	0.90	77.2	76.7	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	78.6	76.7
2-Stiff CH (Qt	########	32.00	3.84	3.84	0.90	0.90	83.3	82.8	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	84.7	82.8
2-Stiff CH (Qt	########	34.00	4.08	4.08	0.90	0.90	89.4	88.9	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	90.8	88.9
2-Stiff CH (Qt	########	35.00	4.20	4.20	0.90	0.90	92.5	92.0	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	93.9	92.0
3-Hard MH (Tc2	########	35.00	4.20	4.20	1.50	1.50	92.5	92.0	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	94.8	92.0
3-Hard MH (Tc2	########	36.00	4.33	4.33	1.50	1.50	97.5	97.1	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	99.9	97.1
3-Hard MH (Tc2	########	38.00	4.58	4.58	1.50	1.50	107.7	107.3	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	110.0	107.3
3-Hard MH (Tc2	########	40.00	4.83	4.83	1.50	1.50	117.9	117.4	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	120.2	117.4
3-Hard MH (Tc2	########	42.00	5.08	5.08	1.50	1.50	128.1	127.6	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	130.4	127.6
3-Hard MH (Tc2	########	44.00	5.33	5.33	1.50	1.50	138.2	137.8	0.00[bc]	[bce]	27.00	140 2.3	0.0	Yes	140.5	137.8
3-Hard MH (Tc2	########	46.00	5.58	5.58	1.50	1.50	148.4	147.9	0.00[bc]	[bce]	27.00	150 2.3	0.0	Yes	150.7	147.9
3-Hard MH (Tc2	########	48.00	5.83	5.83	1.50	1.50	158.6	158.1	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	160.9	158.1
3-Hard MH (Tc2	########	50.00	6.08	6.08	1.50	1.50	168.7	168.3	0.00[bc]	[bce]	27.00	170 2.3	0.0	Yes	171.1	168.3
3-Hard MH (Tc2	########	52.00	6.33	6.33	1.50	1.50	178.9	178.4	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	181.2	178.4
3-Hard MH (Tc2	########	54.00	6.58	6.58	1.50	1.50	189.1	188.6	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	191.4	188.6
3-Hard MH (Tc2	########	55.00	6.70	6.70	1.50	1.50	194.2	193.7	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	196.5	193.7

Notes:
[a] Specified maximum limit reached (max fc, max ft, max q).
[b] Plugged condition: Q'E exceeds Q'FC. Q'FC is not used in total compressive capacity QC.
[c] Plug traveled downward (Q'FC exceeds Q'E).
[d] Q'E is less than Q'FC and not used in total compressive capacity QC.
[e] Inside soil dead weight reached.

AXIAL PILE CAPACITY

PILAX 4.1

Project: I-5 HOV SEGMENT 1
EMI Project No.: 11-135
Description: Wall 203 GROUP II (w η=.9)
~~HP10x42, West Group, H=18-28'~~
Date: 5/3/12 by: MK checked:

UNITS	
Length	Force
ft	K

GWE	GWD
ft	ft
########	100.00

PILE PARAMETERS			
Pile Elev.		Displ. to Mobilize	
Top	Tip	Friction	Bearing
ft	ft	ft	ft
-4.00	-60.00	0.02	0.042

◉ Open section
○ HP section
○ Full section
☑ Allow plugging

E-Modulus	
Top	Tip
K/ft2	K/ft2
4.32E+06	4.32E+06

Circumference		Sectional Area	
Outside	Inside	Annulus	Plug
ft	ft	ft2	ft2
3.390	3.390	0.086	
3.390	3.390	0.086	
3.390	3.390	0.086	

SOIL LAYERS				GRANULAR SOIL-PILE PARAMETERS					COHESIVE SOIL-PILE PARAMETERS			
Description	Top El.	Depth	Total Unit Weight	Friction Angle	Bearing Capacity Factor	Lateral Earth Pressure Coefficients		Skin Friction Angle	Cohesion	Bearing Capacity Factor	Adhesion Factors or "API"	
			γ	ϕ	N_q	K_C	K_T	δ	c	N_C	α_C	α_T
-	ft	ft	K/ft2	deg	-	-	-	deg	K/ft2	-	-	-
Clay/Silt (Af)	0.00	0.00	0.120	32.00	0	1.00	0.50	27.00				
Stiff CH (Qt)	-5.00	5.00	0.120						1.800	9	0.45	0.45
Hard MH (Tc2)	-35.00	35.00	0.125						3.000	9	0.45	0.45

.5 x .9 = .45

SOIL LAYERS			OVERBURDEN		PILE SKIN FRICTION						PILE END BEARING			TOTAL PILE CAPACITY		
Description	Top El.	Depth	Total Stress	Effect. Stress	Unit Stress		Outside Friction Capacity		Inside Friction Capacity		Unit Stress	Section Capacity	Plug Capacity	Plugged?	Compression	Tension
-	-	-	σ_V	σ'_V	f_C	f_T	Q_{FC}	Q_{FT}	Q'_{FC}	Q'_{FT}	q_E	Q_E	Q'_E	-	Q_C	Q_T
-	-	☑ Interval 2.00	-	-	max: 2.40	max: 2.40	FOS: 1.00	FOS: 1.00	FOS: 1.00	FOS: 1.00	max: 200.00	FOS: 1.00	FOS: 1.00	-	-	-
text	ft	ft	K/ft2	K/ft2	K/ft2	K/ft2	K	K	K	K	K/ft2	K	K	Yes/No	K	K
1-Clay/Silt (A	0.00	0.00	0.00	0.00												
1-Clay/Silt (A	-2.00	2.00	0.24	0.24												
1-Clay/Silt (A	-4.00	4.00	0.48	0.48	0.24	0.12	0.0	0.0	0.00[bc]	0.0	0.00	0.0	0.0	Yes	0.0	0.0
1-Clay/Silt (A	-5.00	5.00	0.60	0.60	0.31	0.15	0.9	0.5	0.00[bc]	[bce]	0.00	0.0	0.0	Yes	0.9	0.5
2-Stiff CH (Qt	-5.00	5.00	0.60	0.60	0.81	0.81	0.9	0.5	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	2.3	0.5
2-Stiff CH (Qt	-6.00	6.00	0.72	0.72	0.81	0.81	3.7	3.2	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	5.1	3.2
2-Stiff CH (Qt	-8.00	8.00	0.96	0.96	0.81	0.81	9.2	8.7	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	10.6	8.7
2-Stiff CH (Qt	########	10.00	1.20	1.20	0.81	0.81	14.7	14.2	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	16.1	14.2
2-Stiff CH (Qt	########	12.00	1.44	1.44	0.81	0.81	20.2	19.7	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	21.5	19.7
2-Stiff CH (Qt	########	14.00	1.68	1.68	0.81	0.81	25.6	25.2	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	27.0	25.2
2-Stiff CH (Qt	########	16.00	1.92	1.92	0.81	0.81	31.1	30.7	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	32.5	30.7
2-Stiff CH (Qt	########	18.00	2.16	2.16	0.81	0.81	36.6	36.2	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	38.0	36.2
2-Stiff CH (Qt	########	20.00	2.40	2.40	0.81	0.81	42.1	41.7	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	43.5	41.7
2-Stiff CH (Qt	########	22.00	2.64	2.64	0.81	0.81	47.6	47.1	0.00[bc]	[bce]	16.20	50 1.4	0.0	Yes	49.0	47.1
2-Stiff CH (Qt	########	24.00	2.88	2.88	0.81	0.81	53.1	52.6	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	54.5	52.6
2-Stiff CH (Qt	########	26.00	3.12	3.12	0.81	0.81	58.6	58.1	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	60.0	58.1
2-Stiff CH (Qt	########	28.00	3.36	3.36	0.81	0.81	64.1	63.6	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	65.5	63.6
2-Stiff CH (Qt	########	30.00	3.60	3.60	0.81	0.81	69.6	69.1	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	71.0	69.1
2-Stiff CH (Qt	########	32.00	3.84	3.84	0.81	0.81	75.1	74.6	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	76.5	74.6
2-Stiff CH (Qt	########	34.00	4.08	4.08	0.81	0.81	80.6	80.1	0.00[bc]	[bce]	16.20	80 1.4	0.0	Yes	82.0	80.1
2-Stiff CH (Qt	########	35.00	4.20	4.20	0.81	0.81	83.3	82.8	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	84.7	82.8
3-Hard MH (Tc2	########	35.00	4.20	4.20	1.35	1.35	83.3	82.8	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	85.6	82.8
3-Hard MH (Tc2	########	36.00	4.33	4.33	1.35	1.35	87.9	87.4	0.00[bc]	[bce]	27.00	90 2.3	0.0	Yes	90.2	87.4
3-Hard MH (Tc2	########	38.00	4.58	4.58	1.35	1.35	97.0	96.6	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	99.4	96.6
3-Hard MH (Tc2	########	40.00	4.83	4.83	1.35	1.35	106.2	105.7	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	108.5	105.7
3-Hard MH (Tc2	########	42.00	5.08	5.08	1.35	1.35	115.3	114.9	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	117.7	114.9
3-Hard MH (Tc2	########	44.00	5.33	5.33	1.35	1.35	124.5	124.0	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	126.8	124.0
3-Hard MH (Tc2	########	46.00	5.58	5.58	1.35	1.35	133.7	133.2	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	136.0	133.2
3-Hard MH (Tc2	########	48.00	5.83	5.83	1.35	1.35	142.8	142.3	0.00[bc]	[bce]	27.00	150 2.3	0.0	Yes	145.1	142.3
3-Hard MH (Tc2	########	50.00	6.08	6.08	1.35	1.35	152.0	151.5	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	154.3	151.5
3-Hard MH (Tc2	########	52.00	6.33	6.33	1.35	1.35	161.1	160.6	0.00[bc]	[bce]	27.00	160 2.3	0.0	Yes	163.4	160.6
3-Hard MH (Tc2	########	54.00	6.58	6.58	1.35	1.35	170.3	169.8	0.00[bc]	[bce]	27.00	170 2.3	0.0	Yes	172.6	169.8
3-Hard MH (Tc2	########	56.00	6.83	6.83	1.35	1.35	179.4	178.9	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	181.7	178.9
3-Hard MH (Tc2	########	58.00	7.08	7.08	1.35	1.35	188.6	188.1	0.00[bc]	[bce]	27.00	180 2.3	0.0	Yes	190.9	188.1
3-Hard MH (Tc2	########	60.00	7.33	7.33	1.35	1.35	197.7	197.3	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	200.0	197.3

23' 39' 49'

Notes:
[a] Specified maximum limit reached (max fc, max ft, max q).
[b] Plugged condition: Q'E exceeds Q'FC. Q'FC is not used in total compressive capacity QC.
[c] Plug traveled downward (Q'FC exceeds Q'E).
[d] Q'E is less than Q'FC and not used in total compressive capacity QC.
[e] Inside soil dead weight reached.

AXIAL PILE CAPACITY

PILAX 4.1

Project: I-5 HOV SEGMENT 1
EMI Project No.: 11-135
Description: Wall 203 Group III HP10x42, ~~East Group,~~ H=28-16' (w/ qE=9)
Date: 5/3/12 by: MK checked:

UNITS	
Length	Force
ft	K

GWE	GWD
ft	ft
########	100.00

PILE PARAMETERS			
Pile Elev.		Displ. to Mobilize	
Top	Tip	Friction	Bearing
ft	ft	ft	ft
-4.00	-55.00	0.02	0.042

(•) Open section
( ) HP section
( ) Full section
[x] Allow plugging

E-Modulus	
Top	Tip
K/ft2	K/ft2
4.32E+06	4.32E+06

Circumference		Sectional Area	
Outside	Inside	Annulus	Plug
ft	ft	ft2	ft2
3.390	3.390	0.086	
3.390	3.390	0.086	
3.390	3.390	0.086	

SOIL LAYERS				GRANULAR SOIL-PILE PARAMETERS					COHESIVE SOIL-PILE PARAMETERS			
Description	Top El.	Depth	Total Unit Weight	Friction Angle	Bearing Capacity Factor	Lateral Earth Pressure Coefficients		Skin Friction Angle	Cohesion	Bearing Capacity Factor	Adhesion Factors or "API"	
			γ	ϕ	N_q	K_C	K_T	δ	c	N_C	α_C	α_T
-	ft	ft	K/ft2	deg	-	-	-	deg	K/ft2	-	-	-
Clay/Silt (Af)	0.00	0.00	0.120	32.00	0	1.00	0.50	27.00				
Stiff CH (Qt)	-5.00	5.00	0.120						1.800	9	0.45	0.45
Hard MH (Tc2)	-26.00	26.00	0.125						3.000	9	0.45	0.45

.5x.9=.45

SOIL LAYERS			OVERBURDEN		PILE SKIN FRICTION						PILE END BEARING			TOTAL PILE CAPACITY		
Description	Top El.	Depth	Total Stress	Effect. Stress	Unit Stress		Outside Friction Capacity		Inside Friction Capacity		Unit Stress	Section Capacity	Plug Capacity	Plugged?	Compression	Tension
-	-	-	σ_V	σ'_V	f_C	f_T	Q_{FC}	Q_{FT}	Q'_{FC}	Q'_{FT}	q_E	Q_E	Q'_E	-	Q_C	Q_T
-	-	[x] Interval 2.00	-	-	max: 2.40	max: 2.40	FOS: 1.00	FOS: 1.00	FOS: 1.00	FOS: 1.00	max: 200.00	FOS: 1.00	FOS: 1.00	-	-	-
text	ft	ft	K/ft2	K/ft2	K/ft2	K/ft2	K	K	K	K	K/ft2	K	K	Yes/No	K	K
1-Clay/Silt (A	0.00	0.00	0.00	0.00												
1-Clay/Silt (A	-2.00	2.00	0.24	0.24												
1-Clay/Silt (A	-4.00	4.00	0.48	0.48	0.24	0.12	0.0	0.0	0.00[bc]	0.0	0.00	0.0	0.0	Yes	0.0	0.0
1-Clay/Silt (A	-5.00	5.00	0.60	0.60	0.31	0.15	0.9	0.5	0.00[bc]	[bce]	0.00	0.0	0.0	Yes	0.9	0.5
2-Stiff CH (Qt	-5.00	5.00	0.60	0.60	0.81	0.81	0.9	0.5	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	2.3	0.5
2-Stiff CH (Qt	-6.00	6.00	0.72	0.72	0.81	0.81	3.7	3.2	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	5.1	3.2
2-Stiff CH (Qt	-8.00	8.00	0.96	0.96	0.81	0.81	9.2	8.7	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	10.6	8.7
2-Stiff CH (Qt	########	10.00	1.20	1.20	0.81	0.81	14.7	14.2	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	16.1	14.2
2-Stiff CH (Qt	########	12.00	1.44	1.44	0.81	0.81	20.2	19.7	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	21.5	19.7
2-Stiff CH (Qt	########	14.00	1.68	1.68	0.81	0.81	25.6	25.2	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	27.0	25.2
2-Stiff CH (Qt	########	16.00	1.92	1.92	0.81	0.81	31.1	30.7	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	32.5	30.7
2-Stiff CH (Qt	########	18.00	2.16	2.16	0.81	0.81	36.6	36.2	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	38.0	36.2
2-Stiff CH (Qt	########	20.00	2.40	2.40	0.81	0.81	42.1	41.7	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	43.5	41.7
2-Stiff CH (Qt	########	22.00	2.64	2.64	0.81	0.81	47.6	47.1	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	49.0	47.1
2-Stiff CH (Qt	########	24.00	2.88	2.88	0.81	0.81	53.1	52.6	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	54.5	52.6
2-Stiff CH (Qt	########	26.00	3.12	3.12	0.81	0.81	58.6	58.1	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	60.0	58.1
3-Hard MH (Tc2	########	26.00	3.12	3.12	1.35	1.35	58.6	58.1	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	60.9	58.1
3-Hard MH (Tc2	########	28.00	3.37	3.37	1.35	1.35	67.7	67.3	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	70.1	67.3
3-Hard MH (Tc2	########	30.00	3.62	3.62	1.35	1.35	76.9	76.4	0.00[bc]	[bce]	27.00	80 2.3	0.0	Yes	79.2	76.4
3-Hard MH (Tc2	########	32.00	3.87	3.87	1.35	1.35	86.1	85.6	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	88.4	85.6
3-Hard MH (Tc2	########	34.00	4.12	4.12	1.35	1.35	95.2	94.7	0.00[bc]	[bce]	27.00	90 2.3	0.0	Yes	97.5	94.7
3-Hard MH (Tc2	########	36.00	4.37	4.37	1.35	1.35	104.4	103.9	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	106.7	103.9
3-Hard MH (Tc2	########	38.00	4.62	4.62	1.35	1.35	113.5	113.0	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	115.8	113.0
3-Hard MH (Tc2	########	40.00	4.87	4.87	1.35	1.35	122.7	122.2	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	125.0	122.2
3-Hard MH (Tc2	########	42.00	5.12	5.12	1.35	1.35	131.8	131.4	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	134.1	131.4
3-Hard MH (Tc2	########	44.00	5.37	5.37	1.35	1.35	141.0	140.5	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	143.3	140.5
3-Hard MH (Tc2	########	46.00	5.62	5.62	1.35	1.35	150.1	149.7	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	152.4	149.7
3-Hard MH (Tc2	########	48.00	5.87	5.87	1.35	1.35	159.3	158.8	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	161.6	158.8
3-Hard MH (Tc2	########	50.00	6.12	6.12	1.35	1.35	168.4	168.0	0.00[bc]	[bce]	27.00	120 2.3	0.0	Yes	170.8	168.0
3-Hard MH (Tc2	########	52.00	6.37	6.37	1.35	1.35	177.6	177.1	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	179.9	177.1
3-Hard MH (Tc2	########	54.00	6.62	6.62	1.35	1.35	186.7	186.3	0.00[bc]	[bce]	27.00	180 2.3	0.0	Yes	189.1	186.3
3-Hard MH (Tc2	########	55.00	6.75	6.75	1.35	1.35	191.3	190.8	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	193.6	190.8

Notes:
[a] Specified maximum limit reached (max fc, max ft, max q).
[b] Plugged condition: Q'E exceeds Q'FC. Q'FC is not used in total compressive capacity QC.
[c] Plug traveled downward (Q'FC exceeds Q'E).
[d] Q'E is less than Q'FC and not used in total compressive capacity QC.
[e] Inside soil dead weight reached.

AXIAL PILE CAPACITY

PILAX 4.1

Project: I-5 HOV SEGMENT 1
EMI Project No.: 11-135 GROUP IV
Description: Wall 203
HPT0x42, ~~East Group,~~ H=28-16' (4=1)
Date: 5/3/12 by: MK checked:

UNITS	
Length	Force
ft	K

GWE	GWD
ft	ft
########	100.00

PILE PARAMETERS			
Pile Elev.		Displ. to Mobilize	
Top	Tip	Friction	Bearing
ft	ft	ft	ft
-4.00	-55.00	0.02	0.042

☉ Open section
○ HP section
○ Full section
☑ Allow plugging

E-Modulus	
Top	Tip
K/ft2	K/ft2
4.32E+06	4.32E+06

Circumference		Sectional Area	
Outside	Inside	Annulus	Plug
ft	ft	ft2	ft2
3.390	3.390	0.086	
3.390	3.390	0.086	
3.390	3.390	0.086	

SOIL LAYERS				GRANULAR SOIL-PILE PARAMETERS					COHESIVE SOIL-PILE PARAMETERS			
Description	Top El.	Depth	Total Unit Weight	Friction Angle	Bearing Capacity Factor	Lateral Earth Pressure Coefficients		Skin Friction Angle	Cohesion	Bearing Capacity Factor	Adhesion Factors or "API"	
-	ft	ft	γ K/ft2	ϕ deg	N_q -	K_C -	K_T -	δ deg	c K/ft2	N_C -	α_C -	α_T -
Clay/Silt (Af)	0.00	0.00	0.120	32.00	0	1.00	0.50	27.00				
Stiff CH (Qt)	-5.00	5.00	0.120						1.800	9	0.50	0.50
Hard MH (Tc2)	-26.00	26.00	0.125						3.000	9	0.50	0.50

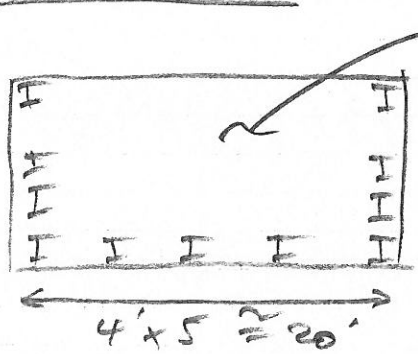
Tc

SOIL LAYERS			OVERBURDEN		PILE SKIN FRICTION						PILE END BEARING			TOTAL PILE CAPACITY		
Description	Top El.	Depth	Total Stress	Effect. Stress	Unit Stress		Outside Friction Capacity		Inside Friction Capacity		Unit Stress	Section Capacity	Plug Capacity	Plugged?	Compression	Tension
-	-	-	σ_V	σ'_V	f_C	f_T	Q_{FC}	Q_{FT}	Q'_{FC}	Q'_{FT}	q_E	Q_E	Q'_E	-	Q_C	Q_T
-	-	☑ Interval 2.00	-	-	max: 2.40	max: 2.40	FOS: 1.00	FOS: 1.00	FOS: 1.00	FOS: 1.00	max: 200.00	FOS: 1.00	FOS: 1.00	-	-	-
text	ft	ft	K/ft2	K/ft2	K/ft2	K/ft2	K	K	K	K	K/ft2	K	K	Yes/No	K	K
1-Clay/Silt (A	0.00	0.00	0.00	0.00												
1-Clay/Silt (A	-2.00	2.00	0.24	0.24												
1-Clay/Silt (A	-4.00	4.00	0.48	0.48	0.24	0.12	0.0	0.0	0.00[bc]	0.0	0.00	0.0	0.0	Yes	0.0	0.0
1-Clay/Silt (A	-5.00	5.00	0.60	0.60	0.31	0.15	0.9	0.5	0.00[bc]	[bce]	0.00	0.0	0.0	Yes	0.9	0.5
2-Stiff CH (Qt	-5.00	5.00	0.60	0.60	0.90	0.90	0.9	0.5	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	2.3	0.5
2-Stiff CH (Qt	-6.00	6.00	0.72	0.72	0.90	0.90	4.0	3.5	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	5.4	3.5
2-Stiff CH (Qt	-8.00	8.00	0.96	0.96	0.90	0.90	10.1	9.6	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	11.5	9.6
2-Stiff CH (Qt	########	10.00	1.20	1.20	0.90	0.90	16.2	15.7	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	17.6	15.7
2-Stiff CH (Qt	########	12.00	1.44	1.44	0.90	0.90	22.3	21.8	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	23.7	21.8
2-Stiff CH (Qt	########	14.00	1.68	1.68	0.90	0.90	28.4	27.9	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	29.8	27.9
2-Stiff CH (Qt	########	16.00	1.92	1.92	0.90	0.90	34.5	34.0	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	35.9	34.0
2-Stiff CH (Qt	########	18.00	2.16	2.16	0.90	0.90	40.6	40.1	0.00[bc]	[bce]	16.20	40 1.4	0.0	Yes	42.0	40.1
2-Stiff CH (Qt	########	20.00	2.40	2.40	0.90	0.90	46.7	46.2	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	48.1	46.2
2-Stiff CH (Qt	########	22.00	2.64	2.64	0.90	0.90	52.8	52.3	0.00[bc]	[bce]	16.20	50 1.4	0.0	Yes	54.2	52.3
2-Stiff CH (Qt	########	24.00	2.88	2.88	0.90	0.90	58.9	58.4	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	60.3	58.4
2-Stiff CH (Qt	########	26.00	3.12	3.12	0.90	0.90	65.0	64.5	0.00[bc]	[bce]	16.20	1.4	0.0	Yes	66.4	64.5
3-Hard MH (Tc2	########	26.00	3.12	3.12	1.50	1.50	65.0	64.5	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	67.3	64.5
3-Hard MH (Tc2	########	28.00	3.37	3.37	1.50	1.50	75.2	74.7	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	77.5	74.7
3-Hard MH (Tc2	########	30.00	3.62	3.62	1.50	1.50	85.3	84.9	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	87.7	84.9
3-Hard MH (Tc2	########	32.00	3.87	3.87	1.50	1.50	95.5	95.0	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	97.8	95.0
3-Hard MH (Tc2	########	37' 34.00	4.12	4.12	1.50	1.50	105.7	105.2	0.00[bc]	[bce]	27.00	120 2.3	0.0	Yes	108.0	105.2
3-Hard MH (Tc2	########	36.00	4.37	4.37	1.50	1.50	115.9	115.4	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	118.2	115.4
3-Hard MH (Tc2	########	41' 38.00	4.62	4.62	1.50	1.50	126.0	125.6	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	128.3	125.6
3-Hard MH (Tc2	########	40.00	4.87	4.87	1.50	1.50	136.2	135.7	0.00[bc]	[bce]	27.00	140 2.3	0.0	Yes	138.5	135.7
3-Hard MH (Tc2	########	43' 42.00	5.12	5.12	1.50	1.50	146.4	145.9	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	148.7	145.9
3-Hard MH (Tc2	########	44.00	5.37	5.37	1.50	1.50	156.5	156.1	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	158.9	156.1
3-Hard MH (Tc2	########	45' 46.00	5.62	5.62	1.50	1.50	166.7	166.2	0.00[bc]	[bce]	27.00	150 2.3	0.0	Yes	169.0	166.2
3-Hard MH (Tc2	########	48.00	5.87	5.87	1.50	1.50	176.9	176.4	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	179.2	176.4
3-Hard MH (Tc2	########	50.00	6.12	6.12	1.50	1.50	187.0	186.6	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	189.4	186.6
3-Hard MH (Tc2	########	52.00	6.37	6.37	1.50	1.50	197.2	196.7	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	199.5	196.7
3-Hard MH (Tc2	########	54.00	6.62	6.62	1.50	1.50	207.4	206.9	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	209.7	206.9
3-Hard MH (Tc2	########	55.00	6.75	6.75	1.50	1.50	212.5	212.0	0.00[bc]	[bce]	27.00	2.3	0.0	Yes	214.8	212.0

Notes:
[a] Specified maximum limit reached (max fc, max ft, max q).
[b] Plugged condition: Q'E exceeds Q'FC. Q'FC is not used in total compressive capacity QC.
[c] Plug traveled downward (Q'FC exceeds Q'E).
[d] Q'E is less than Q'FC and not used in total compressive capacity QC.
[e] Inside soil dead weight reached.

PILE GROUP CAPACITY CHECK

1) Segment H = 28'



HP 10 x 57 piles
(not all piles shown)
R_u = 180 K (max)

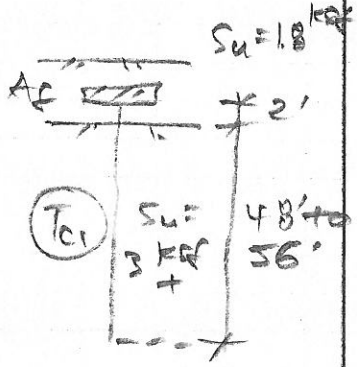
a) Σ Capacity of individual piles:

Σ piles = 23 x 180 K = 4,180 K

b) Capacity of pile group:

$\bar{S}_u = \frac{2' \times 1.8 + 48" \times 3.0}{2 + 48}$

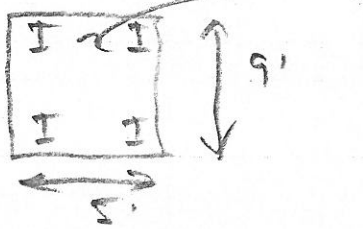
$= 2.95$ ksf.



$Q_g = 20' \times 15.5' \times 50' \times 2.95$

$= 45,725$ K ≫ 4,180 K O.K.

2) Segment H = 18'



4 piles HP10x57
R_u = 170 max
L = 50'

a) Σ piles = 4 x 170 = 680 K

b) $\bar{S}_u \cong 2.95$ ksf

$Q_g = 5 \times 9' \times 50' \times 2.95 = 6,637$ K ≫ 680 K

O.K.

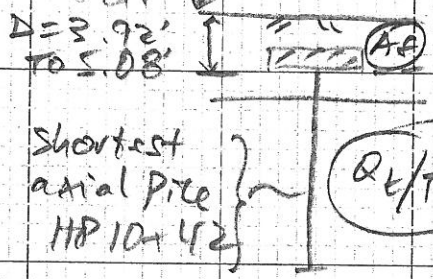
TOPS 35500

Project I-5 HOV SEG. 1
PW 203 Project No. 11-135

By MK Date 5/3/12 Checked By _____ Date _____ Sheet 1 of 9

4) LATERAL PILE TIP

a) CONFIG.



DESIGN DEPTH	γ(PV)	ϕ	c(psf)	ε_{50}
0' - 3'	120	30°	-	-
3' - 5'	120	-	1.8	.01

30' - 34' → use 35'

b) GROUP EFFICIENCY

GROUP I H = 16' - 24' : $\eta = .96$

GROUP I H = 24' - 28' : $\eta = .88$

c) LPILE ANALYSES FOR CONTROLLED DISPLACEMENTS 1/4" 1/2" 1" 3" 5"

REQUIRED PILE LENGTHS:
(SEE ATTACHED SOLUTIONS)

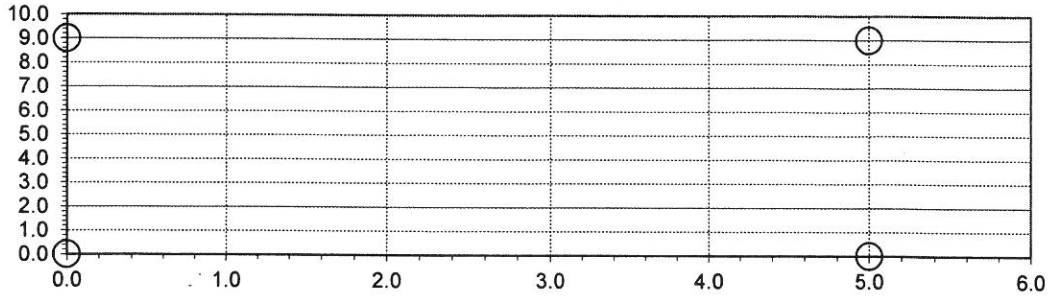
GROUP I : $L_{I,4} = 30'$

GROUP II : $L_{II,4} = 30'$

Project: I-5 HOV Seg 1, RW 203, H=18'
By: MK 5/3/2012

Calculation of Pile Group Efficiency (using formula in Group 7.0 Technical Manual)

Pile Configuration



Pile Dia.: 0.82
No. of Piles: 4

Group Efficiency	X-Dir	Y-Dir
	0.980	1.000

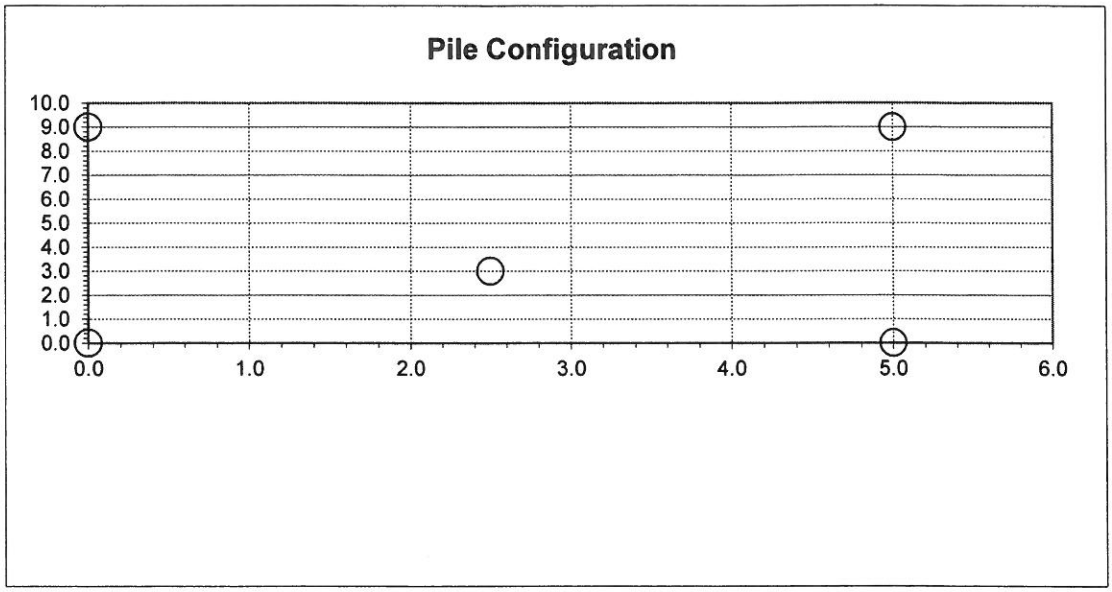
E=.98

Pile No.	X	Y
1	0.0	0.0
2	5.0	0.0
3	0.0	9.0
4	5.0	9.0

Reduction Factors in X-dir	Reduction Factors in Y-dir
0.952	1.000
1.000	1.000
0.952	1.000
1.000	1.000

Project: I-5 HOV Seg 1, RW 203, H=20'
By: MK 5/3/2012

Calculation of Pile Group Efficiency (using formula in Group 7.0 Technical Manual)



Pile Dia.: 0.82
No. of Piles: 5

Group Efficiency	X-Dir	Y-Dir
	0.960	0.970

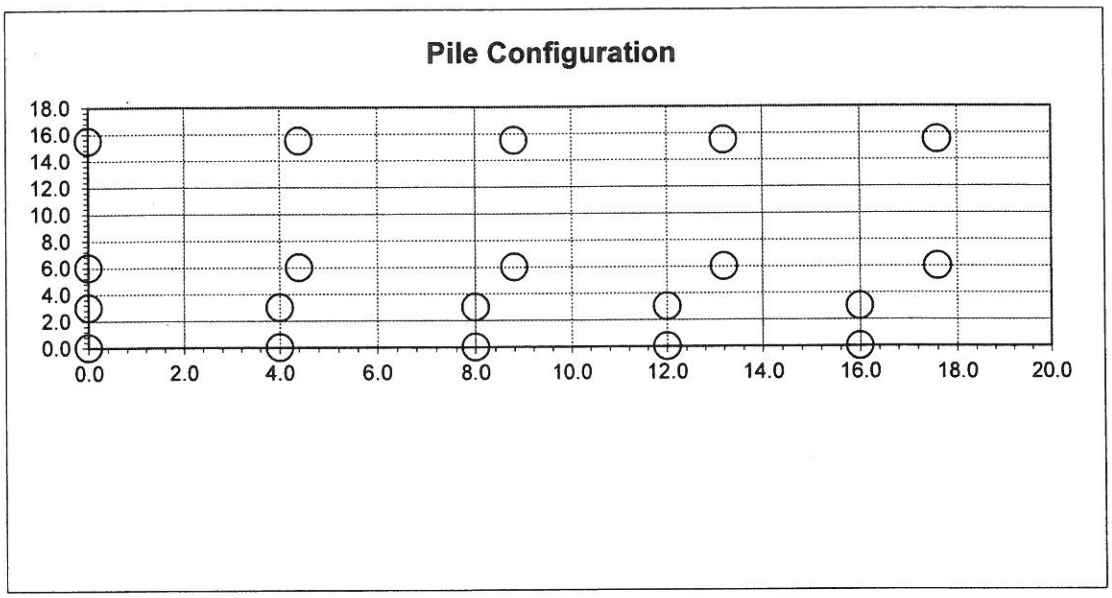
η = .96

Pile No.	X	Y
1	0.0	0.0
2	5.0	0.0
3	0.0	9.0
4	5.0	9.0
5	2.5	3.0

Reduction Factors in X-dir	Reduction Factors in Y-dir
0.903	0.924
1.000	0.924
0.952	1.000
1.000	1.000
0.948	1.000

Project: I-5 HOV Seg 1, RW 203, H=28'
By: MK 5/3/2012

Calculation of Pile Group Efficiency (using formula in Group 7.0 Technical Manual)



Pile Dia.: 0.82
No. of Piles: 20

Group Efficiency	X-Dir	Y-Dir
	0.890	0.880

λ = .89

Pile No.	X	Y
1	0.0	0.0
2	4.0	0.0
3	8.0	0.0
4	12.0	0.0
5	16.0	0.0
6	0.0	3.0
7	4.0	3.0
8	8.0	3.0
9	12.0	3.0
10	16.0	3.0
11	0.0	6.0
12	4.4	6.0
13	8.8	6.0
14	13.2	6.0
15	17.6	6.0
16	0.0	15.5
17	4.4	15.5
18	8.8	15.5
19	13.2	15.5
20	17.6	15.5

Reduction Factors in X-dir	Reduction Factors in Y-dir
0.843	0.771
0.843	0.758
0.843	0.758
0.843	0.758
0.993	0.771
0.823	0.762
0.836	0.761
0.832	0.771
0.822	0.784
0.957	0.796
0.874	0.980
0.866	0.982
0.862	0.989
0.859	0.999
1.000	1.000
0.907	1.000
0.907	1.000
0.907	1.000
0.907	1.000
1.000	1.000

LPILE Output, RW 203, HP10x42

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Group I, Strong Direction

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	4	y = 0.2500	M = 0.000	130000.	0.25000000	303196.	10103.	0.00000000
2	4	y = 0.5000	M = 0.000	130000.	0.50000000	492035.	14401.	0.00000000
3	4	y = 1.0000	M = 0.000	130000.	1.00000000	797875.	20485.	0.00000000
4	4	y = 3.0000	M = 0.000	130000.	3.00000000	1719325.	35593.	0.00000000
5	4	y = 5.0000	M = 0.000	130000.	5.00000000	2446476.	43998.	0.00000000

Group I, Weak Direction

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	4	y = 0.2500	M = 0.000	130000.	0.25000000	172963.	7260.7085	0.00000000
2	4	y = 0.5000	M = 0.000	130000.	0.50000000	280943.	10238.	0.00000000
3	4	y = 1.0000	M = 0.000	130000.	1.00000000	456975.	14385.	0.00000000
4	4	y = 3.0000	M = 0.000	130000.	3.00000000	992206.	24363.	0.00000000
5	4	y = 5.0000	M = 0.000	130000.	5.00000000	1421441.	29530.	0.00000000

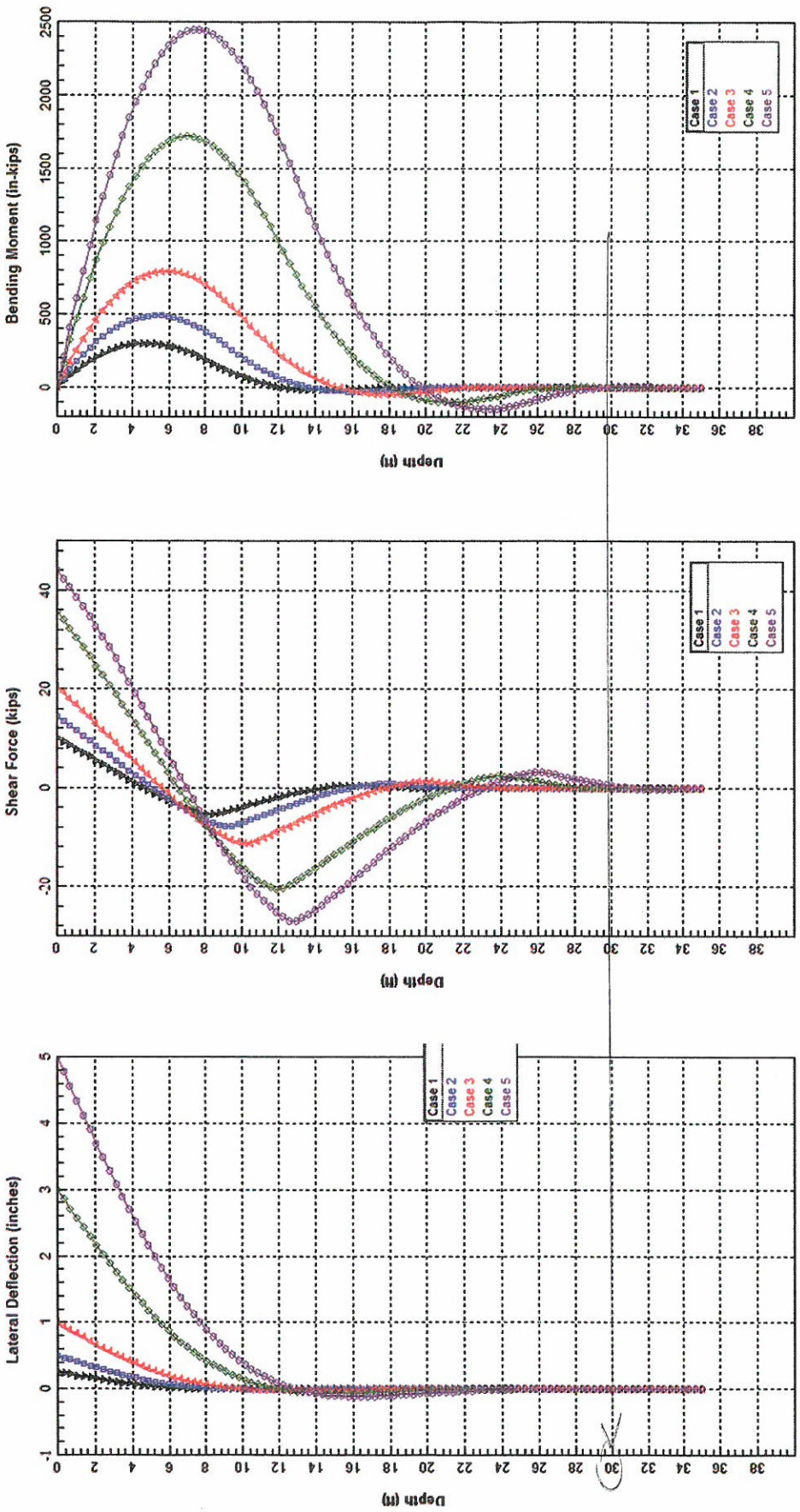
Group II, Strong Direction

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	4	y = 0.2500	M = 0.000	130000.	0.25000000	315790.	10772.	0.00000000
2	4	y = 0.5000	M = 0.000	130000.	0.50000000	511473.	15347.	0.00000000
3	4	y = 1.0000	M = 0.000	130000.	1.00000000	829480.	21846.	0.00000000
4	4	y = 3.0000	M = 0.000	130000.	3.00000000	1787658.	37997.	0.00000000
5	4	y = 5.0000	M = 0.000	130000.	5.00000000	2546067.	47005.	0.00000000

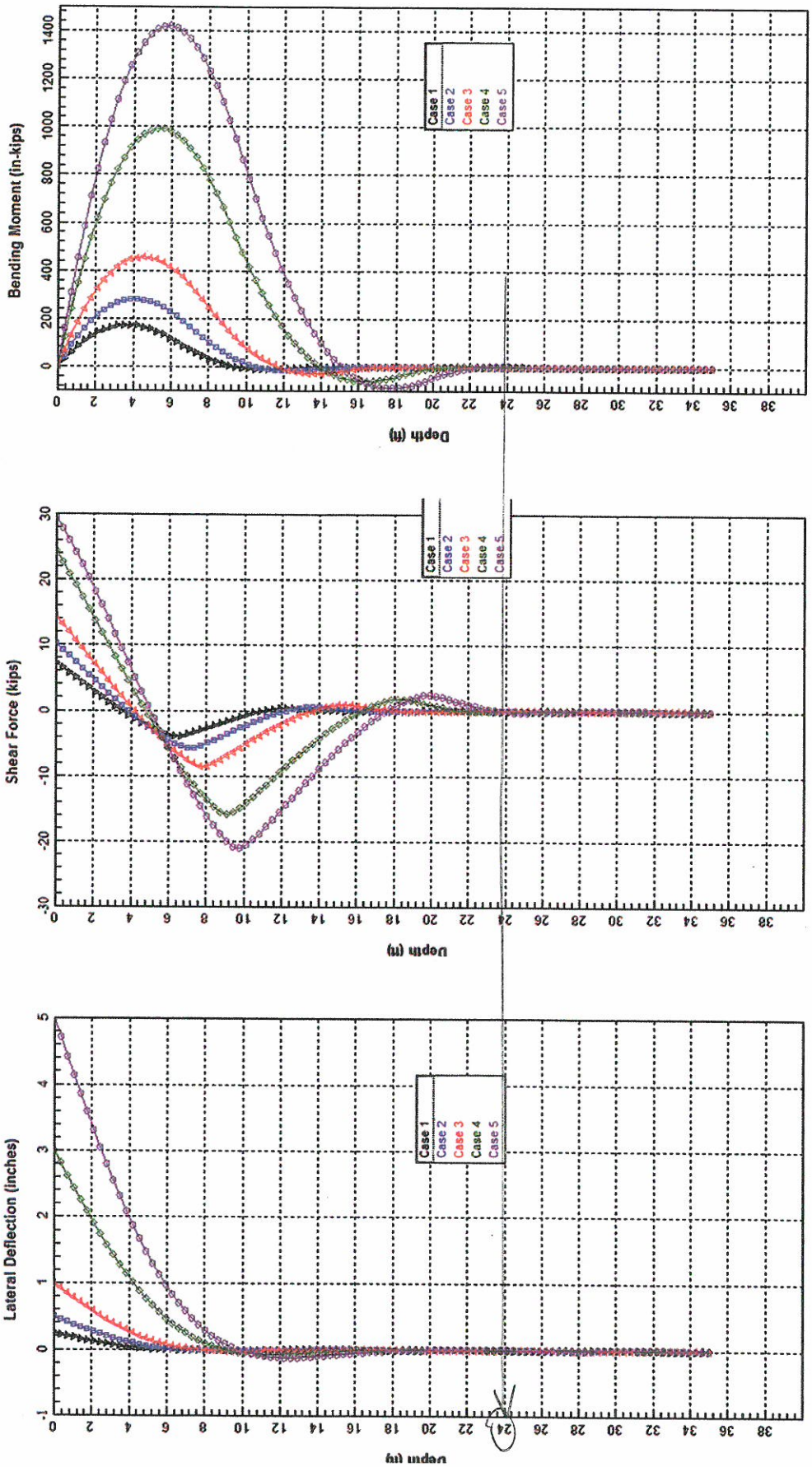
Group II, Weak Direction

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	4	y = 0.2500	M = 0.000	130000.	0.25000000	180145.	7750.8116	0.00000000
2	4	y = 0.5000	M = 0.000	130000.	0.50000000	291695.	10934.	0.00000000
3	4	y = 1.0000	M = 0.000	130000.	1.00000000	474728.	15376.	0.00000000
4	4	y = 3.0000	M = 0.000	130000.	3.00000000	1031179.	26098.	0.00000000
5	4	y = 5.0000	M = 0.000	130000.	5.00000000	1476776.	31688.	0.00000000

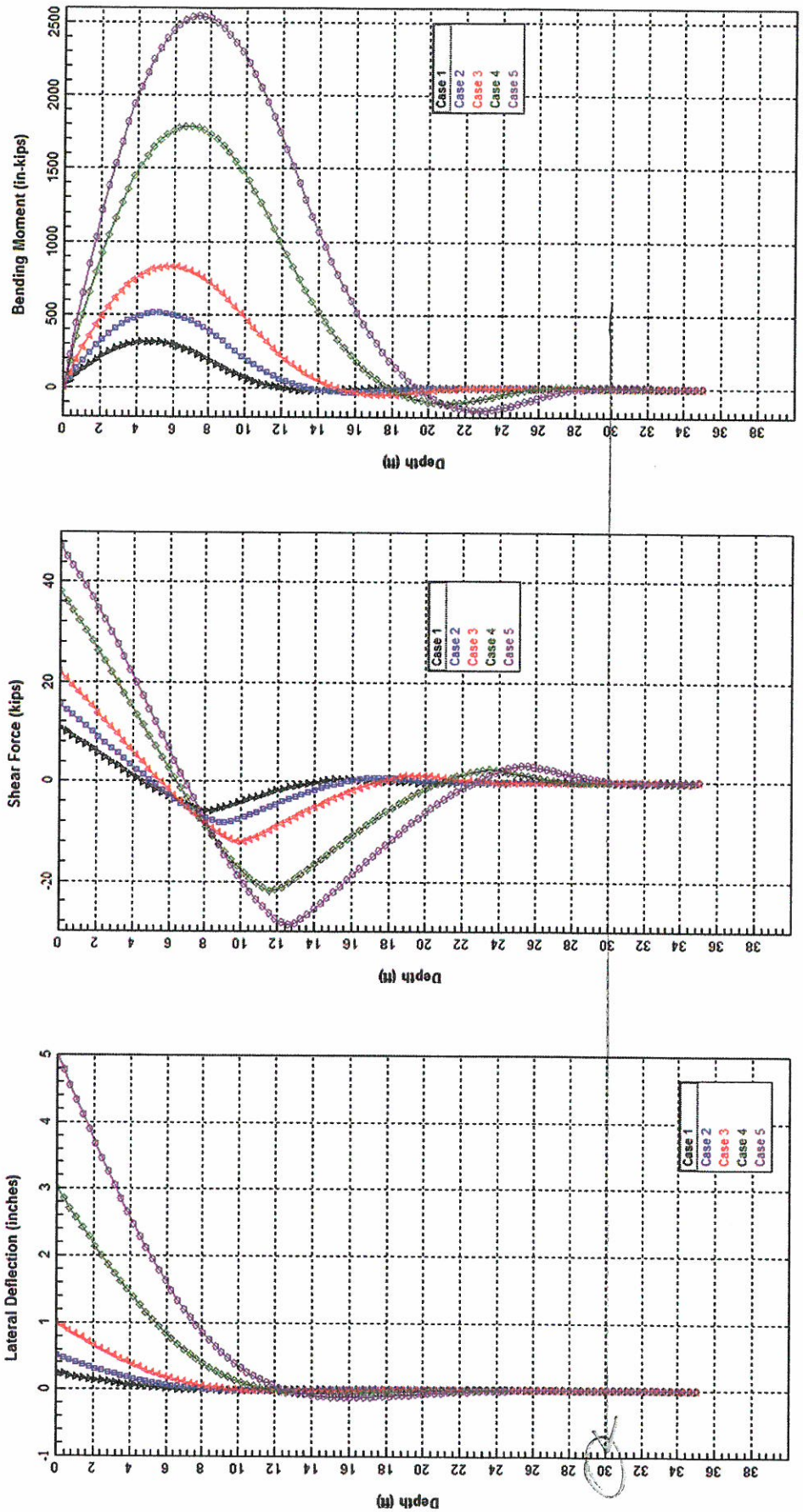
Lateral solutions for
RW 203, HP10x42, Group I, strong axis



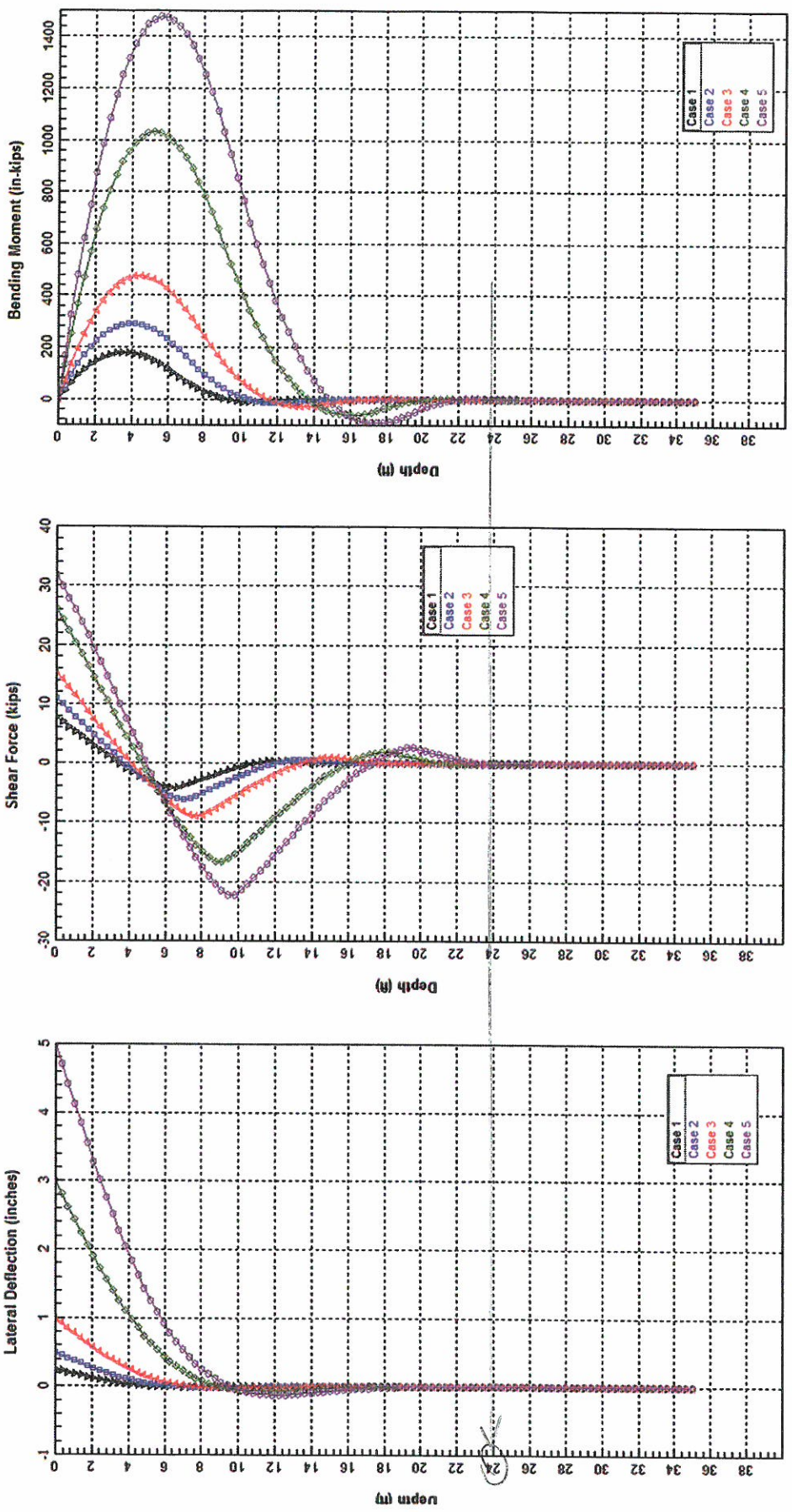
Lateral solutions for
RW 203, HP10x42, Group I, weak axis



Lateral solutions for
RW 203, HP10x42, Group II, strong axis



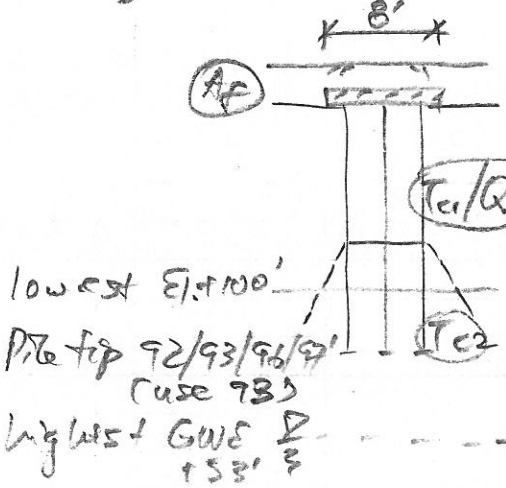
Lateral solutions for
RW 203, HP10x42, Group II, weak axis



22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS
AMPAD

PILE GROUP SETTLEMENT

1) CONTROLLING CONFIG. IS FOR H=26':



C_c=.025

C_R=.032
(from A-11-130 consol data)

C_R=.025
(from project-wide consol. data)

Note: Soil will be removed. Use C_R values.

2) PILECAP DATA:

W = 17.08'

L = 8'

P = 875 K/support (Service-I)

q = 895/(17.08 x 8) = 6.4 ksf (LARGEST BRG. PRESSURE)

3) PILE LENGTH FOR 1" SETTLEMENT:

= 24'

CONTROLS FOR ALL SEGMENTS H=24÷28'

4) SIMILAR FOR H=16÷20':

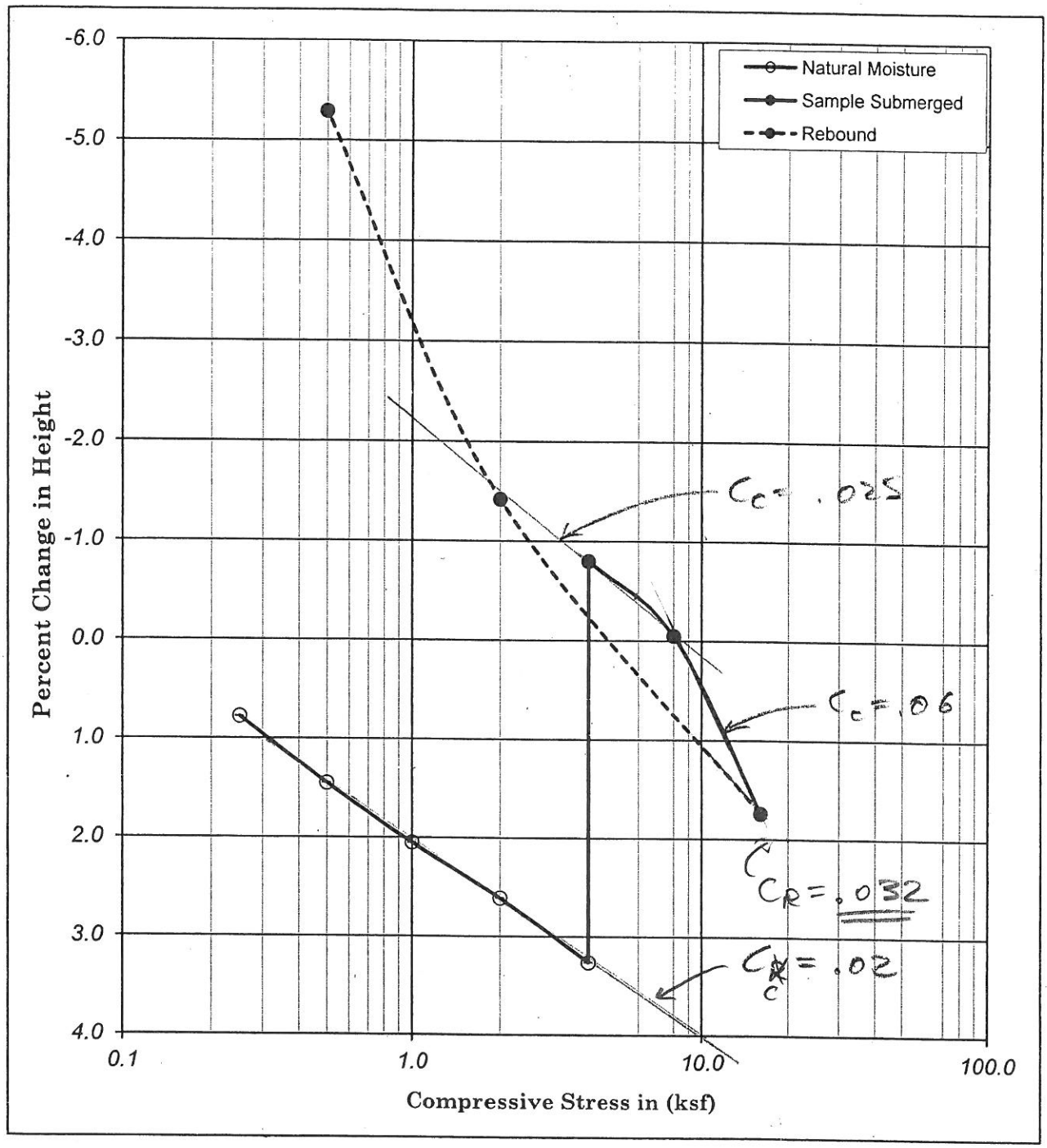
W = 13.25'

L = 8'

P = 268 K

PILE LENGTH FOR 1" IS ONLY 7'<24'

∴ USE 24' FOR ALL PILES.



Boring No.	: A-11-130		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-6		Plastic Limit :	-						
Depth (ft)	: 30.0	31.5	Plastic Index :	-	Initial	19.87	106.39	16.75	91.79	0.58
Depth (m)	: 9.15	9.61	Specific Gravity :	2.70	Final	25.32	101.05	15.91	102.32	0.67

Description : Dark brown, Fat CLAY with SAND (CH) (TC1)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

CONSOLIDATION TEST
(ASTM D-2435 / CT-219)

PILEGROUP SETTLEMENT CALCULATION
I-5 HOV Seg 1, RW 203, H=26' (covers H=24'-28')

Pile Load =	875	kips
Pile Cap Width =	8.00	ft
Pile Cap Length =	17.08	ft
Bottom of Footing El. =	0.00	ft
Pile Length for the Calculation =	24.00	ft
Equivalent Pile Cap Width =	16.00	ft
Bottom of Ib Length =	25.08	ft
Equivalent Footing Bottom of Footing =	-16.00	ft
Bearing Pressure, p =	2.18	ksf

Load distribution (H:V) = 0.5 :1

Soil sublayer	El.	Thickness below equiv. footing	Thicknes s below BOF	γ	σ_v	$\Delta\sigma$	Cc'	Settlement	$\Delta\sigma/p$	Settle-ment (limited depth)
BOF	0.0	ft	ft	psf	ksf	ksf	-	in	%	in
1	-10.0	0.0	10.0	120	1.20	2.18	0.025	0.00	100%	0.00
2	-20.0	4.0	10.0	120	2.16	1.80	0.025	0.32	82%	0.32
3	-35.0	15.0	15.0	120	3.30	0.87	0.025	0.46	40%	0.46
4	-45.0	10.0	10.0	125	4.83	0.45	0.032	0.15	20%	0.15
5	-55.0	10.0	10.0	125	6.08	0.30	0.032	0.08	14%	0.08
6	-65.0	10.0	10.0	125	7.33	0.21	0.025	0.04	10%	0.00
7	-75.0	10.0	10.0	125	8.58	0.16	0.025	0.02	7%	0.00
	Total=	59.0	75.0			**Total settlement=**		1.06		**1.00**

PILEGROUP SETTLEMENT CALCULATION
I-5 HOV Seg 1, RW 203, H=20' (covers H=16'-20')

Pile Load =	268	kips
Pile Cap Width =	8.00	ft
Pile Cap Length =	13.25	ft
Bottom of Footing El. =	0.00	ft
Pile Length for the Calculation =	7.00	ft
Equivalent Pile Cap Width =	10.33	ft
Bottom of Footing Length =	15.58	ft
Equivalent Footing Bottom of Footing =	-4.67	ft
Bearing Pressure, p =	1.66	ksf

Load distribution (H:V) = 0.5 :1

Soil sublayer	El.	Thickness below equiv. footing	Thickness below BOF	γ	σ_v	$\Delta\sigma$	Cc'	Settlement	$\Delta\sigma/p$	Settlement (limited depth)
BOF	0.0	ft	ft	psf	ksf	ksf	-	in	%	in
1	-10.0	5.3	10.0	120	0.88	1.13	0.025	0.57	68%	0.57
2	-20.0	10.0	10.0	120	1.80	0.50	0.025	0.32	30%	0.32
3	-35.0	15.0	15.0	120	3.30	0.21	0.025	0.12	13%	0.12
4	-45.0	10.0	10.0	125	4.83	0.12	0.032	0.04	7%	0.00
5	-55.0	10.0	10.0	125	6.08	0.08	0.032	0.02	5%	0.00
6	-65.0	10.0	10.0	125	7.33	0.06	0.025	0.01	3%	0.00
7	-75.0	10.0	10.0	125	8.58	0.04	0.025	0.01	3%	0.00
	Total=	70.3	75.0			Total settlement=		1.09		1.01

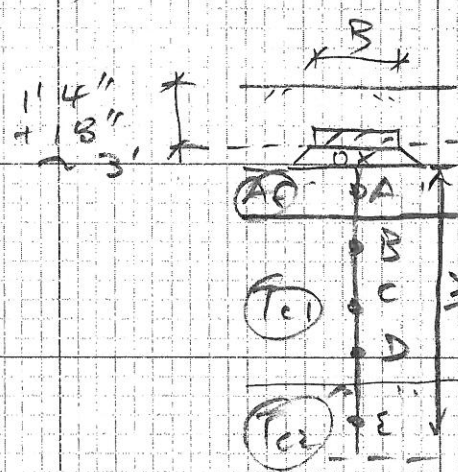
~ 1"

Project I-5 HOV SEG. 1
WALL 203 Project No. 11-135
By MK Date 4/13/12 Checked By SP Date 5/10/12 Sheet 1 of 7

5/8/12

3) SPREAD FTGS

a) CONFIG.



	H=14'	H=12'/8'/4'	γ(pcf)	C_c
	0'	0'		
	3'	3'		
	5'	4.5'		
AC–DA	7'	3'	120	.025
Tc1	≥2B		120	.03
Tc2	38' ±	20'	125	.025

b) DEMANDS

H	L	B	$q_{service}$	q_{ult}	OVEREXCAVATED OX	B	$q_{service}$	q_{ult}
4'	4'	4.75'	.7 ksf	1.5 ksf	1'	6.75'	.49 ksf	1.06k
8'	8'	6.5'	1.2	2.2	1'	8.5'	.92	1.68
12'	8'	9.5'	1.4	2.6	1.5'	12.5'	1.06	1.98
14'	8'	12.5'	1.6	2.6	2'	16.5'	1.21	1.97

FROM CT STANDS. PLAN B3-1

c) BEARING FOR SERVICE (see attached settlement calc's)

H	$q_{applied}$ for S=1"		q_{allow}	
14'	1.21 ksf	=	1.21	O.K
12'	1.18 ksf	>	1.06	O.K
8'	1.17 ksf	>	.92	O.K.
4' (like 8' FTG)		>	.49	O.K.

d) BEARING FOR STRENGTH

$q_{ult} = c N_c + \gamma D = 1.8 \times 5.53 + .125 \times 4$

$= 10.4$ ksf

$\phi = .45$ $q_{ult} = 10.4 \cdot .45 = 4.68$ ksf

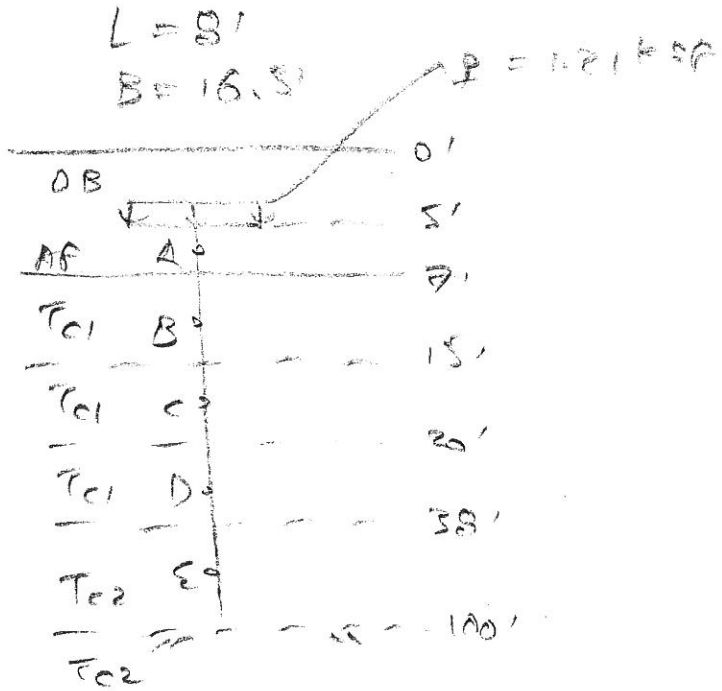
exceeds all strength values → O.K.

SETTLEMENT CALCULATION FOR SERVICE CASE

Project Title: 11-135/I-5 HOV Seg 1 RW 203
height H=14' with 2' OX
By: M. Kapuskar, 5/8/12

applied pressure p_o: 1.21 ksf
applied at depth: 5 ft

USCS	Stress Point	Depth (ft)	Unit Weight (kcf)	C_c	ΔH (ft)	Layer middepth (ft)	σ'_v (ksf)	Depth below load (ft)	Δp (ksf)	δ (in)	$\Delta p/p_o$	δ (in)
OB		0.0	0.120	0.025	-	-	0.00	0.0	0.00	0.00	0%	0.00
Af	A	5.0	0.120	0.025	5.0	2.5	0.30	0.0	0.00	0.00	0%	0.00
Tc1	B	7.0	0.120	0.030	2.0	6.0	0.72	1.0	1.20	0.26	99%	0.26
Tc1	C	15.0	0.120	0.030	8.0	11.0	1.32	6.0	0.86	0.63	71%	0.63
Tc1	D	20.0	0.120	0.030	5.0	17.5	2.10	12.5	0.34	0.12	28%	0.12
Tc2	E	38.0	0.125	0.025	18.0	29.0	3.48	24.0	0.13	0.11	11%	0.00
Tc2	F	100.0			80.0	60.0	7.20	55.0	0.02	0.04	2%	0.00
									δ_{tot}=	1.15	δ_{tot}=	1.00 "



ELASTIC STRESS CALCULATION

Project Title: 11-135/I-5 HOV Seg 1 RW 203
height H=14' with 2' OX
By: M. Kapuskar, 5/8/12

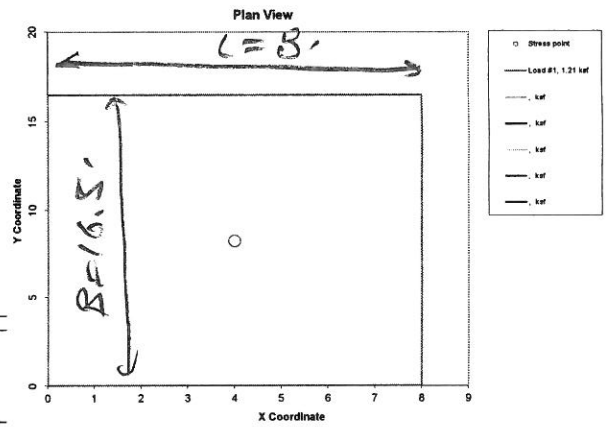
Notes:
1. This spreadsheet calculates 3D pressures in elastic (x,y,z) halfspace medium due to rectangular pressures on its surface using elastic 3D Boussinesq solutions (Poulos 19XX).
2. Input is in yellow cells. All worksheets can be edited freely. Save as Macro-Enabled file (*.xlsm).
3. PLAN shows the horizontal plane of X and Y. X and Y may be negative. Z is depth (always positive). Plan shows a stress point and up to 6 rectangular surface pressures.
4. STRESS POINT is located anywhere on x-y plane, including inside and outside pressure rectangles. The coordinates may be negative. Stresses due to loads will superimposed at this location.
5. PRESSURE RECTANGLE is placed by its (small-x, small-y) corner. The coordinates may be anywhere on x-y plane, including negative.
   Length (always positive) is parallel to X. Width W (always positive) is parallel to Y axis.
   Pressure is vertical and uniform. It is positive in Z (downward) and may be negative (upward).
   Loads may be superimposed and overlapped.
6. STRESS PROFILES are calculated at specified depths below stress point. Stresses are positive if pressure is positive, negative if pressure is negative. Stresses are 1/2 the input pressure under borders, and 1/4 under corners.

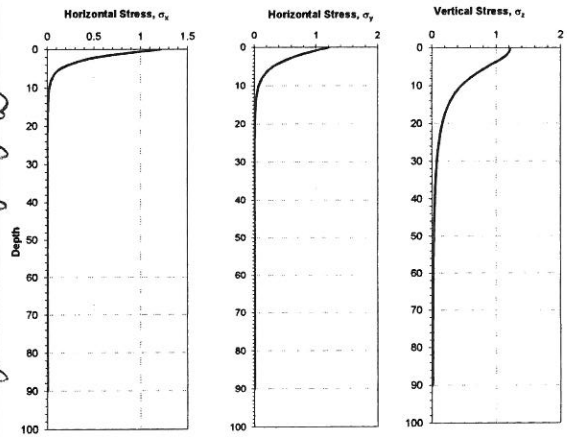
UNITS
length unit= ft
pressure unit= ksf

STRESS POINT LOCATION
X = 4 ft
Y = 8.25 ft

	Load No. 1	Load No. 2	Load No. 3	Load No. 4	Load No. 5	Load No. 6	Total
	Load name = Load #1						All Loads Superimposed
	Pressure, p = 1.21 ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	
	Length along X = 8 ft	Length= ft	Length= ft	Length= ft	Length= ft	Length= ft	
	Width along Y = 16.5 ft	Width= ft	Width= ft	Width= ft	Width= ft	Width= ft	
	Lower left corner X = 0 ft	X = ft	X = ft	X = ft	X = ft	X = ft	
	Lower left corner Y = 0 ft	Y = ft	Y = ft	Y = ft	Y = ft	Y = ft	

Depth	Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Total Stresses		
z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
0.00	1.21	1.21	1.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.21	1.21	1.21
0.10	1.17	1.18	1.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.17	1.18	1.21
0.20	1.13	1.16	1.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.13	1.16	1.21
0.50	1.02	1.08	1.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.02	1.08	1.21
1.00	0.84	0.96	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.84	0.96	1.20
2.50	0.43	0.64	1.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.64	1.12
5.00	0.14	0.30	0.86	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.30	0.86
7.50	0.05	0.14	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.14	0.63
10.00	0.02	0.07	0.46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.07	0.46
12.50	0.01	0.04	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.04	0.34
15.00	0.01	0.02	0.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.26
17.50	0.00	0.01	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.20
20.00	0.00	0.01	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.16
22.50	0.00	0.01	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.13
25.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11
27.50	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09
30.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08
32.50	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07
35.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
37.50	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
40.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05
42.50	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
45.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04
47.50	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
50.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
52.50	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
55.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
60.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
65.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
70.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
75.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
80.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
85.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
90.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01





1.3'
6.5'
13'
24.5'
55'
DL

SETTLEMENT CALCULATION FOR SERVICE CASE

Project Title: 11-135/I-5 HOV Seg 1 RW 203
height H=12' with 1.5' OX
By: M. Kapuskar, 5/8/12

applied pressure p_o: 1.06 ksf
applied at depth: 4.5 ft

USCS	Stress Point	Depth (ft)	Unit Weight (kcf)	C_c	ΔH (ft)	Layer middepth (ft)	σ'_v (ksf)	Depth below load (ft)	Δp (ksf)	δ (in)	$\Delta p/p_o$	δ (in)
OB		0.0	0.120	0.025	-	-	0.00	0.0	0.00	0.00	0%	0.00
Tc1	A	4.5	0.120	0.030	4.5	2.3	0.27	0.0	0.00	0.00	0%	0.00
Tc1	B	10.0	0.120	0.030	5.5	7.3	0.87	2.8	0.97	0.65	92%	0.65
Tc1	C	15.0	0.120	0.030	5.0	12.5	1.50	8.0	0.50	0.22	47%	0.22
Tc2	D	20.0	0.120	0.025	5.0	17.5	2.10	13.0	0.25	0.09	24%	0.09
Tc2	E	40.0	0.125	0.025	20.0	30.0	3.60	25.5	0.08	0.05	7%	0.00
Tc2	F	100.0			80.0	60.0	7.20	55.5	0.02	0.02	2%	0.00
									δ_{tot}=	1.04	δ_{tot}=	0.96 "

applied pressure p: 1.18 ksf

Layer		Depth (ft)	Unit Weight (pcf)	C_c	ΔH (ft)	Layer middepth (ft)	σ'_v (ksf)		Δp (ksf)	δ	$\Delta p/p_o$	δ (in)
OB	0	0.00	0.120	0.025	-	-	0.00	0.0	0.00	0.00	0%	0.00
Tc1	A	4.50	0.120	0.030	4.5	2.3	0.27	0.0	0.00	0.00	0%	0.00
Tc1	B	10.00	0.120	0.030	5.5	7.3	0.87	2.8	1.08	0.70	92%	0.70
Tc1	C	15.00	0.120	0.030	5.0	12.5	1.50	8.0	0.55	0.25	47%	0.25
Tc2	D	20.00	0.120	0.025	5.0	17.5	2.10	13.0	0.28	0.10	24%	0.10
Tc2	E	40.00	0.125	0.025	20.0	30.0	3.60	25.5	0.08	0.06	7%	0.00
Tc2	F	100.00			80.0	60.0	7.20	55.5	0.02	0.03	2%	0.00
									δ_{tot}=	1.13	δ_{tot}=	1.04 "

Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

ELASTIC STRESS CALCULATION

Project Title: 11-135/I-5 HOV Seg 1 RW 203
height H=12' with 1.5' OX
By: M. Kapuskar, 5/8/12

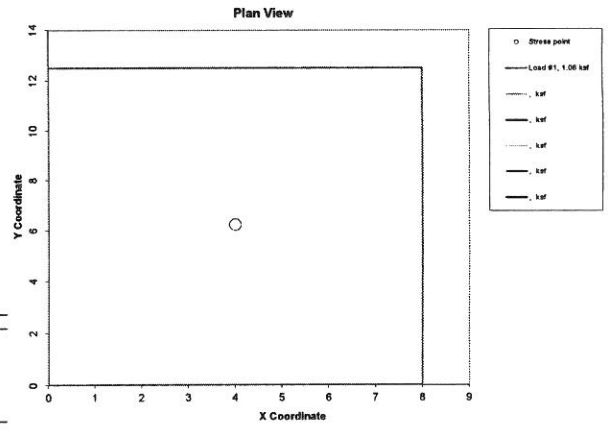
Notes:
1. This spreadsheet calculates 3D pressures in elastic (x,y,z) halfspace medium due to rectangular pressures on its surface using elastic 3D Boussinesq solutions (Poulos 19XX).
2. Input is in yellow cells. All worksheets can be edited freely. Save as Macro-Enabled file (*.xlsm).
3. PLAN shows the horizontal plane of X and Y. X and Y may be negative. Z is depth (always positive). Plan shows a stress point and up to 6 rectangular surface pressures.
4. STRESS POINT is located anywhere on x-y plane, including inside and outside pressure rectangles. The coordinates may be negative. Stresses due to loads will superimposed at this location.
5. PRESSURE RECTANGLE is placed by its (small-x, small-y) corner. The coordinates may be anywhere on x-y plane, including negative.
   Length (always positive) is parallel to X. Width W (always positive) is parallel to Y axis.
   Pressure is vertical and uniform. It is positive in Z (downward) and may be negative (upward).
   Loads may be superimposed and overlapped.
6. STRESS PROFILES are calculated at specified depths below stress point. Stresses are positive if pressure is positive, negative if pressure is negative. Stresses are 1/2 the input pressure under borders, and 1/4 under corners.

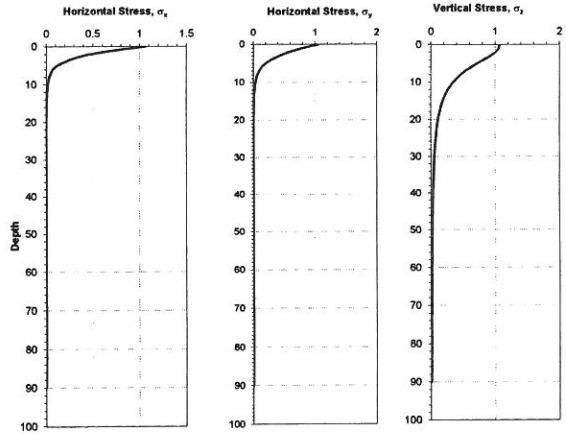
UNITS
length unit= ft
pressure unit= ksf

STRESS POINT LOCATION
X = 4 ft
Y = 6.25 ft

	Load No. 1	Load No. 2	Load No. 3	Load No. 4	Load No. 5	Load No. 6	Total
	Load #1						All Loads Superimposed
Load name =							
Pressure, p =	1.06 ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	
Length along X =	8 ft	Length= ft	Length= ft	Length= ft	Length= ft	Length= ft	
Width along Y =	12.5 ft	Width= ft	Width= ft	Width= ft	Width= ft	Width= ft	
Lower left corner X =	0 ft	X = ft	X = ft	X = ft	X = ft	X = ft	
Lower left corner Y =	0 ft	Y = ft	Y = ft	Y = ft	Y = ft	Y = ft	

Depth	Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Total Stresses		
z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
0.00	1.06	1.06	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.06	1.06	**1.06**
0.10	1.03	1.03	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.03	1.03	**1.06**
0.20	0.99	1.01	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.99	1.01	**1.06**
0.50	0.89	0.93	1.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89	0.93	**1.06**
1.00	0.73	0.81	1.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.81	**1.05**
2.50	0.37	0.49	0.97	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.49	**0.97**
5.00	0.11	0.20	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.20	**0.72**
7.50	0.04	0.08	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.08	**0.50**
10.00	0.02	0.04	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	**0.35**
12.50	0.01	0.02	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	**0.25**
15.00	0.00	0.01	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	**0.19**
17.50	0.00	0.01	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	**0.14**
20.00	0.00	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.11**
22.50	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.09**
25.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.08**
27.50	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
30.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.05**
32.50	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.05**
35.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.04**
37.50	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.03**
40.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.03**
42.50	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.03**
45.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.02**
47.50	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.02**
50.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.02**
52.50	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.02**
55.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.02**
60.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
65.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
70.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
75.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
80.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
85.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
90.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**





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SETTLEMENT CALCULATION FOR SERVICE CASE

Project Title: 11-135/I-5 HOV Seg 1 RW 203
height H=8' with 1' OX
By: M. Kapuskar, 5/8/12

applied pressure p_o: 0.92 ksf
applied at depth: 4 ft

USCS	Stress Point	Depth (ft)	Unit Weight (kcf)	C_c	ΔH (ft)	Layer middepth (ft)	σ'_v (ksf)	Depth below load (ft)	Δp (ksf)	δ (in)	$\Delta p/p_o$	δ (in)
OB		0.0	0.120	0.025	-	-	0.00	0.0	0.00	0.00	0%	0.00
Tc1	A	4.0	0.120	0.030	4.0	2.0	0.24	0.0	0.00	0.00	0%	0.00
Tc1	B	8.0	0.120	0.030	4.0	6.0	0.72	2.0	0.91	0.51	99%	0.51
Tc1	C	14.0	0.120	0.030	6.0	11.0	1.32	7.0	0.55	0.33	60%	0.33
Tc2	D	20.0	0.120	0.025	6.0	17.0	2.04	13.0	0.16	0.07	18%	0.00
Tc2	E	40.0	0.125	0.025	20.0	30.0	3.60	26.0	0.05	0.03	5%	0.00
Tc2	F	100.0			80.0	60.0	7.20	56.0	0.01	0.01	1%	0.00
									δ_{tot}=	0.96	δ_{tot}=	0.84 "

applied pressure p: 1.17 ksf

Layer		Depth (ft)	Unit Weight (pcf)	C_c	ΔH (ft)	Layer middepth (ft)	σ'_v (ksf)		Δp (ksf)	δ	$\Delta p/p_o$	δ (in)
OB	0	0.00	0.120	0.025	-	-	0.00	0.0	0.00	0.00	0%	0.00
Tc1	A	4.00	0.120	0.030	4.0	2.0	0.24	0.0	0.00	0.00	0%	0.00
Tc1	B	8.00	0.120	0.030	4.0	6.0	0.72	2.0	1.16	0.60	99%	0.60
Tc1	C	14.00	0.120	0.030	6.0	11.0	1.32	7.0	0.70	0.40	60%	0.40
Tc2	D	20.00	0.120	0.025	6.0	17.0	2.04	13.0	0.21	0.09	18%	0.00
Tc2	E	40.00	0.125	0.025	20.0	30.0	3.60	26.0	0.06	0.04	5%	0.00
Tc2	F	100.00			80.0	60.0	7.20	56.0	0.01	0.02	1%	0.00
									δ_{tot}=	1.15	δ_{tot}=	1.00 "

Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

ELASTIC STRESS CALCULATION

Project Title: 11-135/I-5 HOV Seg 1 RW 203
height H=8' with 1' OX
By: M. Kapuskar, 5/8/12

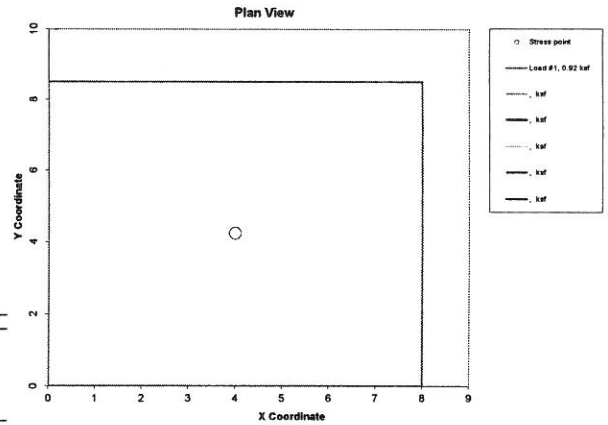
Notes:
1. This spreadsheet calculates 3D pressures in elastic (x,y,z) halfspace medium due to rectangular pressures on its surface using elastic 3D Boussinesq solutions (Poulos 19XX).
2. Input is in yellow cells. All worksheets can be edited freely. Save as Macro-Enabled file (*.xlsm).
3. PLAN shows the horizontal plane of X and Y. X and Y may be negative. Z is depth (always positive). Plan shows a stress point and up to 6 rectangular surface pressures.
4. STRESS POINT is located anywhere on x-y plane, including inside and outside pressure rectangles. The coordinates may be negative. Stresses due to loads will superimposed at this location.
5. PRESSURE RECTANGLE is placed by its (small-x, small-y) corner. The coordinates may be anywhere on x-y plane, including negative.
   Length (always positive) is parallel to X. Width W (always positive) is parallel to Y axis.
   Pressure is vertical and uniform. It is positive in Z (downward) and may be negative (upward).
   Loads may be superimposed and overlapped.
6. STRESS PROFILES are calculated at specified depths below stress point. Stresses are positive if pressure is positive, negative if pressure is negative. Stresses are 1/2 the input pressure under borders, and 1/4 under corners.

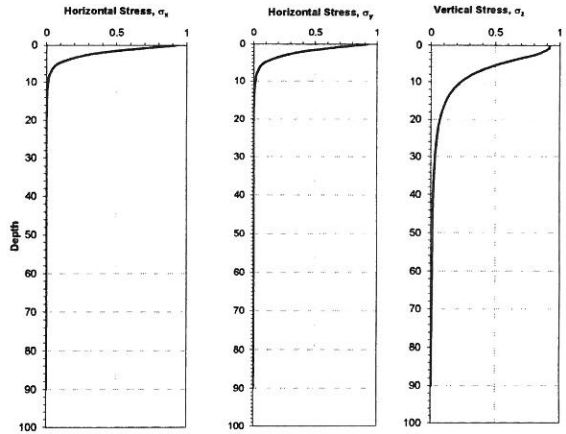
UNITS
length unit= ft
pressure unit= ksf

STRESS POINT LOCATION
X = 4 ft
Y = 4.25 ft

	Load No. 1	Load No. 2	Load No. 3	Load No. 4	Load No. 5	Load No. 6	Total
	Load name = Load #1						All Loads Superimposed
	Pressure, p = 0.92 ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	
	Length along X = 8 ft	Length= ft	Length= ft	Length= ft	Length= ft	Length= ft	
	Width along Y = 8.5 ft	Width= ft	Width= ft	Width= ft	Width= ft	Width= ft	
	Lower left corner X = 0 ft	X = ft	X = ft	X = ft	X = ft	X = ft	
	Lower left corner Y = 0 ft	Y = ft	Y = ft	Y = ft	Y = ft	Y = ft	

Depth	Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Total Stresses		
z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
0.00	0.92	0.92	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.92	0.92	**0.92**
0.10	0.89	0.89	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89	0.89	**0.92**
0.20	0.86	0.86	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.86	0.86	**0.92**
0.50	0.77	0.77	0.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.77	0.77	**0.92**
1.00	0.62	0.64	0.91	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.64	**0.91**
2.50	0.30	0.32	0.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.32	**0.82**
5.00	0.09	0.09	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	**0.55**
7.50	0.03	0.03	0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	**0.35**
10.00	0.01	0.01	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	**0.23**
12.50	0.01	0.01	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	**0.16**
15.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.12**
17.50	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.09**
20.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.07**
22.50	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.06**
25.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.05**
27.50	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.04**
30.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.03**
32.50	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.03**
35.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.02**
37.50	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.02**
40.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.02**
42.50	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.02**
45.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
47.50	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
50.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
52.50	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
55.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
60.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
65.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
70.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
75.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.01**
80.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
85.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
90.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**





PILASTERS

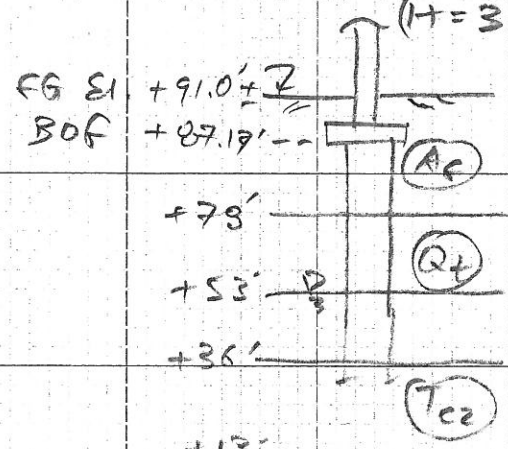
Project I-5 HOV SEG. 1

PILASTER DESIGN Project No. 11-135

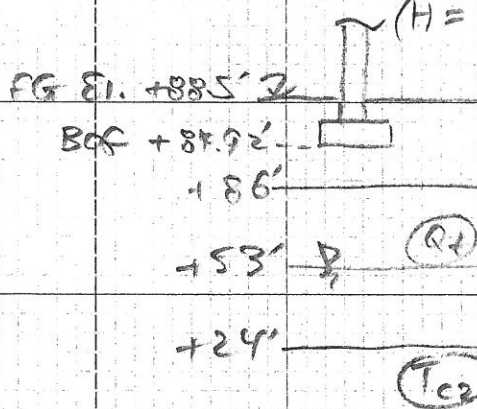
By MK Date 9/11/12 Checked By _____ Date _____ Sheet 1 of 16

1) CONFIGURATION

ABUT 1 – SE PILASTER



ABUT 2 – SW PILASTER



2) SOIL PAR'MS – SEE WINGWALL DESIGN

3) PILE DATA – MAT R_u = 160^k COMPR.
USE CLASS 90 HP 10x57
REDUCED DESIGN SECTION HP10x42
(SAME AS WINGWALLS)

Project I-5 HOV SEG. 1
PILASTER DESIGN
Project No. 11-135

By MK Date 9/11/12 Checked By _____ Date _____ Sheet 2 of 16

4) AXIAL PILE CAPACITY

a) DESIGN TIP EL. FOR COMPRESSION

			STRENGTH			EXTREME		
ABUT	H	FG	R_u	L req.	DESIGN TIP (a-I)	R_u	L req	DESIGN TIP (a-II)
1 (SE)	32'	+91.0'	95^K/.7^K → 140^K	54'	+37' ✓	104^K → 110^K	43'	+48' ✓
2 (SW)	36'	+88.5'	112^K/.7^K → 160^K (use 33')	29'	+55' ✓	130	25'	+63' ✓

b) DESIGN TIP EL. FOR TENSION

			STRENGTH			EXTREME		
ABUT	H	FG	R_u	L req.	DESIGN TIP (b-I)	R_u	L req	DESIGN TIP (b-II)
1 (SE)	32'	+91.0'	N/A	N/A	N/A	12^K → 20^K	18'	+73' ✓
2 (SW)	36'	+88.5'	"	"	"	5^K → 10^K	10'	+78' ✓

5) LATERAL PILE DESIGN

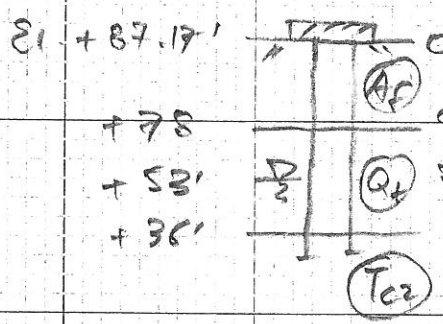
DESIGNER'S LATERAL PILE DEMANDS + SPACINGS ARE LIKE WING WALLS

ABUT	H	PILE CUTOFF	L req.	LAT. DESIGN TIP (d)
1 (SE)	32'	+87.17'	25'	+62.17 → +62.0
2 (SW)	36'	+84.92'	25'	+59.92 → +60.0

5) PILE GROUP SETTLEMENT

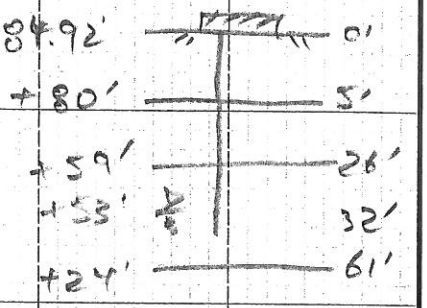
a) CONFIG.

ABUT 1 (SE PILASTER)



γ_{pile}	C_c
120	.025
120	.025
125	.025

ABUT 2 (SW PILASTER)



b) PILE CAP DATA

	ABUT 1	ABUT 2
Width	= 21.17'	24'
Length	= 10'	10'
Total load = 626 K/Support Service-I		816 K/Support

c) SETTLEMENT

Pile length req. for $\delta = 1''$

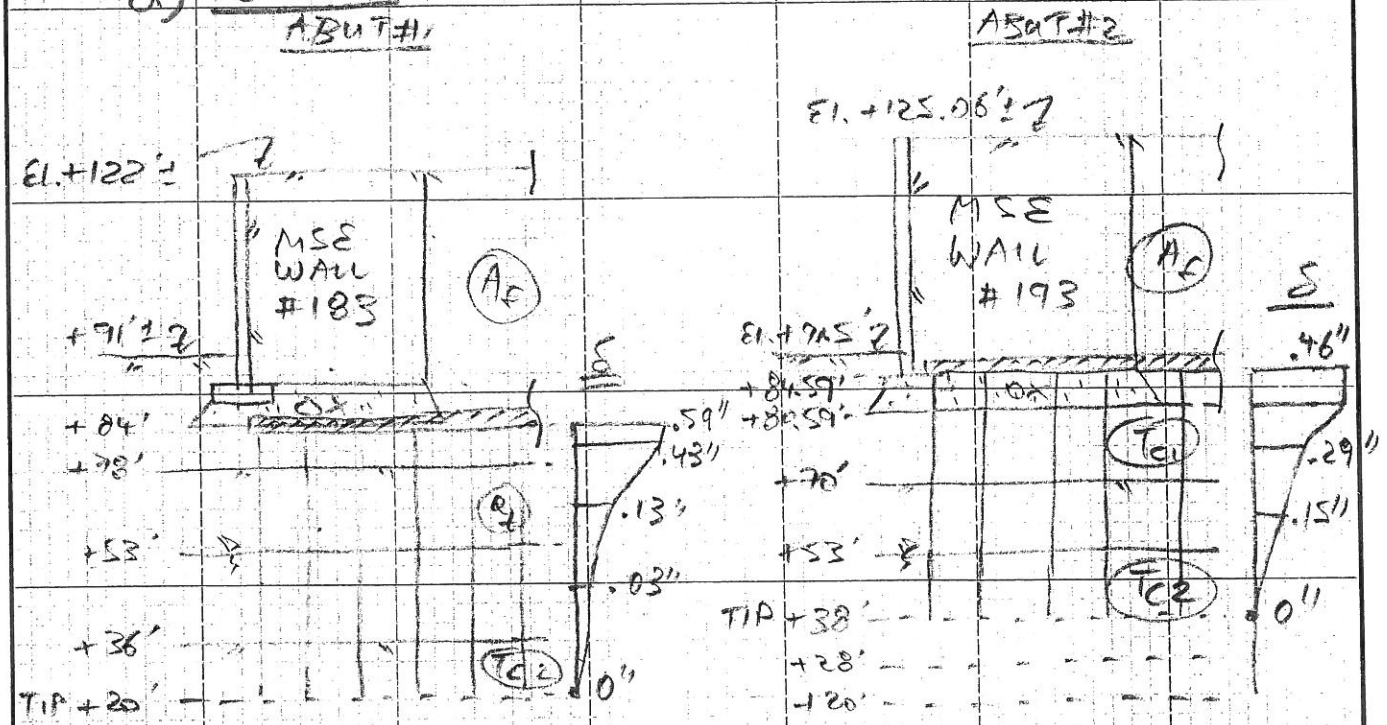
	ABUT 1	ABUT 2
Long	= 11'	17'

d) DESIGN TIP EL.

ABUT	PILE CUT-OFF El.	REQ. LENGTH	DESIGN TIP El (d)
1 (SE)	+87.17'	11'	+76.17 → +76'
2 (NW)	+84.92'	17'	+67.92 → +68'

6) CHECK FOR PILE DOWNDRAG

a) CONFIG



"δ" = soil settlement due to MSE wall backfills

Soil movement required relative to pile to cause downdrag = 0.6" per NAVFAC DM 7.2-21 criteria

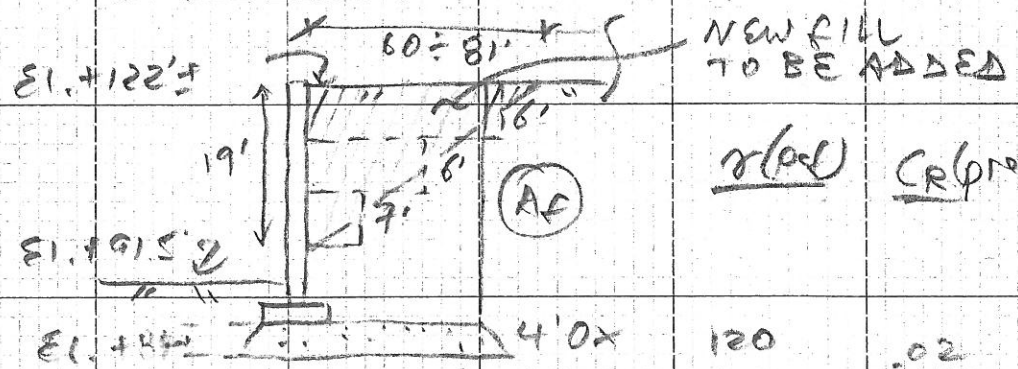
∴ All δ are ≤ 0.6" → no pile downdrag/negative skin friction on piles adjacent to MSE walls (Abutment piles & Pilaster Piles)

Project I-5 HOV SEG. 1
MSE RW 183 Project No. 11135

By MK Date 7/23/12 Checked By LCL Date 9/14/12 Sheet 5 of 16

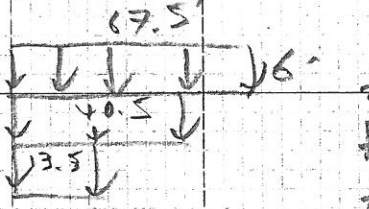
b) SETTLEMENT DUE TO NEW ROADWAY FILL @ MSE WALL 183

1) CONFIG.



	γ(pcf)	Cr(preloaded)
AF	120	.02
Q1	120	.02
Fc2	125	.01

2) LOADING



$P_1 = 6' \times .12 = .72$ ksf
$P_2 = 6' \times .12 = .72$ ksf
$P_2 = 7' \times .12 = .84$ ksf

3) SETTLEMENT ESTIMATE

@ WALL BASE (SEE ATTACHED CALC)

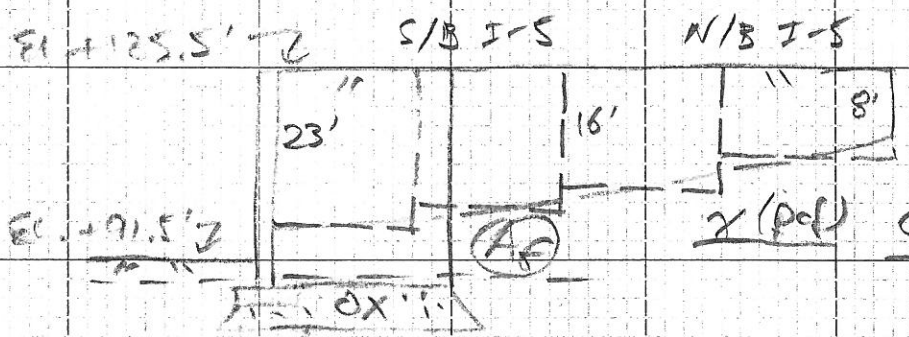
$\delta = .59''$

Project I-5 HOV SEG.1
MSE RW 193 Project No. 11-135

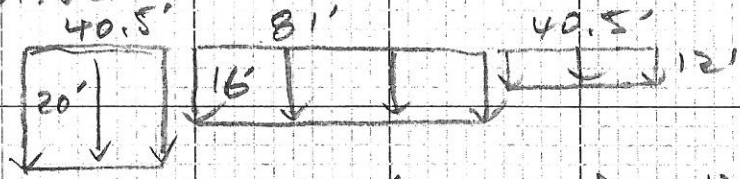
By MK Date 7/23/12 Checked By LL Date 9/14/12 Sheet 6 of 16

c) SETTLEMENT DUE TO NEW ROADWAY FILL @ MSE 193

1) CONFIG.



2) LOADING



$P_1 = 20' \times .12 = 2.4$ ksf
$P_2 = 16' \times .12 = 1.92$ ksf
$P_3 = 12' \times .12 = 1.44$ ksf

3) SETTLEMENT ESTIMATE @ WALL BASE (SEE ATTACHED CALC.)

$\delta = .46''$

7/16

AXIAL PILE CAPACITY

PILAX 4.1

Project: I-5 HOV SEGMENT 1
EMI Project No.: 11-135
Description: Avenida Pico UC
WW 2, SW Pilaster, H=36', HP10x42
Date: 9/11/12 by: MK checked:

UNITS	
Length	Force
ft	K

GWE	GWD
ft	ft
-35.50	35.50

PILE PARAMETERS			
Pile Elev.		Displ. to Mobilize	
Top	Tip	Friction	Bearing
ft	ft	ft	ft
-3.60	-36.00	0.02	0.042

○ Open section
○ HP section
◉ Full section
☐ Allow plugging

E-Modulus	
Top	Tip
K/ft2	K/ft2
4.32E+06	4.32E+06

Circumference		Sectional Area	
Skin	(Unused)	Pile	(Unused)
ft	ft	ft2	ft2
3.300	3.300	0.339	0.705
3.300	3.300	0.339	0.705
3.300	3.300	0.339	0.705

SOIL LAYERS				GRANULAR SOIL-PILE PARAMETERS					COHESIVE SOIL-PILE PARAMETERS			
Description	Top El.	Depth	Total Unit Weight	Friction Angle	Bearing Capacity Factor	Lateral Earth Pressure Coefficients		Skin Friction Angle	Cohesion	Bearing Capacity Factor	Adhesion Factors or "API"	
			γ	ϕ	N_q	K_C	K_T	δ	c	N_C	α_C	α_T
-	ft	ft	K/ft2	deg	-	-	-	deg	K/ft2	-	-	-
Af	0.00	0.00	0.120	32.00	0	1.00	0.50	27.00				
Qt/TC - stiff CH	-3.60	3.60	0.120						1.800	9	0.50	0.50
TC-hard MH	-8.50	8.50	0.125						4.000	9	0.50	0.50

SOIL LAYERS			OVERBURDEN		PILE SKIN FRICTION						PILE END BEARING			TOTAL PILE CAPACITY		
Description	Top El.	Depth	Total Stress	Effect. Stress	Unit Stress		Outside Friction Capacity		Inside Friction Capacity		Unit Stress	Section Capacity	Plug Capacity	Plugged?	Compression	Tension
-	-	-	σ_V	σ'_V	f_C	f_T	Q_{FC}	Q_{FT}	Q'_{FC}	Q'_{FT}	q_E	Q_E	Q'_E	-	Q_C	Q_T
-	-	☑ Interval 1.00	-	-	max: 2.40	max: 2.40	FOS: 1.00	FOS: 1.00	FOS: 1.00	FOS: 1.00	max: 200.00	FOS: 1.00	FOS: 1.00	-	-	-
text	ft	ft	K/ft2	K/ft2	K/ft2	K/ft2	K	K	K	K	K/ft2	K	K	Yes/No	K	K
1-Af	0.00	0.00	0.00	0.00												
1-Af	-1.00	1.00	0.12	0.12												
1-Af	-2.00	2.00	0.24	0.24												
1-Af	-3.00	3.00	0.36	0.36												
1-Af (Pile Top)	-3.60	3.60	0.43	0.43	0.22	0.11	0.0	0.0			0.00	0.0		N/A	0.0	0.0
1-Af	-3.60	3.60	0.43	0.43	0.22	0.11	0.0	0.0			0.00	0.0		N/A	0.0	0.0
2-Qt/TC - stiff CH	-3.60	3.60	0.43	0.43	0.90	0.90	0.0	0.0			16.20	5.5		N/A	5.5	0.0
2-Qt/TC - stiff CH	-4.00	4.00	0.48	0.48	0.90	0.90	1.2	1.2			16.20	5.5		N/A	6.7	1.2
2-Qt/TC - stiff CH	-5.00	5.00	0.60	0.60	0.90	0.90	4.2	4.2			16.20	5.5		N/A	9.6	4.2
2-Qt/TC - stiff CH	-6.00	6.00	0.72	0.72	0.90	0.90	7.1	7.1			16.20	5.5		N/A	12.6	7.1
2-Qt/TC - stiff CH	-7.00	7.00	0.84	0.84	0.90	0.90	10.1	10.1			16.20	5.5		N/A	15.6	10.1
2-Qt/TC - stiff CH	-8.00	8.00	0.96	0.96	0.90	0.90	13.1	13.1			16.20	5.5		N/A	18.6	13.1
2-Qt/TC - stiff CH	-8.50	8.50	1.02	1.02	0.90	0.90	14.6	14.6			16.20	5.5		N/A	20.0	14.6
3-TC-hard MH	-8.50	8.50	1.02	1.02	2.00	2.00	14.6	14.6			36.00	12.2		N/A	26.8	14.6
3-TC-hard MH	-9.00	9.00	1.08	1.08	2.00	2.00	17.9	17.9			36.00	12.2		N/A	30.1	17.9
3-TC-hard MH	-10.00	10.00	1.21	1.21	2.00	2.00	24.5	24.5			36.00	12.2		N/A	36.7	24.5
3-TC-hard MH	-11.00	11.00	1.33	1.33	2.00	2.00	31.1	31.1			36.00	12.2		N/A	43.3	31.1
3-TC-hard MH	-12.00	12.00	1.46	1.46	2.00	2.00	37.7	37.7			36.00	12.2		N/A	49.9	37.7
3-TC-hard MH	-13.00	13.00	1.58	1.58	2.00	2.00	44.3	44.3			36.00	12.2		N/A	56.5	44.3
3-TC-hard MH	-14.00	14.00	1.71	1.71	2.00	2.00	50.9	50.9			36.00	12.2		N/A	63.1	50.9
3-TC-hard MH	-15.00	15.00	1.83	1.83	2.00	2.00	57.5	57.5			36.00	12.2		N/A	69.7	57.5
3-TC-hard MH	-16.00	16.00	1.96	1.96	2.00	2.00	64.1	64.1			36.00	12.2		N/A	76.3	64.1
3-TC-hard MH	-17.00	17.00	2.08	2.08	2.00	2.00	70.7	70.7			36.00	12.2		N/A	82.9	70.7
3-TC-hard MH	-18.00	18.00	2.21	2.21	2.00	2.00	77.3	77.3			36.00	12.2		N/A	89.5	77.3
3-TC-hard MH	-19.00	19.00	2.33	2.33	2.00	2.00	83.9	83.9			36.00	12.2		N/A	96.1	83.9
3-TC-hard MH	-20.00	20.00	2.46	2.46	2.00	2.00	90.5	90.5			36.00	12.2		N/A	102.7	90.5
3-TC-hard MH	-21.00	21.00	2.58	2.58	2.00	2.00	97.1	97.1			36.00	12.2		N/A	109.3	97.1
3-TC-hard MH	-22.00	22.00	2.71	2.71	2.00	2.00	103.7	103.7			36.00	12.2		N/A	115.9	103.7
3-TC-hard MH	-23.00	23.00	2.83	2.83	2.00	2.00	110.3	110.3			36.00	12.2		N/A	122.5	110.3
3-TC-hard MH	-24.00	24.00	2.96	2.96	2.00	2.00	116.9	116.9			36.00	12.2		N/A	129.1	116.9
3-TC-hard MH	-25.00	25.00	3.08	3.08	2.00	2.00	123.5	123.5			36.00	12.2		N/A	135.7	123.5
3-TC-hard MH	-26.00	26.00	3.21	3.21	2.00	2.00	130.1	130.1			36.00	12.2		N/A	142.3	130.1
3-TC-hard MH	-27.00	27.00	3.33	3.33	2.00	2.00	136.7	136.7			36.00	12.2		N/A	148.9	136.7
3-TC-hard MH	-28.00	28.00	3.46	3.46	2.00	2.00	143.3	143.3			36.00	12.2		N/A	155.5	143.3
3-TC-hard MH	-29.00	29.00	3.58	3.58	2.00	2.00	149.9	149.9			36.00	12.2		N/A	162.1	149.9
3-TC-hard MH	-30.00	30.00	3.71	3.71	2.00	2.00	156.5	156.5			36.00	12.2		N/A	168.7	156.5
3-TC-hard MH	-31.00	31.00	3.83	3.83	2.00	2.00	163.1	163.1			36.00	12.2		N/A	175.3	163.1
3-TC-hard MH	-32.00	32.00	3.96	3.96	2.00	2.00	169.7	169.7			36.00	12.2		N/A	181.9	169.7
3-TC-hard MH	-33.00	33.00	4.08	4.08	2.00	2.00	176.3	176.3			36.00	12.2		N/A	188.5	176.3
3-TC-hard MH	-34.00	34.00	4.21	4.21	2.00	2.00	182.9	182.9			36.00	12.2		N/A	195.1	182.9
3-TC-hard MH	-35.00	35.00	4.33	4.33	2.00	2.00	189.5	189.5			36.00	12.2		N/A	201.7	189.5
3-TC-hard MH (Pile T	-36.00	36.00	4.46	4.43	2.00	2.00	196.1	196.1			36.00	12.2		N/A	208.3	196.1

Notes:
[a] Specified maximum limit reached (max fc, max ft, max q).
[b] Plugged condition: Q'E exceeds Q'FC. Q'FC is not used in total compressive capacity QC.
[c] Plug traveled downward (Q'FC exceeds Q'E).
[d] Q'E is less than Q'FC and not used in total compressive capacity QC.
[e] Inside soil dead weight reached.

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AXIAL PILE CAPACITY

PILAX 4.1

Project: I-5 HOV SEGMENT 1
EMI Project No.: 11-135
Description: Avenida Pico UC
WW 1, SE Pilaster, H=32', HP10x42
Date: 9/11/12 by: MK checked:

UNITS	
Length	Force
ft	K

GWE	GWD
ft	ft
-55.00	55.00

PILE PARAMETERS			
Pile Elev.		Displ. to Mobilize	
Top	Tip	Friction	Bearing
ft	ft	ft	ft
-3.80	-60.00	0.02	0.042

○ Open section
○ HP section
◉ Full section
☐ Allow plugging

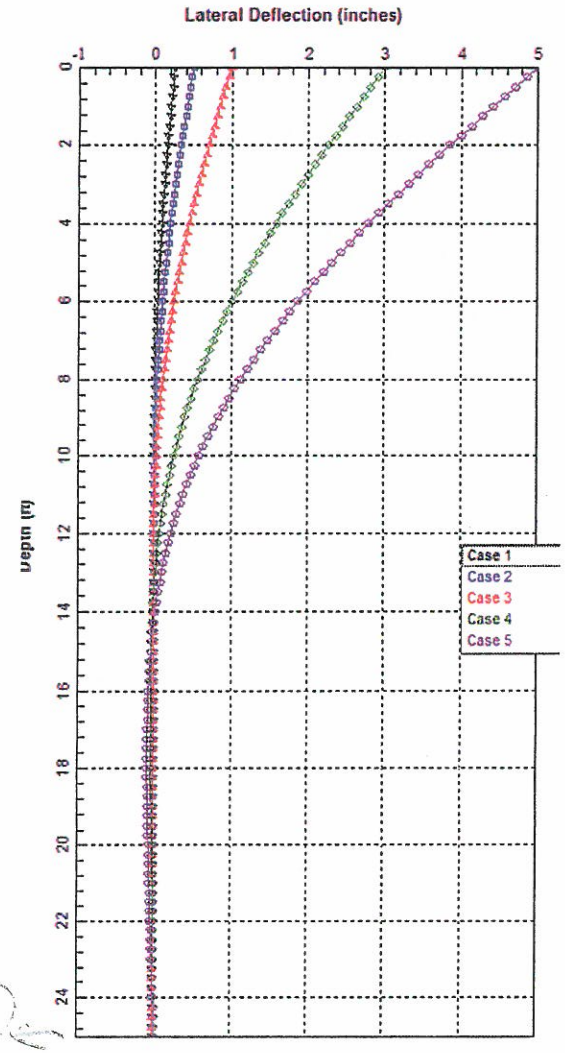
E-Modulus	
Top	Tip
K/ft2	K/ft2
4.32E+06	4.32E+06

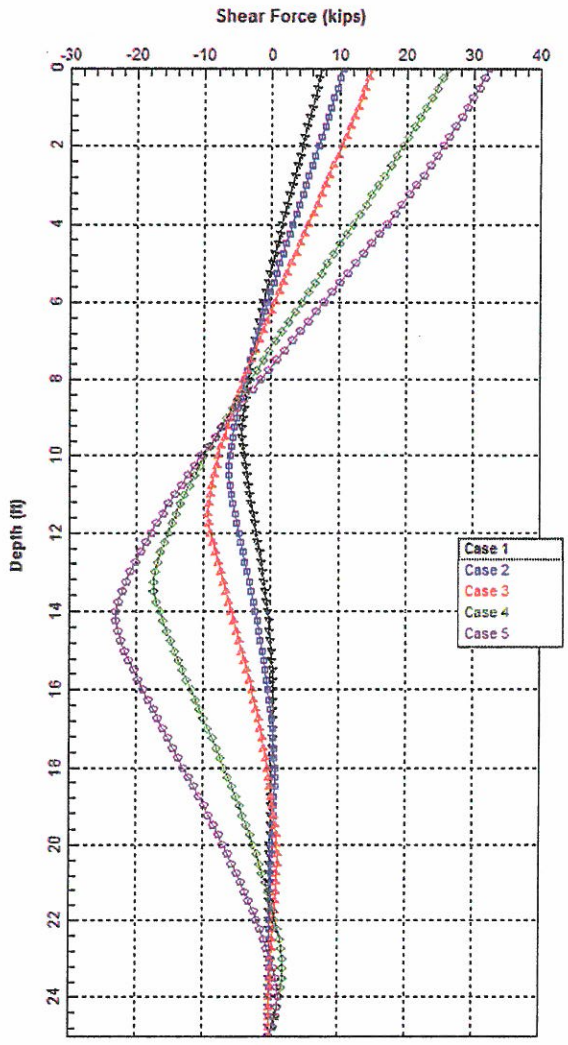
SOIL LAYERS				GRANULAR SOIL-PILE PARAMETERS					COHESIVE SOIL-PILE PARAMETERS				Circumference		Sectional Area	
Description	Top El.	Depth	Total Unit Weight	Friction Angle	Bearing Capacity Factor	Lateral Earth Pressure Coefficients		Skin Friction Angle	Cohesion	Bearing Capacity Factor	Adhesion Factors or "API"		Skin	(Unused)	Pile	(Unused)
			γ	ϕ	N_q	K_C	K_T	δ	c	N_C	α_C	α_T				
-	ft	ft	K/ft2	deg	-	-	-	deg	K/ft2	-	-	-	ft	ft	ft2	ft2
Af- Clay/Silt	0.00	0.00	0.120	32.00	0	1.00	0.50	27.00					3.300	3.300	0.339	0.705
Qt/TC - stiff CH	-13.00	13.00	0.120						1.800	9	0.50	0.50	3.300	3.300	0.339	0.705
TC-hard MH	-55.00	55.00	0.125						4.000	9	0.50	0.50	3.300	3.300	0.339	0.705

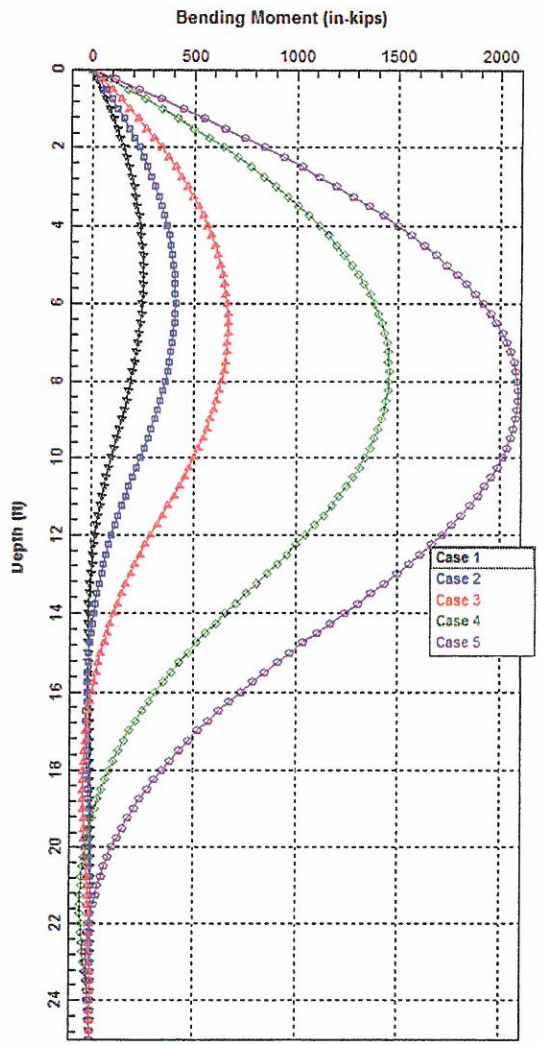
SOIL LAYERS			OVERBURDEN		PILE SKIN FRICTION						PILE END BEARING			TOTAL PILE CAPACITY		
Description	Top El.	Depth	Total Stress	Effect. Stress	Unit Stress		Outside Friction Capacity		Inside Friction Capacity		Unit Stress	Section Capacity	Plug Capacity	Plugged?	Compression	Tension
			σ_V	σ'_V	f_C	f_T	Q_{FC}	Q_{FT}	Q'_{FC}	Q'_{FT}	q_E	Q_E	Q'_E		Q_C	Q_T
-	-	☑ Interval 2.00	-	-	max: 2.40	max: 2.40	FOS: 1.00	FOS: 1.00	FOS: 1.00	FOS: 1.00	max: 200.00	FOS: 1.00	FOS: 1.00	-	-	-
text	ft	ft	K/ft2	K/ft2	K/ft2	K/ft2	K	K	K	K	K/ft2	K	K	Yes/No	K	K
1-Af- Clay/Silt	0.00	0.00	0.00	0.00												
1-Af- Clay/Silt	-2.00	2.00	0.24	0.24												
1-Af- Clay/Silt (Pi	-3.80	3.80	0.46	0.46	0.23	0.12	0.0	0.0			0.00	0.0		N/A	0.0	0.0
1-Af- Clay/Silt	-4.00	4.00	0.48	0.48	0.24	0.12	0.2	0.1			0.00	0.0		N/A	0.2	0.1
1-Af- Clay/Silt	-6.00	6.00	0.72	0.72	0.37	0.18	2.2	1.1			0.00	0.0		N/A	2.2	1.1
1-Af- Clay/Silt	-8.00	8.00	0.96	0.96	0.49	0.24	5.0	2.5			0.00	0.0		N/A	5.0	2.5
1-Af- Clay/Silt	-10.00	10.00	1.20	1.20	0.61	0.31	8.6	4.3			0.00	0.0		N/A	8.6	4.3
1-Af- Clay/Silt	-12.00	12.00	1.44	1.44	0.73	0.37	13.1	6.5			0.00	0.0		N/A	13.1	6.5
1-Af- Clay/Silt	-13.00	13.00	1.56	1.56	0.79	0.40	15.6	7.8			0.00	0.0		N/A	15.6	7.8
2-Qt/TC - stiff CH	-13.00	13.00	1.56	1.56	0.90	0.90	15.6	7.8			16.20	5.5		N/A	21.1	7.8
2-Qt/TC - stiff CH	-14.00	14.00	1.68	1.68	0.90	0.90	18.6	10.8			16.20	5.5		N/A	24.1	10.8
2-Qt/TC - stiff CH	-16.00	16.00	1.92	1.92	0.90	0.90	24.5	16.7			16.20	5.5		N/A	30.0	16.7
2-Qt/TC - stiff CH	-18.00	18.00	2.16	2.16	0.90	0.90	30.4	22.6			16.20	5.5	20K	N/A	35.9	22.6
2-Qt/TC - stiff CH	-20.00	20.00	2.40	2.40	0.90	0.90	36.4	28.6			16.20	5.5		N/A	41.9	28.6
2-Qt/TC - stiff CH	-22.00	22.00	2.64	2.64	0.90	0.90	42.3	34.5			16.20	5.5		N/A	47.8	34.5
2-Qt/TC - stiff CH	-24.00	24.00	2.88	2.88	0.90	0.90	48.3	40.5			16.20	5.5		N/A	53.8	40.5
2-Qt/TC - stiff CH	-26.00	26.00	3.12	3.12	0.90	0.90	54.2	46.4			16.20	5.5		N/A	59.7	46.4
2-Qt/TC - stiff CH	-28.00	28.00	3.36	3.36	0.90	0.90	60.1	52.3			16.20	5.5		N/A	65.6	52.3
2-Qt/TC - stiff CH	-30.00	30.00	3.60	3.60	0.90	0.90	66.1	58.3			16.20	5.5		N/A	71.6	58.3
2-Qt/TC - stiff CH	-32.00	32.00	3.84	3.84	0.90	0.90	72.0	64.2			16.20	5.5		N/A	77.5	64.2
2-Qt/TC - stiff CH	-34.00	34.00	4.08	4.08	0.90	0.90	78.0	70.2			16.20	5.5		N/A	83.5	70.2
2-Qt/TC - stiff CH	-36.00	36.00	4.32	4.32	0.90	0.90	83.9	76.1			16.20	5.5		N/A	89.4	76.1
2-Qt/TC - stiff CH	-38.00	38.00	4.56	4.56	0.90	0.90	89.8	82.0			16.20	5.5		N/A	95.3	82.0
2-Qt/TC - stiff CH	-40.00	40.00	4.80	4.80	0.90	0.90	95.8	88.0			16.20	5.5	110K	N/A	101.3	88.0
2-Qt/TC - stiff CH	-42.00	42.00	5.04	5.04	0.90	0.90	101.7	93.9			16.20	5.5		N/A	107.2	93.9
2-Qt/TC - stiff CH	-44.00	44.00	5.28	5.28	0.90	0.90	107.7	99.9			16.20	5.5		N/A	113.2	99.9
2-Qt/TC - stiff CH	-46.00	46.00	5.52	5.52	0.90	0.90	113.6	105.8			16.20	5.5		N/A	119.1	105.8
2-Qt/TC - stiff CH	-48.00	48.00	5.76	5.76	0.90	0.90	119.5	111.7			16.20	5.5		N/A	125.0	111.7
2-Qt/TC - stiff CH	-50.00	50.00	6.00	6.00	0.90	0.90	125.5	117.7			16.20	5.5		N/A	131.0	117.7
2-Qt/TC - stiff CH	-52.00	52.00	6.24	6.24	0.90	0.90	131.4	123.6			16.20	5.5	140K	N/A	136.9	123.6
2-Qt/TC - stiff CH	-54.00	54.00	6.48	6.48	0.90	0.90	137.4	129.6			16.20	5.5		N/A	142.9	129.6
2-Qt/TC - stiff CH	-55.00	55.00	6.60	6.60	0.90	0.90	140.3	132.5			16.20	5.5		N/A	145.8	132.5
3-TC-hard MH	-55.00	55.00	6.60	6.60	2.00	2.00	140.3	132.5			36.00	12.2		N/A	152.5	132.5
3-TC-hard MH	-56.00	56.00	6.73	6.66	2.00	2.00	146.9	139.1			36.00	12.2		N/A	159.1	139.1
3-TC-hard MH	-58.00	58.00	6.98	6.79	2.00	2.00	160.1	152.3			36.00	12.2		N/A	172.3	152.3
3-TC-hard MH (Pile T	-60.00	60.00	7.23	6.91	2.00	2.00	173.3	165.5			36.00	12.2		N/A	185.5	165.5

Notes:
[a] Specified maximum limit reached (max fc, max ft, max q).
[b] Plugged condition: Q'E exceeds Q'FC. Q'FC is not used in total compressive capacity QC.
[c] Plug traveled downward (Q'FC exceeds Q'E).
[d] Q'E is less than Q'FC and not used in total compressive capacity QC.
[e] Inside soil dead weight reached.

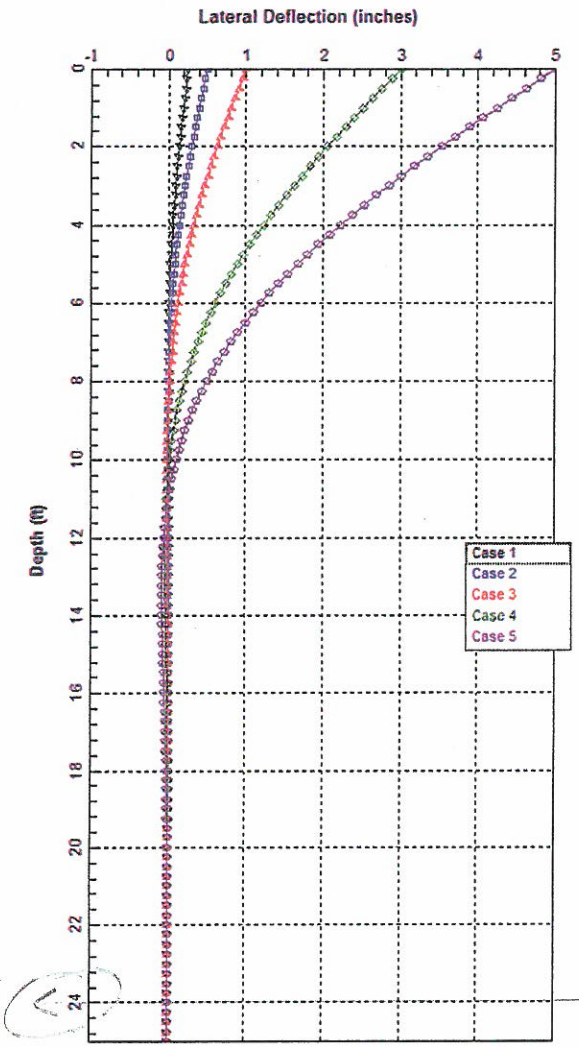
Lateral solutions for
Wing Walls, HP10x42, strong axis

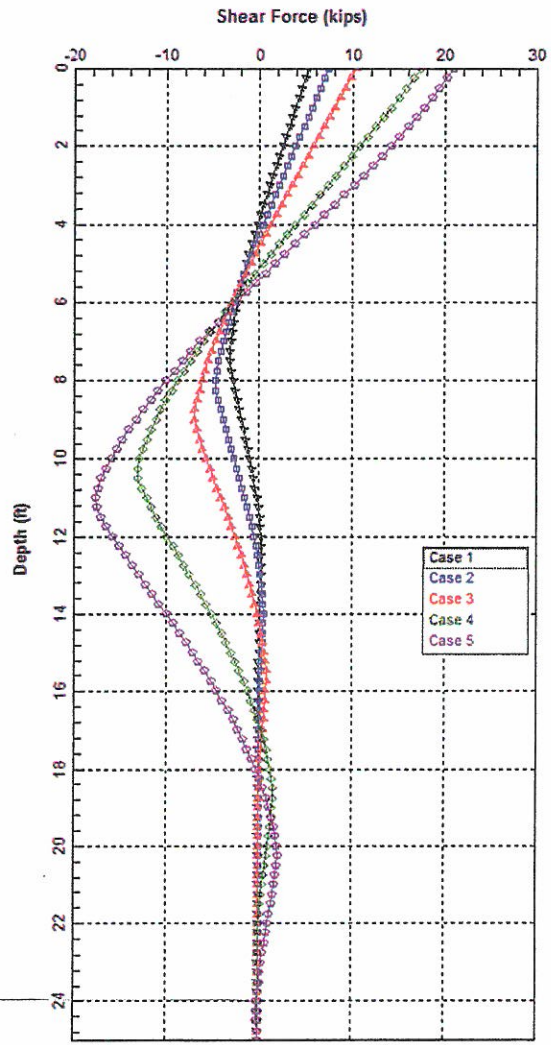


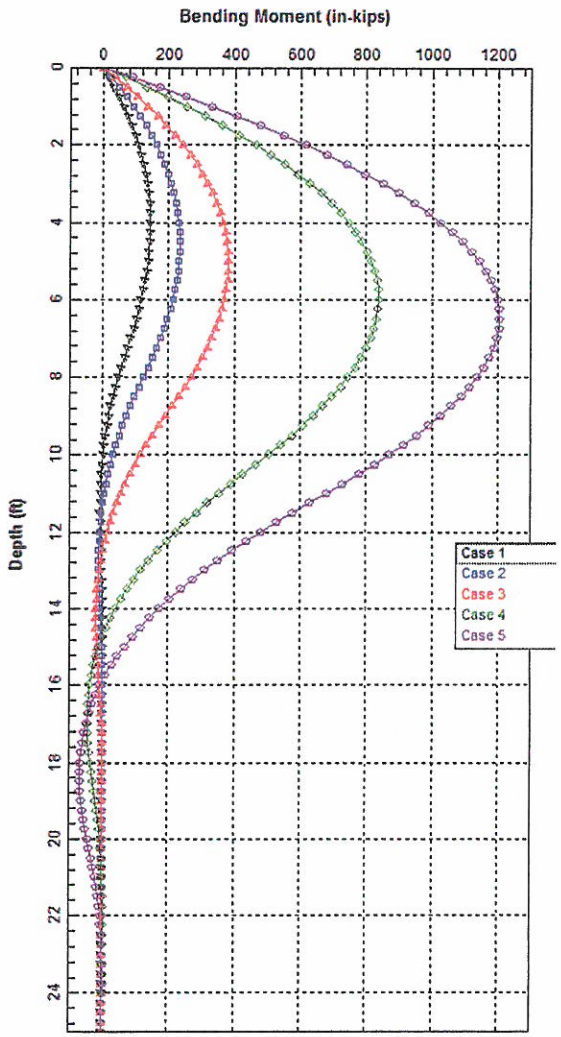




Lateral solutions for
Wing Walls, HP10x42, weak axis







PILEGROUP SETTLEMENT CALCULATION
I-5 HOV Seg 1, SW PILASTER, 9/11/12

Pile Load =	816	kips
Pile Cap Width =	24	ft
Pile Cap Length =	10	ft
Bottom of Footing =	0	ft
Pile Length for the Calculation =	17	ft
Equivalent Pile Cap Width =	29.666667	ft
Bottom of b Length =	15.666667	ft
Equivalent Footing Bottom of Footing =	-11.333333	ft
Bearing Pressure =	1.8	ksf

Load distribution 0.5 :1 (H:V)

Layer	Elevations 0	Thickness below equivakent footing ft	Thicknes s below bottom of footing ft	γ psf	σvo ksf	Δσ ksf	Cc'	Settlement
1	-2.0	0.0	2.0	120	0.24	1.76	0.025	0.00 "
2	-5.0	0.0	3.0	120	0.60	1.76	0.040	0.00 "
3	-12.0	0.7	7.0	120	1.40	1.70	0.025	0.07 "
4	-32.0	20.0	20.0	120	2.64	0.77	0.025	0.67 "
5	-55.0	23.0	23.0	65	4.59	0.28	0.025	0.18 "
6	-86.0	31.0	31.0	65	6.34	0.12	0.025	0.08 "
7		0.0	-86.0		7.35	0.09		0.00 "
	307.0							
		74.7	0.0		**Total secondary settlement=**			**0.99 "**

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PILEGROUP SETTLEMENT CALCULATION
I-5 HOV Seg 1, WW 1 SE PILASTER, 9/11/12

Pile Load =	626	kips
Pile Cap Width =	10	ft
Pile Cap Length =	21.17	ft
Bottom of Footing =	0	ft
Pile Length for the Calculation =	11	ft
Equivalent Pile Cap Width =	13.666667	ft
Bottom of b Length =	24.836667	ft
Equivalent Footing Bottom of Footing =	-7.3333333	ft
Bearing Pressure =	1.8	ksf

Load distribution 0.5 :1 (H:V)

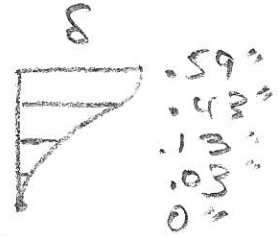
Layer	Elevations 0	Thickness below equivakent footing ft	Thicknes s below bottom of footing ft	γ psf	σvo ksf	Δσ ksf	Cc'	Settlement
1	-3.0	0.0	3.0	120	0.36	1.84	0.025	0.00 "
2	-5.0	0.0	2.0	120	0.60	1.84	0.025	0.00 "
3	-9.0	1.7	4.0	120	0.98	1.68	0.025	0.22 "
4	-34.0	25.0	25.0	120	2.58	0.58	0.025	0.66 "
5	-40.0	6.0	6.0	65	4.28	0.27	0.030	0.06 "
6	-51.0	11.0	11.0	65	4.83	0.19	0.025	0.06 "
7	307.0	0.0	-51.0		5.19	0.16		0.00 "
		43.7	0.0		**Total secondary settlement=**			**0.99 "** ≈ 1"

SETTLEMENT CALCULATION FOR SERVICE-1 CASE

Project Title: 11-135/I-5 HOV Seg 1 MSE 183
@ UC Abutment 1, south side, after preloading and MSE construction
By: M. Kapuskar, 5/3/12, 7/23/12

applied pressure p: 2.28 ksf

Layer	USCS	Depth (ft)	Unit Weight (pcf)	C_c	ΔH (ft)	Middepth (ft)	σ'_v (ksf)	Δp (ksf)	δ (in)
A	Af	0.0	0.120	0	-	-	0.00	2.28	0.00
B	Af	8.0	0.120	0.000	8.0	4.0	0.48	1.20	0.00
C	Qt	19.5	0.120	0.020	11.5	13.8	1.65	0.93	0.00
D	Qt	25.5	0.120	0.020	6.0	22.5	2.70	0.77	0.16
E	Qt	50.5	0.060	0.020	25.0	38.0	4.56	0.55	0.30
F	Tc	67.5	0.065	0.010	17.0	59.0	6.57	0.40	0.10
	Tc	81.0		0.010	13.5	74.3	7.52	0.33	0.03
								δ_{tot}=	0.59



Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

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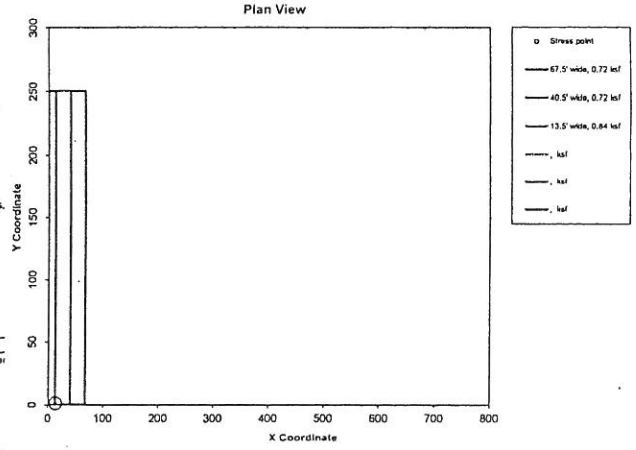
ELASTIC STRESS CALCULATION

Project Title: 11-135/I-5 HOV Seg 1 MSE 183
@ UC Abutment 1, south side
By: M. Kapuskar, 5/3/12

Notes:
1. This spreadsheet calculates 3D pressures in elastic (x,y,z) halfspace medium due to rectangular pressures on its surface using elastic 3D Boussinesq solutions (Poulos 19XX).
2. Input is in yellow cells. All worksheets can be edited freely. Save as Macro-Enabled file (*.xlsm).
3. PLAN shows the horizontal plane of X and Y. X and Y may be negative. Z is depth (always positive). Plan shows a stress point and up to 6 rectangular surface pressures.
4. STRESS POINT is located anywhere on x-y plane, including inside and outside pressure rectangles. The coordinates may be negative. Stresses due to loads will superimposed at this location.
5. PRESSURE RECTANGLE is placed by its (small-x, small-y) corner. The coordinates may be anywhere on x-y plane, including negative.
   Length (always positive) is parallel to X, Width W (always positive) is parallel to Y axis.
   Pressure is vertical and uniform. It is positive in Z (downward) and may be negative (upward).
   Loads may be superimposed and overlapped.
6. STRESS PROFILES are calculated at specified depths below stress point. Stresses are positive if pressure is positive, negative if pressure is negative. Stresses are 1/2 the input pressure under borders, and 1/4 under corners.

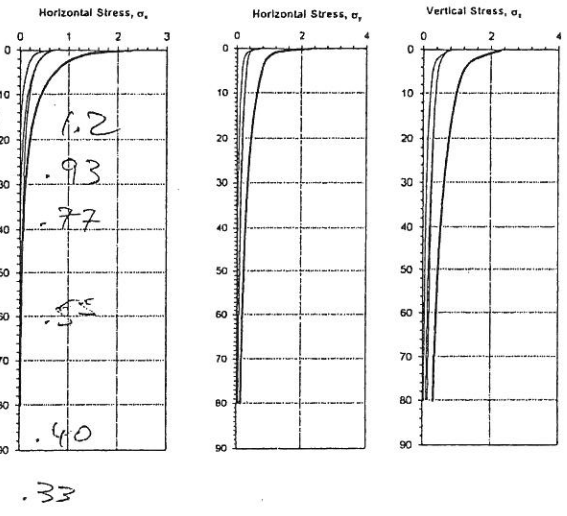
UNITS
length unit= ft
pressure unit= ksf

STRESS POINT LOCATION
X = 13 ft
Y = 1 ft



	Load No. 1	Load No. 2	Load No. 3	Load No. 4	Load No. 5	Load No. 6	Total
	67.5' wide	40.5' wide	13.5' wide				All Loads Superimpose
Load name =							
Pressure, p =	0.72 ksf	Pressure= 0.72 ksf	Pressure= 0.84 ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	
Length along X =	67.5 ft	Length= 40.5 ft	Length= 13.5 ft	Length= ft	Length= ft	Length= ft	
Width along Y =	250 ft	Width= 250 ft	Width= 250 ft	Width= ft	Width= ft	Width= ft	
Lower left corner X =	0 ft	X = 0 ft	X = 0 ft	X = ft	X = ft	X = ft	
Lower left corner Y =	0 ft	Y = 0 ft	Y = 0 ft	Y = ft	Y = ft	Y = ft	

Depth	Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Total Stresses		
z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
0.00	0.72	0.72	0.72	0.72	0.72	0.72	0.84	0.84	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.28	2.28	2.28
0.10	0.69	0.67	0.72	0.69	0.67	0.72	0.72	0.75	0.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.11	2.10	2.28
0.20	0.67	0.63	0.72	0.67	0.63	0.72	0.61	0.67	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.95	1.92	2.27
0.50	0.60	0.52	0.71	0.60	0.52	0.71	0.42	0.47	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.62	1.51	2.16
1.00	0.52	0.41	0.65	0.51	0.41	0.65	0.31	0.32	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.34	1.15	1.81
2.50	0.39	0.34	0.53	0.38	0.34	0.53	0.21	0.22	0.39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.98	0.89	1.44
5.00	0.30	0.31	0.45	0.28	0.30	0.44	0.14	0.17	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.72	0.78	1.16
7.50	0.24	0.28	0.41	0.21	0.27	0.41	0.09	0.15	0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.70	1.07
10.00	0.20	0.26	0.38	0.17	0.24	0.38	0.06	0.13	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.63	0.99
12.50	0.18	0.24	0.36	0.13	0.22	0.36	0.04	0.11	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.58	0.93
15.00	0.15	0.23	0.35	0.11	0.20	0.34	0.03	0.10	0.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.53	0.87
17.50	0.14	0.21	0.33	0.09	0.19	0.32	0.02	0.09	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.49	0.82
20.00	0.12	0.20	0.31	0.07	0.17	0.30	0.02	0.08	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.21	0.45	0.77
22.50	0.11	0.19	0.30	0.06	0.16	0.28	0.01	0.07	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.42	0.73
25.00	0.10	0.18	0.28	0.05	0.15	0.27	0.01	0.07	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16	0.39	0.68
27.50	0.09	0.17	0.28	0.04	0.14	0.25	0.01	0.06	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.37	0.66
30.00	0.08	0.16	0.27	0.03	0.13	0.24	0.01	0.06	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.35	0.63
32.50	0.07	0.16	0.26	0.03	0.12	0.23	0.00	0.05	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.33	0.60
35.00	0.07	0.15	0.25	0.02	0.11	0.22	0.00	0.05	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.31	0.57
37.50	0.06	0.14	0.25	0.02	0.11	0.21	0.00	0.04	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.29	0.55
40.00	0.06	0.14	0.24	0.02	0.10	0.20	0.00	0.04	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.28	0.53
42.50	0.05	0.13	0.23	0.02	0.10	0.19	0.00	0.04	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.27	0.51
45.00	0.05	0.13	0.23	0.01	0.09	0.18	0.00	0.04	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.25	0.48
47.50	0.04	0.12	0.22	0.01	0.09	0.17	0.00	0.04	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.24	0.47
50.00	0.04	0.12	0.21	0.01	0.08	0.17	0.00	0.03	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.23	0.45
52.50	0.04	0.11	0.21	0.01	0.08	0.16	0.00	0.03	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.22	0.44
55.00	0.03	0.11	0.20	0.01	0.07	0.16	0.00	0.03	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.21	0.42
57.50	0.03	0.10	0.20	0.01	0.07	0.15	0.00	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.20	0.41
60.00	0.03	0.10	0.19	0.01	0.07	0.14	0.00	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.19	0.40
62.50	0.03	0.10	0.19	0.01	0.06	0.14	0.00	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.19	0.38
65.00	0.02	0.09	0.18	0.01	0.06	0.13	0.00	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.18	0.37
70.00	0.02	0.09	0.18	0.00	0.05	0.13	0.00	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.16	0.35
75.00	0.02	0.08	0.17	0.00	0.05	0.12	0.00	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.15	0.33
80.00	0.02	0.07	0.16	0.00	0.05	0.11	0.00	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.14	0.32



SETTLEMENT CALCULATION FOR SERVICE-1 CASE

Project Title: 11-135/I-5 HOV Seg 1 MSE 193
@ UC Abutment 2, south side, after preloading and MSE construction
By: M. Kapuskar, 7/23/12

applied pressure p: 2.4 ksf

Layer	USCS	Depth (ft)	Unit Weight (pcf)	C_c	ΔH (ft)	Middepth (ft)	σ'_v (ksf)	Δp (ksf)	δ (in)
A	Af	0.0	0.120	0	-	-	0.00	2.40	0.00
B	Af	6.0	0.120	0.000	6.0	3.0	0.36	1.70	0.00
C	Qt	12.5	0.120	0.000	6.5	9.3	1.11	1.30	0.00
D	Tc	22.5	0.120	0.013	10.0	17.5	2.10	1.10	0.00
E	Tc	32.5	0.120	0.010	10.0	27.5	3.30	0.94	0.17
F	Tc	49.5	0.060	0.010	17.0	41.0	4.92	0.81	0.14
	Tc	81.0		0.010	31.5	65.3	6.89	0.68	0.15
								δ_{tot}=	0.46

δ
.46"
.29"
.15"
0"
~1/2"

Note: Settlement per consolidation equation $\delta=\Delta H*C_c*\log((\sigma'_v+\Delta p)/\sigma'_v)$

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ELASTIC STRESS CALCULATION

Project Title: 11-135/I-5 HOV Seg 1 MSE 193
@ UC Abutment 2, centerline
By: M. Kapuskar, 4/16/12

Notes:

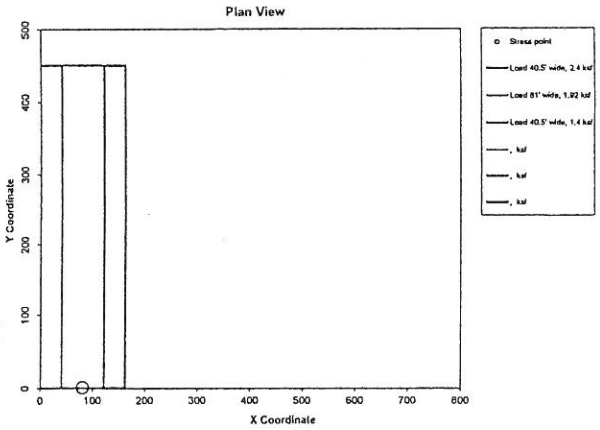
1. This spreadsheet calculates 3D pressures in elastic (x,y,z) halfspace medium due to rectangular pressures on its surface using elastic 3D Boussinesq solutions (Poulos 19XX).
2. Input is in yellow cells. All worksheets can be edited freely. Save as Macro-Enabled file (*.xlsm).
3. PLAN shows the horizontal plane of X and Y. X and Y may be negative. Z is depth (always positive). Plan shows a stress point and up to 6 rectangular surface pressures.
4. STRESS POINT is located anywhere on x-y plane, including inside and outside pressure rectangles. The coordinates may be negative. Stresses due to loads will superimposed at this location.
5. PRESSURE RECTANGLE is placed by its (small-x, small-y) corner. The coordinates may be anywhere on x-y plane, including negative.
   Length (always positive) is parallel to X. Width W (always positive) is parallel to Y axis.
   Pressure is vertical and uniform. It is positive in Z (downward) and may be negative (upward).
   Loads may be superimposed and overlapped.
6. STRESS PROFILES are calculated at specified depths below stress point. Stresses are positive if pressure is positive, negative if pressure is negative. Stresses are 1/2 the input pressure under borders, and 1/4 under corners.

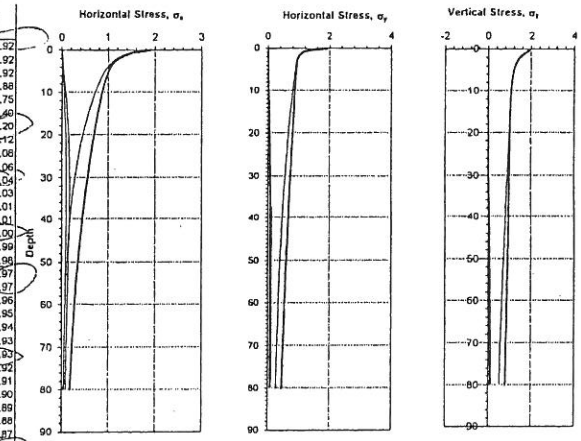
UNITS
length unit= ft
pressure unit= ksf

STRESS POINT LOCATION
X = 81 ft
Y = 1 ft

	Load No. 1	Load No. 2	Load No. 3	Load No. 4	Load No. 5	Load No. 6	Total
Load name =	Load 40.5' wide	Load 81' wide	Load 40.5' wide				All Loads Superimposed
Pressure, p =	2.40 ksf	Pressure= 1.92 ksf	Pressure= 1.40 ksf	Pressure= ksf	Pressure= ksf	Pressure= ksf	
Length along X =	40.5 ft	Length= 81 ft	Length= 40.5 ft	Length= ft	Length= ft	Length= ft	
Width along Y =	450 ft	Width= 450 ft	Width= 450 ft	Width= ft	Width= ft	Width= ft	
Lower left corner X =	0 ft	X = 40.5 ft	X = 121.5 ft	X = ft	X = ft	X = ft	
Lower left corner Y =	0 ft	Y = 0 ft	Y = 0 ft	Y = ft	Y = ft	Y = ft	

Depth	Stresses			Stresses			Stresses			Stresses			Stresses			Stresses			Total Stresses		
z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z	σ_x	σ_y	σ_z
ft	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf	ksf
0.00	0.00	0.00	0.00	1.92	1.92	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.92	1.92	1.92
0.10	0.00	0.00	0.00	1.86	1.80	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.86	1.80	1.92
0.20	0.00	0.00	0.00	1.79	1.68	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.80	1.68	1.92
0.50	0.00	0.00	0.00	1.62	1.38	1.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.63	1.39	1.88
1.00	0.01	0.00	0.00	1.41	1.12	1.75	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.42	1.13	1.75
2.50	0.02	0.01	0.00	1.12	0.94	1.40	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.15	0.96	1.40
5.00	0.05	0.02	0.00	0.83	0.89	1.20	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.92	1.20
7.50	0.07	0.03	0.00	0.82	0.85	1.12	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.93	0.90	1.12
10.00	0.09	0.04	0.00	0.73	0.81	1.08	0.05	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.87	0.88	1.08
12.50	0.11	0.05	0.01	0.65	0.77	1.05	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.86	1.06
15.00	0.12	0.06	0.01	0.58	0.74	1.02	0.07	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.84	1.04
17.50	0.14	0.07	0.01	0.52	0.71	1.00	0.08	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.82	1.03
20.00	0.15	0.08	0.02	0.46	0.68	0.98	0.09	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.80	1.01
22.50	0.16	0.09	0.03	0.41	0.65	0.96	0.09	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.78	1.01
25.00	0.16	0.09	0.03	0.36	0.62	0.94	0.10	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.77	1.00
27.50	0.17	0.10	0.04	0.32	0.59	0.92	0.10	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.75	0.99
30.00	0.17	0.10	0.05	0.29	0.56	0.90	0.10	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.56	0.73	0.98
32.50	0.17	0.11	0.06	0.26	0.54	0.88	0.10	0.06	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.53	0.71	0.97
35.00	0.17	0.11	0.07	0.23	0.52	0.86	0.10	0.07	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.70	0.97
37.50	0.17	0.12	0.08	0.21	0.50	0.84	0.10	0.07	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.47	0.68	0.96
40.00	0.17	0.12	0.08	0.18	0.48	0.82	0.10	0.07	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.66	0.95
42.50	0.16	0.12	0.09	0.16	0.46	0.80	0.09	0.07	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.65	0.94
45.00	0.16	0.12	0.10	0.15	0.44	0.77	0.09	0.07	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.63	0.93
47.50	0.15	0.12	0.11	0.13	0.42	0.75	0.09	0.07	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.37	0.62	0.93
50.00	0.15	0.12	0.11	0.12	0.41	0.73	0.09	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.60	0.92
52.50	0.14	0.12	0.12	0.11	0.39	0.72	0.08	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.33	0.59	0.91
55.00	0.14	0.12	0.13	0.10	0.38	0.70	0.08	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.32	0.57	0.90
57.50	0.13	0.12	0.13	0.09	0.36	0.68	0.08	0.07	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.56	0.89
60.00	0.13	0.12	0.14	0.08	0.35	0.66	0.07	0.07	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.28	0.55	0.88
62.50	0.12	0.12	0.14	0.07	0.34	0.64	0.07	0.07	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.53	0.87
65.00	0.12	0.12	0.15	0.07	0.33	0.63	0.07	0.07	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.52	0.86
70.00	0.11	0.12	0.15	0.06	0.31	0.60	0.06	0.07	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.22	0.50	0.84
75.00	0.10	0.12	0.16	0.05	0.29	0.57	0.06	0.07	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.48	0.82
80.00	0.09	0.11	0.16	0.04	0.27	0.54	0.05	0.07	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.45	0.80





APPENDIX D

CALTRANS REVIEW COMMENTS AND EMI RESPONSES

EXTERNAL SUBMITTAL REVIEW

PROJECT: INTERSTATE 5 HOV IMPROVEMENT
PROJECT No. 1200020277

EA No.: 12-0F96A	
Agency: CalTrans	
Submittal No.	Title: FR for RW181, 183,193, and 203 (I-5 HOV, Segment 1) by EMI, 5/29/2012

Lead:	Date: 8/17/2012
Technical Discipline: Geotechnical	

ACTION (30, 60, 85%): RL = Revise in Later Submittal RI = Revise Immediately & OTS Review

30, 60, 85% SUBMITTAL DISPOSITION (check one): ( )Approved, ( ) Approved as Noted for Correction, ( ) Rejected, Revise & Resubmit, ( ) Record Only
CODE: A - Accept/will comply, B - Agency Action, C - Clarify/Discuss, D - Delete Comment, E - Different Submittal

FINAL SUBMITTAL (100%) DISPOSITION (check one): ( ) Approved, (X) Approved as Noted for Correction, ( ) Rejected, Revise & Resubmit, ( ) Record Only

FILLED OUT BY REVIEWER						FILLED OUT BY RESPONDER		FILLED OUT AT RESOLUTION MEETING			For RFC Use Only	
No.	Plan/SSP/ Page No.	Reviewer	Reviewer Comment No.	Comments	Action	Initial Code	Response	Final Code	Verify (1)	Verify (2)	Verify (3)	Verify (4)
1	Page 3, Table 1	H.Liu	1	Please use "A-Line" (I-5 center-line) station to replace "AP3" station. The station in the table should be consisent with what was used in LOTBS for quick reference.	RI		Comply.					
2	Section 1.2, Figure 2	H.Liu	2	Please show roadway name and north direction on wall location plan	RI		Comply.					
3	Page 5, Table 2	H.Liu	3	Please use "A-Line" station/offset, instead of northing/easting, for boring location description, which was already suggested in the first paragraph of Section 2.1	RI		Comply.					
4	Page 13, Table 3	H.Liu	4	Recommend using "elevation" to define the soil layers. This will provide easy reference to the LOTBS and footing information presented in Table 1 of this report.	RI		Comply.					
5	Page 16, Section 5.4.1.1	H.Liu	5	Please specify the maximum differential settlement along the MSE wall alignment. This may help structure designer of the wall to choose right panel size/joint width, avoiding panel distress, should future differential settlement be excessive.	RI		Comply.					

(1) Responder's Initials - concur with response.
(2) Reviewer's Initials - concur with response.
(3) Kiewit/HNTB initials that comment was satisfied.
(4) Agency initials that comment was satisfied.

EA No.: 12-0F96A	
Agency: CalTrans	
Submittal No.	Title: FR for RW181, 183,193, and 203 (I-5 HOV, Segment 1) by EMI, 5/29/2012

Lead:	Date: 8/17/2012
Technical Discipline: Geotechnical	

ACTION (30, 60, 85%): RL = Revise in Later Submittal RI = Revise Immediately & OTS Review

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No.	Plan/SSP/ Page No.	Reviewer	Reviewer Comment No.	Comments	Action	Initial Code	Response	Final Code	Verify (1)	Verify (2)	Verify (3)	Verify (4)
6	Page 18, Section 5.4.1.2	H.Liu	6	Preloading as described in this section may eliminate dragload on pile introduced by permanent settlement. Dragload can still be created by elastic settlement upon re-loading (MSE approach embankment) after pile installation. An elastic settlement profile at abutment location may be needed to evaluate dragload on bridge foundations	RI		We agree that after the surcharge is removed and abutment piles are installed, there is "elastic" settlement when MSE wall (approach embankment) is constructed. Our settlement calculations using the recompression index showed an "elastic" settlement of about 0.6" or less. For this reason, we do not expect significant downdrag forces to be developed on piles. We will show the calc in the pile design calculations in Appendix C of the Final Report.					
7	Page 19, Section 5.4.2.2	H. Liu	7	There is no one-inch settlement control requirement for general application of retaining wall (without supporting structures and low deflection-tolerance facilities). However limited amount of overexcavation can be still be accepted as foundation preparation practice.	RI		We will remove the sentence that mentions 1" settlement, and just refer to the recommended OX depths to "limit settlement."					
8	Page 26, Section 5.4.2.8	H. Liu	8	Technically, structure backfill behind the wall is only required in the area shown on Plan No. A62B of Std. Plans (2010). The recommended 45-degree backcut for strucure backfill may not be necessary, adequate, or cost effective, depending on the material properties and geometries of the back slope. Please remove such a requirement.	RI		Comply.					

(1) Responder's Initials - concur with response.
(2) Reviewer's Initials - concur with response.
(3) Kiewit/HNTB initials that comment was satisfied.
(4) Agency initials that comment was satisfied.

EA No.: 12-0F96A	
Agency: CalTrans	
Submittal No.	Title: FR for RW181, 183,193, and 203 (I-5 HOV, Segment 1) by EMI, 5/29/2012

Lead:	Date: 8/17/2012
Technical Discipline: Geotechnical	

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No.	Plan/SSP/ Page No.	Reviewer	Reviewer Comment No.	Comments	Action	Initial Code	Response	Final Code	Verify (1)	Verify (2)	Verify (3)	Verify (4)
9	Appendix A LOTBS	H. Liu	9	Boring# A-11-109, at Elev. +92', +82', and 67', please define the percentage of fine SAND in CH, CL, and MH materials, repectively.	RI		Comply.					
10	Appendix A LOTBS	H. Liu	10	Boring #A-11-111: Elev.+30': 1) please define the percentage of fine SAND in MH materials; 2) high plasticity should not be used to describe MH materials, based on Section 14.7.4 of ASTM D-2488.	RI		Comply.					
11	Appendix A LOTBS	H. Liu	11	Boring #A-11-113: Elev.+91', fines should be at least "medium plasticity" to be classified as "Clayey" materials, based on Section 14.7 of ASTM D-2488.	RI		Comply.					
12	Appendix A LOTBS	H. Liu	12	Boring# A-11-114: 1) Elev. +57', please define the percentage of fine SAND in CL materials. 2) Elev.+47' to +32', fines should be at least "medium plasticity" to be classified as "Clayey" materials, based on Section 14.7 of ASTM D-2488.	RI		Comply both.					
13	Appendix A LOTBS	H. Liu	13	Boring# A-11-117: Elev. +110': 1) please define the percentage of fine SAND in CL materials. 2) based on PP# and UU test results, Su>4.5 ksf; please re-define its consistency following the Caltrans logging manual.	RI		Comply both.					
14	Appendix A LOTBS	H. Liu	14	Boring# A-11-118: Elev. +95', please define the percentage of fine SAND in CL materials.	RI		Comply.					

(1) Responder's Initials - concur with response.
(2) Reviewer's Initials - concur with response.
(3) Kiewit/HNTB initials that comment was satisfied.
(4) Agency initials that comment was satisfied.

EA No.: 12-0F96A	
Agency: CalTrans	
Submittal No.	Title: FR for RW181, 183,193, and 203 (I-5 HOV, Segment 1) by EMI, 5/29/2012

Lead:	Date: 8/17/2012
Technical Discipline: Geotechnical	

ACTION (30, 60, 85%): RL = Revise in Later Submittal RI = Revise Immediately & OTS Review

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No.	Plan/SSP/ Page No.	Reviewer	Reviewer Comment No.	Comments	Action	Initial Code	Response	Final Code	Verify (1)	Verify (2)	Verify (3)	Verify (4)
15	Appendix A LOTBS	H. Liu	15	Boring # A-11-134: Elev. +168', fines should be at least "medium plasticity" to be classified as "Clayey" materials, based on Section 14.7 of ASTM D-2488.	RI		Comply. Change to non-plastic to medium plasticity.					
16	Appendix C, Calculations	H.Liu	16	Based on CA Amendment to AASHTO LRFD (2010), the bearing capacity resistance factor for MSE under strength limit state is 0.65 (a back-calc to fit for 2.0 FOS in ASD approach). Please update this factor in calculations.	RI		Comply.					
17	Appendix C, Calculations	H.Liu	17	In bearing capacity and settlement analysis, finished grades at both sides of MSE were averaged, and assumed to be future grade at MSE location. Though this simplified approach may be appropriate for some other applications, it may under-estimate the settlement along wall panel area, where overburden is well below the assumed. Please modify this assumption in analysis.	RI		The soil stresses below the wall facing increase due to the weight of the MSE fill behind the wall facing. As discussed, we will adjust the average grade level to lower 1/3 of the exposed wall height.					

(1) Responder's Initials - concur with response.
(2) Reviewer's Initials - concur with response.
(3) Kiewit/HNTB initials that comment was satisfied.
(4) Agency initials that comment was satisfied.

EA No.: 12-0F96A	
Agency: CalTrans	
Submittal No.	Title: FR for RW181, 183,193, and 203 (I-5 HOV, Segment 1) by EMI, 5/29/2012

Lead:	Date: 8/17/2012
Technical Discipline: Geotechnical	

ACTION (30, 60, 85%): RL = Revise in Later Submittal RI = Revise Immediately & OTS Review

30, 60, 85% SUBMITTAL DISPOSITION (check one): ( )Approved, ( ) Approved as Noted for Correction, ( ) Rejected, Revise & Resubmit, ( ) Record Only
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No.	Plan/SSP/ Page No.	Reviewer	Reviewer Comment No.	Comments	Action	Initial Code	Response	Final Code	Verify (1)	Verify (2)	Verify (3)	Verify (4)
18	Appendix C Calculations, RW183	H.Liu	18	RW183: For bearing capacity/settlement calculation, wall section at STA189+50 was selected for evaluation, with closest refence boring #A-11-114 used for soil parameters. Based on LOTBS, most of soils from Elev.+78' to +36' (42' in thickness as shown in calcs) were defined as "stiff", "mediun stiff", or "vey stiff" with PP# and UU test strength less than 2000 psf. However, shear strength of 3000 psf was assumed for these soils, please make such assumption consistent with the findings from subsurface investigations.	RI		Comply.					
19	General Comment	H.Liu	19	Please include structure/roadway plans (elevations and sections, showing bridge foundation) associated with the wall design in future submittal to assist our review.	RI		Plans will be provided by Parsons.					

(1) Responder's Initials - concur with response.
(2) Reviewer's Initials - concur with response.
(3) Kiewit/HNTB initials that comment was satisfied.
(4) Agency initials that comment was satisfied.

EXTERNAL SUBMITTAL REVIEW

PROJECT: INTERSTATE 5 HOV IMPROVEMENT
PROJECT No. 1200020277

EA No.: 12-0F96A	
Agency: CalTrans	
Submittal No.	Title: Final FR for RW181, 183,193, and 203 (I-5 HOV, Segment 1) by EMI, 10/1/2012

Lead:	Date: 12/12/2012
Technical Discipline: Geotechnical	

ACTION (30, 60, 85%): RL = Revise in Later Submittal RI = Revise Immediately & OTS Review

30, 60, 85% SUBMITTAL DISPOSITION (check one): ( )Approved, ( ) Approved as Noted for Correction, ( ) Rejected, Revise & Resubmit, ( ) Record Only

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No.	Plan/SSP/ Page No.	Reviewer	Reviewer Comment No.	Comments	Action	Initial Code	Response	Final Code	Verify (1)	Verify (2)	Verify (3)	Verify (4)
1	Page 16, Section 5.4.1.1	H.Liu	1	While it could be hard to predict residual settlement due to the long term effect, it is our general practice to terminate pre-loading operation based on relatively stabilized total settlement within a specific period (between two settlement readings). Please consider a revision of the original statement.	RI		We will delete "(½" or less)" from this sentence: "This settlement will be monitored in time until it is determined that the residual settlement is within a tolerable limit ~~(½" or less)~~." We will add the following to the end of para 3: "The above settlement duration may be accelerated if the settlement between two consecutive settlement readings (see next paragraph) is relatively stabilized. The Engineer should be notified to determine whether or not the settlement has stabilized."					
2	Page 18, Table 5.	H.Liu	2	Please make it more specific on maximum differential settlement for RW181, an upper limit is generally recommended.	RI		We meant to say the maximum differential settlement is less than 1/500. We will correct this in the table.					

(1) Responder's Initials - concur with response.
(2) Reviewer's Initials - concur with response.
(3) Kiewit/HNTB initials that comment was satisfied.
(4) Agency initials that comment was satisfied.

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

April 8, 2013

EMI Project No. 11-135

Parsons
2201 Dupont Drive, Suite 200
Irvine, California 92612

Attention: Mr. David Lew

Subject: Addendum No. 1 to Foundation Report for Overhead Sign Structures, I-5 HOV Improvement Project (Segment 1), San Clemente, California, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B), dated Nov. 12, 2012

Dear Mr. Lew:

Earth Mechanics, Inc. (EMI) prepared a Structure Foundation Report dated November 12, 2012 for ten proposed overhead (OH) sign structures for the Segment 1 Interstate 5 (I-5) HOV Widening Project. That Foundation report was reviewed and approved on December 18, 2012 by the Caltrans Office of Geotechnical Design South 1 (OGDS-1), Division of Engineering Services. After the review and approval of the Foundation Report, all sign structures were renamed, the loads for three signs were changed, and one sign location was moved by 20 ft. This Addendum to the Structure Foundation Report documents these changes and provides our findings and conclusions. Attached are the updated Tables 1, 4, 5 and 6 of the Foundations Report clearly showing these changes.

The design changes applied to the three sign structures were evaluated. All recommendations and conclusions of the Foundation Report remain the same. The designated Caltrans Standard Plan Design Sheets as shown in the attached tables can still be applied to all ten sign structures. The Log-of-Test-Boring Sheets were provided to Parsons.

We appreciate the opportunity to provide geotechnical design services for this project. If you have any questions, please call us.

Sincerely,
EARTH MECHANICS, INC.

Mike Kapuskar, PE, GE
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
MIKE KAPUSKAR
No. GE2564
Expires 12-31-12
GEOTECHNICAL
STATE OF CALIFORNIA

Lino Cheang, GE 2345
Project Manager

REGISTERED PROFESSIONAL ENGINEER
LINO C. CHEANG
NO. GE 2345
EXP. 9/30/13
GEOTECHNICAL
STATE OF CALIFORNIA

MK/lcc

TABLE 1. PROPOSED OVERHEAD SIGN STRUCTURE INFORMATION

Sign Structure ID	Location	Station (ft)	Sign Structure Type	Sign Post Type	2010 Caltrans Standard Plan Sheet No.
~~SS6-1~~ SS1	Mainline NB	"A" 167+00	Cantilever	VIII	S8
~~SS7-1~~ SS2	Mainline Median	"A" 178+00	Cantilever	VI	S8
~~SS7-2~~ SS3	Mainline NB	"A" 179+00	Cantilever	VIII	S8
~~SS7-3~~ SS4	Mainline SB	"A" 184+19	Cantilever	VIII	S8
~~SS7-4~~ SS5	Mainline SB	"A" 175+00	Cantilever	VI	S8
~~SS8-1~~ SS6	NB Off-Ramp	"AP2" 38+00	2-Post Bridge	10" NPS	S49
~~SS8-3~~ SS8	SB Off-Ramp	"AP4" 33+~~00~~ 20	2-Post Bridge	10" NPS	S49
~~SS8-5~~ SS10	Mainline NB	"A" 188+00	Cantilever	VIII	S8
~~SS9-1~~ SS11	Mainline SB	"A" 209+40	Cantilever	~~VII~~ VIII	S8
~~SS9-2~~ SS12	Mainline SB	"A" 201+72	Cantilever	VII	S8

TABLE 4. FOUNDATION DATA FOR SIGN STRUCTURES

Sign Structure ID	Location	Sign Structure Type	Sign Post Type	Pedestal/ CIDH Pile Dia.	Foundation Depth	Standard Plan Sheet No.
~~SS6-1~~ SS1	Mainline NB	Cantilever	VIII	5'9" / 5'	25'	S8
~~SS7-1~~ SS2	Mainline Median	Cantilever	VI	5'9" / 5'	22'	S8
~~SS7-2~~ SS3	Mainline NB	Cantilever	VIII	5'9" / 5'	25'	S8
~~SS7-3~~ SS4	Mainline SB	Cantilever	VIII	5'9" / 5'	25'	S8
~~SS7-4~~ SS5	Mainline SB	Cantilever	VII	5'9" / 5'	23'	S8
~~SS8-1~~ SS6	NB Off-Ramp	2-Post Bridge	10" NPS	3'4" / 3'	13'	S49
~~SS8-3~~ SS8	SB Off-Ramp	2-Post Bridge	10" NPS	3'4" / 3'	13'	S49
~~SS8-5~~ SS10	Mainline NB	Cantilever	VIII	5'9" / 5'	25'	S8
~~SS9-1~~ SS11	Mainline SB	Cantilever	~~VII~~ VIII	5'9" / 5'	~~23'~~ 25'	S8
~~SS9-2~~ SS12	Mainline SB	Cantilever	VII	5'9" / 5'	23'	S8

TABLE 5. FOUNDATION DEMANDS FOR SIGN STRUCTURES

Sign Structure ID (Post)	F_x (lbs)	F_y (lbs)	F_z (lbs)	M_x (lbs-ft)	M_y (lbs-ft)	M_z (lbs-ft)
~~SS6-1~~ SS1	11,209	19,783	3,363	234,433	176,546	200,702
~~SS7-1~~ SS2	7,093	13,802	2,128	126,551	78,021	133,699
~~SS7-2~~ SS3	14,234	23,566	4,270	367,244	284,679	329,445
~~SS7-3~~ SS4	11,387	21,960	3,416	267,309	182,195	299,084
~~SS7-4~~ SS5	11,387	19,590	3,416	262,059	182,195	284,736
~~SS8-1~~ SS6 (Lt.)	~~2,561~~ 3,316	~~10,751~~ 4,078	~~768~~ 995	~~100,666~~ 54,596	~~46,061~~ 4,029	~~48,750~~ 56,637
~~SS8-1~~ SS6 (Rt.)	~~2,561~~ 3,371	~~10,751~~ 4,078	~~768~~ 1,011	~~102,094~~ 56,257	~~49,446~~ 4,029	~~52,669~~ 61,753
~~SS8-3~~ SS8 (Lt.)	~~2,446~~ 2,780	~~10,648~~ 4,067	~~734~~ 834	~~92,628~~ 47,720	~~38,817~~ 3,223	~~52,210~~ 47,624
~~SS8-3~~ SS8 (Rt.)	~~2,446~~ 3,283	~~10,648~~ 4,067	~~734~~ 985	~~92,529~~ 52,029	~~45,867~~ 3,847	~~50,131~~ 61,111
~~SS8-5~~ SS10	12,099	22,226	3,630	287,669	205,681	286,683
~~SS9-1~~ SS11	~~10,962~~ 12,251	~~19,538~~ 22,664	~~3,288~~ 3,675	~~270,684~~ 322,485	~~186,347~~ 232,773	~~231,838~~ 259,113
~~SS9-2~~ SS12	9,252	17,478	2,776	185,816	120,277	221,356

Notes: F_x=Horizontal load parallel to freeway centerline
F_y=Vertical load (compression)
F_z=Horizontal load transverse to freeway centerline
M_x=Moment about horizontal direction parallel to freeway centerline
M_y=Torsional moment about vertical
M_z=Moment about horizontal direction transverse to freeway centerline.

TABLE 6. RESULTS OF LATERAL PILE ANALYSIS

Design Soil Condition	Maximum Pile-Head Deflection (in)	Maximum Pile-Head Slope (rad)	Maximum Moment (lb-in)	Depth to Max. Moment from Pile Top (ft)	Maximum Shear (lbs)	Depth to Max. Shear from Pile Top (ft)
Signs ~~SS8-1~~ SS6 and ~~SS8-3~~ SS8 (3' Diameter CIDH Pile)						
Soil Condition (ϕ=30°) per CT Standard Plan S49	~~0.22~~ 0.16	~~0.0025~~ 0.0018	~~105,520~~ 67,800	~~2~~ 3	~~15,400~~ 10,450	9
Existing Weakest Soil Condition (S_u=1,000 psf)	~~0.08~~ 0.04	~~0.0012~~ 0.0006	~~103,400~~ 64,660	~~1~~ 2	~~15,250~~ 10,060	8
All Other Signs (5' Diameter CIDH Piles)						
Soil Condition (ϕ=30°) per CT Standard Plan S8	0.19	0.0014	411,640	5	37,480	15
Existing Weakest Soil Condition (S_u=1,000 psf)	0.10	0.0009	392,820	4	37,480	14

Earth Mechanics, Inc.

Geotechnical & Earthquake Engineering

November 12, 2012

EMI Project No. 11-135

Parsons
2201 Dupont Drive, Suite 200
Irvine, California 92612

Attention: Mr. David Lew

Subject: Foundation Report for Overhead Sign Structures, I-5 HOV Improvement Project (Segment 1), San Clemente, California, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B)

Dear Mr. Lew:

Attached please find the Foundation Report for the proposed overhead sign structures that are part of the subject I-5 HOV Improvement Project (Segment 1). This report contains the findings of our geotechnical investigation and laboratory testing and conclusions, and recommendations for the design and construction of the proposed overhead sign structures.

We appreciate the opportunity to provide geotechnical design services for this project. If you have any questions, please call us.

Sincerely,
EARTH MECHANICS, INC.

11-12-12

Mike Kapuskar, PE, GE
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
MIKE KAPUSKAR
No. GE2564
Expires 12-31-12
GEOTECHNICAL
STATE OF CALIFORNIA

11-12-12

Lino Cheang, GE 2345
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LINO C. CHEANG
NO. GE 2345
EXP. 9/30/13
GEOTECHNICAL
STATE OF CALIFORNIA

11-12-12

Wendy A. Drummond, CEG
Certified Engineering Geologist

CERTIFIED ENGINEERING GEOLOGIST
WENDY A. DRUMMOND
CEG No. 2049
EXP. 8/31/2013
STATE OF CALIFORNIA

MK/lcc/wd

17800 Newhope Street, Suite B, Fountain Valley, California 92708 Tel: (714) 751-3826 Fax: (714) 751-3928

FOUNDATION REPORT

OVERHEAD SIGN STRUCTURES
INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)
SAN CLEMENTE, ORANGE COUNTY, CA
12-ORA-5, PM 3.0/3.7
CALTRANS PROJECT NO. 1200020277 (EA 12-0F96B)

Prepared for:

Parsons
2201 Dupont Drive, Suite 200
Irvine, California 92612

Prepared By:

Earth Mechanics, Inc.
17800 Newhope Street, Suite B
Fountain Valley, California 92708

EMI Project No. 11-135

November 12, 2012

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE OF WORK

This Foundation Report presents findings and conclusions of a geotechnical investigation conducted by Earth Mechanics, Inc. (EMI). It also presents foundation evaluation, design and construction recommendations for proposed Overhead (OH) Sign Structures for the Interstate 5 (I-5) High-Occupancy Vehicle (HOV) Lanes Improvement Project (Segment 1) located in San Clemente, California. The project location is shown on the Site Location Map in Figure 1. The purpose of the geotechnical investigation was to obtain subsurface information to develop design and construction recommendations to assist Parsons in the preparation of the Project Plans, Specifications, and Estimates (PS&E).

The following geotechnical services were completed for this project:

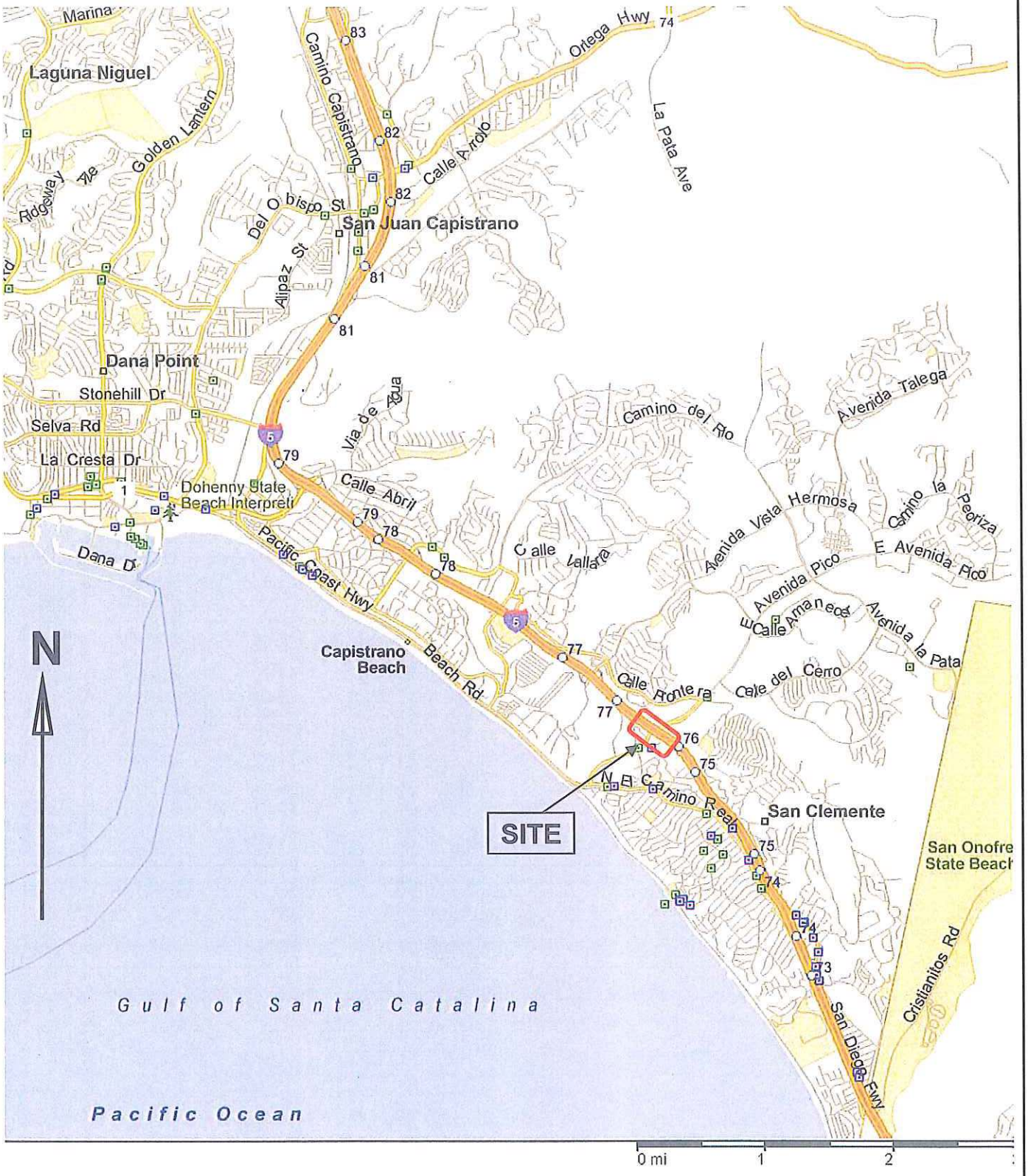
- Geotechnical field exploration consisting of drilling and logging exploratory borings and Cone Penetration Tests,
- Laboratory testing of selected soil/bedrock samples,
- Geotechnical engineering analysis to develop foundation design and construction recommendations, and
- Preparation of this report presenting our findings, conclusions, and recommendations.

1.2 PROJECT DESCRIPTION

The Orange County Transportation Authority (OCTA), in cooperation with Caltrans, and City of San Clemente, proposes to improve the I-5/Avenida Pico interchange. The project extends along I-5 from approximately 0.47 miles south to 0.37 miles north of Avenida Pico (I-5 Mainline Sta. 167+00 to 210+00).

Major proposed improvements consist of widening the I-5 and add one HOV lane in both directions, reestablishing auxiliary lanes, realignment of the four ramps, realignment of Avenida Pico undercrossing and roadway, replacement of the existing bridge structure, new retaining walls, and new sign structures.

This report addresses the proposed twelve (12) OH sign structures proposed to be constructed within Segment 1. Based on the information provided by Parsons, ten (10) sign structures are cantilever single-post or 2-post bridge structures. Pertinent information regarding these ten new sign structures are summarized in Table 1. The remaining two (2) sign structures are bridge-mounted and are not addressed in this report. The signs structures will be supported by round pedestal on pile foundations per 2010 Caltrans Standard Plan S8 and by square pedestal on pile foundations per Caltrans Standard Plan S49.



I-5 HOV Improvement Project
Segment 1

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

SITE LOCATION MAP

Figure 1

Project No. 11-135 | Date: 02-22-12

TABLE 1. PROPOSED OVERHEAD SIGN STRUCTURE INFORMATION

Sign Structure ID	Location	Station (ft)	Sign Structure Type	Sign Post Type	2010 Caltrans Standard Plan Sheet No.
SS6-1	Mainline NB	"A" 167+00	Cantilever	VIII	S8
SS7-1	Mainline Median	"A" 178+00	Cantilever	VI	S8
SS7-2	Mainline NB	"A" 179+00	Cantilever	VIII	S8
SS7-3	Mainline SB	"A" 184+19	Cantilever	VIII	S8
SS7-4	Mainline SB	"A" 175+00	Cantilever	VI	S8
SS8-1	NB Off-Ramp	"AP2" 38+00	2-Post Bridge	10" NPS	S49
SS8-3	SB Off-Ramp	"AP4" 33+00	2-Post Bridge	10" NPS	S49
SS8-5	Mainline NB	"A" 188+00	Cantilever	VIII	S8
SS9-1	Mainline SB	"A" 209+40	Cantilever	VII	S8
SS9-2	Mainline SB	"A" 201+72	Cantilever	VII	S8

2.0 GEOTECHNICAL FIELD INVESTIGATION AND LABORATORY TESTING

2.1 EXISTING INFORMATION

The Log-of-Test-Boring (LOTB) sheet for the existing Avenida Pico Undercrossing bridge, included with the as-built plans were reviewed. The information on the as-built LOTB's were not used for the foundation evaluation because the data from the site-specific field exploration was more relevant.

2.2 SITE-SPECIFIC FIELD EXPLORATION

A geotechnical field investigation was conducted between Sep. 9 and Oct. 3, 2011 for all proposed improvements consisting of a total of 26 exploratory borings and 6 cone penetrometer tests (CPT's). Among these, 12 boreholes and 2 CPT soundings were conducted at or near the sign structure locations on the NB and SB exterior shoulders of the I-5 mainline and along both shoulders of off-ramps to provide data for the proposed OH sign structures. Key exploration information is summarized in Table 2. Logs of boring sheets (LOTB's), boring logs, and CPT logs and interpretations are presented in Appendix A.

TABLE 2. SOIL EXPLORATION INFORMATION

Boring	Easting (ft)	Northing (ft)	Top of Boring El. (ft)	Depth (ft)	Groundwater El. (ft)	Drilling Method
A-11-101	6,144,824	2,104,209	+202.7	40.4	NE	HSA
A-11-104	6,144,002	2,105,453	+136.5	36.5	NE	HSA
A-11-108	6,144,196	2,104,964	+153.8	31.5	NE	HSA
A-11-109	6,143,982	2,105,215	+137.2	70.8	NE	HSA
CPT-11-110	6,143,580	2,105,546	+111.8	81.5	NM	CPT
A-11-113	6,143,335	2,105,750	+110.9	51.5	NE	HSA
A-11-114	6,143,022	2,105,978	+117.5	101.5	+49.5	HSA
A-11-115	6,143,249	2,106,012	+113.5	100.4	+53.0	HSA
CPT-11-115	6,143,249	2,106,012	+113.5	84.8	NM	CPT
A-11-117	6,142,778	2,106,149	+125.5	101.4	NE	HSA
A-11-128	6,142,681	2,106,063	+92.7	6.5	NE	HSA
A-11-130	6,141,102	2,106,519	+148.1	70.5	NE	HSA
HA-11-132	6,142,045	2,106,652	+151.6	2.0	NE	HA
A-11-134	6,141,524	2,107,086	+170.5	30.8	NE	HSA

Notes: NE=Not Encountered
NM=Not Measured
HA=Hand-Auger Boring
HSA=Hollow-Stem Auger Boring
CPT=Cone Penetration Test

2.2.1 Exploratory Boreholes

Boreholes were conducted for the purpose of collecting samples of subsurface earth materials and logging subsurface conditions where improvements are proposed. Hollow-stem auger (HSA) borings were drilled using a CME 75 truck-mounted drill rig equipped with 8" diameter hollow-stem augers. Sampling was performed by alternating the Modified California Drive (MCD) sampler and Standard Penetration Test (SPT) sampler. The soil sampling interval was 5 ft. Relatively undisturbed soil samples were obtained using a 3.25" outer diameter MCD sampler lined with brass rings. Each of these brass rings is 1" long with a 2.5" outside diameter. The SPT sampler (1.4" inside diameter) was also used to obtain soil samples. The MCD and SPT samplers were driven 18" into the ground or until refusal was encountered using a 140-lb hammer free falling from a height of 30". The numbers of blows to advance the sampler each 6" of penetration were recorded. The number of blows for the final 12" or shorter of driving was recorded on the boring logs. Charts published by Winterkorn and Fang (1975) were used to obtain a reduction factor of 0.5 for this project to convert MCD sampler blowcounts to SPT-equivalent blowcounts.

A hand-auger (HA) boring was manually drilled using a 3" diameter stainless steel auger. A shallow bulk sample was collected from the hand-auger boring.

2.2.2 CPT Soundings

To obtain continuous subsurface information, the CPT soundings were performed using an electronic cone penetrometer in general accordance with current ASTM Standards (ASTM D 5778 and D 3441). The CPT used an electronic cone penetrometer in general accordance with current ASTM Standards (ASTM D5778 and D3441). The CPT equipment used hollow sounding rods with a probe with a conical tip with a 60° apex angle and a projected cross sectional area of 1.55 in^2 and a cylindrical friction sleeve with a surface area of 23.25 in^2. The interior of the cone penetrometer is instrumented with strain gauges for cone tip and friction sleeve resistance measurements during penetration. The cone penetrometer assembly is continuously pushed into the soil by a set of hydraulic rams at a standard rate of 0.79" per second while the cone tip resistance and sleeve friction resistance are recorded every 1.967". The 25-ton dead weight of the truck provides the required reaction weight for pushing the rods and is used to transport and house the testing equipment. The computer generated graphical logs include tip resistance, friction resistance, and friction ratio. Soil behavior type interpretations are based on guidelines by Robertson and Campanella (1989). Logs of CPT soundings are provided in Appendix A.

2.3 LABORATORY TESTING

Laboratory tests were performed on representative samples of soil and bedrock to determine or derive their relevant physical and engineering properties. Selected samples were tested to determine soil and bedrock classifications, plasticity, expansion index, shear strength parameters, consolidation characteristics, and corrosion potential. The following laboratory tests were performed to supplement the observations recorded during the field investigation:

- In-situ Moisture Content and Unit Weight,
- Grain Size Distribution and Percent Passing No. 200 Sieve,
- Atterberg Limit,
- Direct Shear,
- Unconsolidated Undrained Triaxial,
- Pocket Penetrometer,
- Minimum Resistivity, pH, Sulfate Content and Chloride Content (Soil Corrosivity).

R-value tests, consolidation, expansion index, and compaction tests indicated on the LOTB's in Appendix A were performed for other design elements. Those tests were not used for the purpose of this report.

The laboratory tests were conducted in general accordance with California Test (CT) methods or American Society for Testing and Materials (ASTM, 2010) standards. Soil corrosivity test results are presented in Section 5.3. The remaining laboratory test results used for design of sign foundations are presented in Appendix B.

3.0 REGIONAL GEOLOGY AND SEISMICITY

3.1 PHYSIOGRAPHY

The project area is in the northwestern part of the Peninsular Ranges physiographic province. The Peninsular Ranges comprise a northwest-southeast trending group of fault-bounded ranges between the Salton Trough and the Pacific Ocean. The Santa Ana Mountains, Puente Hills, and San Joaquin Hills are ranges within the Peninsular Ranges.

The site is located on the low lying rolling hills westerly of the Santa Ana Mountains at the southerly end of the San Joaquin Hills in an area referred to as the Capistrano Embayment.

3.2 STRATIGRAPHY

The geologic units encountered at the site are characterized as follows.

Capistrano Formation (Tc). These marine sedimentary deposits generally consist of brown to gray silty claystone, claystone and siltstone. Secondary gypsum is commonly found deposited along joints, fractures and shears. The formation is generally soft when moist and has engineering properties similar to stiff to very stiff soils. The formation consists generally of soft, weakly cemented to uncemented material that can be disaggregated with finger pressure. A few hard beds occur throughout the formation.

Within the site area, the Capistrano Formation consists of an oxidized (weathered) zone defined by a light brown to brown color with a mottled appearance, underlain by an unoxidized zone that is generally dark brown to dark gray with a greater degree of induration.

Undifferentiated Marine and non-marine Terrace Deposits (Qt). Portions of the project area are capped by Terrace Deposits. Shell fragments were found associated with the marine terrace deposits. The terrace deposits were observed to unconformably overlie the bedrock units of the Capistrano Formation directly. These Pleistocene terrace deposits are characterized by a basal cobble sequence fining upward to light brown and yellow brown fine to coarse grained sands, silty sand, sandy silt and clayey silt.

Landslide Deposits (Qls). The ancient landslide deposits in the vicinity of Avenida Pico consist of displaced blocks of Capistrano Formation bedrock. The lithology of the deposits is similar to the undisturbed bedrock however the degree of weathering and oxidation of the landslide deposits is considerably greater.

Alluvium (Qal). The drainages and canyons crossing the project corridor are mantled by a relatively thin cover of alluvium. These deposits are generally derived from the surrounding bedrock units and terrace deposits and are located in the lower elevations of the site. Where encountered in the borings the alluvium was observed to consist of silty sand to sandy clay.

Artificial Fill (Af). Artificial fill placed during construction of the I-5 Freeway and adjacent residential and commercial developments is located along the project corridor. The fill materials were most likely to be derived from excavation of the Capistrano Formation bedrock and local

surficial deposits. Little or no documentation of the limits of fills or the observation and testing of the fill placement were examined.

3.3 GEOLOGIC STRUCTURE

The Peninsular Ranges are characterized by northwest-southeast trending mountains and valleys that have been faulted and uplifted by northwest-southwest trending faults. The Capistrano Embayment is a relatively flat structural trough of Miocene to Pliocene age. The trough is bordered on the east by the Cristianitos Fault. Active geologic faults in the region are shown on Figure 2. The California Geological Survey does not show any active faults at the site (Jennings, 2010). The nearest known major active faults are the Newport-Inglewood Structural Zone about 5 miles southwest of the site in the offshore area, the Palos Verdes fault about 19 miles to the west, also in the offshore area, and the Elsinore fault about 35 miles to the northeast. A subsurface fault, the San Joaquin Hills blind thrust, is postulated west of the site at a depth of about 2.5 to 3 miles. These faults are discussed in more detail below. Other nearby faults such as the Cristianitos fault and Mission Viejo faults are about 3.5 to 7 miles east of the site but are not believed to be active.

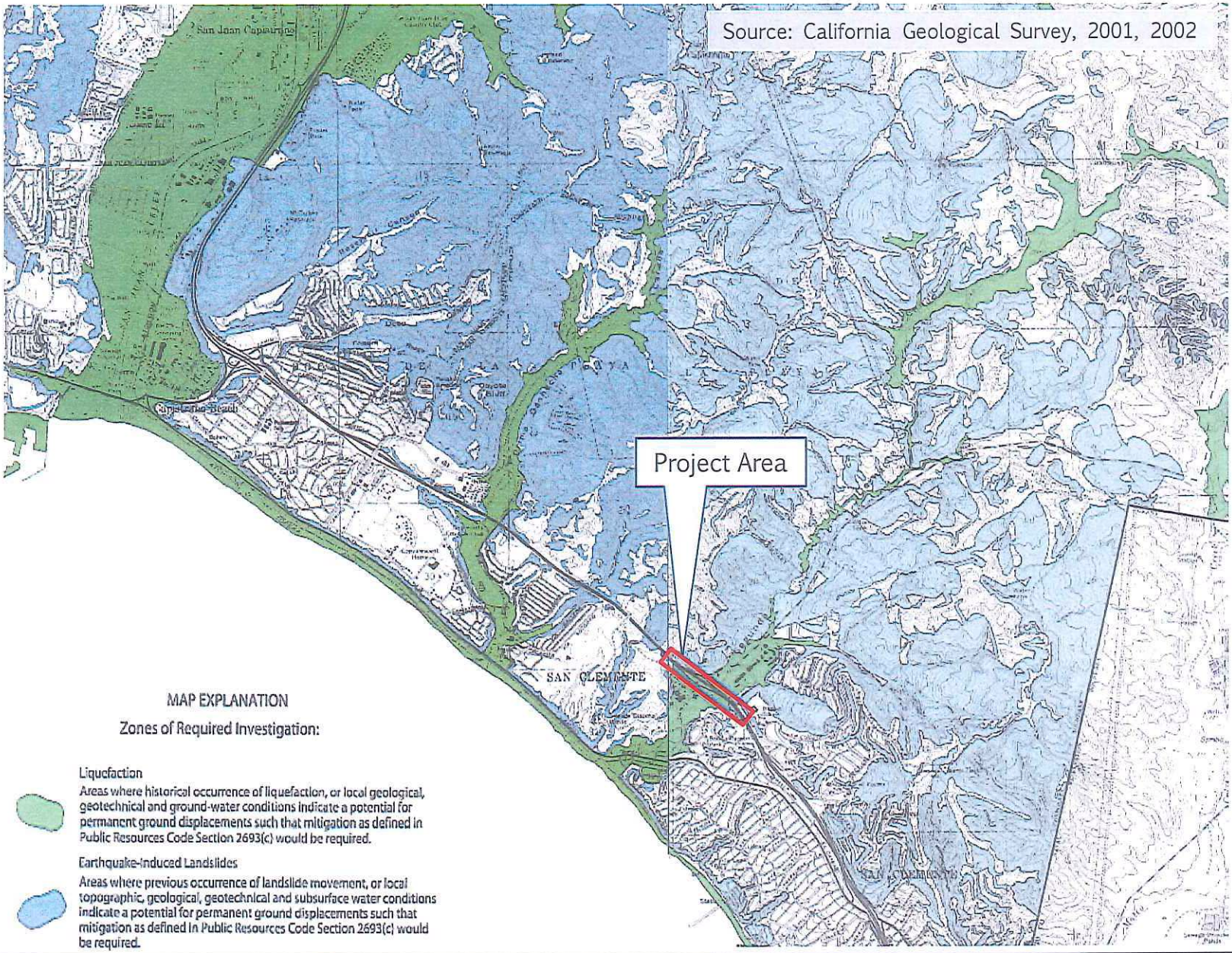
3.4 GEOLOGIC HAZARDS

The geological hazards present in the project area include landsliding, liquefaction and earthquake shaking. The area lies outside identified tsunami inundation zones (California Geological Survey, 2009), and there are no large bodies of water within the site area that could generate a standing wave (seiche).

There are no volcanos in the region and there are no known active surface faults within the project area, therefore ground rupture is not a hazard.

The project area is composed of predominantly medium to high-plasticity fine-grained soils (lean and fat clays) and sedimentary bedrock. The soil borings in the site area did not encounter groundwater above the proposed sign foundation pile tip elevations. The California Geological Survey Seismic Hazard Zone map (2002) shows that the site generally has a low liquefaction potential. The area of the Segunda Deshecha Canada (Avenida Pico) underlain by young alluvium may be susceptible to liquefaction during a strong earthquake. Due to the absence of groundwater and loose saturated granular soils, the liquefaction potential of the site soils is found to be low and not considered a design issue. As a result, seismically-induced settlement is anticipated to be negligible and not expected to adversely impact the proposed OH sign structure foundations.

The area of Capistrano Formation bedrock located on the slopes descending to Avenida Pico and the northbound On-Ramp from Avenida Pico was identified as having potential for landslides as a result of earthquake shaking. These landslides do not affect any of the sign structure locations.



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	I-5 HOV IMPROVEMENT PROJECT, SEGMENT 1	Seismic Hazard Map Figure 2
	Project No. 11-135 / Date: 11-05-12	

3.5 SEISMICITY

The project is in seismically active southern California. The present-day seismotectonic stress field in the Los Angeles region is one of north-northeasterly compression. This is indicated by the geologic structures, by earthquake focal-mechanism solutions, and by geodetic measurements. These data suggest crustal shortening of between 0.20" and 0.35" per year across the greater Los Angeles area (Argus et al., 1999).

Historical earthquake epicenter maps show widespread seismicity throughout the region. Although historical earthquakes occur in proximity to known faults, they are difficult to directly associate with mapped faults. Part of this difficulty is due to the fact that the basin is underlain by several poorly known subsurface thrust faults, generally referred to as blind thrust faults. Ward (1994) estimated that about 40% of seismic moment cannot be associated with known faults. Earthquakes occur primarily as loose clusters along the Newport-Inglewood Structural Zone, the southern margin of the Santa Monica Mountains, the margin between the Santa Susana-San Fernando Valley and the southern margin of the San Gabriel Mountains, and in the Coyote Hills-Puente Hills area. There is no clustering or alignment of earthquakes in proximity to the site. There are fewer earthquakes in the site region than anywhere else in the Los Angeles Basin area. This apparent lack of earthquake activity suggests that the site area is tectonically stable and suggests that there are no unrecognized active faults at the site.

The largest historical earthquake within the Los Angeles Basin was the 1933 Long Beach event which had a magnitude of about moment magnitude $M_W = 6.4$ ($M_L = 6.3$). This earthquake did not rupture the surface but is believed to have been associated with the Newport-Inglewood Structural Zone (Benioff, 1938). The association was based on abundant ground failures along the NISZ trend but no unequivocal surface rupture was identified. Reevaluation of the seismicity data by Hauksson and Gross (1991) relocated the 1933 earthquake hypocenter to a depth of about 6 miles below the Huntington Beach-Newport Beach city boundary.

Other major earthquakes in the region include the 1994 Northridge and the 1971 San Fernando earthquake both of which occurred in the San Fernando Valley region. The 1994 earthquake had a M_W of about 6.7 ($M_S = 6.8$, $M_L = 6.4$), and occurred on a southerly dipping subsurface fault which was unknown prior to the earthquake. The main shock occurred at a depth of about 11.8 miles. Earthquake aftershocks clearly defined the rupture surface dipping about 35° southerly from a depth of about 1.2 or 1.9 miles to 23 miles (Hauksson et al, 1995). The causative fault was never identified with certainty. The event may have occurred on an eastern extension of the Oakridge fault (Yeats and Huftile, 1995), a southerly dipping feature fault bounding the Ventura Basin and the Santa Susana Mountains.

The 1971 San Fernando earthquake was of similar size ($M_W = 6.7$, $M_S = 6.4$, $M_L = 6.4$) to the 1994 event but did involve surface rupture. The 1971 event occurred on a northerly dipping thrust fault that dips from the northern side of the San Fernando Valley to a depth of about 15 km under the San Gabriel Mountains. Several mapped surface faults were involved such as the Sylmar fault, Tujunga fault, and Lakeview fault. These faults are commonly considered to be part of the Sierra Madre fault system which extends easterly from the San Fernando Valley, along the base of the San Gabriel Mountains on the north side of the San Gabriel Valley, and to the Cucamonga fault in the San Bernardino area.

The 1987 Whittier earthquake (M_L = 5.9, M_W = 5.9) occurred on a subsurface fault dipping under the Puente Hills to about 10 miles beneath the San Gabriel Basin (Shaw and Shearer, 1999; Shaw et al., 2002). This event did not rupture the ground surface.

A magnitude 5.4 earthquake occurred at a depth of about 9 miles on 29 July 2008. The epicenter was in the Chino Hills area between the Chino fault and the Whittier fault. Preliminary data were inconclusive with regard to the causative fault. Detailed analysis by Shao and Hauksson (2009) indicated a rupture plane striking N71° W, dipping 62° northeast. They suggested a preference for the Whittier fault being the causative fault but were uncertain, primarily because the Whittier fault is supposed to dip much steeper (~80°). The aftershock pattern formed a subhorizontal alignment indicating the possibility that the event could have been associated with a subsurface thrust fault such as one of the blind faults of the Puente Hills Blind Thrust Fault System or with a blind fault under the Peralta Hills.

Another significant earthquake was the 1812 earthquake which caused damage at the San Juan Capistrano Mission. The location and magnitude of the 1812 earthquake are unknown because of the sparse population at the time, but geological studies (Jacoby et al., 1988; Fumal et al., 1993; Weldon et al., 2004) postulate that it did not occur in the Capistrano area, but rather was a large (M>7.0) distant event on the San Andreas fault in the Wrightwood area of the San Gabriel Mountains.

The earliest documented earthquake in the region was reported by the Portola´ expedition as they camped near the Santa Ana River in 1769. This event has been attributed by various geoscientists to just about every fault in the Los Angeles area but it could just as well have been a distant event that shook a wide area as did the 1971 San Fernando, the 1987 Whittier, and the 1994 Northridge events, as well as many other more-distant events (for example, 1992 Landers event).

3.6 SOIL SURVEY MAPPING

USDA soil survey maps (2012) indicate that the existing soils underlying the project area are sandy loam, clay loam and clay soils that contain the mineral montmorillonite which is responsible for soil expansion potential.

4.0 SUBSURFACE CONDITIONS

4.1 SUBSURFACE CONDITIONS

The geologic subsurface units were described in Section 3.2. Site-specific boreholes and CPT soundings performed for the project indicate that the materials within the project area are artificial fills (Af), alluvium (Qal), and terrace deposits (Qt) overlying sedimentary bedrock of the Capistrano formation (Tc).

The fills (Af) are consist of clayey silts and clay soils and some silty to clayey sands. The alluvium (Qal) consists of lean clays with few zones of fat clays and varying amounts of sand and silt. Terrace deposits (Qt) are composed of fine-grained soils (clay and silt with varying amounts of sand). The Capistrano formation (Tc) consists generally of soft, weakly cemented to uncemented materials with a few hard beds occurring throughout the formation. Within the project area, the Capistrano formation consists of an oxidized (ranging from intensely to moderately weathered) zone underlain by an unoxidized zone (ranging from slightly weathered to fresh).

Because of the large extent that the project area encompasses, the subsurface soil layering cannot be described by a single representative profile. The above soil description is general and only describes the subsurface in very broad terms. For details of stratigraphy at each borehole location, refer to the boring logs, LOTB sheets, and CPT sounding logs provided in Appendix A.

4.2 IDEALIZED SOIL PROFILE

Based on information collected from site-specific borings and the CPT sounding performed for the OH sign structures, an idealized subsurface profile was developed for each OH sign structure. The subsurface profiles and design strength parameters used for geotechnical analyses are presented in Table 3. The soil strength parameters (friction angle and cohesion) are based on shear strength parameters obtained from the direct shear tests, unconsolidated-undrained triaxial tests, or SPT correlations. The selected design strength parameters are the controlling (smaller) strength values obtained from laboratory test results and SPT correlations.

4.3 GROUNDWATER CONDITIONS

As shown in Table 2, groundwater was encountered near El. +49.5 and +53 ft during drilling in September and October, 2011. The As-built plans for Avenida Pico UC include LOTB sheets that show groundwater was not encountered above El. +40 ft in 1955 and El. +37 ft in 1967. These borings are located within the Segunda Deshecha drainage path. The California Geological Survey (CGS, 2002) quadrangle map for San Clemente indicate a highest historical groundwater of 5 to 10 ft below original bottom of nearby Segunda Deshecha canyon which is significantly lower than current roadway grades within the project extents. The soil borings indicate a lack of continuous pervious soil units, and groundwater was encountered in very few borings in September to November of 2011 but not in other nearby borings. These findings suggest that groundwater within the I-5 HOV widening project is perched. Soil moisture content and groundwater level can fluctuate due to variations in seasonal rainfall, nearby irrigation, changes in or addition of flood control improvements, groundwater injection or extraction activities, construction activities, or numerous other man-made or natural conditions.

TABLE 3. IDEALIZED SOIL PROFILES AND STRENGTH PARAMETERS

Approximate Elevation (ft)	Predominant Soil/Bedrock Type	Equivalent SPT Blowcount (blows/ft)	Total Unit Weight (pcf)	Friction Angle	Cohesion/ Undrained Shear Strength (psf)
Signs SS6-1 and SS9-1 (Borings A-11-101 and A-11-134)					
+202 to +130	Bedrock - Siltstone/Claystone	35 to 50+ (Average 40+)	125	0°	3,000
Signs SS7-1 and SS7-2 (Borings A-11-104 and A-11-109)					
+137 to +100	Existing Fill– Sandy Clay and Silt	12 to 37 (Average 24)	120	0°	1,800
+100 to +60	Terrace Deposits/Bedrock – Lean and Fat Clay	15 to 45 (Average 26)	120-125	0°	2,000
Sign SS7-3 (Boring A-11-113 and CPT-11-110)					
+110 to +95	Existing Fill – Silty and Clayey Sand	25	120	32°	100
+95 to +70	Terrace Deposits/Young Alluvium – Lean Clay and Silty Sand	12 to 16 (Average 14)	120	0°	1,000
Sign SS7-4 (Boring A-11-108)					
+154 to +138	Existing Fill – Silty and Clayey Sand, Lean Clay	15 to 18 (Average 16)	120	32°-33°	200-250
+138 to +122	Terrace Deposits – Lean and Fat Clay	12 to 25 (Average 18)	120	0°	1,000
Signs SS8-1 and SS8-5 (Boring A-11-115 and CPT-11-115)					
+113 to +78	Existing Fill - Clayey Sand, Lean Clay	10 to 36 (Average 16)	120	30°-32°	200
Sign SS8-3 (Borings A-11-128 and A-11-117)					
+92 to +70	Terrace Deposits – Lean Clay	14 to 20 (Average 17)	120	0°	1,000
+70 to +24	Bedrock - Siltstone/Claystone	50+	125	0°	3,000
Sign SS9-2 (Boring A-11-130 and HA 11-132)					
+151 to 133	Existing Fill – Silty Sand	9 to 39 (Average 24)	120	32°	200
+133 to +95	Terrace Deposits – Fat Clay	27 to 33 (Average 29)	120	0°	2,000

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 SEISMIC DESIGN CRITERIA

The fault controlling the strong ground motion is the Newport-Inglewood-Rose Canyon/East fault, southwest of the project area. The design ARS curve was based on the 2010 Seismic Design Criteria (SDC) (Caltrans, 2010a) procedures (see Foundation Report for Avenida Pico UC Replacement (EMI, 2012a) for details). The peak ground acceleration (PGA) is the zero-period spectral acceleration in the ARS curve. A PGA of 0.382g was obtained from the design ARS curve.

5.2 LIQUEFACTION

Soil liquefaction is the loss of shear strength in generally cohesionless, saturated soils when the pore-water pressure induced in the soil by a seismic event becomes equal to or exceeds the overburden pressure. Primary factors influencing the potential for liquefaction include groundwater elevation, soil type and grain-size characteristics, relative density of the soil, initial confining pressure, and intensity and duration of ground shaking. Soils most susceptible to liquefaction are saturated low-density sands and silty sands situated within 50 ft of the ground surface.

The vast majority of earth materials within the project area are fine-grained. The materials throughout the area include sedimentary bedrock of the Capistrano formation, terrace deposits, alluvium, and artificial fills that are derived from the bedrock and terrace materials. No consistent shallow groundwater table or relevant continuous unit of saturated loose sandy soils were identified within the project area. The soil borings did not encounter groundwater above the proposed sign foundation pile tip elevations. As described in Section 3.4, the CGS Seismic Hazard Zone map (2002) shows that the site generally has a low liquefaction potential. Based on the fines content and strength of soil materials found throughout the area and due to the absence of groundwater and loose saturated granular soils, the liquefaction potential of the site soils is found to be low and not considered a design issue. As a result, seismically-induced settlement is expected to be negligible and not to adversely impact the proposed OH sign structure foundations.

5.3 SOIL CORROSIVITY

A total of seven (7) soil samples were tested from borehole project-wide to determine minimum resistivity, pH, soluble sulfate content, and soluble chloride content using procedures described in California Test Methods 417, 422, and 643, respectively. The test results are documented in the Materials Report (EMI, 2012c). Among these tests, 6 are relevant to the proposed sign structure foundations. Minimum resistivities ranged between 190 to 410 ohm-cm. The pH values range between 6.5 and 7.3. The soluble sulfate measurements range from 550 to 1950 parts per million (ppm), and the soluble chloride measurements range from 407 to 2,047 ppm.

According to Caltrans Corrosion Guidelines (2003), soils are considered corrosive if the pH is 5.5 or less, or the sulfate concentration is 2,000 ppm or greater, or the chloride concentration is 500 ppm or greater. Based on the test results and the Caltrans criteria, the on-site earth materials

are corrosive to concrete and bare metals. Consequently, proposed structures in contact with the on-site earth materials should be designed for the corrosive environment.

Based on the project-wide chloride concentrations, the minimum foundation concrete cover over reinforcement should be in accordance with Table 8.22.1 of the Caltrans BDS (2004) for "Corrosive soil above MLLW level with chloride concentration between 500 and 5,000 ppm." Based on the project-wide sulfate concentrations, cement type should be in accordance with Table 8.22.2 of Caltrans BDS for "Sulfate Concentration from 2,000 to 15,000 ppm." Additional corrosion protection requirements for concrete structural members are presented in Section 8.22 of Caltrans BDS as well as applicable sections of the Caltrans Standard Specifications (2010c) and Special Provisions.

5.4 PILE FOUNDATION DESIGN OF OH SIGN STRUCTURES

A total of ten overhead sign structures on isolated buried foundations are proposed within the project limit. The overhead sign structure pertinent data, as provided by the structural engineer, are presented in Table 4. The pile foundation depth is measured from the top of the pedestal. Foundation design recommendations for the proposed overhead sign structures are provided in the following sections.

The proposed sign structures per Caltrans Standard Plan S8 are single-post round pedestals supported on Cast-in-Drilled-Hole (CIDH) pile. The sign structures per Standard Plan S49 are 2-post bridge structures with square pedestals on CIDH piles.

TABLE 4. FOUNDATION DATA FOR SIGN STRUCTURES

Sign Structure ID	Location	Sign Structure Type	Sign Post Type	Pedestal/ CIDH Pile Dia.	Foundation Depth	Standard Plan Sheet No.
SS6-1	Mainline NB	Cantilever	VIII	5'9" / 5'	25'	S8
SS7-1	Mainline Median	Cantilever	VI	5'9" / 5'	22'	S8
SS7-2	Mainline NB	Cantilever	VIII	5'9" / 5'	25'	S8
SS7-3	Mainline SB	Cantilever	VIII	5'9" / 5'	25'	S8
SS7-4	Mainline SB	Cantilever	VII	5'9" / 5'	23'	S8
SS8-1	NB Off-Ramp	2-Post Bridge	10" NPS	3'4" / 3'	13'	S49
SS8-3	SB Off-Ramp	2-Post Bridge	10" NPS	3'4" / 3'	13'	S49
SS8-5	Mainline NB	Cantilever	VIII	5'9" / 5'	25'	S8
SS9-1	Mainline SB	Cantilever	VII	5'9" / 5'	23'	S8
SS9-2	Mainline SB	Cantilever	VII	5'9" / 5'	23'	S8

5.4.1 Pile Foundation Demand

The foundation diameters and depths in Table 4 are from the 2010 Caltrans Standard Plan Sheets and are the same as shown on the 2006 Caltrans Standard Plan Sheets. The 2006 Caltrans Standard Plan Design Note states "Foundation design is based on 2001 AASHTO article 13.6 Broms' approximate procedure assuming a cohesionless material. The angle of internal friction used is 30 degree and unit weight of soil used is 120 lb/ft^3." The 2010 Caltrans Standard Plan Sheets do not show this note; however, Caltrans indicates that this note was transferred to the Caltrans Specifications, and therefore, the design note should still be valid. As a precaution, it is recommended that the structural designer compare the 2006 and 2010 Caltrans Standard Plans S8 and S49 to confirm that there are no changes in the structural information, details, and design notes.

As shown in Table 3, the site-specific field investigation revealed that the subsurface earth materials within the "pile foundation depth" zone at Signs SS8-1 and SS8-5 consist of existing sand fill characterized by unit weights of 120 pcf, a friction angle of 30° or more, and cohesion of 200 psf. The foundations soils at these sign locations meet the design requirements of the 2006 Standard Plans S8 and S49. As a result, these Caltrans Standard Plan sheets are suitable for foundation design of the proposed standard OH sign structures SS8-1 and SS8-5, respectively.

The foundation soils at the eight remaining sign locations consists of clays and silts with unit weights of 120 to 125 pcf and undrained shear strengths of 1,000 to 3,000 psf (see Table 3). These soil types do not meet the soil strength requirements described in the 2006 Standard Plan Design Note. As a result, pile foundation design should be performed using the site-specific soil parameters in Table 3, the pile diameters and depths in Table 4, and the pile demands at the pile head. The single-pile demands at the pile head were provided by the structural designer and are summarized in Table 5.

In the axial and lateral foundation design provided below, the pile capacities and deflections using the soil friction angle and unit weight used in the Caltrans Standard Plan design will be compared with the pile resistances capacities and deflections using the site-specific soil friction angle and unit weight, to verify that the Standard Plan can be applied to these sign foundations.

TABLE 5. FOUNDATION DEMANDS FOR SIGN STRUCTURES

Sign Structure ID (Post)	F_x (lbs)	F_y (lbs)	F_z (lbs)	M_x (lbs-ft)	M_y (lbs-ft)	M_z (lbs-ft)
SS6-1	11,209	19,783	3,363	234,433	176,546	200,702
SS7-1	7,093	13,802	2,128	126,551	78,021	133,699
SS7-2	14,234	23,566	4,270	367,244	284,679	329,445
SS7-3	11,387	21,960	3,416	267,309	182,195	299,084
SS7-4	11,387	19,590	3,416	262,059	182,195	284,736
SS8-1 (Lt.)	2,561	10,751	768	100,666	46,061	48,750
SS8-1 (Rt.)	2,561	10,751	768	102,094	49,446	52,669
SS8-3 (Lt.)	2,446	10,648	734	92,628	38,817	52,210
SS8-3 (Rt.)	2,446	10,648	734	92,529	45,867	50,131
SS8-5	12,099	22,226	3,630	287,669	205,681	286,683
SS9-1	10,962	19,538	3,288	270,684	186,347	231,838
SS9-2	9,252	17,478	2,776	185,816	221,356	120,277

Notes: F_x=Horizontal load parallel to freeway centerline
F_y=Vertical load (compression)
F_z=Horizontal load transverse to freeway centerline
M_x=Moment about horizontal direction parallel to freeway centerline
M_y=Torsional moment about vertical
M_z=Moment about horizontal direction transverse to freeway centerline.

5.4.2 Axial Pile Analysis

Axial capacity of a single CIDH pile is determined using the maximum axial compression demand of 23,566 lbs for 5-ft diameter piles and 10,751 lbs for 3-ft diameter piles from Table 5. The axial pile capacity calculations are presented in Appendix C. Based on the results of the analysis, the standard pile foundation depths in Table 4 are sufficient to resist the axial demands of all piles.

5.4.3 Lateral Pile Analysis

Lateral pile analysis was performed using the computer program LPILE (Ensoft, 2010) using a cracked section modulus of the CIDH pile equal to one-half the gross section modulus. The lateral pile analysis of a 5-ft diameter and 22-ft long CIDH pile was conducted using a maximum pile-head shear (V) of 14,234 lbs combined with a maximum overturning moment (M) of 367,244 lb-ft obtained from Table 5. The analyses were conducted for two subsurface soil conditions: (1) the soil condition per 2006 Caltrans Standard Plan design note (γ=120 pcf and ϕ=30°), and (2) the existing subsurface soil condition with the lowest in-situ soil strength in Table 3 (γ=120 pcf and S_u=1,000 psf) among all sign structure locations. Lateral analysis for a 3-ft diameter and 13-ft long CIDH pile was performed for a maximum pile-head shear of 2,561 lbs combined with a maximum overturning moment of 102,094 lb-ft, and for the same two soil conditions.

Results of the lateral pile analysis in terms of shear, bending moment, and lateral deflection along the pile length for a free-head condition are included in Appendix C. A summary of the results is presented in Table 6. Based on the results of the analyses, the pile-head lateral deflections for the existing Soil Condition (2) due to the maximum foundation demands were found to be less than for the Soil Condition (1) per the Caltrans Standard Plans. Since the analysis were performed using the maximum combined shear and moment in Table 5 and the lowest in-situ soil strengths in Table 3, the designated Caltrans Standard Plan sheets are found to be applicable for all ten proposed overhead sign structures.

TABLE 6. RESULTS OF LATERAL PILE ANALYSIS

Design Soil Condition	Maximum Pile-Head Deflection (in)	Maximum Pile-Head Slope (rad)	Maximum Moment (lb-in)	Depth to Max. Moment from Pile Top (ft)	Maximum Shear (lbs)	Depth to Max. Shear from Pile Top (ft)
Signs SS8-1 and SS8-3 (3' Diameter CIDH Pile)						
Soil Condition (ϕ=30°) per CT Standard Plan S49	0.22	0.0025	105,520	2	15,400	9
Existing Weakest Soil Condition (S_u=1,000 psf)	0.08	0.0012	103,400	1	15,250	8
All Other Signs (5' Diameter CIDH Piles)						
Soil Condition (ϕ=30°) per CT Standard Plan S8	0.19	0.0014	411,640	5	37,480	15
Existing Weakest Soil Condition (S_u=1,000 psf)	0.10	0.0009	392,820	4	37,480	14

5.4.4 Torsional Capacity

Torsional capacity of a single Caltrans Standard CIDH pile is estimated using the soil strength parameters in Table 3 and the guidelines given in NAVFAC Design Manual (1986). Analysis for was performed for a maximum torsional moment from Table 5 of 284,679 lbs-ft for a 5-ft diameter pile and 49,446 lbs-ft for the 3-ft diameter pile. Torsional capacity calculations are included in Appendix C. Based on the results of the analysis, the CIDH piles under site-specific soil conditions have adequate torsional capacities.

5.4.5 Settlement

The total static settlement of the CIDH piles under static load is expected to be less than 0.25" and the seismically-induced settlement under the design earthquake is estimated to be negligible as discussed in Section 5.2.

5.4.6 Global Stability

Based on plans provided by the structural designer, the proposed OH sign structures will be founded on nearly level grades. Sign structure SS6-1 is located at the toe of a 2H:1V cut slope.

Signs SS7-2 and SS7-4 are located near the crest of an existing embankment slopes with gradient of about 2H:1V. Based on the global stability analyses performed for the typical cross-sections selected near these sign structures, the calculated factor of safety (FOS) under static and seismic conditions is greater than the required FOS per Caltrans BDS (2004) and Caltrans foundation report preparation guidelines (2009). Therefore, the global slope stability of the ground supporting these two OH sign structures under static and seismic conditions are also not considered to be a design issue. The results of slope stability analyses are included in the Geotechnical Design Report (EMI, 2012d) for this project.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 EARTHWORK

6.1.1 General

Earthwork activities should be performed in accordance with Section 19 of the Caltrans Standard Specifications (2010c) and as indicated in the Special Provisions prepared for the project improvements. Appropriate measures should be taken to prevent damage to existing adjacent structures and utilities. Any design and construction of temporary slopes, sheeting, or shoring should be made the contractor's responsibility. It should be noted that it is the responsibility of the contractor to oversee the safety of workers in the field during construction. The contractor shall conform to all applicable occupational and health standards, rules, regulations, and orders established by the State of California. In addition, other State, County, or Municipal regulations may supersede the recommendations presented in this section. If a trench shoring design plan is required, the geotechnical consultant should review the plan to confirm that recommendations presented in this report have been applied to the design.

Heavy construction equipment should not be used immediately adjacent to shoring due to large lateral pressures induced by such equipment unless the shoring is designed to accommodate such pressures. Excavated soil or construction materials should not be stockpiled adjacent to shoring or open excavations. Stockpiled soil and construction materials should be set back a distance at least equal to the height of the excavation.

6.1.2 Temporary Excavations

Temporary excavations may be required to facilitate the construction of proposed improvements. Temporary excavations, including temporary shoring, necessary to construct the sign foundations will need to be designed by the contractor for local and global stability, once the means and methods of construction are determined.

6.1.3 Groundwater Control

Section 4.3 discussed groundwater evaluation. Based on our observations, shallow groundwater is not expected to be encountered. However, groundwater level can fluctuate due to seasonal rainfall amount, local irrigation and groundwater recharge program and other man-made conditions. If groundwater is encountered during excavations for foundation construction, it can be controlled in accordance with Section 19-3.03D of the Caltrans Standard Specifications (2010c). Any seepage or groundwater removed from an excavation should be tested and disposed of in compliance with all applicable local, state, and federal requirements. Free water should not be allowed to stand in any excavation.

6.2 CIDH PILE CONSTRUCTION

The proposed CIDH piles should be constructed in accordance with Section 49-3 of the Caltrans Standard Specifications (2010c) and as indicated in the Special Provisions prepared for the project improvements. Due to corrosive environment (see Section 5.3), Type V cement should be used in the concrete mix for CIDH piles.

Careful drilling, and placement of steel reinforcement and concrete, is essential to avoid disturbance of CIDH excavations. The Contractor should be required to use a clean-out bucket at the bottom of the CIDH holes to ensure adequate removal of loose materials from the bottom of holes. Clean-out and concrete placement should be addressed in the specifications. The CIDH excavations should be inspected and approved by the Resident Engineer prior to installing steel reinforcement. In accordance with the latest Caltrans requirement (Table 10.8.1.3-1 of 2011 Caltrans State Amendments to AASHTO, 2007), 3" and 5" of concrete cover over reinforcement should be provided to improve the construction of the 3-ft and 5-ft diameter CIDH piles, respectively.

The steel reinforcement cage should be installed and the concrete pumped immediately after each CIDH excavation is completed. No CIDH excavation should be left open overnight. Concrete placement by tremie pipe is recommended. Specifications should require that sufficient space be provided in the reinforcement cage during fabrication to allow insertion of a tremie tube for concrete placement.

Perched groundwater was encountered in three borings at about 45 to 68 ft depth below existing grades (see Table 3 and Section 4.3). Based on the groundwater depths, "wet" construction is not anticipated at the sign locations. However, groundwater levels fluctuate and the Contractor should be prepared to implement the Caltrans Standard Specifications and Special Provisions for wet construction. As a standard Caltrans practice for wet construction, PVC tubes should be installed within the reinforcement cage for gamma-ray testing.

On-site earth materials are generally fine-grained and contain layers of granular soil. Granular soils are susceptible to caving. The use of temporary casing is at the Contractor's discretion. If temporary casing is used, vibratory and oversized predrilling techniques for casing installation are not allowed. Temporary casing should be placed tight in the borehole. The casing should be pulled as the concrete is being poured while always maintaining at least a 5-ft head of concrete inside the casing. If any boring becomes bell-shaped and cannot be advanced due to severe caving, all loose material should be removed from the bottom of the boring and the caved region filled with low-strength sand-cement slurry. Drilling may continue when the slurry has reached its initial set.

6.3 REVIEW OF CONSTRUCTION PLANS

Recommendations contained herein are based on current design information. The geotechnical consultant should review the final construction plans and specifications in order to confirm that the general intent of the recommendations contained in this report have been incorporated into the final construction documents.

6.4 GEOTECHNICAL OBSERVATION AND TESTING

Qualified geotechnical personnel should perform inspections and testing during the following stages of construction:

- Earthwork operations, including excavations and placement of compacted fill,
- CIDH pile excavations,

- Casing or shoring installation if required,
- Steel reinforcement installation and concrete placement,
- Removal or installation of support for buried utilities or structures, and
- When any unusual subsurface conditions are encountered.

7.0 LIMITATIONS

This report is intended for use by Parsons, the Orange County Transportation Authority, the California Department of Transportation, and the City of San Clemente for the proposed overhead sign structures that are part of the I-5 HOV Widening, Segment 1 Project. This report is based on the project as described herein and the information obtained from the exploratory boreholes and Cone Penetration Test (CPT) soundings at the approximate locations indicated on the attached plans. The findings and recommendations contained in this report are based on the results of the field investigation, laboratory tests, and engineering analyses. Also, soils and subsurface conditions encountered in the exploratory boreholes and CPT soundings are presumed to be representative of the project site; however, subsurface conditions and characteristics of soils between exploratory boreholes and CPT soundings can vary. Findings reflect an interpretation of the direct evidence obtained. Recommendations presented herein are based on the assumption that an appropriate level of quality control and quality assurance (inspections and tests) will be provided during construction. EMI should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Modifications to the project plans or variations in subsurface conditions may require re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations contained herein are applicable to the specific design elements and locations which are the subject of this report. Data, opinions, and recommendations herein have no applicability to any other design elements or to any other locations, and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of EMI.

EMI is not responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction, for the acts or omissions of the Contractor, or any other person performing any of the construction, or for the failure of any worker to carry out the construction in accordance with the Final construction drawings and specifications.

Services performed by EMI were conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty or guarantee is included or intended.

8.0 REFERENCES

American Association of State Highway and Transportation Officials (AASHTO), 2007, AASHTO LRFD Bridge Design Specification, 4th Edition with 2008 and 2009 Interim Changes, Washington, DC: AASHTO.

American Society for Testing and Materials (ASTM), 2010, Annual Book of Standards, Soil and Rock; Dimension Stone; Geosynthetics. Vol. 04.08.

Argus, D.F., Heflin, M.B., Donnellan, A., Webb, F.H., Dong, D., Hurst, K.J., Jefferson, D.C., Lyzenga, G.A., Watkins, M.M., and Zumberge, J.F., 1999, Shortening and thickening of metropolitan Los Angeles measured and inferred by using geodesy: Geology, v. 27, p. 703-706.

Benioff, H., 1938, The determination of the extent of faulting with application to the Long Beach earthquake: Bulletin of the Seismological Society of America, v. 28, p. 77-84.

California Department of Transportation, (Various Dates), California Test Methods.

_____, 2010a, Seismic Design Criteria, Version 1.6.

_____, 2010b, Standard Plans.

_____, 2010c, Standard Specifications.

_____, 2006, Standard Plans.

_____, 2004, Bridge Design Specifications.

_____, 2003, Corrosion Guidelines, Version 1.0.

California Geological Survey, 2009, Tsunami Inundation Map for Emergency Planning, San Clemente quadrangle: Division of Mines and Geology.

_____, 2002, Seismic Hazard Zone Report for the San Clemente 7.5-Minute Quadrangle, Orange County, California, Seismic Hazard Zone Report 062; Department of Conservation.

Earth Mechanics (EMI), 2012a, Final Foundation Report, Avenida Pico Undercrossing (Widen), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277 (EA 12-0F96B).

_____, 2012b, Final Foundation Report, Wall 190, Interstate 5 HOV Improvement Project (Segment 1), San Clemente, Orange County, California, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B).

_____, 2012c, Final Materials Report, Interstate 5 HOV Improvement Project (Segment 1), San Clemente, Orange County, California, 12-ORA-5, 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B).

_____, 2012d, Final Geotechnical Design Report, I-5 HOV Improvement Project (Segment 1), San Clemente, California, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277, EA 12-0F96B.

Ensoft, Inc. 2010, LPILE Plus Version 6.0, A Program for Analyzing Stress and Deformation of a Pile or Drilled Shaft under Lateral Loading, Austin, Texas.

Fumal, T.E., Pezzopane, S.K., Weldon, R.J. II, and Schwartz D.P., 1993, A 100-year average recurrence interval for the San Andreas fault at Wrightwood, California, Science, v. 259, p. 199-203.

Hauksson, E., Jones, L.M., and Hutton, K., 1995, The 1994 Northridge earthquake sequence in California: seismological and tectonic aspects, Journal of Geophysical Research, v. 100, p. 12,335-12,355.

Hauksson, E. and Gross, S., 1991, Source parameters of the 1933 Long Beach earthquake: Bulletin of the Seismological Society of American, v. 81, p. 81-98.

Jacoby, G., Sheppard, P., and Sieh, K., 1987, Was the 8 December 1812 California earthquake produced by the San Andreas fault? Evidence from trees near Wrightwood: Seismological Research Letters, v. 58, p. 14.

Jennings, C.W., 2010, Fault Activity Map of California and Adjacent Areas, Geologic Data Map No. 6, Department of Conservation, Division of Mines and Geology.

NAVFAC, 1986, Foundations and Earth Structures, Design Manual 7.2, Department of the Navy, Naval Facilities Engineering Command.

Robertson, P. K. and Campanella, R. G., 1989, Guidelines for Geotechnical Design Using CPT and CPTU, Civil Engineering Department, University of British Columbia, Vancouver, Canada.

Shao, G., and Hauksson, E., 2009, A finite fault study of the 29 July 2008 Mw5.4 Chino Hills Earthquake: Seismological Research Letters, v. 80, p.320-321.

Shaw, J.H., and Shearer, P.M., 1999, An elusive blind-thrust fault beneath metropolitan Los Angeles: Science, v. 283, p.1516.

Shaw, J.H., Plesch, A., Dolan, J.F., Pratt, T.L., and Fiore, P., 2002, Puente Hills blind-thrust system, Los Angeles, California: Bulletin of the Seismological Society of America, v. 92, p. 2946-2960.

United States Department of Agriculture, Natural Resources Conservation Service, 2012, http://websoilsurvey.nrcs.usda.gov.

Ward, S.N., 1994, A multidisciplinary approach to seismic hazard in southern California: Bulletin of the Seismological Society of America, v. 84, p. 1293-1309.

Weldon, R., Scharer, K., Fumal, T., and Biasi, G., 2004, Wrightwood and the earthquake cycle: what a long recurrence record tells us about how faults work: Geological Society of America, GSA Today, v. 14, no. 9, p. 4-10.

Winterkorn, H.F. and Fang, H.Y., 1975, Foundation Design Handbook, Van Nostrand Reinhold Company, New York, NY.

Yeats, R.S., and Huftile, G.J., 1995, The Oak Ridge fault system and the 1994 Northridge earthquake, Nature, v. 373, p. 418-420.

APPENDIX A

LOG OF TEST BORING SHEETS, BORING LOGS, AND CPT SOUNDINGS

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL — 11/12/12 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

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

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

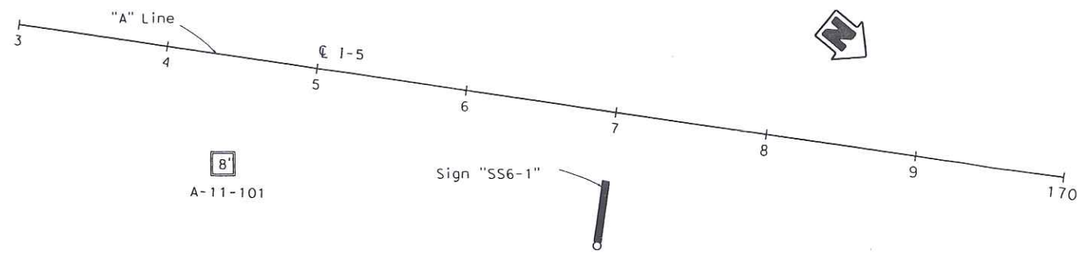
NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

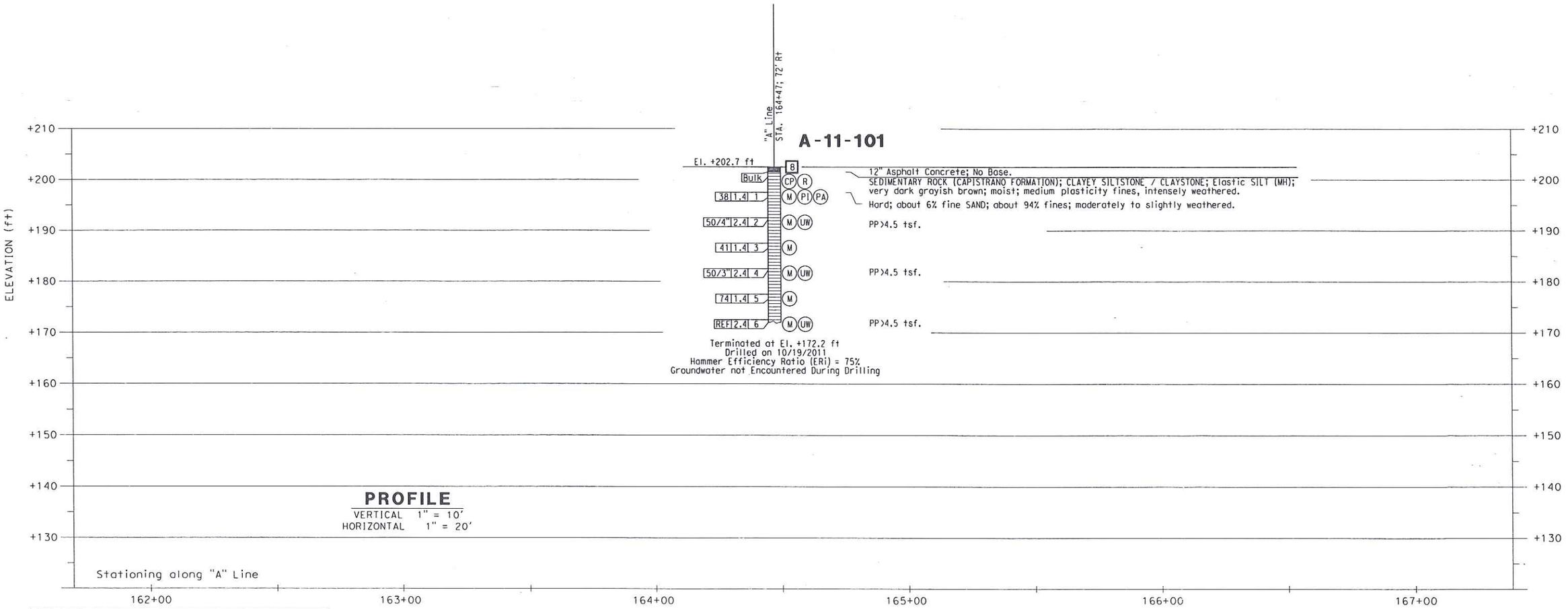
(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



PLAN

1" = 50'



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

95% SUBMITTAL
NOT FOR CONSTRUCTION
NOVEMBER 2012

OVERHEAD SIGN STRUCTURES
LOG OF TEST BORINGS 1 OF 6

REVISED BY	DATE REVISED
MIKE KAPUSKAR	JIANMIN FANG

CALCULATED-DESIGNED BY
CHECKED BY
CONSULTANT FUNCTIONAL SUPERVISOR: DAVID LEW

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

LAST REVISION

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL — 11/12/12 DATE

PLANS APPROVAL DATE

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FOUNTAIN VALLEY, CA 92708

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

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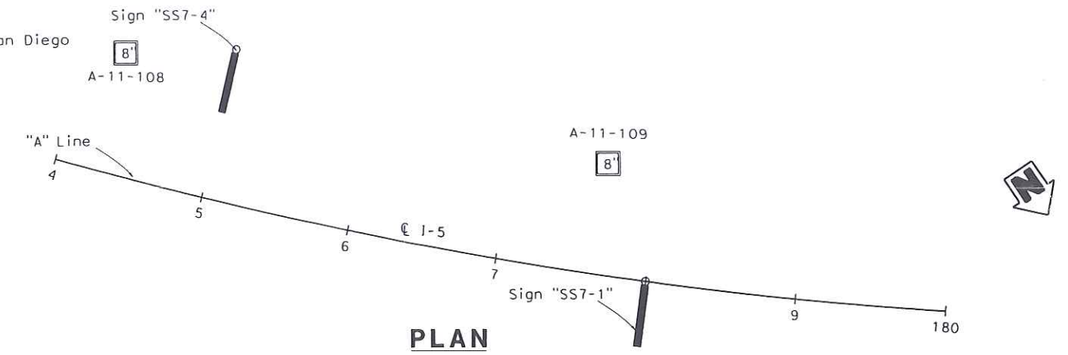
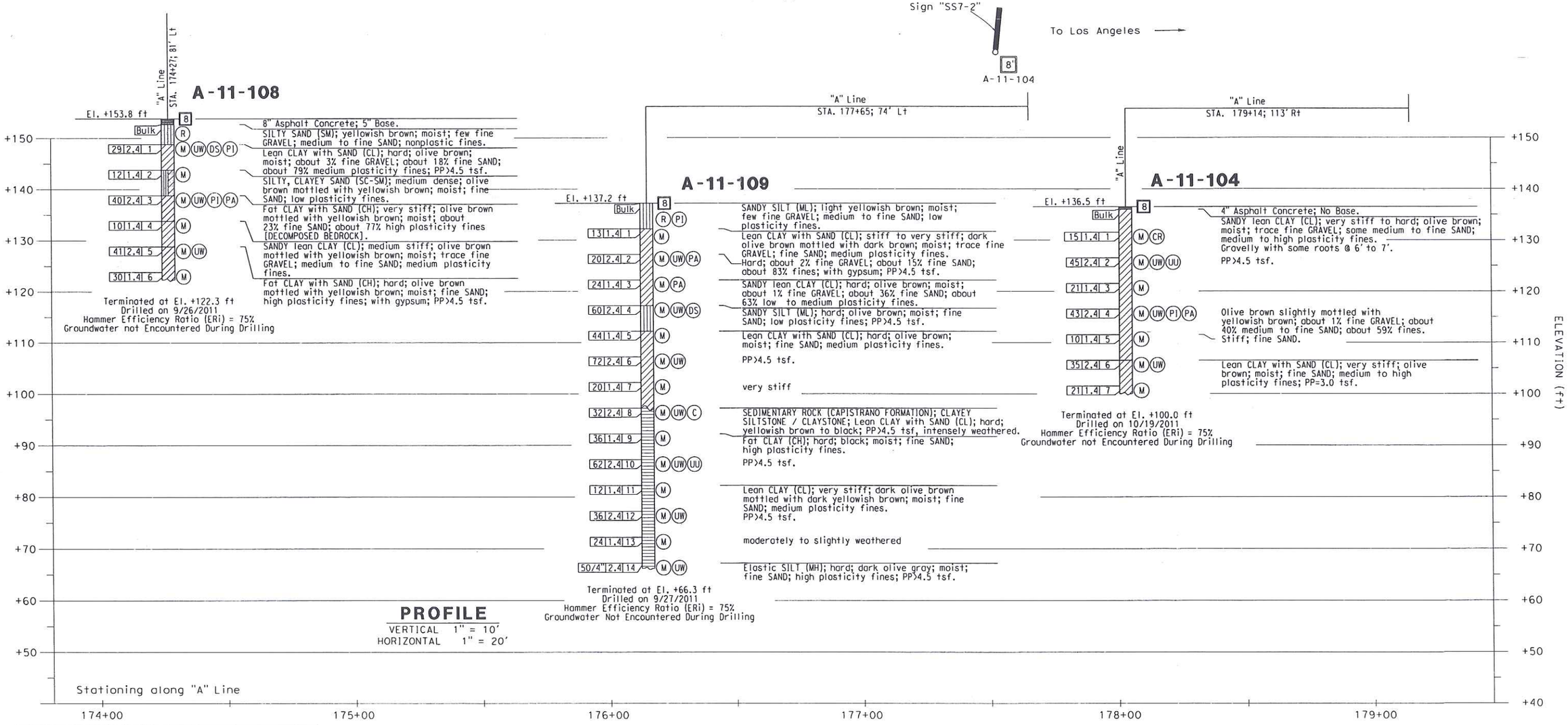
(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



PLAN
1" = 50'



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

95% SUBMITTAL
NOT FOR CONSTRUCTION
NOVEMBER 2012

OVERHEAD SIGN STRUCTURES
LOG OF TEST BORINGS 2 OF 6

REVISED BY	DATE REVISED
MIKE KAPUSKAR	JIANMIN FANG
CALCULATED-DESIGNED BY	CHECKED BY
DAVID LEW	

CONSULTANT FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

LAST REVISION

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL — DATE 11/12/12

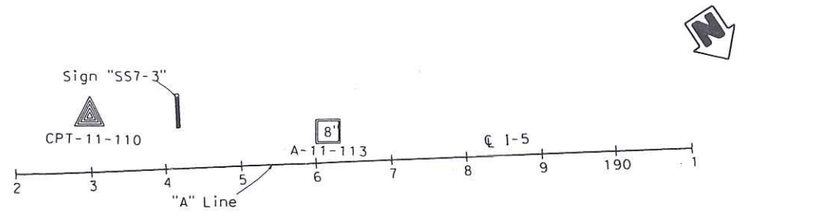
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

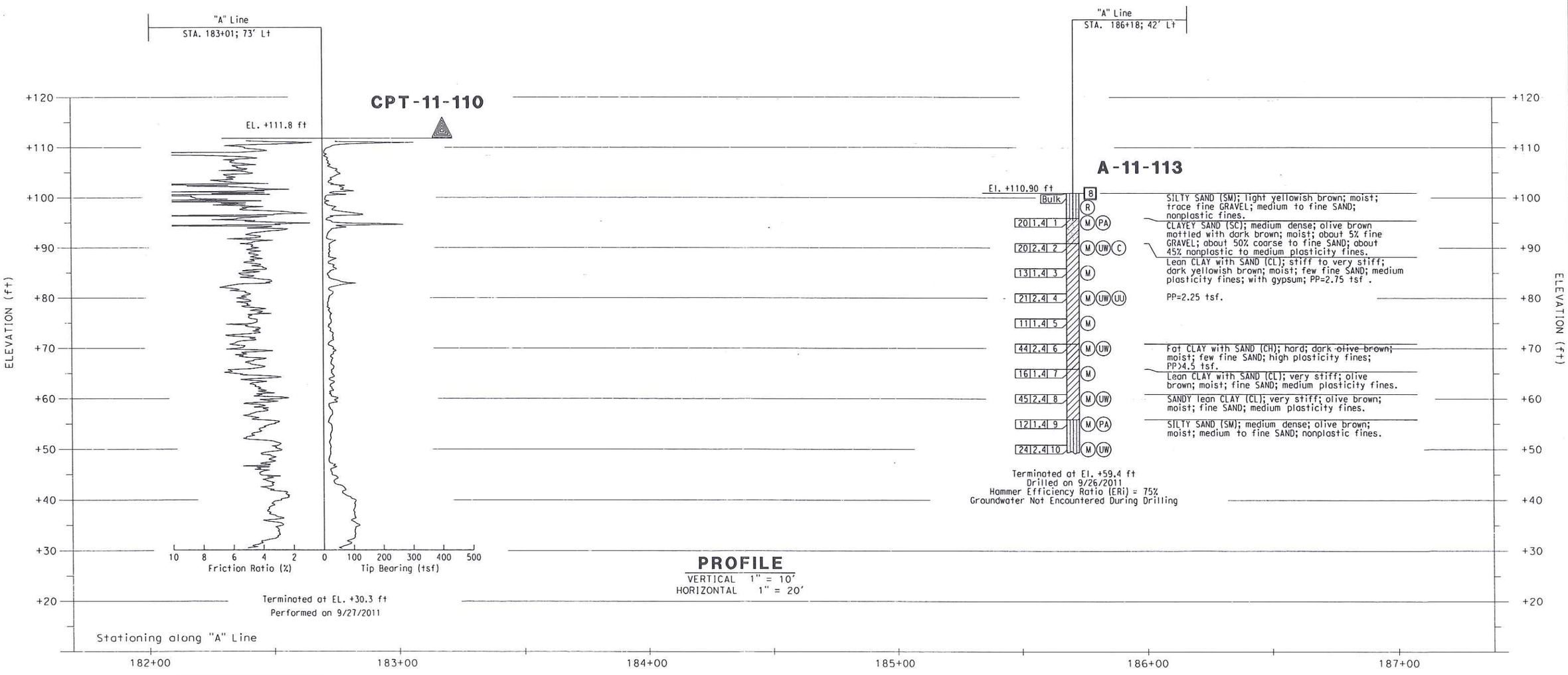
ORANGE COUNTY TRANSPORTATION AUTHORITY
550 SOUTH MAIN STREET
ORANGE, CA 92863



PLAN

1" = 100'

To Los Angeles



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

95% SUBMITTAL

NOT FOR CONSTRUCTION
NOVEMBER 2012

OVERHEAD SIGN STRUCTURES

LOG OF TEST BORINGS 3 OF 6

REVISED BY	DATE REVISED
MIKE KAPUSKAR	JIANMIN FANG
CALCULATED-DESIGNED BY	CHECKED BY
CONSULTANT FUNCTIONAL SUPERVISOR	DAVID LEW

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

USERNAME = \\USER

LAST REVISION

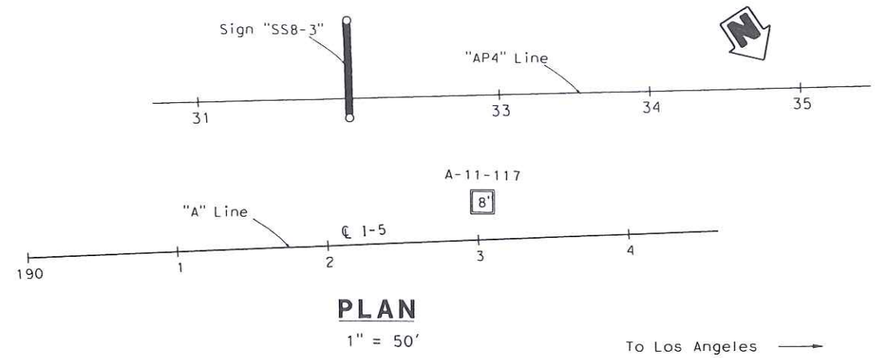
NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



PLAN

1" = 50'

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	5	3.0/3.7		

11/12/12
GEOTECHNICAL PROFESSIONAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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550 SOUTH MAIN STREET
ORANGE, CA 92863

"A" Line
STA. 193+04; 25' Lt

A-11-117

El. +125.5 ft

Blows/ft	Recovery	Sample No.	Sample Type	Lithology
Bulk			CP R	CLAYEY SAND (SC); olive brown; moist; few fine GRAVEL, max. 3/8 in. dia.; medium to fine SAND; medium plasticity fines.
38	2.4	1	M UW	SANDY lean CLAY (CL); very stiff; dark olive brown; moist; few fine GRAVEL, max. 3/8 in. dia.; medium to fine SAND; medium plasticity fines; PP>4.5 tsf.
36	1.4	2	M	
20	2.4	3	M UW UU	SANDY lean CLAY with GRAVEL (CL); hard; dark olive brown; moist; little fine GRAVEL, max. 3/4 in. dia.; medium to fine SAND; medium plasticity fines; with asphalt concrete pieces.
9	1.4	4	M	Lean CLAY (CL); stiff; olive brown; moist; fine SAND; medium plasticity fines; PP>4.5 tsf.
12	2.4	5	M UW	Lean CLAY with SAND (CL); stiff; olive brown; moist; fine SAND; medium plasticity fines. Stiff.
20	1.4	6	M	Very stiff; olive brown mottled with olive gray.
70	2.4	7	M UW CR	Fat CLAY (CH); hard; olive brown mottled with yellowish brown; moist; fine SAND; high plasticity fines; PP>4.5 tsf; moderately to slightly weathered; trace carbonate; rust stains, bedding.
11	1.4	8	M	Very stiff.
67	2.4	9	M UW C	Hard; PP>4.5 tsf.
39	1.4	10	M	
REF	2.4	11	M UW	SEDIMENTARY ROCK (CAPISTRANO FORMATION); CLAYEY SILTSTONE / CLAYSTONE; Elastic SILT (MH); hard; dark grayish brown; moist; fine SAND; high plasticity fines; PP>4.5 tsf; moderately to slightly weathered; hard drilling.
65	1.4	12	M	
REF	2.4	13	M UW	PP>4.5 tsf.
60	1.4	14	M	
REF	2.4	15	M UW	PP>4.5 tsf.
84	1.4	16	M	
REF	2.4	17	M UW	PP>4.5 tsf.
76	1.4	18	M	
REF	2.4	19	M UW	PP>4.5 tsf.
80/11"	1.4	20	M	

Terminated at El. +24.1 ft
Drilled on 9/26/2011
Hammer Efficiency Ratio (ERi) = 75%
Groundwater Not Encountered During Drilling

PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

ELEVATION (ft): +130, +120, +110, +100, +90, +80, +70, +60, +50, +40, +30, +20

Stationing along "A" Line: 192+00, 193+00, 194+00, 195+00, 196+00

95% SUBMITTAL
NOT FOR CONSTRUCTION
NOVEMBER 2012

OVERHEAD SIGN STRUCTURES
LOG OF TEST BORINGS 4 OF 6

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
CONSULTANT FUNCTIONAL SUPERVISOR: DAVID LEW
CALCULATED-DESIGNED BY: JIANMIN FANG
CHECKED BY: MIKE KAPUSKAR
REVISED BY
DATE REVISED

NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

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(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL — 11/12/12 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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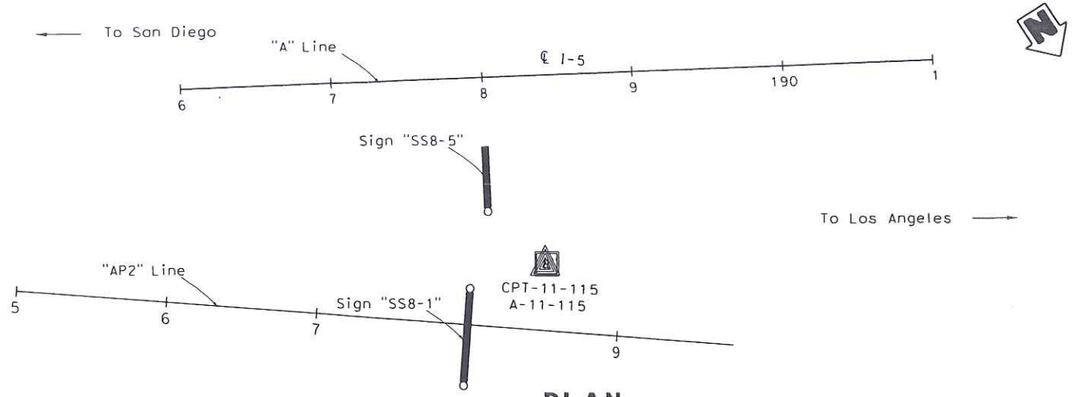
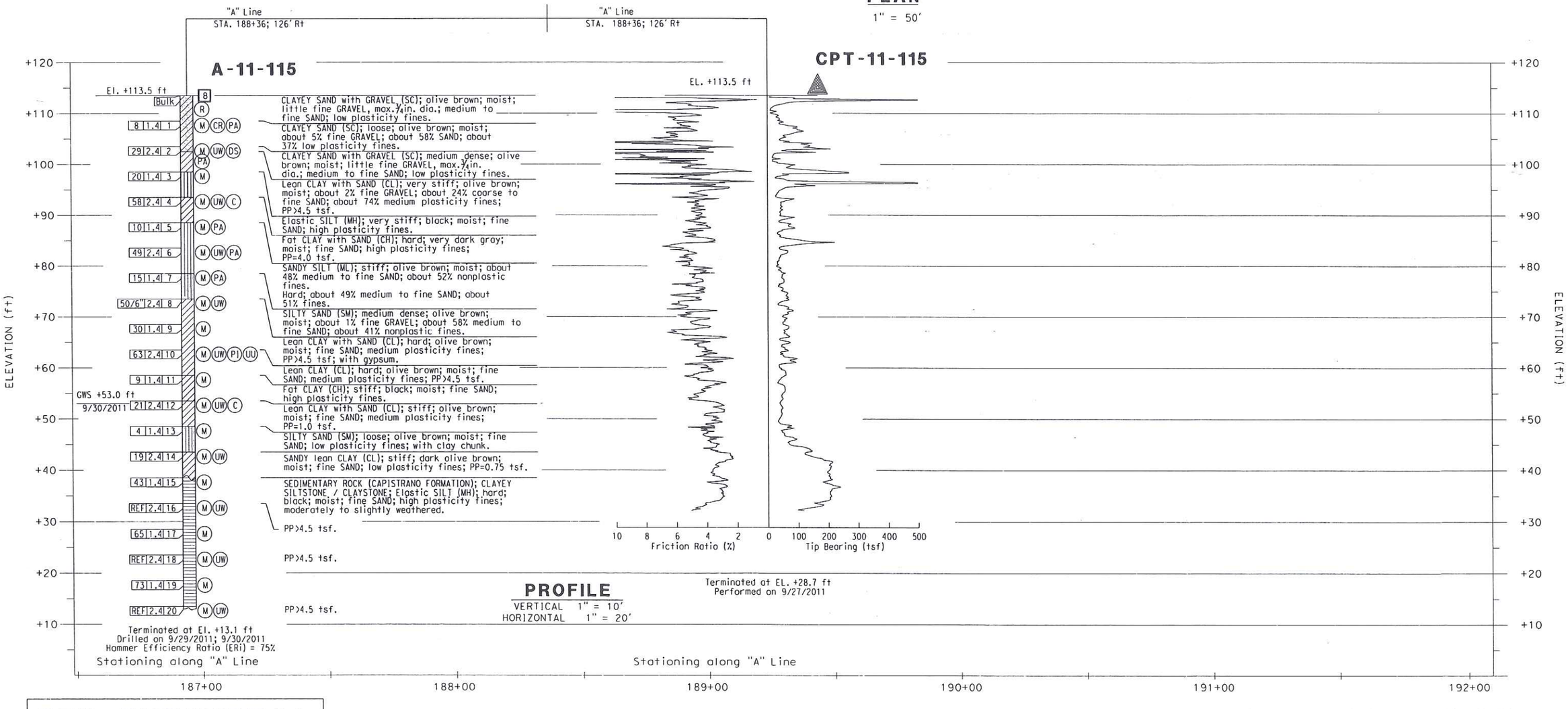


PLAN

1" = 50'



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

95% SUBMITTAL

NOT FOR CONSTRUCTION
NOVEMBER 2012

OVERHEAD SIGN STRUCTURES
LOG OF TEST BORINGS 5 OF 6

REVISED BY	DATE REVISED
MIKE KAPUSKAR	JIANMIN FANG

CALCULATED-DESIGNED BY | CHECKED BY

SUPERVISOR: DAVID LEW

CONSULTANT FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL — 11/12/12 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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

REVISED BY | DATE REVISED

MIKE KAPUSKAR | JIANMIN FANG

CALCULATED-DESIGNED BY | CHECKED BY

CONSULTANT FUNCTIONAL SUPERVISOR

DAVID LEW

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

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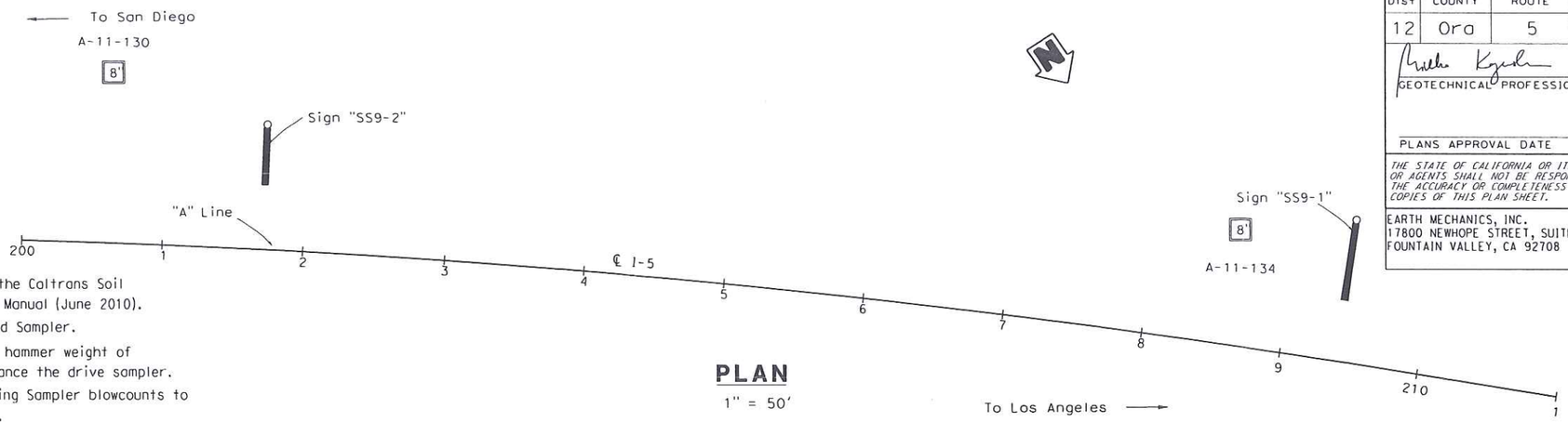
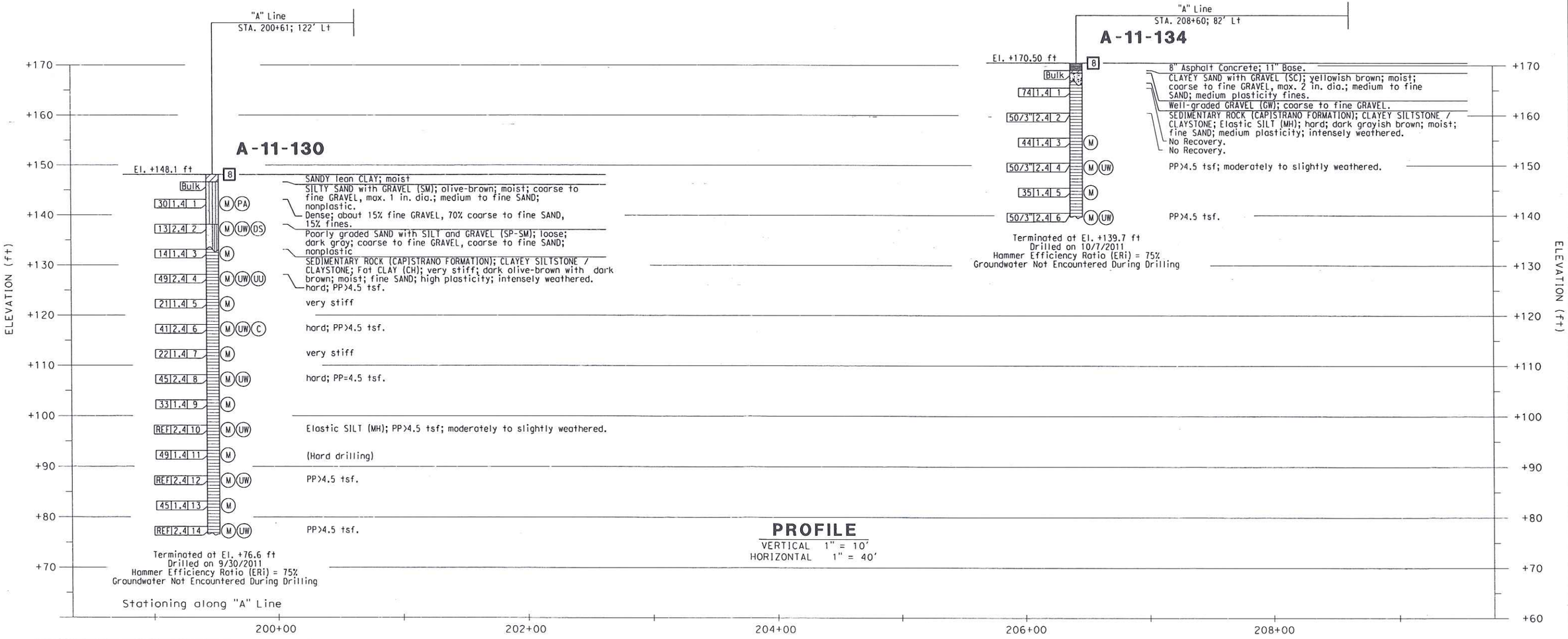


PLAN

1" = 50'



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 40'

95% SUBMITTAL

NOT FOR CONSTRUCTION
NOVEMBER 2012

OVERHEAD SIGN STRUCTURES

LOG OF TEST BORINGS 6 OF 6

LOG OF BORING NO. A-12-106

Grade Elevation:	+31.5 ft				
Boring Depth:	31.5 ft	Driller:	2R Drilling	SHEET 1 of 2	
Borehole Diameter:	5"	Type of Rig:	CME 75	Comments: Hammer Energy Efficiency: 75%	
Date Drilled:	11-19-11	Hammer Data:	Automatic hammer 140-lbs/30-inch drop	Northing: 2,105,945, Easting: 6,143,480	
Logged By:	R.J.	Groundwater Reading:	Not Encountered	Boring Backfill: Cement Grout	

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
					SILTY SAND (SM); olive brown; moist; medium to fine SAND; nonplastic fines.			
5		1	9		Medium dense.			
10		2	8		Very dense; trace mica and shell fragments.	7	104	DS

1. 'Sample Type' - Graphical representation of sample type as shown below.
   - S: Split Spoon - Standard Penetration Test Sample (SPT)
   - D: Drive Sample - California Drive Sampler
   - H: Hand Auger Sample - Obtained by collecting hand auger cuttings in a plastic bag
   - B: Bulk Sample - Obtained by collecting cuttings in a plastic bag
   - T: Tube Sample - Thin-walled Tube Sample
   - P: Thin-walled Pitcher Core Sample
2. 'Sample' - Sample Number
3. 'Blows/foot' - Number of blows required to advance sampler one foot (unless a distance is specified). Samplers in general were driven into the soil at the bottom of the hole with a 140-lb automatic trip hammer falling a standard 30 inches (as specified in header).

   'REC/RQD' - Sample Core Recovery (REC) in percent (%) and Rock Quality Designation (RQD) in percent (%). RQD is defined as the percentage of core in each run in which the spacing between natural fractures is greater than 4 inches. Mechanical breaks of the core are not considered.
4. 'Graphic Log' - Standard symbols for soil and rock types, as shown in Note B opposite
5. ▽ Groundwater elevation while drilling.
6. 'Geotechnical Description' (See also Note A, opposite).

   Soil - Soil classifications are in general accordance with the American Society for Testing and Materials (ASTM) D2488.84. Designations include consistency, moisture, and color. Field description have been modified to reflect results of laboratory analyses where deemed appropriate.

   Rock - Rock classifications generally include a rock type, color, moisture, mineral constituents, degree of weathering, alteration and the mechanical properties of the rock.

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I-5 HOV Widening Segment 1

EMI Project No.: 11-135 Date: 03/05/12

LEGEND FOR LETTER-SIZE GEOTECHNICAL BORING LOGS (SHEET 1 OF 2)

7. 'Moisture Content' and 'Dry Density' determined by laboratory testing.

8. 'Tests/Results' - Identify types of laboratory tests performed on samples collected from the field investigation. Abbreviations of tests are provided below:

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

Criteria for Describing Moisture Condition

Description	Criteria (After ASTM D 2488)
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

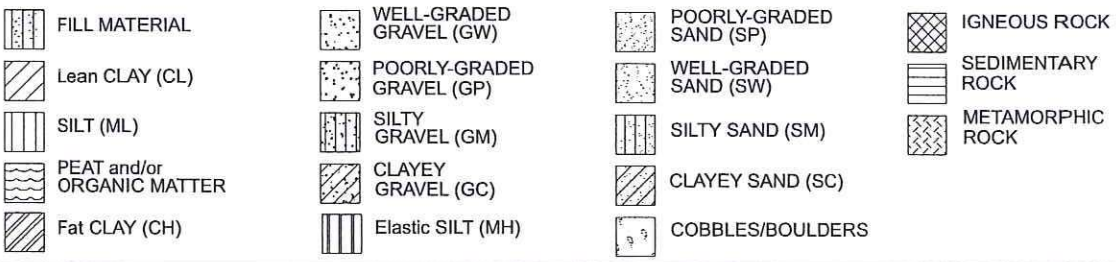
Relative Density of Coarse-Grained Soil

Blows/foot	Relative Density	Field Test (After Sowers, 1979)
0 - 4	Very Loose	Easily penetrated 12" with 0.5-inch steel rod pushed by hand
5 - 10	Loose	Easily penetrated with 0.5-inch steel rod pushed by hand
11 - 30	Medium Dense	Easily penetrated with 0.5-inch steel rod driven by 5-lb hammer
31 - 50	Dense	Penetrated a foot with 0.5-inch steel rod driven by 5-lb hammer
> 50	Very Dense	Penetrated a few inches with 0.5-inch steel rod driven by 5-lb hammer

Consistency of Cohesive Soils

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

Legend of Earth Materials



Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I-5 HOV Widening Segment 1

EMI Project No.: 11-135 Date: 03/05/12

LEGEND FOR LETTER-SIZE GEOTECHNICAL BORING LOGS (SHEET 2 OF 2)

LOG OF BORING NO. A-11-128

Grade Elevation:	+92.7 ft				
Boring Depth:	6.5 ft	Driller:	2R Drilling	SHEET 1 of 1	
Borehole Diameter:	8"	Type of Rig:	CME 75	Comments: Hammer Energy Efficiency: 75%	
Date Drilled:	9-30-11	Hammer Data:	Automatic hammer 140-lbs/30-inch drop	Northing: 2,106,063, Easting: 6,142,681	
Logged By:	CP	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 8" Asphalt Concrete; 4" Base; Geotextile Under Base.			
		bulk			Lean CLAY (CL); very stiff; olive brown; moist; fine SAND; trace gypsum.			PI, R
5		1	16					
					Bottom of borehole at 6.5 ft bgs			
10								
15								
20								
25								

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

LOG OF BORING NO. HA-11-132

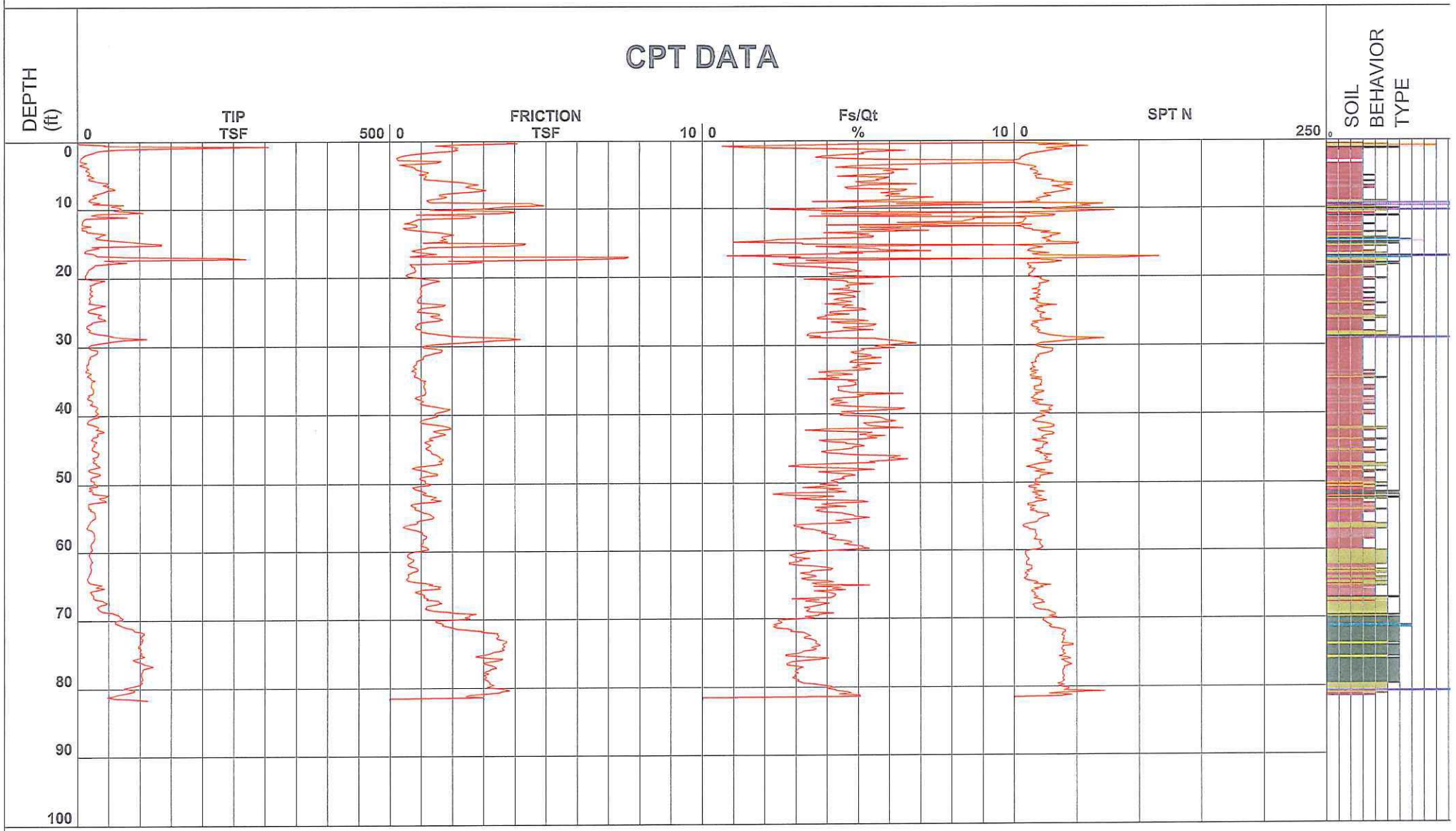
Grade Elevation:	+151.6 ft			
Boring Depth:	2.0 ft	Driller:	EMI	SHEET 1 of 1
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:
Date Drilled:	9-30-11	Hammer Data:	Hand Auger	Northing: 2,106,652, Easting: 6,142,045
Logged By:	KK	Groundwater Reading:	Not Encountered	

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0		bulk			Lean CLAY with SAND (CL); olive brown; medium to fine SAND; low to medium plasticity fines.			
					Bottom of borehole at 2.0 ft bgs			
5								
10								
15								
20								
25								

Earth Mechanics

Location	I-5 HOV Widening Segment 1	Operator	BH-JB	Filename	SDF(530).cpt
Job Number	11-135	Cone Number	DSG1104	GPS	
Hole Number	CPT-11-110	Date and Time	9/27/2011 10:05:52 AM	Maximum Depth	81.69 ft
Water Table Depth	45.00 ft				

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic -	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.10	Cycl SStn %
0.33	3.4	5.4	-	4.1	0.0	9.9	2	Organic SOILS - Peats	100	1.0	3	5	-	-	0.4	9.9	95	10	N/A	0.00	N/A	N/A
0.49	45.5	73.0	204.2	2.3	-0.1	5.0	4	clayy SILT to silty CLAY	115	2.0	23	36	-	-	3.2	9.9	31	15	N/A	0.00	N/A	N/A
0.66	42.6	68.3	158.6	1.5	-0.1	3.5	4	clayy SILT to silty CLAY	115	2.0	21	34	-	-	3.0	9.9	27	15	N/A	0.00	N/A	N/A
0.82	306.1	490.9	490.9	2.0	-0.2	0.7	7	grvly SAND to dense SAND	130	6.0	51	82	95	48	-	-	5	16	N/A	0.00	N/A	N/A
0.98	156.7	251.3	266.7	2.2	0.1	1.4	6	clean SAND to silty SAND	125	5.0	31	50	95	48	-	-	7	16	N/A	0.00	N/A	N/A
1.15	67.7	108.6	189.8	2.1	0.2	3.1	5	silty SAND to sandy SILT	120	4.0	17	27	70	48	-	-	20	16	N/A	0.00	N/A	N/A
1.31	39.4	63.2	201.8	2.2	0.2	5.5	4	clayy SILT to silty CLAY	115	2.0	20	32	-	-	2.8	9.9	34	15	N/A	0.00	N/A	N/A
1.48	30.2	48.5	-	2.0	0.2	6.5	3	silty CLAY to CLAY	115	1.5	20	32	-	-	2.1	9.9	41	15	N/A	0.00	N/A	N/A
1.64	26.4	42.4	-	1.4	-0.3	5.4	3	silty CLAY to CLAY	115	1.5	18	28	-	-	1.9	9.9	40	15	N/A	0.00	N/A	N/A
1.80	20.2	32.4	-	1.0	-1.6	5.1	3	silty CLAY to CLAY	115	1.5	13	22	-	-	1.4	9.9	43	15	N/A	0.00	N/A	N/A
1.97	13.5	21.6	-	0.7	-0.6	5.2	3	silty CLAY to CLAY	115	1.5	9	14	-	-	0.9	9.9	51	15	N/A	0.00	N/A	N/A
2.13	10.6	17.0	-	0.5	0.0	4.5	3	silty CLAY to CLAY	115	1.5	7	11	-	-	0.7	9.9	53	15	N/A	0.00	N/A	N/A
2.30	8.5	13.6	-	0.3	0.2	3.9	3	silty CLAY to CLAY	115	1.5	6	9	-	-	0.6	9.9	56	15	N/A	0.00	N/A	N/A
2.46	6.3	10.2	-	0.2	0.2	3.7	3	silty CLAY to CLAY	115	1.5	4	7	-	-	0.4	9.9	62	15	N/A	0.00	N/A	N/A
2.62	5.4	8.7	-	0.2	0.3	4.5	3	silty CLAY to CLAY	115	1.5	4	6	-	-	0.4	9.9	70	15	N/A	0.00	N/A	N/A
2.79	4.9	7.9	-	0.3	0.2	5.8	3	silty CLAY to CLAY	115	1.5	3	5	-	-	0.3	9.8	78	15	N/A	0.00	N/A	N/A
2.95	4.8	7.7	-	1.6	0.2	9.9	2	Organic SOILS - Peats	100	1.0	5	8	-	-	0.5	9.1	91	10	N/A	0.00	N/A	N/A
3.12	15.3	24.6	-	1.6	0.3	9.9	3	silty CLAY to CLAY	115	1.5	10	16	-	-	1.1	9.9	61	15	N/A	0.00	N/A	N/A
3.28	9.9	15.9	-	1.1	0.2	9.9	3	silty CLAY to CLAY	115	1.5	7	11	-	-	0.7	9.9	71	15	-	-	0.11	-
3.45	4.4	7.1	-	0.3	0.1	7.7	3	silty CLAY to CLAY	115	1.5	3	5	-	-	0.3	7.5	88	15	-	-	0.11	-
3.61	9.8	15.7	-	0.5	0.0	5.7	3	silty CLAY to CLAY	115	1.5	7	10	-	-	0.7	9.9	60	15	-	-	0.11	-
3.77	15.2	24.4	-	0.7	0.0	4.9	3	silty CLAY to CLAY	115	1.5	10	16	-	-	1.1	9.9	48	15	-	-	0.11	-
3.94	18.8	30.1	-	0.8	0.0	4.3	3	silty CLAY to CLAY	115	1.5	13	20	-	-	1.3	9.9	42	15	-	-	0.11	-
4.10	15.3	24.5	-	0.8	-0.2	5.5	3	silty CLAY to CLAY	115	1.5	10	16	-	-	1.1	9.9	50	15	-	-	0.11	-
4.27	13.9	22.2	-	0.9	-0.1	6.7	3	silty CLAY to CLAY	115	1.5	9	15	-	-	1.0	9.9	55	15	-	-	0.11	-
4.43	18.2	29.2	-	1.1	-1.3	5.9	3	silty CLAY to CLAY	115	1.5	12	19	-	-	1.3	9.9	48	15	-	-	0.11	-
4.59	20.2	32.5	-	1.2	-0.6	6.2	3	silty CLAY to CLAY	115	1.5	13	22	-	-	1.4	9.9	47	15	-	-	0.11	-
4.76	19.4	31.1	-	1.2	-0.3	6.2	3	silty CLAY to CLAY	115	1.5	13	21	-	-	1.4	9.9	48	15	-	-	0.11	-
4.92	16.4	26.4	-	1.0	-0.3	6.0	3	silty CLAY to CLAY	115	1.5	11	18	-	-	1.1	9.9	50	15	-	-	0.11	-
5.09	23.1	37.1	-	1.2	-0.3	5.2	3	silty CLAY to CLAY	115	1.5	15	25	-	-	1.6	9.9	41	15	-	-	0.11	-
5.25	27.0	43.3	-	1.2	-7.7	4.4	4	clayy SILT to silty CLAY	115	2.0	14	22	-	-	1.9	9.9	36	15	-	-	0.11	-
5.41	18.6	29.8	-	1.1	-9.2	6.1	3	silty CLAY to CLAY	115	1.5	12	20	-	-	1.3	9.9	48	15	-	-	0.11	-
5.58	18.8	30.2	-	1.1	-9.1	6.0	3	silty CLAY to CLAY	115	1.5	13	20	-	-	1.3	9.9	47	15	-	-	0.11	-
5.74	26.8	43.0	-	1.5	-9.0	5.6	3	silty CLAY to CLAY	115	1.5	18	29	-	-	1.9	9.9	40	15	-	-	0.11	-
5.91	33.4	53.5	-	1.9	-9.0	5.7	3	silty CLAY to CLAY	115	1.5	22	36	-	-	2.3	9.9	37	15	-	-	0.11	-
6.07	47.8	76.6	208.1	2.4	-9.0	5.0	4	clayy SILT to silty CLAY	115	2.0	24	38	-	-	3.4	9.9	30	15	0.00	-	0.11	0.0
6.23	49.7	79.7	216.7	2.5	-9.0	5.1	4	clayy SILT to silty CLAY	115	2.0	25	40	-	-	3.5	9.9	30	15	0.00	-	0.11	0.0
6.40	41.5	66.5	-	2.8	-8.9	6.9	9	very stiff fine SOIL	120	2.0	21	33	54	43	-	-	37	30	-	-	0.11	-
6.56	49.1	77.8	215.6	2.5	-8.9	5.2	4	clayy SILT to silty CLAY	115	2.0	25	39	-	-	3.5	9.9	31	15	0.00	-	0.11	0.0
6.73	49.1	76.8	209.7	2.4	-8.9	5.0	4	clayy SILT to silty CLAY	115	2.0	25	38	-	-	3.5	9.9	30	15	0.00	-	0.11	0.0
6.89	57.0	88.0	213.3	2.6	-8.9	4.6	4	clayy SILT to silty CLAY	115	2.0	28	44	-	-	4.0	9.9	28	15	0.00	-	0.11	0.0
7.05	60.6	92.6	221.0	2.8	-8.9	4.7	9	very stiff fine SOIL	120	2.0	30	46	64	44	-	-	27	30	0.00	-	0.11	0.0
7.22	47.1	75.5	246.9	3.1	-8.8	6.6	9	very stiff fine SOIL	120	2.0	24	38	58	43	-	-	35	30	0.00	-	0.11	0.0
7.38	44.0	70.6	-	2.9	-8.8	6.5	9	very stiff fine SOIL	120	2.0	22	35	56	43	-	-	36	30	-	-	0.11	-
7.55	38.0	61.0	-	2.3	-8.7	6.2	3	silty CLAY to CLAY	115	1.5	25	41	-	-	2.7	9.9	37	15	-	-	0.11	-
7.71	32.5	52.2	-	1.9	-8.7	5.8	3	silty CLAY to CLAY	115	1.5	22	35	-	-	2.3	9.9	38	15	-	-	0.11	-
7.87	25.2	40.5	-	1.6	-8.6	6.5	3	silty CLAY to CLAY	115	1.5	17	27	-	-	1.8	9.9	44	15	-	-	0.11	-
8.04	27.0	43.3	-	1.6	-8.6	6.1	3	silty CLAY to CLAY	115	1.5	18	29	-	-	1.9	9.9	42	15	-	-	0.11	-
8.20	30.9	49.5	-	1.8	-8.6	6.0	3	silty CLAY to CLAY	115	1.5	21	33	-	-	2.2	9.9	39	15	-	-	0.11	-
8.37	23.7	38.0	-	1.8	-8.6	7.6	3	silty CLAY to CLAY	115	1.5	16	25	-	-	1.7	9.9	48	15	-	-	0.11	-
8.53	20.4	32.7	-	1.4	-8.7	7.0	3	silty CLAY to CLAY	115	1.5	14	22	-	-	1.4	9.9	49	15	-	-	0.11	-
8.69	18.7	30.1	-	1.2	-8.7	6.5	3	silty CLAY to CLAY	115	1.5	12	20	-	-	1.3	9.9	49	15	-	-	0.11	-
8.86	22.0	35.3	-	1.2	-8.7	5.7	3	silty CLAY to CLAY	115	1.5	15	24	-	-	1.5	9.9	44	15	-	-	0.11	-
9.02	36.7	49.5	140.9	1.3	-8.6	3.6	4	clayy SILT to silty CLAY	115	2.0	18	25	-	-	2.6	9.9	31	15	1.05	-	0.11	35.9
9.19	25.9	41.5	-	4.5	-8.7	9.9	3	silty CLAY to CLAY	115	1.5	17	28	-	-	1.8	9.9	52	15	-	-	0.10	-
9.35	74.5	98.7	274.2	4.6	-8.7	6.3	9	very stiff fine SOIL	120	2.0	37	49	67	44	-	-	31	30	0.00	-	0.10	0.0
9.51	55.1	88.4	-	4.9	-8.8	9.1	9	very stiff fine SOIL	120	2.0	28	44	63	43	-	-	38	30	-	-	0.10	-
9.68	64.3	83.6	239.0	3.7	-8.5	5.8	9	very stiff fine SOIL	120	2.0	32	42	61	44	-	-	31	30	0.00	-	0.10	0.0
9.84	70.9	91.5	220.3	3.3	-8.5	4.7	9	very stiff fine SOIL	120	2.0	35	46	64	44	-	-	27	30	0.00	-	0.10	0.0
10.01	67.6	86.4	202.1	2.9	-8.4	4.3	4	clayy SILT to silty CLAY	115	2.0	34	43	-	-	4.7	9.9	27	15	0.00	-	0.10	0.0
10.17	59.6	75.6	132.5	1.3	-8.4	2.2	5	silty SAND to sandy SILT	120	4.0	15	19	58	43	-	-	20	16	1.56	-	0.10	18.2
10.34	83.9	105.4	231.7	3.8	-2.4	4.5	9	very stiff fine SOIL	120	2.0	42	53	69	45	-	-	25	30	0.00	-	0.10	0.0
10.50	105.3	131.3	238.7	4.0	-2.0	3.8	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	7.0	9.9	21	16	0.00	-	0.10	0.0
10.66	33.7	54.1	-	3.5	-0.7	9.9	3	silty CLAY to CLAY	115	1.5	22	36	-	-	2.4	9.9	47	15	-	-	0.10	-
10.83	22.6	36.1	-	0.9	-0.4	3.9	4	clayy SILT to silty CLAY	115	2.0	11	18	-	-	1.6	9.9	38	15	-	-	0.10	-
10.99	34.5	54.3	-	2.5	-0.2	7.5	3	silty CLAY to CLAY	115	1.5	23	36	-	-	2.4	9.9	42	15	-	-	0.10	-
11.16	80.1	97.0	190.6	2.8	-0.5	3.5	5	silty SAND to sandy SILT	120	4.0	20	24	66	44	-	-	23	16	0.00	-	0.10	0.0
11.32	14.8	22.6	-	2.5	-0.3	9.9	3	silty CLAY to CLAY	115	1.5	10	15	-	-	1.0	9.9	64	15	-	-	0.10	-
11.48	10.7	16.2	-	0.9	-0.6	9.2	3	silty CLAY to CLAY	115	1.5	7	11	-	-	0.7	8.3	70	15	-	-	0.10	-
11.65	9.7	14.4	-	0.8	-0.8	9.4	3	silty CLAY to CLAY	115	1.5	6	10	-	-	0.7	7.3	74	15	-	-	0.10	-
11.81	8.8	12.8	-	0.7	-1.0	9.2	3	silty CLAY to CLAY	115	1.5	6	9	-	-	0.6	6.5	76	15	-	-	0.10	-
11.98	8.4	12.1	-	0.7	-2.0	9.1	3	silty CLAY to CLAY	115	1.5	6	8	-	-	0.6	6.1	78	15	-	-	0.10	-
12.14	7.7	10.9	-	0.5	-2.3	6.9	3	silty CLAY to CLAY	115	1.5	5	7	-	-	0.5	5.5	74	15	-	-	0.10	-
12.30	8.4	11.8	-	0.8	-3.8	9.9	3	silty CLAY to CLAY	115	1.5	6	8	-	-	0.6	5.9	81	15	-	-	0.10	-
12.47	22.0	30.5	-	0.9	-6.1	4.1	4	clayy SILT to silty CLAY	115	2.0	11	15	-	-	1.5	9.9	41	15	-	-	0.10	-
12.63	7.6	10.4	-	0.9	-0.6	9.9	3	silty CLAY to CLAY	115	1.5	5	7	-	-	0.5	5.3	84	15	-	-	0.10	-
12.80	8.8	11.9	-	0.4	-1.2	5.5	3	silty CLAY to CLAY	115	1.5	6	8	-	-	0.6	6.1	67	15	-	-	0.10	-
12.96	7.9	10.5	-	0.5	-1.5	7.4	3	silty CLAY to CLAY	115	1.5	5	7	-	-	0.5	5.3	77	15	-	-	0.10	-
13.12	16.0	21.1	-	0.8	-1.4	5.3	3	silty CLAY to CLAY	115	1.5	11	14	-	-	1.1	9.9	53	15	-	-	0.10	-
13.29	15.6	20.3	-	1.1	-1.4	7.6	3	silty CLAY to CLAY	115	1.5	10	14	-	-	1.1	9.9	61	15	-	-	0.10	-
13.45	30.1	38.8	-	1.6	-1.2	5.4	3	silty CLAY to CLAY	115	1.5	20	26	-	-	2.1	9.9	42	15	-	-	0.10	-
13.62	45.7	50.1	150.3	1.8	-1.3	4.0	4	clayy SILT to silty CLAY	115	2.0	23	25	-	-	3.2	9.9	33	15	0.81	-	0.10	32.9
13.78	38.3	48.2	-	2.0	-1.2	5.5	3	silty CLAY to CLAY	115	1.5	26	32	-	-	2.7	9.9	38	15	-	-	0.10	-
13.94	36.0	44.7	-	1.8	-1.1	5.1	3	silty CLAY to CLAY	115	1.5	24	30	-	-	2.5	9.9	38	15	-	-	0.10	-
14.11	30.3	37.2	-	1.7	-1.2	5.6	3	silty CLAY to CLAY	115	1.5	20	25	-	-	2.1	9.9	43	15	-	-	0.10	-
14.27	31.2	37.9	-	1.7	-1.1	5.6	3	silty CLAY to CLAY	115	1.5	21	25	-	-	2.2	9.9	43	15	-	-	0.10	-
14.44	47.8	50.9	148.7	1.8	-1.0	3.9	4	clayy SILT to silty CLAY	115	2.0	24	25	-	-	3.3	9.9	32	15	0.92	-	0.10	31.5
14.60	66.8	70.7	135.1	1.6	-1.1	2.5	5	silty SAND to sandy SILT	120	4.0	17	18	56	42	-	-	22	16	1.58	-	0.10	24.4
14.76	90.5	95.2	146.4	1.8	-1.5	2.1	5	silty SAND to sandy SILT	120	4.0	23	24	65	44	-	-	17	16	1.03	-	0.10	6.2
14.93	108.8	113.8	132.5	1.1	-2.9	1.0	6	clean SAND to silty SAND	125	5.0	22	23	71	44	-	-	10	16	1.70	-	0.09	9.6
15.09	135.1	140.5	227.6	4.4	-1.4	3.2	5	silty SAND to sandy SILT	120	4.0	34	35	78	45	-	-	18	16	0.00	-	0.09	0.0
15.26	134.3	138.8	225.5	4.3	-1.9	3.2	5	silty SAND to sandy SILT	120	4.0	34	35	78	45	-	-	18	16	0.00	-	0.09	0.0
15.42	23.9	26.8	-	3.7	-0.4	9.9	3	silty CLAY to CLAY	115	1.5	16	18	-	-	1.7	9.9	60	15	-	-	0.09	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic -	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.10	Cycl SStn %
15.58	34.9	38.7	-	1.3	-0.6	3.8	4	clayy SILT to silty CLAY	115	2.0	17	19	-	-	2.4	9.9	36	15	-	-	0.09	-
15.75	24.0	26.3	-	1.1	-0.9	4.9	3	silty CLAY to CLAY	115	1.5	16	18	-	-	1.7	9.9	47	15	-	-	0.09	-
15.91	15.7	17.0	-	0.9	-0.4	6.0	3	silty CLAY to CLAY	115	1.5	10	11	-	-	1.1	9.3	60	15	-	-	0.09	-
16.08	12.7	13.6	-	0.7	-0.8	6.2	3	silty CLAY to CLAY	115	1.5	8	9	-	-	0.9	7.4	66	15	-	-	0.09	-
16.24	11.8	12.5	-	0.9	-2.5	8.0	3	silty CLAY to CLAY	115	1.5	8	8	-	-	0.8	6.7	74	15	-	-	0.09	-
16.40	25.6	27.0	-	1.1	-2.6	4.6	3	silty CLAY to CLAY	115	1.5	17	18	-	-	1.8	9.9	45	15	-	-	0.09	-
16.57	29.1	30.4	-	1.5	-2.6	5.3	3	silty CLAY to CLAY	115	1.5	19	20	-	-	2.0	9.9	46	15	-	-	0.09	-
16.73	31.8	32.9	-	1.0	-2.6	3.3	4	clayy SILT to silty CLAY	115	2.0	16	16	-	-	2.2	9.9	36	15	-	-	0.09	-
16.90	81.8	80.3	98.5	0.7	-2.5	0.8	6	clean SAND to silty SAND	125	5.0	16	16	60	43	-	-	11	16	2.37	-	0.09	23.0
17.06	241.9	236.4	321.2	7.6	-0.3	3.2	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	16.0	9.9	14	16	0.00	-	0.09	0.0
17.23	270.2	262.9	332.2	7.5	-0.4	2.8	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	17.9	9.9	12	16	0.00	-	0.09	0.0
17.39	43.9	43.6	-	5.9	-0.4	9.9	3	silty CLAY to CLAY	115	1.5	29	29	-	-	3.1	9.9	51	15	-	-	0.09	-
17.55	56.5	54.4	142.7	1.9	-0.4	3.4	4	clayy SILT to silty CLAY	115	2.0	28	27	-	-	4.0	9.9	29	15	1.26	-	0.09	29.9
17.72	79.4	76.2	176.8	3.0	-0.5	3.8	4	clayy SILT to silty CLAY	115	2.0	40	38	-	-	5.6	9.9	26	15	0.00	-	0.08	0.0
17.88	49.5	47.8	-	2.5	-0.4	5.1	4	clayy SILT to silty CLAY	115	2.0	25	24	-	-	3.5	9.9	37	15	-	-	0.08	-
18.05	28.4	27.1	-	0.7	-0.3	2.4	4	clayy SILT to silty CLAY	115	2.0	14	14	-	-	2.0	9.9	35	15	-	-	0.08	-
18.21	28.0	26.6	-	0.7	-0.3	2.6	4	clayy SILT to silty CLAY	115	2.0	14	13	-	-	1.9	9.9	37	15	-	-	0.08	-
18.37	25.0	23.5	-	0.7	-0.3	3.0	4	clayy SILT to silty CLAY	115	2.0	12	12	-	-	1.7	9.9	41	15	-	-	0.08	-
18.54	22.1	20.6	-	0.8	-0.3	3.9	3	silty CLAY to CLAY	115	1.5	15	14	-	-	1.5	9.9	48	15	-	-	0.08	-
18.70	19.1	17.7	-	0.8	-0.4	4.4	3	silty CLAY to CLAY	115	1.5	13	12	-	-	1.3	9.9	53	15	-	-	0.08	-
18.87	17.7	16.2	-	0.8	-0.3	5.0	3	silty CLAY to CLAY	115	1.5	12	11	-	-	1.2	9.1	58	15	-	-	0.08	-
19.03	17.1	15.5	-	0.8	-1.1	5.2	3	silty CLAY to CLAY	115	1.5	11	10	-	-	1.2	8.7	59	15	-	-	0.08	-
19.19	15.6	14.0	-	0.8	-0.9	5.5	3	silty CLAY to CLAY	115	1.5	10	9	-	-	1.1	7.8	63	15	-	-	0.08	-
19.36	15.2	13.6	-	0.7	-0.7	4.9	3	silty CLAY to CLAY	115	1.5	10	9	-	-	1.0	7.6	61	15	-	-	0.08	-
19.52	14.0	12.4	-	0.6	-1.1	4.5	3	silty CLAY to CLAY	115	1.5	9	8	-	-	0.9	6.9	62	15	-	-	0.08	-
19.69	12.9	11.3	-	0.5	-0.4	4.5	3	silty CLAY to CLAY	115	1.5	9	8	-	-	0.9	6.3	65	15	-	-	0.08	-
19.85	13.0	11.3	-	0.6	-0.4	5.1	3	silty CLAY to CLAY	115	1.5	9	8	-	-	0.9	6.2	67	15	-	-	0.08	-
20.01	14.4	12.5	-	0.9	-0.2	6.9	3	silty CLAY to CLAY	115	1.5	10	8	-	-	1.0	6.9	71	15	-	-	0.08	-
20.18	23.4	20.1	-	1.1	0.0	5.2	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.6	9.9	53	15	-	-	0.08	-
20.34	44.1	39.5	124.5	1.4	-0.1	3.4	4	clayy SILT to silty CLAY	115	2.0	22	20	-	-	3.1	9.9	34	15	1.95	-	0.08	51.2
20.51	36.2	30.5	-	1.6	-4.3	4.6	3	silty CLAY to CLAY	115	1.5	24	20	-	-	2.5	9.9	43	15	-	-	0.08	-
20.67	29.4	24.6	-	1.4	-3.9	4.9	3	silty CLAY to CLAY	115	1.5	20	16	-	-	2.0	9.9	48	15	-	-	0.08	-
20.83	26.8	22.2	-	1.2	-3.9	4.9	3	silty CLAY to CLAY	115	1.5	18	15	-	-	1.8	9.9	50	15	-	-	0.08	-
21.00	20.9	17.2	-	1.1	-4.0	5.8	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	9.9	59	15	-	-	0.08	-
21.16	21.5	17.6	-	1.0	-4.0	5.0	3	silty CLAY to CLAY	115	1.5	14	12	-	-	1.5	9.9	56	15	-	-	0.08	-
21.33	22.3	18.1	-	1.0	-4.0	4.9	3	silty CLAY to CLAY	115	1.5	15	12	-	-	1.5	9.9	55	15	-	-	0.08	-
21.49	21.1	17.0	-	1.0	-4.0	5.0	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	9.8	57	15	-	-	0.08	-
21.65	20.9	16.7	-	1.0	-4.0	5.0	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	9.6	57	15	-	-	0.08	-
21.82	24.3	19.2	-	1.0	-3.9	4.4	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.7	9.9	52	15	-	-	0.08	-
21.98	21.8	17.1	-	1.0	-4.0	5.0	3	silty CLAY to CLAY	115	1.5	15	11	-	-	1.5	9.9	56	15	-	-	0.08	-
22.15	20.0	15.7	-	1.0	-3.9	5.4	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.4	9.0	60	15	-	-	0.08	-
22.31	21.2	16.4	-	1.0	-3.9	5.0	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	9.5	57	15	-	-	0.08	-
22.47	24.8	19.1	-	1.0	-3.8	4.3	3	silty CLAY to CLAY	115	1.5	17	13	-	-	1.7	9.9	51	15	-	-	0.08	-
22.64	22.2	17.0	-	1.0	-3.9	4.9	3	silty CLAY to CLAY	115	1.5	15	11	-	-	1.5	9.9	56	15	-	-	0.08	-
22.80	20.0	15.2	-	1.0	-3.9	5.2	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.4	8.8	60	15	-	-	0.08	-
22.97	19.0	14.3	-	0.9	-3.9	5.3	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.3	8.3	62	15	-	-	0.08	-
23.13	20.9	15.6	-	0.9	-3.9	4.7	3	silty CLAY to CLAY	115	1.5	14	10	-	-	1.4	9.0	57	15	-	-	0.08	-
23.30	21.1	15.7	-	0.9	-3.9	4.5	3	silty CLAY to CLAY	115	1.5	14	10	-	-	1.4	9.1	57	15	-	-	0.08	-
23.46	20.1	14.8	-	0.9	-3.9	4.8	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.4	8.6	59	15	-	-	0.08	-
23.62	19.1	14.0	-	0.9	-3.9	5.2	3	silty CLAY to CLAY	115	1.5	13	9	-	-	1.3	8.1	62	15	-	-	0.08	-
23.79	30.1	21.9	-	1.3	-3.9	4.6	3	silty CLAY to CLAY	115	1.5	20	15	-	-	2.1	9.9	50	15	-	-	0.08	-
23.95	45.0	32.5	-	1.8	-3.8	4.1	4	clayy SILT to silty CLAY	115	2.0	22	16	-	-	3.1	9.9	40	15	-	-	0.08	-
24.12	35.7	25.6	-	1.7	-3.9	5.0	3	silty CLAY to CLAY	115	1.5	24	17	-	-	2.5	9.9	48	15	-	-	0.08	-
24.28	29.4	20.9	-	1.3	-3.8	4.8	3	silty CLAY to CLAY	115	1.5	20	14	-	-	2.0	9.9	51	15	-	-	0.08	-
24.44	23.6	16.7	-	1.1	-3.8	4.8	3	silty CLAY to CLAY	115	1.5	16	11	-	-	1.6	9.8	56	15	-	-	0.08	-
24.61	18.5	13.0	-	1.0	-3.8	5.6	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.3	7.5	65	15	-	-	0.08	-
24.77	17.5	12.2	-	0.9	-3.8	5.7	3	silty CLAY to CLAY	115	1.5	12	8	-	-	1.2	7.0	67	15	-	-	0.08	-
24.94	19.5	13.6	-	0.9	-3.9	5.0	3	silty CLAY to CLAY	115	1.5	13	9	-	-	1.3	7.9	62	15	-	-	0.08	-
25.10	30.1	20.7	-	1.2	-3.8	4.3	3	silty CLAY to CLAY	115	1.5	20	14	-	-	2.1	9.9	49	15	-	-	0.08	-
25.26	38.7	26.5	-	1.6	-3.8	4.3	3	silty CLAY to CLAY	115	1.5	26	18	-	-	2.7	9.9	44	15	-	-	0.08	-
25.43	34.1	23.2	-	1.6	-3.8	4.9	3	silty CLAY to CLAY	115	1.5	23	15	-	-	2.4	9.9	49	15	-	-	0.08	-
25.59	33.2	22.5	-	1.3	-3.8	4.1	3	silty CLAY to CLAY	115	1.5	22	15	-	-	2.3	9.9	47	15	-	-	0.08	-
25.76	35.0	23.5	-	1.4	-3.7	4.2	3	silty CLAY to CLAY	115	1.5	23	16	-	-	2.4	9.9	46	15	-	-	0.08	-
25.92	43.1	28.8	-	1.6	-3.7	3.8	4	clayy SILT to silty CLAY	115	2.0	22	14	-	-	3.0	9.9	41	15	-	-	0.08	-
26.08	45.5	30.2	-	1.7	-3.7	3.8	4	clayy SILT to silty CLAY	115	2.0	23	15	-	-	3.2	9.9	40	15	-	-	0.08	-
26.25	31.5	20.8	-	1.6	-3.6	5.3	3	silty CLAY to CLAY	115	1.5	21	14	-	-	2.2	9.9	53	15	-	-	0.08	-
26.41	22.9	15.0	-	1.2	-3.5	5.7	3	silty CLAY to CLAY	115	1.5	15	10	-	-	1.6	8.9	62	15	-	-	0.08	-
26.58	23.9	15.6	-	1.0	-3.5	4.4	3	silty CLAY to CLAY	115	1.5	16	10	-	-	1.6	9.2	56	15	-	-	0.08	-
26.74	19.5	12.6	-	0.9	-3.5	4.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	7.4	63	15	-	-	0.08	-
26.90	16.2	10.4	-	0.9	-3.5	6.2	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	5.9	73	15	-	-	0.08	-
27.07	15.1	9.7	-	0.8	-3.5	6.1	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	5.5	75	15	-	-	0.08	-
27.23	15.8	10.1	-	0.8	-3.5	5.9	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	5.7	73	15	-	-	0.08	-
27.40	19.1	12.0	-	0.9	-3.4	4.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	7.0	65	15	-	-	0.08	-
27.56	21.3	13.4	-	1.0	-3.4	5.1	3	silty CLAY to CLAY	115	1.5	14	9	-	-	1.4	7.8	63	15	-	-	0.08	-
27.72	18.5	11.6	-	1.0	-3.4	6.0	3	silty CLAY to CLAY	115	1.5	12	8	-	-	1.3	6.7	70	15	-	-	0.08	-
27.89	22.5	14.0	-	1.0	-3.4	4.9	3	silty CLAY to CLAY	115	1.5	15	9	-	-	1.5	8.2	61	15	-	-	0.08	-
28.05	29.3	18.1	-	1.2	-3.4	4.4	3	silty CLAY to CLAY	115	1.5	20	12	-	-	2.0	9.9	53	15	-	-	0.08	-
28.22	42.3	25.9	-	1.5	-3.3	3.6	4	clayy SILT to silty CLAY	115	2.0	21	13	-	-	2.9	9.9	42	15	-	-	0.08	-
28.38	51.9	31.7	-	1.8	-3.2	3.5	4	clayy SILT to silty CLAY	115	2.0	26	16	-	-	3.6	9.9	38	15	-	-	0.08	-
28.54	58.6	35.5	-	2.0	-3.0	3.5	4	clayy SILT to silty CLAY	115	2.0	29	18	-	-	4.1	9.9	36	15	-	-	0.08	-
28.71	72.8	54.9	154.9	2.8	-2.9	3.9	4	clayy SILT to silty CLAY	115	2.0	36	27	-	-	5.1	9.9	31	15	1.03	-	0.08	25.1
28.87	111.3	83.7	177.9	3.8	-2.7	3.5	4	clayy SILT to silty CLAY	115	2.0	56	42	-	-	7.8	9.9	24	15	0.00	-	0.08	0.0
29.04	75.4	45.0	-	4.2	-2.9	5.7	3	silty CLAY to CLAY	115	1.5	50	30	-	-	5.3	9.9	40	15	-	-	0.08	-
29.20	58.2	34.5	-	3.4	-2.7	6.1	3	silty CLAY to CLAY	115	1.5	39	23	-	-	4.0	9.9	45	15	-	-	0.08	-
29.36	46.1	27.2	-	2.9	-2.9	6.4	3	silty CLAY to CLAY	115	1.5	31	18	-	-	3.2	9.9	51	15	-	-	0.08	-
29.53	34.1	20.0	-	2.2	-2.6	6.9	3	silty CLAY to CLAY	115	1.5	23	13	-	-	2.3	9.9	59	15	-	-	0.08	-
29.69	23.2	13.5	-	1.6	-2.0	7.4	3	silty CLAY to CLAY	115	1.5	15	9	-	-	1.6	8.0	70	15	-	-	0.08	-
29.86	19.5	11.3	-	1.2	-2.0	6.8	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.6	73	15	-	-	0.08	-
30.02	18.2	10.5	-	1.0	-2.0	6.3	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.2	6.1	74	15	-	-	0.08	-
30.19	19.8	11.3	-	1.1	-2.0	6.1	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.6	71	15	-	-	0.08	-
30.35	23.5	13.4	-	1.5	-2.0	6.7	3	silty CLAY to CLAY	115	1.5	16	9	-	-	1.6	8.0	68	15	-	-	0.08	-
30.51	32.8	18.6	-	1.7	-2.1	5.4	3	silty CLAY to CLAY	115	1.5	22	12	-	-	2.3	9.9	56	15	-	-	0.08	-
30.68	32.5	18.4	-	1.7	-2.1	5.5	3	silty CLAY to CLAY	115	1.5	22	12	-	-	2.2	9.9	56	15	-	-	0.08	-
30.84	32.6	18.3	-	1.6	-2.1	5.3	3	silty CLAY to CLAY	115	1.5	22	12	-	-	2.2	9.9	56	15	-	-	0.08	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.10	Cycl SStn %
31.01	30.3	17.0	-	1.4	-2.4	5.1	3	silty CLAY to CLAY	115	1.5	20	11	-	-	2.1	9.9	57	15	-	-	0.08	-
31.17	27.3	15.2	-	1.3	-2.1	5.2	3	silty CLAY to CLAY	115	1.5	18	10	-	-	1.9	9.1	60	15	-	-	0.08	-
31.33	22.2	12.3	-	1.2	-2.2	5.7	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	7.2	67	15	-	-	0.08	-
31.50	20.0	11.0	-	1.1	-2.1	6.0	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	6.4	71	15	-	-	0.08	-
31.66	21.3	11.6	-	1.1	-2.3	5.5	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	6.9	68	15	-	-	0.08	-
31.83	19.0	10.3	-	1.1	-2.5	6.3	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	6.0	74	15	-	-	0.08	-
31.99	18.8	10.2	-	1.0	-2.4	5.9	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	5.9	73	15	-	-	0.08	-
32.15	17.9	9.7	-	0.9	-2.3	5.5	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	5.6	73	15	-	-	0.08	-
32.32	17.9	9.6	-	0.9	-2.3	5.4	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	5.5	73	15	-	-	0.08	-
32.48	18.4	9.8	-	0.9	-2.4	5.3	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.2	5.7	72	15	-	-	0.08	-
32.65	14.9	7.9	-	0.9	-2.5	6.6	3	silty CLAY to CLAY	115	1.5	10	5	-	-	1.0	4.5	83	15	-	-	0.08	-
32.81	15.7	8.3	-	0.8	-2.5	5.8	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	4.7	79	15	-	-	0.08	-
32.97	15.4	8.1	-	0.8	-2.5	5.7	3	silty CLAY to CLAY	115	1.5	10	5	-	-	1.0	4.6	79	15	-	-	0.08	-
33.14	15.6	8.2	-	0.8	-2.6	5.8	3	silty CLAY to CLAY	115	1.5	10	5	-	-	1.0	4.6	79	15	-	-	0.08	-
33.30	17.7	9.2	-	0.9	-3.1	5.4	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	5.3	74	15	-	-	0.08	-
33.47	14.2	7.4	-	0.8	-3.0	6.3	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	4.1	85	15	-	-	0.08	-
33.63	13.7	7.1	-	0.7	-2.9	6.1	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	3.9	85	15	-	-	0.08	-
33.79	19.4	10.0	-	0.8	-2.9	4.7	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	5.8	69	15	-	-	0.08	-
33.96	22.3	11.4	-	0.8	-2.8	4.1	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	6.7	63	15	-	-	0.08	-
34.12	18.5	9.4	-	0.8	-2.8	5.0	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	5.5	72	15	-	-	0.08	-
34.29	16.5	8.3	-	0.8	-2.9	5.5	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.1	4.8	78	15	-	-	0.08	-
34.45	20.0	10.0	-	0.8	-2.9	4.4	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	5.9	68	15	-	-	0.08	-
34.61	22.0	11.0	-	0.9	-2.8	4.5	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.5	65	15	-	-	0.08	-
34.78	22.5	11.2	-	1.0	-2.7	4.8	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.6	66	15	-	-	0.08	-
34.94	28.8	14.3	-	1.0	-3.0	3.7	3	silty CLAY to CLAY	115	1.5	19	10	-	-	2.0	8.6	55	15	-	-	0.08	-
35.11	23.3	11.5	-	1.2	-3.1	5.5	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	6.8	68	15	-	-	0.08	-
35.27	23.2	11.4	-	1.1	-3.2	5.1	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.6	6.8	67	15	-	-	0.08	-
35.43	22.9	11.2	-	1.1	-2.9	5.4	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.6	69	15	-	-	0.08	-
35.60	22.9	11.2	-	1.1	-2.8	5.4	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.6	69	15	-	-	0.08	-
35.76	22.1	10.7	-	1.1	-2.6	5.5	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.3	70	15	-	-	0.08	-
35.93	22.9	11.0	-	1.1	-2.5	5.3	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.5	68	15	-	-	0.08	-
36.09	25.2	12.1	-	1.1	-2.5	4.7	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	7.3	64	15	-	-	0.08	-
36.26	26.0	12.4	-	1.1	-2.5	4.8	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.8	7.5	63	15	-	-	0.08	-
36.42	25.8	12.3	-	1.1	-2.5	4.8	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	7.4	64	15	-	-	0.08	-
36.58	26.3	12.5	-	1.1	-2.5	4.7	3	silty CLAY to CLAY	115	1.5	18	8	-	-	1.8	7.5	63	15	-	-	0.08	-
36.75	25.5	12.1	-	1.2	-2.5	5.0	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	7.2	65	15	-	-	0.08	-
36.91	23.9	11.2	-	1.1	-2.5	5.2	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	6.7	68	15	-	-	0.08	-
37.08	17.5	8.2	-	1.1	-2.4	7.3	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	4.7	85	15	-	-	0.08	-
37.24	20.0	9.3	-	1.0	-2.3	5.6	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.5	75	15	-	-	0.08	-
37.40	16.7	7.8	-	0.9	-2.3	5.9	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.1	4.4	82	15	-	-	0.08	-
37.57	16.6	7.6	-	0.8	-2.3	5.7	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.1	4.4	81	15	-	-	0.08	-
37.73	21.6	9.9	-	0.9	-2.3	4.7	3	silty CLAY to CLAY	115	1.5	14	7	-	-	1.4	5.8	69	15	-	-	0.08	-
37.90	24.6	11.2	-	1.0	-2.6	4.5	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.7	6.7	65	15	-	-	0.08	-
38.06	24.4	11.1	-	1.1	-2.6	4.9	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	6.6	67	15	-	-	0.08	-
38.22	24.1	10.9	-	1.0	-2.6	4.6	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	6.5	66	15	-	-	0.08	-
38.39	21.1	9.5	-	1.0	-2.3	5.2	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.6	72	15	-	-	0.08	-
38.55	26.0	11.7	-	1.1	-2.3	4.6	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.8	7.0	64	15	-	-	0.08	-
38.72	31.5	14.1	-	1.3	-2.3	4.5	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.1	8.6	59	15	-	-	0.08	-
38.88	32.8	14.6	-	1.5	-2.1	5.0	3	silty CLAY to CLAY	115	1.5	22	10	-	-	2.2	8.9	60	15	-	-	0.08	-
39.04	31.4	13.9	-	1.7	-2.4	5.8	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.1	8.5	64	15	-	-	0.08	-
39.21	29.7	13.1	-	1.9	-2.2	7.0	3	silty CLAY to CLAY	115	1.5	20	9	-	-	2.0	8.0	70	15	-	-	0.08	-
39.37	29.2	12.9	-	1.8	-1.8	6.9	3	silty CLAY to CLAY	115	1.5	19	9	-	-	2.0	7.8	70	15	-	-	0.08	-
39.54	31.8	13.9	-	1.7	-1.7	5.8	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.2	8.5	64	15	-	-	0.08	-
39.70	33.7	14.7	-	1.5	-1.6	4.8	3	silty CLAY to CLAY	115	1.5	22	10	-	-	2.3	9.0	59	15	-	-	0.08	-
39.86	29.5	12.8	-	1.4	-1.0	5.3	3	silty CLAY to CLAY	115	1.5	20	9	-	-	2.0	7.8	64	15	-	-	0.08	-
40.03	33.2	14.4	-	1.5	-0.9	4.8	3	silty CLAY to CLAY	115	1.5	22	10	-	-	2.3	8.8	60	15	-	-	0.08	-
40.19	34.7	15.0	-	1.5	-1.4	4.8	3	silty CLAY to CLAY	115	1.5	23	10	-	-	2.4	9.2	58	15	-	-	0.08	-
40.36	26.0	11.2	-	1.4	-0.8	5.9	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.8	6.7	71	15	-	-	0.08	-
40.52	22.1	9.5	-	1.3	-0.8	6.4	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	5.6	77	15	-	-	0.08	-
40.68	18.8	8.0	-	1.1	-0.6	6.6	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	4.6	83	15	-	-	0.08	-
40.85	17.3	7.3	-	1.0	-0.5	6.8	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	4.2	87	15	-	-	0.08	-
41.01	15.8	6.7	-	1.0	-0.5	7.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	3.7	92	15	-	-	0.08	-
41.18	17.3	7.3	-	1.0	-0.1	6.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	4.1	87	15	-	-	0.08	-
41.34	24.9	10.4	-	1.3	-0.1	5.7	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.2	72	15	-	-	0.08	-
41.50	30.6	12.8	-	1.6	-0.4	5.7	3	silty CLAY to CLAY	115	1.5	20	9	-	-	2.1	7.8	66	15	-	-	0.08	-
41.67	33.8	14.1	-	1.8	-0.2	5.8	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	8.6	64	15	-	-	0.08	-
41.83	33.8	14.0	-	1.9	-0.4	6.1	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	8.6	65	15	-	-	0.08	-
42.00	30.3	12.5	-	2.0	-0.1	7.0	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.1	7.6	71	15	-	-	0.08	-
42.16	39.9	16.4	-	1.6	0.1	4.3	3	silty CLAY to CLAY	115	1.5	27	11	-	-	2.7	9.9	55	15	-	-	0.08	-
42.32	42.4	17.4	-	1.4	-0.1	3.5	3	silty CLAY to CLAY	115	1.5	28	12	-	-	2.9	9.9	50	15	-	-	0.08	-
42.49	34.2	14.0	-	1.5	0.1	4.7	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	8.6	60	15	-	-	0.08	-
42.65	31.4	12.8	-	1.7	0.1	5.9	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.1	7.8	67	15	-	-	0.08	-
42.82	33.7	13.7	-	1.8	-0.1	5.7	3	silty CLAY to CLAY	115	1.5	22	9	-	-	2.3	8.4	64	15	-	-	0.08	-
42.98	31.9	12.9	-	1.6	-0.4	5.5	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.2	7.9	65	15	-	-	0.08	-
43.15	25.3	10.2	-	1.5	-0.3	6.5	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.1	75	15	-	-	0.08	-
43.31	24.5	9.8	-	1.3	0.0	5.9	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	5.8	74	15	-	-	0.08	-
43.47	22.6	9.0	-	1.3	0.0	6.3	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	5.3	78	15	-	-	0.08	-
43.64	27.0	10.7	-	1.4	-0.1	5.6	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.4	71	15	-	-	0.08	-
43.80	31.7	12.5	-	1.2	-0.2	4.1	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.2	7.7	60	15	-	-	0.08	-
43.97	28.7	11.3	-	1.1	-0.2	4.3	3	silty CLAY to CLAY	115	1.5	19	8	-	-	1.9	6.9	64	15	-	-	0.08	-
44.13	26.0	10.2	-	1.2	0.0	5.1	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.1	70	15	-	-	0.08	-
44.29	28.0	11.0	-	1.3	0.0	5.1	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	6.6	68	15	-	-	0.08	-
44.46	25.5	10.0	-	1.3	0.0	5.6	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.0	73	15	-	-	0.08	-
44.62	23.6	9.2	-	1.2	0.0	5.8	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.4	76	15	-	-	0.08	-
44.79	24.0	9.3	-	1.2	0.0	5.4	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.5	74	15	-	-	0.08	-
44.95	24.5	9.5	-	1.2	0.0	5.4	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.6	73	15	-	-	0.08	-
45.11	28.4	10.9	-	1.3	0.0	5.0	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	6.6	68	15	-	-	0.08	-
45.28	32.6	12.5	-	1.3	0.0	4.4	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	7.6	62	15	-	-	0.08	-
45.44	34.8	13.4	-	1.3	-0.3	4.1	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	8.2	59	15	-	-	0.08	-
45.61	33.8	12.9	-	1.3	-0.3	4.3	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	7.9	60	15	-	-	0.08	-
45.77	33.1	12.7	-	1.5	-0.4	4.9	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	7.7	63	15	-	-	0.08	-
45.93	31.5	12.0	-	1.5	-0.3	5.3	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	7.3	66	15	-	-	0.08	-
46.10	25.2	9.6	-	1.6	-0.4	7.1	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	5.7	79	15	-	-	0.08	-
46.26	26.0	9.9	-	1.6	-0.4	6.9	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	5.8	77	15	-	-	0.08	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.10	Cycl SStn %
46.43	28.4	10.8	-	1.7	-0.3	6.7	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	6.4	74	15	-	-	0.08	-
46.59	25.8	9.8	-	1.7	-0.2	7.3	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	5.7	79	15	-	-	0.08	-
46.75	25.9	9.8	-	1.6	0.1	6.8	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	5.7	77	15	-	-	0.08	-
46.92	30.8	11.7	-	1.7	0.0	5.9	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	6.9	69	15	-	-	0.08	-
47.08	30.1	11.4	-	1.7	0.0	6.1	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	6.7	71	15	-	-	0.08	-
47.25	34.6	13.1	-	1.4	-0.3	4.5	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	7.8	61	15	-	-	0.08	-
47.41	36.0	13.6	-	1.1	-0.6	3.4	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	8.1	55	15	-	-	0.08	-
47.57	29.8	11.3	-	0.8	-0.4	3.1	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	6.6	58	15	-	-	0.08	-
47.74	20.9	7.9	-	0.7	0.0	4.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	4.4	73	15	-	-	0.08	-
47.90	18.0	6.8	-	0.9	0.1	5.6	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	3.7	85	15	-	-	0.08	-
48.07	19.2	7.2	-	1.1	0.0	6.4	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	4.0	86	15	-	-	0.08	-
48.23	25.6	9.7	-	1.2	0.0	5.4	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	5.5	73	15	-	-	0.08	-
48.39	34.6	13.0	-	1.3	-0.2	4.1	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	7.6	59	15	-	-	0.08	-
48.56	36.8	13.9	-	1.5	-0.3	4.5	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	8.1	59	15	-	-	0.08	-
48.72	32.1	12.1	-	1.5	-0.2	5.2	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.2	7.0	66	15	-	-	0.08	-
48.89	24.7	9.3	-	1.2	-0.1	5.5	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.2	75	15	-	-	0.08	-
49.05	22.0	8.3	-	1.0	0.0	5.2	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	4.5	77	15	-	-	0.08	-
49.22	21.5	8.1	-	1.0	0.0	5.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	4.4	78	15	-	-	0.08	-
49.38	21.7	8.2	-	1.0	-0.1	5.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	4.4	78	15	-	-	0.08	-
49.54	26.7	10.1	-	1.1	-0.1	4.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.6	69	15	-	-	0.08	-
49.71	27.3	10.3	-	1.1	-0.1	4.6	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.7	68	15	-	-	0.08	-
49.87	26.3	9.9	-	1.1	-0.1	4.9	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.5	70	15	-	-	0.08	-
50.04	32.5	12.2	-	1.3	-0.1	4.5	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	6.9	63	15	-	-	0.08	-
50.20	32.9	12.4	-	1.2	-0.2	4.1	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	6.9	61	15	-	-	0.08	-
50.36	20.7	7.8	-	0.9	-0.1	5.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	4.1	79	15	-	-	0.08	-
50.53	19.2	7.2	-	0.7	-0.1	4.5	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.7	79	15	-	-	0.08	-
50.69	24.1	9.1	-	0.8	-0.1	3.7	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.9	67	15	-	-	0.08	-
50.86	19.0	7.2	-	0.8	-0.1	5.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.7	82	15	-	-	0.08	-
51.02	24.8	9.4	-	1.0	-0.1	4.6	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	5.0	71	15	-	-	0.08	-
51.18	24.6	9.3	-	1.1	-0.1	4.9	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.9	73	15	-	-	0.08	-
51.35	25.3	9.6	-	1.2	-0.1	5.2	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	5.1	73	15	-	-	0.08	-
51.51	38.8	14.7	-	1.0	-0.1	2.9	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	8.1	51	15	-	-	0.08	-
51.68	48.9	18.4	-	1.1	-0.1	2.4	4	clayy SILT to silty CLAY	115	2.0	24	9	-	-	3.3	9.9	43	15	-	-	0.08	-
51.84	45.3	17.1	-	1.3	-0.1	3.1	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.5	48	15	-	-	0.08	-
52.00	35.2	13.3	-	1.5	-0.1	4.6	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	7.2	61	15	-	-	0.08	-
52.17	36.9	13.9	-	1.4	0.0	4.1	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	7.6	58	15	-	-	0.08	-
52.33	44.2	16.7	-	1.3	-0.2	3.2	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	9.2	49	15	-	-	0.08	-
52.50	46.2	17.4	-	1.6	-0.1	3.8	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.6	51	15	-	-	0.08	-
52.66	27.6	10.4	-	1.4	-0.1	5.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.4	72	15	-	-	0.08	-
52.82	18.3	6.9	-	1.0	0.0	6.4	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	3.4	88	15	-	-	0.08	-
52.99	17.1	6.5	-	0.7	0.0	5.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	3.1	86	15	-	-	0.08	-
53.15	17.6	6.6	-	0.7	0.1	4.6	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	3.2	83	15	-	-	0.08	-
53.32	18.0	6.8	-	0.7	0.1	4.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	3.3	83	15	-	-	0.08	-
53.48	18.1	6.8	-	0.8	0.1	5.5	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	3.3	85	15	-	-	0.08	-
53.64	22.0	8.3	-	0.8	0.1	4.2	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	4.1	73	15	-	-	0.08	-
53.81	20.3	7.7	-	0.8	0.1	4.8	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.7	78	15	-	-	0.08	-
53.97	25.2	9.5	-	0.9	0.2	4.3	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	4.8	69	15	-	-	0.08	-
54.14	27.6	10.4	-	1.0	0.2	4.1	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.3	66	15	-	-	0.08	-
54.30	28.1	10.6	-	1.1	0.2	4.4	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	67	15	-	-	0.08	-
54.46	28.4	10.7	-	1.3	0.2	5.0	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	69	15	-	-	0.08	-
54.63	28.5	10.8	-	1.3	0.2	5.2	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	69	15	-	-	0.08	-
54.79	28.5	10.7	-	1.4	0.3	5.4	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	70	15	-	-	0.08	-
54.96	28.8	10.9	-	1.4	0.2	5.5	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.5	70	15	-	-	0.08	-
55.12	25.5	9.6	-	1.4	0.2	6.1	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	4.7	76	15	-	-	0.08	-
55.28	22.9	8.7	-	1.2	0.2	5.9	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	4.2	79	15	-	-	0.08	-
55.45	21.0	7.9	-	1.0	0.3	5.4	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.8	80	15	-	-	0.08	-
55.61	20.1	7.6	-	0.9	0.2	5.1	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.6	80	15	-	-	0.08	-
55.78	19.3	7.3	-	0.9	0.2	5.6	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.4	84	15	-	-	0.08	-
55.94	17.5	6.6	-	0.8	0.3	5.8	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	3.0	88	15	-	-	0.08	-
56.11	17.0	6.4	-	0.6	0.3	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.9	83	15	-	-	0.08	-
56.27	16.2	6.1	-	0.5	0.2	3.7	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.7	82	15	-	-	0.08	-
56.43	14.7	5.5	-	0.4	0.2	3.8	3	silty CLAY to CLAY	115	1.5	10	4	-	-	0.9	2.4	86	15	-	-	0.08	-
56.60	17.0	6.4	-	0.6	0.2	4.0	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.9	81	15	-	-	0.08	-
56.76	22.4	8.4	-	0.7	0.3	3.7	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.9	70	15	-	-	0.08	-
56.93	24.3	9.2	-	0.9	0.3	4.1	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.3	70	15	-	-	0.08	-
57.09	26.0	9.8	-	1.0	0.3	4.2	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.7	68	15	-	-	0.08	-
57.25	26.5	10.0	-	1.1	0.3	4.5	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.8	69	15	-	-	0.08	-
57.42	27.1	10.2	-	1.0	0.3	4.4	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.9	68	15	-	-	0.08	-
57.58	26.7	10.1	-	1.1	0.3	4.6	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.8	69	15	-	-	0.08	-
57.75	27.4	10.3	-	1.2	0.3	4.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.9	69	15	-	-	0.08	-
57.91	27.5	10.4	-	1.2	0.3	4.9	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.9	69	15	-	-	0.08	-
58.07	26.9	10.2	-	1.1	0.3	4.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.8	70	15	-	-	0.08	-
58.24	26.3	9.9	-	1.1	0.3	4.7	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.7	4.6	70	15	-	-	0.08	-
58.40	24.8	9.4	-	1.1	0.3	4.9	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.6	4.3	73	15	-	-	0.08	-
58.57	23.1	8.7	-	1.1	0.3	5.4	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	4.0	77	15	-	-	0.08	-
58.73	22.4	8.4	-	1.1	0.3	5.6	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.8	79	15	-	-	0.08	-
58.89	21.3	8.0	-	1.0	0.3	5.7	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.6	81	15	-	-	0.08	-
59.06	21.6	8.1	-	1.0	0.3	5.4	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.6	79	15	-	-	0.08	-
59.22	21.9	8.2	-	1.0	0.4	5.7	3	silty CLAY to CLAY	115	1.5	15	5	-	-	1.4	3.7	80	15	-	-	0.08	-
59.39	22.7	8.6	-	1.2	0.3	6.1	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.8	80	15	-	-	0.08	-
59.55	24.0	9.1	-	1.2	0.4	6.0	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.1	78	15	-	-	0.08	-
59.71	23.0	8.7	-	1.2	0.4	6.3	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.9	81	15	-	-	0.08	-
59.88	21.3	8.1	-	1.0	0.4	5.8	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.5	81	15	-	-	0.08	-
60.04	20.2	7.6	-	0.8	0.4	4.7	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.3	79	15	-	-	0.08	-
60.21	19.6	7.4	-	0.7	0.4	4.1	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.2	77	15	-	-	0.08	-
60.37	18.3	6.9	-	0.6	0.4	4.0	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.9	79	15	-	-	0.08	-
60.53	19.0	7.2	-	0.6	0.4	3.7	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.0	76	15	-	-	0.08	-
60.70	19.7	7.4	-	0.6	0.3	3.4	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.2	73	15	-	-	0.08	-
60.86	20.9	7.9	-	0.6	0.4	3.5	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.4	72	15	-	-	0.08	-
61.03	21.9	8.3	-	0.7	0.4	3.6	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.5	71	15	-	-	0.08	-
61.19	22.1	8.3	-	0.8	0.3	4.1	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.6	73	15	-	-	0.08	-
61.35	24.1	9.1	-	0.8	0.4	3.7	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	3.9	68	15	-	-	0.08	-
61.52	22.3	8.4	-	0.7	0.4	3.8	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.6	71	15	-	-	0.08	-
61.68	21.0	7.9	-	0.6	0.4	3.6	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.3	72	15	-	-	0.08	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.10	Cycl SStn %
61.85	20.8	7.8	-	0.6	0.4	3.4	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.3	72	15	-	-	0.08	-
62.01	20.7	7.8	-	0.6	0.4	3.4	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.3	72	15	-	-	0.08	-
62.17	20.8	7.8	-	0.6	0.4	3.8	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.3	74	15	-	-	0.08	-
62.34	21.9	8.3	-	0.8	0.4	4.4	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.5	75	15	-	-	0.08	-
62.50	21.9	8.3	-	0.9	0.4	4.8	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.4	77	15	-	-	0.08	-
62.67	21.7	8.2	-	0.9	0.4	5.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.4	78	15	-	-	0.08	-
62.83	21.3	8.0	-	0.9	0.4	5.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.3	78	15	-	-	0.08	-
63.00	20.9	7.9	-	0.7	0.4	4.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.2	76	15	-	-	0.08	-
63.16	19.3	7.3	-	0.7	0.5	4.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	2.9	79	15	-	-	0.08	-
63.32	18.7	7.1	-	0.6	0.5	3.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.8	78	15	-	-	0.08	-
63.49	17.9	6.8	-	0.6	0.5	4.2	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	2.7	81	15	-	-	0.08	-
63.65	17.0	6.4	-	0.6	0.5	4.5	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.5	85	15	-	-	0.08	-
63.82	16.1	6.1	-	0.6	0.5	4.7	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.3	88	15	-	-	0.08	-
63.98	15.8	6.0	-	0.5	0.5	4.5	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.2	87	15	-	-	0.08	-
64.14	16.7	6.3	-	0.5	0.5	4.1	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.4	84	15	-	-	0.08	-
64.31	17.9	6.8	-	0.6	0.5	4.2	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	2.6	82	15	-	-	0.08	-
64.47	19.5	7.4	-	0.8	0.6	5.0	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	2.9	82	15	-	-	0.08	-
64.64	26.8	10.1	-	1.1	0.6	4.9	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.2	71	15	-	-	0.08	-
64.80	38.7	14.6	-	1.4	0.6	3.9	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	6.4	56	15	-	-	0.08	-
64.96	34.3	13.0	-	1.2	0.5	4.1	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	5.6	60	15	-	-	0.08	-
65.13	30.3	11.4	-	1.6	0.6	6.1	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.8	72	15	-	-	0.08	-
65.29	43.0	16.2	-	1.5	0.6	3.9	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	7.1	54	15	-	-	0.08	-
65.46	36.1	13.6	-	1.6	0.6	5.0	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	5.8	62	15	-	-	0.08	-
65.62	25.1	9.5	-	1.0	0.5	4.9	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.6	3.8	73	15	-	-	0.08	-
65.78	20.3	7.6	-	0.9	0.5	5.6	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.0	83	15	-	-	0.08	-
65.95	22.7	8.6	-	0.8	0.6	4.3	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.4	74	15	-	-	0.08	-
66.11	22.2	8.4	-	0.9	0.6	4.8	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.3	77	15	-	-	0.08	-
66.28	25.3	9.6	-	1.0	0.7	4.9	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	3.8	72	15	-	-	0.08	-
66.44	26.0	9.8	-	1.1	0.7	5.0	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.0	72	15	-	-	0.08	-
66.60	25.5	9.6	-	1.1	0.7	5.0	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	3.8	73	15	-	-	0.08	-
66.77	26.1	9.9	-	1.1	0.7	5.0	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.0	72	15	-	-	0.08	-
66.93	29.6	11.2	-	1.2	0.8	4.7	3	silty CLAY to CLAY	115	1.5	20	7	-	-	2.0	4.6	67	15	-	-	0.08	-
67.10	40.8	15.4	-	1.2	0.8	3.2	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	6.5	52	15	-	-	0.08	-
67.26	41.6	15.7	-	1.6	0.9	4.1	3	silty CLAY to CLAY	115	1.5	28	10	-	-	2.8	6.6	56	15	-	-	0.08	-
67.42	47.4	17.9	-	1.6	0.9	3.6	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.2	7.6	50	15	-	-	0.08	-
67.59	45.6	17.2	-	1.7	1.0	4.0	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	7.3	53	15	-	-	0.08	-
67.75	37.6	14.2	-	1.5	0.9	4.5	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	5.9	60	15	-	-	0.08	-
67.92	34.7	13.1	-	1.3	0.9	4.3	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	5.4	61	15	-	-	0.08	-
68.08	31.4	11.9	-	1.2	1.0	4.2	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	4.8	63	15	-	-	0.08	-
68.24	33.4	12.6	-	1.2	1.0	4.0	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	5.1	61	15	-	-	0.08	-
68.41	34.4	13.0	-	1.1	1.0	3.7	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	5.3	58	15	-	-	0.08	-
68.57	35.8	13.5	-	1.2	1.1	3.9	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	5.5	58	15	-	-	0.08	-
68.74	41.1	15.5	-	1.4	1.1	3.8	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.8	6.4	54	15	-	-	0.08	-
68.90	55.9	21.1	-	1.9	1.1	3.6	3	silty CLAY to CLAY	115	1.5	37	14	-	-	3.8	8.9	47	15	-	-	0.08	-
69.07	60.7	22.9	-	2.1	1.1	3.7	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.2	9.8	45	15	-	-	0.08	-
69.23	65.5	24.7	-	2.8	1.3	4.5	3	silty CLAY to CLAY	115	1.5	44	16	-	-	4.5	9.9	47	15	-	-	0.08	-
69.39	68.1	25.7	-	2.5	1.4	4.0	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.7	9.9	44	15	-	-	0.08	-
69.56	68.6	25.9	-	2.6	1.3	4.0	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.7	9.9	44	15	-	-	0.08	-
69.72	72.7	27.4	-	2.4	1.4	3.5	4	clayy SILT to silty CLAY	115	2.0	36	14	-	-	5.0	9.9	41	15	-	-	0.08	-
69.89	71.5	27.0	-	2.5	1.5	3.8	4	clayy SILT to silty CLAY	115	2.0	36	13	-	-	4.9	9.9	42	15	-	-	0.08	-
70.05	62.0	23.4	-	1.9	1.4	3.3	4	clayy SILT to silty CLAY	115	2.0	31	12	-	-	4.2	9.8	43	15	-	-	0.08	-
70.21	60.2	22.7	-	1.5	1.4	2.6	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.1	9.5	40	15	-	-	0.08	-
70.38	60.3	22.8	-	1.5	1.4	2.6	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.1	9.5	40	15	-	-	0.08	-
70.54	64.2	24.2	-	1.6	1.4	2.7	4	clayy SILT to silty CLAY	115	2.0	32	12	-	-	4.4	9.9	40	15	-	-	0.08	-
70.71	68.8	25.9	-	1.7	1.5	2.6	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.7	9.9	38	15	-	-	0.08	-
70.87	73.3	27.6	-	1.7	1.5	2.4	4	clayy SILT to silty CLAY	115	2.0	37	14	-	-	5.0	9.9	36	15	-	-	0.08	-
71.03	77.9	41.8	111.3	1.9	1.5	2.5	4	clayy SILT to silty CLAY	115	2.0	39	21	-	-	5.4	9.9	30	15	2.14	-	0.08	51.2
71.20	87.4	46.8	113.0	2.0	1.6	2.4	5	silty SAND to sandy SILT	120	4.0	22	12	42	36	-	-	27	16	2.11	-	0.07	47.8
71.36	89.9	48.2	116.1	2.1	1.6	2.5	5	silty SAND to sandy SILT	120	4.0	22	12	43	36	-	-	27	16	2.07	-	0.07	46.3
71.53	90.7	48.6	125.8	2.5	1.7	2.9	4	clayy SILT to silty CLAY	115	2.0	45	24	-	-	6.3	9.9	29	15	1.85	-	0.07	45.8
71.69	101.5	54.3	134.6	2.9	1.7	3.0	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.0	9.9	28	15	1.50	-	0.06	36.2
71.85	106.7	57.0	136.2	3.0	1.8	2.9	4	clayy SILT to silty CLAY	115	2.0	53	29	-	-	7.4	9.9	27	15	1.43	-	0.06	29.9
72.02	106.6	56.9	146.9	3.5	1.8	3.4	4	clayy SILT to silty CLAY	115	2.0	53	28	-	-	7.4	9.9	29	15	0.90	-	0.06	15.3
72.18	103.1	55.0	146.8	3.4	1.9	3.5	4	clayy SILT to silty CLAY	115	2.0	52	28	-	-	7.1	9.9	30	15	0.88	-	0.06	19.8
72.35	102.5	54.7	148.3	3.5	2.0	3.5	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	30	15	0.80	-	0.05	19.7
72.51	100.2	37.8	-	3.5	2.0	3.6	4	clayy SILT to silty CLAY	115	2.0	50	19	-	-	6.9	9.9	36	15	-	-	0.05	-
72.67	103.8	55.3	146.3	3.4	2.0	3.4	4	clayy SILT to silty CLAY	115	2.0	52	28	-	-	7.2	9.9	30	15	0.89	-	0.05	19.1
72.84	104.8	55.8	146.3	3.4	2.0	3.4	4	clayy SILT to silty CLAY	115	2.0	52	28	-	-	7.3	9.9	29	15	0.89	-	0.05	17.9
73.00	102.1	38.5	-	3.6	2.0	3.7	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.1	9.9	36	15	-	-	0.05	-
73.17	103.7	39.1	-	3.7	2.1	3.7	4	clayy SILT to silty CLAY	115	2.0	52	20	-	-	7.2	9.9	36	15	-	-	0.05	-
73.33	101.9	38.5	-	3.7	2.1	3.8	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.1	9.9	36	15	-	-	0.05	-
73.49	101.1	38.1	-	3.7	2.1	3.8	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.0	9.9	36	15	-	-	0.05	-
73.66	99.4	37.5	-	3.6	2.1	3.8	4	clayy SILT to silty CLAY	115	2.0	50	19	-	-	6.9	9.9	37	15	-	-	0.05	-
73.82	97.4	36.8	-	3.6	2.1	3.9	4	clayy SILT to silty CLAY	115	2.0	49	18	-	-	6.7	9.9	37	15	-	-	0.05	-
73.99	97.6	36.8	-	3.7	2.2	3.9	4	clayy SILT to silty CLAY	115	2.0	49	18	-	-	6.8	9.9	38	15	-	-	0.05	-
74.15	101.1	38.2	-	3.6	2.2	3.7	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.0	9.9	36	15	-	-	0.05	-
74.31	102.4	38.6	-	3.6	2.2	3.7	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.1	9.9	36	15	-	-	0.05	-
74.48	100.3	37.8	-	3.7	2.2	3.8	4	clayy SILT to silty CLAY	115	2.0	50	19	-	-	6.9	9.9	37	15	-	-	0.05	-
74.64	100.0	37.8	-	3.5	2.2	3.7	4	clayy SILT to silty CLAY	115	2.0	50	19	-	-	6.9	9.9	36	15	-	-	0.05	-
74.81	103.2	54.5	144.1	3.3	2.2	3.4	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.1	9.9	30	15	0.93	-	0.05	21.5
74.97	101.6	53.7	142.2	3.2	2.2	3.3	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.0	9.9	30	15	1.01	-	0.05	24.8
75.13	102.6	54.2	139.4	3.1	2.2	3.2	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.16	-	0.05	25.8
75.30	107.0	56.4	132.2	2.9	2.2	2.8	5	silty SAND to sandy SILT	120	4.0	27	14	48	37	-	-	27	16	1.55	-	0.05	34.4
75.46	102.6	54.1	129.7	2.7	2.2	2.8	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	27	15	1.66	-	0.04	39.7
75.63	93.9	35.4	-	3.0	2.2	3.4	4	clayy SILT to silty CLAY	115	2.0	47	18	-	-	6.5	9.9	36	15	-	-	0.04	-
75.79	89.3	33.7	-	3.6	2.2	4.2	4	clayy SILT to silty CLAY	115	2.0	45	17	-	-	6.2	9.9	40	15	-	-	0.04	-
75.96	93.4	35.2	-	3.6	2.2	4.0	4	clayy SILT to silty CLAY	115	2.0	47	18	-	-	6.5	9.9	39	15	-	-	0.04	-
76.12	100.1	52.7	144.3	3.3	2.2	3.5	4	clayy SILT to silty CLAY	115	2.0	50	26	-	-	6.9	9.9	30	15	0.89	-	0.04	25.9
76.28	104.5	54.9	136.8	3.0	2.2	3.0	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	28	15	1.29	-	0.04	27.1
76.45	107.5	56.5	135.1	3.0	2.2	2.9	4	clayy SILT to silty CLAY	115	2.0	54	28	-	-	7.4	9.9	27	15	1.39	-	0.04	27.3
76.61	115.5	60.6	136.7	3.1	2.2	2.8	5	silty SAND to sandy SILT	120	4.0	29	15	50	37	-	-	26	16	1.34	-	0.03	19.8
76.78	120.6	63.3	139.5	3.3	2.3	2.8	5	silty SAND to sandy SILT	120	4.0	30	16	52	37	-	-	25	16	1.21	-	0.03	14.5
76.94	112.9	59.2	142.5	3.4	2.3	3.1	4	clayy SILT to silty CLAY	115	2.0	56	30	-	-	7.8	9.9	27	15	1.02	-	0.03	11.9
77.10	105.6	55.3	145.0	3.4	2.5	3.4	4	clayy SILT to silty CLAY	115	2.0	53	28	-	-	7.3	9.9	29	15	0.87	-	0.03	18.6

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

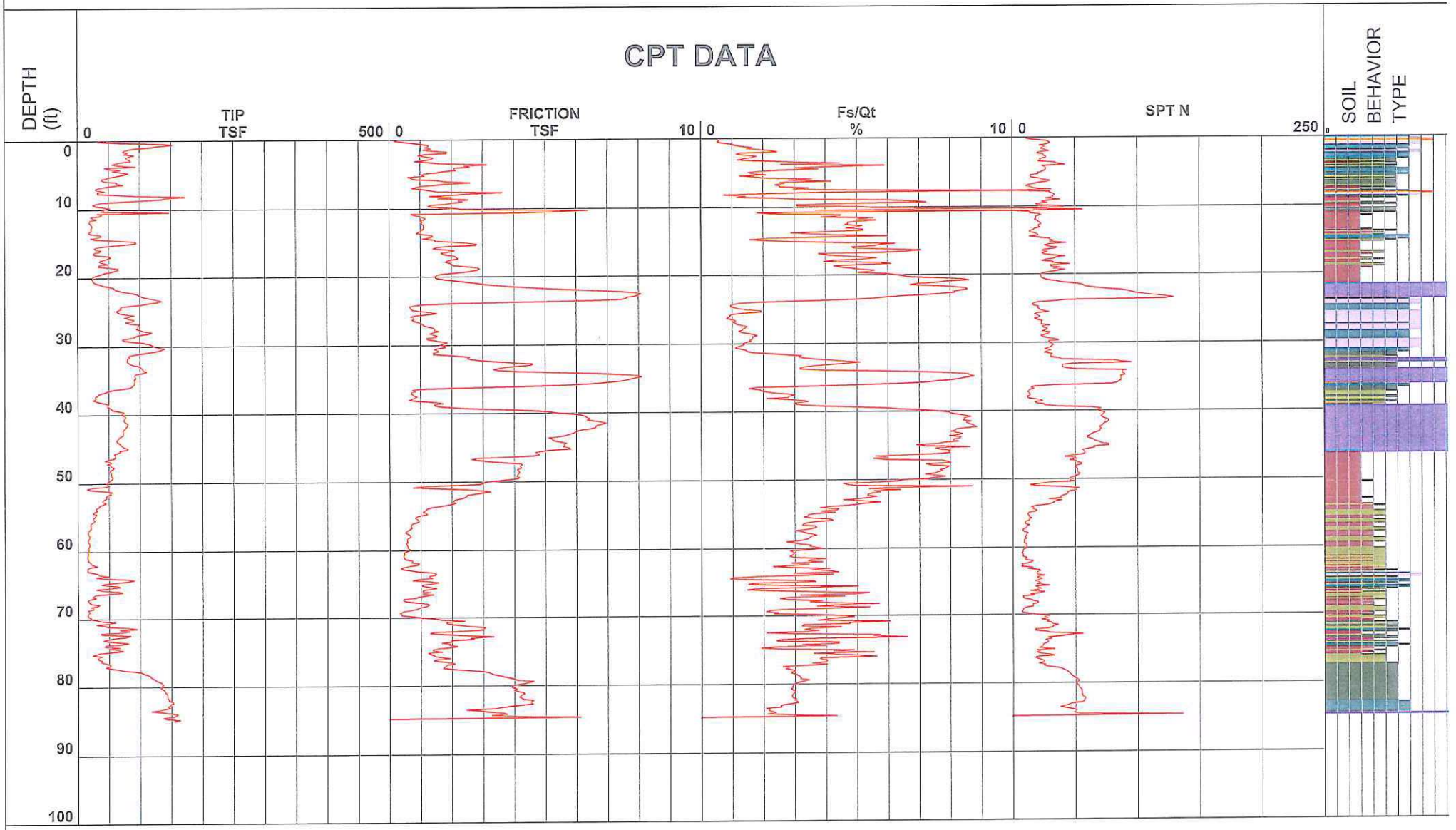
Depth ft	qc PS tsf	qc1n PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.10	Cycl SStn %
77.27	104.5	54.7	141.1	3.2	2.5	3.2	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	29	15	1.06	-	0.03	22.8
77.43	104.7	54.8	140.3	3.2	2.6	3.2	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	29	15	1.10	-	0.03	23.2
77.60	102.7	53.7	137.7	3.1	2.7	3.1	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.23	-	0.02	28.1
77.76	102.0	53.3	136.6	3.0	2.7	3.1	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.28	-	0.02	30.0
77.92	102.7	53.6	139.5	3.2	2.8	3.2	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.13	-	0.02	26.3
78.09	101.6	53.0	136.5	3.0	2.8	3.1	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.0	9.9	29	15	1.28	-	0.02	30.6
78.25	103.0	53.7	136.9	3.1	2.9	3.1	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.1	9.9	29	15	1.26	-	0.02	28.7
78.42	104.0	54.2	137.7	3.1	2.9	3.1	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	29	15	1.22	-	0.01	27.0
78.58	104.9	54.6	135.9	3.0	3.0	3.0	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.3	9.9	28	15	1.32	-	0.01	28.3
78.74	102.3	53.3	136.9	3.1	3.0	3.1	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.26	-	0.01	29.6
78.91	101.6	52.8	139.3	3.1	3.0	3.2	4	clayy SILT to silty CLAY	115	2.0	51	26	-	-	7.0	9.9	29	15	1.13	-	0.01	28.2
79.07	103.5	53.8	139.2	3.2	3.1	3.2	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	29	15	1.14	-	0.01	26.2
79.24	101.4	52.7	140.8	3.2	3.2	3.3	4	clayy SILT to silty CLAY	115	2.0	51	26	-	-	7.0	9.9	30	15	1.05	-	0.00	27.5
79.40	98.8	51.3	141.1	3.2	3.3	3.4	4	clayy SILT to silty CLAY	115	2.0	49	26	-	-	6.8	9.9	31	15	1.01	-	0.00	30.7
79.56	91.6	34.5	-	3.3	3.3	3.8	4	clayy SILT to silty CLAY	115	2.0	46	17	-	-	6.3	9.9	38	15	-	-	0.00	-
79.73	84.0	31.7	-	3.2	3.4	4.1	4	clayy SILT to silty CLAY	115	2.0	42	16	-	-	5.8	9.9	41	15	-	-	0.00	-
79.89	75.0	28.3	-	3.1	3.3	4.4	3	silty CLAY to CLAY	115	1.5	50	19	-	-	5.1	9.9	44	15	-	-	0.00	-
80.06	82.1	31.0	-	3.4	3.4	4.4	3	silty CLAY to CLAY	115	1.5	55	21	-	-	5.6	9.9	42	15	-	-	0.00	-
80.22	91.6	34.6	-	3.7	3.4	4.2	4	clayy SILT to silty CLAY	115	2.0	46	17	-	-	6.3	9.9	40	15	-	-	0.00	-
80.38	89.8	33.9	-	3.8	3.6	4.5	3	silty CLAY to CLAY	115	1.5	60	23	-	-	6.2	9.9	41	15	-	-	0.00	-
80.55	83.3	31.4	-	3.6	3.6	4.6	3	silty CLAY to CLAY	115	1.5	56	21	-	-	5.7	9.9	43	15	-	-	0.00	-
80.71	75.3	28.4	-	3.5	3.6	5.0	3	silty CLAY to CLAY	115	1.5	50	19	-	-	5.2	9.9	46	15	-	-	0.00	-
80.88	64.2	24.2	-	3.1	3.6	5.1	3	silty CLAY to CLAY	115	1.5	43	16	-	-	4.4	8.8	50	15	-	-	0.00	-
81.04	58.2	22.0	-	2.6	3.5	4.8	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	7.9	51	15	-	-	0.00	-
81.20	48.3	18.2	-	2.4	3.5	5.6	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	6.4	58	15	-	-	0.00	-
81.37	59.0	22.3	-	3.0	3.6	5.5	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	8.0	53	15	-	-	0.00	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Earth Mechanics

Location	I-5 HOV Widening Segment 1	Operator	BH-JB	Filename	SDF(528).cpt
Job Number	11-135	Cone Number	DSG1104	GPS	
Hole Number	CPT-11-115	Date and Time	9/27/2011 7:32:50 AM	Maximum Depth	84.97 ft
Water Table Depth	60.50 ft				

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
0.33	67.6	108.4	115.6	0.4	-0.1	0.6	6	clean SAND to silty SAND	125	5.0	14	22	70	48	-	-	7	16	N/A	0.00	N/A	N/A
0.49	138.6	222.3	222.3	0.7	-0.2	0.5	6	clean SAND to silty SAND	125	5.0	28	44	93	48	-	-	5	16	N/A	0.00	N/A	N/A
0.66	152.0	243.8	243.8	1.0	0.0	0.7	6	clean SAND to silty SAND	125	5.0	30	49	95	48	-	-	5	16	N/A	0.00	N/A	N/A
0.82	127.3	204.2	208.5	1.2	-0.1	1.0	6	clean SAND to silty SAND	125	5.0	25	41	91	48	-	-	6	16	N/A	0.00	N/A	N/A
0.98	116.9	187.4	198.9	1.3	-0.1	1.1	6	clean SAND to silty SAND	125	5.0	23	37	88	48	-	-	7	16	N/A	0.00	N/A	N/A
1.15	90.4	145.0	167.2	1.1	0.0	1.3	6	clean SAND to silty SAND	125	5.0	18	29	79	48	-	-	9	16	N/A	0.00	N/A	N/A
1.31	81.2	130.2	165.2	1.3	0.0	1.6	6	clean SAND to silty SAND	125	5.0	16	26	76	48	-	-	12	16	N/A	0.00	N/A	N/A
1.48	74.6	119.6	150.7	1.1	0.0	1.5	6	clean SAND to silty SAND	125	5.0	15	24	73	48	-	-	12	16	N/A	0.00	N/A	N/A
1.64	73.2	117.4	160.5	1.4	0.0	1.9	5	silty SAND to sandy SILT	120	4.0	18	29	72	48	-	-	14	16	N/A	0.00	N/A	N/A
1.80	80.9	129.7	184.8	1.8	0.0	2.3	5	silty SAND to sandy SILT	120	4.0	20	32	76	48	-	-	15	16	N/A	0.00	N/A	N/A
1.97	75.2	120.6	181.2	1.8	0.0	2.4	5	silty SAND to sandy SILT	120	4.0	19	30	73	48	-	-	17	16	N/A	0.00	N/A	N/A
2.13	90.4	145.0	166.9	1.1	0.1	1.3	6	clean SAND to silty SAND	125	5.0	18	29	79	48	-	-	9	16	N/A	0.00	N/A	N/A
2.30	82.3	132.0	152.4	0.9	0.1	1.2	6	clean SAND to silty SAND	125	5.0	16	26	76	48	-	-	9	16	N/A	0.00	N/A	N/A
2.46	78.4	125.7	156.7	1.2	0.1	1.5	6	clean SAND to silty SAND	125	5.0	16	25	75	48	-	-	12	16	N/A	0.00	N/A	N/A
2.62	78.9	126.5	166.2	1.4	0.1	1.8	5	silty SAND to sandy SILT	120	4.0	20	32	75	48	-	-	13	16	N/A	0.00	N/A	N/A
2.79	84.3	135.2	169.0	1.4	-0.1	1.6	6	clean SAND to silty SAND	125	5.0	17	27	77	48	-	-	12	16	N/A	0.00	N/A	N/A
2.95	85.7	137.5	163.8	1.2	0.0	1.4	6	clean SAND to silty SAND	125	5.0	17	27	78	48	-	-	10	16	N/A	0.00	N/A	N/A
3.12	69.5	111.5	135.3	0.8	0.0	1.2	6	clean SAND to silty SAND	125	5.0	14	22	71	47	-	-	11	16	N/A	0.00	N/A	N/A
3.28	61.2	98.2	151.3	1.3	0.0	2.1	5	silty SAND to sandy SILT	120	4.0	15	25	66	46	-	-	17	16	0.15	-	0.37	0.8
3.45	56.0	89.9	170.0	1.7	0.0	3.0	5	silty SAND to sandy SILT	120	4.0	14	22	63	46	-	-	22	16	0.00	-	0.37	0.0
3.61	70.4	112.8	238.0	3.1	0.1	4.5	9	very stiff fine SOIL	120	2.0	35	56	71	46	-	-	24	30	0.00	-	0.37	0.0
3.77	93.4	149.7	213.8	2.4	0.3	2.6	5	silty SAND to sandy SILT	120	4.0	23	37	80	48	-	-	15	16	0.00	-	0.37	0.0
3.94	43.9	70.4	221.7	2.6	0.1	5.9	9	very stiff fine SOIL	120	2.0	22	35	55	44	-	-	34	30	0.00	-	0.37	0.0
4.10	49.9	80.1	192.9	2.1	0.1	4.2	4	clayy SILT to silty CLAY	115	2.0	25	40	-	-	3.5	9.9	27	15	0.00	-	0.37	0.0
4.27	68.4	109.7	190.5	2.1	0.1	3.1	5	silty SAND to sandy SILT	120	4.0	17	27	70	46	-	-	20	16	0.00	-	0.37	0.0
4.43	56.6	90.8	192.6	2.1	-0.2	3.8	4	clayy SILT to silty CLAY	115	2.0	28	45	-	-	4.0	9.9	24	15	0.00	-	0.37	0.0
4.59	69.4	111.4	173.9	1.7	-0.2	2.5	5	silty SAND to sandy SILT	120	4.0	17	28	71	46	-	-	17	16	0.00	-	0.37	0.0
4.76	81.0	129.9	173.0	1.5	-0.1	1.9	5	silty SAND to sandy SILT	120	4.0	20	32	76	46	-	-	14	16	0.00	-	0.37	0.0
4.92	74.2	119.0	151.7	1.1	-0.1	1.5	6	clean SAND to silty SAND	125	5.0	15	24	73	46	-	-	12	16	0.23	-	0.37	1.7
5.09	65.0	104.3	141.2	1.0	-0.1	1.6	5	silty SAND to sandy SILT	120	4.0	16	26	68	45	-	-	14	16	0.51	-	0.36	2.7
5.25	54.7	87.7	140.3	1.1	-0.1	2.1	5	silty SAND to sandy SILT	120	4.0	14	22	63	44	-	-	18	16	0.56	-	0.36	3.0
5.41	48.3	77.4	108.1	0.6	-0.2	1.3	5	silty SAND to sandy SILT	120	4.0	12	19	59	44	-	-	15	16	2.19	-	0.36	24.3
5.58	39.4	63.2	111.5	0.7	-0.1	1.8	5	silty SAND to sandy SILT	120	4.0	10	16	52	43	-	-	20	16	2.13	-	0.36	32.0
5.74	39.6	63.5	116.2	0.8	-0.2	2.0	5	silty SAND to sandy SILT	120	4.0	10	16	52	43	-	-	21	16	2.01	-	0.36	31.3
5.91	43.3	69.4	163.8	1.5	-0.2	3.6	4	clayy SILT to silty CLAY	115	2.0	22	35	-	-	3.0	9.9	27	15	0.00	-	0.35	0.0
6.07	63.7	101.8	175.8	1.8	0.0	2.8	5	silty SAND to sandy SILT	120	4.0	16	25	68	45	-	-	20	16	0.00	-	0.35	0.0
6.23	62.3	98.3	213.4	2.6	-0.1	4.2	9	very stiff fine SOIL	120	2.0	31	49	66	45	-	-	25	30	0.00	-	0.35	0.0
6.40	72.5	113.0	177.4	1.8	-0.4	2.5	5	silty SAND to sandy SILT	120	4.0	18	28	71	45	-	-	18	16	0.00	-	0.35	0.0
6.56	55.4	85.2	156.0	1.5	-0.3	2.7	5	silty SAND to sandy SILT	120	4.0	14	21	62	44	-	-	21	16	0.27	-	0.35	1.5
6.73	43.3	65.7	129.0	1.0	-0.3	2.4	5	silty SAND to sandy SILT	120	4.0	11	16	53	42	-	-	23	16	1.43	-	0.35	16.0
6.89	34.9	52.4	119.7	0.9	-0.2	2.5	5	silty SAND to sandy SILT	120	4.0	9	13	46	41	-	-	26	16	1.93	-	0.35	41.5
7.05	29.2	43.4	111.3	0.7	-0.3	2.6	5	silty SAND to sandy SILT	120	4.0	7	11	39	40	-	-	29	16	2.14	-	0.35	51.2
7.22	31.4	46.1	134.5	1.1	-0.2	3.5	4	clayy SILT to silty CLAY	115	2.0	16	23	-	-	2.2	9.9	32	15	1.17	-	0.34	45.4
7.38	43.7	63.4	142.4	1.3	-0.3	3.0	5	silty SAND to sandy SILT	120	4.0	11	16	52	42	-	-	26	16	0.76	-	0.34	5.3
7.55	32.2	51.7	168.6	1.5	-0.3	4.8	4	clayy SILT to silty CLAY	115	2.0	16	26	-	-	2.3	9.9	35	15	0.00	-	0.34	0.0
7.71	32.7	52.4	-	3.6	-0.4	9.9	3	silty CLAY to CLAY	115	1.5	22	35	-	-	2.3	9.9	48	15	-	-	0.34	-
7.87	62.6	88.1	195.7	2.5	-0.8	4.0	4	clayy SILT to silty CLAY	115	2.0	31	44	-	-	4.4	9.9	25	15	0.00	-	0.34	0.0
8.04	94.0	131.1	185.5	2.1	0.1	2.3	5	silty SAND to sandy SILT	120	4.0	24	33	76	46	-	-	15	16	0.00	-	0.34	0.0
8.20	172.4	237.9	237.9	1.3	-0.5	0.8	6	clean SAND to silty SAND	125	5.0	34	48	95	48	-	-	5	16	0.00	-	0.34	0.0
8.37	140.1	191.3	214.6	2.0	-0.7	1.4	6	clean SAND to silty SAND	125	5.0	28	38	88	47	-	-	9	16	0.00	-	0.34	0.0
8.53	135.0	182.5	198.0	1.6	-0.6	1.2	6	clean SAND to silty SAND	125	5.0	27	36	87	47	-	-	7	16	0.00	-	0.34	0.0
8.69	102.1	136.7	198.4	2.5	-0.5	2.5	5	silty SAND to sandy SILT	120	4.0	26	34	77	46	-	-	16	16	0.00	-	0.34	0.0
8.86	71.3	94.6	177.5	2.2	-0.5	3.1	5	silty SAND to sandy SILT	120	4.0	18	24	65	44	-	-	22	16	0.00	-	0.34	0.0
9.02	39.6	63.5	-	2.4	-0.4	6.0	4	clayy SILT to silty CLAY	115	2.0	20	32	-	-	2.8	9.9	36	15	-	-	0.34	-
9.19	29.6	47.5	-	2.0	-0.5	7.0	3	silty CLAY to CLAY	115	1.5	20	32	-	-	2.1	9.9	43	15	-	-	0.34	-
9.35	25.3	40.6	-	1.8	-0.8	7.4	3	silty CLAY to CLAY	115	1.5	17	27	-	-	1.8	9.9	46	15	-	-	0.34	-
9.51	29.0	46.5	-	1.3	-0.8	4.7	4	clayy SILT to silty CLAY	115	2.0	14	23	-	-	2.0	9.9	36	15	-	-	0.34	-
9.68	40.6	51.7	133.2	1.3	-0.9	3.1	4	clayy SILT to silty CLAY	115	2.0	20	26	-	-	2.8	9.9	29	15	1.44	-	0.34	36.7
9.84	52.0	65.6	147.6	1.6	-0.8	3.1	4	clayy SILT to silty CLAY	115	2.0	26	33	-	-	3.6	9.9	26	15	0.71	-	0.34	5.0
10.01	42.0	58.9	190.7	2.2	-0.6	5.3	4	clayy SILT to silty CLAY	115	2.0	21	29	-	-	2.9	9.9	35	15	0.00	-	0.34	0.0
10.17	42.3	58.6	-	2.3	-0.7	5.6	4	clayy SILT to silty CLAY	115	2.0	21	29	-	-	3.0	9.9	36	15	-	-	0.34	-
10.34	37.9	60.8	-	6.4	-0.8	9.9	9	very stiff fine SOIL	120	2.0	19	30	51	40	-	-	45	30	-	-	0.34	-
10.50	146.3	178.9	283.2	5.4	-0.4	3.7	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	9.7	9.9	18	16	0.00	-	0.34	0.0
10.66	32.1	50.1	-	4.1	-0.6	9.9	3	silty CLAY to CLAY	115	1.5	21	33	-	-	2.2	9.9	48	15	-	-	0.34	-
10.83	39.1	47.1	97.8	0.7	-0.4	1.8	5	silty SAND to sandy SILT	120	4.0	10	12	42	40	-	-	24	16	2.38	-	0.34	47.5
10.99	36.2	43.3	104.3	0.8	-0.5	2.3	5	silty SAND to sandy SILT	120	4.0	9	11	39	40	-	-	27	16	2.26	-	0.33	51.2
11.16	21.6	32.2	-	1.0	-0.4	4.6	3	silty CLAY to CLAY	115	1.5	14	21	-	-	1.5	9.9	42	15	-	-	0.33	-
11.32	24.2	35.6	-	1.1	-0.5	4.6	3	silty CLAY to CLAY	115	1.5	16	24	-	-	1.7	9.9	40	15	-	-	0.33	-
11.48	30.0	38.3	-	1.2	-0.4	4.0	4	clayy SILT to silty CLAY	115	2.0	15	19	-	-	2.1	9.9	37	15	-	-	0.33	-
11.65	20.1	28.7	-	1.1	-0.3	5.7	3	silty CLAY to CLAY	115	1.5	13	19	-	-	1.4	9.9	48	15	-	-	0.33	-
11.81	19.8	27.9	-	1.0	-0.6	5.2	3	silty CLAY to CLAY	115	1.5	13	19	-	-	1.4	9.9	47	15	-	-	0.33	-
11.98	18.8	26.2	-	1.1	-0.6	5.8	3	silty CLAY to CLAY	115	1.5	13	17	-	-	1.3	9.9	50	15	-	-	0.33	-
12.14	20.6	28.4	-	1.0	-0.7	5.2	3	silty CLAY to CLAY	115	1.5	14	19	-	-	1.4	9.9	46	15	-	-	0.33	-
12.30	22.2	30.1	-	1.0	-0.7	4.9	3	silty CLAY to CLAY	115	1.5	15	20	-	-	1.5	9.9	44	15	-	-	0.33	-
12.47	23.3	31.3	-	1.1	-0.7	4.9	3	silty CLAY to CLAY	115	1.5	16	21	-	-	1.6	9.9	43	15	-	-	0.33	-
12.63	23.7	31.4	-	1.1	-0.7	4.8	3	silty CLAY to CLAY	115	1.5	16	21	-	-	1.6	9.9	43	15	-	-	0.33	-
12.80	21.5	28.1	-	1.1	-0.8	5.4	3	silty CLAY to CLAY	115	1.5	14	19	-	-	1.5	9.9	47	15	-	-	0.33	-
12.96	22.0	28.5	-	1.1	-0.8	5.2	3	silty CLAY to CLAY	115	1.5	15	19	-	-	1.5	9.9	46	15	-	-	0.33	-
13.12	22.5	28.8	-	1.1	-0.9	4.8	3	silty CLAY to CLAY	115	1.5	15	19	-	-	1.6	9.9	45	15	-	-	0.33	-
13.29	19.3	24.3	-	1.0	-0.9	5.4	3	silty CLAY to CLAY	115	1.5	13	16	-	-	1.3	9.9	50	15	-	-	0.33	-
13.45	18.2	22.7	-	0.9	-0.9	5.4	3	silty CLAY to CLAY	115	1.5	12	15	-	-	1.3	9.9	52	15	-	-	0.33	-
13.62	21.7	26.8	-	0.9	-0.9	4.2	3	silty CLAY to CLAY	115	1.5	14	18	-	-	1.5	9.9	44	15	-	-	0.33	-
13.78	36.5	39.2	115.6	1.1	-1.0	3.0	4	clayy SILT to silty CLAY	115	2.0	18	20	-	-	2.5	9.9	32	15	2.08	-	0.33	51.2
13.94	38.4	41.0	131.6	1.4	-1.0	3.7	4	clayy SILT to silty CLAY	115	2.0	19	20	-	-	2.7	9.9	34	15	1.69	-	0.32	51.2
14.11	32.0	38.2	-	1.4	-1.0	4.4	4	clayy SILT to silty CLAY	115	2.0	16	19	-	-	2.2	9.9	39	15	-	-	0.32	-
14.27	21.7	25.6	-	1.3	-1.0	6.2	3	silty CLAY to CLAY	115	1.5	14	17	-	-	1.5	9.9	52	15	-	-	0.32	-
14.44	29.2	34.0	-	1.1	-0.9	3.8	4	clayy SILT to silty CLAY	115	2.0	15	17	-	-	2.0	9.9	38	15	-	-	0.32	-
14.60	67.8	70.7	127.5	1.5	-1.1	2.2	5	silty SAND to sandy SILT	120	4.0	17	18	56	42	-	-	21	16	1.85	-	0.32	27.8
14.76	92.5	95.9	133.3	1.5	-1.2	1.6	5	silty SAND to sandy SILT	120	4.0	23	24	66	44	-	-	15	16	1.63	-	0.32	12.6
14.93	93.9	96.8	150.0	2.0	-1.2	2.1	5	silty SAND to sandy SILT	120	4.0	23	24	66	44	-	-	17	16	0.82	-	0.31	4.6
15.09	85.0	87.1	164.7	2.5	-1.3	2.9	5	silty SAND to sandy SILT	120	4.0	21	22	62	43	-	-	22	16	0.00	-	0.31	0.0
15.26	63.5	64.8	180.7	2.8	-1.2	4.5	4	clayy SILT to silty CLAY	115	2.0	32	32	-	-	4.5	9.9	31	15	0.00	-	0.31	0.0
15.42	44.5	48.6	-	2.8	-1.1	6.3	3	silty CLAY to CLAY	115	1.5	30	32	-	-	3.1	9.9	41	15	-	-	0.31	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
15.58	31.4	33.9	-	1.8	-1.0	5.9	3	silty CLAY to CLAY	115	1.5	21	23	-	-	2.2	9.9	45	15	-	-	0.31	-
15.75	27.0	28.8	-	1.5	-1.0	5.8	3	silty CLAY to CLAY	115	1.5	18	19	-	-	1.9	9.9	48	15	-	-	0.31	-
15.91	29.1	30.7	-	1.4	-1.0	5.0	3	silty CLAY to CLAY	115	1.5	19	20	-	-	2.0	9.9	44	15	-	-	0.31	-
16.08	37.9	39.8	-	1.9	-0.9	5.0	3	silty CLAY to CLAY	115	1.5	25	27	-	-	2.6	9.9	40	15	-	-	0.31	-
16.24	35.5	36.9	-	2.1	-1.0	6.0	3	silty CLAY to CLAY	115	1.5	24	25	-	-	2.5	9.9	44	15	-	-	0.31	-
16.40	27.3	28.0	-	1.9	-0.9	7.3	3	silty CLAY to CLAY	115	1.5	18	19	-	-	1.9	9.9	53	15	-	-	0.31	-
16.57	25.4	25.8	-	1.7	-0.9	6.9	3	silty CLAY to CLAY	115	1.5	17	17	-	-	1.8	9.9	53	15	-	-	0.31	-
16.73	29.2	29.4	-	1.7	-0.9	6.1	3	silty CLAY to CLAY	115	1.5	19	20	-	-	2.0	9.9	49	15	-	-	0.31	-
16.90	50.0	48.5	145.9	1.9	-0.9	3.9	4	clayy SILT to silty CLAY	115	2.0	25	24	-	-	3.5	9.9	33	15	1.05	-	0.31	39.2
17.06	53.1	51.3	154.0	2.1	-0.9	4.1	4	clayy SILT to silty CLAY	115	2.0	27	26	-	-	3.7	9.9	33	15	0.69	-	0.31	28.7
17.23	48.9	47.4	-	2.2	-0.9	4.5	4	clayy SILT to silty CLAY	115	2.0	24	24	-	-	3.4	9.9	35	15	-	-	0.31	-
17.39	43.4	42.1	-	2.2	-0.9	5.2	3	silty CLAY to CLAY	115	1.5	29	28	-	-	3.0	9.9	40	15	-	-	0.31	-
17.55	36.2	34.9	-	2.0	-0.9	5.8	3	silty CLAY to CLAY	115	1.5	24	23	-	-	2.5	9.9	45	15	-	-	0.31	-
17.72	35.5	33.9	-	1.9	-0.9	5.4	3	silty CLAY to CLAY	115	1.5	24	23	-	-	2.5	9.9	44	15	-	-	0.31	-
17.88	42.7	40.4	-	1.8	-0.9	4.4	4	clayy SILT to silty CLAY	115	2.0	21	20	-	-	3.0	9.9	37	15	-	-	0.31	-
18.05	49.5	46.5	147.1	2.0	-0.9	4.0	4	clayy SILT to silty CLAY	115	2.0	25	23	-	-	3.5	9.9	34	15	1.02	-	0.31	44.3
18.21	34.8	32.3	-	2.0	-1.0	5.9	3	silty CLAY to CLAY	115	1.5	23	22	-	-	2.4	9.9	46	15	-	-	0.31	-
18.37	33.6	31.0	-	2.0	-1.1	6.3	3	silty CLAY to CLAY	115	1.5	22	21	-	-	2.3	9.9	48	15	-	-	0.31	-
18.54	47.6	43.5	-	2.4	-1.0	5.2	3	silty CLAY to CLAY	115	1.5	32	29	-	-	3.3	9.9	39	15	-	-	0.31	-
18.70	65.3	60.3	172.1	2.8	-1.0	4.3	4	clayy SILT to silty CLAY	115	2.0	33	30	-	-	4.6	9.9	31	15	0.00	-	0.31	0.0
18.87	64.7	59.5	175.8	2.9	-1.0	4.6	4	clayy SILT to silty CLAY	115	2.0	32	30	-	-	4.5	9.9	32	15	0.00	-	0.31	0.0
19.03	58.9	53.9	176.1	2.8	-1.0	4.9	4	clayy SILT to silty CLAY	115	2.0	29	27	-	-	4.1	9.9	35	15	0.00	-	0.31	0.0
19.19	52.3	46.1	-	2.7	-1.0	5.2	3	silty CLAY to CLAY	115	1.5	35	31	-	-	3.7	9.9	38	15	-	-	0.31	-
19.36	43.7	38.2	-	2.4	-1.0	5.7	3	silty CLAY to CLAY	115	1.5	29	25	-	-	3.0	9.9	43	15	-	-	0.31	-
19.52	37.8	32.8	-	2.1	-0.8	5.6	3	silty CLAY to CLAY	115	1.5	25	22	-	-	2.6	9.9	45	15	-	-	0.31	-
19.69	32.8	28.3	-	1.7	-0.8	5.2	3	silty CLAY to CLAY	115	1.5	22	19	-	-	2.3	9.9	47	15	-	-	0.31	-
19.85	25.7	22.0	-	1.5	-2.2	6.2	3	silty CLAY to CLAY	115	1.5	17	15	-	-	1.8	9.9	55	15	-	-	0.31	-
20.01	23.7	20.1	-	1.5	-1.8	6.5	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.6	9.9	58	15	-	-	0.31	-
20.18	22.8	19.1	-	1.5	-1.2	6.9	3	silty CLAY to CLAY	115	1.5	15	13	-	-	1.6	9.9	60	15	-	-	0.31	-
20.34	24.2	20.1	-	1.6	-1.4	7.0	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.7	9.9	59	15	-	-	0.31	-
20.51	24.5	20.3	-	1.9	-1.4	8.0	3	silty CLAY to CLAY	115	1.5	16	14	-	-	1.7	9.9	62	15	-	-	0.31	-
20.67	26.3	21.6	-	2.2	-1.2	8.8	3	silty CLAY to CLAY	115	1.5	18	14	-	-	1.8	9.9	62	15	-	-	0.31	-
20.83	29.4	24.0	-	2.5	-1.2	9.0	3	silty CLAY to CLAY	115	1.5	20	16	-	-	2.0	9.9	60	15	-	-	0.31	-
21.00	36.3	29.3	-	2.8	-1.3	8.1	3	silty CLAY to CLAY	115	1.5	24	20	-	-	2.5	9.9	54	15	-	-	0.31	-
21.16	40.5	32.5	-	3.1	-1.4	7.8	3	silty CLAY to CLAY	115	1.5	27	22	-	-	2.8	9.9	51	15	-	-	0.31	-
21.33	49.8	39.6	-	3.4	-1.3	7.1	3	silty CLAY to CLAY	115	1.5	33	26	-	-	3.5	9.9	46	15	-	-	0.31	-
21.49	57.7	45.6	-	3.9	-1.1	6.9	3	silty CLAY to CLAY	115	1.5	38	30	-	-	4.0	9.9	43	15	-	-	0.31	-
21.65	59.2	46.4	-	4.5	-1.0	7.8	3	silty CLAY to CLAY	115	1.5	39	31	-	-	4.1	9.9	45	15	-	-	0.31	-
21.82	62.1	48.4	-	5.1	-0.9	8.3	3	silty CLAY to CLAY	115	1.5	41	32	-	-	4.3	9.9	46	15	-	-	0.31	-
21.98	68.8	53.2	-	5.8	-0.7	8.7	3	silty CLAY to CLAY	115	1.5	46	35	-	-	4.8	9.9	45	15	-	-	0.31	-
22.15	78.4	60.1	-	6.7	-0.6	8.7	9	very stiff fine SOIL	120	2.0	39	30	50	41	-	-	43	30	-	-	0.31	-
22.31	89.5	68.1	-	7.5	-0.5	8.5	9	very stiff fine SOIL	120	2.0	45	34	54	42	-	-	41	30	-	-	0.31	-
22.47	96.3	72.8	-	7.8	-0.5	8.2	9	very stiff fine SOIL	120	2.0	48	36	57	42	-	-	39	30	-	-	0.31	-
22.64	99.0	74.3	-	8.1	-0.3	8.3	9	very stiff fine SOIL	120	2.0	50	37	57	42	-	-	39	30	-	-	0.31	-
22.80	103.1	76.8	-	8.0	-0.1	7.8	9	very stiff fine SOIL	120	2.0	52	38	58	42	-	-	38	30	-	-	0.31	-
22.97	109.6	81.0	-	7.9	-0.3	7.3	9	very stiff fine SOIL	120	2.0	55	41	60	43	-	-	36	30	-	-	0.31	-
23.13	118.5	98.6	281.0	7.6	-0.1	6.5	9	very stiff fine SOIL	120	2.0	59	49	67	43	-	-	31	30	0.00	-	0.31	0.0
23.30	127.9	106.0	277.2	7.6	0.2	6.0	9	very stiff fine SOIL	120	2.0	64	53	69	43	-	-	29	30	0.00	-	0.31	0.0
23.46	134.4	111.0	271.6	7.4	0.4	5.6	9	very stiff fine SOIL	120	2.0	67	56	70	44	-	-	28	30	0.00	-	0.31	0.0
23.62	127.5	105.0	242.3	6.2	0.7	4.9	9	very stiff fine SOIL	120	2.0	64	52	69	43	-	-	26	30	0.00	-	0.31	0.0
23.79	114.6	94.0	189.3	4.0	0.8	3.5	5	silty SAND to sandy SILT	120	4.0	29	23	65	43	-	-	23	16	0.00	-	0.31	0.0
23.95	105.2	86.0	135.7	2.1	-0.6	2.0	5	silty SAND to sandy SILT	120	4.0	26	22	62	42	-	-	18	16	1.75	-	0.31	20.6
24.12	87.6	71.4	103.0	1.1	-0.9	1.3	5	silty SAND to sandy SILT	120	4.0	22	18	56	41	-	-	16	16	2.28	-	0.30	27.4
24.28	71.4	57.9	87.5	0.8	-0.6	1.1	5	silty SAND to sandy SILT	120	4.0	18	14	49	40	-	-	17	16	2.61	-	0.30	35.8
24.44	68.5	55.4	82.2	0.7	-0.6	1.0	5	silty SAND to sandy SILT	120	4.0	17	14	48	40	-	-	16	16	2.74	-	0.30	38.3
24.61	70.3	56.7	83.1	0.7	-0.7	1.0	5	silty SAND to sandy SILT	120	4.0	18	14	48	40	-	-	16	16	2.72	-	0.29	37.0
24.77	66.3	53.3	83.4	0.7	-0.7	1.1	5	silty SAND to sandy SILT	120	4.0	17	13	46	40	-	-	18	16	2.71	-	0.29	40.5
24.94	62.1	49.7	84.4	0.7	-0.6	1.2	5	silty SAND to sandy SILT	120	4.0	16	12	44	39	-	-	19	16	2.69	-	0.28	44.4
25.10	64.3	51.3	92.5	0.9	-0.7	1.5	5	silty SAND to sandy SILT	120	4.0	16	13	45	39	-	-	21	16	2.49	-	0.28	42.7
25.26	67.7	53.9	107.1	1.3	-0.7	2.0	5	silty SAND to sandy SILT	120	4.0	17	13	47	40	-	-	23	16	2.21	-	0.27	39.9
25.43	78.3	62.1	114.5	1.5	-0.8	2.0	5	silty SAND to sandy SILT	120	4.0	20	16	51	40	-	-	21	16	2.09	-	0.27	32.7
25.59	90.7	71.7	107.7	1.3	-0.8	1.4	5	silty SAND to sandy SILT	120	4.0	23	18	56	41	-	-	17	16	2.20	-	0.27	27.2
25.76	82.7	65.1	92.4	0.9	-0.7	1.1	5	silty SAND to sandy SILT	120	4.0	21	16	53	41	-	-	15	16	2.49	-	0.26	30.9
25.92	75.3	59.2	84.6	0.7	-0.7	1.0	5	silty SAND to sandy SILT	120	4.0	19	15	50	40	-	-	15	16	2.68	-	0.26	34.6
26.08	82.5	64.6	89.2	0.8	-0.7	1.0	5	silty SAND to sandy SILT	120	4.0	21	16	53	41	-	-	15	16	2.57	-	0.26	31.2
26.25	91.2	71.2	92.4	0.8	-0.7	0.9	6	clean SAND to silty SAND	125	5.0	18	14	56	41	-	-	13	16	2.49	-	0.25	27.5
26.41	88.2	68.6	89.4	0.7	-0.7	0.8	6	clean SAND to silty SAND	125	5.0	18	14	55	41	-	-	13	16	2.56	-	0.25	28.9
26.58	76.9	59.6	87.5	0.8	-0.7	1.0	5	silty SAND to sandy SILT	120	4.0	19	15	50	40	-	-	16	16	2.61	-	0.24	34.3
26.74	83.4	64.5	94.0	0.9	-0.7	1.1	5	silty SAND to sandy SILT	120	4.0	21	16	53	40	-	-	16	16	2.46	-	0.24	31.2
26.90	98.8	76.1	100.9	1.0	-0.8	1.0	6	clean SAND to silty SAND	125	5.0	20	15	58	41	-	-	13	16	2.32	-	0.24	25.0
27.07	97.7	75.0	102.3	1.1	-0.8	1.1	5	silty SAND to sandy SILT	120	4.0	24	19	58	41	-	-	14	16	2.29	-	0.23	25.5
27.23	96.9	74.2	103.0	1.1	-0.8	1.2	5	silty SAND to sandy SILT	120	4.0	24	19	57	41	-	-	15	16	2.28	-	0.23	25.9
27.40	96.6	73.7	106.9	1.3	-0.8	1.3	5	silty SAND to sandy SILT	120	4.0	24	18	57	41	-	-	16	16	2.21	-	0.22	26.2
27.56	94.8	72.1	110.4	1.4	-0.8	1.5	5	silty SAND to sandy SILT	120	4.0	24	18	56	41	-	-	17	16	2.15	-	0.22	27.0
27.72	101.9	77.3	113.3	1.5	-0.8	1.5	5	silty SAND to sandy SILT	120	4.0	25	19	58	41	-	-	16	16	2.11	-	0.22	24.4
27.89	106.4	80.5	113.9	1.4	-0.8	1.4	5	silty SAND to sandy SILT	120	4.0	27	20	60	42	-	-	15	16	2.10	-	0.21	22.9
28.05	118.7	89.5	120.9	1.6	-0.9	1.4	5	silty SAND to sandy SILT	120	4.0	30	22	63	42	-	-	14	16	2.00	-	0.21	20.0
28.22	114.2	85.8	114.7	1.4	-0.9	1.2	6	clean SAND to silty SAND	125	5.0	23	17	62	42	-	-	14	16	2.09	-	0.21	21.1
28.38	100.5	75.3	107.8	1.3	-0.8	1.3	5	silty SAND to sandy SILT	120	4.0	25	19	58	41	-	-	15	16	2.20	-	0.20	25.4
28.54	93.2	69.6	109.6	1.4	-0.8	1.6	5	silty SAND to sandy SILT	120	4.0	23	17	55	41	-	-	18	16	2.17	-	0.20	28.3
28.71	91.6	68.3	112.8	1.5	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	23	17	54	41	-	-	19	16	2.12	-	0.20	29.1
28.87	83.2	61.8	110.4	1.5	-0.8	1.8	5	silty SAND to sandy SILT	120	4.0	21	15	51	40	-	-	21	16	2.15	-	0.19	32.8
29.04	72.2	53.5	100.0	1.2	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	18	13	46	39	-	-	22	16	2.34	-	0.19	40.4
29.20	73.8	54.5	100.9	1.2	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	18	14	47	39	-	-	21	16	2.32	-	0.18	39.3
29.36	88.1	64.9	108.9	1.4	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	22	16	53	40	-	-	19	16	2.18	-	0.18	31.0
29.53	105.4	77.5	117.4	1.7	-0.9	1.6	5	silty SAND to sandy SILT	120	4.0	26	19	59	41	-	-	17	16	2.05	-	0.18	24.3
29.69	114.7	84.0	124.1	1.8	-0.9	1.6	5	silty SAND to sandy SILT	120	4.0	29	21	61	42	-	-	16	16	1.96	-	0.17	21.7
29.86	119.0	87.0	122.7	1.7	-0.9	1.5	5	silty SAND to sandy SILT	120	4.0	30	22	62	42	-	-	15	16	1.98	-	0.17	20.7
30.02	121.4	88.5	120.3	1.6	-0.9	1.4	5	silty SAND to sandy SILT	120	4.0	30	22	63	42	-	-	14	16	2.01	-	0.17	20.3
30.19	128.5	93.3	125.9	1.8	-0.9	1.4	5	silty SAND to sandy SILT	120	4.0	32	23	65	42	-	-	14	16	1.94	-	0.16	18.8
30.35	139.8	101.3	129.8	1.8	-0.9	1.3	6	clean SAND to silty SAND	125	5.0	28	20	67	43	-	-	13	16	1.89	-	0.16	16.6
30.51	135.2	97.7	122.9	1.6	-0.9	1.2	6	clean SAND to silty SAND	125	5.0	27	20	66	42	-	-	12	16	1.97	-	0.16	17.6
30.68	130.8	94.3	118.8	1.5	-0.9	1.1	6	clean SAND to silty SAND	125	5.0	26	19	65	42	-	-	12	16	2.03	-	0.15	18.6
30.84	121.4	87.2	117.4	1.5	-0.9	1.3	5	silty SAND to sandy SILT	120	4.0	30	22	62	42	-	-	14	16	2.05	-	0.15	20.7

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
31.01	109.0	78.1	114.7	1.6	-0.8	1.5	5	silty SAND to sandy SILT	120	4.0	27	20	59	41	-	-	16	16	2.09	-	0.15	24.0
31.17	96.1	68.7	107.4	1.4	-0.8	1.5	5	silty SAND to sandy SILT	120	4.0	24	17	55	40	-	-	18	16	2.20	-	0.14	28.9
31.33	86.2	61.4	106.2	1.4	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	22	15	51	40	-	-	20	16	2.22	-	0.14	33.1
31.50	81.1	57.7	119.8	1.8	-0.8	2.3	5	silty SAND to sandy SILT	120	4.0	20	14	49	39	-	-	24	16	2.02	-	0.14	36.1
31.66	84.6	59.9	135.0	2.3	-0.8	2.8	5	silty SAND to sandy SILT	120	4.0	21	15	50	40	-	-	26	16	1.83	-	0.13	34.0
31.83	80.1	56.6	143.4	2.6	-0.8	3.3	4	clayy SILT to silty CLAY	115	2.0	40	28	-	-	5.6	9.9	29	15	1.53	-	0.13	37.1
31.99	79.8	56.3	140.8	2.5	-0.8	3.2	4	clayy SILT to silty CLAY	115	2.0	40	28	-	-	5.6	9.9	28	15	1.63	-	0.13	37.5
32.15	79.7	56.0	145.0	2.6	-0.9	3.4	4	clayy SILT to silty CLAY	115	2.0	40	28	-	-	5.6	9.9	29	15	1.46	-	0.13	37.7
32.32	79.9	56.1	154.1	2.9	-1.0	3.8	4	clayy SILT to silty CLAY	115	2.0	40	28	-	-	5.6	9.9	31	15	1.06	-	0.12	23.9
32.48	82.3	42.8	-	3.4	-1.2	4.3	4	clayy SILT to silty CLAY	115	2.0	41	21	-	-	5.7	9.9	36	15	-	-	0.12	-
32.65	84.7	43.8	-	3.9	-1.0	4.7	4	clayy SILT to silty CLAY	115	2.0	42	22	-	-	5.9	9.9	37	15	-	-	0.12	-
32.81	90.2	46.4	-	4.6	-1.4	5.2	3	silty CLAY to CLAY	115	1.5	60	31	-	-	6.3	9.9	38	15	-	-	0.12	-
32.97	99.3	69.0	192.3	4.6	-1.3	4.7	4	clayy SILT to silty CLAY	115	2.0	50	35	-	-	6.9	9.9	31	15	0.00	-	0.12	0.0
33.14	101.0	70.0	181.9	4.2	-1.3	4.2	4	clayy SILT to silty CLAY	115	2.0	51	35	-	-	7.1	9.9	29	15	0.00	-	0.12	0.0
33.30	103.7	71.7	169.7	3.7	-1.3	3.7	4	clayy SILT to silty CLAY	115	2.0	52	36	-	-	7.3	9.9	27	15	0.00	-	0.12	0.0
33.47	105.0	72.4	163.0	3.5	-1.3	3.4	4	clayy SILT to silty CLAY	115	2.0	52	36	-	-	7.3	9.9	26	15	0.00	-	0.12	0.0
33.63	105.2	72.4	158.9	3.4	-1.2	3.2	4	clayy SILT to silty CLAY	115	2.0	53	36	-	-	7.4	9.9	25	15	0.92	-	0.12	9.3
33.79	111.0	76.2	162.4	3.5	-1.1	3.2	5	silty SAND to sandy SILT	120	4.0	28	19	58	41	-	-	25	16	0.00	-	0.12	0.0
33.96	105.6	72.3	179.1	4.2	-1.1	4.0	4	clayy SILT to silty CLAY	115	2.0	53	36	-	-	7.4	9.9	28	15	0.00	-	0.12	0.0
34.12	94.9	47.0	-	5.5	-1.0	5.9	3	silty CLAY to CLAY	115	1.5	63	31	-	-	6.6	9.9	40	15	-	-	0.12	-
34.29	91.9	45.3	-	6.7	-0.6	7.4	3	silty CLAY to CLAY	115	1.5	61	30	-	-	6.4	9.9	45	15	-	-	0.12	-
34.45	91.8	45.1	-	7.4	-0.7	8.2	3	silty CLAY to CLAY	115	1.5	61	30	-	-	6.4	9.9	47	15	-	-	0.12	-
34.61	92.9	45.4	-	8.0	-0.5	8.8	3	silty CLAY to CLAY	115	1.5	62	30	-	-	6.5	9.9	48	15	-	-	0.12	-
34.78	93.6	45.5	-	8.1	-0.4	8.8	3	silty CLAY to CLAY	115	1.5	62	30	-	-	6.5	9.9	48	15	-	-	0.12	-
34.94	90.4	43.7	-	7.9	-0.5	9.0	3	silty CLAY to CLAY	115	1.5	60	29	-	-	6.3	9.9	49	15	-	-	0.12	-
35.11	91.2	43.9	-	7.8	-0.5	8.7	3	silty CLAY to CLAY	115	1.5	61	29	-	-	6.4	9.9	48	15	-	-	0.12	-
35.27	91.2	43.8	-	7.6	-0.5	8.5	3	silty CLAY to CLAY	115	1.5	61	29	-	-	6.4	9.9	48	15	-	-	0.12	-
35.43	91.2	43.5	-	7.3	-0.5	8.2	3	silty CLAY to CLAY	115	1.5	61	29	-	-	6.4	9.9	47	15	-	-	0.12	-
35.60	90.9	43.2	-	6.9	-0.6	7.8	3	silty CLAY to CLAY	115	1.5	61	29	-	-	6.3	9.9	46	15	-	-	0.12	-
35.76	89.1	42.1	-	6.5	-0.7	7.4	3	silty CLAY to CLAY	115	1.5	59	28	-	-	6.2	9.9	46	15	-	-	0.12	-
35.93	87.3	41.1	-	5.6	-0.6	6.6	3	silty CLAY to CLAY	115	1.5	58	27	-	-	6.1	9.9	44	15	-	-	0.12	-
36.09	82.4	38.6	-	4.2	-0.9	5.3	3	silty CLAY to CLAY	115	1.5	55	26	-	-	5.7	9.9	41	15	-	-	0.12	-
36.26	69.4	32.4	-	2.5	-1.9	3.8	4	clayy SILT to silty CLAY	115	2.0	35	16	-	-	4.8	9.9	39	15	-	-	0.12	-
36.42	55.4	36.7	89.8	1.0	-0.8	1.9	5	silty SAND to sandy SILT	120	4.0	14	9	34	37	-	-	28	16	2.55	-	0.12	51.2
36.58	48.2	31.8	79.9	0.7	-0.8	1.6	5	silty SAND to sandy SILT	120	4.0	12	8	29	36	-	-	28	16	2.81	-	0.12	51.2
36.75	44.2	20.4	-	0.8	-0.7	2.0	4	clayy SILT to silty CLAY	115	2.0	22	10	-	-	3.0	9.9	38	15	-	-	0.11	-
36.91	37.6	17.2	-	0.7	-0.8	2.0	4	clayy SILT to silty CLAY	115	2.0	19	9	-	-	2.6	9.9	42	15	-	-	0.11	-
37.08	33.1	15.1	-	0.7	-0.8	2.3	4	clayy SILT to silty CLAY	115	2.0	17	8	-	-	2.3	9.0	46	15	-	-	0.11	-
37.24	32.1	14.6	-	0.7	-0.7	2.5	4	clayy SILT to silty CLAY	115	2.0	16	7	-	-	2.2	8.7	48	15	-	-	0.11	-
37.40	28.2	12.7	-	0.8	-0.7	3.1	3	silty CLAY to CLAY	115	1.5	19	8	-	-	1.9	7.5	55	15	-	-	0.11	-
37.57	29.7	13.4	-	0.9	-0.8	3.2	3	silty CLAY to CLAY	115	1.5	20	9	-	-	2.0	7.9	54	15	-	-	0.11	-
37.73	28.5	12.8	-	0.8	-0.9	3.1	3	silty CLAY to CLAY	115	1.5	19	9	-	-	1.9	7.5	55	15	-	-	0.11	-
37.90	25.4	11.4	-	0.7	-0.9	3.1	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	6.6	58	15	-	-	0.11	-
38.06	30.1	13.4	-	0.6	-0.9	2.3	4	clayy SILT to silty CLAY	115	2.0	15	7	-	-	2.0	7.9	49	15	-	-	0.11	-
38.22	36.6	16.2	-	1.0	-0.9	3.0	3	silty CLAY to CLAY	115	1.5	24	11	-	-	2.5	9.8	49	15	-	-	0.11	-
38.39	46.0	20.3	-	1.5	-1.0	3.5	3	silty CLAY to CLAY	115	1.5	31	14	-	-	3.2	9.9	46	15	-	-	0.11	-
38.55	50.0	22.0	-	1.7	-1.4	3.6	4	clayy SILT to silty CLAY	115	2.0	25	11	-	-	3.5	9.9	45	15	-	-	0.11	-
38.72	48.2	21.1	-	1.4	-1.1	3.2	4	clayy SILT to silty CLAY	115	2.0	24	11	-	-	3.3	9.9	44	15	-	-	0.11	-
38.88	48.4	21.1	-	1.5	-1.1	3.2	4	clayy SILT to silty CLAY	115	2.0	24	11	-	-	3.3	9.9	44	15	-	-	0.11	-
39.04	51.5	22.4	-	1.7	-1.2	3.4	4	clayy SILT to silty CLAY	115	2.0	26	11	-	-	3.6	9.9	44	15	-	-	0.11	-
39.21	54.1	23.4	-	2.1	-1.6	4.1	3	silty CLAY to CLAY	115	1.5	36	16	-	-	3.7	9.9	46	15	-	-	0.11	-
39.37	56.3	24.2	-	2.8	-1.2	5.3	3	silty CLAY to CLAY	115	1.5	38	16	-	-	3.9	9.9	50	15	-	-	0.11	-
39.54	66.9	28.7	-	4.0	-1.3	6.2	3	silty CLAY to CLAY	115	1.5	45	19	-	-	4.6	9.9	49	15	-	-	0.11	-
39.70	74.5	31.8	-	4.8	-1.1	6.6	3	silty CLAY to CLAY	115	1.5	50	21	-	-	5.2	9.9	49	15	-	-	0.11	-
39.86	71.7	30.5	-	5.2	-0.7	7.5	3	silty CLAY to CLAY	115	1.5	48	20	-	-	5.0	9.9	52	15	-	-	0.11	-
40.03	70.9	30.1	-	5.4	-0.7	7.9	3	silty CLAY to CLAY	115	1.5	47	20	-	-	4.9	9.9	53	15	-	-	0.11	-
40.19	74.3	31.4	-	5.9	-0.4	8.2	3	silty CLAY to CLAY	115	1.5	50	21	-	-	5.2	9.9	53	15	-	-	0.11	-
40.36	77.1	32.4	-	6.2	-0.6	8.3	3	silty CLAY to CLAY	115	1.5	51	22	-	-	5.4	9.9	53	15	-	-	0.11	-
40.52	76.4	32.0	-	6.3	-0.5	8.5	3	silty CLAY to CLAY	115	1.5	51	21	-	-	5.3	9.9	53	15	-	-	0.11	-
40.68	74.8	31.2	-	6.3	-0.3	8.8	3	silty CLAY to CLAY	115	1.5	50	21	-	-	5.2	9.9	54	15	-	-	0.11	-
40.85	74.2	30.8	-	6.4	-0.3	8.9	3	silty CLAY to CLAY	115	1.5	49	21	-	-	5.2	9.9	55	15	-	-	0.11	-
41.01	75.2	31.1	-	6.4	-0.2	8.7	3	silty CLAY to CLAY	115	1.5	50	21	-	-	5.2	9.9	54	15	-	-	0.11	-
41.18	77.4	31.9	-	6.5	-0.3	8.7	3	silty CLAY to CLAY	115	1.5	52	21	-	-	5.4	9.9	54	15	-	-	0.11	-
41.34	80.8	33.2	-	6.8	-0.2	8.7	3	silty CLAY to CLAY	115	1.5	54	22	-	-	5.6	9.9	53	15	-	-	0.11	-
41.50	80.1	32.8	-	6.9	-0.2	8.9	3	silty CLAY to CLAY	115	1.5	53	22	-	-	5.6	9.9	54	15	-	-	0.11	-
41.67	79.8	32.5	-	6.8	0.1	8.8	3	silty CLAY to CLAY	115	1.5	53	22	-	-	5.6	9.9	54	15	-	-	0.11	-
41.83	77.7	31.5	-	6.7	0.2	8.8	3	silty CLAY to CLAY	115	1.5	52	21	-	-	5.4	9.9	54	15	-	-	0.11	-
42.00	76.3	30.8	-	6.6	0.1	9.0	3	silty CLAY to CLAY	115	1.5	51	21	-	-	5.3	9.9	55	15	-	-	0.11	-
42.16	75.4	30.4	-	6.6	0.3	9.1	3	silty CLAY to CLAY	115	1.5	50	20	-	-	5.2	9.9	56	15	-	-	0.11	-
42.32	73.0	29.3	-	6.5	0.3	9.1	3	silty CLAY to CLAY	115	1.5	49	20	-	-	5.1	9.9	57	15	-	-	0.11	-
42.49	72.7	29.1	-	6.2	0.4	8.8	3	silty CLAY to CLAY	115	1.5	48	19	-	-	5.0	9.9	56	15	-	-	0.11	-
42.65	73.6	29.3	-	6.0	0.5	8.5	3	silty CLAY to CLAY	115	1.5	49	20	-	-	5.1	9.9	55	15	-	-	0.11	-
42.82	73.1	29.0	-	6.0	0.7	8.5	3	silty CLAY to CLAY	115	1.5	49	19	-	-	5.1	9.9	55	15	-	-	0.11	-
42.98	73.2	29.0	-	5.9	0.5	8.3	3	silty CLAY to CLAY	115	1.5	49	19	-	-	5.1	9.9	55	15	-	-	0.11	-
43.15	70.6	27.8	-	5.7	0.6	8.4	3	silty CLAY to CLAY	115	1.5	47	19	-	-	4.9	9.9	56	15	-	-	0.11	-
43.31	67.5	26.5	-	5.7	0.7	8.7	3	silty CLAY to CLAY	115	1.5	45	18	-	-	4.7	9.9	58	15	-	-	0.11	-
43.47	65.8	25.7	-	5.5	0.8	8.6	3	silty CLAY to CLAY	115	1.5	44	17	-	-	4.6	9.9	58	15	-	-	0.11	-
43.64	64.3	25.0	-	5.1	0.9	8.3	3	silty CLAY to CLAY	115	1.5	43	17	-	-	4.4	9.9	58	15	-	-	0.11	-
43.80	62.6	24.3	-	5.2	1.0	8.7	3	silty CLAY to CLAY	115	1.5	42	16	-	-	4.3	9.9	59	15	-	-	0.11	-
43.97	63.1	24.4	-	5.2	0.9	8.6	3	silty CLAY to CLAY	115	1.5	42	16	-	-	4.4	9.9	59	15	-	-	0.11	-
44.13	65.6	25.3	-	5.3	0.9	8.5	3	silty CLAY to CLAY	115	1.5	44	17	-	-	4.5	9.9	58	15	-	-	0.11	-
44.29	68.2	26.2	-	5.5	0.9	8.4	3	silty CLAY to CLAY	115	1.5	45	17	-	-	4.7	9.9	57	15	-	-	0.11	-
44.46	68.8	26.3	-	5.7	1.0	8.6	3	silty CLAY to CLAY	115	1.5	46	18	-	-	4.8	9.9	57	15	-	-	0.11	-
44.62	71.8	27.4	-	5.6	1.0	8.1	3	silty CLAY to CLAY	115	1.5	48	18	-	-	5.0	9.9	55	15	-	-	0.11	-
44.79	73.7	28.0	-	5.6	1.1	7.9	3	silty CLAY to CLAY	115	1.5	49	19	-	-	5.1	9.9	55	15	-	-	0.11	-
44.95	80.8	30.6	-	5.6	1.3	7.1	3	silty CLAY to CLAY	115	1.5	54	20	-	-	5.6	9.9	51	15	-	-	0.11	-
45.11	80.1	30.2	-	5.8	1.3	7.4	3	silty CLAY to CLAY	115	1.5	53	20	-	-	5.6	9.9	52	15	-	-	0.11	-
45.28	67.4	25.4	-	5.8	1.4	9.0	3	silty CLAY to CLAY	115	1.5	45	17	-	-	4.7	9.9	59	15	-	-	0.11	-
45.44	68.8	26.0	-	5.2	1.3	7.8	3	silty CLAY to CLAY	115	1.5	46	17	-	-	4.8	9.9	56	15	-	-	0.11	-
45.61	63.8	24.1	-	4.9	1.4	8.0	3	silty CLAY to CLAY	115	1.5	43	16	-	-	4.4	9.9	58	15	-	-	0.11	-
45.77	58.8	22.2	-	4.7	1.0	8.4	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.1	9.9	61	15	-	-	0.11	-
45.93	60.0	22.6	-	4.8	1.2	8.3	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.1	9.9	60	15	-	-	0.11	-
46.10	60.2	22.7	-	4.8	1.2	8.4	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.2	9.9	60	15	-	-	0.11	-
46.26	60.8	22.9	-	4.6	1.2	8.0	3	silty CLAY to CLAY	115	1.5	41	15	-	-	4.2	9.9	59	15	-	-	0.11	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
46.43	58.2	22.0	-	3.9	1.2	7.0	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	9.9	57	15	-	-	0.11	-
46.59	50.4	19.0	-	2.8	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	9.9	57	15	-	-	0.11	-
46.75	44.1	16.7	-	2.6	-1.4	6.4	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	9.9	62	15	-	-	0.11	-
46.92	52.4	19.8	-	2.9	-1.3	5.8	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	56	15	-	-	0.11	-
47.08	53.7	20.3	-	3.2	-0.9	6.3	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	57	15	-	-	0.11	-
47.25	47.7	18.0	-	3.7	-1.5	8.2	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	65	15	-	-	0.11	-
47.41	53.3	20.1	-	4.2	-1.2	8.3	3	silty CLAY to CLAY	115	1.5	36	13	-	-	3.7	9.9	63	15	-	-	0.11	-
47.57	53.2	20.1	-	4.3	-1.1	8.4	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.7	9.9	63	15	-	-	0.11	-
47.74	57.9	21.9	-	4.2	-1.1	7.6	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	9.9	59	15	-	-	0.11	-
47.90	57.3	21.6	-	4.2	-1.1	7.7	3	silty CLAY to CLAY	115	1.5	38	14	-	-	3.9	9.9	60	15	-	-	0.11	-
48.07	52.9	20.0	-	4.2	-1.1	8.4	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	63	15	-	-	0.11	-
48.23	52.1	19.7	-	4.1	-1.0	8.3	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	63	15	-	-	0.11	-
48.39	52.8	19.9	-	4.1	-1.0	8.3	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	63	15	-	-	0.11	-
48.56	54.3	20.5	-	4.2	-0.8	8.1	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	62	15	-	-	0.11	-
48.72	53.8	20.3	-	4.2	-0.7	8.2	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	62	15	-	-	0.11	-
48.89	54.4	20.5	-	4.1	-0.7	8.0	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	62	15	-	-	0.11	-
49.05	54.6	20.6	-	4.1	-0.7	7.9	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.8	9.9	61	15	-	-	0.11	-
49.22	56.8	21.4	-	4.1	-0.6	7.6	3	silty CLAY to CLAY	115	1.5	38	14	-	-	3.9	9.9	59	15	-	-	0.11	-
49.38	55.6	21.0	-	4.2	-0.6	7.9	3	silty CLAY to CLAY	115	1.5	37	14	-	-	3.8	9.9	61	15	-	-	0.11	-
49.54	52.8	19.9	-	4.1	-0.6	8.3	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	63	15	-	-	0.11	-
49.71	50.8	19.2	-	3.8	-0.2	8.0	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	9.9	63	15	-	-	0.11	-
49.87	47.6	18.0	-	3.5	-0.2	7.7	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	64	15	-	-	0.11	-
50.04	48.2	18.2	-	3.1	-0.2	6.9	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	61	15	-	-	0.11	-
50.20	47.6	18.0	-	3.0	-0.2	6.7	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	61	15	-	-	0.11	-
50.36	50.8	19.2	-	2.9	-0.2	6.1	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	9.9	58	15	-	-	0.11	-
50.53	45.2	17.1	-	2.1	-0.2	4.9	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.4	56	15	-	-	0.11	-
50.69	23.8	9.0	-	1.1	-0.6	5.3	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.6	75	15	-	-	0.11	-
50.86	15.1	5.7	-	0.8	-0.9	6.2	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.7	95	15	-	-	0.11	-
51.02	20.1	7.6	-	1.7	-1.0	9.9	2	Organic SOILS - Peats	100	1.0	20	8	-	-	2.0	3.8	95	10	-	-	0.11	-
51.18	43.0	16.2	-	2.6	-0.5	6.5	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	8.8	63	15	-	-	0.11	-
51.35	55.4	20.9	-	3.0	-0.5	5.7	3	silty CLAY to CLAY	115	1.5	37	14	-	-	3.8	9.9	54	15	-	-	0.11	-
51.51	50.7	19.1	-	3.2	-0.6	6.8	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	9.9	60	15	-	-	0.11	-
51.68	53.6	20.2	-	3.0	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	36	13	-	-	3.7	9.9	56	15	-	-	0.11	-
51.84	47.8	18.0	-	2.7	-0.5	6.1	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.7	59	15	-	-	0.11	-
52.00	45.4	17.1	-	2.5	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.2	60	15	-	-	0.11	-
52.17	46.4	17.5	-	2.5	-0.5	5.7	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.4	59	15	-	-	0.11	-
52.33	45.2	17.1	-	2.4	-0.4	5.7	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.1	59	15	-	-	0.11	-
52.50	41.4	15.6	-	2.3	-0.4	6.1	3	silty CLAY to CLAY	115	1.5	28	10	-	-	2.8	8.2	62	15	-	-	0.11	-
52.66	39.5	14.9	-	2.1	-0.4	5.8	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.7	7.8	63	15	-	-	0.11	-
52.82	40.4	15.3	-	2.0	-0.5	5.5	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	8.0	61	15	-	-	0.11	-
52.99	45.2	17.1	-	2.1	-0.5	4.9	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.0	56	15	-	-	0.11	-
53.15	40.6	15.3	-	2.1	-0.5	5.6	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.8	8.0	61	15	-	-	0.11	-
53.32	35.2	13.3	-	2.0	-0.4	6.3	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	6.8	67	15	-	-	0.11	-
53.48	34.6	13.0	-	1.8	-0.4	5.7	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	6.6	66	15	-	-	0.11	-
53.64	32.1	12.1	-	1.6	-0.4	5.5	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.2	6.1	67	15	-	-	0.11	-
53.81	28.9	10.9	-	1.3	-0.4	5.2	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	69	15	-	-	0.11	-
53.97	29.9	11.3	-	1.2	-0.4	4.6	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	5.6	66	15	-	-	0.11	-
54.14	30.7	11.6	-	1.2	-0.4	4.3	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.1	5.8	63	15	-	-	0.11	-
54.30	26.1	9.8	-	1.1	-0.4	5.0	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.8	71	15	-	-	0.11	-
54.46	24.4	9.2	-	1.1	-0.4	5.0	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.4	73	15	-	-	0.11	-
54.63	30.2	11.4	-	1.2	-0.4	4.3	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	5.6	64	15	-	-	0.11	-
54.79	28.3	10.7	-	1.2	-0.4	4.8	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.2	68	15	-	-	0.11	-
54.96	27.7	10.5	-	1.0	-0.3	4.2	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.1	66	15	-	-	0.11	-
55.12	25.0	9.4	-	0.9	-0.4	3.9	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	4.5	68	15	-	-	0.11	-
55.28	24.2	9.1	-	0.8	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.3	69	15	-	-	0.11	-
55.45	26.7	10.1	-	0.9	-0.3	3.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.8	65	15	-	-	0.11	-
55.61	26.2	9.9	-	0.9	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.7	67	15	-	-	0.11	-
55.78	22.9	8.6	-	0.9	-0.3	4.8	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	4.0	75	15	-	-	0.11	-
55.94	20.7	7.8	-	0.9	-0.3	5.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.5	79	15	-	-	0.11	-
56.11	20.2	7.6	-	0.7	-0.3	4.4	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.4	77	15	-	-	0.11	-
56.27	20.9	7.9	-	0.7	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.6	74	15	-	-	0.11	-
56.43	20.8	7.9	-	0.7	-0.3	3.9	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.5	74	15	-	-	0.11	-
56.60	21.3	8.0	-	0.7	-0.3	3.8	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.6	73	15	-	-	0.11	-
56.76	19.8	7.5	-	0.7	-0.3	4.4	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.3	78	15	-	-	0.11	-
56.93	17.8	6.7	-	0.7	-0.3	4.5	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.9	82	15	-	-	0.11	-
57.09	16.8	6.3	-	0.6	-0.3	4.5	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.7	84	15	-	-	0.11	-
57.25	15.9	6.0	-	0.5	-0.3	4.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.5	85	15	-	-	0.11	-
57.42	16.9	6.4	-	0.5	-0.3	3.8	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.7	81	15	-	-	0.11	-
57.58	17.7	6.7	-	0.6	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.8	80	15	-	-	0.11	-
57.75	19.2	7.3	-	0.6	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.1	77	15	-	-	0.11	-
57.91	18.9	7.1	-	0.7	-0.3	4.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.0	79	15	-	-	0.11	-
58.07	18.0	6.8	-	0.7	-0.3	4.6	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.9	82	15	-	-	0.11	-
58.24	16.8	6.4	-	0.6	-0.3	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.6	84	15	-	-	0.11	-
58.40	16.1	6.1	-	0.6	-0.2	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.5	86	15	-	-	0.11	-
58.57	16.2	6.1	-	0.6	-0.2	4.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.5	85	15	-	-	0.11	-
58.73	17.2	6.5	-	0.6	-0.2	4.2	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.7	82	15	-	-	0.11	-
58.89	18.5	7.0	-	0.6	-0.2	3.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.9	78	15	-	-	0.11	-
59.06	18.8	7.1	-	0.5	-0.2	3.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.0	75	15	-	-	0.11	-
59.22	18.4	6.9	-	0.6	-0.2	3.7	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.9	77	15	-	-	0.11	-
59.39	18.0	6.8	-	0.6	-0.2	3.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	2.8	79	15	-	-	0.11	-
59.55	16.7	6.3	-	0.6	-0.2	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.5	85	15	-	-	0.11	-
59.71	16.9	6.4	-	0.6	-0.2	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.6	84	15	-	-	0.11	-
59.88	17.4	6.6	-	0.6	-0.2	4.6	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.6	84	15	-	-	0.11	-
60.04	16.8	6.3	-	0.6	-0.2	4.9	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.5	87	15	-	-	0.11	-
60.21	15.9	6.0	-	0.5	-0.2	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.3	87	15	-	-	0.11	-
60.37	16.3	6.2	-	0.5	-0.1	3.6	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.4	82	15	-	-	0.11	-
60.53	16.1	6.1	-	0.5	-0.1	3.7	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.4	83	15	-	-	0.11	-
60.70	15.7	5.9	-	0.5	-0.1	3.8	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.3	84	15	-	-	0.11	-
60.86	15.3	5.8	-	0.4	-0.1	3.8	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.2	85	15	-	-	0.11	-
61.03	15.7	5.9	-	0.5	-0.1	3.8	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.3	84	15	-	-	0.11	-
61.19	16.6	6.3	-	0.5	-0.1	3.6	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.4	81	15	-	-	0.11	-
61.35	16.4	6.2	-	0.5	-0.1	3.9	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.4	83	15	-	-	0.11	-
61.52	17.8	6.7	-	0.7	-0.1	5.0	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.6	85	15	-	-	0.11	-
61.68	21.2	8.0	-	0.7	-0.1	4.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.3	75	15	-	-	0.11	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
61.85	20.3	7.7	-	0.7	-0.1	4.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.1	76	15	-	-	0.11	-
62.01	24.4	9.2	-	0.9	-0.1	4.5	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	3.8	72	15	-	-	0.11	-
62.17	31.1	11.7	-	0.9	-0.2	3.3	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	5.1	59	15	-	-	0.11	-
62.34	19.1	7.2	-	0.7	-0.2	4.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	2.8	79	15	-	-	0.11	-
62.50	15.6	5.9	-	0.5	-0.1	3.9	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.2	85	15	-	-	0.11	-
62.67	15.8	6.0	-	0.4	-0.1	3.0	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.2	80	15	-	-	0.11	-
62.83	15.2	5.7	-	0.4	-0.1	3.9	3	silty CLAY to CLAY	115	1.5	10	4	-	-	0.9	2.1	86	15	-	-	0.11	-
63.00	16.8	6.3	-	0.7	-0.1	5.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.4	88	15	-	-	0.11	-
63.16	25.7	9.7	-	0.9	-0.1	4.1	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	4.0	69	15	-	-	0.11	-
63.32	33.4	12.6	-	1.4	-0.1	4.7	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	5.4	63	15	-	-	0.11	-
63.49	33.8	12.7	-	1.5	-0.2	4.9	3	silty CLAY to CLAY	115	1.5	23	8	-	-	2.3	5.4	64	15	-	-	0.11	-
63.65	49.5	18.7	-	1.5	-0.7	3.2	3	silty CLAY to CLAY	115	1.5	33	12	-	-	3.4	8.3	47	15	-	-	0.11	-
63.82	30.1	11.4	-	1.3	-2.7	4.8	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.8	67	15	-	-	0.11	-
63.98	39.3	14.8	-	1.3	-2.6	3.6	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	6.4	54	15	-	-	0.11	-
64.14	77.5	39.5	92.8	1.4	-3.0	1.8	5	silty SAND to sandy SILT	120	4.0	19	10	36	36	-	-	27	16	2.48	-	0.11	51.2
64.31	89.6	45.6	77.9	0.9	-3.9	1.1	5	silty SAND to sandy SILT	120	4.0	22	11	41	36	-	-	20	16	2.87	-	0.11	49.3
64.47	79.1	40.3	71.5	0.7	-4.6	1.0	5	silty SAND to sandy SILT	120	4.0	20	10	37	36	-	-	20	16	3.08	-	0.10	51.2
64.64	60.3	22.7	-	1.3	-4.6	2.3	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.1	9.9	39	15	-	-	0.10	-
64.80	43.2	16.3	-	1.6	-4.6	3.9	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	7.0	54	15	-	-	0.10	-
64.96	37.9	14.3	-	1.4	-4.5	4.1	3	silty CLAY to CLAY	115	1.5	25	10	-	-	2.6	6.0	58	15	-	-	0.10	-
65.13	63.6	32.3	84.5	1.0	-4.6	1.8	5	silty SAND to sandy SILT	120	4.0	16	8	30	34	-	-	29	16	2.68	-	0.10	51.2
65.29	60.3	34.7	83.0	1.0	-4.8	1.6	5	silty SAND to sandy SILT	120	4.0	17	9	32	35	-	-	27	16	2.72	-	0.09	51.2
65.46	49.8	18.8	-	1.3	-4.6	2.8	4	clayy SILT to silty CLAY	115	2.0	25	9	-	-	3.4	8.1	45	15	-	-	0.09	-
65.62	29.9	11.3	-	1.5	-4.6	5.8	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.6	71	15	-	-	0.09	-
65.78	37.9	14.3	-	1.3	-4.5	3.7	3	silty CLAY to CLAY	115	1.5	25	10	-	-	2.5	5.9	56	15	-	-	0.09	-
65.95	63.9	32.4	85.4	1.1	-4.6	1.8	5	silty SAND to sandy SILT	120	4.0	16	8	30	34	-	-	29	16	2.66	-	0.09	51.2
66.11	71.1	36.0	83.0	1.0	-4.6	1.6	5	silty SAND to sandy SILT	120	4.0	18	9	33	35	-	-	26	16	2.72	-	0.08	51.2
66.28	52.7	19.9	-	1.3	-4.5	2.7	4	clayy SILT to silty CLAY	115	2.0	26	10	-	-	3.6	8.5	43	15	-	-	0.08	-
66.44	28.8	10.9	-	1.0	-4.4	4.2	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	4.3	66	15	-	-	0.08	-
66.60	25.9	9.8	-	1.4	-4.4	6.3	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	3.8	77	15	-	-	0.08	-
66.77	23.0	8.7	-	1.1	-4.4	6.0	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.3	80	15	-	-	0.08	-
66.93	28.9	10.9	-	0.9	-4.3	3.7	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	4.3	63	15	-	-	0.08	-
67.10	18.3	6.9	-	0.8	-4.3	5.8	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.5	88	15	-	-	0.08	-
67.26	15.9	6.0	-	0.5	-4.3	3.7	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.1	84	15	-	-	0.08	-
67.42	17.3	6.5	-	0.4	-4.3	3.3	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.3	78	15	-	-	0.08	-
67.59	18.5	7.0	-	0.5	-4.3	3.5	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.5	77	15	-	-	0.08	-
67.75	21.9	8.3	-	0.8	-4.3	4.7	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.0	77	15	-	-	0.08	-
67.92	34.1	12.8	-	1.2	-4.3	3.9	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	5.1	60	15	-	-	0.08	-
68.08	30.8	11.6	-	1.3	-4.3	4.7	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.0	4.5	66	15	-	-	0.08	-
68.24	21.3	8.0	-	1.2	-4.3	7.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	2.9	86	15	-	-	0.08	-
68.41	25.4	9.6	-	1.1	-4.2	5.1	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	3.6	74	15	-	-	0.08	-
68.57	24.8	9.4	-	0.9	-4.3	4.4	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.6	3.5	71	15	-	-	0.08	-
68.74	16.3	6.2	-	0.9	-4.2	7.1	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.1	95	15	-	-	0.08	-
68.90	17.2	6.5	-	0.7	-4.2	5.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.2	89	15	-	-	0.08	-
69.07	19.0	7.2	-	0.5	-4.2	3.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	2.5	75	15	-	-	0.08	-
69.23	17.4	6.5	-	0.4	-4.2	2.9	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.2	76	15	-	-	0.08	-
69.39	15.8	6.0	-	0.3	-4.2	2.8	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.0	79	15	-	-	0.08	-
69.56	15.6	5.9	-	0.4	-4.2	3.3	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	1.9	83	15	-	-	0.08	-
69.72	16.6	6.3	-	0.4	-4.2	3.1	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.1	79	15	-	-	0.08	-
69.89	20.6	7.8	-	0.8	-4.2	4.6	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	2.7	79	15	-	-	0.08	-
70.05	22.0	8.3	-	1.0	-4.1	5.7	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.0	81	15	-	-	0.08	-
70.21	30.0	11.3	-	1.5	-4.1	5.7	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.3	71	15	-	-	0.08	-
70.38	38.7	14.6	-	1.7	-4.2	4.9	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	5.7	61	15	-	-	0.08	-
70.54	59.6	22.5	-	2.4	-4.2	4.3	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.1	9.1	48	15	-	-	0.08	-
70.71	48.8	18.4	-	1.8	-4.1	4.1	3	silty CLAY to CLAY	115	1.5	33	12	-	-	3.3	7.3	52	15	-	-	0.08	-
70.87	30.1	11.4	-	1.8	-4.1	7.0	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.2	75	15	-	-	0.08	-
71.03	42.4	16.0	-	2.0	-4.1	5.2	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	6.2	60	15	-	-	0.08	-
71.20	48.6	18.3	-	2.3	-4.1	5.2	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	7.2	56	15	-	-	0.08	-
71.36	80.8	30.5	-	2.6	-4.1	3.4	4	clayy SILT to silty CLAY	115	2.0	40	15	-	-	5.6	9.9	39	15	-	-	0.08	-
71.53	94.7	35.7	-	3.1	-4.2	3.4	4	clayy SILT to silty CLAY	115	2.0	47	18	-	-	6.5	9.9	36	15	-	-	0.08	-
71.69	67.4	25.4	-	3.0	-4.2	4.8	3	silty CLAY to CLAY	115	1.5	45	17	-	-	4.6	9.9	47	15	-	-	0.08	-
71.85	83.5	31.5	-	3.0	-4.1	3.7	4	clayy SILT to silty CLAY	115	2.0	42	16	-	-	5.8	9.9	39	15	-	-	0.08	-
72.02	72.3	27.3	-	2.4	-4.3	3.5	4	clayy SILT to silty CLAY	115	2.0	36	14	-	-	5.0	9.9	41	15	-	-	0.08	-
72.18	37.1	14.0	-	1.4	-5.0	4.2	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	5.3	59	15	-	-	0.08	-
72.35	38.3	14.4	-	1.3	-4.9	3.8	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	5.5	56	15	-	-	0.08	-
72.51	84.3	41.7	103.4	1.8	-5.2	2.2	5	silty SAND to sandy SILT	120	4.0	21	10	38	35	-	-	28	16	2.27	-	0.08	51.2
72.67	78.6	29.7	-	2.4	-5.6	3.2	4	clayy SILT to silty CLAY	115	2.0	39	15	-	-	5.4	9.9	38	15	-	-	0.08	-
72.84	58.1	21.9	-	3.3	-5.6	6.2	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	8.6	55	15	-	-	0.08	-
73.00	47.1	17.8	-	2.6	-5.6	6.1	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	6.8	60	15	-	-	0.08	-
73.17	41.0	15.5	-	2.7	-5.6	7.4	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	5.8	67	15	-	-	0.08	-
73.33	59.2	22.3	-	2.0	-5.6	3.6	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	8.7	46	15	-	-	0.08	-
73.49	80.5	39.7	111.3	2.0	-5.7	2.6	4	clayy SILT to silty CLAY	115	2.0	40	20	-	-	5.5	9.9	31	15	2.14	-	0.08	51.2
73.66	69.1	26.1	-	1.7	-6.5	2.6	4	clayy SILT to silty CLAY	115	2.0	35	13	-	-	4.7	9.9	38	15	-	-	0.07	-
73.82	44.4	16.7	-	2.0	-6.5	4.9	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.0	6.3	57	15	-	-	0.07	-
73.99	43.4	16.4	-	1.9	-6.5	4.9	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	6.1	58	15	-	-	0.07	-
74.15	67.2	25.3	-	2.2	-6.6	3.4	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.6	9.8	42	15	-	-	0.07	-
74.31	49.9	18.8	-	2.0	-6.9	4.3	3	silty CLAY to CLAY	115	1.5	33	13	-	-	3.4	7.1	52	15	-	-	0.07	-
74.48	64.0	24.1	-	1.6	-6.9	2.6	4	clayy SILT to silty CLAY	115	2.0	32	12	-	-	4.4	9.3	39	15	-	-	0.07	-
74.64	71.6	35.2	94.0	1.4	-7.3	2.0	5	silty SAND to sandy SILT	120	4.0	18	9	33	34	-	-	30	16	2.46	-	0.07	51.2
74.81	54.4	20.5	-	1.4	-7.8	2.8	4	clayy SILT to silty CLAY	115	2.0	27	10	-	-	3.7	7.8	43	15	-	-	0.07	-
74.97	34.2	12.9	-	1.7	-7.7	5.6	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	4.6	67	15	-	-	0.07	-
75.13	29.5	11.1	-	1.2	-7.7	5.0	3	silty CLAY to CLAY	115	1.5	20	7	-	-	1.9	3.9	69	15	-	-	0.07	-
75.30	23.4	8.8	-	1.3	-7.6	6.8	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.5	2.9	83	15	-	-	0.07	-
75.46	38.7	14.6	-	1.4	-7.7	4.1	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	5.3	57	15	-	-	0.07	-
75.63	33.4	12.6	-	1.5	-7.6	5.0	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	4.5	65	15	-	-	0.07	-
75.79	31.4	11.8	-	1.6	-7.6	6.0	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	4.1	71	15	-	-	0.07	-
75.96	34.6	13.0	-	1.9	-7.7	6.4	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	4.6	69	15	-	-	0.07	-
76.12	39.4	14.9	-	1.5	-7.7	4.3	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	5.3	58	15	-	-	0.07	-
76.28	37.1	14.0	-	1.4	-7.7	4.3	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	5.0	60	15	-	-	0.07	-
76.45	41.4	15.6	-	1.7	-7.6	4.5	3	silty CLAY to CLAY	115	1.5	28	10	-	-	2.8	5.6	57	15	-	-	0.07	-
76.61	48.9	18.5	-	2.0	-7.6	4.4	3	silty CLAY to CLAY	115	1.5	33	12	-	-	3.3	6.8	53	15	-	-	0.07	-
76.78	52.6	19.9	-	2.1	-7.6	4.3	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	7.3	51	15	-	-	0.07	-
76.94	51.4	19.4	-	1.8	-7.6	3.9	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	7.1	50	15	-	-	0.07	-
77.10	44.9	16.9	-	1.8	-7.6	4.5	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.0	6.1	55	15	-	-	0.07	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
77.27	53.5	20.2	-	1.7	-7.6	3.6	3	silty CLAY to CLAY	115	1.5	36	13	-	-	3.6	7.4	48	15	-	-	0.07	-
77.43	65.8	24.8	-	1.7	-7.6	2.8	4	clayy SILT to silty CLAY	115	2.0	33	12	-	-	4.5	9.2	40	15	-	-	0.07	-
77.60	73.0	27.6	-	2.1	-7.6	3.0	4	clayy SILT to silty CLAY	115	2.0	37	14	-	-	5.0	9.9	39	15	-	-	0.07	-
77.76	93.0	45.2	121.7	2.5	-7.6	2.8	4	clayy SILT to silty CLAY	115	2.0	47	23	-	-	6.4	9.9	30	15	1.94	-	0.07	49.8
77.92	102.5	49.8	131.6	3.0	-7.5	3.1	4	clayy SILT to silty CLAY	115	2.0	51	25	-	-	7.1	9.9	30	15	1.56	-	0.07	42.8
78.09	105.9	51.4	135.2	3.2	-7.5	3.1	4	clayy SILT to silty CLAY	115	2.0	53	26	-	-	7.3	9.9	29	15	1.38	-	0.06	36.2
78.25	112.2	54.5	135.6	3.3	-7.5	3.0	4	clayy SILT to silty CLAY	115	2.0	56	27	-	-	7.8	9.9	28	15	1.39	-	0.06	31.1
78.42	115.9	56.3	136.9	3.3	-7.5	3.0	4	clayy SILT to silty CLAY	115	2.0	58	28	-	-	8.0	9.9	28	15	1.33	-	0.06	26.3
78.58	116.9	56.7	140.7	3.5	-7.5	3.1	4	clayy SILT to silty CLAY	115	2.0	58	28	-	-	8.1	9.9	28	15	1.14	-	0.06	20.2
78.74	119.5	57.9	143.8	3.7	-7.4	3.2	4	clayy SILT to silty CLAY	115	2.0	60	29	-	-	8.3	9.9	28	15	1.00	-	0.05	14.3
78.91	122.9	59.6	147.0	3.9	-7.4	3.3	4	clayy SILT to silty CLAY	115	2.0	61	30	-	-	8.5	9.9	28	15	0.85	-	0.05	8.1
79.07	125.5	60.7	149.2	4.0	-7.4	3.3	4	clayy SILT to silty CLAY	115	2.0	63	30	-	-	8.7	9.9	28	15	0.76	-	0.05	6.1
79.24	129.3	62.6	150.5	4.1	-7.4	3.3	4	clayy SILT to silty CLAY	115	2.0	65	31	-	-	9.0	9.9	27	15	0.72	-	0.05	5.5
79.40	133.7	64.7	160.2	4.6	-7.4	3.6	4	clayy SILT to silty CLAY	115	2.0	67	32	-	-	9.3	9.9	28	15	0.00	-	0.05	0.0
79.56	135.5	65.5	157.1	4.5	-7.3	3.4	4	clayy SILT to silty CLAY	115	2.0	68	33	-	-	9.4	9.9	27	15	0.50	-	0.05	3.0
79.73	137.2	66.3	154.0	4.3	-7.3	3.3	4	clayy SILT to silty CLAY	115	2.0	69	33	-	-	9.5	9.9	27	15	0.60	-	0.05	4.1
79.89	134.9	65.2	149.7	4.1	-7.3	3.1	4	clayy SILT to silty CLAY	115	2.0	67	33	-	-	9.4	9.9	26	15	0.77	-	0.05	6.0
80.06	134.5	64.9	146.8	4.0	-7.3	3.0	4	clayy SILT to silty CLAY	115	2.0	67	32	-	-	9.3	9.9	26	15	0.90	-	0.05	7.9
80.22	133.0	64.2	146.1	3.9	-7.2	3.0	4	clayy SILT to silty CLAY	115	2.0	67	32	-	-	9.2	9.9	26	15	0.93	-	0.04	8.4
80.38	136.3	65.7	147.0	4.0	-7.2	3.0	5	silty SAND to sandy SILT	120	4.0	34	16	53	38	-	-	26	16	0.90	-	0.04	7.7
80.55	139.3	67.1	148.8	4.1	-7.2	3.0	5	silty SAND to sandy SILT	120	4.0	35	17	54	38	-	-	25	16	0.83	-	0.04	6.6
80.71	139.1	67.0	147.1	4.0	-7.2	3.0	5	silty SAND to sandy SILT	120	4.0	35	17	54	38	-	-	25	16	0.90	-	0.04	7.6
80.88	140.9	67.8	149.1	4.1	-7.2	3.0	5	silty SAND to sandy SILT	120	4.0	35	17	54	38	-	-	25	16	0.82	-	0.04	6.3
81.04	142.6	68.6	152.1	4.3	-7.2	3.1	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.69	-	0.04	4.9
81.20	143.5	69.0	152.8	4.3	-7.2	3.1	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.66	-	0.04	4.6
81.37	143.2	68.8	151.3	4.2	-7.2	3.1	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.72	-	0.04	5.2
81.53	143.9	69.1	150.5	4.2	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.76	-	0.03	5.6
81.70	144.0	69.1	149.8	4.2	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.79	-	0.03	5.9
81.86	146.4	70.2	150.9	4.2	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	37	18	55	38	-	-	25	16	0.75	-	0.03	5.4
82.02	146.0	70.0	151.9	4.3	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.70	-	0.03	4.9
82.19	152.3	73.0	157.3	4.6	-7.1	3.1	5	silty SAND to sandy SILT	120	4.0	38	18	57	38	-	-	25	16	0.52	-	0.03	3.2
82.35	152.7	73.1	155.9	4.5	-7.1	3.1	5	silty SAND to sandy SILT	120	4.0	38	18	57	38	-	-	25	16	0.56	-	0.03	3.6
82.52	148.6	71.1	156.1	4.5	-7.1	3.2	5	silty SAND to sandy SILT	120	4.0	37	18	56	38	-	-	25	16	0.55	-	0.03	3.4
82.68	148.3	70.9	157.1	4.6	-7.1	3.2	4	clayy SILT to silty CLAY	115	2.0	74	35	-	-	10.3	9.9	25	15	0.52	-	0.03	3.2
82.85	144.4	69.0	150.3	4.2	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.76	-	0.03	5.6
83.01	147.7	70.6	143.6	3.9	-7.0	2.7	5	silty SAND to sandy SILT	120	4.0	37	18	55	38	-	-	23	16	1.09	-	0.02	10.1
83.17	140.8	67.2	137.9	3.6	-7.0	2.6	5	silty SAND to sandy SILT	120	4.0	35	17	54	38	-	-	24	16	1.35	-	0.02	17.6
83.34	131.8	62.9	134.4	3.4	-6.9	2.6	5	silty SAND to sandy SILT	120	4.0	33	16	52	37	-	-	25	16	1.49	-	0.02	25.9
83.50	118.2	56.4	116.0	2.5	-6.9	2.2	5	silty SAND to sandy SILT	120	4.0	30	14	48	37	-	-	24	16	2.07	-	0.02	37.4
83.67	134.8	64.2	125.6	2.9	-6.9	2.3	5	silty SAND to sandy SILT	120	4.0	34	16	52	37	-	-	23	16	1.88	-	0.01	31.4
83.83	148.9	70.9	130.3	3.2	-6.4	2.2	5	silty SAND to sandy SILT	120	4.0	37	18	56	38	-	-	21	16	1.74	-	0.01	26.3
83.99	160.1	76.2	138.8	3.7	-6.4	2.4	5	silty SAND to sandy SILT	120	4.0	40	19	58	38	-	-	21	16	1.36	-	0.01	14.0
84.16	158.0	75.2	140.7	3.8	-6.4	2.5	5	silty SAND to sandy SILT	120	4.0	40	19	58	38	-	-	22	16	1.26	-	0.01	12.2
84.32	154.9	73.7	131.7	3.3	-6.4	2.2	5	silty SAND to sandy SILT	120	4.0	39	18	57	38	-	-	21	16	1.69	-	0.00	23.6
84.49	137.6	65.4	148.1	4.1	-6.4	3.1	4	clayy SILT to silty CLAY	115	2.0	69	33	-	-	9.6	9.9	26	15	0.82	-	0.00	6.5
84.65	141.7	67.3	186.3	6.1	-6.4	4.5	4	clayy SILT to silty CLAY	115	2.0	71	34	-	-	9.8	9.9	31	15	0.00	-	0.00	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

APPENDIX B

LABORATORY TEST RESULTS

TABLE B-1 SUMMARY OF SOIL LABORATORY TEST RESULTS

Project No.: *11-135* **Project Name:** Parsons/I-5 HOV Widening Segment 1

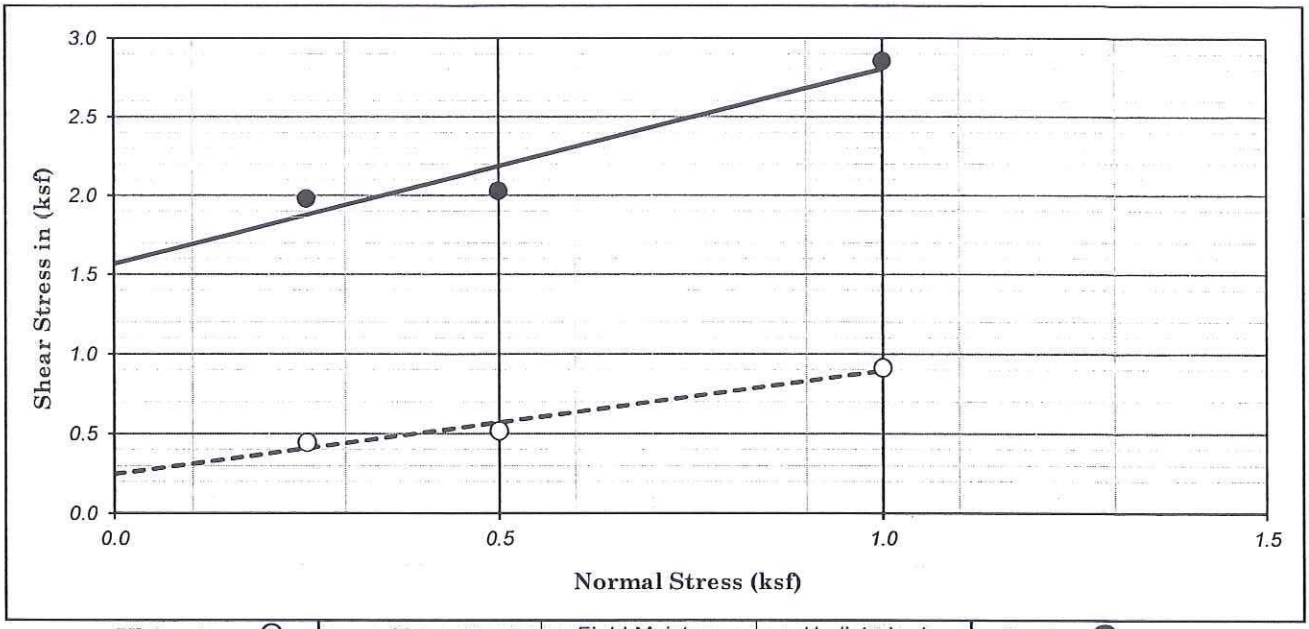
Boring No.	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-101	*S-1*	5	MH	26.1				0:6:94		68/33/35				
A-11-101	*D-2*	10	MH	19.3	125.4	>4.5								
A-11-101	*S-3*	15	MH	24.9										
A-11-101	*D-4*	20	MH	26.6	122.7	>4.5								
A-11-101	*S-5*	25	MH	24.9										
A-11-101	*D-6*	30	MH	21.9	125.6	>4.5								
A-11-104	*S-1*	5	CL	13.0							270	7.1	1620	2047
A-11-104	*D-2*	10	CL	12.3	122.9	>4.5								
A-11-104	*S-3*	15	CL	12.3										
A-11-104	*D-4*	20	CL	12.4	121.2			1:40:59		41/20/21				
A-11-104	*S-5*	25	CL	21.5										
A-11-104	*D-6*	30	CL	24.7	123.3	3.0								
A-11-104	*S-7*	35	CL	20.9										
A-11-106	*Bulk*	0-5	CL							39/15/24				
A-11-108	*D-1*	5	CL	15.7	120.8	>4.5		3:18:79						
A-11-108	*S-2*	10	SC-SM	16.0										
A-11-108	*D-3*	15	CH	19.1	127.3			0:23:77		52/22/30				
A-11-108	*S-4*	20	CL	17.2										
A-11-108	*D-5*	25	CH	26.6	119.8	>4.5								
A-11-108	*S-6*	30	CH	29.4										
A-11-109	*Bulk*	0-5	CL							40/15/25				
A-11-109	*S-1*	2.5	CL	21.1										
A-11-109	*D-2*	5	CL	17.8	117.2	>4.5		2:15:83						
A-11-109	*S-3*	10	CL to ML	14.0				1:36:63						
A-11-109	*D-4*	15	ML	8.6	120.2	>4.5								
A-11-109	*S-5*	20	CL	17.8										
A-11-109	*D-6*	25	CL	17.2	125.4	>4.5								
A-11-109	*S-7*	30	CL	16.6										
A-11-109	*D-8*	40	CL	13.1	119.9	>4.5								
A-11-109	*S-9*	45	CH	17.8										
A-11-109	*D-10*	50	CH	18.4	128.6	>4.5								
A-11-109	*S-11*	55	CL	27.1										
A-11-109	*D-12*	60	CL	28.3	118.4	>4.5								
A-11-109	*S-13*	65	CL	25.7										
A-11-109	*D-14*	70	MH	21.5	125.5	>4.5								
A-11-113	*S-1*	5	SC	10.1				5:50:45						
A-11-113	*D-2*	10	CL	24.7	124.2	2.75								
A-11-113	*S-3*	15	CL	26.0										
A-11-113	*D-4*	20	CL	25.8	114.4	2.25								
A-11-113	*S-5*	25	CL	27.3										
A-11-113	*D-6*	30	CH	17.5	128.8	>4.5								
A-11-113	*S-7*	35	CL	14.0										
A-11-113	*D-8*	40	CL	10.5	105.1									
A-11-113	*S-9*	45	SM	8.2				0:51:49						
A-11-113	*D-10*	50	SM	9.3	111.9									

Project No.: *11-135* Project Name: Parsons/I-5 HOV Widening Segment 1

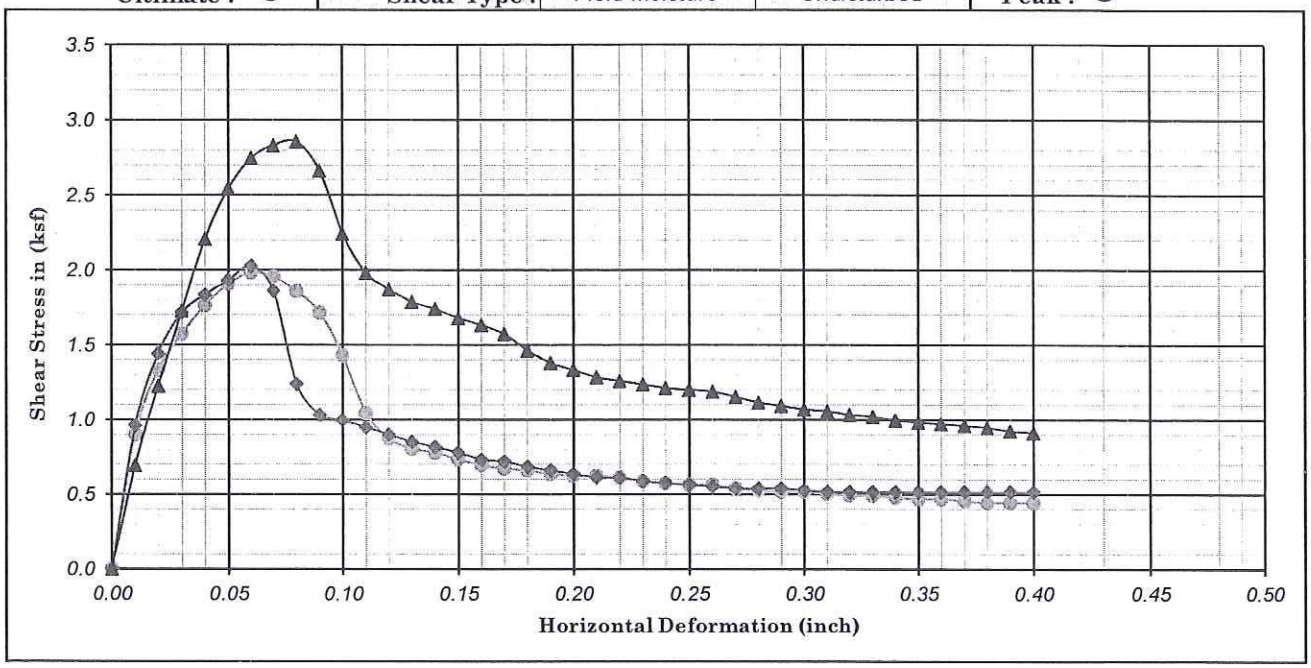
Boring No.	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-114	*D-1*	5	CL	11.4	132.9	>4.5								
A-11-114	*S-2*	10	CL	18.8										
A-11-114	*D-3*	15	CH	23.3	123.5	4.0				52/19/33				
A-11-114	*S-4*	20	CL	23.6										
A-11-114	*D-5*	25	CL	23.0	116.6	1.5								
A-11-114	*S-6*	30	CL	18.0										
A-11-114	*D-7*	35	CL	7.6	103.0	>4.5		0:36:64		35/20/15				
A-11-114	*S-8*	40	ML	8.1										
A-11-114	*D-9*	45	SM	6.0	105.1									
A-11-114	*S-10*	50	ML	9.9				0:35:65						
A-11-114	*D-11*	55	ML	9.8	111.0			0:46:54						
A-11-114	*S-12*	60	CL	40.5										
A-11-114	*D-13*	65	CL	30.9	115.0	1.25								
A-11-114	*S-14*	70	CL	25.7										
A-11-114	*D-15*	75	SC to CL	27.6	121.3	1.25								
A-11-114	*S-16*	80	SC to CL	26.1										
A-11-114	*D-17*	85	MH	19.7	127.8	>4.5								
A-11-114	*S-18*	90	MH	25.4										
A-11-114	*D-19*	95	MH	16.1	127.0	>4.5								
A-11-114	*S-20*	100	MH	24.4										
A-11-115	*Bulk*	0-5	CL							29/13/16				
A-11-115	*S-1*	5	SC	9.4				5:58:37			410	7.2	560	1281
A-11-115	*D-2*	10	SC to CL	17.6	129.1	>4.5		2:24:74						
A-11-115	*S-3*	15	MH	24.7										
A-11-115	*D-4*	20	CH	15.9	122.3	4.0								
A-11-115	*S-5*	25	ML	5.3				0:49:51						
A-11-115	*D-6*	30	ML	5.4	100.8			0:48:52						
A-11-115	*S-7*	35	SM	6.6				1:58:41						
A-11-115	*D-8*	40	CL	12.1	128.3	>4.5								
A-11-115	*S-9*	45	CL	15.3										
A-11-115	*D-10*	50	CL	16.3	127.5	>4.5				48/19/29				
A-11-115	*S-11*	55	CH	30.4										
A-11-115	*D-12*	60	CL	29.8	121.6	1.0								
A-11-115	*S-13*	65	SM	25.2										
A-11-115	*D-14*	70	CL	28.6	122.7	0.75								
A-11-115	*S-15*	75	MH	25.0										
A-11-115	*D-16*	80	MH	17.3	127.0	>4.5								
A-11-115	*S-17*	85	MH	22.7										
A-11-115	*D-18*	90	MH	21.5	125.0	>4.5								
A-11-115	*S-19*	95	MH	22.8										
A-11-115	*D-20*	100	MH	23.7	128.7	>4.5								
A-11-117	*D-1*	5	SC to CL	14.3	126.6	>4.5								
A-11-117	*S-2*	10	CL	10.5										
A-11-117	*D-3*	15	CL	18.1	110.5	>4.5								
A-11-117	*S-4*	20	CL	19.9										
A-11-117	*D-5*	25	CL	17.4	110.4	>4.5								

Project No.: *11-135* Project Name: Parsons/I-5 HOV Widening Segment 1

Boring No.	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-117	*S-6*	30	CL	23.4										
A-11-117	*D-7*	35	CH	29.5	120.2	>4.5					170	5.6	5060	1950
A-11-117	*S-8*	40	CH	37.4										
A-11-117	*D-9*	45	CH	30.4	118.2	>4.5								
A-11-117	*S-10*	50	CH	24.6										
A-11-117	*D-11*	55	MH	22.8	126.0	>4.5								
A-11-117	*S-12*	60	MH	24.7										
A-11-117	*D-13*	65	MH	21.7	125.0	>4.5								
A-11-117	*S-14*	70	MH	23.0										
A-11-117	*D-15*	75	MH	20.9	121.8	>4.5								
A-11-117	*S-16*	80	MH	20.6										
A-11-117	*D-17*	85	MH	18.8	126.8	>4.5								
A-11-117	*S-18*	90	MH	20.0										
A-11-117	*D-19*	95	MH	19.5	121.3	>4.5								
A-11-117	*S-20*	100	MH	19.9										
A-11-128	*Bulk*	0-5	CH							57/18/39				
A-11-130	*S-1*	5	SM	6.9				15:70:15						
A-11-130	*D-2*	10	SP-SM	4.6	113.9									
A-11-130	*S-3*	15	CH	22.2										
A-11-130	*D-4*	20	CH	23.8	117.6	>4.5								
A-11-130	*S-5*	25	CH	19.0										
A-11-130	*D-6*	30	CH	19.1	125.5	>4.5								
A-11-130	*S-7*	35	CH	22.2										
A-11-130	*D-8*	40	CH	24.5	119.8	4.5								
A-11-130	*S-9*	45	CH	23.0										
A-11-130	*D-10*	50	MH	23.2	123.8	>4.5								
A-11-130	*S-11*	55	MH	21.8										
A-11-130	*D-12*	60	MH	20.4	127.5	>4.5								
A-11-130	*S-13*	65	MH	20.3										
A-11-130	*D-14*	70	MH	21.3	122.0	>4.5								
A-11-134	*S-3*	15	MH	25.3										
A-11-134	*D-4*	20	MH	19.7	122.8	>4.5								
A-11-134	*S-5*	25	MH	27.7										
A-11-134	*D-6*	30	MH	13.6	121.3	>4.5								



Ultimate : ○	Shear Type :	Field Moisture	Undisturbed	Peak : ●



Boring No. : A-11-108		Strength Intercept (C) :	1.57	(ksf)	Peak	0.25	(ksf)	Ultimate
Sample No. : D-1			74.98	(kPa)		11.78	(kPa)	
Depth (ft/m) : 2.5	0.00	Friction Angle (ϕ) :	51.06	Degree		32.94	Degree	
Description : Olive-brown, Lean CLAY with SAND (CL)					Shear Rate (inch/minute) :			0.02

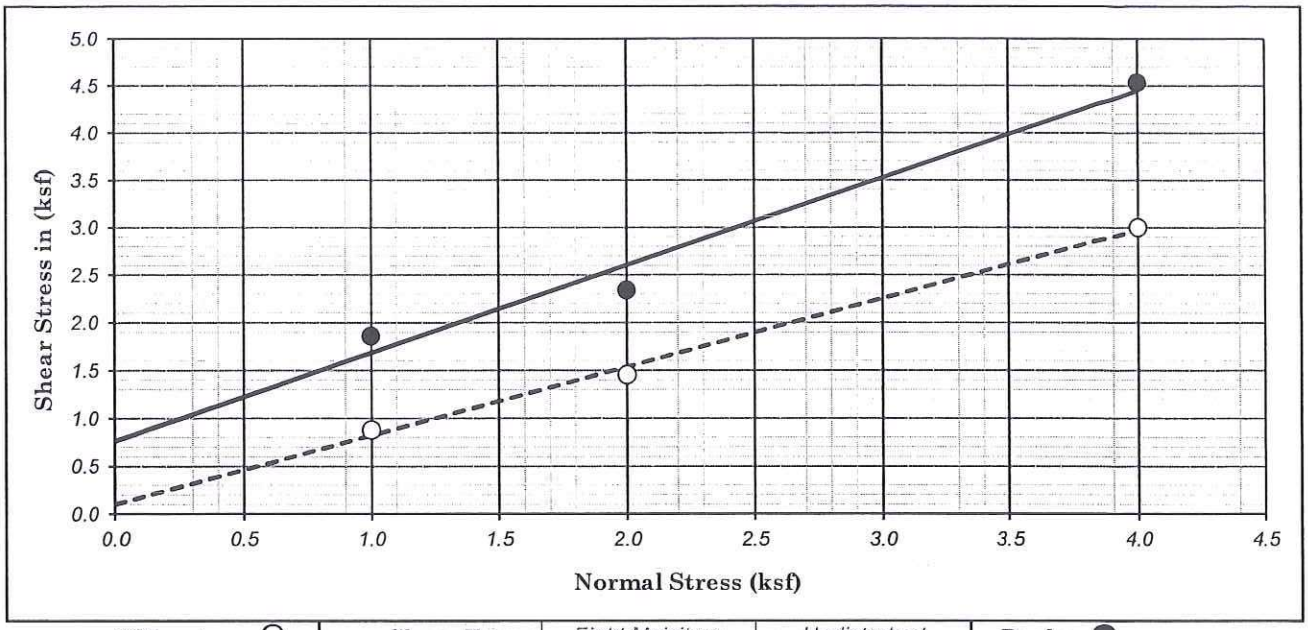
SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	18.71	100.62	15.84	0.68	0.25	11.97	1.98	94.80	0.44	21.26
◆	15.00	108.44	17.07	0.55	0.50	23.94	2.03	97.10	0.52	24.71
▲	16.77	105.37	16.59	0.60	1.00	47.88	2.86	136.75	0.91	43.67

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

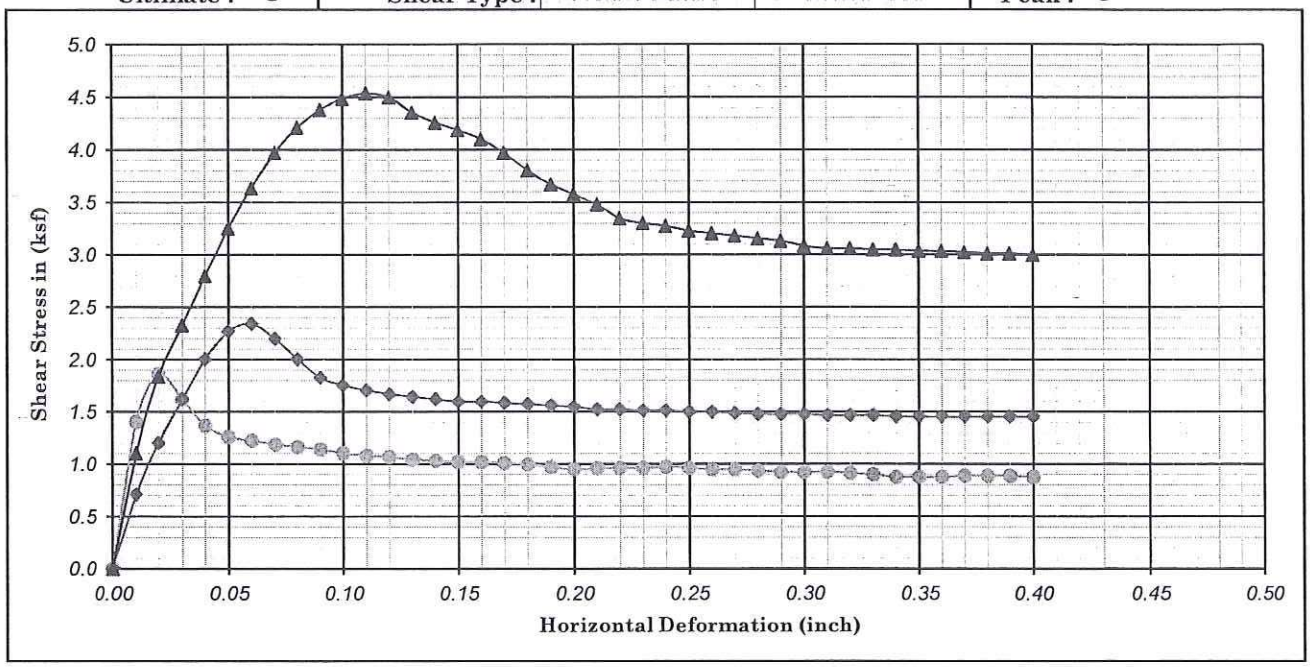
Parsons/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST
(ASTM D-3080)

Project No. : 11-135 | Date : 11/29/11



Ultimate : ○	Shear Type :	Field Moisiture	Undisturbed	Peak : ●



Boring No. : A-11-109		Strength Intercept (C) :	0.76	(ksf)	Peak	0.10	(ksf)	Ultimate
Sample No. : D-4			36.48	(kPa)		4.88	(kPa)	
Depth (ft/m) : 20.0	0.00	Friction Angle (ϕ) :	42.66	Degree		35.66	Degree	

Description : Olive-brown, SANDY SILT (ML) — Shear Rate (inch/minute) : 0.02

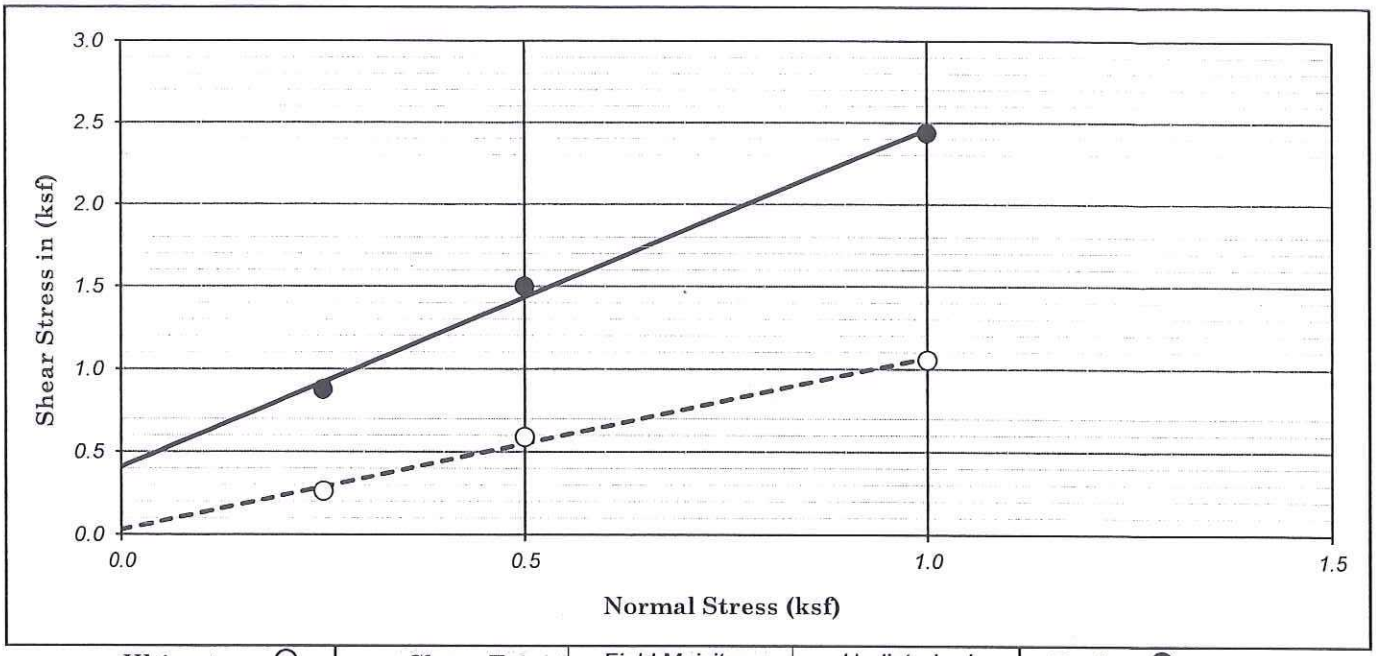
SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	8.54	113.34	17.84	0.49	1.00	47.88	1.86	89.06	0.88	41.94
◆	6.99	105.60	16.62	0.60	2.00	95.76	2.34	112.04	1.45	69.52
▲	10.18	114.97	18.10	0.47	4.00	191.52	4.54	217.18	3.00	143.64
					0.00	0.00	0.76	36.48	0.10	4.88

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

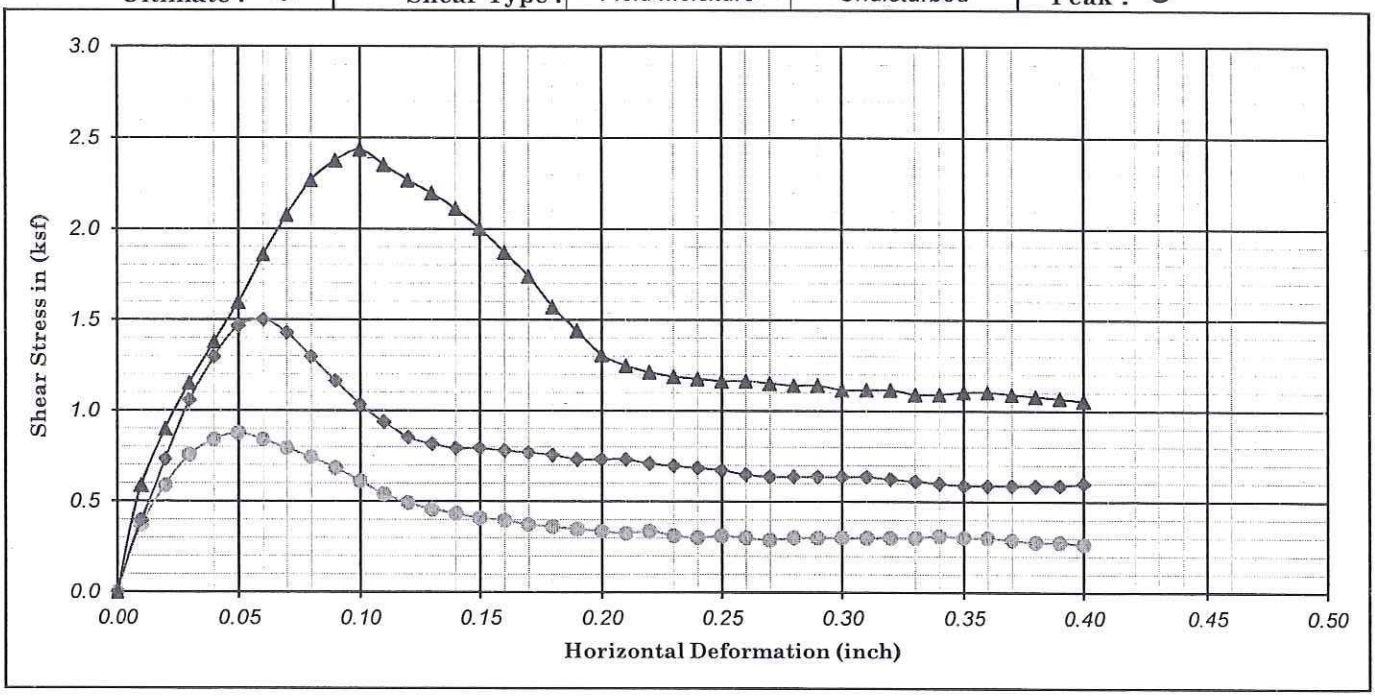
PTG/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST
(ASTM D-3080)

Project No. : 11-135 | Date : 11/29/11



Ultimate : ○	Shear Type :	Field Moisiture	Undisturbed	Peak : ●



Boring No. : A-11-114		Strength Intercept (C) :	0.41	(ksf)	Peak	0.03	(ksf)	Ultimate
Sample No. : D-1			19.54	(kPa)		1.44	(kPa)	
Depth (ft/m) : 2.5	0.00	Friction Angle (ϕ) :	64.00	Degree		46.09	Degree	
Description : Olive-brown, SANDY lean CLAY (CL)						Shear Rate (inch/minute) :		0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	10.98	112.67	17.73	0.50	0.25	11.97	0.88	41.94	0.26	12.64
◆	12.01	117.68	18.52	0.43	0.50	23.94	1.50	71.82	0.59	28.15
▲	11.23	119.11	18.75	0.42	1.00	47.88	2.44	116.64	1.06	50.56
					0.00	0.00	0.41	19.54	0.03	1.44
					1.0	47.88	2.46	117.70	1.07	51.18

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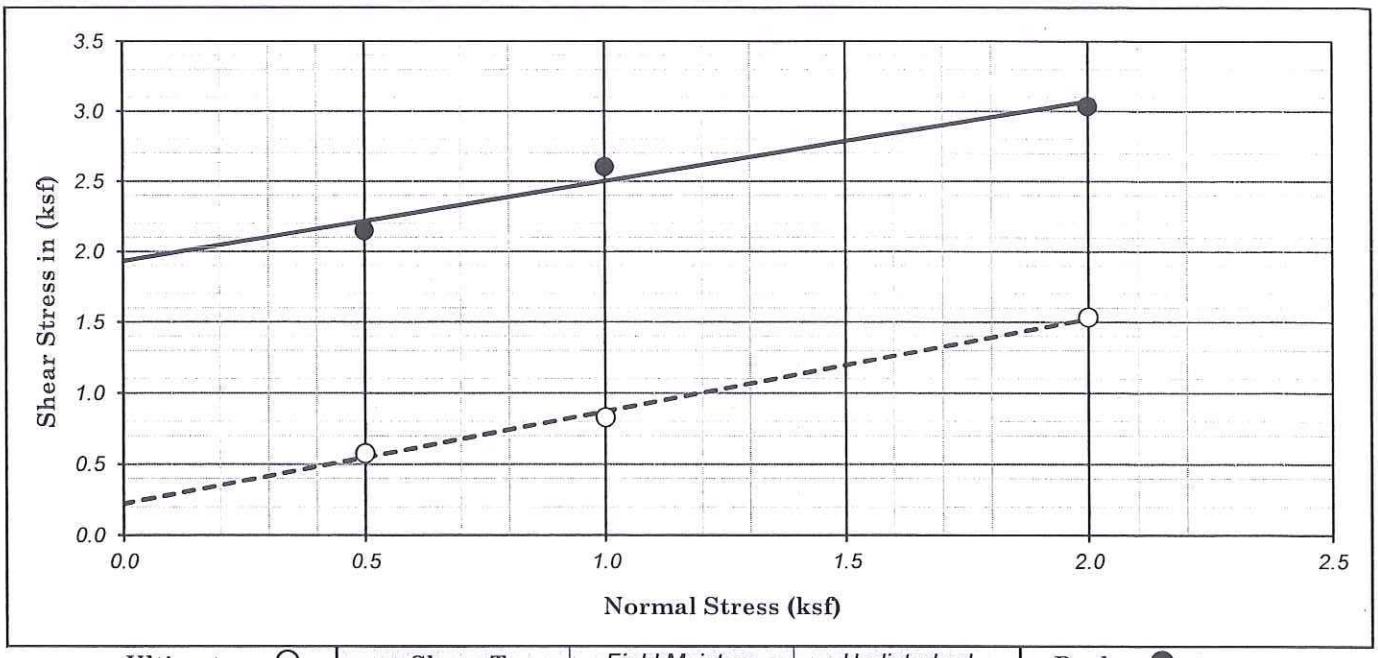
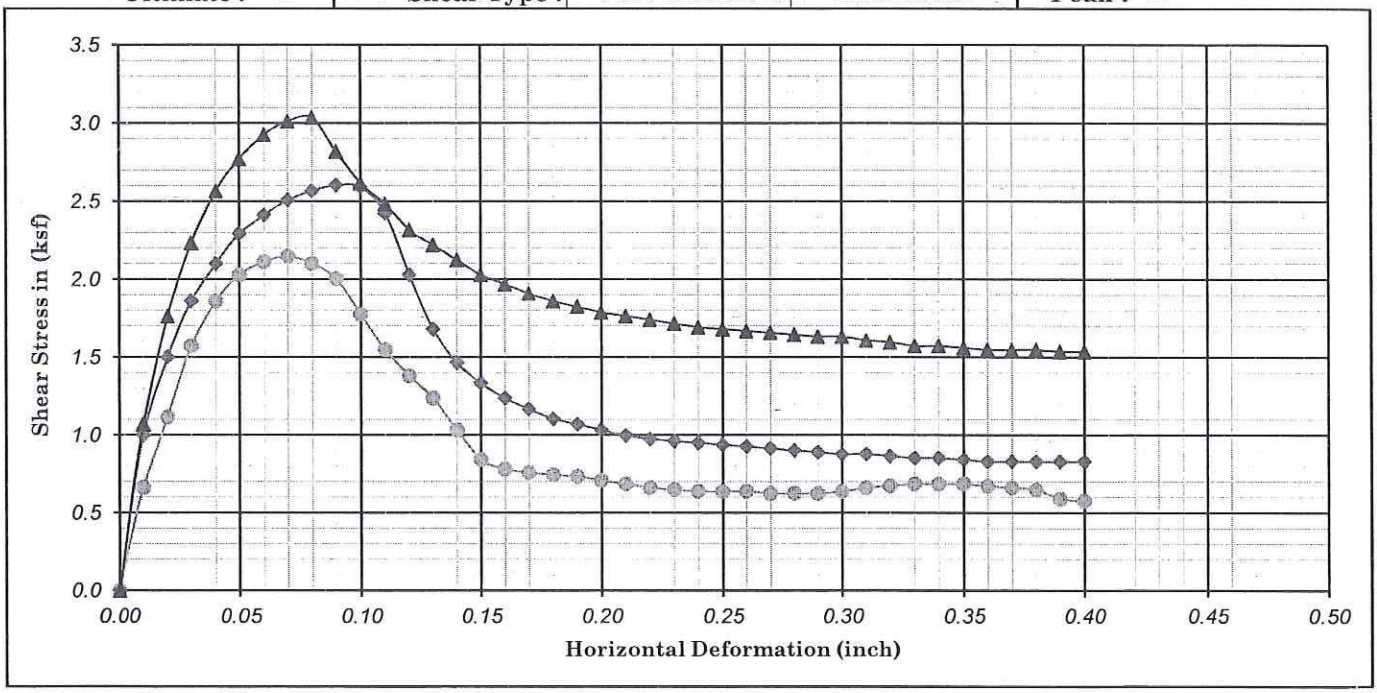
PTG/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST
(ASTM D-3080)

Project No. : 11-135 | Date : 11/29/11



Ultimate : ○	Shear Type :	Field Moisture	Undisturbed	Peak : ●



Boring No. : A-11-115		Strength Intercept (C) :	1.93	(ksf)	Peak	0.22	(ksf)	Ultimate	
Sample No. : D-2			92.50	(kPa)		10.63	(kPa)		
Depth (ft/m) : 10.0	0.00	Friction Angle (ϕ) :	29.65	Degree		33.01	Degree		
Description : Olive-brown, Lean CLAY with SAND (CL)					Shear Rate (inch/minute) :			0.02	

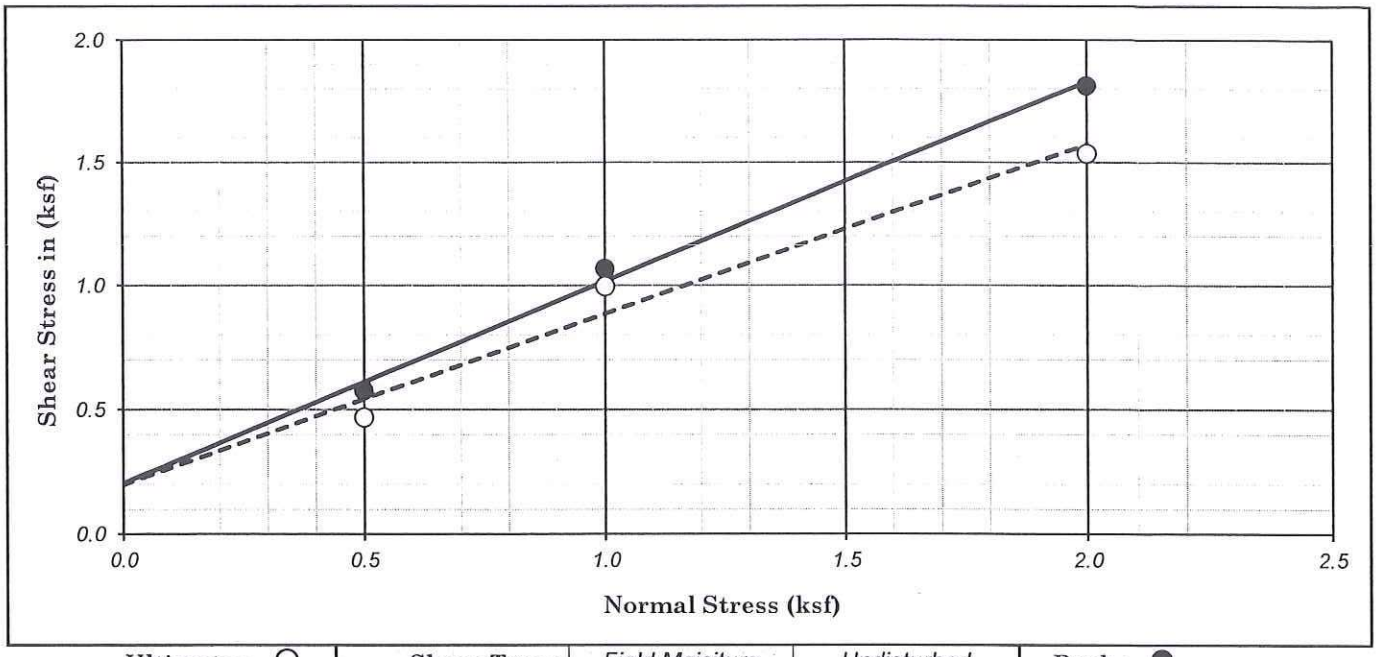
SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	17.09	108.61	17.10	0.55	0.50	23.94	2.15	102.85	0.58	27.58
◆	18.40	109.40	17.22	0.54	1.00	47.88	2.60	124.68	0.83	39.64
▲	17.30	107.85	16.98	0.56	2.00	95.76	3.04	145.36	1.54	73.54

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

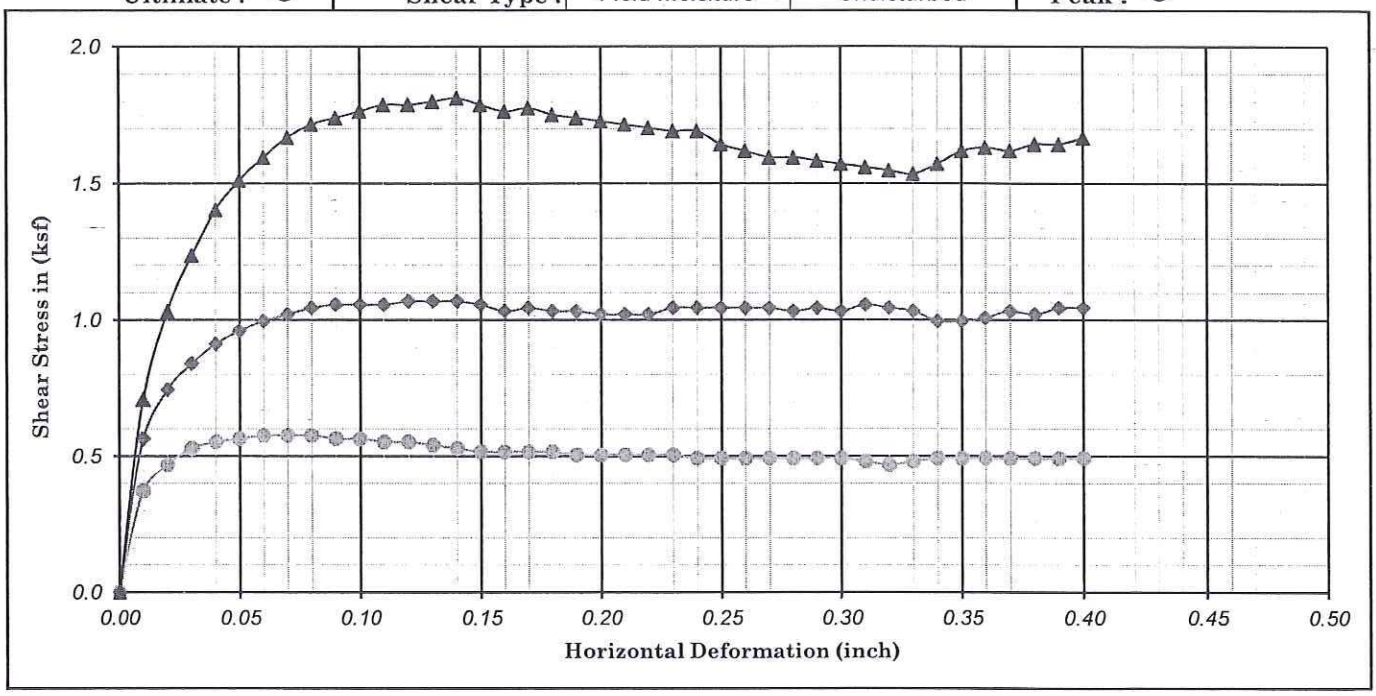
Parsons/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST
(ASTM D-3080)

Project No. : 11-135 | Date : 11/29/11



Ultimate : ○	Shear Type :	Field Moisiture	Undisturbed	Peak : ●



Boring No. : A-11-130		Strength Intercept (C) :	0.20	(ksf)	Peak	0.20	(ksf)	Ultimate
Sample No. : D-2			9.77	(kPa)		9.48	(kPa)	
Depth (ft/m) : 10.0	0.00	Friction Angle (ϕ) :	39.10	Degree		34.51	Degree	

Description : Olive-brown, Poorly graded SAND with SILT and GRAVEL (SP-SM) Shear Rate (inch/minute) : 0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	5.93	109.91	17.30	0.53	0.50	23.94	0.58	27.58	0.47	22.41
◆	4.46	110.89	17.45	0.52	1.00	47.88	1.07	51.14	1.00	47.69
▲	4.15	110.11	17.33	0.53	2.00	95.76	1.81	86.76	1.54	73.54
					0.00	0.00	0.20	9.77	0.20	9.48
					2.0	95.76	1.83	87.58	1.57	75.31

Earth Mechanics, Inc.
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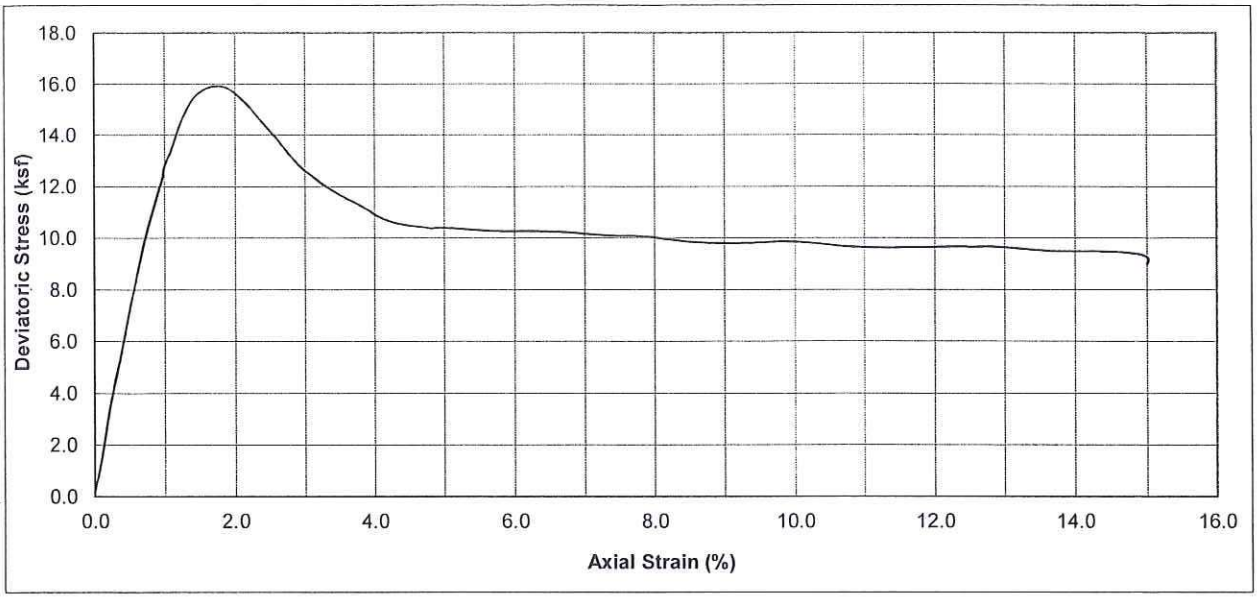
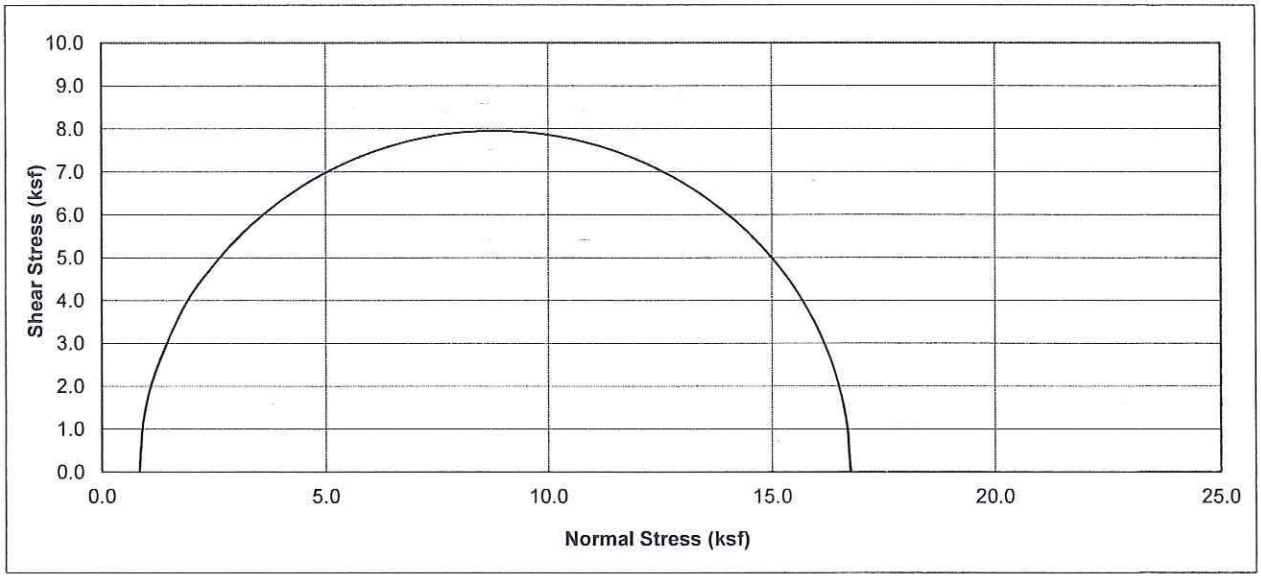
PTG/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST
(ASTM D-3080)

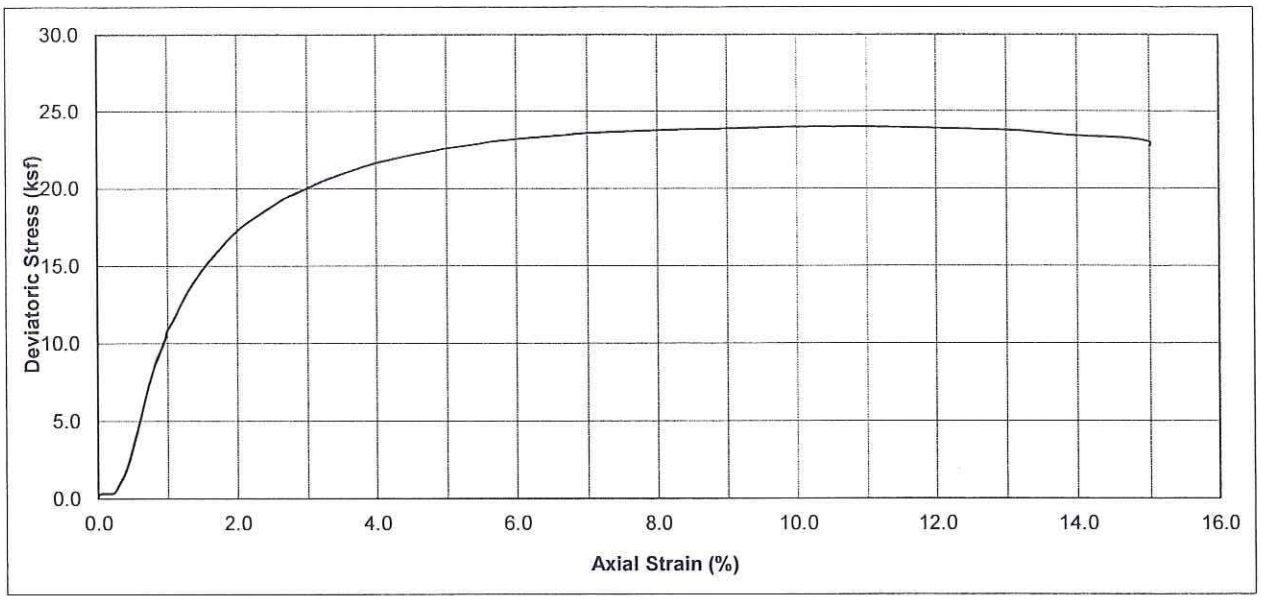
Project No. : 11-135 | Date : 11/29/11

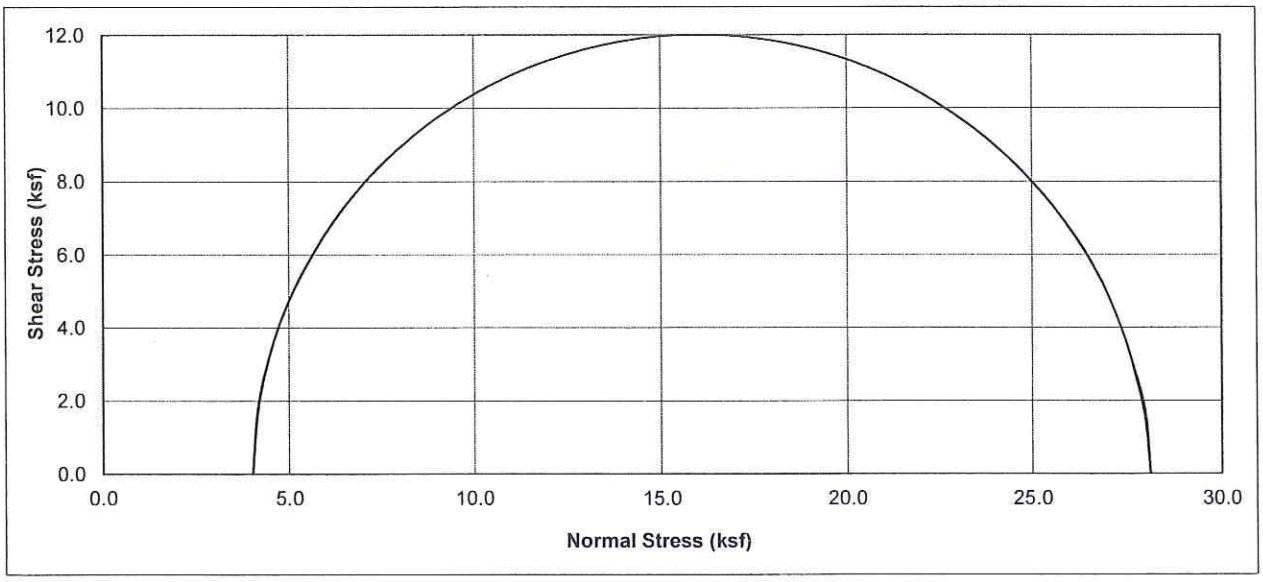




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-104	D-2	10	Olive Brown , SANDY CLAY (CL)	108.9	12.31	0.86	15.91	60.8

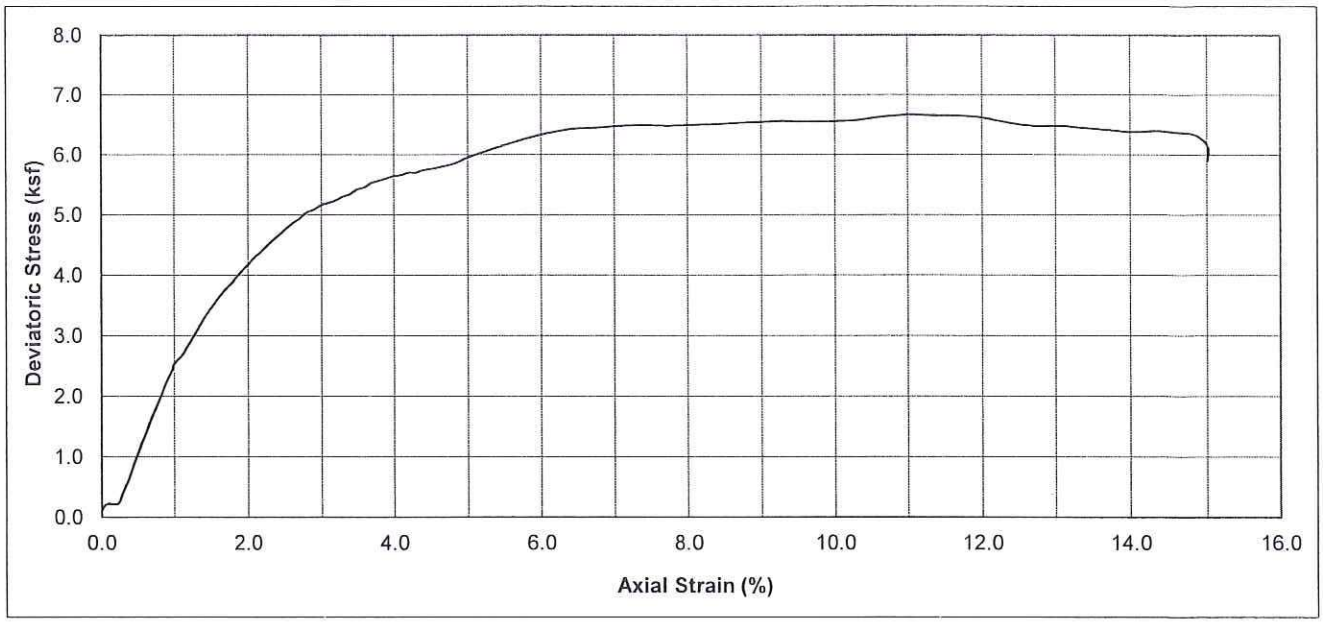
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering		Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135	Date : 12/02/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

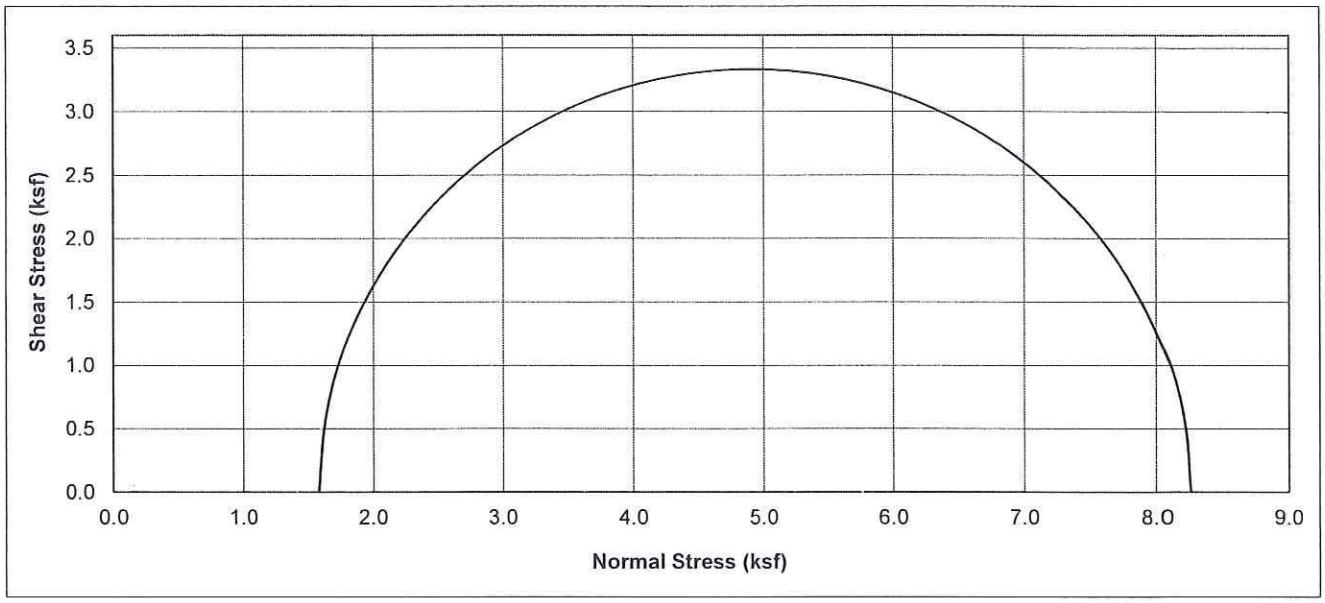




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-109	D-10	50	Very Dk. Gray , FAT CLAY (CH)	111.9	17.01	4.03	24.02	90.9

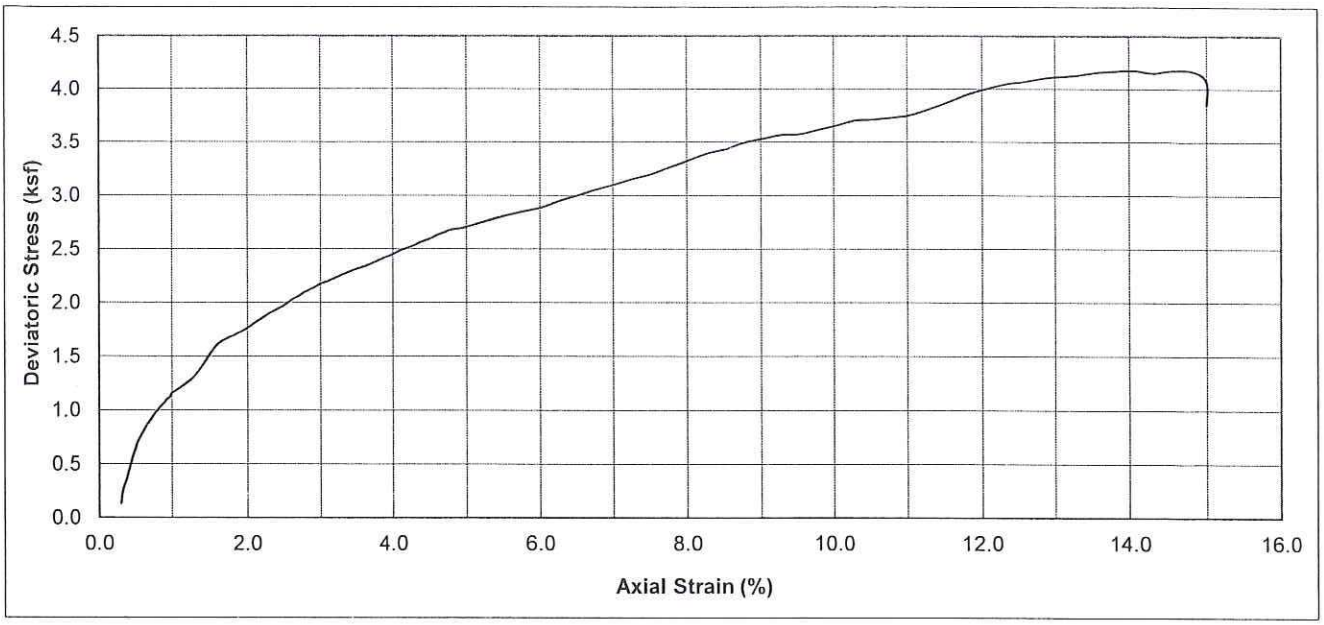
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering		Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135	Date : 12/20/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

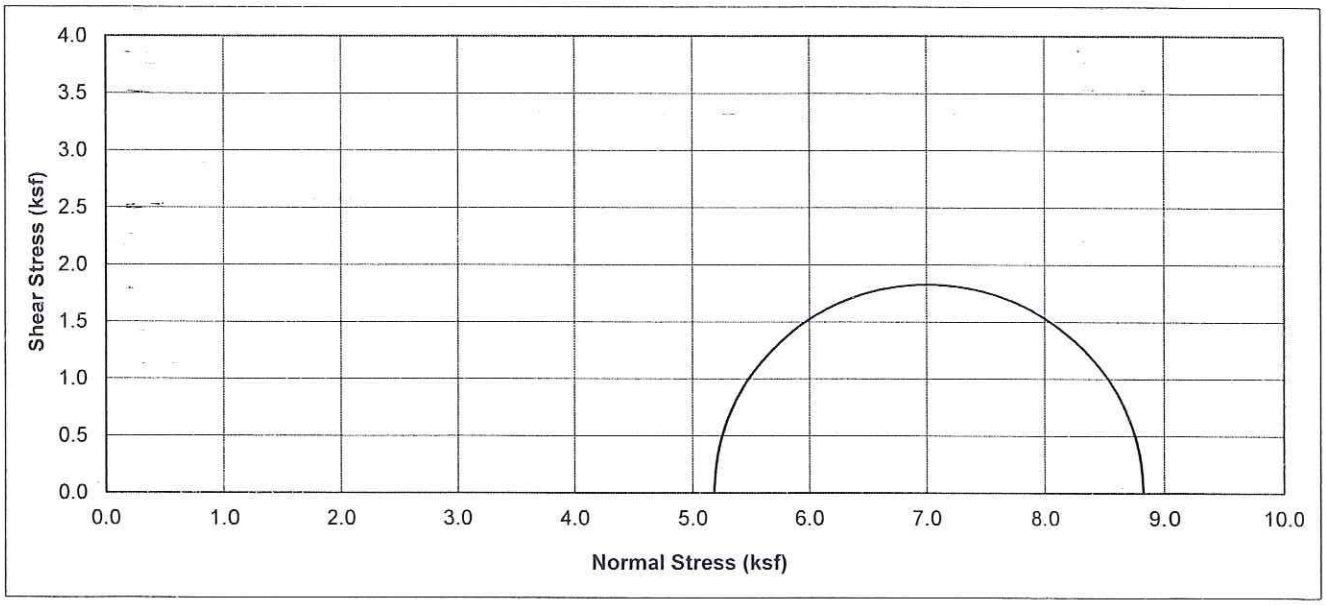




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-113	D-4	20	Dk. Gray , LEAN CLAY (CL)	92.2	25.83	1.58	6.67	84.4

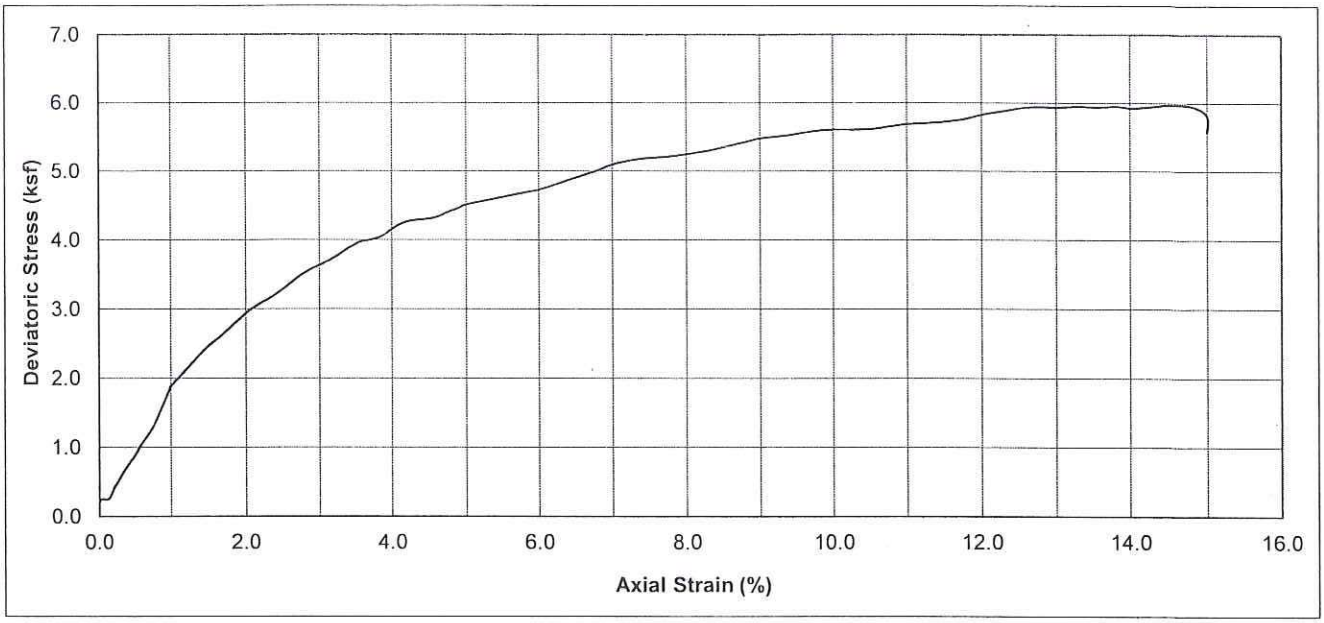
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/02/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

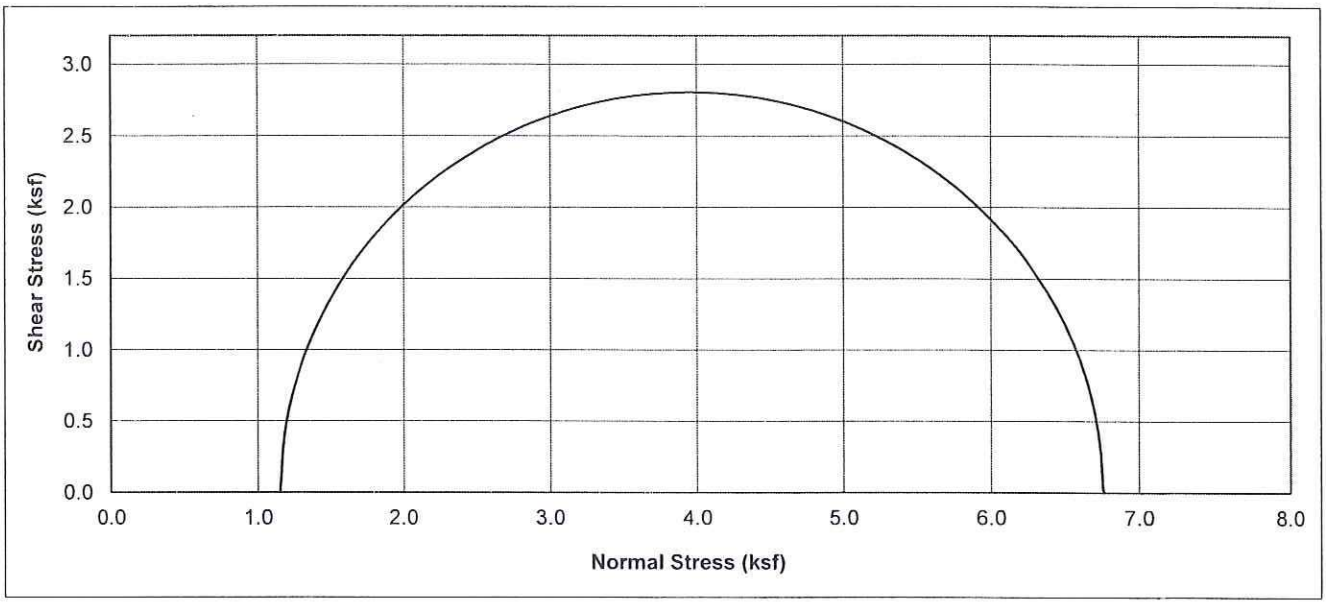




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-114	D-13	65	Dk. Gray , SANDY CLAY (CL)	91.6	29.65	5.18	3.65	95.4

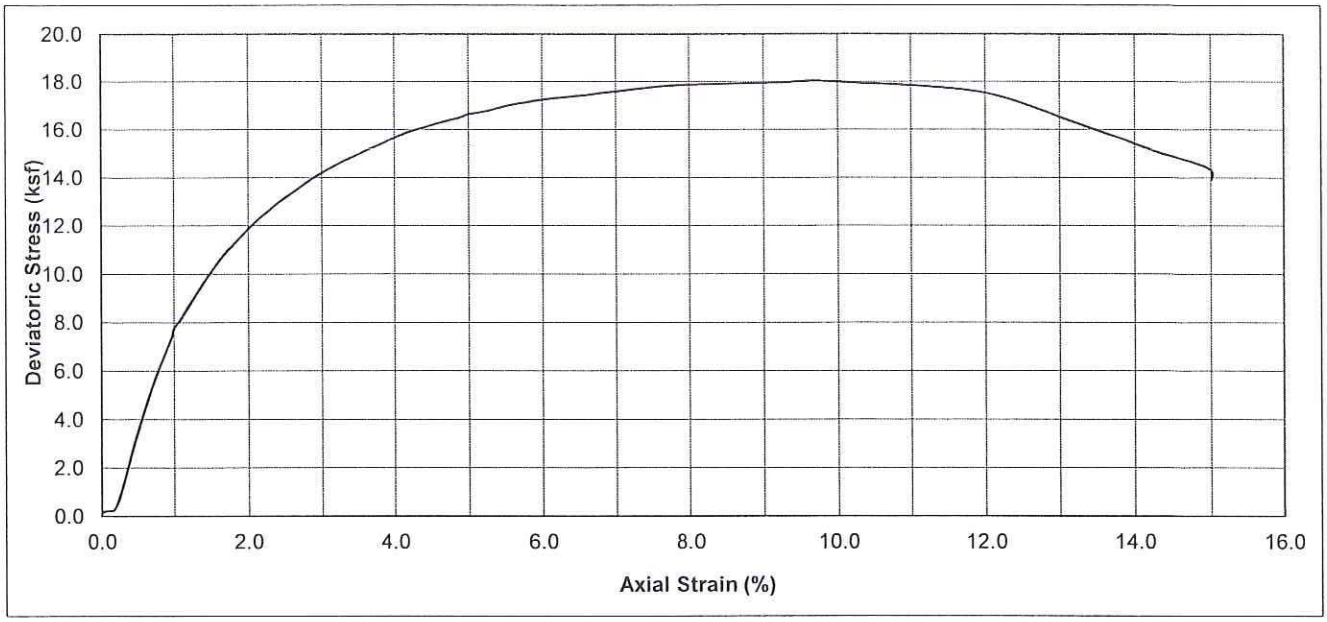
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/06/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

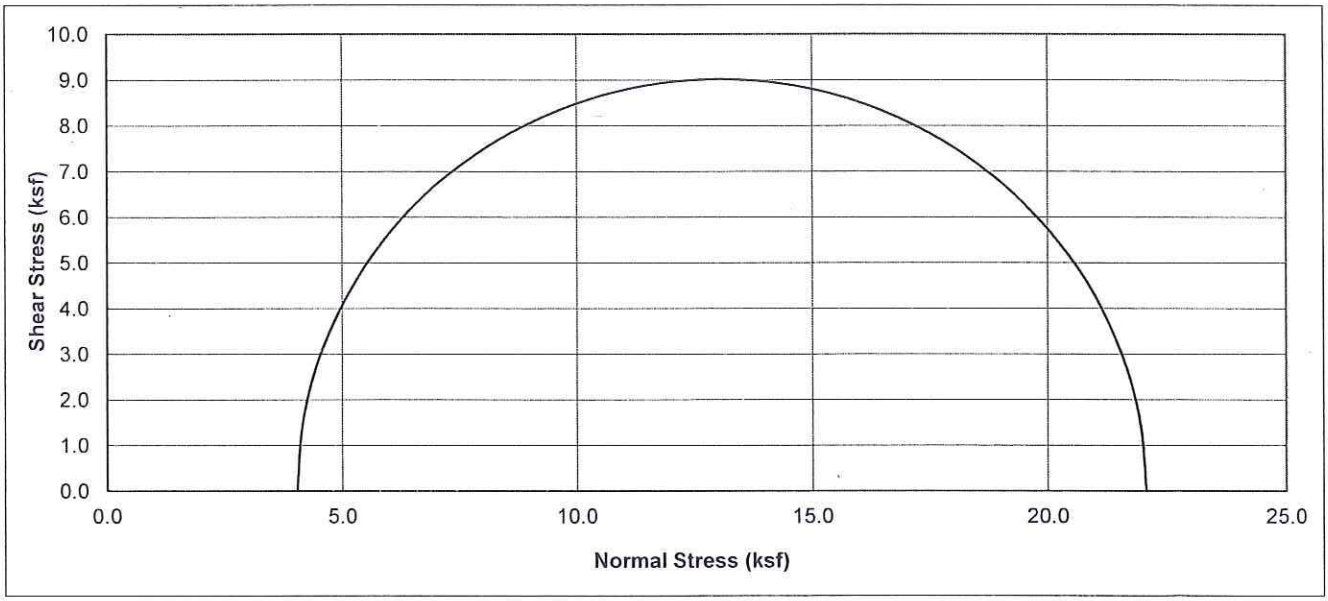




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-114	D-3	15	Olive Brown ,FAT CLAY (CH)	81.8	50.30	1.15	5.61	128.0

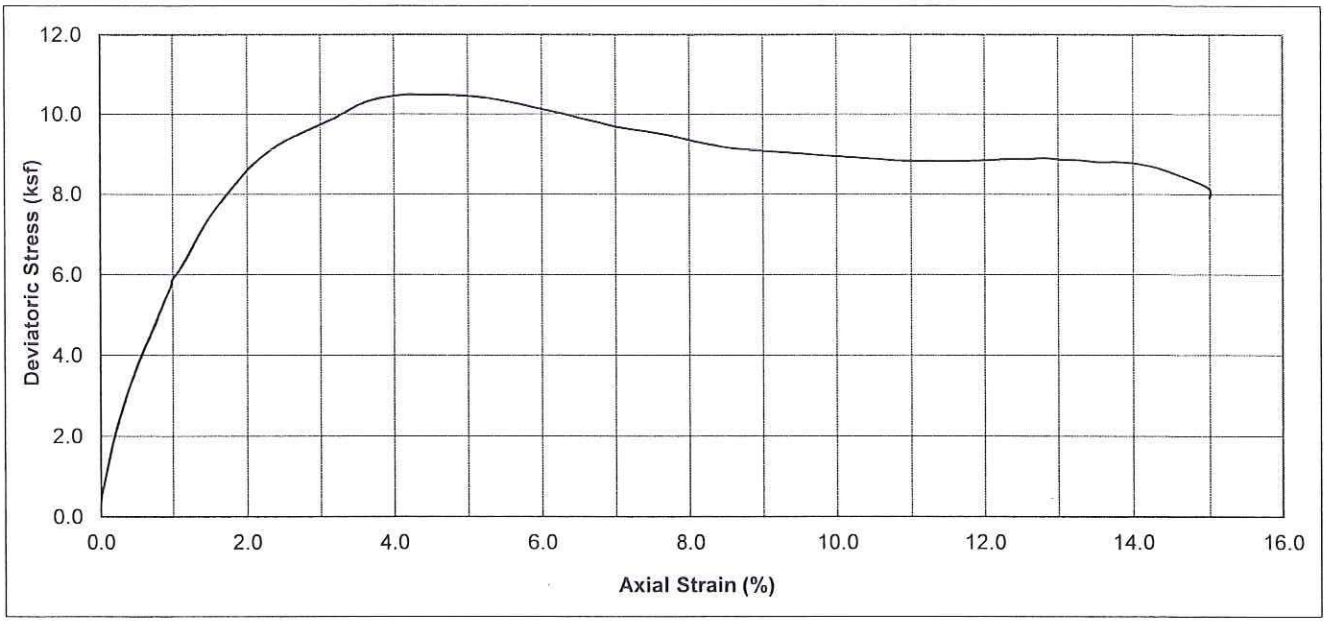
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/06/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

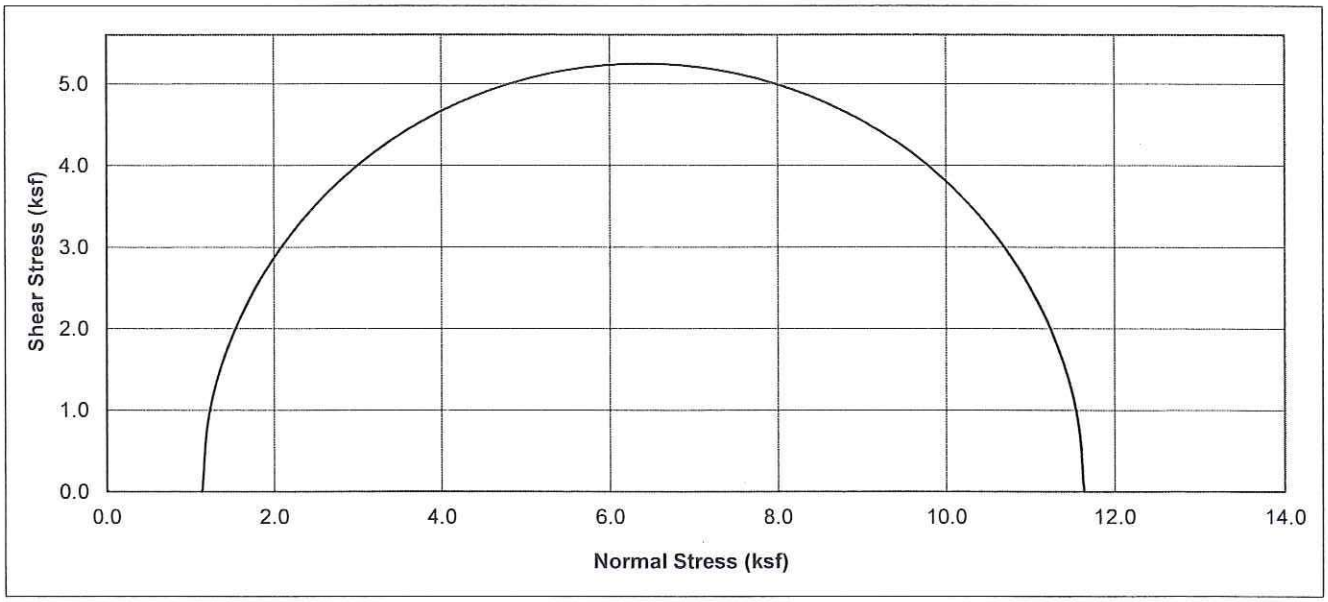




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-115	D-10	50	Olive Brown , LEAN CLAY (CL)	110.0	15.85	4.03	18.03	80.6

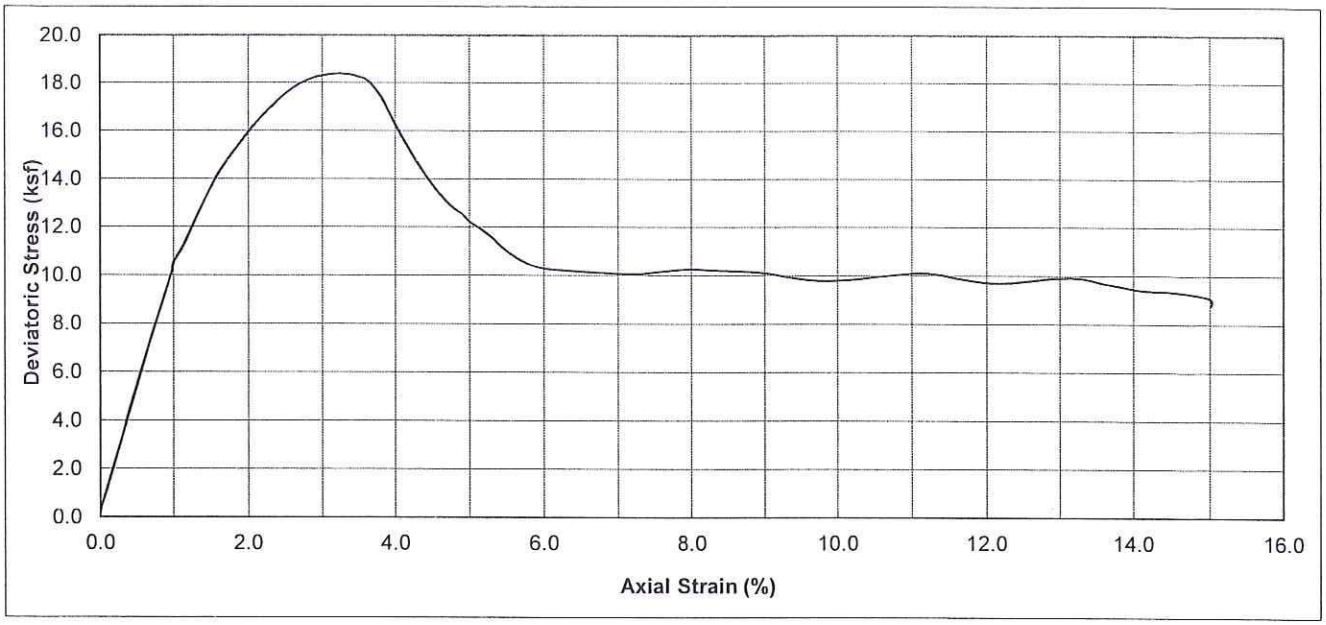
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/20/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

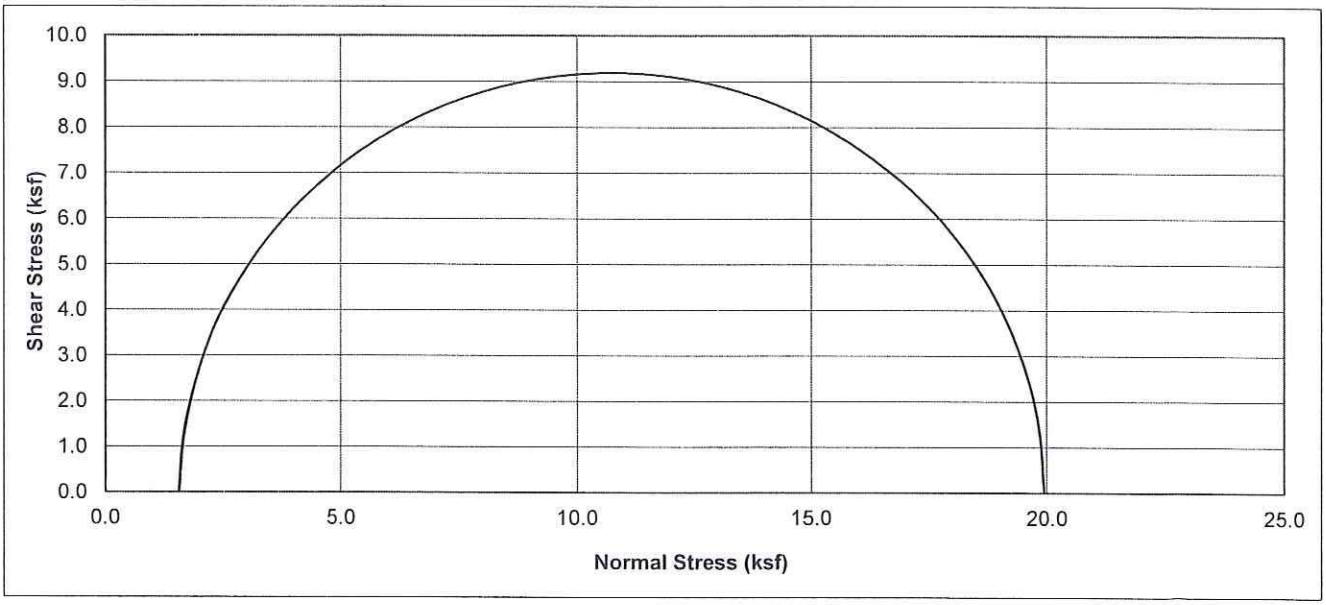




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-117	D-3	15	Olive Brown , LEAN CLAY (CL)	96.7	18.09	1.14	10.49	65.8

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering		Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135	Date : 12/06/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-130	D-4	20	Olive Brown , FAT CLAY (CH)	96.4	23.77	1.57	18.38	85.8

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering		Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135	Date : 12/20/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

APPENDIX C

DESIGN CALCULATIONS

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

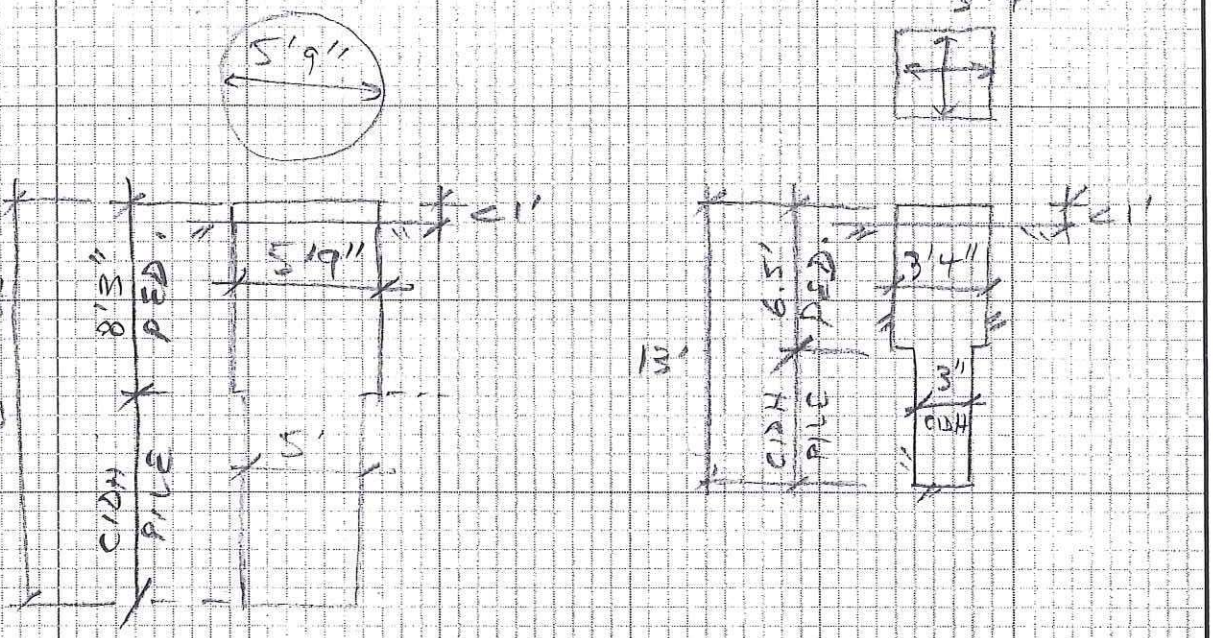
Project I-5 HOV SEG. 1
OH SIGNS
Project No. 11-185

By MK Date 11/7/12 Checked By LLC Date 11/9/12 Sheet 1 of 24

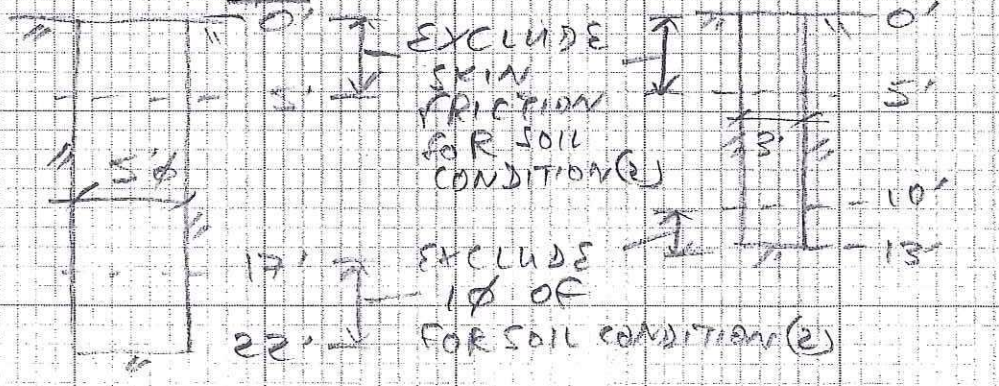
ALL OTHER SIGNS (CT S.P. 58)

SIGNS 58-1 & 8-3 (CT S.P. 48)

1) FOUNDATION CONFIG.



2) IDEALIZED SOIL CONDITIONS & PILES



- SOIL CONDITIONS

	γ (pcf)	ϕ	c (psf)
(1) CT. STANDARD PLANS:	120	30°	0
(2) WEAKEST EXISTING:	120	0	1000

- SIGN 8-1 & 8-3 MEET SOIL CONDITION (1).
ALL OTHER SIGNS MEET SOIL CONDITION (2).

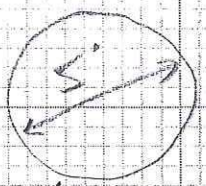
17800 Newhope St., Suite B, Fountain Valley, CA 92708, Phone (714) 751-3826, Fax (714) 751-3928

ALL OTHER SIGNS

SIGNS SS8-1 & 8-2

3) PILE DATA

CIDH



Circ. = π 5' = 15.7'

$A = \frac{\pi}{4} 60^2 = 2827 in^2$

$I = \frac{\pi}{64} 60^4 = 636,620 in^4$

CRACKED 50%

$I_{50} = 318,077 in^4$

$E_c = 5,656$ psi

CIDH

Circ = π 3' = 9.42'

$A = \frac{\pi}{4} 36^2 = 1,018 in^2$

$I = \frac{\pi}{64} 36^4 = 82,448 in^4$

CRACKED 50%

$I_{50} = 41,222 in^4$

4) AXIAL CAPACITY

- SEE ATTACHED SPREAD SHEETS 6/24 & 7/24 FOR SOIL CONDITION (E)
- NOM. RESISTANCE: $R_n = 103,700$ lbs
- LOAD DEMANDS: (SHEET 5/24)

$\max f_y = 23,566$ lbs

req. $R_n = 23,566 \times 2 = 47,100$ lbs $< 103,700$ .. OK

- NOM. RESISTANCE: $R_n = 25,900$ lbs
- LOAD DEMAND: (SHEET 5/24)

$\max f_y = 10,648$ lbs

req. $R_n = 10,648 \times 2 = 21,296$ lbs $< 25,900$ lbs .. OK

- FOR SOIL COND (U SEE SHEETS 6a/24 & 7a/24.

CONCLUSION: ALL (10) PILES MEET REQ'D VERT. DEMANDS.

Project I-5 HOV SEG 1
OH SIGNS
Project No. 11-135

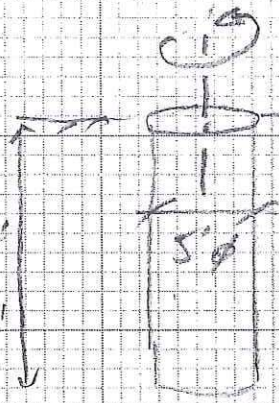
By MK Date 11/8/12 Checked By LCC Date 11/9/12 Sheet 3 of 24

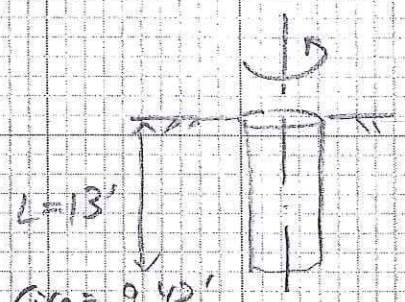
ALL OTHER SIGNS

SIGNS SS 8-1 & 8-2

5) TORSIONAL CAPACITY

NOM. RESISTANCE $R_n = C_A \times L_A \times Circ.$





- SOIL COND (2): C_A = 350 psf (NAVFAC 1986 DM 7.2-196)

SIGNS	L	MAX. MOMENT NOM. RES. (R_n) (lbs-ft)	DEMAND (SHEET 5/24) REQ'D R_n (lbs-ft)	
SS 7-1	22'	259,050	> 78,021	OK
SS 7-4	23'	270,825	> 135,347	OK
SS 7-1, SS 7-2	23'	270,825	> 135,347	OK
SS 7-2	25'	294,375	> 284,679	OK
ALL OTHER SS 8-3	13'	91,875	> 45,564	OK

- SOIL COND. (1): $C_A = \epsilon_v \tan\delta$ (SHEET 5/24)

SS 8-5	25'	323,812	> 205,681	OK ($C_A = 120 \times \frac{3}{5} + 125' \tan 22.5° = 325$ psf)
SS 8-1	13'	58,657	> 47,446	OK ($C_A = 120 \times \frac{3}{5} \times 13 \tan 22.5° = 430$ psf)

- CONCLUSION: ALL (10) PILES MEET REQ'D TORSIONAL DEMANDS.

ALL OTHER SIGNS SIGNS SS8.1 & 8.2

5) LATERAL CAPACITY

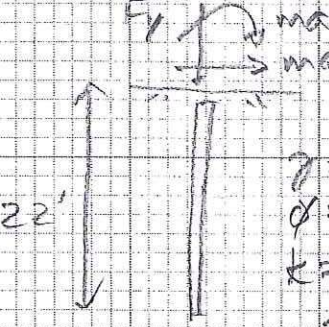
- MAXIMUM LOADS: (SEE SHEET 5/24)

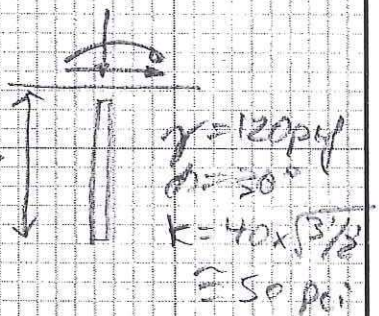
max $F_{x/2}$ = 14,284 lbs max $F_{x/2}$ = 2,561 lbs

max $M_{x/2}$ = 367,244 lbs-ft max $M_{x/2}$ = 102,094 lbs-ft
= 4,406,928 lbs-in = 1,225,128 lbs-in

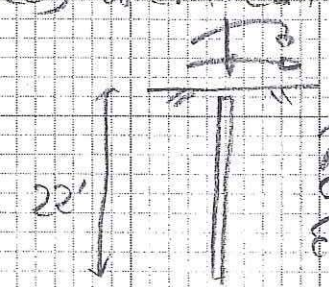
max F_y = 4,132 lbs max F_y = 2,502 lbs

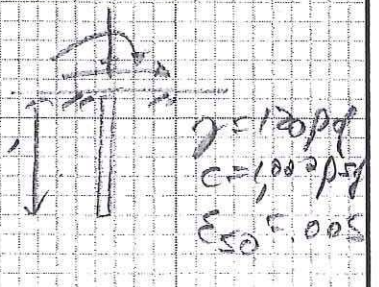
- PERFORM LAT. ANALYSIS FOR
(1) STANDARD SOIL CONDITIONS (TO COMPARE)





(2) WEAKEST IN-SITU SOIL CONDITIONS:





- ALL 4 SOLUTIONS SEE SHEETS 8/24 TO 24/24.
- CONCLUSION:
FOR CONDITION (2), ALL PILE DEFLECTIONS/ROTATIONS ARE LESS THAN FOR CONDITIONS (1).

5/29

SIGN LOADS (@ TOP OF PEDESTAL) (FROM DESIGNER)

I-5 Seg 1 Signs 11/6/2012

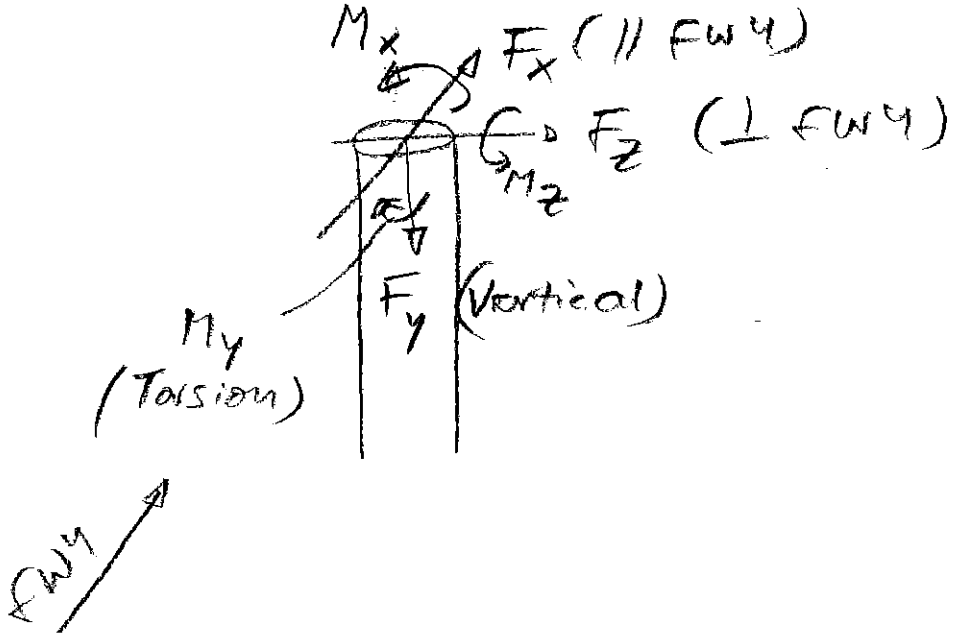
SIGN	POST	Fx-Long (kip)	Fy-Up (kip)	Fz-Trans (kip)	Mx-Long (k-ft)	Mz-Trans (k-ft)	My-Tq (k-ft)	EXIST. SOIL COND. L
SS6-1	1	11,209	19,783	3,363	234,433	200,702	176,546	(2) 25'
SS7-1	1	7,093	13,802	2,128	126,551	133,699	78,021	(2) 22'
SS7-2	1	14,234	23,566	4,270	367,244	329,445	284,679	(2) 25'
SS7-3	1	11,387	21,960	3,416	267,309	299,084	182,195	(2) 25'
SS7-4	1	11,387	19,590	3,416	262,059	284,736	182,195	(2) 23'
SS8-1	1 (Left)	2,561	10,751	768	100,666	48,750	46,061	(1) 13'
	2 (Rifht)	2,561	10,751	768	102,094	52,669	49,446	(1) 13'
SS8-3	1 (Left)	2,446	10,648	734	92,628	52,210	38,817	(2) 13'
	2 (Rifht)	2,446	10,648	734	92,529	50,131	45,867	(2) 13'
SS8-5	1	12,099	22,226	3,630	287,669	286,683	205,681	(1) 25'
SS9-1	1	10,962	19,538	3,288	270,684	231,838	186,347	(2) 23'
SS9-2	1	9,252	17,478	2,776	185,816	221,356	120,277	(2) 23'

SS8 (5'Ø)

SS49 (3'Ø)

SS8 (5'Ø)

= CONTROLLING (MAXIMUM) LOADS/MOMENTS



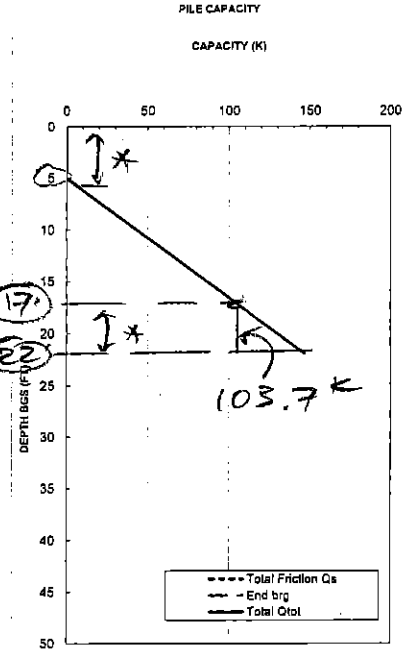
SKIN FRICTION FOR DRILLED SHAFT IN BOTH COHESIONLESS AND COHESIVE SOILS USING REESE AND O'NEILL'S METHOD (1999)

Project: Parsons/I-5 HOV Seg 1 — ITEM: STANDARD 5' DIA. CIDH
Project No.: 11-135 — All OH Signs per Caltrans Standard Plan S8
Analysis By: MK DATE: 11/07/12 — Conservative clay condition
Checked By: LCC DATE: 11/08/12

D_s= 5 ft Hw= 0.0 ft Hg= 0.0 ft — Hw is the depth to water table.
p= 15.7080 ft Ho= 0.0 ft Hf= 0.0 ft — Hg is the depth to ground surface used in calculation.
D_b= 5 ft — Ho is the depth to location starting initial overburden pressure.
Hf is the depth to location starting accumulation of skin friction.

Soil Layer	from Top	to Bottc	γ (pcf)	γ' (pcf)	c' (ksf)	ϕ'	
(1)	0	60	120	57.6	1.00	0	Clay
(2)				-62.4	0.00	0	
(3)				-62.4	0.00	0	
(4)				-62.4	0.00	0	
(5)				-62.4	0.00	0	
(6)				-62.4	0.00	0	
(7)							
(8)							

							GRANULAR				CLAY				BRG. IN SAND		TOTAL
							FRICTION										
Sublayer No.	Depth, z	z_1	New Depth	Soil Unit Weight	Overburden Pressure	c'	β	f_1^a	ΔQ_s^a	Sand Friction Q_s^a	f_1^c	ΔQ_s^c	Clay Friction Q_s^c	Total Friction Q_s	N	End brg	Total Qtot
	(ft)	(ft)	(ft)	(pcf)	(psf)	(ksf)	-	(ksf)	(kips)	(kips)	(ksf)	(kips)	(kips)	(kips)	bpf	(kips)	(kips)
0	0.0	0.0	0.0	57.6	0												
1	0.0	0.0	0.0	57.6	0	1				0.0			0.0	0.0	0	0.0	0.0
2	1.0	0.5	0.5	57.6	29	1	1.2000	0.0000	0.0	0.0	0.0000	0.0	0.0	0.0	0	0.0	0.0
3	2.0	1.5	1.5	57.6	86	1	1.2000	0.0000	0.0	0.0	0.0000	0.0	0.0	0.0	0	0.0	0.0
4	3.0	2.5	2.5	57.6	144	1	1.2000	0.0000	0.0	0.0	0.0000	0.0	0.0	0.0	0	0.0	0.0
5	4.0	3.5	3.5	57.6	202	1	1.2000	0.0000	0.0	0.0	0.0000	0.0	0.0	0.0	0	0.0	0.0
6	5.0	4.5	4.5	57.6	259	1	1.2000	0.0000	0.0	0.0	0.0000	0.0	0.0	0.0	0	0.0	0.0
7	6.0	5.5	5.5	57.6	317	1	1.1934	0.0000	0.0	0.0	0.5500	8.6	8.6	8.6	0	0.0	8.6
8	7.0	6.5	6.5	57.6	374	1	1.1558	0.0000	0.0	0.0	0.5500	8.6	17.3	17.3	0	0.0	17.3
9	8.0	7.5	7.5	57.6	432	1	1.1303	0.0000	0.0	0.0	0.5500	8.6	25.9	25.9	0	0.0	25.9
10	9.0	8.5	8.5	57.6	490	1	1.1064	0.0000	0.0	0.0	0.5500	8.6	34.6	34.6	0	0.0	34.6
11	10.0	9.5	9.5	57.6	547	1	1.0838	0.0000	0.0	0.0	0.5500	8.6	43.2	43.2	0	0.0	43.2
12	11.0	10.5	10.5	57.6	605	1	1.0626	0.0000	0.0	0.0	0.5500	8.6	51.8	51.8	0	0.0	51.8
13	12.0	11.5	11.5	57.6	662	1	1.0422	0.0000	0.0	0.0	0.5500	8.6	60.5	60.5	0	0.0	60.5
14	15.0	13.5	13.5	57.6	778	1	1.0040	0.0000	0.0	0.0	0.5500	25.9	86.4	86.4	0	0.0	86.4
15	17.0	16.0	16.0	57.6	922	1	0.9600	0.0000	0.0	0.0	0.5500	17.3	103.7	103.7	0	0.0	103.7
16	20.0	18.5	18.5	57.6	1066	1	0.9193	0.0000	0.0	0.0	0.5500	25.9	129.6	129.6	0	0.0	129.6
17	22.0	21.0	21.0	57.6	1210	1	0.8814	0.0000	0.0	0.0	0.5500	17.3	146.9	146.9	0	0.0	146.9



* exclude friction

5' ϕ CIDH, L = 22'

AXIAL NOM. RESISTANCE FOR EXISTING SOIL CONDITIONS(2)

R_N = 103.7 K

check: R_N = 15.7' × (22' − 5' − 5') × .55 + 1 kip = 103.6 K ... OK.

11/21/12

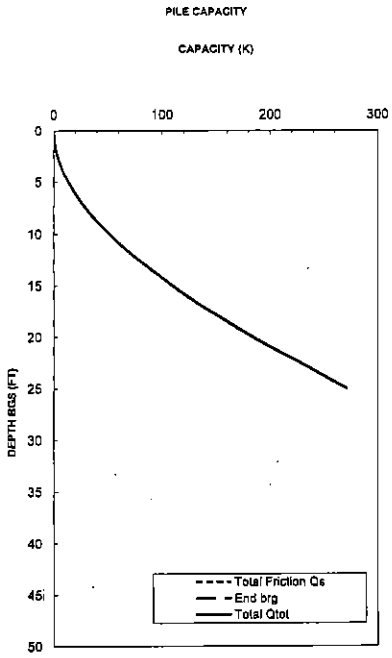
SKIN FRICTION FOR DRILLED SHAFT IN BOTH COHESIONLESS AND COHESIVE SOILS USING REESE AND O'NEILL'S METHOD (1999)

Project: Parsons/I-5 HOV Seg 1 — ITEM: STANDARD 5' DIA. CIDH
Project No.: 11-135 — All OH Signs per Caltrans Standard Plan S8
Analysis By: MK DATE: 11/07/12 — Standard Sand condition
Checked By: LCC DATE: 11/08/12

D_s= 5 ft — Hw= 0.0 ft — Hg= 0.0 ft — Hw is the depth to water table.
p= 15.7080 ft — Ho= 0.0 ft — Hf= 0.0 ft — Hg is the depth to ground surface used in calculation.
D_b= 5 ft — Ho is the depth to location starting initial overburden pressure.
Hf is the depth to location starting accumulation of skin friction.

Soil Layer	from Top	to Bottc	γ (pcf)	γ' (pcf)	c' (ksf)	ϕ'	
(1)	0	50	120	57.6	0.00	0	Clay
(2)				-62.4	0.00	0	
(3)				-62.4	0.00	0	
(4)				-62.4	0.00	0	
(5)				-62.4	0.00	0	
(6)				-62.4	0.00	0	
(7)							
(8)							

							GRANULAR			FRICTION	CLAY				BRG. IN SAND		TOTAL
Sublayer No.	Depth, z	z_i	New Depth	Soil Unit Weight	Overburden Pressure	c'	β	f_i^a	ΔQ_s^a	Sand Friction Q_s^a	f_i^c	ΔQ_s^c	Clay Friction Q_s^c	Total Friction Q_s	N	End brg	Total Qtot
	(ft)	(ft)	(ft)	(pcf)	(psf)	(ksf)	-	(ksf)	(kips)	(kips)	(ksf)	(kips)	(kips)	(kips)	bpf	(kips)	(kips)
0	0.0	0.0	0.0	57.6	0					0.0			0.0	0.0	0	0.0	0.0
1	0.0	0.0	0.0	57.6	0	0											
2	1.0	0.5	0.5	57.6	29	0	1.2000	0.0346	0.5	0.5	0.0000	0.0	0.0	0.5	0	0.0	0.5
3	2.0	1.5	1.5	57.6	86	0	1.2000	0.1037	1.6	2.2	0.0000	0.0	0.0	2.2	0	0.0	2.2
4	3.0	2.5	2.5	57.6	144	0	1.2000	0.1728	2.7	4.9	0.0000	0.0	0.0	4.9	0	0.0	4.9
5	4.0	3.5	3.5	57.6	202	0	1.2000	0.2419	3.8	8.7	0.0000	0.0	0.0	8.7	0	0.0	8.7
6	5.0	4.5	4.5	57.6	259	0	1.2000	0.3110	4.9	13.6	0.0000	0.0	0.0	13.6	0	0.0	13.6
7	6.0	5.5	5.5	57.6	317	0	1.1834	0.3749	5.9	19.5	0.0000	0.0	0.0	19.5	0	0.0	19.5
8	7.0	6.5	6.5	57.6	374	0	1.1556	0.4327	6.8	26.3	0.0000	0.0	0.0	26.3	0	0.0	26.3
9	8.0	7.5	7.5	57.6	432	0	1.1303	0.4883	7.7	33.9	0.0000	0.0	0.0	33.9	0	0.0	33.9
10	9.0	8.5	8.5	57.6	490	0	1.1064	0.5417	8.5	42.4	0.0000	0.0	0.0	42.4	0	0.0	42.4
11	10.0	9.5	9.5	57.6	547	0	1.0839	0.5931	9.3	51.8	0.0000	0.0	0.0	51.8	0	0.0	51.8
12	11.0	10.5	10.5	57.6	605	0	1.0626	0.6426	10.1	61.8	0.0000	0.0	0.0	61.8	0	0.0	61.8
13	12.0	11.5	11.5	57.6	662	0	1.0422	0.6903	10.8	72.7	0.0000	0.0	0.0	72.7	0	0.0	72.7
14	15.0	13.5	13.5	57.6	778	0	1.0040	0.7807	36.8	109.5	0.0000	0.0	0.0	109.5	0	0.0	109.5
15	17.0	16.0	16.0	57.6	922	0	0.9600	0.8847	27.8	137.3	0.0000	0.0	0.0	137.3	0	0.0	137.3
16	20.0	18.5	18.5	57.6	1066	0	0.9193	0.9797	46.2	183.4	0.0000	0.0	0.0	183.4	0	0.0	183.4
17	25.0	22.5	22.5	57.6	1296	0	0.8598	1.1141	87.6	270.9	0.0000	0.0	0.0	270.9	0	0.0	270.9



5' ϕ CIDH L=25' (SS8-5)

AXIAL NOM. RESIST. FOR EXIST. CONDITION (L

R_n = 270^K >> req. R_n = 22,226+2 = 44,452 lbs ... OK

6/6/24

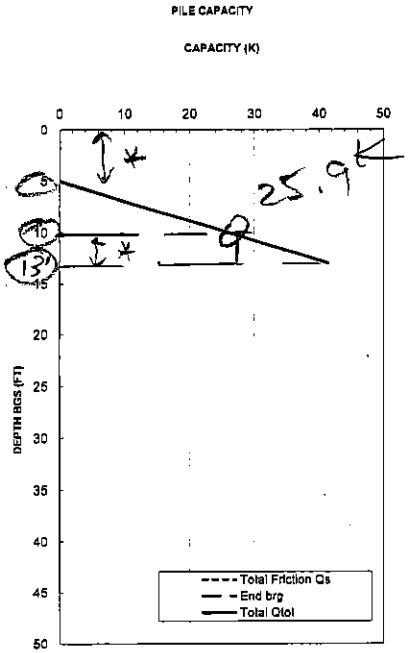
SKIN FRICTION FOR DRILLED SHAFT IN BOTH COHESIONLESS AND COHESIVE SOILS USING REESE AND O'NEILL'S METHOD (1999)

Project: Persona/I-5 HOV Seg 1 — ITEM: STANDARD 3' DIA. CIDH
Project No.: 11-135 — All DH Signs per Caltrans Standard Plan S49
Analysis By: MK DATE: 11/07/12 — Conservative clay condition
Checked By: LCC DATE: 11/08/12

D_s= 3 ft Hw= 0.0 ft Hg= 0.0 ft — Hw is the depth to water table.
p= 9.4248 ft Ho= 0.0 ft Hf= 0.0 ft — Hg is the depth to ground surface used in calculation.
D_b= 3 ft — Ho is the depth to location starting initial overburden pressure.
Hf is the depth to location starting accumulation of skin friction.

Soil Layer	from Top	to Bottc	γ (pcf)	γ' (pcf)	c' (ksf)	ϕ'	
(1)	0	50	120	57.6	1.00	0	Clay
(2)				-62.4	0.00	0	
(3)				-62.4	0.00	0	
(4)				-62.4	0.00	0	
(5)				-62.4	0.00	0	
(6)				-62.4	0.00	0	
(7)							
(8)							

							GRANULAR				CLAY				BRG. IN SAND		TOTAL
							FRICTION										
Sublayer No.	Depth, z	z_i	New Depth	Soil Unit Weight	Overburden Pressure	c'	β	f_i[a]	ΔQ_s[b]	Sand Friction Q_s[d]	f_i[c]	ΔQ_s[c]	Clay Friction Q_s[c]	Total Friction Q_s	N	End brg	Total Qtot
	(ft)	(ft)	(ft)	(pcf)	(psf)	(ksf)	-	(ksf)	(kips)	(kips)	(ksf)	(kips)	(kips)	(kips)	bpf	(kips)	(kips)
0	0.0	0.0	0.0	57.6	0												
1	0.0	0.0	0.0	57.6	0	1				0.0			0.0	0.0	0	0.0	0.0
2	1.0	0.5	0.5	57.6	29	1	1.2000	0.0000	0.0	0.0	0.0000	0.0	0.0	0.0	0	0.0	0.0
3	2.0	1.5	1.5	57.6	86	1	1.2000	0.0000	0.0	0.0	0.0000	0.0	0.0	0.0	0	0.0	0.0
4	3.0	2.5	2.5	57.6	144	1	1.2000	0.0000	0.0	0.0	0.0000	0.0	0.0	0.0	0	0.0	0.0
5	4.0	3.5	3.5	57.6	202	1	1.2000	0.0000	0.0	0.0	0.0000	0.0	0.0	0.0	0	0.0	0.0
6	5.0	4.5	4.5	57.6	259	1	1.2000	0.0000	0.0	0.0	0.0000	0.0	0.0	0.0	0	0.0	0.0
7	6.0	5.5	5.5	57.6	317	1	1.1834	0.0000	0.0	0.0	0.5500	5.2	5.2	5.2	0	0.0	5.2
8	7.0	6.5	6.5	57.6	374	1	1.1558	0.0000	0.0	0.0	0.5500	5.2	10.4	10.4	0	0.0	10.4
9	8.0	7.5	7.5	57.6	432	1	1.1303	0.0000	0.0	0.0	0.5500	5.2	15.6	15.6	0	0.0	15.6
10	9.0	8.5	8.5	57.6	490	1	1.1064	0.0000	0.0	0.0	0.5500	5.2	20.7	20.7	0	0.0	20.7
11	10.0	9.5	8.5	57.6	547	1	1.0839	0.0000	0.0	0.0	0.5500	5.2	25.9	25.9	0	0.0	25.9
12	11.0	10.5	10.5	57.6	605	1	1.0626	0.0000	0.0	0.0	0.5500	5.2	31.1	31.1	0	0.0	31.1
13	12.0	11.5	11.5	57.6	662	1	1.0422	0.0000	0.0	0.0	0.5500	5.2	36.3	36.3	0	0.0	36.3
14	13.0	12.5	12.5	57.6	720	1	1.0227	0.0000	0.0	0.0	0.5500	5.2	41.5	41.5	0	0.0	41.5



*exclude friction

3' ϕ CIDH, L = 13' (SSB-5)

AXIAL NOM. RESISTANCE FOR EAST. SOIL CONDITION(2)

$R_n = \underline{25.9^K}$

check: $R_n = 9.42' \times (13' - 5' - 3') \times .55 \times 1.0\ ksf = 25.9^K$ ...OK

4/2/12

SKIN FRICTION FOR DRILLED SHAFT IN BOTH COHESIONLESS AND COHESIVE SOILS USING REESE AND O'NEILL'S METHOD (1999)

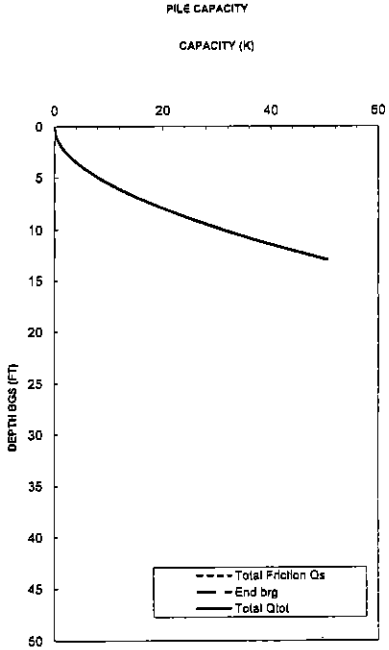
SS 8-1

Project: Parsons/I-5 HOV Seg 1 — ITEM: STANDARD 3' DIA. CIDH
Project No.: 11-135 — All OH Signs per Caltrans Standard Plan S49
Analysis By: MK DATE: 11/07/12 — Standard Sand condition
Checked By: LCC DATE: 11/08/12

D_s= 3 ft Hw= 0.0 ft Hg= 0.0 ft Hw is the depth to water table.
p= 9.4248 ft Ho= 0.0 ft Hf= 0.0 ft Hg is the depth to ground surface used in calculation.
D_b= 3 ft Ho is the depth to location starting initial overburden pressure.
Hf is the depth to location starting accumulation of skin friction.

Soil Layer	from Top	to Bottc	γ (pcf)	γ' (pcf)	c' (ksf)	φ'	
(1)	0	50	120	57.6	0.00	0	Sand
(2)				-62.4	0.00	0	
(3)				-62.4	0.00	0	
(4)				-62.4	0.00	0	
(5)				-62.4	0.00	0	
(6)				-62.4	0.00	0	
(7)							
(8)							

							GRANULAR			FRICTION	CLAY				BRG. IN SAND		TOTAL
Sublayer No.	Depth, z	z_i	New Depth	Soil Unit Weight	Overburden Pressure	c'	β	f_i^a	ΔQ_s^a	Sand Friction Q_s^a	f_i^c	ΔQ_s^c	Clay Friction Q_s^c	Total Friction Q_s	N	End brg	Total Qtot
	(ft)	(ft)	(ft)	(pcf)	(psf)	(ksf)	-	(ksf)	(kips)	(kips)	(ksf)	(kips)	(kips)	(kips)	bpf	(kips)	(kips)
0	0.0	0.0	0.0	57.6	0												
1	0.0	0.0	0.0	57.6	0	0				0.0			0.0	0.0	0	0.0	0.0
2	1.0	0.5	0.5	57.6	29	0	1.2000	0.0346	0.3	0.3	0.0000	0.0	0.0	0.3	0	0.0	0.3
3	2.0	1.5	1.5	57.6	86	0	1.2000	0.1037	1.0	1.3	0.0000	0.0	0.0	1.3	0	0.0	1.3
4	3.0	2.5	2.5	57.6	144	0	1.2000	0.1728	1.6	2.9	0.0000	0.0	0.0	2.9	0	0.0	2.9
5	4.0	3.5	3.5	57.6	202	0	1.2000	0.2419	2.3	5.2	0.0000	0.0	0.0	5.2	0	0.0	5.2
6	5.0	4.5	4.5	57.6	259	0	1.2000	0.3110	2.9	8.1	0.0000	0.0	0.0	8.1	0	0.0	8.1
7	6.0	5.5	5.5	57.6	317	0	1.1934	0.3749	3.5	11.7	0.0000	0.0	0.0	11.7	0	0.0	11.7
8	7.0	6.5	6.5	57.6	374	0	1.1558	0.4327	4.1	15.8	0.0000	0.0	0.0	15.8	0	0.0	15.8
9	8.0	7.5	7.5	57.6	432	0	1.1303	0.4853	4.6	20.4	0.0000	0.0	0.0	20.4	0	0.0	20.4
10	9.0	8.5	8.5	57.6	490	0	1.1064	0.5417	5.1	25.5	0.0000	0.0	0.0	25.5	0	0.0	25.5
11	10.0	9.5	9.5	57.6	547	0	1.0839	0.5831	5.6	31.1	0.0000	0.0	0.0	31.1	0	0.0	31.1
12	11.0	10.5	10.5	57.6	605	0	1.0625	0.6426	6.1	37.1	0.0000	0.0	0.0	37.1	0	0.0	37.1
13	12.0	11.5	11.5	57.6	662	0	1.0422	0.6903	6.5	43.6	0.0000	0.0	0.0	43.6	0	0.0	43.6
14	13.0	12.5	12.5	57.6	720	0	1.0227	0.7383	6.9	50.6	0.0000	0.0	0.0	50.6	0	0.0	50.6



3'ø CIDH L=13' (SS 8-1)

AXIAL NOM. RESISTANCE FOR EXIST. SOIL CONDITION(S)

R_u = 43.6 K >> Rq R_u = 10,250 + 2 = 21,502 lbs ... OK

12/12

8/24

Lateral pile results.txt

RESULTS OF LATERAL ANALYSES

Project 11-135, I-5 HOV SEG 1, OH Signs

Client: Parsons

Date/By: 11/7/12 MK

5' Dia. CIDH pile, Standard Plan Soil Condition 1

Load Case No.	Load Type No.	Condition 1 V(lbs) ~~or~~ y(~~inches~~)	Condition 2 in-lb, rad., ~~or in-lb/rad.~~	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians	DEPTH TO MAX. MOM.	DEPTH TO MAX SHEAR
1	1	V = 14234.	M = 4406928.	47132.	0.19168612	4939689.	-37474.	-0.0014299	15'	5'

367,244 lb-ft

411,640 lb-ft

5' Dia. CIDH pile, Clay Soil Condition 2

Load Case No.	Load Type No.	Condition 1 V(lbs) ~~or~~ y(~~inches~~)	Condition 2 in-lb, rad., ~~or in-lb/rad.~~	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians		
1	1	V = 14234.	M = 4406928.	47132.	0.10096100	4713801.	-37482.	-0.0009305	14'	4'

367,244 lb-ft

~392,820 lb-ft

3' Dia. CIDH pile, Standard Plan Soil Condition 1

Load Case No.	Load Type No.	Condition 1 V(lbs) ~~or~~ y(~~inches~~)	Condition 2 in-lb, rad., ~~or in-lb/rad.~~	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians		
1	1	V = 2561.0000	M = 1225128.	21502.	0.21659779	1266275.	-15403.	-0.0024862	9'	2'

102,094 lb-ft

~105,520 lb-ft

3' Dia. CIDH pile, Existing Clay Soil Condition 2

Load Case No.	Load Type No.	Condition 1 V(lbs) ~~or~~ y(~~inches~~)	Condition 2 in-lb, rad., ~~or in-lb/rad.~~	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians		
1	1	V = 2561.0000	M = 1225128.	21502.	0.07913197	1240871.	-15257.	-0.0012169	8'	1'

102,094 lb-ft

~103,400 lb-ft

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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Problem Title

5' Dia. CIDH pile, Standard Plan Soil Condition 1

Project 11-135, I-5 HOV SEG 1, OH Signs

Client: Parsons

Date/By: 11/7/12 MK

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 22.00 ft

Depth of ground surface below top of pile = 0.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over
the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	60.0000000
2	22.000000	60.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	22.000 in
Top Width	=	60.000 in
Bottom Width	=	60.000 in
Top Area	=	2827.000000 sq. in
Bottom Area	=	2827.000000 sq. in
Moment of Inertia at Top	=	3.181E+05 in^4
Moment of Inertia at Bottom	=	3.181E+05 in^4
Elastic Modulus	=	3600000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 1 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 0.000 ft
Distance from top of pile to bottom of layer = 50.000 ft
p-y subgrade modulus k for top of soil layer = 60.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 60.000 lbs/in**3

(Depth of lowest layer extends 28.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 2 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	0.00	120.00000
2	50.00	120.00000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	kpy pci	Rock Emass psi	krm	Test Type	Depth Test Prop. ft	Eff. Unit Wt., pcf	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50
1	Sand (Reese, et al.)	60.000	--	--	--	0.00	120.000	--	30.000	--	--	--
		60.000	--	--	--	50.000	120.000	--	30.000	--	--	--

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 14234.000 lbs	M = 4406928.000 in-lbs	47132.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 14234.000 lbs
Applied moment at pile head = 4406928.000 in-lbs

11/24

5' CIDH pile, Soil 1.lp6o

Axial thrust load on pile head = 47132.000 lbs

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.1917	4406928.	14234.	-0.001430	432.3207	1.145E+12	0.000	0.000	0.000
2.640	0.1879	4444683.	14195.	-0.001420	435.8816	1.145E+12	-29.7673	418.1760	0.000
5.280	0.1842	4482229.	14078.	-0.001409	439.4229	1.145E+12	-58.3515	836.3520	0.000
7.920	0.1805	4519368.	13888.	-0.001399	442.9257	1.145E+12	-85.7655	1254.5280	0.000
10.560	0.1768	4555907.	13627.	-0.001389	446.3719	1.145E+12	-112.0226	1672.7040	0.000
13.200	0.1732	4591664.	13298.	-0.001378	449.7445	1.145E+12	-137.1360	2090.8800	0.000
15.840	0.1695	4626464.	12904.	-0.001367	453.0267	1.145E+12	-161.1189	2509.0560	0.000
18.480	0.1659	4660140.	12449.	-0.001357	456.2029	1.145E+12	-183.9851	2927.2320	0.000
21.120	0.1624	4692532.	11935.	-0.001346	459.2581	1.145E+12	-205.7480	3345.4080	0.000
23.760	0.1588	4723489.	11364.	-0.001335	462.1778	1.145E+12	-226.4214	3763.5840	0.000
26.400	0.1553	4752867.	10740.	-0.001324	464.9486	1.145E+12	-246.0193	4181.7600	0.000
29.040	0.1518	4780528.	10066.	-0.001313	467.5576	1.145E+12	-264.5556	4599.9360	0.000
31.680	0.1484	4806344.	9344.9488	-0.001302	469.9925	1.145E+12	-282.0443	5018.1120	0.000
34.320	0.1450	4830194.	8578.6307	-0.001291	472.2419	1.145E+12	-298.4997	5436.2880	0.000
36.960	0.1416	4851961.	7770.2158	-0.001280	474.2949	1.145E+12	-313.9359	5854.4640	0.000
39.600	0.1382	4871539.	6922.3758	-0.001269	476.1414	1.145E+12	-328.3672	6272.6400	0.000
42.240	0.1349	4888827.	6037.7447	-0.001257	477.7720	1.145E+12	-341.8079	6690.8160	0.000
44.880	0.1316	4903731.	5118.9185	-0.001246	479.1777	1.145E+12	-354.2725	7108.9920	0.000
47.520	0.1283	4916165.	4168.4553	-0.001235	480.3504	1.145E+12	-365.7753	7527.1680	0.000
50.160	0.1250	4926048.	3188.8752	-0.001223	481.2825	1.145E+12	-376.3308	7945.3440	0.000
52.800	0.1218	4933306.	2182.6602	-0.001212	481.9672	1.145E+12	-385.9533	8363.5200	0.000
55.440	0.1186	4937874.	1152.2542	-0.001201	482.3979	1.145E+12	-394.6573	8781.6960	0.000
58.080	0.1155	4939689.	100.0633	-0.001189	482.5692	1.145E+12	-402.4570	9199.8720	0.000
60.720	0.1124	4938698.	-971.5444	-0.001178	482.4757	1.145E+12	-409.3669	9618.0480	0.000
63.360	0.1093	4934853.	-2060.2384	-0.001166	482.1130	1.145E+12	-415.4012	10036.	0.000
66.000	0.1062	4928110.	-3163.7259	-0.001155	481.4771	1.145E+12	-420.5741	10454.	0.000
68.640	0.1032	4918435.	-4279.7514	-0.001144	480.5646	1.145E+12	-424.8997	10873.	0.000
71.280	0.1002	4905798.	-5406.0964	-0.001132	479.3726	1.145E+12	-428.3920	11291.	0.000
73.920	0.0972	4890173.	-6540.5794	-0.001121	477.8989	1.145E+12	-431.0648	11709.	0.000
76.560	0.0942	4871543.	-7681.0552	-0.001110	476.1418	1.145E+12	-432.9320	12127.	0.000
79.200	0.0913	4849893.	-8825.4149	-0.001099	474.0999	1.145E+12	-434.0071	12545.	0.000
81.840	0.0884	4825218.	-9971.5852	-0.001088	471.7726	1.145E+12	-434.3036	12963.	0.000
84.480	0.0856	4797514.	-11118.	-0.001076	469.1596	1.145E+12	-433.8348	13382.	0.000
87.120	0.0828	4766785.	-12261.	-0.001065	466.2614	1.145E+12	-432.6137	13800.	0.000
89.760	0.0800	4733040.	-13401.	-0.001054	463.0786	1.145E+12	-430.6531	14218.	0.000
92.400	0.0772	4696292.	-14534.	-0.001044	459.6126	1.145E+12	-427.9658	14636.	0.000
95.040	0.0745	4656559.	-15659.	-0.001033	455.8652	1.145E+12	-424.5642	15054.	0.000
97.680	0.0717	4613867.	-16775.	-0.001022	451.8385	1.145E+12	-420.4604	15473.	0.000
100.320	0.0691	4568242.	-17879.	-0.001012	447.5354	1.145E+12	-415.6663	15891.	0.000
102.960	0.0664	4519719.	-18969.	-0.001001	442.9588	1.145E+12	-410.1935	16309.	0.000
105.600	0.0638	4468336.	-20044.	-0.000991	438.1125	1.145E+12	-404.0535	16727.	0.000
108.240	0.0612	4414136.	-21101.	-0.000980	433.0005	1.145E+12	-397.2571	17145.	0.000
110.880	0.0586	4357166.	-22140.	-0.000970	427.6273	1.145E+12	-389.8153	17563.	0.000
113.520	0.0560	4297477.	-23159.	-0.000960	421.9976	1.145E+12	-381.7383	17982.	0.000
116.160	0.0535	4235127.	-24155.	-0.000951	416.1169	1.145E+12	-373.0363	18400.	0.000
118.800	0.0510	4170176.	-25127.	-0.000941	409.9909	1.145E+12	-363.7189	18818.	0.000
121.440	0.0486	4102688.	-26075.	-0.000931	403.6257	1.145E+12	-353.7956	19236.	0.000
124.080	0.0461	4032734.	-26995.	-0.000922	397.0278	1.145E+12	-343.2753	19654.	0.000
126.720	0.0437	3960386.	-27886.	-0.000913	390.2041	1.145E+12	-332.1666	20072.	0.000
129.360	0.0413	3885721.	-28748.	-0.000904	383.1620	1.145E+12	-320.4779	20491.	0.000
132.000	0.0389	3808822.	-29578.	-0.000895	375.9091	1.145E+12	-308.2170	20909.	0.000
134.640	0.0366	3729774.	-30374.	-0.000886	368.4535	1.145E+12	-295.3912	21327.	0.000
137.280	0.0342	3648666.	-31137.	-0.000878	360.8036	1.145E+12	-282.0078	21745.	0.000
139.920	0.0319	3565591.	-31863.	-0.000869	352.9682	1.145E+12	-268.0733	22163.	0.000
142.560	0.0296	3480647.	-32551.	-0.000861	344.9566	1.145E+12	-253.5939	22582.	0.000
145.200	0.0274	3393934.	-33201.	-0.000853	336.7781	1.145E+12	-238.5755	23000.	0.000
147.840	0.0251	3305558.	-33810.	-0.000846	328.4427	1.145E+12	-223.0234	23418.	0.000
150.480	0.0229	3215627.	-34378.	-0.000838	319.9606	1.145E+12	-206.9427	23836.	0.000
153.120	0.0207	3124252.	-34902.	-0.000831	311.3424	1.145E+12	-190.3378	24254.	0.000
155.760	0.0185	3031549.	-35382.	-0.000824	302.5990	1.145E+12	-173.2128	24672.	0.000
158.400	0.0164	2937639.	-35816.	-0.000817	293.7416	1.145E+12	-155.5714	25091.	0.000
161.040	0.0142	2842644.	-36203.	-0.000810	284.7819	1.145E+12	-137.4169	25509.	0.000
163.680	0.0121	2746689.	-36541.	-0.000804	275.7318	1.145E+12	-118.7521	25927.	0.000
166.320	0.009979	2649907.	-36829.	-0.000797	266.6036	1.145E+12	-99.5793	26345.	0.000
168.960	0.007882	2552430.	-37066.	-0.000791	257.4098	1.145E+12	-79.9006	26763.	0.000
171.600	0.005800	2454395.	-37250.	-0.000786	248.1634	1.145E+12	-59.7175	27181.	0.000
174.240	0.003733	2355943.	-37381.	-0.000780	238.8778	1.145E+12	-39.0312	27600.	0.000
176.880	0.001681	2257218.	-37456.	-0.000775	229.5663	1.145E+12	-17.8423	28018.	0.000
179.520	-0.000357	2158369.	-37474.	-0.000770	220.2431	1.145E+12	3.8488	28436.	0.000
182.160	-0.002383	2059546.	-37435.	-0.000765	210.9224	1.145E+12	26.0420	28854.	0.000
184.800	-0.004396	1960903.	-37336.	-0.000760	201.6188	1.145E+12	48.7380	29272.	0.000
187.440	-0.006396	1862600.	-37177.	-0.000756	192.3471	1.145E+12	71.9373	29690.	0.000
190.080	-0.008386	1764797.	-36956.	-0.000752	183.1226	1.145E+12	95.6413	30109.	0.000
192.720	-0.0104	1667661.	-36671.	-0.000748	173.9610	1.145E+12	119.8513	30527.	0.000
195.360	-0.0123	1571360.	-36322.	-0.000744	164.8781	1.145E+12	144.5693	30945.	0.000
198.000	-0.0143	1476065.	-35907.	-0.000740	155.8902	1.145E+12	169.7973	31363.	0.000
200.640	-0.0162	1381954.	-35425.	-0.000737	147.0139	1.145E+12	195.5378	31781.	0.000
203.280	-0.0182	1289205.	-34874.	-0.000734	138.2661	1.145E+12	221.7936	32200.	0.000
205.920	-0.0201	1198001.	-34253.	-0.000731	129.6641	1.145E+12	248.5675	32618.	0.000
208.560	-0.0220	1108530.	-33561.	-0.000728	121.2254	1.145E+12	275.8628	33036.	0.000
211.200	-0.0240	1020981.	-32796.	-0.000726	112.9680	1.145E+12	303.6830	33454.	0.000
213.840	-0.0259	935548.	-31957.	-0.000724	104.9102	1.145E+12	332.0316	33872.	0.000
216.480	-0.0278	852429.	-31042.	-0.000722	97.0707	1.145E+12	360.9125	34290.	0.000
219.120	-0.0297	771825.	-30050.	-0.000720	89.4684	1.145E+12	390.3297	34709.	0.000
221.760	-0.0316	693941.	-28980.	-0.000718	82.1226	1.145E+12	420.2871	35127.	0.000
224.400	-0.0335	618987.	-27831.	-0.000717	75.0531	1.145E+12	450.7890	35545.	0.000
227.040	-0.0354	547174.	-26600.	-0.000715	68.2799	1.145E+12	481.8395	35963.	0.000
229.680	-0.0373	478719.	-25286.	-0.000714	61.8235	1.145E+12	513.4428	36381.	0.000
232.320	-0.0391	413842.	-23888.	-0.000713	55.7045	1.145E+12	545.6033	36799.	0.000
234.960	-0.0410	352768.	-22404.	-0.000712	49.9442	1.145E+12	578.3251	37218.	0.000
237.600	-0.0429	295725.	-20834.	-0.000711	44.5640	1.145E+12	611.6122	37636.	0.000
240.240	-0.0448	242944.	-19174.	-0.000711	39.5859	1.145E+12	645.4687	38054.	0.000
242.880	-0.0467	194662.	-17425.	-0.000710	35.0320	1.145E+12	679.8984	38472.	0.000
245.520	-0.0485	151118.	-15584.	-0.000710	30.9251	1.145E+12	714.9049	38890.	0.000
248.160	-0.0504	112557.	-13649.	-0.000710	27.2882	1.145E+12	750.4916	39309.	0.000
250.800	-0.0523	79227.	-11620.	-0.000709	24.1445	1.145E+12	786.6616	39727.	0.000
253.440	-0.0541	51379.	-9494.9281	-0.000709	21.5180	1.145E+12	823.4177	40145.	0.000
256.080	-0.0560	29270.	-7271.8106	-0.000709	19.4328	1.145E+12	860.7622	40563.	0.000
258.720	-0.0579	13160.	-4949.3242	-0.000709	17.9133	1.145E+12	898.6971	40981.	0.000
261.360	-0.0598	3314.1298	-2525.9086	-0.000709	16.9847	1.145E+12	937.2238	41399.	0.000

264.000	-0.0616	0.000	0.000	-0.000709	16.6721	1.145E+12	976.3433	20909.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
The above values of total stress are computed for combined axial stress and do not equal the
actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.1916861 inches
Computed slope at pile head	=	-0.0014299 radians
Maximum bending moment	=	4939689. inch-lbs
Maximum shear force	=	-37474. lbs
Depth of maximum bending moment	=	58.0800000 inches below pile head
Depth of maximum shear force	=	179.5200000 inches below pile head
Number of iterations	=	5
Number of zero deflection points	=	1

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 14234.	M = 4406928.	47132.	0.19168612	4939689.	-37474.	-0.00000000

The analysis ended normally.

-0.0014299

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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Problem Title

5' Dia. CIDH pile, Clay Soil Condition 2

Project 11-135, I-5 HOV SEG 1, OH Signs

Client: Parsons

Date/By: 11/7/12 MK

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:

- Number of pile increments	=	100	
- Maximum number of iterations allowed	=	100	
- Deflection tolerance for convergence	=	1.0000E-05	in
- Maximum allowable deflection	=	100.0000	in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections	=	1	
Total Pile Length	=	22.00	ft
Depth of ground surface below top of pile	=	0.00	ft
Slope angle of ground surface	=	0.00	deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	60.0000000
2	22.000000	60.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile	
Cross-sectional Shape	=	Circular	
Section Length	=	22.000	in
Top Width	=	60.000	in
Bottom Width	=	60.000	in
Top Area	=	2827.000000	sq. in
Bottom Area	=	2827.000000	sq. in
Moment of Inertia at Top	=	3.181E+05	in^4
Moment of Inertia at Bottom	=	3.181E+05	in^4
Elastic Modulus	=	3600000.000	lbs/in

5' ø CIDH
SOIL CONDITION (2)

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees = 0.000 radians

Pile Batter Angle = 0.000 degrees = 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 1 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 0.000 ft
Distance from top of pile to bottom of layer = 50.000 ft

(Depth of lowest layer extends 28.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 2 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	0.00	120.00000
2	50.00	120.00000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	kpy Rock Emass psi	krm	Test Type	Depth Test Prop. ft	Eff. Unit Wt., pcf	Elas. Subgr. pci	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50
1	Soft Clay	--	--	--	0.00	120.000	--	1000.000	--	--	--	0.00500
--	--	--	--	--	50.000	120.000	--	1000.000	--	--	--	0.00500

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 14234.000 lbs	M = 4406928.000 in-lbs	47132.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 14234.000 lbs
Applied moment at pile head = 4406928.000 in-lbs
Axial thrust load on pile head = 47132.000 lbs

5' CIDH pile, Soil 2.lp6o

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.1010	4406928.	14234.	-0.000930	432.3207	1.145E+12	-320.3356	4188.1818	0.000
2.640	0.0985	4443505.	13385.	-0.000920	435.7705	1.145E+12	-322.8569	8651.6415	0.000
5.280	0.0961	4477830.	12529.	-0.000910	439.0079	1.145E+12	-325.2799	8935.7008	0.000
7.920	0.0937	4509887.	11668.	-0.000900	442.0314	1.145E+12	-327.6037	9228.9322	0.000
10.560	0.0914	4539659.	10800.	-0.000889	444.8395	1.145E+12	-329.8276	9531.7490	0.000
13.200	0.0890	4567131.	9926.2819	-0.000879	447.4305	1.145E+12	-331.9507	9844.5893	0.000
15.840	0.0867	4592288.	9047.2636	-0.000868	449.8033	1.145E+12	-333.9722	10168.	0.000
18.480	0.0844	4615116.	8163.0439	-0.000858	451.9564	1.145E+12	-335.8912	10502.	0.000
21.120	0.0822	4635602.	7273.8947	-0.000847	453.8886	1.145E+12	-337.7067	10848.	0.000
23.760	0.0800	4653733.	6380.0903	-0.000836	455.5986	1.145E+12	-339.4178	11206.	0.000
26.400	0.0778	4669497.	5481.9076	-0.000825	457.0855	1.145E+12	-341.0236	11576.	0.000
29.040	0.0756	4682883.	4579.6263	-0.000815	458.3480	1.145E+12	-342.5229	11960.	0.000
31.680	0.0735	4693881.	3673.5289	-0.000804	459.3852	1.145E+12	-343.9146	12358.	0.000
34.320	0.0714	4702480.	2763.9007	-0.000793	460.1962	1.145E+12	-345.1977	12771.	0.000
36.960	0.0693	4708671.	1851.0303	-0.000782	460.7802	1.145E+12	-346.3708	13198.	0.000
39.600	0.0672	4712448.	935.2095	-0.000771	461.1364	1.145E+12	-347.4328	13643.	0.000
42.240	0.0652	4713801.	16.7336	-0.000760	461.2641	1.145E+12	-348.3823	14104.	0.000
44.880	0.0632	4712725.	-904.0985	-0.000750	461.1626	1.145E+12	-349.2178	14584.	0.000
47.520	0.0613	4709214.	-1826.9838	-0.000739	460.8314	1.145E+12	-349.9378	15082.	0.000
50.160	0.0593	4703263.	-2751.6154	-0.000728	460.2701	1.145E+12	-350.5407	15601.	0.000
52.800	0.0574	4694867.	-3677.6820	-0.000717	459.4782	1.145E+12	-351.0248	16142.	0.000
55.440	0.0555	4684023.	-4604.8672	-0.000706	458.4555	1.145E+12	-351.3882	16705.	0.000
58.080	0.0537	4670729.	-5532.8500	-0.000695	457.2016	1.145E+12	-351.6290	17293.	0.000
60.720	0.0519	4654982.	-6461.3037	-0.000685	455.7164	1.145E+12	-351.7450	17906.	0.000
63.360	0.0501	4636783.	-7389.8960	-0.000674	454.0000	1.145E+12	-351.7340	18547.	0.000
66.000	0.0483	4616131.	-8318.2881	-0.000663	452.0521	1.145E+12	-351.5934	19217.	0.000
68.640	0.0466	4593028.	-9246.1344	-0.000653	449.8731	1.145E+12	-351.3205	19919.	0.000
71.280	0.0449	4567474.	-10173.	-0.000642	447.4629	1.145E+12	-350.9126	20653.	0.000
73.920	0.0432	4539474.	-11099.	-0.000632	444.8220	1.145E+12	-350.3665	21424.	0.000
76.560	0.0415	4509030.	-12023.	-0.000621	441.9506	1.145E+12	-349.6787	22234.	0.000
79.200	0.0399	4476148.	-12945.	-0.000611	438.8493	1.145E+12	-348.8456	23085.	0.000
81.840	0.0383	4440833.	-13865.	-0.000601	435.5185	1.145E+12	-347.8629	23981.	0.000
84.480	0.0367	4403092.	-14781.	-0.000590	431.9589	1.145E+12	-346.7264	24926.	0.000
87.120	0.0352	4362934.	-15695.	-0.000580	428.1713	1.145E+12	-345.4311	25923.	0.000
89.760	0.0337	4320367.	-16605.	-0.000570	424.1565	1.145E+12	-343.9715	26978.	0.000
92.400	0.0322	4275401.	-17511.	-0.000560	419.9155	1.145E+12	-342.3417	28096.	0.000
95.040	0.0307	4228048.	-18412.	-0.000550	415.4493	1.145E+12	-340.5352	29282.	0.000
97.680	0.0293	4178321.	-19309.	-0.000541	410.7591	1.145E+12	-338.5444	30544.	0.000
100.320	0.0278	4126233.	-20200.	-0.000531	405.8463	1.145E+12	-336.3614	31889.	0.000
102.960	0.0265	4071799.	-21084.	-0.000522	400.7123	1.145E+12	-333.9768	33327.	0.000
105.600	0.0251	4015036.	-21963.	-0.000512	395.3586	1.145E+12	-331.3805	34867.	0.000
108.240	0.0238	3955963.	-22834.	-0.000503	389.7870	1.145E+12	-328.5607	36522.	0.000
110.880	0.0224	3894599.	-23697.	-0.000494	383.9993	1.145E+12	-325.5043	38305.	0.000
113.520	0.0211	3830965.	-24552.	-0.000485	377.9975	1.145E+12	-322.1965	40235.	0.000
116.160	0.0199	3765084.	-25398.	-0.000477	371.7838	1.145E+12	-318.6199	42330.	0.000
118.800	0.0186	3696981.	-26234.	-0.000468	365.3606	1.145E+12	-314.7548	44616.	0.000
121.440	0.0174	3626684.	-27060.	-0.000460	358.7303	1.145E+12	-310.5784	47121.	0.000
124.080	0.0162	3554221.	-27874.	-0.000451	351.8958	1.145E+12	-306.0639	49882.	0.000
126.720	0.0150	3479624.	-28675.	-0.000443	344.8601	1.145E+12	-301.1796	52944.	0.000
129.360	0.0139	3402927.	-29463.	-0.000435	337.6262	1.145E+12	-295.8880	56365.	0.000
132.000	0.0127	3324166.	-30237.	-0.000427	330.1977	1.145E+12	-290.1438	60218.	0.000
134.640	0.0116	3243383.	-30995.	-0.000420	322.5785	1.145E+12	-283.8918	64600.	0.000
137.280	0.0105	3160620.	-31735.	-0.000412	314.7725	1.145E+12	-277.0635	69640.	0.000
139.920	0.009424	3075925.	-32457.	-0.000405	306.7843	1.145E+12	-269.5726	75518.	0.000
142.560	0.008363	2989350.	-33157.	-0.000398	298.6188	1.145E+12	-261.3078	82486.	0.000
145.200	0.007321	2900953.	-33835.	-0.000392	290.2815	1.145E+12	-252.1214	90919.	0.000
147.840	0.006296	2810798.	-34487.	-0.000385	281.7784	1.145E+12	-241.8113	101394.	0.000
150.480	0.005288	2718957.	-35110.	-0.000379	273.1162	1.145E+12	-230.0884	114862.	0.000
153.120	0.004297	2625512.	-35699.	-0.000372	264.3027	1.145E+12	-216.5146	133015.	0.000
155.760	0.003322	2530557.	-36250.	-0.000366	255.3468	1.145E+12	-200.3711	159229.	0.000
158.400	0.002362	2434204.	-36752.	-0.000361	246.2591	1.145E+12	-180.3260	201516.	0.000
161.040	0.001417	2336595.	-37193.	-0.000355	237.0529	1.145E+12	-153.3434	285595.	0.000
163.680	0.000487	2237915.	-37473.	-0.000350	227.7457	1.145E+12	-59.3156	321685.	0.000
166.320	-0.000430	2138822.	-37482.	-0.000345	218.3995	1.145E+12	52.8527	324279.	0.000
168.960	-0.001334	2040096.	-37209.	-0.000340	209.0880	1.145E+12	153.9405	304574.	0.000
171.600	-0.002226	1942443.	-36763.	-0.000336	199.8777	1.145E+12	184.0254	218254.	0.000
174.240	-0.003106	1846072.	-36246.	-0.000331	190.7882	1.145E+12	207.2548	176172.	0.000
176.880	-0.003974	1751145.	-35673.	-0.000327	181.8349	1.145E+12	226.7698	150634.	0.000
179.520	-0.004832	1657797.	-35052.	-0.000323	173.0307	1.145E+12	243.9132	133256.	0.000
182.160	-0.005680	1566150.	-34388.	-0.000319	164.3867	1.145E+12	259.3977	120563.	0.000
184.800	-0.006518	1476309.	-33684.	-0.000316	155.9133	1.145E+12	273.6517	110831.	0.000
187.440	-0.007348	1388376.	-32944.	-0.000313	147.6196	1.145E+12	286.9551	103102.	0.000
190.080	-0.008169	1302442.	-32170.	-0.000309	139.5146	1.145E+12	299.5018	96796.	0.000
192.720	-0.008982	1218595.	-31364.	-0.000307	131.6064	1.145E+12	311.4322	91542.	0.000
195.360	-0.009787	1136918.	-30526.	-0.000304	123.9029	1.145E+12	322.8519	87088.	0.000
198.000	-0.0106	1057491.	-29660.	-0.000301	116.4116	1.145E+12	333.8420	83259.	0.000
200.640	-0.0114	980391.	-28764.	-0.000299	109.1397	1.145E+12	344.4668	79927.	0.000
203.280	-0.0122	905691.	-27841.	-0.000297	102.0942	1.145E+12	354.7778	76999.	0.000
205.920	-0.0129	833463.	-26891.	-0.000295	95.2819	1.145E+12	364.8172	74403.	0.000
208.560	-0.0137	763778.	-25915.	-0.000293	88.7094	1.145E+12	374.6201	72083.	0.000
211.200	-0.0145	696704.	-24914.	-0.000291	82.3832	1.145E+12	384.2158	69996.	0.000
213.840	-0.0153	632307.	-23887.	-0.000290	76.3095	1.145E+12	393.6290	68108.	0.000
216.480	-0.0160	570654.	-22835.	-0.000288	70.4945	1.145E+12	402.8812	66389.	0.000
219.120	-0.0168	511808.	-21760.	-0.000287	64.9443	1.145E+12	411.9907	64818.	0.000
221.760	-0.0175	455833.	-20660.	-0.000286	59.6650	1.145E+12	420.9734	63375.	0.000
224.400	-0.0183	402793.	-19537.	-0.000285	54.6623	1.145E+12	429.8431	62044.	0.000
227.040	-0.0190	352748.	-18391.	-0.000284	49.9422	1.145E+12	438.6122	60813.	0.000
229.680	-0.0198	305760.	-17221.	-0.000283	45.5105	1.145E+12	447.2913	59669.	0.000
232.320	-0.0205	261889.	-16029.	-0.000283	41.3727	1.145E+12	455.8899	58604.	0.000
234.960	-0.0213	221196.	-14814.	-0.000282	37.5346	1.145E+12	464.4166	57609.	0.000
237.600	-0.0220	183739.	-13577.	-0.000282	34.0018	1.145E+12	472.8789	56677.	0.000
240.240	-0.0228	149578.	-12318.	-0.000281	30.7799	1.145E+12	481.2833	55802.	0.000
242.880	-0.0235	118772.	-11036.	-0.000281	27.8743	1.145E+12	489.6359	54979.	0.000
245.520	-0.0243	91377.	-9732.5001	-0.000281	25.2905	1.145E+12	497.9421	54202.	0.000
248.160	-0.0250	67454.	-8407.0237	-0.000281	23.0341	1.145E+12	506.2066	53469.	0.000
250.800	-0.0257	47058.	-7059.7786	-0.000280	21.1105	1.145E+12	514.4336	52774.	0.000
253.440	-0.0265	30248.	-5690.8585	-0.000280	19.5250	1.145E+12	522.6270	52116.	0.000
256.080	-0.0272	17080.	-4300.3481	-0.000280	18.2830	1.145E+12	530.7900	51491.	0.000
258.720	-0.0280	7611.8924	-2888.3234	-0.000280	17.3900	1.145E+12	538.9257	50897.	0.000
261.360	-0.0287	1899.6334	-1454.8532	-0.000280	16.8513	1.145E+12	547.0366	50331.	0.000
264.000	-0.0294	0.000	0.000	-0.000280	16.6721	1.145E+12	555.1250	24896.	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.1009610 inches
Computed slope at pile head	=	-0.0009305 radians
Maximum bending moment	=	4713801. inch-lbs
Maximum shear force	=	-37482. lbs
Depth of maximum bending moment	=	42.2400000 inches below pile head
Depth of maximum shear force	=	166.3200000 inches below pile head
Number of iterations	=	23
Number of zero deflection points	=	1

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 14234.	M = 4406928.	47132.	0.10096100	4713801.	-37482.	0.00000000

The analysis ended normally.

-0.0009305

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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Problem Title

3' Dia. CIDH pile, Standard Plan Soil Condition 1

Project 11-135, I-5 HOV SEG 1, OH Signs

Client: Parsons

Date/By: 11/8/12 MK

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment
Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:
- Number of pile increments = 100
- Maximum number of iterations allowed = 100
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and
  soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections = 1

Total Pile Length = 13.00 ft

Depth of ground surface below top of pile = 0.00 ft

Slope angle of ground surface = 0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over
the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	36.0000000
2	13.000000	36.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	13.000 in
Top Width	=	36.000 in
Bottom Width	=	36.000 in
Top Area	=	1018.000000 sq. in
Bottom Area	=	1018.000000 sq. in
Moment of Inertia at Top	=	4.122E+04 in^4
Moment of Inertia at Bottom	=	4.122E+04 in^4
Elastic Modulus	=	3600000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
= 0.000 radians

Pile Batter Angle = 0.000 degrees
= 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 1 layers

Layer 1 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer = 0.000 ft
Distance from top of pile to bottom of layer = 50.000 ft
p-y subgrade modulus k for top of soil layer = 50.000 lbs/in**3
p-y subgrade modulus k for bottom of layer = 50.000 lbs/in**3

(Depth of lowest layer extends 37.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 2 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	0.00	120.00000
2	50.00	120.00000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	kpy pci	Rock Emass psi	krm	Test Type	Depth Test Prop. ft	Eff. Unit Wt., pcf	Elas. Subgr. pci	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50
1	Sand (Reese, et al.)	50.000	--	--	--	0.00	120.000	--	--	30.000	--	--	--
		50.000	--	--	--	50.000	120.000	--	--	30.000	--	--	--

Loading Type

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p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 2561.000 lbs	M = 1225128.000 in-lbs	21502.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

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Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

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Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 2561.000 lbs
Applied moment at pile head = 1225128.000 in-lbs
Axial thrust load on pile head = 21502.000 lbs

Depth	Deflect.	Bending	Shear	Slope	Total	Bending	Soil Res.	Soil Spr.	Distrib.

3' CIDH pile, Soil 1.lp6o

X inches	y inches	Moment in-lbs	Force lbs	S radians	Stress psi*	Stiffness lb-in^2	p lb/in	Es*h lb/inch	Lat. Load lb/inch
0.00	0.2166	1225128.	2561.0000	-0.002486	556.0862	1.484E+11	0.000	0.000	0.000
1.560	0.2127	1229206.	2548.0575	-0.002473	557.8671	1.484E+11	-16.5929	121.6800	0.000
3.120	0.2089	1233244.	2509.6984	-0.002460	559.6301	1.484E+11	-32.5855	243.3600	0.000
4.680	0.2051	1237202.	2446.8555	-0.002447	561.3583	1.484E+11	-47.9824	365.0400	0.000
6.240	0.2012	1241042.	2360.4541	-0.002434	563.0354	1.484E+11	-62.7886	486.7200	0.000
7.800	0.1975	1244730.	2251.4122	-0.002421	564.6455	1.484E+11	-77.0087	608.4000	0.000
9.360	0.1937	1248229.	2120.6405	-0.002408	566.1736	1.484E+11	-90.6475	730.0800	0.000
10.920	0.1899	1251508.	1969.0418	-0.002395	567.6051	1.484E+11	-103.7098	851.7600	0.000
12.480	0.1862	1254533.	1797.5118	-0.002382	568.9263	1.484E+11	-116.2005	973.4400	0.000
14.040	0.1825	1257276.	1606.9385	-0.002369	570.1238	1.484E+11	-128.1243	1095.1200	0.000
15.600	0.1788	1259706.	1398.2022	-0.002355	571.1849	1.484E+11	-139.4863	1216.8000	0.000
17.160	0.1752	1261796.	1172.1759	-0.002342	572.0977	1.484E+11	-150.2911	1338.4800	0.000
18.720	0.1715	1263520.	929.7248	-0.002329	572.8505	1.484E+11	-160.5437	1460.1600	0.000
20.280	0.1679	1264853.	671.7066	-0.002316	573.4325	1.484E+11	-170.2489	1581.8400	0.000
21.840	0.1643	1265771.	398.9714	-0.002302	573.8335	1.484E+11	-179.4116	1703.5200	0.000
23.400	0.1607	1266252.	112.3617	-0.002289	574.0435	1.484E+11	-188.0367	1825.2000	0.000
24.960	0.1572	1266275.	-187.2876	-0.002276	574.0536	1.484E+11	-196.1291	1946.8800	0.000
26.520	0.1536	1265821.	-499.1493	-0.002262	573.8550	1.484E+11	-203.6936	2068.5600	0.000
28.080	0.1501	1264870.	-822.4035	-0.002249	573.4398	1.484E+11	-210.7350	2190.2400	0.000
29.640	0.1466	1263405.	-1156.2382	-0.002236	572.8005	1.484E+11	-217.2582	2311.9200	0.000
31.200	0.1431	1261412.	-1499.8487	-0.002223	571.9301	1.484E+11	-223.2680	2433.6000	0.000
32.760	0.1397	1258875.	-1852.4378	-0.002209	570.8222	1.484E+11	-228.7693	2555.2800	0.000
34.320	0.1362	1255781.	-2213.2158	-0.002196	569.4711	1.484E+11	-233.7666	2676.9600	0.000
35.880	0.1328	1252117.	-2581.4004	-0.002183	567.8713	1.484E+11	-238.2650	2798.6400	0.000
37.440	0.1294	1247873.	-2956.2168	-0.002170	566.0182	1.484E+11	-242.2689	2920.3200	0.000
39.000	0.1260	1243039.	-3336.8973	-0.002157	563.9074	1.484E+11	-245.7831	3042.0000	0.000
40.560	0.1227	1237607.	-3722.6817	-0.002144	561.5352	1.484E+11	-248.8122	3163.6800	0.000
42.120	0.1194	1231568.	-4112.8166	-0.002131	558.8985	1.484E+11	-251.3608	3285.3600	0.000
43.680	0.1160	1224918.	-4506.5562	-0.002118	555.9944	1.484E+11	-253.4335	3407.0400	0.000
45.240	0.1127	1217650.	-4903.1613	-0.002105	552.8209	1.484E+11	-255.0346	3528.7200	0.000
46.800	0.1095	1209761.	-5301.8999	-0.002092	549.3761	1.484E+11	-256.1687	3650.4000	0.000
48.360	0.1062	1201248.	-5702.0468	-0.002079	545.6590	1.484E+11	-256.8401	3772.0800	0.000
49.920	0.1030	1192110.	-6102.8835	-0.002067	541.6687	1.484E+11	-257.0531	3893.7600	0.000
51.480	0.0998	1182346.	-6503.6981	-0.002054	537.4051	1.484E+11	-256.8118	4015.4400	0.000
53.040	0.0966	1171956.	-6903.7854	-0.002042	532.8684	1.484E+11	-256.1206	4137.1200	0.000
54.600	0.0934	1160943.	-7302.4464	-0.002030	528.0593	1.484E+11	-254.9833	4258.8000	0.000
56.160	0.0902	1149309.	-7698.9885	-0.002018	522.9791	1.484E+11	-253.4041	4380.4800	0.000
57.720	0.0871	1137058.	-8092.7254	-0.002006	517.6295	1.484E+11	-251.3868	4502.1600	0.000
59.280	0.0840	1124194.	-8482.9765	-0.001994	512.0125	1.484E+11	-248.9352	4623.8400	0.000
60.840	0.0809	1110725.	-8869.0674	-0.001982	506.1309	1.484E+11	-246.0531	4745.5200	0.000
62.400	0.0778	1096656.	-9250.3293	-0.001970	499.9875	1.484E+11	-242.7441	4867.2000	0.000
63.960	0.0747	1081996.	-9626.0988	-0.001959	493.5861	1.484E+11	-239.0117	4988.8800	0.000
65.520	0.0717	1066754.	-9995.7181	-0.001948	486.9305	1.484E+11	-234.8593	5110.5600	0.000
67.080	0.0687	1050940.	-10359.	-0.001936	480.0252	1.484E+11	-230.2903	5232.2400	0.000
68.640	0.0656	1034565.	-10714.	-0.001925	472.8750	1.484E+11	-225.3078	5353.9200	0.000
70.200	0.0627	1017642.	-11061.	-0.001915	465.4852	1.484E+11	-219.9149	5475.6000	0.000
71.760	0.0597	1000183.	-11400.	-0.001904	457.8616	1.484E+11	-214.1147	5597.2800	0.000
73.320	0.0567	982202.	-11729.	-0.001894	450.0103	1.484E+11	-207.9099	5718.9600	0.000
74.880	0.0538	963715.	-12048.	-0.001883	441.9378	1.484E+11	-201.3033	5840.6400	0.000
76.440	0.0508	944739.	-12357.	-0.001873	433.6514	1.484E+11	-194.2976	5962.3200	0.000
78.000	0.0479	925288.	-12654.	-0.001864	425.1583	1.484E+11	-186.8951	6084.0000	0.000
79.560	0.0450	905383.	-12939.	-0.001854	416.4664	1.484E+11	-179.0983	6205.6800	0.000
81.120	0.0421	885042.	-13212.	-0.001845	407.5841	1.484E+11	-170.9094	6327.3600	0.000
82.680	0.0393	864284.	-13472.	-0.001835	398.5201	1.484E+11	-162.3304	6449.0400	0.000
84.240	0.0364	843131.	-13719.	-0.001826	389.2834	1.484E+11	-153.3634	6570.7200	0.000
85.800	0.0336	821604.	-13951.	-0.001818	379.8836	1.484E+11	-144.0102	6692.4000	0.000
87.360	0.0307	799727.	-14168.	-0.001809	370.3307	1.484E+11	-134.2724	6814.0800	0.000
88.920	0.0279	777523.	-14369.	-0.001801	360.6349	1.484E+11	-124.1516	6935.7600	0.000
90.480	0.0251	755016.	-14555.	-0.001793	350.8071	1.484E+11	-113.6492	7057.4400	0.000
92.040	0.0223	732232.	-14724.	-0.001785	340.8584	1.484E+11	-102.7666	7179.1200	0.000
93.600	0.0196	709198.	-14875.	-0.001777	330.8004	1.484E+11	-91.5049	7300.8000	0.000
95.160	0.0168	685941.	-15009.	-0.001770	320.6450	1.484E+11	-79.8650	7422.4800	0.000
96.720	0.0140	662490.	-15124.	-0.001763	310.4047	1.484E+11	-67.8479	7544.1600	0.000
98.280	0.0113	638873.	-15220.	-0.001756	300.0921	1.484E+11	-55.4543	7665.8400	0.000
99.840	0.008551	615121.	-15297.	-0.001750	289.7206	1.484E+11	-42.6849	7787.5200	0.000
101.400	0.005826	591265.	-15353.	-0.001743	279.3036	1.484E+11	-29.5400	7909.2000	0.000
102.960	0.003112	567337.	-15389.	-0.001737	268.8551	1.484E+11	-16.0200	8030.8800	0.000
104.520	0.000407	543369.	-15403.	-0.001731	258.3895	1.484E+11	-2.1252	8152.5600	0.000
106.080	-0.002290	519397.	-15395.	-0.001726	247.9215	1.484E+11	12.1443	8274.2400	0.000
107.640	-0.004977	495453.	-15364.	-0.001720	237.4664	1.484E+11	26.7887	8395.9200	0.000
109.200	-0.007657	471575.	-15311.	-0.001715	227.0396	1.484E+11	41.8080	8517.6000	0.000
110.760	-0.0103	447798.	-15234.	-0.001710	216.6573	1.484E+11	57.2024	8639.2800	0.000
112.320	-0.0130	424160.	-15132.	-0.001706	206.3356	1.484E+11	72.9725	8760.9600	0.000
113.880	-0.0157	400700.	-15006.	-0.001702	196.0914	1.484E+11	89.1186	8882.6400	0.000
115.440	-0.0183	377456.	-14854.	-0.001697	185.9419	1.484E+11	105.6414	9004.3200	0.000
117.000	-0.0209	354470.	-14676.	-0.001694	175.9045	1.484E+11	122.5416	9126.0000	0.000
118.560	-0.0236	331781.	-14471.	-0.001690	165.9974	1.484E+11	139.8199	9247.6800	0.000
120.120	-0.0262	309433.	-14239.	-0.001687	156.2387	1.484E+11	157.4772	9369.3600	0.000
121.680	-0.0288	287467.	-13980.	-0.001683	146.6474	1.484E+11	175.5144	9491.0400	0.000
123.240	-0.0315	265929.	-13691.	-0.001681	137.2425	1.484E+11	193.9327	9612.7200	0.000
124.800	-0.0341	244863.	-13374.	-0.001678	128.0436	1.484E+11	212.7331	9734.4000	0.000
126.360	-0.0367	224314.	-13027.	-0.001675	119.0708	1.484E+11	231.9168	9856.0800	0.000
127.920	-0.0393	204330.	-12650.	-0.001673	110.3444	1.484E+11	251.4849	9977.7600	0.000
129.480	-0.0419	184957.	-12242.	-0.001671	101.8852	1.484E+11	271.4388	10099.	0.000
131.040	-0.0445	166245.	-11803.	-0.001669	93.7144	1.484E+11	291.7798	10221.	0.000
132.600	-0.0471	148243.	-11332.	-0.001668	85.8537	1.484E+11	312.5091	10343.	0.000
134.160	-0.0497	131002.	-10828.	-0.001666	78.3250	1.484E+11	333.6281	10464.	0.000
135.720	-0.0523	114572.	-10291.	-0.001665	71.1509	1.484E+11	355.1382	10586.	0.000
137.280	-0.0549	99007.	-9719.5143	-0.001664	64.3541	1.484E+11	377.0406	10708.	0.000
138.840	-0.0575	84359.	-9113.9399	-0.001663	57.9579	1.484E+11	399.3369	10830.	0.000
140.400	-0.0601	70683.	-8473.2752	-0.001662	51.9861	1.484E+11	422.0281	10951.	0.000
141.960	-0.0627	58034.	-7796.9030	-0.001661	46.4628	1.484E+11	445.1157	11073.	0.000
143.520	-0.0653	46468.	-7084.2041	-0.001661	41.4125	1.484E+11	468.6008	11195.	0.000
145.080	-0.0679	36042.	-6334.5575	-0.001660	36.8601	1.484E+11	492.4846	11316.	0.000
146.640	-0.0705	26815.	-5547.3404	-0.001660	32.8310	1.484E+11	516.7681	11438.	0.000
148.200	-0.0731	18846.	-4721.9284	-0.001660	29.3511	1.484E+11	541.4524	11560.	0.000
149.760	-0.0757	12194.	-3857.6956	-0.001660	26.4466	1.484E+11	566.5383	11681.	0.000
151.320	-0.0782	6921.3869	-2954.0149	-0.001659	24.1441	1.484E+11	592.0266	11803.	0.000
152.880	-0.0808	3089.1635	-2010.2582	-0.001659	22.4707	1.484E+11	617.9179	11925.	0.000
154.440	-0.0834	760.7040	-1025.7964	-0.001659	21.4540	1.484E+11	644.2126	12046.	0.000
156.000	-0.0860	0.000	0.000	-0.001659	21.1218	1.484E+11	670.9110	6084.0000	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.

The above values of total stress are computed for combined axial stress and do not equal the actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.2165978 inches
Computed slope at pile head	=	-0.0024862 radians
Maximum bending moment	=	1266275. inch-lbs
Maximum shear force	=	-15403. lbs
Depth of maximum bending moment	=	24.9600000 inches below pile head
Depth of maximum shear force	=	104.5200000 inches below pile head
Number of iterations	=	5
Number of zero deflection points	=	1

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 2561.0000	M = 1225128.	21502.	0.21659779	1266275.	-15403.	-0.00000000

The analysis ended normally.

-0.0024862

LPile Plus for Windows, Version 6.0 (6.0.09)

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method

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Problem Title

3' Dia. CIDH pile, Existing Clay Soil Condition 2

Project 11-135, I-5 HOV SEG 1, OH Signs

Client: Parsons

Date/By: 11/8/12 MK

3' Ø CIDH

SOIL CONDITION (2)

Program Options

Units Used - US Customary Units: pounds, inches, feet

Basic Program Options:

This analysis computes nonlinear bending stiffness and nominal Moment Capacity with Pile Response Computed Using Nonlinear EI

Computation Options:
- Only internally-generated p-y curves used in analysis
- Analysis does not use p-y multipliers (individual pile or shaft action only)
- Analysis assumes no shear resistance at pile tip
- Analysis for fixed-length pile or shaft only
- No computation of foundation stiffness matrix elements
- Output pile response for full length of pile
- Analysis assumes no soil movements acting on pile
- No p-y curves to be computed and output for user-specified depths

Solution Control Parameters:

- Number of pile increments	=	100	
- Maximum number of iterations allowed	=	100	
- Deflection tolerance for convergence	=	1.0000E-05	in
- Maximum allowable deflection	=	100.0000	in

Pile Response Output Options:
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1

Pile Structural Properties and Geometry

Total Number of Sections	=	1
Total Pile Length	=	13.00 ft
Depth of ground surface below top of pile	=	0.00 ft
Slope angle of ground surface	=	0.00 deg.

Pile dimensions used for p-y curve computations defined using 2 points.
p-y curves are computed using values of pile diameter interpolated over the length of the pile.

Point	Depth X ft	Pile Diameter in
1	0.00000	36.0000000
2	13.000000	36.0000000

Input Structural Properties:

Section No. 1:

Section Type	=	Elastic Pile
Cross-sectional Shape	=	Circular
Section Length	=	13.000 in
Top Width	=	36.000 in
Bottom Width	=	36.000 in
Top Area	=	1018.000000 sq. in
Bottom Area	=	1018.000000 sq. in
Moment of Inertia at Top	=	4.122E+04 in^4
Moment of Inertia at Bottom	=	4.122E+04 in^4
Elastic Modulus	=	3600000.000 lbs/in

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees = 0.000 radians

Pile Batter Angle = 0.000 degrees = 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 1 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 0.000 ft
Distance from top of pile to bottom of layer = 50.000 ft

(Depth of lowest layer extends 37.00 ft below pile tip)

Effective Unit Weight of Soil vs. Depth

Effective unit weight of soil with depth defined using 2 points

Point No.	Depth X ft	Eff. Unit Weight pcf
1	0.00	120.00000
2	50.00	120.00000

Summary of Soil Properties

Layer Num.	Soil Type (p-y Curve Criteria)	kpy	Rock Emass	krm	Test Type	Depth Test Prop. ft	Eff. Unit Wt., pcf	Elas. Subgr. pci	Cohesion psf	Friction Ang., deg.	qu psi	RQD percent	Epsilon 50
		pci	psi										
1	Soft Clay	--	--	--	--	0.00	120.000	1000.000	--	--	--	--	0.00500
		--	--	--	--	50.000	120.000	1000.000	--	--	--	--	0.00500

Loading Type

p-y criteria for static loading was used for all analyses.

Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs
1	1	V = 2561.000 lbs	M = 1225128.000 in-lbs	21502.000

Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust values were determined from pile-head loading conditions

Number of Sections = 1

Section No. 1:

Moment-Curvature properties derived from elastic section properties

Computed Values of Pile Loading and Deflection for Lateral Loading for Load Case Number 1

Pile-head conditions are Shear and Moment (BC Type 1)

Horizontal shear force at pile head = 2561.000 lbs
Applied moment at pile head = 1225128.000 in-lbs
Axial thrust load on pile head = 21502.000 lbs

3' CIDH pile, Soil 2.lp6o

Depth X inches	Deflect. y inches	Bending Moment in-lbs	Shear Force lbs	Slope S radians	Total Stress psi*	Bending Stiffness lb-in^2	Soil Res. p lb/in	Soil Spr. Es*h lb/inch	Distrib. Lat. Load lb/inch
0.00	0.0791	1225128.	2561.0000	-0.001217	556.0862	1.484E+11	-210.1096	2071.0402	0.000
1.560	0.0772	1228908.	2232.5236	-0.001204	557.7369	1.484E+11	-211.0140	4261.6073	0.000
3.120	0.0754	1232174.	1902.6763	-0.001191	559.1631	1.484E+11	-211.8671	4384.8891	0.000
4.680	0.0735	1234924.	1571.5387	-0.001178	560.3639	1.484E+11	-212.6683	4512.0961	0.000
6.240	0.0717	1237156.	1239.1921	-0.001165	561.3386	1.484E+11	-213.4171	4643.4090	0.000
7.800	0.0699	1238869.	905.7189	-0.001152	562.0863	1.484E+11	-214.1128	4779.0202	0.000
9.360	0.0681	1240060.	571.2021	-0.001139	562.6063	1.484E+11	-214.7549	4919.1346	0.000
10.920	0.0663	1240727.	235.7261	-0.001126	562.8979	1.484E+11	-215.3426	5063.9705	0.000
12.480	0.0646	1240871.	-100.6240	-0.001113	562.9604	1.484E+11	-215.8754	5213.7612	0.000
14.040	0.0629	1240488.	-437.7618	-0.001100	562.7934	1.484E+11	-216.3525	5368.7561	0.000
15.600	0.0612	1239579.	-775.5998	-0.001087	562.3962	1.484E+11	-216.7731	5529.2222	0.000
17.160	0.0595	1238141.	-1114.0492	-0.001074	561.7686	1.484E+11	-217.1364	5695.4457	0.000
18.720	0.0578	1236175.	-1453.0201	-0.001061	560.9099	1.484E+11	-217.4416	5867.7341	0.000
20.280	0.0562	1233679.	-1792.4210	-0.001048	559.8201	1.484E+11	-217.6878	6046.4181	0.000
21.840	0.0545	1230653.	-2132.1591	-0.001035	558.4987	1.484E+11	-217.8739	6231.8540	0.000
23.400	0.0529	1227096.	-2472.1398	-0.001022	556.9456	1.484E+11	-217.9989	6424.4264	0.000
24.960	0.0514	1223008.	-2812.2672	-0.001009	555.1606	1.484E+11	-218.0618	6624.5512	0.000
26.520	0.0498	1218389.	-3152.4432	-0.000996	553.1438	1.484E+11	-218.0613	6832.6789	0.000
28.080	0.0482	1213239.	-3492.5681	-0.000984	550.8950	1.484E+11	-217.9963	7049.2985	0.000
29.640	0.0467	1207559.	-3832.5401	-0.000971	548.4144	1.484E+11	-217.8652	7274.9422	0.000
31.200	0.0452	1201347.	-4172.2550	-0.000958	545.7021	1.484E+11	-217.6668	7510.1900	0.000
32.760	0.0437	1194605.	-4511.6066	-0.000946	542.7583	1.484E+11	-217.3993	7755.6758	0.000
34.320	0.0423	1187334.	-4850.4857	-0.000933	539.5832	1.484E+11	-217.0612	8012.0938	0.000
35.880	0.0408	1179535.	-5188.7809	-0.000921	536.1774	1.484E+11	-216.6505	8280.2067	0.000
37.440	0.0394	1171207.	-5526.3773	-0.000908	532.5411	1.484E+11	-216.1654	8560.8540	0.000
39.000	0.0380	1162353.	-5863.1571	-0.000896	528.6750	1.484E+11	-215.6036	8854.9631	0.000
40.560	0.0366	1152974.	-6198.9989	-0.000884	524.5795	1.484E+11	-214.9629	9163.5609	0.000
42.120	0.0352	1143072.	-6533.7776	-0.000872	520.2555	1.484E+11	-214.2406	9487.7887	0.000
43.680	0.0339	1132647.	-6867.3639	-0.000860	515.7036	1.484E+11	-213.4341	9828.9184	0.000
45.240	0.0325	1121703.	-7199.6240	-0.000848	510.9247	1.484E+11	-212.5403	10188.	0.000
46.800	0.0312	1110241.	-7530.4190	-0.000836	505.9198	1.484E+11	-211.5559	10568.	0.000
48.360	0.0299	1098264.	-7859.6049	-0.000825	500.6899	1.484E+11	-210.4773	10969.	0.000
49.920	0.0287	1085775.	-8187.0314	-0.000813	495.2362	1.484E+11	-209.3003	11394.	0.000
51.480	0.0274	1072775.	-8512.5418	-0.000802	489.5599	1.484E+11	-208.0207	11845.	0.000
53.040	0.0262	1059269.	-8835.9720	-0.000791	483.6624	1.484E+11	-206.6334	12324.	0.000
54.600	0.0249	1045260.	-9157.1497	-0.000780	477.5451	1.484E+11	-205.1330	12836.	0.000
56.160	0.0237	1030751.	-9475.8938	-0.000769	471.2097	1.484E+11	-203.5133	13383.	0.000
57.720	0.0225	1015747.	-9792.0128	-0.000758	464.6579	1.484E+11	-201.7675	13969.	0.000
59.280	0.0214	1000251.	-10105.	-0.000747	457.8915	1.484E+11	-199.8879	14599.	0.000
60.840	0.0202	984268.	-10416.	-0.000737	450.9125	1.484E+11	-197.8656	15280.	0.000
62.400	0.0191	967804.	-10723.	-0.000727	443.7231	1.484E+11	-195.6908	16017.	0.000
63.960	0.0179	950863.	-11026.	-0.000716	436.3256	1.484E+11	-193.3520	16819.	0.000
65.520	0.0168	933451.	-11326.	-0.000707	428.7225	1.484E+11	-190.8361	17695.	0.000
67.080	0.0157	915574.	-11621.	-0.000697	420.9165	1.484E+11	-188.1278	18658.	0.000
68.640	0.0147	897239.	-11912.	-0.000687	412.9104	1.484E+11	-185.2092	19722.	0.000
70.200	0.0136	878454.	-12199.	-0.000678	404.7074	1.484E+11	-182.0593	20906.	0.000
71.760	0.0125	859224.	-12480.	-0.000669	396.3107	1.484E+11	-178.6529	22234.	0.000
73.320	0.0115	839560.	-12756.	-0.000660	387.7241	1.484E+11	-174.9593	23737.	0.000
74.880	0.0105	819470.	-13026.	-0.000651	378.9514	1.484E+11	-170.9413	25456.	0.000
76.440	0.009467	798963.	-13289.	-0.000643	369.9970	1.484E+11	-166.5522	27446.	0.000
78.000	0.008471	778051.	-13545.	-0.000634	360.8654	1.484E+11	-161.7325	29786.	0.000
79.560	0.007487	756745.	-13793.	-0.000626	351.5619	1.484E+11	-156.4048	32588.	0.000
81.120	0.006516	735057.	-14033.	-0.000619	342.0920	1.484E+11	-150.4649	36021.	0.000
82.680	0.005557	713004.	-14262.	-0.000611	332.4622	1.484E+11	-143.7673	40356.	0.000
84.240	0.004610	690600.	-14480.	-0.000604	322.6794	1.484E+11	-136.0987	46052.	0.000
85.800	0.003675	667865.	-14686.	-0.000596	312.7519	1.484E+11	-127.1244	53970.	0.000
87.360	0.002750	644821.	-14876.	-0.000589	302.6892	1.484E+11	-116.2655	65963.	0.000
88.920	0.001835	621493.	-15046.	-0.000583	292.5029	1.484E+11	-102.3546	87000.	0.000
90.480	0.000931	597916.	-15190.	-0.000576	282.2077	1.484E+11	-82.2342	137761.	0.000
92.040	3.691E-05	574138.	-15257.	-0.000570	271.8250	1.484E+11	-3.8960	164680.	0.000
93.600	-0.000848	550351.	-15197.	-0.000564	261.4381	1.484E+11	80.8433	148724.	0.000
95.160	-0.001724	526760.	-15054.	-0.000559	251.1370	1.484E+11	103.1455	93341.	0.000
96.720	-0.002591	503421.	-14881.	-0.000553	240.9455	1.484E+11	118.9897	71640.	0.000
98.280	-0.003450	480370.	-14685.	-0.000548	230.8803	1.484E+11	131.8252	59607.	0.000
99.840	-0.004301	457641.	-14471.	-0.000543	220.9551	1.484E+11	142.8685	51817.	0.000
101.400	-0.005145	435258.	-14240.	-0.000538	211.1817	1.484E+11	152.7072	46304.	0.000
102.960	-0.005981	413248.	-13995.	-0.000534	201.5705	1.484E+11	161.6752	42168.	0.000
104.520	-0.006811	391630.	-13736.	-0.000530	192.1310	1.484E+11	169.9823	38934.	0.000
106.080	-0.007634	370426.	-13465.	-0.000526	182.8721	1.484E+11	177.7697	36326.	0.000
107.640	-0.008451	349655.	-13182.	-0.000522	173.8021	1.484E+11	185.1376	34174.	0.000
109.200	-0.009263	329334.	-12888.	-0.000518	164.9287	1.484E+11	192.1598	32363.	0.000
110.760	-0.0101	309480.	-12583.	-0.000515	156.2595	1.484E+11	198.8925	30815.	0.000
112.320	-0.0109	290111.	-12267.	-0.000512	147.8016	1.484E+11	205.3794	29476.	0.000
113.880	-0.0117	271241.	-11942.	-0.000509	139.5619	1.484E+11	211.6555	28303.	0.000
115.440	-0.0125	252886.	-11607.	-0.000506	131.5470	1.484E+11	217.7489	27267.	0.000
117.000	-0.0132	235061.	-11263.	-0.000504	123.7636	1.484E+11	223.6831	26345.	0.000
118.560	-0.0140	217780.	-10909.	-0.000501	116.2177	1.484E+11	229.4772	25517.	0.000
120.120	-0.0148	201058.	-10547.	-0.000499	108.9157	1.484E+11	235.1478	24770.	0.000
121.680	-0.0156	184908.	-10176.	-0.000497	101.8636	1.484E+11	240.7087	24092.	0.000
123.240	-0.0164	169343.	-9795.8788	-0.000495	95.0672	1.484E+11	246.1718	23474.	0.000
124.800	-0.0171	154378.	-9407.6577	-0.000493	88.5324	1.484E+11	251.5476	22906.	0.000
126.360	-0.0179	140024.	-9011.1116	-0.000492	82.2649	1.484E+11	256.8449	22385.	0.000
127.920	-0.0187	126296.	-8606.3567	-0.000491	76.2703	1.484E+11	262.0717	21903.	0.000
129.480	-0.0194	113205.	-8193.4974	-0.000489	70.5541	1.484E+11	267.2350	21456.	0.000
131.040	-0.0202	100765.	-7772.6283	-0.000488	65.1219	1.484E+11	272.3409	21040.	0.000
132.600	-0.0210	88988.	-7343.8345	-0.000487	59.9791	1.484E+11	277.3948	20653.	0.000
134.160	-0.0217	77885.	-6907.1932	-0.000486	55.1311	1.484E+11	282.4017	20290.	0.000
135.720	-0.0225	67470.	-6462.7743	-0.000486	50.5832	1.484E+11	287.3660	19950.	0.000
137.280	-0.0232	57754.	-6010.6415	-0.000485	46.3406	1.484E+11	292.2915	19631.	0.000
138.840	-0.0240	48749.	-5550.8523	-0.000484	42.4086	1.484E+11	297.1818	19330.	0.000
140.400	-0.0247	40468.	-5083.4592	-0.000484	38.7924	1.484E+11	302.0401	19047.	0.000
141.960	-0.0255	32921.	-4608.5099	-0.000483	35.4972	1.484E+11	306.8692	18779.	0.000
143.520	-0.0262	26122.	-4126.0480	-0.000483	32.5280	1.484E+11	311.6717	18525.	0.000
145.080	-0.0270	20080.	-3636.1131	-0.000483	29.8901	1.484E+11	316.4500	18284.	0.000
146.640	-0.0278	14809.	-3138.7413	-0.000483	27.5884	1.484E+11	321.2062	18055.	0.000
148.200	-0.0285	10320.	-2633.9656	-0.000483	25.6281	1.484E+11	325.9422	17837.	0.000
149.760	-0.0293	6623.6529	-2121.8161	-0.000482	24.0141	1.484E+11	330.6597	17630.	0.000
151.320	-0.0300	3732.1489	-1602.3206	-0.000482	22.7515	1.484E+11	335.3603	17432.	0.000
152.880	-0.0308	1656.7764	-1075.5042	-0.000482	21.8453	1.484E+11	340.0453	17243.	0.000
154.440	-0.0315	408.9376	-541.3902	-0.000482	21.3004	1.484E+11	344.7162	17063.	0.000
156.000	-0.0323	0.000	0.000	-0.000482	21.1218	1.484E+11	349.3738	8445.0611	0.000

* This analysis makes computations of pile response using nonlinear moment-curvature relationships.
  The above values of total stress are computed for combined axial stress and do not equal the
  actual stresses in concrete and steel in the range of nonlinear bending.

Output Verification: Computed forces and moments are within specified convergence limits.

Output Summary for Load Case No. 1:

Pile-head deflection	=	0.0791320 inches
Computed slope at pile head	=	-0.0012169 radians
Maximum bending moment	=	1240871. inch-lbs
Maximum shear force	=	-15257. lbs
Depth of maximum bending moment	=	12.4800000 inches below pile head
Depth of maximum shear force	=	92.0400000 inches below pile head
Number of iterations	=	23
Number of zero deflection points	=	1

Summary of Pile Response(s)

Definitions of Pile-Head Loading Conditions:

Load Type 1: Load 1 = Shear, lbs, and Load 2 = Moment, in-lbs
Load Type 2: Load 1 = Shear, lbs, and Load 2 = Slope, radians
Load Type 3: Load 1 = Shear, lbs, and Load 2 = Rotational Stiffness, in-lbs/radian
Load Type 4: Load 1 = Top Deflection, inches, and Load 2 = Moment, in-lbs
Load Type 5: Load 1 = Top Deflection, inches, and Load 2 = Slope, radians

Load Case No.	Load Type No.	Condition 1 V(lbs) or y(inches)	Condition 2 in-lb, rad., or in-lb/rad.	Axial Load lbs	Pile-Head Deflection inches	Maximum Moment in-lbs	Maximum Shear lbs	Pile-Head Rotation radians
1	1	V = 2561.0000	M = 1225128.	21502.	0.07913197	1240871.	-15257.	0.00000000

The analysis ended normally.

-0.0012169

FINAL GEOTECHNICAL DESIGN REPORT

Interstate 5 HOV Improvement Project (Segment 1)
San Clemente, Orange County, California
12-ORA-5, PM 3.0/3.7
Caltrans Project No. 1200020277 (EA 12-0F96B)
EMI Project No. 11-135
Date: October 1, 2012

EARTH MECHANICS, INC.

Geotechnical and Earthquake Engineering

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

October 1, 2012

EMI Project No. 11-135

Parsons
2201 Dupont Drive, Suite 200
Irvine, California 92612

Attention: Mr. David Lew

Subject: Final Geotechnical Design Report for I-5 HOV Improvement Project (Segment 1), San Clemente, California, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B)

Dear Mr. Lew:

Attached please find the Final Geotechnical Design Report for the subject I-5 HOV Improvement Project (Segment 1). The GDR follows 2006 Caltrans Guidelines for Preparing Geotechnical Design Reports. The GDR describes geotechnical conditions in the project area based on information obtained from our literature review, geotechnical field investigation, and laboratory soil testing. This report contains the findings of our geotechnical investigation and laboratory testing and conclusions, and recommendations for the design and construction of the proposed HOV widening improvements. Caltrans review comments and our responses are attached in Appendix D. The comments are incorporated into this Final Report.

We appreciate the opportunity to provide geotechnical design services for this project. If you have any questions, please call us.

Sincerely,
EARTH MECHANICS, INC.

REGISTERED PROFESSIONAL ENGINEER
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FINAL GEOTECHNICAL DESIGN REPORT

INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)
SAN CLEMENTE, ORANGE COUNTY, CA
12-ORA-5, PM 3.0/3.7
CALTRANS PROJECT NO. 1200020277 (EA 12-0F96B)

Prepared for:

Parsons
2201 Dupont Drive, Suite 200
Irvine, California 92612

Prepared By:

Earth Mechanics, Inc.
17800 Newhope Street, Suite B
Fountain Valley, California 92708

EMI Project No. 11-135

October 1, 2012

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

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1.0 INTRODUCTION

This Final Geotechnical Design Report (GDR) presents findings and conclusions of a geotechnical investigation conducted by Earth Mechanics, Inc. (EMI) for proposed improvements for the Interstate 5 (I-5) High-Occupancy Vehicle (HOV) Lanes Improvement Project (Segment 1) located in San Clemente, California. The project location is shown on the Site Location Map in Figure 1. The purpose of the geotechnical investigation was to obtain subsurface information to develop design and construction recommendations to assist Parsons in the preparation of the Project Plans, Specifications, and Estimates (PS&E).

This report follows the requirements for a GDR in accordance with Topic 113 of the California Department of Transportation (Caltrans) Highway Design Manual (HDM, 2012) and is organized in general accordance with Caltrans Guidelines for Preparing Geotechnical Design Reports (2006).

The following geotechnical services were completed for this project:

- Geotechnical field exploration consisting of drilling and logging exploratory borings and cone penetrometer tests,
- Laboratory testing of selected soil/bedrock samples,
- Evaluate stability of proposed cut slopes,
- Evaluate stability and settlement of earthen fill embankments,
- Develop recommendations for earthwork, and
- Preparation of this report presenting our findings, conclusions, and recommendations.

The purpose of this report is to document subsurface geotechnical conditions, provide analyses of anticipated site conditions as they pertain to roadway embankment fills and cuts described herein, and recommend design and construction criteria for these portions of the project. The proposed earth retaining walls are addressed in separate Foundation Reports for Walls (EMI, 2012d, e). Pavement section recommendations and soil corrosion are addressed in the project Materials Report (EMI, 2012b).

This report also establishes a geotechnical baseline to be used in assessing the existence and scope of changed site conditions. This report is intended for use by the project design engineers, construction personnel, bidders, and contractors.

I-5 HOV Improvement Project
Segment 1

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

SITE LOCATION MAP

Figure 1

Project No. 11-135 | Date: 02-22-12

2.0 EXISTING FACILITIES AND PROPOSED IMPROVEMENTS

2.1 EXISTING FEATURES

The I-5 freeway is a major north-south freeway in the State of California that serves local, regional, interstate, and international traffic to and from Canada and Mexico. The project is located along the I-5 corridor in San Clemente and includes the Avenida Pico UC (Bridge No. 55-0207), and two on-ramps and two off-ramp connections to Avenida Pico. The limits along the I-5 corridor are approximately 2,400 ft south to 1,900 ft north of Avenida Pico (I-5 Mainline Sta. 167+00 to 210+00) with a total project length of 4,300 ft. The segment of I-5 within the project limits currently provides 5 general-purpose lanes (four through-lanes and one auxiliary lane) in each direction and inside and outside shoulders.

The existing I-5/Avenida Pico interchange has four ramps (direct NB and SB on-ramps and direct NB and SB off-ramps) with one to three lanes.

2.2 PROPOSED IMPROVEMENTS

The Orange County Transportation Authority (OCTA), in cooperation with Caltrans, and City of San Clemente, proposes to improve a segment of I-5 extending from 0.47 miles south to 0.37 miles north of Avenida Pico (I-5 Mainline Sta. 167+00 to 210+00).

According to the Project Report, the Preferred Alternative provides continuous access HOV lanes along I-5 and improves the Avenida Pico interchange which is a signature access roadway in San Clemente. The Preferred Alternative specifically includes:

- Add one HOV lane per direction on I-5 throughout project limits,
- Reestablish existing auxiliary lanes,
- Replace the existing Avenida Pico Undercrossing (Bridge No. 55-0207),
- Realign the four interchange ramps, and construct two retaining walls along I-5 SB shoulder at Avenida Pico UC, three retaining walls along I-5 SB On- and Off-Ramps, and widen the I-5 NB On-Ramp to three lanes,
- Realign and widen Avenida Pico, including a new EB through lane, new sidewalk and bicycle lanes, and construct a new retaining wall along new WB shoulder to retain a hillside,
- Improve drainage and construct pavement (addressed in a separate project Materials Report by EMI, 2012b), and
- Construct sign structures at multiple locations throughout the project limits (addressed in a separate project Foundation Report for sign structures by EMI, 2012c).

3.0 PERTINENT REPORTS AND INVESTIGATIONS

3.1 PERTINENT REPORTS AND INVESTIGATIONS

The Log-of-Test-Borings (LOTB) sheets included with the as-built plans for the existing Avenida Pico undercrossing bridge were reviewed. However, these existing borings were not used for preparation of this report. They were used in a separate Foundation Report for the proposed Avenida Pico UC bridge replacement (EMI, 2012a).

Soil borings included in soils reports by Leighton and Associates (1980 and 1999) for an existing retaining wall along Avenida Pico were reviewed. However, these borings were not relevant for preparation of this report. They were used for the Foundation Report for the proposed tieback wall for Avenida Pico realignment and widening in a separate Foundation Report (EMI, 2012e).

3.2 RELATED REPORTS PREPARED FOR THE PROPOSED IMPROVEMENTS

A separate Materials Report (EMI, 2012b) was prepared for the project that addresses pavement, and soil corrosion and culvert material recommendations.

Separate Foundation Reports address the Avenida Pico UC bridge replacement, retaining walls, and sign structures (EMI, 2012a, c, d, e). These reports can be referred to for geotechnical information and recommendations pertaining to the specific improvements.

4.0 PHYSICAL SETTING

4.1 CLIMATIC CONDITIONS

Weather in the coastal Orange County area is a Mediterranean-type, semi-arid, climate characterized by warm dry summers and mild winters. A dominating factor in the weather is the semi-permanent north Pacific high pressure system that migrates northward in summer, holding storm tracks well to the north, and as a result southern California receives little or no precipitation during the summers. In winter, the North Pacific high migrates southward permitting storm centers to swing across southern California. These storms generate moderate, but occasionally severe, precipitation events. When changes in the circulation pattern permit storms to approach from a southwesterly direction, the colder northern air masses merge with subtropical air masses and bring copious amounts of moisture with the northeastward streaming air ("pineapple express"). This results in heavy rains and often produces widespread flooding, especially in the spring when it coincides with runoff from melting snow in the mountains.

Summer is a dry period over most of the area. With the northward migration of the Pacific high most storm tracks are deflected far to the north during summer, and southern California seldom receives precipitation from Pacific storms during this time of year. Occasionally, during the summer months, moist air drifts northward from the Gulf of Mexico or the Gulf of California creating monsoonal conditions. At such times, scattered, locally heavy thunder showers occur, mostly in the desert and inland mountain areas.

The average annual high temperature is 73° F and the average low about 52°. The hottest months are July, August, and September when high temperatures average in the high 70's, and low temperatures average in the high 50's. The coolest temperatures are in the winter months of December, January, and February when average highs are in the high 60's and average lows are in the low to mid 40's.

The extreme high temperatures occur during July, August, and September with the record high of 108° in September. These high temperatures are commonly associated with adiabatic heating associated with winds called Santa Ana winds. The extreme low temperatures average about 44° in December through February with a record low of 21°. Freezing occurs occasionally on the winter nights, but is generally of short duration (a couple hours) and does not commonly result in a "hard" freeze.

Annual precipitation averages about 14". The wettest months are November through March with an average of 3.4" in February. Snow is not uncommon in the surrounding high mountains and results in snow-capped peaks for several days; snow fall is extremely rare in the site area.

The prevailing wind direction is from the southwest. Generally these light winds bring cool ocean air that moderates the local climate. A typical weather characteristic in the area results from the juxtaposition of cool marine waters and dry hot desert air. As the moist marine air masses drift over colder water, a bank of fog or low clouds, locally referred to as the "marine layer", sweeps inland a short distance before evaporating. Characteristically, the marine layer extends inland a mile or two and then recedes offshore during the heat of the afternoon. Occasionally the layer may extend to the bordering hills and mountains during the night. During May and June, the marine layer can remain the entire day.

4.2 TOPOGRAPHY AND DRAINAGE

The project area extends 4,300 ft along I-5 in a northwest to southeast direction for a distance of about 1 mile from the southern end of the San Joaquin Hills of south Orange County (Figure 2). The project corridor is in the northwestern portion of the Peninsular Ranges geomorphic province. Elevations along the I-5 stationline decline from about 173 ft above sea level at the north project limit down to about 110 ft at the lowest point at the Avenida Pico Undercrossing, then rise again to about 190 ft at the south project limit. The alignment is along the rolling hills bordering the Santa Ana Mountains which rise to elevations up to 1,675 ft.

Major rivers within south Orange County are San Juan Creek and San Mateo Creek. San Juan Creek originates in the Santa Ana Mountains to the northeast and flows to the Pacific Ocean in Dana Point, just northerly of the project corridor. San Mateo Creek is located southwesterly of the project site. It also originates in the Santa Ana Mountains to the northeast and flows to the Pacific Ocean in San Clemente.

Drainages in proximity to the project area flow from the Santa Ana Mountains on the northeast. The general drainage pattern within the project vicinity is in a southwesterly direction towards the Pacific Ocean. Drainages include, from north to south, San Juan Creek, Prima Deshecha Canada, Segunda Deshecha Canada and San Mateo creeks. Segunda Deshecha Canada passes under the project corridor in the vicinity of Avenida Pico. The Segunda Deshecha is the main natural regional drainage facility that crosses the project site in the area of the Avenida Pico UC and discharges to the Pacific Ocean further downstream. Existing drainage systems within the project limits generally drain to this facility. On-site runoff is collected by drainage systems in the median and on the shoulders which connect to existing cross culverts that discharge to earthen channels or concrete lined trapezoidal channels which parallel the mainline.

4.3 MAN-MADE AND NATURAL FEATURES OF ENGINEERING AND CONSTRUCTION SIGNIFICANCE

4.3.1 Man Made Features

4.3.1.1 Utilities

Based on the project utility plans, numerous utilities exist within the project area. The plans show utilities owned by: PacBell/AT&T (telephone); the City of San Clemente (sewer); Cox Communications (fiber and cable); San Diego Gas & Electric (buried and overhead electrical lines); Southern California Gas (natural gas); South Coast Water District (water); and Tri-Cities Municipal Water District (water). Existing utility lines are shown to be located along the existing Caltrans right-of-way lines (along the mainline and the ramps) and along the local streets that cross the mainline. Caltrans electrical and irrigation lines, not shown on the current plans, are presumed to exist within the project limits.

The major utility lines crossing the I-5 Mainline are:

- 12" Reclaimed water line near I-5 Mainline Sta. 185+25,
- 27" CML (Cement Mortar Lining) steel water line near I-5 Mainline Sta. 185+50, and
- 18" VCP (Vitrified Clay Pipe) sewer line near I-5 Mainline Sta. 201+75.

I-5 HOV Improvement Project, Segment 1

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

REGIONAL MAP OF ACTIVE FAULTS AND PHYSIOGRAPHY

Figure 2

Project No. 11-135

Date: 06-29-12

The utility plans also show the following utilities along Avenida Pico roadway and along the outside shoulders of the mainline and along some of the ramps: 27" CCP (Concrete Cylinder Pipe) water main, 10" to 16" ACP (Asbestos Cement Pipe) water, 21" to 24" CML steel water, 8" sewer and reclaimed water, 2" to 10" gas, electrical, AT&T/PacBell telephone lines, and communication lines.

Most of these utilities are located between Avenida Pico and the south project limit. There are fiber optic lines identified along the mainline outside shoulders and ramps.

Existing utilities should be protected in place or relocated in accordance with the final project plans.

4.3.1.2 Drainage Facilities

Surface water (run-off) sheet flows over existing paved and unpaved surfaces into existing earthen swales, concrete v-ditches, and into grated drop inlets. The existing drainage system along the I-5 mainline and in the existing interchanges, within the project limits, includes 18" and 24" Reinforced Concrete Pipes (RCP) connected to the drop inlets. It is presumed that the Caltrans drainage system ultimately sends water to the local municipal drainage system which ultimately conveys the water into the Segunda Deshecha Canada channel. The Segunda Deshecha Canada channel appears to be the largest drainage feature in the project area; the channel/RCB structure is located approximately 500 ft east of Avenida Pico UC.

Existing drainage culverts, that are anticipated to be exposed due to the proposed construction, should be inspected and any corroded or damaged culverts should be replaced.

Drainage work is expected to involve construction of various size Reinforced Concrete Pipe (RCP) culverts and drainage inlets throughout the length of the project.

4.3.1.3 Fill

Based on data obtained from the field investigation and geologic mapping, fills are present throughout the project site. The existing mainline embankments approaching the bridge as well as on- and off-ramp embankments appear to be composed of artificial fill. The actual thickness of fills throughout the project area is variable and documentation regarding placement of existing fills was not reviewed by EMI. Fill materials encountered in the exploratory boreholes are found to mostly consist of fine-grained soils (mostly clays and silts) which are derived from the on-site terrace deposits and sedimentary bedrock. Occasional clayey and silty sands were identified, but these materials are limited to local areas and may or may not be derived from the local formation.

4.3.2 Natural Features

The bedrock of the Capistrano Formation underlying the site was found to be massive to poorly bedded. Where bedding was observed, the strikes were variable from east to the northeast with shallow dips less than about 10° to the north, east and south. Throughout the project corridor, the dominant structural pattern is high-angle joints and fractures within the Capistrano bedrock. The exposed cuts, during grading for the project, should be inspected by a Certified Engineering Geologist to verify the geologic structure and address any potentially adverse conditions.

Existing slopes are moderately to densely vegetated. Existing vegetation must be removed prior to placing compacted fill. In addition, loose, soft, dry, wet, unstable, or otherwise unsuitable materials should be removed from areas to receive fill.

4.4 REGIONAL GEOLOGY AND SEISMICITY

4.4.1 Physiography

The project area is in the northwestern part of the Peninsular Ranges physiographic province. The Peninsular Ranges comprise a northwest-southeast trending group of fault-bounded ranges between the Salton Trough and the Pacific Ocean. The Santa Ana Mountains, Puente Hills, and San Joaquin Hills are ranges within the Peninsular Ranges.

The site is located on the low lying rolling hills westerly of the Santa Ana Mountains at the southerly end of the San Joaquin Hills in an area referred to as the Capistrano Embayment.

4.4.2 Stratigraphy

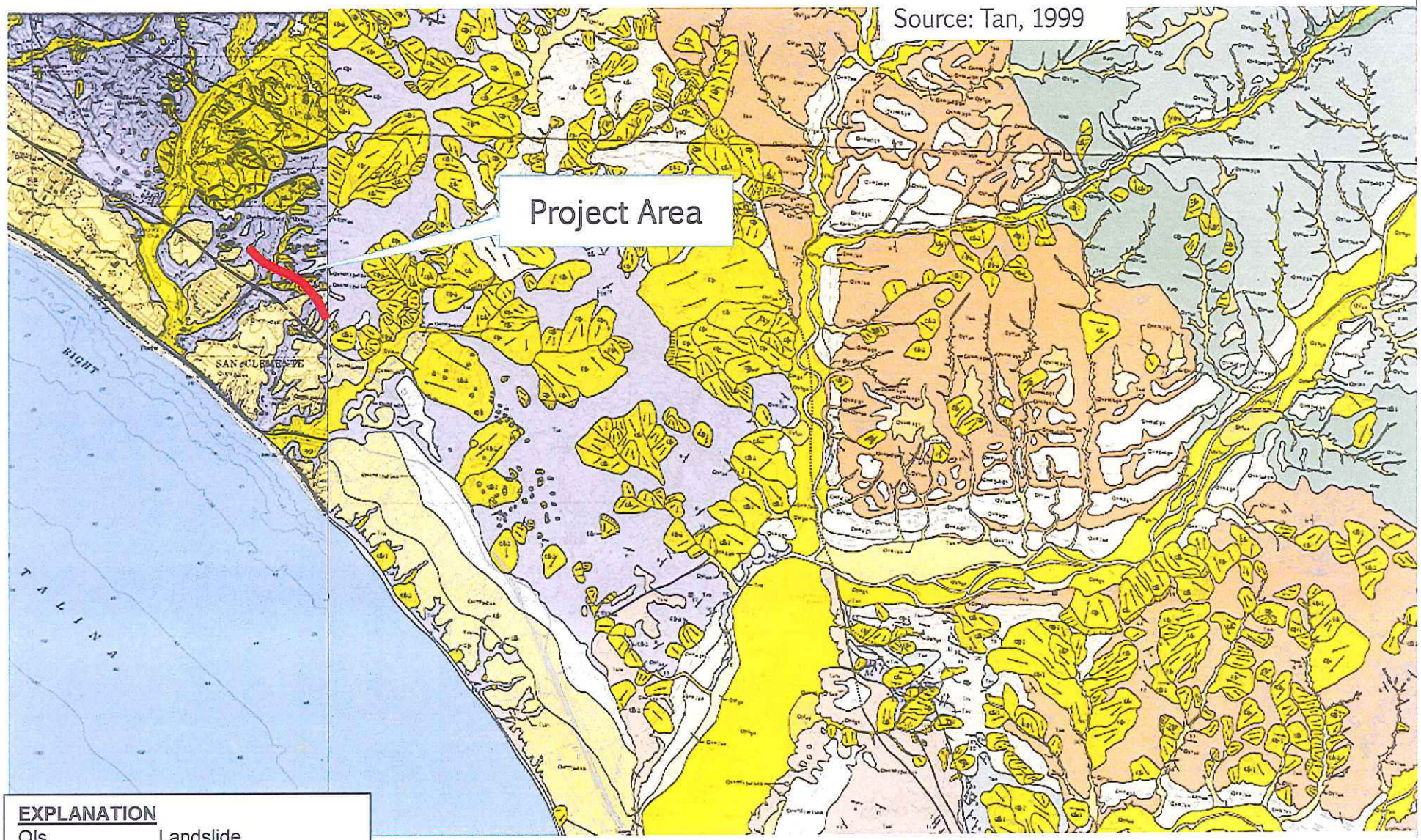
The surficial geologic units are depicted in Figure 3. The geologic units encountered at the site are described as follows:

- Capistrano Formation (Tc): These marine sedimentary deposits generally consist of brown to gray silty claystone, claystone and siltstone. Secondary gypsum is commonly found deposited along joints, fractures and shears. The formation is generally soft when moist and has engineering properties similar to stiff to hard soils. The formation consists generally of soft, weakly cemented to uncemented material that can be disaggregated with finger pressure. A few hard beds occur throughout the formation.

  Within the site area, the Capistrano Formation consists of an oxidized (weathered) zone defined by a light brown to brown color with a mottled appearance, underlain by an unoxidized zone that is generally dark brown to dark gray with a greater degree of induration.

- Undifferentiated Marine and non-marine Terrace Deposits (Qt): Portions of the project area are capped by Terrace Deposits. Shell fragments were found associated with the marine terrace deposits. The terrace deposits were observed to unconformably overlie the bedrock units of the Capistrano Formation directly. These Pleistocene terrace deposits are characterized by a basal cobble sequence fining upward to light brown and yellow brown fine to coarse grained sands, silty sand, sandy silt and clayey silt.

- Landslide Deposits (Qls): The ancient landslide deposits in the vicinity of Avenida Pico consist of displaced blocks of Capistrano Formation bedrock. The lithology of the deposits is similar to the undisturbed bedrock however the degree of weathering and oxidation of the landslide deposits is considerably greater.



EXPLANATION

Qls	Landslide
Qya, Qoa	Alluvium
Qomt	Marine Terrace Deposits
Tcs, Tct	Capistrano Formation

I-5 HOV Improvement Project, Segment 1

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GEOLOGICAL MAP

Figure 3

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- Alluvium (Qal): The drainages and canyons crossing the project corridor are mantled by a relatively thin cover of alluvium. These deposits are generally derived from the surrounding bedrock units and terrace deposits and are located in the lower elevations of the site. Where encountered in the borings the alluvium was observed to consist of silty sand to sandy clay.

- Artificial Fill (Af): Artificial fill placed during construction of the I-5 Freeway and adjacent residential and commercial developments is located along the project corridor. The fill materials were most likely derived from excavation of the Capistrano Formation bedrock and local surficial deposits.

4.4.3 Geologic Structure

The Peninsular Ranges are characterized by northwest-southeast trending mountains and valleys that have been faulted and uplifted by northwest-southwest trending faults. The Capistrano Embayment is a relatively flat structural trough of Miocene to Pliocene age. The trough is bordered on the east by the Cristianitos Fault. Active geologic faults in the region are shown on Figure 2. The California Geological Survey does not show any active faults at the site (Jennings, 2010). The nearest known major active faults are the Newport-Inglewood Structural Zone about 5 miles southwest of the site in the offshore area, the Palos Verdes fault about 19 miles to the west, also in the offshore area, and the Elsinore fault about 35 miles to the northeast. A subsurface fault, the San Joaquin Hills blind thrust, is postulated west of the site at a depth of about 2.5 to 3 miles. These faults are discussed in more detail below. Other nearby faults such as the Cristianitos fault and Mission Viejo faults are about 3.5 to 7 miles east of the site but are not believed to be active.

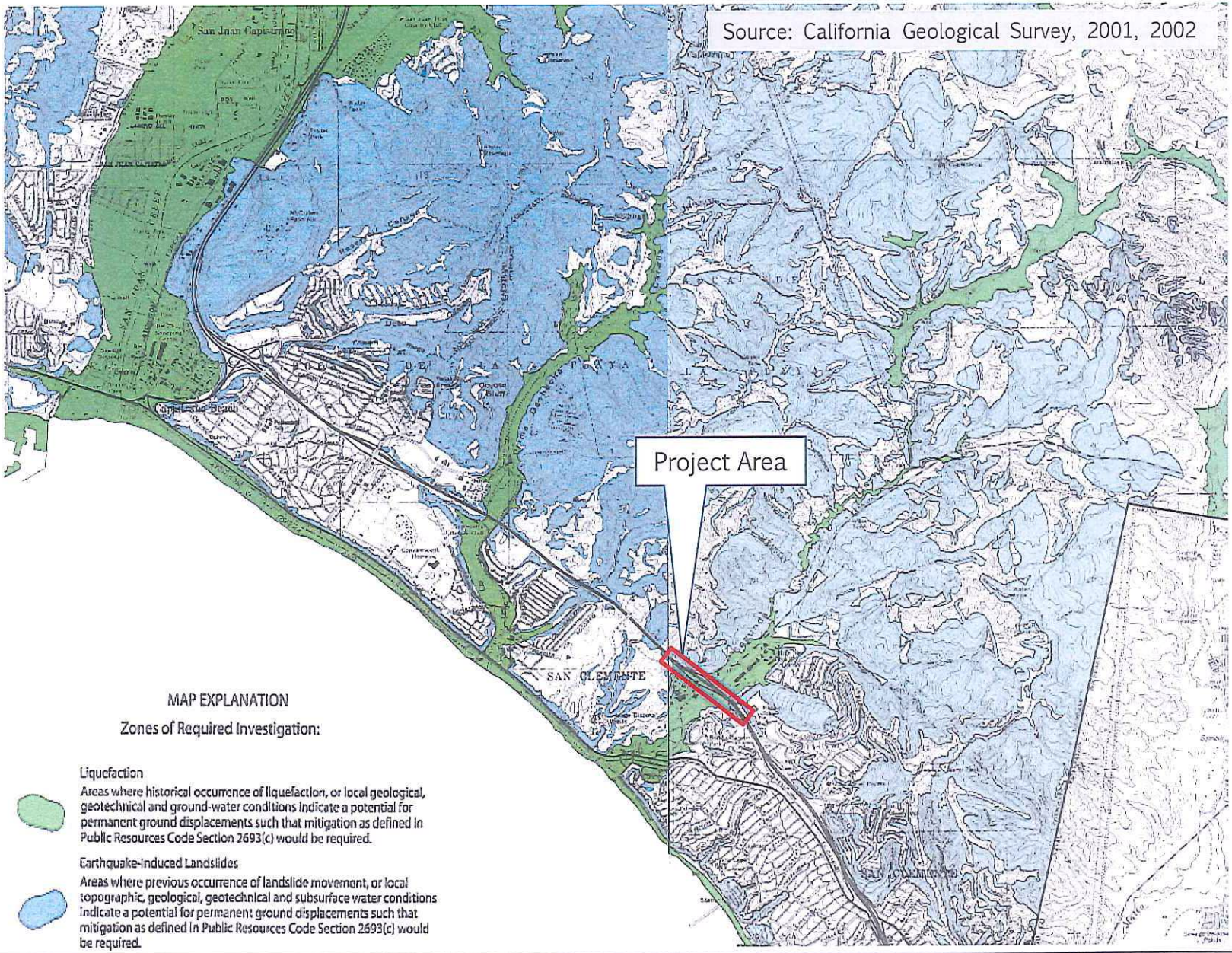
4.4.4 Geologic Hazards

The geological hazards present in the project area include landsliding, liquefaction and earthquake shaking. The area lies outside identified tsunami inundation zones (California Geological Survey, 2009), and there are no large bodies of water within the site area that could generate a standing wave (seiche).

There are no volcanos in the region and there are no known active surface faults within the project area, therefore ground rupture is not a hazard.

The project area is composed of predominantly medium to high-plasticity fine-grained soils (lean and fat clays) and sedimentary bedrock. The California Geological Survey Seismic Hazard Zone map (2002) shows that the site generally has a low liquefaction potential (see Figure 4). The area of the Segunda Deshecha Canada (Avenida Pico) underlain by young alluvium may be susceptible to liquefaction during a strong earthquake.

Several existing landslides have been identified in this area by Leighton and Associates (1980, 1999) during investigations for the tract development at the top of these slopes and the surrounding area. This area is located on the slopes descending to Avenida Pico and the northbound On-Ramp from Avenida Pico.



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I-5 HOV WIDENING PROJECT, SEGMENT 1

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Seismic Hazard Map
Figure 4

A cut of up to 5 ft is proposed along the toe of the slope along the exterior shoulder of NB On-Ramp. Another slope cut and tieback wall is proposed along Avenida Pico roadway. The impact of the existing landslides on these proposed cuts is addressed in Section 8.2. The landslides do not affect the remaining proposed improvements.

4.4.5 Seismicity

The project is in seismically active southern California. The present-day seismotectonic stress field in the Los Angeles region is one of north-northeasterly compression. This is indicated by the geologic structures, by earthquake focal-mechanism solutions, and by geodetic measurements. These data suggest crustal shortening of between 0.2" and 0.35" per year (5 and 9 mm/yr) across the greater Los Angeles area (Argus et al., 1999).

Historical earthquake epicenter maps show widespread seismicity throughout the region. Although historical earthquakes occur in proximity to known faults, they are difficult to directly associate with mapped faults. Part of this difficulty is due to the fact that the basin is underlain by several poorly known subsurface thrust faults, generally referred to as blind thrust faults. Ward (1994) estimated that about 40% of seismic moment cannot be associated with known faults. Earthquakes occur primarily as loose clusters along the Newport-Inglewood Structural Zone, the southern margin of the Santa Monica Mountains, the margin between the Santa Susana-San Fernando Valley and the southern margin of the San Gabriel Mountains, and in the Coyote Hills-Puente Hills area. There is no clustering or alignment of earthquakes in proximity to the site. There are fewer earthquakes in the site region than anywhere else in the Los Angeles Basin area. This apparent lack of earthquake activity suggests that the site area is tectonically stable and suggests that there are no unrecognized active faults at the site.

The largest historical earthquake within the Los Angeles Basin was the 1933 Long Beach event which had a magnitude of about moment magnitude $M_W = 6.4$ ($M_L = 6.3$). This earthquake did not rupture the surface but is believed to have been associated with the Newport-Inglewood Structural Zone (Benioff, 1938). The association was based on abundant ground failures along the NISZ trend but no unequivocal surface rupture was identified. Reevaluation of the seismicity data by Hauksson and Gross (1991) relocated the 1933 earthquake hypocenter to a depth of about 6 miles below the Huntington Beach-Newport Beach city boundary.

Other major earthquakes in the region include the 1994 Northridge and the 1971 San Fernando earthquake both of which occurred in the San Fernando Valley region. The 1994 earthquake had a M_W of about 6.7 ($M_S = 6.8$, $M_L = 6.4$), and occurred on a southerly dipping subsurface fault which was unknown prior to the earthquake. The main shock occurred at a depth of about 11.8 miles. Earthquake aftershocks clearly defined the rupture surface dipping about 35° southerly from a depth of about 1.2 or 1.9 miles to 23 miles (Hauksson et al, 1995). The causative fault was never identified with certainty. The event may have occurred on an eastern extension of the Oakridge fault (Yeats and Huftile, 1995), a southerly dipping feature fault bounding the Ventura Basin and the Santa Susana Mountains.

The 1971 San Fernando earthquake was of similar size ($M_W = 6.7$, $M_S = 6.4$, $M_L = 6.4$) to the 1994 event but did involve surface rupture. The 1971 event occurred on a northerly dipping thrust fault that dips from the northern side of the San Fernando Valley to a depth of about 9.3 miles under the San Gabriel Mountains. Several mapped surface faults were involved such

as the Sylmar fault, Tujunga fault, and Lakeview fault. These faults are commonly considered to be part of the Sierra Madre fault system which extends easterly from the San Fernando Valley, along the base of the San Gabriel Mountains on the north side of the San Gabriel Valley, and to the Cucamonga fault in the San Bernardino area.

The 1987 Whittier earthquake (M_L = 5.9, M_W = 5.9) occurred on a subsurface fault dipping under the Puente Hills to about 10 miles beneath the San Gabriel Basin (Shaw and Shearer, 1999; Shaw et al., 2002). This event did not rupture the ground surface.

A magnitude 5.4 earthquake occurred at a depth of about 9 miles on 29 July 2008. The epicenter was in the Chino Hills area between the Chino fault and the Whittier fault. Preliminary data were inconclusive with regard to the causative fault. Detailed analysis by Shao and Hauksson (2009) indicated a rupture plane striking N71° W, dipping 62° northeast. They suggested a preference for the Whittier fault being the causative fault but were uncertain, primarily because the Whittier fault is supposed to dip much steeper (~80°). The aftershock pattern formed a subhorizontal alignment indicating the possibility that the event could have been associated with a subsurface thrust fault such as one of the blind faults of the Puente Hills Blind Thrust Fault System or with a blind fault under the Peralta Hills.

Another significant earthquake was the 1812 earthquake which caused damage at the San Juan Capistrano Mission. The location and magnitude of the 1812 earthquake are unknown because of the sparse population at the time, but geological studies (Jacoby et al., 1988; Fumal et al., 1993; Weldon et al., 2004) postulate that it did not occur in the Capistrano area, but rather was a large (M>7.0) distant event on the San Andreas fault in the Wrightwood area of the San Gabriel Mountains.

The earliest documented earthquake in the region was reported by the Portola´ expedition as they camped near the Santa Ana River in 1769. This event has been attributed by various geoscientists to just about every fault in the Los Angeles area but it could just as well have been a distant event that shook a wide area as did the 1971 San Fernando, the 1987 Whittier, and the 1994 Northridge events, as well as many other more-distant events (for example, 1992 Landers event).

4.5 SOIL SURVEY MAPPING

USDA soil survey maps (2012) indicate that the existing soils underlying the project area are sandy loam, clay loam and clay soils that contain the mineral montmorillonite which is responsible for soil expansion potential (see Section 7.2.3).

5.0 GEOTECHNICAL EXPLORATION

5.1 DRILLING AND SAMPLING

A geotechnical field investigation was conducted in September to November 2011 for all proposed improvements for Segment 1. The investigation consisted of a total of 26 exploratory borings and 6 cone penetrometer tests (CPT's). Soil exploration information is summarized in Table 1. Approximate locations of borings are shown on Figure 5 to Figure 9. Logs of boring sheets (LOTB's) and CPT logs and interpretations are presented in Appendix A. All locations were surveyed.

Hollow-stem auger (HSA) borings were drilled using a CME 75 truck-mounted drill rig equipped with 8" diameter hollow-stem augers. Sampling was performed by alternating the Modified California Drive (MCD) sampler and Standard Penetration Test (SPT) sampler. The soil sampling interval was 5 ft. Relatively undisturbed soil samples were obtained using a 3.25" outer diameter MCD sampler lined with brass rings. Each of these brass rings is 1" long with a 2.5" outside diameter. The SPT sampler (1.4" inside diameter) was also used to obtain soil samples. The MCD and SPT samplers were driven 18" into the ground or until refusal was encountered using a 140-lb hammer free falling from a height of 30". The numbers of blows to advance the sampler each 6" of penetration were recorded. The number of blows for the final 12" or shorter of driving was recorded on the boring logs. Charts published by Winterkorn and Fang (1975) were used to obtain a reduction factor of 0.5 for this project to convert MCD sampler blowcounts to SPT-equivalent blowcounts.

Hand-auger (HA) borings were manually drilled using a 3" diameter stainless steel auger. Shallow bulk samples were collected from the hand-auger borings.

The CPT used an electronic cone penetrometer in general accordance with current ASTM Standards (ASTM D5778 and D3441). The CPT equipment used hollow sounding rods with a probe with a conical tip with a 60° apex angle and a projected cross sectional area of 1.55 in^2 and a cylindrical friction sleeve with a surface area of 23.25 in^2. The interior of the cone penetrometer is instrumented with strain gauges for cone tip and friction sleeve resistance measurements during penetration. The cone penetrometer assembly is continuously pushed into the soil by a set of hydraulic rams at a standard rate of 0.79" per second while the cone tip resistance and sleeve friction resistance are recorded every 1.967". The 25-ton dead weight of the truck provides the required reaction weight for pushing the rods and is used to transport and house the testing equipment. The computer generated graphical logs include tip resistance, friction resistance, and friction ratio. Soil behavior type interpretations are based on guidelines by Robertson and Campanella (1989).

TABLE 1. SOIL EXPLORATION INFORMATION

Boring	Easting (ft)	Northing (ft)	Top of Boring El. (ft)	Depth (ft)	Groundwater El. (ft)	Drilling Method
A-11-101	6,144,824	2,104,209	+202.7	30.5	NE	HSA
HA-11-102	6,144,546	2,104,728	+178.2	3.0	NE	HA
HA-11-103	6,144,305	2,105,100	+158.4	2.5	NE	HA
A-11-104	6,144,002	2,105,453	+136.5	36.5	NE	HSA
A-11-106	6,143,480	2,105,945	+104.2	31.5	NE	HSA
HA-11-107	6,143,694	2,105,759	+116.7	2.0	NE	HA
A-11-108	6,144,196	2,104,964	+153.8	31.5	NE	HSA
A-11-109	6,143,982	2,105,215	+137.2	70.8	NE	HSA
CPT-11-110	6,143,580	2,105,546	+111.8	81.5	NM	CPT
A-11-111	6,143,220	2,105,740	+95.4	71.5	+50.4	HSA
A-11-112	6,142,953	2,105,842	+88.8	6.5	NE	HSA
A-11-113	6,143,335	2,105,750	+110.9	51.5	NE	HSA
A-11-114	6,143,022	2,105,978	+117.5	101.5	+49.5	HSA
A-11-115	6,143,249	2,106,012	+113.5	100.4	+53.0	HSA
CPT-11-115	6,143,249	2,106,012	+113.5	84.8	NM	CPT
A-11-116	6,142,997	2,106,170	+121.0	89.2	NE	HSA
A-11-117	6,142,778	2,106,149	+125.5	101.4	NE	HSA
A-11-118	6,142,354	2,106,428	+140.4	70.9	NE	HSA
HA-11-119	6,142,687	2,106,380	+132.2	5.0	NE	HA
HA-11-120	6,143,462	2,106,248	+98.0	3.5	NE	HA
HA-11-121	6,142,699	2,105,787	+85.5	2.5	NE	HA
HA-11-122	6,142,622	2,105,661	+81.8	4.0	NE	HA
A-11-124	6,143,375	2,106,283	+97.9	31.5	NE	HSA
CPT-11-125	6,142,946	2,106,286	+111.0	29.0	NM	CPT
A-11-126	6,142,732	2,106,405	+127.0	10.9	NE	HSA
A-11-127	6,142,332	2,106,675	+143.9	6.5	NE	HSA
A-11-128	6,142,681	2,106,063	+92.7	6.5	NE	HSA
CPT-11-129	6,142,417	2,106,285	+118.7	65.6	NM	CPT
A-11-130	6,142,102	2,106,519	+148.1	70.5	NE	HSA
CPT-11-131	6,141,753	2,106,853	+163.9	21.2	NM	CPT
HA-11-132	6,142,045	2,106,652	+151.6	2.0	NE	HA
CPT-11-133	6,141,987	2,106,883	+152.5	27.7	NM	CPT
A-11-134	6,141,524	2,107,086	+170.5	30.8	NE	HSA

Notes: NE=Not Encountered; NM=Not Measured; CPT=Cone Penetration Test; HSA=Hollow-Stem Auger Boring; HA =Hand Auger Boring

5.2 GEOLOGIC MAPPING

Published geological maps (Morton and Miller, 1981; Tan, 1999; Kennedy et al, 2007) show the area is underlain by Pleistocene marine and non-marine terrace deposits (Qt), Quaternary-age

alluvium (Qal) and landslide deposits (Qls) and Miocene to Pliocene-age Capistrano Formation bedrock.

The hillside slopes facing Avenida Pico in the northeast quadrant of the interchange was field-mapped by EMI's Certified Engineering Geologist. The available geologic exposures throughout the area were observed and recorded by the geologist on Figure 5 to Figure 9. Small trenches were hand-dug at various locations for the purpose of evaluating geologic exposures. More details can be found in the project Foundation Report for the proposed tieback wall along Avenida Pico (EMI, 2012d).

5.3 GEOPHYSICAL STUDIES

Geophysical studies were not conducted in the project area as part of this investigation.

5.4 INSTRUMENTATION

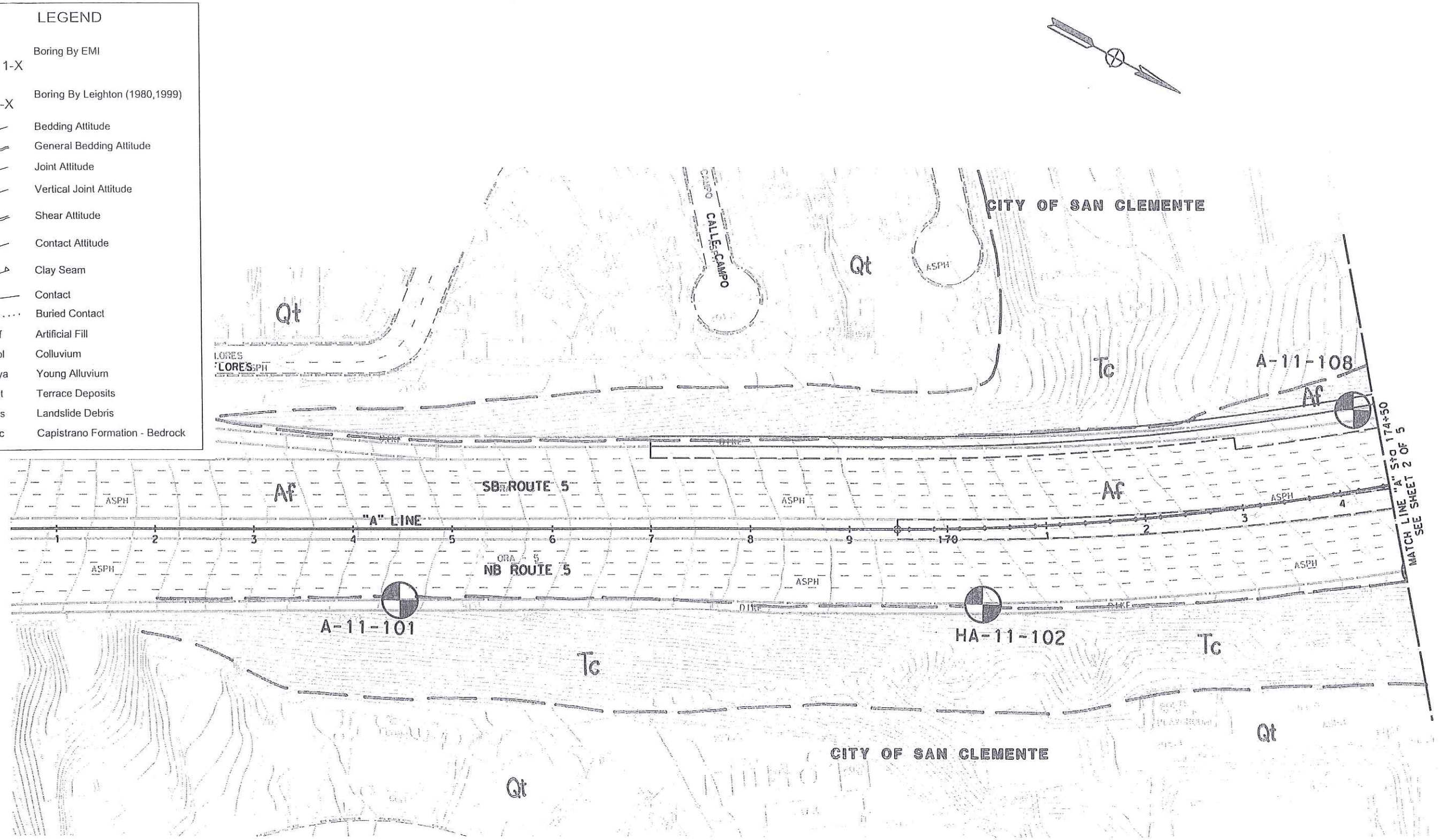
Instrumentation was not necessary and therefore not installed for the field investigation program.

5.5 EXPLORATION NOTES

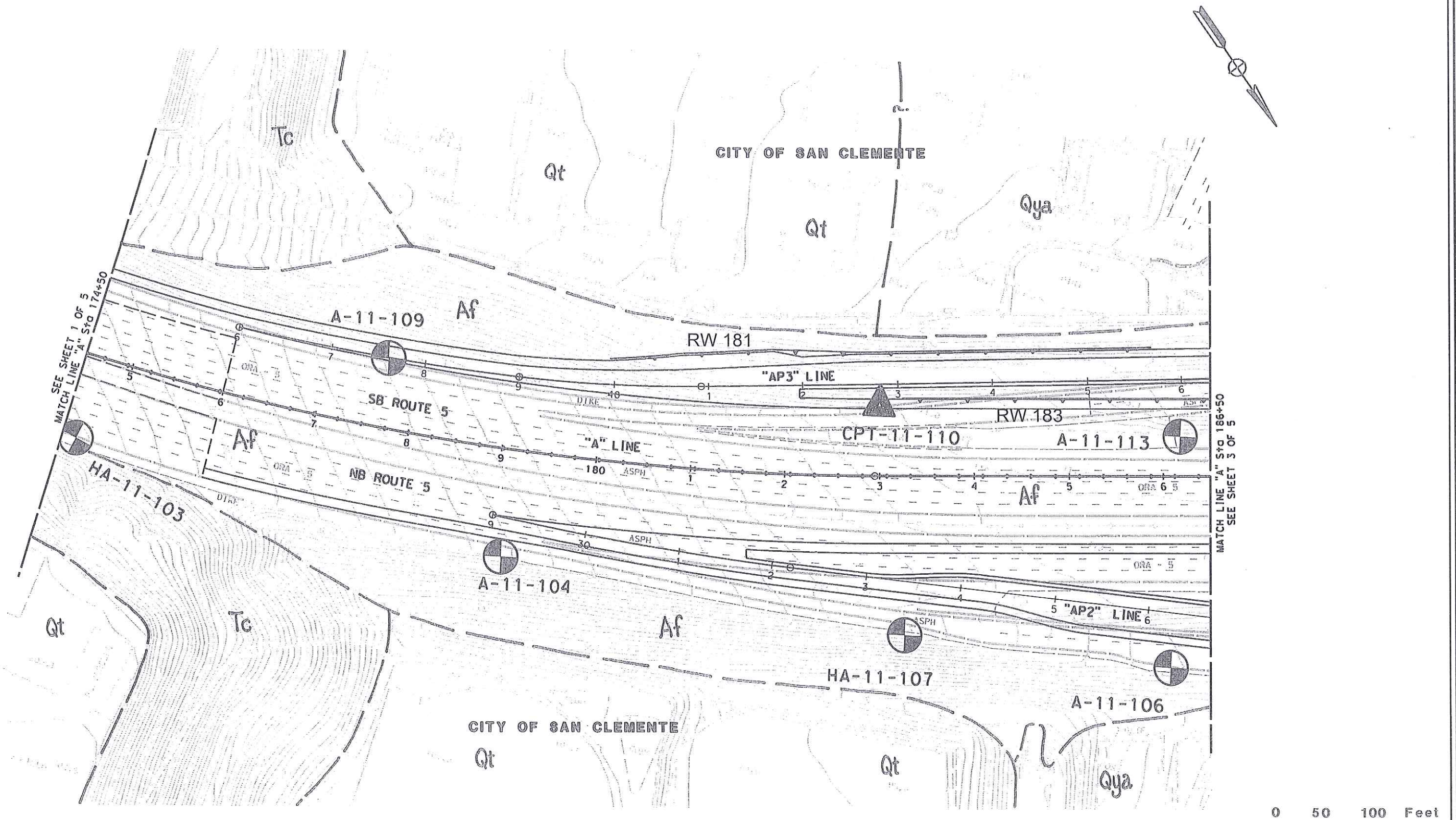
No unique conditions were encountered or observed during the field exploration. Excavations in existing fill, terrace deposits, and Capistrano formation sedimentary bedrock can be performed with conventional heavy-duty excavation equipment.

LEGEND

A-11-X	Boring By EMI
B-X	Boring By Leighton (1980,1999)
	Bedding Attitude
	General Bedding Attitude
	Joint Attitude
	Vertical Joint Attitude
	Shear Attitude
	Contact Attitude
	Clay Seam
	Contact
	Buried Contact
Af	Artificial Fill
Col	Colluvium
Qya	Young Alluvium
Qt	Terrace Deposits
Qls	Landslide Debris
Tc	Capistrano Formation - Bedrock



Earth Mechanics, Inc. Geotechnical & Earthquake Engineering	INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)	Exploratory Boring Location Map (1 of 5)
	Project No.: 11-135 / Date: 03-14-2012	Figure 5



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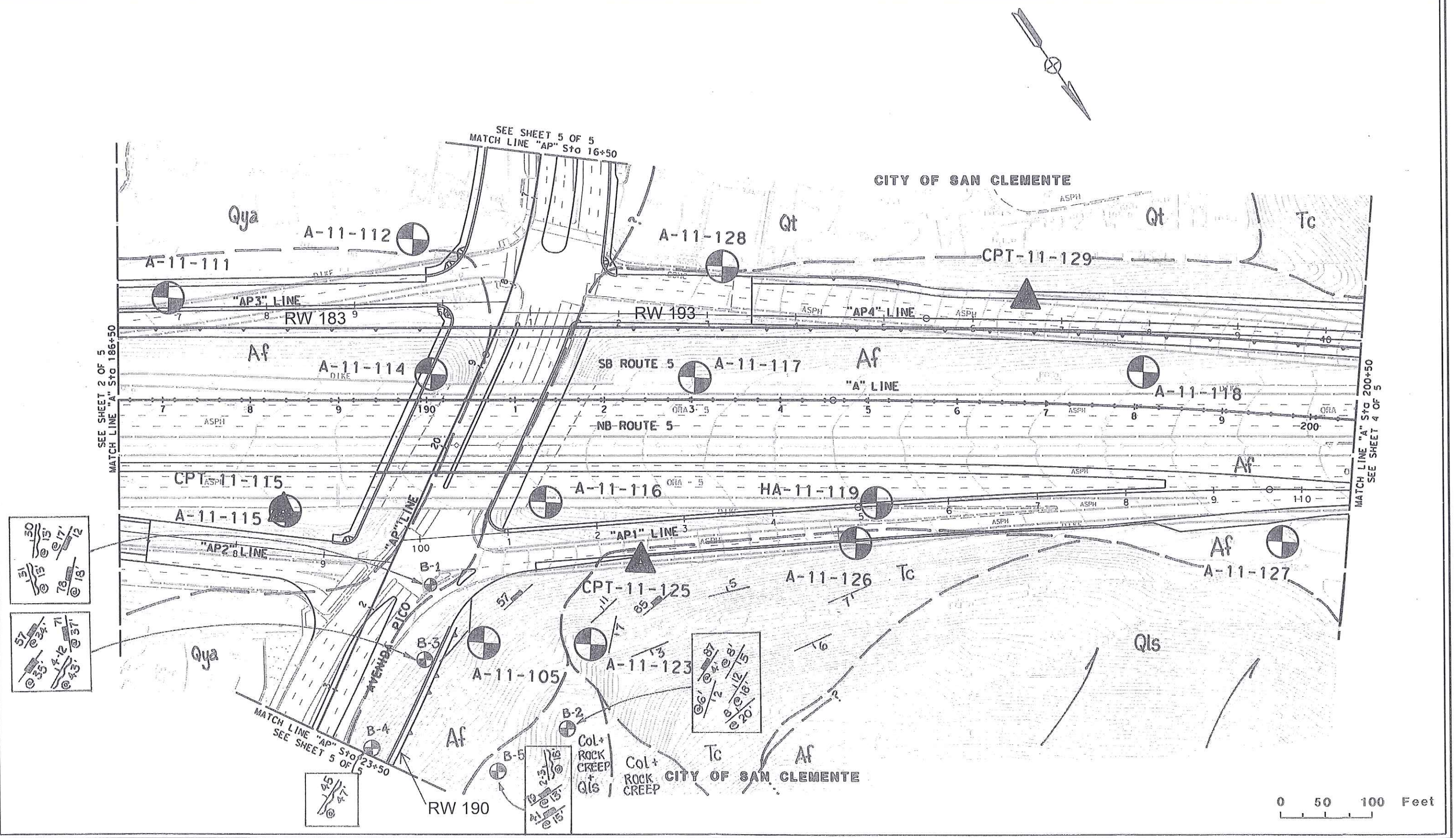
INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)

Project No.: 11-135

Date: 03-14-2012

Exploratory Boring Location Map (2 of 5)

Figure 6



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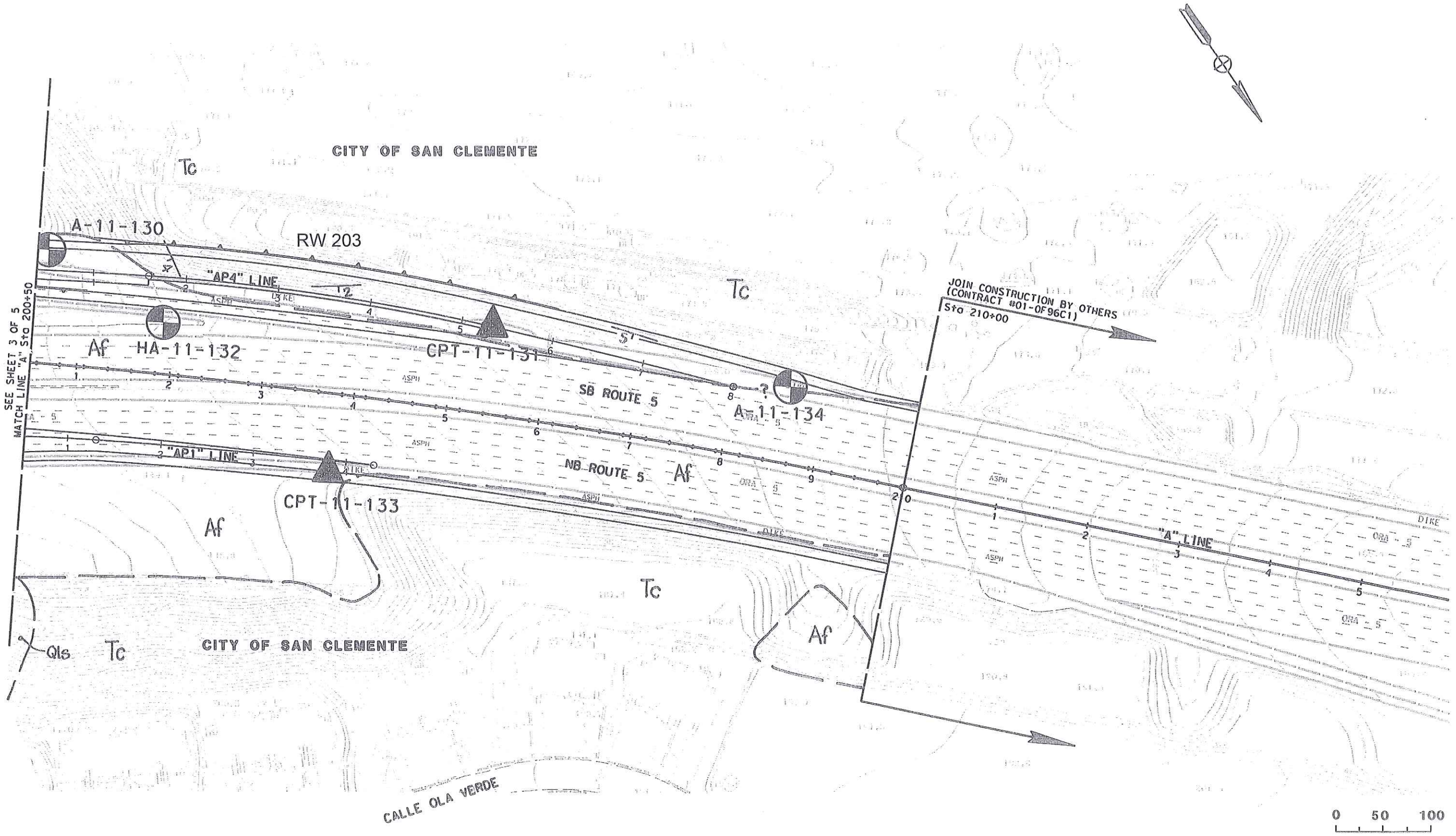
INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)

Project No.: 11-135

Date: 03-14-2012

Exploratory Boring Location Map (3 of 5)

Figure 7



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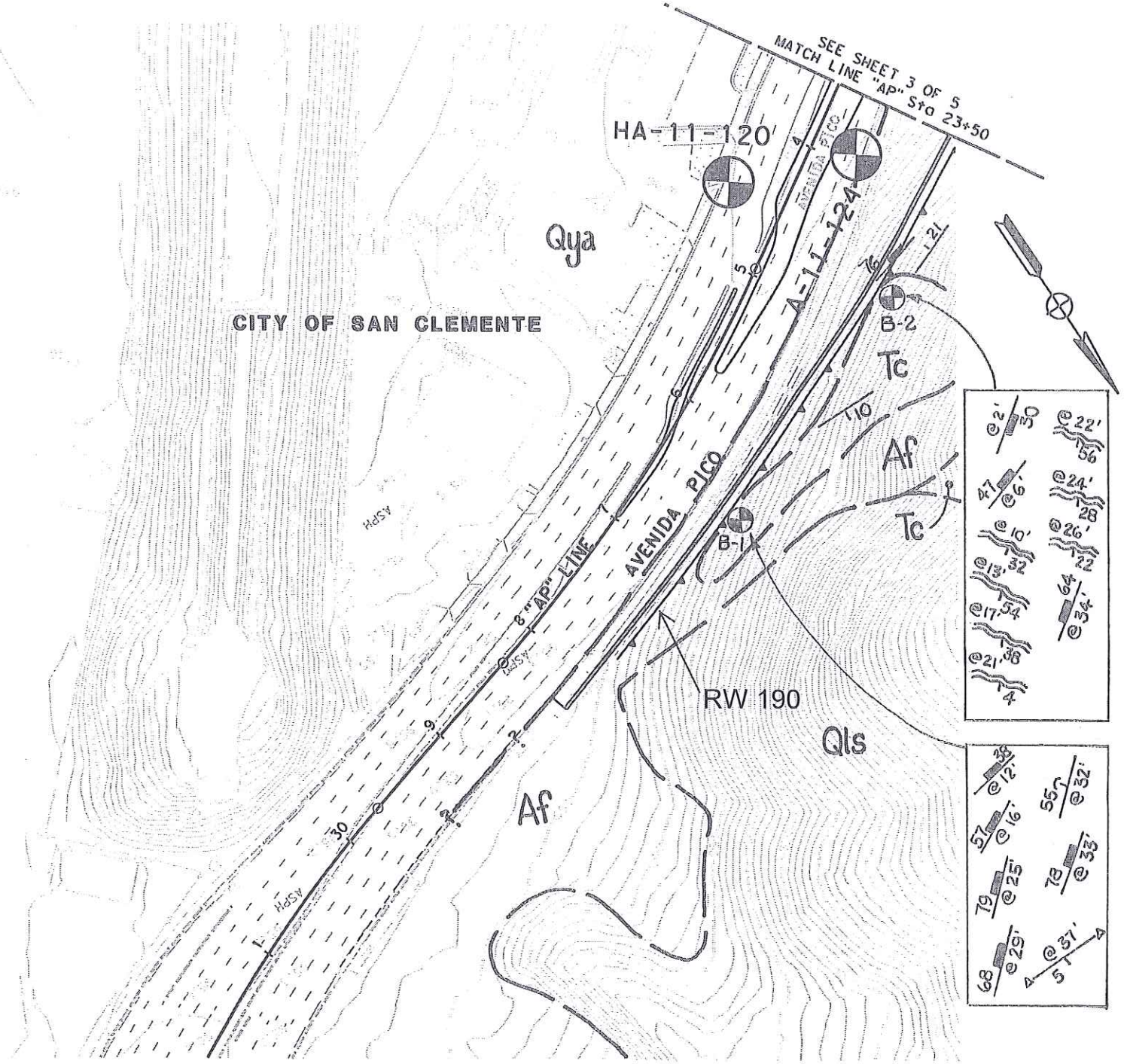
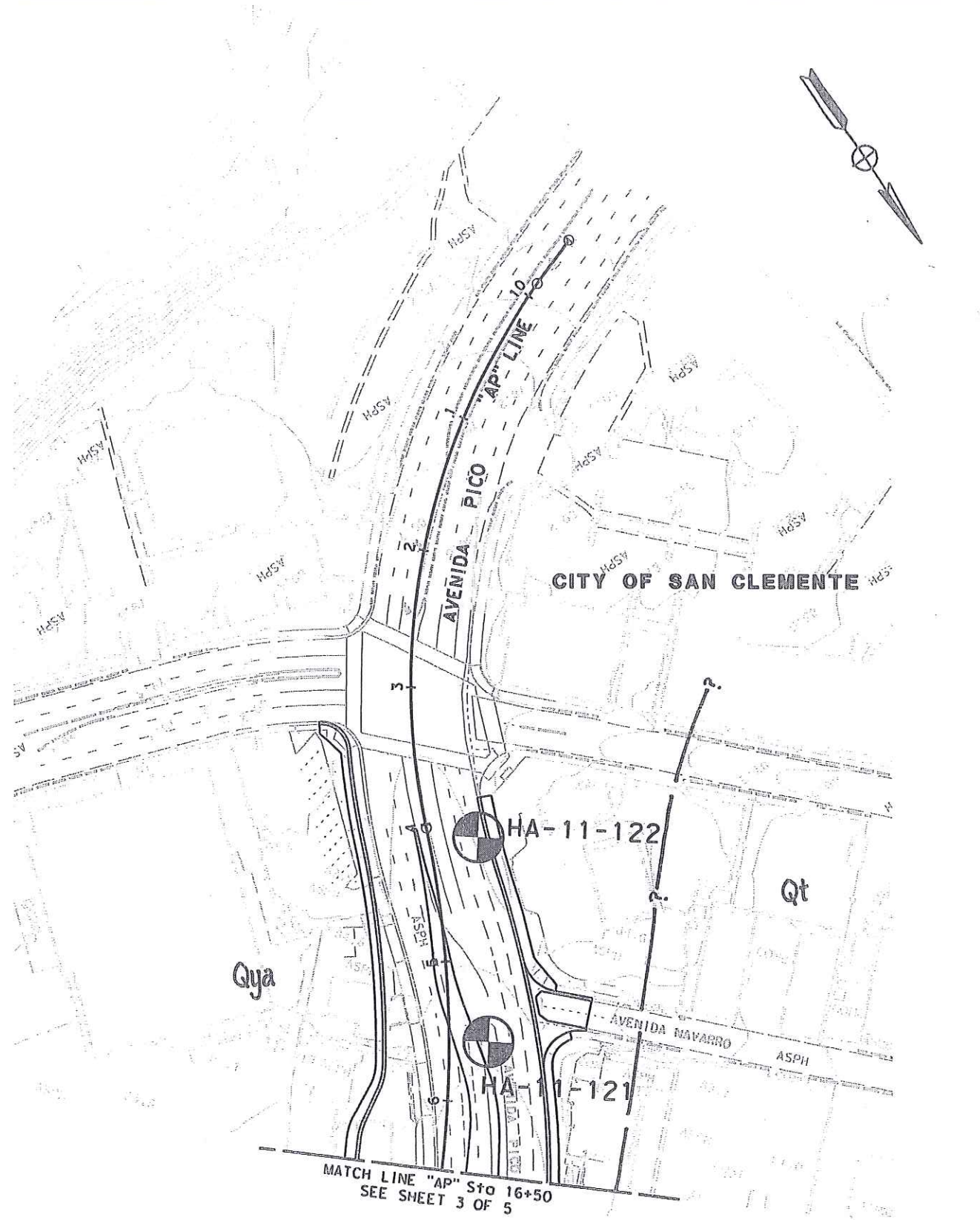
Date: 03-14-2012

Exploratory Boring Location Map (4 of 5)

Figure 8





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INTERSTATE 5 HOV IMPROVEMENT PROJECT (SEGMENT 1)

Project No.: 11-135

Date: 03-14-2012

Exploratory Boring Location Map (5 of 5)

Figure 9

6.0 GEOTECHNICAL TESTING

6.1 IN-SITU TESTING

Blowcounts from the SPT and MCD samplers were recorded during the exploration. In addition, Cone Penetration Test (CPT) soundings were conducted throughout the project area.

6.2 LABORATORY TESTING

Laboratory tests were performed on representative samples of soil and bedrock to determine or derive relevant physical and engineering properties. Selected samples were tested to determine soil/bedrock classification, shear strength parameters, consolidation and compaction characteristics, and corrosion potential. A list of tests performed, the corresponding test methods, and purpose of testing is presented in Table 2. The laboratory test results are presented in Appendix B. R-value tests indicated on the LOTB's in Appendix A were performed for pavement design. Those tests were not used for the purpose of this report.

TABLE 2. EXPLANATION OF LABORATORY TESTS PERFORMED

Type of Test	Applicable Test Method	Purpose
Dry Density	ASTM D 2937	Estimate in-situ soil density
Moisture Content	ASTM D 2216	Estimate in-situ soil moisture content
No. 200 Wash	ASTM D 1140	Estimate percentage of gravel, sand, and fines content
Grain Size Distribution	ASTM D 422	Estimate percentage of gravel, sand, and fines content
Atterberg Limits	ASTM D 4318	Estimate plasticity of fines; soil classification
Direct Shear	ASTM D 3080	Estimate strength parameters of soil
UU Triaxial Test	ASTM D 2850	Estimate undrained shear strength parameters of soil
Consolidation	ASTM D 2435	Estimate soil consolidation characteristics
Maximum Density	CT 216	Estimate maximum density and optimum moisture content
Soil pH	CT 643	Determine pH to assess corrosion potential of soil
Minimum Resistivity	CT 643	Determine corrosion potential of soil
Sulfate Content	CT 417	Determine sulfate content to assess corrosion potential of soil
Chloride Content	CT 422	Determine chloride content to assess corrosion potential of soil

Notes: 1. ASTM = American Society for Testing and Materials.
2. CT = California Test Method.

7.0 GEOTECHNICAL CONDITIONS

7.1 SITE GEOLOGY

7.1.1 Lithology

The project area is underlain by silty claystone, claystone, and siltstone of the Capistrano formation, terrace deposits, and alluvium consisting of non-indurated silty sand with clay and gravel, and landslide deposits derived from units of the Capistrano formation.

7.1.2 Structure

Geologic structure was discussed in Section 4.4.3.

7.1.3 Natural Slope Stability

Currently, the existing cut and fill slopes along the project corridor are generally graded at 2H:1V or flatter. Minor seepage was observed in areas on slopes; however the slopes were generally well vegetated and appear to be performing well.

Landslides have been identified at the eastern and western portions of the proposed retaining wall along Avenida Pico as well as on the slope descending to the Avenida Pico northbound on-ramp. The landslides affecting the project area originate on the slopes descending from the Saint Andrews Church by the Sea United Methodist Church on Avenida Frontera to the north. Numerous grading operations have been performed over the last 30+ years as part of development of the church and Avenida Pico. Available geotechnical reports relating to the landslides and grading operations have been reviewed as part of this study.

The landslide on the slope to the east of the northbound on-ramp to the I-5 Freeway is considered old and inactive and remedial grading was recommended (Leighton, 1979). This landslide is not considered to have an impact on the design and construction of the proposed wall due to its distance from the proposed construction.

Boring logs from five bucket auger borings in the landslide at the western end of the proposed retaining wall (Leighton, 1980) were reviewed. Later reports (Leighton 1999) prepared during the widening of Avenida Pico and construction of the existing keystone wall do not show a landslide being present in this area. It appears that this is an ancient landslide formed as a result of undercutting by the ancestral Segunda Deschecha drainage during a period of lower sea level and much wetter climatic conditions. Leighton (1980) postulates that the basal rupture surface of this landslide is located at an elevation of approximately 60 to 70 ft above sea level (30 to 40 ft below the toe of the proposed wall). Subsequent to the landslide failure alluvial deposits from the Segunda Deshecha drainage have infilled the valley and formed a natural buttress for the toe of the slide mass. Further upslope from the landslide, Leighton (1979, 1980, and 1999) indicates the slope is mantled by a zone of shallow landslide and/or rock creep less than 20 ft thick. Observations made during our field mapping support this finding.

Two bucket auger borings were drilled to the east of the previously mentioned landslide as part of the investigation for the proposed widening of Avenida Pico (Leighton, 1999). The borings encountered bedrock of the Capistrano Formation.

An old, inactive landslide has been mapped at the eastern end of the proposed wall (Leighton, 1979, 1991). It is understood that artificial fill was placed over portions of this landslide during grading for the church parking lot and access road. A tieback wall is proposed at Avenida Pico below this landslide. The tieback wall is a top-down construction involving minimal earthwork in this area, and therefore, it should not impact the stability of this landslide.

Detailed discussions of the above landslide features including slope stability analysis to evaluate their impact on the proposed tieback wall are presented in a separate Foundation Report (EMI, 2012e).

7.2 SUBSURFACE SOIL CONDITIONS

7.2.1 Stratigraphy

Based on visual classification and laboratory tests, the majority of earth materials throughout the project site are fine-grained fills and alluvium composed of clay and silt, terrace deposits, and clayey siltstone and claystone of the Capistrano formation. The clays found throughout the project are predominantly stiff to hard lean to fat clays and the silts are stiff to very hard elastic silts. Granular sand fills other than roadway base materials were rarely encountered in the borings documented in this report.

The geologic units encountered in the project area were described in Section 4.4.2. The distribution and location of these materials are shown on the maps of Figure 5 to Figure 9.

Artificial fill (Af) placed during construction of the I-5 freeway and adjacent residential and commercial developments is located along the project corridor. Fill materials were most likely derived from excavation of the Capistrano formation bedrock and local surficial deposits. The fills are predominantly composed of clayey silts and clay soils.

Generally, the existing fills overlie terrace deposits (Qt) or Capistrano formation bedrock (Tc). The terrace deposits are characterized by a basal cobble sequence fining upward to coarse to fine grained sands, silty sand, sandy silt, and clayey silt. The terrace deposits unconformably overlie bedrock units of the Capistrano formation.

The Capistrano formation is a marine sedimentary deposit generally consisting of brown to gray silty claystone, claystone, and siltstone. Secondary gypsum is commonly found deposited along joints, fractures and shears. The formation is generally soft when moist and has engineering properties similar to stiff to hard soils. The formation consists generally of soft, weakly cemented to uncemented material that can be disaggregated with finger pressure. A few hard beds occur throughout the formation. Within the project area, the Capistrano formation consists of an oxidized (weathered) zone defined by a light brown to brown color with a mottled appearance, underlain by an unoxidized zone that is generally dark brown to dark gray with a greater degree of induration.

Alluvium (Qal) is present in the drainages and canyons crossing the project corridor. The drainages and canyons are mantled by a relatively thin cover of alluvium that are generally derived from the surrounding bedrock and terrace deposits and are located in the lower elevations of the site. Where encountered in the borings the alluvium was observed to consist of silty sand to sandy clay.

Because of the large extent that the project area encompasses, the subsurface soil layering cannot be described by a single representative profile. The above soil description is general and only describes the subsurface in very broad terms. For details of stratigraphy at each borehole location, refer to the boring logs, LOTB sheets, and the CPT sounding logs provided in Appendix A.

7.2.2 Soil and Bedrock Strength Parameters

Shear strength parameters for soils, terrace deposits, and Capistrano formation bedrock were estimated using results of direct shear tests and unconsolidated-undrained triaxial tests and SPT blowcount correlations. The shear strength parameters used for geotechnical analyses are shown in Table 3 below.

TABLE 3. ENGINEERING PROPERTIES OF EXISTING EARTH MATERIALS

Material Type	Friction Angle	Cohesion (psf)	Range of Undrained Shear Strength (psf)	Typical Total Unit Weight (pcf)
Artificial Fill (Af)	32°	200	1,000 – 2,000	120
Alluvium (Qal)	-	-	1,500 – 2,500	120
Terrace Deposit (Qt)	-	-	1,500 – 1,800	120
Capistrano formation, Tc (cross-bedding)	28°	300	3,000 – 4,000	125
Capistrano formation, Tc (along-bedding)	23°	200		

7.2.3 Expansion Potential

Based on visual classification and laboratory tests, the vast majority of earth materials throughout the project site are plastic fine-grained materials including fills and alluvium composed of clay and silt, terrace deposits, and clayey siltstone and claystone of the Capistrano formation. The clays found throughout the project are predominantly lean to fat clays and the silts are elastic silts.

Soil samples were tested for PI and the results ranged from 15 to 35 (see Table B-1 in Appendix B). Caltrans HDM Topic 614.4 (2012) classifies clay soils having a PI greater than 12% as expansive soil. USDA soil survey maps (2012) indicate that the existing clay soils underlying the project area contain the mineral montmorillonite. Among a total of ten (10) consolidation tests documented in Appendix B, five (5) showed significant swell when they absorbed water. Based on these findings, the lean or fat clay soils within in the project area are considered expansive.

The in-situ native soils, terrace deposits, and Capistrano formation bedrock should not be left in-place directly beneath proposed pavement sections and should not be used as fill directly beneath pavement sections. In addition, these expansive materials should not be used as backfill behind or beneath retaining walls. However, these expansive materials may be used in general fill areas,

away from proposed pavement and structures. Laboratory tests may be required during earthwork operations to verify the expansion potential of soils used in specific areas.

7.2.4 Settlement Potential

Since subsurface materials consist of predominantly fine-grained soil, terrace deposits, and fine-grained sedimentary bedrock, consolidation (long-term) settlement can occur under additional vertical loading due to embankment or structure foundations. In areas where coarse-grained earth materials are present, immediate (elastic) settlement can occur under additional vertical loading. Settlement due to proposed embankment widening is discussed in Section 8.3.

7.3 WATER

7.3.1 Surface Water

No permanent standing surface water was encountered at the site. Drainage along the I-5 in the project area is controlled by man-made facilities such as culverts and storm drains that flow into local channels. There are no lakes, streams or basins in immediate proximity to the subject site.

Scour. The existing I-5 roadway surface is paved and drainage is controlled by engineered facilities. There are no existing or proposed unlined open flood control channels in the project area. Scour is not considered a design issue for the project.

Erosion. The surficial earth materials within the project area are predominantly fine-grained with moderate to significant cohesion, the surficial materials have a relatively low potential for erosion. Erosion of the existing slope faces was observed to be generally minimal.

However, where present, the clayey surficial soils along the project corridor are expected to expand when wet, and crack upon drying. Cracking allows infiltration of water from rainfall and irrigation, ultimately causing loosening of the surficial soils. This results in an increase of the soil erodibility. Surficial soils that are sandy can be susceptible to rilling, gullying, piping and accelerated erosion on steep slopes over long periods of time. Currently most of the slopes adjacent to the project corridor are densely vegetated and erosion impacts are expected to be small.

Provisions for surface drainage, slope planting, and other measures in accordance with Caltrans requirements should be fulfilled to mitigate erosion. To minimize erosion of slopes, surface water should not be directed to flow over slope faces, and concentrated flows of water should be controlled and outlet onto non-erodible surfaces. Prompt revegetation of graded slopes is recommended to be performed to minimize erosion.

7.3.2 Groundwater

As shown in Table 1, groundwater was encountered at three borings between about El. +49.5 and +53 ft during drilling in September and October, 2011. The As-built plans for Avenida Pico UC include LOTB sheets that show groundwater was not encountered above El. +40 ft in 1955 and El. +37 ft in 1967. These borings are located within the Segunda Deshecha drainage path. The California Geological Survey (CGS, 2002) quadrangle map for San Clemente indicate a highest historical groundwater of 5 to 10 ft below original bottom of nearby Segunda Deshecha canyon

which is significantly lower than current roadway grades within the project extents. The soil borings indicate a lack of continuous pervious soil units, and groundwater was encountered in very few borings in September to November of 2011 but not in other nearby borings. These findings suggest that groundwater within the I-5 HOV widening project is perched. Groundwater levels are also subject to seasonal fluctuation due to precipitation and other man-made and natural influences.

7.4 PROJECT SITE SEISMICITY

7.4.1 Ground Motions

The fault controlling the strong ground motion is the Newport-Inglewood-Rose Canyon/East fault, southwest of the project area. Using the latest Caltrans seismic design criteria, the peak ground acceleration at the site is estimated to be 0.38g. The principal sources of strong ground motion and their maximum earthquakes are listed on Table 4.

TABLE 4. EARTHQUAKE SOURCES AND MAXIMUM MAGNITUDES

Fault Name	Maximum Earthquake Magnitude	Approximate Distance to Site (miles)
Newport-Inglewood-Rose Canyon/East	7.5	5.0
Palos Verdes Hills- Coronado Bank	7.6	19.3
Whittier-Elsinore	7.6	22.4

Note: (1) Maximum magnitudes from Caltrans fault data base (2007).

The main faults are described as follows.

Newport-Inglewood Structural Zone. The Newport-Inglewood Structural Zone (NISZ) which lies along the coast and in the offshore area southwest of the site (see Figure 2) comprises a northwest-southeast trending series of faults and folds in the western Los Angeles Basin. This structural zone extends southeasterly from the Beverly Hills area on the north to the San Joaquin Hills and Newport Beach area on the south where it extends into the offshore area. In the offshore area, the fault zone is believed to continue to at least the Dana Point area. Just north of the Newport Beach-San Joaquin Hills area, the structural zone widens and comprises faults such as the Bolsa, Fairview, and Pelican Hill faults. Offshore, in the San Onofre region, the fault is believed to connect with a similar zone of folding and faulting called the Offshore Zone of Deformation and together, the fault system may extend southerly to the Rose Canyon fault zone in the San Diego region. This longer trend of faults and folds is commonly referred to as the Santa Monica-Baja Zone of Deformation.

Whittier-Elsinore Fault. The Whittier-Elsinore fault system extends from the Los Angeles Basin area to Mexico, a distance of more than 160 miles. The fault zone comprises several interconnected fault segments. The northwest end of the zone is the Whittier fault which is along

the southwest side of the Puente Hills. The Whittier fault connects to the Elsinore fault along the eastern side of the Santa Ana Mountains and may continue into Mexico connecting to faults such as the Laguna Salada fault.

Cristianitos Fault. The Cristianitos fault trends north-northwest along the eastern side of the Capistrano Embayment about 4.5 miles east of the site. This fault has received considerable attention because it trends into the offshore area near the San Onofre Nuclear Generating Station where it is prominently exposed in the sea cliffs.

The Cristianitos fault was active primarily during the Miocene or Pliocene time but its activity may have continued into the Quaternary time based on deformed terrace deposits along Aliso Creek; these offset deposits could be several hundred thousand years old (middle-early Pleistocene age). Along the coast south of San Onofre, the fault is overlain by unbroken marine terrace deposits dated at about 70,000 to 125,000 years old indicating that the fault has not been active for a long period of time (Shlemon, 1987). The fault is not considered to be active by the California Geological Survey (Jennings, 2010).

San Joaquin Hills Fault. Research by Grant et al. (1999, 2002) on the age and rate of uplift of the San Joaquin Hills included a postulation that uplift of the hills was due to the presence of the buried, low-angle, blind, thrust fault and, furthermore, that the fault is capable of generating magnitude 6.8 to 7.3 earthquakes. They postulate that the fault dips westerly from about 1 mile depth under the east side of the San Joaquin Hills to about 5 miles depth where the fault would intersect the Newport-Inglewood fault. They did not discuss the difficult and critical issue of how the two faults interact where they intersect.

There is no direct evidence for a subsurface thrust fault under the San Joaquin Hills. For example, there are no boreholes showing a fault, no geophysical evidence (seismic reflection/refraction), and no earthquake evidence indicating such a fault. A recent small earthquake in the area was predominantly a strike-slip rupture of the type expected on the NISZ rather than a thrust-type event that one would expect from the postulated subsurface fault.

The fault is shown as a dotted line on Figure 2. This line represents the updip edge of the fault below the surface. As visualized by Grant et al (2002), the fault would dip southwesterly such that it would not directly underlie the site but at its closest point to the site would be about 2.5 to 3 miles below the surface. The fault is not recognized as an active fault according to the Alquist-Priolo Earthquake Fault Zone maps.

7.4.2 Ground Rupture

There are no known active faults at the site. As a result, there is little potential for ground rupture.

8.0 GEOTECHNICAL ANALYSES AND DESIGN

8.1 DYNAMIC ANALYSES

8.1.1 Parameter Selection

The design horizontal PGA for the project is 0.38g. Generally, the PGA is used to evaluate liquefaction potential and slope stability. In evaluating liquefaction potential, the PGA is used in the analysis. For evaluation of global slope stability under pseudo-static conditions, Caltrans practice uses a horizontal seismic coefficient (k_h) equal to one-third of the PGA limited to 0.2 in accordance with Section 5.2.2.3 of Caltrans guidelines for Foundation Reports (2009). Therefore, a horizontal seismic coefficient of 0.13 was used in evaluating the global stability of slopes and retaining walls.

8.1.2 Liquefaction Potential and Seismically-Induced Settlement

Liquefaction Potential. Liquefaction is the loss of shear strength in generally cohesionless, saturated soils when the pore-water pressure induced in the soil by a seismic event becomes equal to or exceeds the overburden pressure. The primary factors influencing the potential for liquefaction include: groundwater elevation, soil type and grain-size characteristics, relative density of the soil, initial confining pressure, and intensity and duration of ground shaking. Soils most susceptible to liquefaction are saturated low-density sands and silty sands within 50 ft of the ground surface.

The vast majority of earth materials within the project area are fine-grained; the earth materials throughout the area include sedimentary bedrock of the Capistrano formation, terrace deposits, alluvium, and artificial fills that are derived from the bedrock and terrace materials. No consistent shallow groundwater table or relevant continuous unit of saturated loose sandy soils was identified within the project area. Based on the fines content and strength of soil materials found throughout the area and a lack of a shallow groundwater table, liquefaction of the present earth materials is unlikely.

Seismically-Induced Settlement. Because of the stiff to hard nature of the subsurface materials (sedimentary bedrock, terrace deposits, compacted fill), and because the materials are composed predominantly of medium to highly plastic fine-grained particles, seismic settlement of in-situ earth material is expected to be negligible.

8.2 CUTS AND EXCAVATIONS

Existing slopes within the project limits are up to 35 ft in height. Based on the current grading plans and cross-sections, permanent cuts into existing ascending slopes are planned to achieve proposed finish grades. The proposed cuts will result in new permanent finished slope faces having inclinations of 2H:1V or flatter.

Specifically, major cuts and excavations are required as follows based on the Profile Sheets provided by the civil designer:

- Up to 18 ft of cut with an approximate gradient of 3H:1V or flatter is required into the north embankment slope of I-5 between approximately "A-Line" Sta. 185 to 197 for realignment of the new Avenida Pico Undercrossing approaches and I-5 embankments at the north side,
- Up to about 12 ft of cut with an approximate gradient of 2.5H:1V or flatter is required for widening and realignment of the I-5 SB Off-Ramp, and
- A slope cut up to about 34 ft tall is proposed along Avenida Pico roadway for construction of a new tieback wall.

Minor cuts and excavations of about 5 ft will be required in the other areas, including a cut along the toe of the existing slope adjacent to the outside shoulder of the NB On-Ramp.

In addition to the permanent cuts, temporary excavations (generally 2 to 5.5 ft deep) are proposed to accomplish remedial removals in areas where compacted fill and new pavement are proposed and to accommodate construction of short retaining walls. For retaining walls of significant heights, temporary shoring will likely be used in order to minimize traffic impact during construction.

8.2.1 Slope Stability

The slope cut (up to 34 ft) and tieback wall proposed along Avenida Pico roadway (see Figure 7 and Figure 9) and the impact of the existing landslides on this proposed cut is addressed in a separate Foundation Report (EMI, 2012e).

Global Stability. Global stability of the proposed cut slopes was evaluated under both static and pseudo-static conditions using the computer program SLIDE (Rocscience, 2012). The soil strength parameters in Table 3 were used in the static and pseudo-static analysis and the results are presented in Appendix C. Controlling finished slope configurations were taken from cross sections provided by Parsons. One controlling section for a cut slope along I-5 (north side) was selected near "A-Line" Sta. 193+00 with a proposed cut height of about 18 ft.

For this section, the calculated factor of safety (FOS) for a deep-seated failure was found to be greater than the minimum required value of 1.5 per Caltrans Guidelines for Structures Foundation Reports (2009) for gross stability under static conditions with a 2 ft soil surcharge to represent I-5 traffic loading. Slope stability analysis under pseudo-static condition was performed using a seismic coefficient equal to 0.13 (see Section 8.1.1). Analysis indicates that the calculated factor of safety exceeded the required minimum FOS of 1.1 under pseudo-static condition per Caltrans guidelines (2009).

Topic 304 of the Caltrans HDM (2012) advises that for new construction, widening, or where slopes are otherwise being modified, embankment (fill) slopes should be constructed at an inclination of 4H:1V or flatter. Due to right-of-way limitations, possible physical obstructions, and associated earthwork costs, the proposed cut slopes for the project can be constructed with a finished inclination of 2H:1V. Existing cut slopes are graded to 2H:1V. Slopes steeper than 4H:1V require a design exception from Caltrans and obtaining approval from the Caltrans Landscape Architect.

Surficial Stability. For cut slopes with a gradient of 2H:1V or flatter, surficial stability should not be a design concern. If slope paving is proposed for cut slopes with a gradient of 1.5H:1V, then surficial stability is also not a design concern. If slope paving is not used for the 1.5H:1V slopes,

with a minimum internal friction angle of 27° and a minimum cohesion of 200 psf. This select material should be properly keyed and benched into the sloping ground. In all cases, proper maintenance with erosion protection and drainage control in accordance with Section 21 of Caltrans Standard Specifications (2010) are also recommended.

8.2.2 Rippability

Excavations are anticipated to be accomplished in existing fill, terrace deposits, and sedimentary bedrock of the Capistrano formation. The on-site materials can be excavated using conventional heavy-duty earth-moving equipment; the materials are not expected to pose a rippability problem.

8.2.3 Grading Factors

The volume change of on-site materials upon excavation and compaction will vary with material type and density. Although accurate grading factors cannot be determined, the following estimates are provided for determining preliminary earthwork quantities.

TABLE 5. EARTHWORK FACTORS

Earth Material	Approx. Range of Volume Change After Compaction (%)
Compacted Fills	-3 to +3
Terrace Deposits	-1 to +6
Capistrano Formation Sedimentary Bedrock	+4 to +13

Note: Negative factors represent shrinkage. Positive factors represent bulking.

8.3 EMBANKMENTS

8.3.1 Description

Existing embankments within the project area include the I-5 mainline embankment, and the on- and off-ramp embankments at Avenida Pico. These embankments have side slopes with an inclination of about 2H:1V or flatter. The existing slopes exhibit no evidence of gross or surficial instability and appear to have performed adequately over time.

Generally, the proposed grading involves placing compacted fills along portions of the mainline and ramps to realign and widen the existing embankments. Fills will be placed along the existing outside edges of the embankments, where there are presently graded descending slopes. At locations where fill is proposed, the existing slopes range in height from less than 4 ft to about 35 ft. In most cases, thicker fills will be placed behind proposed retaining walls. The proposed compacted fills to create new slopes (2H:1V or flatter) are sliver fills less than 4 ft wide and up to 30 ft wide (measured horizontally from the existing slope face). The fills placed behind

proposed retaining walls can be up to 50 ft wide and 30 ft thick based on cross sections provided by the civil designer.

Specifically, the following fills will need to be placed to achieve proposed finished grades based on the Profile Sheets and cross-sections provided by the civil designer:

- Up to 22 ft of fills are required against the south embankment slopes of I-5 between approximately "A-Line" Sta. 173 and 182 for freeway widening and realignment. These fill embankment slopes will be partially retained by MSE walls.
- Up to 35 ft of fills are required against the south embankment slopes of I-5 between approximately "A-Line" Sta. 182 and 202 for freeway widening and realignment and to construct both approaches for the new Avenida Pico Undercrossing and realignment of ramps. These fill embankments will be partially retained by MSE walls.

Minor fills less than 5 ft are required in other places.

8.3.2 Settlement

Compacted fill placed for new embankments or embankment widening generally induces compression of underlying earth materials resulting in settlement of the embankment. Immediate settlement is usually associated with coarse-grained soils (sand) and occurs during grading; consolidation settlement is associated with fine-grained soils (silt and clay) or very soft or weathered sedimentary bedrock and occurs over longer time periods. Settlement magnitude and time period is directly related to the depth of fill placed above compressible earth materials, the thickness of compressible materials, and the compressibility characteristics of the materials.

The thickest fills proposed for widening existing embankments (not retained by new walls) are up to about 15 ft thick and up to about 20 ft wide and occur between "A-Line" Sta. 173 and 182. A controlling cross section was selected at "A-Line" Sta. 180 (south side) to evaluate potential settlement. The finish slopes will have an inclination of 2H:1V. Based on the slope configurations described above, the maximum estimated settlement is expected to be less than 1".

Settlement of the proposed bridge approach fill embankments for Avenida Pico Undercrossing replacement and retaining walls are addressed in separate Foundation Reports (EMI, 2012a, d).

8.3.3 Stability

Stability of the proposed fill embankments for the bridge approaches and retaining walls are addressed in separate Foundation Reports (EMI, 2012a, d).

Global Stability. Global stability of the embankment slopes where widening is proposed was evaluated under both static and pseudo-static conditions using the computer program SLIDE (Rocscience, 2012). One controlling section at "A-Line" Sta. 180 with a fill height of about 15 ft was analyzed. The finished slope configuration was taken from cross sections provided by the civil designer. The compacted embankment fill is assumed to have a minimum friction angle of 32° and a minimum cohesion of 200 psf. The static and pseudo-static analyses and results are documented in Appendix C.

Based on the analyses, the calculated factor-of-safety exceeds the minimum value of 1.3 required per Section 5.2.2.3 of the Caltrans Bridge Design Guidelines (2004) for gross stability under static conditions with a 2 ft soil surcharge to represent I-5 traffic loading. Seismic slope stability under the pseudo-static condition was evaluated using a seismic coefficient of 0.13 (see Section 8.1.1). Results of the analysis indicate that the factor-of-safety for the pseudo-static condition is greater than 1.0 which meets the minimum required by Caltrans Bridge Design Guidelines as well.

Topic 304 of the Caltrans HDM (2012) advises that for new construction, widening, or where slopes are otherwise being modified, embankment (fill) slopes should be constructed with an inclination of 4H:1V or flatter. The requirement for constructing 4H:1V slopes (or flatter) is based on the assumptions that adequate space is available, that there are no physical obstructions interfering with the slope, and that earthwork costs are not prohibitive. Where space is limited by right-of-way or other physical constraints, or when fill quantities and associated earthwork costs become unreasonable, stable fill slopes can be constructed with inclinations steeper than 4H:1V. However, slopes steeper than 4H:1V require obtaining a design exception from Caltrans and obtaining approval from the Caltrans Landscape Architect.

Surficial Stability. Fill slopes with a gradient of 2H:1V or flatter should be surficially stable. If slope paving is proposed for fill slopes with a gradient of 1.5H:1V, surficial stability is also not a design concern. If slope paving is not used for the 1.5H:1V slopes, it is recommended that the upper 4 ft of the new 1.5H:1V slope face be covered with materials with a minimum internal friction angle of 27° and a minimum cohesion of 200 psf. This select material should be properly keyed and benched into the sloping ground. In all cases, proper maintenance with erosion protection and drainage control in accordance with Section 21 of Caltrans Standard Specifications (2010) are also recommended.

8.4 EARTH RETAINING STRUCTURES

Several earth retaining structures are proposed as part of the project improvements. These Caltrans non-standard structures consist of mechanically stabilized embankment (MSE) walls, a cantilevered retaining wall, and a tieback wall. Foundation design for the proposed retaining walls are addressed in two separate Foundation Reports (EMI, 2012d, e).

8.5 CULVERT FOUNDATIONS

Large-diameter culverts or large RCB structures requiring special foundations are not proposed for the project. Based on the preliminary plans, drainage improvements appear to involve installing new and relatively small diameter RCP and extending existing RCP culverts.

8.6 SOIL CORROSIVITY

Representative soil and bedrock samples were tested to determine corrosivity including minimum resistivity, pH, soluble sulfate content, and soluble chloride content. A total of five (5) soil samples were tested to determine minimum resistivity, pH, soluble sulfate content, and soluble chloride content using procedures described in California Test Methods 417, 422, and 643, respectively. The test results are presented in Table 6.

TABLE 6. SOIL CORROSION TEST RESULTS

Boring	Sample Depth (ft)	Soil Type	Minimum Resistivity (ohm-cm)	pH	Soluble Sulfate Content (ppm)	Soluble Chloride Content (ppm)
A-11-104	5	CL	270	7.1	1,620	2,047
A-11-115	5	SC	410	7.2	560	1,281
A-11-116	5	CL	250	7.3	950	2,029
A-11-117	35	CH	170	5.6	5,060	1,950
A-11-118	2.5	CH	270	6.7	550	1,986

Based on the Caltrans Corrosion Guidelines (2003), soils are considered corrosive if the pH is 5.5 or less, or the sulfate concentration is 2,000 ppm or greater, or the chloride concentration is 500 ppm or greater. Based on the test results and the Caltrans criteria, the on-site soils classify as corrosive to bare metals and concrete that is in contact with them. The project area is deemed to be an aggressive corrosion environment. Appropriate corrosion measures should be taken for any concrete or steel elements that will be in contact with on-site soil and bedrock. Corrosion protection requirements for various culvert materials are presented in the project Materials Report (EMI, 2012b).

9.0 MATERIAL SOURCES

Fill is expected to be required for the proposed improvements. Fill materials can be obtained from public or private sources. Private sources of construction materials (sand, gravel, aggregate base, concrete, and asphalt concrete) were not investigated by EMI. However, materials are available from various commercial suppliers located in Orange County and the surrounding area. The project Materials Report (EMI, 2012b) gives a list of potential commercial suppliers for sand, gravel, aggregate base, and concrete.

Pulverizing existing pavement, during construction, might be performed. New asphalt pavement can be produced using Reclaimed Asphalt Pavement (RAP). RAP, pulverized asphalt concrete and pulverized Portland cement concrete may be used on the project if approved by Caltrans. The quality and use of recycled and reclaimed materials should conform to Caltrans Specifications (2010).

10.0 MATERIAL DISPOSAL

Due to remedial earthwork recommended below spread footings for cantilevered retaining walls (overexcavation and soil replacement) and the remedial earthwork for new pavement sections, the project is expected to generate earth materials that may require off-site disposal. Disposal sites were not investigated for the project.

11.0 CONSTRUCTION CONSIDERATIONS

11.1 CONSTRUCTION ADVISORIES

All work should be performed in accordance with the Caltrans Standard Specifications (2010) except as indicated in the Special Provisions prepared for the project improvements. Compaction of soil should be conducted in accordance with requirements in Section 19-5 of the Caltrans Standard Specifications (2010). Fill placed on sloping ground should be properly keyed and benched into existing ground and placed as specified in Section 19-6 of the Caltrans Standard Specifications.

11.2 CONSTRUCTION CONSIDERATIONS THAT INFLUENCE DESIGN

No construction considerations influenced the analyses or design of proposed improvements described in this report.

11.3 CONSTRUCTION CONSIDERATIONS THAT INFLUENCE SPECIFICATIONS

Special Provisions that are influenced by geotechnical factors include shoring requirements, and corrosion protection specifications. Temporary construction slopes, bracing, and shoring should be made the contractor's responsibility.

11.4 CONSTRUCTION MONITORING AND INSTRUMENTATION

Qualified geotechnical personnel should perform field inspections and soil testing during the following stages of construction:

- Grading operations, including excavations and placement of compacted fill,
- Excavations and remedial earthwork for structure foundations,
- Foundation construction including spread footings and pile installations,
- Excavations for utility trenches and drainage structures,
- Monitoring vertical and horizontal movement of existing structures and utilities that will be protected in place,
- Removal or support of buried utilities or structures,
- Shoring installation, if necessary, and
- When any unusual conditions are encountered,

Temporary construction slopes and shoring used during construction of proposed improvements should be monitored by the contractor and qualified geotechnical personnel.

11.5 HAZARDOUS WASTE CONSIDERATIONS

Evaluating the presence and concentration of hazardous contaminants is beyond EMI's scope of work and therefore is not addressed herein. The results of the ADL investigation are provided in a separate report (EMI, 2012f). EMI assumes that no hazardous or toxic materials exist within the project area; therefore, no hazardous waste considerations are provided. If for any reason

hazardous or toxic materials are believed to exist within the project area, an environmental consultant should be retained.

11.6 DIFFERING SITE CONDITIONS

The analyses and recommendations contained in this report are based on the data obtained from the review of available geologic references, our site reconnaissance, exploratory boreholes and CPT soundings, and laboratory testing. The borehole and CPT sounding logs indicate subsurface conditions only at specific locations and times drilled, and only to the depths penetrated. The borehole and CPT logs do not necessarily reflect subsurface variations that may exist between such locations. If variations in soil and subsurface conditions, from those described herein are noted during construction, the recommendations presented in this report must be re-evaluated. In the event that any changes in the nature, design, or location of the proposed facilities occur, the conclusions and recommendations in this report should not be considered valid unless the changes are reviewed and conclusions of this report are verified in writing by the designer. Therefore, upon encountering any site conditions that are perceived to differ materially from those conditions anticipated in this report, the resident engineer should contact the geotechnical designer immediately.

12.0 RECOMMENDATIONS AND SPECIFICATIONS

Below are recommendations for proposed improvements. If designers have questions or disagree with the recommendations, or, if variations in subsurface conditions from those described herein are observed during construction, the geotechnical engineer should be contacted to verify the applicability of the recommendations. Recommendations in this report may require modification based on actual subsurface conditions encountered during construction.

- Earthwork should be performed in general accordance with Caltrans Standard Specifications (2010) with addition of the provisions below. Compaction of soil should be conducted in accordance with requirements in Section 19-5 of the Standard Specifications with addition of the provisions below.
- Earthwork throughout the project area is anticipated to be minor to substantial. In fill areas, compressible surficial materials including topsoil, loose alluvium, dry or saturated soil, or otherwise unsuitable fill should be completely removed prior to placing compacted fill. After clearing and grubbing, a minimum overexcavation of 2 ft is recommended within all areas to receive compacted fill. The overexcavation should extend horizontally a minimum distance of 2 ft from edges of new fills. Actual depths and extent of the remedial removals should be determined in the field by qualified geotechnical personnel. Bottoms of overexcavations should be scarified to a minimum depth of 8", moisture-conditioned to near-optimum moisture content, and compacted in-place to minimum 90% relative compaction and following Caltrans Standard Specifications. Excavation bottoms should be observed to firm and unyielding prior to placing compacted fill. Remedial excavation in areas where new pavement is proposed is addressed in the project Materials Report (EMI, 2012b). Remedial excavation beneath proposed walls is discussed in a separate Foundation Report (EMI, 2012d).
- The Capistrano Formation bedrock encountered in the project area was found to be massive to poorly bedded. Where bedding was observed, the strikes were generally to the east to northeast with shallow dips less than about 10° (measured from horizontal) to the north, east and south. Throughout the project area, the dominant structural pattern is high-angle joints and fractures within the Capistrano bedrock. The exposed cuts, during grading for the project, should be inspected by a Certified Engineering Geologist to verify the geologic structure and address any potentially adverse conditions.
- Fills placed against sloping ground shall be keyed and benched into the sloping ground and placed as specified in Section 19-6 of the Caltrans Standard Specifications (2010).
- Existing topsoil can be stockpiled for future use on finished grades to help in the re-vegetation of the area.
- All overexcavations should be observed by qualified geotechnical personnel to confirm that unsuitable materials are removed and that firm and unyielding ground surfaces are exposed. Overexcavated areas should be cleaned of loose soils and debris and should be observed to be firm and unyielding prior to receiving fill.
- The in-situ sedimentary bedrock of the Capistrano Formation, the terrace deposits, and the existing fills that are derived from the on-site earth materials, are classified as having high to very high expansion potential. There are localized areas of sandy soils that are non-expansive but compose only a relatively small area of the project The in-situ native soils, terrace

deposits, and sedimentary bedrock are considered suitable for use as compacted fill in general fill areas, assuming the soils meet the quality requirements given in the Caltrans Standard Specifications (2010). However, the in-situ expansive earth materials should not be placed as fill behind or beneath proposed retaining walls and should not be used beneath proposed pavement sections. Laboratory tests may be required during earthwork operations to verify the expansion potential of soils used in specific areas.

- Topic 304 of the Caltrans HDM (2012) advises that for new construction, widening, or where slopes are otherwise being modified, embankment (fill) slopes be constructed at an inclination of 4H:1V or flatter. Due to right-of-way limitations, possible physical obstructions, and associated earthwork costs, the proposed cut slopes for the project can be constructed with an finish inclination of 2H:1V. Any new slopes graded steeper than 4H:1V would require a design exception from Caltrans with approval from the Caltrans Landscape Architect.
- All finished slopes should be planted as soon as practical after grading in an attempt to minimize surface erosion. Local areas may require additional measures at the discretion of the Resident Engineer present on-site during construction.
- The impact of new fills 5 ft or more in height should be evaluated for utilities and drainage structures that fall within a 45° projection below the footprint of fills.
- Drainage work involves construction of various sized Reinforced Concrete Pipe (RCP) culverts and drainage inlets throughout the length of the project. The major utility lines crossing the I-5 mainline will be protected in place. No special foundation treatment is recommended for proposed drainage structures at this site. Other recommendations for utilities and pavement structural sections for the I-5 Mainline lanes and shoulders, ramps and Avenida Pico are presented in the project Materials Report (EMI, 2012b).
- Design of temporary construction slopes and shoring is the contractor's responsibility during construction.
- It shall be made the contractor's responsibility to control any surface water and dewater the site as necessary. Free water should not be allowed to stand in any excavations. If excavations become flooded, at least the bottom 8" of soil should be removed and replaced, and re-compacted in-place to the required relative compaction. Additional removals may be required at the discretion of the Resident Engineer or geotechnical inspection personnel.

13.0 LIMITATIONS

This report is intended for the use of OCTA, Parsons, and Caltrans for design and construction of the I-5 HOV Improvement Project (Segment 1) between Mainline Sta. 167+00 and 210+00. This report is based on the project as described and the information obtained from the exploratory borings at the approximate locations indicated on the attached plans. The findings and recommendations contained in this report are based on the results of the field investigation, laboratory tests, and engineering analyses. In addition, soils and subsurface conditions encountered in the exploratory borings are presumed to be representative of the project site. However, subsurface conditions and characteristics of soils between exploratory borings can vary. The findings reflect an interpretation of the direct evidence obtained. The recommendations presented in this report are based on the assumption that an appropriate level of quality control and quality assurance (inspections and tests) will be provided during construction. EMI should be notified of any pertinent changes in the project plans or if subsurface conditions are found to vary from those described herein. Such changes or variations may require a re-evaluation of the recommendations contained in this report.

The data, opinions, and recommendations contained herein are applicable to the specific design elements and locations which are the subject of this report. Data, opinions, and recommendations herein have no applicability to any other design elements or to any other locations, and any and all subsequent users accept any and all liability resulting from any use or reuse of the data, opinions, and recommendations without the prior written consent of EMI.

EMI is not responsible for construction means, methods, techniques, sequences, or procedures, or for safety precautions or programs in connection with the construction. EMI is not responsible for the acts or omissions of the Contractor, or any other person performing any construction, or for the failure of any worker to carry out construction in accordance with the Final construction drawings and specifications.

Services performed by EMI were conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions. No other representation, expressed or implied, and no warranty or guarantee is included or intended.

14.0 REFERENCES

American Society for Testing and Materials (ASTM), 2008. Annual Book of Standards. Soil and Rock; Vol. 04.08.

Argus, D.F., Heflin, M.B., Donnellan, A., Webb, F.H., Dong, D., Hurst, K.J., Jefferson, D.C., Lyzenga, G.A., Watkins, M.M., and Zumberge, J.F., 1999, Shortening and thickening of metropolitan Los Angeles measured and inferred by using geodesy: Geology, v. 27, p. 703-706.

Benioff, H., 1938, The determination of the extent of faulting with application to the Long Beach earthquake: Bulletin of the Seismological Society of America, v. 28, p. 77-84.

California Geological Survey, 2009, Tsunami Inundation Map for Emergency Planning, San Clemente quadrangle: Division of Mines and Geology.

_____, 2002, Division of Mines and Geology, Seismic Hazard Zone Report for the San Clemente 7.5-Minute Quadrangle, Orange County, Report 062.

California Department of Transportation (Caltrans), California Test Methods, various dates.

_____, 2012, Highway Design Manual.

_____, 2010, Standard Specifications.

_____, 2009, Foundation Report Preparation for Bridge Foundations, Division of Engineering Services, Geotechnical Services.

_____, 2006, Guidelines for Geotechnical Design Reports and Materials Reports, Version 1.3.

_____, 2004, Bridge Design Guidelines.

_____, 2003, Corrosion Guidelines, Version 1.0; Office of Materials Engineering and Testing Services, Corrosion Technology Branch.

Earth Mechanics (EMI), 2012a, Final Foundation Report, Avenida Pico Undercrossing (Replace), Bridge No. 55-0207, San Clemente, Orange County, California, 12-ORA-5, PM 3.39, Caltrans Project No. 1200020277 (EA 12-0F96B).

_____, 2012b, Final Materials Report, Interstate 5 HOV Improvement Project (Segment 1), San Clemente, Orange County, California, 12-ORA-5, 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B).

_____, 2012c, Final Foundation Report for Sign Structures, Interstate 5 HOV Improvement Project (Segment 1), San Clemente, Orange County, California, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B).

_____, 2012d, Final Foundation Report, Wall 181 (Bridge No. 55E-0139), PM 3.0/3.7, Wall 183 (Bridge No. 55E-0140), PM 3.0/3.7, Wall 193 (Bridge No. 55E-0142), PM 3.47/3.66, and Wall 203 (Bridge No. 55-0143), PM 3.0/3.7, Interstate 5 HOV Improvement Project (Segment 1), San Clemente, Orange County, CA, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B).

_____, 2012e, Final Foundation Report, Wall 190, Interstate 5 HOV Improvement Project (Segment 1), San Clemente, Orange County, California, 12-ORA-5, PM 3.0/3.7, Caltrans Project No. 1200020277 (EA 12-0F96B).

_____, 2012f, Final Aerially-Deposited Lead Report, Interstate 5 HOV Widening, Segments 1, 2, and 3, Cities of San Clemente, Dana Point, and San Juan Capistrano, Orange County, California, 12-ORA-5, PM 3.0/8.7, Caltrans Project Nos. 1200020277 (EA 12-0F96B), 1200020278 (EA 12-0F96C1), and 1200020279 (EA 12-0F96E1).

Fumal, T.E., Pezzopane, S.K., Weldon, R.J. II, and Schwartz D.P., 1993, A 100-year Average Recurrence Interval for the San Andreas Fault at Wrightwood, California: Science, v. 259, p. 199-203.

Grant, L.B., Mueller, K.J., Gath, E.M., Cheng, H., Edwards, R.L., Munro, R., and Kennedy, G.L., 1999, Late Quaternary uplift and earthquake potential of the San Joaquin Hills, southern Los Angeles basin, California: Geology, v. 27, p.1031-1034.

Grant, L.B., Ballenger, L.J., and Runnerstrom, E.E., 2002, Coastal Uplift of the San Joaquin Hills, Southern Los Angeles Basin, California, by a Large Earthquake since A.D. 1635: Bulletin of the Seismological Society of America, v. 92, p 590-599.

Hauksson, E. and Gross, S., 1991, Source Parameters of the 1933 Long Beach Earthquake: Bulletin of the Seismological Society of American, v. 81, p. 81-98.

Hauksson, E., Jones, L.M., and Hutton, K., 1995, The 1994 Northridge earthquake sequence in California: seismological and tectonic aspects: Journal of Geophysical Research, v. 100, p. 12,335-12,355.

Jacoby, G., Sheppard, P., and Sieh, K., 1987, Was the 8 December 1812 California earthquake produced by the San Andreas fault? Evidence from trees near Wrightwood: Seismological Research Letters, v. 58, p. 14.

Jennings, C.W., 2010, Fault Activity Map of California and Adjacent Areas, Geologic Data Map No. 6, Department of Conservation, Division of Mines and Geology.

Kennedy, M.P., Tan, S.S., Bovard, K.R., Watson, M.J., and Guitierrez, C.I., 2007, Geologic Map of the Oceanside 30x60-minute quadrangle, California; California Geologic Survey, Regional Geologic Map No. 2, Scale 1:100 000.

Leighton and Associates, 1999, Geotechnical Engineering Investigation for the Proposed Avenida Pico Widening to the East of the On-Ramp to North-bound San Diego Freeway (I-5), San Clemente, California.

_____, 1991, Final Geotechnical Report of Rough- and Postgrading Operations, Parcels 1, 2, and 3 of Parcel Map No. 89311, St. Andrews By The Sea United Methodist Church, San Clemente, California.

_____, 1980, Geotechnical Investigation of Proposed Cut Slope at the Intersection of Avenida Pico and the Northbound San Diego Freeway On-Ramp, Tentative Tract 8818, Reeves Ranch (Marblehead), San Clemente, California.

_____, 1979, Geotechnical Investigation of Tentative Tract 8818 and Grading Plan Review of Phase I, Reeves Ranch (Marblehead), San Clemente, California.

Morton, P.K. and Miller, R.V., 1981, Geologic map of Orange County, California showing mines and mineral deposits: California Division of Mines and Geology, Bulletin 204.

Robertson, P. K. and Campanella, R. G., 1989, Guidelines for Geotechnical Design Using CPT and CPTU, Civil Engineering Department, University of British Columbia, Vancouver, Canada.

Rocscience, 2012, SLIDE 6.0 – 2D Limit Equilibrium Slope Stability Program, Toronto, Canada.

Shao, G., and Hauksson, E., 2009, A finite fault study of the 29 July 2008 Mw5.4 Chino Hills Earthquake: Seismological Research Letters, v. 80, p.320-321.

Shaw, J.H., and Shearer, P.M., 1999, An Elusive Blind-Thrust Fault Beneath Metropolitan Los Angeles: Science, v. 283, p.1516 (5 March).

Shaw, J.H., Plesch, A., Dolan, J.F., Pratt, T.L., and Fiore, P., 2002, Puente Hills Blind-Thrust System, Los Angeles, California: Bulletin of the Seismological Society of America, v. 92, p. 2946-2960.

Shlemon, R.J., 1987, The Cristianitos fault and Quaternary geology, San Onofre State Beach, California: Geological Society of American Centennial Field Guide - Cordilleran Section, reprinted in Engineering Geology along Coastal Orange County: Association of Engineering Geologists, Southern California Section, Annual Field Trip Guidebook, (September 23, 1989), p. 161-164.

Tan, S.S., 1999, Geologic Map of the San Clemente 7.5' Quadrangle, San Diego and Orange Counties, California: A Digital Database: California Geological Survey, Preliminary Geologic Map, scale 1:24,000.

Ward, S.N., 1994, A Multidisciplinary Approach to Seismic Hazard in Southern California: Bulletin of the Seismological Society of America, v. 84, p. 1293-1309.

Weldon, R., Scharer, K., Fumal, T., and Biasi, G., 2004, Wrightwood and the Earthquake Cycle: What a Long Recurrence Record Tells Us About How Faults Work: Geological Society of America, GSA Today, v. 14, no. 9, p. 4-10.

Winterkorn, H.F. and Fang, H.Y., 1975, Foundation Design Handbook, Van Nostrand Reinhold Company, New York, NY.

Yeats, R.S., and Huftile, G.J., 1995, The Oak Ridge Fault System and the 1994 Northridge Earthquake: Nature, v. 373, p. 418-420.

United States Department of Agriculture (USDA), Natural Resources Conservation Service, 2012, http://websoilsurvey.nrcs.usda.gov.

APPENDIX A

LOG OF TEST BORING SHEETS

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

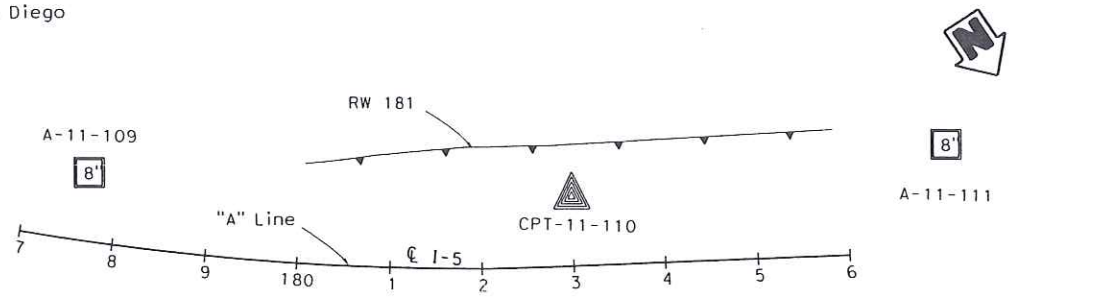
NOTES:

(1) This LOTB sheet was prepared in accordance with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2010).

(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



PLAN

1" = 100'

To Los Angeles

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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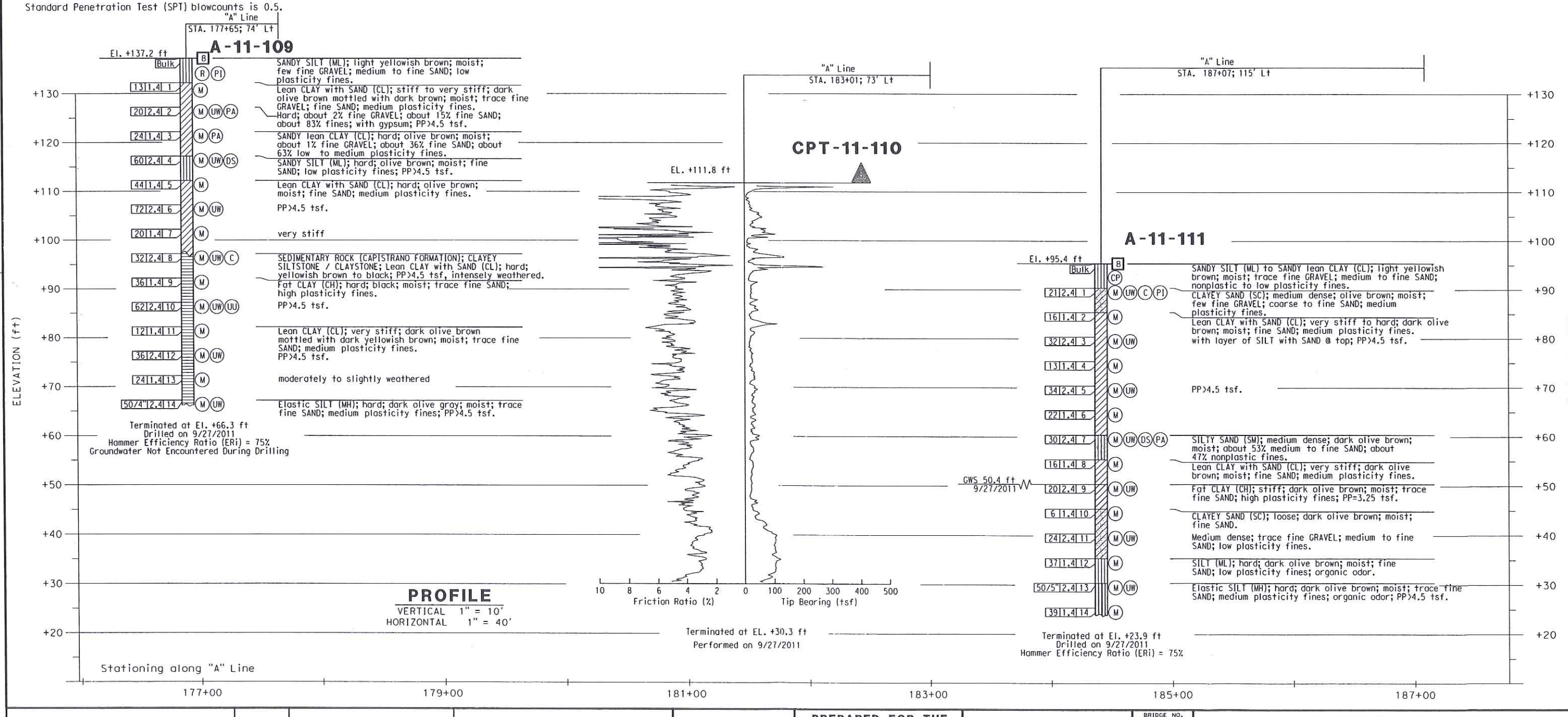
FOUNTAIN VALLEY, CA 92708



PROFILE

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HORIZONTAL 1" = 40'

TIME PLOTTED => $TIME
DATE PLOTTED => $DATE
USERNAME => $USER

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011				POST MILES -

RETAINING WALL 181

LOG OF TEST BORINGS 1 OF 1

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 12000202771

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => $REQUEST

CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

NOTES:

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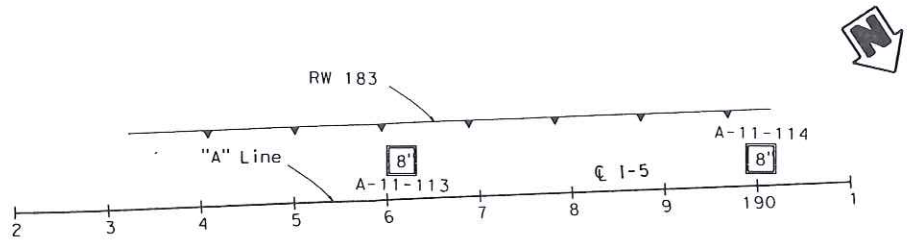
(2) 2.4" samples were taken using a California Modified Sampler.

(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.

← To San Diego



PLAN

1" = 100'

To Los Angeles →

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

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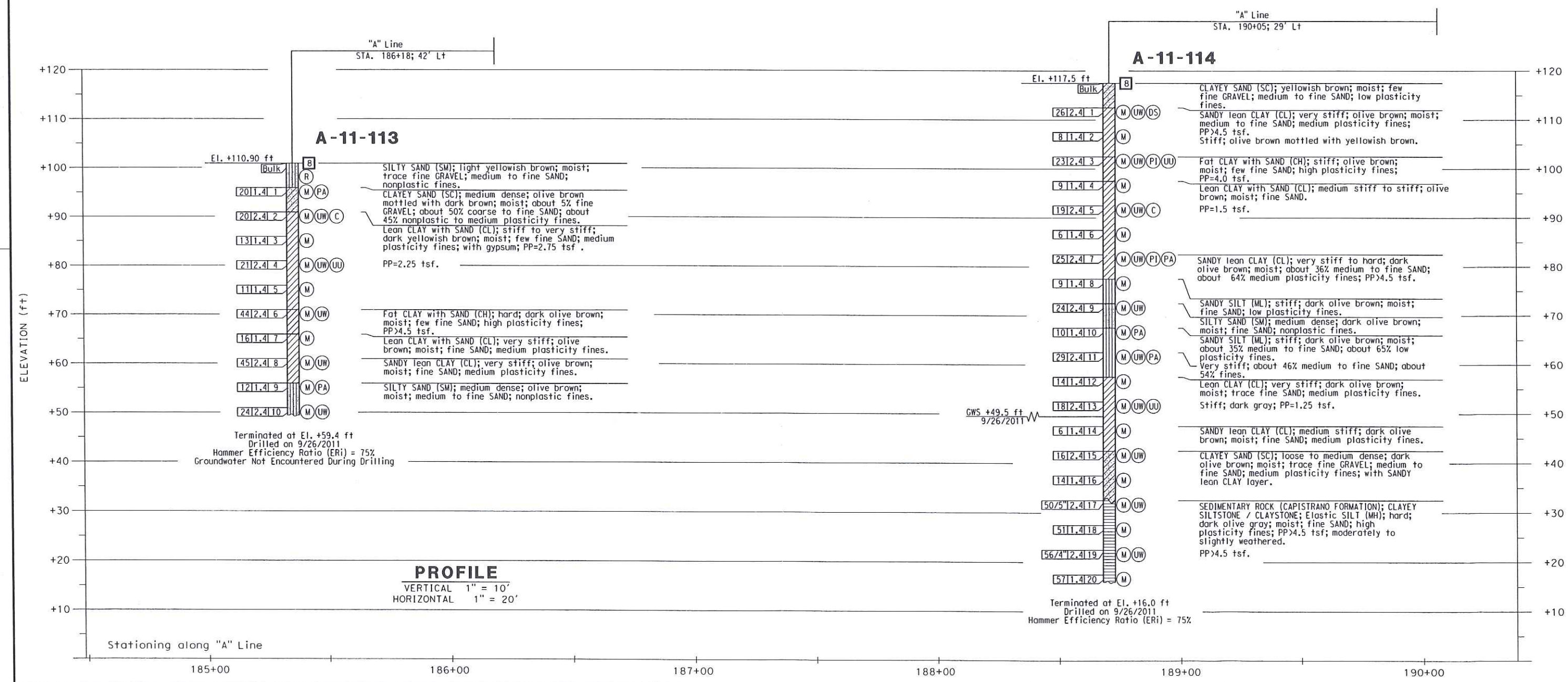

PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011				POST MILES -

RETAINING WALL 183

LOG OF TEST BORINGS 2 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

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CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

NOTES:

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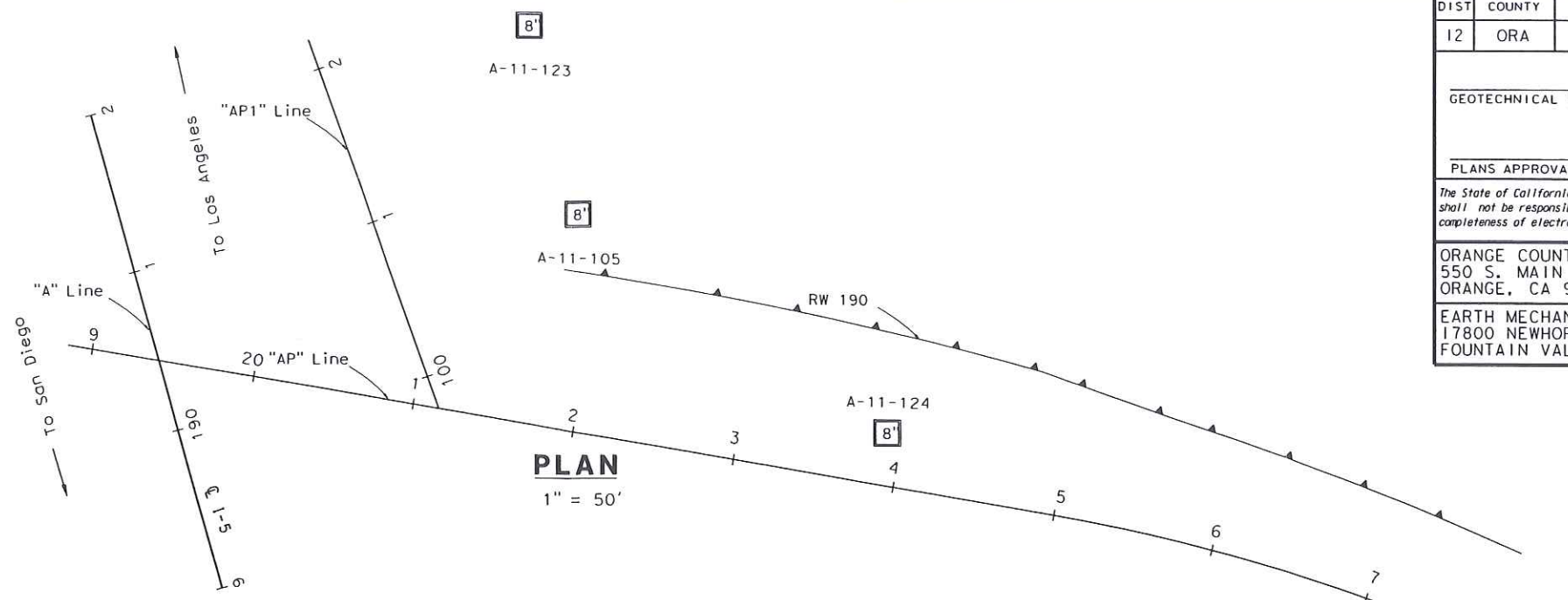
(3) An automatic trip hammer system or a rope and pulley hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.



DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR NO. GE 2564 EXP. 12-31-12 GEOTECHNICAL STATE OF CALIFORNIA

PLANS APPROVAL DATE

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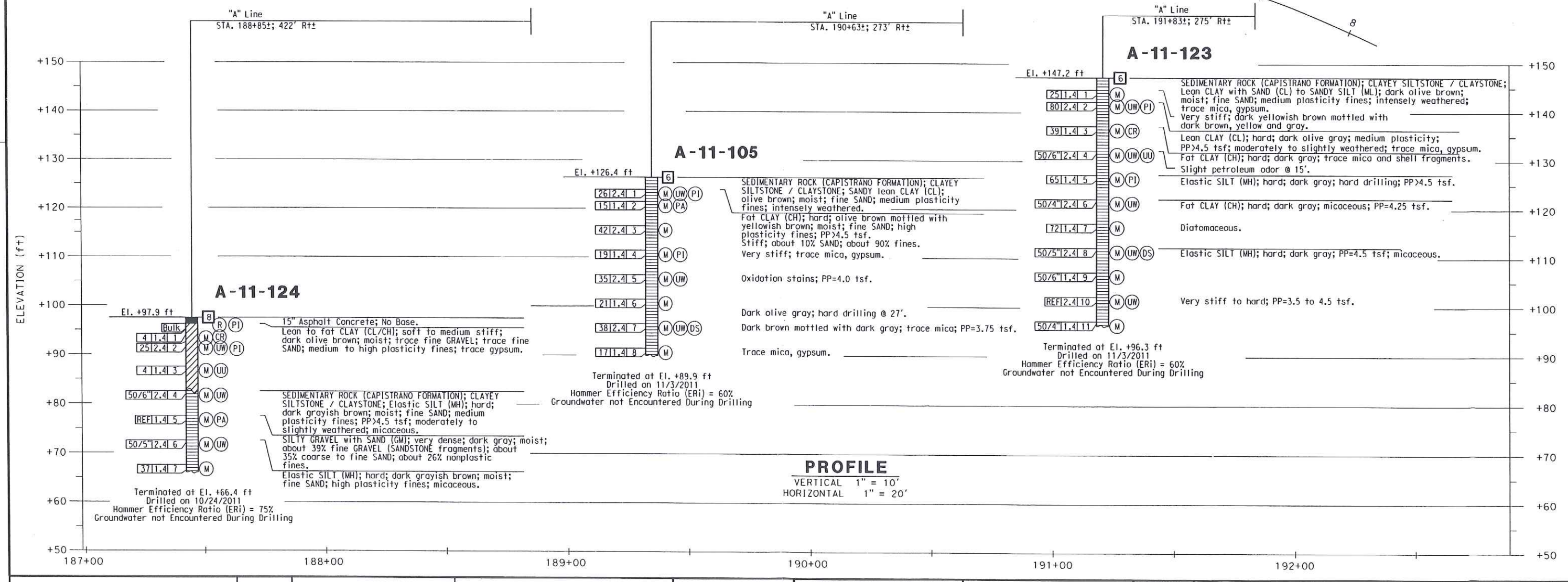

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -	RETAINING WALL 190
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 10/2011, 11/2011			POST MILES -	LOG OF TEST BORINGS 1 OF 7

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771 CONTRACT NO.: 12-0F96B1

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES | SHEET | OF

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USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

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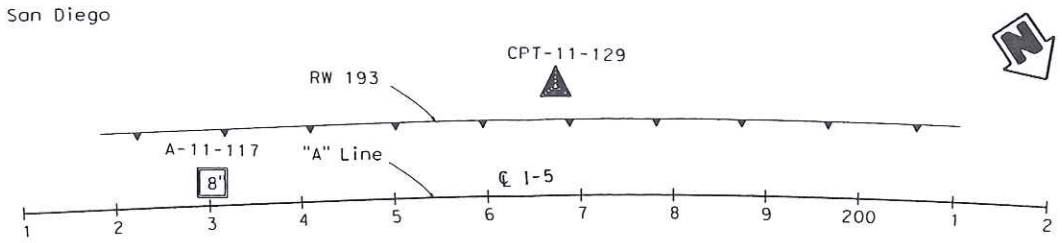

PLAN

1" = 100'

To Los Angeles

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPISKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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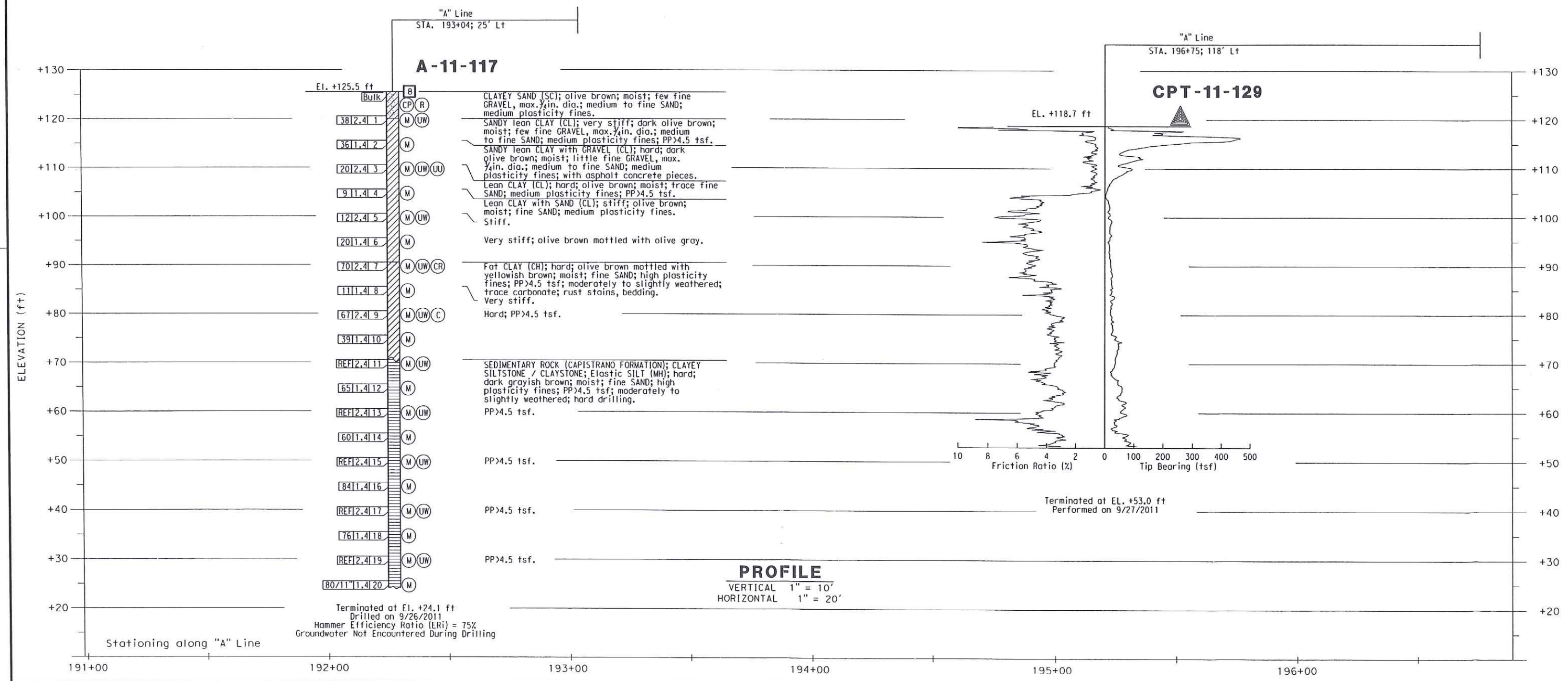

PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR	BRIDGE NO. -	RETAINING WALL 193
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011		PROJECT ENGINEER	POST MILES -	LOG OF TEST BORINGS 1 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 1200020771

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

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CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

NOTES:

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(3) An automatic trip hammer system consisting of a hammer weight of 140 lbs falling a distance of 30" was used to advance the drive sampler.

(4) Conversion factor from 2.4" Modified California Ring Sampler blowcounts to Standard Penetration Test (SPT) blowcounts is 0.5.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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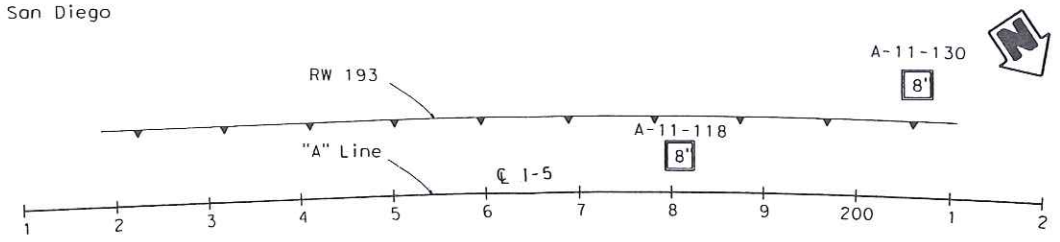
ORANGE COUNTY TRANSPORTATION AUTHORITY
550 S. MAIN STREET
ORANGE, CA 92863-1584

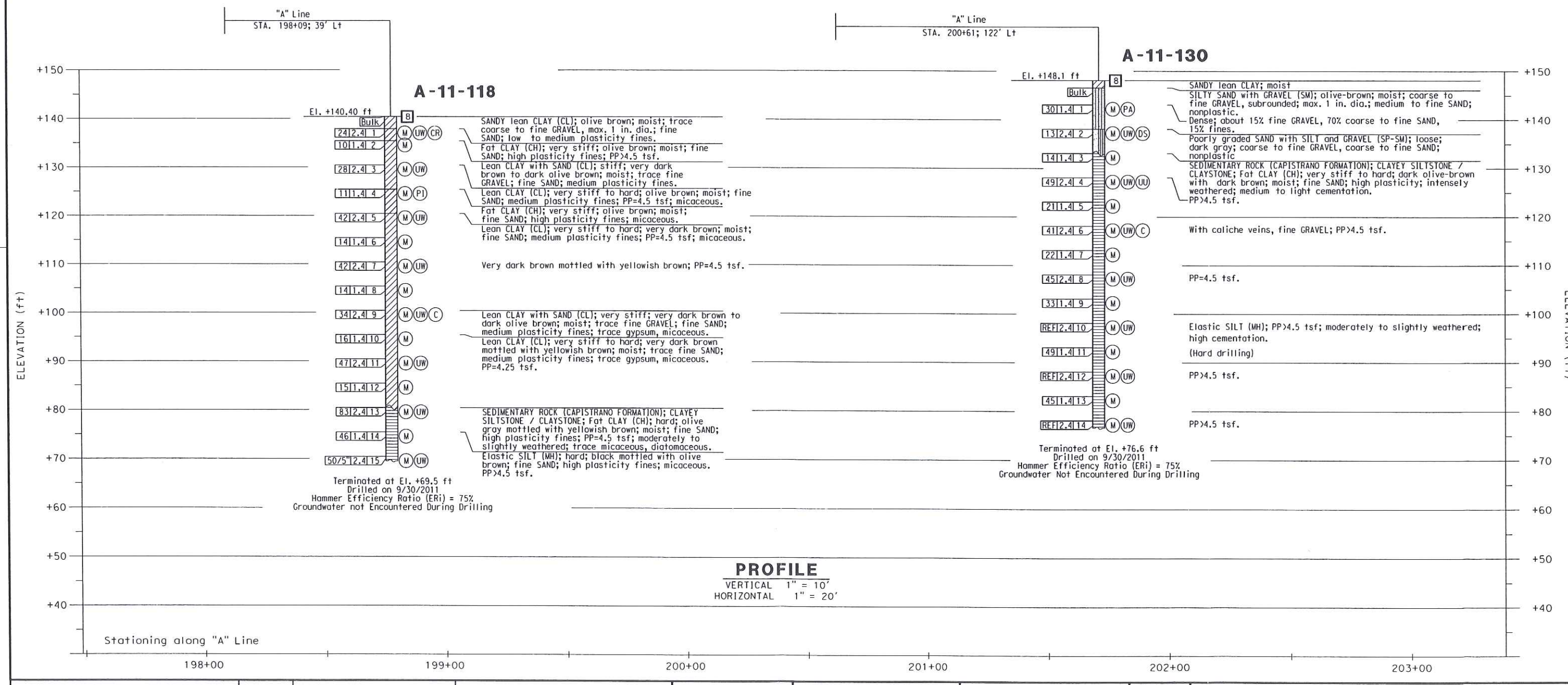
EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708



PLAN

1" = 100'

To Los Angeles →



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011				POST MILES -

RETAINING WALL 193

LOG OF TEST BORINGS 2 OF 2

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => $REQUEST

CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

DATE PLOTTED => $DATE TIME PLOTTED => $TIME USERNAME => $USER

BENCH MARK:

DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

DESCRIBED BY OCS 2003 - FOUND 3¼" OCS ALUMINUM BENCH MARK DISK STAMPED "3Y-38-91", SET IN THE NORTHWESTERLY CORNER OF A 4 FT. BY 17 FT. CONCRETE CATCH BASIN. MONUMENT IS LOCATED IN THE SOUTHEASTERLY CORNER OF INTERSECTION OF AVENIDA PICO AND AVENIDA LA PATA, 50 FT. SOUTHERLY OF THE CENTERLINE OF AVENIDA LA PATA AND 90 FT. EASTERLY OF THE AVENIDA PICO. MONUMENT IS SET LEVEL WITH THE TOP OF THE CURB.

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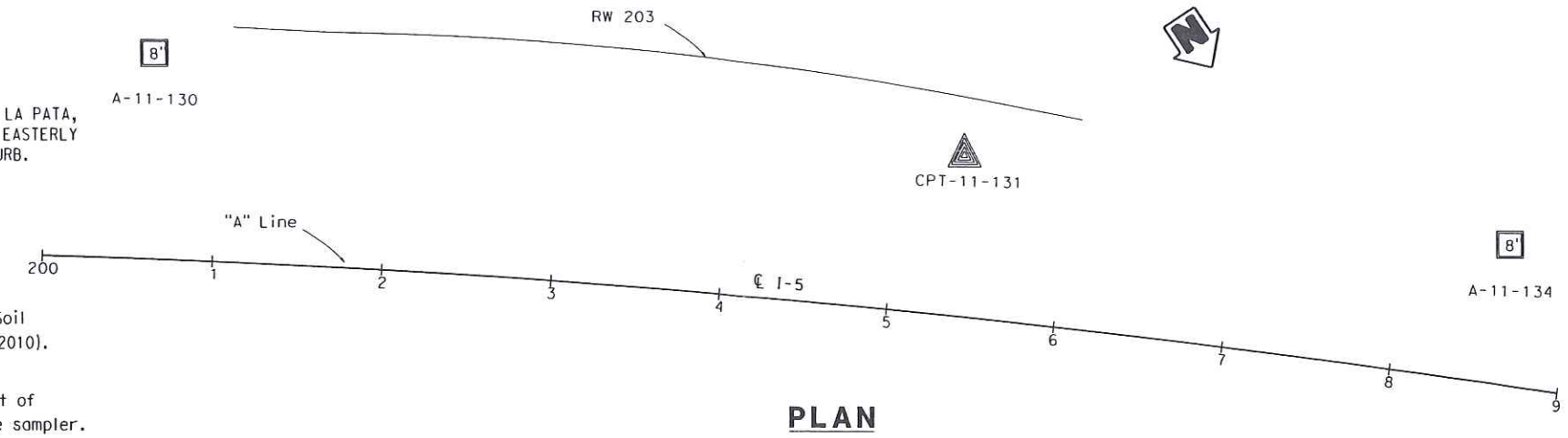

PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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ORANGE, CA 92863-1584

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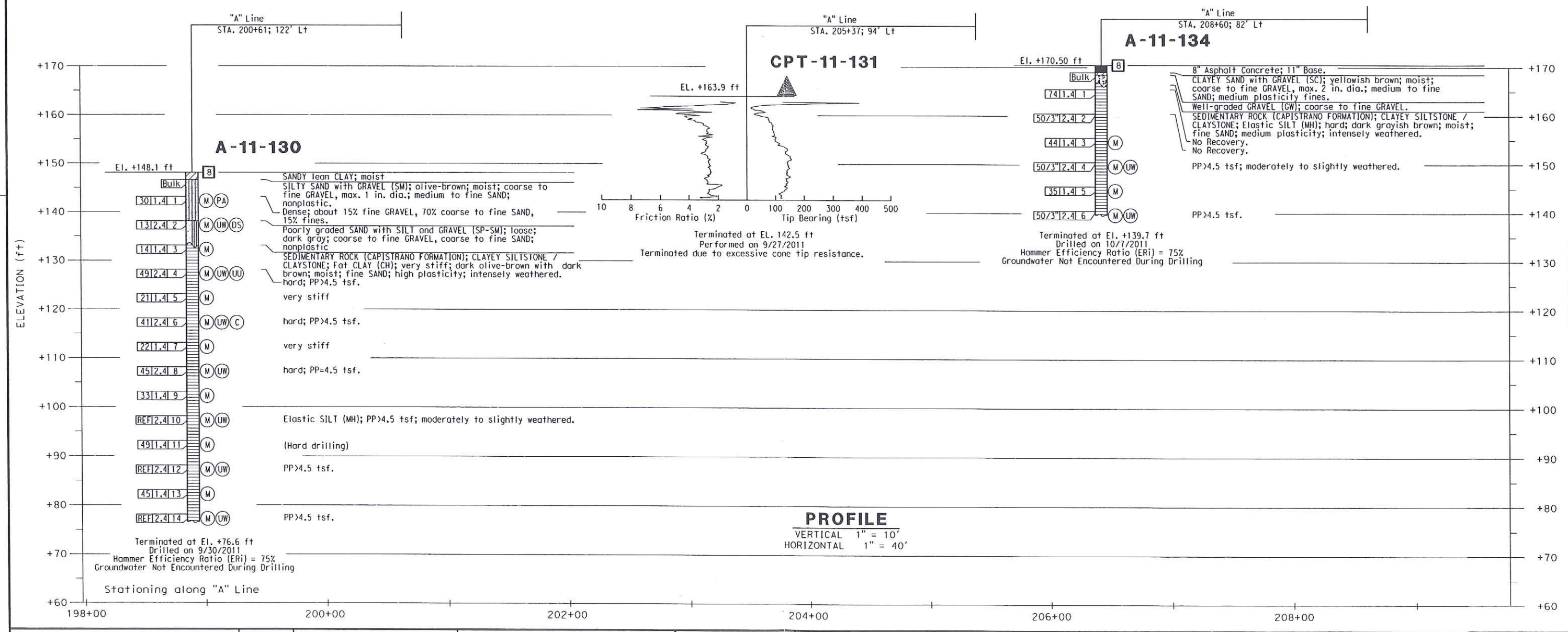
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708



PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 40'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -	RETAINING WALL 203
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011, 10/2011			POST MILES -	LOG OF TEST BORINGS 1 OF 1

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES | SHEET | OF

FILE => $REQUEST

CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

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DESIGNATION: 3Y-38-91 ELEV 252.197' NAVD88

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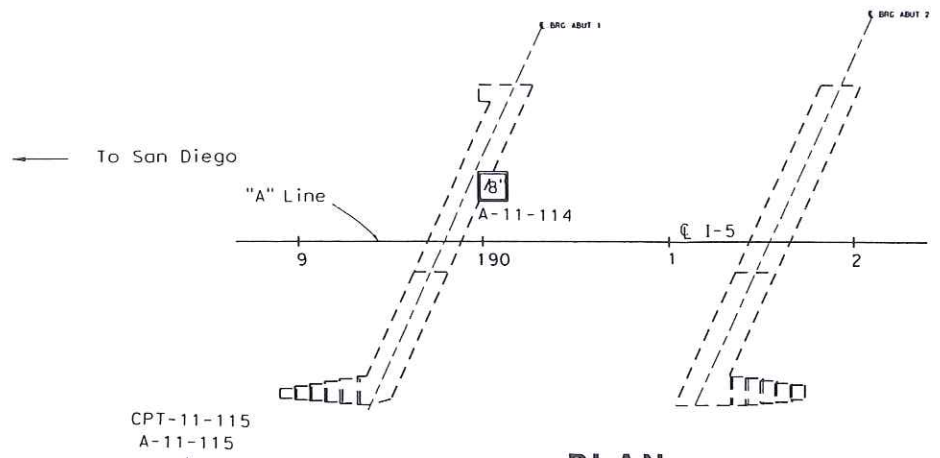
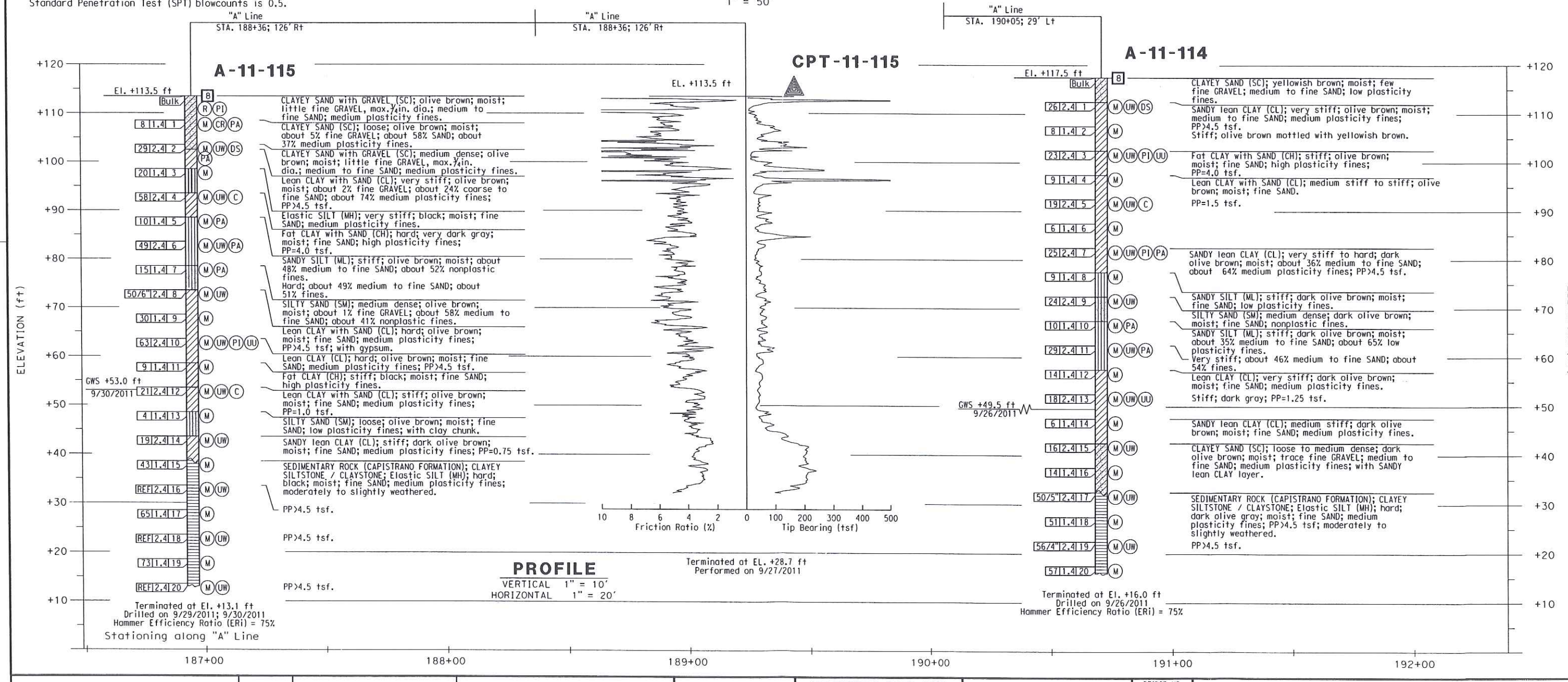


PLAN

1" = 50'



PROFILE

VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. 55-0207
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011			POST MILES 3.39

AVENIDA PICO UC (REPLACE)

LOG OF TEST BORINGS 1 OF 4

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => $REQUEST

CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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17800 NEWHOPE STREET, SUITE B
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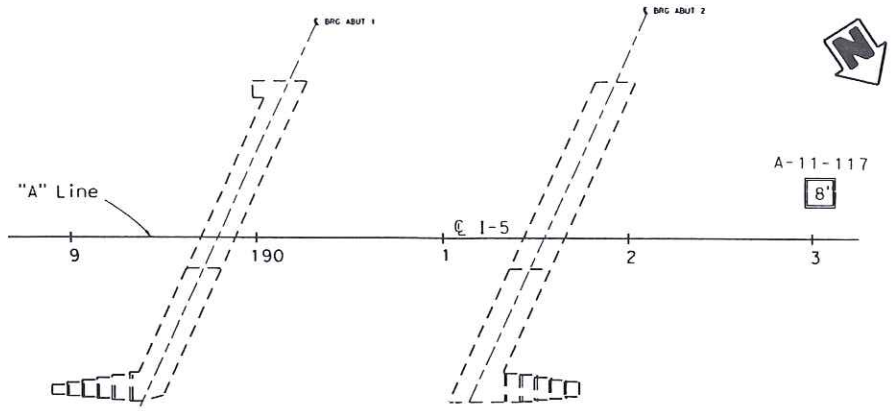
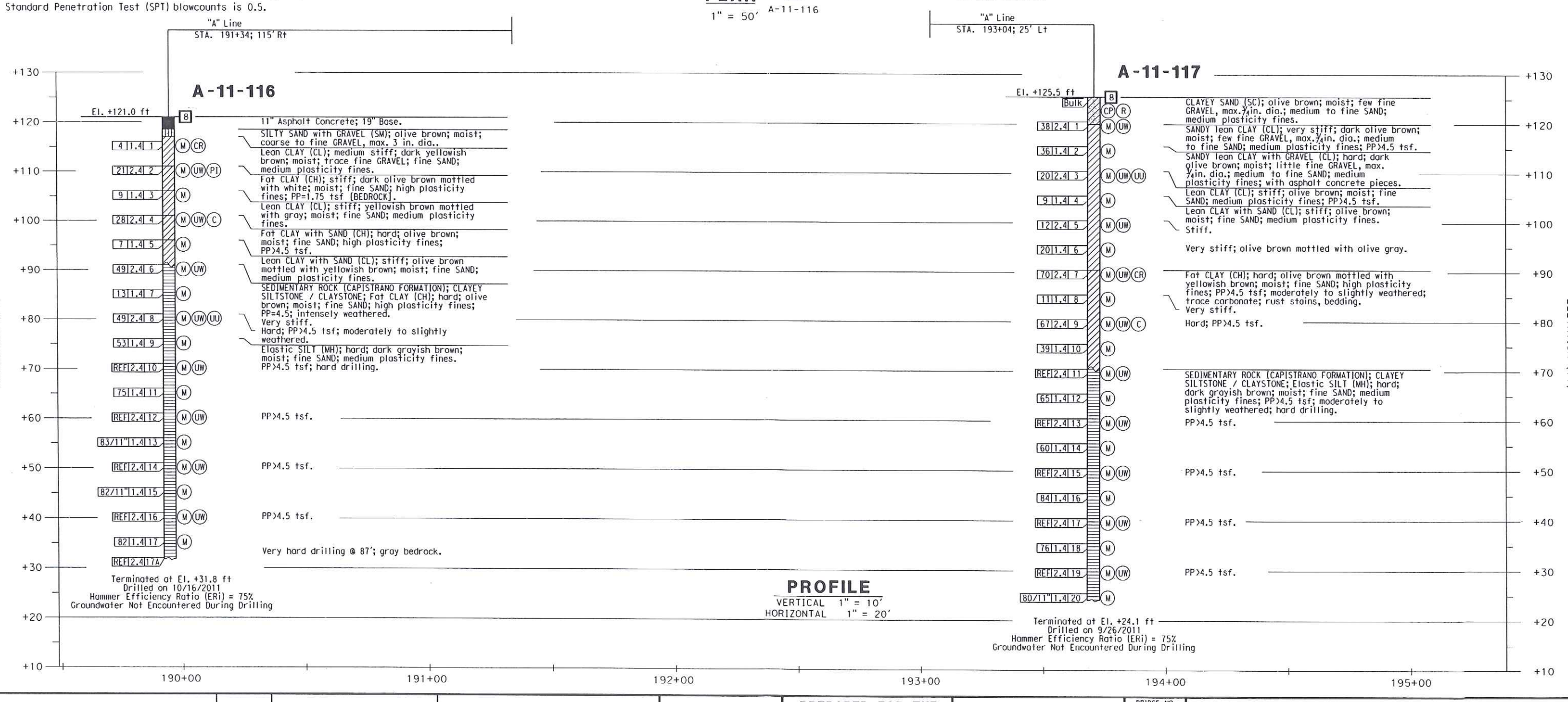


PLAN 8' A-11-116
1" = 50'

To Los Angeles →



PROFILE
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HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR	BRIDGE NO. 55-0207	AVENIDA PICO UC (REPLACE)
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011, 10/2011		PROJECT ENGINEER	POST MILES 3.39	LOG OF TEST BORINGS 2 OF 4

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771

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FILE => $REQUEST

CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

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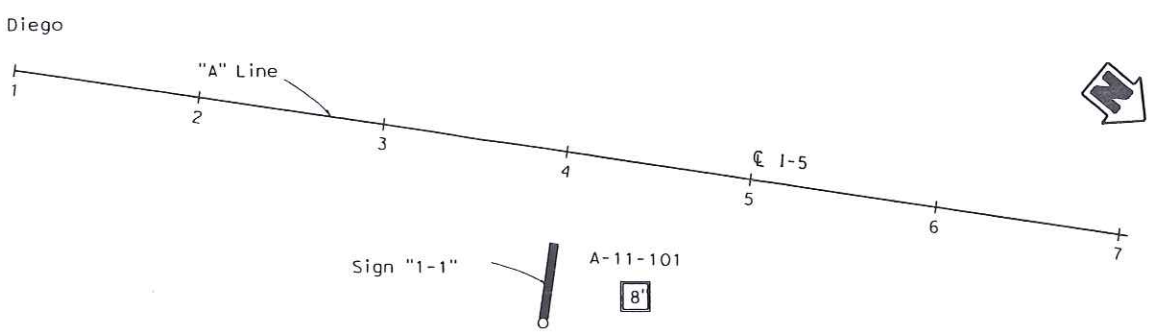

PLAN

1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MIKE KAPUSKAR — NO. GE 2564 EXP. 12-31-12 — GEOTECHNICAL — STATE OF CALIFORNIA

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ORANGE, CA 92863-1584

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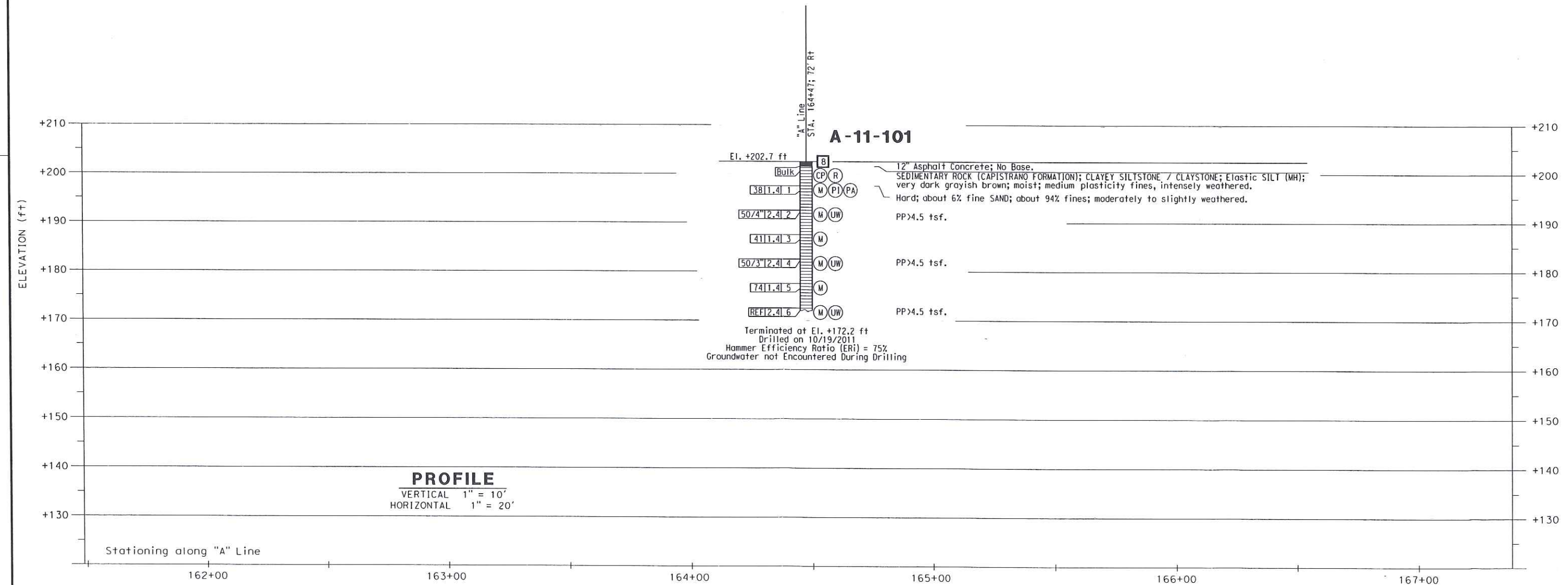
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708



PROFILE

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HORIZONTAL 1" = 20'

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 10/2011				POST MILES -

OVERHEAD SIGN STRUCTURES

LOG OF TEST BORINGS 1 OF 6

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: -
PROJECT NUMBER & PHASE: 12000202771

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => $REQUEST

CONTRACT NO.: 12-OF96B1 PROJECT ID: 1200020277

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

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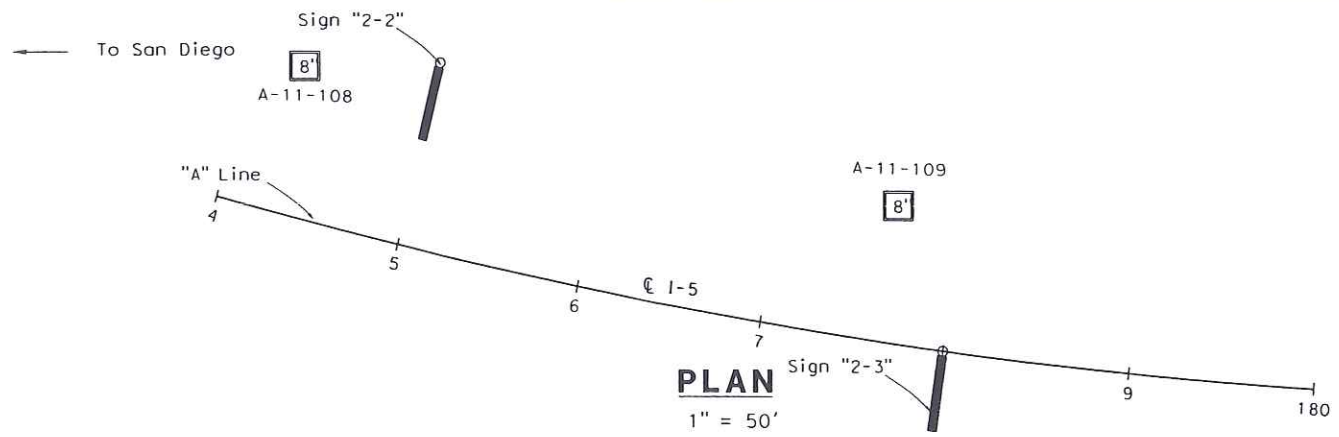

PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	ORA	5	3.0/3.7		

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

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550 S. MAIN STREET
ORANGE, CA 92863-1584

EARTH MECHANICS, INC.
17800 NEWHOPE STREET, SUITE B
FOUNTAIN VALLEY, CA 92708

A-11-108

"A" Line STA. 174+27; 81' Lt

El. +153.8 ft

8" Asphalt Concrete; 5" Base.

SILTY SAND (SM); yellowish brown; moist; few fine GRAVEL; medium to fine SAND; nonplastic fines.

29|2.4|1 M UW DS PI

Lean CLAY with SAND (CL); hard; olive brown; moist; about 3% fine GRAVEL; about 18% fine SAND; about 79% medium plasticity fines; PP>4.5 tsf.

12|1.4|2 M

SILTY, CLAYEY SAND (SC-SM); medium dense; olive brown mottled with yellowish brown; moist; fine SAND; low plasticity fines.

40|2.4|3 M UW PI PA

Fat CLAY with SAND (CH); very stiff; olive brown mottled with yellowish brown; moist; about 23% fine SAND; about 77% high plasticity fines [DECOMPOSED BEDROCK].

10|1.4|4 M

SANDY lean CLAY (CL); medium stiff; olive brown mottled with yellowish brown; moist; trace fine GRAVEL; medium to fine SAND; medium plasticity fines.

41|2.4|5 M UW

Fat CLAY with SAND (CH); hard; olive brown mottled with yellowish brown; moist; fine SAND; high plasticity fines; with gypsum; PP>4.5 tsf.

30|1.4|6 M

Terminated at El. +122.3 ft
Drilled on 9/26/2011
Hammer Efficiency Ratio (ERi) = 75%
Groundwater not Encountered During Drilling

A-11-109

"A" Line STA. 177+65; 74' Lt

El. +137.2 ft

SANDY SILT (ML); light yellowish brown; moist; few fine GRAVEL; medium to fine SAND; low plasticity fines.

13|1.4|1 M

Lean CLAY with SAND (CL); stiff to very stiff; dark olive brown mottled with dark brown; moist; trace fine GRAVEL; fine SAND; medium plasticity fines.

20|2.4|2 M UW PA

Hard; about 2% fine GRAVEL; about 15% fine SAND; about 83% fines; with gypsum; PP>4.5 tsf.

24|1.4|3 M PA

SANDY lean CLAY (CL); hard; olive brown; moist; about 1% fine GRAVEL; about 36% fine SAND; about 63% low to medium plasticity fines.

60|2.4|4 M UW DS

SANDY SILT (ML); hard; olive brown; moist; fine SAND; low plasticity fines; PP>4.5 tsf.

44|1.4|5 M

Lean CLAY with SAND (CL); hard; olive brown; moist; fine SAND; medium plasticity fines.

72|2.4|6 M UW

PP>4.5 tsf.

20|1.4|7 M

very stiff

32|2.4|8 M UW C

SEDIMENTARY ROCK (CAPISTRANO FORMATION); CLAYEY SILTSTONE / CLAYSTONE; Lean CLAY with SAND (CL); hard; yellowish brown to black; PP>4.5 tsf, intensely weathered.

36|1.4|9 M

Fat CLAY (CH); hard; black; moist; fine SAND; high plasticity fines.

62|2.4|10 M UW UU

PP>4.5 tsf.

12|1.4|11 M

Lean CLAY (CL); very stiff; dark olive brown mottled with dark yellowish brown; moist; fine SAND; medium plasticity fines. PP>4.5 tsf.

36|2.4|12 M UW

24|1.4|13 M

moderately to slightly weathered

50/4"|2.4|14 M UW

Elastic SILT (MH); hard; dark olive gray; moist; fine SAND; high plasticity fines; PP>4.5 tsf.

Terminated at El. +66.3 ft
Drilled on 9/27/2011
Hammer Efficiency Ratio (ERi) = 75%
Groundwater Not Encountered During Drilling

A-11-104

"A" Line STA. 179+14; 113' Rt

El. +136.5 ft

4" Asphalt Concrete; No Base.

SANDY lean CLAY (CL); very stiff to hard; olive brown; moist; trace fine GRAVEL; some medium to fine SAND; medium to high plasticity fines. Gravelly with some roots @ 6' to 7'.

15|1.4|1 M CR

45|2.4|2 M UW UU

PP>4.5 tsf.

21|1.4|3 M

43|2.4|4 M UW PI PA

Olive brown slightly mottled with yellowish brown; about 1% fine GRAVEL; about 40% medium to fine SAND; about 59% fines. Stiff; fine SAND.

10|1.4|5 M

35|2.4|6 M UW

Lean CLAY with SAND (CL); very stiff; olive brown; moist; fine SAND; medium to high plasticity fines; PP=3.0 tsf.

21|1.4|7 M

Terminated at El. +100.0 ft
Drilled on 10/19/2011
Hammer Efficiency Ratio (ERi) = 75%
Groundwater not Encountered During Drilling

PROFILE
VERTICAL 1" = 10'
HORIZONTAL 1" = 20'

ELEVATION (ft): +150, +140, +130, +120, +110, +100, +90, +80, +70, +60, +50, +40

Stationing along "A" Line: 174+00, 175+00, 176+00, 177+00, 178+00, 179+00

DESIGN OVERSIGHT	DRAWN BY	J. FANG	R. JIE; K. KAEKUL; C. PONGSAKORNPATARA		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. -
SIGN OFF DATE	CHECKED BY	M. KAPUSKAR	FIELD INVESTIGATION BY: DATE: 9/2011, 10/2011				POST MILES -

OVERHEAD SIGN STRUCTURES

LOG OF TEST BORINGS 2 OF 6

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: - PROJECT NUMBER & PHASE: 12000202771

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET | OF

FILE => $REQUEST

CONTRACT NO.: 12-0F96B1 PROJECT ID: 1200020277

TIME PLOTTED => $TIME

DATE PLOTTED => $DATE

USERNAME => $USER

LOG OF BORING NO. A-12-106

Grade Elevation:	+31.5 ft				
Boring Depth:	31.5 ft	Driller:	2R Drilling	SHEET 1 of 2	
Borehole Diameter:	5"	Type of Rig:	CME 75	Comments: Hammer Energy Efficiency: 75%	
Date Drilled:	11-19-11	Hammer Data:	Automatic hammer 140-lbs/30-inch drop	Northing: 2,105,945, Easting: 6,143,480	
Logged By:	R.J.	Groundwater Reading:	Not Encountered	Boring Backfill: Cement Grout	

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
					SILTY SAND (SM); olive brown; moist; medium to fine SAND; nonplastic fines.			
5		1	9		Medium dense.			
10		2	8		Very dense; trace mica and shell fragments.	7	104	DS

1. 'Sample Type' - Graphical representation of sample type as shown below.
   - S: Split Spoon - Standard Penetration Test Sample (SPT)
   - D: Drive Sample - California Drive Sampler
   - H: Hand Auger Sample - Obtained by collecting hand auger cuttings in a plastic bag
   - B: Bulk Sample - Obtained by collecting cuttings in a plastic bag
   - T: Tube Sample - Thin-walled Tube Sample
   - P: Thin-walled Pitcher Core Sample
2. 'Sample' - Sample Number
3. 'Blows/foot' - Number of blows required to advance sampler one foot (unless a distance is specified). Samplers in general were driven into the soil at the bottom of the hole with a 140-lb automatic trip hammer falling a standard 30 inches (as specified in header).

   'REC/RQD' - Sample Core Recovery (REC) in percent (%) and Rock Quality Designation (RQD) in percent (%). RQD is defined as the percentage of core in each run in which the spacing between natural fractures is greater than 4 inches. Mechanical breaks of the core are not considered.
4. 'Graphic Log' - Standard symbols for soil and rock types, as shown in Note B opposite
5. ▽ Groundwater elevation while drilling.
6. 'Geotechnical Description' (See also Note A, opposite).

   Soil - Soil classifications are in general accordance with the American Society for Testing and Materials (ASTM) D2488.84. Designations include consistency, moisture, and color. Field description have been modified to reflect results of laboratory analyses where deemed appropriate.

   Rock - Rock classifications generally include a rock type, color, moisture, mineral constituents, degree of weathering, alteration and the mechanical properties of the rock.

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

I-5 HOV Widening Segment 1

EMI Project No.: 11-135 Date: 03/05/12

LEGEND FOR LETTER-SIZE GEOTECHNICAL BORING LOGS (SHEET 1 OF 2)

7. 'Moisture Content' and 'Dry Density' determined by laboratory testing.

8. 'Tests/Results' - Identify types of laboratory tests performed on samples collected from the field investigation. Abbreviations of tests are provided below:

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

Criteria for Describing Moisture Condition

Description	Criteria (After ASTM D 2488)
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

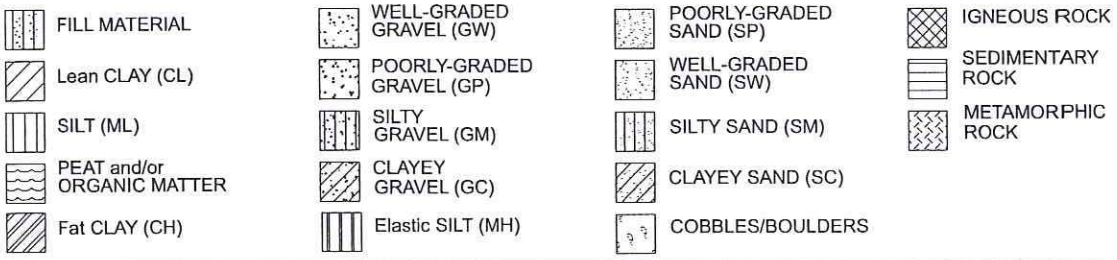
Relative Density of Coarse-Grained Soil

Blows/foot	Relative Density	Field Test (After Sowers, 1979)
0 - 4	Very Loose	Easily penetrated 12" with 0.5-inch steel rod pushed by hand
5 - 10	Loose	Easily penetrated with 0.5-inch steel rod pushed by hand
11 - 30	Medium Dense	Easily penetrated with 0.5-inch steel rod driven by 5-lb hammer
31 - 50	Dense	Penetrated a foot with 0.5-inch steel rod driven by 5-lb hammer
> 50	Very Dense	Penetrated a few inches with 0.5-inch steel rod driven by 5-lb hammer

Consistency of Cohesive Soils

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

Legend of Earth Materials



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I-5 HOV Widening Segment 1

EMI Project No.: 11-135 Date: 03/05/12

LEGEND FOR LETTER-SIZE GEOTECHNICAL BORING LOGS (SHEET 2 OF 2)

LOG OF BORING NO. HA-11-102

Grade Elevation:	+178.2 ft				
Boring Depth:	3.0 ft	Driller:	EMI	SHEET 1 of 1	
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:	
Date Drilled:	10-19-11	Hammer Data:	Hand Auger	Northing: 2,104,728, Easting: 6,144,546	
Logged By:	KK	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 14" Asphalt Concrete; No Base.			
		bulk			SANDY lean CLAY (CL); olive brown; moist; medium to fine SAND; low plasticity fines.			
					Bottom of borehole at 3.0 ft bgs			
5								
10								
15								
20								
25								

LOG OF BORING NO. HA-11-103

Grade Elevation:	+158.4 ft				
Boring Depth:	2.0 ft	Driller:	EMI		SHEET 1 of 1
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:	
Date Drilled:	10-19-11	Hammer Data:	Hand Auger	Northing: 2,105,100, Easting: 6,144,305	
Logged By:	KK	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 13" Asphalt Concrete; No Base.			
		bulk			SANDY lean CLAY (CL); olive brown; moist; medium to fine SAND; low plasticity fines; ; some fat CLAY.			R
					Bottom of borehole at 2.0 ft bgs			
5								
10								
15								
20								
25								

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012.1.GLB 9/14/12

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I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

LOG OF BORING NO. A-11-106

Grade Elevation:	+104.2 ft				
Boring Depth:	31.5 ft	Driller:	2R Drilling	SHEET 1 of 2	
Borehole Diameter:	8"	Type of Rig:	CME 75	Comments: Hammer Energy Efficiency: 75%	
Date Drilled:	10-19-11	Hammer Data:	Automatic hammer 140-lbs/30-inch drop	Northing: 2,105,945, Easting: 6,143,480	
Logged By:	KK	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 12" Asphalt Concrete; 8" Base.			
					SANDY lean CLAY (CL); olive brown; moist; medium to fine SAND; medium plasticity fines.			PI, R
		Bulk			@ 4'; some subrounded cobbles, size up to 3" dia..			
5		1	9		Lean CLAY with SAND (CL); stiff; olive brown slightly mottled with yellowish brown; moist; fine SAND; medium plasticity fines.	21		
					Trace GRAVEL.			
10		2	42		Lean CLAY (CL); very stiff to hard; olive brown; moist; fine SAND; medium plasticity fines; trace asphalt debris, PP>4.5 tsf.	21	106	UU
15		3	13		Fat CLAY (CH); very stiff; dark olive brown to black; moist; fine SAND; high plasticity fines.	18		
20		4	11		SANDY lean CLAY (CL); hard; dark olive brown; moist; fine SAND; medium plasticity fines; PP>4.5 tsf.	16	106	
25								

(continued)

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I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

(CONTINUED) LOG OF BORING NO. A-11-106

Date Drilled:	10-19-11	Comments: Hammer Energy Efficiency: 75%	SHEET 2 of 2
Logged By:	KK		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
25		5	9		Stiff. SANDY lean CLAY (CL) *(continued)*.	19		
30		6	26		Very stiff to hard; PP=4.25 tsf.	25	96	
					Bottom of borehole at 31.5 ft bgs			
35								
40								
45								
50								

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I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

LOG OF BORING NO. HA-11-107

Grade Elevation:	+116.7 ft				
Boring Depth:	2.5 ft	Driller:	EMI	SHEET 1 of 1	
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:	
Date Drilled:	10-20-11	Hammer Data:	Hand Auger	Northing: 2,105,759, Easting: 6,143,694	
Logged By:	RJ	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0		bulk			SANDY lean CLAY (CL); olive brown; moist; trace coarse to fine GRAVEL; medium to fine SAND; low to medium plasticity fines.			
					Bottom of borehole at 2.5 ft bgs			
5								
10								
15								
20								
25								

EM BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EM LIBRARY CALTRANS 2012-1.GLB 9/14/12

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

LOG OF BORING NO. A-11-112

Grade Elevation:	+88.8 ft				
Boring Depth:	6.5 ft	Driller:	2R Drilling	SHEET 1 of 1	
Borehole Diameter:	8"	Type of Rig:	CME 75	Comments: Hammer Energy Efficiency: 75%	
Date Drilled:	9-27-11	Hammer Data:	Automatic hammer 140-lbs/30-inch drop	Northing: 2,105,842, Easting: 6,142,953	
Logged By:	CP	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0		bulk			SANDY SILT (ML); yellowish brown; moist; medium to fine SAND; nonplastic fines.			PI, R
		1	15		Lean CLAY with SAND (CL); very stiff; dark grayish brown; moist; fine SAND; low plasticity fines.			
5		2	42					
					Bottom of borehole at 6.5 ft bgs			
10								
15								
20								
25								

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

LOG OF BORING NO. HA-11-119

Grade Elevation:	+132.2 ft			
Boring Depth:	5.0 ft	Driller:	EMI	SHEET 1 of 1
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:
Date Drilled:	10-16-11	Hammer Data:	Hand Auger	Northing: 2,106,380, Easting: 6,142,687
Logged By:	KK	Groundwater Reading:	Not Encountered	

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 12" Asphalt Concrete; 8" Base.			
		bulk			Lean CLAY with SAND (CL); olive brown; few fine GRAVEL; medium to fine SAND; nonplastic to low plasticity fines.			PI, R
5					Bottom of borehole at 5.0 ft bgs			
10								
15								
20								
25								

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

LOG OF BORING NO. HA-11-120

Grade Elevation:	+98.0 ft				
Boring Depth:	3.5 ft	Driller:	EMI	SHEET 1 of 1	
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:	
Date Drilled:	10-24-11	Hammer Data:	Hand Auger	Northing: 2,106,248, Easting: 6,143,462	
Logged By:	RJ	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 17" Asphalt Concrete; No Base.			
		bulk			Lean CLAY with SAND (CL); olive brown; moist; trace fine GRAVEL; fine SAND; medium plasticity fines.			
					Bottom of borehole at 3.5 ft bgs			
5								
10								
15								
20								
25								

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

LOG OF BORING NO. HA-11-121

Grade Elevation:	+85.5 ft				
Boring Depth:	2.5 ft	Driller:	EMI	SHEET 1 of 1	
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:	
Date Drilled:	10-24-11	Hammer Data:	Hand Auger	Northing: 2,105,787, Easting: 6,142,699	
Logged By:	RJ	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0		bulk			Poorly graded SAND with SILT (SP-SM); light olive brown; trace coarse to fine GRAVEL, max. 1 in. dia.; medium to fine SAND; nonplastic fines.			CP, R
					@ 2.5' Lean CLAY (CL); dark brown; fine SAND. Bottom of borehole at 2.5 ft bgs			
5								
10								
15								
20								
25								

Earth Mechanics, Inc.
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I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

LOG OF BORING NO. HA-11-122

Grade Elevation:	+81.8 ft			
Boring Depth:	4.0 ft	Driller:	EMI	SHEET 1 of 1
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:
Date Drilled:	10-24-11	Hammer Data:	Hand Auger	Northing: 2,105,661, Easting: 6,142,622
Logged By:	RJ	Groundwater Reading:	Not Encountered	

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 11" Asphalt Concrete; 12" Base.			
		bulk			Lean CLAY with SAND (CL); soft; olive brown; trace fine GRAVEL; fine SAND; medium plasticity fines.			
					Bottom of borehole at 4.0 ft bgs			
5								
10								
15								
20								
25								

Earth Mechanics, Inc.
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I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

EM BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EM LIBRARY CALTRANS 2012-1.GLB 9/14/12

LOG OF BORING NO. A-11-126

Grade Elevation:	+127.0 ft				
Boring Depth:	10.9 ft	Driller:	2R Drilling	SHEET 1 of 1	
Borehole Diameter:	8"	Type of Rig:	CME 75	Comments: Hammer Energy Efficiency: 75%	
Date Drilled:	9-28-11	Hammer Data:	Automatic hammer 140-lbs/30-inch drop	Northing: 2,106,405, Easting: 6,142,732	
Logged By:	CP	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0		bulk			Lean CLAY with SAND (CL); dark grayish brown; moist; trace fine GRAVEL; fine SAND; low plasticity fines.			R
		1	84		Elastic SILT (MH); hard; dark grayish brown; moist; fine SAND; high plasticity fines; PP>4.5 tsf.	22	103	
5		2	33			21		
10		3	50/5 "		PP>4.5 tsf; SEDIMENTARY ROCK (CAPISTRANO FORMATION); CLAYEY SILTSTONE / CLAYSTONE [BEDROCK].	22	102	
					Bottom of borehole at 10.9 ft bgs			
15								
20								
25								

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

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I-5 HOV Widening Segment 1

Project Number: 11-135 | Date:

LOG OF BORING NO. A-11-127

Grade Elevation:	+143.9 ft				
Boring Depth:	6.5 ft	Driller:	2R Drilling	SHEET 1 of 1	
Borehole Diameter:	8"	Type of Rig:	CME 75	Comments: Hammer Energy Efficiency: 75%	
Date Drilled:	9-28-11	Hammer Data:	Automatic hammer 140-lbs/30-inch drop	Northing: 2,106,675, Easting: 6,142,332	
Logged By:	CP	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0		bulk			SILT with SAND (ML); light yellowish brown; moist; fine SAND; nonplastic fines.			
		1	15		Very stiff.			
5		2	45		Lean CLAY (CL); very stiff; yellowish brown; moist; fine SAND; low plasticity fines.			
					Bottom of borehole at 6.5 ft bgs			
10								
15								
20								
25								

EMI BORING LOG - 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

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I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

LOG OF BORING NO. A-11-128

Grade Elevation:	+92.7 ft				
Boring Depth:	6.5 ft	Driller:	2R Drilling	SHEET 1 of 1	
Borehole Diameter:	8"	Type of Rig:	CME 75	Comments: Hammer Energy Efficiency: 75%	
Date Drilled:	9-30-11	Hammer Data:	Automatic hammer 140-lbs/30-inch drop	Northing: 2,106,063, Easting: 6,142,681	
Logged By:	CP	Groundwater Reading:	Not Encountered		

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0					ASPHALT ; 8" Asphalt Concrete; 4" Base; Geotextile Under Base.			
		bulk			Lean CLAY (CL); very stiff; olive brown; moist; fine SAND; trace gypsum.			PI, R
5		1	16					
					Bottom of borehole at 6.5 ft bgs			
10								
15								
20								
25								

EMI BORING LOG 11-135 I-5 HOV SEGMENT 1.GPJ EMI LIBRARY CALTRANS 2012-1.GLB 9/14/12

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I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

LOG OF BORING NO. HA-11-132

Grade Elevation:	+151.6 ft			
Boring Depth:	2.0 ft	Driller:	EMI	SHEET 1 of 1
Borehole Diameter:	Bulk	Type of Rig:	Hand Auger	Comments:
Date Drilled:	9-30-11	Hammer Data:	Hand Auger	Northing: 2,106,652, Easting: 6,142,045
Logged By:	KK	Groundwater Reading:	Not Encountered	

Depth (ft)	Sample Type	Sample	Blows/foot	Graphic Log	GEOTECHNICAL DESCRIPTION	Moisture (%)	Dry Density (pcf)	Test/ Results
0		bulk			Lean CLAY with SAND (CL); olive brown; medium to fine SAND; low to medium plasticity fines.			
					Bottom of borehole at 2.0 ft bgs			
5								
10								
15								
20								
25								

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Geotechnical and Earthquake Engineering

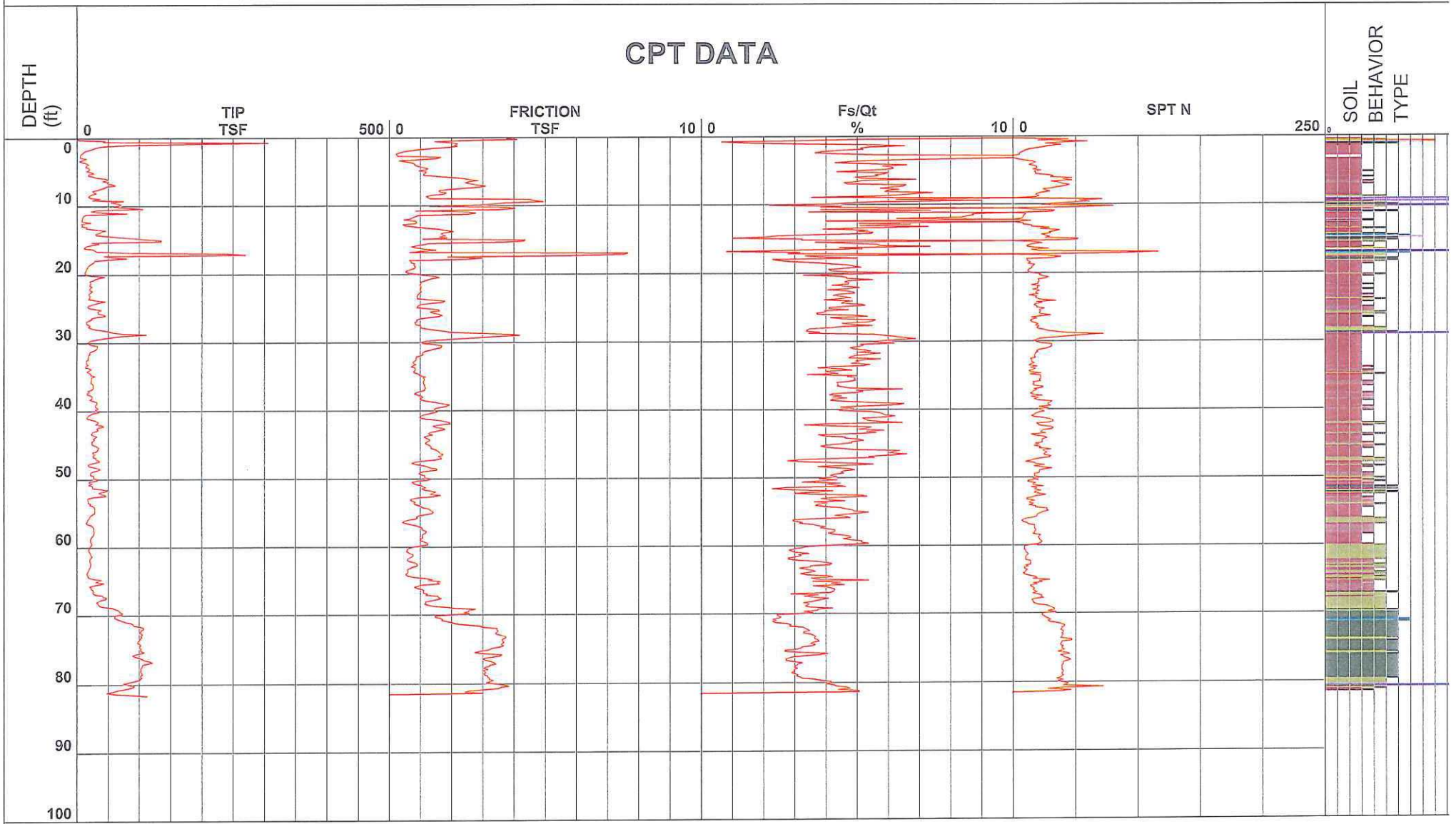
I-5 HOV Widening Segment 1

Project Number: 11-135 | Date: 4-12-12

Earth Mechanics

Location	I-5 HOV Widening Segment 1	Operator	BH-JB	Filename	SDF(530).cpt
Job Number	11-135	Cone Number	DSG1104	GPS	
Hole Number	CPT-11-110	Date and Time	9/27/2011 10:05:52 AM	Maximum Depth	81.69 ft
Water Table Depth	45.00 ft				

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qc1n PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.10	Cycl SStn %
0.33	3.4	5.4	-	4.1	0.0	9.9	2	Organic SOILS - Peats	100	1.0	3	5	-	-	0.4	9.9	95	10	N/A	0.00	N/A	N/A
0.49	45.5	73.0	204.2	2.3	-0.1	5.0	4	clayy SILT to silty CLAY	115	2.0	23	36	-	-	3.2	9.9	31	15	N/A	0.00	N/A	N/A
0.66	42.6	68.3	158.6	1.5	-0.1	3.5	4	clayy SILT to silty CLAY	115	2.0	21	34	-	-	3.0	9.9	27	15	N/A	0.00	N/A	N/A
0.82	306.1	490.9	490.9	2.0	-0.2	0.7	7	grvly SAND to dense SAND	130	6.0	51	82	95	48	-	-	5	16	N/A	0.00	N/A	N/A
0.98	156.7	251.3	266.7	2.2	0.1	1.4	6	clean SAND to silty SAND	125	5.0	31	50	95	48	-	-	7	16	N/A	0.00	N/A	N/A
1.15	67.7	108.6	189.8	2.1	0.2	3.1	5	silty SAND to sandy SILT	120	4.0	17	27	70	48	-	-	20	16	N/A	0.00	N/A	N/A
1.31	39.4	63.2	201.8	2.2	0.2	5.5	4	clayy SILT to silty CLAY	115	2.0	20	32	-	-	2.8	9.9	34	15	N/A	0.00	N/A	N/A
1.48	30.2	48.5	-	2.0	0.2	6.5	3	silty CLAY to CLAY	115	1.5	20	32	-	-	2.1	9.9	41	15	N/A	0.00	N/A	N/A
1.64	26.4	42.4	-	1.4	-0.3	5.4	3	silty CLAY to CLAY	115	1.5	18	28	-	-	1.9	9.9	40	15	N/A	0.00	N/A	N/A
1.80	20.2	32.4	-	1.0	-1.6	5.1	3	silty CLAY to CLAY	115	1.5	13	22	-	-	1.4	9.9	43	15	N/A	0.00	N/A	N/A
1.97	13.5	21.6	-	0.7	-0.6	5.2	3	silty CLAY to CLAY	115	1.5	9	14	-	-	0.9	9.9	51	15	N/A	0.00	N/A	N/A
2.13	10.6	17.0	-	0.5	0.0	4.5	3	silty CLAY to CLAY	115	1.5	7	11	-	-	0.7	9.9	53	15	N/A	0.00	N/A	N/A
2.30	8.5	13.6	-	0.3	0.2	3.9	3	silty CLAY to CLAY	115	1.5	6	9	-	-	0.6	9.9	56	15	N/A	0.00	N/A	N/A
2.46	6.3	10.2	-	0.2	0.2	3.7	3	silty CLAY to CLAY	115	1.5	4	7	-	-	0.4	9.9	62	15	N/A	0.00	N/A	N/A
2.62	5.4	8.7	-	0.2	0.3	4.5	3	silty CLAY to CLAY	115	1.5	4	6	-	-	0.4	9.9	70	15	N/A	0.00	N/A	N/A
2.79	4.9	7.9	-	0.3	0.2	5.8	3	silty CLAY to CLAY	115	1.5	3	5	-	-	0.3	9.8	78	15	N/A	0.00	N/A	N/A
2.95	4.8	7.7	-	1.6	0.2	9.9	2	Organic SOILS - Peats	100	1.0	5	8	-	-	0.5	9.1	91	10	N/A	0.00	N/A	N/A
3.12	15.3	24.6	-	1.6	0.3	9.9	3	silty CLAY to CLAY	115	1.5	10	16	-	-	1.1	9.9	61	15	N/A	0.00	N/A	N/A
3.28	9.9	15.9	-	1.1	0.2	9.9	3	silty CLAY to CLAY	115	1.5	7	11	-	-	0.7	9.9	71	15	-	-	0.11	-
3.45	4.4	7.1	-	0.3	0.1	7.7	3	silty CLAY to CLAY	115	1.5	3	5	-	-	0.3	7.5	88	15	-	-	0.11	-
3.61	9.8	15.7	-	0.5	0.0	5.7	3	silty CLAY to CLAY	115	1.5	7	10	-	-	0.7	9.9	60	15	-	-	0.11	-
3.77	15.2	24.4	-	0.7	0.0	4.9	3	silty CLAY to CLAY	115	1.5	10	16	-	-	1.1	9.9	48	15	-	-	0.11	-
3.94	18.8	30.1	-	0.8	0.0	4.3	3	silty CLAY to CLAY	115	1.5	13	20	-	-	1.3	9.9	42	15	-	-	0.11	-
4.10	15.3	24.5	-	0.8	-0.2	5.5	3	silty CLAY to CLAY	115	1.5	10	16	-	-	1.1	9.9	50	15	-	-	0.11	-
4.27	13.9	22.2	-	0.9	-0.1	6.7	3	silty CLAY to CLAY	115	1.5	9	15	-	-	1.0	9.9	55	15	-	-	0.11	-
4.43	18.2	29.2	-	1.1	-1.3	5.9	3	silty CLAY to CLAY	115	1.5	12	19	-	-	1.3	9.9	48	15	-	-	0.11	-
4.59	20.2	32.5	-	1.2	-0.6	6.2	3	silty CLAY to CLAY	115	1.5	13	22	-	-	1.4	9.9	47	15	-	-	0.11	-
4.76	19.4	31.1	-	1.2	-0.3	6.2	3	silty CLAY to CLAY	115	1.5	13	21	-	-	1.4	9.9	48	15	-	-	0.11	-
4.92	16.4	26.4	-	1.0	-0.3	6.0	3	silty CLAY to CLAY	115	1.5	11	18	-	-	1.1	9.9	50	15	-	-	0.11	-
5.09	23.1	37.1	-	1.2	-0.3	5.2	3	silty CLAY to CLAY	115	1.5	15	25	-	-	1.6	9.9	41	15	-	-	0.11	-
5.25	27.0	43.3	-	1.2	-7.7	4.4	4	clayy SILT to silty CLAY	115	2.0	14	22	-	-	1.9	9.9	36	15	-	-	0.11	-
5.41	18.6	29.8	-	1.1	-9.2	6.1	3	silty CLAY to CLAY	115	1.5	12	20	-	-	1.3	9.9	48	15	-	-	0.11	-
5.58	18.8	30.2	-	1.1	-9.1	6.0	3	silty CLAY to CLAY	115	1.5	13	20	-	-	1.3	9.9	47	15	-	-	0.11	-
5.74	26.8	43.0	-	1.5	-9.0	5.6	3	silty CLAY to CLAY	115	1.5	18	29	-	-	1.9	9.9	40	15	-	-	0.11	-
5.91	33.4	53.5	-	1.9	-9.0	5.7	3	silty CLAY to CLAY	115	1.5	22	36	-	-	2.3	9.9	37	15	-	-	0.11	-
6.07	47.8	76.6	208.1	2.4	-9.0	5.0	4	clayy SILT to silty CLAY	115	2.0	24	38	-	-	3.4	9.9	30	15	0.00	-	0.11	0.0
6.23	49.7	79.7	216.7	2.5	-9.0	5.1	4	clayy SILT to silty CLAY	115	2.0	25	40	-	-	3.5	9.9	30	15	0.00	-	0.11	0.0
6.40	41.5	66.5	-	2.8	-8.9	6.9	9	very stiff fine SOIL	120	2.0	21	33	54	43	-	-	37	30	-	-	0.11	-
6.56	49.1	77.8	215.6	2.5	-8.9	5.2	4	clayy SILT to silty CLAY	115	2.0	25	39	-	-	3.5	9.9	31	15	0.00	-	0.11	0.0
6.73	49.1	76.8	209.7	2.4	-8.9	5.0	4	clayy SILT to silty CLAY	115	2.0	25	38	-	-	3.5	9.9	30	15	0.00	-	0.11	0.0
6.89	57.0	88.0	213.3	2.6	-8.9	4.6	4	clayy SILT to silty CLAY	115	2.0	28	44	-	-	4.0	9.9	28	15	0.00	-	0.11	0.0
7.05	60.6	92.6	221.0	2.8	-8.9	4.7	9	very stiff fine SOIL	120	2.0	30	46	64	44	-	-	27	30	0.00	-	0.11	0.0
7.22	47.1	75.5	246.9	3.1	-8.8	6.6	9	very stiff fine SOIL	120	2.0	24	38	58	43	-	-	35	30	0.00	-	0.11	0.0
7.38	44.0	70.6	-	2.9	-8.8	6.5	9	very stiff fine SOIL	120	2.0	22	35	56	43	-	-	36	30	-	-	0.11	-
7.55	38.0	61.0	-	2.3	-8.7	6.2	3	silty CLAY to CLAY	115	1.5	25	41	-	-	2.7	9.9	37	15	-	-	0.11	-
7.71	32.5	52.2	-	1.9	-8.7	5.8	3	silty CLAY to CLAY	115	1.5	22	35	-	-	2.3	9.9	38	15	-	-	0.11	-
7.87	25.2	40.5	-	1.6	-8.6	6.5	3	silty CLAY to CLAY	115	1.5	17	27	-	-	1.8	9.9	44	15	-	-	0.11	-
8.04	27.0	43.3	-	1.6	-8.6	6.1	3	silty CLAY to CLAY	115	1.5	18	29	-	-	1.9	9.9	42	15	-	-	0.11	-
8.20	30.9	49.5	-	1.8	-8.6	6.0	3	silty CLAY to CLAY	115	1.5	21	33	-	-	2.2	9.9	39	15	-	-	0.11	-
8.37	23.7	38.0	-	1.8	-8.6	7.6	3	silty CLAY to CLAY	115	1.5	16	25	-	-	1.7	9.9	48	15	-	-	0.11	-
8.53	20.4	32.7	-	1.4	-8.7	7.0	3	silty CLAY to CLAY	115	1.5	14	22	-	-	1.4	9.9	49	15	-	-	0.11	-
8.69	18.7	30.1	-	1.2	-8.7	6.5	3	silty CLAY to CLAY	115	1.5	12	20	-	-	1.3	9.9	49	15	-	-	0.11	-
8.86	22.0	35.3	-	1.2	-8.7	5.7	3	silty CLAY to CLAY	115	1.5	15	24	-	-	1.5	9.9	44	15	-	-	0.11	-
9.02	36.7	49.5	140.9	1.3	-8.6	3.6	4	clayy SILT to silty CLAY	115	2.0	18	25	-	-	2.6	9.9	31	15	1.05	-	0.11	35.9
9.19	25.9	41.5	-	4.5	-8.7	9.9	3	silty CLAY to CLAY	115	1.5	17	28	-	-	1.8	9.9	52	15	-	-	0.10	-
9.35	74.5	98.7	274.2	4.6	-8.7	6.3	9	very stiff fine SOIL	120	2.0	37	49	67	44	-	-	31	30	0.00	-	0.10	0.0
9.51	55.1	88.4	-	4.9	-8.8	9.1	9	very stiff fine SOIL	120	2.0	28	44	63	43	-	-	38	30	-	-	0.10	-
9.68	64.3	83.6	239.0	3.7	-8.5	5.8	9	very stiff fine SOIL	120	2.0	32	42	61	44	-	-	31	30	0.00	-	0.10	0.0
9.84	70.9	91.5	220.3	3.3	-8.5	4.7	9	very stiff fine SOIL	120	2.0	35	46	64	44	-	-	27	30	0.00	-	0.10	0.0
10.01	67.6	86.4	202.1	2.9	-8.4	4.3	4	clayy SILT to silty CLAY	115	2.0	34	43	-	-	4.7	9.9	27	15	0.00	-	0.10	0.0
10.17	59.6	75.6	132.5	1.3	-8.4	2.2	5	silty SAND to sandy SILT	120	4.0	15	19	58	43	-	-	20	16	1.56	-	0.10	18.2
10.34	83.9	105.4	231.7	3.8	-2.4	4.5	9	very stiff fine SOIL	120	2.0	42	53	69	45	-	-	25	30	0.00	-	0.10	0.0
10.50	105.3	131.3	238.7	4.0	-2.0	3.8	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	7.0	9.9	21	16	0.00	-	0.10	0.0
10.66	33.7	54.1	-	3.5	-0.7	9.9	3	silty CLAY to CLAY	115	1.5	22	36	-	-	2.4	9.9	47	15	-	-	0.10	-
10.83	22.6	36.1	-	0.9	-0.4	3.9	4	clayy SILT to silty CLAY	115	2.0	11	18	-	-	1.6	9.9	38	15	-	-	0.10	-
10.99	34.5	54.3	-	2.5	-0.2	7.5	3	silty CLAY to CLAY	115	1.5	23	36	-	-	2.4	9.9	42	15	-	-	0.10	-
11.16	80.1	97.0	190.6	2.8	-0.5	3.5	5	silty SAND to sandy SILT	120	4.0	20	24	66	44	-	-	23	16	0.00	-	0.10	0.0
11.32	14.8	22.6	-	2.5	-0.3	9.9	3	silty CLAY to CLAY	115	1.5	10	15	-	-	1.0	9.9	64	15	-	-	0.10	-
11.48	10.7	16.2	-	0.9	-0.6	9.2	3	silty CLAY to CLAY	115	1.5	7	11	-	-	0.7	8.3	70	15	-	-	0.10	-
11.65	9.7	14.4	-	0.8	-0.8	9.4	3	silty CLAY to CLAY	115	1.5	6	10	-	-	0.7	7.3	74	15	-	-	0.10	-
11.81	8.8	12.8	-	0.7	-1.0	9.2	3	silty CLAY to CLAY	115	1.5	6	9	-	-	0.6	6.5	76	15	-	-	0.10	-
11.98	8.4	12.1	-	0.7	-2.0	9.1	3	silty CLAY to CLAY	115	1.5	6	8	-	-	0.6	6.1	78	15	-	-	0.10	-
12.14	7.7	10.9	-	0.5	-2.3	6.9	3	silty CLAY to CLAY	115	1.5	5	7	-	-	0.5	5.5	74	15	-	-	0.10	-
12.30	8.4	11.8	-	0.8	-3.8	9.9	3	silty CLAY to CLAY	115	1.5	6	8	-	-	0.6	5.9	81	15	-	-	0.10	-
12.47	22.0	30.5	-	0.9	-6.1	4.1	4	clayy SILT to silty CLAY	115	2.0	11	15	-	-	1.5	9.9	41	15	-	-	0.10	-
12.63	7.6	10.4	-	0.9	-0.6	9.9	3	silty CLAY to CLAY	115	1.5	5	7	-	-	0.5	5.3	84	15	-	-	0.10	-
12.80	8.8	11.9	-	0.4	-1.2	5.5	3	silty CLAY to CLAY	115	1.5	6	8	-	-	0.6	6.1	67	15	-	-	0.10	-
12.96	7.9	10.5	-	0.5	-1.5	7.4	3	silty CLAY to CLAY	115	1.5	5	7	-	-	0.5	5.3	77	15	-	-	0.10	-
13.12	16.0	21.1	-	0.8	-1.4	5.3	3	silty CLAY to CLAY	115	1.5	11	14	-	-	1.1	9.9	53	15	-	-	0.10	-
13.29	15.6	20.3	-	1.1	-1.4	7.6	3	silty CLAY to CLAY	115	1.5	10	14	-	-	1.1	9.9	61	15	-	-	0.10	-
13.45	30.1	38.8	-	1.6	-1.2	5.4	3	silty CLAY to CLAY	115	1.5	20	26	-	-	2.1	9.9	42	15	-	-	0.10	-
13.62	45.7	50.1	150.3	1.8	-1.3	4.0	4	clayy SILT to silty CLAY	115	2.0	23	25	-	-	3.2	9.9	33	15	0.81	-	0.10	32.9
13.78	38.3	48.2	-	2.0	-1.2	5.5	3	silty CLAY to CLAY	115	1.5	26	32	-	-	2.7	9.9	38	15	-	-	0.10	-
13.94	36.0	44.7	-	1.8	-1.1	5.1	3	silty CLAY to CLAY	115	1.5	24	30	-	-	2.5	9.9	38	15	-	-	0.10	-
14.11	30.3	37.2	-	1.7	-1.2	5.6	3	silty CLAY to CLAY	115	1.5	20	25	-	-	2.1	9.9	43	15	-	-	0.10	-
14.27	31.2	37.9	-	1.7	-1.1	5.6	3	silty CLAY to CLAY	115	1.5	21	25	-	-	2.2	9.9	43	15	-	-	0.10	-
14.44	47.8	50.9	148.7	1.8	-1.0	3.9	4	clayy SILT to silty CLAY	115	2.0	24	25	-	-	3.3	9.9	32	15	0.92	-	0.10	31.5
14.60	66.8	70.7	135.1	1.6	-1.1	2.5	5	silty SAND to sandy SILT	120	4.0	17	18	56	42	-	-	22	16	1.58	-	0.10	24.4
14.76	90.5	95.2	146.4	1.8	-1.5	2.1	5	silty SAND to sandy SILT	120	4.0	23	24	65	44	-	-	17	16	1.03	-	0.10	6.2
14.93	108.8	113.8	132.5	1.1	-2.9	1.0	6	clean SAND to silty SAND	125	5.0	22	23	71	44	-	-	10	16	1.70	-	0.09	9.6
15.09	135.1	140.5	227.6	4.4	-1.4	3.2	5	silty SAND to sandy SILT	120	4.0	34	35	78	45	-	-	18	16	0.00	-	0.09	0.0
15.26	134.3	138.8	225.5	4.3	-1.9	3.2	5	silty SAND to sandy SILT	120	4.0	34	35	78	45	-	-	18	16	0.00	-	0.09	0.0
15.42	23.9	26.8	-	3.7	-0.4	9.9	3	silty CLAY to CLAY	115	1.5	16	18	-	-	1.7	9.9	60	15	-	-	0.09	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.10	Cycl SStn %
15.58	34.9	38.7	-	1.3	-0.6	3.8	4	clayy SILT to silty CLAY	115	2.0	17	19	-	-	2.4	9.9	36	15	-	-	0.09	-
15.75	24.0	26.3	-	1.1	-0.9	4.9	3	silty CLAY to CLAY	115	1.5	16	18	-	-	1.7	9.9	47	15	-	-	0.09	-
15.91	15.7	17.0	-	0.9	-0.4	6.0	3	silty CLAY to CLAY	115	1.5	10	11	-	-	1.1	9.3	60	15	-	-	0.09	-
16.08	12.7	13.6	-	0.7	-0.8	6.2	3	silty CLAY to CLAY	115	1.5	8	9	-	-	0.9	7.4	66	15	-	-	0.09	-
16.24	11.8	12.5	-	0.9	-2.5	8.0	3	silty CLAY to CLAY	115	1.5	8	8	-	-	0.8	6.7	74	15	-	-	0.09	-
16.40	25.6	27.0	-	1.1	-2.6	4.6	3	silty CLAY to CLAY	115	1.5	17	18	-	-	1.8	9.9	45	15	-	-	0.09	-
16.57	29.1	30.4	-	1.5	-2.6	5.3	3	silty CLAY to CLAY	115	1.5	19	20	-	-	2.0	9.9	46	15	-	-	0.09	-
16.73	31.8	32.9	-	1.0	-2.6	3.3	4	clayy SILT to silty CLAY	115	2.0	16	16	-	-	2.2	9.9	36	15	-	-	0.09	-
16.90	81.8	80.3	98.5	0.7	-2.5	0.8	6	clean SAND to silty SAND	125	5.0	16	16	60	43	-	-	11	16	2.37	-	0.09	23.0
17.06	241.9	236.4	321.2	7.6	-0.3	3.2	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	16.0	9.9	14	16	0.00	-	0.09	0.0
17.23	270.2	262.9	332.2	7.5	-0.4	2.8	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	17.9	9.9	12	16	0.00	-	0.09	0.0
17.39	43.9	43.6	-	5.9	-0.4	9.9	3	silty CLAY to CLAY	115	1.5	29	29	-	-	3.1	9.9	51	15	-	-	0.09	-
17.55	56.5	54.4	142.7	1.9	-0.4	3.4	4	clayy SILT to silty CLAY	115	2.0	28	27	-	-	4.0	9.9	29	15	1.26	-	0.09	29.9
17.72	79.4	76.2	176.8	3.0	-0.5	3.8	4	clayy SILT to silty CLAY	115	2.0	40	38	-	-	5.6	9.9	26	15	0.00	-	0.08	0.0
17.88	49.5	47.8	-	2.5	-0.4	5.1	4	clayy SILT to silty CLAY	115	2.0	25	24	-	-	3.5	9.9	37	15	-	-	0.08	-
18.05	28.4	27.1	-	0.7	-0.3	2.4	4	clayy SILT to silty CLAY	115	2.0	14	14	-	-	2.0	9.9	35	15	-	-	0.08	-
18.21	28.0	26.6	-	0.7	-0.3	2.6	4	clayy SILT to silty CLAY	115	2.0	14	13	-	-	1.9	9.9	37	15	-	-	0.08	-
18.37	25.0	23.5	-	0.7	-0.3	3.0	4	clayy SILT to silty CLAY	115	2.0	12	12	-	-	1.7	9.9	41	15	-	-	0.08	-
18.54	22.1	20.6	-	0.8	-0.3	3.9	3	silty CLAY to CLAY	115	1.5	15	14	-	-	1.5	9.9	48	15	-	-	0.08	-
18.70	19.1	17.7	-	0.8	-0.4	4.4	3	silty CLAY to CLAY	115	1.5	13	12	-	-	1.3	9.9	53	15	-	-	0.08	-
18.87	17.7	16.2	-	0.8	-0.3	5.0	3	silty CLAY to CLAY	115	1.5	12	11	-	-	1.2	9.1	58	15	-	-	0.08	-
19.03	17.1	15.5	-	0.8	-1.1	5.2	3	silty CLAY to CLAY	115	1.5	11	10	-	-	1.2	8.7	59	15	-	-	0.08	-
19.19	15.6	14.0	-	0.8	-0.9	5.5	3	silty CLAY to CLAY	115	1.5	10	9	-	-	1.1	7.8	63	15	-	-	0.08	-
19.36	15.2	13.6	-	0.7	-0.7	4.9	3	silty CLAY to CLAY	115	1.5	10	9	-	-	1.0	7.6	61	15	-	-	0.08	-
19.52	14.0	12.4	-	0.6	-1.1	4.5	3	silty CLAY to CLAY	115	1.5	9	8	-	-	0.9	6.9	62	15	-	-	0.08	-
19.69	12.9	11.3	-	0.5	-0.4	4.5	3	silty CLAY to CLAY	115	1.5	9	8	-	-	0.9	6.3	65	15	-	-	0.08	-
19.85	13.0	11.3	-	0.6	-0.4	5.1	3	silty CLAY to CLAY	115	1.5	9	8	-	-	0.9	6.2	67	15	-	-	0.08	-
20.01	14.4	12.5	-	0.9	-0.2	6.9	3	silty CLAY to CLAY	115	1.5	10	8	-	-	1.0	6.9	71	15	-	-	0.08	-
20.18	23.4	20.1	-	1.1	0.0	5.2	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.6	9.9	53	15	-	-	0.08	-
20.34	44.1	39.5	124.5	1.4	-0.1	3.4	4	clayy SILT to silty CLAY	115	2.0	22	20	-	-	3.1	9.9	34	15	1.95	-	0.08	51.2
20.51	36.2	30.5	-	1.6	-4.3	4.6	3	silty CLAY to CLAY	115	1.5	24	20	-	-	2.5	9.9	43	15	-	-	0.08	-
20.67	29.4	24.6	-	1.4	-3.9	4.9	3	silty CLAY to CLAY	115	1.5	20	16	-	-	2.0	9.9	48	15	-	-	0.08	-
20.83	26.8	22.2	-	1.2	-3.9	4.9	3	silty CLAY to CLAY	115	1.5	18	15	-	-	1.8	9.9	50	15	-	-	0.08	-
21.00	20.9	17.2	-	1.1	-4.0	5.8	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	9.9	59	15	-	-	0.08	-
21.16	21.5	17.6	-	1.0	-4.0	5.0	3	silty CLAY to CLAY	115	1.5	14	12	-	-	1.5	9.9	56	15	-	-	0.08	-
21.33	22.3	18.1	-	1.0	-4.0	4.9	3	silty CLAY to CLAY	115	1.5	15	12	-	-	1.5	9.9	55	15	-	-	0.08	-
21.49	21.1	17.0	-	1.0	-4.0	5.0	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	9.8	57	15	-	-	0.08	-
21.65	20.9	16.7	-	1.0	-4.0	5.0	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	9.6	57	15	-	-	0.08	-
21.82	24.3	19.2	-	1.0	-3.9	4.4	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.7	9.9	52	15	-	-	0.08	-
21.98	21.8	17.1	-	1.0	-4.0	5.0	3	silty CLAY to CLAY	115	1.5	15	11	-	-	1.5	9.9	56	15	-	-	0.08	-
22.15	20.0	15.7	-	1.0	-3.9	5.4	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.4	9.0	60	15	-	-	0.08	-
22.31	21.2	16.4	-	1.0	-3.9	5.0	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	9.5	57	15	-	-	0.08	-
22.47	24.8	19.1	-	1.0	-3.8	4.3	3	silty CLAY to CLAY	115	1.5	17	13	-	-	1.7	9.9	51	15	-	-	0.08	-
22.64	22.2	17.0	-	1.0	-3.9	4.9	3	silty CLAY to CLAY	115	1.5	15	11	-	-	1.5	9.9	56	15	-	-	0.08	-
22.80	20.0	15.2	-	1.0	-3.9	5.2	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.4	8.8	60	15	-	-	0.08	-
22.97	19.0	14.3	-	0.9	-3.9	5.3	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.3	8.3	62	15	-	-	0.08	-
23.13	20.9	15.6	-	0.9	-3.9	4.7	3	silty CLAY to CLAY	115	1.5	14	10	-	-	1.4	9.0	57	15	-	-	0.08	-
23.30	21.1	15.7	-	0.9	-3.9	4.5	3	silty CLAY to CLAY	115	1.5	14	10	-	-	1.4	9.1	57	15	-	-	0.08	-
23.46	20.1	14.8	-	0.9	-3.9	4.8	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.4	8.6	59	15	-	-	0.08	-
23.62	19.1	14.0	-	0.9	-3.9	5.2	3	silty CLAY to CLAY	115	1.5	13	9	-	-	1.3	8.1	62	15	-	-	0.08	-
23.79	30.1	21.9	-	1.3	-3.9	4.6	3	silty CLAY to CLAY	115	1.5	20	15	-	-	2.1	9.9	50	15	-	-	0.08	-
23.95	45.0	32.5	-	1.8	-3.8	4.1	4	clayy SILT to silty CLAY	115	2.0	22	16	-	-	3.1	9.9	40	15	-	-	0.08	-
24.12	35.7	25.6	-	1.7	-3.9	5.0	3	silty CLAY to CLAY	115	1.5	24	17	-	-	2.5	9.9	48	15	-	-	0.08	-
24.28	29.4	20.9	-	1.3	-3.8	4.8	3	silty CLAY to CLAY	115	1.5	20	14	-	-	2.0	9.9	51	15	-	-	0.08	-
24.44	23.6	16.7	-	1.1	-3.8	4.8	3	silty CLAY to CLAY	115	1.5	16	11	-	-	1.6	9.8	56	15	-	-	0.08	-
24.61	18.5	13.0	-	1.0	-3.8	5.6	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.3	7.5	65	15	-	-	0.08	-
24.77	17.5	12.2	-	0.9	-3.8	5.7	3	silty CLAY to CLAY	115	1.5	12	8	-	-	1.2	7.0	67	15	-	-	0.08	-
24.94	19.5	13.6	-	0.9	-3.9	5.0	3	silty CLAY to CLAY	115	1.5	13	9	-	-	1.3	7.9	62	15	-	-	0.08	-
25.10	30.1	20.7	-	1.2	-3.8	4.3	3	silty CLAY to CLAY	115	1.5	20	14	-	-	2.1	9.9	49	15	-	-	0.08	-
25.26	38.7	26.5	-	1.6	-3.8	4.3	3	silty CLAY to CLAY	115	1.5	26	18	-	-	2.7	9.9	44	15	-	-	0.08	-
25.43	34.1	23.2	-	1.6	-3.8	4.9	3	silty CLAY to CLAY	115	1.5	23	15	-	-	2.4	9.9	49	15	-	-	0.08	-
25.59	33.2	22.5	-	1.3	-3.8	4.1	3	silty CLAY to CLAY	115	1.5	22	15	-	-	2.3	9.9	47	15	-	-	0.08	-
25.76	35.0	23.5	-	1.4	-3.7	4.2	3	silty CLAY to CLAY	115	1.5	23	16	-	-	2.4	9.9	46	15	-	-	0.08	-
25.92	43.1	28.8	-	1.6	-3.7	3.8	4	clayy SILT to silty CLAY	115	2.0	22	14	-	-	3.0	9.9	41	15	-	-	0.08	-
26.08	45.5	30.2	-	1.7	-3.7	3.8	4	clayy SILT to silty CLAY	115	2.0	23	15	-	-	3.2	9.9	40	15	-	-	0.08	-
26.25	31.5	20.8	-	1.6	-3.6	5.3	3	silty CLAY to CLAY	115	1.5	21	14	-	-	2.2	9.9	53	15	-	-	0.08	-
26.41	22.9	15.0	-	1.2	-3.5	5.7	3	silty CLAY to CLAY	115	1.5	15	10	-	-	1.6	8.9	62	15	-	-	0.08	-
26.58	23.9	15.6	-	1.0	-3.5	4.4	3	silty CLAY to CLAY	115	1.5	16	10	-	-	1.6	9.2	56	15	-	-	0.08	-
26.74	19.5	12.6	-	0.9	-3.5	4.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	7.4	63	15	-	-	0.08	-
26.90	16.2	10.4	-	0.9	-3.5	6.2	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	5.9	73	15	-	-	0.08	-
27.07	15.1	9.7	-	0.8	-3.5	6.1	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	5.5	75	15	-	-	0.08	-
27.23	15.8	10.1	-	0.8	-3.5	5.9	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	5.7	73	15	-	-	0.08	-
27.40	19.1	12.0	-	0.9	-3.4	4.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	7.0	65	15	-	-	0.08	-
27.56	21.3	13.4	-	1.0	-3.4	5.1	3	silty CLAY to CLAY	115	1.5	14	9	-	-	1.4	7.8	63	15	-	-	0.08	-
27.72	18.5	11.6	-	1.0	-3.4	6.0	3	silty CLAY to CLAY	115	1.5	12	8	-	-	1.3	6.7	70	15	-	-	0.08	-
27.89	22.5	14.0	-	1.0	-3.4	4.9	3	silty CLAY to CLAY	115	1.5	15	9	-	-	1.5	8.2	61	15	-	-	0.08	-
28.05	29.3	18.1	-	1.2	-3.4	4.4	3	silty CLAY to CLAY	115	1.5	20	12	-	-	2.0	9.9	53	15	-	-	0.08	-
28.22	42.3	25.9	-	1.5	-3.3	3.6	4	clayy SILT to silty CLAY	115	2.0	21	13	-	-	2.9	9.9	42	15	-	-	0.08	-
28.38	51.9	31.7	-	1.8	-3.2	3.5	4	clayy SILT to silty CLAY	115	2.0	26	16	-	-	3.6	9.9	38	15	-	-	0.08	-
28.54	58.6	35.5	-	2.0	-3.0	3.5	4	clayy SILT to silty CLAY	115	2.0	29	18	-	-	4.1	9.9	36	15	-	-	0.08	-
28.71	72.8	54.9	154.9	2.8	-2.9	3.9	4	clayy SILT to silty CLAY	115	2.0	36	27	-	-	5.1	9.9	31	15	1.03	-	0.08	25.1
28.87	111.3	83.7	177.9	3.8	-2.7	3.5	4	clayy SILT to silty CLAY	115	2.0	56	42	-	-	7.8	9.9	24	15	0.00	-	0.08	0.0
29.04	75.4	45.0	-	4.2	-2.9	5.7	3	silty CLAY to CLAY	115	1.5	50	30	-	-	5.3	9.9	40	15	-	-	0.08	-
29.20	58.2	34.5	-	3.4	-2.7	6.1	3	silty CLAY to CLAY	115	1.5	39	23	-	-	4.0	9.9	45	15	-	-	0.08	-
29.36	46.1	27.2	-	2.9	-2.9	6.4	3	silty CLAY to CLAY	115	1.5	31	18	-	-	3.2	9.9	51	15	-	-	0.08	-
29.53	34.1	20.0	-	2.2	-2.6	6.9	3	silty CLAY to CLAY	115	1.5	23	13	-	-	2.3	9.9	59	15	-	-	0.08	-
29.69	23.2	13.5	-	1.6	-2.0	7.4	3	silty CLAY to CLAY	115	1.5	15	9	-	-	1.6	8.0	70	15	-	-	0.08	-
29.86	19.5	11.3	-	1.2	-2.0	6.8	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.6	73	15	-	-	0.08	-
30.02	18.2	10.5	-	1.0	-2.0	6.3	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.2	6.1	74	15	-	-	0.08	-
30.19	19.8	11.3	-	1.1	-2.0	6.1	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.6	71	15	-	-	0.08	-
30.35	23.5	13.4	-	1.5	-2.0	6.7	3	silty CLAY to CLAY	115	1.5	16	9	-	-	1.6	8.0	68	15	-	-	0.08	-
30.51	32.8	18.6	-	1.7	-2.1	5.4	3	silty CLAY to CLAY	115	1.5	22	12	-	-	2.3	9.9	56	15	-	-	0.08	-
30.68	32.5	18.4	-	1.7	-2.1	5.5	3	silty CLAY to CLAY	115	1.5	22	12	-	-	2.2	9.9	56	15	-	-	0.08	-
30.84	32.6	18.3	-	1.6	-2.1	5.3	3	silty CLAY to CLAY	115	1.5	22	12	-	-	2.2	9.9	56	15	-	-	0.08	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qIncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.10	Cycl SStn %
31.01	30.3	17.0	-	1.4	-2.4	5.1	3	silty CLAY to CLAY	115	1.5	20	11	-	-	2.1	9.9	57	15	-	-	0.08	-
31.17	27.3	15.2	-	1.3	-2.1	5.2	3	silty CLAY to CLAY	115	1.5	18	10	-	-	1.9	9.1	60	15	-	-	0.08	-
31.33	22.2	12.3	-	1.2	-2.2	5.7	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	7.2	67	15	-	-	0.08	-
31.50	20.0	11.0	-	1.1	-2.1	6.0	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	6.4	71	15	-	-	0.08	-
31.66	21.3	11.6	-	1.1	-2.3	5.5	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	6.9	68	15	-	-	0.08	-
31.83	19.0	10.3	-	1.1	-2.5	6.3	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	6.0	74	15	-	-	0.08	-
31.99	18.8	10.2	-	1.0	-2.4	5.9	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	5.9	73	15	-	-	0.08	-
32.15	17.9	9.7	-	0.9	-2.3	5.5	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	5.6	73	15	-	-	0.08	-
32.32	17.9	9.6	-	0.9	-2.3	5.4	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	5.5	73	15	-	-	0.08	-
32.48	18.4	9.8	-	0.9	-2.4	5.3	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.2	5.7	72	15	-	-	0.08	-
32.65	14.9	7.9	-	0.9	-2.5	6.6	3	silty CLAY to CLAY	115	1.5	10	5	-	-	1.0	4.5	83	15	-	-	0.08	-
32.81	15.7	8.3	-	0.8	-2.5	5.8	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	4.7	79	15	-	-	0.08	-
32.97	15.4	8.1	-	0.8	-2.5	5.7	3	silty CLAY to CLAY	115	1.5	10	5	-	-	1.0	4.6	79	15	-	-	0.08	-
33.14	15.6	8.2	-	0.8	-2.6	5.8	3	silty CLAY to CLAY	115	1.5	10	5	-	-	1.0	4.6	79	15	-	-	0.08	-
33.30	17.7	9.2	-	0.9	-3.1	5.4	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	5.3	74	15	-	-	0.08	-
33.47	14.2	7.4	-	0.8	-3.0	6.3	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	4.1	85	15	-	-	0.08	-
33.63	13.7	7.1	-	0.7	-2.9	6.1	3	silty CLAY to CLAY	115	1.5	9	5	-	-	0.9	3.9	85	15	-	-	0.08	-
33.79	19.4	10.0	-	0.8	-2.9	4.7	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	5.8	69	15	-	-	0.08	-
33.96	22.3	11.4	-	0.8	-2.8	4.1	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	6.7	63	15	-	-	0.08	-
34.12	18.5	9.4	-	0.8	-2.8	5.0	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	5.5	72	15	-	-	0.08	-
34.29	16.5	8.3	-	0.8	-2.9	5.5	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.1	4.8	78	15	-	-	0.08	-
34.45	20.0	10.0	-	0.8	-2.9	4.4	3	silty CLAY to CLAY	115	1.5	13	7	-	-	1.3	5.9	68	15	-	-	0.08	-
34.61	22.0	11.0	-	0.9	-2.8	4.5	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.5	65	15	-	-	0.08	-
34.78	22.5	11.2	-	1.0	-2.7	4.8	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.6	66	15	-	-	0.08	-
34.94	28.8	14.3	-	1.0	-3.0	3.7	3	silty CLAY to CLAY	115	1.5	19	10	-	-	2.0	8.6	55	15	-	-	0.08	-
35.11	23.3	11.5	-	1.2	-3.1	5.5	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	6.8	68	15	-	-	0.08	-
35.27	23.2	11.4	-	1.1	-3.2	5.1	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.6	6.8	67	15	-	-	0.08	-
35.43	22.9	11.2	-	1.1	-2.9	5.4	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.6	69	15	-	-	0.08	-
35.60	22.9	11.2	-	1.1	-2.8	5.4	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.6	69	15	-	-	0.08	-
35.76	22.1	10.7	-	1.1	-2.6	5.5	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.3	70	15	-	-	0.08	-
35.93	22.9	11.0	-	1.1	-2.5	5.3	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.5	68	15	-	-	0.08	-
36.09	25.2	12.1	-	1.1	-2.5	4.7	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	7.3	64	15	-	-	0.08	-
36.26	26.0	12.4	-	1.1	-2.5	4.8	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.8	7.5	63	15	-	-	0.08	-
36.42	25.8	12.3	-	1.1	-2.5	4.8	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	7.4	64	15	-	-	0.08	-
36.58	26.3	12.5	-	1.1	-2.5	4.7	3	silty CLAY to CLAY	115	1.5	18	8	-	-	1.8	7.5	63	15	-	-	0.08	-
36.75	25.5	12.1	-	1.2	-2.5	5.0	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	7.2	65	15	-	-	0.08	-
36.91	23.9	11.2	-	1.1	-2.5	5.2	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	6.7	68	15	-	-	0.08	-
37.08	17.5	8.2	-	1.1	-2.4	7.3	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	4.7	85	15	-	-	0.08	-
37.24	20.0	9.3	-	1.0	-2.3	5.6	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.5	75	15	-	-	0.08	-
37.40	16.7	7.8	-	0.9	-2.3	5.9	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.1	4.4	82	15	-	-	0.08	-
37.57	16.6	7.6	-	0.8	-2.3	5.7	3	silty CLAY to CLAY	115	1.5	11	5	-	-	1.1	4.4	81	15	-	-	0.08	-
37.73	21.6	9.9	-	0.9	-2.3	4.7	3	silty CLAY to CLAY	115	1.5	14	7	-	-	1.4	5.8	69	15	-	-	0.08	-
37.90	24.6	11.2	-	1.0	-2.6	4.5	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.7	6.7	65	15	-	-	0.08	-
38.06	24.4	11.1	-	1.1	-2.6	4.9	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	6.6	67	15	-	-	0.08	-
38.22	24.1	10.9	-	1.0	-2.6	4.6	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	6.5	66	15	-	-	0.08	-
38.39	21.1	9.5	-	1.0	-2.3	5.2	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.6	72	15	-	-	0.08	-
38.55	26.0	11.7	-	1.1	-2.3	4.6	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.8	7.0	64	15	-	-	0.08	-
38.72	31.5	14.1	-	1.3	-2.3	4.5	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.1	8.6	59	15	-	-	0.08	-
38.88	32.8	14.6	-	1.5	-2.1	5.0	3	silty CLAY to CLAY	115	1.5	22	10	-	-	2.2	8.9	60	15	-	-	0.08	-
39.04	31.4	13.9	-	1.7	-2.4	5.8	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.1	8.5	64	15	-	-	0.08	-
39.21	29.7	13.1	-	1.9	-2.2	7.0	3	silty CLAY to CLAY	115	1.5	20	9	-	-	2.0	8.0	70	15	-	-	0.08	-
39.37	29.2	12.9	-	1.8	-1.8	6.9	3	silty CLAY to CLAY	115	1.5	19	9	-	-	2.0	7.8	70	15	-	-	0.08	-
39.54	31.8	13.9	-	1.7	-1.7	5.8	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.2	8.5	64	15	-	-	0.08	-
39.70	33.7	14.7	-	1.5	-1.6	4.8	3	silty CLAY to CLAY	115	1.5	22	10	-	-	2.3	9.0	59	15	-	-	0.08	-
39.86	29.5	12.8	-	1.4	-1.0	5.3	3	silty CLAY to CLAY	115	1.5	20	9	-	-	2.0	7.8	64	15	-	-	0.08	-
40.03	33.2	14.4	-	1.5	-0.9	4.8	3	silty CLAY to CLAY	115	1.5	22	10	-	-	2.3	8.8	60	15	-	-	0.08	-
40.19	34.7	15.0	-	1.5	-1.4	4.8	3	silty CLAY to CLAY	115	1.5	23	10	-	-	2.4	9.2	58	15	-	-	0.08	-
40.36	26.0	11.2	-	1.4	-0.8	5.9	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.8	6.7	71	15	-	-	0.08	-
40.52	22.1	9.5	-	1.3	-0.8	6.4	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	5.6	77	15	-	-	0.08	-
40.68	18.8	8.0	-	1.1	-0.6	6.6	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	4.6	83	15	-	-	0.08	-
40.85	17.3	7.3	-	1.0	-0.5	6.8	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	4.2	87	15	-	-	0.08	-
41.01	15.8	6.7	-	1.0	-0.5	7.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	3.7	92	15	-	-	0.08	-
41.18	17.3	7.3	-	1.0	-0.1	6.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	4.1	87	15	-	-	0.08	-
41.34	24.9	10.4	-	1.3	-0.1	5.7	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.2	72	15	-	-	0.08	-
41.50	30.6	12.8	-	1.6	-0.4	5.7	3	silty CLAY to CLAY	115	1.5	20	9	-	-	2.1	7.8	66	15	-	-	0.08	-
41.67	33.8	14.1	-	1.8	-0.2	5.8	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	8.6	64	15	-	-	0.08	-
41.83	33.8	14.0	-	1.9	-0.4	6.1	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	8.6	65	15	-	-	0.08	-
42.00	30.3	12.5	-	2.0	-0.1	7.0	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.1	7.6	71	15	-	-	0.08	-
42.16	39.9	16.4	-	1.6	0.1	4.3	3	silty CLAY to CLAY	115	1.5	27	11	-	-	2.7	9.9	55	15	-	-	0.08	-
42.32	42.4	17.4	-	1.4	-0.1	3.5	3	silty CLAY to CLAY	115	1.5	28	12	-	-	2.9	9.9	50	15	-	-	0.08	-
42.49	34.2	14.0	-	1.5	0.1	4.7	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	8.6	60	15	-	-	0.08	-
42.65	31.4	12.8	-	1.7	0.1	5.9	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.1	7.8	67	15	-	-	0.08	-
42.82	33.7	13.7	-	1.8	-0.1	5.7	3	silty CLAY to CLAY	115	1.5	22	9	-	-	2.3	8.4	64	15	-	-	0.08	-
42.98	31.9	12.9	-	1.6	-0.4	5.5	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.2	7.9	65	15	-	-	0.08	-
43.15	25.3	10.2	-	1.5	-0.3	6.5	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.1	75	15	-	-	0.08	-
43.31	24.5	9.8	-	1.3	0.0	5.9	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	5.8	74	15	-	-	0.08	-
43.47	22.6	9.0	-	1.3	0.0	6.3	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	5.3	78	15	-	-	0.08	-
43.64	27.0	10.7	-	1.4	-0.1	5.6	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.4	71	15	-	-	0.08	-
43.80	31.7	12.5	-	1.2	-0.2	4.1	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.2	7.7	60	15	-	-	0.08	-
43.97	28.7	11.3	-	1.1	-0.2	4.3	3	silty CLAY to CLAY	115	1.5	19	8	-	-	1.9	6.9	64	15	-	-	0.08	-
44.13	26.0	10.2	-	1.2	0.0	5.1	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.1	70	15	-	-	0.08	-
44.29	28.0	11.0	-	1.3	0.0	5.1	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	6.6	68	15	-	-	0.08	-
44.46	25.5	10.0	-	1.3	0.0	5.6	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.0	73	15	-	-	0.08	-
44.62	23.6	9.2	-	1.2	0.0	5.8	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.4	76	15	-	-	0.08	-
44.79	24.0	9.3	-	1.2	0.0	5.4	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.5	74	15	-	-	0.08	-
44.95	24.5	9.5	-	1.2	0.0	5.4	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.6	73	15	-	-	0.08	-
45.11	28.4	10.9	-	1.3	0.0	5.0	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	6.6	68	15	-	-	0.08	-
45.28	32.6	12.5	-	1.3	0.0	4.4	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	7.6	62	15	-	-	0.08	-
45.44	34.8	13.4	-	1.3	-0.3	4.1	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	8.2	59	15	-	-	0.08	-
45.61	33.8	12.9	-	1.3	-0.3	4.3	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	7.9	60	15	-	-	0.08	-
45.77	33.1	12.7	-	1.5	-0.4	4.9	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	7.7	63	15	-	-	0.08	-
45.93	31.5	12.0	-	1.5	-0.3	5.3	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	7.3	66	15	-	-	0.08	-
46.10	25.2	9.6	-	1.6	-0.4	7.1	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	5.7	79	15	-	-	0.08	-
46.26	26.0	9.9	-	1.6	-0.4	6.9	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	5.8	77	15	-	-	0.08	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.10	Cycl SStn %
46.43	28.4	10.8	-	1.7	-0.3	6.7	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	6.4	74	15	-	-	0.08	-
46.59	25.8	9.8	-	1.7	-0.2	7.3	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	5.7	79	15	-	-	0.08	-
46.75	25.9	9.8	-	1.6	0.1	6.8	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	5.7	77	15	-	-	0.08	-
46.92	30.8	11.7	-	1.7	0.0	5.9	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	6.9	69	15	-	-	0.08	-
47.08	30.1	11.4	-	1.7	0.0	6.1	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	6.7	71	15	-	-	0.08	-
47.25	34.6	13.1	-	1.4	-0.3	4.5	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	7.8	61	15	-	-	0.08	-
47.41	36.0	13.6	-	1.1	-0.6	3.4	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	8.1	55	15	-	-	0.08	-
47.57	29.8	11.3	-	0.8	-0.4	3.1	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	6.6	58	15	-	-	0.08	-
47.74	20.9	7.9	-	0.7	0.0	4.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	4.4	73	15	-	-	0.08	-
47.90	18.0	6.8	-	0.9	0.1	5.6	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	3.7	85	15	-	-	0.08	-
48.07	19.2	7.2	-	1.1	0.0	6.4	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	4.0	86	15	-	-	0.08	-
48.23	25.6	9.7	-	1.2	0.0	5.4	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	5.5	73	15	-	-	0.08	-
48.39	34.6	13.0	-	1.3	-0.2	4.1	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	7.6	59	15	-	-	0.08	-
48.56	36.8	13.9	-	1.5	-0.3	4.5	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	8.1	59	15	-	-	0.08	-
48.72	32.1	12.1	-	1.5	-0.2	5.2	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.2	7.0	66	15	-	-	0.08	-
48.89	24.7	9.3	-	1.2	-0.1	5.5	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.2	75	15	-	-	0.08	-
49.05	22.0	8.3	-	1.0	0.0	5.2	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	4.5	77	15	-	-	0.08	-
49.22	21.5	8.1	-	1.0	0.0	5.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	4.4	78	15	-	-	0.08	-
49.38	21.7	8.2	-	1.0	-0.1	5.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	4.4	78	15	-	-	0.08	-
49.54	26.7	10.1	-	1.1	-0.1	4.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.6	69	15	-	-	0.08	-
49.71	27.3	10.3	-	1.1	-0.1	4.6	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.7	68	15	-	-	0.08	-
49.87	26.3	9.9	-	1.1	-0.1	4.9	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.5	70	15	-	-	0.08	-
50.04	32.5	12.2	-	1.3	-0.1	4.5	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	6.9	63	15	-	-	0.08	-
50.20	32.9	12.4	-	1.2	-0.2	4.1	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	6.9	61	15	-	-	0.08	-
50.36	20.7	7.8	-	0.9	-0.1	5.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	4.1	79	15	-	-	0.08	-
50.53	19.2	7.2	-	0.7	-0.1	4.5	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.7	79	15	-	-	0.08	-
50.69	24.1	9.1	-	0.8	-0.1	3.7	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.9	67	15	-	-	0.08	-
50.86	19.0	7.2	-	0.8	-0.1	5.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.7	82	15	-	-	0.08	-
51.02	24.8	9.4	-	1.0	-0.1	4.6	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	5.0	71	15	-	-	0.08	-
51.18	24.6	9.3	-	1.1	-0.1	4.9	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.9	73	15	-	-	0.08	-
51.35	25.3	9.6	-	1.2	-0.1	5.2	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	5.1	73	15	-	-	0.08	-
51.51	38.8	14.7	-	1.0	-0.1	2.9	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	8.1	51	15	-	-	0.08	-
51.68	48.9	18.4	-	1.1	-0.1	2.4	4	clayy SILT to silty CLAY	115	2.0	24	9	-	-	3.3	9.9	43	15	-	-	0.08	-
51.84	45.3	17.1	-	1.3	-0.1	3.1	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.5	48	15	-	-	0.08	-
52.00	35.2	13.3	-	1.5	-0.1	4.6	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	7.2	61	15	-	-	0.08	-
52.17	36.9	13.9	-	1.4	0.0	4.1	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	7.6	58	15	-	-	0.08	-
52.33	44.2	16.7	-	1.3	-0.2	3.2	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	9.2	49	15	-	-	0.08	-
52.50	46.2	17.4	-	1.6	-0.1	3.8	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.6	51	15	-	-	0.08	-
52.66	27.6	10.4	-	1.4	-0.1	5.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.4	72	15	-	-	0.08	-
52.82	18.3	6.9	-	1.0	0.0	6.4	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	3.4	88	15	-	-	0.08	-
52.99	17.1	6.5	-	0.7	0.0	5.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	3.1	86	15	-	-	0.08	-
53.15	17.6	6.6	-	0.7	0.1	4.6	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	3.2	83	15	-	-	0.08	-
53.32	18.0	6.8	-	0.7	0.1	4.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	3.3	83	15	-	-	0.08	-
53.48	18.1	6.8	-	0.8	0.1	5.5	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	3.3	85	15	-	-	0.08	-
53.64	22.0	8.3	-	0.8	0.1	4.2	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	4.1	73	15	-	-	0.08	-
53.81	20.3	7.7	-	0.8	0.1	4.8	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.7	78	15	-	-	0.08	-
53.97	25.2	9.5	-	0.9	0.2	4.3	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	4.8	69	15	-	-	0.08	-
54.14	27.6	10.4	-	1.0	0.2	4.1	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.3	66	15	-	-	0.08	-
54.30	28.1	10.6	-	1.1	0.2	4.4	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	67	15	-	-	0.08	-
54.46	28.4	10.7	-	1.3	0.2	5.0	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	69	15	-	-	0.08	-
54.63	28.5	10.8	-	1.3	0.2	5.2	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	69	15	-	-	0.08	-
54.79	28.5	10.7	-	1.4	0.3	5.4	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	70	15	-	-	0.08	-
54.96	28.8	10.9	-	1.4	0.2	5.5	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.5	70	15	-	-	0.08	-
55.12	25.5	9.6	-	1.4	0.2	6.1	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	4.7	76	15	-	-	0.08	-
55.28	22.9	8.7	-	1.2	0.2	5.9	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	4.2	79	15	-	-	0.08	-
55.45	21.0	7.9	-	1.0	0.3	5.4	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.8	80	15	-	-	0.08	-
55.61	20.1	7.6	-	0.9	0.2	5.1	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.6	80	15	-	-	0.08	-
55.78	19.3	7.3	-	0.9	0.2	5.6	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.4	84	15	-	-	0.08	-
55.94	17.5	6.6	-	0.8	0.3	5.8	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	3.0	88	15	-	-	0.08	-
56.11	17.0	6.4	-	0.6	0.3	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.9	83	15	-	-	0.08	-
56.27	16.2	6.1	-	0.5	0.2	3.7	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.7	82	15	-	-	0.08	-
56.43	14.7	5.5	-	0.4	0.2	3.8	3	silty CLAY to CLAY	115	1.5	10	4	-	-	0.9	2.4	86	15	-	-	0.08	-
56.60	17.0	6.4	-	0.6	0.2	4.0	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.9	81	15	-	-	0.08	-
56.76	22.4	8.4	-	0.7	0.3	3.7	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.9	70	15	-	-	0.08	-
56.93	24.3	9.2	-	0.9	0.3	4.1	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.3	70	15	-	-	0.08	-
57.09	26.0	9.8	-	1.0	0.3	4.2	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.7	68	15	-	-	0.08	-
57.25	26.5	10.0	-	1.1	0.3	4.5	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.8	69	15	-	-	0.08	-
57.42	27.1	10.2	-	1.0	0.3	4.4	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.9	68	15	-	-	0.08	-
57.58	26.7	10.1	-	1.1	0.3	4.6	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.8	69	15	-	-	0.08	-
57.75	27.4	10.3	-	1.2	0.3	4.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.9	69	15	-	-	0.08	-
57.91	27.5	10.4	-	1.2	0.3	4.9	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.9	69	15	-	-	0.08	-
58.07	26.9	10.2	-	1.1	0.3	4.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.8	70	15	-	-	0.08	-
58.24	26.3	9.9	-	1.1	0.3	4.7	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.7	4.6	70	15	-	-	0.08	-
58.40	24.8	9.4	-	1.1	0.3	4.9	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.6	4.3	73	15	-	-	0.08	-
58.57	23.1	8.7	-	1.1	0.3	5.4	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	4.0	77	15	-	-	0.08	-
58.73	22.4	8.4	-	1.1	0.3	5.6	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.8	79	15	-	-	0.08	-
58.89	21.3	8.0	-	1.0	0.3	5.7	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.6	81	15	-	-	0.08	-
59.06	21.6	8.1	-	1.0	0.3	5.4	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.6	79	15	-	-	0.08	-
59.22	21.9	8.2	-	1.0	0.4	5.7	3	silty CLAY to CLAY	115	1.5	15	5	-	-	1.4	3.7	80	15	-	-	0.08	-
59.39	22.7	8.6	-	1.2	0.3	6.1	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.8	80	15	-	-	0.08	-
59.55	24.0	9.1	-	1.2	0.4	6.0	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.1	78	15	-	-	0.08	-
59.71	23.0	8.7	-	1.2	0.4	6.3	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.9	81	15	-	-	0.08	-
59.88	21.3	8.1	-	1.0	0.4	5.8	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.5	81	15	-	-	0.08	-
60.04	20.2	7.6	-	0.8	0.4	4.7	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.3	79	15	-	-	0.08	-
60.21	19.6	7.4	-	0.7	0.4	4.1	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.2	77	15	-	-	0.08	-
60.37	18.3	6.9	-	0.6	0.4	4.0	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.9	79	15	-	-	0.08	-
60.53	19.0	7.2	-	0.6	0.4	3.7	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.0	76	15	-	-	0.08	-
60.70	19.7	7.4	-	0.6	0.3	3.4	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.2	73	15	-	-	0.08	-
60.86	20.9	7.9	-	0.6	0.4	3.5	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.4	72	15	-	-	0.08	-
61.03	21.9	8.3	-	0.7	0.4	3.6	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.5	71	15	-	-	0.08	-
61.19	22.1	8.3	-	0.8	0.3	4.1	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.6	73	15	-	-	0.08	-
61.35	24.1	9.1	-	0.8	0.4	3.7	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	3.9	68	15	-	-	0.08	-
61.52	22.3	8.4	-	0.7	0.4	3.8	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.6	71	15	-	-	0.08	-
61.68	21.0	7.9	-	0.6	0.4	3.6	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.3	72	15	-	-	0.08	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic -	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.10	Cycl SStn %
61.85	20.8	7.8	-	0.6	0.4	3.4	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.3	72	15	-	-	0.08	-
62.01	20.7	7.8	-	0.6	0.4	3.4	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.3	72	15	-	-	0.08	-
62.17	20.8	7.8	-	0.6	0.4	3.8	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.3	74	15	-	-	0.08	-
62.34	21.9	8.3	-	0.8	0.4	4.4	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.5	75	15	-	-	0.08	-
62.50	21.9	8.3	-	0.9	0.4	4.8	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.4	77	15	-	-	0.08	-
62.67	21.7	8.2	-	0.9	0.4	5.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.4	78	15	-	-	0.08	-
62.83	21.3	8.0	-	0.9	0.4	5.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.3	78	15	-	-	0.08	-
63.00	20.9	7.9	-	0.7	0.4	4.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.2	76	15	-	-	0.08	-
63.16	19.3	7.3	-	0.7	0.5	4.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	2.9	79	15	-	-	0.08	-
63.32	18.7	7.1	-	0.6	0.5	3.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.8	78	15	-	-	0.08	-
63.49	17.9	6.8	-	0.6	0.5	4.2	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	2.7	81	15	-	-	0.08	-
63.65	17.0	6.4	-	0.6	0.5	4.5	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.5	85	15	-	-	0.08	-
63.82	16.1	6.1	-	0.6	0.5	4.7	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.3	88	15	-	-	0.08	-
63.98	15.8	6.0	-	0.5	0.5	4.5	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.2	87	15	-	-	0.08	-
64.14	16.7	6.3	-	0.5	0.5	4.1	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.4	84	15	-	-	0.08	-
64.31	17.9	6.8	-	0.6	0.5	4.2	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	2.6	82	15	-	-	0.08	-
64.47	19.5	7.4	-	0.8	0.6	5.0	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	2.9	82	15	-	-	0.08	-
64.64	26.8	10.1	-	1.1	0.6	4.9	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.2	71	15	-	-	0.08	-
64.80	38.7	14.6	-	1.4	0.6	3.9	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	6.4	56	15	-	-	0.08	-
64.96	34.3	13.0	-	1.2	0.5	4.1	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	5.6	60	15	-	-	0.08	-
65.13	30.3	11.4	-	1.6	0.6	6.1	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.8	72	15	-	-	0.08	-
65.29	43.0	16.2	-	1.5	0.6	3.9	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	7.1	54	15	-	-	0.08	-
65.46	36.1	13.6	-	1.6	0.6	5.0	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	5.8	62	15	-	-	0.08	-
65.62	25.1	9.5	-	1.0	0.5	4.9	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.6	3.8	73	15	-	-	0.08	-
65.78	20.3	7.6	-	0.9	0.5	5.6	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.0	83	15	-	-	0.08	-
65.95	22.7	8.6	-	0.8	0.6	4.3	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.4	74	15	-	-	0.08	-
66.11	22.2	8.4	-	0.9	0.6	4.8	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.3	77	15	-	-	0.08	-
66.28	25.3	9.6	-	1.0	0.7	4.9	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	3.8	72	15	-	-	0.08	-
66.44	26.0	9.8	-	1.1	0.7	5.0	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.0	72	15	-	-	0.08	-
66.60	25.5	9.6	-	1.1	0.7	5.0	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	3.8	73	15	-	-	0.08	-
66.77	26.1	9.9	-	1.1	0.7	5.0	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.0	72	15	-	-	0.08	-
66.93	29.6	11.2	-	1.2	0.8	4.7	3	silty CLAY to CLAY	115	1.5	20	7	-	-	2.0	4.6	67	15	-	-	0.08	-
67.10	40.8	15.4	-	1.2	0.8	3.2	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	6.5	52	15	-	-	0.08	-
67.26	41.6	15.7	-	1.6	0.9	4.1	3	silty CLAY to CLAY	115	1.5	28	10	-	-	2.8	6.6	56	15	-	-	0.08	-
67.42	47.4	17.9	-	1.6	0.9	3.6	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.2	7.6	50	15	-	-	0.08	-
67.59	45.6	17.2	-	1.7	1.0	4.0	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	7.3	53	15	-	-	0.08	-
67.75	37.6	14.2	-	1.5	0.9	4.5	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	5.9	60	15	-	-	0.08	-
67.92	34.7	13.1	-	1.3	0.9	4.3	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	5.4	61	15	-	-	0.08	-
68.08	31.4	11.9	-	1.2	1.0	4.2	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	4.8	63	15	-	-	0.08	-
68.24	33.4	12.6	-	1.2	1.0	4.0	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	5.1	61	15	-	-	0.08	-
68.41	34.4	13.0	-	1.1	1.0	3.7	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	5.3	58	15	-	-	0.08	-
68.57	35.8	13.5	-	1.2	1.1	3.9	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	5.5	58	15	-	-	0.08	-
68.74	41.1	15.5	-	1.4	1.1	3.8	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.8	6.4	54	15	-	-	0.08	-
68.90	55.9	21.1	-	1.9	1.1	3.6	3	silty CLAY to CLAY	115	1.5	37	14	-	-	3.8	8.9	47	15	-	-	0.08	-
69.07	60.7	22.9	-	2.1	1.1	3.7	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.2	9.8	45	15	-	-	0.08	-
69.23	65.5	24.7	-	2.8	1.3	4.5	3	silty CLAY to CLAY	115	1.5	44	16	-	-	4.5	9.9	47	15	-	-	0.08	-
69.39	68.1	25.7	-	2.5	1.4	4.0	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.7	9.9	44	15	-	-	0.08	-
69.56	68.6	25.9	-	2.6	1.3	4.0	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.7	9.9	44	15	-	-	0.08	-
69.72	72.7	27.4	-	2.4	1.4	3.5	4	clayy SILT to silty CLAY	115	2.0	36	14	-	-	5.0	9.9	41	15	-	-	0.08	-
69.89	71.5	27.0	-	2.5	1.5	3.8	4	clayy SILT to silty CLAY	115	2.0	36	13	-	-	4.9	9.9	42	15	-	-	0.08	-
70.05	62.0	23.4	-	1.9	1.4	3.3	4	clayy SILT to silty CLAY	115	2.0	31	12	-	-	4.2	9.8	43	15	-	-	0.08	-
70.21	60.2	22.7	-	1.5	1.4	2.6	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.1	9.5	40	15	-	-	0.08	-
70.38	60.3	22.8	-	1.5	1.4	2.6	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.1	9.5	40	15	-	-	0.08	-
70.54	64.2	24.2	-	1.6	1.4	2.7	4	clayy SILT to silty CLAY	115	2.0	32	12	-	-	4.4	9.9	40	15	-	-	0.08	-
70.71	68.8	25.9	-	1.7	1.5	2.6	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.7	9.9	38	15	-	-	0.08	-
70.87	73.3	27.6	-	1.7	1.5	2.4	4	clayy SILT to silty CLAY	115	2.0	37	14	-	-	5.0	9.9	36	15	-	-	0.08	-
71.03	77.9	41.8	111.3	1.9	1.5	2.5	4	clayy SILT to silty CLAY	115	2.0	39	21	-	-	5.4	9.9	30	15	2.14	-	0.08	51.2
71.20	87.4	46.8	113.0	2.0	1.6	2.4	5	silty SAND to sandy SILT	120	4.0	22	12	42	36	-	-	27	16	2.11	-	0.07	47.8
71.36	89.9	48.2	116.1	2.1	1.6	2.5	5	silty SAND to sandy SILT	120	4.0	22	12	43	36	-	-	27	16	2.07	-	0.07	46.3
71.53	90.7	48.6	125.8	2.5	1.7	2.9	4	clayy SILT to silty CLAY	115	2.0	45	24	-	-	6.3	9.9	29	15	1.85	-	0.07	45.8
71.69	101.5	54.3	134.6	2.9	1.7	3.0	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.0	9.9	28	15	1.50	-	0.06	36.2
71.85	106.7	57.0	136.2	3.0	1.8	2.9	4	clayy SILT to silty CLAY	115	2.0	53	29	-	-	7.4	9.9	27	15	1.43	-	0.06	29.9
72.02	106.6	56.9	146.9	3.5	1.8	3.4	4	clayy SILT to silty CLAY	115	2.0	53	28	-	-	7.4	9.9	29	15	0.90	-	0.06	15.3
72.18	103.1	55.0	146.8	3.4	1.9	3.5	4	clayy SILT to silty CLAY	115	2.0	52	28	-	-	7.1	9.9	30	15	0.88	-	0.06	19.8
72.35	102.5	54.7	148.3	3.5	2.0	3.5	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	30	15	0.80	-	0.05	19.7
72.51	100.2	37.8	-	3.5	2.0	3.6	4	clayy SILT to silty CLAY	115	2.0	50	19	-	-	6.9	9.9	36	15	-	-	0.05	-
72.67	103.8	55.3	146.3	3.4	2.0	3.4	4	clayy SILT to silty CLAY	115	2.0	52	28	-	-	7.2	9.9	30	15	0.89	-	0.05	19.1
72.84	104.8	55.8	146.3	3.4	2.0	3.4	4	clayy SILT to silty CLAY	115	2.0	52	28	-	-	7.3	9.9	29	15	0.89	-	0.05	17.9
73.00	102.1	38.5	-	3.6	2.0	3.7	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.1	9.9	36	15	-	-	0.05	-
73.17	103.7	39.1	-	3.7	2.1	3.7	4	clayy SILT to silty CLAY	115	2.0	52	20	-	-	7.2	9.9	36	15	-	-	0.05	-
73.33	101.9	38.5	-	3.7	2.1	3.8	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.1	9.9	36	15	-	-	0.05	-
73.49	101.1	38.1	-	3.7	2.1	3.8	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.0	9.9	36	15	-	-	0.05	-
73.66	99.4	37.5	-	3.6	2.1	3.8	4	clayy SILT to silty CLAY	115	2.0	50	19	-	-	6.9	9.9	37	15	-	-	0.05	-
73.82	97.4	36.8	-	3.6	2.1	3.9	4	clayy SILT to silty CLAY	115	2.0	49	18	-	-	6.7	9.9	37	15	-	-	0.05	-
73.99	97.6	36.8	-	3.7	2.2	3.9	4	clayy SILT to silty CLAY	115	2.0	49	18	-	-	6.8	9.9	38	15	-	-	0.05	-
74.15	101.1	38.2	-	3.6	2.2	3.7	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.0	9.9	36	15	-	-	0.05	-
74.31	102.4	38.6	-	3.6	2.2	3.7	4	clayy SILT to silty CLAY	115	2.0	51	19	-	-	7.1	9.9	36	15	-	-	0.05	-
74.48	100.3	37.8	-	3.7	2.2	3.8	4	clayy SILT to silty CLAY	115	2.0	50	19	-	-	6.9	9.9	37	15	-	-	0.05	-
74.64	100.0	37.8	-	3.5	2.2	3.7	4	clayy SILT to silty CLAY	115	2.0	50	19	-	-	6.9	9.9	36	15	-	-	0.05	-
74.81	103.2	54.5	144.1	3.3	2.2	3.4	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.1	9.9	30	15	0.93	-	0.05	21.5
74.97	101.6	53.7	142.2	3.2	2.2	3.3	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.0	9.9	30	15	1.01	-	0.05	24.8
75.13	102.6	54.2	139.4	3.1	2.2	3.2	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.16	-	0.05	25.8
75.30	107.0	56.4	132.2	2.9	2.2	2.8	5	silty SAND to sandy SILT	120	4.0	27	14	48	37	-	-	27	16	1.55	-	0.05	34.4
75.46	102.6	54.1	129.7	2.7	2.2	2.8	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	27	15	1.66	-	0.04	39.7
75.63	93.9	35.4	-	3.0	2.2	3.4	4	clayy SILT to silty CLAY	115	2.0	47	18	-	-	6.5	9.9	36	15	-	-	0.04	-
75.79	89.3	33.7	-	3.6	2.2	4.2	4	clayy SILT to silty CLAY	115	2.0	45	17	-	-	6.2	9.9	40	15	-	-	0.04	-
75.96	93.4	35.2	-	3.6	2.2	4.0	4	clayy SILT to silty CLAY	115	2.0	47	18	-	-	6.5	9.9	39	15	-	-	0.04	-
76.12	100.1	52.7	144.3	3.3	2.2	3.5	4	clayy SILT to silty CLAY	115	2.0	50	26	-	-	6.9	9.9	30	15	0.89	-	0.04	25.9
76.28	104.5	54.9	136.8	3.0	2.2	3.0	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	28	15	1.29	-	0.04	27.1
76.45	107.5	56.5	135.1	3.0	2.2	2.9	4	clayy SILT to silty CLAY	115	2.0	54	28	-	-	7.4	9.9	27	15	1.39	-	0.04	27.3
76.61	115.5	60.6	136.7	3.1	2.2	2.8	5	silty SAND to sandy SILT	120	4.0	29	15	50	37	-	-	26	16	1.34	-	0.03	19.8
76.78	120.6	63.3	139.5	3.3	2.3	2.8	5	silty SAND to sandy SILT	120	4.0	30	16	52	37	-	-	25	16	1.21	-	0.03	14.5
76.94	112.9	59.2	142.5	3.4	2.3	3.1	4	clayy SILT to silty CLAY	115	2.0	56	30	-	-	7.8	9.9	27	15	1.02	-	0.03	11.9
77.10	105.6	55.3	145.0	3.4	2.5	3.4	4	clayy SILT to silty CLAY	115	2.0	53	28	-	-	7.3	9.9	29	15	0.87	-	0.03	18.6

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(530)-45.cpt
CPT Date: 9/27/2011 10:05:52 AM
GW During Test: 45 ft

Sounding ID: CPT-11-110
Project No: 11-135
Cone/Rig: DSG1104

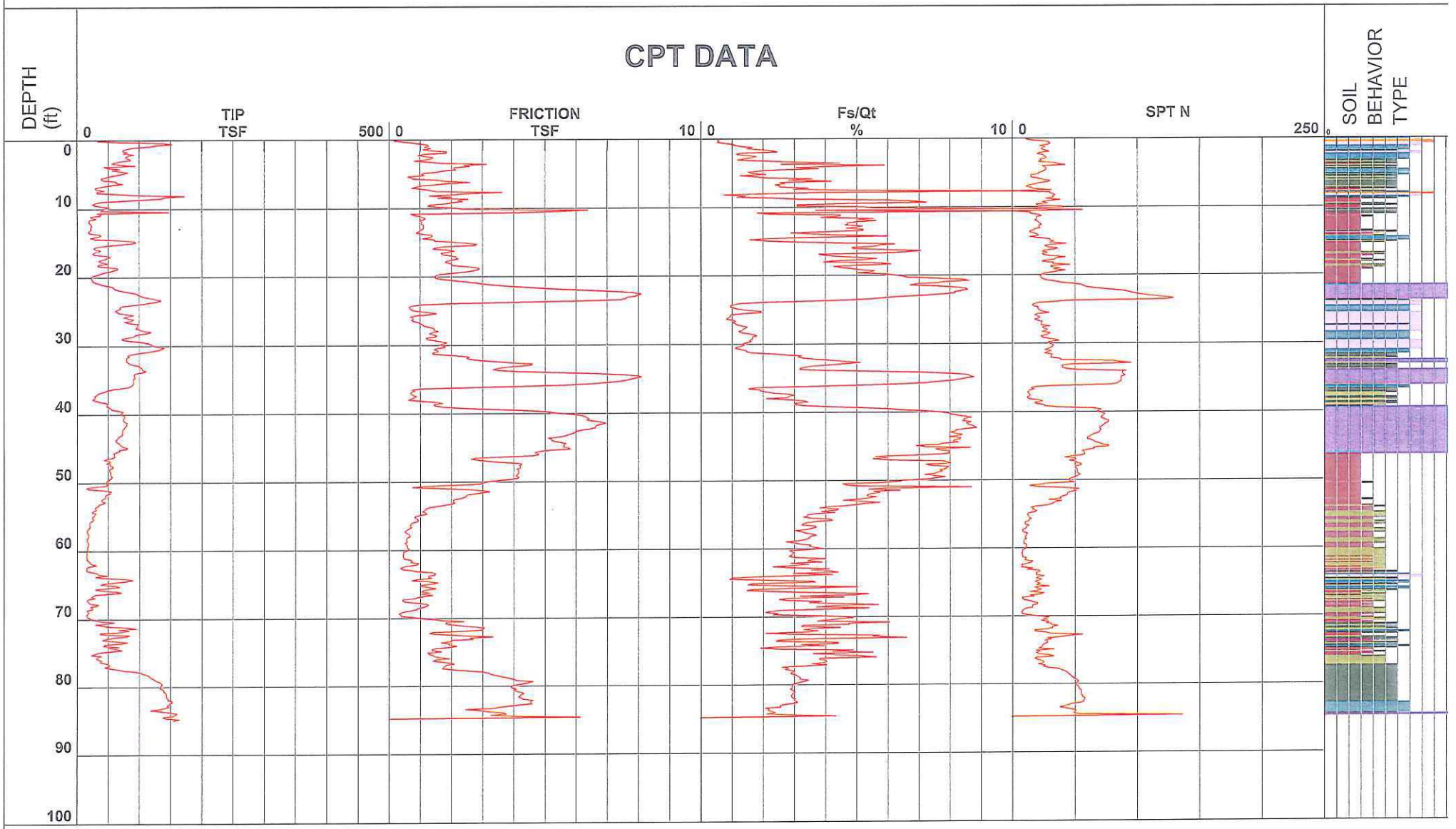
Depth ft	qc PS tsf	*qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	*Mat Typ Zon	*Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	*SPT R-N1 60%	*Rel Den %	*Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	*Nk - -	*Vol Strn %	*Dry Stlmt 0.00	*Liq Stlmt 0.10	*Cycl SStn %
77.27	104.5	54.7	141.1	3.2	2.5	3.2	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	29	15	1.06	-	0.03	22.8
77.43	104.7	54.8	140.3	3.2	2.6	3.2	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	29	15	1.10	-	0.03	23.2
77.60	102.7	53.7	137.7	3.1	2.7	3.1	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.23	-	0.02	28.1
77.76	102.0	53.3	136.6	3.0	2.7	3.1	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.28	-	0.02	30.0
77.92	102.7	53.6	139.5	3.2	2.8	3.2	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.13	-	0.02	26.3
78.09	101.6	53.0	136.5	3.0	2.8	3.1	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.0	9.9	29	15	1.28	-	0.02	30.6
78.25	103.0	53.7	136.9	3.1	2.9	3.1	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.1	9.9	29	15	1.26	-	0.02	28.7
78.42	104.0	54.2	137.7	3.1	2.9	3.1	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	29	15	1.22	-	0.01	27.0
78.58	104.9	54.6	135.9	3.0	3.0	3.0	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.3	9.9	28	15	1.32	-	0.01	28.3
78.74	102.3	53.3	136.9	3.1	3.0	3.1	4	clayy SILT to silty CLAY	115	2.0	51	27	-	-	7.1	9.9	29	15	1.26	-	0.01	29.6
78.91	101.6	52.8	139.3	3.1	3.0	3.2	4	clayy SILT to silty CLAY	115	2.0	51	26	-	-	7.0	9.9	29	15	1.13	-	0.01	28.2
79.07	103.5	53.8	139.2	3.2	3.1	3.2	4	clayy SILT to silty CLAY	115	2.0	52	27	-	-	7.2	9.9	29	15	1.14	-	0.01	26.2
79.24	101.4	52.7	140.8	3.2	3.2	3.3	4	clayy SILT to silty CLAY	115	2.0	51	26	-	-	7.0	9.9	30	15	1.05	-	0.00	27.5
79.40	98.8	51.3	141.1	3.2	3.3	3.4	4	clayy SILT to silty CLAY	115	2.0	49	26	-	-	6.8	9.9	31	15	1.01	-	0.00	30.7
79.56	91.6	34.5	-	3.3	3.3	3.8	4	clayy SILT to silty CLAY	115	2.0	46	17	-	-	6.3	9.9	38	15	-	-	0.00	-
79.73	84.0	31.7	-	3.2	3.4	4.1	4	clayy SILT to silty CLAY	115	2.0	42	16	-	-	5.8	9.9	41	15	-	-	0.00	-
79.89	75.0	28.3	-	3.1	3.3	4.4	3	silty CLAY to CLAY	115	1.5	50	19	-	-	5.1	9.9	44	15	-	-	0.00	-
80.06	82.1	31.0	-	3.4	3.4	4.4	3	silty CLAY to CLAY	115	1.5	55	21	-	-	5.6	9.9	42	15	-	-	0.00	-
80.22	91.6	34.6	-	3.7	3.4	4.2	4	clayy SILT to silty CLAY	115	2.0	46	17	-	-	6.3	9.9	40	15	-	-	0.00	-
80.38	89.8	33.9	-	3.8	3.6	4.5	3	silty CLAY to CLAY	115	1.5	60	23	-	-	6.2	9.9	41	15	-	-	0.00	-
80.55	83.3	31.4	-	3.6	3.6	4.6	3	silty CLAY to CLAY	115	1.5	56	21	-	-	5.7	9.9	43	15	-	-	0.00	-
80.71	75.3	28.4	-	3.5	3.6	5.0	3	silty CLAY to CLAY	115	1.5	50	19	-	-	5.2	9.9	46	15	-	-	0.00	-
80.88	64.2	24.2	-	3.1	3.6	5.1	3	silty CLAY to CLAY	115	1.5	43	16	-	-	4.4	8.8	50	15	-	-	0.00	-
81.04	58.2	22.0	-	2.6	3.5	4.8	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	7.9	51	15	-	-	0.00	-
81.20	48.3	18.2	-	2.4	3.5	5.6	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	6.4	58	15	-	-	0.00	-
81.37	59.0	22.3	-	3.0	3.6	5.5	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	8.0	53	15	-	-	0.00	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Earth Mechanics

Location	I-5 HOV Widening Segment 1	Operator	BH-JB	Filename	SDF(528).cpt
Job Number	11-135	Cone Number	DSG1104	GPS	
Hole Number	CPT-11-115	Date and Time	9/27/2011 7:32:50 AM	Maximum Depth	84.97 ft
Water Table Depth		60.50 ft			

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
0.33	67.6	108.4	115.6	0.4	-0.1	0.6	6	clean SAND to silty SAND	125	5.0	14	22	70	48	-	-	7	16	N/A	0.00	N/A	N/A
0.49	138.6	222.3	222.3	0.7	-0.2	0.5	6	clean SAND to silty SAND	125	5.0	28	44	93	48	-	-	5	16	N/A	0.00	N/A	N/A
0.66	152.0	243.8	243.8	1.0	0.0	0.7	6	clean SAND to silty SAND	125	5.0	30	49	95	48	-	-	5	16	N/A	0.00	N/A	N/A
0.82	127.3	204.2	208.5	1.2	-0.1	1.0	6	clean SAND to silty SAND	125	5.0	25	41	91	48	-	-	6	16	N/A	0.00	N/A	N/A
0.98	116.9	187.4	198.9	1.3	-0.1	1.1	6	clean SAND to silty SAND	125	5.0	23	37	88	48	-	-	7	16	N/A	0.00	N/A	N/A
1.15	90.4	145.0	167.2	1.1	0.0	1.3	6	clean SAND to silty SAND	125	5.0	18	29	79	48	-	-	9	16	N/A	0.00	N/A	N/A
1.31	81.2	130.2	165.2	1.3	0.0	1.6	6	clean SAND to silty SAND	125	5.0	16	26	76	48	-	-	12	16	N/A	0.00	N/A	N/A
1.48	74.6	119.6	150.7	1.1	0.0	1.5	6	clean SAND to silty SAND	125	5.0	15	24	73	48	-	-	12	16	N/A	0.00	N/A	N/A
1.64	73.2	117.4	160.5	1.4	0.0	1.9	5	silty SAND to sandy SILT	120	4.0	18	29	72	48	-	-	14	16	N/A	0.00	N/A	N/A
1.80	80.9	129.7	184.8	1.8	0.0	2.3	5	silty SAND to sandy SILT	120	4.0	20	32	76	48	-	-	15	16	N/A	0.00	N/A	N/A
1.97	75.2	120.6	181.2	1.8	0.0	2.4	5	silty SAND to sandy SILT	120	4.0	19	30	73	48	-	-	17	16	N/A	0.00	N/A	N/A
2.13	90.4	145.0	166.9	1.1	0.1	1.3	6	clean SAND to silty SAND	125	5.0	18	29	79	48	-	-	9	16	N/A	0.00	N/A	N/A
2.30	82.3	132.0	152.4	0.9	0.1	1.2	6	clean SAND to silty SAND	125	5.0	16	26	76	48	-	-	9	16	N/A	0.00	N/A	N/A
2.46	78.4	125.7	156.7	1.2	0.1	1.5	6	clean SAND to silty SAND	125	5.0	16	25	75	48	-	-	12	16	N/A	0.00	N/A	N/A
2.62	78.9	126.5	166.2	1.4	0.1	1.8	5	silty SAND to sandy SILT	120	4.0	20	32	75	48	-	-	13	16	N/A	0.00	N/A	N/A
2.79	84.3	135.2	169.0	1.4	-0.1	1.6	6	clean SAND to silty SAND	125	5.0	17	27	77	48	-	-	12	16	N/A	0.00	N/A	N/A
2.95	85.7	137.5	163.8	1.2	0.0	1.4	6	clean SAND to silty SAND	125	5.0	17	27	78	48	-	-	10	16	N/A	0.00	N/A	N/A
3.12	69.5	111.5	135.3	0.8	0.0	1.2	6	clean SAND to silty SAND	125	5.0	14	22	71	47	-	-	11	16	N/A	0.00	N/A	N/A
3.28	61.2	98.2	151.3	1.3	0.0	2.1	5	silty SAND to sandy SILT	120	4.0	15	25	66	46	-	-	17	16	0.15	-	0.37	0.8
3.45	56.0	89.9	170.0	1.7	0.0	3.0	5	silty SAND to sandy SILT	120	4.0	14	22	63	46	-	-	22	16	0.00	-	0.37	0.0
3.61	70.4	112.8	238.0	3.1	0.1	4.5	9	very stiff fine SOIL	120	2.0	35	56	71	46	-	-	24	30	0.00	-	0.37	0.0
3.77	93.4	149.7	213.8	2.4	0.3	2.6	5	silty SAND to sandy SILT	120	4.0	23	37	80	48	-	-	15	16	0.00	-	0.37	0.0
3.94	43.9	70.4	221.7	2.6	0.1	5.9	9	very stiff fine SOIL	120	2.0	22	35	55	44	-	-	34	30	0.00	-	0.37	0.0
4.10	49.9	80.1	192.9	2.1	0.1	4.2	4	clayy SILT to silty CLAY	115	2.0	25	40	-	-	3.5	9.9	27	15	0.00	-	0.37	0.0
4.27	68.4	109.7	190.5	2.1	0.1	3.1	5	silty SAND to sandy SILT	120	4.0	17	27	70	46	-	-	20	16	0.00	-	0.37	0.0
4.43	56.6	90.8	192.6	2.1	-0.2	3.8	4	clayy SILT to silty CLAY	115	2.0	28	45	-	-	4.0	9.9	24	15	0.00	-	0.37	0.0
4.59	69.4	111.4	173.9	1.7	-0.2	2.5	5	silty SAND to sandy SILT	120	4.0	17	28	71	46	-	-	17	16	0.00	-	0.37	0.0
4.76	81.0	129.9	173.0	1.5	-0.1	1.9	5	silty SAND to sandy SILT	120	4.0	20	32	76	46	-	-	14	16	0.00	-	0.37	0.0
4.92	74.2	119.0	151.7	1.1	-0.1	1.5	6	clean SAND to silty SAND	125	5.0	15	24	73	46	-	-	12	16	0.23	-	0.37	1.7
5.09	65.0	104.3	141.2	1.0	-0.1	1.6	5	silty SAND to sandy SILT	120	4.0	16	26	68	45	-	-	14	16	0.51	-	0.36	2.7
5.25	54.7	87.7	140.3	1.1	-0.1	2.1	5	silty SAND to sandy SILT	120	4.0	14	22	63	44	-	-	18	16	0.56	-	0.36	3.0
5.41	48.3	77.4	108.1	0.6	-0.2	1.3	5	silty SAND to sandy SILT	120	4.0	12	19	59	44	-	-	15	16	2.19	-	0.36	24.3
5.58	39.4	63.2	111.5	0.7	-0.1	1.8	5	silty SAND to sandy SILT	120	4.0	10	16	52	43	-	-	20	16	2.13	-	0.36	32.0
5.74	39.6	63.5	116.2	0.8	-0.2	2.0	5	silty SAND to sandy SILT	120	4.0	10	16	52	43	-	-	21	16	2.01	-	0.36	31.3
5.91	43.3	69.4	163.8	1.5	-0.2	3.6	4	clayy SILT to silty CLAY	115	2.0	22	35	-	-	3.0	9.9	27	15	0.00	-	0.35	0.0
6.07	63.7	101.8	175.8	1.8	0.0	2.8	5	silty SAND to sandy SILT	120	4.0	16	25	68	45	-	-	20	16	0.00	-	0.35	0.0
6.23	62.3	98.3	213.4	2.6	-0.1	4.2	9	very stiff fine SOIL	120	2.0	31	49	66	45	-	-	25	30	0.00	-	0.35	0.0
6.40	72.5	113.0	177.4	1.8	-0.4	2.5	5	silty SAND to sandy SILT	120	4.0	18	28	71	45	-	-	18	16	0.00	-	0.35	0.0
6.56	55.4	85.2	156.0	1.5	-0.3	2.7	5	silty SAND to sandy SILT	120	4.0	14	21	62	44	-	-	21	16	0.27	-	0.35	1.5
6.73	43.3	65.7	129.0	1.0	-0.3	2.4	5	silty SAND to sandy SILT	120	4.0	11	16	53	42	-	-	23	16	1.43	-	0.35	16.0
6.89	34.9	52.4	119.7	0.9	-0.2	2.5	5	silty SAND to sandy SILT	120	4.0	9	13	46	41	-	-	26	16	1.93	-	0.35	41.5
7.05	29.2	43.4	111.3	0.7	-0.3	2.6	5	silty SAND to sandy SILT	120	4.0	7	11	39	40	-	-	29	16	2.14	-	0.35	51.2
7.22	31.4	46.1	134.5	1.1	-0.2	3.5	4	clayy SILT to silty CLAY	115	2.0	16	23	-	-	2.2	9.9	32	15	1.17	-	0.34	45.4
7.38	43.7	63.4	142.4	1.3	-0.3	3.0	5	silty SAND to sandy SILT	120	4.0	11	16	52	42	-	-	26	16	0.76	-	0.34	5.3
7.55	32.2	51.7	168.6	1.5	-0.3	4.8	4	clayy SILT to silty CLAY	115	2.0	16	26	-	-	2.3	9.9	35	15	0.00	-	0.34	0.0
7.71	32.7	52.4	-	3.6	-0.4	9.9	3	silty CLAY to CLAY	115	1.5	22	35	-	-	2.3	9.9	48	15	-	-	0.34	-
7.87	62.6	88.1	195.7	2.5	-0.8	4.0	4	clayy SILT to silty CLAY	115	2.0	31	44	-	-	4.4	9.9	25	15	0.00	-	0.34	0.0
8.04	94.0	131.1	185.5	2.1	0.1	2.3	5	silty SAND to sandy SILT	120	4.0	24	33	76	46	-	-	15	16	0.00	-	0.34	0.0
8.20	172.4	237.9	237.9	1.3	-0.5	0.8	6	clean SAND to silty SAND	125	5.0	34	48	95	48	-	-	5	16	0.00	-	0.34	0.0
8.37	140.1	191.3	214.6	2.0	-0.7	1.4	6	clean SAND to silty SAND	125	5.0	28	38	88	47	-	-	9	16	0.00	-	0.34	0.0
8.53	135.0	182.5	198.0	1.6	-0.6	1.2	6	clean SAND to silty SAND	125	5.0	27	36	87	47	-	-	7	16	0.00	-	0.34	0.0
8.69	102.1	136.7	198.4	2.5	-0.5	2.5	5	silty SAND to sandy SILT	120	4.0	26	34	77	46	-	-	16	16	0.00	-	0.34	0.0
8.86	71.3	94.6	177.5	2.2	-0.5	3.1	5	silty SAND to sandy SILT	120	4.0	18	24	65	44	-	-	22	16	0.00	-	0.34	0.0
9.02	39.6	63.5	-	2.4	-0.4	6.0	4	clayy SILT to silty CLAY	115	2.0	20	32	-	-	2.8	9.9	36	15	-	-	0.34	-
9.19	29.6	47.5	-	2.0	-0.5	7.0	3	silty CLAY to CLAY	115	1.5	20	32	-	-	2.1	9.9	43	15	-	-	0.34	-
9.35	25.3	40.6	-	1.8	-0.8	7.4	3	silty CLAY to CLAY	115	1.5	17	27	-	-	1.8	9.9	46	15	-	-	0.34	-
9.51	29.0	46.5	-	1.3	-0.8	4.7	4	clayy SILT to silty CLAY	115	2.0	14	23	-	-	2.0	9.9	36	15	-	-	0.34	-
9.68	40.6	51.7	133.2	1.3	-0.9	3.1	4	clayy SILT to silty CLAY	115	2.0	20	26	-	-	2.8	9.9	29	15	1.44	-	0.34	36.7
9.84	52.0	65.6	147.6	1.6	-0.8	3.1	4	clayy SILT to silty CLAY	115	2.0	26	33	-	-	3.6	9.9	26	15	0.71	-	0.34	5.0
10.01	42.0	58.9	190.7	2.2	-0.6	5.3	4	clayy SILT to silty CLAY	115	2.0	21	29	-	-	2.9	9.9	35	15	0.00	-	0.34	0.0
10.17	42.3	58.6	-	2.3	-0.7	5.6	4	clayy SILT to silty CLAY	115	2.0	21	29	-	-	3.0	9.9	36	15	-	-	0.34	-
10.34	37.9	60.8	-	6.4	-0.8	9.9	9	very stiff fine SOIL	120	2.0	19	30	51	40	-	-	45	30	-	-	0.34	-
10.50	146.3	178.9	283.2	5.4	-0.4	3.7	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	9.7	9.9	18	16	0.00	-	0.34	0.0
10.66	32.1	50.1	-	4.1	-0.6	9.9	3	silty CLAY to CLAY	115	1.5	21	33	-	-	2.2	9.9	48	15	-	-	0.34	-
10.83	39.1	47.1	97.8	0.7	-0.4	1.8	5	silty SAND to sandy SILT	120	4.0	10	12	42	40	-	-	24	16	2.38	-	0.34	47.5
10.99	36.2	43.3	104.3	0.8	-0.5	2.3	5	silty SAND to sandy SILT	120	4.0	9	11	39	40	-	-	27	16	2.26	-	0.33	51.2
11.16	21.6	32.2	-	1.0	-0.4	4.6	3	silty CLAY to CLAY	115	1.5	14	21	-	-	1.5	9.9	42	15	-	-	0.33	-
11.32	24.2	35.6	-	1.1	-0.5	4.6	3	silty CLAY to CLAY	115	1.5	16	24	-	-	1.7	9.9	40	15	-	-	0.33	-
11.48	30.0	38.3	-	1.2	-0.4	4.0	4	clayy SILT to silty CLAY	115	2.0	15	19	-	-	2.1	9.9	37	15	-	-	0.33	-
11.65	20.1	28.7	-	1.1	-0.3	5.7	3	silty CLAY to CLAY	115	1.5	13	19	-	-	1.4	9.9	48	15	-	-	0.33	-
11.81	19.8	27.9	-	1.0	-0.6	5.2	3	silty CLAY to CLAY	115	1.5	13	19	-	-	1.4	9.9	47	15	-	-	0.33	-
11.98	18.8	26.2	-	1.1	-0.6	5.8	3	silty CLAY to CLAY	115	1.5	13	17	-	-	1.3	9.9	50	15	-	-	0.33	-
12.14	20.6	28.4	-	1.0	-0.7	5.2	3	silty CLAY to CLAY	115	1.5	14	19	-	-	1.4	9.9	46	15	-	-	0.33	-
12.30	22.2	30.1	-	1.0	-0.7	4.9	3	silty CLAY to CLAY	115	1.5	15	20	-	-	1.5	9.9	44	15	-	-	0.33	-
12.47	23.3	31.3	-	1.1	-0.7	4.9	3	silty CLAY to CLAY	115	1.5	16	21	-	-	1.6	9.9	43	15	-	-	0.33	-
12.63	23.7	31.4	-	1.1	-0.7	4.8	3	silty CLAY to CLAY	115	1.5	16	21	-	-	1.6	9.9	43	15	-	-	0.33	-
12.80	21.5	28.1	-	1.1	-0.8	5.4	3	silty CLAY to CLAY	115	1.5	14	19	-	-	1.5	9.9	47	15	-	-	0.33	-
12.96	22.0	28.5	-	1.1	-0.8	5.2	3	silty CLAY to CLAY	115	1.5	15	19	-	-	1.5	9.9	46	15	-	-	0.33	-
13.12	22.5	28.8	-	1.1	-0.9	4.8	3	silty CLAY to CLAY	115	1.5	15	19	-	-	1.6	9.9	45	15	-	-	0.33	-
13.29	19.3	24.3	-	1.0	-0.9	5.4	3	silty CLAY to CLAY	115	1.5	13	16	-	-	1.3	9.9	50	15	-	-	0.33	-
13.45	18.2	22.7	-	0.9	-0.9	5.4	3	silty CLAY to CLAY	115	1.5	12	15	-	-	1.3	9.9	52	15	-	-	0.33	-
13.62	21.7	26.8	-	0.9	-0.9	4.2	3	silty CLAY to CLAY	115	1.5	14	18	-	-	1.5	9.9	44	15	-	-	0.33	-
13.78	36.5	39.2	115.6	1.1	-1.0	3.0	4	clayy SILT to silty CLAY	115	2.0	18	20	-	-	2.5	9.9	32	15	2.08	-	0.33	51.2
13.94	38.4	41.0	131.6	1.4	-1.0	3.7	4	clayy SILT to silty CLAY	115	2.0	19	20	-	-	2.7	9.9	34	15	1.69	-	0.32	51.2
14.11	32.0	38.2	-	1.4	-1.0	4.4	4	clayy SILT to silty CLAY	115	2.0	16	19	-	-	2.2	9.9	39	15	-	-	0.32	-
14.27	21.7	25.6	-	1.3	-1.0	6.2	3	silty CLAY to CLAY	115	1.5	14	17	-	-	1.5	9.9	52	15	-	-	0.32	-
14.44	29.2	34.0	-	1.1	-0.9	3.8	4	clayy SILT to silty CLAY	115	2.0	15	17	-	-	2.0	9.9	38	15	-	-	0.32	-
14.60	67.8	70.7	127.5	1.5	-1.1	2.2	5	silty SAND to sandy SILT	120	4.0	17	18	56	42	-	-	21	16	1.85	-	0.32	27.8
14.76	92.5	95.9	133.3	1.5	-1.2	1.6	5	silty SAND to sandy SILT	120	4.0	23	24	66	44	-	-	15	16	1.63	-	0.32	12.6
14.93	93.9	96.8	150.0	2.0	-1.2	2.1	5	silty SAND to sandy SILT	120	4.0	23	24	66	44	-	-	17	16	0.82	-	0.31	4.6
15.09	85.0	87.1	164.7	2.5	-1.3	2.9	5	silty SAND to sandy SILT	120	4.0	21	22	62	43	-	-	22	16	0.00	-	0.31	0.0
15.26	63.5	64.8	180.7	2.8	-1.2	4.5	4	clayy SILT to silty CLAY	115	2.0	32	32	-	-	4.5	9.9	31	15	0.00	-	0.31	0.0
15.42	44.5	48.6	-	2.8	-1.1	6.3	3	silty CLAY to CLAY	115	1.5	30	32	-	-	3.1	9.9	41	15	-	-	0.31	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-Nj 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
15.58	31.4	33.9	-	1.8	-1.0	5.9	3	silty CLAY to CLAY	115	1.5	21	23	-	-	2.2	9.9	45	15	-	-	0.31	-
15.75	27.0	28.8	-	1.5	-1.0	5.8	3	silty CLAY to CLAY	115	1.5	18	19	-	-	1.9	9.9	48	15	-	-	0.31	-
15.91	29.1	30.7	-	1.4	-1.0	5.0	3	silty CLAY to CLAY	115	1.5	19	20	-	-	2.0	9.9	44	15	-	-	0.31	-
16.08	37.9	39.8	-	1.9	-0.9	5.0	3	silty CLAY to CLAY	115	1.5	25	27	-	-	2.6	9.9	40	15	-	-	0.31	-
16.24	35.5	36.9	-	2.1	-1.0	6.0	3	silty CLAY to CLAY	115	1.5	24	25	-	-	2.5	9.9	44	15	-	-	0.31	-
16.40	27.3	28.0	-	1.9	-0.9	7.3	3	silty CLAY to CLAY	115	1.5	18	19	-	-	1.9	9.9	53	15	-	-	0.31	-
16.57	25.4	25.8	-	1.7	-0.9	6.9	3	silty CLAY to CLAY	115	1.5	17	17	-	-	1.8	9.9	53	15	-	-	0.31	-
16.73	29.2	29.4	-	1.7	-0.9	6.1	3	silty CLAY to CLAY	115	1.5	19	20	-	-	2.0	9.9	49	15	-	-	0.31	-
16.90	50.0	48.5	145.9	1.9	-0.9	3.9	4	clayy SILT to silty CLAY	115	2.0	25	24	-	-	3.5	9.9	33	15	1.05	-	0.31	39.2
17.06	53.1	51.3	154.0	2.1	-0.9	4.1	4	clayy SILT to silty CLAY	115	2.0	27	26	-	-	3.7	9.9	33	15	0.69	-	0.31	28.7
17.23	48.9	47.4	-	2.2	-0.9	4.5	4	clayy SILT to silty CLAY	115	2.0	24	24	-	-	3.4	9.9	35	15	-	-	0.31	-
17.39	43.4	42.1	-	2.2	-0.9	5.2	3	silty CLAY to CLAY	115	1.5	29	28	-	-	3.0	9.9	40	15	-	-	0.31	-
17.55	36.2	34.9	-	2.0	-0.9	5.8	3	silty CLAY to CLAY	115	1.5	24	23	-	-	2.5	9.9	45	15	-	-	0.31	-
17.72	35.5	33.9	-	1.9	-0.9	5.4	3	silty CLAY to CLAY	115	1.5	24	23	-	-	2.5	9.9	44	15	-	-	0.31	-
17.88	42.7	40.4	-	1.8	-0.9	4.4	4	clayy SILT to silty CLAY	115	2.0	21	20	-	-	3.0	9.9	37	15	-	-	0.31	-
18.05	49.5	46.5	147.1	2.0	-0.9	4.0	4	clayy SILT to silty CLAY	115	2.0	25	23	-	-	3.5	9.9	34	15	1.02	-	0.31	44.3
18.21	34.8	32.3	-	2.0	-1.0	5.9	3	silty CLAY to CLAY	115	1.5	23	22	-	-	2.4	9.9	46	15	-	-	0.31	-
18.37	33.6	31.0	-	2.0	-1.1	6.3	3	silty CLAY to CLAY	115	1.5	22	21	-	-	2.3	9.9	48	15	-	-	0.31	-
18.54	47.6	43.5	-	2.4	-1.0	5.2	3	silty CLAY to CLAY	115	1.5	32	29	-	-	3.3	9.9	39	15	-	-	0.31	-
18.70	65.3	60.3	172.1	2.8	-1.0	4.3	4	clayy SILT to silty CLAY	115	2.0	33	30	-	-	4.6	9.9	31	15	0.00	-	0.31	0.0
18.87	64.7	59.5	175.8	2.9	-1.0	4.6	4	clayy SILT to silty CLAY	115	2.0	32	30	-	-	4.5	9.9	32	15	0.00	-	0.31	0.0
19.03	58.9	53.9	176.1	2.8	-1.0	4.9	4	clayy SILT to silty CLAY	115	2.0	29	27	-	-	4.1	9.9	35	15	0.00	-	0.31	0.0
19.19	52.3	46.1	-	2.7	-1.0	5.2	3	silty CLAY to CLAY	115	1.5	35	31	-	-	3.7	9.9	38	15	-	-	0.31	-
19.36	43.7	38.2	-	2.4	-1.0	5.7	3	silty CLAY to CLAY	115	1.5	29	25	-	-	3.0	9.9	43	15	-	-	0.31	-
19.52	37.8	32.8	-	2.1	-0.8	5.6	3	silty CLAY to CLAY	115	1.5	25	22	-	-	2.6	9.9	45	15	-	-	0.31	-
19.69	32.8	28.3	-	1.7	-0.8	5.2	3	silty CLAY to CLAY	115	1.5	22	19	-	-	2.3	9.9	47	15	-	-	0.31	-
19.85	25.7	22.0	-	1.5	-2.2	6.2	3	silty CLAY to CLAY	115	1.5	17	15	-	-	1.8	9.9	55	15	-	-	0.31	-
20.01	23.7	20.1	-	1.5	-1.8	6.5	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.6	9.9	58	15	-	-	0.31	-
20.18	22.8	19.1	-	1.5	-1.2	6.9	3	silty CLAY to CLAY	115	1.5	15	13	-	-	1.6	9.9	60	15	-	-	0.31	-
20.34	24.2	20.1	-	1.6	-1.4	7.0	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.7	9.9	59	15	-	-	0.31	-
20.51	24.5	20.3	-	1.9	-1.4	8.0	3	silty CLAY to CLAY	115	1.5	16	14	-	-	1.7	9.9	62	15	-	-	0.31	-
20.67	26.3	21.6	-	2.2	-1.2	8.8	3	silty CLAY to CLAY	115	1.5	18	14	-	-	1.8	9.9	62	15	-	-	0.31	-
20.83	29.4	24.0	-	2.5	-1.2	9.0	3	silty CLAY to CLAY	115	1.5	20	16	-	-	2.0	9.9	60	15	-	-	0.31	-
21.00	36.3	29.3	-	2.8	-1.3	8.1	3	silty CLAY to CLAY	115	1.5	24	20	-	-	2.5	9.9	54	15	-	-	0.31	-
21.16	40.5	32.5	-	3.1	-1.4	7.8	3	silty CLAY to CLAY	115	1.5	27	22	-	-	2.8	9.9	51	15	-	-	0.31	-
21.33	49.8	39.6	-	3.4	-1.3	7.1	3	silty CLAY to CLAY	115	1.5	33	26	-	-	3.5	9.9	46	15	-	-	0.31	-
21.49	57.7	45.6	-	3.9	-1.1	6.9	3	silty CLAY to CLAY	115	1.5	38	30	-	-	4.0	9.9	43	15	-	-	0.31	-
21.65	59.2	46.4	-	4.5	-1.0	7.8	3	silty CLAY to CLAY	115	1.5	39	31	-	-	4.1	9.9	45	15	-	-	0.31	-
21.82	62.1	48.4	-	5.1	-0.9	8.3	3	silty CLAY to CLAY	115	1.5	41	32	-	-	4.3	9.9	46	15	-	-	0.31	-
21.98	68.8	53.2	-	5.8	-0.7	8.7	3	silty CLAY to CLAY	115	1.5	46	35	-	-	4.8	9.9	45	15	-	-	0.31	-
22.15	78.4	60.1	-	6.7	-0.6	8.7	9	very stiff fine SOIL	120	2.0	39	30	50	41	-	-	43	30	-	-	0.31	-
22.31	89.5	68.1	-	7.5	-0.5	8.5	9	very stiff fine SOIL	120	2.0	45	34	54	42	-	-	41	30	-	-	0.31	-
22.47	96.3	72.8	-	7.8	-0.5	8.2	9	very stiff fine SOIL	120	2.0	48	36	57	42	-	-	39	30	-	-	0.31	-
22.64	99.0	74.3	-	8.1	-0.3	8.3	9	very stiff fine SOIL	120	2.0	50	37	57	42	-	-	39	30	-	-	0.31	-
22.80	103.1	76.8	-	8.0	-0.1	7.8	9	very stiff fine SOIL	120	2.0	52	38	58	42	-	-	38	30	-	-	0.31	-
22.97	109.6	81.0	-	7.9	-0.3	7.3	9	very stiff fine SOIL	120	2.0	55	41	60	43	-	-	36	30	-	-	0.31	-
23.13	118.5	98.6	281.0	7.6	-0.1	6.5	9	very stiff fine SOIL	120	2.0	59	49	67	43	-	-	31	30	0.00	-	0.31	0.0
23.30	127.9	106.0	277.2	7.6	0.2	6.0	9	very stiff fine SOIL	120	2.0	64	53	69	43	-	-	29	30	0.00	-	0.31	0.0
23.46	134.4	111.0	271.6	7.4	0.4	5.6	9	very stiff fine SOIL	120	2.0	67	56	70	44	-	-	28	30	0.00	-	0.31	0.0
23.62	127.5	105.0	242.3	6.2	0.7	4.9	9	very stiff fine SOIL	120	2.0	64	52	69	43	-	-	26	30	0.00	-	0.31	0.0
23.79	114.6	94.0	189.3	4.0	0.8	3.5	5	silty SAND to sandy SILT	120	4.0	29	23	65	43	-	-	23	16	0.00	-	0.31	0.0
23.95	105.2	86.0	135.7	2.1	-0.6	2.0	5	silty SAND to sandy SILT	120	4.0	26	22	62	42	-	-	18	16	1.75	-	0.31	20.6
24.12	87.6	71.4	103.0	1.1	-0.9	1.3	5	silty SAND to sandy SILT	120	4.0	22	18	56	41	-	-	16	16	2.28	-	0.30	27.4
24.28	71.4	57.9	87.5	0.8	-0.6	1.1	5	silty SAND to sandy SILT	120	4.0	18	14	49	40	-	-	17	16	2.61	-	0.30	35.8
24.44	68.5	55.4	82.2	0.7	-0.6	1.0	5	silty SAND to sandy SILT	120	4.0	17	14	48	40	-	-	16	16	2.74	-	0.30	38.3
24.61	70.3	56.7	83.1	0.7	-0.7	1.0	5	silty SAND to sandy SILT	120	4.0	18	14	48	40	-	-	16	16	2.72	-	0.29	37.0
24.77	66.3	53.3	83.4	0.7	-0.7	1.1	5	silty SAND to sandy SILT	120	4.0	17	13	46	40	-	-	18	16	2.71	-	0.29	40.5
24.94	62.1	49.7	84.4	0.7	-0.6	1.2	5	silty SAND to sandy SILT	120	4.0	16	12	44	39	-	-	19	16	2.69	-	0.28	44.4
25.10	64.3	51.3	92.5	0.9	-0.7	1.5	5	silty SAND to sandy SILT	120	4.0	16	13	45	39	-	-	21	16	2.49	-	0.28	42.7
25.26	67.7	53.9	107.1	1.3	-0.7	2.0	5	silty SAND to sandy SILT	120	4.0	17	13	47	40	-	-	23	16	2.21	-	0.27	39.9
25.43	78.3	62.1	114.5	1.5	-0.8	2.0	5	silty SAND to sandy SILT	120	4.0	20	16	51	40	-	-	21	16	2.09	-	0.27	32.7
25.59	90.7	71.7	107.7	1.3	-0.8	1.4	5	silty SAND to sandy SILT	120	4.0	23	18	56	41	-	-	17	16	2.20	-	0.27	27.2
25.76	82.7	65.1	92.4	0.9	-0.7	1.1	5	silty SAND to sandy SILT	120	4.0	21	16	53	41	-	-	15	16	2.49	-	0.26	30.9
25.92	75.3	59.2	84.6	0.7	-0.7	1.0	5	silty SAND to sandy SILT	120	4.0	19	15	50	40	-	-	15	16	2.68	-	0.26	34.6
26.08	82.5	64.6	89.2	0.8	-0.7	1.0	5	silty SAND to sandy SILT	120	4.0	21	16	53	41	-	-	15	16	2.57	-	0.26	31.2
26.25	91.2	71.2	92.4	0.8	-0.7	0.9	6	clean SAND to silty SAND	125	5.0	18	14	56	41	-	-	13	16	2.49	-	0.25	27.5
26.41	88.2	68.6	89.4	0.7	-0.7	0.8	6	clean SAND to silty SAND	125	5.0	18	14	55	41	-	-	13	16	2.56	-	0.25	28.9
26.58	76.9	59.6	87.5	0.8	-0.7	1.0	5	silty SAND to sandy SILT	120	4.0	19	15	50	40	-	-	16	16	2.61	-	0.24	34.3
26.74	83.4	64.5	94.0	0.9	-0.7	1.1	5	silty SAND to sandy SILT	120	4.0	21	16	53	40	-	-	16	16	2.46	-	0.24	31.2
26.90	98.8	76.1	100.9	1.0	-0.8	1.0	6	clean SAND to silty SAND	125	5.0	20	15	58	41	-	-	13	16	2.32	-	0.24	25.0
27.07	97.7	75.0	102.3	1.1	-0.8	1.1	5	silty SAND to sandy SILT	120	4.0	24	19	58	41	-	-	14	16	2.29	-	0.23	25.5
27.23	96.9	74.2	103.0	1.1	-0.8	1.2	5	silty SAND to sandy SILT	120	4.0	24	19	57	41	-	-	15	16	2.28	-	0.23	25.9
27.40	96.6	73.7	106.9	1.3	-0.8	1.3	5	silty SAND to sandy SILT	120	4.0	24	18	57	41	-	-	16	16	2.21	-	0.22	26.2
27.56	94.8	72.1	110.4	1.4	-0.8	1.5	5	silty SAND to sandy SILT	120	4.0	24	18	56	41	-	-	17	16	2.15	-	0.22	27.0
27.72	101.9	77.3	113.3	1.5	-0.8	1.5	5	silty SAND to sandy SILT	120	4.0	25	19	58	41	-	-	16	16	2.11	-	0.22	24.4
27.89	106.4	80.5	113.9	1.4	-0.8	1.4	5	silty SAND to sandy SILT	120	4.0	27	20	60	42	-	-	15	16	2.10	-	0.21	22.9
28.05	118.7	89.5	120.9	1.6	-0.9	1.4	5	silty SAND to sandy SILT	120	4.0	30	22	63	42	-	-	14	16	2.00	-	0.21	20.0
28.22	114.2	85.8	114.7	1.4	-0.9	1.2	6	clean SAND to silty SAND	125	5.0	23	17	62	42	-	-	14	16	2.09	-	0.21	21.1
28.38	100.5	75.3	107.8	1.3	-0.8	1.3	5	silty SAND to sandy SILT	120	4.0	25	19	58	41	-	-	15	16	2.20	-	0.20	25.4
28.54	93.2	69.6	109.6	1.4	-0.8	1.6	5	silty SAND to sandy SILT	120	4.0	23	17	55	41	-	-	18	16	2.17	-	0.20	28.3
28.71	91.6	68.3	112.8	1.5	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	23	17	54	41	-	-	19	16	2.12	-	0.20	29.1
28.87	83.2	61.8	110.4	1.5	-0.8	1.8	5	silty SAND to sandy SILT	120	4.0	21	15	51	40	-	-	21	16	2.15	-	0.19	32.8
29.04	72.2	53.5	100.0	1.2	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	18	13	46	39	-	-	22	16	2.34	-	0.19	40.4
29.20	73.8	54.5	100.9	1.2	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	18	14	47	39	-	-	21	16	2.32	-	0.18	39.3
29.36	88.1	64.9	108.9	1.4	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	22	16	53	40	-	-	19	16	2.18	-	0.18	31.0
29.53	105.4	77.5	117.4	1.7	-0.9	1.6	5	silty SAND to sandy SILT	120	4.0	26	19	59	41	-	-	17	16	2.05	-	0.18	24.3
29.69	114.7	84.0	124.1	1.8	-0.9	1.6	5	silty SAND to sandy SILT	120	4.0	29	21	61	42	-	-	16	16	1.96	-	0.17	21.7
29.86	119.0	87.0	122.7	1.7	-0.9	1.5	5	silty SAND to sandy SILT	120	4.0	30	22	62	42	-	-	15	16	1.98	-	0.17	20.7
30.02	121.4	88.5	120.3	1.6	-0.9	1.4	5	silty SAND to sandy SILT	120	4.0	30	22	63	42	-	-	14	16	2.01	-	0.17	20.3
30.19	128.5	93.3	125.9	1.8	-0.9	1.4	5	silty SAND to sandy SILT	120	4.0	32	23	65	42	-	-	14	16	1.94	-	0.16	18.8
30.35	139.8	101.3	129.8	1.8	-0.9	1.3	6	clean SAND to silty SAND	125	5.0	28	20	67	43	-	-	13	16	1.89	-	0.16	16.6
30.51	135.2	97.7	122.9	1.6	-0.9	1.2	6	clean SAND to silty SAND	125	5.0	27	20	66	42	-	-	12	16	1.97	-	0.16	17.6
30.68	130.8	94.3	118.8	1.5	-0.9	1.1	6	clean SAND to silty SAND	125	5.0	26	19	65	42	-	-	12	16	2.03	-	0.15	18.6
30.84	121.4	87.2	117.4	1.5	-0.9	1.3	5	silty SAND to sandy SILT	120	4.0	30	22	62	42	-	-	14	16	2.05	-	0.15	20.7

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic -	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
31.01	109.0	78.1	114.7	1.6	-0.8	1.5	5	silty SAND to sandy SILT	120	4.0	27	20	59	41	-	-	16	16	2.09	-	0.15	24.0
31.17	96.1	68.7	107.4	1.4	-0.8	1.5	5	silty SAND to sandy SILT	120	4.0	24	17	55	40	-	-	18	16	2.20	-	0.14	28.9
31.33	86.2	61.4	106.2	1.4	-0.8	1.7	5	silty SAND to sandy SILT	120	4.0	22	15	51	40	-	-	20	16	2.22	-	0.14	33.1
31.50	81.1	57.7	119.8	1.8	-0.8	2.3	5	silty SAND to sandy SILT	120	4.0	20	14	49	39	-	-	24	16	2.02	-	0.14	36.1
31.66	84.6	59.9	135.0	2.3	-0.8	2.8	5	silty SAND to sandy SILT	120	4.0	21	15	50	40	-	-	26	16	1.83	-	0.13	34.0
31.83	80.1	56.6	143.4	2.6	-0.8	3.3	4	clayy SILT to silty CLAY	115	2.0	40	28	-	-	5.6	9.9	29	15	1.53	-	0.13	37.1
31.99	79.8	56.3	140.8	2.5	-0.8	3.2	4	clayy SILT to silty CLAY	115	2.0	40	28	-	-	5.6	9.9	28	15	1.63	-	0.13	37.5
32.15	79.7	56.0	145.0	2.6	-0.9	3.4	4	clayy SILT to silty CLAY	115	2.0	40	28	-	-	5.6	9.9	29	15	1.46	-	0.13	37.7
32.32	79.9	56.1	154.1	2.9	-1.0	3.8	4	clayy SILT to silty CLAY	115	2.0	40	28	-	-	5.6	9.9	31	15	1.06	-	0.12	23.9
32.48	82.3	42.8	-	3.4	-1.2	4.3	4	clayy SILT to silty CLAY	115	2.0	41	21	-	-	5.7	9.9	36	15	-	-	0.12	-
32.65	84.7	43.8	-	3.9	-1.0	4.7	4	clayy SILT to silty CLAY	115	2.0	42	22	-	-	5.9	9.9	37	15	-	-	0.12	-
32.81	90.2	46.4	-	4.6	-1.4	5.2	3	silty CLAY to CLAY	115	1.5	60	31	-	-	6.3	9.9	38	15	-	-	0.12	-
32.97	99.3	69.0	192.3	4.6	-1.3	4.7	4	clayy SILT to silty CLAY	115	2.0	50	35	-	-	6.9	9.9	31	15	0.00	-	0.12	0.0
33.14	101.0	70.0	181.9	4.2	-1.3	4.2	4	clayy SILT to silty CLAY	115	2.0	51	35	-	-	7.1	9.9	29	15	0.00	-	0.12	0.0
33.30	103.7	71.7	169.7	3.7	-1.3	3.7	4	clayy SILT to silty CLAY	115	2.0	52	36	-	-	7.3	9.9	27	15	0.00	-	0.12	0.0
33.47	105.0	72.4	163.0	3.5	-1.3	3.4	4	clayy SILT to silty CLAY	115	2.0	52	36	-	-	7.3	9.9	26	15	0.00	-	0.12	0.0
33.63	105.2	72.4	158.9	3.4	-1.2	3.2	4	clayy SILT to silty CLAY	115	2.0	53	36	-	-	7.4	9.9	25	15	0.92	-	0.12	9.3
33.79	111.0	76.2	162.4	3.5	-1.1	3.2	5	silty SAND to sandy SILT	120	4.0	28	19	58	41	-	-	25	16	0.00	-	0.12	0.0
33.96	105.6	72.3	179.1	4.2	-1.1	4.0	4	clayy SILT to silty CLAY	115	2.0	53	36	-	-	7.4	9.9	28	15	0.00	-	0.12	0.0
34.12	94.9	47.0	-	5.5	-1.0	5.9	3	silty CLAY to CLAY	115	1.5	63	31	-	-	6.6	9.9	40	15	-	-	0.12	-
34.29	91.9	45.3	-	6.7	-0.6	7.4	3	silty CLAY to CLAY	115	1.5	61	30	-	-	6.4	9.9	45	15	-	-	0.12	-
34.45	91.8	45.1	-	7.4	-0.7	8.2	3	silty CLAY to CLAY	115	1.5	61	30	-	-	6.4	9.9	47	15	-	-	0.12	-
34.61	92.9	45.4	-	8.0	-0.5	8.8	3	silty CLAY to CLAY	115	1.5	62	30	-	-	6.5	9.9	48	15	-	-	0.12	-
34.78	93.6	45.5	-	8.1	-0.4	8.8	3	silty CLAY to CLAY	115	1.5	62	30	-	-	6.5	9.9	48	15	-	-	0.12	-
34.94	90.4	43.7	-	7.9	-0.5	9.0	3	silty CLAY to CLAY	115	1.5	60	29	-	-	6.3	9.9	49	15	-	-	0.12	-
35.11	91.2	43.9	-	7.8	-0.5	8.7	3	silty CLAY to CLAY	115	1.5	61	29	-	-	6.4	9.9	48	15	-	-	0.12	-
35.27	91.2	43.8	-	7.6	-0.5	8.5	3	silty CLAY to CLAY	115	1.5	61	29	-	-	6.4	9.9	48	15	-	-	0.12	-
35.43	91.2	43.5	-	7.3	-0.5	8.2	3	silty CLAY to CLAY	115	1.5	61	29	-	-	6.4	9.9	47	15	-	-	0.12	-
35.60	90.9	43.2	-	6.9	-0.6	7.8	3	silty CLAY to CLAY	115	1.5	61	29	-	-	6.3	9.9	46	15	-	-	0.12	-
35.76	89.1	42.1	-	6.5	-0.7	7.4	3	silty CLAY to CLAY	115	1.5	59	28	-	-	6.2	9.9	46	15	-	-	0.12	-
35.93	87.3	41.1	-	5.6	-0.6	6.6	3	silty CLAY to CLAY	115	1.5	58	27	-	-	6.1	9.9	44	15	-	-	0.12	-
36.09	82.4	38.6	-	4.2	-0.9	5.3	3	silty CLAY to CLAY	115	1.5	55	26	-	-	5.7	9.9	41	15	-	-	0.12	-
36.26	69.4	32.4	-	2.5	-1.9	3.8	4	clayy SILT to silty CLAY	115	2.0	35	16	-	-	4.8	9.9	39	15	-	-	0.12	-
36.42	55.4	36.7	89.8	1.0	-0.8	1.9	5	silty SAND to sandy SILT	120	4.0	14	9	34	37	-	-	28	16	2.55	-	0.12	51.2
36.58	48.2	31.8	79.9	0.7	-0.8	1.6	5	silty SAND to sandy SILT	120	4.0	12	8	29	36	-	-	28	16	2.81	-	0.12	51.2
36.75	44.2	20.4	-	0.8	-0.7	2.0	4	clayy SILT to silty CLAY	115	2.0	22	10	-	-	3.0	9.9	38	15	-	-	0.11	-
36.91	37.6	17.2	-	0.7	-0.8	2.0	4	clayy SILT to silty CLAY	115	2.0	19	9	-	-	2.6	9.9	42	15	-	-	0.11	-
37.08	33.1	15.1	-	0.7	-0.8	2.3	4	clayy SILT to silty CLAY	115	2.0	17	8	-	-	2.3	9.0	46	15	-	-	0.11	-
37.24	32.1	14.6	-	0.7	-0.7	2.5	4	clayy SILT to silty CLAY	115	2.0	16	7	-	-	2.2	8.7	48	15	-	-	0.11	-
37.40	28.2	12.7	-	0.8	-0.7	3.1	3	silty CLAY to CLAY	115	1.5	19	8	-	-	1.9	7.5	55	15	-	-	0.11	-
37.57	29.7	13.4	-	0.9	-0.8	3.2	3	silty CLAY to CLAY	115	1.5	20	9	-	-	2.0	7.9	54	15	-	-	0.11	-
37.73	28.5	12.8	-	0.8	-0.9	3.1	3	silty CLAY to CLAY	115	1.5	19	9	-	-	1.9	7.5	55	15	-	-	0.11	-
37.90	25.4	11.4	-	0.7	-0.9	3.1	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	6.6	58	15	-	-	0.11	-
38.06	30.1	13.4	-	0.6	-0.9	2.3	4	clayy SILT to silty CLAY	115	2.0	15	7	-	-	2.0	7.9	49	15	-	-	0.11	-
38.22	36.6	16.2	-	1.0	-0.9	3.0	3	silty CLAY to CLAY	115	1.5	24	11	-	-	2.5	9.8	49	15	-	-	0.11	-
38.39	46.0	20.3	-	1.5	-1.0	3.5	3	silty CLAY to CLAY	115	1.5	31	14	-	-	3.2	9.9	46	15	-	-	0.11	-
38.55	50.0	22.0	-	1.7	-1.4	3.6	4	clayy SILT to silty CLAY	115	2.0	25	11	-	-	3.5	9.9	45	15	-	-	0.11	-
38.72	48.2	21.1	-	1.4	-1.1	3.2	4	clayy SILT to silty CLAY	115	2.0	24	11	-	-	3.3	9.9	44	15	-	-	0.11	-
38.88	48.4	21.1	-	1.5	-1.1	3.2	4	clayy SILT to silty CLAY	115	2.0	24	11	-	-	3.3	9.9	44	15	-	-	0.11	-
39.04	51.5	22.4	-	1.7	-1.2	3.4	4	clayy SILT to silty CLAY	115	2.0	26	11	-	-	3.6	9.9	44	15	-	-	0.11	-
39.21	54.1	23.4	-	2.1	-1.6	4.1	3	silty CLAY to CLAY	115	1.5	36	16	-	-	3.7	9.9	46	15	-	-	0.11	-
39.37	56.3	24.2	-	2.8	-1.2	5.3	3	silty CLAY to CLAY	115	1.5	38	16	-	-	3.9	9.9	50	15	-	-	0.11	-
39.54	66.9	28.7	-	4.0	-1.3	6.2	3	silty CLAY to CLAY	115	1.5	45	19	-	-	4.6	9.9	49	15	-	-	0.11	-
39.70	74.5	31.8	-	4.8	-1.1	6.6	3	silty CLAY to CLAY	115	1.5	50	21	-	-	5.2	9.9	49	15	-	-	0.11	-
39.86	71.7	30.5	-	5.2	-0.7	7.5	3	silty CLAY to CLAY	115	1.5	48	20	-	-	5.0	9.9	52	15	-	-	0.11	-
40.03	70.9	30.1	-	5.4	-0.7	7.9	3	silty CLAY to CLAY	115	1.5	47	20	-	-	4.9	9.9	53	15	-	-	0.11	-
40.19	74.3	31.4	-	5.9	-0.4	8.2	3	silty CLAY to CLAY	115	1.5	50	21	-	-	5.2	9.9	53	15	-	-	0.11	-
40.36	77.1	32.4	-	6.2	-0.6	8.3	3	silty CLAY to CLAY	115	1.5	51	22	-	-	5.4	9.9	53	15	-	-	0.11	-
40.52	76.4	32.0	-	6.3	-0.5	8.5	3	silty CLAY to CLAY	115	1.5	51	21	-	-	5.3	9.9	53	15	-	-	0.11	-
40.68	74.8	31.2	-	6.3	-0.3	8.8	3	silty CLAY to CLAY	115	1.5	50	21	-	-	5.2	9.9	54	15	-	-	0.11	-
40.85	74.2	30.8	-	6.4	-0.3	8.9	3	silty CLAY to CLAY	115	1.5	49	21	-	-	5.2	9.9	55	15	-	-	0.11	-
41.01	75.2	31.1	-	6.4	-0.2	8.7	3	silty CLAY to CLAY	115	1.5	50	21	-	-	5.2	9.9	54	15	-	-	0.11	-
41.18	77.4	31.9	-	6.5	-0.3	8.7	3	silty CLAY to CLAY	115	1.5	52	21	-	-	5.4	9.9	54	15	-	-	0.11	-
41.34	80.8	33.2	-	6.8	-0.2	8.7	3	silty CLAY to CLAY	115	1.5	54	22	-	-	5.6	9.9	53	15	-	-	0.11	-
41.50	80.1	32.8	-	6.9	-0.2	8.9	3	silty CLAY to CLAY	115	1.5	53	22	-	-	5.6	9.9	54	15	-	-	0.11	-
41.67	79.8	32.5	-	6.8	0.1	8.8	3	silty CLAY to CLAY	115	1.5	53	22	-	-	5.6	9.9	54	15	-	-	0.11	-
41.83	77.7	31.5	-	6.7	0.2	8.8	3	silty CLAY to CLAY	115	1.5	52	21	-	-	5.4	9.9	54	15	-	-	0.11	-
42.00	76.3	30.8	-	6.6	0.1	9.0	3	silty CLAY to CLAY	115	1.5	51	21	-	-	5.3	9.9	55	15	-	-	0.11	-
42.16	75.4	30.4	-	6.6	0.3	9.1	3	silty CLAY to CLAY	115	1.5	50	20	-	-	5.2	9.9	56	15	-	-	0.11	-
42.32	73.0	29.3	-	6.5	0.3	9.1	3	silty CLAY to CLAY	115	1.5	49	20	-	-	5.1	9.9	57	15	-	-	0.11	-
42.49	72.7	29.1	-	6.2	0.4	8.8	3	silty CLAY to CLAY	115	1.5	48	19	-	-	5.0	9.9	56	15	-	-	0.11	-
42.65	73.6	29.3	-	6.0	0.5	8.5	3	silty CLAY to CLAY	115	1.5	49	20	-	-	5.1	9.9	55	15	-	-	0.11	-
42.82	73.1	29.0	-	6.0	0.7	8.5	3	silty CLAY to CLAY	115	1.5	49	19	-	-	5.1	9.9	55	15	-	-	0.11	-
42.98	73.2	29.0	-	5.9	0.5	8.3	3	silty CLAY to CLAY	115	1.5	49	19	-	-	5.1	9.9	55	15	-	-	0.11	-
43.15	70.6	27.8	-	5.7	0.6	8.4	3	silty CLAY to CLAY	115	1.5	47	19	-	-	4.9	9.9	56	15	-	-	0.11	-
43.31	67.5	26.5	-	5.7	0.7	8.7	3	silty CLAY to CLAY	115	1.5	45	18	-	-	4.7	9.9	58	15	-	-	0.11	-
43.47	65.8	25.7	-	5.5	0.8	8.6	3	silty CLAY to CLAY	115	1.5	44	17	-	-	4.6	9.9	58	15	-	-	0.11	-
43.64	64.3	25.0	-	5.1	0.9	8.3	3	silty CLAY to CLAY	115	1.5	43	17	-	-	4.4	9.9	58	15	-	-	0.11	-
43.80	62.6	24.3	-	5.2	1.0	8.7	3	silty CLAY to CLAY	115	1.5	42	16	-	-	4.3	9.9	59	15	-	-	0.11	-
43.97	63.1	24.4	-	5.2	0.9	8.6	3	silty CLAY to CLAY	115	1.5	42	16	-	-	4.4	9.9	59	15	-	-	0.11	-
44.13	65.6	25.3	-	5.3	0.9	8.5	3	silty CLAY to CLAY	115	1.5	44	17	-	-	4.5	9.9	58	15	-	-	0.11	-
44.29	68.2	26.2	-	5.5	0.9	8.4	3	silty CLAY to CLAY	115	1.5	45	17	-	-	4.7	9.9	57	15	-	-	0.11	-
44.46	68.8	26.3	-	5.7	1.0	8.6	3	silty CLAY to CLAY	115	1.5	46	18	-	-	4.8	9.9	57	15	-	-	0.11	-
44.62	71.8	27.4	-	5.6	1.0	8.1	3	silty CLAY to CLAY	115	1.5	48	18	-	-	5.0	9.9	55	15	-	-	0.11	-
44.79	73.7	28.0	-	5.6	1.1	7.9	3	silty CLAY to CLAY	115	1.5	49	19	-	-	5.1	9.9	55	15	-	-	0.11	-
44.95	80.8	30.6	-	5.6	1.3	7.1	3	silty CLAY to CLAY	115	1.5	54	20	-	-	5.6	9.9	51	15	-	-	0.11	-
45.11	80.1	30.2	-	5.8	1.3	7.4	3	silty CLAY to CLAY	115	1.5	53	20	-	-	5.6	9.9	52	15	-	-	0.11	-
45.28	67.4	25.4	-	5.8	1.4	9.0	3	silty CLAY to CLAY	115	1.5	45	17	-	-	4.7	9.9	59	15	-	-	0.11	-
45.44	68.8	26.0	-	5.2	1.3	7.8	3	silty CLAY to CLAY	115	1.5	46	17	-	-	4.8	9.9	56	15	-	-	0.11	-
45.61	63.8	24.1	-	4.9	1.4	8.0	3	silty CLAY to CLAY	115	1.5	43	16	-	-	4.4	9.9	58	15	-	-	0.11	-
45.77	58.8	22.2	-	4.7	1.0	8.4	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.1	9.9	61	15	-	-	0.11	-
45.93	60.0	22.6	-	4.8	1.2	8.3	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.1	9.9	60	15	-	-	0.11	-
46.10	60.2	22.7	-	4.8	1.2	8.4	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.2	9.9	60	15	-	-	0.11	-
46.26	60.8	22.9	-	4.6	1.2	8.0	3	silty CLAY to CLAY	115	1.5	41	15	-	-	4.2	9.9	59	15	-	-	0.11	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic -	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
46.43	58.2	22.0	-	3.9	1.2	7.0	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	9.9	57	15	-	-	0.11	-
46.59	50.4	19.0	-	2.8	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	9.9	57	15	-	-	0.11	-
46.75	44.1	16.7	-	2.6	-1.4	6.4	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	9.9	62	15	-	-	0.11	-
46.92	52.4	19.8	-	2.9	-1.3	5.8	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	56	15	-	-	0.11	-
47.08	53.7	20.3	-	3.2	-0.9	6.3	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	57	15	-	-	0.11	-
47.25	47.7	18.0	-	3.7	-1.5	8.2	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	65	15	-	-	0.11	-
47.41	53.3	20.1	-	4.2	-1.2	8.3	3	silty CLAY to CLAY	115	1.5	36	13	-	-	3.7	9.9	63	15	-	-	0.11	-
47.57	53.2	20.1	-	4.3	-1.1	8.4	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.7	9.9	63	15	-	-	0.11	-
47.74	57.9	21.9	-	4.2	-1.1	7.6	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	9.9	59	15	-	-	0.11	-
47.90	57.3	21.6	-	4.2	-1.1	7.7	3	silty CLAY to CLAY	115	1.5	38	14	-	-	3.9	9.9	60	15	-	-	0.11	-
48.07	52.9	20.0	-	4.2	-1.1	8.4	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	63	15	-	-	0.11	-
48.23	52.1	19.7	-	4.1	-1.0	8.3	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	63	15	-	-	0.11	-
48.39	52.8	19.9	-	4.1	-1.0	8.3	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	63	15	-	-	0.11	-
48.56	54.3	20.5	-	4.2	-0.8	8.1	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	62	15	-	-	0.11	-
48.72	53.8	20.3	-	4.2	-0.7	8.2	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	62	15	-	-	0.11	-
48.89	54.4	20.5	-	4.1	-0.7	8.0	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	62	15	-	-	0.11	-
49.05	54.6	20.6	-	4.1	-0.7	7.9	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.8	9.9	61	15	-	-	0.11	-
49.22	56.8	21.4	-	4.1	-0.6	7.6	3	silty CLAY to CLAY	115	1.5	38	14	-	-	3.9	9.9	59	15	-	-	0.11	-
49.38	55.6	21.0	-	4.2	-0.6	7.9	3	silty CLAY to CLAY	115	1.5	37	14	-	-	3.8	9.9	61	15	-	-	0.11	-
49.54	52.8	19.9	-	4.1	-0.6	8.3	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.9	63	15	-	-	0.11	-
49.71	50.8	19.2	-	3.8	-0.2	8.0	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	9.9	63	15	-	-	0.11	-
49.87	47.6	18.0	-	3.5	-0.2	7.7	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	64	15	-	-	0.11	-
50.04	48.2	18.2	-	3.1	-0.2	6.9	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	61	15	-	-	0.11	-
50.20	47.6	18.0	-	3.0	-0.2	6.7	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	61	15	-	-	0.11	-
50.36	50.8	19.2	-	2.9	-0.2	6.1	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	9.9	58	15	-	-	0.11	-
50.53	45.2	17.1	-	2.1	-0.2	4.9	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.4	56	15	-	-	0.11	-
50.69	23.8	9.0	-	1.1	-0.6	5.3	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.6	75	15	-	-	0.11	-
50.86	15.1	5.7	-	0.8	-0.9	6.2	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.7	95	15	-	-	0.11	-
51.02	20.1	7.6	-	1.7	-1.0	9.9	2	Organic SOILS - Peats	100	1.0	20	8	-	-	2.0	3.8	95	10	-	-	0.11	-
51.18	43.0	16.2	-	2.6	-0.5	6.5	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	8.8	63	15	-	-	0.11	-
51.35	55.4	20.9	-	3.0	-0.5	5.7	3	silty CLAY to CLAY	115	1.5	37	14	-	-	3.8	9.9	54	15	-	-	0.11	-
51.51	50.7	19.1	-	3.2	-0.6	6.8	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	9.9	60	15	-	-	0.11	-
51.68	53.6	20.2	-	3.0	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	36	13	-	-	3.7	9.9	56	15	-	-	0.11	-
51.84	47.8	18.0	-	2.7	-0.5	6.1	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.7	59	15	-	-	0.11	-
52.00	45.4	17.1	-	2.5	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.2	60	15	-	-	0.11	-
52.17	46.4	17.5	-	2.5	-0.5	5.7	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.4	59	15	-	-	0.11	-
52.33	45.2	17.1	-	2.4	-0.4	5.7	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.1	59	15	-	-	0.11	-
52.50	41.4	15.6	-	2.3	-0.4	6.1	3	silty CLAY to CLAY	115	1.5	28	10	-	-	2.8	8.2	62	15	-	-	0.11	-
52.66	39.5	14.9	-	2.1	-0.4	5.8	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.7	7.8	63	15	-	-	0.11	-
52.82	40.4	15.3	-	2.0	-0.5	5.5	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	8.0	61	15	-	-	0.11	-
52.99	45.2	17.1	-	2.1	-0.5	4.9	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.0	56	15	-	-	0.11	-
53.15	40.6	15.3	-	2.1	-0.5	5.6	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.8	8.0	61	15	-	-	0.11	-
53.32	35.2	13.3	-	2.0	-0.4	6.3	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	6.8	67	15	-	-	0.11	-
53.48	34.6	13.0	-	1.8	-0.4	5.7	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	6.6	66	15	-	-	0.11	-
53.64	32.1	12.1	-	1.6	-0.4	5.5	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.2	6.1	67	15	-	-	0.11	-
53.81	28.9	10.9	-	1.3	-0.4	5.2	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.4	69	15	-	-	0.11	-
53.97	29.9	11.3	-	1.2	-0.4	4.6	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	5.6	66	15	-	-	0.11	-
54.14	30.7	11.6	-	1.2	-0.4	4.3	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.1	5.8	63	15	-	-	0.11	-
54.30	26.1	9.8	-	1.1	-0.4	5.0	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.8	71	15	-	-	0.11	-
54.46	24.4	9.2	-	1.1	-0.4	5.0	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.4	73	15	-	-	0.11	-
54.63	30.2	11.4	-	1.2	-0.4	4.3	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	5.6	64	15	-	-	0.11	-
54.79	28.3	10.7	-	1.2	-0.4	4.8	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.2	68	15	-	-	0.11	-
54.96	27.7	10.5	-	1.0	-0.3	4.2	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.1	66	15	-	-	0.11	-
55.12	25.0	9.4	-	0.9	-0.4	3.9	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	4.5	68	15	-	-	0.11	-
55.28	24.2	9.1	-	0.8	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.3	69	15	-	-	0.11	-
55.45	26.7	10.1	-	0.9	-0.3	3.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	4.8	65	15	-	-	0.11	-
55.61	26.2	9.9	-	0.9	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	4.7	67	15	-	-	0.11	-
55.78	22.9	8.6	-	0.9	-0.3	4.8	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	4.0	75	15	-	-	0.11	-
55.94	20.7	7.8	-	0.9	-0.3	5.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.5	79	15	-	-	0.11	-
56.11	20.2	7.6	-	0.7	-0.3	4.4	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.4	77	15	-	-	0.11	-
56.27	20.9	7.9	-	0.7	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.6	74	15	-	-	0.11	-
56.43	20.8	7.9	-	0.7	-0.3	3.9	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.5	74	15	-	-	0.11	-
56.60	21.3	8.0	-	0.7	-0.3	3.8	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.6	73	15	-	-	0.11	-
56.76	19.8	7.5	-	0.7	-0.3	4.4	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.3	3.3	78	15	-	-	0.11	-
56.93	17.8	6.7	-	0.7	-0.3	4.5	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.9	82	15	-	-	0.11	-
57.09	16.8	6.3	-	0.6	-0.3	4.5	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.7	84	15	-	-	0.11	-
57.25	15.9	6.0	-	0.5	-0.3	4.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.5	85	15	-	-	0.11	-
57.42	16.9	6.4	-	0.5	-0.3	3.8	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.7	81	15	-	-	0.11	-
57.58	17.7	6.7	-	0.6	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.8	80	15	-	-	0.11	-
57.75	19.2	7.3	-	0.6	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.1	77	15	-	-	0.11	-
57.91	18.9	7.1	-	0.7	-0.3	4.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.0	79	15	-	-	0.11	-
58.07	18.0	6.8	-	0.7	-0.3	4.6	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.9	82	15	-	-	0.11	-
58.24	16.8	6.4	-	0.6	-0.3	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.6	84	15	-	-	0.11	-
58.40	16.1	6.1	-	0.6	-0.2	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.5	86	15	-	-	0.11	-
58.57	16.2	6.1	-	0.6	-0.2	4.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.5	85	15	-	-	0.11	-
58.73	17.2	6.5	-	0.6	-0.2	4.2	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.7	82	15	-	-	0.11	-
58.89	18.5	7.0	-	0.6	-0.2	3.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.9	78	15	-	-	0.11	-
59.06	18.8	7.1	-	0.5	-0.2	3.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	3.0	75	15	-	-	0.11	-
59.22	18.4	6.9	-	0.6	-0.2	3.7	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.9	77	15	-	-	0.11	-
59.39	18.0	6.8	-	0.6	-0.2	3.9	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.1	2.8	79	15	-	-	0.11	-
59.55	16.7	6.3	-	0.6	-0.2	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.5	85	15	-	-	0.11	-
59.71	16.9	6.4	-	0.6	-0.2	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.6	84	15	-	-	0.11	-
59.88	17.4	6.6	-	0.6	-0.2	4.6	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.6	84	15	-	-	0.11	-
60.04	16.8	6.3	-	0.6	-0.2	4.9	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.5	87	15	-	-	0.11	-
60.21	15.9	6.0	-	0.5	-0.2	4.4	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.3	87	15	-	-	0.11	-
60.37	16.3	6.2	-	0.5	-0.1	3.6	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.4	82	15	-	-	0.11	-
60.53	16.1	6.1	-	0.5	-0.1	3.7	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.4	83	15	-	-	0.11	-
60.70	15.7	5.9	-	0.5	-0.1	3.8	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.3	84	15	-	-	0.11	-
60.86	15.3	5.8	-	0.4	-0.1	3.8	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.2	85	15	-	-	0.11	-
61.03	15.7	5.9	-	0.5	-0.1	3.8	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.3	84	15	-	-	0.11	-
61.19	16.6	6.3	-	0.5	-0.1	3.6	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.4	81	15	-	-	0.11	-
61.35	16.4	6.2	-	0.5	-0.1	3.9	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.4	83	15	-	-	0.11	-
61.52	17.8	6.7	-	0.7	-0.1	5.0	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.6	85	15	-	-	0.11	-
61.68	21.2	8.0	-	0.7	-0.1	4.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.3	75	15	-	-	0.11	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic -	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
61.85	20.3	7.7	-	0.7	-0.1	4.2	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.1	76	15	-	-	0.11	-
62.01	24.4	9.2	-	0.9	-0.1	4.5	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	3.8	72	15	-	-	0.11	-
62.17	31.1	11.7	-	0.9	-0.2	3.3	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	5.1	59	15	-	-	0.11	-
62.34	19.1	7.2	-	0.7	-0.2	4.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	2.8	79	15	-	-	0.11	-
62.50	15.6	5.9	-	0.5	-0.1	3.9	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	2.2	85	15	-	-	0.11	-
62.67	15.8	6.0	-	0.4	-0.1	3.0	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.2	80	15	-	-	0.11	-
62.83	15.2	5.7	-	0.4	-0.1	3.9	3	silty CLAY to CLAY	115	1.5	10	4	-	-	0.9	2.1	86	15	-	-	0.11	-
63.00	16.8	6.3	-	0.7	-0.1	5.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.4	88	15	-	-	0.11	-
63.16	25.7	9.7	-	0.9	-0.1	4.1	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	4.0	69	15	-	-	0.11	-
63.32	33.4	12.6	-	1.4	-0.1	4.7	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	5.4	63	15	-	-	0.11	-
63.49	33.8	12.7	-	1.5	-0.2	4.9	3	silty CLAY to CLAY	115	1.5	23	8	-	-	2.3	5.4	64	15	-	-	0.11	-
63.65	49.5	18.7	-	1.5	-0.7	3.2	3	silty CLAY to CLAY	115	1.5	33	12	-	-	3.4	8.3	47	15	-	-	0.11	-
63.82	30.1	11.4	-	1.3	-2.7	4.8	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.8	67	15	-	-	0.11	-
63.98	39.3	14.8	-	1.3	-2.6	3.6	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	6.4	54	15	-	-	0.11	-
64.14	77.5	39.5	92.8	1.4	-3.0	1.8	5	silty SAND to sandy SILT	120	4.0	19	10	36	36	-	-	27	16	2.48	-	0.11	51.2
64.31	89.6	45.6	77.9	0.9	-3.9	1.1	5	silty SAND to sandy SILT	120	4.0	22	11	41	36	-	-	20	16	2.87	-	0.11	49.3
64.47	79.1	40.3	71.5	0.7	-4.6	1.0	5	silty SAND to sandy SILT	120	4.0	20	10	37	36	-	-	20	16	3.08	-	0.10	51.2
64.64	60.3	22.7	-	1.3	-4.6	2.3	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.1	9.9	39	15	-	-	0.10	-
64.80	43.2	16.3	-	1.6	-4.6	3.9	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	7.0	54	15	-	-	0.10	-
64.96	37.9	14.3	-	1.4	-4.5	4.1	3	silty CLAY to CLAY	115	1.5	25	10	-	-	2.6	6.0	58	15	-	-	0.10	-
65.13	63.6	32.3	84.5	1.0	-4.6	1.8	5	silty SAND to sandy SILT	120	4.0	16	8	30	34	-	-	29	16	2.68	-	0.10	51.2
65.29	68.3	34.7	83.0	1.0	-4.8	1.6	5	silty SAND to sandy SILT	120	4.0	17	9	32	35	-	-	27	16	2.72	-	0.09	51.2
65.46	49.8	18.8	-	1.3	-4.6	2.8	4	clayy SILT to silty CLAY	115	2.0	25	9	-	-	3.4	8.1	45	15	-	-	0.09	-
65.62	29.9	11.3	-	1.5	-4.6	5.8	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.6	71	15	-	-	0.09	-
65.78	37.9	14.3	-	1.3	-4.5	3.7	3	silty CLAY to CLAY	115	1.5	25	10	-	-	2.5	5.9	56	15	-	-	0.09	-
65.95	63.9	32.4	85.4	1.1	-4.6	1.8	5	silty SAND to sandy SILT	120	4.0	16	8	30	34	-	-	29	16	2.66	-	0.09	51.2
66.11	71.1	36.0	83.0	1.0	-4.6	1.6	5	silty SAND to sandy SILT	120	4.0	18	9	33	35	-	-	26	16	2.72	-	0.08	51.2
66.28	52.7	19.9	-	1.3	-4.5	2.7	4	clayy SILT to silty CLAY	115	2.0	26	10	-	-	3.6	8.5	43	15	-	-	0.08	-
66.44	28.8	10.9	-	1.0	-4.4	4.2	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	4.3	66	15	-	-	0.08	-
66.60	25.9	9.8	-	1.4	-4.4	6.3	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	3.8	77	15	-	-	0.08	-
66.77	23.0	8.7	-	1.1	-4.4	6.0	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	3.3	80	15	-	-	0.08	-
66.93	28.9	10.9	-	0.9	-4.3	3.7	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	4.3	63	15	-	-	0.08	-
67.10	18.3	6.9	-	0.8	-4.3	5.8	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.5	88	15	-	-	0.08	-
67.26	15.9	6.0	-	0.5	-4.3	3.7	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.1	84	15	-	-	0.08	-
67.42	17.3	6.5	-	0.4	-4.3	3.3	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.3	78	15	-	-	0.08	-
67.59	18.5	7.0	-	0.5	-4.3	3.5	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	2.5	77	15	-	-	0.08	-
67.75	21.9	8.3	-	0.8	-4.3	4.7	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.0	77	15	-	-	0.08	-
67.92	34.1	12.8	-	1.2	-4.3	3.9	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	5.1	60	15	-	-	0.08	-
68.08	30.8	11.6	-	1.3	-4.3	4.7	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.0	4.5	66	15	-	-	0.08	-
68.24	21.3	8.0	-	1.2	-4.3	7.0	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	2.9	86	15	-	-	0.08	-
68.41	25.4	9.6	-	1.1	-4.2	5.1	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	3.6	74	15	-	-	0.08	-
68.57	24.8	9.4	-	0.9	-4.3	4.4	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.6	3.5	71	15	-	-	0.08	-
68.74	16.3	6.2	-	0.9	-4.2	7.1	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.1	95	15	-	-	0.08	-
68.90	17.2	6.5	-	0.7	-4.2	5.3	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.1	2.2	89	15	-	-	0.08	-
69.07	19.0	7.2	-	0.5	-4.2	3.3	3	silty CLAY to CLAY	115	1.5	13	5	-	-	1.2	2.5	75	15	-	-	0.08	-
69.23	17.4	6.5	-	0.4	-4.2	2.9	3	silty CLAY to CLAY	115	1.5	12	4	-	-	1.1	2.2	76	15	-	-	0.08	-
69.39	15.8	6.0	-	0.3	-4.2	2.8	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.0	79	15	-	-	0.08	-
69.56	15.6	5.9	-	0.4	-4.2	3.3	3	silty CLAY to CLAY	115	1.5	10	4	-	-	1.0	1.9	83	15	-	-	0.08	-
69.72	16.6	6.3	-	0.4	-4.2	3.1	3	silty CLAY to CLAY	115	1.5	11	4	-	-	1.0	2.1	79	15	-	-	0.08	-
69.89	20.6	7.8	-	0.8	-4.2	4.6	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	2.7	79	15	-	-	0.08	-
70.05	22.0	8.3	-	1.0	-4.1	5.7	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.4	3.0	81	15	-	-	0.08	-
70.21	30.0	11.3	-	1.5	-4.1	5.7	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.3	71	15	-	-	0.08	-
70.38	38.7	14.6	-	1.7	-4.2	4.9	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	5.7	61	15	-	-	0.08	-
70.54	59.6	22.5	-	2.4	-4.2	4.3	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.1	9.1	48	15	-	-	0.08	-
70.71	48.8	18.4	-	1.8	-4.1	4.1	3	silty CLAY to CLAY	115	1.5	33	12	-	-	3.3	7.3	52	15	-	-	0.08	-
70.87	30.1	11.4	-	1.8	-4.1	7.0	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	4.2	75	15	-	-	0.08	-
71.03	42.4	16.0	-	2.0	-4.1	5.2	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	6.2	60	15	-	-	0.08	-
71.20	48.6	18.3	-	2.3	-4.1	5.2	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	7.2	56	15	-	-	0.08	-
71.36	80.8	30.5	-	2.6	-4.1	3.4	4	clayy SILT to silty CLAY	115	2.0	40	15	-	-	5.6	9.9	39	15	-	-	0.08	-
71.53	94.7	35.7	-	3.1	-4.2	3.4	4	clayy SILT to silty CLAY	115	2.0	47	18	-	-	6.5	9.9	36	15	-	-	0.08	-
71.69	67.4	25.4	-	3.0	-4.2	4.8	3	silty CLAY to CLAY	115	1.5	45	17	-	-	4.6	9.9	47	15	-	-	0.08	-
71.85	83.5	31.5	-	3.0	-4.1	3.7	4	clayy SILT to silty CLAY	115	2.0	42	16	-	-	5.8	9.9	39	15	-	-	0.08	-
72.02	72.3	27.3	-	2.4	-4.3	3.5	4	clayy SILT to silty CLAY	115	2.0	36	14	-	-	5.0	9.9	41	15	-	-	0.08	-
72.18	37.1	14.0	-	1.4	-5.0	4.2	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	5.3	59	15	-	-	0.08	-
72.35	38.3	14.4	-	1.3	-4.9	3.8	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	5.5	56	15	-	-	0.08	-
72.51	84.3	41.7	103.4	1.8	-5.2	2.2	5	silty SAND to sandy SILT	120	4.0	21	10	38	35	-	-	28	16	2.27	-	0.08	51.2
72.67	78.6	29.7	-	2.4	-5.6	3.2	4	clayy SILT to silty CLAY	115	2.0	39	15	-	-	5.4	9.9	38	15	-	-	0.08	-
72.84	58.1	21.9	-	3.3	-5.6	6.2	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	8.6	55	15	-	-	0.08	-
73.00	47.1	17.8	-	2.6	-5.6	6.1	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	6.8	60	15	-	-	0.08	-
73.17	41.0	15.5	-	2.7	-5.6	7.4	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	5.8	67	15	-	-	0.08	-
73.33	59.2	22.3	-	2.0	-5.6	3.6	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	8.7	46	15	-	-	0.08	-
73.49	80.5	39.7	111.3	2.0	-5.7	2.6	4	clayy SILT to silty CLAY	115	2.0	40	20	-	-	5.5	9.9	31	15	2.14	-	0.08	51.2
73.66	69.1	26.1	-	1.7	-6.5	2.6	4	clayy SILT to silty CLAY	115	2.0	35	13	-	-	4.7	9.9	38	15	-	-	0.07	-
73.82	44.4	16.7	-	2.0	-6.5	4.9	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.0	6.3	57	15	-	-	0.07	-
73.99	43.4	16.4	-	1.9	-6.5	4.9	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	6.1	58	15	-	-	0.07	-
74.15	67.2	25.3	-	2.2	-6.6	3.4	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.6	9.8	42	15	-	-	0.07	-
74.31	49.9	18.8	-	2.0	-6.9	4.3	3	silty CLAY to CLAY	115	1.5	33	13	-	-	3.4	7.1	52	15	-	-	0.07	-
74.48	64.0	24.1	-	1.6	-6.9	2.6	4	clayy SILT to silty CLAY	115	2.0	32	12	-	-	4.4	9.3	39	15	-	-	0.07	-
74.64	71.6	35.2	94.0	1.4	-7.3	2.0	5	silty SAND to sandy SILT	120	4.0	18	9	33	34	-	-	30	16	2.46	-	0.07	51.2
74.81	54.4	20.5	-	1.4	-7.8	2.8	4	clayy SILT to silty CLAY	115	2.0	27	10	-	-	3.7	7.8	43	15	-	-	0.07	-
74.97	34.2	12.9	-	1.7	-7.7	5.6	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	4.6	67	15	-	-	0.07	-
75.13	29.5	11.1	-	1.2	-7.7	5.0	3	silty CLAY to CLAY	115	1.5	20	7	-	-	1.9	3.9	69	15	-	-	0.07	-
75.30	23.4	8.8	-	1.3	-7.6	6.8	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.5	2.9	83	15	-	-	0.07	-
75.46	38.7	14.6	-	1.4	-7.7	4.1	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	5.3	57	15	-	-	0.07	-
75.63	33.4	12.6	-	1.5	-7.6	5.0	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	4.5	65	15	-	-	0.07	-
75.79	31.4	11.8	-	1.6	-7.6	6.0	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	4.1	71	15	-	-	0.07	-
75.96	34.6	13.0	-	1.9	-7.7	6.4	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	4.6	69	15	-	-	0.07	-
76.12	39.4	14.9	-	1.5	-7.7	4.3	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.6	5.3	58	15	-	-	0.07	-
76.28	37.1	14.0	-	1.4	-7.7	4.3	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	5.0	60	15	-	-	0.07	-
76.45	41.4	15.6	-	1.7	-7.6	4.5	3	silty CLAY to CLAY	115	1.5	28	10	-	-	2.8	5.6	57	15	-	-	0.07	-
76.61	48.9	18.5	-	2.0	-7.6	4.4	3	silty CLAY to CLAY	115	1.5	33	12	-	-	3.3	6.8	53	15	-	-	0.07	-
76.78	52.6	19.9	-	2.1	-7.6	4.3	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	7.3	51	15	-	-	0.07	-
76.94	51.4	19.4	-	1.8	-7.6	3.9	3	silty CLAY to CLAY	115	1.5	34	13	-	-	3.5	7.1	50	15	-	-	0.07	-
77.10	44.9	16.9	-	1.8	-7.6	4.5	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.0	6.1	55	15	-	-	0.07	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(528)-60-5.cpt
CPT Date: 9/27/2011 7:32:50 AM
GW During Test: 0.5 ft

Sounding ID: CPT-11-115
Project No: 11-135
Cone/Rig: DSG1104

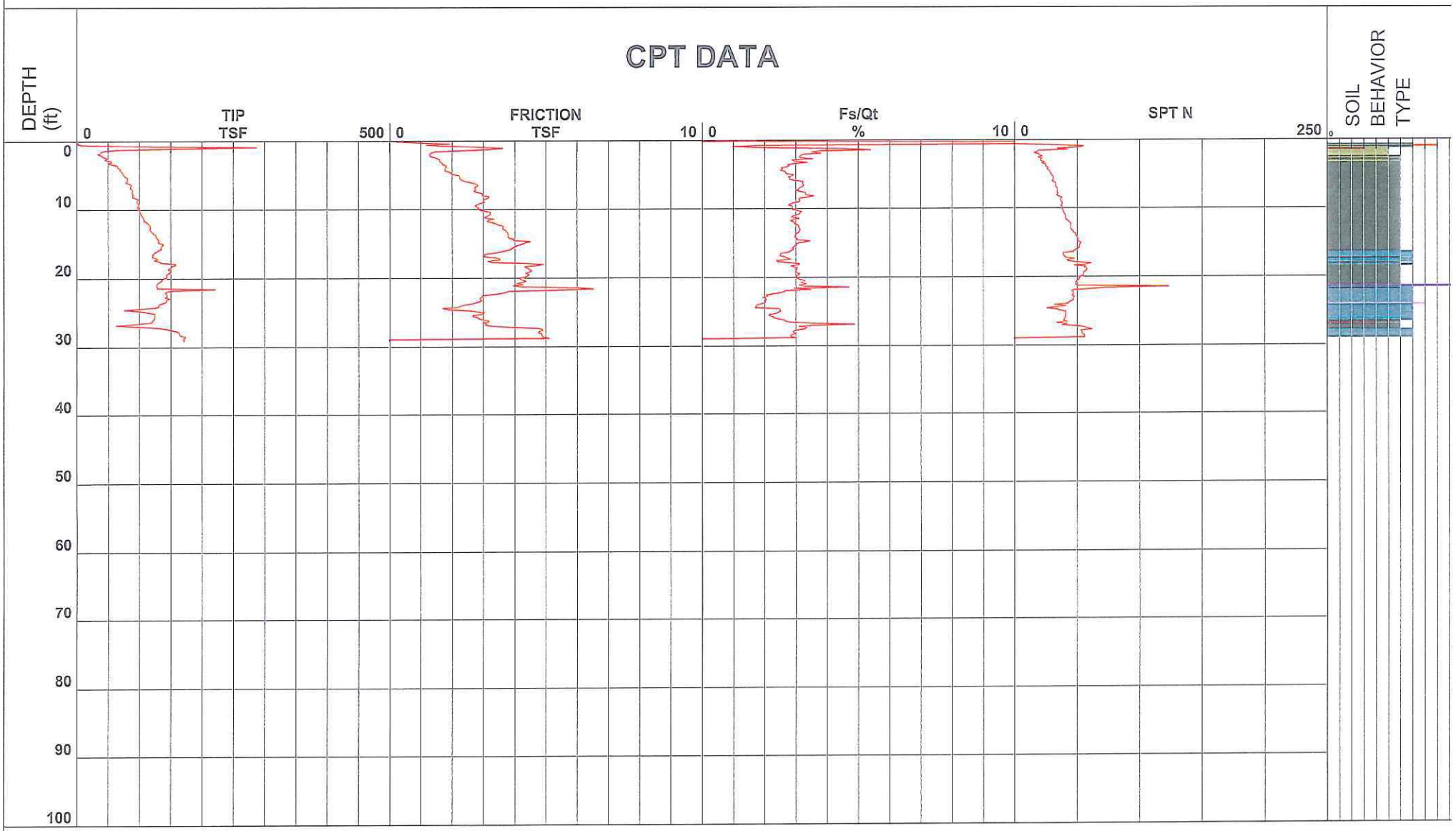
Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.36	Cycl SStn %
77.27	53.5	20.2	-	1.7	-7.6	3.6	3	silty CLAY to CLAY	115	1.5	36	13	-	-	3.6	7.4	48	15	-	-	0.07	-
77.43	65.8	24.8	-	1.7	-7.6	2.8	4	clayy SILT to silty CLAY	115	2.0	33	12	-	-	4.5	9.2	40	15	-	-	0.07	-
77.60	73.0	27.6	-	2.1	-7.6	3.0	4	clayy SILT to silty CLAY	115	2.0	37	14	-	-	5.0	9.9	39	15	-	-	0.07	-
77.76	93.0	45.2	121.7	2.5	-7.6	2.8	4	clayy SILT to silty CLAY	115	2.0	47	23	-	-	6.4	9.9	30	15	1.94	-	0.07	49.8
77.92	102.5	49.8	131.6	3.0	-7.5	3.1	4	clayy SILT to silty CLAY	115	2.0	51	25	-	-	7.1	9.9	30	15	1.56	-	0.07	42.8
78.09	105.9	51.4	135.2	3.2	-7.5	3.1	4	clayy SILT to silty CLAY	115	2.0	53	26	-	-	7.3	9.9	29	15	1.38	-	0.06	36.2
78.25	112.2	54.5	135.6	3.3	-7.5	3.0	4	clayy SILT to silty CLAY	115	2.0	56	27	-	-	7.8	9.9	28	15	1.39	-	0.06	31.1
78.42	115.9	56.3	136.9	3.3	-7.5	3.0	4	clayy SILT to silty CLAY	115	2.0	58	28	-	-	8.0	9.9	28	15	1.33	-	0.06	26.3
78.58	116.9	56.7	140.7	3.5	-7.5	3.1	4	clayy SILT to silty CLAY	115	2.0	58	28	-	-	8.1	9.9	28	15	1.14	-	0.06	20.2
78.74	119.5	57.9	143.8	3.7	-7.4	3.2	4	clayy SILT to silty CLAY	115	2.0	60	29	-	-	8.3	9.9	28	15	1.00	-	0.05	14.3
78.91	122.9	59.6	147.0	3.9	-7.4	3.3	4	clayy SILT to silty CLAY	115	2.0	61	30	-	-	8.5	9.9	28	15	0.85	-	0.05	8.1
79.07	125.5	60.7	149.2	4.0	-7.4	3.3	4	clayy SILT to silty CLAY	115	2.0	63	30	-	-	8.7	9.9	28	15	0.76	-	0.05	6.1
79.24	129.3	62.6	150.5	4.1	-7.4	3.3	4	clayy SILT to silty CLAY	115	2.0	65	31	-	-	9.0	9.9	27	15	0.72	-	0.05	5.5
79.40	133.7	64.7	160.2	4.6	-7.4	3.6	4	clayy SILT to silty CLAY	115	2.0	67	32	-	-	9.3	9.9	28	15	0.00	-	0.05	0.0
79.56	135.5	65.5	157.1	4.5	-7.3	3.4	4	clayy SILT to silty CLAY	115	2.0	68	33	-	-	9.4	9.9	27	15	0.50	-	0.05	3.0
79.73	137.2	66.3	154.0	4.3	-7.3	3.3	4	clayy SILT to silty CLAY	115	2.0	69	33	-	-	9.5	9.9	27	15	0.60	-	0.05	4.1
79.89	134.9	65.2	149.7	4.1	-7.3	3.1	4	clayy SILT to silty CLAY	115	2.0	67	33	-	-	9.4	9.9	26	15	0.77	-	0.05	6.0
80.06	134.5	64.9	146.8	4.0	-7.3	3.0	4	clayy SILT to silty CLAY	115	2.0	67	32	-	-	9.3	9.9	26	15	0.90	-	0.05	7.9
80.22	133.0	64.2	146.1	3.9	-7.2	3.0	4	clayy SILT to silty CLAY	115	2.0	67	32	-	-	9.2	9.9	26	15	0.93	-	0.04	8.4
80.38	136.3	65.7	147.0	4.0	-7.2	3.0	5	silty SAND to sandy SILT	120	4.0	34	16	53	38	-	-	26	16	0.90	-	0.04	7.7
80.55	139.3	67.1	148.8	4.1	-7.2	3.0	5	silty SAND to sandy SILT	120	4.0	35	17	54	38	-	-	25	16	0.83	-	0.04	6.6
80.71	139.1	67.0	147.1	4.0	-7.2	3.0	5	silty SAND to sandy SILT	120	4.0	35	17	54	38	-	-	25	16	0.90	-	0.04	7.6
80.88	140.9	67.8	149.1	4.1	-7.2	3.0	5	silty SAND to sandy SILT	120	4.0	35	17	54	38	-	-	25	16	0.82	-	0.04	6.3
81.04	142.6	68.6	152.1	4.3	-7.2	3.1	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.69	-	0.04	4.9
81.20	143.5	69.0	152.8	4.3	-7.2	3.1	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.66	-	0.04	4.6
81.37	143.2	68.8	151.3	4.2	-7.2	3.1	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.72	-	0.04	5.2
81.53	143.9	69.1	150.5	4.2	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.76	-	0.03	5.6
81.70	144.0	69.1	149.8	4.2	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.79	-	0.03	5.9
81.86	146.4	70.2	150.9	4.2	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	37	18	55	38	-	-	25	16	0.75	-	0.03	5.4
82.02	146.0	70.0	151.9	4.3	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.70	-	0.03	4.9
82.19	152.3	73.0	157.3	4.6	-7.1	3.1	5	silty SAND to sandy SILT	120	4.0	38	18	57	38	-	-	25	16	0.52	-	0.03	3.2
82.35	152.7	73.1	155.9	4.5	-7.1	3.1	5	silty SAND to sandy SILT	120	4.0	38	18	57	38	-	-	25	16	0.56	-	0.03	3.6
82.52	148.6	71.1	156.1	4.5	-7.1	3.2	5	silty SAND to sandy SILT	120	4.0	37	18	56	38	-	-	25	16	0.55	-	0.03	3.4
82.68	148.3	70.9	157.1	4.6	-7.1	3.2	4	clayy SILT to silty CLAY	115	2.0	74	35	-	-	10.3	9.9	25	15	0.52	-	0.03	3.2
82.85	144.4	69.0	150.3	4.2	-7.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	17	55	38	-	-	25	16	0.76	-	0.03	5.6
83.01	147.7	70.6	143.6	3.9	-7.0	2.7	5	silty SAND to sandy SILT	120	4.0	37	18	55	38	-	-	23	16	1.09	-	0.02	10.1
83.17	140.8	67.2	137.9	3.6	-7.0	2.6	5	silty SAND to sandy SILT	120	4.0	35	17	54	38	-	-	24	16	1.35	-	0.02	17.6
83.34	131.8	62.9	134.4	3.4	-6.9	2.6	5	silty SAND to sandy SILT	120	4.0	33	16	52	37	-	-	25	16	1.49	-	0.02	25.9
83.50	118.2	56.4	116.0	2.5	-6.9	2.2	5	silty SAND to sandy SILT	120	4.0	30	14	48	37	-	-	24	16	2.07	-	0.02	37.4
83.67	134.8	64.2	125.6	2.9	-6.9	2.3	5	silty SAND to sandy SILT	120	4.0	34	16	52	37	-	-	23	16	1.88	-	0.01	31.4
83.83	148.9	70.9	130.3	3.2	-6.4	2.2	5	silty SAND to sandy SILT	120	4.0	37	18	56	38	-	-	21	16	1.74	-	0.01	26.3
83.99	160.1	76.2	138.8	3.7	-6.4	2.4	5	silty SAND to sandy SILT	120	4.0	40	19	58	38	-	-	21	16	1.36	-	0.01	14.0
84.16	158.0	75.2	140.7	3.8	-6.4	2.5	5	silty SAND to sandy SILT	120	4.0	40	19	58	38	-	-	22	16	1.26	-	0.01	12.2
84.32	154.9	73.7	131.7	3.3	-6.4	2.2	5	silty SAND to sandy SILT	120	4.0	39	18	57	38	-	-	21	16	1.69	-	0.00	23.6
84.49	137.6	65.4	148.1	4.1	-6.4	3.1	4	clayy SILT to silty CLAY	115	2.0	69	33	-	-	9.6	9.9	26	15	0.82	-	0.00	6.5
84.65	141.7	67.3	186.3	6.1	-6.4	4.5	4	clayy SILT to silty CLAY	115	2.0	71	34	-	-	9.8	9.9	31	15	0.00	-	0.00	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Earth Mechanics

Location	I-5 HOV Widening Segment 1	Operator	BH-JB	Filename	SDF(533).cpt
Job Number	11-135	Cone Number	DSG1104	GPS	
Hole Number	CPT-11-125	Date and Time	9/28/2011 9:41:24 AM	Maximum Depth	29.20 ft
Water Table Depth		>29.20 ft			

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(533).cpt
CPT Date: 9/28/2011 9:41:24 AM
GW During Test: No GW

Sounding ID: CPT-11-125
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qIncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.03	Cycl SStn %
0.33	2.6	4.2	-	1.0	0.0	9.9	2	Organic SOILS - Peats	100	1.0	3	4	-	-	0.3	9.9	95	10	N/A	0.00	N/A	N/A
0.49	1.8	2.8	-	1.9	0.1	9.9	2	Organic SOILS - Peats	100	1.0	2	3	-	-	0.2	9.9	95	10	N/A	0.00	N/A	N/A
0.66	9.6	15.4	-	1.2	0.1	9.9	3	silty CLAY to CLAY	115	1.5	6	10	-	-	0.7	9.9	72	15	N/A	0.00	N/A	N/A
0.82	99.0	158.8	194.2	1.7	-0.1	1.7	6	clean SAND to silty SAND	125	5.0	20	32	82	48	-	-	11	16	N/A	0.00	N/A	N/A
0.98	287.3	460.7	460.7	2.8	-0.5	1.0	6	clean SAND to silty SAND	125	5.0	57	92	95	48	-	-	5	16	N/A	0.00	N/A	N/A
1.15	162.3	260.3	307.0	3.6	-0.1	2.2	6	clean SAND to silty SAND	125	5.0	32	52	95	48	-	-	10	16	N/A	0.00	N/A	N/A
1.31	70.6	113.2	241.0	3.2	0.1	4.6	9	very stiff fine SOIL	120	2.0	35	57	71	48	-	-	25	30	N/A	0.00	N/A	N/A
1.48	44.1	70.7	209.6	2.4	0.2	5.4	4	clayy SILT to silty CLAY	115	2.0	22	35	-	-	3.1	9.9	32	15	N/A	0.00	N/A	N/A
1.64	39.0	62.6	160.2	1.5	-0.2	3.8	4	clayy SILT to silty CLAY	115	2.0	20	31	-	-	2.8	9.9	29	15	N/A	0.00	N/A	N/A
1.80	38.2	61.3	152.6	1.3	-0.4	3.5	4	clayy SILT to silty CLAY	115	2.0	19	31	-	-	2.7	9.9	28	15	N/A	0.00	N/A	N/A
1.97	34.2	54.9	151.2	1.3	-0.9	3.8	4	clayy SILT to silty CLAY	115	2.0	17	27	-	-	2.4	9.9	31	15	N/A	0.00	N/A	N/A
2.13	39.5	63.4	147.9	1.3	-0.8	3.2	4	clayy SILT to silty CLAY	115	2.0	20	32	-	-	2.8	9.9	27	15	N/A	0.00	N/A	N/A
2.30	41.7	66.9	149.3	1.3	-0.8	3.2	4	clayy SILT to silty CLAY	115	2.0	21	33	-	-	2.9	9.9	26	15	N/A	0.00	N/A	N/A
2.46	45.8	73.5	155.5	1.4	-1.0	3.1	5	silty SAND to sandy SILT	120	4.0	11	18	57	46	-	-	24	16	N/A	0.00	N/A	N/A
2.62	49.0	78.5	161.0	1.5	-1.0	3.1	5	silty SAND to sandy SILT	120	4.0	12	20	59	46	-	-	24	16	N/A	0.00	N/A	N/A
2.79	45.3	72.7	165.9	1.6	-1.1	3.5	4	clayy SILT to silty CLAY	115	2.0	23	36	-	-	3.2	9.9	26	15	N/A	0.00	N/A	N/A
2.95	55.4	88.8	164.2	1.6	-1.1	2.9	5	silty SAND to sandy SILT	120	4.0	14	22	63	46	-	-	21	16	N/A	0.00	N/A	N/A
3.12	55.8	89.5	166.5	1.6	-1.1	2.9	5	silty SAND to sandy SILT	120	4.0	14	22	63	46	-	-	21	16	N/A	0.00	N/A	N/A
3.28	50.3	80.7	169.6	1.7	-1.3	3.4	5	silty SAND to sandy SILT	120	4.0	13	20	60	45	-	-	24	16	0.00	-	0.03	0.0
3.45	58.0	93.0	170.1	1.7	-1.3	2.9	5	silty SAND to sandy SILT	120	4.0	15	23	65	46	-	-	21	16	0.00	-	0.03	0.0
3.61	65.3	104.8	175.5	1.8	-1.3	2.7	5	silty SAND to sandy SILT	120	4.0	16	26	69	46	-	-	19	16	0.00	-	0.03	0.0
3.77	65.7	105.4	177.8	1.8	-1.3	2.8	5	silty SAND to sandy SILT	120	4.0	16	26	69	46	-	-	19	16	0.00	-	0.03	0.0
3.94	66.2	106.2	176.4	1.8	-1.3	2.7	5	silty SAND to sandy SILT	120	4.0	17	27	69	46	-	-	19	16	0.00	-	0.03	0.0
4.10	70.3	112.7	176.7	1.8	-1.3	2.5	5	silty SAND to sandy SILT	120	4.0	18	28	71	46	-	-	18	16	0.00	-	0.03	0.0
4.27	68.9	110.6	176.3	1.8	-1.2	2.6	5	silty SAND to sandy SILT	120	4.0	17	28	70	46	-	-	18	16	0.00	-	0.03	0.0
4.43	71.1	114.0	177.4	1.8	-1.2	2.5	5	silty SAND to sandy SILT	120	4.0	18	28	71	46	-	-	17	16	0.00	-	0.03	0.0
4.59	72.9	116.8	184.4	1.9	-1.2	2.7	5	silty SAND to sandy SILT	120	4.0	18	29	72	46	-	-	18	16	0.00	-	0.03	0.0
4.76	73.9	118.5	186.6	2.0	-1.2	2.7	5	silty SAND to sandy SILT	120	4.0	18	30	73	46	-	-	18	16	0.00	-	0.03	0.0
4.92	74.9	120.2	189.0	2.0	-1.2	2.7	5	silty SAND to sandy SILT	120	4.0	19	30	73	46	-	-	18	16	0.00	-	0.03	0.0
5.09	75.8	121.5	197.9	2.2	-1.1	2.9	5	silty SAND to sandy SILT	120	4.0	19	30	73	46	-	-	18	16	0.00	-	0.03	0.0
5.25	78.4	125.7	200.2	2.2	-1.1	2.9	5	silty SAND to sandy SILT	120	4.0	20	31	75	46	-	-	18	16	0.00	-	0.03	0.0
5.41	81.4	130.6	201.5	2.2	-1.1	2.8	5	silty SAND to sandy SILT	120	4.0	20	33	76	46	-	-	17	16	0.00	-	0.03	0.0
5.58	80.9	129.7	202.2	2.3	-1.1	2.8	5	silty SAND to sandy SILT	120	4.0	20	32	76	46	-	-	17	16	0.00	-	0.03	0.0
5.74	81.9	131.3	203.8	2.3	-1.1	2.8	5	silty SAND to sandy SILT	120	4.0	20	33	76	46	-	-	17	16	0.00	-	0.03	0.0
5.91	81.1	130.1	207.2	2.4	-1.0	3.0	5	silty SAND to sandy SILT	120	4.0	20	33	76	46	-	-	18	16	0.00	-	0.03	0.0
6.07	78.8	126.4	212.8	2.5	-1.0	3.2	5	silty SAND to sandy SILT	120	4.0	20	32	75	46	-	-	19	16	0.00	-	0.03	0.0
6.23	83.2	133.4	220.4	2.7	-1.0	3.2	5	silty SAND to sandy SILT	120	4.0	21	33	77	46	-	-	19	16	0.00	-	0.03	0.0
6.40	87.3	138.1	223.9	2.8	-1.0	3.2	5	silty SAND to sandy SILT	120	4.0	22	35	78	46	-	-	18	16	0.00	-	0.03	0.0
6.56	87.0	136.0	223.4	2.8	-1.0	3.3	5	silty SAND to sandy SILT	120	4.0	22	34	77	46	-	-	19	16	0.00	-	0.03	0.0
6.73	86.2	133.0	219.8	2.8	-1.0	3.2	5	silty SAND to sandy SILT	120	4.0	22	33	76	46	-	-	19	16	0.00	-	0.03	0.0
6.89	85.7	130.7	215.7	2.7	-1.0	3.2	5	silty SAND to sandy SILT	120	4.0	21	33	76	46	-	-	19	16	0.00	-	0.03	0.0
7.05	88.4	133.1	215.5	2.7	-1.0	3.1	5	silty SAND to sandy SILT	120	4.0	22	33	76	46	-	-	18	16	0.00	-	0.03	0.0
7.22	89.5	133.2	215.2	2.8	-1.0	3.1	5	silty SAND to sandy SILT	120	4.0	22	33	76	46	-	-	18	16	0.00	-	0.03	0.0
7.38	89.4	131.6	211.4	2.7	-1.0	3.0	5	silty SAND to sandy SILT	120	4.0	22	33	76	46	-	-	18	16	0.00	-	0.03	0.0
7.55	88.6	129.0	213.0	2.8	-1.0	3.2	5	silty SAND to sandy SILT	120	4.0	22	32	75	46	-	-	19	16	0.00	-	0.03	0.0
7.71	88.8	127.9	217.3	2.9	-0.9	3.3	5	silty SAND to sandy SILT	120	4.0	22	32	75	46	-	-	19	16	0.00	-	0.03	0.0
7.87	90.4	128.7	218.0	3.0	-0.9	3.3	5	silty SAND to sandy SILT	120	4.0	23	32	75	46	-	-	19	16	0.00	-	0.03	0.0
8.04	89.6	126.3	216.0	3.0	-0.9	3.3	5	silty SAND to sandy SILT	120	4.0	22	32	75	46	-	-	20	16	0.00	-	0.03	0.0
8.20	89.3	124.6	222.6	3.2	-0.9	3.6	5	silty SAND to sandy SILT	120	4.0	22	31	74	45	-	-	21	16	0.00	-	0.03	0.0
8.37	94.2	130.1	221.6	3.2	-0.9	3.4	5	silty SAND to sandy SILT	120	4.0	24	33	76	46	-	-	19	16	0.00	-	0.03	0.0
8.53	98.4	134.5	218.1	3.1	-1.0	3.1	5	silty SAND to sandy SILT	120	4.0	25	34	77	46	-	-	18	16	0.00	-	0.03	0.0
8.69	97.4	131.9	213.8	3.0	-0.9	3.1	5	silty SAND to sandy SILT	120	4.0	24	33	76	46	-	-	18	16	0.00	-	0.03	0.0
8.86	96.3	129.2	212.6	3.0	-0.9	3.1	5	silty SAND to sandy SILT	120	4.0	24	32	75	46	-	-	19	16	0.00	-	0.03	0.0
9.02	97.3	129.4	212.7	3.0	-0.9	3.1	5	silty SAND to sandy SILT	120	4.0	24	32	75	46	-	-	19	16	0.00	-	0.03	0.0
9.19	99.1	130.5	207.4	2.9	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	25	33	76	46	-	-	18	16	0.00	-	0.03	0.0
9.35	99.2	129.5	203.0	2.8	-0.9	2.8	5	silty SAND to sandy SILT	120	4.0	25	32	76	46	-	-	18	16	0.00	-	0.03	0.0
9.51	99.2	128.4	199.8	2.7	-0.9	2.8	5	silty SAND to sandy SILT	120	4.0	25	32	75	45	-	-	17	16	0.00	-	0.03	0.0
9.68	97.1	124.5	199.7	2.8	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	24	31	74	45	-	-	18	16	0.00	-	0.03	0.0
9.84	98.7	125.5	201.3	2.9	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	25	31	75	45	-	-	18	16	0.00	-	0.03	0.0
10.01	98.9	124.7	199.7	2.8	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	25	31	74	45	-	-	18	16	0.00	-	0.03	0.0
10.17	100.5	125.7	201.1	2.9	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	25	31	75	45	-	-	18	16	0.00	-	0.03	0.0
10.34	100.6	124.8	205.4	3.1	-0.9	3.1	5	silty SAND to sandy SILT	120	4.0	25	31	74	45	-	-	19	16	0.00	-	0.03	0.0
10.50	101.9	125.4	210.7	3.2	-0.9	3.2	5	silty SAND to sandy SILT	120	4.0	25	31	74	45	-	-	19	16	0.00	-	0.03	0.0
10.66	102.8	125.6	209.2	3.2	-0.9	3.1	5	silty SAND to sandy SILT	120	4.0	26	31	75	45	-	-	19	16	0.00	-	0.03	0.0
10.83	103.6	125.6	208.7	3.2	-0.9	3.1	5	silty SAND to sandy SILT	120	4.0	26	31	75	45	-	-	19	16	0.00	-	0.03	0.0
10.99	104.7	125.9	205.9	3.2	-0.9	3.0	5	silty SAND to sandy SILT	120	4.0	26	31	75	45	-	-	19	16	0.00	-	0.03	0.0
11.16	106.5	127.2	202.6	3.1	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	27	32	75	45	-	-	18	16	0.00	-	0.03	0.0
11.32	106.5	126.2	201.0	3.0	-0.8	2.9	5	silty SAND to sandy SILT	120	4.0	27	32	75	45	-	-	18	16	0.00	-	0.03	0.0
11.48	107.8	126.8	209.5	3.3	-0.8	3.1	5	silty SAND to sandy SILT	120	4.0	27	32	75	45	-	-	19	16	0.00	-	0.03	0.0
11.65	107.5	125.6	203.0	3.2	-0.8	3.0	5	silty SAND to sandy SILT	120	4.0	27	31	75	45	-	-	18	16	0.00	-	0.03	0.0
11.81	110.6	128.3	202.2	3.1	-0.8	2.9	5	silty SAND to sandy SILT	120	4.0	28	32	75	45	-	-	18	16	0.00	-	0.03	0.0
11.98	112.7	129.8	206.2	3.3	-0.9	2.9	5	silty SAND to sandy SILT	120	4.0	28	32	76	45	-	-	18	16	0.00	-	0.03	0.0
12.14	115.2	131.7	209.2	3.4	-0.8	3.0	5	silty SAND to sandy SILT	120	4.0	29	33	76	45	-	-	18	16	0.00	-	0.03	0.0
12.30	116.5	132.3	210.6	3.5	-0.8	3.0	5	silty SAND to sandy SILT	120	4.0	29	33	76	45	-	-	18	16	0.00	-	0.03	0.0
12.47	117.5	132.6	214.3	3.6	-0.8	3.1	5	silty SAND to sandy SILT	120	4.0	29	33	76	45	-	-	18	16	0.00	-	0.03	0.0
12.63	118.3	132.7	215.0	3.7	-0.8	3.1	5	silty SAND to sandy SILT	120	4.0	30	33	76	45	-	-	18	16	0.00	-	0.03	0.0
12.80	117.3	130.7	212.9	3.6	-0.8	3.1	5	silty SAND to sandy SILT	120	4.0	29	33	76	45	-	-	18	16	0.00	-	0.03	0.0
12.96	117.3	129.8	212.6	3.6	-0.7	3.1	5	silty SAND to sandy SILT	120	4.0	29	32	76	45	-	-	19	16	0.00	-	0.03	0.0
13.12	118.5	130.3	214.5	3.7	-0.7	3.2	5	silty SAND to sandy SILT	120	4.0	30	33	76	45	-	-	19	16	0.00	-	0.03	0.0
13.29	120.1	131.2	214.0	3.7	-0.7	3.1	5	silty SAND to sandy SILT	120	4.0	30	33	76	45	-	-	19	16	0.00	-	0.03	0.0
13.45	121.7	132.2	214.9	3.8	-0.7	3.1	5	silty SAND to sandy SILT	120	4.0	30	33	76	45	-	-	18	16	0.00	-	0.03	0.0
13.62	123.8	133.6	215.1	3.8	-0.7	3.1	5	silty SAND to sandy SILT	120	4.0	31	33	77	45	-	-	18	16	0.00	-	0.03	0.0
13.78	126.6	135.9	215.1	3.8	-0.7	3.0	5	silty SAND to sandy SILT	120	4.0	32	34	77	45	-	-	18	16	0.00	-	0.03	0.0
13.94	126.8	135.2	214.3	3.8	-0.7	3.0	5	silty SAND to sandy SILT	120	4.0	32	34	77	45	-	-	18	16	0.00	-	0.03	0.0
14.11	127.9	135.6	213.8	3.8	-0.6	3.0	5	silty SAND to sandy SILT	120	4.0	32	34	77	45	-	-	18	16	0.00	-	0.03	0.0
14.27	129.3	136.3	214.7	3.8	-0.6	3.0	5	silty SAND to sandy SILT	120	4.0	32	34	77	45	-	-	18	16	0.00	-	0.03	0.0
14.44	130.6	136.8	217.8	4.0	-0.6	3.1	5	silty SAND to sandy SILT	120	4.0	33	34	77	45	-	-	18	16	0.00	-	0.03	0.0
14.60	132.1	137.6	217.4	4.0	-0.6	3.0	5	silty SAND to sandy SILT	120	4.0	33	34	78	45	-	-	18	16	0.00	-	0.03	0.0
14.76	130.8	135.5	230.1	4.5	-0.6	3.5	5	silty SAND to sandy SILT	120	4.0	33	34	77	45	-	-	19	16	0.00	-	0.03	0.0
14.93	133.0	137.1	225.4	4.3	-0.6	3.3	5	silty SAND to sandy SILT	120	4.0	33	34	77	45	-	-	19	16	0.00	-	0.03	0.0
15.09	138.7	142.1	224.0	4.3	-0.5	3.1	5	silty SAND to sandy SILT	120	4.0	35	36	79	45	-	-	18	16	0.00	-	0.03	0.0
15.26	138.0	140.7	220.2	4.1	-0.5	3.0	5	silty SAND to sandy SILT	120	4.0	35	35	78	45	-	-	18	16	0.00	-	0.03	0.0
15.42	135.0	136.9	216.4	4.1	-0.5	3.0	5	silty SAND to sandy SILT	120	4.0	34	34	77	45	-	-	18	16	0.00	-	0.03	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(533).cpt
CPT Date: 9/28/2011 9:41:24 AM
GW During Test: No GW

Sounding ID: CPT-11-125
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.03	Cycl SStn %
15.58	135.2	136.3	213.9	4.0	-0.5	3.0	5	silty SAND to sandy SILT	120	4.0	34	34	77	45	-	-	18	16	0.00	-	0.03	0.0
15.75	135.5	135.9	211.6	3.9	-0.5	2.9	5	silty SAND to sandy SILT	120	4.0	34	34	77	45	-	-	17	16	0.00	-	0.03	0.0
15.91	131.8	131.5	208.7	3.9	-0.5	3.0	5	silty SAND to sandy SILT	120	4.0	33	33	76	45	-	-	18	16	0.00	-	0.03	0.0
16.08	128.7	127.8	203.1	3.7	-0.5	2.9	5	silty SAND to sandy SILT	120	4.0	32	32	75	45	-	-	18	16	0.00	-	0.03	0.0
16.24	125.7	124.2	198.3	3.6	-0.5	2.9	5	silty SAND to sandy SILT	120	4.0	31	31	74	45	-	-	18	16	0.00	-	0.03	0.0
16.40	123.5	121.4	192.2	3.4	-0.5	2.8	5	silty SAND to sandy SILT	120	4.0	31	30	73	44	-	-	18	16	0.00	-	0.03	0.0
16.57	121.4	118.7	183.0	3.1	-0.4	2.5	5	silty SAND to sandy SILT	120	4.0	30	30	73	44	-	-	17	16	0.00	-	0.03	0.0
16.73	122.1	118.8	182.3	3.0	-0.5	2.5	5	silty SAND to sandy SILT	120	4.0	31	30	73	44	-	-	17	16	0.00	-	0.03	0.0
16.90	121.1	117.2	180.9	3.0	-0.5	2.5	5	silty SAND to sandy SILT	120	4.0	30	29	72	44	-	-	17	16	0.00	-	0.03	0.0
17.06	126.6	122.0	190.6	3.4	-0.5	2.7	5	silty SAND to sandy SILT	120	4.0	32	30	74	44	-	-	18	16	0.00	-	0.03	0.0
17.23	129.8	124.4	194.7	3.5	-0.3	2.7	5	silty SAND to sandy SILT	120	4.0	32	31	74	45	-	-	18	16	0.00	-	0.03	0.0
17.39	125.0	119.3	193.6	3.5	-0.3	2.9	5	silty SAND to sandy SILT	120	4.0	31	30	73	44	-	-	18	16	0.00	-	0.03	0.0
17.55	132.7	126.0	185.2	3.2	-0.2	2.4	5	silty SAND to sandy SILT	120	4.0	33	31	75	45	-	-	16	16	0.00	-	0.03	0.0
17.72	135.0	127.6	187.6	3.2	-0.2	2.4	5	silty SAND to sandy SILT	120	4.0	34	32	75	45	-	-	16	16	0.00	-	0.03	0.0
17.88	157.4	148.1	220.0	4.4	-0.2	2.8	5	silty SAND to sandy SILT	120	4.0	39	37	80	45	-	-	16	16	0.00	-	0.03	0.0
18.05	158.6	148.5	231.4	4.9	-0.2	3.1	5	silty SAND to sandy SILT	120	4.0	40	37	80	45	-	-	17	16	0.00	-	0.03	0.0
18.21	151.9	141.6	224.5	4.7	-0.2	3.1	5	silty SAND to sandy SILT	120	4.0	38	35	78	45	-	-	18	16	0.00	-	0.03	0.0
18.37	151.8	140.9	215.1	4.3	-0.2	2.9	5	silty SAND to sandy SILT	120	4.0	38	35	78	45	-	-	17	16	0.00	-	0.03	0.0
18.54	148.7	137.4	215.2	4.4	-0.2	3.0	5	silty SAND to sandy SILT	120	4.0	37	34	77	45	-	-	18	16	0.00	-	0.03	0.0
18.70	146.0	134.3	215.6	4.5	-0.1	3.1	5	silty SAND to sandy SILT	120	4.0	37	34	77	45	-	-	18	16	0.00	-	0.03	0.0
18.87	150.1	137.5	217.7	4.5	-0.1	3.0	5	silty SAND to sandy SILT	120	4.0	38	34	78	45	-	-	18	16	0.00	-	0.03	0.0
19.03	150.9	137.6	217.5	4.5	-0.1	3.0	5	silty SAND to sandy SILT	120	4.0	38	34	78	45	-	-	18	16	0.00	-	0.03	0.0
19.19	148.8	135.1	214.5	4.5	-0.1	3.0	5	silty SAND to sandy SILT	120	4.0	37	34	77	45	-	-	18	16	0.00	-	0.03	0.0
19.36	145.9	131.9	211.3	4.4	-0.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	33	76	45	-	-	18	16	0.00	-	0.03	0.0
19.52	143.3	129.0	212.6	4.5	-0.1	3.1	5	silty SAND to sandy SILT	120	4.0	36	32	75	44	-	-	19	16	0.00	-	0.03	0.0
19.69	144.2	129.3	211.3	4.4	-0.1	3.1	5	silty SAND to sandy SILT	120	4.0	36	32	75	44	-	-	19	16	0.00	-	0.03	0.0
19.85	144.3	128.8	209.2	4.4	-0.1	3.0	5	silty SAND to sandy SILT	120	4.0	36	32	75	44	-	-	18	16	0.00	-	0.03	0.0
20.01	139.4	124.0	203.4	4.2	0.0	3.0	5	silty SAND to sandy SILT	120	4.0	35	31	74	44	-	-	19	16	0.00	-	0.03	0.0
20.18	136.7	121.0	202.9	4.2	0.0	3.1	5	silty SAND to sandy SILT	120	4.0	34	30	73	44	-	-	19	16	0.00	-	0.03	0.0
20.34	136.4	120.3	204.1	4.3	0.0	3.1	5	silty SAND to sandy SILT	120	4.0	34	30	73	44	-	-	19	16	0.00	-	0.03	0.0
20.51	133.7	117.4	206.1	4.4	0.0	3.3	5	silty SAND to sandy SILT	120	4.0	33	29	72	44	-	-	20	16	0.00	-	0.03	0.0
20.67	131.1	114.7	203.0	4.3	0.1	3.3	5	silty SAND to sandy SILT	120	4.0	33	29	72	44	-	-	20	16	0.00	-	0.03	0.0
20.83	128.8	112.3	197.8	4.1	0.1	3.2	5	silty SAND to sandy SILT	120	4.0	32	28	71	44	-	-	20	16	0.00	-	0.03	0.0
21.00	127.9	111.0	201.9	4.3	0.2	3.4	5	silty SAND to sandy SILT	120	4.0	32	28	70	44	-	-	21	16	0.00	-	0.03	0.0
21.16	127.8	110.4	194.0	4.0	0.2	3.1	5	silty SAND to sandy SILT	120	4.0	32	28	70	44	-	-	20	16	0.00	-	0.03	0.0
21.33	129.3	111.4	200.2	4.2	0.2	3.3	5	silty SAND to sandy SILT	120	4.0	32	28	71	44	-	-	21	16	0.00	-	0.03	0.0
21.49	128.8	110.5	244.6	6.0	0.3	4.7	9	very stiff fine SOIL	120	2.0	64	55	70	44	-	-	25	30	0.00	-	0.03	0.0
21.65	221.4	189.2	265.9	6.5	251.0	3.0	5	silty SAND to sandy SILT	120	4.0	55	47	88	46	-	-	15	16	0.00	-	0.03	0.0
21.82	155.0	131.9	227.9	5.4	256.2	3.5	5	silty SAND to sandy SILT	120	4.0	39	33	76	44	-	-	20	16	0.00	-	0.03	0.0
21.98	143.6	121.8	190.6	3.8	257.5	2.7	5	silty SAND to sandy SILT	120	4.0	36	30	74	44	-	-	18	16	0.00	-	0.03	0.0
22.15	141.6	119.6	187.4	3.7	257.6	2.6	5	silty SAND to sandy SILT	120	4.0	35	30	73	44	-	-	18	16	0.00	-	0.03	0.0
22.31	143.4	120.7	183.4	3.5	256.9	2.5	5	silty SAND to sandy SILT	120	4.0	36	30	73	44	-	-	17	16	0.00	-	0.03	0.0
22.47	144.3	121.0	177.2	3.3	256.9	2.3	5	silty SAND to sandy SILT	120	4.0	36	30	73	44	-	-	16	16	0.00	-	0.03	0.0
22.64	144.9	121.1	170.4	3.0	256.8	2.1	5	silty SAND to sandy SILT	120	4.0	36	30	73	44	-	-	15	16	0.00	-	0.03	0.0
22.80	141.4	117.7	168.8	3.0	256.6	2.1	5	silty SAND to sandy SILT	120	4.0	35	29	72	44	-	-	15	16	0.00	-	0.03	0.0
22.97	148.2	122.9	169.0	2.9	255.6	2.0	5	silty SAND to sandy SILT	120	4.0	37	31	74	44	-	-	14	16	0.00	-	0.03	0.0
23.13	143.7	118.8	167.4	2.9	255.6	2.0	5	silty SAND to sandy SILT	120	4.0	36	30	73	44	-	-	15	16	0.00	-	0.03	0.0
23.30	144.0	118.7	168.2	3.0	255.5	2.1	5	silty SAND to sandy SILT	120	4.0	36	30	73	44	-	-	15	16	0.00	-	0.03	0.0
23.46	142.7	117.2	165.9	2.9	255.2	2.0	5	silty SAND to sandy SILT	120	4.0	36	29	72	44	-	-	15	16	0.00	-	0.03	0.0
23.62	137.8	112.7	161.7	2.8	254.9	2.0	5	silty SAND to sandy SILT	120	4.0	34	28	71	43	-	-	15	16	0.00	-	0.03	0.0
23.79	132.4	107.9	156.7	2.6	254.4	2.0	5	silty SAND to sandy SILT	120	4.0	33	27	70	43	-	-	16	16	0.86	-	0.03	4.7
23.95	131.0	106.4	150.2	2.4	254.0	1.8	5	silty SAND to sandy SILT	120	4.0	33	27	69	43	-	-	15	16	1.15	-	0.03	6.7
24.12	131.4	106.4	147.3	2.3	253.8	1.8	5	silty SAND to sandy SILT	120	4.0	33	27	69	43	-	-	15	16	1.28	-	0.02	7.8
24.28	125.5	101.2	142.9	2.2	253.4	1.8	5	silty SAND to sandy SILT	120	4.0	31	25	67	43	-	-	15	16	1.48	-	0.02	11.1
24.44	101.3	81.4	124.3	1.7	281.9	1.7	5	silty SAND to sandy SILT	120	4.0	25	20	60	42	-	-	17	16	1.96	-	0.02	22.5
24.61	76.4	61.2	128.1	1.9	281.3	2.5	5	silty SAND to sandy SILT	120	4.0	19	15	51	40	-	-	24	16	1.91	-	0.02	33.2
24.77	102.7	82.0	148.1	2.6	246.6	2.5	5	silty SAND to sandy SILT	120	4.0	26	20	60	42	-	-	21	16	1.23	-	0.01	11.4
24.94	112.9	89.9	156.1	2.8	237.9	2.5	5	silty SAND to sandy SILT	120	4.0	28	22	63	42	-	-	20	16	0.90	-	0.01	6.2
25.10	124.0	98.4	161.7	3.0	239.5	2.5	5	silty SAND to sandy SILT	120	4.0	31	25	66	43	-	-	19	16	0.00	-	0.01	0.0
25.26	125.3	99.1	160.4	3.0	239.9	2.4	5	silty SAND to sandy SILT	120	4.0	31	25	67	43	-	-	18	16	0.00	-	0.01	0.0
25.43	124.3	98.0	152.6	2.7	240.1	2.2	5	silty SAND to sandy SILT	120	4.0	31	24	66	43	-	-	17	16	1.08	-	0.01	7.2
25.59	124.6	97.9	152.1	2.7	240.4	2.2	5	silty SAND to sandy SILT	120	4.0	31	24	66	43	-	-	17	16	1.11	-	0.01	7.5
25.76	124.3	97.3	155.6	2.8	240.7	2.3	5	silty SAND to sandy SILT	120	4.0	31	24	66	43	-	-	18	16	0.96	-	0.01	6.2
25.92	123.9	96.8	156.0	2.9	241.0	2.3	5	silty SAND to sandy SILT	120	4.0	31	24	66	43	-	-	18	16	0.95	-	0.00	6.1
26.08	122.2	95.1	158.3	3.0	241.2	2.5	5	silty SAND to sandy SILT	120	4.0	31	24	65	42	-	-	19	16	0.86	-	0.00	5.5
26.25	121.0	93.8	163.2	3.2	241.1	2.7	5	silty SAND to sandy SILT	120	4.0	30	23	65	42	-	-	20	16	0.00	-	0.00	0.0
26.41	119.2	92.2	162.9	3.2	241.1	2.7	5	silty SAND to sandy SILT	120	4.0	30	23	64	42	-	-	20	16	0.00	-	0.00	0.0
26.58	106.2	81.9	157.7	3.0	240.5	2.9	5	silty SAND to sandy SILT	120	4.0	27	20	60	42	-	-	22	16	0.87	-	0.00	6.6
26.74	86.5	66.5	163.3	3.1	238.8	3.7	4	clayy SILT to silty CLAY	115	2.0	43	33	-	-	6.1	9.9	28	15	0.00	-	0.00	0.0
26.90	63.1	39.3	-	3.1	232.0	5.0	3	silty CLAY to CLAY	115	1.5	42	26	-	-	4.4	9.9	40	15	-	-	0.00	-
27.07	95.6	73.0	167.2	3.3	233.3	3.5	4	clayy SILT to silty CLAY	115	2.0	48	37	-	-	6.7	9.9	26	15	0.00	-	0.00	0.0
27.23	127.0	96.8	180.5	3.9	235.6	3.1	5	silty SAND to sandy SILT	120	4.0	32	24	66	42	-	-	22	16	0.00	-	0.00	0.0
27.40	142.4	108.1	199.5	4.8	238.2	3.4	5	silty SAND to sandy SILT	120	4.0	36	27	70	43	-	-	21	16	0.00	-	0.00	0.0
27.56	147.9	112.0	202.2	4.9	239.6	3.3	5	silty SAND to sandy SILT	120	4.0	37	28	71	43	-	-	21	16	0.00	-	0.00	0.0
27.72	157.7	119.1	202.8	4.9	242.0	3.1	5	silty SAND to sandy SILT	120	4.0	39	30	73	43	-	-	19	16	0.00	-	0.00	0.0
27.89	162.8	122.5	200.5	4.8	242.8	3.0	5	silty SAND to sandy SILT	120	4.0	41	31	74	44	-	-	19	16	0.00	-	0.00	0.0
28.05	164.2	123.2	200.2	4.8	243.6	2.9	5	silty SAND to sandy SILT	120	4.0	41	31	74	44	-	-	18	16	0.00	-	0.00	0.0
28.22	164.2	122.9	202.2	4.9	244.3	3.0	5	silty SAND to sandy SILT	120	4.0	41	31	74	44	-	-	19	16	0.00	-	0.00	0.0
28.38	165.8	123.8	201.6	4.9	245.2	3.0	5	silty SAND to sandy SILT	120	4.0	41	31	74	44	-	-	18	16	0.00	-	0.00	0.0
28.54	173.3	129.0	203.0	4.9	246.3	2.9	5	silty SAND to sandy SILT	120	4.0	43	32	75	44	-	-	18	16	0.00	-	0.00	0.0
28.71	173.4	128.6	203.2	4.9	247.1	2.9	5	silty SAND to sandy SILT	120	4.0	43	32	75	44	-	-	18	16	0.00	-	0.00	0.0
28.87	170.6	126.2	206.1	5.1	247.6	3.0	5	silty SAND to sandy SILT	120	4.0	43	32	75	44	-	-	19	16	0.00	-	0.00	0.0

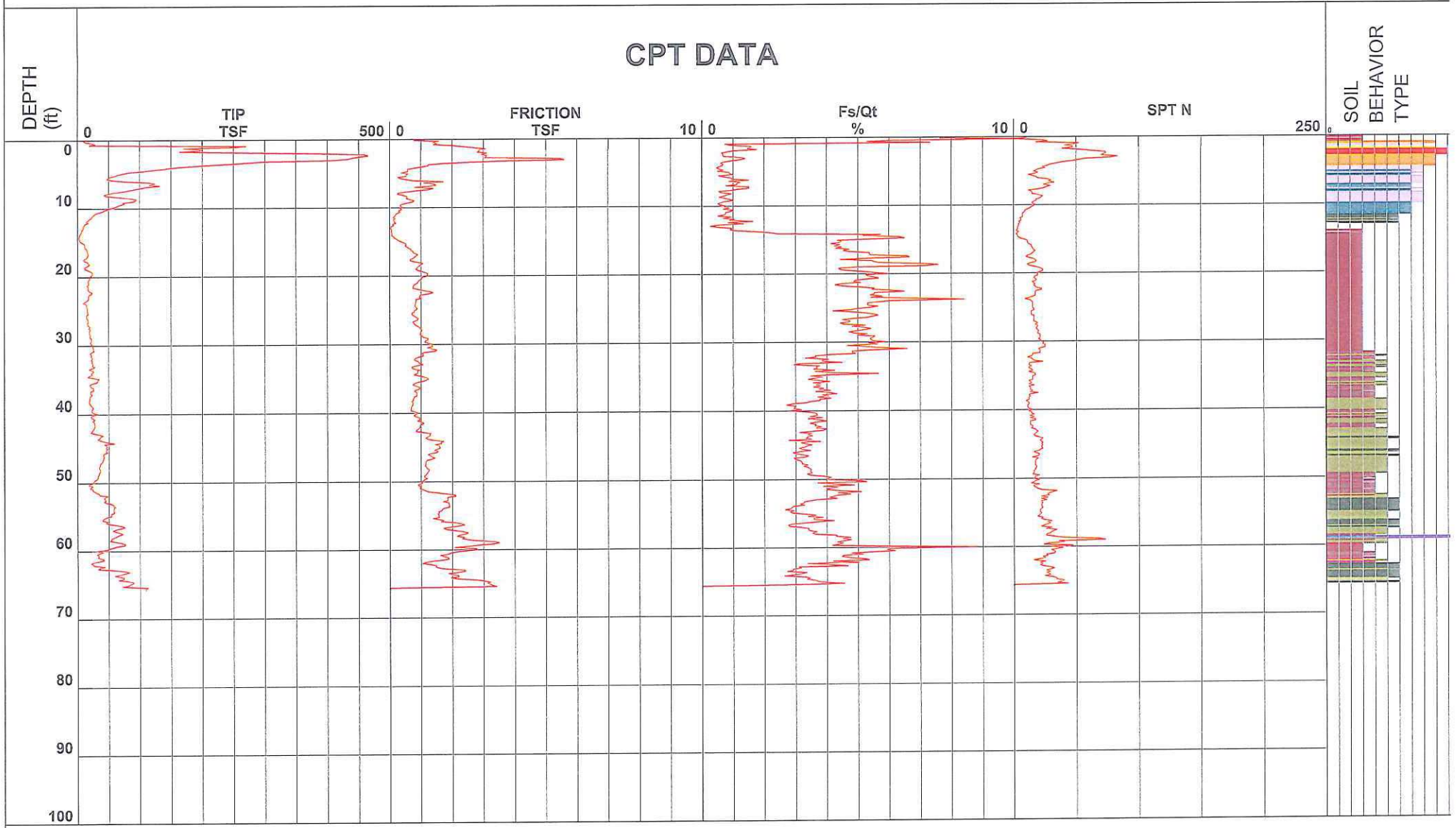
* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Earth Mechanics

Location	I-5 HOV Widening Segment 1	Operator	BH-JB	Filename	SDF(532).cpt
Job Number	11-135	Cone Number	DSG1104	GPS	
Hole Number	CPT-11-129	Date and Time	9/27/2011 1:41:34 PM	Maximum Depth	65.78 ft
Water Table Depth		>65.78 ft			

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(532).cpt
CPT Date: 9/27/2011 1:41:34 PM
GW During Test: No GW

Sounding ID: CPT-11-129
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk - -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.17	Cycl SStn %
0.33	13.0	20.9	-	1.6	0.3	9.9	3	silty CLAY to CLAY	115	1.5	9	14	-	-	0.9	9.9	65	15	N/A	0.00	N/A	N/A
0.49	22.7	36.4	-	1.4	0.4	6.1	3	silty CLAY to CLAY	115	1.5	15	24	-	-	1.6	9.9	44	15	N/A	0.00	N/A	N/A
0.66	28.6	45.8	-	1.5	0.6	5.3	3	silty CLAY to CLAY	115	1.5	19	31	-	-	2.0	9.9	38	15	N/A	0.00	N/A	N/A
0.82	19.3	30.9	-	1.4	0.5	7.3	3	silty CLAY to CLAY	115	1.5	13	21	-	-	1.4	9.9	50	15	N/A	0.00	N/A	N/A
0.98	270.0	433.0	433.0	2.0	-0.1	0.7	6	clean SAND to silty SAND	125	5.0	54	87	95	48	-	-	5	16	N/A	0.00	N/A	N/A
1.15	253.0	405.8	405.8	2.4	-0.3	0.9	6	clean SAND to silty SAND	125	5.0	51	81	95	48	-	-	5	16	N/A	0.00	N/A	N/A
1.31	170.1	272.9	293.8	2.7	0.0	1.6	6	clean SAND to silty SAND	125	5.0	34	55	95	48	-	-	7	16	N/A	0.00	N/A	N/A
1.48	198.2	317.8	332.2	3.1	0.1	1.6	6	clean SAND to silty SAND	125	5.0	40	64	95	48	-	-	6	16	N/A	0.00	N/A	N/A
1.64	196.4	314.9	325.2	2.9	0.3	1.5	6	clean SAND to silty SAND	125	5.0	39	63	95	48	-	-	6	16	N/A	0.00	N/A	N/A
1.80	164.3	263.4	291.5	2.9	0.2	1.7	6	clean SAND to silty SAND	125	5.0	33	53	95	48	-	-	8	16	N/A	0.00	N/A	N/A
1.97	275.1	441.2	441.2	2.8	0.0	1.0	6	clean SAND to silty SAND	125	5.0	55	88	95	48	-	-	5	16	N/A	0.00	N/A	N/A
2.13	391.2	627.4	627.4	3.1	-0.2	0.8	7	grvly SAND to dense SAND	130	6.0	65	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
2.30	459.2	736.4	736.4	3.0	-0.2	0.6	7	grvly SAND to dense SAND	130	6.0	77	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
2.46	465.1	745.8	745.8	3.1	-0.2	0.7	7	grvly SAND to dense SAND	130	6.0	78	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
2.62	452.4	725.5	725.5	3.1	-0.2	0.7	7	grvly SAND to dense SAND	130	6.0	75	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
2.79	440.0	705.7	705.7	3.1	0.0	0.7	7	grvly SAND to dense SAND	130	6.0	73	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
2.95	432.8	694.1	694.1	5.5	0.2	1.3	6	clean SAND to silty SAND	125	5.0	87	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
3.12	404.4	648.6	648.6	5.6	0.1	1.4	6	clean SAND to silty SAND	125	5.0	81	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
3.28	295.2	473.4	473.4	3.5	0.3	1.2	6	clean SAND to silty SAND	125	5.0	59	95	95	48	-	-	5	16	0.00	-	0.18	0.0
3.45	269.3	431.8	431.8	2.4	0.2	0.9	6	clean SAND to silty SAND	125	5.0	54	86	95	48	-	-	5	16	0.00	-	0.18	0.0
3.61	238.3	382.1	382.1	1.6	0.2	0.7	6	clean SAND to silty SAND	125	5.0	48	76	95	48	-	-	5	16	0.00	-	0.18	0.0
3.77	205.6	329.7	329.7	1.3	0.2	0.6	6	clean SAND to silty SAND	125	5.0	41	66	95	48	-	-	5	16	0.00	-	0.18	0.0
3.94	179.0	287.0	287.0	1.2	0.2	0.7	6	clean SAND to silty SAND	125	5.0	36	57	95	48	-	-	5	16	0.00	-	0.18	0.0
4.10	153.8	246.6	246.6	1.0	0.2	0.7	6	clean SAND to silty SAND	125	5.0	31	49	95	48	-	-	5	16	0.00	-	0.18	0.0
4.27	140.2	224.8	224.8	0.8	0.3	0.5	6	clean SAND to silty SAND	125	5.0	28	45	94	48	-	-	5	16	0.00	-	0.18	0.0
4.43	120.9	193.8	193.8	0.6	0.3	0.5	6	clean SAND to silty SAND	125	5.0	24	39	89	48	-	-	5	16	0.00	-	0.18	0.0
4.59	106.1	170.2	170.2	0.6	0.3	0.6	6	clean SAND to silty SAND	125	5.0	21	34	85	48	-	-	5	16	0.00	-	0.18	0.0
4.76	82.3	132.1	138.6	0.6	0.1	0.7	6	clean SAND to silty SAND	125	5.0	16	26	76	46	-	-	6	16	0.54	-	0.18	2.8
4.92	74.1	118.9	121.6	0.4	0.2	0.5	6	clean SAND to silty SAND	125	5.0	15	24	73	46	-	-	6	16	1.58	-	0.18	6.2
5.09	64.9	104.1	120.4	0.6	0.1	0.9	6	clean SAND to silty SAND	125	5.0	13	21	68	45	-	-	10	16	1.69	-	0.18	8.0
5.25	60.8	97.5	115.1	0.5	0.1	0.9	6	clean SAND to silty SAND	125	5.0	12	20	66	45	-	-	10	16	2.02	-	0.17	13.0
5.41	53.1	85.1	107.1	0.5	0.2	1.0	6	clean SAND to silty SAND	125	5.0	11	17	62	44	-	-	12	16	2.21	-	0.17	21.3
5.58	49.6	79.5	90.6	0.3	0.2	0.6	6	clean SAND to silty SAND	125	5.0	10	16	59	44	-	-	9	16	2.53	-	0.17	23.4
5.74	48.0	77.0	92.3	0.3	0.2	0.7	6	clean SAND to silty SAND	125	5.0	10	15	58	43	-	-	11	16	2.50	-	0.16	24.5
5.91	56.2	90.2	110.1	0.5	0.2	0.9	6	clean SAND to silty SAND	125	5.0	11	18	64	44	-	-	11	16	2.16	-	0.16	19.4
6.07	77.8	123.2	139.3	0.7	0.1	1.0	6	clean SAND to silty SAND	125	5.0	16	25	74	45	-	-	9	16	0.72	-	0.16	3.4
6.23	114.6	179.0	205.6	1.7	0.1	1.5	6	clean SAND to silty SAND	125	5.0	23	36	86	47	-	-	9	16	0.00	-	0.15	0.0
6.40	124.6	192.1	194.7	1.1	0.2	0.9	6	clean SAND to silty SAND	125	5.0	25	38	89	47	-	-	5	16	0.00	-	0.15	0.0
6.56	115.9	176.3	194.5	1.4	0.2	1.2	6	clean SAND to silty SAND	125	5.0	23	35	86	47	-	-	8	16	0.00	-	0.15	0.0
6.73	131.8	198.1	209.8	1.5	0.0	1.1	6	clean SAND to silty SAND	125	5.0	26	40	90	47	-	-	7	16	0.00	-	0.15	0.0
6.89	111.5	165.6	181.7	1.3	0.2	1.1	6	clean SAND to silty SAND	125	5.0	22	33	84	47	-	-	8	16	0.00	-	0.15	0.0
7.05	102.3	150.1	156.8	0.8	0.1	0.8	6	clean SAND to silty SAND	125	5.0	20	30	80	46	-	-	6	16	0.27	-	0.15	2.1
7.22	92.0	133.5	164.4	1.4	0.2	1.5	6	clean SAND to silty SAND	125	5.0	18	27	77	46	-	-	11	16	0.00	-	0.15	0.0
7.38	82.7	118.6	151.1	1.2	0.3	1.5	6	clean SAND to silty SAND	125	5.0	17	24	73	45	-	-	12	16	0.41	-	0.15	2.4
7.55	73.8	104.8	129.2	0.9	-0.1	1.2	6	clean SAND to silty SAND	125	5.0	15	21	69	45	-	-	11	16	1.48	-	0.15	7.3
7.71	58.8	82.5	103.5	0.6	-0.1	0.9	6	clean SAND to silty SAND	125	5.0	12	16	61	43	-	-	12	16	2.27	-	0.15	22.2
7.87	50.7	70.4	83.1	0.3	-0.1	0.6	6	clean SAND to silty SAND	125	5.0	10	14	55	43	-	-	10	16	2.72	-	0.15	27.9
8.04	43.1	59.3	75.5	0.3	-0.1	0.6	6	clean SAND to silty SAND	125	5.0	9	12	50	42	-	-	12	16	2.94	-	0.14	34.5
8.20	46.0	62.5	87.1	0.4	0.0	1.0	5	silty SAND to sandy SILT	120	4.0	11	16	52	42	-	-	15	16	2.62	-	0.14	32.4
8.37	64.2	86.5	104.0	0.5	0.0	0.8	6	clean SAND to silty SAND	125	5.0	13	17	62	44	-	-	11	16	2.26	-	0.13	20.9
8.53	82.8	110.5	121.0	0.6	-0.1	0.7	6	clean SAND to silty SAND	125	5.0	17	22	70	45	-	-	8	16	1.93	-	0.13	10.8
8.69	94.4	124.8	128.2	0.5	-0.2	0.6	6	clean SAND to silty SAND	125	5.0	19	25	74	45	-	-	6	16	1.62	-	0.13	7.1
8.86	93.5	122.4	131.6	0.7	-0.2	0.7	6	clean SAND to silty SAND	125	5.0	19	24	74	45	-	-	7	16	1.44	-	0.12	6.3
9.02	89.6	116.2	131.2	0.8	-0.2	0.9	6	clean SAND to silty SAND	125	5.0	18	23	72	45	-	-	9	16	1.47	-	0.12	6.7
9.19	73.1	93.9	115.1	0.7	-0.2	1.0	6	clean SAND to silty SAND	125	5.0	15	19	65	44	-	-	11	16	2.08	-	0.12	18.6
9.35	75.3	96.0	109.7	0.6	-0.2	0.7	6	clean SAND to silty SAND	125	5.0	15	19	66	44	-	-	9	16	2.17	-	0.12	18.1
9.51	68.6	86.7	98.6	0.4	-0.1	0.6	6	clean SAND to silty SAND	125	5.0	14	17	62	43	-	-	9	16	2.36	-	0.11	20.8
9.68	64.7	81.0	91.5	0.3	-0.1	0.5	6	clean SAND to silty SAND	125	5.0	13	16	60	43	-	-	9	16	2.51	-	0.11	22.7
9.84	60.6	75.3	87.8	0.3	-0.1	0.6	6	clean SAND to silty SAND	125	5.0	12	15	58	43	-	-	10	16	2.60	-	0.10	25.4
10.01	54.7	67.4	85.9	0.4	-0.1	0.8	6	clean SAND to silty SAND	125	5.0	11	13	54	42	-	-	12	16	2.65	-	0.10	29.6
10.17	48.9	59.7	78.9	0.4	-0.1	0.7	6	clean SAND to silty SAND	125	5.0	10	12	50	41	-	-	13	16	2.84	-	0.10	34.1
10.34	43.6	52.9	77.6	0.4	0.0	0.9	5	silty SAND to sandy SILT	120	4.0	11	13	46	41	-	-	16	16	2.88	-	0.09	41.0
10.50	40.9	49.2	70.0	0.3	0.0	0.7	5	silty SAND to sandy SILT	120	4.0	10	12	44	40	-	-	15	16	3.13	-	0.09	45.0
10.66	34.0	40.5	71.2	0.3	0.0	1.0	5	silty SAND to sandy SILT	120	4.0	8	10	37	39	-	-	20	16	3.09	-	0.08	51.2
10.83	28.7	34.0	65.3	0.3	0.0	1.0	5	silty SAND to sandy SILT	120	4.0	7	8	31	38	-	-	22	16	3.32	-	0.08	51.2
10.99	26.7	31.4	59.0	0.2	0.0	0.8	5	silty SAND to sandy SILT	120	4.0	7	8	29	38	-	-	22	16	3.60	-	0.07	51.2
11.16	24.4	28.5	56.8	0.2	-0.1	0.8	5	silty SAND to sandy SILT	120	4.0	6	7	26	37	-	-	23	16	3.71	-	0.06	51.2
11.32	23.3	27.0	54.8	0.2	-0.1	0.7	5	silty SAND to sandy SILT	120	4.0	6	7	24	37	-	-	23	16	3.83	-	0.06	51.2
11.48	21.6	24.9	48.4	0.1	0.0	0.6	5	silty SAND to sandy SILT	120	4.0	5	6	21	36	-	-	23	16	4.24	-	0.05	51.2
11.65	18.9	21.6	56.9	0.2	0.0	1.0	5	silty SAND to sandy SILT	120	4.0	5	5	16	35	-	-	30	16	3.71	-	0.04	51.2
11.81	17.1	19.5	49.7	0.1	-0.1	0.7	5	silty SAND to sandy SILT	120	4.0	4	5	13	35	-	-	29	16	4.15	-	0.04	51.2
11.98	14.1	17.1	55.6	0.1	-0.1	1.1	4	clayy SILT to silty CLAY	115	2.0	7	9	-	-	1.0	9.5	35	15	3.78	-	0.03	51.2
12.14	16.9	19.0	53.6	0.2	-0.2	0.9	5	silty SAND to sandy SILT	120	4.0	4	5	12	35	-	-	31	16	3.89	-	0.03	51.2
12.30	12.2	16.0	-	0.2	-0.2	1.7	4	clayy SILT to silty CLAY	115	2.0	6	8	-	-	0.8	8.0	41	15	-	-	0.02	-
12.47	11.6	15.0	-	0.1	-0.2	0.9	4	clayy SILT to silty CLAY	115	2.0	6	8	-	-	0.8	7.4	36	15	-	-	0.02	-
12.63	9.6	12.4	-	0.1	-0.2	1.5	4	clayy SILT to silty CLAY	115	2.0	5	6	-	-	0.6	6.1	45	15	-	-	0.02	-
12.80	10.2	11.8	-	0.1	-0.2	0.6	4	clayy SILT to silty CLAY	115	2.0	5	6	-	-	0.7	6.4	37	15	-	-	0.02	-
12.96	9.1	10.4	34.4	0.0	-0.2	0.3	5	silty SAND to sandy SILT	120	4.0	2	3	5	30	-	-	35	16	5.61	-	0.01	51.2
13.12	8.3	10.3	-	0.0	-0.3	0.6	4	clayy SILT to silty CLAY	115	2.0	4	5	-	-	0.6	5.0	40	15	-	-	0.00	-
13.29	7.1	8.6	-	0.1	-0.3	1.1	4	clayy SILT to silty CLAY	115	2.0	4	4	-	-	0.5	4.1	51	15	-	-	0.00	-
13.45	6.4	7.8	-	0.1	-0.3	1.1	4	clayy SILT to silty CLAY	115	2.0	3	4	-	-	0.4	3.7	53	15	-	-	0.00	-
13.62	5.7	6.8	-	0.1	-0.3	1.2	3	silty CLAY to CLAY	115	1.5	4	5	-	-	0.4	3.2	59	15	-	-	0.00	-
13.78	4.4	5.2	-	0.1	-0.3	2.2	3	silty CLAY to CLAY	115	1.5	3	3	-	-	0.3	2.3	77	15	-	-	0.00	-
13.94	3.7	4.3	-	0.1	-0.4	2.9	3	silty CLAY to CLAY	115	1.5	2	3	-	-	0.2	1.8	90	15	-	-	0.00	-
14.11	3.0	3.5	-	0.1	-0.4	3.4	3	silty CLAY to CLAY	115	1.5	2	2	-	-	0.2	1.4	95	15	-	-	0.00	-
14.27	2.3	2.6	-	0.1	-0.4	9.3	2	Organic SOILS - Peats	100	1.0	2	3	-	-	0.2	0.9	95	10	-	-	0.00	-
14.44	2.9	3.3	-	0.1	-0.4	7.4	2	Organic SOILS - Peats	100	1.0	3	3	-	-	0.3	1.3	95	10	-	-	0.00	-
14.60	3.6	4.0	-	0.2	-0.7	8.4	2	Organic SOILS - Peats	100	1.0	4	4	-	-	0.3	1.7	95	10	-	-	0.00	-
14.76	4.1	4.6	-	0.3	-0.7	8.3	2	Organic SOILS - Peats	100	1.0	4	5	-	-	0.4	2.0	95	10	-	-	0.00	-
14.93	6.4	7.1	-	0.3	-0.5	6.3	3	silty CLAY to CLAY	115	1.5	4	5	-	-	0.4	3.4	86	15	-	-	0.00	-
15.09	9.8	10.6	-	0.4	-0.7	4.8	3	silty CLAY to CLAY	115	1.5	7	7	-	-	0.7	5.4	68	15	-	-	0.00	-
15.26	11.4	12.3	-	0.5	-0.5	4.9	3	silty CLAY to CLAY	115	1.5	8	8	-	-	0.8	6.3	64	15	-	-	0.00	-
15.42	12.0	12.8	-	0.5	-0.5	4.8	3	silty CLAY to CLAY	115	1.5	8	9	-	-	0.8	6.6	63	15	-	-	0.00	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Project ID: Earth Mechanics
Data File: SDF(532).cpt
CPT Date: 9/27/2011 1:41:34 PM
GW During Test: No GW

Sounding ID: CPT-11-129
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qIncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.17	Cycl SStn %
15.58	11.9	12.6	-	0.5	-0.4	4.5	3	silty CLAY to CLAY	115	1.5	8	8	-	-	0.8	6.5	62	15	-	-	0.00	-
15.75	12.6	13.2	-	0.6	-0.4	4.8	3	silty CLAY to CLAY	115	1.5	8	9	-	-	0.9	6.9	62	15	-	-	0.00	-
15.91	14.2	14.8	-	0.6	-0.4	4.6	3	silty CLAY to CLAY	115	1.5	9	10	-	-	1.0	7.8	58	15	-	-	0.00	-
16.08	15.1	15.5	-	0.7	-0.3	4.8	3	silty CLAY to CLAY	115	1.5	10	10	-	-	1.0	8.2	58	15	-	-	0.00	-
16.24	15.8	16.1	-	0.7	-0.3	4.6	3	silty CLAY to CLAY	115	1.5	11	11	-	-	1.1	8.5	56	15	-	-	0.00	-
16.40	15.8	15.9	-	0.7	-0.3	5.0	3	silty CLAY to CLAY	115	1.5	11	11	-	-	1.1	8.4	58	15	-	-	0.00	-
16.57	16.6	16.6	-	0.8	-0.3	4.8	3	silty CLAY to CLAY	115	1.5	11	11	-	-	1.1	8.9	56	15	-	-	0.00	-
16.73	17.3	17.1	-	0.8	-0.2	5.0	3	silty CLAY to CLAY	115	1.5	12	11	-	-	1.2	9.2	56	15	-	-	0.00	-
16.90	16.7	16.4	-	0.9	-0.3	5.7	3	silty CLAY to CLAY	115	1.5	11	11	-	-	1.1	8.8	60	15	-	-	0.00	-
17.06	15.7	15.2	-	0.8	-0.3	5.7	3	silty CLAY to CLAY	115	1.5	10	10	-	-	1.1	8.1	62	15	-	-	0.00	-
17.23	14.9	14.3	-	0.8	-0.3	5.8	3	silty CLAY to CLAY	115	1.5	10	10	-	-	1.0	7.6	63	15	-	-	0.00	-
17.39	11.6	11.1	-	0.8	-0.2	7.2	3	silty CLAY to CLAY	115	1.5	8	7	-	-	0.8	5.8	75	15	-	-	0.00	-
17.55	10.1	9.5	-	0.7	-0.2	7.4	3	silty CLAY to CLAY	115	1.5	7	6	-	-	0.7	4.9	80	15	-	-	0.00	-
17.72	12.3	11.5	-	0.7	-0.2	5.8	3	silty CLAY to CLAY	115	1.5	8	8	-	-	0.8	6.0	69	15	-	-	0.00	-
17.88	17.0	15.8	-	0.8	-0.5	4.7	3	silty CLAY to CLAY	115	1.5	11	11	-	-	1.2	8.6	57	15	-	-	0.00	-
18.05	17.4	16.0	-	0.9	-0.5	5.8	3	silty CLAY to CLAY	115	1.5	12	11	-	-	1.2	8.7	61	15	-	-	0.00	-
18.21	19.2	17.5	-	1.1	-0.7	5.8	3	silty CLAY to CLAY	115	1.5	13	12	-	-	1.3	9.5	59	15	-	-	0.00	-
18.37	17.7	16.0	-	1.0	-0.5	6.0	3	silty CLAY to CLAY	115	1.5	12	11	-	-	1.2	8.7	61	15	-	-	0.00	-
18.54	13.5	12.1	-	1.0	-0.8	7.8	3	silty CLAY to CLAY	115	1.5	9	8	-	-	0.9	6.5	74	15	-	-	0.00	-
18.70	11.8	10.5	-	0.9	-0.9	8.4	3	silty CLAY to CLAY	115	1.5	8	7	-	-	0.8	5.5	80	15	-	-	0.00	-
18.87	12.4	11.0	-	0.9	-1.1	7.9	3	silty CLAY to CLAY	115	1.5	8	7	-	-	0.8	5.8	77	15	-	-	0.00	-
19.03	17.1	14.9	-	0.8	-0.8	5.3	3	silty CLAY to CLAY	115	1.5	11	10	-	-	1.2	8.1	61	15	-	-	0.00	-
19.19	20.6	17.8	-	0.9	-0.8	4.6	3	silty CLAY to CLAY	115	1.5	14	12	-	-	1.4	9.8	54	15	-	-	0.00	-
19.36	23.0	19.8	-	1.0	-0.7	4.6	3	silty CLAY to CLAY	115	1.5	15	13	-	-	1.6	9.9	52	15	-	-	0.00	-
19.52	24.3	20.8	-	1.1	-0.7	4.8	3	silty CLAY to CLAY	115	1.5	16	14	-	-	1.7	9.9	51	15	-	-	0.00	-
19.69	23.8	20.2	-	1.2	-0.7	5.4	3	silty CLAY to CLAY	115	1.5	16	13	-	-	1.6	9.9	54	15	-	-	0.00	-
19.85	21.9	18.4	-	1.2	-0.7	5.8	3	silty CLAY to CLAY	115	1.5	15	12	-	-	1.5	9.9	57	15	-	-	0.00	-
20.01	20.3	16.9	-	1.2	-0.7	6.3	3	silty CLAY to CLAY	115	1.5	14	11	-	-	1.4	9.4	61	15	-	-	0.00	-
20.18	20.0	16.5	-	1.1	-0.7	5.6	3	silty CLAY to CLAY	115	1.5	13	11	-	-	1.4	9.2	59	15	-	-	0.00	-
20.34	19.4	16.0	-	1.0	-0.6	5.7	3	silty CLAY to CLAY	115	1.5	13	11	-	-	1.3	8.8	60	15	-	-	0.00	-
20.51	18.2	14.8	-	1.0	-0.6	5.9	3	silty CLAY to CLAY	115	1.5	12	10	-	-	1.2	8.2	63	15	-	-	0.00	-
20.67	16.9	13.7	-	1.0	-0.6	6.1	3	silty CLAY to CLAY	115	1.5	11	9	-	-	1.1	7.5	66	15	-	-	0.00	-
20.83	17.5	14.0	-	0.9	-0.6	5.6	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	7.7	63	15	-	-	0.00	-
21.00	18.3	14.6	-	0.9	-0.6	5.3	3	silty CLAY to CLAY	115	1.5	12	10	-	-	1.2	8.1	61	15	-	-	0.00	-
21.16	17.5	13.8	-	0.9	-0.6	5.2	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	7.6	62	15	-	-	0.00	-
21.33	15.7	12.3	-	0.8	-0.5	5.5	3	silty CLAY to CLAY	115	1.5	10	8	-	-	1.1	6.7	66	15	-	-	0.00	-
21.49	17.1	13.3	-	0.8	-0.5	4.8	3	silty CLAY to CLAY	115	1.5	11	9	-	-	1.2	7.3	62	15	-	-	0.00	-
21.65	17.6	13.6	-	0.8	-0.5	4.6	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	7.5	60	15	-	-	0.00	-
21.82	16.6	12.7	-	0.7	-0.5	4.9	3	silty CLAY to CLAY	115	1.5	11	8	-	-	1.1	7.0	63	15	-	-	0.00	-
21.98	17.7	13.5	-	0.9	-0.5	5.5	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	7.5	64	15	-	-	0.00	-
22.15	19.1	14.5	-	1.1	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	13	10	-	-	1.3	8.1	64	15	-	-	0.00	-
22.31	23.3	17.5	-	1.3	-0.6	5.8	3	silty CLAY to CLAY	115	1.5	16	12	-	-	1.6	9.9	58	15	-	-	0.00	-
22.47	22.8	17.0	-	1.4	-0.6	6.4	3	silty CLAY to CLAY	115	1.5	15	11	-	-	1.6	9.6	61	15	-	-	0.00	-
22.64	19.2	14.2	-	1.2	-0.7	7.0	3	silty CLAY to CLAY	115	1.5	13	9	-	-	1.3	8.0	67	15	-	-	0.00	-
22.80	17.8	13.1	-	1.0	-0.6	6.0	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	7.3	66	15	-	-	0.00	-
22.97	17.5	12.8	-	1.0	-0.6	6.0	3	silty CLAY to CLAY	115	1.5	12	9	-	-	1.2	7.1	67	15	-	-	0.00	-
23.13	17.5	12.7	-	0.9	-0.6	5.9	3	silty CLAY to CLAY	115	1.5	12	8	-	-	1.2	7.0	67	15	-	-	0.00	-
23.30	17.6	12.7	-	1.0	-0.5	6.3	3	silty CLAY to CLAY	115	1.5	12	8	-	-	1.2	7.0	68	15	-	-	0.00	-
23.46	15.3	11.0	-	0.8	-0.6	6.0	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.0	6.0	71	15	-	-	0.00	-
23.62	12.7	9.1	-	0.9	-0.6	7.6	3	silty CLAY to CLAY	115	1.5	8	6	-	-	0.8	4.9	82	15	-	-	0.00	-
23.79	9.8	6.9	-	0.8	-0.7	9.8	2	Organic SOILS - Peats	100	1.0	10	7	-	-	1.0	3.6	95	10	-	-	0.00	-
23.95	13.6	9.5	-	0.8	-0.7	6.8	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	5.2	78	15	-	-	0.00	-
24.12	14.5	10.1	-	0.8	-0.7	6.3	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.0	5.5	75	15	-	-	0.00	-
24.28	15.3	10.6	-	0.8	-0.7	5.9	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.0	5.8	72	15	-	-	0.00	-
24.44	15.3	10.5	-	0.8	-0.7	5.9	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.0	5.8	72	15	-	-	0.00	-
24.61	15.8	10.8	-	0.8	-0.7	5.8	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	6.0	71	15	-	-	0.00	-
24.77	15.7	10.7	-	0.9	-0.7	6.2	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.1	5.9	73	15	-	-	0.00	-
24.94	15.7	10.6	-	0.8	-0.7	5.9	3	silty CLAY to CLAY	115	1.5	10	7	-	-	1.1	5.8	72	15	-	-	0.00	-
25.10	15.8	10.6	-	0.8	-0.7	5.5	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	5.9	71	15	-	-	0.00	-
25.26	16.6	11.1	-	0.8	-0.7	5.3	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	6.2	68	15	-	-	0.00	-
25.43	17.0	11.2	-	0.7	-0.7	4.6	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	6.3	65	15	-	-	0.00	-
25.59	14.7	9.7	-	0.7	-0.7	5.3	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	5.3	72	15	-	-	0.00	-
25.76	14.2	9.3	-	0.7	-0.7	5.9	3	silty CLAY to CLAY	115	1.5	9	6	-	-	0.9	5.1	76	15	-	-	0.00	-
25.92	14.6	9.5	-	0.8	-0.7	6.2	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	5.2	76	15	-	-	0.00	-
26.08	15.0	9.7	-	0.8	-0.6	6.3	3	silty CLAY to CLAY	115	1.5	10	6	-	-	1.0	5.4	76	15	-	-	0.00	-
26.25	16.7	10.7	-	0.9	-0.6	6.0	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	6.0	72	15	-	-	0.00	-
26.41	17.1	10.9	-	0.9	-0.7	5.8	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	6.1	71	15	-	-	0.00	-
26.58	17.2	10.9	-	0.8	-0.6	5.3	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.2	6.1	69	15	-	-	0.00	-
26.74	16.5	10.4	-	0.7	-0.6	5.0	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	5.8	69	15	-	-	0.00	-
26.90	16.3	10.2	-	0.8	-0.6	5.2	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	5.7	71	15	-	-	0.00	-
27.07	16.6	10.3	-	0.8	-0.6	5.3	3	silty CLAY to CLAY	115	1.5	11	7	-	-	1.1	5.8	70	15	-	-	0.00	-
27.23	18.8	11.7	-	0.8	-0.6	4.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.6	65	15	-	-	0.00	-
27.40	19.9	12.3	-	0.9	-0.6	4.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	7.0	64	15	-	-	0.00	-
27.56	18.1	11.1	-	0.9	-0.6	5.8	3	silty CLAY to CLAY	115	1.5	12	7	-	-	1.2	6.2	70	15	-	-	0.00	-
27.72	20.1	12.3	-	1.0	-0.5	5.2	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.4	7.0	65	15	-	-	0.00	-
27.89	19.7	11.9	-	1.0	-0.5	5.7	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.8	68	15	-	-	0.00	-
28.05	18.9	11.4	-	1.0	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.5	70	15	-	-	0.00	-
28.22	19.1	11.4	-	1.0	-0.5	5.7	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.5	69	15	-	-	0.00	-
28.38	19.5	11.6	-	1.0	-0.5	5.5	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.6	68	15	-	-	0.00	-
28.54	20.6	12.2	-	1.0	-0.5	5.1	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	7.0	65	15	-	-	0.00	-
28.71	20.4	12.0	-	1.0	-0.5	5.3	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	6.8	66	15	-	-	0.00	-
28.87	19.8	11.6	-	1.0	-0.5	5.8	3	silty CLAY to CLAY	115	1.5	13	8	-	-	1.3	6.6	69	15	-	-	0.00	-
29.04	21.5	12.5	-	1.1	-0.5	5.4	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.5	7.2	66	15	-	-	0.00	-
29.20	22.3	12.9	-	1.2	-0.5	6.0	3	silty CLAY to CLAY	115	1.5	15	9	-	-	1.5	7.4	67	15	-	-	0.00	-
29.36	22.3	12.8	-	1.2	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	15	9	-	-	1.5	7.4	67	15	-	-	0.00	-
29.53	21.5	12.3	-	1.2	-0.4	5.9	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.5	7.1	68	15	-	-	0.00	-
29.69	20.6	11.7	-	1.1	-0.4	5.9	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	6.7	69	15	-	-	0.00	-
29.86	22.1	12.5	-	1.2	-0.4	6.0	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	7.2	67	15	-	-	0.00	-
30.02	23.3	13.1	-	1.4	-0.4	6.3	3	silty CLAY to CLAY	115	1.5	16	9	-	-	1.6	7.6	68	15	-	-	0.00	-
30.19	25.3	14.2	-	1.3	-0.4	5.7	3	silty CLAY to CLAY	115	1.5	17	9	-	-	1.7	8.3	64	15	-	-	0.00	-
30.35	24.4	13.6	-	1.4	-0.4	6.1	3	silty CLAY to CLAY	115	1.5	16	9	-	-	1.7	7.9	66	15	-	-	0.00	-
30.51	25.9	14.4	-	1.2	-0.4	5.0	3	silty CLAY to CLAY	115	1.5	17	10	-	-	1.8	8.4	61	15	-	-	0.00	-
30.68	25.6	14.2	-	1.3	-0.3	5.6	3	silty CLAY to CLAY	115	1.5	17	9	-	-	1.7	8.3	63	15	-	-	0.00	-
30.84	26.3	14.4	-	1.5	-0.4	6.1	3	silty CLAY to CLAY	115	1.5	18	10	-	-	1.8	8.5	64	15	-	-	0.00	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(532).cpt
CPT Date: 9/27/2011 1:41:34 PM
GW During Test: No GW

Sounding ID: CPT-11-129
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.17	Cycl SStn %
31.01	22.2	12.1	-	1.5	-0.5	7.2	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	7.0	72	15	-	-	0.00	-
31.17	20.7	11.3	-	1.1	-0.5	5.9	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	6.5	70	15	-	-	0.00	-
31.33	21.5	11.6	-	1.0	-0.5	5.3	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.4	6.7	67	15	-	-	0.00	-
31.50	22.2	12.0	-	1.1	-0.4	5.3	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	6.9	66	15	-	-	0.00	-
31.66	21.6	11.6	-	1.1	-0.4	5.4	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.5	6.7	67	15	-	-	0.00	-
31.83	23.7	12.6	-	1.0	-0.4	4.5	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	7.3	62	15	-	-	0.00	-
31.99	23.2	12.3	-	0.8	-0.4	4.0	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.6	7.1	60	15	-	-	0.00	-
32.15	21.7	11.5	-	0.8	-0.4	4.0	3	silty CLAY to CLAY	115	1.5	14	8	-	-	1.5	6.6	62	15	-	-	0.00	-
32.32	23.9	12.6	-	0.8	-0.4	3.6	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	7.3	58	15	-	-	0.00	-
32.48	22.2	11.6	-	0.9	-0.4	4.4	3	silty CLAY to CLAY	115	1.5	15	8	-	-	1.5	6.7	64	15	-	-	0.00	-
32.65	24.2	12.6	-	0.9	-0.4	4.2	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	7.3	61	15	-	-	0.00	-
32.81	24.8	12.8	-	1.0	-0.4	4.2	3	silty CLAY to CLAY	115	1.5	17	9	-	-	1.7	7.5	60	15	-	-	0.00	-
32.97	23.6	12.1	-	1.1	-0.4	4.9	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	7.1	64	15	-	-	0.00	-
33.14	27.3	14.0	-	0.9	-0.4	3.4	3	silty CLAY to CLAY	115	1.5	18	9	-	-	1.9	8.2	54	15	-	-	0.00	-
33.30	24.1	12.3	-	0.7	-0.3	3.2	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	7.2	57	15	-	-	0.00	-
33.47	19.0	9.6	-	0.7	-0.3	4.2	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.5	68	15	-	-	0.00	-
33.63	22.2	11.2	-	0.8	-0.3	4.0	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	6.5	63	15	-	-	0.00	-
33.79	25.7	12.9	-	1.0	-0.2	4.0	3	silty CLAY to CLAY	115	1.5	17	9	-	-	1.7	7.6	59	15	-	-	0.00	-
33.96	24.4	12.2	-	0.9	-0.2	3.9	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	7.1	60	15	-	-	0.00	-
34.12	21.4	10.6	-	0.9	-0.1	4.7	3	silty CLAY to CLAY	115	1.5	14	7	-	-	1.4	6.1	67	15	-	-	0.00	-
34.29	23.7	11.7	-	0.9	-0.2	4.0	3	silty CLAY to CLAY	115	1.5	16	8	-	-	1.6	6.8	61	15	-	-	0.00	-
34.45	19.0	9.4	-	0.8	-0.2	4.6	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.3	71	15	-	-	0.00	-
34.61	16.9	8.3	-	1.0	-0.2	6.4	3	silty CLAY to CLAY	115	1.5	11	6	-	-	1.1	4.7	81	15	-	-	0.00	-
34.78	27.2	13.3	-	1.1	-0.2	4.4	3	silty CLAY to CLAY	115	1.5	18	9	-	-	1.8	7.8	60	15	-	-	0.00	-
34.94	34.5	16.8	-	1.2	-0.3	3.7	3	silty CLAY to CLAY	115	1.5	23	11	-	-	2.4	9.9	51	15	-	-	0.00	-
35.11	32.0	15.5	-	1.2	-0.4	4.1	3	silty CLAY to CLAY	115	1.5	21	10	-	-	2.2	9.3	55	15	-	-	0.00	-
35.27	32.3	15.6	-	1.2	-0.2	3.8	3	silty CLAY to CLAY	115	1.5	22	10	-	-	2.2	9.3	54	15	-	-	0.00	-
35.43	30.4	14.6	-	1.0	-0.2	3.7	3	silty CLAY to CLAY	115	1.5	20	10	-	-	2.1	8.7	54	15	-	-	0.00	-
35.60	23.1	11.0	-	0.9	-0.2	4.1	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.6	6.4	64	15	-	-	0.00	-
35.76	19.6	9.3	-	0.8	-0.1	4.6	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.3	71	15	-	-	0.00	-
35.93	20.6	9.7	-	0.7	-0.2	4.0	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.6	67	15	-	-	0.00	-
36.09	21.8	10.3	-	0.8	-0.2	4.2	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	5.9	66	15	-	-	0.00	-
36.26	25.6	12.0	-	0.9	-0.1	4.0	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	7.0	61	15	-	-	0.00	-
36.42	25.1	11.7	-	1.0	-0.1	4.1	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	6.9	62	15	-	-	0.00	-
36.58	25.7	12.0	-	0.9	-0.1	3.9	3	silty CLAY to CLAY	115	1.5	17	8	-	-	1.7	7.0	61	15	-	-	0.00	-
36.75	20.9	9.7	-	0.8	-0.1	4.3	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.6	68	15	-	-	0.00	-
36.91	21.1	9.7	-	0.8	-0.1	4.2	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.6	68	15	-	-	0.00	-
37.08	20.8	9.5	-	0.9	0.0	4.6	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.5	70	15	-	-	0.00	-
37.24	23.7	10.8	-	0.9	0.1	4.0	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	6.3	64	15	-	-	0.00	-
37.40	21.1	9.6	-	0.9	0.2	4.6	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.5	70	15	-	-	0.00	-
37.57	19.9	9.0	-	0.9	0.1	4.8	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.1	73	15	-	-	0.00	-
37.73	19.8	8.9	-	0.8	0.1	4.4	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.1	71	15	-	-	0.00	-
37.90	19.0	8.5	-	0.8	0.1	4.6	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	4.8	73	15	-	-	0.00	-
38.06	20.0	9.0	-	0.7	0.1	4.2	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	5.1	70	15	-	-	0.00	-
38.22	18.2	8.1	-	0.8	0.1	4.7	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	4.6	75	15	-	-	0.00	-
38.39	18.7	8.3	-	0.7	0.1	4.3	3	silty CLAY to CLAY	115	1.5	12	6	-	-	1.2	4.7	73	15	-	-	0.00	-
38.55	19.6	8.6	-	0.7	0.1	4.3	3	silty CLAY to CLAY	115	1.5	13	6	-	-	1.3	4.9	71	15	-	-	0.00	-
38.72	21.2	9.3	-	0.7	0.1	3.9	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.4	67	15	-	-	0.00	-
38.88	22.2	9.7	-	0.7	0.1	3.7	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	5.6	65	15	-	-	0.00	-
39.04	24.5	10.7	-	0.7	0.1	3.2	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.6	6.3	60	15	-	-	0.00	-
39.21	25.3	11.0	-	0.7	0.2	3.0	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.4	58	15	-	-	0.00	-
39.37	23.2	10.0	-	0.7	0.3	3.3	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.6	5.8	62	15	-	-	0.00	-
39.54	22.8	9.8	-	0.7	0.3	3.3	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	5.7	63	15	-	-	0.00	-
39.70	23.0	9.9	-	0.7	0.3	3.3	3	silty CLAY to CLAY	115	1.5	15	7	-	-	1.5	5.8	63	15	-	-	0.00	-
39.86	25.6	10.9	-	0.8	0.3	3.5	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.4	61	15	-	-	0.00	-
40.03	31.5	13.4	-	0.9	0.3	3.1	3	silty CLAY to CLAY	115	1.5	21	9	-	-	2.1	8.0	54	15	-	-	0.00	-
40.19	25.2	10.7	-	0.8	0.3	3.7	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.3	63	15	-	-	0.00	-
40.36	21.5	9.1	-	0.8	0.4	4.1	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	5.2	69	15	-	-	0.00	-
40.52	22.2	9.3	-	0.8	0.4	4.1	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	5.4	69	15	-	-	0.00	-
40.68	25.3	10.6	-	0.9	0.5	4.1	3	silty CLAY to CLAY	115	1.5	17	7	-	-	1.7	6.2	65	15	-	-	0.00	-
40.85	27.5	11.5	-	1.0	0.5	3.8	3	silty CLAY to CLAY	115	1.5	18	8	-	-	1.9	6.8	61	15	-	-	0.00	-
41.01	24.7	10.3	-	1.0	0.5	4.3	3	silty CLAY to CLAY	115	1.5	16	7	-	-	1.7	6.0	66	15	-	-	0.00	-
41.18	26.4	10.9	-	0.9	0.5	3.7	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.4	62	15	-	-	0.00	-
41.34	27.0	11.1	-	1.0	0.5	4.1	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.6	64	15	-	-	0.00	-
41.50	27.1	11.2	-	1.1	0.5	4.4	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.6	65	15	-	-	0.00	-
41.67	28.2	11.5	-	1.0	0.5	4.0	3	silty CLAY to CLAY	115	1.5	19	8	-	-	1.9	6.8	62	15	-	-	0.00	-
41.83	27.8	11.3	-	1.0	0.6	3.8	3	silty CLAY to CLAY	115	1.5	19	8	-	-	1.9	6.7	62	15	-	-	0.00	-
42.00	26.5	10.8	-	1.0	0.6	4.0	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.4	64	15	-	-	0.00	-
42.16	26.3	10.6	-	1.0	0.6	4.0	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.3	64	15	-	-	0.00	-
42.32	23.9	9.6	-	0.9	0.6	4.3	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.6	68	15	-	-	0.00	-
42.49	23.4	9.4	-	0.9	0.6	4.1	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	5.5	68	15	-	-	0.00	-
42.65	21.2	8.5	-	0.8	0.6	4.5	3	silty CLAY to CLAY	115	1.5	14	6	-	-	1.4	4.9	73	15	-	-	0.00	-
42.82	27.4	10.9	-	1.1	0.7	4.3	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	6.5	65	15	-	-	0.00	-
42.98	36.6	14.5	-	1.3	0.7	3.8	3	silty CLAY to CLAY	115	1.5	24	10	-	-	2.5	8.8	55	15	-	-	0.00	-
43.15	40.7	16.1	-	1.3	0.7	3.3	3	silty CLAY to CLAY	115	1.5	27	11	-	-	2.8	9.8	51	15	-	-	0.00	-
43.31	36.9	14.5	-	1.3	0.7	3.8	3	silty CLAY to CLAY	115	1.5	25	10	-	-	2.5	8.8	55	15	-	-	0.00	-
43.47	35.8	14.1	-	1.2	0.8	3.6	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	8.5	55	15	-	-	0.00	-
43.64	32.7	12.8	-	1.2	0.8	3.8	3	silty CLAY to CLAY	115	1.5	22	9	-	-	2.2	7.7	59	15	-	-	0.00	-
43.80	36.1	14.1	-	1.2	0.8	3.6	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.5	8.5	55	15	-	-	0.00	-
43.97	42.1	16.4	-	1.4	0.9	3.6	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	9.9	51	15	-	-	0.00	-
44.13	48.9	18.9	-	1.7	0.9	3.7	3	silty CLAY to CLAY	115	1.5	33	13	-	-	3.4	9.9	49	15	-	-	0.00	-
44.29	58.6	22.6	-	1.6	0.9	2.9	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	42	15	-	-	0.00	-
44.46	43.6	16.8	-	1.6	1.0	4.0	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	9.9	53	15	-	-	0.00	-
44.62	46.0	17.6	-	1.5	1.0	3.4	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.9	49	15	-	-	0.00	-
44.79	47.5	18.1	-	1.6	1.0	3.5	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	49	15	-	-	0.00	-
44.95	45.6	17.3	-	1.6	1.1	3.7	3	silty CLAY to CLAY	115	1.5	30	12	-	-	3.1	9.9	51	15	-	-	0.00	-
45.11	48.1	18.2	-	1.6	1.1	3.5	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	49	15	-	-	0.00	-
45.28	46.3	17.5	-	1.5	1.1	3.5	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.9	50	15	-	-	0.00	-
45.44	46.0	17.4	-	1.4	1.1	3.3	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.9	49	15	-	-	0.00	-
45.61	48.0	18.1	-	1.5	1.1	3.4	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.9	48	15	-	-	0.00	-
45.77	43.4	16.4	-	1.5	1.1	3.7	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	9.9	52	15	-	-	0.00	-
45.93	41.0	15.5	-	1.3	1.2	3.4	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.8	9.3	52	15	-	-	0.00	-
46.10	41.9	15.8	-	1.2	1.2	3.1	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	9.5	50	15	-	-	0.00	-
46.26	43.1	16.2	-	1.3	1.1	3.2	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	9.8	50	15	-	-	0.00	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(532).cpt
CPT Date: 9/27/2011 1:41:34 PM
GW During Test: No GW

Sounding ID: CPT-11-129
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln * PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT * R-N1 60%	Rel * Den %	Ftn * Ang deg	Und Shr tsf	OCR - ~	Fin * Ic -	Nk * -	Vol * Strn %	Dry * Stlmt 0.00	Liq * Stlmt 0.17	Cycl * SStn %
46.43	41.8	15.8	-	1.3	1.1	3.4	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	9.4	52	15	-	-	0.00	-
46.59	42.2	15.9	-	1.4	1.2	3.6	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	9.5	52	15	-	-	0.00	-
46.75	40.1	15.1	-	1.3	1.2	3.6	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	9.0	53	15	-	-	0.00	-
46.92	40.3	15.2	-	1.2	1.2	3.2	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	9.0	51	15	-	-	0.00	-
47.08	38.9	14.7	-	1.2	1.2	3.2	3	silty CLAY to CLAY	115	1.5	26	10	-	-	2.7	8.6	52	15	-	-	0.00	-
47.25	36.9	13.9	-	1.1	1.2	3.4	3	silty CLAY to CLAY	115	1.5	25	9	-	-	2.5	8.1	54	15	-	-	0.00	-
47.41	36.2	13.7	-	1.1	1.2	3.4	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.5	7.9	55	15	-	-	0.00	-
47.57	35.9	13.6	-	1.1	1.2	3.5	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	7.8	55	15	-	-	0.00	-
47.74	35.0	13.2	-	1.1	1.2	3.5	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	7.6	56	15	-	-	0.00	-
47.90	34.8	13.1	-	1.2	1.3	3.7	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	7.5	57	15	-	-	0.00	-
48.07	36.2	13.7	-	1.2	1.3	3.5	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.5	7.8	56	15	-	-	0.00	-
48.23	36.7	13.8	-	1.2	1.2	3.7	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.5	7.9	56	15	-	-	0.00	-
48.39	36.6	13.8	-	1.3	1.2	3.7	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.5	7.9	56	15	-	-	0.00	-
48.56	35.0	13.2	-	1.2	1.2	3.8	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	7.5	58	15	-	-	0.00	-
48.72	34.7	13.1	-	1.2	1.2	3.8	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	7.4	58	15	-	-	0.00	-
48.89	33.8	12.8	-	1.2	1.2	3.8	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	7.1	59	15	-	-	0.00	-
49.05	32.5	12.3	-	1.1	1.2	3.9	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	6.8	60	15	-	-	0.00	-
49.22	32.6	12.3	-	1.1	1.2	3.7	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	6.8	59	15	-	-	0.00	-
49.38	32.1	12.1	-	1.1	1.2	3.8	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.2	6.7	60	15	-	-	0.00	-
49.54	30.6	11.5	-	1.2	1.2	4.3	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.1	6.3	64	15	-	-	0.00	-
49.71	27.1	10.2	-	1.1	1.2	4.6	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.5	68	15	-	-	0.00	-
49.87	26.3	9.9	-	1.1	1.3	4.5	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.8	5.3	69	15	-	-	0.00	-
50.04	25.3	9.6	-	1.0	1.3	4.6	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	5.1	70	15	-	-	0.00	-
50.20	20.4	7.7	-	1.0	1.3	5.9	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.3	3.9	82	15	-	-	0.00	-
50.36	18.2	6.9	-	1.0	1.3	6.3	3	silty CLAY to CLAY	115	1.5	12	5	-	-	1.2	3.4	88	15	-	-	0.00	-
50.53	24.4	9.2	-	0.9	1.3	4.2	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.8	70	15	-	-	0.00	-
50.69	22.5	8.5	-	0.9	1.3	4.9	3	silty CLAY to CLAY	115	1.5	15	6	-	-	1.5	4.4	75	15	-	-	0.00	-
50.86	20.6	7.8	-	1.0	1.2	5.7	3	silty CLAY to CLAY	115	1.5	14	5	-	-	1.4	3.9	81	15	-	-	0.00	-
51.02	24.6	9.3	-	1.0	1.2	4.4	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.8	70	15	-	-	0.00	-
51.18	24.6	9.3	-	1.1	1.3	4.9	3	silty CLAY to CLAY	115	1.5	16	6	-	-	1.6	4.8	73	15	-	-	0.00	-
51.35	28.4	10.7	-	1.1	1.2	4.5	3	silty CLAY to CLAY	115	1.5	19	7	-	-	1.9	5.6	67	15	-	-	0.00	-
51.51	30.5	11.5	-	1.2	1.2	4.5	3	silty CLAY to CLAY	115	1.5	20	8	-	-	2.0	6.0	64	15	-	-	0.00	-
51.68	34.8	13.1	-	1.5	1.3	4.8	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.4	7.0	62	15	-	-	0.00	-
51.84	35.5	13.4	-	1.8	1.3	5.6	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	7.1	65	15	-	-	0.00	-
52.00	47.9	18.1	-	2.1	1.4	4.7	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.8	54	15	-	-	0.00	-
52.17	44.3	16.7	-	2.1	1.4	5.1	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.0	9.0	57	15	-	-	0.00	-
52.33	42.3	16.0	-	1.8	1.4	4.7	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	8.5	57	15	-	-	0.00	-
52.50	43.9	16.6	-	1.9	1.5	4.5	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	8.8	56	15	-	-	0.00	-
52.66	45.1	17.0	-	1.8	1.6	4.4	3	silty CLAY to CLAY	115	1.5	30	11	-	-	3.1	9.1	54	15	-	-	0.00	-
52.82	43.0	16.2	-	1.9	1.6	4.7	3	silty CLAY to CLAY	115	1.5	29	11	-	-	2.9	8.6	56	15	-	-	0.00	-
52.99	46.4	17.5	-	1.7	1.7	4.0	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.3	52	15	-	-	0.00	-
53.15	54.5	20.6	-	1.9	1.6	3.7	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	47	15	-	-	0.00	-
53.32	57.6	21.7	-	1.9	1.6	3.5	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	45	15	-	-	0.00	-
53.48	58.2	21.9	-	1.9	1.7	3.5	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	45	15	-	-	0.00	-
53.64	60.6	22.9	-	1.9	1.7	3.3	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.2	9.9	43	15	-	-	0.00	-
53.81	58.0	21.9	-	1.9	1.7	3.5	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	45	15	-	-	0.00	-
53.97	58.7	22.1	-	1.7	1.7	3.1	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	43	15	-	-	0.00	-
54.14	58.0	21.9	-	1.7	1.8	3.0	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	43	15	-	-	0.00	-
54.30	58.8	22.2	-	1.7	1.8	3.0	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	42	15	-	-	0.00	-
54.46	58.5	22.1	-	1.6	1.8	2.8	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	42	15	-	-	0.00	-
54.63	54.1	20.4	-	1.6	1.8	3.1	4	clayy SILT to silty CLAY	115	2.0	27	10	-	-	3.7	9.9	45	15	-	-	0.00	-
54.79	54.3	20.5	-	1.5	1.8	3.0	4	clayy SILT to silty CLAY	115	2.0	27	10	-	-	3.7	9.9	44	15	-	-	0.00	-
54.96	54.1	20.4	-	1.6	1.8	3.1	4	clayy SILT to silty CLAY	115	2.0	27	10	-	-	3.7	9.9	45	15	-	-	0.00	-
55.12	46.9	17.7	-	1.6	1.7	3.6	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.2	9.0	50	15	-	-	0.00	-
55.28	43.5	16.4	-	1.6	1.6	3.9	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	8.3	53	15	-	-	0.00	-
55.45	40.8	15.4	-	1.4	1.6	3.7	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.8	7.7	54	15	-	-	0.00	-
55.61	40.6	15.3	-	1.6	1.8	4.2	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.8	7.7	56	15	-	-	0.00	-
55.78	48.2	18.2	-	1.7	1.8	3.8	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	9.2	51	15	-	-	0.00	-
55.94	46.0	17.4	-	1.6	1.8	3.9	3	silty CLAY to CLAY	115	1.5	31	12	-	-	3.1	8.7	52	15	-	-	0.00	-
56.11	49.6	18.7	-	2.1	1.9	4.5	3	silty CLAY to CLAY	115	1.5	33	12	-	-	3.4	9.4	53	15	-	-	0.00	-
56.27	62.0	23.4	-	2.3	1.9	3.9	3	silty CLAY to CLAY	115	1.5	41	16	-	-	4.3	9.9	46	15	-	-	0.00	-
56.43	71.5	27.0	-	2.4	2.0	3.5	4	clayy SILT to silty CLAY	115	2.0	36	13	-	-	4.9	9.9	41	15	-	-	0.00	-
56.60	75.4	28.5	-	2.2	2.1	3.0	4	clayy SILT to silty CLAY	115	2.0	38	14	-	-	5.2	9.9	38	15	-	-	0.00	-
56.76	70.0	26.4	-	1.9	2.1	2.9	4	clayy SILT to silty CLAY	115	2.0	35	13	-	-	4.8	9.9	39	15	-	-	0.00	-
56.93	62.0	23.4	-	1.7	2.1	2.9	4	clayy SILT to silty CLAY	115	2.0	31	12	-	-	4.3	9.9	41	15	-	-	0.00	-
57.09	57.1	21.5	-	1.8	2.0	3.4	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	3.9	9.9	45	15	-	-	0.00	-
57.25	61.6	23.2	-	2.1	2.0	3.6	4	clayy SILT to silty CLAY	115	2.0	31	12	-	-	4.2	9.9	44	15	-	-	0.00	-
57.42	69.0	26.0	-	2.3	2.1	3.6	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.8	9.9	42	15	-	-	0.00	-
57.58	71.9	27.1	-	2.5	2.0	3.6	4	clayy SILT to silty CLAY	115	2.0	36	14	-	-	5.0	9.9	42	15	-	-	0.00	-
57.75	66.6	25.1	-	2.4	2.0	3.9	4	clayy SILT to silty CLAY	115	2.0	33	13	-	-	4.6	9.9	44	15	-	-	0.00	-
57.91	63.2	23.9	-	2.2	2.1	3.7	4	clayy SILT to silty CLAY	115	2.0	32	12	-	-	4.4	9.9	44	15	-	-	0.00	-
58.07	59.8	22.6	-	2.2	2.0	3.8	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.1	9.9	46	15	-	-	0.00	-
58.24	55.3	20.8	-	2.4	2.0	4.6	3	silty CLAY to CLAY	115	1.5	37	14	-	-	3.8	9.9	51	15	-	-	0.00	-
58.40	54.1	20.4	-	2.3	2.1	4.6	3	silty CLAY to CLAY	115	1.5	36	14	-	-	3.7	9.9	51	15	-	-	0.00	-
58.57	52.4	19.8	-	2.5	2.2	5.1	3	silty CLAY to CLAY	115	1.5	35	13	-	-	3.6	9.6	54	15	-	-	0.00	-
58.73	60.6	22.9	-	2.7	2.2	4.8	3	silty CLAY to CLAY	115	1.5	40	15	-	-	4.2	9.9	49	15	-	-	0.00	-
58.89	70.6	26.7	-	3.4	2.4	5.0	3	silty CLAY to CLAY	115	1.5	47	18	-	-	4.9	9.9	47	15	-	-	0.00	-
59.06	76.1	28.7	-	3.5	2.3	4.8	3	silty CLAY to CLAY	115	1.5	51	19	-	-	5.3	9.9	45	15	-	-	0.00	-
59.22	75.9	28.6	-	3.3	2.2	4.5	3	silty CLAY to CLAY	115	1.5	51	19	-	-	5.2	9.9	44	15	-	-	0.00	-
59.39	63.0	23.8	-	2.8	2.3	4.8	3	silty CLAY to CLAY	115	1.5	42	16	-	-	4.3	9.9	49	15	-	-	0.00	-
59.55	58.3	22.0	-	2.5	2.3	4.6	3	silty CLAY to CLAY	115	1.5	39	15	-	-	4.0	9.9	50	15	-	-	0.00	-
59.71	49.8	18.8	-	2.1	2.4	4.5	3	silty CLAY to CLAY	115	1.5	33	13	-	-	3.4	8.9	53	15	-	-	0.00	-
59.88	48.5	18.3	-	2.8	2.2	6.1	3	silty CLAY to CLAY	115	1.5	32	12	-	-	3.3	8.6	59	15	-	-	0.00	-
60.04	31.6	11.9	-	2.8	1.8	9.9	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	5.4	81	15	-	-	0.00	-
60.21	40.3	15.2	-	2.4	1.6	6.6	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.7	7.0	65	15	-	-	0.00	-
60.37	35.9	13.5	-	2.1	1.2	6.6	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	6.2	68	15	-	-	0.00	-
60.53	31.5	11.9	-	1.9	1.1	6.9	3	silty CLAY to CLAY	115	1.5	21	8	-	-	2.1	5.3	73	15	-	-	0.00	-
60.70	33.5	12.7	-	1.9	1.2	6.2	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	5.7	69	15	-	-	0.00	-
60.86	34.0	12.8	-	1.6	1.5	5.4	3	silty CLAY to CLAY	115	1.5	23	9	-	-	2.3	5.8	65	15	-	-	0.00	-
61.03	33.4	12.6	-	1.7	1.4	5.8	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	5.6	67	15	-	-	0.00	-
61.19	41.0	15.5	-	1.9	1.2	5.0	3	silty CLAY to CLAY	115	1.5	27	10	-	-	2.8	7.0	59	15	-	-	0.00	-
61.35	42.1	15.9	-	1.9	1.2	4.9	3	silty CLAY to CLAY	115	1.5	28	11	-	-	2.9	7.2	58	15	-	-	0.00	-
61.52	36.0	13.6	-	1.7	1.3	5.3	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	6.1	64	15	-	-	0.00	-
61.68	26.3	9.9	-	1.4	1.3	6.0	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.7	4.2	75	15	-	-	0.00	-

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(532).cpt
CPT Date: 9/27/2011 1:41:34 PM
GW During Test: No GW

Sounding ID: CPT-11-129
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.17	Cycl SStn %
61.85	21.9	8.2	-	1.2	1.3	6.4	3	silty CLAY to CLAY	115	1.5	15	5	-	-	1.4	3.4	83	15	-	-	0.00	-
62.01	25.1	9.5	-	1.1	1.2	4.9	3	silty CLAY to CLAY	115	1.5	17	6	-	-	1.7	4.0	73	15	-	-	0.00	-
62.17	26.5	10.0	-	1.3	1.3	5.8	3	silty CLAY to CLAY	115	1.5	18	7	-	-	1.7	4.2	74	15	-	-	0.00	-
62.34	43.8	16.5	-	1.5	1.3	3.7	3	silty CLAY to CLAY	115	1.5	29	11	-	-	3.0	7.4	52	15	-	-	0.00	-
62.50	35.8	13.5	-	1.5	1.0	4.6	3	silty CLAY to CLAY	115	1.5	24	9	-	-	2.4	5.9	61	15	-	-	0.00	-
62.67	33.5	12.6	-	1.6	1.1	5.2	3	silty CLAY to CLAY	115	1.5	22	8	-	-	2.2	5.5	65	15	-	-	0.00	-
62.83	58.9	22.2	-	1.8	1.2	3.3	4	clayy SILT to silty CLAY	115	2.0	29	11	-	-	4.0	9.9	44	15	-	-	0.00	-
63.00	75.7	28.6	-	2.4	1.2	3.3	4	clayy SILT to silty CLAY	115	2.0	38	14	-	-	5.2	9.9	39	15	-	-	0.00	-
63.16	83.0	31.3	-	2.4	1.3	3.0	4	clayy SILT to silty CLAY	115	2.0	42	16	-	-	5.7	9.9	36	15	-	-	0.00	-
63.32	76.3	28.8	-	2.2	1.3	3.1	4	clayy SILT to silty CLAY	115	2.0	38	14	-	-	5.3	9.9	38	15	-	-	0.00	-
63.49	69.0	26.0	-	1.9	1.4	2.9	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.7	9.9	39	15	-	-	0.00	-
63.65	60.2	22.7	-	2.0	1.6	3.6	4	clayy SILT to silty CLAY	115	2.0	30	11	-	-	4.1	9.9	45	15	-	-	0.00	-
63.82	68.6	25.9	-	2.2	1.6	3.4	4	clayy SILT to silty CLAY	115	2.0	34	13	-	-	4.7	9.9	41	15	-	-	0.00	-
63.98	74.2	28.0	-	2.2	1.5	3.1	4	clayy SILT to silty CLAY	115	2.0	37	14	-	-	5.1	9.9	39	15	-	-	0.00	-
64.14	74.5	28.1	-	2.0	1.5	2.8	4	clayy SILT to silty CLAY	115	2.0	37	14	-	-	5.1	9.9	37	15	-	-	0.00	-
64.31	66.1	24.9	-	2.2	1.6	3.5	4	clayy SILT to silty CLAY	115	2.0	33	12	-	-	4.5	9.9	43	15	-	-	0.00	-
64.47	80.9	30.5	-	2.8	1.7	3.6	4	clayy SILT to silty CLAY	115	2.0	40	15	-	-	5.6	9.9	39	15	-	-	0.00	-
64.64	89.5	33.8	-	3.0	1.7	3.5	4	clayy SILT to silty CLAY	115	2.0	45	17	-	-	6.2	9.9	37	15	-	-	0.00	-
64.80	89.4	33.7	-	3.2	1.7	3.8	4	clayy SILT to silty CLAY	115	2.0	45	17	-	-	6.2	9.9	38	15	-	-	0.00	-
64.96	84.1	31.7	-	3.1	1.7	3.9	4	clayy SILT to silty CLAY	115	2.0	42	16	-	-	5.8	9.9	40	15	-	-	0.00	-
65.13	81.6	30.8	-	3.2	1.8	4.1	4	clayy SILT to silty CLAY	115	2.0	41	15	-	-	5.6	9.9	41	15	-	-	0.00	-
65.29	72.4	27.3	-	3.3	1.8	4.8	3	silty CLAY to CLAY	115	1.5	48	18	-	-	5.0	9.9	46	15	-	-	0.00	-
65.46	112.3	55.9	139.5	3.4	1.9	3.1	4	clayy SILT to silty CLAY	115	2.0	56	28	-	-	7.8	9.9	28	15	1.48	-	0.00	37.9

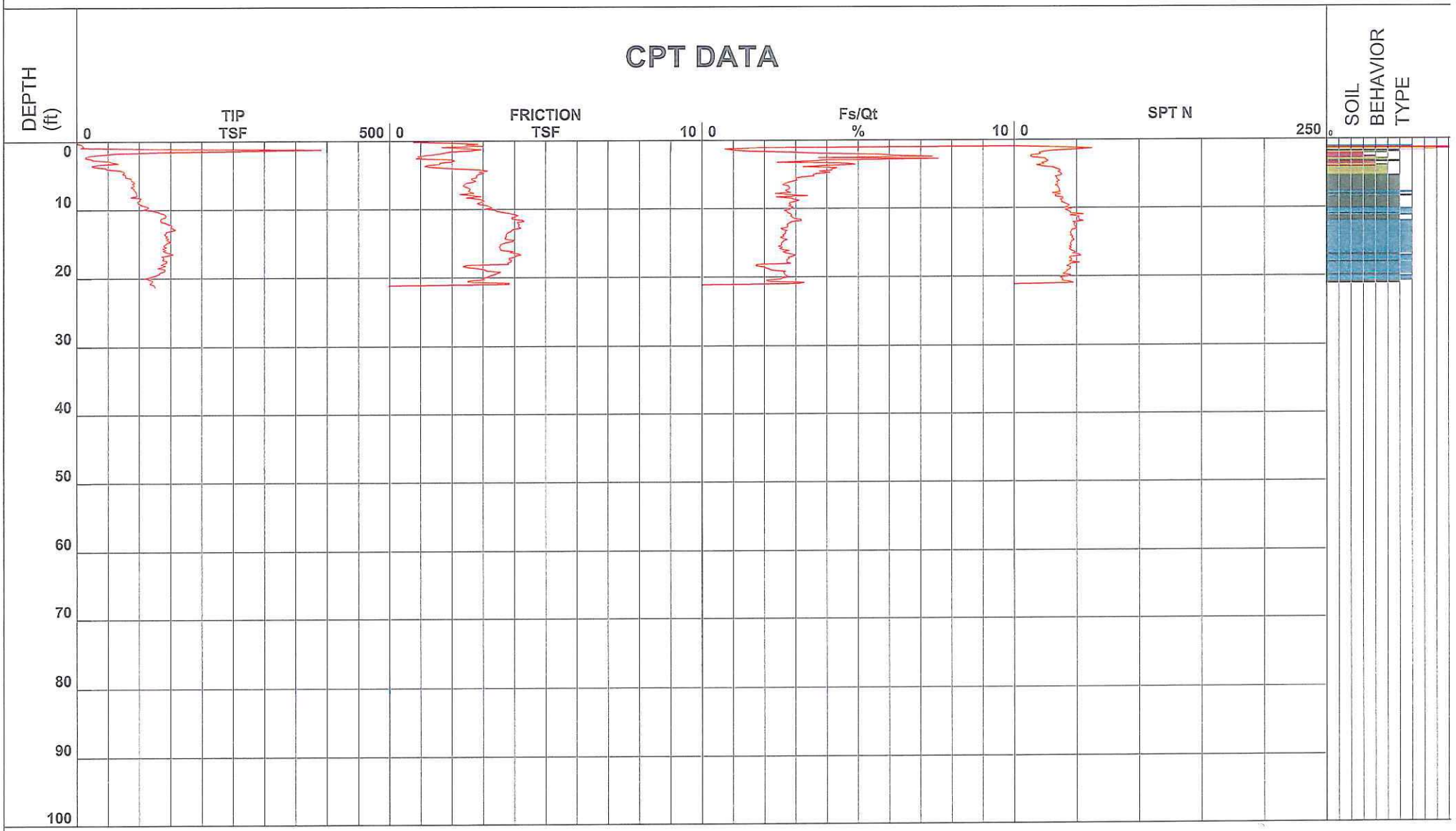
* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Earth Mechanics

Location	I-5 HOV Widening Segment 1	Operator	BH-JB	Filename	SDF(531).cpt
Job Number	11-135	Cone Number	DSG1104	GPS	
Hole Number	CPT-11-131	Date and Time	9/27/2011 12:07:53 PM	Maximum Depth	21.33 ft
Water Table Depth		>21.33 ft			

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(531).cpt
CPT Date: 9/27/2011 12:07:53 PM
GW During Test: No GW

Sounding ID: CPT-11-131
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic -	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.00	Cycl SStn %
0.33	1.1	1.4	-	1.9	0.1	9.9	2	Organic SOILS - Peats	100	1.0	1	1	-	-	0.1	9.9	95	10	N/A	0.00	N/A	N/A
0.49	7.4	11.9	-	2.8	0.2	9.9	3	silty CLAY to CLAY	115	1.5	5	8	-	-	0.5	9.9	78	15	N/A	0.00	N/A	N/A
0.66	9.2	14.7	-	2.4	0.3	9.9	3	silty CLAY to CLAY	115	1.5	6	10	-	-	0.6	9.9	73	15	N/A	0.00	N/A	N/A
0.82	11.1	17.7	-	3.0	0.4	9.9	3	silty CLAY to CLAY	115	1.5	7	12	-	-	0.8	9.9	68	15	N/A	0.00	N/A	N/A
0.98	7.3	11.6	-	1.7	0.4	9.9	3	silty CLAY to CLAY	115	1.5	5	8	-	-	0.5	9.9	79	15	N/A	0.00	N/A	N/A
1.15	125.2	200.8	237.2	2.3	0.3	1.9	6	clean SAND to silty SAND	125	5.0	25	40	90	48	-	-	10	16	N/A	0.00	N/A	N/A
1.31	390.4	626.2	626.2	2.9	-0.6	0.7	7	grvly SAND to dense SAND	130	6.0	65	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
1.48	250.2	401.2	401.2	2.5	0.0	1.0	6	clean SAND to silty SAND	125	5.0	50	80	95	48	-	-	5	16	N/A	0.00	N/A	N/A
1.64	129.9	208.4	232.0	1.9	0.2	1.5	6	clean SAND to silty SAND	125	5.0	26	42	91	48	-	-	8	16	N/A	0.00	N/A	N/A
1.80	60.7	97.4	173.0	1.8	0.2	2.9	5	silty SAND to sandy SILT	120	4.0	15	24	66	48	-	-	20	16	N/A	0.00	N/A	N/A
1.97	41.7	67.0	163.3	1.5	0.2	3.7	4	clayy SILT to silty CLAY	115	2.0	21	33	-	-	2.9	9.9	28	15	N/A	0.00	N/A	N/A
2.13	21.5	34.4	-	1.2	0.2	5.7	3	silty CLAY to CLAY	115	1.5	14	23	-	-	1.5	9.9	44	15	N/A	0.00	N/A	N/A
2.30	14.9	23.9	-	0.9	0.2	6.1	3	silty CLAY to CLAY	115	1.5	10	16	-	-	1.0	9.9	52	15	N/A	0.00	N/A	N/A
2.46	13.9	22.3	-	1.0	0.1	7.4	3	silty CLAY to CLAY	115	1.5	9	15	-	-	1.0	9.9	57	15	N/A	0.00	N/A	N/A
2.62	22.9	36.7	-	0.9	-0.1	3.8	4	clayy SILT to silty CLAY	115	2.0	11	18	-	-	1.6	9.9	36	15	N/A	0.00	N/A	N/A
2.79	26.1	41.9	-	2.0	-0.2	7.6	3	silty CLAY to CLAY	115	1.5	17	28	-	-	1.8	9.9	46	15	N/A	0.00	N/A	N/A
2.95	51.6	82.7	190.5	2.1	-0.3	4.0	4	clayy SILT to silty CLAY	115	2.0	26	41	-	-	3.6	9.9	26	15	N/A	0.00	N/A	N/A
3.12	56.7	90.9	184.8	2.0	-0.3	3.5	5	silty SAND to sandy SILT	120	4.0	14	23	64	46	-	-	23	16	N/A	0.00	N/A	N/A
3.28	66.7	107.0	167.7	1.6	-1.3	2.4	5	silty SAND to sandy SILT	120	4.0	17	27	69	47	-	-	18	16	0.00	-	0.00	0.0
3.45	34.6	55.5	172.6	1.6	-0.7	4.7	4	clayy SILT to silty CLAY	115	2.0	17	28	-	-	2.4	9.9	34	15	0.00	-	0.00	0.0
3.61	24.7	39.6	-	1.2	-0.4	4.9	3	silty CLAY to CLAY	115	1.5	16	26	-	-	1.7	9.9	39	15	-	-	0.00	-
3.77	28.5	45.7	144.8	1.1	-0.2	4.0	4	clayy SILT to silty CLAY	115	2.0	14	23	-	-	2.0	9.9	34	15	0.24	-	0.00	0.5
3.94	45.9	73.6	159.4	1.5	-0.7	3.3	5	silty SAND to sandy SILT	120	4.0	11	18	57	45	-	-	25	16	0.13	-	0.00	0.4
4.10	48.5	77.7	192.7	2.1	-1.5	4.3	4	clayy SILT to silty CLAY	115	2.0	24	39	-	-	3.4	9.9	28	15	0.00	-	0.00	0.0
4.27	69.4	111.3	227.3	2.9	-1.3	4.2	9	very stiff fine SOIL	120	2.0	35	56	71	46	-	-	24	30	0.00	-	0.00	0.0
4.43	75.5	121.0	237.7	3.1	-1.1	4.2	9	very stiff fine SOIL	120	2.0	38	61	73	47	-	-	23	30	0.00	-	0.00	0.0
4.59	76.6	122.8	227.0	2.9	-1.0	3.8	8	stiff SAND to clayy SAND	115	1.0	77	100	-	-	5.1	9.9	21	16	0.00	-	0.00	0.0
4.76	73.8	118.3	232.8	3.0	-1.0	4.1	9	very stiff fine SOIL	120	2.0	37	59	73	46	-	-	23	30	0.00	-	0.00	0.0
4.92	77.6	124.5	225.8	2.9	-1.0	3.7	8	stiff SAND to clayy SAND	115	1.0	78	100	-	-	5.1	9.9	21	16	0.00	-	0.00	0.0
5.09	78.6	126.0	223.5	2.8	-1.0	3.6	5	silty SAND to sandy SILT	120	4.0	20	31	75	46	-	-	20	16	0.00	-	0.00	0.0
5.25	78.1	125.2	223.4	2.8	-1.0	3.6	5	silty SAND to sandy SILT	120	4.0	20	31	74	46	-	-	21	16	0.00	-	0.00	0.0
5.41	86.9	139.3	224.8	2.8	-1.0	3.2	5	silty SAND to sandy SILT	120	4.0	22	35	78	47	-	-	18	16	0.00	-	0.00	0.0
5.58	87.5	140.3	219.1	2.6	-0.9	3.0	5	silty SAND to sandy SILT	120	4.0	22	35	78	47	-	-	17	16	0.00	-	0.00	0.0
5.74	87.5	140.4	219.8	2.6	-1.0	3.0	5	silty SAND to sandy SILT	120	4.0	22	35	78	47	-	-	18	16	0.00	-	0.00	0.0
5.91	90.9	145.8	225.7	2.8	-1.0	3.0	5	silty SAND to sandy SILT	120	4.0	23	36	79	47	-	-	17	16	0.00	-	0.00	0.0
6.07	93.2	149.5	223.6	2.7	-1.0	2.9	5	silty SAND to sandy SILT	120	4.0	23	37	80	47	-	-	16	16	0.00	-	0.00	0.0
6.23	89.1	142.9	213.3	2.5	-0.9	2.8	5	silty SAND to sandy SILT	120	4.0	22	36	79	46	-	-	16	16	0.00	-	0.00	0.0
6.40	91.9	145.7	211.7	2.4	-0.9	2.6	5	silty SAND to sandy SILT	120	4.0	23	36	79	46	-	-	16	16	0.00	-	0.00	0.0
6.56	91.3	142.9	207.8	2.4	-0.9	2.6	5	silty SAND to sandy SILT	120	4.0	23	36	79	46	-	-	16	16	0.00	-	0.00	0.0
6.73	87.3	135.0	206.0	2.4	-0.9	2.8	5	silty SAND to sandy SILT	120	4.0	22	34	77	46	-	-	17	16	0.00	-	0.00	0.0
6.89	90.1	137.6	208.9	2.5	-0.9	2.8	5	silty SAND to sandy SILT	120	4.0	23	34	78	46	-	-	17	16	0.00	-	0.00	0.0
7.05	92.0	138.8	211.0	2.6	-0.8	2.8	5	silty SAND to sandy SILT	120	4.0	23	35	78	46	-	-	17	16	0.00	-	0.00	0.0
7.22	92.9	138.4	210.2	2.6	-0.8	2.8	5	silty SAND to sandy SILT	120	4.0	23	35	78	46	-	-	17	16	0.00	-	0.00	0.0
7.38	94.6	139.4	207.2	2.5	-0.8	2.7	5	silty SAND to sandy SILT	120	4.0	24	35	78	46	-	-	16	16	0.00	-	0.00	0.0
7.55	95.1	138.6	207.7	2.6	-0.8	2.7	5	silty SAND to sandy SILT	120	4.0	24	35	78	46	-	-	17	16	0.00	-	0.00	0.0
7.71	95.4	137.5	210.8	2.7	-0.8	2.8	5	silty SAND to sandy SILT	120	4.0	24	34	78	46	-	-	17	16	0.00	-	0.00	0.0
7.87	96.6	137.8	194.9	2.3	-0.8	2.4	5	silty SAND to sandy SILT	120	4.0	24	34	78	46	-	-	15	16	0.00	-	0.00	0.0
8.04	96.5	136.3	205.0	2.6	-0.8	2.7	5	silty SAND to sandy SILT	120	4.0	24	34	77	46	-	-	17	16	0.00	-	0.00	0.0
8.20	86.8	121.3	212.8	2.9	0.2	3.4	5	silty SAND to sandy SILT	120	4.0	22	30	73	45	-	-	20	16	0.00	-	0.00	0.0
8.37	103.1	142.6	200.9	2.5	0.2	2.4	5	silty SAND to sandy SILT	120	4.0	26	36	79	46	-	-	15	16	0.00	-	0.00	0.0
8.53	100.9	138.1	211.4	2.9	0.2	2.8	5	silty SAND to sandy SILT	120	4.0	25	35	78	46	-	-	17	16	0.00	-	0.00	0.0
8.69	101.5	137.6	214.4	3.0	0.2	2.9	5	silty SAND to sandy SILT	120	4.0	25	34	78	46	-	-	17	16	0.00	-	0.00	0.0
8.86	97.6	131.2	213.6	3.0	0.2	3.1	5	silty SAND to sandy SILT	120	4.0	24	33	76	46	-	-	18	16	0.00	-	0.00	0.0
9.02	98.4	131.0	209.6	2.9	0.2	3.0	5	silty SAND to sandy SILT	120	4.0	25	33	76	46	-	-	18	16	0.00	-	0.00	0.0
9.19	100.3	132.2	204.9	2.8	0.2	2.8	5	silty SAND to sandy SILT	120	4.0	25	33	76	46	-	-	17	16	0.00	-	0.00	0.0
9.35	103.8	135.6	207.7	2.9	0.2	2.8	5	silty SAND to sandy SILT	120	4.0	26	34	77	46	-	-	17	16	0.00	-	0.00	0.0
9.51	109.7	142.1	216.1	3.1	0.2	2.9	5	silty SAND to sandy SILT	120	4.0	27	36	79	46	-	-	17	16	0.00	-	0.00	0.0
9.68	115.2	148.0	219.3	3.2	0.2	2.8	5	silty SAND to sandy SILT	120	4.0	29	37	80	46	-	-	16	16	0.00	-	0.00	0.0
9.84	113.2	144.2	219.7	3.3	0.2	2.9	5	silty SAND to sandy SILT	120	4.0	28	36	79	46	-	-	17	16	0.00	-	0.00	0.0
10.01	107.6	135.9	210.6	3.1	0.2	2.9	5	silty SAND to sandy SILT	120	4.0	27	34	77	46	-	-	17	16	0.00	-	0.00	0.0
10.17	120.8	151.3	223.2	3.4	0.3	2.8	5	silty SAND to sandy SILT	120	4.0	30	38	81	46	-	-	16	16	0.00	-	0.00	0.0
10.34	129.6	161.0	227.3	3.4	0.3	2.7	5	silty SAND to sandy SILT	120	4.0	32	40	83	46	-	-	15	16	0.00	-	0.00	0.0
10.50	133.1	164.1	232.9	3.6	0.3	2.7	5	silty SAND to sandy SILT	120	4.0	33	41	83	46	-	-	15	16	0.00	-	0.00	0.0
10.66	139.6	170.7	240.0	3.8	0.4	2.8	5	silty SAND to sandy SILT	120	4.0	35	43	85	47	-	-	15	16	0.00	-	0.00	0.0
10.83	141.9	172.1	244.4	4.0	0.4	2.8	5	silty SAND to sandy SILT	120	4.0	35	43	85	47	-	-	15	16	0.00	-	0.00	0.0
10.99	143.0	172.1	246.0	4.1	0.4	2.9	5	silty SAND to sandy SILT	120	4.0	36	43	85	47	-	-	15	16	0.00	-	0.00	0.0
11.16	142.2	169.9	242.9	4.0	0.4	2.9	5	silty SAND to sandy SILT	120	4.0	36	42	85	47	-	-	15	16	0.00	-	0.00	0.0
11.32	135.6	160.8	235.6	3.9	0.4	2.9	5	silty SAND to sandy SILT	120	4.0	34	40	83	46	-	-	16	16	0.00	-	0.00	0.0
11.48	134.3	158.1	234.5	3.9	0.5	2.9	5	silty SAND to sandy SILT	120	4.0	34	40	82	46	-	-	16	16	0.00	-	0.00	0.0
11.65	134.5	157.3	241.8	4.2	0.5	3.2	5	silty SAND to sandy SILT	120	4.0	34	39	82	46	-	-	17	16	0.00	-	0.00	0.0
11.81	135.4	157.2	242.5	4.3	0.5	3.2	5	silty SAND to sandy SILT	120	4.0	34	39	82	46	-	-	17	16	0.00	-	0.00	0.0
11.98	142.6	164.4	238.8	4.1	0.5	2.9	5	silty SAND to sandy SILT	120	4.0	36	41	83	46	-	-	16	16	0.00	-	0.00	0.0
12.14	145.8	166.9	239.0	4.1	0.6	2.8	5	silty SAND to sandy SILT	120	4.0	36	42	84	46	-	-	15	16	0.00	-	0.00	0.0
12.30	152.0	172.8	242.1	4.2	0.6	2.8	5	silty SAND to sandy SILT	120	4.0	38	43	85	47	-	-	15	16	0.00	-	0.00	0.0
12.47	151.7	171.4	240.0	4.1	0.6	2.7	5	silty SAND to sandy SILT	120	4.0	38	43	85	46	-	-	15	16	0.00	-	0.00	0.0
12.63	150.7	169.1	238.9	4.1	0.6	2.8	5	silty SAND to sandy SILT	120	4.0	38	42	84	46	-	-	15	16	0.00	-	0.00	0.0
12.80	154.4	172.1	240.7	4.2	0.7	2.7	5	silty SAND to sandy SILT	120	4.0	39	43	85	46	-	-	15	16	0.00	-	0.00	0.0
12.96	157.8	174.8	236.5	4.0	0.6	2.5	5	silty SAND to sandy SILT	120	4.0	39	44	85	46	-	-	14	16	0.00	-	0.00	0.0
13.12	151.9	167.2	230.9	3.9	0.7	2.6	5	silty SAND to sandy SILT	120	4.0	38	42	84	46	-	-	15	16	0.00	-	0.00	0.0
13.29	143.7	157.2	226.0	3.9	0.7	2.7	5	silty SAND to sandy SILT	120	4.0	36	39	82	46	-	-	16	16	0.00	-	0.00	0.0
13.45	143.4	155.9	222.6	3.8	0.7	2.7	5	silty SAND to sandy SILT	120	4.0	36	39	82	46	-	-	15	16	0.00	-	0.00	0.0
13.62	140.4	151.7	219.6	3.8	0.8	2.7	5	silty SAND to sandy SILT	120	4.0	35	38	81	46	-	-	16	16	0.00	-	0.00	0.0
13.78	141.7	152.2	218.5	3.7	0.8	2.7	5	silty SAND to sandy SILT	120	4.0	35	38	81	46	-	-	15	16	0.00	-	0.00	0.0
13.94	144.8	154.5	218.8	3.7	0.8	2.6	5	silty SAND to sandy SILT	120	4.0	36	39	81	46	-	-	15	16	0.00	-	0.00	0.0
14.11	142.4	151.1	217.4	3.7	0.8	2.6	5	silty SAND to sandy SILT	120	4.0	36	38	81	46	-	-	16	16	0.00	-	0.00	0.0
14.27	147.3	155.4	217.3	3.7	0.8	2.5	5	silty SAND to sandy SILT	120	4.0	37	39	82	46	-	-	15	16	0.00	-	0.00	0.0
14.44	144.0	151.1	215.6	3.7	0.8	2.6	5	silty SAND to sandy SILT	120	4.0	36	38	81	46	-	-	15	16	0.00	-	0.00	0.0
14.60	146.7	153.0	222.3	4.0	0.9	2.7	5	silty SAND to sandy SILT	120	4.0	37	38	81	46	-	-	16	16	0.00	-	0.00	0.0
14.76	150.6	156.2	221.7	3.9	0.9	2.6	5	silty SAND to sandy SILT	120	4.0	38	39	82	46	-	-	15	16	0.00	-	0.00	0.0
14.93	144.4	148.9	213.9	3.7	0.9	2.6	5	silty SAND to sandy SILT	120	4.0	36	37	80	46	-	-	16	16	0.00	-	0.00	0.0
15.09	143.0	146.7	210.1	3.6	1.0	2.6	5	silty SAND to sandy SILT	120	4.0	36	37	80	45	-	-	15	16	0.00	-	0.00	0.0
15.26	140.1	142.9	206.2	3.6	1.0	2.6	5	silty SAND to sandy SILT	120	4.0	35	36	79	45	-	-	16	16	0.00	-	0.00	0.0
15.42	139.6	141.7	205.6	3.6	1.0	2.6	5	silty SAND to sandy SILT	120	4.0	35	35	78	45	-	-	16	16	0.00	-	0.00	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(531).cpt
CPT Date: 9/27/2011 12:07:53 PM
GW During Test: No GW

Sounding ID: CPT-11-131
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	* qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	* Mat Typ Zon	* Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	* SPT R-N1 60%	* Rel Den %	* Ftn Ang deg	Und Shr tsf	OCR - -	* Fin Ic %	* Nk -	* Vol Strn %	* Dry Stlmt 0.00	* Liq Stlmt 0.00	* Cycl SStn %
15.58	143.5	144.8	205.2	3.5	1.0	2.5	5	silty SAND to sandy SILT	120	4.0	36	36	79	45	-	-	15	16	0.00	-	0.00	0.0
15.75	137.5	138.1	203.1	3.5	1.1	2.6	5	silty SAND to sandy SILT	120	4.0	34	35	78	45	-	-	16	16	0.00	-	0.00	0.0
15.91	142.7	142.5	204.4	3.6	1.1	2.5	5	silty SAND to sandy SILT	120	4.0	36	36	79	45	-	-	15	16	0.00	-	0.00	0.0
16.08	138.2	137.3	202.9	3.6	1.1	2.6	5	silty SAND to sandy SILT	120	4.0	35	34	77	45	-	-	16	16	0.00	-	0.00	0.0
16.24	141.6	140.0	212.1	4.0	1.2	2.8	5	silty SAND to sandy SILT	120	4.0	35	35	78	45	-	-	17	16	0.00	-	0.00	0.0
16.40	148.7	146.3	211.6	3.9	1.2	2.6	5	silty SAND to sandy SILT	120	4.0	37	37	80	45	-	-	16	16	0.00	-	0.00	0.0
16.57	153.7	150.3	218.4	4.1	1.3	2.7	5	silty SAND to sandy SILT	120	4.0	38	38	80	45	-	-	16	16	0.00	-	0.00	0.0
16.73	146.5	142.6	217.3	4.2	1.4	2.9	5	silty SAND to sandy SILT	120	4.0	37	36	79	45	-	-	17	16	0.00	-	0.00	0.0
16.90	136.3	132.1	210.7	4.1	1.5	3.0	5	silty SAND to sandy SILT	120	4.0	34	33	76	45	-	-	18	16	0.00	-	0.00	0.0
17.06	138.9	133.9	209.3	4.0	1.6	2.9	5	silty SAND to sandy SILT	120	4.0	35	33	77	45	-	-	18	16	0.00	-	0.00	0.0
17.23	139.5	133.8	205.1	3.8	1.6	2.8	5	silty SAND to sandy SILT	120	4.0	35	33	77	45	-	-	17	16	0.00	-	0.00	0.0
17.39	137.2	131.0	203.5	3.8	1.6	2.8	5	silty SAND to sandy SILT	120	4.0	34	33	76	45	-	-	17	16	0.00	-	0.00	0.0
17.55	144.2	137.0	206.8	3.9	1.7	2.7	5	silty SAND to sandy SILT	120	4.0	36	34	77	45	-	-	17	16	0.00	-	0.00	0.0
17.72	143.9	136.1	205.6	3.9	1.8	2.7	5	silty SAND to sandy SILT	120	4.0	36	34	77	45	-	-	17	16	0.00	-	0.00	0.0
17.88	139.2	131.1	201.3	3.8	1.8	2.7	5	silty SAND to sandy SILT	120	4.0	35	33	76	45	-	-	17	16	0.00	-	0.00	0.0
18.05	135.1	126.6	200.6	3.8	1.9	2.8	5	silty SAND to sandy SILT	120	4.0	34	32	75	45	-	-	18	16	0.00	-	0.00	0.0
18.21	141.7	132.2	171.0	2.5	2.0	1.8	6	clean SAND to silty SAND	125	5.0	28	26	76	45	-	-	13	16	0.00	-	0.00	0.0
18.37	136.7	126.9	165.5	2.4	2.0	1.7	6	clean SAND to silty SAND	125	5.0	27	25	75	45	-	-	13	16	0.00	-	0.00	0.0
18.54	130.3	120.4	166.7	2.6	3.5	2.0	5	silty SAND to sandy SILT	120	4.0	33	30	73	44	-	-	15	16	0.00	-	0.00	0.0
18.70	140.8	129.5	177.7	2.9	3.5	2.1	5	silty SAND to sandy SILT	120	4.0	35	32	76	45	-	-	14	16	0.00	-	0.00	0.0
18.87	141.4	129.5	181.4	3.1	3.5	2.2	5	silty SAND to sandy SILT	120	4.0	35	32	76	45	-	-	15	16	0.00	-	0.00	0.0
19.03	139.2	126.9	181.5	3.1	3.4	2.3	5	silty SAND to sandy SILT	120	4.0	35	32	75	44	-	-	15	16	0.00	-	0.00	0.0
19.19	133.0	120.7	189.9	3.6	3.4	2.7	5	silty SAND to sandy SILT	120	4.0	33	30	73	44	-	-	18	16	0.00	-	0.00	0.0
19.36	132.9	120.1	187.3	3.5	3.3	2.6	5	silty SAND to sandy SILT	120	4.0	33	30	73	44	-	-	17	16	0.00	-	0.00	0.0
19.52	128.7	115.9	183.8	3.4	3.3	2.7	5	silty SAND to sandy SILT	120	4.0	32	29	72	44	-	-	18	16	0.00	-	0.00	0.0
19.69	123.3	110.5	179.4	3.3	3.3	2.7	5	silty SAND to sandy SILT	120	4.0	31	28	70	44	-	-	18	16	0.00	-	0.00	0.0
19.85	117.9	105.3	176.1	3.2	3.4	2.7	5	silty SAND to sandy SILT	120	4.0	29	26	69	43	-	-	19	16	0.00	-	0.00	0.0
20.01	110.9	98.6	171.6	3.1	3.5	2.8	5	silty SAND to sandy SILT	120	4.0	28	25	67	43	-	-	20	16	0.00	-	0.00	0.0
20.18	115.3	102.1	169.2	3.0	3.5	2.6	5	silty SAND to sandy SILT	120	4.0	29	26	68	43	-	-	19	16	0.00	-	0.00	0.0
20.34	120.1	106.0	171.6	3.0	3.5	2.6	5	silty SAND to sandy SILT	120	4.0	30	26	69	43	-	-	18	16	0.00	-	0.00	0.0
20.51	121.6	106.8	157.8	2.5	3.6	2.1	5	silty SAND to sandy SILT	120	4.0	30	27	69	43	-	-	16	16	0.68	-	0.00	3.7
20.67	118.9	104.1	156.7	2.5	3.7	2.1	5	silty SAND to sandy SILT	120	4.0	30	26	68	43	-	-	17	16	0.73	-	0.00	4.1
20.83	117.5	102.4	190.8	3.8	6.0	3.3	5	silty SAND to sandy SILT	120	4.0	29	26	68	43	-	-	22	16	0.00	-	0.00	0.0
21.00	123.2	106.9	190.5	3.8	6.1	3.1	5	silty SAND to sandy SILT	120	4.0	31	27	69	43	-	-	21	16	0.00	-	0.00	0.0

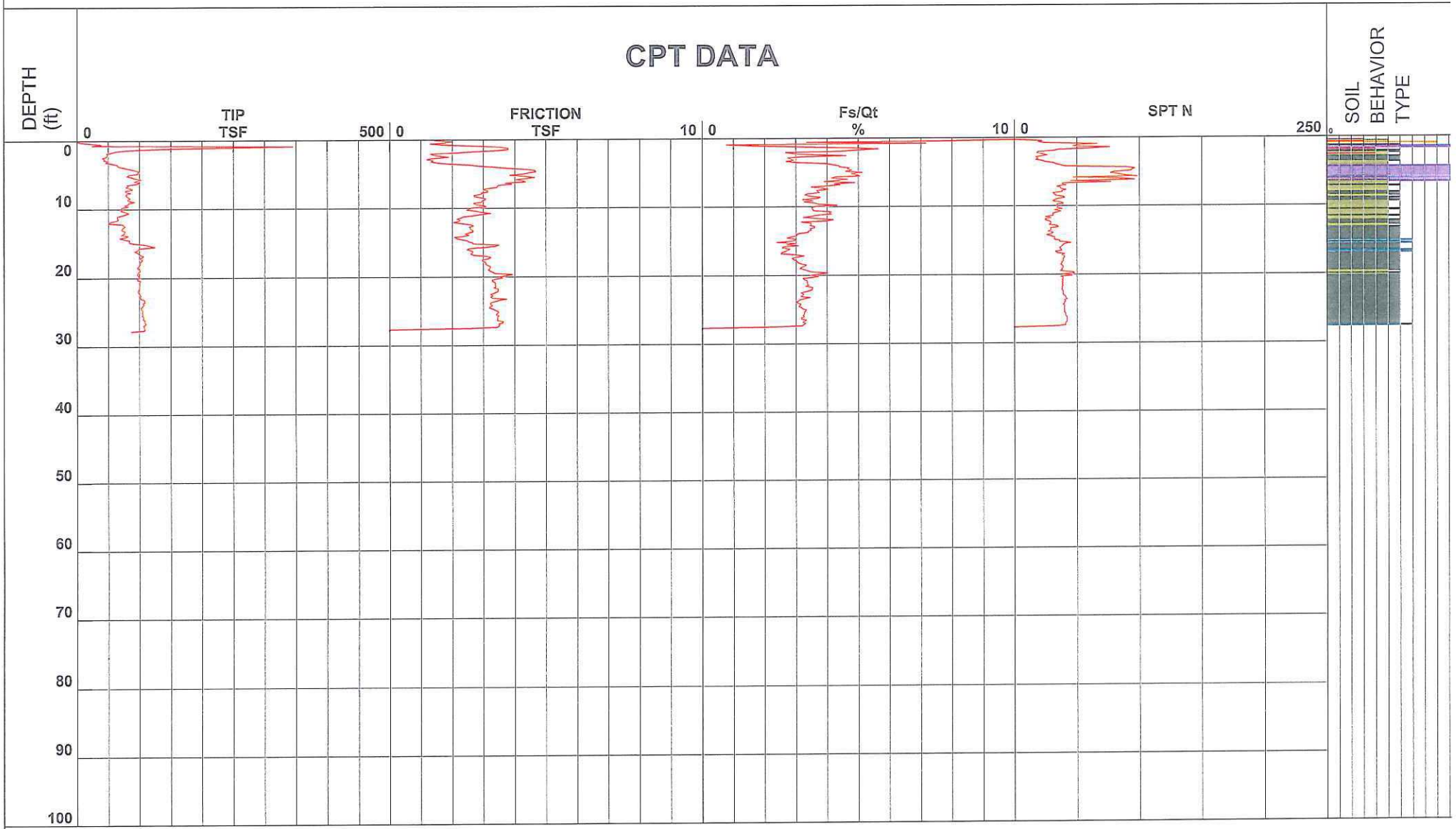
* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

Earth Mechanics

Location	I-5 HOV Widening Segment 1	Operator	BH-JB	Filename	SDF(534).cpt
Job Number	11-135	Cone Number	DSG1104	GPS	
Hole Number	CPT-11-133	Date and Time	9/28/2011 11:26:42 AM	Maximum Depth	27.89 ft
Water Table Depth		>27.89 ft			

CPT DATA



1 - sensitive fine grained
2 - organic material
3 - clay
4 - silty clay to clay
5 - clayey silt to silty clay
6 - sandy silt to clayey silt
7 - silty sand to sandy silt
8 - sand to silty sand
9 - sand
10 - gravelly sand to sand
11 - very stiff fine grained (*)
12 - sand to clayey sand (*)

I-5 HOV Widening Segment 1

Project ID: Earth Mechanics
Data File: SDF(534).cpt
CPT Date: 9/28/2011 11:26:42 AM
GW During Test: No GW

Sounding ID: CPT-11-133
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Ratio %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR -	Fin Ic -	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.01	Cycl SStn %
0.33	5.6	9.0	-	2.0	0.0	9.9	3	silty CLAY to CLAY	115	1.5	4	6	-	-	0.4	9.9	86	15	N/A	0.00	N/A	N/A
0.49	22.8	36.6	-	1.8	0.0	7.7	3	silty CLAY to CLAY	115	1.5	15	24	-	-	1.6	9.9	48	15	N/A	0.00	N/A	N/A
0.66	38.9	62.4	149.0	1.3	0.0	3.3	4	clayy SILT to silty CLAY	115	2.0	19	31	-	-	2.7	9.9	27	15	N/A	0.00	N/A	N/A
0.82	24.7	39.5	-	1.8	0.2	7.2	3	silty CLAY to CLAY	115	1.5	16	26	-	-	1.7	9.9	46	15	N/A	0.00	N/A	N/A
0.98	345.0	553.3	553.3	2.7	0.0	0.8	6	clean SAND to silty SAND	125	5.0	69	100	95	48	-	-	5	16	N/A	0.00	N/A	N/A
1.15	209.7	336.3	354.6	3.5	0.1	1.7	6	clean SAND to silty SAND	125	5.0	42	67	95	48	-	-	7	16	N/A	0.00	N/A	N/A
1.31	122.0	195.7	277.1	3.8	0.1	3.1	8	stiff SAND to clayy SAND	115	1.0	100	100	-	-	8.1	9.9	15	16	N/A	0.00	N/A	N/A
1.48	79.3	127.2	265.2	3.8	0.0	4.8	9	very stiff fine SOIL	120	2.0	40	64	75	48	-	-	24	30	N/A	0.00	N/A	N/A
1.64	62.3	99.9	256.7	3.5	-0.1	5.6	9	very stiff fine SOIL	120	2.0	31	50	67	48	-	-	29	30	N/A	0.00	N/A	N/A
1.80	55.7	89.4	223.2	2.7	0.0	4.9	9	very stiff fine SOIL	120	2.0	28	45	63	48	-	-	28	30	N/A	0.00	N/A	N/A
1.97	47.8	76.6	195.7	2.1	0.1	4.5	4	clayy SILT to silty CLAY	115	2.0	24	38	-	-	3.4	9.9	29	15	N/A	0.00	N/A	N/A
2.13	49.2	78.9	148.5	1.3	0.3	2.7	5	silty SAND to sandy SILT	120	4.0	12	20	59	47	-	-	22	16	N/A	0.00	N/A	N/A
2.30	47.8	76.7	152.3	1.4	0.2	2.9	5	silty SAND to sandy SILT	120	4.0	12	19	58	47	-	-	23	16	N/A	0.00	N/A	N/A
2.46	46.4	74.5	167.4	1.6	0.2	3.5	4	clayy SILT to silty CLAY	115	2.0	23	37	-	-	3.3	9.9	26	15	N/A	0.00	N/A	N/A
2.62	40.9	65.6	184.1	1.9	0.1	4.6	4	clayy SILT to silty CLAY	115	2.0	20	33	-	-	2.9	9.9	31	15	N/A	0.00	N/A	N/A
2.79	43.9	70.4	154.0	1.4	0.1	3.2	5	silty SAND to sandy SILT	120	4.0	11	18	55	45	-	-	25	16	N/A	0.00	N/A	N/A
2.95	43.3	69.5	141.6	1.2	0.2	2.8	5	silty SAND to sandy SILT	120	4.0	11	17	55	45	-	-	24	16	N/A	0.00	N/A	N/A
3.12	49.4	79.2	153.4	1.4	0.3	2.8	5	silty SAND to sandy SILT	120	4.0	12	20	59	45	-	-	22	16	N/A	0.00	N/A	N/A
3.28	45.6	73.2	149.8	1.3	0.0	2.9	5	silty SAND to sandy SILT	120	4.0	11	18	57	45	-	-	24	16	0.16	-	0.01	0.5
3.45	56.5	90.7	160.8	1.5	0.2	2.7	5	silty SAND to sandy SILT	120	4.0	14	23	64	46	-	-	20	16	0.00	-	0.01	0.0
3.61	64.3	103.1	182.8	1.9	0.0	3.0	5	silty SAND to sandy SILT	120	4.0	16	26	68	46	-	-	20	16	0.00	-	0.01	0.0
3.77	65.1	104.4	212.1	2.6	0.1	3.9	9	very stiff fine SOIL	120	2.0	33	52	68	46	-	-	23	30	0.00	-	0.01	0.0
3.94	69.5	111.4	226.7	2.9	-0.2	4.2	9	very stiff fine SOIL	120	2.0	35	56	71	46	-	-	23	30	0.00	-	0.01	0.0
4.10	78.2	125.4	249.6	3.4	-0.3	4.4	9	very stiff fine SOIL	120	2.0	39	63	74	47	-	-	23	30	0.00	-	0.01	0.0
4.27	86.2	138.2	265.5	3.8	-0.1	4.4	9	very stiff fine SOIL	120	2.0	43	69	78	47	-	-	22	30	0.00	-	0.01	0.0
4.43	93.5	149.9	289.5	4.4	-0.5	4.7	9	very stiff fine SOIL	120	2.0	47	75	80	47	-	-	22	30	0.00	-	0.01	0.0
4.59	100.0	160.3	299.3	4.6	-0.2	4.7	9	very stiff fine SOIL	120	2.0	50	80	83	48	-	-	22	30	0.00	-	0.01	0.0
4.76	97.8	156.8	300.4	4.7	0.2	4.8	9	very stiff fine SOIL	120	2.0	49	78	82	47	-	-	22	30	0.00	-	0.01	0.0
4.92	97.1	155.7	292.1	4.5	0.3	4.6	9	very stiff fine SOIL	120	2.0	49	78	82	47	-	-	22	30	0.00	-	0.01	0.0
5.09	83.4	133.7	284.6	4.3	0.3	5.1	9	very stiff fine SOIL	120	2.0	42	67	77	47	-	-	25	30	0.00	-	0.01	0.0
5.25	80.5	129.2	268.2	3.9	0.5	4.8	9	very stiff fine SOIL	120	2.0	40	65	75	46	-	-	24	30	0.00	-	0.01	0.0
5.41	88.1	141.3	287.3	4.3	0.4	4.9	9	very stiff fine SOIL	120	2.0	44	71	78	47	-	-	23	30	0.00	-	0.01	0.0
5.58	92.1	147.7	298.7	4.6	0.3	5.0	9	very stiff fine SOIL	120	2.0	46	74	80	47	-	-	23	30	0.00	-	0.01	0.0
5.74	102.3	164.0	288.5	4.3	0.5	4.3	9	very stiff fine SOIL	120	2.0	51	82	83	47	-	-	20	30	0.00	-	0.01	0.0
5.91	97.5	156.3	276.6	4.0	-0.4	4.2	9	very stiff fine SOIL	120	2.0	49	78	82	47	-	-	20	30	0.00	-	0.01	0.0
6.07	91.7	147.0	284.5	4.3	-1.2	4.7	9	very stiff fine SOIL	120	2.0	46	74	80	46	-	-	22	30	0.00	-	0.01	0.0
6.23	100.1	159.7	287.5	4.3	-1.2	4.4	9	very stiff fine SOIL	120	2.0	50	80	82	47	-	-	21	30	0.00	-	0.01	0.0
6.40	94.6	149.0	259.9	3.7	-0.8	3.9	8	stiff SAND to clayy SAND	115	1.0	95	100	-	-	6.2	9.9	20	16	0.00	-	0.01	0.0
6.56	80.2	124.7	266.2	3.9	-0.9	4.9	9	very stiff fine SOIL	120	2.0	40	62	74	46	-	-	25	30	0.00	-	0.01	0.0
6.73	82.5	126.7	246.9	3.5	-1.1	4.2	9	very stiff fine SOIL	120	2.0	41	63	75	46	-	-	23	30	0.00	-	0.01	0.0
6.89	78.5	119.1	244.2	3.5	-0.7	4.4	9	very stiff fine SOIL	120	2.0	39	60	73	45	-	-	24	30	0.00	-	0.01	0.0
7.05	85.7	128.5	241.0	3.4	-0.5	4.0	8	stiff SAND to clayy SAND	115	1.0	86	100	-	-	5.7	9.9	22	16	0.00	-	0.01	0.0
7.22	88.5	131.2	227.1	3.1	-0.4	3.5	5	silty SAND to sandy SILT	120	4.0	22	33	76	46	-	-	20	16	0.00	-	0.01	0.0
7.38	77.8	114.1	221.1	3.0	-0.2	3.9	8	stiff SAND to clayy SAND	115	1.0	78	100	-	-	5.1	9.9	22	16	0.00	-	0.01	0.0
7.55	77.9	113.1	225.2	3.1	-0.2	4.0	9	very stiff fine SOIL	120	2.0	39	57	71	45	-	-	23	30	0.00	-	0.01	0.0
7.71	85.5	122.7	224.1	3.1	-0.5	3.7	5	silty SAND to sandy SILT	120	4.0	21	31	74	45	-	-	21	16	0.00	-	0.01	0.0
7.87	79.4	112.7	214.3	2.9	-0.4	3.7	5	silty SAND to sandy SILT	120	4.0	20	28	71	45	-	-	22	16	0.00	-	0.01	0.0
8.04	78.6	110.5	213.4	2.9	-0.4	3.8	5	silty SAND to sandy SILT	120	4.0	20	28	70	45	-	-	22	16	0.00	-	0.01	0.0
8.20	80.3	111.7	203.1	2.7	-0.4	3.4	5	silty SAND to sandy SILT	120	4.0	20	28	71	45	-	-	21	16	0.00	-	0.01	0.0
8.37	82.5	113.6	202.3	2.7	-0.4	3.3	5	silty SAND to sandy SILT	120	4.0	21	28	71	45	-	-	21	16	0.00	-	0.01	0.0
8.53	85.1	116.0	209.4	2.9	-0.4	3.5	5	silty SAND to sandy SILT	120	4.0	21	29	72	45	-	-	21	16	0.00	-	0.01	0.0
8.69	81.3	109.8	214.1	3.1	-0.4	3.8	5	silty SAND to sandy SILT	120	4.0	20	27	70	45	-	-	23	16	0.00	-	0.01	0.0
8.86	82.5	110.4	212.2	3.1	-0.4	3.7	5	silty SAND to sandy SILT	120	4.0	21	28	70	45	-	-	22	16	0.00	-	0.01	0.0
9.02	91.8	121.7	208.3	3.0	-0.4	3.2	5	silty SAND to sandy SILT	120	4.0	23	30	73	45	-	-	20	16	0.00	-	0.01	0.0
9.19	83.0	109.0	205.7	2.9	-0.4	3.6	5	silty SAND to sandy SILT	120	4.0	21	27	70	45	-	-	22	16	0.00	-	0.01	0.0
9.35	82.2	107.0	195.3	2.7	-0.4	3.3	5	silty SAND to sandy SILT	120	4.0	21	27	69	45	-	-	21	16	0.00	-	0.01	0.0
9.51	76.4	98.6	196.5	2.7	-0.4	3.6	5	silty SAND to sandy SILT	120	4.0	19	25	67	44	-	-	23	16	0.00	-	0.01	0.0
9.68	81.7	104.5	206.1	3.0	-0.4	3.7	5	silty SAND to sandy SILT	120	4.0	20	26	68	44	-	-	23	16	0.00	-	0.01	0.0
9.84	71.7	91.0	209.3	3.1	-0.6	4.3	4	clayy SILT to silty CLAY	115	2.0	36	46	-	-	5.0	9.9	26	15	0.00	-	0.01	0.0
10.01	72.0	90.7	189.8	2.6	-0.6	3.7	4	clayy SILT to silty CLAY	115	2.0	36	45	-	-	5.1	9.9	24	15	0.00	-	0.01	0.0
10.17	72.2	90.2	185.4	2.5	-0.6	3.5	5	silty SAND to sandy SILT	120	4.0	18	23	64	44	-	-	24	16	0.00	-	0.01	0.0
10.34	70.5	87.3	182.0	2.5	-0.6	3.5	5	silty SAND to sandy SILT	120	4.0	18	22	63	44	-	-	24	16	0.00	-	0.01	0.0
10.50	78.5	96.5	193.0	2.8	-0.6	3.6	5	silty SAND to sandy SILT	120	4.0	20	24	66	44	-	-	23	16	0.00	-	0.01	0.0
10.66	82.5	100.6	197.7	2.9	-0.6	3.6	5	silty SAND to sandy SILT	120	4.0	21	25	67	44	-	-	23	16	0.00	-	0.01	0.0
10.83	78.3	94.7	208.3	3.2	-0.7	4.2	4	clayy SILT to silty CLAY	115	2.0	39	47	-	-	5.5	9.9	25	15	0.00	-	0.01	0.0
10.99	71.5	85.9	196.6	2.9	-0.8	4.1	4	clayy SILT to silty CLAY	115	2.0	36	43	-	-	5.0	9.9	26	15	0.00	-	0.01	0.0
11.16	64.9	77.4	188.2	2.7	-0.7	4.2	4	clayy SILT to silty CLAY	115	2.0	32	39	-	-	4.6	9.9	28	15	0.00	-	0.01	0.0
11.32	64.4	76.3	174.9	2.4	-0.7	3.7	4	clayy SILT to silty CLAY	115	2.0	32	38	-	-	4.5	9.9	26	15	0.00	-	0.01	0.0
11.48	65.6	77.1	170.3	2.3	-0.7	3.5	4	clayy SILT to silty CLAY	115	2.0	33	39	-	-	4.6	9.9	25	15	0.00	-	0.01	0.0
11.65	66.5	77.6	164.4	2.2	-0.6	3.3	5	silty SAND to sandy SILT	120	4.0	17	19	59	43	-	-	24	16	0.00	-	0.01	0.0
11.81	60.0	69.6	169.7	2.3	-0.7	3.8	4	clayy SILT to silty CLAY	115	2.0	30	35	-	-	4.2	9.9	28	15	0.00	-	0.01	0.0
11.98	52.9	61.0	170.2	2.2	-0.7	4.2	4	clayy SILT to silty CLAY	115	2.0	26	30	-	-	3.7	9.9	31	15	0.00	-	0.01	0.0
12.14	51.5	58.9	163.0	2.1	-0.7	4.0	4	clayy SILT to silty CLAY	115	2.0	26	29	-	-	3.6	9.9	31	15	0.00	-	0.01	0.0
12.30	73.4	83.5	168.7	2.3	-0.7	3.2	5	silty SAND to sandy SILT	120	4.0	18	21	61	43	-	-	23	16	0.00	-	0.01	0.0
12.47	74.8	84.5	178.3	2.6	-0.6	3.5	5	silty SAND to sandy SILT	120	4.0	19	21	61	43	-	-	24	16	0.00	-	0.01	0.0
12.63	76.7	86.1	180.5	2.7	-0.6	3.5	5	silty SAND to sandy SILT	120	4.0	19	22	62	43	-	-	24	16	0.00	-	0.01	0.0
12.80	73.8	82.3	175.5	2.6	-0.6	3.5	4	clayy SILT to silty CLAY	115	2.0	37	41	-	-	5.2	9.9	25	15	0.00	-	0.01	0.0
12.96	71.9	79.7	176.6	2.6	-0.6	3.6	4	clayy SILT to silty CLAY	115	2.0	36	40	-	-	5.1	9.9	25	15	0.00	-	0.01	0.0
13.12	72.2	79.5	176.3	2.6	-0.6	3.6	4	clayy SILT to silty CLAY	115	2.0	36	40	-	-	5.1	9.9	25	15	0.00	-	0.01	0.0
13.29	76.7	83.9	177.2	2.6	-0.6	3.5	5	silty SAND to sandy SILT	120	4.0	19	21	61	43	-	-	24	16	0.00	-	0.01	0.0
13.45	76.8	83.5	177.7	2.7	-0.6	3.5	4	clayy SILT to silty CLAY	115	2.0	38	42	-	-	5.4	9.9	25	15	0.00	-	0.01	0.0
13.62	75.2	81.3	173.0	2.6	-0.6	3.4	5	silty SAND to sandy SILT	120	4.0	19	20	60	43	-	-	25	16	0.00	-	0.01	0.0
13.78	71.4	76.8	167.8	2.4	-0.5	3.4	4	clayy SILT to silty CLAY	115	2.0	36	38	-	-	5.0	9.9	25	15	0.00	-	0.01	0.0
13.94	81.9	87.5	170.4	2.5	-0.6	3.1	5	silty SAND to sandy SILT	120	4.0	20	22	63	43	-	-	22	16	0.00	-	0.01	0.0
14.11	79.0	83.9	164.7	2.4	-0.6	3.1	5	silty SAND to sandy SILT	120	4.0	20	21	61	43	-	-	23	16	0.00	-	0.01	0.0
14.27	68.9	72.8	153.7	2.1	-0.5	3.1	5	silty SAND to sandy SILT	120	4.0	17	18	57	42	-	-	24	16	0.64	-	0.01	4.3
14.44	75.6	79.4	155.6	2.2	-0.5	2.9	5	silty SAND to sandy SILT	120	4.0	19	20	59	43	-	-	23	16	0.58	-	0.00	3.5
14.60	84.3	88.0	159.9	2.3	-0.5	2.7	5	silty SAND to sandy SILT	120	4.0	21	22	63	43	-	-	21	16	0.45	-	0.00	2.6
14.76	83.7	86.9	165.9	2.5	-0.5	3.0	5	silty SAND to sandy SILT	120	4.0	21	22	62	43	-	-	22	16	0.00	-	0.00	0.0
14.93	84.3	87.0	167.5	2.5	-0.5	3.0	5	silty SAND to sandy SILT	120	4.0	21	22	62	43	-	-	22	16	0.00	-	0.00	0.0
15.09	93.8	96.3	171.1	2.6	-0.5	2.9	5	silty SAND to sandy SILT	120	4.0	23	24	66	44	-	-	20	16	0.00	-	0.00	0.0
15.26	111.4	113.8	174.3	2.7	-0.5	2.4	5	silty SAND to sandy SILT	120	4.0	28	28	71	44	-	-	17	16	0.00	-	0.00	0.0
15.42	117.0	118.9	198.1	3.5	-0.4	3.0	5	silty SAND to sandy SILT	120	4.0	29	30	73	44	-	-	19	16	0.00	-	0.00	0.0

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Project ID: Earth Mechanics
Data File: SDF(534).cpt
CPT Date: 9/28/2011 11:26:42 AM
GW During Test: No GW

Sounding ID: CPT-11-133
Project No: 11-135
Cone/Rig: DSG1104

Depth ft	qc PS tsf	qcln PS -	qlncs PS -	Slv Stss tsf	pore prss (psi)	Frct Rato %	Mat Typ Zon	Material Behavior Description	Unit Wght pcf	Qc to N	SPT R-N 60%	SPT R-N1 60%	Rel Den %	Ftn Ang deg	Und Shr tsf	OCR - -	Fin Ic %	Nk -	Vol Strn %	Dry Stlmt 0.00	Liq Stlmt 0.01	Cycl SStn %
15.58	124.7	126.0	196.3	3.4	-0.4	2.7	5	silty SAND to sandy SILT	120	4.0	31	31	75	45	-	-	17	16	0.00	-	0.00	0.0
15.75	100.9	101.4	183.3	3.1	-0.3	3.1	5	silty SAND to sandy SILT	120	4.0	25	25	67	44	-	-	21	16	0.00	-	0.00	0.0
15.91	98.8	98.8	166.1	2.6	-0.2	2.6	5	silty SAND to sandy SILT	120	4.0	25	25	67	44	-	-	19	16	0.00	-	0.00	0.0
16.08	96.7	96.1	163.2	2.5	-0.1	2.6	5	silty SAND to sandy SILT	120	4.0	24	24	66	43	-	-	19	16	0.00	-	0.00	0.0
16.24	92.7	91.7	165.9	2.6	-0.1	2.8	5	silty SAND to sandy SILT	120	4.0	23	23	64	43	-	-	21	16	0.00	-	0.00	0.0
16.40	97.1	95.6	168.1	2.7	0.0	2.8	5	silty SAND to sandy SILT	120	4.0	24	24	66	43	-	-	20	16	0.00	-	0.00	0.0
16.57	99.1	97.1	167.0	2.6	0.0	2.7	5	silty SAND to sandy SILT	120	4.0	25	24	66	43	-	-	20	16	0.00	-	0.00	0.0
16.73	101.8	99.2	165.7	2.6	0.0	2.6	5	silty SAND to sandy SILT	120	4.0	25	25	67	43	-	-	19	16	0.00	-	0.00	0.0
16.90	106.6	103.4	168.7	2.7	0.1	2.5	5	silty SAND to sandy SILT	120	4.0	27	26	68	44	-	-	19	16	0.00	-	0.00	0.0
17.06	104.2	100.5	180.4	3.1	0.1	3.0	5	silty SAND to sandy SILT	120	4.0	26	25	67	44	-	-	21	16	0.00	-	0.00	0.0
17.23	99.6	95.6	183.4	3.2	0.1	3.3	5	silty SAND to sandy SILT	120	4.0	25	24	66	43	-	-	22	16	0.00	-	0.00	0.0
17.39	104.9	100.2	181.1	3.2	0.2	3.1	5	silty SAND to sandy SILT	120	4.0	26	25	67	43	-	-	21	16	0.00	-	0.00	0.0
17.55	103.4	98.4	175.1	3.0	0.2	2.9	5	silty SAND to sandy SILT	120	4.0	26	25	66	43	-	-	20	16	0.00	-	0.00	0.0
17.72	101.8	96.3	174.2	3.0	0.2	3.0	5	silty SAND to sandy SILT	120	4.0	25	24	66	43	-	-	21	16	0.00	-	0.00	0.0
17.88	101.6	95.7	176.0	3.0	0.1	3.0	5	silty SAND to sandy SILT	120	4.0	25	24	66	43	-	-	21	16	0.00	-	0.00	0.0
18.05	101.3	95.0	176.6	3.1	0.2	3.1	5	silty SAND to sandy SILT	120	4.0	25	24	65	43	-	-	21	16	0.00	-	0.00	0.0
18.21	100.4	93.7	176.1	3.1	0.2	3.1	5	silty SAND to sandy SILT	120	4.0	25	23	65	43	-	-	22	16	0.00	-	0.00	0.0
18.37	99.0	92.0	177.6	3.1	0.2	3.2	5	silty SAND to sandy SILT	120	4.0	25	23	64	43	-	-	22	16	0.00	-	0.00	0.0
18.54	96.9	89.6	179.8	3.2	0.2	3.4	5	silty SAND to sandy SILT	120	4.0	24	22	63	43	-	-	23	16	0.00	-	0.00	0.0
18.70	98.0	90.3	179.2	3.2	0.2	3.3	5	silty SAND to sandy SILT	120	4.0	24	23	64	43	-	-	23	16	0.00	-	0.00	0.0
18.87	100.9	92.5	178.0	3.2	0.3	3.2	5	silty SAND to sandy SILT	120	4.0	25	23	64	43	-	-	22	16	0.00	-	0.00	0.0
19.03	100.9	92.1	176.6	3.2	0.3	3.2	5	silty SAND to sandy SILT	120	4.0	25	23	64	43	-	-	22	16	0.00	-	0.00	0.0
19.19	98.7	89.7	178.5	3.2	0.2	3.3	5	silty SAND to sandy SILT	120	4.0	25	22	63	43	-	-	23	16	0.00	-	0.00	0.0
19.36	97.9	88.6	180.1	3.3	0.3	3.4	5	silty SAND to sandy SILT	120	4.0	24	22	63	43	-	-	23	16	0.00	-	0.00	0.0
19.52	96.5	87.0	181.5	3.4	0.3	3.5	5	silty SAND to sandy SILT	120	4.0	24	22	62	43	-	-	24	16	0.00	-	0.00	0.0
19.69	98.1	88.0	197.9	3.9	0.3	4.1	4	clayy SILT to silty CLAY	115	2.0	49	44	-	-	6.9	9.9	26	15	0.00	-	0.00	0.0
19.85	99.2	88.7	191.9	3.7	0.3	3.8	4	clayy SILT to silty CLAY	115	2.0	50	44	-	-	7.0	9.9	25	15	0.00	-	0.00	0.0
20.01	100.7	89.7	184.8	3.5	0.4	3.5	5	silty SAND to sandy SILT	120	4.0	25	22	63	43	-	-	24	16	0.00	-	0.00	0.0
20.18	96.9	86.0	187.4	3.6	0.4	3.8	4	clayy SILT to silty CLAY	115	2.0	48	43	-	-	6.8	9.9	25	15	0.00	-	0.00	0.0
20.34	97.2	85.8	181.8	3.4	0.5	3.6	4	clayy SILT to silty CLAY	115	2.0	49	43	-	-	6.8	9.9	24	15	0.00	-	0.00	0.0
20.51	101.8	89.6	177.1	3.3	0.6	3.3	5	silty SAND to sandy SILT	120	4.0	25	22	63	43	-	-	23	16	0.00	-	0.00	0.0
20.67	100.6	88.1	176.7	3.3	0.5	3.3	5	silty SAND to sandy SILT	120	4.0	25	22	63	43	-	-	23	16	0.00	-	0.00	0.0
20.83	100.2	87.5	178.3	3.4	0.5	3.4	5	silty SAND to sandy SILT	120	4.0	25	22	63	42	-	-	24	16	0.00	-	0.00	0.0
21.00	100.7	87.6	178.9	3.4	0.6	3.4	5	silty SAND to sandy SILT	120	4.0	25	22	63	42	-	-	24	16	0.00	-	0.00	0.0
21.16	100.3	86.9	178.1	3.4	0.6	3.4	5	silty SAND to sandy SILT	120	4.0	25	22	62	42	-	-	24	16	0.00	-	0.00	0.0
21.33	100.7	86.8	178.2	3.4	0.6	3.4	5	silty SAND to sandy SILT	120	4.0	25	22	62	42	-	-	24	16	0.00	-	0.00	0.0
21.49	99.8	85.7	178.3	3.4	0.6	3.5	5	silty SAND to sandy SILT	120	4.0	25	21	62	42	-	-	24	16	0.00	-	0.00	0.0
21.65	100.6	86.1	176.2	3.3	0.7	3.4	5	silty SAND to sandy SILT	120	4.0	25	22	62	42	-	-	24	16	0.00	-	0.00	0.0
21.82	98.5	84.0	180.0	3.5	0.7	3.6	4	clayy SILT to silty CLAY	115	2.0	49	42	-	-	6.9	9.9	25	15	0.00	-	0.00	0.0
21.98	98.5	83.7	179.5	3.5	0.7	3.6	4	clayy SILT to silty CLAY	115	2.0	49	42	-	-	6.9	9.9	25	15	0.00	-	0.00	0.0
22.15	98.5	83.4	179.0	3.5	0.7	3.6	4	clayy SILT to silty CLAY	115	2.0	49	42	-	-	6.9	9.9	25	15	0.00	-	0.00	0.0
22.31	99.6	84.0	176.8	3.4	0.7	3.5	5	silty SAND to sandy SILT	120	4.0	25	21	61	42	-	-	24	16	0.00	-	0.00	0.0
22.47	100.7	84.7	173.9	3.3	0.7	3.3	5	silty SAND to sandy SILT	120	4.0	25	21	62	42	-	-	24	16	0.00	-	0.00	0.0
22.64	102.3	85.7	171.2	3.2	0.8	3.2	5	silty SAND to sandy SILT	120	4.0	26	21	62	42	-	-	23	16	0.00	-	0.00	0.0
22.80	101.6	84.8	172.8	3.3	0.8	3.3	5	silty SAND to sandy SILT	120	4.0	25	21	62	42	-	-	24	16	0.00	-	0.00	0.0
22.97	100.7	83.7	170.8	3.2	0.8	3.3	5	silty SAND to sandy SILT	120	4.0	25	21	61	42	-	-	24	16	0.00	-	0.00	0.0
23.13	103.7	85.9	171.4	3.3	0.8	3.2	5	silty SAND to sandy SILT	120	4.0	26	21	62	42	-	-	23	16	0.00	-	0.00	0.0
23.30	108.3	89.4	183.4	3.7	0.8	3.5	5	silty SAND to sandy SILT	120	4.0	27	22	63	42	-	-	24	16	0.00	-	0.00	0.0
23.46	107.9	88.8	176.8	3.5	0.8	3.3	5	silty SAND to sandy SILT	120	4.0	27	22	63	42	-	-	23	16	0.00	-	0.00	0.0
23.62	108.9	89.3	173.7	3.4	1.0	3.2	5	silty SAND to sandy SILT	120	4.0	27	22	63	42	-	-	22	16	0.00	-	0.00	0.0
23.79	105.6	86.3	169.7	3.3	1.0	3.1	5	silty SAND to sandy SILT	120	4.0	26	22	62	42	-	-	23	16	0.00	-	0.00	0.0
23.95	107.4	87.4	168.2	3.2	1.1	3.0	5	silty SAND to sandy SILT	120	4.0	27	22	63	42	-	-	22	16	0.00	-	0.00	0.0
24.12	105.7	85.7	168.6	3.2	1.1	3.1	5	silty SAND to sandy SILT	120	4.0	26	21	62	42	-	-	23	16	0.00	-	0.00	0.0
24.28	104.2	84.2	169.7	3.3	1.1	3.2	5	silty SAND to sandy SILT	120	4.0	26	21	61	42	-	-	23	16	0.00	-	0.00	0.0
24.44	102.6	82.7	167.4	3.2	1.1	3.2	5	silty SAND to sandy SILT	120	4.0	26	21	61	42	-	-	23	16	0.00	-	0.00	0.0
24.61	103.2	82.9	166.5	3.2	1.2	3.1	5	silty SAND to sandy SILT	120	4.0	26	21	61	42	-	-	23	16	0.00	-	0.00	0.0
24.77	104.5	83.7	169.6	3.3	1.2	3.2	5	silty SAND to sandy SILT	120	4.0	26	21	61	42	-	-	23	16	0.00	-	0.00	0.0
24.94	105.5	84.1	171.0	3.4	1.2	3.3	5	silty SAND to sandy SILT	120	4.0	26	21	61	42	-	-	23	16	0.00	-	0.00	0.0
25.10	104.3	82.9	173.0	3.5	1.3	3.4	5	silty SAND to sandy SILT	120	4.0	26	21	61	42	-	-	24	16	0.00	-	0.00	0.0
25.26	105.2	83.4	173.2	3.5	1.3	3.4	5	silty SAND to sandy SILT	120	4.0	26	21	61	42	-	-	24	16	0.00	-	0.00	0.0
25.43	105.2	83.1	171.8	3.4	1.3	3.3	5	silty SAND to sandy SILT	120	4.0	26	21	61	42	-	-	24	16	0.00	-	0.00	0.0
25.59	104.5	82.3	170.8	3.4	1.3	3.3	5	silty SAND to sandy SILT	120	4.0	26	21	61	42	-	-	24	16	0.00	-	0.00	0.0
25.76	107.1	84.0	172.7	3.5	1.4	3.3	5	silty SAND to sandy SILT	120	4.0	27	21	61	42	-	-	24	16	0.00	-	0.00	0.0
25.92	106.8	83.6	171.1	3.4	1.4	3.3	5	silty SAND to sandy SILT	120	4.0	27	21	61	42	-	-	24	16	0.00	-	0.00	0.0
26.08	105.9	82.6	171.1	3.5	1.4	3.3	5	silty SAND to sandy SILT	120	4.0	26	21	61	42	-	-	24	16	0.00	-	0.00	0.0
26.25	108.6	84.4	170.5	3.5	1.5	3.2	5	silty SAND to sandy SILT	120	4.0	27	21	61	42	-	-	23	16	0.00	-	0.00	0.0
26.41	108.7	84.2	170.2	3.5	1.6	3.2	5	silty SAND to sandy SILT	120	4.0	27	21	61	42	-	-	23	16	0.00	-	0.00	0.0
26.58	109.4	84.5	175.0	3.6	1.6	3.4	5	silty SAND to sandy SILT	120	4.0	27	21	61	42	-	-	24	16	0.00	-	0.00	0.0
26.74	110.5	85.1	174.1	3.6	1.6	3.3	5	silty SAND to sandy SILT	120	4.0	28	21	62	42	-	-	24	16	0.00	-	0.00	0.0
26.90	108.6	83.4	170.7	3.5	1.7	3.3	5	silty SAND to sandy SILT	120	4.0	27	21	61	42	-	-	24	16	0.00	-	0.00	0.0
27.07	106.3	81.3	171.2	3.5	1.8	3.4	5	silty SAND to sandy SILT	120	4.0	27	20	60	42	-	-	24	16	0.00	-	0.00	0.0
27.23	107.9	82.3	170.3	3.5	1.9	3.3	5	silty SAND to sandy SILT	120	4.0	27	21	61	42	-	-	24	16	0.00	-	0.00	0.0
27.40	107.7	82.0	168.7	3.4	1.9	3.2	5	silty SAND to sandy SILT	120	4.0	27	20	60	42	-	-	24	16	0.00	-	0.00	0.0
27.56	108.8	82.5	144.1	2.5	2.0	2.4	5	silty SAND to sandy SILT	120	4.0	27	21	61	42	-	-	20	16	1.49	-	0.00	17.8

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Middle Earth Geo Testing

APPENDIX B

LABORATORY TEST RESULTS

TABLE B-1 SUMMARY OF SOIL LABORATORY TEST RESULTS

Project No.: *11-135* Project Name: Parsons/I-5 HOV Widening Segment 1

Boring No .	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-101	*S-1*	5	MH	26.1				0:6:94		68/33/35				
A-11-101	*D-2*	10	MH	19.3	125.4	>4.5								
A-11-101	*S-3*	15	MH	24.9										
A-11-101	*D-4*	20	MH	26.6	122.7	>4.5								
A-11-101	*S-5*	25	MH	24.9										
A-11-101	*D-6*	30	MH	21.9	125.6	>4.5								
A-11-104	*S-1*	5	CL	13.0							270	7.1	1620	2047
A-11-104	*D-2*	10	CL	12.3	122.9	>4.5								
A-11-104	*S-3*	15	CL	12.3										
A-11-104	*D-4*	20	CL	12.4	121.2			1:40:59		41/20/21				
A-11-104	*S-5*	25	CL	21.5										
A-11-104	*D-6*	30	CL	24.7	123.3	3.0								
A-11-104	*S-7*	35	CL	20.9										
A-11-106	*Bulk*	0-5	CL							39/15/24				
A-11-106	*S-1*	5	CL	21.1										
A-11-106	*D-2*	10	CL	21.0	128.1	>4.5								
A-11-106	*S-3*	15	CH	18.4										
A-11-106	*D-4*	20	CL	15.9	122.5	>4.5								
A-11-106	*S-5*	25	CL	19.3										
A-11-106	*D-6*	30	CL	25.3	120.7	4.25								
A-11-108	*D-1*	5	CL	15.7	120.8	>4.5		3:18:79						
A-11-108	*S-2*	10	SC-SM	16.0										
A-11-108	*D-3*	15	CH	19.1	127.3			0:23:77		52/22/30				
A-11-108	*S-4*	20	CL	17.2										
A-11-108	*D-5*	25	CH	26.6	119.8	>4.5								
A-11-108	*S-6*	30	CH	29.4										
A-11-109	*Bulk*	0-5	CL							40/15/25				
A-11-109	*S-1*	2.5	CL	21.1										
A-11-109	*D-2*	5	CL	17.8	117.2	>4.5		2:15:83						
A-11-109	*S-3*	10	CL to ML	14.0				1:36:63						
A-11-109	*D-4*	15	ML	8.6	120.2	>4.5								
A-11-109	*S-5*	20	CL	17.8										
A-11-109	*D-6*	25	CL	17.2	125.4	>4.5								
A-11-109	*S-7*	30	CL	16.6										
A-11-109	*D-8*	40	CL	13.1	119.9	>4.5								
A-11-109	*S-9*	45	CH	17.8										
A-11-109	*D-10*	50	CH	18.4	128.6	>4.5								
A-11-109	*S-11*	55	CL	27.1										
A-11-109	*D-12*	60	CL	28.3	118.4	>4.5								
A-11-109	*S-13*	65	CL	25.7										
A-11-109	*D-14*	70	MH	21.5	125.5	>4.5								
A-11-111	*D-1*	5	SC	13.7	135.8					31/16/15				
A-11-111	*S-2*	10	CL	11.9		>4.5								
A-11-111	*D-3*	15	ML to CL	10.8	115.4									
A-11-111	*S-4*	20	CL	15.4										
A-11-111	*D-5*	25	CL	10.7	115.9	>4.5								

Project No.: *11-135* **Project Name:** Parsons/I-5 HOV Widening Segment 1

Boring No .	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-111	*S-6*	30	CL	8.9										
A-11-111	*D-7*	35	SM	7.4	112.7			0:53:47						
A-11-111	*S-8*	40	CL	18.2										
A-11-111	*D-9*	45	CH	26.8	111.3	3.25								
A-11-111	*S-10*	50	SC	28.4										
A-11-111	*D-11*	55	SC	21.0	127.7									
A-11-111	*S-12*	60	ML	19.4										
A-11-111	*D-13*	65	MH	23.0	125.2	>4.5								
A-11-111	*S-14*	70	MH	22.5										
A-11-113	*S-1*	5	SC	10.1				5:50:45						
A-11-113	*D-2*	10	CL	24.7	124.2	2.75								
A-11-113	*S-3*	15	CL	26.0										
A-11-113	*D-4*	20	CL	25.8	114.4	2.25								
A-11-113	*S-5*	25	CL	27.3										
A-11-113	*D-6*	30	CH	17.5	128.8	>4.5								
A-11-113	*S-7*	35	CL	14.0										
A-11-113	*D-8*	40	CL	10.5	105.1									
A-11-113	*S-9*	45	SM	8.2				0:51:49						
A-11-113	*D-10*	50	SM	9.3	111.9									
A-11-114	*D-1*	5	CL	11.4	132.9	>4.5								
A-11-114	*S-2*	10	CL	18.8										
A-11-114	*D-3*	15	CH	23.3	123.5	4.0				52/19/33				
A-11-114	*S-4*	20	CL	23.6										
A-11-114	*D-5*	25	CL	23.0	116.6	1.5								
A-11-114	*S-6*	30	CL	18.0										
A-11-114	*D-7*	35	CL	7.6	103.0	>4.5		0:36:64		35/20/15				
A-11-114	*S-8*	40	ML	8.1										
A-11-114	*D-9*	45	SM	6.0	105.1									
A-11-114	*S-10*	50	ML	9.9				0:35:65						
A-11-114	*D-11*	55	ML	9.8	111.0			0:46:54						
A-11-114	*S-12*	60	CL	40.5										
A-11-114	*D-13*	65	CL	30.9	115.0	1.25								
A-11-114	*S-14*	70	CL	25.7										
A-11-114	*D-15*	75	SC to CL	27.6	121.3	1.25								
A-11-114	*S-16*	80	SC to CL	26.1										
A-11-114	*D-17*	85	MH	19.7	127.8	>4.5								
A-11-114	*S-18*	90	MH	25.4										
A-11-114	*D-19*	95	MH	16.1	127.0	>4.5								
A-11-114	*S-20*	100	MH	24.4										
A-11-115	*Bulk*	0-5	CL							29/13/16				
A-11-115	*S-1*	5	SC	9.4				5:58:37			410	7.2	560	1281
A-11-115	*D-2*	10	SC to CL	17.6	129.1	>4.5		2:24:74						
A-11-115	*S-3*	15	MH	24.7										
A-11-115	*D-4*	20	CH	15.9	122.3	4.0								
A-11-115	*S-5*	25	ML	5.3				0:49:51						
A-11-115	*D-6*	30	ML	5.4	100.8			0:48:52						

Project No.: *11-135* **Project Name:** Parsons/I-5 HOV Widening Segment 1

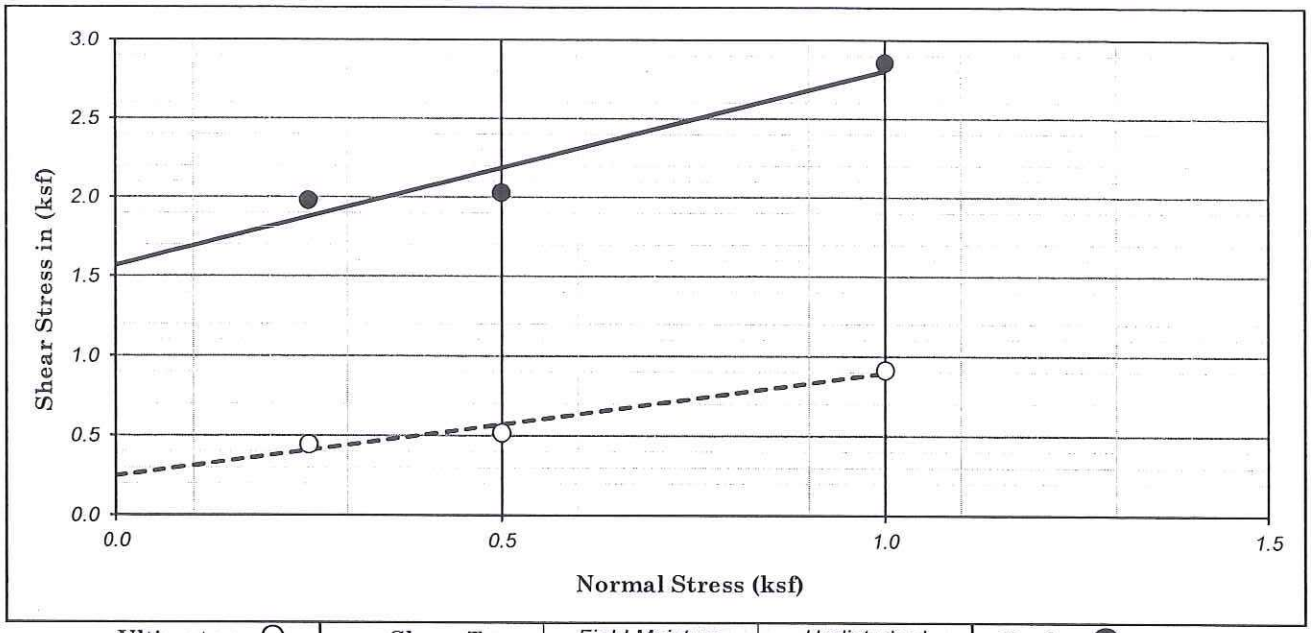
Boring No .	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-115	*S-7*	35	SM	6.6				1:58:41						
A-11-115	*D-8*	40	CL	12.1	128.3	>4.5								
A-11-115	*S-9*	45	CL	15.3										
A-11-115	*D-10*	50	CL	16.3	127.5	>4.5				48/19/29				
A-11-115	*S-11*	55	CH	30.4										
A-11-115	*D-12*	60	CL	29.8	121.6	1.0								
A-11-115	*S-13*	65	SM	25.2										
A-11-115	*D-14*	70	CL	28.6	122.7	0.75								
A-11-115	*S-15*	75	MH	25.0										
A-11-115	*D-16*	80	MH	17.3	127.0	>4.5								
A-11-115	*S-17*	85	MH	22.7										
A-11-115	*D-18*	90	MH	21.5	125.0	>4.5								
A-11-115	*S-19*	95	MH	22.8										
A-11-115	*D-20*	100	MH	23.7	128.7	>4.5								
A-11-116	*S-1*	5	CL	20.2							250	7.3	950	2029
A-11-116	*D-2*	10	CH	25.8	118.8	1.75				56/25/31				
A-11-116	*S-3*	15	CL	25.1										
A-11-116	*D-4*	20	CH	24.8	120.7	>4.5								
A-11-116	*S-5*	25	CL	29.1										
A-11-116	*D-6*	30	CH	29.6	120.5	4.5								
A-11-116	*S-7*	35	CH	28.2										
A-11-116	*D-8*	40	CH	29.0	117.4	>4.5								
A-11-116	*S-9*	45	MH	22.6										
A-11-116	*D-10*	50	MH	21.4	124.2	>4.5								
A-11-116	*S-11*	55	MH	21.2										
A-11-116	*D-12*	60	MH	20.4	121.1	>4.5								
A-11-116	*S-13*	65	MH	20.2										
A-11-116	*D-14*	70	MH	19.7	126.3	>4.5								
A-11-116	*S-15*	75	MH	20.4										
A-11-116	*D-16*	80	MH	20.6	126.7	>4.5								
A-11-116	*S-17*	85	MH	19.0										
A-11-117	*D-1*	5	SC to CL	14.3	126.6	>4.5								
A-11-117	*S-2*	10	CL	10.5										
A-11-117	*D-3*	15	CL	18.1	110.5	>4.5								
A-11-117	*S-4*	20	CL	19.9										
A-11-117	*D-5*	25	CL	17.4	110.4	>4.5								
A-11-117	*S-6*	30	CL	23.4										
A-11-117	*D-7*	35	CH	29.5	120.2	>4.5					170	5.6	5060	1950
A-11-117	*S-8*	40	CH	37.4										
A-11-117	*D-9*	45	CH	30.4	118.2	>4.5								
A-11-117	*S-10*	50	CH	24.6										
A-11-117	*D-11*	55	MH	22.8	126.0	>4.5								
A-11-117	*S-12*	60	MH	24.7										
A-11-117	*D-13*	65	MH	21.7	125.0	>4.5								
A-11-117	*S-14*	70	MH	23.0										
A-11-117	*D-15*	75	MH	20.9	121.8	>4.5								

Project No.: *11-135* Project Name: Parsons/I-5 HOV Widening Segment 1

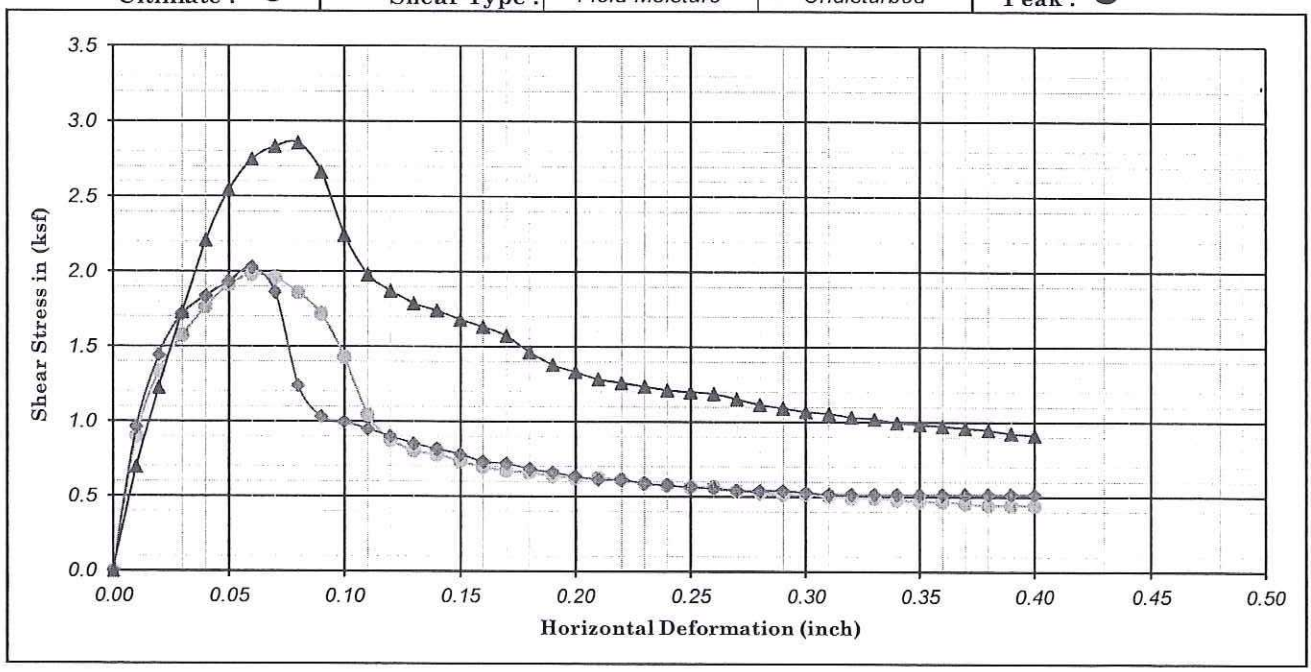
Boring No .	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-117	*S-16*	80	MH	20.6										
A-11-117	*D-17*	85	MH	18.8	126.8	>4.5								
A-11-117	*S-18*	90	MH	20.0										
A-11-117	*D-19*	95	MH	19.5	121.3	>4.5								
A-11-117	*S-20*	100	MH	19.9										
A-11-118	*D-1*	2.5	CH	30.2	116.7	>4.5					270	6.7	550	1986
A-11-118	*S-2*	5	CL	23.5										
A-11-118	*D-3*	10	CL	25.7	122.1	4.5								
A-11-118	*S-4*	15	CH	33.7						59/28/31				
A-11-118	*D-5*	20	CL	28.0	117.9	4.5								
A-11-118	*S-6*	25	CL	27.8										
A-11-118	*D-7*	30	CL	25.5	115.5	4.5								
A-11-118	*S-8*	35	CL	30.3										
A-11-118	*D-9*	40	CL	30.9	117.3	2.25								
A-11-118	*S-10*	45	CL	28.4										
A-11-118	*D-11*	50	CL	28.0	121.7	4.25								
A-11-118	*S-12*	55	CL	30.5										
A-11-118	*D-13*	60	CH	28.0	121.3	4.5								
A-11-118	*S-14*	65	MH	25.4										
A-11-118	*D-15*	70	MH	25.3	122.7	>4.5								
A-11-119	*Bulk*	0-5	CL							41/15/26				
A-11-124	*Bulk*	0-5	CH							55/17/38				
A-11-124	*S-1*	2.5	CL	21.3							310	6.5	1950	407
A-11-124	*D-2*	5	CH	30.9	114.4					63/28/35				
A-11-124	*S-3*	10	CL	32.5										
A-11-124	*D-4*	15	MH	26.1	125.2	>4.5								
A-11-124	*S-5*	20	GM	3.8				39:35:26						
A-11-124	*D-6*	25	MH	20.4	127.0									
A-11-124	*S-7*	30	MH	21.5										
A-11-126	*D-1*	2.5	MH	22.0	125.3	>4.5								
A-11-126	*S-2*	5	MH	21.1										
A-11-126	*D-3*	10	MH	21.9	123.8	>4.5								
A-11-128	*Bulk*	0-5	CH							57/18/39				
A-11-130	*S-1*	5	SM	6.9				15:70:15						
A-11-130	*D-2*	10	SP-SM	4.6	113.9									
A-11-130	*S-3*	15	CH	22.2										
A-11-130	*D-4*	20	CH	23.8	117.6	>4.5								
A-11-130	*S-5*	25	CH	19.0										
A-11-130	*D-6*	30	CH	19.1	125.5	>4.5								
A-11-130	*S-7*	35	CH	22.2										
A-11-130	*D-8*	40	CH	24.5	119.8	4.5								
A-11-130	*S-9*	45	CH	23.0										
A-11-130	*D-10*	50	MH	23.2	123.8	>4.5								
A-11-130	*S-11*	55	MH	21.8										
A-11-130	*D-12*	60	MH	20.4	127.5	>4.5								
A-11-130	*S-13*	65	MH	20.3										

Project No.: *11-135* Project Name: Parsons/I-5 HOV Widening Segment 1

Boring No .	Sample No.	Sample Depth	Soil Identification ASTM D2488/ D2487	Moisture Content ASTM D2216	Total Unit Weight ASTM D2937	Pocket Penetro-meter	Torvane Shear	Grain Size Distribution Gravel: Sand: Fines	Sand Equivalent CT-217	Atterberg Limits ASTM D4318	SoilMinimum Resisivity CT-532	Soil pH CT-532	Soil Soluble Sulfate Content CT-417	Soil Moisture Chloride Content CT-422
		(ft)		(%)	(pcf)	(tsf)	(tsf)	(%)		(LL/PL/PI)	(ohm-cm)		(ppm)	(ppm)
A-11-130	*D-14*	70	MH	21.3	122.0	>4.5								
A-11-134	*S-3*	15	MH	25.3										
A-11-134	*D-4*	20	MH	19.7	122.8	>4.5								
A-11-134	*S-5*	25	MH	27.7										
A-11-134	*D-6*	30	MH	13.6	121.3	>4.5								



Ultimate : ○	Shear Type :	Field Moisture	Undisturbed	Peak : ●



Boring No. : A-11-108		Strength Intercept (C) :	1.57	(ksf)	Peak	0.25	(ksf)	Ultimate
Sample No. : D-1			74.98	(kPa)		11.78	(kPa)	
Depth (ft/m) : 2.5	0.00	Friction Angle (ϕ) :	51.06	Degree		32.94	Degree	
Description : Olive-brown, Lean CLAY with SAND (CL)						Shear Rate (inch/minute) :		0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m³)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	18.71	100.62	15.84	0.68	0.25	11.97	1.98	94.80	0.44	21.26
◆	15.00	108.44	17.07	0.55	0.50	23.94	2.03	97.10	0.52	24.71
▲	16.77	105.37	16.59	0.60	1.00	47.88	2.86	136.75	0.91	43.67

Earth Mechanics, Inc.
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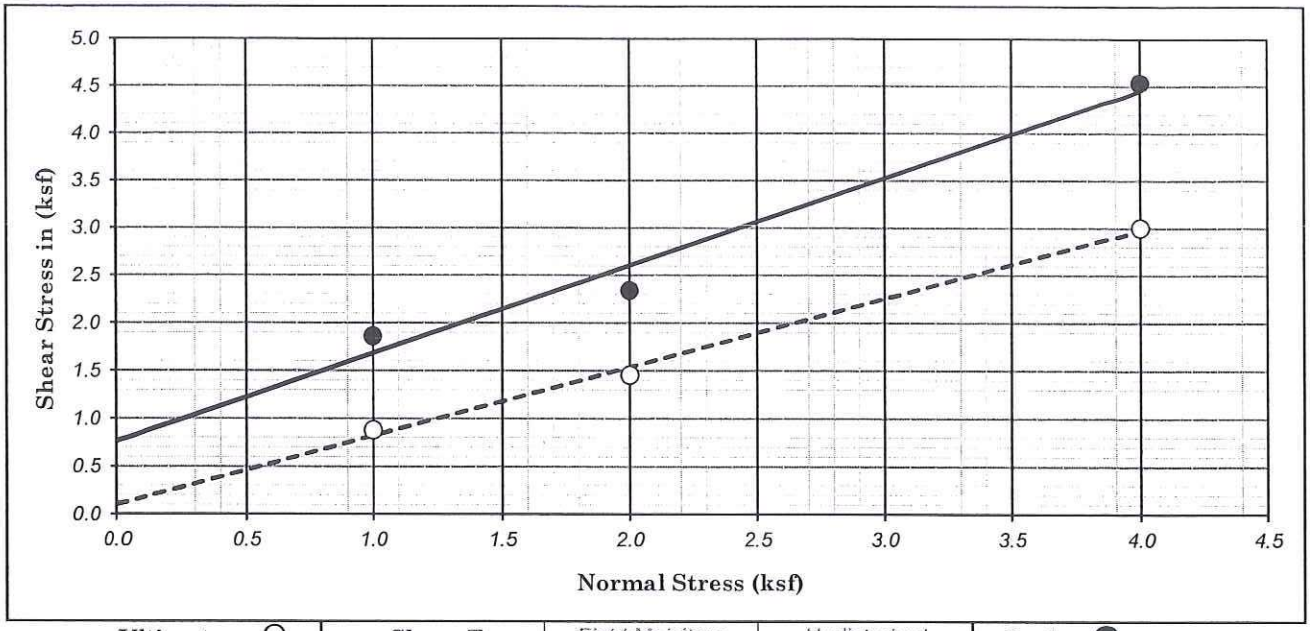
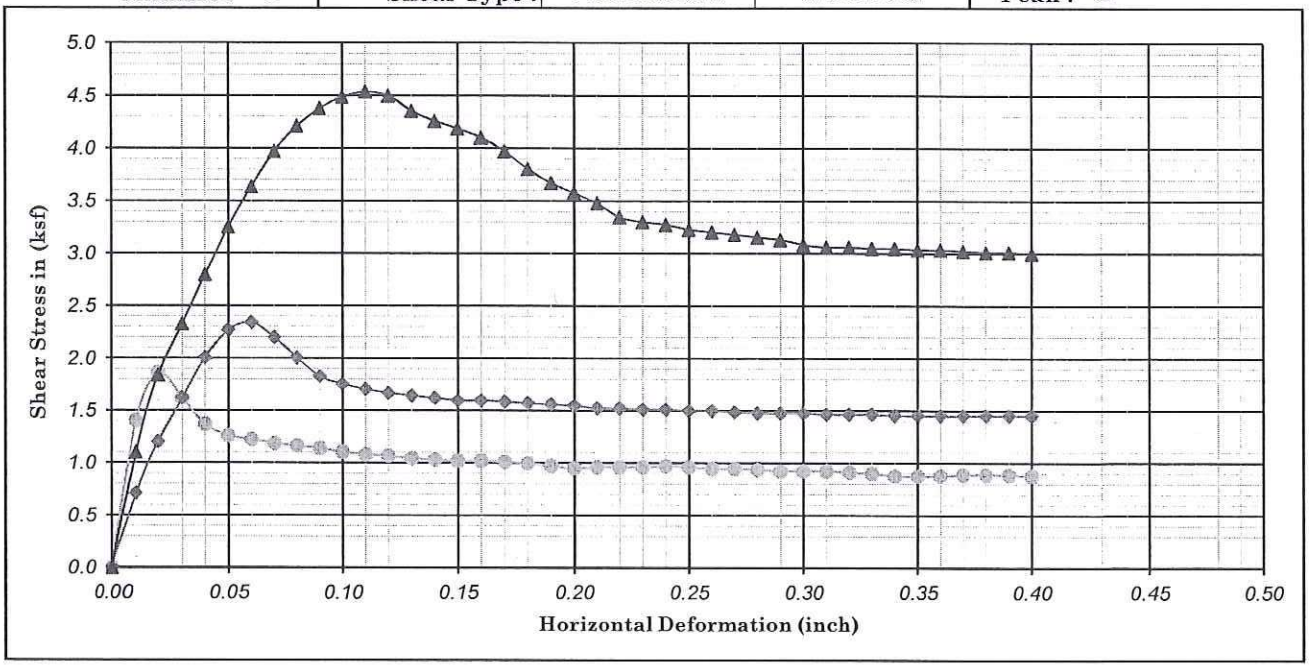
Parsons/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST
(ASTM D-3080)

Project No. : 11-135 | Date : 11/29/11



Ultimate : ○	Shear Type :	Field Moisiture	Undisturbed	Peak : ●



Boring No. : A-11-109		**Strength Intercept (C) :**	0.76	(ksf)	**Peak**	0.10	(ksf)	**Ultimate**
Sample No. : D-4			36.48	(kPa)		4.88	(kPa)	
Depth (ft/m) : 20.0	0.00	**Friction Angle (ϕ) :**	42.66	Degree		35.66	Degree	

Description : Olive-brown, SANDY SILT (ML) **Shear Rate** (inch/minute) : 0.02

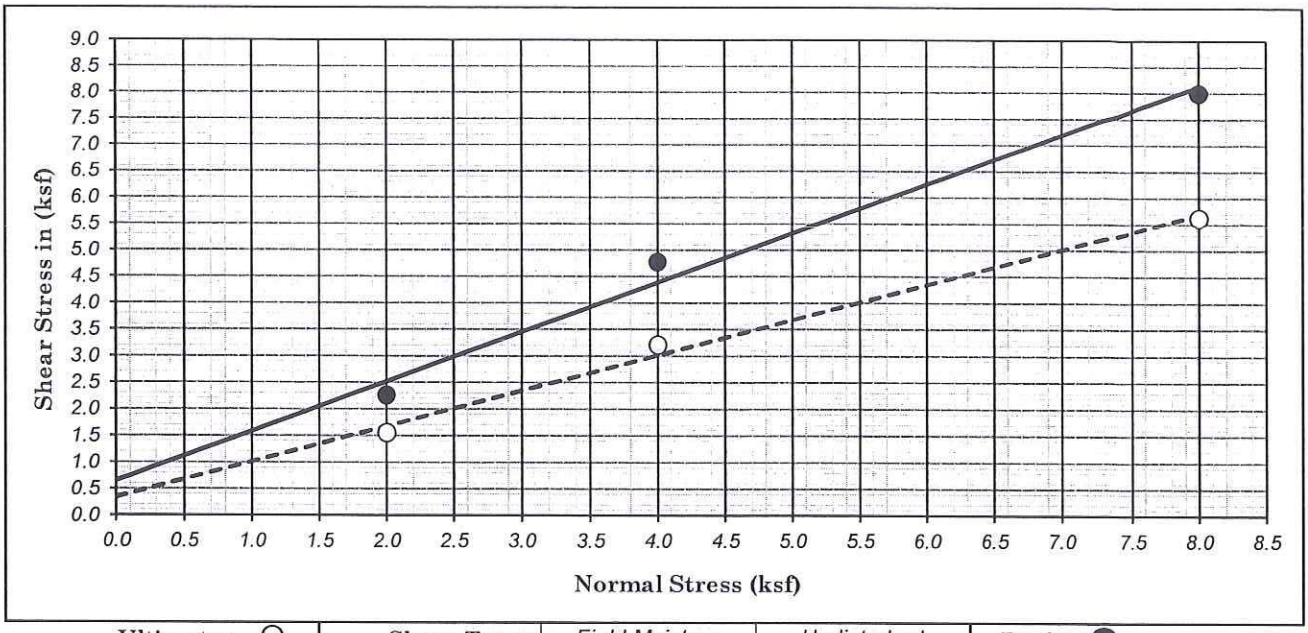
SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	8.54	113.34	17.84	0.49	1.00	47.88	1.86	89.06	0.88	41.94
◆	6.99	105.60	16.62	0.60	2.00	95.76	2.34	112.04	1.45	69.52
▲	10.18	114.97	18.10	0.47	4.00	191.52	4.54	217.18	3.00	143.64
					0.00	0.00	0.76	36.48	0.10	4.88

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

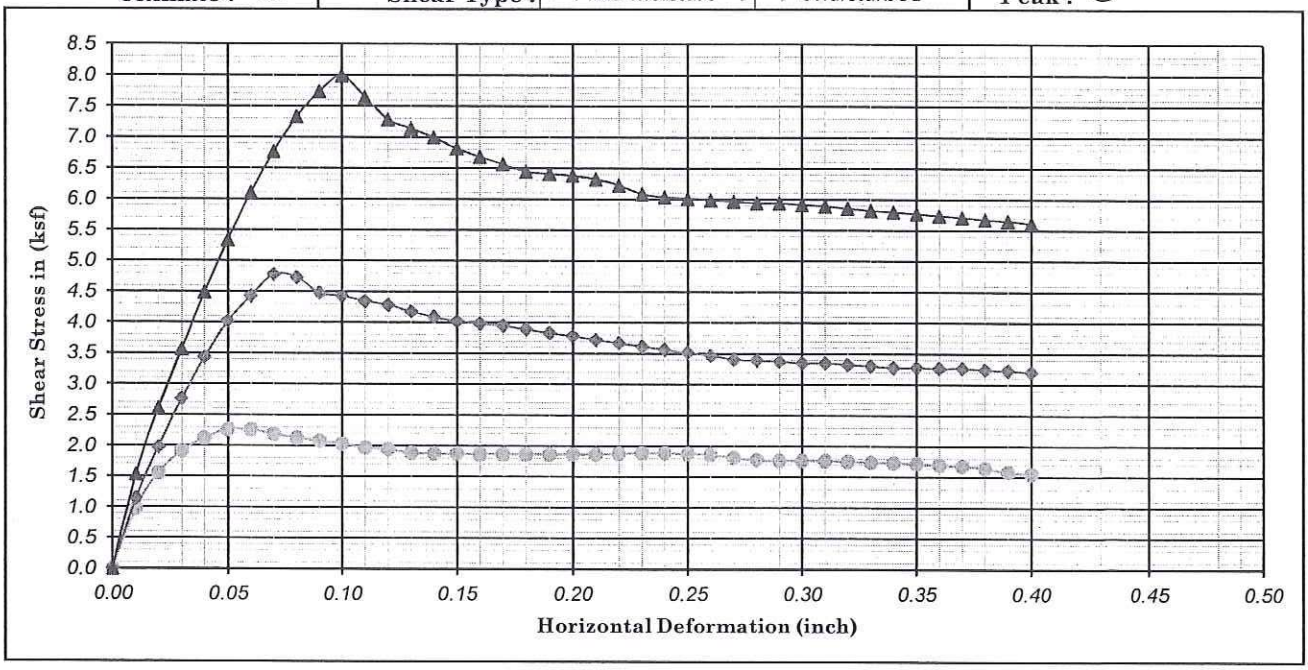
PTG/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST
(ASTM D-3080)

Project No. : 11-135 **Date :** 11/29/11



Ultimate : ○	Shear Type :	Field Moisture	Undisturbed	Peak : ●



Boring No. : A-11-111		Strength Intercept (C) :	0.65	(ksf)	Peak	0.34	(ksf)	Ultimate
Sample No. : D-7			31.05	(kPa)		16.40	(kPa)	
Depth (ft/m) : 35.0	0.00	Friction Angle (ϕ) :	43.05	Degree		33.71	Degree	

Description : Dark Olive-brown, SILTY SAND (SM) — Shear Rate (inch/minute) : 0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	7.97	104.30	16.42	0.62	2.00	95.76	2.26	108.02	1.55	74.12
◆	10.47	107.06	16.85	0.57	4.00	191.52	4.78	228.67	3.20	153.41
▲	12.93	111.75	17.59	0.51	8.00	383.04	7.99	382.61	5.62	268.85

Earth Mechanics, Inc.
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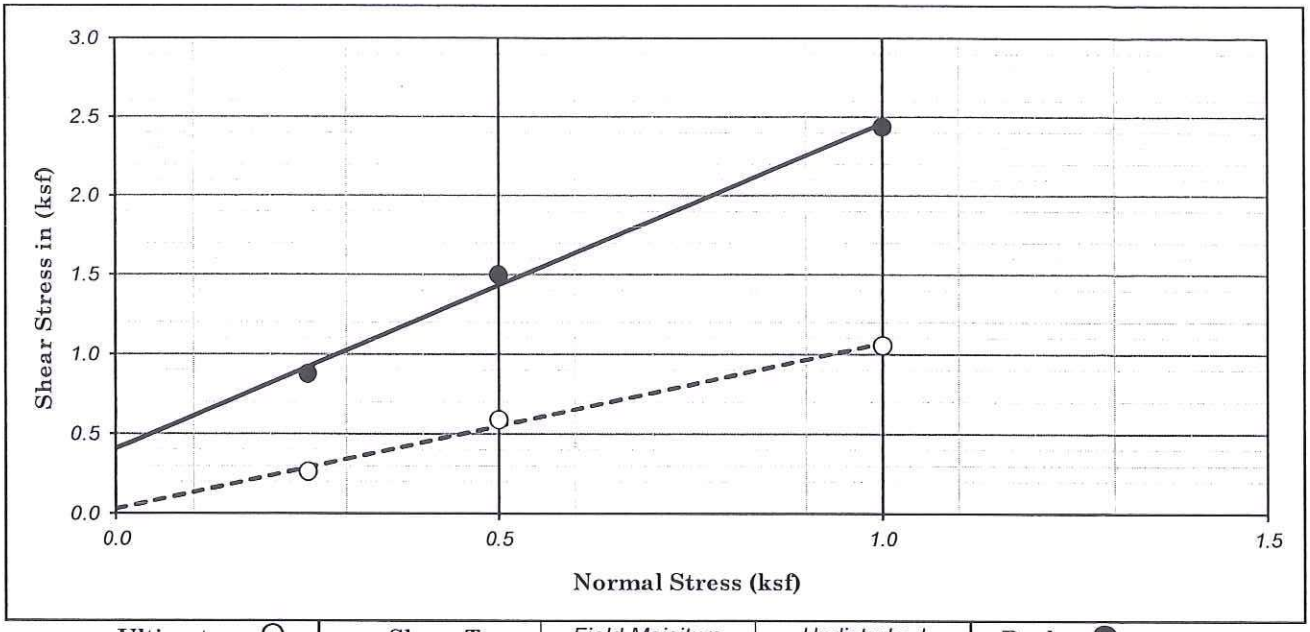
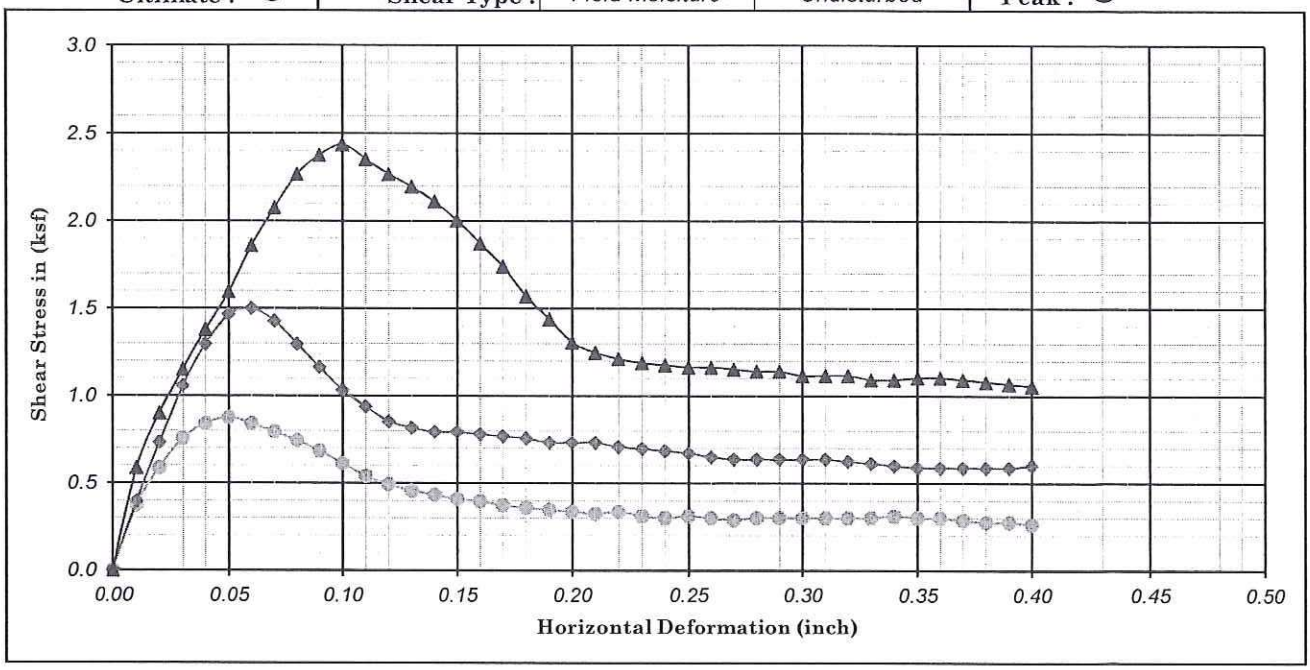
Parsons/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST
(ASTM D-3080)

Project No. : 11-135 | Date : 11/29/11



Ultimate : ○	Shear Type :	Field Moisiture	Undisturbed	Peak : ●



Boring No. : A-11-114		Strength Intercept (C) :	0.41	(ksf)	Peak	0.03	(ksf)	Ultimate
Sample No. : D-1			19.54	(kPa)		1.44	(kPa)	
Depth (ft/m) : 2.5	0.00	Friction Angle (ϕ) :	64.00	Degree		46.09	Degree	

Description : Olive-brown, SANDY lean CLAY (CL) — Shear Rate (inch/minute) : 0.02

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	10.98	112.67	17.73	0.50	0.25	11.97	0.88	41.94	0.26	12.64
◆	12.01	117.68	18.52	0.43	0.50	23.94	1.50	71.82	0.59	28.15
▲	11.23	119.11	18.75	0.42	1.00	47.88	2.44	116.64	1.06	50.56
					0.00	0.00	0.41	19.54	0.03	1.44
					1.0	47.88	2.46	117.70	1.07	51.18

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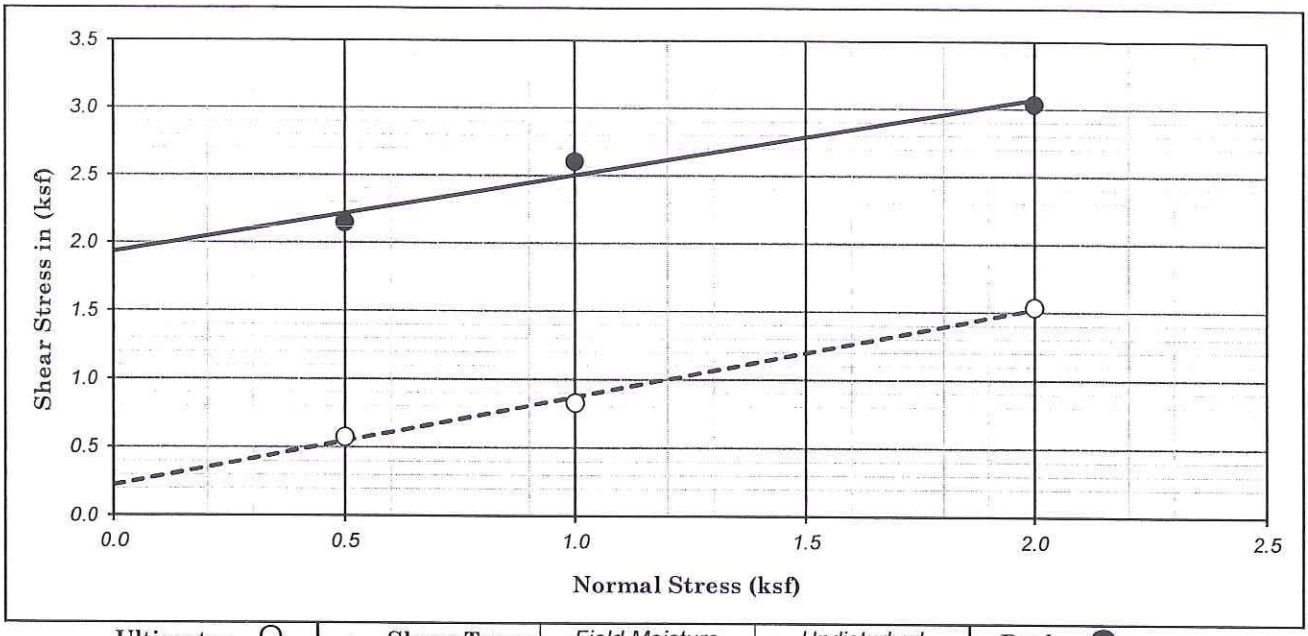
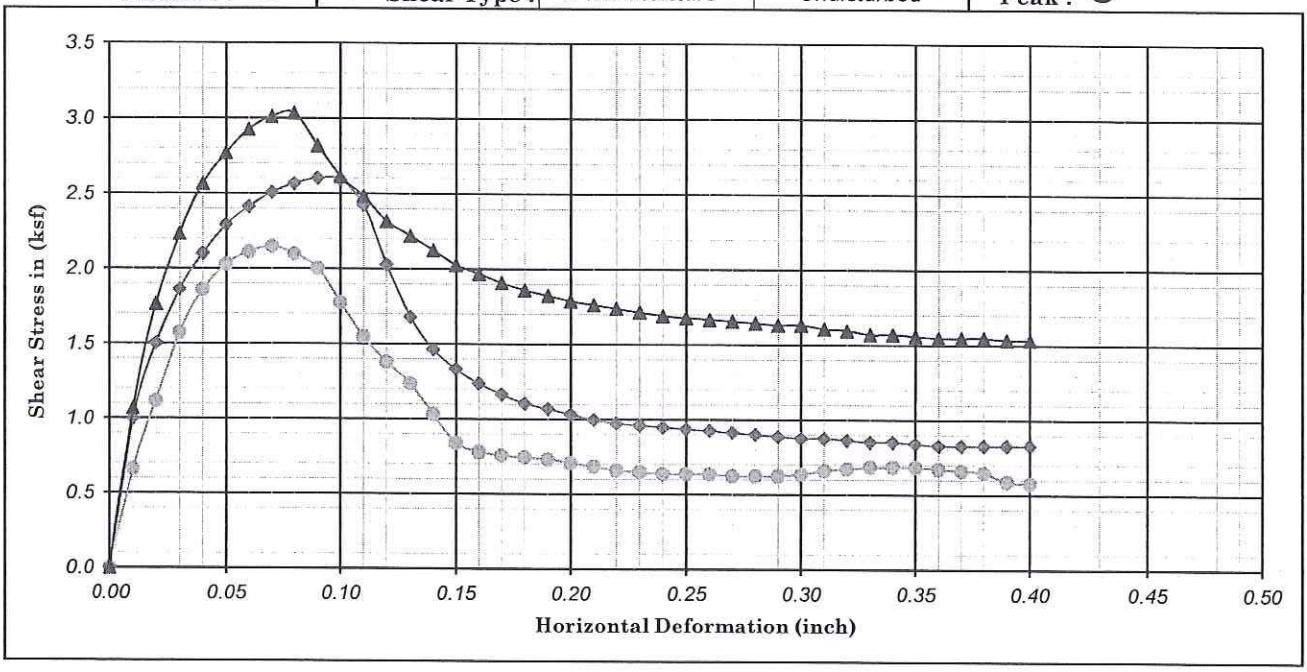
PTG/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST
(ASTM D-3080)

Project No. : 11-135 | Date : 11/29/11



Ultimate : ○	Shear Type :	Field Moisture	Undisturbed	Peak : ●



Boring No. : A-11-115		Strength Intercept (C) :	1.93	(ksf)	Peak	0.22	(ksf)	Ultimate
Sample No. : D-2			92.50	(kPa)		10.63	(kPa)	
Depth (ft/m) : 10.0	0.00	Friction Angle (ϕ) :	29.65	Degree		33.01	Degree	
Description : Olive-brown, Lean CLAY with SAND (CL)					Shear Rate (inch/minute) :		0.02	

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	17.09	108.61	17.10	0.55	0.50	23.94	2.15	102.85	0.58	27.58
◆	18.40	109.40	17.22	0.54	1.00	47.88	2.60	124.68	0.83	39.64
▲	17.30	107.85	16.98	0.56	2.00	95.76	3.04	145.36	1.54	73.54

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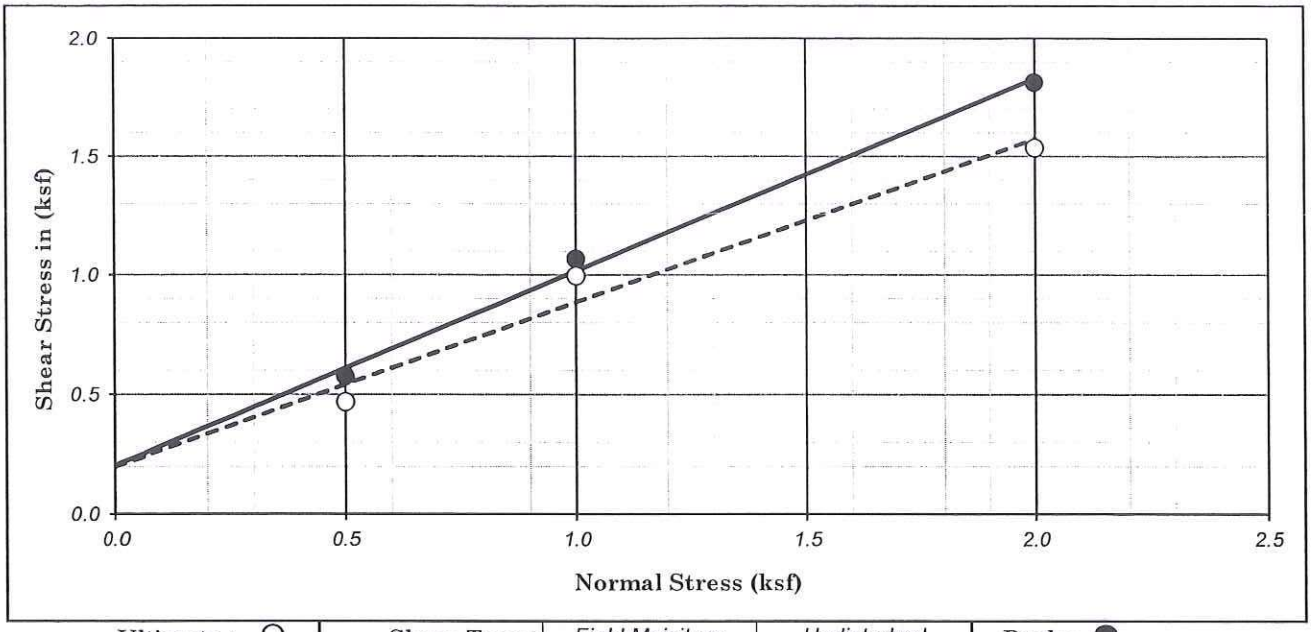
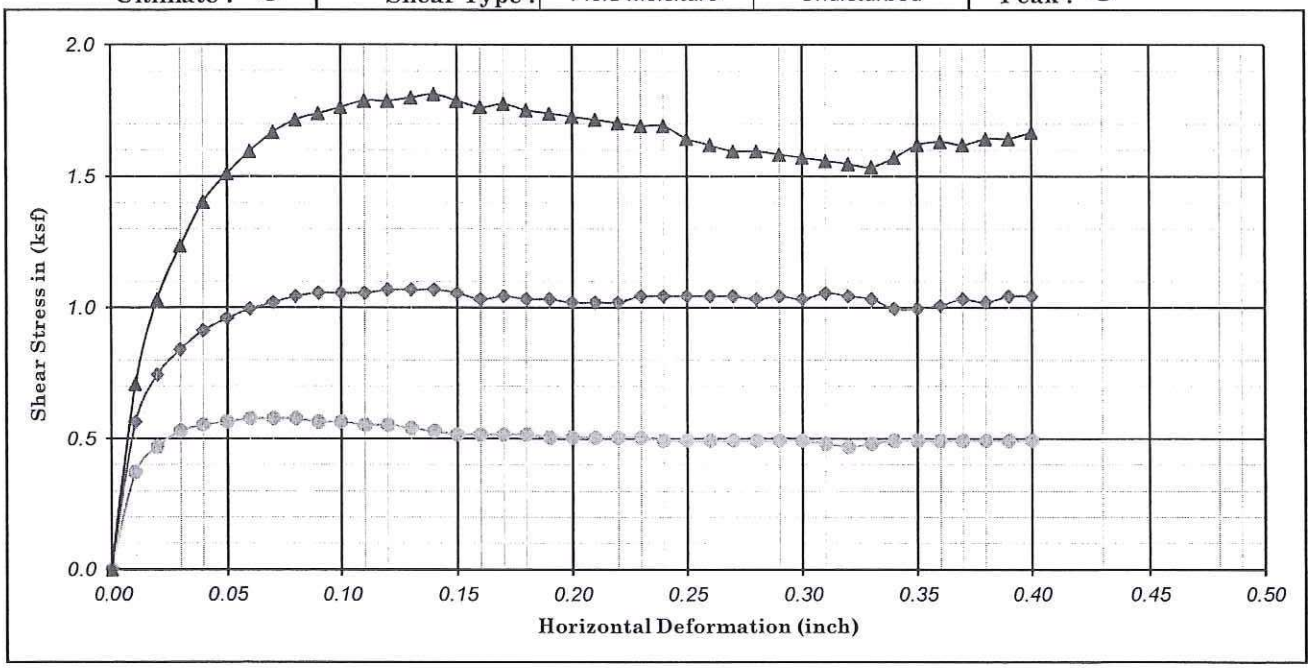
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 | Date : 11/29/11

DIRECT SHEAR TEST
(ASTM D-3080)



Ultimate : ○	Shear Type :	Field Moisiture	Undisturbed	Peak : ●



Boring No. : A-11-130		Strength Intercept (C) :	0.20	(ksf)	Peak	0.20	(ksf)	Ultimate	
Sample No. : D-2			9.77	(kPa)		9.48	(kPa)		
Depth (ft/m) : 10.0	0.00	Friction Angle (ϕ) :	39.10	Degree		34.51	Degree		
Description : Olive-brown, Poorly graded SAND with SILT and GRAVEL (SP-SM)					Shear Rate (inch/minute) :			0.02	

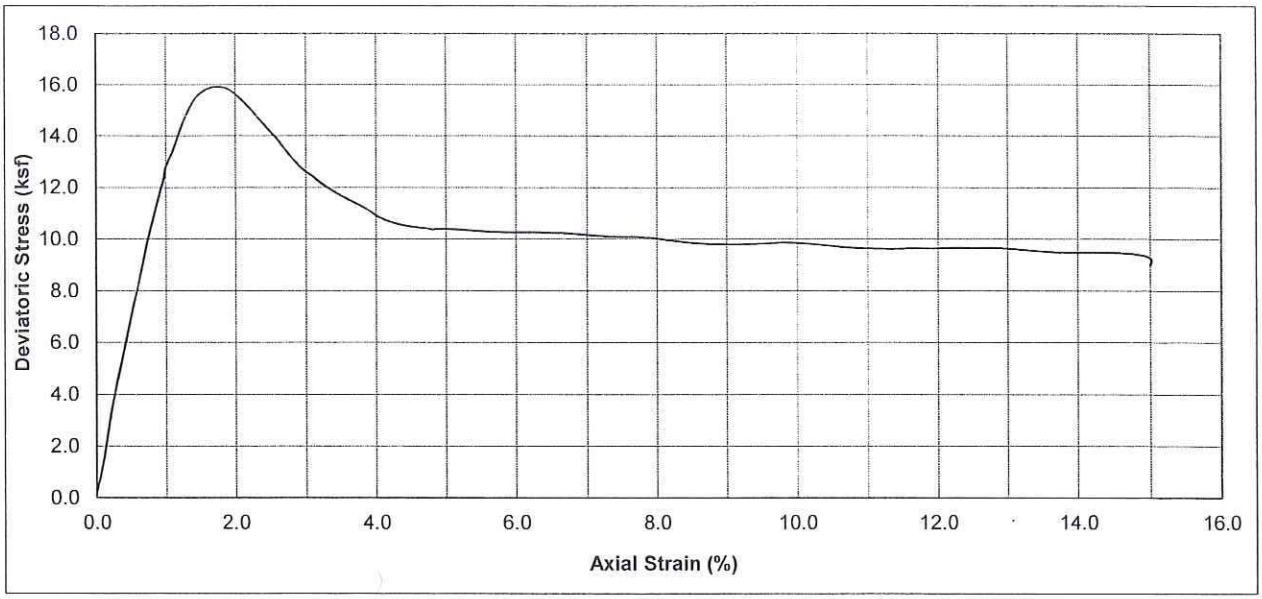
SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	DRY DENSITY (kN/m^3)	VOID RATIO	NORMAL STRESS (ksf)	NORMAL STRESS (kPa)	PEAK STRESS (ksf)	PEAK STRESS (kPa)	ULTIMATE STRESS (ksf)	ULTIMATE STRESS (kPa)
●	5.93	109.91	17.30	0.53	0.50	23.94	0.58	27.58	0.47	22.41
◆	4.46	110.89	17.45	0.52	1.00	47.88	1.07	51.14	1.00	47.69
▲	4.15	110.11	17.33	0.53	2.00	95.76	1.81	86.76	1.54	73.54
					0.00	0.00	0.20	9.77	0.20	9.48
					2.0	95.76	1.83	87.58	1.57	75.31

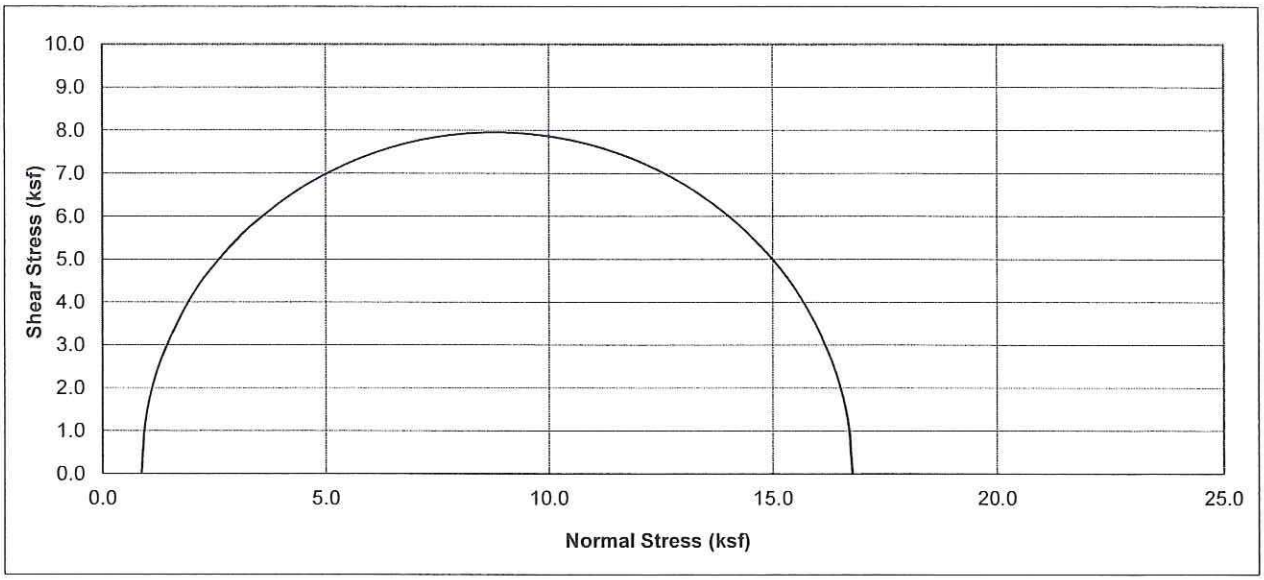
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

PTG/I-5 HOV Widening Segment 1

DIRECT SHEAR TEST
(ASTM D-3080)

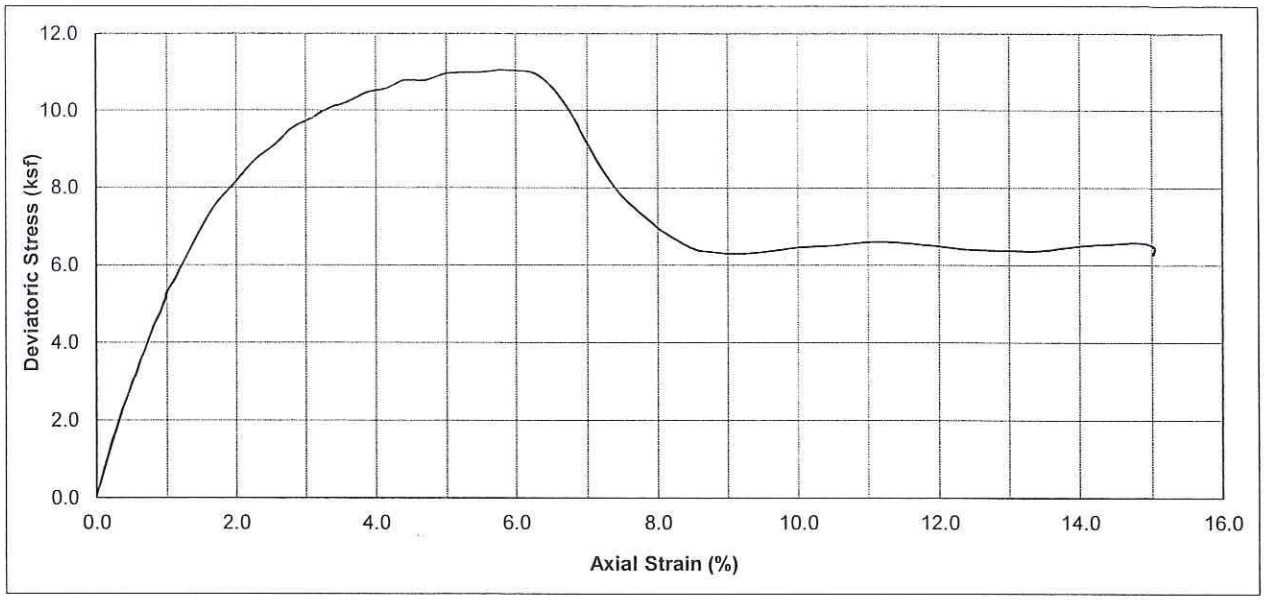
Project No. : 11-135 | Date : 11/29/11

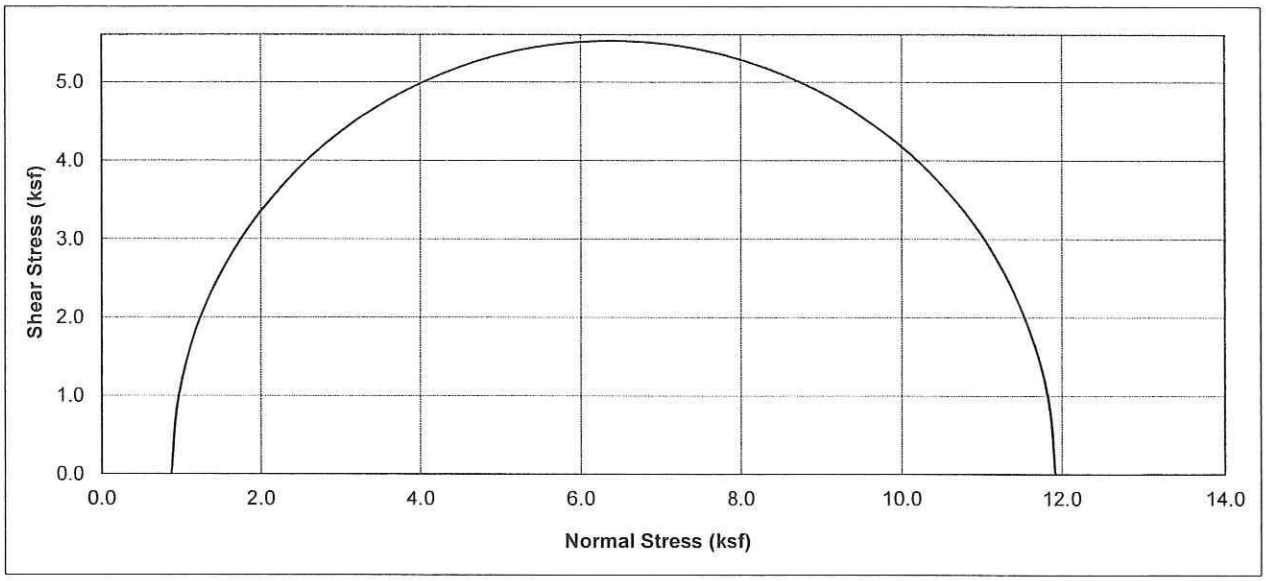




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-104	D-2	10	Olive Brown , SANDY CLAY (CL)	108.9	12.31	0.86	15.91	60.8

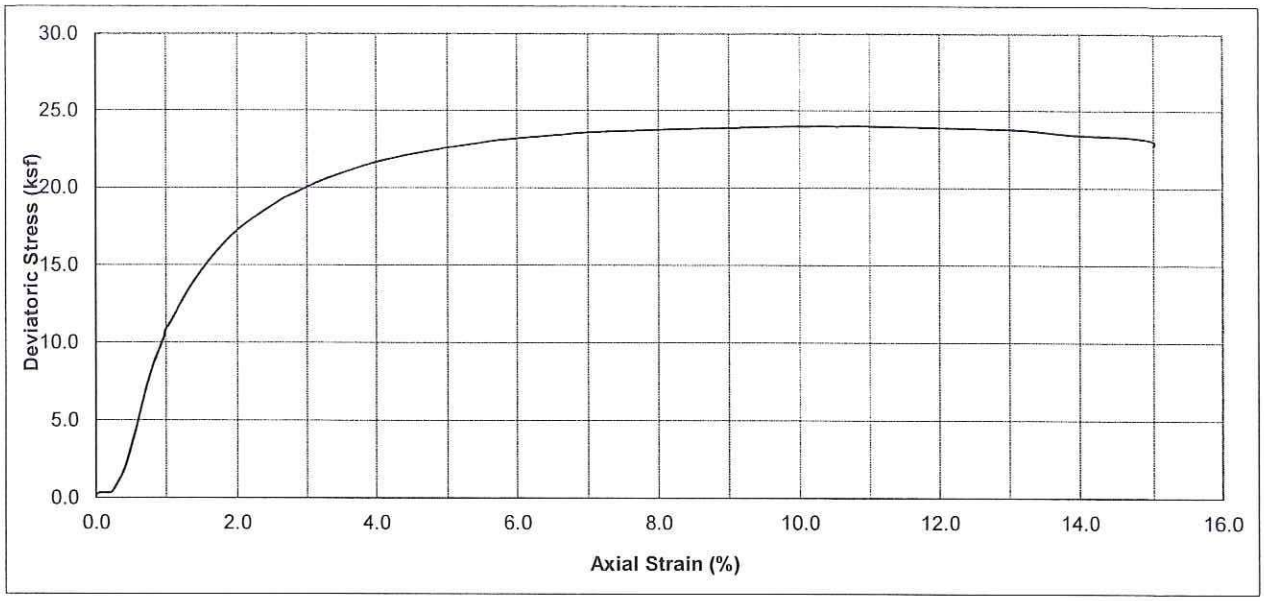
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering		Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135	Date : 12/02/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

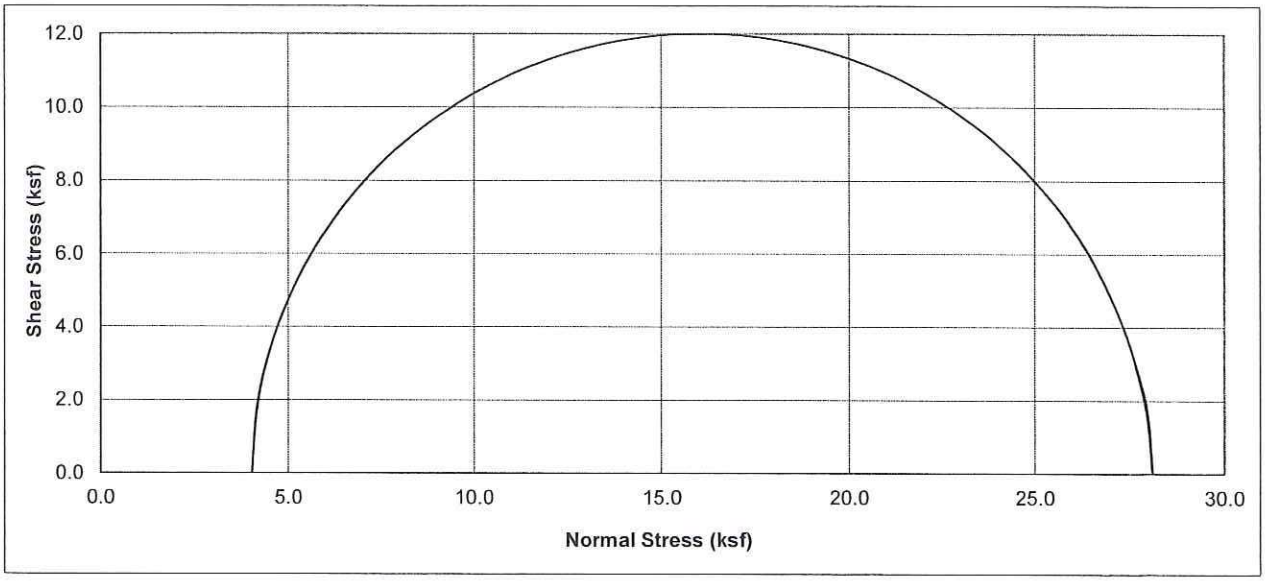




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-106	D-2	10	Olive Brown , LEAN CLAY(CL)	105.5	21.03	0.86	11.05	95.2

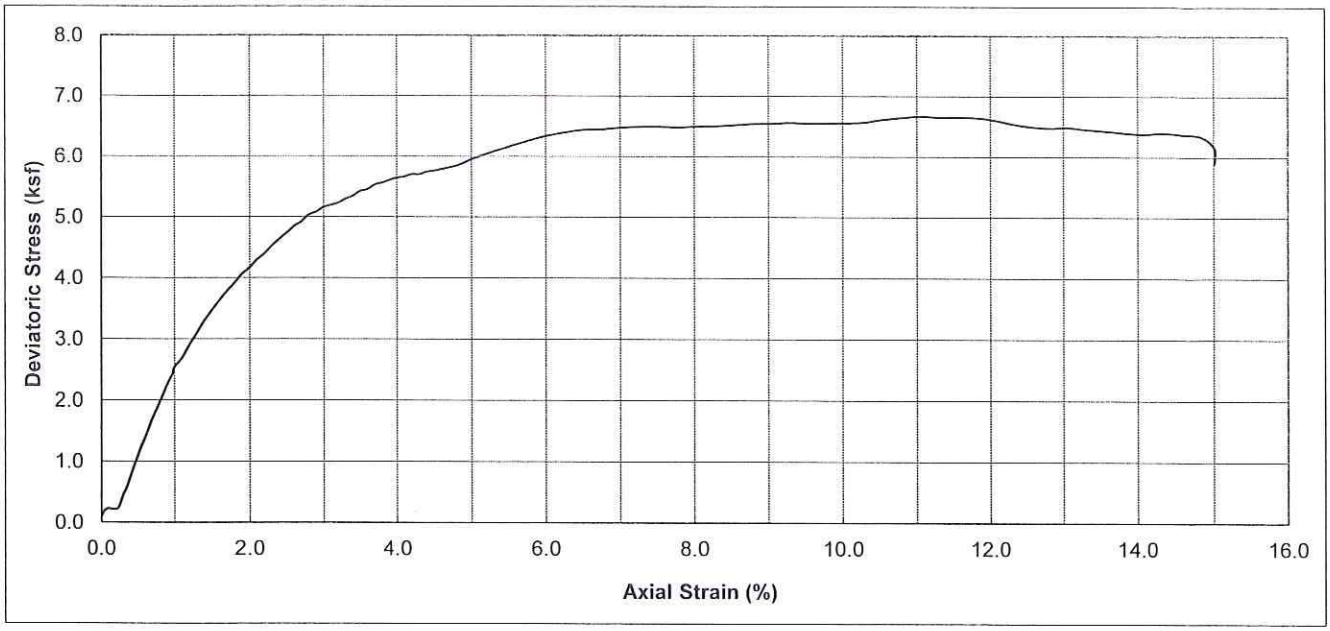
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/02/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

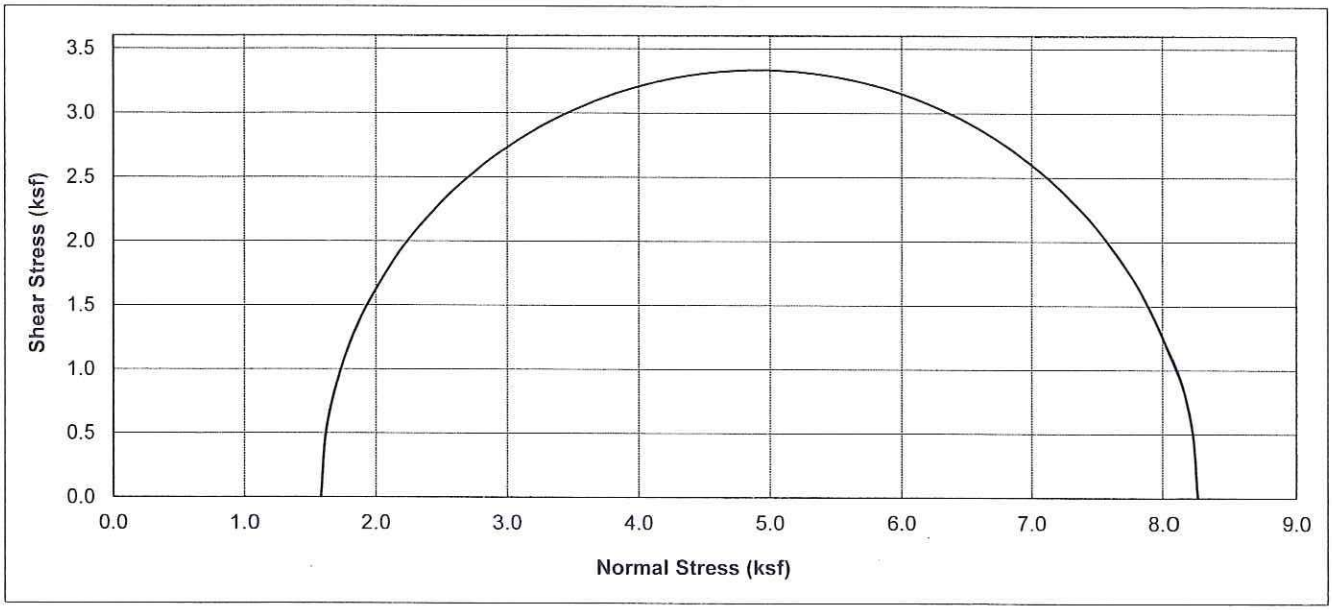




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-109	D-10	50	Very Dk. Gray , FAT CLAY (CH)	111.9	17.01	4.03	24.02	90.9

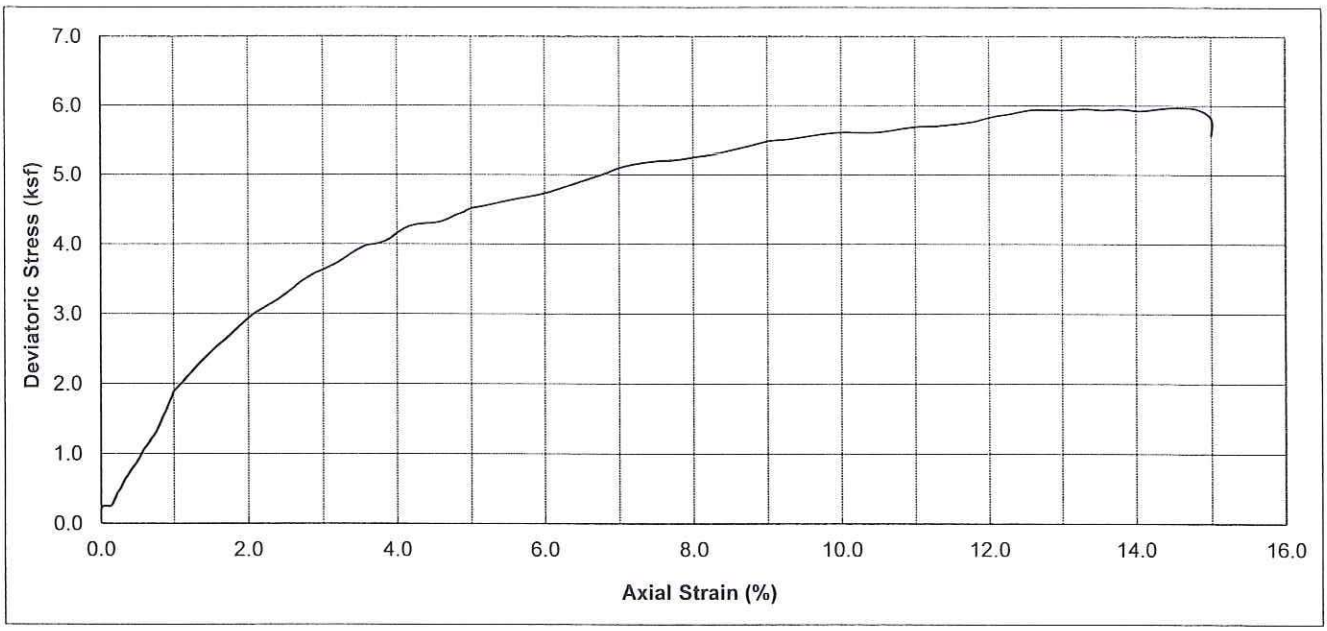
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 / Date : 12/20/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

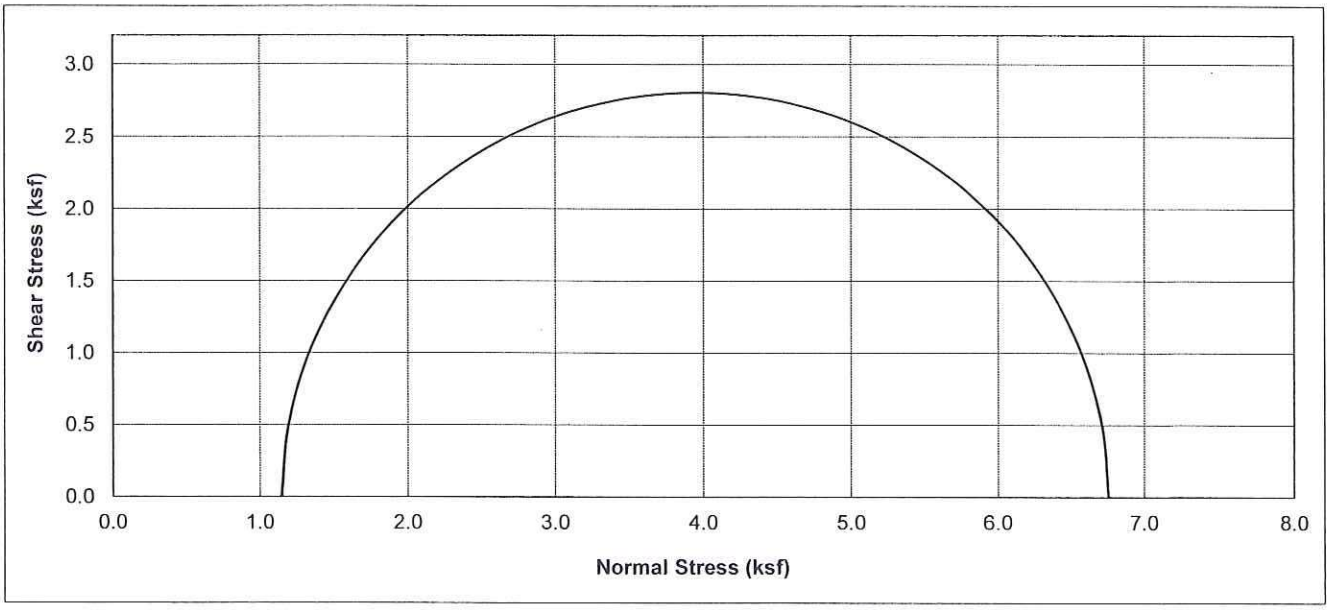




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-113	D-4	20	Dk. Gray , LEAN CLAY (CL)	92.2	25.83	1.58	6.67	84.4

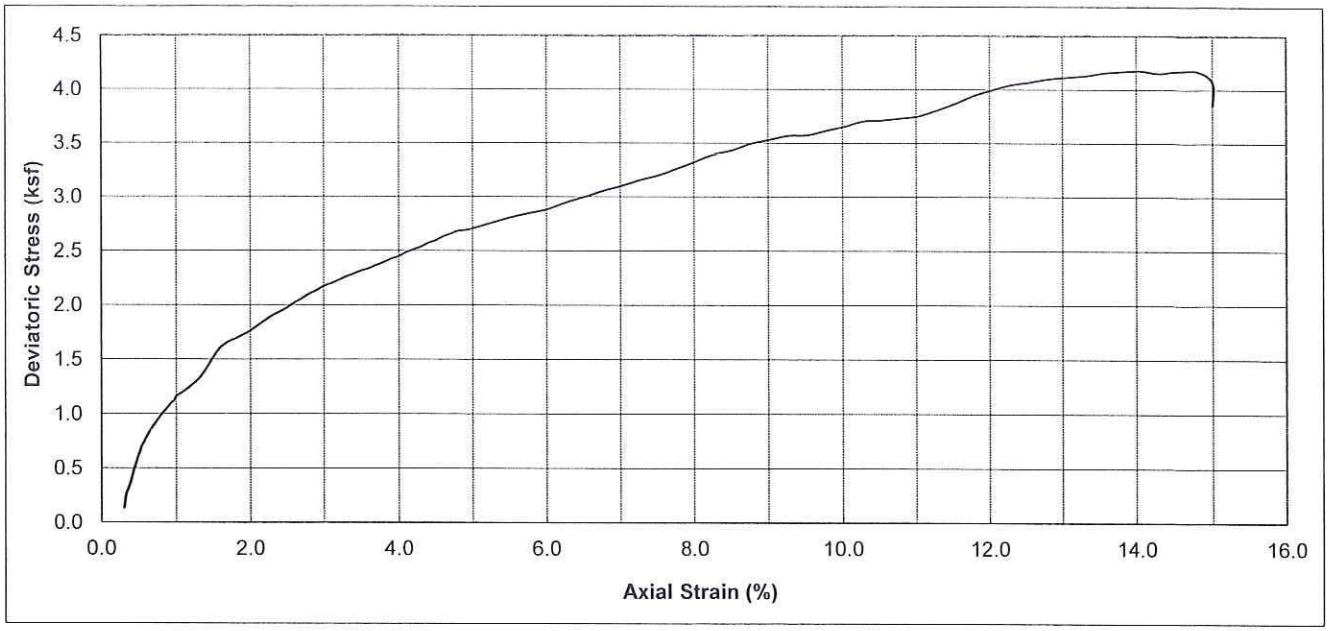
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/02/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

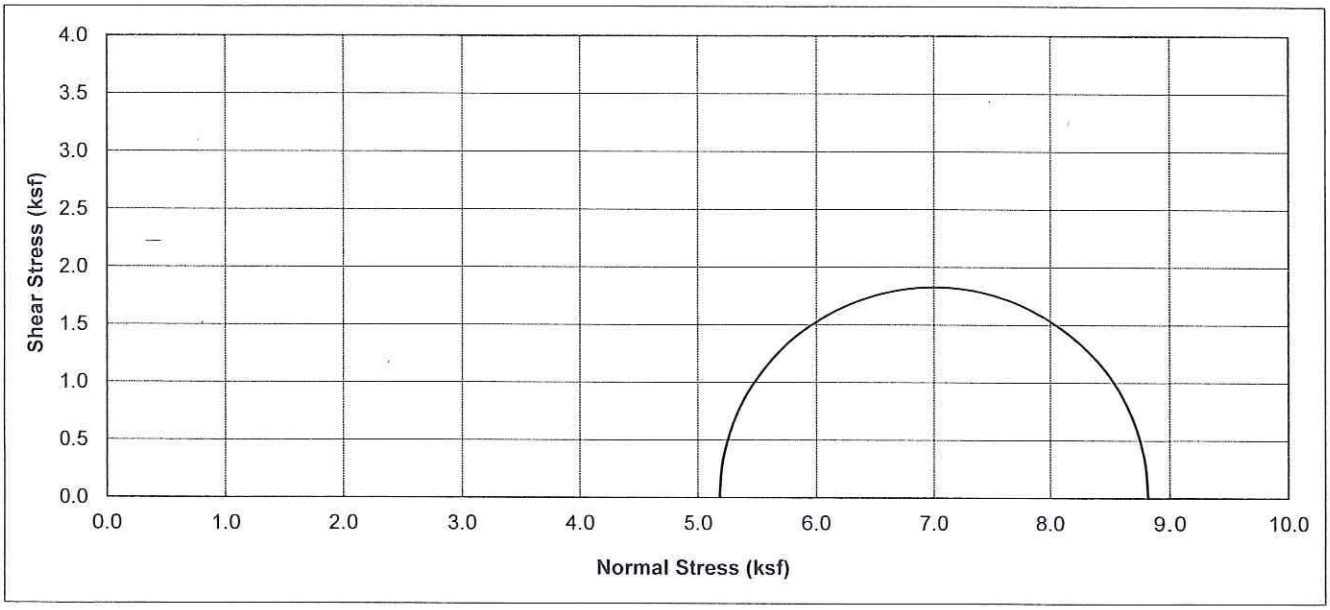




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-114	D-3	15	Olive Brown ,FAT CLAY (CH)	81.8	50.30	1.15	5.61	128.0

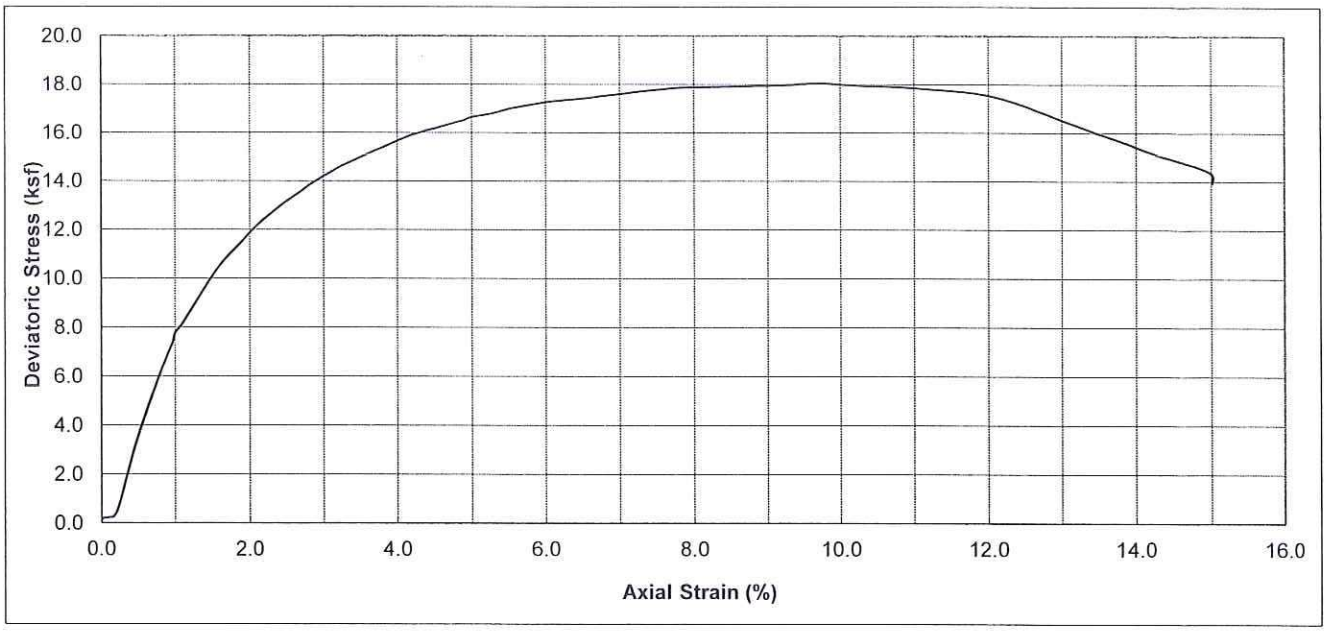
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering		Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135	Date : 12/06/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

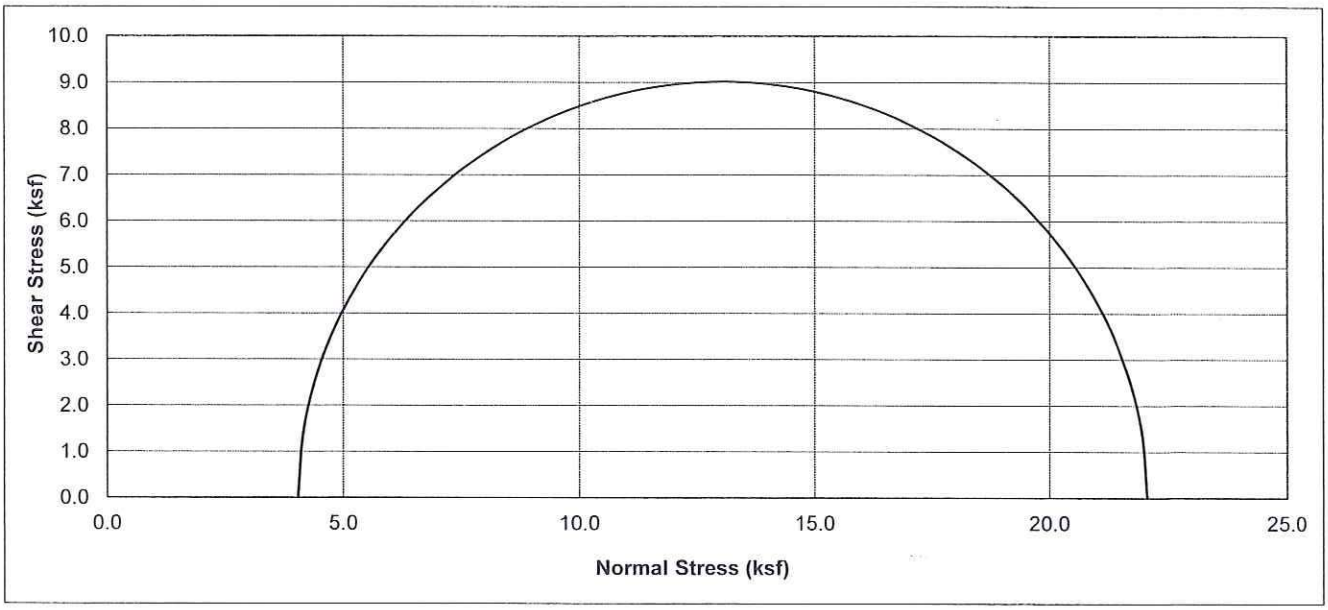




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-114	D-13	65	Dk. Gray , SANDY CLAY (CL)	91.6	29.65	5.18	3.65	95.4

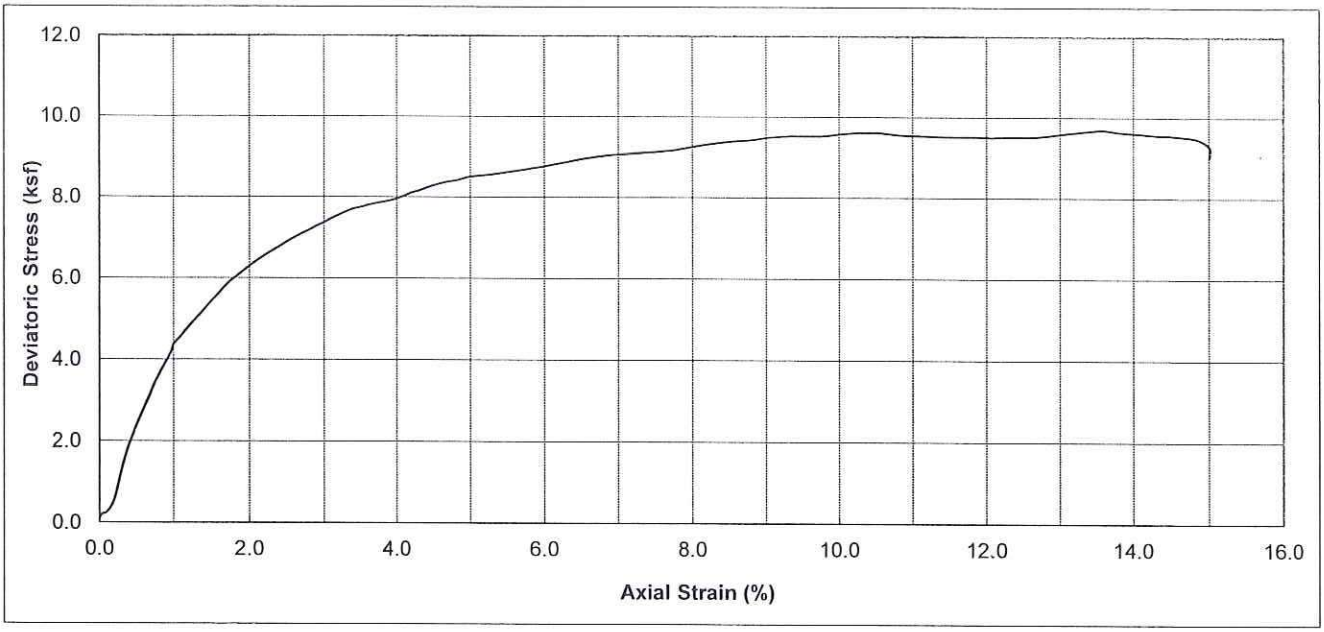
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering		Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135	Date : 12/06/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

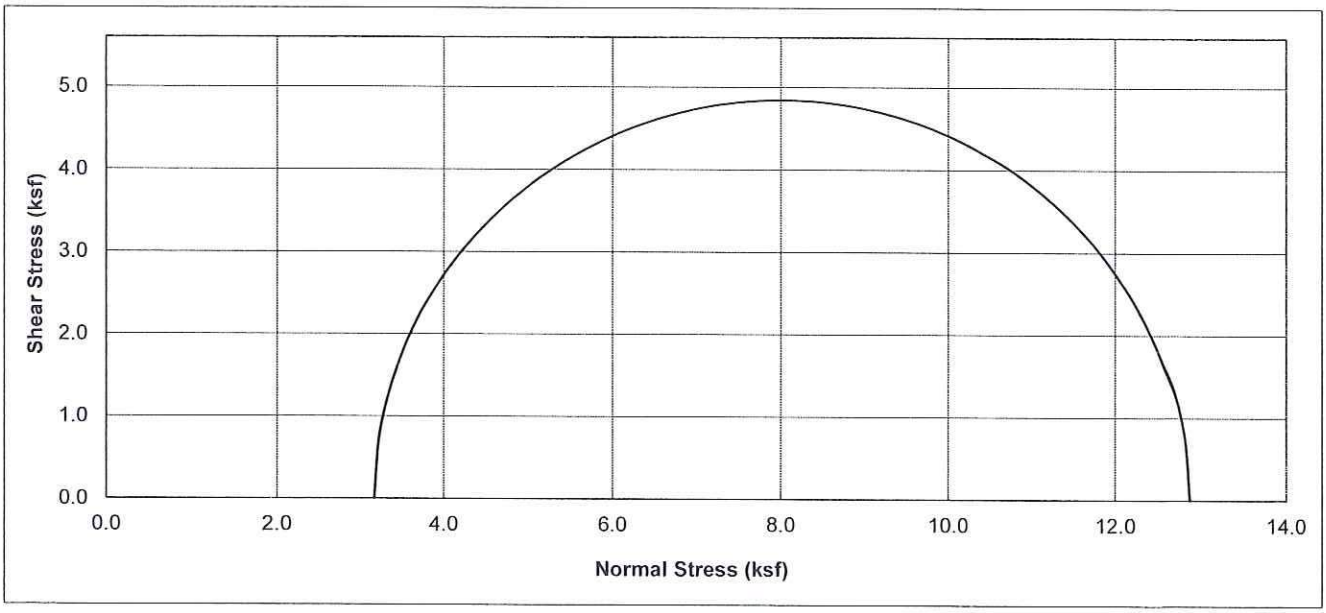




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-115	D-10	50	Olive Brown , LEAN CLAY (CL)	110.0	15.85	4.03	18.03	80.6

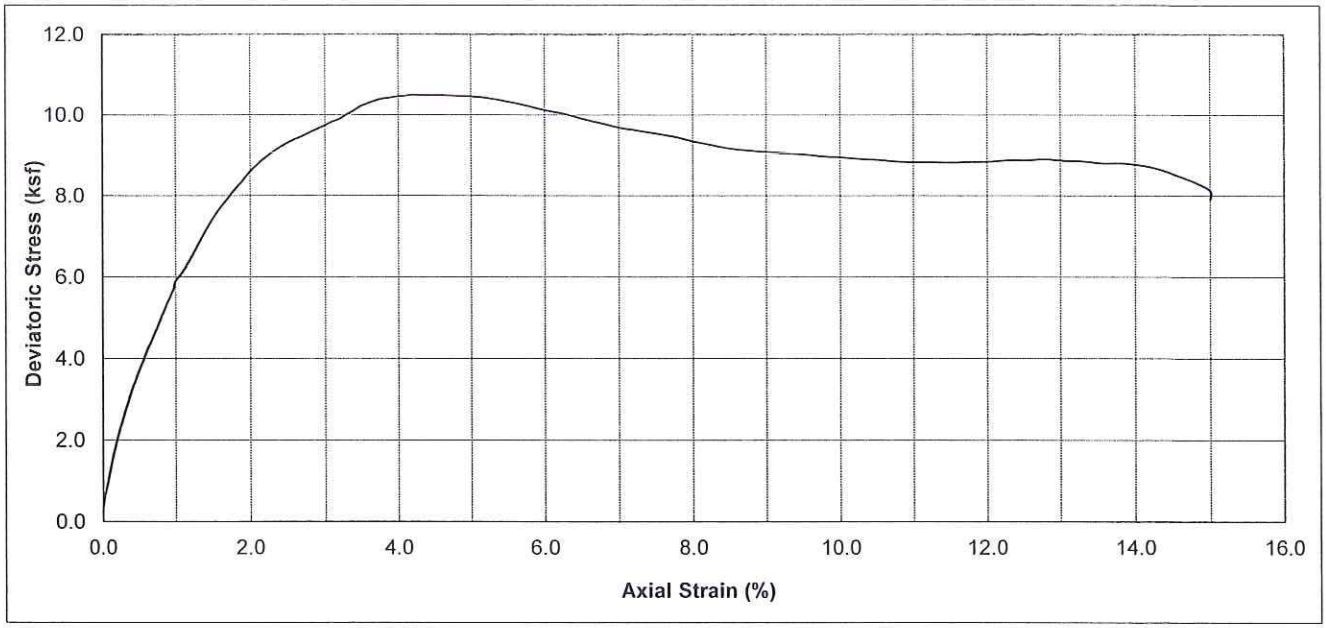
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/20/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

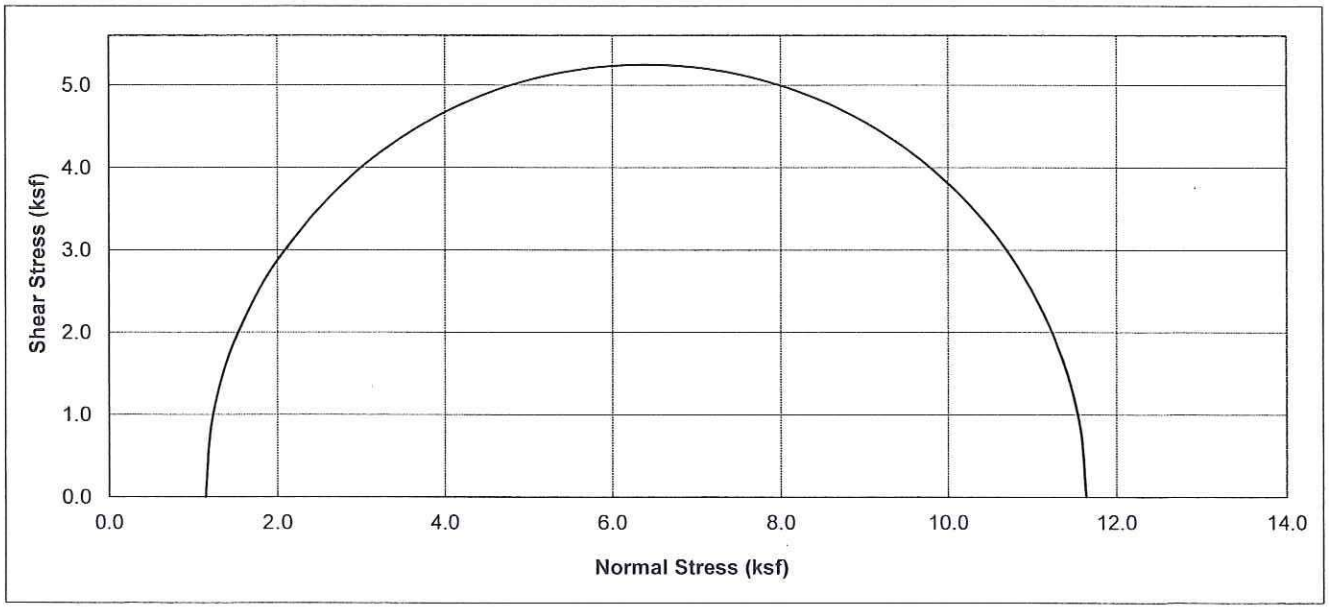




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-116	D-8	40	Dark Olive , FAT CLAY (CH)	92.6	29.02	3.17	9.69	95.6

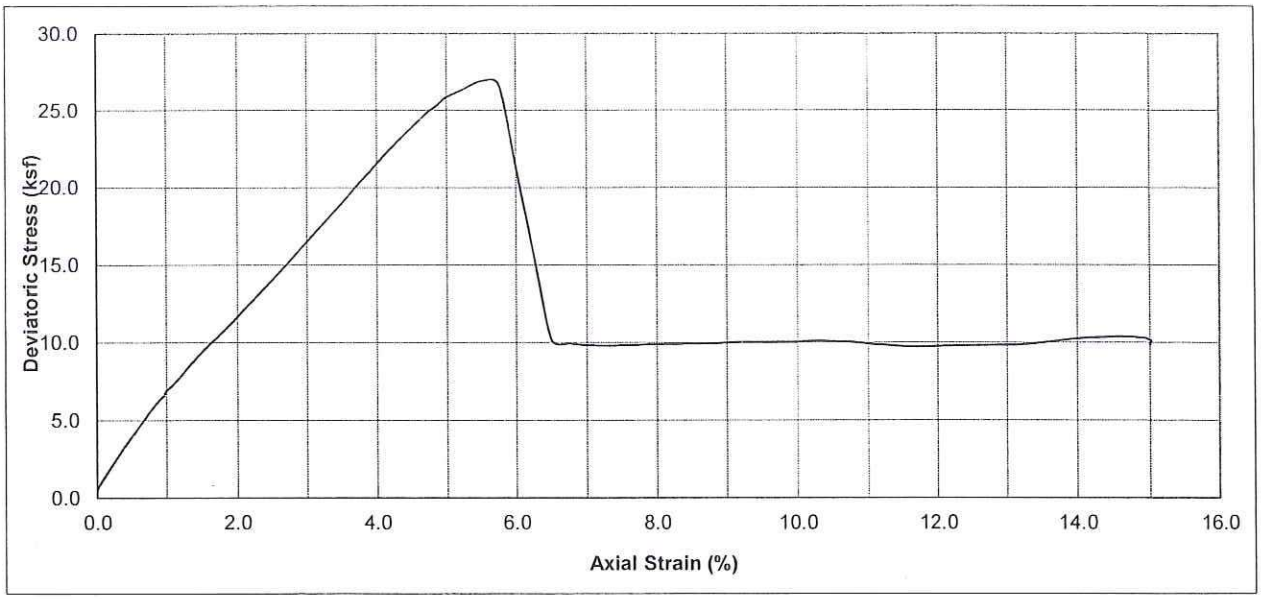
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering		Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135	Date : 12/20/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

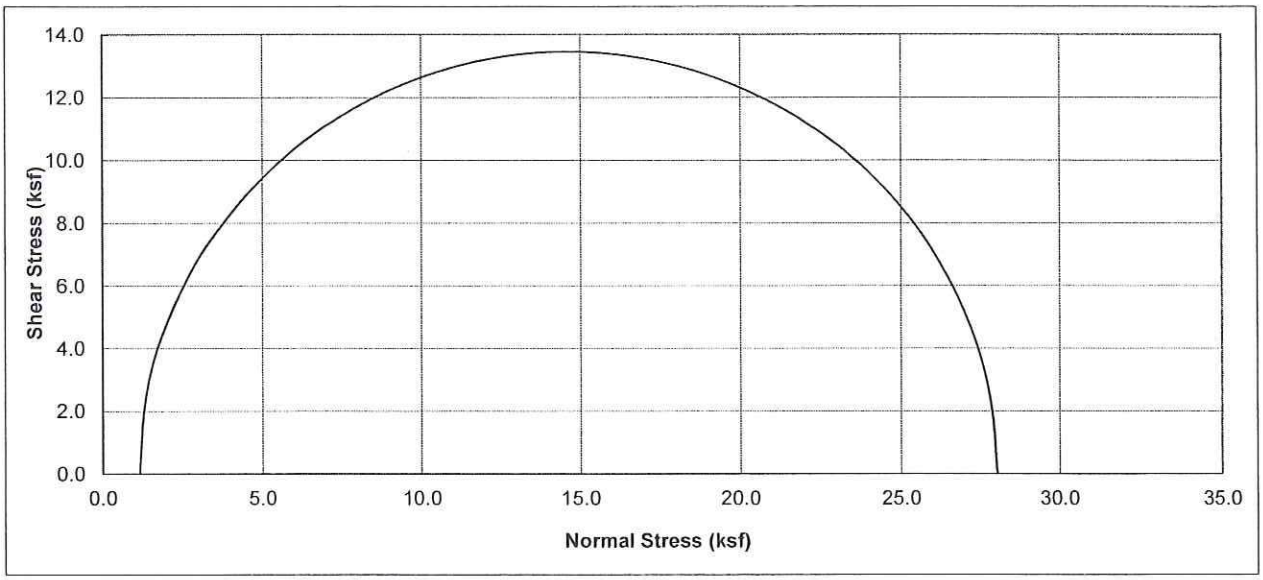




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-117	D-3	15	Olive Brown , LEAN CLAY (CL)	96.7	18.09	1.14	10.49	65.8

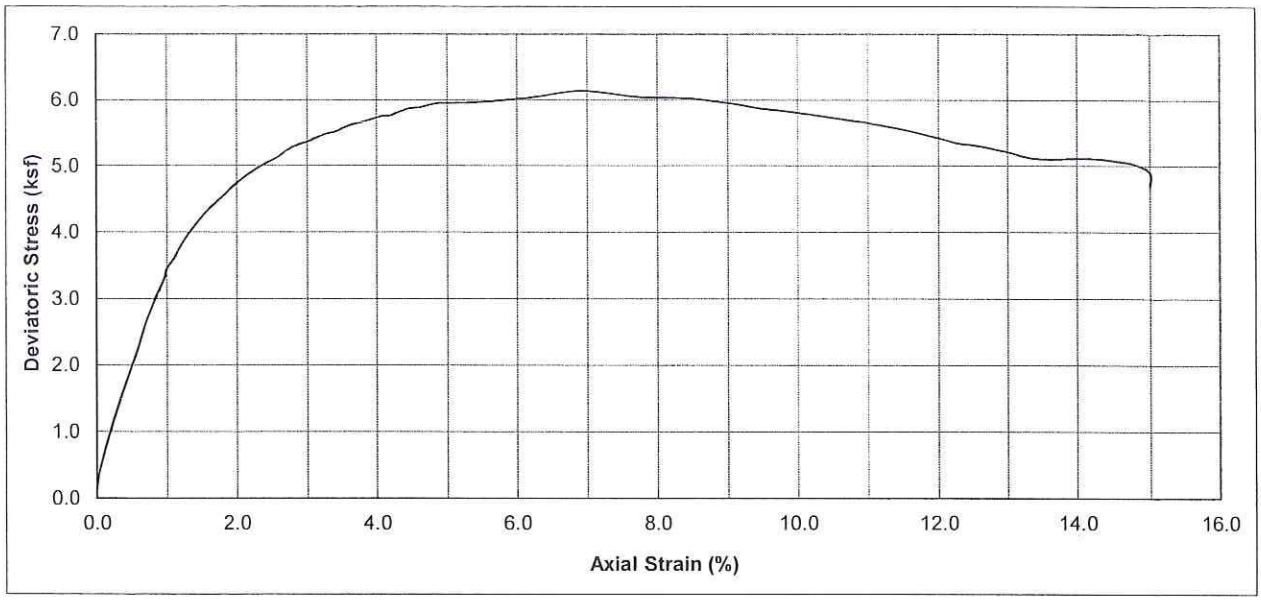
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/06/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

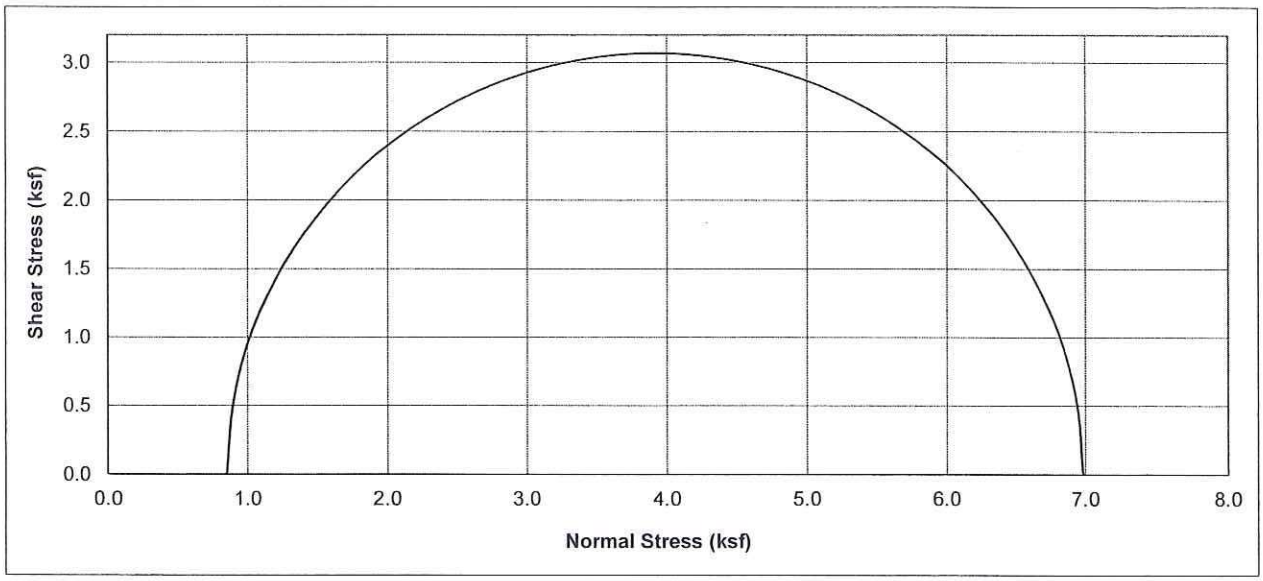




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-123	D-4	15	Gray , ELASTIC SILT (MH)	103.3	21.37	1.14	26.90	91.4

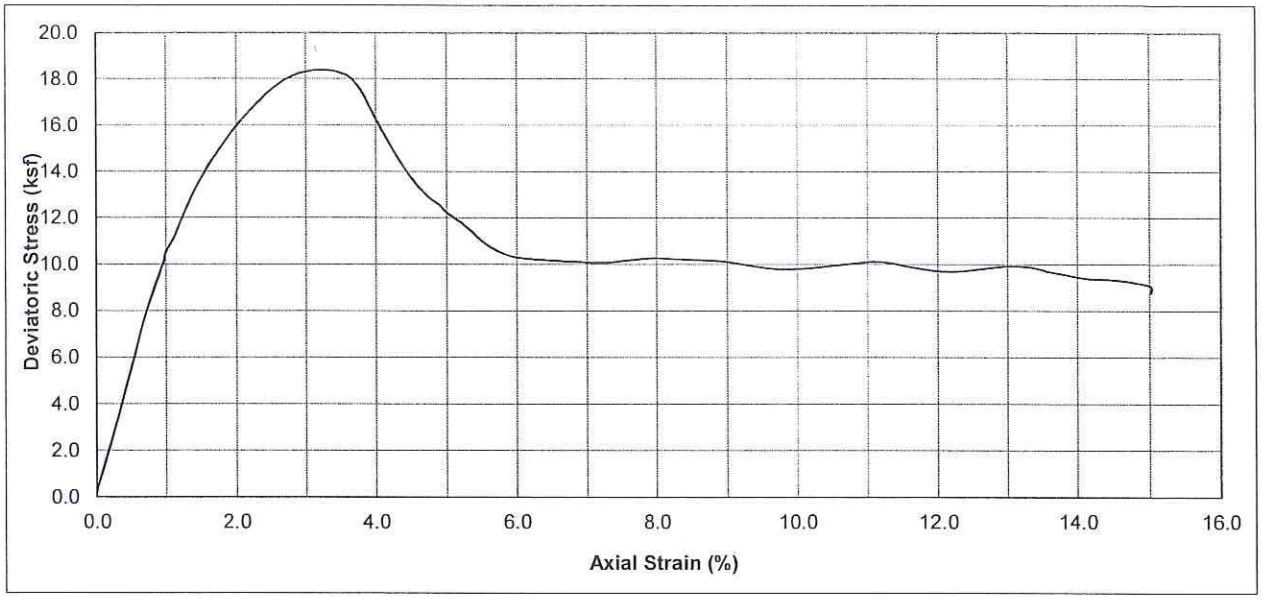
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/20/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)

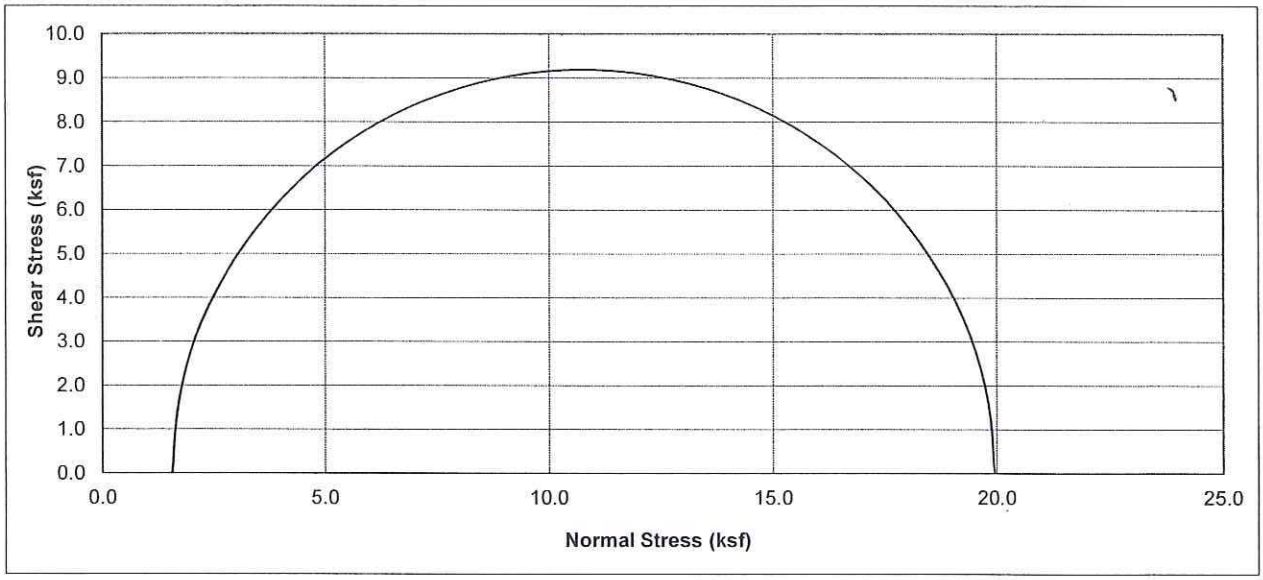




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-124	D-2	10	Olive Brown , FAT CLAY (CH)	88.3	30.90	0.85	6.13	91.8

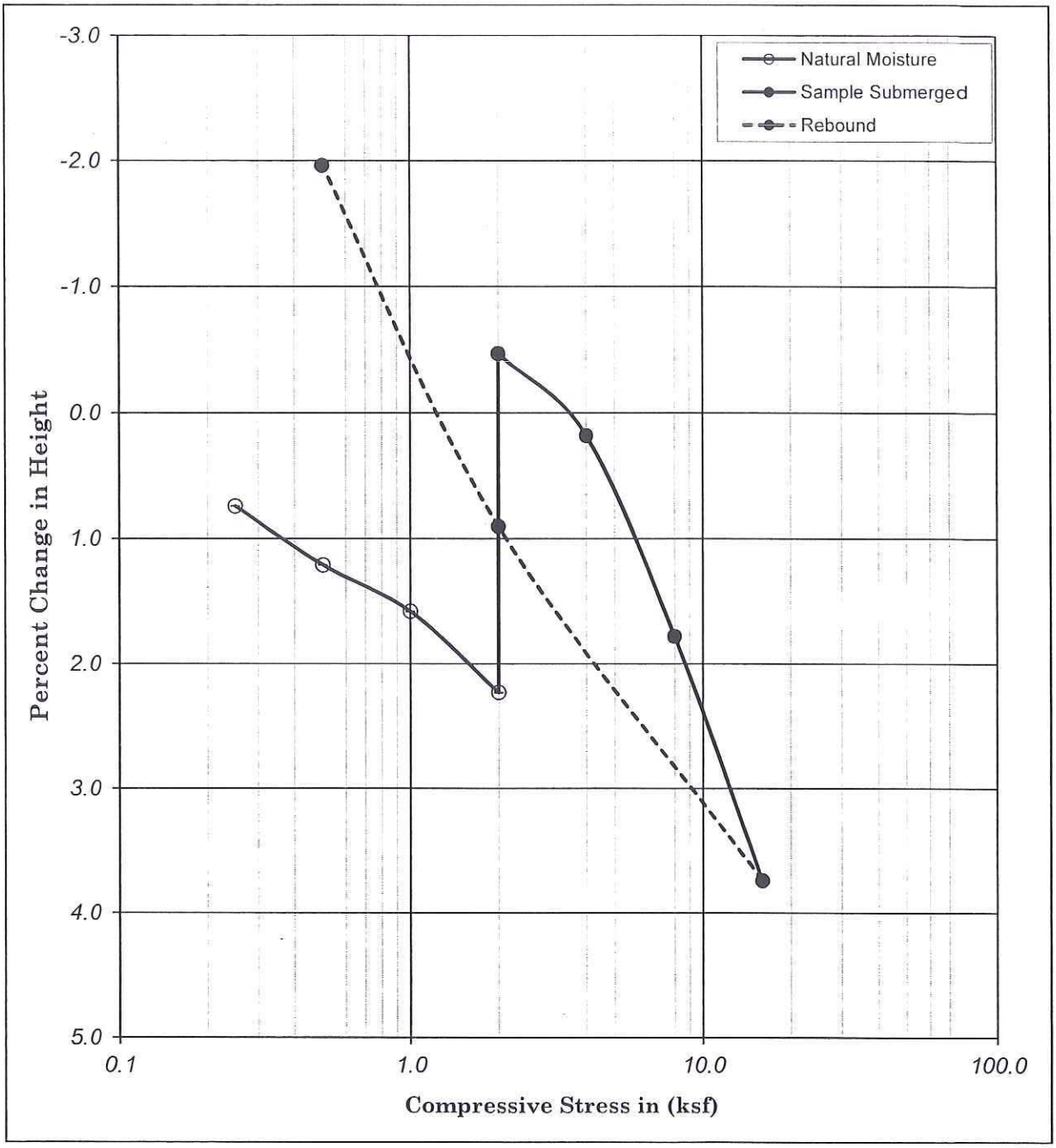
Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135 Date : 12/06/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	10% Axial Strain Dev. Stress (ksf)	Initial Saturation (%)
A-11-130	D-4	20	Olive Brown , FAT CLAY (CH)	96.4	23.77	1.57	18.38	85.8

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering		Parsons/I-5 HOV Widening Segment 1
Project No. : 11-135	Date : 12/20/11	UNCONSOLIDATED UNDRAINED TEST (ASTM D2850)



Boring No.	: A-11-109		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-8		Plastic Limit :	-						
Depth (ft)	: 40.0	41.5	Plastic Index :	-	Initial	14.73	109.39	17.22	73.55	0.54
Depth (m)	: 12.20	12.66	Specific Gravity :	2.70	Final	21.61	107.35	16.90	102.32	0.57

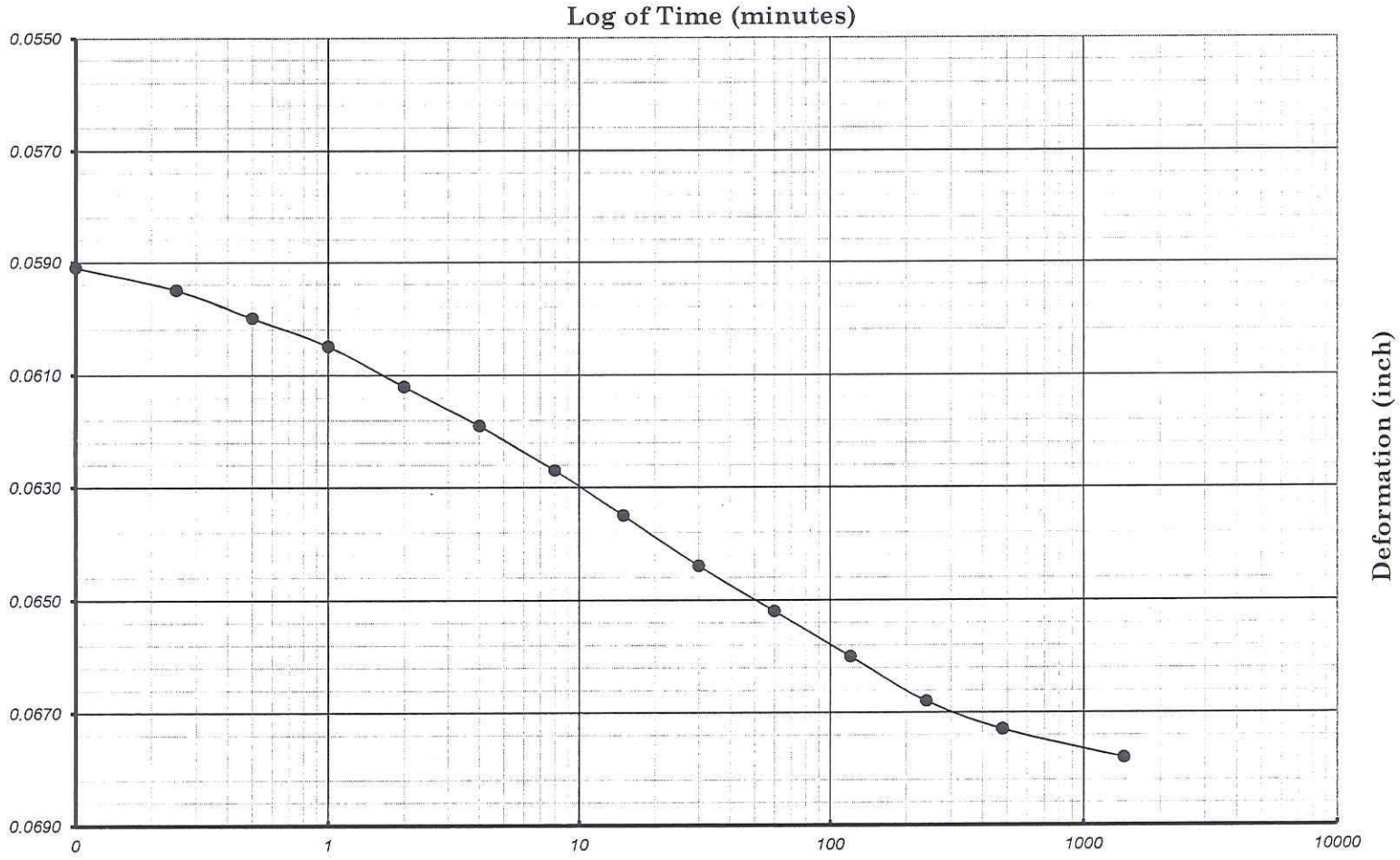
Description : *Olive-brown with dark brown, Lean CLAY with SAND (CL)*

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

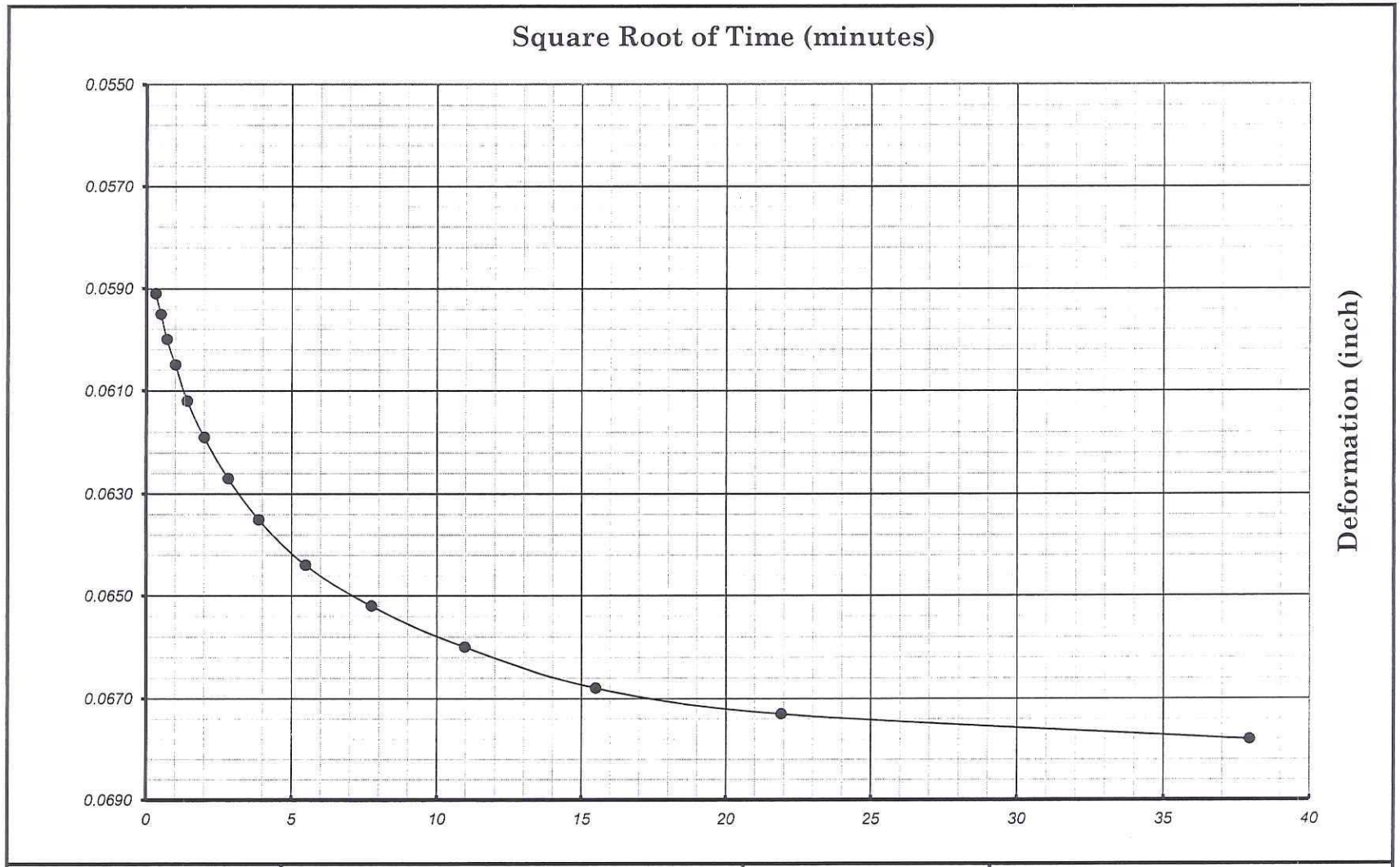
Parsons/I-5 HOV Widening Segment 1

Project No. : *11-135* *01/30/12*

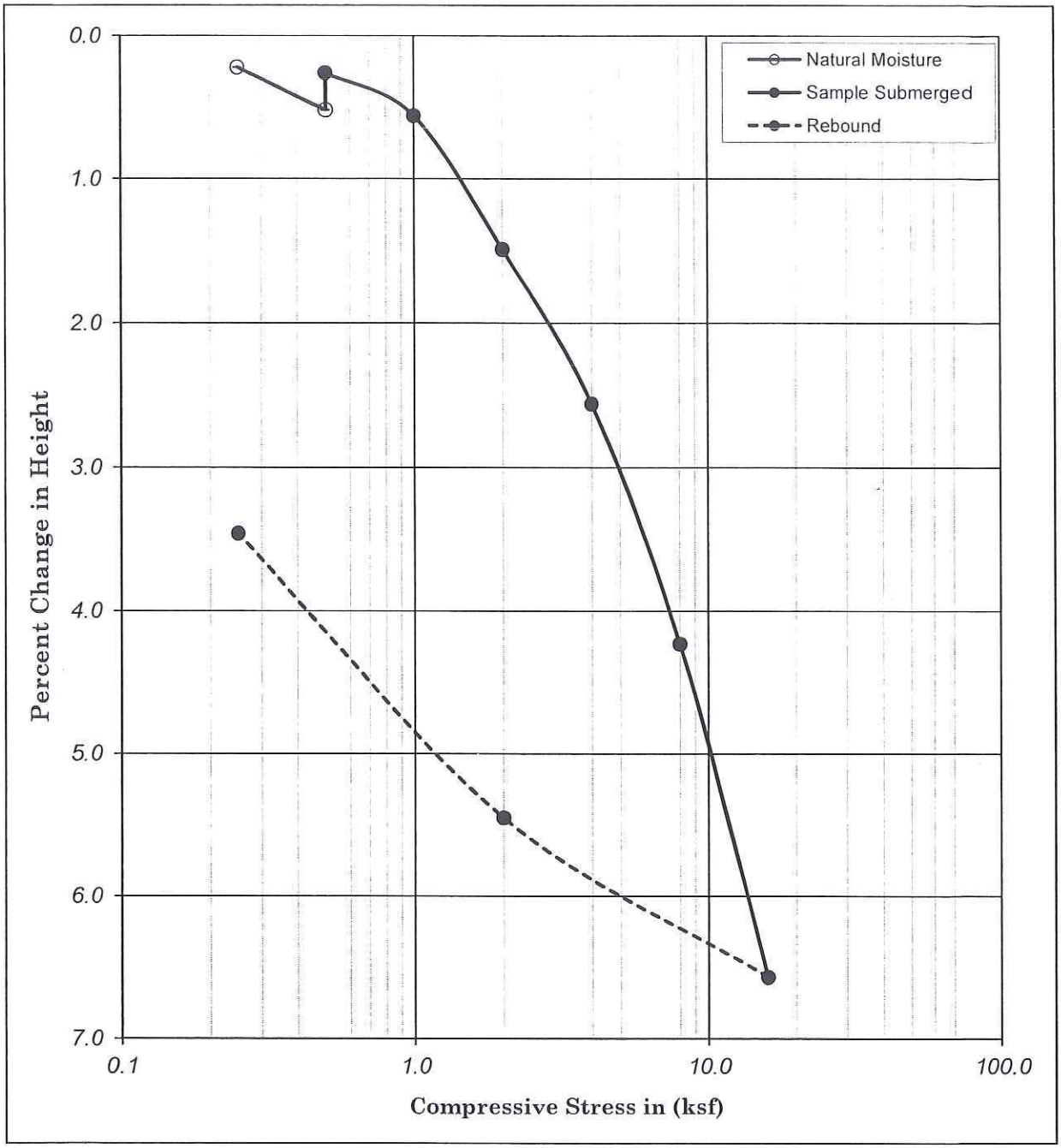
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-109*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-8*	
EMI Project No. : *11-135*		Depth (ft/m) : *40.0* *12.2*	Veritcal Load (ksf/kpa) : *8.00* *383.0*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-109*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-8*	
EMI Project No. : *11-135*		Depth (ft/m) : *40.0* *12.2*	Veritcal Load (ksf/kpa) : *8.0* *383.0*



Boring No.	: A-11-111		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m^3)	Percent Saturation	Void Ratio
Sample No.	: D-1		Plastic Limit :	-						
Depth (ft)	: 5.0	6.5	Plastic Index :	-	Initial	12.22	116.71	18.37	74.26	0.44
Depth (m)	: 1.53	1.98	Specific Gravity :	2.70	Final	15.70	120.90	19.03	107.52	0.39

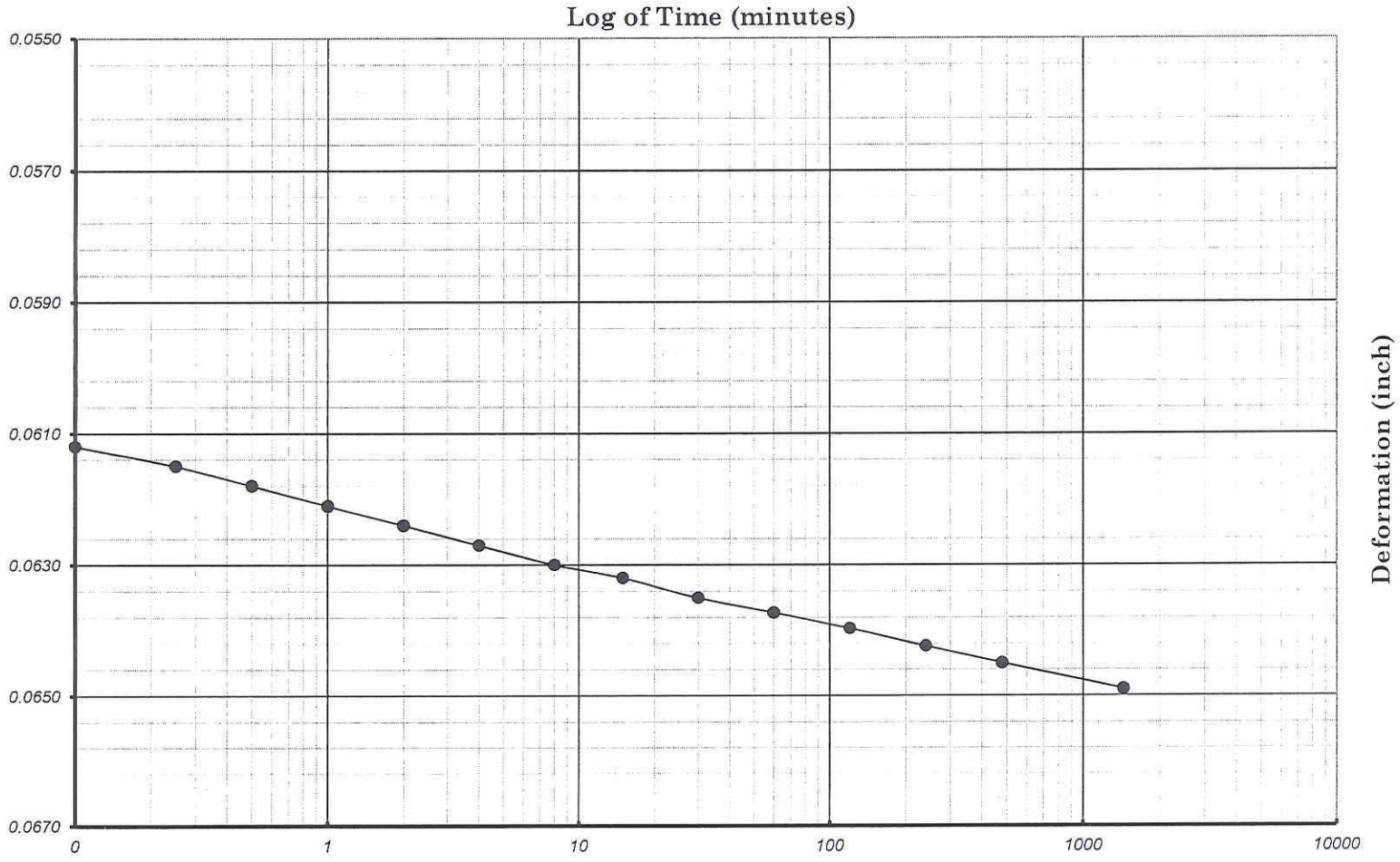
Description : Olive-brown, CLAYEY SAND (SC)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

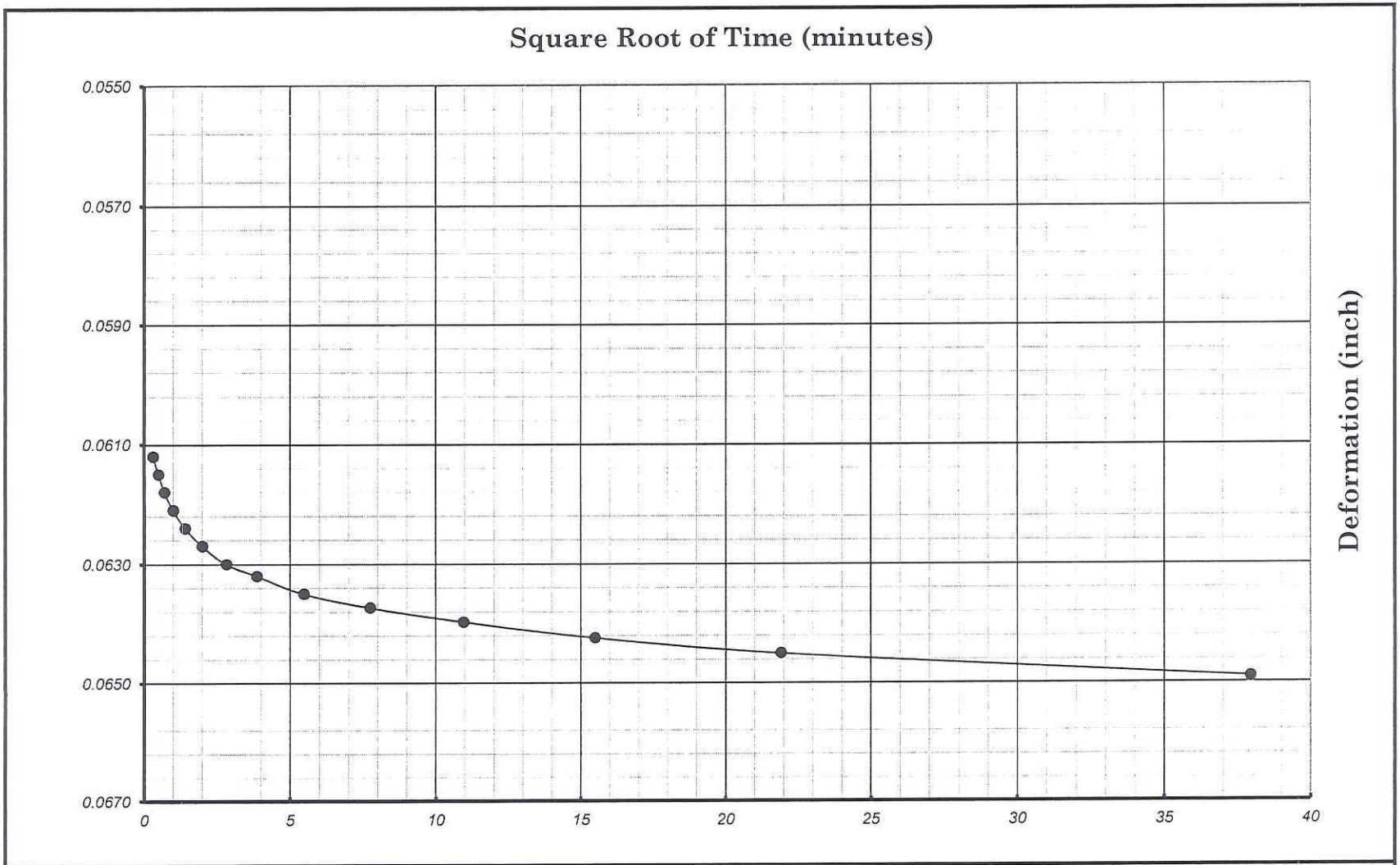
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

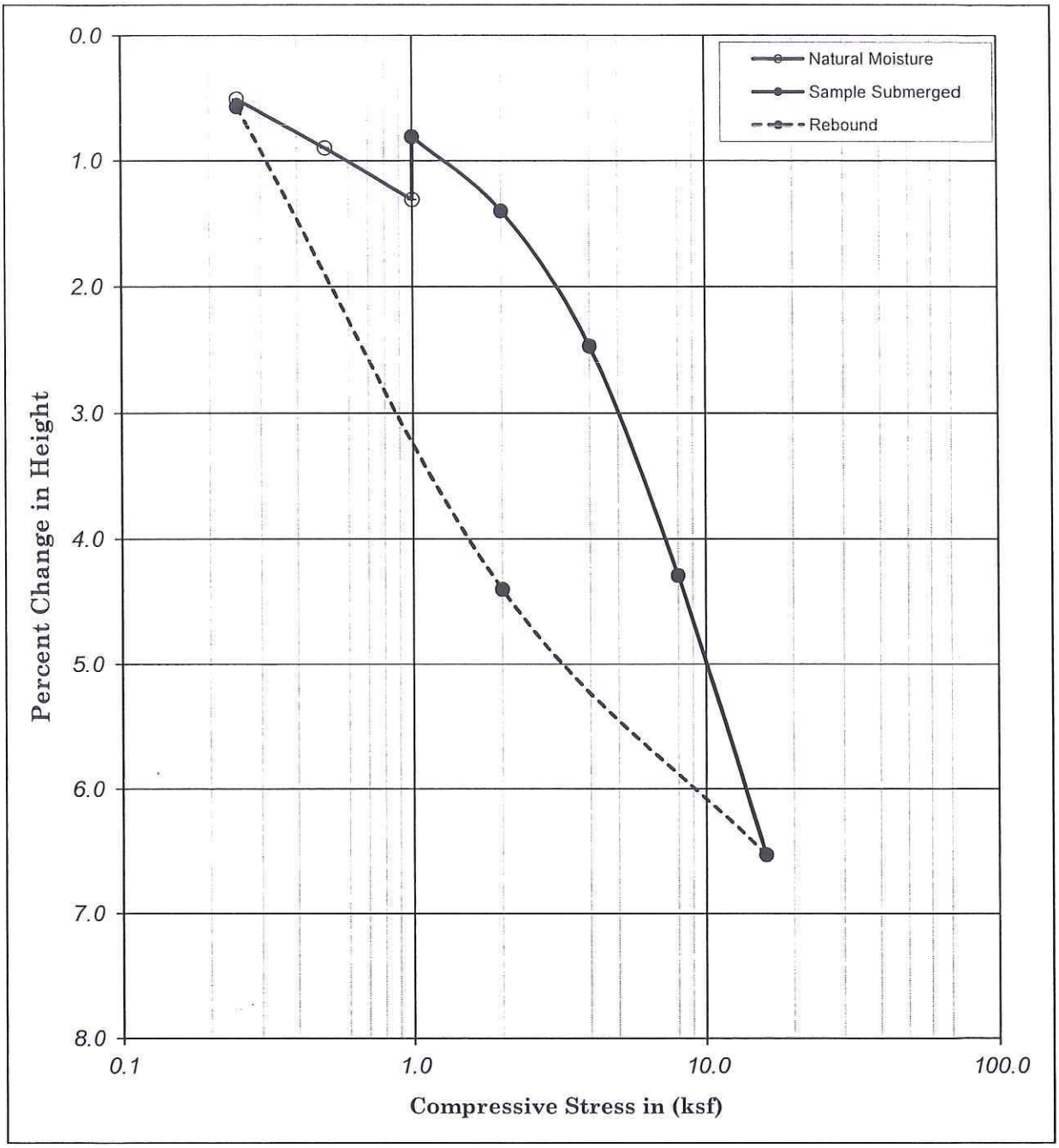
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-111*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-1*	
EMI Project No. : *11-135*		Depth (ft/m) : *5.0* *1.5*	Veritcal Load (ksf/kpa) : *2.00* *95.8*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-111*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-1*	
EMI Project No. : *11-135*		Depth (ft/m) : *5.0* *1.5*	Veritcal Load (ksf/kpa) : *2.0* *95.8*



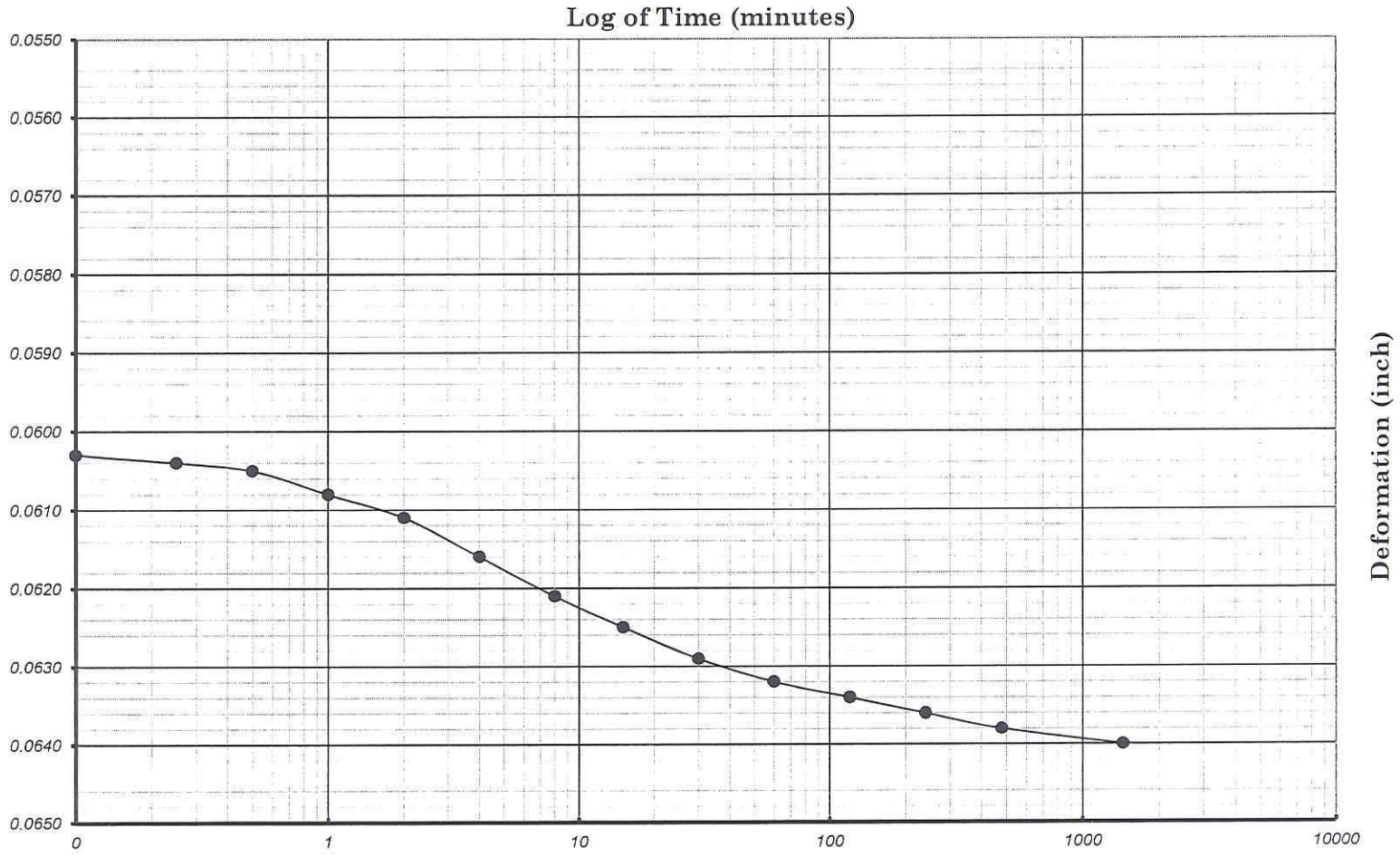
Boring No.	: A-11-113			Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-2			Plastic Limit :	-						
Depth (ft)	: 10.0		11.5	Plastic Index :	-	Initial	24.75	100.80	15.87	99.39	0.67
Depth (m)	: 3.05		3.51	Specific Gravity :	2.70	Final	25.32	101.43	15.97	103.32	0.66
Description	: Yellowish brown with gray, Lean CLAY with gypsum (CL)										

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

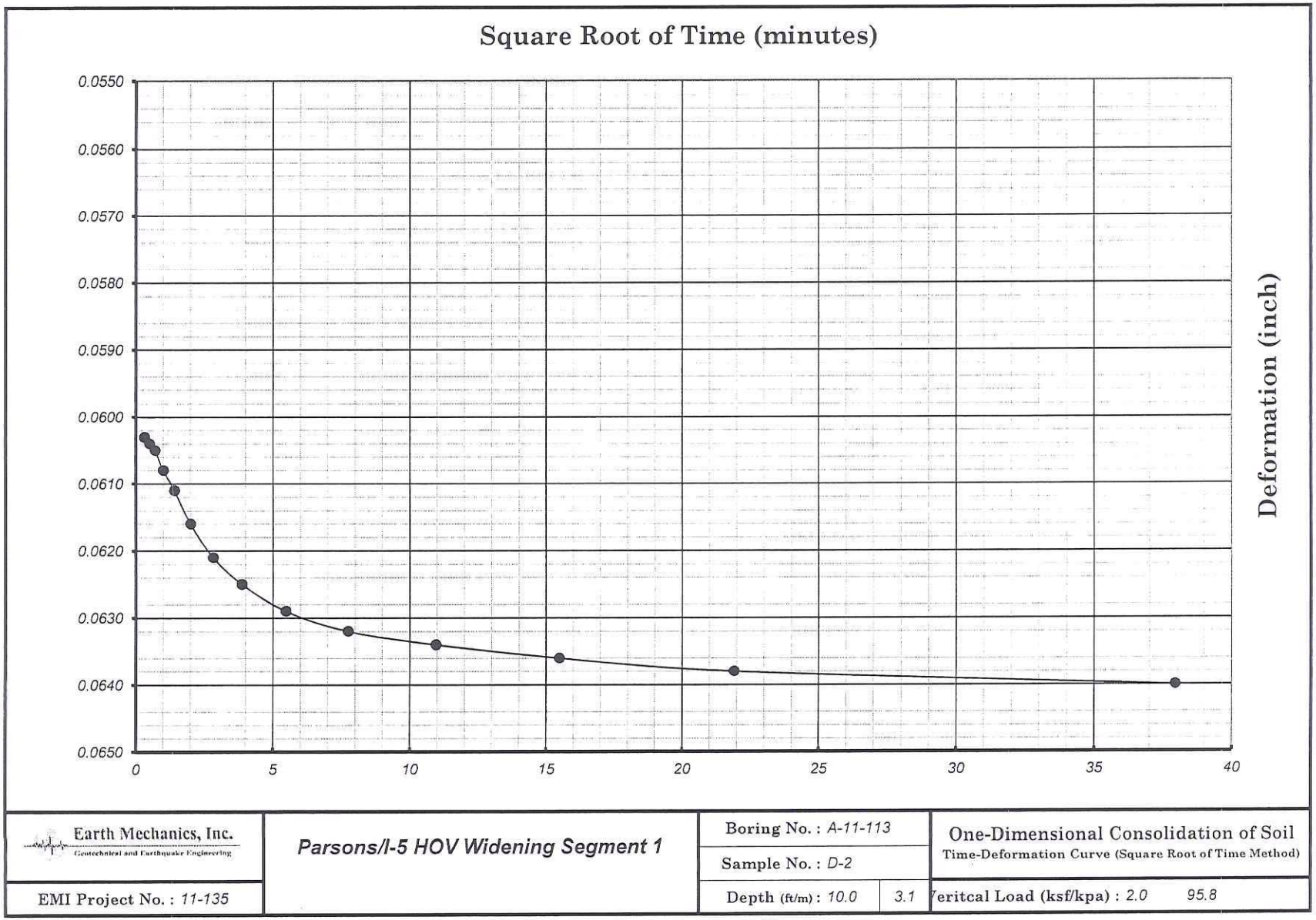
Parsons/I-5 HOV Widening Segment 1

Project No. : *11-135* *01/30/12*

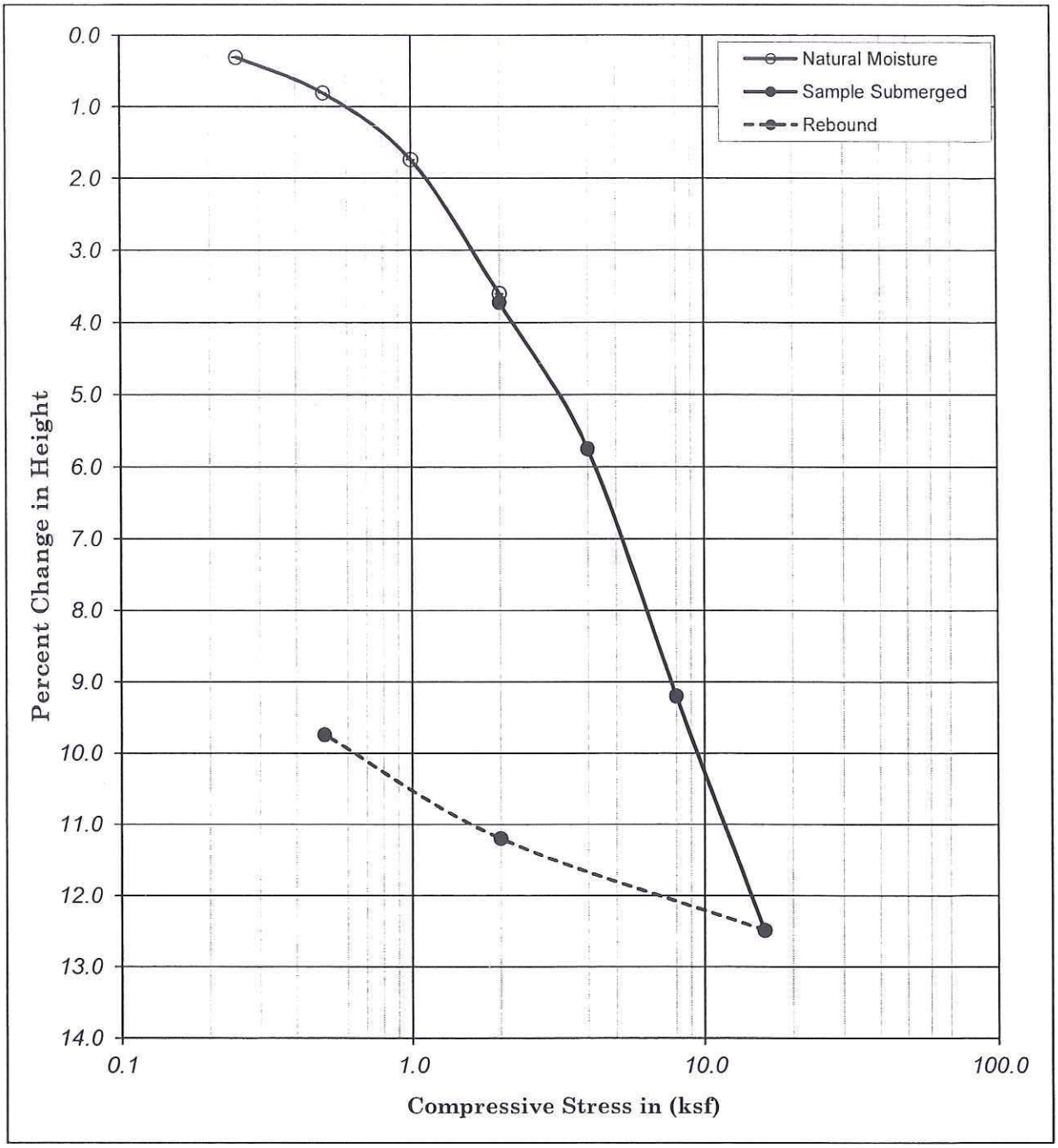
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-113*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-2*	
EMI Project No. : *11-135*		Depth (ft/m) : *10.0* *3.1*	Veritcal Load (ksf/kpa) : *2.00* *95.8*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-113*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-2*	
EMI Project No. : *11-135*		Depth (ft/m) : *10.0* *3.1*	Veritcal Load (ksf/kpa) : *2.0* *95.8*



Boring No.	: A-11-114		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m^3)	Percent Saturation	Void Ratio
Sample No.	: D-5		Plastic Limit :	-						
Depth (ft)	: 25.0	26.5	Plastic Index :	-	Initial	25.96	92.56	14.57	85.36	0.82
Depth (m)	: 7.63	8.08	Specific Gravity :	2.70	Final	23.00	102.63	16.15	96.69	0.64

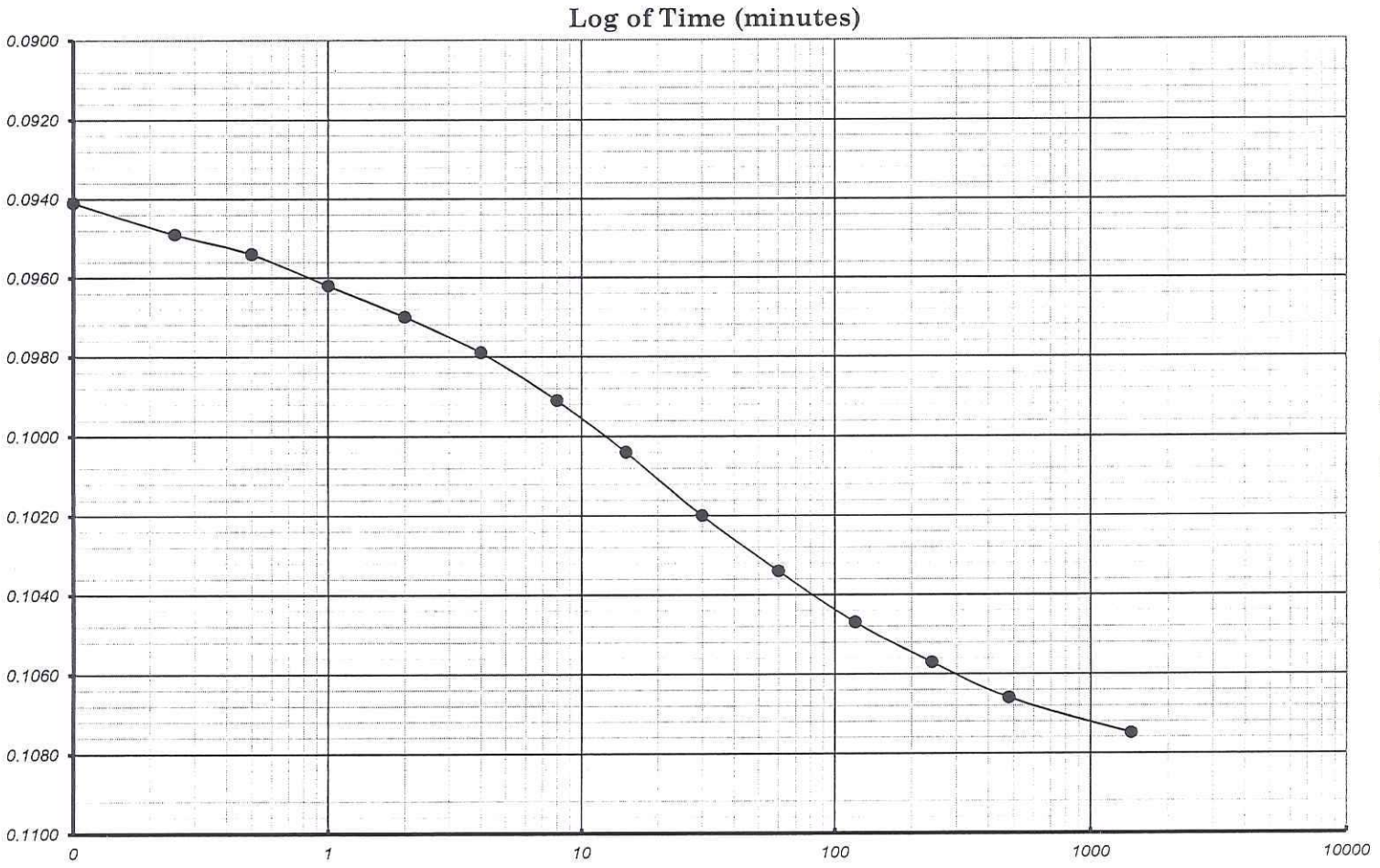
Description : Olive-brown, Lean CLAY with SAND (CL) .

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

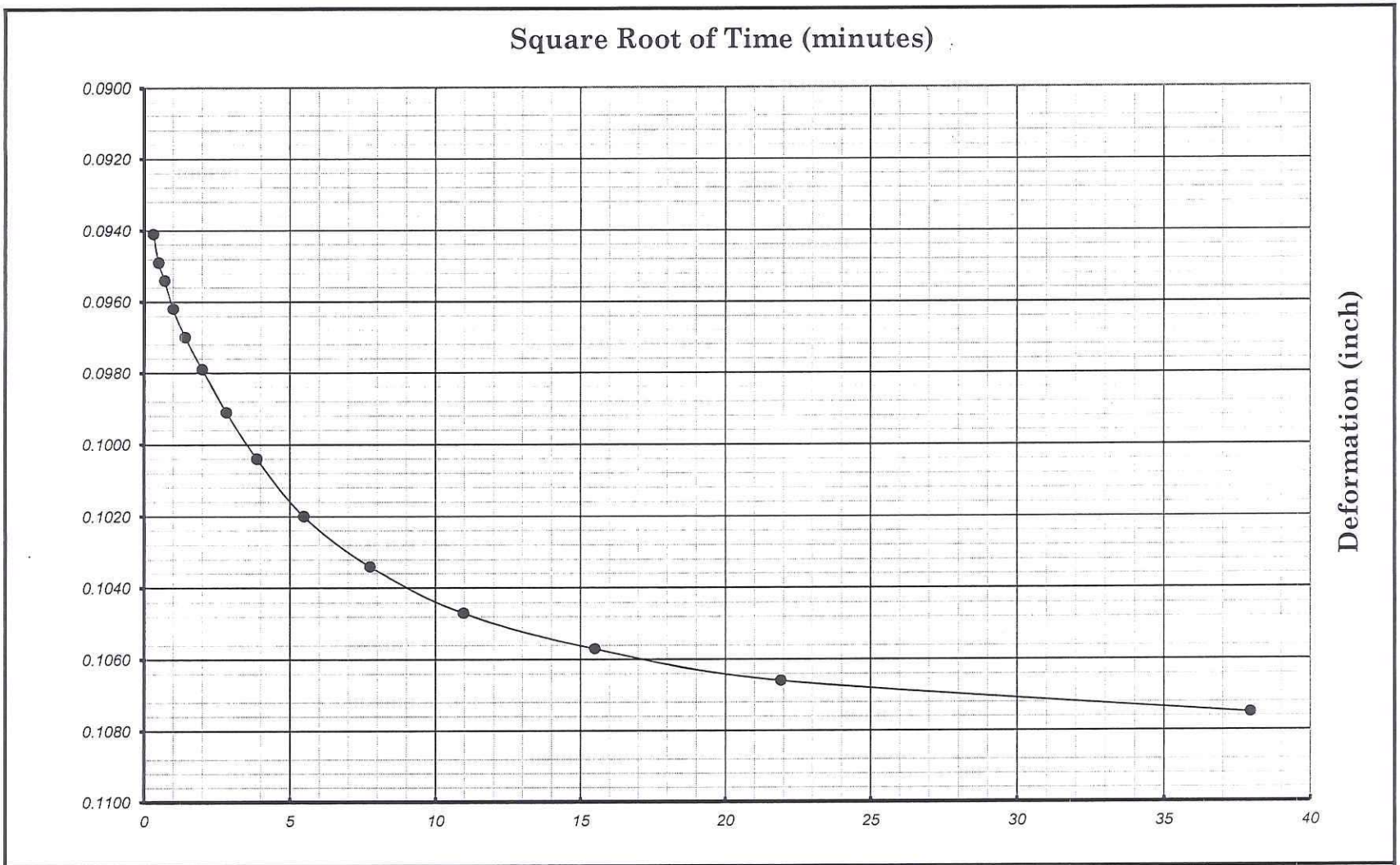
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

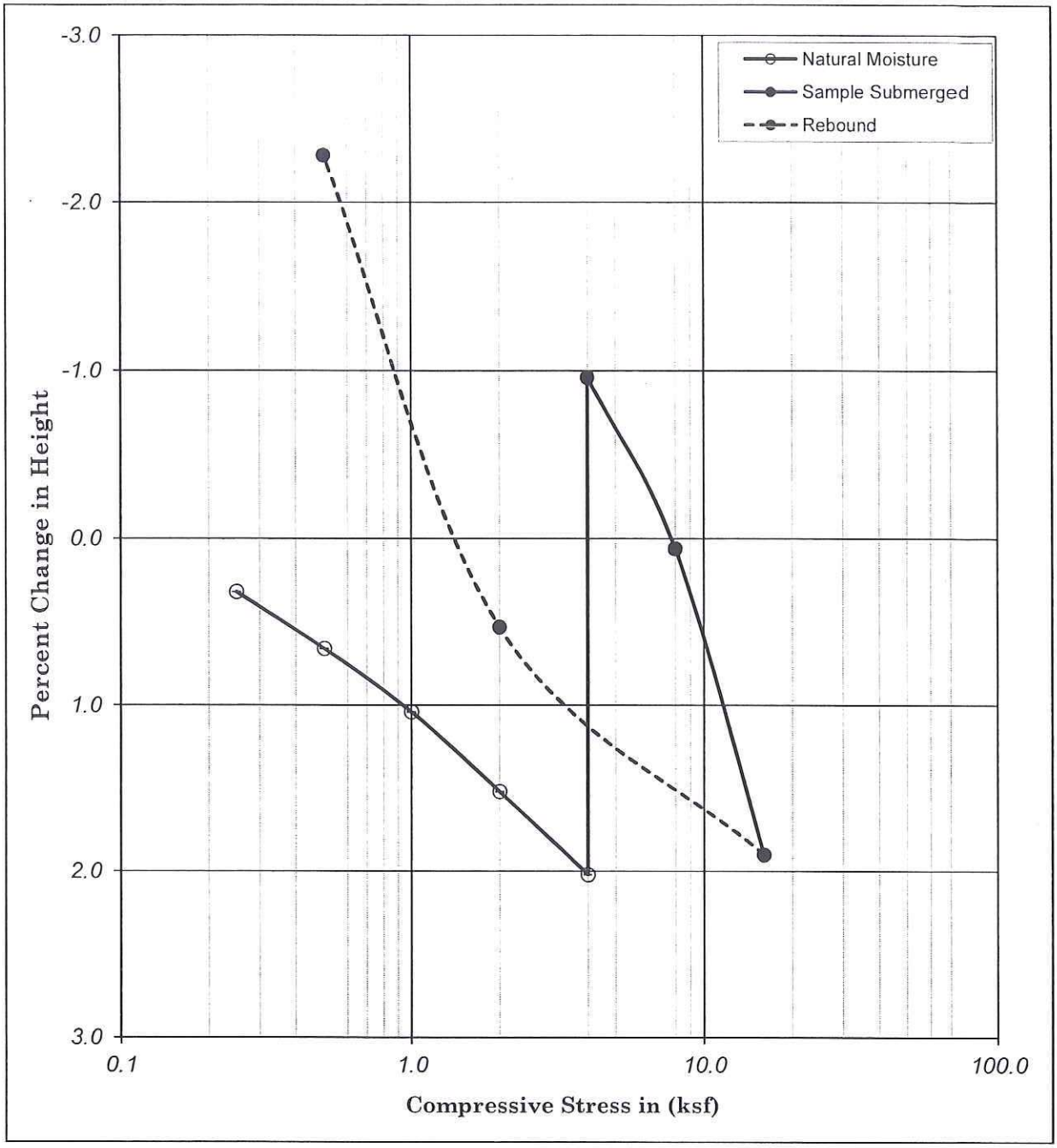
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-114*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-5*	
EMI Project No. : *11-135*		Depth (ft/m) : *25.0* *7.6*	Veritcal Load (ksf/kpa) : *4.00* *191.5*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-114*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-5*	
EMI Project No. : *11-135*		Depth (ft/m) : *25.0* *7.6*	Veritcal Load (ksf/kpa) : *4.0* *191.5*



Boring No.	: A-11-115		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-4		Plastic Limit :	-						
Depth (ft)	: 20.0	21.5	Plastic Index :	-	Initial	17.01	110.16	17.34	86.62	0.53
Depth (m)	: 6.10	6.56	Specific Gravity :	2.70	Final	20.31	107.72	16.95	97.10	0.56

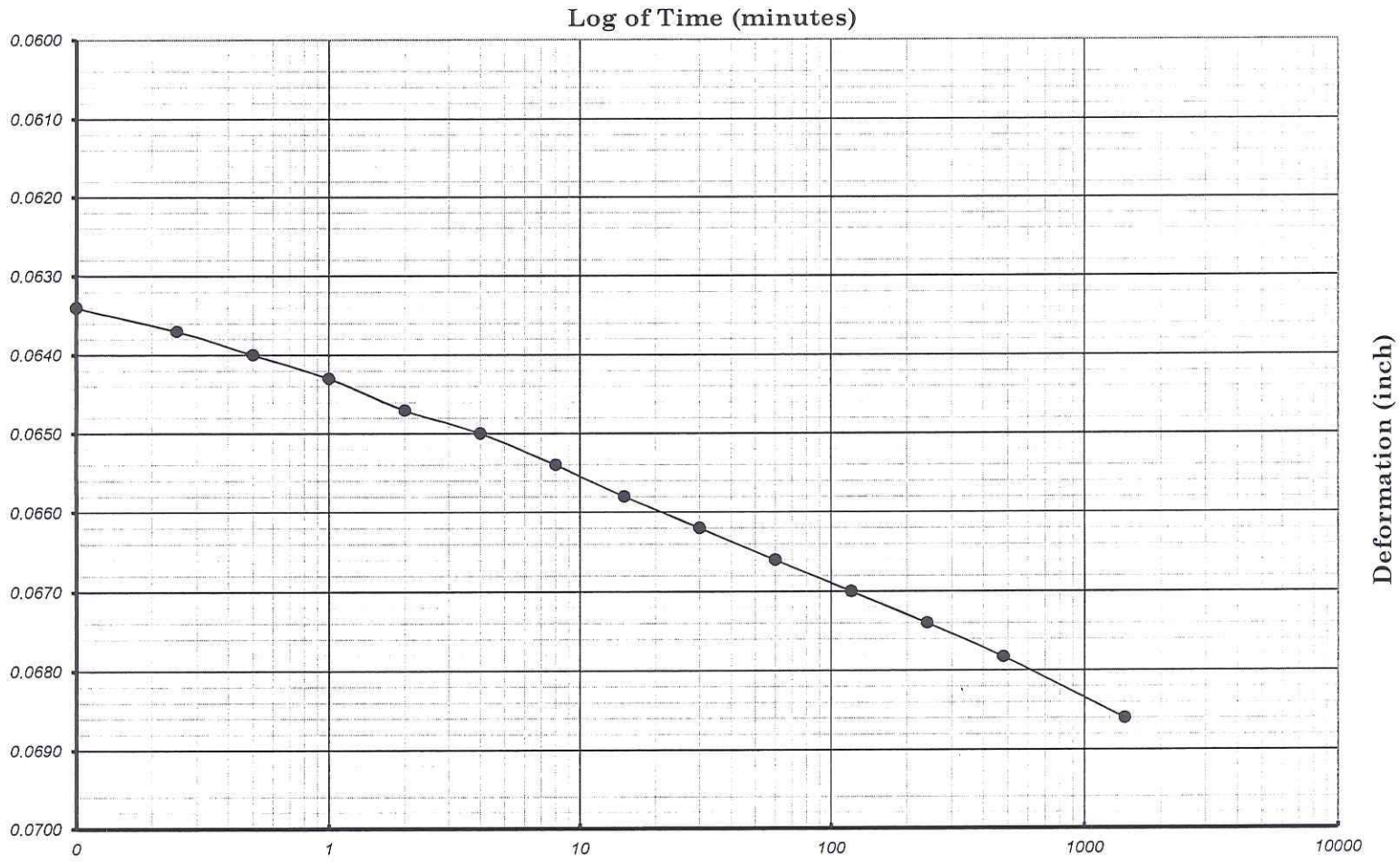
Description : Dark brown, Fat CLAY with SAND (CH)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

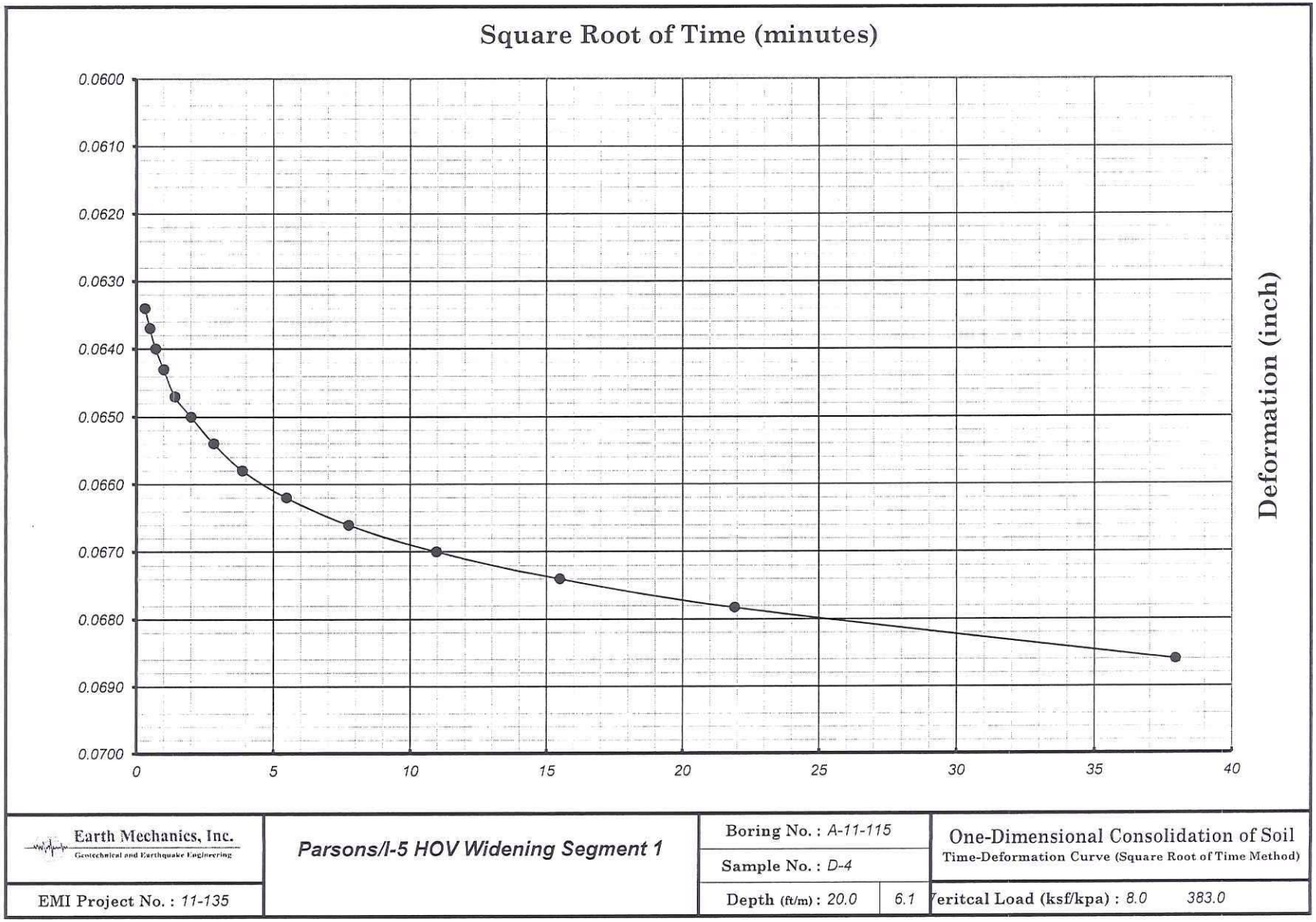
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

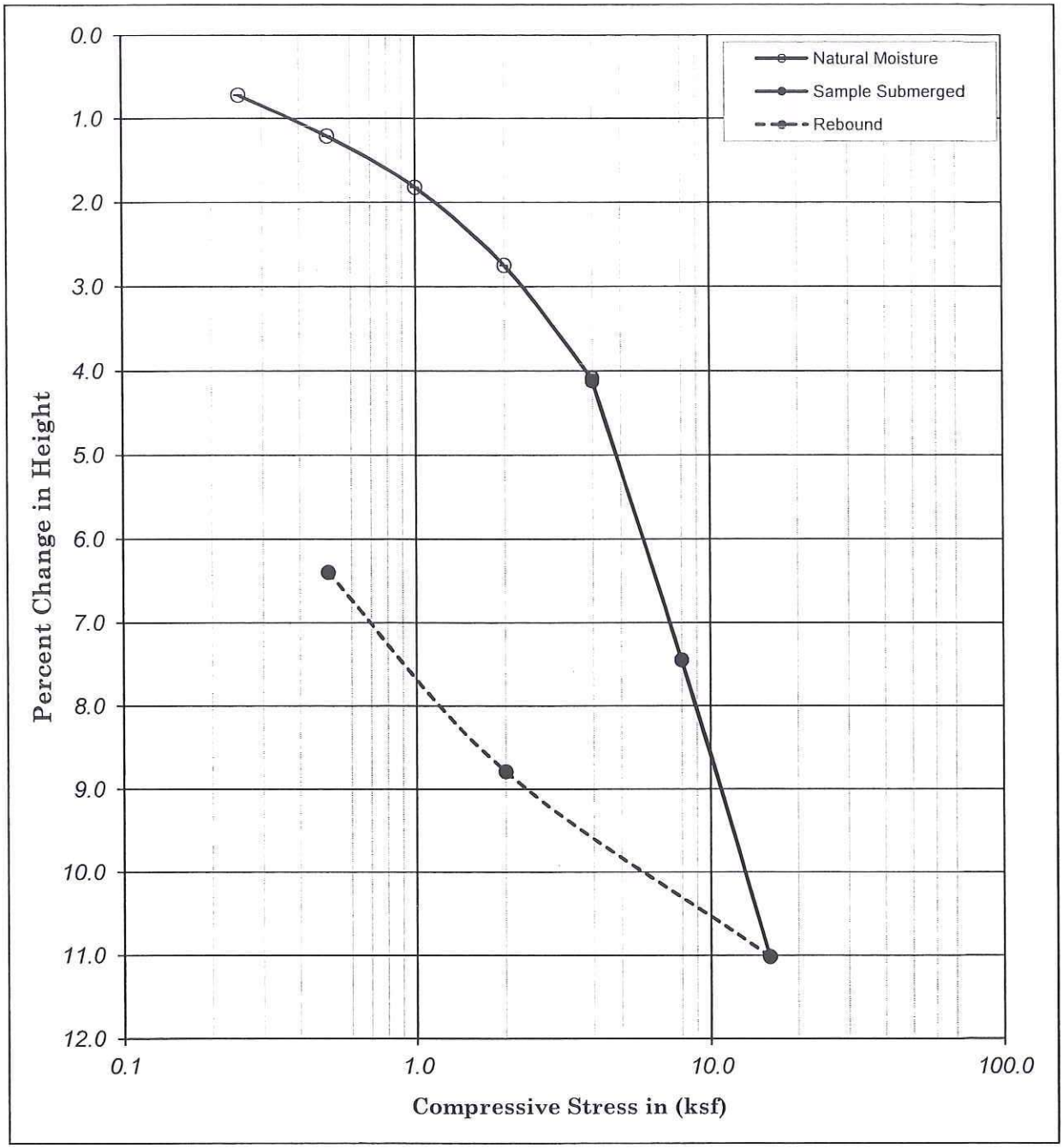
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-115*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-4*	
EMI Project No. : *11-135*		Depth (ft/m) : *20.0* *6.1*	Veritcal Load (ksf/kpa) : *8.00* *383.0*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-115*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-4*	
EMI Project No. : *11-135*		Depth (ft/m) : *20.0* *6.1*	Veritcal Load (ksf/kpa) : *8.0* *383.0*



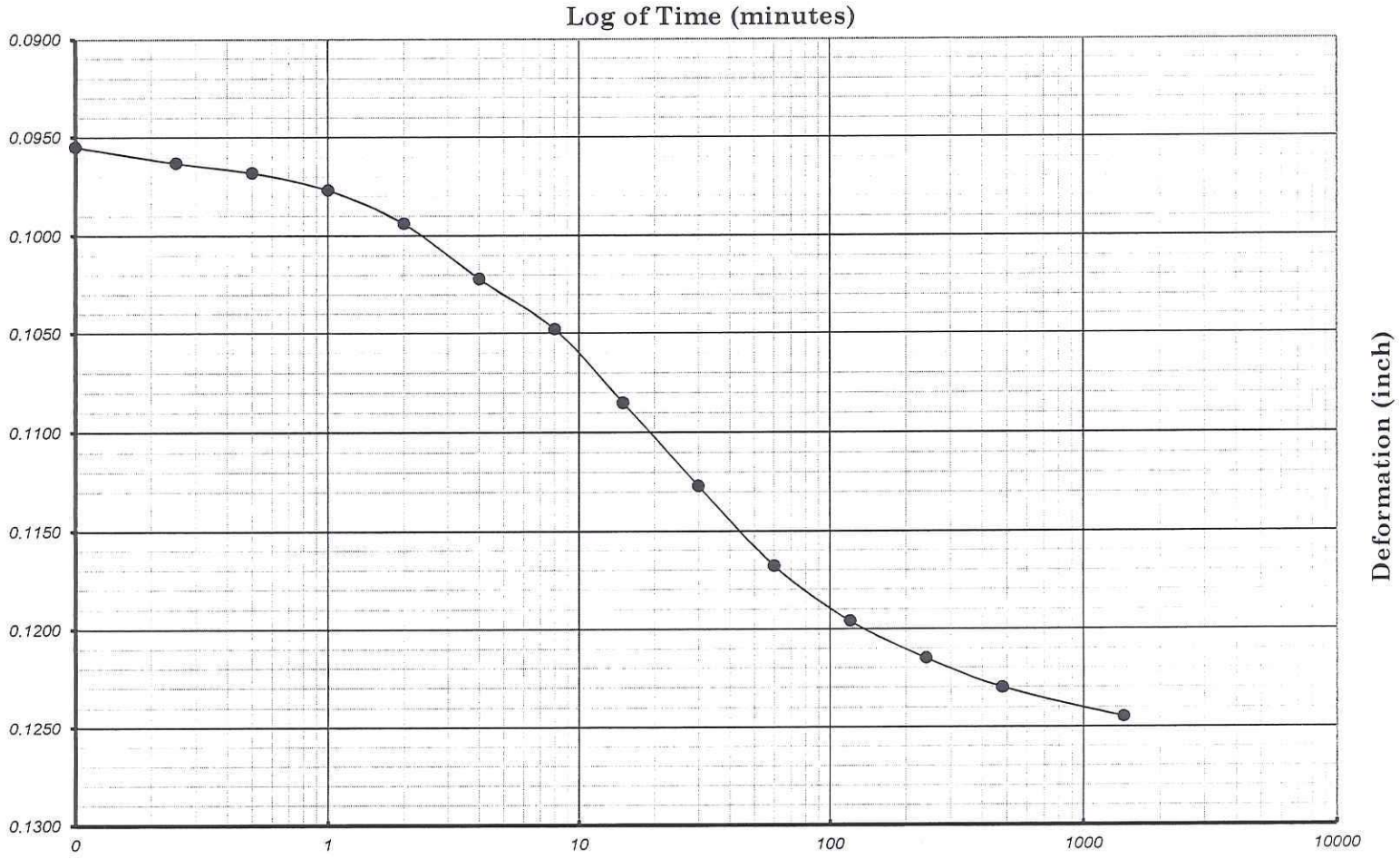
Boring No. : A-11-115			Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No. : D-12			Plastic Limit :	-						
Depth	(ft) : 60.0	61.5	Plastic Index :	-	Initial	28.91	94.07	14.81	98.59	0.79
	(m) : 18.30	18.76	Specific Gravity :	2.70	Final	25.66	100.58	15.83	102.52	0.68
Description : Olive-brown, Lean CLAY with SAND (CL)										

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

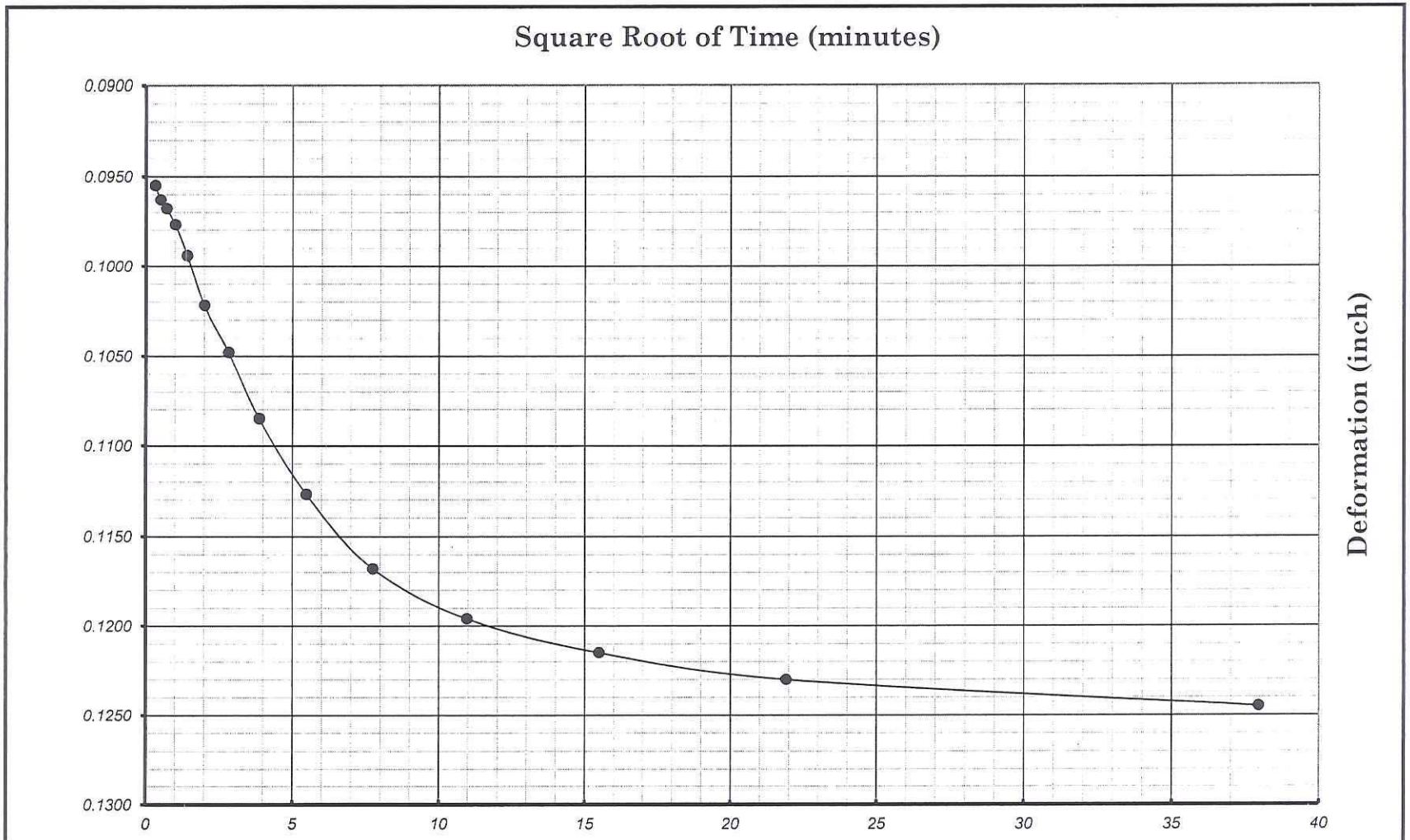
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 Date: 01/30/12

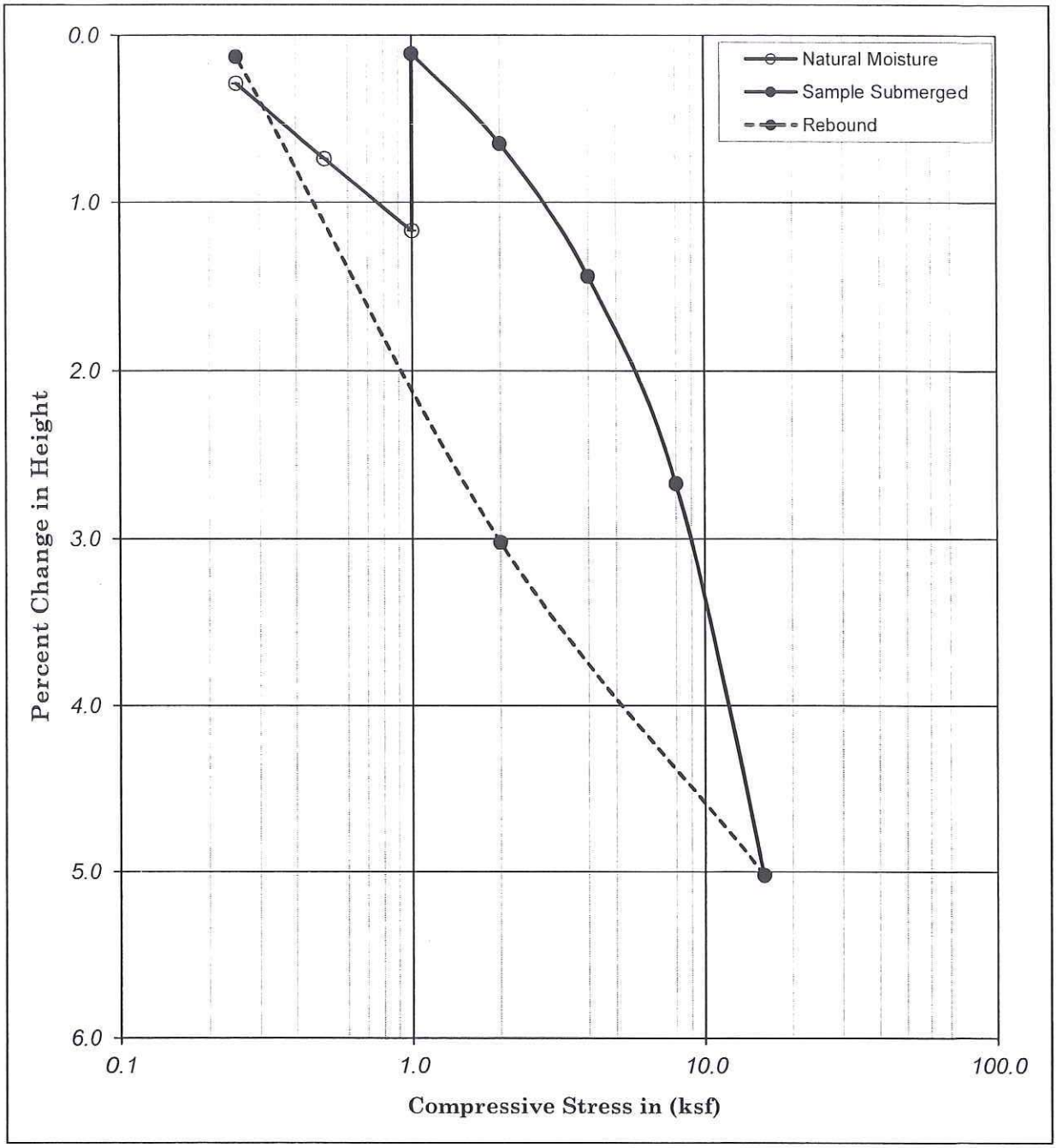
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-115*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-12*	
EMI Project No. : *11-135*		Depth (ft/m) : *60.0* *18.3*	Veritcal Load (ksf/kpa) : *8.00* *383.0*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-115*	One-Dimensional Consolidation of Soil
		Sample No. : *D-12*	Time-Deformation Curve (Square Root of Time Method)
EMI Project No. : *11-135*		Depth (ft/m) : *60.0* *18.3*	Veritcal Load (ksf/kpa) : *8.0* *383.0*



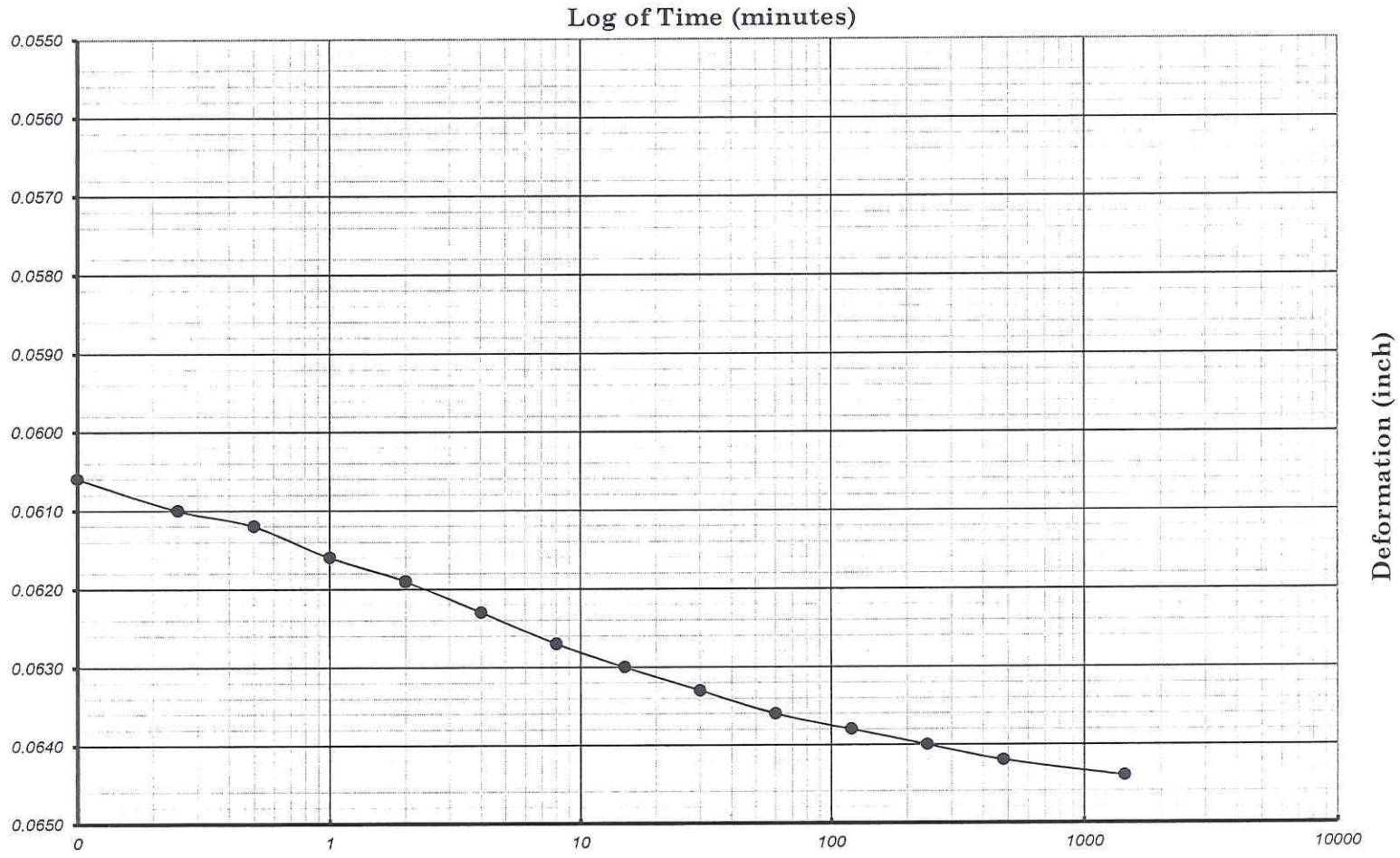
Boring No.	: A-11-116		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m^3)	Percent Saturation	Void Ratio
Sample No.	: D-4		Plastic Limit :	-						
Depth (ft)	: 20.0	21.5	Plastic Index :	-	Initial	25.87	96.45	15.18	93.40	0.75
Depth (m)	: 6.10	6.56	Specific Gravity :	2.70	Final	28.20	96.61	15.21	102.24	0.74
Description : Olive-brown, Fat CLAY with SAND (CH)										

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

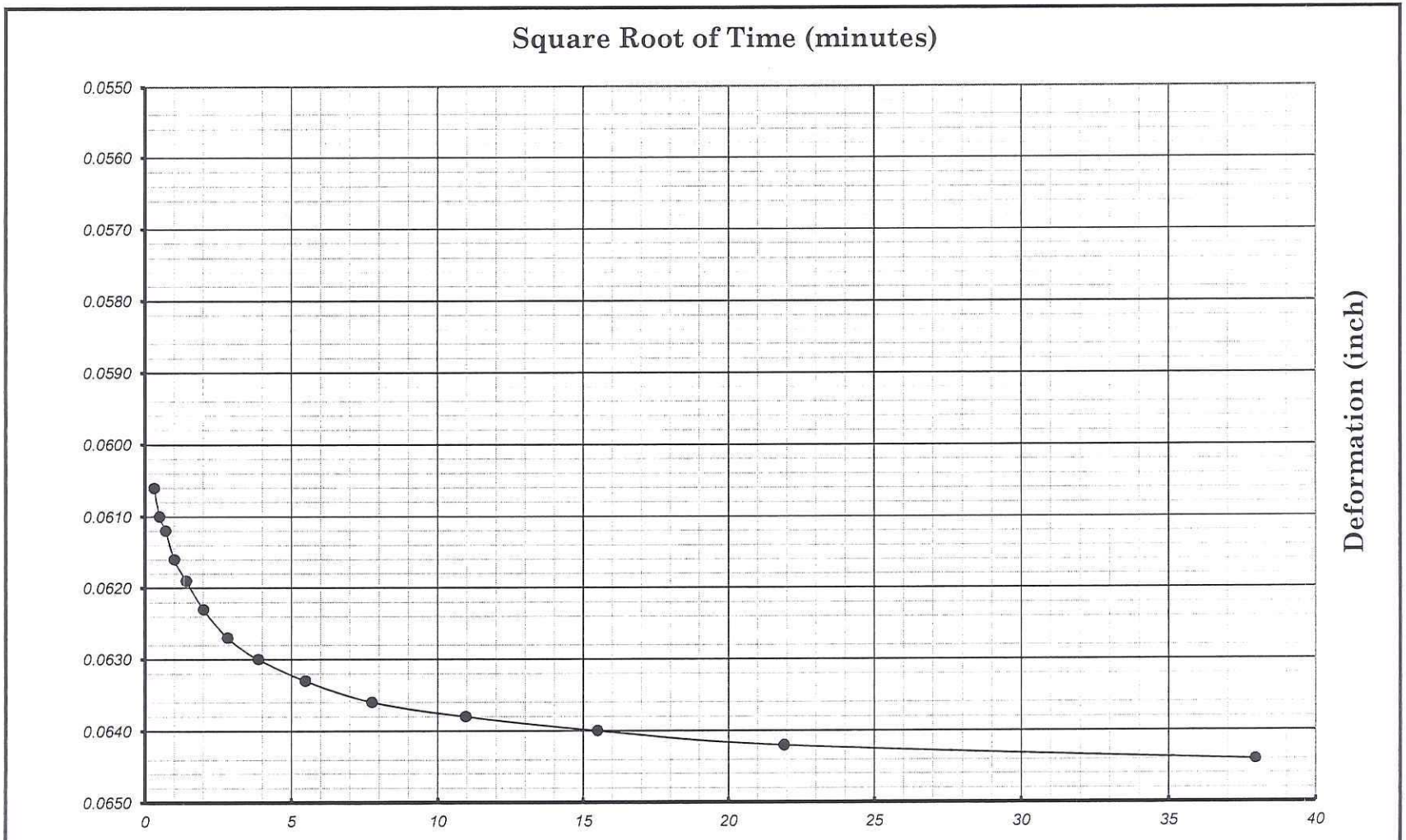
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

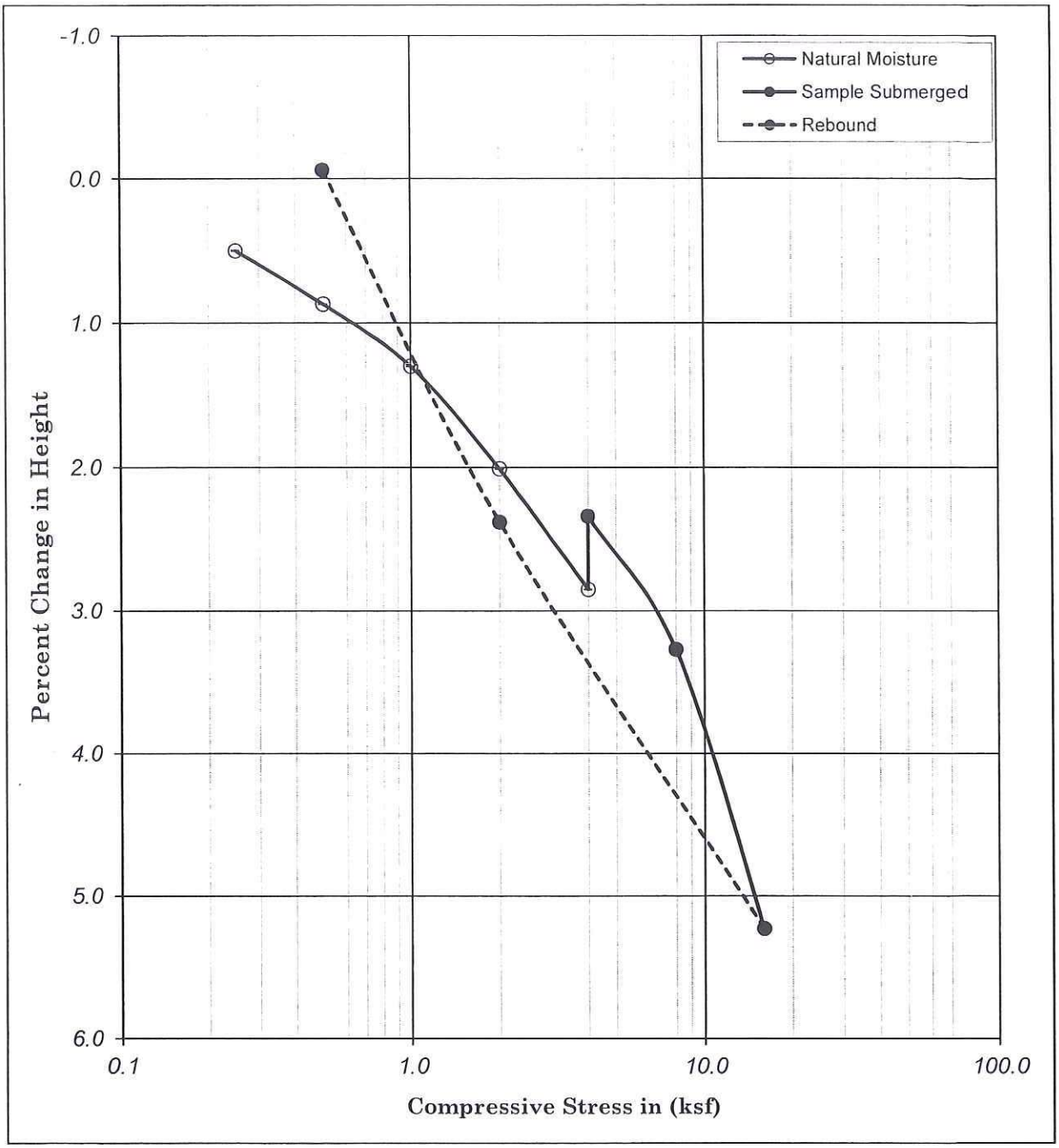
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-116*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-4*	
EMI Project No. : *11-135*		Depth (ft/m) : *20.0* *6.1*	Veritcal Load (ksf/kpa) : *4.00* *191.5*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-116*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-4*	
EMI Project No. : *11-135*		Depth (ft/m) : *20.0* *6.1*	Veritcal Load (ksf/kpa) : *4.0* *191.5*



Boring No.	: A-11-117		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m^3)	Percent Saturation	Void Ratio
Sample No.	: D-9		Plastic Limit :	-						
Depth (ft)	: 45.0	46.5	Plastic Index :	-	Initial	31.10	91.39	14.39	99.46	0.84
Depth (m)	: 13.73	14.18	Specific Gravity :	2.70	Final	32.84	91.39	14.39	105.02	0.84

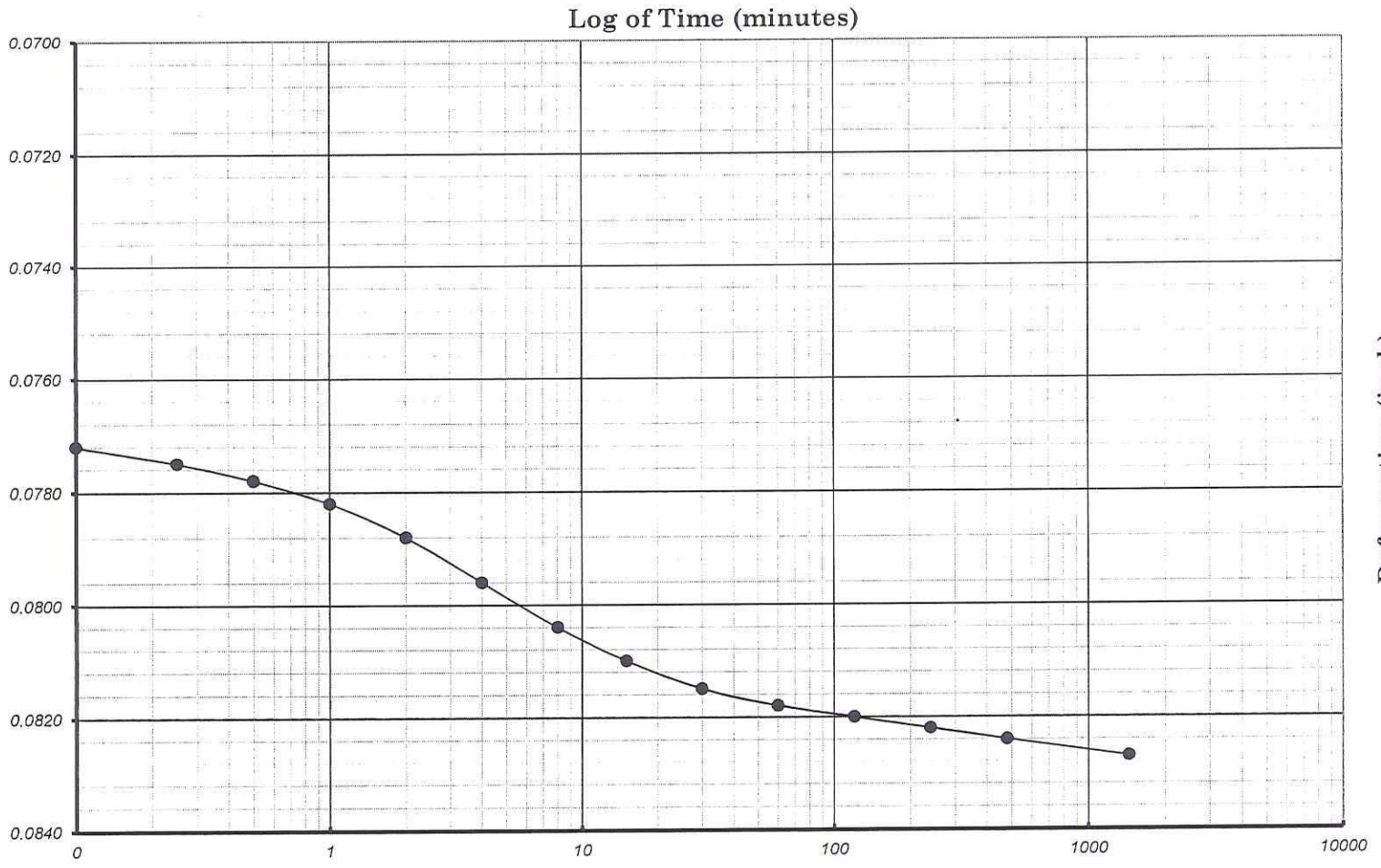
Description : Olive-brown, Fat CLAY (CH)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

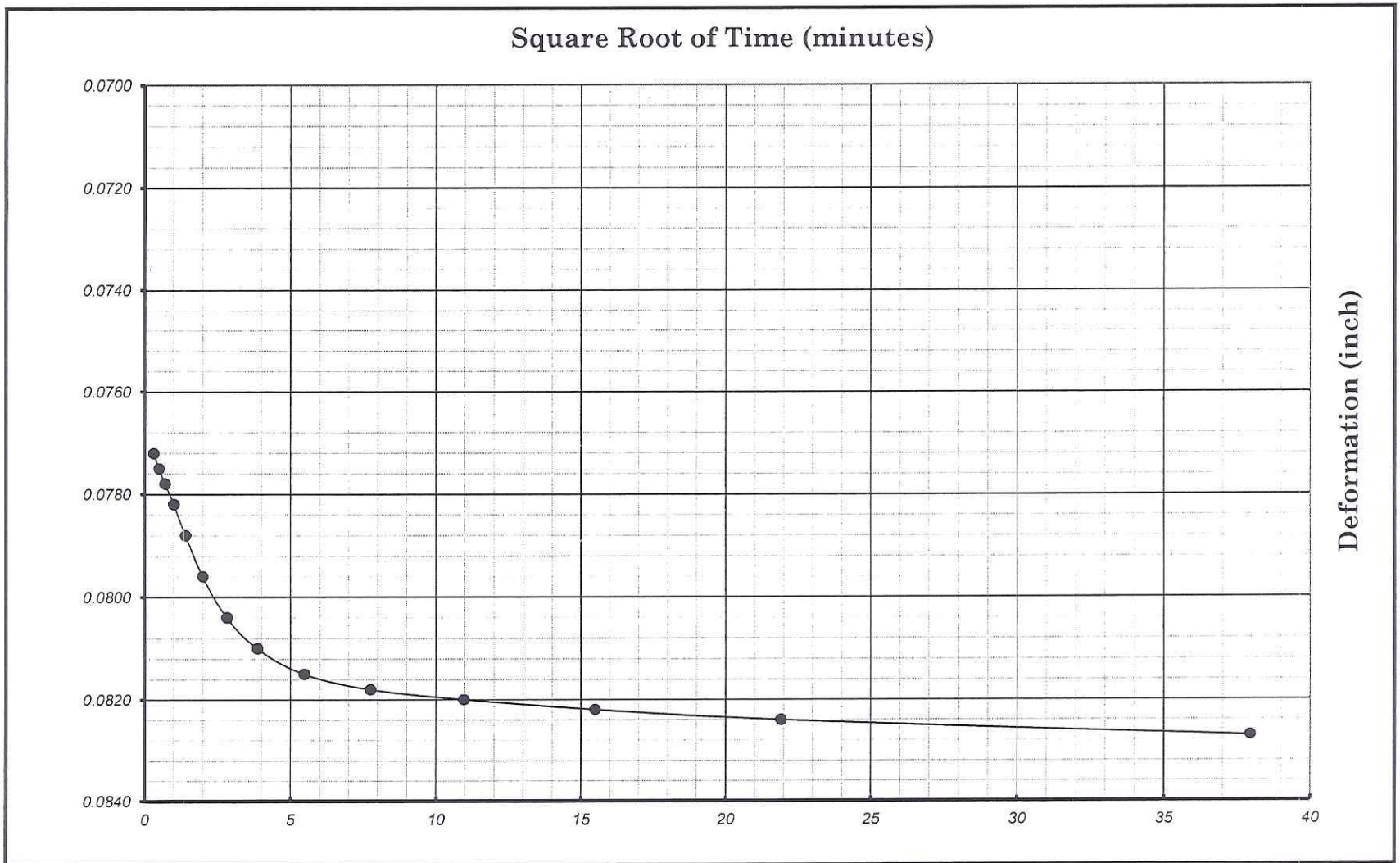
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

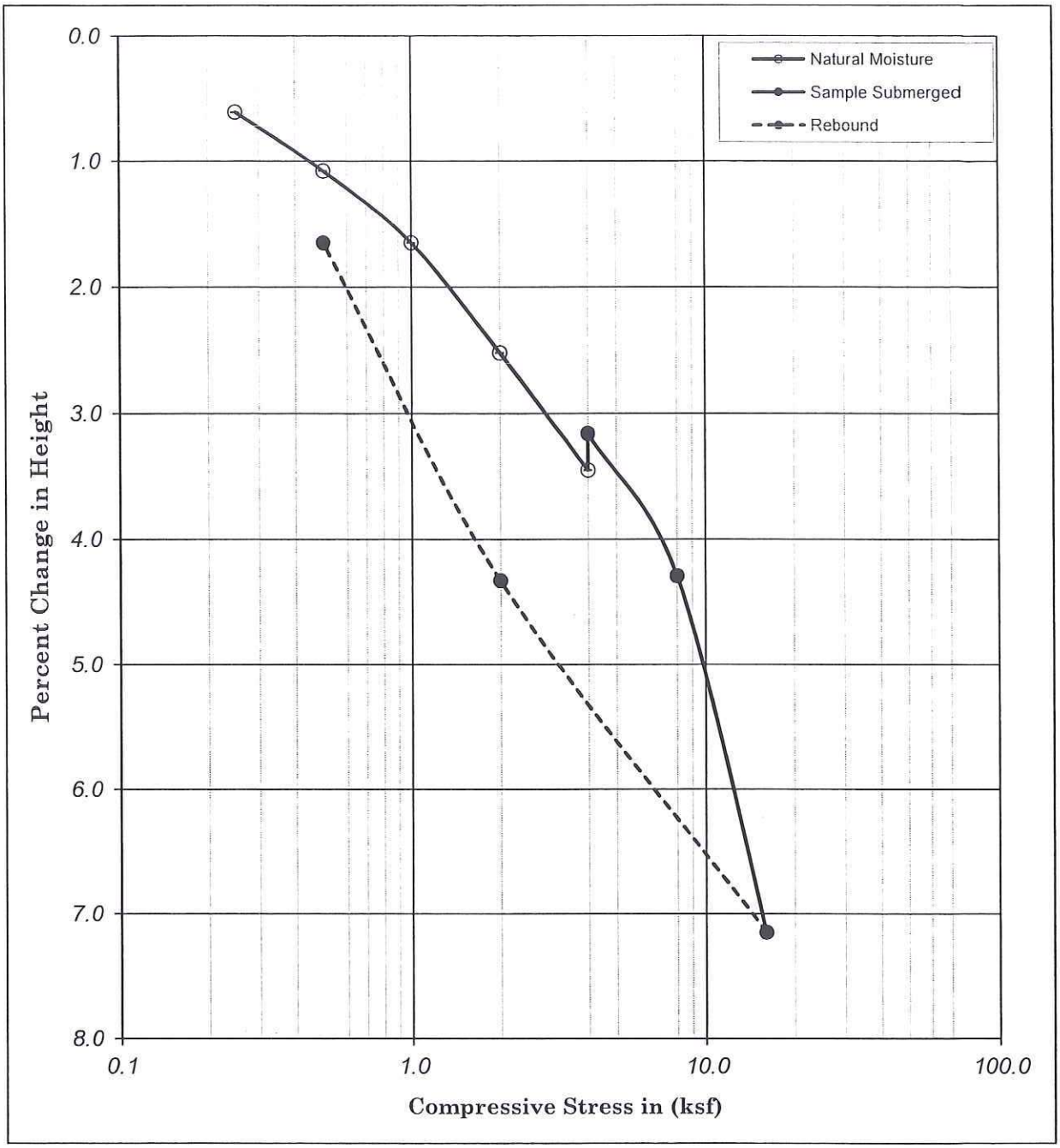
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-117*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-9*	
EMI Project No. : *11-135*		Depth (ft/m) : *45.0* *13.7*	Veritcal Load (ksf/kpa) : *8.00* *383.0*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-117*	One-Dimensional Consolidation of Soil
		Sample No. : *D-9*	Time-Deformation Curve (Square Root of Time Method)
EMI Project No. : *11-135*		Depth (ft/m) : *45.0* *13.7*	Veritcal Load (ksf/kpa) : *8.0* *383.0*



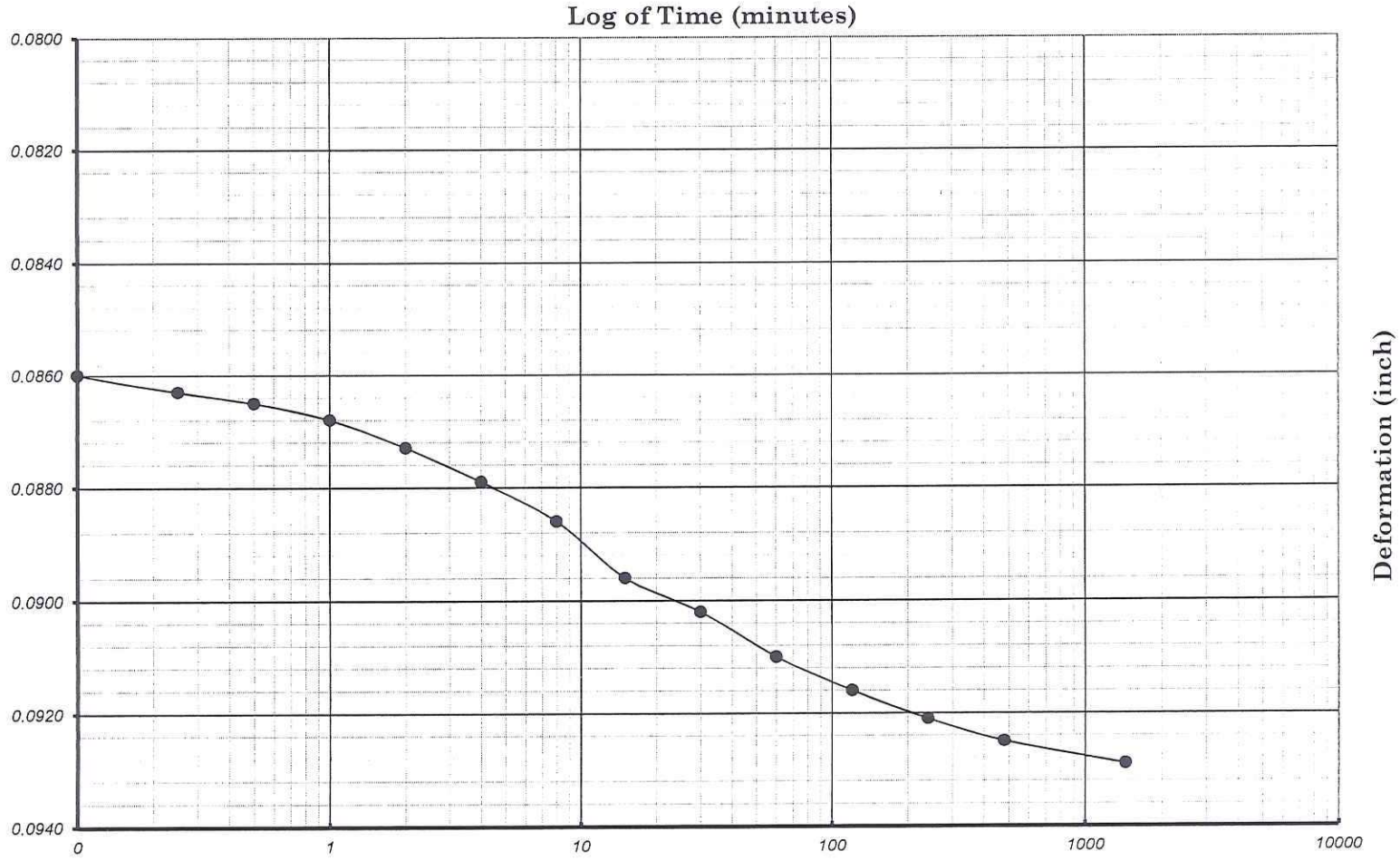
Boring No. : A-11-118				Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No. : D-9				Plastic Limit :	-						
Depth	(ft) : 40.0		41.5	Plastic Index :	-	Initial	31.24	90.87	14.30	98.67	0.85
	(m) : 12.20		12.66	Specific Gravity :	2.70	Final	32.39	92.44	14.55	106.19	0.82
Description : Olive-brown with olive-gray, Lean CLAY with SAND (CL)											

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

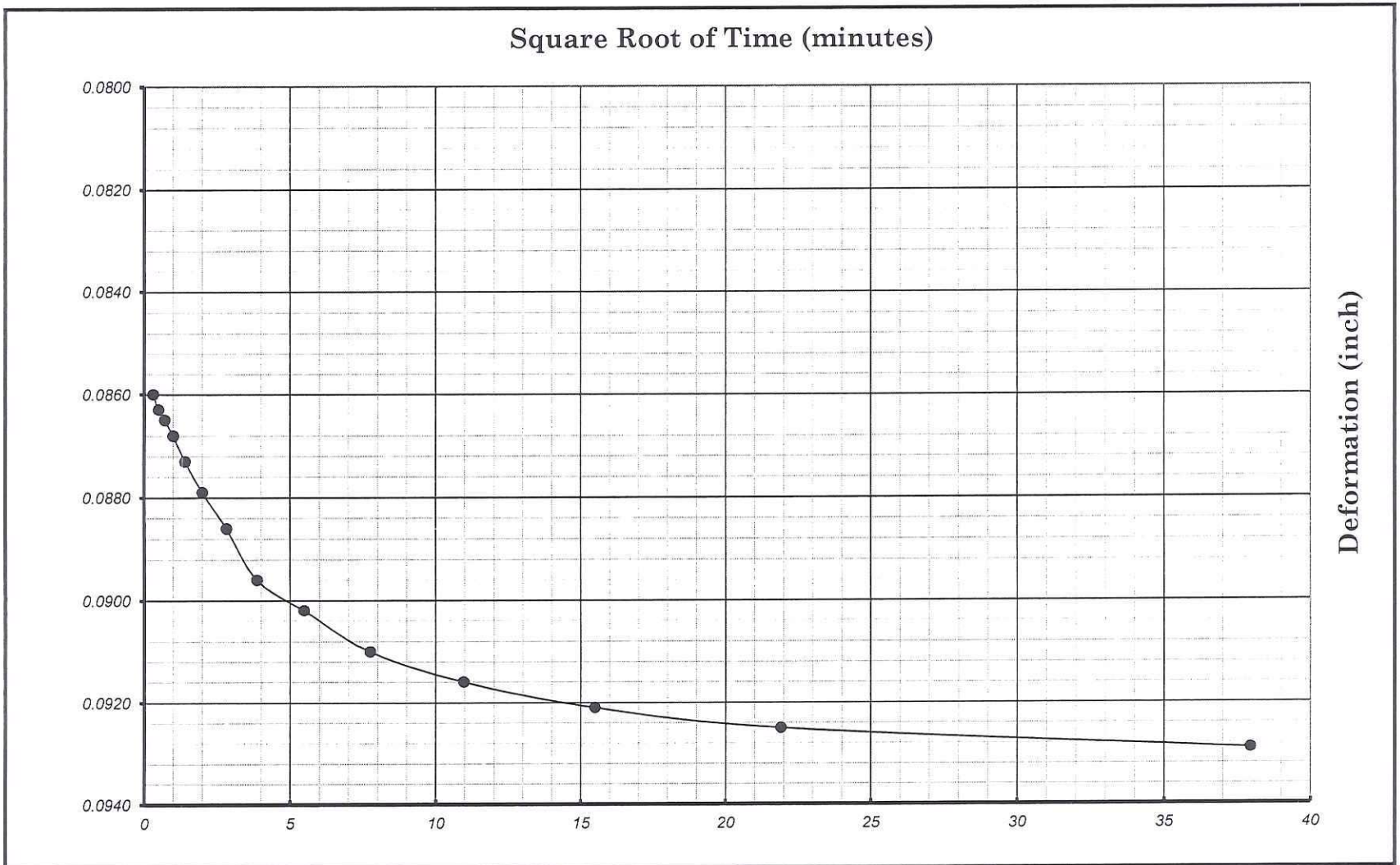
Parsons/I-5 HOV Widening Segment 1

Project No. : 11-135 01/30/12

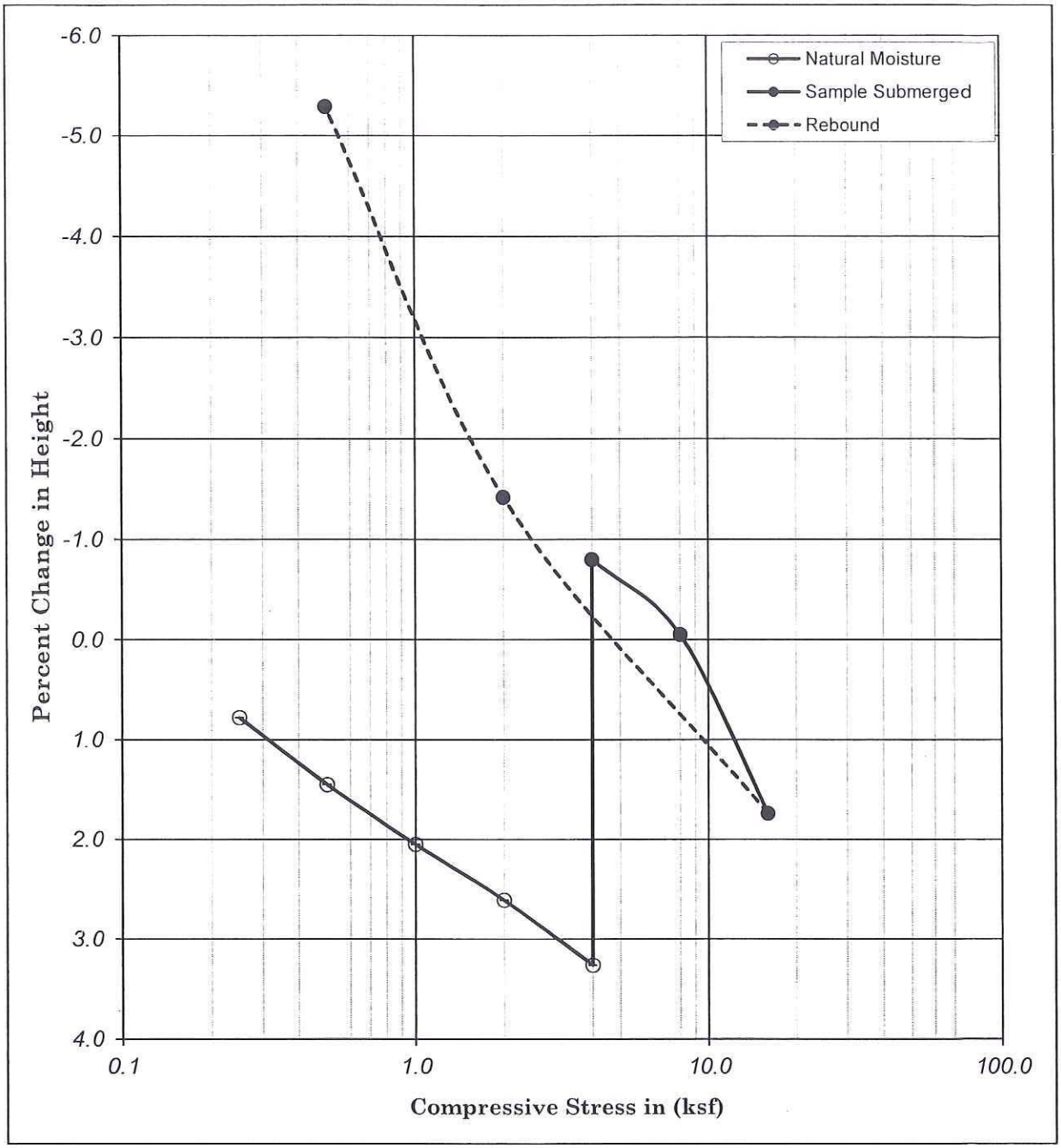
CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-118*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-9*	
EMI Project No. : *11-135*		Depth (ft/m) : *40.0* *12.2*	Veritcal Load (ksf/kpa) : *8.00* *383.0*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-118*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-9*	
EMI Project No. : *11-135*		Depth (ft/m) : *40.0* *12.2*	Veritcal Load (ksf/kpa) : *8.0* *383.0*



Boring No.	: A-11-130		Liquid Limit :	-		Moisture Content (%)	Dry Density (pcf)	Dry Density (kN/m³)	Percent Saturation	Void Ratio
Sample No.	: D-6		Plastic Limit :	-						
Depth (ft)	: 30.0	31.5	Plastic Index :	-	Initial	19.87	106.39	16.75	91.79	0.58
Depth (m)	: 9.15	9.61	Specific Gravity :	2.70	Final	25.32	101.05	15.91	102.32	0.67

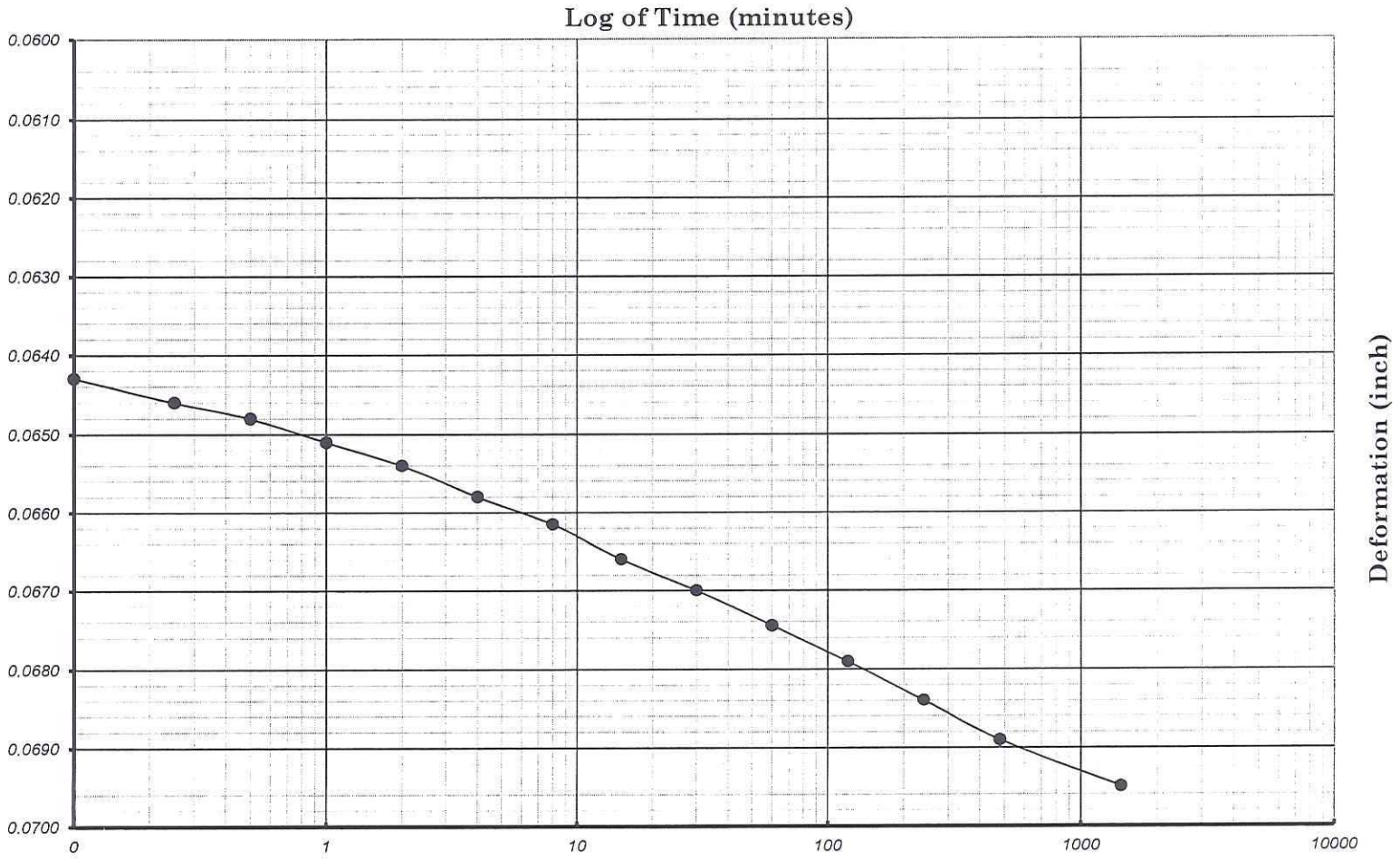
Description : *Dark brown, Fat CLAY with SAND (CH)*

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

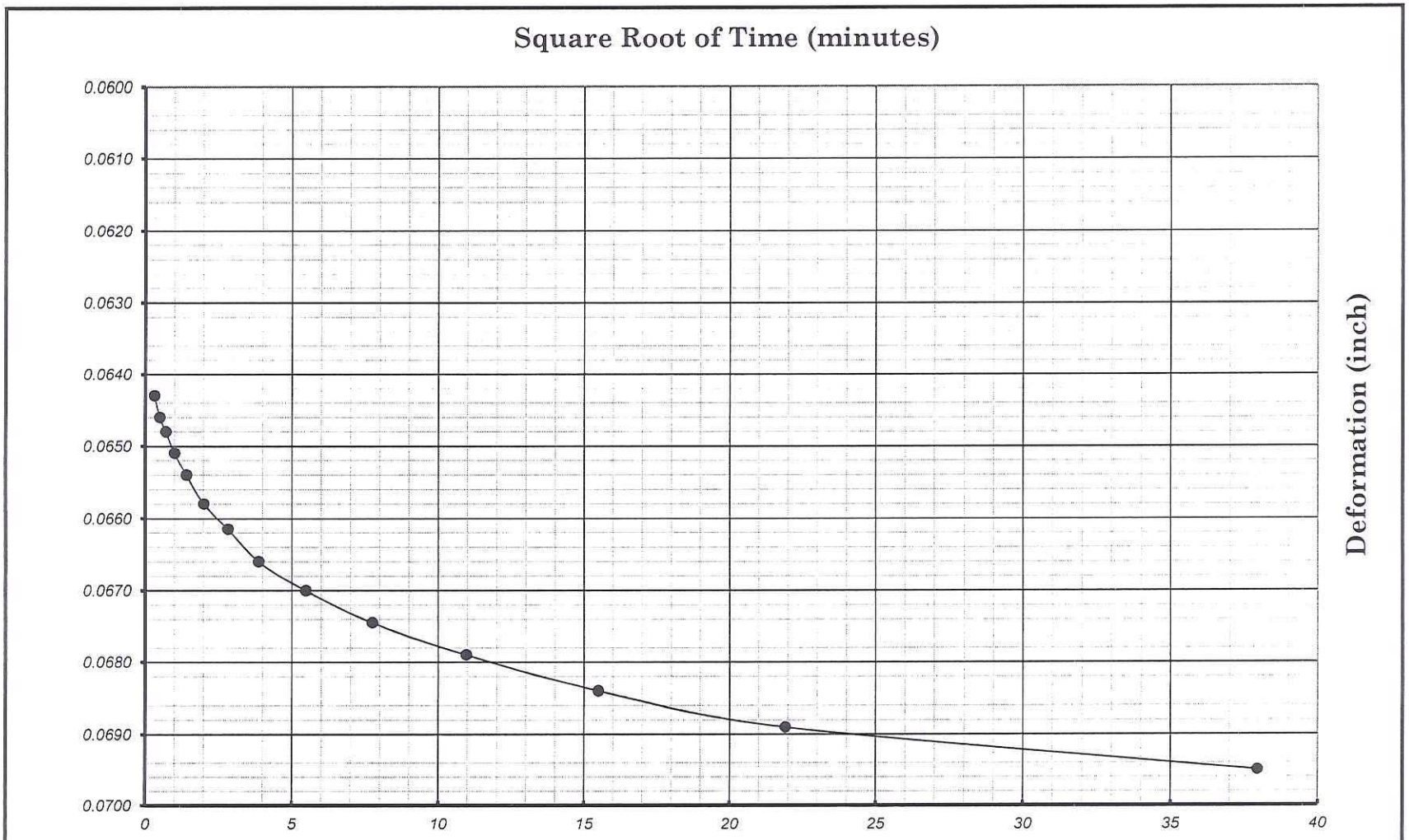
Parsons/I-5 HOV Widening Segment 1

Project No. : *11-135* *01/30/12*

CONSOLIDATION TEST
(ASTM D-2435 / CT-219)



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-130*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Log of Time Method)
		Sample No. : *D-6*	
EMI Project No. : *11-135*		Depth (ft/m) : *30.0* *9.2*	Veritcal Load (ksf/kpa) : *8.00* *383.0*



Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	*Parsons/I-5 HOV Widening Segment 1*	Boring No. : *A-11-130*	One-Dimensional Consolidation of Soil Time-Deformation Curve (Square Root of Time Method)
		Sample No. : *D-6*	
EMI Project No. : *11-135*		Depth (ft/m) : *30.0* *9.2*	Veritcal Load (ksf/kpa) : *8.0* *383.0*

AP Engineering & Testing, Inc.

CAL 216 PART 2

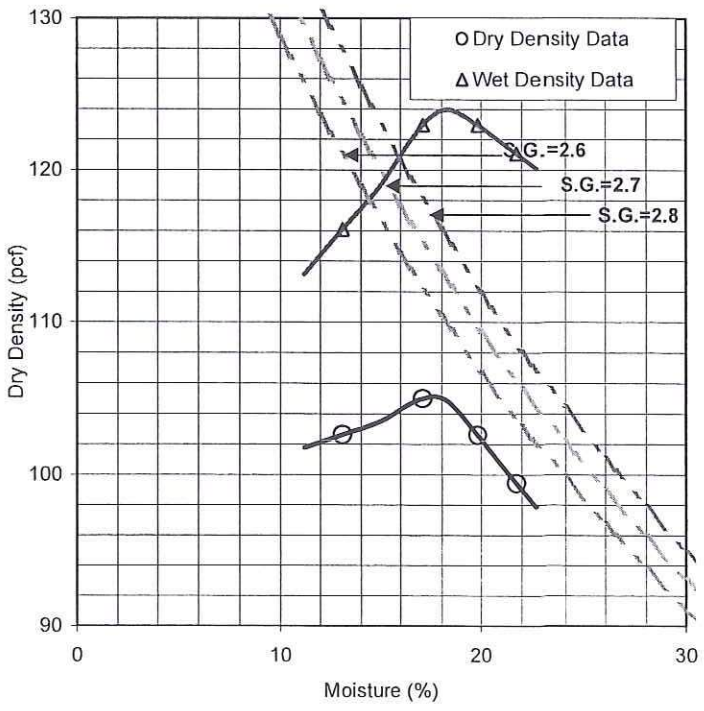
LABORATORY COMPACTED TEST MAXIMUM WET DENSITY

Client:	Earth Mechanics, Inc.			AP Number:	11-1059
Project Name:	I-5 HOV Widening Segment 1	Tested By:	CC	Date:	12/04/11
Project No. :	11-135	Calculated By:	KM	Date:	12/13/11
Boring No.:	A-11-101	Checked By:	AP	Date:	12/18/11
Sample No. :	B-0	Depth (ft):	0-5		
Visual Sample Description:	Sandy Clay w/gravel				

IMPACT TEST DATA							
I	Initial Wet Weight of Test Specimen (Grams)	2350					
	Increment No.	1	2	3	4	5	6
	Water Adjustment (grams)	0	47	94	-47		
J	Tamper Reading	11.4	11.3	11.5	12.0		
K	Wet Density (gm/cc) from Table 1	1.97	1.97	1.94	1.86		
	Dry Density (gm/cc)	1.68	1.64	1.59	1.64		
	Dry Density (pcf)	**105.0**	**102.6**	**99.4**	**102.6**		
	Wt. of Container (gm.)	147.93	149.57	154.24	148.72		
	Wet Wt. of Soil + Cont. (gm.)	632.29	564.82	604.87	521.60		
	Dry Wt. of Soil + Cont. (gm.)	561.56	496.10	524.36	478.40		
	Moisture Content (%)	**17.10**	**19.83**	**21.75**	**13.10**		

ROCK CORRECTION				
L	Total Sample Weight		(grams)	11351
M	+19 mm (¾") Weight in Air		(grams)	0
N	+19 mm (¾") Weight in Water		(grams)	0
O	+19 mm (¾") Volume		(M-N)	0
P	% +19 mm (¾")	100*	(M/L)	0.00
Q	% -19 mm (¾")		(100-P)	100.00
R	Density of +19 mm (¾")		(M/O)	0.00
S	(%+19 mm)/Density of +19 mm		(P/RY)	0.00
T	(%-19 mm)/Density of -19 mm		(Q/K)	50.76
U	Sum of S and T		(S+T)	50.76
V	Average Adjusted Density		(100/U)	1.97
Percent Relative* Compaction		Spec	Failed	or less
			Passed	
*(H/K) for 10% or less +19 mm; (H/V) for > 10% +19 mm				
Note: 62.4 x (gm/cc) = P.C.F.				

Maximum Dry Density (pcf)	**105.0**
Optimum Moisture Content (%)	**18.0**
Maximum Wet Density (pcf)	**123.9**



AP Engineering & Testing, Inc.

CAL 216 PART 2

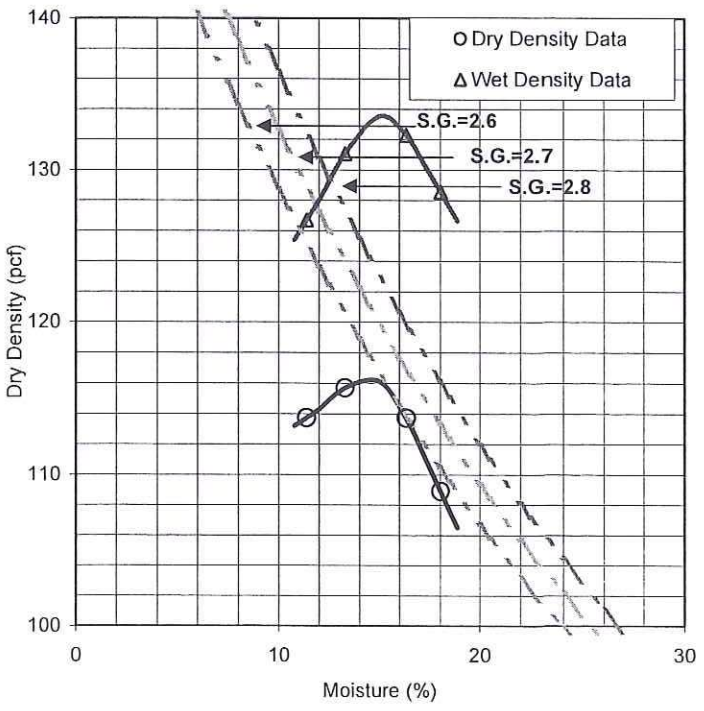
LABORATORY COMPACTED TEST MAXIMUM WET DENSITY

Client:	Earth Mechanics, Inc.			AP Number:	11-1059
Project Name:	I-5 HOV Widening Segment 1	Tested By:	CC	Date:	12/05/11
Project No. :	11-135	Calculated By:	KM	Date:	12/13/11
Boring No.:	A-11-111	Checked By:	AP	Date:	12/18/11
Sample No. :	B-0	Depth (ft):	0-5		
Visual Sample Description:	Sandy Clay w/gravel				

IMPACT TEST DATA							
I	Initial Wet Weight of Test Specimen (Grams)	2350					
	Increment No.	1	2	3	4	5	6
	Water Adjustment (grams)	0	47	-47	94		
J	Tamper Reading	10.5	10.8	10.6	11.0		
K	Wet Density (gm/cc) from Table 1	2.12	2.06	2.10	2.03		
	Dry Density (gm/cc)	1.82	1.75	1.85	1.82		
	Dry Density (pcf)	**113.7**	**108.9**	**115.7**	**113.7**		
	Wt. of Container (gm.)	147.21	181.39	150.36	162.80		
	Wet Wt. of Soil + Cont. (gm.)	597.83	736.32	592.97	637.51		
	Dry Wt. of Soil + Cont. (gm.)	534.54	651.49	541.04	588.93		
	Moisture Content (%)	**16.34**	**18.05**	**13.29**	**11.40**		

ROCK CORRECTION				
L	Total Sample Weight		(grams)	19307
M	+19 mm (¾") Weight in Air		(grams)	852.8
N	+19 mm (¾") Weight in Water		(grams)	495.4
O	+19 mm (¾") Volume		(M-N)	357.4
P	% +19 mm (¾")	100*	(M/L)	4.42
Q	% -19 mm (¾")		(100-P)	95.58
R	Density of +19 mm (¾")		(M/O)	2.39
S	(%+19 mm)/Density of +19 mm		(P/RY)	1.85
T	(%-19 mm)/Density of -19 mm		(Q/K)	45.09
U	Sum of S and T		(S+T)	46.94
V	Average Adjusted Density		(100/U)	2.13
Percent Relative* Compaction		Spec	Failed	or less
			Passed	
*(H/K) for 10% or less +19 mm; (H/V) for > 10% +19 mm				
Note: 62.4 x (gm/cc) = P.C.F.				

Maximum Dry Density (pcf)	**116.0**
Optimum Moisture Content (%)	**15.0**
Maximum Wet Density (pcf)	**133.4**



AP Engineering & Testing, Inc.

CAL 216 PART 2

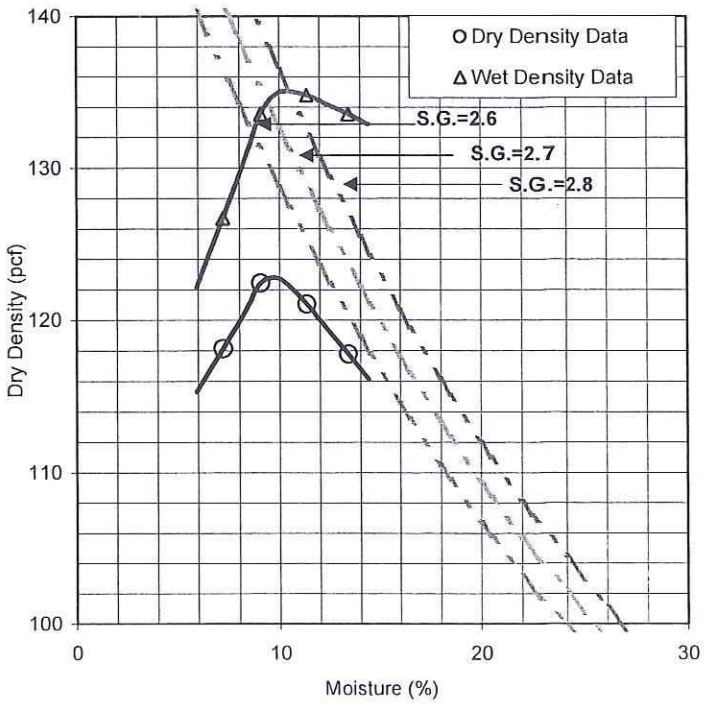
LABORATORY COMPACTED TEST MAXIMUM WET DENSITY

Client:	Earth Mechanics, Inc.			AP Number:	11-1059
Project Name:	I-5 HOV Widening Segment 1	Tested By:	CC	Date:	11/30/11
Project No. :	11-135	Calculated By:	KM	Date:	12/13/11
Boring No.:	A-11-117	Checked By:	AP	Date:	12/18/11
Sample No. :	B-0	Depth (ft):	0-5		
Visual Sample Description:	Sandy Lean Clay w/gravel				

IMPACT TEST DATA							
I	Initial Wet Weight of Test Specimen (Grams)	2350					
	Increment No.	1	2	3	4	5	6
	Water Adjustment (grams)	0	47	-47	-94		
J	Tamper Reading	10.3	10.4	10.4	11.0		
K	Wet Density (gm/cc) from Table 1	2.16	2.14	2.14	2.03		
	Dry Density (gm/cc)	1.94	1.89	1.96	1.89		
	Dry Density (pcf)	**121.0**	**117.8**	**122.4**	**118.1**		
	Wt. of Container (gm.)	149.55	181.14	149.88	160.52		
	Wet Wt. of Soil + Cont. (gm.)	566.92	688.05	448.93	449.98		
	Dry Wt. of Soil + Cont. (gm.)	524.36	628.15	424.01	430.49		
	Moisture Content (%)	**11.36**	**13.40**	**9.09**	**7.22**		

ROCK CORRECTION				
L	Total Sample Weight		(grams)	25770
M	+19 mm (¾") Weight in Air		(grams)	836.4
N	+19 mm (¾") Weight in Water		(grams)	482.6
O	+19 mm (¾") Volume		(M-N)	353.8
P	% +19 mm (¾")	100*	(M/L)	3.25
Q	% -19 mm (¾")		(100-P)	96.75
R	Density of +19 mm (¾")		(M/O)	2.36
S	(%+19 mm)/Density of +19 mm		(P/RY)	1.37
T	(%-19 mm)/Density of -19 mm		(Q/K)	44.79
U	Sum of S and T		(S+T)	46.17
V	Average Adjusted Density		(100/U)	2.17
Percent Relative* Compaction		Spec	Failed	or less
			Passed	
*(H/K) for 10% or less +19 mm; (H/V) for > 10% +19 mm				
Note: 62.4 x (gm/cc) = P.C.F.				

Maximum Dry Density (pcf)	**122.5**
Optimum Moisture Content (%)	**10.0**
Maximum Wet Density (pcf)	**134.8**



AP Engineering & Testing, Inc.

CAL 216 PART 2

LABORATORY COMPACTED TEST MAXIMUM WET DENSITY

Client:	Earth Mechanics, Inc.			AP Number:	11-1059
Project Name:	I-5 HOV Widening Segment 1	Tested By:	CC	Date:	12/03/11
Project No. :	11-135	Calculated By:	KM	Date:	12/13/11
Boring No.:	A-11-121	Checked By:	AP	Date:	12/18/11
Sample No. :	B-0	Depth (ft):	0-5		
Visual Sample Description:	Silty Sand w/gravel				

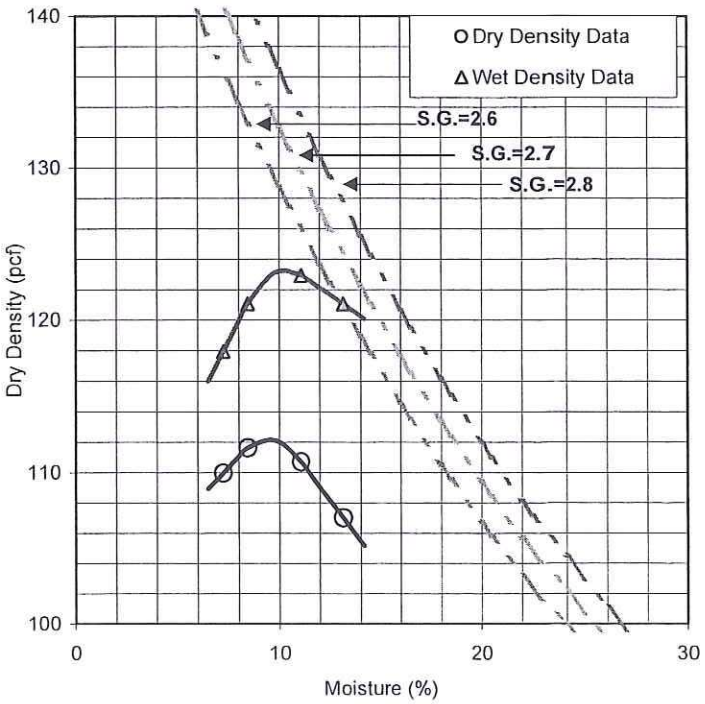
IMPACT TEST DATA

I	Initial Wet Weight of Test Specimen (Grams)	2350					
	Increment No.	1	2	3	4	5	6
	Water Adjustment (grams)	0	47	94	141		
J	Tamper Reading	11.8	11.5	11.3	11.5		
K	Wet Density (gm/cc) from Table 1	1.89	1.94	1.97	1.94		
	Dry Density (gm/cc)	1.76	1.79	1.77	1.71		
	Dry Density (pcf)	**110.0**	**111.6**	**110.7**	**107.0**		
	Wt. of Container (gm.)	149.53	149.84	149.30	179.98		
	Wet Wt. of Soil + Cont. (gm.)	708.28	455.28	684.36	640.31		
	Dry Wt. of Soil + Cont. (gm.)	670.48	431.44	631.01	586.85		
	Moisture Content (%)	**7.26**	**8.47**	**11.08**	**13.14**		

ROCK CORRECTION

L	Total Sample Weight (grams)		22018.5
M	+19 mm (¾") Weight in Air (grams)		460
N	+19 mm (¾") Weight in Water (grams)		284.7
O	+19 mm (¾") Volume (M-N)		175.3
P	% +19 mm (¾") 100* (M/L)		2.09
Q	% -19 mm (¾") (100-P)		97.91
R	Density of +19 mm (¾") (M/O)		2.62
S	(%+19 mm)/Density of +19 mm (P/RY)		0.80
T	(%-19 mm)/Density of -19 mm (Q/K)		49.70
U	Sum of S and T (S+T)		50.50
V	Average Adjusted Density (100/U)		1.98
Percent Relative* Compaction	Spec	Failed	or less
		Passed	
*(H/K) for 10% or less +19 mm; (H/V) for > 10% +19 mm			
Note: 62.4 x (gm/cc) = P.C.F.			

Maximum Dry Density (pcf)	**112.0**
Optimum Moisture Content (%)	**10.0**
Maximum Wet Density (pcf)	**123.2**



AP Engineering & Testing, Inc.

CAL 216 PART 2

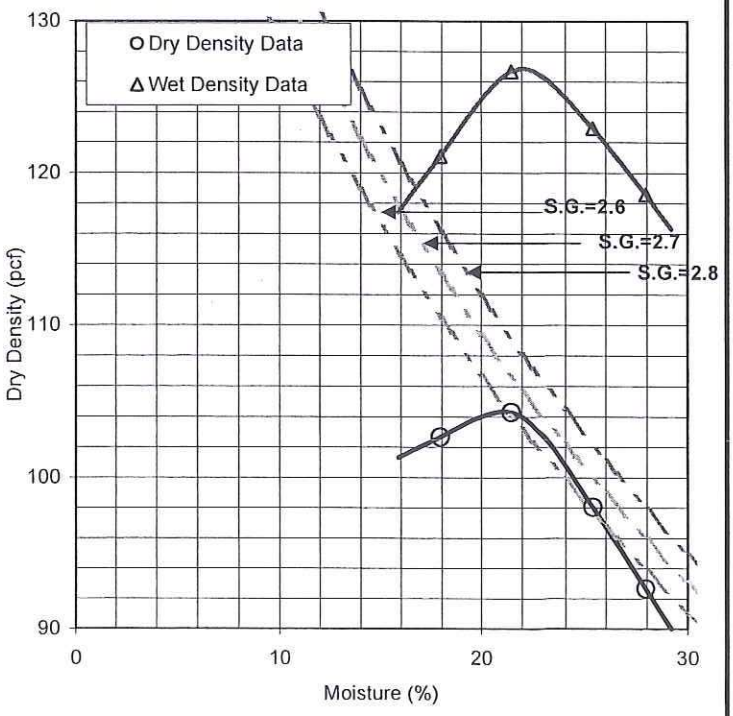
LABORATORY COMPACTED TEST MAXIMUM WET DENSITY

Client:	Earth Mechanics, Inc.			AP Number:	11-1059
Project Name:	I-5 HOV Widening Segment 1	Tested By:	CC	Date:	12/03/11
Project No. :	11-135	Calculated By:	KM	Date:	12/13/11
Boring No.:	A-11-134	Checked By:	AP	Date:	12/18/11
Sample No. :	B-0	Depth (ft):	0-5		
Visual Sample Description:	Sandy Clay w/gravel				

IMPACT TEST DATA							
I	Initial Wet Weight of Test Specimen (Grams)	2350					
	Increment No.	1	2	3	4	5	6
	Water Adjustment (grams)	0	47	-47	-94		
J	Tamper Reading	11.3	11.7	11.0	11.5		
K	Wet Density (gm/cc) from Table 1	1.97	1.90	2.03	1.94		
	Dry Density (gm/cc)	1.57	1.49	1.67	1.64		
	Dry Density (pcf)	**98.0**	**92.7**	**104.3**	**102.6**		
	Wt. of Container (gm.)	149.63	150.66	179.12	149.49		
	Wet Wt. of Soil + Cont. (gm.)	410.28	466.71	475.71	506.28		
	Dry Wt. of Soil + Cont. (gm.)	357.50	397.68	423.27	452.01		
	Moisture Content (%)	**25.39**	**27.95**	**21.48**	**17.94**		

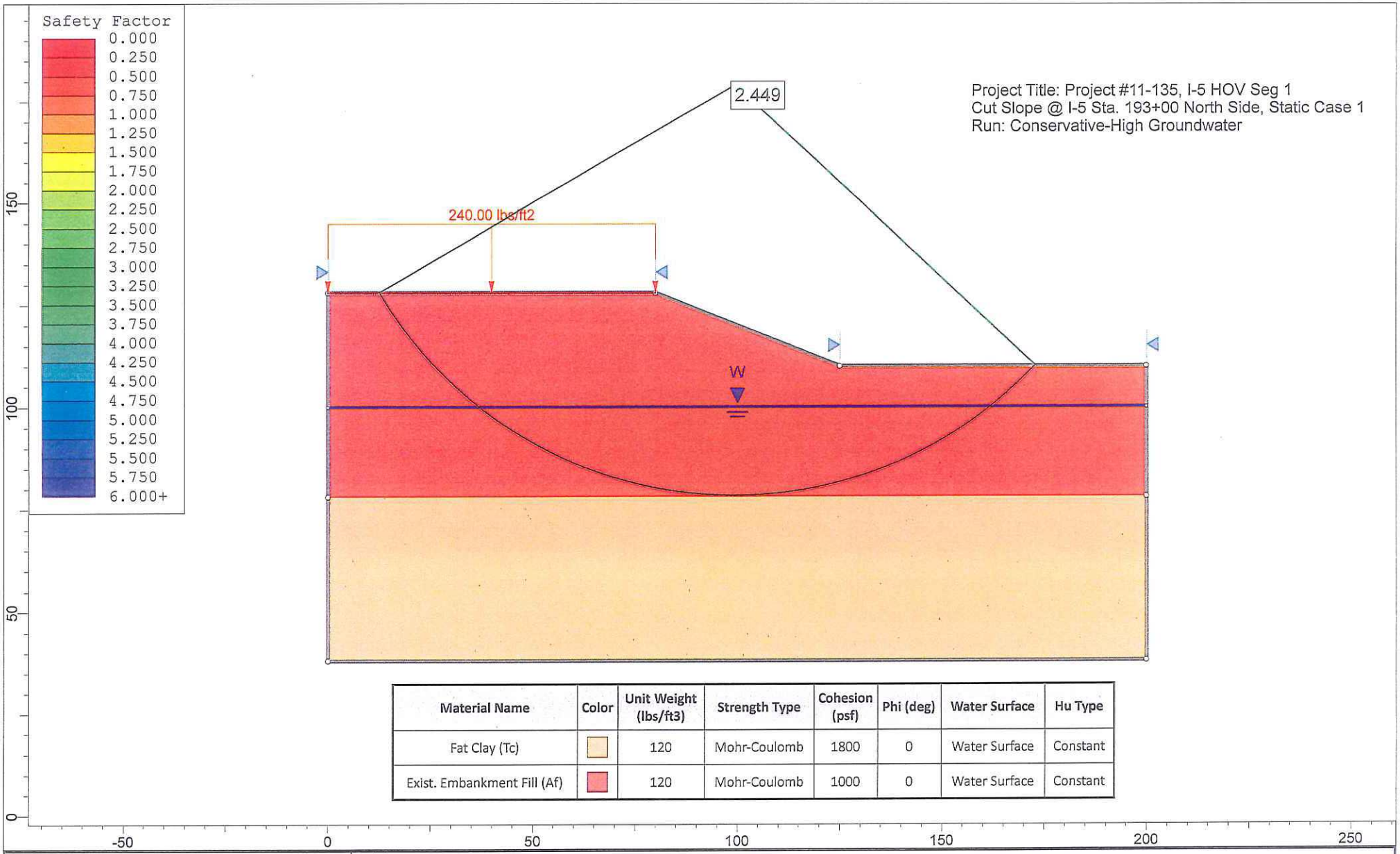
ROCK CORRECTION				
L	Total Sample Weight		(grams)	19400
M	+19 mm (¾") Weight in Air		(grams)	135.9
N	+19 mm (¾") Weight in Water		(grams)	83.1
O	+19 mm (¾") Volume		(M-N)	52.8
P	% +19 mm (¾")	100*	(M/L)	0.70
Q	% -19 mm (¾")		(100-P)	99.30
R	Density of +19 mm (¾")		(M/O)	2.57
S	(%+19 mm)/Density of +19 mm		(P/RY)	0.27
T	(%-19 mm)/Density of -19 mm		(Q/K)	48.92
U	Sum of S and T		(S+T)	49.19
V	Average Adjusted Density		(100/U)	2.03
Percent Relative* Compaction		Spec	Failed	or less
			Passed	
*(H/K) for 10% or less +19 mm; (H/V) for > 10% +19 mm				
Note: 62.4 x (gm/cc) = P.C.F.				

Maximum Dry Density (pcf)	**104.5**
Optimum Moisture Content (%)	**21.0**
Maximum Wet Density (pcf)	**126.4**



APPENDIX C

DESIGN CALCULATIONS

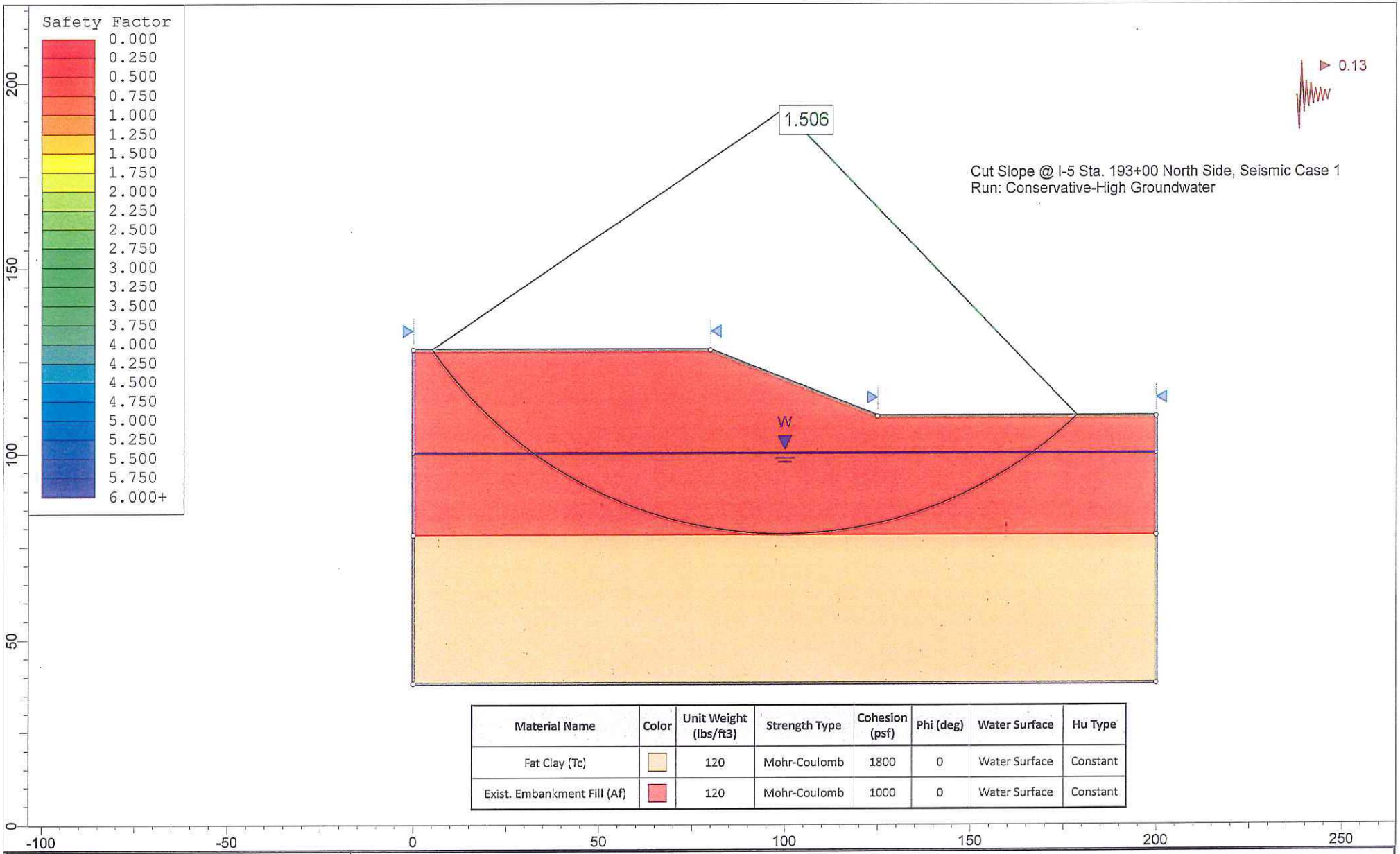


Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
Fat Clay (Tc)		120	Mohr-Coulomb	1800	0	Water Surface	Constant
Exist. Embankment Fill (Af)		120	Mohr-Coulomb	1000	0	Water Surface	Constant

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1			
Analysis Description	Cut Slope @ I-5 Sta. 193+00 North Side, Static Case 1			
Drawn By	MK	Scale	1:389	Company: Earth Mechanics
Date	4/6/12			File Name: Static1.slim

SLIDEINTERPRET 6.015



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
Fat Clay (Tc)		120	Mohr-Coulomb	1800	0	Water Surface	Constant
Exist. Embankment Fill (Af)		120	Mohr-Coulomb	1000	0	Water Surface	Constant

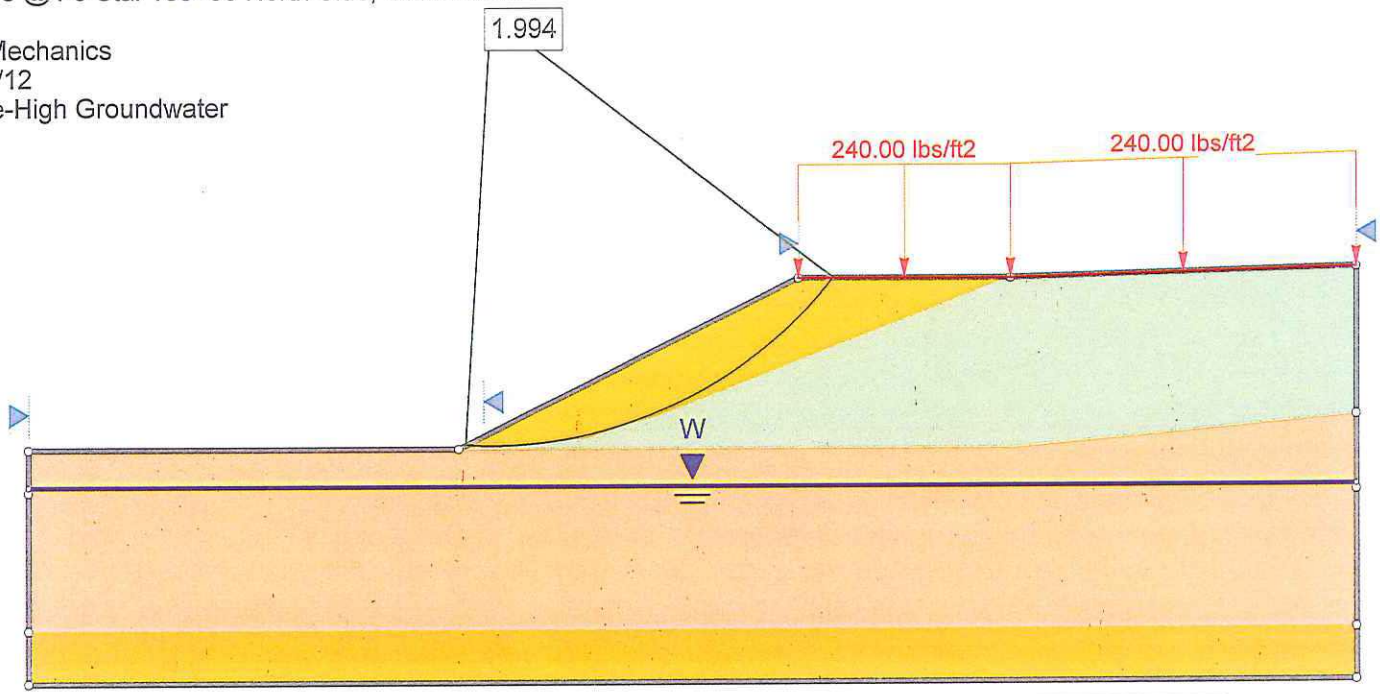
Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1				
Analysis Description	Cut Slope @ I-5 Sta. 193+00 North Side, Seismic Case 1				
Drawn By	MK	Scale	1:429	Company	Earth Mechanics
Date	4/6/12			File Name	Pseudostatic1.slim

SLIDEINTERPRET 6.015

Safety Factor
0.000
0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+

Project Settings
Project Title: Project #11-135, I-5 HOV Seg 1
Analysis: Cut Slope @ I-5 Sta. 180+00 North Side, Static Case 1
Author: MK
Company: Earth Mechanics
Date Created: 4/6/12
Run: Conservative-High Groundwater



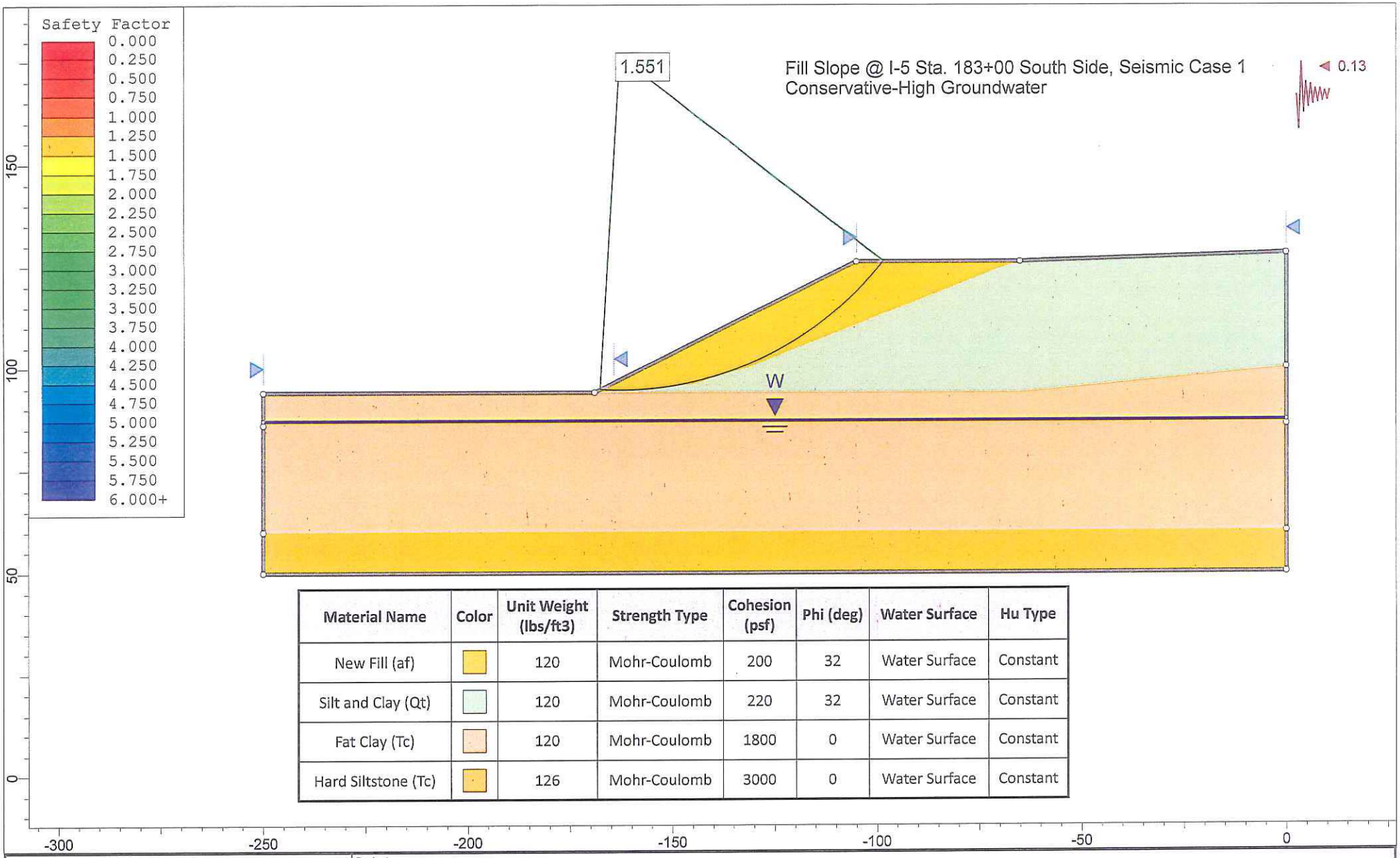
Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
New Fill (af)		120	Mohr-Coulomb	200	32	Water Surface	Constant
Silt and Clay (Qt)		120	Mohr-Coulomb	220	32	Water Surface	Constant
Fat Clay (Tc)		120	Mohr-Coulomb	1800	0	Water Surface	Constant
Hard Siltstone (Tc)		126	Mohr-Coulomb	3000	0	Water Surface	Constant

200
150
100
50
0
-300
-250
-200
-150
-100
-50
0

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1		
Analysis Description	Fill Slope @ I-5 Sta. 180+00 South Side, Static Case 1		
Drawn By	MK	Scale 1:432	Company Earth Mechanics
Date	4/9/12		File Name Static1.slim

SLIDEINTERPRET 6.015



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Water Surface	Hu Type
New Fill (af)		120	Mohr-Coulomb	200	32	Water Surface	Constant
Silt and Clay (Qt)		120	Mohr-Coulomb	220	32	Water Surface	Constant
Fat Clay (Tc)		120	Mohr-Coulomb	1800	0	Water Surface	Constant
Hard Siltstone (Tc)		126	Mohr-Coulomb	3000	0	Water Surface	Constant

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project	Project #11-135, I-5 HOV Seg 1		
Analysis Description	Fill Slope @ I-5 Sta. 180+00 South Side, Seismic Case 1		
Drawn By	MK	Scale 1:389	Company Earth Mechanics
Date	4/9/12		File Name Pseudostatic1.slim

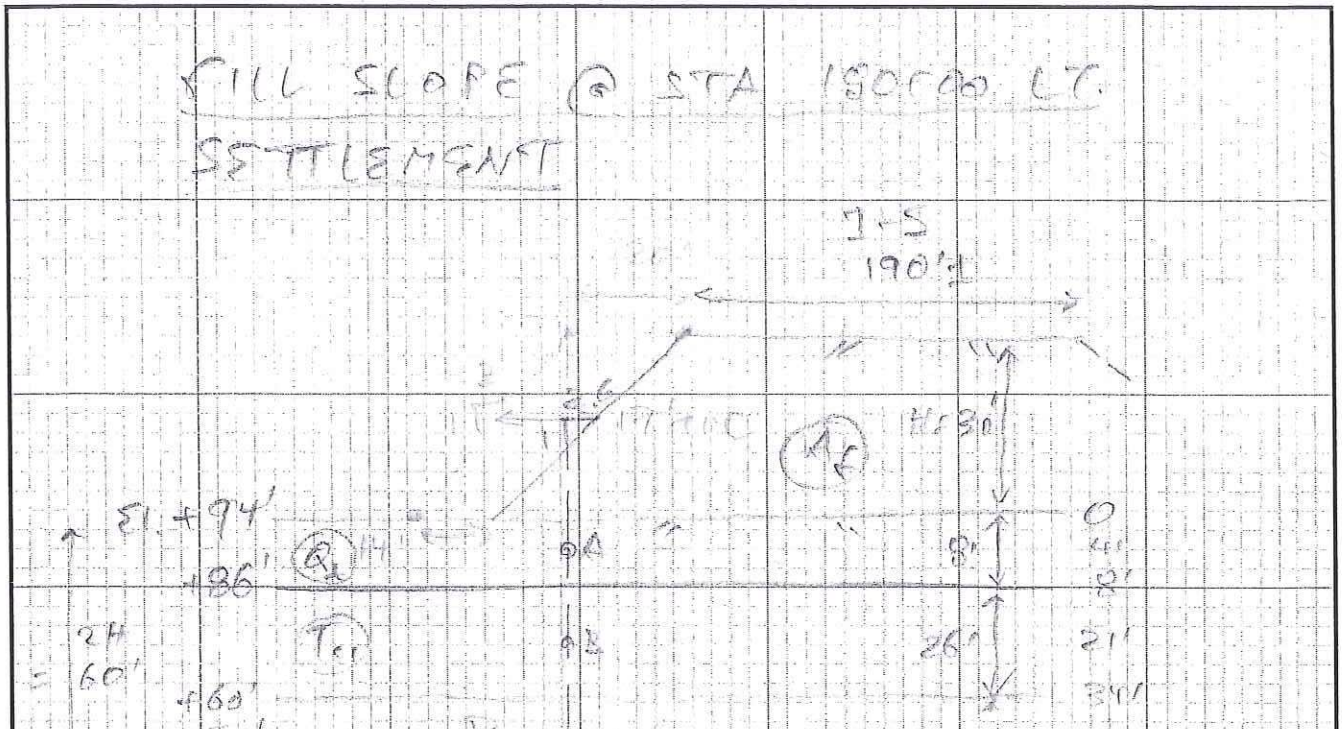
SLIDEINTERPRET 6.015

2/2

Project I-5 HOV SEG. 1
STA 180+00 LT. Project No. 11-185

By MK Date 4/9/12 Checked By LLC Date 5/10/12 Sheet 1 of 3

FILL SLOPE @ STA 180+00 LT.
SETTLEMENT



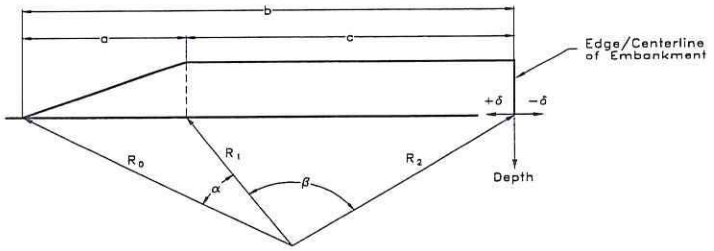
POINT	DEPTH/ΔH	σ_{vo} (ksf)	σ_{vf} (ksf)	Δσ (ksf)	C_c	ε
A	41'/8'	.48	4.07	1.21	.025	.23'
B	21'/26'	2.52	5.90	1.07	.015	.33"
C	49'/26'	4.86	4.86	.79	.012	1.4"
				Total settlement =		2.0"

Notes:
all γ = 120 pcf ; Assume GWT @ El +50' (conservative)
$\delta = C_c H / (1+e_o) \log \frac{\sigma_{vf}}{\sigma_{vo}}$
Use C_c from AASHTO above GWT

Stress Calculation below Earth Embankment

By: MK
Date: 4/9/2012
Project: I-5 HOV Seg 1
Case: Fill Slope @ Sta 180+00 LT

Equation of Stress Given Below (Poulos & Davis P. 40)



Case: Initial Embankment

Soil Unit Weight	0.120 kcf		
Embankment Height =	30 ft	a =	78 ft
Embankment Width (c) =	190 ft	b =	268 ft
Side Slope Ratio (H:V) =	2.6 :1	c =	190 ft

Distance Delta= 217 ft

Depth (ft)	R2 (ft)	alpha (rad)	beta (rad)	SigmaZ (ksf)
4.0	217.0	2.916	0.129	2.35
21.0	218.0	2.090	0.565	2.32
47.0	222.0	1.348	0.836	2.20
0.0	217.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	217.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	217.0	#DIV/0!	#DIV/0!	#DIV/0!

Distance Delta= ft

Depth (ft)	R2 (ft)	alpha (rad)	beta (rad)	SigmaZ (ksf)
4.0	4.0	0.006	1.550	1.80
21.0	21.0	0.032	1.461	1.80
47.0	47.0	0.069	1.328	1.79
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!

Distance Delta= ft

Depth (ft)	R2 (ft)	alpha (rad)	beta (rad)	SigmaZ (ksf)
4.0	4.0	0.006	1.550	1.80
21.0	21.0	0.032	1.461	1.80
47.0	47.0	0.069	1.328	1.79
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!

Distance Delta= ft

Depth (ft)	R2 (ft)	alpha (rad)	beta (rad)	SigmaZ (ksf)
4.0	4.0	0.006	1.550	1.80
21.0	21.0	0.032	1.461	1.80
47.0	47.0	0.069	1.328	1.79
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!

Case: Final Embankment

Soil Unit Weight	0.120 kcf		
Embankment Height =	30 ft	a =	60 ft
Embankment Width (c) =	207 ft	b =	267 ft
Side Slope Ratio (H:V) =	2 :1	c =	207 ft

Distance Delta= 200 ft

Depth (ft)	R2 (ft)	alpha (rad)	beta (rad)	SigmaZ (ksf)
4.0	200.0	0.460	2.602	3.59
21.0	201.1	0.945	1.788	3.38
47.0	205.4	0.811	1.488	3.00
0.0	200.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	200.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	200.0	#DIV/0!	#DIV/0!	#DIV/0!

Distance Delta= ft

Depth (ft)	R2 (ft)	alpha (rad)	beta (rad)	SigmaZ (ksf)
4.0	4.0	0.004	1.551	1.80
21.0	21.0	0.023	1.470	1.80
47.0	47.0	0.049	1.348	1.79
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!

Distance Delta= ft

Depth (ft)	R2 (ft)	alpha (rad)	beta (rad)	SigmaZ (ksf)
4.0	4.0	0.004	1.551	1.80
21.0	21.0	0.023	1.470	1.80
47.0	47.0	0.049	1.348	1.79
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!

Distance Delta= ft

Depth (ft)	R2 (ft)	alpha (rad)	beta (rad)	SigmaZ (ksf)
4.0	4.0	0.004	1.551	1.80
21.0	21.0	0.023	1.470	1.80
47.0	47.0	0.049	1.348	1.79
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!
0.0	0.0	#DIV/0!	#DIV/0!	#DIV/0!

Stress Change from Final Embankment to Initial Embankment

Depth (ft)	SigmaZ (ksf)
4.0	+1.24
21.0	+1.05
47.0	+0.79
0.0	#DIV/0!
0.0	#DIV/0!
0.0	#DIV/0!

Depth (ft)	SigmaZ (ksf)
4.0	0.00
21.0	0.00
47.0	0.00
0.0	#DIV/0!
0.0	#DIV/0!
0.0	#DIV/0!

Depth (ft)	SigmaZ (ksf)
4.0	0.00
21.0	0.00
47.0	0.00
0.0	#DIV/0!
0.0	#DIV/0!
0.0	#DIV/0!

Depth (ft)	SigmaZ (ksf)
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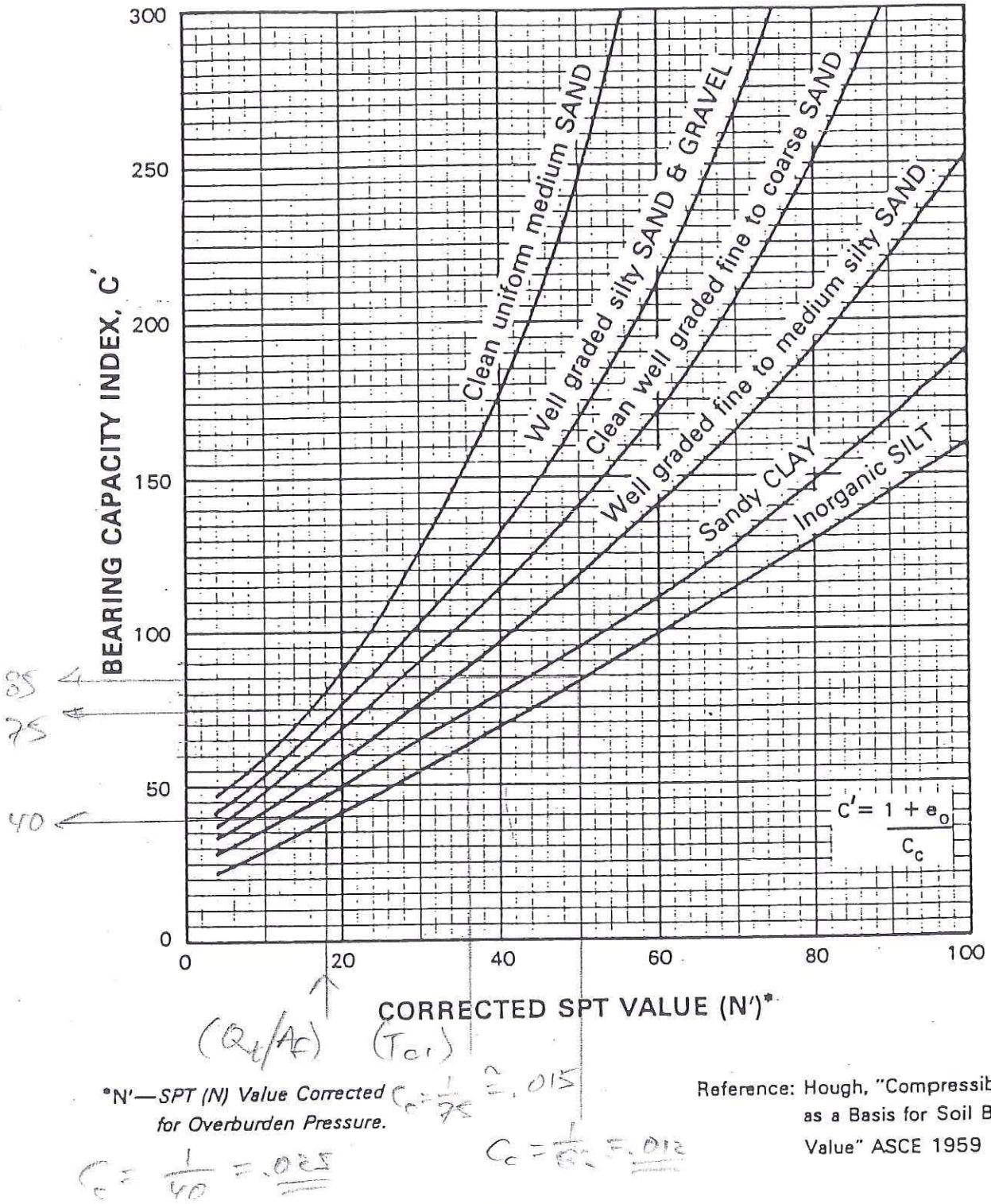
21.0	0.00
47.0	0.00
0.0	#DIV/0!
0.0	#DIV/0!
0.0	#DIV/0!



*N'—*SPT (N) Value Corrected for Overburden Pressure.*

Reference: Hough, "Compressibility as a Basis for Soil Bearin Value" ASCE 1959

FIGURE 13

BEARING CAPACITY INDEX (C') VALUES FOR GRANULAR SOIL.

APPENDIX D

CALTRANS REVIEW COMMENTS AND EMI RESPONSES

EXTERNAL SUBMITTAL REVIEW

PROJECT: INTERSTATE 5 HOV IMPROVEMENT
PROJECT No. 1200020277

EA No.: 12-0F96A1	
Agency: CalTrans	
Submittal No.	Title: GDR for I-5 HOV Segment 1 PM3.0-3.7, 5/29/2012

Lead:	Date: 8/29/2012
Technical Discipline: Geotechnical	

ACTION (30, 60, 85%): RL = Revise in Later Submittal RI = Revise Immediately & OTS Review
30, 60, 85% SUBMITTAL DISPOSITION (check one): ( )Approved, ( ) Approved as Noted for Correction, ( ) Rejected, Revise & Resubmit, ( ) Record Only
CODE: A - Accept/will comply, B - Agency Action, C - Clarify/Discuss, D - Delete Comment, E - Different Submittal
FINAL SUBMITTAL (100%) DISPOSITION (check one): ( ) Approved, (X) Approved as Noted for Correction, ( ) Rejected, Revise & Resubmit, ( ) Record Only

FILLED OUT BY REVIEWER						FILLED OUT BY RESPONDER		FILLED OUT AT RESOLUTION MEETING			For RFC Use Only	
No.	Plan/SSP/ Page No.	Reviewer	Reviewer Comment No.	Comments	Action	Initial Code	Response	Final Code	Verify (1)	Verify (2)	Verify (3)	Verify (4)
1	Section 5.2, Figures 5 to 9	H.Liu	1	Please show proposed retaining wall number on Geological Maps / Exploratory Boring Location Maps	RI		Comply on Figures 6 to 9.					
2	Section 8.3.3, Stability, Page 34	H.Liu	2	Factor of safety of 1.3 for static, 1.0 for for seismic conditions should be adequate for general global stability of highway embankment. Such requirement should be indentical to that for general retaining walls which are not part of structure foundations, or support structure foundations and other low-deflection tolerance facilities (Section 5.2.2.3 of Caltrans' BDS, Aug, 2004).	RI		Comply. We will update the text.					
3	Appendix A LOTBS	H.Liu	3	LOTBS 1 of 7, please change the retainng wall number from #203 to #190.	RI		Comply.					
4	Appendix A LOTBS	H.Liu	4	A-11-115: Elev. +113.5' to +103', plasticity of fines should be medium in order to be defined as Clayey materials; Elev.+98' to +93', plasticity of MH should be low to medium according to Section 14.7 of ASTM D2488 and Caltrans Soil and Rock Logging Manual; Elev. +43', Plasticity of CL materials should be "medium", instead of "low"	RI		Comply all.					
5												

(1) Responder's Initials - concur with response.
(2) Reviewer's Initials - concur with response.
(3) Kiewit/HNTB initials that comment was satisfied.
(4) Agency initials that comment was satisfied.

• ANALYSIS
• DESIGN

LaBelle • Marvin

• SOILS, ASPHALT TECHNOLOGY

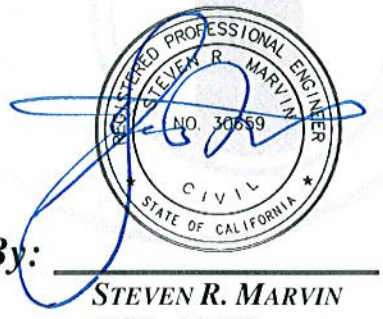
PROFESSIONAL PAVEMENT ENGINEERING
A CALIFORNIA CORPORATION

STRUCTURAL PAVEMENT INVESTIGATION REPORT

Of

Avenida Pico at Interstate 5

Within the City of
San Clemente, California



Reviewed By: _____

STEVEN R. MARVIN
RCE 30659

Client: City of San Clemente

Project No. 38212
August 2012

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Section 1 – Project Overview

Avenida Pico from the southbound off/on ramps of Interstate 5 (I-5) east to San Clemente High School, San Clemente, California is scheduled for improvement in the near future. The Project includes modification or construction/widening of Avenida Pico. Widening of the roadway will likely impact grades and cross slope and will include resurfacing or reconstruction of the remaining roadway, grade or structural conditions dependent.

Avenida Pico is a primary circulation element within the City of San Clemente, providing access to various regional shopping areas, extensive residential development inland of Interstate 5, and access to the San Clemente High School. Plans have been pending for a number of years to increase the current six travel lanes and improve various Avenida Pico On and Off ramps.

Avenida Pico and the Freeway interchange provides access east and west of I-5 to areas of commercial, light industrial, warehousing, construction material facilities and retail areas east and west of Interstate 5. Traffic within the interchange area includes a mixture of trucks servicing the retail, warehouse and commercial businesses in the region, combined with large numbers of automobile and light trucks accessing the San Clemente High School and residential and retail areas.

Avenida Pico has been the subject of various resurfacing and/or repairs, slurry seal programs and the most recent resurfacing comprised of a typical 0.10’ thick asphalt rubber or open grade friction course. The rubberized asphalt concrete (RAC) or Asphalt Rubber Hot Mix (ARHM) wearing surface placed from east of the I-5 Freeway to the east is of recent construction and exhibits no visible defects or distress. Previous utility trenching, patching and crack fill measures are visible from the construction joint east of the I-5 Freeway to the west project limits.

The purpose of this investigation is to provide a comprehensive evaluation of the current structural integrity of the travel lanes combined with developing corresponding structural section requirements in areas of required reconstruction. The measured structural conditions may then

be combined with existing visible pavement distress and any existing geometric limitations or requirements to develop final improvement recommendations.

The requirements developed during this report must then be combined with recommendations provided by others relative to widening and realignment areas. Multiple alternatives have been developed to provide the design team latitude in combining grade requirements with structural needs.

Section 2 – Scope of Services

Investigation of Avenida Pico, San Clemente, California utilized a combination of non-destructive strength testing combined with specific measurement of existing pavement sections through core sampling and related laboratory testing.

- **Site Inspection** – Review of prevailing conditions was performed during several separate field review and data gathering periods.
    - Site reconnaissance to determine the general roadway layout, traffic control requirements during testing and sampling and the variability of conditions to define testing and sampling intervals
    - Documentation of site conditions during field strength (deflection testing sequence) testing
    - Documentation of site conditions during pavement core sampling
    - Verification and correlation of field conditions and measured structural properties during engineering review of conditions

- **In-Place Strength Testing** - Pavement strength (FWD) testing was performed in accordance with California Test Method 356 to determine the current load carrying capacity of the roadway and ultimately develop rehabilitation/resurfacing potential. Pavement response to the Falling Weight Deflectometer (FWD) was obtained at each test site including
    - Deflection at the loading point

- Correlating deflection at nine (9) additional locations spaced 6" to 12" on center at each test site defining the pavement deflection basin under loading
- Distance Measuring Instrument (DMI) project limits and cross street locations
- DMI curb and or gutter locations
- Median type and DMI location
- Visible changes in pavement conditions or types
- DMI longitudinal test location
- GPS spatial test location
- Pavement surface temperature

- **Field Core Sampling –** Core sampling of the existing pavement was performed to document the thicknesses of the various pavement structural layers along the roadway. Core sampling included a total of twelve (12) locations distributed within the east and westbound travel lanes during this investigation. The cores obtained during the investigation provide an understanding of the roadway history and present a clearer picture of as-built thickness variations.

  Pavement core sampling included
  - DMI longitudinal and transverse location
  - Visible pavement conditions
  - Asphalt concrete total thickness and individual layer thickness
  - Asphalt concrete layer thickness and maintenance history
  - Portland Cement Concrete layer thickness (if any)
  - Aggregate base layer thickness and condition (if any)

- **Bulk Sampling of Subgrade Soils –** Bulk samples of the underlying subgrade soils are obtained at each field core location. Bulk soil samples combined with field thickness measurements provide a basis for analyzing the cause or causes of conditions encountered during the investigation.
  - Subgrade identification
  - In-situ subgrade moisture determination
  - Subgrade R-Value strength determination

- Subgrade Plasticity Index determination

- **Engineering Analysis** – The Engineering analysis combines the various data with field observations and engineering judgment, providing a basis for structural evaluation of the pavement section.
  - In-place Strength Analysis based on Falling Weight Deflectometer Measurements
  - Component Analysis combining laboratory strength measurements and documented field thicknesses
  - Site Condition Assessment comparing prevailing visual conditions, ride qualities, drainage patterns, etc. with documented information

- **Report Preparation –** The final report utilizes all information developed during the investigation, combined with engineering judgment and ongoing developments in pavement design and engineering, yielding recommendations for rehabilitation and/or reconstruction.

Section 3 - Project Discussion

The investigation performed utilizes a full range of measuring techniques to ascertain the present structural condition of the roadway within the study area. The study utilizes pavement core sampling to define the existing section thicknesses and in-place strength testing to determine the combined effects of subgrade strength variations, historical traffic use, previous maintenance, and resurfacing. The various methodologies employed provide full exploration of rehabilitation alternatives, and provide a cross check for full understanding of the roadway history contributing to present conditions. The specific 'hard' data is combined with visual examination of the roadway during development of testing protocol, field strength testing, field core sampling and during engineering review of conditions prior to development of final recommendations for maintenance, rehabilitation or reconstruction.

The variables associated with pavement performance and pavement rehabilitation present challenges which are addressed during design including current grades, crown heights and cross slopes, curbs and curb heights. The impact on surface grades and elevations for each of the

rehabilitation or maintenance alternatives is evaluated to explore short and long term performance with related initial and projected long term costs. Balancing the costs and benefits requires consideration of numerous alternative methods of construction, which along with the costs and benefits include certain risks.

Pavement reconstruction provides the greatest product uniformity generally at the highest initial cost. Reconstruction includes the potential of encountering undefined subsurface conditions, utility conflicts, weather delays, and increased costs related to change orders. Reconstruction also includes obvious disruption to residential and business life, and may be hampered with delays where subsurface conditions require design or construction changes. The specter of maintaining emergency access to businesses and residents impacted by the construction project are always most severe during roadway reconstruction projects.

Resurfacing of the existing roadway typically includes the least initial cost balancing performance risks with construction and personal cost savings, constructability, and the impact on future maintenance choices with the type of resurfacing procedure chosen. Pavement resurfacing must also address street variability, changes in past and future traffic patterns, such as the advent of street side recycling of green waste, bottles and cans, and collection of normal household and business refuse and the impact on adjacent residents and businesses. The least cost alternative available may therefore not always be the most cost effective alternative over time.

Evaluation of the roadway system, and ultimately selection of an appropriate course of corrective action must consider each of these objective issues, and combine these impacts with subjective values of the community such as appearance, curing periods, actual apparent work performed versus the total area within the City improved, i.e., the perceived value of work performed. Inherent in each of the construction procedures, including reconstruction, is the potential for unknown conditions, change orders, quality control and quality assurance procedures, the risks and implications of material variability, and in the case of resurfacing, grade impacts, grade restrictions along the roadway edges due to the presence or absence of curb or curb and gutter,

prior construction history, the potential for reflection of existing cracking through the new wearing surface, etc.

Section 4 - Traffic Use Estimates

The estimate of future traffic use (Traffic Index) was provided by Parsons. A 20 year Traffic Index of 9.5 has been provided for all portions of Avenida Pico investigated. The selected Traffic Index was compared to observed field use during engineering review. The Traffic Index is intended to include estimates of current and future truck and potentially bus use combined with routine vehicular traffic and traffic growth.

A range of Traffic Indices was evaluated for provided design criteria. A Traffic Index of 9.5 to represent 20 year design parameters and Traffic Indices of 10.0 and 10.5 were utilized for evaluation of 40 year design criteria. The structural implications based on these traffic estimates provide the basis for developing the final rehabilitation recommendations. Where project specific traffic studies indicate actual truck weights or future bus use differ from the traffic projections represented by the Traffic Indices used, revision of these findings will be necessary.

Section 5 – Field Conditions

The current roadway conditions visibly change 100’ +/- east of the Northbound I-5 Freeway Off ramp. The pavement change corresponds to a recent resurfacing project by the City of San Clemente, extending from that point easterly. Review of the surface reveals the most recent wearing surface west of the I-5 Freeway is an asphalt rubber hot mix or rubberized asphalt concrete, depending upon specifications at the time of construction. The asphalt rubber hot mix wearing surface obscures any pre-existing pavement cracking which may have been apparent prior to resurfacing and may have promulgated use of ARHM surfacing materials.

Pavement cracking is evident throughout the remainder of the pavement surface, west of the construction joint, from 100’ east of the I-5 Freeway to the west project limits. The cracking

patterns include longitudinal cracking corresponding to wheel paths and apparent construction joints, areas of random and transverse cracking and local alligator cracking along the roadway edge. Surface erosion as a result of water runoff and surface raveling are also apparent towards the westerly end of the project.

The roadway typically includes three eastbound travel lanes for the length of the project. The westbound direction currently includes four westbound travel lanes from SCHS to I-5, with three lanes continuing to the west, to the project limits. The directions of travel are generally separated by striped medians west of I-5 (except for a small island area at the southbound I-5 ramps) and a raised median from I-5 to the east project limits.

Section 6 – Subsurface Exploration

Pavement core sampling was performed at twelve (12) locations distributed within the eastbound and westbound travel lanes during this investigation. The core samples obtained provide information relative to as-built pavement sections, historical use of thin overlay and prevailing subgrade moistures and R-value strengths. Access through the asphalt pavements was provided through .50’ (6”) diameter core holes, cut through the surface utilizing portable coring equipment.

The existing roadway history is reflected in the core sampling. The roadway immediately below the I-5 Freeway and within the Caltrans right of way encompassing the On and Off ramps includes a relatively thick aggregate base section of 1.7’ (20”) or greater. Remaining structural sections are variable, including areas of full depth asphalt concrete ranging from 1.30’ (15 5/8”) to 1.55’ (18 ½”) thick, constructed in five (5) to six (6) separate layers.

Previous widening performed circa 2000 utilized a 380 mm (1.25’; 15”) full depth asphalt concrete section in widening areas, generally coinciding with the current number three lane at, below and east of the freeway. Pavement core sampling coinciding with these locations encountered 1.30’ (15 5/8”) to 1.55’ (18 ½”) full depth asphalt concrete sections.

A more conventional structural section, 0.67' (8") to 0.92' (11") asphalt concrete over 0.83' (10") to 0.98' (11 ¾") aggregate base was encountered at three of the twelve locations. The conventional sections appear to correlate to the eastbound number one and two lanes and may reflect the oldest portion of the roadway, possibly prior to previous developer driven widening and realignments.

Pavement reinforcing fabric was encountered at six (6) of the twelve locations, and does not generally coincide with the most recent rubberized asphalt concrete wearing surface. Two locations do however coincide with the ARHM wearing surface, however the layers are not in direct contact with the ARHM wearing surface, being buried by a variable thickness conventional asphalt concrete, likely left in place following roadway surface milling in preparation for the most recent resurfacing.

Field Core Sampling Summary Table

Existing Asphalt Concrete	0.63' (7 ½") to 1.56' (18 ¾")
Existing Aggregate Base	0' (0") to 2.1' (25 ¼")
Subgrade Description	Brown Clayey Silt; Brown Sandy Silt (with Diatomaceous Materials)**;** Brown Clayey Sand; Brown Sandy Silt; Brown Slightly Sandy Clay
Subgrade Moisture	9.3% to 19.1% (Single Diatomaceous material 31.9%)
Plasticity Index	See Appendix E
Equilibrium R-Value	7 to 61
Equilibrium Moisture**	
Subgrade	11 ½% to 19% (Diatomaceous Material 29%)

***Predicted field moisture conditions*

Section 7 – Condition and Structural Analysis

Evaluation of pavement conditions and structural needs along Avenida Pico includes analysis of the existing pavement sections, visual pavement conditions, and ride qualities, grade and cross slope issues, and measured structural strengths.

Pavement strength testing performed along the length of Avenida Pico reveals nominal reinforcing requirements to meet a 20 year design period. Increasing the structural evaluation to encompass a 40 year period increases overlay requirements to 0.12' (1 ½") or less. The majority of the roadway does not require reinforcement for either design period.

Design of roadway improvements may therefore focus on key design issues

- Wearing surface upgrades/replacement
- Interim wearing surface replacement during 40 year design period
- Constructability
- Reflective crack mitigation

In-place Strength Analysis

The net effect of as-built pavement thicknesses, variability of subgrade soil types and conditions, construction and maintenance history, weather and aging cycles and the impact of continued and ever increasing traffic weights and volumes is determined through specific measurement of the in-place pavement strength.

Pavement deflection testing was performed in August 2012 using the JILS Model 20T Falling Weight Deflectometer. Testing included 50' intervals west of the Freeway and 100' intervals

from the southbound Freeway ramps to the east project limits. All testing was performed along the right wheel path of the corresponding travel lanes.

All test data are located longitudinally using onboard distance measuring instrumentation. Testing performed included GPS spatial locating methodologies. Explanations of the test equipment, deflection testing performed, and the test data relating to the investigation provided are included in Appendix F.

The pavement response to known loading criteria provides real time measurement of the present pavement strength. The pavement strength measurements are evaluated, using specific pavement performance models, combining all known information with projections of future traffic use as represented by the Traffic Index. The in-place strength testing permits development of rehabilitation alternatives, which aid in reinforcing the roadway, address present physical defects and distress, and provide the user with a serviceable roadway for an extended time period.

Pavement deflection testing performed along the length of Avenida Pico reveals nominal reinforcing requirements to meet 20 year design period. Increasing the structural evaluation to encompass a 40 year period increases overlay requirements to 0.12’ (1 ½”) or less. The majority of the roadway does not require reinforcement for either of the design periods.

Areas of specific need for reinforcement include the eastbound number one lane from Calle De Industrias to 100’ easterly, the eastbound number one lane from the I-5 Northbound Ramps to the east project limits and the westbound number one lane from the east project limits to 200’ westerly. The reinforcement needs in these areas is generally 0.10’ or less.

Information from the design team suggests current elevations along the length of the project will be raised from 0.15’ (2”) to 0.85’ (10”). Adjustment of grades through overlay alone will address all measured structural conditions.

Placement of planned overlays will impact median curb heights. Based on stated grade modifications, replacement or construction of new medians is assumed for purposes of this report.

Reflective Crack Analysis

Pavement cracking was noted from the construction joint immediately east of the northbound On and Off ramps to the westerly project limits during field testing and field review. The pavement cracking has been maintained over time through routine crack filling and repair. The filled cracks are readily visible within available aerial photographic documentation.

Pavement reinforcing fabric has been utilized previously to mitigate reflective cracking. Based on cracking patterns and available plans, the current fabric installation is in excess of 12 years old. The fabric layer was also encountered sandwiched between two conventional asphalt concrete layers, below the present rubberized asphalt concrete wearing surface.

The roadway from immediately east of the freeway northbound ramps has recently been resurfaced using a rubberized asphalt concrete or asphalt rubber hot mix wearing surface. No pavement cracking is currently evident however rubberized materials are typically selected during resurfacing projects to mitigate pre-existing cracking. Presence of cracking below the current rubberized wearing surface should be assumed. Use of a similar material for the final wearing surface following roadway improvements should provide performance continuity.

The existing asphalt concrete section thicknesses range from 0.63’ (7 ½”) to 1.56’ (18 ¾”) thick. Assuming cracking is prevalent within the pavement sections throughout the length of the project; mitigation of reflection cracking will be required. Placement of a minimum 0.35’ (4 ½”) new asphalt concrete pavement layer over the remaining pavement section is a viable alternative. Based on the need for long term pavement preservation, a combination of conventional asphalt concrete layers and a rubberized asphalt concrete wearing surface is suggested.

Ride Quality Analysis

Ride qualities are not generally impacted by the current wearing surface conditions. Resurfacing of the roadway in conjunction with widening and realignment will address all such issues.

Structural Section Component Analysis – Laboratory Based

Component analysis is performed at both laboratory equilibrium conditions and corresponding to actual in-place field moistures determined during this investigation. Comparison of replacement section thickness requirements with current thicknesses provides an initial basis for development of probable structural deficiencies. Subgrade strengths vary with changes in subgrade moisture.

Comparison of replacement section thickness requirements with current thicknesses provides an initial basis for development of probable structural deficiencies. Subgrade strengths in-situ yielding strengths greatly above or below predicted strengths will directly impact this analysis.

Subgrade strengths corresponding to R-value strengths ranging from 7 to 61 were determined in the laboratory for the soils along the roadway. The subgrade soil profile is complicated by diatomaceous materials encountered in the westbound number four lane, 300’ +/- east of the I-5 Freeway. While the equilibrium R-value strength corresponds to a 31, high subgrade moistures and lack of support for construction equipment may hamper construction where these soils are encountered during construction. Comparison of asphalt concrete overlay requirements with existing thicknesses and design traffic indices provides a cross check relative to probable subgrade support values.

The existing structural sections along Avenida Pico range from conventional asphalt concrete over aggregate base to full depth asphalt concrete sections. Available improvement plans indicate the full depth sections ranging from 1.30’ (15 5/8”) to 1.56’ (18 ¾”) were apparently constructed as part of the circa 2000 roadway widening project. The design section for the widening areas was 1.25’ (15”). Given the higher moistures encountered during this

investigation, the thicker section measured may be indicative of grade control issues during the 2000 project.

Replacement sections have been designed based on the range of subgrade R-value strengths encountered. Given areas of high subgrade moisture and the variability of the soil conditions, the initial section comparisons are performed at the worse case R-value of 7.

9.5 Traffic Index – 20 Year Design Criteria

The full depth asphalt concrete pavement sections all exceed the minimum requirements based on the 9.5 – 20 Year Design criteria and subgrade 7 R-value. Similar worse case comparisons reveal the bulk of locations meet or exceed current and long term thickness requirements. A limited area included deficiencies of 0.15' (2") to 0.30' (3 ½") within the eastbound one and two lanes east of the I-5 Freeway northbound ramps. A very worse case 0.45' (5 ½") thick deficiency was encountered within the eastbound number two lane immediately west of the southbound I-5 ramps.

The variety of construction joints, widening, etc. would therefore suggest isolated areas of deficiency may exist. The soils along the roadway however are not consistently worse case 7 R-value materials, with all other testing ranging from 20 to 61. Utilizing a 20 R-value subgrade strength the deficiency decreases to less than 0.15' (2") in all but one location.

The section deficiencies should be compared to close interval in place strength testing data to aid in defining the most probable subgrade support within sections of like strengths. Deflection testing in the eastbound number one and two lanes within these same limits suggest the deficiencies are more in the range of 0.15' (2") or less consistent with higher strength subgrade soils.

Current input from the design team suggests grades within the planning area will be raised from 0.15' (2") to 0.85' (10"). Where the design is based on component analysis only, and worse case soils, grade modification raising the elevations of the eastbound number one and two lanes 0.30'

(3 ½") above current elevations will be required. Given the range of subgrade strengths encountered are substantially higher than the worse case design scenario combined with in place strength data, raising grades 0.15' (2") above present elevations should satisfy all foreseeable structural needs.

10.5 Traffic Index – 40 Year Design Criteria

Design of asphalt concrete improvements for a 40 year design period should include programmed wearing surface replacement at or about 20 years. Consistent with current and probable future practice, replacement of the rubberized asphalt concrete wearing surface is the most likely requirement.

The full depth asphalt concrete pavement sections are marginal based on the minimum requirements corresponding to the 10.5 – 40 Year Design criteria and subgrade 7 R-value. Asphalt concrete overlays 0.07' (1") to 0.12' (1 ½") thick are required to consistently provide full depth sections consistent with 40 year design criteria.

Similar worse case comparisons reveal the bulk of locations meet or exceed current and long term thickness requirements. A limited area included deficiencies of 0.20' (2 ½") to 0.35' (4") within the eastbound one and two lanes east of the I-5 Freeway northbound ramps. A very worse case 0.50' (6") thick deficiency was encountered within the eastbound number two lane immediately west of the southbound I-5 ramps.

The variety of construction joints, widening, etc. would therefore suggest isolated areas of deficiency may exist. The soils along the roadway however are not consistently worse case 7 R-value materials, with all other testing ranging from 20 to 61. Utilizing a 20 R-value subgrade strength the deficiency decreases to less than 0.20' (2 ½") in all but one location.

The section deficiencies should be compared to close interval in place strength testing data to aid in defining the most probable subgrade support within sections of like strengths. Deflection testing in the eastbound number one and two lanes within these same limits suggest the

deficiencies are more in the range of 0.15’ (2”) or less consistent with higher strength subgrade soils.

Current input from the design team suggests grades within the planning area will be raised from 0.15’ (2”) to 0.85’ (10”). Where the design is based on component analysis only, and worse case soils, grade modification raising the elevations of the eastbound number one and two lanes 0.30’ (3 ½”) above current elevations will be required. Given the range of subgrade strengths encountered substantially higher than the worse case design scenario combined with in place strength data, raising grades0.15’ (2”) above present elevations should satisfy all foreseeable structural needs.

Section 8 – Conclusion/Recommendations

Rehabilitation of Avenida Pico meeting either 20 year or 40 year criteria may accomplished through limited reconstruction and placement of relatively nominal thickness reinforcing overlays. The combination of previous use of rubberized asphalt concrete surfacing and areas of previous pavement reinforcing fabric use will complicate simple placement of thicker pavements. Prior to any resurfacing, streetwide cold milling will therefore be required to remove the upper 0.15’ (2”) to 0.25’ (3”) of existing roadway section.

The specific depth of milling and overlay thickness will be a function of construction history, layer thicknesses, use of pavement reinforcing fabric layers, rubberized asphalt concrete, structural needs, planned grade modifications and construction logistics. Long term pavement design may also include use of high stability asphalt concrete, requiring placement in thicker interim layers. These combined requirements will ultimately determine the actual areas and thicknesses of overlay.

The general design parameters currently being explored indicate present elevations will be raised been 0.15’ (2”) and 0.85’ (10”) above current elevations. Alternative methods of rehabilitation have therefore been developed based on 0.15’ (2”) surface elevation changes and changes in

excess of 0.15' (2"). The specific blend of rehabilitation strategies may therefore require refinement as specific elevation changes are defined.

Design strategies have also included discussions relative to 20 year versus 40 year design periods. Practical extension of the design life to 40 years will require development of overall structural needs to address long term ESAL volumes combined with programmed or scheduled replacement of the wearing surface at or about year 20.

20 Year Design Period Traffic Index 9.5

Alternative One – 0.15' (2") Grade Modifications

Alternative One is limited to a 0.15' (2") change in elevations of any existing travel lanes. Where structural requirements exceed the assumed elevation change, reconstruction has been recommended. Based on historical construction, particularly within most recent widening and realignment, use of full depth asphalt concrete is recommended in reconstruction areas. Full depth reconstruction will limit excavation depths, limit conflicts with existing utilities and permit field modification where unsuitable conditions are encountered during reconstruction.

- Cold mill existing roadway 0.25' (3") below present elevations

Note: Cold milling will remove a combination of conventional asphalt concrete, pavement reinforcing fabric and rubberized asphalt concrete. Provisions should be made for potential disposal issues and related costs.

- Construct new 0.25' (3") thick asphalt concrete layer to elevation 0.15' below finish elevations.
- Construct 0.15' (2") rubberized asphalt concrete (asphalt rubber hot mix) wearing surface throughout project limits.

Alternative Two – 0.15'+ (2"+) Grade Modifications

Alternative Two is based on raising finish elevations greater than 0.15' (2") higher than existing elevations. Where structural requirements exceed the assumed elevation change, reconstruction has been recommended. Based on historical construction, particularly within most recent widening and realignment, use of full depth asphalt concrete is recommended in reconstruction areas. Full depth reconstruction will limit excavation depths, limit conflicts with existing utilities and permit field modification where unsuitable conditions are encountered during reconstruction.

- Cold mill existing roadway 0.25' (3") below present elevations

Note: Cold milling will remove a combination of conventional asphalt concrete, pavement reinforcing fabric and rubberized asphalt concrete. Provisions should be made for potential disposal issues and related costs.

- Construct new asphalt concrete layer(s) (minimum 0.35'/4") to elevation 0.15' (2") below finish elevations.
- Construct 0.15'(2") rubberized asphalt concrete (asphalt rubber hot mix) wearing surface throughout project limits.

40 Year Design Period Traffic Index 10.5

Alternative One – 0.15' (2") Grade Modifications

Alternative One is limited to a 0.15' (2") change in elevations of any existing travel lanes. Where structural requirements exceed the assumed elevation change, reconstruction has been recommended. Based on historical construction, particularly within most recent widening and realignment, use of full depth asphalt concrete is recommended in reconstruction areas. Full depth reconstruction will limit excavation depths, limit conflicts with existing utilities and permit field modification where unsuitable conditions are encountered during reconstruction.

- Cold mill existing roadway 0.35' (4") below present elevations

Note: Cold milling will remove a combination of conventional asphalt concrete, pavement reinforcing fabric and rubberized asphalt concrete. Provisions should be made for potential disposal issues and related costs.

- Construct new 0.35' (4") thick high stability asphalt concrete layer to elevation 0.15' (2") below finish elevations.
- Construct 0.15' (2") rubberized asphalt concrete (asphalt rubber hot mix) wearing surface throughout project limits.
- Program/budget cold milling and replacement of rubberized asphalt concrete wearing surface at or about year 20.

Alternative Two – 0.15'+ (2"+) Grade Modifications

Alternative Two is based on raising finish elevations greater than 0.15' (2") higher than existing elevations. Where structural requirements exceed the assumed elevation change, reconstruction has been recommended. Based on historical construction, particularly within most recent widening and realignment, use of full depth asphalt concrete is recommended in reconstruction areas. Full depth reconstruction will limit excavation depths, limit conflicts with existing utilities and permit field modification where unsuitable conditions are encountered during reconstruction.

- Cold mill existing roadway 0.25' (3") below present elevations

Note: Cold milling will remove a combination of conventional asphalt concrete, pavement reinforcing fabric and rubberized asphalt concrete. Provisions should be made for potential disposal issues and related costs.

- Construct new high stability asphalt concrete layer(s) (minimum 0.35'/4") to elevation 0.15' (2") below finish elevations.
- Construct 0.15' (2") rubberized asphalt concrete (asphalt rubber hot mix) wearing surface throughout project limits.
- Program/budget cold milling and replacement of rubberized asphalt concrete wearing surface at or about year 20.

Section 9 - Replacement Section Alternatives

Improvement of Avenida Pico will require new construction in widening and realignment areas. Replacement sections within these widening and realignment areas are being provided by others.

Reconstruction within the existing alignment should not be required based on documented structural conditions. Reconstruction may however be required to accommodate transitions where raising grades is not possible, jointing details, forming adjacent to planned bus pads (if any), utility crossings, etc. Areas where construction logistics prevent utilization of one of the alternatives provided may require reconstruction.

Use of one of the following alternative replacement sections is recommended in these areas. Subgrade identification and testing within the existing roadway alignment reveals materials with predicted R-Value strengths of 7 to 61. Based on the very limited areas of anticipated reconstruction, areas of wet subgrade and variability of soils within the alignment, use of the worse case 7 R-value has been selected for design of replacement sections. Replacement section alternatives are provided for a design Traffic Index of 9.5 (20 Year Design) and 10.5 (40 Year Design). The replacement section alternatives provided include the thickness of planned overlays.

20 Year Design Period

Recommended Design R-Value **7**

Design Traffic Index **9.5**

	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Asphalt Concrete	0.50’ (6”)	0.60’ (7 ½”)	1.00’ (12”)	1.25’ (15”)
Aggregate Base	1.75’ (21”)	1.55’ (19”)	0.50’ (6”)	-
Subgrade Compaction (Upper 12")	95% Min.	95% Min.	95% Min.	95% Min.

40 Year Design Period

Recommended Design R-Value **7**

Design Traffic Index **10.5**

	Alt. 1	Alt. 2	Alt. 3	Alt. 4
Asphalt Concrete	0.55’ (6”)	0.60’ (7 ½”)	1.00’ (12”)	1.45’ (17 ½”)
Aggregate Base	2.00’ (23 ½”)	1.90’ (22 ½”)	0.90’(11”)	-
Subgrade Compaction (Upper 12")	95% Min.	95% Min.	95% Min.	95% Min.

Section 10 – Subgrade Conditions

Soft or wet subgrade conditions should be anticipated based on recent subgrade sampling. Where wet grade is encountered during reconstruction or new construction, additional time should be provided within the construction schedule to permit drying, processing and recompaction of the subgrade prior to placement of the structural section. Where time constraints do not permit suitable drying, or where perimeter conditions include uncontrollable water sources, additional measures may be necessary.

Conventional Section Procedure

The exposed subgrade should be inspected during excavation and prior to placement of aggregate base. Where conditions are not firm and unyielding, use of a Geotextile should be considered. The excavation should be extended 0.35’ (4”) greater than the currently planned aggregate base thickness unless rut depths exceed 0.35’ (4”).

Geotextile should then be placed over the prepared grade. The type of Geotextile and width of overlap will be a function of conditions encountered at the time of construction. Aggregate base should then be end dumped and spread in minimum 1.00’ (12”) lifts. No equipment should be permitted to operate on the exposed fabric or on top of the aggregate base where the thickness is

less than 1.00’ (12”). Where rut depths exceed 0.35’ (4”), a qualified pavement engineer should be contacted to review conditions and provide specific recommendations.

Full Depth Asphalt Concrete Procedure

The exposed subgrade should be inspected during excavation and prior to placement of aggregate base. Where conditions are not firm and unyielding the exposed subgrade should be over excavated equivalent to the approximate depth of rutting left by trucks and equipment during excavation, to a 0.35’ (4”) maximum additional depth.

A single 0.50’ to 0.65’ (6” to 8”) thick asphalt concrete layer should be end dumped and spread with suitable equipment. The asphalt concrete shall then be lightly rolled for grade control purposes only. Relative compaction requirement should be waived for the initial pavement layer.

The completed layer should be permitted to cool for a minimum of 15 hours prior to placement of subsequent layers. No trucks should be permitted to operate on the exposed subgrade or on the asphalt concrete layer until a suitable cooling period has expired. All subsequent layers should be placed in accordance with requirements of the SSPWC for grade control, layer thickness and compaction.

Section 11 - Materials Recommendations

Aggregate Base

Aggregate base sections shall be Class 2 Aggregate Base complying with the applicable sections of the State of California Department of Transportation (Caltrans) Standard Specifications, latest edition.

Asphalt Concrete – New Construction/Overlay

20 Year Design

Asphalt concrete shall be ¾” Maximum Type A PG 64-28 PM per Caltrans Section 39.

40 Year Design

Asphalt concrete shall be ¾" Maximum HMA Type C PG 64-28 PM per Caltrans Section 39.

Wearing Surface/Gap Graded

Wearing surface shall be Rubberized Hot Mix Asphalt – Gap Graded (RHMA-G) complying with Caltrans Section 39.

Geotextile Fabric

Geotextile Fabric shall be Nonwoven Fabric conforming to the minimum requirements as set forth in Section 213 Engineering Fabrics Type 180N as defined in the Standard Specifications for Public Works Construction, latest edition.

Appendix A

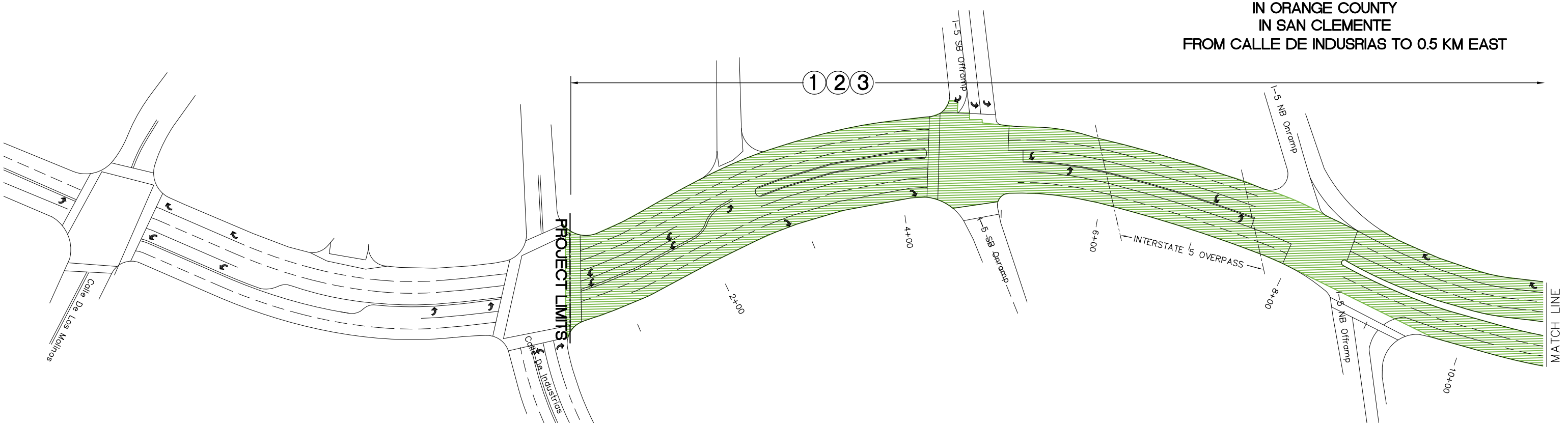
Structural Improvement Plans

LaBelle Marvin
PAVEMENT ANALYSIS, DESIGN, TESTING, & INSPECTION SERVICES

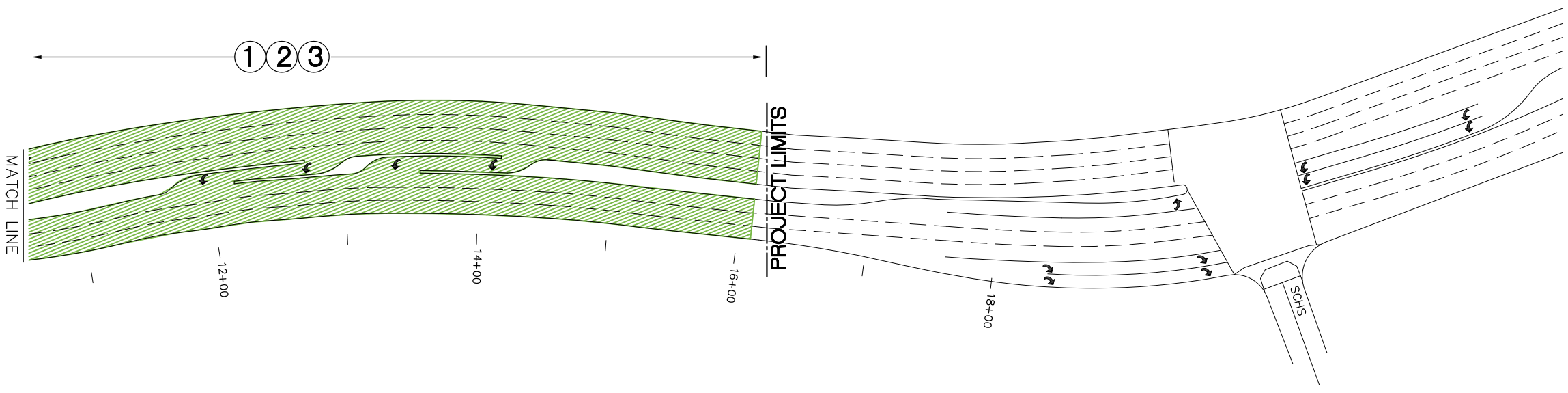
STREET IMPROVEMENT ALTERNTIVE 1 RECOMMENDATION PLAN

AVENIDA PICO AT INTERSTATE STATE 5

IN ORANGE COUNTY
IN SAN CLEMENTE
FROM CALLE DE INDUSRIAS TO 0.5 KM EAST



20 YEAR DESIGN LIFE



ALTERNATE 1 RECOMMENDATION NOTES

1. Cold mill existing roadway 0.25'(3") below present elevations.

NOTE: Cold milling will remove a combination of conventional asphalt concrete, pavement reinforcing fabric and rubberized asphalt concrete. Provisions should be made for potential disposal issues and related costs.

2. Construct new 0.25'(3") thick conventional asphalt concrete layer to elevation 0.15'below finish elevations.

3. Construct 0.15'(2") rubberized asphalt concrete (asphalt rubber hot mix) wearing surface throughout project limits.

LEGEND

Cold Mill 3" depth, Construct 3" Conventional AC Layer, Cap with 2" ARHM SEE NOTE 1, 2 and 3

NO.	DATE	REVISIONS	APP.	DATE
8				
7				
6				
5				
4				
3				
2				
1				

PLANS PREPARED BY:
LABELLE • MARVIN, INC.
PAVEMENT TECHNOLOGY SPECIALISTS
2700 S. GRAND AVENUE, SANTA ANA, CA 92705
PH (714) 546-3468 FAX (714) 546-58.41

CLIENT:
PARSONS
2201 DUPONT DRIVE, SUITE 100
IRVINE, CA 92612

20 YEAR TRAFFIC INDEX
ALTERNATE ONE RECOMMENDATION PLAN
ARHM (ASPHALT RUBBER HOT MIX) OVERLAY
MAXIMUM GRADE IMPACT (2")

Avenida Pico at Interstate State 5
Improvement Project
City of San Clemente, City Project Ref #19901
Caltrans District 12, EA 0F96A1

STREET IMPROVEMENT ALTERNTIVE 1 RECOMMENDATION PLAN

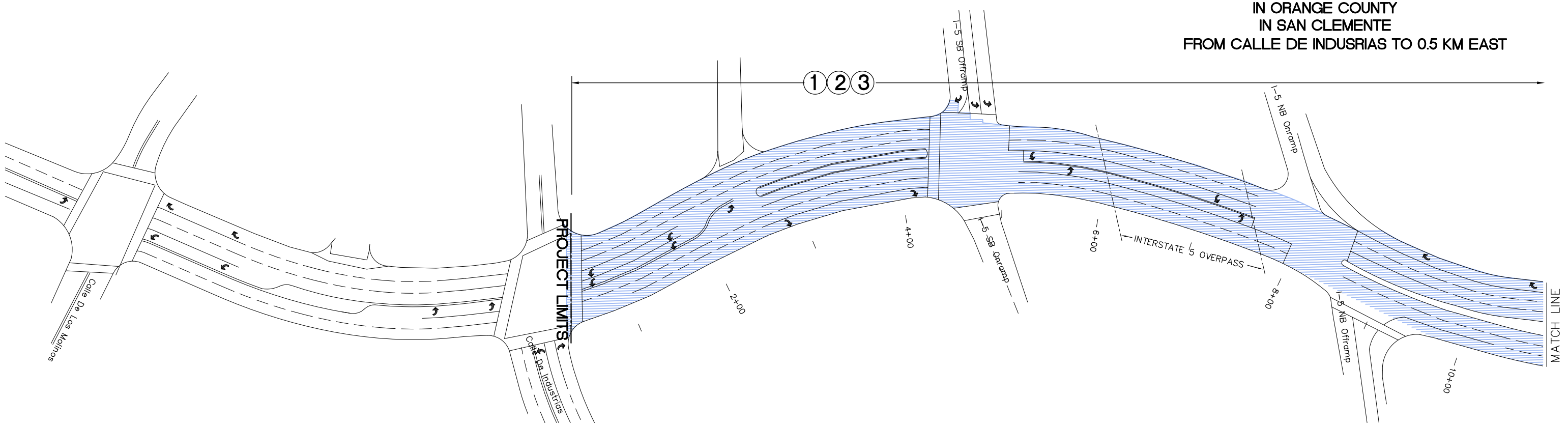
SHEET No.
1 OF 2
DATE: 7/17/2012
SCALE: 1" = NTS
DRAWN BY: G. MARVIN
laBelle Marvin, Inc.

LMI PN 38212

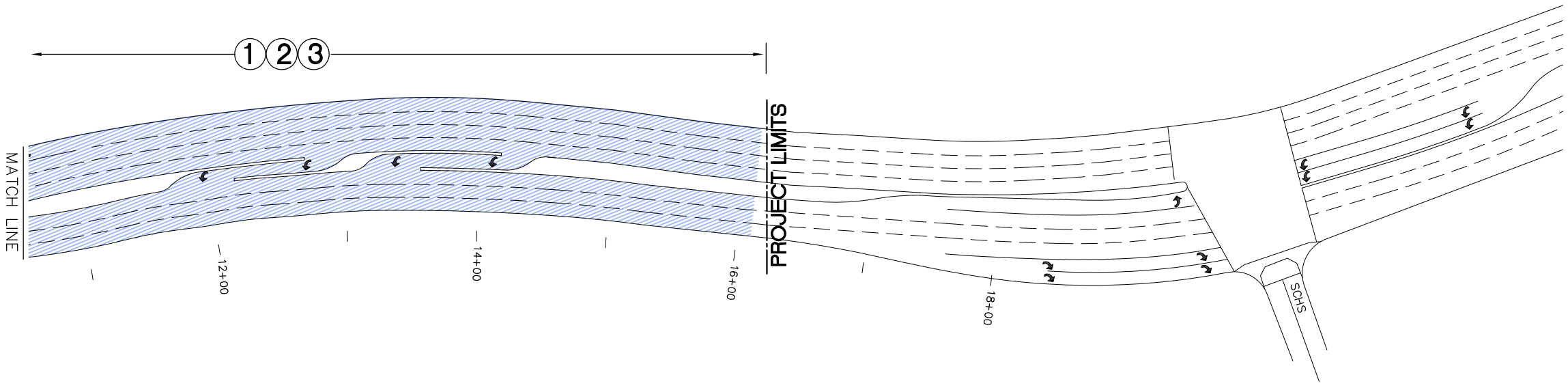
STREET IMPROVEMENT ALTERNTIVE 2 RECOMMENDATION PLAN

AVENIDA PICO AT INTERSTATE STATE 5

IN ORANGE COUNTY
IN SAN CLEMENTE
FROM CALLE DE INDUSRIAS TO 0.5 KM EAST



20 YEAR DESIGN LIFE



ALTERNATE 2 RECOMMENDATION NOTES

1. Cold mill existing roadway 0.25'(3") below present elevations.

NOTE: Cold milling will remove a combination of conventional asphalt concrete, pavement reinforcing fabric and rubberized asphalt concrete. Provisions should be made for potential disposal issues and related costs.

2. Construct new conventional asphalt concrete layer(s) (minimum 0.35'/4") to elevation, 0.15'below finish elevations.

3. Construct 0.15'(2") rubberized asphalt concrete (asphalt rubber hot mix) wearing surface throughout project limits.

LEGEND

Cold Mill 3" depth, Construct Min. 4" Conventional AC Layer, Cap with 2" ARHM SEE NOTE 1, 2 and 3

NO.	DATE	REVISIONS	APP.	DATE
8				
7				
6				
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4				
3				
2				
1				

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PH (714) 546-3468 FAX (714) 546-58.41

CLIENT:
PARSONS
2201 DUPONT DRIVE, SUITE 100
IRVINE, CA 92612

20 YEAR TRAFFIC INDEX
ALTERNATE TWO RECOMMENDATION PLAN

ARHM (ASPHALT RUBBER HOT MIX) OVERLAY
MINIMAL GRADE IMPACT (2'+)

Avenida Pico at Interstate State 5
Improvement Project
City of San Clemente, City Project Ref #19901
Caltrans District 12, EA 0F96A1

STREET IMPROVEMENT ALTERNTIVE 2 RECOMMENDATION PLAN

SHEET No.
2 OF 2

DATE: 7/17/2012
SCALE: 1" = NTS
DRAWN BY: G. MARVIN
laBelle Marvin, Inc.

LMI PN 38212

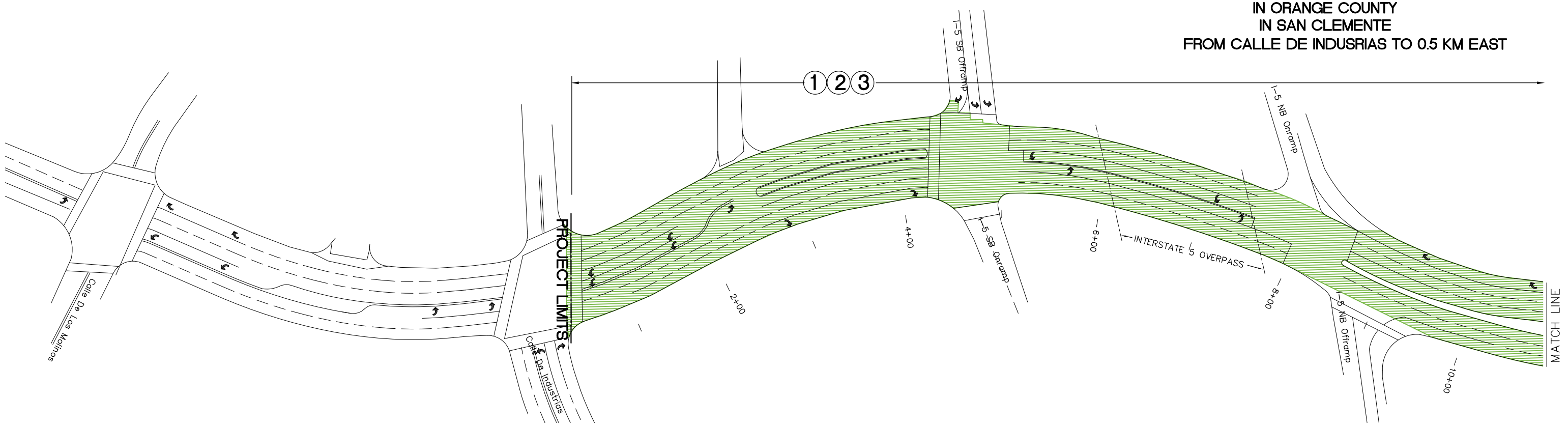
STREET IMPROVEMENT ALTERNTIVE 1 RECOMMENDATION PLAN

AVENIDA PICO AT INTERSTATE STATE 5

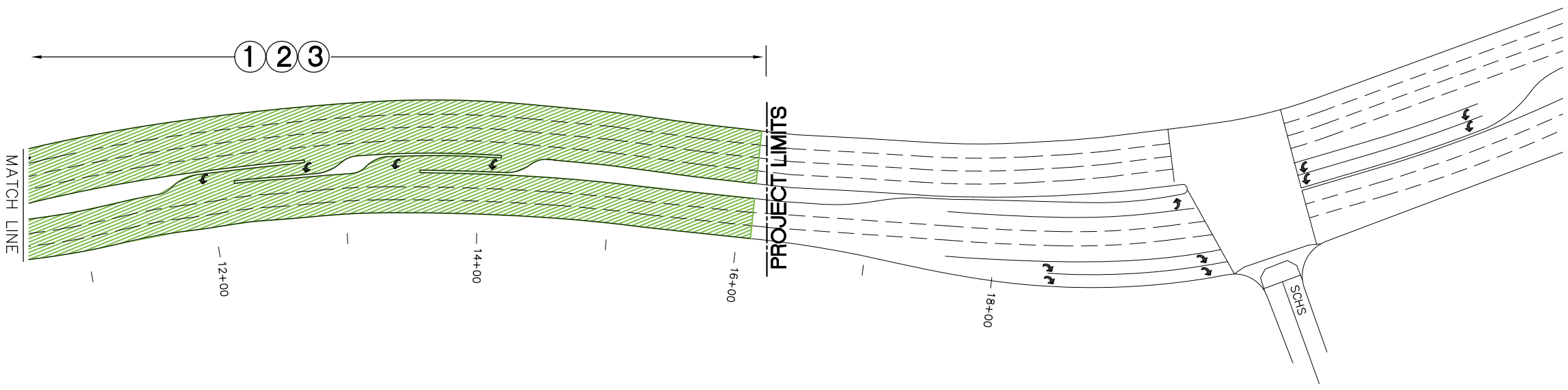
IN ORANGE COUNTY

IN SAN CLEMENTE

FROM CALLE DE INDUSRIAS TO 0.5 KM EAST



40 YEAR DESIGN LIFE



ALTERNATE 1 RECOMMENDATION NOTES

1. Cold mill existing roadway 0.35'(4") below present elevations.

NOTE: Cold milling will remove a combination of conventional asphalt concrete, pavement reinforcing fabric and rubberized asphalt concrete. Provisions should be made for potential disposal issues and related costs.

2. Construct new 0.35'(4") thick high stability asphalt concrete layer to elevation 0.15'below finish elevations.

3. Construct 0.15'(2") rubberized asphalt concrete (asphalt rubber hot mix) wearing surface throughout project limits.

40 YEAR DESIGN LIFE NOTE: Program/budget cold milling and replacement of rubberized asphalt concrete wearing surface at or about year 20

LEGEND

Cold Mill 4" depth, Construct 4" High Stability AC Layer, Cap with 2" ARHM SEE NOTE 1, 2 and 3

NO.	DATE	REVISIONS	APP.	DATE
8				
7				
6				
5				
4				
3				
2				
1				

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LABELLE • MARVIN, INC.

PAVEMENT TECHNOLOGY SPECIALISTS

2700 S. GRAND AVENUE, SANTA ANA, CA 92705

PH (714) 546-3468 FAX (714) 546-58.41

CLIENT:

PARSONS

2201 DUPONT DRIVE, SUITE 100

IRVINE, CA 92612

40 YEAR TRAFFIC INDEX

ALTERNATE ONE RECOMMENDATION PLAN

ARHM (ASPHALT RUBBER HOT MIX) OVERLAY

MAXIMUM GRADE IMPACT (2")

Avenida Pico at Interstate State 5

Improvement Project

City of San Clemente, City Project Ref #19901

Caltrans District 12, EA 0F96A1

STREET IMPROVEMENT ALTERNTIVE 1 RECOMMENDATION PLAN

SHEET No.

1 OF 2

DATE: 7/17/2012

SCALE: 1" = NTS

DRAWN BY: G. MARVIN

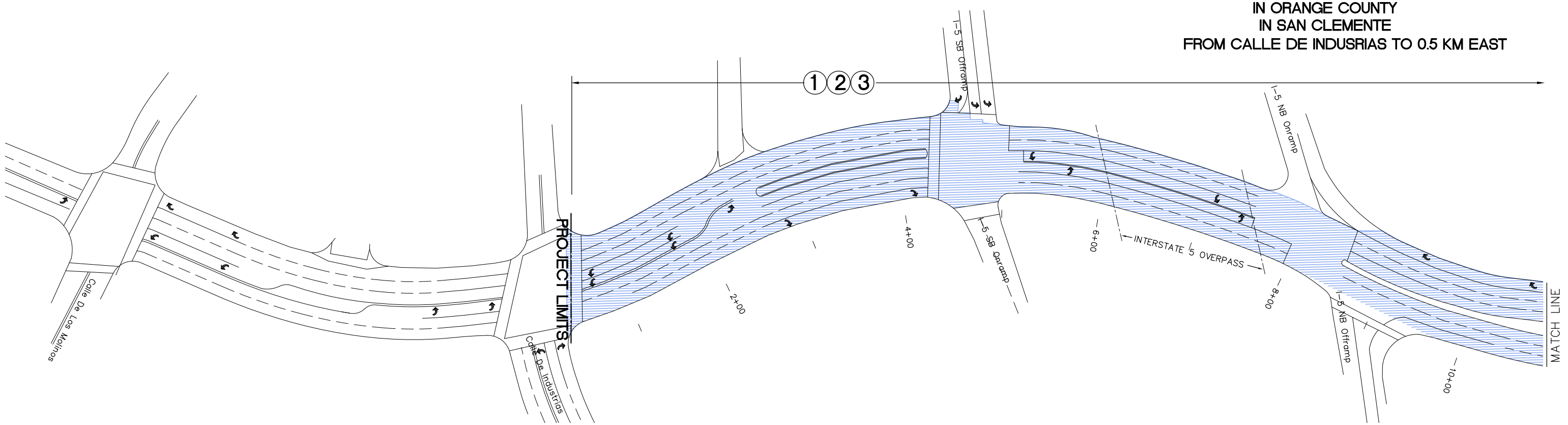
laBelle Marvin, Inc.

LMI PN 38212

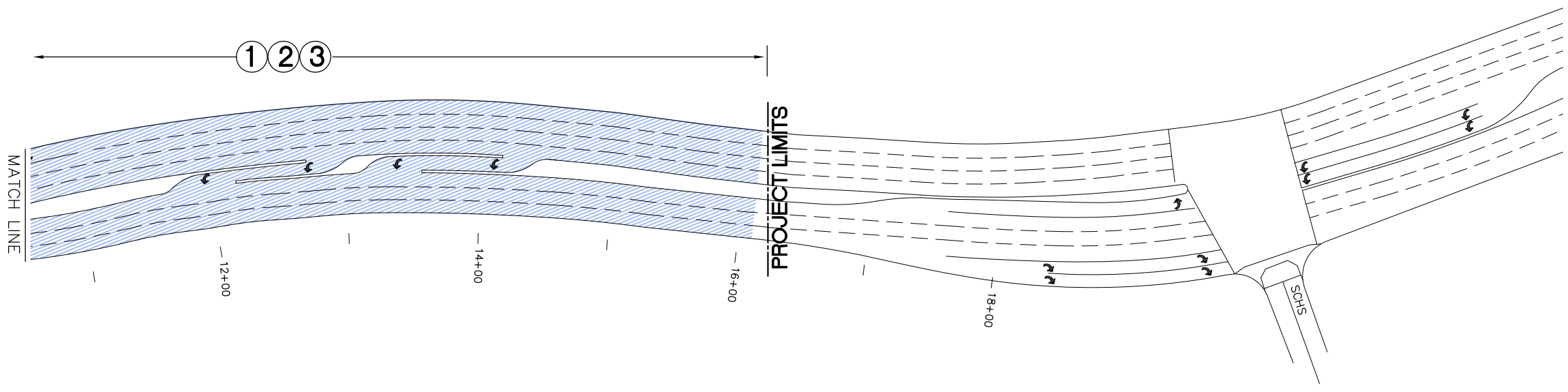
STREET IMPROVEMENT ALTERNTIVE 2 RECOMMENDATION PLAN

AVENIDA PICO AT INTERSTATE STATE 5

IN ORANGE COUNTY
IN SAN CLEMENTE
FROM CALLE DE INDUSRIAS TO 0.5 KM EAST



40 YEAR DESIGN LIFE



ALTERNATE 2 RECOMMENDATION NOTES

1. Cold mill existing roadway 0.25'(3") below present elevations.

NOTE: Cold milling will remove a combination of conventional asphalt concrete, pavement reinforcing fabric and rubberized asphalt concrete. Provisions should be made for potential disposal issues and related costs.

2. Construct new high stability asphalt concrete layer(s) (minimum 0.35'/4") to elevation, 0.15'below finish elevations.

3. Construct 0.15'(2") rubberized asphalt concrete (asphalt rubber hot mix) wearing surface throughout project limits.

40 YEAR DESIGN LIFE NOTE: Program/budget cold milling and replacement of rubberized asphalt concrete wearing surface at or about year 20

LEGEND

Cold Mill 3" depth, Construct Min. 4" High Stability AC Layer, Cap with 2" ARHM
SEE NOTE 1, 2 and 3

NO.	DATE	REVISIONS	APP.	DATE
8				
7				
6				
5				
4				
3				
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40 YEAR TRAFFIC INDEX
ALTERNATE TWO RECOMMENDATION PLAN

ARHM (ASPHALT RUBBER HOT MIX) OVERLAY
MINIMAL GRADE IMPACT (2'+)

Avenida Pico at Interstate State 5
Improvement Project
City of San Clemente, City Project Ref #19901
Caltrans District 12, EA 0F96A1

STREET IMPROVEMENT ALTERNTIVE 2 RECOMMENDATION PLAN

SHEET No.
2 OF 2

DATE: 7/17/2012
SCALE: 1" = NTS
DRAWN BY: G. MARVIN
laBelle Marvin, Inc.

LMI PN 38212

Appendix B

Structural Analysis Summary Table

LaBelle Marvin
PAVEMENT ANALYSIS, DESIGN, TESTING, & INSPECTION SERVICES

LABELLE • MARVIN INC

PAVEMENT ENGINEERING, DESIGN, INSPECTION & TESTING

Structural Analysis Summary Table

Location: San Clemente/ Pico

Date: 2012-08-16 11:43:31
Client:
Project #: 38212

Avenida Pico

Location: San Clemente/ Pico | SC Highschool to Calle De Industrias | Date: 2012-08-16 11:43:31 | Project: 38212

Avenida Pico Westbound Lane 1

Limits	FWD_{80th}	TD_{80th}	'T'	T.I.	TDallow	% Red.	GE	AC	NSL
00+00 to 03+01	9.52	11.42	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	4	0.01	0.01	13
03+01 to 06+01	12.32	14.79	0.50	9.5	13	12	0.05	0.02	9
				10.0	12	19	0.10	0.05	6
				11.0	11	26	0.19	0.10	3
06+01 to 12+51	10.69	12.83	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	6	0.02	0.01	14
				11.0	11	14	0.06	0.03	6
12+51 to 13+51	4.77	5.73	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	0	0.00	0.00	20
13+51 to 15+41	8.22	9.87	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	0	0.00	0.00	20

Avenida Pico Eastbound Lane 1

Limits	FWD_{80th}	TD_{80th}	'T'	T.I.	TDallow	% Red.	GE	AC	NSL
00+00 to 01+10	13.12	15.74	0.50	9.5	13	17	0.09	0.05	6
				10.0	12	24	0.16	0.09	4
				11.0	11	30	0.24	0.13	2
01+10 to 09+89	6.86	8.24	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	0	0.00	0.00	20
09+89 to 17+06	11.53	13.84	0.50	9.5	13	6	0.02	0.01	14
				10.0	12	13	0.05	0.03	9
				11.0	11	20	0.11	0.06	4
17+06 to 20+36	6.13	7.35	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	0	0.00	0.00	20

Avenida Pico Westbound Lane 2

Limits	FWD_{80th}	TD_{80th}	'T'	T.I.	TDallow	% Red.	GE	AC	NSL
00+00 to 03+52	9.37	11.25	0.50	9.5	13	0	0.00	0.00	20

				10.0	12	0	0.00	0.00	20
				11.0	11	2	0.01	0.00	14
03+52 to 10+40	13.08	15.69	0.50	9.5	13	17	0.09	0.05	7
				10.0	12	24	0.16	0.09	4
				11.0	11	30	0.24	0.13	2
10+40 to 20+14	9.00	10.81	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	0	0.00	0.00	18

Avenida Pico Eastbound Lane 2

Limits	FWD_{80th}	TD_{80th}	'T'	T.I.	TDallow	% Red.	GE	AC	NSL
00+00 to 05+82	10.61	12.74	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	6	0.02	0.01	15
				11.0	11	14	0.06	0.03	7
05+82 to 09+81	4.99	5.99	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	0	0.00	0.00	20
09+81 to 20+32	11.78	14.14	0.50	9.5	13	8	0.02	0.01	12
				10.0	12	15	0.07	0.04	8
				11.0	11	22	0.14	0.07	4

Avinida Pica Westbound Lane 3

Limits	FWD_{80th}	TD_{80th}	'T'	T.I.	TDallow	% Red.	GE	AC	NSL
00+00 to 04+01	9.26	11.11	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	1	0.00	0.00	15
04+01 to 08+01	5.76	6.92	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	0	0.00	0.00	20
08+01 to 12+51	10.02	12.03	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	9	0.03	0.01	9
12+51 to 20+18	6.63	7.95	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	0	0.00	0.00	20

Avenida Pico Eastbound Lane 3

Limits	FWD_{80th}	TD_{80th}	'T'	T.I.	TDallow	% Red.	GE	AC	NSL
00+00 to 09+02	4.90	5.88	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	0	0.00	0.00	20
09+02 to 11+02	12.89	15.46	0.50	9.5	13	16	0.08	0.04	7
				10.0	12	22	0.14	0.07	5
				11.0	11	29	0.23	0.12	2
11+02 to 17+98	8.89	10.67	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	0	0.00	0.00	19
17+98 to 20+41	16.84	20.21	0.50	9.5	13	36	0.35	0.18	1
				10.0	12	41	0.44	0.23	1

				11.0	11	46	0.55	0.29	0

Avenida Pico Westbound Lane 4

Limits	FWD_{80th}	TD_{80th}	'T'	T.I.	TDallow	% Red.	GE	AC	NSL
00+00 to 03+52	10.39	12.47	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	4	0.01	0.01	17
				11.0	11	12	0.05	0.02	8
03+52 to 08+52	6.71	8.05	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	0	0.00	0.00	20
08+52 to 15+35	10.69	12.83	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	6	0.02	0.01	14
				11.0	11	14	0.06	0.03	6
15+35 to 18+07	5.17	6.20	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	0	0.00	0.00	20
18+07 to 20+19	7.94	9.53	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	0	0.00	0.00	20

Avenida Pico Eastbound I-5 Northbound Turn Lane

Limits	FWD_{80th}	TD_{80th}	'T'	T.I.	TDallow	% Red.	GE	AC	NSL
00+00 to 04+81	9.53	11.43	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	4	0.01	0.01	13
04+81 to 09+11	4.07	4.88	0.50	9.5	13	0	0.00	0.00	20
				10.0	12	0	0.00	0.00	20
				11.0	11	0	0.00	0.00	20

Appendix C

Coring Results and Location Plan

LaBelle Marvin
PAVEMENT ANALYSIS, DESIGN, TESTING, & INSPECTION SERVICES

Project No. 38212

CORING RESULTS

Avenida Pico

Client: Parsons

Cores Obtained: August 2012 **Technician(s): JG/JW**

PAVEMENT CORING DATA							SOIL BORING DATA			
Core	Lane	Dir.	Location	Total Pavement	Cross-Section	Type	Aggregate Base (AB)	Type	Soil Type (Maximum 3' depth)	Moisture Content
8/1	**3**	**W**	**Avenida Pico**	**18 3/4"**	2 1/2"	ARHM	**-**	AB	Brown Clayey Silt	17.4%
	Lateral and Longitudinal Position				3 1/2"	AC				
	482'	W	San Clemente High School		5 "	AC				
	13'	S	Curb Face		2 3/4"	AC				
	Field Notes:				5 "	AC				
	#7									
8/2	**4**	**W**	**Avenida Pico**	**15 5/8"**	2 1/4"	ARHM	**-**	AB	Brown Sandy Silt	31.9%
	Lateral and Longitudinal Position				2 "	AC				
	756'	W	San Clemente High School		3 "	AC				
	4'	S	Curb Face		4 "	AC				
	Field Notes:				4 3/8"	AC				
	#8									
8/3	**1**	**W**	**Avenida Pico**	**7 1/2"**	1 1/4"	AC	**22 1/2"+**	AB	No Sample	
	Lateral and Longitudinal Position				Fabric					
	1260'	W	San Clemente High School		1 1/4"	AC				
	13'	S	Curb Face		2 1/4"	AC				
	Field Notes:				2 3/4"	AC				
	#10; Obstructed at 30"									
8/4	**2**	**W**	**Avenida Pico**	**7 3/4"**	2 "	AC	**20 1/4"+**	AB	No Sample	
	Lateral and Longitudinal Position				Fabric					
	1460'	W	San Clemente High School		1 1/4"	AC				
	11'	S	Curb Face		4 1/2"	AC				
	Field Notes:									
	#11; Obstructed at 28"									
8/5	**3**	**W**	**Avenida Pico**	**15 3/4"**	2 "	AC	**-**	AB	Brown Clayey Sand	14.6%
	Lateral and Longitudinal Position				2 "	AC				
	1755'	W	San Clemente High School		3 "	AC				
	9'	S	Curb Face		8 3/4"	AC				
	Field Notes:									
	#12									
8/6	**1**	**W**	**Avenida Pico**	**11 3/4"**	1 1/4"	AC	**25 1/4"**	AB	Brown Slightly Sandy Clay	15.0%
	Lateral and Longitudinal Position				1 3/4"	AC				
	1090'	W	San Clemente High School		1 1/2"	AC				
	38'	S	Curb Face		7 1/4"	AC				
	Field Notes:									
	#9									

CORING RESULTS

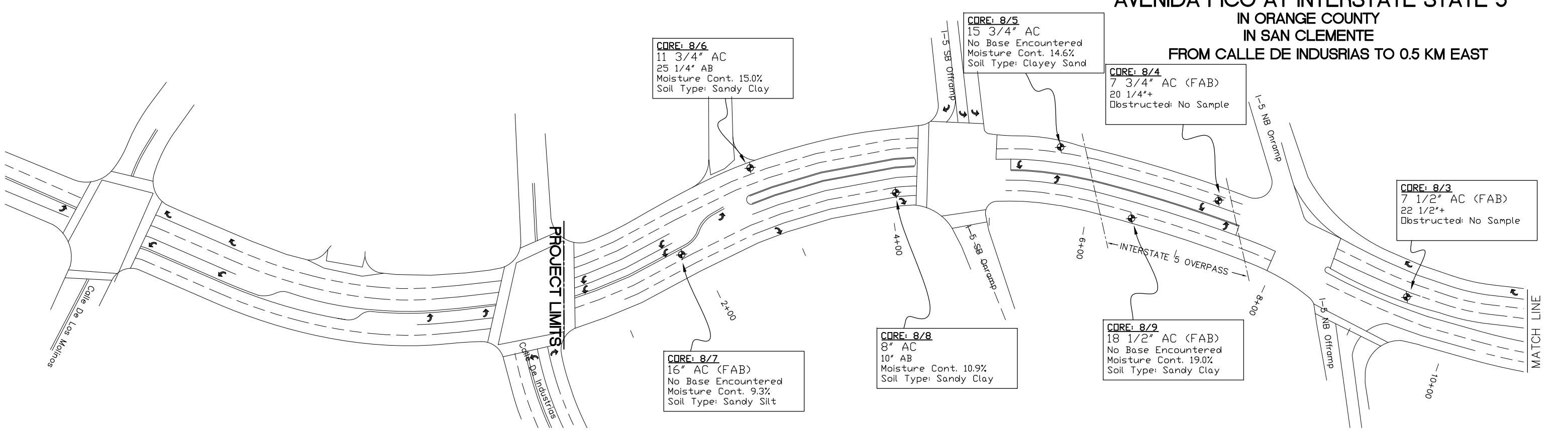
Avenida Pico

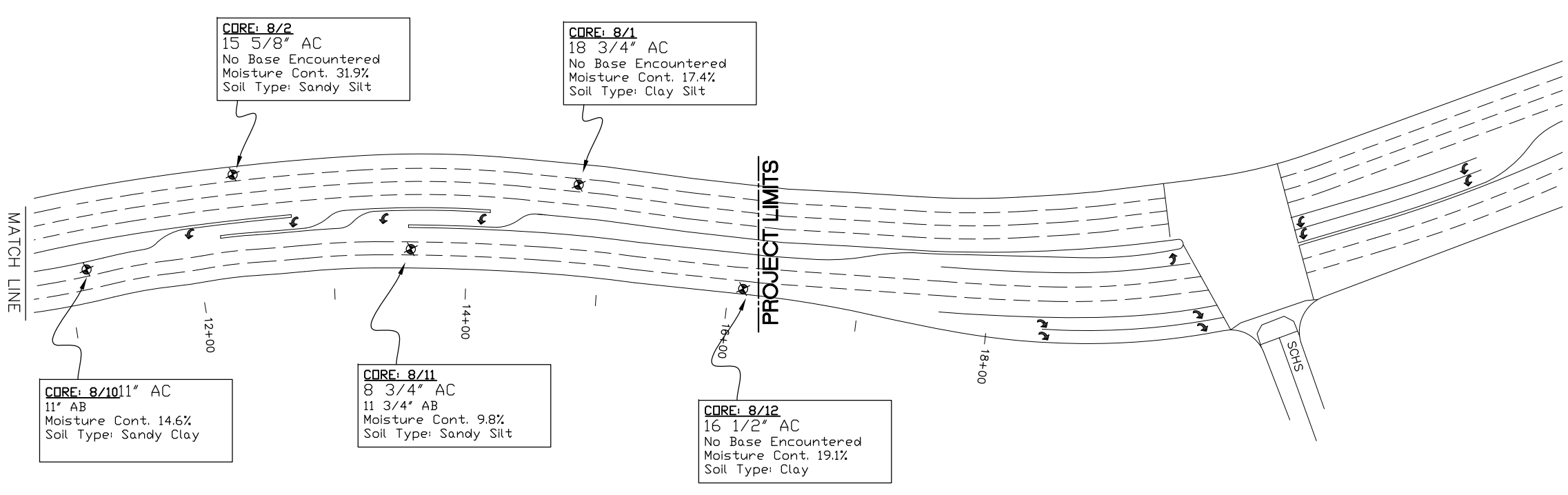
Client: Parsons

Cores Obtained: August 2012 **Technician(s): JG/JW**

PAVEMENT CORING DATA							SOIL BORING DATA			
Core	Lane	Dir.	Location	Total Pavement	Cross-Section	Type	Aggregate Base (AB)	Type	Soil Type (Maximum 3' depth)	Moisture Content
8/7	**1**	**E**	**Avenida Pico**	**16"**	1 1/2"	AC	**-**	AB	Brown Sandy Silt	9.3%
	Lateral and Longitudinal Position				1 1/2"	AC				
	175'	E	Calle de Industrias		Fabric					
	24'	N	Curb Face		3 "	AC				
	Field Notes:				10 "	AC*				
	#1; Longitudinal Cracking;* Lifts below 3rd are indeterminable - core broke apart									
8/8	**2**	**E**	**Avenida Pico**	**8"**	1 1/4"	AC	**10 "**	AB	Brown Sandy Clay	10.9%
	Lateral and Longitudinal Position				3 "	AC				
	430'	E	Calle de Industrias		3 3/4"	AC				
	22'	N	Curb Face							
	Field Notes:									
	#2									
8/9	**2**	**E**	**Avenida Pico**	**18 1/2"**	1 1/2"	ARHM	**-**	AB	Brown Slightly Sandy Clay	19.0%
	Lateral and Longitudinal Position				Fabric					
	670'	E	Calle de Industrias		2 1/4"	AC				
	9'	N	Curb Face		2 3/4"	AC				
	Field Notes:				2 1/4"	AC				
	#3				2 "	AC				
					7 3/4"	AC				
8/10	**3**	**E**	**Avenida Pico**	**16 1/2"**	2 1/2"	ARHM	**-**	AB	Brown Clay	19.1%
	Lateral and Longitudinal Position				3 "					
	1600'	E	Calle de Industrias		3 1/4"	AC				
	4'	N	Curb Face		7 3/4"	AC*				
	Field Notes:									
	#6; *Lifts below 3rd are indeterminable - core broke apart									
8/11	**2**	**E**	**Avenida Pico**	**8 3/4"**	2 1/4"	ARHM	**11 3/4"**	AB	Brown Sandy Silt	9.8%
	Lateral and Longitudinal Position				3/4"	AC				
	1385'	E	Calle de Industrias		Fabric					
	12'	N	Curb Face		1 1/2"	AC				
	Field Notes:				4 "	AC				
	#5									
8/12	**1**	**E**	**Avenida Pico**	**11"**	3 1/4"	ARHM	**11 "**	AB	Brown Sandy Clay	14.6%
	Lateral and Longitudinal Position				1 1/2"	AC				
	1140'	E	Calle de Industrias		Fabric					
	26'	N	Curb Face		2 "	AC				
	Field Notes:				4 1/4"	AC				
	#4									

CORE LOCATION PLAN
AVENIDA PICO AT INTERSTATE STATE 5
IN ORANGE COUNTY
IN SAN CLEMENTE
FROM CALLE DE INDUSRIAS TO 0.5 KM EAST





R-Value Determinations

Subgrade Testing	R-Value
Soil ID Number: 8-7/11	61
Soil ID Number: 8-10	7
Soil ID Number: 8-6	31

Refer to Section 9 – Replacement Section Alternatives of this report for designed replacement sections.

NO.	DATE	REVISIONS	APP.	DATE
8				
7				
6				
5				
4				
3				
2				
1				

PLANS PREPARED BY:

LABELLE • MARVIN, INC.
PAVEMENT TECHNOLOGY SPECIALISTS
2700 S. GRAND AVENUE, SANTA ANA, CA 92705
PH (714) 546-3468 FAX (714) 546-58.41

CLIENT:

PARSONS
2201 DUPONT DRIVE, SUITE 100
IRVINE, CA 92612

Laboratory Testing

R-Value Determinations: Shown Hereon
Moisture Content Range: 9.3%-31.9%
LaBelle Marvin Coring and Boring
Avg AC Thickness: 13" AC
Number of Cores: 12

Avenida Pico at Interstate State 5
Improvement Project
City of San Clemente, City Project Ref #19901
Caltrans District 12, EA 0F96A1

cCORE LOCATION PLAN

SHEET No.
1 OF 1
DATE: 7/17/2012
SCALE: 1" = NTS
DRAWN BY: G. MARVIN
LaBelle Marvin, Inc.

LMI PN 38212

Appendix D

Deflection Data

LaBelle Marvin
PAVEMENT ANALYSIS, DESIGN, TESTING, & INSPECTION SERVICES

LABELLE • MARVIN INC

PAVEMENT ENGINEERING, DESIGN, INSPECTION & TESTING

Avenida Pico

Location: San Clemente/ Pico | SC Highschool to Calle De Industrias | Date: 2012-08-16 11:43:31 | Project: 38212

Avenida Pico Westbound Lane 1

00+00

Avenida Pico Westbound Lane 1

Notes: Begin Testing Avenida Pico; Avenida Pico Westbound Lane 1; CL of SC Highschool

Pvt Temp: 0° F

GPS: 0.00000° Lat, 0.00000° Lon

Limit ☐ NIS ☐

00+42

Avenida Pico Westbound Lane 1

Notes: Median, Raised

Pvt Temp: 0° F

GPS: 0.00000° Lat, 0.00000° Lon

Limit ☐ NIS ☐

01+01 (test 1)

Avenida Pico Westbound Lane 1

Notes:

Avg FWD1: 5.98667

Pvt Temp: 73.6° F

GPS: 33.44029° Lat, -117.61876° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.38	6.01	4.72	4.51	4.09	3.77	3.22	2.52	1.96	4.81	5.17
9.55	6.12	4.83	4.56	4.13	3.79	3.26	2.54	1.94	4.91	5.26
9.03	5.83	4.63	4.38	3.98	3.68	3.11	2.41	1.89	4.69	5.03

02+07 (test 2)

Avenida Pico Westbound Lane 1

Notes:

Avg FWD1: 8.07333

Pvt Temp: 71° F

GPS: 33.44016° Lat, -117.61907° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	8.11	6.38	6.08	5.5	5.05	4.3	3.24	2.5	6.19	7.07
8.89	8.07	6.36	6.07	5.52	5.06	4.33	3.25	2.49	6.17	7.06
8.91	8.04	6.36	6.08	5.53	5.06	4.34	3.22	2.52	6.24	7

03+01 (test 3)

Avenida Pico Westbound Lane 1

Notes:

Avg FWD1: 9.75

Pvt Temp: 67.4° F

GPS: 33.44007° Lat, -117.61936° Lon

Limit ☑ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.69	9.84	7.68	7.05	6.05	5.3	4.19	3.24	2.54	6.98	8.24
8.59	9.68	7.59	6.94	5.97	5.2	4.1	3.15	2.49	6.88	8.08
8.72	9.73	7.71	7.03	6.03	5.29	4.15	3.23	2.54	6.97	8.16

04+04 (test 4)

Avenida Pico Westbound Lane 1

Notes:

Pvt Temp: 68.5° F

Avg FWD1: 10.4367

GPS: 33.43997° Lat, -117.61968° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.69	10.47	8.83	8.34	7.43	6.77	5.49	4.19	3.18	8.87	9.5
8.76	10.44	8.8	8.29	7.43	6.75	5.48	4.18	3.23	8.86	9.5
8.72	10.4	8.77	8.29	7.43	6.74	5.53	4.21	3.22	8.84	9.48

05+01 (test 5)

Avenida Pico Westbound Lane 1

Notes:

Pvt Temp: 68.8° F

Avg FWD1: 11.8233

GPS: 33.43990° Lat, -117.61998° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.96	11.99	9.58	8.8	7.65	6.78	5.34	4.15	3.2	9.64	10.7
8.76	11.7	9.37	8.62	7.49	6.63	5.25	4.03	3.14	9.4	10.4
8.89	11.78	9.44	8.68	7.53	6.69	5.28	4.09	3.18	9.47	10.44

05+76

Avenida Pico Westbound Lane 1

Notes: LTP

Pvt Temp: 0° F

GPS: 33.43990° Lat, -117.61998° Lon

Limit ☐ NIS ☐

06+01 (test 6)

Avenida Pico Westbound Lane 1

Notes:

Pvt Temp: 68.8° F

Avg FWD1: 12.2867

GPS: 33.43981° Lat, -117.62029° Lon

Limit ☑ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.84	12.29	9.12	8.33	7.17	6.37	5.11	3.95	3.05	9.15	10.36
9.06	12.41	9.27	8.49	7.33	6.51	5.25	4.05	3.15	9.34	10.45
8.89	12.16	9.11	8.36	7.21	6.4	5.22	3.93	3.09	9.14	10.22

07+00 (test 7)

Avenida Pico Westbound Lane 1

Notes: Near Manhole

Pvt Temp: 68.8° F

Avg FWD1: 8.17333

GPS: 33.43970° Lat, -117.62058° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.03	8.29	6.33	5.87	5.26	4.78	4.1	3.12	2.4	5.57	6.67
8.86	8.07	6.16	5.73	5.13	4.66	4.02	3.04	2.34	5.44	6.46
9.11	8.16	6.22	5.8	5.19	4.73	4.05	3.09	2.42	5.45	6.52

07+27

Avenida Pico Westbound Lane 1

Notes: LTP

Pvt Temp: 0° F

GPS: 33.43970° Lat, -117.62058° Lon

Limit ☐ NIS ☐

08+01 (test 8)

Avenida Pico Westbound Lane 1

Notes:

Pvt Temp: 70.7° F

Avg FWD1: 7.25667

GPS: 33.43956° Lat, -117.62087° Lon

Limit ☐ NIS ☐

Limit NIS

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	7.39	5.19	4.54	3.68	2.97	2.13	1.35	0.93	5.34	6.29
8.94	7.22	5.12	4.46	3.64	2.91	2.1	1.35	0.92	5.22	6.18
9.01	7.16	5.14	4.47	3.65	2.95	2.08	1.33	0.91	5.21	6.15

09+01 (test 9)

Avenida Pico Westbound Lane 1

Notes:

Pvt Temp: 71.4° F

Avg FWD1: 14.0933

GPS: 33.43941° Lat, -117.62114° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.89	14.32	10.43	9.21	7.64	6.41	4.86	3.28	2.43	10.55	12.16
8.72	13.89	10.2	8.99	7.48	6.29	4.77	3.24	2.38	10.27	11.84
8.86	14.07	10.41	9.18	7.62	6.41	4.87	3.28	2.42	10.41	11.9

10+01 (test 10)

Avenida Pico Westbound Lane 1

Notes: Near Traffic Sensors

Pvt Temp: 72.5° F

Avg FWD1: 5.56667

GPS: 33.43926° Lat, -117.62141° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.2	5.67	3.37	3.09	2.73	2.46	2.29	1.83	1.55	3.45	4.09
9.03	5.51	3.32	3	2.66	2.41	2.26	1.78	1.51	3.33	3.97
9.06	5.52	3.35	3.05	2.71	2.44	2.28	1.8	1.64	3.38	3.96

11+01 (test 11)

Avenida Pico Westbound Lane 1

Notes:

Pvt Temp: 73.2° F

Avg FWD1: 5.93333

GPS: 33.43914° Lat, -117.62171° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.89	5.92	3.58	3.17	2.74	2.47	2.3	1.96	1.67	4.16	4.82
8.84	5.88	3.55	3.14	2.66	2.42	2.38	1.96	1.66	4.07	4.72
8.89	6	3.6	3.17	2.73	2.53	2.3	1.93	1.67	4.06	4.69

11+66

Avenida Pico Westbound Lane 1

Notes: CL of I-5 Northbound onramp

Pvt Temp: 0° F

GPS: 33.43914° Lat, -117.62171° Lon

Limit ☐ NIS ☐

12+03 (test 12)

Avenida Pico Westbound Lane 1

Notes: Lateral Cracks

Pvt Temp: 75.1° F

Avg FWD1: 7.49667

GPS: 33.43905° Lat, -117.62203° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.01	7.56	6.38	5.94	5.32	4.72	3.88	2.88	6.15	6.42	6.92
9.03	7.47	6.32	5.9	5.26	4.69	3.91	2.9	2.24	6.31	6.83
9.06	7.46	6.32	5.91	5.26	4.72	3.93	2.9	2.31	6.28	6.8

12+51

Avenida Pico Westbound Lane 1

Notes: Median, Painted , trans into turn lane

Pvt Temp: 0° F

GPS: 33.43905° Lat, -117.62203° Lon

Limit ☑ NIS ☐

12+51 (test 13)

Avenida Pico Westbound Lane 1

Notes:

Pvt Temp: 65.6° F

Avg FWD1: 3.53333

GPS: 33.43904° Lat, -117.62217° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.28	3.62	2.81	2.66	2.5	2.4	2.33	1.88	1.58	2.85	3.05
9.03	3.48	2.72	2.6	2.41	2.33	2.25	1.82	1.53	2.74	2.92
9.08	3.5	2.74	2.61	2.44	2.35	2.26	1.8	1.49	2.79	2.95

13+00 (test 14)

Avenida Pico Westbound Lane 1

Notes:

Pvt Temp: 67.7° F

Avg FWD1: 4.23667

GPS: 33.43902° Lat, -117.62218° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.03	4.28	3.44	3.3	3.07	2.89	2.55	2.05	1.68	3.46	3.66
9.03	4.26	3.43	3.29	3.06	2.86	2.51	2.1	1.73	3.46	3.7
8.91	4.17	3.4	3.26	3.02	2.82	2.47	2.03	1.67	3.39	3.65

13+51 (test 15)

Avenida Pico Westbound Lane 1

Notes: Near Manhole

Pvt Temp: 68.8° F

Avg FWD1: 4.87

GPS: 33.43902° Lat, -117.62218° Lon

Limit ☑ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.96	4.93	3.92	3.62	3.2	2.84	2.36	1.84	1.5	3.87	4.25
8.81	4.83	3.86	3.52	3.09	2.8	2.32	1.84	1.46	3.74	4.12
8.96	4.85	3.81	3.53	3.13	2.79	2.32	1.83	1.44	3.72	4.11

14+08 (test 16)

Avenida Pico Westbound Lane 1

Notes: Lateral Cracks

Pvt Temp: 77.6° F

Avg FWD1: 7.54667

GPS: 33.43902° Lat, -117.62218° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	7.52	5.74	5.2	4.43	3.91	3.15	2.4	1.86	5.86	6.61
8.86	7.5	5.74	5.14	4.39	3.92	3.13	2.39	1.87	5.83	6.59
9.06	7.62	5.84	5.24	4.47	3.95	3.19	2.45	1.9	5.96	6.67

14+51 (test 17)

Avenida Pico Westbound Lane 1

Notes: Near Traffic Sensors

Pvt Temp: 76.2° F

Avg FWD1: 8.18

GPS: 33.43876° Lat, -117.62277° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.08	8.3	5.91	5.35	4.57	3.98	3.14	2.36	1.82	5.97	6.82
9.03	8.21	5.84	5.29	4.49	3.94	3.11	2.31	1.84	5.84	6.69
8.96	8.03	5.71	5.18	4.41	3.91	3.17	2.26	1.83	5.72	6.59

14+86 (test 18)

Avenida Pico Westbound Lane 1

Notes:

Pvt Temp: 76.9° F

Avg FWD1: 5.72667

GPS: 33.43869° Lat, -117.62284° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.06	5.79	2.6	2.07	1.52	1.3	1.33	1.07	0.97	2.9	3.7
9.03	5.69	2.57	2.03	1.47	1.27	1.31	1.08	0.96	2.83	3.59

9.08	5.7	2.54	2.03	1.48	1.29	1.38	1.09	0.94	2.87	3.64

15+41
Notes: CL of I-5 Southbound Onramp

Avenida Pico Westbound Lane 1
Pvt Temp: 0° F
GPS: 33.43869° Lat, -117.62284° Lon
Limit ☐ NIS ☐

Avenida Pico Eastbound Lane 1

00+00
Notes: Avenida Pico Eastbound Lane 1; CL of Via Pico Plaza

Avenida Pico Eastbound Lane 1
Pvt Temp: 0° F
GPS: 33.43869° Lat, -117.62284° Lon
Limit ☐ NIS ☐

00+60 (test 19)
Notes: Median, Painted
Avg FWD1: 13.0367

Avenida Pico Eastbound Lane 1
Pvt Temp: 77.3° F
GPS: 33.43753° Lat, -117.62359° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.81	13.06	10.43	9.67	8.49	7.56	5.11	3.83	2.94	10.14	11.32
8.86	13.11	10.52	9.75	8.62	7.69	5.22	3.9	3	10.18	11.29
8.89	12.94	10.4	9.64	8.53	7.66	5.23	3.92	2.98	10.08	11.16

01+10 (test 20)
Notes: Longitudinal Cracks
Avg FWD1: 12.1533

Avenida Pico Eastbound Lane 1
Pvt Temp: 76.2° F
GPS: 33.43765° Lat, -117.62352° Lon
Limit ☑ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.86	12.27	9.82	9	7.82	6.93	5.37	4.02	3.04	9.96	11.08
8.91	12.11	9.72	8.97	7.77	6.9	5.36	4.02	3.04	9.87	10.93
8.89	12.08	9.64	8.9	7.71	6.83	5.33	4.02	2.99	9.74	10.76

01+52 (test 21)
Notes: Longitudinal Cracks
Avg FWD1: 8.02667

Avenida Pico Eastbound Lane 1
Pvt Temp: 75.8° F
GPS: 33.43776° Lat, -117.62348° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.01	8.13	6.39	5.78	4.97	4.4	3.63	2.82	2.24	6.6	7.31
8.96	7.97	6.31	5.74	4.93	4.39	3.6	2.83	2.17	6.49	7.19
9.03	7.98	6.37	5.77	4.98	4.43	3.63	2.85	2.27	6.53	7.23

02+01 (test 22)
Notes:
Avg FWD1: 6.92

Avenida Pico Eastbound Lane 1
Pvt Temp: 76.2° F
GPS: 33.43789° Lat, -117.62343° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.13	7.06	5.58	5.07	4.36	3.79	3.19	2.35	1.86	5.57	6.11
8.96	6.83	5.42	4.94	4.25	3.75	3.16	2.32	1.84	5.42	5.96
9.13	6.87	5.46	4.98	4.31	3.81	3.18	2.35	1.86	5.41	5.98

02+35
Notes: Begin Longitudinal Trench

Avenida Pico Eastbound Lane 1
Pvt Temp: 0° F
GPS: 33.43789° Lat, -117.62343° Lon
Limit ☐ NIS ☐

02+51 (test 23)
Notes: Next to Trench
Avg FWD1: 7.8

Avenida Pico Eastbound Lane 1
Pvt Temp: 77.6° F
GPS: 33.43802° Lat, -117.62337° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.11	7.92	6.19	5.68	4.93	4.36	3.57	2.71	2.12	6.31	7.02
8.96	7.79	6.09	5.6	4.86	4.28	3.48	2.65	2.1	6.14	6.91
8.98	7.69	6.08	5.6	4.86	4.27	3.52	2.7	2.1	6.11	6.88

02+59
Notes: End Longitudinal Trench, LTP

Avenida Pico Eastbound Lane 1
Pvt Temp: 0° F
GPS: 33.43802° Lat, -117.62337° Lon
Limit ☐ NIS ☐

03+01 (test 24)
Notes:
Avg FWD1: 6.63

Avenida Pico Eastbound Lane 1
Pvt Temp: 80.2° F
GPS: 33.43814° Lat, -117.62330° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.98	6.71	5.23	4.81	4.16	3.69	3.02	2.41	1.89	5.35	5.97
8.98	6.63	5.18	4.76	4.14	3.69	3.06	2.36	1.9	5.3	5.93
8.86	6.55	5.16	4.74	4.15	3.71	3.04	2.37	1.92	5.26	5.84

03+52 (test 25)
Notes:
Avg FWD1: 5.21667

Avenida Pico Eastbound Lane 1
Pvt Temp: 80.2° F
GPS: 33.43826° Lat, -117.62322° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	5.27	4.05	3.81	3.4	3.12	2.69	2.19	1.7	4.26	4.74
8.86	5.18	4.03	3.78	3.35	3.1	2.67	2.17	1.77	4.21	4.64
9.06	5.2	4.11	3.86	3.43	3.18	2.75	2.21	1.81	4.23	4.71

04+02 (test 26)
Notes:
Avg FWD1: 6.55333

Avenida Pico Eastbound Lane 1
Pvt Temp: 80.2° F
GPS: 33.43838° Lat, -117.62313° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.08	6.63	5.22	4.8	4.24	3.77	3.31	2.52	2.01	5.52	6.15
8.94	6.47	5.08	4.67	4.18	3.72	3.25	2.51	1.98	5.37	5.95
8.98	6.56	5.15	4.75	4.16	3.78	3.3	2.51	1.98	5.37	5.97

04+08
Notes: Median, Raised

Avenida Pico Eastbound Lane 1
Pvt Temp: 0° F
GPS: 33.43838° Lat, -117.62313° Lon
Limit ☐ NIS ☐

04+41 (test 27)

Notes: Median, Painted

Avg FWD1: 6.76667

Avenida Pico Eastbound Lane 1
Pvt Temp: 81.7° F
GPS: 33.43846° Lat, -117.62304° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.86	6.81	5.42	5.01	4.43	3.93	3.25	2.4	1.9	5.75	6.3
8.89	6.7	5.38	4.97	4.39	3.9	3.24	2.39	1.92	5.72	6.23
9.01	6.79	5.48	5.06	4.45	4	3.29	2.42	1.94	5.7	6.28

04+75

Notes: CL of I-5 Southbound Onramp

Avenida Pico Eastbound Lane 1
Pvt Temp: 0° F
GPS: 33.43846° Lat, -117.62304° Lon
Limit ☐ NIS ☐

05+53 (test 28)

Notes:

Avg FWD1: 4.54333

Avenida Pico Eastbound Lane 1
Pvt Temp: 78.7° F
GPS: 33.43866° Lat, -117.62277° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.16	4.6	3.43	3.09	2.62	2.17	1.7	1.17	0.89	3.57	3.98
9.25	4.49	3.36	3.01	2.55	2.14	1.63	1.11	0.83	3.46	3.89
9.18	4.54	3.38	3.06	2.61	2.15	1.69	1.15	0.88	3.49	3.91

06+03 (test 29)

Notes:

Avg FWD1: 4.86

Avenida Pico Eastbound Lane 1
Pvt Temp: 79.8° F
GPS: 33.43875° Lat, -117.62264° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.11	4.93	3.86	3.57	3.14	2.81	2.53	1.98	1.65	3.89	4.38
9.01	4.84	3.77	3.5	3.11	2.83	2.57	1.97	1.59	3.81	4.25
9.11	4.81	3.78	3.49	3.08	2.81	2.52	1.92	1.6	3.79	4.2

06+54 (test 30)

Notes:

Avg FWD1: 5.58333

Avenida Pico Eastbound Lane 1
Pvt Temp: 71° F
GPS: 33.43880° Lat, -117.62252° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.08	5.62	4.42	4.09	3.65	3.32	2.76	2.27	1.89	4.52	4.92
9.01	5.6	4.41	4.11	3.65	3.32	2.81	2.32	1.88	4.52	4.91
8.96	5.53	4.37	4.07	3.65	3.33	2.79	2.3	1.85	4.44	4.84

07+00 (test 31)

Notes:

Avg FWD1: 3.71333

Avenida Pico Eastbound Lane 1
Pvt Temp: 68.8° F
GPS: 33.43885° Lat, -117.62251° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.06	3.7	2.83	2.71	2.51	2.36	2.28	1.85	1.55	2.82	3.11
9.13	3.67	2.87	2.75	2.55	2.46	2.38	1.87	1.6	2.86	3.1
9.2	3.77	2.84	2.76	2.55	2.44	2.43	1.88	1.57	2.87	3.14

07+08
Notes: Begin Longitudinal Trench

Avenida Pico Eastbound Lane 1
Pvt Temp: 0° F
GPS: 33.43885° Lat, -117.62251° Lon
Limit ☐ NIS ☐

07+53 (test 32)
Notes: Test Taken on Trench
Avg FWD1: 3.4

Avenida Pico Eastbound Lane 1
Pvt Temp: 69.2° F
GPS: 33.43885° Lat, -117.62251° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.64	3.37	2.92	2.78	2.6	2.51	2.26	1.96	1.66	2.85	3.12
8.69	3.42	2.93	2.79	2.61	2.5	2.28	1.96	1.71	2.88	3.14
8.72	3.41	2.88	2.77	2.57	2.47	2.26	1.92	1.64	2.86	3.09

07+98 (test 33)
Notes: Test Taken on Trench
Avg FWD1: 4.16333

Avenida Pico Eastbound Lane 1
Pvt Temp: 69.9° F
GPS: 33.43904° Lat, -117.62206° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.91	4.16	3.23	3.07	2.83	2.68	2.44	2.03	1.69	3.26	3.58
8.98	4.17	3.23	3.06	2.81	2.66	2.4	2.07	1.7	3.29	3.54
8.86	4.16	3.21	3.06	2.79	2.66	2.39	2.03	1.68	3.24	3.52

08+03
Notes: End Longitudinal Trench

Avenida Pico Eastbound Lane 1
Pvt Temp: 0° F
GPS: 33.43904° Lat, -117.62206° Lon
Limit ☐ NIS ☐

08+53 (test 34)
Notes: Longitudinal Cracks
Avg FWD1: 5.05

Avenida Pico Eastbound Lane 1
Pvt Temp: 80.6° F
GPS: 33.43904° Lat, -117.62191° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.01	5.07	3.52	3.3	2.98	2.82	2.64	2.07	1.75	3.55	4.1
9.03	5.06	3.51	3.3	2.96	2.78	2.68	2.07	1.73	3.58	4.12
9.01	5.02	3.48	3.27	2.98	2.74	2.65	2.07	1.76	3.53	4.12

08+89
Notes: Median, Raised; CL of I-5 Northbound Offramp

Avenida Pico Eastbound Lane 1
Pvt Temp: 0° F
GPS: 33.43904° Lat, -117.62191° Lon
Limit ☐ NIS ☐

09+03 (test 35)
Notes:
Avg FWD1: 5.79

Avenida Pico Eastbound Lane 1
Pvt Temp: 78.4° F
GPS: 33.43909° Lat, -117.62176° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.16	5.87	4.34	3.93	3.46	3.09	2.65	2.15	1.72	4.41	4.97

9.08	5.75	4.3	3.91	3.43	3.08	2.66	2.11	1.67	4.38	4.92
9.2	5.75	4.33	3.9	3.43	3.07	2.66	2.06	1.67	4.33	4.92

09+89
Notes: Change in Pavement

Avenida Pico Eastbound Lane 1
Pvt Temp: 0° F
GPS: 33.43909° Lat, -117.62176° Lon
Limit ☑ NIS ☐

10+02 (test 36)
Notes:
Avg FWD1: 10.5267

Avenida Pico Eastbound Lane 1
Pvt Temp: 78° F
GPS: 33.43919° Lat, -117.62145° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.13	10.73	8.17	7.65	6.7	6.07	4.94	3.86	2.93	8.35	9.14
9.03	10.51	8.06	7.53	6.63	6.02	4.9	3.79	2.96	8.27	9
8.96	10.34	7.93	7.4	6.52	5.9	4.81	3.75	2.89	8.13	8.88

11+02 (test 37)
Notes:
Avg FWD1: 8.71667

Avenida Pico Eastbound Lane 1
Pvt Temp: 77.3° F
GPS: 33.43932° Lat, -117.62117° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	8.83	6.93	6.44	5.66	5.11	4.22	3.34	2.66	7.24	8.01
8.86	8.64	6.83	6.39	5.64	5.04	4.19	3.29	2.66	7.16	7.86
9.01	8.68	6.81	6.34	5.61	5.02	4.17	3.31	2.63	7.09	7.78

12+01 (test 38)
Notes:
Avg FWD1: 8.41

Avenida Pico Eastbound Lane 1
Pvt Temp: 74.3° F
GPS: 33.43947° Lat, -117.62090° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.06	8.51	6.41	5.88	5.14	4.51	3.68	2.67	1.99	6.5	7.32
8.86	8.39	6.34	5.83	5.11	4.51	3.74	2.67	2.02	6.4	7.26
8.96	8.33	6.31	5.81	5.09	4.48	3.68	2.65	2.01	6.38	7.18

13+03 (test 39)
Notes:
Avg FWD1: 12.9667

Avenida Pico Eastbound Lane 1
Pvt Temp: 74.7° F
GPS: 33.43962° Lat, -117.62061° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.96	13.09	10.61	9.87	8.69	7.88	6.45	4.9	3.73	11.03	12.06
9.06	12.94	10.5	9.82	8.62	7.85	6.49	4.86	3.69	10.88	11.83
8.96	12.87	10.46	9.73	8.62	7.86	6.49	4.82	3.7	10.83	11.75

14+02 (test 40)
Notes:
Avg FWD1: 10.8467

Avenida Pico Eastbound Lane 1
Pvt Temp: 74.7° F
GPS: 33.43973° Lat, -117.62032° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	10.9	8.55	7.99	7.06	6.37	5.22	4.07	3.16	8.56	9.45
8.89	10.82	8.55	7.97	7.04	6.36	5.24	4.09	3.17	8.55	9.41

8.94	10.82	8.5	7.95	7.06	6.38	5.19	4.09	3.16	8.54	9.33

15+01 (test 41)

Avenida Pico Eastbound Lane 1

Notes:

Pvt Temp: 75.1° F

Avg FWD1: 11.0467

GPS: 33.43983° Lat, -117.62002° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	11.15	8.58	7.94	6.96	6.23	4.54	3.88	2.96	8.67	9.62
9.03	11.09	8.57	7.94	6.95	6.24	5.07	3.88	2.99	8.66	9.57
8.89	10.9	8.48	7.83	6.86	6.14	5.04	3.84	2.94	8.55	9.39

15+22

Avenida Pico Eastbound Lane 1

Notes: Lateral Trench

Pvt Temp: 0° F

GPS: 33.43983° Lat, -117.62002° Lon

Limit ☐ NIS ☐

16+02 (test 42)

Avenida Pico Eastbound Lane 1

Notes:

Pvt Temp: 74.3° F

Avg FWD1: 10.6

GPS: 33.43991° Lat, -117.61970° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	10.66	8.29	7.64	6.72	5.98	4.79	3.61	2.77	8.31	9.18
8.96	10.62	8.34	7.66	6.73	5.99	4.82	3.65	2.77	8.22	9.12
8.96	10.52	8.29	7.58	6.72	5.97	4.71	3.59	2.78	8.22	9.07

17+06 (test 43)

Avenida Pico Eastbound Lane 1

Notes:

Pvt Temp: 74° F

Avg FWD1: 8.12667

GPS: 33.44000° Lat, -117.61939° Lon

Limit ☑ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.08	8.37	4.95	4.28	3.65	3.13	2.37	1.65	1.18	5.07	6.13
8.94	8.02	4.88	4.2	3.55	3.12	2.32	1.65	1.18	4.92	5.95
8.89	7.99	4.9	4.26	3.59	3.14	2.36	1.66	1.18	4.92	5.85

18+00 (test 44)

Avenida Pico Eastbound Lane 1

Notes: LTP

Pvt Temp: 75.1° F

Avg FWD1: 4.31

GPS: 33.44009° Lat, -117.61909° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.11	4.35	2.89	2.7	2.57	2.4	2.32	1.84	1.5	2.94	3.33
9.08	4.29	2.88	2.72	2.53	2.38	2.29	1.83	1.51	2.92	3.3
9.03	4.29	2.87	2.7	2.53	2.35	2.25	1.84	1.5	2.87	3.27

19+03 (test 45)

Avenida Pico Eastbound Lane 1

Notes:

Pvt Temp: 76.5° F

Avg FWD1: 5.1

GPS: 33.44019° Lat, -117.61878° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.08	5.11	3.9	3.71	3.4	3.23	2.98	2.35	1.88	3.86	4.26
9.01	5.07	3.92	3.75	3.44	3.25	2.99	2.34	1.92	3.83	4.22
9.13	5.12	3.94	3.72	3.45	3.24	2.99	2.35	1.9	3.79	4.21

20+00 (test 46)

Notes:

Avg FWD1: 6.36333

Avenida Pico Eastbound Lane 1
Pvt Temp: 76.2° F
GPS: 33.44032° Lat, -117.61850° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.06	6.53	5.09	4.8	4.32	3.97	3.36	2.56	2	5.43	5.81
8.89	6.25	4.94	4.66	4.27	3.86	3.36	2.51	1.95	5.27	5.63
9.01	6.31	5.04	4.73	4.29	3.92	3.32	2.57	1.96	5.33	5.66

20+36

Notes: CL of SC High School

Avenida Pico Eastbound Lane 1
Pvt Temp: 0° F
GPS: 33.44032° Lat, -117.61850° Lon
Limit ☐ NIS ☐

Avenida Pico Westbound Lane 2

00+00

Notes: Avenida Pico Westbound Lane 2; CL of SC High School

Avenida Pico Westbound Lane 2
Pvt Temp: 0° F
GPS: 33.44032° Lat, -117.61850° Lon
Limit ☐ NIS ☐

00+50 (test 47)

Notes:

Avg FWD1: 8.63667

Avenida Pico Westbound Lane 2
Pvt Temp: 72.1° F
GPS: 33.44039° Lat, -117.61864° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.89	8.65	6.11	5.57	4.91	4.33	3.53	2.72	2.05	6.4	7.22
8.96	8.67	6.11	5.6	4.88	4.38	3.53	2.72	2.96	6.33	7.17
8.98	8.59	6.06	5.55	4.85	4.34	3.52	2.73	2.08	6.27	7.06

01+63 (test 48)

Notes:

Avg FWD1: 8.88

Avenida Pico Westbound Lane 2
Pvt Temp: 69.2° F
GPS: 33.44024° Lat, -117.61896° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.96	8.93	6.58	6.01	5.23	4.62	3.78	2.77	2.16	6.7	7.65
8.91	8.88	6.54	5.96	5.21	4.62	3.77	2.76	2.12	6.69	7.57
8.96	8.83	6.55	5.99	5.22	4.63	3.76	2.77	2.11	6.69	7.54

02+52 (test 49)

Notes:

Avg FWD1: 9.40667

Avenida Pico Westbound Lane 2
Pvt Temp: 68.1° F
GPS: 33.44014° Lat, -117.61923° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.08	9.46	6.71	5.98	5.12	4.49	3.53	2.72	2.07	6.64	7.78
9.11	9.49	6.76	6.04	5.16	4.49	3.56	2.74	2.11	6.67	7.77
8.94	9.27	6.63	5.92	5.08	4.49	3.5	2.72	2.09	6.58	7.61

03+52 (test 50)

Avenida Pico Westbound Lane 2

Notes:

Avg FWD1: 6.87667

Pvt Temp: 65.6° F

GPS: 33.44004° Lat, -117.61953° Lon

Limit ☑ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.11	6.98	5.05	4.65	4.19	3.89	3.39	2.75	2.19	4.94	5.72
9.03	6.82	4.92	4.57	4.13	3.86	3.34	2.73	2.17	4.86	5.54
8.96	6.83	4.96	4.63	4.14	3.84	3.31	2.69	2.13	4.86	5.52

04+54 (test 51)

Notes:

Avg FWD1: 14.0967

Avenida Pico Westbound Lane 2

Pvt Temp: 65.6° F

GPS: 33.43996° Lat, -117.61986° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.89	14.27	11.77	10.89	9.56	8.49	6.72	4.94	3.59	11.74	12.98
8.94	14.04	11.6	10.76	9.46	8.4	6.71	4.9	3.63	11.57	12.75
8.86	13.98	11.58	10.73	9.38	8.36	6.74	4.89	3.56	11.48	12.69

05+56 (test 52)

Notes: Near Manhole

Avg FWD1: 10.03

Avenida Pico Westbound Lane 2

Pvt Temp: 65.9° F

GPS: 33.43988° Lat, -117.62017° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.01	10.15	7.78	7.14	6.23	5.54	4.34	3.22	2.33	8.21	9.09
8.84	9.98	7.67	7.04	6.17	5.44	4.28	3.15	2.37	8.06	8.89
8.96	9.96	7.66	7.01	6.13	5.47	4.29	3.18	2.33	8.06	8.83

06+52 (test 53)

Notes:

Avg FWD1: 13.0067

Avenida Pico Westbound Lane 2

Pvt Temp: 65.2° F

GPS: 33.43978° Lat, -117.62046° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.81	13.07	11.32	10.62	9.46	8.47	6.75	5.14	3.89	11.44	12.22
8.91	13	11.26	10.59	9.41	8.47	6.74	5.12	3.84	11.4	12.13
8.91	12.95	11.28	10.56	9.37	8.46	6.8	5.14	3.85	11.38	12.1

07+50 (test 54)

Notes:

Avg FWD1: 10.7433

Avenida Pico Westbound Lane 2

Pvt Temp: 65.9° F

GPS: 33.43966° Lat, -117.62075° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.91	10.7	8.06	7.2	6.13	5.27	4.09	2.81	1.99	8.43	9.57
8.94	10.74	7.99	7.17	6.07	5.26	4.06	2.79	1.98	8.27	9.38
8.98	10.79	8.02	7.21	6.18	5.3	4.15	2.84	2	8.3	9.35

08+52 (test 55)

Notes:

Avg FWD1: 10.7167

Avenida Pico Westbound Lane 2

Pvt Temp: 67.7° F

GPS: 33.43951° Lat, -117.62103° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.98	10.97	8.03	7.18	6.08	5.16	3.82	2.41	1.5	8.27	9.44
8.84	10.63	7.79	6.99	5.9	5.03	3.74	2.31	1.45	8.06	9.15
8.81	10.55	7.76	6.97	5.92	5.02	3.77	2.34	1.48	8.03	9.1

09+51 (test 56)

Avenida Pico Westbound Lane 2

Notes:

Pvt Temp: 70.7° F

Avg FWD1: 11.99

GPS: 33.43935° Lat, -117.62129° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.98	12.12	9.43	8.55	7.27	6.26	4.79	3.51	2.55	9.67	10.85
8.76	11.94	9.27	8.39	7.12	6.19	4.73	3.44	2.55	9.5	10.59
8.84	11.91	9.26	8.41	7.16	6.22	4.73	3.46	2.53	9.46	10.59

10+40

Avenida Pico Westbound Lane 2

Notes: Change in Pavement

Pvt Temp: 0° F

GPS: 33.43935° Lat, -117.62129° Lon

Limit ☑ NIS ☐

10+52 (test 57)

Avenida Pico Westbound Lane 2

Notes: Longitudinal Cracks

Pvt Temp: 70.3° F

Avg FWD1: 8.93667

GPS: 33.43922° Lat, -117.62158° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.06	9.14	6.1	5.46	4.69	4.01	3.42	2.57	2	6.31	7.37
8.89	8.82	5.98	5.34	4.55	3.96	3.34	2.53	1.97	6.16	7.17
8.94	8.85	6.03	5.39	4.56	3.96	3.38	2.54	1.96	6.18	7.16

11+41 (test 58)

Avenida Pico Westbound Lane 2

Notes: Longitudinal Cracks

Pvt Temp: 72.9° F

Avg FWD1: 8.39

GPS: 33.43913° Lat, -117.62186° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.03	8.55	6.03	5.45	4.69	4.05	3.21	2.45	1.88	6.14	7.33
8.96	8.38	5.9	5.36	4.62	4.01	3.16	2.39	1.86	6.01	7.13
8.91	8.24	5.86	5.32	4.58	3.98	3.2	2.41	1.84	5.93	6.96

11+66

Avenida Pico Westbound Lane 2

Notes: CL of I-5 Northbound Onramp

Pvt Temp: 0° F

GPS: 33.43913° Lat, -117.62186° Lon

Limit ☐ NIS ☐

12+51 (test 59)

Avenida Pico Westbound Lane 2

Notes:

Pvt Temp: 63° F

Avg FWD1: 9.23667

GPS: 33.43903° Lat, -117.62220° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.11	9.45	7	6.21	5.2	4.41	3.31	2.39	1.77	6.93	8.08
8.84	9.13	6.8	6.06	5.04	4.25	3.24	2.31	1.72	6.73	7.81
8.96	9.13	6.83	6.09	5.08	4.32	3.32	2.36	1.73	6.72	7.86

13+51 (test 60)

Avenida Pico Westbound Lane 2

Notes: Near Traffic Sensors

Pvt Temp: 64.1° F

Avg FWD1: 8.44333

GPS: 33.43902° Lat, -117.62227° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10

9.08	8.6	6.88	6.14	5.16	4.38	3.24	2.28	1.7	6.85	7.64
9.01	8.4	6.7	6.06	5.1	4.32	3.17	2.27	1.67	6.67	7.45
8.98	8.33	6.67	6.01	5.08	4.31	3.18	2.25	1.69	6.63	7.4

Avenida Pico Westbound Lane 2

14+51 (test 61)

Notes: Longitudinal Cracks

Pvt Temp: 75.8° F

Avg FWD1: 7.54

GPS: 33.43878° Lat, -117.62280° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.11	7.63	6.63	6.31	5.66	5.14	4.24	3.29	2.6	6.72	7.07
9.11	7.51	6.54	6.22	5.57	5.1	4.19	3.32	2.58	6.6	7
9.06	7.48	6.5	6.21	5.57	5.07	4.2	3.3	2.53	6.6	6.94

14+98 (test 62)

Notes: Longitudinal Cracks

Avenida Pico Westbound Lane 2

Pvt Temp: 76.5° F

Avg FWD1: 6.08333

GPS: 33.43869° Lat, -117.62289° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.74	6.14	5.25	4.94	4.48	4.05	3.44	2.65	2.09	5.63	6.11
8.59	6.03	5.19	4.87	4.41	3.97	3.45	2.62	2.03	5.51	5.91
8.67	6.08	5.18	4.9	4.4	4.01	3.47	2.61	2.13	5.51	5.95

15+45

Notes: CL of I-5 Southbound Offramp

Avenida Pico Westbound Lane 2

Pvt Temp: 0° F

GPS: 33.43869° Lat, -117.62289° Lon

Limit ☐ NIS ☐

16+01 (test 63)

Notes: Median, Raised Longitudinal Cracks

Avenida Pico Westbound Lane 2

Pvt Temp: 78.7° F

Avg FWD1: 8.68667

GPS: 33.43850° Lat, -117.62313° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.98	8.83	5.05	4.35	3.77	3.43	2.91	2.27	1.84	5.25	6.44
8.94	8.66	5.01	4.31	3.72	3.46	2.92	2.28	1.82	5.1	6.36
9.01	8.57	4.95	4.27	3.67	3.39	2.83	2.27	1.81	5.14	6.26

16+36

Notes: Median, Painted

Avenida Pico Westbound Lane 2

Pvt Temp: 0° F

GPS: 33.43850° Lat, -117.62313° Lon

Limit ☐ NIS ☐

16+56 (test 64)

Notes: Longitudinal Cracks

Avenida Pico Westbound Lane 2

Pvt Temp: 76.5° F

Avg FWD1: 9.27667

GPS: 33.43838° Lat, -117.62325° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.89	9.45	5	4.15	3.43	3.06	1.93	1.52	1.31	5.69	7.47
8.84	9.24	4.93	4.11	3.39	3	1.93	1.54	1.32	5.54	7.28
8.91	9.14	4.93	4.11	3.41	3.03	1.96	1.52	1.3	5.48	7.13

16+85
Notes: Begin Patch

Avenida Pico Westbound Lane 2
Pvt Temp: 0° F
GPS: 33.43838° Lat, -117.62325° Lon
Limit ☐ NIS ☐

17+01
Notes: End Patch

Avenida Pico Westbound Lane 2
Pvt Temp: 0° F
GPS: 33.43838° Lat, -117.62325° Lon
Limit ☐ NIS ☐

17+08 (test 65)
Notes: Longitudinal Cracks

Avg FWD1: 7.36

Avenida Pico Westbound Lane 2
Pvt Temp: 76.5° F
GPS: 33.43826° Lat, -117.62334° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.91	7.45	5.94	5.51	4.85	4.38	3.59	2.96	2.33	6.22	6.9
8.91	7.35	5.86	5.42	4.82	4.39	3.63	2.93	2.26	6.13	6.78
8.84	7.28	5.8	5.36	4.79	4.36	3.65	2.93	2.29	6.11	6.7

17+54 (test 66)
Notes: Longitudinal Cracks

Avg FWD1: 8.90667

Avenida Pico Westbound Lane 2
Pvt Temp: 77.3° F
GPS: 33.43815° Lat, -117.62341° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.72	8.95	6.32	5.72	5.01	4.5	3.63	2.87	2.27	6.51	7.55
8.81	8.95	6.27	5.7	5	4.5	3.64	2.86	2.26	6.44	7.44
8.81	8.82	6.25	5.7	4.99	4.47	3.66	2.87	2.26	6.44	7.39

18+02 (test 67)
Notes: CL of Avenida Navarro Longitudinal Cracks

Avg FWD1: 7.42667

Avenida Pico Westbound Lane 2
Pvt Temp: 78.4° F
GPS: 33.43803° Lat, -117.62347° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	7.51	5.12	4.64	4.04	3.61	3.13	2.35	1.99	5.48	6.39
8.86	7.43	5.09	4.61	3.98	3.61	3.08	2.37	1.95	5.39	6.24
8.94	7.34	5.05	4.57	3.99	3.59	3.1	2.39	1.97	5.32	6.19

18+52 (test 68)
Notes: Longitudinal Cracks

Avg FWD1: 8.32667

Avenida Pico Westbound Lane 2
Pvt Temp: 78° F
GPS: 33.43790° Lat, -117.62353° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.13	8.47	6.63	5.96	5.11	4.48	3.65	2.86	2.26	6.47	7.34
9.03	8.29	6.55	5.88	5.07	4.46	3.65	2.84	2.25	6.37	7.18
8.94	8.22	6.51	5.85	5.04	4.41	3.65	2.84	2.24	6.32	7.16

18+76
Notes: LTP

Avenida Pico Westbound Lane 2
Pvt Temp: 0° F
GPS: 33.43790° Lat, -117.62353° Lon
Limit ☐ NIS ☐

19+02 (test 69)

Avenida Pico Westbound Lane 2

Notes:

Pvt Temp: 77.6° F

Avg FWD1: 8.87667

GPS: 33.43777° Lat, -117.62358° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.98	9.06	6.71	5.94	5.06	4.48	3.78	2.77	2.14	6.88	7.96
8.86	8.88	6.57	5.87	5.01	4.45	3.71	2.76	2.14	6.73	7.77
8.81	8.69	6.45	5.77	4.89	4.36	3.71	2.75	2.13	6.67	7.67

19+49 (test 70)

Avenida Pico Westbound Lane 2

Notes: Near Traffic Sensors

Pvt Temp: 75.8° F

Avg FWD1: 8.13

GPS: 33.43765° Lat, -117.62363° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	8.32	6.33	5.72	4.89	4.32	3.54	2.63	2.08	6.83	7.7
8.79	8.05	6.12	5.59	4.81	4.23	3.53	2.61	2.01	6.62	7.44
8.79	8.02	6.22	5.58	4.77	4.27	3.55	2.63	2.03	6.59	7.44

20+14

Avenida Pico Westbound Lane 2

Notes: CL of Calle De Industrias

Pvt Temp: 0° F

GPS: 33.43765° Lat, -117.62363° Lon

Limit ☐ NIS ☐

Avenida Pico Eastbound Lane 2

00+00

Avenida Pico Eastbound Lane 2

Notes: Avenida Pico Eastbound Lane 2; CL of Via Pico Plaza

Pvt Temp: 0° F

GPS: 33.43765° Lat, -117.62363° Lon

Limit ☐ NIS ☐

00+42

Avenida Pico Eastbound Lane 2

Notes: Curb and Gutter

Pvt Temp: 0° F

GPS: 33.43765° Lat, -117.62363° Lon

Limit ☐ NIS ☐

00+56 (test 71)

Avenida Pico Eastbound Lane 2

Notes: Longitudinal Cracks

Pvt Temp: 74.3° F

Avg FWD1: 15.02

GPS: 33.43751° Lat, -117.62356° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.03	15.33	12.45	11.4	9.23	8	5.94	4.36	3.22	11.96	13.26
8.89	14.95	12.22	11.22	9.14	7.92	5.91	4.31	3.17	11.7	12.96
8.89	14.78	12.08	11.12	9.03	7.84	5.82	4.24	3.17	11.55	12.83

00+83 (test 72)

Avenida Pico Eastbound Lane 2

Notes: Longitudinal Cracks

Pvt Temp: 75.1° F

Avg FWD1: 9.21667

GPS: 33.43757° Lat, -117.62353° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	9.32	8.01	7.46	6.53	5.84	4.66	3.49	2.7	8.04	8.77
8.84	9.18	7.89	7.32	6.47	5.71	4.65	3.5	2.68	7.88	8.58
8.94	9.15	7.92	7.33	6.44	5.73	4.65	3.52	2.69	7.88	8.58

01+12

Notes: RTP

Avenida Pico Eastbound Lane 2

Pvt Temp: 0° F

GPS: 33.43757° Lat, -117.62353° Lon

Limit ☐ NIS ☐

01+29 (test 73)

Notes: Longitudinal Cracks

Avg FWD1: 10.0033

Avenida Pico Eastbound Lane 2

Pvt Temp: 75.8° F

GPS: 33.43769° Lat, -117.62347° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.98	10.12	8.3	7.64	6.69	5.91	4.7	3.59	2.8	8.41	9.25
8.98	9.98	8.2	7.58	6.62	5.92	4.63	3.57	2.78	8.28	9.06
9.03	9.91	8.17	7.56	6.61	5.84	4.61	3.59	2.78	8.26	9.01

01+78 (test 74)

Notes: Longitudinal Cracks

Avg FWD1: 6.78333

Avenida Pico Eastbound Lane 2

Pvt Temp: 76.9° F

GPS: 33.43782° Lat, -117.62342° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.06	6.88	5.54	5.02	4.32	3.86	3.15	2.47	1.97	5.42	6.15
8.91	6.73	5.44	4.93	4.33	3.82	3.18	2.45	1.94	5.34	6.05
8.89	6.74	5.47	4.95	4.31	3.85	3.17	2.45	1.93	5.33	6.04

02+27 (test 75)

Notes: Longitudinal Cracks

Avg FWD1: 9.54667

Avenida Pico Eastbound Lane 2

Pvt Temp: 76.2° F

GPS: 33.43795° Lat, -117.62337° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.79	9.68	7.81	7.1	6.16	5.37	4.26	3.17	2.41	8.13	8.98
8.81	9.56	7.73	7.04	6.08	5.38	4.33	3.18	2.4	7.96	8.84
8.67	9.4	7.59	6.98	6.06	5.29	4.3	3.19	2.41	7.91	8.71

02+76 (test 76)

Notes: Near Traffic Sensors

Avg FWD1: 8.46

Avenida Pico Eastbound Lane 2

Pvt Temp: 74.7° F

GPS: 33.43807° Lat, -117.62331° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.81	8.64	7.08	6.55	5.74	5.1	4.19	3.17	2.38	7.47	8.16
8.81	8.39	6.92	6.39	5.58	5.01	4.1	3.17	2.4	7.32	7.93
8.76	8.35	6.82	6.28	5.51	4.97	4.09	3.13	2.37	7.18	7.76

03+28 (test 77)

Notes:

Avg FWD1: 6.42

Avenida Pico Eastbound Lane 2

Pvt Temp: 75.1° F

GPS: 33.43820° Lat, -117.62323° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.89	6.46	5.26	4.83	4.22	3.77	3.03	2.43	0.85	5.45	6.03
8.81	6.38	5.14	4.72	4.12	3.67	3.08	2.37	1.87	5.33	5.9
8.94	6.42	5.21	4.79	4.17	3.72	3.1	2.44	1.92	5.4	5.94

03+77 (test 78)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 76.2° F

Avg FWD1: 7.64667

GPS: 33.43831° Lat, -117.62314° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.98	7.79	6.26	5.67	4.82	4.18	3.38	2.53	2.01	6.88	7.51
8.89	7.59	6.07	5.52	4.72	4.12	3.34	2.51	1.97	6.66	7.27
8.89	7.56	6.05	5.49	4.7	4.08	3.32	2.54	1.96	6.63	7.23

04+26 (test 79)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 74.7° F

Avg FWD1: 6.22333

GPS: 33.43842° Lat, -117.62305° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.18	6.31	5.59	5.09	4.25	3.73	3.03	2.51	2.06	5.05	5.41
9.11	6.23	5.53	4.99	4.19	3.71	3.01	2.49	2.07	4.98	5.4
9.13	6.13	5.44	4.92	4.14	3.69	2.98	2.46	2.04	4.92	5.26

04+83

Avenida Pico Eastbound Lane 2

Notes: CL of I-5 Southbound Onramp

Pvt Temp: 0° F

GPS: 33.43842° Lat, -117.62305° Lon

Limit ☐ NIS ☐

05+29 (test 80)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 72.1° F

Avg FWD1: 6.77667

GPS: 33.43861° Lat, -117.62280° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	6.79	5.63	5.27	4.58	4.13	3.77	2.97	2.35	5.38	6.05
9.06	6.82	5.65	5.33	4.69	4.16	3.79	2.99	2.41	5.44	6.07
8.94	6.72	5.6	5.28	4.61	4.12	3.74	2.95	2.37	5.33	5.99

05+82 (test 81)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 76.9° F

Avg FWD1: 7.28

GPS: 33.43870° Lat, -117.62267° Lon

Limit ☑ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.86	7.35	6.11	5.67	4.96	4.43	3.7	2.69	2.08	6.04	6.61
8.84	7.24	6.06	5.63	4.95	4.4	3.67	2.68	2.08	5.97	6.48
8.89	7.25	6.02	5.6	4.92	4.41	3.64	2.68	2.07	5.93	6.47

06+27 (test 82)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 75.1° F

Avg FWD1: 5.74333

GPS: 33.43876° Lat, -117.62255° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10

9.01	5.79	4.54	4.21	3.75	3.48	3.05	2.63	2.2	4.5	4.98
8.98	5.72	4.53	4.16	3.73	3.49	3.04	2.62	2.2	4.45	4.93
9.06	5.72	4.56	4.2	3.8	3.47	3.07	2.59	2.22	4.48	4.91

06+79 (test 83)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 63.7° F

Avg FWD1: 3.73667

GPS: 33.43876° Lat, -117.62256° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.03	3.75	3.03	2.85	2.64	2.54	2.33	1.96	1.68	2.95	3.2
9.03	3.72	3.04	2.87	2.68	2.51	2.29	1.98	1.67	2.93	3.21
9.08	3.74	3.03	2.89	2.71	2.55	2.28	1.98	1.7	2.97	3.21

07+27 (test 84)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 63.4° F

Avg FWD1: 3.07667

GPS: 33.43876° Lat, -117.62256° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.2	3.1	2.36	2.27	2.15	2.07	2.05	1.72	1.5	2.34	2.51
9.16	3.08	2.34	2.25	2.14	2.05	2.02	1.71	1.49	2.29	2.48
9.11	3.05	2.28	2.21	2.16	2.02	2.01	1.69	1.47	2.33	2.49

07+76 (test 85)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 63.4° F

Avg FWD1: 3.65

GPS: 33.43876° Lat, -117.62256° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.96	3.67	3.02	2.89	2.69	2.58	2.36	2.02	1.75	3.04	3.21
8.89	3.63	2.96	2.84	2.65	2.56	2.33	1.99	1.79	3.03	3.14
8.96	3.65	3	2.86	2.65	2.55	2.31	2.01	1.79	3	3.2

08+23 (test 86)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 74.7° F

Avg FWD1: 5.09333

GPS: 33.43903° Lat, -117.62198° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.86	5.1	3.89	3.61	3.25	3.12	2.75	2.27	1.76	4.11	4.73
8.84	5.13	3.88	3.66	3.29	3.1	2.77	2.28	1.93	4.14	4.71
8.79	5.05	3.82	3.59	3.23	3.08	2.74	2.26	1.91	4.07	4.6

08+93

Avenida Pico Eastbound Lane 2

Notes: CL of I-5 Northbound Offramp

Pvt Temp: 0° F

GPS: 33.43903° Lat, -117.62198° Lon

Limit ☐ NIS ☐

09+02 (test 87)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 77.3° F

Avg FWD1: 4.19667

GPS: 33.43906° Lat, -117.62173° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.08	4.21	3.35	3.12	2.86	2.61	2.26	1.83	1.49	3.55	3.87
9.03	4.19	3.4	3.15	2.83	2.61	2.22	1.81	1.5	3.51	3.85

9.03	4.19	3.37	3.15	2.85	2.61	2.25	1.85	1.49	3.53	3.85

09+53 (test 88)

Notes: Longitudinal Cracks

Avg FWD1: 4.10333

Avenida Pico Eastbound Lane 2
Pvt Temp: 75.8° F
GPS: 33.43910° Lat, -117.62157° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.06	4.15	3.49	3.26	2.95	2.73	2.43	1.97	1.61	3.54	3.76
8.98	4.07	3.38	3.17	2.88	2.68	2.39	1.88	1.55	3.45	3.71
9.01	4.09	3.39	3.23	2.92	2.67	2.4	1.93	1.57	3.47	3.72

09+81

Notes: Change in Pavement

Avenida Pico Eastbound Lane 2
Pvt Temp: 0° F
GPS: 33.43910° Lat, -117.62157° Lon
Limit ☑ NIS ☐

10+54 (test 89)

Notes:

Avg FWD1: 14.67

Avenida Pico Eastbound Lane 2
Pvt Temp: 74° F
GPS: 33.43922° Lat, -117.62127° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.84	14.95	11.18	9.95	8.1	6.72	5	3.62	2.77	10.4	12.02
8.86	14.58	10.94	9.72	7.97	6.62	4.97	3.57	2.7	10.11	11.71
8.91	14.48	10.89	9.74	7.93	6.6	5	3.61	2.76	10.09	11.61

11+53 (test 90)

Notes:

Avg FWD1: 10.69

Avenida Pico Eastbound Lane 2
Pvt Temp: 74.3° F
GPS: 33.43936° Lat, -117.62100° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.01	10.83	7.91	7.22	6.34	5.76	4.79	3.67	3.07	7.55	8.72
8.91	10.63	7.87	7.16	6.35	5.7	4.82	3.68	3.02	7.49	8.63
8.89	10.61	7.91	7.22	6.34	5.77	4.84	3.69	3.04	7.48	8.63

12+51 (test 91)

Notes:

Avg FWD1: 8.49

Avenida Pico Eastbound Lane 2
Pvt Temp: 74° F
GPS: 33.43952° Lat, -117.62072° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.96	8.62	6.65	5.98	5.11	4.46	3.6	2.85	2.4	7.55	8.33
8.89	8.43	6.56	5.89	5.05	4.44	3.61	2.83	2.38	7.48	8.19
8.91	8.42	6.54	5.86	4.99	4.38	3.63	2.81	2.33	7.43	8.1

13+54 (test 92)

Notes:

Avg FWD1: 8.81667

Avenida Pico Eastbound Lane 2
Pvt Temp: 74° F
GPS: 33.43966° Lat, -117.62043° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.98	8.93	7.34	7.02	6.46	6.03	5.2	4.17	3.32	7.42	7.94
8.94	8.76	7.28	6.98	6.45	6.05	5.2	4.18	3.31	7.36	7.92
8.86	8.76	7.22	6.9	6.35	5.96	5.17	4.13	3.28	7.31	7.81

14+51 (test 93)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 73.6° F

Avg FWD1: 9.21667

GPS: 33.43976° Lat, -117.62014° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.89	9.26	7.4	7	6.29	5.83	5.04	3.95	3.1	7.52	8.12
8.84	9.18	7.34	6.97	6.31	5.77	5.11	3.94	3.17	7.47	8.09
8.96	9.21	7.43	7.01	6.31	5.86	5.15	3.98	3.1	7.51	8.11

15+16

Avenida Pico Eastbound Lane 2

Notes: Lateral Trench

Pvt Temp: 0° F

GPS: 33.43976° Lat, -117.62014° Lon

Limit ☐ NIS ☐

15+51 (test 94)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 73.2° F

Avg FWD1: 11.48

GPS: 33.43985° Lat, -117.61983° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.91	11.54	8.94	8.17	7.05	6.21	4.95	3.68	2.78	9.06	10.08
8.86	11.45	8.87	8.15	7.03	6.21	5.05	3.68	2.79	8.99	10.02
8.96	11.45	8.89	8.13	7.07	6.24	5.08	3.74	2.81	8.98	9.99

16+54 (test 95)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 73.2° F

Avg FWD1: 7.31333

GPS: 33.43994° Lat, -117.61951° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.03	7.41	4.39	3.83	3.3	2.97	2.48	1.89	1.53	4.57	5.53
8.94	7.27	4.35	3.84	3.31	2.95	2.48	1.86	1.53	4.5	5.43
8.98	7.26	4.36	3.82	3.32	2.94	2.43	1.85	1.53	4.48	5.39

17+59 (test 96)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 72.1° F

Avg FWD1: 11.2167

GPS: 33.44003° Lat, -117.61918° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	11.4	8.99	8.3	7.22	6.39	5.05	3.8	2.89	9.45	10.22
8.94	11.2	8.9	8.17	7.14	6.35	5.01	3.77	2.87	9.32	10.08
8.86	11.05	8.77	8.12	7.06	6.31	4.98	3.77	2.89	9.19	9.96

18+52 (test 97)

Avenida Pico Eastbound Lane 2

Notes:

Pvt Temp: 72.5° F

Avg FWD1: 5.08667

GPS: 33.44012° Lat, -117.61890° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.96	5.16	3.51	3.24	2.89	2.58	2.19	1.69	1.33	3.75	4.08
8.89	5.05	3.46	3.2	2.88	2.56	2.24	1.65	1.37	3.68	4
9.01	5.05	3.46	3.22	2.87	2.56	2.24	1.66	1.35	3.63	3.96

19+58 (test 98)

Avenida Pico Eastbound Lane 2

Notes:

Avg FWD1: 8.96

Pvt Temp: 73.2° F

GPS: 33.44025° Lat, -117.61859° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.84	9.01	7.37	6.96	6.25	5.64	4.65	3.59	2.74	7.58	8.16
8.89	8.94	7.3	6.91	6.21	5.56	4.62	3.58	2.71	7.49	8.06
8.86	8.93	7.33	6.9	6.23	5.61	4.61	3.56	2.75	7.44	8

20+32

Notes: CL of SC High School

Avenida Pico Eastbound Lane 2

Pvt Temp: 0° F

GPS: 33.44025° Lat, -117.61859° Lon

Limit ☐ NIS ☐

Avinida Pica Westbound Lane 3

00+00

Notes: Avinida Pica Westbound Lane 3; CL of SC High School

Avinida Pica Westbound Lane 3

Pvt Temp: 0° F

GPS: 33.44025° Lat, -117.61859° Lon

Limit ☐ NIS ☐

00+97 (test 99)

Notes:

Avg FWD1: 7.69

Avinida Pica Westbound Lane 3

Pvt Temp: 73.6° F

GPS: 33.44034° Lat, -117.61879° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.01	7.77	5.73	5.3	4.65	4.18	3.51	2.58	1.98	5.53	6.31
8.98	7.64	5.64	5.21	4.61	4.13	3.5	2.55	2.04	5.52	6.19
9.11	7.66	5.69	5.23	4.66	4.19	3.56	2.61	2.01	5.59	6.22

02+26 (test 100)

Notes:

Avg FWD1: 6.46

Avinida Pica Westbound Lane 3

Pvt Temp: 69.6° F

GPS: 33.44019° Lat, -117.61918° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.91	6.52	5.04	4.73	4.23	3.86	3.39	2.64	2.15	4.98	5.54
8.98	6.44	5.02	4.67	4.19	3.86	3.35	2.61	2.1	4.87	5.45
9.03	6.42	5	4.66	4.17	3.8	3.29	2.6	2.08	4.9	5.39

03+03 (test 101)

Notes:

Avg FWD1: 8.54

Avinida Pica Westbound Lane 3

Pvt Temp: 70.3° F

GPS: 33.44011° Lat, -117.61941° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.08	8.65	6.38	5.77	5.03	4.45	3.65	2.7	2.18	6.17	7.19
9.01	8.54	6.32	5.74	4.97	4.4	3.58	2.72	2.14	6.07	7.09
9.06	8.43	6.3	5.72	4.96	4.38	3.58	2.73	2.12	6	7.02

04+01 (test 102)

Notes:

Avg FWD1: 9.72333

Avinida Pica Westbound Lane 3

Pvt Temp: 67.7° F

GPS: 33.44003° Lat, -117.61971° Lon

Limit ☑ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.84	9.87	7.5	6.94	6.05	5.39	4.46	3.3	2.54	7.58	8.4
8.86	9.71	7.43	6.9	6.01	5.37	4.4	3.26	2.57	7.47	8.25
8.91	9.59	7.42	6.84	5.97	5.34	4.44	3.28	2.55	7.4	8.16

05+00 (test 103)

Avinida Pica Westbound Lane 3

Notes:

Pvt Temp: 67.7° F

Avg FWD1: 5.28667

GPS: 33.43995° Lat, -117.62002° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.03	5.34	4.04	3.75	3.38	3.08	2.61	2.18	1.86	3.99	4.49
8.98	5.26	4	3.76	3.35	3.05	2.67	2.21	1.81	3.99	4.42
9.01	5.26	4.02	3.78	3.32	3.09	2.66	2.23	1.82	4	4.44

06+01 (test 104)

Avinida Pica Westbound Lane 3

Notes:

Pvt Temp: 68.8° F

Avg FWD1: 5.99333

GPS: 33.43986° Lat, -117.62033° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.11	6.07	5.32	5.13	4.78	4.55	4.12	3.4	2.77	5.3	5.47
8.98	5.94	5.19	5.02	4.68	4.46	4.08	3.37	2.76	5.18	5.42
8.94	5.97	5.23	5.06	4.72	4.49	4.04	3.33	2.79	5.2	5.37

07+02 (test 105)

Avinida Pica Westbound Lane 3

Notes:

Pvt Temp: 69.9° F

Avg FWD1: 4.91

GPS: 33.43974° Lat, -117.62063° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.03	4.93	3.68	3.47	3.11	2.84	2.49	1.95	1.6	3.92	4.17
9.06	4.92	3.67	3.44	3.12	2.84	2.5	1.97	1.62	3.89	4.17
9.03	4.88	3.7	3.45	3.13	2.84	2.51	1.96	1.63	3.87	4.15

08+01 (test 106)

Avinida Pica Westbound Lane 3

Notes:

Pvt Temp: 69.6° F

Avg FWD1: 5.35333

GPS: 33.43961° Lat, -117.62091° Lon

Limit ☑ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.13	5.4	3.97	3.75	3.42	3.18	2.68	2	1.58	3.87	4.41
9.01	5.31	3.9	3.71	3.39	3.09	2.63	1.99	1.51	3.83	4.34
9.62	5.35	3.91	3.72	3.39	3.12	2.66	2	1.52	3.86	4.34

09+02 (test 107)

Avinida Pica Westbound Lane 3

Notes:

Pvt Temp: 72.5° F

Avg FWD1: 9.06667

GPS: 33.43945° Lat, -117.62118° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.01	9.14	6.24	5.71	4.96	4.47	3.77	2.78	2.15	6.39	7.23
8.96	9.03	6.24	5.68	4.95	4.47	3.77	2.78	2.16	6.36	7.17
8.98	9.03	6.24	5.69	4.95	4.49	3.78	2.81	2.16	6.35	7.1

10+01 (test 108)

Avinida Pica Westbound Lane 3

Notes: Near Traffic Sensors

Pvt Temp: 71.8° F

Avg FWD1: 10.6933

GPS: 33.43931° Lat, -117.62145° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.79	10.78	7.97	7.21	6.16	5.41	4.19	3.19	2.41	7.81	8.97
8.89	10.7	7.98	7.22	6.18	5.45	4.2	3.17	2.42	7.82	8.92
8.84	10.6	7.87	7.15	6.11	5.36	4.11	3.13	2.41	7.67	8.76

10+37
Notes: Change in Pavement

Avinida Pica Westbound Lane 3
Pvt Temp: 0° F
GPS: 33.43931° Lat, -117.62145° Lon
Limit ☐ NIS ☐

11+02 (test 109)
Notes:

Avg FWD1: 8.16667

Avinida Pica Westbound Lane 3
Pvt Temp: 74.3° F
GPS: 33.43920° Lat, -117.62176° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.06	8.2	6.8	6.33	5.58	4.99	4.03	3.15	2.44	6.77	7.51
9.11	8.16	6.78	6.29	5.53	4.98	4.02	3.17	2.46	6.81	7.45
9.01	8.14	6.76	6.27	5.51	4.98	4.03	3.14	2.41	6.81	7.42

11+68
Notes: CL of I-5 Northbound Onramp

Avinida Pica Westbound Lane 3
Pvt Temp: 0° F
GPS: 33.43920° Lat, -117.62176° Lon
Limit ☐ NIS ☐

12+51 (test 110)
Notes:

Avg FWD1: 7.29

Avinida Pica Westbound Lane 3
Pvt Temp: 62.6° F
GPS: 33.43904° Lat, -117.62221° Lon
Limit ☑ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.96	7.33	6.13	5.58	4.77	4.11	3.1	2.22	1.67	5.92	6.68
8.91	7.21	6.06	5.54	4.75	4.07	3.11	2.24	1.67	5.86	6.62
8.96	7.33	6.05	5.51	4.73	4.09	3.14	2.25	1.65	5.81	6.56

12+95 (test 111)
Notes:

Avg FWD1: 4.98333

Avinida Pica Westbound Lane 3
Pvt Temp: 62.3° F
GPS: 33.43905° Lat, -117.62223° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.16	5.06	3.75	3.29	2.66	2.18	1.55	1.03	0.81	3.69	4.34
9.06	4.95	3.69	3.23	2.58	2.16	1.56	1.02	0.79	3.61	4.25
9.03	4.94	3.65	3.22	2.58	2.13	1.54	1.03	0.78	3.55	4.19

12+99
Notes: Begin Patch

Avinida Pica Westbound Lane 3
Pvt Temp: 0° F
GPS: 33.43905° Lat, -117.62223° Lon
Limit ☐ NIS ☐

13+04
Notes: End Patch

Avinida Pica Westbound Lane 3
Pvt Temp: 0° F
GPS: 33.43905° Lat, -117.62223° Lon
Limit ☐ NIS ☐

13+50 (test 112)
Notes: Near Traffic Sensors
Avg FWD1: 5.44333

Avinida Pica Westbound Lane 3
Pvt Temp: 62.6° F
GPS: 33.43905° Lat, -117.62223° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.11	5.54	3.68	3.03	2.28	1.81	1.27	0.89	0.78	3.75	4.5
9.03	5.41	3.62	3	2.21	1.79	1.29	0.91	0.78	3.65	4.4
9.08	5.38	3.58	2.97	2.21	1.79	1.26	0.9	0.77	3.6	4.33

14+04 (test 113)
Notes:
Avg FWD1: 4.57

Avinida Pica Westbound Lane 3
Pvt Temp: 72.1° F
GPS: 33.43905° Lat, -117.62223° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.11	4.65	3.54	3.09	2.5	2.04	1.45	0.96	0.73	3.51	4.11
9.06	4.54	3.47	3.05	2.45	2	1.44	0.98	0.75	3.41	3.99
9.13	4.52	3.44	3.01	2.43	2	1.43	0.99	0.75	3.36	3.97

14+51 (test 114)
Notes:
Avg FWD1: 3.59333

Avinida Pica Westbound Lane 3
Pvt Temp: 70.3° F
GPS: 33.43880° Lat, -117.62281° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.03	3.64	2.06	1.68	1.36	1.19	1.18	1	0.95	2.7	3.23
8.98	3.59	2.05	1.68	1.34	1.13	1.17	1.02	0.94	2.63	3.16
8.94	3.55	2.01	1.66	1.35	1.14	1.12	1	0.94	2.58	3.1

15+01 (test 115)
Notes:
Avg FWD1: 8.82667

Avinida Pica Westbound Lane 3
Pvt Temp: 68.5° F
GPS: 33.43870° Lat, -117.62292° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.03	8.94	7.54	6.98	6.07	5.41	4.19	3.27	2.5	7.63	8.28
8.79	8.76	7.43	6.87	5.99	5.35	4.16	3.19	2.44	7.46	8.13
8.94	8.78	7.42	6.84	6.02	5.37	4.19	3.25	2.52	7.47	8.13

15+46
Notes: CL of I-5 Southbound Offramp

Avinida Pica Westbound Lane 3
Pvt Temp: 0° F
GPS: 33.43870° Lat, -117.62292° Lon
Limit ☐ NIS ☐

15+90 (test 116)
Notes: Lateral Cracks
Avg FWD1: 5.21333

Avinida Pica Westbound Lane 3
Pvt Temp: 72.1° F
GPS: 33.43854° Lat, -117.62313° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.01	5.25	4.11	3.78	3.4	3.13	2.77	2.3	1.94	3.77	4.5
8.96	5.21	4.07	3.76	3.33	3.15	2.74	2.29	1.93	3.76	4.46
8.91	5.18	4.03	3.76	3.33	3.16	2.74	2.27	1.92	3.7	4.43

16+54 (test 117)

Notes: Longitudinal Cracks

Avg FWD1: 3.7

Avinida Pica Westbound Lane 3
Pvt Temp: 74.7° F
GPS: 33.43840° Lat, -117.62326° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.06	3.72	2.29	2.11	2.04	2.06	2.17	1.8	1.55	2.36	2.92
9.03	3.71	2.27	2.08	2.02	2.04	2.17	1.84	1.55	2.35	2.85
9.03	3.67	2.3	2.09	2.03	2.05	2.15	1.84	1.58	2.35	2.85

17+06 (test 118)

Notes: Near Traffic Sensors

Avg FWD1: 3.19333

Avinida Pica Westbound Lane 3
Pvt Temp: 73.2° F
GPS: 33.43829° Lat, -117.62336° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.13	3.16	2.4	2.3	2.19	2.11	2.13	1.9	1.68	2.54	2.74
9.16	3.2	2.37	2.31	2.19	2.1	2.14	1.94	1.69	2.49	2.71
9.13	3.22	2.41	2.29	2.2	2.1	2.15	1.91	1.69	2.5	2.69

17+55 (test 119)

Notes:

Avg FWD1: 5.05333

Avinida Pica Westbound Lane 3
Pvt Temp: 75.8° F
GPS: 33.43817° Lat, -117.62344° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.91	5.16	3.09	2.68	2.31	1.99	1.79	1.62	1.42	3.47	4.12
8.94	5.03	3.08	2.61	2.24	1.99	1.81	1.59	1.39	3.36	3.99
8.81	4.97	3	2.63	2.25	2	1.81	1.61	1.43	3.34	3.92

18+04

Notes: CL of Avenida Navarro

Avinida Pica Westbound Lane 3
Pvt Temp: 0° F
GPS: 33.43817° Lat, -117.62344° Lon
Limit ☐ NIS ☐

18+54 (test 120)

Notes: Longitudinal Cracks

Avg FWD1: 7.62667

Avinida Pica Westbound Lane 3
Pvt Temp: 76.2° F
GPS: 33.43792° Lat, -117.62356° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.03	7.71	6.42	5.97	5.24	4.69	3.91	3.01	2.34	6.49	7.13
8.96	7.59	6.36	5.92	5.22	4.69	3.9	3.04	2.4	6.44	7.06
8.98	7.58	6.32	5.9	5.22	4.7	3.88	3.02	2.41	6.37	7.02

19+05 (test 121)

Notes: Longitudinal Cracks

Avg FWD1: 5.13667

Avinida Pica Westbound Lane 3
Pvt Temp: 75.8° F
GPS: 33.43779° Lat, -117.62361° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.11	5.19	4	3.77	3.46	3.24	3.09	2.44	1.99	4.45	4.85

9.08	5.12	3.95	3.75	3.41	3.21	3.04	2.4	2	4.37	4.74
9.01	5.1	3.95	3.74	3.43	3.23	3.09	2.37	2	4.36	4.72

19+54 (test 122)

Notes: Longitudinal Cracks, Near Traffic Sensors

Avg FWD1: 11.6133

Avinida Pica Westbound Lane 3
Pvt Temp: 74.7° F
GPS: 33.43766° Lat, -117.62366° Lon
Limit ☐ NIS ☑

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.74	11.67	8.74	8.04	6.85	5.92	4.54	3.32	2.48	9.26	10.23
8.79	11.65	8.72	8.03	6.87	5.91	4.57	3.37	2.56	9.2	10.11
8.69	11.52	8.62	7.96	6.78	5.9	4.56	3.31	2.53	9.08	9.97

20+18

Notes: CL of Calle De Industrias

Avinida Pica Westbound Lane 3
Pvt Temp: 0° F
GPS: 33.43766° Lat, -117.62366° Lon
Limit ☐ NIS ☐

Avenida Pico Eastbound Lane 3

00+00

Notes: Avenida Pico Eastbound Lane 3; CL of Via Pico Plaza

Avenida Pico Eastbound Lane 3
Pvt Temp: 0° F
GPS: 33.43766° Lat, -117.62366° Lon
Limit ☐ NIS ☐

00+38

Notes: Curb and Gutter

Avenida Pico Eastbound Lane 3
Pvt Temp: 0° F
GPS: 33.43766° Lat, -117.62366° Lon
Limit ☐ NIS ☐

01+03 (test 123)

Notes:

Avg FWD1: 4.42333

Avenida Pico Eastbound Lane 3
Pvt Temp: 74.3° F
GPS: 33.43760° Lat, -117.62348° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.13	4.44	4.04	3.96	3.71	3.56	3.25	2.79	2.36	4.02	4.23
9.08	4.41	4.06	3.95	3.7	3.52	3.24	2.79	2.33	4	4.29
9.13	4.42	4.05	3.95	3.7	3.53	3.21	2.82	2.35	4	4.23

01+52 (test 124)

Notes:

Avg FWD1: 3.99

Avenida Pico Eastbound Lane 3
Pvt Temp: 74.3° F
GPS: 33.43773° Lat, -117.62343° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.96	4.01	3.56	3.43	3.25	3.14	2.98	2.55	2.16	3.58	3.72
8.91	3.96	3.54	3.44	3.26	3.11	2.99	2.56	2.16	3.57	3.74
8.89	4	3.52	3.46	3.28	3.16	3	2.57	2.14	3.57	3.74

02+02 (test 125)

Avenida Pico Eastbound Lane 3

02+02 (test 125)

Avenida Pico Eastbound Lane 3

Notes:

Pvt Temp: 75.1° F

Avg FWD1: 2.46667

GPS: 33.43786° Lat, -117.62338° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.62	2.9	1.93	1.9	1.79	1.79	1.7	1.47	1.34	2.19	2.55
8.59	2.16	1.97	1.87	1.8	1.73	1.66	1.49	1.28	2.13	2.5
8.64	2.34	1.96	1.9	1.81	1.75	1.69	1.48	1.33	2.12	2.5

02+49 (test 126)

Avenida Pico Eastbound Lane 3

Notes:

Pvt Temp: 73.6° F

Avg FWD1: 3.20333

GPS: 33.43798° Lat, -117.62332° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.01	3.23	2.72	2.62	2.5	2.42	2.33	2.04	1.78	2.7	2.89
9.01	3.2	2.66	2.59	2.45	2.37	2.28	2.04	1.75	2.67	2.82
8.98	3.18	2.7	2.61	2.5	2.4	2.36	2.05	1.76	2.67	2.87

03+00 (test 127)

Avenida Pico Eastbound Lane 3

Notes: Near Traffic Sensors

Pvt Temp: 76.5° F

Avg FWD1: 4.94

GPS: 33.43810° Lat, -117.62325° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.86	4.98	4.45	4.31	3.98	3.83	3.51	2.9	9.95	4.45	4.69
8.74	4.89	4.4	4.31	4	3.83	3.51	2.9	7.58	4.4	4.65
8.89	4.95	4.45	4.33	3.99	3.86	3.53	2.92	6.86	4.44	4.66

03+52 (test 128)

Avenida Pico Eastbound Lane 3

Notes: Longitudinal Cracks

Pvt Temp: 76.2° F

Avg FWD1: 4.86

GPS: 33.43823° Lat, -117.62317° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.89	4.84	4.33	4.2	3.92	3.77	3.41	2.94	2.47	4.28	4.56
9.03	4.87	4.39	4.22	3.96	3.76	3.43	2.92	2.45	4.28	4.59
8.94	4.87	4.34	4.18	3.96	3.82	3.46	2.92	2.44	4.27	4.57

04+04 (test 129)

Avenida Pico Eastbound Lane 3

Notes: Near Traffic Sensors

Pvt Temp: 77.3° F

Avg FWD1: 4.82333

GPS: 33.43835° Lat, -117.62307° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.86	4.85	4.25	4.07	3.8	3.64	3.24	2.73	2.24	4.32	4.58
8.79	4.8	4.13	4.03	3.76	3.56	3.18	2.67	2.25	4.31	4.52
8.72	4.82	4.19	4.05	3.77	3.57	3.19	2.67	2.22	4.26	4.51

04+85

Avenida Pico Eastbound Lane 3

Notes: CL of I-5 Southbound Onramp

Pvt Temp: 0° F

GPS: 33.43835° Lat, -117.62307° Lon

Limit ☐ NIS ☐

09+02

Avenida Pico Eastbound Lane 3

Notes: CL of I-5 Northbound Offramp

Pvt Temp: 0° F

GPS: 33.43835° Lat, -117.62307° Lon
Limit ☑ NIS ☐

09+86
Notes: Change in Pavement

Avenida Pico Eastbound Lane 3
Pvt Temp: 0° F
GPS: 33.43835° Lat, -117.62307° Lon
Limit ☐ NIS ☐

10+02 (test 130)
Notes:
Avg FWD1: 12.7667

Avenida Pico Eastbound Lane 3
Pvt Temp: 77.3° F
GPS: 33.43914° Lat, -117.62142° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.76	12.97	10.1	8.95	7.43	6.31	4.49	3.11	2.25	10.72	12
8.69	12.71	9.94	8.78	7.27	6.11	4.42	3.05	2.25	10.46	11.68
8.72	12.62	9.87	8.71	7.27	6.14	4.38	3.11	2.25	10.37	11.55

11+02 (test 131)
Notes:
Avg FWD1: 11.4933

Avenida Pico Eastbound Lane 3
Pvt Temp: 80.2° F
GPS: 33.43927° Lat, -117.62113° Lon
Limit ☑ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.62	11.56	9.56	8.89	7.99	7.35	6.11	4.78	3.68	10.56	11.12
8.69	11.49	9.52	8.82	7.95	7.35	6.1	4.72	3.61	10.52	11.05
8.72	11.43	9.49	8.82	7.88	7.34	6.06	4.73	3.63	10.49	10.96

12+01 (test 132)
Notes:
Avg FWD1: 5.98

Avenida Pico Eastbound Lane 3
Pvt Temp: 82.4° F
GPS: 33.43943° Lat, -117.62086° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.98	6.06	4.51	4.1	3.53	3.15	2.6	2.02	1.63	4.81	5.29
8.89	5.94	4.45	4.06	3.49	3.11	2.56	1.97	1.6	4.69	5.18
8.96	5.94	4.46	4.07	3.51	3.1	2.58	1.98	1.6	4.72	5.17

13+01 (test 133)
Notes:
Avg FWD1: 7.28

Avenida Pico Eastbound Lane 3
Pvt Temp: 79.1° F
GPS: 33.43957° Lat, -117.62058° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.98	7.31	6.19	5.84	5.3	4.88	4.13	3.29	2.62	6.41	6.82
8.96	7.29	6.11	5.78	5.22	4.91	4.14	3.26	2.63	6.37	6.76
9.01	7.24	6.11	5.8	5.23	4.91	4.13	3.31	2.64	6.34	6.7

14+01 (test 134)
Notes:
Avg FWD1: 8.34

Avenida Pico Eastbound Lane 3
Pvt Temp: 80.6° F
GPS: 33.43968° Lat, -117.62028° Lon
Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.91	8.38	7.32	7.02	6.44	5.95	5.02	3.99	3.09	7.6	7.96
8.91	8.34	7.29	7.01	6.4	5.96	4.99	3.99	3.09	7.59	7.92

8.81	8.3	7.27	6.94	6.38	5.93	4.99	3.95	3.05	7.54	7.88

15+00 (test 135)

Notes:

Avg FWD1: 9.91

Avenida Pico Eastbound Lane 3

Pvt Temp: 79.8° F

GPS: 33.43978° Lat, -117.61998° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.89	9.99	8.59	8.06	7.24	6.66	5.4	4.09	3.06	8.69	9.26
8.81	9.87	8.48	7.97	7.21	6.57	5.38	4.06	3.07	8.62	9.18
8.89	9.87	8.49	8.01	7.22	6.6	5.39	4.07	3.07	8.61	9.2

15+14

Notes: Lateral Trench

Avenida Pico Eastbound Lane 3

Pvt Temp: 0° F

GPS: 33.43978° Lat, -117.61998° Lon

Limit ☐ NIS ☐

16+01 (test 136)

Notes:

Avg FWD1: 18.58

Avenida Pico Eastbound Lane 3

Pvt Temp: 78.4° F

GPS: 33.43987° Lat, -117.61967° Lon

Limit ☐ NIS ☑

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.54	18.66	15.79	14.22	11.65	9.62	6.44	4.3	3.24	15.13	16.88
8.57	18.72	15.89	14.3	11.75	9.7	6.57	4.38	3.3	15.15	16.95
8.54	18.36	15.63	14.1	11.59	9.59	6.49	4.32	3.22	14.94	16.67

17+06 (test 137)

Notes:

Avg FWD1: 8.14667

Avenida Pico Eastbound Lane 3

Pvt Temp: 80.6° F

GPS: 33.43996° Lat, -117.61934° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.91	8.27	6.03	5.68	5.12	4.77	3.84	3.32	2.67	6.33	6.9
8.98	8.14	6.03	5.66	5.11	4.78	4.2	3.32	2.67	6.26	6.88
8.86	8.03	5.94	5.58	5.06	4.67	4.13	3.23	2.57	6.17	6.74

17+97

Notes: RTP

Avenida Pico Eastbound Lane 3

Pvt Temp: 0° F

GPS: 33.43996° Lat, -117.61934° Lon

Limit ☐ NIS ☐

17+98 (test 138)

Notes:

Avg FWD1: 6.68

Avenida Pico Eastbound Lane 3

Pvt Temp: 79.1° F

GPS: 33.44004° Lat, -117.61906° Lon

Limit ☑ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.06	6.73	4.98	4.66	4.1	3.63	2.88	2.14	1.71	5.08	5.62
8.98	6.66	4.97	4.62	4.07	3.59	2.89	2.13	1.61	5.02	5.5
8.91	6.65	4.98	4.61	4.08	3.57	2.85	2.14	1.59	4.98	5.51

19+03 (test 139)

Avenida Pico Eastbound Lane 3

Notes:

Avg FWD1: 10.6833

Pvt Temp: 79.1° F

GPS: 33.44015° Lat, -117.61874° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.72	10.8	8.37	7.75	6.83	6.09	4.9	3.72	2.85	8.71	9.55
8.69	10.67	8.31	7.71	6.73	6.05	4.84	3.7	2.86	8.62	9.41
8.54	10.58	8.28	7.67	6.73	6.05	4.86	3.69	2.82	8.55	9.35

20+00 (test 140)

Avenida Pico Eastbound Lane 3

Notes:

Pvt Temp: 77.3° F

Avg FWD1: 16.31

GPS: 33.44027° Lat, -117.61846° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.72	16.48	13.84	12.48	10.67	9.27	6.92	4.86	3.49	13.75	14.93
8.69	16.41	13.78	12.48	10.66	9.27	6.93	4.86	3.51	13.71	14.85
8.59	16.04	13.5	12.25	10.52	9.1	6.77	4.77	3.45	13.42	14.52

20+41

Avenida Pico Eastbound Lane 3

Notes: CL of SC High School

Pvt Temp: 0° F

GPS: 33.44027° Lat, -117.61846° Lon

Limit ☐ NIS ☐

Avenida Pico Westbound Lane 4

00+00

Avenida Pico Westbound Lane 4

Notes: Avenida Pico Westbound Lane 4; CL of SC High School Curb and Gutter

Pvt Temp: 0° F

GPS: 33.44027° Lat, -117.61846° Lon

Limit ☐ NIS ☐

00+51 (test 141)

Avenida Pico Westbound Lane 4

Notes:

Pvt Temp: 72.1° F

Avg FWD1: 9.62

GPS: 33.44044° Lat, -117.61869° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.76	9.7	7.96	7.29	6.33	5.54	4.34	3.2	2.36	8.15	8.85
8.86	9.65	7.9	7.26	6.32	5.6	4.37	3.24	2.37	8.12	8.81
8.86	9.51	7.87	7.21	6.29	5.51	4.3	3.21	2.35	8.01	8.67

01+58 (test 142)

Avenida Pico Westbound Lane 4

Notes:

Pvt Temp: 67.7° F

Avg FWD1: 18.3333

GPS: 33.44030° Lat, -117.61899° Lon

Limit ☐ NIS ☑

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.5	18.33	13.54	11.74	9.42	7.61	5.1	3.51	2.66	13.78	15.92
8.57	18.38	13.68	11.89	9.48	7.68	5.11	3.52	2.68	13.85	15.9
8.67	18.29	13.66	11.84	9.47	7.72	5.12	3.52	2.65	13.81	15.82

02+51 (test 143)

Avenida Pico Westbound Lane 4

Notes:

Pvt Temp: 65.9° F

Avg FWD1: 10.46

GPS: 33.44020° Lat, -117.61927° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.84	10.55	8.97	8.31	7.23	6.44	5.17	3.88	3.03	9.05	9.84
8.79	10.43	8.87	8.22	7.17	6.39	5.19	3.85	3.02	8.87	9.66
8.76	10.4	8.84	8.22	7.16	6.38	5.21	3.9	3.07	8.88	9.67

03+52 (test 144)

Avenida Pico Westbound Lane 4

Notes:

Pvt Temp: 64.5° F

Avg FWD1: 10.0333

GPS: 33.44010° Lat, -117.61958° Lon

Limit ☑ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.67	10.16	8.26	7.74	6.84	6.25	5.06	3.95	3.08	8.3	8.93
8.62	9.98	8.15	7.61	6.72	6.12	5.03	3.92	2.96	8.13	8.78
8.62	9.96	8.12	7.61	6.69	6.13	5.02	3.92	2.99	8.15	8.79

04+51 (test 145)

Avenida Pico Westbound Lane 4

Notes:

Pvt Temp: 65.2° F

Avg FWD1: 5.8

GPS: 33.44003° Lat, -117.61989° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.89	5.76	4.39	4.23	3.94	3.66	3.24	2.62	2.17	4.54	4.7
8.96	5.79	4.45	4.26	3.87	3.63	3.25	2.66	2.17	4.5	4.72
9.01	5.85	4.54	4.34	3.99	3.73	3.27	2.67	2.18	4.52	4.77

05+53 (test 146)

Avenida Pico Westbound Lane 4

Notes:

Pvt Temp: 65.6° F

Avg FWD1: 3.30667

GPS: 33.43994° Lat, -117.62021° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.11	3.36	2.48	2.46	2.35	2.32	2.44	2.08	1.89	2.47	2.62
9.03	3.28	2.45	2.41	2.29	2.29	2.43	2.05	1.85	2.44	2.57
9.08	3.28	2.45	2.42	2.3	2.3	2.44	2.05	1.86	2.43	2.57

06+50 (test 147)

Avenida Pico Westbound Lane 4

Notes:

Pvt Temp: 65.6° F

Avg FWD1: 5.25667

GPS: 33.43983° Lat, -117.62050° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.11	5.31	4.37	4.24	3.91	3.67	3.26	2.58	2.1	4.32	4.6
8.98	5.27	4.39	4.22	3.85	3.6	3.16	2.55	2.07	4.23	4.55
8.91	5.19	4.31	4.17	3.83	3.62	3.16	2.52	2.04	4.27	4.54

07+55 (test 148)

Avenida Pico Westbound Lane 4

Notes:

Pvt Temp: 65.6° F

Avg FWD1: 6.40667

GPS: 33.43970° Lat, -117.62080° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.76	6.39	5.03	4.73	4.3	3.87	3.21	2.32	1.67	5.13	5.45
8.84	6.47	5.1	4.79	4.34	3.93	3.29	2.34	1.68	5.19	5.5
8.72	6.36	5.02	4.73	4.24	3.88	3.17	2.31	1.68	5.08	5.4

08+52 (test 149)

Avenida Pico Westbound Lane 4

Notes:

Avg FWD1: 6.92333

Pvt Temp: 66.3° F

GPS: 33.43956° Lat, -117.62107° Lon

Limit ☑ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.86	6.88	5.12	4.9	4.43	4.09	3.44	2.38	7.66	5.1	5.59
8.89	6.97	5.19	4.96	4.51	4.21	3.47	2.42	26.48	5.14	5.67
9.01	6.92	5.19	4.94	4.51	4.14	3.48	2.42	5.55	5.11	5.69

09+56 (test 150)

Avenida Pico Westbound Lane 4

Notes:

Avg FWD1: 10.4033

Pvt Temp: 65.9° F

GPS: 33.43939° Lat, -117.62135° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.67	10.4	8.36	7.62	6.54	5.71	4.42	3.38	2.61	8.55	9.39
8.86	10.46	8.43	7.68	6.63	5.75	4.48	3.43	2.64	8.57	9.41
8.76	10.35	8.36	7.64	6.59	5.75	4.44	3.39	2.63	8.49	9.34

10+51 (test 151)

Avenida Pico Westbound Lane 4

Notes:

Avg FWD1: 7.34667

Pvt Temp: 68.8° F

GPS: 33.43927° Lat, -117.62162° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.84	7.38	5.82	5.27	4.52	3.9	3.23	2.3	1.82	5.97	6.58
8.84	7.33	5.82	5.28	4.5	3.93	3.18	2.33	1.77	5.98	6.57
8.94	7.33	5.79	5.28	4.51	3.91	3.3	2.34	1.82	5.95	6.52

11+63

Avenida Pico Westbound Lane 4

Notes: CL of I-5 Northbound Onramp

Pvt Temp: 0° F

GPS: 33.43927° Lat, -117.62162° Lon

Limit ☐ NIS ☐

15+35

Avenida Pico Westbound Lane 4

Notes: CL of I-5 Southbound Offramp

Pvt Temp: 0° F

GPS: 33.43927° Lat, -117.62162° Lon

Limit ☑ NIS ☐

16+21 (test 152)

Avenida Pico Westbound Lane 4

Notes:

Avg FWD1: 4.90333

Pvt Temp: 72.1° F

GPS: 33.43850° Lat, -117.62322° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.91	4.9	4.28	4.04	3.73	3.54	3.11	2.63	2.18	4.54	4.71
8.84	4.86	4.25	4.07	3.74	3.55	3.16	2.64	2.21	4.5	4.68
8.96	4.95	4.26	4.12	3.81	3.59	3.17	2.67	2.22	4.58	4.72

16+51 (test 153)

Avenida Pico Westbound Lane 4

Notes:

Avg FWD1: 5.07333

Pvt Temp: 69.9° F

GPS: 33.43843° Lat, -117.62328° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.06	5.17	4.67	4.52	4.22	4.13	3.8	3.19	2.77	4.56	4.85
8.86	5.04	4.58	4.44	4.13	4.02	3.76	3.15	2.68	4.55	4.8
8.86	5.01	4.6	4.44	4.16	4.05	3.75	3.18	2.66	4.52	4.75

17+01 (test 154)

Notes: Near Traffic Sensors

Avg FWD1: 5.02333

Avenida Pico Westbound Lane 4

Pvt Temp: 70.3° F

GPS: 33.43832° Lat, -117.62337° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.86	5.05	4.48	4.31	4.02	3.87	3.48	2.89	2.4	4.55	4.81
8.94	5.03	4.44	4.31	3.99	3.81	3.42	2.86	2.34	4.49	4.75
8.81	4.99	4.39	4.26	3.98	3.75	3.43	2.85	2.36	4.49	4.72

17+47 (test 155)

Notes:

Avg FWD1: 5.06667

Avenida Pico Westbound Lane 4

Pvt Temp: 68.5° F

GPS: 33.43821° Lat, -117.62345° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.18	5.15	4.7	4.54	4.21	3.92	3.62	2.95	2.41	4.77	4.92
9.08	5.05	4.62	4.45	4.14	3.92	3.69	2.87	2.35	4.64	4.84
8.94	5	4.54	4.42	4.1	3.83	3.61	2.87	2.36	4.6	4.83

18+00 (test 156)

Notes:

Avg FWD1: 4.18

Avenida Pico Westbound Lane 4

Pvt Temp: 72.5° F

GPS: 33.43808° Lat, -117.62352° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.96	4.22	3.73	3.54	3.27	3.07	2.83	2.34	1.96	3.57	3.87
8.91	4.13	3.65	3.49	3.23	3.04	2.78	2.3	1.9	3.53	3.83
8.91	4.19	3.68	3.53	3.27	3.11	2.83	2.33	1.96	3.49	3.83

18+07

Notes: CL of Avenida Navarro

Avenida Pico Westbound Lane 4

Pvt Temp: 0° F

GPS: 33.43808° Lat, -117.62352° Lon

Limit ☑ NIS ☐

18+56 (test 157)

Notes:

Avg FWD1: 6.98

Avenida Pico Westbound Lane 4

Pvt Temp: 73.2° F

GPS: 33.43793° Lat, -117.62358° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.96	7.05	6.09	5.61	4.98	4.36	3.47	2.69	2.14	6.33	6.69
8.89	6.94	5.98	5.54	4.84	4.32	3.47	2.7	2.13	6.19	6.59
8.89	6.95	5.99	5.56	4.86	4.36	3.44	2.65	2.12	6.18	6.58

19+06 (test 158)

Notes:

Avg FWD1: 8.02667

Avenida Pico Westbound Lane 4

Pvt Temp: 73.6° F

GPS: 33.43780° Lat, -117.62363° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.98	8.07	6.65	6.13	5.25	4.63	3.03	2.89	2.31	6.6	7.18
8.94	7.97	6.59	6.03	5.17	4.57	2.97	2.84	2.33	6.48	7.1

9.01	8.04	6.64	6.1	5.26	4.64	3.13	2.86	2.34	6.53	7.14

19+54 (test 159)

Notes: Near Traffic Sensors

Avg FWD1: 7.50667

Avenida Pico Westbound Lane 4

Pvt Temp: 72.1° F

GPS: 33.43768° Lat, -117.62368° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.81	7.57	6.35	5.81	4.98	4.53	3.83	3.07	2.58	6.4	7.07
8.72	7.43	6.23	5.75	4.97	4.49	3.83	3.02	2.57	6.32	6.91
8.86	7.52	6.35	5.82	5.01	4.58	3.86	3.11	2.63	6.44	7.07

20+19

Notes: CL of Calle De Industrias

Avenida Pico Westbound Lane 4

Pvt Temp: 0° F

GPS: 33.43768° Lat, -117.62368° Lon

Limit ☐ NIS ☐

Avenida Pico Eastbound I-5 Northbound Turn Lane

00+00

Notes: Avenida Pico Eastbound I-5 Northbound Turn Lane; CL of Via Pico Plaza

Avenida Pico Eastbound I-5 Northbound Turn Lane

Pvt Temp: 0° F

GPS: 33.43768° Lat, -117.62368° Lon

Limit ☐ NIS ☐

02+70 (test 160)

Notes:

Avg FWD1: 7.07333

Avenida Pico Eastbound I-5 Northbound Turn Lane

Pvt Temp: 70.3° F

GPS: 33.43807° Lat, -117.62339° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.81	7.19	5.51	4.97	4.21	3.76	3.05	2.4	5.12	5.74	6.52
8.74	6.99	5.41	4.9	4.21	3.73	3.05	2.37	1.87	5.65	6.37
8.79	7.04	5.45	4.92	4.23	3.77	3.07	2.39	1.91	5.68	6.4

03+27 (test 161)

Notes:

Avg FWD1: 5.73

Avenida Pico Eastbound I-5 Northbound Turn Lane

Pvt Temp: 70.7° F

GPS: 33.43821° Lat, -117.62330° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.84	5.78	4.27	3.82	3.4	3.11	2.61	2.13	1.76	4.73	5.35
8.89	5.73	4.23	3.77	3.33	3.05	2.6	2.07	1.72	4.69	5.27
8.76	5.68	4.21	3.82	3.37	3.02	2.58	2.12	1.7	4.66	5.23

03+81 (test 162)

Notes:

Avg FWD1: 5.92333

Avenida Pico Eastbound I-5 Northbound Turn Lane

Pvt Temp: 68.8° F

GPS: 33.43834° Lat, -117.62321° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.69	5.8	5.14	4.75	4.13	3.75	3.23	2.41	1.94	5.45	5.87
8.62	5.94	5.05	4.66	4.11	3.66	3.23	2.4	1.92	5.32	5.72
8.67	6.03	5.12	4.73	4.15	3.75	3.26	2.44	1.97	5.38	5.79

04+27 (test 163)

Avenida Pico Eastbound I-5 Northbound Turn Lane

Notes:

Pvt Temp: 69.6° F

Avg FWD1: 11.0533

GPS: 33.43844° Lat, -117.62312° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.59	11.2	9.1	8.31	7.13	6.24	4.81	3.62	2.8	9.37	10.41
8.57	11.06	9.02	8.22	7.06	6.15	4.8	3.64	2.8	9.29	10.22
8.52	10.9	8.94	8.15	6.98	6.15	4.74	3.58	2.8	9.1	10.1

04+81

Avenida Pico Eastbound I-5 Northbound Turn Lane

Notes: CL of I-5 Southbound ONramp

Pvt Temp: 0° F

GPS: 33.43844° Lat, -117.62312° Lon

Limit ☑ NIS ☐

05+54 (test 164)

Avenida Pico Eastbound I-5 Northbound Turn Lane

Notes:

Pvt Temp: 75.8° F

Avg FWD1: 2.39

GPS: 33.43867° Lat, -117.62282° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	2.38	1.91	1.8	1.66	1.59	1.38	1.16	0.93	1.7	1.86
9.01	2.4	1.93	1.81	1.67	1.61	1.38	1.14	0.92	1.72	1.89
8.86	2.39	1.91	1.78	1.64	1.6	1.39	1.13	0.94	1.72	1.85

05+79 (test 165)

Avenida Pico Eastbound I-5 Northbound Turn Lane

Notes:

Pvt Temp: 75.4° F

Avg FWD1: 3.81667

GPS: 33.43872° Lat, -117.62275° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.96	3.96	3.17	3.02	2.77	2.59	2.31	1.91	1.61	3.25	3.41
8.86	3.72	3.16	3	2.76	2.61	2.32	1.9	0.67	3.23	3.39
8.89	3.77	3.13	2.99	2.77	2.62	2.35	1.91	1.59	3.19	3.38

06+28 (test 166)

Avenida Pico Eastbound I-5 Northbound Turn Lane

Notes:

Pvt Temp: 76.5° F

Avg FWD1: 4.04333

GPS: 33.43879° Lat, -117.62262° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
9.01	4.06	3.41	3.19	2.96	2.75	2.39	2.04	1.68	3.39	3.63
8.86	4.04	3.34	3.15	2.9	2.76	2.41	2.04	1.7	3.43	3.6
8.94	4.03	3.34	3.14	2.9	2.69	2.36	2.04	1.7	3.34	3.57

06+81 (test 167)

Avenida Pico Eastbound I-5 Northbound Turn Lane

Notes:

Pvt Temp: 67.4° F

Avg FWD1: 3.54333

GPS: 33.43884° Lat, -117.62252° Lon

Limit ☐ NIS ☐

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.94	3.62	3.17	3.02	2.86	2.67	2.53	2.09	1.72	3.26	3.45
8.86	3.49	3.08	2.93	2.72	2.57	2.44	1.98	1.66	3.15	3.24
8.76	3.52	3.08	2.98	2.77	2.65	2.44	2.02	1.5	3.11	3.24

07+29 (test 168)

Avenida Pico Eastbound I-5 Northbound Turn Lane

Pvt Temp: 67.7° F

GPS: 33.43884° Lat, -117.62252° Lon

Limit ☐ NIS ☐

Notes:

Avg FWD1: 3.80333

Force	FWD1	FWD2	FWD3	FWD4	FWD5	FWD6	FWD7	FWD8	FWD9	FWD10
8.96	3.81	3.08	2.93	2.72	2.61	2.39	1.94	1.59	3.08	3.29
8.94	3.83	3.09	2.96	2.75	2.63	2.4	1.98	1.59	3.09	3.28
8.79	3.77	3	2.92	2.71	2.6	2.38	1.93	1.61	3.02	3.23

09+11

Avenida Pico Eastbound I-5 Northbound Turn Lane

Pvt Temp: 0° F

GPS: 33.43884° Lat, -117.62252° Lon

Limit ☐ NIS ☐

Notes: CL of I-5 Northbound Onramp

Appendix E

R-Value Determination
and
Plasticity Index

LaBelle Marvin
PAVEMENT ANALYSIS, DESIGN, TESTING, & INSPECTION SERVICES

R - VALUE DATA SHEET

Parsons
Avenida Pico

PROJECT NUMBER 38212 BORING NUMBER: Subgrade 8-2

SAMPLE DESCRIPTION: Brown Sandy Silt (Diatomaceous)

Item	SPECIMEN		
	a	b	c
Mold Number	2	3	4
Water added, grams	116	32	2
Initial Test Water, %	31.3	21.4	17.9
Compact Gage Pressure,psi	40	100	165
Exudation Pressure, psi	226	367	620
Height Sample, Inches	2.68	2.58	2.43
Gross Weight Mold, grams	2948	2989	2978
Tare Weight Mold, grams	1969	1977	1977
Sample Wet Weight, grams	979	1012	1001
Expansion, Inches x 10exp-4	15	183	330
Stability 2,000 lbs (160psi)	64 / 114	48 / 115	27 / 85
Turns Displacement	4.85	3.63	3.28
R-Value Uncorrected	17	21	40
R-Value Corrected	19	23	38
Dry Density, pcf	84.3	97.9	105.9
DESIGN CALCULATION DATA			
Traffic Index Given:	9.5	9.5	9.5
G.E. by Stability	1.97	1.87	1.51
G. E. by Expansion	0.50	6.10	11.00

Equilibrium R-Value **20** by EXUDATION

Examined & Checked: 8 /16/ 12

REMARKS:
Gf = 1.25
0.7% Retained on the 3/4" Sieve.

REGISTERED PROFESSIONAL ENGINEER
STEVEN R. MARVIN
C 30659
STATE OF CALIFORNIA

Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

LaBelle • Marvin

R-VALUE GRAPHICAL PRESENTATION

PROJECT NO. 38212 Parsons

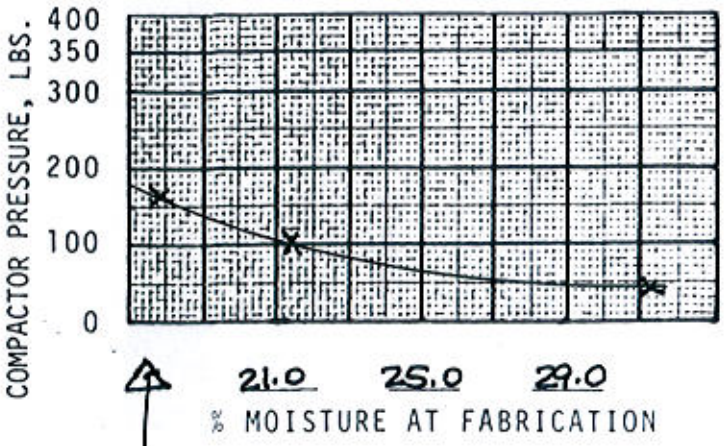
BORING NO. Subgrade 8-2 Avenida Rico

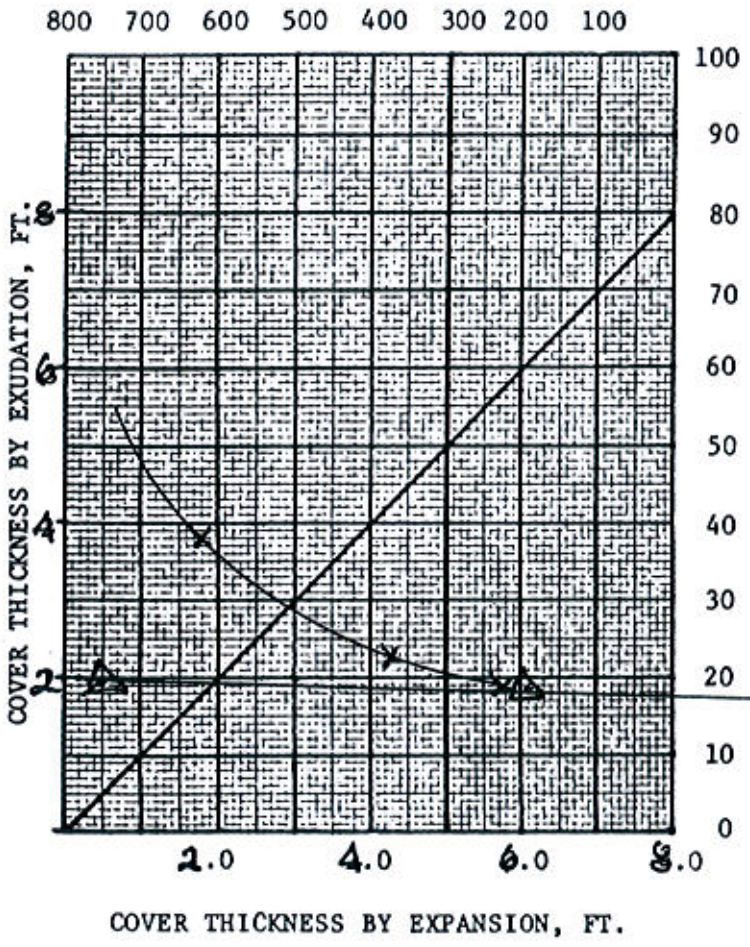
DATE 8/20/12

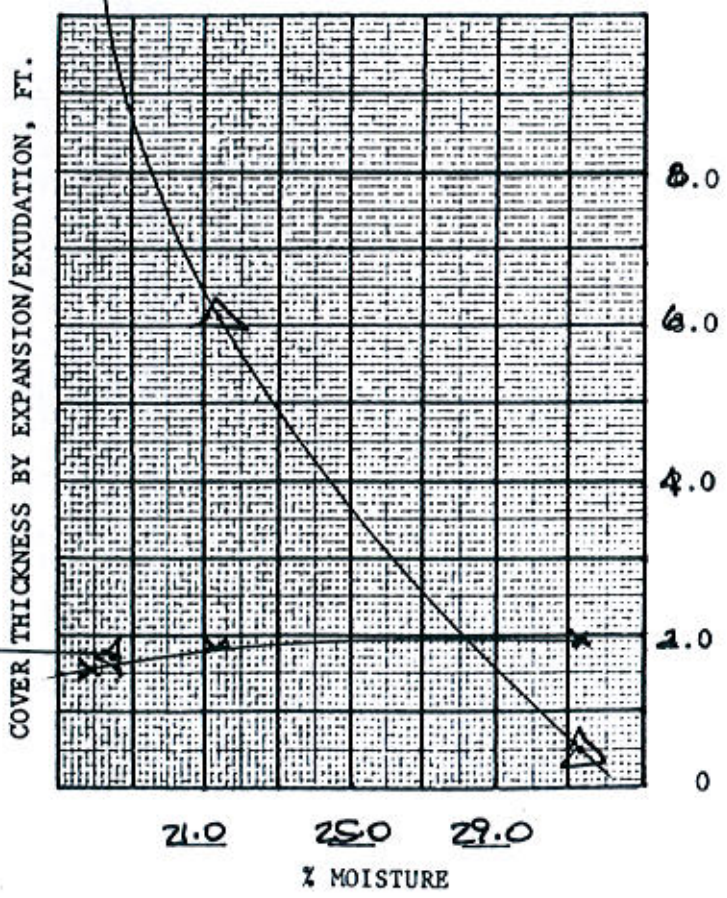
TRAFFIC INDEX Given 9.5

R-VALUE BY EXUDATION 20

R-VALUE BY EXPANSION 20







R-VALUE vs. EXUD. PRES.

T by EXUDATION

EXUD. T vs. EXPAN. T

T by EXPANSION

REMARKS

GF=1.25

LaBelle • Marvin
PROFESSIONAL PAVEMENT ENGINEERING

LaBelle Marvin

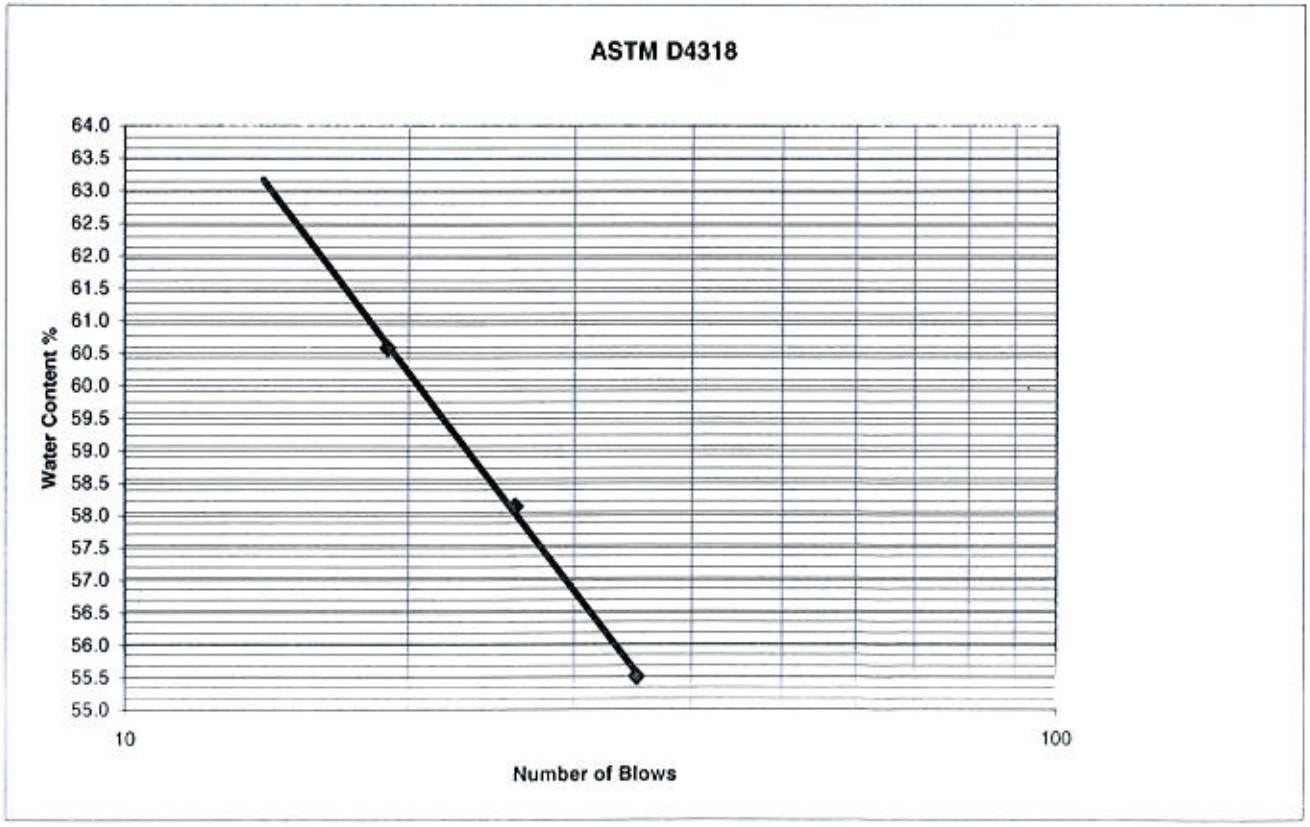
PAVEMENT ANALYSIS, DESIGN, TESTING, & INSPECTION SERVICES

Date	8/29/2012
Project No.	38212
Client	Parsons
Material/Plant	Subgrade 8-2 Avenida Pico

Date Tested	8/28/2012
Tester:	J.G.

Liquid Limit/Plastic Limit/Plasticity Index of Soils ASTM D4318

	Liquid Limits			Plastic Limits		
Trial Number	A	B	C	D		
Wet Wt. of Soil + Tare	35.1910	35.5320	33.7817	27.8519		
Dryt Wt. of Soil + Tare	28.0876	28.1176	26.8067	24.8697		
Wt.of Water	7.1034	7.4144	6.9750	2.9822	0.0000	0.0000
Wt.of Tare	15.2905	15.3652	15.2937	15.3720		
Dry Wt. of Soil	12.7971	12.7524	11.5130	9.4977	0.0000	0.0000
Water Content, %	55.5	58.1	60.6	31.4	#DIV/0!	#DIV/0!
Number of Blows	35	26	19			
LL= 58	PL= 31			PI= 27		
Soil Classification						



R - VALUE DATA SHEET

Parsons
Avenida Pico

PROJECT NUMBER 38212 BORING NUMBER: Subgrade 8-6

SAMPLE DESCRIPTION: Brown Slightly Sandy Clay

Item	SPECIMEN		
	a	b	c
Mold Number	4	5	6
Water added, grams	56	29	14
Initial Test Water, %	14.4	11.9	10.6
Compact Gage Pressure,psi	40	85	150
Exudation Pressure, psi	247	448	701
Height Sample, Inches	2.59	2.43	2.47
Gross Weight Mold, grams	3134	3075	3110
Tare Weight Mold, grams	1977	1975	1976
Sample Wet Weight, grams	1157	1100	1134
Expansion, Inches x 10exp-4	6	36	109
Stability 2,000 lbs (160psi)	46 / 116	30 / 69	25 / 55
Turns Displacement	3.82	3.45	3.29
R-Value Uncorrected	20	49	59
R-Value Corrected	21	48	59
Dry Density, pcf	118.3	122.5	125.8
DESIGN CALCULATION DATA			
Traffic Index Given:	9.5	9.5	9.5
G.E. by Stability	1.92	1.26	1.00
G. E. by Expansion	0.20	1.20	3.63

Equilibrium R-Value 31 by EXUDATION

Examined & Checked: 8 /16/ 12

REMARKS:
Gf = 1.25
0.0% Retained on the 3/4" Sieve.

REGISTERED PROFESSIONAL ENGINEER
STEVEN R. MARVIN
C 30659
CIVIL
STATE OF CALIFORNIA

Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

LaBelle • Marvin

R-VALUE GRAPHICAL PRESENTATION

PROJECT NO. 38212 Parsons

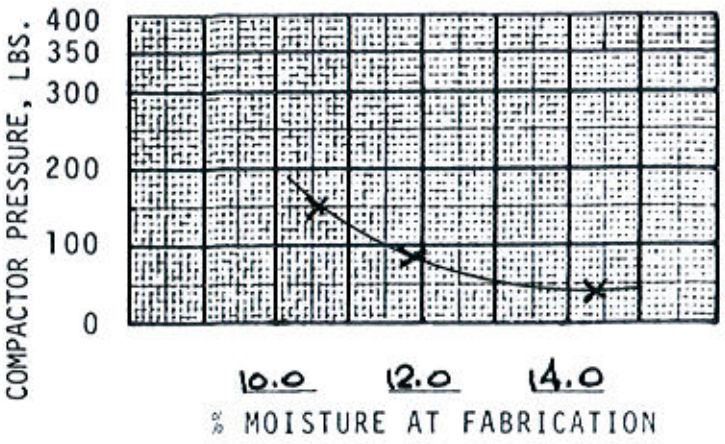
BORING NO. Subgrade B-6 Avenida Rico

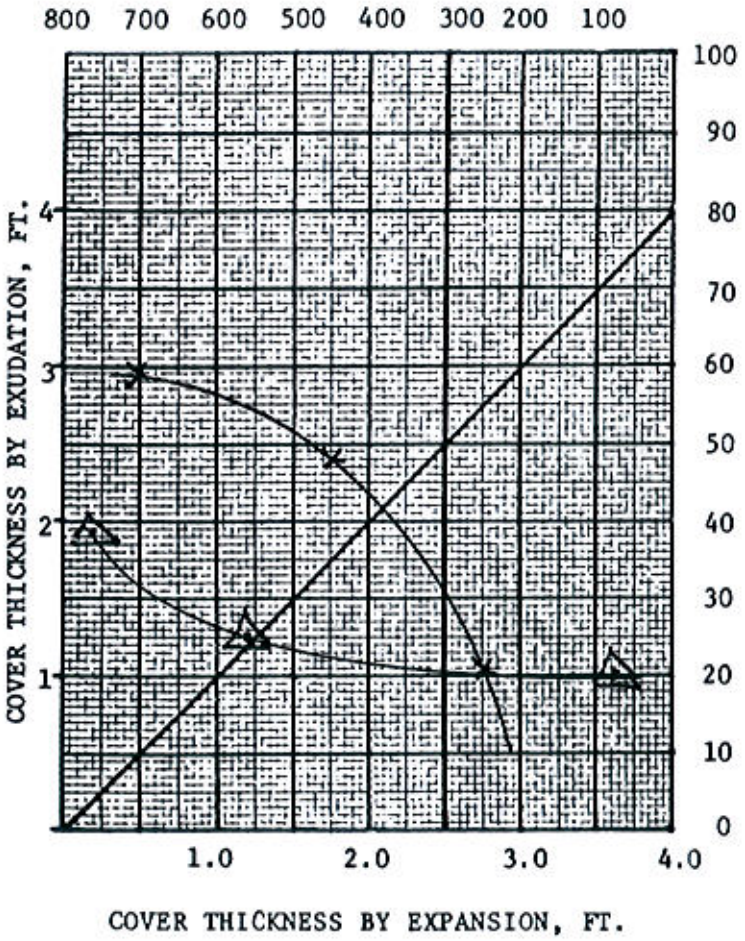
DATE 8/16/12

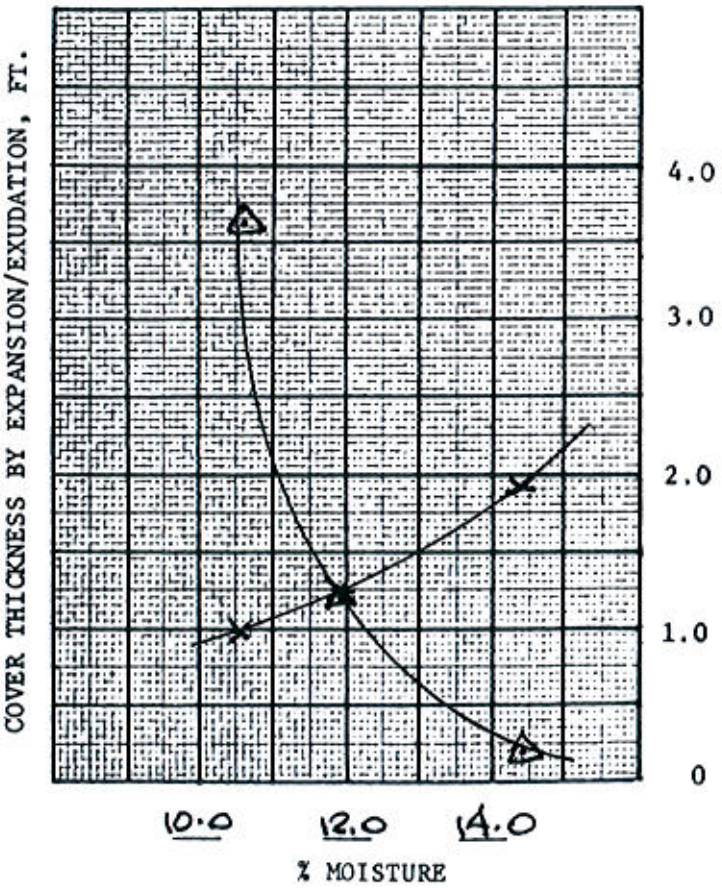
TRAFFIC INDEX Given 9.5

R-VALUE BY EXUDATION 31

R-VALUE BY EXPANSION ~~







R-VALUE vs. EXUD. PRES.

T by EXUDATION

EXUD. T vs. EXPAN. T

T by EXPANSION

REMARKS

Gf=1.25

LaBelle • Marvin
PROFESSIONAL PAVEMENT ENGINEERING

LaBelle Marvin

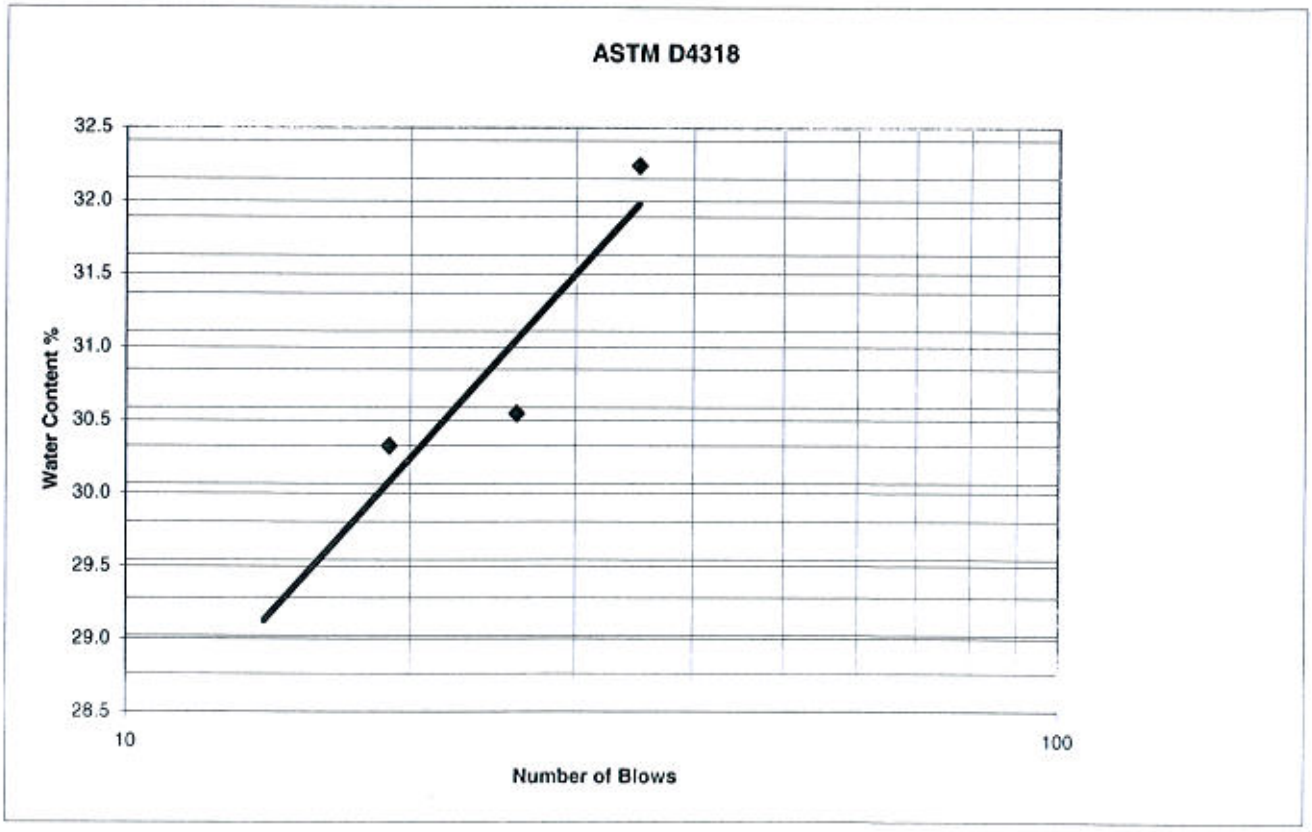
PAVEMENT ANALYSIS, DESIGN, TESTING, & INSPECTION SERVICES

Date	8/29/2012
Project No.	38212
Client	Parsons
Material/Plant	Subgrade 8-6 Avenida Pico

Date Tested: 8/28/2012
Tester: J.G.

Liquid Limit/Plastic Limit/Plasticity Index of Soils ASTM D4318

	Liquid Limits			Plastic Limits		
Trial Number	A	B	C	D		
Wet Wt. of Soil + Tare	33.1608	33.2311	38.1524	29.7920		
Dryt Wt. of Soil + Tare	28.8380	28.9672	32.8583	27.4097		
Wt.of Water	4.3228	4.2639	5.2941	2.3823	0.0000	0.0000
Wt.of Tare	15.4315	15.0085	15.4012	15.3864		
Dry Wt. of Soil	13.4065	13.9587	17.4571	12.0233	0.0000	0.0000
Water Content, %	32.2	30.5	30.3	19.8	#DIV/0!	#DIV/0!
Number of Blows	35	26	19			
LL= 31	PL= 20			PI= 11		
Soil Classification						



R - VALUE DATA SHEET

Parsons
Avenida Pico

PROJECT NUMBER 38212 BORING NUMBER: Subgrade 8-7&11

SAMPLE DESCRIPTION: Brown Sandy Silt

Item	SPECIMEN		
	a	b	c
Mold Number	1	2	3
Water added, grams	60	82	48
Initial Test Water, %	11.6	13.6	10.5
Compact Gage Pressure,psi	140	70	200
Exudation Pressure, psi	320	102	594
Height Sample, Inches	2.50	2.55	2.62
Gross Weight Mold, grams	3063	3080	3118
Tare Weight Mold, grams	1965	1969	1977
Sample Wet Weight, grams	1098	1111	1141
Expansion, Inches x 10exp-4	5	4	28
Stability 2,000 lbs (160psi)	19 / 40	25 / 54	18 / 35
Turns Displacement	4.60	4.95	4.32
R-Value Uncorrected	62	50	67
R-Value Corrected	62	50	70
Dry Density, pcf	119.2	116.3	119.4
DESIGN CALCULATION DATA			
Traffic Index Given:	9.5	9.5	9.5
G.E. by Stability	0.92	1.22	0.73
G. E. by Expansion	0.17	0.13	0.93

Equilibrium R-Value 61 by EXUDATION

Examined & Checked: 8 /16/ 12

REMARKS:
Gf = 1.25
0.8% Retained on the 3/4" Sieve.

REGISTERED PROFESSIONAL ENGINEER STEVEN R. MARVIN 30659 CIVIL STATE OF CALIFORNIA

Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

LaBelle • Marvin

R-VALUE GRAPHICAL PRESENTATION

PROJECT NO. 38212 Parsons

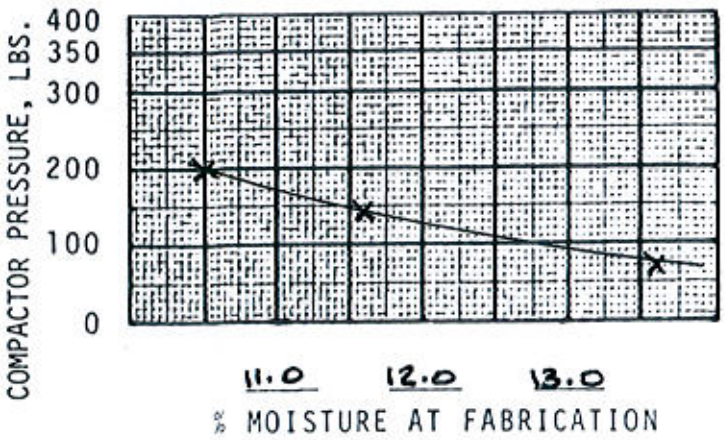
BORING NO. Sub. 8-7 & 11 Comb. Avenida Pico

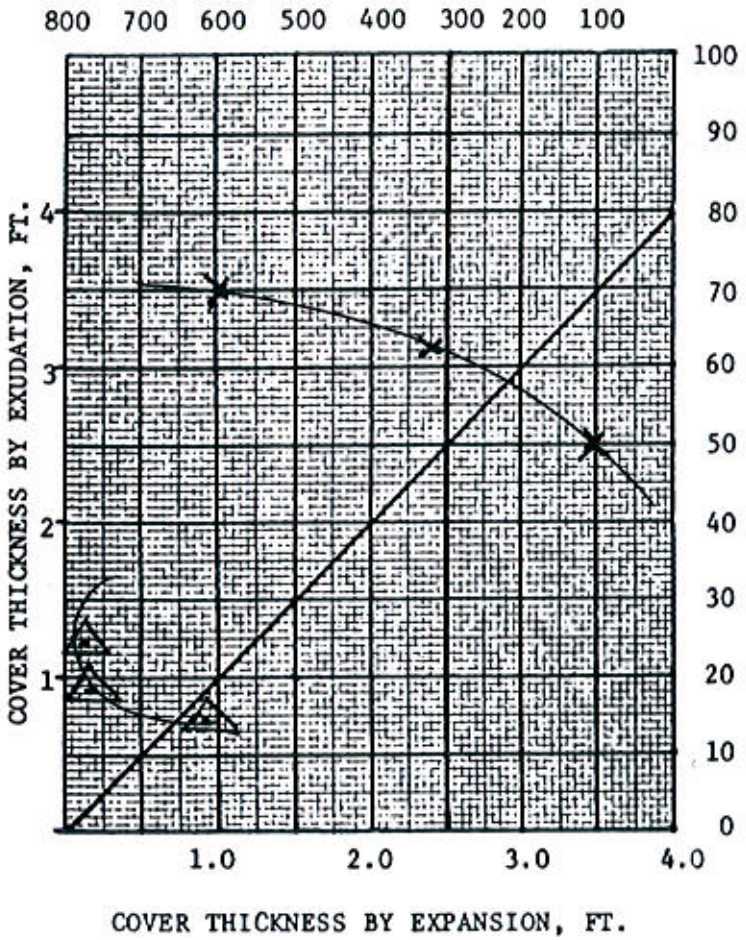
DATE 8/16/12

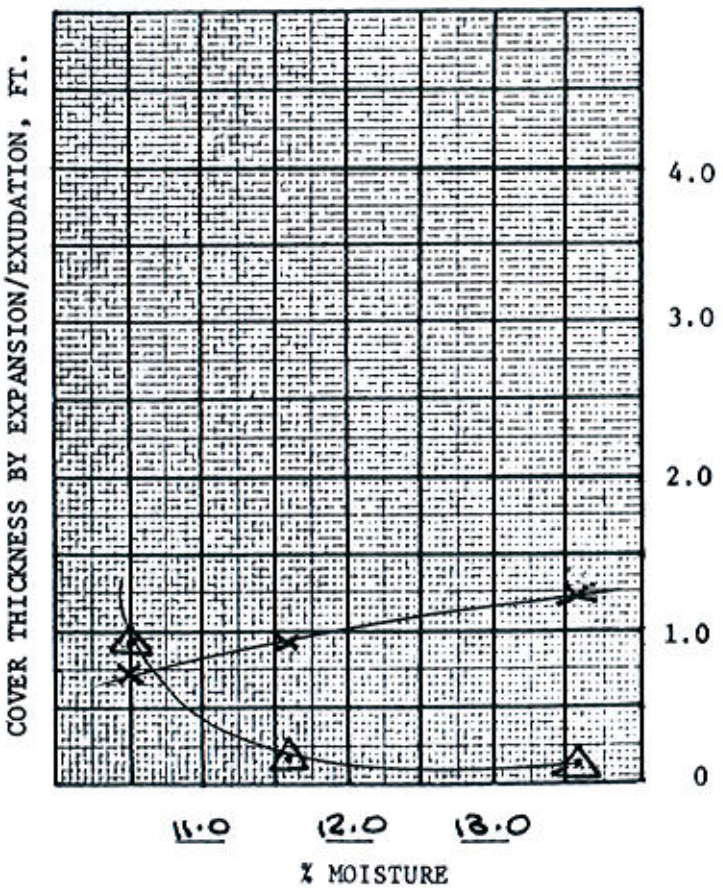
TRAFFIC INDEX Given 9.5

R-VALUE BY EXUDATION 61

R-VALUE BY EXPANSION ~~N~~







R-VALUE vs. EXUD. PRES.

T by EXUDATION

EXUD. T vs. EXPAN. T

T by EXPANSION

REMARKS

Gf=1.25

LaBelle • Marvin
PROFESSIONAL PAVEMENT ENGINEERING

LaBelle Marvin

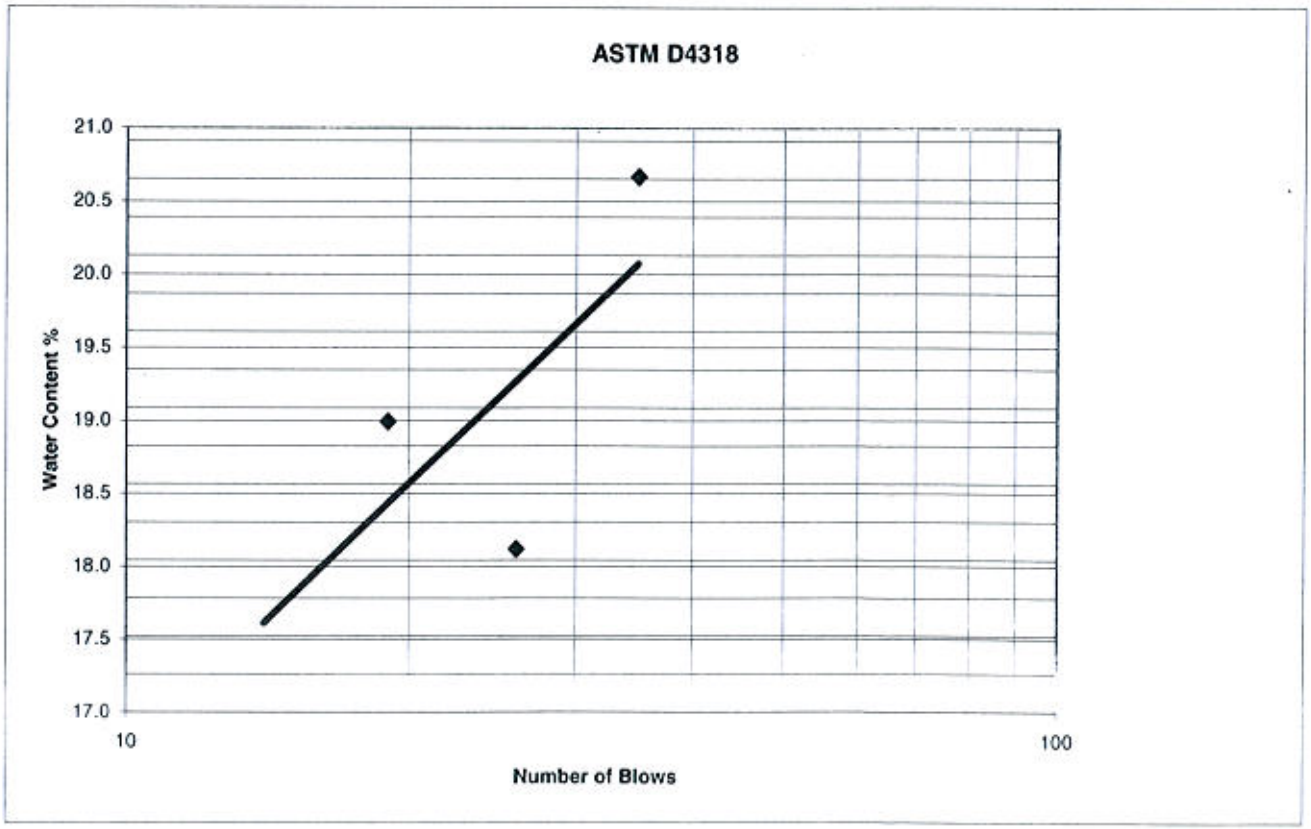
PAVEMENT ANALYSIS, DESIGN, TESTING, & INSPECTION SERVICES

Date	8/29/2012
Project No.	38212
Client	Parsons
Material/Plant	Subgrade 8-7 Avenida Pico

Date Tested	8/28/2012
Tester:	J.G.

Liquid Limit/Plastic Limit/Plasticity Index of Soils ASTM D4318

	Liquid Limits			Plastic Limits		
Trial Number	A	B	C	D		
Wet Wt. of Soil + Tare	37.2606	32.0340	36.5783	N/P		
Dryt Wt. of Soil + Tare	33.4793	29.4626	33.1927	N/P		
Wt.of Water	3.7813	2.5714	3.3856	#VALUE!	0.0000	0.0000
Wt.of Tare	15.1842	15.2721	15.3692	14.9910		
Dry Wt. of Soil	18.2951	14.1905	17.8235	#VALUE!	0.0000	0.0000
Water Content, %	20.7	18.1	19.0	#VALUE!	#DIV/0!	#DIV/0!
Number of Blows	35	26	19			
LL= 19	PL= #VALUE!			PI= #VALUE!		
Soil Classification N/P						



R - VALUE DATA SHEET

Parsons
Avenida Pico

PROJECT NUMBER 38212 BORING NUMBER: Subgrade 8-10

SAMPLE DESCRIPTION: Brown Clay

Item	SPECIMEN		
	a	b	c
Mold Number	7	8	9
Water added, grams	70	120	40
Initial Test Water, %	16.2	21.2	13.2
Compact Gage Pressure,psi	40	30	75
Exudation Pressure, psi	457	212	576
Height Sample, Inches	2.56	2.58	2.42
Gross Weight Mold, grams	3058	2996	2857
Tare Weight Mold, grams	1968	1964	1789
Sample Wet Weight, grams	1090	1032	1068
Expansion, Inches x 10exp-4	2	0	64
Stability 2,000 lbs (160psi)	56 / 132	68 / 148	37 / 106
Turns Displacement	3.30	4.22	3.05
R-Value Uncorrected	14	5	29
R-Value Corrected	15	5	27
Dry Density, pcf	111.0	100.0	118.1
DESIGN CALCULATION DATA			
Traffic Index Given:	9.5	9.5	9.5
G.E. by Stability	2.07	2.31	1.78
G. E. by Expansion	0.07	0.00	2.13

Equilibrium R-Value 7 by EXUDATION

Examined & Checked: 8 /16/ 12

REMARKS:
Gf = 1.25
0.7% Retained on the 3/4" Sieve.

REGISTERED PROFESSIONAL ENGINEER
STEVEN R. MARVIN
C 30659
STATE OF CALIFORNIA

Steven R. Marvin, RCE 30659

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LaBelle • Marvin

R-VALUE GRAPHICAL PRESENTATION

PROJECT NO. 38212 Parson

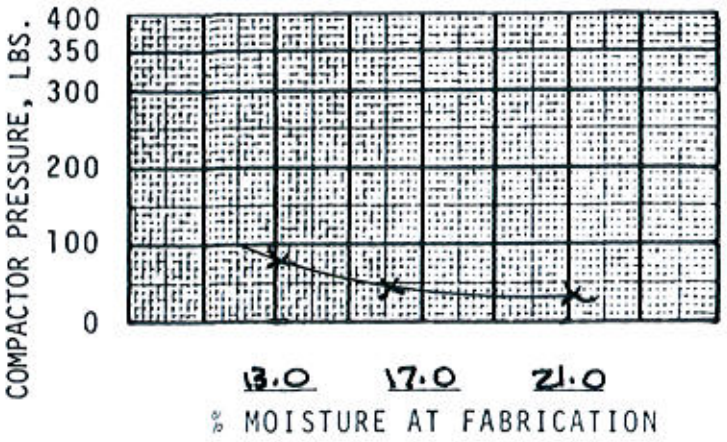
BORING NO. Subgrade 8-10 Avenida Pico

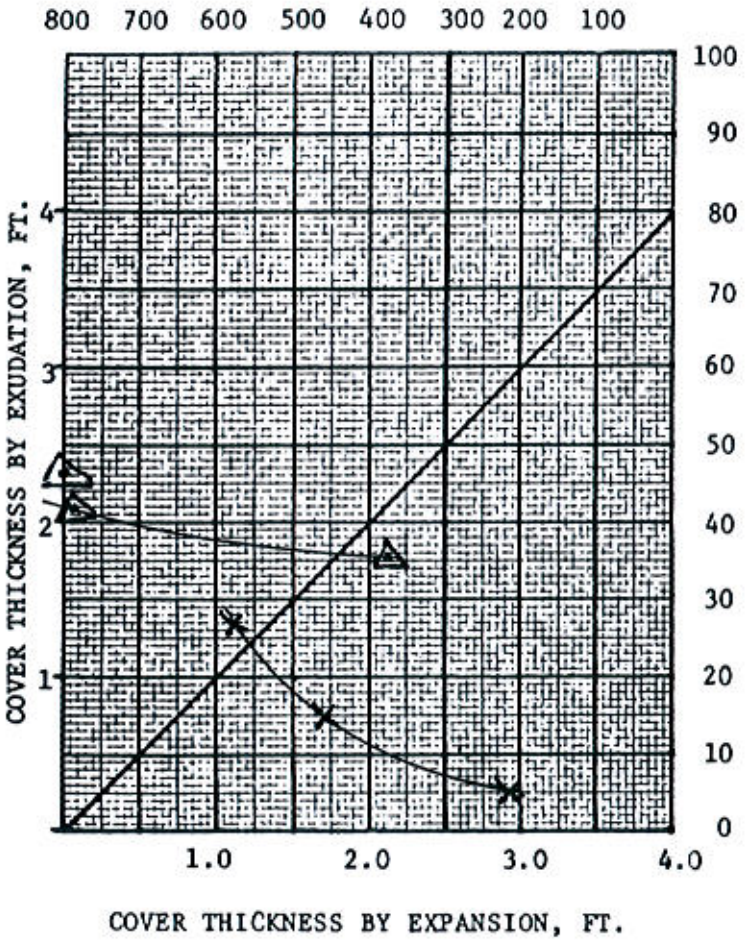
DATE 8/16/12

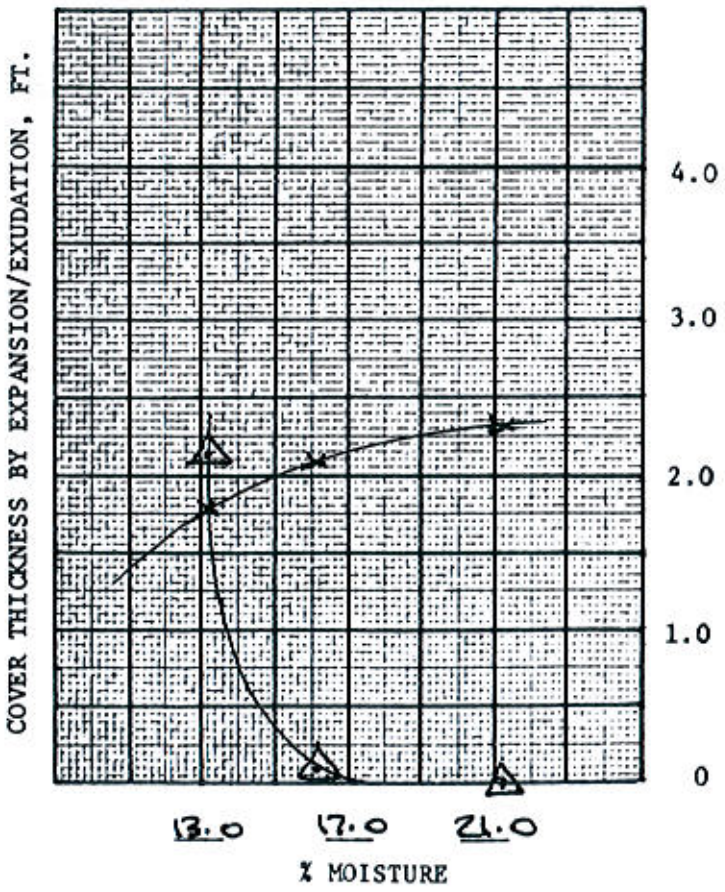
TRAFFIC INDEX Given 9.5

R-VALUE BY EXUDATION 7

R-VALUE BY EXPANSION







R-VALUE vs. EXUD. PRES.

T by EXUDATION

EXUD. T vs. EXPAN. T

T by EXPANSION

REMARKS

Gf=1.25

LaBelle • Marvin
PROFESSIONAL PAVEMENT ENGINEERING

LaBelle Marvin

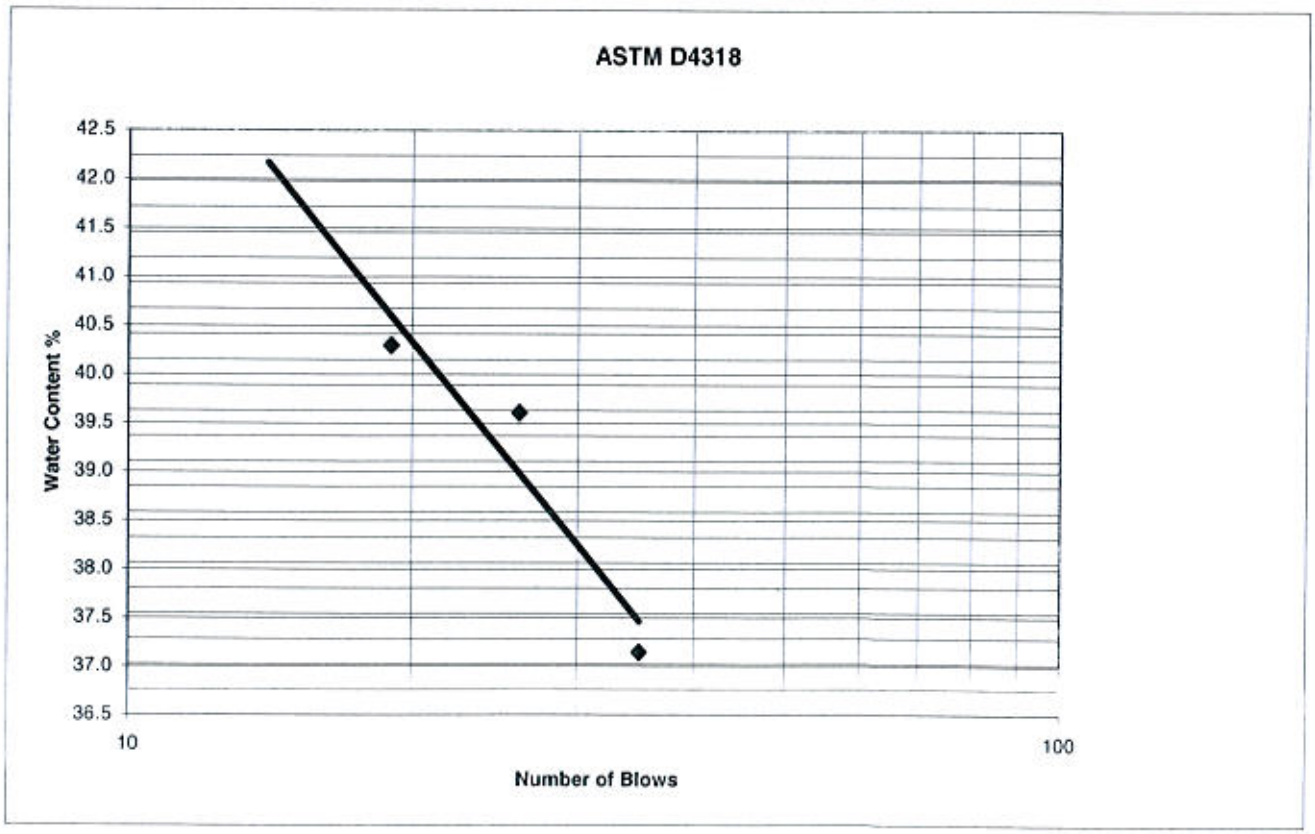
PAVEMENT ANALYSIS, DESIGN, TESTING, & INSPECTION SERVICES

Date	8/29/2012
Project No.	38212
Client	Parsons
Material/Plant	Subgrade 8-10 Avenida Pico

Date Tested: 8/28/2012
Tester: J.G.

Liquid Limit/Plastic Limit/Plasticity Index of Soils ASTM D4318

	Liquid Limits			Plastic Limits		
Trial Number	A	B	C	D		
Wet Wt. of Soil + Tare	34.9731	33.7950	32.5643	28.8485		
Dryt Wt. of Soil + Tare	29.5365	28.6205	27.6296	26.4630		
Wt.of Water	5.4366	5.1745	4.9347	2.3855	0.0000	0.0000
Wt.of Tare	14.9002	15.5572	15.3846	15.3444		
Dry Wt. of Soil	14.6363	13.0633	12.2450	11.1186	0.0000	0.0000
Water Content, %	37.1	39.6	40.3	21.5	#DIV/0!	#DIV/0!
Number of Blows	35	26	19			
LL= 39	PL= 21			PI= 18		
Soil Classification						



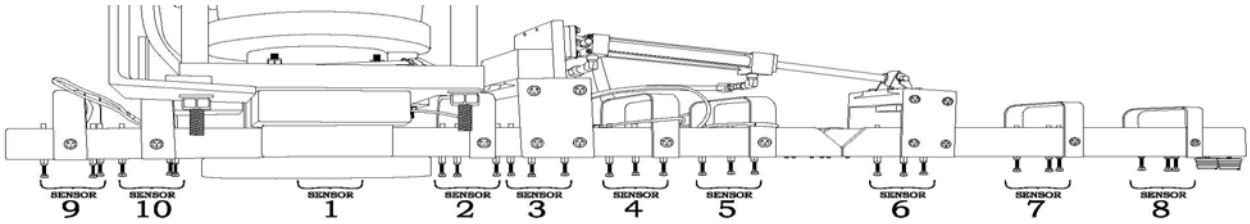
Appendix F

Glossary of Terms

LaBelle Marvin
PAVEMENT ANALYSIS, DESIGN, TESTING, & INSPECTION SERVICES

Glossary of Terms

Deflection Testing, CA Test Method 356, is a structural analysis of measured deflection values obtained during our field testing operations, utilizing our non-destructive JILS Falling Weight Deflectometer equipment. Data accumulated on the deflection values, thickness of AC pavement with aggregate base, subjected to various traffic loadings along with the tolerable deflection criteria, provides the basis of needed overlay and/or structural reinforcement. The Falling Weight Deflectometer, F.W.D., provides a tabulation of all test data, distance measurements DMI, field observations, in-situ pavement temperatures, global position GPS data, and permanent landmarks such as cross streets, patches, utility trenches, etc. taken in the field. The Individual deflection test data, provided with this report, was reviewed and grouped according to data trends and engineering judgment.



Sensors: FWD 1, FWD 2, FWD 3, FWD 4, FWD 5, FWD 6, FWD 7, FWD 8, FWD 9, FWD 10. These are the 10 separate deflection readings in 10^{-3} inches. FWD 1 represents the deflection directly beneath the load input.

Force: Standard Dynamic Loading measured.

GPR: Ground Penetrating Radar of in-situ pavement thicknesses. (optional)

GPS: The North American Datum (NAD 83).

NIS: Not included in sums.

Limits The station limits represent areas of like deflection determined during the engineering review of deflection data and field conditions. Limits are represented by local stationing gathered in the field per street, and is taken in each direction and lane.

FWD_{80th} The 80th percentile deflection value representing the strength under loading of the section/group being evaluated, reported in inches times 10^{-3}.

TD_{80th} The 80th percentile deflection value converted to an equivalent Traveling Deflectometer unit, reported in inches times 10^{-3}.

T The represented thickness (T) of existing pavement structure. This value is taken from our pavement coring data obtained in the field.

T.I. The Traffic Index (TI) used for the evaluation of the specific test loading. The traffic index represents the anticipated accumulation of equivalent axle loads with design period.

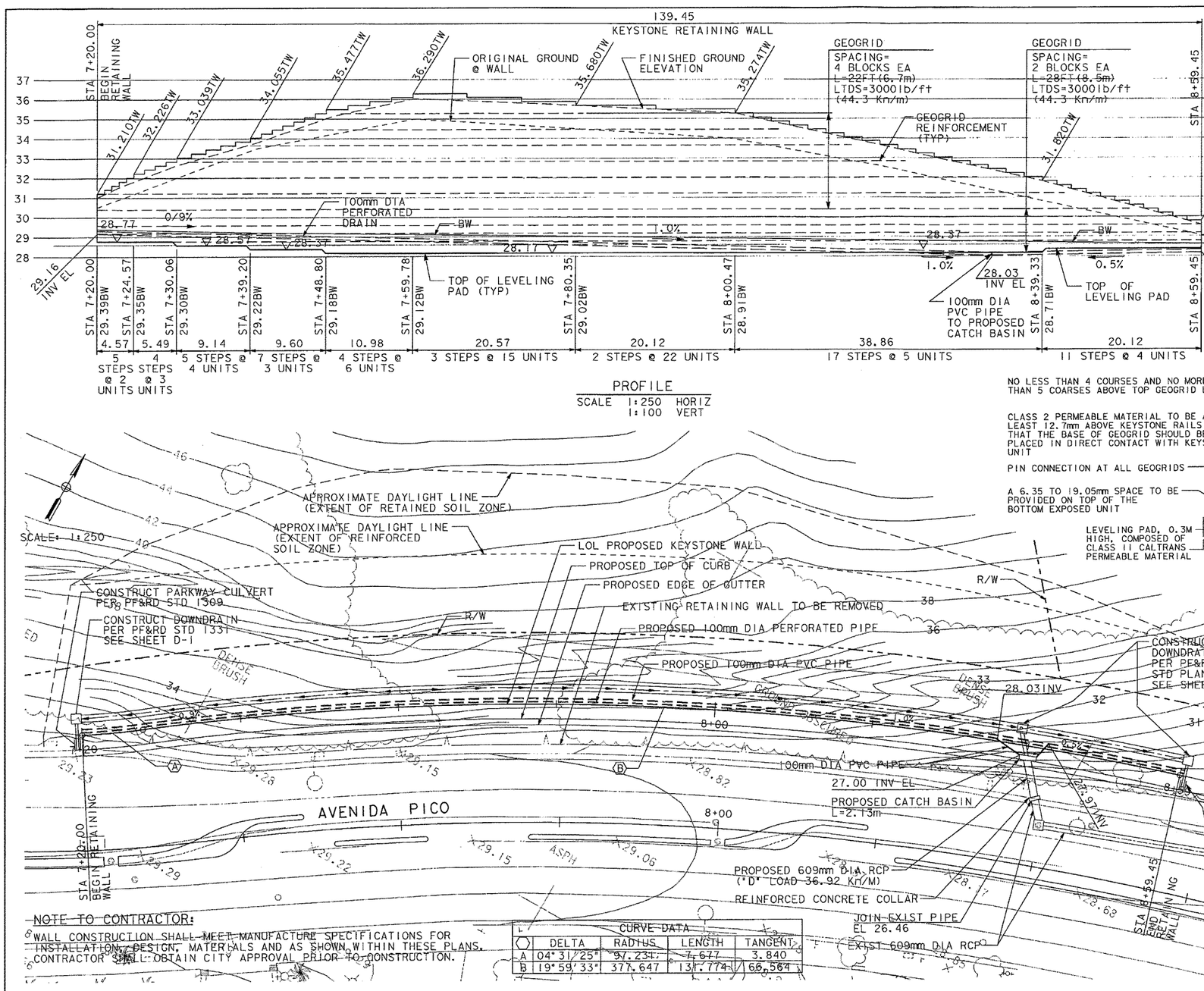
TDallow The maximum permissible deflection value where no reinforcement is necessary based upon asphalt concrete thickness and traffic index by Caltrans Test Method 356.

%Red. The percent reduction in measured deflection to match tolerable or allowable deflection levels, based upon Traveling Deflectometer conversions.

GE The equivalent thickness, in feet, of rock base required to effect the specified deflection reduction.

AC The equivalent thickness, in feet, of asphalt concrete thickness required to effect the specified deflection reduction.

NSL LaBelle Marvin, Inc.'s calculated Nominal Service Life of the existing pavement.

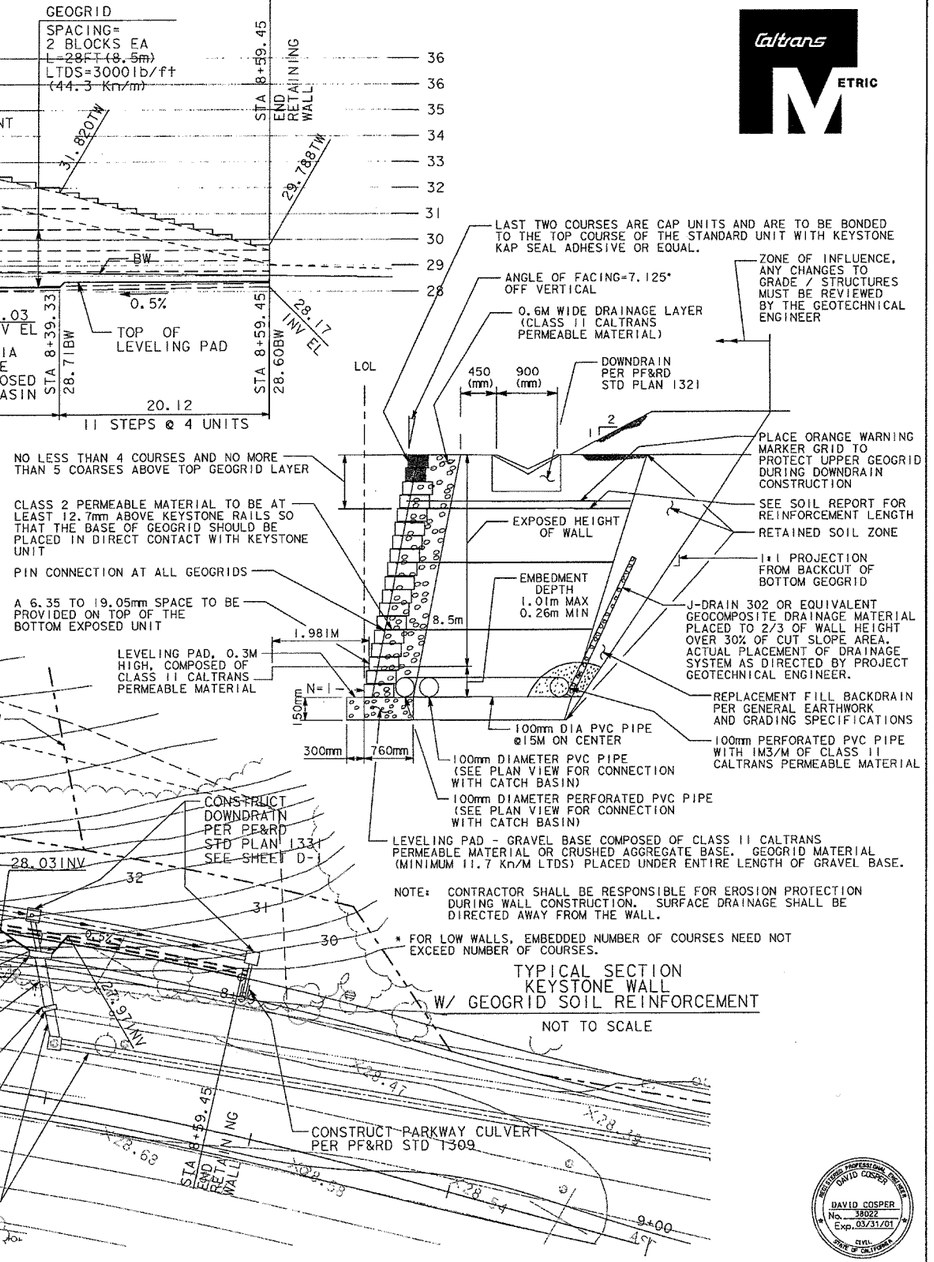


PROFILE
SCALE 1:250 HORIZ
1:100 VERT

NOTE TO CONTRACTOR:
WALL CONSTRUCTION SHALL MEET MANUFACTURE SPECIFICATIONS FOR INSTALLATION, DESIGN, MATERIALS AND AS SHOWN WITHIN THESE PLANS. CONTRACTOR SHALL OBTAIN CITY APPROVAL PRIOR TO CONSTRUCTION.

CURVE DATA

	DELTA	RADIUS	LENGTH	TANGENT
A	04°31'25"	97.23m	7.677	3.840
B	19°59'33"	377.647	131.774	66.564



NOTE: CONTRACTOR SHALL BE RESPONSIBLE FOR EROSION PROTECTION DURING WALL CONSTRUCTION. SURFACE DRAINAGE SHALL BE DIRECTED AWAY FROM THE WALL.

* FOR LOW WALLS, EMBEDDED NUMBER OF COURSES NEED NOT EXCEED NUMBER OF COURSES.

TYPICAL SECTION
KEYSTONE WALL
W/ GEOGRID SOIL REINFORCEMENT
NOT TO SCALE

REV.	DATE:	DESCRIPTION	BY:	APP'VD:

REVISIONS | REFERENCES | APPROVALS

PREPARED BY: UMA ENGINEERING, INC.
3300 Irvine Avenue
Newport Beach, CA 92660
Phone (949) 660-0101
DAVID COSPER R.C.E. 38022 — DATE 5/10/00

ENGINEERING SCALE : AS SHOWN — DATE: 05-19-00
DRAWN BY : DES — DESIGNED BY : RM
CHECKED BY : DAVE COSPER
APPROVED :
W.E. CAMERON RCE 23764 CITY ENGINEER — DATE

AVENIDA PICO EAST/WEST OF I-5 FWY
RETAINING WALL - EAST
CITY OF SAN CLEMENTE

DRAWING NO: R-1
SHEET 26
OF 38

DFLTUSER
p:\d58000\\coddr01.dgn
17 MAY 2000
15:46:14

FOR REDUCED PLANS
ORIGINAL SCALE IN MILLIMETERS
0 20 40 60 80

Caltrans METRIC

DRAWING NUMBER
R-2

DRAWING NUMBER
R-1

DRAWING