INFORMATION HANDOUT

For Contract No. 05-330784
At 05-SLO-46-46.0/50.2

Identified by
Project ID 0512000076

ADDITIONAL MATERIALS INFORMATION

13. Geotechnical Design Report dated June 23, 2014.

Stationte of California

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: JACK WALKER
Senior Design Engineer
Office of Design II, Branch A
Project Development Central Region

Date: June 23, 2014

File: 05-330781 (0512000076)
05-SLO-46-46.0/50.2
Whitley 2B Segment

Attn: Jose Arguello
Project Engineer

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES

Subject: Geotechnical Design Report

Introduction

A Geotechnical Design Report (GDR) is provided for the above referenced project per your request, dated April 10, 2012. The Whitley 2B segment (ATTACHMENT 1) of the Highway 46 corridor expansion, extends approximately 4 miles further east of the Whitley 2A project in San Luis Obispo County, between PM 46 (0.2 miles east of McMillan Canyon Road), and 52.2 (0.5 miles east of Shandon Safety Roadside Rest Area). The project proposes to widen the existing highway from a two-lane conventional highway to a four-lane divided expressway. This project is one segment of a larger project to improve operations and safety on Route 46 between the Central Valley and Route 101.

Recommendations presented in this report are based on review of previous reported geotechnical investigations in the area, geologic maps, and geotechnical subsurface investigations conducted in 2012 and March, 2013. This report assess the potential for adverse geologic and hydrologic conditions which may affect proposed cut and fill sections along the highway segment described above. Based on observed and documented site geotechnical conditions, design and construction criteria for the roadway portions of the project are recommended. A geotechnical baseline is established to be used in assessing the existence and scope of differing site conditions.

This report is intended for use by the project design engineer, construction personnel, bidders, and contractors.

Existing Facilities and Proposed Improvements

The existing Route 46 alignment within the Whitley 2B project limits (PM 46.0/50.2) is a two-lane conventional highway with 12-foot travel lanes and shoulders ranging in width between 4 to 8-feet. Passing lanes within the project limits exist only for eastbound traffic between PM 46.0 to 47.06.

This segment of highway intersects seven private driveways along the east and westbound sides, the Shandon safety roadside rest area on the eastbound side, and East Centre St, also on the eastbound side. Within the project limits, route 46 crosses Cholame Creek once at approximately PM 49.34. The existing Cholame Creek Bridge (Br. No. 49-0095) is 4-spans with a continuous reinforced concrete slab.

Proposed improvements along the Whitley 2B segment of Highway 46 are construction of two additional 12-foot wide lanes with 10-foot and 5-foot wide, inside and outside paved shoulders respectively. The new alignment runs parallel to and/or crosses the existing alignment, utilizing the existing eastbound or westbound alignment. Construction of the new alignment will require both cut and fill sections. From west to east, beginning at Station 883+00, the new alignment (both eastbound and westbound lanes) curves to the north of the existing alignment and back to the south near station 914+00. From stations 914+00 to 1040+00, the new westbound alignment would be constructed parallel to and just north of the existing alignment. From Stations 1040+00 to about 1057+00, the new eastbound lanes would be constructed just south of the existing alignment. From stations 1057+00 to the end of the new alignment near station 1100+00, westbound lanes would be constructed to the immediate north of the existing alignment. Variable width (1-12 foot) turn channelization will be provided to access the private driveways, Shandon Rest Stop, Highway 41, and rural roads intersecting the new alignment.

Roadway Cross Section

Roadway cut and fill descriptions summarized in the following sections are based on cross sections at 500-foot intervals, Layouts, and Profiles provided by the Division of Design. The locations summarized in Table 1.0 below, are estimated from measurements in Microstationtion-V8.

TABLE 1.0 - Roadway Cut and Fill Sections

Station	PM	Cut	Dir. from CL	Fill	Dir. from CL	Notes
883+25 - 892+00	46.0/46.2	X	N	X	S	Cuts and Fills < 3-foot
892+00 - 917+00	46.2/46.7			X	N/S	Cuts and Fills < 3-foot
917+00 – 925+00	46.7/46.8	X	N	X	S	Cuts and Fills < 3-foot
925+00 – 972+50	46.6/47.7			X	N/S	Cuts and Fills < 3-foot

TABLE 1.0 - Roadway Cut and Fill Sections

Station	PM	Cut	Dir. from CL	Fill	Dir. from CL	Notes
972+50 – 973+50	47.7/47.75	X	N	X	S	Cuts and Fills < 3-foot
973+50 – 990+00	47.75/48.05			X	N/S	Fill between 986+73 to 990+00 between 10 to > 20 foot
990+00 – 1004+00	48.05/48.3	X	N/S			Landform grading cut to north > 100 vert. foot. Fills < 10-foot
1004+00 – 1036+00	48.3/48.9	X	N/S	X	N/S	< 3-foot high cut/fill with < 40-foot cut slope, EASTBOUND-side at Station 1036+00
1036+00 – 1042+50	48.9/49.05	X	S	X	N	Fill up to 12-foot
1042+50 – 1103+00	49.05/50.2	X	N/S	X	N/S	Fill < 10-foot

Pertinent Reports and Investigations

The following publications were used to assist in the assessment of site conditions:

1. *Caltrans ARS Online.*
2. *Geotechnical Design Report: Whitley 2A,* Caltrans, Daniel L. Appelbaum, 2004.
3. *Cut Slope Recommendations: McMillan Segment,* Caltrans, Daniel L. Appelbaum, 2003.
4. *Geologic Map of the San Luis Obispo County, California,* Compiled by Lew Rosenberg.
5. *Geotechnical Impact of Proposed Project: US Route 46 Widening, San Luis Obispo County, 05-SLO-46-32.2/36.4,* PSC Associates, Inc., 1992.
6. *Geotechnical Services Design Manual, Version 1.0,* Division of Engineering Services, August 2009.
7. *Route 46/41 Interchange Seismic Hazard Report,* Caltrans, John D. Duffy, 2000.

8. *Soil Survey of San Luis Obispo County, California*, United Stationtes Department of Agriculture, Soil Conservation Service.

Physical Setting

The project is located near the southern end of the Salinas Valley in the Coast Ranges geomorphic province. The Coast Ranges are a northwest trending series of mountains that parallel the California coastline and provide a nearly continuous topographic barrier between the coast and the Central Valley.

Climate

The project is located in the Paso Robles Hills and Valleys sub-region of the Central California Coast Ranges ecological section. The climate in the project area is semi-arid, with hot summers and cool winters. The mean annual precipitation is 12 to 18 inches and the mean annual air temperature is about 57° F. Winters are generally mild with occasional single digit lows and average highs in the 60's. The average high temperature in the summer is 91° F, with high temperatures often in the 100's. Nearly all precipitation accumulates during Pacific storms between October and May, with the majority falling during winter months. Vegetation in the project area primarily consists of grasslands and oak trees, with willow trees growing near sources of water.

Topography and Drainage

The Whitley 2B segment of Highway 46 is parallels two ephemeral drainage systems; Cholame Creek east of Shandon and the Estrella River, west of Shandon. Cholame Creek traverses on the north side of the highway before crossing to the south side at PM 48.32 (Cholame Creek Bridge No. 49-0095). The Cholame Creek joins the Estrella River drainage system and San Juan Creek at approximately 1,500-foot south of Highway 46 at PM 47.9. Cholame Creek crosses Route 46 at Cholame Creek Bridge (No. 49-0095) at Sta 1005+00 and runs sub-parallel and north of Route 46 east of the bridge and along the south side of the highway west of the bridge. The geomorphology of Cholame Creek is deeply incised in alluvial sands, silts, and gravels with point bars and opposing cut banks along its meandering path. Paleo-flood plains exist sporadically along the length of Cholame Creek and Estrella River channels. Several locations of vertical (>25-feet) cut banks encroach on the highway embankment and are discussed under the Surface Water section that follows.

Topography in the project region consists of dissected plains surrounded by low, moderately steep to steep rounded hills, incised by shallow to deep drainages. The region is bounded by the Gabilan Range to the north, the San Andreas Fault and the Cholame Hills to the northeast, and the Santa Lucia Range to the southwest.

The highway alignment within the project limits traverses the edge of the Cholame Creek alluvial valley. Roadway elevations along the existing highway alignment within the project limits range from approximately 940 feet and 1,070 feet above mean sea level.

Regional Geology and Seismicity

The region is divided into three geologic blocks separated by the San Andreas Fault and the Sur-Naciemento Fault Zone. The Diablo Range is in the block located northeast of the San Andreas Fault. The Gabilan Range and the Salinas Valley are located in the central block. The Santa Lucia Range is located in the western block. "Basement" rocks in the western and eastern blocks consist of Franciscan Assemblage rocks and a complex of metamorphic units. Granitic intrusions form the bedrock in the central block, beneath the project area.

Pre-Cretaceous age rocks of the Sur Series are the oldest rocks in the area. These have been intruded by Cretaceous-age granite or granodiorite. This metamorphic-granitic complex is confined to the central fault block, beneath the Salinas Valley and Gabilan Range. Sedimentary rock formations and some volcanic units were deposited on top of the basement rocks during the Cretaceous and Tertiary Periods. Subsequently, during the Quaternary Period, clastic sediments were deposited primarily in marine/transgression environments, which alternated with periods of uplifoot/regression during which erosion and subareal deposition occurred. The latest uplift (and/or drop in sea level) occurred in Late Pliocene to Mid-Pleistocene time, leaving the sediments at nearly their present-day elevations. Some of these formations have been folded and faulted by the same compressive forces that produced the San Andreas Fault system. Present-day topographic surface features and drainage patterns were established by Mid-Pleistocene time.

The project is located in within a seismically active region of California. There are several earthquake faults in close proximity to the project area. Table 2 lists the active and potentially active faults in the project vicinity as described in Caltran's *2012 Fault Database*. Corresponding Moment Magnitudes and distances to the project area are also given. Estimated Peak Ground Acceleration, measured in gravity (g), is estimated from a semi-log seismic attenuation graph produced by Mualchin (1990). A fault map is included as ATTACHMENT 4 in this report.

TABLE 2.0- Faults

Fault	*Moment Magitude of Maximum Credible Earthquake*	*Dist. To Fault from Center of Project (mi)*	*Peak Ground Acceleration (g)*
San Andreas Fault Zone (Parkfield section)	7.9	6.4	0.55
Oceanic-West Huasna Fault Zone	7.0	27.3	0.12
Rinconada Fault	7.4	18.2	0.20

Soil Survey Mapping

The Whitley 2B segment of highway locally rests above well drained alluvial soils developed on paleo-stream terraces associated with the Estrella River to the west and Cholame Creek to the east. The highway alignment lies entirely within Hydrologic Soil Group B soils, characterized by saturated hydraulic conductivities between approximately 1.5 to 6-inches/hr in the least transmissive layer between the surface and 20-inches. The map produced as ATTACHMENT 6 in ARC MAP is produced from a digital soil survey, developed by the National Cooperative Soil Survey. The information was prepared by digitizing maps, by compiling information onto a planimetric correct base and digitizing, or by revising digitized maps using remotely sensed and other information. The soil types and distribution along the Whitley 2B alignment are summarized in Table 3.0.

The following is a partial list of soils mapped and defined by the United States Department of Agriculture, Soil Conservation Service for San Luis Obispo County.

- 102: Arbuckle-Positas complex, 9 to 15 percent slopes; well drained; form on the treads of terraces; parent material is alluvium derived from mixed rock sources.
- 104: Arbuckle-Positas complex, 30 to 50 percent slopes; well drained; form on the treads of terraces; parent material is alluvium derived from mixed rock sources.
- 113: Balcom-Calleguas complex, 50 to 75 percent slopes; well drained; form on the flanks of mountains; parent material is residuum weathered from sandstone and shale.
- 173: Mocho clay loam, 0 to 2 percent slopes; well drained; form on the treads of alluvial flats; parent material is alluvium derived from calcareous sedimentary rock.
- 174: Mocho clay loam, 2 to 9 percent slopes; well drained; form on the treads of alluvial fans; parent material is alluvium derived from calcareous sedimentary rock.
- 194: San Emigdio fine sandy loam, 0 to 2 percent slopes; well drained; form on the treads of alluvial fans; parent material is alluvium derived from calcareous sedimentary rock.
- 195: San Emigdio fine sandy loam, 2 to 9 percent slopes; well drained; form on the footslopes of alluvial fans; parent material is calcareous alluvium.
- 212: Xerofluvents-Riverwash association, 0 to 2 percent slopes; somewhat excessively drained; derived from fluvial transport and deposition from various up stream sources.

Table 3.0: Soil Type Distribution and Hydrologic Soil Group

Post Mile	Soil Group	Hydrologic Soil Group
46.0-46.2	173	B
46.2-46.8	174	B
46.8-47.2	173	B
47.2-47.6	174	B
47.6-48.0	173	B
48.0-48.1	174	B
48.1-48.2	113	None
48.2-48.3	102	B
48.3-48.35	212	B
48.35-48.6	194	B
48.6-48.85	102	B
48.85-48.95	104	B
48.95-49.4	195	B
49.4-50.05	173	B
50.05-50.2	195	B

Exploration

Field investigations performed at the project site included geotechnical borings, visual evaluations of the performance of existing slopes and stream cut banks, and monitoring of groundwater elevations.

Drilling and Sampling

A total of 8 mud rotary borings were completed within the project area between 2010 and 2012, and 28 hand auger borings in 2014, to characterize engineering properties of subsurface soils for bearing resistance and/or consolidation potential. Three of these borings (RC-12-003, RC-12-004, and RC-12-004) are used for this report to aid in geotechnical recommendations for cut slope and fill design (ATTACHMENT 5). Boring RC-10-011, completed at the west end of the Whitley 2B alignment was completed for installation of a monitoring well on the northern cut bank of the Estrella River at approximately station 917+45, 114-feet right. This hole was developed for monitoring of seasonal groundwater fluctuation and was not logged. Borings RC-12-001, RC-12-002, RC-12-005, and RC-12-006, where completed at the approximate proposed bent locations at the Cholame Creek crossing and may be found in the Cholame Creek bridge Log of Test Borings (LOTB). Boring RC-12-007 was completed in proximity to the northern headwall of drainage system 98950 (station 989+29.88, 110.03-feet left). Borings RC-12-003 and RC-12-004 were completed along an access road benched on the existing cut slope to the immediate east of the fill (EL 1082.5-feet and 1088.6-feet respectively).

A separate investigation was conducted in 2014 with hand auger at selected culvert headwall/wingwall locations along the entire length of the Whitley 2B segment (ATTACHMENT 5A). Locations were selected at the center of the culvert and headwall alignment where possible. A few locations were off-set up to 35-ft due to access issues. Auger holes were advanced to approximately 15-ft below the ground surface where possible, and tested with a 1-inch diameter solid cone-tip and 25-pound slide hammer at two-foot intervals to estimate equivalent SPT values and internal angle of friction (ϕ) for corresponding soil layers. Cohesion (c) was correlated both to blow counts and pocket penetrometer were applicable.

Instrumentation

Four monitoring wells were installed along the Whitley 2B segment between 2010 and 2012. A vibrating wire piezometer with data logger was installed in boring R-10-011 (station 917+45, 114-feet right) and RC-12-001 and RC-12-002 were completed as open observation wells and documented in Cholame Creek bridge Foundation Report. RC-12-003 was completed in August, 2012 and abandoned (backfilled with bentonite) in March 2013. Data obtained from these wells is summarized under the groundwater section of this report.

Explortation Notes

Soil samples collected at RC-12-007 were tested for gradation and consolidation potential. Soils extracted from RC-12-003 and RC-12-004 were tested for shear strength (direct shear test), and corrosion. Analysis of these results are summarized under the Geotechnical Analysis and Design section of this report. Soils extracted from RC-12-003 and RC-12-004 show the Paso Robles formation between Sta 990+00 and 1004+00 to be gradations of SAND, Silty SAND, and Clayey SAND, with minor amounts of Lean CLAY. Soils observed in hand auger holes at additional culvert wing wall locations over the length of the Whitley 2B alignment were mostly Silty SAND and SILT with sparsely interbedded layers of very stiff (pp= >2.0 tsf) Fat CLAY and Clayey SAND. The Log of Test Borings (LOTB) are given as ATTACHMENT 7 at the end of this report.

Geotechnical Testing

In Situ Testing

Geotechnical testing for the Whitley 2B segment occurred between August 2012 and June 2014. A total of seven Continuous sample, 4-in diameter (punch core) borings were advanced at the locations of proposed bents and abutments of the Cholame Creek Bridge (Cholame Creek Bridge Replace, 2014) and one boring advanced near the proposed northern wingwall of a an 8' X 8' box culvert at Sta 989+28.74 115.89Lt. Per 2010 Caltrans Standard Plans, culvert wing walls at or greater than 4-feet high, must be founded on soils with bearing capacities which exceed specified soil bearing pressures computed with the AASHTO Load Resistance Factor Design (LRFD) guidelines (0.45 for walls). With exception to the highest wing wall inlet-outlet pair (H = 13-feet) at

respective Stations 989+28.74 115.89Lt 991+38.96 141.96Rt, where deeper investigation required a drill rig, the remaining locations were mostly under H=5-feet. Soil strength parameters were estimated from combined blow counts of a 1.4-inch diameter hollow SPT sampler driven by the drop of a 140-pound hammer over 30-inches (drill rig), or manually by a 1-inch diameter, solid conical tipped sampler, driven by the drip of a 28-pound hammer over 12-inches. In both cases, blow counts over the final 12-inches were added and corrected for hammer energy efficiency. Final blow counts from the manual method were reduced by a factor of 0.33 to obtain the standardized SPT equivalents.

Excluding the highest wing wall location above, wing walls at 14 additional locations along the Whitley 2B alignment were at or exceeded H= 4-feet. With exception to culvert systems 107150 and 107700, which have design heights of H= 8-feet, the remaining culvert wing walls have a maximum wall height of about 5-feet. Given the relatively small soil bearing pressures demanded by these smaller wall dimensions and observed soil strengths, in situ testing was conducted at 12 wing wall locations out of the 17 wing wall pairs (34-wall locations total). Test locations were spread over the length of the project to bracket the range of soil types and engineering properties.

A total of 14 piezo-cone-Penetrometer Tests (CPTu) were completed on March 21-22, 2013 (ATTACHMENT 5), on the north and south side of the current Highway 46 alignment between approximate stations 987+24 and 992+24. The locations and elevations of each test site is summarized in Table 4.0 below. The piezo-cone was used to conduct one pore water dissipation test at CPT-002, in the saturated clay layer identified in RC-12-007 at about 27.5-feet. The dissipation test is a measurement of the rate of decay of pore water pressure in a soil after advancement of the probe is ceased. The relatively fast dissipation of pore water pressure (most tests in CLAY require hours to complete), suggests inter-layering of SILT and fine SAND (higher hydraulic conductivity material) within the lean CLAY.

A standard CPT was conducted at the remaining 13 locations to establish correlative stratigraphy with soils logged in RC-12-007. The piezocone added dynamic pore pressure as an additional parameter to the standard CPT. The results are presented as ATTACHMENT 9. The graphs showing tip bearing (Qc), sleeve friction (Fs), and the friction ratio (Fs/Qc) may be used to infer correlative soil types from the plot of Qc vs Fs/Qc to estimate granular and cohesive layers and their relative consistency. North of the existing alignment, CPT-001 through CPT-007 show CLAY layers (identified as SANDY lean CLAY in RC-12-007) thickening to the west to a maximum thickness of about 30-foot at CPT-005, then tapering to under 10-foot at CPT-006. These CLAY layers are interpreted to be inter-layered with granular SILT mixes. From north to south, correlating CPT-001 to CPT-007, CPT-002/RC-12-007 to CPT-013, and CPT-004 to CPT-014, the clay pinches out beneath the existing embankment fill, showing more sand, inter-layered with 2-3-foot thick random clay layers.

Table 4.0 – Cone Penetration Test Locations

CPT No.	Station/off-set	Northing	Easting	Elevation (foot)
CPT-001	989+78, 109 Lt.	2435843.721	5858275.662	1033.27
CPT-002	989+18, 113 Lt.	2435849.318	5858217.384	1033.39
CPT-003	988+77, 114 Lt.	2435851.208	5858174.609	1033.40
CPT-004	988+30, 115 Lt.	2435852.972	5858128.774	1033.46
CPT-005	987+75, 117 Lt.	2435857.607	5858074.423	1033.82
CPT-006	987+24, 117 Lt.	2435859.474	5858024.577	1034.30
CPT-007	989+76, 113 Rt.	2435621.513	5858270.57	1035.50
CPT-008	990+24, 115 Rt.	2435618.445	5858321.036	1035.60
CPT-009	990+73, 119 Rt.	2435611.274	5858369.296	1035.68
CPT-010	991+23, 123 Rt.	2435605.223	5858420.27	1035.69
CPT-011	991+75, 128 Rt.	2435599.103	5858467.977	1035.96
CPT-012	992+24, 126 Rt.	2435599.905	5858519.605	1036.41
CPT-013	989+27, 110 Rt.	2435625.853	5858222.615	1035.84
CPT-014	988+80, 108 Rt.	2435629.568	5858177.683	1036.12

Table 5.0 – Hand Auger Borings

Boring No.	System No.	Culvert Type	Station/Offset	Northing	Easting	Hole Depth (ft)
HA-14-014	89300	2-24"RCP	893+16.50/ 85.75 Lt	2435954.009	5848614.829	15.5
not tested	89730	TRIPLE 10X3 RCB	897+53.52/86.99 Lt 897+40.16/86.99 Rt	2435988.524 2435815.261	5849048.670 5849050.246	na
HA-14-015	90130	Dbl 10x3 RCB	901+49.12/87.00 Lt	2436018.404	5849445.112	16.0
not tested	93915	2-36" APC	939+15.00/86.50 Lt 939+15.00/86.50 Rt	2435991.106 2435919.092	5853217.983 5853211.952	na

Boring No.	System No.	Culvert Type	Station/Offset	Northing	Easting	Hole Depth (ft)
not tested	95550	2-36" APC	956+52.24/86.74 Lt 955+54.14/88.83 Rt	2435933.075 2435761.957	5854953.869 5854850.505	na
not tested	96237	TRIPLE 12x4 RCB	964+31.91/110.23Lt 962+35.27/91.45 Rt	2435912.623 2435736.372	5855648.208 5855532.022	na
not tested	97440	6X4 RCB	975+48.25/94.77 Lt 974+44.09/92.75 Rt	2435877.294 2435693.591	5856849.246 5856739.287	na
not tested	98700	Dbl 8x4 RCB	985+90.51/150.76 Lt 986+77.80/155.0 Lt	2435897.432 2435898.632	5857893.035 5857979.673	na
HA-14-011	101725	2-48" APC	16+08.08/62.80 Rt	2436760.475	5860744.377	15.5
HA-14-012 HA-14-013	103584	42" RCP	1034+92.03/328.76 Lt 1038+44.93/110.16 Rt	2438467.022 2438393.322	5861460.043 5862022.718	13.5 15.5
HA-14-009 HA-14-007	106800	4x2 Precast RCB	1067+17.09/122.67 Rt 1068+83.99/121.49 Rt	2440127.156 2440229.111	5864297.967 5864435.606	15.5 15.5
HA-14-010 HA-14-006	107150	10X3 RCB	1071+68.41/86.50 Lt 1072+08.05/86.48 Rt	2440561.294 2440442.728	5864544.709 5864675.668	15.5 15.5
HA-14-005 HA-14-003	107700	8X4 RCB	1076+83.64/86.97 Lt 1077+14.50/98.98 Rt	2440854.338 2440718.728	5864970.411 5865099.803	15.5 15.5
HA-14-002 HA-14-001	108175	42" APC	1081+69.44/86.37 Lt 1082+50.0/100.0 Rt	2441136.853 2441047.535	5865354.934 5865535.713	13.5 13.5

Laboratory Testing

Soils were tested for corrosive conditions specifically for a drainage headwall to be constructed at Sta 989+28.74, 115.89Lt, where a large fill section is proposed (Table 6.0). For structural elements, Caltrans considers corrosive soil conditions to exist if pH is 5.5 or less, chloride concentration is 500 ppm or greater, or sulfate concentration is 2000 ppm or greater. Representative soil samples were collected during the field investigation from RC-12-003, RC-12-004, and RC-12-007 (ATTACHMENT 5). Borings RC-12-003 and RC-12-004 are non-corrosive by the above standards and represent the borrow material for fill sections. Soils collected at RC-12-007 (approximate location of proposed northern headwall of box culvert) however, are corrosive. The over-all site (stations 973+50 to 990+00) should be considered corrosive.

Table 6.0- Corrosion Results

Boring	Depth	SIC Number	Minimum Resistivity (Ohm-Cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)	Corrosive
RC-12-003	16.8	C494615	3604	9.02	N/A	N/A	No
RC-12-004	16.8	C494616	4060	8.63	N/A	N/A	No
RC-12-007	6.4'-10.4'	C494635	475	7.66	23	5465	Yes
	8.5'-10'	C494636	475	7.73	11	4074	Yes

Geotechnical Conditions

Site Geology

Lithology

The Whitley 2B segment of Highway 46 (PM 46.0-50.2) traverses primarily Quaternary age alluvial deposits (Qa) composed of inter-layered SILT and SAND with discontinuous lenses of CLAY and silty clay deposited episodically by the Cholame Creek and Estrella River drainage systems. In closer proximity to the current Cholame Creek and Estrella River channels, sporadic occurrences of fine and coarse, subrounded to subangular gravels may be encountered. The stratigraphy across the width of the valley is highly variable, determined by prehistoric climate changes and drainage flow paths. The proposed new alignment also cuts through a ridge of the Paso Robles Formation (QTs) between approximate stations 994+00 and 1004+00 (ATTACHMENT 3). The lithology described in the borings below, confirm the soil and rock types shown in the attachment.

Two geotechnical mud rotary borings (RC-12-003 and RC-12-004) were completed 41.3-foot below ground surface, on an unpaved access road above and parallel to westbound Highway 46 to assess engineering properties of borrowed fill material. Boring RC-12-003 (station 995+33.65, 79.5-feet left) encounters Poorly graded SAND with SILT in the upper 4-feet, SILTS between 4 to 16-feet, SAND between 16-feet to about 32-feet, Sandy lean CLAY between 32-feet to36-feet, SILTS from 36-feet to 39-feet, and Poorly graded SAND with SILT from 39-feet to the bottom of the hole at 41.3-feet below ground surface (bgs). Boring RC-12-004 (station 999+53.52, 81.0-feet left) encounters mostly medium dense CLAYEY and SILTY SANDs in the top 15-feet, and Poorly graded SAND with SILT from about 15-feet to the bottom of the hole at 41.3-feet bgs. Boring RC-12-007 is located in a paleo-alluvial flood plain, where mostly fine material is inter-layered granular slope wash from the adjacent hills. Mostly stiff SANDY fat CLAY exists in the top 10-feet, SANDY lean CLAY between 10-feet and about 37-feet. Poorly graded SAND with SILT and GRAVEL was encountered below this depth to the bottom of the hole at 42.9-feet.

Mostly fine Silty SAND and SILT was encountered with interception of sparse fat CLAY and Sandy CLAY lenses down to a maximum depth of about 15 feet in hand auger borings HA-14-001 through HA-14-015. The most significant Fat CLAY layers were intercepted between depths of 4.5

to 14.0 feet below the surface at drainage system No. 107150 Lt (Sta. 1071+68.41/ 86.50Lt) where HA-14-010 was augered.

Structure

The Paso Robles formation is characterized as poorly indurated "valley deposits" which generally possess recognizable layers inclined at low angles to the topography. Strata typically contains alternating beds of GRAVELS, SANDS, and CLAY. Existing cut slopes above Route 46 between Sta 990 and 1004 expose differentially cemented layers (based on erosion) that are sub-parallel to the slope and variable in thickness. Clay was not visible in any of the exposures along the ranch road cut slopes above the highway or erosion scarps produced by the Cholame drainage to the east. Clay may occur in random lenses at depth within the proposed cut area and be exposed during excavation. Clay strata within the formation may behave as slide planes depending on orientation relative to the cut slope face.

Natural Slope Stability

All slopes observed over the span of the Whitley 2B project area between PM 46 and PM 50.2 appear regionally stable, assessed by field reconnaissance and aerial photo survey. Vertical slopes along nearby channel banks of Cholame Creek are regionally stable, but retreating as a result of undercutting and surface erosion during significant storm events.

Soil and Ground Water Conditions

Groundwater along the Whitley 2B segment is controlled by the distribution and depth of permeable sediments. Clay layers within alluvial deposits and the silts and sands of the Paso Robles formation may produce perched water tables or confine groundwater at depth, creating artesian conditions. Groundwater is expected to have no adverse impact on the proposed Whitley 2B cut and fill sections because of adequate cementation within layers of the Paso Robles formation. The interception of shallow or perched ground water in the large cut section between approximately Sta 990+00 and Sta 1004+00 may occur if construction is preceded by significant precipitation.

Surface Water

Within the region of Whitley 2B, surface drainage is dendritic, flowing from northeast to southwest. Sub-basins within the Cholame Creek watershed have high to moderate infiltration rates with in flatter Quaternary deposits along the channels. The slopes above these short drainages, however, are characterized by soils classified into hydrologic groups C and D which have slow and very slow infiltration rates respectively. Once the soils have been saturated, surface run-off rates are high. Much of this water is expected to reach tributary channels by sheet flow during a succession of intense storms. During flood events, Cholame Creek produces a peak flow of 750cfs and has a base flow of 5.79cfs (USGS, 1959-1973, viewed 2013).

Erosion

Natural erosion along the Cholame Creek appears to occur episodically during infrequent flood events, which have undercut the 15 to 25-ft vertical creek banks, narrowing the distance between the EP and channel bottom. The most significant bank erosion was observed approximately between stations 906+00 to 916+50, 921+30, 940+60, and 1047+50. These areas were examined in historical aerials dating back to 1950, and in the field, to assess erosion rates and alternatives to mitigate it. Small scale aerial photos from 1950 show some artificial bank protection in place, evident by a linear segment at the base of the cut bank free of erosion gullies. Two to three-foot diameter boulders exist along the base of the bank near Sta 916+00 and riparian vegetation, including Willow trees, are established along the base. Caltrans Hydraulics has surveyed the existing problem areas and proposed mitigation strategies for preservation of the cut banks under rare flood conditions by deflecting stream flow and/or reinforcing the base of the cut banks using methods in place at the time of this report.

Ground Water

Ground water was monitored at R-10-011, RC-12-001, and RC-12-002. Ground water elevations for the later two borings above are summarized in the Foundation Report for Cholame Creek Bridge. Borings drilled for the subsurface investigation were instrumented as open-standpipe observation wells to monitor groundwater elevations. Open observation wells were constructed by installing 1.5-inch slotted PVC pipe in the open boreholes and backfilling the annulus with No-8 medium sand to within 5-feet of original ground. The wells were protected against surface water intrusion by sealing the tops of the borings with bentonite chips or grout and installing well caps. Some of the observation wells simply consisted of slotted PVC pipe installed in open borings. Water levels in the latter wells were measured after the rainy season, and the wells were abandoned by removing the PVC casing, and backfilling the borings with bentonite chips.

Readings recorded from June 9, 2010 to December 1, 2011 in boring R-10-011, record about 6-feet of elevation change (980-feet to 986-feet) on the northern alluvial embankment of the Estrella River west of Shandon (ATTACHMENT 8).

Groundwater measurements indicate that the groundwater elevation trends from higher to lower moving from east to west in the project area. This corresponds to the direction of flow of the nearby Estrella River, which joins the Salinas River to the east.

Project Site Seismicity

Ground Motion

Peak ground acceleration (PGA) in the project area due to an earthquake on one of the nearby faults was estimated using the *2009 Caltrans Seismic Design Procedure.* The procedure was developed to

calculate the minimum seismic design requirements for bridges on state highways. The Acceleration Response Spectral curves are not required in the scope of this report. Acceleration Response Spectra were produced for Cholame Creek Bridge, in the Whitley 2B Foundation Report (2013).

The controlling fault in the project area is the Parkfield section of the right lateral (dextral) slip San Andreas Fault Zone. The San Andreas Fault Zone represents the boundary between the North American and Pacific plates which have an annual net slip rate of 34 mm/yr and maximum magnitude of Mmax=7.9. The peak ground acceleration at the westerly end of the project is estimated to be 0.55 g. The Parkfield section is well instrumented and known to generally experience smaller ($5.0 \leq Mmax \leq 6.0$), incremental seismic events known as fault creep.

Ground Rupture

No known active or potentially active faults project towards or cross the highway alignment within the project limits. Therefore, there is no potential for surface fault rupture to occur and no mitigation efforts are necessary.

Geotechnical Analysis and Design

Embankment Settlement

Embankment settlement is anticipated to be negligible for most of the proposed Whitley 2B alignment based on relatively shallow (<10-feet) fill sections, and should occur only during construction. Settlement is expected to occur at a deeper fill section from about station 973+50 and 990+00 (see Table 1.0 and lithology under Site Geology). Using the results from a consolidation test on SANDY lean CLAY collected at about 33-feet below ground surface, consolidation settlement was estimated using Terzaghi's one-dimensional consolidation theory. Elastic settlement in cohesionless soils was calculated using Hough's Method, which correlates soil grain size distribution and SPT values with a settlement index that is used in the settlement equation.

For an assumed maximum embankment height of 20-feet at boring RC-12-007 (**station 989+29.88, 110-feet left**), The *total settlement* for this location is about **5.5 inches** and should occur during construction. Consolidation testing shows that the clay has been pre-consolidated in the past and long term settlement is not expected.

Culverts and Headwalls

Sixteen out of thirty-six proposed culverts along the Whitley 2B segment have headwalls which exceed the 4-foot height threshold for required soil bearing capacity assessment. No headwall on the Whitley 2B alignment exceeds the bearing pressure of 3 ksf, which would require presentation in a Structure Foundations Report. The majority of headwalls along this alignment range between 4 to 6 feet high with respective (case II) bearing pressures between 1.16 to 1.51 ksf. Since the majority of

headwalls had bearing pressures well below the bearing capacity of the dominant soil types of SANDS and SILTS, analysis for bearing capacity was performed only for the highest headwalls and/or fill sections exceeded 10-feet thick and settlement from consolidation of soft soil layers at depth was a concern. Per Caltrans 2010 Standard Plans, and drainage profiles, case II loading conditions (2:1 unlimited slopes behind headwall) are assumed, and the maximum wall height with corresponding bearing pressure used for analysis. Headwalls for box culverts proposed between approximate stations 991+75, 128-feet right, and 989+30, 110-feet left were of primary concern due to wall height and fill thickness. Geotechnical boring RC-12-007 was completed at the approximate location of the northern headwall, where soft clays were intercepted at depth (approximately 5 to 35-ft below ground surface). Bearing resistance was calculated using a design height of 10-ft. and case II loading. The California modified AASHTO LRFD resistance factors of 0.45 and 0.50 were used to compute the nominal resistance of soils using SPT at the northern headwall and CPT at the southern headwall respectively. The soil bearing capacity at both locations exceeds the soil bearing pressure of 2.29 ksf (Table 7.0).

Headwalls at the other locations are on average half the height of the headwalls proposed in the vicinity of Station 991+75 mentioned above. Soils encountered over the length of the alignment and up to 15-ft below the surface (ATTACHMENT 7), were dominantly loose to medium dense, silts and sands, with sporadic clay layers. Using an assumed average moist unit weight of γ=120pcf, soil strength parameters φ= 30, c=1000psf (cohesion used where interbedded stiff CLAY were observed), a bearing resistance was estimated to be between 1.6 tsf and >9.5 tsf under case II loading conditions and a 0.50 resistance factor. Bearing capacities exceeded Caltrans 2010 Standard Plans LRFD bearing pressures at all test locations.

Table 7.0- Culvert Headwall Soil Bearing Capacities

Culvert Drainage Systerm No.	Culvert headwall	Footing Size-B (ft)	Bottom of Footing Elevation (ft)	Design Height (ft)	LRFD	
					Strength Limit Factored Bearing Resistance Strength (ksf) φ=0.50 (SPT)[1] φ=0.45 (CPT)[2]	**Strength Limit Factored Gross Uniform Bearing Stress q_u (ksf)**
98950	115.89 Lt 989+28.74	8'3"	1031.68	10'	2.72[1]	2.29
98950	141.96 Rt 991+38.96	8'3"	1028.79	10'	3.40[2]	2.29

Soil strength parameters on the outlet side of drainage system No. 98950 were estimated from CPT soundings.

Embankment Stability

Existing embankment slopes are typically inclined at 1.5:1 (horizontal:vertical). The embankments appear to be globally stable. Many of the slopes, however, show general degradation evident by slope rounding at the hinge point from sheet flow. Field reconnaissance and review of geologic maps show alluvial sediments (Qa), and the sand, silt, clay, and gravels of the Paso Robles formation will be the source of borrow material for all fill. This material is the same borrow material assessed in Whitley 2A. Global slope stability analysis was conducted using XSTABL, Version 5. Typical cross section geometry and assumed borrow materials from the Paso Robles formation were modeled.

Embankment slopes of 2:1 or flatter are recommended. Slope stability analyses indicate that embankments constructed of native soils with slope inclinations of 2:1 should be globally stable. An aggressive revegetation plan would be highly beneficial in addressing surficial stability concerns, and would minimize the potential for erosion in the more granular soils.

If right of way or other constraints dictate construction of fill slopes steeper than 2:1, it will be necessary to employ one of the following strategies:

- Use geosynthetic reinforcement in the embankments.
- Use select material to construct the embankments.
- Construct retaining walls.

This office should be consulted for site-specific recommendations on constructing embankments steeper than 2:1.

Cuts and Excavations

It is recommended that all cut slopes within the project limits be excavated at a slope of 2:1 or flatter unless specifically addressed in the following sections. This will assure long-term stability and help reduce the potential for erosion. Cuts in Paso Robles Formation and alluvium can be expected to encounter mixed soil types, which may include layers of granular non-cohesive soils with clay-rich-cohesive layers. Cuts through sandy material will be susceptible to erosion if water is allowed to sheet flow over the cut face from the slopes above. Extremely low hydraulic conductivity inter-bedded clay layers depending on orientation relative to the cut face, Top-of-cut ditches should be specified where offsite drainage could otherwise sheet flow down the slope face. Slough and debris can be expected to collect at bottom of cut slopes during rainstorms, particularly during the first winter following construction. Landscape Architecture should be consulted for recommendations regarding temporary and permanent erosion control on all exposed cut faces in the project area.

The material in the proposed cuts can be expected to be readily rippable. An earthwork factor of 0.98 should be used for earthwork quantity calculations. Based on mechanical analyses of material sampled from Paso Robles Formation in the project area, a soil erodibility factor K of 0.30 can be used in the Universal Soil Loss Equation to estimate potential soil loss from erosion.

The existing cut slopes between station 990+00 and station 1004+00 are inclined at approximately 1.5:1 with artificially steeper (1:1) slopes along existing ranch roads. Minor slumps and shallow erosion occurs on slopes exceeding 1.5:1. The global and surficial stability appear adequate, and the slopes are well vegetated with grasses, with exception to the steeper cut slopes along the ranch road. The native material consists of medium dense to very dense granular soil. A direct shear test of this material produced a high angle of internal friction (φ=38.5°). It is expected that this material would be globally stable at inclinations as steep as 1.5:1. Local areas of exposed formation appear near vertical, particularly above the Cholame Creek, have been subject to erosion, but show no sign of catastrophic failure. The Landscape Architect Branch should be consulted for recommendations regarding plant selection and proper application of erosion control materials.

Several smaller cut slopes exist along this alignment which do not exceed 30-vertical feet in height and are composed of the same material as above. These slopes are also globally stable at their current ratios between 2:1 to 1.5:1, but should be flattened to 2:1 or flatter for erosion control.

Construction Considerations

Foundation soils are generally adequate to support the proposed highway embankments and drainage structures throughout the project limits. Localized areas of unconsolidated or saturated foundation materials, however, may require stripping and recompaction, or removal of material deemed unsuitable. If standing water or unsuitable material is encountered to a depth where it cannot be economically removed, it is recommended that the unsuitable material be sub excavated 18 inches and replaced with Class B3 sub-grade enhancement geotextile and Class 1, Type B permeable material per Caltrans 2010 Standard Specifications. The permeable material will allow water to fill its pore spaces without a loss of strength. The geotextile fabric will act as a separator, preventing the soils above the fabric from filling the voids in the permeable material, and preventing the permeable material from penetrating the soft soils beneath the fabric. The geotextile will also serve to reinforce the subgrade soil. The permeable material encapsulated in geotextile fabric will provide a dry and stable working platform for embankment or drainage structure construction.

Recommendations

Refer to the preceding sections for detailed recommendations. The following list summarizes the recommendations provided in this report:

- Roadway cut and fill slopes are to be constructed with a slope of 2:1 or flatter.

- Re-vegetate all exposed slopes and implement erosion control measures to increase resistance to shallow slope instabilities.

The recommendations contained in this report are based on specific project information that has been provided by Office of Design II, Branch A. If any conceptual changes are made during final project design, the Office of Geotechnical Design – North, Branch D should review those changes to determine if the recommendations contained in this report are still applicable. Any questions regarding the recommendations contained herein should be directed to the attention of Mike Jurasius, (805) 549-3729, or Mike Finegan, (805) 549-3194, at the Office of Geotechnical Design – North, Branch D.

PROFESSIONAL GEOLOGIST
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No.2567
CERTIFIED ENGINEERING GEOLOGIST
6-23-14
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Supervised by,

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Engineering Geologist
Geotechnical Design – North
Branch D

MICHAEL S. FINEGAN, PE, Chief
Geotechnical Design - North
Branch D

c: Reza Mahallati
John Luchetta – Project Manager (E-copy)
GEODOG
Doug Lambert – District Materials Engineer (E-copy)
Job File / Branch D Records

LIST OF ATTACHMENTS

ATTACHMENT 1	**VICINITY MAP**
ATTACHMENT 2	**TYPICAL CROSS SECTIONS**
ATTACHMENT 3	**REGIONAL GEOLOGY**
ATTACHMENT 4	**REGIONAL FAULT MAP**
ATTACHMENT 5	**SUBSURFACE EXPLORATION MAP**
ATTACHMENT 6	**SOILS MAP**
ATTACHMENT 7	**BORING RECORDS**
ATTACHMENT 8	**GROUNDWATER**
ATTACHMENT 9	**CONE PENETRATION TEST DATA**

INDEX OF PLANS

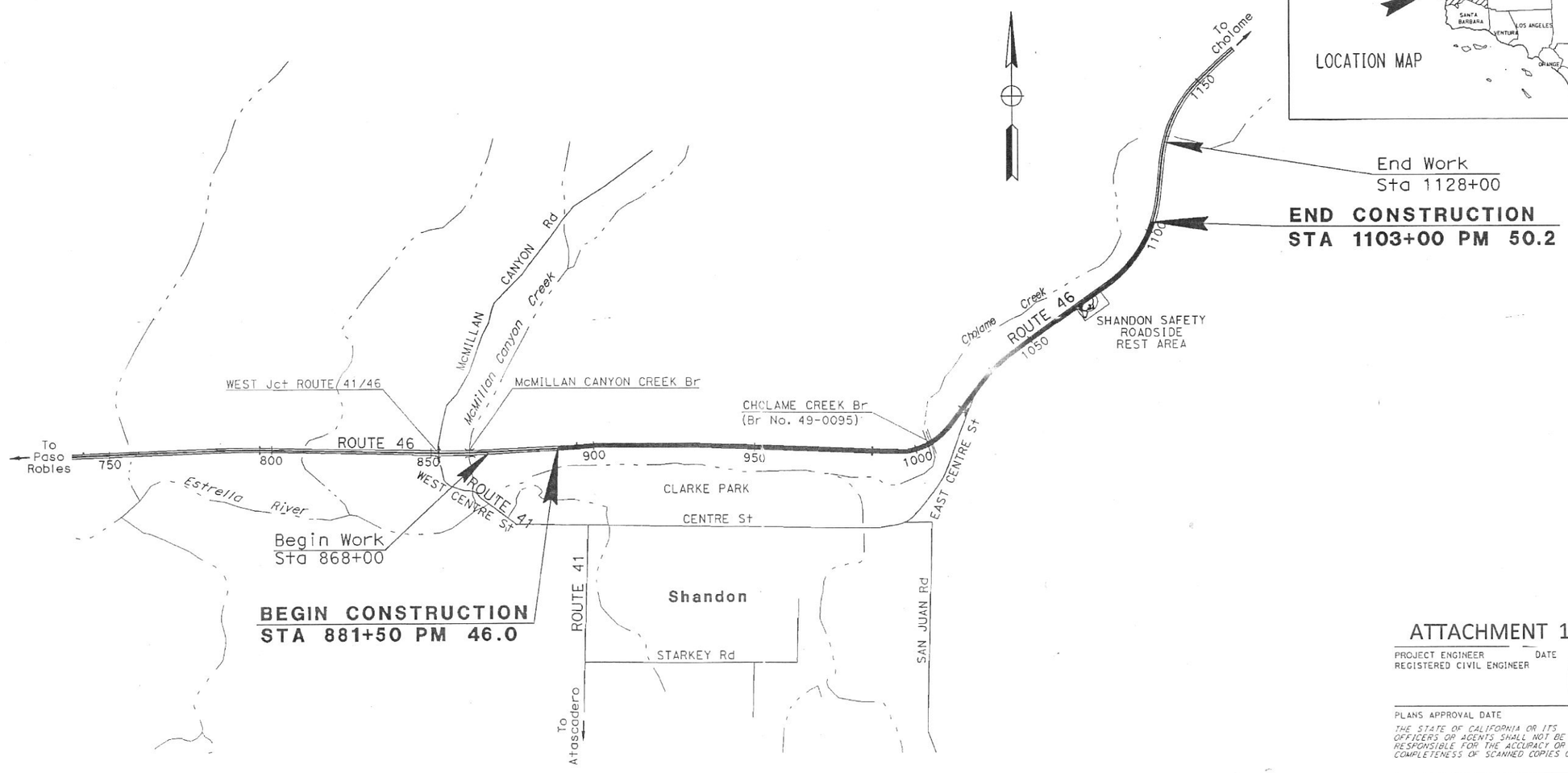
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION ON
STATE HIGHWAY
IN SAN LUIS OBISPO COUNTY
NEAR SHANDON
FROM 0.2 MILE EAST OF McMILLAN CANYON ROAD
TO 0.5 MILE EAST OF SHANDON SAFETY ROADSIDE REST AREA

TO BE SUPPLEMENTED BY STANDARD PLANS DATED 2010

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
05	SLO	46	46.0/50.2		

LOCATION MAP



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ATTACHMENT 1

PROJECT ENGINEER DATE
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER No. Exp. CIVIL STATE OF CALIFORNIA

CONTRACT No.	05-330784
PROJECT ID	0512000076

PROJECT MANAGER JOHN LUCHETTA
DESIGN ENGINEER JACK WALKER

THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO BIDDERS."

LAST REVISION 04-09-12
DATE PLOTTED => 09-APR-2012
TIME PLOTTED => 12:56

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05	SLO	46	46.0/50.2		

REGISTERED CIVIL ENGINEER DATE

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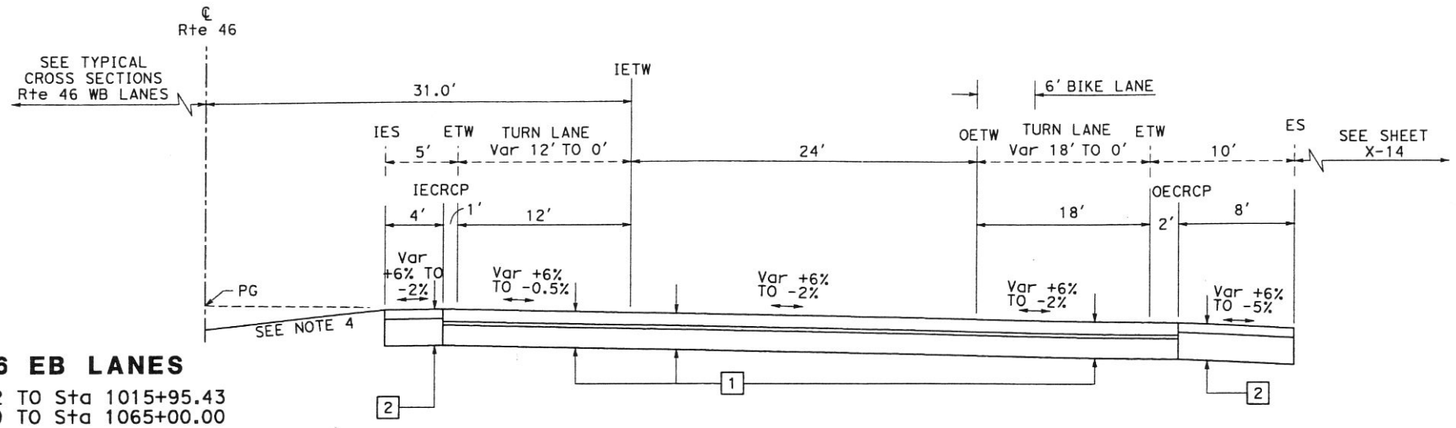

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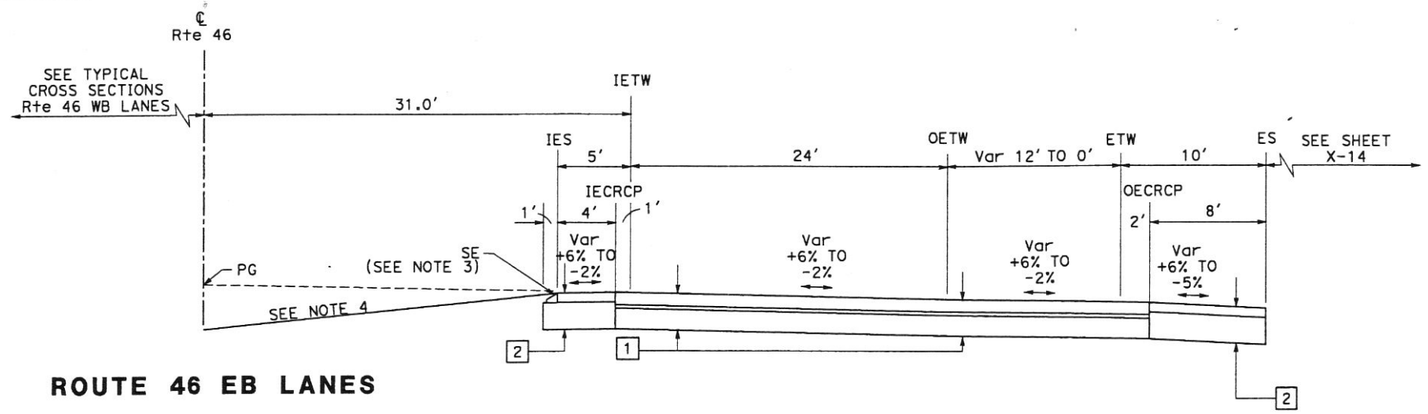
Sta 1059+84.30 TO Sta 1065+00.00



ROUTE 46 EB LANES

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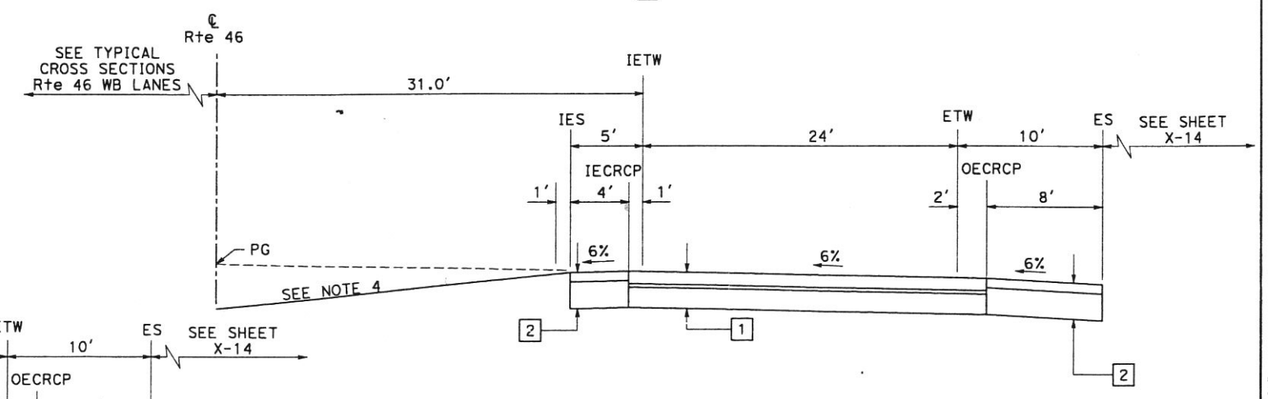
Sta 1019+90.58 TO Sta 1026+57.32
Sta 1036+20.98 TO Sta 1042+25.52
Sta 1069+68.11 TO Sta 1086+04.39



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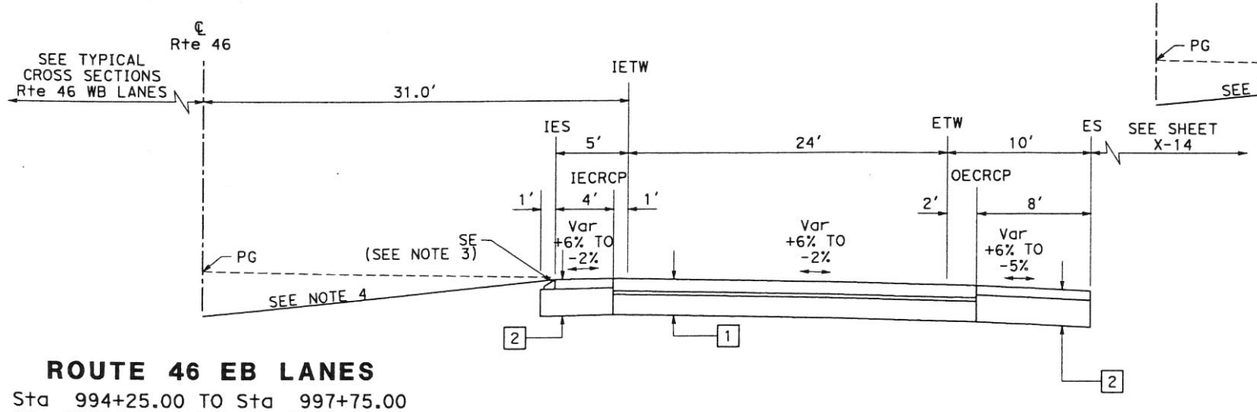

ROUTE 46 EB LANES

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Sta 1058+39.36 TO Sta 1059+84.30

ATTACHMENT 2

TYPICAL CROSS SECTIONS

NO SCALE

X-4

REVISED BY	DATE REVISED
SUMANGALI HOODE	
CALCULATED-DESIGNED BY	CHECKED BY
FUNCTIONAL SUPERVISOR	
JACK WALKER	

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans
06-DESIGN

DATE PLOTTED => 27-SEP-2013
TIME PLOTTED => 10:39
LAST REVISION 09-24-13

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
05	SLO	46	46.0/50.2		

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PLANS APPROVAL DATE

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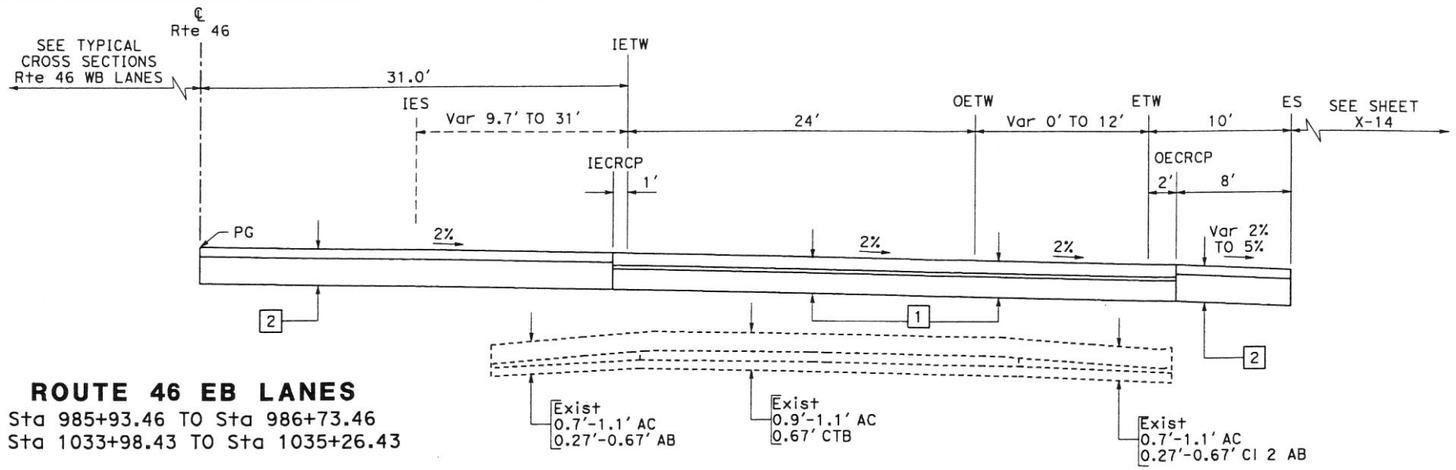

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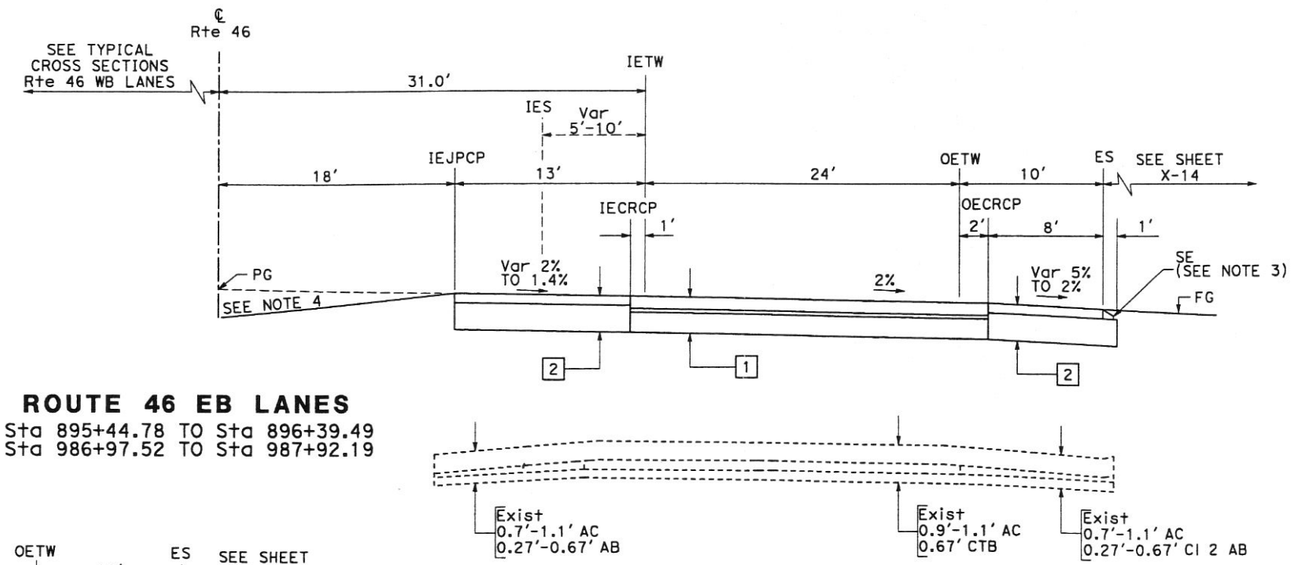

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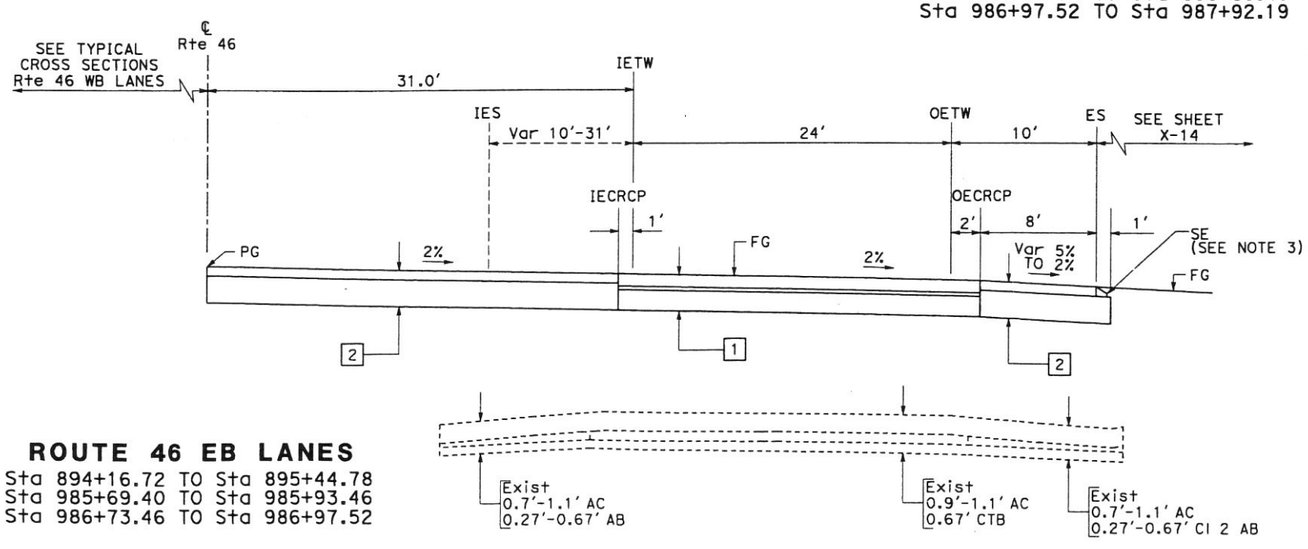

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Sta 986+73.46 TO Sta 986+97.52

ATTACHMENT 2

TYPICAL CROSS SECTIONS

NO SCALE

X-3

REVISED BY	DATE REVISED

SUMANGALI HOODE

CALCULATED-DESIGNED BY | CHECKED BY

FUNCTIONAL SUPERVISOR: JACK WALKER

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

06-DESIGN

LAST REVISION | DATE PLOTTED => 27-SEP-2013 | TIME PLOTTED => 10:39
09-24-13

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
05	SLO	46	46.0/50.2		

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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EB LANES

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Sta 919+50 TO Sta 922+00	HP-3
Sta 922+00 TO Sta 985+93.46	HP-1
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Sta 986+73.47 TO Sta 994+25	HP-1
Sta 994+25 TO Sta 994+75	HP-5
Sta 994+75 TO Sta 997+00	HP-11
Sta 997+00 TO Sta 997+75	HP-5
Sta 997+75 TO Sta 1002+50	HP-1
Sta 1002+50 TO Sta 1003+11.55	HP-6
Sta 1003+11.55 TO Sta 1003+64.46	HP-12

CHOLAME CREEK Br (Br NO. 49-0095R)	
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Sta 1006+50 TO Sta 1009+25	HP-1
Sta 1009+25 TO Sta 1009+60.52	HP-13
Sta 1009+60.52 TO Sta 1015+00	HP-7
Sta 1015+00 TO Sta 1015+95.43	HP-8
Sta 1015+95.43 TO Sta 1017+62.43	HP-15
EAST CENTRE St	
Sta 1018+73.60 TO Sta 1019+77.43	HP-15
Sta 1019+77.43 TO Sta 1021+25	HP-14
Sta 1021+25 TO Sta 1026+00	HP-4
Sta 1026+00 TO Sta 1030+00	HP-2
Sta 1030+00 TO Sta 1033+98.43	HP-9
Sta 1033+98.43 TO Sta 1037+25	HP-10
Sta 1037+25 TO Sta 1058+39.36	HP-1
Prvt Dwy 7	
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Sta 1059+84.31 TO Sta 1065+00	HP-9
Sta 1065+00 TO Sta 1065+70.95	HP-16
Sta 1065+70.95 TO Sta 1067+43.91	HP-2
SRRA	
Sta 1068+54.06 TO Sta 1069+53.87	
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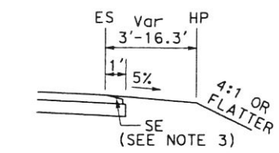

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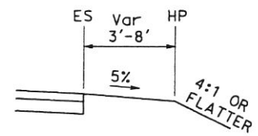

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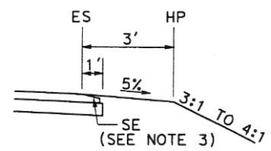

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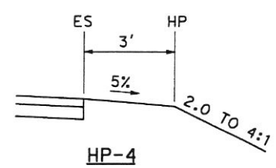

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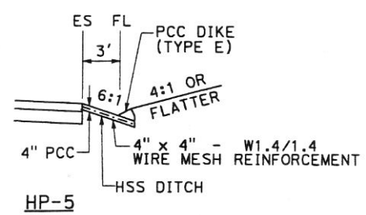

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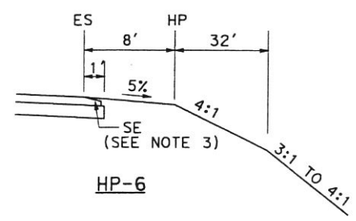

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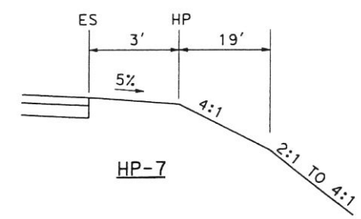

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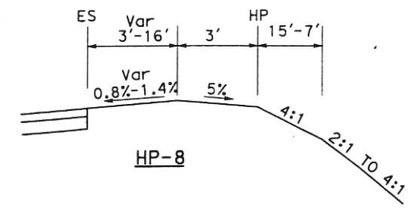
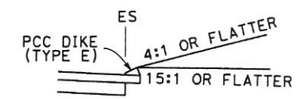


HP-8



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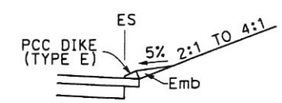

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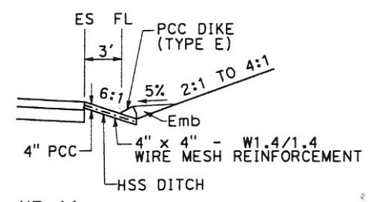

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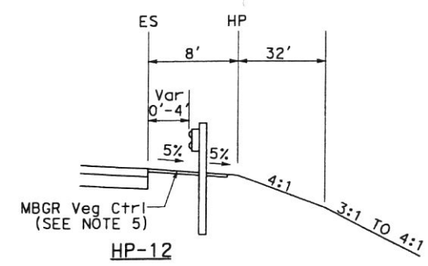

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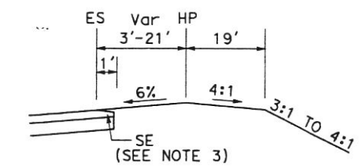

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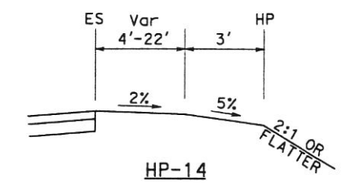

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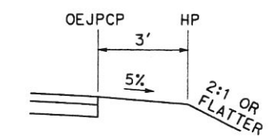

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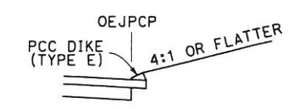


HP-16

ROUTE 46 HP TYPES
EB LANES

ATTACHMENT 2

TYPICAL CROSS SECTIONS
NO SCALE

X-14

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans 06-DESIGN

FUNCTIONAL SUPERVISOR: JACK WALKER
CALCULATED-DESIGNED BY: SUMANGALI HOODE
CHECKED BY: KHORSHED KHAN
REVISED BY / DATE REVISED

LAST REVISION 09-27-13 | DATE PLOTTED => 27-SEP-2013 | TIME PLOTTED => 10:39

BORDER LAST REVISED 7/2/2010 | USERNAME => s128966 | DGN FILE => 0512000076ca014_SE.dgn | RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3 | UNIT 1435 | PROJECT NUMBER & PHASE 05120000761

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
05	SLO	46	46.0/50.2		

REGISTERED CIVIL ENGINEER DATE

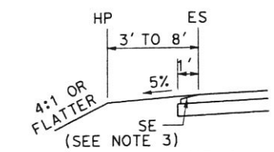
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER No. Exp. 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.

WB LANES

LOCATION	HP TYPE
Sta 883+25.46 TO Sta 883+50.00	HP-4
Sta 883+50.00 TO Sta 891+75.00	HP-8
Sta 891+75.00 TO Sta 894+40.69	HP-1
Prvt Dwy 1	
Sta 895+20.89 TO Sta 904+50.00	HP-1
Sta 904+50.00 TO Sta 919+75.00	HP-8
Sta 919+75.00 TO Sta 945+25.00	HP-1
Sta 945+25.00 TO Sta 954+50.00	HP-8
Sta 954+50.00 TO Sta 973+75.00	HP-1
Sta 973+75.00 TO Sta 978+75.00	HP-8
Sta 978+75.00 TO Sta 985+93.46	HP-1
Prvt Dwy 3	
Sta 986+73.46 TO Sta 993+25.00	HP-1
Sta 993+25.00 TO Sta 998+00	HP-10
Sta 998+00 TO Sta 1001+50	HP-1
Sta 1001+50 TO Sta 1003+64.46	HP-5
CHOLAME CREEK Br (Br NO. 49-0095L)	
Sta 1006+10.44 TO Sta 1006+71.10	HP-9
Sta 1006+71.10 TO Sta 1013+00.00	HP-1
Sta 1013+00.00 TO Sta 1017+85.52	HP-5
Prvt Dwy 4	
Sta 1018+65.52 TO Sta 1021+50.00	HP-5
Sta 1021+50.00 TO Sta 1026+25.00	HP-1
Sta 1026+25.00 TO Sta 1034+23.10	HP-x
Prvt Dwy 5	
Sta 1035+01.53 TO Sta 1035+75.00	HP-4
Sta 1035+75.00 TO Sta 1049+00.00	HP-1
Sta 1049+00.00 TO Sta 1058+79.54	HP-5
Sta 1058+79.54 TO Sta 1059+61.83	HP-11
Prvt Dwy 8	
Sta 1060+41.47 TO Sta 1083+50.00	HP-1
Sta 1083+50.00 TO Sta 1086+09.41	HP-2
Sta 1086+09.41 TO Sta 1087+00.00	HP-6
Sta 1087+00.00 TO Sta 1088+50.00	HP-3
Sta 1088+50.00 TO Sta 1090+00.00	HP-6
Sta 1088+50.00 TO Sta 1091+00.00	HP-3



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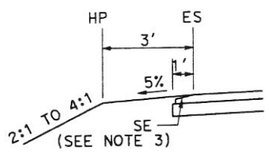

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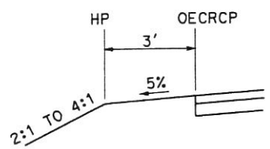

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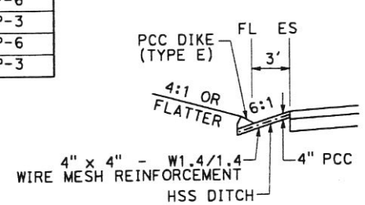

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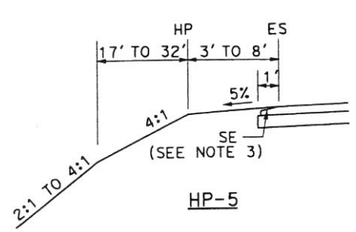

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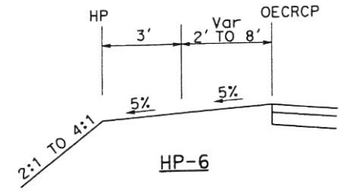

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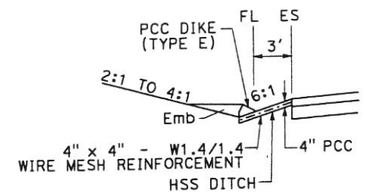

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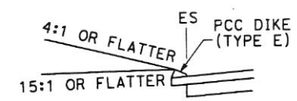
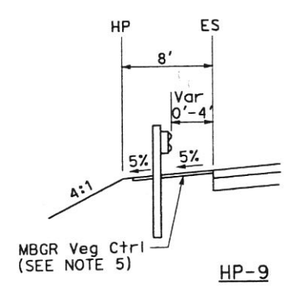


HP-8



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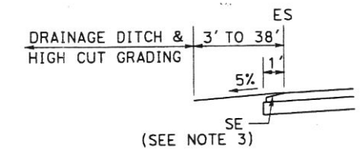

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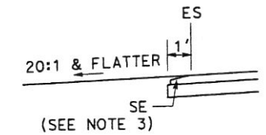


HP-11

ROUTE 46 HP TYPES
WB LANES

ATTACHMENT 2

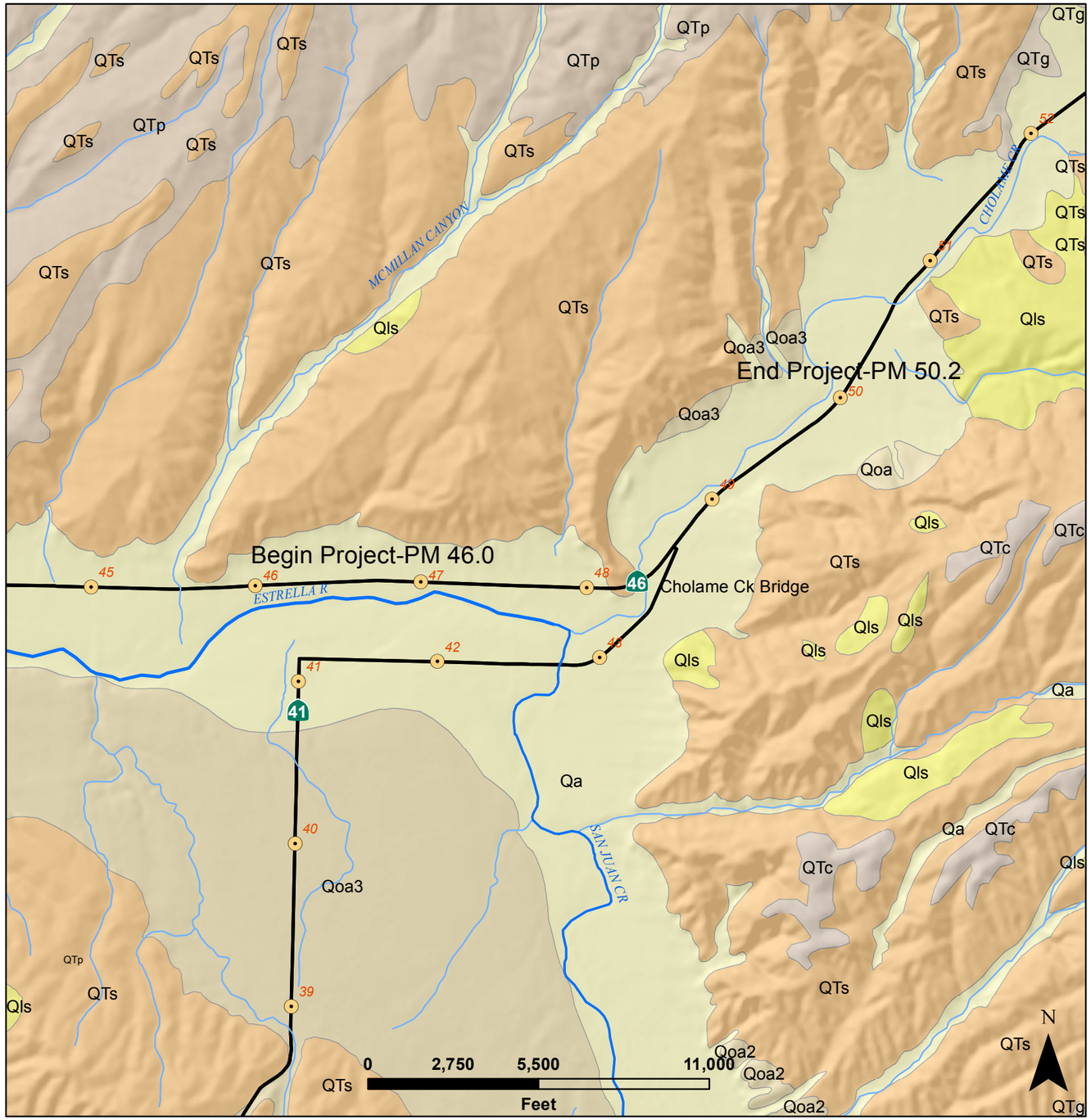
TYPICAL CROSS SECTIONS
NO SCALE **X-15**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans 06-DESIGN

FUNCTIONAL SUPERVISOR: JACK WALKER
CALCULATED-DESIGNED BY: SUMANGALI HOODE
CHECKED BY: KHORSHED KHAN
REVISED BY / DATE REVISED

UNIT 1435 | PROJECT NUMBER & PHASE 05120000761

Regional Geologic Map- Whitley 2B- Rte 46, PM 46.0/50.2

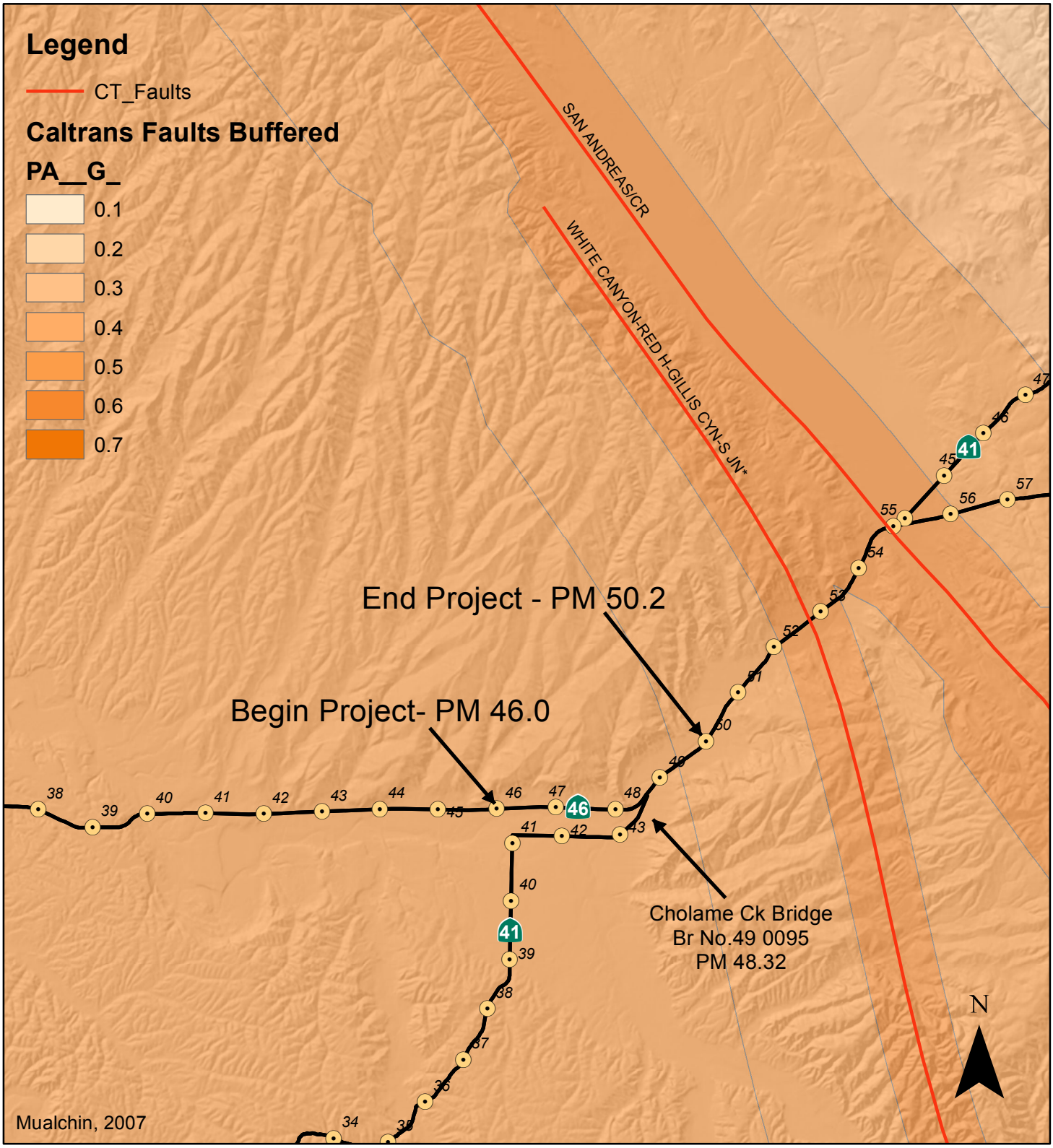


modified from Rosenberg, 2002

Legend

QTc	*Continental deposits, undifferentiated (Pleistocene-Pliocene?)—Semiconsolidated, relatively fine-grained, oxidized sand and silt. Probably equivalent to Paso Robles Formation*
QTg	*Paso Robles Formation, cobble gravel (Pleistocene-Pliocene?)—Cobble gravel*
QTp	*Paso Robles Formation, undifferentiated (Pleistocene-Pliocene?)—Terrestrial sediments of Salinas Valley, weakly indurated pebble gravel with minor sand and clay.*
QTs	*Paso Robles Formation, sand and clay*
Qa	*Alluvial deposits, undifferentiated (Holocene)—Unconsolidated, heterogeneous, moderately sorted silt and sand with discontinuous lenses of clay and silty clay*
Qls	*Landslide deposits (Quaternary)—Heterogeneous mixture of deposits ranging from large block slides of indurated bedrock to debris flows in semiconsolidated sand and clay*
Qoa	*Early to late Pleistocene alluvial deposits, undiferentiated*
Qoa2	*Early to late Pleistocene alluvial deposits, undiferentiated*
Qoa3	*Older alluvium, youngest (lowest terrace)*

ATTACHMENT 3
REGIONAL GEOLOGY
SLO-46 Corridor Improvements
Whitley 2B Segment
05-SLO-46-46.0/50.2



0 7,500 15,000 30,000

Feet

ATTACHMENT 4
Regional Fault Map
SLO-46-46/50.2- Whitley 2B

ATTACHMENT 5
Subsurface Exploration Map
SLO-46 Corridor Improvements
Whitley 2B Segment
05-SLO-46-46.0/50.2

Subsurface Exploration Map- Whitley 2B- Rte 46, PM 46.0/50.2

ATTACHMENT 5A
Culvert Headwall Boring Map
Whitley 2B Segment
05-SLO-46-46.0/50.2

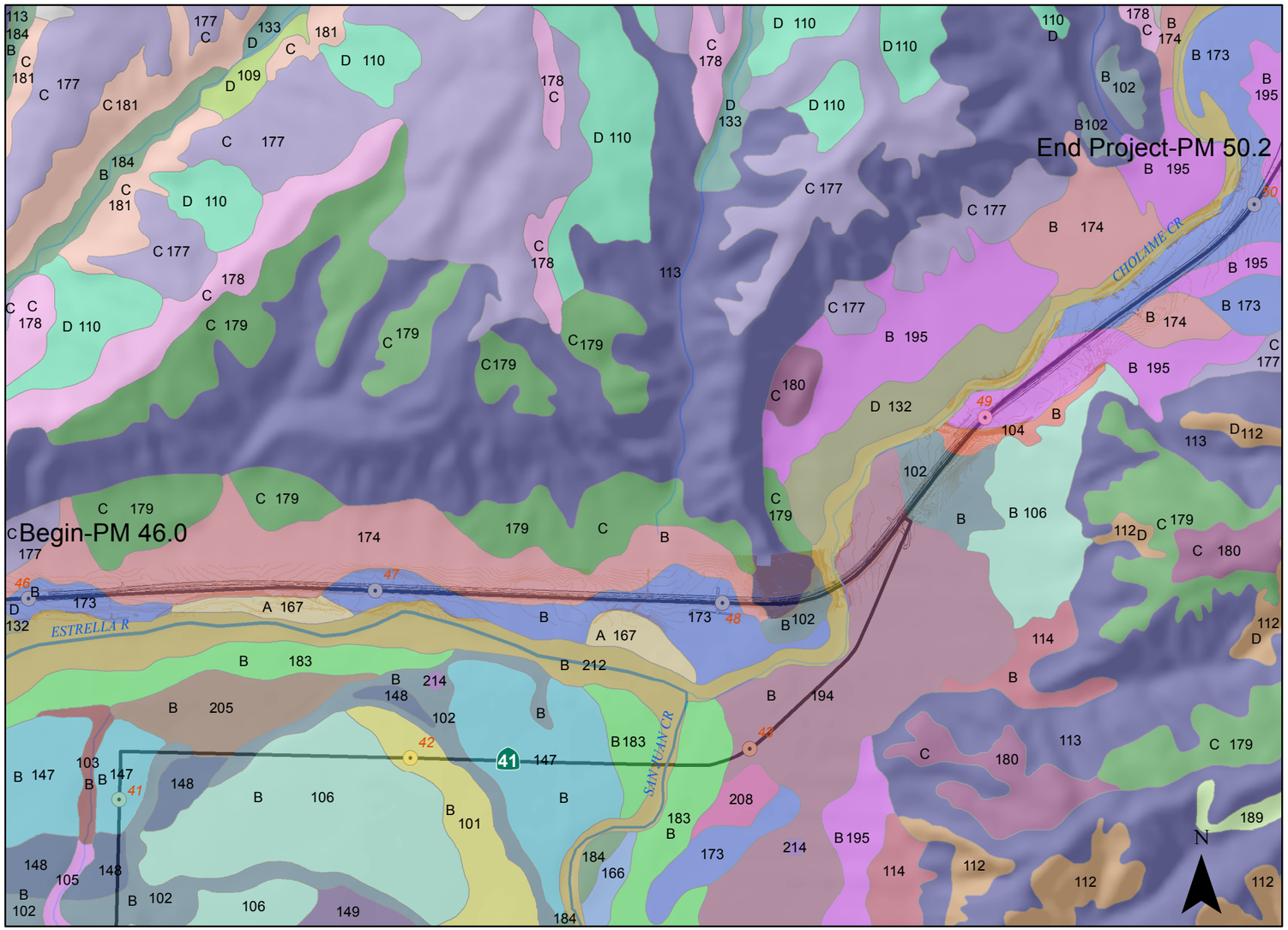
Subsurface Exploration Map- Whitley 2B- Rte 46, PM 46.0/50.2

ATTACHMENT 5A
Culvert Headwall Boring Map
Whitley 2B Segment
05-SLO-46-46.0/50.2

Subsurface Exploration Map- Whitley 2B- Rte 46, PM 46.0/50.2

ATTACHMENT 5A
Culvert Headwall Boring Map
Whitley 2B Segment
05-SLO-46-46.0/50.2

Whitley 2B Soils Map with Hydraulic Classification, Rte 46- PM 46.0/50.2



Legend

Whitley2B-SOILS

- Arbuckle fine sandy loam, 2 to 9 percent slopes
- Arbuckle-Positas complex, 15 to 30 percent slopes
- Arbuckle-Positas complex, 30 to 50 percent slopes
- Arbuckle-Positas complex, 50 to 75 percent slopes
- Arbuckle-Positas complex, 9 to 15 percent slopes
- Arbuckle-San Ysidro complex, 2 to 9 percent slopes
- Ayar and Diablo soils, 15 to 30 percent slopes
- Ayar and Diablo soils, 9 to 15 percent slopes
- BADLAND
- Balcom-Calleguas complex, 50 to 75 percent slopes
- Balcom-Nacimiento association, moderately steep
- Cropley clay, 0 to 2 percent slopes
- Cropley clay, 2 to 9 percent slopes
- Hanford and Greenfield gravelly sandy loams, 0 to 2 percent slopes
- Hanford and Greenfield soils, 0 to 2 percent slopes
- Hanford and Greenfield soils, 2 to 9 percent slopes
- Metz loamy sand, 0 to 5 percent slopes
- Metz-Tujunga complex, occasionally flooded, 0 to 5 percent slopes
- Mocho clay loam, 0 to 2 percent slopes
- Mocho clay loam, 2 to 9 percent slopes
- Nacimiento-Ayar complex, 30 to 50 percent slopes
- Nacimiento-Ayar complex, 9 to 30 percent slopes
- Nacimiento-Los Osos complex, 30 to 50 percent slopes
- Nacimiento-Los Osos complex, 50 to 75 percent slopes
- Nacimiento-Los Osos complex, 9 to 30 percent slopes
- Pico fine sandy loam, 0 to 2 percent slopes
- Pico fine sandy loam, 2 to 9 percent slopes
- Rincon clay loam, 9 to 15 percent slopes
- San Emigdio fine sandy loam, 0 to 2 percent slopes
- San Emigdio fine sandy loam, 2 to 9 percent slopes
- Sorrento clay loam, 0 to 2 percent slopes
- Still clay loam, 0 to 2 percent slopes
- WATER
- Xerofluvents-Riverwash association

A *Saturated hydraulic conductivity of the least transmissive layer: >5.67 in/h; depth to water impermeable layer:20 to 40 in; depth to high water table: 24 to 40 in.*

B *Saturated hydraulic conductivity of the least transmissive layer: ≤5.67 to >1.42 in/h; depth to water impermeable layer: 20 to 40 in; depth to high water table:24 to 40 in.*

C *saturated hydraulic conductivity of the least transmissive layer: ≤1.42 to >0.14 in/h; depth to water impermeable layer: 20 to 40 in; depth to high water table: 24 to 40 in.*

D *aturated hydraulic conductivity of the least transmissive layer: ≤0.14 in/h; depth to water impermeable layer: <20 in; depth to high water table: <24 in.*

0 1,600 3,200 6,400

Feet

ATTACHMENT 6
SOILS MAP
SLO-46 Corridor Improvements
Whitley 2B Segment
05-SLO-46-46.0/50.2

ATTACHMENT 7

Boring Records

Whitley 2B Segment

05-SLO-46-46.0/50.2

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
R Turner	8-21-12	8-21-12	2435799.6 ft / 5858827.2 ft NAD83	RC-12-003
DRILLING CONTRACTOR: Caltrans			BOREHOLE LOCATION (Offset, Station, Line): 79.5' Lt Sta 995+33.65 Route 46	SURFACE ELEVATION: 1082.5 ft NGVD29
DRILLING METHOD: Rotary Wire-Line			DRILL RIG: CS 2000 (truck)	BOREHOLE DIAMETER: 4.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID): SPT, Punch Core			SPT HAMMER TYPE: Automatic 140#/30" Drop	HAMMER EFFICIENCY, ERi: 93%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 41.3 ft

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0	Poorly graded SAND with SILT (SP-SM); yellowish brown; dry; fine and medium SAND.		1										
1080.54	2													
1078.54	4	SILT (ML); very dense; light yellowish brown; moist; few fine SAND.												
1076.54	6			2	15 19 27	46								
	7			3										
1074.54	8	SANDY SILT (ML); very dense; yellowish brown; moist; fine SAND.												
1072.54	10													
	11			4	22 39 46	85								
1070.54	12			5										
1068.54	14													
1066.54	16			6	28 40 49	89								
	17	Poorly graded SAND with SILT (SP-SM); very dense; light yellowish brown; moist; fine SAND.		7										
1064.54	18													
	19	Well-graded SAND with SILT (SW-SM); very dense; light yellowish brown; moist; subangular SAND ; moderate cementation.		8										
1062.54	20													
	21			9	32 50/6"	50/6								
1060.54	22			10										
	23	Poorly graded SAND with SILT (SP-SM); very dense; yellowish brown; moist; fine and medium SAND.		11										
1058.54	24													
	25													

(continued)

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE				HOLE ID
BORING RECORD				RC-12-003
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE 46.0/50.2	PROJECT ID 05-0512000076
PROJECT OR BRIDGE NAME: SLO 46 Corridor Improvements: Whitley 2B Segment				
BRIDGE NUMBER	PREPARED BY DL Appelbaum	DATE 4-1-13	SHEET 1 of 2	

5 BR - STANDARD 533078LOTB.GPJ DRAFT CALTRANS LIBRARY OCT 2011.GLB 3/27/13

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		Poorly graded SAND with SILT (SP-SM) *(continued)*.		12	30 43 50/4"	93/10								
1056.54	26														
	27				13										
1054.54	28				14										
	29		- from fine to coarse, subrounded SAND.												
1052.54	30				15	36 50/5"	50/5								
	31				16										
1050.54	32		SANDY lean CLAY (CL); hard; light yellowish brown; moist; fine and medium SAND ; PP>4.5 tsf.												
	33														
1048.54	34														
	35				17	18 19 50/5"	69/11								
1046.54	36														
	37		SILT with SAND (ML); very dense; light yellowish brown; moist; fine SAND ; weak cementation.		18										
1044.54	38														
	39														
1042.54	40		Poorly graded SAND with SILT (SP-SM); very dense; yellowish brown; moist; fine and medium SAND.												
	41				19	27 50/6"	50/6								
1040.54	42		Bottom of borehole at 41.3 ft bgs												
	43		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
1038.54	44														
	45														
1036.54	46														
	47														
1034.54	48														
	49														
1032.54	50														
	51														
1030.54	52														
	53														
1028.54	54														
	55														

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE				HOLE ID
BORING RECORD				**RC-12-003**
DIST. **05**	COUNTY **SLO**	ROUTE **46**	POSTMILE **46.0/50.2**	PROJECT ID **05-0512000076**
PROJECT OR BRIDGE NAME **SLO 46 Corridor Improvements: Whitley 2B Segment**				
BRIDGE NUMBER	PREPARED BY **DL Appelbaum**		DATE **4-1-13**	SHEET **2 of 2**

5 BR - STANDARD 533078LOTB.GPJ DRAFT CALTRANS LIBRARY OCT 2011.GLB 3/27/13

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
R Turner	8-21-12	8-21-12	2435858.7 ft / 5859225.3 ft NAD83	RC-12-004
DRILLING CONTRACTOR			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
Caltrans			81.0' Lt Sta 999+53.52 Route 46	1088.6 ft NGVD29
DRILLING METHOD			DRILL RIG	BOREHOLE DIAMETER
Rotary Wire-Line			CS 2000 (truck)	4.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID)			SPT HAMMER TYPE	HAMMER EFFICIENCY, ERi
SPT, Punch Core			Automatic 140#/30" Drop	93%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS DURING DRILLING AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING
				41.3 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		CLAYEY SAND (SC); brown; dry; fine SAND; some fines.		1										
	1														
1086.56	2		SILTY SAND (SM); very dense; yellowish brown; moist; fine SAND; some fines.												
	3														
1084.56	4														
	5		Poorly graded SAND with SILT (SP-SM); very dense; light yellowish brown; moist; fine SAND.		2	15 17 17	34								
1082.56	6														
	7				3										
1080.56	8														
	9														
1078.56	10														
	11				4	17 14 21	35								
1076.56	12				5										
	13														
1074.56	14		CLAYEY SAND (SC); very dense; yellowish brown; moist; fine and medium SAND; some fines.												
	15														
1072.56	16		Poorly graded SAND with SILT (SP-SM); very dense; light yellowish brown; moist; fine SAND ; weak cementation.		6	23 36 50/4"	86/10								
	17				7										
1070.56	18														
	19		- fine and medium SAND.												
1068.56	20														
	21				8	29 37 49	86								
1066.56	22				9										
	23														
1064.56	24														
	25														

(continued)

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE				HOLE ID
BORING RECORD				RC-12-004
DIST.	COUNTY	ROUTE	POSTMILE	PROJECT ID
05	SLO	46	46.0/50.2	05-0512000076
PROJECT OR BRIDGE NAME				
SLO 46 Corridor Improvements: Whitley 2B Segment				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET	
	DL Appelbaum	4-1-13	1 of 2	

5 BR - STANDARD 533078LOTB.GPJ DRAFT CALTRANS LIBRARY OCT 2011.GLB 3/27/13

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		Poorly graded SAND with SILT (SP-SM) *(continued)*.												
1062.56	26				10	36 50/6"	50/6								
	27				11										
1060.56	28														
	29														
1058.56	30														
	31				12	23 50/6"	50/6								
1056.56	32				13										
	33		- from fine to coarse, subrounded SAND.												
1054.56	34														
	35														
1052.56	36				14										
	37														
1050.56	38														
	39														
1048.56	40														
	41				15	24 50/6"	50/6								
1046.56	42		Bottom of borehole at 41.3 ft bgs												
	43														
1044.56	44														
	45														
1042.56	46														
	47														
1040.56	48														
	49														
1038.56	50														
	51														
1036.56	52														
	53														
1034.56	54														
	55														

This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.

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Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE				HOLE ID
BORING RECORD				**RC-12-004**
DIST. **05**	COUNTY **SLO**	ROUTE **46**	POSTMILE **46.0/50.2**	PROJECT ID **05-0512000076**
PROJECT OR BRIDGE NAME **SLO 46 Corridor Improvements: Whitley 2B Segment**				
BRIDGE NUMBER	PREPARED BY **DL Appelbaum**	DATE **4-1-13**	SHEET **2 of 2**	

5 BR - STANDARD 533078LOTB.GPJ DRAFT CALTRANS LIBRARY OCT 2011.GLB 3/27/13

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
DL Appelbaum	10-17-12	10-17-12	2435845.2 ft / 5858230.6 ft NAD83	RC-12-007
DRILLING CONTRACTOR: Caltrans			BOREHOLE LOCATION (Offset, Station, Line): 110.0' Lt Sta 989+29.88 Route 46	SURFACE ELEVATION: 1033.4 ft NGVD29
DRILLING METHOD: Rotary Wire-Line			DRILL RIG: Acker AD2	BOREHOLE DIAMETER: 4.5 in
SAMPLER TYPE(S) AND SIZE(S) (ID): SPT, Punch Core			SPT HAMMER TYPE: Automatic 140#/30" Drop	HAMMER EFFICIENCY, ERi: 68%
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 42.9 ft

ELEVATION (ft)	DEPTH (ft)	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0	SANDY fat CLAY (CH); medium stiff; grayish brown; dry; fine and medium SAND ; PP=1.0 tsf.		1										
	1													
1031.37	2	- hard; very dark brown; PP>4.5 tsf.												
	3													
1029.37	4													
	5	- dark grayish brown; moist; calcite nodules.												
1027.37	6													
	7			2	3 4 10	14								
1025.37	8			3										
	9			4	5 6 7	13								
1023.37	10	CLAYEY SAND (SC); medium dense; yellowish brown; moist; fine and medium SAND; little fines.		5										
	11	SANDY lean CLAY (CL); very stiff; dark grayish brown; moist; fine and medium SAND ; calcite nodules; PP=2.5 tsf.		6	2 5 7	12								
1021.37	12													
	13			7										
1019.37	14													
	15													
1017.37	16													
	17	- stiff; PP=2.0 tsf.		8	2 3 5	8								
1015.37	18			9										
	19													
1013.37	20													
	21													
1011.37	22	- PP=1.5 tsf.		10	3 5 5	10								
	23			11										
1009.37	24													
	25													

(continued)

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE				HOLE ID
BORING RECORD				RC-12-007
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE 46.0/50.2	PROJECT ID 05-0512000076
PROJECT OR BRIDGE NAME: SLO 46 Corridor Improvements: Whitley 2B Segment				
BRIDGE NUMBER	PREPARED BY DL Appelbaum		DATE 4-1-13	SHEET 1 of 2

5 BR - STANDARD 533078LOTB.GPJ DRAFT CALTRANS LIBRARY OCT 2011.GLB 3/27/13

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	25		- PP=1.75 tsf. SANDY lean CLAY (CL) *(continued)*.		11										
1007.37	26														
	27		- PP=0.75.		12	0 0 0	0								
1005.37	28														
	29														
1003.37	30				13										
	31														
1001.37	32				14										
	33														
999.37	34				15										
	35														
997.37	36														
	37				16	15 14 13	27								
995.37	38		Poorly graded SAND with SILT and GRAVEL (SP-SM); dense; dark grayish brown; wet; from fine to coarse, angular SAND; little fine, subangular GRAVEL; trace coarse, subangular GRAVEL; 2" maximum diameter.		17										
	39														
993.37	40														
	41														
991.37	42				18	8 16 16	32								
	43		Bottom of borehole at 42.9 ft bgs												
989.37	44														
	45		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
987.37	46														
	47														
985.37	48														
	49														
983.37	50														
	51														
981.37	52														
	53														
979.37	54														
	55														

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE				HOLE ID
BORING RECORD				**RC-12-007**
DIST. **05**	COUNTY **SLO**	ROUTE **46**	POSTMILE **46.0/50.2**	PROJECT ID **05-0512000076**
PROJECT OR BRIDGE NAME **SLO 46 Corridor Improvements: Whitley 2B Segment**				
BRIDGE NUMBER	PREPARED BY **DL Appelbaum**		DATE **4-1-13**	SHEET **2 of 2**

5 BR - STANDARD 533078LOTB.GPJ DRAFT CALTRANS LIBRARY OCT 2011.GLB 3/27/13

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	5-19-14	5-19-14	2441047.5 ft / 5865535.7 ft	HA-14-001
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line): 100.0' Rt Sta 1082+50.0	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 13.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND (SM); medium dense; light yellowish brown; dry; mostly fine SAND ; little nonplastic fines.												
	1														
	2				1	11 14 22	36								
	3		- light brown; moist; some nonplastic fines; 1/4" fragments fine grained tabular SANDSTONE.												
	4				2	12 40 29	69								
	5		SANDY SILT (ML); loose; brown; moist; fine SAND.												
	6		SILTY SAND (SM); medium dense; yellowish brown; moist; little nonplastic fines.		3	24 35 40	75								
	7														
	8		- brown; trace fine, subrounded GRAVEL.		4	26 30 29	59								
	9		Poorly graded SAND (SP); medium dense; yellowish brown; moist; fine SAND.												
	10		- fine and medium, subangular SAND; trace high plasticity fines.												
	11		- fine SAND.												
	12		SANDY SILT (ML); medium dense; brown; moist; fine SAND.		5	12 15 14	29								
	13		CLAYEY SAND (SC); medium dense; dark yellowish brown; moist; mostly fine SAND ; little high plasticity fines.												
	14		Bottom of borehole at 13.5 ft bgs												
	15		Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86												
	16		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	17														
	18														
	19														
	20														
	21														
	22														
	23														
	24														
	25														

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE				HOLE ID
BORING RECORD				HA-14-001
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET 1 of 1

5 BR - STANDARD WHITLEY 2B HAND AUGER 2014.GPJ CALTRANS LIBRARY (FEB 2013).GLB 6/27/14

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	5-19-14	5-19-14	2441136.9 ft / 5865354.9 ft	HA-14-002
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line): 86.4' Rt Sta 1081+69.44	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 13.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND (SM); loose; yellowish brown; dry; fine SAND; some nonplastic fines; few fine and coarse, angular GRAVEL; trace debris.												
	1		- dense.												
	2				1	53 77 62	139								
	3		- from fine to coarse, subrounded SAND.												
	4				2	33 27 22	49								
	5		SILT with SAND (ML); medium dense; brown; moist; little fine SAND ; trace caliche.												
	6				3	19 30 28	58								
	7		- caliche hard pan.												
	8		- varved SILT and fine SAND at 2mm intervals.		4	15 18 29	47								
	9		CLAYEY SAND (SC); medium dense; dark yellowish brown; moist; mostly fine SAND ; little medium plasticity fines.												
	10		SANDY SILT (ML); medium dense; dark yellowish brown; moist; some fine SAND.		5	33 16 16	32								
	11		SILTY SAND (SM); medium dense; yellowish brown; moist; mostly fine SAND ; little nonplastic fines.												
	12		SILT (ML); medium dense; dark brown; moist; trace fine SAND.		6	34 16 13	29								
	13														
	14		Bottom of borehole at 13.5 ft bgs												
	15		Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86												
	16		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	17														
	18														
	19														
	20														
	21														
	22														
	23														
	24														
	25														

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REPORT TITLE				HOLE ID
BORING RECORD				HA-14-002
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET 1 of 1	

5 BR - STANDARD WHITLEY 2B HAND AUGER 2014.GPJ CALTRANS LIBRARY (FEB 2013).GLB 6/27/14

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	5-19-14	5-19-14	2440718.7 ft / 5865099.8 ft	HA-14-003
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line): 99.0' Rt Sta 1077+14.50	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 15.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0–1		SILTY SAND (SM); loose; yellowish brown; dry; little fines; few fine, angular GRAVEL; trace AC rubble (FILL).												
	2–3		SANDY SILT (ML); medium dense; brown; moist; some fine SAND.		1	28 29 30	59								
	4–5		SILTY SAND (SM); dense; dark yellowish brown; moist; mostly fine SAND ; little nonplastic fines.		2	31 52 49	101								
	6		SANDY SILT (ML); medium dense; brown; moist; fine SAND; trace fine, subrounded GRAVEL; (SHALE).		3	18 25 23	48								
	7–8		SANDY lean CLAY (CL); stiff; dark brown; moist; varved with fine SAND; caliche; pp=1.25 tsf.		4	12 21 28	49								
	9–11		CLAYEY SAND (SC); medium dense; dark yellowish brown; moist; mostly fine SAND ; some medium plasticity fines.		5	15 28 22	50								
	12		Lean CLAY with SAND (CL); stiff; dark yellowish brown; moist; fine SAND ; pp=1.25 tsf.		6	17 18 22	40								
	13–15		SANDY lean CLAY (CL); stiff; dark yellowish brown; moist; varved with very fine SAND; pp=1.25 tsf.		7	25 28 37	65								
	16		Bottom of borehole at 15.5 ft bgs												
	17–25														

Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86

This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.

Department of Transportation
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Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE				HOLE ID
BORING RECORD				HA-14-003
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET 1 of 1	

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LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	5-20-14	5-20-14		HA-14-004
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 5.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILT with GRAVEL (ML); medium dense; yellowish brown; dry; little fine, angular GRAVEL.												
	1														
	2				1	37	72								
						33									
	3		SANDY SILT (ML); dense; brown; moist; fine SAND. - caliche.			39									
	4				2	34	109								
						44									
	5					65									
			- Refusal @ 5'. Bottom of borehole at 5.0 ft bgs												
	6														
	7		Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86												
	8		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	9														
	10														
	11														
	12														
	13														
	14														
	15														
	16														
	17														
	18														
	19														
	20														
	21														
	22														
	23														
	24														
	25														

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE				HOLE ID
BORING RECORD				HA-14-004
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET 1 of 1	

5 BR - STANDARD WHITLEY 2B HAND AUGER 2014.GPJ CALTRANS LIBRARY (FEB 2013).GLB 6/27/14

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	5-20-14	5-20-14	2440854.3 ft / 5864970.4 ft	HA-14-005
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line): 87.0' Rt Sta 1076+83.64	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 15.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILT with GRAVEL (ML); dense; yellowish brown; dry; little angular GRAVEL.												
	1														
	2				1	59 55 40	95								
	3		SILT with SAND (ML); dense; brown; moist; little fine SAND ; trace caliche.												
	4				2	51 60 63	123								
	5														
	6		- caliche hard pan. SILTY SAND (SM); medium dense; dark yellowish brown; moist; fine SAND; little fines.		3	16 19 19	38								
	7		- trace subrounded GRAVEL; Sandstone. SILT with SAND (ML); medium dense; dark brown; moist; fine SAND ; caliche nodules.												
	8				4	20 21 27	48								
	9														
	10				5	22 32 37	69								
	11		SANDY SILT (ML); medium dense; dark yellowish brown; moist; fine SAND.												
	12				6	14 19 24	43								
	13														
	14				7	16 25 32	57								
	15														
	16		Bottom of borehole at 15.5 ft bgs												
	17		Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86												
	18		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	19														
	20														
	21														
	22														
	23														
	24														
	25														

Department of Transportation
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Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE				HOLE ID
BORING RECORD				HA-14-005
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET 1 of 1	

5 BR - STANDARD WHITLEY 2B HAND AUGER 2014.GPJ CALTRANS LIBRARY (FEB 2013).GLB 6/27/14

LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	5-21-14	5-21-14	2440442.7 ft / 5864675.7 ft	HA-14-006
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line): 86.5' Rt Sta 1072+08.05	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 15.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND (SM); loose; brown; moist; some nonplastic fines ; trace organics.												
	1														
	2		Poorly graded SAND (SP); loose; yellowish brown; moist; fine SAND ; trace nonplastic fines.		1	14 10 9	19								
	3		CLAYEY SAND (SC); medium dense; dark yellowish brown; moist; fine SAND; some high plasticity fines; varved CLAY and SAND; caliche stringers.												
	4		- dark brown.		2	12 20 25	45								
	5		- dark yellowish brown.												
	6		- loose; little high plasticity fines.		3	8 11 16	27								
	7		- medium dense; yellowish brown.												
	8				4	10 15 18	33								
	9		- trace coarse SAND; (shale).												
	10		SANDY fat CLAY (CH); stiff; dark yellowish brown; moist; fine SAND ; varved; pp=2.0 tsf.		5	9 20 26	46								
	11														
	12		SILTY SAND (SM); loose; yellowish brown; moist; mostly medium, angular SAND ; some fines.		6	10 9 17	26								
	13		Fat CLAY with SAND (CH); stiff; yellowish brown; moist; fine SAND ; pp=1.25 tsf.												
	14		CLAYEY SAND (SC); medium dense; yellowish brown; moist; fine SAND ; little high plasticity fines.		7	11 22 24	46								
	15														
	16		Bottom of borehole at 15.5 ft bgs												
	17		Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86												
	18		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	19														
	20														
	21														
	22														
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	24														
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REPORT TITLE				HOLE ID
BORING RECORD				HA-14-006
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET 1 of 1	

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LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	5-21-14	5-21-14	2440229.1 ft / 5864435.6 ft	HA-14-007
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line): 121.5' Rt Sta 1068+83.99	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 15.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SANDY SILT (ML); loose; brown; dry.												
	1		- moist.												
	2		SILTY SAND (SM); loose; yellowish brown; moist; little fine SAND.		1	9 14 12	26								
	3														
	4				2	14 13 15	28								
	5		- light yellowish brown; fine and medium, angular SAND.												
	6		CLAYEY SAND (SC); loose; yellowish brown; moist; little fine SAND.		3	13 12 12	24								
	7		SANDY fat CLAY (CH); stiff; dark brown; moist; fine SAND ; varved with trace caliche stringers; pp=2 tsf.												
	8		SILTY SAND (SM); loose; brown; moist; mostly fine and medium, angular SAND; little fines; caliche nodules.		4	17 21 22	43								
	9														
	10				5	14 8 13	21								
	11		- mostly fine SAND.												
	12				6	12 10 18	28								
	13		- medium dense; some nonplastic fines.												
	14		SILT with SAND (ML); medium dense; yellowish brown; moist; < 3" lenses of CLAYEY fine SAND.		7	13 15 16	31								
	15														
	16		Bottom of borehole at 15.5 ft bgs												
	17		Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86												
	18		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	19														
	20														
	21														
	22														
	23														
	24														
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REPORT TITLE				HOLE ID
BORING RECORD				HA-14-007
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET 1 of 1	

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LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	5-21-14	5-21-14		HA-14-008
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line)	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 1.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND with GRAVEL (SM); loose; yellowish brown; dry; from fine to coarse, angular and subangular SAND; little fine, angular and subangular GRAVEL; little fines.			R									
	1														
	2		Bottom of borehole at 1.5 ft bgs												
	3		Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86												
	4		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	5														
	6														
	7														
	8														
	9														
	10														
	11														
	12														
	13														
	14														
	15														
	16														
	17														
	18														
	19														
	20														
	21														
	22														
	23														
	24														
	25														

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REPORT TITLE				HOLE ID
BORING RECORD				HA-14-008
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET 1 of 1	

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LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	5-21-14	5-21-14	2440127.2 ft / 5864298.0 ft	HA-14-009
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line): 122.7' Rt Sta 1067+17.09	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 15.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND (SM); medium dense; brown; dry; mostly fine and medium, subangular SAND; little fines; trace fine, angular GRAVEL.												
	1														
	2				1	21 40 38	78								
	3		- yellowish brown. - loose.												
	4				2	12 21 20	41								
	5		- medium dense; fine SAND.												
	6				3	17 40 33	73								
	7		- trace caliche nodules.												
	8				4	19 33 26	59								
	9		- brown; caliche stringers. - dark yellowish brown.												
	10				5	23 32 40	72								
	11														
	12				6	31 33 31	64								
	13														
	14				7	39 34 21	55								
	15														
	16		Bottom of borehole at 15.5 ft bgs												
	17		Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86												
	18		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	19														
	20														
	21														
	22														
	23														
	24														
	25														

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REPORT TITLE				HOLE ID
BORING RECORD				HA-14-009
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET 1 of 1	

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LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	5-22-14	5-22-14	2440561.3 ft / 5864544.7 ft	HA-14-010
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line): 86.5' Rt Sta 1071+68.41	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 15.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND (SM); loose; light yellowish brown; from dry to moist; fine SAND; little fines; trace organics.												
	1														
	2		SANDY SILT (ML); loose; dark brown; moist.		1	7 8 7	15								
	3		SILTY SAND (SM); medium dense; dark brown; moist; fine SAND; little fines; trace organics (roots).												
	4		CLAYEY SAND (SC); medium dense; yellowish brown; moist; fine SAND; little fines.		2	11 31 52	83								
	5		SANDY fat CLAY (CH); very stiff; brown; moist; fine SAND ; caliche stringers and nodules; trace organics; pp= 2-3 tsf.												
	6				3	13 19 17	36								
	7		CLAYEY SAND (SC); medium dense; yellowish brown and brown; moist; mostly fine and medium SAND; little medium plasticity fines.												
	8		SANDY SILT (ML); medium dense; dark yellowish brown; moist; fine and medium SAND ; caliche stringers; laminated. - few medium plasticity fines. - (SILTY SAND) (SM); yellowish brown; fine and medium SAND; 4" lense.		4	13 13 18	31								
	9														
	10		Fat CLAY with SAND (CH); very stiff; dark yellowish brown; moist; fine SAND ; pp=>2.0 tsf. - (SANDY fat CLAY) (CH); lense <6".		5	7 15 27	42								
	11														
	12				6	10 23 24	47								
	13														
	14				7	8 20 33	53								
	15														
	16		Bottom of borehole at 15.5 ft bgs												
	17		Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86												
	18		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	19														
	20														
	21														
	22														
	23														
	24														
	25														

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REPORT TITLE				HOLE ID
BORING RECORD				HA-14-010
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET 1 of 1	

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LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	5-22-14	5-22-14	2436760.5 ft / 5860744.4 ft	HA-14-011
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line): 62.8' Rt Sta 16+08.08	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 15.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0–1		SILTY SAND (SM); loose; yellowish brown; from dry to moist; mostly fine and medium, angular SAND; little fines.												
	2–3		Poorly graded SAND (SP); loose; light yellowish brown; moist; fine SAND.		1	5 11 16	27								
	4–6		SILTY SAND (SM); medium dense; yellowish brown; moist; mostly fine SAND; little fines.		2	14 28 18	46								
	6–7		SANDY SILT (ML); medium dense; brown; moist; some fine SAND ; caliche nodules.		3	11 15 19	34								
	8		SILTY SAND (SM); medium dense; dark yellowish brown; moist; mostly fine SAND; little fines.		4	17 19 22	41								
	9–15		SANDY SILT (ML); medium dense; dark brown; moist; fine SAND; little fines; caliche stringers and nodules; interbedded with <1.0' beds of fine SILTY SAND(SM).		5	15 18 18	36								
					6	11 20 23	43								
					7	12 13 26	39								
	16		Bottom of borehole at 15.5 ft bgs												

Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86

This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.

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REPORT TITLE				HOLE ID
BORING RECORD				HA-14-011
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET 1 of 1	

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LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	5-28-14	5-28-14	2438467.0 ft / 5861460.0 ft	HA-14-012
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line): 328.8' Rt Sta 1034+92.03	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 12.0 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND with GRAVEL (SM); loose; brown; dry; mostly fine SAND; little fines; little subrounded GRAVEL.												
	1														
	2		- some fines; trace caliche.		1	15	60								
	3					31									
						29									
	4		SANDY SILT with GRAVEL (ML); medium dense; dark yellowish brown; moist; fine SAND; little fine, subangular GRAVEL; (flood deposits).		2	21	85								
	5		SILTY SAND with GRAVEL (SM); medium dense; dark yellowish brown; moist; from fine to coarse, subangular and subrounded SAND; little fines; little fine, subangular GRAVEL.			38									
						47									
	6				3	31	83								
	7					36									
						47									
	8		Poorly graded SAND (SP); medium dense; light yellowish brown; moist; mostly fine SAND.												
	9				4	105	400								
	10		- very dense; fine and medium SAND; trace fine subangular GRAVEL.			200									
						200									
	11														
	12		Bottom of borehole at 12.0 ft bgs		5	100									
	13		Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86												
	14		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	15														
	16														
	17														
	18														
	19														
	20														
	21														
	22														
	23														
	24														
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REPORT TITLE				HOLE ID
BORING RECORD				HA-14-012
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET 1 of 1	

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LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	5-28-14	5-28-14	2438393.3 ft / 5862022.7 ft	HA-14-013
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line): 110.2' Rt Sta 1038+44.93	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 15.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SANDY SILT (ML); medium dense; brown; from dry to moist; fine SAND ; trace organics.												
	2		SILTY SAND (SM); medium dense; yellowish brown; moist; mostly fine SAND ; some nonplastic fines.		1	39 36 37	73								
	4		SANDY SILT (ML); medium dense; dark brown; moist; some fine SAND.		2	24 30 36	66								
	6		SILTY SAND (SM); medium dense; brown; moist; fine SAND; some fines.		3	38 41 31	72								
	8		SANDY SILT (ML); medium dense; dark brown; moist; fine SAND ; caliche stringers.		4	37 46 71	117								
	10				5	23 31 34	65								
	11		SILT (ML); medium dense; mottled; dark yellowish brown; dark brown; moist; caliche stringers; laminated.												
	12				6	14 23 27	50								
	13		Lean CLAY with SAND (CL); very stiff; dark yellowish brown; moist; fine SAND ; laminated; pp=>4.0 tsf.												
	14				7	14 18 24	42								
	15														
	16		Bottom of borehole at 15.5 ft bgs												
	17		Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86												
	18		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	19														
	20														
	21														
	22														
	23														
	24														
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REPORT TITLE				HOLE ID
BORING RECORD				HA-14-013
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET 1 of 1	

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LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	6-13-14	6-13-14	2435954.0 ft / 5848614.8 ft	HA-14-014
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line): 85.8' Rt Sta 893+16.50	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 14.5 ft

ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SANDY SILT (ML); loose; brown; from dry to moist; some fine SAND.												
	1														
	2				1	6 9 9	18								
	3														
	4		- medium dense; yellowish brown.		2	7 12 26	38								
	5		SILT with SAND (ML); medium dense; brown; moist; fine SAND ; caliche.												
	6		Lean CLAY (CL); stiff; dark brown; moist; trace fine SAND ; caliche; pp=2.5 tsf.		3	18 19 24	43								
	7														
	8				4	14 16 18	34								
	9		SILTY SAND (SM); loose; dark yellowish brown; moist; mostly fine SAND ; little nonplastic fines ; caliche.												
	10				5	10 11 12	23								
	11														
	12														
	13				6	12 14 16	30								
	14														
	15		Bottom of borehole at 14.5 ft bgs												
	16		Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86												
	17		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	18														
	19														
	20														
	21														
	22														
	23														
	24														
	25														

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REPORT TITLE				HOLE ID
BORING RECORD				HA-14-014
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY		DATE	SHEET 1 of 1

5 BR - STANDARD WHITLEY 2B HAND AUGER 2014.GPJ CALTRANS LIBRARY (FEB 2013).GLB 6/27/14

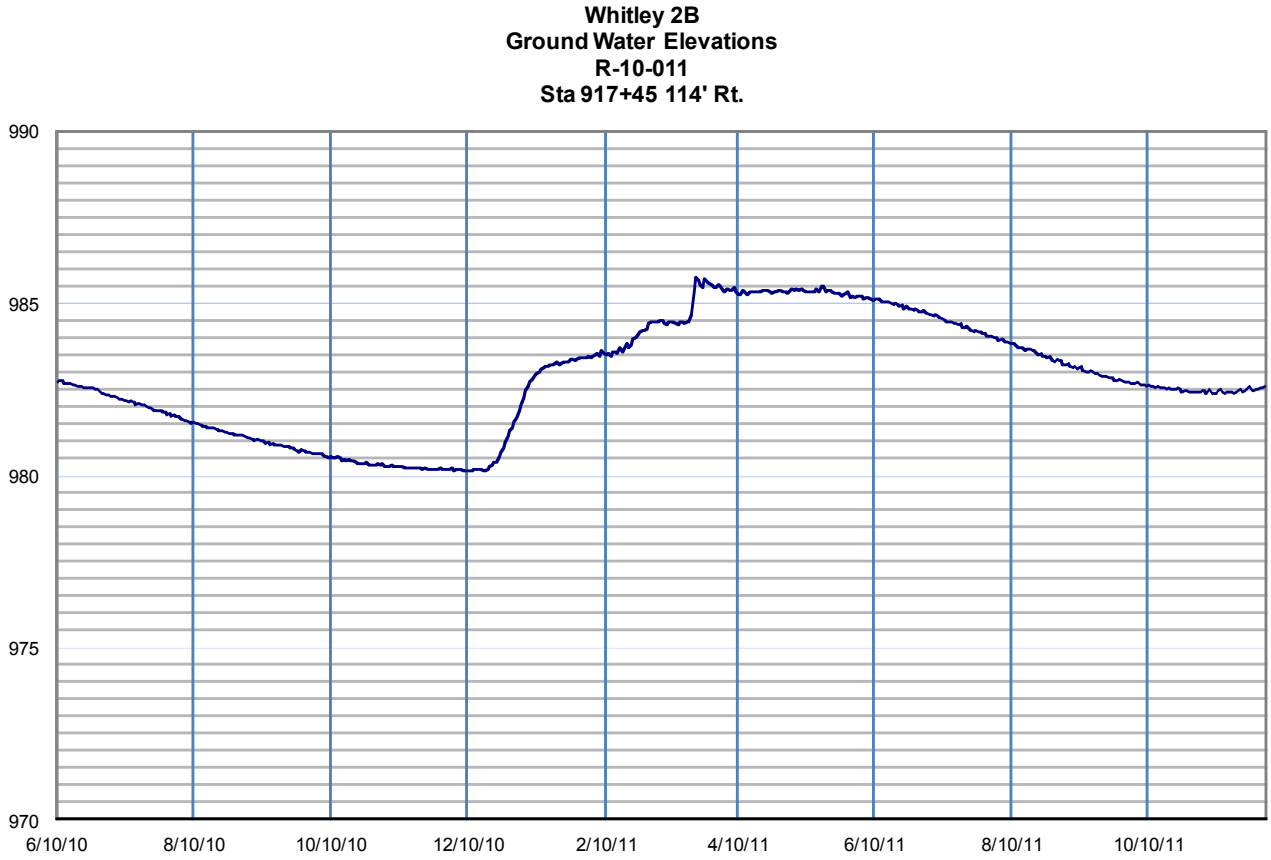
LOGGED BY	BEGIN DATE	COMPLETION DATE	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	HOLE ID
M. Jurasius	6-13-14	6-13-14	2436018.4 ft / 5849445.1 ft	HA-14-015
DRILLING CONTRACTOR: GeoTech North			BOREHOLE LOCATION (Offset, Station, Line): 87.0' Rt Sta 901+49.12	SURFACE ELEVATION
DRILLING METHOD: Hand Auger			DRILL RIG	BOREHOLE DIAMETER: 4"
SAMPLER TYPE(S) AND SIZE(S) (ID): 1" Dia solid closed tip			SPT HAMMER TYPE: 28lbs; 12" drop	HAMMER EFFICIENCY, ERi
BOREHOLE BACKFILL AND COMPLETION			GROUNDWATER READINGS: DURING DRILLING / AFTER DRILLING (DATE)	TOTAL DEPTH OF BORING: 16.0 ft

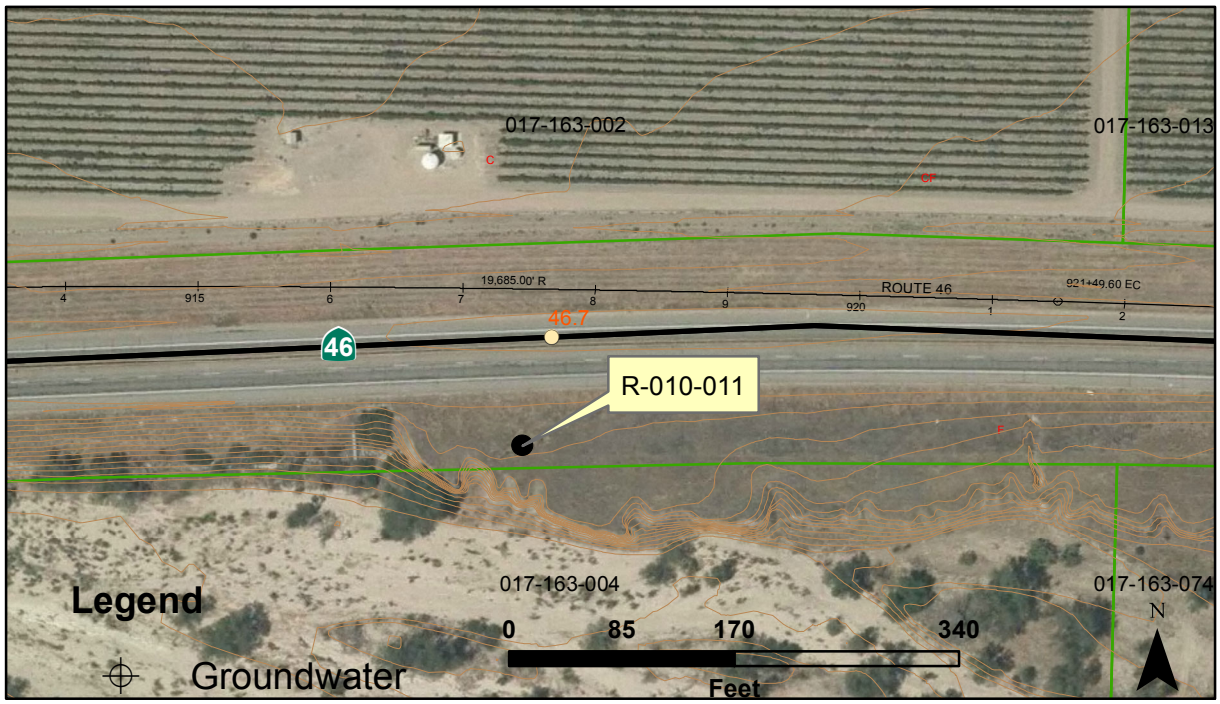
ELEVATION (ft)	DEPTH (ft)	Material Graphics	DESCRIPTION	Sample Location	Sample Number	Blows per 6 in.	Blows per foot	Recovery (%)	RQD (%)	Moisture Content (%)	Dry Unit Weight (pcf)	Shear Strength (tsf)	Drilling Method	Casing Depth	Remarks
	0		SILTY SAND (SM); loose; brown; from dry to moist; mostly fine SAND ; little nonplastic fines.												
	1														
	2		- yellowish brown.		1	8 8 16	24								
	3														
	4		- medium dense.		2	21 28 25	53								
	5														
	6		- dark yellowish brown.		3	16 30 26	56								
	7		SANDY SILT (ML); medium dense; dark yellowish brown; moist; fine SAND.												
	8		- plastic debris (historic flood plain).		4	23 25 26	51								
	9		SILTY SAND (SM); medium dense; yellowish brown; moist; mostly fine SAND ; little nonplastic fines.												
	10		SANDY SILT (ML); medium dense; dark yellowish brown; moist; some fine SAND ; trace Lean CLAY.		5	21 23 26	49								
	11		SILT with SAND (ML); medium dense; dark yellowish brown; moist; fine SAND ; caliche.												
	12				6	17 13 13	26								
	13		SILTY SAND (SM); loose; yellowish brown; moist; fine SAND ; little nonplastic fines.												
	14														
	15		- medium dense.		7	30 27 31	58								
	16		Bottom of borehole at 16.0 ft bgs												
	17		Notes: Multiplie "blows per foot" by .22 for equivalent SPT blow counts; ASTM 15/86												
	18		This Boring Record was developed in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010) except as noted on the Soil or Rock Legend or below.												
	19														
	20														
	21														
	22														
	23														
	24														
	25														

Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE				HOLE ID
BORING RECORD				HA-14-015
DIST. 05	COUNTY SLO	ROUTE 46	POSTMILE M46.0/50.2	PROJECT ID 0512000076
PROJECT OR BRIDGE NAME: Whitley 2 B				
BRIDGE NUMBER	PREPARED BY	DATE	SHEET 1 of 1	

5 BR - STANDARD WHITLEY 2B HAND AUGER 2014.GPJ CALTRANS LIBRARY (FEB 2013).GLB 6/27/14





ATTACHMENT 8
GROUNDWATER
SLO-46 Corridor Improvements
Whitley 2B Segment
05-SLO-46-46.0/50.2

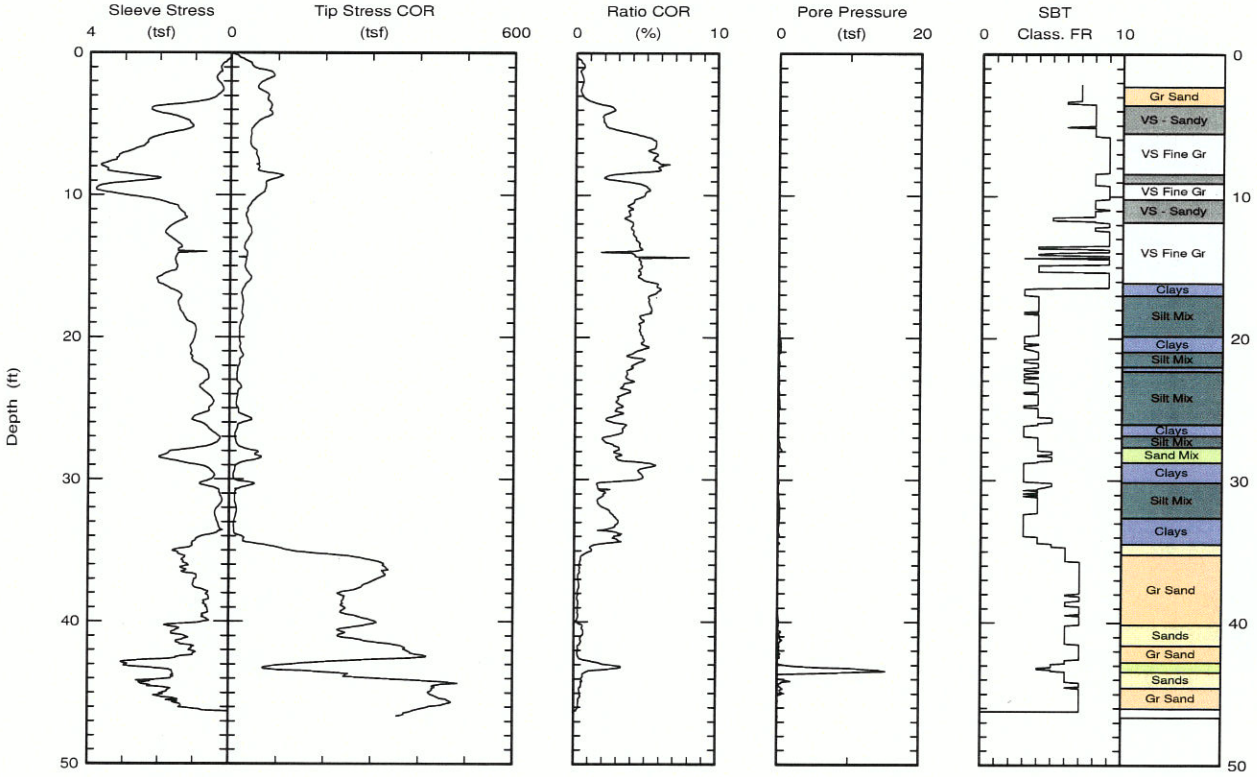
ATTACHMENT 9

CONE PENETRATION TEST DATA

WHITLEY 2B CORRIDOR IMPROVEMENTS

05-SLO-046-46.0/50.2

Division of Engineer Service Geotechnical Service 5900 Folsom Blvd. Sac., CA 95819 www.dot.ca.gov	Lat: Lon: Elevation:	Date: 19/Mar/2013 Test ID: 19M02-001 Project: 05330784
	Customer: MKE JURASIUS Job Site: WHITLEY2B	

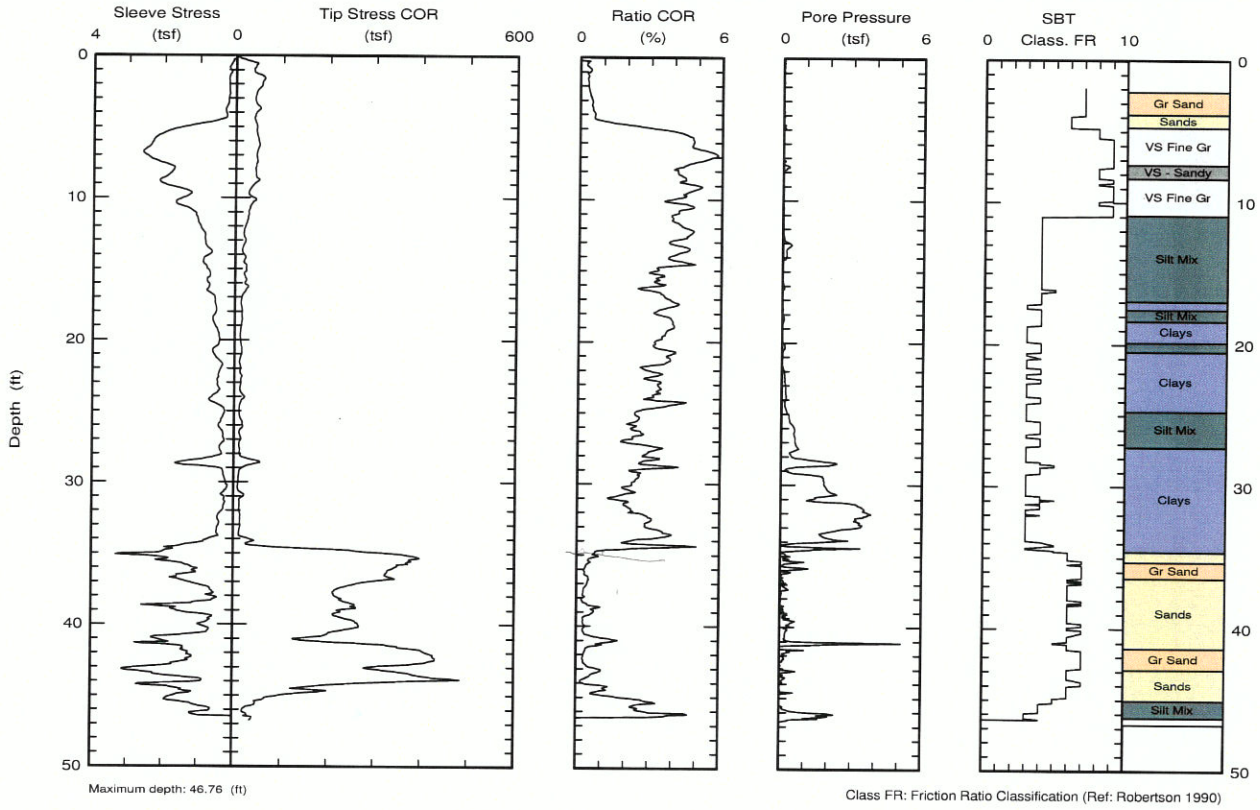


Maximum depth: 46.65 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 19M02-001
File: CPT19M1302C.ecp

Division of Engineer Service Geotechnical Service 5900 Folsom Blvd. Sac., CA 95819 www.dot.ca.gov	Lat: Lon: Elevation:	Date: 19/Mar/2013 Test ID: 19M01-002 Project: 05330784
	Customer: MKE JURASIUS Job Site: WHITLEY2B	

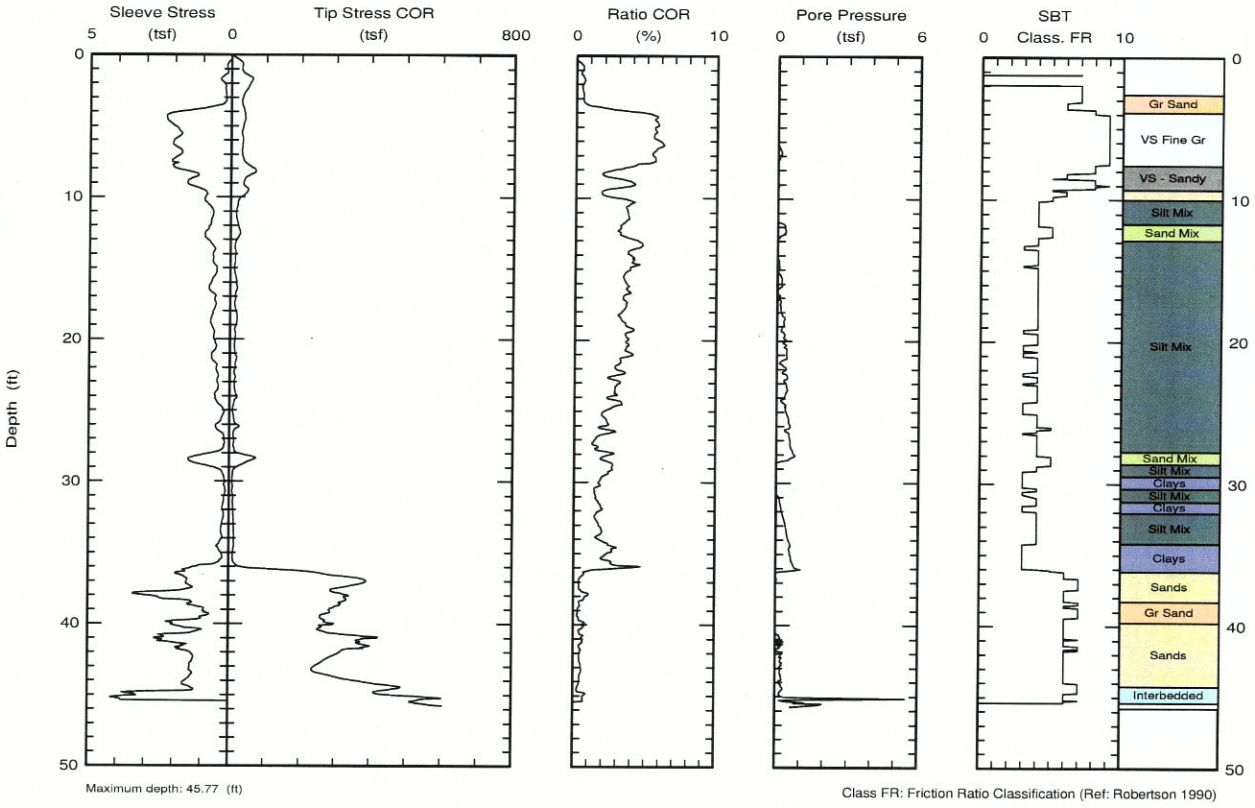


Maximum depth: 46.76 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 19M01-002
File: CPT19M1301C.ecp

Division of Engineer Service Geotechnical Service 5900 Folsom Blvd. Sac., CA 95819 www.dot.ca.gov	Lat: Lon: Elevation:	Date: 19/Mar/2013 Test ID: 19M03-003 Project: 05330784
	Customer: MKE JURASIUS Job Site: WHITLEY2B	

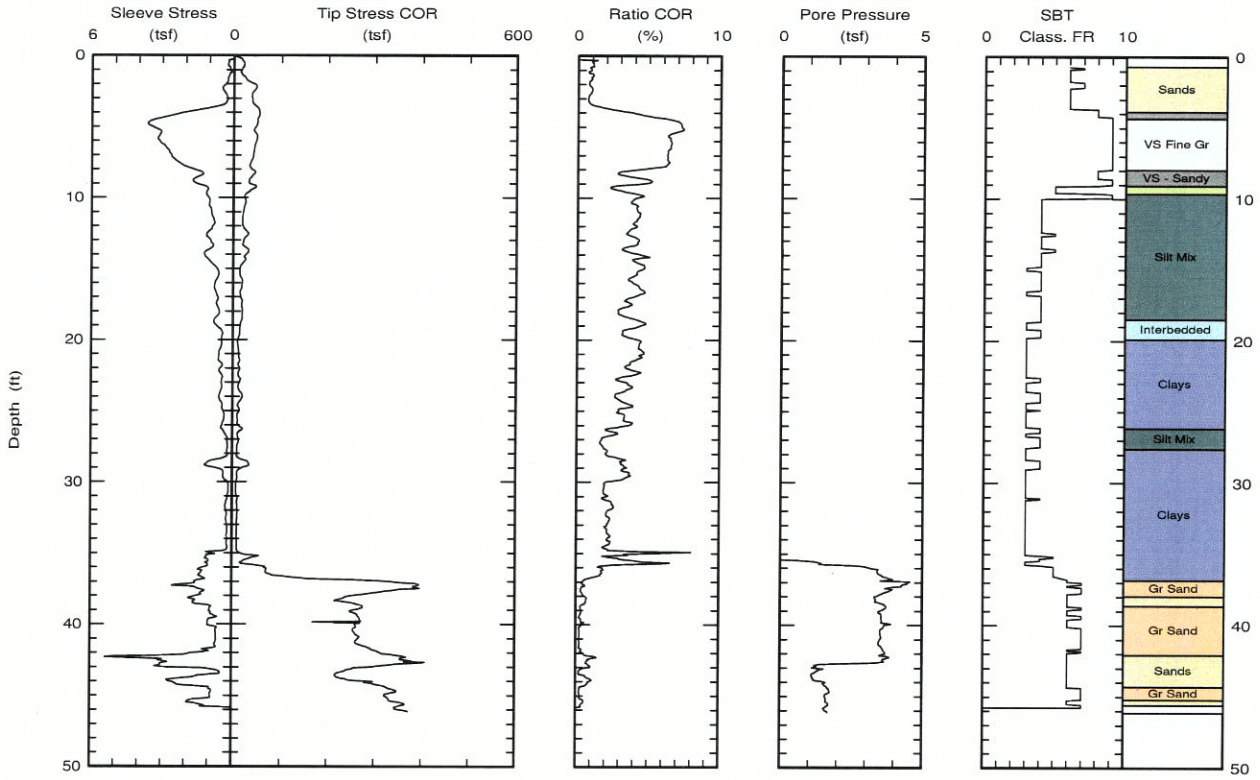


Maximum depth: 45.77 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 19M03-003
File: CPT19M1303C.ecp

Division of Engineer Service Geotechnical Service 5900 Folsom Blvd. Sac., CA 95819 www.dot.ca.gov	Lat: Lon: Elevation:	Date: 19/Mar/2013 Test ID: 19M05-004B Project: 05330784
	Customer: MKE JURASIUS Job Site: WHITLEY2B	

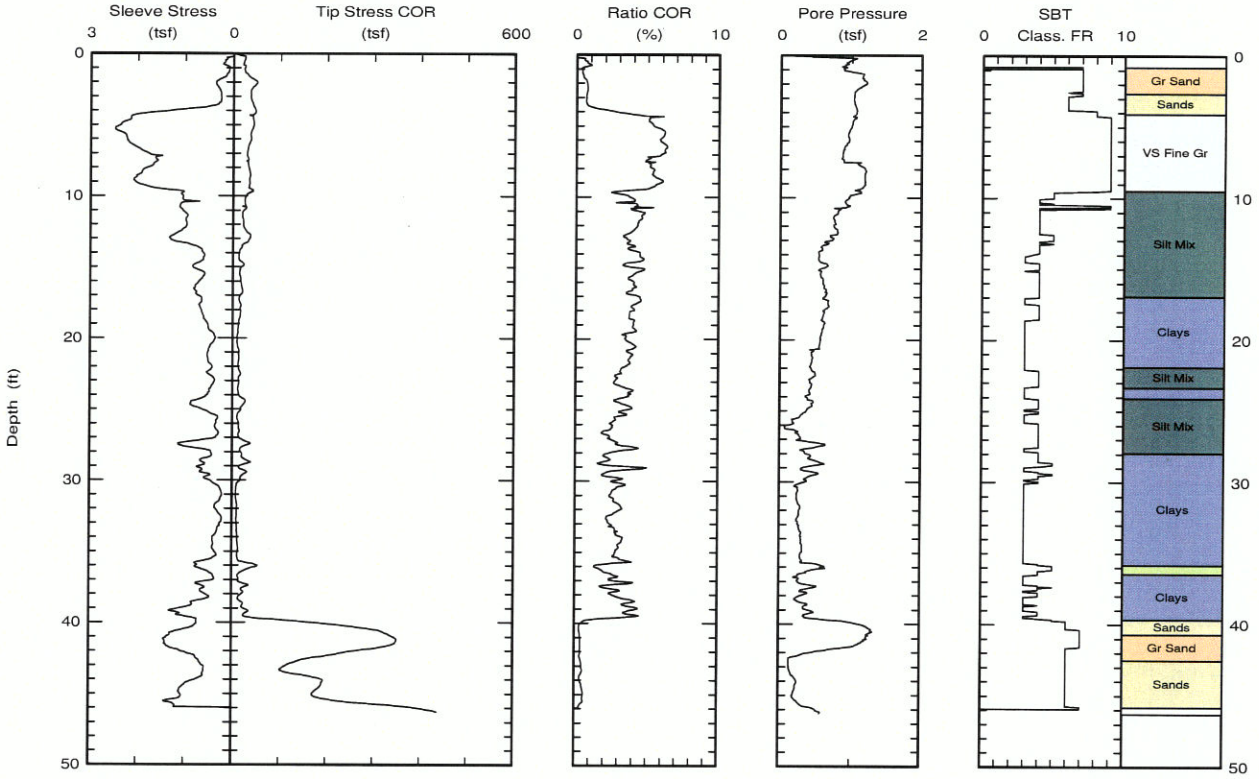


Maximum depth: 46.14 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 19M05-004B
File: CPT19M1305C.ecp

Division of Engineer Service Geotechnical Service 5900 Folsom Blvd. Sac., CA 95819 www.dot.ca.gov	Lat: Lon: Elevation:	Date: 19/Mar/2013 Test ID: 19M06-005 Project: 05330784
	Customer: MKE JURASIUS Job Site: WHITLEY2B	

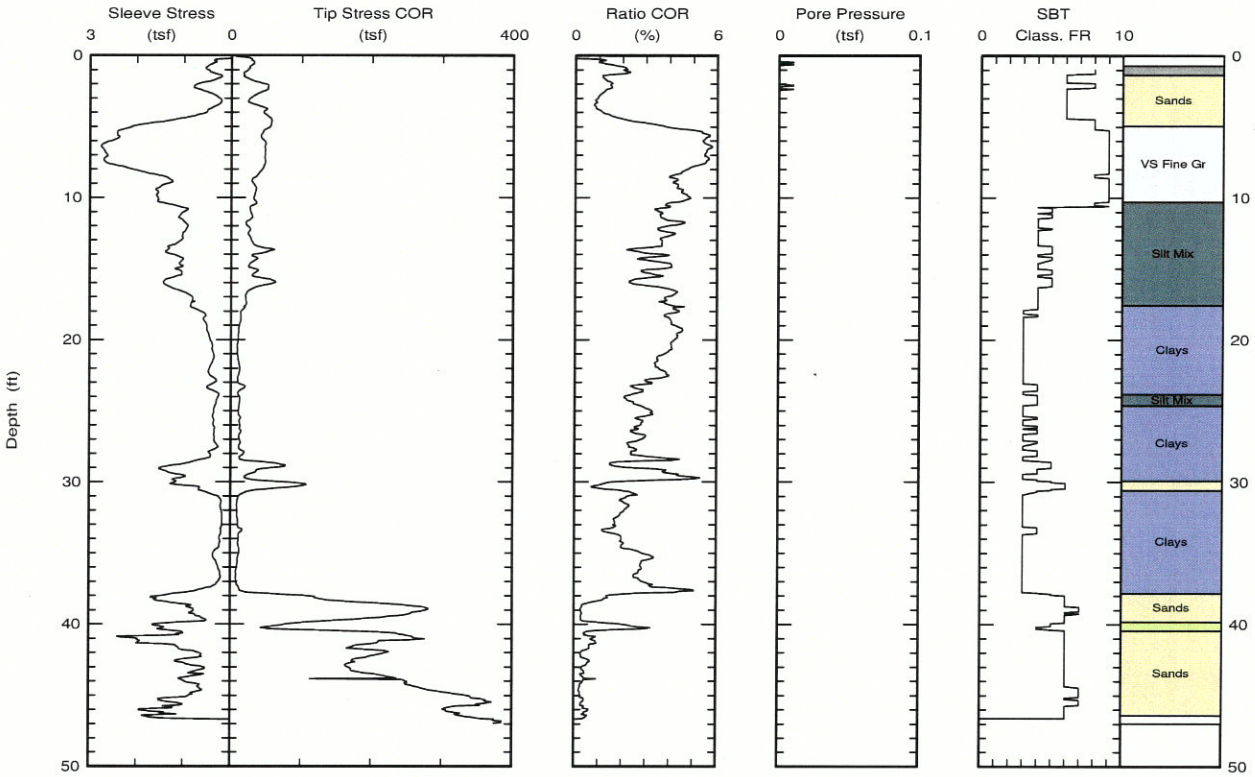


Maximum depth: 46.29 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 19M06-005
File: CPT19M1306C.ecp

Division of Engineer Service Geotechnical Service 5900 Folsom Blvd. Sac., CA 95819 www.dot.ca.gov	Lat: Lon: Elevation:	Date: 19/Mar/2013 Test ID: 19M07-006 Project: 05330784
	Customer: MKE JURASIUS Job Site: WHITLEY2B	

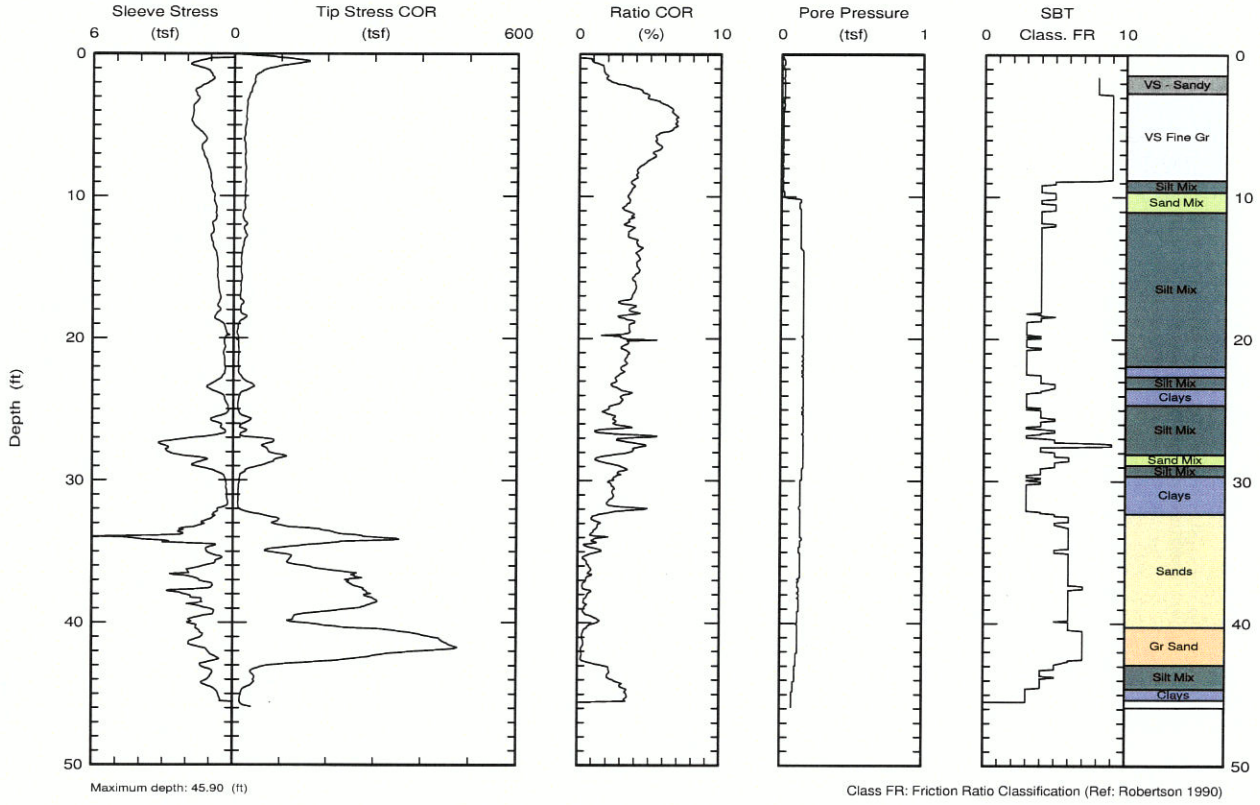


Maximum depth: 46.98 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 19M07-006
File: CPT19M1307C.ecp

Division of Engineer Service Geotechnical Service 5900 Folsom Blvd. Sac., CA 95819 www.dot.ca.gov	Lat: Lon: Elevation:	Date: 19/Mar/2013 Test ID: 19M08-007 Project: 05330784
	Customer: MKE JURASIUS Job Site: WHITLEY2B	

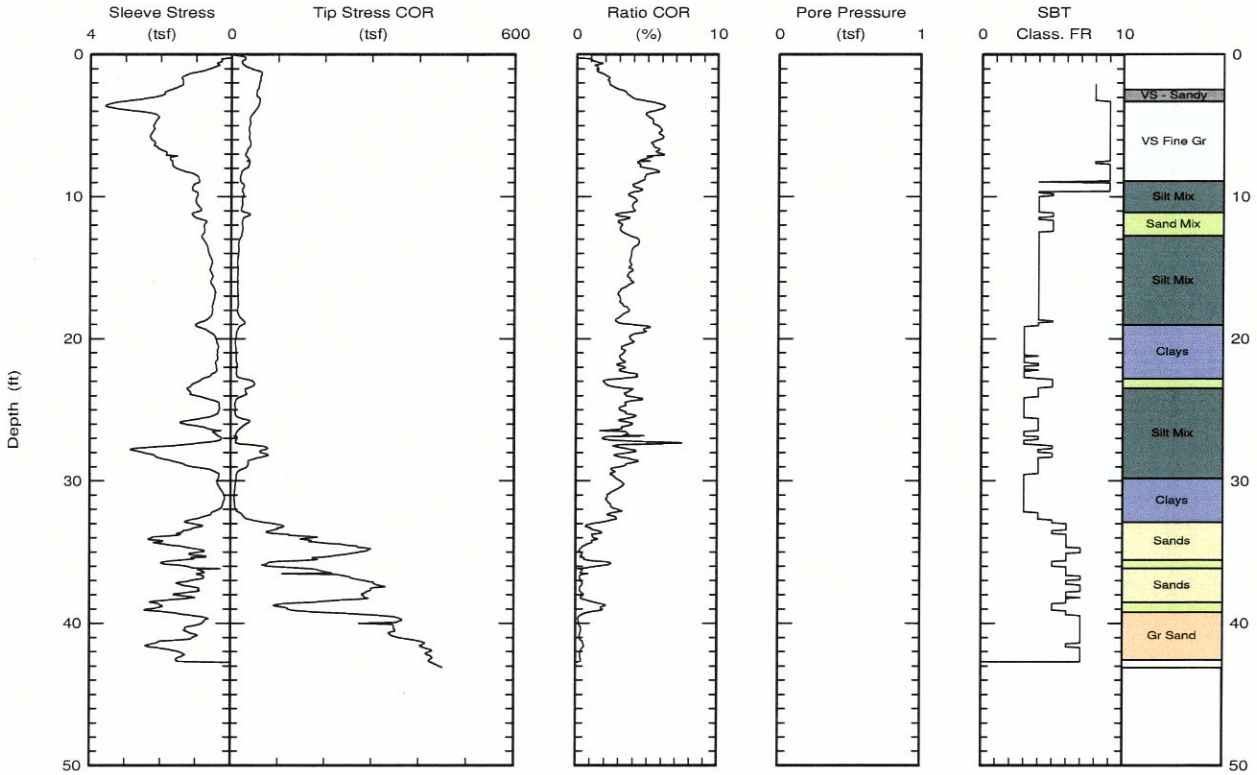


Maximum depth: 45.90 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 19M08-007
File: CPT19M1308C.ecp

Division of Engineer Service Geotechnical Service 5900 Folsom Blvd. Sac., CA 95819 www.dot.ca.gov	Lat: Lon: Elevation:	Date: 20/Mar/2013 Test ID: 20M01-008 Project: 05330784
	Customer: MKE JURASIUS Job Site: WHITLEY2B	

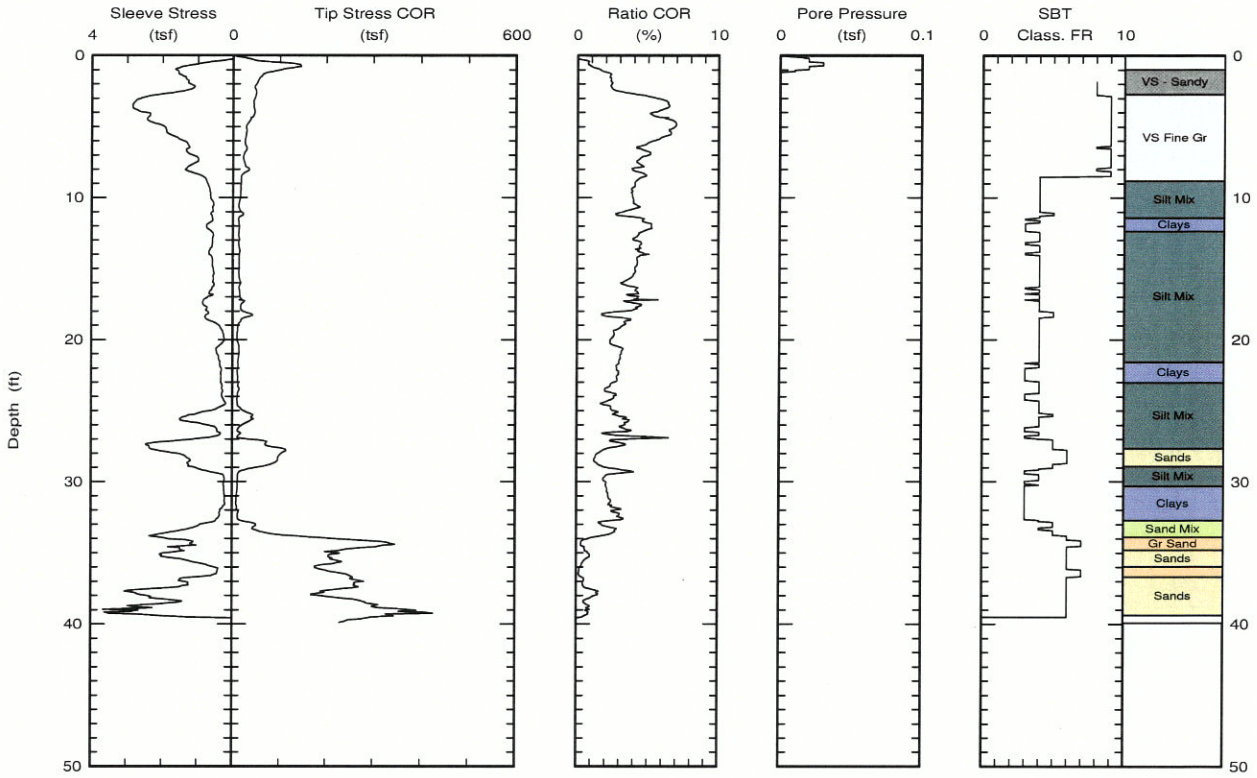


Maximum depth: 43.11 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 20M01-008
File: CPT20M1301C.ecp

Division of Engineer Service Geotechnical Service 5900 Folsom Blvd. Sac., CA 95819 www.dot.ca.gov	Lat: Lon: Elevation:	Date: 20/Mar/2013 Test ID: 20M02-009 Project: 05330784
	Customer: MKE JURASIUS Job Site: WHITLEY2B	

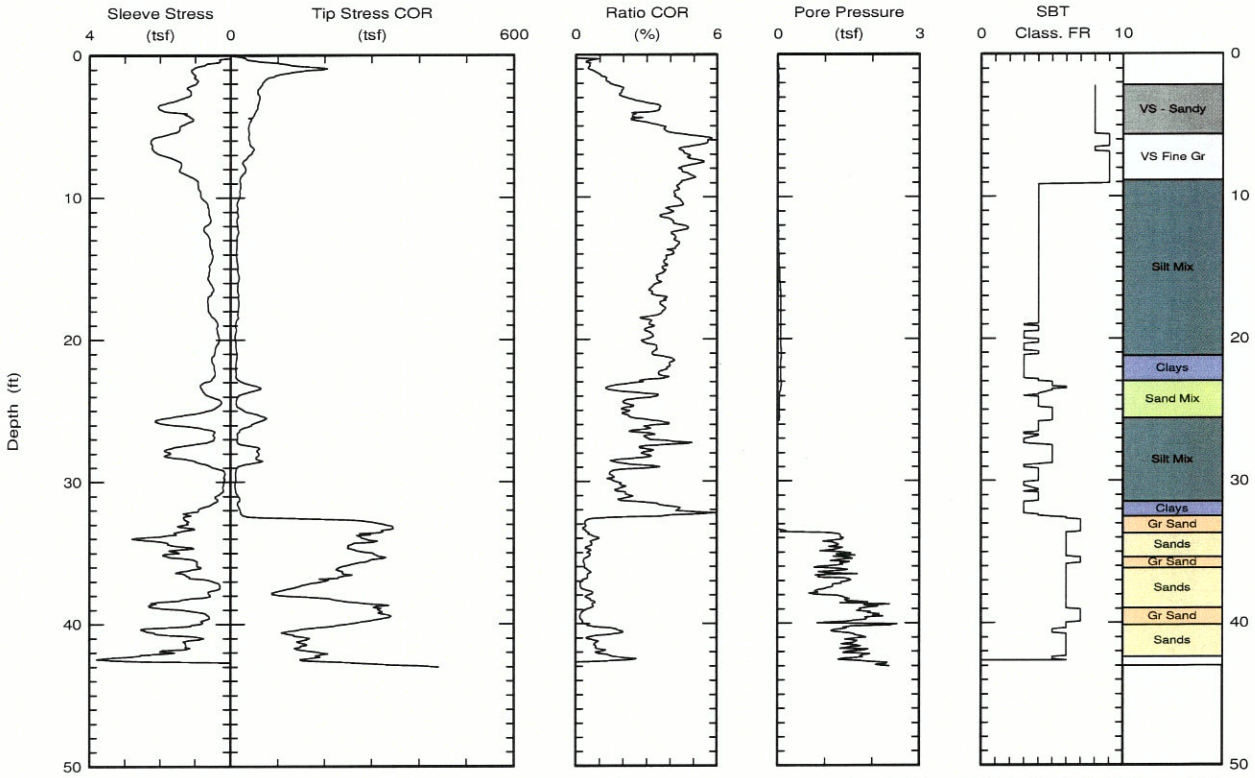


Maximum depth: 39.90 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 20M02-009
File: CPT20M1302C.ecp

Division of Engineer Service Geotechnical Service 5900 Folsom Blvd. Sac., CA 95819 www.dot.ca.gov	Lat: Lon: Elevation:	Date: 20/Mar/2013 Test ID: 20M03-010 Project: 05330784
	Customer: MKE JURASIUS Job Site: WHITLEY2B	

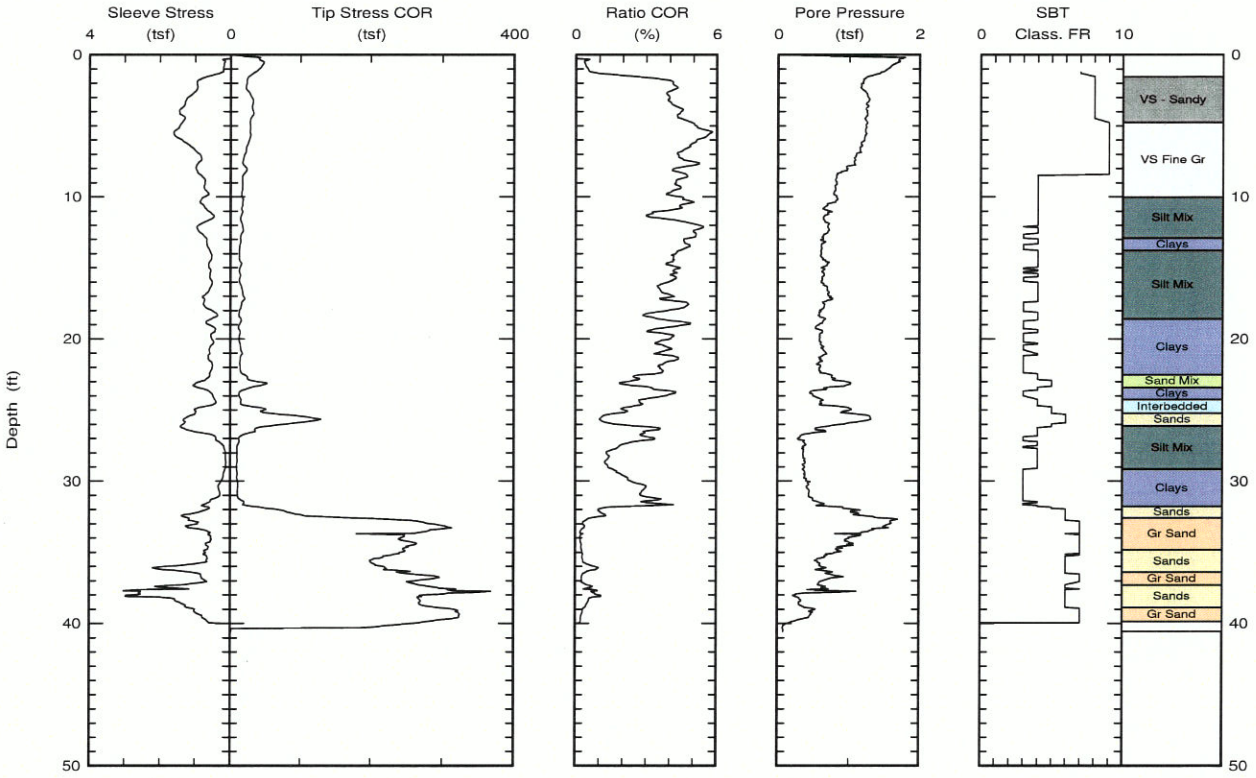


Maximum depth: 43.02 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 20M03-010
File: CPT20M1303C.ecp

Division of Engineer Service Geotechnical Service 5900 Folsom Blvd. Sac., CA 95819 www.dot.ca.gov	Lat: Lon: Elevation:	Date: 20/Mar/2013 Test ID: 20M04-011 Project: 05330784
	Customer: MKE JURASIUS Job Site: WHITLEY2B	

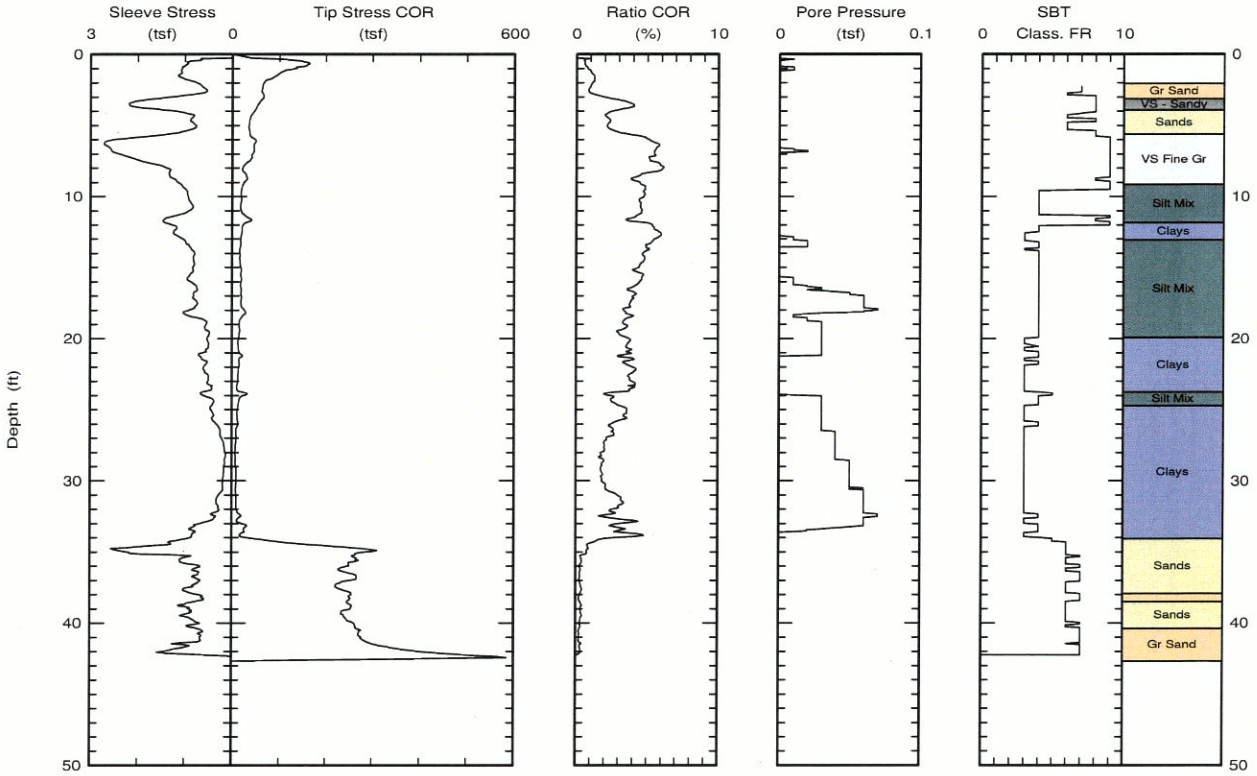


Maximum depth: 40.57 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 20M04-011
File: CPT20M1304C.ecp

Division of Engineer Service Geotechnical Service 5900 Folsom Blvd. Sac., CA 95819 www.dot.ca.gov	Lat: Lon: Elevation:	Date: 20/Mar/2013 Test ID: 20M05-012 Project: 05330784
	Customer: MKE JURASIUS Job Site: WHITLEY2B	

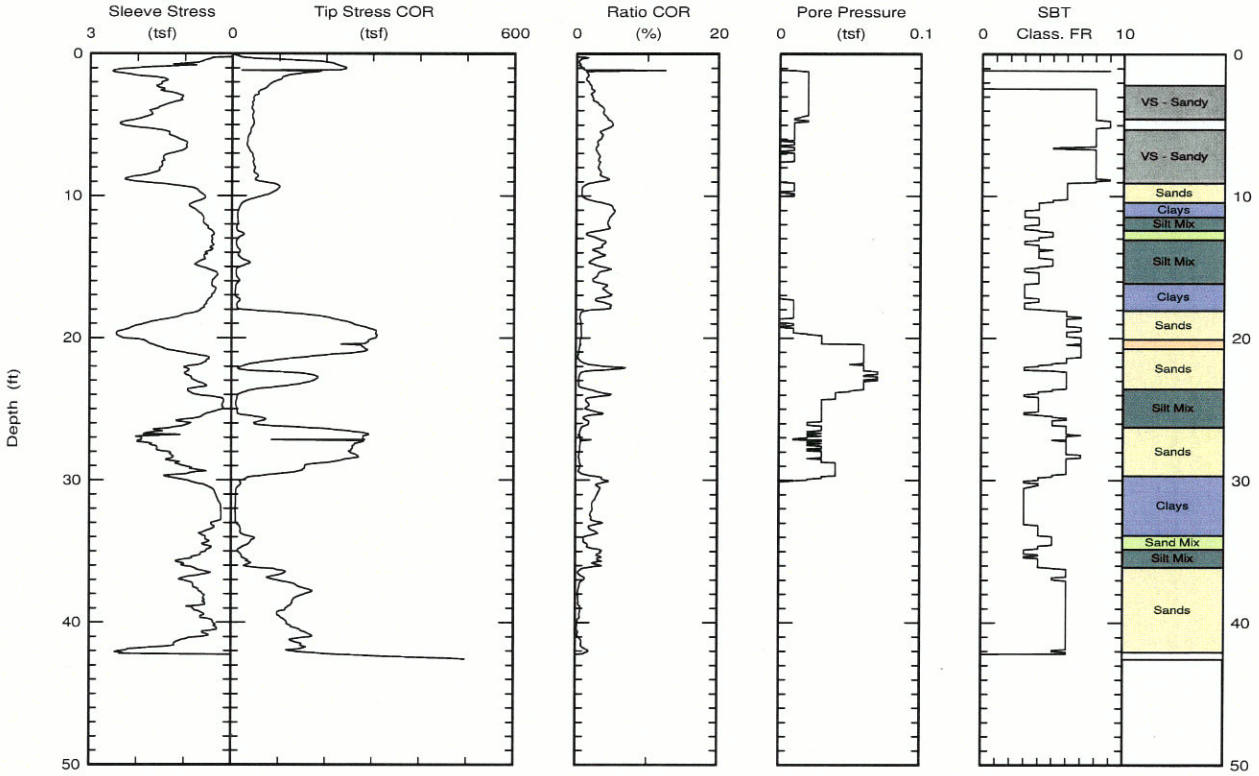


Maximum depth: 42.68 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 20M05-012
File: CPT20M1305C.ecp

Division of Engineer Service Geotechnical Service 5900 Folsom Blvd. Sac., CA 95819 www.dot.ca.gov	Lat: Lon: Elevation:	Date: 20/Mar/2013 Test ID: 20M06-013 Project: 05330784
	Customer: MKE JURASIUS Job Site: WHITLEY2B	

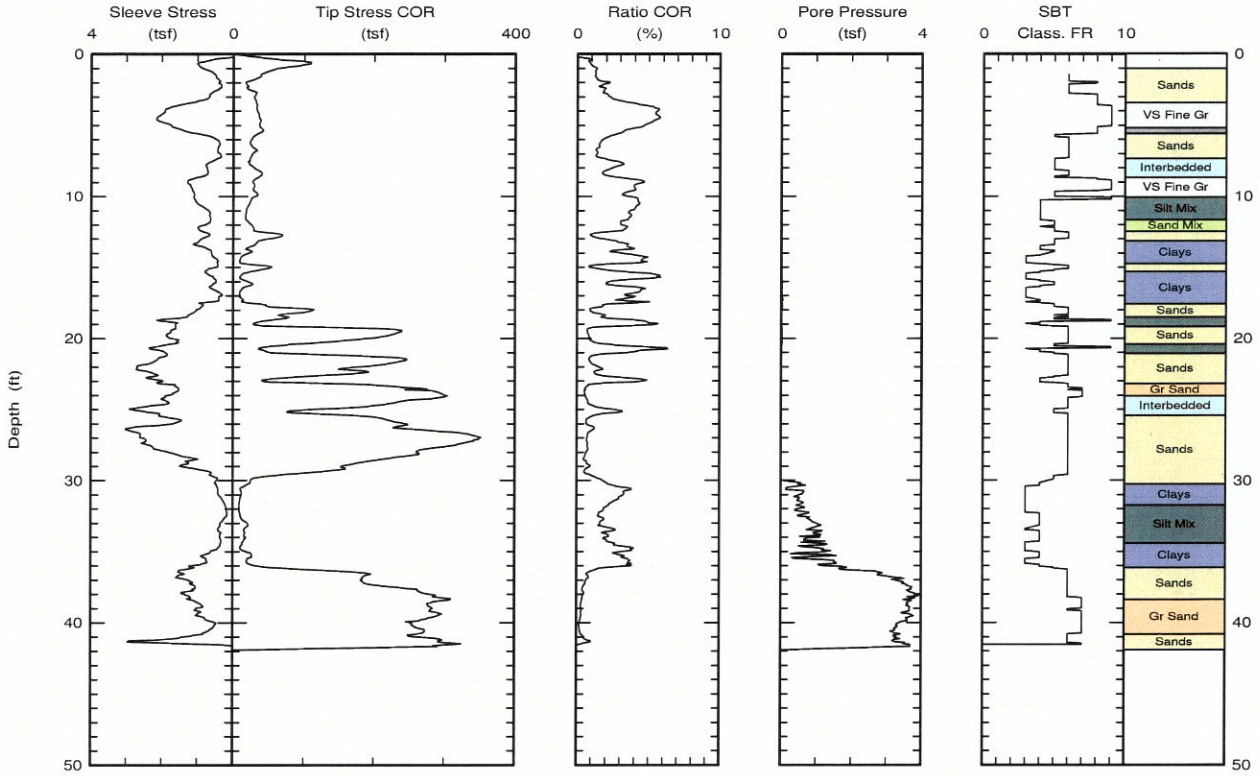


Maximum depth: 42.57 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 20M06-013
File: CPT20M1306C.ecp

Division of Engineer Service Geotechnical Service 5900 Folsom Blvd. Sac., CA 95819 www.dot.ca.gov	Lat: Lon: Elevation:	Date: 20/Mar/2013 Test ID: 20M07-014 Project: 05330784
	Customer: MKE JURASIUS Job Site: WHITLEY2B	



Maximum depth: 41.92 (ft)

Class FR: Friction Ratio Classification (Ref: Robertson 1990)

Test ID: 20M07-014
File: CPT20M1307C.ecp