FOR CONTRACT NO: 12-0C5604
PROJECT ID: 1200000078

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GEOTECHINCAL DESIGN REPORT FOR RETAINING WALLS #454 and 519, DATED JANUARY 18, 2013

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ROUTE: 12-Ora-91-8.1/9.3, 10.1

State of California **Business, Transportation and Housing Agency**

M e m o r a n d u m

To	**:**	MR. Matthew Cugini Branch Chief Design Branch C	**Date:**	January 4, 2013
Attn		MR. Fred Faizi – Project Engineer District 12 Design Branch C	**File No.**12-ORG-91 PM 8.1/9.3 EA 12-0C5601 Retaining Walls 21A, 21B, 21 C, 453, 470, 497, and 515	
From	**:**	**DEPARTMENT OF TRANSPORTATION** DIVISION OF ENGINEERING SERVICES METS and Geotechnical Services Office of Geotechnical Design South-1		
Subject	**:**	Geotechnical Design Report for Retaining Walls		

1. SCOPE OF WORK

The Office of Geotechnical Design South – 1 has prepared this Memorandum to provide geotechnical recommendations for the proposed five retaining walls along the westbound of SR-91 in the City of Anaheim.

2. PROJECT DESCRIPTION

Within the project limits of SR-91, there are three general purpose travel lanes and one fast track lane in the westbound direction. The connector from the NB SR-55 to the WB SR-91 has two lanes that merge into an auxiliary lane into the SR-91, which becomes an exit to the Tustin Ave. off-ramp.

Assessments of the transportation demand for current and forecasted traffic volumes indicate the need to resolve deficiencies resulting from excessive weaving, merging, and diverging occurring at the site.

This project includes widening Santa Ana Bridge and constructing nine retaining walls, including five standard and four special design walls, along the westbound of SR-91. The total lengths of the standard retaining walls are approximately 2,068 feet with heights varying from 4 to 22 feet. The following tables summarize the information of the proposed retaining walls, and applicable boreholes for subsurface information.

Table 1 Summary of Retaining Walls

Retaining wall No.	Direction	Begin Station	End Station	Length (ft)	Proposed Height (ft)	Applicable Borehole Nos.	Location
21A	WB	20+99.33 "T2" Line	22+39.96 "T2" Line	140	8 - 18	A-12-012 thru A-12-016 (current) CPT-09-006 (CT, 2009)	Tustin Ave off-ramp
21B	WB	22+39.96 "T2" Line	24+03.94 "T2" Line	168	18 - 24		
21C	WB	24+03.94 "T2" Line	506+65.67 "A1" Line	630	16 - 22		
515	WB	515+40.22 "A1" Line	518+95.87 "A1" Line	356	6 - 10	A-12-011 A-12-033 (current) CPT-09-004 (CT, 2009)	West of Riverdale OC
453	WB	453+00 "T4" Line	458+50 "T4" Line	558	4 - 12	A-12-006 A-12-007 (current) CPT-09-002 (CT, 2009)	East of Riverdale OC
470	WB	470+80 "T4" Line	546+10 "A2" Line	318	6	A-12-001 (current) CPT-09-001 (CT, 2009)	East of SR-55 NB and SR-91 WB merge
497	WB	496+05.56	496+44.73	41	8 - 10	A-12-016 A-12-017 A-12-035 A-12-036	Tustin Ave UC
		497+43.00	497+62.25	20	8		

The scope of this report includes:

- Review project plans and relevant plans;
- Review published historical groundwater levels;
- Perform subsurface exploration, includes drilling 13 boreholes, with a maximum depth of 55 feet;
- Evaluate laboratory tests;
- Evaluate data obtained from above activities and perform engineering analyses; and
- Draft the report.

3. SUBSURFACE EXPLORATION PROGRAM

Previous Subsurface Exploration

A total of six Cone Penetration Tests (CPTs) were performed between November and December, 2009. CPTs were advanced to depths varied from eight to 49 feet below grade.

Current Subsurface Exploration

Current subsurface exploration was performed between March 09 and June 10, 2012, which includes advancing 13 boreholes to a maximum depth of 55 feet below the existing ground surface. The boreholes were drilled using truck-mounted drill rigs fitted with hollow stem augers, and four and half inch rotary wash drill bit.

The locations of the boreholes are shown on LOTBs.

Standard Penetration Test (SPT) was performed during subsurface exploration that complies with ASTM D1586.

Sampling consisted of:

- Collecting samples retrieved from the SPT split spoon; and
- Collecting soil samples at selected locations using Modified California Samplers.

4. LABORATORY TESTING PROGRAM

Selected samples obtained from subsurface exploration were assigned for laboratory tests. The soils were described under Caltrans 2010, Soil and Rock Logging, Classification, and Presentation Manual. The soils were also classified using laboratory data.

Laboratory tests performed included corrosivity tests (minimum resistivity and pH) on composite soil samples, direct shear, particle-size gradation, Atterberg Limits, Expansion Index, and consolidation tests.

5. SITE GEOLOGY AND SUBSURFACE CONDITIONS

5.1 Site Geology

The site is located within the Los Angeles Basin of the Peninsular Ranges geomorphic province. The Peninsular Ranges province is composed of mountain ranges that are oriented roughly northwest-southeast which roughly parallel the San Andreas fault. The Los Angeles Basin is an alluvium filled basin with a maximum thickness of about several miles at its deepest point.

The site is located in the Los Angeles Basin, and is underlain by alluvium derived from the surrounding mountains. The alluvium is composed mostly of medium dense to dense gravelly sands and sands, with a few layers of stiff to very stiff silt and clay.

5.2 Subsurface Conditions

The generalized stratigraphic profile at the borehole locations consisted of silt/clay overlying sand in the east of Santa Ana River. Gravel layer was encountered at depths from 10 to 30 feet in Boreholes A-12-006 and 007. The subsurface soil profile in the west of Santa Ana River consisted of sand. A five feet thick layer of silt was encountered at a depth varying from 35 to 40 feet below existing grade. According to pocket penetrameter test, the consistencies of silt and clay layers are generally stiff to hard. The recorded SPT N values indicate that the sandy layers are generally medium dense to very dense and the gravel layers are generally very dense. It should be noted that very loose sandy materials were observed from existing grade to 10 feet deep at borehole R-12-015.

5.3. Groundwater

Ground water was encountered at boreholes A-12-011, R-12-012, and A-12-033 at depths vary from 30 to 40 feet below existing grade during current subsurface exploration. Two piezometer wells were installed in boreholes A-12-011, R-12-012 to monitor groundwater level after drilling completion. Groundwater information during and after drilling are summarized in Table 2.

Table 2 Summary of Groundwater Level

Borehole No.	Top Borehole Elevation (ft)	Groundwater Level at Drilling Completion		Groundwater Elevation Measured after Drilling Completion (ft)	Historical Highest Groundwater Depth (ft)
		Estimated Depth (ft)	Estimated Elevation (ft)		
A-12-001	306.9	40	266.9	N/A	>40
A-12-006	274.3	Not Encountered	--	N/A	30
A-12-007	278.6	Not Encountered	--	N/A	30
A-12-011	257.2	30	227.2	232.1	10
R-12-012	244.3	35	209.3	215.4	10
R-12-013	243.6	15	228.6	N/A	10
R-12-014	242.0	35	207.0	N/A	10
R-12-015	244.1	Not Encountered	--	N/A	10
A-12-016	261.7	Not Encountered	--	N/A	10
A-12-033	256.9	29	227.9	N/A	10

5.4 Corrosion Evaluation

Minimum resistivity and pH tests were conducted on composite samples obtained at various depths. The test results are summarized in the table below. According to Caltrans Corrosion Guidelines, version 1.0, September 2003, the proposed RW 453 site is considered corrosive.

Table 3 Soil Corrosion Test Summary

Location	SIC Number	Minimum Resistivity (Ohm-Cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
A-12-003*	N/A	800	7.53	N/A	N/A
A-12-004*	C080017	650	7.70	N/A	N/A
A-12-004*	C080015	570	6.98	285	1569
A-12-005*	C080016	710	7.51	39	2327
A-12-006*	N/A	1,200	7.84	N/A	N/A
A-12-008	N/A	1,300	7.63	N/A	N/A
A-12-010	N/A	2,300	8.30	N/A	N/A
R-12-013*	N/A	1,800	8.23	N/A	N/A
A-12-016*	N/A	2,900	8.48	N/A	N/A
A-12-017*	N/A	1,800	9.45	N/A	N/A
A-12-019	C747858	443	7.56	208	3990
A-12-020	C747859	508	7.78	337	3400
A-12-021	C747860	1,386	7.96	N/A	N/A
A-12-022*	C747861	2,585	8.26	N/A	N/A
A-12-023	N/A	9,100	8.90	N/A	N/A
R-12-032	C080020	660	7.37	86	354
A-12-033*	N/A	3,200	8.52	N/A	N/A
R-12-034*	C747862	5,042	8.66	N/A	N/A
A-12-036*	N/A	1,700	8.40	N/A	N/A

Note: 1. Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist: Chloride concentration is greater than or equal to 500 ppm, sulfate concentration is greater than or equal to 2000 ppm, or the pH is 5.5.or less.

2. * Denotes test performed at or near the proposed retaining wall locations

6. SEISMIC RECOMMENDATIONS

6.1 Seismicity

The site is located within a seismically active region of southern California, and close to a number of faults that are considered to be active or potentially active. According to the stratigraphy of the project site, a shear wave velocity (v_{s30}) of 980 ft/s (300 m/s) to 1,100 ft/s (340 m/s) is considered appropriate. Based on the Caltrans ARS online tool (2009), the proposed improvements are located 4.8 miles south of the Elsinore fault zone (Whittier Section). This fault is a strike slip fault, for which the magnitude of the maximum credible earthquake (MCE) is 7.6. The design median peak ground acceleration (PGA) at retaining wall locations is approximately 0.55g. Other nearby faults, including the Peralta Hills fault would be expected to have a lesser impact on the proposed improvement than the Elsinore fault zone.

6.2 Liquefaction

For liquefaction analysis and seismic settlement estimate, groundwater elevation is assumed to be at 215 feet for the local area west of Santa Ana River bridge and at 232 feet for the local area east of Santa Ana River bridge.

According to analysis using Liquefy5, a liquefaction analysis software program, there is a liquefiable zone in the medium dense sand layers at borehole R-12-015. The top of the liquefiable zone is about 29 feet below the existing grade (Elevation 215 feet) and the thickness of the liquefiable zone is about 20 feet.

6.3 Seismically Induced Settlement

Probable seismic settlement is estimated to be about 12 inches at borehole R-12-015. The seismic settlement is negligible at other borehole locations because foundation soils are generally medium dense to very dense as indicated by relatively high SPT “N” values.

7. GEOTECHNICAL RECOMMENDATIONS

7.1 Soil Engineering Properties

Estimated soil engineering properties and generalized soil stratigraphy used for geotechnical analysis are summarized in the tables below. The soil engineering properties were derive from laboratory test and estimated from corrected SPT N values (Bowles, 1977).

Table 4 Type 1 Retaining Wall No. 21A and 21C

Layer No.	Depth (ft)	Soil Type	Field SPT Blow Counts	Estimated Soil Engineering Properties
1	retained soil behind wall	Well Compacted Selected Fill	N/A	γ = 120 pcf φ = 34˚
2*	0-25	Silty Sand	14	γ = 120 pcf φ = 32˚
3	25-35	Silty Sand	30	γ = 126 pcf φ = 34˚
4	35-40	Sandy Silt	14	γ = 114 pcf φ = 30˚
5	40-50	Gravel	>50	γ = 130 pcf φ = 37˚

Note: 1. Depths are measured from design finish grade
2.*Soil layer where wall footing will be seated

Table 5 Type 1 Retaining Wall No. 453

Layer No.	Depth (ft)	Soil Type	Field SPT Blow Counts	Estimated Soil Engineering Properties
1	retained soil behind wall	Well Compacted Selected Fill	N/A	γ = 120 pcf φ = 34˚
2*	0-10	Sandy Clay	15	γ = 125 pcf c = 2000 psf
3	10-30	Sand Gravel	>50	γ = 130 pcf φ = 38˚
4	30-45	Sandy Clay	26	γ = 128 pcf c = 3000 psf

Note: 1. Depths are measured from design finish grade
2.*Soil layer where wall footing will be seated

Table 6 Type 1 Retaining Wall No. 470

Layer No.	Depth (ft)	Soil Type	Field SPT Blow Counts	Estimated Soil Engineering Properties
1	retained soil behind wall	Well Compacted Selected Fill	N/A	γ = 120 pcf φ = 34˚
2*	0-20	Sandy Silt	13	γ = 125 pcf φ = 32˚
3	20-40	Sandy Clay	10	γ = 122 pcf c = 900 psf
4	40-45	Sand with Gravel	>50	γ = 128 pcf φ = 36˚

Note: 1. Depths are measured from design finish grade
2.*Soil layer where wall footing will be seated

Table 7 Type 1 Retaining Wall No. 497

Layer No.	Depth (ft)	Soil Type	Field SPT Blow Counts	Estimated Soil Engineering Properties
1	retained soil behind wall	Well Compacted Selected Fill	N/A	γ = 120 pcf φ = 34˚
2*	0-30	Silty Sand	20	γ = 120 pcf φ = 33˚

Note: 1. Depths are measured from design finish grade
2.*Soil layer where wall footing will be seated

Table 8 Type 1 Retaining Wall No. 515

Layer No.	Depth (ft)	Soil Type	Field SPT Blow Counts	Estimated Soil Engineering Properties
1	retained soil behind wall	Well Compacted Selected Fill	N/A	γ = 120 pcf φ = 34˚
2*	0-20	Sand Silt	8	γ = 114 pcf φ = 30˚
3	10-20	Poorly graded Sand	18	γ = 115 pcf φ = 32˚
4	20-35	Silty Sand	42	γ = 122 pcf φ = 35˚

Note: 1. Depths are measured from design finish grade
2.*Soil layer where wall footing will be seated

7.2 Liquefaction Mitigation

Localized probable seismically induced settlement was estimated to be greater than 12 inches in Borehole R-12-015 near the proposed Retaining Wall 21B. Mitigation for potential liquefaction is needed if Caltrans standard walls were selected. Alternatively, MSE wall may be used which can tolerate the settlement and does not require liquefaction mitigation of the foundation soil.

Liquefaction mitigation options considered including: 1). jet grouting; 2). compaction grouting; 3). stone column; 4).densification by driven pile; and 5). driven piles supported wall footings.

Among these options, driven piles supported wall footings is the most cost effective option and is described in details as follows.

7.3 Footing Type

7.3.1 Pile Footing (RW 21B)

Based on the information provided by Structure Design, Alternative “X”, 14-inch square Class 200 concrete piles with a pile cap will be used at the proposed retaining wall 21B location. Table 9 summarizes the general foundation information of the proposed foundations and Table 10 summarizes pile axial load capacities along with tip elevations.

Table 9 General Foundation Information

Exposed Wall Height (ft)	Design Method	Pile Type (Driven)	Finished Grade Elevation (ft)	Cut-off Elevation (ft)	Pile Cap Size (ft)		Permissible settlement under Service Load (in)	Number of Piles Per Support
					B	L		
18	LRFD	Class 200	248.15	244.40	12.0	16.0	1	10
22	LRFD	Class 200	244.15	239.65	14.5	32.0	1	21
24	LRFD	Class 200	242.15	237.65	16.0	40.0	1	36
22	LRFD	Class 200	242.15	237.65	14.5	80.0	1	52

Table 10 Foundation Recommendations

Exposed Wall Height (ft)	Pile Type (Driven)	Cut-Off Elevation (ft)	Service-I Limit State Load (kips) per Support	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevation (ft)*	Specified Tip Elevation (ft)
					Strength Limit		Extreme Limit			
					Comp. ($\varphi = 0.7$)	Tension ($\varphi = 0.7$)	Comp. ($\varphi = 1.0$)	Tension ($\varphi = 1.0$)		
18	Class 200	244.40	485	1	99/pile	0	76/pile	0	189.0	189.0
22	Class 200	239.65	1,444	1	117/pile	0	93/pile	0	189.0	189.0
24	Class 200	237.65	2,146	1	117/pile	0	153/pile	73	189.0	189.0
22	Class 200	237.65	3,609	1	117/pile	0	93/pile	0	189.0	189.0

Note: * Design tip elevations are controlled by compression

Table 11 Pile Data Table

Exposed Wall Height (ft)	Pile Type (Driven)	Nominal Resistance (kips) per pile		Design Tip Elevation (ft)*	Specified Tip Elevation (ft)	Nominal Driving Resistance (kips)
		Compression	Tension			
18	Class 200	180	0	189.0	189.0	340
22	Class 200	180	0	189.0	189.0	340
24	Class 200	180	80	189.0	189.0	340
22	Class 200	180	0	189.0	189.0	340

Note: * Design tip elevations are controlled by compression

Group Effect

For driven pile groups in cohesionless soil, the nominal axial resistance of the pile group should be taken as the sum of the nominal resistance of all of the piles in the group. The efficiency factor should be 1.0 for a center-to-center pile spacing of 2.5 diameters or greater.

7.3.2 MSE Wall

An MSE wall may be used for RW 21B.

Based on the provided structural plans, the maximum exposed wall height of the MSE wall is about 22 feet.

The embedment lengths of the reinforcement are summarized in the following table.

Table 12 Summary of MSE wall 21B

Maximum Exposed Wall Height (ft)	Length of Embedment (ft)
20 to 23	25
15 to 20	20
10 to 15	15
Lower than 10	12

Subgrade Preparation for MSE Wall

Very loose sandy materials were encountered at a shallow depth in borehole R-12-015 during current subsurface exploration. To provide sufficient bearing resistance to support the MSE wall, subgrade preparation is required.

Soils within the wall limits should be excavated to 10 feet below existing grade, replaced, and recompacted to at least 95% Relative Compaction. Lateral extend of excavation is required in front of the wall and should be at least 10 feet from the face of the wall.

Based on the discussion with project design team, the MSE Wall option is not feasible due to limited construction space and traffic operation constraints.

7.3.3 Spread Footing

According to the bearing capacity analysis, the bearing resistances of the foundation soil are satisfactory. The analysis results are shown in the following table.

Table 13 Estimated Bearing Resistances

Retaining Wall No.	Wall Type	Maximum Height (ft)	Base Width (ft)	Bottom of Footing Elevation (ft)	Estimated Bearing Resistance[2] (ksf)		
					Service Limit State	Strength Limit State	Extreme Limit State
21A 21C	1	18.0 22.0	19.5 23.5	varies	5.0	5.0	9.0
453	1	12.0	12.5	varies	4.0	4.0	7.0
470	1	12.0	12.5	varies	4.5	4.5	8.0
497	1	10.0	11.0	varies	4.5	4.5	8.0
515	1	10.0	11.0	varies	4.5	4.5	8.0

Note: 1. Minimum footing embedment depth is 3 ft
2. Bearing resistance is estimated based on the footing width with maximum wall height

Soil bearing resistances are estimated based on:

- wall foundations to be founded on the expected soil layers denoted in Tables 4 to 8;
- selected Caltrans Standard Type 1wall; and
- base widths shown on the Standard Plans.

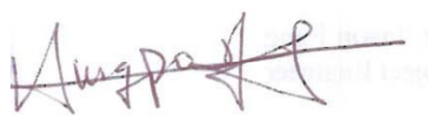
Should soil layers of wall foundations during construction are found different from reported, or designed wall types or maximum wall heights are different from provided in Table 13, please notify us so that revisions to allowable bearing capacities can be provided, if necessary.

The required minimum footing cover depth of 1.5 ft should be provided. For footings constructed on slopes, a minimum horizontal distance of 4 ft measured at the top of the footing should be provided between the near face of the footing and the face of the finished slope.

8. CONSTRUCTION CONSIDERATIONS

- Before installing driven pile, the Contractor must provide a driving system submittal, including driveability analysis.
- Hard driving resistance should be expected within the very dense sandy layers.
- Drilling may be required before driving the piles. The bottom elevation of the drilling hole is 215 feet.
- Control location: near Sta. “T2” 23+00.
- Medium expansive materials (EI = 58) were encountered in borehole A-12-007. These clayey materials are not suitable to be used as backfill materials.

If you have any questions or comments, please contact Hung Po Yang (916) 227-4534.



Hung Po Yang, P.E.
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Cc: Leo Chen, PM
Shira Rajendra, GS Corporate
Kirsten Stahl, DME
We-Kung Hsia, SD
Bartt Gunter, SD

State of California | Business, Transportation and Housing Agency

M e m o r a n d u m

Flex your power!
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To: MR. BARTT GUNTER, CHIEF
BRIDGE DESIGN BRANCH 19
OFFICE OF STRUCURE DESIGN

Date: January 18, 2013

File: 12-ORA-91-PM7.9/9.5
EA 12-0C5601
RW#454, 497 &519

Attn: Wei-Kung Hsia

Project No. 1200000078

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services – MS5
Office of Geotechnical Design – South 1

Subject: **Geotechnical Design Report for Retaining Walls #454, 497, and 519**

The following is the foundation report for the subject retaining walls proposed at west-bound State Route 91 and northbound (NB) SR55 to westbound (WB) SR91 connector ramp.

SCOPE OF WORK

The geotechnical scope of work for this project includes:

- Review As-Built plans
- Perform subsurface exploration
- Perform laboratory tests on soil samples obtained during subsurface exploration
- Evaluate site geology, subsurface, and groundwater conditions
- Perform site seismicity study
- Perform engineering analyses
- Provide geotechnical recommendations and construction considerations

PROJECT DESCRIPTION

The project is located between Post Mile (PM) 7.9 and PM 9.5 of State Route (SR) 91, in the city of Anaheim, Orange County, California. The proposed improvement is to add an exit bypass lane on westbound (WB) SR-91 from east of the NB SR-55/WB SR-91 connector to the Tustin Avenue off-ramp. This also includes reconstruction of the WB auxiliary lane within the same project limits. The improvement requires construction of eight retaining walls. Among them, five walls are standard walls to be designed by the District; three walls (RW#454, 497, and 519) are special design walls to be addressed by Office of Structure Design. The general information regarding the special design walls included in this report is summarized in following table:

Table 1 General Information for Special Walls

Wall	Wall Type	Approx. Station		Approx. Wall Length, feet	Maximum Wall Height, feet
		Beg. Wall	End Wall		
RW 454	Soil Nail Wall	453+10 ("T4")	460+94.5 ("T4")	784	28
	Tangent Pile Wall (Alternative 2)	460+34.5 ("T4")	460+67.0 ("T4")	32.5	
RW 497	Type 1 Wall (Spread Footing)	496+05.56 (SR91)	496+44.73 (SR91)	41	11
	Tie-in Barrier	496+44.73 (SR91)	497+43.01 (SR91)	102	5
	Type 1 Wall (Spread Footing)	497+43.01 (SR91)	497+62.25 (SR91)	20	8
RW 519	Anchored Wall	519+05/10+00 (SR91/RWLOL)	10+83.0 (RWLOL)	83	14
	Tangent Pile Wall	10+83 (RWLOL)	11+11.5 (RWLOL)	28.5	14
	Anchored Wall	11+11.5 (RWLOL)	11+38/448+93 (RWLOL/"T4")	26.5	14

SUBSURFACE EXPLORATION AND TESTING PROGRAM

Subsurface exploration for the proposed earth retaining structures was completed in May 2012. A total of ten hollow-stem-auger (HSA) boreholes were drilled near the wall sites. Standard Penetration Tests (SPT) were performed in compliance with ASTM D 1586. Pocket penetrometer readings were also collected from cohesive soil samples at the selected depth for strength evaluation.

The general information for those borings is summarized in following table:

Table 2 Summary of Subsurface Exploration for RW# 454, 497, and 519

Retaining Wall No.	Borehole No.	Top of Hole Elevation (feet)	Station	Offset (feet)	Boring Depth (feet)	Bottom Of Hole Elevation (feet)	Exploration Method	Drill Rig /Hammer Type	Hammer Efficiency (%)
RW454	A-012-002	308.2	531+30.40	-119.48	45.3	262.9	HSA	Acker /Auto	77
	A-012-003	295.16	529+42.72	-153.62	45.3	249.86	HSA	Acker /Auto	77
	A-012-004	281.52	527+42.18	-157.71	25.3	256.22	HSA	Acker /Auto	77
	A-012-005	267.09	525+49.6	-122.89	31.5	235.59	HSA	Acker /Auto	77
RW519	A-012-008	280.28	520+04.58	-149.53	51.5	228.78	HSA	CS2000 /Auto	97
	A-012-009	257.4	520+06.37	-85.72	56.5	200.9	HSA	Acker /Auto	77
	A-012-010	257.25	518+99.61	-84.47	66.5	190.75	HSA	Acker /Auto	77
RW497	A-012-016	261.72	498+69.07	-187.25	50.5	211.22	HSA	CME75 /Auto	79
	A-012-017	266.74	497+27.10	-101.9	45.25	221.49	HSA	CME75 /Auto	79
	A-012-035	244.07	496+34.26	-59.32	31.5	212.57	HSA	Acker /Auto	77
	A-012-036	247.13	497+75.60	-62.06	36.5	210.63	HSA	Acker /Auto	77

LABORATORY TESTING

Samples collected by SPT sampler and Modified California sampler were tested. The tests performed included unit weight, moisture content, unconfined compression, Atterberg limits, and particle size analysis. Bulk samples were also collected from the job site for corrosion evaluation.

SITE GEOLOGY

The site is within the Los Angeles Basin of the Peninsular Ranges geomorphic province. The Peninsular Ranges province is composed of mountain ranges that are oriented roughly northwest-southeast, which roughly parallel the San Andreas Fault. The Los Angeles Basin is an alluvium filled basing that is up to several miles thick at its deepest point. The site is near the western limits of the Peralta Hills, which join the Santa Ana Mountains to the east.

The site is located at the southern edge of the Los Angeles Basin, and is underlain by artificial fill and alluvium derived from the Santa Ana River**.** The alluvium is composed mostly of medium dense to very dense gravelly sands, sandy gravels and silty sands, with a few layers of stiff to very stiff silt and clay, and with occasional cobbles and boulders.

SUBSURFACE CONDITIONS

At RW454, the embankment materials are mostly stiff to very stiff lean clay with sand. Five to 15 feet thick very dense gravelly materials were encountered below the embankment from elevation of approximately 260'. At RW497, foundation soils near the bridge abutments consist mostly of medium dense to dense Clayey sand and silty sand within 30 feet from top of the proposed retaining wall (Elev. 252'). Near RW519, however, the soils behind and below the proposed cut wall are predominantly cohesive, with consistency from stiff to very stiff. A ten-foot thick granular layer was encountered below elevation 233'. For foundation design purpose, the idealized soil profiles are presented in Table 3 of this report.

GROUNDWATER

The data from the closest monitoring well, installed by Department of Water Resources, shows a historic high ground water table at 233.8 feet above mean-sea-level (MSL) in January 2007 at well No. 04S09W04L002S near Santa Ana River. The highest groundwater elevation from the monitoring wells at a gas station near the intersection of E. Riverdale Ave. and N. Tustin Ave. was registered to be 232.69 feet above MSL, based on available records between 1992 and 2008 from GeoTracker website (California Regional Water Quality Control Board).

Groundwater was also encountered during subsurface exploration at RW519 site at Elev. 230 feet. However, the as-built LOTBs for the existing Riverdale Ave UC indicated that the groundwater was at 232 feet above MSL (NGVD29) in 1964. Based on the above findings, the design high groundwater is assumed to be 235 feet above MSL, after vertical datum conversion (NAVD88).

CORROSION EVALUATION

Corrosion samples were obtained during subsurface explorations. The bulk samples were collected from the borings and tested for corrosion potential following the guidelines from Caltrans' Corrosion Technology Branch. The test results are presented in Table 4. Based on the test results, the subsurface materials are considered non-corrosive at RW519 and RW497 sites, but corrosive at RW454 site.

Table 3 Idealized Soil Profile and Strength Parameters

Depth (from Wall Top), feet	Elevation, feet	Soil Type, USCS	Average Blowcounts N60 / PP#	Total Unit Weight, pcf	Apparent Friction Angle, degree	Undrained Shear Strength, psf
RW454						
STA453+10 to STA456+50 ("T4 "Line), reference borehole A-12-004 & A-12-005						
0 - 8	Varies	Sandy Lean Clay (CL), Stiff	PP# 1.0 to 1.25	120	NA	1000
8 - 30	Varies	Sandy lean Lean Clay (CL), very Stiff	PP# 2.0 to 4.5	120	NA	2500
STA456+50 to STA459+50 ("T4 "Line), reference borehole A-12-003						
0 - 28	Varies	Sandy Lean Clay (CL), Stiff	PP# 1.0 to 1.5	120	NA	1300
28 - 35	Varies	Sandy Lean Clay (CL), Very Stiff	PP# 1.5 to 2.5	120	NA	2000
35 - 45	Varies	Gravel with sand and Silt (GW-GM)	N60>50	125	38	NA
STA459+50 to STA460+90 ("T4" Line), Reference boring A-12-002						
0 - 28	Varies	Sandy lean Clay (CL), Stiff	PP# 1.0 to 1.5	120	NA	1100
28 -45	Varies	Sandy lean Clay (CL), Very Stiff	PP# 2.0 to 4.5	120	NA	2500
RW519, **r**efence borings A-12-008/009/010						
0 - 7	267 - 260	Lean Clay (CL), Stiff	PP# 0.75 to 1.25	120	NA	1000
7 - 34	260 - 233	Lean Clay (CL), Very Stiff	PP# 1.75 to 4.5	120	NA	2000
23 - 33	233 - 223	Silty Sand & Gravel (SM/GM)	N60 >50	125	38	NA
RW497, **r**efence borings A-12-016/017/035/36						
0 - 8	252 - 244	Clayey Sand (SC) & Silty Sand (SM)	N60 =27- 62	120	37	NA
8 - 31	244 - 221	Silty Sand (SM), Medium Dense	N60 = 14 - 28	120	33	NA

Table 4 Corrosion Test Results

Location	Sampling Borehole	Depth of Sample (ft)	pH	Soluble Sulfates	Soluble Chlorides	Minimum Resistivity
RW454	A-12-004	10 - 11.5	6.98	1569	285	570 ohm-cm
	A-12-005	10 - 11.5	7.51	2327	39	710 ohm-cm
RW519	A-12-010	0 - 5	8.3	N/A	N/A	2300 ohm-cm
RW497	A-12-036	0 - 10	8.4	N/A	N/A	1700 ohm-cm

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist: Chloride concentration is greater than or equal to 500 ppm, sulfate concentration is greater than or equal to 2000 ppm, or the pH is 5.5.or less. It is the practice of Caltrans Corrosion Technology Section (with the exception of MSE Walls) if the minimum resistivity of the sample is greater than 1000 ohm-cm and the pH is greater than 5.5, the sample is considered to be noncorrosive.

SEISMICITY

The site is located within a seismically active region of southern California, and close to a number of faults that are considered to be active or potentially active. According to the stratigraphy of the project site, a shear wave velocity (v_{s30}) of 980 ft/s (300 m/s) to 1,100 ft/s (340 m/s) is considered appropriate. Based on the Caltrans ARS online tool (2009), the job site is located approximately 4.8 miles south of the Elsinore fault zone (Whittier Section). This fault is a strike slip fault, for which the magnitude of the maximum credible earthquake (MCE) is 7.6. The design median peak ground acceleration (PGA) at retaining wall locations is approximately 0.6g. Other nearby faults, including the Peralta Hills fault should exert a lesser impact on the proposed improvements than the Elsinore fault zone.

GEOTECHNICAL RECOMMENDATIONS

Soil nail wall was recommended for RW454 to accommodate the proposed bypass lane north-east of existing connector embankment, north of existing North Connector Overcrossing. Two alternatives, 1) soil nail wall and 2) tangent pile wall, were proposed for the 32.5 feet long wall section near Abutment 5 of the existing connector bridge.

Type 1 reinforced concrete cantilever wall is recommended for the portion of RW497 located outside of the footprint of existing Tustin Ave OC. Tie-in barrier on existing bridge footing was proposed by Structure Design for the portion of RW497 located under the bridge. The loss of lateral resistance due to the soil removal in front of the abutment is negligible, since the lateral resistance will be provided by horizontal component of axial resistance of the battered piles with the pile top generally located below the finished grade. The foundation recommendations for standard type 1 wall will be included in a separate report for this project. Tie-in barrier will be designed by structure engineer assuming structure backfill behind the barrier wall.

Ground anchor wall was recommended for most part of RW519, except for location within 28.5 feet south of existing Riverdale Ave OC, where tangent pile wall was recommended to avoid potential conflict with existing wingwall and its pile foundations.

The wall type selection information is presented in Table 1 of this report.

Geotechnical Recommendations for RW454

The soil nail wall is the most economical option for the wall 454. For the design of soil nail wall, the computer program SNAILZWIN was used. Following are the geotechnical design criteria for the soil nail wall:

- **Static Case**

Minimum Factor of Safety: 1.5

- **Seismic Case**

Minimum Factor of Safety: 1.0
Non-dimensional horizontal seismic coefficient k_h: = 0.2
Expected deformation: less than 4 inches

The soil nail wall design is summarized in Table 5 below,

Table 5 Soil Nail Wall Design

Wall Height (ft)	Maximum Nail Spacing Vertical (ft)	Nail Spacing Horizontal (ft)	Nail Length (ft)
to 5	5	5	7
to 10	5	5	13
to 15	5	5	19
to 20	5	5	25
to 25	5	5	30
to 30	5	5	36

Note:
1. Square nail layout pattern should be used.
2. Design wall height is the vertical distance from the top of shotcrete to the bottom of the wall.
3. The nails are inclined 15 degrees from horizontal.

4. First row of the nails should be placed 2.0 to 2.5 feet below the original ground, and vertical nail spacing needs to be adjusted in areas with geometric constraints.

For the wall section adjacent to existing bridge abutment (Stations 460+34.5 to 460+67.0), the nail design should be modified as shown in Table 6 to avoid potential conflict with the existing wingwall or piles. A minimum clearance of one foot should be maintained to prevent damage on existing facilities during nail installation.

Table 6 Soil Nail Wall Design near Existing Bridge Abutment

Row of Nails	Nail Length, feet	Nail Inclination, degrees
First	15	25
Second	30	20
Below Second	30	15

Note:
1. Square nail layout pattern should be used.
2. The nail inclination is measured from horizontal.
3. First row of the nails should be placed 2.0 to 2.5 feet below the original ground.
4. Vertical nail spacing needs to be adjusted in areas with geometric constraints.

The soil nail wall is designed to support existing embankment, which consists of stiff to very stiff clay and will be subject to compaction over a long period of time. The design pullout resistance for the nails is presented in the table below,

Table 7 Soil Nail Resistance Information

Station	Zone 1	Maximum Stress on Nail[2], ksi	Maximum Tensile Force from Nail on Facing[2], kips
	Design Pullout Resistance[1], lb/ft		
453+10 to 460+94.5	1400	40	30

Note:
1. Design pullout resistance of the soil nail should be placed on the plans.
2. For structural design purpose, appropriate factor of safety should be applied to the nail tensile force: both bending moment and punching shear resistance should be checked based on tensile force on facing shown in this table.

For seismic stability analysis, pseudo-static method was used. In pseudo-static analysis, the earthquake-induced inertial forces varying in time are simplified as equivalent pseudo-static force acting on the center of gravity of the analyzed soil block.

Tangent Pile Wall Alternative near Abutment 5 of BR 55-0329G

To avoid the construction difficulty caused by potential conflict between soil nails and structural elements of the existing bridge, tangent pile wall may be used between stations 460+34.5 and 460+67.0 (“T4” Line), north of Abutment 5 of existing connector overcrossing (BR 55-0329G). The design height of the tangent pile wall varies along the wall alignment. For structure design of this wall section, use the soil strength properties as shown in the following table.

Table 8 Shear Parameters for Tangent Pile Wall Design

Depth (below the bottom of wall), feet	Cohesion, lb/ft^2	Friction Angle, degrees
0 to 50	400	26

The above engineering properties are based on long-term drained behavior of clayey materials with absence of groundwater and an expected negligible strain experienced by the soils during construction.

Geotechnical Recommendations for RW519

Lateral Earth Pressure on Wall beyond Abutment 3

For the wall section located beyond bridge abutment (Abut 3), static earth pressure behind the wall was estimated using trial wedge analysis assuming drained shear parameters for the clayey materials at the wall location. Seismic lateral earth pressure was also estimated using trial wedge analysis based on residual value of undrained shear strength (2/3 of S_u) for the clayey soils behind the wall. Horizontal earthquake acceleration was assumed to be 0.5 times of peak ground acceleration (PGA) in pseudo static analysis.

The lateral load behind ground anchor wall and tangent pile wall under both static and seismic conditions beyond bridge abutment are summarized in the table below.

Table 9 Lateral Load behind Wall beyond Abutment 3

Wall Type	Retained Soil Height, feet	Lateral Load against the Wall (per linear foot along wall alignment)		
		Static Condition[1] (P_a)		Seismic Condtion[2]
Tangent Pile Wall	12	2.00 kips/ft		8.0 kips/ft
Anchored Wall	12	2.00 kips/ft	Failure Wedge 40 degrees from Vertical	8.0 kips/ft
	10	1.10 kips/ft	Failure Wedge 45 degrees from Vertical	5.0 kips/ft
	8	0.55 kips/ft	Failure Wedge 50 degrees from Vertical	2.4 kips/ft
	6	0.25 kips/ft	Failure Wedge 45 degrees from Vertical	0.8 kips/ft

1. Drained shear strength properties were assumed for clayey soils in static condition with active lateral earth pressure resultant located at 1/3 of retained soil height from bottom.
2. Undrained shear strength properties with residual strength were used for clayey soils in seismic condition, with seismic earth pressue resultant located at mid-height of retained soil (uniformly distributed).

Lateral Earth Pressure on Walls in front of Abutment 3

The static lateral earth pressure on wall in front of bridge abutment is very low without proposed anchor lock-off, due to the existence of abutment behind the cut. The wall design is controlled by lateral load transferred from bridge abutment during seismic event. Lateral load from seismic active wedge behind abutment wall will be resisted by both battered piles under abutment footing and ground anchors behind the existing structure foundations.

The total loss of passive resistance in front of the bridge abutment and abutment foundation due to 9 feet high and 18 feet long cut is estimated to be 12 kips/ft. The above resistance should be higher than the passive resistance that can be mobilized by lateral movement of existing bridge abutment. The anchored wall design should provide sufficient resistance from the ground anchor.

Unbonded Length of Anchored Wall

The unbounded length should extend beyond the critical failure surface. Starting from the vertical wall face, the critical failure surface is defined by the angle of clockwise rotation centered at the bottom of the anchored wall. Trial wedge analysis was performed to obtain the critical wedge at different wall locations. The results are presented in Table 9 above. The unbonded length should be extended a minimum of H/5 (H, wall height) or 5 feet, whichever is greater, behind the above critical failure surface. Unbonded length should be at least 15 feet to limit seating loss during anchor lock-off.

For anchored wall in front of abutment, unbounded length should extend at least 5 feet beyond the edge of abutment footing for the reduction of the lateral stress against existing pile foundation.

Bonded Length of Ground Anchor

Contractor is responsible for determining the bonded length of the ground anchor. However, the bonded length of the anchor should not be less than 15 feet. The nominal bond strength within the ground anchor bond zone is assumed to be 3.6 ksf (after PTI, 2004), for the initial assessment of anchor length and right of way acquisition.

Bearing Capacity of Anchored Wall

The bearing capacity analysis is based on minimum embedment depth of 2.0 feet and footing width of 1.7 feet. The ultimate bearing capacity of anchored wall foundation is 10.5 ksf , or 17 kips/ft along the wall alignment. The bearing pressure under the wall foundation is 3.0 ksf corresponding to one inch settlement of vertical wall element.

Lateral Analysis of Tangent Pile Wall

Lateral analysis for the CIDH piles to be used in tangent pile wall was performed to evaluate pile response under both service and extreme limit states. Three CIDH piles were proposed for the tangent pile wall. The embedment depth of the piles is assumed to be 16 feet, with maximum retained soil height of 12 feet above the finished grade in front of the wall. The pile diameter is 3 feet, with on center spacing of 10 feet. The earth pressure from approach embankment against the shotcrete will be transferred to the piles through connecting bond dowels. The analysis was performed using LPILE PLUS5.0 program (Ensoft Inc), and results are presented in Table 10 below.

Table 10 Summary of Lateral Analysis for Tangent Piles (CIDH Piles) at RW519

Service Limit State			Extreme Limit State		
Max. Moment, kips-ft	Max. Shear, kips	Top of Wall Deflection, inches	Max. Moment, kips-ft	Max. Shear, kips	Top of Wall Deflection, inches
132	21	0.13	654	102	10.9
Analysis based on non-linear EI, assuming 8 #10 bars with 3 in bar protective cover. Elastic modulus for concrete and steel used are 3,500 ksi and 29,000 ksi, respectively. Crack Moment of 3 ft diameter pile is estimated to be 192 kips-ft, with ultimate moment capacity at approximately 670 kips-ft.					

CONSTRUCTION CONSIDERATIONS

RW519

To minimize the adverse impact on existing bridge foundations, ground anchor should be constructed in segments in front of the existing abutment. The maximum length of ground anchor wall segments under construction should not exceed one third of the length of existing abutment footing at any given time under the existing bridge.

The subsurface condition is generally uniform within the limits of wall alignment. Only one wall zone is defined for the entire wall (RW519).

The design high groundwater is at 235 feet above MSL. However, groundwater will fluctuate in different years and different seasons of the year. Depending on the final design depth of CIDH piles, groundwater may be encountered. Under such circumstance, wet method will be needed for pile installation.

RW454

Only one wall zone is defined for the entire wall for the purpose of verification test on nails and stability test on temporary cut.

Although subsurface materials are predominantly cohesive at RW454 (soil nail wall) site, caving soils may still be encountered during nail installation.

Soil nails may be installed east of Abutment 5 of North Connector Overcrossing (Alternative 1). Should adjustment of nail alignment be needed to avoid conflict with abutment wing wall and concrete piles on existing bridge during nail installation, this Office should be notified before any alteration of current nail design.

Should you have any question or comment, please contact Haitao Liu at (916)-227-0992, or Seungwoon Han at (916) 227-4533.

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State of California **Business, Transportation and Housing Agency**

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To: MR BARTT GUNTER, CHIEF
Bridge Design Branch 19
Office of Bridge Design South 2

Date: December 13, 2012

File: 12-ORA-91-PM 8.57
Project Id: 1200000078
(EA 12-0C5601)
Santa Ana River Bridge
(Widen), Br# 55-0106

Attn: **Mr. Wei-Kung Hsia**

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design South 1
Branch B

Subject: Foundation Report for Santa Ana Bridge (No. 55-0106) Widening Project

1.0 INTRODUCTION

Per your request dated October 11, 2011, this Foundation Report (FR) has been prepared for the above referenced project on SR-91 in the City of Anaheim. The foundation recommendations provided herein are based on the results of a our project-specific geotechnical site exploration and the project information provided by your office including the foundation design data on December 6, 2012. This FR supersedes both the Preliminary Foundation Report (PFR) dated May 04, 2010, and the Draft Foundation Report (DFR) dated July 13, 2012 that were submitted earlier for this project.

1.1 Scope of work

The following tasks were performed for the preparation of this report:

- Review of available existing relevant data
- Field exploration
- Laboratory testing
- Geotechnical data interpretation and evaluation
- Geotechnical and seismic analysis and design, and the
- Preparation of this FR.

2.0 PROJECT DESCRIPTION

The California Department of Transportation (Caltrans) -District 12 proposes to widen the State Route 91 (SR-91), from Post Mile (PM) 7.9 to PM 9.5, at and near its connection with SR-55 in the City of Anaheim, Orange County, California. The project will widen the existing west bound

(WB) SR-91 bridge over Santa Ana River on the outside to provide an exit bypass lane from east of the existing northbound (NB) SR-55/WB SR-91 connector to the Tustin Avenue off-ramp. Additionally, the project will reconstruct the WB auxiliary lane from NB SR-55/WB SR-91 connector to the Tustin Avenue off-ramp, and involve construction of earth retaining structures. The project will relieve existing weaving, merging, and diverging deficiencies between the NB SR-55/WB SR-91 connector and the Tustin Avenue off-ramp. The total length of the project is 1.6 miles. The scope of this FR is limited to the proposed bridge (No. 55-0106) widening part of the project only.

2.1 Existing Site Conditions

The existing bridge is located on WB SR-91 between NB SR-55/WB SR-91 interchange and the Tustin Avenue Undercrossing, as shown in Figure 1 below.

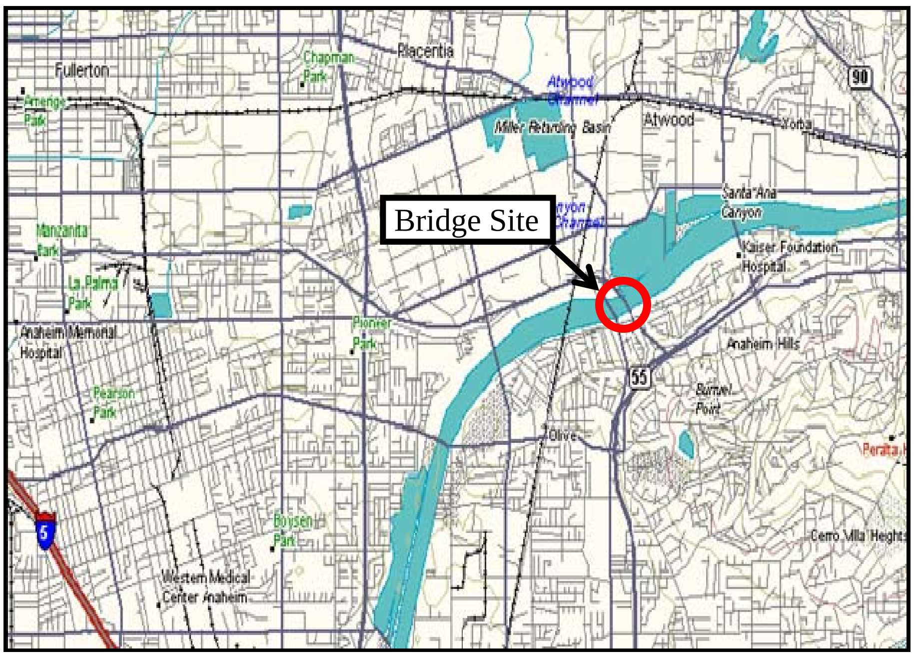

Figure 1 – Site Vicinity Map

The existing structure is a continuous 18 span reinforced concrete "T" girder-bridge and supported by substructures consisting of solid reinforced concrete pier walls and seat type abutments. All substructures are founded on steel HP 10x42 piles. The bridge was first built in 1953 as two separate river crossing structures (EB and WB). Both bridge structures were widened in 1965. In 1995, the left (WB) and right (EB) structures were connected by center widening. Both bridges were also widened on the outside. The combined bridge structure was also retrofitted in 1995 for improved seismic performance. Several pier walls were thickened. All widened structures provided the same super and substructure types. The retrofit work did not involve any foundation work.

The total length of the existing bridge is approximately 868 feet; the width is approximately 150 feet.

2.2 Proposed Widening

The proposed widening consists of reinforced-concrete “T” girder superstructure and reinforced concrete pier walls and seat type abutments. HP 10x57 steel piles, are proposed by Bridge Design South 2 for this bridge widening. The existing and widened bridge decks will be connected by a closure pour.

The proposed widening is on the outer left side (WB SR-91) only. The proposed widening width varies from approximately 19.25 feet to 23.75 feet.

3.0 SITE EXPLORATION

Field exploration was conducted between March 5 and May 8, 2012. A total of eight (10) exploratory borings (R-12-024 through R-12-034) were drilled through the existing bridge deck. The boring locations are shown in Figure 2 and 3. These borings were drilled between two adjacent piers through the existing bridge.

Permits didn’t allow drilling within the footprint of the proposed widening. The permits also didn’t allow drilling through the bike path lane between Pier 18 and Abutment 19, and through the maintenance road between pier 3 and 4. This pile foundation design is primarily based on the geotechnical data obtained from these borings, and as-built data in 1964.

Boring locations are shown in Figure 2 and 3. A summary of boring data for the current exploration is presented in Table 1 below. Stations, offsets, and elevations of the borings presented are based on survey conducted by District 12 Engineering Services-Surveys.

All borings were drilled by the Caltrans Office of Drilling Services and logged by personnel from our office. All borings were drilled utilizing mud rotary method or Hollow Stem Auger method. Soil samples were collected using Standard Penetration Test (SPT) sampler and Modified California Sampler (MCS) typically at 5-foot depth intervals. The samplers were driven a total of 18 inches using a 140-pound hammer falling freely for 30 inches. The MCS is a 2.0-inch inside-diameter split-barrel type sampler lined inside with thin rings. This MCS was used to collect relatively undisturbed samples of fine-grained or cohesive soils.

Table 1 – Summary of Boring Information

Boring	Station[1&3]	Offset[1] (ft)	Surface Elevation[2] (ft.)	Drilled Depth, (ft.)	Bottom Elevation[2], (NAVD 88, ft.)
R-12-024	514+79.23	-71.09	256.77	86.5	170.27
R-12-025	514+02.61	-69.66	256.71	91.5	165.21
R-12-026	513+01.58	-70.16	256.56	85.3	171.26
R-12-027	512+01.27	-70.22	256.37	101.5	154.87
R-12-028	511+00.97	-70.19	256.2	86.5	169.70
R-12-029	509+69.54	-69.98	255.92	60.25	195.67
R-12-030	508+52.53	-69.75	255.71	61.5	194.21
R-12-032	507+04.76	-70.15	255.37	65.25	190.12
A-12-033	516+20.57	-76.69	256.89	35.5	221.39
A-12-034	505+78.42	-69.49	255.84	45.5	210.34

Note: 1. Stationing and Offsets according to D-12 survey request # 12-016, dated 5/4/2012. Positive is right of layout lines, negative is left of Layout lines. (All referenced to existing center line of SR-91).
2. Elevations are above Mean Sea Level (MSL) based on NAVD88 datum.
3. Existing SR-91 Main line stationing.

4.0 LABORATORY TESTING

Laboratory testing was performed on selected SPT and undisturbed samples from the borings. Laboratory testing included Unit weight, Moisture Content, Unconfined Compression, Plasticity Index, Mechanical Analysis, Consolidation, Maximum Density, Direct Shear, Expansion Index and Corrosion. Geotechnical testing was performed in accordance with California Test Methods, ASTM or UBC procedures (see Table 2 below). A complete set of geotechnical laboratory results is presented in Appendix I: Laboratory Data.

Table 2 – Laboratory Test Methods

Test	Standard
Unit Weight	CTM 212
Moisture Content	CTM 226
Unconfined Compression	CTM 221
Plasticity Index	CTM 204
Mechanical Analysis	CTM 203
Consolidation	ASTM D2435
Maximum Density	ASTM D1557
Direct Shear	ASTM D3080
Expansion Index	UBC-29-2
Corrosion – Resistivity, pH	CTM 643
Corrosion – Chloride Content	CTM 422
Corrosion – Sulfate Content	CTM 417

5.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

5.1 Regional Geology

The site is located within the Los Angeles Basin of the Peninsular Ranges geomorphic province. The Peninsular Ranges province is composed of mountain ranges that are oriented roughly northwest-southeast, which roughly parallel the San Andreas fault. The Los Angeles Basin is an alluvium filled basin that is up to several miles thick at its deepest point. The site is near the western limits of the Peralta Hills, which join the Santa Ana Mountains to the east.

5.2 Site Geology

The site is located at the southern edge of the Los Angeles Basin, and consists artificial fill and alluvium derived from the Santa Ana River**.** These soils are underlain by marine and non-marine Tertiary-age sedimentary formational material. The alluvium consists of gravel, sand, silt and clay layers with occasional cobbles and boulders.

5.3 Subsurface Conditions

Based on findings of our current geotechnical investigation and the as-built information, the subsurface soils within the maximum depth of the borings consist of artificial fill, except within the active unlined central river channel, and young to older alluvium overlying hard clay-like formational materials.

The fill soils at the site are associated mainly with the existing levee/dike or, near the abutments, with the existing bridge construction. The active unlined river channel crossing the bridge alignment near the middle is contained on both sides by levees covered with riprap. A relatively high flood protection dike is also present near the Pier 9.

Generally the upper younger alluvial material consists of very loose to medium dense, fine to coarse, poorly-graded to well-graded sand with silt, silty/clayey sand, silt and clay layers with some fine to coarse gravels. The underlying older alluvium consists primarily of dense to very dense gravelly sands and sandy gravels. Some cobbles and boulders were also encountered within the alluvium during this investigation.

The underlying formational material is variably weathered ranging from moderately weathered to relatively fresh. This material is hard.

For more specific subsurface conditions encountered at the locations of the bore holes, refer to the LOTB sheets for the proposed bridge (widen) project submitted separately for inclusion in the project plans and the as-built LOTB sheets for the existing bridge. It should be noted that due to the small size and discrete locations of the exploratory bore holes, the size ranges, amount, distribution or hardness of the localized hard material, cobbles and boulders present in the field may be significantly different from those encountered during drilling and presented in the LOTBs. This aspect of the subsurface conditions should be considered in the selection, design and construction of foundations at the site.

5.4 Groundwater

5.4.1 Historical Data

Data from the closest California Department of Water Resources operated ground water well indicates a historic high ground water elevation at about 234 feet above sea level in January 2007 at well 04S09W04L002S. This water well is located between the Santa Ana River and the water basins to the north of the bridge. Monitoring wells at a gas station at the intersection of E. Riverdale Ave. and N. Tustin Ave. show a high ground water elevation of about 233 feet above sea level between 1992 and 2008 according to the GeoTracker website.

5.4.2 Current investigation

Two (2) borings (A-12-011, R-12-012), drilled concurrently for retaining walls proposed as part of the overall project, close to the bridge abutments were converted to piezometers to monitor the groundwater table. The water surface levels (river flowing water) under the bridge were also measured during the investigation at the location of the borings R-12-025, 026, 027, and 030. Tabulated below is a summary of our findings.

Table 3 – Groundwater Monitoring Results

Boring No	Date	Elevation (ft)	Date	Elevation (ft)	Date	Elevation (NAVD88, ft)
A-12-011	5/8/12	232.1	5/30/12	232.0	8/15/12	232.0
R-12-012	5/8/12	215.4	5/30/12	215.3	8/15/12	216.5
R-12-025	--	--	--	--	5/15/12	233.3
R-12-026	--	--	--	--	5/15/12	233.3
R-12-027	--	--	--	--	5/15/12	233.6
R-12-030	--	--	--	--	5/15/12	228.6

Based on the above data, the groundwater surface elevation for design is recommended to be considered as 234 feet.

6.0 SCOUR POTENTIAL

The following table is a summary of potential total scour elevations for the proposed bridge widening, per the “Final Hydraulic Report” for this bridge (widen) prepared by the Caltrans HQ Hydraulic Branch, dated 8/3/2012. It should be noted that the estimated scour at depth the location of the Piers 12 and 13 is approximately 1.8 feet below the proposed bottom of footing elevation of 228.31 feet. Either no scour or scour to elevations above the support footing are estimated at the other support locations.

Table 4 – Scour Potential Summary Results

Support Location	Finish Grade Elev. (ft)	Pile Cut-off Elev. (ft)	Local Pier Scour Depth (ft)	Long Term Degradation (ft)	Total Scour Depth (ft)	Total Scour Elev. (NAVD 88, ft)
Abut 1 and Piers 2-9	--	--	--	--	--	--
Pier 10	234.00	228.31	1.7	1.5	3.2	230.8
Pier 11	234.00	228.31	3.8	1.5	5.3	228.7
Pier 12	234.00	228.31	6.0	1.5	7.5	226.5
Pier 13	234.00	228.31	6.0	1.5	7.5	226.5
Pier 14	234.00	228.31	3.8	1.5	5.3	228.7
Pier 15	234.00	228.31	3.8	1.5	5.3	228.7
Pier 16	234.00	228.31	3.8	1.5	5.3	228.7
Pier 17	234.00	228.31	3.8	1.5	5.3	228.7
Pier 18 and Abut 19	--	--	--	--	--	--

7.0 CORROSION EVALUATION

Five (5) representative composite bulk samples were tested for corrosion potential of soils within the bridge alignment. Based on these results soils at the subject are not considered corrosive.

Table 5 – Corrosion Test Results

Boring	Depth (ft)	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
R-12-028	0-5	6800	8.01	N/A	N/A
R-12-029	0-5	6000	8.20	N/A	N/A
R-12-030	0-5	3900	8.11	N/A	N/A
R-12-032	0-5	660	7.37	86	354
R-12-033	0-5	3200	8.52	N/A	N/A
R-12-034	0-5	5042	8.66	N/A	N/A

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist: Chloride concentration is greater than or equal to 500 ppm, sulfate concentration is greater than or equal to 2000 ppm, or the pH is 5.5 or less. A minimum Resistivity value of less than 1000 (Ohm-cm) indicates the presence of high quantities of soluble salts and a higher propensity for corrosion.

8.0 SEISMIC HAZARDS

The bridge site is not located within any "Earthquake Fault Zone" as currently delineated by the California Geological Survey (CGS).

A ground motion hazard analysis was performed at the bridge site in accordance with the requirement of the Seismic Design Criteria, Version 1.0 (SDC, 2010). Fault parameters for the three most significant faults for the subject site are summarized below.

Table 6 - Fault and Design Ground Motion Parameters

Fault	M_{max}	Type	Dip	Dip Direction	R_{rup} (km)	R_{JB} (km)	R_x (km)
Peralta Hills	6.2	Reverse	50°	N	1.17	0.03	1.53
Elsinore (Chino)	7.6	Reverse	50°	W	12.09	3.20	15.79
Elsinore (Whittier)	7.6	Strike Slip	75°	NE	7.74	7.74	7.74

Both deterministic and probabilistic ground motion hazard analyses were performed utilizing the Caltrans 2009 ARS Online tool. A Vs_{30}= 340 m/sec (1115 feet/sec) was determined from empirical correlations between SPT blow counts and soil shear wave velocity. A summary of the results of these analyses are presented in Table 7 below.

Table 7- Summary of Ground Motion Parameters (1)

<table>
<tr><th colspan="7">Ground Motion Hazard Analysis Method</th></tr>
<tr><th colspan="4">Deterministic</th><th colspan="3">Probabilistic (Return Period = 975 yrs)</th></tr>
<tr><th>PHGA (g)</th><th>S₁</th><th>(M_w)_{max}</th><th>Causative Fault</th><th>PHGA (g)</th><th>S₁</th><th>Median Earthquake Magnitude, (M_w)_{median}</th></tr>
<tr><td>0.61</td><td>0.71</td><td>6.2</td><td>Peralta Hills</td><td rowspan="2">0.48</td><td rowspan="2">0.68</td><td rowspan="2">7.0</td></tr>
<tr><td>0.48</td><td>0.69</td><td>7.6</td><td>Whittier-Elsinore</td></tr>
</table>

Note 1: PHGA = Peak Horizontal Ground Acceleration, S_1= Spectral acceleration at 1.0 second period, $(M_w)_{max}$ = Moment magnitude of the maximum earthquake event. $(M_w)_{median}$ = Moment magnitude of the median earthquake event.

The recommended ARS curve based on these analyses is attached as Appendix II.

8.1 Soil Liquefaction Hazard Evaluation

Based on the above discussed site-specific geotechnical exploration and review of the as-built data, approximately the upper 10 feet of alluvial subsurface soils within the river/flood plain segment of the alignment consists of loose to medium dense granular or cohesionless soils. This layer of soils also extends underneath the approach abutment fills. The fine contents (Passing #200 sieve) of this layer of soil ranged from about 7 to 33 % are predominantly non-cohesive. Such soils, when saturated, are highly susceptible to soil liquefaction during seismic shaking.

For the purpose of soil liquefaction and related hazards including lateral spreading of sloped ground, the relevant ground motion parameters at this time are the Peak Horizontal Ground Acceleration (PHGA), the spectral acceleration at 1.0 second period (S_1) and the moment magnitudes (Mw) of the causative seismic event. These ground motion parameters for the subject bridge site evaluated based on the Departments current design ground motion evaluation guidelines and procedures are summarized in Table 7 above.

As previously mentioned in Section 5.4, historical record indicates that high-groundwater elevation for the site is at 234 feet, which was adopted as the water table for liquefaction analysis.

Due to the present of groundwater during a significant period, if not most, of the year, and the range of ground motion parameters presented in Table 7, the above discussed upper approximately 10 feet of alluvial soils are considered susceptible to liquefaction during the design seismic event. The actual thickness of the potentially liquefiable soil varies from pier to pier, as shown in the Table 8 below.

The potential liquefaction effects on the foundation soils include lose of soil strength and stiffness, and settlement due the dissipation of the excess pore pressure that is likely to develop during seismic events. Reduction in soil strength and stiffness in turn results in reduction in the load supporting capacities of foundations. Ground settlement exerts addition downward axial load on deep foundations due to downdrag. Lateral spread of soils generally occurs when sloped ground is present, such as that normally occurs at and near bridge abutments, exerting additional lateral loads on foundations due to kinematic effects.

8.2 Lateral Spreading Hazard

In the event of liquefaction, as stated above, the liquefied soil layer is likely to lose significant, if not all, of its shear strength. Once this layer of soil loses its shear strength, the overlying sloped grounds that are present at some of the support locations (Abut 1 to pier 4, and Abut 19 to pier 17 and on the sides of the existing levee where the Piers 7 thru 10 are located) are considered susceptible to slope failures, often termed as the lateral spreading failures. Pseudo-static slope stability analyses were performed to evaluate the stability conditions of these slopes in the event of soil liquefaction. The analyses indicated lateral soil movements is likely to occur during the design seismic event at each of the support locations with sloped ground conditions.

Results of the slope stability analyses are summarized in Table 9 below. Additional results are presented in Appendix III. The critical or yield accelerations k_y, defined as the PHGA at which the factor of safety is 1.0 against slope failure, are indicated in this Table 9. Any time during the design seismic event the horizontal ground acceleration exceeds the yield acceleration, lateral ground movement occurs in the downward direction of the sloped grounds.

Additional analyses were thus performed to evaluate the likely range of Newmark type lateral ground displacements that these sloped grounds may experience during each of the seismic event scenarios presented in Table 7. These analyses were performed in accordance with the procedure presented in the NCHRP Report 611 (2010). Estimated lateral ground displacement at the bridge support locations are presented in Table 8. As seen, one (1.0) to six (6.0) inches of lateral soil displacement is estimated at the affected bridge support locations.

Table 8 –Results of Liquefaction and Lateral Spreading Hazard Analyses

Support Location	Approx Finished Grade Elevation (ft)	Pile Cut-off Elevation (ft)	Approximate Elevations of the Liquefiable layers (ft)	Lateral Soil Displacement (inches)
Abut 1	249.39	245.56	233-228 and 223-218	2.0 to 4.0
Pier 2	246.00	228.31	233-228 and 223-218	2.0 to 4.0
Pier 3	238.00	227.81	233-228 and 223-218	2.0 to 4.0
Pier 4	238.00	228.31	233-228 and 223-218	2.0 to 4.0
Pier 5	230.00	228.31	230-224	0.0
Pier 6	230.00	228.31	230-224	0.0
Pier 7	230.00	228.31	230-224	1.0 to 3.0
Pier 8	240.00	228.31	234-224	1.0 to 3.0
Pier 9	247.00	228.31	234-224	1.0 to 3.0
Pier 10	234.00	228.31	234-224	1.0 to 3.0
Pier 11	234.00	228.31	234-224	0.0
Pier 12	234.00	228.31	234-224	0.0
Pier 13	234.00	228.31	234-224	0.0
Pier 14	234.00	228.31	234-224	0.0
Pier 15	234.00	228.31	234-224	0.0
Pier 16	234.00	228.31	234-224	0.0
Pier 17	234.00	228.31	234-224	4.0 to 6.0
Pier 18	242.00	228.31	234-224	4.0 to 6.0
Abut 19	250.39	246.56	234-224	4.0 to 6.0

Table 9– Summary of Seismic Slope Stability (Lateral Spreading) Analyses

Slope at Abut 1 - Pier 4			
Slope Yield Acceleration Coefficient (k_y)		**0.22**	
Fault Name	**Peralta Hills**	**Elsinore**	**Probabilistic**
Coefficient of PHGA	0.6	0.48	0.48
Magnitude Mw	6.2	7.6	7
S1	0.71	0.69	0.68
Horizontal PGV (in/sec)	24	26	24
Lateral Displacement (in)	4.0	3.0	2.0

Slopes at Pier 7 - Pier 10			
Slope Yield Acceleration Coefficient (k_y)		**0.25**	
Fault Name	**Peralta Hills**	**Elsinore**	**Probabilistic**
Coefficient of PHGA	0.60	0.48	0.48
Magnitude Mw	6.2	7.6	7
S1	0.71	0.69	0.68
Horizontal PGV (in/sec)	24.0	26	24
Lateral Displacement (in)	3.0	2.0	1.0

Slope at Pier 17 - Abut 19			
Slope Yield Acceleration Coefficient (k_y)		**0.18**	
Causative Event	**Deterministic Events**		**Probabilistic Events**
	Peralta Hills	**Elsinore**	
Coefficient of PHGA	0.6	0.48	0.48
Magnitude Mw	6.2	7.6	7
S_1	0.71	0.69	0.68
Horizontal PGV (in/sec)	24.0	26.0	24.0
Lateral Displacement (in)	6.0	4.0	4.0

8.3 Seismically Induced Ground Settlement

Due to the presence of soil liquefaction as described above, the seismically induced ground surface settlement at the site, is estimated to be on the order of 2 to 3 inches.

8.4 Liquefaction Hazard Mitigation Recommendations

Soil liquefaction susceptibility of the site soils and the associated hazards as discussed above can be significantly reduced, or even eliminated, by mitigation measures such improvement of the identified potentially liquefiable soil layer. Soil grouting, permeation or compaction type, is considered a suitable ground improvement method for this purpose at this site. Recommend limits of such soil improvement are shown in Figure 4 and 5. Uses of rows of non- structure piles, alone or in combinations with soil grouting, are also considered technically suitable remedial options at this site.

However, based on information provided by your Office, it is our understanding that proposed bridge foundations are considered adequate to withstand the additional kinematic lateral loads due to the estimated lateral soil movements as presented in the above Table 8, and thus to prevent the structure from collapsing during or following the occurrence of the design ground motion event. Therefore no soil liquefaction and/or lateral spread hazard mitigation measure is considered necessary for the subject project.

Since no soil liquefaction or lateral spreading hazard mitigation measures will be implemented at the site, the potential effects of the reduction in soil strength and stiffness should be considered in the design of the proposed foundations.

The reduction in the pile axial nominal resistance and additional axial loads due to downdrag resulting from ground settlement due to liquefaction were considered in the analysis performed to evaluate the design pile tip elevation for seismic design as presented later in this report.

Soil parameters considering the estimated reduction in soil strength and stiffness are also presented in this report for your use to evaluate the lateral response and perform structural design of the proposed foundations for the seismic loading. They are included in Appendix III.

9.0 FOUNDATION DESIGN RECOMMENDATIONS

Steel HP 10x57 piles, were proposed by Structure Design for the subject widening. Foundation information and design loads in Table 10 and 11, respectively, provided by your Office were used to determine the required design pile tip elevations for various LRFD design limits and the recommended specified pile tip elevation for construction. As stated above, soil liquefaction and related effects were considered in our analyses for the pile tip elevations for the seismic design.

Our findings and recommendations are summarized in Table 12 and 13. Note that all elevations are based on the datum of NAVD 1988.

Table 10 –Foundation General Information from Structure Design

Support Location	Design Method	Pile Type	Approx Finished Grade Elevation (NAVD 88, ft)	Cut-off Elevation (NAVD 88, ft)	Pile Cap Size (ft)		Permissible Settlement under Service Load (in)	Number of Piles per Support
					B	L		
Abut 1	LRFD	HP10x57	249.39	245.56	6.00	29.00	1.0	7
Pier 2	LRFD	HP10x57	246.00	228.31	3.00	28.25	1.0	10
Pier 3	LRFD	HP10x57	238.00	227.81	3.00	29.58	1.0	10
Pier 4	LRFD	HP10x57	238.00	228.31	3.00	28.25	1.0	10
Pier 5	LRFD	HP10x57	230.00	228.31	3.00	28.25	1.0	10
Pier 6	LRFD	HP10x57	230.00	228.31	3.00	28.25	1.0	10
Pier 7	LRFD	HP10x57	230.00	228.31	3.00	28.25	1.0	10
Pier 8	LRFD	HP10x57	240.00	228.31	3.00	28.25	1.0	10
Pier 9	LRFD	HP10x57	247.00	228.31	3.00	28.25	1.0	10
Pier 10	LRFD	HP10x57	234.00	228.31	7.00	29.33	1.0	14
Pier 11	LRFD	HP10x57	234.00	228.31	7.00	29.33	1.0	14
Pier 12	LRFD	HP10x57	234.00	228.31	7.00	28.83	1.0	14
Pier 13	LRFD	HP10x57	234.00	228.31	7.00	28.83	1.0	14
Pier 14	LRFD	HP10x57	234.00	228.31	7.00	29.33	1.0	14
Pier 15	LRFD	HP10x57	234.00	228.31	7.00	28.25	1.0	14
Pier 16	LRFD	HP10x57	234.00	228.31	7.00	27.00	1.0	12
Pier 17	LRFD	HP10x57	234.00	228.31	7.00	25.83	1.0	12
Pier 18	LRFD	HP10x57	242.00	228.31	3.00	24.50	1.0	10
Abut 19	LRFD	HP10x57	250.39	246.56	6.00	24.25	1.0	7

Table 11 – Foundation Design loads provided by Structure Design

Support Location	Pile Type	Service Limit State (kips)			Strength Limit State (kips)				Extreme Event Limit State (kips)				
		Total Vertical Load		Permanent Loads	Compression		Tension		Compression		Tension	Shear	
		Per Support	Max Per Pile	Per Support	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Max Per Pile	Per Support	Per Support	Max Per Pile
Abut 1	HP10x57	595	85	394	875	125	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pier 2	HP10x57	836	115	461	1093	162	N/A	N/A	563	56	N/A	264	26
Pier 3	HP10x57	870	121	466	1139	155	N/A	N/A	496	50	N/A	138	14
Pier 4	HP10x57	860	98	449	1126	133	N/A	N/A	454	45	N/A	137	14
Pier 5	HP10x57	838	88	428	1100	125	N/A	N/A	446	45	N/A	137	14
Pier 6	HP10x57	839	91	428	1101	125	N/A	N/A	471	47	N/A	136	14
Pier 7	HP10x57	918	107	502	1200	141	N/A	N/A	515	51	N/A	258	26
Pier 8	HP10x57	947	132	531	1236	174	N/A	N/A	553	55	N/A	257	26
Pier 9	HP10x57	889	103	546	1214	144	N/A	N/A	524	52	N/A	178	18
Pier 10	HP10x57	954	75	538	1245	100	N/A	N/A	564	40	N/A	134	10
Pier 11	HP10x57	956	78	540	1248	102	N/A	N/A	567	41	N/A	133	9
Pier 12	HP10x57	1031	99	615	1342	130	N/A	N/A	631	45	N/A	253	18
Pier 13	HP10x57	1031	87	615	1342	117	N/A	N/A	627	45	N/A	251	18
Pier 14	HP10x57	944	74	522	1232	101	N/A	N/A	568	41	N/A	131	9
Pier 15	HP10x57	926	69	519	1209	96	N/A	N/A	533	38	N/A	131	9
Pier 16	HP10x57	907	90	494	1185	119	N/A	N/A	510	42	N/A	130	11
Pier 17	HP10x57	921	103	508	1203	135	N/A	N/A	555	46	N/A	130	11
Pier 18	HP10x57	834	104	457	1090	152	N/A	N/A	575	58	N/A	246	25
Abut 19	HP10x57	595	85	394	875	125	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 12 –Foundation Design Recommendations

Support Location	Pile Type	Cut-off Elevation (NAVD 88, ft)	Service Limit State Load per Support (kips)	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance (kips)				Design Tip Elevations (NAVD 88, ft)	Specified Tip Elevation (NAVD 88,ft)[3]
					Strength Limit		Extreme Event			
					Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1)	Tension (φ=1)		
Abut-1	HP10x57	246	595	1	125	N/A	N/A	N/A	(a-I)=198 (b-I)=N/A (a-II)=N/A (b-II)=N/A (c)=219 (d): Note 2	198
Pier-2	HP10x57	228	836	1	162	N/A	563	N/A	(a-I)=183 (b-I)=N/A (a-II)=201 (b-II)=N/A (c)=197 (d): Note 2	183
Pier-3	HP10x57	228	870	1	155	N/A	496	N/A	(a-I)=185 (b-I)=N/A (a-II)=205 (b-II)=N/A (c)=196 (d): Note 2	185
Pier-4	HP10x57	228	860	1	133	N/A	454	N/A	(a-I)=189 (b-I)=N/A (a-II)=205 (b-II)=N/A (c)=199 (d): Note 2	189
Pier-5	HP10x57	228	838	1	125	N/A	446	N/A	(a-I)=192 (b-I)=N/A (a-II)=199 (b-II)=N/A (c)=202 (d): Note 2	192

Pier-6	HP10x57	228	839	1	125	N/A	471	N/A	(a-I)=192 (b-I)=N/A (a-II)=199 (b-II)=N/A (c)=202 (d): Note 2	192
Pier-7	HP10x57	228	918	1	141	N/A	515	N/A	(a-I)=188 (b-I)=N/A (a-II)=208 (b-II)=N/A (c)=199 (d): Note 2	188
Pier-8	HP10x57	228	947	1	174	N/A	553	N/A	(a-I)=184 (b-I)=N/A (a-II)=208 (b-II)=N/A (c)=194 (d): Note 2	184
Pier-9	HP10x57	228	889	1	144	N/A	524	N/A	(a-I)=188 (b-I)=N/A (a-II)=208 (b-II)=N/A (c)=199 (d): Note 2	188
Pier-10	HP10x57	228	954	1	100	N/A	564	N/A	(a-I)=192 (b-I)=N/A (a-II)=210 (b-II)=N/A (c)=205 (d): Note 2	192
Pier-11	HP10x57	228	956	1	102	N/A	567	N/A	(a-I)=181 (b-I)=N/A (a-II)=210 (b-II)=N/A (c)=204 (d): Note 2	181

Pier-12	HP10x57	228	1,031	1	130	N/A	631	N/A	(a-I)=173 (b-I)=N/A (a-II)=210 (b-II)=N/A (c)=201 (d): Note 2	173
Pier-13	HP10x57	228	1,031	1	117	N/A	627	N/A	(a-I)=183 (b-I)=N/A (a-II)=212 (b-II)=N/A (c)=204 (d): Note 2	183
Pier-14	HP10x57	228	944	1	101	N/A	568	N/A	(a-I)=185 (b-I)=N/A (a-II)=212 (b-II)=N/A (c)=204 (d): Note 2	185
Pier-15	HP10x57	228	926	1	96	N/A	533	N/A	(a-I)=184 (b-I)=N/A (a-II)=213 (b-II)=N/A (c)=207 (d): Note 2	184
Pier-16	HP10x57	228	907	1	119	N/A	510	N/A	(a-I)=174 (b-I)=N/A (a-II)=212 (b-II)=N/A (c)=204 (d): Note 2	174
Pier-17	HP10x57	228	921	1	135	N/A	555	N/A	(a-I)=174 (b-I)=N/A (a-II)=212 (b-II)=N/A (c)=190 (d): Note 2	174

Pier-18	HP10x57	228	834	1	152	N/A	575	N/A	(a-I)=173 (b-I)=N/A (a-II)=208 (b-II)=N/A (c)=190 (d): Note 2	173
Abut-19	HP10x57	247	595	1	125	N/A	N/A	N/A	(a-I)=191 (b-I)=N/A (a-II)=N/A (b-II)=N/A (c)=208 (d): Note 2	191

Notes:

1) Design tip elevations are controlled by: (a-I) Compression (Strength Limit), (b-I) Tension (Strength Limit), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), (c) Settlement, and (d) Lateral Load, respectively.
2) Design tip elevation for lateral load is to be determined by SD.
3) Specified tip elevations for construction, unless controlled by the design pile tip elevation for lateral loads.

Table 13 – Recommended Pile Data Table

Support Location	Pile Type	Required Minimum Nominal Resistance Based on the Strength Limit State Loads (kips)		Design Tip Elevations	Specified Tip Elevations (Note 3)	Required Minimum Nominal Driving Resistance for Pile Acceptance
		Compression	Tension	(NAVD 88, ft)	(NAVD 88, ft)	(Kips)
Abut 1	HP10x57	180	N/A	(a): 198 (c): 219 (d): Note 2	198	220
Pier 2	HP10x57	240	N/A	(a): 183 (c): 197 (d): Note 2	183	240
Pier 3	HP10x57	230	N/A	(a): 185 (c): 196 (d): Note 2	185	230
Pier 4	HP10x57	190	N/A	(a): 189 (c): 199 (d): Note 2	189	200
Pier 5	HP10x57	180	N/A	(a): 192 (c): 202 (d): Note 2	192	180
Pier 6	HP10x57	180	N/A	(a): 192 (c): 202 (d): Note 2	192	180
Pier 7	HP10x57	210	N/A	(a): 188 (c): 199 (d): Note 2	188	220
Pier 8	HP10x57	250	N/A	(a): 184 (c): 194 (d): Note 2	184	250
Pier 9	HP10x57	210	N/A	(a): 188 (c): 199 (d): Note 2	188	210
Pier 10	HP10x57	150	N/A	(a): 192 (c): 205 (d): Note 2	192	170
Pier 11	HP10x57	150	N/A	(a): 181 (c): 204 (d): Note 2	181	150
Pier 12	HP10x57	190	N/A	(a): 173 (c): 201 (d): Note 2	173	190

Pier 13	HP10x57	170	N/A	(a): 183 (c): 204 (d): Note 2	183	240
Pier 14	HP10x57	150	N/A	(a): 185 (c): 204 (d): Note 2	185	190
Pier 15	HP10x57	140	N/A	(a): 184 (c): 207 (d): Note 2	184	150
Pier 16	HP10x57	170	N/A	(a): 174 (c): 206 (d): Note 2	174	200
Pier 17	HP10x57	200	N/A	(a): 174 (c): 190 (d): Note 2	174	200
Pier 18	HP10x57	220	N/A	(a): 173 (c): 190 (d): Note 2	173	240
Abut 19	HP10x57	180	N/A	(a): 191 (c): 208 (d): Note 2	191	220

Notes:

1) Design tip elevations are controlled by: (a) Compression (c) Settlement, and (d) Lateral Load, respectively.
2) Design tip elevation for lateral load is to be determined by SD.
3) Unless controlled by the design tip elevations for lateral loads. In that case, replace the specified tip elevation in this table with the controlling design elevations for lateral loads.

Based on the proposed center-to-center pile spacing and the soil conditions at the site, no reduction in axial pile resistance due to ground effect is considered necessary at any of the support locations.

For laterally loaded pile analyses, reduction in the soil lateral resistance (p) due to group effects should be considered as per Section 10.7.2.4 of the AASHTO LRFD Bridge Design Specifications (2007) with the current California Amendments.

10.0 CONSTRUCTION CONSIDERATIONS

- Due to permit restrictions or the accessibility problems, exploratory borings could not be located within the footprint of the proposed pier or abutment foundations. Boring were located between two adjacent piers and drilled through the existing bridge deck. As such, some variations in the subsurface soils at the locations of the supports from those encountered at the boring locations should be anticipated.

- It should also be noted that due to the small size and discrete locations of the exploratory bore holes, the size ranges, amount, distribution or hardness of the localized hard material, cobbles and boulders present in the field may be significantly different from those encountered during drilling and presented in the LOTBs. This aspect of the subsurface conditions was considered in the selection and design, and should also be considered in the construction of foundations at the site.

- The proposed bridge (widen) site lies within the riverbed with artificial fill and/or alluvium derived from upper hills and mountains and underlain by hard clay-like formational materials. Very dense gravely sands and sandy gravels with SPT blow counts more than 100 were encountered in the artificial and alluvium materials, so were extremely hard cobbles and boulders. Therefore, hard and difficult pile driving conditions should be anticipated at this site.

- Due to the erratic presence of very loose soils to extremely hard cobbles and boulders, highly variable resistance conditions should be anticipated when driving piles at this site. The need to alternate driving equipment and techniques between those appropriate for soft/loose soil material and those appropriate for very hard rock drilling techniques should be anticipated in order to be able to install the piles to the specified tip elevations.

- Due to the presence of liquefiable loose soils or consolidation soils, the required driving resistances for pile acceptance is equal or higher than that required based on the design factored loads (or the required design nominal resistances).

- Pile driving equipment and methods should be carefully selected considering the site conditions and the potential challenges. Experienced personnel and driving aids such as tip driving shoes may be necessary to insure pile integrity during driving. Pile heads must be carefully protected from direct impact of the hammer by cushion-driving blocks or other appropriate measures.

- If the specified tip elevations cannot be reached despite the use of appropriate driving equipment and methods or solely due to localized hard conditions of the subsurface materials, predrilling a smaller hole through such materials or using other driving aids approved by the Engineer may be used to reach the specified tip elevations. However, **no drilling is allowed** for driven piles.

- If predrilling is necessary and utilized, at any locations, the voids, if any, in the ground, must be completely filled with approved slurry concrete. Especially at pier 8, 9 and 10 located within or near the existing flood control levee area, all efforts shall be made to avoid predrillig or any other methods that may result in voids in the ground. If pre-drilling is necessary at these locations, all efforts shall be made to minimize voids in the ground. Contractor should be responsible for insuring the integrity of the existing levee during construction, including pile installation.

- Accessibility, use of certain equipment and construction methods may be limited by other agencies. Permit requirements from other agencies, where necessary, should be carefully reviewed prior to the start of any field work. Topography and surface conditions may also impose certain limitations and/challenges during construction. The contactor should be responsible for identifying any such limitations/challenges.

- **Pile Driving Acceptance Criteria:** Per Caltrans Standard Specifications (2010) Section 49-2.01A (4)(b), pile must be driven until the required nominal driving resistance is achieved and the specified tip elevation is reached.

  Pile driving resistance in the field should be assessed by the formula (nominal driving resistance Ru) as specified in the above referenced section of Standard Specifications. At least a two (2) week set up time and re-striking the piles are required for the acceptance of the piles at Piers 12 through Abutment 19. The required pile driving resistance for pile acceptance at these locations should be based on these re-strike hammer blow counts.

  Hammer blow counts measured during initial installation or re-striking after a shorter set up time may be approved by the Engineer if the contractor can demonstrate that the pile axial resistance will not decrease with further elapse of time by means of driving at least one sacrificial pile near one of these support locations and re-striking after different set up times. Location of the sacrificial pile, if installed, should be approved by the Engineer. Setup times may be permitted at the other support locations if requested by the contractor.

- <u>In no case shall the piles be tipped above any of the specified tip elevations that are not based on the required nominal resistance in compression for the Strength Limit State design. If a change in the specified pile tip elevations is deemed necessary based on actual conditions encountered during construction, this office and Structure Design Engineer should be contacted to review and evaluate the proposal, and, if necessary, to provide updated recommendations, on a case by case occurrence.</u>

- If piles have to be relocated or alternative piles to be used, both cases have to be approved by this Office and the Structure Design Engineer (SE).

- The contractor may propose, but is not required, to install sacrificial indicator piles to confirm the drivability, equipment, procedure, depth to the very dense bearing layer and ability to successfully achieve the required pile capacity.

- Due to the close proximity of adjacent residential and commercial buildings, sound/noise and ground vibrations from the pile driving operation should be evaluated prior to construction. Mitigation measures, if necessary, should be used to control sound/noise and ground vibrations within the generally accepted permissible limits for the type of affected facilities and their occupants. The contactor should be responsible for evaluating the need for and establishing the permissible limits, and the implementation of appropriate mitigations measures if necessary. We recommend that a pre and post survey program be implemented, and to document conditions of the adjacent facilities.

- A close construction inspection program should be implemented to verify the capacity of each pile. Field personnel must make sure that equipment and installation methods are being implemented in accordance to Caltrans Construction Specifications. Records must be kept daily for each pile installation. Any problems must be reported to the design office the same day. If problems reoccur, modification to the equipment or field procedures may be required.

- No pile driving should be allowed, unless a field survey of the area has been accurately completed and documented. Contractor must become familiarized with the site conditions. Care must be exercised during pile driving to avoid damage to the close-by utilities. All utilities should be identified and protected or relocated.

- All earth work shall be implemented in accordance to the recommendations outlined in Section 19 of the Caltrans Standard Specifications (2010).

- Contractor should provide equipment information and proposed driving methods, and supporting selection information to the RE for review and concurrence before field driving the piles.

- It is recommended that our office be notified when pile driving begins in order to witness initial work progress.

- Project Plans and Specifications should be submitted to our office for review.

- If you have any questions, please contact Michael (Quanyan) Liao at (949) 724-2978 or Dr. Mohammed Islam at (916) 227-0993.

Prepared by:

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GEOLOGIST
8-31-13
STATE OF CALIFORNIA

Kristopher Barker

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Reviewed by:

Md - Rafiqul Islam

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cc: District 12 Project Manager – Leo_Chen@dot.ca.gov
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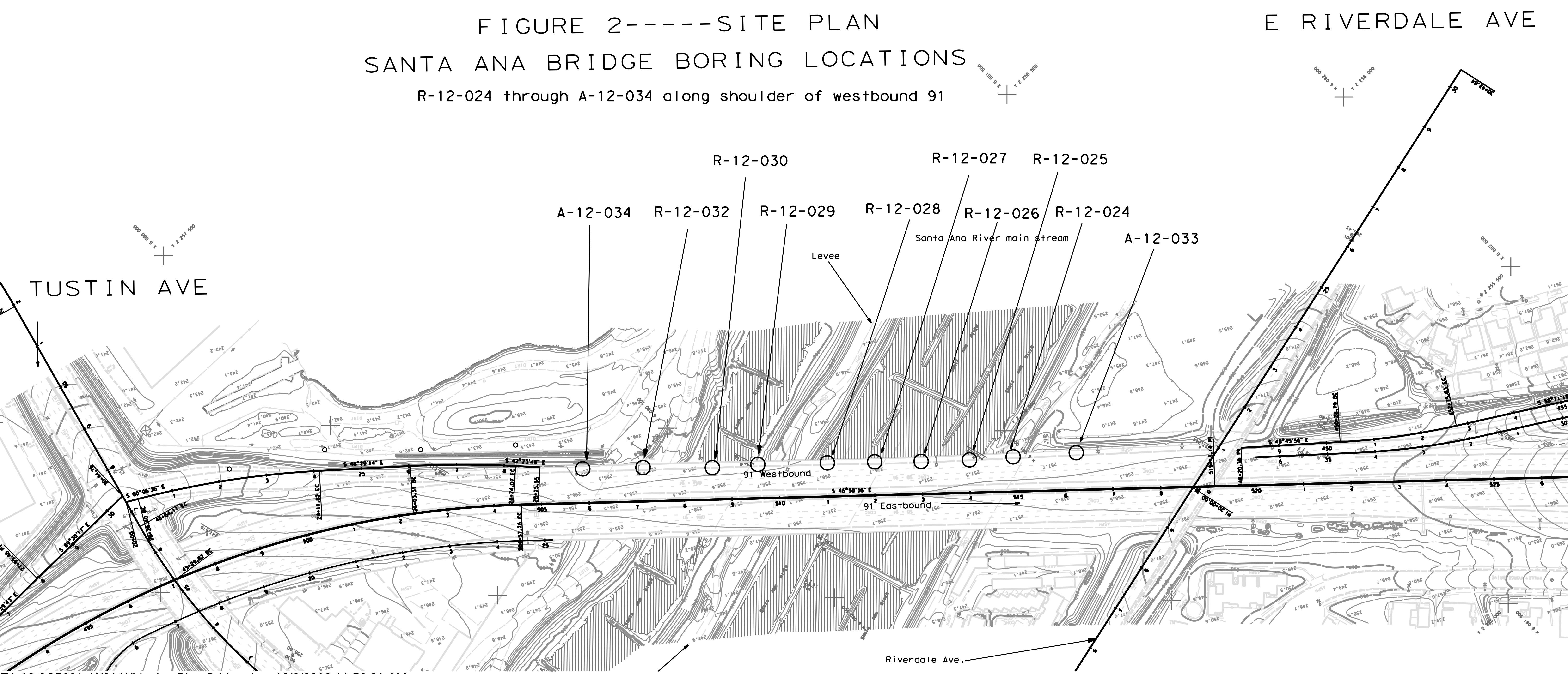
Bridge Design Engineer – Rui_Wang@dot.ca.gov
District 12 Hazardous Waste – Reza_Aurasteh@dot.ca.gov
GS Corporate – Shira_Rajendra@dot.ca.gov

Figure 2 – Site Plan
Figure 3 - Approximate Boring Locations
Figure 4 – Grouting Plan (Plan View)
Figure 5 – Grouting Plan (Elevation View)
Appendix I –Laboratory Data
Appendix II – ARS Curve and Data
Appendix III– Slope Stability Analysis

FIGURE 2-----SITE PLAN

SANTA ANA BRIDGE BORING LOCATIONS

R-12-024 through A-12-034 along shoulder of westbound 91



EA 12-0C5601- W91 Widening Plan-Bridge.dgn 12/3/2012 11:56:31 AM

Figure 3 — Approximate Boring Locations (not to scale)

P & Q

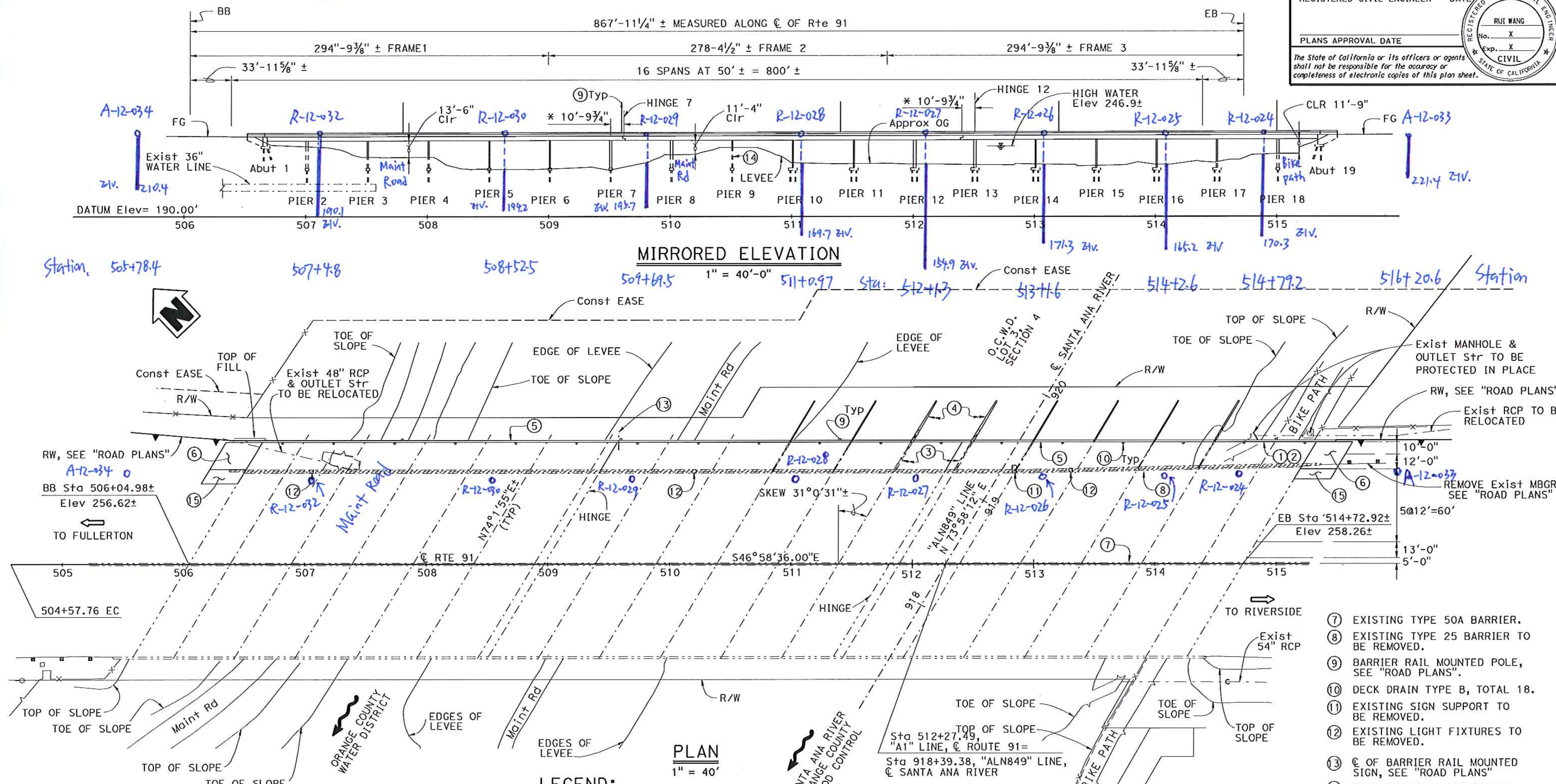
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91			

REGISTERED CIVIL ENGINEER X DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER RUI WANG No. X Exp. X CIVIL 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.



LEGEND:

- NEW STRUCTURE
- EXISTING STRUCTURE
- BRIDGE REMOVAL PORTION
- DIRECTION OF TRAFFIC FLOW
- * MEASURED PARALLEL TO ℄ Rte 91

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

NOTES:

1. PAINT "BR. NO. 55-0106".
2. PAINT "SANTA ANA RIVER BRIDGE".
3. EXISTING DEBRIS PIERS TO BE DEMOLISHED.
4. NEW DEBRIS PIERS.
5. TYPE 736 BARRIER.
6. STRUCTURE APPROACH TYPE N(30S).
7. EXISTING TYPE 50A BARRIER.
8. EXISTING TYPE 25 BARRIER TO BE REMOVED.
9. BARRIER RAIL MOUNTED POLE, SEE "ROAD PLANS".
10. DECK DRAIN TYPE B, TOTAL 18.
11. EXISTING SIGN SUPPORT TO BE REMOVED.
12. EXISTING LIGHT FIXTURES TO BE REMOVED.
13. ℄ OF BARRIER RAIL MOUNTED SIGN, SEE "ROAD PLANS"
14. PIER RETROFIT. SEE DETAIL "MIRRORED ELEVATION TYPICAL NORTH LEVEE RECONSTRUCTION" ON "LEVEE CONSTRUCTION DETAILS" SHEET
15. EXISTING AC SHOULDER TO BE REPLACED BY STRUCTURE APPROACH TYPE N(30S)

BARTT GUNTER DESIGN ENGINEER	DESIGN	BY RUI WANG	CHECKED TRACY SANDERSON	LOAD & RESISTANCE FACTOR DESIGN	LIVE LOADING: HL93 W/"LOW-BOY"; PERMIT DESIGN VEHICLE	
	DETAILS	BY A. ONG/H. INIGUEZ	CHECKED TRACY SANDERSON	LAYOUT	BY RUI WANG	CHECKED TRACY SANDERSON
	QUANTITIES	BY B. VO/D. AZZAM	CHECKED TRACY SANDERSON	SPECIFICATIONS	BY X	PLANS AND SPECS COMPARED X

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN — DESIGN BRANCH 19

BRIDGE NO. 55-0106R/L — POST MILE 8.57

SANTA ANA RIVER BRIDGE (WIDEN)

GENERAL PLAN NO. 1

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3621 PROJECT NUMBER & PHASE: 1200000078-1 CONTRACT NO.: 12-0C5601

DISREGARD PRINTS BEARING EARLIER REVISION DATES — REVISION DATES 11/01/11 12/30/12 12/30/12 — SHEET 1 OF 28

FILE => 01-55-0106-a-gp01.dgn

STRUCTURES DESIGN GENERAL PLAN SHEET (ENGLISH) (REV.09-01-10)

USERNAME => s120514 DATE PLOTTED => 01-NOV-2012 TIME PLOTTED => 13:42

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91			

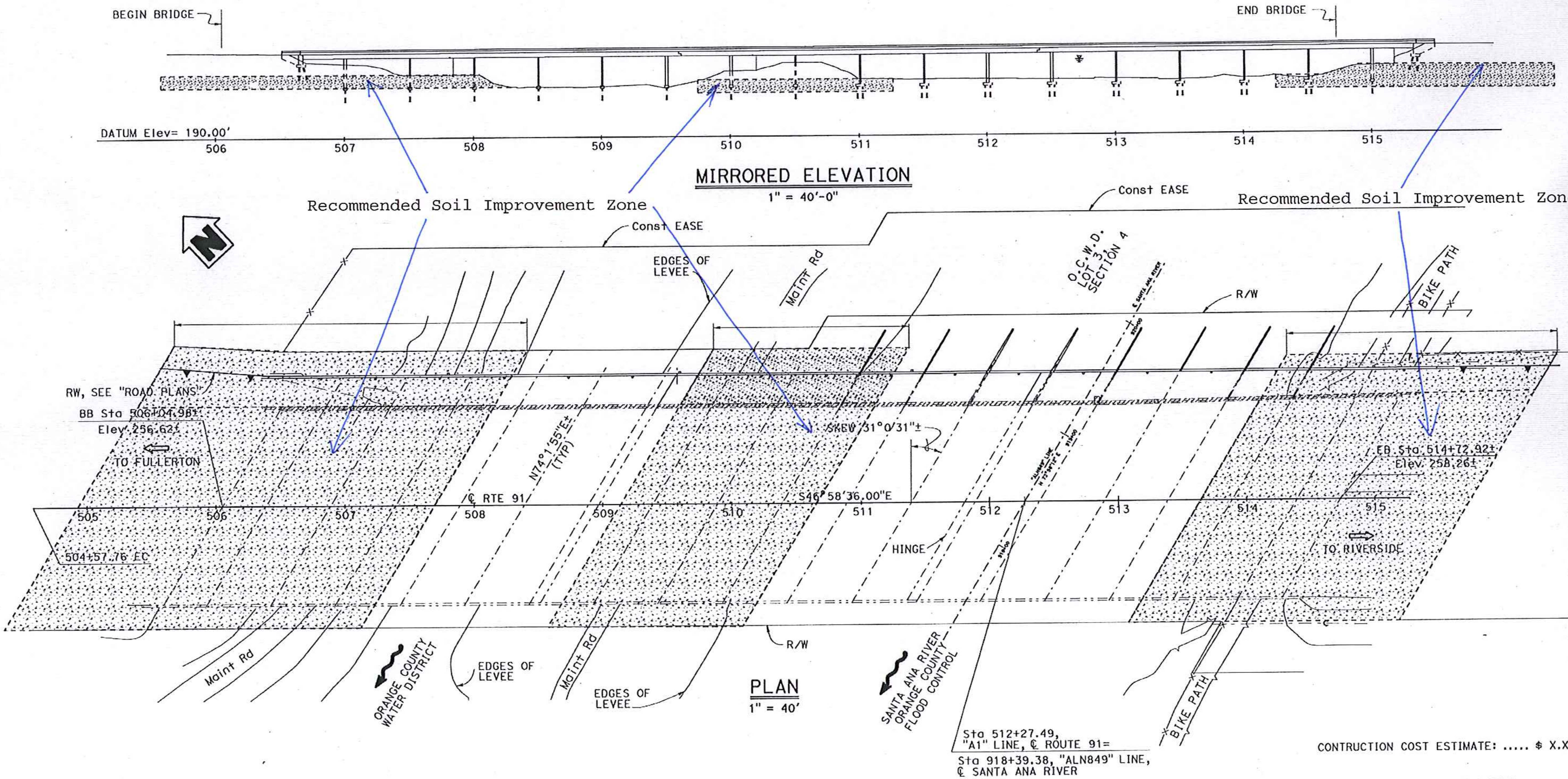
REGISTERED CIVIL ENGINEER X DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER RUI WANG No. X Exp. X CIVIL 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.

Figure 4 — Grouting plan (plan view)



CONTRUCTION COST ESTIMATE: ..... $ X.X MILLION

ALT4

GROUTING

BARTT GUNTER DESIGN ENGINEER	DESIGN	BY WEI-KUNG HSIA	CHECKED RUI WANG	LOAD & RESISTANCE FACTOR DESIGN	LIVE LOADING: HL93 W/"LOW-BOY", PERMIT DESIGN VEHICLE	
	DETAILS	BY ANTONETTE L. ONG	CHECKED RUI WANG	LAYOUT	BY WEI-KUNG HSIA	CHECKED RUI WANG
	QUANTITIES	BY X	CHECKED X	SPECIFICATIONS	BY X	PLANS AND SPECS COMPARED X

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN

DESIGN BRANCH 19

BRIDGE NO. 55-0106R/L

POST MILE 8.57

SANTA ANA RIVER BRIDGE (WIDEN)

LATERAL SPREADING HAZARD REMEDIATION

UNIT: 3621

PROJECT NUMBER & PHASE: 1200000078-1

CONTRACT NO.: 12-0C5601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 11/07/11 08/07/12 08/23/12

SHEET 1 OF 28

FILE => ALT4 - SANTA ANA ALTERNATIVES-301-55-0106-a-gp01-rui.dgn

STRUCTURES DESIGN GENERAL PLAN SHEET (ENGLISH) (REV.09-01-10)

USERNAME => s120514 DATE PLOTTED => 17-OCT-2012 TIME PLOTTED => 15:22

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91			

REGISTERED CIVIL ENGINEER X DATE

PLANS APPROVAL DATE

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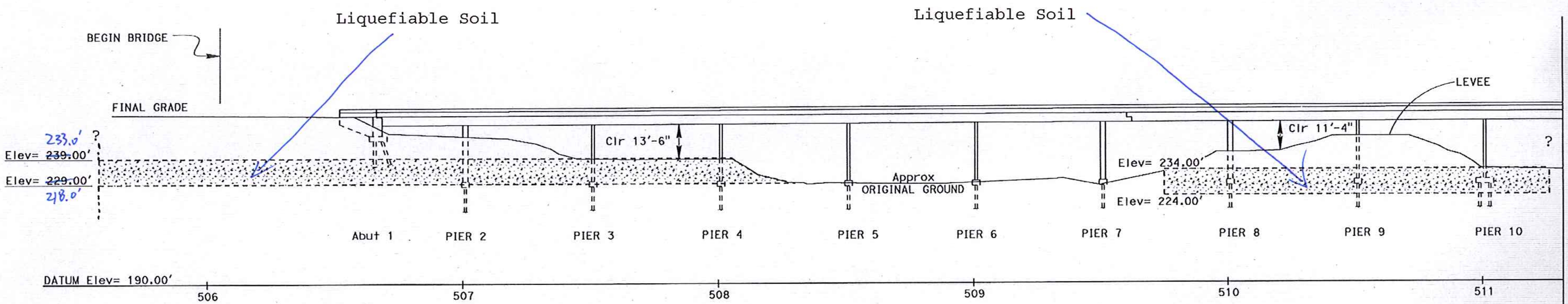
REGISTERED PROFESSIONAL ENGINEER RUI WANG No. X Exp. X CIVIL STATE OF CALIFORNIA

Figure 5 — Grouting Plan (Elevation View)



MIRRORED ELEVATION

1" = 20'-0"

GROUTING ALT4

BARTT GUNTER DESIGN ENGINEER	DESIGN	BY WEI-KUNG HSIA	CHECKED RUI WANG	LOAD & RESISTANCE FACTOR DESIGN	LIVE LOADING: HL93 W/"LOW-BOY"; PERMIT DESIGN VEHICLE		
	DETAILS	BY ANTONETTE L. ONG	CHECKED RUI WANG	LAYOUT	BY WEI-KUNG HSIA	CHECKED RUI WANG	
	QUANTITIES	BY X	CHECKED X	SPECIFICATIONS	BY X	PLANS AND SPECS COMPARED X	

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN — DESIGN BRANCH 19

BRIDGE NO. 55-0106R/L — POST MILE 8.57

SANTA ANA RIVER BRIDGE (WIDEN)

GENERAL PLAN NO. 1

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3621 PROJECT NUMBER & PHASE: 1200000078-1 CONTRACT NO.: 12-0C5601

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 11/21/11 08/07/12 08/23/12 — SHEET 1 OF 28

FILE => ALT4 - SANTA ANA ALTERNATIVES-301-55-0106-a-gp01-rui.dgn

STRUCTURES DESIGN GENERAL PLAN SHEET (ENGLISH) (REV.09-01-10)

USERNAME => s120514 DATE PLOTTED => 17-OCT-2012 TIME PLOTTED => 15:22

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91			

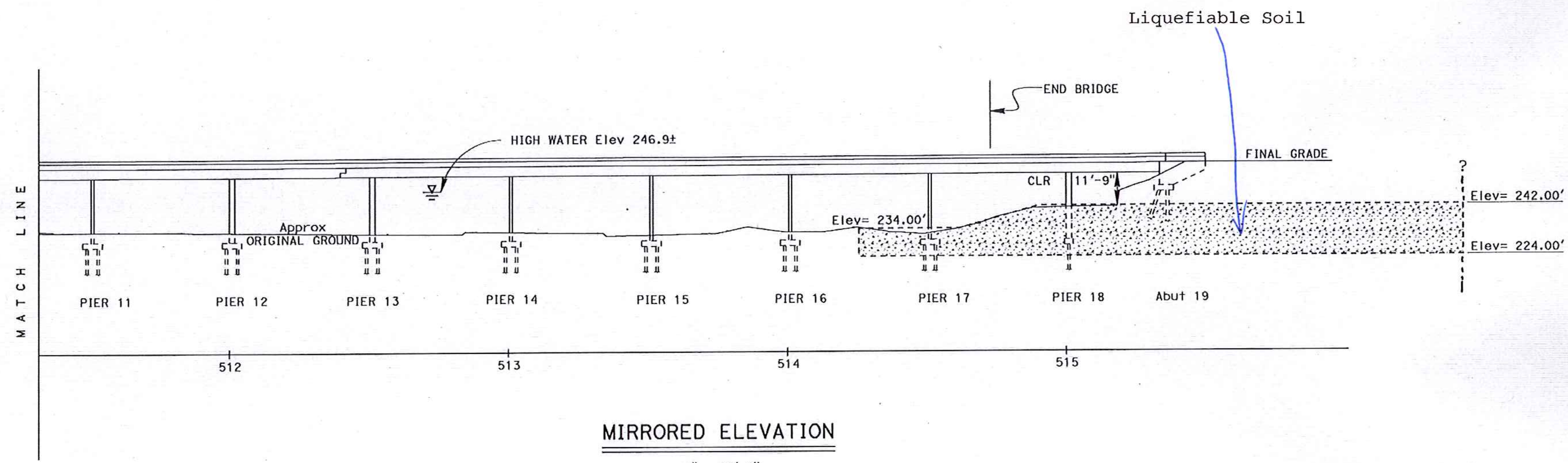
REGISTERED CIVIL ENGINEER X DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER RUI WANG No. X Exp. X CIVIL 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.

Figure 5 – Grouting plan (Elevation view) [continue]



MIRRORED ELEVATION

1" = 20'-0"

GROUTING ALT4

BARTT GUNTER DESIGN ENGINEER	DESIGN	BY WEI-KUNG HSIA	CHECKED RUI WANG	LOAD & RESISTANCE FACTOR DESIGN	LIVE LOADING: HL93 W/"LOW-BOY"; PERMIT DESIGN VEHICLE		
	DETAILS	BY ANTONETTE L. ONG	CHECKED RUI WANG	LAYOUT	BY WEI-KUNG HSIA	CHECKED RUI WANG	
	QUANTITIES	BY X	CHECKED X	SPECIFICATIONS	BY X	PLANS AND SPECS COMPARED X	

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN

DESIGN BRANCH 19

BRIDGE NO. 55-0106R/L

POST MILE 8.57

SANTA ANA RIVER BRIDGE (WIDEN)

GENERAL PLAN NO. 1

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 3621

PROJECT NUMBER & PHASE: 1200000078-1

CONTRACT NO.: 12-0C5601

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET 1 OF 28

FILE => ALT4 - SANTA ANA ALTERNATIVES-301-55-0106-a-gp01-rui.dgn

USERNAME => s120514 DATE PLOTTED => 17-OCT-2012 TIME PLOTTED => 15:23

STRUCTURES DESIGN GENERAL PLAN SHEET (ENGLISH) (REV.09-01-10)

Appendix I: Laboratory Data

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 1	2152B

DATE RCV'D: 05/09/2012	DATE OUT: 06/01/2012
NUMBER OF CONTAINERS: 1 zip bag	By: FAX / MAIL / PHONE / OTHER
NORMAL	PRIORITY ✓ DATE NEEDED: 6/10/2012

Sample of: Soil

Sampled from: R - 12 - 024

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.:
(213) 620 - 2135

Fax. No.:
(213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 411 g | By: JM | Date: 05/15/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
0	19	0	0		100	
12	12.5	12	3		97	
11	9.5	23	6		94	
46	4.75	69	17		83	
342		411				

FINE GRADE / MECHANICAL ANALYSIS

	Size	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	
Dry Wt.			0	100	83	
(g)	2.36 mm	13	11	89	74	
115.0 g	1.18 mm	29	25	75	62	
	600 μm	50	43	57	47	
	300 μm	74	64	36	30	
	150 μm	89	77	23	19	
	75 μm	97	84	16	13	

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr. 5M	12.0	6.0	6.0	5%	4%
24hr. 1M	10.0	6.0	4.0	3%	2%

SAND EQUIVALENT

SAND EQUIVALENT				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

DURABILITY INDEX		SPEC.
Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod. | SPEC.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE	SPEC.
RESULT	

SP. G. FINE (SSD)	
(B) S.S. Dry	
(A) Ov. Dry	
ABS. %	
Wt. S+C+H2O	
Wt. S+C	
W=Wt. H2O	
Bulk = $\frac{500}{500 - W}$ =	

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry	
(A) Ov. Dry	
ABS. %	
(C) Wt. S. in H2O	

App = $\frac{A}{A-C}$ =

SSD = $\frac{B}{B-C}$ =

OD = $\frac{A}{B-C}$ =

MOISTURE CONTENT	SPEC.	PLASTICITY INDEX
Gr. Wet	L.L.	
Gr. Dry		
H2O	P.L.	
Tare		
Net Dry	P.I.	
% H2O		

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING	ORGANIC IMPURITIES	
NM	Satisfactory	
	Unsatisfactory	

TEST(S) REQUESTED

	TEST(S) REQUESTED		✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE

SAMPLE TYPE			✓
A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)	
Opt. Moist Content (%)	

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec. Grav.
Wa		
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 5 2 B

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 3	2153B

DATE RCV'D:	05/09/2012
DATE OUT:	06/01/2012
NUMBER OF CONTAINERS:	1 zip bag
NORMAL	
PRIORITY	✓
DATE NEEDED:	6/10/2012
By:	FAX / MAIL / PHONE / OTHER

Sample of: Soil

Sampled from: R - 12 - 024

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA
SRL Materials Engineer

R.E.: Sam Sukiasian

Address:
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Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 559 g | By: JM | Date: 05/15/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
0	37.5	0	0		100	
26	25	26	5		95	
0	19	26	5		95	
59	12.5	85	15		85	
13	9.5	98	18		82	
20	4.75	118	21		79	
441		559				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)			0	100	79	
	2.36 mm					
	1.18 mm					
.0 g	600 µm					
	300 µm					
	150 µm					
	75 µm					

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr. 5M					
24hr. 1M					

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

		SPEC.
Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

R-VALUE RESULT | SPEC.

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O
$Bulk = \frac{500}{500-W} =$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$App = \frac{A}{A-C} =$

$SSD = \frac{B}{B-C} =$

$OD = \frac{A}{B-C} =$

% CRUSHED PARTICLES

SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

MOISTURE CONTENT

SPEC.

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.	23
P.L.	20
P.I.	3

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.
Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING	ORGANIC IMPURITIES
NM	Satisfactory
	Unsatisfactory

TEST(S) REQUESTED

	Test	No.	✓
	Fine Grade	202	
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE

			✓
A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)
Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 5 3 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 5	2154B

Sample of: Soil

Sampled from: R - 12 - 024

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D:	05/09/2012	DATE OUT:	06/01/2012
NUMBER OF CONTAINERS:	1 zip bag	By:	FAX
NORMAL	PRIORITY ✓		MAIL
	DATE NEEDED: 6/10/2012		PHONE
			OTHER

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336
Phone: (909) 350 9039
Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 834 g By: JM Date: 05/15/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
0	19	0	0		100	
5	12.5	5	1		99	
1	9.5	6	1		99	
5	4.75	11	1		99	
823		834				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size		% Ret.	% Pass	Comb. % Pass	SPEC.
			0	100	99	
	2.36 mm					
	1.18 mm					
.0 g	600 µm					
	300 µm					
	150 µm					
	75 µm					

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus	Comb % In Sus
1hr.	5M					
24hr.	1M					

SAND EQUIVALENT — MIN. SPEC.

Sand R2				Avg.	SPEC.
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = Wt. of spheres =

DURABILITY INDEX — SPEC.

Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES — SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE — SPEC.

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry	
(A) Ov. Dry	
ABS. %	
Wt. S+C+H2O	
Wt. S+C	
W=Wt. H2O	

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry	
(A) Ov. Dry	
ABS. %	
(C) Wt. S. in H2O	

$$\text{App} = \frac{A}{A - C} =$$

$$\text{SSD} = \frac{B}{B - C} =$$

$$\text{OD} = \frac{A}{B - C} =$$

MOISTURE CONTENT — SPEC.

Gr. Wet	
Gr. Dry	
H2O	
Tare	
Net Dry	
% H2O	

PLASTICITY INDEX

L.L.	44
P.L.	26
P.I.	18

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		
Based on 18 gauge CMP.		
Estimated life:		

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING — NM

ORGANIC IMPURITIES — Satisfactory / Unsatisfactory

TEST(S) REQUESTED ✓

	Test	No.	✓
	Fine Grade	202	
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)	
Opt. Moist Content (%)	

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 5 4 B

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 7	2155B

Sample of: Soil

Sampled from: R - 12 - 024

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 | DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

NORMAL [ ] PRIORITY ✓ DATE NEEDED: 6/10/2012

By: FAX / MAIL / PHONE / OTHER

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 749 g | By: JM | Date: 05/16/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
0	19	0	0		**100**	
17	12.5	17	2		**98**	
4	9.5	21	3		**97**	
4	4.75	25	3		**97**	
724		749				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)			0	100	97	
	2.36 mm					
	1.18 mm					
.0 g	600 µm					
	300 µm					
	150 µm					
	75 µm					

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr. 5M					
24hr. 1M					

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

		SPEC.
Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod. | SPEC.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE SPEC. RESULT

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$Bulk = \frac{500}{500 - W} =$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$App = \frac{A}{A - C} =$

$SSD = \frac{B}{B - C} =$

$OD = \frac{A}{B - C} =$

MOISTURE CONTENT

SPEC.

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.	**46**
P.L.	**26**
P.I.	**20**

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING NM

ORGANIC IMPURITIES
Satisfactory
Unsatisfactory

TEST(S) REQUESTED ✓

	Test		✓
	Fine Grade	202	
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 5 5 B

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 1	2156B

Sample of: Soil

Sampled from: R - 12 - 025

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

R.E.: Sam Sukiasian

Address: 100 Main St. 11th Floor, Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

DATE RCV'D: 05/09/2012 | DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag | By: FAX / MAIL / PHONE / OTHER

NORMAL ☐ PRIORITY ✓ DATE NEEDED: 6/10/2012

GRADING ANALYSIS

Total Wt 810 g | By: JM | Date: 05/16/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
	12.5					
	9.5					
0	4.75	0	0		100	
810		810				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)			0	100	100	
	2.36 mm					
	1.18 mm					
.0 g	600 µm					
	300 µm					
	150 µm					
	75 µm					

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus.
1hr. 5M					
24hr. 1M					

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

			SPEC.
Dura-Coarse	Sed.Ht.=		
Dura-Fine	R2/R1 =		

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES (SPEC.)

%Ret.x(Wt.Cr./Tot.Wt.) = Prod. | Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE RESULT | SPEC.

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O
Bulk = $\frac{500}{500 - W}$ =

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

App = $\frac{A}{A-C}$ =

SSD = $\frac{B}{B-C}$ =

OD = $\frac{A}{B-C}$ =

MOISTURE CONTENT (SPEC.)

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.	28
P.L.	18
P.I.	10

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.
Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory
Unsatisfactory

TEST(S) REQUESTED

	Test	No.	✓
	Fine Grade	202	
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)
Opt. Moist Content (%)
Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 5 6 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 2	2157B

Sample of: Soil

Sampled from: R - 12 - 025

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

By: FAX / MAIL / PHONE / OTHER

NORMAL ☐ PRIORITY ✓ DATE NEEDED: 6/10/2012

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 663 g By: JM Date: 05/16/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
0	12.5	0				
2	9.5	2	0		100	
16	4.75	18	3		97	
645		663				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size					SPEC.
			0	100	97	
	2.36 mm	2	2	98	95	
	1.18 mm	4	3	97	94	
115.0 g	600 µm	15	13	87	84	
	300 µm	50	43	57	55	
	150 µm	83	72	28	27	
	75 µm	97	84	16	16	

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr. 5M	13.0	6.0	7.0	6%	6%
24hr. 1M	11.0	6.0	5.0	4%	4%

SAND EQUIVALENT

MIN. SPEC.

				Avg.
Sand R2				
Clay R1				
S.E. Value				

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = Wt. of spheres =

DURABILITY INDEX

SPEC.

Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE

SPEC.

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry

(A) Ov. Dry

ABS. %

Wt. S+C+H2O

Wt. S+C

W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry

(A) Ov. Dry

ABS. %

(C) Wt. S. in H2O

$$\text{App} = \frac{A}{A - C} =$$

$$\text{SSD} = \frac{B}{B - C} =$$

$$\text{OD} = \frac{A}{B - C} =$$

MOISTURE CONTENT

SPEC.

Gr. Wet

Gr. Dry

H2O

Tare

Net Dry

% H2O

PLASTICITY INDEX

L.L.

P.L.

P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory

Unsatisfactory

TEST(S) REQUESTED

	Test	Method	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

		Spec. Grav.
Wo		
Wa		
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 5 7 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	1 2 0 C 5 6 0 3
SAMPLE NO.	S - 3
LAB. NO.	2158B
DATE RCV'D:	05/09/2012
DATE OUT:	06/01/2012
NUMBER OF CONTAINERS:	1 zip bag
NORMAL	
PRIORITY	✓
DATE NEEDED:	6/10/2012
By:	FAX / MAIL / PHONE / OTHER

Sample of: Soil

Sampled from: R - 12 - 025

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

R.E.: Sam Sukiasian

Address: 100 Main St. 11th Floor, Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 558 g | By: JM | Date: 05/17/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
0	37.5	0	0		100	
43	25	43	8		92	
16	19	59	11		89	
12	12.5	71	13		87	
38	9.5	109	20		80	
79	4.75	188	34		66	
370		558				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	
			0	100	66	
115.0 g	2.36 mm	22	19	81	53	
	1.18 mm	49	43	57	38	
	600 µm	70	61	39	26	
	300 µm	83	72	28	18	
	150 µm	93	81	19	13	
	75 µm	96	83	17	11	

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M	12.0	6.0	6.0	5%	3%
24hr.	1M	10.0	6.0	4.0	3%	2%

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

		SPEC.
Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES (SPEC.)

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE (SPEC.)

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry

(A) Ov. Dry

ABS. %

Wt. S+C+H2O

Wt. S+C

W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry

(A) Ov. Dry

ABS. %

(C) Wt. S. in H2O

$$\text{App} = \frac{A}{A - C} =$$

$$\text{SSD} = \frac{B}{B - C} =$$

$$\text{OD} = \frac{A}{B - C} =$$

MOISTURE CONTENT (SPEC.)

Gr. Wet | Gr. Dry | H2O | Tare | Net Dry | % H2O

PLASTICITY INDEX

L.L. | P.L. | P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory

Unsatisfactory

TEST(S) REQUESTED

	Test	No.	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec. Grav.
Wa		
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 5 8 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

Contract No.	Sample No.	Lab. No.
1 2 0 C 5 6 0 3	S - 5	2159B

Sample of: Soil

Sampled from: R - 12 - 025

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA
SRL Materials Engineer

DATE RCV'D: 05/09/2012
DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

NORMAL ☐ PRIORITY ✓ DATE NEEDED: 6/10/2012

By: FAX / MAIL / PHONE / OTHER

R.E.: Sam Sukiasian
Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012
Phone No.: (213) 620 - 2135
Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336
Phone: (909) 350 9039
Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 903 g | By: JM | Date: 05/17/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
	12.5					
	9.5					
0	4.75	0	0		100	
903		903				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size		% Ret.	% Pass	Comb. % Pass	
			0	100	100	
	2.36 mm					
.0 g	1.18 mm					
	600 µm					
	300 µm					
	150 µm					
	75 µm					

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M					
24hr.	1M					

SAND EQUIVALENT — MIN. SPEC.

				Avg.	SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = Wt. of spheres =

DURABILITY INDEX — SPEC.

Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES — SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE — SPEC.

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O
$\text{Bulk} = \frac{500}{500 - W} =$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$\text{App} = \frac{A}{A - C} =$

$\text{SSD} = \frac{B}{B - C} =$

$\text{OD} = \frac{A}{B - C} =$

MOISTURE CONTENT — SPEC.

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.	50
P.L.	32
P.I.	18

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.
Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory
Unsatisfactory

TEST(S) REQUESTED ✓

	Test	No.	✓
	Fine Grade	202	
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)
Opt. Moist Content (%)
Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo		Spec.	
Wa		Grav.	
Wb			

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 5 9 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 1	2160B

Sample of: Soil

Sampled from: R - 12 - 026

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA
SRL Materials Engineer

DATE RCV'D: 05/09/2012 | DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag | By: FAX / MAIL / PHONE / OTHER

NORMAL | PRIORITY ✓ | DATE NEEDED: 6/10/2012

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca..90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 473 g | By: JM | Date: 05/18/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
0	19	0	0		**100**	
7	12.5	7	1		**99**	
9	9.5	16	3		**97**	
22	4.75	38	8		**92**	
435		473				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt.			0	100	92	
(g)	2.36 mm	10	9	91	**84**	
	1.18 mm	33	29	71	**65**	
115.0 g	600 µm	61	53	47	**43**	
	300 µm	81	70	30	**28**	
	150 µm	93	81	19	**17**	
	75 µm	100	87	13	**12**	

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus	Comb % In Sus
1hr.	5M	11.0	6.0	5.0	**4%**	**4%**
24hr.	1M	8.0	6.0	2.0	**2%**	**2%**

SAND EQUIVALENT — MIN. SPEC.

				Avg.	SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX — SPEC.

Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES — SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE — SPEC.

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$App = \frac{A}{A - C} =$$

$$SSD = \frac{B}{B - C} =$$

$$OD = \frac{A}{B - C} =$$

MOISTURE CONTENT — SPEC.

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.
P.L.
P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.
Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory
Unsatisfactory

TEST(S) REQUESTED ✓

	Test	No.	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)
Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 6 0 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 5	2161B

Sample of: Soil

Sampled from: R - 12 - 026

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

R.E.: Sam Sukiasian

Address: 100 Main St. 11th Floor, Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SRL Lab. Stamp

By __________ for

D. OZOWARA

SRL Materials Engineer

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

DATE RCV'D: 05/09/2012 | DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

NORMAL ☐ PRIORITY ✓ DATE NEEDED: 6/10/2012

By: FAX / MAIL / PHONE / OTHER

GRADING ANALYSIS

Total Wt 659 g | By: JM | Date: 05/18/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
	12.5					
	9.5					
0	4.75	0	0		100	
659		659				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)			0	100	100	
	2.36 mm					
	1.18 mm					
.0 g	600 µm					
	300 µm					
	150 µm					
	75 µm					

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus.
1hr. 5M					
24hr. 1M					

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX (SPEC.)

Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES (SPEC.)

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE (SPEC.)

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$\text{App} = \frac{A}{A - C} =$$

$$\text{SSD} = \frac{B}{B - C} =$$

$$\text{OD} = \frac{A}{B - C} =$$

MOISTURE CONTENT (SPEC.)

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.	26
P.L.	26
P.I.	0

pH / RESISTIVITY

	Field	Lab.	
Soil pH			
H2O			
Min. Resistivity			

Based on 18 gauge CMP.
Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING	ORGANIC IMPURITIES	
NM	Satisfactory	
	Unsatisfactory	

TEST(S) REQUESTED

	Test	No.	✓
	Fine Grade	202	
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)
Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 6 1 B

SRL SOIL & AGGREGATE TESTS

1	2	0	C	5	6	0	3			S	-	6		2162B
CONTRACT NO.									SAMPLE NO.					LAB. NO.

Sample of: Soil

Sampled from: R - 12 - 026

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

NORMAL ☐ PRIORITY ✓ DATE NEEDED: 6/10/2012

By: FAX / MAIL / PHONE / OTHER

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 839 g By: JM Date: 05/18/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
	12.5					
0	9.5	0				
2	4.75	2	0		100	
837		839				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)			0	100	100	
	2.36 mm					
.0 g	1.18 mm					
	600 µm					
	300 µm					
	150 µm					
	75 µm					

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus.
1hr. 5M					
24hr. 1M					

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = Wt. of spheres =

DURABILITY INDEX

		SPEC.
Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod. — SPEC.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE SPEC. RESULT

SP. G. FINE (SSD)

- (B) S.S. Dry
- (A) Ov. Dry
- ABS. %
- Wt. S+C+H2O
- Wt. S+C
- W=Wt. H2O
- Bulk $= \frac{500}{500 - W} =$

SP. GR. COARSE CT206/CT209, +4

- (B) S.S. Dry
- (A) Ov. Dry
- ABS. %
- (C) Wt. S. in H2O
- $App = \frac{A}{A - C} =$
- $SSD = \frac{B}{B - C} =$
- $OD = \frac{A}{B - C} =$

MOISTURE CONTENT

SPEC.

- Gr. Wet
- Gr. Dry
- H2O
- Tare
- Net Dry
- % H2O

PLASTICITY INDEX

L.L.	40
P.L.	27
P.I.	13

pH / RESISTIVITY

	Field	Lab.	
Soil pH			
H2O			
Min. Resistivity			

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING NM

ORGANIC IMPURITIES

- Satisfactory
- Unsatisfactory

TEST(S) REQUESTED

	Test	No.	✓
	Fine Grade	202	
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec. Grav.
Wa		
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 6 2 B

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 1	2163B

Sample of: Soil

Sampled from: R - 12 - 027

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

By: FAX / MAIL / PHONE / OTHER

NORMAL PRIORITY ✓ DATE NEEDED: 6/10/2012

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 681 g By: JM Date: 05/18/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
0	12.5	0				
1	9.5	1	0		**100**	
16	4.75	17	2		**98**	
664		681				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)			0	100	98
	2.36 mm	7	6	94	**92**
	1.18 mm	24	21	79	**77**
115.0 g	600 µm	61	53	47	**46**
	300 µm	91	79	21	**21**
	150 µm	101	88	12	**12**
	75 µm	105	91	9	**9**

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M	10.0	6.0	4.0	**3%**	**3%**
24hr.	1M	8.0	6.0	2.0	**2%**	**2%**

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = Wt. of spheres =

DURABILITY INDEX

			SPEC.
Dura-Coarse	Sed.Ht.=		
Dura-Fine	R2/R1 =		

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod. SPEC.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE RESULT SPEC.

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$\text{App} = \frac{A}{A - C} =$$

$$\text{SSD} = \frac{B}{B - C} =$$

$$\text{OD} = \frac{A}{B - C} =$$

MOISTURE CONTENT

SPEC.

Gr. Wet / Gr. Dry / H2O / Tare / Net Dry / % H2O

PLASTICITY INDEX

L.L. / P.L. / P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING: NM

ORGANIC IMPURITIES: Satisfactory / Unsatisfactory

TEST(S) REQUESTED

	Test	No.	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo Spec.
Wa Grav.
Wb

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 6 3 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

1	2	0	C	5	6	0	3		S	-	2				2164B
CONTRACT NO.								SAMPLE NO.							LAB. NO.

Sample of: Soil

Sampled from: R - 12 - 027

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

By: FAX / MAIL / PHONE / OTHER

NORMAL ☐ PRIORITY ✓

DATE NEEDED: 6/10/2012

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.:
(213) 620 - 2135

Fax. No.:
(213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 646 g By: JM Date: 05/18/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
	12.5					
	9.5					
0	4.75	0	0		100	
646		646				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)			0	100	100	
	2.36 mm					
	1.18 mm					
.0 g	600 µm					
	300 µm					
	150 µm					
	75 µm					

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus.
1hr. 5M					
24hr. 1M					

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = Wt. of spheres =

DURABILITY INDEX

		SPEC.
Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

R-VALUE RESULT SPEC.

SP. G. FINE (SSD)

(B) S.S. Dry

(A) Ov. Dry

ABS. %

Wt. S+C+H2O

Wt. S+C

W=Wt. H2O

$\text{Bulk} = \frac{500}{500 - W} =$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry

(A) Ov. Dry

ABS. %

(C) Wt. S. in H2O

$\text{App} = \frac{A}{A - C} =$

$\text{SSD} = \frac{B}{B - C} =$

$\text{OD} = \frac{A}{B - C} =$

% CRUSHED PARTICLES (SPEC.)

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

MOISTURE CONTENT (SPEC.)

Gr. Wet

Gr. Dry

H2O

Tare

Net Dry

% H2O

PLASTICITY INDEX

L.L.	28
P.L.	19
P.I.	9

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING — NM

ORGANIC IMPURITIES — Satisfactory / Unsatisfactory

TEST(S) REQUESTED

			✓
	Fine Grade	202	
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec.	
Wa		Grav.	
Wb			

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 6 4 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	1 2 0 C 5 6 0 3
SAMPLE NO.	S - 7
LAB. NO.	2165B

Sample of: Soil

Sampled from: R - 12 - 027

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA
SRL Materials Engineer

R.E.: Sam Sukiasian
Address: 100 Main St. 11th Floor
Los Angeles, Ca. 90012
Phone No.: (213) 620 - 2135
Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336
Phone: (909) 350 9039
Fax: (909) 829 6294

DATE RCV'D: 05/09/2012
DATE OUT: 06/01/2012
NUMBER OF CONTAINERS: 1 zip bag
NORMAL [ ] PRIORITY ✓
DATE NEEDED: 6/10/2012
By: FAX / MAIL / PHONE / OTHER

GRADING ANALYSIS

Total Wt 723 g | By: JM | Date: 05/21/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
	12.5					
	9.5					
0	4.75	0	0		100	
723		723				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size					
			0	100	100	
	2.36 mm					
	1.18 mm					
.0 g	600 µm					
	300 µm					
	150 µm					
	75 µm					

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M					
24hr.	1M					

SAND EQUIVALENT — MIN. SPEC.

				Avg.	SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = Wt. of spheres =

DURABILITY INDEX — SPEC.

Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES — SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE — SPEC.

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$Bulk = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$App = \frac{A}{A - C} =$$

$$SSD = \frac{B}{B - C} =$$

$$OD = \frac{A}{B - C} =$$

MOISTURE CONTENT — SPEC.

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.	49
P.L.	26
P.I.	23

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.
Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING — NM

ORGANIC IMPURITIES: Satisfactory / Unsatisfactory

TEST(S) REQUESTED

	Test	No.	✓
	Fine Grade	202	
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)
Opt. Moist Content (%)
Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo		Spec.	
Wa		Grav.	
Wb			

CONTRACT NO. 1 2 - 0 C 5 6 0 3
LAB. NO. 2 1 6 5 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 9	2166B

Sample of: Soil

Sampled from: R - 12 - 027

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 — DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag — By: FAX / MAIL / PHONE / OTHER

NORMAL [ ] PRIORITY ✓ DATE NEEDED: 6/10/2012

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 1300 g — By: JM — Date: 05/21/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
	12.5					
0	9.5	0				
3	4.75	3	0		100	
1297		1300				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)						
Dry Wt.			0	100	100	
(g)	2.36 mm					
	1.18 mm					
.0 g	600 µm					
	300 µm					
	150 µm					
	75 µm					

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus	Comb % In Sus
1hr.	5M					
24hr.	1M					

SAND EQUIVALENT — MIN. SPEC.

				Avg.	SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = — Wt. of spheres =

DURABILITY INDEX — SPEC.

Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES — SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE — SPEC.

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry	
(A) Ov. Dry	
ABS. %	
Wt. S+C+H2O	
Wt. S+C	
W=Wt. H2O	

$$Bulk = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry	
(A) Ov. Dry	
ABS. %	
(C) Wt. S. in H2O	

$$App = \frac{A}{A - C} =$$

$$SSD = \frac{B}{B - C} =$$

$$OD = \frac{A}{B - C} =$$

MOISTURE CONTENT — SPEC.

Gr. Wet	
Gr. Dry	
H2O	
Tare	
Net Dry	
% H2O	

PLASTICITY INDEX

L.L.	36
P.L.	27
P.I.	9

pH / RESISTIVITY

	Field	Lab.	
Soil pH			
H2O			
Min. Resistivity			

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING	ORGANIC IMPURITIES	
NM	Satisfactory	
	Unsatisfactory	

TEST(S) REQUESTED ✓

	Test	No.	✓
	Fine Grade	202	
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)	
Opt. Moist Content (%)	

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 6 6 B

SRL SOIL & AGGREGATE TESTS

Contract No.	Sample No.	Lab. No.
1 2 0 C 5 6 0 3	Bulk	2211B

Sample of:	Soil
Sampled from:	R-12-028
Material Source:	
Owner / Mfr.:	
Date Sampled:	

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D:	05/31/2012	DATE OUT:	06/08/2012
NUMBER OF CONTAINERS:	1 Bag	By:	FAX / MAIL / PHONE / OTHER
NORMAL		PRIORITY ✓	DATE NEEDED: 6/16/2012

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620-2135

Fax. No.: (213) 620-2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 7444 g | By: JT | Date: 06/04/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
0	50	0	0		100	
92	37.5	92	1		99	
113	25	205	3		97	
66	19	271	4		96	
325	12.5	596	8		92	
201	9.5	797	11		89	
585	4.75	1382	19		81	
6062		7444				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size		% Ret.	% Pass	Comb. % Pass	
			0	100	81	
	2.36 mm	45	9	91	74	
	1.18 mm	124	25	75	61	
502.0 g	600 µm	240	48	52	42	
	300 µm	362	72	28	23	
	150 µm	437	87	13	11	
	75 µm	467	93	7	6	

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M					
24hr.	1M					

SAND EQUIVALENT — MIN. SPEC.

				Avg.
Sand R2				
Clay R1				
S.E. Value				

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = Wt. of spheres =

DURABILITY INDEX — SPEC.

Dura-Coarse	Sed.Ht.=
Dura-Fine	R2/R1 =

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

R-VALUE — SPEC. RESULT

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$Bulk = \frac{500}{500-W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$App = \frac{A}{A-C} =$$

$$SSD = \frac{B}{B-C} =$$

$$OD = \frac{A}{B-C} =$$

% CRUSHED PARTICLES — SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

MOISTURE CONTENT — SPEC.

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.
P.L.
P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		8.01
H2O		25 cc
Min. Resistivity		6800

Based on 18 gauge CMP.

Estimated life: 55 yrs.

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory
Unsatisfactory

TEST(S) REQUESTED ✓

	Test	No.	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
■	pH (CMP)	643	✓
■	Resistivity (CMP)	643	✓
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 2 1 1 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 2	2167B

Sample of: Soil

Sampled from: R - 12 - 028

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

DATE RCV'D:	05/09/2012	DATE OUT:	06/01/2012
NUMBER OF CONTAINERS:	1 zip bag	By:	FAX / MAIL / PHONE / OTHER
NORMAL	PRIORITY ✓	DATE NEEDED:	6/10/2012

GRADING ANALYSIS

Total Wt 605 g | By: JM | Date: 05/21/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
0	19	0	0		**100**	
11	12.5	11	2		**98**	
0	9.5	11	2		**98**	
8	4.75	19	3		**97**	
586		605				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size	Wt. Ret.	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
				0	100	97	
	2.36 mm	2	2	98	**95**		
	1.18 mm	5	4	96	**93**		
115.0 g	600 µm	16	14	86	**83**		
	300 µm	47	41	59	**57**		
	150 µm	89	77	23	**22**		
	75 µm	105	91	9	**9**		

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M	9.0	6.0	3.0	**3%**	**3%**
24hr.	1M	7.0	6.0	1.0	**1%**	**1%**

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

			SPEC.
Dura-Coarse	Sed.Ht.=		
Dura-Fine	R2/R1 =		

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

R-VALUE SPEC.

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$\text{App} = \frac{A}{A - C} =$$

$$\text{SSD} = \frac{B}{B - C} =$$

$$\text{OD} = \frac{A}{B - C} =$$

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod. | SPEC.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

MOISTURE CONTENT

SPEC.

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.
P.L.
P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.
Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING
NM

ORGANIC IMPURITIES
Satisfactory
Unsatisfactory

TEST(S) REQUESTED

	Test	No.	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)
Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 12-0C5603

LAB. NO. 2167B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 4	2168B

Sample of: Soil

Sampled from: R - 12 - 028

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

DATE RCV'D: 05/09/2012

DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

NORMAL | PRIORITY ✓

DATE NEEDED: 6/10/2012

By: FAX | MAIL | PHONE | OTHER

GRADING ANALYSIS

Total Wt 797 g | By: JM | Date: 05/21/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
	12.5					
	9.5					
0	4.75	0	0		100	
797		797				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)			0	100	100	
	2.36 mm					
.0 g	1.18 mm					
	600 µm					
	300 µm					
	150 µm					
	75 µm					

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus.
1hr. 5M					
24hr. 1M					

SAND EQUIVALENT (MIN. SPEC.)

				Avg.	SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX (SPEC.)

Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES (SPEC.)

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE (SPEC.)

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$\text{App} = \frac{A}{A - C} =$$

$$\text{SSD} = \frac{B}{B - C} =$$

$$\text{OD} = \frac{A}{B - C} =$$

MOISTURE CONTENT (SPEC.)

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.	42
P.L.	20
P.I.	22

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory
Unsatisfactory

TEST(S) REQUESTED ✓

	Test	No.	✓
	Fine Grade	202	
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 6 8 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 7	2169B

Sample of: Soil

Sampled from: R - 12 - 028

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D:	05/09/2012
DATE OUT:	06/01/2012
NUMBER OF CONTAINERS:	1 zip bag
NORMAL	
PRIORITY	✓
DATE NEEDED:	6/10/2012

By: FAX / MAIL / PHONE / OTHER

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 757 g | By: JM | Date: 05/21/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
	12.5					
	9.5					
0	4.75	0	0		100	
757		757				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)			0	100	100	
	2.36 mm					
.0 g	1.18 mm					
	600 µm					
	300 µm					
	150 µm					
	75 µm					

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr. 5M					
24hr. 1M					

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

		SPEC.
Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod. | SPEC.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE

RESULT | SPEC.

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$\text{App} = \frac{A}{A - C} =$$

$$\text{SSD} = \frac{B}{B - C} =$$

$$\text{OD} = \frac{A}{B - C} =$$

MOISTURE CONTENT

SPEC.

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.	45
P.L.	24
P.I.	21

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory
Unsatisfactory

TEST(S) REQUESTED

	Test	No.	✓
	Fine Grade	202	
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo		Spec.	
Wa		Grav.	
Wb			

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 6 9 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 1 1	2170B

Sample of: Soil

Sampled from: R - 12 - 028

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By __________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 | DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

NORMAL | PRIORITY ✓ | DATE NEEDED: 6/10/2012

By: FAX / MAIL / PHONE / OTHER

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.:
(213) 620 - 2135

Fax. No.:
(213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 613 g | By: JM | Date: 05/22/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
0	12.5	0				
3	9.5	3	0		100	
6	4.75	9	1		99	
604		613				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size					
			0	100	99	
	2.36 mm	4	3	97	96	
	1.18 mm	8	7	93	92	
115.0 g	600 µm	12	10	90	89	
	300 µm	16	14	86	85	
	150 µm	24	21	79	78	
	75 µm	41	36	64	63	

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M	25.0	6.0	19.0	17%	17%
24hr.	1M	14.0	6.0	8.0	7%	7%

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

		SPEC.
Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod. | SPEC.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE | SPEC.

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$Bulk = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$App = \frac{A}{A - C} =$$

$$SSD = \frac{B}{B - C} =$$

$$OD = \frac{A}{B - C} =$$

MOISTURE CONTENT | SPEC.

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.	33
P.L.	26
P.I.	7

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING: NM

ORGANIC IMPURITIES: Satisfactory / Unsatisfactory

TEST(S) REQUESTED ✓

	Test		✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo | Spec.
Wa | Grav.
Wb

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 7 0 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	B u l k	2212B

Sample of: Soil

Sampled from: R-12-029

Material Source:

Owner / Mfr.:

Date Sampled:

SRL Lab. Stamp

By __________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D:	05/31/2012	DATE OUT:	06/08/2012
NUMBER OF CONTAINERS:	1 Bag	By:	FAX
			MAIL
NORMAL	PRIORITY ✓		PHONE
	DATE NEEDED: 6/16/2012		OTHER

R.E.: Sam Sukiasian

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13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 6401 g | By: JM | Date: 06/04/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
0	19	0				
32	12.5	32	0		100	
44	9.5	76	1		99	
292	4.75	368	6		94	
6033		6401				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt.			0	100	94	
(g)	2.36 mm	84	17	83	78	
503.0 g	1.18 mm	259	51	49	46	
	600 µm	412	82	18	17	
	300 µm	473	94	6	6	
	150 µm	484	96	4	4	
	75 µm	489	97	3	3	

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M				
24hr.	1M				

SAND EQUIVALENT

					MIN. SPEC.
Sand R2				Avg.	
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

		SPEC.
Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

R-VALUE RESULT | SPEC.

SP. G. FINE (SSD)

(B) S.S. Dry

(A) Ov. Dry

ABS. %

Wt. S+C+H2O

Wt. S+C

W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry

(A) Ov. Dry

ABS. %

(C) Wt. S. in H2O

$$\text{App} = \frac{A}{A - C} =$$

$$\text{SSD} = \frac{B}{B - C} =$$

$$\text{OD} = \frac{A}{B - C} =$$

% CRUSHED PARTICLES | SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

MOISTURE CONTENT | SPEC.

Gr. Wet

Gr. Dry

H2O

Tare

Net Dry

% H2O

PLASTICITY INDEX

L.L.

P.L.

P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		8.20
H2O		55 cc
Min. Resistivity		6000

Based on 18 gauge CMP.

Estimated life: 52 yrs.

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory

Unsatisfactory

TEST(S) REQUESTED ✓

	Test	Method	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
■	pH (CMP)	643	✓
■	Resistivity (CMP)	643	✓
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 12-0C5603

LAB. NO. 2212B

SRL SOIL & AGGREGATE TESTS

1	2	0	C	5	6	0	3		S	-	1			2171B
CONTRACT NO.								SAMPLE NO.						LAB. NO.

Sample of: Soil

Sampled from: R - 12 - 029

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 | DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

NORMAL | PRIORITY ✓ | DATE NEEDED: 6/10/2012

By: FAX / MAIL / PHONE / OTHER

R.E.: Sam Sukiasian

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Los Angeles, Ca. 90012

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13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

TEST(S) REQUESTED

	Test		✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

GRADING ANALYSIS

Total Wt 311 g | By: JM | Date: 05/21/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
	12.5					
0	9.5	0	0		100	
4	4.75	4	1		99	
307		311				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt.			0	100	99	
(g)	2.36 mm	1	1	99	98	
115.0 g	1.18 mm	3	3	97	96	
	600 µm	12	10	90	89	
	300 µm	22	19	81	80	
	150 µm	36	31	69	68	
	75 µm	60	52	48	48	

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M	15.0	6.0	9.0	8%	8%
24hr.	1M	11.0	6.0	5.0	4%	4%

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

			SPEC.
Dura-Coarse	Sed.Ht.=		
Dura-Fine	R2/R1 =		

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

R-VALUE RESULT | SPEC.

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod. | SPEC.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

SP. G. FINE (SSD)

(B) S.S. Dry

(A) Ov. Dry

ABS. %

Wt. S+C+H2O

Wt. S+C

W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry

(A) Ov. Dry

ABS. %

(C) Wt. S. in H2O

$$\text{App} = \frac{A}{A - C} =$$

$$\text{SSD} = \frac{B}{B - C} =$$

$$\text{OD} = \frac{A}{B - C} =$$

MOISTURE CONTENT

Gr. Wet

Gr. Dry

H2O

Tare

Net Dry

% H2O

PLASTICITY INDEX

L.L.	22
P.L.	22
P.I.	0

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING: NM

ORGANIC IMPURITIES: Satisfactory / Unsatisfactory

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo | Spec.

Wa | Grav.

Wb

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 7 1 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 2	2172B

Sample of: Soil

Sampled from: R - 12 - 029

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012

DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

By: FAX / MAIL / PHONE / OTHER

NORMAL ☐ PRIORITY ✓

DATE NEEDED: 6/10/2012

R.E.: Sam Sukiasian

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13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

TEST(S) REQUESTED

	Test		✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)	
Opt. Moist Content (%)	

Laboratory Remarks:

GRADING ANALYSIS

Total Wt 506 g By: JM Date: 05/21/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
	12.5					
0	9.5	0				
1	4.75	1	0		100	
505		506				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
115.0 g			0	100	100	
	2.36 mm	2	2	98	98	
	1.18 mm	15	13	87	87	
	600 µm	47	41	59	59	
	300 µm	76	66	34	34	
	150 µm	93	81	19	19	
	75 µm	102	89	11	11	

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M	10.0	6.0	4.0	3%	3%
24hr.	1M	8.0	6.0	2.0	2%	2%

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = Wt. of spheres =

DURABILITY INDEX

			SPEC.
Dura-Coarse	Sed.Ht.=		
Dura-Fine	R2/R1 =		

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod. — SPEC.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE

RESULT — SPEC.

SP. G. FINE (SSD)

(B) S.S. Dry

(A) Ov. Dry

ABS. %

Wt. S+C+H2O

Wt. S+C

W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry

(A) Ov. Dry

ABS. %

(C) Wt. S. in H2O

$$\text{App} = \frac{A}{A - C} =$$

$$\text{SSD} = \frac{B}{B - C} =$$

$$\text{OD} = \frac{A}{B - C} =$$

MOISTURE CONTENT

SPEC.

Gr. Wet

Gr. Dry

H2O

Tare

Net Dry

% H2O

PLASTICITY INDEX

L.L.

P.L.

P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING	ORGANIC IMPURITIES
NM	Satisfactory
	Unsatisfactory

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec.	
Wa		Grav.	
Wb			

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 7 2 B

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 4	2173B

Sample of: Soil

Sampled from: R - 12 - 029

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

By: FAX / MAIL / PHONE / OTHER

NORMAL ☐ PRIORITY ✓ DATE NEEDED: 6/10/2012

R.E.: Sam Sukiasian

Address: 100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 557 g By: JM Date: 05/22/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
	12.5					
0	9.5	0	0		**100**	
8	4.75	8	1		**99**	
549		557				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt.			0	100	99	
(g)	2.36 mm	2	2	98	**97**	
	1.18 mm	4	3	97	**96**	
115.0 g	600 μm	11	10	90	**89**	
	300 μm	27	23	77	**76**	
	150 μm	54	47	53	**52**	
	75 μm	77	67	33	**33**	

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M	17.0	6.0	11.0	**10%**	**10%**
24hr.	1M	13.0	6.0	7.0	**6%**	**6%**

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = Wt. of spheres =

DURABILITY INDEX

			SPEC.
Dura-Coarse	Sed.Ht.=		
Dura-Fine	R2/R1 =		

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES (SPEC.)

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE (SPEC.)

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$Bulk = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$App = \frac{A}{A - C} =$$

$$SSD = \frac{B}{B - C} =$$

$$OD = \frac{A}{B - C} =$$

MOISTURE CONTENT (SPEC.)

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.	21
P.L.	21
P.I.	0

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.
Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING	ORGANIC IMPURITIES	
NM	Satisfactory	
	Unsatisfactory	

TEST(S) REQUESTED

	Test	No.	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)	
Opt. Moist Content (%)	

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo		Spec.	
Wa		Grav.	
Wb			

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 7 3 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

1	2	0	C	5	6	0	3		B	u	l	k		2213B
CONTRACT NO.									SAMPLE NO.					LAB. NO.

DATE RCV'D:	05/31/2012	DATE OUT:	06/08/2012
NUMBER OF CONTAINERS:	1 Bag	By:	FAX
			MAIL
NORMAL	PRIORITY ✓		PHONE
	DATE NEEDED: 6/16/2012		OTHER

Sample of: Soil

Sampled from: R-12-030

Material Source:

Owner / Mfr.:

Date Sampled:

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620-2135

Fax. No.: (213) 620-2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 6884 g | By: JM | Date: 06/05/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
0	25	0	0		100	
53	19	53	1		99	
117	12.5	170	2		98	
118	9.5	288	4		96	
369	4.75	657	10		90	
6227		6884				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)			0	100	90	
	2.36 mm	36	7	93	84	
	1.18 mm	107	21	79	71	
501.0 g	600 µm	228	46	54	49	
	300 µm	373	74	26	23	
	150 µm	448	89	11	10	
	75 µm	470	94	6	5	

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus.
1hr.	5M				
24hr.	1M				

SAND EQUIVALENT

				Avg.	MIN. / SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

			SPEC.
Dura-Coarse	Sed.Ht.=		
Dura-Fine	R2/R1 =		

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.			SPEC.
			Wtd.
			Avg.
			% CP
			Ret.
			No.4 =
	% CP = P/R		

R-VALUE	SPEC.
RESULT	

SP. G. FINE (SSD)	
(B) S.S. Dry	
(A) Ov. Dry	
ABS. %	
Wt. S+C+H2O	
Wt. S+C	
W=Wt. H2O	
Bulk = $\frac{500}{500 - W}$ =	

MOISTURE CONTENT		SPEC.	PLASTICITY INDEX
Gr. Wet		L.L.	
Gr. Dry			
H2O		P.L.	
Tare			
Net Dry		P.I.	
% H2O			

SP. GR. COARSE CT206/CT209, +4	
(B) S.S. Dry	
(A) Ov. Dry	
ABS. %	
(C) Wt. S. in H2O	
App = $\frac{A}{A-C}$ =	
SSD = $\frac{B}{B-C}$ =	
OD = $\frac{A}{B-C}$ =	

pH / RESISTIVITY

	Field	Lab.	
Soil pH		8.11	
H2O		40 cc	
Min. Resistivity		3900	
Based on 18 gauge CMP.			
Estimated life:		44 yrs.	

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING	ORGANIC IMPURITIES	
NM	Satisfactory	
	Unsatisfactory	

TEST(S) REQUESTED

	Test	No.	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
■	pH (CMP)	643	✓
■	Resistivity (CMP)	643	✓
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)	
Opt. Moist Content (%)	

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 12-0C5603

LAB. NO. 2213B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 1	2174B

Sample of:	Soil
Sampled from:	R - 12 - 030
Material Source:	
Owner / Mfr.:	
Date Sampled:	3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D:	05/09/2012	DATE OUT:	06/01/2012
NUMBER OF CONTAINERS:	1 zip bag	By:	FAX / MAIL / PHONE / OTHER
NORMAL		PRIORITY	✓
DATE NEEDED:	6/10/2012		

R.E.: Sam Sukiasian

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Los Angeles, Ca. 90012

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Fax. No.: (213) 620 - 2316

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13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt: 401 g | By: JM | Date: 05/22/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
0	19	0	0		**100**	
9	12.5	9	2		**98**	
17	9.5	26	6		**94**	
23	4.75	49	12		**88**	
352		401				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
115.0 g			0	100	88	
	2.36 mm	7	6	94	**83**	
	1.18 mm	27	23	77	**68**	
	600 µm	54	47	53	**47**	
	300 µm	82	71	29	**26**	
	150 µm	97	84	16	**14**	
	75 µm	104	90	10	**9**	

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M	10.0	6.0	4.0	**3%**	**3%**
24hr.	1M	8.0	6.0	2.0	**2%**	**2%**

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

			SPEC.
Dura-Coarse	Sed.Ht.=		
Dura-Fine	R2/R1 =		

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.			SPEC.
			Wtd.
			Avg.
			% CP
			Ret.
			No.4 =
% CP = P/R			

R-VALUE

RESULT		SPEC.

SP. G. FINE (SSD)

(B) S.S. Dry	
(A) Ov. Dry	
ABS. %	
Wt. S+C+H2O	
Wt. S+C	
W=Wt. H2O	
Bulk $= \frac{500}{500 - W} =$	

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry	
(A) Ov. Dry	
ABS. %	
(C) Wt. S. in H2O	

$App = \frac{A}{A-C} =$

$SSD = \frac{B}{B-C} =$

$OD = \frac{A}{B-C} =$

MOISTURE CONTENT

		SPEC.
Gr. Wet		
Gr. Dry		
H2O		
Tare		
Net Dry		
% H2O		

PLASTICITY INDEX

L.L.	
P.L.	
P.I.	

pH / RESISTIVITY

	Field	Lab.	
Soil pH			
H2O			
Min. Resistivity			

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING	ORGANIC IMPURITIES	
NM	Satisfactory	
	Unsatisfactory	

TEST(S) REQUESTED

	Test	No.	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)	
Opt. Moist Content (%)	

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 7 4 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

1	2	0	C	5	6	0	3	S	-	3	2175B
CONTRACT NO.								SAMPLE NO.			LAB. NO.

Sample of: Soil

Sampled from: R - 12 - 030

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

By: FAX / MAIL / PHONE / OTHER

NORMAL ☐ PRIORITY ✓ DATE NEEDED: 6/10/2012

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 592 g | By: JM | Date: 05/22/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
0	12.5	0				
2	9.5	2	0		**100**	
1	4.75	3	1		**99**	
589		592				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)			0	100	99	
	2.36 mm					
	1.18 mm					
.0 g	600 µm					
	300 µm					
	150 µm					
	75 µm					

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M				
24hr.	1M				

SAND EQUIVALENT					MIN. SPEC.
Sand R2				Avg.	
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				
No. of spheres =		Wt. of spheres =				

DURABILITY INDEX			SPEC.
Dura-Coarse	Sed.Ht.=		
Dura-Fine	R2/R1 =		

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.			SPEC.
			Wtd.
			Avg.
			% CP
			Ret.
			No.4 =
% CP = P/R			

R-VALUE | SPEC. | RESULT

SP. G. FINE (SSD)	
(B) S.S. Dry	
(A) Ov. Dry	
ABS. %	
Wt. S+C+H2O	
Wt. S+C	
W=Wt. H2O	
Bulk = $\frac{500}{500 - W}$ =	

SP. GR. COARSE CT206/CT209, +4	
(B) S.S. Dry	
(A) Ov. Dry	
ABS. %	
(C) Wt. S. in H2O	
App = $\frac{A}{A - C}$ =	
SSD = $\frac{B}{B - C}$ =	
OD = $\frac{A}{B - C}$ =	

MOISTURE CONTENT		SPEC.
Gr. Wet		
Gr. Dry		
H2O		
Tare		
Net Dry		
% H2O		

PLASTICITY INDEX	
L.L.	**20**
P.L.	**19**
P.I.	**1**

pH / RESISTIVITY

	Field	Lab.	
Soil pH			
H2O			
Min. Resistivity			
Based on 18 gauge CMP.			
Estimated life:			

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING	ORGANIC IMPURITIES	
NM	Satisfactory	
	Unsatisfactory	

TEST(S) REQUESTED

	Test	No.	✓
	Fine Grade	202	
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE

			✓
A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)	
Opt. Moist Content (%)	

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec.	
Wa		Grav.	
Wb			

CONTRACT NO. 12-0C5603

LAB. NO. 2175B

SRL SOIL & AGGREGATE TESTS

1	2	0	C	5	6	0	3		B	u	l	k		2214B
CONTRACT NO.									SAMPLE NO.					LAB. NO.

DATE RCV'D: 05/31/2012 DATE OUT: 06/08/2012
NUMBER OF CONTAINERS: 1 Bag By: FAX / MAIL / PHONE / OTHER
NORMAL PRIORITY ✓ DATE NEEDED: 6/16/2012

Sample of: Soil
Sampled from: R-12-032
Material Source:
Owner / Mfr.:
Date Sampled:

SRL Lab. Stamp
By ____________ for
D. OZOWARA
SRL Materials Engineer

R.E.: Sam Sukiasian
Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012
Phone No.: (213) 620-2135
Fax. No.: (213) 620-2316

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13970 Victoria Street
Fontana, CA 92336
Phone: (909) 350 9039
Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 6077 g By: JM Date: 06/05/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
0	37.5	0	0		**100**	
181	25	181	3		**97**	
25	19	206	3		**97**	
137	12.5	343	6		**94**	
76	9.5	419	7		**93**	
263	4.75	682	11		**89**	
5395		6077				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)			0	100	89
	2.36 mm	21	4	96	**85**
	1.18 mm	57	11	89	**79**
504.0 g	600 µm	127	25	75	**67**
	300 µm	242	48	52	**46**
	150 µm	341	68	32	**28**
	75 µm	402	80	20	**18**

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus.
1hr. 5M					
24hr. 1M					

SAND EQUIVALENT — MIN. SPEC.

				Avg.	SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = Wt. of spheres =

DURABILITY INDEX — SPEC.

Dura-Coarse	Sed.Ht.=		
Dura-Fine	R2/R1 =		

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

R-VALUE SPEC. RESULT

SP. G. FINE (SSD): (B) S.S. Dry; (A) Ov. Dry; ABS. %; Wt. S+C+H2O; Wt. S+C; W=Wt. H2O; Bulk = $\frac{500}{500-W}$ =

SP. GR. COARSE CT206/CT209, +4: (B) S.S. Dry; (A) Ov. Dry; ABS. %; (C) Wt. S. in H2O

App = $\frac{A}{A-C}$ =

SSD = $\frac{B}{B-C}$ =

OD = $\frac{A}{B-C}$ =

% CRUSHED PARTICLES — SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

MOISTURE CONTENT — SPEC.

Gr. Wet; Gr. Dry; H2O; Tare; Net Dry; % H2O

PLASTICITY INDEX

L.L.; P.L.; P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		**7.37**
H2O		**15 cc**
Min. Resistivity		**660**

Based on 18 gauge CMP.
Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING: NM

ORGANIC IMPURITIES: Satisfactory / Unsatisfactory

TEST(S) REQUESTED ✓

	Test	No.	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
■	pH (CMP)	643	✓
■	Resistivity (CMP)	643	✓
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)
Opt. Moist Content (%)

Laboratory Remarks:
Min. Resistivity is less than 1000Ω-cm

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo; Wa; Wb — Spec. Grav.

CONTRACT NO. 1 2 - 0 C 5 6 0 3
LAB. NO. 2 2 1 4 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

Results sent to: SAM SUKIASIAN

Division of Engineering Services
Materials Engineering and Testing Services
Corrosion and Structural Concrete Field Investigation Branch
Report Date: 6/26/2012
Reported by Michael Mifkovic

TEST SUMMARY REPORT - SOIL

EA **12-0C5601**

EFIS: **1200000078**

Bridge #:

Dist/Co/Rte/PM: **12 / ORA /91/ / 7.9-9.5 PM**

Bridge Name:

CORROSION LAB #	TL101 #	BORE #	FIELD SAMPLE #	DEPTH (FT) START	DEPTH (FT) END	MINIMUM RESISTIVITY[1] (ohm-cm)	pH[1]	CHLORIDE CONTENT[2] (ppm)	SULFATE CONTENT[3] (ppm)	SAMPLE LOCATION	IS SAMPLE CORROSIVE?
CR20120288	C080020	R-12-032		0	5	660	7.37	86	354		NO

This site is corrosive to foundation elements(see note below for MSE wall backfill).

Controlling corrosion parameters are as follows:

- Sulfate concentration is 2000 ppm or greater

Note: For MSE wall structure backfill material, minimum resistivity must be 2000 ohm-cm or greater, pH must be between 5.5 and 10.0, chloride content must not be greater than 250 ppm, and sulfate content must not be greater than 500 ppm.

[1]CTM 643, [2]CTM 422, [3]CTM 417

6/26/2012

CR20120284 - CR20120288

SRL SOIL & AGGREGATE TESTS

1	2	0	C	5	6	0	3		S	-	2		2176B
CONTRACT NO.									SAMPLE NO.				LAB. NO.

Sample of: Soil

Sampled from: R - 12 - 032

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 | DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

By: FAX / MAIL / PHONE / OTHER

NORMAL [ ] PRIORITY ✓ DATE NEEDED: 6/10/2012

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 211 g | By: JM | Date: 05/22/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
0	12.5	0	0		**100**	
3	9.5	3	1		**99**	
1	4.75	4	2		**98**	
207		211				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
			0	100	98	
115.0 g	2.36 mm	2	2	98	**96**	
	1.18 mm	9	8	92	**90**	
	600 µm	25	22	78	**76**	
	300 µm	48	42	58	**57**	
	150 µm	73	63	37	**36**	
	75 µm	88	77	23	**23**	

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus.
1hr.	5M	15.0	6.0	9.0	**8%**	**8%**
24hr.	1M	10.0	6.0	4.0	**3%**	**3%**

SAND EQUIVALENT — MIN. SPEC.

				Avg.	SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX — SPEC.

Dura-Coarse	Sed.Ht.=		
Dura-Fine	R2/R1 =		

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES — SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP

Ret. No.4 =

% CP = P/R

R-VALUE — SPEC.

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$Bulk = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$App = \frac{A}{A - C} =$$

$$SSD = \frac{B}{B - C} =$$

$$OD = \frac{A}{B - C} =$$

MOISTURE CONTENT — SPEC.

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.
P.L.
P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory
Unsatisfactory

TEST(S) REQUESTED ✓

	Test	No.	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)	
Opt. Moist Content (%)	

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 7 6 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
12-0C5603	S-4	2177B

Sample of: Soil

Sampled from: R - 12 - 032

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA
SRL Materials Engineer

R.E.: Sam Sukiasian
Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012
Phone No.: (213) 620 - 2135
Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336
Phone: (909) 350 9039
Fax: (909) 829 6294

DATE RCV'D:	05/09/2012
DATE OUT:	06/01/2012
NUMBER OF CONTAINERS:	1 zip bag
NORMAL	
PRIORITY	✓
DATE NEEDED:	6/10/2012
By: FAX	
MAIL	
PHONE	
OTHER	

GRADING ANALYSIS

Total Wt 306 g | By: JM | Date: 05/22/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
0	25	0	0		100	
16	19	16	5		95	
13	12.5	29	9		91	
8	9.5	37	12		88	
37	4.75	74	24		76	
232		306				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
115.0 g			0	100	76	
	2.36 mm	19	17	83	63	
	1.18 mm	45	39	61	46	
	600 µm	73	63	37	28	
	300 µm	91	79	21	16	
	150 µm	101	88	12	9	
	75 µm	105	91	9	7	

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus.
1hr. 5M	10.0	6.0	4.0	3%	2%
24hr. 1M	8.0	6.0	2.0	2%	2%

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

		SPEC.
Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod. | SPEC.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE

RESULT | SPEC.

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$\text{App} = \frac{A}{A - C} =$$

$$\text{SSD} = \frac{B}{B - C} =$$

$$\text{OD} = \frac{A}{B - C} =$$

MOISTURE CONTENT

SPEC.

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.
P.L.
P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.
Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory
Unsatisfactory

TEST(S) REQUESTED

	Test	No.	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)
Opt. Moist Content (%)
Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 7 7 B

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 5	2178B

Sample of: Soil

Sampled from: R - 12 - 032

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 — DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

NORMAL [ ] PRIORITY ✓ DATE NEEDED: 6/10/2012

By: FAX / MAIL / PHONE / OTHER

R.E.: Sam Sukiasian

Address: 100 Main St. 11th Floor, Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336
Phone: (909) 350 9039
Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 401 g — By: JM — Date: 05/22/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
0	25	0	0		100	
32	19	32	8		92	
21	12.5	53	13		87	
2	9.5	55	14		86	
23	4.75	78	19		81	
323		401				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
			0	100	81	
	2.36 mm	9	8	92	75	
	1.18 mm	33	29	71	58	
115.0 g	600 µm	63	55	45	36	
	300 µm	87	76	24	19	
	150 µm	99	86	14	11	
	75 µm	105	91	9	7	

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr. 5M	10.0	6.0	4.0	3%	2%
24hr. 1M	8.0	6.0	2.0	2%	2%

SAND EQUIVALENT — MIN. SPEC.

Sand R2				Avg.	
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = — Wt. of spheres =

DURABILITY INDEX — SPEC.

Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES — SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE RESULT — SPEC.

SP. G. FINE (SSD): (B) S.S. Dry; (A) Ov. Dry; ABS. %; Wt. S+C+H2O; Wt. S+C; W=Wt. H2O

$Bulk = \frac{500}{500 - W} =$

SP. GR. COARSE CT206/CT209, +4: (B) S.S. Dry; (A) Ov. Dry; ABS. %; (C) Wt. S. in H2O

$App = \frac{A}{A - C} =$

$SSD = \frac{B}{B - C} =$

$OD = \frac{A}{B - C} =$

MOISTURE CONTENT — SPEC.: Gr. Wet; Gr. Dry; H2O; Tare; Net Dry; % H2O

PLASTICITY INDEX: L.L.; P.L.; P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING: NM

ORGANIC IMPURITIES: Satisfactory; Unsatisfactory

TEST(S) REQUESTED

	Test		✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo — Spec.

Wa — Grav.

Wb

CONTRACT NO. 1 2 - 0 C 5 6 0 3 — LAB. NO. 2 1 7 8 B

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	SAMPLE NO.	LAB. NO.
1 2 0 C 5 6 0 3	S - 6	2179B

Sample of: Soil

Sampled from: R - 12 - 032

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

By: FAX / MAIL / PHONE / OTHER

NORMAL PRIORITY ✓

DATE NEEDED: 6/10/2012

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 492 g By: JM Date: 05/23/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
	19					
0	12.5	0				
2	9.5	2	0		100	
1	4.75	3	1		99	
489		492				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	
			0	100	99	
	2.36 mm	0	0	100	99	
	1.18 mm	1	1	99	98	
115.0 g	600 µm	22	19	81	80	
	300 µm	72	63	37	37	
	150 µm	93	81	19	19	
	75 µm	102	89	11	11	

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus.
1hr.	5M	10.0	6.0	4.0	3%	3%
24hr.	1M	8.0	6.0	2.0	2%	2%

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = Wt. of spheres =

DURABILITY INDEX

		SPEC.
Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod. SPEC.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE SPEC. RESULT

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$\text{Bulk} = \frac{500}{500 - W} =$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$\text{App} = \frac{A}{A - C} =$

$\text{SSD} = \frac{B}{B - C} =$

$\text{OD} = \frac{A}{B - C} =$

MOISTURE CONTENT

SPEC.

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.
P.L.
P.I.

pH / RESISTIVITY

	Field	Lab.	
Soil pH			
H2O			
Min. Resistivity			

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING NM

ORGANIC IMPURITIES

Satisfactory
Unsatisfactory

TEST(S) REQUESTED

	Test		✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)	
Opt. Moist Content (%)	

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo Spec.
Wa Grav.
Wb

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 7 9 B

SRL SOIL & AGGREGATE TESTS

1	2	0	C	5	6	0	3		

CONTRACT NO.: 1 2 0 C 5 6 0 3 | SAMPLE NO.: Bulk | LAB. NO.: 2180B

Sample of: Soil

Sampled from: A - 12 - 033

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 | DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 Bag

By: FAX / MAIL / PHONE / OTHER

NORMAL [ ] PRIORITY ✓

DATE NEEDED: 6/10/2012

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt: 8878 g | By: JT | Date: 05/21/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
0	25	0	0		**100**	
68	19	68	1		**99**	
306	12.5	374	4		**96**	
180	9.5	554	6		**94**	
589	4.75	1143	13		**87**	
7735		8878				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt.			0	100	87	
(g)	2.36 mm	50	10	90	**78**	
	1.18 mm	116	23	77	**67**	
501.0 g	600 µm	211	42	58	**50**	
	300 µm	318	63	37	**32**	
	150 µm	382	76	24	**21**	
	75 µm	413	82	18	**16**	

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M					
24hr.	1M					

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

		SPEC.
Dura-Coarse	Sed.Ht.=	
Dura-Fine	R2/R1 =	

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
100	19 mm	1200
97	12.5 mm	1164
95	9.5 mm	1140
88	4.75 mm	1056

R-VALUE RESULT: **38** | SPEC.

% CRUSHED PARTICLES | SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$Bulk = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$App = \frac{A}{A - C} =$$

$$SSD = \frac{B}{B - C} =$$

$$OD = \frac{A}{B - C} =$$

MOISTURE CONTENT | SPEC.

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.
P.L.
P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		**8.52**
H2O		**25 cc**
Min. Resistivity		**3200**

Based on 18 gauge CMP.

Estimated life: **40 yrs.**

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING	ORGANIC IMPURITIES	
NM	Satisfactory	
	Unsatisfactory	

TEST(S) REQUESTED ✓

	Test	No.	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
■	R-Value	301	✓
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
■	pH (CMP)	643	✓
■	Resistivity (CMP)	643	✓
■	Expansion Index	UBC-29-2	✓
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index
15.0

Dry Density
122.9 pcf
% Moisture = 6.9

Max. Dry Density (pcf)
Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 12-0C5603

LAB. NO. 2180B

SRL SOIL & AGGREGATE TESTS

Contract No.	Sample No.	Lab. No.
1 2 0 C 5 6 0 3	S - 1	2181B

Sample of: Soil

Sampled from: A - 12 - 033

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012

DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

NORMAL | PRIORITY ✓ | DATE NEEDED: 6/10/2012

By: FAX | MAIL | PHONE | OTHER

R.E.: Sam Sukiasian

Address: 100 Main St. 11th Floor, Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336
Phone: (909) 350 9039
Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 407 g | By: JM | Date: 05/23/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
0	19	0	0		**100**	
21	12.5	21	5		**95**	
5	9.5	26	6		**94**	
19	4.75	45	11		**89**	
362		407				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)			0	100	89	
.0 g	2.36 mm					
	1.18 mm					
	600 µm					
	300 µm					
	150 µm					
	75 µm					

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M					
24hr.	1M					

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = | Wt. of spheres =

DURABILITY INDEX

			SPEC.
Dura-Coarse	Sed.Ht.=		
Dura-Fine	R2/R1 =		

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

%Ret.x(Wt.Cr./Tot.Wt.) = Prod. | SPEC.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE

RESULT | SPEC.

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$\text{App} = \frac{A}{A-C} =$$

$$\text{SSD} = \frac{B}{B-C} =$$

$$\text{OD} = \frac{A}{B-C} =$$

MOISTURE CONTENT

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

	SPEC.
L.L.	43
P.L.	26
P.I.	17

pH / RESISTIVITY

	Field	Lab.	
Soil pH			
H2O			
Min. Resistivity			

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory
Unsatisfactory

TEST(S) REQUESTED ✓

	Test	No.	✓
	Fine Grade	202	
■	Coarse Grade	202	✓
	Filler Material	202	
	Mech. Analysis	203	
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

		Spec. Grav.
Wo		
Wa		
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 8 1 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

CONTRACT NO.	12OC5603
SAMPLE NO.	S-3
LAB. NO.	2182B

Sample of: Soil

Sampled from: A - 12 - 033

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA
SRL Materials Engineer

R.E.: Sam Sukiasian

Address: 100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336
Phone: (909) 350 9039
Fax: (909) 829 6294

DATE RCV'D: 05/09/2012 DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

NORMAL ☐ PRIORITY ✓ DATE NEEDED: 6/10/2012

By: FAX / MAIL / PHONE / OTHER

TEST(S) REQUESTED

	Test	No.	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

GRADING ANALYSIS

Total Wt 782 g By: JM Date: 05/23/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
	25					
0	19	0	0		**100**	
8	12.5	8	1		**99**	
0	9.5	8	1		**99**	
3	4.75	11	1		**99**	
771		782				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size					
			0	100	99	
115.0 g	2.36 mm	1	1	99	**98**	
	1.18 mm	3	3	97	**96**	
	600 µm	7	6	94	**93**	
	300 µm	13	11	89	**88**	
	150 µm	31	27	73	**72**	
	75 µm	57	50	50	**50**	

MECH. / HYDRO.	R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr. 5M	23.0	6.0	17.0	**15%**	**15%**
24hr. 1M	17.0	6.0	11.0	**10%**	**10%**

SAND EQUIVALENT

MIN. SPEC.

				Avg.
Sand R2				
Clay R1				
S.E. Value				

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = Wt. of spheres =

DURABILITY INDEX

SPEC.

Dura-Coarse Sed.Ht.=

Dura-Fine R2/R1 =

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE SPEC. RESULT

SP. G. FINE (SSD)

(B) S.S. Dry
(A) Ov. Dry
ABS. %
Wt. S+C+H2O
Wt. S+C
W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry
(A) Ov. Dry
ABS. %
(C) Wt. S. in H2O

$$\text{App} = \frac{A}{A - C} =$$

$$\text{SSD} = \frac{B}{B - C} =$$

$$\text{OD} = \frac{A}{B - C} =$$

MOISTURE CONTENT

SPEC.

Gr. Wet
Gr. Dry
H2O
Tare
Net Dry
% H2O

PLASTICITY INDEX

L.L.
P.L.
P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory
Unsatisfactory

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)
Wt Pycnometer + H_2O (Wa)
Wt Pycnometer + H2O + Soil (Wb)
Wo / (Wo + Wa - Wb)

Wo Spec.
Wa Grav.
Wb

CONTRACT NO. 12-0C5603

LAB. NO. 2182B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

1	2	0	C	5	6	0	3		S	-	4	2183B
CONTRACT NO.									SAMPLE NO.			LAB. NO.

Sample of: Soil

Sampled from: A - 12 - 033

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By __________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012 — DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

By: FAX / MAIL / PHONE / OTHER

NORMAL [ ] PRIORITY ✓ DATE NEEDED: 6/10/2012

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

TEST(S) REQUESTED

	Test	No.	✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
■	Plasticity Index	204	✓
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)	
Opt. Moist Content (%)	

Laboratory Remarks:

GRADING ANALYSIS

Total Wt 742 g — By: JM — Date: 05/23/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
0	25	0	0		**100**	
19	19	19	3		**97**	
0	12.5	19	3		**97**	
3	9.5	22	3		**97**	
2	4.75	24	3		**97**	
718		742				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)	Size	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	
			0	100	97	
115.0 g	2.36 mm	1	1	99	**96**	
	1.18 mm	2	2	98	**95**	
	600 µm	5	4	96	**93**	
	300 µm	9	8	92	**89**	
	150 µm	18	16	84	**81**	
	75 µm	31	27	73	**71**	

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M	30.0	6.0	24.0	**21%**	**20%**
24hr.	1M	22.0	6.0	16.0	**14%**	**14%**

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = — Wt. of spheres =

DURABILITY INDEX

			SPEC.
Dura-Coarse	Sed.Ht.=		
Dura-Fine	R2/R1 =		

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES — SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE — SPEC.

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry

(A) Ov. Dry

ABS. %

Wt. S+C+H2O

Wt. S+C

W=Wt. H2O

$Bulk = \frac{500}{500-W} =$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry

(A) Ov. Dry

ABS. %

(C) Wt. S. in H2O

$App = \frac{A}{A-C} =$

$SSD = \frac{B}{B-C} =$

$OD = \frac{A}{B-C} =$

MOISTURE CONTENT — SPEC.

Gr. Wet

Gr. Dry

H2O

Tare

Net Dry

% H2O

PLASTICITY INDEX

L.L.	22
P.L.	19
P.I.	3

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory

Unsatisfactory

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec.	
Wa		Grav.	
Wb			

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 8 3 B

07-AGG-SSD (RG/SD 7/93, Rev. HC 10/17/11)

SRL SOIL & AGGREGATE TESTS

Contract No.	Sample No.	Lab. No.
1 2 0 C 5 6 0 3	S - 5	2184B

Sample of: Soil

Sampled from: A - 12 - 033

Material Source:

Owner / Mfr.:

Date Sampled: 3/14/12 - 5/2/12

SRL Lab. Stamp

By ____________ for

D. OZOWARA

SRL Materials Engineer

DATE RCV'D: 05/09/2012

DATE OUT: 06/01/2012

NUMBER OF CONTAINERS: 1 zip bag

NORMAL [ ] PRIORITY ✓

DATE NEEDED: 6/10/2012

By: FAX / MAIL / PHONE / OTHER

R.E.: Sam Sukiasian

Address:
100 Main St. 11th Floor
Los Angeles, Ca. 90012

Phone No.: (213) 620 - 2135

Fax. No.: (213) 620 - 2316

SOUTHERN REGIONAL LABORATORY
13970 Victoria Street
Fontana, CA 92336

Phone: (909) 350 9039

Fax: (909) 829 6294

GRADING ANALYSIS

Total Wt 847 g By: JM Date: 05/23/2012

Wt. Ret.	Size (mm)	Acc. Wt. Ret.	% Ret.	% Pass	Comb. % Pass	SPEC.
	87.5					
	75					
	62.5					
	50					
	37.5					
0	25	0	0		**100**	
37	19	37	4		**96**	
20	12.5	57	7		**93**	
5	9.5	62	7		**93**	
45	4.75	107	13		**87**	
740		847				

FINE GRADE / MECHANICAL ANALYSIS

Dry Wt. (g)			0	100	87	
	2.36 mm	7	6	94	**82**	
115.0 g	1.18 mm	18	16	84	**73**	
	600 µm	35	30	70	**61**	
	300 µm	57	50	50	**44**	
	150 µm	75	65	35	**30**	
	75 µm	85	74	26	**23**	

MECH. / HYDRO.		R	Corr.	C.R.	Mat In Sus.	Comb % In Sus
1hr.	5M	18.0	6.0	12.0	**10%**	**9%**
24hr.	1M	14.0	6.0	8.0	**7%**	**6%**

SAND EQUIVALENT

				Avg.	MIN. SPEC.
Sand R2					
Clay R1					
S.E. Value					

L.A.R.T.	Rev.	Wt.	Wt. Ret.	% Ret.	% Loss	% SPEC.
A B	100	5000g				
C D	500	5000g				

No. of spheres = Wt. of spheres =

DURABILITY INDEX

			SPEC.
Dura-Coarse	Sed.Ht.=		
Dura-Fine	R2/R1 =		

R-VALUE BATCH

% Run	Size	Wt.
	25 mm	
	19 mm	
	12.5 mm	
	9.5 mm	
	4.75 mm	

% CRUSHED PARTICLES

SPEC.

%Ret.x(Wt.Cr./Tot.Wt.) = Prod.

Wtd. Avg. % CP Ret. No.4 =

% CP = P/R

R-VALUE

SPEC.

RESULT

SP. G. FINE (SSD)

(B) S.S. Dry

(A) Ov. Dry

ABS. %

Wt. S+C+H2O

Wt. S+C

W=Wt. H2O

$$\text{Bulk} = \frac{500}{500 - W} =$$

SP. GR. COARSE CT206/CT209, +4

(B) S.S. Dry

(A) Ov. Dry

ABS. %

(C) Wt. S. in H2O

$$\text{App} = \frac{A}{A - C} =$$

$$\text{SSD} = \frac{B}{B - C} =$$

$$\text{OD} = \frac{A}{B - C} =$$

MOISTURE CONTENT

SPEC.

Gr. Wet

Gr. Dry

H2O

Tare

Net Dry

% H2O

PLASTICITY INDEX

L.L.

P.L.

P.I.

pH / RESISTIVITY

	Field	Lab.
Soil pH		
H2O		
Min. Resistivity		

Based on 18 gauge CMP.

Estimated life:

CLEANNESS VALUE

NL	SED. HT.	RESULT

FILM STRIPPING

NM

ORGANIC IMPURITIES

Satisfactory

Unsatisfactory

TEST(S) REQUESTED

	Test		✓
■	Fine Grade	202	✓
■	Coarse Grade	202	✓
	Filler Material	202	
■	Mech. Analysis	203	✓
	Plasticity Index	204	
	% Crushed Particles	205	
	SpG. Coarse	206	
	SpG. Fine (SSD)	207	
	SpG. of Soils	209	
	L.A.R.T.	211	
	Unit Wt.	212	
	Organic Impurities	213	
	Soundness	214	
	Relative Compaction	216	
	Sand Equivalent	217	
	Moisture Content	226	
	Cleaness Value	227	
	Durability Fine	229	
	Durability Coarse	229	
	Flat & Elongated	ASTM D 4791	
	R-Value	301	
	Fine Agg Angularity	AASHTO T 304	
	Mortar Strength	515	
	pH (RC)	532	
	Resistivity (RC)	532	
	pH (CMP)	643	
	Resistivity (CMP)	643	
	Expansion Index	UBC-29-2	
	Max. Dry Density/ Opt. Moist Content	ASTM-D1557	

SAMPLE TYPE ✓

A.B.		PCC	
A.S.		Bk.Fill	
EMB.		MISC.	
O.G.		Sub-Grade	
A.C. Agg.		SOIL	✓

TL-101 S.I.C. NO.

Expansion Index

Dry Density

Max. Dry Density (pcf)

Opt. Moist Content (%)

Laboratory Remarks:

SPECIFIC GRAVITY OF SOILS

Wt Oven Dry Soil (Wo)

Wt Pycnometer + H_2O (Wa)

Wt Pycnometer + H2O + Soil (Wb)

Wo / (Wo + Wa - Wb)

Wo		Spec.
Wa		Grav.
Wb		

CONTRACT NO. 1 2 - 0 C 5 6 0 3

LAB. NO. 2 1 8 4 B

CALIFORNIA DEPARTMENT OF TRANSPORTATION
GEOTECHNICAL LABORATORY

GL TRACKING NO : 12-042
Dist - EA: 12-0C5601
Report Date: June 15, 2012

CLASSIFICATION TEST SUMMARY

SAMPLE ID	% FINER THAN																	ATTERBERG LIMITS		AS RECEIVED		Gs
	3"	2 1/2"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	5μ	1μ	LL	PI	γd (pcf)	%m	
A-12-34_S-02				100	92	84	79	75	69	59	50	39	29	21	17	7	5					
A-12-34_S-06A					100	98	97	96	93	87	76	59	34	18	10	4	3					

Results sent to: AHMED MUSHTAQ

Division of Engineering Services
Materials Engineering and Testing Services
Corrosion and Structural Concrete Field Investigation Branch
Report Date: 6/14/2012
Reported by Michael Mifkovic

TEST SUMMARY REPORT - SOIL

EA **12-0C5601**

EFIS: **1200000078**

Bridge #:

Dist/Co/Rte/PM: **12 / ORA /91/ / 7.9-9.5 PM**

Bridge Name:

CORROSION LAB #	TL101 #	BORE #	FIELD SAMPLE #	DEPTH (FT) START	END	MINIMUM RESISTIVITY[1] (ohm-cm)	pH[1]	CHLORIDE CONTENT[2] (ppm)	SULFATE CONTENT[3] (ppm)	SAMPLE LOCATION	IS SAMPLE CORROSIVE?
CR20120261	C747862	**A-12-034**		0	5	5042	8.66			ROUTE 55/91	NO

This site is corrosive to foundation elements(see note below for MSE wall backfill).

Controlling corrosion parameters are as follows:

- Sulfate concentration is 2000 ppm or greater

Note: For MSE wall structure backfill material, minimum resistivity must be 2000 ohm-cm or greater, pH must be between 5.5 and 10.0, chloride content must not be greater than 250 ppm, and sulfate content must not be greater than 500 ppm.

[1]CTM 643, [2]CTM 422, [3]CTM 417

6/14/2012

CR20120256 - CR20120261

CONSOLIDATION TEST DATA

Project: Wal Widening
Boring No.: R-12-026
Sample No.: S-2B
Test No.: 12-106-G3

Location: 12-ORA-91-7.5-9.8
Tested By: jg
Test Date: 05/18/12
Sample Type: 2" tube

Project No.: 12-0C5601
Checked By: W 5/26
Depth: 40 - 41.5
Elevation: 12 - 040

Soil Description: Moist, Brown, Very Stiff, Clay/Silt
Remarks: Priority

Measured Specific Gravity: 2.75
Initial Void Ratio: 0.52
Final Void Ratio: 0.41

Liquid Limit: ---
Plastic Limit: ---
Plasticity Index: ---

Initial Height: 0.75 in
Specimen Diameter: 1.94 in

	Before Consolidation		After Consolidation	
	Trimmings	Specimen+Ring	Specimen+Ring	Trimmings
Container ID		RING		
Wt. Container + Wet Soil, gm	105.8	105.8	103.2	103.2
Wt. Container + Dry Soil, gm	93.5	93.5	93.5	93.5
Wt. Container, gm	27.6	27.6	27.6	27.6
Wt. Dry Soil, gm	65.9	65.9	65.9	65.9
Water Content, %	18.66	18.66	14.72	14.72
Void Ratio	---	0.52	0.41	---
Degree of Saturation, %	---	98.14	99.91	---
Dry Unit Weight, pcf	---	112.78	122.24	---

CONSOLIDATION TEST DATA

Project: Wal Widening
Boring No.: R-12-026
Sample No.: S-2B
Test No.: 12-106-G3

Location: 12-ORA-91-7.5-9.8
Tested By: jg
Test Date: 05/18/12
Sample Type: 2" tube

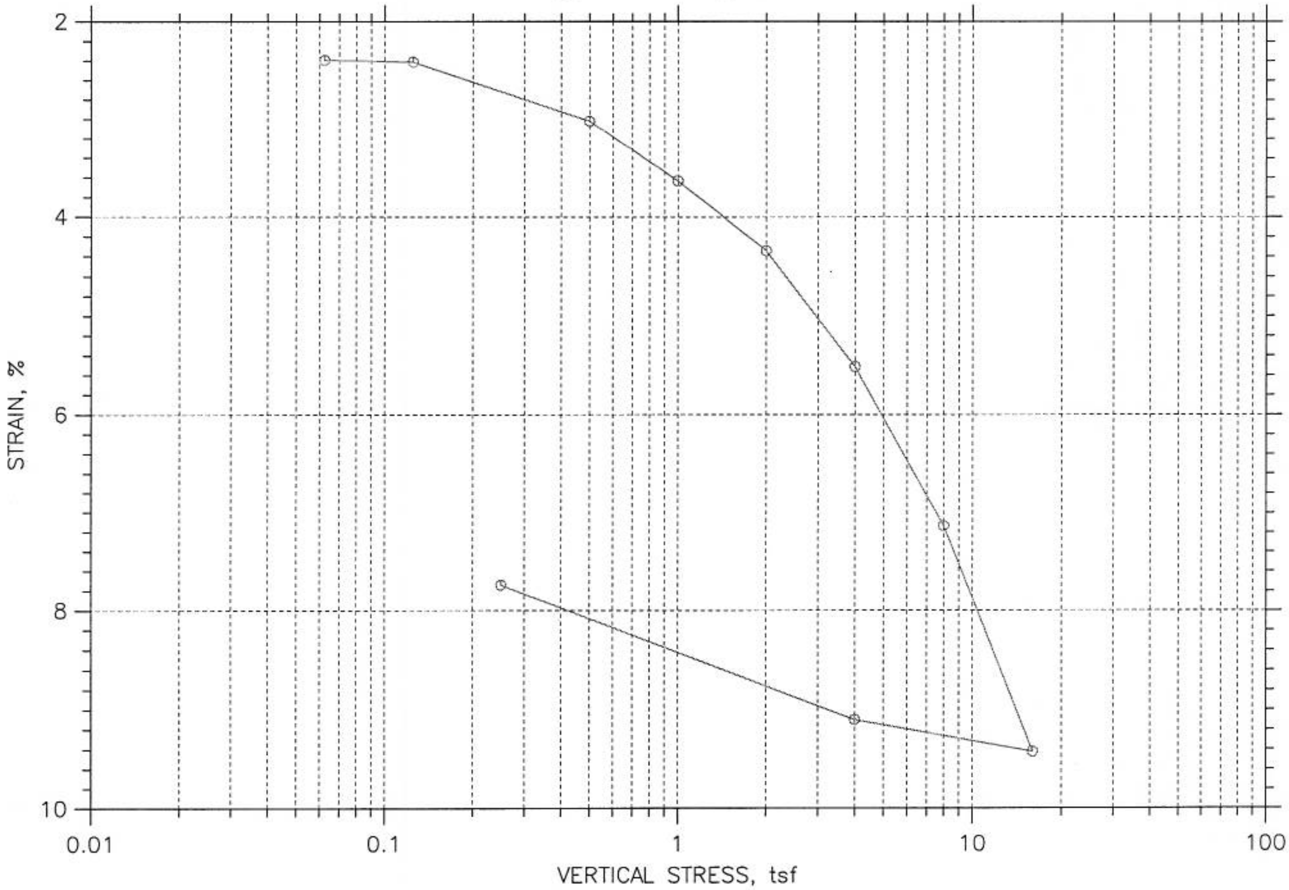
Project No.: 12-0C5601
Checked By:
Depth: 40 - 41.5
Elevation: 12 - 040

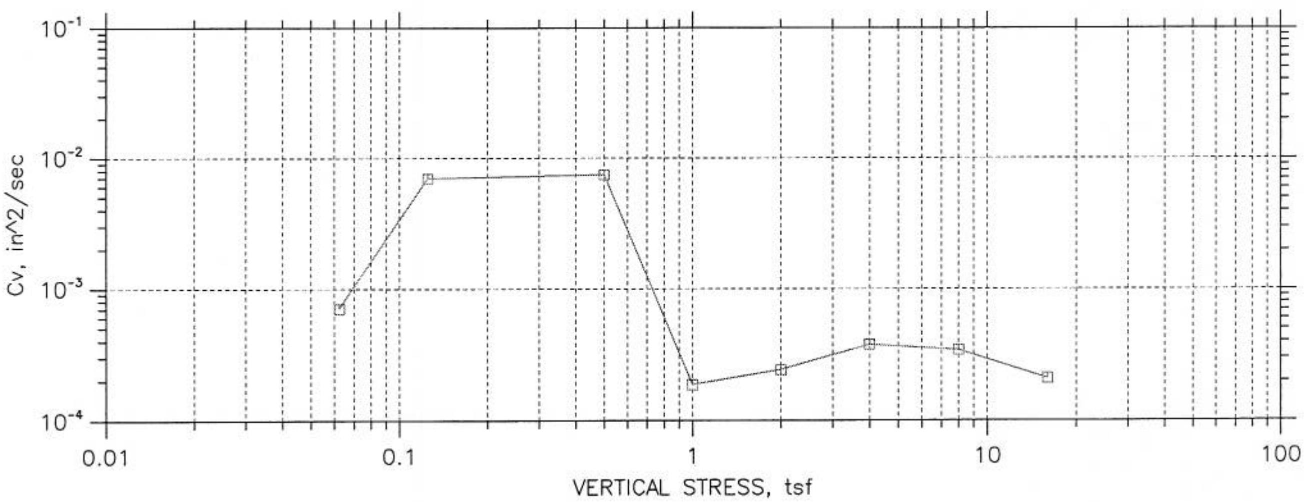
Soil Description: Moist, Brown, Very Stiff, Clay/Silt
Remarks: Priority

	Applied Stress tsf	Final Displacement in	Void Ratio	Strain at End %	T50 Fitting Sq.Rt. min	T50 Fitting Log min	Coefficient of Consolidation Sq.Rt. in^2/sec	Coefficient of Consolidation Log in^2/sec	Coefficient of Consolidation Ave. in^2/sec
1	0.0625	0.01795	0.487	2.39	0.7	0.5	6.03e-004	8.50e-004	7.06e-004
2	0.125	0.0181	0.487	2.41	0.1	0.0	6.97e-003	0.00e+000	6.97e-003
3	0.5	0.02265	0.477	3.02	0.1	0.0	6.42e-003	8.92e-003	7.46e-003
4	1	0.02725	0.468	3.63	2.3	0.0	1.86e-004	0.00e+000	1.86e-004
5	2	0.03259	0.457	4.34	1.9	1.6	2.23e-004	2.65e-004	2.42e-004
6	4	0.04137	0.439	5.52	1.0	1.2	4.02e-004	3.51e-004	3.75e-004
7	8	0.05354	0.415	7.14	1.2	1.1	3.30e-004	3.54e-004	3.42e-004
8	16	0.0707	0.380	9.43	1.9	1.8	2.05e-004	2.12e-004	2.09e-004
9	4	0.06827	0.385	9.10	0.0	0.0	1.73e-002	0.00e+000	1.73e-002
10	0.25	0.05807	0.405	7.74	3.9	1.6	9.93e-005	2.48e-004	1.42e-004

CONSOLIDATION TEST DATA

SUMMARY REPORT



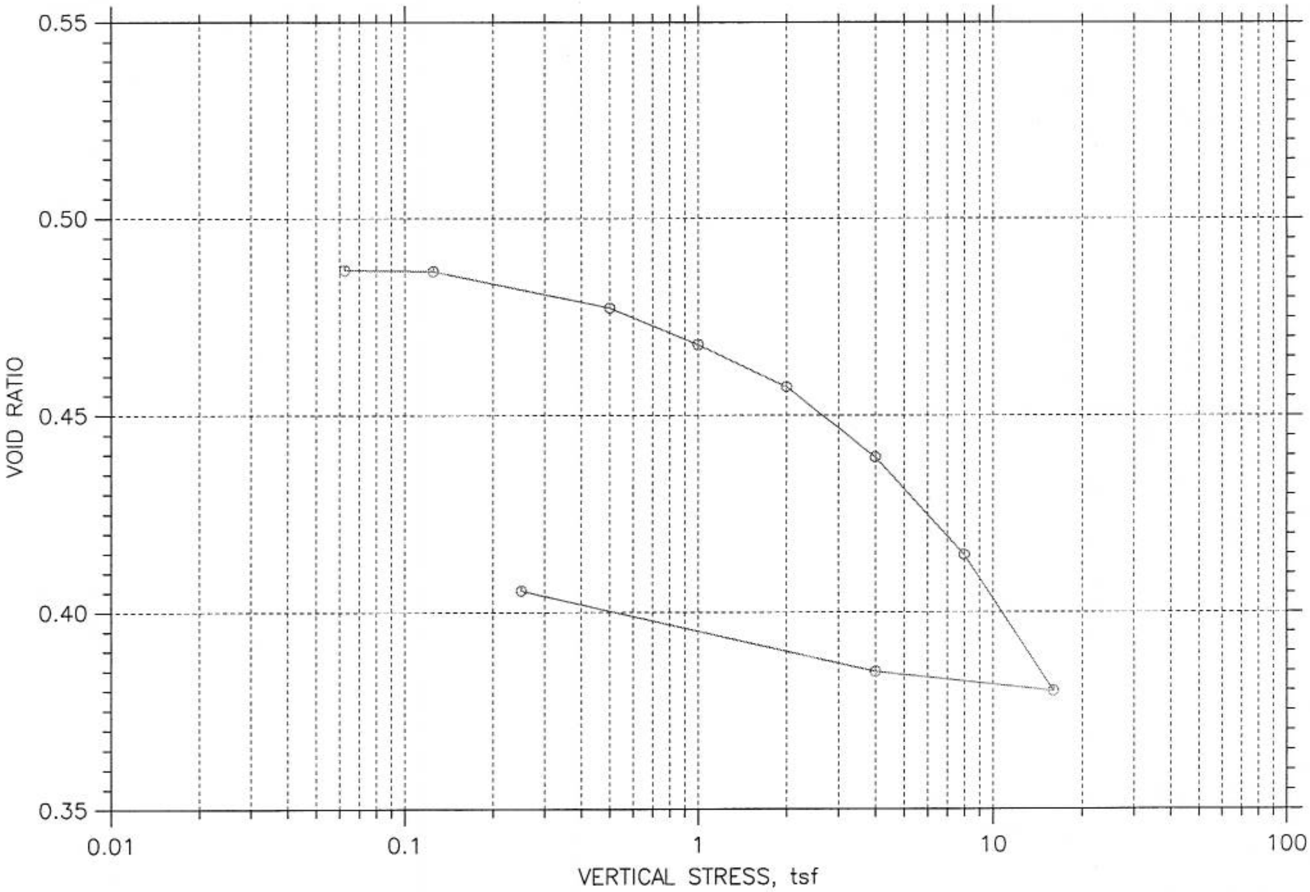


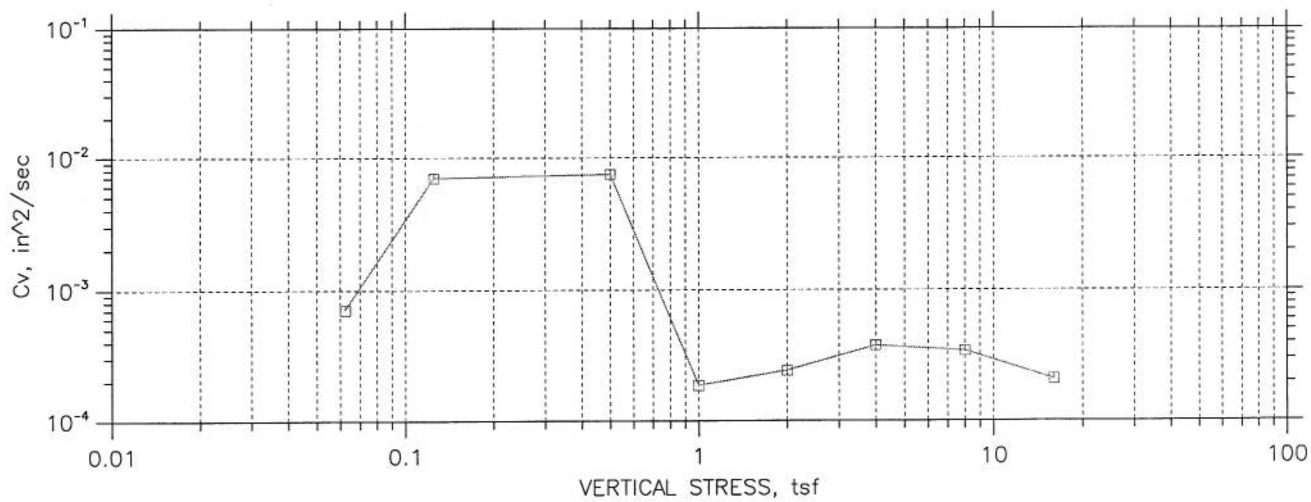
	Project: Wal Widening	Location: 12-ORA-91-7.5-9.8	Project No.: 12-0C5601
	Boring No.: R-12-026	Tested By: jg	Checked By:
	Sample No.: S-2B	Test Date: 05/18/12	Depth: 40 - 41.5
	Test No.: 12-106-G3	Sample Type: 2" tube	Elevation: 12 - 040
	Description: Moist, Brown, Very Stiff, Clay/Silt		
	Remarks: Priority		

Thu, 24-MAY-2012 13:55:49

CONSOLIDATION TEST DATA

SUMMARY REPORT

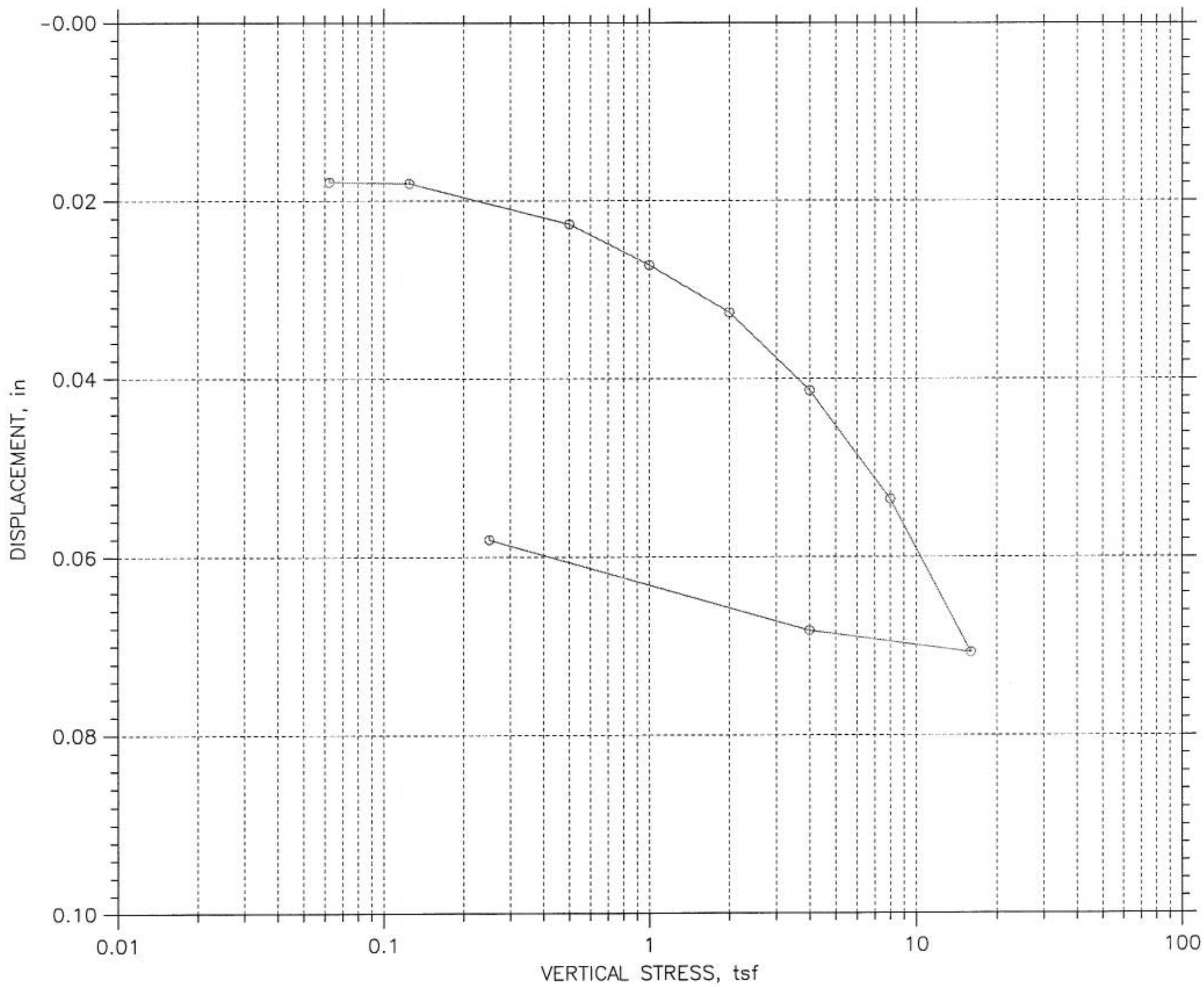




	Project: Wal Widening	Location: 12-ORA-91-7.5-9.8	Project No.: 12-0C5601
	Boring No.: R-12-026	Tested By: jg	Checked By:
	Sample No.: S-2B	Test Date: 05/18/12	Depth: 40 - 41.5
	Test No.: 12-106-G3	Sample Type: 2" tube	Elevation: 12 - 040
	Description: Moist, Brown, Very Stiff, Clay/Silt		
	Remarks: Priority		

CONSOLIDATION TEST DATA

SUMMARY REPORT

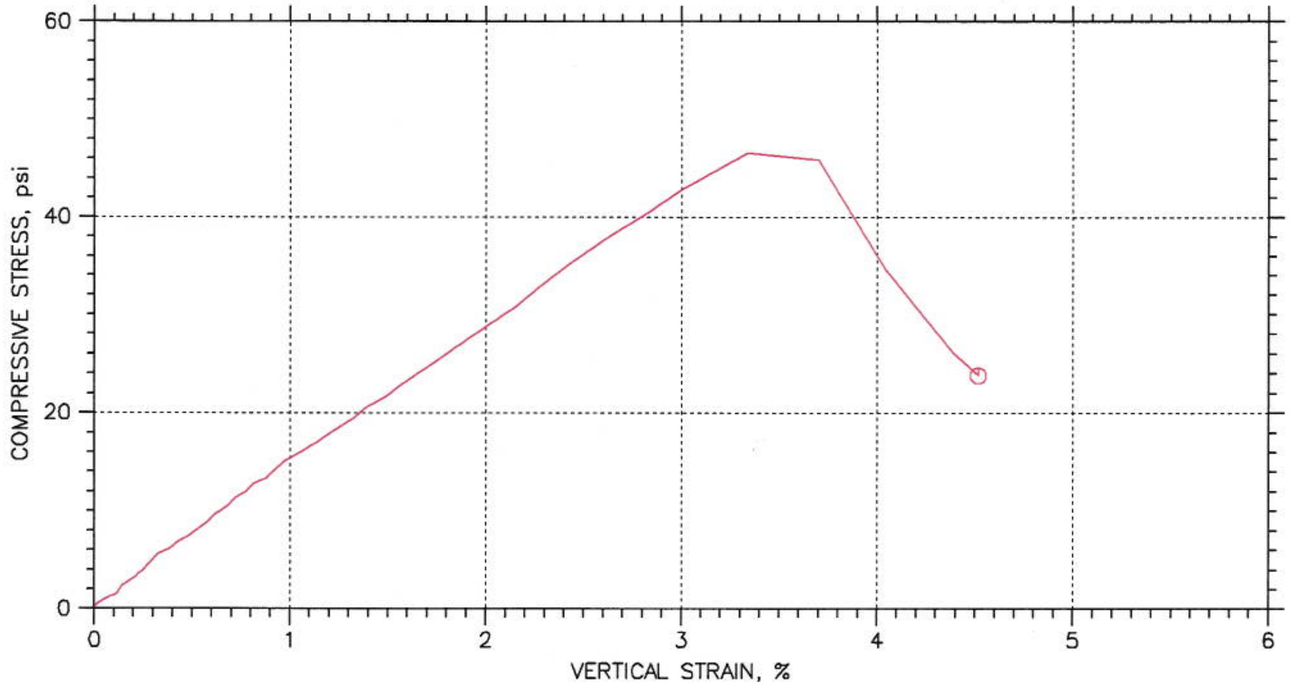


					Before Test	After Test
Overburden Pressure: 0 tsf				Water Content, %	18.66	14.72
Preconsolidation Pressure: 0 tsf				Dry Unit Weight, pcf	112.8	122.2
Compression Index: 0				Saturation, %	98.14	99.91
Diameter: 1.944 in		Height: 0.75 in		Void Ratio	0.52	0.41
LL: ---	PL: ---	PI: ---	GS: 2.75			

	Project: Wal Widening	Location: 12-ORA-91-7.5-9.8	Project No.: 12-0C5601
	Boring No.: R-12-026	Tested By: jg	Checked By:
	Sample No.: S-2B	Test Date: 05/18/12	Depth: 40 - 41.5
	Test No.: 12-106-G3	Sample Type: 2" tube	Elevation: 12 - 040
	Description: Moist, Brown, Very Stiff, Clay/Silt		
	Remarks: Priority		

Thu, 24-MAY-2012 13:56:45

UNCONFINED COMPRESSION TEST REPORT

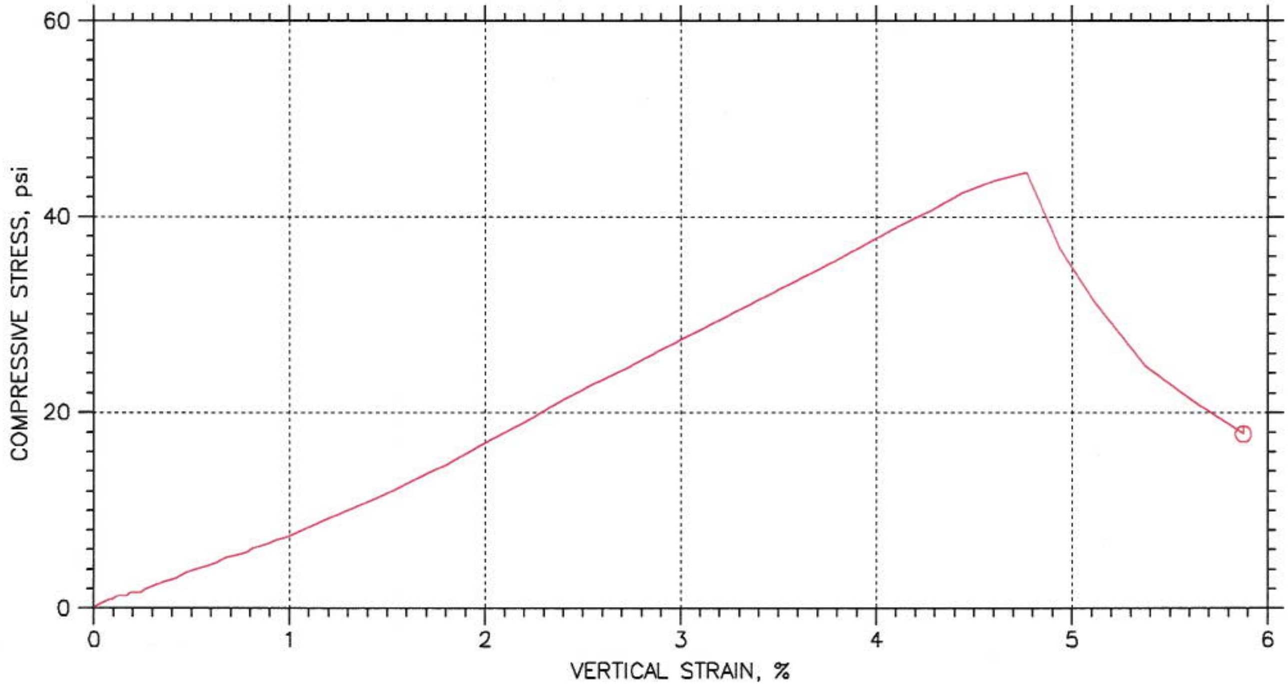


Symbol		⊙
Test No.		Q12-040
Initial	Diameter, in	1.94
	Height, in	4
	Water Content, %	23.28
	Dry Density, pcf	103.
	Saturation, %	
	Void Ratio	
Unconfined Compressive Strength, psi		46.62
Undrained Shear Strength, psi		
Time to Failure, min		
Strain Rate, %/min		1
Implied Specific Gravity		
Liquid Limit		---
Plastic Limit		---
Plasticity Index		---
Failure Sketch		

Caltrans	
	Project: Wal Widening
	Location: 12-ORA-91-7.5-9.8
	Project No.: 12-0C5601
	Boring No.: R12-024
	Sample No.: S-6
	Description: MOIST, BROWN, SILT W/CLAY
	Remarks: No Initial Picture ASTM 2166 5/31

Thu, 31-MAY-2012 09:21:41

UNCONFINED COMPRESSION TEST REPORT



Symbol		⊙	
Test No.		Q12-041	
Initial	Diameter, in	1.94	
	Height, in	3.75	
	Water Content, %	17.91	
	Dry Density, pcf	107.7	
	Saturation, %		
	Void Ratio		
Unconfined Compressive Strength, psi		44.54	
Undrained Shear Strength, psi			
Time to Failure, min			
Strain Rate, %/min		1	
Implied Specific Gravity			
Liquid Limit		---	
Plastic Limit		---	
Plasticity Index		---	
Failure Sketch			

Caltrans	Project: Wal Widening
	Location: 12-ORA-91-7.5-9.8
	Project No.: 12-0C5601
	Boring No.: R12-025
	Sample No.: S-6
	Description: MOIST, LIGHT BROWN, SILT W/CLAY
	Remarks: L/D < 2.0 ASTM 2166 NP 5/31

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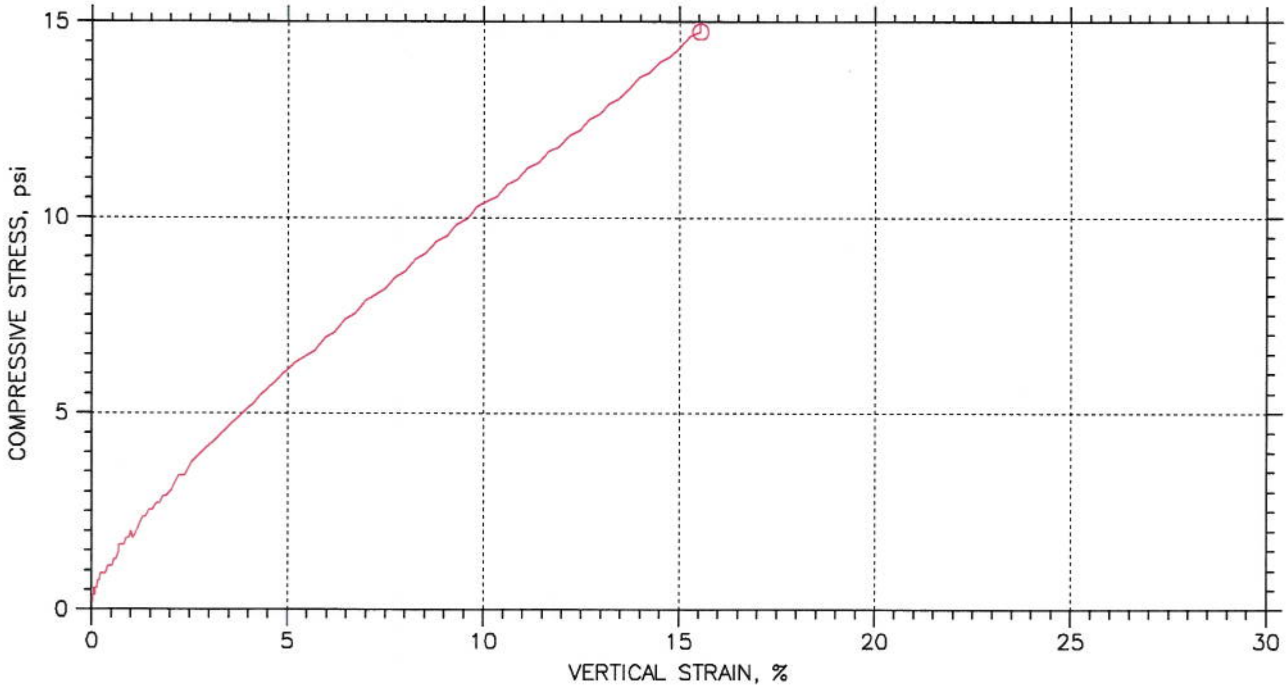
UNCONFINED COMPRESSION TEST REPORT



Symbol		⊙
Test No.		Q12-042
Initial	Diameter, in	1.93
	Height, in	3.65
	Water Content, %	17.49
	Dry Density, pcf	115.6
	Saturation, %	
	Void Ratio	
Unconfined Compressive Strength, psi		14.75
Undrained Shear Strength, psi		
Time to Failure, min		
Strain Rate, %/min		1
Implied Specific Gravity		
Liquid Limit		---
Plastic Limit		---
Plasticity Index		---
Failure Sketch		

	Project: Wal Widening
	Location: 12-ORA-91-7.5-9.8
	Project No.: 12-0C5601
	Boring No.: R12-026
	Sample No.: S-2A
	Description: MOIST, LIGHT BROWN, SILT W/CLAY 4DL2.0
	Remarks: According to ASTM D2166, Max Load shown is the load at 15 min. hp 5/31

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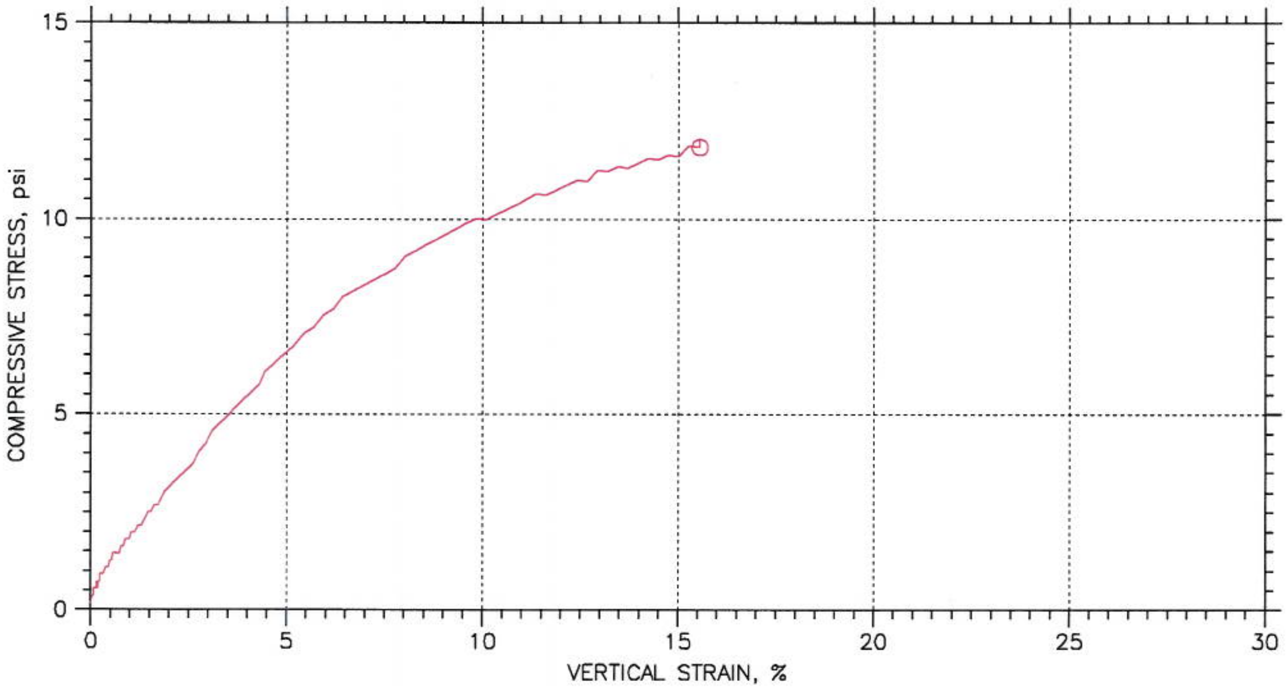
UNCONFINED COMPRESSION TEST REPORT

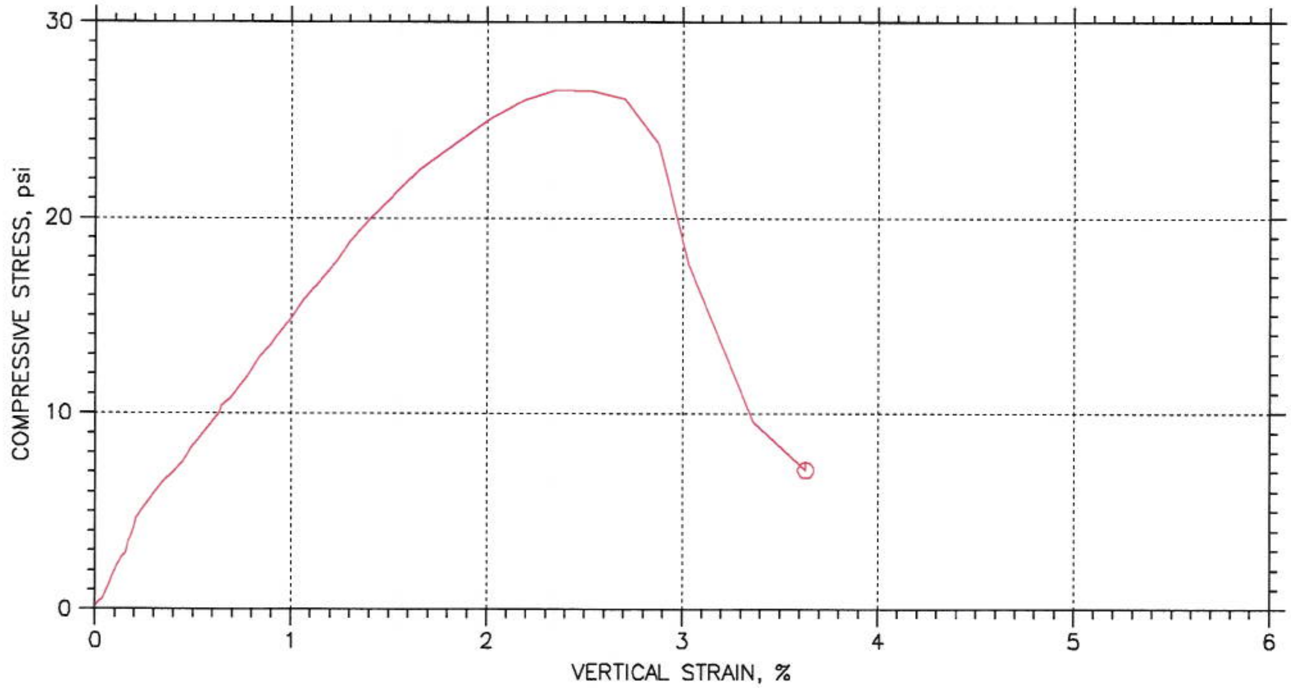


Symbol		⊕
Test No.		Q12-043
Initial	Diameter, in	1.94
	Height, in	3.86
	Water Content, %	21.79
	Dry Density, pcf	106.5
	Saturation, %	
	Void Ratio	
Unconfined Compressive Strength, psi		11.87
Undrained Shear Strength, psi		
Time to Failure, min		
Strain Rate, %/min		1
Implied Specific Gravity		
Liquid Limit		---
Plastic Limit		---
Plasticity Index		---
Failure Sketch		

Caltrans	Project: Wal Widening
	Location: 12-ORA-91-7.5-9.8
	Project No.: 12-0C5601
	Boring No.: R12-027
	Sample No.: S-2
	Description: MOIST, BROWN, SILT W/CLAY
	Remarks: According to ASTM D2166, Max Load shown is the load at 14.8 min. YP 5/31

Thu, 31-MAY-2012 14:08:01

UNCONFINED COMPRESSION TEST REPORT



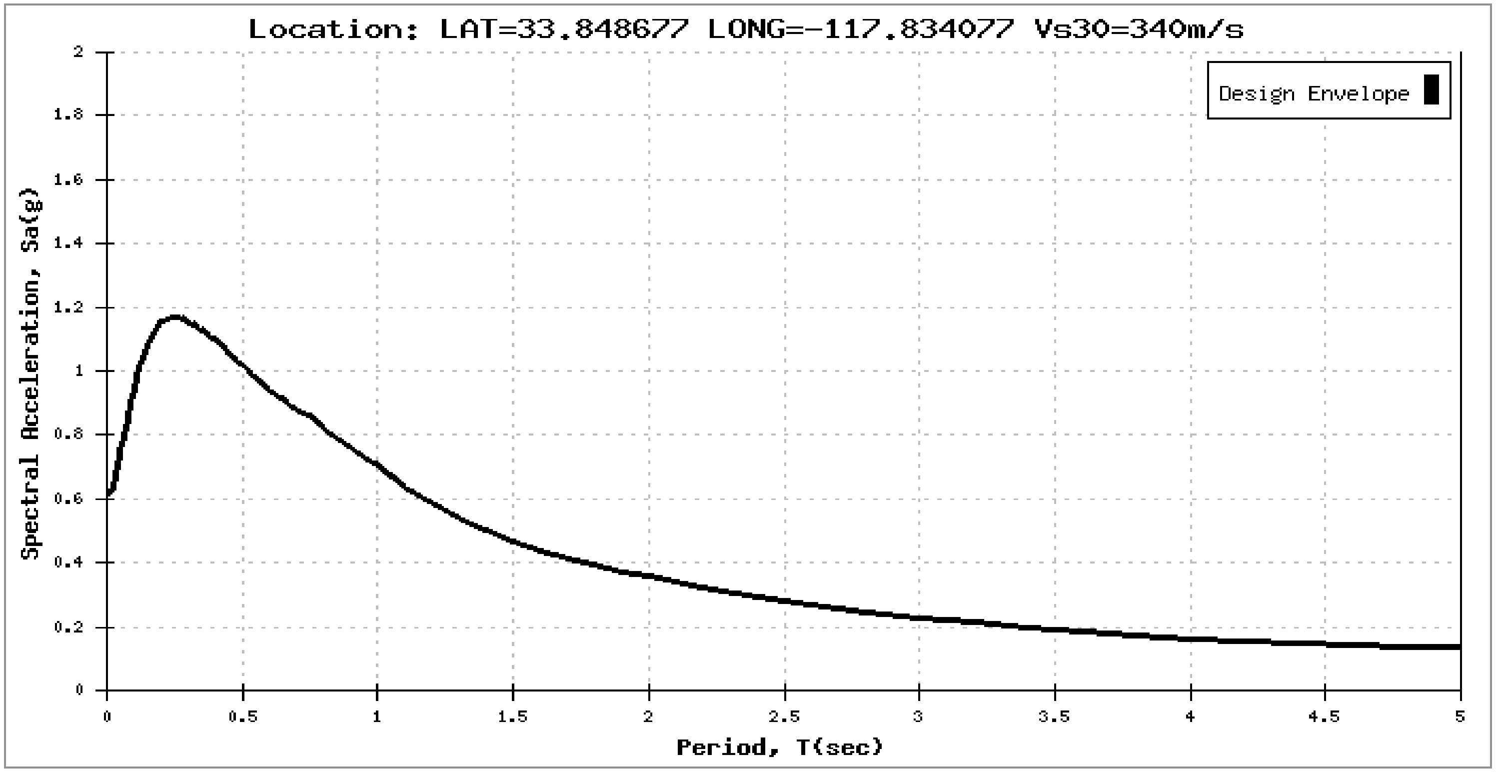
Symbol		⊙
Test No.		Q12-044
Initial	Diameter, in	1.95
	Height, in	3.93
	Water Content, %	21.38
	Dry Density, pcf	104.7
	Saturation, %	
	Void Ratio	
Unconfined Compressive Strength, psi		26.56
Undrained Shear Strength, psi		
Time to Failure, min		
Strain Rate, %/min		1
Implied Specific Gravity		
Liquid Limit		---
Plastic Limit		---
Plasticity Index		---
Failure Sketch		

Caltrans	
	Project: Wal Widening
	Location: 12-ORA-91-7.5-9.8
	Project No.: 12-0C5601
	Boring No.: R12-027
	Sample No.: S-8
	Description: MOIST, REDISH BROWN, SILT W/CLAY
	Remarks: ASTM 2166 hp 5/31

Thu, 31-MAY-2012 14:27:43

Appendix II: ARS Curve Data

ARS CURVE ENVELOPE DATA



0.01	0.614
0.02	0.629
0.022	0.637
0.025	0.649
0.029	0.662
0.03	0.666
0.032	0.675
0.035	0.688
0.036	0.693
0.04	0.709
0.042	0.718
0.044	0.726

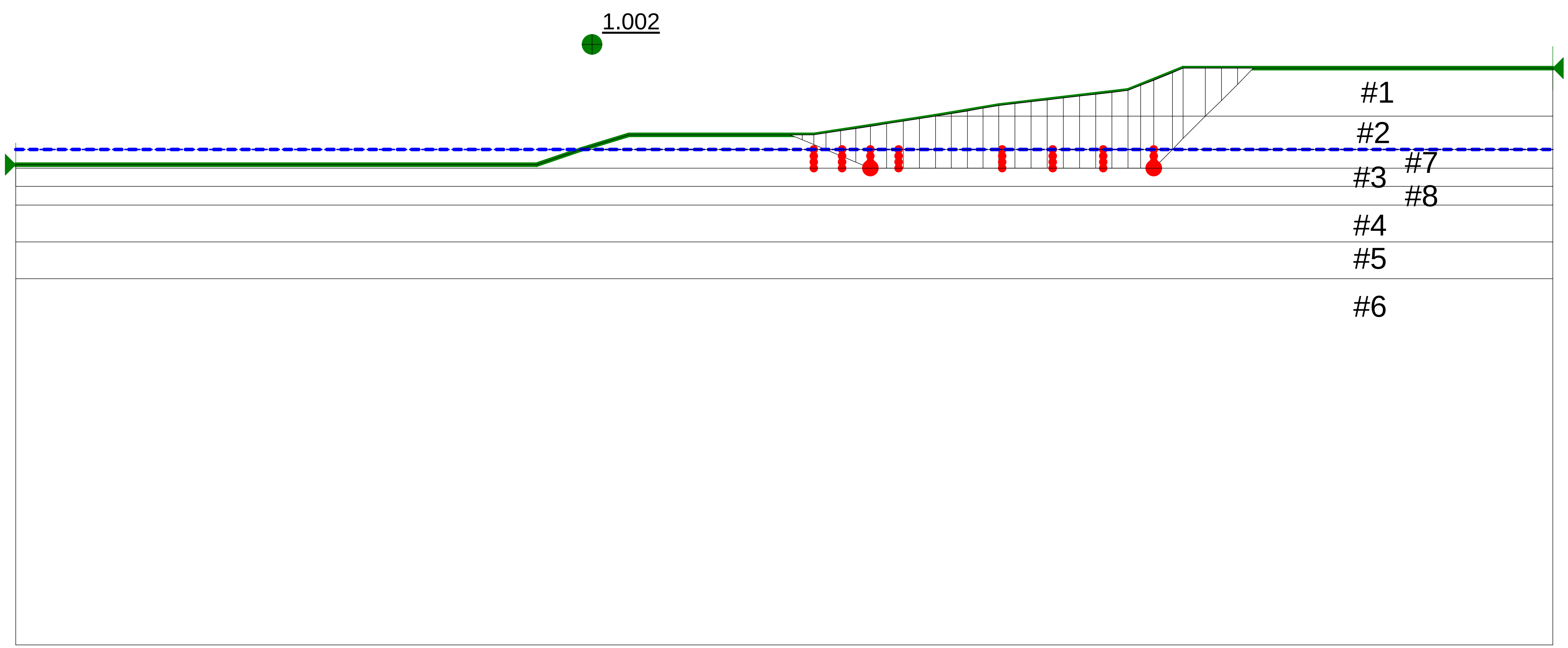
0.045	0.731
0.046	0.735
0.048	0.744
0.05	0.752
0.055	0.771
0.06	0.790
0.065	0.808
0.067	0.815
0.07	0.826
0.075	0.844
0.08	0.865
0.085	0.884
0.09	0.904
0.095	0.923
0.1	0.942
0.11	0.978
0.12	1.010
0.13	1.037
0.133	1.044
0.14	1.059
0.15	1.078
0.16	1.097
0.17	1.114
0.18	1.128
0.19	1.141
0.2	1.152
0.22	1.161
0.24	1.166
0.25	1.167
0.26	1.165
0.28	1.161
0.29	1.156
0.3	1.152
0.32	1.144
0.34	1.134

0.35	1.128
0.36	1.123
0.38	1.110
0.4	1.097
0.42	1.081
0.44	1.064
0.45	1.056
0.46	1.047
0.48	1.031
0.5	1.015
0.55	0.976
0.6	0.942
0.65	0.911
0.667	0.901
0.7	0.882
0.75	0.856
0.8	0.822
0.85	0.790
0.9	0.760
0.95	0.733
1	0.707
1.1	0.634
1.2	0.585
1.3	0.541
1.4	0.502
1.5	0.466
1.6	0.439
1.7	0.415
1.8	0.393
1.9	0.374
2	0.357
2.2	0.322
2.4	0.293
2.5	0.280
2.6	0.268

2.8	0.248
3	0.230
3.2	0.213
3.4	0.198
3.5	0.192
3.6	0.186
3.8	0.174
4	0.164
4.2	0.157
4.4	0.151
4.6	0.145
4.8	0.140
5	0.135

Appendix III: Slope Stability Analysis

SLOPE -1 (ABUT 1 - PIER 4)
Ky=0.224 g



Material #: 1
Description: FILL
Wt: 115
Cohesion: 0
Phi: 34

Material #: 2
Description: Sand 1
Wt: 115
Cohesion: 0
Phi: 34

Material #: 3
Description: Sand 2
Wt: 125
Cohesion: 0
Phi: 36

Material #: 4
Description: Sand 3
Wt: 130
Cohesion: 0
Phi: 36

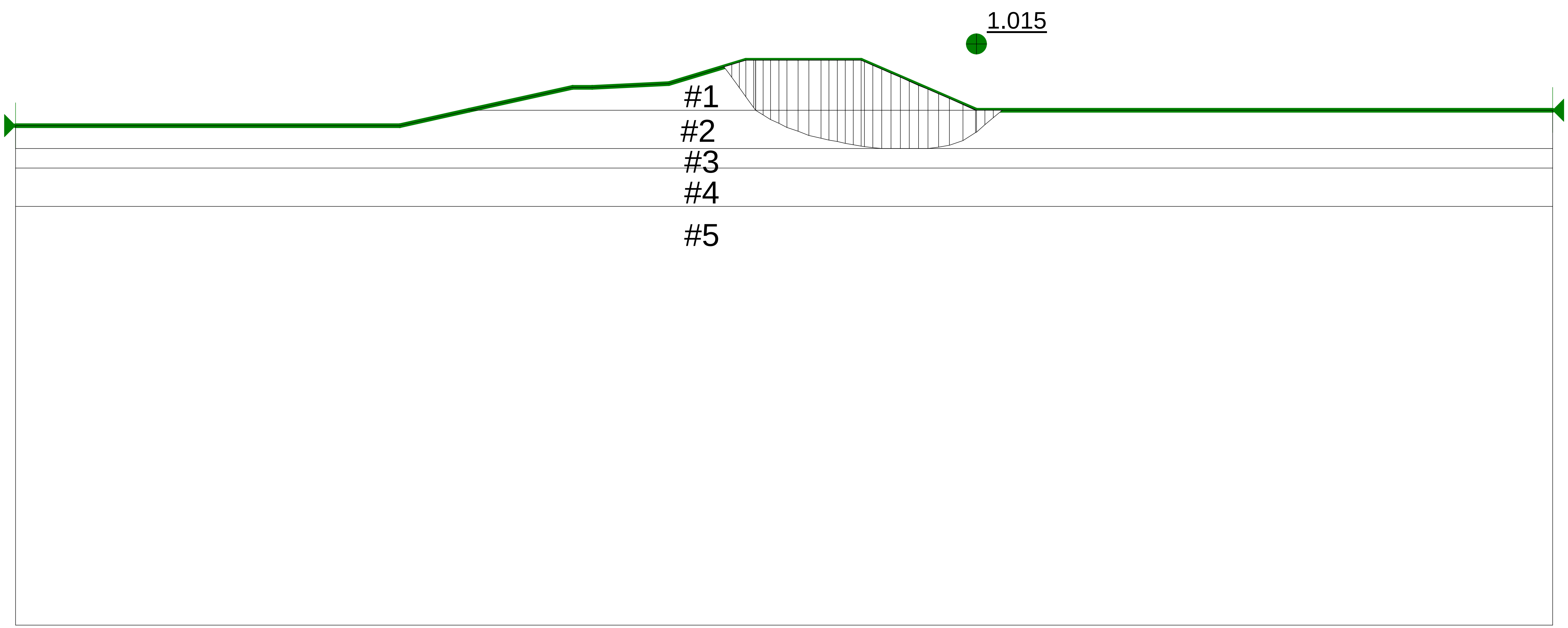
Material #: 5
Description: Sand 4
Wt: 135
Cohesion: 0
Phi: 43

Material #: 6
Description: Sand 5
Wt: 138
Cohesion: 0
Phi: 45

Material #: 7
Description: Liq Sand 1
Wt: 120
Cohesion: 520
Phi: 0

Material #: 8
Description: Liq Sand 2
Wt: 120
Cohesion: 560
Phi: 0

SLOPE -2 (Pier 7 to Pier 10)
Ky=0.253



Material #: 1
Description: FILL
Wt: 120
Cohesion: 300
Phi: 34

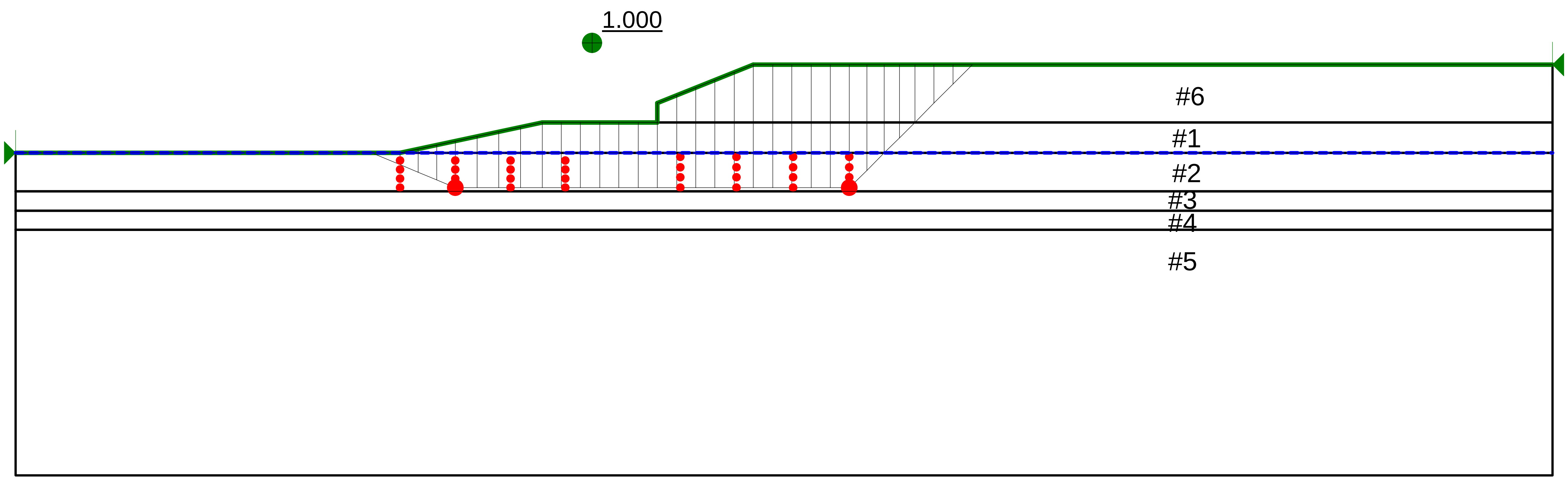
Material #: 2
Description: Liq Sand
Wt: 120
Cohesion: 550
Phi: 0

Material #: 3
Description: Sand 1
Wt: 130
Cohesion: 0
Phi: 43

Material #: 4
Description: Sand 2
Wt: 130
Cohesion: 0
Phi: 37

Material #: 5
Description: Sand 3
Wt: 138
Cohesion: 0
Phi: 45

SLOPE -3 (Pier 17 to Abut 19)
Ky=0.183



Material #: 1
Description: sand
Wt: 120
Cohesion: 200
Phi: 31

Material #: 2
Description: Liq sand
Wt: 120
Cohesion: 500
Phi: 0

Material #: 3
Description: Clay 1
Wt: 110
Cohesion: 850
Phi: 0

Material #: 4
Description: Sand
Wt: 135
Cohesion: 0
Phi: 43

Material #: 5
Description: Clay 2
Wt: 130
Cohesion: 3350
Phi: 0

Material #: 6
Description: FILL
Wt: 115
Cohesion: 850
Phi: 0

State of California
Department of Transportation
Division of Engineering Services
Office of Design and Technical Services

Structures Hydraulics and Hydrology

Structures
Final Hydraulic Report

SANTA ANA RIVER BRIDGE (WIDENING)

Located on State Route 91 in Orange County, CA

JOB:

Santa Ana River Bridge Widening
Bridge Number 55-0106
EA: 12-0C5601

LOCATION:

12-ORA-SR 91-PM 7.9/9.5

DATE:

August 3, 2012

REGISTERED CIVIL ENGINEER (SIGNATURE):

REGISTERED PROFESSIONAL ENGINEER
RICK R. MACALA
C 67475
EXP. 6/30/13
CIVIL
STATE OF CALIFORNIA

RICK R. MACALA, PE
Registration Number C67475

This report has been prepared under my direct supervision as the professional engineer in responsible charge of the work, in accordance with the provisions of the Professional Engineers Act of the State of California.

Hydrology/Hydraulic Report

GENERAL:

This Final Hydraulic Report (FHR) is a revision to and supersedes the original FHR (dated December 5, 2011) for the Santa Ana River Bridge (Bridge Number 55-0106) widening project located on State Route 91 in Orange County, CA.

It is proposed to improve highway deficiencies at State Route 91 between the State Route 55 connector to the Tustin Avenue Overcrossing from post mile 7.9 to 9.5 in the city of Anaheim, Orange County, California. The proposed project will include widening the westbound lane on State Route 91 which will result in widening the existing Santa Ana River Bridge (Br. No. 55-0106). The Santa Ana River Bridge will be widened in the upstream direction by approximately 23-feet, 9-inches and matching the existing structure type.

See Figure 1 for a site map of the project and the Santa Ana River Bridge location.

The existing structure is a continuous 18-span reinforced concrete T-beam structure with open end reinforced concrete seated abutments. The support elements are reinforced concrete pier walls on steel piles. The original left and right structures were built in 1954, both structures were widened in 1965, and in 1994 the two structures were connected with a median widening while also widening the whole structure in both the upstream and downstream edge of decks. The current bridge length is 869.5 feet and has a total width of approximately 155.5 feet.

The data and references of this hydraulic report were obtained from the following sources:

- Caltrans' Bridge Maintenance Records
- "Preliminary Hydraulic Report – Widening of Santa Ana River Bridge" from the Office of Structure Hydraulics and Hydrology, dated July 1, 2010.
- "Structures Final Hydraulic Report – Santa Ana River Bridge (Widening)" from the Office of Structure Hydraulics and Hydrology, dated December 5, 2011.
- "Structure Preliminary Geotechnical Recommendations for 91 WB from NB SR-55 Connector to Tustin Avenue OC" from the Office of Geotechnical Design South 1, dated May 4, 2010.
- 1994 As-built General Plan, Foundation Plan, Abutment and Pier Details, and Log of Test Borings for the widening project of Santa Ana River Bridge (Br. No. 55-0106).
- Design Study Plans for the proposed Santa Ana River Bridge widening from the Office of Bridge Design South, Bridge Design Branch 19, dated May 17, 2012.
- Field photo documentation dated November 2001 and April 2009.
- Historical channel cross sections for the Santa Ana River at the upstream face of the Santa Ana River Bridge (Br. No. 55-0106) dated January 1989, November 2001, and April 2009.
- Federal Emergency Management Agency (FEMA) Flood Insurance Study for Orange County, California and Incorporated Areas (Flood Insurance Study Number 06059CV001B), Volumes 1-3, dated December 2009.

- HEC-RAS Hydraulic Model for the Santa Ana River mainstem (from the Pacific Coast Highway to Weir Canyon Road) representing the existing conditions, provided by the U.S. Army Corps of Engineers.

Note: unless otherwise stated, all vertical elevations in this report are based from the National Geodetic Vertical Datum of 1929. (NGVD-29).

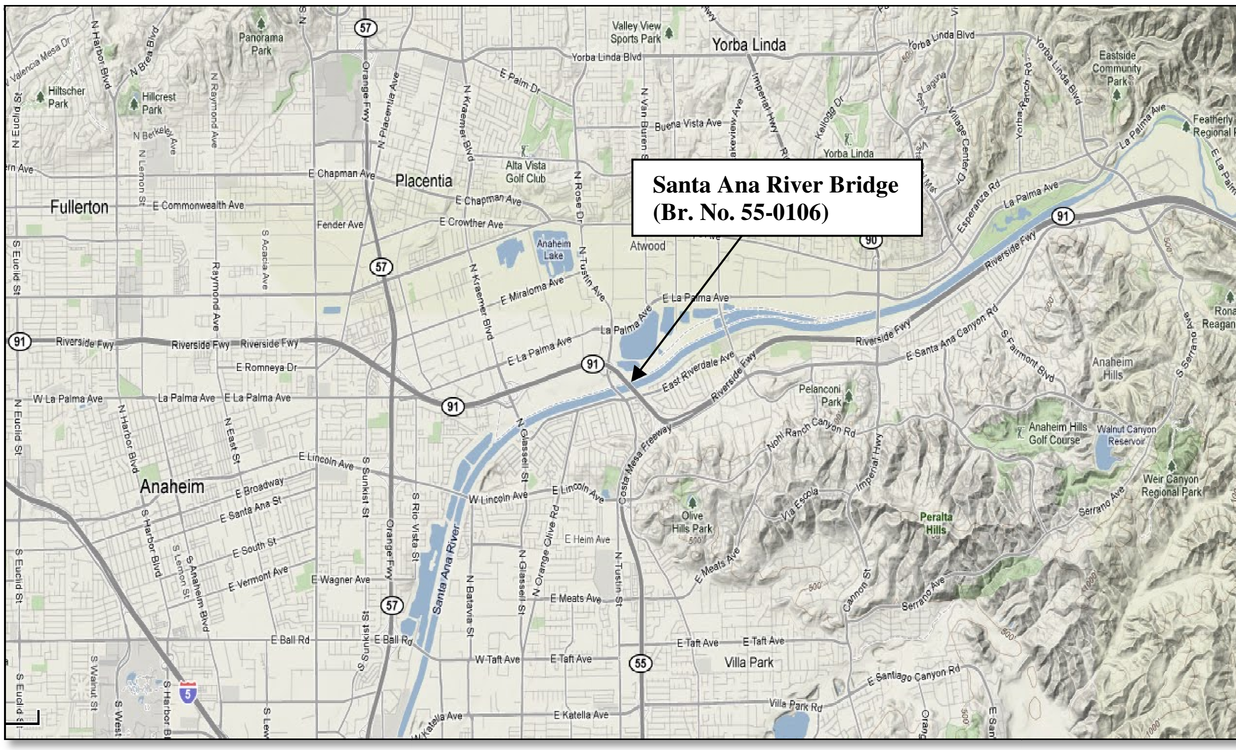


Figure 1: Site Map of Project Location.

<u>DESIGN OBJECTIVES:</u>

This FHR <u>only</u> addresses the introduced scour and hydraulic impacts of widening the existing Santa Ana River Bridge and its effects on the <u>mainstem Santa Ana River</u>.

The Santa Ana River Bridge crosses a waterway composed of two channels. The northerly channel is operated by the Orange County Water District (OCWD) and is used as a ground water recharge system. The OCWD channel is not designed to carry flood flows. The southerly channel is the mainstem of the Santa Ana River and is the focus of this FHR. The mainstem of the Santa Ana River is used for both flood flows and groundwater recharge during low flows. The two channels are separated by a levee system that runs from Imperial Highway upstream of the Santa Ana River Bridge and downstream to Ball Road in the city of Anaheim. See Figure 2 for a layout of the channels compared to the pier layout of the Santa Ana River Bridge.

To evaluate the scour and hydraulic impacts, a hydraulic model was developed using the U.S. Army Corps of Engineers' (USACE) one-dimensional river analysis software HEC-RAS (v.

4.1.0). Two specific plans were modeled to cover all aspects of the design and anticipated conditions:

1. Existing Conditions (unmodified USACE hydraulic model) Plan, and
2. Proposed Conditions (23'-9" upstream deck widening) Plan.

The USACE provided their hydraulic model of the mainstem Santa Ana River from Weir Canyon Road to the Pacific Coast Highway. This model was used as the Existing Conditions Plan and provides a baseline condition to assess the impacts of the proposed bridge widening.

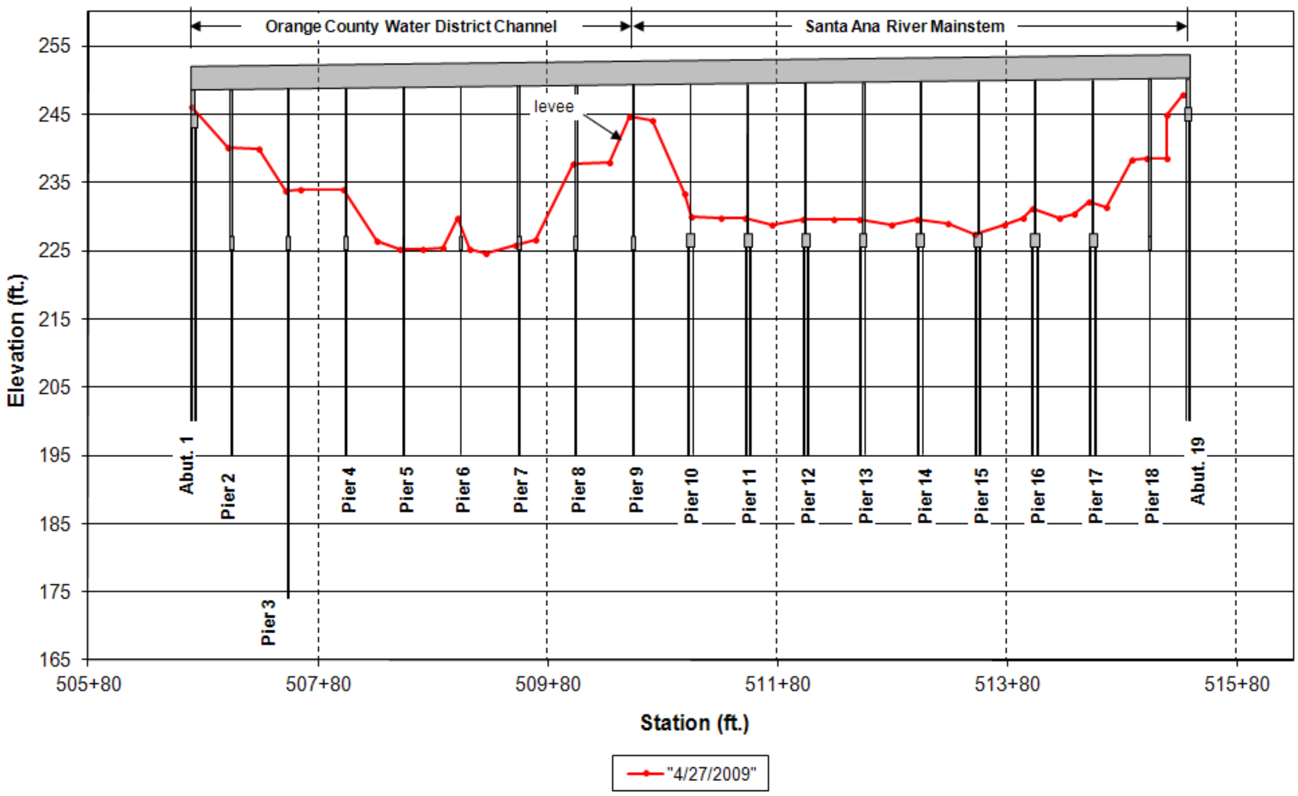


Figure 2: Channel Layout under the Santa Ana River Bridge (Br. No. 55-0106).

MODEL COMPARISONS:

As mentioned previously, the USACE provided their HEC-RAS hydraulic model for the mainstem Santa Ana River from Weir Canyon Road in Orange County, CA to the Pacific Coast Highway including the Santa Ana River Bridge at State Route 91. This HEC-RAS model represents the Existing Conditions Plan and was left unmodified so that it can be compared to the Proposed Conditions Plan to determine the impacts of the hydraulics and scour conditions on the mainstem Santa Ana River due to the bridge widening.

The Proposed Conditions Plan represents the proposed widening of the existing Santa Ana River Bridge on the westbound lane by 23-feet, 9-inches. The proposed bridge widening is on a bridge skew of 31° 0' 31" therefore the skewed widening, as the water sees it, is 27.71 feet. Compared to the Existing Conditions Plan, the proposed bridge width was widened from 180 feet to 207.71 feet. Due to the widening of the existing bridge one cross section (River Station 92710) had to be removed from the model. This cross section was only 10 feet upstream of the existing Santa Ana River Bridge's edge of deck and represents the upstream bounding cross section. Therefore, a new cross section (River Station 92737.71) was developed to represent the new upstream bounding cross section for the proposed bridge. In addition, the existing bridge was modified on the upstream edge of deck to introduce the new low chord elevations due to the bridge widening, structure depth, and the 2% cross slope.

It should also be noted that the existing model developed by the USACE has pier widths of 1.5 feet for all piers (Piers 10 through 18) on the existing Santa Ana River Bridge. However, the true pier widths for Piers 10, 11, and 14 to 17 are 1.0 feet and Piers 12, 13, and 18 are 2.0 feet. In order to properly compare the hydraulic effects of the Existing Conditions Plan to the Proposed Condition Plan, the pier widths of 1.5 feet were unchanged. On the other hand, for the total scour analysis the true pier widths of the Santa Ana River Bridge were used.

BASIN:

Santa Ana River watershed upstream of the existing structure drains a basin of approximately 2,322 square miles (mi^2); however, 97% (2,255 mi^2) of the watershed is regulated above the Prado Dam flood control structure. Prado Dam is located approximately 30.5 miles upstream from the Pacific Ocean. The Santa Ana River's headwaters begin in the rugged western slopes of the San Gabriel and San Bernardino Mountains and to a lesser extent in the San Jacinto and Santa Ana Mountains.

The Santa Ana River is quite diverse, ranging from high peaks of the San Gabriel and San Bernardino Mountains in the north and east to the hot, dry interior and semi-desert basin to the flat coastal plains of Orange County. Once the Santa Ana River leaves it's headwaters at an elevation of approximately 7,000 feet it flows in a southwesterly direction into the arid interior basin of San Bernardino and Riverside Counties where it discharges into Prado Dam. After flowing out of Prado Dam, the Santa Ana River begins its march through the rolling hills of Puente and Chino Hills then through the major urban areas of Orange County at an elevation of approximately 255 feet near the project site at State Route 91. The channel bed just upstream from the bridge site has a channel slope of approximately 0.22-percent.

The climate in the area of the Santa Ana River Bridge maintains a Mediterranean climate with warm to hot, dry summers and mild to cool, wet winters. Average annual precipitation over the watershed is approximately 20 inches. Temperatures for the area range between 47º F to 87º F with a mean annual temperature of about 66.5º F.

DISCHARGE:

According to the U.S. Army Corps of Engineers, the Santa Ana River mainstem channel near Highway 91 is designed for flood flows of approximately 38,000 cfs. This design discharge is certified by the USACE to be the 100-year flood discharge and the improvements along the lower Santa Ana River from Weir Canyon Road to the Pacific Ocean can adequately provide 100-year flood protection. The USACE 100-year flood discharge supersedes the FEMA flood insurance designation for the lower Santa Ana River. Table 1 provides a summary of the flowrate condition used in this hydraulic report.

Table 1: Design Discharge.

Flowrate Condition	Design Discharge (cfs)
100-year Flood Event	38,000

STAGE, VELOCITY, AND FREEBOARD:

The USACE 100-year flood discharge was modeled through the Santa Ana River Bridge using the Existing Conditions Plan. Table 2 summarizes the hydraulic parameters at the upstream face of the bridge at River Station 92710. Using the existing soffit elevation and the water surface elevation, the available freeboard was calculated. The existing conditions analysis provides a base comparison to the Proposed Conditions plan.

Table 2: Hydraulic Parameters for Santa Ana River Bridge under Existing Conditions.

Design Discharge (cfs)	Soffit Elevation (ft)	Water Surface Elevation (ft)	Average channel Velocity (fps)	Freeboard (ft)
38,000	249.27	243.95	8.9	5.3

Table 3 summarizes the hydraulic parameters after the upstream bridge widening (Proposed Conditions Plan) at River Station 92737.71. As can be seen from Table 3, the change in water surface elevation has increased by approximately 0.17-feet (2.04 inches). This increase is minimal and will not cause any backwater conditions that would adversely affect the channel to pass its flood discharges.

Table 3: Hydraulic Parameters for Santa Ana River Bridge under Proposed Conditions.

Design Discharge (cfs)	Soffit Elevation (ft)	Water Surface Elevation (ft)	Average Velocity (fps)	Freeboard (ft)	Δ Water Surface Elevation (ft)	Δ Average Channel Velocity (fps)
38,000	248.82	244.12	8.9	4.7	+0.17	0.0

Table 4 provides a summary of changes in water surface elevations comparing the existing and proposed conditions. The flood water elevations due to the proposed bridge widening returned to existing conditions approximately 4,500 feet upstream of the proposed bridge's upstream edge of deck.

Table 4 also provides the available freeboard from the left and right bank levee elevations to the proposed water surface elevation of the bridge widening.

Table 4: Flood Water Elevation Changes and Available Freeboard due to the Proposed Bridge Widening.

River Station[1] (ft)	**Existing Water Surface Elevation (ft)**	**Proposed Water Surface Elevation (ft)**	**Δ Water Surface Elevation (ft)**	**Left Bank Levee Elevation (ft)**	**Right Bank Levee Elevation (ft)**	**Available Freeboard from Top of Levee[2] (ft)**
97376.8	251.97	251.97	0.00	258.27	259.27	6.30 / 7.30
97200	251.59	251.59	0.00	257.50	259.00	5.91 / 7.41
96800	250.74	250.75	+0.01	256.79	257.86	6.04 / 7.11
96400	249.89	249.91	+0.02	256.07	256.71	6.16 / 6.80
96000	249.07	249.09	+0.02	255.36	255.57	6.27 / 6.48
95600	248.28	248.31	+0.03	254.25	254.25	5.94 / 5.94
95200	247.54	247.58	+0.04	252.75	252.75	5.17 / 5.17
94800	246.85	246.90	+0.05	251.33	251.33	4.43 / 4.43
94400	246.21	246.28	+0.07	250.00	250.00	3.72 / 3.72
94000	245.61	245.69	+0.08	249.00	249.00	3.31 / 3.31
93600	245.06	245.16	+0.10	248.00	248.00	2.84 / 2.84
93200	244.57	244.68	+0.11	247.00	247.00	2.32 / 2.32
93000	244.34	244.46	+0.12	246.50	246.50	2.04 / 2.04
92855	244.13	244.26	+0.13	246.45	246.45	2.19 / 2.19
92737.71	--	244.12	--	246.46	246.46	2.34 / 2.34
92710	243.95	--	--	246.40	246.40	2.45 / 2.45
92628 Inside Bridge U/S	243.37	243.56	+0.19	246.46	246.46	2.90 / 2.90
92628 Inside Bridge D/S	241.59	241.59	0.00	245.10	245.10	3.51 / 3.51
92530	241.72	241.72	0.00	245.10	245.10	3.38 / 3.38
92415	241.51	241.51	0.00	244.85	244.85	3.34 / 3.34

Notes:
1 – River Station 92737.71 is the new upstream bounding cross section for the proposed bridge widening and River Station 92710 is the existing cross section that was replaced due to the widening.
2 – Left value is the available freeboard for the left bank levee and right value is the available freeboard for right bank levee. Freeboard is calculated from levee bank elevation to the calculated proposed water surface elevation.

STREAMBED AND CHANNEL SLOPES:

Subsurface conditions at the bridge site are based on the As-Built Log of Test Borings and the Preliminary Geotechnical Report. The project location is underlain by alluvium derived from the surrounding mountains. The Santa Ana River Bridge's foundations lie on slightly compact, very fine to fine sand with some uncohesive silt layers in the upper layers and a compact to dense, fine to coarse clean sand below the bottom of footings. This report assumes there is nothing unique about the soils supporting this structure that would prevent scour from reaching the predicted depths.

DRIFT:

Field observations and photographic logs collected by Caltrans' Structure Maintenance and Investigations show the river channel clear of any type of vegetation. The channel side slopes near the project location is composed of loose and grouted rip rap. Bridge maintenance records do not indicate any history of drift problems at the bridge site.

The Office of Structure Hydraulics does not expect to have any drift problems for any given flow condition.

SCOUR AND CHANNEL DEGRADATION:

A total scour analysis was calculated for the proposed conditions applying the USACE 100-year flood discharge and in accordance to the guidelines by the Federal Highway Administration's Hydraulic Engineering Circular Number 18 (HEC-18) – Evaluating Scour at Bridges, 4th Edition. HEC-18 defines total scour as a summation of three components: (1) long-term degradation of the river bed, (2) general scour at the bridge, and (3) local scour at the piers and abutments. Table 5 provides a summary of the potential total scour depths for the proposed bridge widening.

Long-Term Degradation:

The long-term stream degradation at the proposed bridge was calculated using a 75-year (assumed design life of the structure) projected degradation trend using historical channel cross sections at the upstream face of the existing bridge. The resulting long-term degradation, as shown in Table 5, is 1.5 feet.

General Scour:

General scour is a lowering of the streambed across the stream or waterway at the bridge. The most common form of general scour is contraction scour. Contraction scour occurs when the flow area of a stream at flood stage is reduced, either by a natural contraction of the stream channel or by a bridge structure. At the project location, the channel is on a straight stream section and the abutments are placed outside of the stream's overbanks not affecting the flow area of the upstream channel. Therefore, no general scour is expected to occur and will not be analyzed.

Local Scour:

Local scour involves the removal of bed material around piers, abutments, and embankments. It is caused by an acceleration of flow and resulting vortices induced by obstructions to the flow. Local abutment scour for Abutment 19 (adjacent to the existing bicycle trail) was not analyzed because the 100-year flood water surface elevation in the channel was not high enough to cause scour.

Upstream channel velocities and flow depths from the HEC-RAS Proposed Conditions Plan were utilized to evaluate local scour at each pier. Table 5 provides a summary of the local pier scour depth and the mean upstream velocities used in the analysis.

The approximate final grade elevations were obtained from field surveys provided by Caltrans' District 12 survey crew. A total scour elevation was determined using these final grade elevations and the calculated total scour depths. It should be noted that Piers 12 and 13 have total scour elevations approximately 1.39 feet below the bottom of pile cap elevation of 225.5 feet.

Table 5: Total Scour Conditions for the Proposed Bridge Widening.

Pier Location	Approx. Final Grade Elevation[1] (ft)	Local Pier Scour Depth (ft)	Mean Upstream Velocity (ft/s)	Long Term Degradation (ft)	Total Scour Depth (ft)	Total Scour Elevation[2] (ft)
Pier 10	231.61	1.7	2.12	1.5	3.2	228.41
Pier 11	231.61	3.8	9.16	1.5	5.3	226.31
Pier 12	231.61	6.0	9.16	1.5	7.5	224.11
Pier 13	231.61	6.0	9.16	1.5	7.5	224.11
Pier 14	231.61	3.8	9.16	1.5	5.3	226.31
Pier 15	231.61	3.8	9.16	1.5	5.3	226.31
Pier 16	231.61	3.8	9.16	1.5	5.3	226.31
Pier 17	231.61	3.8	9.16	1.5	5.3	226.31
Pier 18	239.61	--[3]	4.78	--[3]	--[3]	--

Notes:
1 – Final grade elevations were estimated from field surveys provided by Caltrans' District 12 survey crew and are considered approximate.
2 – Bottom of pile cap elevation is 225.5-feet for Piers 10 through 17.
3 – Scour and degradation for Pier 18 were not analyzed due to asphalt pavement surrounding this pier.

REQUIRED WATERWAY:

Through hydraulic modeling it has been determined that Santa Ana River Bridge's proposed widening is able to pass all flowrate conditions without soffit impact. The proposed bridge widening will have no significant impacts to the existing waterway at or near the bridge.

CONCLUSIONS / RECOMMENDATIONS:

- The proposed bridge widening of Santa Ana River Bridge was analyzed and determined not to cause any significant hydraulic or scour issues.
- The proposed bridge widening will raise the water surface elevation at the upstream edge of deck by approximately 0.17 feet.
- The soffit elevation of the proposed widening is approximately 248.8 feet.
- Predicted total scour depths were calculated to be 3.2 feet for Pier 10, 5.3 feet for Piers 11 and 14 to 17, and 7.5 feet for Piers 12 and 13.

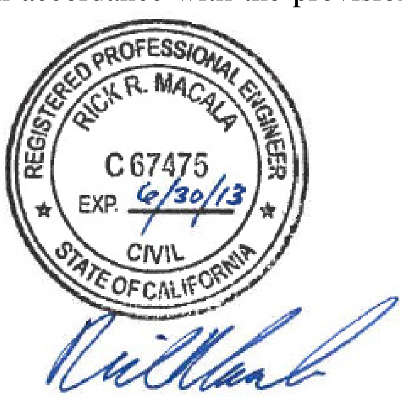
Summary Information for the Bridge Designer

All vertical elevations on this sheet are based on the NGVD-1929 vertical datum.

Minimum Soffit Elevation	248.8 ft
Anticipated Total Scour Depths for: Pier 10 Piers 11 and 14 to 17 Piers 12 and 13	 3.2 ft 5.3 ft 7.5 ft
Average Velocity (for 100-Yr Flood Event)	8.9 fps

HYDROLOGIC SUMMARY			
Drainage Area: 2,322 square miles			
	Design Flood	**Base Flood**	**Overtopping Flood**
Flood Frequency	50-Year	100-Year	>> 500-yr
Discharge	-	38,000 cfs	-
Water Surface Elevation at Bridge	-	244.1 ft	-
Flood plain data are based upon information available when the plans were prepared and are shown to meet federal requirements. The accuracy of said information is not warranted by the State and interested or affected parties should make their own investigation.			

This report has been prepared under my direction as the professional engineer in responsible charge of the work, in accordance with the provisions of the Professional Engineers Act of the State of California.



REGISTERED CIVIL ENGINEER (SIGNATURE)

REGISTRATION NUMBER: C67475 DATE: August 3, 2012

Memo C-19: Longer T-Beam Falsework Span

To prevent overstressing of concrete and reinforcing steel in the girder stems of T-beam girder bridges, the current specifications limit the length of falsework spans to 14 feet plus 8.5 times the depth of the T-beam girder. "Depth of the T-beam girder" is a distance between the top of the deck and the girder soffit.

Occasionally contractors request to use a longer falsework span than allowed by the Standard Specifications. The contractor may request to exceed the specification falsework span length provided the deflection due to concrete loading in the longer span is the same as the maximum deflection for the specification falsework span length. For T-beams with varying depth (haunch) girders use minimum depth for calculating falsework span, 14+ 8.5 D. If the requested falsework span is longer than allowed by the Standard Specifications, the contractor's request may be implemented if approved by Contract Change Order.

To fulfill this requirement, falsework stringer will require a moment of inertia greater than that required for the specification falsework span length.

The following analysis can be used to determine the required moment of inertia for the longer span:

Given:

l_1=14 +8.5D (feet) max per specification.
l_2 = Proposed falsework span in feet.
w = Uniform load on falsework stringer.
D = Depth of Tee beam (in feet).
I_1 = Required moment of inertia (in^4) to meet the deflection for falsework span length of 14 +8.5D.
Δ_1= Deflection *"$l_1/240$"*.
Δ_2= Deflection of the proposed span, limited to not greater than Δ_1.

Find:

I_2 = Required moment of inertia for the proposed "l_2" falsework span.

Solution:

$$\Delta_1 = \Delta_2$$

$$\frac{5wl_1^4}{384EI_1} = \frac{5wl_2^4}{384EI_2}$$

$$I_2 = I_1(l_2^4/l_1^4)$$

April 30, 2012
Project No. 208449003

Mr. David Yaghoubi
State of California Department of Transportation
District 12, Environmental Engineering
3347 Michelson Drive, Suite 100
Irvine, California 92612-8894

Subject: Aerially Deposited Lead Site Investigation
NB SR-55/WB SR 91 Connector
Anaheim, California
Task Order No. 12-0C5601-03
EA No. 0C5601-3
Contract No. 12A1340

Dear Mr. Yaghoubi:

In accordance with the State of California Department of Transportation Contract No. 12A1340, Task Order No. 12-0C5601-03, Ninyo & Moore has conducted an aerially deposited lead investigation at the northbound State Route 55 and the westbound State Route 91 connector in the city of Anaheim, California.

The following report documents our methodologies, findings, conclusions, and recommendations.

We appreciate the opportunity to be of service to you on this project.

Sincerely,
NINYO & MOORE

Pedro Rodriguez-Mendez
Staff Scientist

Michael Cushner, CAC
Project Environmental Scientist

PROFESSIONAL GEOLOGIST
WALTER R. CRONE
NO. 4350
EXP. 09/13
STATE OF CALIFORNIA

Walter R. Crone, PG, REA
Principal Environmental Geologist

PRM/MSC/NA/WRC/sc

Distribution: (8) Addressee (5 bound copies, 1 unbound copy, 1 CD; 1 via e-mail)

AERIALLY DEPOSITED LEAD SITE INVESTIGATION
NB SR-55/WB SR 91 CONNECTOR
ANAHEIM, CALIFORNIA
TASK ORDER NO. 12-0C5601-03
EA NO. 0C5601-3, CONTRACT NO. 12A1340

PREPARED FOR:

State of California
Department of Transportation
District 12, Environmental Engineering
3347 Michelson Drive, Suite 100
Irvine, California 92612-8894

PREPARED BY:

Ninyo & Moore
Geotechnical and Environmental Sciences Consultants
475 Goddard, Suite 200
Irvine, California 92618

April 30, 2012
Project No. 208449003

AERIALLY DEPOSITED LEAD INVESTIGATION REPORT
Task Order No. 12-0C5601-03
E.A. 0C5601-3

This report was prepared by the staff of Ninyo & Moore Geotechnical and Environmental Sciences Consultants under the supervision of the Engineer and/or Geologist whose signature appears hereon.

The findings, recommendations, specifications, or professional opinions are presented within the limits described by the client, after being prepared in accordance with generally accepted professional engineering and geologic practice. No warranty is expressed or implied.

Walter R. Crone

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EXECUTIVE SUMMARY

The State of California Department of Transportation (Department) authorized Ninyo & Moore to conduct an aerially deposited lead (ADL) site investigation at the northbound (NB) State Route 55 (SR-55) to westbound (WB) State Route 91 (SR-91) connector in the city of Anaheim, California (Figure 1).Work was conducted in general accordance with the Department Contract No. 12A1340, Task Order No. 12-0C5601-03, dated February 14, 2012.

It is our understanding that the Department is proposing to construct an exit bypass lane on WB SR-91 from west of Tustin Ave to east of the NB SR-55/WB SR-91 connector. The project will also include reconstruction of the WB auxiliary lane from NB SR-55/WB SR-91 connector to the Tustin off-ramp (Figure 1). This investigation was performed to evaluate the presence of lead in soil resulting from the combustion of leaded fuel from nearby traffic. Data collected during this investigation were used to develop recommendations for the potential reuse or disposal of soil excavated from the site and to inform the Department of potential health and safety issues concerning the presence of lead in soil for workers at the site during construction activities.

Ninyo & Moore collected 79 soil samples from 20 borings at the site (B1 through B20). Eighteen of the 79 samples contained total lead concentrations greater than or equal to 50 milligrams per kilogram and were subsequently analyzed for soluble lead in accordance with the Waste Extraction Test (WET) using citric acid as the extractant. Eleven of those 18 sample results were greater than the Soluble Threshold Limit Concentration for California hazardous waste (Title 22 California Code of Regulations [CCR] Section 66261.24) of 5.0 milligrams per liter (mg/l) and were subsequently analyzed for soluble lead by the WET using deionized water as the extractant (WET-DI) and in accordance with the Toxicity Characteristic Leaching Procedure (TCLP). The results of the soluble lead by WET-DI were below 1.5 mg/l and the TCLP results were below 5.0 mg/l (below the threshold for federal hazardous waste under Resource Conservation and Recovery Act [Title 40 Code of Federal Regulations {CFR} 261-24]). Eight samples were analyzed for pH. The pH levels ranged from 8.2 to 9.1.

Our recommendations for soil reuse on site are based on the guidelines set forth by the Department of Toxic Substances Control (DTSC) Lead Variance issued to the Department on June 30, 2009 (DTSC Variance). Laboratory analytical results for lead were compared to the guidelines of the DTSC Variance for potential reuse of the soil as fill within the Department right-of-way.

Our recommendations for off-site disposal were based on the comparison of lead concentrations in soil samples to the California Health and Safety Code thresholds and Title 40 CFR 261.24 thresholds.

Based on the analytical results, the site was divided into two groups. Group 1 includes borings B1 through B5 (from approximate station numbers 549+00 [SR-55] to 534+00 [SR-55]) and Group 2 includes borings B6 through B20 (from approximate station numbers 534+00 [SR-55] to 484+00 [SR-91]). The on-site reuse and the off-site disposal recommendations for the two groups are summarized below.

Group 1 – Recommendations for Soil for Reuse by the Department

All scenarios: The soil in all layer combinations (surface to 4 feet below ground surface [bgs]) is suitable for on-site reuse by the Department with no restrictions based on total and soluble lead concentrations (Type X).

Group 1 – Recommendations for Soil to be Disposed Off Site

All scenarios: The soil in all layer combinations (surface to 4 feet bgs) is classified as non-hazardous and may be disposed off site with no restrictions based on total and soluble lead concentrations (Type X).

Group 2 – Recommendations for Soil for Reuse by the Department

Soil at the site can be reused on site with the following restrictions:

- Scenario A: The soil in the surface layer (surface to 0.5 feet bgs) (Type Y1) may be reused on site if it is placed a minimum of 5 feet above the maximum water table elevation and covered with at least 1 foot of non-hazardous soil. The remaining soil from the 1.5- to 4-foot layers combined (0.5 to 4 feet bgs) is suitable for on-site reuse by the Department with no restrictions based on total and soluble lead concentrations (Type X).

- Scenario B: The soil in the surface and 1.5-foot layers combined (surface to 1.5 feet bgs) (Type Y1) may be reused on site if it is placed a minimum of 5 feet above the maximum water table elevation and covered with at least 1 foot of non-hazardous soil. The remaining soil from the 3- and 4-foot layers combined (1.5 to 4 feet bgs) is suitable for on-site reuse by the Department with no restrictions based on total and soluble lead concentrations (Type X).

- Scenario C: The soil in the surface to 3-foot layers combined (surface to 3 feet bgs) (Type Y1) may be reused on site if it is placed a minimum of 5 feet above the maximum water table elevation and covered with at least 1 foot of non-hazardous soil. The remaining soil from the 4-foot layer (3 to 4 feet bgs) has no restrictions based on total and soluble lead concentrations (Type X).

- Scenario D: The soil in the layers combined (surface to 4 feet bgs) (Type Y1) may be reused on site if it is placed a minimum of 5 feet above the maximum water table elevation and covered with at least 1 foot of non-hazardous soil.

Group 2 – Recommendations for Soil to be Disposed Off Site

If the Department elects to dispose the soil off site, the following restrictions apply:

- Scenario A: The soil in the surface layer (surface to 0.5 feet bgs) is classified as California hazardous and should be disposed at a Class 1 disposal site in accordance with Title 22 CCR requirements (Type Z2). The remaining soil from the 1.5- to 4-foot layers combined (0.5 to 4 feet bgs) is classified as non-hazardous and may be disposed off site with no restrictions based on total and soluble lead concentrations (Type X).

- Scenario B: The soil in the surface and 1.5-foot layer combined (surface to 1.5 feet bgs) is classified as California hazardous and should be disposed at a Class 1 disposal site in accordance with Title 22 CCR requirements (Type Z2). The remaining soil from the 3- and 4-foot layers combined (1.5 to 4 feet bgs) is classified as non-hazardous and may be disposed off site with no restrictions based on total and soluble lead concentrations (Type X).

- Scenario C: The soil in the surface to 3-foot layers combined (surface to 3 feet bgs) and in the 4-foot layer (3 to 4 feet bgs) is classified as California hazardous and should be disposed at a Class 1 disposal site in accordance with Title 22 CCR requirements (Type Z2).

- Scenario D: The soil in the layers combined (surface to 4 feet bgs) is classified as California hazardous and should be disposed at a Class 1 disposal site in accordance with Title 22 CCR requirements (Type Z2).

The Department should notify the contractors performing the construction activities that elevated concentrations of lead are present in on-site soil. Appropriate health and safety measures should be taken to minimize the potential exposure to lead.

1. INTRODUCTION

The State of California Department of Transportation (Department) authorized Ninyo & Moore to conduct an aerially deposited lead (ADL) site investigation at the northbound (NB) State Route 55 (SR-55) to westbound (WB) State Route 91 (SR-91) connector in the city of Anaheim, California (Figure 1). Work was conducted in general accordance with the Department Contract No. 12A1340, Task Order No. 12-0C5601-03 (TO 03), dated February 14, 2012.

1.1. Project Description and Objective

It is our understanding that the Department is proposing to construct an exit bypass lane on WB SR-91 from west of Tustin Ave to east of the NB SR-55/WB SR-91 connector. The project will also include reconstruction of the WB auxiliary lane from NB SR-55/WB SR-91 connector to the Tustin off-ramp (Figure 1). This report has been prepared by Ninyo & Moore to document the results of a study to evaluate the presence of ADL along the unpaved shoulder area of the site. Twenty borings were hand augered at the site for this task order.

1.2. Scope of Work

Ninyo & Moore performed the tasks described in the following sections.

1.2.1. Pre-Field Activities

Pre-field activities included:

- Preparing a site specific health and safety plan (HSP).
- Marking boring locations at the sites.
- Notifying Underground Service Alert (USA) that Ninyo & Moore would be advancing soil borings in the area (USA ticket number A20671224).
- Preparing a project schedule and coordinating work with subcontractors.

1.2.2. Soil Sampling

Soil sampling was conducted on March 13, 2012. Twenty sampling locations (B1 through B20) were chosen, as shown on Figure 2. One boring at each sampling location was advanced and sampled using a hand auger. Four soil samples were attempted for collection from depths of surface to ½, 1½ to 2, 2 ½ to 3, and 3 ½ to 4 feet below ground surface (bgs) at each boring location.

1.2.3. Laboratory Analysis

Ninyo & Moore submitted the soil samples under chain-of-custody (COC) protocol to Pat-Chem Laboratories of Moorpark, California; a laboratory certified by the State of California Department of Health Services Environmental Laboratory Accreditation Program.

1.2.4. Global Positioning System Surveying

Approximate latitude and longitude (North American Datum 83) of sampling locations were recorded with a handheld GPS unit (GeoXT, Trimble). The latitude and longitude data for each boring are presented on Table 1.

1.2.5. Report Preparation

This report was prepared in general accordance with Department Contract No. 12A1340 and TO 03 dated February 14, 2012.

1.3. Previous Site Investigations

Ninyo & Moore has not performed previous investigations at this site. In addition, the Department has not notified Ninyo & Moore of previous investigations performed at the site.

2. BACKGROUND

The Department obtained a variance (V09 HQSCD006) from the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), on June 30, 2009 (DTSC Variance). The DTSC Variance allows for conditional reuse of lead-impacted soil within the Department right-of-way (ROW). Background information regarding the source of ADL and the reuse or disposal of lead-impacted soil is discussed in the following sections.

2.1. Aerially Deposited Lead in Soil

Analyses for lead in soil along highways throughout the state of California have revealed that lead is commonly present along the shoulders of the highways as a result of automobile exhaust containing lead from the combustion of leaded gasoline. Elevated concentrations of lead are commonly found in the upper 2 feet of soil. Lead concentrations in soil are dependent on many variables; but in general, are a function of the age of the highway and the volume of traffic using the highway.

2.2. Hazardous Waste Classification Criteria

Soil that exceeds the following limitations may be classified as hazardous waste with respect to lead concentrations:

- The soil contains more than 1,000 milligrams per kilogram (mg/kg) total lead, exceeding the Total Threshold Limit Concentration (TTLC) for California hazardous waste (Title 22 California Code of Regulations [CCR], Section 66261.24);

- The soil contains more than 5.0 milligrams per liter (mg/l) citric acid-extractable lead, exceeding the Soluble Threshold Limit Concentration (STLC) for California hazardous waste (Title 22 CCR, Section 66261.24);

- The soil contains more than 5.0 mg/l leachable lead using the Toxicity Characteristic Leaching Procedure (TCLP), exceeding the maximum concentration for the toxicity characteristic of the Resource Conservation and Recovery Act (RCRA; Title 40 Code of Federal Regulations [CFR] 261.24); or

- The soil pH is less than or equal to 2.0 or greater than or equal to 12.5, which exceeds the limits for the corrosivity characteristic of RCRA hazardous waste (40 CFR 261.22) and California hazardous waste (Title 22 CCR, Section 66261.22).

2.3. DTSC Variance

In accordance with the DTSC Variance, soil that is subject to the guidelines presented below may be reused within the Department ROW. A chart presenting the different ADL soil type classifications is included in Appendix A.

2.3.1. Reuse – Condition 1

Soil containing less than 1.5 mg/l extractable lead by the Waste Extraction Test (WET) using de-ionized water as the extractant (WET-DI) and less than or equal to 1,411 mg/kg total lead (United States Environmental Protection Agency [EPA] Method 6010B) may be used as fill in the Department ROW provided the soil is placed a minimum of 5 feet above the maximum level of the water table and covered with at least 1 foot of non-hazardous soil.

2.3.2. Reuse – Condition 2

Soil containing greater than or equal to 1.5 mg/l, but less than 150 mg/l, extractable lead by WET-DI method, or more than 1,411 mg/kg total lead but less than 3,397 mg/kg total lead, may be used as fill in the Department ROW provided the soil is placed a minimum of 5 feet above the maximum level of the water table and protected from infiltration by a paved structure that will be maintained by the Department.

2.3.3. Reuse – Condition 3

Lead-contaminated soil with a pH less than 5.5 but greater than 5.0 shall only be used as fill material under the paved portion of the roadway. Lead-contaminated soil with a pH at or less than 5.0 shall be managed as a hazardous waste.

2.4. Criteria for Disposal of Soil Not Intended for Reuse On Site

If the Department elects to dispose soil within the Department ROW that has been excavated during construction activities, the soil may be classified either as hazardous waste or non-hazardous waste. The distinction is based on the total and soluble lead concentrations compared to the TTLC and STLC criteria. As mentioned in Section 2.2, the TTLC for total lead is 1,000 mg/kg and the STLC for citric acid extractable lead is 5.0 mg/l. Waste containing lead concentrations in excess of or equal to those listed must be disposed at a Class I hazardous waste disposal facility pursuant to State of California regulations.

3. INVESTIGATION METHODS

The investigation activities are described in the following subsections and were conducted in general accordance with the TO that was approved by the Department prior to beginning the field activities.

3.1. Health and Safety Plan (HSP)

A site-specific HSP dated February 28, 2012, was prepared by Ninyo & Moore and submitted to the Department for approval prior to commencing field work.

3.2. Utility Clearance

The boring locations were described to USA during the notification at least 2 working days prior to conducting the soil sampling. USA marked the member utilities known to be in the vicinity of the boring locations.

3.3. Hand-Auger Sampling

The field work was conducted on March 13, 2012. The boring locations were approved by the Department Task Order Manager and are shown on the attached Figures 2 through 8. Four samples were attempted for collection from each of the five boreholes at depths of ½, 1½ to 2, 2 ½ to 3, and 3 ½ to 4 feet bgs unless refusal was encountered. The depths reached for each boring are presented on Table 1.

Samples were placed into new, 4-ounce, glass jars; capped with Teflon-coated plastic lids; labeled; placed in a resealable plastic bag; and stored in a cooler. The sampling equipment was decontaminated between each boring. Soil samples were transferred under COC protocol to Pat-Chem Laboratories within 24 hours of collection. In accordance with the TO, soil sample homogenization was performed in the laboratory.

Hand augering was conducted by Ninyo & Moore personnel.

3.4. Investigation-Derived Wastes

Soil cuttings generated by hand-auger drilling were returned to their corresponding boreholes after collection of soil samples. Decontamination water was transported to Ninyo & Moore's Irvine office and placed in a drum pending chemical characterization. Based on the analytical result of the decontamination water sample, the decontamination water was subsequently disposed in the sanitary sewer.

3.5. Laboratory Analyses

Once the samples were received by Pat-Chem Laboratories the samples were homogenized and analyzed for the following:

- Seventy-nine soil samples were analyzed for total lead using EPA Method 6010B;
- Eighteen soil samples were analyzed for soluble lead by the WET using a citric acid extraction (WET-citric);
- Eleven soil samples was analyzed for soluble lead by the WET-DI and soluble lead by TCLP;
- Eight soil samples were analyzed for pH using EPA Method 9045;
- One decontamination water sample was analyzed for total lead using EPA Method 6010B.

4. ANALYTICAL RESULTS

The results of this investigation are described in the following subsections. The analytical results of lead and pH are summarized in Table 1, and the sampling locations with their corresponding data are shown on Figures 3 through 8. Laboratory reports and COC records are included in Appendix B.

4.1. Total Lead

Seventy-nine soil samples were analyzed for total lead. The maximum total lead concentration was 1,100 mg/kg. The minimum total lead concentration was less than the laboratory practical quantitation limit of 1.0 mg/kg (Table 1).

The decontamination water sample contained 0.54 mg/l of lead.

4.2. Soluble Lead – Citric Acid

Eighteen of the 80 samples contained total lead at a concentration of greater than or equal to 50 mg/kg and were subsequently analyzed for soluble lead by WET-citric. The maximum soluble lead concentration was 71 mg/l. The minimum soluble lead concentration was 0.31 mg/l (Table 1).

4.3. Soluble Lead – Deionized Water

Eleven of the samples analyzed using the WET-citric contained soluble lead at a concentration greater than or equal to 5.0 mg/l and were subsequently analyzed for soluble lead using the WET-DI. The maximum soluble lead concentration using the WET-DI was 0.48 mg/l. The minimum soluble lead concentration using the WET-DI was the laboratory practical quantization limit of 0.20 mg/l.

4.4. Soluble Lead – TCLP

Eleven of the samples analyzed using the WET-citric contained soluble lead at a concentration greater than or equal to 5.0 mg/l and were subsequently analyzed for soluble lead by the TCLP. The maximum soluble lead concentration using the TCLP was 1.2 mg/l. The minimum soluble lead concentration using the TCLP was 0.08 mg/l.

4.5. pH

Eight of the samples collected were analyzed for pH. The maximum pH level was 9.1 and the minimum pH level was 8.2.

5. STATISTICAL EVALUATION

The following subsections describe the statistical methods used to evaluate the lead data set for the site.

Based on the analytical results, the site was divided into two groups. Group 1 includes borings B1 through B5 (from approximate station numbers 549+00 [SR-55] to 534+00 [SR-55]) and Group 2 includes borings B6 through B20 (from approximate station numbers 534+00 [SR-55] to 484+00 [SR-91]).

In order to evaluate four of the possible soil excavation depth scenarios, the following depth combinations were evaluated:

- **Scenario A –** surface soil (0 to ½ foot) and underlying subsurface soil (½ foot to 4 feet bgs)
- **Scenario B –** the upper 1½ feet (0 to 1½ feet) and the underlying subsurface soil (1½ to 4 feet)

- **Scenario C** – the upper 3 feet (0 to 3 feet) and the underlying subsurface soil (3 to 4 feet)
- **Scenario D** – the entire 4-foot soil column

5.1. Statistical Evaluation Methods

The analytical results were evaluated statistically to recommend the appropriate method of on-site reuse or off-site disposal of excavated soil. Prior to performing statistical calculations, concentrations below the laboratory reporting limit were assigned values equal to half the reporting limit. Statistical methods were applied to the data set to evaluate:

- The total lead data population distribution;
- The one-sided upper confidence limits (UCLs) of the means of the total lead concentrations; and
- If there is an acceptable correlation between total and soluble lead concentrations that would allow prediction of soluble lead concentrations based on calculated UCLs.

5.2. Population Distribution

A test for population distribution is necessary in order to apply the appropriate evaluation methods when estimating the UCLs on the total lead means. When evaluating the distribution of total lead concentrations, total lead data are treated as one data set. Distribution was evaluated in accordance with EPA SW-846, Chapter Nine (1986) by comparing the mean to the variance of the total lead data sets. If the mean is greater than the variance, the data set is normally distributed and no transformation is performed. If the mean is less than the variance, the data set is transformed using an arcsine conversion. If the mean is approximately equal to the variance, the data set is transformed using a square-root conversion. A histogram of the data is presented in Appendix D.

5.3. Upper Confidence Limits

The UCLs are used to address the uncertainty associated with estimating the true mean concentration of a population. As more data become available for a given site, the uncertainty of the estimate of a true statistical mean decreases and the UCLs move closer to the true mean of the population.

For this project, a 90 percent UCL is calculated for soil to be reused on site, while a 95 percent UCL is calculated for soil to be disposed off site. As described in Section 2.3.2, the maximum 90 percent UCL allowed for soil reuse on site is 3,397 mg/kg. A total lead concentration above 1,000 mg/kg is classified as hazardous for soil not reused on site, corresponding to a 95 percent UCL greater than or equal to 1,000 mg/kg.

One-sided 90 and 95 percent UCLs of the true mean are defined as values that, when calculated repeated for randomly drawn subsets of data, equal or exceed the true mean 90 and 95 percent of the time, respectively. The following equation (EPA, 1986) was used to calculate the UCLs:

$$UCL = x + t_p \frac{S}{\text{sqrt}(n)}$$

Where:

x = sample mean
t_p = student's t for a one-tailed confidence interval and a probability of p
S = standard deviation
N = number of samples

The samples in this study were collected using a systematic random sampling approach. SW-846 Chapter Nine indicates that statistical transformation should be used if the data set is not normally distributed and that statistical evaluations should be performed on the transformed scale. The data for this project are not normally distributed and therefore must be transformed using the arcsine function.

Transformation using the arcsine function is accomplished by calculating the arcsine of the concentration normalized to the maximum concentration in the population. That is:

$$y_i = \text{arcsine} \frac{x_i}{x_{max}}$$

Where:

y_i = transformed value sample mean
x_i = reported concentration
x_{max} = maximum concentration reported for the data set

The final result is transformed back to a concentration by multiplying the sine of the transformed number by the maximum concentration:

$z_i = x_{max} \sin y_i$

Results of this exercise are presented in Appendix C and are shown graphically on the block diagrams presented in Appendix F.

5.4. Regression Analysis

A linear regression analysis is used to create a soluble lead prediction model for use with the 90 and 95 percent UCLs. A line fit to the data using the equation:

$y = mx + b$

Where:

y = soluble lead by WET-citric acid, mg/l
x = total lead concentration, mg/kg
b = y-intercept
m = slope

$$\text{slope} = \frac{r \text{ x } s_t}{s_s}$$

Where:

r = correlation coefficient
s_t = standard deviation of the total lead concentrations
s_s = standard deviation of the soluble lead concentrations

The linear equation from the regression is used to predict soluble lead concentrations for the statistical total lead UCLs. The integrity of the equation is directly related to ‘r,’ the correlation coefficient, which should be greater than or equal to 0.8.

A regression analysis was performed for this data set and the correlation coefficient was 0.94. The regression analysis is included as Appendix E.

6. CONCLUSIONS

The analyses of the data indicate that the surface layers tend to have the highest concentrations of total lead, followed by the 1½-, 3-, and 4-foot layers. Assuming the soil has not been disturbed since construction of the routes in the site vicinities, concentrations of total lead would be expected to decrease with depth.

7. RECOMMENDATIONS

Based on the findings of this study, recommendations are summarized on block diagrams in Appendix C and discussed below.

7.1. Group 1 – Recommendations for Soil for Reuse by the Department

All scenarios: The soil in all layer combinations (surface to 4 feet bgs) is suitable for on-site reuse by the Department with no restrictions based on total and soluble lead concentrations (Type X).

7.2. Group 1 – Recommendations for Soil to be Disposed Off Site

All scenarios: The soil in all layer combinations (surface to 4 feet bgs) is classified as non-hazardous and may be disposed off site with no restrictions based on total and soluble lead concentrations (Type X).

7.3. Group 2 – Recommendations for Soil for Reuse by the Department

Soil at the site can be reused on site with the following restrictions:

- Scenario A: The soil in the surface layer (surface to 0.5 feet bgs) (Type Y1) may be reused on site if it is placed a minimum of 5 feet above the maximum water table elevation and covered with at least 1 foot of non-hazardous soil. The remaining soil from the 1.5- to 4-foot layers combined (0.5 to 4 feet bgs) is suitable for on-site reuse by the Department with no restrictions based on total and soluble lead concentrations (Type X).

- Scenario B: The soil in the surface and 1.5-foot layers combined (surface to 1.5 feet bgs) (Type Y1) may be reused on site if it is placed a minimum of 5 feet above the maximum water table elevation and covered with at least 1 foot of non-hazardous soil. The remaining soil from the 3- and 4-foot layers combined (1.5 to 4 feet bgs) is suitable for on-site reuse by the Department with no restrictions based on total and soluble lead concentrations (Type X).

- Scenario C: The soil in the surface to 3-foot layers combined (surface to 3 feet bgs) (Type Y1) may be reused on site if it is placed a minimum of 5 feet above the maximum water table elevation and covered with at least 1 foot of non-hazardous soil. The remaining soil from the 4-foot layer (3 to 4 feet bgs) has no restrictions based on total and soluble lead concentrations (Type X).

- Scenario D: The soil in the layers combined (surface to 4 feet bgs) (Type Y1) may be reused on site if it is placed a minimum of 5 feet above the maximum water table elevation and covered with at least 1 foot of non-hazardous soil.

7.4. Group 2 – Recommendations for Soil to be Disposed Off Site

If the Department elects to dispose the soil off site, the following restrictions apply:

- Scenario A: The soil in the surface layer (surface to 0.5 feet bgs) is classified as California hazardous and should be disposed at a Class 1 disposal site in accordance with Title 22 CCR requirements (Type Z2). The remaining soil from the 1.5- to 4-foot layers combined (0.5 to 4 feet bgs) is classified as non-hazardous and may be disposed off site with no restrictions based on total and soluble lead concentrations (Type X).

- Scenario B: The soil in the surface and 1.5-foot layer combined (surface to 1.5 feet bgs) is classified as California hazardous and should be disposed at a Class 1 disposal site in accordance with Title 22 CCR requirements (Type Z2). The remaining soil from the 3- and 4-foot layers combined (1.5 to 4 feet bgs) is classified as non-hazardous and may be disposed off site with no restrictions based on total and soluble lead concentrations (Type X).

- Scenario C: The soil in the surface to 3-foot layers combined (surface to 3 feet bgs) and in the 4-foot layer (3 to 4 feet bgs) is classified as California hazardous and should be disposed at a Class 1 disposal site in accordance with Title 22 CCR requirements (Type Z2).

- Scenario D: The soil in the layers combined (surface to 4 feet bgs) is classified as California hazardous and should be disposed at a Class 1 disposal site in accordance with Title 22 CCR requirements (Type Z2).

The Department should notify the contractors performing the construction activities that elevated concentrations of lead are present in on-site soil. Appropriate health and safety measures should be taken to minimize the potential exposure to lead.

8. HEALTH EFFECTS OF LEAD

Concentrations of lead in soil at the site represent a potential threat to the health of site workers performing earthwork activities.

Lead in its element form is a heavy, ductile, soft, gray metal. The permissible exposure limit for lead is 0.05 milligrams per cubic meter (mg/m^3) in air based on an eight-hour time-weighted average. The immediately dangerous to life and health exposure limit is 100 mg/m^3 as established by the National Institute of Occupational Safety and Health. Exposure may produce several symptoms including weakness, eye irritation, facial pallor, pale eyes, lassitude, insomnia, anemia, tremors, malnutrition, constipation, paralysis of the wrists and ankles, abdominal pain, colic, nephropathy, encephalopathy, gingival lead line, hypertension, anorexia, and weight loss. Target organs are the central nervous system, kidneys, eyes, blood, gingival tissue, and the gastrointestinal tract.

Because of the potential hazard from exposure to lead-contaminated soil, a lead HSP should be prepared by a Certified Industrial Hygienist (CIH). In addition, all site workers (earthwork) should have completed a training program meeting the requirements of 29 CFR 1910.120 and 8 CCR 1532.1. The plan developed by the CIH should include a hazard analysis, dust control measures, air monitoring, signage, work practices, emergency response plans, personal protective equipment, decontamination, and documentation.

9. LIMITATIONS

The services outlined in this report have been conducted in a manner generally consistent with current regulatory guidelines. No warranty, expressed or implied, is made regarding the professional opinions presented in this report. Ninyo & Moore’s opinions are based on an analysis of observed conditions and on information obtained from third parties. It is likely that variations in soil conditions may exist.

The samples collected and chemically analyzed and the observations made are believed to be representative of the general area evaluated; however, conditions can vary significantly between sampling locations. The interpretations and opinions contained in this report are based on the results of laboratory tests and analyses intended to detect the presence and measure the concentration of selected chemical or physical constituents in samples collected from the site. The analyses have been conducted by an independent laboratory certified by the State of California to conduct such analyses. Ninyo & Moore has no involvement in, or control over, such analyses and has no means of confirming the accuracy of laboratory results. Ninyo & Moore, therefore, disclaims any responsibility for inaccuracy in such laboratory results.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader wants any additional information, or has questions regarding content, interpretations presented, or completeness of this document. Opinions and judgments expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal opinions.

For individuals with sensory disabilities, this document is available in alternate formats upon request. For any questions regarding this document, please call or write David Yaghoubi, Environmental Engineering, 3347 Michelson Drive, Suite 100, Irvine, California 92612-1692. Phone Number (949) 724-2221.

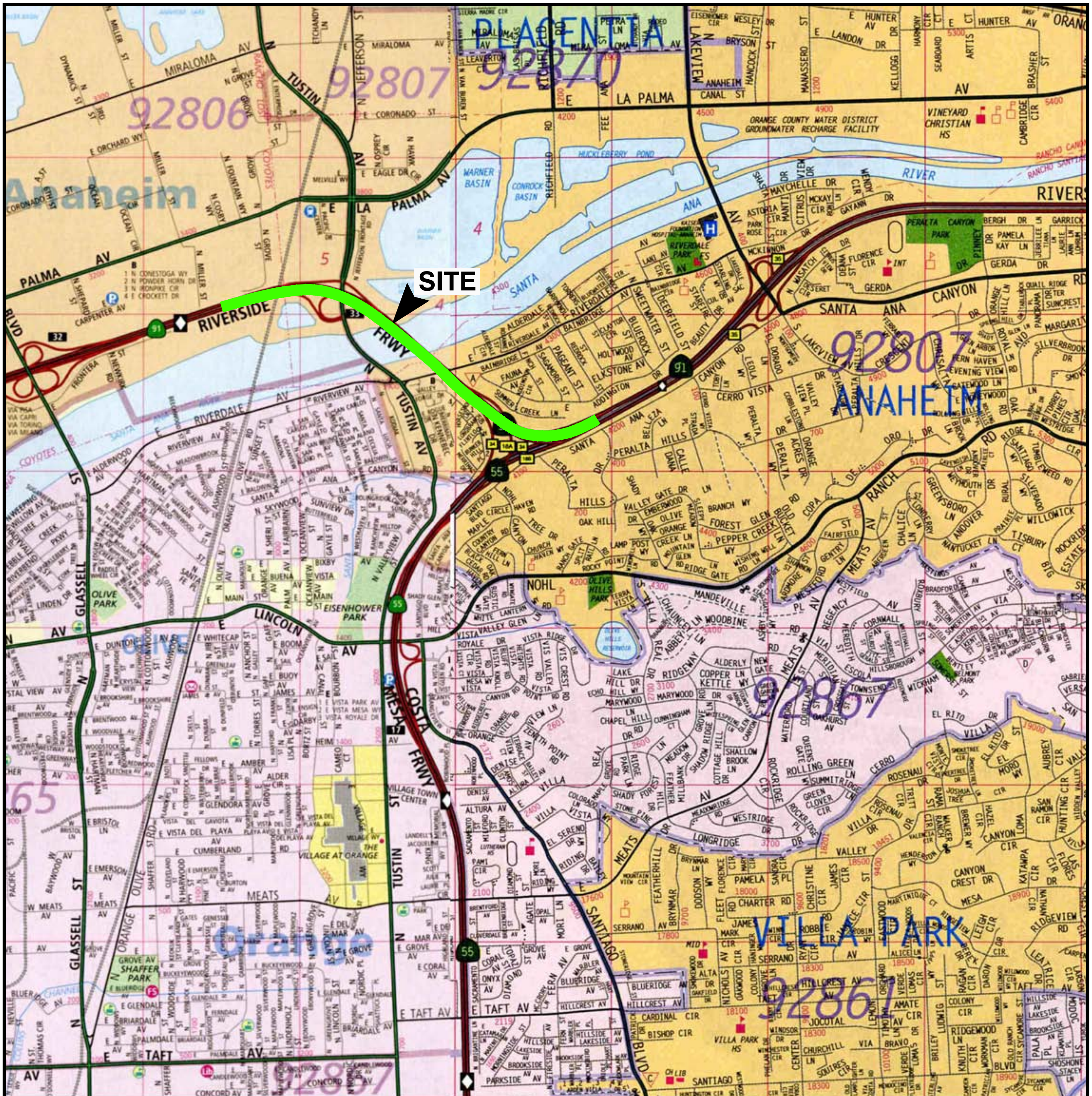
TABLE 1 – SOIL ANALYTICAL RESULTS – AERIALLY DEPOSITED LEAD, pH, AND GPS COORDINATES

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH	Latitude	Longitude
GROUP 1									
B1-0.5	0.5	3/13/2012	17	--	--	--	--	33.845311	-117.824547
B1-1.5	1.5	3/13/2012	22	--	--	--	--		
B1-3.0	3	3/13/2012	ND<1.0	--	--	--	--		
B1-4.0	4	3/13/2012	ND<1.0	--	--	--	--		
B2-0.5	0.5	3/13/2012	5.2	--	--	--	8.8	33.845061	-117.825329
B2-1.5	1.5	3/13/2012	ND<1.0	--	--	--	--		
B2-3.0	3.0	3/13/2012	3.8	--	--	--	--		
B2-4.0	4.0	3/13/2012	28	--	--	--	--		
B3-0.5	0.5	3/13/2012	14	--	--	--	--	33.844797	-117.826096
B3-1.5	1.5	3/13/2012	3.1	--	--	--	--		
B3-3.0	3.0	3/13/2012	20	--	--	--	--		
B3-4.0	4.0	3/13/2012	1.1	--	--	--	--		
B4-0.5	0.5	3/13/2012	4.2	--	--	--	--	33.844641	-117.826940
B4-1.5	1.5	3/13/2012	1.5	--	--	--	--		
B4-3.0	3	3/13/2012	ND<1.0	--	--	--	8.5		
B4-4.0	4	3/13/2012	ND<1.0	--	--	--	--		
B5-0.5	0.5	3/13/2012	4.4	--	--	--	--	33.844712	-117.827840
B5-1.5	1.5	3/13/2012	ND<1.0	--	--	--	--		
B5-3.0	3.0	3/13/2012	2.4	--	--	--	--		
B5-4.0	4.0	3/13/2012	ND<1.0	--	--	--	--		
GROUP 2									
B6-0.5	0.5	3/13/2012	13	--	--	--	--	33.845277	-117.828769
B6-1.5	1.5	3/13/2012	130	8.6	ND<0.20	0.08	--		
B6-3.0	3.0	3/13/2012	1.7	--	--	--	--		
B6-4.0	4.0	3/13/2012	ND<1.0	--	--	--	--		
B7-0.5	0.5	3/13/2012	600	16	ND<0.20	0.33	--	33.845798	-117.829404
B7-1.5	1.5	3/13/2012	23	--	--	--	--		
B7-3.0	3.0	3/13/2012	ND<1.0	--	--	--	--		
B7-4.0	4.0	3/13/2012	ND<1.0	--	--	--	--		
B8-0.5	0.5	3/13/2012	1,100	71	0.45	1.2	--	33.846172	-117.829907
B8-1.5	1.5	3/13/2012	13	--	--	--	--		
B8-3.0	3.0	3/13/2012	1.4	--	--	--	--		
B8-4.0	4.0	3/13/2012	20	--	--	--	8.8		
B9-0.5	0.5	3/13/2012	42	--	--	--	--	33.846643	-117.830737
B9-1.5	1.5	3/13/2012	14	--	--	--	--		
B9-3.0	3.0	3/13/2012	ND<1.0	--	--	--	--		
B9-4.0	4.0	3/13/2012	11	--	--	--	--		
B10-0.5	0.5	3/13/2012	140	7.7	ND<0.20	0.17	8.5	33.847063	-117.831383
B10-1.5	1.5	3/13/2012	12	--	--	--	--		
B10-3.0	3.0	3/13/2012	170	9.3	ND<0.20	0.13	--		
B10-4.0	4.0	3/13/2012	4.7	--	--	--	--		
B11-0.5	0.5	3/13/2012	76	4.2	--	--	--	33.847604	-117.832139
B11-1.5	1.5	3/13/2012	120	9.0	ND<0.20	0.3	--		
B11-3.0	3.0	3/13/2012	270	21	ND<0.20	0.53	--		
B11-4.0	4.0	3/13/2012	310	22	0.32	0.62	--		
B12-0.5	0.5	3/13/2012	14	--	--	--	--	33.848006	-117.832705
B12-1.5	1.5	3/13/2012	6.4	--	--	--	--		
B12-3.0	3.0	3/13/2012	22	--	--	--	--		
B12-4.0	4.0	3/13/2012	56	2.8	--	--	--		
B13-0.5	0.5	3/13/2012	17	--	--	--	9.0	33.849898	-117.835266
B13-1.5	1.5	3/13/2012	29	--	--	--	--		
B13-3.0	3.0	3/13/2012	32	--	--	--	--		

TABLE 1 – SOIL ANALYTICAL RESULTS – AERIALLY DEPOSITED LEAD, pH, AND GPS COORDINATES

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH	Latitude	Longitude
B13-4.0	4.0	3/13/2012	45	--	--	--	--		
B14-0.5	0.5	3/13/2012	110	7.1	ND<0.20	0.16	--	33.850530	-117.836097
B14-1.5	1.5	3/13/2012	160	4.4	--	--	--		
B14-3.0	3.0	3/13/2012	ND<1.0	--	--	--	--		
B14-4.0	4.0	3/13/2012	15	--	--	--	--		
B15-0.5	0.5	3/13/2012	2.7	--	--	--	--	33.850891	-117.836553
B15-1.5	1.5	3/13/2012	ND<1.0	--	--	--	8.2		
B15-3.0	3.0	3/13/2012	8.6	--	--	--	--		
B16-0.5	0.5	3/13/2012	60	3.9	--	--	--	33.851593	-117.837445
B16-1.5	1.5	3/13/2012	41	--	--	--	--		
B16-3.0	3.0	3/13/2012	81	5.5	ND<0.20	0.09	--		
B16-4.0	4.0	3/13/2012	24	--	--	--	--		
B17-0.5	0.5	3/13/2012	56	0.31	--	--	--	33.851767	-117.839191
B17-1.5	1.5	3/13/2012	54	0.37	--	--	--		
B17-3.0	3.0	3/13/2012	7.4	--	--	--	--		
B17-4.0	4.0	3/13/2012	ND<1.0	--	--	--	9.0		
B18-0.5	0.5	3/13/2012	18	--	--	--	--	33.851757	-117.840136
B18-1.5	1.5	3/13/2012	18	--	--	--	--		
B18-3.0	3.0	3/13/2012	1.0	--	--	--	--		
B18-4.0	4.0	3/13/2012	2.7	--	--	--	--		
B19-0.5	0.5	3/13/2012	310	20	0.48	0.37	--	33.851692	-117.841332
B19-1.5	1.5	3/13/2012	ND>1.0	--	--	--	--		
B19-3.0	3.0	3/13/2012	ND>1.0	--	--	--	9.1		
B19-4.0	4.0	3/13/2012	4.3	--	--	--	--		
B20-0.5	0.5	3/13/2012	68	4.0	--	--	--	33.851570	-117.841820
B20-1.5	1.5	3/13/2012	ND<1.0	--	--	--	--		
B20-3.0	3.0	3/13/2012	ND<1.0	--	--	--	--		
B20-4.0	4.0	3/13/2012	ND<1.0	--	--	--	--		
Maximum			1100	71	0.48	1.2	9.1		
Average			56.6	12.1	0.19	0.36	8.7		
Minimum			ND<1.0	0.31	ND<0.20	0.08	8.2		
Regulatory Limits			1,411(1)	5(2)	1.5(3)	5(4)	5(5)		
Decontamination Water (mg/l)									
EB-1	--	3/13/2012	0.54	--	--	--			

Notes:
TTLC – total lead for comparison to the Total Threshold Limit Concentration
mg/kg – milligrams per kilogram
WET – Waste Extraction Test
WET-citric – soluble lead by WET using citric acid for comparison to the Soluble Threshold Limit Concentration
mg/l – milligrams per liter
WET-DI – soluble lead by WET using deionized water for comparison to the Soluble Threshold Limit Concentration
TCLP – soluble lead by the Toxicity Characteristic Leaching Procedure
ND − not detected above reporting limits presented in Appendix B
1 − Limit specified in addendum to Variance issued by the Department of Toxic Substance Control to Caltrans (DTSC) Variance, September 22, 2000; Addendum, December 2002; Addendum June 2008)
2 − Soluble Threshold Limit Concentration for California Hazardous Waste (California Code of Regulations [CCR] Title 22, Section 66261.24)
3 − Limit Specified by DTSC Variance
4 − Maximum concentration for the TCLP of Resource, Conservation, and Recovery Act (RCRA) hazardous waste (CCR Title 22, Section 66216.24)
5 − Minimum value specified by DTSC variance
* Borings sampled as part of Task Order 31 and were identified as B1 and B2, respectively



REFERENCE: 2007 THOMAS GUIDE FOR LOS ANGELES/ORANGE COUNTIES, STREET GUIDE AND DIRECTORY

N

APPROXIMATE SCALE

0 2400 4800

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Map © Rand McNally, R.L.07-S-129

208449_A2.DWG.......GK

Ninyo & Moore		SITE LOCATION	FIGURE
PROJECT NO.	DATE	NORTHBOUND SR-55/WESTBOUND SR-91 CONNECTOR ANAHEIM, CALIFORNIA	1
208449003	4/12		

208449_A3.DWG......—G.K.

REFERENCE: GOOGLE EARTH AERIAL PHOTO, 2012.

N

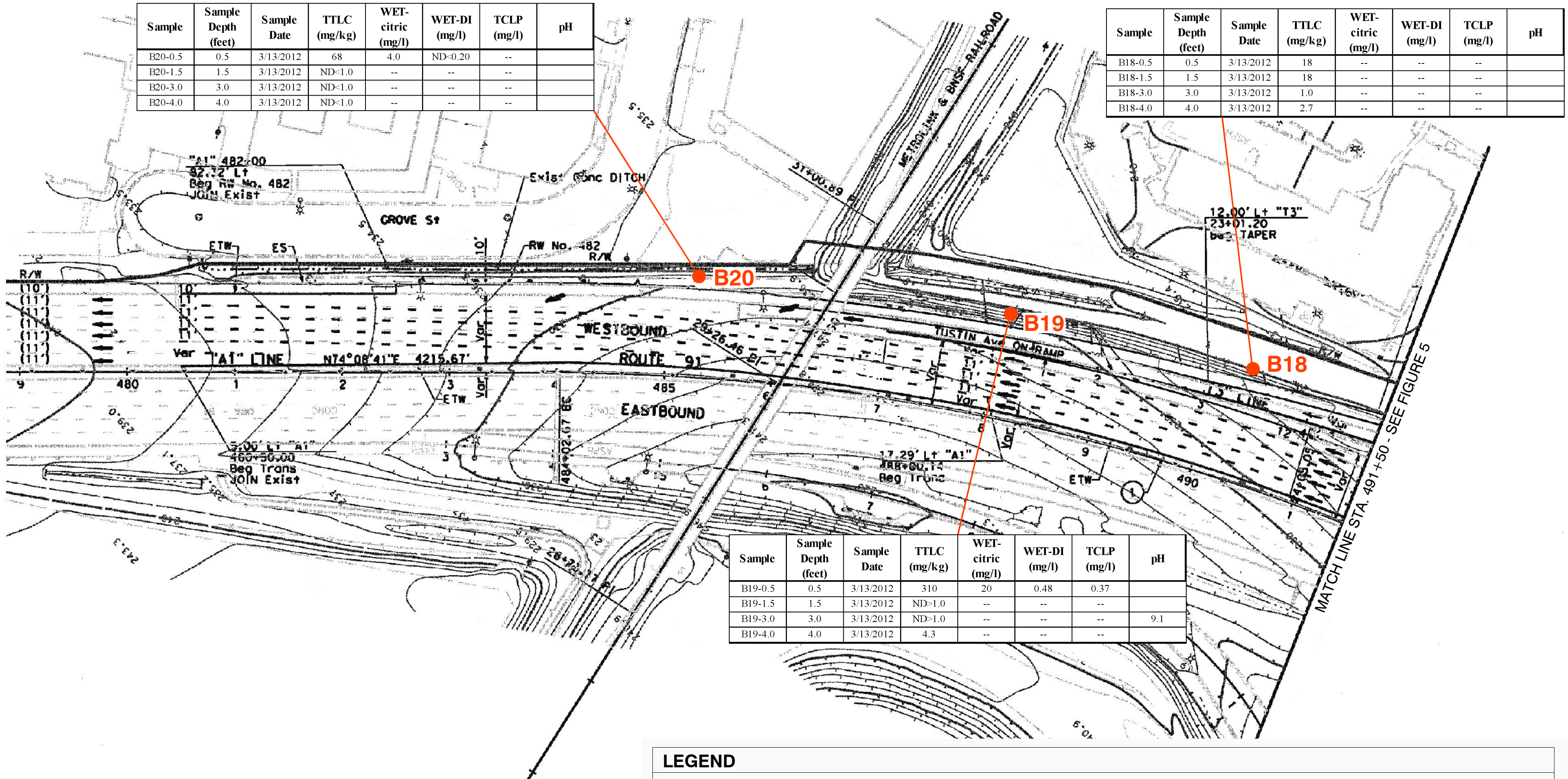
SCALE IN FEET

0 600 1,200

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

LEGEND		
B1 - B5	●	GROUP 1 BORINGS
B6 - B20	●	GROUP 2 BORINGS

Ninyo & Moore		BORING LOCATIONS	FIGURE
PROJECT NO.	DATE	NORTHBOUND SR-55/WESTBOUND SR-91 CONNECTOR ANAHEIM, CALIFORNIA	2
208449003	4/12		



Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B20-0.5	0.5	3/13/2012	68	4.0	ND<0.20	--	
B20-1.5	1.5	3/13/2012	ND<1.0	--	--	--	
B20-3.0	3.0	3/13/2012	ND<1.0	--	--	--	
B20-4.0	4.0	3/13/2012	ND<1.0	--	--	--	

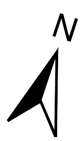
Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B18-0.5	0.5	3/13/2012	18	--	--	--	
B18-1.5	1.5	3/13/2012	18	--	--	--	
B18-3.0	3.0	3/13/2012	1.0	--	--	--	
B18-4.0	4.0	3/13/2012	2.7	--	--	--	

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B19-0.5	0.5	3/13/2012	310	20	0.48	0.37	
B19-1.5	1.5	3/13/2012	ND>1.0	--	--	--	
B19-3.0	3.0	3/13/2012	ND>1.0	--	--	--	9.1
B19-4.0	4.0	3/13/2012	4.3	--	--	--	

LEGEND

B20 ●	Boring location	WET-citric	Soluble lead by WET using citric acide for comparision to Soluble Threshold Limit Concentration
TTLC	Total lead for comparison to the Total Threshold Limit Concentration	WET-DI	Soluble lead by WET using deionized water for comparison to Soluble Threshold Limit Concentration
mg/kg	milligrams per kilogram	mg/l	milligrams per liter
WET	Waste Extraction Test	TCLP	Soluble lead by Toxicity Characteristic Leaching Procedure

REFERENCE: CALTRANS



SCALE IN FEET

0 150 300

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore

PROJECT NO.	DATE
208449003	4/12

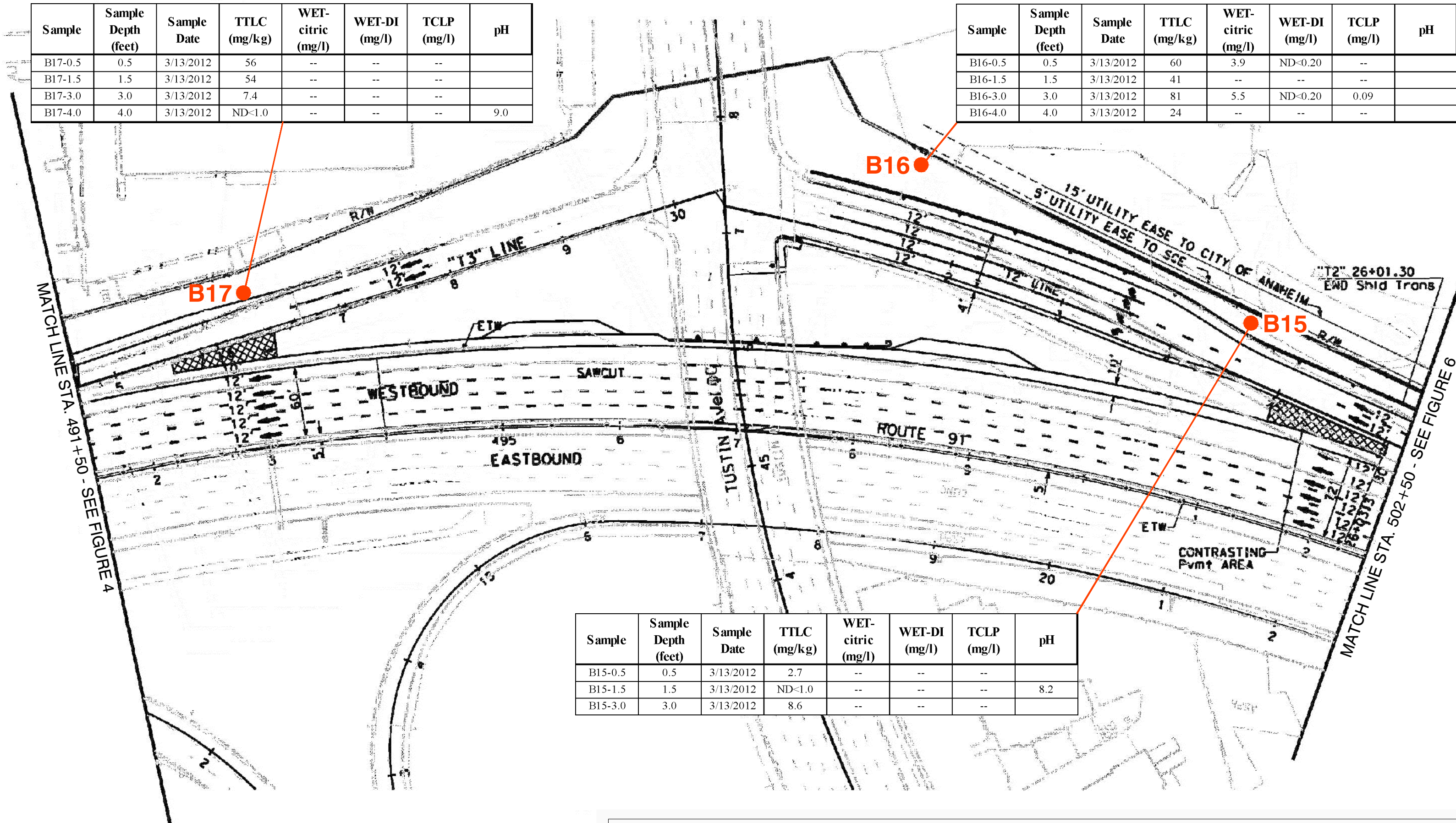
BORING DATA

NORTHBOUND SR-55/WESTBOUND SR-91 CONNECTOR
ANAHEIM, CALIFORNIA

FIGURE

3

208449_A4.DWG......-G.K.



Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B17-0.5	0.5	3/13/2012	56	--	--	--	
B17-1.5	1.5	3/13/2012	54	--	--	--	
B17-3.0	3.0	3/13/2012	7.4	--	--	--	
B17-4.0	4.0	3/13/2012	ND<1.0	--	--	--	9.0

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B16-0.5	0.5	3/13/2012	60	3.9	ND<0.20	--	
B16-1.5	1.5	3/13/2012	41	--	--	--	
B16-3.0	3.0	3/13/2012	81	5.5	ND<0.20	0.09	
B16-4.0	4.0	3/13/2012	24	--	--	--	

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B15-0.5	0.5	3/13/2012	2.7	--	--	--	
B15-1.5	1.5	3/13/2012	ND<1.0	--	--	--	8.2
B15-3.0	3.0	3/13/2012	8.6	--	--	--	

LEGEND

B17 ●	Boring location	WET-citric	Soluble lead by WET using citric acide for comparision to Soluble Threshold Limit Concentration
TTLC	Total lead for comparison to the Total Threshold Limit Concentration	WET-DI	Soluble lead by WET using deionized water for comparison to Soluble Threshold Limit Concentration
mg/kg	milligrams per kilogram	mg/l	milligrams per liter
WET	Waste Extraction Test	TCLP	Soluble lead by Toxicity Characteristic Leaching Procedure

208449_A5.DWG.......-G.K.

REFERENCE: CALTRANS

N

SCALE IN FEET

0 150 300

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore

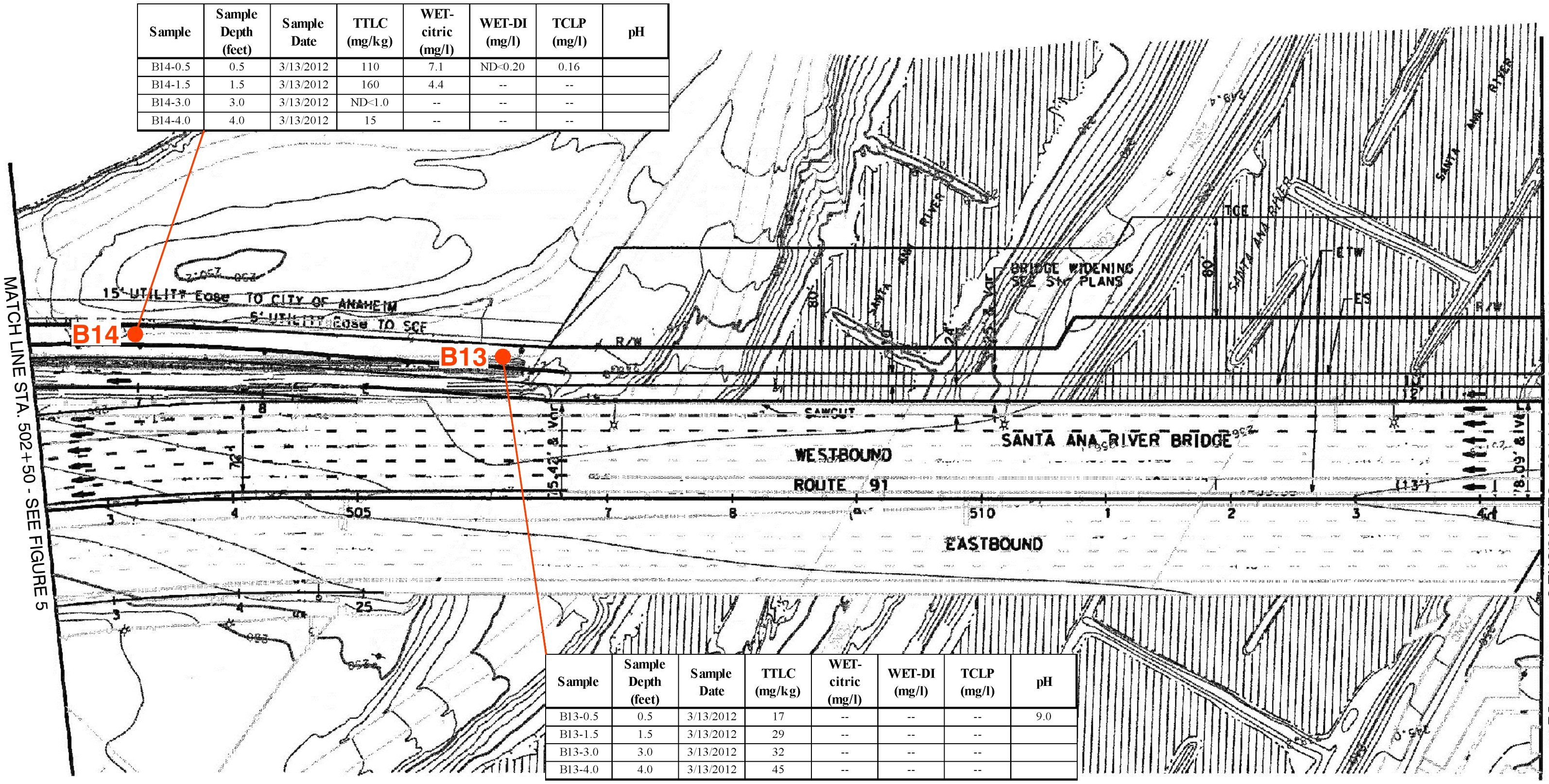
PROJECT NO.	DATE
208449003	4/12

BORING DATA

NORTHBOUND SR-55/WESTBOUND SR-91 CONNECTOR
ANAHEIM, CALIFORNIA

FIGURE

4



Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B14-0.5	0.5	3/13/2012	110	7.1	ND<0.20	0.16	
B14-1.5	1.5	3/13/2012	160	4.4	--	--	
B14-3.0	3.0	3/13/2012	ND<1.0	--	--	--	
B14-4.0	4.0	3/13/2012	15	--	--	--	

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B13-0.5	0.5	3/13/2012	17	--	--	--	9.0
B13-1.5	1.5	3/13/2012	29	--	--	--	
B13-3.0	3.0	3/13/2012	32	--	--	--	
B13-4.0	4.0	3/13/2012	45	--	--	--	

LEGEND

B14 ●	Boring location	WET-citric	Soluble lead by WET using citric acide for comparision to Soluble Threshold Limit Concentration
TTLC	Total lead for comparison to the Total Threshold Limit Concentration	WET-DI	Soluble lead by WET using deionized water for comparison to Soluble Threshold Limit Concentration
mg/kg	milligrams per kilogram	mg/l	milligrams per liter
WET	Waste Extraction Test	TCLP	Soluble lead by Toxicity Characteristic Leaching Procedure

208449_A6.DWG.......--G.K.

REFERENCE: CALTRANS

N

SCALE IN FEET

0 150 300

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore

PROJECT NO.	DATE
208449003	4/12

BORING DATA

NORTHBOUND SR-55/WESTBOUND SR-91 CONNECTOR
ANAHEIM, CALIFORNIA

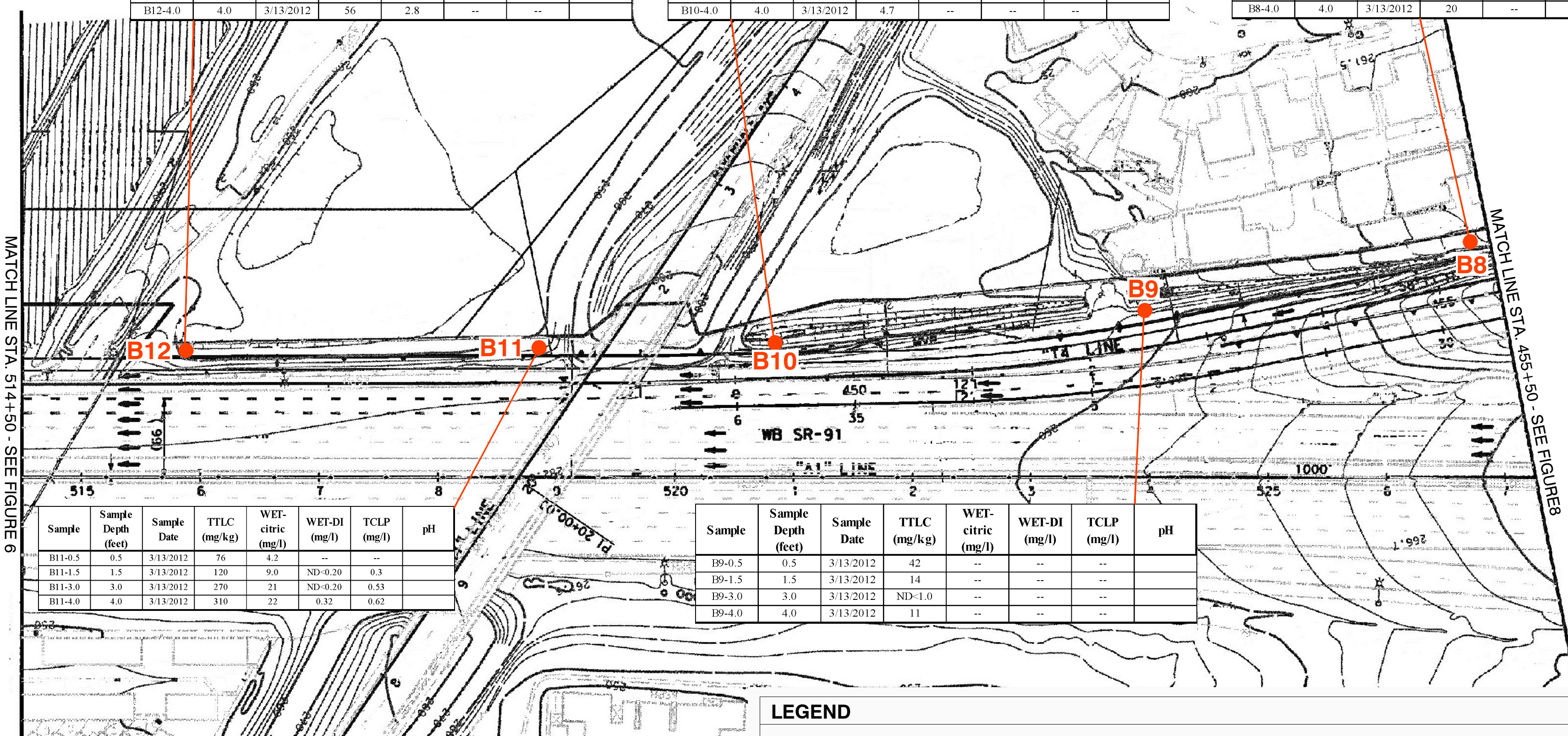
FIGURE

5

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B12-0.5	0.5	3/13/2012	14	--	--	--	
B12-1.5	1.5	3/13/2012	6.4	--	--	--	
B12-3.0	3.0	3/13/2012	22	--	--	--	
B12-4.0	4.0	3/13/2012	56	2.8	--	--	

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B10-0.5	0.5	3/13/2012	140	7.7	ND<0.20	0.17	8.5
B10-1.5	1.5	3/13/2012	12	--	--	--	
B10-3.0	3.0	3/13/2012	170	9.3	ND<0.20	0.13	
B10-4.0	4.0	3/13/2012	4.7	--	--	--	

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B8-0.5	0.5	3/13/2012	1100	71	0.45	1.20	
B8-1.5	1.5	3/13/2012	13	--	--	--	
B8-3.0	3.0	3/13/2012	1.4	--	--	--	
B8-4.0	4.0	3/13/2012	20	--	--	--	8.8



Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B11-0.5	0.5	3/13/2012	76	4.2	--	--	
B11-1.5	1.5	3/13/2012	120	9.0	ND<0.20	0.3	
B11-3.0	3.0	3/13/2012	270	21	ND<0.20	0.53	
B11-4.0	4.0	3/13/2012	310	22	0.32	0.62	

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B9-0.5	0.5	3/13/2012	42	--	--	--	
B9-1.5	1.5	3/13/2012	14	--	--	--	
B9-3.0	3.0	3/13/2012	ND<1.0	--	--	--	
B9-4.0	4.0	3/13/2012	11	--	--	--	

REFERENCE: CALTRANS

208449_A7.DWG.......G.K.

LEGEND

B12 ●	Boring location	WET-citric	Soluble lead by WET using citric acide for comparision to Soluble Threshold Limit Concentration
TTLC	Total lead for comparison to the Total Threshold Limit Concentration	WET-DI	Soluble lead by WET using deionized water for comparison to Soluble Threshold Limit Concentration
mg/kg	milligrams per kilogram	mg/l	milligrams per liter
WET	Waste Extraction Test	TCLP	Soluble lead by Toxicity Characteristic Leaching Procedure

N

SCALE IN FEET

0 150 300

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore

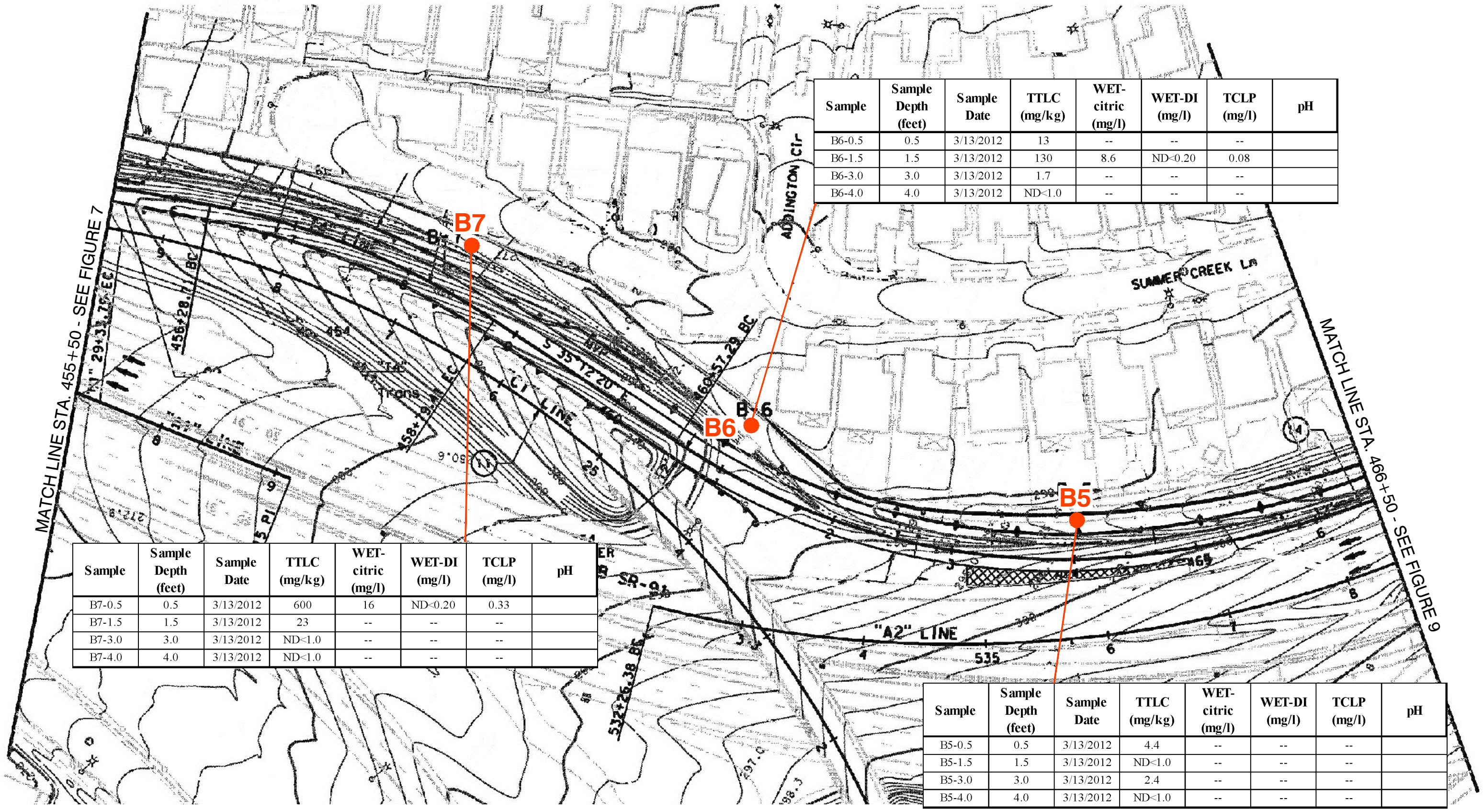
PROJECT NO.	DATE
208449003	4/12

BORING DATA

NORTHBOUND SR-55/WESTBOUND SR-91 CONNECTOR
ANAHEIM, CALIFORNIA

FIGURE

6



Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B6-0.5	0.5	3/13/2012	13	--	--	--	
B6-1.5	1.5	3/13/2012	130	8.6	ND<0.20	0.08	
B6-3.0	3.0	3/13/2012	1.7	--	--	--	
B6-4.0	4.0	3/13/2012	ND<1.0	--	--	--	

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B7-0.5	0.5	3/13/2012	600	16	ND<0.20	0.33	
B7-1.5	1.5	3/13/2012	23	--	--	--	
B7-3.0	3.0	3/13/2012	ND<1.0	--	--	--	
B7-4.0	4.0	3/13/2012	ND<1.0	--	--	--	

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B5-0.5	0.5	3/13/2012	4.4	--	--	--	
B5-1.5	1.5	3/13/2012	ND<1.0	--	--	--	
B5-3.0	3.0	3/13/2012	2.4	--	--	--	
B5-4.0	4.0	3/13/2012	ND<1.0	--	--	--	

LEGEND

B7 ●	Boring location	WET-citric	Soluble lead by WET using citric acide for comparision to Soluble Threshold Limit Concentration
TTLC	Total lead for comparison to the Total Threshold Limit Concentration	WET-DI	Soluble lead by WET using deionized water for comparison to Soluble Threshold Limit Concentration
mg/kg	milligrams per kilogram	mg/l	milligrams per liter
WET	Waste Extraction Test	TCLP	Soluble lead by Toxicity Characteristic Leaching Procedure

208449_A8.DWG.......—G.K.

REFERENCE: CALTRANS

N

SCALE IN FEET

0 150 300

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore

PROJECT NO.	DATE
208449003	4/12

BORING DATA

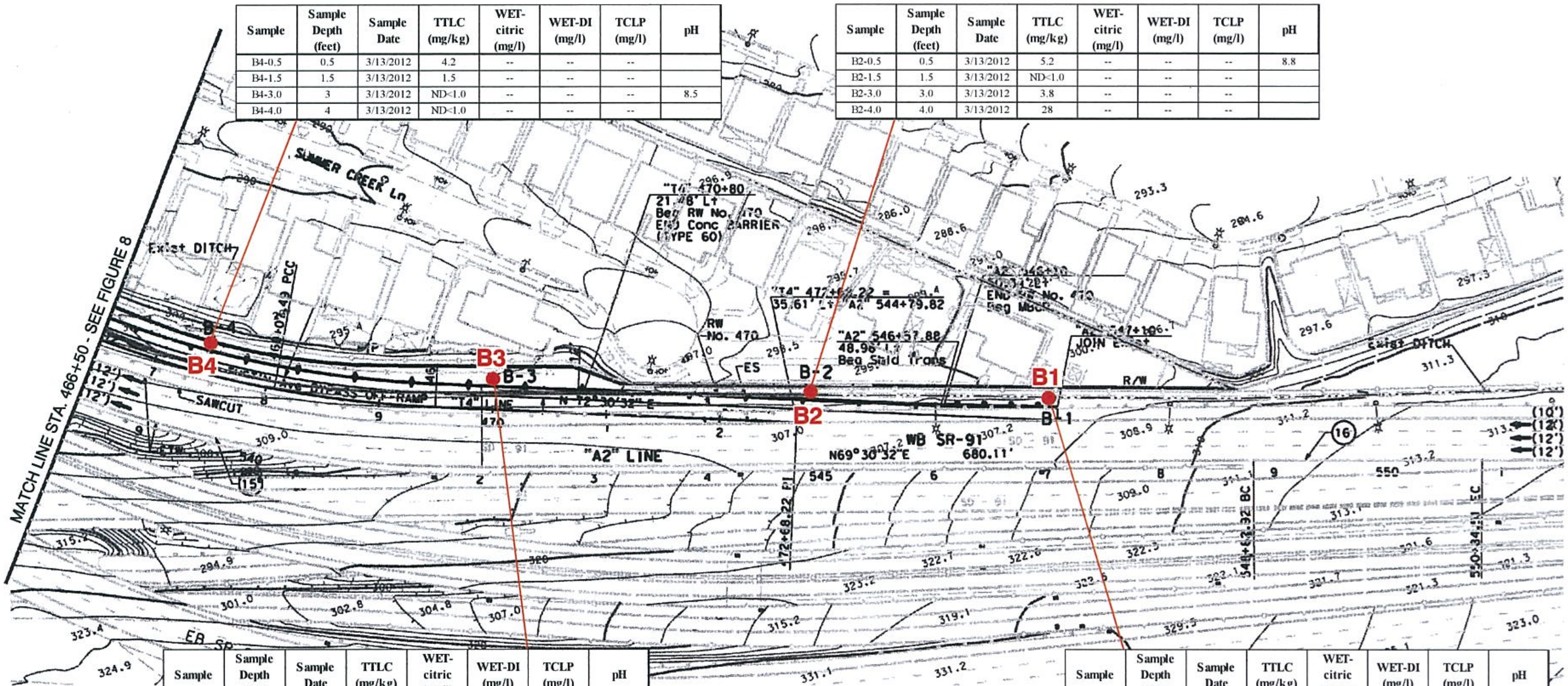
NORTHBOUND SR-55/WESTBOUND SR-91 CONNECTOR
ANAHEIM, CALIFORNIA

FIGURE

7

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B4-0.5	0.5	3/13/2012	4.2	--	--	--	
B4-1.5	1.5	3/13/2012	1.5	--	--	--	
B4-3.0	3	3/13/2012	ND<1.0	--	--	--	8.5
B4-4.0	4	3/13/2012	ND<1.0	--	--	--	

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B2-0.5	0.5	3/13/2012	5.2	--	--	--	8.8
B2-1.5	1.5	3/13/2012	ND<1.0	--	--	--	
B2-3.0	3.0	3/13/2012	3.8	--	--	--	
B2-4.0	4.0	3/13/2012	28	--	--	--	



Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B3-0.5	0.5	3/13/2012	14	--	--	--	
B3-1.5	1.5	3/13/2012	3.1	--	--	--	
B3-3.0	3.0	3/13/2012	20	--	--	--	
B3-4.0	4.0	3/13/2012	1.1	--	--	--	

Sample	Sample Depth (feet)	Sample Date	TTLC (mg/kg)	WET-citric (mg/l)	WET-DI (mg/l)	TCLP (mg/l)	pH
B1-0.5	0.5	3/13/2012	17	--	--	--	
B1-1.5	1.5	3/13/2012	22	--	--	--	
B1-3.0	3	3/13/2012	ND<1.0	--	--	--	
B1-4.0	4	3/13/2012	ND<1.0	--	--	--	

208449_A9.DWG.......G.K.

REFERENCE: CALTRANS

LEGEND

B7 ●	Boring location	WET-citric	Soluble lead by WET using citric acide for comparision to Soluble Threshold Limit Concentration
TTLC	Total lead for comparison to the Total Threshold Limit Concentration	WET-DI	Soluble lead by WET using deionized water for comparison to Soluble Threshold Limit Concentration
mg/kg	milligrams per kilogram	mg/l	milligrams per liter
WET	Waste Extraction Test	TCLP	Soluble lead by Toxicity Characteristic Leaching Procedure

N

SCALE IN FEET

0 150 300

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore

PROJECT NO.	DATE
208449003	4/12

BORING DATA

NORTHBOUND SR-55/WESTBOUND SR-91 CONNECTOR
ANAHEIM, CALIFORNIA

FIGURE **8**

APPENDIX A

AERIALLY DEPOSITED LEAD SOIL MANAGEMENT CHART

AERIALLY DEPOSITED LEAD SOIL MANAGEMENT			
SOLUBLE LEAD (mg/l)	**TOTAL LEAD (mg/kg)**	**SOIL TYPE**	**HANDLING**
CALIFORNIA TESTING			
STLC <5.0	TTLC <1000	X	Non-hazardous Waste. Notify and require Lead Compliance Plan for worker safety.
	1000 – 1411 and DI WET < 1.5 mg/l	Y1	Hazardous Waste. Variance applies – cover with minimum 1 foot of clean soil.*
	1411 – 3397 and DI WET < 150 mg/l	Y2	Hazardous Waste. Variance applies – cover with pavement structure. *
	1000 – 3397 but Surplus	Z2	Hazardous Waste - Surplus. Dispose at Class 1 disposal site.
	> 3397 or 1000 – 3397 & DI WET > 150 mg/l	Z2	Hazardous Waste – not reusable under Variance. Dispose at Class 1 disposal site.
STLC >5.0	TTLC < 1411 and DI WET < 1.5 mg/l	Y1	Hazardous Waste. Variance applies – cover with minimum of 1 foot of clean soil.*
	1411 – 3397 and DI WET < 150 mg/l	Y2	Hazardous Waste. Variance applies – cover with pavement structure.*
	< 3397 and DI WET < 150 mg/l but Surplus	Z2	Hazardous Waste - Surplus. Dispose at Class 1 disposal site.
	> 3397 or DI WET > 150 mg/l	Z2	Hazardous Waste – not reusable under Variance. Dispose at Class 1 disposal site.
FEDERAL TESTING			
TCLP > 5.0 mg/l	N/A	Z3	RCRA Hazardous Waste Dispose at Class 1 disposal site as a RCRA waste regardless of TTLC and STLC results.

*Note: For hazardous waste levels of lead - if pH is less than 5.5 soil must be placed under a pavement structure. If pH is less than 5.0 variance can not be used and the soil must be disposed as Z-2 material.

APPENDIX B

LABORATORY REPORTS AND CHAIN-OF-CUSTODY DOCUMENTATION

PAT-CHEM LABORATORIES

11990 Discovery Ct. • Moorpark, CA 93021 • Ph. (805) 532-0012 • Fax (805) 532-0016

Customer:	**Ninyo & Moore, Geo. & Enviro. Sciences Consul** 475 Goddard, Suite 200 Irvine CA, 92618
Attention:	Mike Cushner
Report Date:	30-Mar-12 17:32
Subject:	Lead Soil Samples

Project/P.O.#: 208449003

PARAMETER	METHOD	QC BATCH	REPORTING LIMIT	ANALYZED (ANALYST)		RESULT	NOTE
B1-0.5 (Sample I.D.# : 1203147-01) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	16-Mar-12 (AF)		17 mg/kg	
B1-1.5 (Sample I.D.# : 1203147-02) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		22 mg/kg	
B1-3.0 (Sample I.D.# : 1203147-03) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
B1-4.0 (Sample I.D.# : 1203147-04) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
B2-0.5 (Sample I.D.# : 1203147-05) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		5.2 mg/kg	
pH	EPA 9045B	AC21402	0.1	14-Mar-12 (CS)		8.8 pH Units	
B2-1.5 (Sample I.D.# : 1203147-06) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
B2-3.0 (Sample I.D.# : 1203147-07) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		3.8 mg/kg	
B2-4.0 (Sample I.D.# : 1203147-08) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		28 mg/kg	
B3-0.5 (Sample I.D.# : 1203147-09) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		14 mg/kg	
B3-1.5 (Sample I.D.# : 1203147-10) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		3.1 mg/kg	
B3-3.0 (Sample I.D.# : 1203147-11) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		20 mg/kg	
B3-4.0 (Sample I.D.# : 1203147-12) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		1.1 mg/kg	
B4-0.5 (Sample I.D.# : 1203147-13) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		4.2 mg/kg	
B4-1.5 (Sample I.D.# : 1203147-14) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		1.5 mg/kg	

Respectfully Submitted,

Pat Brueckner

Pat Brueckner 3/30/2012
Laboratory Director

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Report Date: 30-Mar-12 17:32
Subject: Lead Soil Samples

Project/P.O.#: 208449003

PARAMETER	METHOD	QC BATCH	REPORTING LIMIT	ANALYZED (ANALYST)		RESULT	NOTE
B4-3.0 (Sample I.D.# : 1203147-15) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
pH	EPA 9045B	AC21402	0.1	14-Mar-12 (CS)		8.5 pH Units	
B4-4.0 (Sample I.D.# : 1203147-16) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
B5-0.5 (Sample I.D.# : 1203147-17) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		4.4 mg/kg	
B5-1.5 (Sample I.D.# : 1203147-18) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
B5-3.0 (Sample I.D.# : 1203147-19) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		2.4 mg/kg	
B5-4.0 (Sample I.D.# : 1203147-20) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
B6-0.5 (Sample I.D.# : 1203147-21) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	16-Mar-12 (AF)		13 mg/kg	
B6-1.5 (Sample I.D.# : 1203147-22) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		130 mg/kg	
Lead	EPA 6010B(TCLP)	AC22113	0.02	21-Mar-12 (AF)		0.08 mg/l	
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		8.6 mg/l	
Lead	EPA 6010B(STLC-DI)	AC22620	0.20	23-Mar-12 (AF)	<	0.20 mg/l	
B6-3.0 (Sample I.D.# : 1203147-23) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		1.7 mg/kg	
B6-4.0 (Sample I.D.# : 1203147-24) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
B7-0.5 (Sample I.D.# : 1203147-25) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		600 mg/kg	

Respectfully Submitted,

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Attention: Mike Cushner
Report Date: 30-Mar-12 17:32
Subject: Lead Soil Samples

Project/P.O.#: 208449003

PARAMETER	METHOD	QC BATCH	REPORTING LIMIT	ANALYZED (ANALYST)		RESULT	NOTE
B7-0.5 (Sample I.D.# : 1203147-25) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B(TCLP)	AC22113	0.02	21-Mar-12 (AF)		0.33 mg/l	
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		16 mg/l	
Lead	EPA 6010B(STLC-DI)	AC22620	0.20	23-Mar-12 (AF)	<	0.20 mg/l	
B7-1.5 (Sample I.D.# : 1203147-26) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		23 mg/kg	
B7-3.0 (Sample I.D.# : 1203147-27) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
B7-4.0 (Sample I.D.# : 1203147-28) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
B8-0.5 (Sample I.D.# : 1203147-29) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		1100 mg/kg	
Lead	EPA 6010B(TCLP)	AC22113	0.02	21-Mar-12 (AF)		1.2 mg/l	
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		71 mg/l	
Lead	EPA 6010B(STLC-DI)	AC22620	0.20	23-Mar-12 (AF)		0.45 mg/l	
B8-1.5 (Sample I.D.# : 1203147-30) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		13 mg/kg	
B8-3.0 (Sample I.D.# : 1203147-31) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		1.4 mg/kg	
B8-4.0 (Sample I.D.# : 1203147-32) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		20 mg/kg	

Respectfully Submitted,

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Irvine CA, 92618

Attention: Mike Cushner
Report Date: 30-Mar-12 17:32
Subject: Lead Soil Samples

Project/P.O.#: 208449003

PARAMETER	METHOD	QC BATCH	REPORTING LIMIT	ANALYZED (ANALYST)		RESULT		NOTE
B8-4.0 (Sample I.D.# : 1203147-32) Collected: 13-Mar-12 By J.J.								
pH	EPA 9045B	AC21402	0.1	14-Mar-12 (CS)		8.8	pH Units	
B9-0.5 (Sample I.D.# : 1203147-33) Collected: 13-Mar-12 By J.J.								
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		42	mg/kg	
B9-1.5 (Sample I.D.# : 1203147-34) Collected: 13-Mar-12 By J.J.								
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		14	mg/kg	
B9-3.0 (Sample I.D.# : 1203147-35) Collected: 13-Mar-12 By J.J.								
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0	mg/kg	
B9-4.0 (Sample I.D.# : 1203147-36) Collected: 13-Mar-12 By J.J.								
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		11	mg/kg	
B10-0.5 (Sample I.D.# : 1203147-37) Collected: 13-Mar-12 By J.J.								
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		140	mg/kg	
Lead	EPA 6010B(TCLP)	AC22113	0.02	21-Mar-12 (AF)		0.17	mg/l	
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		7.7	mg/l	
Lead	EPA 6010B(STLC-DI)	AC22620	0.20	23-Mar-12 (AF)	<	0.20	mg/l	
pH	EPA 9045B	AC21402	0.1	14-Mar-12 (CS)		8.5	pH Units	
B10-1.5 (Sample I.D.# : 1203147-38) Collected: 13-Mar-12 By J.J.								
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		12	mg/kg	
B10-3.0 (Sample I.D.# : 1203147-39) Collected: 13-Mar-12 By J.J.								
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		170	mg/kg	
Lead	EPA 6010B(TCLP)	AC22113	0.02	21-Mar-12 (AF)		0.13	mg/l	

Respectfully Submitted,

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Project/P.O.#: 208449003

PARAMETER	METHOD	QC BATCH	REPORTING LIMIT	ANALYZED (ANALYST)		RESULT	NOTE
B10-3.0 (Sample I.D.# : 1203147-39) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		9.3 mg/l	
Lead	EPA 6010B(STLC-DI)	AC22620	0.20	23-Mar-12 (AF)	<	0.20 mg/l	
B10-4.0 (Sample I.D.# : 1203147-40) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		4.7 mg/kg	
B11-0.5 (Sample I.D.# : 1203147-41) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	16-Mar-12 (AF)		76 mg/kg	
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		4.2 mg/l	
B11-1.5 (Sample I.D.# : 1203147-42) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		120 mg/kg	
Lead	EPA 6010B(TCLP)	AC22113	0.02	21-Mar-12 (AF)		0.30 mg/l	
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		9.0 mg/l	
Lead	EPA 6010B(STLC-DI)	AC22620	0.20	23-Mar-12 (AF)	<	0.20 mg/l	
B11-3.0 (Sample I.D.# : 1203147-43) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		270 mg/kg	
Lead	EPA 6010B(TCLP)	AC22113	0.02	21-Mar-12 (AF)		0.53 mg/l	
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		21 mg/l	
Lead	EPA 6010B(STLC-DI)	AC22620	0.20	23-Mar-12 (AF)	<	0.20 mg/l	
B11-4.0 (Sample I.D.# : 1203147-44) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		310 mg/kg	
Lead	EPA 6010B(TCLP)	AC22113	0.02	21-Mar-12 (AF)		0.62 mg/l	
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		22 mg/l	
Lead	EPA 6010B(STLC-DI)	AC22620	0.20	23-Mar-12 (AF)		0.32 mg/l	
B12-0.5 (Sample I.D.# : 1203147-45) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		14 mg/kg	
B12-1.5 (Sample I.D.# : 1203147-46) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		6.4 mg/kg	

Respectfully Submitted,

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Laboratory Director

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PARAMETER	METHOD	QC BATCH	REPORTING LIMIT	ANALYZED (ANALYST)		RESULT	NOTE
B12-3.0 (Sample I.D.# : 1203147-47) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		22 mg/kg	
B12-4.0 (Sample I.D.# : 1203147-48) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		56 mg/kg	
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		2.8 mg/l	
B13-0.5 (Sample I.D.# : 1203147-49) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		17 mg/kg	
pH	EPA 9045B	AC21402	0.1	14-Mar-12 (CS)		9.0 pH Units	
B13-1.5 (Sample I.D.# : 1203147-50) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		29 mg/kg	
B13-3.0 (Sample I.D.# : 1203147-51) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		32 mg/kg	
B13-4.0 (Sample I.D.# : 1203147-52) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		45 mg/kg	
B14-0.5 (Sample I.D.# : 1203147-53) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		110 mg/kg	
Lead	EPA 6010B(TCLP)	AC22113	0.02	21-Mar-12 (AF)		0.16 mg/l	
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		7.1 mg/l	
Lead	EPA 6010B(STLC-DI)	AC22620	0.20	23-Mar-12 (AF)	<	0.20 mg/l	
B14-1.5 (Sample I.D.# : 1203147-54) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		160 mg/kg	

Respectfully Submitted,

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B14-1.5 (Sample I.D.# : 1203147-54) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		4.4 mg/l	
B14-3.0 (Sample I.D.# : 1203147-55) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
B14-4.0 (Sample I.D.# : 1203147-56) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		15 mg/kg	
B15-0.5 (Sample I.D.# : 1203147-57) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		2.7 mg/kg	
B15-1.5 (Sample I.D.# : 1203147-58) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
pH	EPA 9045B	AC21402	0.1	14-Mar-12 (CS)		8.2 pH Units	
B15-3.0 (Sample I.D.# : 1203147-59) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		8.6 mg/kg	
B16-0.5 (Sample I.D.# : 1203147-60) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		60 mg/kg	
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		3.9 mg/l	
B16-1.5 (Sample I.D.# : 1203147-61) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	16-Mar-12 (AF)		41 mg/kg	
B16-3.0 (Sample I.D.# : 1203147-62) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		81 mg/kg	

Respectfully Submitted,

Pat Brueckner

Pat Brueckner 3/30/2012
Laboratory Director

PAT-CHEM LABORATORIES

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Customer: **Ninyo & Moore, Geo. & Enviro. Sciences Consul**
475 Goddard, Suite 200
Irvine CA, 92618

Attention: Mike Cushner
Report Date: 30-Mar-12 17:32
Subject: Lead Soil Samples

Project/P.O.#: 208449003

PARAMETER	METHOD	QC BATCH	REPORTING LIMIT	ANALYZED (ANALYST)		RESULT	NOTE
B16-3.0 (Sample I.D.# : 1203147-62) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B(TCLP)	AC22113	0.02	21-Mar-12 (AF)		0.09 mg/l	
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		5.5 mg/l	
Lead	EPA 6010B(STLC-DI)	AC22620	0.20	23-Mar-12 (AF)	<	0.20 mg/l	
B16-4.0 (Sample I.D.# : 1203147-63) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		24 mg/kg	
B17-0.5 (Sample I.D.# : 1203147-64) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		56 mg/kg	
Lead	EPA 6010B(STLC)	AC21906	0.02	19-Mar-12 (AF)		0.31 mg/l	
B17-1.5 (Sample I.D.# : 1203147-65) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		54 mg/kg	
Lead	EPA 6010B(STLC)	AC21906	0.02	19-Mar-12 (AF)		0.37 mg/l	
B17-3.0 (Sample I.D.# : 1203147-66) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		7.4 mg/kg	
B17-4.0 (Sample I.D.# : 1203147-67) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
pH	EPA 9045B	AC21402	0.1	14-Mar-12 (CS)		9.0 pH Units	
B18-0.5 (Sample I.D.# : 1203147-68) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		18 mg/kg	
B18-1.5 (Sample I.D.# : 1203147-69) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		18 mg/kg	
B18-3.0 (Sample I.D.# : 1203147-70) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		1.0 mg/kg	
B18-4.0 (Sample I.D.# : 1203147-71) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		2.7 mg/kg	
B19-0.5 (Sample I.D.# : 1203147-72) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		310 mg/kg	

Respectfully Submitted,

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Pat Brueckner 3/30/2012
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Report Date: 30-Mar-12 17:32
Subject: Lead Soil Samples

Project/P.O.#: 208449003

PARAMETER	METHOD	QC BATCH	REPORTING LIMIT	ANALYZED (ANALYST)		RESULT	NOTE
B19-0.5 (Sample I.D.# : 1203147-72) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B(TCLP)	AC22113	0.02	21-Mar-12 (AF)		0.37 mg/l	
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		20 mg/l	
Lead	EPA 6010B(STLC-DI)	AC22620	0.20	23-Mar-12 (AF)		0.48 mg/l	
B19-1.5 (Sample I.D.# : 1203147-73) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
B19-3.0 (Sample I.D.# : 1203147-74) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
pH	EPA 9045B	AC21402	0.1	14-Mar-12 (CS)		9.1 pH Units	
B19-4.0 (Sample I.D.# : 1203147-75) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		4.3 mg/kg	
B20-0.5 (Sample I.D.# : 1203147-76) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)		68 mg/kg	
Lead	EPA 6010B(STLC)	AC21906	0.20	19-Mar-12 (AF)		4.0 mg/l	
B20-1.5 (Sample I.D.# : 1203147-77) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
B20-3.0 (Sample I.D.# : 1203147-78) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
B20-4.0 (Sample I.D.# : 1203147-79) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21415	1.0	15-Mar-12 (AF)	<	1.0 mg/kg	
EB-1 (Sample I.D.# : 1203147-80) Collected: 13-Mar-12 By J.J.							
Lead	EPA 6010B	AC21512	0.02	16-Mar-12 (AF)		0.54 mg/l	

Respectfully Submitted,

Pat Brueckner

Pat Brueckner 3/30/2012
Laboratory Director

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Attention: Mike Cushner
Report Date: 30-Mar-12 17:32
Subject: Lead Soil Samples

Project/P.O.#: 208449003

Metals by EPA 6000/7000 Series Methods - Quality Control

Parameter	Result	Rep. Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch AC21415 - EPA 3050B										
Blank (AC21415-BLK1)				Prepared: 14-Mar-12 Analyzed: 15-Mar-12						
Lead	ND	1.0	mg/kg							
Blank (AC21415-BLK2)				Prepared: 14-Mar-12 Analyzed: 15-Mar-12						
Lead	ND	1.0	mg/kg							
Blank (AC21415-BLK3)				Prepared: 14-Mar-12 Analyzed: 15-Mar-12						
Lead	ND	1.0	mg/kg							
Blank (AC21415-BLK4)				Prepared: 14-Mar-12 Analyzed: 15-Mar-12						
Lead	ND	1.0	mg/kg							
LCS (AC21415-BS1)				Prepared: 14-Mar-12 Analyzed: 15-Mar-12						
Lead	27.9	1.0	mg/kg	25.0		112	80-120			
LCS (AC21415-BS2)				Prepared: 14-Mar-12 Analyzed: 15-Mar-12						
Lead	28.7	1.0	mg/kg	25.0		115	80-120			
LCS (AC21415-BS3)				Prepared: 14-Mar-12 Analyzed: 15-Mar-12						
Lead	27.9	1.0	mg/kg	25.0		112	80-120			
LCS (AC21415-BS4)				Prepared: 14-Mar-12 Analyzed: 15-Mar-12						
Lead	27.0	1.0	mg/kg	25.0		108	80-120			
LCS Dup (AC21415-BSD1)				Prepared: 14-Mar-12 Analyzed: 15-Mar-12						
Lead	27.3	1.0	mg/kg	25.0		109	80-120	2.04	20	
LCS Dup (AC21415-BSD2)				Prepared: 14-Mar-12 Analyzed: 15-Mar-12						
Lead	28.2	1.0	mg/kg	25.0		113	80-120	2.06	20	

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Metals by EPA 6000/7000 Series Methods - Quality Control

Parameter	Result	Rep. Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch AC21415 - EPA 3050B										
LCS Dup (AC21415-BSD3)				Prepared: 14-Mar-12 Analyzed: 15-Mar-12						
Lead	26.7	1.0	mg/kg	25.0		107	80-120	4.42	20	
LCS Dup (AC21415-BSD4)				Prepared: 14-Mar-12 Analyzed: 15-Mar-12						
Lead	28.2	1.0	mg/kg	25.0		113	80-120	4.16	20	
Duplicate (AC21415-DUP1)		**Source: 1203147-01**		Prepared: 14-Mar-12 Analyzed: 16-Mar-12						
Lead	16.8	1.0	mg/kg		16.5			1.48	20	
Duplicate (AC21415-DUP2)		**Source: 1203147-21**		Prepared: 14-Mar-12 Analyzed: 16-Mar-12						
Lead	12.8	1.0	mg/kg		13.3			3.65	20	
Duplicate (AC21415-DUP3)		**Source: 1203147-41**		Prepared: 14-Mar-12 Analyzed: 16-Mar-12						
Lead	78.4	1.0	mg/kg		76.1			3.06	20	
Duplicate (AC21415-DUP4)		**Source: 1203147-61**		Prepared: 14-Mar-12 Analyzed: 16-Mar-12						
Lead	42.7	1.0	mg/kg		41.0			4.20	20	
Matrix Spike (AC21415-MS1)		**Source: 1203147-01**		Prepared: 14-Mar-12 Analyzed: 16-Mar-12						
Lead	126	1.0	mg/kg	125	16.5	87.8	75-125			
Matrix Spike (AC21415-MS2)		**Source: 1203147-21**		Prepared: 14-Mar-12 Analyzed: 16-Mar-12						
Lead	117	1.0	mg/kg	125	13.3	82.7	75-125			
Matrix Spike (AC21415-MS3)		**Source: 1203147-41**		Prepared: 14-Mar-12 Analyzed: 16-Mar-12						
Lead	197	1.0	mg/kg	125	76.1	97.1	75-125			
Matrix Spike (AC21415-MS4)		**Source: 1203147-61**		Prepared: 14-Mar-12 Analyzed: 16-Mar-12						
Lead	170	1.0	mg/kg	125	41.0	104	75-125			

Respectfully Submitted,

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Subject: Lead Soil Samples

Project/P.O.#: 208449003

Metals by EPA 6000/7000 Series Methods - Quality Control

Parameter	Result	Rep. Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch AC21415 - EPA 3050B										
Matrix Spike Dup (AC21415-MSD1)		**Source: 1203147-01**		Prepared: 14-Mar-12 Analyzed: 16-Mar-12						
Lead	128	1.0	mg/kg	125	16.5	88.9	75-125	1.10	20	
Matrix Spike Dup (AC21415-MSD2)		**Source: 1203147-21**		Prepared: 14-Mar-12 Analyzed: 16-Mar-12						
Lead	138	1.0	mg/kg	125	13.3	100	75-125	17.2	20	
Matrix Spike Dup (AC21415-MSD3)		**Source: 1203147-41**		Prepared: 14-Mar-12 Analyzed: 16-Mar-12						
Lead	218	1.0	mg/kg	125	76.1	114	75-125	10.1	20	
Matrix Spike Dup (AC21415-MSD4)		**Source: 1203147-61**		Prepared: 14-Mar-12 Analyzed: 16-Mar-12						
Lead	164	1.0	mg/kg	125	41.0	98.7	75-125	3.64	20	
Batch AC21512 - EPA 200 Series										
Blank (AC21512-BLK1)				Prepared: 15-Mar-12 Analyzed: 16-Mar-12						
Lead	ND	0.02	mg/l							
LCS (AC21512-BS1)				Prepared: 15-Mar-12 Analyzed: 16-Mar-12						
Lead	0.529	0.02	mg/l	0.500		106	80-120			
LCS Dup (AC21512-BSD1)				Prepared: 15-Mar-12 Analyzed: 16-Mar-12						
Lead	0.534	0.02	mg/l	0.500		107	80-120	0.757	20	
Duplicate (AC21512-DUP1)		**Source: 1203148-01**		Prepared: 15-Mar-12 Analyzed: 16-Mar-12						
Lead	ND	0.02	mg/l		ND				20	
Matrix Spike (AC21512-MS1)		**Source: 1203148-01**		Prepared: 15-Mar-12 Analyzed: 16-Mar-12						
Lead	0.975	0.02	mg/l	1.00	ND	97.5	80-120			

Respectfully Submitted,

Pat Brueckner

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Laboratory Director

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Report Date: 30-Mar-12 17:32
Subject: Lead Soil Samples

Project/P.O.#: 208449003

Metals by EPA 6000/7000 Series Methods - Quality Control

Parameter	Result	Rep. Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch AC21512 - EPA 200 Series										
Matrix Spike Dup (AC21512-MSD1)		**Source: 1203148-01**		Prepared: 15-Mar-12 Analyzed: 16-Mar-12						
Lead	0.990	0.02	mg/l	1.00	ND	99.0	80-120	1.52	20	

Respectfully Submitted,

Pat Brueckner

Pat Brueckner 3/30/2012
Laboratory Director

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Attention: Mike Cushner
Project/P.O.#: 208449003
Report Date: 30-Mar-12 17:32
Subject: Lead Soil Samples

TCLP Metals by 6000/7000 Series Methods - Quality Control

Parameter	Result	Rep. Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch AC22113 - TCLP Metals										
Blank (AC22113-BLK1)				Prepared & Analyzed: 21-Mar-12						
Lead	ND	0.02	mg/l							
LCS (AC22113-BS1)				Prepared & Analyzed: 21-Mar-12						
Lead	0.519	0.02	mg/l	0.500		104	80-120			
LCS Dup (AC22113-BSD1)				Prepared & Analyzed: 21-Mar-12						
Lead	0.510	0.02	mg/l	0.500		102	80-120	1.80	20	
Duplicate (AC22113-DUP1)		**Source: 1203147-25**		Prepared & Analyzed: 21-Mar-12						
Lead	0.337	0.02	mg/l		0.331			2.01	20	
Matrix Spike (AC22113-MS1)		**Source: 1203147-25**		Prepared & Analyzed: 21-Mar-12						
Lead	1.20	0.02	mg/l	1.00	0.331	86.6	75-125			
Matrix Spike Dup (AC22113-MSD1)		**Source: 1203147-25**		Prepared & Analyzed: 21-Mar-12						
Lead	1.19	0.02	mg/l	1.00	0.331	86.3	75-125	0.230	20	

Respectfully Submitted,

Pat Brueckner

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Laboratory Director

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Project/P.O.#: 208449003

STLC Metals by 6000/7000 Series Methods - Quality Control

Parameter	Result	Rep. Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch AC21906 - TCLP Metals										
Blank (AC21906-BLK1)				Prepared & Analyzed: 19-Mar-12						
Lead	ND	0.02	mg/l							
LCS (AC21906-BS1)				Prepared & Analyzed: 19-Mar-12						
Lead	0.534	0.02	mg/l	0.500		107	80-120			
LCS Dup (AC21906-BSD1)				Prepared & Analyzed: 19-Mar-12						
Lead	0.549	0.02	mg/l	0.500		110	80-120	2.68	20	
Duplicate (AC21906-DUP1)		**Source: 1203147-25**		Prepared & Analyzed: 19-Mar-12						
Lead	15.7	0.20	mg/l		15.7			0.0707	20	
Matrix Spike (AC21906-MS1)		**Source: 1203147-25**		Prepared & Analyzed: 19-Mar-12						
Lead	25.6	0.20	mg/l	10.0	15.7	98.9	80-120			
Matrix Spike Dup (AC21906-MSD1)		**Source: 1203147-25**		Prepared & Analyzed: 19-Mar-12						
Lead	25.2	0.20	mg/l	10.0	15.7	95.5	80-120	1.33	20	
Batch AC22620 - TCLP Metals										
Blank (AC22620-BLK1)				Prepared & Analyzed: 23-Mar-12						
Lead	ND	0.02	mg/l							
LCS (AC22620-BS1)				Prepared & Analyzed: 23-Mar-12						
Lead	0.508	0.02	mg/l	0.500		102	80-120			
LCS Dup (AC22620-BSD1)				Prepared & Analyzed: 23-Mar-12						
Lead	0.512	0.02	mg/l	0.500		102	80-120	0.744	20	

Respectfully Submitted,

Pat Brueckner

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Project/P.O.#: 208449003

STLC Metals by 6000/7000 Series Methods - Quality Control

Parameter	Result	Rep. Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch AC22620 - TCLP Metals										
Duplicate (AC22620-DUP1)	**Source: 1203147-25**			Prepared & Analyzed: 23-Mar-12						
Lead	ND	0.20	mg/l		ND				20	
Matrix Spike (AC22620-MS1)	**Source: 1203147-25**			Prepared & Analyzed: 23-Mar-12						
Lead	10.0	0.20	mg/l	10.0	ND	100	80-120			
Matrix Spike Dup (AC22620-MSD1)	**Source: 1203147-25**			Prepared & Analyzed: 23-Mar-12						
Lead	11.5	0.20	mg/l	10.0	ND	115	80-120	13.8	20	

Respectfully Submitted,

Pat Brueckner

Pat Brueckner 3/30/2012
Laboratory Director

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Report Date:	30-Mar-12 17:32
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Project/P.O.#: 208449003

General Inorganic Nonmetallic Chemistry by Standard Methods/EPA Methods - Quality Control

Parameter	Result	Rep. Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Note
Batch AC21402 - General Preparation										
Duplicate (AC21402-DUP1)	**Source: 1203147-05**		Prepared & Analyzed: 14-Mar-12							
pH	8.81	0.1	pH Units		8.85			0.453	15	

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis

Respectfully Submitted,

Pat Brueckner

Pat Brueckner 3/30/2012
Laboratory Director

LABORATORY:	SITE: SB SR-55 / WB SR 91	CONSULTANT:
Pat Chem Laboratories 11990 Discovery Court Moorpark, CA 93021 (805) 532-0012 / fax (805) 532-0016	Connector Anaheim, California EA 0C5601 Project Number 208449003	Ninyo & Moore 475 Goddard, Suite 200 Irvine, CA 92618 (949) 753-7070/fax (949) 753-7071

Special Instructions:

Homogonize the samples

If total lead is <1,000 mg/kg, but >/= 50 mg/kg, run STLC WET test (citric acid extraction EPA Method 7000 series)

If STLC WET >/= 5 mg/l, run STLC-DI (DI extraction EPA Method 7000 series)

If total lead is >/=1,000 mg/kg or STLC WET >/=5 mg/l, run TCLP (EPA Method 7000 series for leachable lead)

Samplers Name: Jonathan Johnson

Relinquished by (name/date and time):	Received by (name/date and time):
Jonathan Johnson [signature] 3/13/12 1028	[signature] 3/13/12 1628
Relinquished by (name/date and time):	Received by (name/date and time):
Relinquished by (name/date and time):	Received by (name/date and time):
Relinquished by (name/date and time):	Received by (name/date and time):

Lab No.	Sample I. D.	Date	Time	Total Lead EPA Method 6010	pH EPA Method 9045	Sample Type	Turn-Around Time	Container Type	HOLD
	B1-0.5	3/13/12	0820	X		Soil	Normal	Glass Jar	
	B1-1.5		0825			Soil	Normal	Glass Jar	
	B1-3.0		0830			Soil	Normal	Glass Jar	
	B1-4.0		0835		X	Soil	Normal	Glass Jar	
	B2-0.5		0845			Soil	Normal	Glass Jar	
	B2-1.5		0850			Soil	Normal	Glass Jar	
	B2-3.0		0905			Soil	Normal	Glass Jar	
	B2-4.0		0910			Soil	Normal	Glass Jar	
	B3-0.5		0900			Soil	Normal	Glass Jar	
	B3-1.5		0904			Soil	Normal	Glass Jar	
	B3-3.0		0940			Soil	Normal	Glass Jar	
	B3-4.0		0945			Soil	Normal	Glass Jar	
	B4-0.5		0950			Soil	Normal	Glass Jar	
	B4-1.5		0955		X	Soil	Normal	Glass Jar	
	B4-3.0		1000			Soil	Normal	Glass Jar	
	B4-4.0		1005			Soil	Normal	Glass Jar	
	B5-0.5		0954			Soil	Normal	Glass Jar	
	B5-1.5		1001			Soil	Normal	Glass Jar	
	B5-3.0		1005			Soil	Normal	Glass Jar	
	B5-4.0		1009			Soil	Normal	Glass Jar	
	B6-0.5		1010			Soil	Normal	Glass Jar	
	B6-1.5		1020			Soil	Normal	Glass Jar	
	B6-3.0		1023			Soil	Normal	Glass Jar	
	B6-4.0		1030			Soil	Normal	Glass Jar	
	B7-0.5		1024			Soil	Normal	Glass Jar	
	B7-1.5		1027			Soil	Normal	Glass Jar	
	B7-3.0		1031			Soil	Normal	Glass Jar	
	B7-4.0		1036			Soil	Normal	Glass Jar	
	B8-0.5		1045			Soil	Normal	Glass Jar	
	B8-1.5		1050			Soil	Normal	Glass Jar	
	B8-3.0		1100			Soil	Normal	Glass Jar	
	B8-4.0		1105		X	Soil	Normal	Glass Jar	
	B9-0.5		1110			Soil	Normal	Glass Jar	
	B9-1.5		1120			Soil	Normal	Glass Jar	
	B9-3.0		1135			Soil	Normal	Glass Jar	
	B9-4.0		1140		X	Soil	Normal	Glass Jar	
	B10-0.5		1055			Soil	Normal	Glass Jar	
	B10-1.5		1100			Soil	Normal	Glass Jar	
	B10-3.0		1100			Soil	Normal	Glass Jar	
	B10-4.0		1105			Soil	Normal	Glass Jar	
	B11-0.5		1205			Soil	Normal	Glass Jar	
	B11-1.5		1208			Soil	Normal	Glass Jar	
	B11-3.0		1218			Soil	Normal	Glass Jar	
	B11-4.0		1222			Soil	Normal	Glass Jar	
	B12-0.5		1221			Soil	Normal	Glass Jar	
	B12-1.5		1230			water	Normal	Plastic	

LABORATORY: Pat Chem Laboratories 11990 Discovery Court Moorpark, CA 93021 (805) 532-0012 / fax (805) 532-0016	SITE: SB SR-55 / WB SR 91 Connector Anaheim, California EA 0C5601 Project Number 208449003	CONSULTANT: Ninyo & Moore 475 Goddard, Suite 200 Irvine, CA 92618 (949) 753-7070/fax (949) 753-7071

Special Instructions:

Homogonize the samples

If total lead is <1,000 mg/kg, but >/= 50 mg/kg, run STLC WET test (citric acid extraction EPA Method 7000 series)

If STLC WET >/= 5 mg/l, run STLC-DI (DI extraction EPA Method 7000 series)

If total lead is >/=1,000 mg/kg or STLC WET >/=5 mg/l, run TCLP (EPA Method 7000 series for leachable lead)

Samplers Name: Jonathan Johnson

Relinquished by (name/date and time):	Received by (name/date and time):
Jonathan Johnson [signature] 3/13/12 1028	[signature] 3/13/12 1028
Relinquished by (name/date and time):	Received by (name/date and time):
Relinquished by (name/date and time):	Received by (name/date and time):
Relinquished by (name/date and time):	Received by (name/date and time):

Lab No.	Sample I. D.	Date	Time	Total Lead EPA Method 6010	pH EPA Method 9045	Sample Type	Turn-Around Time	Container Type	HOLD
	B12-3.0	3/13/12	1240	X		Soil	Normal	Glass Jar	
	B12-4.0		1245			Soil	Normal	Glass Jar	
	B13-0.5		1250		X	Soil	Normal	Glass Jar	
	B13-1.5		1258			Soil	Normal	Glass Jar	
	B13-3.0		1309			Soil	Normal	Glass Jar	
	B13-4.0		1311			Soil	Normal	Glass Jar	
	B14-0.5		1324			Soil	Normal	Glass Jar	
	B14-1.5		1326			Soil	Normal	Glass Jar	
	B14-3.0		1349			Soil	Normal	Glass Jar	
	B14-4.0		1352			Soil	Normal	Glass Jar	
	B15-0.5		1323			Soil	Normal	Glass Jar	
	B15-1.5		1328		X	Soil	Normal	Glass Jar	
	B15-3.0		1345			Soil	Normal	Glass Jar	
	~~B15-4.0~~					~~Soil~~	~~Normal~~	~~Glass Jar~~	
	B16-0.5		1400			Soil	Normal	Glass Jar	
	B16-1.5		1405			Soil	Normal	Glass Jar	
	B16-3.0		1412			Soil	Normal	Glass Jar	
	B16-4.0		1415			Soil	Normal	Glass Jar	
	B17-0.5		1422			Soil	Normal	Glass Jar	
	B17-1.5		1426			Soil	Normal	Glass Jar	
	B17-3.0		1430			Soil	Normal	Glass Jar	
	B17-4.0		1432		X	Soil	Normal	Glass Jar	
	B18-0.5		1438			Soil	Normal	Glass Jar	
	B18-1.5		1443			Soil	Normal	Glass Jar	
	B18-3.0		1449			Soil	Normal	Glass Jar	
	B18-4.0		1450			Soil	Normal	Glass Jar	
	B19-0.5		1440			Soil	Normal	Glass Jar	
	B19-1.5		1441			Soil	Normal	Glass Jar	
	B19-3.0		1443		X	Soil	Normal	Glass Jar	
	B19-4.0		1445			Soil	Normal	Glass Jar	
	B20-0.5		1305			Soil	Normal	Glass Jar	
	B20-1.5		1515			Soil	Normal	Glass Jar	
	B20-3.0		1517			Soil	Normal	Glass Jar	
	B20-4.0		1528			Soil	Normal	Glass Jar	
	EB-1		1539			Water	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						Soil	Normal	Glass Jar	
						water	Normal	Plastic	

APPENDIX C

STATISTICAL ANALYSES

TABLE C1
LEAD ANALYSES – GROUP 1 - SURFACE LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B1-0.5	0.5	17	1.0000	1.570796327
B2-0.5	0.5	5.2	0.3059	0.310865065
B3-0.5	0.5	14	0.8235	0.967604921
B4-0.5	0.5	4.2	0.2471	0.249643807
B5-0.5	0.5	4.4	0.2588	0.261804030

Total Lead	Max TTLC:	17	**Transformed Data**		**Soluble Data**	
Number of Samples:	5		5			
Sample Mean:	9		0.672			
Delta = RT - mean	991					
Appropriate Number of Samples:	0.00					
Standard Deviation of Sample:	6		0.586			
Standard Deviation of Mean:	3		0.262			
Sample Variance:	37		0.343			
t-value for 90%:	1.533	Need to Transform Data	1.533			
Upper Confidence Limit for 90%:			1.074			
Reverse Transformation for 90%			15	mg/kg	0.3	mg/l
t-value for 95%:	2.132		2.132			
Upper Confidence Limit for 95%:			1.231			
Reverse Transformation for 95%			16	mg/kg	0.4	mg/l

TABLE C2
LEAD ANALYSES – GROUP 1 - 1½ TO 4 FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B1-1.5	1.5	22	0.7857	0.903849982
B1-3.0	3	0.5	0.0179	0.017858092
B1-4.0	4	0.5	0.0179	0.017858092
B2-1.5	1.5	0.5	0.0179	0.017858092
B2-3.0	3.0	3.8	0.1357	0.136134383
B2-4.0	4.0	28	1.0000	1.570796327
B3-1.5	1.5	3.1	0.1107	0.110941725
B3-3.0	3.0	20	0.7143	0.795602953
B3-4.0	4.0	1.1	0.0393	0.039295827
B4-1.5	1.5	1.5	0.0536	0.053597086
B4-3.0	3	0.5	0.0179	0.017858092
B4-4.0	4	0.5	0.0179	0.017858092
B5-1.5	1.5	0.5	0.0179	0.017858092
B5-3.0	3.0	2.4	0.0857	0.085819591
B5-4.0	4.0	0.5	0.0179	0.017858092

Total Lead	Max TTLC:	28	**Transformed Data**		**Soluble Data**	
Number of Samples:	15		15			
Sample Mean:	6		0.255			
Delta = RT - mean	994					
Appropriate Number of Samples:	0.00					
Standard Deviation of Sample:	9		0.462			
Standard Deviation of Mean:	2		0.119			
Sample Variance:	87		0.213			
t-value for 90%:	1.345	Need to Transform Data	1.345			
Upper Confidence Limit for 90%:			0.415			
Reverse Transformation for 90%			11	mg/kg	0.1	mg/l
t-value for 95%:	1.761		1.761			
Upper Confidence Limit for 95%:			0.465			
Reverse Transformation for 95%			13	mg/kg	0.2	mg/l

TABLE C3
LEAD ANALYSES – GROUP 1 - SURFACE TO $1^1/_2$ FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B1-0.5	0.5	17	0.7727	0.883126675
B1-1.5	1.5	22	1.0000	1.570796327
B2-0.5	0.5	5.2	0.2364	0.238621731
B2-1.5	1.5	0.5	0.0227	0.022729230
B3-0.5	0.5	14	0.6364	0.689775001
B3-1.5	1.5	3.1	0.1409	0.141379608
B4-0.5	0.5	4.2	0.1909	0.192088188
B4-1.5	1.5	1.5	0.0682	0.068234756
B5-0.5	0.5	4.4	0.2000	0.201357921
B5-1.5	1.5	0.5	0.0227	0.022729230

Total Lead	Max TTLC:	22	**Transformed Data**		**Soluble Data**	
Number of Samples:	10		10			
Sample Mean:	7		0.403			
Delta = RT - mean	993					
Appropriate Number of Samples:	0.00					
Standard Deviation of Sample:	8		0.501			
Standard Deviation of Mean:	2		0.158			
Sample Variance:	58		0.251			
t-value for 90%:	1.383	Need to Transform Data	1.383			
Upper Confidence Limit for 90%:			0.622			
Reverse Transformation for 90%			13	mg/kg	0.2	mg/l
t-value for 95%:	1.833		1.833			
Upper Confidence Limit for 95%:			0.693			
Reverse Transformation for 95%			14	mg/kg	0.3	mg/l

TABLE C4
LEAD ANALYSES – GROUP 1 - 3 TO 4 FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B1-3.0	3	0.5	0.0179	0.017858092
B1-4.0	4	0.5	0.0179	0.017858092
B2-3.0	3.0	3.8	0.1357	0.136134383
B2-4.0	4.0	28	1.0000	1.570796327
B3-3.0	3.0	20	0.7143	0.795602953
B3-4.0	4.0	1.1	0.0393	0.039295827
B4-3.0	3	0.5	0.0179	0.017858092
B4-4.0	4	0.5	0.0179	0.017858092
B5-3.0	3.0	2.4	0.0857	0.085819591
B5-4.0	4.0	0.5	0.0179	0.017858092

Total Lead	Max TTLC:	28	**Transformed Data**		**Soluble Data**	
Number of Samples:	10		10			
Sample Mean:	6		0.272			
Delta = RT - mean	994					
Appropriate Number of Samples:	0.00					
Standard Deviation of Sample:	10		0.515			
Standard Deviation of Mean:	3		0.163			
Sample Variance:	97		0.266			
t-value for 90%:	1.383	Need to Transform Data	1.383			
Upper Confidence Limit for 90%:			0.497			
Reverse Transformation for 90%			13	mg/kg	0.2	mg/l
t-value for 95%:	1.833		1.833			
Upper Confidence Limit for 95%:			0.570			
Reverse Transformation for 95%			15	mg/kg	0.3	mg/l

TABLE C5
LEAD ANALYSES – GROUP 1 - SURFACE TO 3 FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B1-0.5	0.5	17	0.7727	0.883126675
B1-1.5	1.5	22	1.0000	1.570796327
B1-3.0	3	0.5	0.0227	0.022729230
B2-0.5	0.5	5.2	0.2364	0.238621731
B2-1.5	1.5	0.5	0.0227	0.022729230
B2-3.0	3.0	3.8	0.1727	0.173597891
B3-0.5	0.5	14	0.6364	0.689775001
B3-1.5	1.5	3.1	0.1409	0.141379608
B3-3.0	3.0	20	0.9091	1.141096661
B4-0.5	0.5	4.2	0.1909	0.192088188
B4-1.5	1.5	1.5	0.0682	0.068234756
B4-3.0	3	0.5	0.0227	0.022729230
B5-0.5	0.5	4.4	0.2000	0.201357921
B5-1.5	1.5	0.5	0.0227	0.022729230
B5-3.0	3.0	2.4	0.1091	0.109308455

Total Lead	Max TTLC:	22	**Transformed Data**		**Soluble Data**	
Number of Samples:	15		15			
Sample Mean:	7		0.367			
Delta = RT - mean	993					
Appropriate Number of Samples:	0.00					
Standard Deviation of Sample:	8		0.479			
Standard Deviation of Mean:	2		0.124			
Sample Variance:	57		0.229			
t-value for 90%:	1.345	Need to Transform Data	1.345			
Upper Confidence Limit for 90%:			0.533			
Reverse Transformation for 90%			11	mg/kg	0.1	mg/l
t-value for 95%:	1.761		1.761			
Upper Confidence Limit for 95%:			0.584			
Reverse Transformation for 95%			12	mg/kg	0.2	mg/l

TABLE C6
LEAD ANALYSES – GROUP 1 - 4 FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B1-4.0	4.0	0.5	0.0179	0.017858092
B2-4.0	4.0	28	1.0000	1.570796327
B3-4.0	4.0	1.1	0.0393	0.039295827
B4-4.0	4.0	0.5	0.0179	0.017858092
B5-4.0	4.0	0.5	0.0179	0.017858092

Total Lead	Max TTLC:	28	**Transformed Data**		**Soluble Data**	
Number of Samples:	5		5			
Sample Mean:	6		0.333			
Delta = RT - mean	994					
Appropriate Number of Samples:	0.00					
Standard Deviation of Sample:	12		0.692			
Standard Deviation of Mean:	5		0.310			
Sample Variance:	150		0.479			
t-value for 90%:	1.533	Need to Transform Data	1.533			
Upper Confidence Limit for 90%:			0.807			
Reverse Transformation for 90%			20	mg/kg	0.6	mg/l
t-value for 95%:	2.132		2.132			
Upper Confidence Limit for 95%:			0.993			
Reverse Transformation for 95%			23	mg/kg	0.8	mg/l

TABLE C7
LEAD ANALYSES – GROUP 1 - SURFACE TO 4 FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B1-0.5	0.5	17	0.6071	0.652459897
B1-1.5	1.5	22	0.7857	0.903849982
B1-3.0	3	0.5	0.0179	0.017858092
B1-4.0	4	0.5	0.0179	0.017858092
B2-0.5	0.5	5.2	0.1857	0.186798744
B2-1.5	1.5	0.5	0.0179	0.017858092
B2-3.0	3.0	3.8	0.1357	0.136134383
B2-4.0	4.0	28	1.0000	1.570796327
B3-0.5	0.5	14	0.5000	0.523598776
B3-1.5	1.5	3.1	0.1107	0.110941725
B3-3.0	3.0	20	0.7143	0.795602953
B3-4.0	4.0	1.1	0.0393	0.039295827
B4-0.5	0.5	4.2	0.1500	0.150568273
B4-1.5	1.5	1.5	0.0536	0.053597086
B4-3.0	3	0.5	0.0179	0.017858092
B4-4.0	4	0.5	0.0179	0.017858092
B5-0.5	0.5	4.4	0.1571	0.157796896
B5-1.5	1.5	0.5	0.0179	0.017858092
B5-3.0	3.0	2.4	0.0857	0.085819591
B5-4.0	4.0	0.5	0.0179	0.017858092

Total Lead	Max TTLC:	28	**Transformed Data**			**Soluble Data**
Number of Samples:	20		20			
Sample Mean:	7		0.275			
Delta = RT - mean	993					
Appropriate Number of Samples:	0.00					
Standard Deviation of Sample:	9		0.413			
Standard Deviation of Mean:	2		0.092			
Sample Variance:	74		0.170			
t-value for 90%:	1.328	Need to Transform Data	1.328			
Upper Confidence Limit for 90%:			0.397			
Reverse Transformation for 90%			11	mg/kg	0.1	mg/l
t-value for 95%:	1.729		1.729			
Upper Confidence Limit for 95%:			0.434			
Reverse Transformation for 95%			12	mg/kg	0.1	mg/l

TABLE C8
LEAD ANALYSES – GROUP 2 - SURFACE LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B6-0.5	0.5	13	0.0118	0.011818457
B7-0.5	0.5	600	0.5455	0.576931345
B8-0.5	0.5	1100	1.0000	1.570796327
B9-0.5	0.5	42	0.0382	0.038191102
B10-0.5	0.5	140	0.1273	0.127618858
B11-0.5	0.5	76	0.0691	0.069145996
B12-0.5	0.5	14	0.0127	0.012727616
B13-0.5	0.5	17	0.0155	0.015455161
B14-0.5	0.5	110	0.1000	0.100167421
B15-0.5	0.5	2.7	0.0025	0.002454548
B16-0.5	0.5	60	0.0545	0.054572538
B17-0.5	0.5	56	0.0509	0.050931107
B18-0.5	0.5	18	0.0164	0.016364367
B19-0.5	0.5	310	0.2818	0.285688573
B20-0.5	0.5	68	0.0618	0.061857623

Total Lead	Max TTLC:	1100	**Transformed Data**		**Soluble Data**	
Number of Samples:	15		15			
Sample Mean:	175		0.200			
Delta = RT - mean	825					
Appropriate Number of Samples:	0.24					
Standard Deviation of Sample:	300		0.408			
Standard Deviation of Mean:	77		0.105			
Sample Variance:	89837		0.166			
t-value for 90%:	1.345	Need to Transform Data	1.345			
Upper Confidence Limit for 90%:			0.341			
Reverse Transformation for 90%			368	mg/kg	21.1	mg/l
t-value for 95%:	1.761		1.761			
Upper Confidence Limit for 95%:			0.385			
Reverse Transformation for 95%			413	mg/kg	23.7	mg/l

TABLE C9
LEAD ANALYSES – GROUP 2 - 1½ TO 4 FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B6-1.5	1.5	130	0.4194	0.432734534
B6-3.0	3.0	1.7	0.0055	0.005483898
B6-4.0	4.0	0.5	0.0016	0.001612904
B7-1.5	1.5	23	0.0742	0.074261786
B7-3.0	3.0	0.5	0.0016	0.001612904
B7-4.0	4.0	0.5	0.0016	0.001612904
B8-1.5	1.5	13	0.0419	0.041947785
B8-3.0	3.0	1.4	0.0045	0.004516144
B8-4.0	4.0	20	0.0645	0.064560969
B9-1.5	1.5	14	0.0452	0.045176656
B9-3.0	3.0	0.5	0.0016	0.001612904
B9-4.0	4.0	11	0.0355	0.035491322
B10-1.5	1.5	12	0.0387	0.038719351
B10-3.0	3.0	170	0.5484	0.580434223
B10-4.0	4.0	4.7	0.0152	0.015161871
B11-1.5	1.5	120	0.3871	0.397480802
B11-3.0	3.0	270	0.8710	1.057168492
B11-4.0	4.0	310	1.0000	1.570796327
B12-1.5	1.5	6.4	0.0206	0.020646628
B12-3.0	3.0	22	0.0710	0.071027448
B12-4.0	4.0	56	0.1806	0.181642365
B13-1.5	1.5	29	0.0935	0.093685372
B13-3.0	3.0	32	0.1032	0.103410013
B13-4.0	4.0	45	0.1452	0.145675988
B14-1.5	1.5	160	0.5161	0.542325303
B14-3.0	3.0	0.5	0.0016	0.001612904
B14-4.0	4.0	15	0.0484	0.048405998
B15-1.5	1.5	0.5	0.0016	0.001612904
B15-3.0	3.0	8.6	0.0277	0.027745495
B16-1.5	1.5	41	0.1323	0.132646712
B16-3.0	3.0	81	0.2613	0.264358723
B16-4.0	4.0	24	0.0774	0.077496903
B17-1.5	1.5	54	0.1742	0.175086736
B17-3.0	3.0	7.4	0.0239	0.023873235
B17-4.0	4.0	0.5	0.0016	0.001612904
B18-1.5	1.5	18	0.0581	0.058097193
B18-3.0	3.0	1.0	0.0032	0.003225812
B18-4.0	4.0	2.7	0.0087	0.008709788
B19-1.5	1.5	0.5	0.0016	0.001612904
B19-3.0	3.0	0.5	0.0016	0.001612904

TABLE C9
LEAD ANALYSES – GROUP 2 - 1½ TO 4 FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B19-4.0	4.0	4.3	0.0139	0.013871413
B20-1.5	1.5	0.5	0.0016	0.001612904
B20-3.0	3.0	0.5	0.0016	0.001612904
B20-4.0	4.0	0.5	0.0016	0.001612904

Total Lead	Max TTLC:	310	**Transformed Data**		**Soluble Data**	
Number of Samples:	44		44			
Sample Mean:	39		0.145			
Delta = RT - mean	961					
Appropriate Number of Samples:	0.01					
Standard Deviation of Sample:	70		0.300			
Standard Deviation of Mean:	11		0.045			
Sample Variance:	4874		0.090			
t-value for 90%:	1.302	Need to Transform Data	1.302			
Upper Confidence Limit for 90%:			0.204			
Reverse Transformation for 90%			63	mg/kg	3.1	mg/l
t-value for 95%:	1.682		1.682			
Upper Confidence Limit for 95%:			0.221			
Reverse Transformation for 95%			68	mg/kg	3.4	mg/l

TABLE C10
LEAD ANALYSES – GROUP 2 - SURFACE TO 1½ FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B6-0.5	0.5	13	0.0118	0.011818457
B6-1.5	1.5	130	0.1182	0.118458668
B7-0.5	0.5	600	0.5455	0.576931345
B7-1.5	1.5	23	0.0209	0.020910615
B8-0.5	0.5	1100	1.0000	1.570796327
B8-1.5	1.5	13	0.0118	0.011818457
B9-0.5	0.5	42	0.0382	0.038191102
B9-1.5	1.5	14	0.0127	0.012727616
B10-0.5	0.5	140	0.1273	0.127618858
B10-1.5	1.5	12	0.0109	0.010909307
B11-0.5	0.5	76	0.0691	0.069145996
B11-1.5	1.5	120	0.1091	0.109308455
B12-0.5	0.5	14	0.0127	0.012727616
B12-1.5	1.5	6.4	0.0058	0.005818215
B13-0.5	0.5	17	0.0155	0.015455161
B13-1.5	1.5	29	0.0264	0.026366691
B14-0.5	0.5	110	0.1000	0.100167421
B14-1.5	1.5	160	0.1455	0.145972389
B15-0.5	0.5	2.7	0.0025	0.002454548
B15-1.5	1.5	0.5	0.0005	0.000454545
B16-0.5	0.5	60	0.0545	0.054572538
B16-1.5	1.5	41	0.0373	0.037281363
B17-0.5	0.5	56	0.0509	0.050931107
B17-1.5	1.5	54	0.0491	0.049110648
B18-0.5	0.5	18	0.0164	0.016364367
B18-1.5	1.5	18	0.0164	0.016364367
B19-0.5	0.5	310	0.2818	0.285688573
B19-1.5	1.5	0.5	0.0005	0.000454545
B20-0.5	0.5	68	0.0618	0.061857623
B20-1.5	1.5	0.5	0.0005	0.000454545

Total Lead	Max TTLC:	1100	**Transformed Data**		**Soluble Data**
Number of Samples:	30		30		
Sample Mean:	108		0.119		
Delta = RT - mean	892				
Appropriate Number of Samples:	0.11				
Standard Deviation of Sample:	222		0.297		
Standard Deviation of Mean:	41		0.054		
Sample Variance:	49298		0.088		
t-value for 90%:	1.311	Need to Transform Data	1.311		
Upper Confidence Limit for 90%:			0.190		
Reverse Transformation for 90%			207	mg/kg	11.6 mg/l
t-value for 95%:	1.699		1.699		
Upper Confidence Limit for 95%:			0.211		
Reverse Transformation for 95%			230	mg/kg	13.0 mg/l

TABLE C11
LEAD ANALYSES – GROUP 2 - 3 TO 4 FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B6-3.0	3.0	1.7	0.0055	0.005483898
B6-4.0	4.0	0.5	0.0016	0.001612904
B7-3.0	3.0	0.5	0.0016	0.001612904
B7-4.0	4.0	0.5	0.0016	0.001612904
B8-3.0	3.0	1.4	0.0045	0.004516144
B8-4.0	4.0	20	0.0645	0.064560969
B9-3.0	3.0	0.5	0.0016	0.001612904
B9-4.0	4.0	11	0.0355	0.035491322
B10-3.0	3.0	170	0.5484	0.580434223
B10-4.0	4.0	4.7	0.0152	0.015161871
B11-3.0	3.0	270	0.8710	1.057168492
B11-4.0	4.0	310	1.0000	1.570796327
B12-3.0	3.0	22	0.0710	0.071027448
B12-4.0	4.0	56	0.1806	0.181642365
B13-3.0	3.0	32	0.1032	0.103410013
B13-4.0	4.0	45	0.1452	0.145675988
B14-3.0	3.0	0.5	0.0016	0.001612904
B14-4.0	4.0	15	0.0484	0.048405998
B15-3.0	3.0	8.6	0.0277	0.027745495
B16-3.0	3.0	81	0.2613	0.264358723
B16-4.0	4.0	24	0.0774	0.077496903
B17-3.0	3.0	7.4	0.0239	0.023873235
B17-4.0	4.0	0.5	0.0016	0.001612904
B18-3.0	3.0	1.0	0.0032	0.003225812
B18-4.0	4.0	2.7	0.0087	0.008709788
B19-3.0	3.0	0.5	0.0016	0.001612904
B19-4.0	4.0	4.3	0.0139	0.013871413
B20-3.0	3.0	0.5	0.0016	0.001612904
B20-4.0	4.0	0.5	0.0016	0.001612904

Total Lead	Max TTLC:	310	**Transformed Data**		**Soluble Data**	
Number of Samples:	29		29			
Sample Mean:	38		0.149			
Delta = RT - mean	962					
Appropriate Number of Samples:	0.01					
Standard Deviation of Sample:	78		0.350			
Standard Deviation of Mean:	15		0.065			
Sample Variance:	6125		0.123			
t-value for 90%:	1.313	Need to Transform Data	1.313			
Upper Confidence Limit for 90%:			0.234			
Reverse Transformation for 90%			72	mg/kg	3.7	mg/l
t-value for 95%:	1.701		1.701			
Upper Confidence Limit for 95%:			0.260			
Reverse Transformation for 95%			80	mg/kg	4.1	mg/l

TABLE C12
LEAD ANALYSES – GROUP 2 - SURFACE TO 3 FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B6-0.5	0.5	13	0.0118	0.011818457
B6-1.5	1.5	130	0.1182	0.118458668
B6-3.0	3.0	1.7	0.0015	0.001545455
B7-0.5	0.5	600	0.5455	0.576931345
B7-1.5	1.5	23	0.0209	0.020910615
B7-3.0	3.0	0.5	0.0005	0.000454545
B8-0.5	0.5	1100	1.0000	1.570796327
B8-1.5	1.5	13	0.0118	0.011818457
B8-3.0	3.0	1.4	0.0013	0.001272728
B9-0.5	0.5	42	0.0382	0.038191102
B9-1.5	1.5	14	0.0127	0.012727616
B9-3.0	3.0	0.5	0.0005	0.000454545
B10-0.5	0.5	140	0.1273	0.127618858
B10-1.5	1.5	12	0.0109	0.010909307
B10-3.0	3.0	170	0.1545	0.155167364
B11-0.5	0.5	76	0.0691	0.069145996
B11-1.5	1.5	120	0.1091	0.109308455
B11-3.0	3.0	270	0.2455	0.247988554
B12-0.5	0.5	14	0.0127	0.012727616
B12-1.5	1.5	6.4	0.0058	0.005818215
B12-3.0	3.0	22	0.0200	0.020001334
B13-0.5	0.5	17	0.0155	0.015455161
B13-1.5	1.5	29	0.0264	0.026366691
B13-3.0	3.0	32	0.0291	0.029095014
B14-0.5	0.5	110	0.1000	0.100167421
B14-1.5	1.5	160	0.1455	0.145972389
B14-3.0	3.0	0.5	0.0005	0.000454545
B15-0.5	0.5	2.7	0.0025	0.002454548
B15-1.5	1.5	0.5	0.0005	0.000454545
B15-3.0	3.0	8.6	0.0078	0.007818261
B16-0.5	0.5	60	0.0545	0.054572538
B16-1.5	1.5	41	0.0373	0.037281363
B16-3.0	3.0	81	0.0736	0.073703073
B17-0.5	0.5	56	0.0509	0.050931107
B17-1.5	1.5	54	0.0491	0.049110648
B17-3.0	3.0	7.4	0.0067	0.006727323
B18-0.5	0.5	18	0.0164	0.016364367
B18-1.5	1.5	18	0.0164	0.016364367
B18-3.0	3.0	1.0	0.0009	0.000909091
B19-0.5	0.5	310	0.2818	0.285688573
B19-1.5	1.5	0.5	0.0005	0.000454545
B19-3.0	3.0	0.5	0.0005	0.000454545
B20-0.5	0.5	68	0.0618	0.061857623

TABLE C12
LEAD ANALYSES – GROUP 2 - SURFACE TO 3 FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B20-1.5	1.5	0.5	0.0005	0.000454545
B20-3.0	3.0	0.5	0.0005	0.000454545

Total Lead	Max TTLC:	1100	**Transformed Data**		**Soluble Data**
Number of Samples:	45		45		
Sample Mean:	85		0.091		
Delta = RT - mean	915				
Appropriate Number of Samples:	0.07				
Standard Deviation of Sample:	188		0.247		
Standard Deviation of Mean:	28		0.037		
Sample Variance:	35516		0.061		
t-value for 90%:	1.302	Need to Transform Data	1.302		
Upper Confidence Limit for 90%:			0.139		
Reverse Transformation for 90%			153	mg/kg	8.4 mg/l
t-value for 95%:	1.681		1.681		
Upper Confidence Limit for 95%:			0.153		
Reverse Transformation for 95%			168	mg/kg	9.3 mg/l

TABLE C13
LEAD ANALYSES – GROUP 2 - 4 FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B6-4.0	4.0	0.5	0.0016	0.001612904
B7-4.0	4.0	0.5	0.0016	0.001612904
B8-4.0	4.0	20	0.0645	0.064560969
B9-4.0	4.0	11	0.0355	0.035491322
B10-4.0	4.0	4.7	0.0152	0.015161871
B11-4.0	4.0	310	1.0000	1.570796327
B12-4.0	4.0	56	0.1806	0.181642365
B13-4.0	4.0	45	0.1452	0.145675988
B14-4.0	4.0	15	0.0484	0.048405998
B16-4.0	4.0	24	0.0774	0.077496903
B17-4.0	4.0	0.5	0.0016	0.001612904
B18-4.0	4.0	2.7	0.0087	0.008709788
B19-4.0	4.0	4.3	0.0139	0.013871413
B20-4.0	4.0	0.5	0.0016	0.001612904

Total Lead	Max TTLC:	310	**Transformed Data**		**Soluble Data**	
Number of Samples:	14		14			
Sample Mean:	35		0.155			
Delta = RT - mean	965					
Appropriate Number of Samples:	0.01					
Standard Deviation of Sample:	81		0.411			
Standard Deviation of Mean:	22		0.110			
Sample Variance:	6550		0.169			
t-value for 90%:	1.350	Need to Transform Data	1.350			
Upper Confidence Limit for 90%:			0.303			
Reverse Transformation for 90%			93	mg/kg	4.9	mg/l
t-value for 95%:	1.771		1.771			
Upper Confidence Limit for 95%:			0.350			
Reverse Transformation for 95%			106	mg/kg	5.7	mg/l

TABLE C14
LEAD ANALYSES – GROUP 2 - SURFACE TO 4 FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B6-0.5	0.5	13	0.0118	0.011818457
B6-1.5	1.5	130	0.1182	0.118458668
B6-3.0	3.0	1.7	0.0015	0.001545455
B6-4.0	4.0	0.5	0.0005	0.000454545
B7-0.5	0.5	600	0.5455	0.576931345
B7-1.5	1.5	23	0.0209	0.020910615
B7-3.0	3.0	0.5	0.0005	0.000454545
B7-4.0	4.0	0.5	0.0005	0.000454545
B8-0.5	0.5	1100	1.0000	1.570796327
B8-1.5	1.5	13	0.0118	0.011818457
B8-3.0	3.0	1.4	0.0013	0.001272728
B8-4.0	4.0	20	0.0182	0.018182820
B9-0.5	0.5	42	0.0382	0.038191102
B9-1.5	1.5	14	0.0127	0.012727616
B9-3.0	3.0	0.5	0.0005	0.000454545
B9-4.0	4.0	11	0.0100	0.010000167
B10-0.5	0.5	140	0.1273	0.127618858
B10-1.5	1.5	12	0.0109	0.010909307
B10-3.0	3.0	170	0.1545	0.155167364
B10-4.0	4.0	4.7	0.0043	0.004272740
B11-0.5	0.5	76	0.0691	0.069145996
B11-1.5	1.5	120	0.1091	0.109308455
B11-3.0	3.0	270	0.2455	0.247988554
B11-4.0	4.0	310	0.2818	0.285688573
B12-0.5	0.5	14	0.0127	0.012727616
B12-1.5	1.5	6.4	0.0058	0.005818215
B12-3.0	3.0	22	0.0200	0.020001334
B12-4.0	4.0	56	0.0509	0.050931107
B13-0.5	0.5	17	0.0155	0.015455161
B13-1.5	1.5	29	0.0264	0.026366691
B13-3.0	3.0	32	0.0291	0.029095014
B13-4.0	4.0	45	0.0409	0.040920510
B14-0.5	0.5	110	0.1000	0.100167421
B14-1.5	1.5	160	0.1455	0.145972389
B14-3.0	3.0	0.5	0.0005	0.000454545
B14-4.0	4.0	15	0.0136	0.013636786
B15-0.5	0.5	2.7	0.0025	0.002454548
B15-1.5	1.5	0.5	0.0005	0.000454545
B15-3.0	3.0	8.6	0.0078	0.007818261
B16-0.5	0.5	60	0.0545	0.054572538
B16-1.5	1.5	41	0.0373	0.037281363
B16-3.0	3.0	81	0.0736	0.073703073
B16-4.0	4.0	24	0.0218	0.021819913
B17-0.5	0.5	56	0.0509	0.050931107
B17-1.5	1.5	54	0.0491	0.049110648

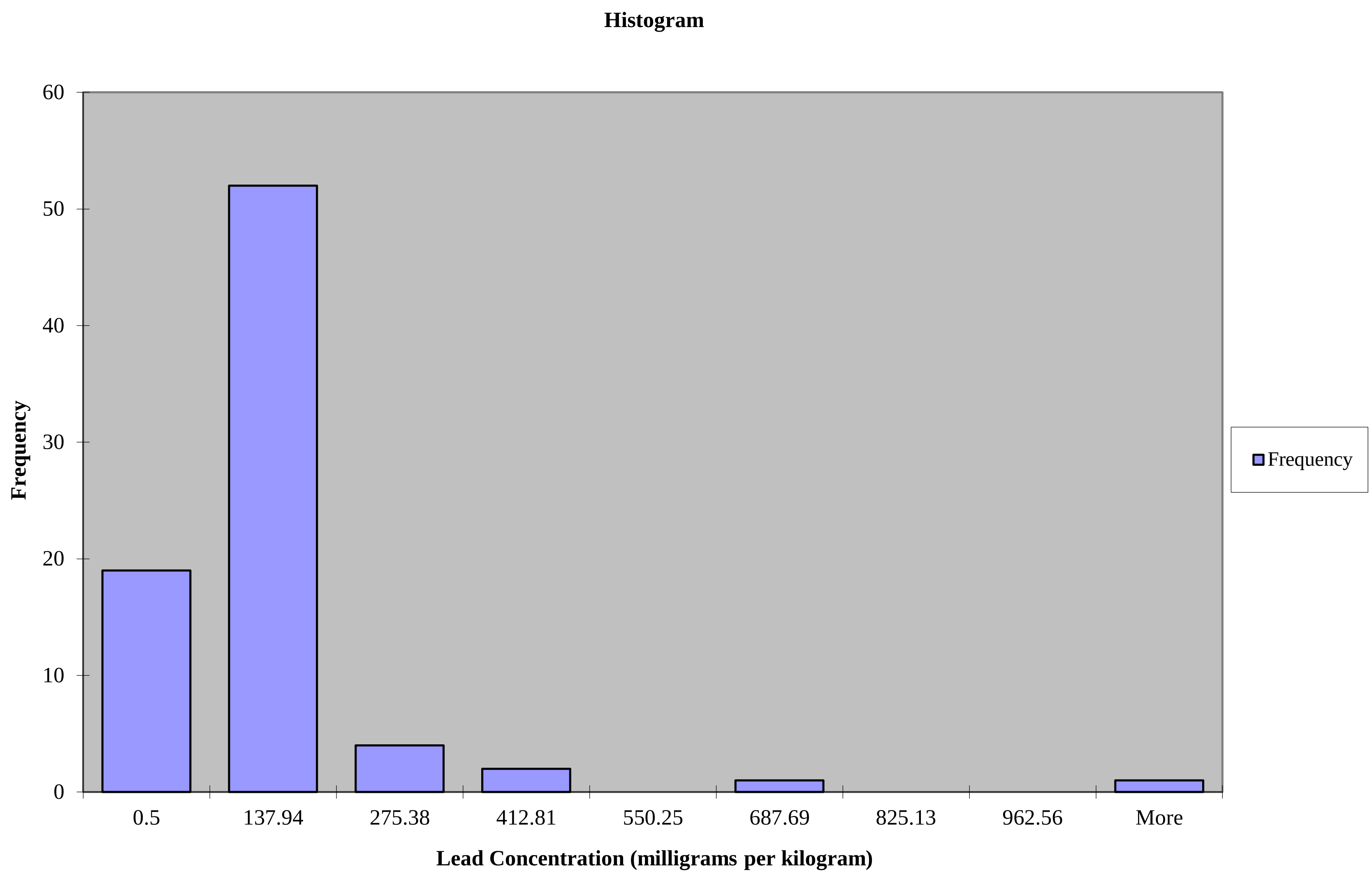
TABLE C14
LEAD ANALYSES – GROUP 2 - SURFACE TO 4 FOOT LAYER

Sample ID	Depth (feet bgs)	Total Lead (mg/kg)	Total Lead % of Maximum	Transformed Data Arcsine
B17-3.0	3.0	7.4	0.0067	0.006727323
B17-4.0	4.0	0.5	0.0005	0.000454545
B18-0.5	0.5	18	0.0164	0.016364367
B18-1.5	1.5	18	0.0164	0.016364367
B18-3.0	3.0	1.0	0.0009	0.000909091
B18-4.0	4.0	2.7	0.0025	0.002454548
B19-0.5	0.5	310	0.2818	0.285688573
B19-1.5	1.5	0.5	0.0005	0.000454545
B19-3.0	3.0	0.5	0.0005	0.000454545
B19-4.0	4.0	4.3	0.0039	0.003909101
B20-0.5	0.5	68	0.0618	0.061857623
B20-1.5	1.5	0.5	0.0005	0.000454545
B20-3.0	3.0	0.5	0.0005	0.000454545
B20-4.0	4.0	0.5	0.0005	0.000454545

Total Lead	Max TTLC:	1100	**Transformed Data**		**Soluble Data**	
Number of Samples:	59		59			
Sample Mean:	74		0.077			
Delta = RT - mean	926					
Appropriate Number of Samples:	0.06					
Standard Deviation of Sample:	170		0.220			
Standard Deviation of Mean:	22		0.029			
Sample Variance:	28874		0.048			
t-value for 90%:	1.297	Need to Transform Data	1.297			
Upper Confidence Limit for 90%:			0.114			
Reverse Transformation for 90%			126	mg/kg	6.8	mg/l
t-value for 95%:	1.672		1.672			
Upper Confidence Limit for 95%:			0.125			
Reverse Transformation for 95%			137	mg/kg	7.5	mg/l

APPENDIX D

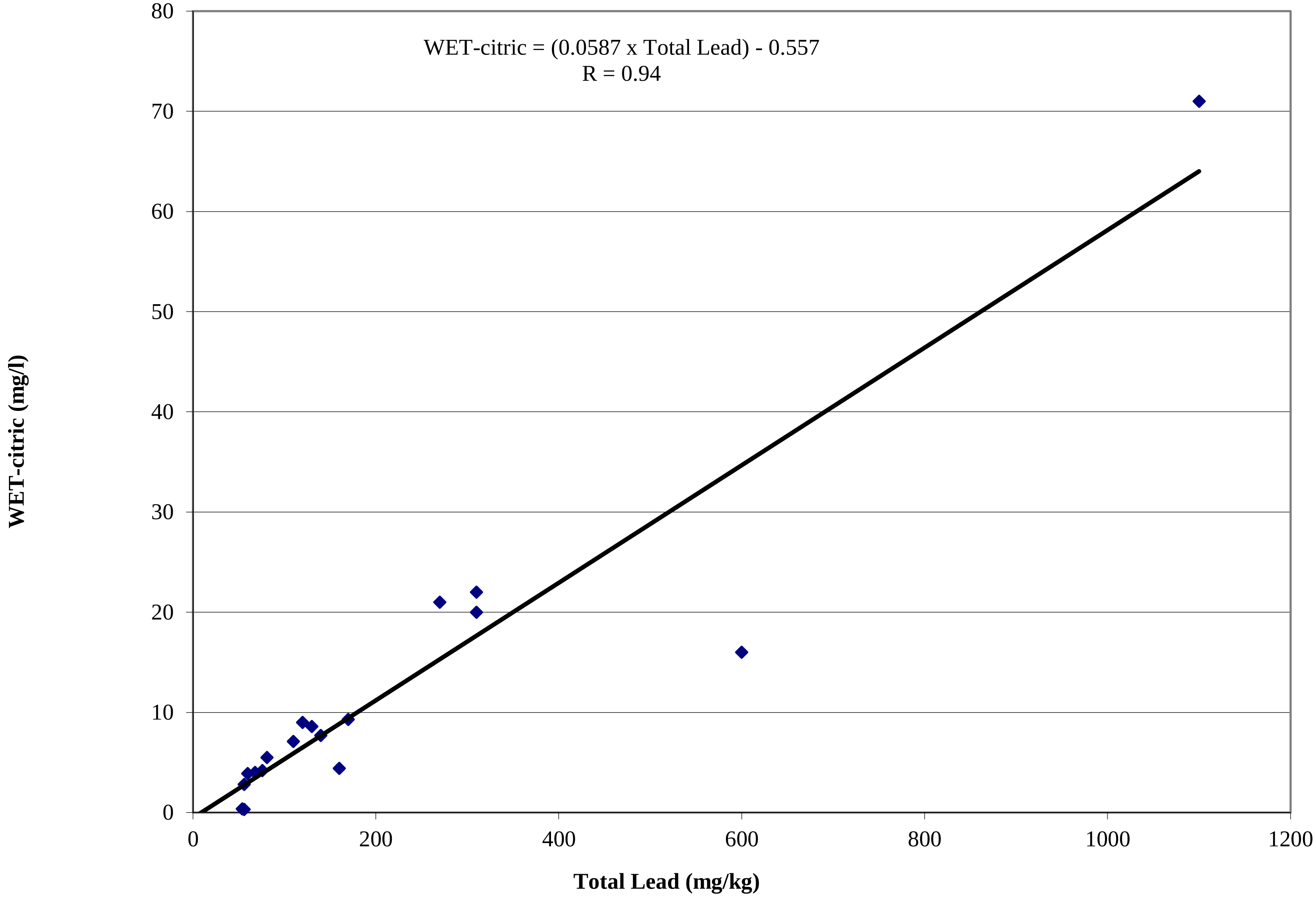
HISTOGRAM


Histogram
60
50
40
30
20
10
0
Frequency
0.5
137.94
275.38
412.81
550.25
687.69
825.13
962.56
More
Lead Concentration (milligrams per kilogram)
Frequency

APPENDIX E

CORRELATION OF TOTAL LEAD TO SOLUBLE LEAD

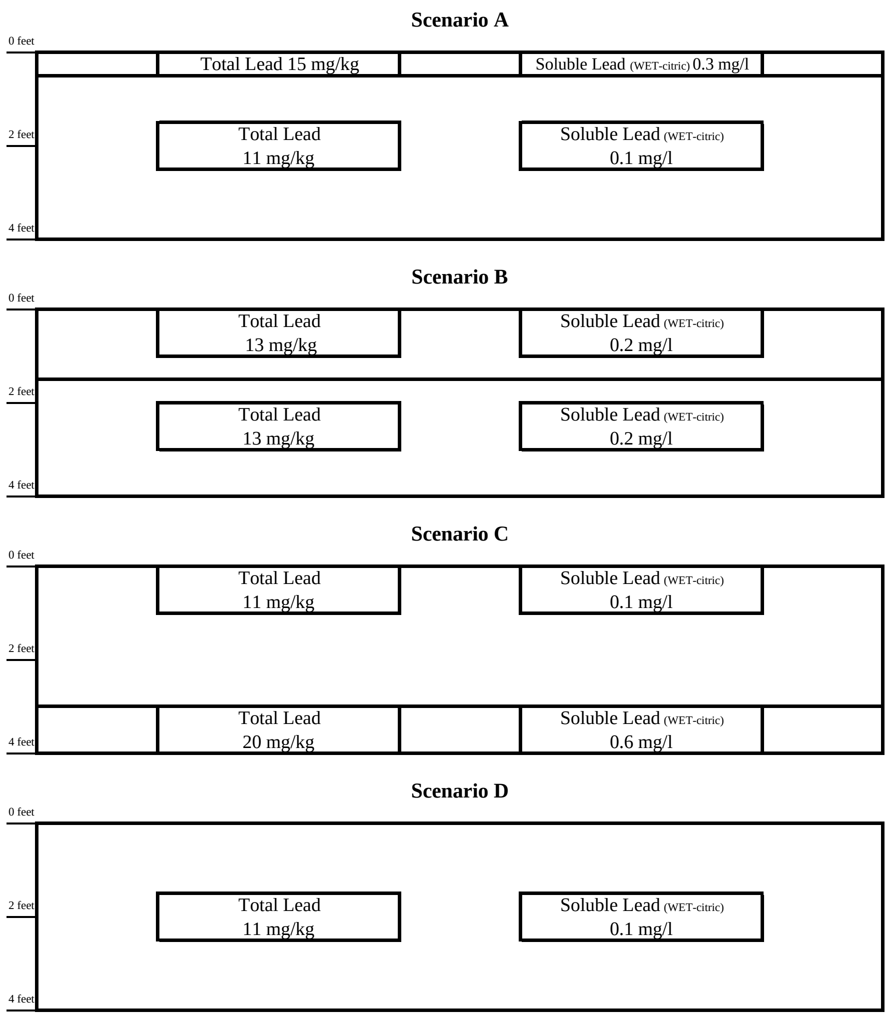
CORRELATION OF TOTAL LEAD TO SOLUBLE LEAD



APPENDIX F

BLOCK DIAGRAMS

FIGURE F1 – GROUP 1 - BLOCK DIAGRAM FOR POTENTIAL DEPARTMENT RIGHT-OF-WAY RE-USE ONE-TAILED 90 PERCENT UCLs FOR ARCSINE TRANSFORMATION



– Non-hazardous soil with respect to total and soluble lead

– Reuse Condition 1 [Hazardous. Variance applies. Use material on job site. Place a minimum of 5 feet above maximum water table elevation and cover with at least 1 foot of non-hazardous soil]

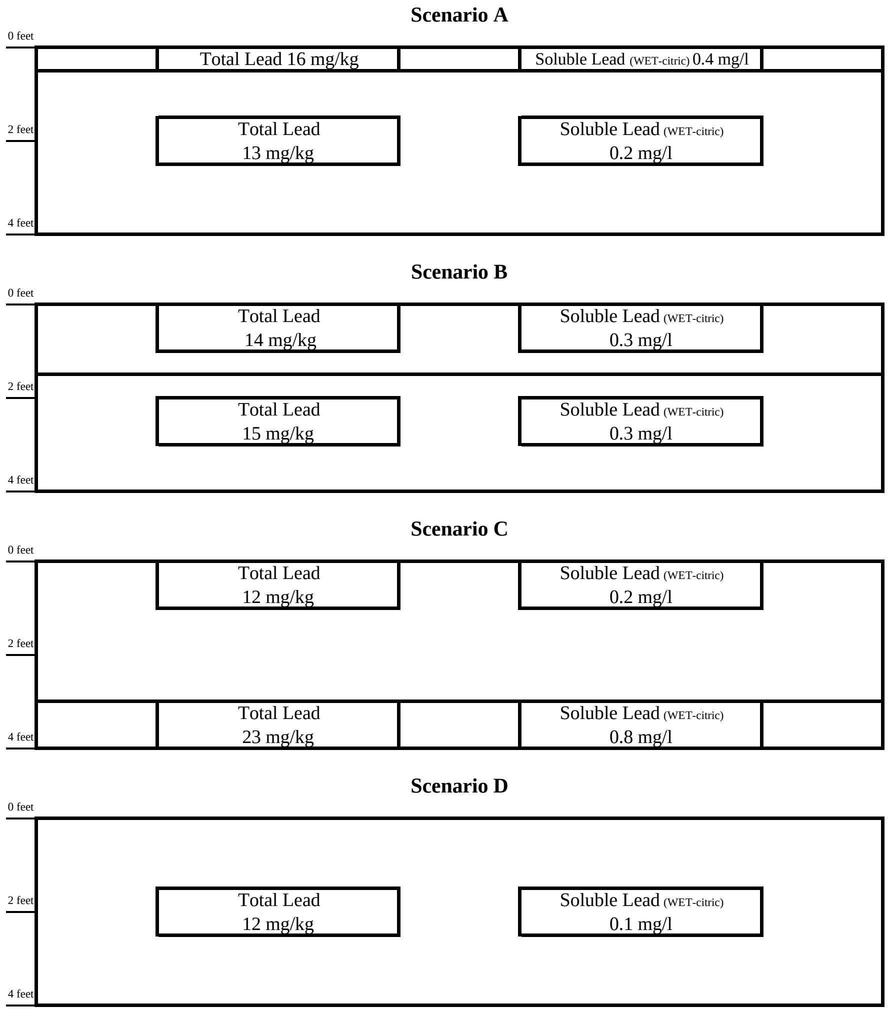
– Reuse Condition 2 [Hazardous. Variance applies. Use material on job site. Place a minimum of 5 feet above maximum water table elevation and protect from infiltration with a pavement structure which will be maintained by the Department]

– Hazardous. Class 1 disposal site, all other Title 22 CCR requirements apply

– Hazardous. Class 1 disposal site RCRA based on the layer having a TCLP value≥ 5 mg/l

UCL – upper confidence limit
WET-DI – soluble lead using the Waste Extraction Test with deionized water
WET-citric acid – soluble lead using the Waste Extraction Test with citric acid
TCLP – Toxicity Characteristic Leaching Procedure
mg/kg – milligrams per kilogram
mg/l – milligrams per liter
CCR – California Code of Regulations
RCRA – Resource, Conservation, and Recovery Act

FIGURE F2 – GROUP 1 - BLOCK DIAGRAM FOR POTENTIAL DEPARTMENT OFF SITE DISPOSAL ONE-TAILED 95 PERCENT UCLs FOR ARCSINE TRANSFORMATION



– Non-hazardous soil with respect to total and soluble lead

– Reuse Condition 1 [Hazardous. Variance applies. Use material on job site. Place a minimum of 5 feet above maximum water table elevation and cover with at least 1 foot of non-hazardous soil]

– Reuse Condition 2 [Hazardous. Variance applies. Use material on job site. Place a minimum of 5 feet above maximum water table elevation and protect from infiltration with a pavement structure which will be maintained by the Department]

– Hazardous. Class 1 disposal site, all other Title 22 CCR requirements apply

– Hazardous. Class 1 disposal site RCRA based on the layer having a TCLP value≥ 5 mg/l

UCL – upper confidence limit
WET-DI – soluble lead using the Waste Extraction Test with deionized water
WET-citric acid – soluble lead using the Waste Extraction Test with citric acid
TCLP – Toxicity Characteristic Leaching Procedure
mg/kg – milligrams per kilogram
mg/l – milligrams per liter
CCR – California Code of Regulations
RCRA – Resource, Conservation, and Recovery Act

FIGURE F3 – GROUP 2 - BLOCK DIAGRAM FOR POTENTIAL DEPARTMENT RIGHT-OF-WAY RE-USE ONE-TAILED 90 PERCENT UCLs FOR ARCSINE TRANSFORMATION

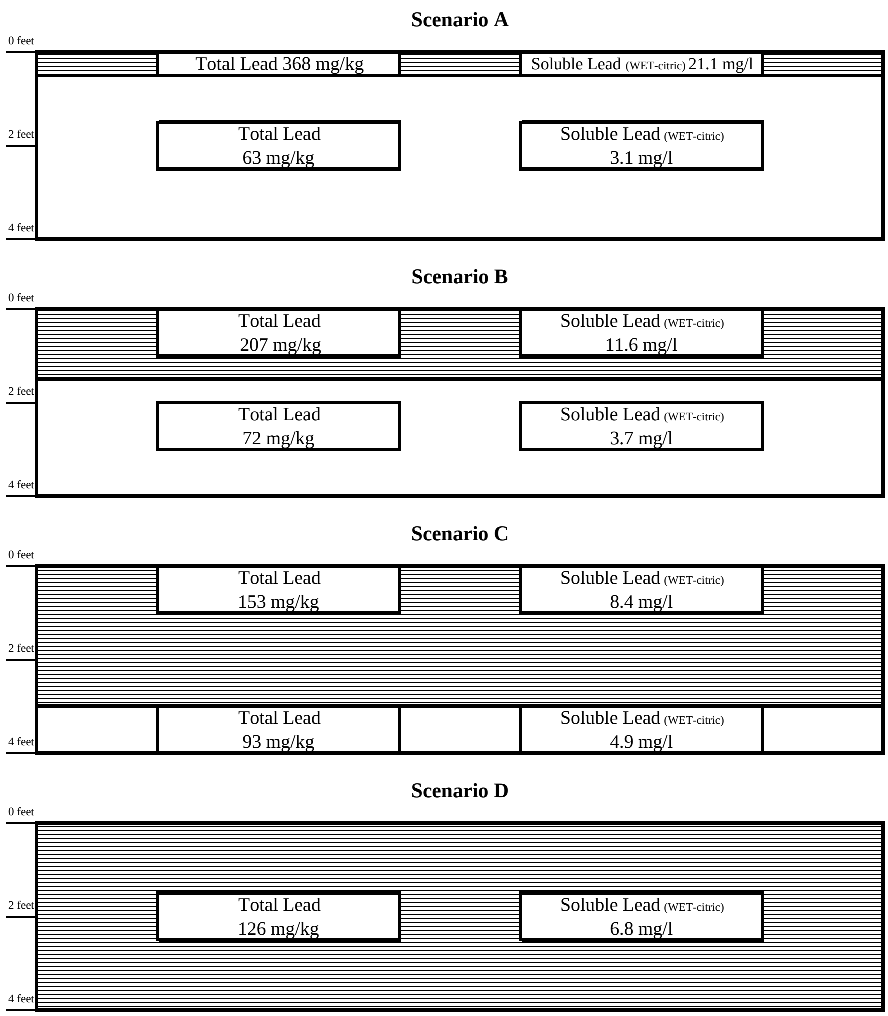


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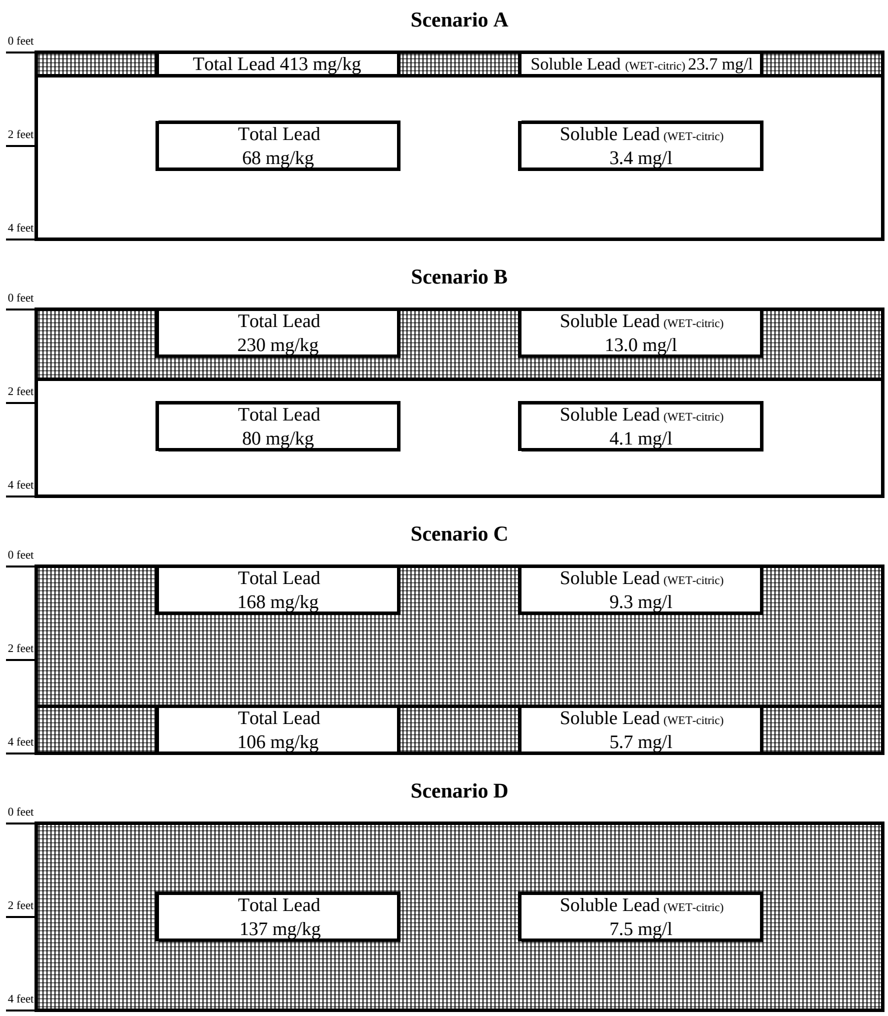
FIGURE F4 – GROUP 2 - BLOCK DIAGRAM FOR POTENTIAL DEPARTMENT OFF SITE DISPOSAL ONE-TAILED 95 PERCENT UCLs FOR ARCSINE TRANSFORMATION



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ELECTRICAL ENGINEERING DIVISION
201 S. ANAHEIM BLVD., SUITE 701
ANAHEIM, CA 92805

Case #: UEC2012-00600
Project #: 1300000074
Work Order #: 1300500-01

LETTER OF TRANSMITTAL

Date: October 12, 2012

Service Requested: [X] Relocation [ ] Temporary [ ] Permanent

Applicant

CALTRANS

Project Description:
C-Secondary Fed Underground Service.
Relocate 100Amp Meter Pedestal. SR-2704
SR-2705

Service Address:
4001 E RIVERDALE AVE
ANAHEIM, CA

This Letter of Transmittal (LOT) identifies the requirements and fees to be paid by the applicant for the requested electrical service per the Electric Rates, Rules & Regulations, which includes design preparation of service plans, utility inspection fees, and utility construction labor, materials and equipment charges.

Enclosed, please find:

- [X] 1 copies of the subject drawing for contractor bidding and construction use.
- [X] 1 copies of the Underground Electrical Specifications.
- [ ] ___ copies of the Street Lighting Specification.
- [ ] Outage notification letter required to notify affected properties of the planned outage. Please provide the requested date at least 10 working days in advance for scheduling.

The following releases are required in order to complete your project:

- [X] Contact Customer Service and apply for electrical service. Call (714) 765-3300 or visit them at City Hall West, 1st floor, 201 S. Anaheim Blvd.
- [ ] Building Division release is obtained, with building inspections completed. Call (714) 765-5153 or visit them at City Hall, 1st floor, 200 S. Anaheim Blvd.
- [X] Utility Inspection has been completed and customer construction of utility facilities approved. Your inspector's contact information is found on your service plan.
- [ ] Electrical Engineering requires an electrical easement, including legal description, metes and bounds drawing stamped by a licensed civil engineer or surveyor, and a copy of the Grant Deed and/or Title Report for the property.

The following electrical fees are required to be paid prior to energization of service:

- [X] Utility fees of $4,181.68 in accordance with Rates, Rules & Regulations must be paid before a work order can be released for construction scheduling. Please reference account # 528-521-6761-4063 - 1300500-01 on your check. Fees are valid for 180 days after date shown on this letter.
- [ ] At the applicant's request, work may be scheduled for overtime to expedite beyond normal business hours. Overtime charges are $0.00. Please reference account # 528-521-6761-4063 - 1300500-01 on your check. Fees are valid for 180 days after date shown on this letter.

To pay your utility fees by mail, please attach a copy of this letter with your check made payable to "City of Anaheim" and mailed to: City of Anaheim, Division of Collections, 201 S. Anaheim Blvd #101, Anaheim, CA 92805.

If you have any questions concerning this project, please contact Jason Rilloraza at (714) 765-4659.

Manny Soto FOR TM

PRINCIPAL ELECTRICAL ENGINEER

fuec_lot

714-240-3305 - Eddie Ramirez - Inspector for temporary and permanent power service

BY CONTRACTOR: TEMPORARY SERVICE:

(1) REMOVE EXISTING 100A, 480Y/277V, 3Ø, 4W, COMMERCIAL UNDERGROUND SERVICE WEATHERPROOF METER PEDESTAL AND EQUIPMENT.

NOTE TO CONTRACTOR: COORDINATE WITH ELECTRICAL UTILITIES INSPECTOR PRIOR TO REMOVING EXISTING PANEL FOR REMOVAL OF METERING EQUIPMENT.

(2) PROVIDE AND INSTALL NEW 2-100A, 480Y/277V, 3Ø, 4W, COMMERCIAL OVERHEAD SERVICE WEATHERPROOF METER PANEL WITH MAIN DISCONNECT PER EUSERC DWG 305. CONTRACTOR TO LABEL ADDRESS ON METER PANEL.

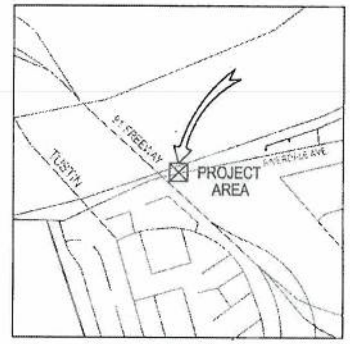
NOTE TO CONTRACTOR: CONTACT ELECTRICAL UTILITIES INSPECTOR FOR INSPECTION AND TO SCHEDULE PROJECT WITH UTILITIES SERVICE CREW.

BY APU: TEMPORARY SERVICE:

A REMOVE EXISTING ALUMINUM TRIPLEX SECONDARY UNDERGROUND CABLE.

B REMOVE COMMERCIAL RISER (UNMARKED SR ON POLE #1478055E). REMOVE CONNECTIONS AND DE-ENERGIZE EXISTING SERVICE.

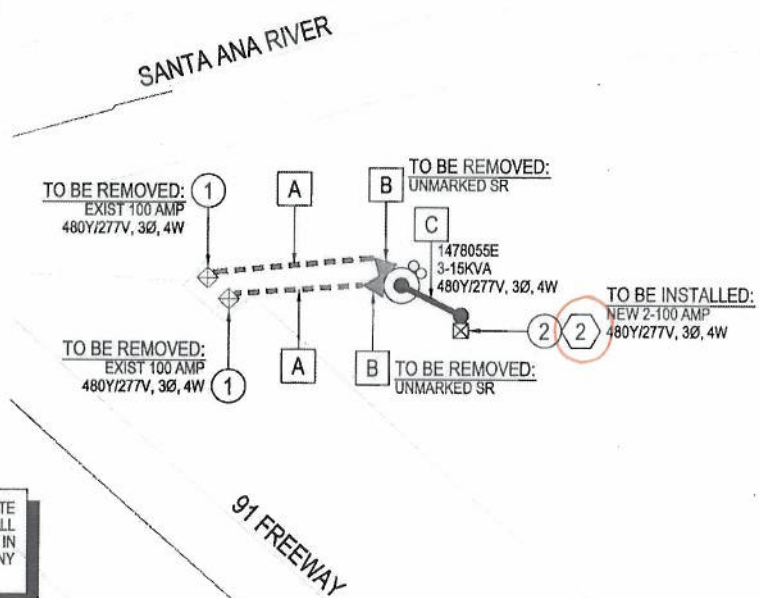
C INSTALL NEW 1/0 ALUMINUM QUAD SECONDARY OVERHEAD WIRE. MAKE CONNECTIONS AND ENERGIZE SERVICE.



VICINITY MAP
N.T.S.

N

EM155
CRAVENS 12KV CIRCUIT
YORBA SUB



ELECTRICAL UTILITY UNDERGROUND GENERAL NOTES:

1. *INSPECTION:* THE DEVELOPER/CONTRACTOR SHALL CONTACT THE ELECTRICAL UTILITY INSPECTOR, NOT LESS THAN TWO (2) CALENDAR WEEKS PRIOR TO BEGINNING WORK TO ESTABLISH A PRE-CONSTRUCTION CONFERENCE FOR COORDINATION WITH THE ANAHEIM PUBLIC UTILITIES DEPARTMENT.
2. *CONSTRUCTION SPECIFICATIONS:* THE DEVELOPER/CONTRACTOR SHALL COMPLY WITH ALL PROVISIONS OF THE "ELECTRICAL SPECIFICATIONS FOR UNDERGROUND SYSTEMS & DISTRIBUTION SUBSTRUCTURES" OF THE ANAHEIM PUBLIC UTILITY DEPARTMENT.
3. *CABLE SEPARATION:* ELECTRICAL POWER CABLES SHALL BE SEPARATED FROM TELEPHONE CABLES/CONDUIT, GAS LINES, WATER LINES, AND ALL OTHER PIPE SYSTEMS OR FOREIGN SUBSTRUCTURES BY AT LEAST 12 INCHES WHERE THEY ARE PARALLEL TO EACH OTHER, AND AT LEAST 6 INCHES WHERE THEY CROSS EACH OTHER.
4. *CONDUIT IN STREET, ALLEY, OR EASEMENT:* FOR ALL UTILITY POWER CABLES CROSSING UNDER A DEDICATED PUBLIC STREET, PRIVATE STREET, DRIVEWAY, ALLEY OR EASEMENT; THE CONTRACTOR SHALL INSTALL CONDUIT FOR CABLING AS PER CITY OF ANAHEIM ELECTRICAL SPECIFICATIONS.
5. *RETAINING WALLS:* RETAINING WALLS SHALL BE INSTALLED BY DEVELOPER TO PROTECT TRANSFORMERS AND OTHER ELECTRICAL EQUIPMENT OR STRUCTURES IN ALL SLOPE AREAS SUBJECT TO EROSION. DESIGN AND INSTALLATION SHALL COMPLY WITH CITY OF ANAHEIM BUILDING ORDINANCES AND ELECTRICAL UTILITY CONSTRUCTION STANDARDS.
6. *EASEMENT DOCUMENTS:* THE DEVELOPER/CONTRACTOR SHALL PROVIDE ENGINEERING DRAWINGS SHOWING METES AND BOUNDS WITH ALL BEARINGS NECESSARY FOR PREPARING EASEMENT DOCUMENTS.
7. *APPLICATION FOR SERVICE:* THE DEVELOPER/CONTRACTOR IS REQUIRED TO CONTACT THE NEW BUSINESS REPRESENTATIVE AT (714) 765-4201 EXTENSION 5003 (COMMERCIAL CONSTRUCTION) OR 5604 (RESIDENTIAL CONSTRUCTION) TO REQUEST AND MAKE APPLICATION FOR SERVICE 6 WEEKS PRIOR TO REQUIRED SERVICE DATE.
8. *CONSTRUCTION COORDINATION:* THE DEVELOPER/CONTRACTOR SHALL CONTACT THE ELECTRICAL UTILITY INSPECTOR ASSIGNED TO THE PROJECT, WITH 2 WORKING DAYS NOTICE, TO COORDINATE ELECTRICAL UTILITY INSPECTION WHEN THE PROJECT IS READY.
9. *SERVICE PANEL INSPECTION:* THE DEVELOPER/CONTRACTOR SHALL NOTIFY THE UTILITY ELECTRICAL METER SHOP AT (714) 765-6858 FOR SERVICE PANEL INSPECTION, APPROVAL AND RELEASE WHEN PANEL(S) IS (ARE) INSTALLED ON ALL COMMERCIAL INSTALLATIONS.
10. *SERVICE RELEASE:* BEFORE THE ELECTRICAL SERVICE TO ANY DEVELOPMENT CAN BE ENERGIZED, THE ELECTRICAL PANEL SHALL BE INSTALLED AND THREE (3) INSPECTION RELEASES,
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    (2) UTILTY ELECTRIC INSPECTOR;
    (3) UTILTY ELECTRICAL METER SHOP;
    ARE REQUIRED AS WELL AS ANY OUTSTANDING ELECTRICAL FEES OR EASEMENT REQUIREMENT S.
11. *PUBLIC RIGHT OF WAY:* ALL WORK WITHIN PUBLIC R/W WILL REQUIRE A PUBLIC R/W EXCAVATION AND CONSTRUCTION PERMIT. CALL PUBLIC WORKS ENGINEERING AT (714) 765-4431 FOR REQUIREMENTS.

CONTACT INFORMATION

CUSTOMER CONTACT:	VANESSA TRUONG	(949) 724-2336
ELEC. INSPECTOR:	EDDIE RAMIREZ	(714) 240-3305
ELEC. METER SHOP:	MICHAEL BALTES	(714) 765-6858
ELEC. DESIGNER:	JASON RILLORAZA	(714) 765-4659

CALL BEFORE YOU DIG
Underground Service Alert of Southern California
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

NOTE: ENERGIZED CABLE IN THE IMMEDIATE VICINITY OF THE WORK; CONTRACTOR SHALL ASCERTAIN THE EXACT LOCATION AND PROTECT IN PLACE. NOTIFY UTILITIES INSPECTOR PRIOR TO ANY EXCAVATION.

SECONDARY FED OVERHEAD

4001 AND 4003 E. RIVERDALE AVENUE
TEMPORARY POWER
NEW 2-100 AMP PANEL

G:\T&D\PROJECT#\P1300000074.DWG

NOTICE TO CONTRACTOR:

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES WAS OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. ADDITIONAL UNDERGROUND FACILITIES MAY EXIST, OR THE LOCATION OF THE FACILITIES MAY DIFFER FROM THE LOCATIONS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, DETERMINE THE EXACT LOCATION OF ALL SUCH UNDERGROUND FACILITIES PRIOR TO COMMENCEMENT OF ANY WORK OR ANY ACTION WHICH MAY DAMAGE SUCH FACILITIES OR INTERFERE WITH THEIR CONTINUOUS AND PROPER OPERATION.

NO.	DATE	REVISIONS
-	-	-

CITY OF ANAHEIM PUBLIC UTILITIES
ELECTRICAL ENGINEERING DIVISION
201 SOUTH ANAHEIM BLVD, #701
ANAHEIM, CA 92805
(714) 765-5156
www.anaheim.net

INSPECTOR W/O	1300500-03
FIELD W/O	1300501-01
ENGR.	JR
P.E.	TM
DRAFTER	JR
ISSUE DATE	10/12/2012
CONST. DATE	-

UEC NO:	00600/00601	**DRAWING NUMBER**
PROJECT:	1300000074	
PROGRAM:	6761	1300000074
SCALE:	1" = 20'	
SHEET	1 OF 1	

REV 0

BY CONTRACTOR: AFTER TEMPORARY SERVICE:

(1) REMOVE EXISTING 2-100A, 480Y/277V, 3Ø, 4W, COMMERCIAL OVERHEAD SERVICE WEATHERPROOF METER PANEL AND EQUIPMENT.

NOTE TO CONTRACTOR: COORDINATE WITH ELECTRICAL UTILITIES INSPECTOR PRIOR TO REMOVING EXISTING PANEL FOR REMOVAL OF METERING EQUIPMENT.

(2) PROVIDE AND INSTALL NEW 100A, 480Y/277V, 3Ø, 4W, COMMERCIAL UNDERGROUND SERVICE WEATHERPROOF METER PEDESTAL WITH MAIN DISCONNECT PER EUSERC DWG 308. CONTRACTOR TO LABEL ADDRESS ON METER PANEL.

NOTE TO CONTRACTOR: CONTACT ELECTRICAL UTILITIES INSPECTOR FOR INSPECTION AND TO SCHEDULE PROJECT WITH UTILITIES SERVICE CREW.

(3) PROVIDE AND INSTALL NEW 1-3" GRAY PVC SCHEDULE 80 SERVICE CONDUIT, PER CU1500-5, CU1600-4A, CU1600-96M, 36" MIN. DEEP FROM FINISHED GRADE, WITH 3-1/0 AL XHHW-2 OR EQUAL CONDUCTORS IN CONDUIT FROM NEW PEDESTAL TO SECONDARY LEVEL OF POLE #1478055E. STUB CONDUIT 10" UP THE POLE. COORDINATE WITH UTILITIES INSPECTOR AND CITY ELECTRICAL CREW TO COMPLETE RISER CONDUIT AND CONDUCTOR INSTALLATION ON THE POLE.

NOTE TO CONTRACTOR: ALL TRENCHING AND BACKFILLING SHALL BE PER APU ELECTRICAL CONSTRUCTION STANDARDS.

BY APU: AFTER TEMPORARY SERVICE:

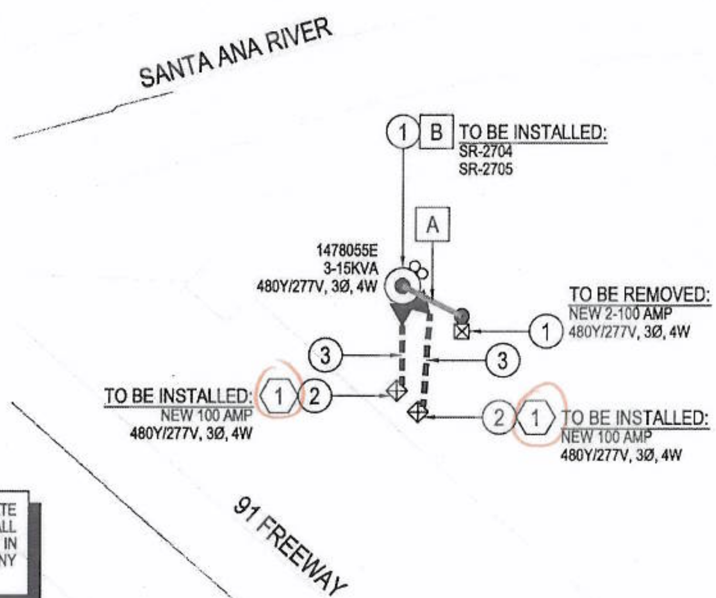
A REMOVE EXISTING 1/0 ALUMINUM QUAD SECONDARY OVERHEAD WIRE. REMOVE CONNECTIONS AND DE-ENERGIZE SERVICE.

B INSTALL 2-3" RISER (SR-2704 AND SR-2705 ON POLE #1478055E). MAKE CONNECTIONS AND ENERGIZE SERVICE.

RISER DETAILS

RISER DETAIL
POLE #1478055E

VICINITY MAP
N.T.S.



N

EM155
CRAVENS 12KV CIRCUIT
YORBA SUB

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Underground Service Alert of Southern California
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SECONDARY FED UNDERGROUND

4001 AND 4003 E. RIVERDALE AVENUE
PERMANENT POWER
NEW 2-100 AMP PANEL

NOTICE TO CONTRACTOR:

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NO.	DATE	REVISIONS
-	-	-

CITY OF ANAHEIM PUBLIC UTILITIES
ELECTRICAL ENGINEERING DIVISION
201 SOUTH ANAHEIM BLVD. #701
ANAHEIM, CA 92805
(714) 765-5156
www.anaheim.net

G:\T&D\SR\SR-2704 SR-2705.DWG

INSPECTOR W/O	1300500-03
FIELD W/O	1300501-01
ENGR.	JR
P.E.	TM
DRAFTER	JR
ISSUE DATE	10/12/2012
CONST. DATE	-

UEC NO:	00600/00601
PROJECT:	1300000074
PROGRAM:	6761
SCALE:	1" = 20'
SHEET	1 OF 1

DRAWING NUMBER	REV
SR-2704 SR-2705	0

BY CONTRACTOR: TEMPORARY SERVICE:

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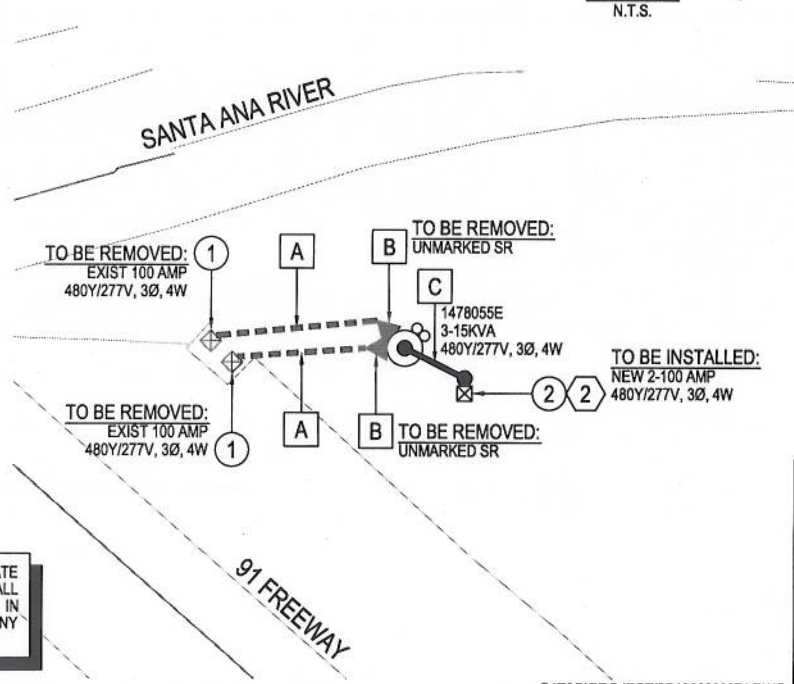

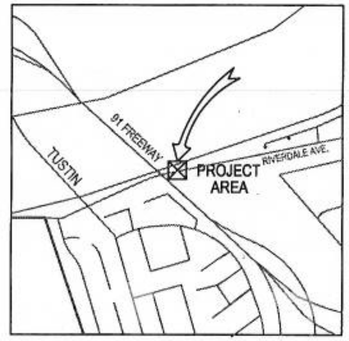

VICINITY MAP
N.T.S.

N

EM155
CRAVENS 12KV CIRCUIT
YORBA SUB

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SECONDARY FED OVERHEAD

4001 AND 4003 E. RIVERDALE AVENUE
TEMPORARY POWER
NEW 2-100 AMP PANEL

Under ground Service Alert of Southern California
Call: TOLL FREE 1-800 227-2600
TWO WORKING DAYS BEFORE YOU DIG

NOTE: ENERGIZED CABLE IN THE IMMEDIATE VICINITY OF THE WORK; CONTRACTOR SHALL ASCERTAIN THE EXACT LOCATION AND PROTECT IN PLACE. NOTIFY UTILITIES INSPECTOR PRIOR TO ANY EXCAVATION.

G:\T&D\PROJECT#\P1300000074.DWG

NOTICE TO CONTRACTOR:

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES OR STRUCTURES WAS OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. ADDITIONAL UNDERGROUND FACILITIES MAY EXIST, OR THE LOCATION OF THE FACILITIES MAY DIFFER FROM THE LOCATIONS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, DETERMINE THE EXACT LOCATION OF ALL SUCH UNDERGROUND FACILITIES PRIOR TO COMMENCEMENT OF ANY WORK OR ANY ACTION WHICH MAY DAMAGE SUCH FACILITIES OR INTERFERE WITH THEIR CONTINUOUS AND PROPER OPERATION.

NO.	DATE	REVISIONS
-	-	-

CITY OF ANAHEIM PUBLIC UTILITIES
ELECTRICAL ENGINEERING DIVISION
201 SOUTH ANAHEIM BLVD. #701
ANAHEIM, CA 92805
(714) 765-5156
www.anaheim.net

INSPECTOR W/O	1300500-03
FIELD W/O	1300501-01
ENGR.	JR
P.E.	TM
DRAFTER	JR
ISSUE DATE	10/12/2012
CONST. DATE	-

UEC NO: 00600/00601	**DRAWING NUMBER**		**REV**
PROJECT: 1300000074	1300000074		0
PROGRAM: 6761			
SCALE: 1" = 20'			
SHEET 1 **OF** 1			

BY CONTRACTOR: AFTER TEMPORARY SERVICE:

1 REMOVE EXISTING 2-100A, 480Y/277V, 3Ø, 4W, COMMERCIAL OVERHEAD SERVICE WEATHERPROOF METER PANEL AND EQUIPMENT.

NOTE TO CONTRACTOR: COORDINATE WITH ELECTRICAL UTILITIES INSPECTOR PRIOR TO REMOVING EXISTING PANEL FOR REMOVAL OF METERING EQUIPMENT.

2 PROVIDE AND INSTALL NEW 100A, 480Y/277V, 3Ø, 4W, COMMERCIAL UNDERGROUND SERVICE WEATHERPROOF METER PEDESTAL WITH MAIN DISCONNECT PER EUSERC DWG 308. CONTRACTOR TO LABEL ADDRESS ON METER PANEL.

NOTE TO CONTRACTOR: CONTACT ELECTRICAL UTILITIES INSPECTOR FOR INSPECTION AND TO SCHEDULE PROJECT WITH UTILITIES SERVICE CREW.

3 PROVIDE AND INSTALL NEW 1-3" GRAY PVC SCHEDULE 80 SERVICE CONDUIT, PER CU1500-5, CU1600-4A, CU1600-96M, 36" MIN. DEEP FROM FINISHED GRADE, WITH 3-1/0 AL XHHW-2 OR EQUAL CONDUCTORS IN CONDUIT FROM NEW PEDESTAL TO SECONDARY LEVEL OF POLE #1478055E. STUB CONDUIT 10" UP THE POLE. COORDINATE WITH UTILITIES INSPECTOR AND CITY ELECTRICAL CREW TO COMPLETE RISER CONDUIT AND CONDUCTOR INSTALLATION ON THE POLE.

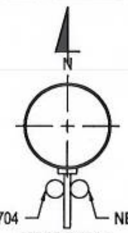
NOTE TO CONTRACTOR: ALL TRENCHING AND BACKFILLING SHALL BE PER APU ELECTRICAL CONSTRUCTION STANDARDS.

BY APU: AFTER TEMPORARY SERVICE:

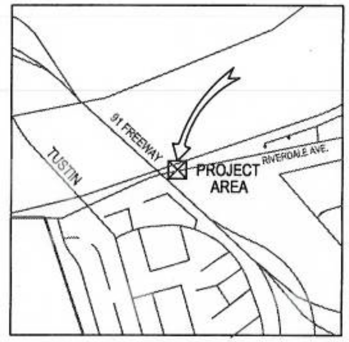
A REMOVE EXISTING 1/0 ALUMINUM QUAD SECONDARY OVERHEAD WIRE. REMOVE CONNECTIONS AND DE-ENERGIZE SERVICE.

B INSTALL 2-3" RISER (SR-2704 AND SR-2705 ON POLE #1478055E). MAKE CONNECTIONS AND ENERGIZE SERVICE.

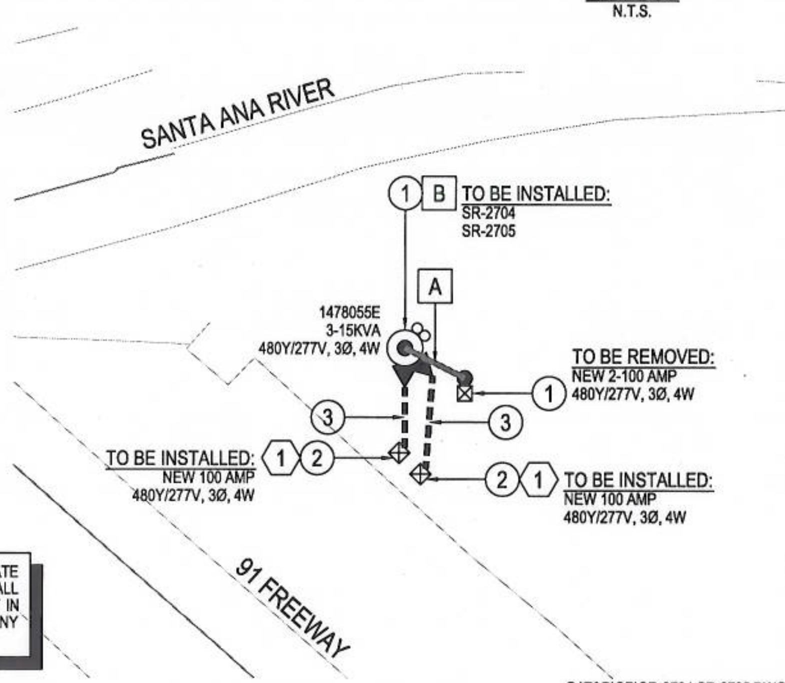
RISER DETAILS



RISER DETAIL
POLE #1478055E



VICINITY MAP
N.T.S.



N

EM155
CRAVENS 12KV CIRCUIT
YORBA SUB

ELECTRICAL UTILITY UNDERGROUND GENERAL NOTES:

1. ***INSPECTION:*** THE DEVELOPER/CONTRACTOR SHALL CONTACT THE ELECTRICAL UTILITY INSPECTOR, NOT LESS THAN TWO (2) CALENDAR WEEKS PRIOR TO BEGINNING WORK TO ESTABLISH A PRE-CONSTRUCTION CONFERENCE FOR COORDINATION WITH THE ANAHEIM PUBLIC UTILITIES DEPARTMENT.
2. ***CONSTRUCTION SPECIFICATIONS:*** THE DEVELOPER/CONTRACTOR SHALL COMPLY WITH ALL PROVISIONS OF THE "ELECTRICAL SPECIFICATIONS FOR UNDERGROUND SYSTEMS & DISTRIBUTION SUBSTRUCTURES" OF THE ANAHEIM PUBLIC UTILITY DEPARTMENT.
3. ***CABLE SEPARATION:*** ELECTRICAL POWER CABLES SHALL BE SEPARATED FROM TELEPHONE CABLES/CONDUIT, GAS LINES, WATER LINES, AND ALL OTHER PIPE SYSTEMS OR FOREIGN SUBSTRUCTURES BY AT LEAST 12 INCHES WHERE THEY ARE PARALLEL TO EACH OTHER, AND AT LEAST 6 INCHES WHERE THEY CROSS EACH OTHER.
4. ***CONDUIT IN STREET, ALLEY, OR EASEMENT:*** FOR ALL UTILITY POWER CABLES CROSSING UNDER A DEDICATED PUBLIC STREET, PRIVATE STREET, DRIVEWAY, ALLEY OR EASEMENT; THE CONTRACTOR SHALL INSTALL CONDUIT FOR CABLING AS PER CITY OF ANAHEIM ELECTRICAL SPECIFICATIONS.
5. ***RETAINING WALLS:*** RETAINING WALLS SHALL BE INSTALLED BY DEVELOPER TO PROTECT TRANSFORMERS AND OTHER ELECTRICAL EQUIPMENT OR STRUCTURES IN ALL SLOPE AREAS SUBJECT TO EROSION. DESIGN AND INSTALLATION SHALL COMPLY WITH CITY OF ANAHEIM BUILDING ORDINANCES AND ELECTRICAL UTILITY CONSTRUCTION STANDARDS.
6. ***EASEMENT DOCUMENTS:*** THE DEVELOPER/CONTRACTOR SHALL PROVIDE ENGINEERING DRAWINGS SHOWING METES AND BOUNDS WITH ALL BEARINGS NECESSARY FOR PREPARING EASEMENT DOCUMENTS.
7. ***APPLICATION FOR SERVICE:*** THE DEVELOPER/CONTRACTOR IS REQUIRED TO CONTACT THE NEW BUSINESS REPRESENTATIVE AT (714) 765-4201 EXTENSION 5003 (COMMERCIAL CONSTRUCTION) OR 5604 (RESIDENTIAL CONSTRUCTION) TO REQUEST AND MAKE APPLICATION FOR SERVICE 6 WEEKS PRIOR TO REQUIRED SERVICE DATE.
8. ***CONSTRUCTION COORDINATION:*** THE DEVELOPER/CONTRACTOR SHALL CONTACT THE ELECTRICAL UTILITY INSPECTOR ASSIGNED TO THE PROJECT, WITH 2 WORKING DAYS NOTICE, TO COORDINATE ELECTRICAL UTILITY INSPECTION WHEN THE PROJECT IS READY.
9. ***SERVICE PANEL INSPECTION:*** THE DEVELOPER/CONTRACTOR SHALL NOTIFY THE UTILITY ELECTRICAL METER SHOP AT (714) 765-6858 FOR SERVICE PANEL INSPECTION, APPROVAL AND RELEASE WHEN PANEL(S) IS (ARE) INSTALLED ON ALL COMMERCIAL INSTALLATIONS.
10. ***SERVICE RELEASE:*** BEFORE THE ELECTRICAL SERVICE TO ANY DEVELOPMENT CAN BE ENERGIZED, THE ELECTRICAL PANEL SHALL BE INSTALLED AND THREE (3) INSPECTION RELEASES,
    (1) CITY BUILDING DEPARTMENT;
    (2) UTIILTY ELECTRIC INSPECTOR;
    (3) UTIILTY ELECTRICAL METER SHOP;
    ARE REQUIRED AS WELL AS ANY OUTSTANDING ELECTRICAL FEES OR EASEMENT REQUIREMENT S.
11. ***PUBLIC RIGHT OF WAY:*** ALL WORK WITHIN PUBLIC R/W WILL REQUIRE A PUBLIC R/W EXCAVATION AND CONSTRUCTION PERMIT. CALL PUBLIC WORKS ENGINEERING AT (714) 765-4431 FOR REQUIREMENTS.

CONTACT INFORMATION

CUSTOMER CONTACT:	VANESSA TRUONG	(949) 724-2336
ELEC. INSPECTOR:	EDDIE RAMIREZ	(714) 240-3305
ELEC. METER SHOP:	MICHAEL BALTES	(714) 765-6858
ELEC. DESIGNER:	JASON RILLORAZA	(714) 765-4659

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SECONDARY FED UNDERGROUND

4001 AND 4003 E. RIVERDALE AVENUE
PERMANENT POWER
NEW 2-100 AMP PANEL

NOTICE TO CONTRACTOR:

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NO.	DATE	REVISIONS
-	-	-

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ELECTRICAL ENGINEERING DIVISION
201 SOUTH ANAHEIM BLVD. #701
ANAHEIM, CA 92805
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G:\T&D\SR\SR-2704 SR-2705.DWG

INSPECTOR W/O	1300500-03
FIELD W/O	1300501-01
ENGR.	JR
P.E.	TM
DRAFTER	JR
ISSUE DATE	10/12/2012
CONST. DATE	-

UEC NO: 00600/00601	DRAWING NUMBER		REV
PROJECT: 1300000074	SR-2704 SR-2705		0
PROGRAM: 6761			
SCALE: 1" = 20'			
SHEET 1 OF 1			

Memorandum

Flex your power!
Be energy efficient!

To: SON NGUYEN
Bridge Design Branch 1
Structures Design-MS 9-4/8I
Division of Engineering Services

Date: June 18, 2012

File: 12-ORA-91-PM 7.9/9.5
EA: 12-0C5601 (12-00000078)
Overhead Signs

Attn: **Bang Hua, Project Engineer**

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design South 1
Branch B

Subject: Foundation Report, Overhead Sign, No's 203L, 203R,305,400, 513 and 615

1.0 INTRODUCTION

Per your request dated January 20, 2012, this Foundation Report (FR) has been prepared for the Overhead Signs (OH) along ORA 91 West as a part of Operational Improvement project. The foundation recommendations provided herein are based on the latest sign details provided by your office as well as results of the Geotechnical Exploration program implemented for this project.

1.1 Scope of work

The following tasks were performed for the preparation of this report:

- Review of archived data.
- Geotechnical drilling.
- Laboratory testing.
- Geotechnical analysis.
- Preparation of this FR.

2.0 PROJECT DESCRIPTION

2.1 Existing Segment 5 Site Conditions

State Route 91 (SR-91) in Orange County was originally constructed in the 1960s as a controlled access freeway. A major effort to improve traffic capacity began in 1992 with the construction of the SR-91 toll lanes and the SR-241 toll road. The SR-91 is generally an 8- to 10- general-purpose lane freeway with auxiliary lanes. The SR-91 express/toll lanes provide two additional lanes in each direction. The toll lanes in the median are operated and maintained by OCTA (Orange County Transportation Authority) under a franchise agreement with the State. The Santa Ana River parallels the project area to the north of SR-91, and several residential and commercial communities are located south of SR-91. SR-91 is a major east-west freeway that extends from

Interstate 110 (I-110) in the City of Gardena in Los Angeles County east through Orange County, where it intersects Interstates 710 (I-710), 605 (I-605) and 5 (I-5), as well as State Route 57 (SR-57), SR-55 and SR-241. SR-91 extends further northeast beyond the project limits to the City of Riverside in Riverside County. Reference site Vicinity Map Figure 1. The purpose of the project is to reduce traffic congestion, improve operational deficiencies and comply with Department design standards on SR-91 between SR-55 and SR-241. The project will accomplish the following objectives:

- Enhance mid-term capacity for SR-91.
- Improve operational characteristics, such as weaving and lane efficiency at ramp junctions.
- Widen the existing 11-ft lane and 2-ft right shoulder within a portion of the project limit to the standard width of 12-ft lane and 10-ft right shoulder.

2.2 Proposed Structure

The improvements include three truss sign structures along westbound SR-91 and two lightweight structures, one on Tustin Avenue off-ramp and one on the NB 55/WB-91 connector. A conflict between retaining wall and Sign No. 203R is noted. Reference Sign Details sheet SD-2. Sign details are shown Appendix I. A summary of the proposed signs is provided in Table 1 below.

Table 1 – Proposed Sings

Sign No.	Route	Station
203L	91	21+80
203R	91	21+80
305	91	506+53.66
400	91	449+50
513L	91	20+60
513R	91	20+60
615	91	547+00

3.0 FIELD INVESTIGATION AND TESTING PROGRAM

A geotechnical investigation took place between March 6 and May 3, 2012. A total of six (6) exploratory borings were drilled within the general proposed area of the overhead signs. These borings were drilled with a CME-75 drill rig utilizing hollow stem auger methods. The geotechnical findings obtained from these borings were utilized for the proposed overhead signs foundation design.

All borings were drilled by the Caltrans Office of Drilling Services and logged by personnel from our office. Soil samples were logged and sampled using primarily a Standard Penetration Test (SPT) sampler and a Modified California sampler at typically 5-foot intervals. SPT samples were driven using a 140-pound hammer falling freely for 30 inches for a total penetration of 18 inches. The modified California Sampler is a 2.0-inch inside-diameter sampler, which retrieves

Table 4 – Corrosion Test Results

Sign No.	Boring	Depth (ft)	Minimum Resistivity (Ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
203L & R	A-12-16A	5-20	1260	6.99	N/A	N/A
513	A-12-19	5-20	443	7.56	208	3990
513	A-12-20	5-20	508	7.78	337	3400
400	A-12-21	5-20	1386	7.96	N/A	N/A
615	A-12-22	0-5	2585	8.26	N/A	N/A
305	A-12-34	0-5	5042	8.66	N/A	N/A

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist: Chloride concentration is greater than or equal to 500 ppm, sulfate concentration is greater than or equal to 2000 ppm, or the pH is 5.5 or less. A minimum Resistivity value of less than 1000 (Ohm-cm) indicates the presence of high quantities of soluble salts and a higher propensity for corrosion.

7.0 SEISMIC RECOMMENDATIONS

The seismicity for the project was measured from the SR-55 north to SR-91 west connector because that sign location is closest to the Peralta Hills Fault. A V_{s30} of 300-400 m/s was used based on correlations with SPT blow counts and the borings drilled for the sign locations and other structures in the vicinity. The PGA for the project limits is 0.6g. The ARS curve is attached as Appendix III.

The controlling faults are the USGS 5% in 50 years probabilistic data, the Peralta Hills Fault, and the Elsinore Fault Zone (Chino Section). The Peralta Hills Fault is Fault ID 146 in the Caltrans ARS On-line database. It is a reverse fault dipping 50° to the north with a M_{max} of 6.2. The rupture distance (R_{rup}) is approximately 1.0 km from the site. The Elsinore Fault Zone (Chino Section) is Fault ID 242 in the Caltrans ARS On-line database. It is a reverse fault dipping 50° to the west with a M_{max} of 7.6. The rupture distance (R_{rup}) is approximately 12.1 km from the site.

7.1 Liquefaction Evaluation

Liquefaction is a phenomenon in which loose, saturated, fine-grained, granular soils behave like a liquid while being subjected to high-intensity ground shaking. Liquefaction occurs when shallow ground water, low-density, sandy soils, and high-intensity ground motion exist at a site. Saturated, loose to medium dense, near-surface, cohesionless soils exhibit the highest liquefaction potential, while dense, cohesionless soils and cohesive soils exhibit low to negligible liquefaction potential.

As previously mentioned in Section 5.4, ground water was encountered in boring A-12-21 at elevation 231.00.

Based upon the groundwater elevation and high density of soils below that elevation, liquefaction potential for this site is considered to be low.

8.0 SOIL BOUNDARY CONDITIONS

Soil parameters used in pile analysis are summarized Appendix IV. These parameters were based upon boring log information in the field.

9.0 FOUNDATION RECOMMENDATIONS

9.1 Axial and Lateral Pile Capacity Analysis

The axial pile capacity evaluation for the proposed CIDH piles was performed using SHAFT for Windows, V5.0 by ENSOFT Inc. The lateral load-deformation response of single pile was analyzed utilizing the LPILE plus for Windows, V5.0m by ENSOFT Inc. The depth of sign foundation was computed based on the boundary conditions shown in Table 5. Pile data is shown in Table 6. The recommended pile depth is given in Table 7. Maximum bending moments and maximum shear forces computed are presented in Table 8.

Table 5 – Unfactored Loads

Sign Post No.	Bending Moment at Pile Head (Kip-ft)	Shear Force at Pile Head (Kips)	Design Axial Load (Kips)
203L	139	5.8	4.3
203R	139	5.8	4.3
305	472	15.6	23.7
400	508	16.4	24.4
513	208	7.5	11.0
615	319	11.5	18.8

Table 6 below summarizes the proposed pile data.

Table 6- Pile Data

Sign Post No.	Pile Type	Design Loading (Kips)	Nominal Resistance		Design Tip Elevation (ft)	Specified Tip Elevation (ft)	Cut-Off Elevation (ft)
			Compression (Kips)	Tension (Kips)			
203L	3.0' CIDH	4.3	8.6	N/A	251 (1) 239 (2)	239	263
203R	3.0' CIDH	4.3	8.6	N/A	253 (1) 241 (2)	241	265
305	5.0' CIDH	23.7	47.4	N/A	240 (1) 223 (2)	223	255
400	5.0' CIDH	24.4	48.8	N/A	245 (1) 221 (2)	221	257
513L	5.0' CIDH	11.0	22.0	N/A	315 (1) 302 (2)	302	331
513R	5.0' CIDH	11.0	22.0	N/A	319 (1) 305 (2)	305	335
615	5.0' CIDH	18.8	37.6	N/A	288 (1) 272 (2)	272	307

(1) Compression Load based on skin friction capacity only.
(2) Lateral Loads

Table 7 below summarizes proposed CIDH piles diameter and length for support of subject overhead signs.

Table 7 - Recommended Pile Depths

Sign Post No.	Pile Diameter/ Pile Type	Pile Depth (Length from pile head to pile tip) (feet)
203L & R	3.0'/ CIDH	24
305	3.0'/ CIDH	34
400	5.0'/ CIDH	36
513L & R	5.0'/ CIDH	30
615	5.0'/ CIDH	35

Maximum bending moments and maximum shear forces computed are presented in Table 8 below.

Table 8 - Maximum Bending Moments (BM) and Maximum Shear Forces

Sign Post No.	Max. BM (Kip-in)	Depth of Max BM below the pile head (feet)	Max. Shear (Kips)	Depth of Max Shear below the pile head (feet)	Maximum lateral pile head deflection (inches)
203L & R	2000	6	5	13	0.11
305	2000	12	16	23	0.04
400	7250	9	16.5	22	0.13
513L & R	2800	4.5	18	7	0.027
615	4500	8	10.5	20	0.065

The LPile and Shaft runs are attached as Appendix V

10.0 CONSTRUCTION CONSIDERATIONS

The following recommendations are made for CIDH piles installation and construction and are recommended to be incorporated in the Special Provisions of the project.

- The contractor shall be required to clean out the bottom of the shaft prior to placing the cage and the concrete.
- Concrete placement for construction of the CIDH piling shall be completed within the same day that excavation of the drilled hole has been completed.
- Caving is anticipated during excavation of the pile boring and during CIDH piles construction at all sign locations (Sign No. 203L, 203R, 305, 400, 513L, 513R and 615). A method of caving control, such as using temporary casing should be considered by the contractor.

If you have any questions or comments, please call Mushtaq Ahmed at 213-620-2132 or Sam Sukiasian at 213-620-2135.

Prepared by: Date: 7/18/12

MUSHTAQ AHMED P.E.
Transportation Engineer - Civil
Office of Geotechnical Design – South 1
Branch B

REGISTERED CIVIL ENGINEER
MOHAMMAD MUSHTAQ AHMED
No. C056390
Exp. 6-30-13
STATE OF CALIFORNIA

Reviewed by: Date: 7/18/12

SAM SUKIASIAN G.E.
Senior Transportation Engineer
Office of Geotechnical Design – South 1
Branch B

REGISTERED PROFESSIONAL ENGINEER
SAMUEL G. SUKIASIAN
No. GE2681
Exp. 6-30-14
GEOTECHNICAL
STATE OF CALIFORNIA

KRISTOPHER BARKER, C.E.G.
Engineering Geologist
Office of Geotechnical Design – South 1
Branch B

PROFESSIONAL GEOLOGIST
KRISTOPHER BARKER
No. 2383
CERTIFIED ENGINEERING GEOLOGIST
8-31-13
STATE OF CALIFORNIA

cc: Structure Construction R.E. pending File (RE_Pending@dot.ca.gov)
District Project Manager – Syed_Haq@dor.ca.gov
Structure Design – Anthony_Logus@dor.ca.gov
GS Corporate – Shira_Rajedra@dot.ca.gov

Attachments:
Figure 1 – Vicinity Map
Appendix I – OH Sign Details
Appendix II – Laboratory Data
Appendix III – ARS Curve
Appendix IV –Soil Parameters
Appendix V – LPile and Shaft runs

Figure 1: Vicinity Map

Appendix I: Sign Details

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	7.9/9.5		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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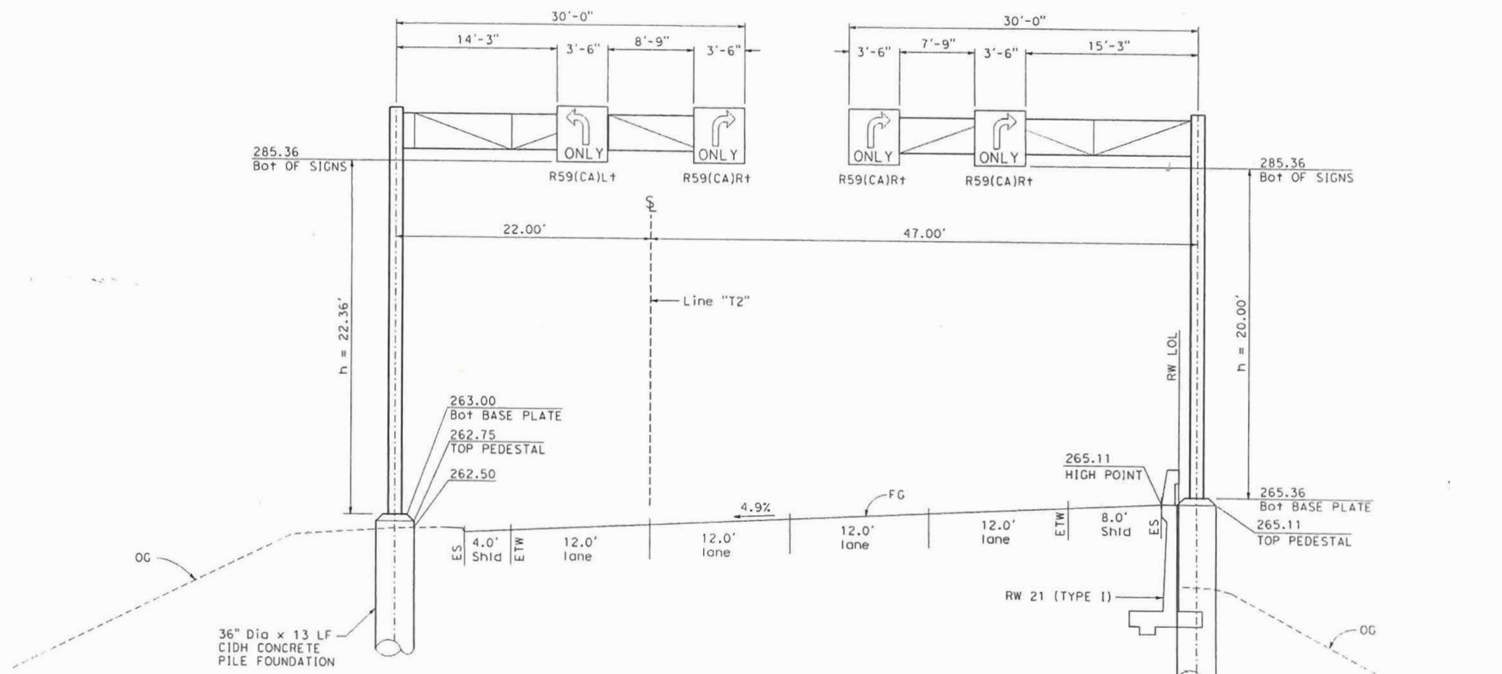

SIGN 203L

FWBT Rte-91 "T2" Sta 21+80

SIGN TYPE: LIGHTWEIGHT, TYPE C-2
POST: 10" NPS, t=1/2"
ARMS: TS 6 x 4 x 3/8
SIGN PANEL: LAMINATED TYPE A
ILLUMINATION REQUIRED

SIGN 203R

FWBT Rte-91 "T2" Sta 21+80

SIGN TYPE: LIGHTWEIGHT, TYPE C-2
POST: 10" NPS, t=1/2"
ARMS: TS 6 x 4 x 3/8
SIGN PANEL: LAMINATED TYPE A
ILLUMINATION REQUIRED

SIGN DETAILS

NO SCALE

SD-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

FUNCTIONAL SUPERVISOR: SON NGUYEN

CALCULATED- DESIGNED BY | CHECKED BY | REVISED BY | DATE REVISED

LAST REVISION 00-00-00 | DATE PLOTTED => 06/05/2012 | TIME PLOTTED => 4:01:24 PM

BORDER LAST REVISED 7/2/2010

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RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 3004

PROJECT NUMBER & PHASE 1200000078

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	7.9/9.5		

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PLANS APPROVAL DATE

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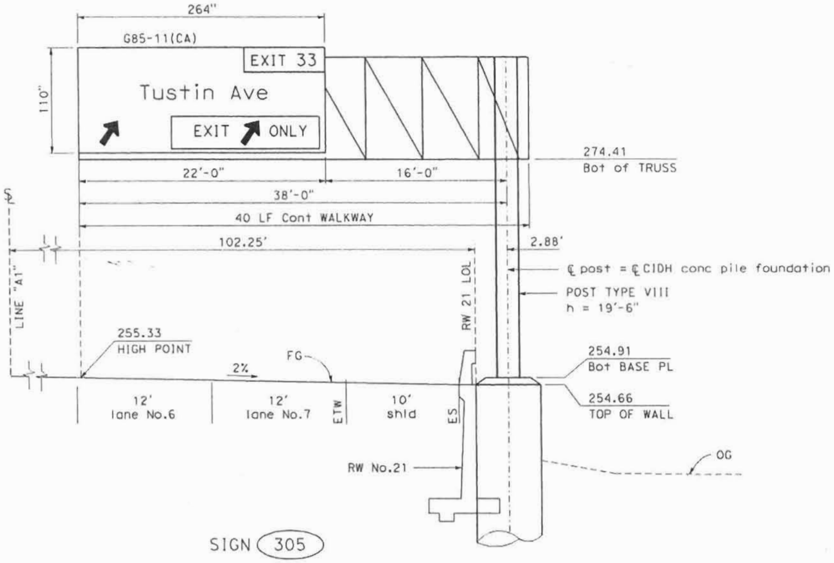
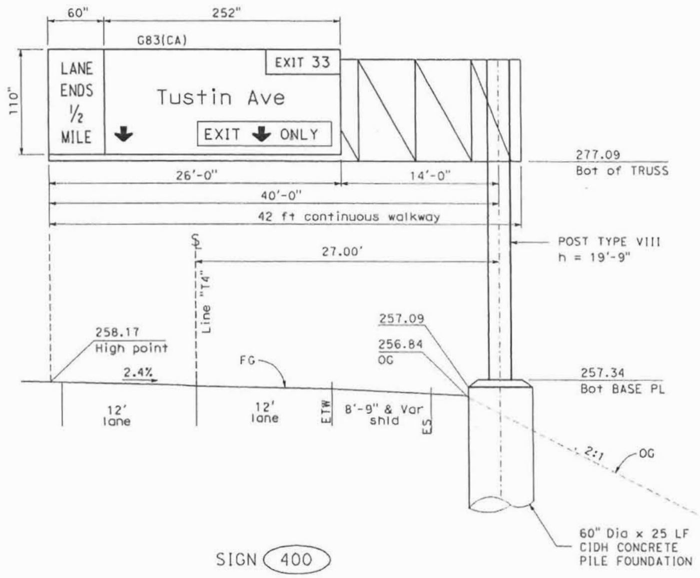
REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA



SIGN (305)

FWBT Rte-91 "A1" Sta 506+53.66

SIGN TYPE: TRUSS
SIGN PANEL: LAMINATED TYPE A
ILLUMINATION REQUIRED



SIGN (400)

FWBT SR-91 "T4" Sta 449+50

SIGN TYPE: TRUSS
SIGN PANEL: LAMINATED TYPE A
ILLUMINATION REQUIRED

NOTES:

1. Install laminated sign panel type A.
2. Maintain minimum 18'-6" vertical clearance between the bottom of the truss frame and the high point of roadway surface below.
3. Contractor to verify all elevations and sign panel dimensions prior to fabricating any material.
4. Illumination required.

SIGN DETAILS

NO SCALE

SD-3

REVISED BY	DATE REVISED
CALCULATED-DESIGNED BY	CHECKED BY
FUNCTIONAL SUPERVISOR	SON NGUYEN

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans®

LAST REVISION 00-00-00 DATE PLOTTED => 11-MAY-2012 TIME PLOTTED => 15:42

BORDER LAST REVISED 7/2/2010 | USERNAME => s113859 DGN FILE => 1200000078ab003.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 3004 | PROJECT NUMBER & PHASE 1200000078

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	7.9/9.5		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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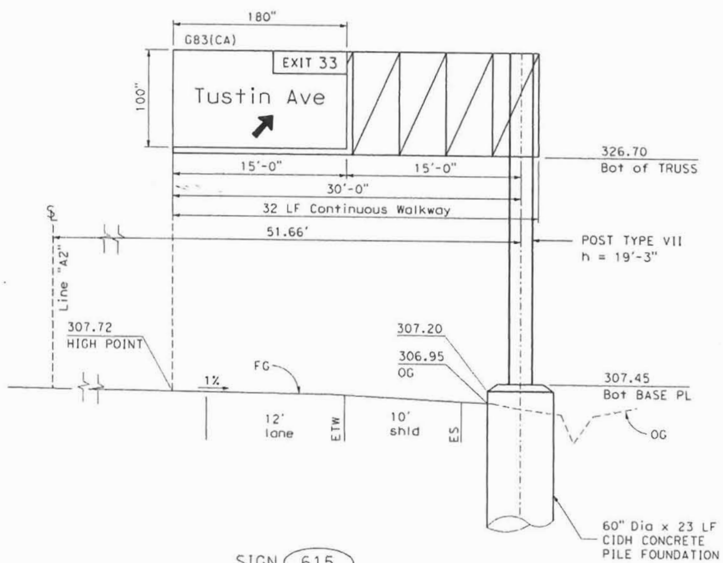
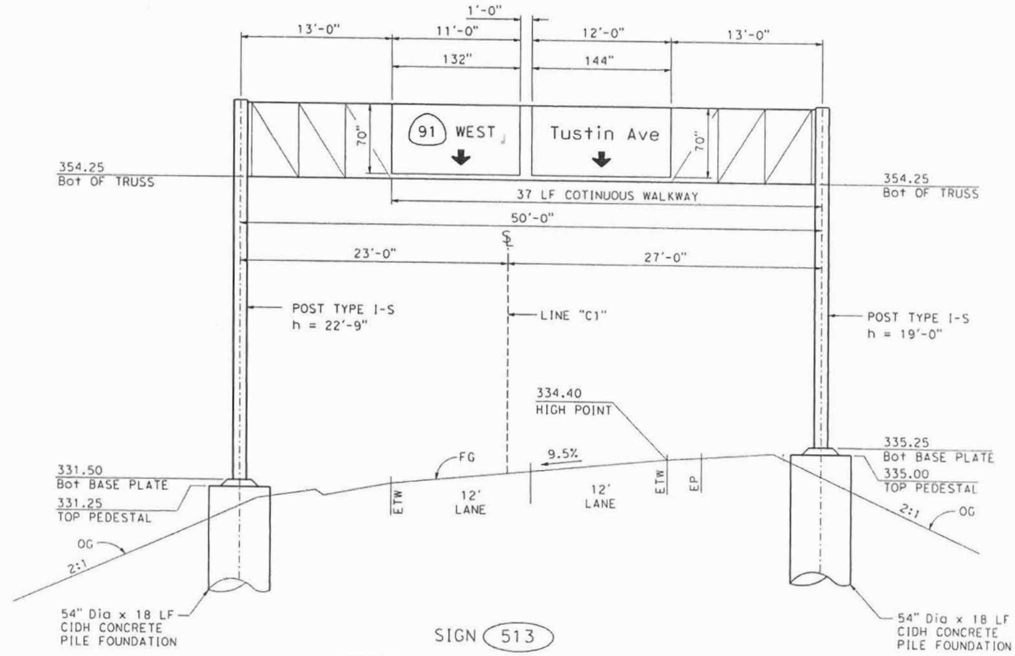


SIGN (615)

FWBT SR-91 "A2" Sta 547+00

SIGN TYPE: TRUSS
SIGN PANEL: LAMINATED TYPE A
ILLUMINATION REQUIRED



SIGN (513)

FWBT N55-W91 Conn "C1" Sta 20+60

SIGN TYPE: TRUSS
SIGN PANEL: LAMINATED TYPE A
ILLUMINATION REQUIRED

SIGN DETAILS

NO SCALE

SD-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY		REVISED BY	
SON NGUYEN	CHECKED BY		DATE REVISED	

BORDER LAST REVISED 7/2/2010

USERNAME => $USER
DGN FILE => ...\Signs\1200000078ob004.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

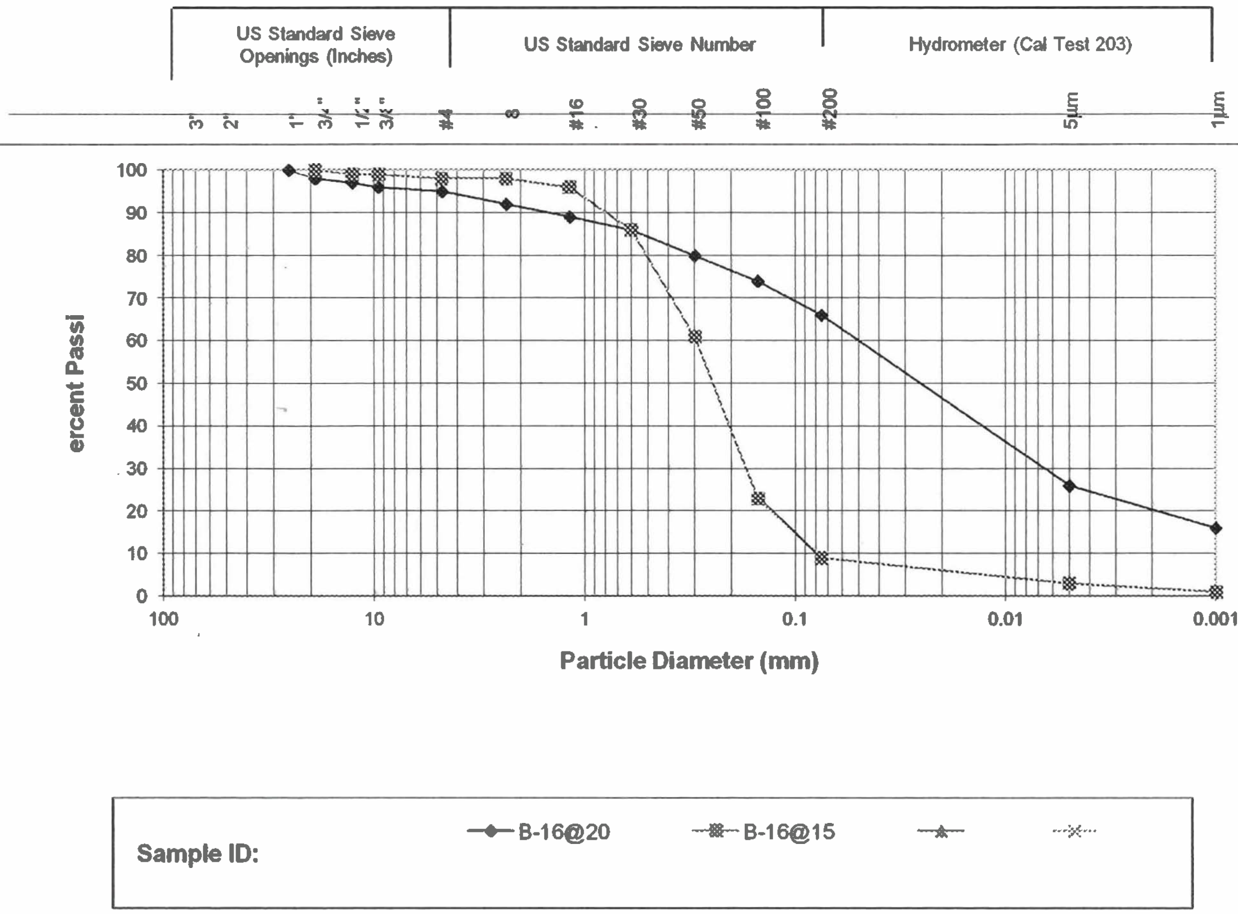
UNIT 3004

PROJECT NUMBER & PHASE 1200000078

LAST REVISION 00-00-00 DATE PLOTTED => 06/05/2012 TIME PLOTTED => 3:47:35 PM

Appendix II: Laboratory Data

Gradation Analysis Test Results



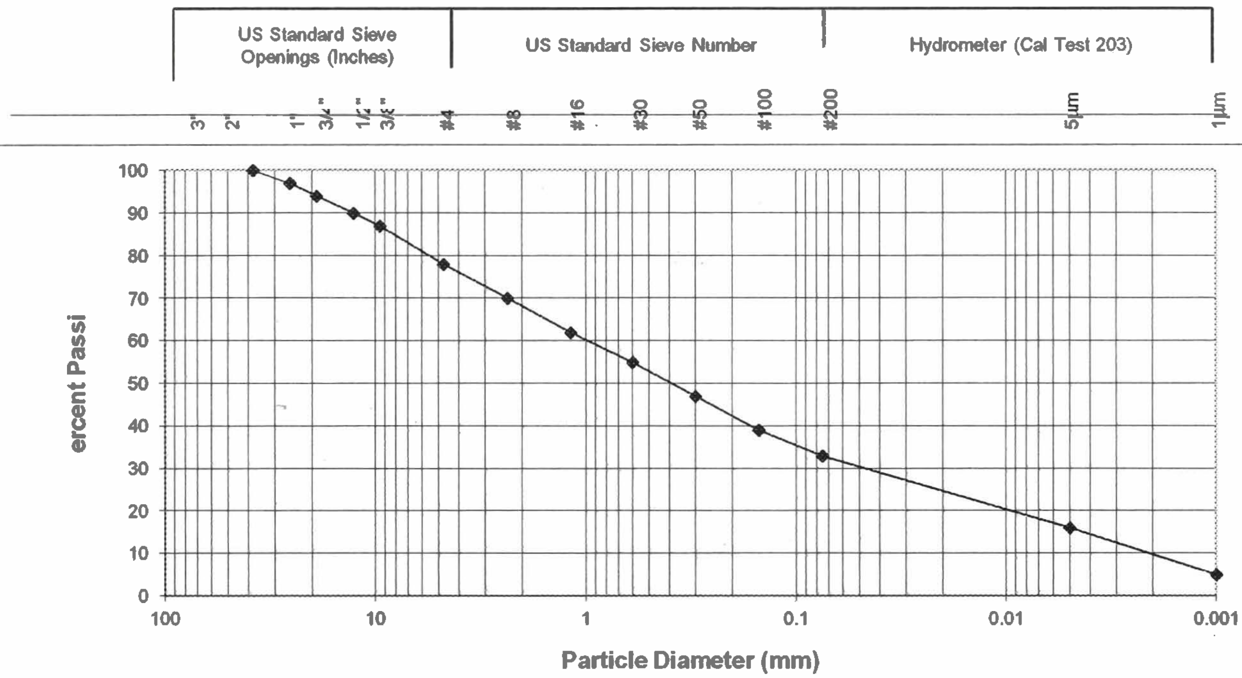
COBBLES	GRAVELS		SANDS			SILT	CLAY
	Coarse	Fine	Crse.	Medium	Fine		

Caltrans

Engineering Services
Division of Geotechnical Services
Office of Geotechnical
Design - South 1

Project:	ORG-91 OH Signs
EA:	12-0C560
Dist-Co-Rte-PM:	12-ORG-91-7.9/9.5

Gradation Analysis Test Results



Sample ID: B-16A@20

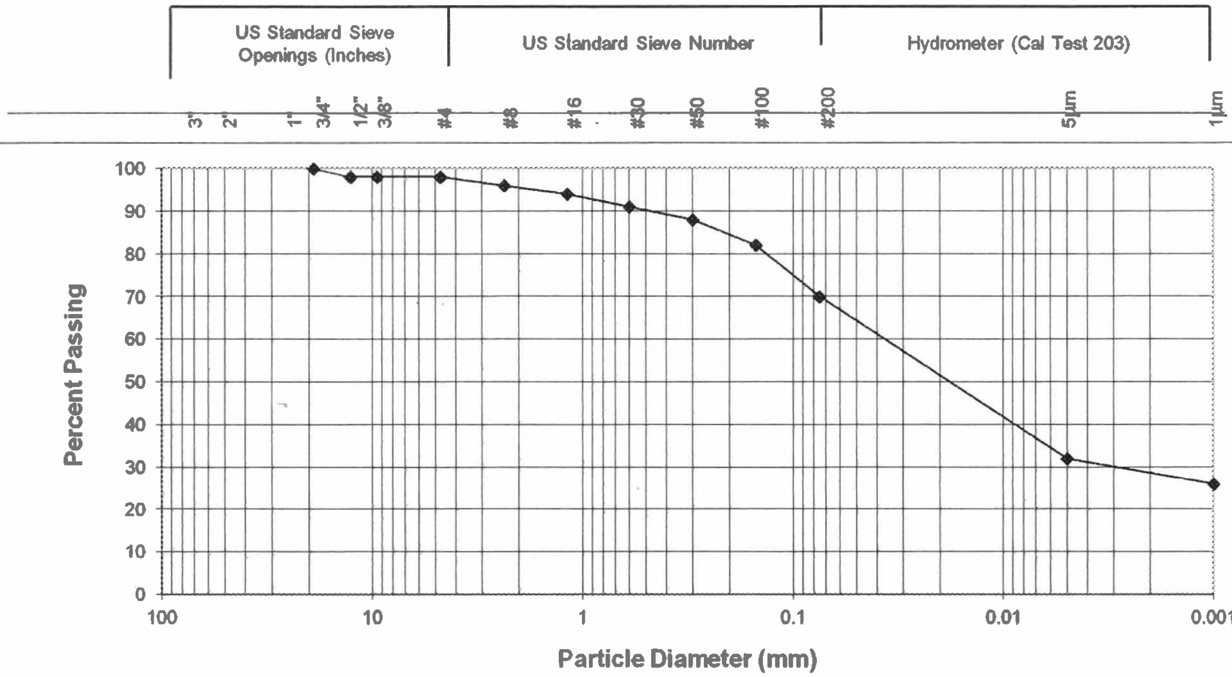
COBBLES	GRAVELS		SANDS			SILT	CLAY
	Coarse	Fine	Crse.	Medium	Fine		

Caltrans

Engineering Services
Division of Geotechnical Services
Office of Geotechnical
Design - South 1

Project:	ORG-91 OH Signs
EA:	12-0C560
Dist-Co-Rte-PM:	12-ORG-91-7.9/9.5

Gradation Analysis Test Results



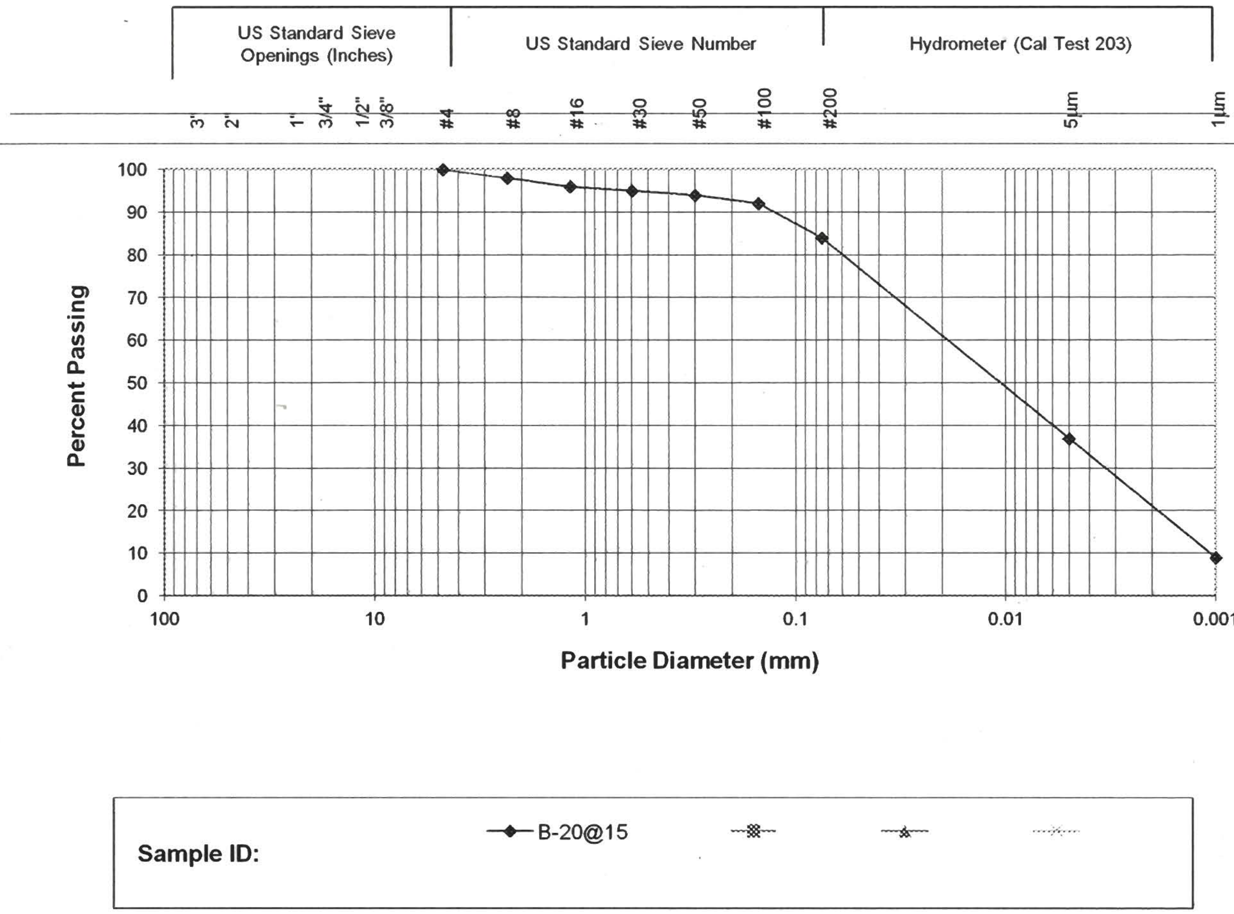
Sample ID: B-19@35

COBBLES	GRAVELS		SANDS			SILT	CLAY
	Coarse	Fine	Crse.	Medium	Fine		

Engineering Services
Division of Geotechnical Services
Office of Geotechnical
Design - South 1

Project:	ORG-91 OH Signs
EA:	12-0C560
Dist-Co-Rte-PM:	12-ORG-91-7.9/9.5

Gradation Analysis Test Results

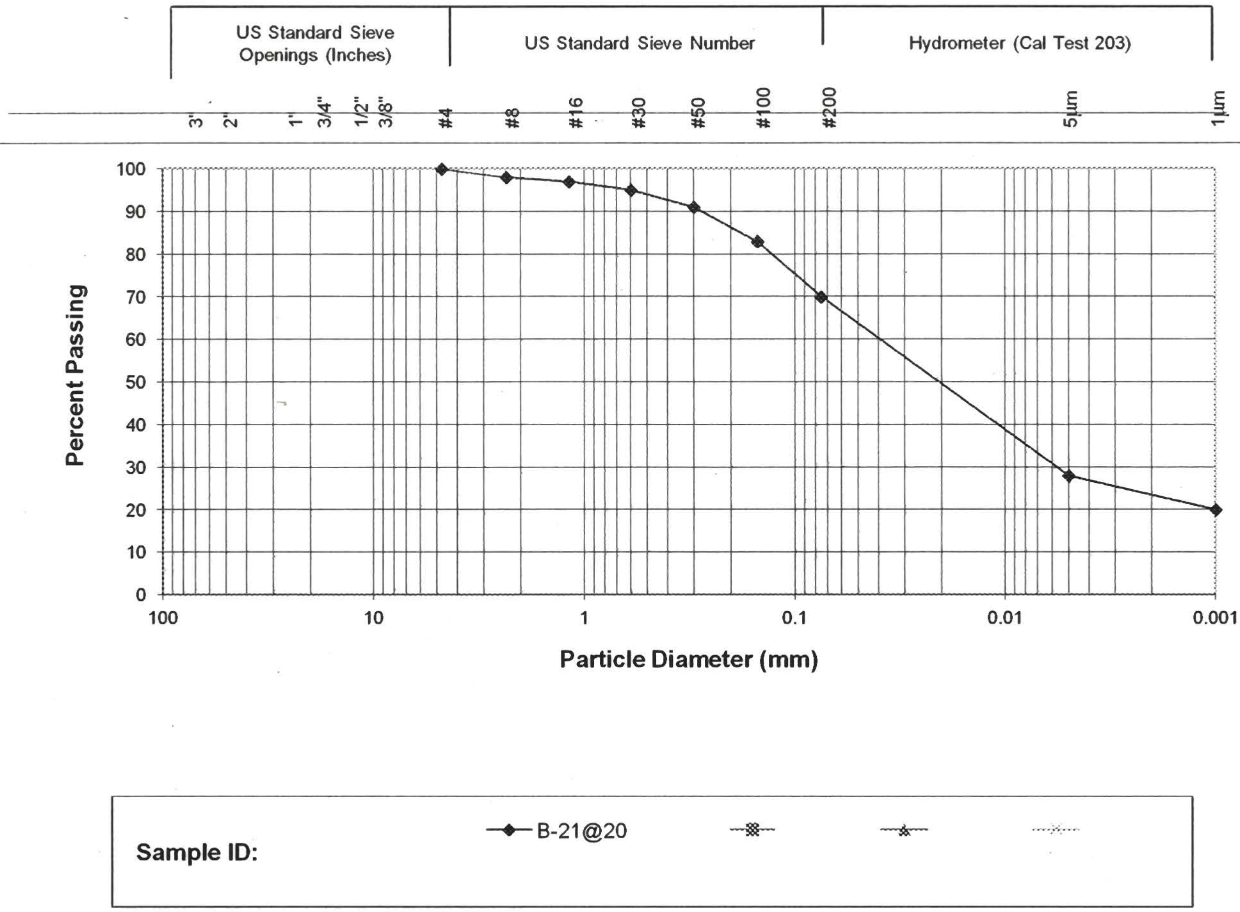


COBBLES	GRAVELS		SANDS			SILT	CLAY
	Coarse	Fine	Crse.	Medium	Fine		

Engineering Services
Division of Geotechnical Services
Office of Geotechnical
Design - South 1

Project:	ORG-91 OH Signs
EA:	12-0C560
Dist-Co-Rte-PM:	12-ORG-91-7.9/9.5

Gradation Analysis Test Results

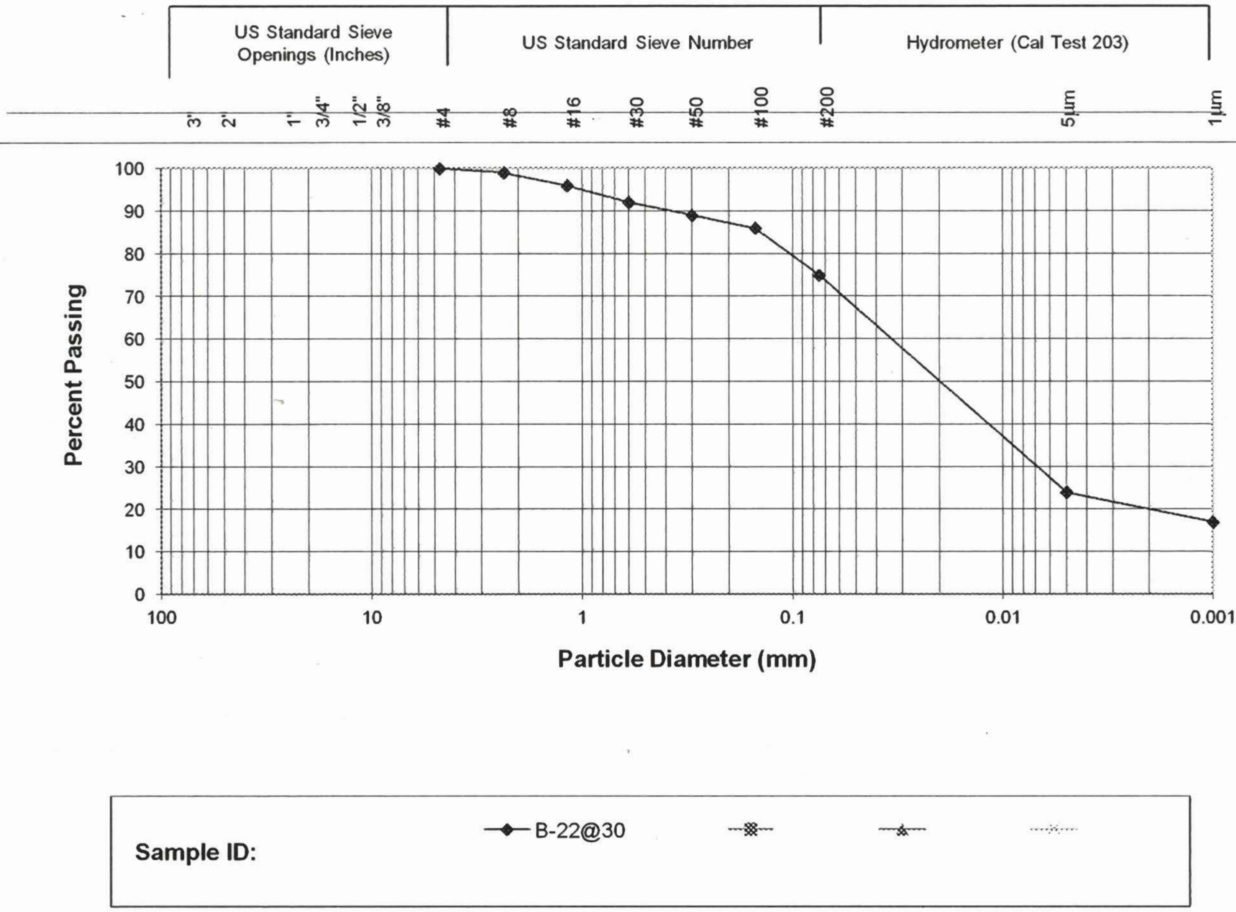


COBBLES	GRAVELS		SANDS			SILT	CLAY
	Coarse	Fine	Crse.	Medium	Fine		

Engineering Services
Division of Geotechnical Services
Office of Geotechnical
Design - South 1

Project:	ORG-91 OH Signs
EA:	12-0C560
Dist-Co-Rte-PM:	12-ORG-91-7.9/9.5

Gradation Analysis Test Results



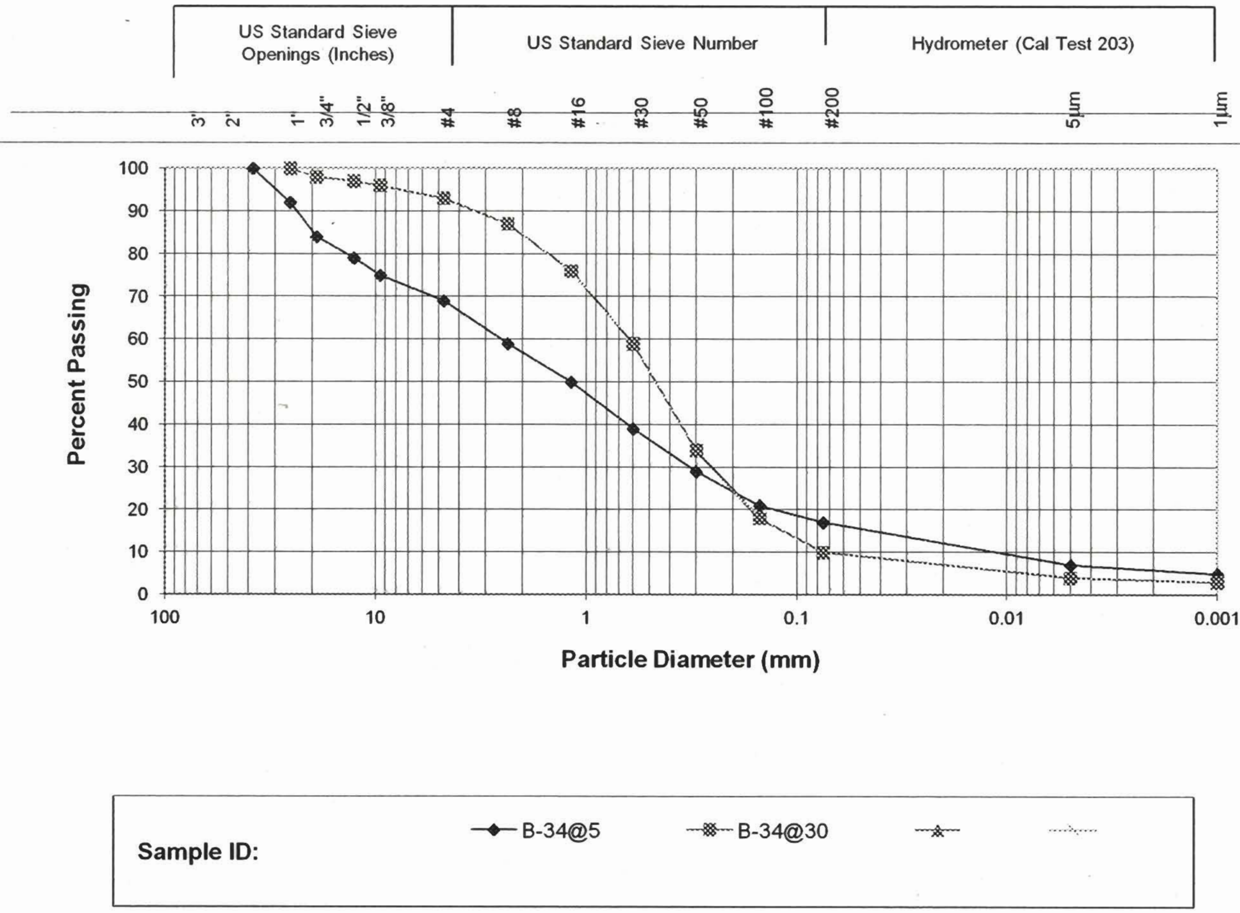
COBBLES	GRAVELS		SANDS			SILT	CLAY
	Coarse	Fine	Crse.	Medium	Fine		

Caltrans

Engineering Services
Division of Geotechnical Services
Office of Geotechnical Design - South 1

Project:	ORG-91 OH Signs
EA:	12-0C560
Dist-Co-Rte-PM:	12-ORG-91-7.9/9.5

Gradation Analysis Test Results

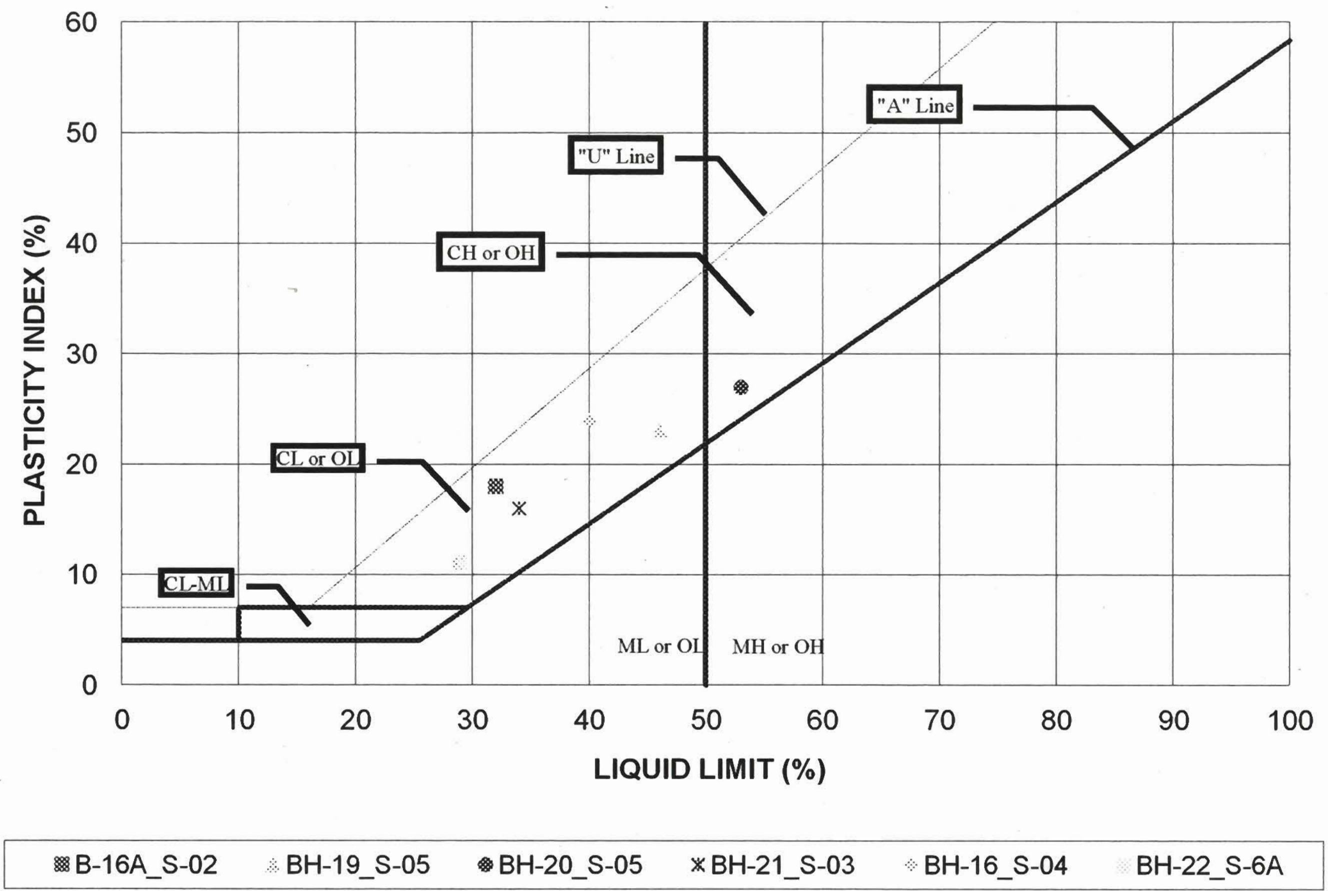


COBBLES	GRAVELS		SANDS			SILT	CLAY
	Coarse	Fine	Crse.	Medium	Fine		

Engineering Services
Division of Geotechnical Services
Office of Geotechnical
Design - South 1

Project:	ORG-91 OH Signs
EA:	12-0C560
Dist-Co-Rte-PM:	12-ORG-91-7.9/9.5

Atterberg Limits Test Results



Boring No.	Sample No.	Depth (m)	LL	PL	PI	Classification
BH-16A	S-2	10	32	14	18	CL
BH-19	S-5	20	46	23	23	CL
BH-20	S-5	20	53	27	26	CH
BH-21	S-3	15	34	16	18	CL
BH-22	S-6A	30	29	11	18	CL
BH-16	S-4	20	40	24	16	CL

Caltrans

Engineering Services
Division of Geotechnical Services
Office of Geotechnical
Design - South 1

Project:	91 Widening Overhead Signs
EA:	12-0C560
Dist-Co-Rte-KP:	12-ORA-91-7.9/9.5

Appendix III: ARS Curve

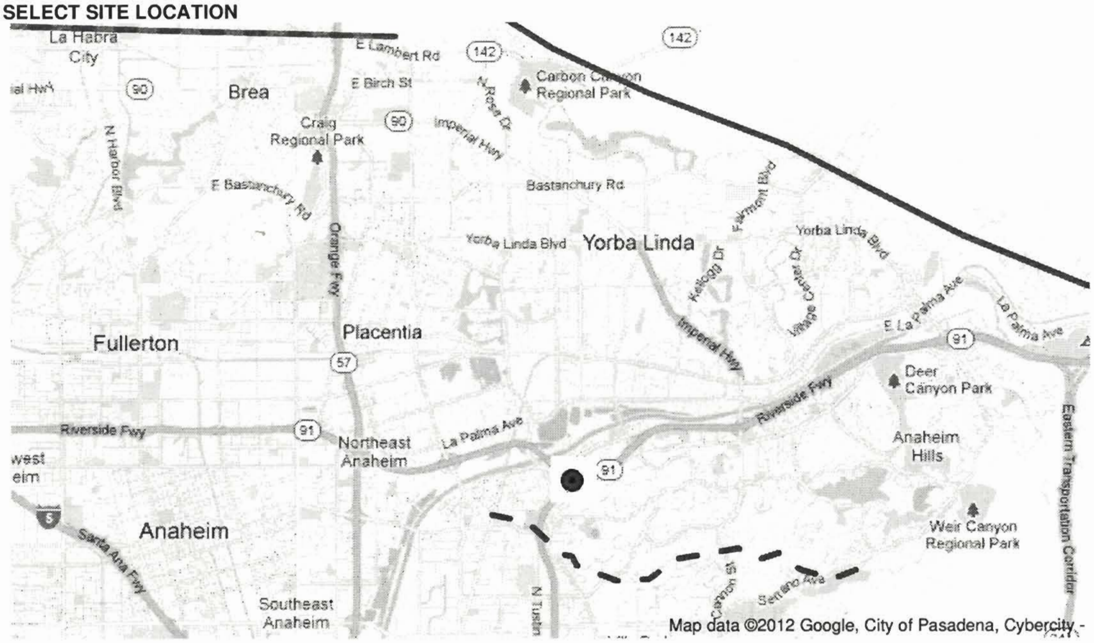
CALIFORNIA DEPARTMENT OF

TRANSPORTATION

Caltrans ARS Online (v1.0.4)

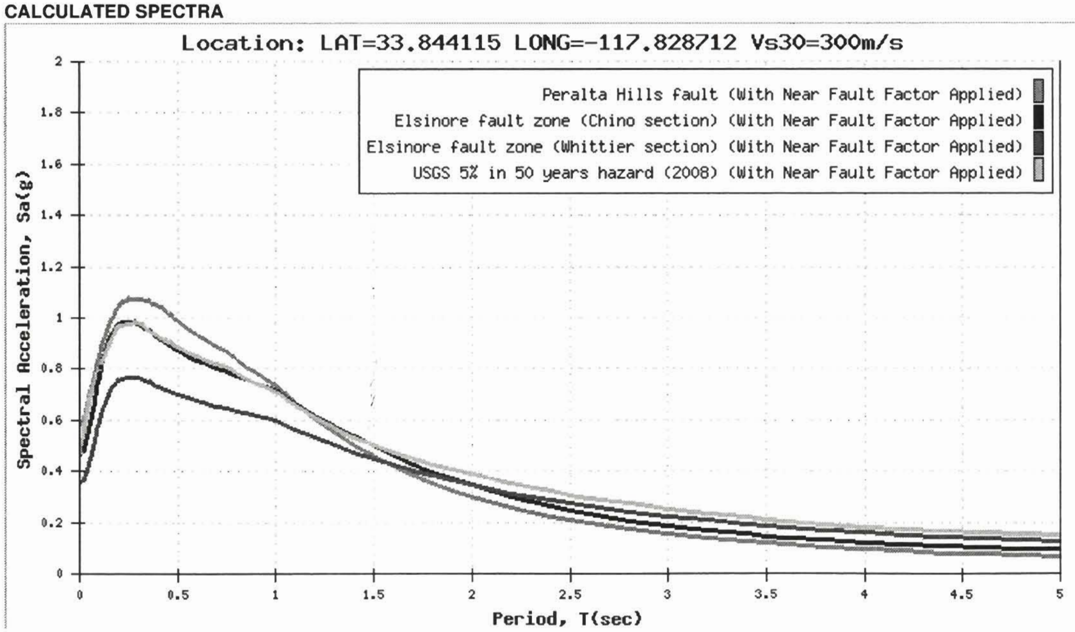
This web-based tool calculates both deterministic and probabilistic acceleration response spectra for any location in California based on criteria provided in *Appendix B of Caltrans Seismic Design Criteria*. More...

SELECT SITE LOCATION



Latitude: 33.84411463 **Longitude:** -117.82871246 **Vs30:** 300 m/s Calculate

CALCULATED SPECTRA



SITE DATA

Shear Wave Velocity, Vs_{30}:	300 m/s
Latitude:	33.844115
Longitude:	-117.828712
Depth to Vs = 1.0 km/s:	315 m
Depth to Vs = 2.5 km/s:	2.00 km

DETERMINISTIC

Peralta Hills fault

Fault ID:	146
Maximum Magnitude (MMax):	6.2
Fault Type:	R
Fault Dip:	50 Deg
Dip Direction:	N
Bottom of Rupture Plane:	14.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	1.00 km
Rjb:	0.02 km
Rx:	1.30 km
Fnorm:	0
Frev:	1

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.584	1.000	1.000	0.584
0.02	0.597	1.000	1.000	0.597
0.022	0.604	1.000	1.000	0.604
0.025	0.614	1.000	1.000	0.614
0.029	0.625	1.000	1.000	0.625
0.03	0.628	1.000	1.000	0.628
0.032	0.635	1.000	1.000	0.635
0.035	0.646	1.000	1.000	0.646
0.036	0.649	1.000	1.000	0.649
0.04	0.662	1.000	1.000	0.662
0.042	0.669	1.000	1.000	0.669
0.044	0.676	1.000	1.000	0.676
0.045	0.679	1.000	1.000	0.679
0.046	0.683	1.000	1.000	0.683
0.048	0.690	1.000	1.000	0.690
0.05	0.696	1.000	1.000	0.696
0.055	0.710	1.000	1.000	0.710
0.06	0.724	1.000	1.000	0.724

0.065	0.738	1.000	1.000	0.738
0.067	0.744	1.000	1.000	0.744
0.07	0.752	1.000	1.000	0.752
0.075	0.767	1.000	1.000	0.767
0.08	0.783	1.000	1.000	0.783
0.085	0.800	1.000	1.000	0.800
0.09	0.816	1.000	1.000	0.816
0.095	0.832	1.000	1.000	0.832
0.1	0.848	1.000	1.000	0.848
0.11	0.878	1.000	1.000	0.878
0.12	0.906	1.000	1.000	0.906
0.13	0.930	1.000	1.000	0.930
0.133	0.936	1.000	1.000	0.936
0.14	0.950	1.000	1.000	0.950
0.15	0.967	1.000	1.000	0.967
0.16	0.986	1.000	1.000	0.986
0.17	1.003	1.000	1.000	1.003
0.18	1.018	1.000	1.000	1.018
0.19	1.031	1.000	1.000	1.031
0.2	1.044	1.000	1.000	1.044
0.22	1.057	1.000	1.000	1.057
0.24	1.068	1.000	1.000	1.068
0.25	1.072	1.000	1.000	1.072
0.26	1.073	1.000	1.000	1.073
0.28	1.074	1.000	1.000	1.074
0.29	1.074	1.000	1.000	1.074
0.3	1.073	1.000	1.000	1.073
0.32	1.070	1.000	1.000	1.070
0.34	1.066	1.000	1.000	1.066
0.35	1.063	1.000	1.000	1.063
0.36	1.060	1.000	1.000	1.060
0.38	1.053	1.000	1.000	1.053
0.4	1.045	1.000	1.000	1.045
0.42	1.034	1.000	1.000	1.034
0.44	1.022	1.000	1.000	1.022
0.45	1.017	1.000	1.000	1.017
0.46	1.011	1.000	1.000	1.011
0.48	0.999	1.000	1.000	0.999
0.5	0.988	1.000	1.000	0.988
0.55	0.940	1.000	1.020	0.959
0.6	0.898	1.000	1.040	0.934
0.65	0.858	1.000	1.060	0.910
0.667	0.846	1.000	1.067	0.902
0.7	0.822	1.000	1.080	0.888
0.75	0.788	1.000	1.100	0.867
0.8	0.748	1.000	1.120	0.838
0.85	0.711	1.000	1.140	0.810
0.9	0.676	1.000	1.160	0.784

0.95	0.644	1.000	1.180	0.759
1	0.613	1.000	1.200	0.736
1.1	0.555	1.000	1.200	0.666
1.2	0.505	1.000	1.200	0.605
1.3	0.460	1.000	1.200	0.552
1.4	0.420	1.000	1.200	0.504
1.5	0.385	1.000	1.200	0.462
1.6	0.350	1.000	1.200	0.420
1.7	0.320	1.000	1.200	0.384
1.8	0.293	1.000	1.200	0.352
1.9	0.270	1.000	1.200	0.324
2	0.250	1.000	1.200	0.300
2.2	0.214	1.000	1.200	0.257
2.4	0.185	1.000	1.200	0.222
2.5	0.173	1.000	1.200	0.208
2.6	0.162	1.000	1.200	0.195
2.8	0.144	1.000	1.200	0.172
3	0.128	1.000	1.200	0.153
3.2	0.115	1.000	1.200	0.137
3.4	0.103	1.000	1.200	0.124
3.5	0.098	1.000	1.200	0.118
3.6	0.094	1.000	1.200	0.112
3.8	0.085	1.000	1.200	0.102
4	0.078	1.000	1.200	0.094
4.2	0.072	1.000	1.200	0.087
4.4	0.067	1.000	1.200	0.081
4.6	0.063	1.000	1.200	0.075
4.8	0.058	1.000	1.200	0.070
5	0.055	1.000	1.200	0.065

To use above data in Excel, copy/paste:

```
0.01	0.584	1.000	1.000	0.584
0.02	0.597	1.000	1.000	0.597
```

Elsinore fault zone (Chino section)

Fault ID:	242
Maximum Magnitude (MMax):	7.6
Fault Type:	R
Fault Dip:	50 Deg
Dip Direction:	W
Bottom of Rupture Plane:	15.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	12.09 km
Rjb:	3.20 km
Rx:	15.79 km
Fnorm:	0
Frev:	1

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)

0.01	0.466	1.000	1.000	0.466
0.02	0.479	1.000	1.000	0.479
0.022	0.484	1.000	1.000	0.484
0.025	0.493	1.000	1.000	0.493
0.029	0.503	1.000	1.000	0.503
0.03	0.505	1.000	1.000	0.505
0.032	0.512	1.000	1.000	0.512
0.035	0.522	1.000	1.000	0.522
0.036	0.525	1.000	1.000	0.525
0.04	0.537	1.000	1.000	0.537
0.042	0.544	1.000	1.000	0.544
0.044	0.550	1.000	1.000	0.550
0.045	0.554	1.000	1.000	0.554
0.046	0.557	1.000	1.000	0.557
0.048	0.563	1.000	1.000	0.563
0.05	0.570	1.000	1.000	0.570
0.055	0.589	1.000	1.000	0.589
0.06	0.609	1.000	1.000	0.609
0.065	0.628	1.000	1.000	0.628
0.067	0.636	1.000	1.000	0.636
0.07	0.648	1.000	1.000	0.648
0.075	0.668	1.000	1.000	0.668
0.08	0.688	1.000	1.000	0.688
0.085	0.709	1.000	1.000	0.709
0.09	0.729	1.000	1.000	0.729
0.095	0.749	1.000	1.000	0.749
0.1	0.768	1.000	1.000	0.768
0.11	0.804	1.000	1.000	0.804
0.12	0.836	1.000	1.000	0.836
0.13	0.865	1.000	1.000	0.865
0.133	0.873	1.000	1.000	0.873
0.14	0.889	1.000	1.000	0.889
0.15	0.911	1.000	1.000	0.911
0.16	0.928	1.000	1.000	0.928
0.17	0.942	1.000	1.000	0.942
0.18	0.954	1.000	1.000	0.954
0.19	0.964	1.000	1.000	0.964
0.2	0.974	1.000	1.000	0.974
0.22	0.980	1.000	1.000	0.980
0.24	0.983	1.000	1.000	0.983
0.25	0.983	1.000	1.000	0.983
0.26	0.982	1.000	1.000	0.982
0.28	0.980	1.000	1.000	0.980
0.29	0.977	1.000	1.000	0.977
0.3	0.975	1.000	1.000	0.975
0.32	0.966	1.000	1.000	0.966
0.34	0.957	1.000	1.000	0.957
0.35	0.951	1.000	1.000	0.951

0.36	0.946	1.000	1.000	0.946
0.38	0.934	1.000	1.000	0.934
0.4	0.922	1.000	1.000	0.922
0.42	0.912	1.000	1.000	0.912
0.44	0.902	1.000	1.000	0.902
0.45	0.897	1.000	1.000	0.897
0.46	0.892	1.000	1.000	0.892
0.48	0.882	1.000	1.000	0.882
0.5	0.872	1.000	1.000	0.872
0.55	0.835	1.000	1.020	0.852
0.6	0.802	1.000	1.040	0.835
0.65	0.772	1.000	1.060	0.819
0.667	0.762	1.000	1.067	0.813
0.7	0.744	1.000	1.080	0.804
0.75	0.719	1.000	1.100	0.791
0.8	0.692	1.000	1.120	0.775
0.85	0.667	1.000	1.140	0.760
0.9	0.643	1.000	1.160	0.745
0.95	0.620	1.000	1.180	0.732
1	0.598	1.000	1.200	0.718
1.1	0.555	1.000	1.200	0.666
1.2	0.516	1.000	1.200	0.619
1.3	0.480	1.000	1.200	0.576
1.4	0.447	1.000	1.200	0.537
1.5	0.418	1.000	1.200	0.501
1.6	0.385	1.000	1.200	0.462
1.7	0.356	1.000	1.200	0.427
1.8	0.330	1.000	1.200	0.396
1.9	0.308	1.000	1.200	0.369
2	0.288	1.000	1.200	0.345
2.2	0.249	1.000	1.200	0.299
2.4	0.218	1.000	1.200	0.262
2.5	0.205	1.000	1.200	0.246
2.6	0.193	1.000	1.200	0.231
2.8	0.172	1.000	1.200	0.206
3	0.154	1.000	1.200	0.185
3.2	0.140	1.000	1.200	0.168
3.4	0.127	1.000	1.200	0.153
3.5	0.122	1.000	1.200	0.146
3.6	0.117	1.000	1.200	0.140
3.8	0.108	1.000	1.200	0.130
4	0.100	1.000	1.200	0.120
4.2	0.095	1.000	1.200	0.114
4.4	0.090	1.000	1.200	0.108
4.6	0.086	1.000	1.200	0.103
4.8	0.082	1.000	1.200	0.098
5	0.078	1.000	1.200	0.094

To use above data in Excel,

copy/paste:

```
0.01    0.466   1.000   1.000   0.466
0.02    0.479   1.000   1.000   0.479
```

Elsinore fault zone (Whittier section)

Revised fault data exists that is not incorporated in these analysis results. Please refer to the Errata document for changes.

Fault ID:	241
Maximum Magnitude (MMax):	7.6
Fault Type:	RLSS
Fault Dip:	90 Deg
Dip Direction:	V
Bottom of Rupture Plane:	15.00 km
Top of Rupture Plane(Ztor):	0.00 km
Rrup	8.04 km
Rjb:	8.03 km
Rx:	8.04 km
Fnorm:	0
Frev:	0

Period	SA (Base Spectrum)	Basin Factor	Near Fault Factor (Applied)	SA (Final Spectrum)
0.01	0.360	1.000	1.000	0.360
0.02	0.365	1.000	1.000	0.365
0.022	0.369	1.000	1.000	0.369
0.025	0.375	1.000	1.000	0.375
0.029	0.381	1.000	1.000	0.381
0.03	0.383	1.000	1.000	0.383
0.032	0.388	1.000	1.000	0.388
0.035	0.396	1.000	1.000	0.396
0.036	0.398	1.000	1.000	0.398
0.04	0.408	1.000	1.000	0.408
0.042	0.413	1.000	1.000	0.413
0.044	0.418	1.000	1.000	0.418
0.045	0.421	1.000	1.000	0.421
0.046	0.423	1.000	1.000	0.423
0.048	0.428	1.000	1.000	0.428
0.05	0.434	1.000	1.000	0.434
0.055	0.449	1.000	1.000	0.449
0.06	0.465	1.000	1.000	0.465
0.065	0.481	1.000	1.000	0.481
0.067	0.487	1.000	1.000	0.487
0.07	0.496	1.000	1.000	0.496
0.075	0.512	1.000	1.000	0.512
0.08	0.528	1.000	1.000	0.528
0.085	0.545	1.000	1.000	0.545
0.09	0.561	1.000	1.000	0.561
0.095	0.576	1.000	1.000	0.576
0.1	0.592	1.000	1.000	0.592
0.11	0.619	1.000	1.000	0.619

0.12	0.644	1.000	1.000	0.644
0.13	0.666	1.000	1.000	0.666
0.133	0.672	1.000	1.000	0.672
0.14	0.685	1.000	1.000	0.685
0.15	0.702	1.000	1.000	0.702
0.16	0.716	1.000	1.000	0.716
0.17	0.728	1.000	1.000	0.728
0.18	0.739	1.000	1.000	0.739
0.19	0.748	1.000	1.000	0.748
0.2	0.757	1.000	1.000	0.757
0.22	0.763	1.000	1.000	0.763
0.24	0.767	1.000	1.000	0.767
0.25	0.768	1.000	1.000	0.768
0.26	0.768	1.000	1.000	0.768
0.28	0.767	1.000	1.000	0.767
0.29	0.765	1.000	1.000	0.765
0.3	0.764	1.000	1.000	0.764
0.32	0.759	1.000	1.000	0.759
0.34	0.753	1.000	1.000	0.753
0.35	0.750	1.000	1.000	0.750
0.36	0.746	1.000	1.000	0.746
0.38	0.739	1.000	1.000	0.739
0.4	0.731	1.000	1.000	0.731
0.42	0.725	1.000	1.000	0.725
0.44	0.719	1.000	1.000	0.719
0.45	0.716	1.000	1.000	0.716
0.46	0.713	1.000	1.000	0.713
0.48	0.706	1.000	1.000	0.706
0.5	0.700	1.000	1.000	0.700
0.55	0.673	1.000	1.020	0.687
0.6	0.649	1.000	1.040	0.675
0.65	0.627	1.000	1.060	0.664
0.667	0.620	1.000	1.067	0.661
0.7	0.606	1.000	1.080	0.655
0.75	0.588	1.000	1.100	0.646
0.8	0.568	1.000	1.120	0.636
0.85	0.550	1.000	1.140	0.627
0.9	0.532	1.000	1.160	0.617
0.95	0.516	1.000	1.180	0.609
1	0.501	1.000	1.200	0.601
1.1	0.470	1.000	1.200	0.564
1.2	0.443	1.000	1.200	0.532
1.3	0.418	1.000	1.200	0.502
1.4	0.396	1.000	1.200	0.475
1.5	0.375	1.000	1.200	0.450
1.6	0.354	1.000	1.200	0.425
1.7	0.335	1.000	1.200	0.402
1.8	0.318	1.000	1.200	0.381

1.9	0.302	1.000	1.200	0.362
2	0.288	1.000	1.200	0.346
2.2	0.261	1.000	1.200	0.313
2.4	0.237	1.000	1.200	0.285
2.5	0.227	1.000	1.200	0.273
2.6	0.218	1.000	1.200	0.261
2.8	0.201	1.000	1.200	0.241
3	0.186	1.000	1.200	0.223
3.2	0.173	1.000	1.200	0.208
3.4	0.162	1.000	1.200	0.194
3.5	0.156	1.000	1.200	0.188
3.6	0.151	1.000	1.200	0.182
3.8	0.142	1.000	1.200	0.171
4	0.134	1.000	1.200	0.161
4.2	0.127	1.000	1.200	0.152
4.4	0.120	1.000	1.200	0.144
4.6	0.114	1.000	1.200	0.137
4.8	0.109	1.000	1.200	0.131
5	0.104	1.000	1.200	0.125

To use above data in Excel, copy/paste:

```
0.01    0.360    1.000    1.000    0.360
0.02    0.365    1.000    1.000    0.365
```

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	0.468	1.000	1.000	0.468
0.02	0.550	1.000	1.000	0.550
0.022	0.562	1.000	1.000	0.562
0.025	0.579	1.000	1.000	0.579
0.029	0.599	1.000	1.000	0.599
0.03	0.604	1.000	1.000	0.604
0.032	0.613	1.000	1.000	0.613
0.035	0.626	1.000	1.000	0.626
0.036	0.630	1.000	1.000	0.630
0.04	0.646	1.000	1.000	0.646
0.042	0.653	1.000	1.000	0.653
0.044	0.660	1.000	1.000	0.660
0.045	0.664	1.000	1.000	0.664
0.046	0.667	1.000	1.000	0.667
0.048	0.674	1.000	1.000	0.674
0.05	0.680	1.000	1.000	0.680
0.055	0.695	1.000	1.000	0.695
0.06	0.709	1.000	1.000	0.709
0.065	0.723	1.000	1.000	0.723

0.067	0.728	1.000	1.000	0.728
0.07	0.735	1.000	1.000	0.735
0.075	0.747	1.000	1.000	0.747
0.08	0.758	1.000	1.000	0.758
0.085	0.769	1.000	1.000	0.769
0.09	0.779	1.000	1.000	0.779
0.095	0.789	1.000	1.000	0.789
0.1	0.798	1.000	1.000	0.798
0.11	0.820	1.000	1.000	0.820
0.12	0.840	1.000	1.000	0.840
0.13	0.859	1.000	1.000	0.859
0.133	0.865	1.000	1.000	0.865
0.14	0.877	1.000	1.000	0.877
0.15	0.894	1.000	1.000	0.894
0.16	0.910	1.000	1.000	0.910
0.17	0.926	1.000	1.000	0.926
0.18	0.941	1.000	1.000	0.941
0.19	0.955	1.000	1.000	0.955
0.2	0.969	1.000	1.000	0.969
0.22	0.972	1.000	1.000	0.972
0.24	0.975	1.000	1.000	0.975
0.25	0.976	1.000	1.000	0.976
0.26	0.978	1.000	1.000	0.978
0.28	0.980	1.000	1.000	0.980
0.29	0.981	1.000	1.000	0.981
0.3	0.983	1.000	1.000	0.983
0.32	0.970	1.000	1.000	0.970
0.34	0.958	1.000	1.000	0.958
0.35	0.953	1.000	1.000	0.953
0.36	0.948	1.000	1.000	0.948
0.38	0.937	1.000	1.000	0.937
0.4	0.928	1.000	1.000	0.928
0.42	0.919	1.000	1.000	0.919
0.44	0.910	1.000	1.000	0.910
0.45	0.906	1.000	1.000	0.906
0.46	0.902	1.000	1.000	0.902
0.48	0.895	1.000	1.000	0.895
0.5	0.888	1.000	1.000	0.888
0.55	0.849	1.000	1.020	0.866
0.6	0.815	1.000	1.040	0.848
0.65	0.785	1.000	1.060	0.832
0.667	0.776	1.000	1.067	0.827
0.7	0.758	1.000	1.080	0.819
0.75	0.734	1.000	1.100	0.807
0.8	0.700	1.000	1.120	0.784
0.85	0.669	1.000	1.140	0.763
0.9	0.642	1.000	1.160	0.745
0.95	0.617	1.000	1.180	0.728

1	0.594	1.000	1.200	0.713
1.1	0.547	1.000	1.200	0.656
1.2	0.507	1.000	1.200	0.608
1.3	0.473	1.000	1.200	0.567
1.4	0.443	1.000	1.200	0.532
1.5	0.418	1.000	1.200	0.501
1.6	0.395	1.000	1.200	0.474
1.7	0.374	1.000	1.200	0.449
1.8	0.356	1.000	1.200	0.428
1.9	0.340	1.000	1.200	0.408
2	0.325	1.000	1.200	0.390
2.2	0.294	1.000	1.200	0.353
2.4	0.268	1.000	1.200	0.322
2.5	0.257	1.000	1.200	0.308
2.6	0.246	1.000	1.200	0.295
2.8	0.228	1.000	1.200	0.273
3	0.211	1.000	1.200	0.254
3.2	0.196	1.000	1.200	0.235
3.4	0.183	1.000	1.200	0.219
3.5	0.177	1.000	1.200	0.212
3.6	0.171	1.000	1.200	0.205
3.8	0.161	1.000	1.200	0.193
4	0.151	1.000	1.200	0.182
4.2	0.145	1.000	1.200	0.174
4.4	0.139	1.000	1.200	0.167
4.6	0.134	1.000	1.200	0.161
4.8	0.129	1.000	1.200	0.155
5	0.125	1.000	1.200	0.150

To use above data in Excel, copy/paste:

```
0.01    0.468    1.000    1.000    0.468
0.02    0.550    1.000    1.000    0.550
```

Envelope Data

Period	SA
0.01	0.584
0.02	0.597
0.022	0.604
0.025	0.614
0.029	0.625
0.03	0.628
0.032	0.635
0.035	0.646
0.036	0.649
0.04	0.662
0.042	0.669
0.044	0.676
0.045	0.679

0.046	0.683
0.048	0.690
0.05	0.696
0.055	0.710
0.06	0.724
0.065	0.738
0.067	0.744
0.07	0.752
0.075	0.767
0.08	0.783
0.085	0.800
0.09	0.816
0.095	0.832
0.1	0.848
0.11	0.878
0.12	0.906
0.13	0.930
0.133	0.936
0.14	0.950
0.15	0.967
0.16	0.986
0.17	1.003
0.18	1.018
0.19	1.031
0.2	1.044
0.22	1.057
0.24	1.068
0.25	1.072
0.26	1.073
0.28	1.074
0.29	1.074
0.3	1.073
0.32	1.070
0.34	1.066
0.35	1.063
0.36	1.060
0.38	1.053
0.4	1.045
0.42	1.034
0.44	1.022
0.45	1.017
0.46	1.011
0.48	0.999
0.5	0.988
0.55	0.959
0.6	0.934
0.65	0.910
0.667	0.902

0.7	0.888
0.75	0.867
0.8	0.838
0.85	0.810
0.9	0.784
0.95	0.759
1	0.736
1.1	0.666
1.2	0.619
1.3	0.576
1.4	0.537
1.5	0.501
1.6	0.474
1.7	0.449
1.8	0.428
1.9	0.408
2	0.390
2.2	0.353
2.4	0.322
2.5	0.308
2.6	0.295
2.8	0.273
3	0.254
3.2	0.235
3.4	0.219
3.5	0.212
3.6	0.205
3.8	0.193
4	0.182
4.2	0.174
4.4	0.167
4.6	0.161
4.8	0.155
5	0.150

To use above data in Excel, copy/paste:

```
0.01    0.584
0.02    0.597
```

Appendix IV: Soil Parameters

Sign 203R, Soil Boring A-12-16

Depth (ft)	Soil Type	N	c (psf)	γ (pcf)	φ
0-22	SM	30	-	120	36
22-50.5	SP-SM	37	-	120	38

Sign 203L, Soil Boring A-12-16A

Depth (ft)	Soil Type	N	c (psf)	γ (pcf)	φ
0-12	SC	12	-	110	30
12-15	CL	33	800	125	
15-25	SM	18	-	128	33
25-45	SP	22	-	125	34

Sign 513, Soil Boring A-19

Depth (ft)	Soil Type	N	c (psf)	γ (pcf)	φ
0-9	CL	9	350	125	-
9-15	ML	-	-	128	31
15-39	CL	21	500	128	-

Sign 513, Soil Boring A-20

Depth (ft)	Soil Type	N	c (psf)	γ (pcf)	φ
0-15	CL	10	350	125	-
15-20	SP	16	-	115	32
20-25	ML	12	-	120	30
25-44.5	CL	16	500	125	-

Sign 400, Soil Boring A-12-21

Depth (ft)	Soil Type	N	c (psf)	γ (pcf)	φ
0-16	SC	17	-	120	32
16-25	CL	8	350	110	-
25-30	SW-SM	50	-	125	38

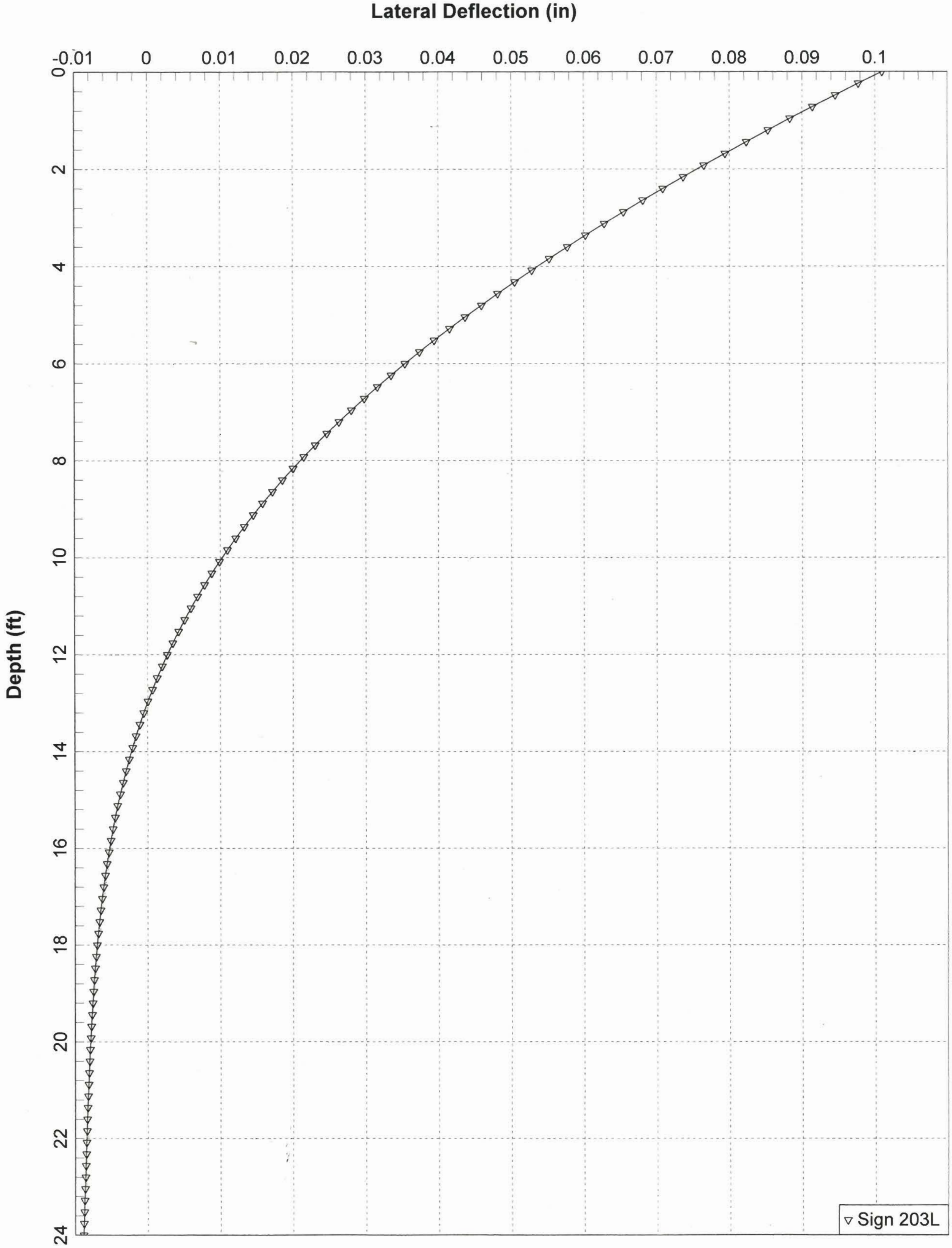
Sign 615, Soil Boring A-12-22

Depth (ft)	Soil Type	N	c (psf)	γ (pcf)	φ
0-12	CL	13	400	125	-
12-28	MH	13	-	115	34
28-33	SM	-	-	120	34
33-38	CH	13	400	128	-
38-43	SC	14	450	120	28
43-45.8	SW-SM	50	-	135	38

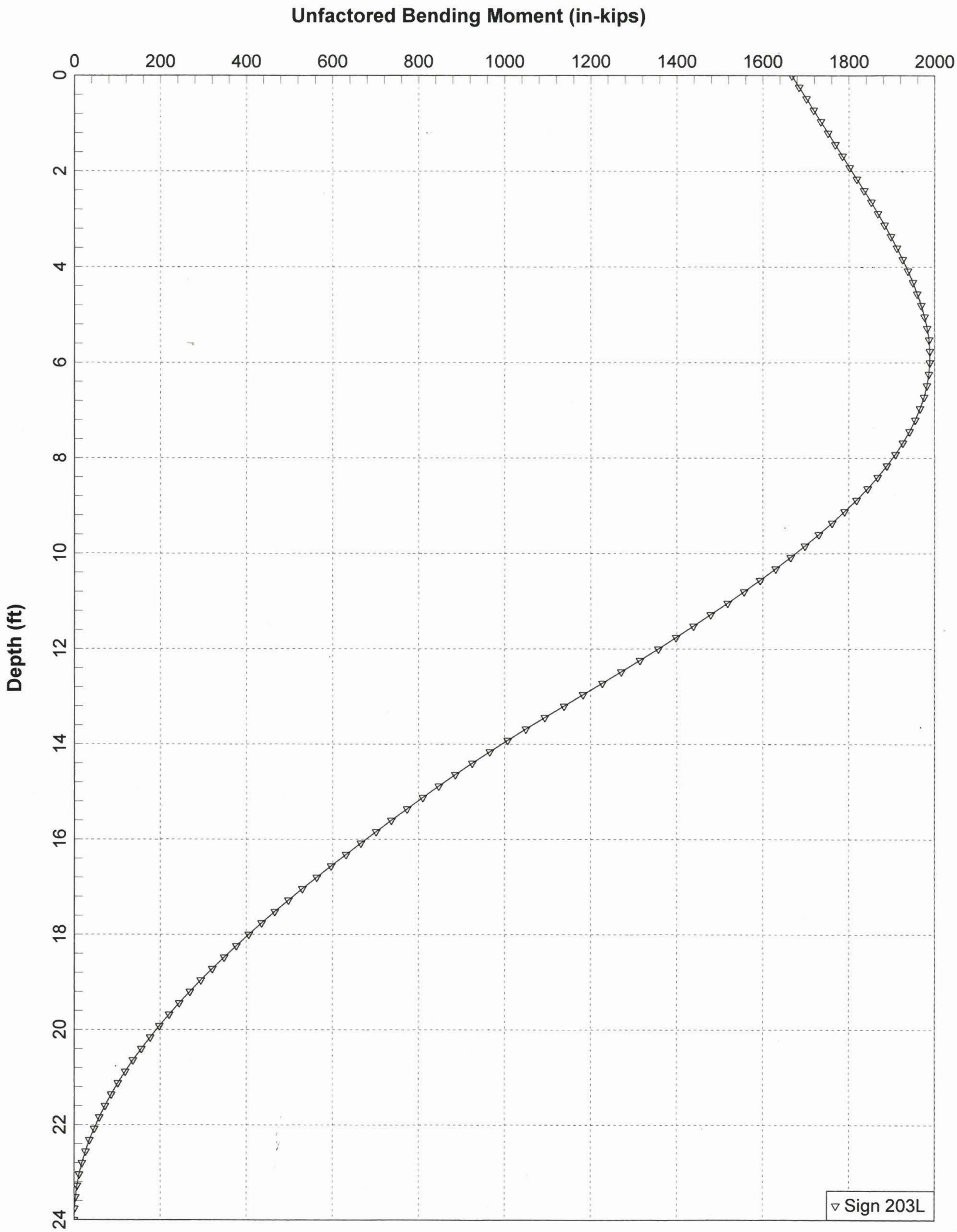
Sign 305, Soil Boring A-12-34

Depth (ft)	Soil Type	N	c (psf)	γ (pcf)	φ
0-32	SP	10	-	115	30
32-45.5	SW	30	-	125	36

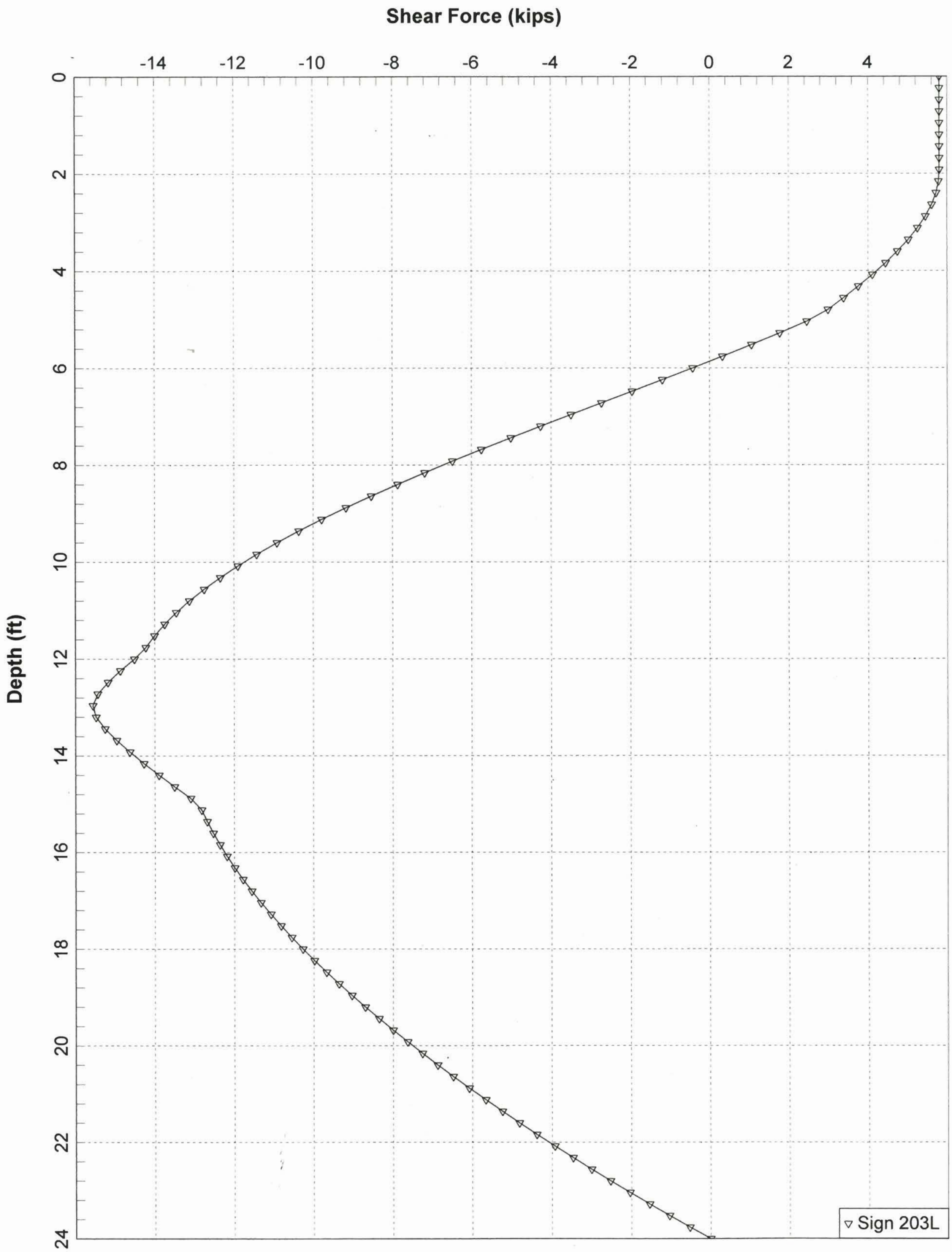
Appendix V: Lpile & Shaft Runs


Lateral Deflection (in)
-0.01
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.1
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
Sign 203L

Sign 203L

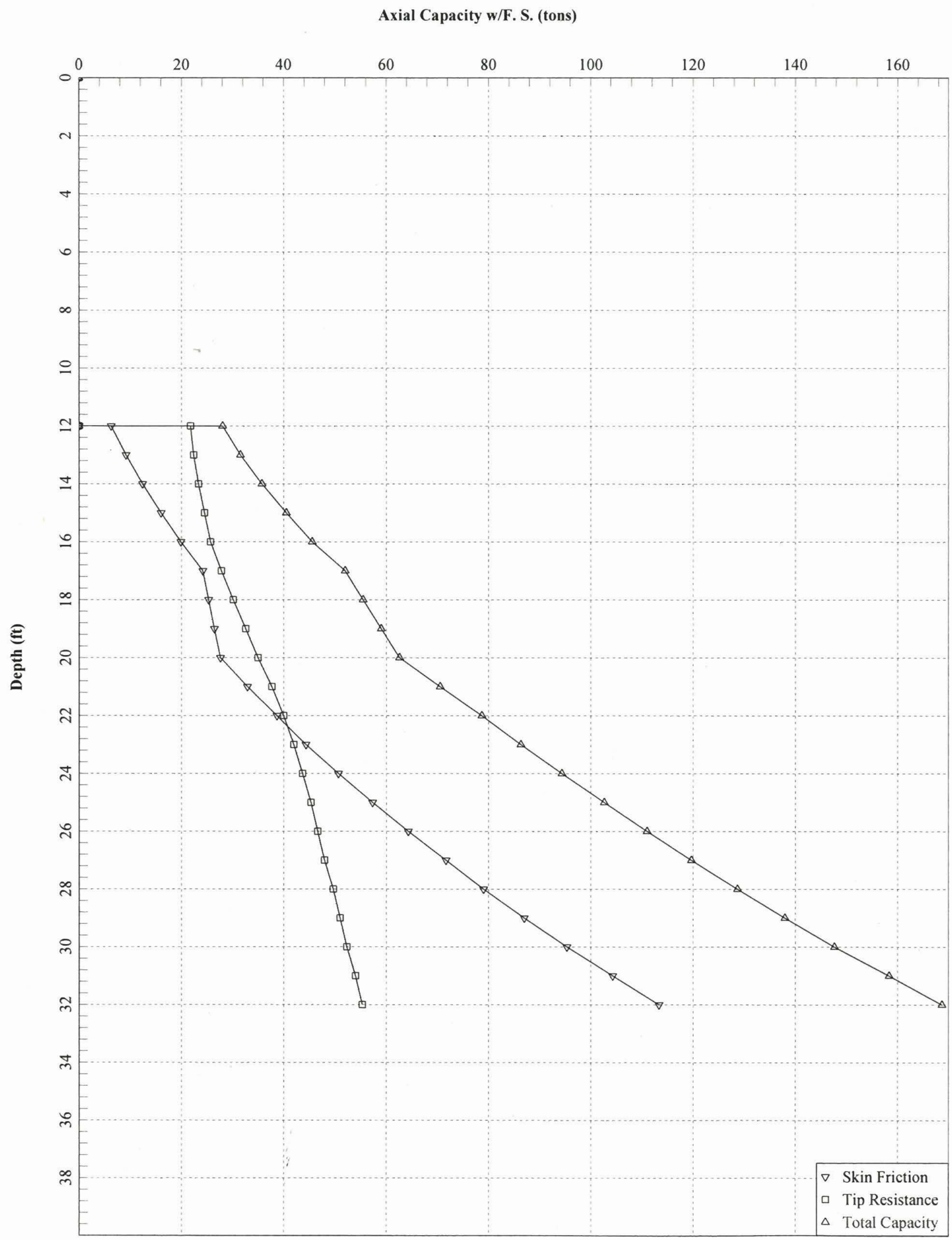

Unfactored Bending Moment (in-kips)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
Sign 203L

Sign 203L

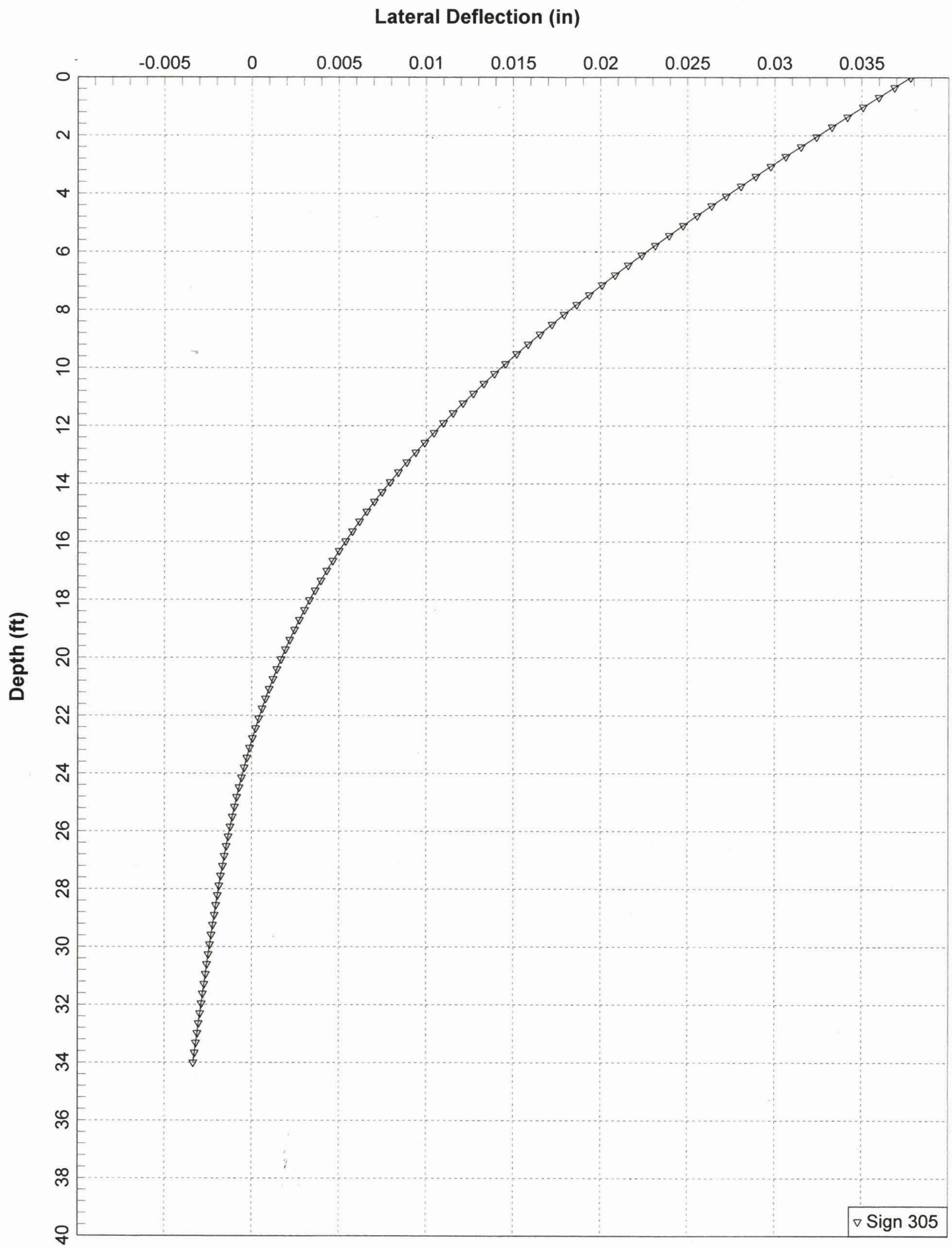


Shear Force (kips)
-14
-12
-10
-8
-6
-4
-2
0
2
4
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
Sign 203L

Sign 203L

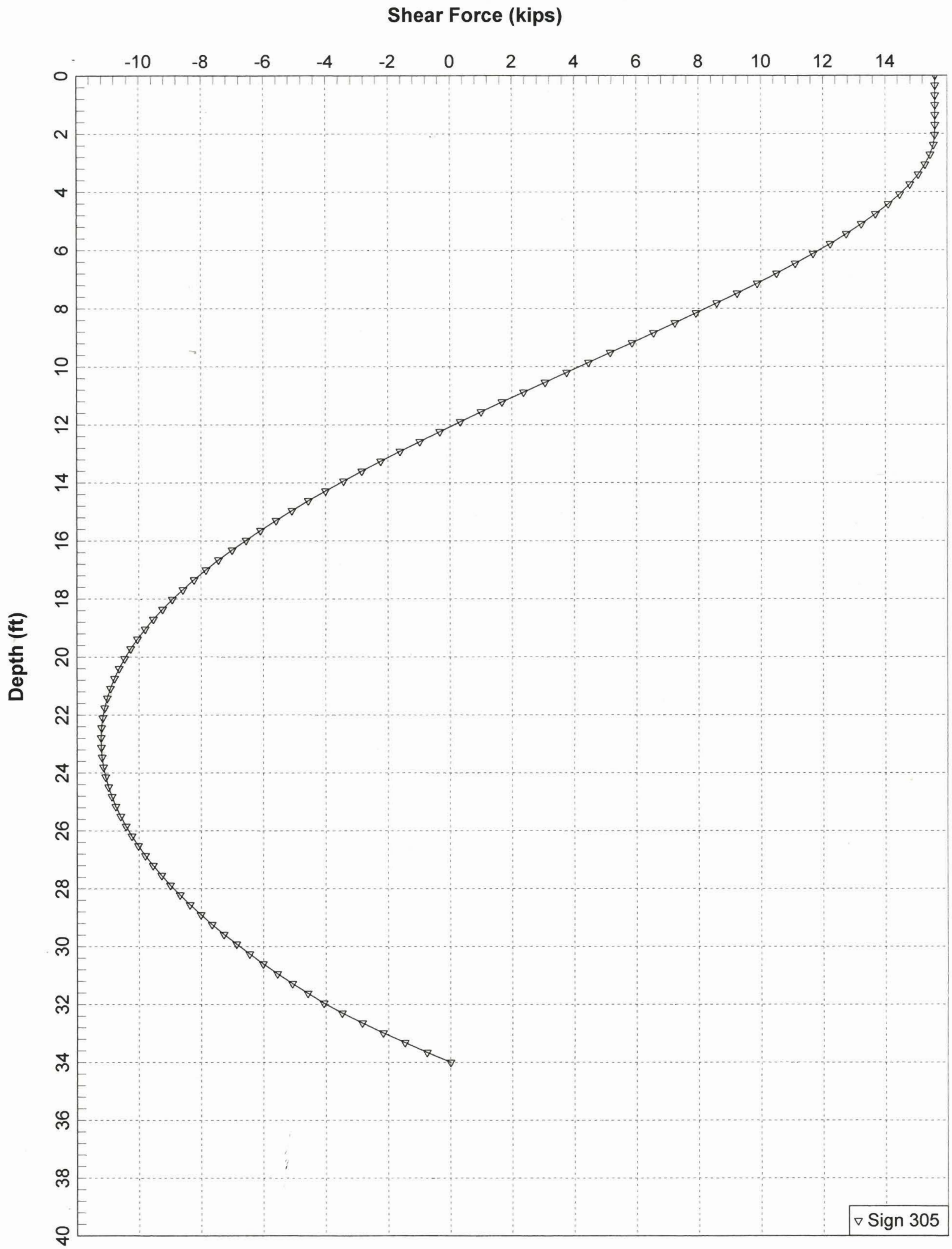

Axial Capacity w/F. S. (tons)
0
20
40
60
80
100
120
140
160
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Skin Friction
Tip Resistance
Total Capacity

Sign 203L

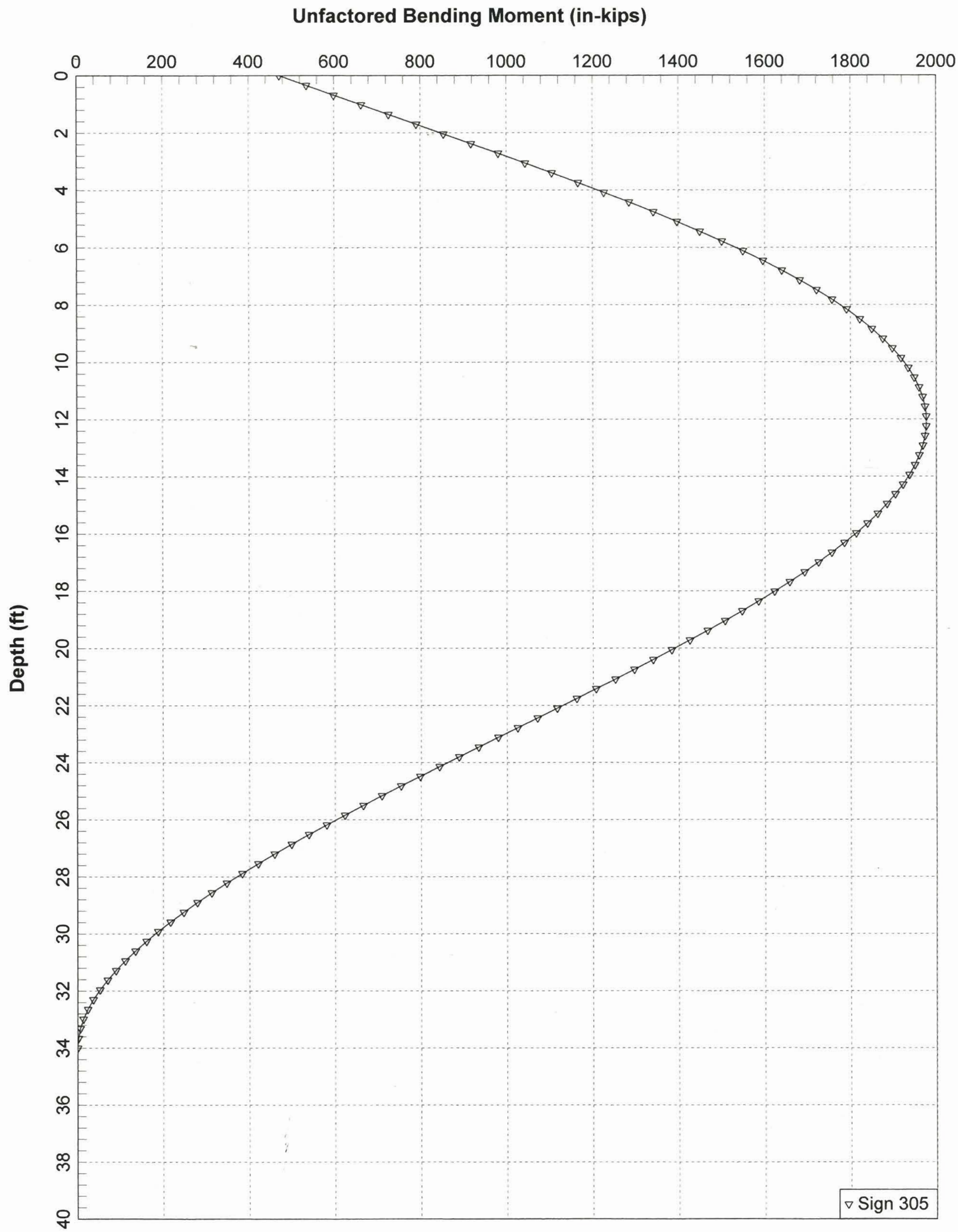


Lateral Deflection (in)
-0.005
0
0.005
0.01
0.015
0.02
0.025
0.03
0.035
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
Sign 305

Sign 305

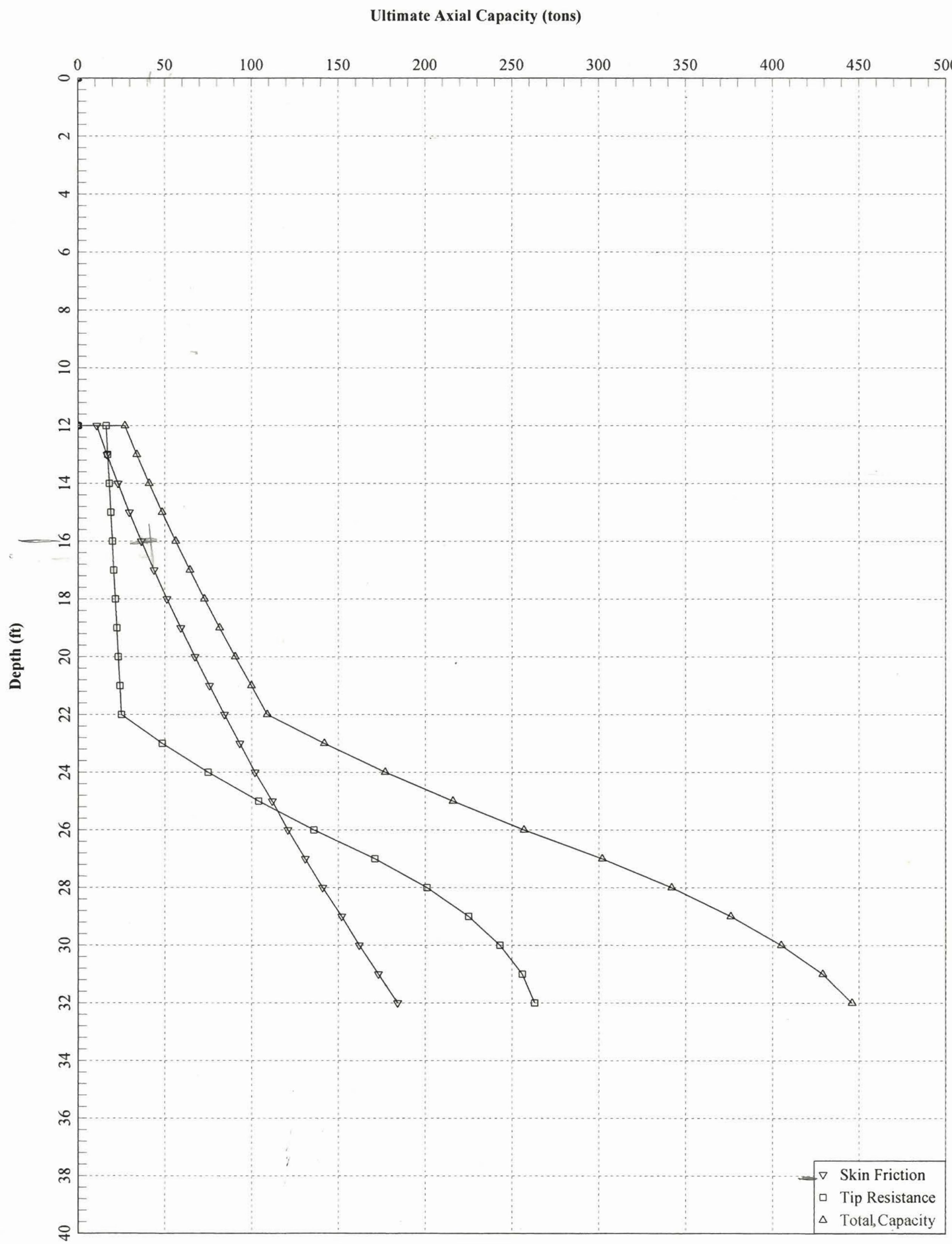

Shear Force (kips)
-10
-8
-6
-4
-2
0
2
4
6
8
10
12
14
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
Sign 305

Sign 305

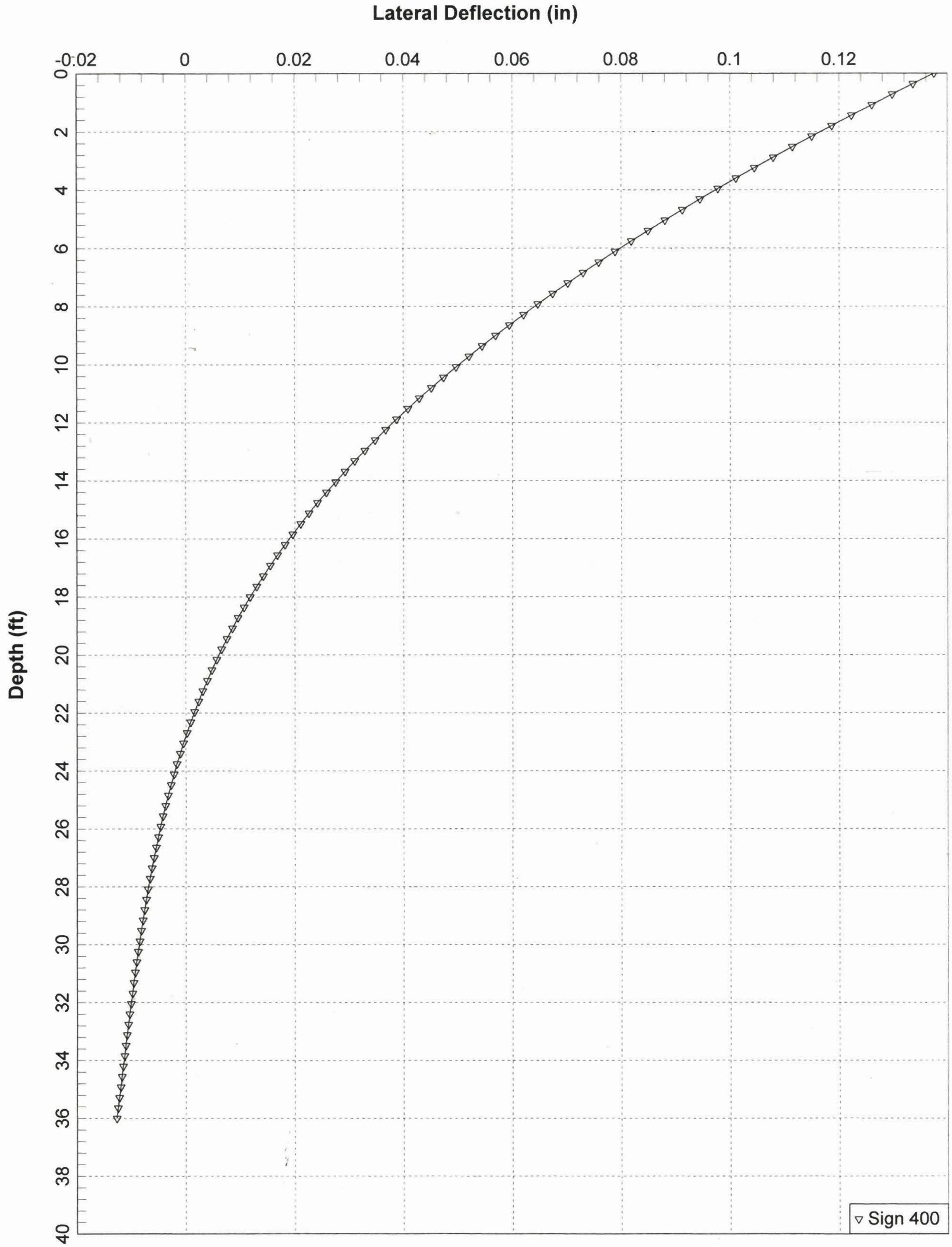


Unfactored Bending Moment (in-kips)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
Sign 305

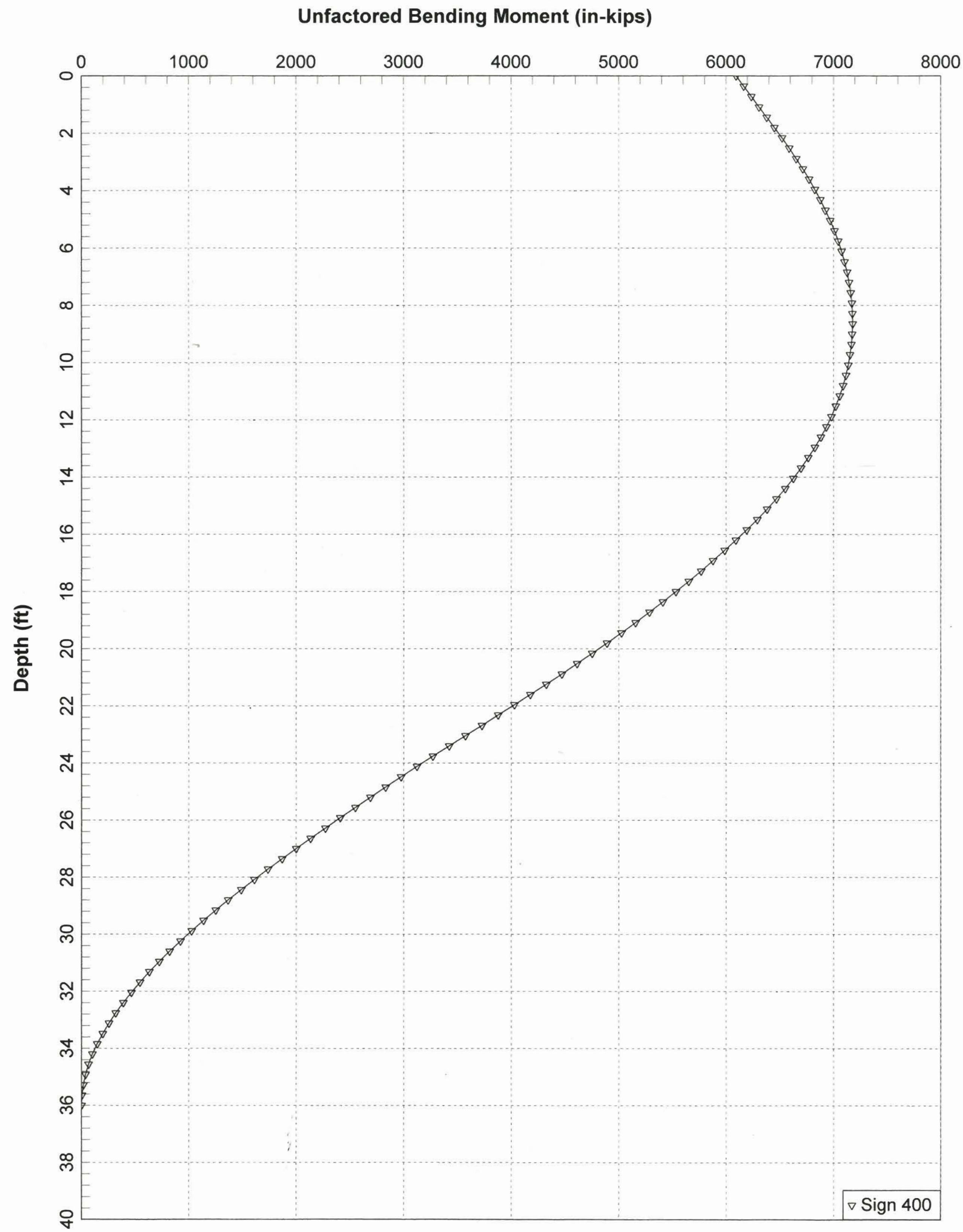
Sign 305


Ultimate Axial Capacity (tons)
0
50
100
150
200
250
300
350
400
450
500
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
Skin Friction
Tip Resistance
Total Capacity

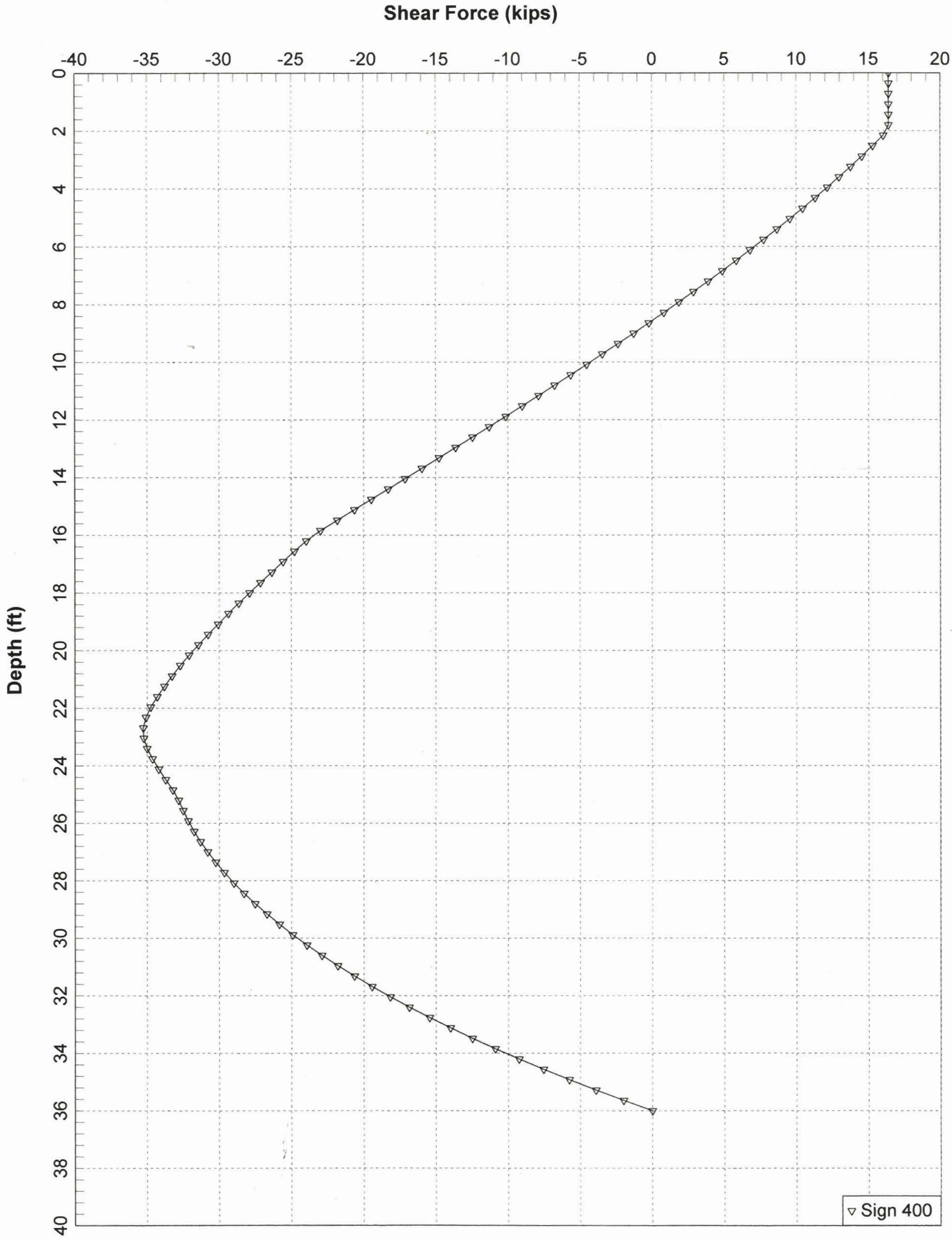
Sign 305


Lateral Deflection (in)
-0.02
0
0.02
0.04
0.06
0.08
0.1
0.12
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
Sign 400

Sign 400

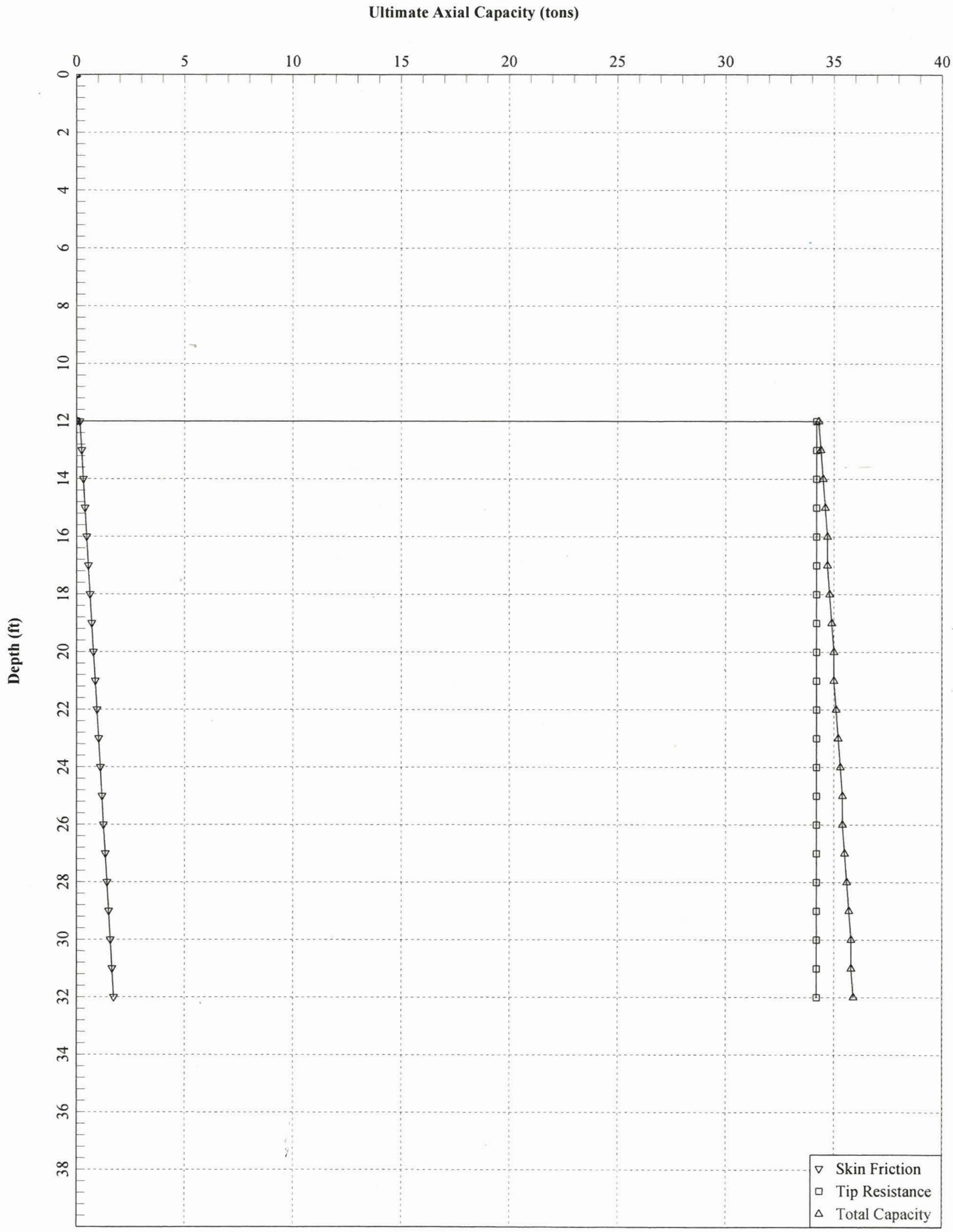

Unfactored Bending Moment (in-kips)
0
1000
2000
3000
4000
5000
6000
7000
8000
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
Depth (ft)
Sign 400

Sign 400

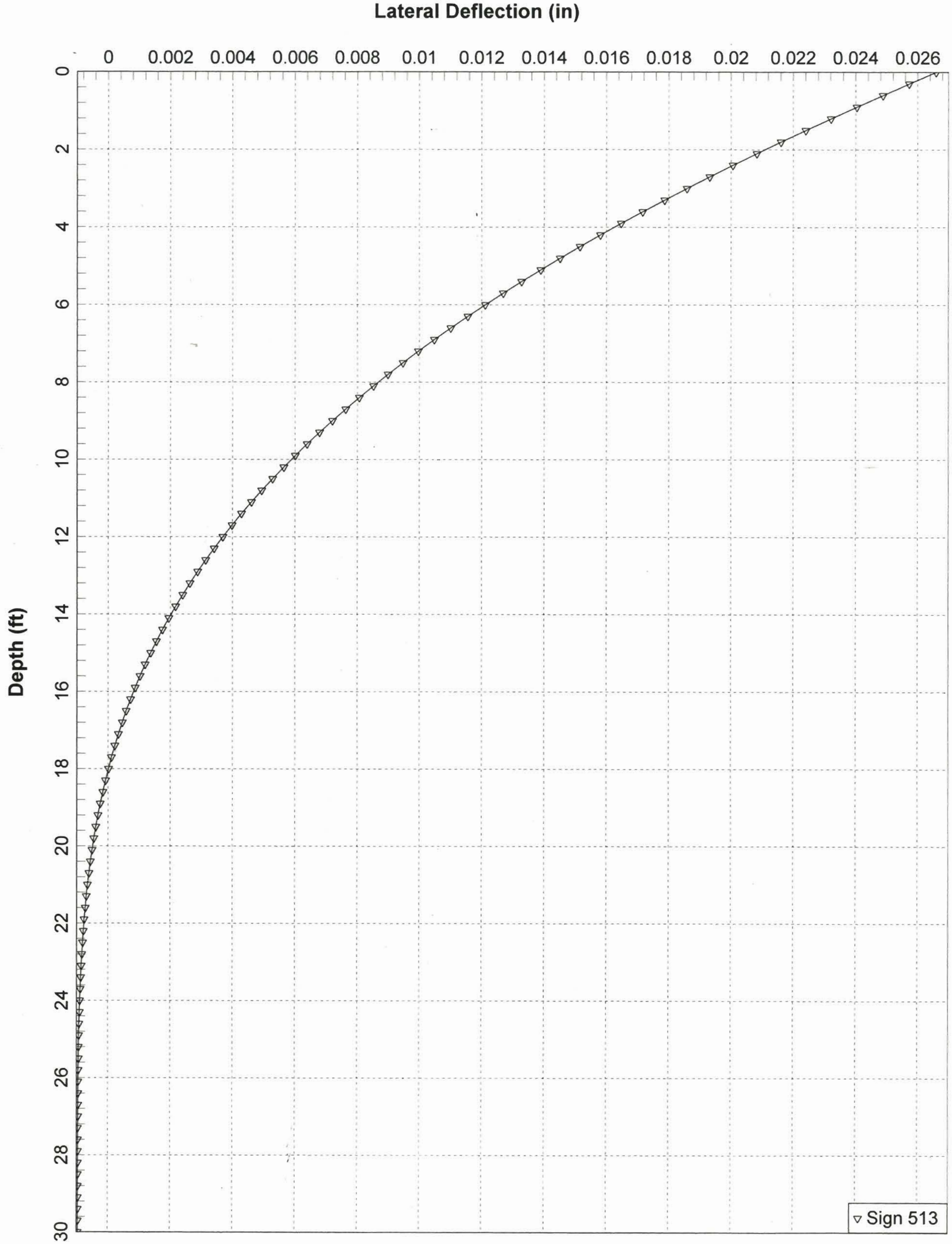


Shear Force (kips)
-40
-35
-30
-25
-20
-15
-10
-5
0
5
10
15
20
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
Sign 400

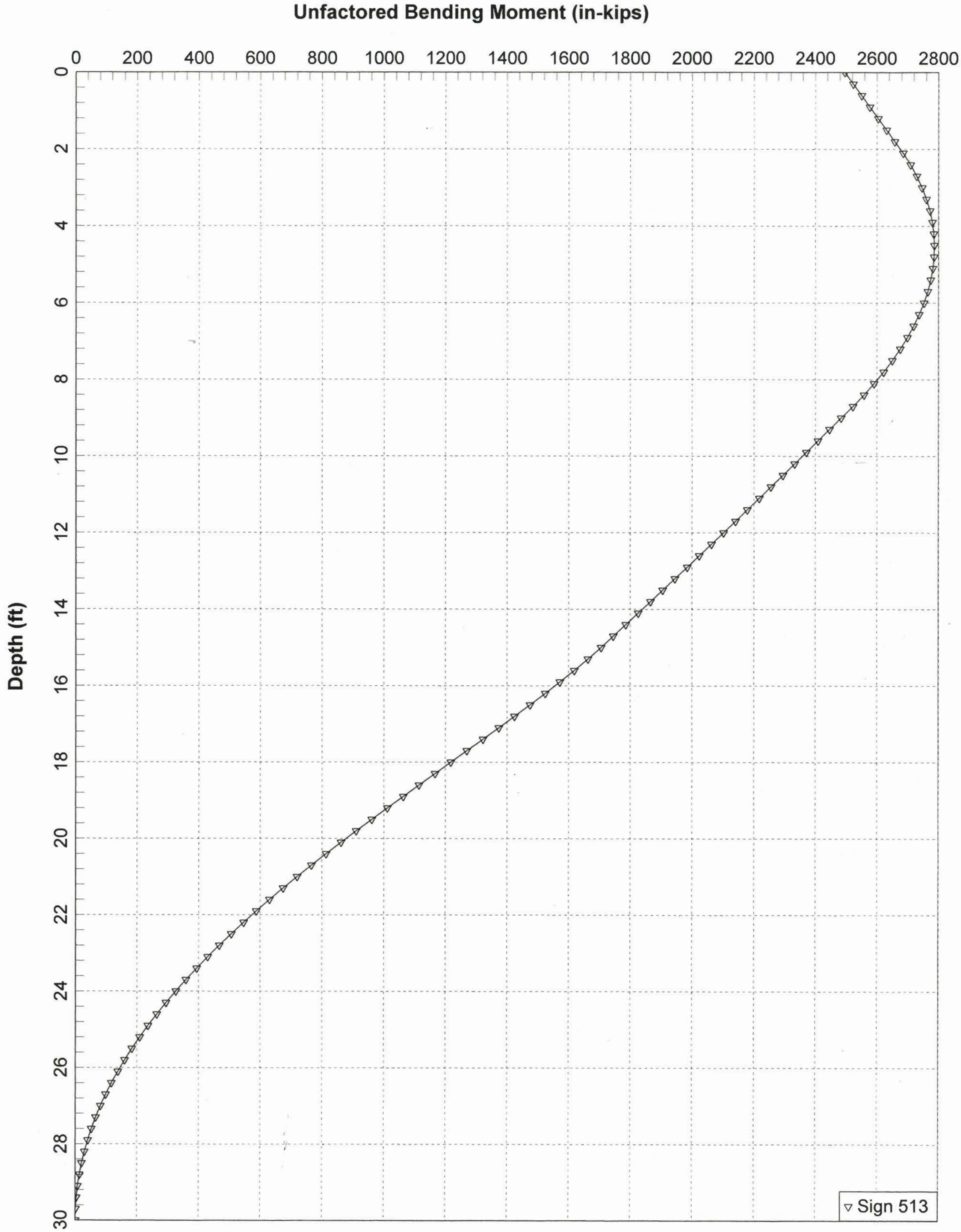
Sign 400


Ultimate Axial Capacity (tons)
0
5
10
15
20
25
30
35
40
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
Skin Friction
Tip Resistance
Total Capacity

Sign 400

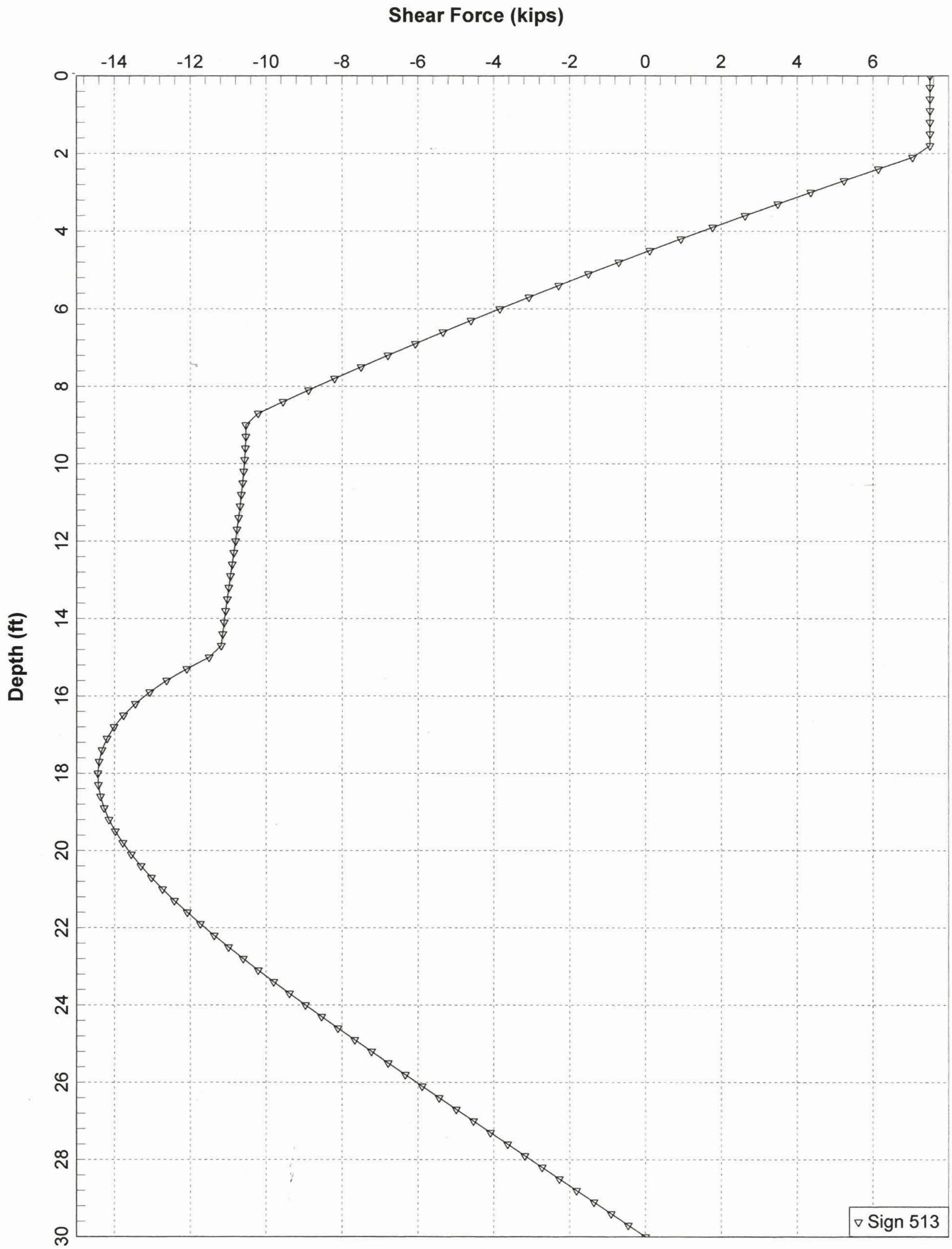

Lateral Deflection (in)
0
0.002
0.004
0.006
0.008
0.01
0.012
0.014
0.016
0.018
0.02
0.022
0.024
0.026
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
Sign 513

Sign 513



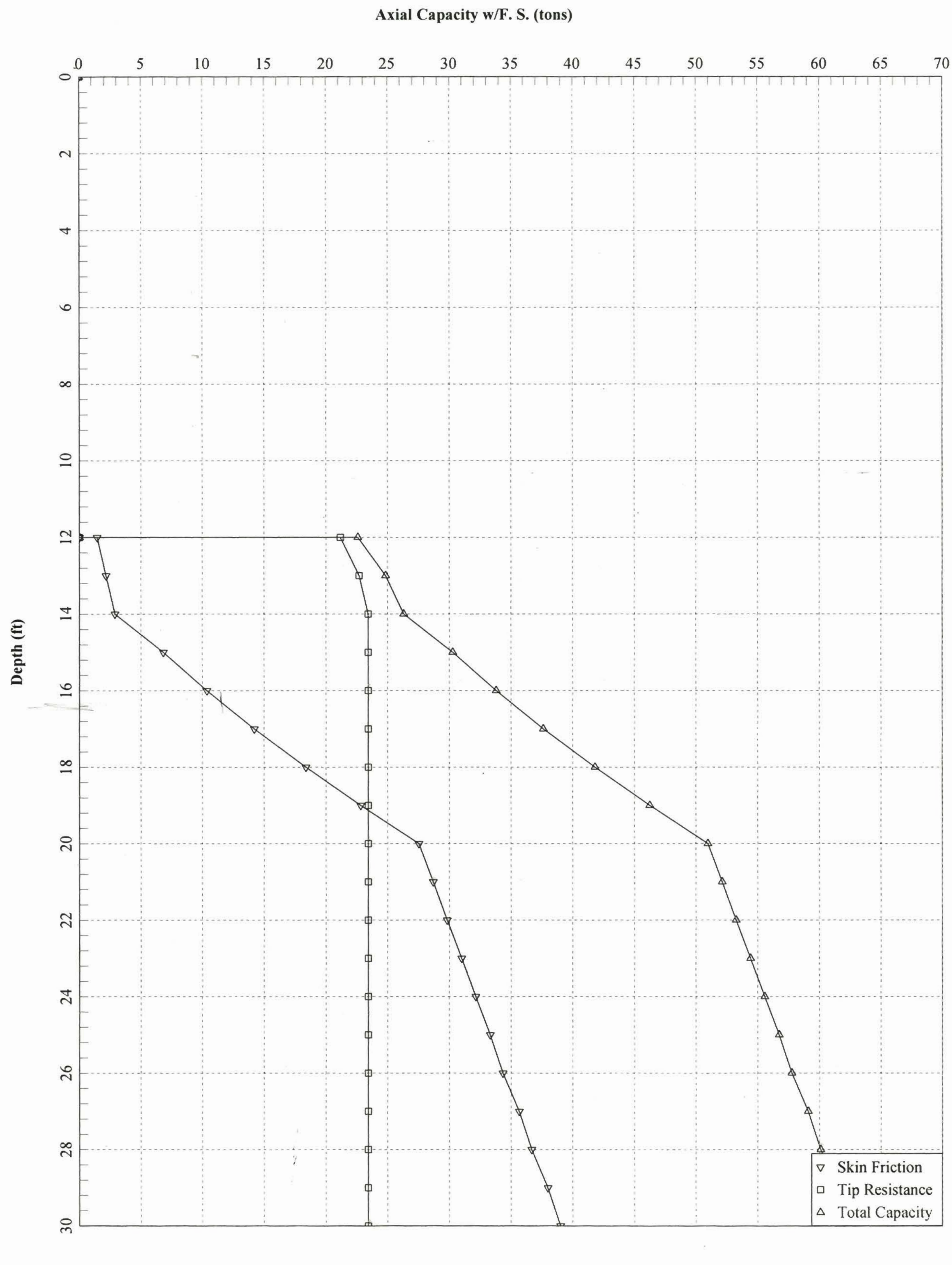
Unfactored Bending Moment (in-kips)
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
Sign 513

Sign 513

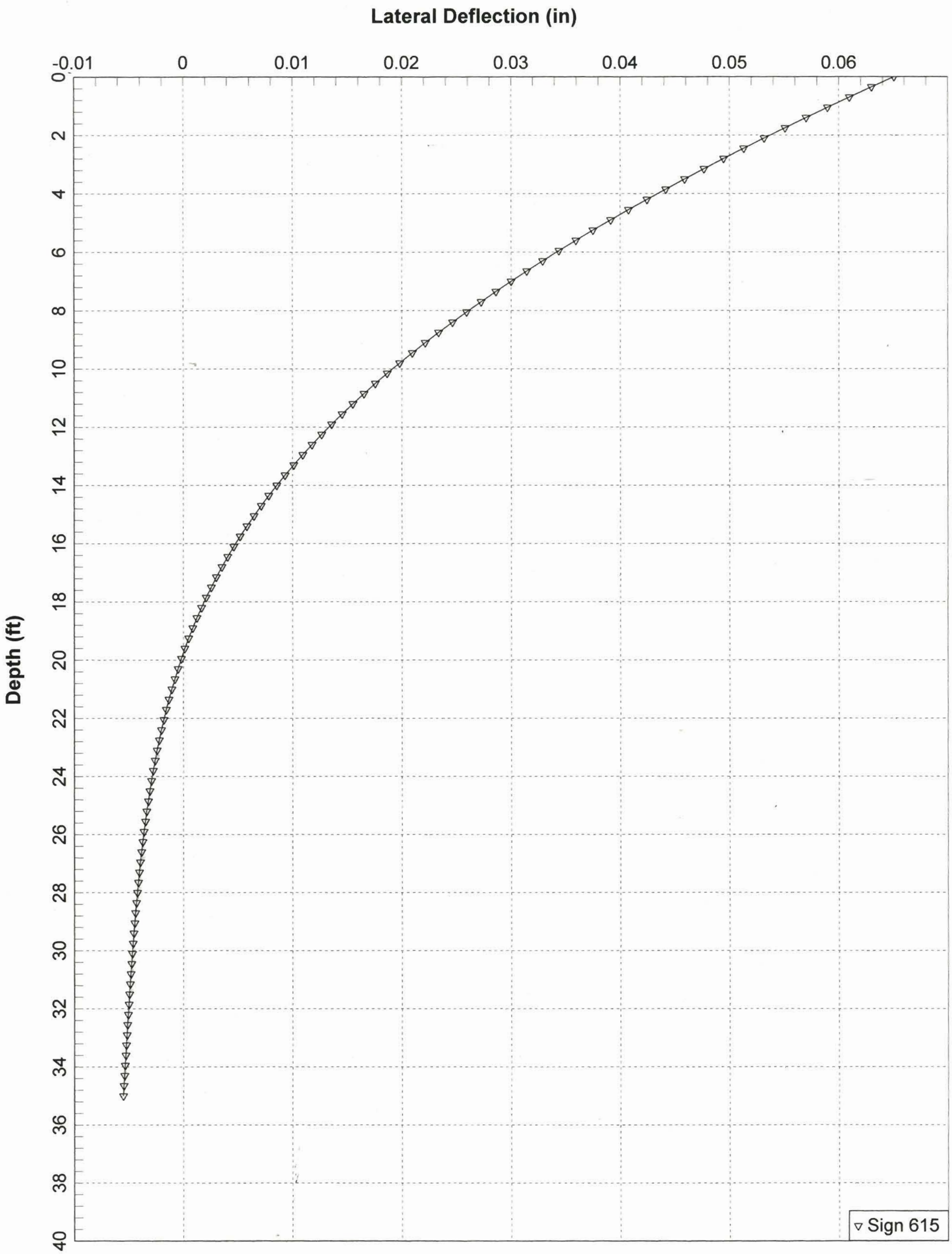


Shear Force (kips)
-14
-12
-10
-8
-6
-4
-2
0
2
4
6
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
Sign 513

Sign 513

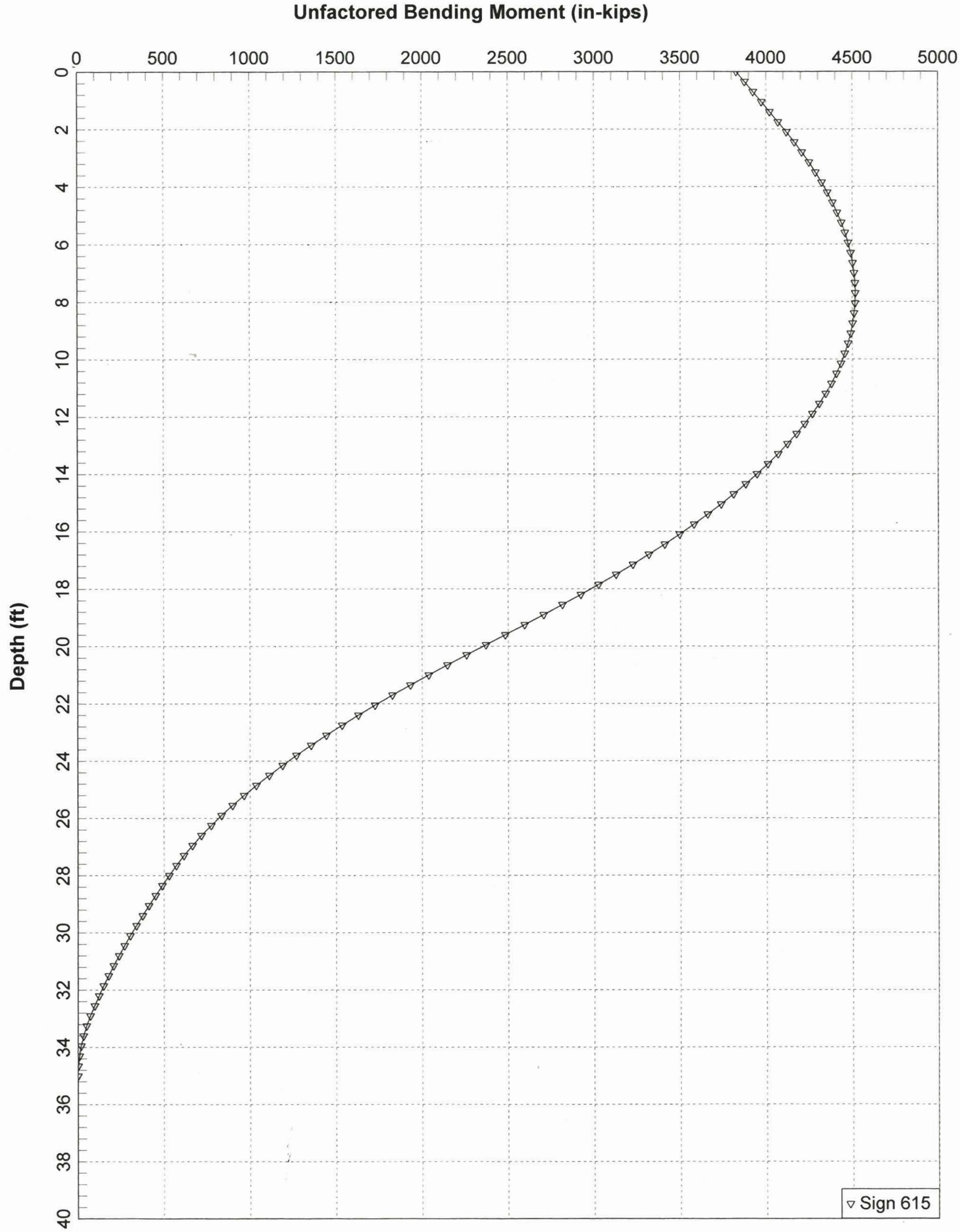

Axial Capacity w/F. S. (tons)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
Skin Friction
Tip Resistance
Total Capacity

Sign 513



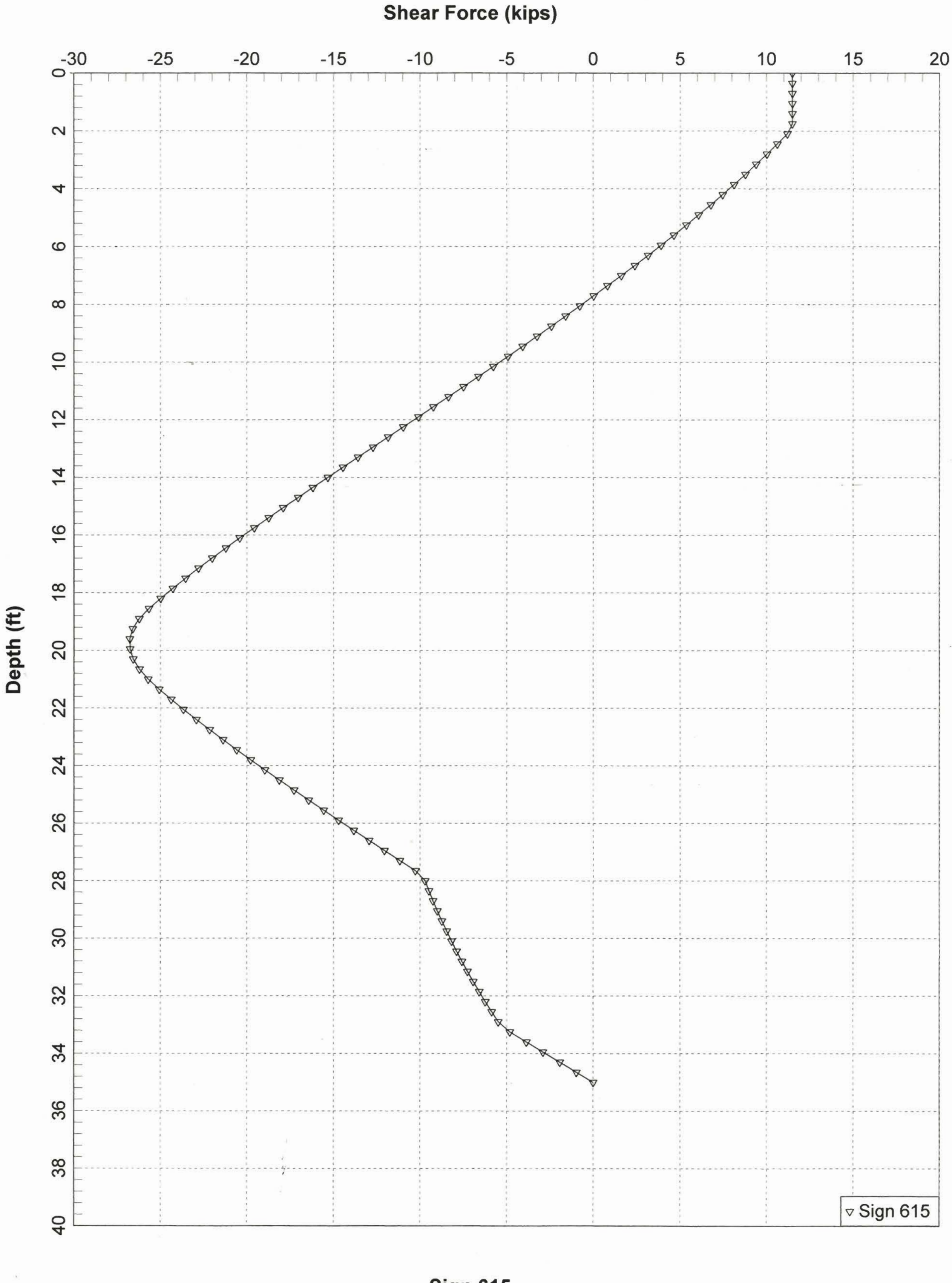
Lateral Deflection (in)
-0.01
0
0.01
0.02
0.03
0.04
0.05
0.06
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
Sign 615

Sign 615

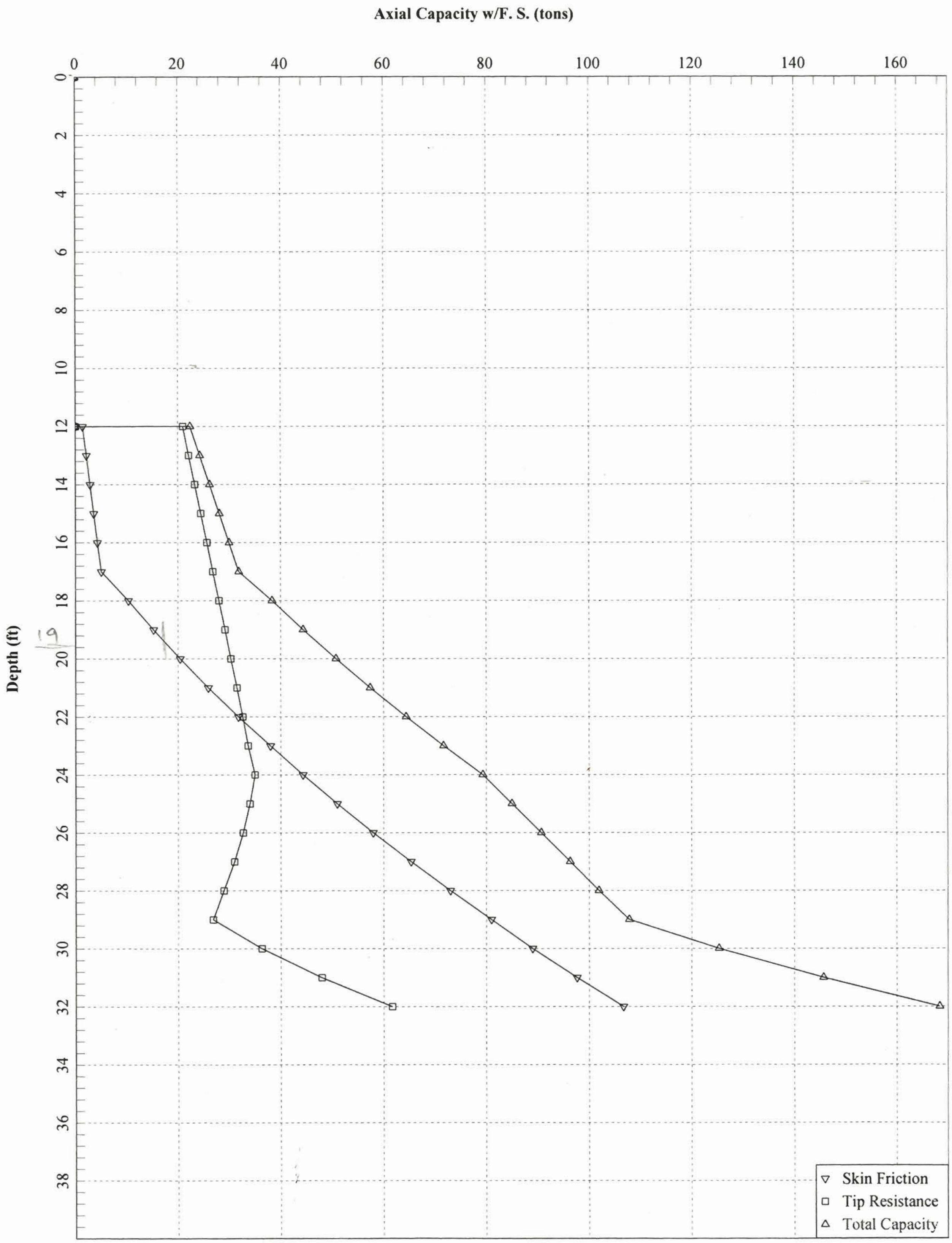


Unfactored Bending Moment (in-kips)
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
Sign 615

Sign 615


Shear Force (kips)
-30
-25
-20
-15
-10
-5
0
5
10
15
20
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
40
Sign 615

Sign 615



Axial Capacity w/F. S. (tons)
0
20
40
60
80
100
120
140
160
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
32
34
36
38
19
Skin Friction
Tip Resistance
Total Capacity

Sign 615

STATE OF CALIFORNIA

Business, Transportation and Housing Agency

MEMORANDUM

Date: April 19, 2013

To: MATTHEW CUGINI, CHIEF
DESIGN BRANCH C

File: EA #0C5601
12-ORA-91- PM 7.9/9.5 (KP 14.8/16.8)

Attn: FRED FAIZI

From: GRACE PINA-GARRETT, CHIEF
NPDES / STORM WATER UNIT

Subject: **STORM WATER INFORMATION HANDOUT (FOR R.E. FILE)**
Extending Lanes and Constructing Auxiliary Lane on Westbound SR-91 from the NB SR-55/WB SR-91 Connector to the Tustin Ave. Interchange in the City of Tustin, Orange County

Please include the following information into the Resident Engineer's Handout:

1. All construction activities within project limits shall comply with General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit Order No. 2009-0009-DWQ adopted on September 2, 2009).
2. Temporary Construction BMP such as Coffer Dam, Stream Diversion, and/ or any necessary BMPs shall incorporate upon construction of bridge widening excavation when such activities operating within the Santa Ana River. A strategy of how such temporary BMP including details should include in the Storm Water Pollution Prevention Plan for approval. Groundwater extraction and/ or dewatering of groundwater activities shall comply with the approved Clean Water Act Section 401 Certification.
3. Before any groundwater extraction and/ or dewatering activities, the contractor shall:
   a. Notify the Resident Engineer and NPDES/Storm Water Unit 2 weeks in advance. Prepare an extraction or dewatering strategy plan to illustrate how such activities will proceed.
   b. Monitoring and Reporting Program, Order No. R8-2009-0003-050.
   c. Santa Ana Regional Water Quality Control Board, Deminimus Permit Order No. R8-2009-0003.
4. All debris resulting from cutting, coring, excavation, etc. during bridge widening activities shall be kept away from the Santa Ana River to the maximum extent possible and cleaned up at the end of each work day.
5. Idling equipment shall be kept free from potential oil/grease leakage which potential draining into the Santa Ana River.

Should you have any questions, please contact me at x2189.

Attachments

Cc: NPDES files
Tran Dang, NPDES / Storm Water Unit

December 3, 2012

Matthew Cugini
California Department of Transportation,
District 12
3347 Michelson Drive, Suite 100
Irvine, CA 92612

CLEAN WATER ACT SECTION 401 WATER QUALITY STANDARDS CERTIFICATION FOR THE WESTBOUND SR-91 LANE EXTENSION & AUXILIARY LANE RECONSTRUCTION PROJECT, COUNTY OF ORANGE, CALIFORNIA (ACOE REFERENCE NO. SPL-2011-1198-SCH) (SARWQCB PROJECT NO. 302012-32)

Dear Mr. Cugini:

On October 5, 2012, we received an application for Clean Water Act Section 401 Water Quality Standards Certification ("Certification") from Caltrans District 12, for a westbound lane extension project between the NB SR-55/WB SR-91 connector and the westbound Tustin Avenue off-ramp. This letter responds to your request for certification that the proposed project, described in your application and summarized below, will comply with State water quality standards outlined in the Water Quality Control Plan for the Santa Ana River Basin (1995) (Basin Plan) and subsequent Basin Plan amendments:

Project Description:	As part of the proposed improvements, the bridge over the Santa Ana River will be widened. The bridge widening entails direct permanent impacts to the riverbed by increasing the bridge footing and pier size (permanent concrete fill) and temporary impacts by construction access and excavation. The work will take place within Section 4 of Township 4 South, Range 9 West, of the U.S. Geological Survey *Orange* quadrangle map (33° 50' 56.80" N/ -117° 50' 02.41" W).
Receiving water:	Santa Ana River
Fill area:	0.1340 acre of permanent impact to streambed habitat (788.28 linear feet), 2.11 acres of temporary impact to streambed habitat (868 linear feet)
Dredge/Fill volume:	1902.63 cubic yards
Federal permit:	U.S. Army Corps of Engineers Nationwide Permit No. 14

You have proposed to mitigate water quality impacts as described in your Certification application. The proposed mitigation is summarized below:

Onsite Water Quality Standards Mitigation Proposed:

- Standard water quality related best management practices (BMPs) will be employed during construction activities.
- The subject project lies within the Orange County Water District's and Orange County Flood Control District's groundwater recharge service area. As such, the project will install bio-swales and bio-strips as permanent BMPs in order to reduce potential pollutant levels carried by surface flows from the project.

Offsite Water Quality Standards Mitigation Proposed:

- To compensate for permanent impact to 0.1340 acre of streambed habitat, the applicant will purchase invasive species removal mitigation credits at a 1:1 ratio from the Santa Ana Watershed Association's In Lieu Fee Program.

Should the proposed project impact state- or federally-listed endangered species or their habitat, implementation of measures identified in consultation with U.S. Fish and Wildlife Service and the California Department of Fish and Game will ensure those impacts are mitigated to an acceptable level. Appropriate BMPs will be implemented to reduce construction-related impacts to Waters of the State and of the U.S. according to the requirements of Order No. 99-06-DWQ, issued to CalTrans by the State Water Resources Control Board, and subsequent iterations thereof. These requirements include the development and implementation of appropriate Best Management Practices for the purpose of removing construction-related and transportation-related pollutants in discharges from CalTrans' rights-of-way and easements.

A Mitigated Negative Declaration for the project was filed by the California Department of Transportation, District 12, on January 12, 2011. Pursuant to California Code of Regulations, Title 14, Chapter 3, Section 15096, as a responsible agency, the Regional Board is required to consider an EIR or Negative Declaration prepared by the lead agency in determining whether to approve a project. A responsible agency has responsibility for mitigating and avoiding only the direct and indirect environmental effects of those parts of the project which it decides to carry out, finance, or approve. Further, the responsible agency must make findings as required by Sections 15091 and, if necessary, 15093, for each and every significant impact of the project.

The Regional Board has considered the CalTrans Mitigated Negative Declaration (MND) for this project before issuing this Certification, particularly those sections of the MND that relate to water quality. Based on the mitigation proposed in the MND and application, and the conditions set forth in this Certification, the Regional Board concludes that impacts to water quality will be reduced to a less-than-significant level and beneficial uses will be protected. The Regional Board independently finds that changes or alterations have been required or incorporated into the project that avoid or mitigate impacts to water quality to a less-than-significant level.

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

1) The applicant must comply with the requirements of the applicable Clean Water Act section 404 permit.

2) Proposed mitigation shall be timely implemented. Materials documenting the purchase of necessary mitigation credits shall be provided to this office prior to the discharge of fill to, or the dredging or excavation of material from, waters of the state.

3) All materials generated from construction activities associated with this project shall be managed appropriately. This shall include identifying all potential pollution sources within the scope of work of this project, and incorporating all necessary pollution prevention BMPs as they relate to each potential pollution source identified.

4) The project proponent shall utilize BMPs during project construction to minimize the controllable discharges of sediment and other wastes to drainage systems or other waters of the state and of the United States.

5) Substances resulting from project-related activities that could be harmful to aquatic life, including, but not limited to, petroleum lubricants and fuels, cured and uncured cements, epoxies, paints and other protective coating materials, portland cement concrete or asphalt concrete, and washings and cuttings thereof, shall not be discharged to soils or waters of the state. All waste concrete shall be removed.

6) Motorized equipment shall not be maintained or parked within or near any stream crossing, channel or lake margin in such a manner that petroleum products or other pollutants from the equipment may enter these areas under any flow conditions. Vehicles shall not be driven or equipment operated in waters of the state on-site, except as necessary to complete the proposed project. No equipment shall be operated in areas of flowing water.

7) This Water Quality Certification is subject to the acquisition of all local, regional, state, and federal permits and approvals as required by law. Failure to meet any conditions contained herein or any the conditions contained in any other permit or approval issued by the State of California or any subdivision thereof may result in the revocation of this Certification and civil or criminal liability.

8) Best management practices to stabilize disturbed soils must include the use of native plant species whenever feasible.

9) Construction de-watering discharges, including temporary stream diversions necessary for project construction may be regulated under Regional Board Order No. R8-2009-0003, General Waste Discharge Requirements for Discharges to Surface Waters that Pose an Insignificant (De Minimus) Threat to Water Quality. For more information, please review Order No. R8-2009-0003 at www.waterboards.ca.gov/santaana/

10) Applicant shall ensure that all fees associated with this project shall be paid to each respective agency prior to conducting any on-site construction activities.

11) Prior to any grading for the project in areas slated to be impacted, functional assessments of these proposed areas of wetland and riparian habitats and riparian mitigation sites shall be conducted using the California Rapid Assessment Method, February 2012. Site mitigation assessments shall be conducted from October through December, until success criteria are met for consecutive years. This information shall be reported to http://www.califroniawetlands.net/tracker/

Applicant shall ensure that all fees associated with this project shall be paid to each respective agency prior to conducting any on-site construction activities.
Under California Water Code, Section 1058, and Pursuant to 23 CCR §3860, the following shall be included as conditions of all water quality certification actions:

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

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

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

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

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

This letter constitutes a Water Quality Standards Certification issued pursuant to Clean Water Act Section 401. I hereby issue an order certifying that any discharge from the referenced project will comply with the applicable provisions of Sections 301 (Effluent Limitations), 302 (Water Quality Related Effluent Limitations), 303 (Water Quality Standards and Implementation Plans), 306 (National Standards of Performance), and 307 (Toxic and Pretreatment Effluent Standards) of the Clean Water Act, and with other applicable requirements of State law. This discharge is also regulated under State Water Resources Control Board Order No. 2003-0017-DWQ (Order No. 2003-0017-DWQ), "General Waste Discharge Requirements for Dredge and Fill Discharges That Have Received Water Quality Certification" which requires compliance with all conditions of this Water Quality Standards Certification. Order No. 2003-0017-DWQ is available at:
www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2003/wqo/wqo2003-0017.pdf

Should there be any questions, please contact Marc Brown at (951) 321-4584, or Mark Adelson at (951) 782-3234.

Sincerely,

Kurt V. Berchtold

Kurt V. Berchtold
Executive Officer
Santa Ana Regional Water Quality Control Board

cc (via electronic mail):
U.S. Army Corps of Engineers, Los Angeles Office - Stephen Estes
State Water Resources Control Board, OCC - David Rice
California Department of Fish and Game - Kevin Hupf, KHupf@dfg.ca.gov
State Water Resources Control Board, DWQ-Water Quality Certification Unit - Bill Orme

302012-32_wb sr-91lane extension & aux lane recon_03dec12.docx

DEPARTMENT OF THE ARMY
Los Angeles District Corps of Engineers
P.O. Box 532711
Los Angeles, California 90053

REPLY TO
ATTENTION OF

April 18, 2013

Regulatory Division

Mr. Matthew Cugini, Branch Chief, P.E.,
California Department of Transportation, District 12
Attn: Shannon Crossen
3347 Michelson Drive, Suite 100,
Irvine, California 92612

DEPARTMENT OF THE ARMY NATIONWIDE PERMIT VERIFICATION

Dear Mr. Cugini:

I am responding to your request, dated December 26, 2012, to modify your Department of the Army permit verification (SPL-2011-01198-SCH) dated December 17, 2012. Specifically, you propose to modify the proposed project activity to include additional work associated with seismic retrofit of the Santa Ana River Bridge (see attached figures).

Pursuant to 33 CFR § 325.7, the Corps may reevaluate the circumstances and conditions of any permit and initiate action to modify a permit as necessary. Under the provisions of 33 CFR §325.7(b), the terms and conditions of your permit verification have been modified. This Department of the Army permit verification supersedes your DA permit verification dated December 17, 2012.

The construction of State Route (SR) 91 Westbound Widening Project between the State Route 55 and the State Route 91 (SR-91) connector to the Tustin Avenue Off-Ramp and associated seismic retrofit activities on the Santa Ana River Bridge comply with Nationwide Permit (NWP) No. 14 Linear Transportation Projects, if conducted as described in your original application and December 26, 2012 modification request.

Specifically, you are authorized to conduct the following Corps-regulated activities:

1. permanently impact 0.134 acre (788 linear feet) of non-wetland waters of the U.S. associated with widening of a bridge footing;

2. temporarily impact 2.11 acre (868 linear feet) of non-wetland waters of the U.S. associated with water diversion/water displacement activities;

3. temporarily impact 0.24 acre (2,879 linear feet) of non-wetland waters of the U.S. associated with covering open concrete channels; and

4. temporarily impact 0.0354 acre (22 linear feet) of non-wetland waters of the U.S. associated with conducing seismic retrofit work along the Santa Ana River Bridge.

For this NWP 14 verification letter to be valid, you must comply with all of the terms and conditions in Enclosure 1. Furthermore, you must comply with the following non-discretionary Special Conditions listed below:

1. The Permittee shall abide by the terms and conditions of the project's section 401 Water Quality Certification, dated December 3, 2012.

2. Prior to initiating construction in waters of the U.S., and to mitigate at a 2:1 ratio (0.268 acre) for permanent impacts to 0.134 acre of impacts to non-wetland waters of the U.S., the Permittee shall provide documentation verifying purchase of credits for enhancement (invasive species removal) of riverine habitat within the Santa Ana River Watershed from a Corps Regulatory Division-approved mitigation bank or in-lieu fee program (ILFP). The Permittee shall not initiate work in waters of the U.S. until receiving written confirmation (by letter or e-mail) from the Corps Regulatory Division as to compliance with this special condition. The permittee retains responsibility for providing the compensatory mitigation until the number and resource type of credits described above have been secured from a sponsor and the Corps Regulatory Division has received documentation that confirms that the sponsor has accepted the responsibility for providing the required compensatory mitigation. This documentation may consist of a letter or form signed by the sponsor, with the permit number and a statement indicating the number and resource type of credits that have been secured from the sponsor.

3. The Permittee shall clearly mark the limits of the workspace with flagging or similar means to ensure mechanized equipment does not enter avoided waters of the U.S. and riparian wetland/habitat areas. Adverse impacts to waters of the U.S. beyond the Corps Regulatory Division-approved construction footprint are not authorized. Such impacts could result in permit suspension and revocation, administrative, civil or criminal penalties, and/or substantial, additional, compensatory mitigation requirements.

4. Within 45 calendar days of completion of authorized work in waters of the U.S., the Permittee shall submit to the Corps Regulatory Division a post-project implementation memo indicating the date authorized impacts to waters of the U.S. ceased.

5. The permittee shall employ all best management practices (BMPs) to ensure that no debris, soil, silt, sand, rubbish, cement or concrete washings thereof, oil or petroleum can be washed by rainfall or runoff into waters of the U.S. When project operations are completed, any and all excess construction material, debris, and or other associated excess project materials shall be removed and if not recycled or reused, disposed of at an appropriate off-site location outside of any Corps jurisdictional waters of the U.S. Similarly, the permittee shall ensure that all vehicle maintenance, staging, storage, and dispensing of fuel occurs in designated upland areas. The permittee shall ensure that these designated upland areas are located in such a manner to prevent any runoff from entering waters of the U.S.

6. A copy of this permit shall be on the job site at all times during construction. The permittee shall provide a copy of this permit to all contractors, subcontractors, and forepersons. The permittee shall require that all contractors, subcontractors, and forepersons read this authorization in its entirety and acknowledge they understand its contents and their responsibility to ensure compliance with all general and special conditions contained herein.

Endangered Species Act:

7. This Corps permit does not authorize you to take any federally listed as threatened or endangered species. In order to legally take a federally listed species, you must have separate authorization under the Endangered Species Act (ESA) from the U.S. Fish and Wildlife Service.

Cultural Resources:

8. Pursuant to 36 C.F.R. section 800.13, in the event of any discoveries during construction of either human remains, archeological deposits, or any other type of historic property, the Permittee shall notify the Corps' Regulatory Division staff and Archeology staff (Steve Dibble at 213-452-3849 or John Killeen at 213-452-3861) within 24 hours. The Permittee shall immediately suspend all work within 100 feet of any area(s) where potential cultural resources are discovered. The Permittee shall not resume construction in the area surrounding the potential cultural resources until the Corps Regulatory Division re-authorizes project construction, per 36 C.F.R. section 800.13.

Your verification is valid through March 18, 2017. It is incumbent upon you to remain informed of changes to the NWPs. A public notice of the change(s) will be issued when any of the NWPs are modified, reissued, or revoked. Furthermore, if you commence or are under contract to commence this activity before the date on which the relevant NWP is reissued, modified, or revoked, you will have twelve (12) months from the date of the reissuance, modification, or revocation of the NWP to complete the activity under the present terms and conditions of the relevant NWP.

A preliminary jurisdictional determination (JD) has been conducted to determine the extent of U.S. Army Corps of Engineers (Corps) geographic jurisdiction, upon which this NWP verification is based. A preliminary JD is advisory in nature and is a written indication that Corps geographic jurisdiction may be present on a particular site, but is not appealable. Please refer to the enclosed Notification of Appeal Process (NAP) fact sheet and Request for Appeal (RFA) form for more information.

A NWP does not grant any property rights or exclusive privileges. Additionally, it does not authorize any injury to the property, rights of others, nor does it authorize interference with any existing or proposed Federal project. Furthermore, it does not obviate the need to obtain other Federal, state, or local authorizations required by law.

Thank you for participating in our regulatory program. If you have any questions, please contact Sophia Huynh at 213-452-3357 or via e-mail at Sophia.C.Huynh@usace.army.mil.

Please be advised that you can now comment on your experience with Regulatory Division by accessing the Corps web-based customer survey form at: http://per2.nwp.usace.army.mil/survey.html.

"Building Strong and Taking Care of People!"

Sincerely,

Mark Cohen

Mark D. Cohen
Deputy Chief, Regulatory Division

Enclosure(s)

LOS ANGELES DISTRICT
U.S. ARMY CORPS OF ENGINEERS

CERTIFICATE OF COMPLIANCE WITH DEPARTMENT OF THE ARMY NATIONWIDE PERMIT

Permit Number: *SPL-2011-01198-SCH*

Name of Permittee: *California Department of Transportation District 12, Matthew Cugini*

Date of Issuance: *April 18, 2013*

Upon completion of the activity authorized by this permit and the mitigation required by this permit, sign this certificate, and return it to the following address:

U.S. Army Corps of Engineers, Los Angeles District
Regulatory Division
ATTN: CESPL-RG-SPL-2011-01198-SCH
P.O. Box 532711
Los Angeles, California 90053

Please note that your permitted activity is subject to a compliance inspection by an Army Corps of Engineers representative. If you fail to comply with this Nationwide Permit, you may be subject to permit suspension, modification, or revocation procedures as contained in 33 C.F.R. § 330.5 or enforcement procedures such as those contained in 33 C.F.R. §§ 326.4 and 326.5.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit condition(s).

______________________________ ______________________________

Signature of Permittee Date

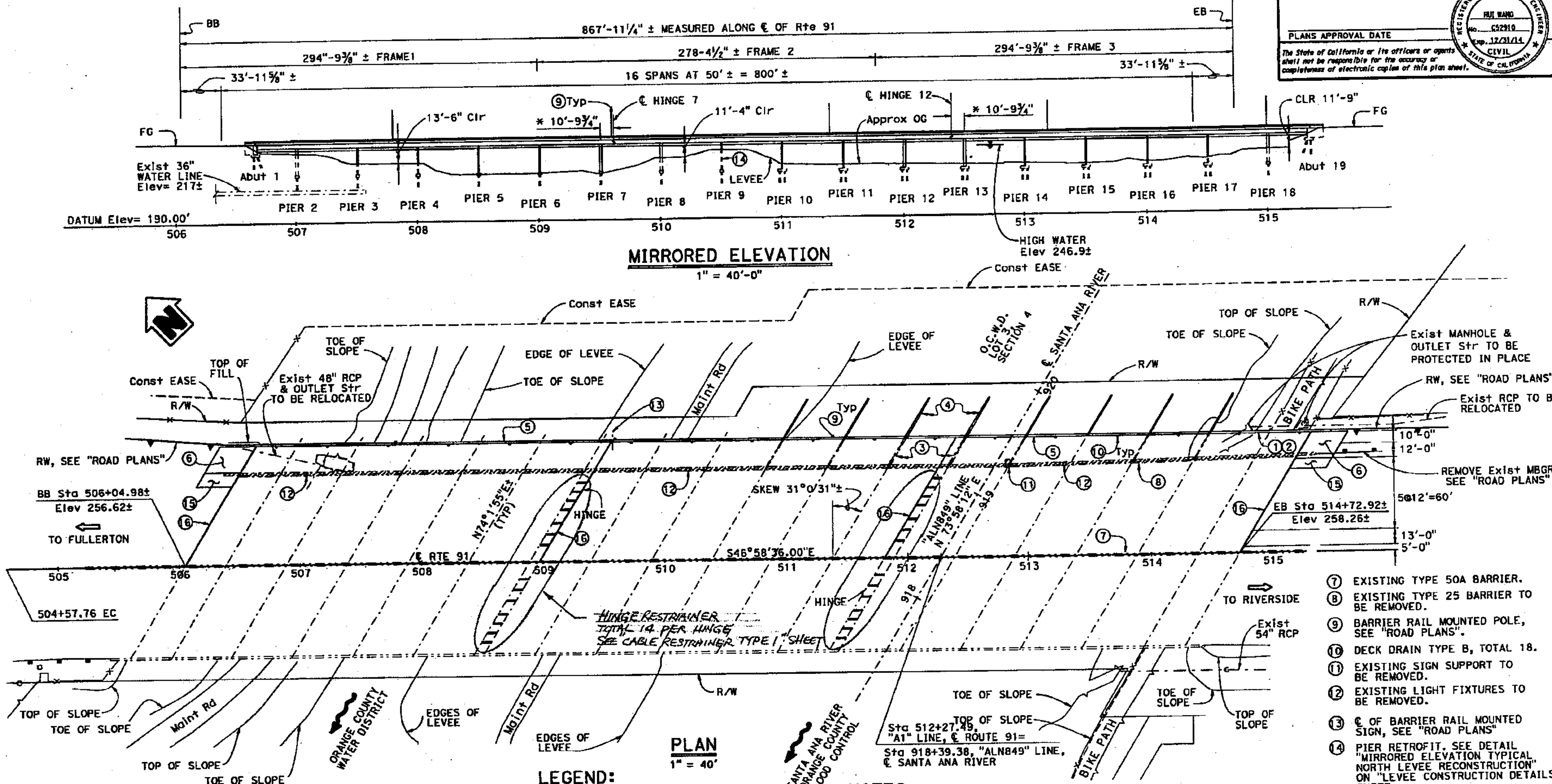
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91			

REGISTERED CIVIL ENGINEER 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 RUI WANG No. C52910 Exp. 12/31/14 CIVIL STATE OF CALIFORNIA



LEGEND:

- NEW STRUCTURE
- EXISTING STRUCTURE
- BRIDGE REMOVAL PORTION
- DIRECTION OF TRAFFIC FLOW
- * MEASURED PARALLEL TO ℄ Rte 91

NOTES:

1. PAINT "BR. NO. 55-0106".
2. PAINT "SANTA ANA RIVER BRIDGE".
3. EXISTING DEBRIS PIERS TO BE DEMOLISHED.
4. NEW DEBRIS PIERS.
5. TYPE 736 BARRIER.
6. STRUCTURE APPROACH TYPE N(30S).
7. EXISTING TYPE 50A BARRIER.
8. EXISTING TYPE 25 BARRIER TO BE REMOVED.
9. BARRIER RAIL MOUNTED POLE, SEE "ROAD PLANS".
10. DECK DRAIN TYPE B, TOTAL 18.
11. EXISTING SIGN SUPPORT TO BE REMOVED.
12. EXISTING LIGHT FIXTURES TO BE REMOVED.
13. ℄ OF BARRIER RAIL MOUNTED SIGN, SEE "ROAD PLANS"
14. PIER RETROFIT, SEE DETAIL "MIRRORED ELEVATION TYPICAL NORTH LEVEE RECONSTRUCTION" ON "LEVEE CONSTRUCTION DETAILS" SHEET
15. EXISTING AC SHOULDER TO BE REPLACED BY STRUCTURE APPROACH TYPE R(30S)
16. REPLACE EXISTING JOINT SEALS

NOTE:
THE CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL.

DESIGN	BY RUI WANG	CHECKED TRACY SANDERSON
DETAILS	BY A. ONG/H. INIGUEZ	CHECKED TRACY SANDERSON
QUANTITIES	BY B. VO/D. AZZAM	CHECKED TRACY SANDERSON

LOAD & RESISTANCE FACTOR DESIGN — LIVE LOADING: HL93 W/"LOW-BOY" PERMIT DESIGN VEHICLE
LAYOUT BY RUI WANG — CHECKED TRACY SANDERSON
SPECIFICATIONS BY THERESA NEDWICK — PLANS AND SPECS COMPARED THERESA NEDWICK

BARTT GUNTER
DESIGN ENGINEER

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN
DESIGN BRANCH 19

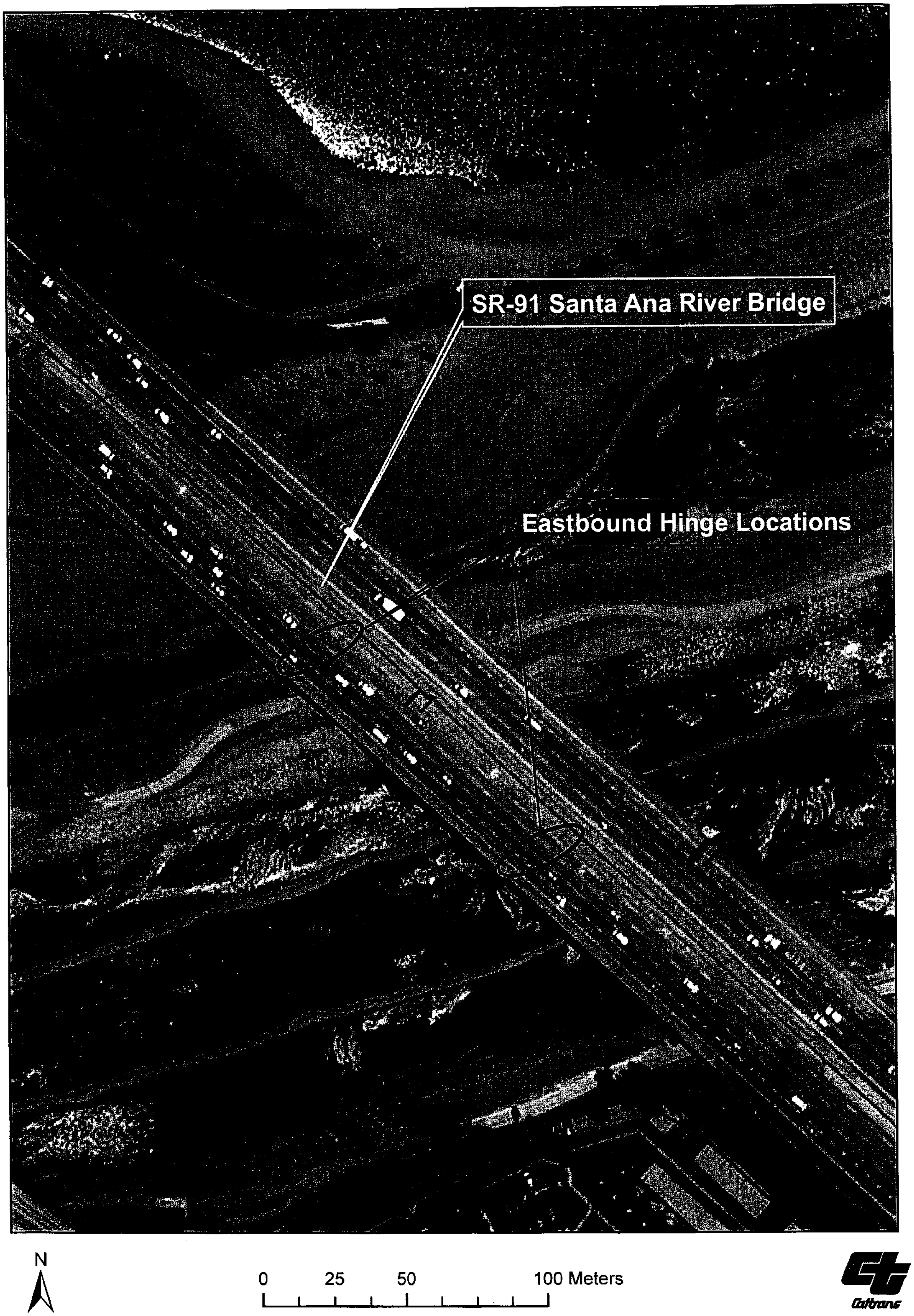
BRIDGE NO. 55-0106R/L
POST MILE 8.57

SANTA ANA RIVER BRIDGE (WIDEN)

GENERAL PLAN NO. 1

UNIT: 3621
PROJECT NUMBER & PHASE: 1200000078-1
CONTRACT NO.: 12-0C5601
DISREGARD PRINTS BEARING EARLIER REVISION DATES
SHEET 1 OF 43

FILE => 01-55-0106-0-gp01.dgn


SR-91 Santa Ana River Bridge
Eastbound Hinge Locations
N
0
25
50
100 Meters
Caltrans

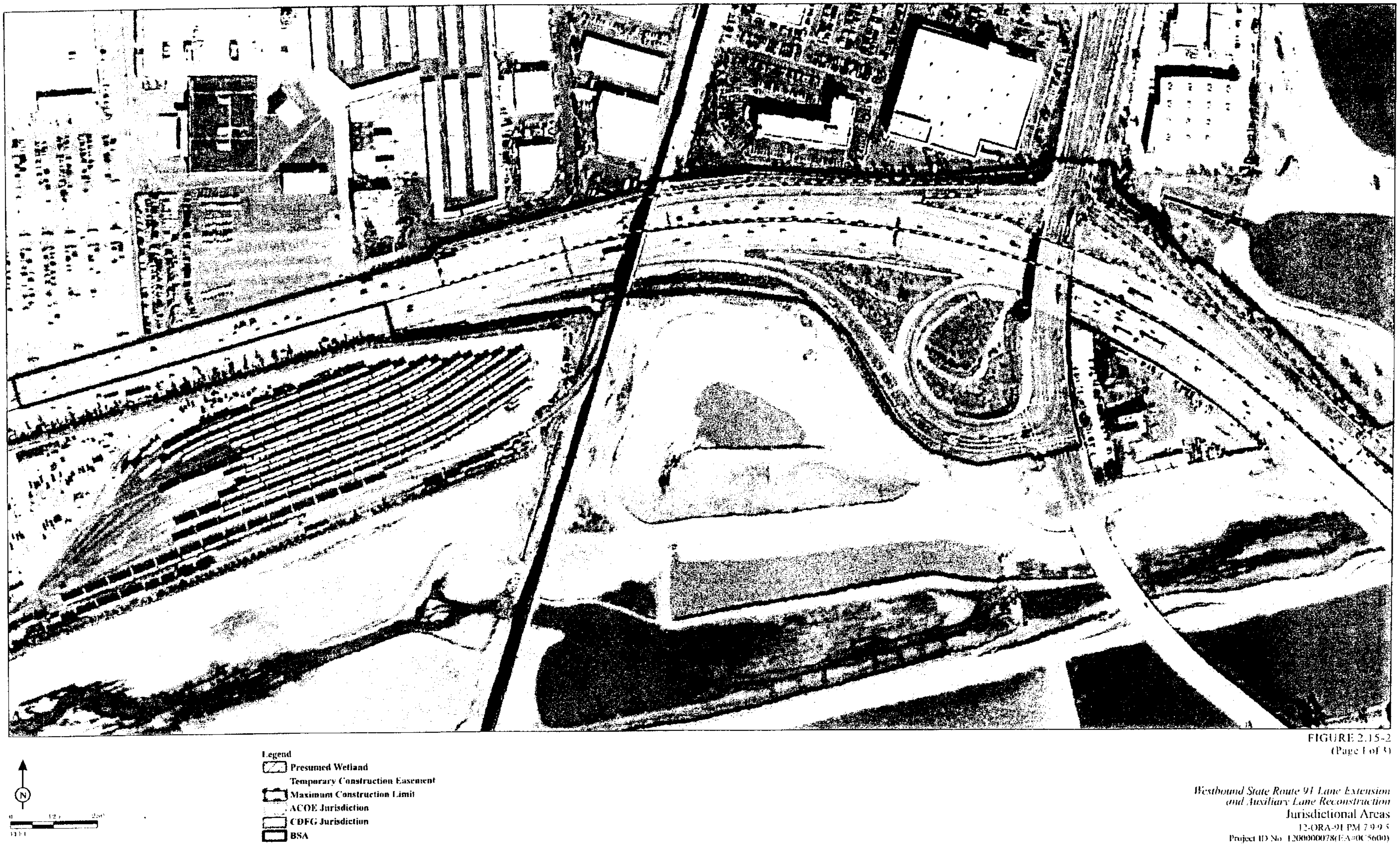
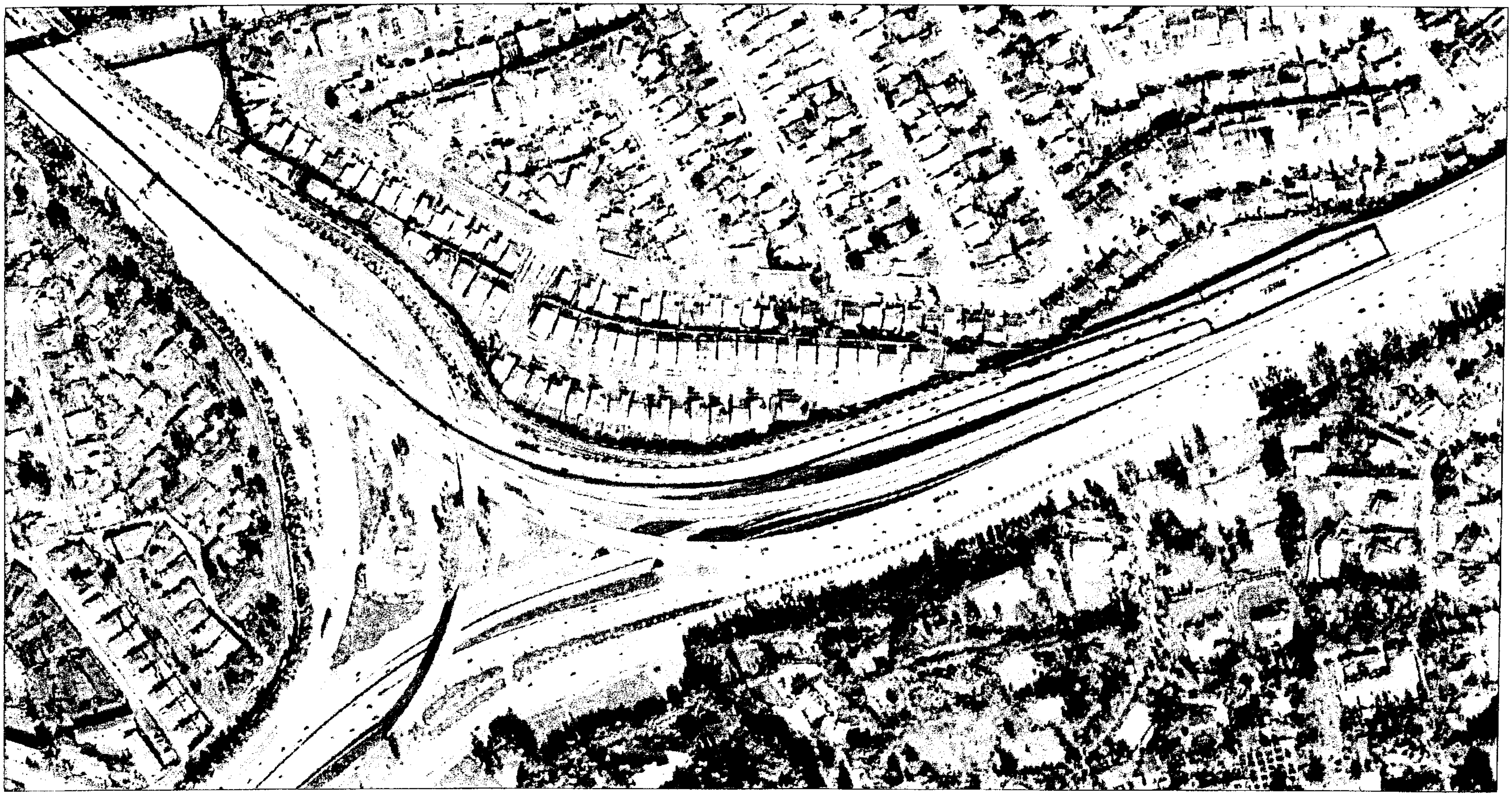


FIGURE 2.15-2
(Page 1 of 3)

Westbound State Route 91 Lane Extension and Auxiliary Lane Reconstruction
Jurisdictional Areas
12-ORA-91 PM 7.9-9.5
Project ID No. 1200000078(EA#0C5600)

F:CTD1006\VG Impacts.cdr (11.3.10)



N

0 125 250

Feet

Legend

Presumed Wetland

Temporary Construction Easement

Maximum Construction Limit

ACOE Jurisdiction

CDFG Jurisdiction

BSA

FIGURE 2.15-2
(Page 3 of 3)

Westbound State Route 91 Lane Extension
and Auxiliary Lane Reconstruction
Jurisdictional Areas
12-ORA-91 PM 7.9/9.5
Project ID No. 1200000078(EA-0C5600)

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3,10.1		

Fred Faizi 04-04-13
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER F. FAIZI No. C47267 Exp. 12-31-13 CIVIL 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.

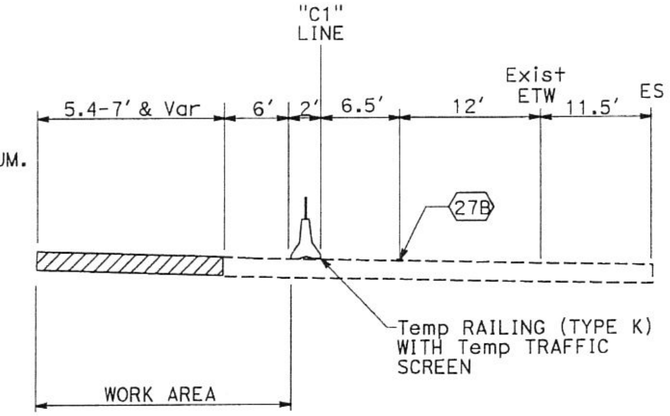
RECEIVED
APR 23 2013
COUNTY PROPERTY PERMITS

NOTES:

1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.
2. ALL TRAFFIC STRIPES AND PAVEMENT MARKINGS SHALL BE PAINT 2-COAT.
3. ALL TRAFFIC LANE WIDTHS SHALL BE MAINTAINED AT 11′ MINIMUM.
4. SEE SHEET SCQ-1 FOR SIGN INFORMATION.

LEGEND:

- (No.) DETAIL No. PAINT TRAFFIC STRIPE (2-COAT)
- DIRECTION OF TRAVEL
- TEMPORARY RAILING (TYPE K)
- CHANNELIZER (SURFACE MOUNTED)
- TEMPORARY CRASH CUSHION (ARRAY PER PLAN)
- CONSTRUCTION AREA
- TEMPORARY RAILING (TYPE K) WITH TEMPORARY TRAFFIC SCREEN
- CHANGE IN PAVEMENT DELINEATION DETAIL



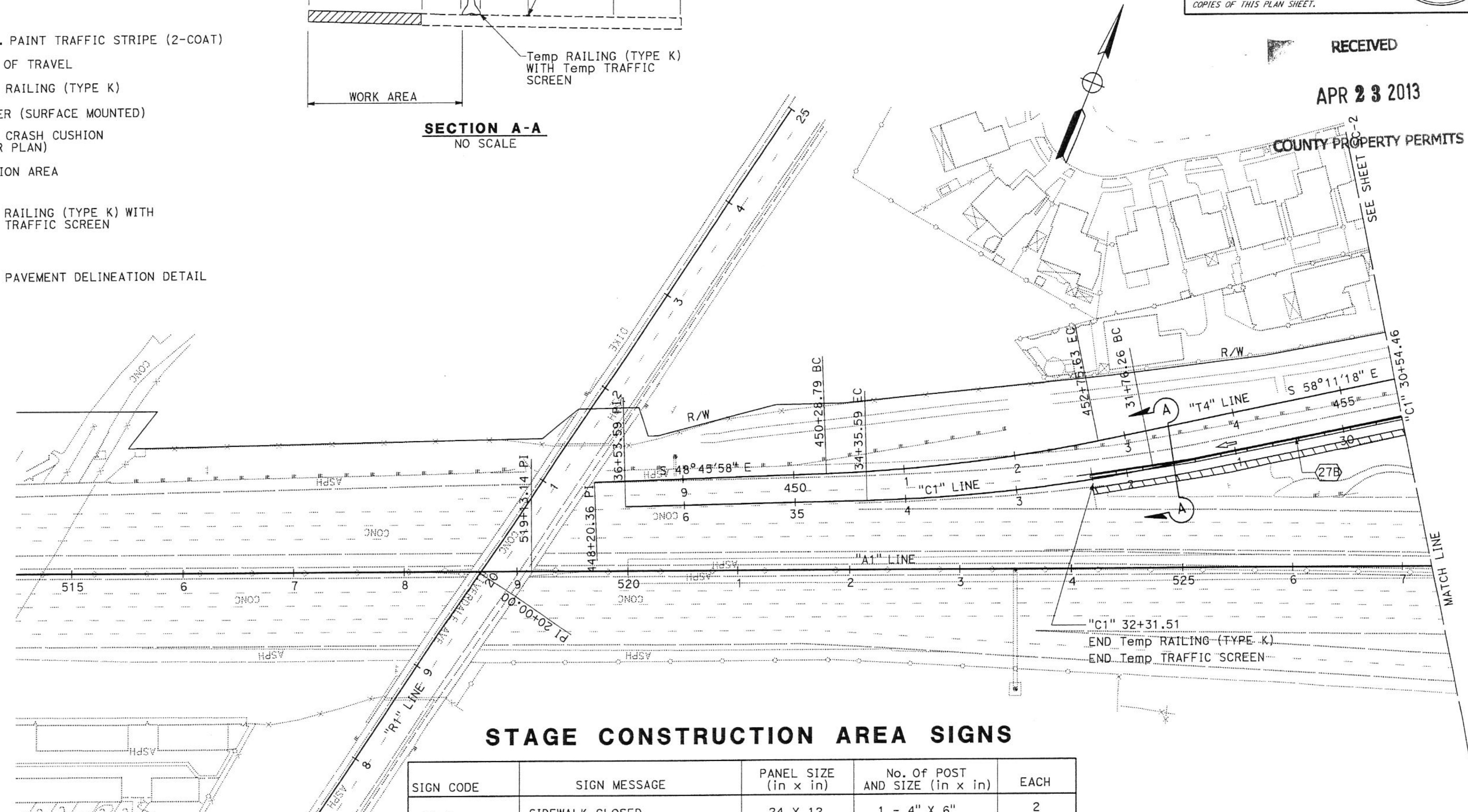
SECTION A-A
NO SCALE

TRAFFIC CONTROL:

1. PLACE K-RAIL AND CRASH CUSHIONS; RESTRIPE CONNECTOR TO REDUCE TO ONE LANE.

CONSTRUCTION SEQUENCE:

2. REMOVE AND RECONSTRUCT EXISTING LEFT SHOULDER ON NB SR-55 TO WB SR-91 CONNECTOR.



STAGE CONSTRUCTION AREA SIGNS

SIGN CODE	SIGN MESSAGE	PANEL SIZE (in x in)	No. Of POST AND SIZE (in x in)	EACH
R9-9	SIDEWALK CLOSED	24 X 12	1 - 4" X 6"	2
R9-11	SIDEWALK CLOSED AHEAD CROSS HERE	24 X 18	1 - 4" X 6"	2
R61-26(CA)	INTERSECTION CONTROL	48 X 30	1 - 4" X 6"	4
C30A(CA)	SHOULDER CLOSED	48 X 48	1 - 6" X 6"	6
W13-2(30)	EXIT 30 MPH	36 X 48	1 - 4" X 6"	1
G85(MODIFIED)	SEE SHEET SC-2	168 X 72	2 - 6" X 8"	1
W3-3	SIGNAL AHEAD	48 X 48	1 - 6" X 6"	1
W4-2	LANE ENDS (SYMBOL)	36 X 36	1 - 6" X 6"	1

APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN (STAGE 1A)

SCALE: 1" = 50′

SC-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN

FUNCTIONAL SUPERVISOR: MATTHEW CUGINI
CALCULATED-DESIGNED BY: VANESSA RAGLAND
CHECKED BY: FRED FAIZI
REVISED BY
DATE REVISED

LAST REVISION 01-16-13
DATE PLOTTED => 23-APR-2013
TIME PLOTTED => 13:39

BORDER LAST REVISED 7/2/2010
USERNAME => s127956
DGN FILE => 1200000078ma001.dgn
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT 2994
PROJECT NUMBER & PHASE 12000000781

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

Fred Faizi 02-04-13
REGISTERED CIVIL ENGINEER DATE

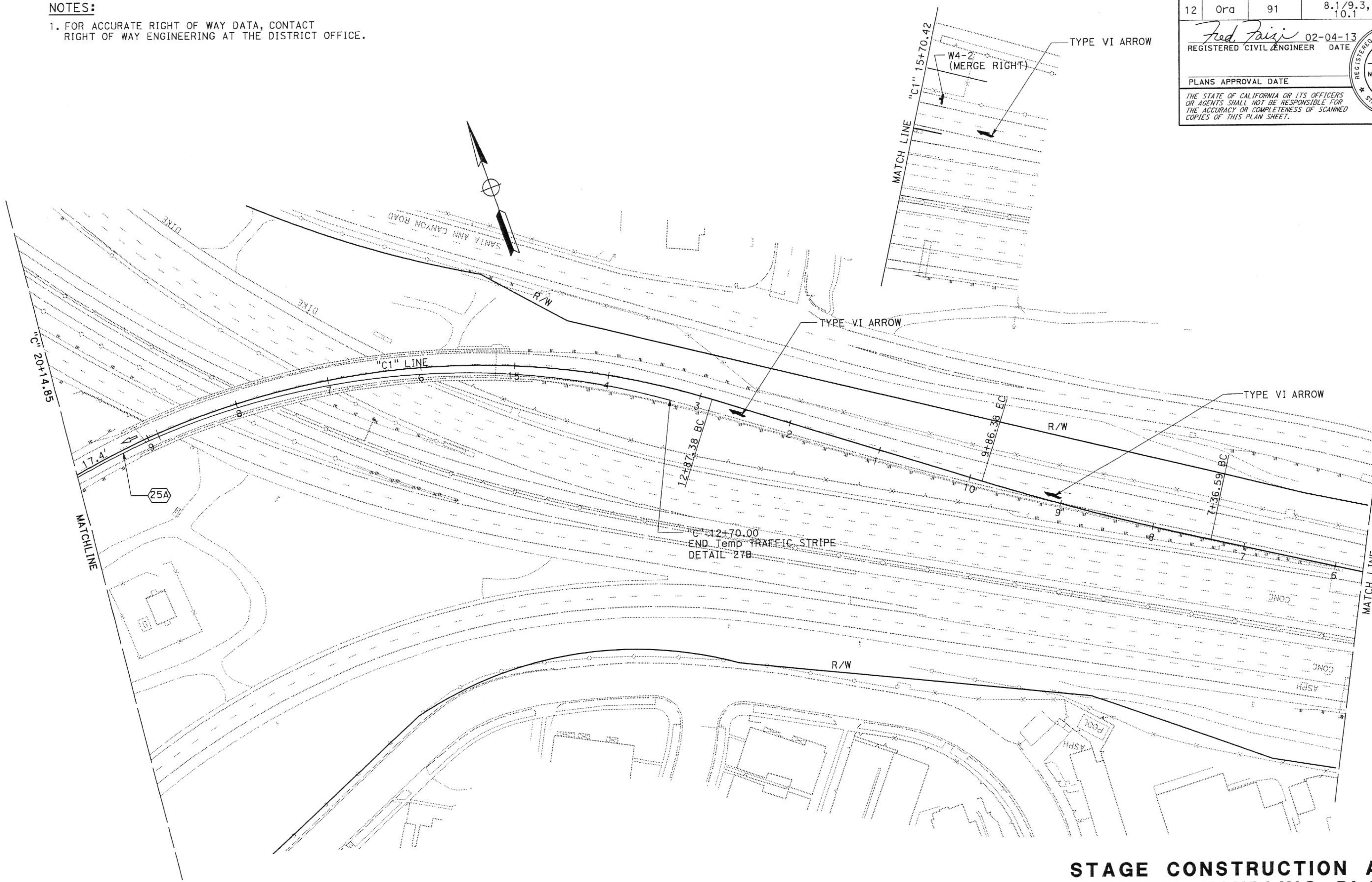
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
F. FAIZI
No. C47267
Exp. 12-31-13
CIVIL
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.

NOTES:

1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.



STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN (STAGE 1A)

SCALE: 1" = 50'

SC-3

APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN

FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISED BY
MATTHEW CUGINI	VANESSA RAGLAND	
	CHECKED BY	DATE REVISED
	FRED FAIZI	

LAST REVISION 11-19-12 | DATE PLOTTED => 23-APR-2013 | TIME PLOTTED => 13:44

BORDER LAST REVISED 7/2/2010
USERNAME => s127956
DGN FILE => 1200000078ma003.dgn
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT 2994
PROJECT NUMBER & PHASE 12000000781

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

Fred Faizi 04-04-13
REGISTERED CIVIL ENGINEER DATE

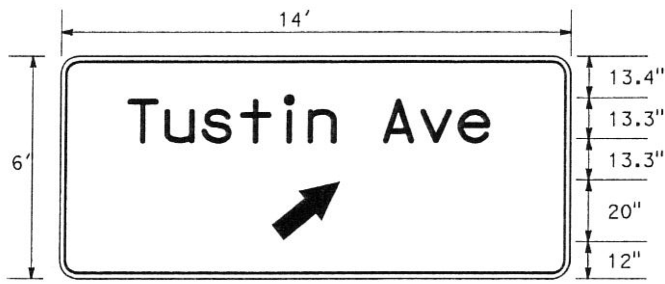
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER F. FAIZI No. C47267 Exp. 12-31-13 CIVIL 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.

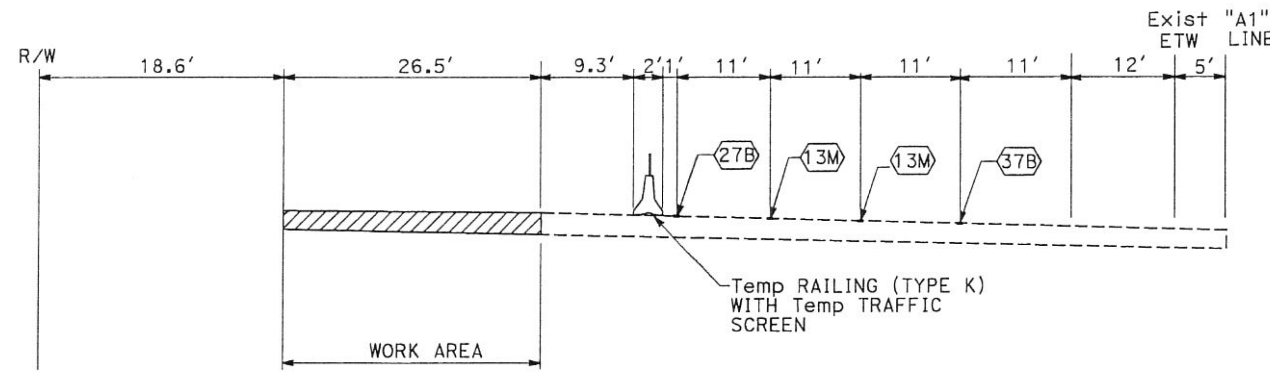
NOTES:

1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.
2. SIGN SHALL BE INSTALLED PRIOR TO REMOVAL OF THE EXISTING OVERHEAD SIGN. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH DETAILS OF THE BRACING FOR THE SIGN SUPPORT PRIOR TO INSTALLING THE SIGN. THE HEIGHT OF THE SIGN TO BE DETERMINED BY THE ENGINEER.

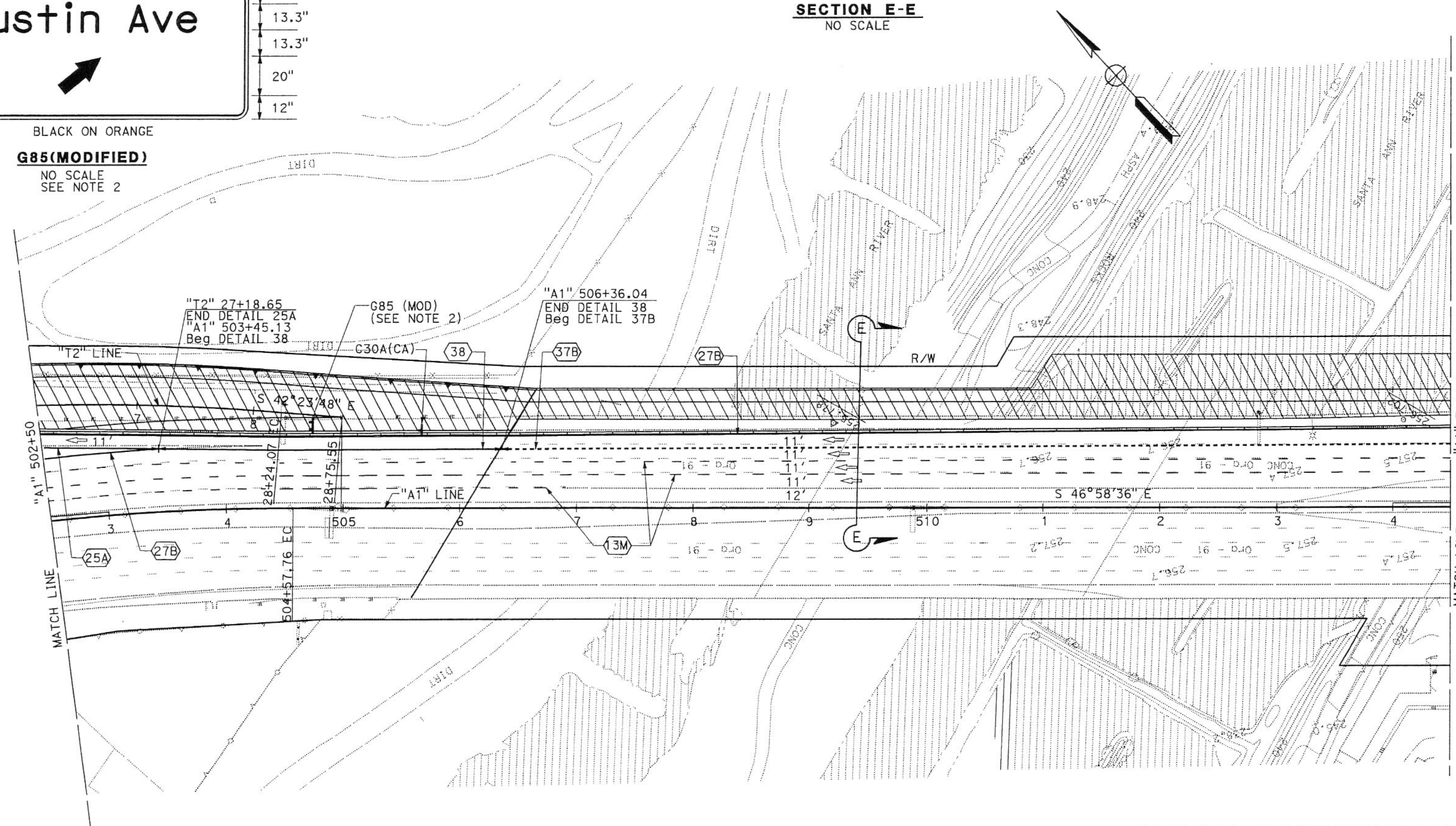


BLACK ON ORANGE

G85(MODIFIED)
NO SCALE
SEE NOTE 2



SECTION E-E
NO SCALE



STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN (STAGE 1B)
SCALE: 1" = 50'

APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-5

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN

FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISED BY	DATE REVISED
MATTHEW CUGINI	VANESSA RAGLAND	FRED FAIZI		

LAST REVISION 11-19-12 DATE PLOTTED => 23-APR-2013 TIME PLOTTED => 13:39

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

Fred Faizi 02-04-13
REGISTERED CIVIL ENGINEER DATE

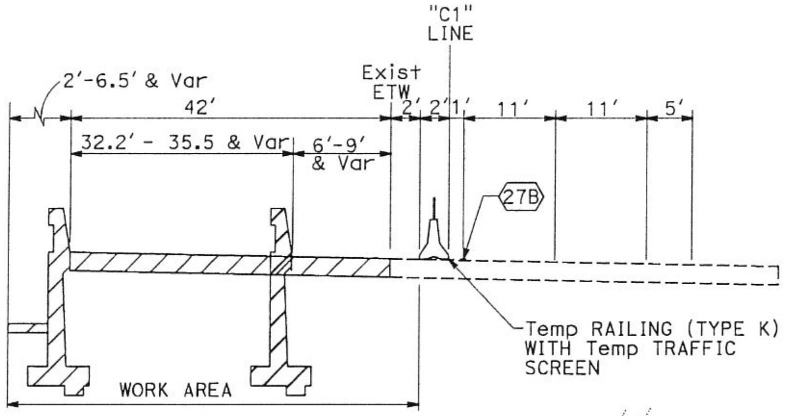
REGISTERED PROFESSIONAL ENGINEER
F. FAIZI
No. C47267
Exp. 12-31-13
CIVIL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

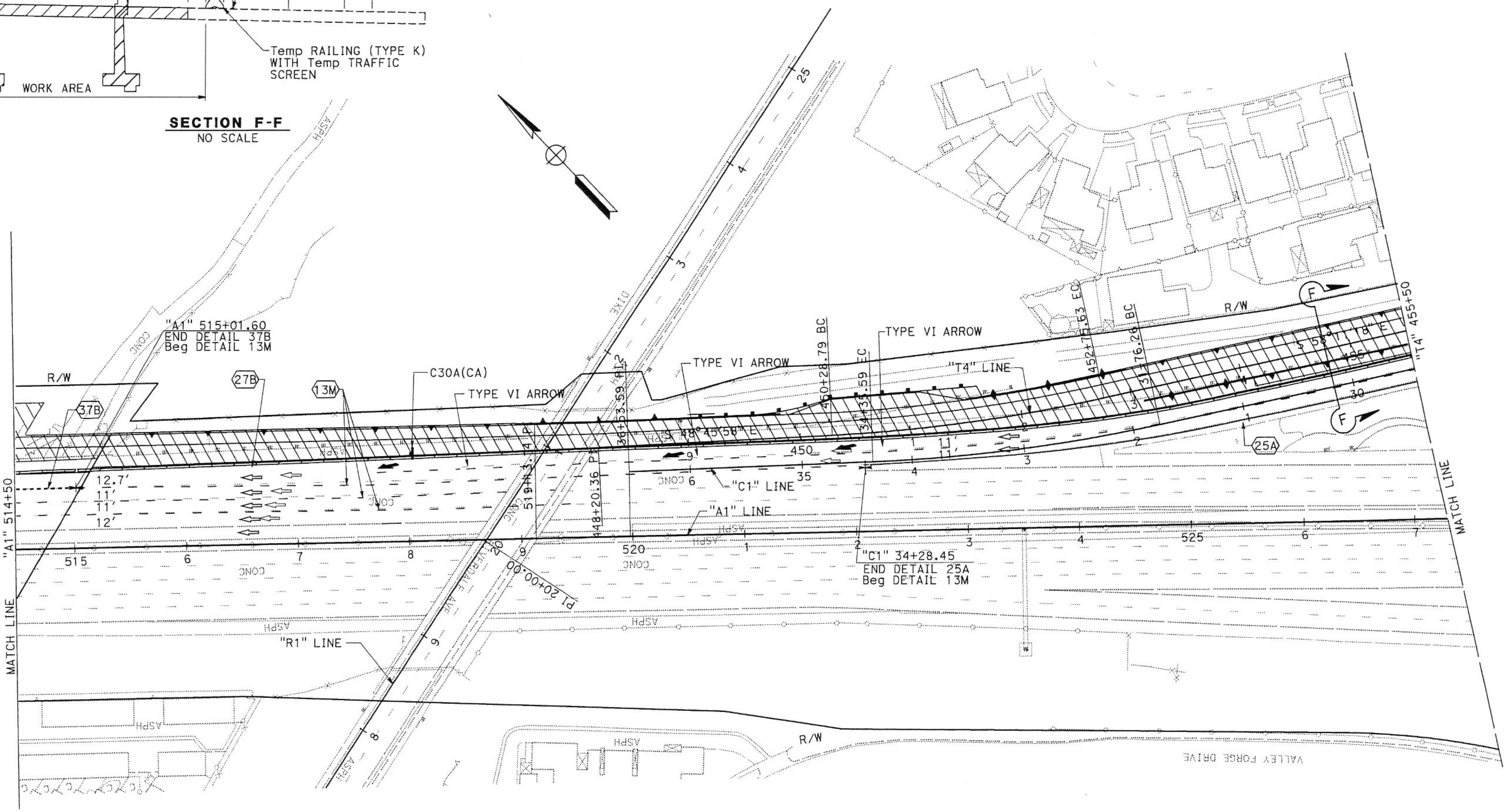
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTE:

1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.



SECTION F-F
NO SCALE



STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN (STAGE 1B)

SCALE: 1" = 50'

APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-6

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN

FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISED BY	DATE REVISED
MATTHEW CUGINI	VANESSA RAGLAND	FRED FAIZI		

LAST REVISION 11-19-12 | DATE PLOTTED => 23-APR-2013 | TIME PLOTTED => 13:44

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

Fred Faizi 04-04-13
REGISTERED CIVIL ENGINEER DATE

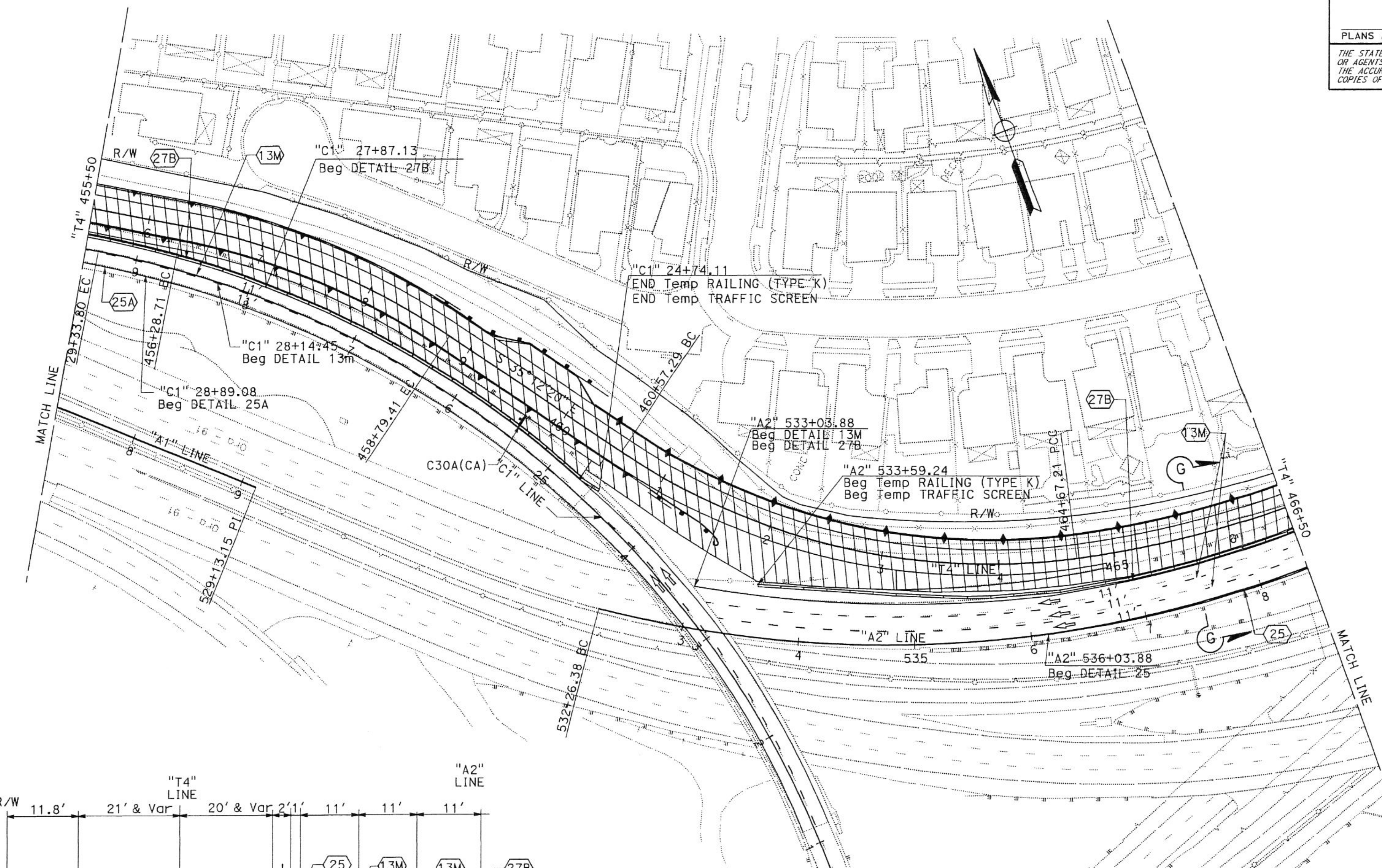
REGISTERED PROFESSIONAL ENGINEER F. FAIZI No. C47267 Exp. 12-31-13 CIVIL STATE OF CALIFORNIA

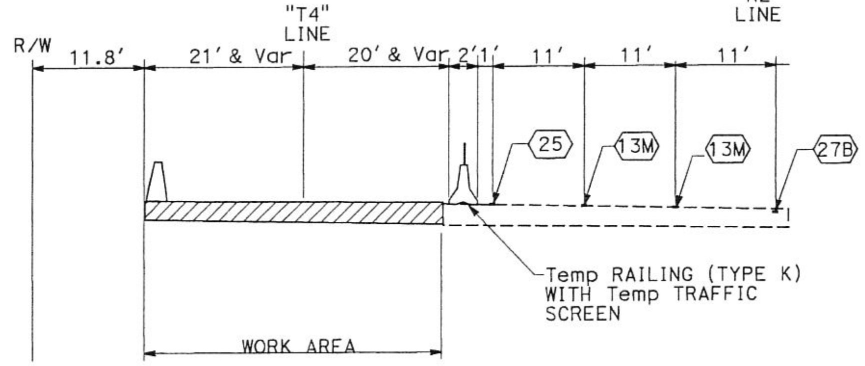
PLANS APPROVAL DATE

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

NOTE:

1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.





SECTION G-G
NO SCALE

APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN (STAGE 1B)

SCALE: 1" = 50'

SC-7

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN

FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISED BY
MATTHEW CUGINI	VANESSA RAGLAND	
	CHECKED BY	DATE REVISED
	FRED FAIZI	

LAST REVISION 11-19-12 | DATE PLOTTED => 23-APR-2013 | TIME PLOTTED => 13:39

BORDER LAST REVISED 7/2/2010 | USERNAME => s127956 | DGN FILE => 1200000078ma007.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 2994 | PROJECT NUMBER & PHASE 12000000781

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

Fred Faizi 04-04-13
REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
F. FAIZI
No. C47267
Exp. 12-31-13
CIVIL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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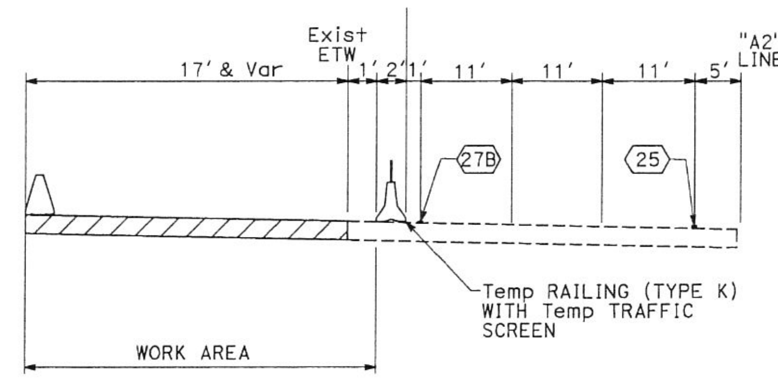
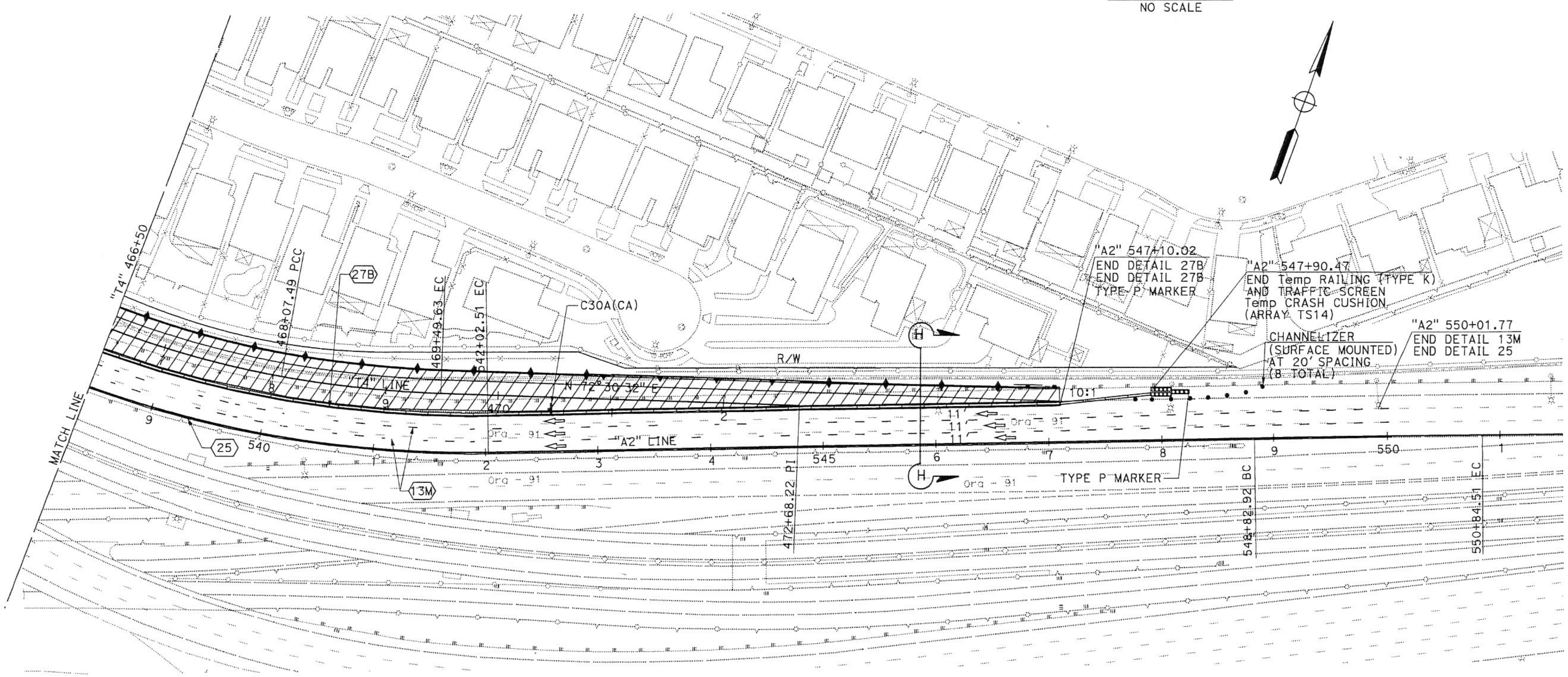
NOTE:

1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.



SECTION H-H
NO SCALE



APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN (STAGE 1B)

SCALE: 1" = 50'

SC-8

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

DESIGN

FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISED BY
MATTHEW CUGINI	VANESSA RAGLAND	
	CHECKED BY	DATE REVISED
	FRED FAIZI	

LAST REVISION 11-19-12 | DATE PLOTTED => 23-APR-2013 | TIME PLOTTED => 13:39

BORDER LAST REVISED 7/2/2010 | USERNAME => s127956 | DGN FILE => 1200000078ma008.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 2994 | PROJECT NUMBER & PHASE | 12000000781

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

Fred Faizi 04-04-13
REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER F. FAIZI No. C47267 Exp 12-31-13 CIVIL 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 SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

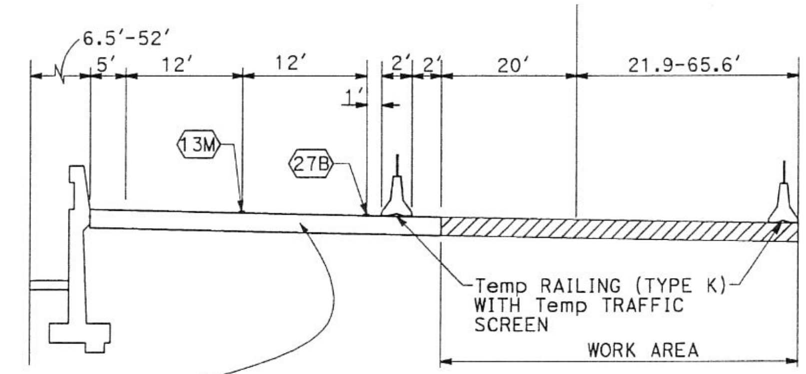
1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.
2. SEE STAGE 1B FOR MAINLINE STRIPING DETAILS.
3. FOR PEDESTRIAN SIGNS AND DETOURS, SEE PLAN SHEET SC-15.

TRAFFIC CONTROL:

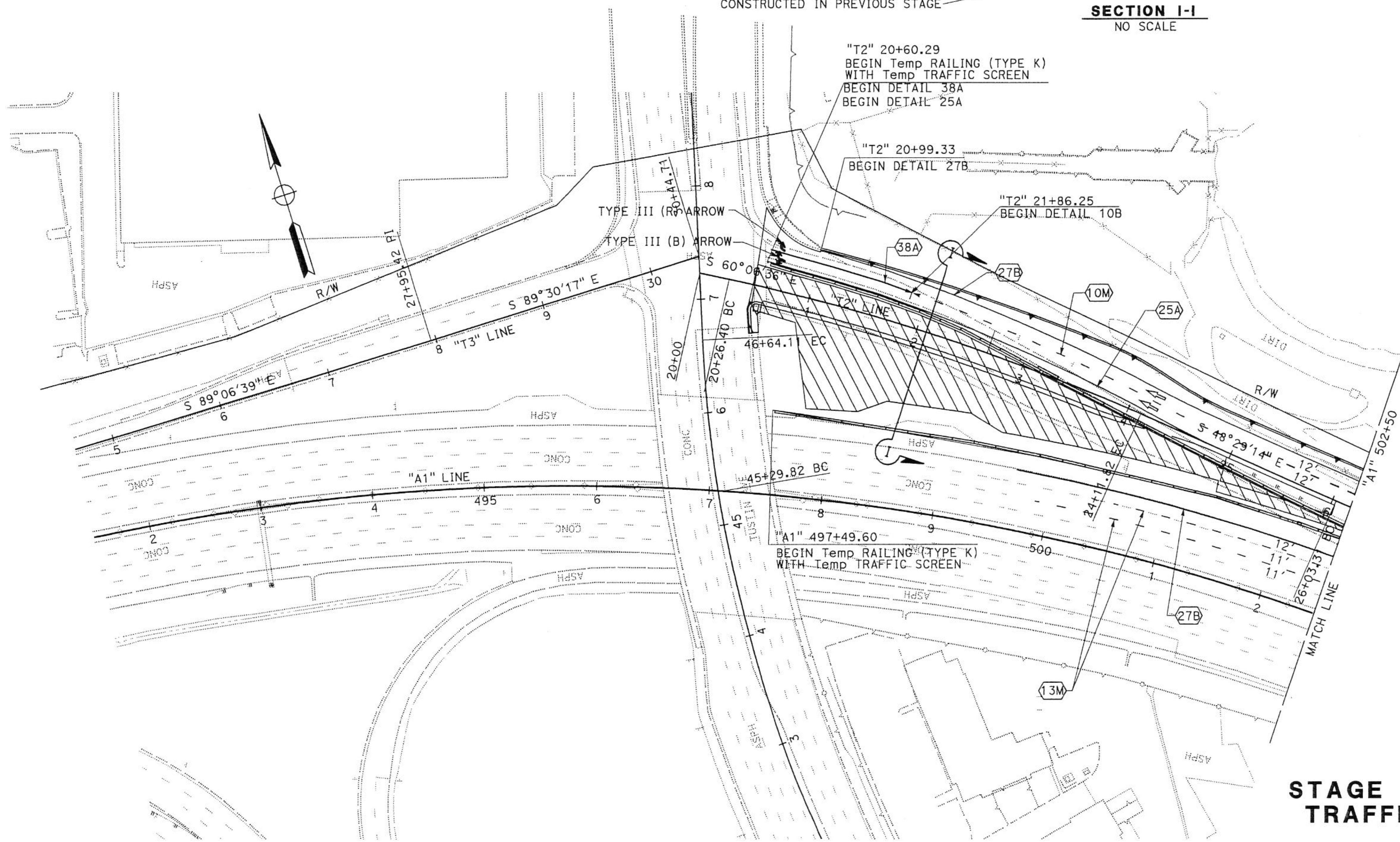
1. SHIFT TRAFFIC TO THE LEFT SIDE OF TUSTIN AVENUE OFF-RAMP.

CONSTRUCTION SEQUENCE:

1. CONSTRUCT RIGHT SIDE OF TUSTIN AVENUE OFF-RAMP.



SECTION I-I
NO SCALE



STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN (STAGE 1C)

SCALE: 1" = 50'

APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-9

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN

FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY		REVISED BY
MATTHEW CUGINI	CHECKED BY	FRED FAIZI	DATE REVISED
		VANESSA RAGLAND	

LAST REVISION 11-19-12 | DATE PLOTTED => 23-APR-2013 | TIME PLOTTED => 13:39

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

Fred Faizi 04-04-13
REGISTERED CIVIL ENGINEER DATE

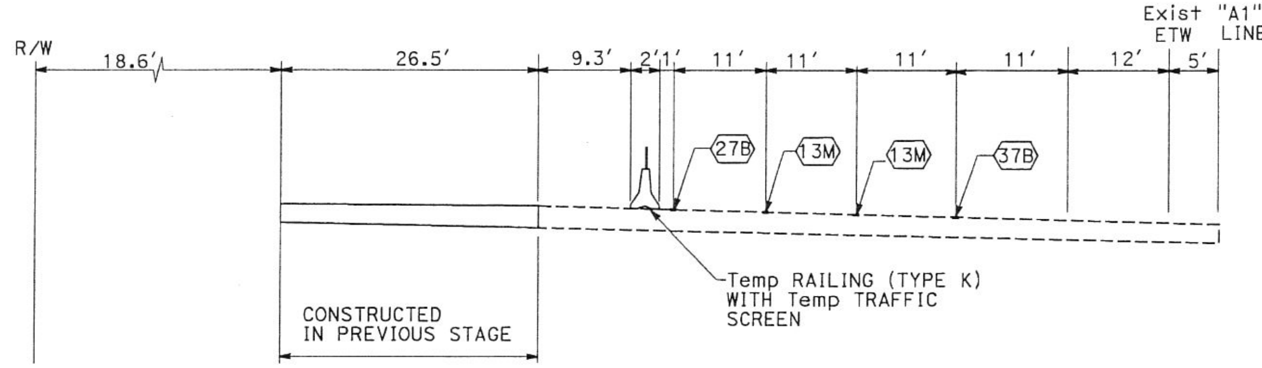
REGISTERED PROFESSIONAL ENGINEER
F. FAIZI
No. C47267
Exp. 12-31-13
CIVIL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

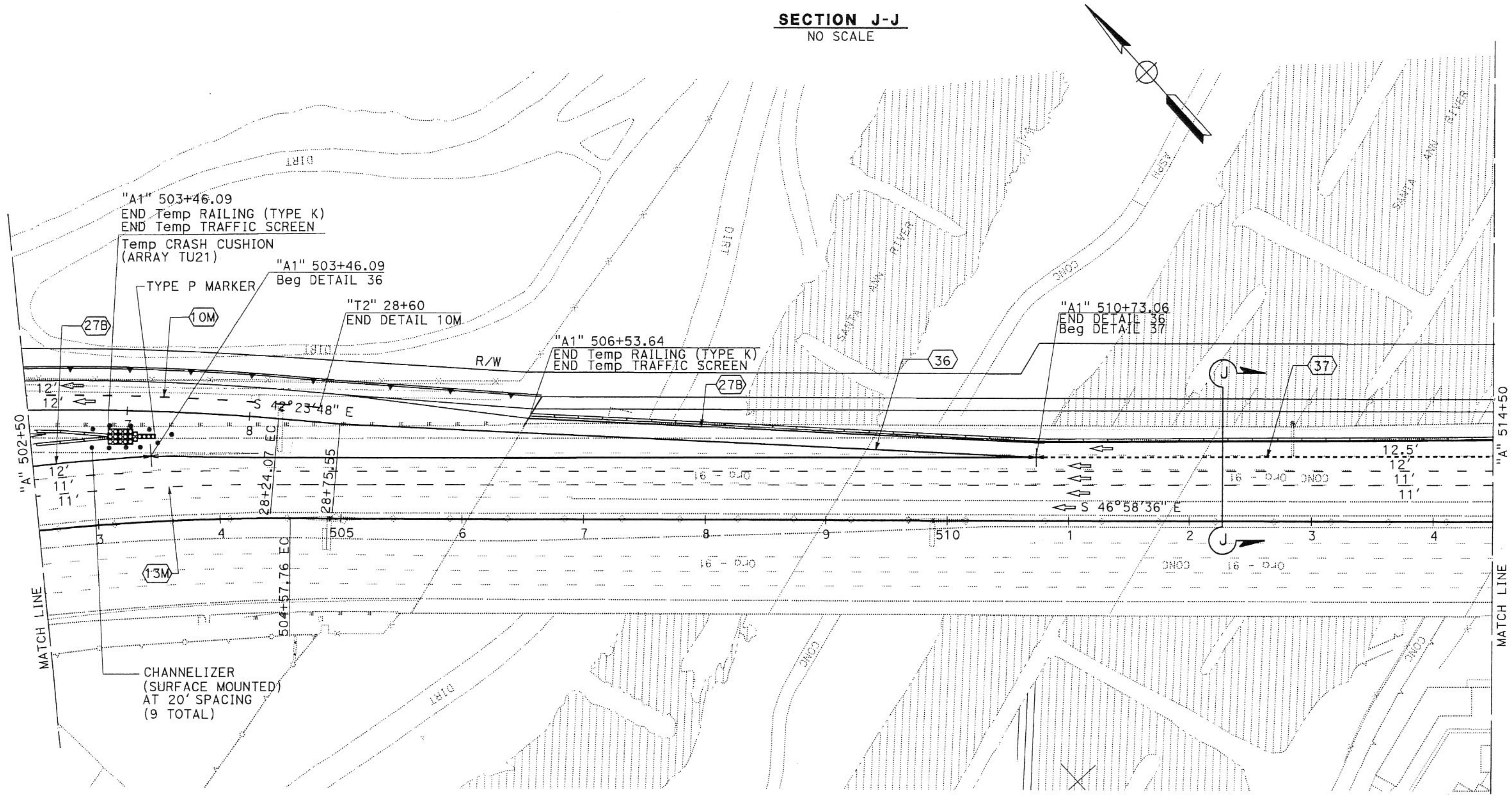
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTE:

1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.



SECTION J-J
NO SCALE



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
DESIGN
Caltrans

FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISED BY	DATE REVISED
MATTHEW CUGINI	VANESSA RAGLAND	FRED FAIZI		

STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN (STAGE 1C)

SCALE: 1" = 50'

APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-10

LAST REVISION 11-19-12 | DATE PLOTTED => 23-APR-2013 | TIME PLOTTED => 13:39

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

Fred Faizi 04-04-13
REGISTERED CIVIL ENGINEER DATE

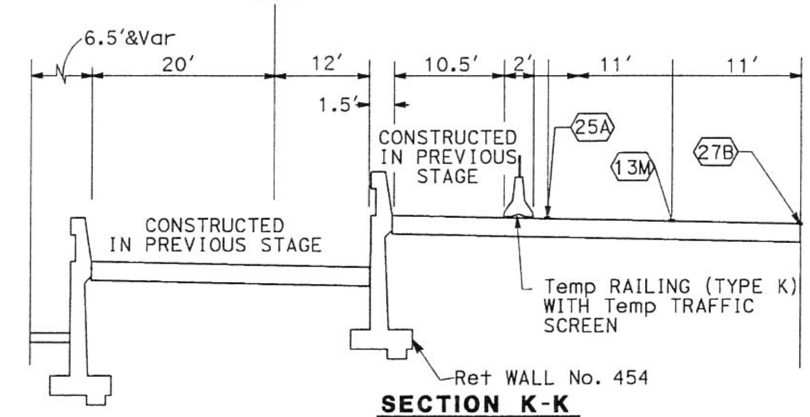
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER F. FAIZI No. C47267 Exp. 12-31-13 CIVIL STATE OF CALIFORNIA

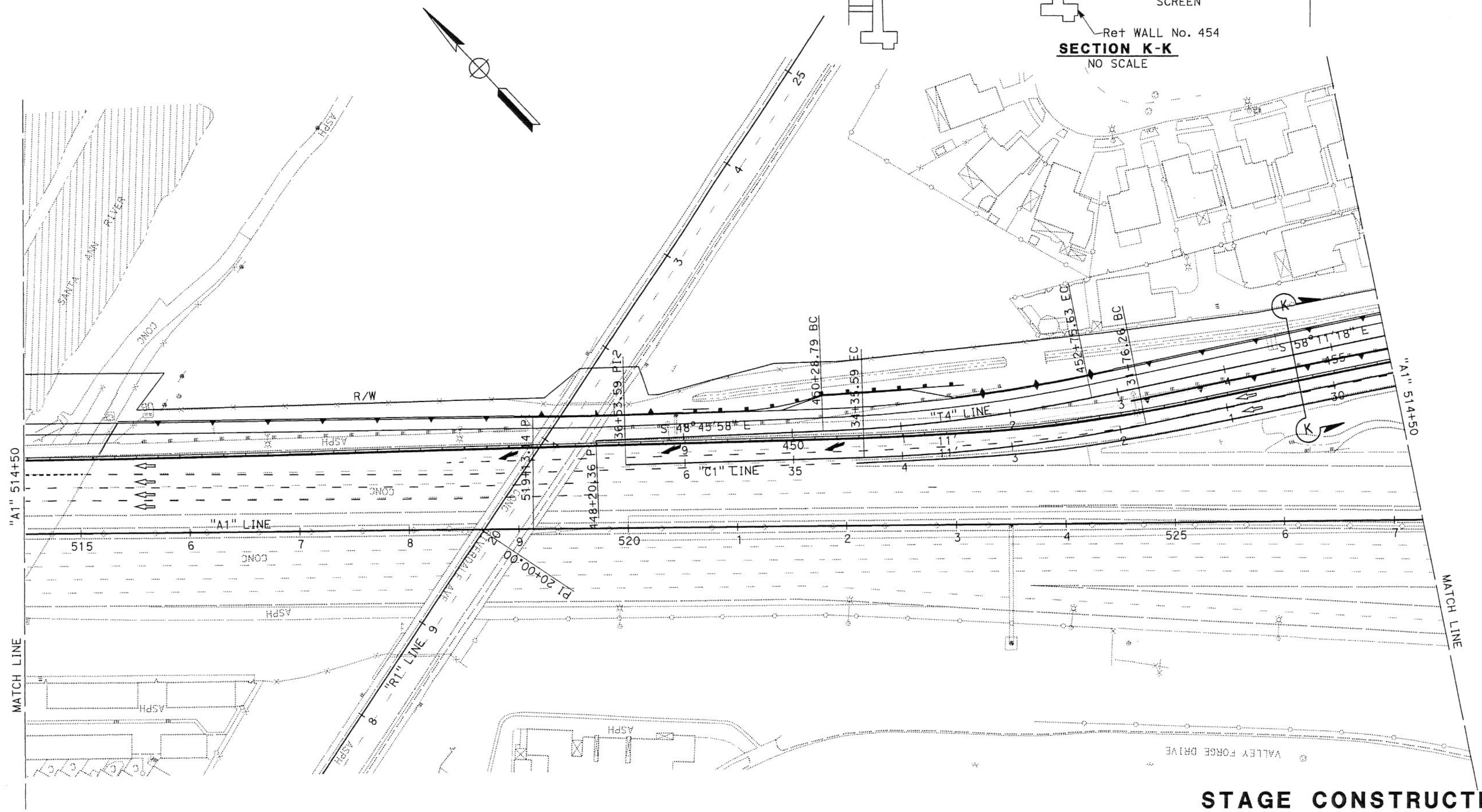
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTES:

1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.
2. SEE STAGE 1B FOR STRIPING DETAILS.
3. TEMPORARY RAILING (TYPE K), TEMPORARY TRAFFIC SCREEN, CRASH CUSHION, CHANNELIZERS AND TEMPORARY SIGNS IN PREVIOUS STAGE TO REMAIN IN PLACE.



SECTION K-K
NO SCALE



STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN (STAGE 1C)

SCALE: 1" = 50'

APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-11

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN

FUNCTIONAL SUPERVISOR: MATTHEW CUGINI
CALCULATED-DESIGNED BY: VANESSA RAGLAND
CHECKED BY: FRED FAIZI
REVISED BY
DATE REVISED

LAST REVISION 11-19-12
DATE PLOTTED => 23-APR-2013
TIME PLOTTED => 13:39

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

Fred Faizi 02-04-13
REGISTERED CIVIL ENGINEER DATE

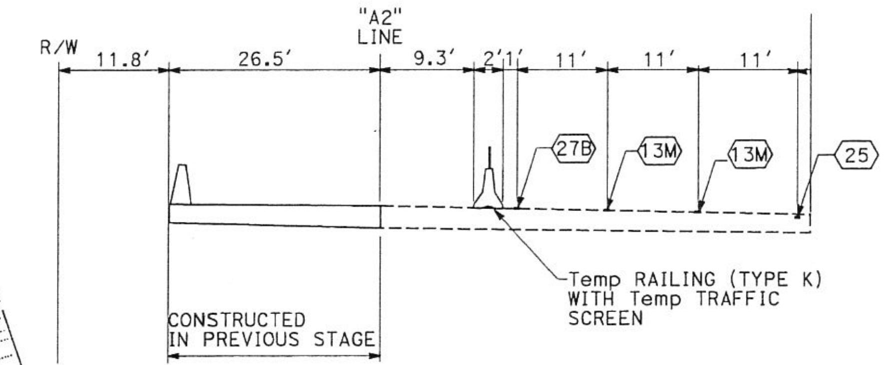
REGISTERED PROFESSIONAL ENGINEER
F. FAIZI
No. C47267
Exp. 12-31-13
CIVIL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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

NOTES:

1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.
2. FOR STRIPING DETAILS SEE STAGE 1B.
3. TEMPORARY RAILING (TYPE K), TEMPORARY TRAFFIC SCREEN, CRASH CUSHION, AND CHANNELIZERS IN PREVIOUS STAGE TO REMAIN IN PLACE.



SECTION L-L
NO SCALE

STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN (STAGE 1C)

SCALE: 1" = 50'

APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-12

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN

FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISED BY	DATE REVISED
MATTHEW CUGINI	VANESSA RAGLAND	FRED FAIZI		

LAST REVISION 11-19-12
DATE PLOTTED => 23-APR-2013
TIME PLOTTED => 13:44

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

Fred Faizi 04-04-13
REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
F. FAIZI
No. C47267
Exp. 12-31-13
CIVIL
STATE OF CALIFORNIA

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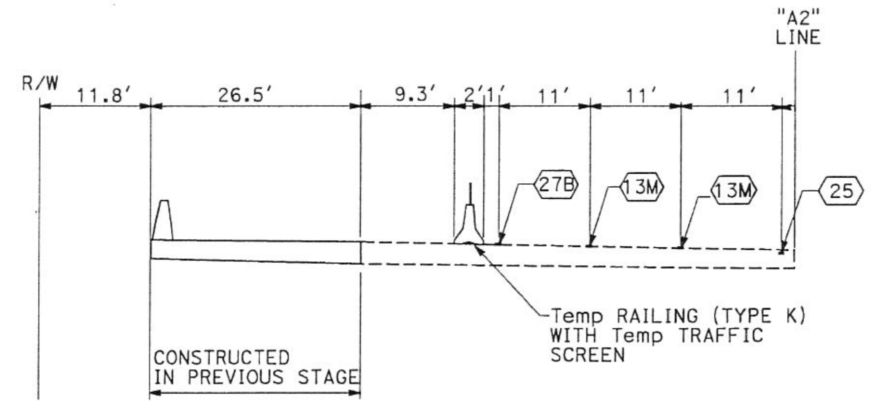
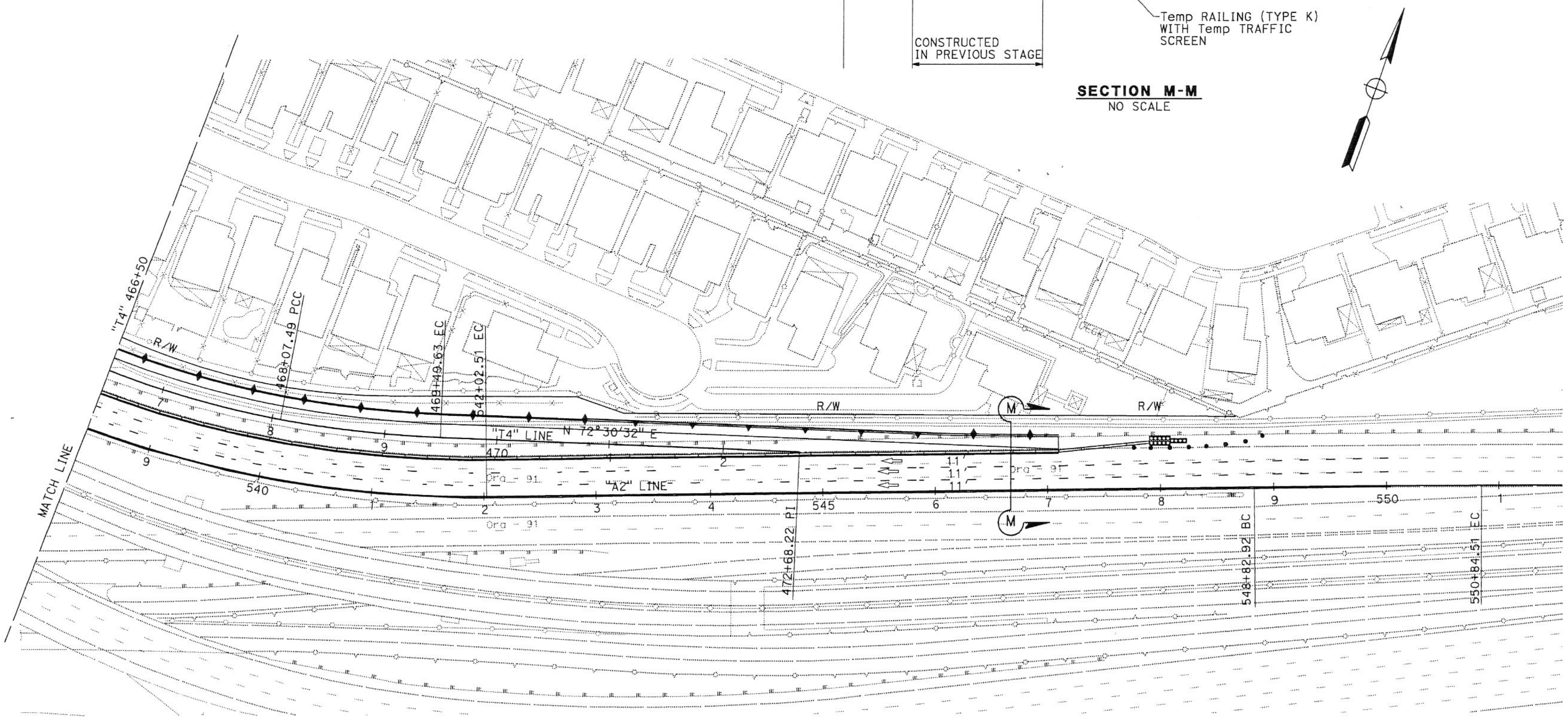
NOTES:

1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.
2. FOR STRIPING DETAILS SEE STAGE 1B.
3. TEMPORARY RAILING (TYPE K), TEMPORARY TRAFFIC SCREEN, CRASH CUSHION, AND CHANNELIZERS IN PREVIOUS STAGE TO REMAIN IN PLACE.



SECTION M-M
NO SCALE



STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN (STAGE 1C)

SCALE: 1" = 50'

APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-13

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN

FUNCTIONAL SUPERVISOR: MATTHEW CUGINI
CALCULATED-DESIGNED BY: VANESSA RAGLAND
CHECKED BY: FRED FAIZI
REVISED BY
DATE REVISED

LAST REVISION 11-19-12
DATE PLOTTED => 23-APR-2013
TIME PLOTTED => 13:39

BORDER LAST REVISED 7/2/2010
USERNAME => s127956
DGN FILE => 1200000078ma013.dgn
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT 2994
PROJECT NUMBER & PHASE 12000000781

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

Fred Faizi 02-04-13
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER F. FAIZI No. C47267 Exp. 12-31-13 CIVIL 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.

NOTE:

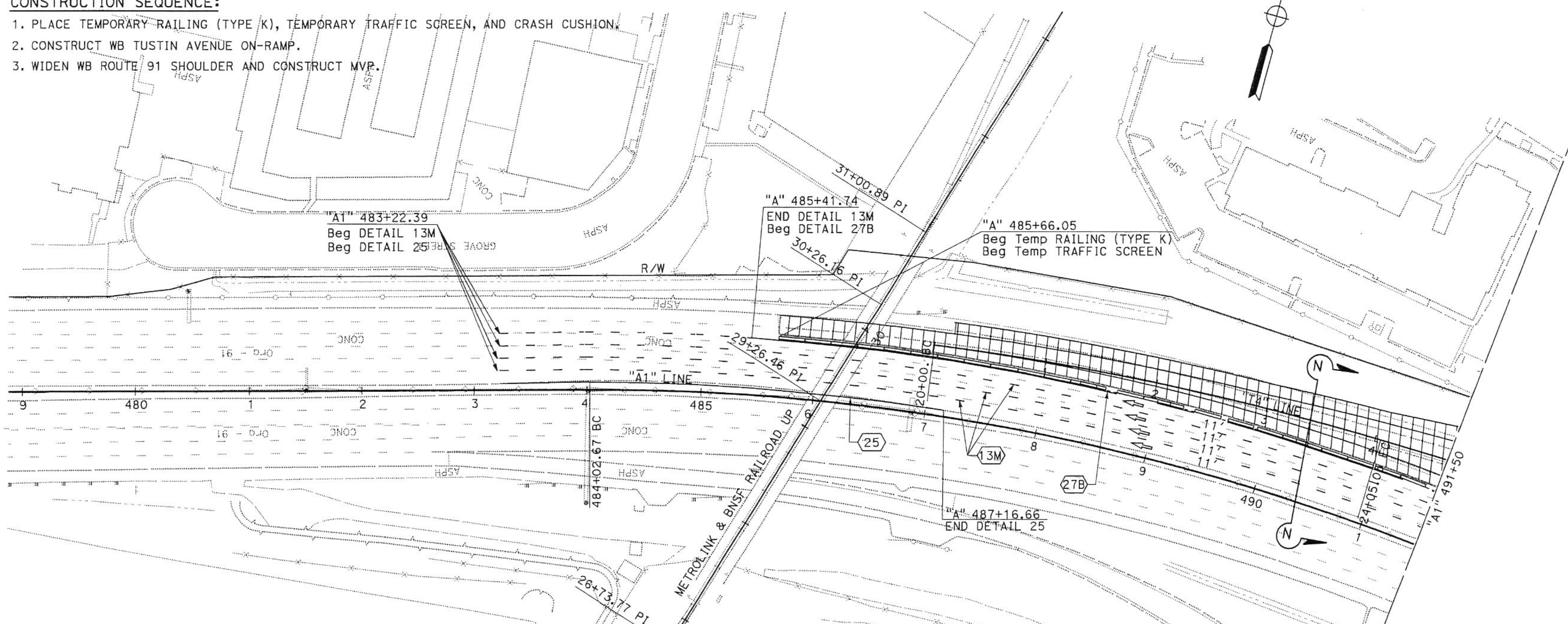
1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

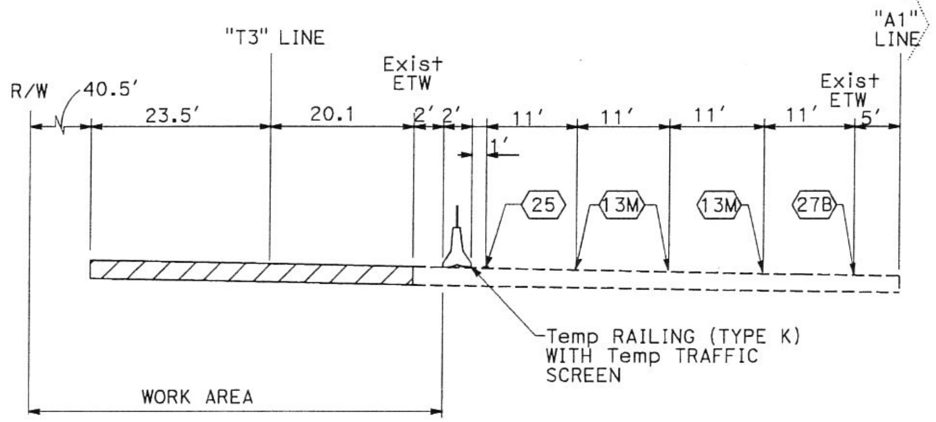
TRAFFIC CONTROL:

1. RESTRIPE WESTBOUND ROUTE 91 TRAFFIC FROM "A" 483+22.39 TO "A" 514+50.00
2. FULL WB TUSTIN AVENUE ON-RAMP CLOSURE.
3. PERMANANT STRIPING SHALL BE PLACED FROM "A" 514+50.00 TO "A" 525+00.00, "T4" 488+20.36 TO "T4" 472+68.22, AND "A2" 544+00.00 TO "A2" 547+10.00 (SEE PD SHEETS FOR DETAILS)

CONSTRUCTION SEQUENCE:

1. PLACE TEMPORARY RAILING (TYPE K), TEMPORARY TRAFFIC SCREEN, AND CRASH CUSHION.
2. CONSTRUCT WB TUSTIN AVENUE ON-RAMP.
3. WIDEN WB ROUTE 91 SHOULDER AND CONSTRUCT MVP.





SECTION N-N
NO SCALE

APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN (STAGE 2)

SCALE: 1" = 50'

SC-14

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN

FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISED BY
MATTHEW CUGINI	VANESSA RAGLAND	
	CHECKED BY	DATE REVISED
	FRED FAIZI	

LAST REVISION 11-19-12 DATE PLOTTED => 23-APR-2013 TIME PLOTTED => 13:44

NOTE:

1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

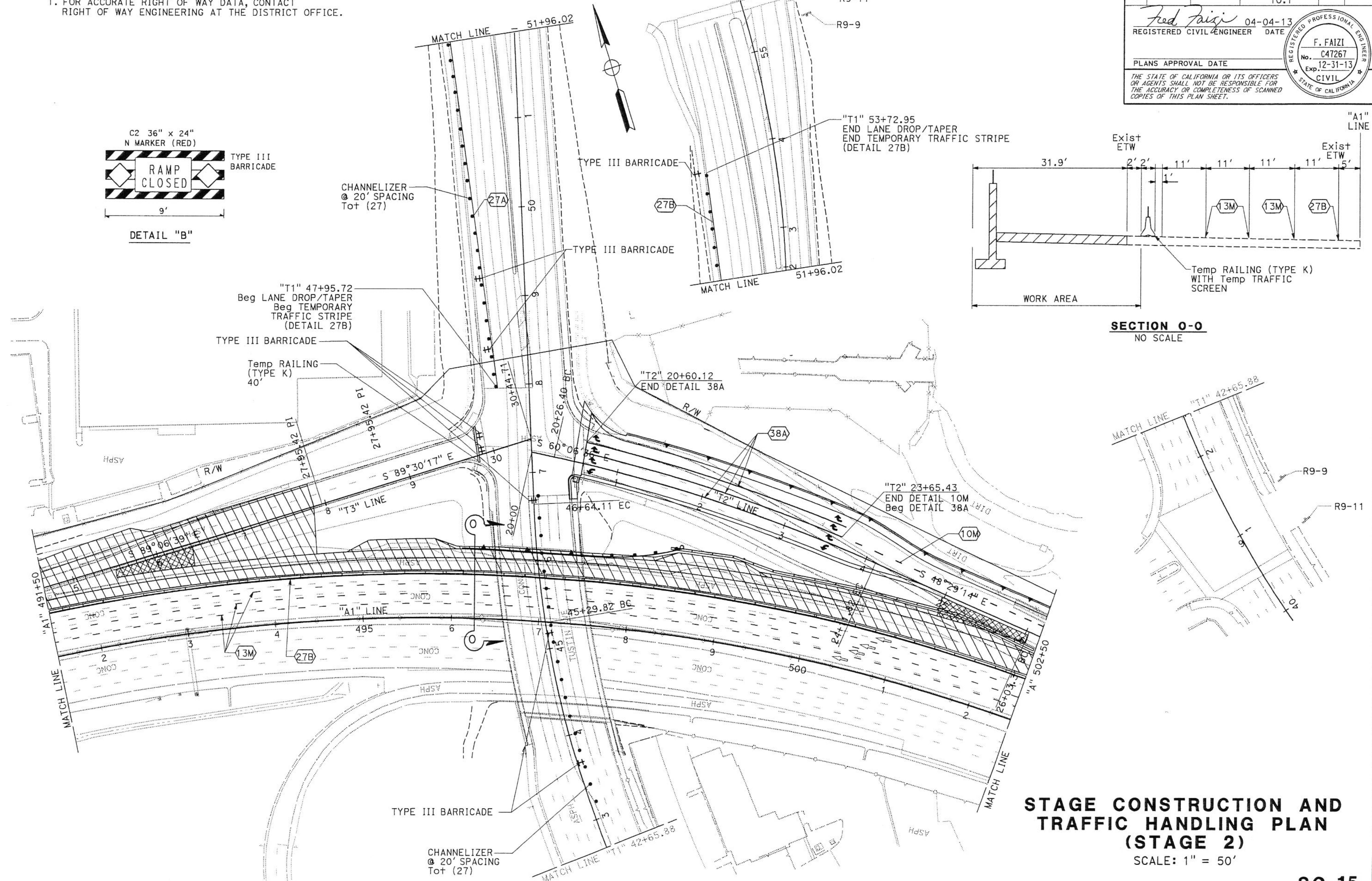
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

Fred Faizi 04-04-13
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER F. FAIZI No. C47267 Exp. 12-31-13 CIVIL 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.



STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN (STAGE 2)

SCALE: 1" = 50'

APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-15

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN

FUNCTIONAL SUPERVISOR	MATTHEW CUGINI
CALCULATED-DESIGNED BY	VANESSA RAGLAND
CHECKED BY	FRED FAIZI
REVISED BY	DATE REVISED

LAST REVISION 00-00-00 DATE PLOTTED => 23-APR-2013 TIME PLOTTED => 13:40

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

REGISTERED CIVIL ENGINEER 04-04-13 DATE

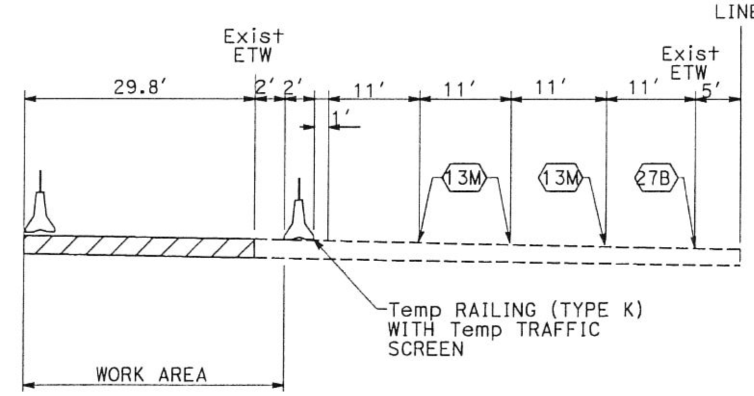
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER F. FAIZI No. C47267 Exp. 12-31-13 CIVIL STATE OF CALIFORNIA

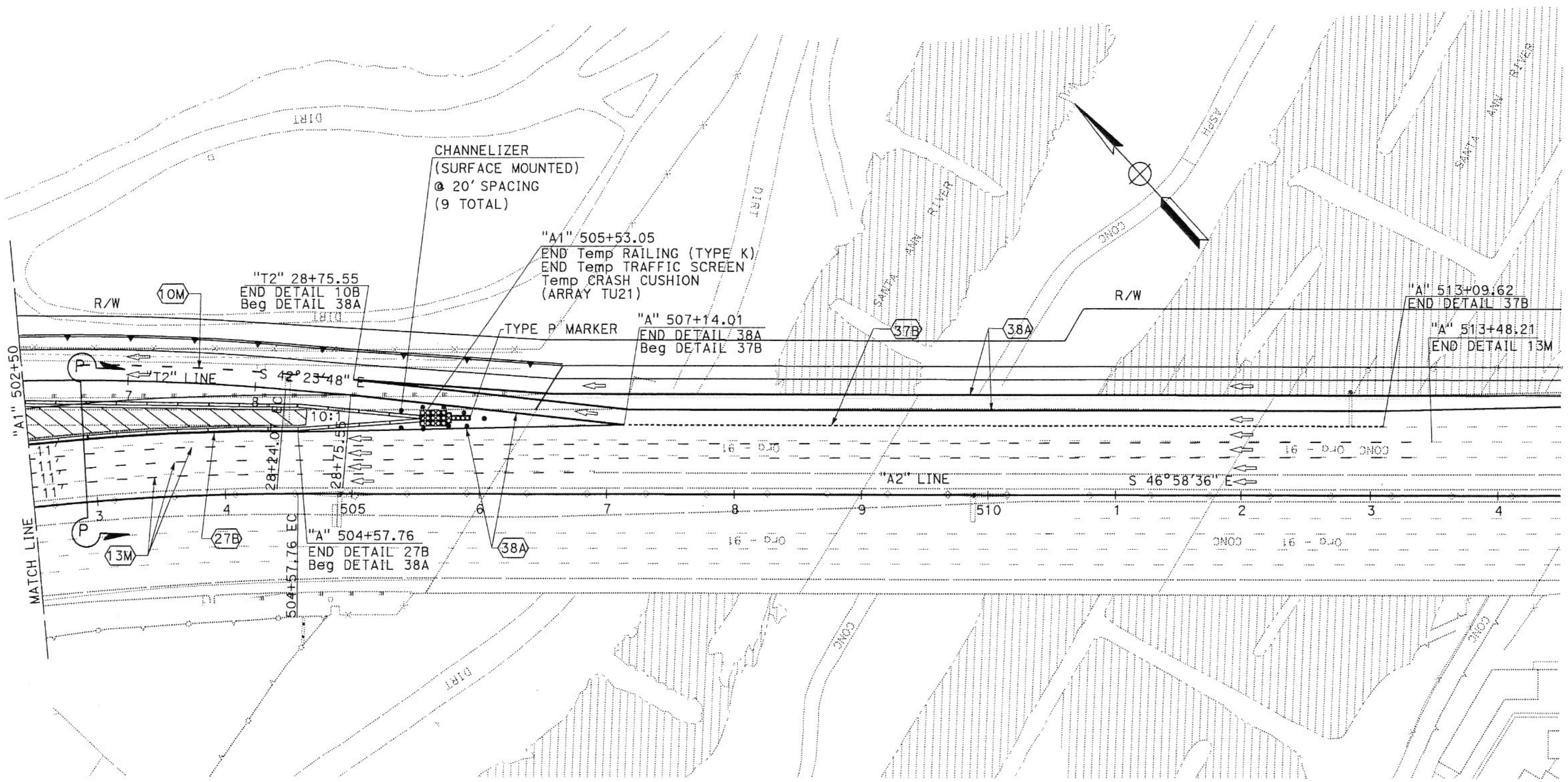
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

NOTE:

1. FOR ACCURATE RIGHT OF WAY DATA, CONTACT RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.



SECTION P-P
NO SCALE



STAGE CONSTRUCTION AND TRAFFIC HANDLING PLAN (STAGE 2)

SCALE: 1" = 50'

APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SC-16

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

DESIGN

FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	CHECKED BY	REVISED BY	DATE REVISED
MATTHEW CUGINI	VANESSA RAGLAND	FRED FAIZI		

LAST REVISION 11-19-12 | DATE PLOTTED => 23-APR-2013 | TIME PLOTTED => 13:40

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

Fred Faizi 04-04-13
REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
F. FAIZI
No. C47267
Exp. 12-31-13
CIVIL
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 SCANNED COPIES OF THIS PLAN SHEET.

STAGE CONSTRUCTION QUANTITIES

SHEET NUMBER	LOCATION	PAINT TRAFFIC STRIPE (2-COAT)									PAVEMENT MARKERS*			PAINT PAVEMENT MARKING (2-COAT)	TEMPORARY RAILING (TYPE K)	TEMPORARY TRAFFIC SCREEN	OBJECT MARKER (TYPE P)	TYPE III BARRICADE	CHANNELIZER (SURFACE MOUNTED)	TEMPORARY CRASH CUSHION MODULE	REMOVALS			
		4"					8"					RETROREFLECTIVE												
		DETAIL 10 MOD (BROKEN WHITE)	DETAIL 13 MOD (BROKEN WHITE)	DETAIL 27B (SOLID WHITE)	DETAIL 25 (SOLID YELLOW)	DETAIL 25A (SOLID YELLOW)	DETAIL 37B (BROKEN WHITE)	DETAIL 36 (SOLID WHITE)	DETAIL 38 (SOLID WHITE)	DETAIL 38A (SOLID WHITE)	NON-REFLECTIVE TYPE A	TYPE G	TYPE H								REMOVE PAINTED TRAFFIC STRIPE	REMOVE YELLOW PAINTED TRAFFIC STRIPE (HAZARDOUS WASTE)	REMOVE PAVEMENT MARKER*	REMOVE PAINTED PAVEMENT MARKING
		LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	SQFT	LF	LF	EA	EA	EA	EA	LF	LF	EA	SQFT
SC-1	WB CONNECTOR "C1" LINE					177							13		172	172					177			
SC-2	WB CONNECTOR "C1" LINE					1040							66		772	772	1		8	14	1040			
SC-3	WB CONNECTOR "C1" LINE					127							9	84							127			84
SC-4	MAINLINE "A1" LINE		867	289							73	38									506		111	
	WB TUSTIN OFF "T2" LINE			563		244				76			17	188	563	563					638	244	17	188
SC-5	MAINLINE "A1" LINE		1252	952			814		291		246	258			947	947					2141		504	
	WB TUSTIN OFF "T2" LINE			234		97							7		254	254					234	97	7	
SC-6	MAINLINE "A1" LINE		1651	548			52				138	79		126	548	548					971		217	126
	WB CONNECTOR "C1" LINE		590	597		372					50	26	25		597	597					745	372	101	
SC-7	MAINLINE "A2" LINE		541	541	228						45	24	16		443	443					676	228	84	
	WB CONNECTOR "C1" LINE		475	162		60					40	21	5		475	475					281	60	66	
SC-8	MAINLINE "A2" LINE		2316	866	1158						193	98	49		833	833	2		8	14	2024	1158	340	
SC-9	MAINLINE "A1" LINE														501	501								
	WB TUSTIN OFF "T2" LINE	351		518		557					44	16	36	188	609	609					912	557	96	188
SC-10	MAINLINE "A1" LINE			967			377	1305		351		53			933	933	1		9	21	967		53	
	WB TUSTIN OFF "T2" LINE	244		259							31	12									290			
SC-14	MAINLINE "A1" LINE		2703	609	395						226	114	18		584	584					1960	395	358	
SC-15	MAINLINE "A1" LINE		1100	1100							92	47			1100	1100					1650		139	
	TUSTIN Ave "T1" LINE			577														8	45		577			
	WB TUSTIN OFF "T2" LINE	257								916	33	12									1002		45	
SC-16	MAINLINE "A1" LINE		1099	208			596			2375	92	129			606	606	1		9	21	3251		221	
	WB TUSTIN OFF "T2" LINE	251									32	12									84		44	
	SUBTOTAL	1103	12,594	8990	1781	2674	1839	1305	291	3718	1335	939	261	586	9937	9937	5	8	79	70	20,253	3111	2403	586
	TOTAL	34,295									1335	1200		586	9937	9937	5	8	79	70	20,253	3111	2403	586

NOTE:
(*) FOR GRAND TOTAL OF PAVEMENT MARKERS AND REMOVE PAVEMNT MARKERS, SEE SHEET PDQ-1.

STAGE CONSTRUCTION AND TRAFFIC HANDLING QUANTITIES

APPROVED FOR STAGE CONSTRUCTION AND TRAFFIC HANDLING WORK ONLY

SCQ-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN

FUNCTIONAL SUPERVISOR	CALCULATED-DESIGNED BY	REVISED BY
MATTHEW CUGINI	VANESSA RAGLAND	
	CHECKED BY	DATE REVISED
	FRED FAIZI	

LAST REVISION 06-06-12
DATE PLOTTED => 23-APR-2013
TIME PLOTTED => 13:40

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

04-04-13
REGISTERED CIVIL ENGINEER DATE

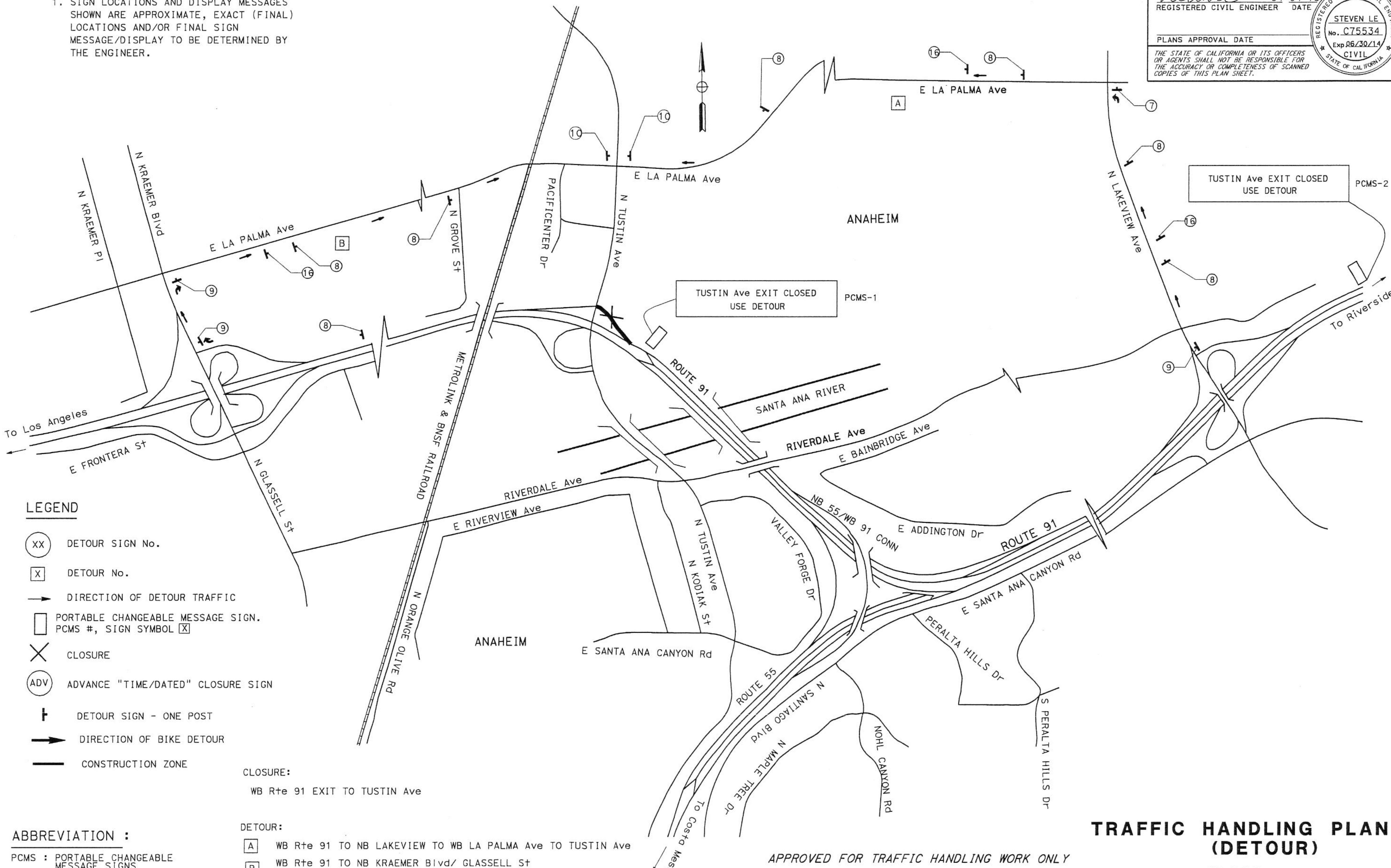
REGISTERED PROFESSIONAL ENGINEER
STEVEN LE
No. C75534
Exp 06/30/14
CIVIL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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

NOTE:

1. SIGN LOCATIONS AND DISPLAY MESSAGES SHOWN ARE APPROXIMATE, EXACT (FINAL) LOCATIONS AND/OR FINAL SIGN MESSAGE/DISPLAY TO BE DETERMINED BY THE ENGINEER.



LEGEND

(XX) DETOUR SIGN No.

[X] DETOUR No.

→ DIRECTION OF DETOUR TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGN. PCMS #, SIGN SYMBOL [X]

X CLOSURE

(ADV) ADVANCE "TIME/DATED" CLOSURE SIGN

DETOUR SIGN - ONE POST

DIRECTION OF BIKE DETOUR

CONSTRUCTION ZONE

CLOSURE:

WB Rte 91 EXIT TO TUSTIN Ave

DETOUR:

[A] WB Rte 91 TO NB LAKEVIEW TO WB LA PALMA Ave TO TUSTIN Ave

[B] WB Rte 91 TO NB KRAEMER Blvd/ GLASSELL St TO EB LA PALMA Ave TO TUSTIN Ave

ABBREVIATION :

PCMS : PORTABLE CHANGEABLE MESSAGE SIGNS

APPROVED FOR TRAFFIC HANDLING WORK ONLY

TRAFFIC HANDLING PLAN (DETOUR)

NO SCALE

TH-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

DESIGN

FUNCTIONAL SUPERVISOR: MATTHEW Q. CUGINI

CALCULATED-DESIGNED BY: STEVEN LE

CHECKED BY: FRED FAIZI

REVISED BY

DATE REVISED

LAST REVISION 11-29-12

DATE PLOTTED => 23-APR-2013
TIME PLOTTED => 13:34

BORDER LAST REVISED 7/2/2010

USERNAME => s127956
DGN FILE => 1200000078md001.dgn

RELATIVE BORDER SCALE IS IN INCHES

0 1 2 3

UNIT 2994

PROJECT NUMBER & PHASE 12000000781

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

Steven Le 04-04-13
REGISTERED CIVIL ENGINEER DATE

REGISTERED PROFESSIONAL ENGINEER
STEVEN LE
No. C75534
Exp 06/30/14
CIVIL
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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Note:

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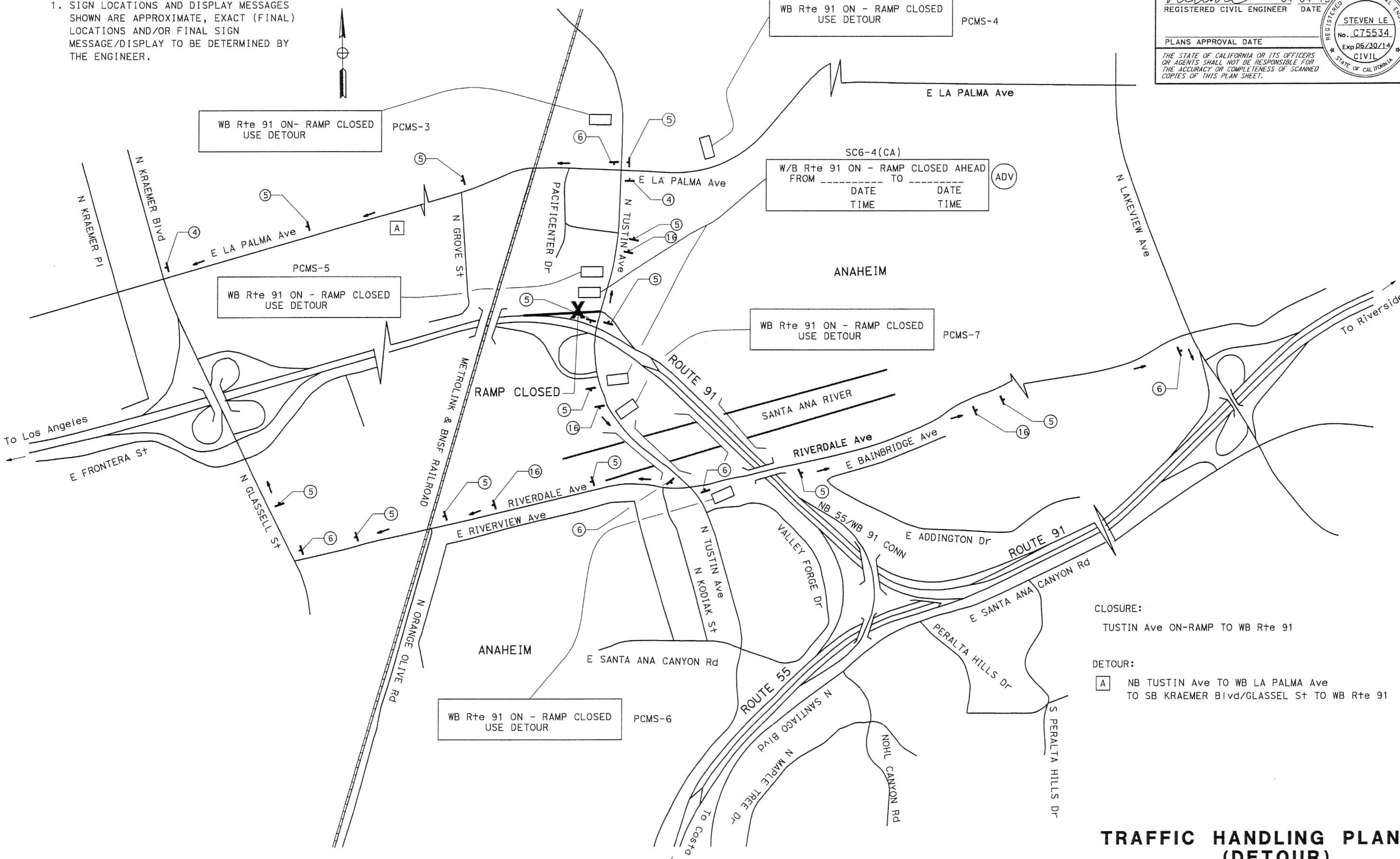


CLOSURE:

TUSTIN Ave ON-RAMP TO WB Rte 91

DETOUR:

A NB TUSTIN Ave TO WB LA PALMA Ave TO SB KRAEMER Blvd/GLASSEL St TO WB Rte 91

APPROVED FOR TRAFFIC HANDLING WORK ONLY

TRAFFIC HANDLING PLAN (DETOUR)

NO SCALE

TH-2

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
DESIGN

FUNCTIONAL SUPERVISOR: MATTHEW Q. CUGINI
CALCULATED-DESIGNED BY: STEVEN LE
CHECKED BY: FRED FAIZI
REVISED BY
DATE REVISED

LAST REVISION 11-29-12
DATE PLOTTED => 23-APR-2013
TIME PLOTTED => 13:40

BORDER LAST REVISED 7/2/2010
USERNAME => s127956
DGN FILE => 1200000078md002.dgn
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT 2994
PROJECT NUMBER & PHASE 12000000781

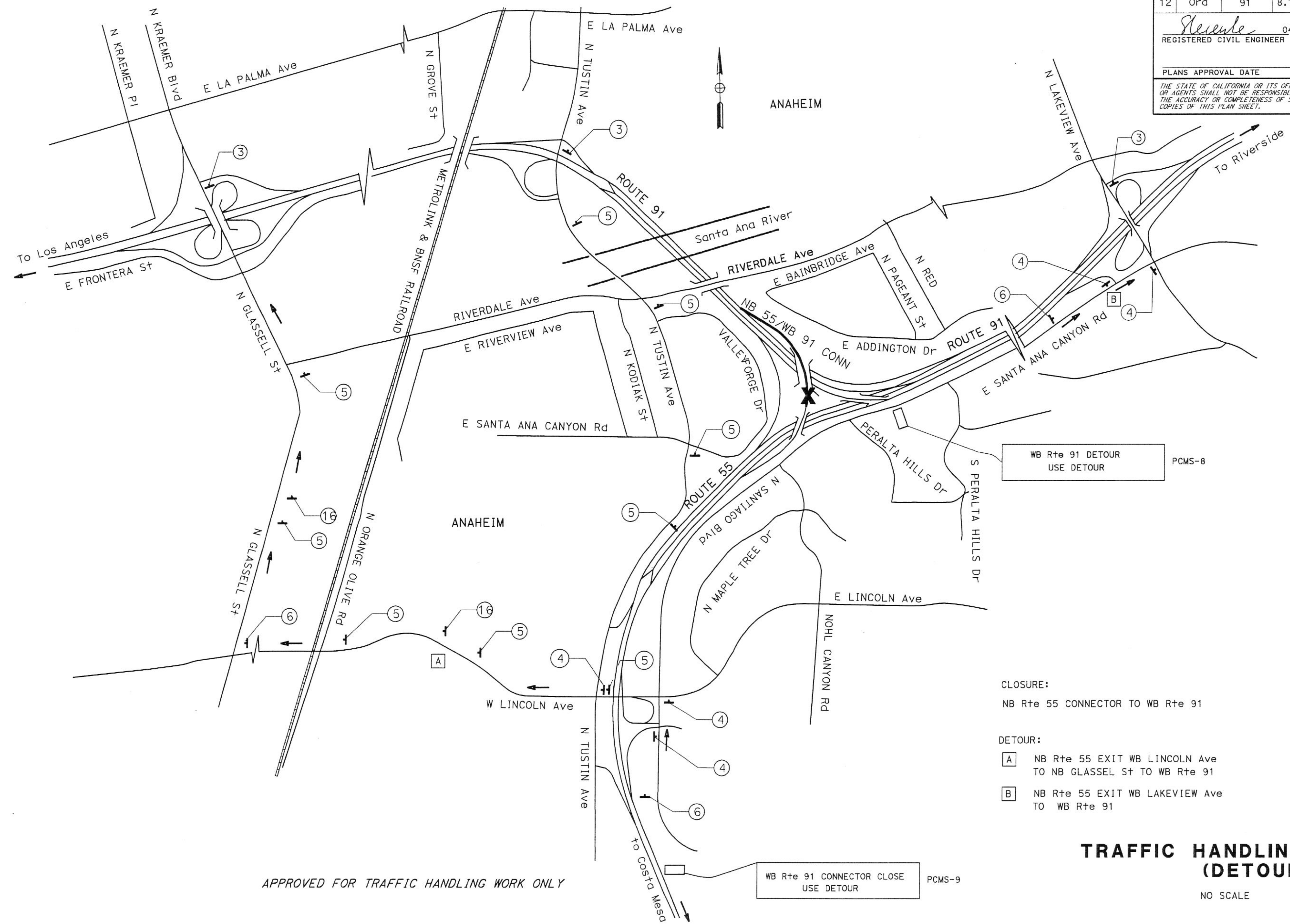
Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

REGISTERED CIVIL ENGINEER 04-04-13 DATE

REGISTERED PROFESSIONAL ENGINEER STEVEN LE No. C75534 Exp 06/30/14 CIVIL 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 SCANNED COPIES OF THIS PLAN SHEET.



CLOSURE:

NB Rte 55 CONNECTOR TO WB Rte 91

DETOUR:

A NB Rte 55 EXIT WB LINCOLN Ave TO NB GLASSEL St TO WB Rte 91

B NB Rte 55 EXIT WB LAKEVIEW Ave TO WB Rte 91

APPROVED FOR TRAFFIC HANDLING WORK ONLY

TRAFFIC HANDLING PLAN (DETOUR)

NO SCALE

TH-3

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

DESIGN

FUNCTIONAL SUPERVISOR MATTHEW Q. CUGINI

CALCULATED-DESIGNED BY STEVEN LE

CHECKED BY FRED FAIZI

REVISED BY

DATE REVISED

LAST REVISION 11-29-12

DATE PLOTTED => 23-APR-2013
TIME PLOTTED => 13:40

BORDER LAST REVISED 7/2/2010

USERNAME => s127956
DGN FILE => 1200000078md003.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 2994

PROJECT NUMBER & PHASE 12000000781

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

02-04-13
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER STEVEN LE No. C75534 Exp. 06/30/14 CIVIL STATE OF CALIFORNIA

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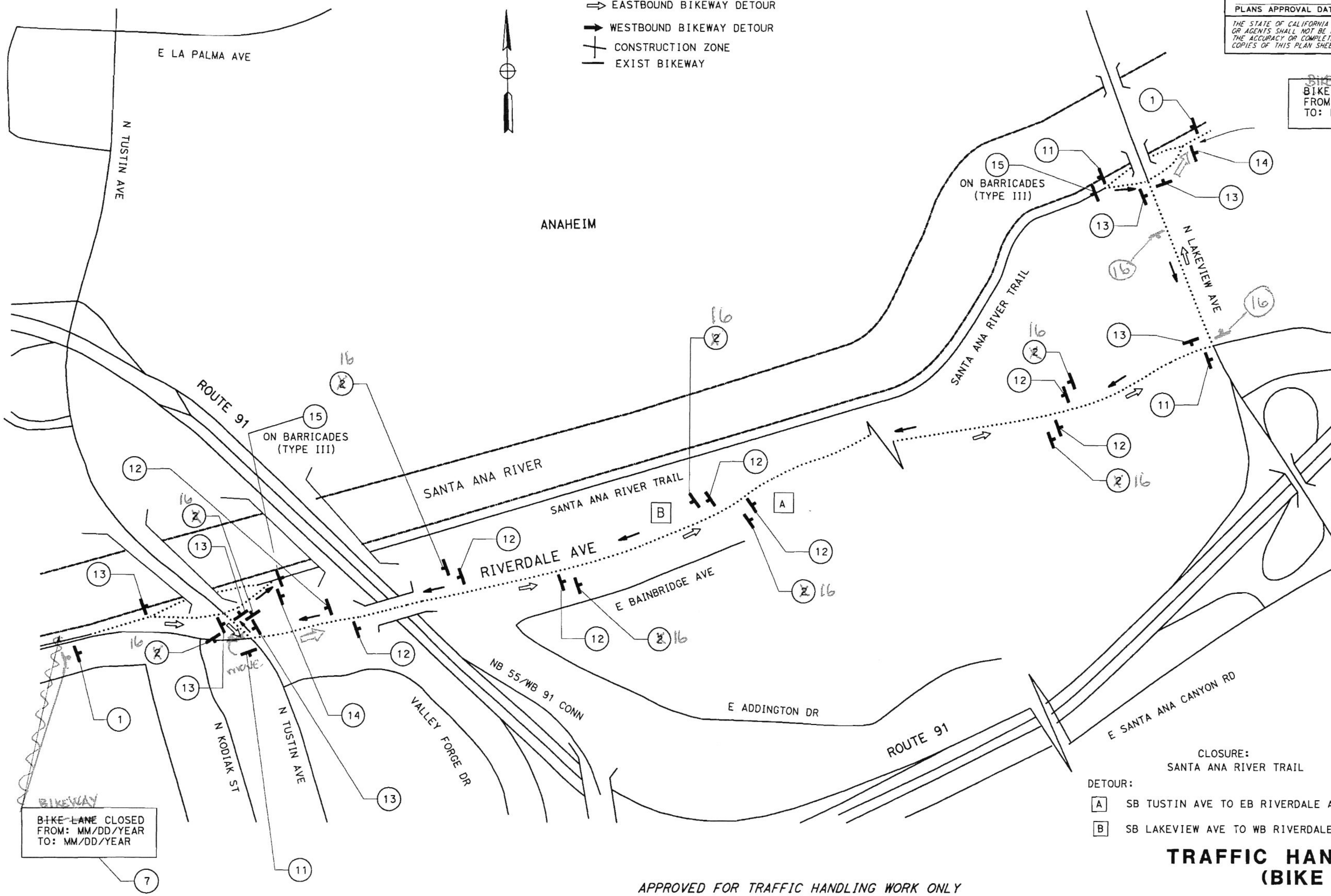
NOTES:
1. SIGN LOCATIONS AND DISPLAY MESSAGES SHOWN ARE APPROXIMATE, EXACT (FINAL) LOCATIONS AND/OR FINAL SIGN MESSAGE/DISPLAY TO BE DETERMINED BY THE ENGINEER.

LEGEND
- BIKEWAY DETOUR ROUTE
- EASTBOUND BIKEWAY DETOUR
- WESTBOUND BIKEWAY DETOUR
- CONSTRUCTION ZONE
- EXIST BIKEWAY



CLOSURE:
SANTA ANA RIVER TRAIL

DETOUR:

A SB TUSTIN AVE TO EB RIVERDALE AVE TO NB LAKEVIEW AVE

B SB LAKEVIEW AVE TO WB RIVERDALE AVE TO NB TUSTIN AVE

APPROVED FOR TRAFFIC HANDLING WORK ONLY

TRAFFIC HANDLING PLAN (BIKE DETOUR)

NO SCALE

TH-4

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans DESIGN

FUNCTIONAL SUPERVISOR: MATTHEW Q. CUGINI
CALCULATED-DESIGNED BY: STEVEN LE
CHECKED BY: FRED FAIZI
REVISED BY
DATE REVISED

LAST REVISION 00-00-00
DATE PLOTTED => 10-APR-2013
TIME PLOTTED => 14:52

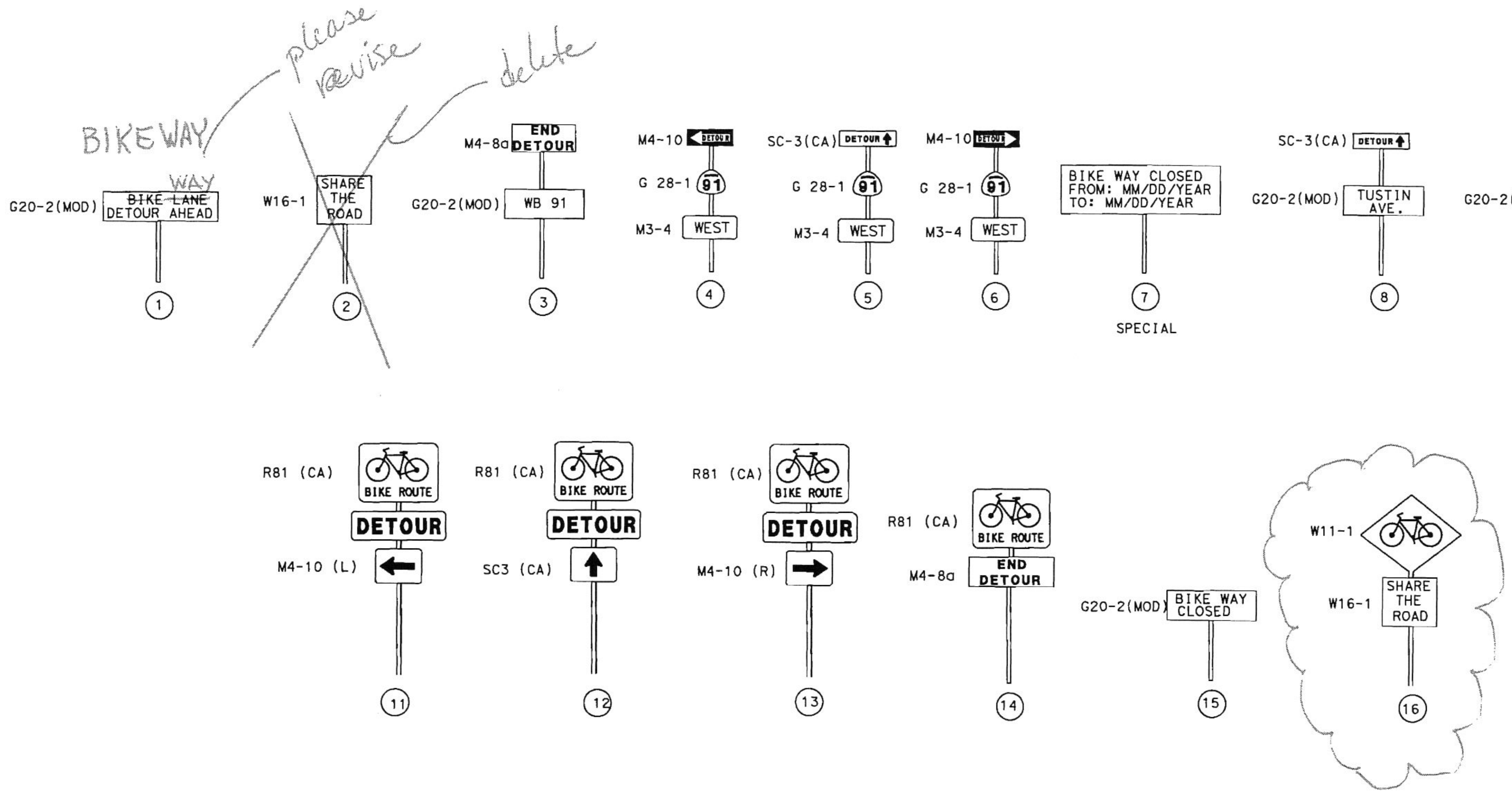
BORDER LAST REVISED 7/2/2010
USERNAME => s122534
DGN FILE => 1200000078md004.dgn
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT 0000
PROJECT NUMBER & PHASE 12000000781

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

02-04-13
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
STEVEN LE
No. C75534
Exp 06/30/14
CIVIL
STATE OF CALIFORNIA



DETOUR SIGNS

TRAFFIC HANDLING DETAILS

NO SCALE

APPROVED FOR TRAFFIC HANDLING WORK ONLY

THD-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

DESIGN

FUNCTIONAL SUPERVISOR: MATTHEW Q. CUGINI

CALCULATED-DESIGNED BY: STEVEN LE

CHECKED BY: FRED FAIZI

REVISED BY

DATE REVISED

LAST REVISION 11-29-12

DATE PLOTTED => 10-APR-2013
TIME PLOTTED => 15:07

BORDER LAST REVISED 7/2/2010

USERNAME => s122534
DGN FILE => 1200000078me001.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 2994

PROJECT NUMBER & PHASE 12000000781

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	Ora	91	8.1/9.3, 10.1		

04-04-13
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
STEVEN LE
No. C75534
Exp 06/30/14
CIVIL
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.

NOTE:

SIGNS SHOWN ON THIS SHEET ARE IN ADDITION TO THOSE SIGNS SHOWN ON SHEET CS-1 AND SCQ-1

ABBREVIATION:

(S) STATIONARY MOUNTED SIGN

STATIONARY MOUNTED CONSTRUCTION AREA SIGNS

SIGN SYMBOL	SIGN CODE	PANEL SIZE (in)	No. OF SIGNS	No. OF POST AND SIZE (in)	SIGN MESSAGE
1	W20-2(MOD)	36 x 18	2	1 - 4 x 4	
2	M16-1	18 x 24	8	1 - 4 x 4	
3	M4-8a	20 X 16	3	1 - 4 x 4	SEE THD-1 FOR DETAIL
	W20-2(MOD)	24 x 24			
4	M4-10 (Lt)	48 x 48	7	1 - 4 x 4	SEE THD-1 FOR DETAIL
	G28-1	42 x 36			
	M3- 4	30 x 15			
5	SC-3 (CA)	48 x 48	22	1 - 4 x 4	SEE THD-1 FOR DETAIL
	G28-1	42 x 36			
	M3- 4	30 x 15			
6	M4-10 (Rt)	48 x 48	8	1 - 4 x 4	SEE THD-1 FOR DETAIL
	G28-1	42 x 36			
	M3- 4	30 x 15			
7	SPECIAL SIGN	42 x 24	2	1 - 4 x 4	SEE THD-1 FOR DETAIL
8	SC-3 (CA)	48 x 48	7	1 - 4 x 4	SEE THD-1 FOR DETAIL
	W20-2(MOD)	42 x 18			
9	M4-10 (Rt)	48 x 48	3	1 - 4 x 4	SEE THD-1 FOR DETAIL
	W20-2(MOD)	42 x 18			
10	M4-8	20 x 16	2	1 - 4 x 4	SEE THD-1 FOR DETAIL
	W20-2(MOD)	42 x 18			
11	M4-10 (Lt)	48 x 48	3	1 - 4 x 4	SEE THD-1 FOR DETAIL
	W20-2(MOD)	42 x 18			
12	SC-3 (CA)	48 x 48	8	1 - 4 x 4	SEE THD-1 FOR DETAIL
	W20-2(MOD)	42 x 18			

STATIONARY MOUNTED CONSTRUCTION AREA SIGNS (Cont)

SIGN SYMBOL	SIGN CODE	PANEL SIZE (IN)	No. OF SIGNS	No. OF POST AND SIZE	SIGN MESSAGE
13	M4-10 (Rt)	48 x 48	7	1 - 4 x 4	SEE THD-1 FOR DETAIL
	W20-2(MOD)	42 x 18			
14	M4- 8a	20 x 16	2	1 - 4 x 4	SEE THD-1 FOR DETAIL
15	W20-2(MOD)	42 x 18	2	1 - 4 x 4	SEE THD-1 FOR DETAIL
16	M11-1	18 x 18	9	1 - 4 x 4	SEE THD-1 FOR DETAIL
	W16-1	18 x 24			
ADV	SC6 - 4 (CA)	72 x 30	2	TYPE III BARRICADE	SEE THD-1 FOR DETAIL

PORTABLE CHANGABLE MESSAGE SIGN

SIGN CODE	SHEET No.	SIGN MESSAGE
PCMS-1	TH-1	TUSTIN AVE EXIT CLOSED USE DETOUR
PCMS-2	TH-1	TUSTIN AVE EXIT CLOSED USE DETOUR
PCMS-3	TH-2	WB RT 91 ON- RAMP CLOSED USE DETOUR
PCMS-4	TH-2	WB RT 91 ON- RAMP CLOSED USE DETOUR
PCMS-5	TH-2	WB RT 91 ON- RAMP CLOSED USE DETOUR
PCMS-6	TH-2	WB RT 91 ON- RAMP CLOSED USE DETOUR
PCMS-7	TH-3	WB RT 91 ON- RAMP CLOSED USE DETOUR
PCMS-8	TH-3	WB Rte 91 DETOUR
PCMS-9	TH-3	WB Rte 91 CONNECTOR CLOSE USE DETOUR

TRAFFIC HANDLING QUANTITIES

THQ-1

APPROVED FOR TRAFFIC HANDLING WORK ONLY

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans®
DESIGN
FUNCTIONAL SUPERVISOR
MATTHEW Q. CUGINI
CALCULATED-DESIGNED BY
STEVEN LE
CHECKED BY
FRED FAIZI
REVISED BY
DATE REVISED

LAST REVISION 11-29-12
DATE PLOTTED => 23-APR-2013
TIME PLOTTED => 13:40

BORDER LAST REVISED 7/2/2010
USERNAME => s127956
DGN FILE => 1200000078mf001.dgn
RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3
UNIT 2994
PROJECT NUMBER & PHASE 12000000781

COUNTY PROPERTY PERMIT

4/23/2013

2012-00353

Ngo, Andy 3:41:46 PM

INSPECTION PHONE

714-245-4550

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

ENCROACHMENT PERMIT

COUNTY OF ORANGE

OC Public Works/ OC Planning/ County Property Permits

Main Office: 300 North Flower Street,
Santa Ana, California 92703-5001
or P.O. Box 4048, Santa Ana, California 92702-4048

(714) 667-8888

Fax: (714) 667-8885

Permit No: **2012-00353**

Effective Date: 4/23/2013 12:00 AM

Expiration Date: 4/23/2014 12:00 AM

Applicant assumes sole responsibility for obtaining a rider (extension) prior to this date

PERMITTEE

California Department of Transportation - District 12 (CalTrans
3337 Michelson Drive, Suite 380

Irvine, CA 92612-8894
949-724-2020

Contact Person Kathy Lowe
Telephone No. 949-724-2121

FACILITY

Type	Facility Name	Number
	SANTA ANA RIVER CHANNEL	E01

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

To construct and maintain approximate 38-feet bridge widening of Westbound of State Route 91 (SR-91) Widening Project under State Of California-Department of Transportation project tittle "Project Plans for Construction on State Highway in Orange County in Anaheim from 0.3 Miles of Tustin Avenue to 0.3 Miles East of NB SR-55/Wb SR-91 Connector" within a portion of Orange County Flood Control District's Santa Ana River Channel (E01) right-of-way, per attached plans, provisions, and to the satisfaction of the assigned County inspection personnel.

PERMITTED USE NOT EFFECTIVE UNTIL APPROVED BY THE ASSIGNED COUNTY INSPECTOR.

BEFORE COMMENCING WORK WITHIN COUNTY RIGHTS-OF-WAY, THE PERMITTEE FIRST OBTAINS A RIDER TO THIS PERMIT TO ADD THE SELECTED CONTRACTOR AND THE CONTRACTOR PAY PERMIT FEE, SUBMIT THE CONSTRUCTION BOND AND CONTRACTOR'S VALID INSURANCE THAT MEETS COUNTY INSURANCE REQUIREMENTS TO COUNTY PROPERTY PERMITS.

PERMITTEE REQUIRED TO OBTAIN ALL NECESSARY REGULATORY PERMITS BEFORE COMMENCING WORK WITHIN COUNTY RIGHTS-OF-WAY.

CEQA Code 1 SWPPP: Yes

LOCATION OF WORK:

Santa Ana River Channel (E01) Tustin Ave and River Dale Ave

Dimension/Type: 38-feet Bridge widening Thomas Brother: 769;J3 Area: Tustin

PERMITTEE'S ACCEPTANCE:

HPatel

for Kathy Lowe Hitesh P Patel 4-23-13

COUNTY APPROVAL:

Capalety, Dean 4/23/2013

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

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

ENCROACHMENT PERMIT

CONSIDERATION:

Types	PWO#	Permit Fees	Surety	Penalty	Total	Total Fees: 0.00
FE	EF68120	0.00 (2071)	0.00 (2091)	0.00	0.00	

Surety Paid By:

TUF Invoice Paid By:

Contractor: TBD

Engineer:

Inspection: OC Inspections

CC: Operations & Maintenance

PERMIT INSPECTORS REPORT:

DATE WORK COMPLETED:________________

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

Remarks:

Inspector:

Date

Permit Superintendent:

Date

Refund Recommended By:

Date

Refund Approved By:

Date:

Orange County Flood Control District
Right-of-Way Encroachment Permit
Special Provision Attachment
(2012-00353)

By acceptance of this permit, Permittee agrees the following Special Provisions shall remain for the life of the proposed project:

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

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

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

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

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

6. If any approved permit activity within a bikeway or trail area is anticipated to have an impact or disruption upon normal recreational use, prior to Permittee's activities within, upon, under or over District's ROW, Permittee shall submit in writing a detailed Traffic Control Plan for the written approval of Director. Upon receipt of Director's written approval, Permittee shall implement the approved Traffic Control Plan. Permittee shall not conduct any activity within, upon, under or over District's ROW until it has implemented the approved Traffic Control Plan.

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

8. Permittee shall not allow any non-District motorized vehicles to operate within District ROW. This permit does not authorize the use of motorized vehicles.

13. Permittee shall ensure that all laws and regulations are enforced and obeyed during event by Permittee and all participants.

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

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

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

19. Nothing in this Permit is intended nor shall anything in this permit be construed to transfer to District or its successors and assigns or to relieve Permittee or their successors and assigns or predecessors in title of any responsibility or liability Permittee now has, has had, or comes to

have with respect to human health or the environment, including, but not limited to responsibility or liability related to hazardous or toxic substances or materials (as such terms as those used in this sentence are defined by statute, ordinance, case law, governmental regulation other provision of the law). Furthermore, District may exercise its right under law to bring action, if necessary, to recover clean up costs and penalties paid, if any, from Permittee or any others who are ultimately determined to have responsibility for said toxic or hazardous materials.

20. Permittee's use of District ROW which includes material deliveries shall be coordinated with the assigned inspector. NO VEHICULAR ACCESS WITHIN DISTRICT ROW IS APPROVED EXCEPT FOR MAKING CONSTRUCTION MATERIAL DELIVERIES. ANY VIOLATION OF THIS PROVISION SHALL VOID PERMIT.

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

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

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

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

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

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

27. Permittee shall be required to yield the right-of-way to recreational users in cases where the District access road is also designated as a bikeway or riding/hiking trail. In such cases, the Permittee shall drive vehicles off to the right side of the access road/bikeway/trail improvement,

stop, and allow the recreational user to pass by prior to commencing to the Permittee's desired location.

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

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

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

31. Prior to construction, the Permittee is required to provide a copy of the final documentation showing that Orange County Water District (OCWD) approved the proposed Caltrans improvements within OCWD right-of-way, the proposed Caltrans R/W Limits, and construction and maintenance easements for the proposed improvements.

32. Proof of coverage under the General Permit for Discharges of Storm Water Associated with Construction Activity (Construction General Permit Order 2009-0009-DWQ adopted on September 2, 2009, and as subsequently amended and in force) shall be provided to the County prior to initiation of work.

33. Caltrans may need to provide a full set of complete, signed and stamped plans (hardcopy and/or electronic) for Santa Ana River Programs (SARP's) record upon request by staff.

Signature: HP Patel Date: 4-23-13

for kathy Lowe

Print Name: Hitesh P. Patel

STANDARD PROVISIONS

TO BE ATTACHED TO AND MADE A PART OF PERMIT NO. 2012-00353

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

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

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

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

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

   Permits Inspection (714) 245-4550
   1152 E. Fruit Street
   Santa Ana, CA 92702

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

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

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

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

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

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

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

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

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

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

ADDITIONAL STANDARD PROVISIONS

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

TO BE ATTACHED TO AND MADE A PART OF PERMIT NO. 2012-00353

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

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

13. SURVEY MONUMENTS: It is imperative that Permittees NOTIFY THE SURVEY OFFICE, telephone 714-955-0152, of OC Public Works at least 48 hours prior to removing or replacing any Survey monuments. All monuments shall be replaced at Permittee's expense and MUST be replaced in kind within 0.01 feet of their original horizontal and vertical location, unless otherwise specified in writing.

CONSTRUCTION REQUIREMENTS

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

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

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

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

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

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

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

20. OPEN CUT METHOD: Open cutting of local streets may be permitted. NOT more than one-half (1/2) of the width of a traveled way shall be disturbed at one time and the remaining width shall be kept open to traffic. Two-way traffic shall be maintained on pavement at all times.

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

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

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

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

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

23. OIL-MIXED SHOULDERS: Improved oil-mixed shoulders are to be remixed to minimum depth of four (4) inches with an approved oil-mixing machine using approximately ½ gallon to 2½ gallons of SC 800 per square yard as determined by the Director. In lieu of the former, the entire width of the shoulder may be removed to a minimum depth of two (2) inches and replaced with a minimum of two (2) inches of AC.

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

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

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

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

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

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

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

TRAFFIC

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

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

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

29. SIGNALIZED INTERSECTION: Permittee shall notify OC Public Works/Traffic Section at 714-245-4580, at least 72 hours in advance of any excavation within one hundred (100) feet of a signalized intersection. Permittee and/or his contractor shall assume cost and responsibility for maintaining existing and temporary electrical systems or any other item or portion of work, as may be deemed necessary or advisable for protection of highway and traveling public and payment of all costs incurred by the County of Orange in repairing facilities damaged during construction. Applicant shall immediately repair or replace any damaged traffic control devices and/or striping facilities.

PERMITTEE'S OBLIGATION

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

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

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

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

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

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

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

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

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

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

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

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
SOUTH COAST REGION (REGION 5)
3883 RUFFIN ROAD
SAN DIEGO, CALIFORNIA 92123

STREAMBED ALTERATION AGREEMENT
NOTIFICATION NO. 1600-2012-0184-R5
SANTA ANA RIVER

CALIFORNIA DEPARTMENT OF TRANSPORTATION, DISTRICT 12
STATE ROUTE 91 WESTBOUND LANE EXTENSION AND AUXILIARY LANE RECONSTRUCTION PROJECT

This Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Wildlife (CDFW) and California Department of Transportation, District 12 (Permittee) as represented by Matthew Cugini.

RECITALS

WHEREAS, pursuant to Fish and Game Code (FGC) section 1602, Permittee notified CDFW on September 21, 2012, that Permittee intends to complete the project described herein.

WHEREAS, pursuant to FGC section 1603, CDFW has determined that the project could substantially adversely affect existing fish or wildlife resources and has included measures in the Agreement necessary to protect those resources.

WHEREAS, Permittee has reviewed the Agreement and accepts its terms and conditions, including the measures to protect fish and wildlife resources.

NOW THEREFORE, Permittee agrees to complete the project in accordance with the Agreement.

PROJECT LOCATION

The project is located along State Route (SR-) 91 between SR-55 (mile post 7.9) and Tustin Avenue (mile post 9.5), affecting the Santa Ana River, in the County of Orange, State of California; Latitude 33°50'56.80"N, Longitude 117°50'02.41"W, Sections 4, Township 4S, Range 9W, U.S. Geological Survey (USGS) map Orange, Ca.

PROJECT DESCRIPTION

The project is limited to the extension of a westbound (WB) general-purpose lane from the northbound (NB) SR-55/WB SR-91 connector through the Tustin Avenue interchange and reconstruction of an existing WB auxiliary lane from east of the NB SR-

55/WB SR-91 connector to the Tustin Avenue off-ramp, and the associated bridgework, including seismic retrofitting, crossing the Santa Ana River, in the city of Anaheim, Orange County.

PROJECT IMPACTS

Existing fish or wildlife resources that the project could substantially adversely affect include: Reptiles: western fence lizard (*Sceloporus occidentalis*), side-blotched lizard (*Uta stansburiana*); Birds: great blue heron (*Ardea herodias*), Cooper's hawk (*Accipiter cooperii*), cliff swallows (*Petrochelidon pyrrhonota*), white-throated swift (*Aeronautes saxatilis*); Mammals: Yuma myotis (*Myotis yumanensis*), Mexican free-tailed bat (*Tadarida brasiliensis*), and big brown bat (*Eptesicus fuscus*).

The adverse effects the project could have on the fish or wildlife resources identified above include: temporary impacts to 2.1453 acres of unvegetated channel and permanent impacts to 0.1340 acres of unvegetated streambed under the jurisdiction of CDFW.

MEASURES TO PROTECT FISH AND WILDLIFE RESOURCES

1. Administrative Measures

Permittee shall meet each administrative requirement described below.

1.1 Documentation at Project Site. Permittee shall make the Agreement, any extensions and amendments to the Agreement, and all related notification materials and California Environmental Quality Act (CEQA) documents, readily available at the project site at all times and shall be presented to CDFW personnel, or personnel from another state, federal, or local agency upon request.

1.2 Providing Agreement to Persons at Project Site. Permittee shall provide copies of the Agreement and any extensions and amendments to the Agreement to all persons who will be working on the project at the project site on behalf of Permittee, including but not limited to contractors, subcontractors, inspectors, and monitors.

1.3 Notification of Conflicting Provisions. Permittee shall notify CDFW if Permittee determines or learns that a provision in the Agreement might conflict with a provision imposed on the project by another local, state, or federal agency. In that event, CDFW shall contact Permittee to resolve any conflict.

1.4 Changes in Project. In the event that the project scope, nature, or environmental impact is altered by subsequent permit measures by a local, state or federal regulatory authority, Permittee shall either submit an Amendment request or re-

Notify CDFW of any project modification which conflicts with current measures or project description.

1.5 Designated Biologist(s). Permittee shall submit to CDFW in writing the name, qualifications, business address, and contact information of biological monitor(s) (Designated Biologist(s)) at least 30 days before starting construction. Permittee shall ensure that the Designated Biologist is knowledgeable and experienced in the biology, natural history, collecting and handling of appropriate species. The Designated Biologist shall be responsible for monitoring activities addressed by this Agreement. Permittee shall obtain CDFW approval of Designated Biologist(s) in writing before starting Covered Activities, and shall also obtain approval in advance in writing if a Designated Biologist must be changed.

1.6 Designated Biologist(s) Authority. To ensure compliance with the measures of this Agreement, the Designated Biologist(s) shall have authority to immediately stop any activity that does not comply with this Agreement, and/or to order any reasonable measure to avoid the violation of those measures.

1.7 CDFW Access. Permittee shall provide CDFW staff with reasonable access to the Project and mitigation lands under Permittee control, and shall otherwise fully cooperate with CDFW efforts to verify compliance with or effectiveness of mitigation measures set forth in this Agreement.

2. Avoidance and Minimization Measures

To avoid or minimize adverse impacts to fish and wildlife resources identified above, Permittee shall implement each measure listed below.

2.1 Work Period and Time Limits – Bird Nesting. Migratory non-game native bird species are protected by international treaty under the Federal Migratory Bird Treaty Act (MBTA) of 1918 (50 C.F.R. Section 10.1 3). Sections 3503, 3503.5 and 3513 of the California Fish and Game Code prohibit take of all birds and their active nests including raptors and other migratory non-game birds (as listed under the Federal MBTA). Permittee shall not perform construction work on the bridge from March 15 to August 15 to avoid impacts to nesting birds. However, Permittee may perform work during this time if a Designated Biologist conducts a survey for nesting birds within three days prior to the construction start, and ensures no nesting birds shall be impacted by the project. Swallows and swifts may be excluded from the bridge work area if exclusion devices are installed prior to March 1st (or if surveys are performed as noted above to determine that no active nests are present), and Permittee utilizes the appropriate methods and exclusion devices, under the direction of a Designated Biologist.

2.2 Preconstruction Bat Surveys. Permittee shall perform preconstruction surveys, including a combination of structure inspection, exit counts and acoustic surveys for purposes of species identification and to locate bat roosts, utilizing appropriate methods under the direction of a Designated Biologist.

2.3 Bat Day Roost Protection. In order to avoid mortality of young unable to fly (spring) and adults in torpor (winter), Permittee shall exclude bats from directly affected work areas utilizing appropriate methods and exclusion devices, installed between October 1 and November 30, within the twelve month period prior to construction. The selection and installation of the devices shall be under the direction of a Designated Biologist. Exclusion shall be done selectively, and only to the extent necessary, to prevent morbidity or mortality to the bats. Bat exclusion devices shall be inspected at least weekly between March 1 and May 31 and monthly thereafter, and any deficiencies shall be corrected or devices shall be modified to function appropriately. Permittee shall consult with CDFW if occupancy is noted during May inspections and construction shall not proceed at that location unless authorized in writing by CDFW. Exclusionary devices shall be removed at the end of construction or as otherwise authorized in writing by CDFW. A monthly report summarizing materials, methods, inspection results and exclusionary device effectiveness shall be submitted to CDFW by the Designated Biologist.

2.4 Bat Day Roost Access. In non-direct work areas where bats are allowed to remain, Permittee shall ensure that: airspace access to and from the bridge is maintained; colony ventilation and protection shall remain the same, and shall minimize disturbance to that necessary to provide access and human safety. Permittee shall not park or operate combustion equipment, such as generators, pumps, and vehicles, under or adjacent to the structure unless they are required to be in contact with the structure. The presence of personnel directly under the colony is to be minimized.

2.5 Habitat Protection – Domestic Animals. Permittee shall prohibit domestic dogs and other domestic animals from the Project site and site access routes during Project activities and development of the Project, except service dogs in the possession of authorized personnel or local, State, or Federal law enforcement officials.

2.6 Trash Abatement. Permittee shall initiate a trash abatement program before starting construction and shall continue the program for the duration of the Project. Permittee shall ensure that trash and food items are contained in animal-proof containers and removed at least once a week to avoid attracting opportunistic predators such as ravens, coyotes, and feral dogs.

2.7 Habitat Protection – Erosion Control. Permittee shall only use erosion and sediment control measures such as fiber rolls and erosion control blankets that utilize biodegradable materials such as jute instead of plastic mesh, to avoid potential plastics pollution hazards to wildlife, unless otherwise authorized in writing by CDFW.

2.8 Habitat Protection – Debris Removal. Any materials or debris placed in seasonally dry portions of a stream or lake that could be washed downstream or could be deleterious to aquatic life shall be removed from the project site prior to inundation by high flows.

2.9 Exotic Species. Permittee shall remove any invasive exotic vegetation (tree tobacco, castor bean, giant cane, cape ivy, periwinkle, etc.) from the work area and shall dispose of it in a manner and a location which prevents its reestablishment.

2.10 Vegetation, Revegetation and Restoration. CDFW recommends the use of native plants to the greatest extent feasible in the landscape areas, especially adjacent to open space and wetland/riparian areas. Permittee shall not plant, seed or otherwise introduce invasive exotic plant species to the landscaped areas, and shall remove invasive exotic vegetation adjacent to any mitigation/open space and wetland/riparian areas within the project area. Invasive exotic plant species not to be used include: those species listed on updated Lists A & B of the California Invasive Plant Council's (Cal-IPC) list of "Exotic Pest Plants of Greatest Ecological Concern in California" as of October 1999; species listed as invasive in the California Invasive Plant Inventory Database (Cal-IPC 2006); or species listed on United States Department of Agriculture – Natural Resource Conservation Service's (USDA-NRCS) 2009 California State-listed Noxious Weeds; This list includes such species as: pepper trees, pampas grass, fountain grass, ice plant, myoporum, tree of heaven, black locust, capeweed, periwinkle, sweet alyssum, English ivy, French broom, Scotch broom, and Spanish broom. A copy of the complete Cal-IPC lists can be obtained by contacting the California Invasive Plant Council at 1442-A Walnut Street, #462, Berkeley, CA 94709, or by accessing their web site at http://www.cal-ipc.org. For USDA-NRCS information, the website link is http://plants.usda.gov/java/noxComposite

2.11 Habitat Protection - Vehicles. Permittee shall ensure any equipment or vehicles driven and/or operated within or adjacent to the stream/lake shall be checked and maintained daily, to prevent leaks of materials that if introduced to water could be deleterious to aquatic life.

2.12 Habitat Protection - Stationary Equipment. Permittee shall ensure stationary equipment such as motors, pumps, generators, and welders, located within or adjacent to the stream/lake shall be positioned over drip pans. Stationary heavy equipment shall have suitable containment to handle a catastrophic spill/leak. Clean up equipment such as extra boom, absorbent pads, skimmers, shall be on site prior to the start of construction.

2.13 Habitat Protection - Equipment Maintenance. Permittee shall ensure no equipment maintenance shall be done within or near any stream channel or lake margin where petroleum products or other pollutants from the equipment may enter these areas under any flow.

2.14 Habitat Protection - Hazardous Waste. Permittee shall immediately stop and, pursuant to pertinent state and federal statutes and regulations, arrange for repair and clean up by qualified individuals of any fuel or hazardous waste leaks or spills at the time of occurrence, or as soon as it is safe to do so. Permittee shall exclude the storage and handling of hazardous materials from the Project Area and shall properly contain and dispose of any unused or leftover hazardous products off-site CDFW shall be notified immediately by Permittee of any spills and shall be consulted regarding clean-up procedures. For reporting requirements on spills or releases, California Emergency Management Agency (CalEMA) should be contacted. Additional information is available on the CalEMA website at: (http://www.calema.ca.gov/HazardousMaterials/Pages/Spill-Release-Reporting.aspx)

2.15 Habitat Protection - Pollution, Sedimentation, and Litter. Permittee shall not allow any debris, soil, silt, sand, bark, slash, sawdust, rubbish, construction waste, cement or concrete or washings thereof, asphalt, paint, oil or other petroleum products or any other substances which could be hazardous to aquatic life, or other organic or earthen material from any vegetation clearing, construction, or other associated project-related activity to contaminate the soil and/or enter into, or place where it may be washed by rainfall or runoff into, waters of the State. Permittee shall remove immediately any of these materials, placed within or where they may enter a stream or lake, by Permittee or any party working under contract, or with the permission of Permittee. When project operations are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 feet of the high water mark of any stream or lake.

2.16 Equipment and Access. When work in a flowing stream is unavoidable, Permittee shall divert the entire stream flow around the work area by a barrier, temporary culvert, new channel, or other means approved by CDFW. Location of the upstream and downstream diversion points shall be approved by CDFW. Construction of the barrier and/or the new channel shall normally begin in the downstream area and continue in an upstream direction, and the flow shall be diverted only when construction of the diversion is completed. Channel bank or barrier construction shall be adequate to prevent seepage into or from the work area. Channel banks or barriers shall not be made of earth or other substances subject to erosion unless first enclosed by sheet piling, rock rip-rap, or other protective material. The enclosure and the supportive material shall be removed when the work is completed and removal shall normally proceed from downstream in an upstream direction. Permittee shall obtain all written approvals from CDFW prior to initiation of construction activities.

2.17 Habitat Protection – Flow Diversions. Permittee shall ensure that flow diversions will be done in a manner that shall prevent pollution and/or siltation and which shall provide flows to downstream reaches. Permittee shall ensure that flows to downstream reaches will be provided during all times that the natural flow would have supported aquatic life. Said flows shall be sufficient quality and quantity, and of appropriate temperature to support fish and other aquatic life both above and below the diversion. Permittee shall restore normal flows to the affected stream immediately upon completion of work at that location.

2.18 Habitat Protection - Flow Diversions. Permittee may dredge an area not to exceed five (5) feet from the existing pump intake as required to maintain the efficient operation of said pump.

3. Compensatory Measures

To compensate for adverse impacts to fish and wildlife resources identified above that cannot be avoided or minimized, Permittee shall implement each measure listed below.

3.1 Alternative Bat Roost Site. If a substantial portion of the bat colony, as determined by CDFW, is to be excluded from the bridge for a breeding season or more, Permittee shall develop a replacement bat day roost/maternity roost plan and shall implement the plan upon written approval by CDFW. The plan shall address critical issues including access, ventilation, and protection, search image and thermal conditions. The plan shall identify species utilizing the existing roost; existing roost characteristics; and describe how the replacement roost will provide similar or improved conditions. The plan shall be developed by a Designated Biologist, and as necessary, in coordination with CDFW, structural engineers or other experts depending on the location of the replacement habitat. The roost site shall be monitored quarterly by a Designated Biologist for five years or until it becomes functional, the existing roost is again available for occupation and is reoccupied as determined by monitoring, and is accepted in writing by CDFW as satisfactory. Quarterly reports documenting activity at the roost will be provided to CDFW by the designated biologist. If after two years it is not utilized, the Designated Biologist shall reevaluate the roost and provide recommendations, to the Permittee and CDFW, to relocate or modify the roost as necessary to provide a successful roost, as evidenced by occupancy as a day roost/maternity roost.

3.2 Mitigation for Unauthorized Impacts. Permittee shall provide compensatory mitigation at a minimum 5:1 ratio for impacts beyond those authorized in this Agreement. In the event that additional mitigation is required, the type of mitigation shall be determined by CDFW, and may include establishment (creation), restoration, enhancement and/or preservation.

3.3 Habitat Restoration – Bat Roosts. Permittee shall provide similar features in the new portion of the bridge to allow for roosting (day, maternity and night roosts) of bat species formerly occupying the site, which shall be monitored to determine occupancy, or alternative roosts shall be included in the bridge to provide similar or greater habitat. A quarterly report detailing the results of the monitoring shall be provided to CDFW by the Designated Biologist. CDFW shall provide written confirmation that the mitigation is complete upon evidence of successful reoccupation of the roost sites for the above listed roosting types.

4. Reporting Measures

Permittee shall meet each reporting requirement described below.

4.1 Notification Prior to and Following Completion of Work. Permittee shall notify CDFW, in writing, at least five days prior to initiation of construction (project) activities and at least five days prior to completion of construction (project) activities. Notification shall be sent to CDFW's South Coast Region Office at the address below, ATTN: Streambed Alteration Program – SAA # 1600-2012-0184-R5 or alternatively to R5LSACompliance@wildlife.ca.gov.

4.2 Quarterly Monitoring Reports. Permittee shall submit quarterly reports by the 10th day of the month after the quarter ends, for required monitoring beginning after the project implementation and continuing until project completion, unless otherwise directed in writing by CDFW.

Reports will include the following information:

- Names and qualifications of monitors;
- Descriptions of monitoring methods;
- Time and date of monitoring efforts;
- Weather conditions significantly affecting monitoring;
- Specific reports required by any measure of this Agreement;
- A table of any observations of state or federally listed threatened or endangered species, California species of special concern, or their sign;
- A table of general wildlife species using the site including reptiles, birds, mammals and invertebrates based on casual observation of those animals, their tracks, scat or other signs;
- Documentation of compliance or non-compliance with measures of the agreement;
- Discussion of any problems encountered during restoration/mitigation, and the remediation implemented, including weed control, trash removal, etc.

4.3 Submit Documentation, Reports, and Surveys. Permittee shall submit all required documentation, reports and surveys described above to CDFW's South Coast Region office at 3883 Ruffin Road, San Diego, CA, 92123, Attn: Streambed Alteration Staff– SAA # 1600-2012-0184-R5.

CONTACT INFORMATION

Any communication that Permittee or CDFW submits to the other shall be in writing and any communication or documentation shall be delivered to the address below by U.S.

mail, fax, or email, or to such other address as Permittee or CDFW specifies by written notice to the other.

To Permittee:

Matthew Cugini
Branch Chief, P.E.
California Department of Transportation
3347 Michelson Drive, Suite 100
Irvine, CA 92612
Phone (949) 724-2043
matthew_cugini@dot.ca.gov

Ec: Shannon Crossen, shannon_crossen@dot.ca.gov

To CDFW:

Department of Fish and Wildlife
South Coast Region (Region 5)
3883 Ruffin Road
San Diego, CA 92123
Attn: Lake and Streambed Alteration Program – Tim Dillingham
Notification #1600-2012-0184-R5
Phone (858) 467-4250
Fax (858) 467-4299
Email tim.dillingham@wildlife.ca.gov

LIABILITY

Permittee shall be solely liable for any violations of the Agreement, whether committed by Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents or contractors and subcontractors, to complete the project or any activity related to it that the Agreement authorizes.

This Agreement does not constitute CDFW's endorsement of, or require Permittee to proceed with the project. The decision to proceed with the project is Permittee's alone.

SUSPENSION AND REVOCATION

CDFW may suspend or revoke in its entirety the Agreement if it determines that Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, is not in compliance with the Agreement.

Before CDFW suspends or revokes the Agreement, it shall provide Permittee written notice by certified or registered mail that it intends to suspend or revoke. The notice shall state the reason(s) for the proposed suspension or revocation, provide Permittee an opportunity to correct any deficiency before CDFW suspends or revokes the Agreement, and include instructions to Permittee, if necessary, including but not limited to a directive to immediately cease the specific activity or activities that caused CDFW to issue the notice.

ENFORCEMENT

Nothing in the Agreement precludes CDFW from pursuing an enforcement action against Permittee instead of, or in addition to, suspending or revoking the Agreement.

Nothing in the Agreement limits or otherwise affects CDFW's enforcement authority or that of its enforcement personnel.

OTHER LEGAL OBLIGATIONS

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from obtaining any other permits or authorizations that might be required under other federal, state, or local laws or regulations before beginning the project or an activity related to it.

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from complying with other applicable statutes in the FGC including, but not limited to, FGC sections 2050 *et seq.* (threatened and endangered species), 3503 (bird nests and eggs), 3503.5 (birds of prey), 5650 (water pollution), 5652 (refuse disposal into water), 5901 (fish passage), 5937 (sufficient water for fish), and 5948 (obstruction of stream).

Nothing in the Agreement authorizes Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, to trespass.

AMENDMENT

CDFW may amend the Agreement at any time during its term if CDFW determines the amendment is necessary to protect an existing fish or wildlife resource.

Permittee may amend the Agreement at any time during its term, provided the amendment is mutually agreed to in writing by CDFW and Permittee. To request an amendment, Permittee shall submit to CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the corresponding amendment fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

TRANSFER AND ASSIGNMENT

This Agreement may not be transferred or assigned to another entity, and any purported transfer or assignment of the Agreement to another entity shall not be valid or effective, unless the transfer or assignment is requested by Permittee in writing, as specified below, and thereafter CDFW approves the transfer or assignment in writing.

The transfer or assignment of the Agreement to another entity shall constitute a minor amendment, and therefore to request a transfer or assignment, Permittee shall submit to CDFW a completed CDFW "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the minor amendment fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

EXTENSIONS

In accordance with FGC section 1605(b), Permittee may request one extension of the Agreement, provided the request is made prior to the expiration of the Agreement's term. To request an extension, Permittee shall submit to CDFW a completed CDFW "Request to Extend Lake or Streambed Alteration" form and include with the completed form payment of the extension fee identified in CDFW's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5). CDFW shall process the extension request in accordance with FGC 1605(b) through (e).

If Permittee fails to submit a request to extend the Agreement prior to its expiration, Permittee must submit a new notification and notification fee before beginning or continuing the project the Agreement covers (Fish & G. Code, § 1605, subd. (f)). .

EFFECTIVE DATE

The Agreement becomes effective on the date of CDFW's signature, which shall be: 1) after Permittee's signature; 2) after CDFW complies with all applicable requirements under the California Environmental Quality Act (CEQA); and 3) after payment of the applicable FGC section 711.4 filing fee listed at http://www.wildlife.ca.gov/habcon/ceqa/ceqa_changes.html.

TERM

This Agreement shall expire on December 31, 2017 unless it is terminated or extended before then. All provisions in the Agreement shall remain in force throughout its term. Permittee shall remain responsible for implementing any provisions specified herein to protect fish and wildlife resources after the Agreement expires or is terminated, as FGC section 1605(a)(2) requires.

AUTHORITY

If the person signing the Agreement (signatory) is doing so as a representative of Permittee, the signatory hereby acknowledges that he or she is doing so on Permittee's behalf and represents and warrants that he or she has the authority to legally bind Permittee to the provisions herein.

AUTHORIZATION

This Agreement authorizes only the project described herein. If Permittee begins or completes a project different from the project the Agreement authorizes, Permittee may be subject to civil or criminal prosecution for failing to notify CDFW in accordance with FGC section 1602.

CONCURRENCE		
The undersigned accepts and agrees to comply with all provisions contained herein.		
FOR CALIFORNIA DEPARTMENT OF TRANSPORTATION		
		1-22-2013
Matthew Cugini		Date
Branch Chief, P.E.		
FOR DEPARTMENT OF FISH AND WILDLIFE		
Marilyn Fluharty		2-6-13
Marilyn Fluharty		Date
Acting Environmental Program Manager		

Prepared by: Tim Dillingham
Staff Environmental Scientist