Appendix N. Structure Preliminary Geotechnical Report for the Culver Boulevard Bridge Over SR-1/Lincoln Boulevard

STRUCTURE PRELIMINARY GEOTECHNICAL REPORT
CULVER BOULEVARD BRIDGE REPLACEMENT
LOS ANGELES, CALIFORNIA

Submitted to

PSOMAS

and

CALTRANS

Prepared for

PSOMAS

555 South Flower Street, Suite 4300

Los Angeles, California, 90071

Prepared by

GROUP DELTA CONSULTANTS, INC.

370 Amapola Avenue, Suite 212

Los Angeles, California 90501

Group Delta Project No. LA1590

November 7, 2022

GROUP DELTA

PSOMAS
555 South Flower Street, Suite 4300
Los Angeles, California, 90071

November 7, 2022
Project No. LA1590

Attention: Tim Hayes
Project Manager

SUBJECT: Structure Preliminary Geotechnical Report
Culver Boulevard Bridge Replacement
Los Angeles, California

Dear Mr. Hayes,

Group Delta is pleased to submit our Structure Preliminary Geotechnical Report (SPGR) for the subject new bridge structure replacing the existing Culver Boulevard bridge in accordance with our revised proposal dated October 4, 2022. Please feel free to contact us if you have questions or comments.

Sincerely,
GROUP DELTA CONSULTANTS, INC.

REGISTERED PROFESSIONAL ENGINEER
PIROOZ KASHIGHANDI
GE 3104
GEOTECHNICAL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
ASHEESH PRADHAN
No. C 89285
CIVIL
STATE OF CALIFORNIA

Pirooz Kashighandi, Ph.D., G.E.
Senior Geotechnical Engineer

Asheesh Pradhan, Ph.D., P.E.
Project Engineer

Distribution: Addressee (PDF file to Psomas)

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1.0 INTRODUCTION

The following document presents a Structure Preliminary Geotechnical Report (SPGR) for the proposed new Culver Boulevard bridge replacing the existing Culver Boulevard bridge (Bridge No. 53-89) in Los Angeles, California. Culver Boulevard crosses over Lincoln Boulevard about 300 feet northwest of Ballona Creek, as shown on the Site Location Map, Figure 1A. The site vicinity is shown in more detail in Figure 1B. Photographs of the bridge at present, and during construction in 1937 are provided in Figures 1C and 1D.

A preliminary layout for the proposed new bridge is shown in the Proposed Development, Figure 2A. The bridge profile and deck configuration are shown in Figure 2B. The approximate locations of 36 explorations that have previously been conducted within about 1,500 feet of Lincoln Boulevard are shown in the Existing Explorations, Figure 3A. An aerial photograph showing the approximate locations of the 4 explorations we propose for the final design is provided in Figure 3B.

The purpose of this study was to characterize the pertinent geotechnical conditions at the site and provide preliminary geotechnical input for the proposed bridge. Our conclusions and recommendations are based on the previous subsurface explorations and laboratory testing, as well as supplemental engineering analyses, and our previous experience with similar geologic conditions. This SPGR was prepared in general accordance with Caltrans Guidelines for the Preparation of Foundation Reports for Bridges (Caltrans, 2021a).

1.1 Purpose and Scope of Work

This SPGR is provided to support Advanced Planning Studies at the Project Approval/Environmental Document (PA/ED) stage of the project, in accordance with Caltrans's "Foundation Reports for Bridges" (Caltrans, 2021a). The scope of work included:

- A review of the surface characteristics of the site, available geologic hazard maps, geotechnical reports, and aerial photographs.
- A review of 36 explorations that were conducted in the site vicinity between 1998 and 2013.
- A review of previous laboratory tests conducted on samples collected from the exploratory borings.
- Analysis of the available field and laboratory data to help develop preliminary geotechnical input for the proposed bridge.
- Summary of anticipated site conditions, geology, and subsurface conditions.

- Summary of subsurface data and as-built foundation data.
- Preliminary scour and corrosion evaluation.
- Preliminary seismic information and recommendations.
- Preliminary evaluation of the liquefaction and seismic settlement and evaluation of the slope stability (lateral spreading) of the abutments based on liquefied soil profile, depths of liquefaction, residual shear strengths, etc.
- Preliminary recommendations for foundation type, size, and capacity.
- Recommend scope of additional investigations for final design, and
- Preparation of this report.

2.0 PROJECT DESCRIPTION

2.1 Project

The project consists of the construction of a new single-span precast girder bridge along Culver Boulevard crossing over Lincoln Boulevard 1,600 feet northwest of West Jefferson Boulevard replacing the existing Culver Boulevard bridge. Based on the structural drawings for the planning study, the bridge has a span of 150 feet. The bridge will be approximately 54 feet 4 inches wide with two traffic lanes and a shoulder and sidewalk on either side. The abutment retaining walls are stepped with a height of about 25 feet and 15 feet and each step is about 25 feet long.

The new bridge is proposed to be constructed over the existing bridge. Vehicular traffic along Culver Boulevard will be diverted during the construction. As discussed above, the existing bridge will be demolished.

2.2 Pertinent Reports and Investigations

The following reports and investigations from nearby projects performed by Group Delta and Pacific Soils Engineering were available and reviewed.

- Group Delta's nearby project Ballona Wetlands (Group Delta, 2013) that included three rotary wash (RW) borings, one hollow stem auger (HSA) boring, and six cone penetration test (CPT) soundings.

- Group Delta's nearby development project in Playa Vista (Group Delta, 1999) that included eleven borings and 8 CPTs.

- Pacific Soils Engineering's nearby development project in Playa Vista (Pacific Soils Engineering, 1998) that included eight exploratory borings and twelve CPTs.

2.3 Project Datum

The elevation data presented herein reflect feet above Mean Sea Level (MSL) based on the North American Vertical Datum of 1988 (NAVD88). Topographic roadway elevations, the elevation of the proposed bridge, and elevations from the as-built plans of the existing bridge are based on the National Geodetic Vertical Datum of 1929 (NGVD29). The horizontal datum is the North American Datum of 1983 (NAD83).

2.4 Exceptions to Policies and Procedures

No exceptions to policy or procedures are proposed.

3.0 FIELD INVESTIGATION

3.1 Existing Field and Laboratory Data

No new explorations were performed as part of this study. The available subsurface data in the site vicinity included three previous geotechnical investigations conducted near the Lincoln Boulevard Multi-Modal Improvement Project between 1998 and 2013. The data from the most recent field investigation for the Ballona Wetlands Restoration Project is reproduced in Figures A-1 through A-10 in Appendix A (Group Delta, 2013). The Ballona Wetlands study included the advancement of three rotary wash (RW) borings, one hollow-stem-auger (HSA) boring, and six cone penetrometer test (CPT) soundings within about 1,500 feet of Lincoln Boulevard. These explorations were advanced between September 14th and October 16th of 2012 (Group Delta, 2013).

Photocopies of 11 exploratory borings and 8 CPT soundings we previously conducted for the Playa Vista development are attached as the second Appendix A (Group Delta, 1999). Photocopies of 8 exploratory borings and 12 CPT soundings conducted by others for the Playa Vista development are also attached as the third Appendix A (Pacific Soils Engineering, 1998). The approximate locations for all these borings and CPT soundings are shown in the Existing Explorations, Figure 3A.

Soil samples were collected from the borings for laboratory testing and analyses. Previous testing programs included gradation analyses and Atterberg Limits to aid in material classification using the Unified Soil Classification System (USCS). Tests were conducted on relatively intact samples to estimate the in-situ dry density and moisture content of the materials encountered on site. Corrosivity tests were conducted to evaluate the pH, resistivity, chloride, and sulfate content of the on-site soils. Direct shear tests were conducted on relatively intact soil samples to aid in strength characterization. Consolidation tests were conducted on undisturbed samples of the alluvium to help characterize the potential for settlement. The laboratory test results for the three studies noted above are also presented in Appendix B (Group Delta, 1999 and 2013, and Pacific Soils Engineering, 1998).

The explorations utilized in this study are shown in Figure 3A and summarized in Table 1 below.

Table 1: Summary of Existing Subsurface Investigation

Exploration No.	Completion Date	Drill Rig Type	Hammer Type	Hammer Efficiency (%)	Approximate Ground Surface Elevation (ft)	Exploration Depth (ft)	Ground water Depth (ft)	Approximate Groundwater Elevation (ft)
Group Delta Consultants, Inc (1999)								
B-302R	12/11/1998	RW	Auto	--	17.5	66.5	20.0	2.5
B-304H	10/29/1998	HSA	Auto	--	14.6	31.0	12.2	2.4
B-305H	10/29/1998	HSA	Auto	--	15.3	31.0	12.0	3.3
B-306R	11/04/1998	RW	Auto	--	16.8	51.5	--	--
B-307R	11/06/1998	RW	Auto	--	11.4	61.0	--	--
B-309R	11/04/1998	RW	Auto	--	12.8	61.0	--	--
B-313H	10/29/1998	HSA	Auto	--	12.6	26.0	8.4	4.2
B-315H	10/30/1998	HSA	Auto	--	13.3	26.0	8.0	5.3
B-316R	11/03/1998	RW	Auto	--	14.1	57.5	--	--
B-317R	11/05/1998	RW	Auto	--	9.5	61.0	--	--
B-319R	11/05/1998	RW	Auto	--	11.7	61.0	--	--
C-301C	12/07/1998	CPT	--	--	--	68.0	14	--
C-303C	12/07/1998	CPT	--	--	--	61	14	--
C-308	11/03/1998	CPT	--	--	--	62	10	--
C-310C	11/03/1998	CPT	--	--	--	62	8	--
C-311C	11/03/1998	CPT	--	--	--	63	8	--
C-312C	11/03/1998	CPT	--	--	--	69	8	--
C-314C	11/03/1998	CPT	--	--	--	64	8	--
C-318C	11/03/1998	CPT	--	--	--	64	8	--
Group Delta Consultants, Inc (2013)								
A-RW013	09/26/2012	RW	Auto	84	13.8	56.5	--	--
A-RW015	10/02/2012	RW	Auto	84	17.1	61.5	--	--
B-RW049	10/01/2012	RW	Auto	84	17.6	69	--	--
B-HSA051	10/16/2012	HSA	Auto	84	6.3	21.5	NE	--
A-CPT-012	09/24/2012	--	--	--	13.8	48.1	--	--
A-CPT-014	09/24/2012	--	--	--	16.0	52.0	--	--
A-CPT-025	09/26/2012	--	--	--	20.0	65.1	--	--
B-CPT-050	09/14/2012	--	--	--	20.2	64.1	--	--
C-CPT-060	10/10/2012	--	--	--	14.6	49.0	--	--

Exploration No.	Completion Date	Drill Rig Type	Hammer Type	Hammer Efficiency (%)	Approximate Ground Surface Elevation (ft)	Exploration Depth (ft)	Ground water Depth (ft)	Approximate Groundwater Elevation (ft)
A-CPT-065	09/26/2012	--	--	--	20.5	63.3	--	--
Pacific Soils Engineering (1998)								
PSB-1	12/05/1997	HSA	Auto	--	16	71	14	2
PSB-2	12/09/1997	HSA	Auto	--	16	71	15	1
PSB-3	12/09/1997	HSA	Auto	--	16	71	15	1
PSB-4	12/09/1997	HSA	Auto	--	16	71	10	6
PSB-5	12/10/1997	HSA	Auto	--	16	66	--	--
PSB-6	12/10/1997	HSA	Auto	--	16	71	10	6
PSB-7	12/10/1997	HSA	Auto	--	16	71	17	-1
PSB-8	12/11/1997	HSA	Auto	--	16	71	15	1
PSCPT-1	12/10/1997	CPT	--	--	--	~50	--	--
PSCPT-2	12/10/1997	CPT	--	--	--	~50	--	--
PSCPT-3	12/10/1997	CPT	--	--	--	~50	--	--
PSCPT-4	12/10/1997	CPT	--	--	--	~52	--	--
PSCPT-5	12/10/1997	CPT	--	--	--	~50	--	--
PSCPT-6	12/10/1997	CPT	--	--	--	~51	--	--
PSCPT-7	12/10/1997	CPT	--	--	--	~51	--	--
PSCPT-8	12/10/1997	CPT	--	--	--	~51	--	--
PSCPT-9	12/10/1997	CPT	--	--	--	~50	--	--
PSCPT-10	12/10/1997	CPT	--	--	--	~50	--	--
PSCPT-11	12/10/1997	CPT	--	--	--	~50	--	--
PSCPT-12	12/10/1997	CPT	--	--	--	~51	--	--

Notes: RW = rotary wash; HSA = hollow stem auger, NE = not encountered

4.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

4.1 Site Conditions

The subject bridge site is located within the City of Marina Del Rey in Los Angeles County, California along Culver Boulevard between Station 108+16.75 and 109+66.75. The approximate location and extent of the project are shown in the Site Location Map, Figure 1A. The areas located both north and west of the roadway are primarily undeveloped wetlands associated with Ballona Creek, as discussed in the referenced report (Group Delta, 2013) however the area on the southeast has been developed with residential structures (Playa Vista). The area located immediately southeast of the Lincoln Boulevard Bridge was investigated previously as "Area De" of the Playa Vista Development (Group Delta, 1999).

The existing bridge is located at latitude 33.9760° north and longitude 118.4330° west, as shown in the Site Vicinity Plan, Figure 1B. A photograph showing the current configuration of the bridge is presented in Figure 1C. An aerial photograph showing the bridge during construction in 1937 is provided in Figure 1D.

Available drawings indicate that existing elevations along Culver Boulevard are about 32 feet. The surface of Lincoln Boulevard is about El. 10 feet beneath the bridge, as shown in Figure 2A.

The site vicinity has been repeatedly developed over the years. The Pacific Electric Railroad was constructed in the 1880s immediately north of present-day Culver Boulevard (see Figure 1D). The rail has since been demolished, although portions of the ballasted trackway may remain below grade. The Ballona Wetlands were opened to oil and gas exploration in the 1930s, and numerous oil derricks and dikes were constructed in the area through the 1950s. Ballona Creek was channelized and protected with reinforced concrete in 1934. However, previous improvements included some rip-rap slope protection along the creek, which may also remain beneath the ground surface. Development of the Marina Del Rey project in the 1950s included dredging of the harbor and the placement of hydraulic fill throughout the wetlands.

4.2 Site Geology

The site is located within the Los Angeles basin section of the Peninsular Ranges geomorphic province of southern California. The Los Angeles basin is generally underlain by Quaternary alluvial deposits, which overlie several thousand feet of Tertiary marine and non-marine sediments. The previous investigations indicate that the site is underlain by Quaternary Alluvial Floodplain Deposits (Map Symbol – Qa), which are covered with both hydraulic fill and conventional fill. The general geology in the site vicinity is shown on the Local Geologic Map, Figure 4A. Logs describing the subsurface conditions encountered in the borings and CPT soundings are provided in Appendix A. The various geologic materials encountered at the site are described in more detail below.

4.2.1 Alluvial Floodplain Deposits (Qa)

Quaternary- age alluvial sediments primarily associated with the Ballona Creek drainage are believed to underlie the entire site to the maximum depth explored. The upper portion of these alluvial deposits (from a few feet above mean sea level down to about 35 feet or 40 feet below mean sea level) is typically poorly consolidated, and most commonly consists of interbedded lean and fat clay (CL or CH) and silt (ML and MH), with occasional beds of silty and clayey sand (SM and SC). The CPT data suggests that the fine-grained soils within this zone are typically soft to medium stiff, with estimated undrained shear strengths (Su) generally ranging from about 400 pounds per square foot (psf) to 1,000 psf. The sandy soils in this zone generally varied in thickness from about 2 feet to 5 feet and were typically loose in relative density based on correlations to the available SPT blow count data (N_{60} < 10).

At elevations approximately 35 feet or 45 feet below mean sea level (MSL), the density of the alluvium typically increases, and the beds of silty, clayey, and poorly graded sand (SM, SC, or SP) become more common. The corrected SPT blow counts in these deeper beds of sandy alluvium typically varied from 30 to 50 or more, indicating dense to very dense conditions. Most of the CPT soundings met with refusal within these deeper alluvial deposits, with the CPT tip resistance in excess of 300 tons per square foot (TSF). The fine-grained soil layers within the deeper alluvial deposits were typically stiff to very stiff in consistency, with undrained shear strengths (Su) from the CPT interpretations typically ranging from about 1,500 psf to 2,000 psf.

Laboratory tests indicate that the alluvium is moderate to highly compressible. The results of previous consolidation tests conducted on samples of the alluvium collected in the site vicinity are presented in Appendix B. These previous tests suggest that the upper alluvial deposits are essentially normally consolidated, with a slight over-consolidation in the deeper alluvium. Our previous settlement analyses indicate that a 10-foot fill load over the alluvium may result in roughly 10 inches to 20 inches of settlement (Group Delta, 2013). Based on settlement monitoring of surcharge fill loads placed at the Playa Vista Development, it appears that the settlement should typically be 90 percent completed within about 3 months to 6 months of the completion of the fill placement (Group Delta, 1999).

Shear wave velocities were previously measured at 7 locations for the Ballona Wetlands restoration project, with an average value of Vs_{30} of 202 m/s at these locations (Group Delta, 2013). The closest measurement to the subject site was in sounding A-SCPT-022, roughly 3,000 feet west of Lincoln Boulevard (Group Delta, 2013). The average shear wave velocity in the upper 100 feet of the soil profile (Vs_{30}) at the location of A-SCPT-022 was approximately 210 m/s.

4.2.2 Artificial Fill (af)

The existing bridge abutments are believed to be underlain by compacted fill, as well as hydraulic fill soils placed during the development of Marina Del Rey. The hydraulic fills are similar in composition to the underlying alluvium, as they were likely generated from these deposits.

Consequently, the hydraulic fill is not differentiated from the alluvium on the logs. Hydraulic fill was likely placed to roughly 0 feet to 5 feet (MSL), with conventional fill placed above that elevation.

The Artificial Fill (af) observed at the four borings locations conducted near the subject site was located at elevations ranging from 0 feet to 8 feet (MSL) or higher (Group Delta, 2013). As observed in these borings, the fill typically consisted of silty sand (SM) and sandy silt (ML) that is fine to medium-grained and moist. The corrected SPT blow counts (N_{60}) collected within the fill ranged from 5 to 11 and averaged 9. This indicates that the fill is loose on average. Higher-density compacted fill is anticipated at the bridge abutment locations due to typical construction and compaction requirements in such areas. However, supplemental investigations will be needed to characterize the fill at the precise abutment locations. Although not directly observed in the previous borings, some riprap is also anticipated within the fill, based on historic aerial photographs of Ballona Creek.

4.2.3 Groundwater

Groundwater was not measured in the exploratory borings and CPT soundings conducted for the most recent site investigation (Group Delta, 2013). However, temporary groundwater monitoring wells were established within four of the hollow stem borings conducted at the Playa Vista development immediately southeast of the Lincoln Boulevard bridge (Group Delta, 1999). The groundwater elevations at that location varied from roughly 2 feet to 5 feet (MSL) in December 1998. We understand that these monitoring wells were destroyed during the construction of the Playa Vista residential development. The final groundwater readings within these monitoring wells are summarized in the table below. The approximate monitoring well locations are shown in Figure 3A.

Observation Well ID	Groundwater Record Date	Ground Surface Elevation [FT]	Groundwater Depth [FT]	Groundwater Elevation [FT], MSL
B-304H	12/23/98	16.7	14.4	2.3
B-305H	12/23/98	17.4	14.9	2.5
B-313H	12/23/98	14.6	10.5	4.1
B-315H	12/23/98	15.4	10.0	5.4

We understand that water surface elevations in the Ballona Creek channel typically vary from roughly 2 feet to 5 feet (MSL), depending in part on tidal fluctuations. The flow height in the creek may rise to roughly 6 feet to 10 feet (MSL) during winter storm events. Note that the available plans suggest that the bottom of the Ballona Creek channel is located at about 0 feet, whereas the approach abutments vary in height from about 16 feet to 32 feet, as shown in Figure 2B. The High Groundwater Map suggests that groundwater levels may rise to about 5 feet below existing grades in the site vicinity (see Figure 4B, CDMG, 1998).

It should be noted that groundwater levels at the site are likely to be closely related to the water surface elevation within Ballona Creek. Floods within the channel may cause the groundwater levels to temporarily rise within the surrounding levees (although the concrete armor on the channel walls may increase the lag time in groundwater response). Groundwater levels may also fluctuate over time throughout the site due to changes in the water surface elevation and flow within the creek, as well as variations in rainfall, irrigation, or site drainage conditions.

5.0 AS-BUILT FOUNDATION DATA

The existing 2-lane bridge was constructed in 1937 (see Figures 1C and 1D). Available as-built drawings for subsequent improvements in the site vicinity between 1978 and 2010 show that the single-span bridge is roughly 50 feet wide and 130 feet long. The bridge includes a cast-in-place concrete deck and rails supported by steel girders that span beyond the two abutment walls. Each of the abutment walls is believed to be supported by groups of vertical driven timber piles. However, no as-built drawings showing the precise pile foundation configuration have been found. The existing bridge is also depicted in Figures 2A and 2B. Note that the second set of abutment walls located west of the existing Culver Boulevard Bridge was previously abandoned (along with the railroad trackway). The approximate locations of the abandoned walls are shown in Figure 2A. Selected as-built plans for the bridge and roadway are provided in Appendix C.

No details about the existing retaining walls or their foundations near the abutments on either side of Culver Boulevard were available.

6.0 SCOUR EVALUATION

The Culver Boulevard Bridge crosses Lincoln Boulevard. The potential for scour on the existing roadway is considered to be low. The FEMA Flood Maps and Tsunami Inundation Zones for the site are shown in Figures 7A and 7B. No site-specific scour information has been provided.

7.0 CORROSION EVALUATION

Corrosion tests were performed on selected samples collected from the previous exploratory borings at the site, as summarized in Table 2. The corrosion potential for the on-site soils was assessed in accordance with the Caltrans Corrosion Guidelines (Caltrans, 2021b). Caltrans defines a corrosive environment as an area where the soil has either a chloride concentration of 500 parts per million (ppm) or greater, a sulfate concentration of 1,500 ppm or greater, or a pH of 5.5 or less. The available test data indicates that the site soils are not corrosive based on Caltrans' criteria. However, additional corrosion testing should be conducted as part of the site-specific evaluation.

Table 2: Summary of Soil Corrosivity

Boring Number and Year	Sample Depth (feet)	pH	Chloride Content (ppm)	Sulfate Content (ppm)	Minimum Resistivity (ohm-cm)
B-304H	0 to 5	8.1	<10	130	250
B-305H	0 to 5	8.2	<10	120	240
B-313H	0 to 5	7.8	30	260	130

The available resistivity tests do suggest that the on-site soils may be extremely corrosive to buried metals, based on the nomography provided in Figure 855.3B of the 2020 Caltrans Highway Design Manual (Caltrans, 2020a). All three of the soil samples previously tested had minimum resistivities below 1,000 ohm-cm. This is indicative of corrosive soil since soil corrosion is associated with electrical conductivity. Typical corrosion control measures should be incorporated into the project design. A corrosion consultant may be referred for specific recommendations.

8.0 PRELIMINARY SEISMIC INFORMATION AND RECOMMENDATIONS

The project is located in a seismically active area, as shown on the Regional Fault Map, Figure 5A. A detailed Local Fault Map is provided in Figure 5B. Other potential geologic and seismic hazards include ground rupture, strong ground shaking, seismic settlement, slope instability, lateral spread, tsunamis, and earthquake-induced flooding. Each hazard is discussed in more detail below.

8.1 Ground Rupture

Ground rupture is the result of movement on an active fault reaching the ground surface. Known faults within 100 kilometers (km) of the site are shown on the Regional Fault Map, Figure 5A. The approximate locations of both the active and potentially active faults in the site vicinity are shown on the Local Fault Map, Figure 5B (Jennings, C. W., 1994).

The site is not located within an Alquist-Priolo Earthquake Fault Zone (CDMG, 1992), and no evidence of active or potentially active faulting was encountered during our previous site investigation or literature review. Consequently, ground rupture is not considered a significant geologic hazard at the site.

8.2 Seismicity and ARS Curve

The current Caltrans ARS Online tool (V3.0.2) was used to develop a preliminary design spectrum for the site located at a latitude of 33.9760° north, and a longitude of 118.4330° west. The ARS design spectrum incorporated an average shear wave velocity (Vs_{30}) of 210 m/s (or 690 ft/s), based on the direct shear wave velocity measurements conducted in CPT sounding A-SCPT-022.

The preliminary Caltrans ARS design spectrum for the site has a Peak Ground Acceleration (PGA) of 0.6g, as shown in Figure 6. The deaggregated mean earthquake moment magnitude (M) is 6.6 and the mean site-to-source distance (R) for the 1.0 seconds spectral acceleration is 16.6 kilometers. Note that loose soil at the site (N_{60}<10) would classify as Class S2 soil per Section 6.1.3 of the Caltrans Seismic Design Criteria, Version 2.0.

8.3 Liquefaction and Seismic Settlement

The site is located within an area previously identified as susceptible to liquefaction. Liquefaction involves the sudden loss in strength of a saturated, cohesionless soil (sand and non-plastic silts) caused by the build-up of pore water pressure during cyclic loadings, such as that produced by an earthquake. This increase in pore water pressure can temporarily transform the soil into a fluid mass, resulting in sand boils, settlement, and lateral ground deformations. Typically, liquefaction occurs in areas where there are loose to medium dense sands and silts, and where the depth to groundwater is less than 50 feet from the ground surface. In summary, three simultaneous conditions are required for liquefaction:

- Historic high groundwater within 50 feet of the ground surface
- Liquefiable soils such as loose to medium dense sands
- Strong shaking, such as that caused by an earthquake

The typical groundwater level at the site is approximately 5 feet MSL. The historic high groundwater associated with flooding is estimated at about 5 feet below the ground surface (see Figure 4B). Although the alluvium at the site is predominately clayey, it does contain frequent beds of loose to medium dense sand and silt and is located in close proximity to several active fault zones. Our analyses indicate that these loose to medium dense beds of sand and silt may liquefy during the design earthquake of 0.6g. The deeper alluvial deposits typically have corrected SPT blow counts above 30, and do not appear to be liquefiable.

The results of our liquefaction analyses are summarized in Appendix D. We performed the liquefaction calculations using the available nearby Cone Penetration Test (CPT) data (Group Delta, 2013). The triggering and settlement evaluations were based on the methods originally developed in the 1998 NCEER Workshops, as implemented in the commercially available computer program CLiq. The calculations were carried to the maximum depth of the available CPT soundings, although the bulk of the associated settlement typically occurred at depths of less than 50 feet below grade. For the analyses, we used a moment magnitude of 6.6, a PGA of 0.6g, and a typical groundwater elevation of 5 feet (MSL) during the earthquake (corresponding to a minimum depth of 7 feet below grade). Based on the results of our analyses, we estimate that the total liquefaction settlement associated with the Design level earthquake at the site should typically vary from about 1 inch to 3 inches.

Liquefaction settlement may result in a downdrag load on the piles, settlement of the approach embankments, and lateral spreading of the abutments. Liquefaction also creates the potential for loss of near-surface soil strength resulting in a reduced lateral pile capacity.

Dissipation of the excess porewater pressure generated in completely liquefied soils, and hence liquefaction-induced downdrag, does not occur until the cessation of ground shaking. Therefore, the effects of liquefaction-induced downdrag on the pile need not be considered in combination with the inertial component that occurs during shaking. Thus, in liquefied soils, a pile foundation needs to be designed to satisfy the seismic axial bearing stability requirements in compression extreme events for two different combinations – a) permanent loads and inertial loads resulting from the ground motion-induced inertia of the superstructure during the shaking, and b) permanent loads and liquefaction induced downdrag after the cessation of the shaking (Caltrans, 2020b).

8.4 Slope Instability and Lateral Spreads

Lateral spreading is the result of liquefaction or plastic deformation occurring on the sloping ground during an earthquake. Lateral spreading is typically characterized by blocks of mostly intact, surficial soil displacing down-slope or towards a free face along a shear zone that has formed within an underlying liquefied sediment. The definition of lateral spreading used in this section includes flow liquefaction or flow slide failure. Based on simplified empirical methods, there appears to be a strong potential for lateral spread of the Ballona Creek levees in the site vicinity. Previous analyses suggest that displacements along the levees may vary from roughly 6 inches to 18 inches (Group Delta, 2013).

Note that the precise location, depth, and density of the liquefiable layers at the abutment locations will greatly impact the seismic response and should be better defined through future subsurface investigation.

The presence of the abutment piles helps reduce the displacement at the abutment locations. Lateral spread analyses including soil-pile interaction may be conducted per Caltrans Geotechnical Manual (Caltrans, 2020c), Memo to Designers 20-15 (Caltrans, 2017b), and Attachment 1 to the memo for lateral spreading analysis. No site-specific subsurface data is available at the abutment locations.

8.5 Tsunamis, Seiches, and Flooding

The Ballona Creek channel drains a large portion of the Los Angeles basin, and seasonal storms are expected to produce floods within the channel beneath the Lincoln Boulevard bridge annually. Available as-built maps for the existing Lincoln Boulevard bridge suggest that the design flood level within the creek may be on the order of 6 feet MSL. The approximate 100-year and 500-year flood zones are shown on the FEMA Flood Maps, Figure 7A. The ultimate 100-year design water surface level should be determined by the bridge designer and shown on the bridge plans.

The site is located about 3 km northeast of a breakwater in the Pacific Ocean, and the Ballona Creek channel bottom is only a few feet above mean sea level. The relatively close proximity to

the ocean suggests that the potential may exist for flooding in the event that an earthquake-induced tsunami was to travel up the Ballona Creek channel. However, the existence of the offshore barrier islands and the configuration of the continental shelf in southern California have historically provided relief from such tsunamis. The ten largest tsunamis that occurred within the Pacific Ocean over the last century did not significantly impact the region.

Studies by the Army Corps of Engineers (US Army, 1974) suggest that a 500-year tsunami within the Pacific Ocean may result in a water surface runup of about 14 feet above tidal elevations (U.S. Army, 1974). The California Emergency Management Agency's Tsunami Inundation Map is shown in Figure 7B. This map suggests that a tsunami may travel up the Ballona Creek channel beyond the subject site. Note that the top of the existing bridge is located at an elevation of about 32 feet at the abutment locations, as shown in Figure 2A. The potential for damage to the bridge from flooding or a tsunami within the Ballona Creek channel should be evaluated by the project design team.

9.0 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

The remainder of this report presents preliminary recommendations for the design of the proposed bridge and retaining wall foundations. These recommendations are based on empirical and analytical methods typical of the standards of practice in southern California. If these recommendations do not appear to cover a specific feature of the project, please feel free to contact our office for additions or revisions. These recommendations should be considered preliminary and subject to revision based on the findings of the supplemental field investigation.

9.1 Foundation Type

Based on the structural drawings the abutments for the new bridge are supported on a group of Cast-In-Drilled-Hole (CIDH) piles. The abutment retaining walls are also anticipated to be supported on large diameter CIDH piles. These foundation systems are feasible for supporting the bridge and the retaining wall structure. Alternatively, Cast-In-Steel-Shell (CISS) piles may also be used for supporting the abutments and the retaining walls.

To resist lateral spreading seismic displacements, large diameter (36-inch or greater) CIDH, or CISS pile foundation systems are recommended for supporting the bridge abutments.

Large diameter CIDH piles are feasible, but special construction techniques (slurry, casing, etc.) and integrity testing (gamma-gamma logging) will be required due to shallow groundwater and caving prone soils.

CISS piles are driven pipe piles that are filled with cast-in-place reinforced concrete no deeper than the shell tip elevation. Since CISS piles are driven, noise issues should be considered in the pile type selection process due to proximity to the residential development.

Our preliminary liquefaction settlement analyses indicate that the bottom of the liquefiable layers may extend to elevations -25 feet to -30 feet. With proposed pile cut-offs at or around the elevation of 0 to 5 feet, downdrag loads may be experienced along up to 30 to 35 feet of the pile length, negating any pile resistance down to about El. -40 feet within the denser alluvial deposits.

For cost-estimating purposes, we recommend that an average nominal (ultimate) soil skin friction resistance of 1.5 ksf, and 2 ksf be assumed below El. -40 feet for CIDH piles and CISS piles, respectively, for estimation of the pile lengths. This will likely result in pile lengths of about 70 to 85 feet, tipping at elevations between -65 feet to -80 feet.

Smaller diameter driven piles are not recommended due to unfavorable subsurface soil conditions as the site is classified as S2 per the SDC V2.0., Section 6.1, and Section 6.2.3. Shallow foundations are not feasible for supporting the bridge structure due to seismic settlement and lateral spreading issues.

9.2 CIDH and CISS Construction Considerations

Due to high groundwater, a wet method of construction will need to be utilized for CIDH piles. Temporary casing will need to be used for the construction of the piles and the temporary casing will need to be left in place near the ground surface to prevent water from flooding into the construction. The casings may be installed by an oscillatory or rotary method.

For wet construction, slurry should be used as drilling fluid per Caltrans Standard Specifications Section 49 (Caltrans, 2022). To maintain the hole sidewall and bottom stability, and to help reduce and potential for anomalies, it is essential that a positive slurry head of no less than 10 feet above the groundwater table be maintained at all times during drilling and concrete placement. The tip resistance of the CIDH piles should be ignored in axial capacity calculations due to the wet method of construction. A permanent casing may also need to be considered within a portion of the pile length in contact with channel water or soft soils near the invert of the Ballona Creek channel.

CISS piles are driven piles that are filled with cast-in-place reinforced concrete no deeper than the shell tip elevation. A soil plug should be left at the bottom of the CISS piles so that the pile is not undermined due to water intrusion. A 20-foot-long soil plug usually provides an adequate seal at the bottom of the pile.

Site-specific issues such as noise and vibration should be considered for this site due to its proximity to residential development. When site-specific subsurface data is available, drivability analysis should also be performed for the CISS piles.

9.3 Approach Fill Settlement and Waiting Period

Based on the general plan of the planning study, a significant amount of cut, and fill will be required to accommodate the longer new Culver Blvd bridge, particularly at the eastern

abutment. The approach embankments will also be widened as well as raised several feet in profile grades. Due to the presence of soft to stiff saturated clayey/silty layers some long-term consolidation settlement should be anticipated due to grade increase and a waiting period will be required before driving abutment piles. The time required for settlement to take place will be determined based on final embankment geometry and amount of fill placed, soil types and consolidation properties, layer thickness, and single versus double drainage conditions. Waiting periods in general can be reduced by temporary surcharge and/or wick drains.

Our previous settlement analyses indicate that a 10-foot-high abutment fill load over the alluvium may result in roughly 10 inches to 20 inches of settlement (Group Delta, 2013). Based on settlement monitoring of surcharge fill loads placed at the Playa Vista Development, it appears that such settlement should typically be substantially completed within about 3 months to 6 months of the completion of the fill placement (Group Delta, 1999). Consequently, a waiting period of 90 days to 180 days may be needed for the installation of the piles at the abutment locations, if additional fill loads are proposed. The waiting period should begin after the new abutments are constructed to full height. Construction of the approach slabs and pavement should also be delayed until the waiting period is completed. Note that if the abutment piles are installed prior to fill placement, a drag log would be imparted on the piles which would result in a reduced axial pile capacity.

Settlement monuments should be installed in all new fill areas. The monuments should be surveyed regularly until the settlement is deemed substantially complete. Settlement monitoring should be performed in general accordance with CT112. Installation of the abutment piles and settlement sensitive surface improvements should be delayed until the settlement is deemed substantially complete based on the survey data. The Geotechnical Engineer should review the settlement data to determine when sufficient settlement is completed for the installation of the piles.

9.4 Abutment Approach Retaining Walls

Based on the general plan of the planning study, the abutment retaining walls are stepped with a height of about 25 feet and 15 feet and each step is about 25 feet long on either side of Culver Boulevard. Pile-supported retaining walls (Type 1 or similar) supported on large diameter (36-inch or greater in diameter) CIDH or CISS piles are recommended for the bridge abutments. The piles should be designed with considerations for downdrag due to liquefaction, as well as lateral spreading displacements.

Alternatively, Mechanically Stabilized Embankment (MSE) walls (Caltrans Pre-Designed) may be used at abutment approaches since PGA is no more than 0.6g at the site. However, since substantial static settlement is anticipated as a result of the construction of the MSE embankments, an adequate waiting period during construction, or preloading the abutment area should be implemented to avoid static downdrag on the abutment piles.

9.4.1 Retaining Wall External Loading

The retaining walls will have level backfill and be subject to normal street vehicular and live load surcharge, as well as seismic loading. Since the PGA at the site is estimated as 0.6g, the pseudo-static acceleration coefficient should be ⅓ of the PGA or K_h=0.2g per Seismic Design of Retaining Walls (Caltrans, 2021c).

9.4.2 Retaining Wall Site Constraints

Since vehicular traffic along Culver Boulevard during the construction is proposed to be diverted there is no site constraint related to the vehicular traffic along the street. The existing overhead utilities around the existing bridge may need to be protected in place, removed, or relocated as appropriate.

10.0 ADDITIONAL FIELDWORK AND LABORATORY TESTING

Additional field exploration and laboratory testing will be needed in order to provide geotechnical information adequate for final design development. One rotary wash boring and one CPT sounding are proposed at each of the bridge abutment locations, as shown in the Exploration Plan, Figure 3B. We recommend that the borings be drilled using the rotary wash method due to the presence of shallow groundwater. In the CPT soundings, shear wave velocities should be measured at 5-foot depth intervals to aid in site-specific seismic hazard analysis. All of the borings and CPT soundings should be extended to a minimum depth of 100 feet below the ground surface or refusal.

Laboratory tests should be conducted on samples collected from the proposed rotary wash borings to supplement the previous testing shown in Appendix B. All tests should be performed in accordance with applicable Caltrans and ASTM standards. As a minimum, additional soil classification, corrosion, and consolidation tests should be conducted on soils collected within the upper 50 feet of the ground surface to aid in the supplemental geotechnical analyses. Additional shear and unconfined compression tests should also be conducted to aid in pile capacity analyses.

11.0 LIMITATIONS

This report was prepared in accordance with generally accepted Geotechnical Engineering principles and practice. The professional engineering work and judgments presented in this report meet the standard of care of our profession at this time. No other warranty, expressed or implied, is made. This report has been prepared for PSOMAS and their design consultants. It may not contain sufficient information for other parties or other purposes and should not be used for other projects or other purposes without review and approval by Group Delta.

The recommendations for this project, to a high degree, are dependent upon proper quality control of site grading, fill and backfill placement, and pile foundation installation. The recommendations are made contingent on the opportunity for Group Delta to observe the earthwork operations. This firm should be notified of any pertinent changes in the project, or if conditions are encountered in the field, which differ from those described herein. If parties other than Group Delta are engaged to provide such services, they must be notified that they will be required to assume complete responsibility for the geotechnical phase of the project and must either concur with the recommendations in this report or provide alternate recommendations.

12.0 REFERENCES

California Department of Conservation, Division of Mines and Geology (1992). *Fault Rupture Hazard Zones in California, Alquist-Priolo Special Studies Zone Act of 1972*: California Division of Mines and Geology, Special Publication 42.

California Division of Mines and Geology (1998). *Seismic Hazard Zone Report for Venice 7.5-Minute Quadrangle, Los Angeles County, California, Seismic Hazard Zone Report 036, Plate 1.2*

California Emergency Management Agency (2018). *FEMA Flood Plains and California Specific Flood Area.*

California Emergency Management Agency (2018). *Tsunami Emergency Response Planning Zone, Recommended Evacuation Area.*

Caltrans (2000). *California Bank and Shore Rock Slope Protection Design, Practitioner's Guide and Field Evaluations of Riprap Methods*, FHWA-CA-TL-95-10, October.

Caltrans (2017a). GeoDOG – Digital Archive of Geotechnical Data https://geodog.dot.ca.gov/index.php Accessed October 25, 2022.

Caltrans (2017b). *Memo to Designers, Lateral Spreading Analysis For New and Existing Bridges,* May 2017.

Caltrans (2019). Caltrans Seismic Design Criteria, Version 2.0, April 2019.

Caltrans (2020a). *Caltrans Highway Design Manual, Chapter 850,* July 1, 2020.

Caltrans (2020b). *Caltrans Geotechnical Manual, Structure Foundations, Downdrag,* 2020.

Caltrans (2020c). Caltrans Geotechnical Manual, Seismic, Lateral Spreading, January 2020.

Caltrans (2021a). *Caltrans Geotechnical Manual, Reporting Standards, Foundation Reports for Bridges,* January 2021.

Caltrans (2021b). *Corrosion Guidelines*, California Department of Transportation Division of Engineering and Testing Services, Material Engineering and Testing Services, Corrosion Branch, Version 3.2, May 2021.

Caltrans (2021c). *Caltrans Geotechnical Manual, Earth Retaining Systems, Seismic Design of Retaining Walls,* January 2021

Caltrans (2021d). *Caltrans Geotechnical Manual, Earth Retaining Systems, Mechanically Stabilized Embankments (Caltrans Pre-Designed),* January 2021.

Caltrans (2022). Caltrans ARS Online (V3.0.2) https://arsonline.dot.ca.gov/ Accessed October 11, 2022.

Geologismiki (2006). CLiq V3.3.1.14.

Group Delta Consultants, Inc. (1999). *Geotechnical Recommendations, Increment 1, Area De, Playa Vista Development, Northeast Corner of Jefferson and Lincoln Boulevards, Marina Del Rey, Los Angeles, California, Project No. L-191,* January 25.

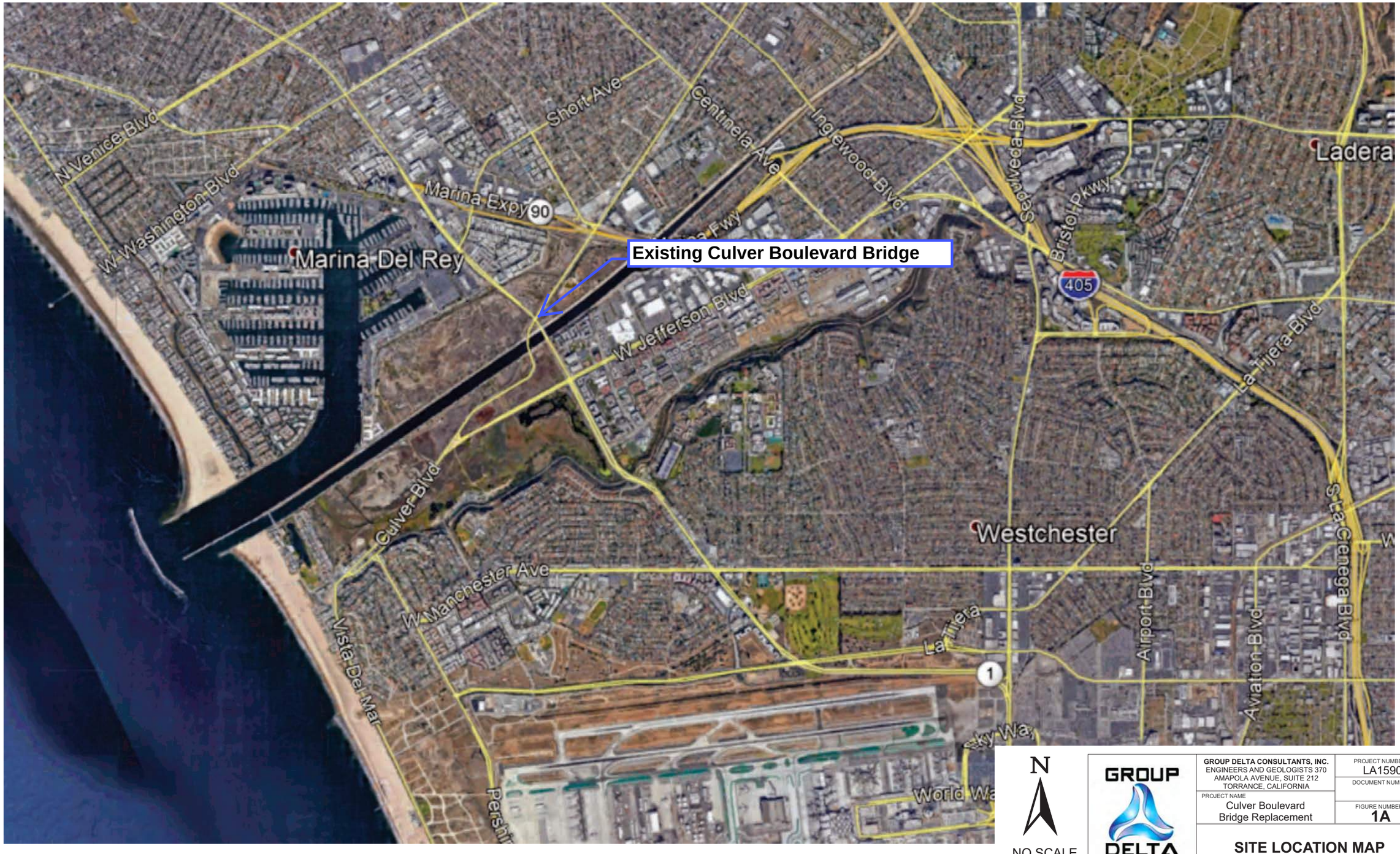
Group Delta Consultants Inc. (2013). *Geotechnical Investigation Report, Ballona Wetlands Restoration Project, Marina Del Rey, Los Angeles County, California, Project No. LA-962A,* July 1.

Jennings, C. W. (1994). *Fault Activity Map of California and Adjacent Areas with Locations and Ages of Recent Volcanic Eruptions*: California Division of Mines and Geology, Geologic Data Map Series, Map No. 6.

Pacific Soils Engineering (1998). *Results of Geotechnical Investigation, Proposed Brisa Ballona Drive Development, Portions of Lots 17 and 18, Tentative Tract 49104, Southwesterly Corner of the Intersection of Jefferson Boulevard and Lincoln Avenue, Playa Vista Area, City of Los Angeles, California,* January 21.

United States Army Engineer Waterways Experiment Station (1974). *Tsunami Prediction for Pacific Coastal Communities,* Hydraulics Laboratory, Vicksburg

FIGURES



N

NO SCALE

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS 370
AMAPOLA AVENUE, SUITE 212
TORRANCE, CALIFORNIA

PROJECT NUMBER
LA1590

DOCUMENT NUMBER

PROJECT NAME
Culver Boulevard
Bridge Replacement

FIGURE NUMBER
1A

SITE LOCATION MAP

N

NO SCALE

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Culver Boulevard
Bridge Replacement

PROJECT NUMBER
LA1590

DOCUMENT NUMBER

FIGURE NUMBER
1B

SITE VICINITY PLAN

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Culver Boulevard
Bridge Replacement

PROJECT NUMBER
LA1590

DOCUMENT NUMBER

FIGURE NUMBER
1C

SITE PHOTOGRAPH (2018)

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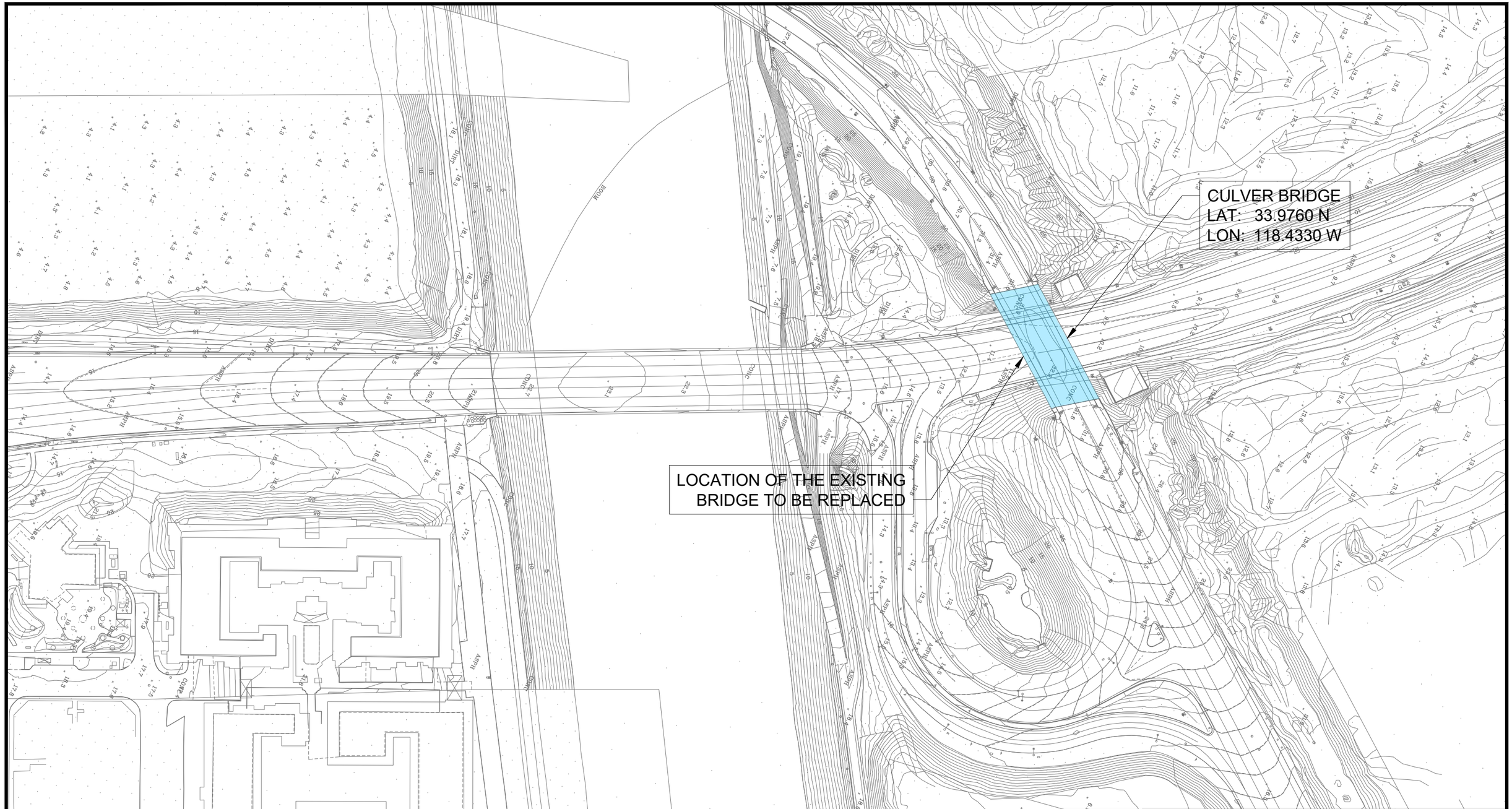
Bridge Replacement

PROJECT NUMBER
LA1590

DOCUMENT NUMBER

FIGURE NUMBER
1D

SITE PHOTOGRAPH (1937)



0 100' 200'

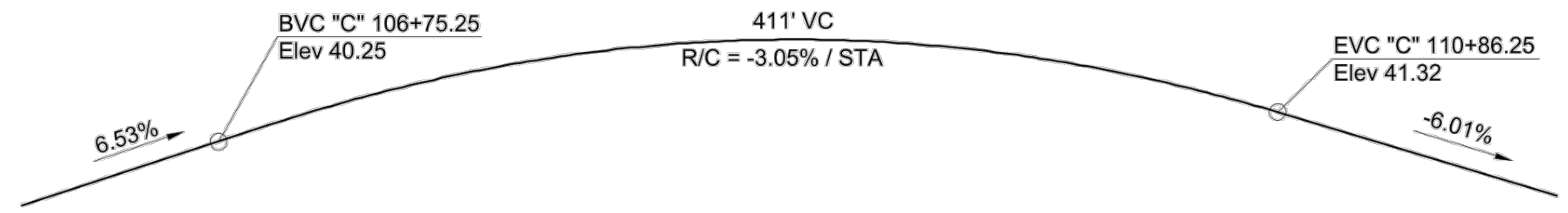
REFERENCE: PLANNING STUDY, CALTRANS, 2022

GROUP DELTA	GROUP DELTA CONSULTANTS, INC. ENGINEERS AND GEOLOGISTS 370 AMAPOLA AVENUE, SUITE 212 TORRANCE, CALIFORNIA	PROJECT NUMBER: LA1590
PREPARED BY: JMR	PROJECT NAME: CULVER BOULEVARD BRIDGE REPLACEMENT	FIGURE NUMBER: 2A
REVIEWED BY: AP	PROPOSED DEVELOPMENT	

FILE PATH: N:\Projects\1500-1599\LA1590 Pacomas Lincoln Bridge and Culver Bridge SPGR\t600 Drafting\LA1590 Figs 2A-2B-Culver Bridge.dwg
PLOTTED DATE: 10/26/2022 1:58:57 PM SAVED BY: josemiguelt

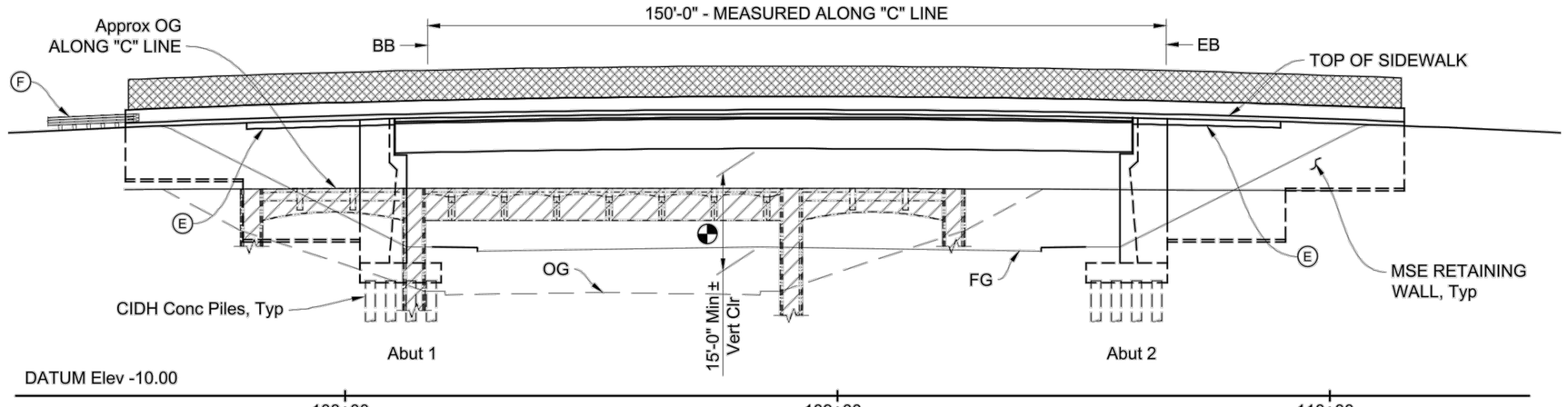
DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT
7	LA		

CNS ENGINEERS, INC.
11870 PIERCE ST, STE 265
RIVERSIDE, CA 92505



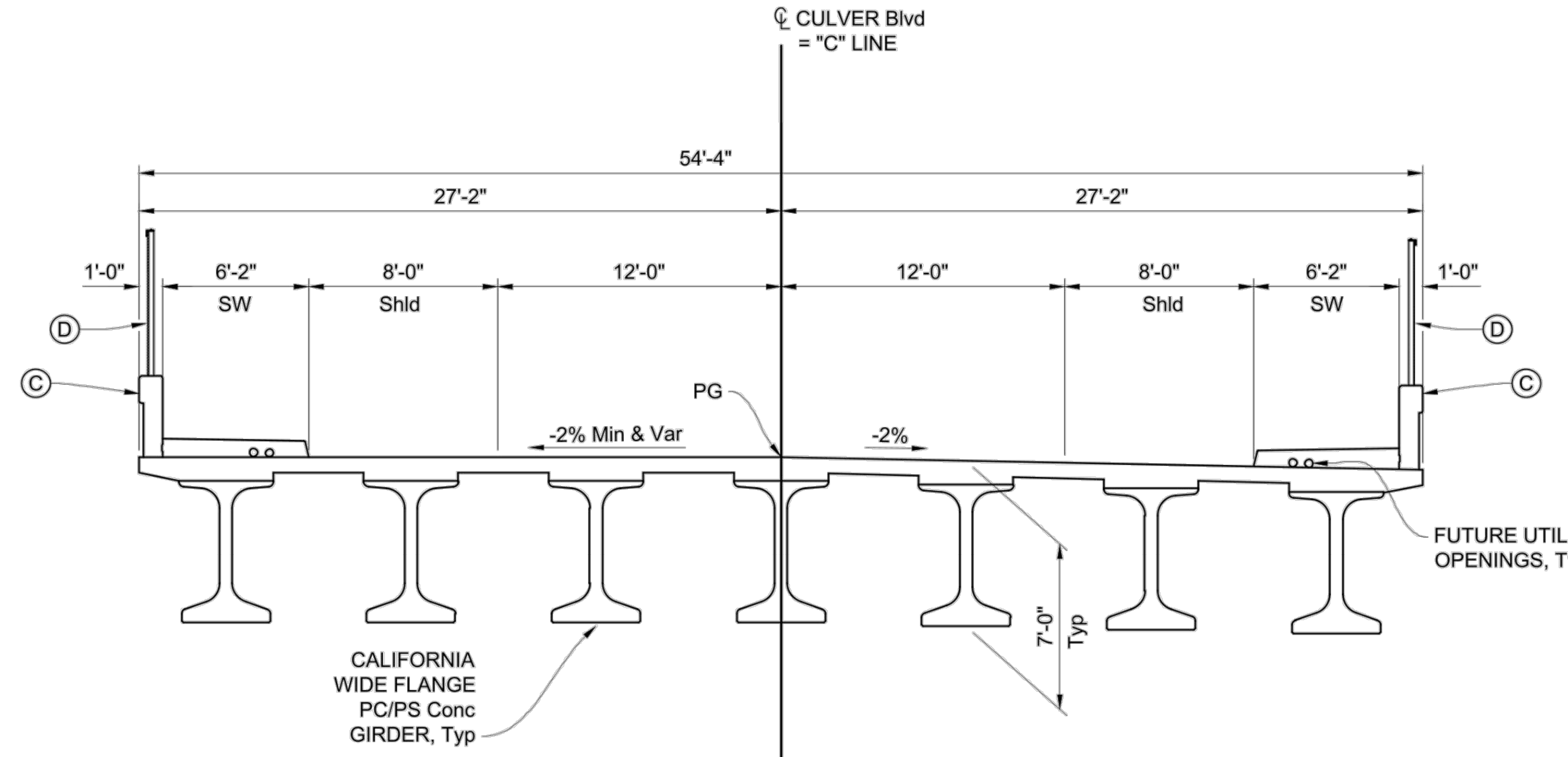
PROFILE GRADE

NO SACLE



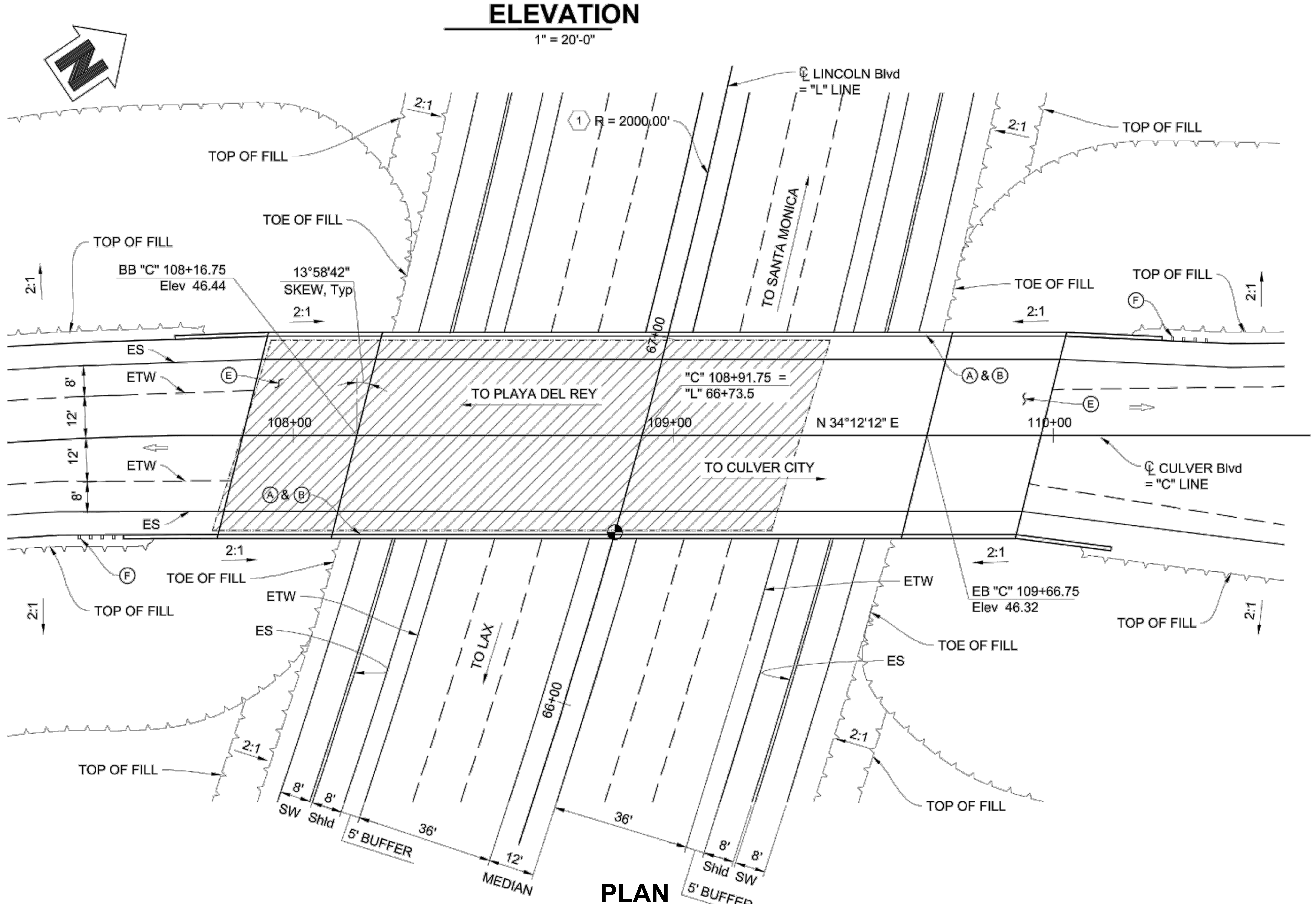
ELEVATION

1" = 20'-0"



TYPICAL SECTION

1" = 5'-0"



PLAN

1" = 20'-0"

LEGEND:

- Exist Structure
- New Construction
- Traffic Direction
- Bridge Removal
- Point of Minimum Vertical Clearance

KEY NOTES:

- (A) Paint "Br. No. ---"
- (B) Paint "CULVER BLVD OC"
- (C) Conc Barrier, Type 732SW (Mod)
- (D) Chain Link Railing, Type 7
- (E) Structure Approach, Type N (30S)
- (F) MGS, see "ROAD PLANS"

NOTE:

Date of Estimate		10/01/2021
Str Depth	=	7'-0"
Length	=	150'-0"
Width	=	54'-4"
Area	=	8,150 sqft
Avg Cost per Sq Ft Including 10% Mobilization & 25% Contingency	=	$782.00
Total Cost	=	$6,372,000

CURVE DATA TABLE

CURVE No.	R	Δ	T	L
1	2000.00'	25°36'56.00"	886.72'	894.15'

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370 AMAPOLA AVENUE, SUITE 212
TORRANCE, CALIFORNIA

PROJECT NUMBER: LA1590

PREPARED BY: JMR

PROJECT NAME: CULVER BOULEVARD BRIDGE REPLACEMENT

FIGURE NUMBER: 2B

REVIEWED BY: AP

PROPOSED DEVELOPMENT

REFERENCE: PLANNING STUDY, CALTRANS, 2022

EXPLANATION:

B-HSA051 Approximate locations of the existing borings in close proximity to the site (A, B or C prefix~ Group Delta, PS~Pacific Soils).

A-CPT-065 Approximate locations of existing CPT soundings in close proximity to the site (A, B or C ~ Group Delta, PS ~ Pacific Soils).

N

NO SCALE

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LA1590

DOCUMENT NUMBER

PROJECT NAME
Culver Boulevard
Bridge Replacement

FIGURE NUMBER
3A

EXISTING EXPLORATIONS

EXPLANATION:

- Approximate locations of the 2 proposed exploratory borings
- Approximate locations of the 2 proposed exploratory CPT soundings

N

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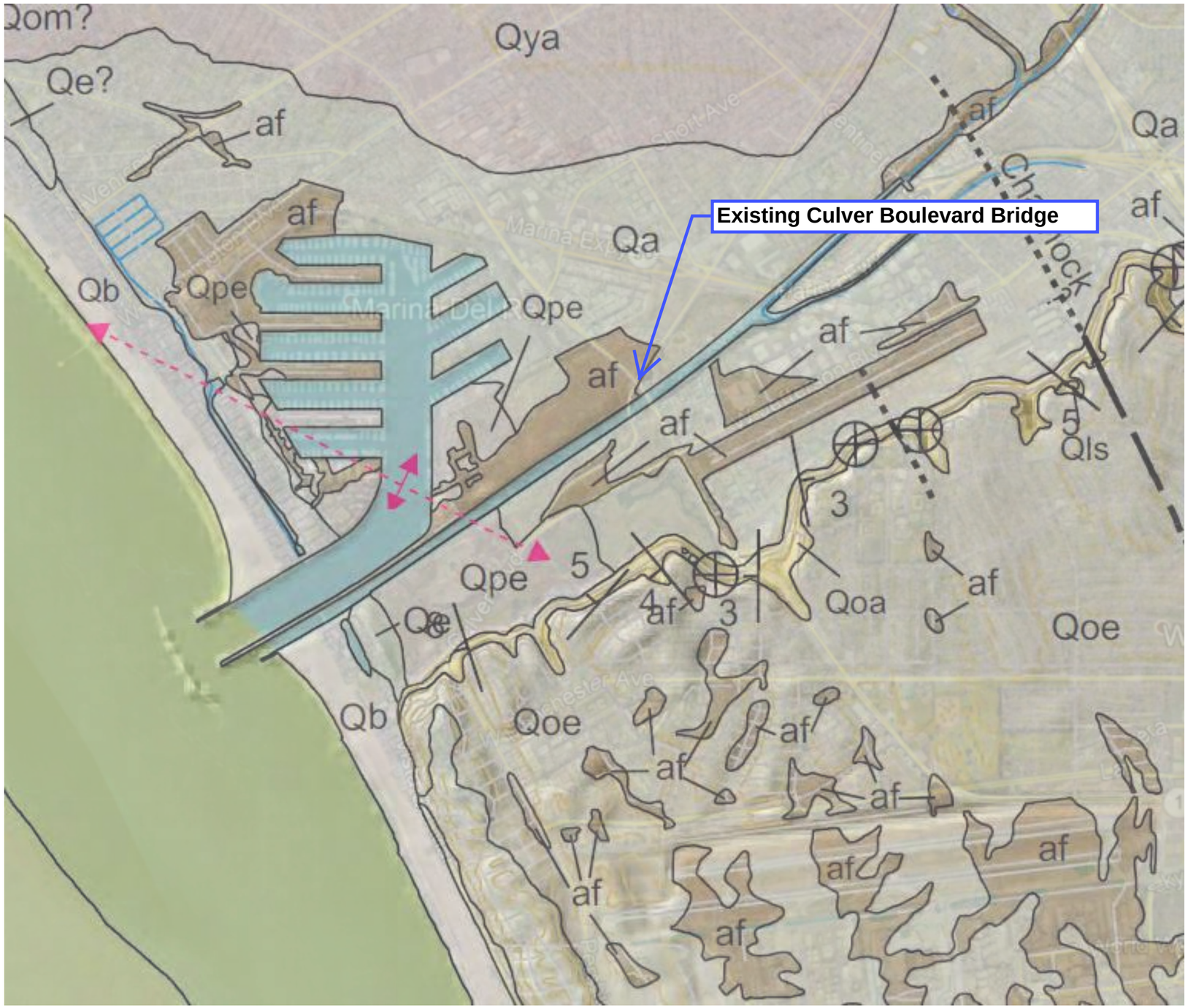
DOCUMENT NUMBER

PROJECT NAME
Culver Boulevard
Bridge Replacement

FIGURE NUMBER
3B

EXPLORATION PLAN



ABBREVIATED EXPLANATION

HOLOCENE	af	Artificial fill
	Qw	Active channel and wash deposits
	Qa	Alluvial flood plain deposits
	Qls	Landslide deposits
	Qb	Beach deposits
	Qe	Eolian deposits
	Qpe	Paralic estuarine deposits
	Qyf	Young alluvial fan and valley deposits, undivided a = sand, s = silt, c = clay
	Qyf2	Young alluvial fan deposits, unit 2
	Qyf1	Young alluvial fan deposits, unit 1
	Qya	Young alluvial flood plain deposits, unit 1
	Qye	Young eolian deposits
	Qype	Young paralic estuarine deposits
	Qof	Old alluvial fan and valley deposits, undivided a = sand, s = silt, c = clay
	Qoa	Old alluvial flood plain deposits, undivided
	Qoe	Old eolian deposits
PLEISTOCENE	Qom	Old marine deposits, undivided
	Qop	Old paralic deposits, undivided, a = sand, s = silt, c = clay
	Qlh	La Habra Formation
		San Pedro Formation
	Qsp	San Pedro Formation, undivided
	Qspt	Timms Point Silt Member
	Qspl	Lomita Marl Member
	Qi	Inglewood Formation
	Qp	Pleistocene sedimentary deposits, undivided

REFERENCE: Saucedo et al. (2003). *Geologic Map of the Long Beach 30'x60' Quadrangle, California*, CGS, Scale 1:100,000.

N

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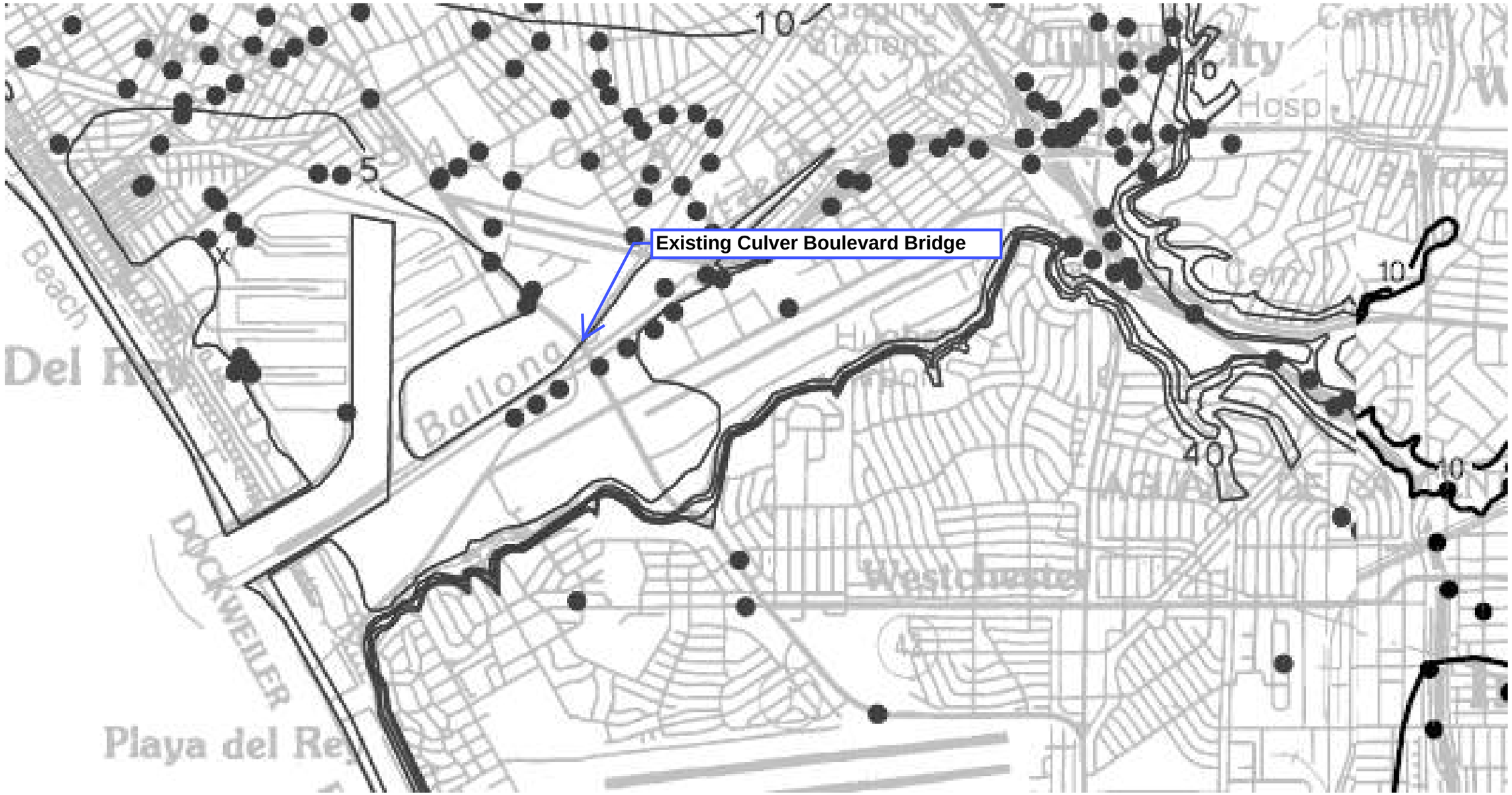
PROJECT NUMBER: LA1590

DOCUMENT NUMBER:

PROJECT NAME: Culver Boulevard Bridge Replacement

FIGURE NUMBER: **4A**

LOCAL GEOLOGIC MAP



EXPLANATION:

- ● Approximate location of borehole used to collect groundwater data.
- 5 Approximate depth to historic high groundwater in feet.

REFERENCE: California Geologic Survey (1998). Seismic Hazard Zone Report for the Venice & Inglew

N

NO SCALE

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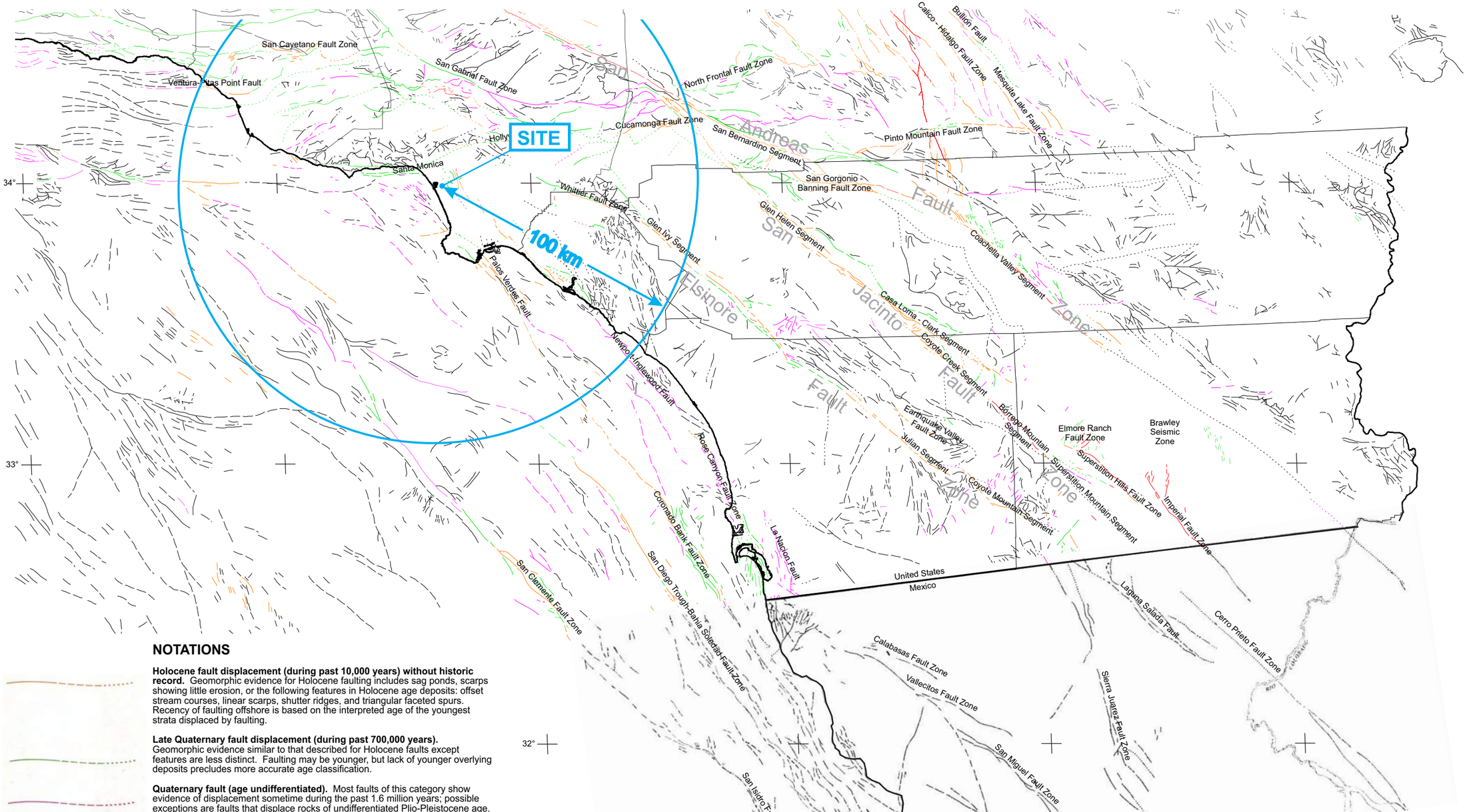
PROJECT NUMBER: LA1590

DOCUMENT NUMBER:

PROJECT NAME: Culver Boulevard Bridge Replacement

FIGURE NUMBER: **4B**

HIGH GROUNDWATER MAP



NOTATIONS

Holocene fault displacement (during past 10,000 years) without historic record. Geomorphic evidence for Holocene faulting includes sag ponds, scarps showing little erosion, or the following features in Holocene age deposits: offset stream courses, linear scarps, shutter ridges, and triangular faceted spurs. Recency of faulting offshore is based on the interpreted age of the youngest strata displaced by faulting.

Late Quaternary fault displacement (during past 700,000 years). Geomorphic evidence similar to that described for Holocene faults except features are less distinct. Faulting may be younger, but lack of younger overlying deposits precludes more accurate age classification.

Quaternary fault (age undifferentiated). Most faults of this category show evidence of displacement sometime during the past 1.6 million years; possible exceptions are faults that displace rocks of undifferentiated Plio-Pleistocene age. See Bulletin 201, Appendix D for source data.

Late Cenozoic faults within the Sierra Nevada including, but not restricted to, the Foothills fault system. Faults show stratigraphic and/or geomorphic evidence for displacement of late Miocene and Pliocene deposits. By analogy, late Cenozoic faults in this system that have been investigated in detail may have been active in Quaternary time (Data from PG&.E, l993.)

Pre-Quaternary fault (older than 1.6 million years) or fault without recognized Quaternary displacement. Some faults are shown in this category because the source of mapping used was of reconnaissance nature, or was not done with the object of dating fault displacements. Faults in this category are not necessarily inactive.

N

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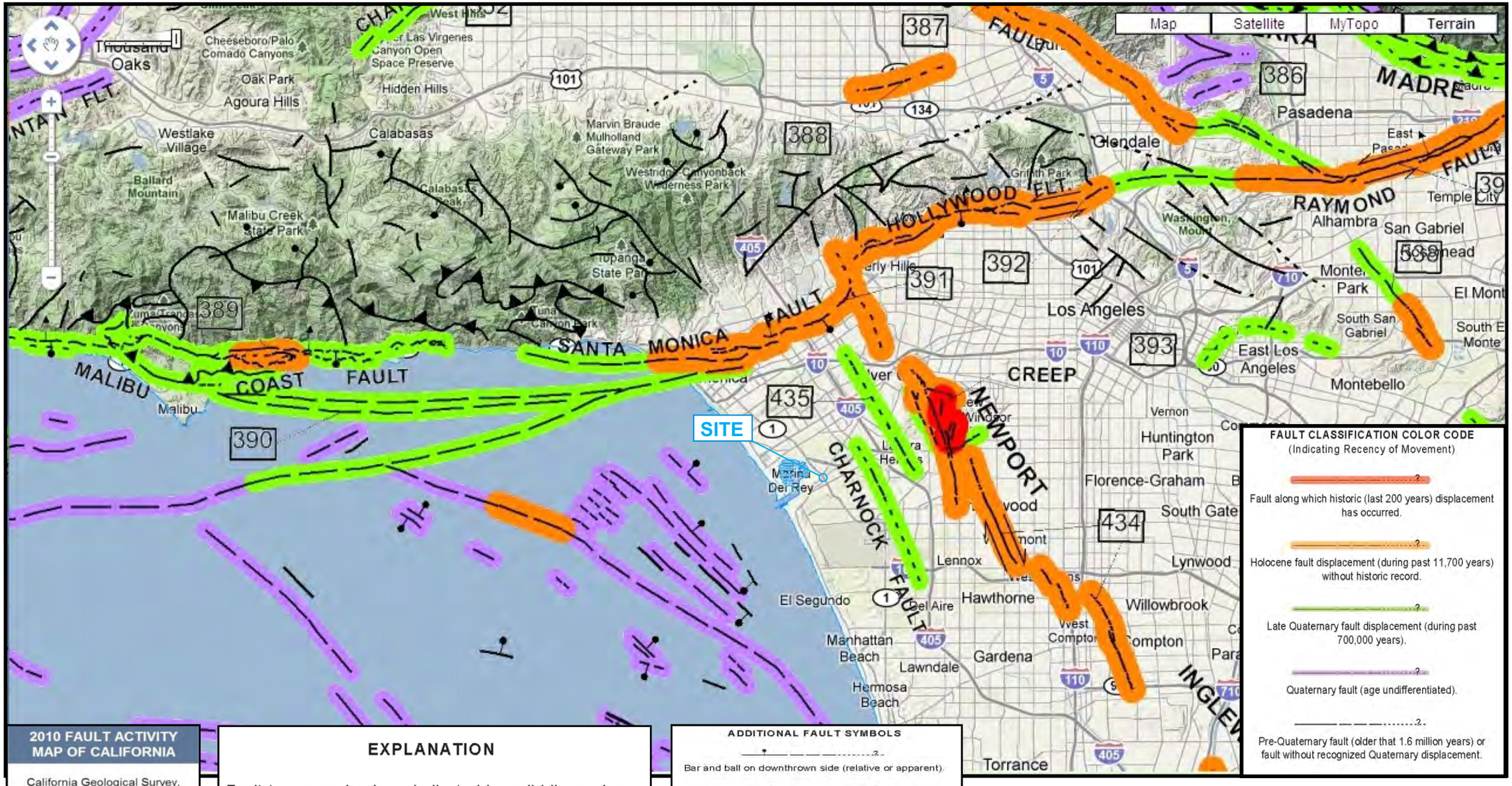
PROJECT NUMBER
LA1590

DOCUMENT NUMBER

PROJECT NAME
Culver Boulevard
Bridge Replacement

FIGURE NUMBER
5A

REGIONAL FAULT MAP



2010 FAULT ACTIVITY MAP OF CALIFORNIA

California Geological Survey, Geologic Data Map No. 6

Compilation and Interpretation by: Charles W. Jennings and William A. Bryant

Graphics by: Milind Patel, Ellen Sander, Jim Thompson, Barbara Wanish and Milton Fonseca

EXPLANATION

Fault traces on land are indicated by solid lines where well located, by dashed lines where approximately located or inferred, and by dotted lines where concealed by younger rocks or by lakes or bays. Fault traces are queried where continuation or existence is uncertain.

ADDITIONAL FAULT SYMBOLS

Bar and ball on downthrown side (relative or apparent).

Arrows along fault indicate relative or apparent direction of lateral movement.

Arrow on fault indicates direction of dip.

Low angle fault (barbs on upper plate).

N

NO SCALE

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TORRANCE, CALIFORNIA

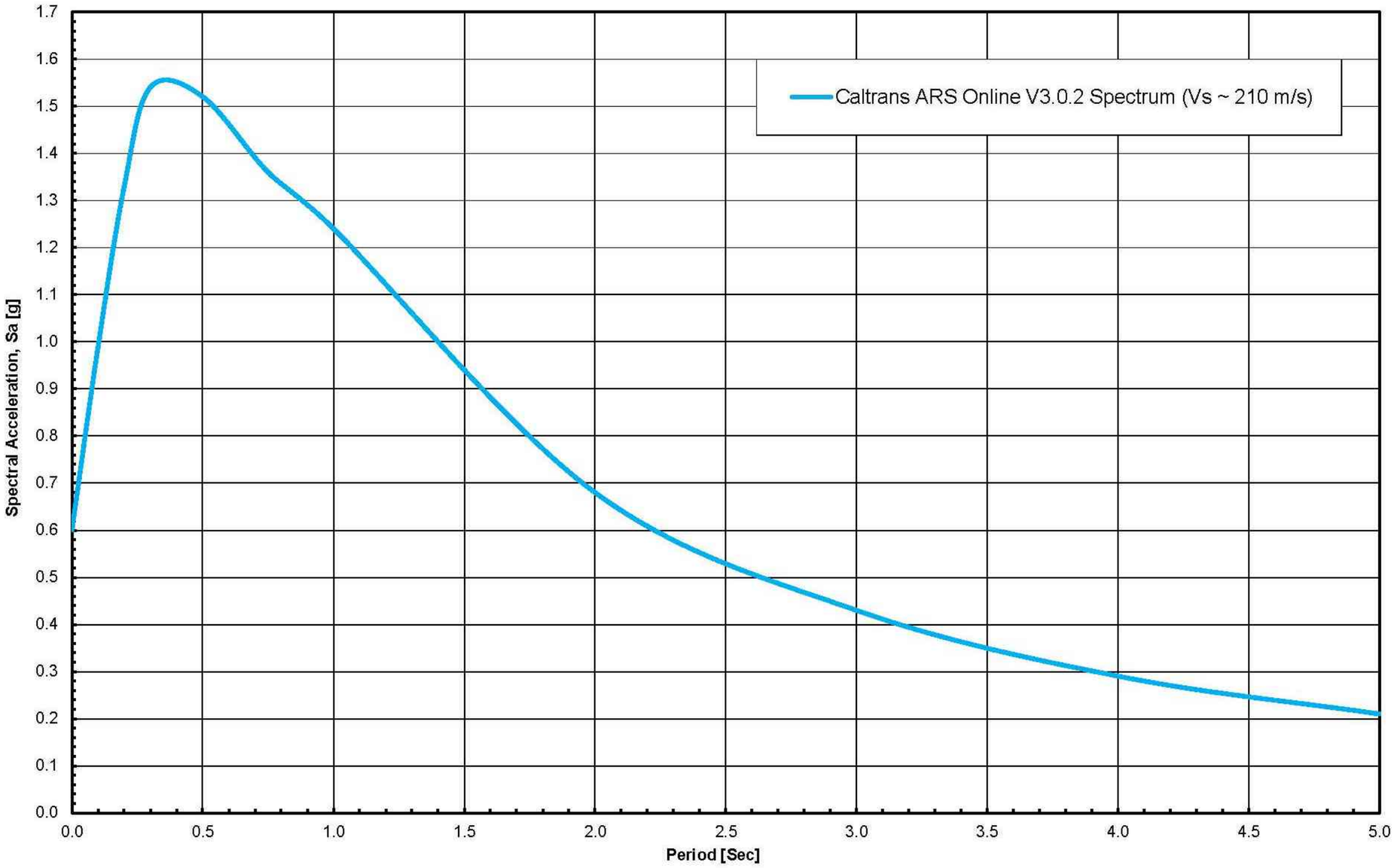
PROJECT NUMBER: LA1590

DOCUMENT NUMBER:

PROJECT NAME: Culver Boulevard Bridge Replacement

FIGURE NUMBER: **5B**

LOCAL FAULT MAP



Caltrans ARS Online Design Spectrum

Period [Sec]	Sa [g]
0	0.6
0.10	0.990
0.20	1.330
0.30	1.540
0.50	1.520
0.75	1.360
1.00	1.240
2.00	0.680
3.00	0.430
4.00	0.290
5.00	0.210

Mean magnitude (for PGA) = 6.6
Mean site-source distance (for Sa at 1s) = 16.6 km

REFERENCE: CALTRANS (2019). *ARS Online, Version V3.0.2,* http://dap3.dot.ca.gov/ARS_Online/, October 11, 2022.

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370 AMAPOLA AVENUE, SUITE 212
TORRANCE, CALIFORNIA

PROJECT NUMBER: LA1590
DOCUMENT NUMBER:
PROJECT NAME: Culver Boulevard Bridge Replacement
FIGURE NUMBER: 6

SITE RESPONSE SPECTRUM

REFERENCE: California Emergency Management Agency (2018). *FEMA Flood Plains and California Specific Flood Areas.*

N

NO SCALE

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
370 AMAPOLA AVENUE, SUITE 212
TORRANCE, CALIFORNIA

PROJECT NAME
Culver Boulevard Bridge Replacement

PROJECT NUMBER
LA1590

DOCUMENT NUMBER

FIGURE NUMBER
7A

FEMA FLOOD MAPS

REFERENCE: California Emergency Management Agency (2018). *Tsunami Emergency Response Planning Zone, Recommended Evaculation Area.*

N

NO SCALE

GROUP DELTA

GROUP DELTA CONSULTANTS, INC.
ENGINEERS AND GEOLOGISTS
370 AMAPOLA AVENUE, SUITE 212
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FIGURE NUMBER
7B

TSUNAMI INUNDATION ZONE

APPENDIX A
EXISTING FIELD DATA

APPENDIX A
EXISTING FIELD DATA (Group Delta, 2013)

APPENDIX A

EXISTING FIELD DATA

No site-specific subsurface explorations have yet been conducted. The approximate locations of eight explorations we have proposed at the site are shown on the Exploration Plan, Figure 3B. To aid in the preparation of this preliminary report, we reviewed three previous investigations conducted in relatively close proximity to the Lincoln Boulevard Multi-Modal Improvement Project between 1998 and 2013. The approximate locations of these existing explorations located within about 1,500 feet of the subject site are shown on the Existing Explorations, Figure 3A.

The field and laboratory data from our most recent geotechnical investigation for the Ballona Wetlands Restoration Project was still available, and is reproduced in the following Figures A-1 through A-10 (GDC, 2013). Photocopies of the previous subsurface explorations we conducted for the Playa Vista development located southeast of the Lincoln Boulevard bridge are attached as the second Appendix A (GDC, 1999). Photocopies of the previous explorations conducted by others for the Playa Vista development are attached as the third Appendix A (Pacific Soils Engineering, 1998).

The previous field exploration program for the Ballona Wetlands Restoration Project included the advancement of three rotary wash borings, one hollow stem boring, and six cone penetrometer test (CPT) soundings. These 10 explorations were completed between September 14th and October 16th, 2012. Disturbed samples were collected from the borings using a 2-inch diameter Standard Penetration Test (SPT) sampler. Less disturbed samples were also collected using a 3-inch outside diameter ring lined sampler (a modified California sampler). These samples were sealed in plastic bags, labeled, and returned to the laboratory for testing. For each sample, the number of blows needed to drive the sampler 12 inches was recorded on the logs. The drive samples were collected from the borings using an automatic hammer with an Energy Transfer Ratio (ETR) of about 84 percent. The field blow counts (N) were normalized to approximate a standard 60 percent ETR as shown on the logs (N_{60}). Undisturbed Shelby-Tube samples, as well as bulk soil samples were also collected at selected intervals. Logs describing the subsurface conditions encountered in the four previous borings are shown in Figures A-1 to A-4, immediately after the Boring Record Legends.

The cone penetrometer (CPT) soundings were advanced by either Gregg In-Situ or Kehoe Testing and Engineering in general accordance with ASTM D5778. Integrated electronic circuitry was used to measure the tip resistance (Qc) and skin friction (Fs) while the CPT was advanced into the soil with hydraulic down pressure. A piezometer located behind the cone tip also measured transient pore pressure (u). The nearby CPT data from our 2013 Ballona Wetland study is presented in Figures A-5 through A-10. Note that the first figure for each CPT sounding presents the raw data (Figures A-5a through A-10a). The estimated undrained strength (Su) and Soil Behavior Type Index (Ic) is shown in detail in Figures A-5b through A-10b. The Soil Behavior Type (SBT) profiles from the program CPeT-IT v2.0.1.55 are presented along with the raw data in color coded logs at the end of each CPT sounding. Note that the soil interpretations are a function of the normalized cone resistance and friction ratio (Robertson, 2010).

APPENDIX A

EXISTING FIELD DATA (Continued)

The previous exploratory boring and CPT locations were determined by visually estimating, pacing and taping distances from landmarks shown on the available plans. The supplemental borings proposed for the Foundation Report should be surveyed by Psomas. The exploration locations shown in Figures 3A and 3B should not be considered more accurate than is implied by the method of measurement used and the scale of the map. The lines designating the interface between differing soil materials on the logs may be abrupt or gradational. Further, soil conditions at locations between the explorations may be substantially different from those at the specific locations explored. It should be noted that the passage of time may also result in changes in the soil conditions reported in the logs.

SOIL IDENTIFICATION AND DESCRIPTION SEQUENCE

Sequence	Identification Components	Refer to Section: Field	Refer to Section: Lab	Required	Optional
1	Group Name	2.5.2	3.2.2	●	
2	Group Symbol	2.5.2	3.2.2	●	
	Description Components				
3	Consistency of Cohesive Soil	2.5.3	3.2.3	●	
4	Apparent Density of Cohesionless Soil	2.5.4		●	
5	Color	2.5.5		●	
6	Moisture	2.5.6		●	
7	Percent or Proportion of Soil	2.5.7	3.2.4	●	⬭
	Particle Size	2.5.8	2.5.8	●	⬭
	Particle Angularity	2.5.9			○
	Particle Shape	2.5.10			○
8	Plasticity (for fine-grained soil)	2.5.11	3.2.5		○
9	Dry Strength (for fine-grained soil)	2.5.12			○
10	Dilatency (for fine-grained soil)	2.5.13			○
11	Toughness (for fine-grained soil)	2.5.14			○
12	Structure	2.5.15			○
13	Cementation	2.5.16		●	
14	Percent of Cobbles and Boulders	2.5.17		●	
	Description of Cobbles and Boulders	2.5.18		●	
15	Consistency Field Test Result	2.5.3		●	
16	Additional Comments	2.5.19			○

Describe the soil using descriptive terms in the order shown

Minimum Required Sequence:

USCS Group Name (Group Symbol); Consistency or Density; Color; Moisture; Percent or Proportion of Soil; Particle Size; Plasticity (optional).

⬭ = optional for non-Caltrans projects

Where applicable:

Cementation; % cobbles & boulders; Description of cobbles & boulders; Consistency field test result

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

HOLE IDENTIFICATION

Holes are identified using the following convention:

H – YY – NNN

Where:

H: Hole Type Code

YY: 2-digit year

NNN: 3-digit number (001-999)

Hole Type Code and Description

Hole Type Code	Description
A	Auger boring (hollow or solid stem, bucket)
R	Rotary drilled boring (conventional)
RC	Rotary core (self-cased wire-line, continuously-sampled)
RW	Rotary core (self-cased wire-line, not continuously sampled)
P	Rotary percussion boring (Air)
HD	Hand driven (1-inch soil tube)
HA	Hand auger
D	Driven (dynamic cone penetrometer)
CPT	Cone Penetration Test
O	Other (note on LOTB)

Description Sequence Examples:

SANDY lean CLAY (CL); very stiff; yellowish brown; moist; mostly fines; some SAND, from fine to medium; few gravels; medium plasticity; PP=2.75.

Well-graded SAND with SILT and GRAVEL and COBBLES (SW-SM); dense; brown; moist; mostly SAND, from fine to coarse; some fine GRAVEL; few fines; weak cementation; 10% GRANITE COBBLES; 3 to 6 inches; hard; subrounded.

Clayey SAND (SC); medium dense, light brown; wet; mostly fine sand,; little fines; low plasticity.

GROUP DELTA

Project No. LA1590

Lincoln Boulevard Bridge Replacement

Psomas

BORING RECORD LEGEND #1

GROUP SYMBOLS AND NAMES

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

FIELD AND LABORATORY TESTING

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

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT)
- Standard California Sampler
- Modified California Sampler (2.4" ID, 3" OD)
- Shelby Tube
- Piston Sampler
- NX Rock Core
- HQ Rock Core
- Bulk Sample
- Other (see remarks)

DRILLING METHOD SYMBOLS

- Auger Drilling
- Rotary Drilling
- Dynamic Cone or Hand Driven
- Diamond Core

WATER LEVEL SYMBOLS

- First Water Level Reading (during drilling)
- Static Water Level Reading (after drilling, date)

Definitions for Change in Material

Term	Definition	Symbol
Material Change	Change in material is observed in the sample or core and the location of change can be accurately located.	———
Estimated Material Change	Change in material cannot be accurately located either because the change is gradational or because of limitations of the drilling and sampling methods.	– – – – –
Soil / Rock Boundary	Material changes from soil characteristics to rock characteristics.	~~~

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

GROUP DELTA

Project No. LA1590

Lincoln Boulevard Bridge Replacement

Psomas

BORING RECORD LEGEND #2

CONSISTENCY OF COHESIVE SOILS				
Description	**Shear Strength (tsf)**	**Pocket Penetrometer, PP, Measurement (tsf)**	**Torvane, TV, Measurement (tsf)**	**Vane Shear, VS, Measurement (tsf)**
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 - 0.5	0.25 - 0.5
Stiff	0.5 - 1	1 - 2	0.5 - 1	0.5 - 1
Very Stiff	1 - 2	2 - 4	1 - 2	1 - 2
Hard	Greater than 2	Greater than 4	Greater than 2	Greater than 2

APPARENT DENSITY OF COHESIONLESS SOILS	
Description	**SPT N_{60} (blows / 12 inches)**
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE	
Description	**Criteria**
Dry	No discernable moisture
Moist	Moisture present, but no free water
Wet	Visible free water

PERCENT OR PROPORTION OF SOILS	
Description	**Criteria**
Trace	Particles are present but estimated to be less than 5%
Few	5 - 10%
Little	15 - 25%
Some	30 - 45%
Mostly	50 - 100%

PARTICLE SIZE		
Description		**Size (in)**
Boulder		Greater than 12
Cobble		3 - 12
Gravel	Coarse	3/4 - 3
	Fine	1/5 - 3/4
Sand	Coarse	1/16 - 1/5
	Medium	1/64 - 1/16
	Fine	1/300 - 1/64
Silt and Clay		Less than 1/300

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

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010), with the exception of consistency of cohesive soils vs. N_{60}.

Plasticity

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

CONSISTENCY OF COHESIVE SOILS	
Description	SPT N_{60} (blows/12 inches)
Very Soft	0 - 2
Soft	2 - 4
Medium Stiff	4 - 8
Stiff	8 - 15
Very Stiff	15 - 30
Hard	Greater than 30

Ref: Peck, Hansen, and Thornburn, 1974, "Foundation Engineering," Second Edition.

Note: Only to be used (with caution) when pocket penetrometer or other data on undrained shear strength are unavailable. Not allowed by Caltrans Soil and Rock Logging and Classification Manual, 2010.

GROUP DELTA

Project No. LA1590

Lincoln Boulevard Bridge Replacement

Psomas

BORING RECORD LEGEND #3

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Lincoln Bridge Multi-Modal Improvement Project	LA1345	**A-RW013**

SITE LOCATION	START	FINISH	SHEET NO.
Ballona Wetlands	9/26/2012	9/26/2012	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Cascade Drilling	Rotary Wash	N. Briffa	P. Kashighandi

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
CME 85	3.875	56.5	13.8	▼ / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
ETR ~ 84%, N_{60} ~ 84/60 * N ~ 1.40 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			B-1									**Artificial Fill (af):** Silty Sand (SM), brown, dry, fine to coarse grained sand, fine to coarse gravel, few organics, trace shell fragments, denser than other locations in Area A.
5	10		R-2	0 4 3	7	7	20	117		5		-Loose, no organics, few shell fragments.
10	5		S-3	3 4 4	8	11			PA	10		**Alluvium (Qa):** Sandy Silt (ML), olive brown, wet, medium stiff, highly micaceous, some oxidation. (0% Gravel; 16% Sand; 84% Fines)
15	0		R-4	0 0 2	2	2	48	71	PA PI C	15		Lean Clay (CL), olive brown, wet, soft, medium plasticity, highly micaceous, some oxidation. Vane Shear = 0.3 ksf (0% Gravel; 12% Sand; 88% Fines) (LL~47; PL~27; PI~20)
20	-5		S-5	0 1 1	2	3			PI	20		Fat Clay (CH), gray, wet, soft, few fine grained sand, high plasticity, trace shell fragments, H2S odor. (LL~56; PL~28; PI~28)
	-10											

GDC_LOG_BORING_MMX_SOIL_SD L-962_PART 1.GPJ GDCLOG.GDT 2/13/18

GROUP DELTA CONSULTANTS, INC.
9245 Activity Road, Suite 103
San Diego, CA 92126

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

FIGURE
A-1 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Lincoln Bridge Multi-Modal Improvement Project	LA1345	**A-RW013**

SITE LOCATION	START	FINISH	SHEET NO.
Ballona Wetlands	9/26/2012	9/26/2012	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Cascade Drilling	Rotary Wash	N. Briffa	P. Kashighandi

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
CME 85	3.875	56.5	13.8	▼ / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
ETR ~ 84%, N_{60} ~ 84/60 * N ~ 1.40 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			SH-6									**Alluvium (Qa):** Fat Clay (CH), gray, wet, soft, few fine grained sand, high plasticity, trace shell fragments, H2S odor.
	-15											Lean Clay (CL), gray, wet, medium stiff, trace coarse grained sand, medium plasticity.
30			R-7	5 5 6	11	10	15	115	PI	30		NOTE: Increase in stiffness at bottom. (LL~34; PL~18; PI~16) Vane Shear = 1.2 ksf
	-20											Silty Sand (SM), gray, wet, loose, fine grained sand, trace fine gravel.
35			S-8	3 3 3	6	8				35		
	-25											Fat Clay (CH), gray, moist, stiff, medium to high plasticity, interbedded with Silt (ML), gray, wet, stiff, trace fine grained sand, medium plasticity.
40			R-9	4 4 6	10	9	57	69		40		
	-30											
45			S-10	3 3 4	7	10				45		Peat (PT), brown, moist, firm, 4" layer of Fat Clay (CH), tree stump or branch >3".
	-35											Poorly Graded Sand with Silt (SP-SM), gray, wet, dense, fine to medium sand, trace organics (wood fibers).

GROUP DELTA CONSULTANTS, INC.
9245 Activity Road, Suite 103
San Diego, CA 92126

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FIGURE
A-1 b

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Lincoln Bridge Multi-Modal Improvement Project	LA1345	**A-RW013**

SITE LOCATION	START	FINISH	SHEET NO.
Ballona Wetlands	9/26/2012	9/26/2012	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Cascade Drilling	Rotary Wash	N. Briffa	P. Kashighandi

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
CME 85	3.875	56.5	13.8	▼ / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
ETR ~ 84%, N_{60} ~ 84/60 * N ~ 1.40 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R-11	22 27 35	62	58	21	104				**Alluvium (Qa):** Poorly Graded Sand with Silt (SP-SM), gray, wet, dense, fine to medium grained sand, trace organics (wood fibers).
	-40											Poorly graded Sand with Gravel (SP), gray, wet, dense, fine to medium grained sand, few coarse grained sand, fine to coarse gravel, trace clay.
55			S-12	15 24 25	49	69				55		
	-45											Boring terminated at 56.5 ft. Groundwater not measured. Boring backfilled with bentonite grout. This boring was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010).
60										60		
	-50											
65										65		
	-55											
70										70		
	-60											

GDC_LOG_BORING_MMX_SOIL_SD L-962_PART 1.GPJ GDCLOG.GDT 2/13/18

GROUP DELTA CONSULTANTS, INC.
9245 Activity Road, Suite 103
San Diego, CA 92126

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

FIGURE
A-1 c

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Lincoln Bridge Multi-Modal Improvement Project	LA1345	**A-RW015**

SITE LOCATION	START	FINISH	SHEET NO.
Ballona Wetlands	10/2/2012	10/2/2012	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Cascade Drilling	Rotary Wash	N. Briffa/JW	P. Kashighandi

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
CME 85	3.875	61.5	17.1	▼ / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
ETR ~ 84%, N_{60} ~ 84/60 * N ~ 1.40 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	15		B-1									**Artificial Fill (af):** Silty Sand (SM), brown, dry, fine to coarse grained sand, few fine to coarse gravels, trace cobble, little sea shells, little rootlets/branches.
5			S-2	1 4 4	8	11				5		-Dark gray to brown, moist, loose, fine to medium grained sand, low to medium plasticity, trace shell fragments, little oxidation.
	10											
10			R-3	2 4 5	9	8	27		PI	10		**Alluvium (Qa):** Fat Clay (CH), dark gray to brown, moist, stiff, fine grained sand, high plasticity, little medium grained sand. (LL~57; PL~22; PI~35) Vane Shear = 1.1 ksf
	5											
15			S-4	1 2 3	5	7			PA	15		Clayey Sand (SC), gray with mottled brown, moist, loose, fine grained sand, some oxidation, micaceous. (0% Gravel; 57% Sand; 43% Fines)
	0											
20			R-5	5 4 3	7	7	43	78	DS	20		-Wet, low plasticity, large shell fragments.
	-5											Lean Clay (CL), gray, moist, medium stiff, trace fine grained sand, medium plasticity, H2S odor.

GDC_LOG_BORING_MMX_SOIL_SD L-962_PART 1.GPJ GDCLOG.GDT 2/13/18

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

FIGURE
A-2 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Lincoln Bridge Multi-Modal Improvement Project	LA1345	**A-RW015**

SITE LOCATION	START	FINISH	SHEET NO.
Ballona Wetlands	10/2/2012	10/2/2012	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Cascade Drilling	Rotary Wash	N. Briffa/JW	P. Kashighandi

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
CME 85	3.875	61.5	17.1	▼ / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
ETR ~ 84%, N_{60} ~ 84/60 * N ~ 1.40 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S-6	0 1 2	3	4						**Alluvium (Qa):** Lean Clay (CL), gray, moist, medium stiff, trace fine grained sand, medium plasticity, H2S odor.
	-10											
30			SH-7							30		-Moist, fine to medium grained sand.
	-15											
			R-8	13 18 18	36	34	25	107	DS			Poorly graded Sand with Silt (SP-SM), gray, wet, medium dense, fine to coarse grained sand.
35			S-9	4 5 6	11	15			PA	35		Silt (ML), gray, wet, soft, trace fine grained sand, none to low plasticity, ~3" layer of Sand with Silt (SM). (0% Gravel; 37% Sand; 63% Fines)
	-20											
40			R-10	3 4 4	8	7	25			40		Sandy Silt (ML), gray, wet, firm, fine grained sand, trace coarse grained sand, low plasticity.
	-25											
45			S-11	1 4 5	9	13			PI	45		Fat Clay (CH), gray, moist, medium stiff, high plasticity, some organics. (LL~57; PL~28; PI~29)
	-30											Silty Sand (SM), gray, moist to wet, medium dense, fine grained sand, trace organics.

GDC_LOG_BORING_MMX_SOIL_SD L-962_PART 1.GPJ GDCLOG.GDT 2/13/18

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FIGURE
A-2 b

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Lincoln Bridge Multi-Modal Improvement Project	LA1345	**A-RW015**

SITE LOCATION	START	FINISH	SHEET NO.
Ballona Wetlands	10/2/2012	10/2/2012	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Cascade Drilling	Rotary Wash	N. Briffa/JW	P. Kashighandi

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
CME 85	3.875	61.5	17.1	▼ / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
ETR ~ 84%, N_{60} ~ 84/60 * N ~ 1.40 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R-12	9 15 15	30	28	25	100	PA			**Alluvium (Qa):** Silty Sand (SM), gray, moist to wet, medium dense, fine grained sand, trace organics. (0% Gravel; 56% Sand; 44% Fines)
	-35											Poorly Graded Sand (SP), gray, wet, very dense, fine to coarse grained sand, few fine subangular gravel.
55			S-13	12 27 27	44	62				55		
	-40											
60			S-14	48 40 46	86	120				60		-Few fine to coarse gravel.
	-45											Boring terminated at 61.5 ft. Groundwater not measured. Boring backfilled with bentonite grout. This boring was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010).
65										65		
	-50											
70										70		
	-55											

GDC_LOG_BORING_MMX_SOIL_SD L-962_PART 1.GPJ GDCLOG.GDT 2/13/18

GROUP DELTA CONSULTANTS, INC.
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FIGURE
A-2 c

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Lincoln Bridge Multi-Modal Improvement Project	LA1345	**B-RW049**

SITE LOCATION	START	FINISH	SHEET NO.
Ballona Wetlands	10/1/2012	10/1/2012	1 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Cascade Drilling	Rotary Wash	N. Briffa	P. Kashighandi

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
CME 85	3.875	69	17.6	▼ / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
ETR ~ 84%, N_{60} ~ 84/60 * N ~ 1.40 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	15		B-1									**Artificial Fill (af):** Silty Sand with Gravel (SM), brown, dry, fine to coarse grained sand, fine to coarse gravel.
5			S-2	3 4 4	8	11				5		Silt (ML), brown, moist, medium stiff, low plasticity, trace roots.
	10											
10			R-3	2 4 8	12	11	31	81		10		-Olive brown, low to medium plasticity, trace dark brown clay seams. Vane Shear = 0.7 ksf
	5											
15			SH-4				37	74	PA PI C	15		-None to low plasticity, increase in roots, highly micaceous, no clay seams. Vane Shear = 0.5 ksf
	0											Elastic Silt (MH), dark brown with orange spots of Silt, high plasticity, trace hair or fiber, trace shell fragments. (0% Gravel; 45% Sand; 55% Fines) (LL~84; PL~41; PI~43)
20			S-5	2 1 2	3	4			PI	20		**Alluvium (Qa)**Lean Clay (CL), gray, wet, soft, low to medium plasticity, some laminations and pinholes of oxidation, micaceous. (LL~27; PL~20; PI~7)
	-5											Fat Clay (CH), gray, wet, medium stiff, trace fine grained sand, high plasticity, micaceous, H2S odor.

GDC_LOG_BORING_MMX_SOIL_SD L-962_PART 1.GPJ GDCLOG.GDT 2/13/18

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FIGURE
A-3 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Lincoln Bridge Multi-Modal Improvement Project	LA1345	**B-RW049**

SITE LOCATION	START	FINISH	SHEET NO.
Ballona Wetlands	10/1/2012	10/1/2012	2 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Cascade Drilling	Rotary Wash	N. Briffa	P. Kashighandi

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
CME 85	3.875	69	17.6	▼ / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
ETR ~ 84%, N_{60} ~ 84/60 * N ~ 1.40 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			SH-6				63	62	PI C			**Alluvium (Qa):** Fat Clay (CH), gray, wet, medium stiff, trace fine grained sand, high plasticity, micaceous, H2S odor. (LL~67; PL~33; PI~234) Vane Shear = 1.0 ksf
	-10											
30			R-7	3 4 5	9	8	32	89		30		Lean Clay (CL), gray, wet, medium stiff, few fine grained sand, low to medium plasticity, trace shell fragments, slight H2S odor.
	-15											
35			SH-8				28	96	PI	35		-Moist, stiff, trace fine grained sand, medium plasticity, trace rootlets. (LL~40; PL~23; PI~17) Vane Shear = 1.1 ksf
	-20											
40			R-9	10 10 13	23	21	22	105	DS	40		Silty Sand (SM), gray, wet, medium dense, fine to coarse grained sand.
	-25											
45			S-10	9 9 12	21	29				45		-Fine grained sand, trace seams of Elastic Silt.
	-30											

GDC_LOG_BORING_MMX_SOIL_SD L-962_PART 1.GPJ GDCLOG.GDT 2/13/18

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FIGURE
A-3 b

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Lincoln Bridge Multi-Modal Improvement Project	LA1345	**B-RW049**

SITE LOCATION	START	FINISH	SHEET NO.
Ballona Wetlands	10/1/2012	10/1/2012	3 of 3

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Cascade Drilling	Rotary Wash	N. Briffa	P. Kashighandi

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
CME 85	3.875	69	17.6	▼ / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
ETR ~ 84%, N_{60} ~ 84/60 * N ~ 1.40 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R-11	14 20 28	48	45	18	106				**Alluvium (Qa):** Silty Sand (SM), gray, wet, medium dense, fine to coarse grained sand. Dense, fine to medium grained sand, trace fine gravel.
	-35											
55			S-12	16 14 15	29	41				55		Poorly Graded Sand with Silt (SP-SM), gray, wet, medium dense, fine to medium grained sand, few coarse grained sand.
	-40											
60			R-13	4 5 8	13	12	31	85	PI	60		Lean Clay (CL), gray, moist, stiff, few fine grained sand, medium plasticity, trace organics. Vane Shear = 1.0 ksf (LL~39; PL~23; PI~16)
	-45											
65			SH-14							65		No recovery.
	-50		S-15	3 14 23	37	52	21					Poorly Graded Sand (SP), gray, wet, dense, fine to medium grained sand, trace fines.
70										70		Boring terminated at 69 ft. Groundwater not measured. Boring backfilled with bentonite grout. This boring was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010).
	-55											

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FIGURE
A-3 c

BORING RECORD

PROJECT NAME	PROJECT NUMBER	BORING
Lincoln Bridge Multi-Modal Improvement Project	LA1345	**B-HSA051**

SITE LOCATION	START	FINISH	SHEET NO.
Ballona Wetlands	10/16/2012	10/16/2012	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Cascade Drilling	Hollow Stem Auger	N. Briffa	P. Kashighandi

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
CME 85 All Terrain	8	21.5	6.3	▼ / *na*

SAMPLING METHOD
Hammer: 140 lbs., Drop: 30 in.

NOTES
ETR ~ 84%, N_{60} ~ 84/60 * N ~ 1.40 * N

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOW/FT "N"	N_{60}	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	DEPTH (feet)	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	5		B-1									**Artificial Fill (af):** Lean Clay (CL), brown, dry, low to medium plasticity, trace organics, trace sea shells, few fine roots, trace white residue. -Moist
			S-2	0 2 4	6	8	17					-Firm, no snail shells.
5	0		R-3	1 2 3	5	5	42	76	C	5		-Soft, light brown and gray, moist, medium plasticity.
			S-4	1 2 2	4	6						**Alluvium (Qa):** Interbedded layers of Lean Clay (CL) and Silt (ML), gray, wet, soft, fine grained sand, few oxidation, trace fine rootlets, micaceous.
10	-5		R-5	0 0 2	2	2	49	68	C	10		Silt (ML), gray, wet, very soft, low plasticity, trace oxidation, some small to large shell fragments, H2S odor.
			S-6	0 0 0	0	0			PI			Elastic Silt (MH), gray, wet, very soft, few fine grained sand, medium plasticity, few shell fragments, few tan color blebs of organics or CH, strong H2S odor. (LL~87; PL~43; PI~44)
15	-10		R-7	0 0 1	1	1	103	43		15		-Trace fine rootlets.
			S-8	0 5 7	12	17						-Increase in shell fragments.
20	-15		R-9	0 2 4	6	6	17	111		20		Sandy Lean Clay (CL), gray, wet, stiff, some fine grained sand, trace sea shells, H2S odor. Strong H2S odor occurred at ~20' (H2S >150 ppm).
												Boring terminated at 21.5 ft. Groundwater not encountered. Boring backfilled with tamped cuttings. This boring was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010).

GDC_LOG_BORING_MMX_SOIL_SD L-962_PART 1.GPJ GDCLOG.GDT 2/13/18

GROUP DELTA CONSULTANTS, INC.
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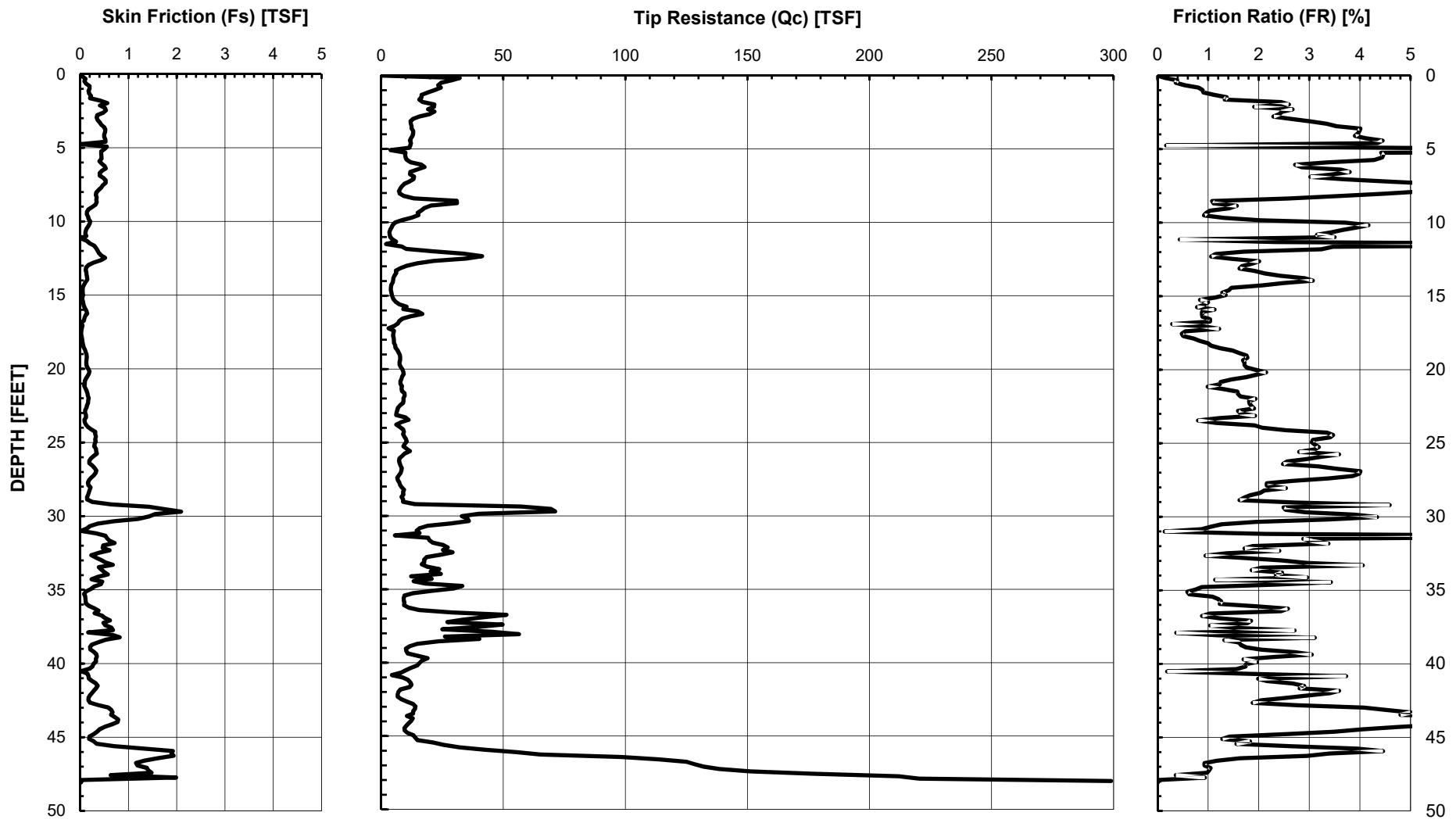
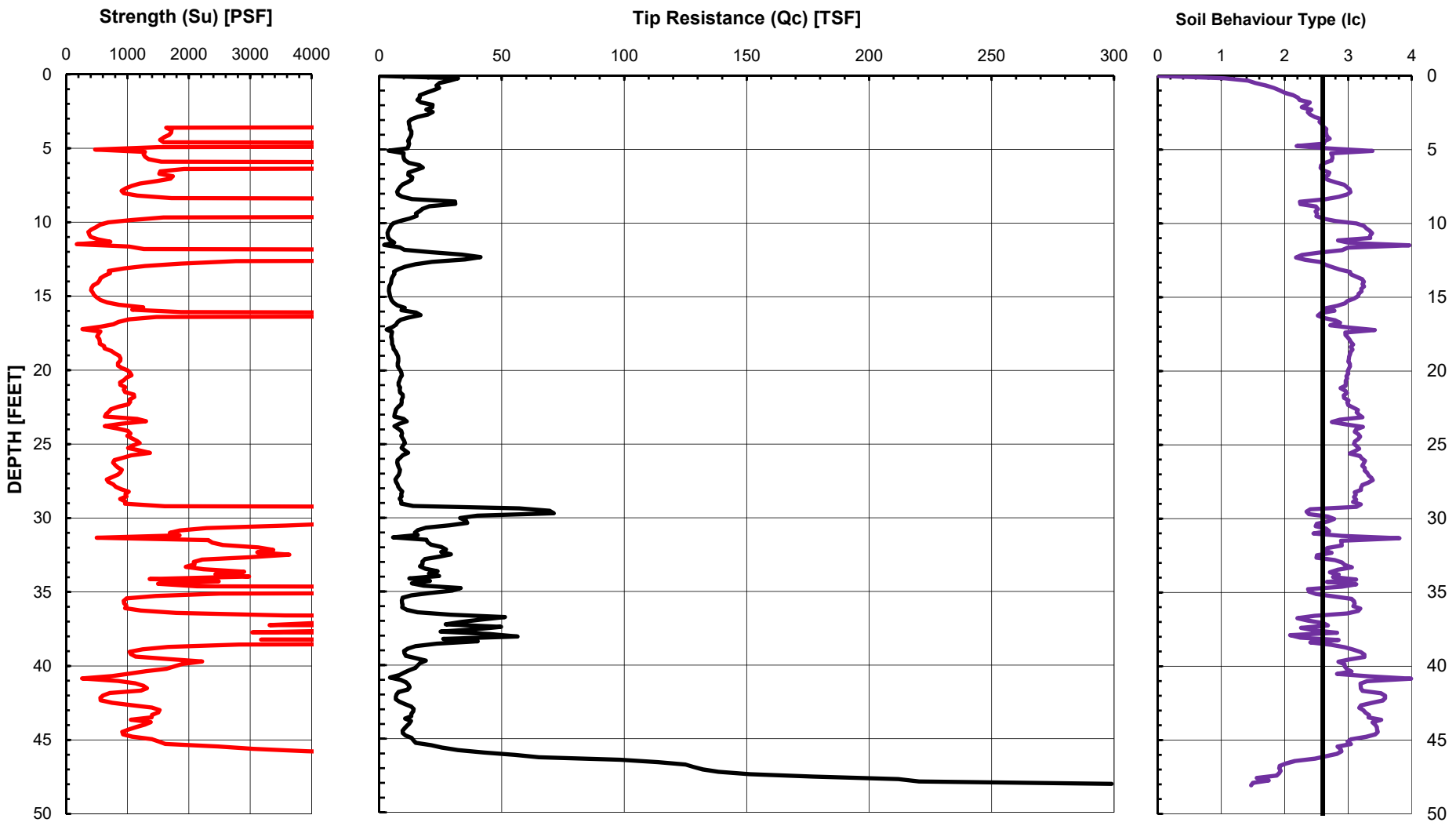
FIGURE
A-4



GROUP DELTA

CONE PENETOMETER DATA (A-CPT-012)

Document No. 18-0018
Project No. LA1345
FIGURE A-5a



GROUP DELTA

INTERPRETED SOIL DATA (A-CPT-012)

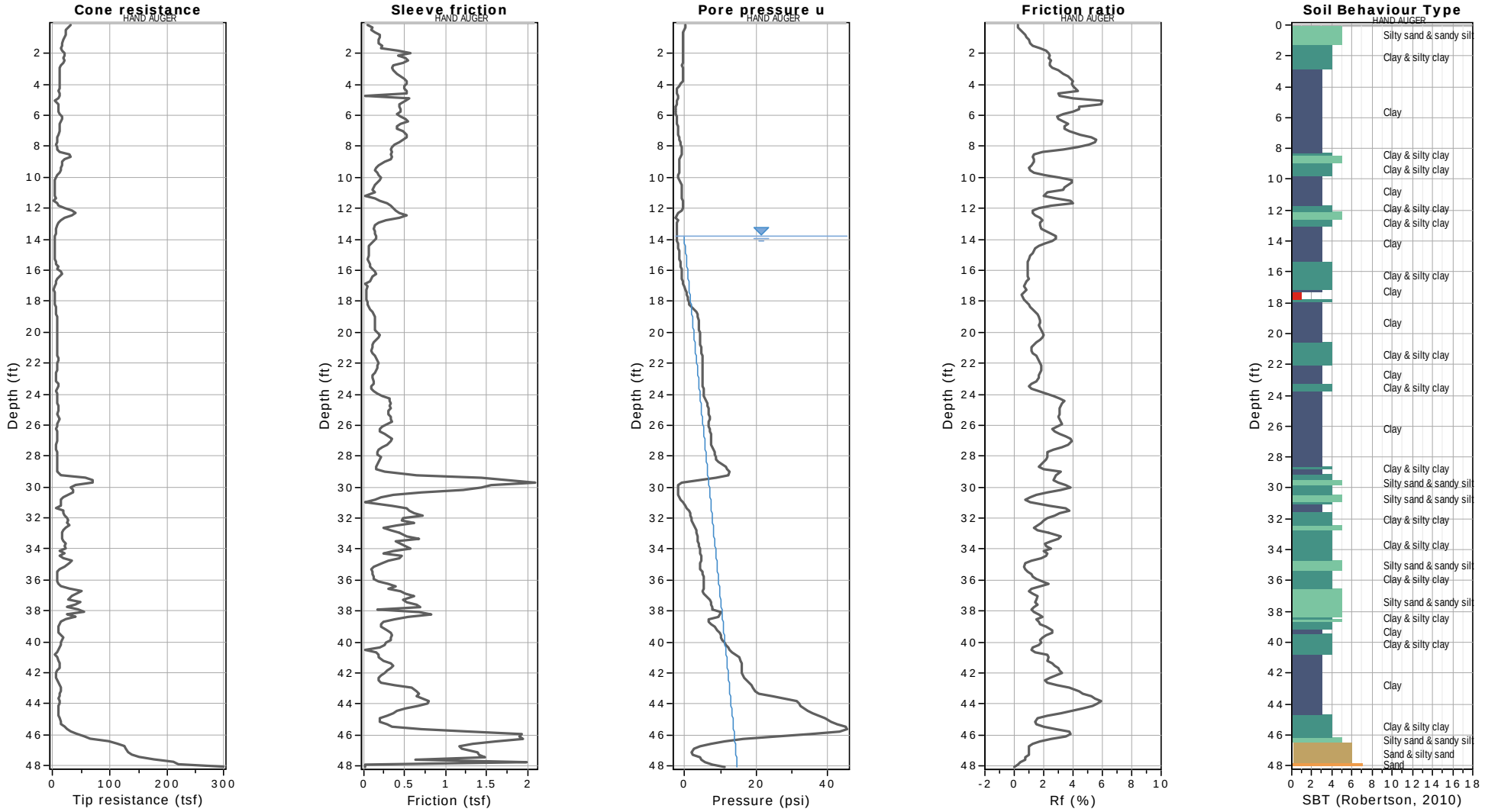
Document No. 18-0018
Project No. LA1345
FIGURE A-5b

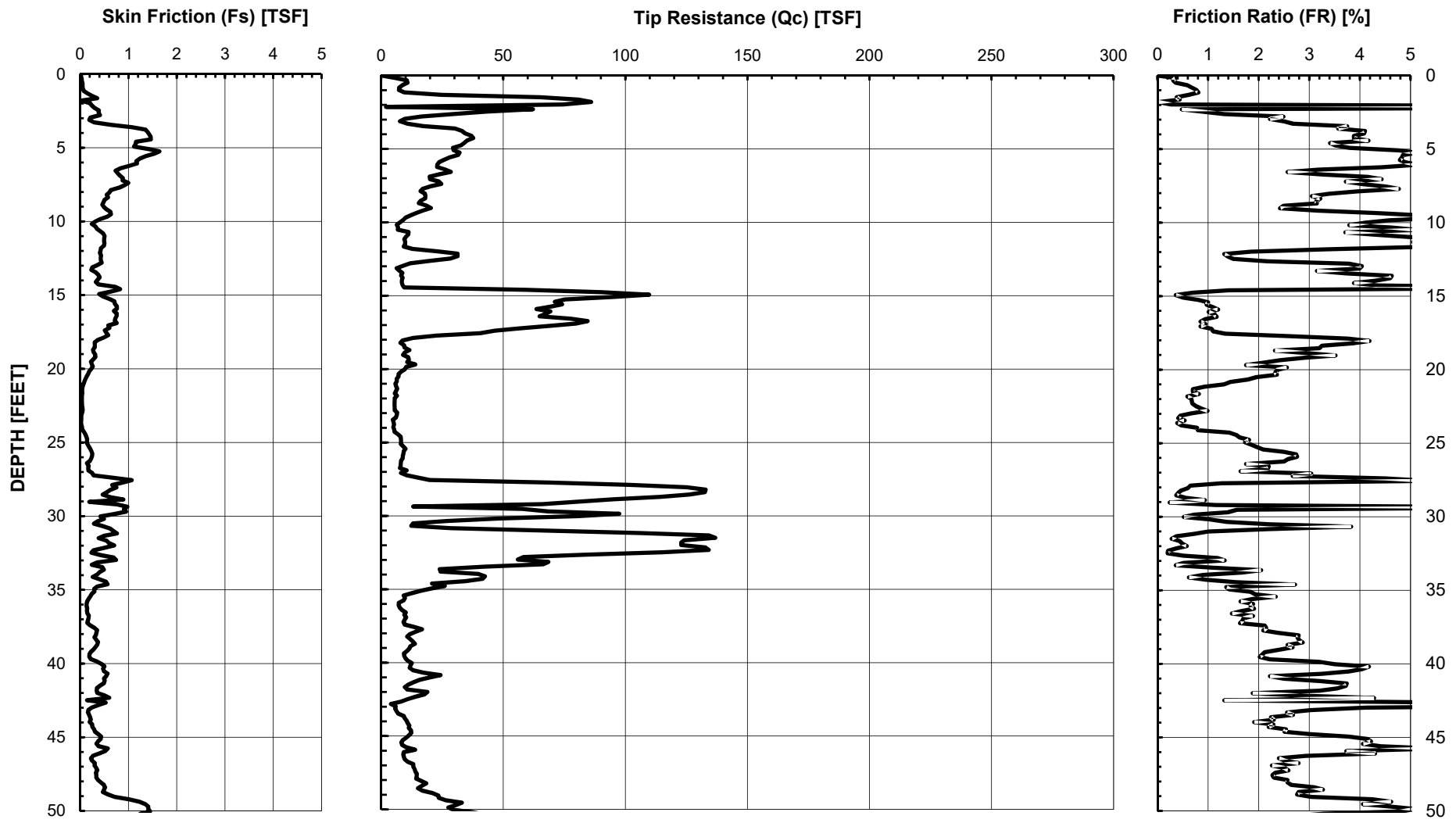
Group Delta Consultants, Inc.
Project No. LA1345

CPT: A-CPT-012

Project: **Lincoln Bridge Multi-Modal Improvement Project**
Location: **Los Angeles, California**

Total depth: 48.06 ft, Date: 9/24/2012
Surface Elevation: 13.80 ft

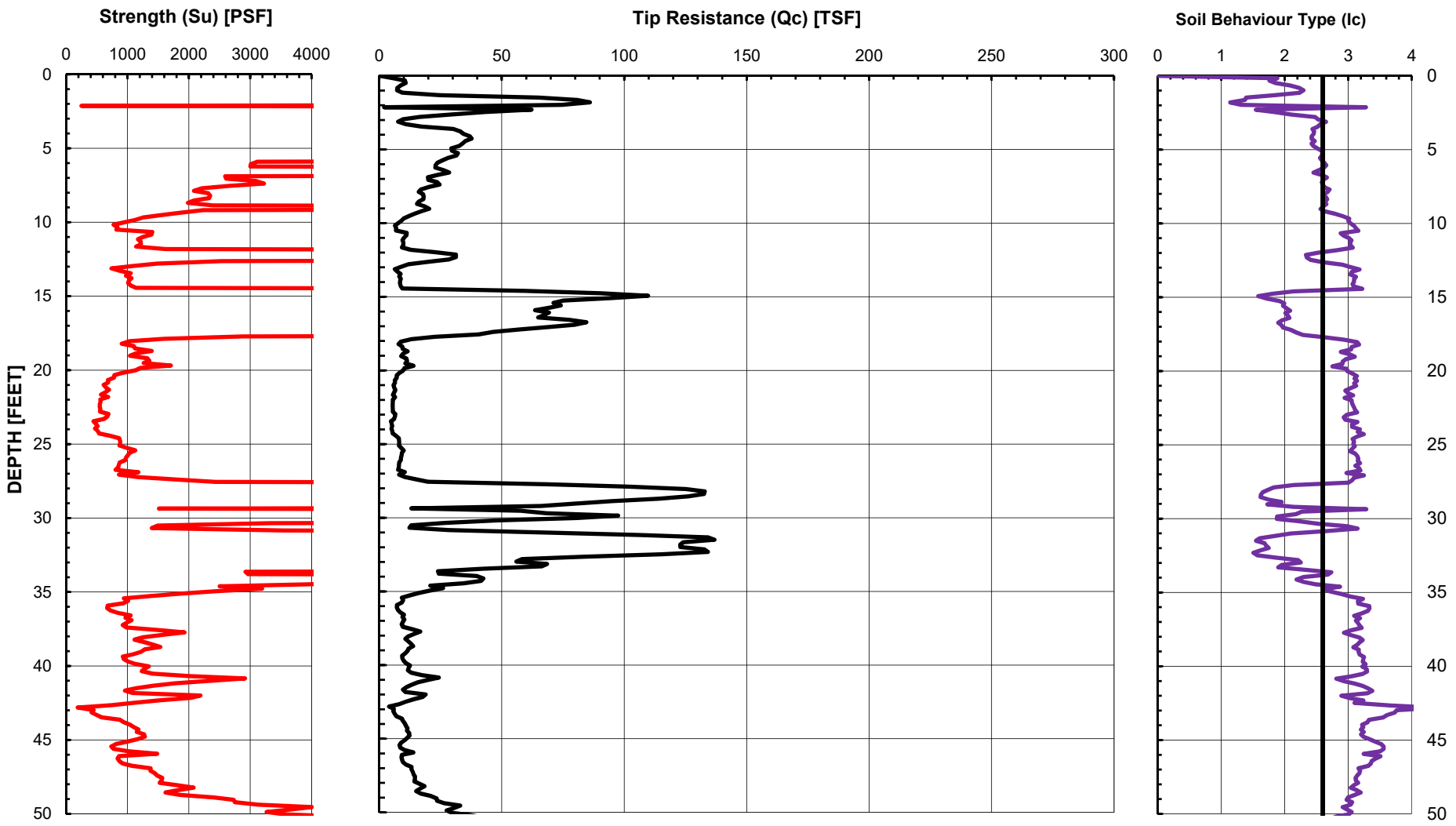




GROUP DELTA

CONE PENETOMETER DATA (A-CPT-014)

Document No. 18-0018
Project No. LA1345
FIGURE A-6a



GROUP DELTA

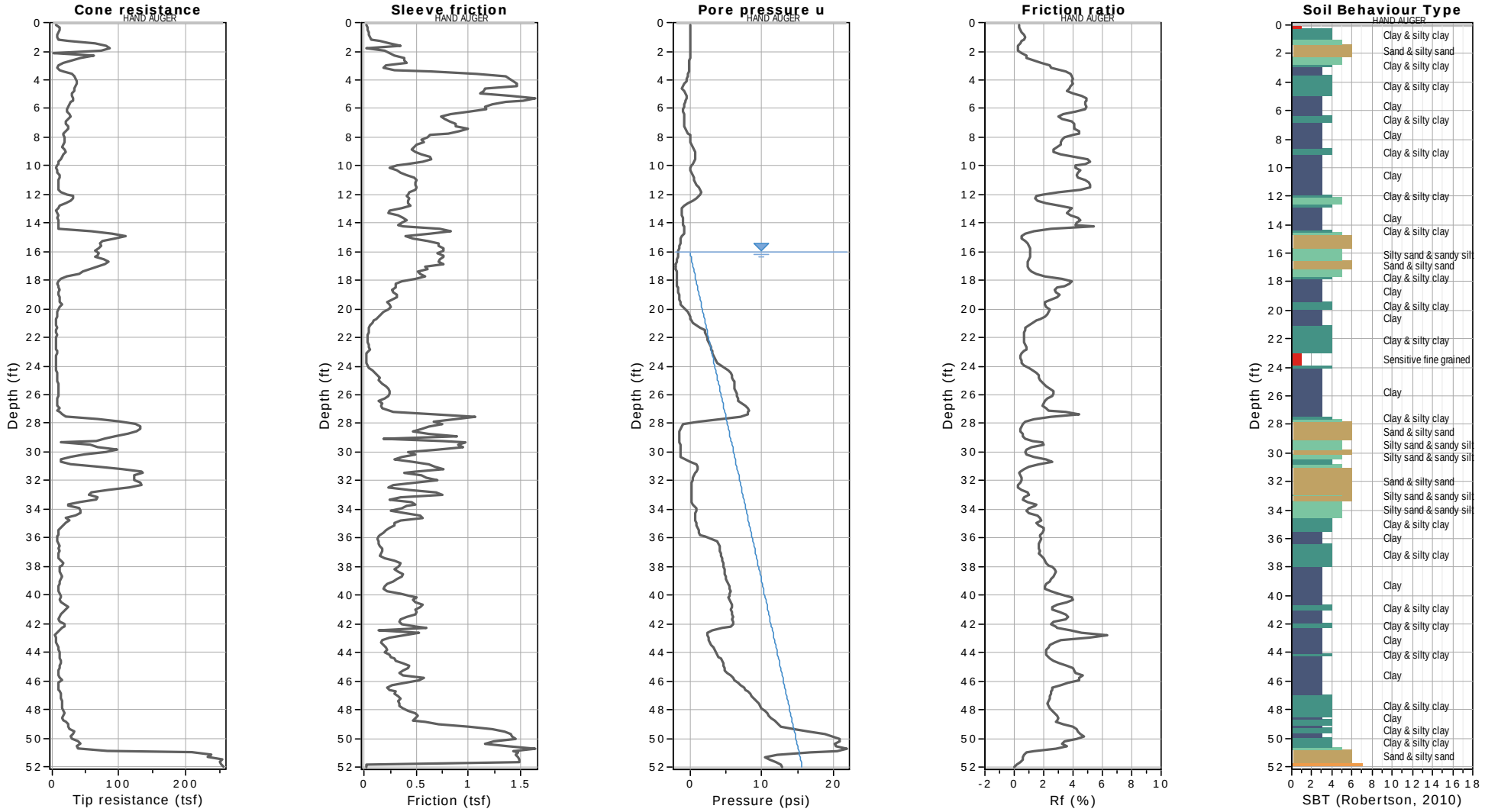
INTERPRETED SOIL DATA (A-CPT-014)

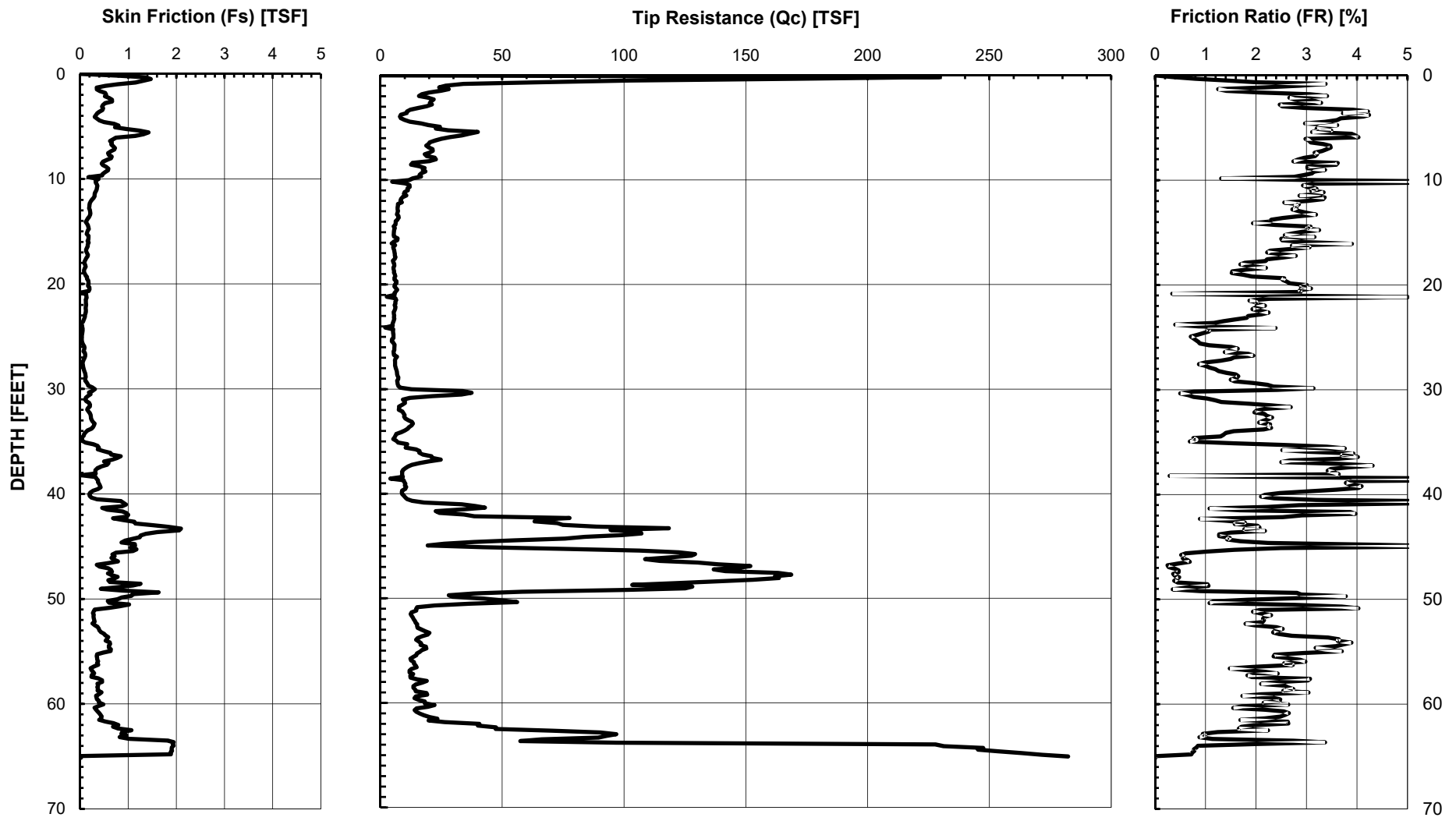
Document No. 18-0018
Project No. LA1345
FIGURE A-6b

CPT: A-CPT-014

Project: **Lincoln Bridge Multi-Modal Improvement Project**
Location: **Los Angeles, California**

Total depth: 52.00 ft, Date: 9/24/2012
Surface Elevation: 16.00 ft

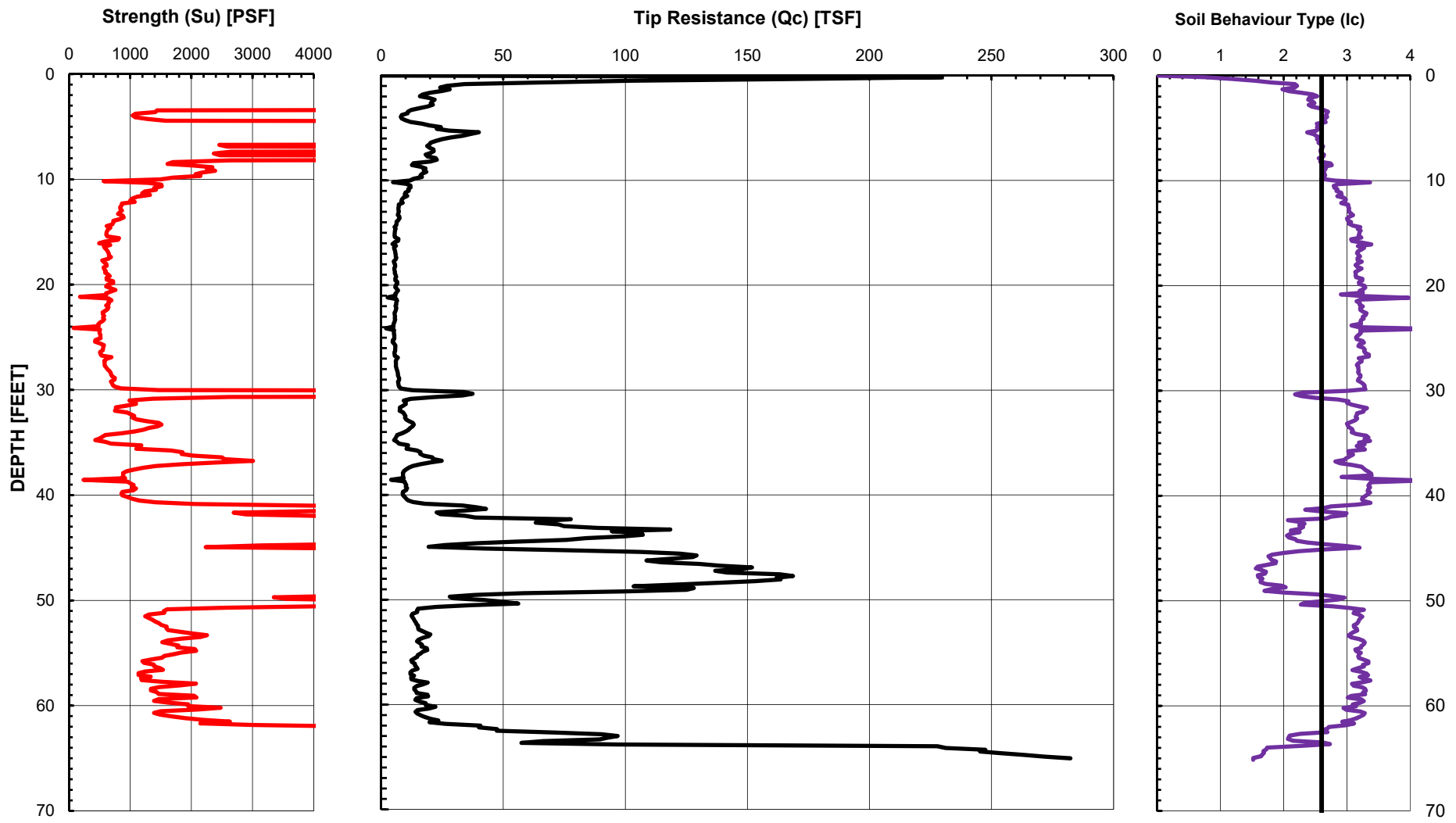




GROUP DELTA

CONE PENETOMETER DATA (A-CPT-025)

Document No. 18-0018
Project No. LA1345
FIGURE A-7a



GROUP DELTA

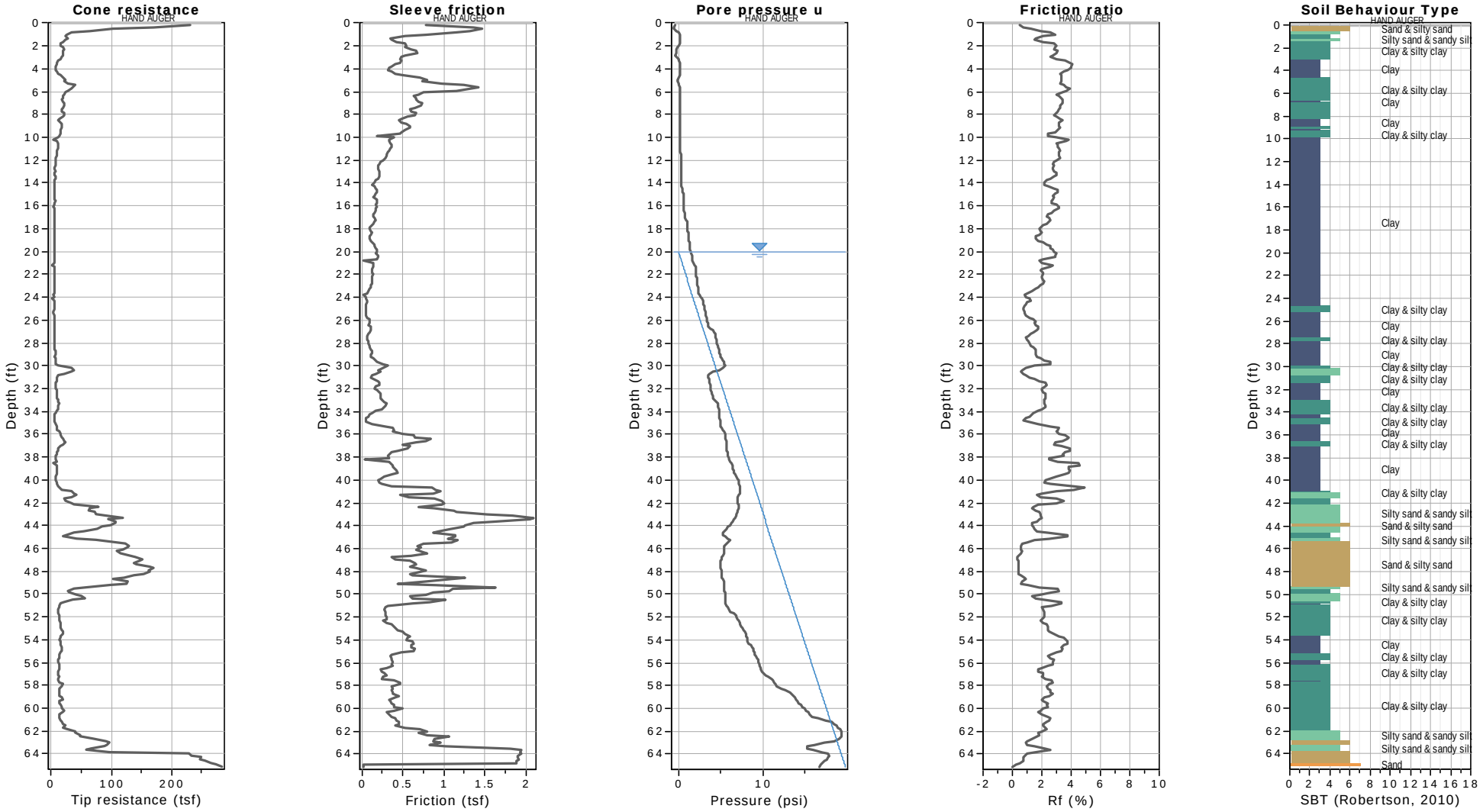
INTERPRETED SOIL DATA (A-CPT-025)

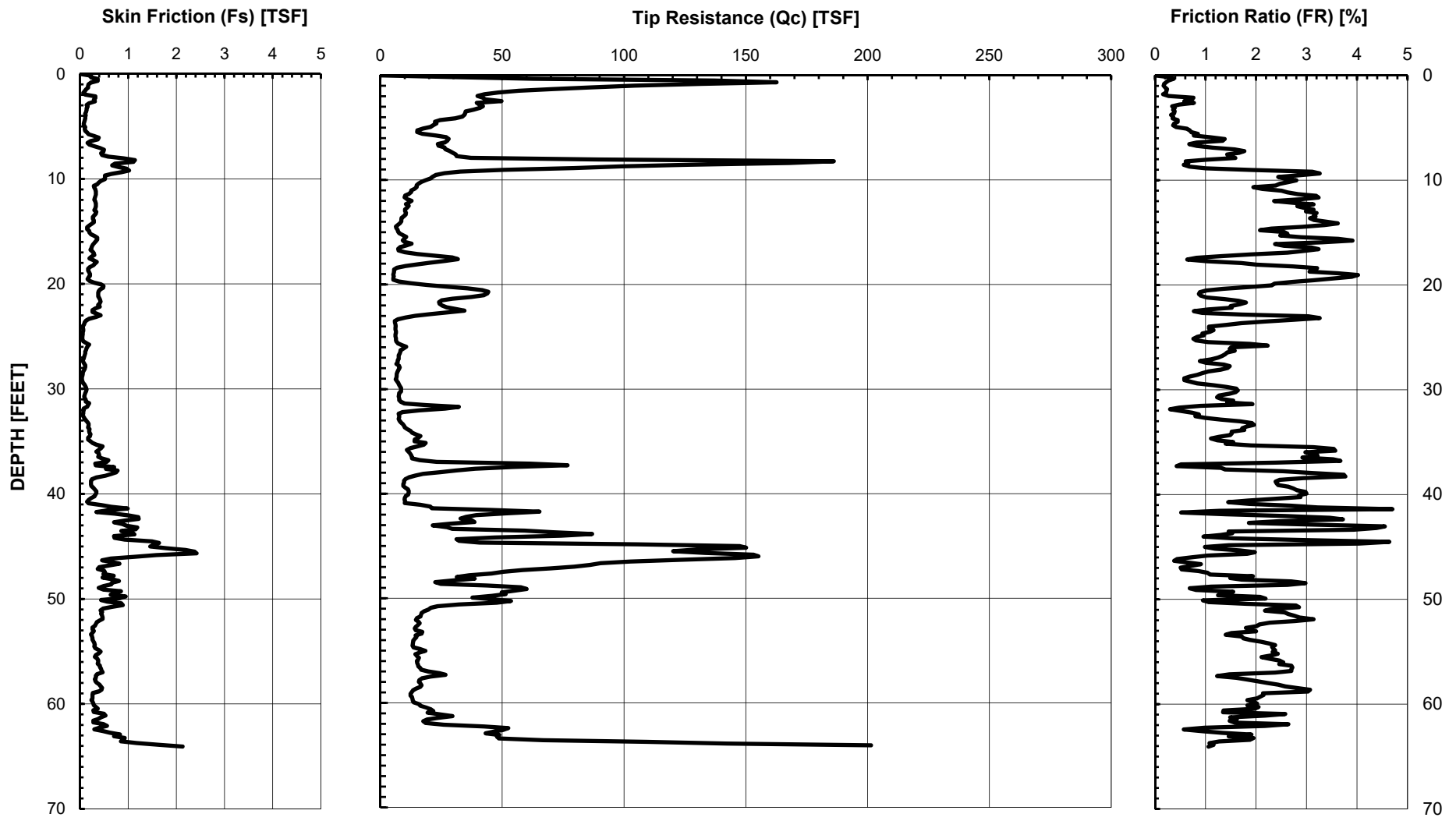
Document No. 18-0018
Project No. LA1345
FIGURE A-7b

CPT: A-CPT-025

Project: **Lincoln Bridge Multi-Modal Improvement Project**
Location: **Los Angeles, California**

Total depth: 65.13 ft, Date: 9/26/2012
Surface Elevation: 20.00 ft

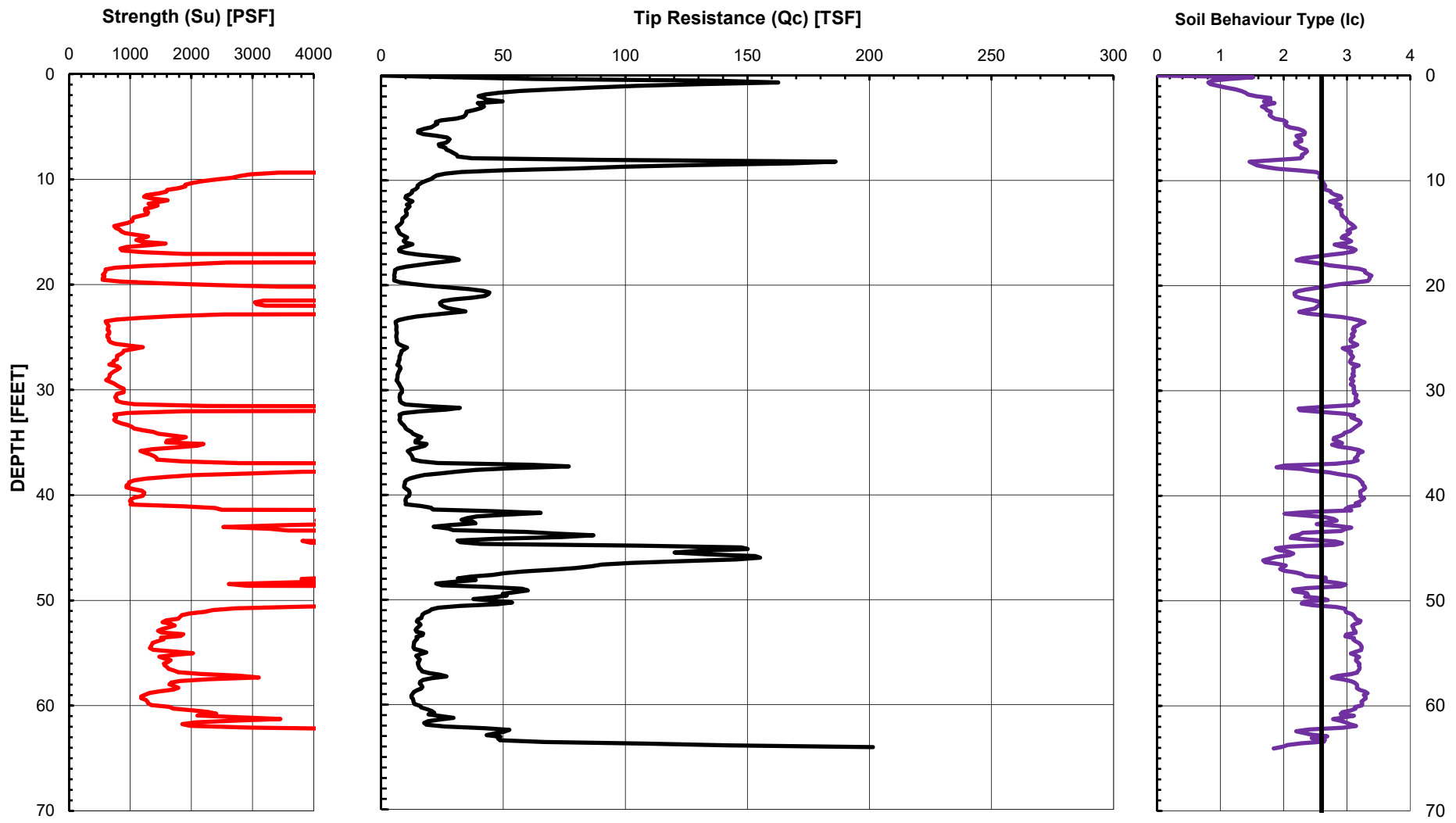




GROUP DELTA

CONE PENETOMETER DATA (B-CPT-050)

Document No. 18-0018
Project No. LA1345
FIGURE A-8a



GROUP DELTA

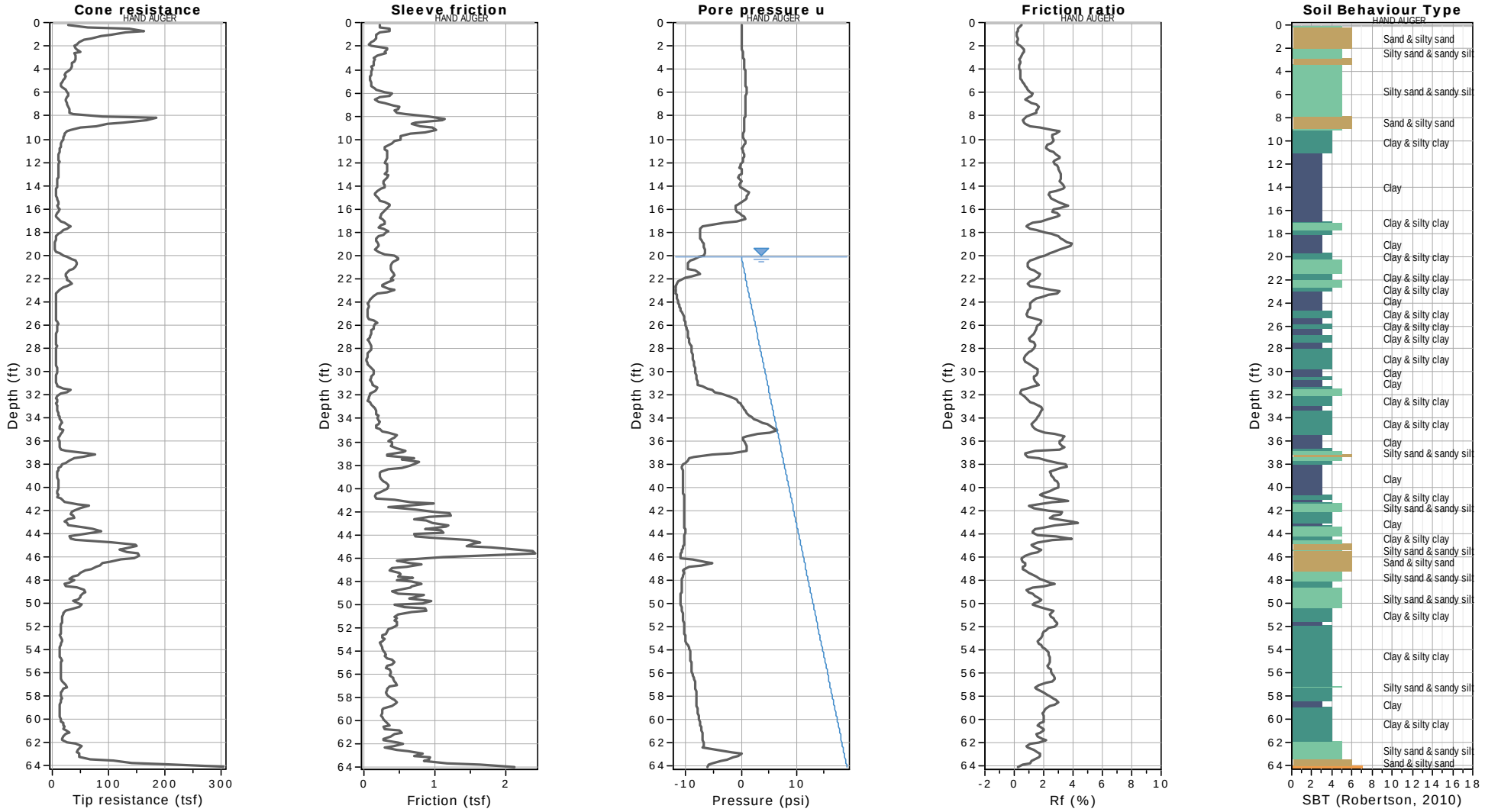
INTERPRETED SOIL DATA (B-CPT-050)

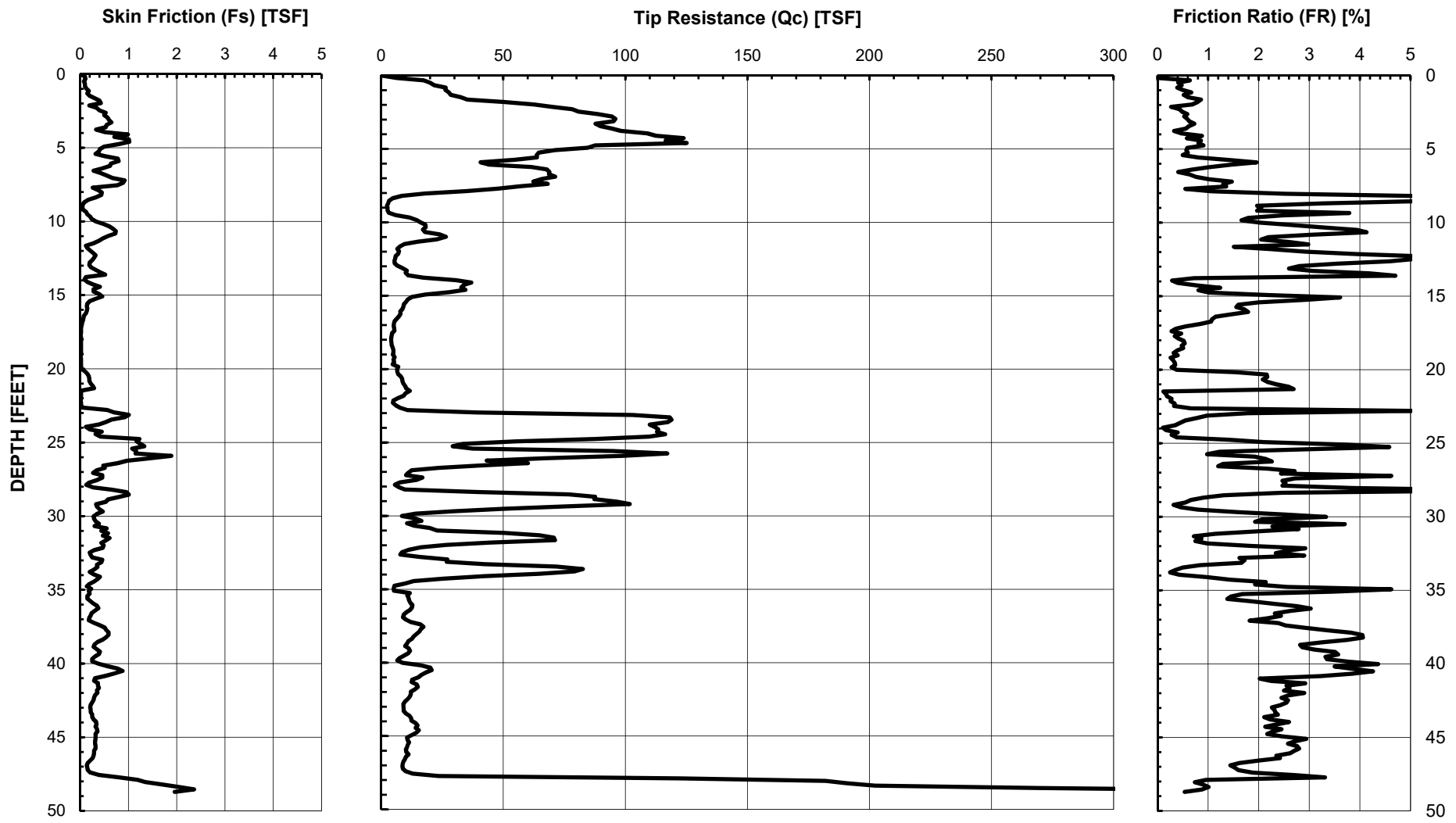
Document No. 18-0018
Project No. LA1345
FIGURE A-8b

CPT: B-CPT-050

Project: **Lincoln Bridge Multi-Modal Improvement Project**
Location: **Los Angeles, California**

Total depth: 64.12 ft, Date: 9/14/2012
Surface Elevation: 20.20 ft

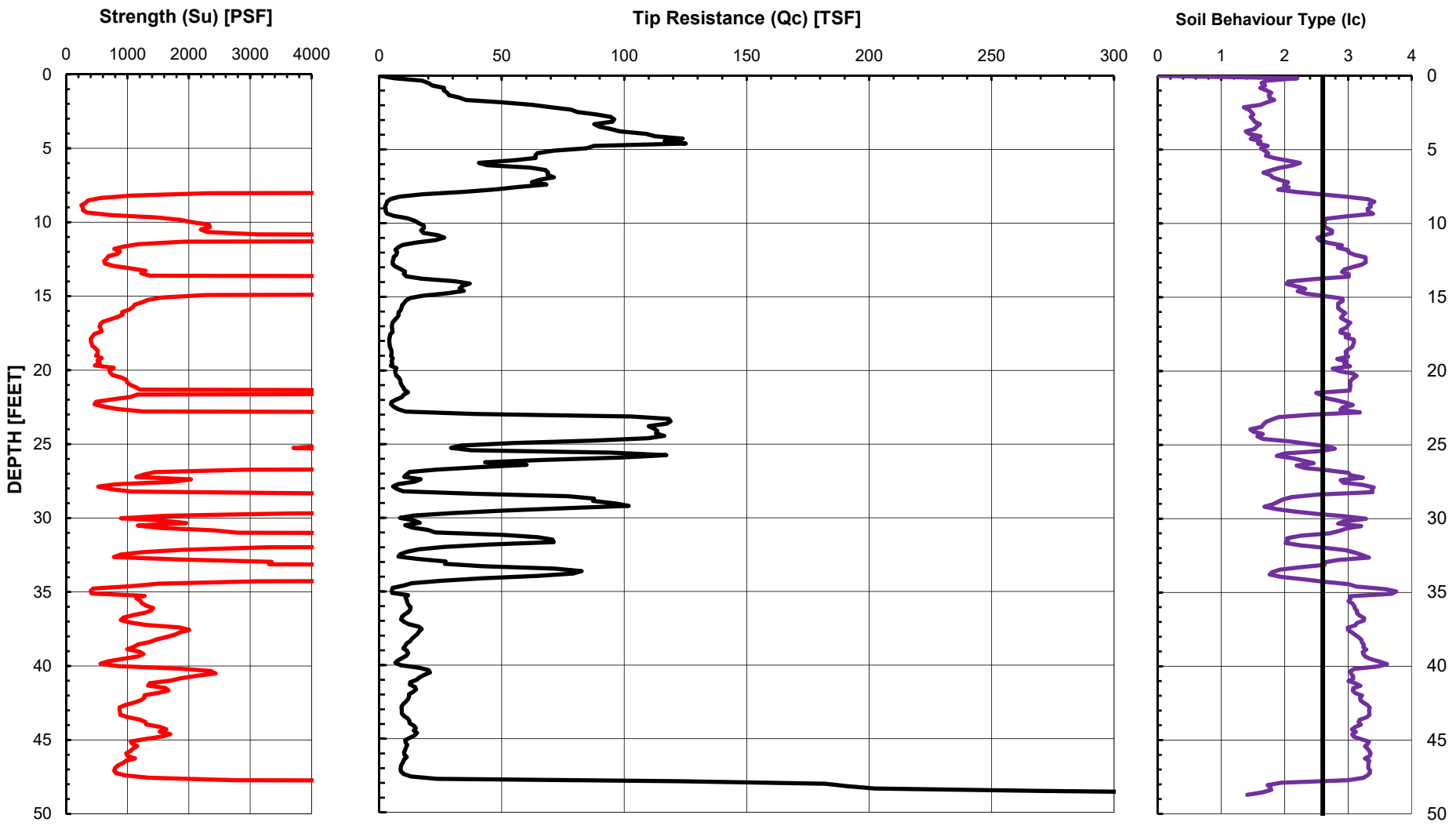




GROUP DELTA

CONE PENETOMETER DATA (C-CPT-060)

Document No. 18-0018
Project No. LA1345
FIGURE A-9a



GROUP DELTA

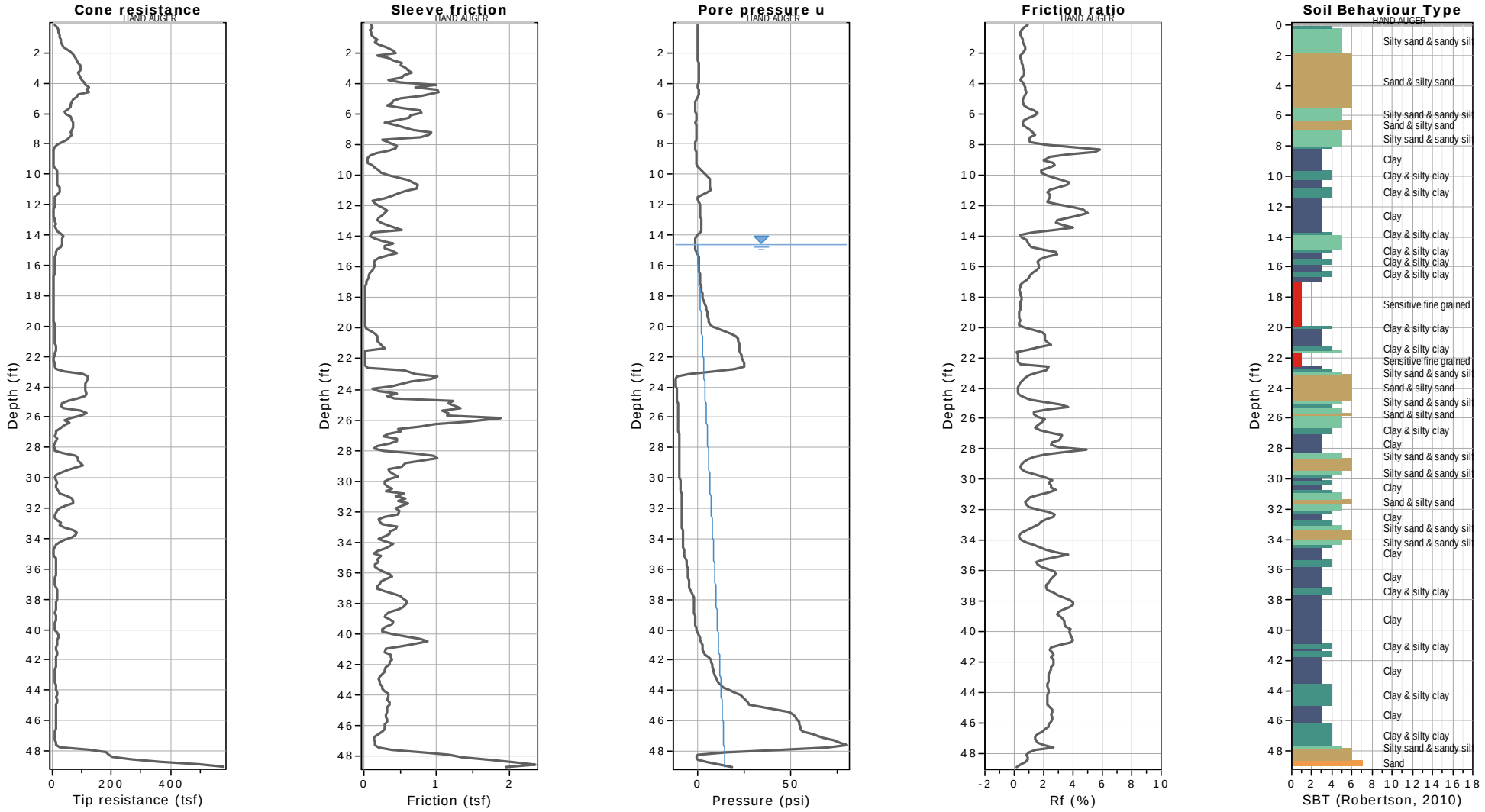
INTERPRETED SOIL DATA (C-CPT-060)

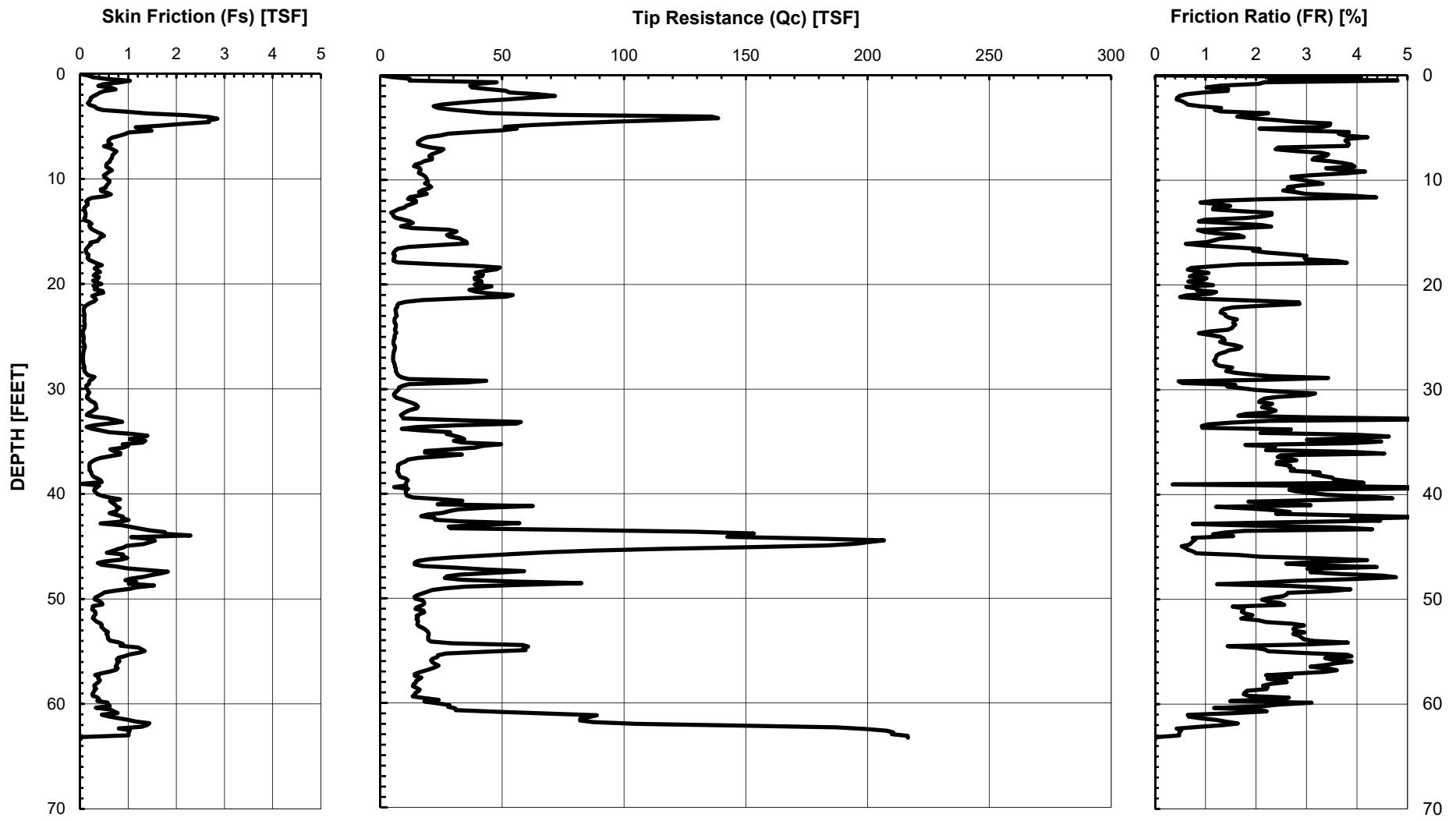
Document No. 18-0018
Project No. LA1345
FIGURE A-9b

CPT: C-CPT-060

Project: **Lincoln Bridge Multi-Modal Improvement Project**
Location: **Los Angeles, California**

Total depth: 49.04 ft, Date: 10/10/2012
Surface Elevation: 14.60 ft

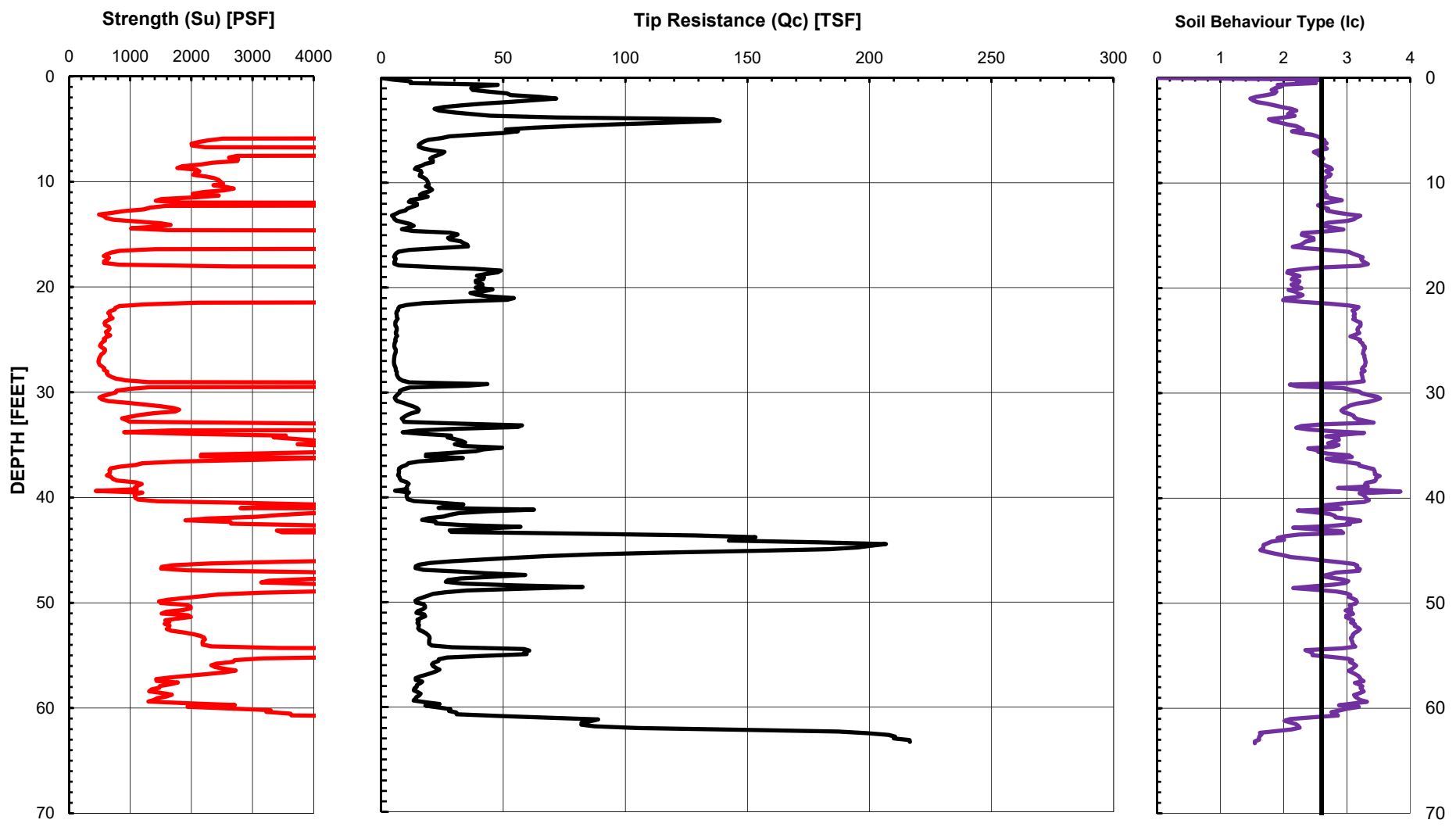




GROUP DELTA

CONE PENETOMETER DATA (A-CPT-065)

Document No. 18-0018
Project No. LA1345
FIGURE A-10a



GROUP DELTA

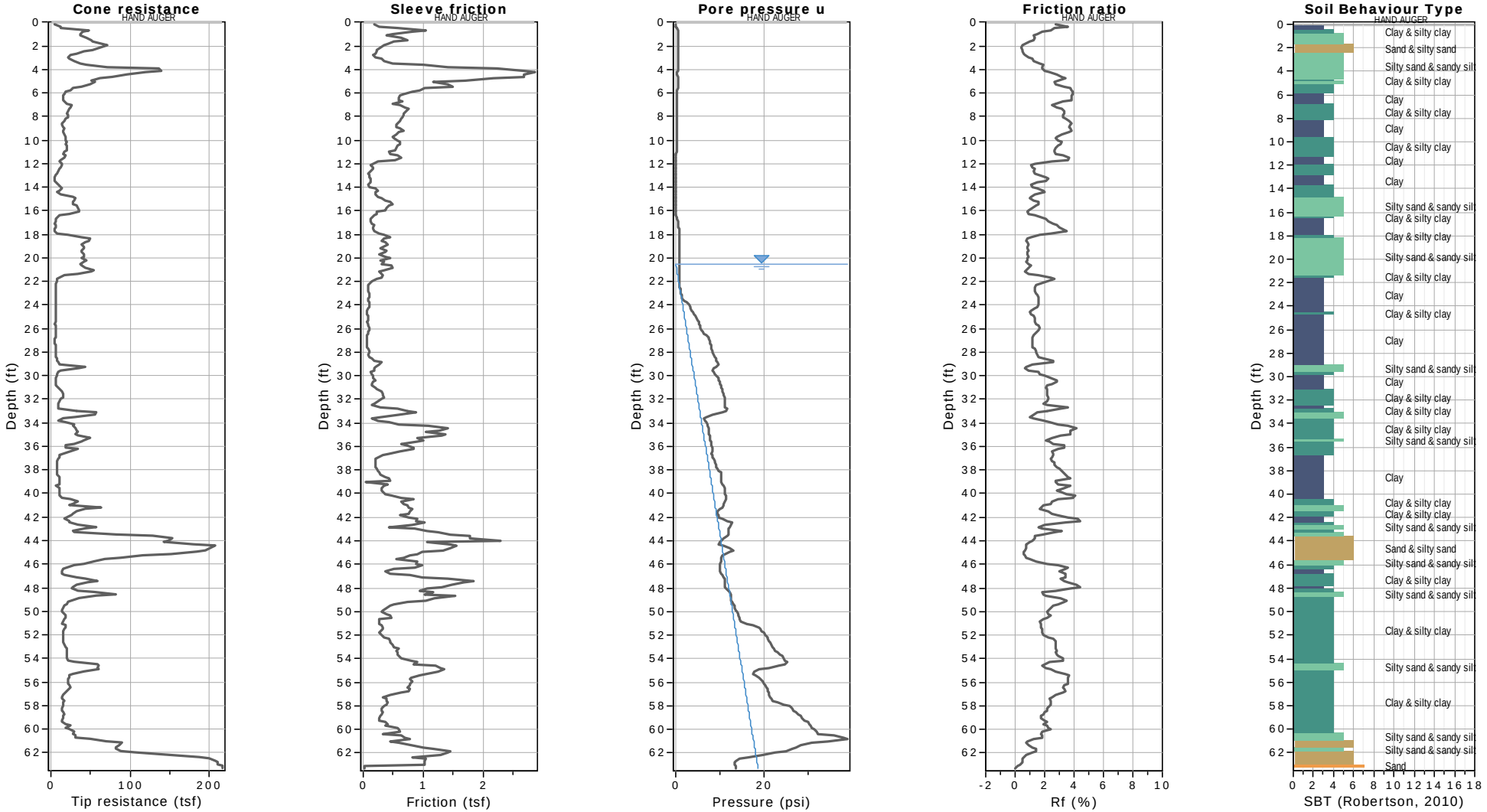
INTERPRETED SOIL DATA (A-CPT-065)

Document No. 18-0018
Project No. LA1345
FIGURE A-10b

CPT: A-CPT-065

Project: **Lincoln Bridge Multi-Modal Improvement Project**
Location: **Los Angeles, California**

Total depth: 63.32 ft, Date: 9/26/2012
Surface Elevation: 20.50 ft



APPENDIX A
EXISTING FIELD DATA (Group Delta, 1999)

APPENDIX C
GDC FIELD INVESTIGATION

C.1 Introduction

The subsurface conditions at the project site were investigated by Group Delta Consultants during the period of October 29, 1998 to December 11, 1998 by performing the following activities:

- 11 soil borings to depths ranging from 26 ft to 66.3 ft below ground surface (bgs), as shown in Figure 3 of this report including the construction of a four temporary observation wells; and

- A total of eight CPTs to depths ranging from 38 ft to 69 ft bgs, also as shown in Figure 3.

C.2 Soil Drilling, Excavation, and Sampling

The borings were advanced utilizing both rotary wash and hollow-stem auger drill rig systems. The rotary wash borings had a hole diameter ranging from 4.5 inches to 6 inches; the hollow stem auger borings had a hole diameter of 10 inches. The borings were performed by both C&L Drilling (rotary) and THF Drilling (rotary and hollow-stem). This exploration program was supervised by the GDC Field Engineer, who visually inspected the soil samples, maintained detailed logs of the borings, interpreted stratigraphy, classified the soils, and obtained drive samples as well as Standard Penetration Test (SPT) samples and bulk samples at maximum vertical spacing of approximately 5-foot intervals. The soils were classified in the field and further examined in the laboratory in accordance with the Unified Soil Classification System (Figure C-1). Field classifications were modified, where necessary, on the basis of laboratory test results.

Relatively undisturbed soil samples were obtained using a 3.25-inch outside diameter sampler lined with brass rings, each 1-inch high and 2.42-inch inside diameter. The ring and tube samplers were driven with a 140-pound hammer dropping 30 inches. In addition, Standard Penetration Tests (SPT) were performed in accordance with ASTM D1586 using a 2-inch outside diameter and 1.375-inch inside diameter split-spoon barrel sampler. The SPT sampler was driven with a 140-pound safety hammer dropping 30-inches.

The Standard Penetration Test consists of counting the number of hammer blows it takes to drive the sampler approximately 1 foot into the ground. SPT blowcounts are often used as an index of the relative density and resistance of the sampled materials. The blowcounts obtained by driving the ring sampler can be converted to an approximate equivalent SPT blowcount using a multiplication factor of 0.65.

Detailed logs of the soil borings including blowcount data and in-situ moisture content and soil density are presented in Figures C-2 through C-20. Laboratory tests performed on the samples, such as moisture content and dry density, are shown in the "Other Tests" columns of the log. Descriptions and further result summaries of laboratory tests performed are provided in Appendix D.

In addition, four temporary observation wells were placed in Boring B-304H, B-305H, B-313H, and B-315H to evaluate groundwater conditions. Groundwater level measurements in these wells and other existing wells were recorded and are provided in Table C-2

C.3 Cone Penetration Test (CPT)

A total of eight CPT soundings were conducted for the Site to depths ranging from 38 ft to 69 ft bgs. This was performed in general accordance with ASTM D3441-86, using an electric cone penetrometer. The CPT soundings were performed by Gregg In-Situ, Inc. at the locations shown in Figure 3 and are presented as Figures C-21 to C-43.

CPTs are advanced from the ground surface with a truck-mounted hydraulic ram which pushes a steel rod with a conical tip and cylindrical friction-sleeve into the ground. The conical tip has a 60-degree apex angle and a projected cross-sectional area of 1.55 square inches. The cylindrical friction sleeve has a surface area of 23.25 square inches. Both the tip and the sleeve have outside diameters of 1.4 inches.

As the rod is advanced, electronic instruments measure and record both the tip resistance and the frictional resistance on the sleeve. The tip and frictional resistance are then analyzed, using available correlations, to estimate soil classification, density, strength, and compressibility of the subsurface materials. Unlike soil borings, in which drive samples are typically taken at discrete intervals, the CPT provides a continuous record of soil properties with depth. Hence, the CPT can evaluate the subsurface soil profile with much higher resolution than a soil boring, more precisely identifying the actual thickness of soft/compressible layers (to the nearest foot), and often detecting thin layers that may not be observed with conventional drilling and sampling techniques.

C.4 List of Attached Tables and Figures

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

Table C-1	Field Exploration Summary
Table C-2	Summary of Water Level Measurements
Figure C-1	Key for Soil Classification
Figures C-2 through C-20	Boring Logs
Figures C-21 through C-43	CPT Logs

TABLE C-1
SUMMARY OF SOIL BORINGS

Expl. No.	Date Drilled	Ground Surface Elevation (feet, MSL)	Ground water Depth (feet)	Final Groundwater Elevation at Time of Exploration (feet, MSL)	Total Depth (ft)	Remarks
B-302R	12-11-98	17.5	20.0	-2.5	66.5	--
B-304H	10-29-98	14.6	12.2	+2.4	31.0	Installed 4" well
B-305H	10-29-98	15.3	12.0	+3.3	31.0	Installed 4" well
B-306R	11-04-98	16.8	--	--	51.5	--
B-307R	11-06-98	11.4	--	--	61.0	--
B-309R	11-04-98	12.8	--	--	61.0	--
B-313H	10-29-98	12.6	8.4	+4.2	26.0	Installed 4" well
B-315H	10-30-98	13.3	8.0	+5.3	26.0	Installed 4" well
B-316R	11-03-98	14.1	--	--	57.5	--
B-317R	11-05-98	9.5	--	--	61.0	--
B-319R	11-05-98	11.7	--	--	61.0	--

TABLE C-2
SUMMARY OF WATER LEVEL MEASUREMENTS

Well I.D.	Date Recorded	Time Recorded	Well Diameter Size (in)	Casing Elevation (ft, MSL)	Ground water Depth (ft)	Groundwater Elevation (ft, MSL)
Well by SE gate	11-11-98	0835	2	13.5	5.1	8.4
Well 315H	11-11-98	0902	4	15.4	9.6	5.8
Well central area	11-11-98	0906	2	14.8	10.5	4.3
Well B-305H	11-11-98	0912	4	17.4	14.6	2.8
Well B-304H	11-11-98	0921	4	16.7	14.1	2.6
Well B-313H	11-11-98	0930	4	14.6	10.1	4.5
Well by SE gate	12-04-98	1551	2	13.5	5.2	8.3
Well 315H	12-04-98	1556	4	15.4	9.5	5.9
Well central area	12-04-98	1612	2	14.8	10.4	4.4
Well B-305H	12-04-98	1600	4	17.4	14.6	2.8
Well B-304H	12-04-98	1606	4	16.7	14.1	2.6
Well B-313H	12-04-98	0615	4	14.6	10.2	4.4
Well by SE gate	12-23-98	1350	2	13.5	6.1	7.4
Well 315H	12-23-98	1240	4	15.4	10.0	5.4
Well central area	12-23-98	1330	2	14.8	10.8	4.0
Well B-305H	12-23-98	1315	4	17.4	14.9	2.5
Well B-304H	12-23-98	1300	4	16.7	14.4	2.3
Well B-313H	12-23-98	1250	4	14.6	10.5	4.1

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D-2487)

PRIMARY DIVISIONS			GROUP SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOILS — MORE THAN HALF OF MATERIALS IS LARGER THAN # 200 SIEVE SIZE	GRAVELS — MORE THAN HALF OF COARSE FRACTION IS LARGER THAN # 4 SIEVE	CLEAN GRAVELS (LESS THAN 5% FINES)	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.
			GP	POORLY GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES.
		GRAVEL WITH FINES	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURE. NON PLASTIC FINES.
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES. PLASTIC FINES.
	SANDS — MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN # 4 SIEVE	CLEAN SANDS (LESS THAN 5% FINES)	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.
			SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES.
		SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES. NON-PLASTIC FINES.
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES. PLASTIC FINES.
FINE GRAINED SOILS — MORE THAN HALF OF MATERIAL IS SMALLER THAN # 200 SIEVE SIZE	SILTS AND CLAYS — LIQUID LIMIT IS LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY.
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS.
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY.
	SILTS AND CLAYS — LIQUID LIMIT IS GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS.
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS.
	HIGHLY ORGANIC SOILS		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS.

CLASSIFICATION CRITERIA BASED ON FIELD TESTS

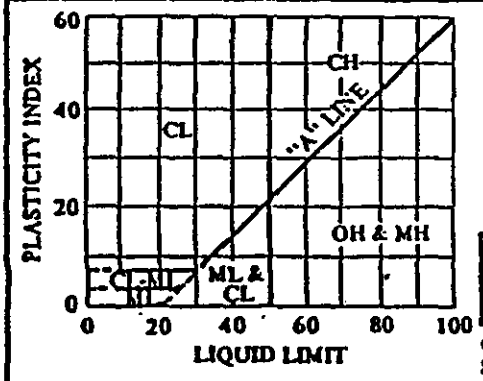
PENETRATION RESISTANCE (PR)	
SANDS AND GRAVELS	
RELATIVE DENSITY	BLOWS/FOOT*
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

CLAYS AND SILTS		
CONSISTANCY	BLOWS/FOOT*	STRENGTH**
VERY SOFT	0 - 2	0 - ¼
SOFT	2 - 4	¼ - ½
FIRM	4 - 8	½ - 1
STIFF	8 - 15	1 - 2
VERY STIFF	15 - 30	2 - 4
HARD	OVER 30	OVER 4

* NUMBER OF BLOWS OF 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1 3/8 INCH I.D.) SPLIT BARREL SAMPLER (ASTM-1586 STANDARD PENETRATION TEST)

** UNCONFINED COMPRESSIVE STRENGTH IN TONS/SQ. FT. READ FROM POCKET PENETROMETER

CLASSIFICATION CRITERIA BASED ON LAB TESTS



GW AND SW – $C_u = \frac{D_{60}}{D_{10}}$ GREATER THAN 4 FOR GW AND 6 FOR SW; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ BETWEEN 1 AND 3

GP AND SP – CLEAN GRAVEL OR SAND NOT MEETING REQUIREMENT FOR GW AND SW

GM AND SM – ATTERBERG LIMIT BELOW "A" LINE OR P.I. LESS THAN 4

GC AND SC – ATTERBERG LIMIT ABOVE "A" LINE P.I. GREATER THAN 7

FINES (SILT OR CLAY)	FINE SAND	MEDIUM SAND	COARSE SAND	FINE GRAVEL	COARSE GRAVEL	COBBLES	BOULDERS
SIEVE SIZES 200	40	10	4	3/4"	3"	10"	

CLASSIFICATION OF EARTH MATERIALS IS BASED ON FIELD INSPECTION AND SHOULD NOT BE CONSTRUED TO IMPLY LABORATORY ANALYSIS UNLESS SO STATED.

KEY FOR SOIL EXPLORATION LOGS

Figure C-1

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
PLAYA VISTA - Site DE & Ballona Creek	L-196	LEGEND

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California			1 of 1

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
		45.0 ft.		▼

SAMPLING METHOD

NOTES

LOCATIONS: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
						5			FILL - Soil material not native to the location.
						10			NATIVE - Soil material naturally deposited at the location.
						15			BULK 1, R-2, S-3 - Refers to the type and sequence in which the sample was taken.
						20			GRAB, MC, SPT - Refers to the method in which the sample was obtained.
Bulk 1 GRAB									GRAB - Refers to collecting sample by method of placing loose soil material into a plastic bag.
R-2 MC						25			MC (CALIFORNIA MODIFIED) - Refers to collecting the sample by method of a 2.4" inside diameter by 12" long cylindrical sampler driven into the soil by a downward force, usually provided by a free falling hammer.
S-3 SPT						30			SPT (STANDARD PENETRATING TEST) - Refers to collecting the sample by method of a 1.4" inside diameter by 18" long cylindrical sampler driven into the soil by a downward force, usually provided by a free falling hammer.
						35			THE FOLLOWING SUBSURFACE SUMMARIES APPLY ONLY AT THE LOCATION OF THESE BORINGS AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THESE LOCATIONS WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.
						40			
						45			

GDC_L_BORING L195.GPJ GDC_WLOG.GDT 1/4/99

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FIGURE C-2

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	B-302R

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California	12/11/98	12/11/98	1 of 2

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY
C & L	ROTARY WASH	SHK	MDR

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
MAYHEW ROTARY	6"	66.5 ft.	17.50	▼ 20.0 / -2.5

SAMPLING METHOD
R: 400-lb downhole hammer S:140-lb 30-inch Free Falling Hammer

NOTES
LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
									FILL (SM) Olive gray fine SAND
S-1 SPT	4	27.4			-13	5			Very loose, with SILT
R-2 MC	5	31.8	86.2		-8	10			No change
S-3 SPT	2	48.5		AL	-3	15			NATIVE (CH) Dark gray, very soft, Silty CLAY
R-4 MC	5	32.3	91.0	DS	-3	20			Micaceous
S-5 SPT	1	56.4		WA	-8	25			(ML) Dark gray, very loose, medium to fine, Sandy SILT, with CLAY, some sea shells (ML) Light gray, very soft, Clayey SILT, carbonaceous
R-6 MC	5	27.1	98.1	DS	-13	30			(CL) Dark gray Silty CLAY, some plant particles
S-7 SPT	15	18.8		WA	-18	35			(ML) Dark gray, stiff, coarse to fine, Sandy SILT, some GRAVEL Stiff, no SAND and GRAVEL, some sea shells
R-8 MC	8	41.7	82.6		-23	40			(CL) Blue to olive gray, Silty CLAY

GDC_LOG_BORING_L196PV.GPJ GDC_WLOG.GDT 1/4/99

GROUP DELTA CONSULTANTS, INC.

FIGURE C-3

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	**B-302R**

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California	12/11/98	12/11/98	2 of 2

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY
C & L	ROTARY WASH	SHK	MDR

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
MAYHEW ROTARY	6"	66.5 ft.	17.50	▼ 20.0 / -2.5

SAMPLING METHOD
R: 400-lb downhole hammer S:140-lb 30-inch Free Falling Hammer

NOTES
LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
S-9 SPT	8	43.9		AL	-28	45			(ML) Greenish gray, soft, Clayey SILT
S-10 SPT	Pushed				-33	50			Sample pushed (CL) dark greenish gray, soft, Silty CLAY
S-11 SPT	14	48.2		AL	-38	55			(CL) Dark gray, stiff, Silty CLAY, with trace of fine SAND
S-12 SPT	22	25.8			-43	60			(SP) Dark gray, compact, SAND, with GRAVEL
S-13 SPT	73	9.2			-48	65			Very dense
									Bottom of B-302R @ 66.5 feet *Ground water was observed at 20 feet below the top surface.* *The boring was backfilled with grout.* *The boring cuttings were placed into DOT drums.*
					-53	70			
					-58	75			
					-63	80			

GDC_LOG_BORING_L196PV.GPJ GDC_WLOG.GDT 1/4/99

GROUP DELTA CONSULTANTS, INC.

FIGURE **C-4**

BORING/WELL LOG

PROJECT	PROJECT NUMBER	SHEET NO.	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	1 of 1	**B-304H**

SITE	LOGGED BY	CHECKED BY	BEGUN	COMPLETED
Playa del Rey, California	SHK	MDR	10/29/98	10/29/98

DRILLER	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	TOP OF CASING ELEV.	DEPTH/*ELEV.* GROUND WATER
THF	10"	31.0 ft.	14.55	16.69	▼ 12.2 / 2.3

DRILL METHOD	CASING TYPE/DIA.	SCREEN TYPE/SLOT	GRAVEL PACK TYPE	GROUT TYPE/QUANTITY
HOLLOW STEM	4" PVC Casing	0.010" Slotted Casing	12 bgs, 2/12 Sand	2 bgs, Bentonite Chips

SAMPLING METHOD	NOTES
140-lb 30-inch Free Falling Hammer	LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	DESCRIPTION AND CLASSIFICATION
BULK1 GRAB		9.8		CO			FILL (SM) Dark brown, coarse to fine, Silty SAND, damp
R-1 MC	20	18.7	98.0	AL CS	10	5	(SC) Dark gray Clayey SAND, with SILT
R-2 MC	71	11.5	95.4		5	10	(CL) Gray, medium to fine Sandy CLAY, with white cemented SAND
R-3 MC	15	30.9	90.1	WA	0	15	NATIVE (ML) Gray to olive gray, Sandy SILT, micaceous
R-4 MC	10	37.2	76.4	AL CS	-5	20	(CH) Medium gray, Silty CLAY, fossil worm holes present.
R-5 MC	10				-10	25	NO SAMPLE RECOVERED
R-6 MC	17				-15	30	
					-20	35	
					-25	40	

Bottom of B-304H @ 31 feet
Ground water was observed at 12.22 feet below ground surface on 12/23/98.
The boring cuttings and water were placed into DOT drums.

GDC_WELL_LOG L196PV.GPJ GDC_WLOG.GDT 1/4/99

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FIGURE **C-5**

BORING/WELL LOG

PROJECT	PROJECT NUMBER	SHEET NO.	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	1 of 1	B-305H

SITE	LOGGED BY	CHECKED BY	BEGUN	COMPLETED
Playa del Rey, California	SHK	MDR	10/29/98	10/29/98

DRILLER	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	TOP OF CASING ELEV.	DEPTH/ELEV. GROUND WATER
THF	10"	31.0 ft.	15.29	17.43	▼ 12.0 / 3.3

DRILL METHOD	CASING TYPE/DIA.	SCREEN TYPE/SLOT	GRAVEL PACK TYPE	GROUT TYPE/QUANTITY
HOLLOW STEM	4" PVC Casing	0.010" Slotted Casing	12 bgs, 2/12 Sand	2 bgs, Bentonite Chips

SAMPLING METHOD: 140-lb 30-inch Free Falling Hammer

NOTES: LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	DESCRIPTION AND CLASSIFICATION
BULK1 GRAB		9.0		CO			FILL (SM) Brown to dark brown, coarse to fine, Silty SAND, with CLAY, GRAVEL
R-1 MC	20	18.6	109.0	AL CS	10	5	(CL) Dark brown, fine Sandy CLAY
R-2 MC	20	15.2			5	10	Increse in SILT, less SAND, Silty CLAY, with GRAVEL
R-3 MC	10	34.9	87.6	AL CS	0	15	NATIVE (SM) Olive gray to gray, coarse Silty SAND, with sea shell fragments, micaceous
R-4 MC	6	65.1	58.4	AL CS	-5	20	(CH) Olive to dark gray, Silty CLAY
R-5 MC	11	22.4	100.4		-10	25	Color change: Dark gray
R-6 MC	16				-15	30	NSR *Bottom of B-305H @ 31 feet* *Ground water was observed at 12.77 feet below ground surface on 12/23/98.* *The boring cuttings and water were placed into DOT drums.*
					-20	35	
					-25	40	

GDC_WELL_LOG L196PV.GPJ GDC_WLOG.GDT 1/4/99

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FIGURE C-6

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	**B-306R**

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California	11/04/98	11/04/98	1 of 2

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY
THF	ROTARY WASH	SHK	MDR

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
MOBILE 61 ROTARY	4.5"	51.5 ft.	16.78	▼ N/T / *na*

SAMPLING METHOD: 140-lb 30-inch Free Falling Hammer

NOTES: LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
									FILL
									(SC/SM) Olive gray, Silty to Clayey SAND
R-1 MC	73@11"	16.8	112.1		-12	5			With GRAVEL
S-2 SPT	82				-7	10			Very dense, less GRAVEL
									NATIVE
R-3 MC	33	40.8		WA	-2	15			(CL) Light gray, Silty CLAY, with fine SAND, carbonaceous
S-4 SPT	18	55.9	63.9	AL	-3	20			(CH) Black to dark gray, stiff, CLAY, carbonaceous
R-5 MC	50				-8	25			No change
S-6 SPT	36				-13	30			Hard, GRAVELS up to 1/2"
R-7 MC	84	10.6	129.1	SE					(SP) Dark gray, coarse to medium, Gravelly SAND, up to 2"
S-8 SPT	19	32.7			-18	35			(CL) Dark gray, stiff, Silty CLAY
R-9 MC	72				-23	40			medium to fine SAND present

GDC_LOG_BORING L196PV.GPJ GDC_WLOG.GDT 1/4/99

GROUP DELTA CONSULTANTS, INC.

FIGURE **C-7**

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	**B-306R**

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California	11/04/98	11/04/98	2 of 2

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY
THF	ROTARY WASH	SHK	MDR

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
MOBILE 61 ROTARY	4.5"	51.5 ft.	16.78	▼ N/T / *na*

SAMPLING METHOD
140-lb 30-inch Free Falling Hammer

NOTES
LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
S-10 SPT	68	37.6			-28	45			Dense
S-11 SPT	66	41.1			-33	50			(CH) Dark gray, hard, CLAY, with fine SAND
					-38	55			*Bottom of B-306R @ 51.5 feet* *Ground water measurement was not taken.* *The boring was backfilled with grout.* *The boring cuttings were placed into DOT drums.*
					-43	60			
					-48	65			
					-53	70			
					-58	75			
					-63	80			

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FIGURE **C-8**

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	B-307R

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California	11/06/98	11/06/98	1 of 2

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY
THF	ROTARY WASH	SHK	MDR

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
MOBILE 61 ROTARY	4.5"	61.0 ft.	11.38	▼ N/T / *na*

SAMPLING METHOD
140-lb 30-inch Free Falling Hammer

NOTES
LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
									FILL (CL) Olive gray Sandy CLAY
S-1 SPT	12	16.2			6	5			Gradation change: Stiff, coarse to fine Sandy CLAY, some GRAVEL
									NATIVE
R-2 MC	26				1	10			(CL) Medium gray to gray, CLAY
R-3 MC	26	40.0	81.5						(CH) Olive gray, fine Sandy CLAY, micaceous
R-4 MC	43				-4	15			No Recovery
R-5 MC	6	82.0	51.3	WA AL CS	-9	20			(CH/OH) Dark gray, Sandy CLAY / Organic Sandy CLAY
S-6 SPT	16	23.5		WA	-14	25			Gradation change: Stiff, fine Sandy / Organic Sandy CLAY
R-7 MC	49	29.5	94.8	DS	-19	30			(ML) Dark gray, fine Sandy SILT, trace of CLAY
S-8 SPT	59	28.2			-24	35			(CL) Dark gray, hard, Silty CLAY (SP) Dark gray, dense, coarse to medium, SAND, with some GRAVEL
S-9 SPT	22	36.9			-29	40			(CL) Dark gray, very stiff, Silty CLAY

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FIGURE C-9

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	**B-307R**

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California	11/06/98	11/06/98	2 of 2

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY
THF	ROTARY WASH	SHK	MDR

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
MOBILE 61 ROTARY	4.5"	61.0 ft.	11.38	▼ N/T / *na*

SAMPLING METHOD
140-lb 30-inch Free Falling Hammer

NOTES
LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
S-10 SPT	25	33.6			-34	45			Very stiff
S-11 SPT	39	22.8			-39	50			(SP) Dark gray, dense, coarse to medium, SAND, with fine GRAVEL (CL) Dark gray Silty CLAY
S-12 SPT	112@15"	28.6			-44	55			(ML) Dark gray, very hard, fine Sandy SILT
S-13 SPT	120	21.0			-49	60			(SP) Gray, very dense, coarse to medium, SAND
					-54	65			*Bottom of B-307R @ 61 feet* *Ground water measurement was not taken.* *The boring was backfilled with grout.* *The boring cuttings were placed into DOT drums.*
					-59	70			
					-64	75			
					-69	80			

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FIGURE **C-10**

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	**B-309R**

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California	11/04/98	11/04/98	1 of 2

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY
THF	ROTARY WASH	SHK	MDR

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
MOBILE 61 ROTARY	4.5"	61.0 ft.	12.76	▼ N/T / *na*

SAMPLING METHOD: 140-lb 30-inch Free Falling Hammer

NOTES: LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
									FILL (SC) Olive gray, Clayey SILT, with GRAVEL
S-1 SPT	26	18.4			8	5			Compact
R-2 MC	23	27.5	91.0		-3	10			NATIVE (CL) Gray to medium gray, Silty CLAY
S-3 SPT	17			AL	-2	15			Color change: Gray to olive gray, stiff
R-4 MC	24	29.2		AL	-7	20			(CL/OL) Dark gray, Silty / Organic CLAY, with sea shells and decaying plants
S-5 SPT	8			WA	-12	25			Gradation change: Soft, coarse to fine Silty / Organic Clay, with GRAVEL
R-6 MC	32	37.5	89.6		-17	30			With sections of Silty SAND
S-7 SPT	16	36.9		AL	-22	35			(CH) Dark gray, stiff, CLAY, porous
R-8 MC	32				-27	40			With some SILT

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FIGURE **C-11**

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	**B-309R**

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California	11/04/98	11/04/98	2 of 2

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY
THF	ROTARY WASH	SHK	MDR

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
MOBILE 61 ROTARY	4.5"	61.0 ft.	12.76	▼ N/T / *na*

SAMPLING METHOD
140-lb 30-inch Free Falling Hammer

NOTES
LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
S-9 SPT	22	37.9			-32	45			Very stiff,
S-10 SPT	50				-37	50			Hard, SILT lenses are present
S-11 SPT	48	31.5			-42	55			Hard
S-12 SPT	70@3"	4.5			-47	60			(GP) Dark gray, very dense, well graded GRAVEL
					-52	65			*Bottom of B-309R @ 61 feet* *Ground water measurement was not taken.* *The boring was backfilled with grout.* *The boirng cuttings were placed into DOT drums.*
					-57	70			
					-62	75			
					-67	80			

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FIGURE **C-12**

BORING/WELL LOG

PROJECT	PROJECT NUMBER	SHEET NO.	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	1 of 1	**B-313H**

SITE	LOGGED BY	CHECKED BY	BEGUN	COMPLETED
Playa del Rey, California	SHK	MDR	10/29/98	10/29/98

DRILLER	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	TOP OF CASING ELEV.	DEPTH/*ELEV.* GROUND WATER
THF	10"	26.0 ft.	12.58	14.62	▼ 8.4 / *4.1*

DRILL METHOD	CASING TYPE/DIA.	SCREEN TYPE/SLOT	GRAVEL PACK TYPE	GROUT TYPE/QUANTITY
HOLLOW STEM	4" PVC Casing	0.010" Slotted Casing	12 bgs, 2/12 Sand	2 bgs, Bentonite Chips

SAMPLING METHOD: 140-lb 30-inch Free Falling Hammer

NOTES: LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	DESCRIPTION AND CLASSIFICATION
BULK1 GRAB				CO			FILL (SM) Dark brown, coarse to medium, Silty SAND, with GRAVEL
R-1 MC	18	19.1	105.9	GS	8	5	(CL) Olive gray with black streaks, Silty CLAY
R-2 MC	11	29.8	89.4		3	10	NATIVE (ML) Olive gray, Clayey SILLT, micaceous, wet
R-3 MC	6	39.5	81.3		-2	15	Saturated, thin 1/8" stringers of organic material
R-4 MC	4	86.4	51.4	AL CS	-7	20	(CH) Dark gray, CLAY / Organic CLAY, fossilierous
R-5 MC	9	42.1	83.5		-12	25	No change
					-17	30	*Bottom of B-313H @ 26 feet* *Ground water was observed at 8.45 feet below ground surface on 12/23/98.* *The boring cuttings and well water were placed into DOT drums.*
					-22	35	
					-27	40	

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FIGURE **C-13**

BORING/WELL LOG

PROJECT	PROJECT NUMBER	SHEET NO.	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	1 of 1	B-315H

SITE	LOGGED BY	CHECKED BY	BEGUN	COMPLETED
Playa del Rey, California	SHK	MDR	10/30/98	10/30/98

DRILLER	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	TOP OF CASING ELEV.	DEPTH/*ELEV.* GROUND WATER
THF	10"	26.0 ft.	13.34	15.36	▼ 8.0 / 5.3

DRILL METHOD	CASING TYPE/DIA.	SCREEN TYPE/SLOT	GRAVEL PACK TYPE	GROUT TYPE/QUANTITY
HOLLOW STEM	4" PVC Casing	0.010" Slotted Casing	12 bgs, 2/12 Sand	2 bgs, Bentonite Chips

SAMPLING METHOD	NOTES
140-lb 30-inch Free Falling Hammer	LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	DESCRIPTION AND CLASSIFICATION
BULK1 GRAB				RV			FILL (SM) Dark brown, Silty SAND, with CLAY, GRAVEL, and some brick fragments
R-1 MC	21	10.2	120.7		8	5	Slight increase in GRAVEL
R-2 MC	6	48.7	68.7		3	10	NATIVE (CL) Medium gray, Silty CLAY, with some sea shells, micaceous
R-3 MC	9	42.7	80.6	WA	-2	15	(ML) Olive gray, Clayey SILT, micaceous, very wet
R-4 MC	10	65.1	59.8	AL CS	-7	20	(MH) Dark gray, Clayey SILT, organic content, saturated
R-5 MC	13	50.5	84.6		-12	25	No change
					-17	30	*Bottom of B-315H @ 26 feet* *Ground water was observed at 8.0 feet below ground surface on 12/23/98.* *The boring cuttings and well water were placed into DOT drums.*
					-22	35	
					-27	40	

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FIGURE **C-14**

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	B-316R

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California	11/03/98	11/03/98	1 of 2

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY
THF	ROTARY WASH	SHK	MDR

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
MOBILE 61 ROTARY	4.5"	57.5 ft.	14.08	▼ N/T / *na*

SAMPLING METHOD: 140-lb 30-inch Free Falling Hammer

NOTES: LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
									FILL (SC) Olive gray, Clayey SAND, with GRAVEL
R-1 MC	29				-9	5			Some SILT and brick fragments
S-2 SPT	37	34.5		WA AL	-4	10			NATIVE (CL) Dark gray to olive gray, hard, Silty CLAY
R-3 MC	19				-1	15			No Sample Recovered
S-4 SPT	11	60.1			-6	20			Color change: Gray, stiff, some medium grain SAND lenses to 1/4"
R-5 MC	21				-11	25			No change
R-6 MC	22	18.6	109.4	WA					(ML) Dark gray, fine to medium Sandy SILT, slightly porous
S-7 SPT	9	30.4			-16	30			(CL) Dark gray, soft, Silty CLAY
S-8 SPT	15	31.8			-21	35			(CL/OL) Dark gray, stiff, Silty / Organic CLAY
S-9 SPT	12	33.9			-26	40			Stiff

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FIGURE **C-15**

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	**B-316R**

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California	11/03/98	11/03/98	2 of 2

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY
THF	ROTARY WASH	SHK	MDR

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
MOBILE 61 ROTARY	4.5"	57.5 ft.	14.08	▼ N/T / *na*

SAMPLING METHOD
140-lb 30-inch Free Falling Hammer

NOTES
LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
S-10 SPT	33	27.9			-31	45			(CL) Dark gray, very stiff, CLAY, with 1" thick SAND lenses
S-11 SPT	62	35.0			-36	50			(SM) Dark gray, dense, fine Silty SAND
S-12 SPT	71	26.4			-41	55			Gradation change: Very dense, coarse to fine Silty SAND, with GRAVEL
					-46	60			*Bottom of B-316R @ 57.5 feet* *Ground water measurement was not taken.* *The boring was backfilled with grout and capped with concrete.* *The boring cuttings were placed into DOT drums.*
					-51	65			
					-56	70			
					-61	75			
					-66	80			

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FIGURE **C-16**

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	B-317R

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California	11/05/98	11/05/98	1 of 2

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY
THF	ROTARY WASH	SHK	MDR

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
MOBILE 61 ROTARY	4.5"	61.0 ft.	9.53	▼ N/T / *na*

SAMPLING METHOD: 140-lb 30-inch Free Falling Hammer

NOTES: LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
									FILL (SC) Brown to olive gray, Clayey SAND, with GRAVEL
S-1 SPT	49				5	5			Dense, some glass and plastic present
R-2 MC	6	49.9	73.3		0	10			NATIVE (CL) Dark gray to light gray, Silty CLAY, carbonaceous
S-3 SPT	4	35.8	87.4	WA	-5	15			(ML) Olive gray, very soft, Clayey SILT, with medium to fine SAND, sea shells, micaceous
R-4 MC	12	93.7	47.2		-10	20			(CL) Gray, fine Sandy CLAY, fossiliferous
S-5 SPT	19	26.9			-15	25			Stiff, with SILT, carbonates present
R-6 MC	22	42.0	81.1		-20	30			Friable / cottage cheese texture when broken
S-7 SPT	21	25.5			-25	35			(ML) Dark gray, very stiff, Clayey SILT
R-8 MC	90	22.7	102.3		-30	40			(SM) Dark gray, coarse to fine, Silty SAND

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FIGURE C-17

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	B-317R

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California	11/05/98	11/05/98	2 of 2

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY
THF	ROTARY WASH	SHK	MDR

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
MOBILE 61 ROTARY	4.5"	61.0 ft.	9.53	▼ N/T / *na*

SAMPLING METHOD
140-lb 30-inch Free Falling Hammer

NOTES
LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
S-9 SPT	49	36.0			-35	45			(CL) Dark gray, hard, Silty CLAY, 1/2" thick organic deposit
S-10 SPT	37	31.4			-40	50			Hard, no organics
S-11 SPT	89	23.6			-45	55			(SM) Dark gray, very dense, medium to fine, Silty SAND
S-12 SPT	70@1"	10.1			-50	60			(SP) Gray, very dense, coarse to medium, SAND, with GRAVEL up to 1"
					-55	65			*Bottom of B-317R @ 61 feet* *Ground water measurement was not taken.* *The boring was backfilled with grout.* *The boring cuttings were placed into DOT drums.*
					-60	70			
					-65	75			
					-70	80			

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FIGURE **C-18**

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	**B-319R**

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California	11/05/98	11/05/98	1 of 2

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY
THF	ROTARY WASH	SHK	MDR

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
MOBILE 61 ROTARY	4.5"	61.0 ft.	11.67	▼ N/T / *na*

SAMPLING METHOD: 140-lb 30-inch Free Falling Hammer

NOTES: LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
									FILL (CL) Olive gray Sandy CLAY
S-1 SPT	26	18.1			7	5			Very stiff, medium to fine Sandy CLAY, with some GRAVEL, soome brick fragments
R-2 MC	20				2	10			NATIVE
R-3 MC	21	43.3	79.5						(CL) Dark gray, Silty CLAY
S-4 SPT	19	39.6			-3	15			(ML) Light gray, fine Sandy SILT, micaaceous
R-5 MC	8	66.8	60.0	AL CS	-8	20			(MH) Dark gray, Clayey SILT, fossiliferous
S-6 SPT	9	31.2			-13	25			Soft, with fine grain SAND, some sea shells
R-7 MC	24	33.0	91.4	DS	-18	30			(CL) Greenish gray, mottled dark yellow-orange, Silty CLAY, trace of fine SAND
S-8 SPT	N/R	28.8			-23	35			Color change: Dark gray, fine SAND grading to SILT and Silty CLAY
S-9 SPT	36	24.7			-28	40			(SM) Dary gray, dense, fine Silty SAND

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FIGURE **C-19**

LOG OF TEST BORING

PROJECT	PROJECT NUMBER	HOLE NUMBER
Playa Vista - Site DE & Ballona Creek	L-196	**B-319R**

SITE	BEGUN	COMPLETED	SHEET NO.
Playa del Rey, California	11/05/98	11/05/98	2 of 2

DRILLER	DRILL METHOD	LOGGED BY	CHECKED BY
THF	ROTARY WASH	SHK	MDR

DRILL EQUIPMENT	BORING DIA.	TOTAL DEPTH	GROUND ELEV.	DEPTH/*ELEV.* GROUND WATER
MOBILE 61 ROTARY	4.5"	61.0 ft.	11.67	▼ N/T / *na*

SAMPLING METHOD
140-lb 30-inch Free Falling Hammer

NOTES
LOCATION: PLEASE REFER TO FIGURE 2, SITE MAP

SAMPLE ID.	PENETRATION RESISTANCE (BLOWS/FOOT)	MOISTURE (%)	DRY DENSITY (pcf)	OTHER TESTS	ELEVATION	DEPTH (feet)	GRAPHIC LOG	SAMPLE TYPE	DESCRIPTION AND CLASSIFICATION
S-10 SPT	23	38.0			-33	45			(CL) Dark gray, compact, Silty CLAY
S-11 SPT	61	30.3			-38	50			Dense
S-12 SPT	98	25.4			-43	55			(ML) Dark gray, very hard, fine Sandy SILT
S-13 SPT	100@9"	15.0			-48	60			(SP) Gray, very dense, coarse to medium, SAND, with GRAVEL up to 1"
					-53	65			*Bottom of B-319R @ 61 feet* *Ground water measurement was not taken.* *The boring was backfilled with grout.* *The boring cuttings were placed into DOT drums.*
					-58	70			
					-63	75			
					-68	80			

GDC_LOG_BORING L196PV.GPJ GDC_WLOG.GDT 1/4/99

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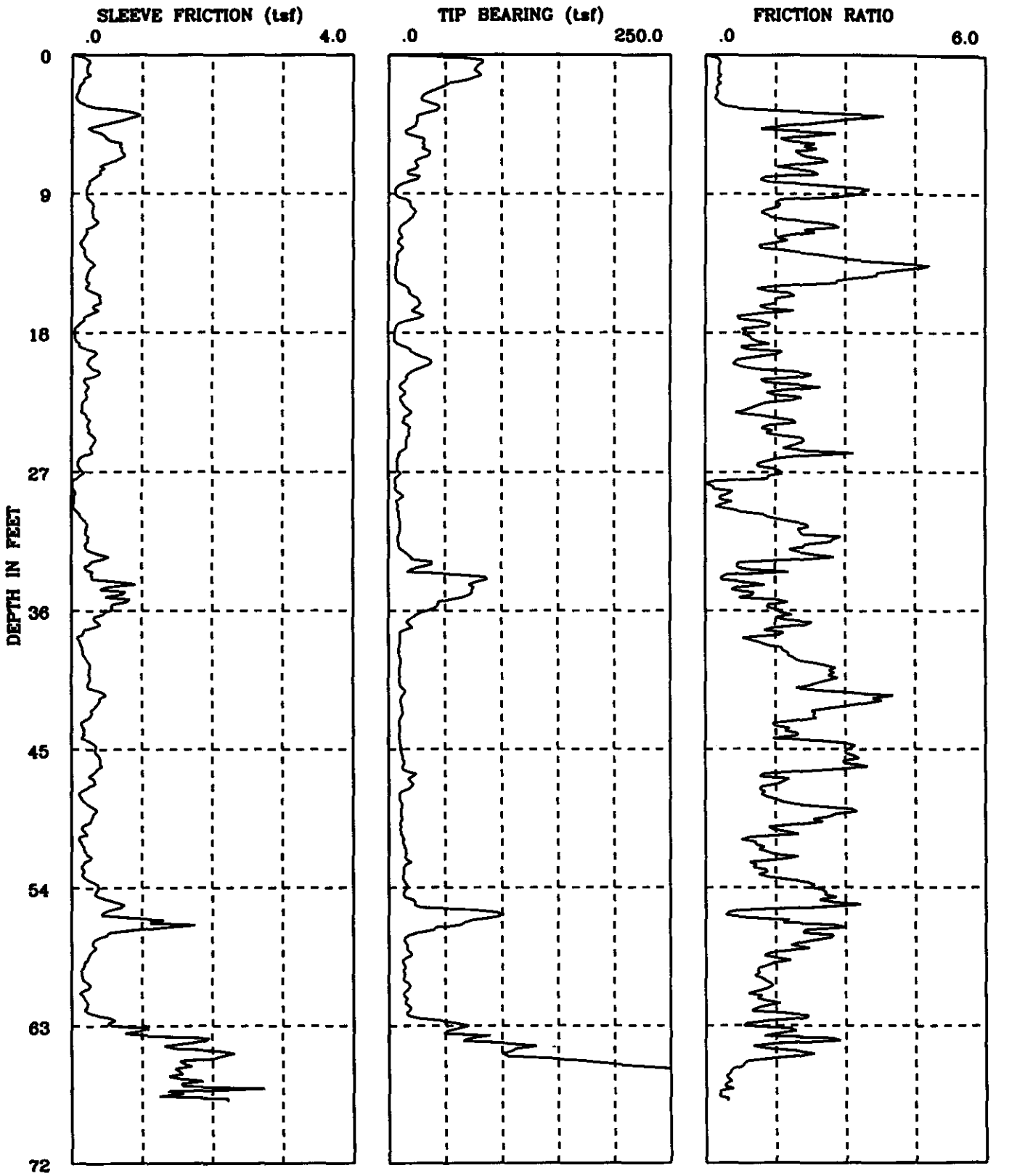
FIGURE **C-20**



CPT 301C	Playa Vista Site
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

GROUP DELTA CONSULTANTS

CPT Date :12-07-98
Cone Used :CPT B-301C
Depth to water table (ft) : 14

Job No. L196 Playa Vista
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.20	1	53.89	0.15	0.28	0.02	sand to silty sand	>90	>48	13	UNDEFINED
0.50	2	74.67	0.21	0.29	0.07	sand to silty sand	>90	>48	18	UNDEFINED
0.80	3	40.45	0.10	0.24	0.12	sand to silty sand	70-80	46-48	10	UNDEFINED
1.10	4	38.62	0.32	0.84	0.18	silty sand to sandy silt	60-70	44-46	12	UNDEFINED
1.40	5	24.75	0.68	2.76	0.24	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
1.70	6	22.30	0.43	1.94	0.29	sandy silt to clayey silt	UNDFND	UNDFD	9	1.4
2.00	7	34.35	0.71	2.07	0.35	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
2.30	8	22.07	0.47	2.11	0.41	sandy silt to clayey silt	UNDFND	UNDFD	8	1.4
2.70	9	14.80	0.25	1.71	0.47	clayey silt to silty clay	UNDFND	UNDFD	7	.9
3.00	10	15.40	0.27	1.73	0.54	clayey silt to silty clay	UNDFND	UNDFD	7	.9
3.30	11	20.56	0.32	1.57	0.59	sandy silt to clayey silt	UNDFND	UNDFD	8	1.3
3.60	12	10.45	0.23	2.20	0.65	clayey silt to silty clay	UNDFND	UNDFD	5	.6
3.90	13	9.67	0.15	1.52	0.71	clayey silt to silty clay	UNDFND	UNDFD	5	.5
4.20	14	6.86	0.26	3.79	0.76	clay	UNDFND	UNDFD	7	.4
4.50	15	7.20	0.23	3.19	0.81	clay	UNDFND	UNDFD	7	.4
4.80	16	20.35	0.30	1.49	0.84	sandy silt to clayey silt	UNDFND	UNDFD	8	1.2
5.10	17	25.68	0.33	1.30	0.86	sandy silt to clayey silt	UNDFND	UNDFD	10	1.6
5.40	18	13.94	0.12	0.86	0.89	sandy silt to clayey silt	UNDFND	UNDFD	5	.8
5.70	19	6.05	0.07	1.10	0.92	sensitive fine grained	UNDFND	UNDFD	3	.3
6.00	20	25.92	0.26	1.00	0.94	sandy silt to clayey silt	UNDFND	UNDFD	10	1.6
6.30	21	26.72	0.30	1.12	0.97	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7
6.60	22	13.17	0.21	1.57	0.99	clayey silt to silty clay	UNDFND	UNDFD	6	.7
6.90	23	12.68	0.19	1.47	1.02	clayey silt to silty clay	UNDFND	UNDFD	6	.7
7.20	24	16.72	0.21	1.24	1.04	sandy silt to clayey silt	UNDFND	UNDFD	6	1.0
7.50	25	17.53	0.25	1.45	1.07	sandy silt to clayey silt	UNDFND	UNDFD	7	1.0
7.80	26	15.10	0.31	2.03	1.10	clayey silt to silty clay	UNDFND	UNDFD	7	.9
8.10	27	8.37	0.13	1.55	1.12	clayey silt to silty clay	UNDFND	UNDFD	4	.4
8.40	28	7.56	0.09	1.15	1.15	undefined	UNDFND	UNDFD	UDF	UNDEFINED
8.70	29	8.73	0.03	0.34	1.17	sensitive fine grained	UNDFND	UNDFD	4	.4
9.10	30	8.59	0.06	0.73	1.20	clayey silt to silty clay	UNDFND	UNDFD	4	.4
9.40	31	10.01	0.20	2.03	1.23	clayey silt to silty clay	UNDFND	UNDFD	5	.5
9.70	32	8.66	0.22	2.54	1.26	silty clay to clay	UNDFND	UNDFD	6	.4
10.00	33	24.02	0.36	1.51	1.29	sandy silt to clayey silt	UNDFND	UNDFD	9	1.4
10.30	34	43.40	0.26	0.60	1.31	silty sand to sandy silt	<40	34-36	14	UNDEFINED
10.60	35	75.37	0.65	0.86	1.34	sand to silty sand	50-60	38-40	18	UNDEFINED
10.90	36	50.75	0.60	1.19	1.36	silty sand to sandy silt	40-50	36-38	16	UNDEFINED
11.20	37	22.39	0.39	1.73	1.39	sandy silt to clayey silt	UNDFND	UNDFD	9	1.3
11.50	38	13.87	0.19	1.37	1.42	sandy silt to clayey silt	UNDFND	UNDFD	5	.7

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

GROUP DELTA CONSULTANTS

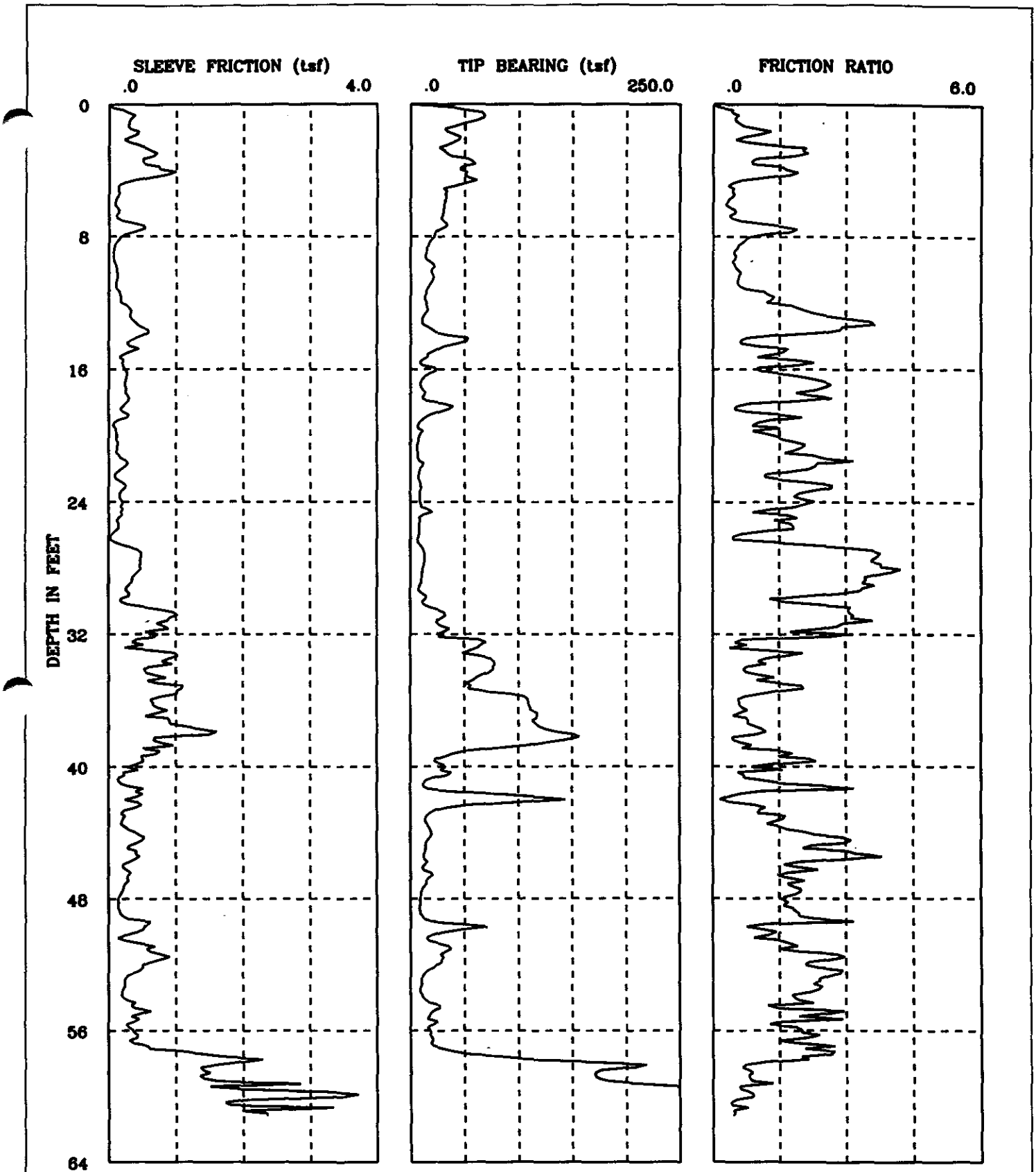
CPT Date :12-07-98
Cone Used :CPT B-301C
Depth to water table (ft) : 14

Job No. L196 Playa Vista
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.80	39	9.43	0.14	1.52	1.44	clayey silt to silty clay	UNDFND	UNDFD	5	.4
12.10	40	9.94	0.23	2.31	1.47	silty clay to clay	UNDFND	UNDFD	6	.5
12.40	41	9.56	0.25	2.65	1.49	silty clay to clay	UNDFND	UNDFD	6	.4
12.70	42	12.60	0.36	2.88	1.52	silty clay to clay	UNDFND	UNDFD	8	.6
13.00	43	11.74	0.33	2.81	1.54	silty clay to clay	UNDFND	UNDFD	7	.6
13.30	44	9.56	0.18	1.88	1.57	clayey silt to silty clay	UNDFND	UNDFD	5	.4
13.60	45	9.75	0.21	2.15	1.60	clayey silt to silty clay	UNDFND	UNDFD	5	.4
13.90	46	11.58	0.36	3.14	1.62	silty clay to clay	UNDFND	UNDFD	7	.5
14.20	47	16.57	0.36	2.15	1.65	clayey silt to silty clay	UNDFND	UNDFD	8	.9
14.50	48	18.67	0.28	1.50	1.67	sandy silt to clayey silt	UNDFND	UNDFD	7	1.0
14.80	49	10.51	0.16	1.55	1.70	clayey silt to silty clay	UNDFND	UNDFD	5	.5
15.10	50	11.47	0.31	2.73	1.73	silty clay to clay	UNDFND	UNDFD	7	.5
15.50	51	11.20	0.17	1.50	1.76	clayey silt to silty clay	UNDFND	UNDFD	5	.5
15.80	52	14.40	0.18	1.23	1.79	sandy silt to clayey silt	UNDFND	UNDFD	6	.7
16.10	53	15.02	0.20	1.33	1.81	sandy silt to clayey silt	UNDFND	UNDFD	6	.8
16.40	54	14.06	0.25	1.78	1.84	clayey silt to silty clay	UNDFND	UNDFD	7	.7
16.70	55	16.36	0.41	2.49	1.86	clayey silt to silty clay	UNDFND	UNDFD	8	.8
17.00	56	66.15	0.57	0.86	1.89	sand to silty sand	40-50	34-36	16	UNDEFINED
17.30	57	59.16	1.30	2.20	1.92	sandy silt to clayey silt	UNDFND	UNDFD	23	3.7
17.60	58	16.14	0.37	2.31	1.94	clayey silt to silty clay	UNDFND	UNDFD	8	.8
17.90	59	16.25	0.26	1.60	1.97	sandy silt to clayey silt	UNDFND	UNDFD	6	.8
18.20	60	13.61	0.16	1.15	1.99	sandy silt to clayey silt	UNDFND	UNDFD	5	.6
18.50	61	16.00	0.21	1.29	2.02	sandy silt to clayey silt	UNDFND	UNDFD	6	.8
18.80	62	15.31	0.19	1.26	2.04	sandy silt to clayey silt	UNDFND	UNDFD	6	.7
19.10	63	27.02	0.39	1.44	2.07	sandy silt to clayey silt	UNDFND	UNDFD	10	1.5
19.40	64	70.35	0.89	1.27	2.10	silty sand to sandy silt	40-50	34-36	22	UNDEFINED
19.70	65	101.69	1.77	1.74	2.12	silty sand to sandy silt	50-60	36-38	32	UNDEFINED
20.00	66	166.43	1.79	1.08	2.15	sand to silty sand	70-80	38-40	40	UNDEFINED
20.30	67	315.87	1.59	0.50	2.17	gravelly sand to sand	80-90	42-44	>50	UNDEFINED
20.60	68	448.42	1.40	0.31	2.20	gravelly sand to sand	>90	44-46	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****



CPT 303C	Playa Vista Site
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

GROUP DELTA CONSULTANTS

CPT Date :12-07-98
Cone Used :**CPT B-303C**
Depth to water table (ft) : 14

Job No. L196 Playa Vista
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.20	1	39.17	0.20	0.50	0.02	silty sand to sandy silt	>90	>48	13	UNDEFINED
0.50	2	45.01	0.34	0.75	0.07	silty sand to sandy silt	80-90	>48	14	UNDEFINED
0.80	3	36.92	0.39	1.05	0.12	silty sand to sandy silt	60-70	44-46	12	UNDEFINED
1.10	4	48.52	0.58	1.20	0.18	silty sand to sandy silt	70-80	44-46	15	UNDEFINED
1.40	5	52.30	0.67	1.28	0.24	silty sand to sandy silt	60-70	44-46	17	UNDEFINED
1.70	6	35.67	0.14	0.39	0.29	silty sand to sandy silt	50-60	40-42	11	UNDEFINED
2.00	7	31.14	0.12	0.40	0.35	silty sand to sandy silt	40-50	40-42	10	UNDEFINED
2.30	8	29.74	0.33	1.12	0.41	silty sand to sandy silt	40-50	38-40	9	UNDEFINED
2.70	9	18.03	0.14	0.76	0.47	sandy silt to clayey silt	UNDFND	UNDFD	7	1.1
3.00	10	17.76	0.09	0.49	0.54	sandy silt to clayey silt	UNDFND	UNDFD	7	1.1
3.30	11	19.54	0.11	0.58	0.59	sandy silt to clayey silt	UNDFND	UNDFD	7	1.2
3.60	12	14.23	0.15	1.08	0.65	sandy silt to clayey silt	UNDFND	UNDFD	5	.9
3.90	13	14.12	0.30	2.12	0.71	clayey silt to silty clay	UNDFND	UNDFD	7	.8
4.20	14	16.52	0.47	2.84	0.76	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
4.50	15	40.76	0.37	0.91	0.81	silty sand to sandy silt	40-50	36-38	13	UNDEFINED
4.80	16	12.62	0.21	1.69	0.84	clayey silt to silty clay	UNDFND	UNDFD	6	.7
5.10	17	15.70	0.25	1.59	0.86	sandy silt to clayey silt	UNDFND	UNDFD	6	.9
5.40	18	11.37	0.26	2.32	0.89	clayey silt to silty clay	UNDFND	UNDFD	5	.6
5.70	19	28.23	0.24	0.84	0.92	silty sand to sandy silt	<40	34-36	9	UNDEFINED
6.00	20	9.56	0.10	1.05	0.94	clayey silt to silty clay	UNDFND	UNDFD	5	.5
6.30	21	6.90	0.12	1.74	0.97	silty clay to clay	UNDFND	UNDFD	4	.3
6.60	22	8.50	0.19	2.20	0.99	silty clay to clay	UNDFND	UNDFD	5	.4
6.90	23	8.01	0.13	1.67	1.02	clayey silt to silty clay	UNDFND	UNDFD	4	.4
7.20	24	8.88	0.20	2.25	1.04	silty clay to clay	UNDFND	UNDFD	6	.5
7.50	25	12.87	0.19	1.45	1.07	clayey silt to silty clay	UNDFND	UNDFD	6	.7
7.80	26	7.88	0.14	1.82	1.10	silty clay to clay	UNDFND	UNDFD	5	.4
8.10	27	7.80	0.09	1.15	1.12	clayey silt to silty clay	UNDFND	UNDFD	4	.4
8.40	28	12.62	0.46	3.62	1.15	silty clay to clay	UNDFND	UNDFD	8	.7
8.70	29	10.96	0.41	3.74	1.17	clay	UNDFND	UNDFD	11	.6
9.10	30	10.63	0.27	2.54	1.20	silty clay to clay	UNDFND	UNDFD	7	.5
9.40	31	23.26	0.69	2.98	1.23	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
9.70	32	28.00	0.74	2.64	1.26	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
10.00	33	53.06	0.42	0.80	1.29	silty sand to sandy silt	40-50	36-38	17	UNDEFINED
10.30	34	67.04	0.94	1.40	1.31	silty sand to sandy silt	50-60	36-38	21	UNDEFINED
10.60	35	66.70	0.59	0.88	1.34	sand to silty sand	50-60	36-38	16	UNDEFINED
10.90	36	76.58	0.96	1.25	1.36	silty sand to sandy silt	50-60	38-40	24	UNDEFINED
11.20	37	112.48	0.70	0.62	1.39	sand to silty sand	60-70	40-42	27	UNDEFINED
11.50	38	119.14	1.05	0.88	1.42	sand to silty sand	60-70	40-42	29	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

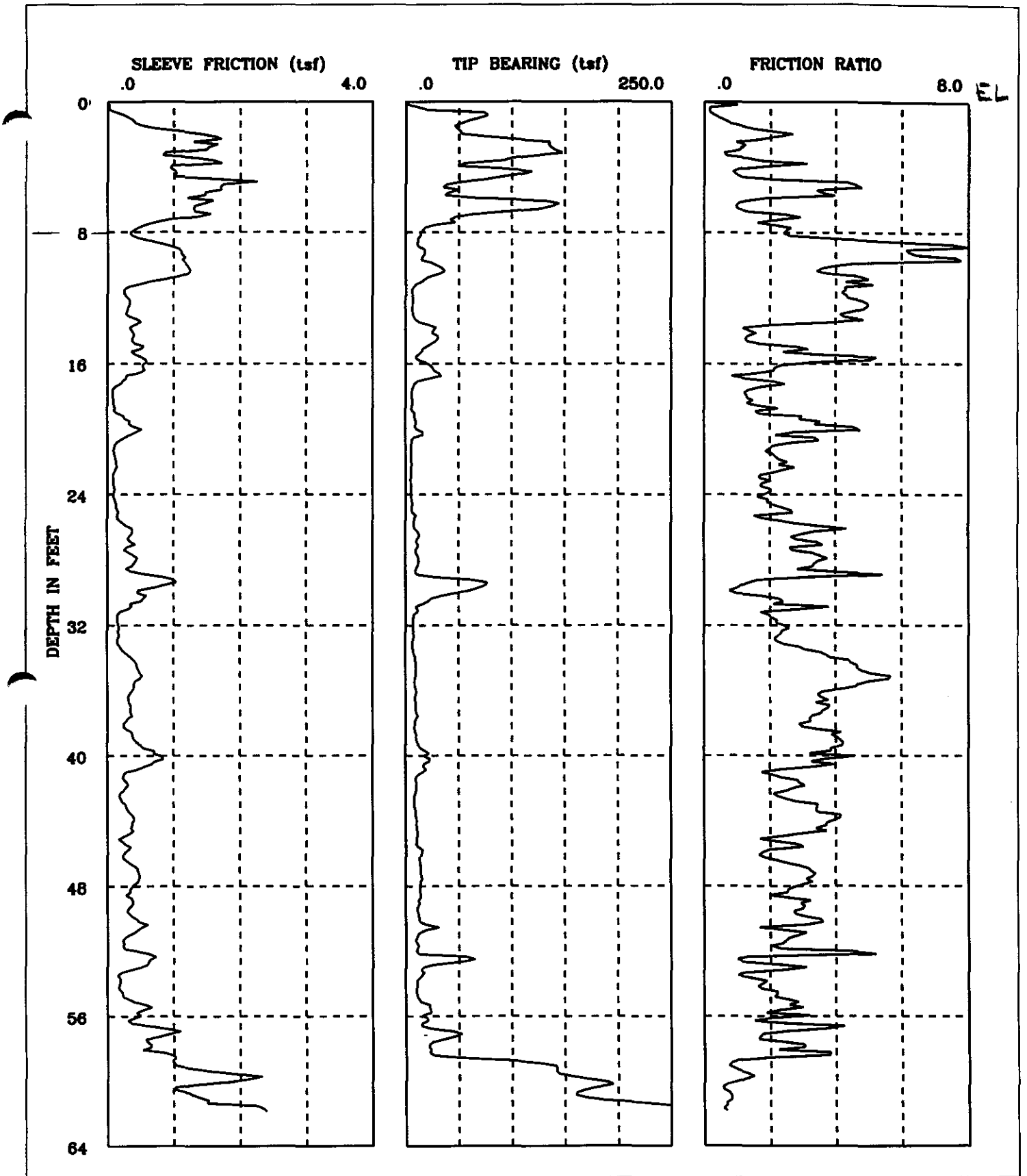
C: Date :12-07-98
Cone Used :CPT B-303C
Depth to water table (ft) : 14

Job No. L196 Playa Vista
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.80	39	134.72	1.04	0.77	1.44	sand	60-70	40-42	26	UNDEFINED
12.10	40	35.16	0.58	1.66	1.47	sandy silt to clayey silt	UNDFND	UNDFD	13	2.1
12.40	41	29.83	0.21	0.70	1.49	silty sand to sandy silt	<40	30-32	10	UNDEFINED
12.70	42	37.56	0.40	1.06	1.52	silty sand to sandy silt	<40	32-34	12	UNDEFINED
13.00	43	72.46	0.32	0.44	1.54	sand to silty sand	50-60	36-38	17	UNDEFINED
13.30	44	14.70	0.22	1.52	1.57	clayey silt to silty clay	UNDFND	UNDFD	7	.8
13.60	45	17.04	0.45	2.62	1.60	clayey silt to silty clay	UNDFND	UNDFD	8	.9
13.90	46	12.96	0.36	2.75	1.62	clayey silt to silty clay	UNDFND	UNDFD	6	.6
14.20	47	14.87	0.26	1.73	1.65	clayey silt to silty clay	UNDFND	UNDFD	7	.8
14.50	48	12.55	0.24	1.94	1.67	clayey silt to silty clay	UNDFND	UNDFD	6	.6
14.80	49	8.69	0.15	1.69	1.70	clayey silt to silty clay	UNDFND	UNDFD	4	.3
15.10	50	23.07	0.34	1.47	1.73	sandy silt to clayey silt	UNDFND	UNDFD	9	1.3
15.50	51	29.24	0.43	1.45	1.76	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
15.80	52	30.23	0.71	2.34	1.79	sandy silt to clayey silt	UNDFND	UNDFD	12	1.8
16.10	53	14.87	0.37	2.51	1.81	clayey silt to silty clay	UNDFND	UNDFD	7	.7
16.40	54	10.00	0.21	2.13	1.84	clayey silt to silty clay	UNDFND	UNDFD	5	.4
16.70	55	20.60	0.41	1.97	1.86	sandy silt to clayey silt	UNDFND	UNDFD	8	1.1
17.00	56	19.20	0.34	1.75	1.89	sandy silt to clayey silt	UNDFND	UNDFD	7	1.0
17.30	57	19.31	0.39	2.02	1.92	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
17.60	58	62.81	1.43	2.28	1.94	sandy silt to clayey silt	UNDFND	UNDFD	24	3.9
17.90	59	188.35	1.46	0.77	1.97	sand	70-80	40-42	36	UNDEFINED
18.20	60	278.74	2.12	0.76	1.99	sand	80-90	42-44	>50	UNDEFINED
18.50	61	414.60	2.84	0.69	2.02	gravelly sand to sand	>90	44-46	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****



CPT B-308C	Playa Vista Site De
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

GROUP DELTA CONSULTANTS

CPT Date :11-03-98
Cone Used :CPT B-308
Depth to water table (ft) : 10

Job No. L196 Playa Vista Site De
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.20	1	28.78	0.05	0.19	0.02	silty sand to sandy silt	80-90	>48	9	UNDEFINED
0.50	2	56.78	0.49	0.86	0.07	silty sand to sandy silt	80-90	>48	18	UNDEFINED
0.80	3	96.95	1.59	1.64	0.12	silty sand to sandy silt	>90	>48	31	UNDEFINED
1.10	4	118.64	1.30	1.10	0.18	sand to silty sand	>90	>48	28	UNDEFINED
1.40	5	86.58	0.99	1.15	0.24	sand to silty sand	80-90	46-48	21	UNDEFINED
1.70	6	42.89	1.81	4.23	0.29	silty clay to clay	UNDFND	UNDFD	27	2.8
2.00	7	112.58	1.33	1.18	0.35	sand to silty sand	80-90	44-46	27	UNDEFINED
2.30	8	44.48	1.03	2.32	0.41	sandy silt to clayey silt	UNDFND	UNDFD	17	2.9
2.70	9	13.43	0.59	4.41	0.47	clay	UNDFND	UNDFD	13	.8
3.00	10	19.18	1.15	6.01	0.54	clay	UNDFND	UNDFD	18	1.2
3.30	11	28.17	1.12	3.96	0.58	silty clay to clay	UNDFND	UNDFD	18	1.8
3.60	12	7.20	0.34	4.67	0.61	clay	UNDFND	UNDFD	7	.4
3.90	13	6.78	0.32	4.77	0.64	clay	UNDFND	UNDFD	6	.4
4.20	14	16.48	0.39	2.39	0.66	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
4.50	15	26.55	0.39	1.48	0.69	sandy silt to clayey silt	UNDFND	UNDFD	10	1.7
4.80	16	13.19	0.50	3.76	0.71	silty clay to clay	UNDFND	UNDFD	8	.8
5.10	17	27.60	0.46	1.65	0.74	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
5.40	18	7.92	0.14	1.77	0.76	clayey silt to silty clay	UNDFND	UNDFD	4	.4
5.70	19	5.70	0.09	1.58	0.79	sensitive fine grained	UNDFND	UNDFD	3	.3
6.00	20	9.12	0.24	2.67	0.82	silty clay to clay	UNDFND	UNDFD	6	.5
6.30	21	10.96	0.36	3.25	0.84	silty clay to clay	UNDFND	UNDFD	7	.6
6.60	22	5.08	0.10	2.04	0.87	silty clay to clay	UNDFND	UNDFD	3	.2
6.90	23	5.01	0.12	2.46	0.89	clay	UNDFND	UNDFD	5	.2
7.20	24	4.82	0.09	1.80	0.92	silty clay to clay	UNDFND	UNDFD	3	.2
7.50	25	5.44	0.11	1.96	0.95	silty clay to clay	UNDFND	UNDFD	3	.2
7.80	26	7.50	0.15	2.05	0.97	silty clay to clay	UNDFND	UNDFD	5	.4
8.10	27	10.56	0.33	3.13	1.00	silty clay to clay	UNDFND	UNDFD	7	.6
8.40	28	10.47	0.32	3.09	1.02	silty clay to clay	UNDFND	UNDFD	7	.5
8.70	29	11.26	0.38	3.35	1.05	silty clay to clay	UNDFND	UNDFD	7	.6
9.10	30	51.93	0.72	1.39	1.08	silty sand to sandy silt	40-50	36-38	17	UNDEFINED
9.40	31	21.41	0.49	2.27	1.11	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
9.70	32	8.33	0.16	1.92	1.14	silty clay to clay	UNDFND	UNDFD	5	.4
10.00	33	7.16	0.17	2.33	1.16	silty clay to clay	UNDFND	UNDFD	5	.3
10.30	34	7.18	0.22	3.11	1.19	clay	UNDFND	UNDFD	7	.3
10.60	35	9.35	0.43	4.64	1.21	clay	UNDFND	UNDFD	9	.4
10.90	36	8.82	0.45	5.10	1.24	clay	UNDFND	UNDFD	8	.4
11.20	37	9.39	0.33	3.51	1.26	clay	UNDFND	UNDFD	9	.4
11.50	38	9.62	0.34	3.50	1.29	clay	UNDFND	UNDFD	9	.4

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

GROUP DELTA CONSULTANTS

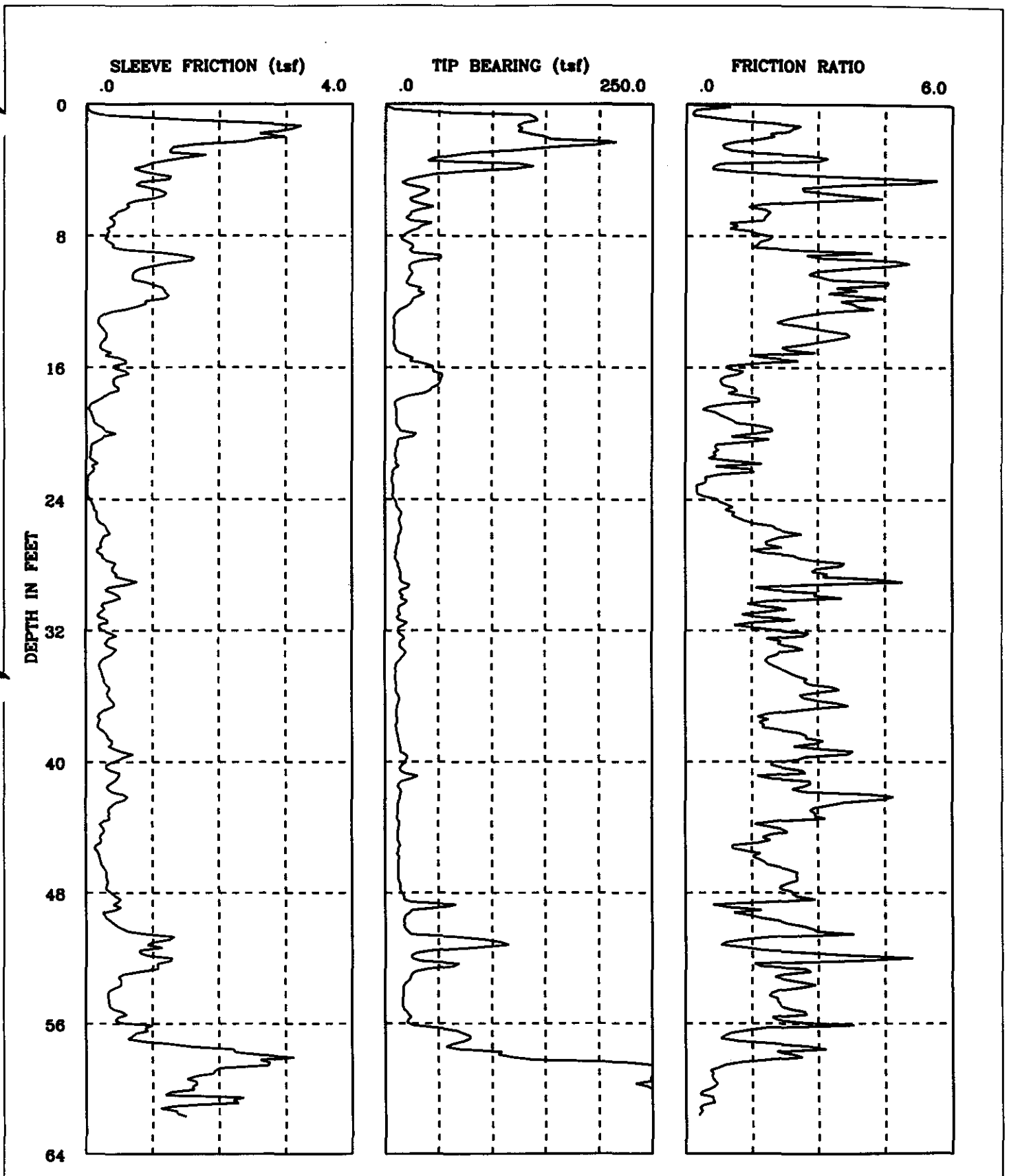
CPT Date :11-03-98
Cone Used :**CPT B-308**
Depth to water table (ft) : 10

Job No. L196 Playa Vista Site De
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.80	39	8.67	0.30	3.42	1.32	clay	UNDFND	UNDFD	8	.4
12.10	40	13.45	0.54	4.01	1.34	clay	UNDFND	UNDFD	13	.7
12.40	41	18.91	0.70	3.70	1.37	silty clay to clay	UNDFND	UNDFD	12	1.1
12.70	42	12.09	0.27	2.23	1.39	clayey silt to silty clay	UNDFND	UNDFD	6	.6
13.00	43	9.03	0.22	2.44	1.42	silty clay to clay	UNDFND	UNDFD	6	.4
13.30	44	8.54	0.31	3.67	1.45	clay	UNDFND	UNDFD	8	.4
13.60	45	10.22	0.39	3.78	1.47	clay	UNDFND	UNDFD	10	.5
13.90	46	10.85	0.28	2.55	1.50	silty clay to clay	UNDFND	UNDFD	7	.5
14.20	47	13.76	0.28	2.03	1.52	clayey silt to silty clay	UNDFND	UNDFD	7	.7
14.50	48	14.72	0.47	3.22	1.55	silty clay to clay	UNDFND	UNDFD	9	.8
14.80	49	13.76	0.34	2.49	1.58	clayey silt to silty clay	UNDFND	UNDFD	7	.7
15.10	50	11.53	0.35	3.01	1.60	silty clay to clay	UNDFND	UNDFD	7	.5
15.50	51	17.42	0.44	2.56	1.63	clayey silt to silty clay	UNDFND	UNDFD	8	.9
15.80	52	10.43	0.25	2.43	1.66	silty clay to clay	UNDFND	UNDFD	7	.4
16.10	53	34.54	0.63	1.82	1.69	sandy silt to clayey silt	UNDFND	UNDFD	13	2.1
16.40	54	13.58	0.24	1.74	1.71	clayey silt to silty clay	UNDFND	UNDFD	7	.7
16.70	55	10.73	0.21	1.99	1.74	clayey silt to silty clay	UNDFND	UNDFD	5	.5
17.00	56	20.07	0.51	2.52	1.76	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
17.30	57	19.99	0.56	2.80	1.79	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
17.60	58	36.51	0.72	1.98	1.82	sandy silt to clayey silt	UNDFND	UNDFD	14	2.2
17.90	59	48.79	0.84	1.71	1.84	silty sand to sandy silt	<40	32-34	16	UNDEFINED
18.20	60	146.80	1.64	1.12	1.87	sand to silty sand	60-70	38-40	35	UNDEFINED
18.50	61	177.58	1.37	0.77	1.89	sand	70-80	40-42	34	UNDEFINED
18.80	62	264.91	1.76	0.66	1.92	sand	80-90	42-44	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****



CPT B-310C	Playa Vista Site De
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

GROUP DELTA CONSULTANTS

CPT Date :11-03-98
Cone Used :**CPT B-310C**
Depth to water table (ft) : 8

Job No. L196 Playa Vista
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.20	1	47.69	0.08	0.16	0.02	sand to silty sand	>90	>48	11	UNDEFINED
0.50	2	130.15	2.57	1.97	0.07	silty sand to sandy silt	>90	>48	42	UNDEFINED
0.80	3	173.17	2.23	1.29	0.12	sand to silty sand	>90	>48	41	UNDEFINED
1.10	4	84.37	1.24	1.47	0.18	silty sand to sandy silt	80-90	46-48	27	UNDEFINED
1.40	5	62.07	1.00	1.61	0.24	silty sand to sandy silt	70-80	44-46	20	UNDEFINED
1.70	6	31.08	1.01	3.24	0.29	clayey silt to silty clay	UNDFND	UNDFD	15	2.0
2.00	7	31.50	0.61	1.94	0.35	sandy silt to clayey silt	UNDFND	UNDFD	12	2.0
2.30	8	31.33	0.36	1.16	0.41	silty sand to sandy silt	40-50	38-40	10	UNDEFINED
2.70	9	20.41	0.39	1.94	0.47	sandy silt to clayey silt	UNDFND	UNDFD	8	1.3
3.00	10	35.79	1.34	3.73	0.50	clayey silt to silty clay	UNDFND	UNDFD	17	2.3
3.30	11	22.26	0.77	3.46	0.52	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
3.60	12	32.33	1.18	3.64	0.55	clayey silt to silty clay	UNDFND	UNDFD	15	2.1
3.90	13	16.00	0.60	3.73	0.57	silty clay to clay	UNDFND	UNDFD	10	1.0
4.20	14	8.47	0.23	2.68	0.60	silty clay to clay	UNDFND	UNDFD	5	.5
4.50	15	8.73	0.26	2.94	0.62	silty clay to clay	UNDFND	UNDFD	6	.5
4.80	16	24.94	0.49	1.96	0.65	sandy silt to clayey silt	UNDFND	UNDFD	10	1.6
5.10	17	50.17	0.50	0.99	0.68	silty sand to sandy silt	50-60	38-40	16	UNDEFINED
5.40	18	37.73	0.40	1.06	0.70	silty sand to sandy silt	40-50	36-38	12	UNDEFINED
5.70	19	9.99	0.09	0.93	0.73	clayey silt to silty clay	UNDFND	UNDFD	5	.5
6.00	20	11.43	0.16	1.37	0.75	clayey silt to silty clay	UNDFND	UNDFD	5	.6
6.30	21	17.89	0.25	1.42	0.78	sandy silt to clayey silt	UNDFND	UNDFD	7	1.1
6.60	22	9.56	0.08	0.84	0.81	clayey silt to silty clay	UNDFND	UNDFD	5	.5
6.90	23	8.92	0.08	0.86	0.83	clayey silt to silty clay	UNDFND	UNDFD	4	.5
7.20	24	7.20	0.02	0.32	0.86	sensitive fine grained	UNDFND	UNDFD	3	.3
7.50	25	10.77	0.09	0.87	0.88	sandy silt to clayey silt	UNDFND	UNDFD	4	.6
7.80	26	14.38	0.21	1.46	0.91	clayey silt to silty clay	UNDFND	UNDFD	7	.8
8.10	27	13.19	0.28	2.10	0.94	clayey silt to silty clay	UNDFND	UNDFD	6	.7
8.40	28	9.86	0.21	2.16	0.96	clayey silt to silty clay	UNDFND	UNDFD	5	.5
8.70	29	13.24	0.43	3.25	0.99	silty clay to clay	UNDFND	UNDFD	8	.7
9.10	30	16.91	0.50	2.93	1.02	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
9.40	31	15.36	0.28	1.85	1.05	clayey silt to silty clay	UNDFND	UNDFD	7	.9
9.70	32	14.46	0.23	1.59	1.07	clayey silt to silty clay	UNDFND	UNDFD	7	.8
10.00	33	15.19	0.33	2.19	1.10	clayey silt to silty clay	UNDFND	UNDFD	7	.8
10.30	34	16.44	0.36	2.21	1.12	clayey silt to silty clay	UNDFND	UNDFD	8	.9
10.60	35	10.00	0.23	2.27	1.15	silty clay to clay	UNDFND	UNDFD	6	.5
10.90	36	10.45	0.31	3.00	1.18	silty clay to clay	UNDFND	UNDFD	7	.5
11.20	37	12.22	0.37	3.00	1.20	silty clay to clay	UNDFND	UNDFD	8	.6
11.50	38	10.73	0.20	1.83	1.23	clayey silt to silty clay	UNDFND	UNDFD	5	.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

GROUP DELTA CONSULTANTS

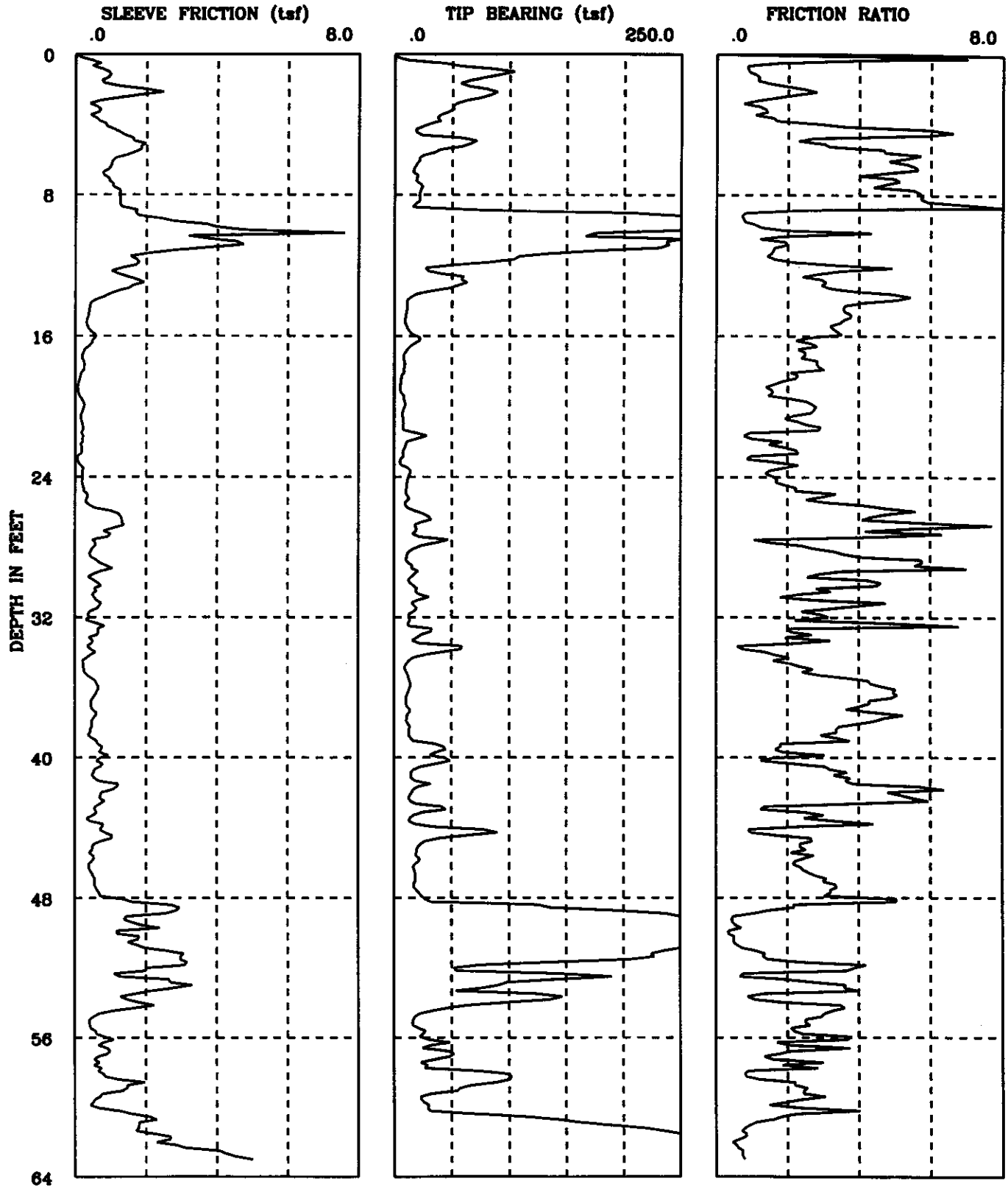
CPT Date :11-03-98
Cone Used :CPT B-310C
Depth to water table (ft) : 8

Job No. L196 Playa Vista
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.80	39	11.66	0.31	2.69	1.25	silty clay to clay	UNDFND	UNDFD	7	.6
12.10	40	16.42	0.48	2.94	1.28	clayey silt to silty clay	UNDFND	UNDFD	8	.9
12.40	41	17.12	0.39	2.30	1.31	clayey silt to silty clay	UNDFND	UNDFD	8	.9
12.70	42	16.74	0.38	2.27	1.33	clayey silt to silty clay	UNDFND	UNDFD	8	.9
13.00	43	13.00	0.51	3.95	1.36	clay	UNDFND	UNDFD	12	.7
13.30	44	12.23	0.32	2.59	1.38	clayey silt to silty clay	UNDFND	UNDFD	6	.6
13.60	45	12.15	0.24	1.98	1.41	clayey silt to silty clay	UNDFND	UNDFD	6	.6
13.90	46	12.28	0.18	1.47	1.43	clayey silt to silty clay	UNDFND	UNDFD	6	.6
14.20	47	12.53	0.24	1.94	1.46	clayey silt to silty clay	UNDFND	UNDFD	6	.6
14.50	48	13.10	0.31	2.39	1.49	clayey silt to silty clay	UNDFND	UNDFD	6	.6
14.80	49	18.88	0.43	2.26	1.51	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
15.10	50	31.44	0.36	1.15	1.54	silty sand to sandy silt	<40	30-32	10	UNDEFINED
15.50	51	38.92	0.79	2.02	1.57	sandy silt to clayey silt	UNDFND	UNDFD	15	2.4
15.80	52	61.75	0.88	1.43	1.60	silty sand to sandy silt	40-50	36-38	20	UNDEFINED
16.10	53	41.31	1.05	2.53	1.62	sandy silt to clayey silt	UNDFND	UNDFD	16	2.5
16.40	54	20.46	0.49	2.38	1.65	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
16.70	55	16.59	0.34	2.05	1.68	clayey silt to silty clay	UNDFND	UNDFD	8	.8
17.00	56	20.43	0.49	2.40	1.70	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
17.30	57	57.69	0.88	1.52	1.73	silty sand to sandy silt	40-50	34-36	18	UNDEFINED
17.60	58	79.74	1.57	1.97	1.75	silty sand to sandy silt	50-60	36-38	25	UNDEFINED
17.90	59	204.96	2.63	1.28	1.78	sand	70-80	40-42	39	UNDEFINED
18.20	60	263.30	1.70	0.65	1.81	sand	80-90	42-44	>50	UNDEFINED
18.50	61	346.18	1.67	0.48	1.83	gravelly sand to sand	>90	42-44	>50	UNDEFINED
18.80	62	418.30	1.42	0.34	1.86	gravelly sand to sand	>90	44-46	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****



CPT B-311C	Playa Vista Site De
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

GROUP DELTA CONSULTANTS

CPT Date :11-03-98
Cone Used :**CPT B-311C**
Depth to water table (ft) : 8

Job No. L196 Playa Vista
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.20	1	22.80	0.31	1.37	0.02	sandy silt to clayey silt	UNDFND	UNDFD	9	1.5
0.50	2	79.48	0.89	1.12	0.07	sand to silty sand	>90	>48	19	UNDEFINED
0.80	3	74.85	1.49	1.99	0.12	silty sand to sandy silt	80-90	>48	24	UNDEFINED
1.10	4	44.56	0.61	1.37	0.18	silty sand to sandy silt	60-70	44-46	14	UNDEFINED
1.40	5	23.99	1.10	4.58	0.24	clay	UNDFND	UNDFD	23	1.5
1.70	6	54.71	1.70	3.11	0.29	sandy silt to clayey silt	UNDFND	UNDFD	21	3.6
2.00	7	18.94	1.03	5.42	0.35	clay	UNDFND	UNDFD	18	1.2
2.30	8	20.98	0.94	4.50	0.41	clay	UNDFND	UNDFD	20	1.3
2.70	9	34.15	1.37	4.00	0.47	silty clay to clay	UNDFND	UNDFD	22	2.2
3.00	10	310.10	2.85	0.92	0.50	sand	>90	>48	>50	UNDEFINED
3.30	11	241.32	5.36	2.22	0.52	silty sand to sandy silt	>90	46-48	>50	UNDEFINED
3.60	12	122.35	2.05	1.68	0.55	silty sand to sandy silt	80-90	44-46	39	UNDEFINED
3.90	13	42.05	1.41	3.35	0.57	clayey silt to silty clay	UNDFND	UNDFD	20	2.7
4.20	14	34.02	1.21	3.56	0.60	clayey silt to silty clay	UNDFND	UNDFD	16	2.2
4.50	15	10.74	0.41	3.82	0.62	clay	UNDFND	UNDFD	10	.6
4.80	16	11.06	0.37	3.38	0.65	silty clay to clay	UNDFND	UNDFD	7	.6
5.10	17	17.15	0.44	2.57	0.68	clayey silt to silty clay	UNDFND	UNDFD	8	1.0
5.40	18	8.42	0.23	2.73	0.70	silty clay to clay	UNDFND	UNDFD	5	.4
5.70	19	6.66	0.13	2.00	0.73	silty clay to clay	UNDFND	UNDFD	4	.3
6.00	20	7.38	0.14	1.90	0.75	silty clay to clay	UNDFND	UNDFD	5	.4
6.30	21	7.96	0.20	2.47	0.78	silty clay to clay	UNDFND	UNDFD	5	.4
6.60	22	14.65	0.21	1.46	0.81	sandy silt to clayey silt	UNDFND	UNDFD	6	.8
6.90	23	9.34	0.19	2.00	0.83	clayey silt to silty clay	UNDFND	UNDFD	4	.5
7.20	24	8.53	0.13	1.52	0.86	clayey silt to silty clay	UNDFND	UNDFD	4	.4
7.50	25	11.53	0.21	1.82	0.88	clayey silt to silty clay	UNDFND	UNDFD	6	.6
7.80	26	10.82	0.35	3.27	0.91	silty clay to clay	UNDFND	UNDFD	7	.6
8.10	27	23.63	1.21	5.11	0.94	clay	UNDFND	UNDFD	23	1.4
8.40	28	27.27	0.86	3.14	0.96	clayey silt to silty clay	UNDFND	UNDFD	13	1.7
8.70	29	16.17	0.49	3.03	0.99	clayey silt to silty clay	UNDFND	UNDFD	8	.9
9.10	30	14.27	0.69	4.85	1.02	clay	UNDFND	UNDFD	14	.8
9.40	31	21.76	0.63	2.88	1.05	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
9.70	32	15.84	0.57	3.62	1.07	silty clay to clay	UNDFND	UNDFD	10	.9
10.00	33	19.28	0.60	3.11	1.10	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
10.30	34	33.39	0.43	1.30	1.12	silty sand to sandy silt	<40	34-36	11	UNDEFINED
10.60	35	16.48	0.29	1.76	1.15	clayey silt to silty clay	UNDFND	UNDFD	8	.9
10.90	36	12.46	0.44	3.53	1.18	silty clay to clay	UNDFND	UNDFD	8	.6
11.20	37	11.70	0.56	4.82	1.20	clay	UNDFND	UNDFD	11	.6
11.50	38	11.95	0.52	4.38	1.23	clay	UNDFND	UNDFD	11	.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

GROUP DELTA CONSULTANTS

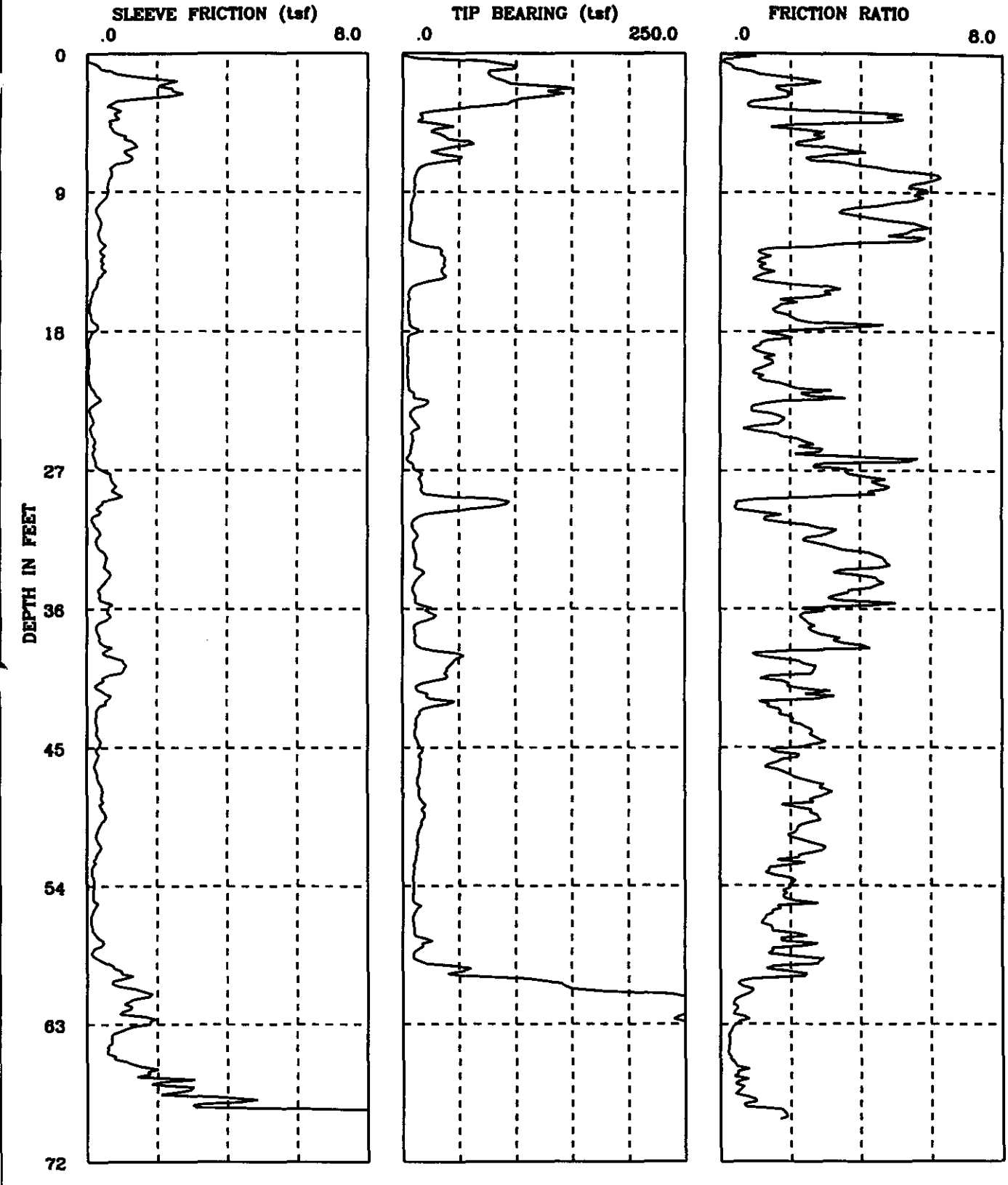
CPT Date :11-03-98
Cone Used :CPT B-311C
Depth to water table (ft) : 8

Job No. L196 Playa Vista
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.80	39	12.42	0.42	3.41	1.25	silty clay to clay	UNDFND	UNDFD	8	.6
12.10	40	32.00	0.69	2.16	1.28	sandy silt to clayey silt	UNDFND	UNDFD	12	1.9
12.40	41	32.89	0.69	2.09	1.31	sandy silt to clayey silt	UNDFND	UNDFD	13	2.0
12.70	42	18.20	0.79	4.32	1.33	clay	UNDFND	UNDFD	17	1.0
13.00	43	15.73	0.72	4.60	1.36	clay	UNDFND	UNDFD	15	.8
13.30	44	24.84	0.50	2.00	1.38	sandy silt to clayey silt	UNDFND	UNDFD	10	1.4
13.60	45	54.03	0.89	1.64	1.41	silty sand to sandy silt	40-50	36-38	17	UNDEFINED
13.90	46	20.55	0.52	2.51	1.43	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
14.20	47	18.88	0.45	2.38	1.46	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
14.50	48	18.34	0.59	3.20	1.49	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
14.80	49	63.91	1.76	2.75	1.51	sandy silt to clayey silt	UNDFND	UNDFD	24	4.0
15.10	50	296.81	1.93	0.65	1.54	sand	>90	42-44	>50	UNDEFINED
15.50	51	314.91	1.61	0.51	1.57	gravelly sand to sand	>90	44-46	>50	UNDEFINED
15.80	52	167.80	3.04	1.81	1.60	sand to silty sand	70-80	40-42	40	UNDEFINED
16.10	53	114.21	1.99	1.74	1.62	silty sand to sandy silt	60-70	38-40	36	UNDEFINED
16.40	54	112.47	1.98	1.76	1.65	silty sand to sandy silt	60-70	38-40	36	UNDEFINED
16.70	55	38.14	1.27	3.33	1.68	clayey silt to silty clay	UNDFND	UNDFD	18	2.3
17.00	56	20.89	0.49	2.33	1.70	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
17.30	57	36.40	0.92	2.54	1.73	sandy silt to clayey silt	UNDFND	UNDFD	14	2.2
17.60	58	32.75	0.70	2.15	1.75	sandy silt to clayey silt	UNDFND	UNDFD	13	1.9
17.90	59	89.12	1.17	1.32	1.78	sand to silty sand	50-60	36-38	21	UNDEFINED
18.20	60	34.70	0.86	2.47	1.81	sandy silt to clayey silt	UNDFND	UNDFD	13	2.0
18.50	61	80.33	1.53	1.91	1.83	silty sand to sandy silt	50-60	36-38	26	UNDEFINED
18.80	62	248.12	2.07	0.83	1.86	sand	80-90	42-44	48	UNDEFINED
19.10	63	531.60	3.23	0.61	1.88	gravelly sand to sand	>90	44-46	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****



CPT B-312C	Playa Vista Site De
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

GROUP DELTA CONSULTANTS

CPT Date :11-03-98
Cone Used :**CPT B-312C**
Depth to water table (ft) : 8

Job No. L196 Playa Vista
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.20	1	33.18	0.08	0.25	0.02	silty sand to sandy silt	>90	>48	11	UNDEFINED
0.50	2	85.69	1.04	1.21	0.07	sand to silty sand	>90	>48	21	UNDEFINED
0.80	3	128.64	2.46	1.91	0.12	silty sand to sandy silt	>90	>48	41	UNDEFINED
1.10	4	81.53	1.00	1.22	0.18	sand to silty sand	80-90	46-48	20	UNDEFINED
1.40	5	21.07	0.78	3.72	0.24	silty clay to clay	UNDFND	UNDFD	13	1.3
1.70	6	34.36	0.88	2.55	0.29	sandy silt to clayey silt	UNDFND	UNDFD	13	2.2
2.00	7	44.44	1.25	2.81	0.35	sandy silt to clayey silt	UNDFND	UNDFD	17	2.9
2.30	8	28.31	0.92	3.26	0.41	clayey silt to silty clay	UNDFND	UNDFD	14	1.8
2.70	9	10.60	0.62	5.90	0.47	clay	UNDFND	UNDFD	10	.6
3.00	10	8.85	0.47	5.27	0.50	clay	UNDFND	UNDFD	8	.5
3.30	11	7.81	0.32	4.05	0.52	clay	UNDFND	UNDFD	7	.4
3.60	12	6.84	0.36	5.31	0.55	clay	UNDFND	UNDFD	7	.4
3.90	13	20.37	0.44	2.14	0.57	clayey silt to silty clay	UNDFND	UNDFD	10	1.3
4.20	14	36.81	0.44	1.20	0.60	silty sand to sandy silt	40-50	38-40	12	UNDEFINED
4.50	15	32.13	0.41	1.29	0.62	silty sand to sandy silt	40-50	36-38	10	UNDEFINED
4.80	16	6.71	0.20	2.93	0.65	clay	UNDFND	UNDFD	6	.3
5.10	17	4.97	0.09	1.81	0.68	silty clay to clay	UNDFND	UNDFD	3	.2
5.40	18	7.13	0.21	2.94	0.70	clay	UNDFND	UNDFD	7	.4
5.70	19	8.15	0.12	1.43	0.73	clayey silt to silty clay	UNDFND	UNDFD	4	.4
6.00	20	4.44	0.05	1.13	0.75	sensitive fine grained	UNDFND	UNDFD	2	.2
6.30	21	4.39	0.05	1.21	0.78	sensitive fine grained	UNDFND	UNDFD	2	.2
6.60	22	4.95	0.08	1.68	0.81	sensitive fine grained	UNDFND	UNDFD	2	.2
6.90	23	14.23	0.29	2.06	0.83	clayey silt to silty clay	UNDFND	UNDFD	7	.8
7.20	24	8.90	0.12	1.35	0.86	clayey silt to silty clay	UNDFND	UNDFD	4	.5
7.50	25	11.72	0.14	1.22	0.88	clayey silt to silty clay	UNDFND	UNDFD	6	.6
7.80	26	8.24	0.21	2.59	0.91	silty clay to clay	UNDFND	UNDFD	5	.4
8.10	27	6.52	0.20	3.07	0.94	clay	UNDFND	UNDFD	6	.3
8.40	28	13.89	0.56	4.03	0.96	clay	UNDFND	UNDFD	13	.8
8.70	29	17.52	0.80	4.55	0.99	clay	UNDFND	UNDFD	17	1.0
9.10	30	63.86	0.48	0.75	1.02	sand to silty sand	50-60	38-40	15	UNDEFINED
9.40	31	9.60	0.22	2.29	1.05	silty clay to clay	UNDFND	UNDFD	6	.5
9.70	32	11.04	0.31	2.78	1.07	silty clay to clay	UNDFND	UNDFD	7	.6
10.00	33	11.40	0.48	4.24	1.10	clay	UNDFND	UNDFD	11	.6
10.30	34	14.67	0.58	3.98	1.12	clay	UNDFND	UNDFD	14	.8
10.60	35	10.49	0.45	4.26	1.15	clay	UNDFND	UNDFD	10	.5
10.90	36	13.36	0.50	3.74	1.18	silty clay to clay	UNDFND	UNDFD	9	.7
11.20	37	23.55	0.59	2.52	1.20	clayey silt to silty clay	UNDFND	UNDFD	11	1.4
11.50	38	10.68	0.30	2.78	1.23	silty clay to clay	UNDFND	UNDFD	7	.5

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

GROUP DELTA CONSULTANTS

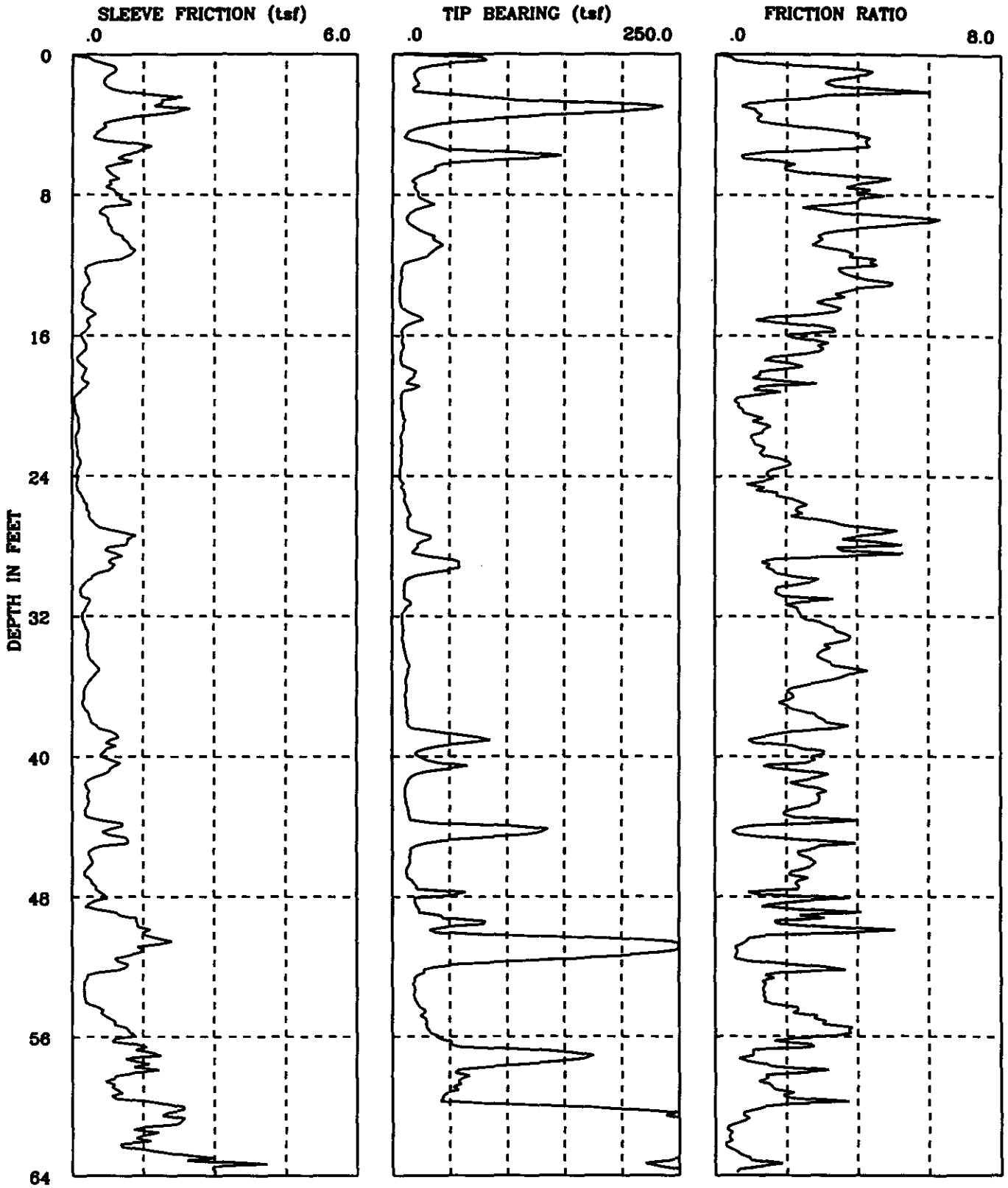
CPT Date :11-03-98
Cone Used :**CPT B-312C**
Depth to water table (ft) : 8

Job No. L196 Playa Vista
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.80	39	16.78	0.46	2.74	1.25	clayey silt to silty clay	UNDFND	UNDFD	8	.9
12.10	40	47.07	0.91	1.93	1.28	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9
12.40	41	35.43	0.69	1.96	1.31	sandy silt to clayey silt	UNDFND	UNDFD	14	2.2
12.70	42	15.53	0.45	2.88	1.33	clayey silt to silty clay	UNDFND	UNDFD	7	.8
13.00	43	29.01	0.37	1.28	1.36	sandy silt to clayey silt	UNDFND	UNDFD	11	1.7
13.30	44	12.02	0.26	2.14	1.38	clayey silt to silty clay	UNDFND	UNDFD	6	.6
13.60	45	11.44	0.32	2.80	1.41	silty clay to clay	UNDFND	UNDFD	7	.5
13.90	46	15.74	0.32	2.01	1.43	clayey silt to silty clay	UNDFND	UNDFD	8	.8
14.20	47	15.31	0.24	1.57	1.46	clayey silt to silty clay	UNDFND	UNDFD	7	.8
14.50	48	13.80	0.35	2.54	1.49	clayey silt to silty clay	UNDFND	UNDFD	7	.7
14.80	49	15.29	0.43	2.83	1.51	clayey silt to silty clay	UNDFND	UNDFD	7	.8
15.10	50	18.71	0.47	2.51	1.54	clayey silt to silty clay	UNDFND	UNDFD	9	1.0
15.50	51	14.51	0.32	2.24	1.57	clayey silt to silty clay	UNDFND	UNDFD	7	.7
15.80	52	12.80	0.35	2.73	1.60	silty clay to clay	UNDFND	UNDFD	8	.6
16.10	53	11.06	0.22	2.02	1.62	clayey silt to silty clay	UNDFND	UNDFD	5	.5
16.40	54	9.72	0.17	1.78	1.65	clayey silt to silty clay	UNDFND	UNDFD	5	.4
16.70	55	8.96	0.17	1.90	1.68	clayey silt to silty clay	UNDFND	UNDFD	4	.3
17.00	56	11.36	0.23	2.00	1.70	clayey silt to silty clay	UNDFND	UNDFD	5	.5
17.30	57	9.41	0.12	1.31	1.73	clayey silt to silty clay	UNDFND	UNDFD	5	.4
17.60	58	15.65	0.34	2.19	1.75	clayey silt to silty clay	UNDFND	UNDFD	7	.8
17.90	59	11.51	0.22	1.88	1.78	clayey silt to silty clay	UNDFND	UNDFD	6	.5
18.20	60	40.31	0.78	1.93	1.81	sandy silt to clayey silt	UNDFND	UNDFD	15	2.4
18.50	61	133.78	1.03	0.77	1.83	sand	60-70	38-40	26	UNDEFINED
18.80	62	278.01	1.42	0.51	1.86	sand	80-90	42-44	>50	UNDEFINED
19.10	63	249.34	1.37	0.55	1.88	sand	80-90	42-44	48	UNDEFINED
19.40	64	338.62	1.21	0.36	1.91	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.70	65	261.66	0.67	0.25	1.93	gravelly sand to sand	80-90	42-44	42	UNDEFINED
20.00	66	284.85	0.90	0.31	1.96	gravelly sand to sand	80-90	42-44	45	UNDEFINED
20.30	67	336.77	2.28	0.68	1.99	sand	>90	42-44	>50	UNDEFINED
20.60	68	487.00	2.29	0.47	2.01	gravelly sand to sand	>90	44-46	>50	UNDEFINED
20.90	69	473.95	5.33	1.13	2.04	sand	>90	44-46	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****



CPT B-314C	Playa Vista Site De
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

GROUP DELTA CONSULTANTS

CPT Date :11-03-98
Cone Used :**CPT B-314C**
Depth to water table (ft) : 8

Job No. L196 Playa Vista
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.20	1	38.72	0.44	1.14	0.02	silty sand to sandy silt	>90	>48	12	UNDEFINED
0.50	2	20.37	0.76	3.71	0.07	silty clay to clay	UNDFND	UNDFD	13	1.3
0.80	3	58.54	1.44	2.46	0.12	sandy silt to clayey silt	UNDFND	UNDFD	22	3.8
1.10	4	175.53	1.71	0.97	0.18	sand	>90	>48	34	UNDEFINED
1.40	5	24.92	0.59	2.37	0.24	sandy silt to clayey silt	UNDFND	UNDFD	10	1.6
1.70	6	55.14	1.25	2.27	0.29	sandy silt to clayey silt	UNDFND	UNDFD	21	3.6
2.00	7	67.81	0.89	1.31	0.35	silty sand to sandy silt	70-80	42-44	22	UNDEFINED
2.30	8	19.94	0.78	3.91	0.41	silty clay to clay	UNDFND	UNDFD	13	1.3
2.70	9	25.92	0.94	3.62	0.47	clayey silt to silty clay	UNDFND	UNDFD	12	1.6
3.00	10	15.27	0.76	4.98	0.50	clay	UNDFND	UNDFD	15	.9
3.30	11	35.92	1.05	2.91	0.52	sandy silt to clayey silt	UNDFND	UNDFD	14	2.3
3.60	12	26.60	1.02	3.84	0.55	silty clay to clay	UNDFND	UNDFD	17	1.7
3.90	13	7.92	0.30	3.79	0.57	clay	UNDFND	UNDFD	8	.4
4.20	14	6.48	0.27	4.12	0.60	clay	UNDFND	UNDFD	6	.3
4.50	15	10.86	0.33	3.04	0.62	silty clay to clay	UNDFND	UNDFD	7	.6
4.80	16	15.72	0.31	1.99	0.65	clayey silt to silty clay	UNDFND	UNDFD	8	.9
5.10	17	9.35	0.26	2.78	0.68	silty clay to clay	UNDFND	UNDFD	6	.5
5.40	18	8.07	0.17	2.06	0.70	silty clay to clay	UNDFND	UNDFD	5	.4
5.70	19	17.32	0.27	1.56	0.73	sandy silt to clayey silt	UNDFND	UNDFD	7	1.0
6.00	20	11.56	0.11	0.98	0.75	sandy silt to clayey silt	UNDFND	UNDFD	4	.6
6.30	21	8.77	0.08	0.95	0.78	clayey silt to silty clay	UNDFND	UNDFD	4	.5
6.60	22	9.35	0.12	1.28	0.81	clayey silt to silty clay	UNDFND	UNDFD	4	.5
6.90	23	8.07	0.10	1.24	0.83	clayey silt to silty clay	UNDFND	UNDFD	4	.4
7.20	24	7.56	0.14	1.85	0.86	silty clay to clay	UNDFND	UNDFD	5	.4
7.50	25	7.69	0.11	1.39	0.88	clayey silt to silty clay	UNDFND	UNDFD	4	.4
7.80	26	10.81	0.24	2.19	0.91	clayey silt to silty clay	UNDFND	UNDFD	5	.6
8.10	27	14.44	0.37	2.54	0.94	clayey silt to silty clay	UNDFND	UNDFD	7	.8
8.40	28	23.62	0.97	4.11	0.96	silty clay to clay	UNDFND	UNDFD	15	1.4
8.70	29	23.75	0.96	4.06	0.99	silty clay to clay	UNDFND	UNDFD	15	1.4
9.10	30	40.95	0.64	1.58	1.02	silty sand to sandy silt	40-50	36-38	13	UNDEFINED
9.40	31	10.39	0.20	1.96	1.05	clayey silt to silty clay	UNDFND	UNDFD	5	.5
9.70	32	12.34	0.29	2.38	1.07	clayey silt to silty clay	UNDFND	UNDFD	6	.7
10.00	33	9.20	0.28	3.01	1.10	silty clay to clay	UNDFND	UNDFD	6	.4
10.30	34	9.47	0.33	3.48	1.12	clay	UNDFND	UNDFD	9	.5
10.60	35	13.04	0.40	3.09	1.15	silty clay to clay	UNDFND	UNDFD	8	.7
10.90	36	12.47	0.45	3.61	1.18	silty clay to clay	UNDFND	UNDFD	8	.6
11.20	37	12.02	0.26	2.14	1.20	clayey silt to silty clay	UNDFND	UNDFD	6	.6
11.50	38	12.58	0.31	2.46	1.23	clayey silt to silty clay	UNDFND	UNDFD	6	.6

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

GROUP DELTA CONSULTANTS

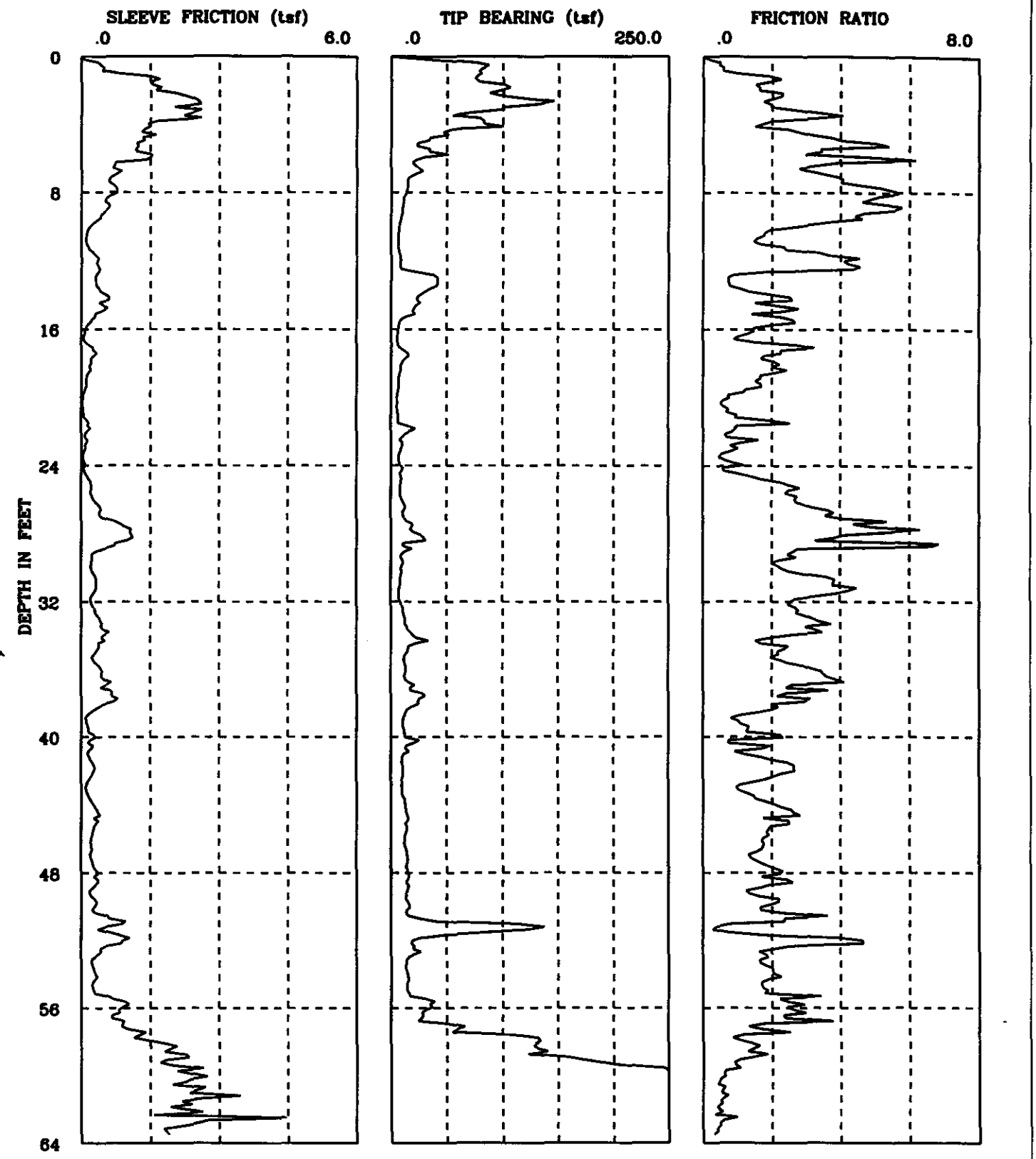
CPT Date :11-03-98
Cone Used :**CPT B-314C**
Depth to water table (ft) : 8

Job No. L196 Playa Vista
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.80	39	27.38	0.63	2.30	1.25	sandy silt to clayey silt	UNDFND	UNDFD	10	1.6
12.10	40	50.22	0.81	1.61	1.28	silty sand to sandy silt	40-50	36-38	16	UNDEFINED
12.40	41	38.47	0.83	2.17	1.31	sandy silt to clayey silt	UNDFND	UNDFD	15	2.4
12.70	42	15.38	0.43	2.80	1.33	clayey silt to silty clay	UNDFND	UNDFD	7	.8
13.00	43	11.64	0.35	2.98	1.36	silty clay to clay	UNDFND	UNDFD	7	.6
13.30	44	14.10	0.39	2.74	1.38	clayey silt to silty clay	UNDFND	UNDFD	7	.7
13.60	45	105.49	0.94	0.89	1.41	sand to silty sand	60-70	38-40	25	UNDEFINED
13.90	46	20.44	0.66	3.23	1.43	clayey silt to silty clay	UNDFND	UNDFD	10	1.1
14.20	47	13.78	0.35	2.54	1.46	clayey silt to silty clay	UNDFND	UNDFD	7	.7
14.50	48	17.61	0.42	2.37	1.49	clayey silt to silty clay	UNDFND	UNDFD	8	.9
14.80	49	31.18	0.48	1.54	1.51	sandy silt to clayey silt	UNDFND	UNDFD	12	1.8
15.10	50	48.79	1.22	2.50	1.54	sandy silt to clayey silt	UNDFND	UNDFD	19	3.0
15.50	51	157.56	1.67	1.06	1.57	sand to silty sand	70-80	40-42	38	UNDEFINED
15.80	52	150.63	1.17	0.77	1.60	sand	70-80	40-42	29	UNDEFINED
16.10	53	22.90	0.52	2.27	1.62	sandy silt to clayey silt	UNDFND	UNDFD	9	1.3
16.40	54	19.12	0.26	1.38	1.65	sandy silt to clayey silt	UNDFND	UNDFD	7	1.0
16.70	55	24.96	0.57	2.28	1.68	sandy silt to clayey silt	UNDFND	UNDFD	10	1.4
17.00	56	30.80	1.10	3.58	1.70	clayey silt to silty clay	UNDFND	UNDFD	15	1.8
17.30	57	72.63	1.20	1.65	1.73	silty sand to sandy silt	40-50	36-38	23	UNDEFINED
17.60	58	134.04	1.50	1.12	1.75	sand to silty sand	60-70	38-40	32	UNDEFINED
17.90	59	58.25	1.03	1.77	1.78	silty sand to sandy silt	40-50	34-36	19	UNDEFINED
18.20	60	47.84	1.12	2.34	1.81	sandy silt to clayey silt	UNDFND	UNDFD	18	2.9
18.50	61	222.47	2.26	1.01	1.83	sand	80-90	40-42	43	UNDEFINED
18.80	62	386.29	1.69	0.44	1.86	gravelly sand to sand	>90	44-46	>50	UNDEFINED
19.10	63	337.19	1.54	0.46	1.88	gravelly sand to sand	>90	42-44	>50	UNDEFINED
19.40	64	327.25	3.35	1.02	1.91	sand	>90	42-44	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****



CPT B-318C	Playa Vista Site De
GROUP DELTA CONSULTANTS, INC.	Fs, Qc, AND FRICTION RATIO vs DEPTH

GROUP DELTA CONSULTANTS

CPT Date :11-03-98
Cone Used :**CPT B-318C**
Depth to water table (ft) : 8

Job No. L196 Playa Vista
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.20	1	52.66	0.29	0.54	0.02	sand to silty sand	>90	>48	13	UNDEFINED
0.50	2	85.88	1.35	1.57	0.07	silty sand to sandy silt	>90	>48	27	UNDEFINED
0.80	3	114.75	2.14	1.87	0.12	silty sand to sandy silt	>90	>48	37	UNDEFINED
1.10	4	84.76	2.35	2.77	0.18	sandy silt to clayey silt	UNDFND	UNDFD	32	5.6
1.40	5	63.30	1.48	2.34	0.24	sandy silt to clayey silt	UNDFND	UNDFD	24	4.2
1.70	6	30.44	1.27	4.16	0.29	silty clay to clay	UNDFND	UNDFD	19	2.0
2.00	7	24.73	0.99	3.99	0.35	silty clay to clay	UNDFND	UNDFD	16	1.6
2.30	8	17.23	0.68	3.97	0.41	silty clay to clay	UNDFND	UNDFD	11	1.1
2.70	9	11.85	0.63	5.27	0.47	clay	UNDFND	UNDFD	11	.7
3.00	10	8.88	0.38	4.24	0.50	clay	UNDFND	UNDFD	9	.5
3.30	11	6.76	0.12	1.73	0.52	silty clay to clay	UNDFND	UNDFD	4	.4
3.60	12	7.33	0.26	3.50	0.55	clay	UNDFND	UNDFD	7	.4
3.90	13	18.14	0.35	1.93	0.57	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
4.20	14	37.58	0.35	0.92	0.60	silty sand to sandy silt	40-50	38-40	12	UNDEFINED
4.50	15	23.32	0.52	2.22	0.62	sandy silt to clayey silt	UNDFND	UNDFD	9	1.5
4.80	16	12.60	0.23	1.80	0.65	clayey silt to silty clay	UNDFND	UNDFD	6	.7
5.10	17	5.80	0.08	1.32	0.68	sensitive fine grained	UNDFND	UNDFD	3	.3
5.40	18	11.56	0.26	2.25	0.70	clayey silt to silty clay	UNDFND	UNDFD	6	.7
5.70	19	8.33	0.18	2.12	0.73	silty clay to clay	UNDFND	UNDFD	5	.4
6.00	20	6.39	0.09	1.46	0.75	sensitive fine grained	UNDFND	UNDFD	3	.3
6.30	21	5.48	0.04	0.67	0.78	sensitive fine grained	UNDFND	UNDFD	3	.2
6.60	22	8.88	0.11	1.20	0.81	clayey silt to silty clay	UNDFND	UNDFD	4	.5
6.90	23	12.15	0.11	0.88	0.83	sandy silt to clayey silt	UNDFND	UNDFD	5	.7
7.20	24	7.67	0.06	0.74	0.86	sensitive fine grained	UNDFND	UNDFD	4	.4
7.50	25	8.79	0.09	1.02	0.88	clayey silt to silty clay	UNDFND	UNDFD	4	.4
7.80	26	8.35	0.21	2.48	0.91	silty clay to clay	UNDFND	UNDFD	5	.4
8.10	27	11.05	0.34	3.11	0.94	silty clay to clay	UNDFND	UNDFD	7	.6
8.40	28	14.36	0.67	4.69	0.96	clay	UNDFND	UNDFD	14	.8
8.70	29	20.03	0.97	4.83	0.99	clay	UNDFND	UNDFD	19	1.2
9.10	30	12.01	0.30	2.46	1.02	clayey silt to silty clay	UNDFND	UNDFD	6	.6
9.40	31	8.77	0.29	3.27	1.05	clay	UNDFND	UNDFD	8	.4
9.70	32	7.27	0.27	3.67	1.07	clay	UNDFND	UNDFD	7	.3
10.00	33	10.45	0.29	2.74	1.10	silty clay to clay	UNDFND	UNDFD	7	.5
10.30	34	14.57	0.48	3.27	1.12	silty clay to clay	UNDFND	UNDFD	9	.8
10.60	35	19.95	0.39	1.96	1.15	sandy silt to clayey silt	UNDFND	UNDFD	8	1.1
10.90	36	12.49	0.31	2.46	1.18	clayey silt to silty clay	UNDFND	UNDFD	6	.6
11.20	37	13.78	0.52	3.75	1.20	silty clay to clay	UNDFND	UNDFD	9	.7
11.50	38	23.66	0.63	2.66	1.23	clayey silt to silty clay	UNDFND	UNDFD	11	1.4

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

GROUP DELTA CONSULTANTS

CPT Date :11-03-98
Cone Used :**CPT B-318C**
Depth to water table (ft) : 8

Job No. L196 Playa Vista
Tot. Unit Wt. (avg) : 115 pcf

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
11.80	39	16.87	0.30	1.76	1.25	clayey silt to silty clay	UNDFND	UNDFD	8	.9
12.10	40	11.11	0.13	1.20	1.28	clayey silt to silty clay	UNDFND	UNDFD	5	.5
12.40	41	15.42	0.22	1.45	1.31	sandy silt to clayey silt	UNDFND	UNDFD	6	.8
12.70	42	10.81	0.21	1.91	1.33	clayey silt to silty clay	UNDFND	UNDFD	5	.5
13.00	43	10.26	0.21	2.08	1.36	clayey silt to silty clay	UNDFND	UNDFD	5	.5
13.30	44	10.28	0.13	1.26	1.38	clayey silt to silty clay	UNDFND	UNDFD	5	.5
13.60	45	13.51	0.34	2.49	1.41	clayey silt to silty clay	UNDFND	UNDFD	6	.7
13.90	46	14.29	0.30	2.10	1.43	clayey silt to silty clay	UNDFND	UNDFD	7	.7
14.20	47	12.64	0.22	1.74	1.46	clayey silt to silty clay	UNDFND	UNDFD	6	.6
14.50	48	14.53	0.23	1.56	1.49	clayey silt to silty clay	UNDFND	UNDFD	7	.7
14.80	49	14.72	0.32	2.17	1.51	clayey silt to silty clay	UNDFND	UNDFD	7	.7
15.10	50	13.96	0.24	1.72	1.54	clayey silt to silty clay	UNDFND	UNDFD	7	.7
15.50	51	21.79	0.52	2.40	1.57	clayey silt to silty clay	UNDFND	UNDFD	10	1.2
15.80	52	82.67	0.74	0.89	1.60	sand to silty sand	50-60	36-38	20	UNDEFINED
16.10	53	19.69	0.55	2.79	1.62	clayey silt to silty clay	UNDFND	UNDFD	9	1.1
16.40	54	13.53	0.25	1.82	1.65	clayey silt to silty clay	UNDFND	UNDFD	6	.6
16.70	55	14.70	0.28	1.90	1.68	clayey silt to silty clay	UNDFND	UNDFD	7	.7
17.00	56	27.61	0.67	2.44	1.70	sandy silt to clayey silt	UNDFND	UNDFD	11	1.6
17.30	57	28.17	0.81	2.86	1.73	clayey silt to silty clay	UNDFND	UNDFD	13	1.6
17.60	58	84.48	1.14	1.35	1.75	silty sand to sandy silt	50-60	36-38	27	UNDEFINED
17.90	59	128.56	2.01	1.57	1.78	sand to silty sand	60-70	38-40	31	UNDEFINED
18.20	60	235.45	1.98	0.84	1.81	sand	80-90	42-44	45	UNDEFINED
18.50	61	444.03	2.56	0.58	1.83	gravelly sand to sand	>90	44-46	>50	UNDEFINED
18.80	62	435.12	2.46	0.56	1.86	gravelly sand to sand	>90	44-46	>50	UNDEFINED
19.10	63	469.12	2.23	0.47	1.88	gravelly sand to sand	>90	44-46	>50	UNDEFINED
19.40	64	501.82	1.99	0.40	1.91	gravelly sand to sand	>90	44-46	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 15

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.04) ****

APPENDIX A

EXISTING FIELD DATA (Pacific Soils Engineering, 1998)

GEOTECHNICAL BORING LOG

PROJECT NO. 500464
DATE STARTED 12/5/97
DATE FINISHED 12/5/97
DRILLER 2R DRILLING
TYPE OF DRILL RIG 8" HOLLOWSTEM

PROJECT NAME Playa Vista
GROUND ELEV. 16 +
GW DEPTH (FT) 14.00
DRIVE WT. 140 lbs.
DROP 30"

BORING DESIG. B-01
LOGGED BY DO
NOTE

DEPTH (Feet)	ELEV	SAMPLE TYPE	SAMPLE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
							FILL (Af): SILTY CLAY, dark brown and CLAYEY SILT, medium brown, damp, medium stiff				
5		R		6/18/25				19.9	103	85	
							ALLUVIUM (Qal): SILTY CLAY, trace very fine sand, damp to moist, plastic at in situ moisture, medium stiff				
10		R		9/13/19			SILTY SAND, orange brown, fine to coarse, traces fine to coarse gravel, damp, medium dense	17.1	108	82	
							SILTY CLAY, black, damp to moist, medium stiff	17.9	112	96	
15		R		3/5/7		SM/ML	Fine-grained SANDY SILT to SILTY SAND, light gray, moist, medium dense, slightly micaceous	30.8	88	90	DS HY
							SILTY CLAY, dark gray, moist to wet, medium stiff				
20		R		2/3/4				49.2	73	98	
25		R		3/4/10		ML	SANDY SILT, dark gray-brown, moist, medium stiff, trace old rootlets and pin size pores, aqua coloring	19.9	106	91	CON HY
30		R		6/9/17			CLAYEY Fine to Coarse-Grained SAND, and fine to coarse gravel, wet, medium dense to dense, trace cobbles	10.2	95	36	
35		R		6/8/12			SILT, with traces of CLAY, dark gray-brown, moist to wet, medium stiff to stiff, traces of mica	30.0	93	99	

SAMPLE TYPES:
[R] RING (DRIVE) SAMPLE
[S] SPT (SPLIT SPOON) SAMPLE
[B] BULK SAMPLE [T] TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-1

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GEOTECHNICAL BORING LOG

PROJECT NO.	500464	PROJECT NAME	Playa Vista		
DATE STARTED	12/5/97	GROUND ELEV.	16 +	BORING DESIG.	B-01
DATE FINISHED	12/5/97	GW DEPTH (FT)	14.00	LOGGED BY	DO
DRILLER	2R DRILLING	DRIVE WT.	140 lbs.	NOTE	
TYPE OF DRILL RIG	8" HOLLOWSTEM	DROP	30"		

DEPTH (Feet)	ELEV	SAMPLE TYPE	SAMPLE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
		R		3/5/7		ML	CLAYEY SILT, dark gray, moist to wet, medium stiff to stiff, plastic with dark brown mottling, interbedded with fine-grained SANDY SILT, wet	33.4	89	99	CON HY
45		R		6/7/7				47.0	77	98	
							CLAYEY SILT, dark gray, wet, medium stiff to stiff, micaceous				
50		R		6/8/12				33.7	88	100	
							gravel				
55		R		17/ 50 for 4"			PLEISTOCENE SAND (Ps): Fine to Medium-Grained SAND, gray, wet, dense, with some coarse SAND, fine gravel	13.9	120	93	
60		R		51 for 6"			Becomes coarser with depth, fine to coarse-grained SAND and fine to coarse GRAVEL.	13.0	117	81	
65		R		20/33 50 for 4"			Encountered piece of cobble	26.3	97	97	
70		R		20/ 50 for 4"				24.5	100	96	
							Total Depth 71 feet Groundwater encountered at about 14 feet				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-1

A-67

GEOTECHNICAL BORING LOG

PROJECT NO. 500464
DATE STARTED 12/9/97
DATE FINISHED 12/9/97
DRILLER 2R DRILLING
TYPE OF DRILL RIG 8" HOLLOWSTEM

PROJECT NAME Playa Vista
GROUND ELEV. 16+
GW DEPTH (FT) 15.00
DRIVE WT. 140 lbs.
DROP 30"

BORING DESIG. B-02
LOGGED BY DO
NOTE

DEPTH (Feet)	ELEV	SAMPLE TYPE	SAMPLE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
		B				SC	**FILL (Af):** Fine-Grained SANDY CLAY, brown, damp, medium stiff, with some coarse SAND and fine gravel				MAX DSR EI HY
5		R		4/7/14			@5' cobble encountered	14.3	118	91	
							SILTY Fine-Grained SAND, orange brown, damp, medium dense				
10		R		8/9/13			**ALLUVIUM (Qal):** SILTY CLAY, black, damp, medium stiff	19.7	107	93	
15		R		3/4/6			Fine-Grained SANDY SILT, damp to moist, medium dense, micaceous	42.5	79	99	
							SILTY CLAY, aqua blue, moist, medium stiff, plastic				
20		R		1/2/4		CL	@ 20' wet sample	33.5	90	100	DS
							Coarse to Fine-Grained SAND, black gray, moist to wet, medium dense				
25		R		4/5/7			SILTY CLAY, dark brown, moist to wet, stiff, plastic	24.7	100	98	
							Water measured at 27 feet and 3 inches during drilling				
30		R		2/4/7		ML	SILTY CLAY to CLAYEY SILT, black brown	29.9	94	99	CON HY
35		R		6/6/11							

SAMPLE TYPES:
[R] RING (DRIVE) SAMPLE
[S] SPT (SPLIT SPOON) SAMPLE
[B] BULK SAMPLE [T] TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-2

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GEOTECHNICAL BORING LOG

PROJECT NO. 500464
DATE STARTED 12/9/97
DATE FINISHED 12/9/97
DRILLER 2R DRILLING
TYPE OF DRILL RIG 8" HOLLOWSTEM

PROJECT NAME Playa Vista
GROUND ELEV. 16 +
GW DEPTH (FT) 15.00
DRIVE WT. 140 lbs.
DROP 30"

BORING DESIG. B-02
LOGGED BY DO
NOTE

DEPTH (Feet)	ELEV	SAMPLE TYPE	SAMPLE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
		R		3/7/8			CLAYEY SILT with some fine-grained SAND, dark brown, wet, micaceous	27.7	98	99	
45		R		5/9/16			CLAYEY Coarse-Grained SAND with gravel, black brown, wet, medium dense	27.8	95	97	
50		R		6/7/15			Fine to Medium-Grained SAND, black brown, wet, medium dense	26.6	97	98	
55		R		7/13/30			PLEISTOCENE SAND (Ps): Fine-Grained SILTY SAND, with fine to coarse gravel, dark gray, wet, medium dense to dense, gravel encountered 55 to 60 feet	26.0	102	89	
60		R		11/15/40			Fine to Coarse-Grained SAND, with fine to coarse gravel, gray, wet, dense	12.0	129	99	
65		R		16/50 for 6"			Same as 60' with fine cobbles	8.0	133	80	
70		R		40/50 for 5"				10.5	131	98	
							Total Depth 71 feet Groundwater encountered at about 15 feet				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-2

GEOTECHNICAL BORING LOG

PROJECT NO.	500464	PROJECT NAME	Playa Vista		
DATE STARTED	12/9/97	GROUND ELEV.	16 +	BORING DESIG.	B-03
DATE FINISHED	12/9/97	GW DEPTH (FT)	15.00	LOGGED BY	DO
DRILLER	2R DRILLING	DRIVE WT.	140 lbs.	NOTE	
TYPE OF DRILL RIG	8" HOLLOWSTEM	DROP	30"		

DEPTH (Feet)	ELEV	SAMPLE TYPE	SAMPLE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
							FILL (Af): Medium to Coarse-Grained SANDY CLAY, brown, damp, medium stiff, also fine gravel				
5		R		20/19/20			Occasional cobbles	7.3	123	54	
10		R		9/11/17			**ALLUVIUM (Qal):** SILTY CLAY, black, damp, medium stiff	21.7	106	98	
15		R		6/6/8		ML	CLAYEY SAND, gray-brown, damp, medium dense	32.8	90	99	HY
20		R		1/1/2		CL	Water on sampler	48.5	73	100	CON HY
							SILTY CLAY, gray-brown, wet, stiff, roots				
25		R		2/2/4			SILTY CLAY, black, moist to wet, stiff	38.5	81	97	CHEM
30		R		3/6/7			CLAYEY SILT, black, moist to wet, moderately firm	27.1	98	98	
35		R		7/7/7		ML	Medium-Grained SANDY SILT, gray-brown, wet, medium dense	25.0	101	99	DS

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-3

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GEOTECHNICAL BORING LOG

PROJECT NO.	500464	PROJECT NAME	Playa Vista		
DATE STARTED	12/9/97	GROUND ELEV.	16 +	BORING DESIG.	B-03
DATE FINISHED	12/9/97	GW DEPTH (FT)	15.00	LOGGED BY	DO
DRILLER	2R DRILLING	DRIVE WT.	140 lbs.	NOTE	
TYPE OF DRILL RIG	8" HOLLOWSTEM	DROP	30"		

DEPTH (Feet)	ELEV	SAMPLE TYPE	SAMPLE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
		R		3/4/7		SP	CLAYEY Coarse-Grained SAND, with gravel, black brown, wet, medium dense	11.9	101	49	CON HY
45		R		4/9/11			CLAYEY SILT with sand, black brown, wet, medium dense	34.5	87	99	
50		R		5/7/10			SILTY Medium to Fine-Grained SAND, gray-black, wet, medium dense	28.9	95	100	
55		R		4/9/12			CLAYEY SILT, gray-brown, moist to wet, firm, micaceous	22.0	106	100	
60		R		11/31/50 for 5"			PLEISTOCENE SAND (Ps): Medium to Coarse-Grained GRAVELLY SAND, gray-brown, wet, medium dense	20.6	103	87	
65		R		14/50 for 3"		SP	Increase in gravel size with occasional cobbles	16.5	117	99	CON HY
70		R		16/50 for 5"			Medium to Fine-Grained SAND, gray-brown, wet, medium dense, micaceous	23.7	104	99	
							Total Depth 71 feet Groundwater encountered at about 15 feet				

SAMPLE TYPES:
[R] RING (DRIVE) SAMPLE
[S] SPT (SPLIT SPOON) SAMPLE
[B] BULK SAMPLE [T] TUBE SAMPLE

GROUNDWATER
SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-3

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GEOTECHNICAL BORING LOG

PROJECT NO. 500464
DATE STARTED 12/9/97
DATE FINISHED 12/9/97
DRILLER 2R DRILLING
TYPE OF DRILL RIG 8"HOLLOWSTEM

PROJECT NAME Playa Vista
GROUND ELEV. 16 +
GW DEPTH (FT) 10.00
DRIVE WT. 140 lbs.
DROP 30"

BORING DESIG. B-04
LOGGED BY DO
NOTE

DEPTH (Feet)	ELEV	SAMPLE TYPE	SAMPLE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
							ALLUVIUM (Qal): CLAYEY SAND, medium to coarse, dark brown, moist, medium dense, some gravel to 3/4" subrounded				
5		R		12/12/7			CLAYEY SAND, medium to coarse with gravel, brown, damp, medium dense, occasional cobble	9.9	120	66	
10		R		15/7/8		CL	SANDY CLAY, medium grained, gray-brown, damp, medium stiff	27.8	95	97	DS HY
15		R		4/5/8			SILTY SAND, medium to fine grained, gray-brown, damp, medium dense	33.3	89	98	
20		R		3/4/6			SANDY SILT, fine grained, gray-brown, damp to moist, firm	40.4	80	98	
25		R		2/1/2		ML	CLAYEY SILT, black-brown, moist, stiff, some shells	32.3	93	99	CON HY
30		R		5/4/12			No Recovery				
35		R		4/7/7			SILTY CLAY, gray-brown, moist, moderately firm	37.3	84	100	

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-4

A-72

GEOTECHNICAL BORING LOG

PROJECT NO.	500464	PROJECT NAME	Playa Vista		
DATE STARTED	12/9/97	GROUND ELEV.	16 +	BORING DESIG.	B-04
DATE FINISHED	12/9/97	GW DEPTH (FT)	10.00	LOGGED BY	DO
DRILLER	2R DRILLING	DRIVE WT.	140 lbs.	NOTE	
TYPE OF DRILL RIG	8"HOLLOWSTEM	DROP	30"		

DEPTH (Feet)	ELEV	SAMPLE TYPE	SAMPLE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
		R		3/3/4			SILTY CLAY, bluish gray-brown, moist, firm	35.2	88	98	CHEM
45		R		3/5/7		CL	same as above	38.0	83	99	DS
50		R		5/8/6			SILTY CLAY,with fine grained sand, blue gray-brown, moist to wet, firm	32.5	90	99	
55		R		4/4/6		ML	SILTY CLAY, black-brown, moist, firm with some fine SAND	41.8	81	99	CON HY
60		R		1/2/7			PLEISTOCENE SAND (Ps): SAND, medium grained, gray-brown, wet, medium dense	12.0	119	79	
65		R		50 for 3"		SP	same as above	23.1	103	99	DS HY
70		R		30/50			Coarse Grained SAND, gray-brown, wet, dense with gravel up to 1/2" subrounded	9.4	122	67	
							Total Depth 71 feet Groundwater encountered at about 10 feet				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER

SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-4

A-73

GEOTECHNICAL BORING LOG

PROJECT NO. 500464
DATE STARTED 12/10/97
DATE FINISHED 12/10/97
DRILLER 2R DRILLING
TYPE OF DRILL RIG 8" HOLLOWSTEM

PROJECT NAME Playa Vista
GROUND ELEV. 16 +
GW DEPTH (FT)
DRIVE WT. 140 lbs.
DROP 30"

BORING DESIG. B-05
LOGGED BY DO
NOTE

DEPTH (Feet)	ELEV	SAMPLE TYPE	SAMPLE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
							FILL (Af): SANDY CLAY, gravel, moist to wet, stiff				
5		R		6/14/12			CLAYEY SAND, coarse up to 1/4", black-brown, damp, stiff	9.9	119	65	
10		R		3/4/4			ALLUVIUM (Qal): SANDY CLAY, gray-brown, wet, soft	37.9	82	97	
15		R		3/3/4			SILTY SAND, fine grained, gray-brown, moist, soft	38.2	84	99	
20		R		1/1/1		CL	SILTY CLAY, gray-brown, wet, soft, odiferous, peat (?), micaceous	70.8	58	98	CON HY
25		R		2/1/2			SANDY CLAY, black brown, moist to wet, soft	26.6	87	77	
30		R		3/5/6			CLAYEY SILT, with fine sand, gray-brown, wet, firm	28.7	96	98	CHEM
35		R		3/3/4			SILTY fine SAND, with CLAY, blue-gray, wet, soft, micaceous	27.8	96	99	

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-5

A-74

GEOTECHNICAL BORING LOG

PROJECT NO. 500464
DATE STARTED 12/10/97
DATE FINISHED 12/10/97
DRILLER 2R DRILLING
TYPE OF DRILL RIG 8" HOLLOWSTEM

PROJECT NAME Playa Vista
GROUND ELEV. 16 +
GW DEPTH (FT)
DRIVE WT. 140 lbs.
DROP 30"

BORING DESIG. B-05
LOGGED BY DO
NOTE

DEPTH (Feet)	ELEV	SAMPLE TYPE	SAMPLE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
		R		4/4/8			CLAYEY SILT, blue-gray, moist to wet, firm, micaceous	32.0	92	99	
45		R		4/5/8			SILTY CLAY, blue-gray, wet, very firm, micaceous	36.5	85	99	
50		R		8/12/13			CLAY, blue-gray, wet, soft	33.3	89	100	
							1 foot layer of medium to fine SAND				
							CLAY, blue-gray, wet, soft				
55		R		3/4/6		ML	same with 1/8" root encountered	29.7	93	99	CON HY
60		R		5/19/30			PLEISTOCENE SAND (Ps): Fine to Coarse SAND, gray, wet, medium dense to dense, trace of silt, cobble fragments in tip 2 1/2"	19.6	116	99	
65		R		27/53			same with increase in grain size	9.0	139	98	
							Total Depth 66 feet Seepage at about 1 foot Possibly locally shallow perched groundwater				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-5

A-75

GEOTECHNICAL BORING LOG

PROJECT NO. 500464
DATE STARTED 12/10/97
DATE FINISHED 12/10/97
DRILLER 2R DRILLING
TYPE OF DRILL RIG 8" HOLLOWSTEM

PROJECT NAME Playa Vista
GROUND ELEV. 16 +
GW DEPTH (FT) 10.00
DRIVE WT. 140 lbs.
DROP 30"

BORING DESIG. B-06
LOGGED BY DO
NOTE

DEPTH (Feet)	SAMPLE TYPE	SAMPLE	BLOWS/FT	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
					FILL (Af): Medium SANDY CLAY, brown, damp, firm				
5	R		4/7/13		CLAYEY medium SAND, brown, damp, medium dense				
10	R		7/10/15		ALLUVIUM (Qal): SILTY CLAY with fine SAND, gray-brown, damp, firm	27.0	97	99	
15	R		3/6/10		SILTY fine SAND, brown, wet, loose to medium dense	30.7	95	98	
20	R		2/3/3		SANDY CLAY, gray-brown, moist to wet, soft	36.3	61	98	
25	R		3/4/7		same as above	20.7	106	95	
30	R		3/6/6	ML	SANDY SILT, gray-brown, moist to wet, soft	31.4	93	99	CON HY
					SILTY SAND, medium to coarse, gray-brown, moist to wet, dense				
35	R		3/9/15		same as above	23.4	103	99	
					SANDY CLAY, gray-brown, moist to wet, firm				

SAMPLE TYPES:
R RING (DRIVE) SAMPLE
S SPT (SPLIT SPOON) SAMPLE
B BULK SAMPLE T TUBE SAMPLE

GROUNDWATER
SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-6

A-76

GEOTECHNICAL BORING LOG

PROJECT NO. 500464
DATE STARTED 12/10/97
DATE FINISHED 12/10/97
DRILLER 2R DRILLING
TYPE OF DRILL RIG 8" HOLLOWSTEM

PROJECT NAME Playa Vista
GROUND ELEV. 16 +
GW DEPTH (FT) 10.00
DRIVE WT. 140 lbs.
DROP 30"

BORING DESIG. B-06
LOGGED BY DO
NOTE

DEPTH (Feet)	ELEV	SAMPLE TYPE	SAMPLE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
		R		3/5/8			SILTY CLAY, gray-brown, moist to wet, soft to firm, micaceous	29.4	97	99	
45		R		2/4/6		ML	CLAYEY SILT, black-brown, moist to wet, firm	33.6	79	80	CON HY
50		R		3/6/8			CLAYEY SAND, black-brown, wet, dense	28.3	96	98	
							SANDY CLAY, black-brown, moist to wet, firm				
55		R		4/5/12			Fine SANDY SILT, blue-gray, moist, firm, micaceous, 1/8" root	31.2	92	99	
60		R		3/7/10			CLAYEY Medium SAND, gray-brown, wet, dense, root 1/8", micaceous, occasional coarse sizes to 1/4"	25.2	100	99	
65		R		14/50			PLEISTOCENE SAND (Ps): Coarse SAND, gray-brown, wet, dense	15.0	119	98	
70		R		15/50 for 5"		SP	same	17.9	109	89	DS HY
							Total Depth 71 feet Groundwater encountered at about 10 feet				

SAMPLE TYPES:
[R] RING (DRIVE) SAMPLE
[S] SPT (SPLIT SPOON) SAMPLE
[B] BULK SAMPLE [T] TUBE SAMPLE

GROUNDWATER
SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-6

A-77

GEOTECHNICAL BORING LOG

PROJECT NO. 500464
DATE STARTED 12/10/97
DATE FINISHED 12/10/97
DRILLER 2R DRILLING
TYPE OF DRILL RIG 8" HOLLOWSTEM

PROJECT NAME Playa Vista
GROUND ELEV. 16 +
GW DEPTH (FT) 17.00
DRIVE WT. 140 lbs.
DROP 30"

BORING DESIG. B-07
LOGGED BY DO
NOTE

DEPTH (Feet)	SAMPLE TYPE	BLOWS/FT	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
			SC	FILL (Af): CLAYEY SAND, brown, damp, medium dense				MAX RV HY
5	R	6/8/13		SANDY CLAY, brown, damp, moderately firm, with gravel	15.1	111	78	
10	R	7/12/13		CLAY, some fine SAND, black, damp to moist, hard, micaceous, roots	24.3	100	96	
15	R	3/4/5		ALLUVIUM (Qal): SANDY SILT, black-brown, damp to moist, firm, micaceous ▼ water	32.4	90	99	
20	R	2/3/3		SILT with CLAY and SAND, greenish-gray, wet, firm	26.6	90	82	CHEM
25	R	2/5/4	ML	SANDY SILT, greenish gray, wet, firm	20.5	107	97	CON HY
30	R	3/5/5	ML	SANDY SILT, gray-brown, wet, firm	26.4	98	99	DS
35	R	1/2/4		No Recovery				

SAMPLE TYPES:
[R] RING (DRIVE) SAMPLE
[S] SPT (SPLIT SPOON) SAMPLE
[B] BULK SAMPLE [T] TUBE SAMPLE

▼ GROUNDWATER
► SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-7

A-78

GEOTECHNICAL BORING LOG

PROJECT NO.	500464	PROJECT NAME	Playa Vista		
DATE STARTED	12/10/97	GROUND ELEV.	16 +	BORING DESIG.	B-07
DATE FINISHED	12/10/97	GW DEPTH (FT)	17.00	LOGGED BY	DO
DRILLER	2R DRILLING	DRIVE WT.	140 lbs.	NOTE	
TYPE OF DRILL RIG	8" HOLLOWSTEM	DROP	30"		

DEPTH (Feet)	SAMPLE TYPE	SAMPLE	BLOWS/FT	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT. URATION (%)	OTHER TESTS
	R		6/7/12	SILTY medium to coarse SAND, gray-brown, wet, medium dense	19.8	110	99	
45	R		6/8/8	SILTY CLAY, blue-gray, moist to wet, soft to firm	23.5	99	90	
50	R		7/10/15	same as above	28.9	94	97	
55	R		6/8/10	CLAYEY SILT, blue-gray, moist to wet, firm, with roots	32.3	90	99	
60	R		12/20/30	PLEISTOCENE SAND (Ps): Coarse Grained SAND, blue-gray, wet, dense	17.7	112	95	
65	R		12/30/50 for 4"	same, 1 1/2" gravel in tip	15.5	116	93	
70	R		7/20/48	same	10.3	127	84	
				Total Depth 71 feet Groundwater encountered at about 17 feet				

SAMPLE TYPES:
- R RING (DRIVE) SAMPLE
- S SPT (SPLIT SPOON) SAMPLE
- B BULK SAMPLE
- T TUBE SAMPLE

GROUNDWATER

SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-7

GEOTECHNICAL BORING LOG

PROJECT NO. 500464
DATE STARTED 12/11/97
DATE FINISHED 12/11/97
DRILLER 2R DRILLING
TYPE OF DRILL RIG 8" HOLLOWSTEM

PROJECT NAME Playa Vista
GROUND ELEV. 16 +
GW DEPTH (FT) 15.00
DRIVE WT. 140 lbs.
DROP 30"

BORING DESIG. B-08
LOGGED BY DO
NOTE

DEPTH (Feet)	ELEV	SAMPLE TYPE	SAMPLE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
							FILL (Af): CLAYEY fine to coarse SAND, brown, damp, loose				
5		R		11/15/6			same but damp to moist, with cobble fragments	5.6	114	32	
10		R		6/9/19			SANDY CLAY, coarse, black-brown, damp, firm, micaceous 6 inch layer of SILTY SAND	15.5	116	92	
							water				
15		R		4/6/9			ALLUVIUM (Qal): CLAYEY SILT, with medium SAND, gray-blue, moist to wet, firm	35.2	88	99	
20		R		2/3/4		ML	same with roots and shells	41.5	71	82	CON HY
25		R		4/6/9			CLAYEY SILT with medium SAND, blue-gray, moist to wet, firm, micaceous	20.0	106	92	
							Coarse SAND, gray, wet				
30		R		5/5/8			SILTY CLAY, gray-brown, moist to wet, soft	28.5	95	100	CHEM
35		R		2/5/7			Fine SANDY CLAY, gray-brown, moist to wet, firm, roots	35.6	89	99	

SAMPLE TYPES:
[R] RING (DRIVE) SAMPLE
[S] SPT (SPLIT SPOON) SAMPLE
[B] BULK SAMPLE [T] TUBE SAMPLE

GROUNDWATER
SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-8

A-80

GEOTECHNICAL BORING LOG

PROJECT NO. 500464
DATE STARTED 12/11/97
DATE FINISHED 12/11/97
DRILLER 2R DRILLING
TYPE OF DRILL RIG 8" HOLLOWSTEM

PROJECT NAME Playa Vista
GROUND ELEV. 16 +
GW DEPTH (FT) 15.00
DRIVE WT. 140 lbs.
DROP 30"

BORING DESIG. B-08
LOGGED BY DO
NOTE

DEPTH (Feet)	ELEV	SAMPLE TYPE	SAMPLE	BLOWS/FT	LITHOLOGY	GROUP SYMBOL	GEOTECHNICAL DESCRIPTION	MOISTURE CONT (%)	DRY (pcf) DENSITY	SAT-URATION (%)	OTHER TESTS
		R		3/5/7		ML	CLAYEY SILT, aqua, moist to wet, firm, micaceous, roots	35.8	87	99	CON HY
45		R		5/8/7			CLAYEY SILT, gray-black, moist to wet, firm, micaceous	31.8	92	100	
50		R		4/7/11			CLAYEY SILT, gray, moist to wet, firm, roots	24.5	97	89	
55		R		4/5/8		ML		34.2	88	99	CON HY
60		R		6/8/12			CLAYEY SAND, coarse with subrounded gravel up to 1", moist to wet, dense	28.2	95	99	
65		R		10/50		SP	PLEISTOCENE SAND (Ps): Coarse SAND, gray, wet, dense	17.5	110	88	DS HY
70		R		11/50 for 5"			same with increase in grain size	23.7	101	97	
							Total Depth 71 feet Groundwater encountered at about 15 feet				

SAMPLE TYPES:
[R] RING (DRIVE) SAMPLE
[S] SPT (SPLIT SPOON) SAMPLE
[B] BULK SAMPLE [T] TUBE SAMPLE

GROUNDWATER
SEEPAGE

PACIFIC SOILS ENGINEERING, INC.

PLATE A-8

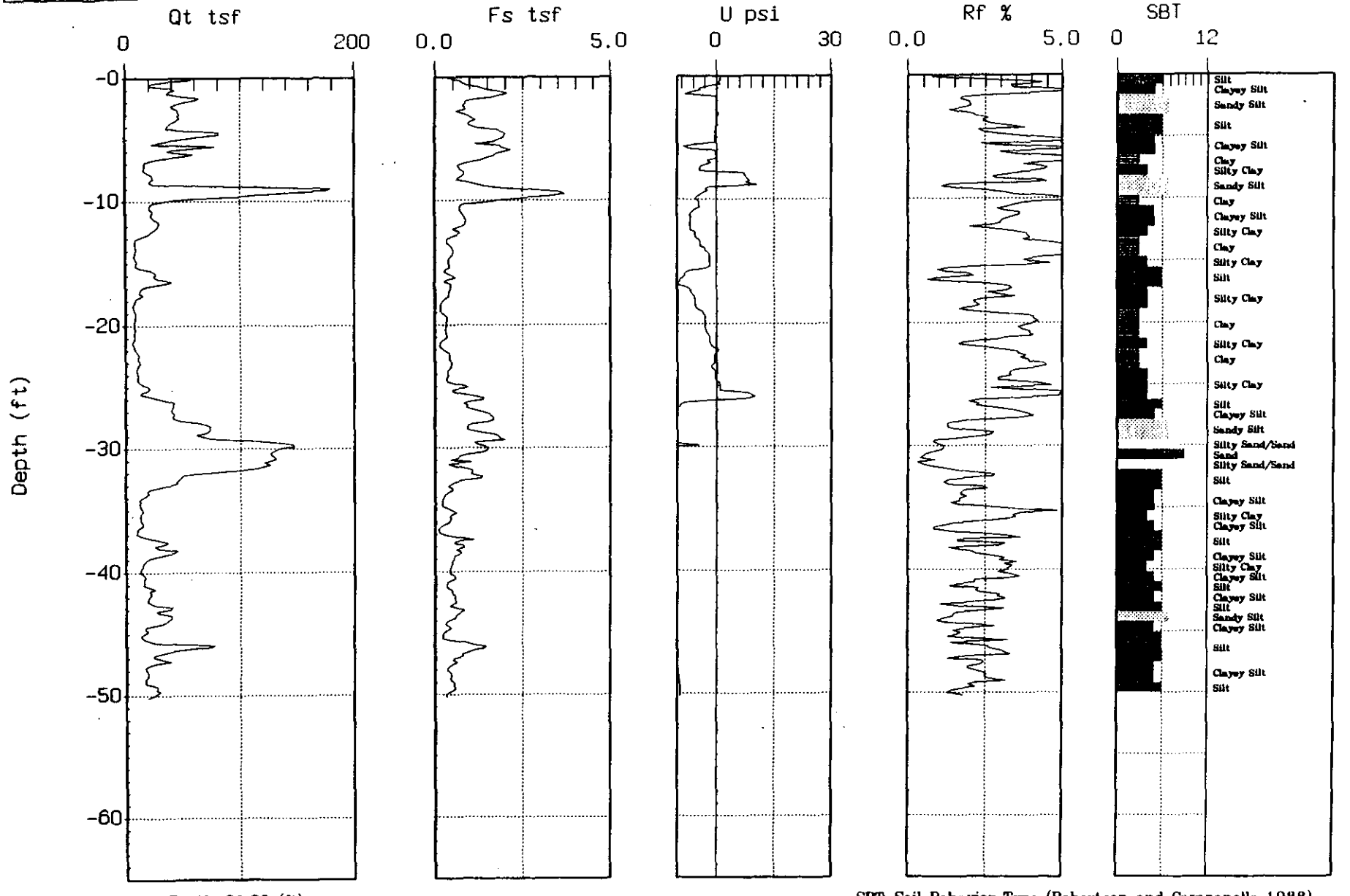
A-81

GREGG

PACIFIC SOILS

Site : PLAYA DEL REY
Location : CPT-1

Engineer : C. KROLL
Date : 12:10:97 06:48



Max. Depth: 50.20 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

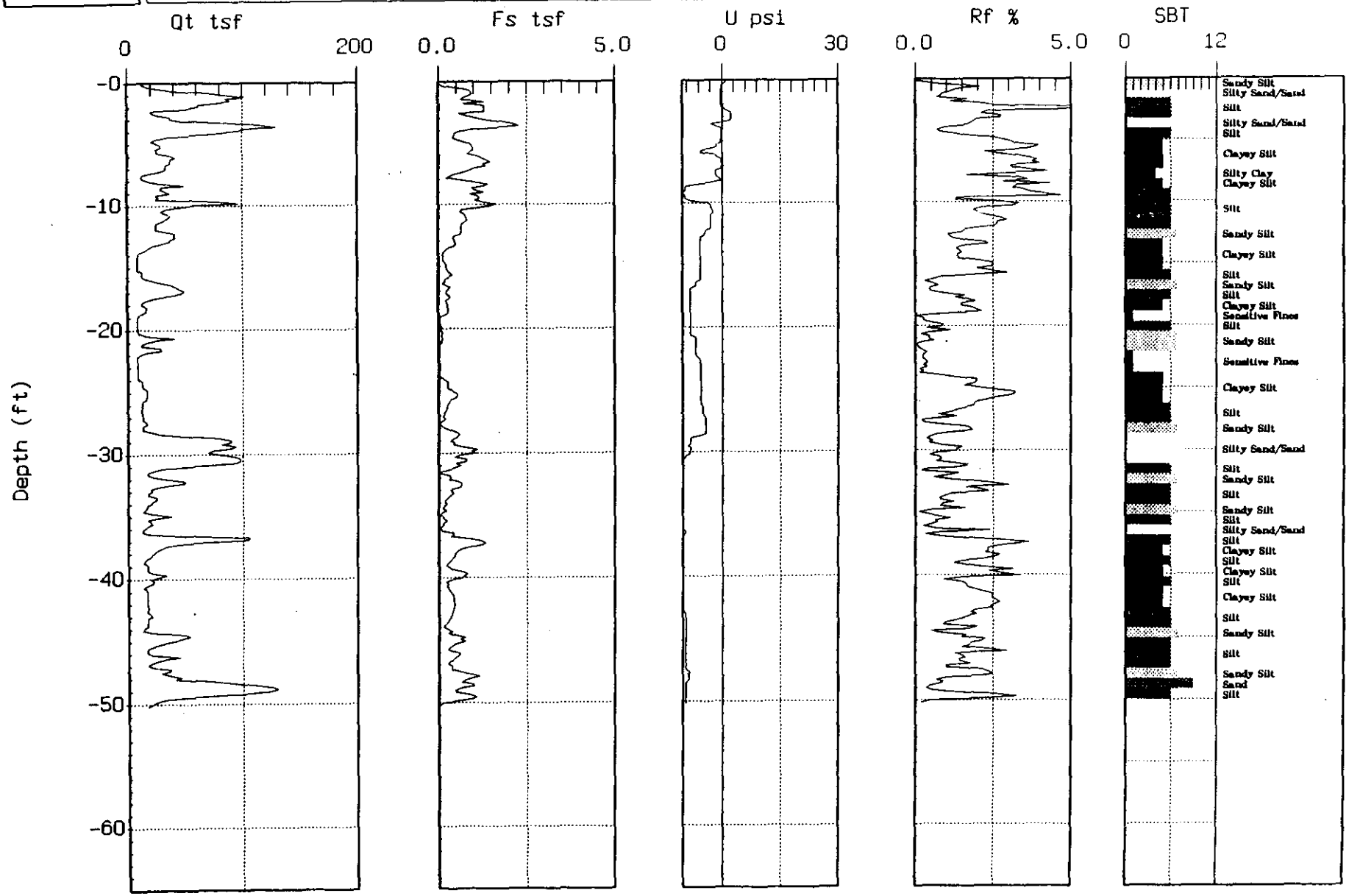
A-107

GREGG

PACIFIC SOILS

Site : PLAYA DEL REY
Location : CPT-2

Engineer : S. KROLL
Date : 12:10:97 09:11



Max. Depth: 50.20 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

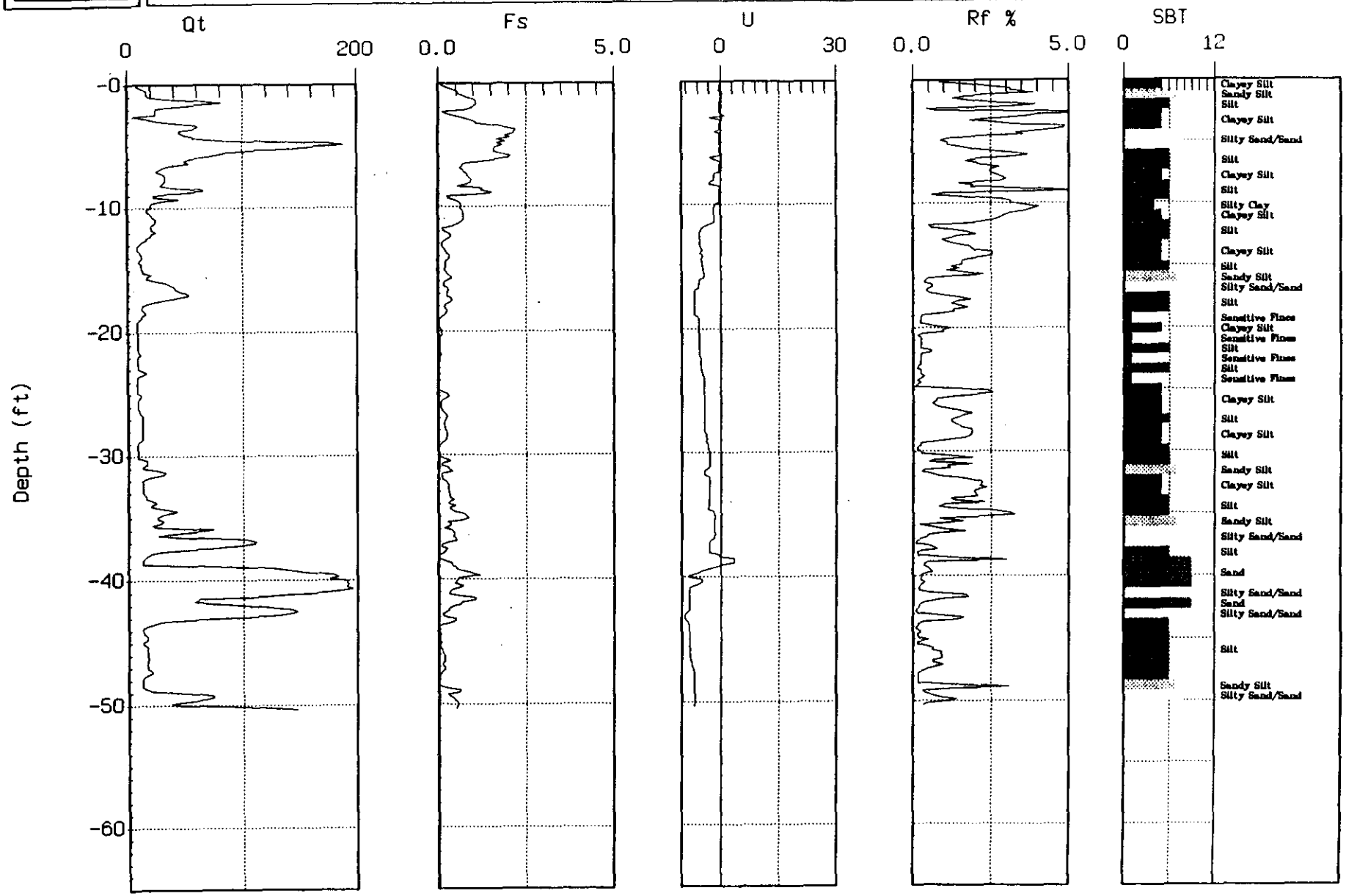
A-108

GREGG

PACIFIC SOILS

Site : PLAYA DEL REY
Location : CPT-3

Engineer : S.KROLL
Date : 12:10:97 09:52



Max. Depth: 50.36 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

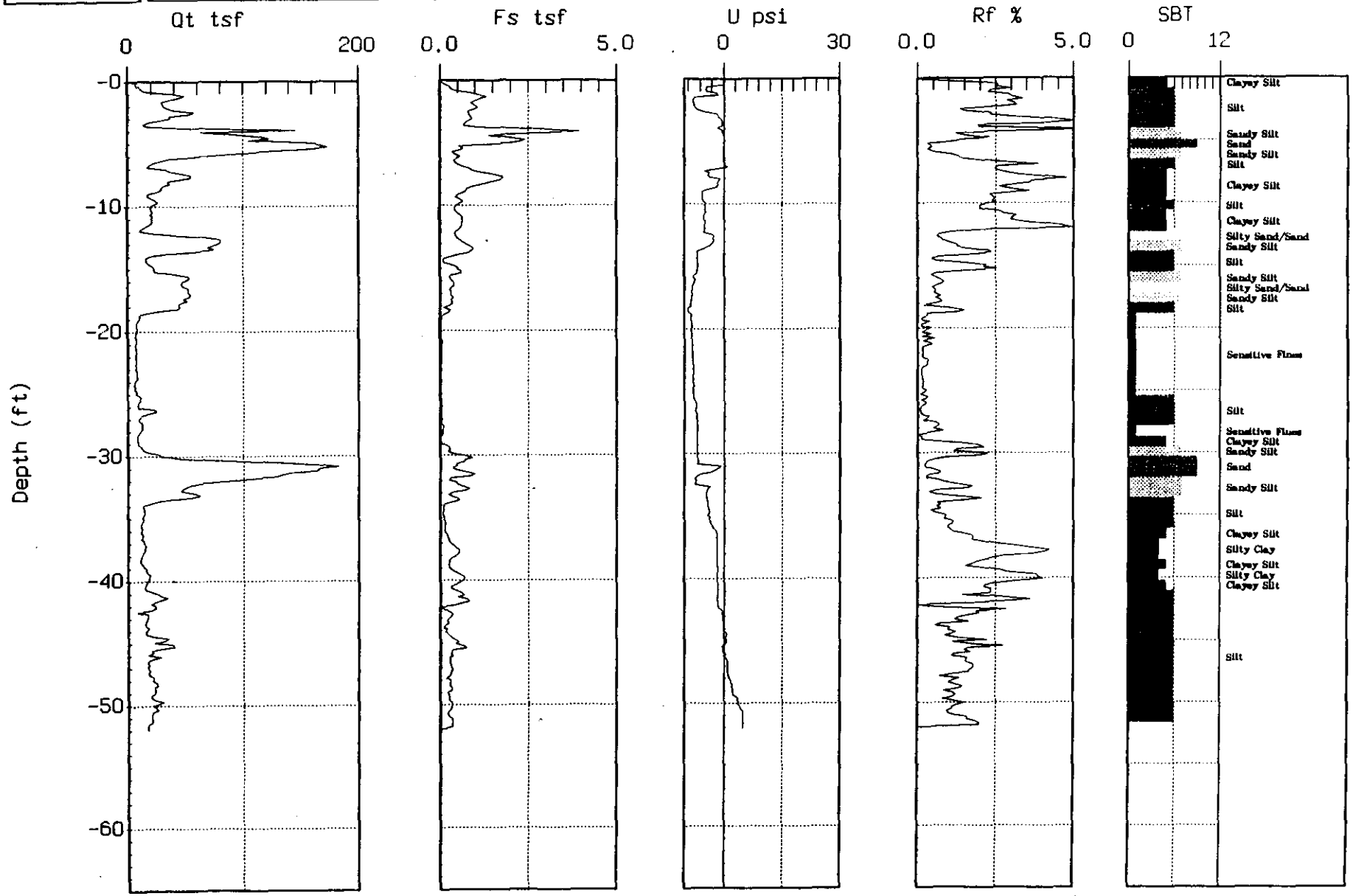
A-109

GREGG

PACIFIC SOILS

Site : PLAYA DEL REY
Location : CPT-4

Engineer : S. KROLL
Date : 12:10:97 10:48



Max. Depth: 52.00 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

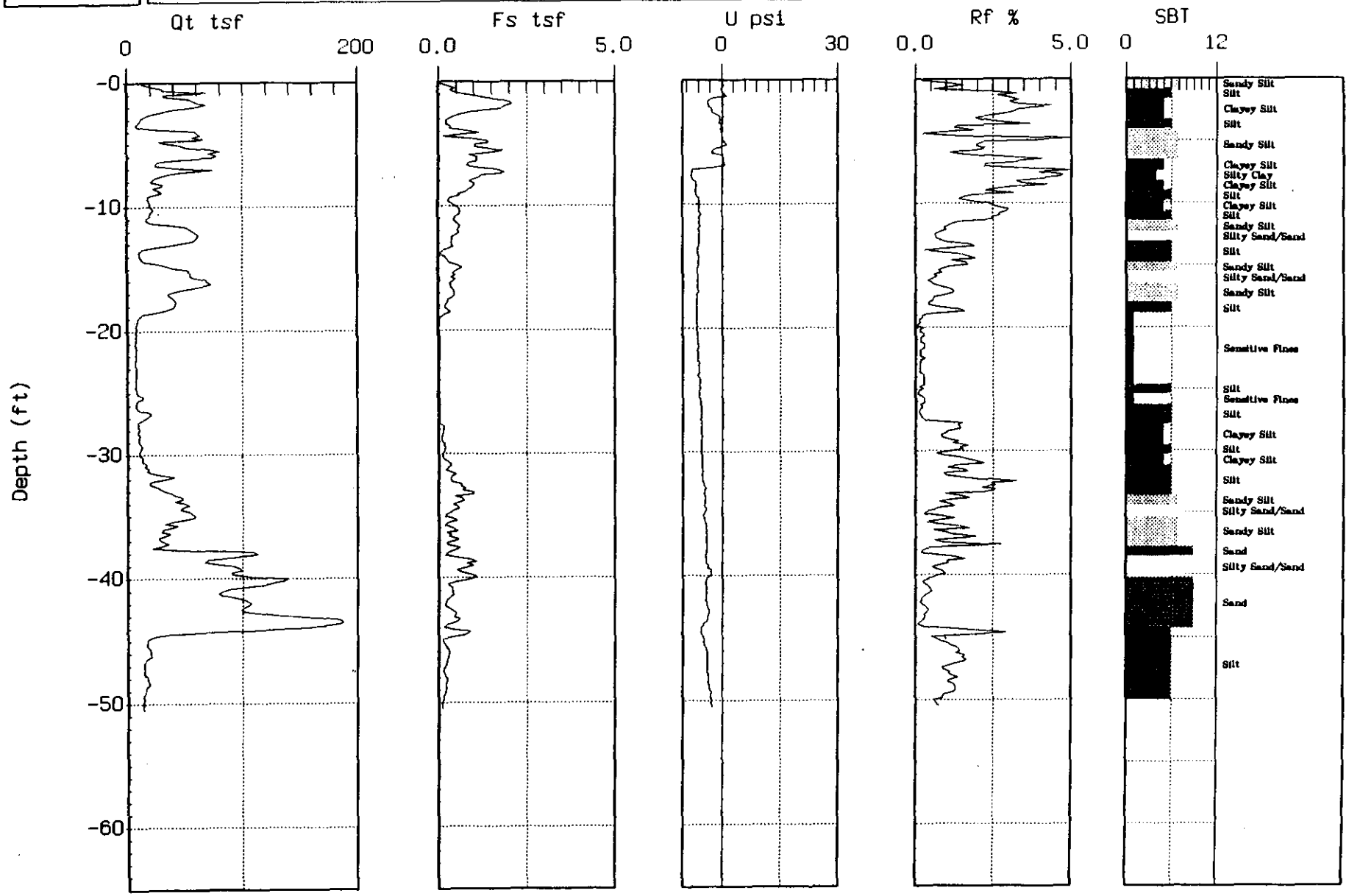
A-110

GREGG

PACIFIC SOILS

Site : PLAYA DEL REY
Location : CPT-5

Engineer : S. KROLL
Date : 12:10:97 12:09



Max. Depth: 50.52 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

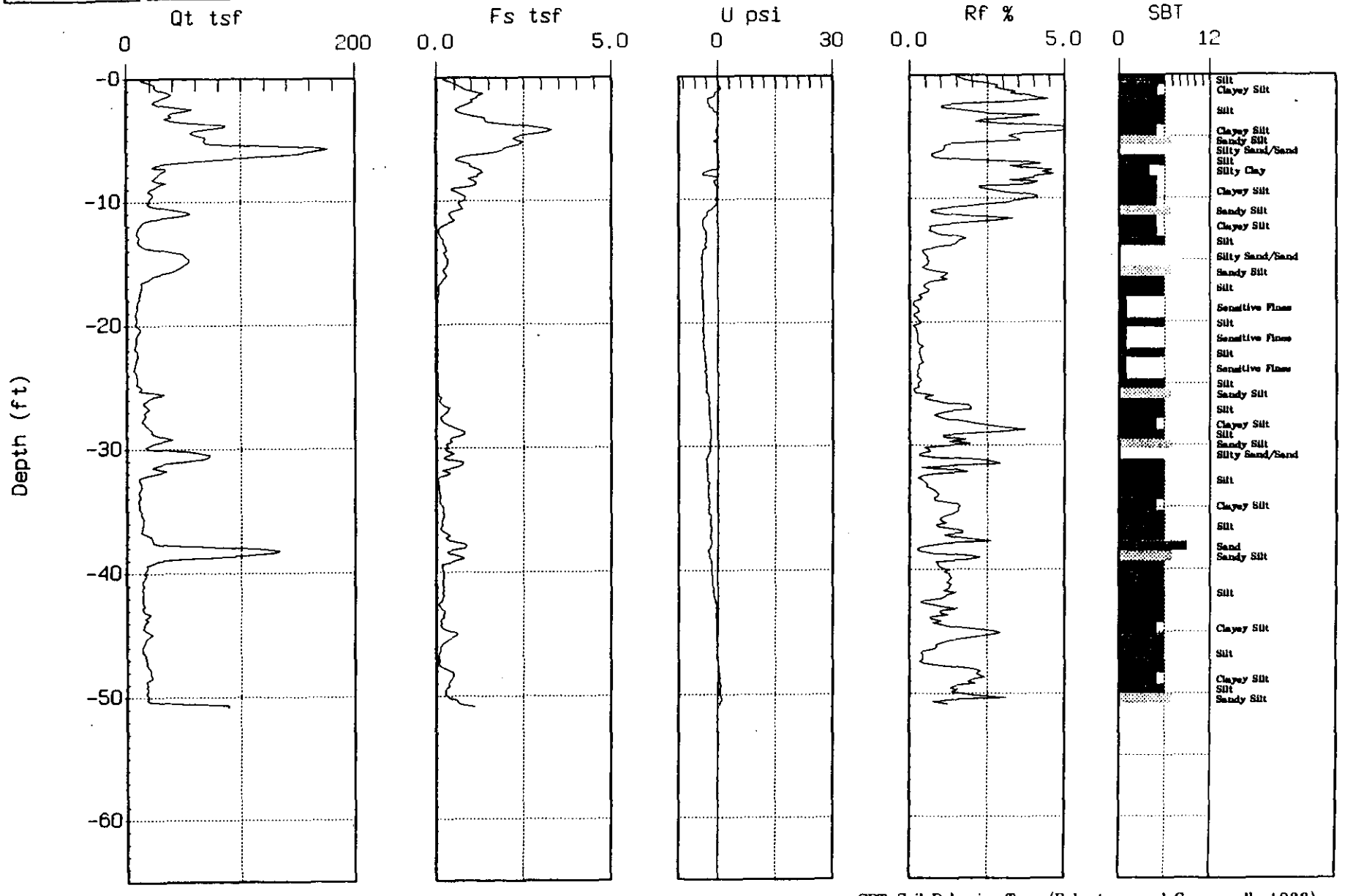
A-111

GREGG

PACIFIC SOILS

Site : PLAYA DEL REY
Location : CPT-6

Engineer : S. KROLL
Date : 12:10:97 12:37



Max. Depth: 50.85 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

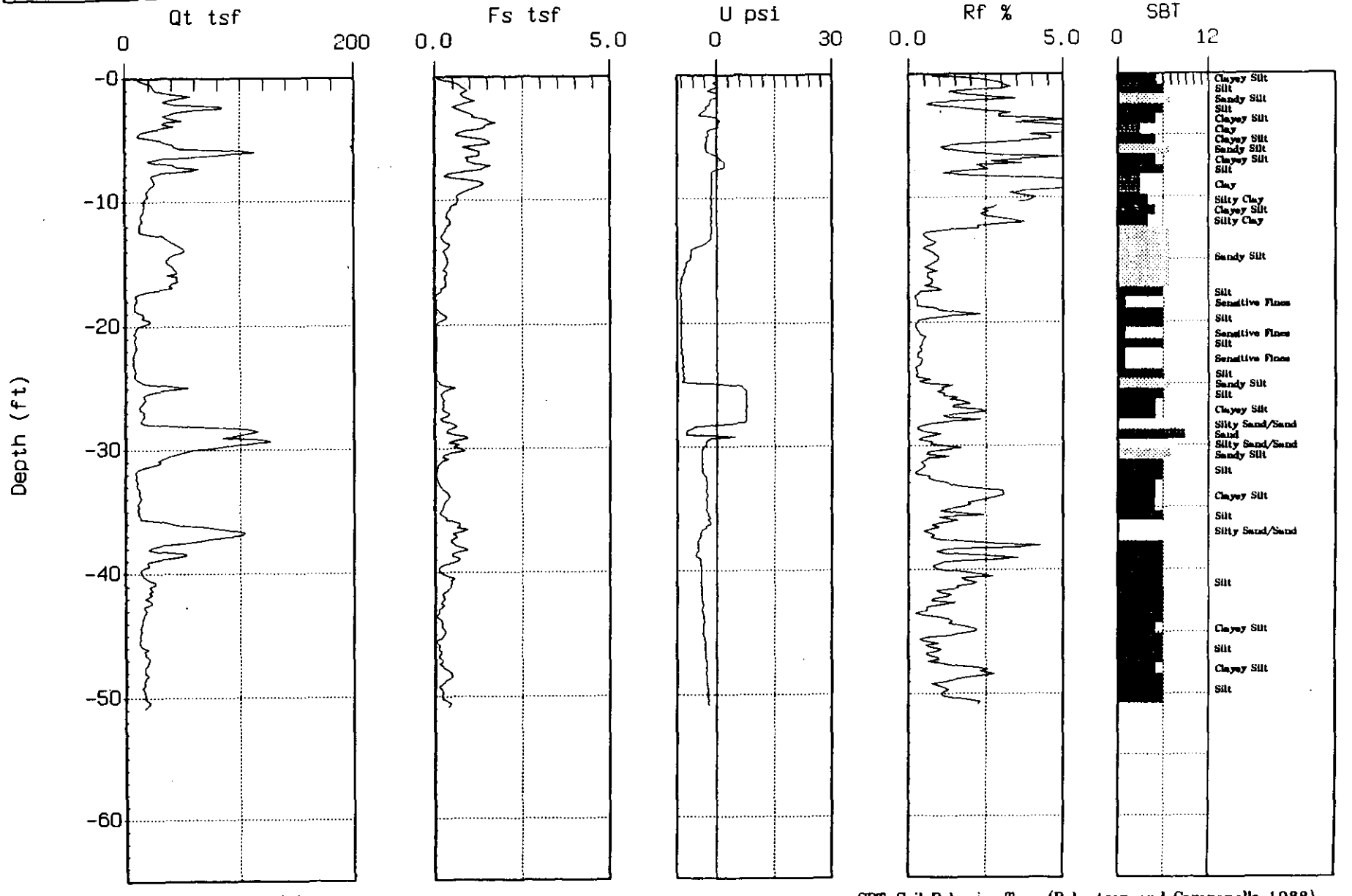
A-112

GREGG

PACIFIC SOILS

Site : PLAYA DEL REY
Location : CPT-7

Engineer : S. KROLL
Date : 12:10:97 13:04



Max. Depth: 50.85 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

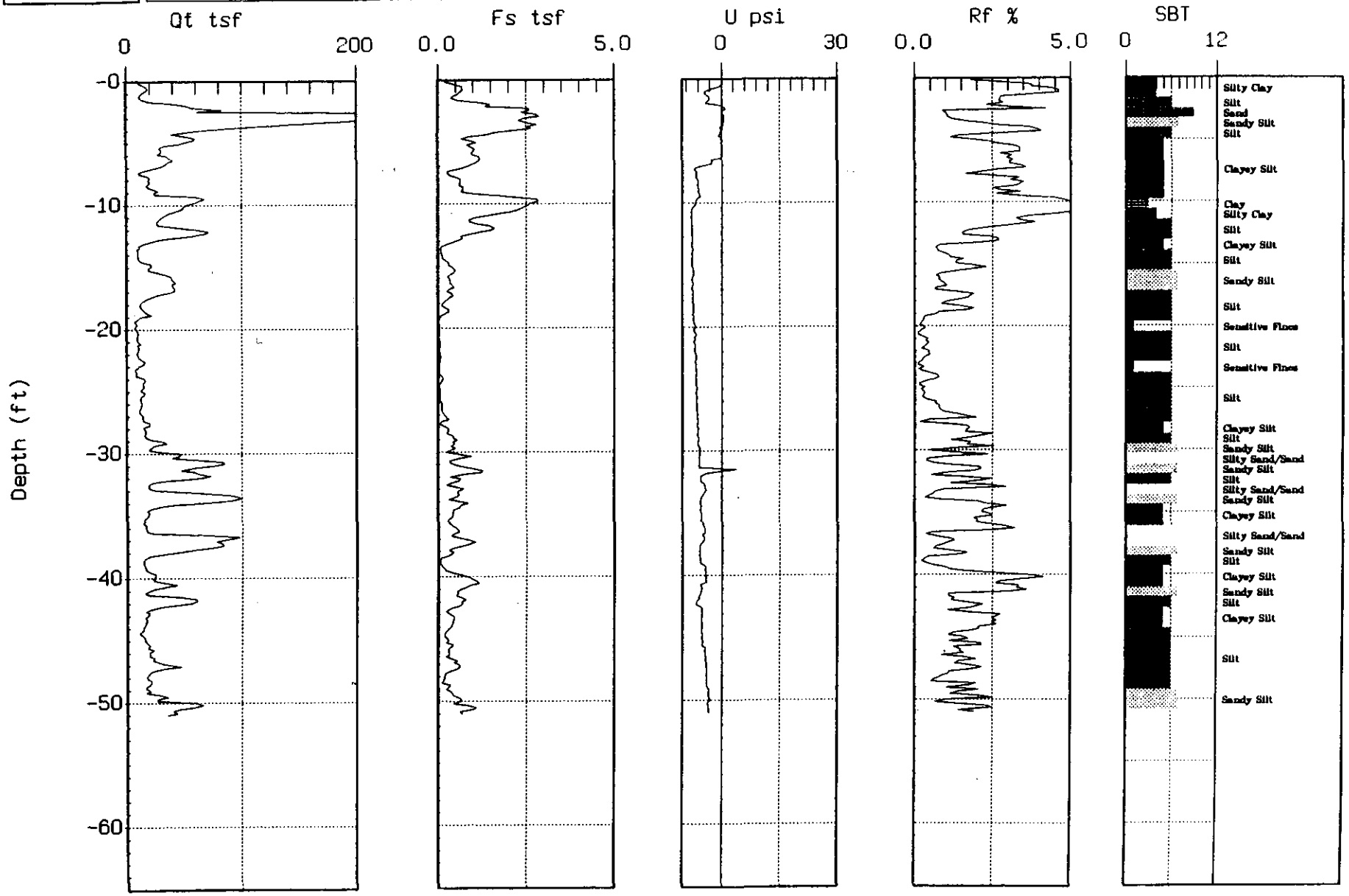
A-113

GREGG

PACIFIC SOILS

Site : PLAYA DEL REY
Location : CPT-8

Engineer : S. KROLL
Date : 12:10:97 13:59



Max. Depth: 51.02 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

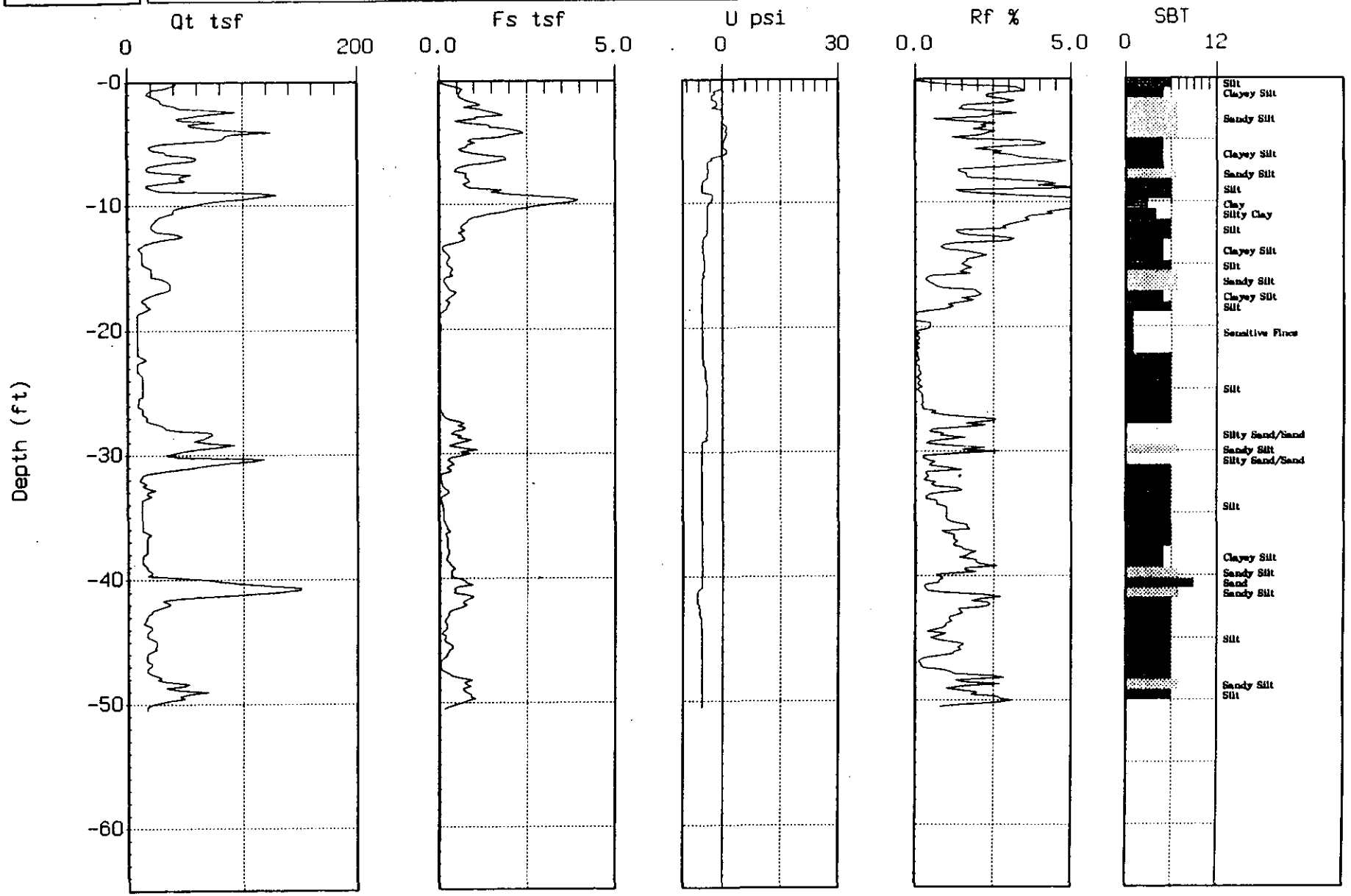
A-114

GREGG

PACIFIC SOILS

Site : PLAYA DEL REY
Location : CPT-9

Engineer : S. KROLL
Date : 12:10:97 14:57



Max. Depth: 50.52 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

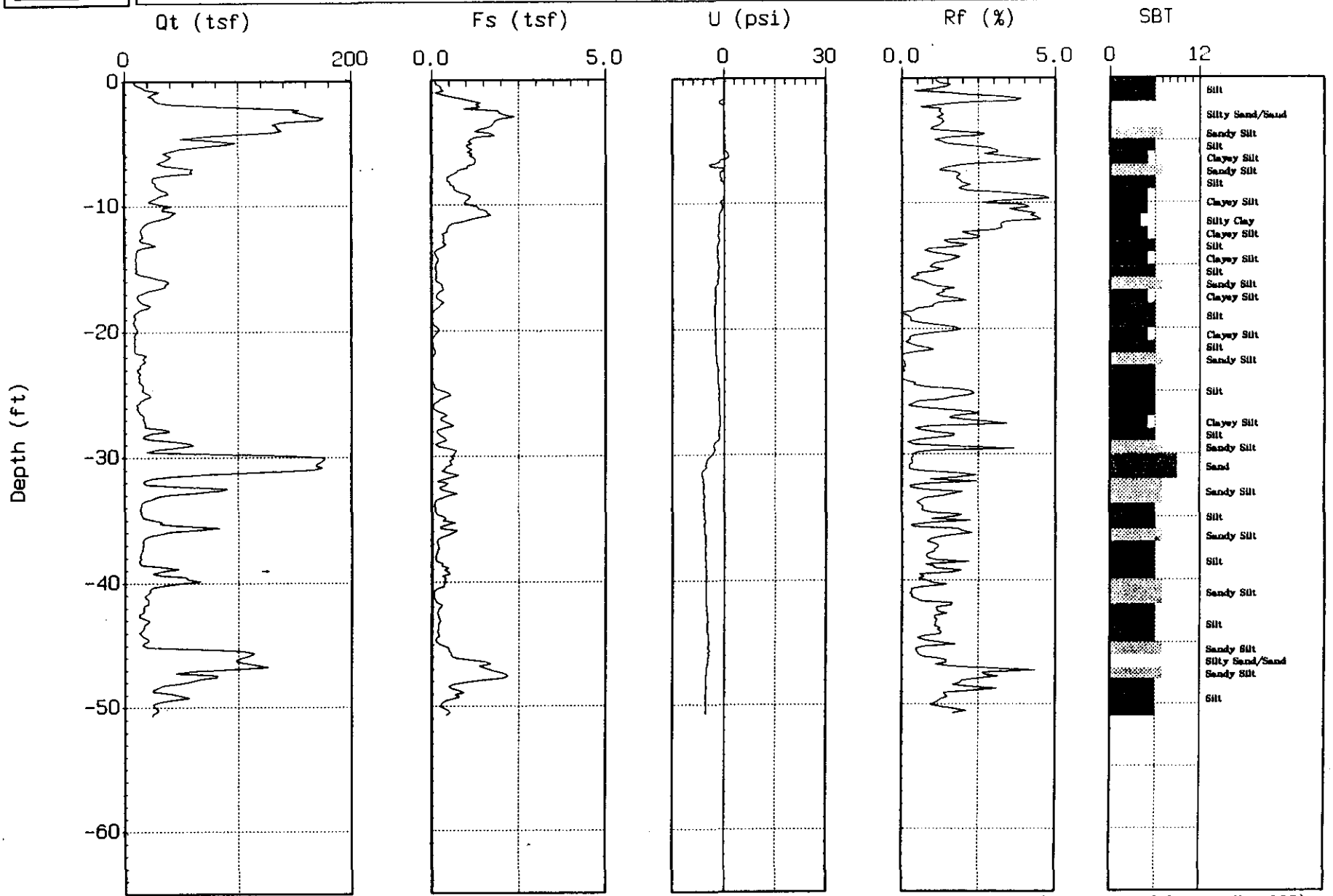
A-115

GREGG

PACIFIC SOILS

Site : PLAYA DEL REY
Location : CPT-10

Engineer : S. KROLL
Date : 12:10:97 15:25



Max. Depth: 50.69 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

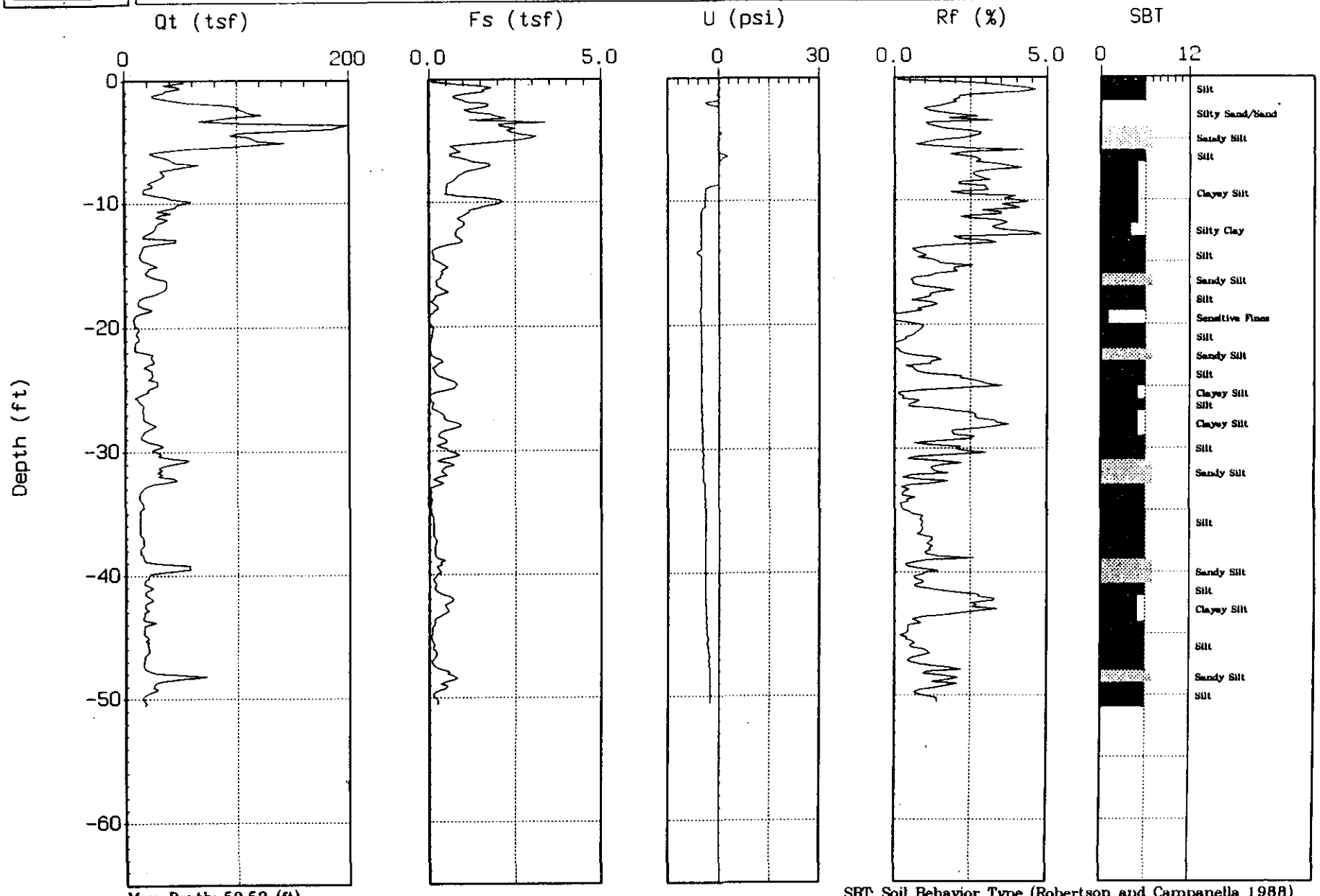
A-116

GREGG

PACIFIC SOILS

Site : PLAYA DEL REY
Location : CPT-11

Engineer : S. KROLL
Date : 12:10:97 15:57



Max. Depth: 50.52 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

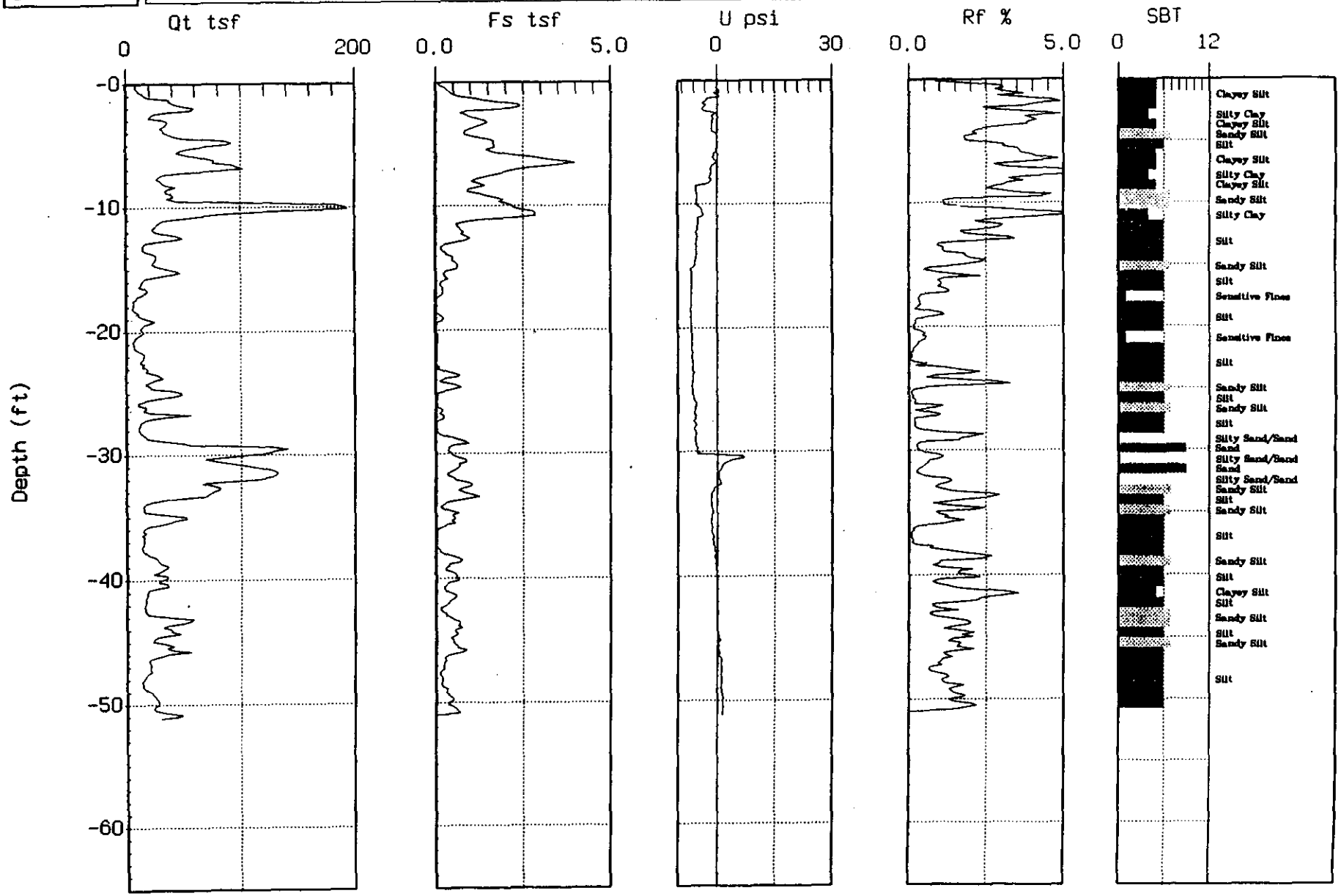
A-117

GREGG

PACIFIC SOILS

Site : PLAYA DEL REY
Location : CPT-12

Engineer : S. KROLL
Date : 12:10:97 16:23



Max. Depth: 51.18 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

A-118

APPENDIX B
EXISTING LABORATORY DATA

APPENDIX B

EXISTING LABORATORY DATA (Group Delta, 2013)

APPENDIX B

EXISTING LABORATORY DATA

Laboratory testing was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions and in the same locality. No warranty, express or implied, is made as to the correctness or serviceability of the test results, or the conclusions derived from these tests. Where a specific laboratory test method has been referenced, such as ASTM or Caltrans, the reference only applies to the specified laboratory test method, which has been used only as a guidance document for the general performance of the test and not as a "Test Standard". A brief description of the various tests performed for the previous investigations in the site vicinity follows (GDC, 1999, 2013).

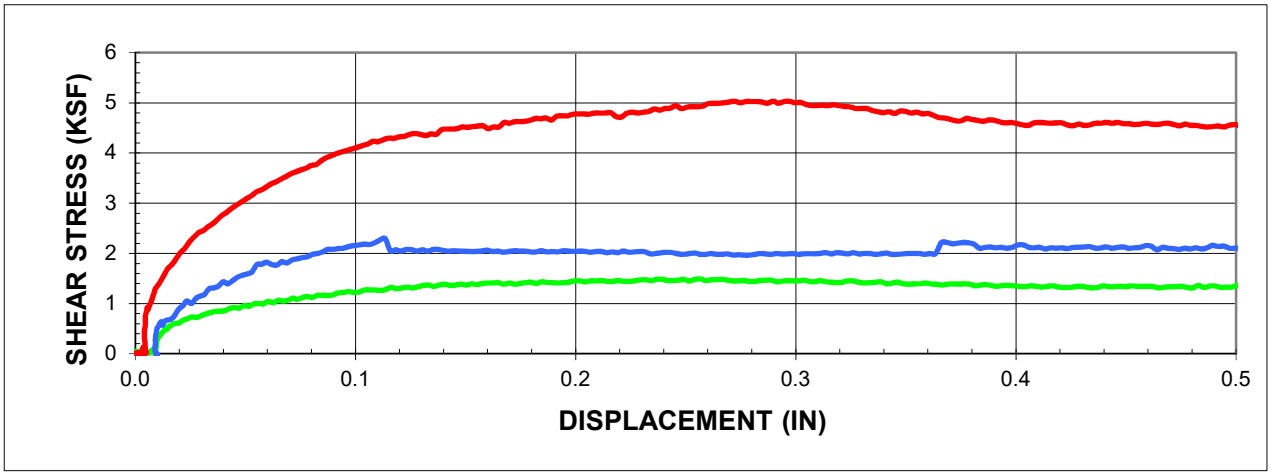
Classification: Soils were classified visually according to the Unified Soil Classification System as established by the American Society of Civil Engineers. Visual classification was supplemented by laboratory testing and classification using ASTM D2487. The soil classifications are summarized on the Boring Records in Appendix A.

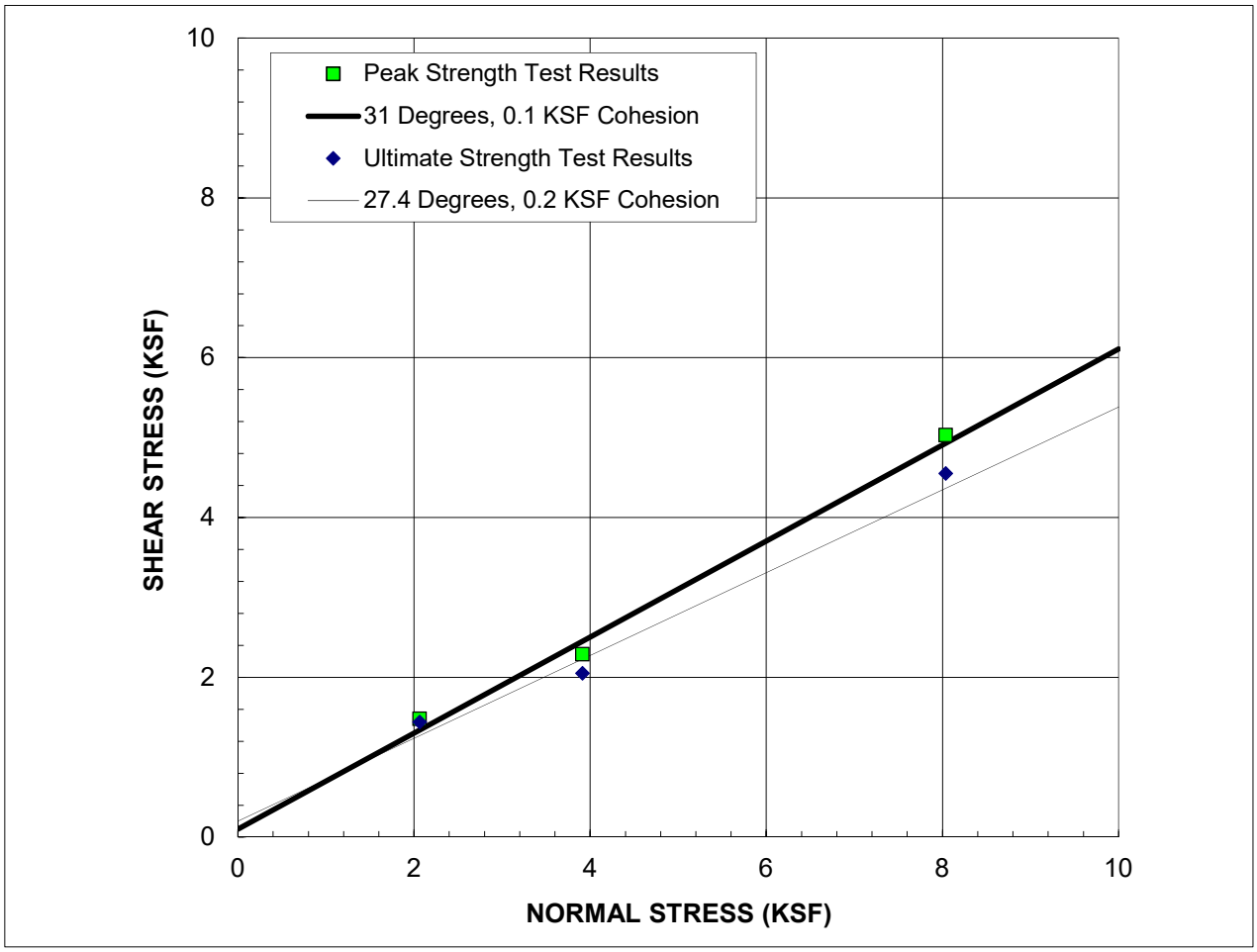
Particle Size Analysis: Particle size analyses were performed in general accordance with ASTM D422, and were used to supplement visual soil classifications. The test results are summarized on the Boring Records in Appendix A.

Atterberg Limits: ASTM D4318 was used to determine the liquid and plastic limits, and plasticity index of selected soil samples. The test results are shown on the Boring Records in Appendix A.

Direct Shear: The shear strengths of selected materials were assessed using direct shear testing conducted on relatively undisturbed soil samples in general accordance with ASTM D3080. The shear test results are shown in Figures B-1.1 through B-1.3.

Consolidation: The one-dimensional consolidation properties of selected samples were evaluated in general accordance with ASTM D2435. The samples were inundated with water under an 800 PSF load, and then subjected to controlled stress increments while restrained laterally and drained axially. The test results are presented in Figures B-2.1 through B-2.5.





SAMPLE: A-RW015 R5@20'

Description:	Very Dark greenish Gray Silty Sand with Shells

STRAIN RATE: 0.0050 IN/MIN

(Sample was consolidated and drained)

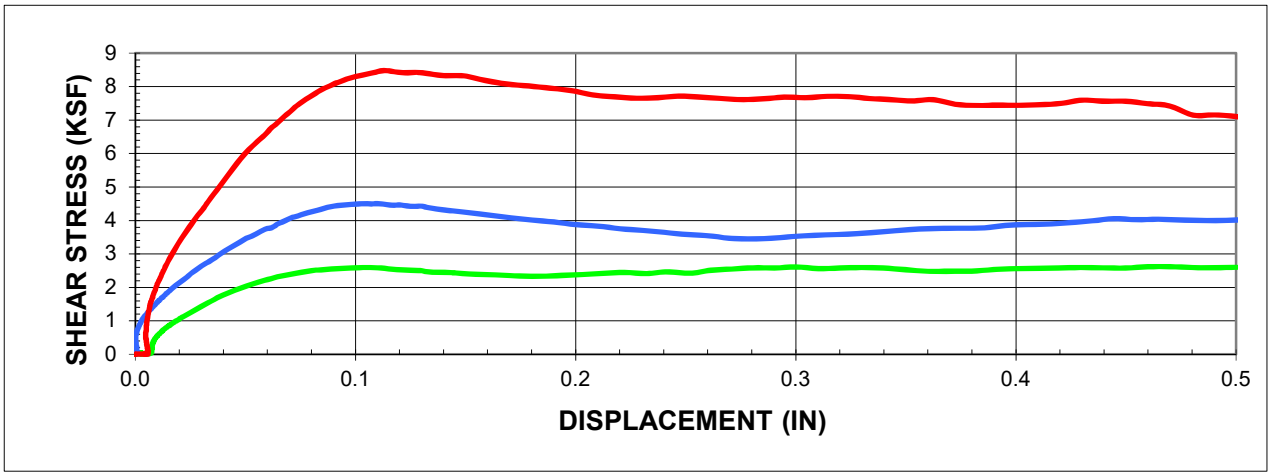
	PEAK	**ULTIMATE**
ϕ'	31 °	27 °
c'	0.10 KSF	0.20 KSF

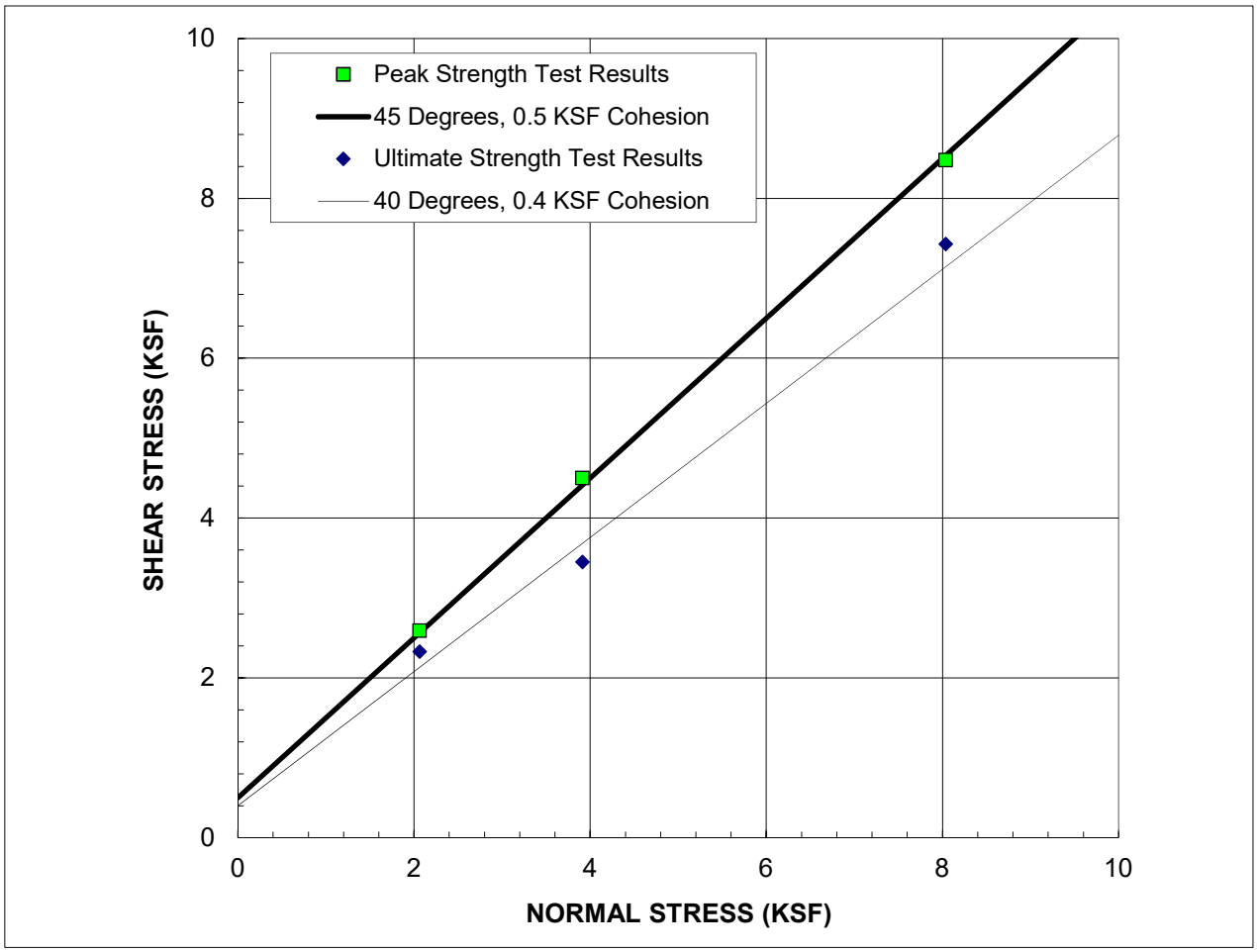
	IN-SITU	**AS-TESTED**
γ_d	79.8 PCF	79.8 PCF
w_c	17.5 %	17.8 %

GROUP DELTA

DIRECT SHEAR TEST RESULTS

Document No. 18-0018
Project No. LA1345
FIGURE B-1.1





SAMPLE: A-RW015 R8@32.5

Description:	Very Dark Greenish Gray Coarse Sand

STRAIN RATE: 0.0250 IN/MIN
(Sample was consolidated and drained)

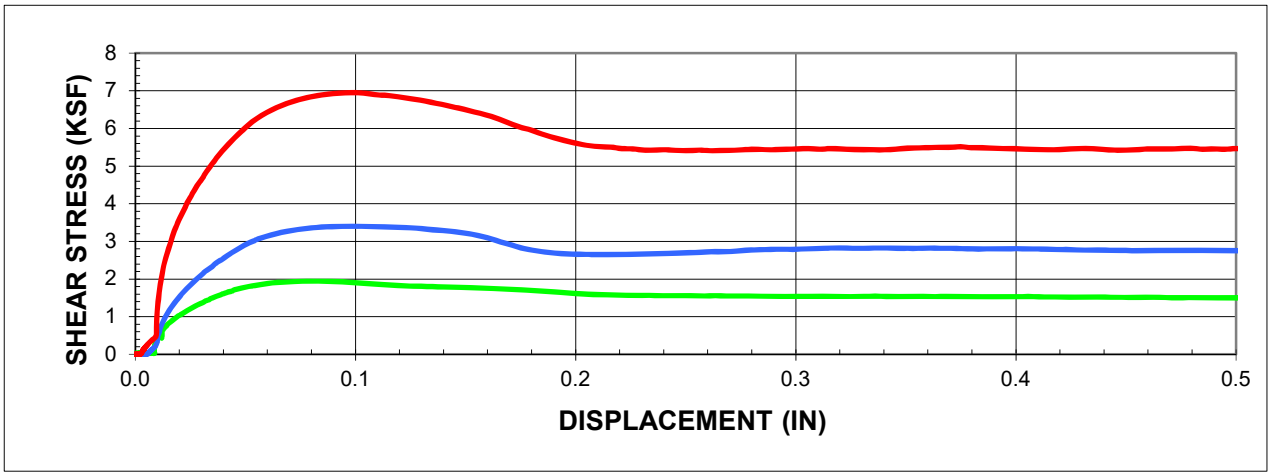
	PEAK	**ULTIMATE**
ϕ'	45 °	40 °
c'	0.50 KSF	0.40 KSF

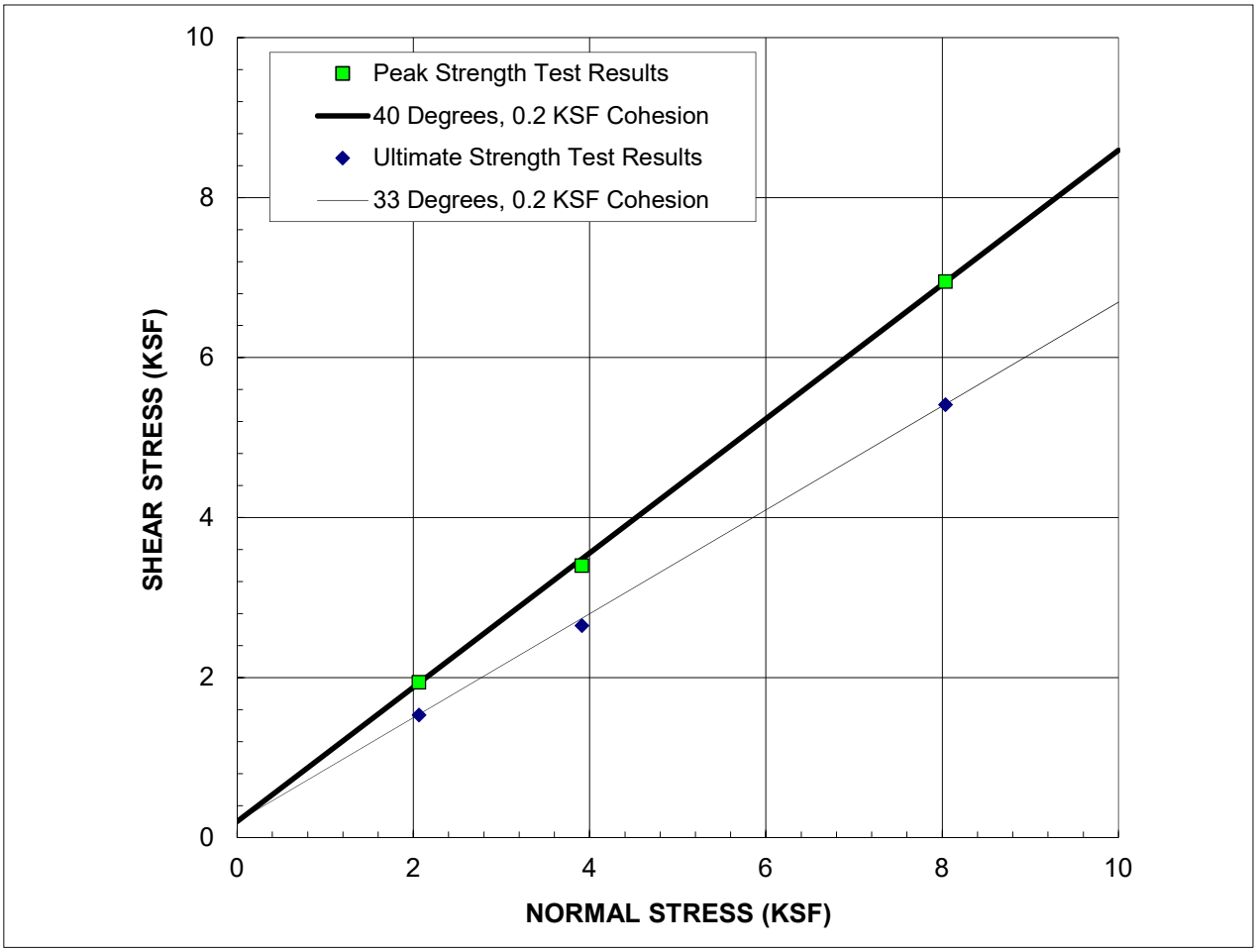
	IN-SITU	**AS-TESTED**
γ_d	112.5 PCF	112.5 PCF
w_c	20.8 %	19.1 %

GROUP DELTA

DIRECT SHEAR TEST RESULTS

Document No. 18-0018
Project No. LA1345
FIGURE B-1.2





SAMPLE: B-RW049 R9@40'

Description: Dark Greenish Gray Sand

STRAIN RATE: 0.0250 IN/MIN

(Sample was consolidated and drained)

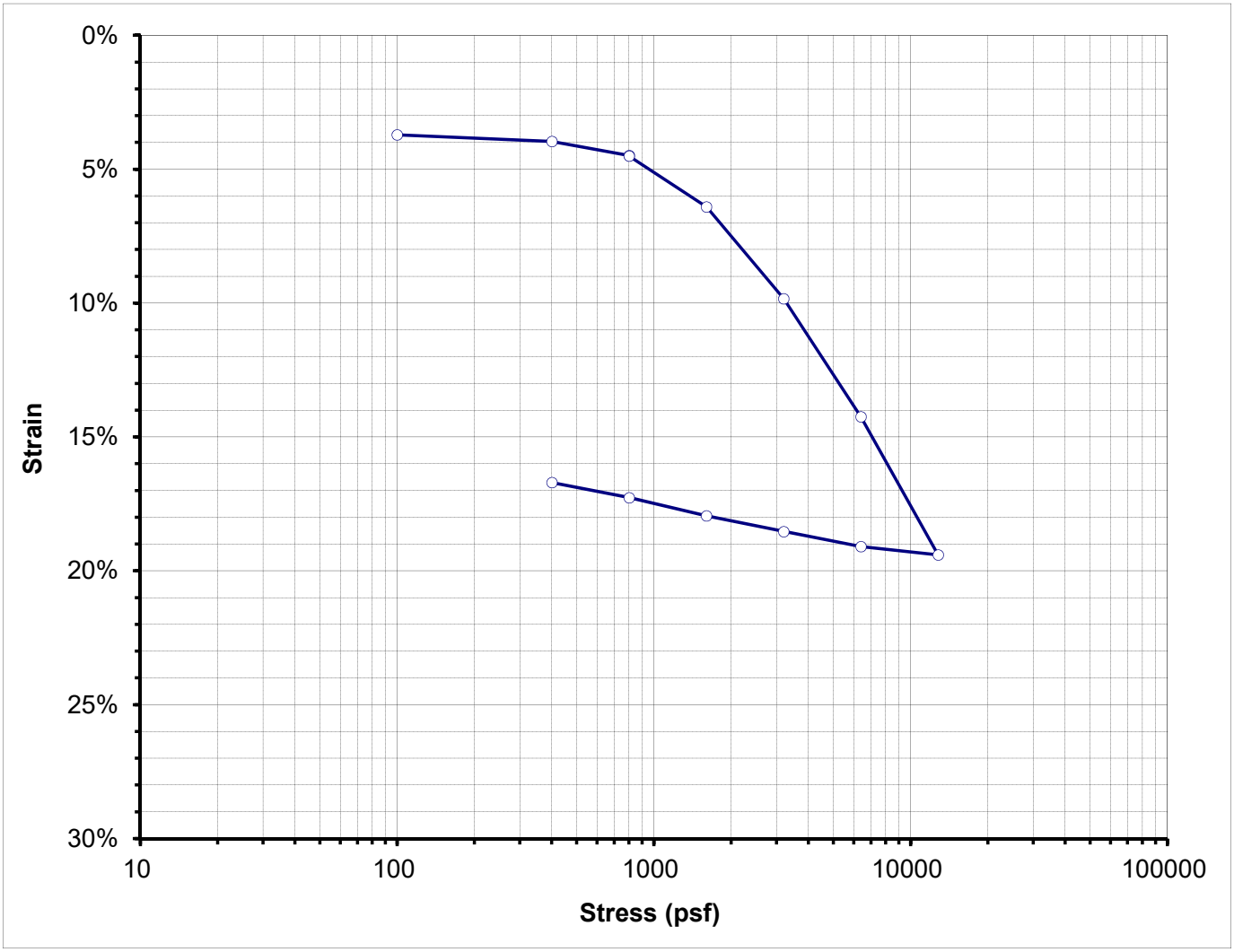
	PEAK	ULTIMATE
ϕ'	40 °	33 °
c'	0.20 KSF	0.20 KSF

	IN-SITU	AS-TESTED
γ_d	102.6 PCF	102.6 PCF
w_c	20.0 %	23.0 %

GROUP DELTA

DIRECT SHEAR TEST RESULTS

Document No. 18-0018
Project No. LA1345
FIGURE B-1.3



Boring No.	A-RW013	**Sample Depth**	15
Sample No.	R4	**USCS**	0

BEFORE TEST

Initial Moisture Content:	50.9%	
Initial Dry Unit Wt:	73.3	pcf
Initial Total Unit Wt.:	110.6	pcf
Initial Void Ratio:	1.3750	
Initial Degree of Saturation:	103.3%	

AFTER TEST

Final Moisture Content:	38.6%	
Final Dry Unit Wt:	86.7	pcf
Final Total Unit Wt.:	123.5	pcf
Final Void Ratio:	1.0076	
Final Degree of Saturation:	106.9%	

Water Added at: 800 psf

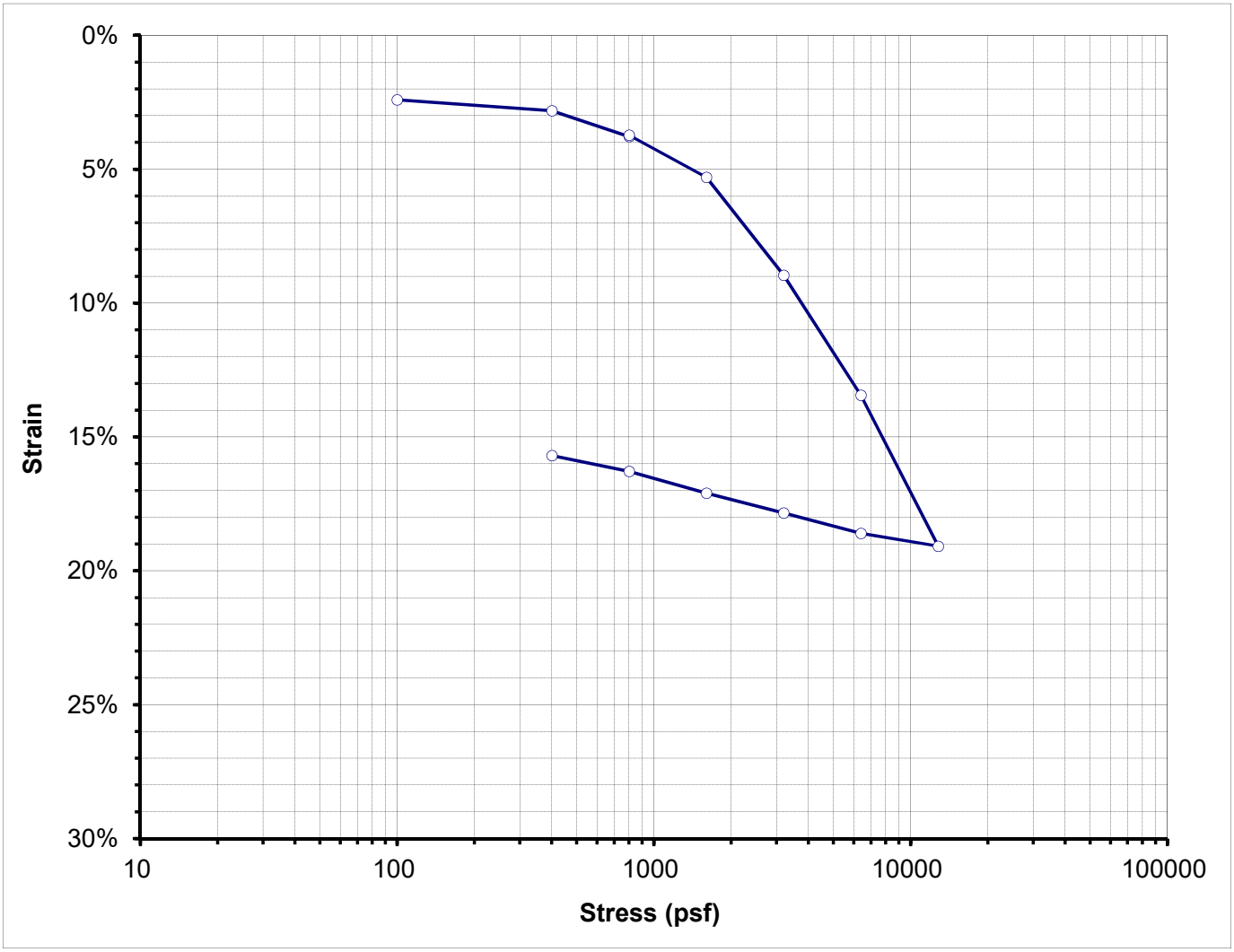
ATTERBERG LIMITS					
LL=		**PL=**		**PI=**	

PRESSURE (psf)	SAMPLE STRAIN	VOID RATIO
100	3.71%	1.2868
400	3.97%	1.2807
800	4.49%	1.2684
800	4.51%	1.2679
1600	6.41%	1.2228
3200	9.84%	1.1414
6400	14.24%	1.0367
12800	19.41%	0.9141
6400	19.09%	0.9216
3200	18.53%	0.9349
1600	17.95%	0.9487
800	17.27%	0.9650
400	16.70%	0.9783

GROUP DELTA

CONSOLIDATION RESULTS

Document No. 18-0018
Project No. LA1345
FIGURE B-2.1



Boring No.	B-RW049	**Sample Depth**	15
Sample No.	R4A	**USCS**	0

BEFORE TEST

Initial Moisture Content:	72.7%	
Initial Dry Unit Wt:	56.2	pcf
Initial Total Unit Wt.:	97.1	pcf
Initial Void Ratio:	2.0975	
Initial Degree of Saturation:	96.7%	

AFTER TEST

Final Moisture Content:	59.5%	
Final Dry Unit Wt:	65.9	pcf
Final Total Unit Wt.:	120.1	pcf
Final Void Ratio:	1.6422	
Final Degree of Saturation:	101.0%	

Water Added at: 800 psf

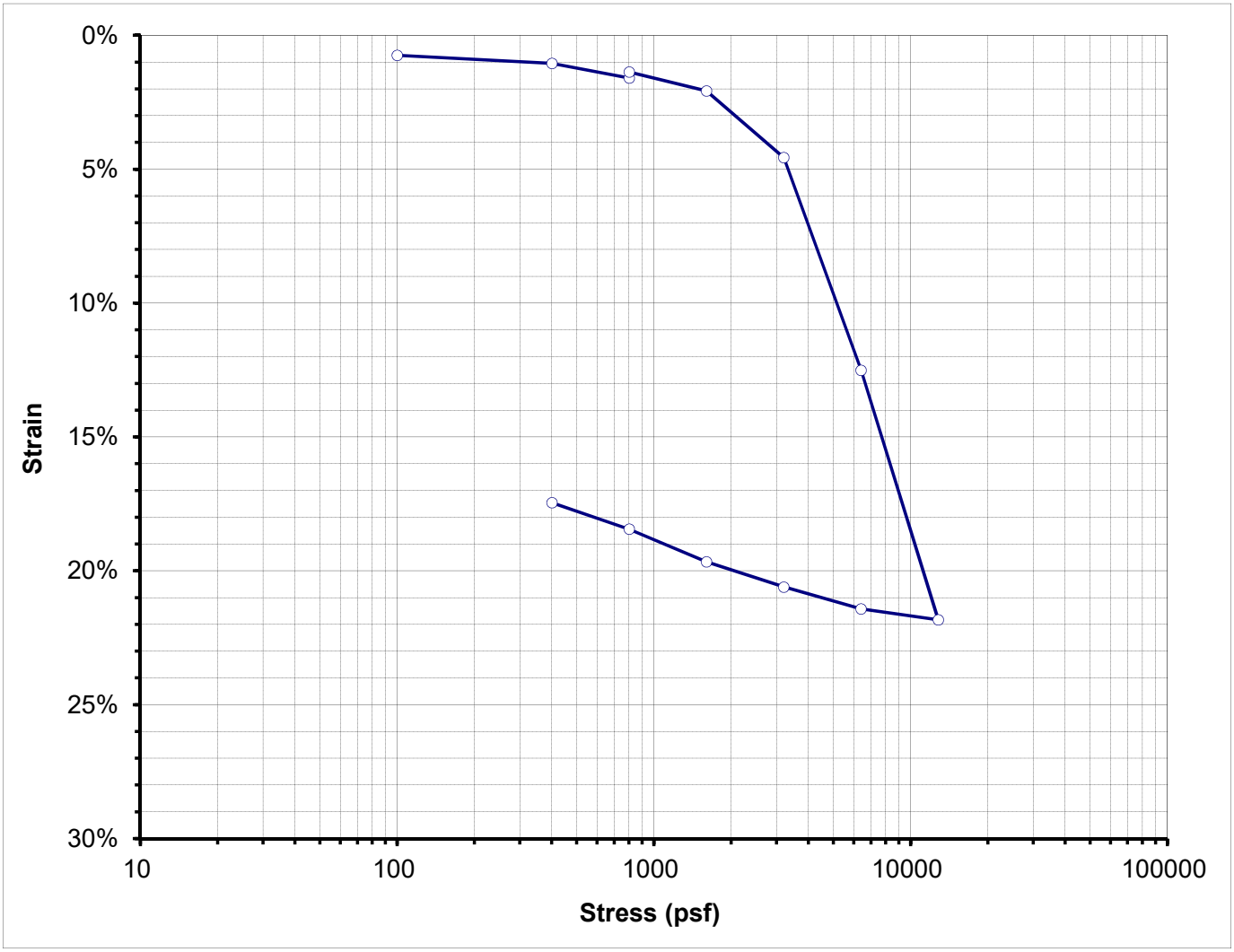
ATTERBERG LIMITS					
LL=		**PL=**		**PI=**	

PRESSURE (psf)	SAMPLE STRAIN	VOID RATIO
100	2.40%	2.0230
400	2.82%	2.0103
800	3.78%	1.9805
800	3.73%	1.9820
1600	5.30%	1.9333
3200	8.96%	1.8200
6400	13.45%	1.6810
12800	19.08%	1.5065
6400	18.60%	1.5214
3200	17.84%	1.5450
1600	17.10%	1.5677
800	16.28%	1.5931
400	15.69%	1.6114

GROUP DELTA

CONSOLIDATION RESULTS

Document No. 18-0018
Project No. LA1345
FIGURE B-2.2



Boring No.	B-RW049	**Sample Depth**	25 ft
Sample No.	R6A	**USCS**	0

BEFORE TEST

Initial Moisture Content:	64.3%	
Initial Dry Unit Wt:	60.4	pcf
Initial Total Unit Wt.:	99.2	pcf
Initial Void Ratio:	1.8822	
Initial Degree of Saturation:	95.2%	

AFTER TEST

Final Moisture Content:	50.8%	
Final Dry Unit Wt:	72.4	pcf
Final Total Unit Wt.:	122.8	pcf
Final Void Ratio:	1.4048	
Final Degree of Saturation:	100.8%	

Water Added at: 800 psf

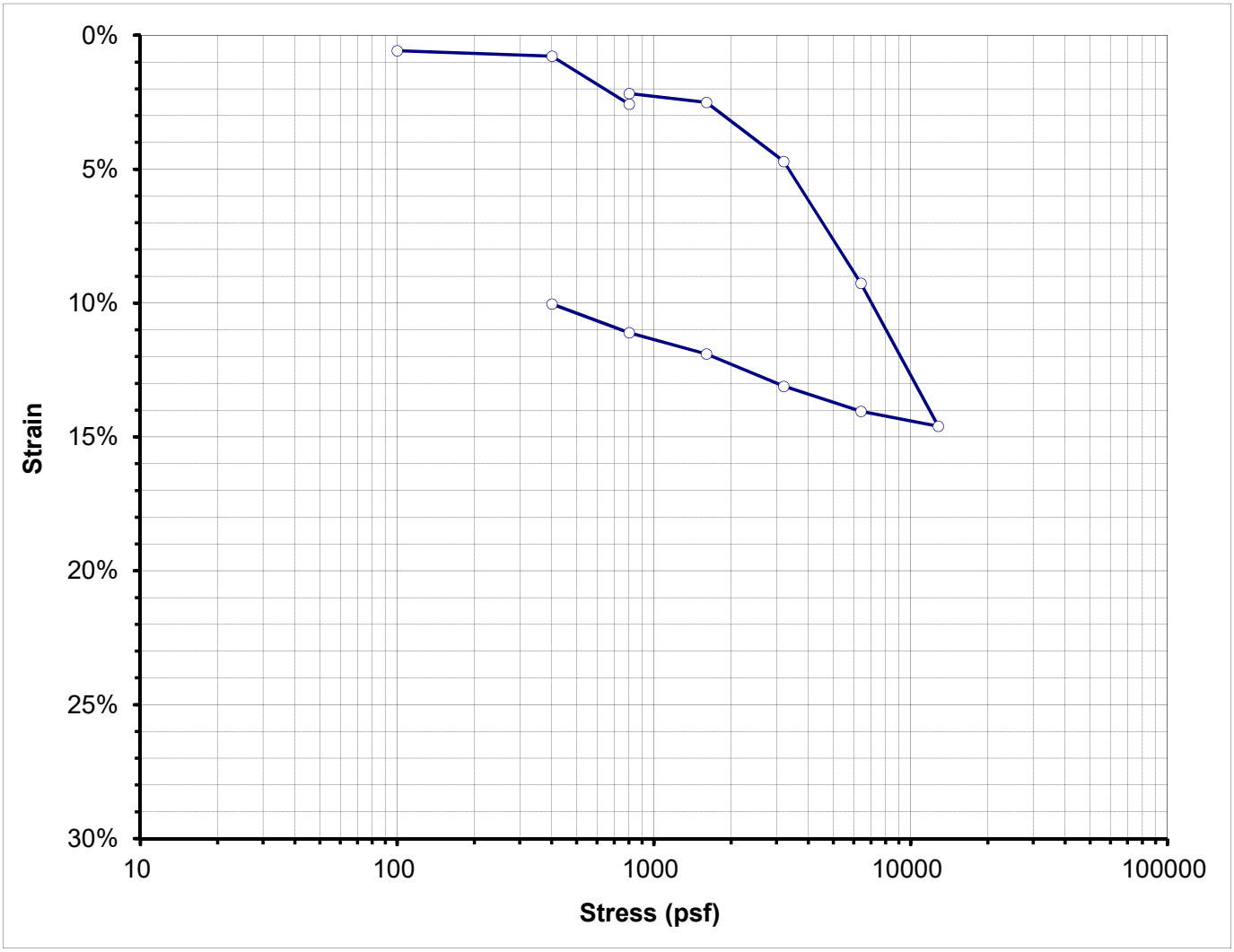
ATTERBERG LIMITS					
LL=		**PL=**		**PI=**	

PRESSURE (psf)	SAMPLE STRAIN	VOID RATIO
100	0.75%	1.8605
400	1.05%	1.8518
800	1.59%	1.8362
800	1.37%	1.8426
1600	2.07%	1.8224
3200	4.57%	1.7505
6400	12.51%	1.5217
12800	21.82%	1.2532
6400	21.42%	1.2647
3200	20.60%	1.2884
1600	19.66%	1.3155
800	18.44%	1.3508
400	17.45%	1.3791

GROUP DELTA

CONSOLIDATION RESULTS

Document No. 18-0018
Project No. LA1345
FIGURE B-2.3



Boring No.	B-HSA051	**Sample Depth**	5 ft
Sample No.	R3	**USCS**	0

BEFORE TEST

Initial Moisture Content:	45.1%	
Initial Dry Unit Wt:	75.7	pcf
Initial Total Unit Wt.:	109.9	pcf
Initial Void Ratio:	1.2998	
Initial Degree of Saturation:	96.9%	

AFTER TEST

Final Moisture Content:	40.9%	
Final Dry Unit Wt:	82.5	pcf
Final Total Unit Wt.:	111.6	pcf
Final Void Ratio:	1.1111	
Final Degree of Saturation:	102.6%	

Water Added at: 800 psf

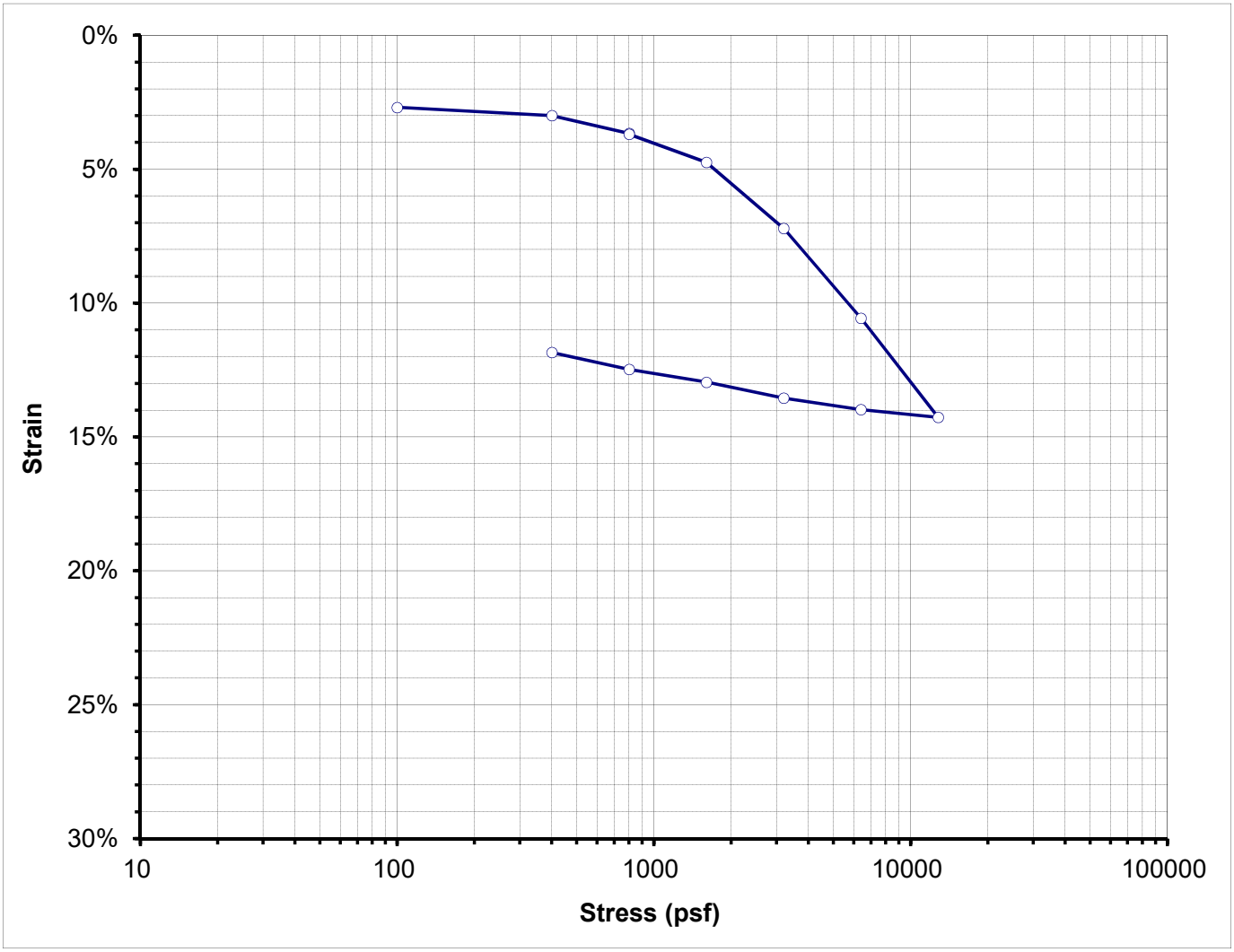
ATTERBERG LIMITS					
LL=		**PL=**		**PI=**	

PRESSURE (psf)	SAMPLE STRAIN	VOID RATIO
100	0.57%	1.2867
400	0.78%	1.2819
800	2.58%	1.2406
800	2.17%	1.2498
1600	2.51%	1.2422
3200	4.71%	1.1915
6400	9.26%	1.0869
12800	14.60%	0.9641
6400	14.05%	0.9768
3200	13.11%	0.9984
1600	11.90%	1.0261
800	11.10%	1.0445
400	10.03%	1.0692

GROUP DELTA

CONSOLIDATION RESULTS

Document No. 18-0018
Project No. LA1345
FIGURE B-2.4



Boring No.	B-HSA051	**Sample Depth**	10 ft
Sample No.	R5	**USCS**	0

BEFORE TEST

Initial Moisture Content:	43.6%	
Initial Dry Unit Wt:	77.5	pcf
Initial Total Unit Wt.:	111.3	pcf
Initial Void Ratio:	1.2466	
Initial Degree of Saturation:	97.5%	

AFTER TEST

Final Moisture Content:	36.8%	
Final Dry Unit Wt:	86.3	pcf
Final Total Unit Wt.:	114.5	pcf
Final Void Ratio:	1.0165	
Final Degree of Saturation:	100.9%	

Water Added at: 800 psf

ATTERBERG LIMITS					
LL=		**PL=**		**PI=**	

PRESSURE (psf)	SAMPLE STRAIN	VOID RATIO
100	2.69%	1.1861
400	2.99%	1.1793
800	3.67%	1.1642
800	3.70%	1.1635
1600	4.74%	1.1401
3200	7.22%	1.0845
6400	10.57%	1.0091
12800	14.27%	0.9260
6400	13.98%	0.9326
3200	13.55%	0.9423
1600	12.95%	0.9556
800	12.48%	0.9662
400	11.85%	0.9804

GROUP DELTA

CONSOLIDATION RESULTS

Document No. 18-0018
Project No. LA1345
FIGURE B-2.5

APPENDIX B

EXISTING LABORATORY DATA (Group Delta, 1999)

APPENDIX D
GDC LABORATORY TESTING

D.1 Introduction

Relatively undisturbed Standard Penetration Test (SPT) samples and Shelby tube samples were collected and carefully sealed in the field to prevent moisture loss. All the samples were then transported to our in-house geotechnical laboratory for examination and testing. Tests were performed on selected samples as an aid in classifying the soils, and to evaluate their physical properties and engineering characteristics that may be present in the soil samples. Details of the laboratory testing program and test results are discussed in the following sections. All tests were performed in general accordance with appropriate American Society for Testing and Materials (ASTM) Test Methods. Brief descriptions of the laboratory testing program and test results are presented below.

D.2 Soil Classification

The subsurface materials were classified using the Unified Soil Classification System, in accordance with ASTM Test Methods D2487-85 and D2488-84. The soil classifications are presented on the boring logs in Appendix C.

D.3 Moisture Content

Moisture content was determined for selected samples. The samples were dried in accordance with ASTM D2937. After drying, the weight of each sample was measured and moisture content was calculated. Moisture content values are summarized in Table D-1 and presented on the boring logs in Appendix C.

D.4 Grain Size Distribution and Fines Content

Representative samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. The portion of the material retained on the No. 200 sieve was oven-dried and then run through a standard set of sieves in accordance with ASTM D422. In addition, silt and clay content was evaluated by performance of hydrometer tests on selected samples. The results of grain size distribution tests performed are summarized in Table D-1 and graphically shown in Figure D-1. The percentage of fines (i.e., soil passing #200 sieve) is an important factor for evaluating the liquefaction potential of sandy soils.

D.5 Atterberg Limits Tests

Liquid and plastic limits were determined for selected samples showing plasticity properties in accordance with ASTM D4318. The test results are summarized in Figures D-2 through D-4.

D.6 Direct Shear Tests

To determine the shear strength parameters of the on-site soils, direct shear tests were performed on selected undisturbed drive samples in accordance with ASTM D 3080. After the initial weight and volume measurements were made, the sample was placed in a calibrated shear machine and a selected normal load was applied. The samples were submerged, allowed to consolidate, and then were sheared to failure. Shear stress and sample deformation were monitored throughout the test. The process was repeated under two additional normal loads. The test results are summarized in Table D-3 and graphically presented in Figure D-5.

D.7 Consolidation Tests

One dimensional tests were performed on disturbed samples in accordance with ASTM D 2435-90. The tests were performed on 1-inch high samples having a diameter of 2.42 inches. After trimming the ends, the sample was placed in the consolidometer and initial reading was recorded. The sample was saturated under loading and thereafter; the sample was incrementally loaded to 16 ksf. The results of the consolidation tests are shown graphically in Figures D-6 to D-14. In addition, time rates for selected consolidation tests were performed and are presented in Figures D-15 through D-19

D.8 Resistance Value Test

A resistance or R-Value test was performed on a selected bulk sample of subgrade soils. The result of the R-Value test is presented in Table D-2.

D.9 Corrosivity Tests

Corrosivity tests were performed on selected samples. Corrosivity testing included analyses for minimum resistivity, pH, electrical conductivity, and chemical analyses such as chlorides and sulfates. The results of the tests are presented in Table D-3.

D.10 List of Attached Tables and Figures

The following figures are attached and complete this appendix:

Table D-1	Summary of Moisture Content and Grain Size Distribution
Table D-2	Summary of R-Value Test Results
Table D-3	Summary of Corrosivity Test Results
Figure D-1	Grain Size Distribution Test Results
Figures D-2 to D-4	Atterberg Limits Test Results
Figure D-5	Direct Shear Test Results
Figures D-6 to D-14	Consolidation Test Results
Figures D-15 to D-19	Time Rate Results

TABLE D-1
SUMMARY OF MOISTURE CONTENT AND GRAIN SIZE DISTRIBUTION

Boring No.	Sample Depth (ft)	USCS Soil Type	Blow Counts per ft	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)
B-302R	5.0	SM	4	27.4	--	--	--	--
B-302R	10.0	SM	5	31.8	86.2	--	--	--
B-302R	15.0	CH	2	48.5	--	--	--	--
B-302R	20.0	CH	5	32.3	91.0	--	--	--
B-302R	25.0	ML	1	56.4	--	--	--	56
B-302R	30.0	CL	5	27.1	98.1	--	--	--
B-302R	35.0	ML	15	18.8	--	--	--	62
B-302R	40.0	CL	8	41.7	82.6	--	--	--
B-302R	45.0	ML	8	43.9	--	--	--	--
B-302R	55.0	CL	14	48.2	--	--	--	--
B-302R	60.0	SP	22	25.8	--	--	--	--
B-302R	65.0	SP	73	9.2	--	--	--	--
B-304H	0.0	SM	--	9.8	--	--	--	--
B-304H	5.0	SC	20	18.7	98.0	--	--	--
B-304H	10.0	CL	71	11.5	95.4	--	--	--
B-304H	15.0	ML	15	30.9	90.1	--	--	64
B-304H	20.0	CH	10	37.2	76.4	--	--	--
B-305H	0.0	SM	--	9.0	--	--	--	--
B-305H	5.0	CL	20	18.6	109.0	--	--	--
B-305H	10.0	CL	20	15.2	--	--	--	--
B-305H	15.0	SM	10	34.9	87.6	--	--	--
B-305H	20.0	CH	6	65.1	58.4	--	--	--
B-305H	25.0	CH	11	22.4	100.4	--	--	--
B-306R	5.0	SC/SM	73/11"	16.8	112.1	--	--	--
B-306R	15.0	CL	33	40.8	--	--	--	--
B-306R	20.	CH	18	55.9	63.9	--	--	--
B-306R	32.0	SP	84	10.6	129.1	34	52	14
B-306R	35.0	CL	19	32.7	--	--	--	--
B-306R	45.0	CL	68	37.6	--	--	--	--
B-306R	50.0	CH	66	41.1	--	--	--	--
B-307R	5.0	CL	12	16.2	--	--	--	--
B-307R	12.0	CL	26	40.0	81.5	--	--	--
B-307R	20.0	CH/OH	6	82.0	51.3	--	--	71
B-307R	25.0	CH/OH	16	23.5	--	--	--	65
B-307R	30.0	ML	49	29.5	94.8	--	--	--
B-307R	35.0	CL/SP	59	28.2	--	--	--	--
B-307R	40.0	CL	22	36.9	--	--	--	--
B-307R	45.0	CL	25	33.6	--	--	--	--
B-307R	50.0	SP/CL	39	22.8	--	--	--	--
B-307R	55.0	ML	112/5"	28.6	--	--	--	--
B-307R	60.0	SP	120	21.0	--	--	--	--

TABLE D-1 (continued)
SUMMARY OF MOISTURE CONTENT AND GRAIN SIZE DISTRIBUTION

Boring No.	Sample Depth (ft)	USCS Soil Type	Blow Counts per ft	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)
B-309R	5.0	SC	26	18.4	--	--	--	--
B-309R	10.0	SC	23	27.5	91.0	--	--	--
B-309R	20.0	CL/OL	24	29.2	--	--	--	--
B-309R	30.0	CL/OL	32	37.5	89.6	--	--	--
B-309R	35.0	CH	16	36.9	--	--	--	--
B-309R	45.0	CH	22	37.9	--	--	--	--
B-309R	55.0	CH	48	31.5	--	--	--	--
B-309R	60.0	GP	70/3"	4.5	--	--	--	--
B-313H	5.0	CL	18	19.1	105.9	0	27	73
B-313H	10.0	ML	11	29.8	89.4	--	--	--
B-313H	15.0	ML	6	39.5	81.3	--	--	--
B-313H	20.0	CH	4	86.4	51.4	--	--	--
B-313H	25.0	CH	9	42.1	83.5	--	--	--
B-315H	5.0	SM/SC	21	10.2	120.7	--	--	--
B-315H	10.0	CL	6	48.7	68.7	--	--	--
B-315H	15.0	CL	9	42.7	80.6	--	--	82
B-315H	20.0	MH	10	65.1	59.8	--	--	--
B-315H	25.0	MH	13	50.5	84.6	--	--	--
B-316R	10.0	CL	37	34.5	--	--	--	--
B-316R	20.0	CL	11	60.1	--	--	--	--
B-316R	27.0	ML	22	18.6	109.4	--	--	55
B-316R	30.0	CL	9	30.4	--	--	--	--
B-316R	35.0	CL/OL	15	31.8	--	--	--	--
B-316R	40.0	CL/OL	12	33.9	--	--	--	--
B-316R	45.0	CL	33	27.9	--	--	--	--
B-316R	50.0	SM	62	35.0	--	--	--	--
B-316R	55.0	SM	71	26.4	--	--	--	--
B-317R	10.0	CL	6	49.9	73.3	--	--	--
B-317R	15.0	ML	4	35.8	87.4	--	--	62
B-317R	20.0	CL	12	93.7	47.2	--	--	--
B-317R	25.0	CL	19	26.9	--	--	--	--
B-317R	30.0	CL	22	42.0	81.1	--	--	--
B-317R	35.0	ML	21	25.5	--	--	--	--
B-317R	40.0	SP	90	22.7	--	--	--	9
B-317R	45.0	CL	49	36.0	--	--	--	--
B-317R	50.0	CL	37	31.4	--	--	--	--
B-317R	55.0	SM	89	23.6	--	--	--	24
B-317R	60.0	SP	70/1"	10.1	--	--	--	9

TABLE D-1 (continued)
SUMMARY OF MOISTURE CONTENT AND GRAIN SIZE DISTRIBUTION

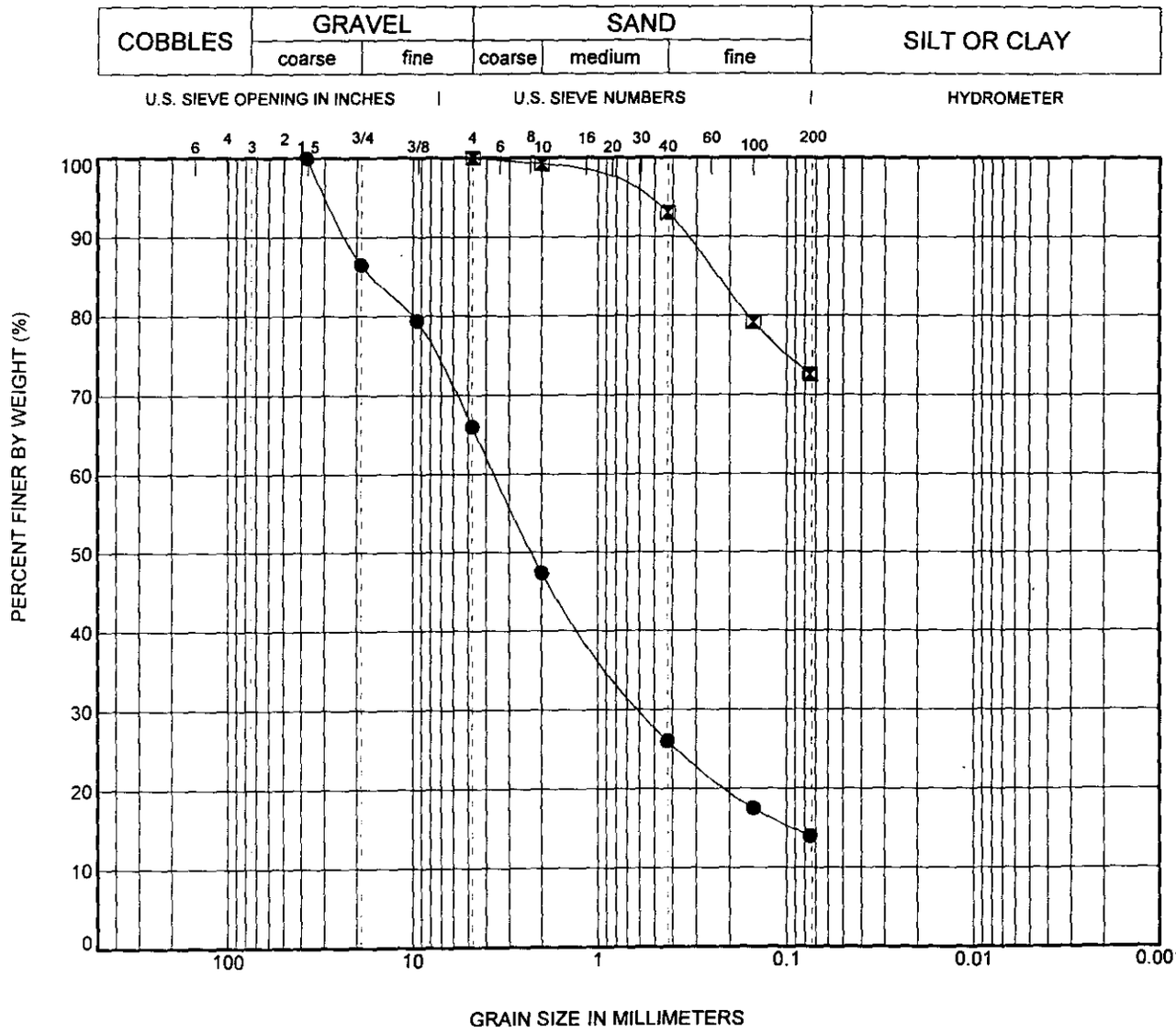
Boring No.	Sample Depth (ft)	USCS Soil Type	Blow Counts per ft	Moisture Content (%)	Dry Density (pcf)	Gravel Content (%)	Sand Content (%)	Fines Content (%)
B-319R	5.0	CL	26	18.1	--	--	--	--
B-319R	11.0	CL	21	43.3	79.5	--	--	--
B-319R	15.0	ML	19	39.6	--	--	--	--
B-319R	20.0	MH	8	66.8	60.0	--	--	--
B-319R	25.0	MH	9	31.2	--	--	--	--
B-319R	30.0	CL	24	33.0	91.4	--	--	--
B-319R	35.0	CL	--	28.8	--	--	--	--
B-319R	40.0	SM	36	24.7	--	--	--	38
B-319R	45.0	CL	23	38.0	--	--	--	--
B-319R	50.0	CL	61	30.3	--	--	--	--
B-319R	55.0	ML	98	25.4	--	--	--	--
B-319R	60.0	SP	100/9"	15.0	--	--	--	--

TABLE D-2
SUMMARY OF R-VALUE TEST RESULTS

Boring No.	Sample Depth (ft)	Soil Type	R-Value
B-315H	0.0-5.0	SC/CL	10

TABLE D-3
SUMMARY OF CORROSIVITY TEST RESULTS

Boring No.	Sample Depth (ft)	Soil Type	Soluble Sulfate (ppm)	Soluble Chloride (ppm)	Minimum Resistivity (ohm-cm)	pH
B-304H	0.0-5.0	SM	130	<10	250	8.1
B-305H	0.0-5.0	SM	120	<10	240	8.2
B-313H	0.0-5.0	SM/SC	260	30	130	7.8



SYMBOL	BORING	DEPTH (ft)	DESCRIPTION
●	B-306R	32.0	(SP) Dark Gray Gravelly SAND
⊠	B-313H	5.0	(CL) Olive Gray Silty CLAY

SYMBOL	BORING	DEPTH (ft)	D100	D60	D30	D10	LL	PL	PI	Cc	Cu
●	B-306R	32.0	37.5	3.593	0.568						
⊠	B-313H	5.0	4.75								

GDC GRAIN SIZE L196PV.GPJ GDC WLOG.GDT 12/23/98

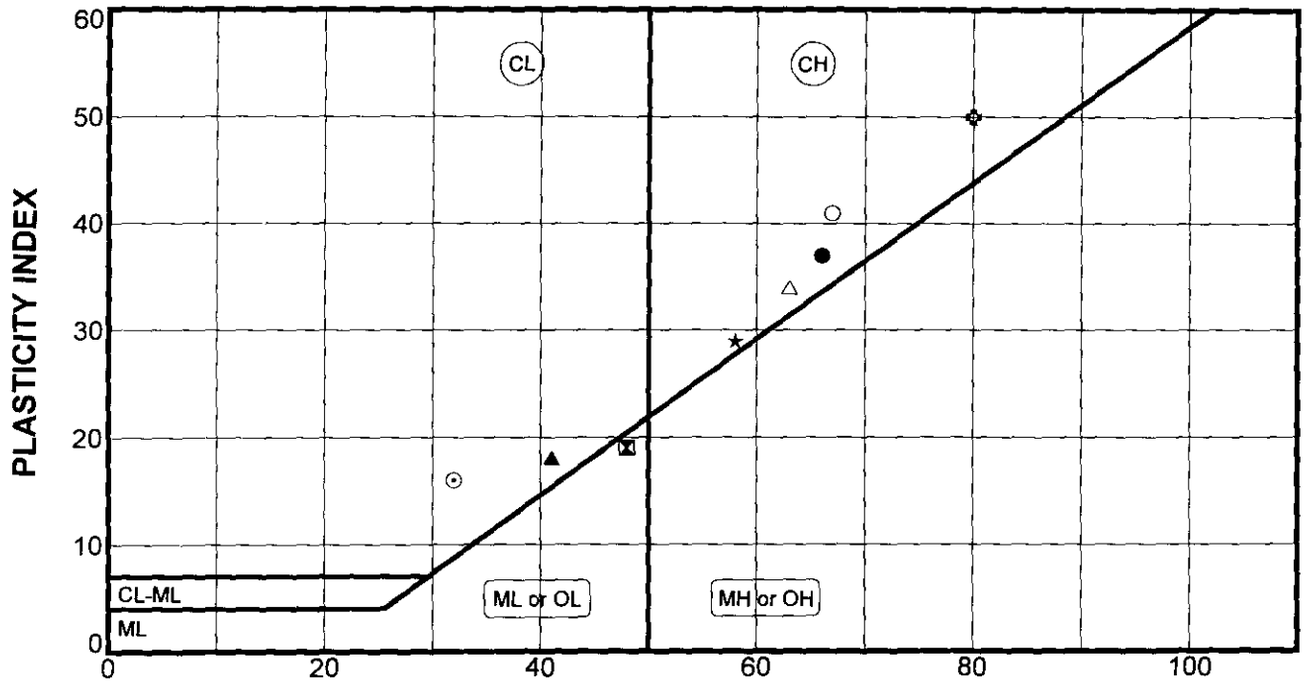
GROUP DELTA CONSULTANTS

GRAIN SIZE DISTRIBUTION

GROUP DELTA CONSULTANTS

Project: Playa Vista - Site DE & Ballona Creek
Location: Playa del Rey, California
Number: L-196

FIGURE **D-1**



Sym	BORING	Depth (ft)	LL	PL	PI	Description
●	B-302R	15.0	66	29	37	(CH) Dark Gray Silty CLAY
⊠	B-302R	45.0	48	29	19	(ML) Greenish Gray Clayey SILT
▲	B-302R	55.0	41	23	18	(CL) Dark Gray Silty CLAY
★	B-304H	20.0	58	29	29	(CH) Medium Gray Silty CLAY
⊙	B-305H	5.0	32	16	16	(CL) Dark Brown Sandy CLAY
✿	B-305H	20.0	80	30	50	(CH) Black to Dark Gray CLAY
○	B-306R	20.0	67	26	41	(CH) Dark Gray Silty CLAY
△	B-307R	12.0	63	29	34	(CH) Medium Gray CLAY

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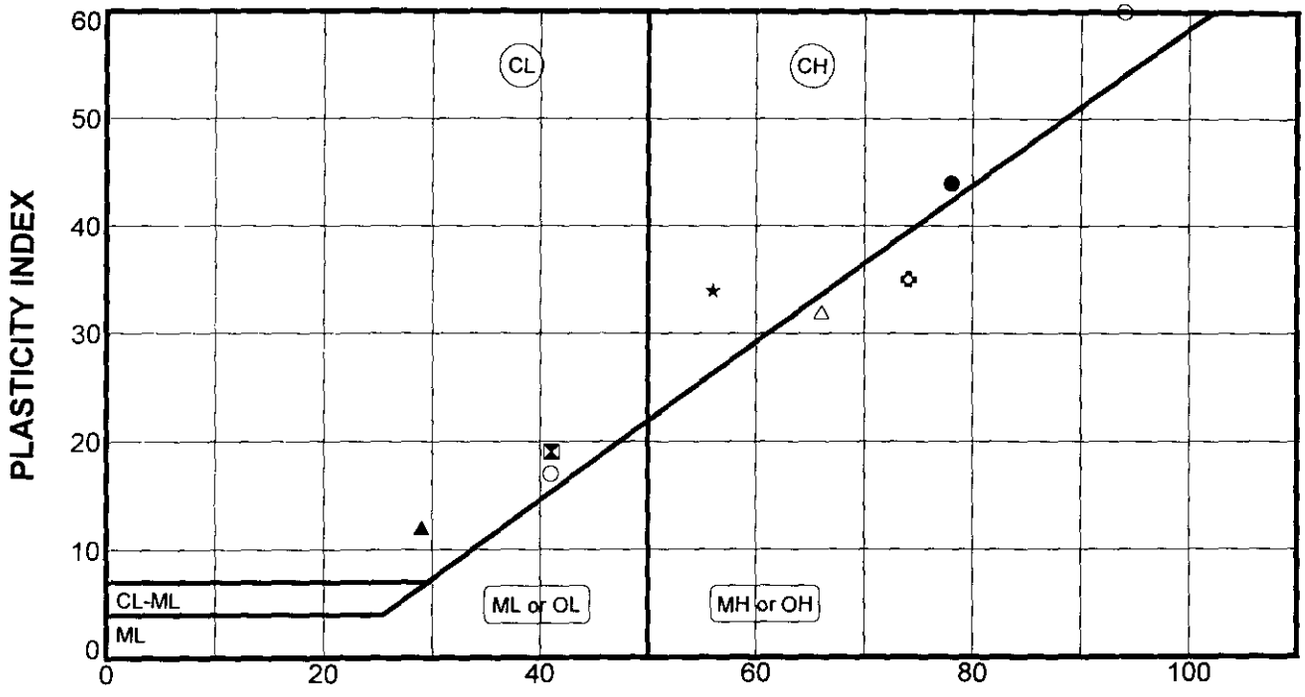
Project: Playa Vista - Site DE & Ballona Creek

Location: Playa del Rey, California

Number: L-196

FIGURE **D-2**



Sym	BORING	Depth (ft)	LL	PL	PI	Description
●	B-307R	20.0	78	34	44	(CH) Dark Gray Sandy CLAY
⊠	B-309R	15.0	41	22	19	(CL) Olive Gray Silty CLAY
▲	B-309R	20.0	29	17	12	(CL/OL) Dark Gray Silty Organic CLAY
★	B-309R	35.0	56	22	34	(CH) Dark Gray CLAY
⊙	B-313H	20.0	94	34	60	(CH) Dark Gray CLAY
✿	B-315H	20.0	74	39	35	(MH) Dark Gray Clayey SILT
○	B-316R	10.0	41	24	17	(CL) Dark Gray Silty CLAY
△	B-319R	20.0	66	34	32	(MH) Dark Gray Clayey SILT

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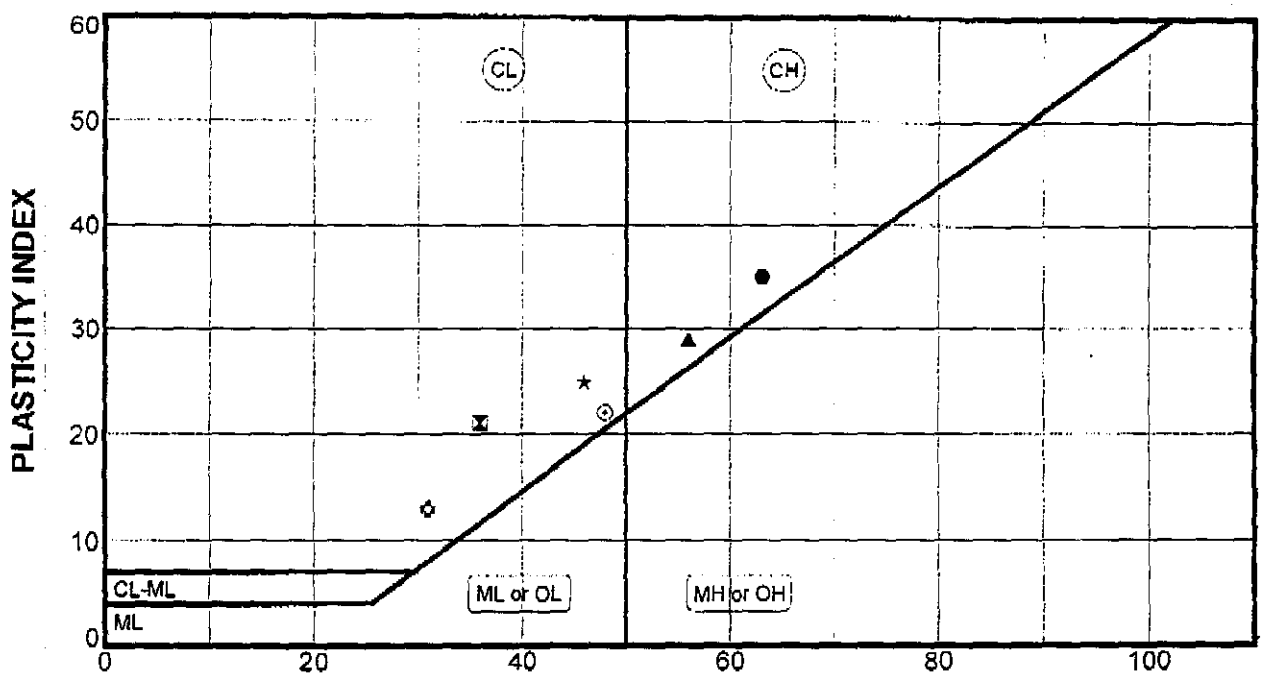
Project: Playa Vista - Site DE & Ballona Creek
Location: Playa del Rey, California
Number: L-196

FIGURE **D-3**



Sym	BORING	Depth (ft)	LL	PL	PI	Description
●	B-317R	10.0	63	28	35	(CH) Dark Gray CLAY
⊠	B-317R	25.0	36	15	21	(CL) Dark Gray CLAY
▲	B-317R	30.0	56	27	29	(CH) Dark Gray CLAY
★	B-317R	35.0	46	21	25	(CL) Dark Gray CLAY
⊙	B-317R	45.0	48	26	22	(CL) Dark Gray CLAY
◇	B-317R	50.0	31	18	13	(CL) Dark Gray CLAY

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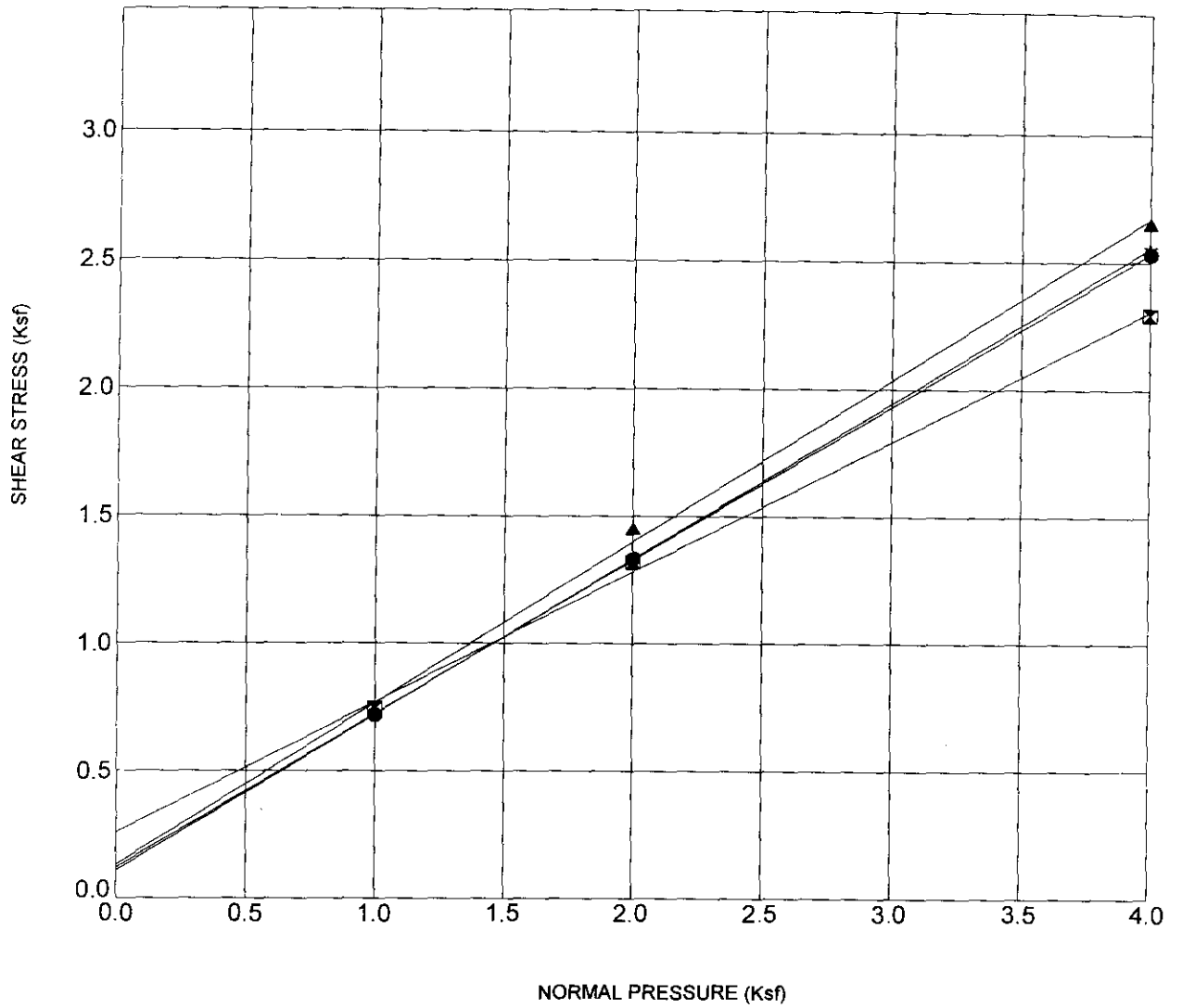
Project: Playa Vista - Site DE & Ballona Creek
Location: Playa del Rey, California
Number: L-196

FIGURE **D-4**



SYM	BORING	Depth(ft)	DESCRIPTION	γ_d lb/ft^3	MC % Before	MC % After	c KSF	ϕ deg
●	B-302R	20.0	(ML) Dark Gray Clayey SILT	90.2	32.3	32.7	0.12	31.1
⊠	B-302R	30.0	(CL) Dark Gray Silty CLAY	98.7	27.1	40.4	0.26	27.1
▲	B-307R	30.0	(ML) Dark Gray Sandy SILT	95.0	29.5	29.8	0.13	32.4
★	B-319R	30.0	(CL) Greenish Gray Silty CLAY	91.5	33.0	30.1	0.11	31.5

NOTE: All samples submerged unless otherwise noted
Shear Strength are Ultimate with less than 0.25 inch deflection

GDC DIRECT SHEAR L196PV.GPJ GDC_WLOG.GDT 1/4/99

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DIRECT SHEAR TEST

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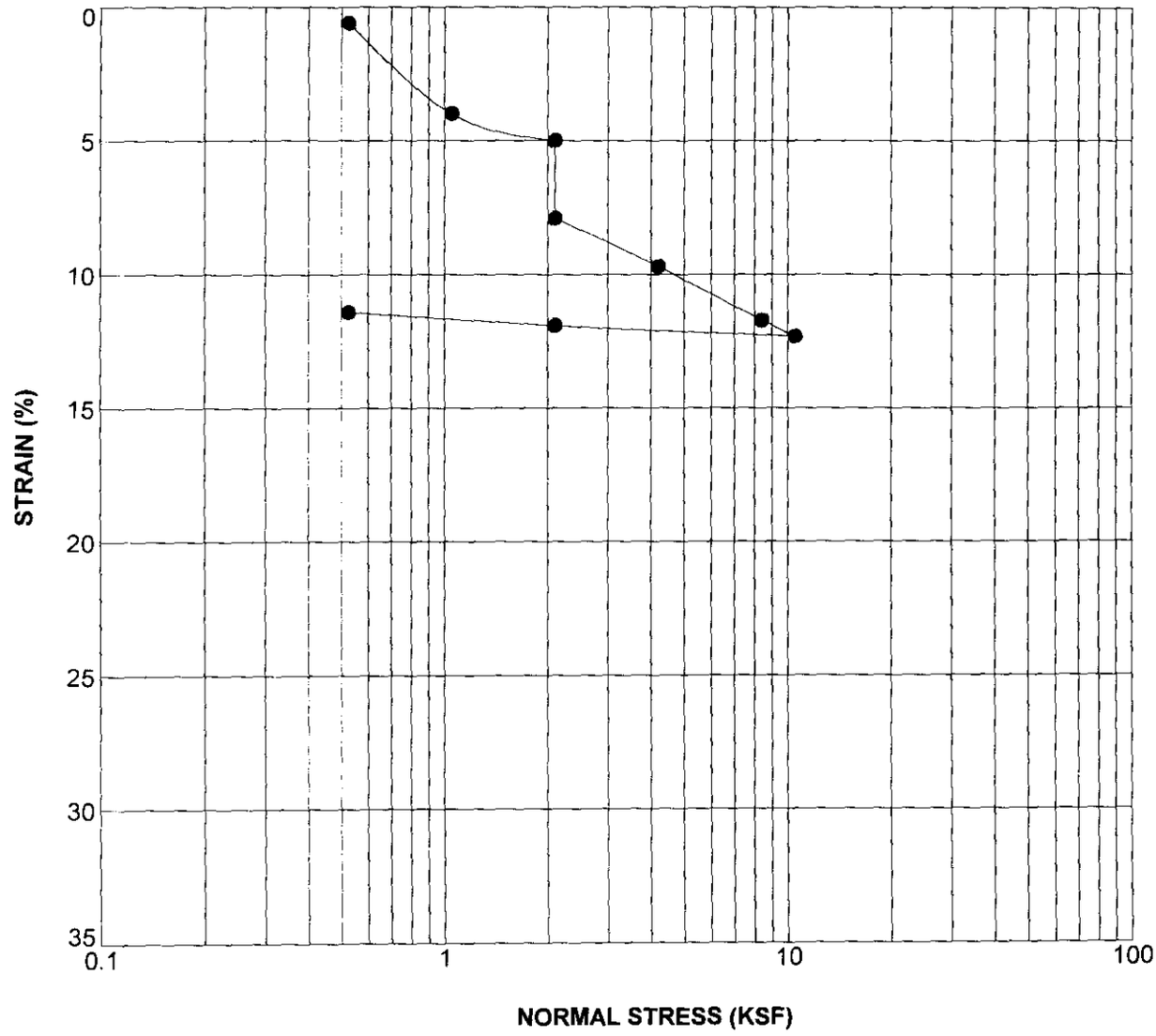
Project: Playa Vista - Site DE & Ballona Creek
Location: Playa del Rey, California
Number: L-196

FIGURE **D-5**



SYMBOL	BORING	DEPTH (ft)	DESCRIPTION	Liquid Limit	Plastic Limit
●	B-304H	5.0	(SC) Dark Gray Clayey SAND w/Silt	NON PLASTIC	

	Moisture Content (%)	Dry Density (pcf)	Percent Saturation (%)	Void Ratio
INITIAL	18.7	96.7	68.0	0.742
FINAL	15.1	120.6	100.0	0.397

Specific Gravity: 2.7

Remark: SAMPLE SATURATED AT 2.1 KSF

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CONSOLIDATION TEST

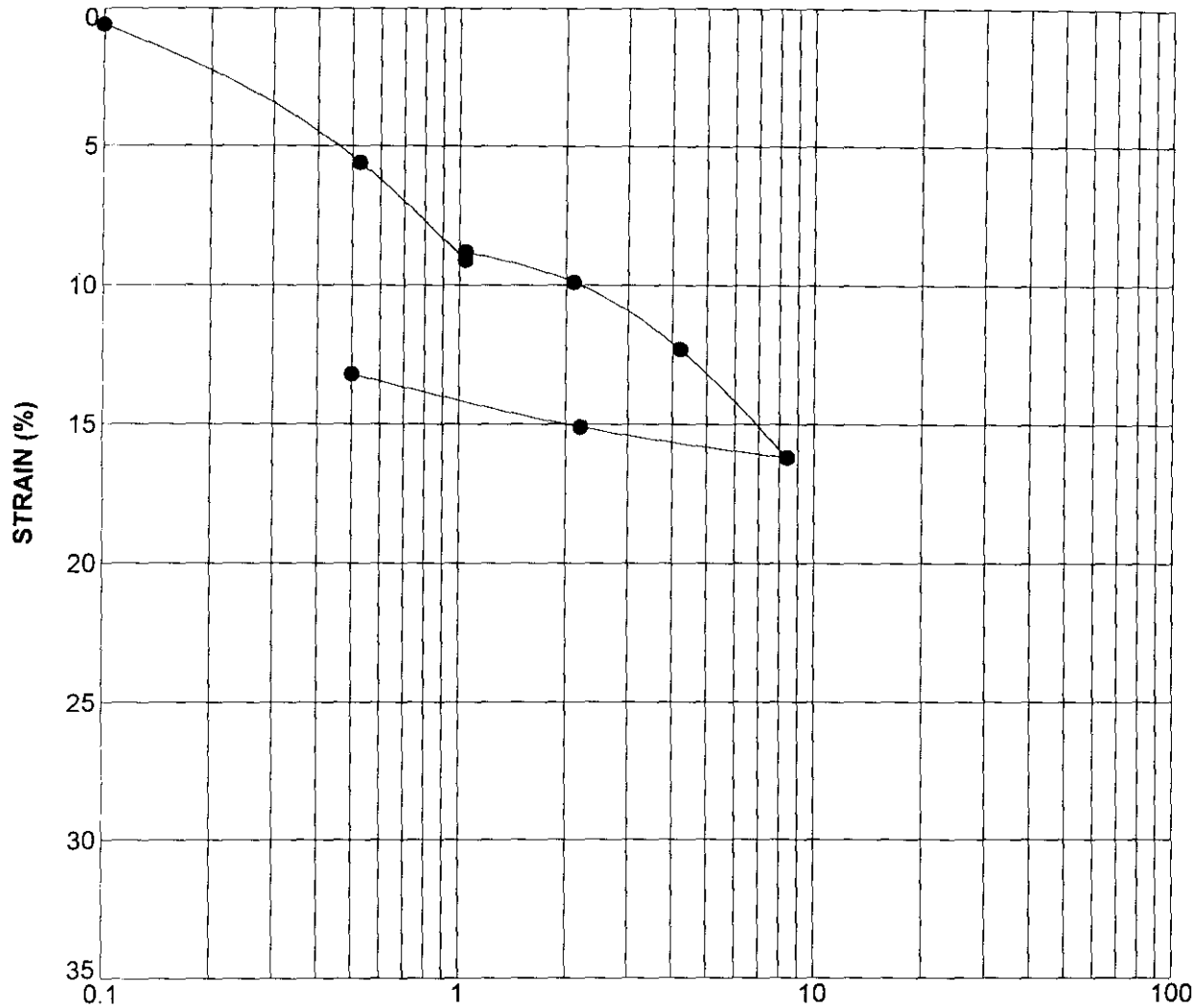
GROUP DELTA CONSULTANTS, INC.

Project: Playa Vista - Site DE & Ballona Creek

Location: Playa del Rey, California

Number: L-196

FIGURE **D-6**



SYMBOL	BORING	DEPTH (ft)	DESCRIPTION	Liquid Limit	Plastic Limit
●	B-304H	20.0	(CH) Medium Gray Silty CLAY	58	29

	Moisture Content (%)	Dry Density (pcf)	Percent Saturation (%)	Void Ratio
INITIAL	37.2	77.7	86.0	1.168
FINAL	40.8	83.7	100.0	1.013

Specific Gravity: 2.7

Remark: SAMPLE SATURATED AT 1.1 KSF

GDC_CON STRNVSSTRS L196PV.GPJ GDC_WLOG.GDT 1/4/99

GROUP DELTA CONSULTANTS

CONSOLIDATION TEST

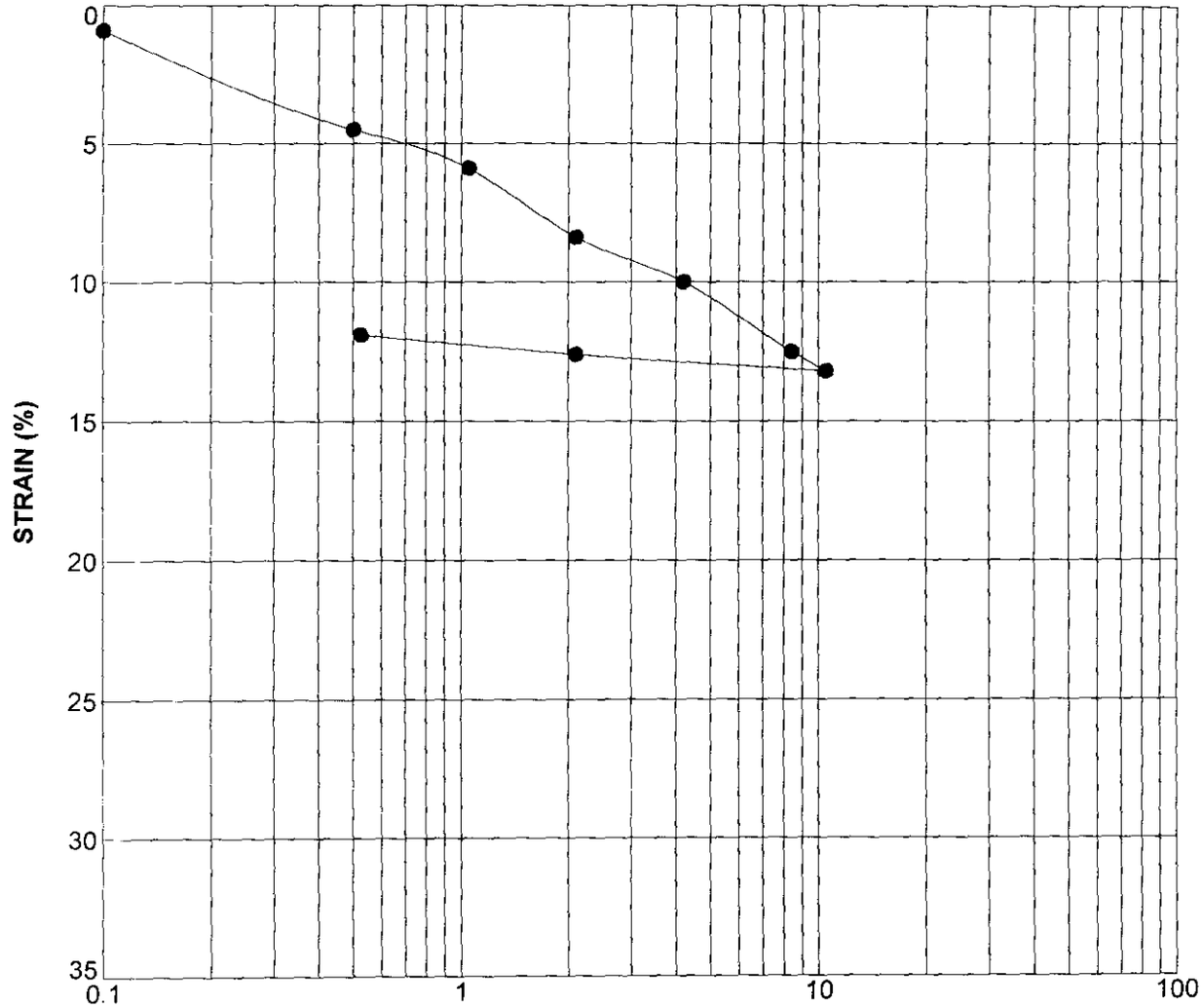
GROUP DELTA CONSULTANTS, INC.

Project: Playa Vista - Site DE & Ballona Creek

Location: Playa del Rey, California

Number: L-196

FIGURE **D-7**



SYMBOL	BORING	DEPTH (ft)	DESCRIPTION	Liquid Limit	Plastic Limit
●	B-305H	5.0	(CL) Dark Brown Sandy CLAY	32	16

	Moisture Content (%)	Dry Density (pcf)	Percent Saturation (%)	Void Ratio
INITIAL	18.6	108.9	91.8	0.547
FINAL	17.1	123.7	100.0	0.362

Specific Gravity: 2.7

Remark: SAMPLE SATURATED AT 1.05 KSF

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CONSOLIDATION TEST

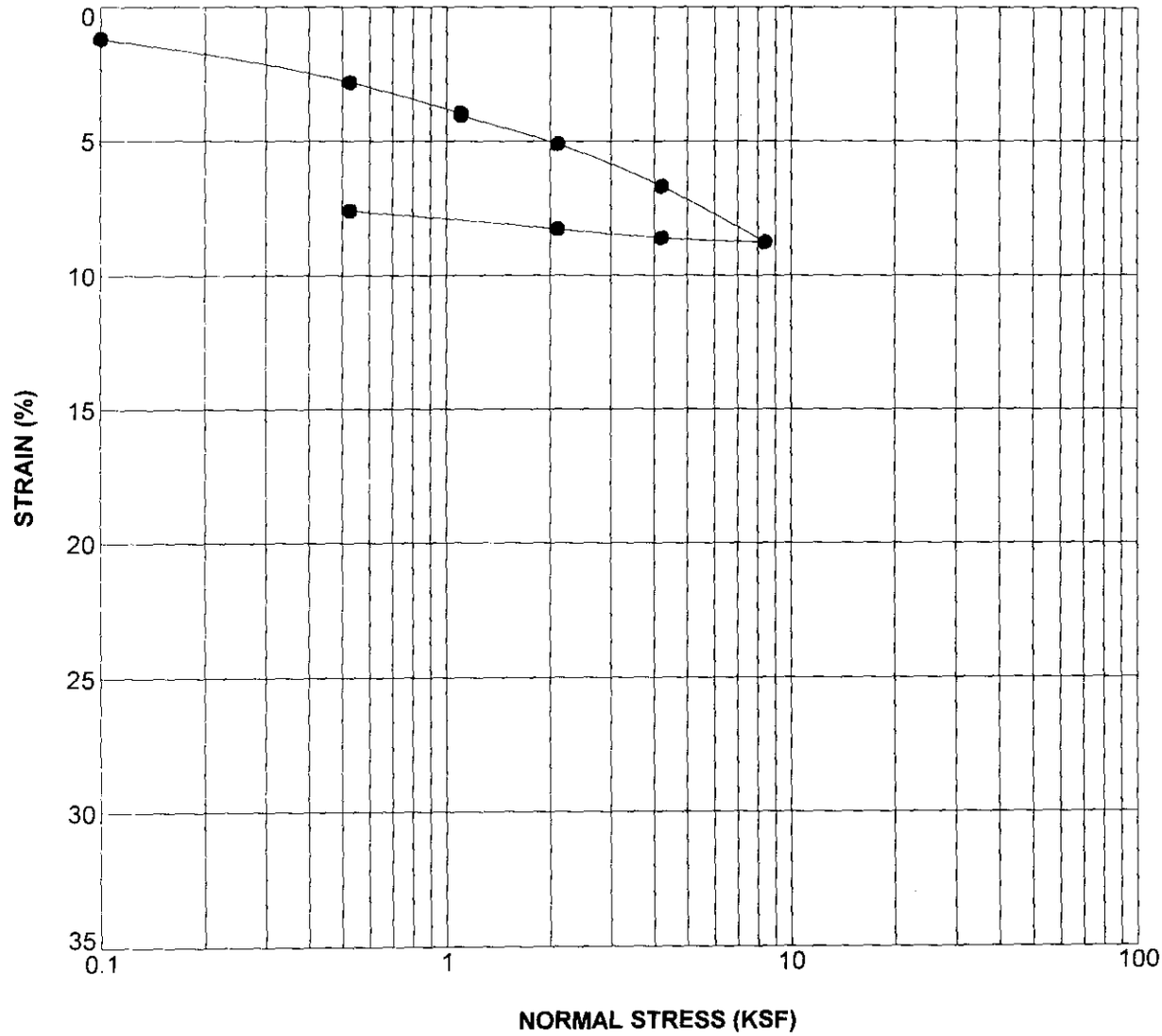
GROUP DELTA CONSULTANTS, INC.

Project: Playa Vista - Site DE & Ballona Creek

Location: Playa del Rey, California

Number: L-196

FIGURE **D-8**



SYMBOL	BORING	DEPTH (ft)	DESCRIPTION	Liquid Limit	Plastic Limit
●	B-305H	15.0	(ML) Olive Gray Sandy SILT	NON PLASTIC	

	Moisture Content (%)	Dry Density (pcf)	Percent Saturation (%)	Void Ratio
INITIAL	34.9	87.3	100.0	0.930
FINAL	29.8	106.1	100.0	0.588

Specific Gravity: 2.7

Remark: SAMPLE SATURATED AT 1.1 KSF

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GROUP DELTA CONSULTANTS

CONSOLIDATION TEST

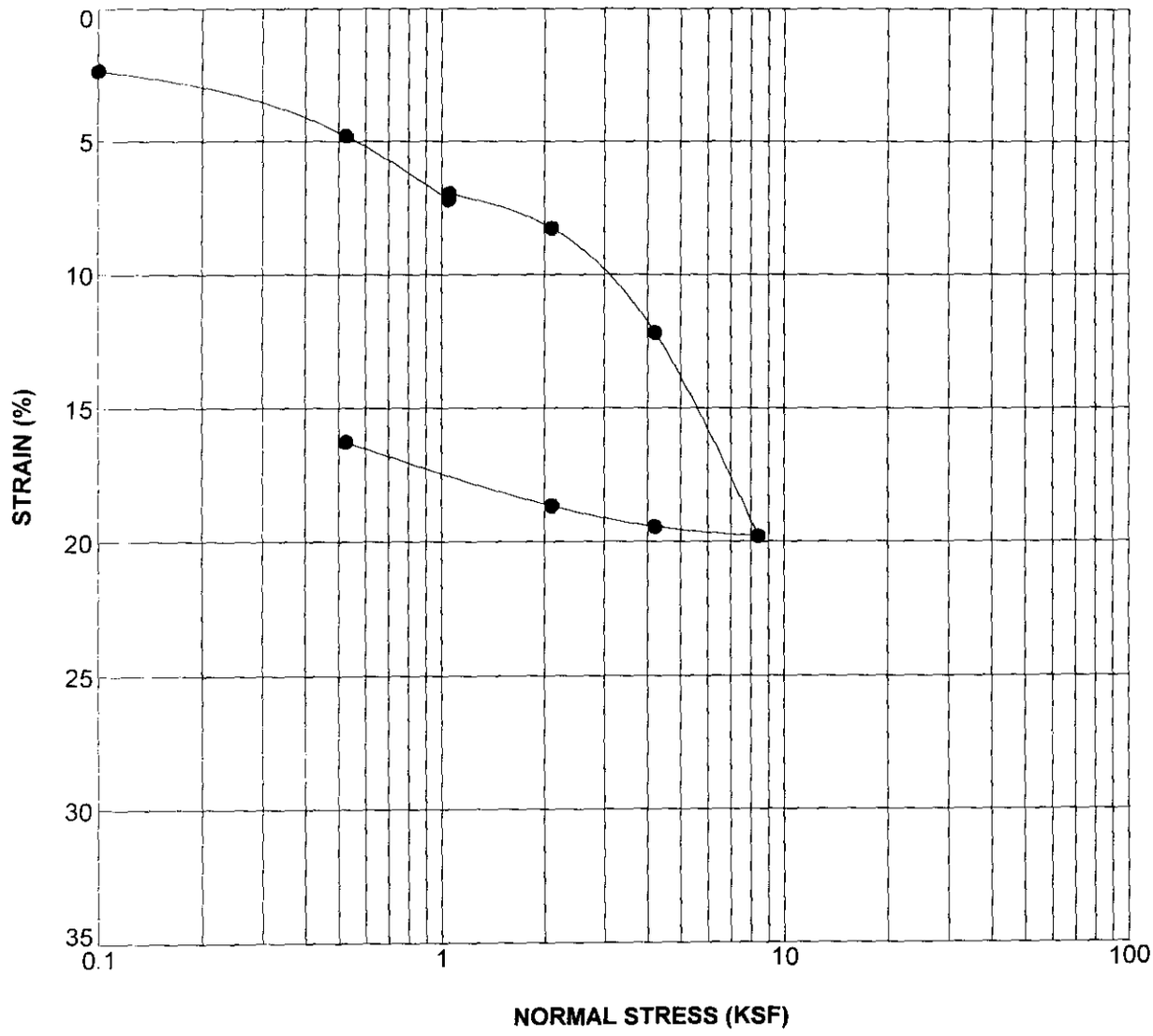
GROUP DELTA CONSULTANTS, INC.

Project: Playa Vista - Site DE & Ballona Creek

Location: Playa del Rey, California

Number: L-196

FIGURE **D-9**



SYMBOL	BORING	DEPTH (ft)	DESCRIPTION	Liquid Limit	Plastic Limit
●	B-305H	20.0	(CH) Black to Dark Gray CLAY	80	30

	Moisture Content (%)	Dry Density (pcf)	Percent Saturation (%)	Void Ratio
INITIAL	65.1	60.7	99.0	1.776
FINAL	32.8	83.4	86.8	1.020

Specific Gravity: 2.7

Remark: SAMPLE SATURATED AT 1.05 KSF

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CONSOLIDATION TEST

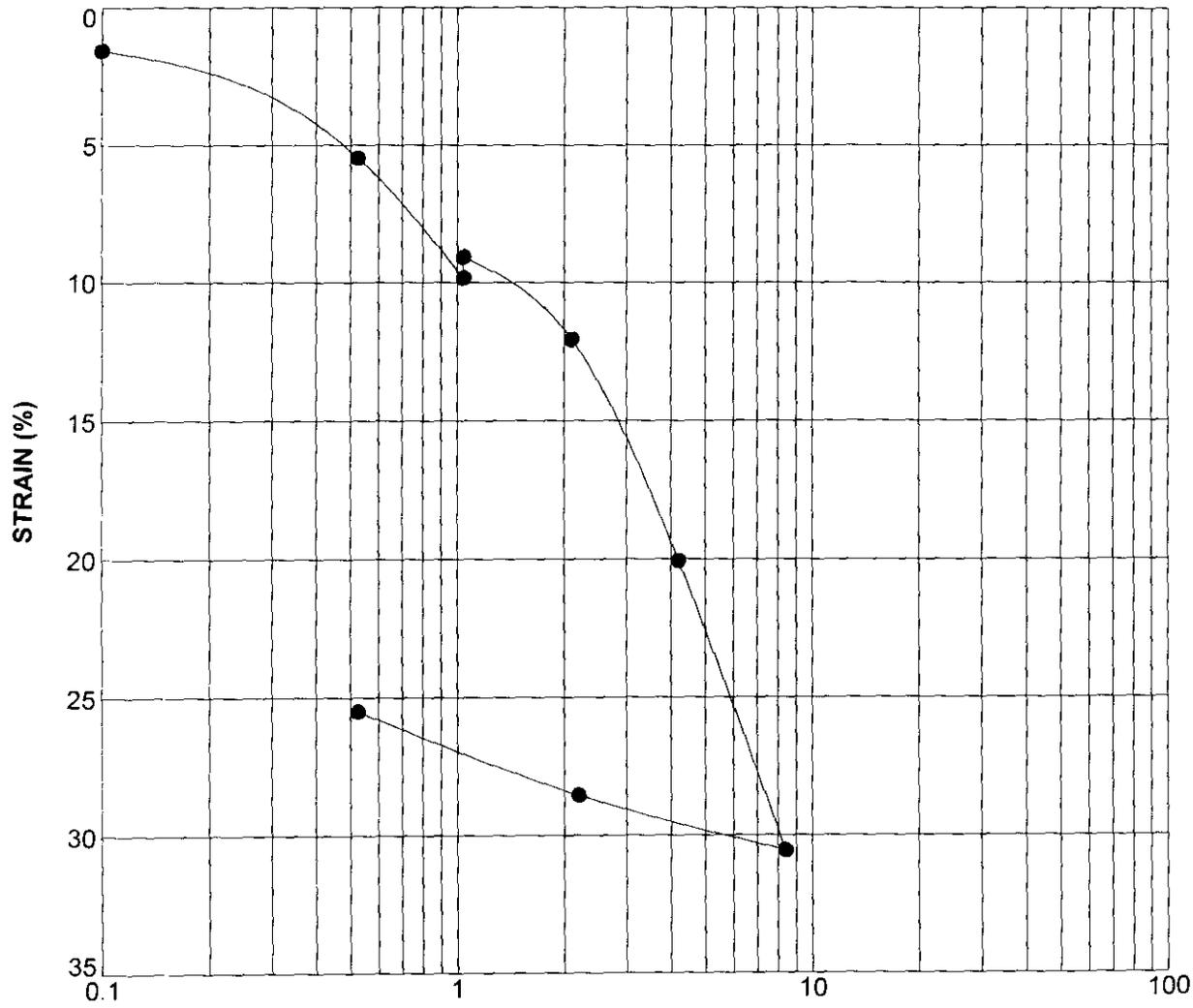
GROUP DELTA CONSULTANTS, INC.

Project: Playa Vista - Site DE & Ballona Creek

Location: Playa del Rey, California

Number: L-196

FIGURE **D-10**



SYMBOL	BORING	DEPTH (ft)	DESCRIPTION	Liquid Limit	Plastic Limit
●	B-307R	20.0	(CH) Dark Gray Sandy CLAY	78	34

	Moisture Content (%)	Dry Density (pcf)	Percent Saturation (%)	Void Ratio
INITIAL	82	50.1	93.7	2.362
FINAL	68.6	63.0	100.0	1.674

Specific Gravity: 2.7

Remark: SAMPLE SATURATED AT 1.05 KSF

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CONSOLIDATION TEST

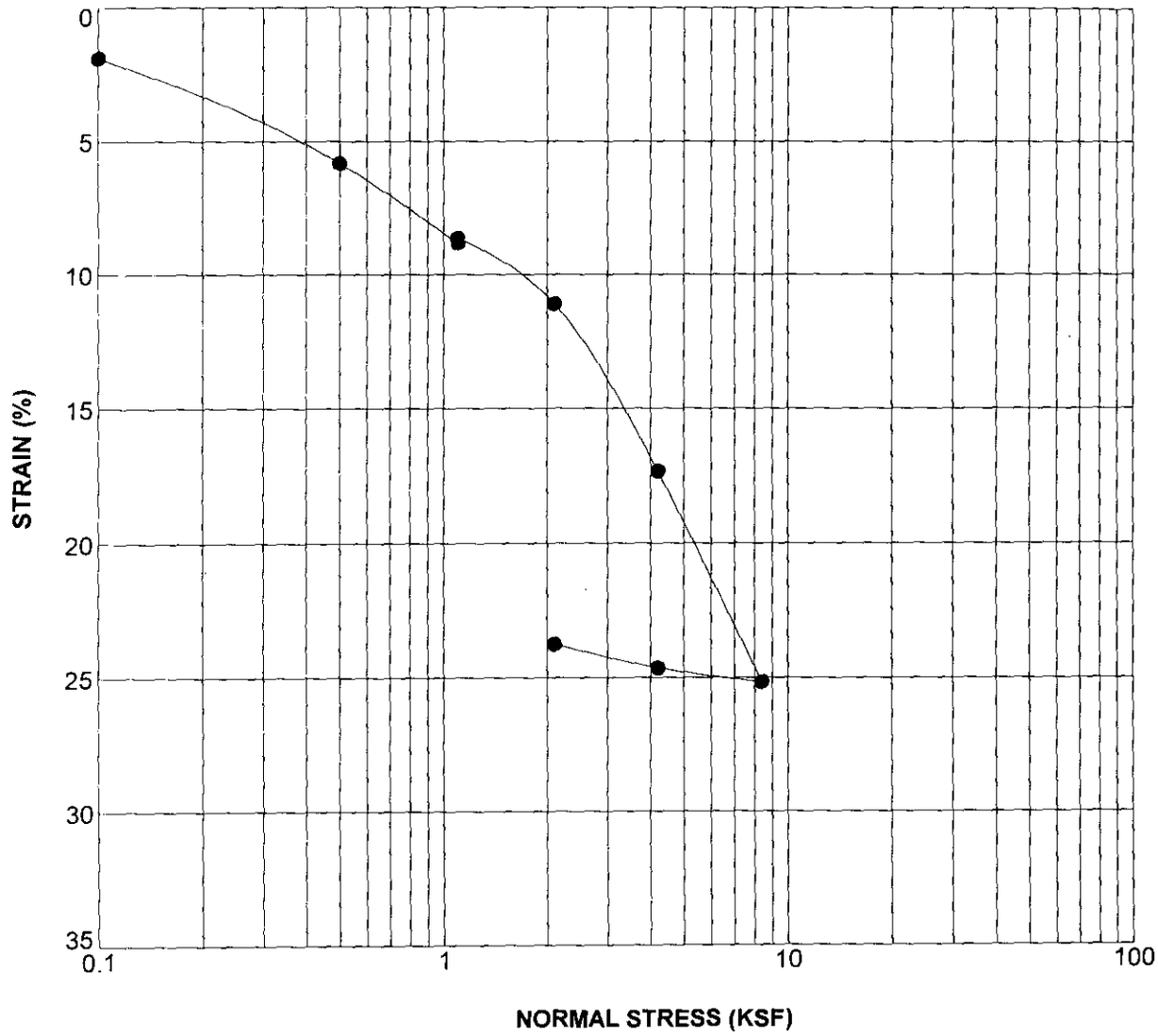
GROUP DELTA CONSULTANTS, INC.

Project: Playa Vista - Site DE & Ballona Creek

Location: Playa del Rey, California

Number: L-196

FIGURE **D-11**



SYMBOL	BORING	DEPTH (ft)	DESCRIPTION	Liquid Limit	Plastic Limit
●	B-313H	20.0	(CH) Dark Gray CLAY	94	34

	Moisture Content (%)	Dry Density (pcf)	Percent Saturation (%)	Void Ratio
INITIAL	86.4	52.9	100.0	2.185
FINAL	34.8	85.7	97.3	0.966

Specific Gravity: 2.7

Remark: SAMPLE SATURATED AT 1.1 KSF

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CONSOLIDATION TEST

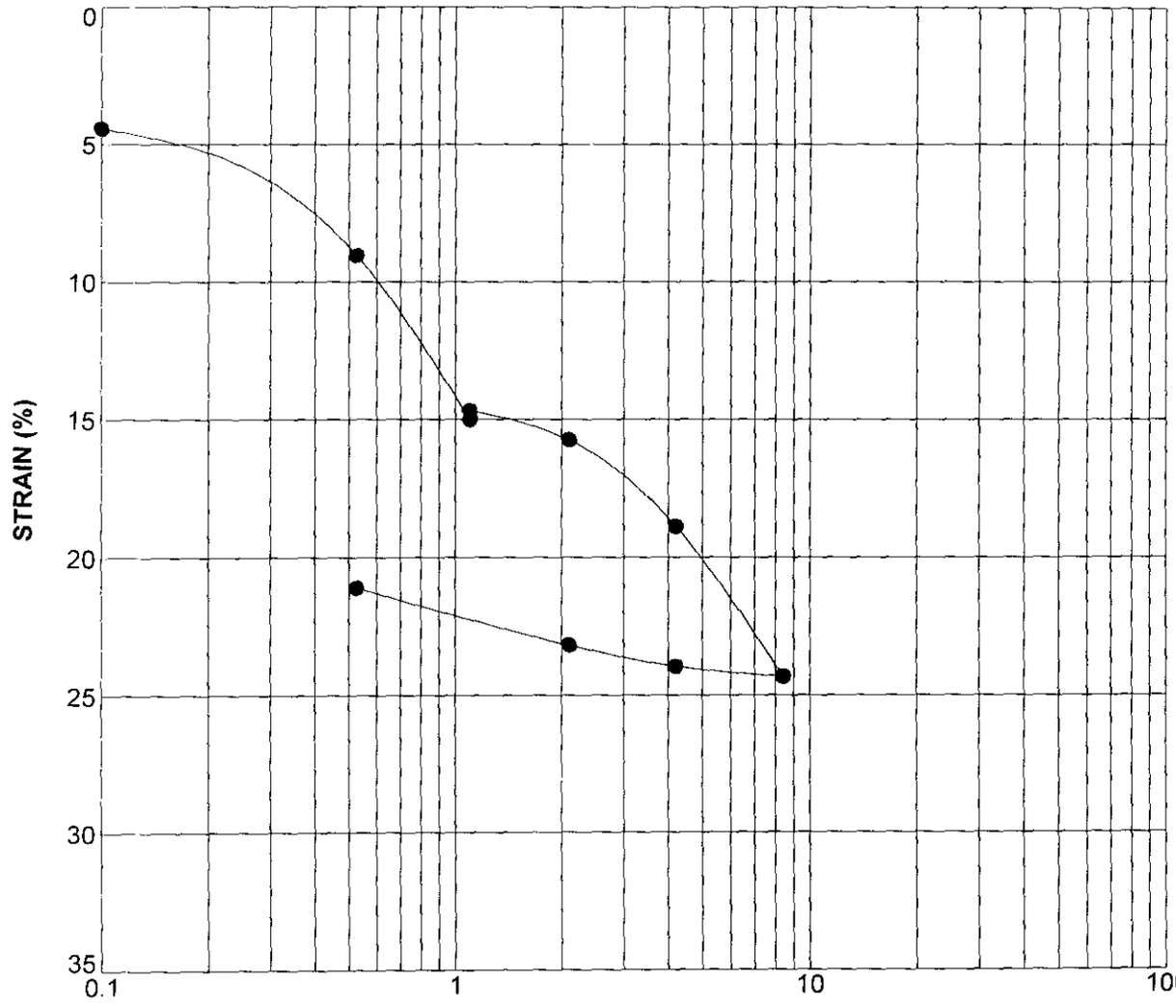
GROUP DELTA CONSULTANTS, INC.

Project: Playa Vista - Site DE & Ballona Creek

Location: Playa del Rey, California

Number: L-196

FIGURE **D-12**



SYMBOL	BORING	DEPTH (ft)	DESCRIPTION	Liquid Limit	Plastic Limit
●	B-315H	20.0	(MH) Dark Gray Clayey SILT	74	39

	Moisture Content (%)	Dry Density (pcf)	Percent Saturation (%)	Void Ratio
INITIAL	65.1	61.1	100.0	1.757
FINAL	30.0	88.0	88.6	0.915

Specific Gravity: 2.7

Remark: SAMPLE SATURATED AT 1.1 KSF

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GROUP DELTA CONSULTANTS

CONSOLIDATION TEST

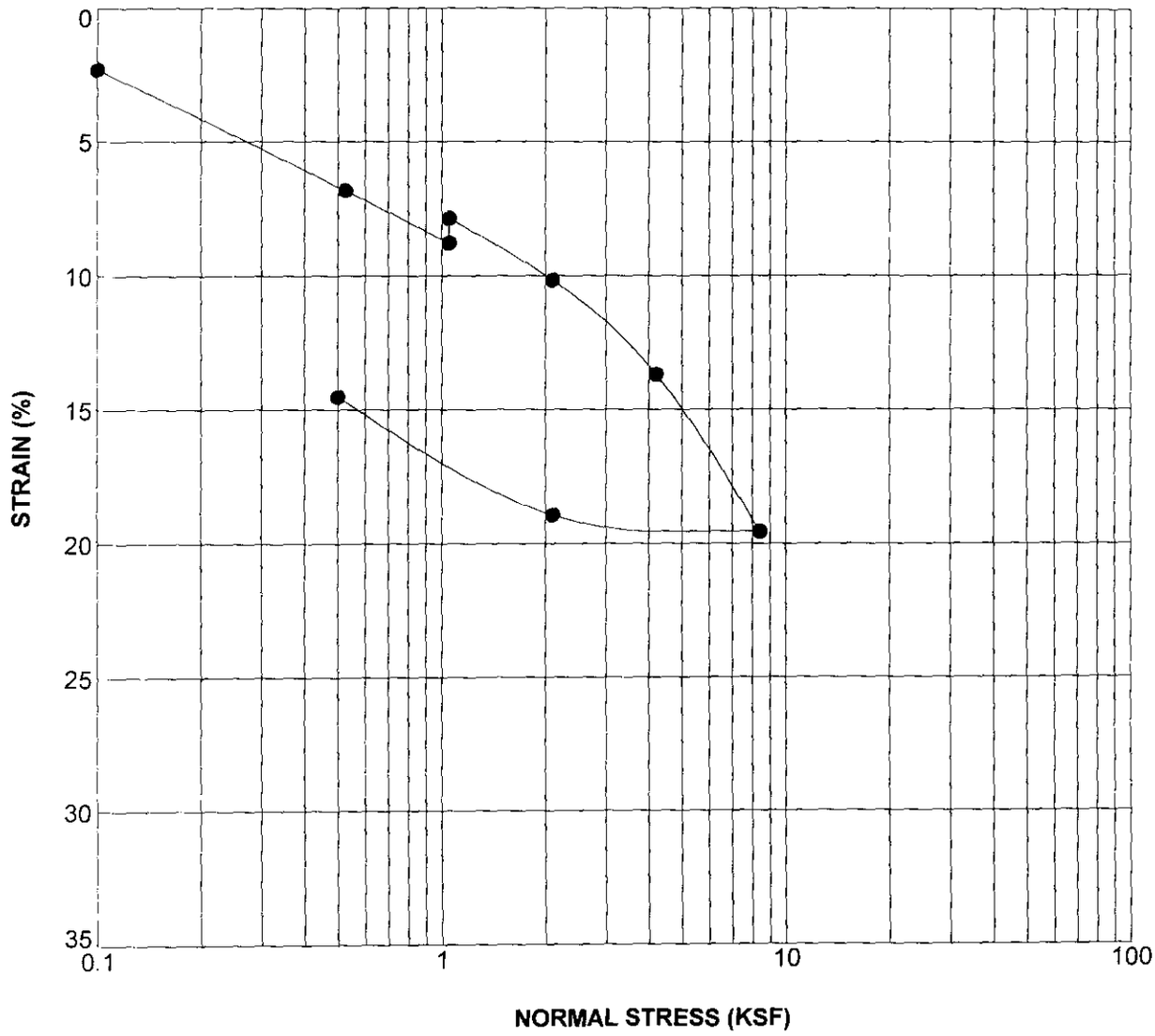
GROUP DELTA CONSULTANTS, INC.

Project: Playa Vista - Site DE & Ballona Creek

Location: Playa del Rey, California

Number: L-196

FIGURE **D-13**



SYMBOL	BORING	DEPTH (ft)	DESCRIPTION	Liquid Limit	Plastic Limit
●	B-319R	20.0	(MH) Dark Gray Clayey SILT	66	34

	Moisture Content (%)	Dry Density (pcf)	Percent Saturation (%)	Void Ratio
INITIAL	66.8	72.5	100.0	1.324
FINAL	57.0	70.0	100.0	1.407

Specific Gravity: 2.7

Remark: SAMPLE SATURATED AT 1.05 KSF

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CONSOLIDATION TEST

GROUP DELTA CONSULTANTS, INC.

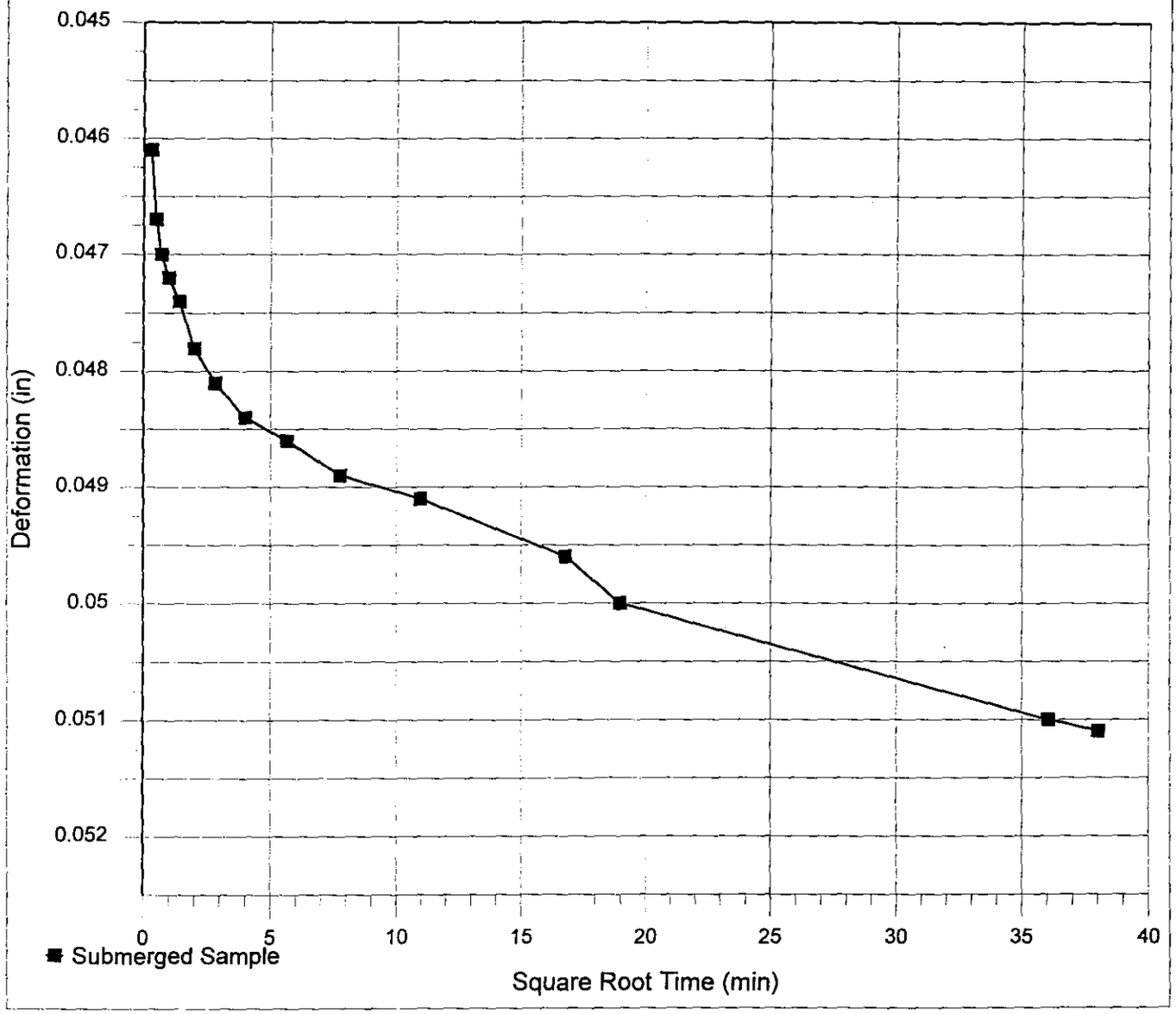
Project: Playa Vista - Site DE & Ballona Creek

Location: Playa del Rey, California

Number: L-196

FIGURE **D-14**

Deformation vs. Square Root Time



Sample Location: B-305H

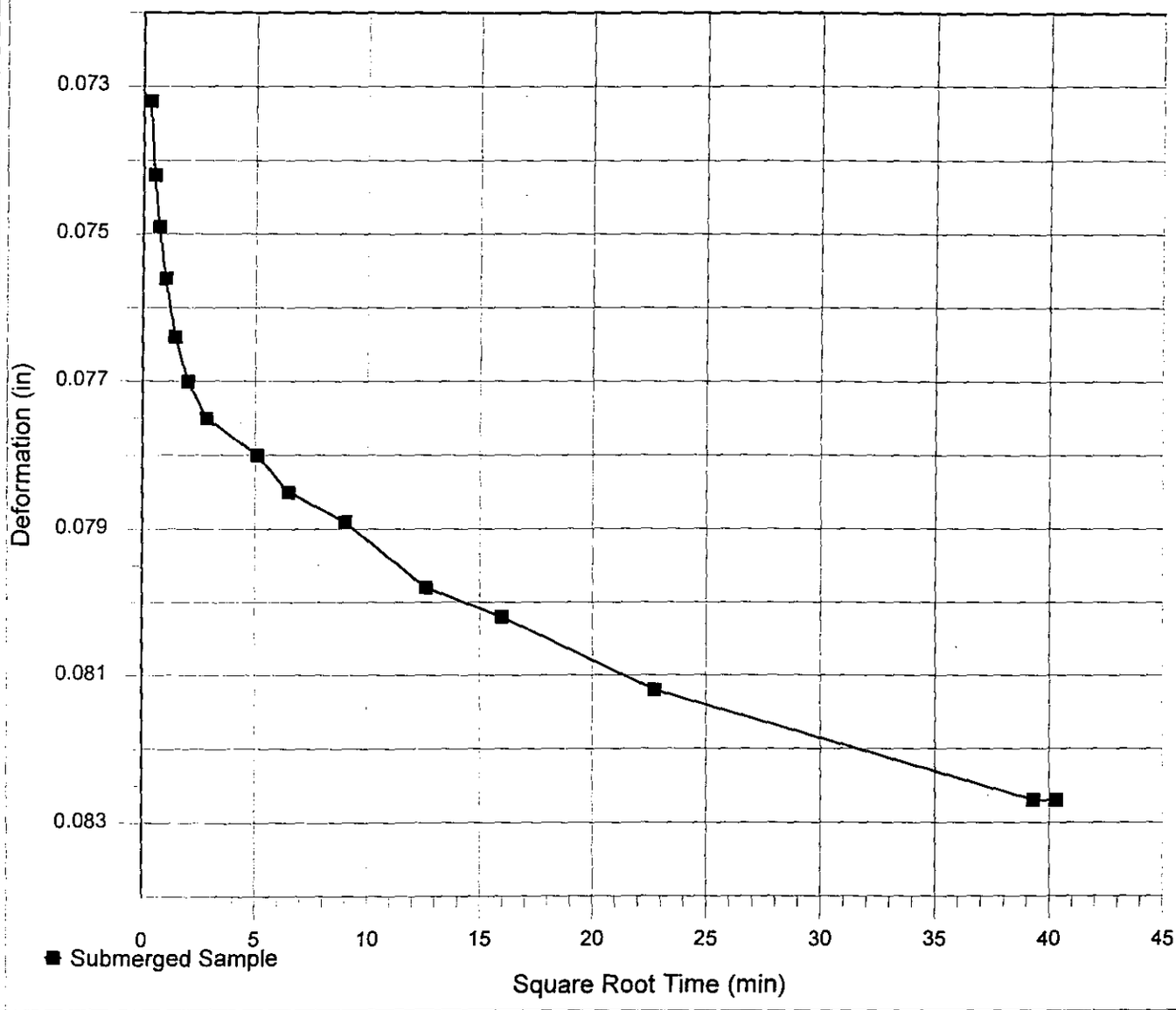
Confining Pressure: 2.1 KSF

Sample Depth: 15 feet

Soil Description: (SM) Olive Gray Silty SAND

GROUP DELTA CONSULTANTS	**TIME RATE CONSOLIDATION**	Project: Playa Vista
		Location: Site DE & Bollona Creek Channel
	GROUP DELTA CONSULTANTS, INC.	Number: L-196 Figure: **D-15**

Deformation vs. Square Root Time



Sample Location: B-305H

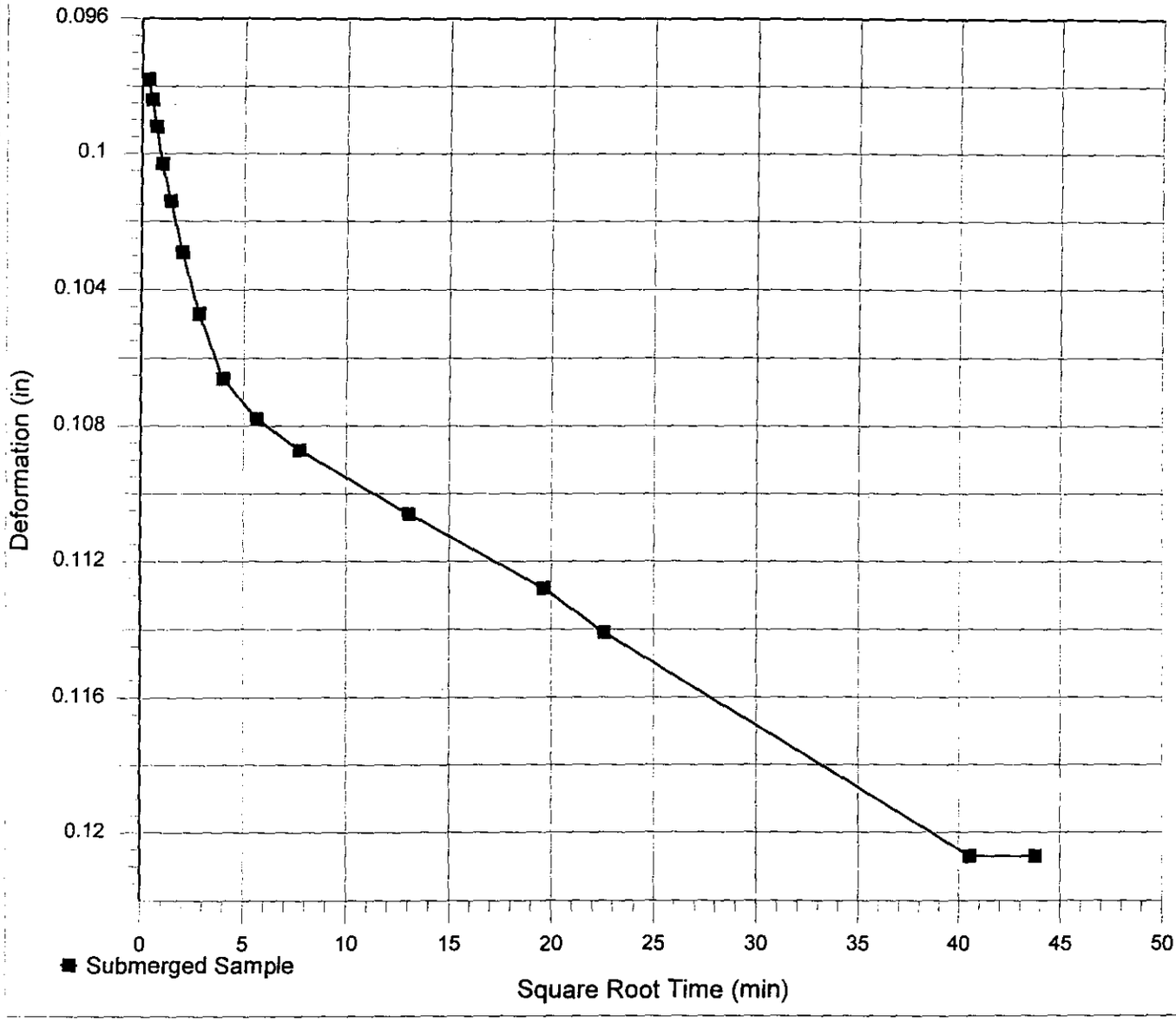
Confining Pressure: 2.1 KSF

Sample Depth: 20 feet

Soil Description: (CL) Dark Gray Silty CLAY

GROUP DELTA CONSULTANTS	**TIME RATE CONSOLIDATION**	Project: Playa Vista
		Location: Site DE & Bollona Creek Channel
	GROUP DELTA CONSULTANTS, INC.	Number: L-196 Figure: **D-16**

Deformation vs. Square Root Time



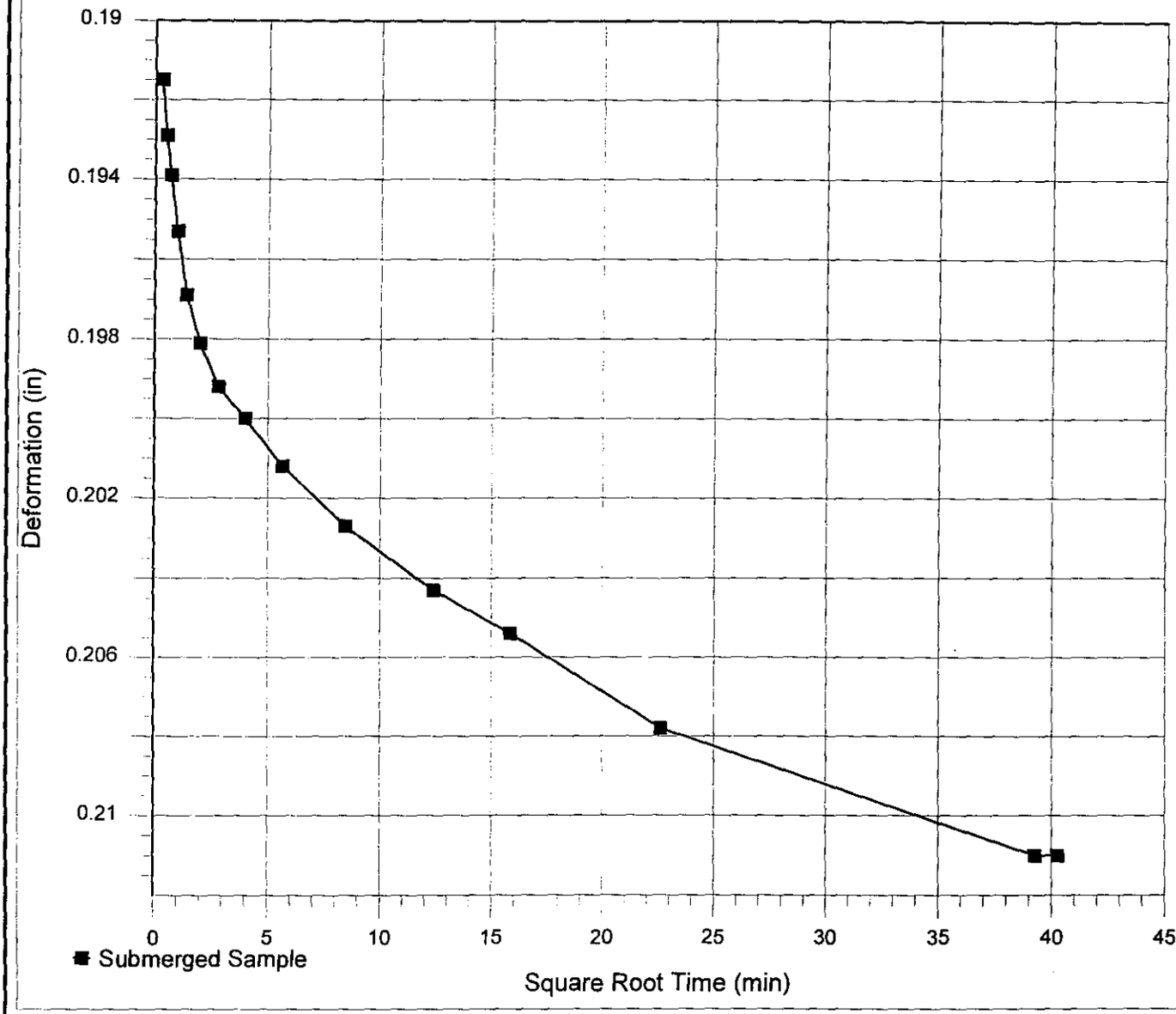
Sample Location: B-307R **Confining Pressure:** 2.1 KSF

Sample Depth: 20 feet

Soil Description: (CH) Dark Gray Sandy CLAY

GROUP DELTA CONSULTANTS	**TIME RATE CONSOLIDATION**	Project: Playa Vista
		Location: Site DE & Bollona Creek Channel
	GROUP DELTA CONSULTANTS, INC.	Number: L-196 Figure: **D-17**

Deformation vs. Square Root Time



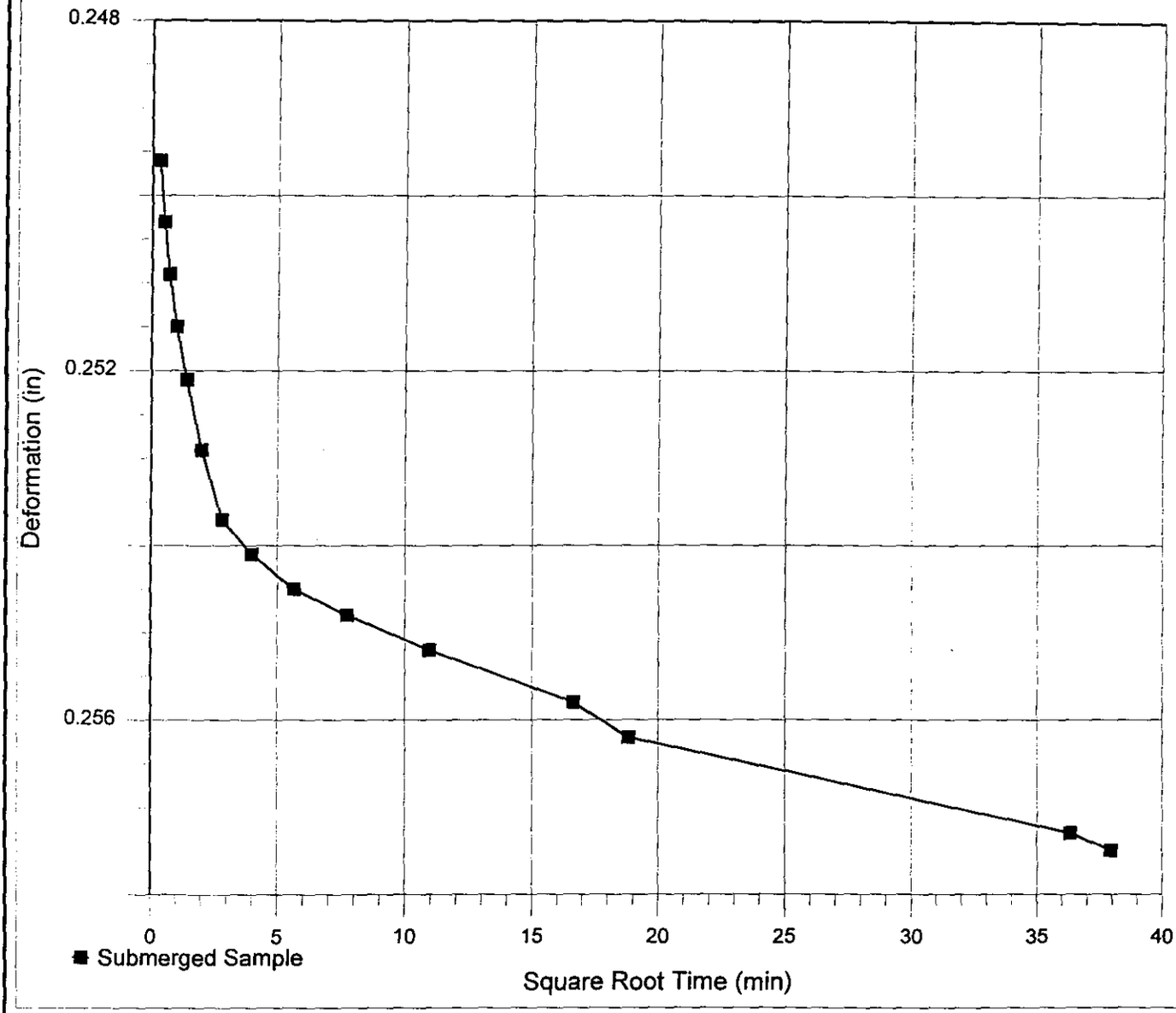
Sample Location: B-313H **Confining Pressure:** 2.1 KSF

Sample Depth: 20 feet

Soil Description: (CH/OH) Dark Gray Organic CLAY

GROUP DELTA CONSULTANTS	**TIME RATE CONSOLIDATION**	Project: Playa Vista
		Location: Site DE & Bollona Creek Channel
	GROUP DELTA CONSULTANTS, INC.	Number: L-196 Figure: **D-18**

Deformation vs. Square Root Time



Sample Location: B-315H

Confining Pressure: 2.1 KSF

Sample Depth: 20 feet

Soil Description: (MH) Dark Gray Silty CLAY

GROUP DELTA CONSULTANTS	**TIME RATE CONSOLIDATION**	Project: Playa Vista
		Location: Site DE & Bollona Creek Channel
	GROUP DELTA CONSULTANTS, INC.	Number: L-196 Figure: **D-19**

APPENDIX B

EXISTING LABORATORY DATA (Pacific Soils Engineering, 1998)

APPENDIX B

Laboratory Testing

The results of laboratory testing performed during this study (for the subject site and the northerly neighboring site) are enclosed within this appendix. Table B-1 presents a summary of laboratory test results.

The following laboratory tests were performed on representative samples in accordance with the applicable latest standards or methods from the ASTM, Uniform Building Code (UBC) and California Department of Transportation.

Moisture and In-Place Density

The field moisture content and in-situ dry density were established on relatively undisturbed ring samples obtained from the borings. The moisture content was obtained in accordance with ASTM Test Method: D-2216. The in-situ dry density was computed using the net weight of the entire sample. The results of these tests are presented on the boring logs.

Classification

Soils were classified with respect to the Unified Soil Classification System (USCS) in accordance with ASTM Test Methods: D-2487 and D-2488.

Direct Shear Tests

Direct shear tests were performed on two remolded samples that were saturated under a surcharge equal to the applied normal force during testing. The apparatus used is in conformance with the requirements outlined in ASTM Test Method D-3080. The test specimens, 2.5-inches in diameter and 1-inch in height, were subjected to simple shear along a plane at mid-height.

The samples were sheared under various normal loads, a different specimen being used for each normal load. A strain of 0.050-inches per minute was used to evaluate shear strength values. The specimens were sheared until the shear stress reached a constant value or until the sample deformation had reached approximately 10 percent of the original diameter.

The shear stress values obtained from the tests were plotted versus applied normal pressures. The best-fitting straight lines were drawn through the plotted points to obtain the shear strength envelopes. The cohesion and angle of internal friction of the soil materials were evaluated from the shear strength envelopes. The direct shear test results are shown on Plates _____.

Consolidation Tests

Consolidation tests were performed on undisturbed soils samples in accordance with procedures outlined in ASTM Test Method D-2435. Samples were placed in a consolidometer and loads were applied incrementally in geometric progression. The sample (2.5-inches in diameter and 1-inch in height) was permitted to consolidate under each load increment until the slope of the characteristics linear secondary compression portion of the thickness versus log of time plot was apparent.

The percent consolidation for each load cycle was recorded as the ratio of the amount of vertical compression to the original 1-inch height. Hydroconsolidation (collapse) and expansion characteristics were also evaluated by monitoring the change in volume with saturation while the specimen was confined under constant normal street. The consolidation test results are shown on Plates B-17 through B-21.

Maximum Density/Optimum Moisture

The maximum dry density and optimum moisture content of two representative bulk samples was evaluated in accordance with ASTM Test Method D 1557-91/Method A. The results of this test are summarized in Table B-1.

Particle Size Analysis

Modified hydrometer portion ASTM Test Method D-2422-72 were conducted to aid in classification of the soils. The results of the particle size analysis are presented in Table B-1.

Expansion Index Tests

An expansion index test was performed to evaluate the expansion potential of typical onsite soils. Testing was carried out according to UBC Method 29-2. The results are presented in Table B-1.

TABLE B-1

Playa Vista W.O.500464

SUMMARY OF LABORATORY TEST DATA

Boring	Depth (feet)	Soil Description	Group Classif-ication	% Gravel	% Sand	% Silt	% Clay	Max.Dry Density (pcf)	Opt. Moist. (%)	EI	RV
B-01	15.0	Silty Sand/Sandy Si	SM/ML	0	50	40	10				
B-01	25.0	Sandy Silt	ML	0	40	38	22				
B-01	40.0	Clayey Silt	ML	0	2	58	40				
B-02	0.0	Clayey Sand	SC	7	50	21	22	127.5	8.9	17	
B-02	20.0	Silty Clay	CL	0	27	31	42				
B-02	30.0	Clayey Silt	ML	0	7	63	30				
B-03	15.0	Sandy Clayey Silt	ML	0	23	59	18				
B-03	20.0	Silty Clay	CL	0	0	47	53				
B-03	35.0	Sandy Silt	ML	0	35	50	15				
B-03	40.0	Sand	SP	32	65	1	2				
B-03	65.0	Sand	SP	7	85	5	3				
B-04	10.0	Clay	CL	0	17	13	70				
B-04	25.0	Clayey Silt	ML	0	20	55	25				
B-04	45.0	Silty Clay	CL	0	0	37	63				
B-04	55.0	Clayey Silt	ML	0	0	52	48				
B-04	65.0	Sand	SP	0	90	7	3				
B-05	20.0	Silty Clay	CL	0	10	43	47				
B-05	55.0	Clayey Silt	ML	0	2	63	35				
B-06	30.0	Sandy Silt	ML	0	32	51	17				
B-06	45.0	Clayey Silt	ML	0	2	51	47				
B-06	70.0	Sand	SP	7	88	2	3				
B-07	0.0	Clayey Sand	SC	11	45	20	24	125.8	9.4		32
B-07	25.0	Clayey Sandy Silt	ML	0	38	37	25				
B-07	30.0	Sandy Silt	ML	0	47	43	10				
B-08	20.0	Clayey Silt	ML	0	2	71	27				
B-08	40.0	Clayey Silt	ML	0	0	53	47				
B-08	55.0	Clayey Silt	ML	0	5	57	38				
B-08	65.0	Sand	SP	0	97	1	2				

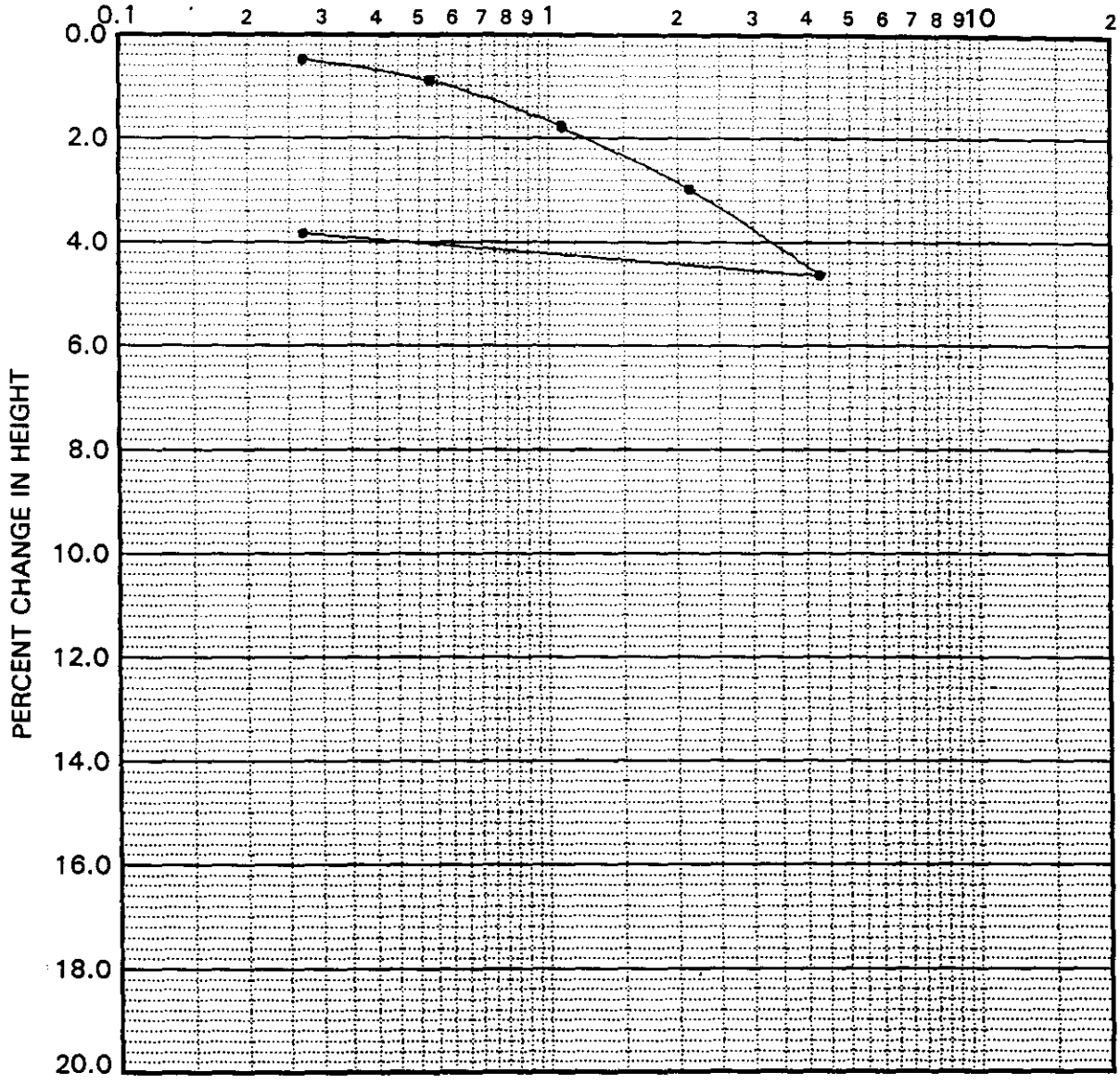
TABLE B-1

Playa Vista W.O.500464

SUMMARY OF LABORATORY TEST DATA

Boring	Depth (feet)	Soil Description	Group Classif-ication	% Gravel	% Sand	% Silt	% Clay	Max.Dry Density (pcf)	Opt. Moist. (%)	EI	RV
B-09	20.0	Clayey Silt	ML	0	12	50	38				
B-09	45.0	Clayey Silt	ML	0	15	58	27				
B-10	0.0	Sandy Clay	CL	4	44	24	28	123.3	10.0		
B-10	40.0	Clayey Silt	ML	0	0	68	32				
B-10	60.0	Sand	SP	20	78	0	3				
B-11	0.0	Sandy Clay	CL	5	38	27	30	121.4	10.1	34	
B-11	15.0	Silty Clay	CL	0	12	36	52				
B-11	25.0	Clayey Silt	ML	0	18	45	37				
B-11	35.0	Sandy Silt	ML	0	32	53	15				
B-11	60.0	Sand	SP	0	92	5	3				

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-01	25.0	106.0	19.9	60	ML	Sandy Silt

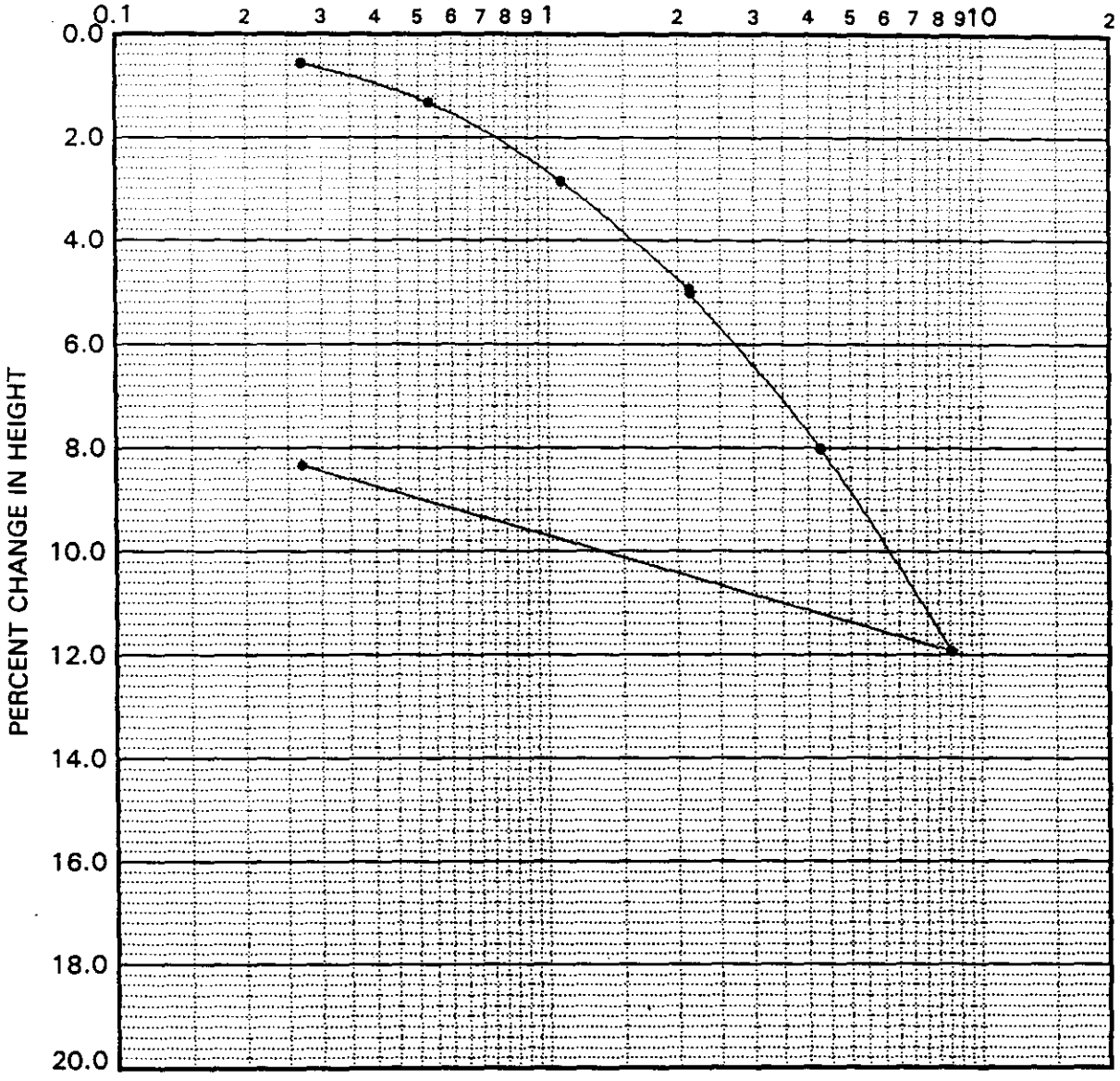
REMARKS: WATER ADDED AT 1.07 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-1

A-86



boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-01	40.0	89.0	33.4	98	ML	Clayey Silt

REMARKS: WATER ADDED AT 2.13 TSF

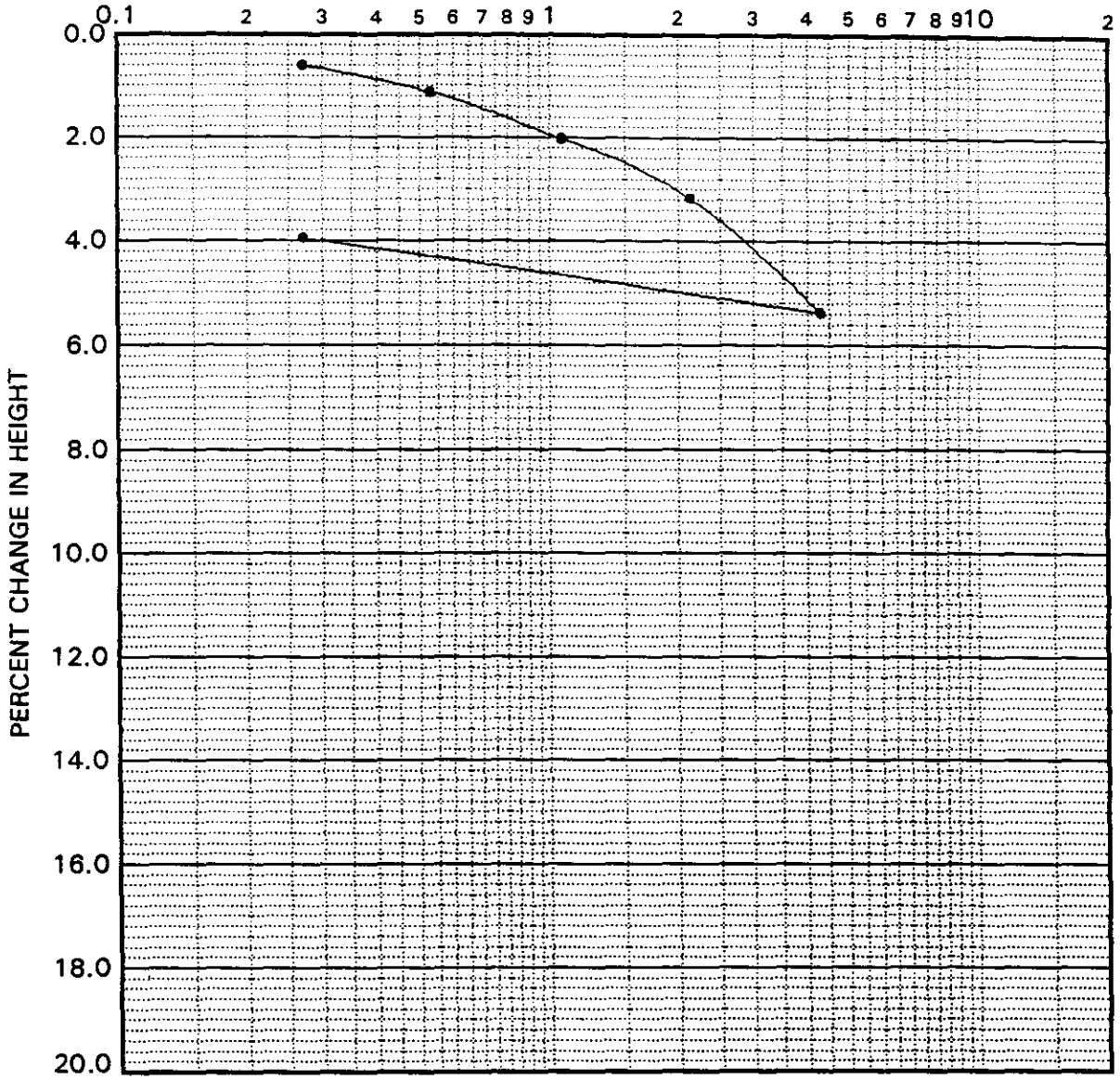
CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-2

A-87

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-02	30.0	94.1	29.9	93	ML	Clayey Silt

REMARKS: WATER ADDED AT 1.07 TSF

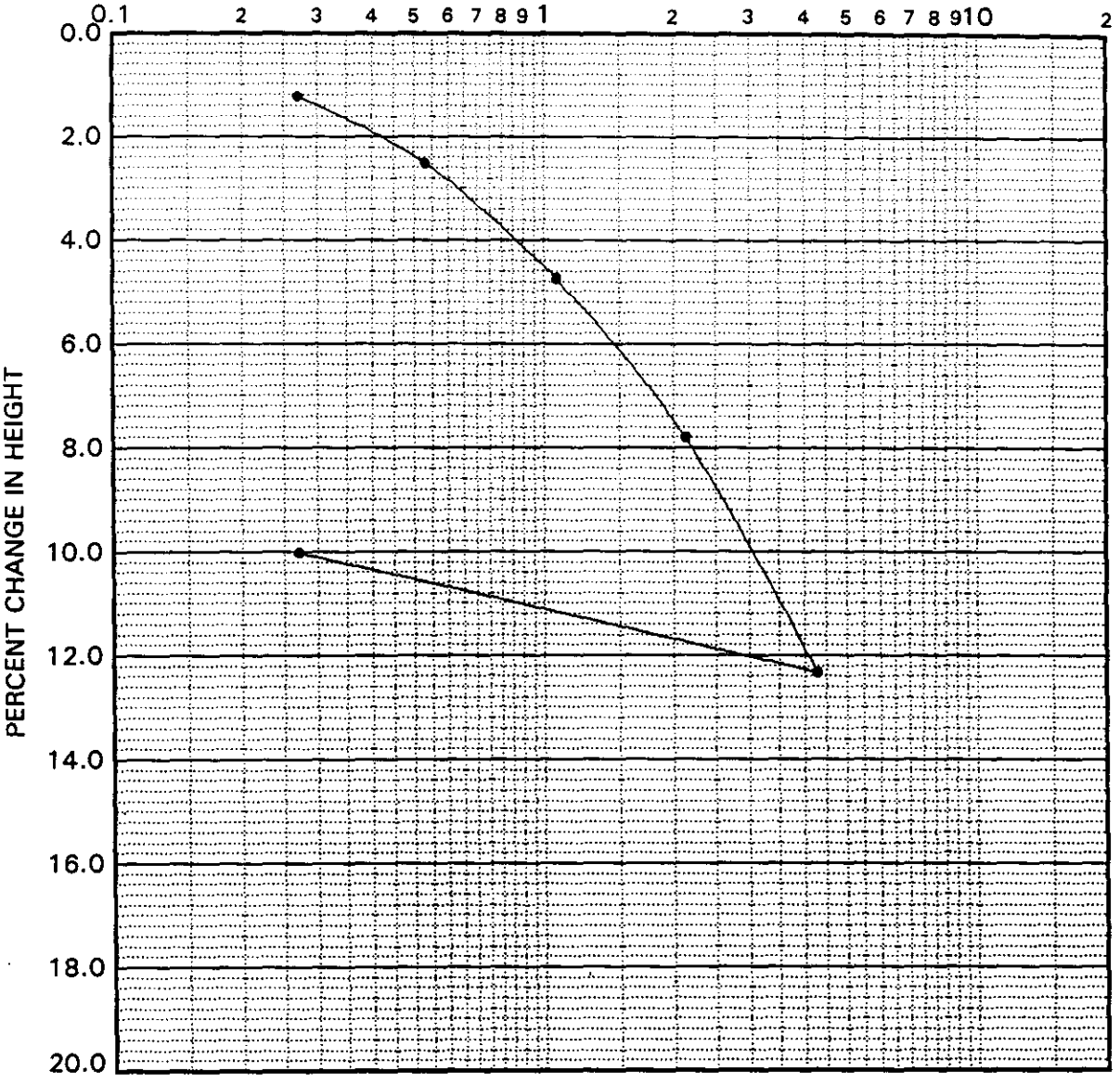
CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-3

A-88

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-03	20.0	73.4	48.5	100	CL	Silty Clay

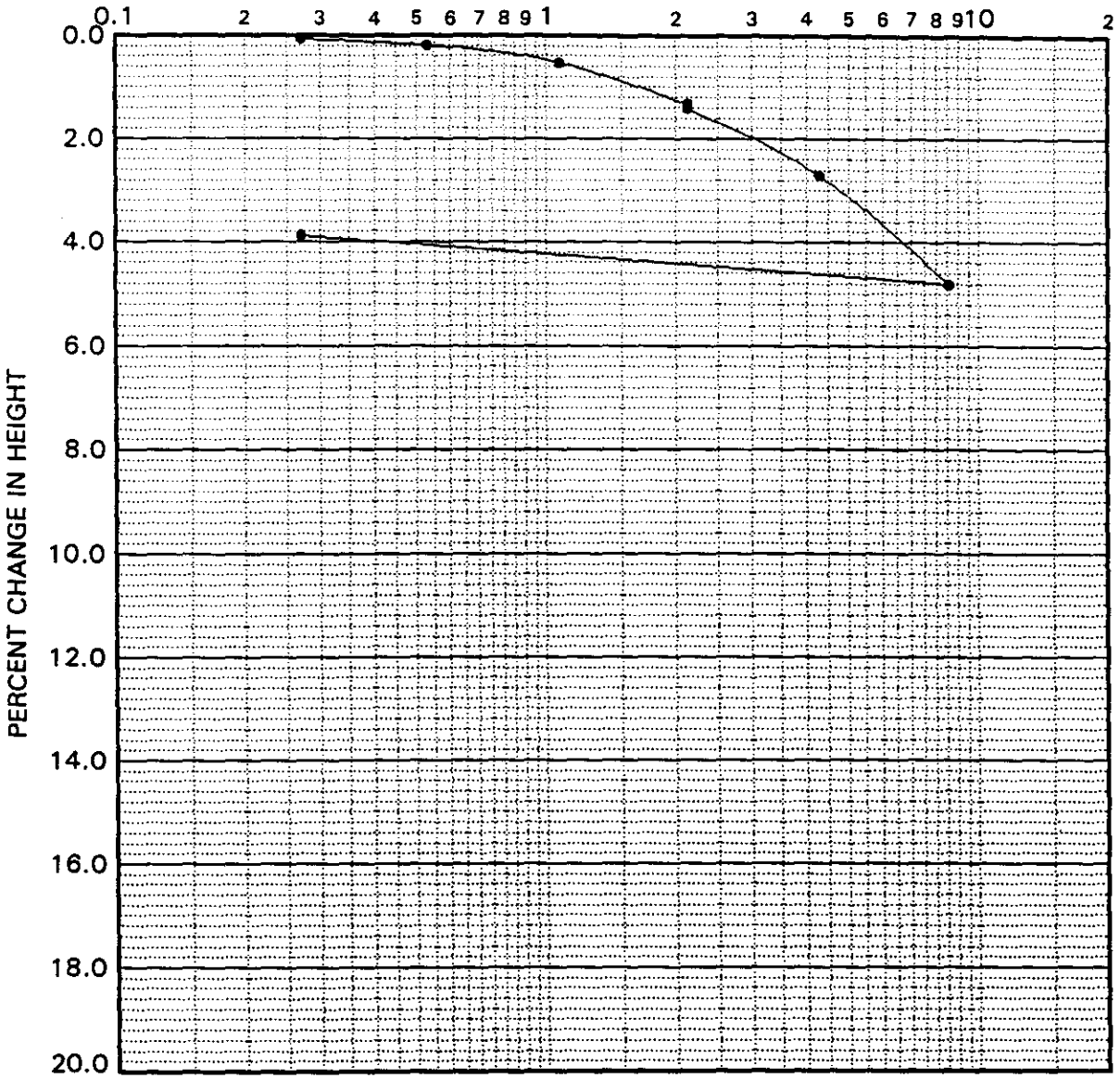
REMARKS: WATER ADDED AT 1.07 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-4

A-89



boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-03	40.0	101.4	11.9	3	SP	Sand

REMARKS: WATER ADDED AT 2.13 TSF

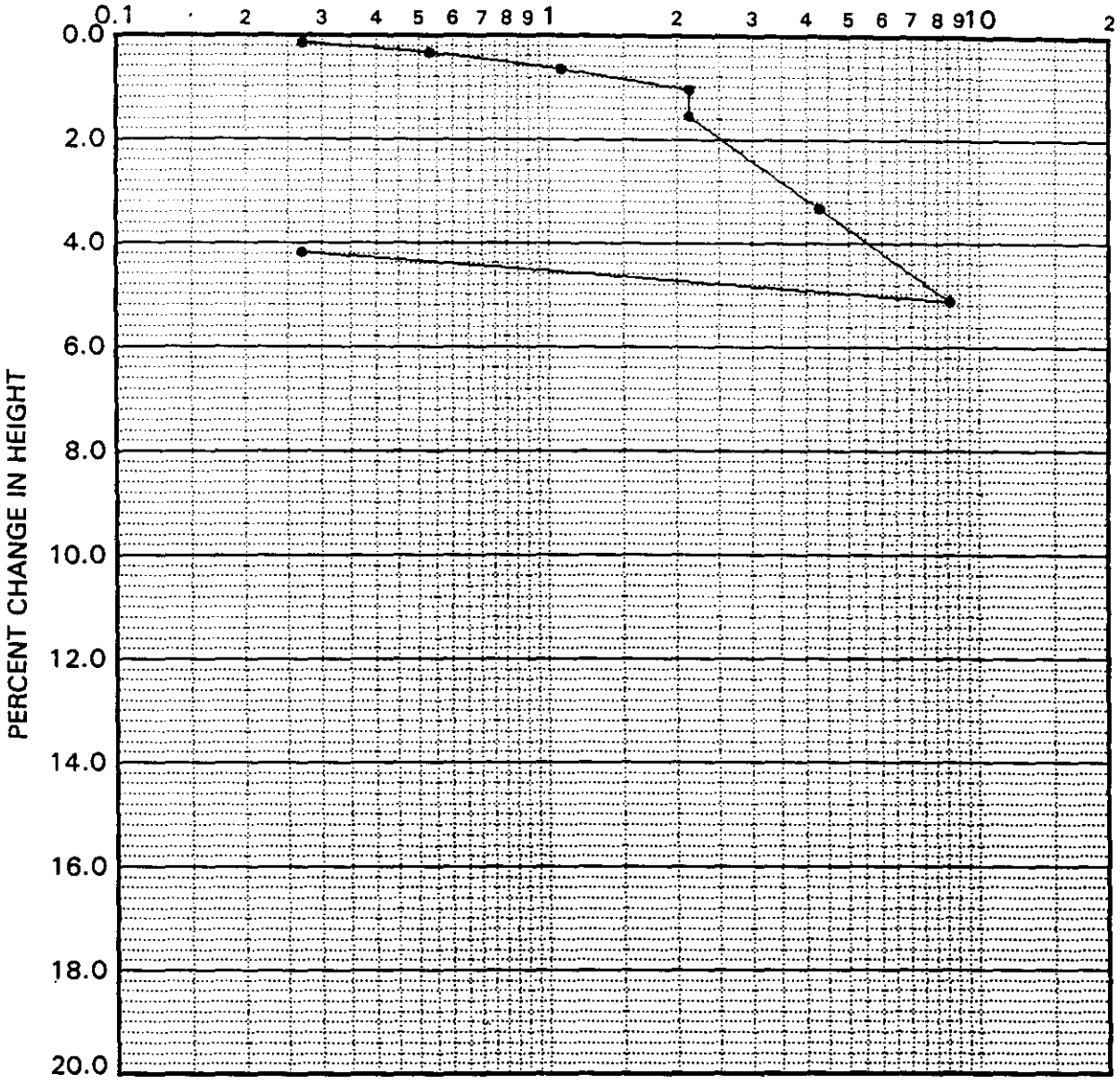
CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-5

A-90

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-03	65.0	117.5	16.5	8	SP	Sand

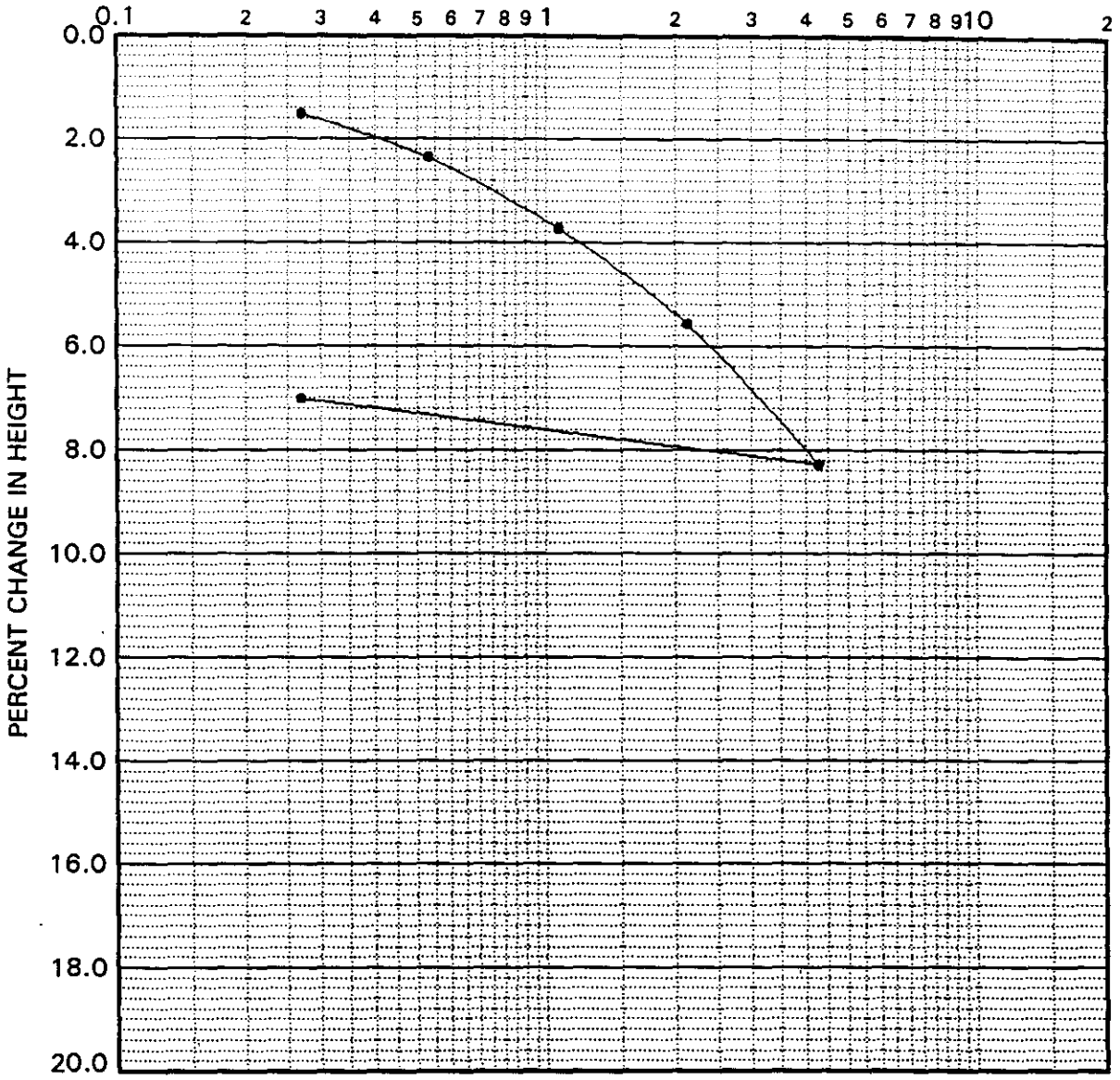
REMARKS: WATER ADDED AT 2.13 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-6

A-91



boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-04	25.0	93.2	32.3	80	ML	Clayey Silt

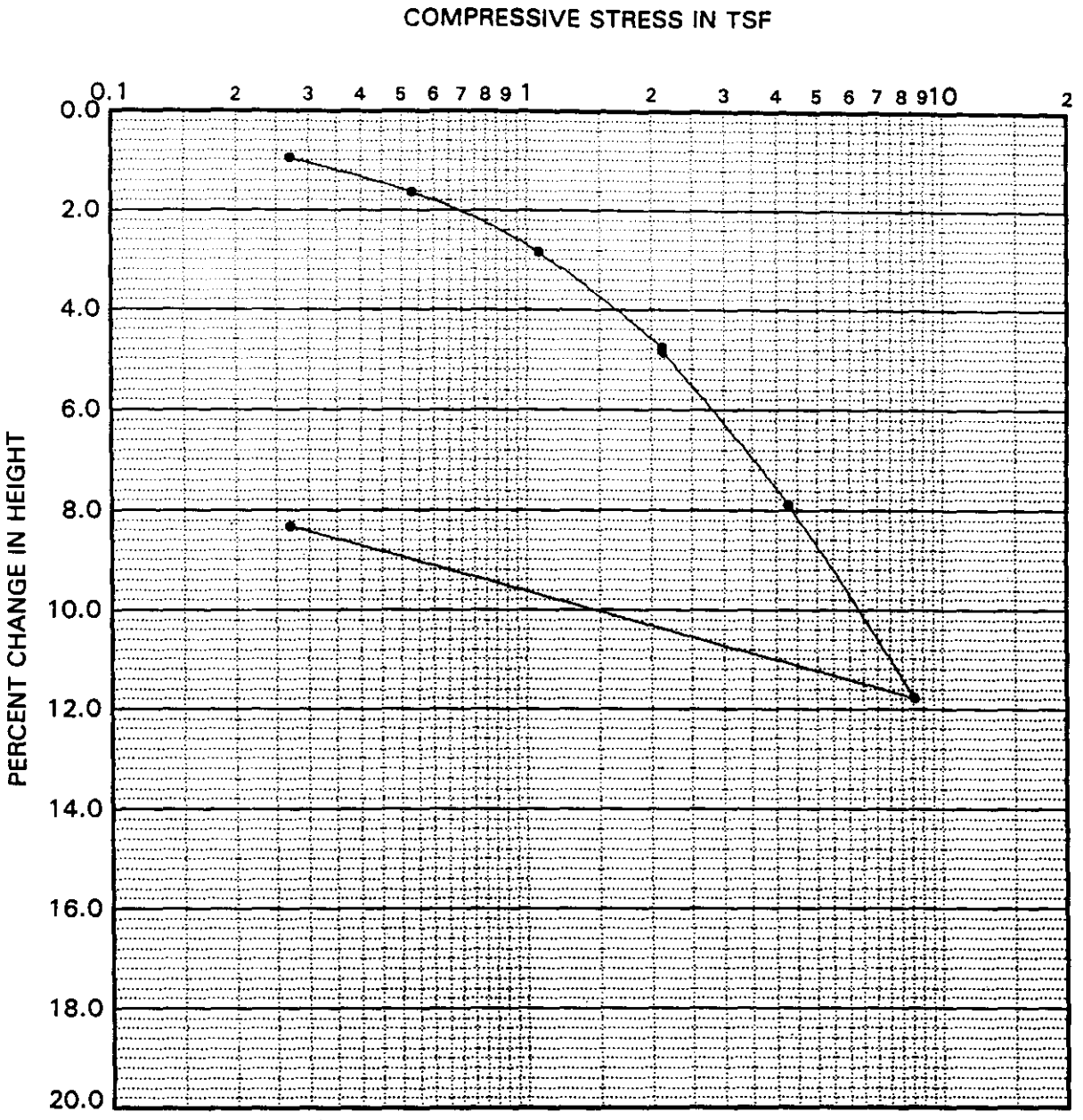
REMARKS: WATER ADDED AT 1.07 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-7

A-92



boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-04	55.0	81.1	41.8	100	ML	Clayey Silt

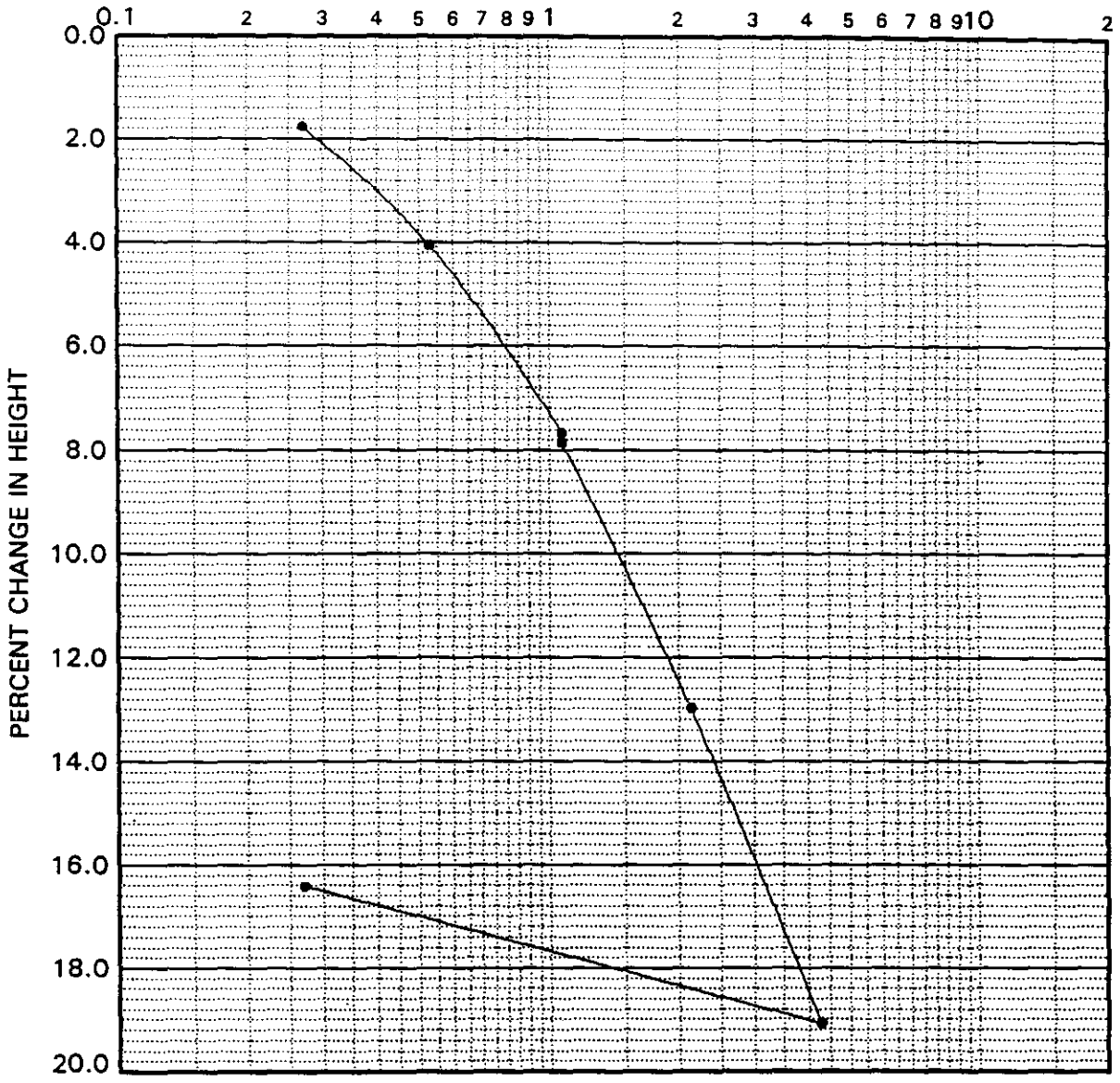
REMARKS: WATER ADDED AT 2.13 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-8

A-93



boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-05	20.0	57.7	70.8	90	CL	Silty Clay

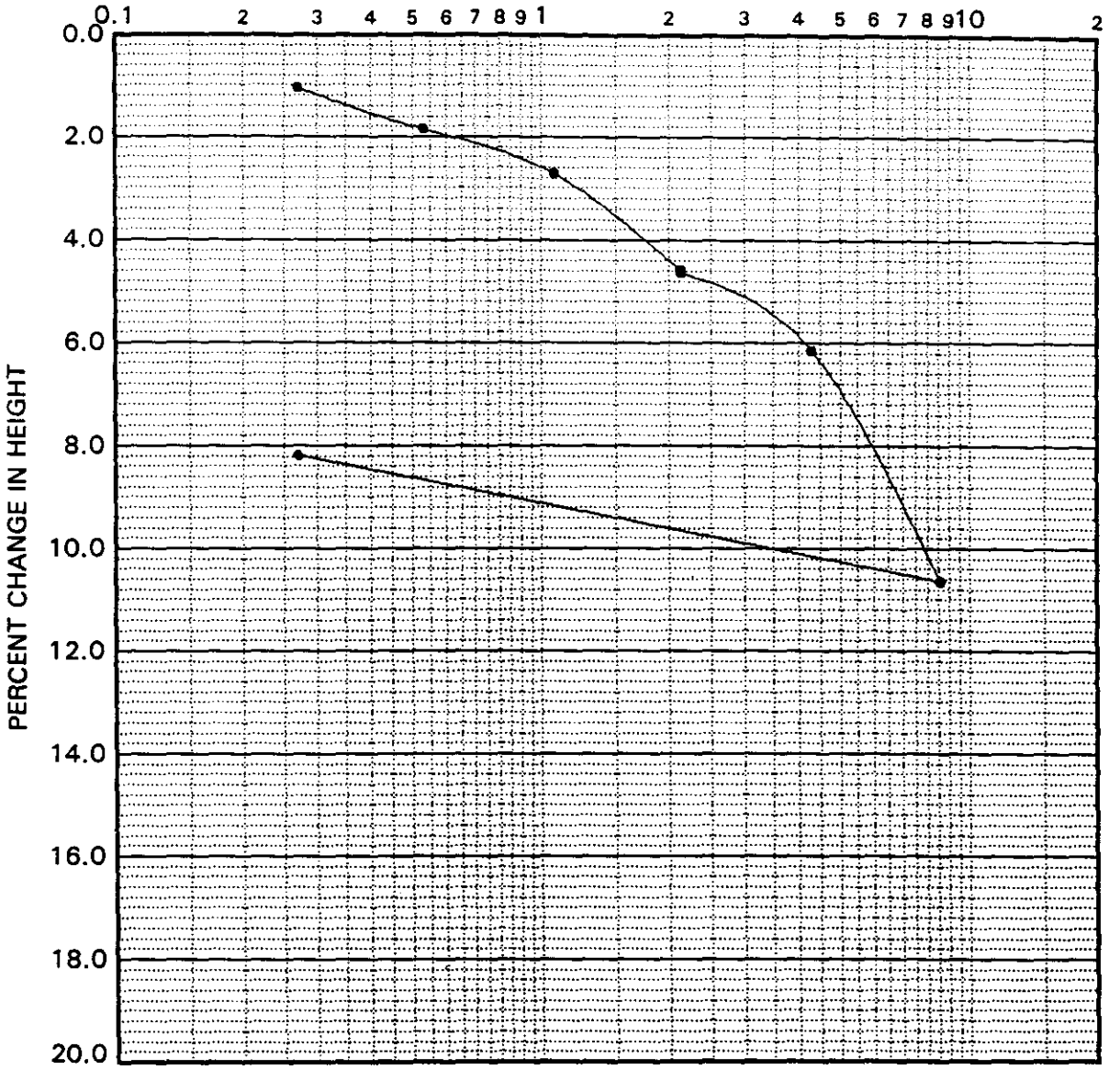
REMARKS: WATER ADDED AT 1.07 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-9

A-94



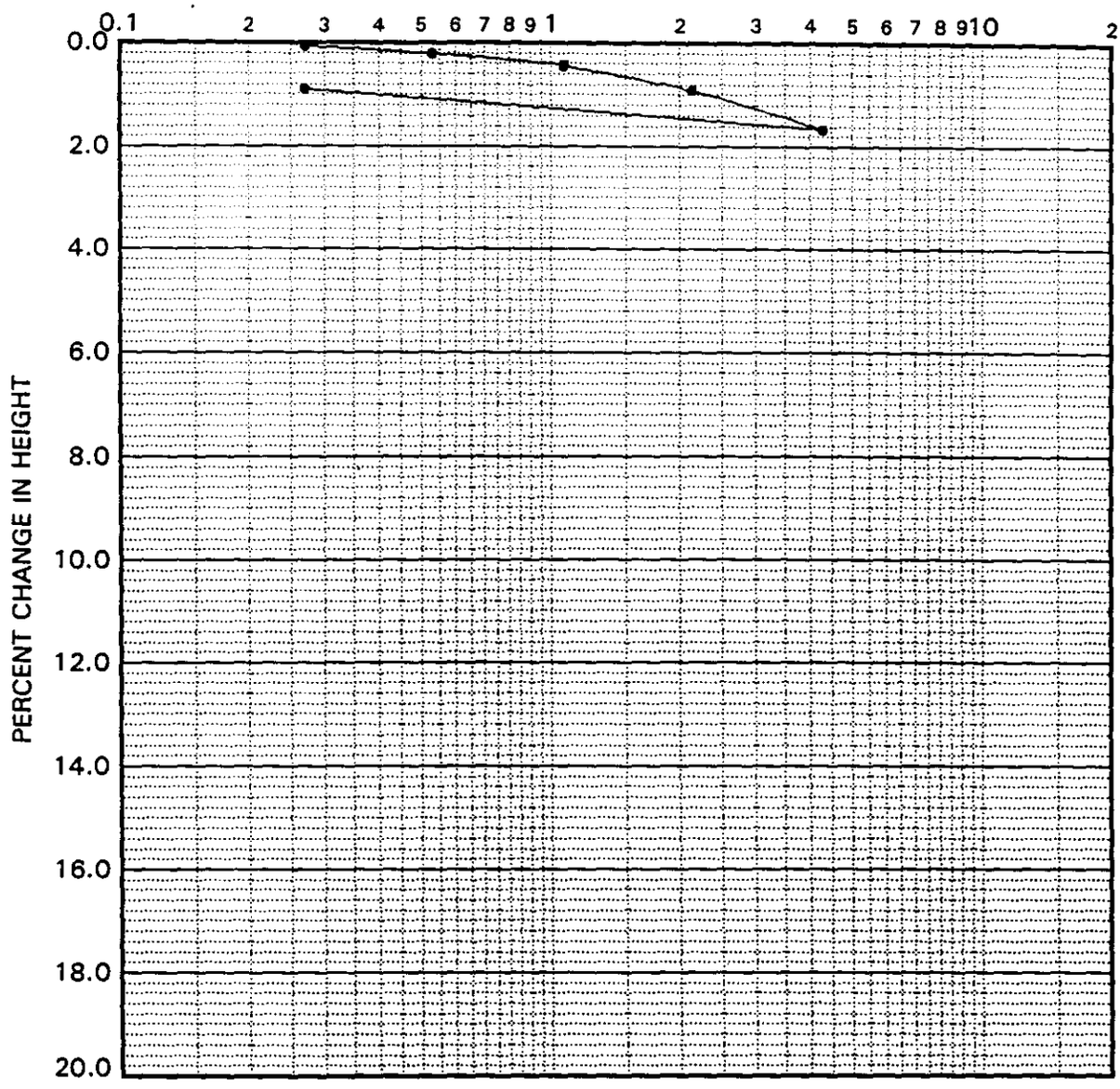
boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-05	55.0	93.1	29.7	98	ML	Clayey Silt

REMARKS: WATER ADDED AT 2.13 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122
W.O. 500464 PLATE B-10

A-95



boring	depth (ft.)	dry density	in situ, moist.	-200 sieve	group symbol	typical names
B-06	30.0	93.2	31.4	68	ML	Sandy Silt

REMARKS: WATER ADDED AT 1.07 TSF

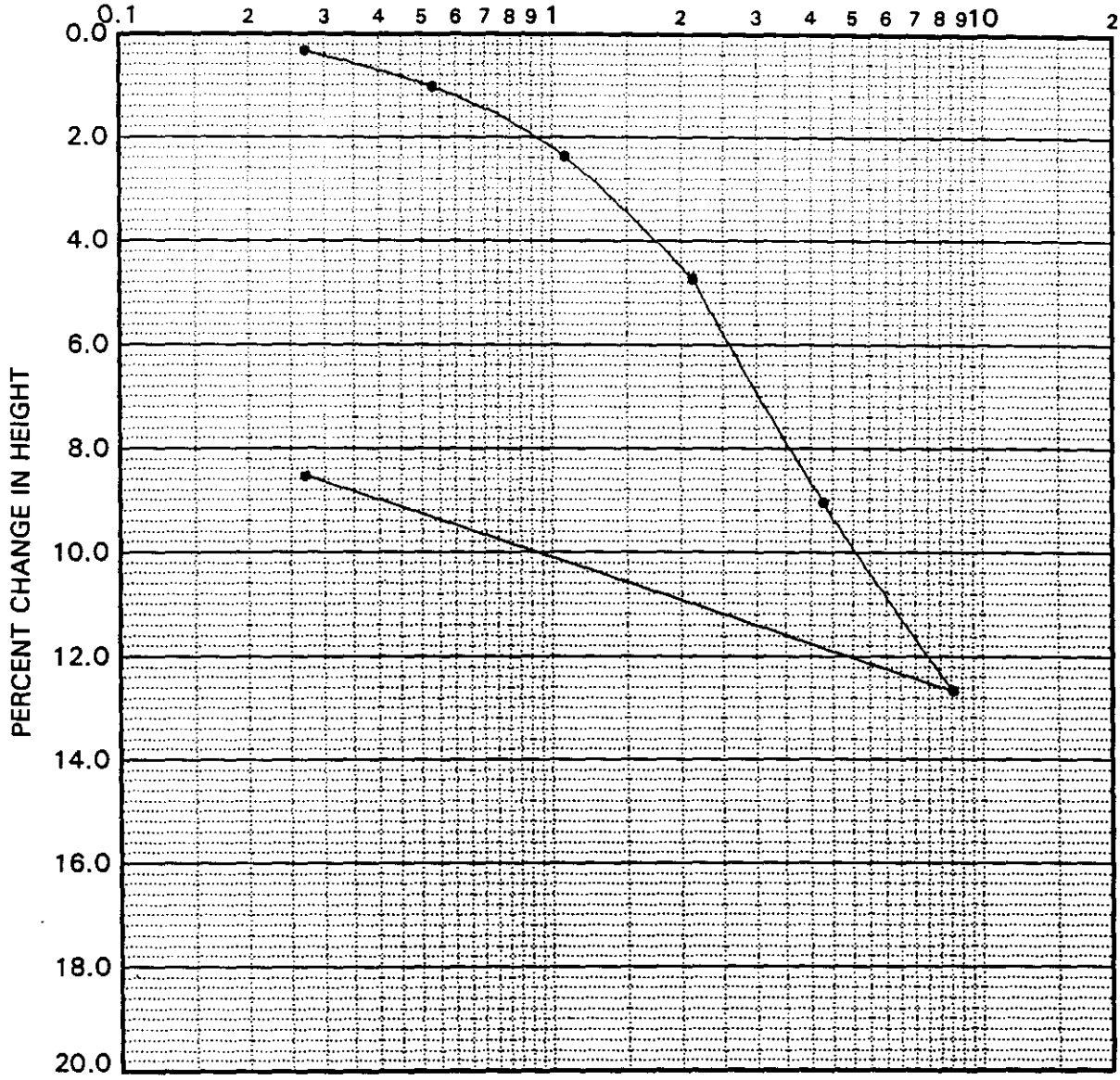
CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-11

A-96

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-06	45.0	79.1	33.6	98	ML	Clayey Silt

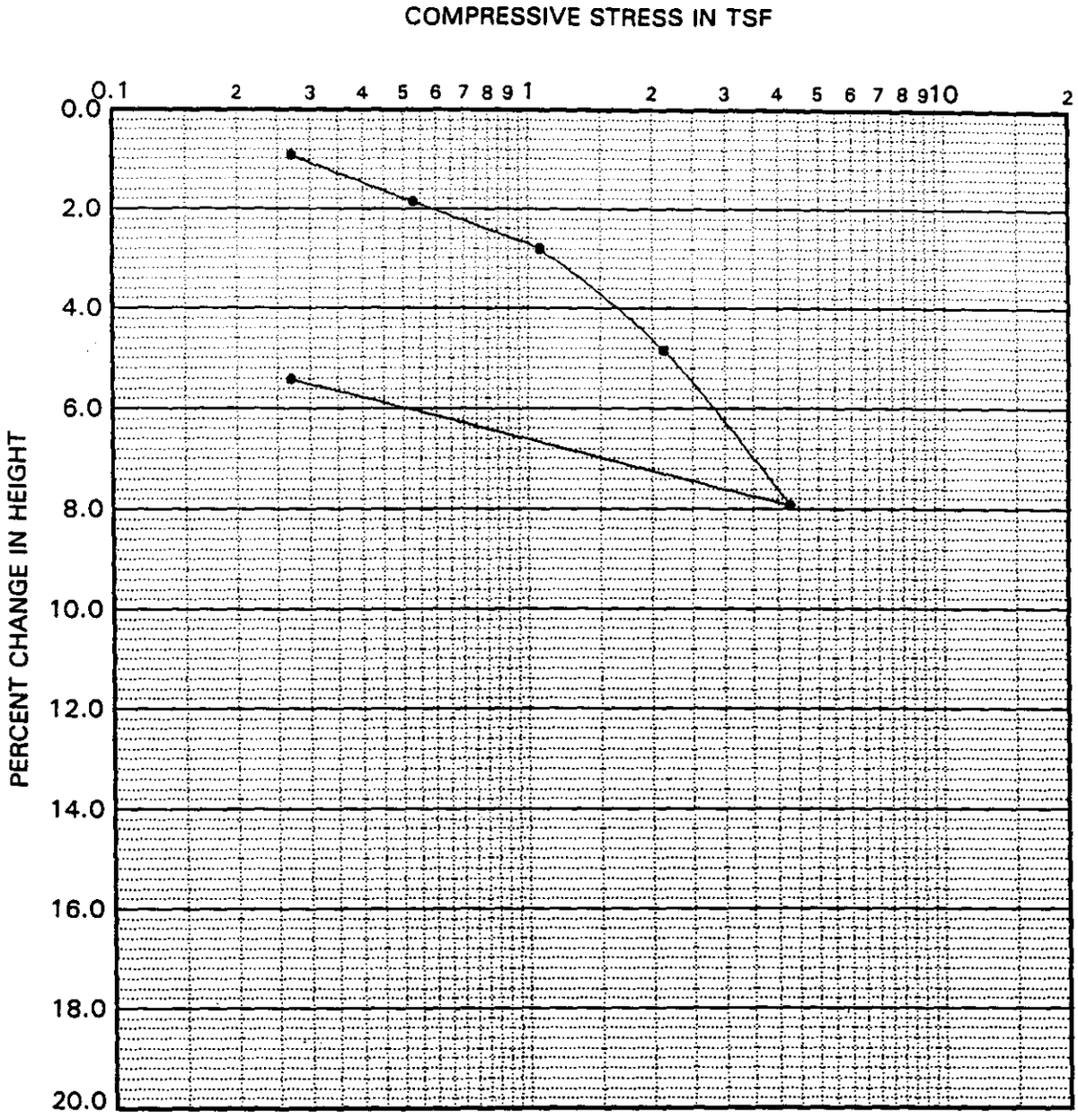
REMARKS: WATER ADDED AT 2.13 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-12

A-97



boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-07	25.0	107.3	20.5	62	ML	Clayey Sandy Silt

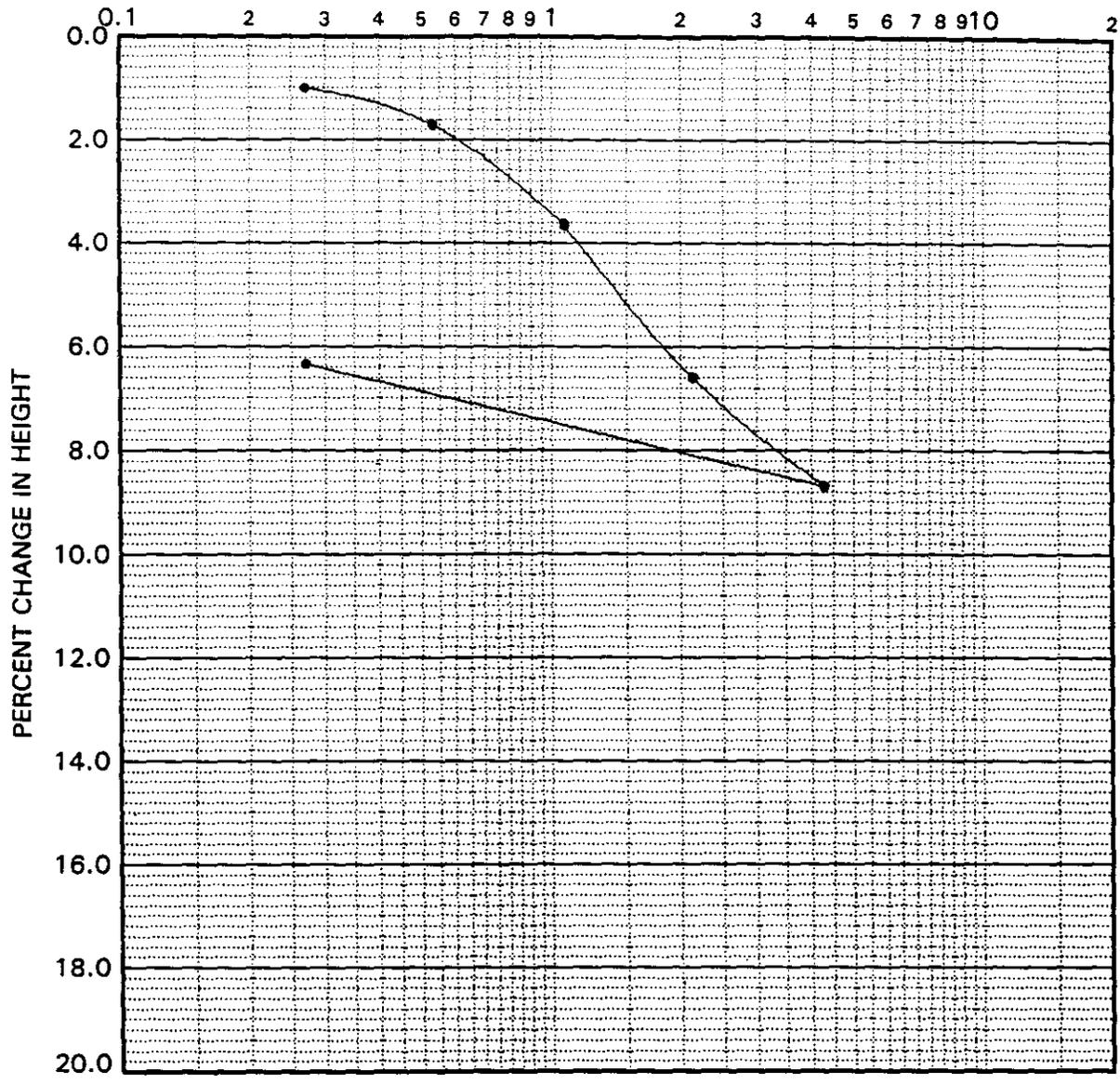
REMARKS: WATER ADDED AT 1.07 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-13

A-98



boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-08	20.0	71.3	41.5	98	ML	Clayey Silt

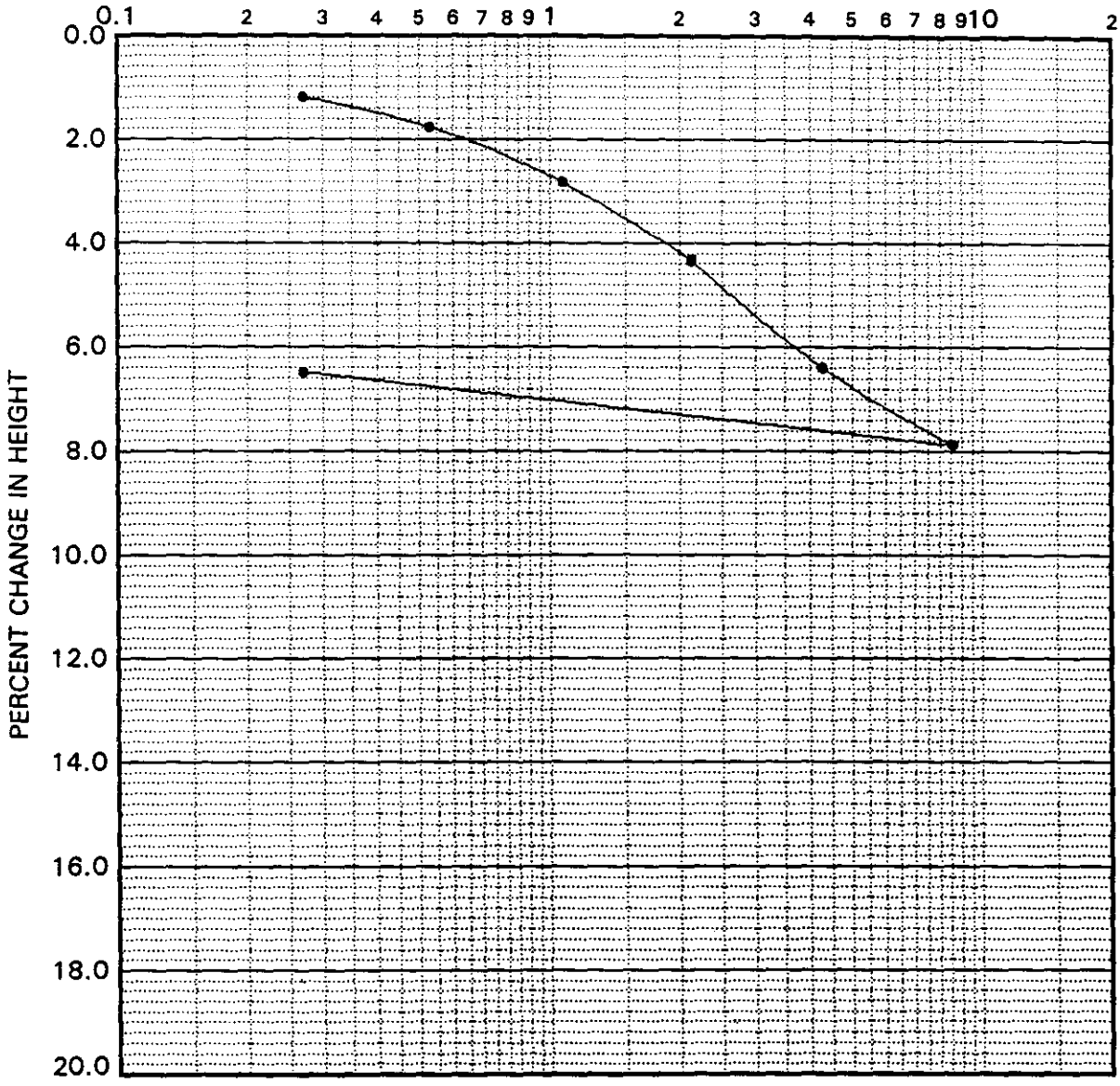
REMARKS: WATER ADDED AT 1.07 TSF

CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-14

A-99



boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-08	40.0	87.2	35.8	100	ML	Clayey Silt

REMARKS: WATER ADDED AT 2.13 TSF

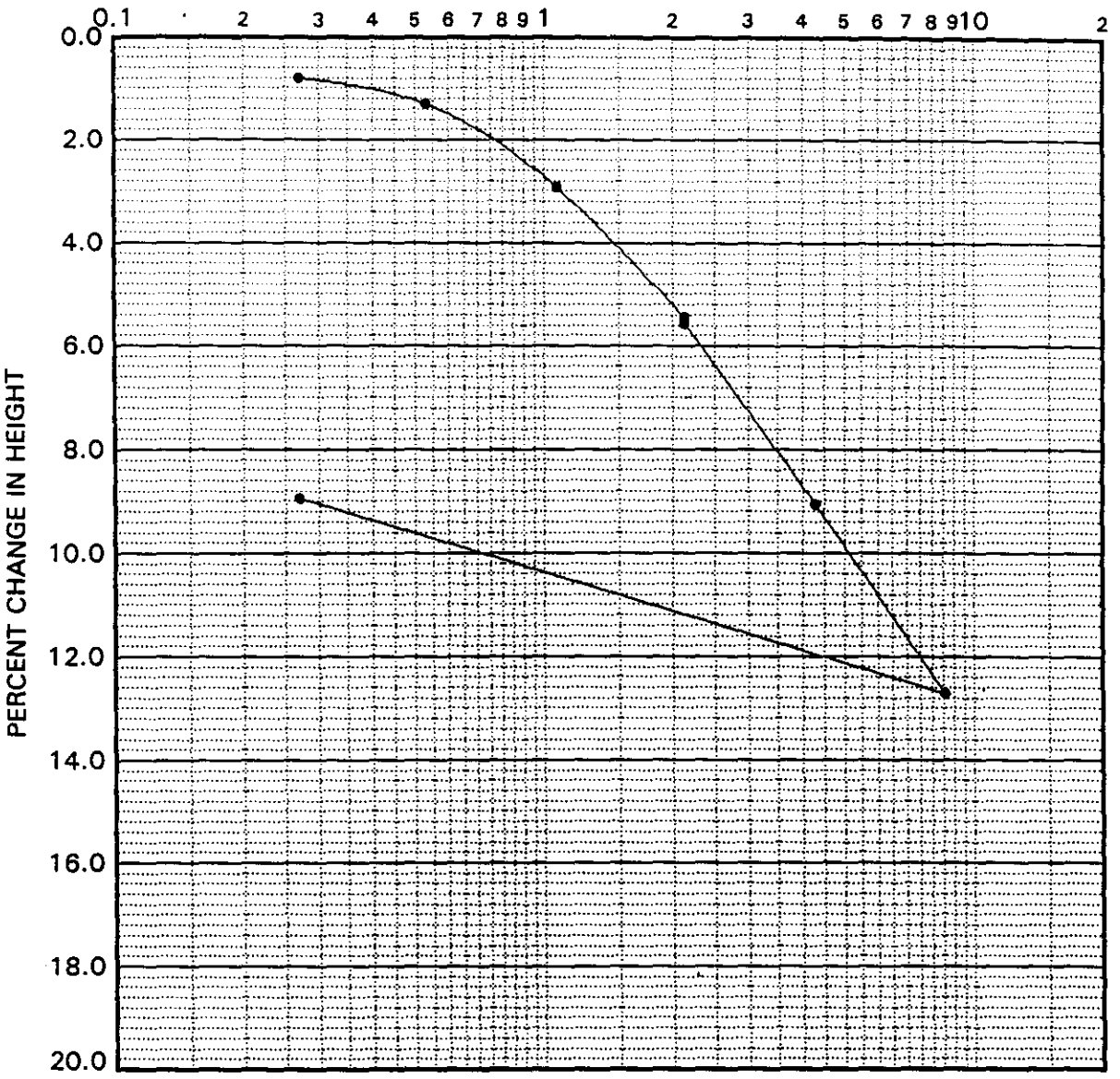
CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-15

A-100

COMPRESSIVE STRESS IN TSF



boring	depth (ft.)	dry density	in situ moist.	-200 sieve	group symbol	typical names
B-08	55.0	87.9	34.2	95	ML	Clayey Silt

REMARKS: WATER ADDED AT 2.13 TSF

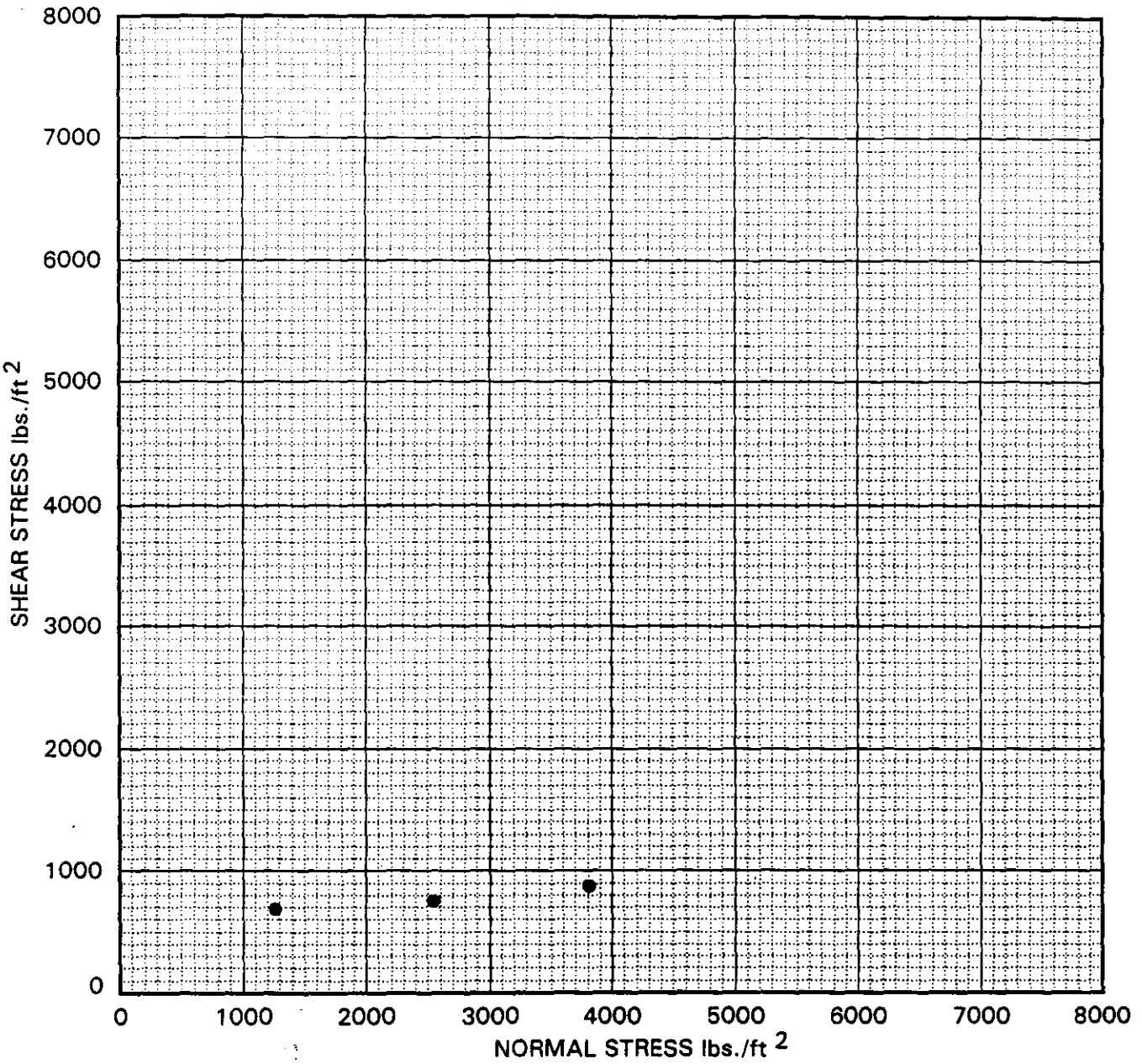
CONSOLIDATION CURVE

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-16

A-101

DIRECT SHEAR TEST
Undisturbed



Silty Sand/Sandy Silt	COHESION 600 psf.
SM/ML	FRICTION ANGLE 5.0 degrees

symbol	boring	depth (ft.)	symbol	boring	depth (ft.)
●	B-01	15.00			

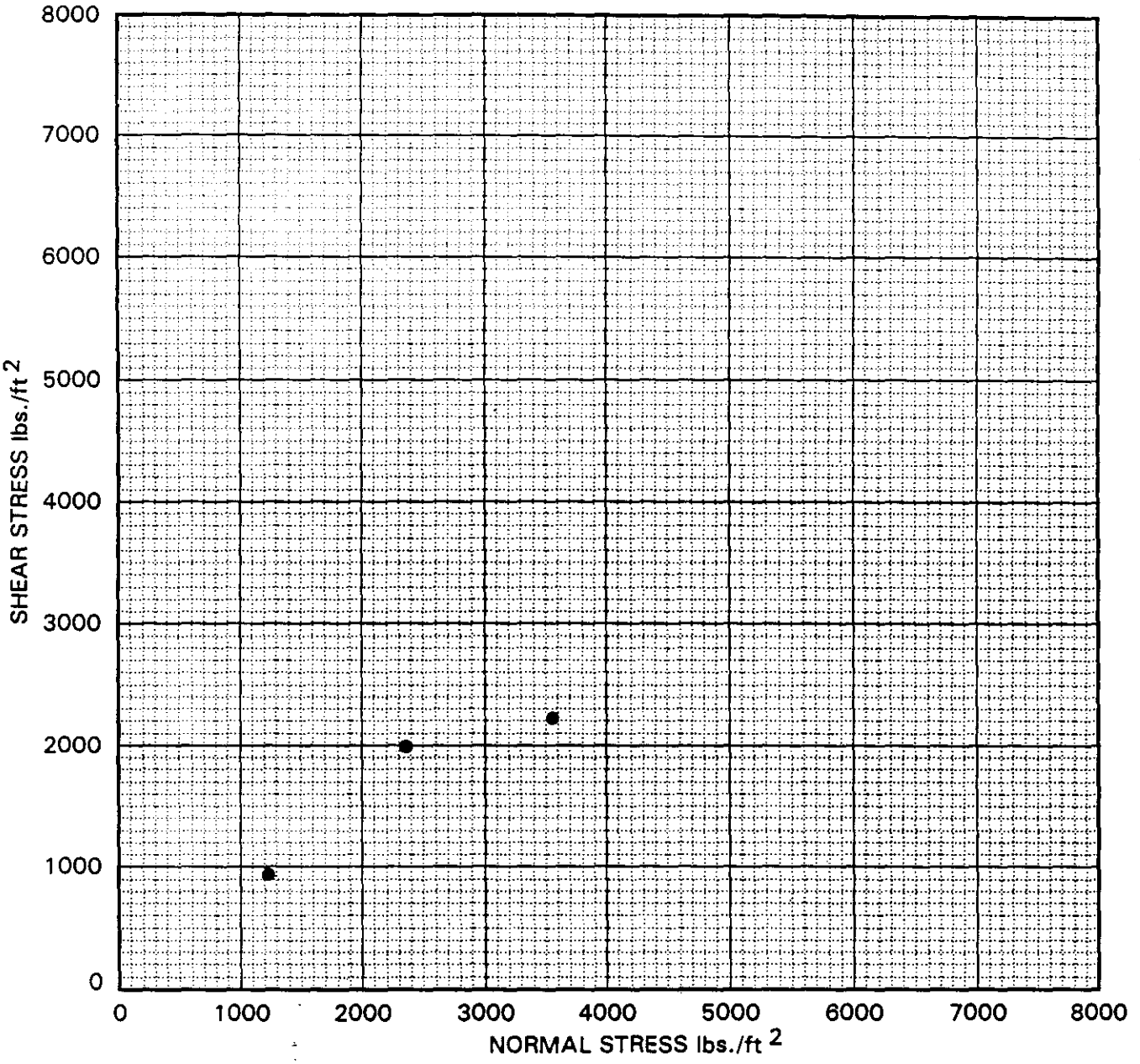
DIRECT SHEAR TEST

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-22

A-102

DIRECT SHEAR TEST
Remolded



	COHESION 450 psf.
	FRICTION ANGLE 28.0 degrees

symbol	boring	depth (ft.)	symbol	boring	depth (ft.)
●	B-02	5.00			

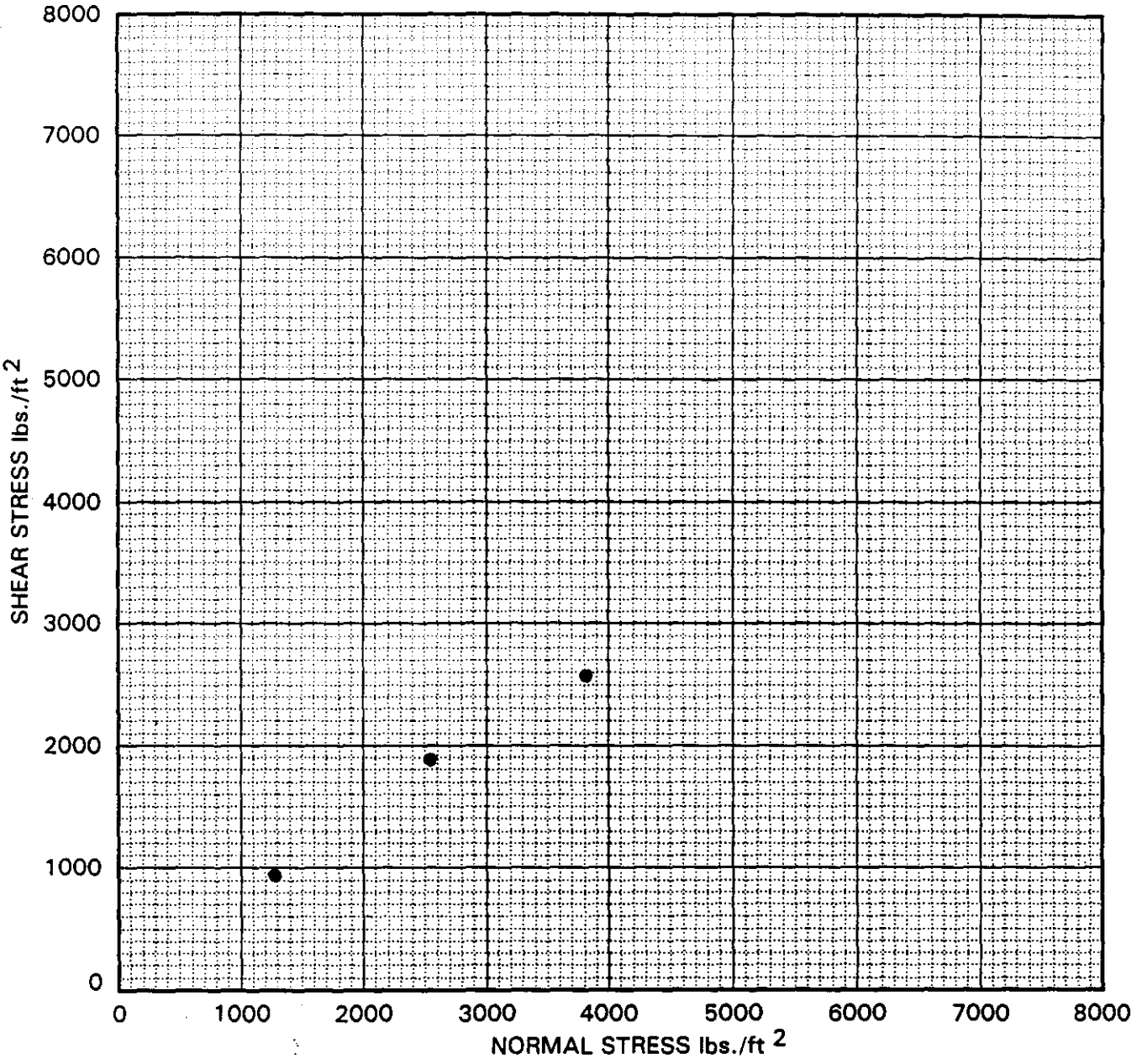
DIRECT SHEAR TEST

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 **PLATE B-23**

A-103

DIRECT SHEAR TEST
Undisturbed



Sand	COHESION 200 psf.
SP	FRICTION ANGLE 32.0 degrees

symbol	boring	depth (ft.)	symbol	boring	depth (ft.)
●	B-04	65.00			

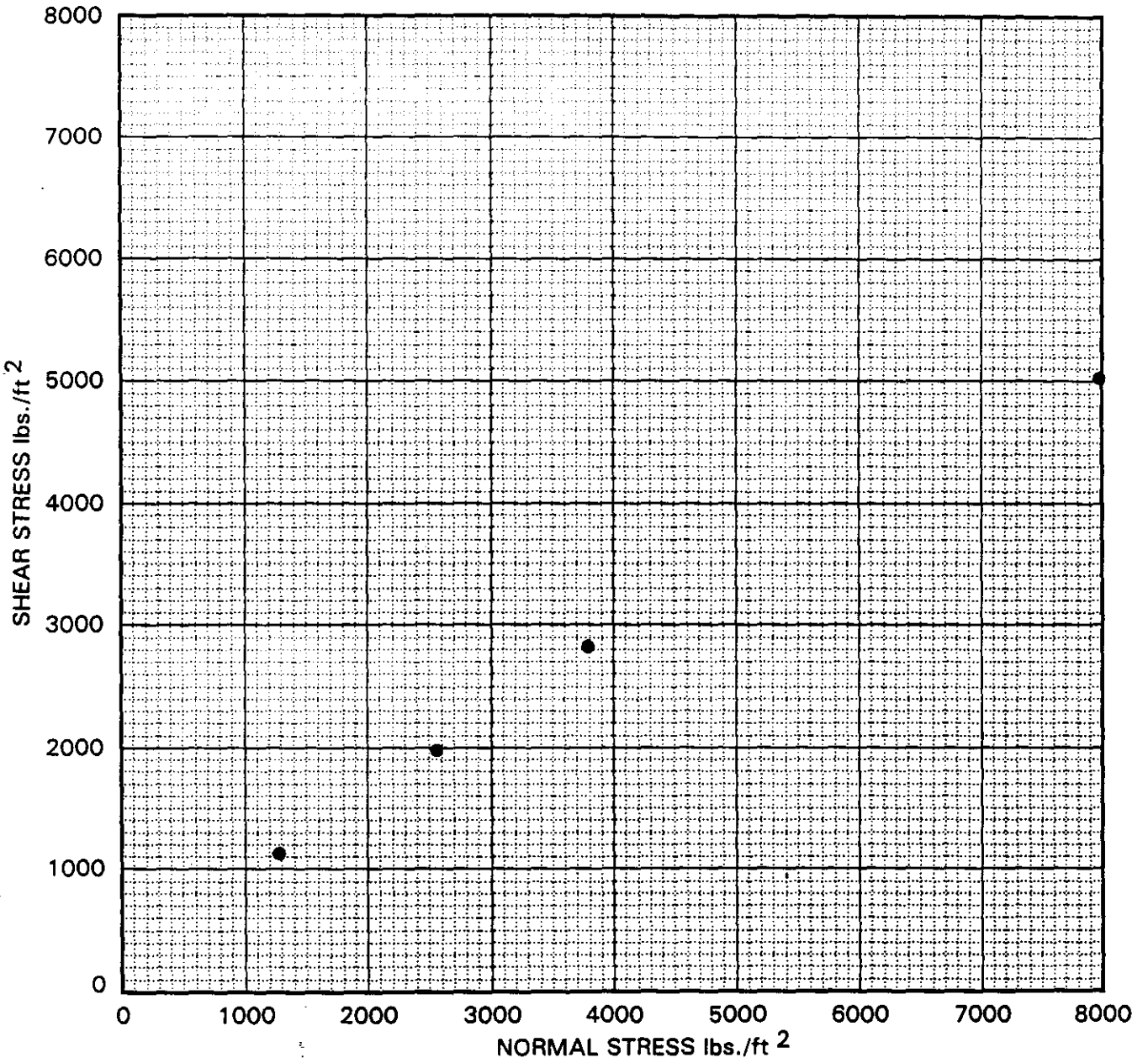
DIRECT SHEAR TEST

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-24

A-104

DIRECT SHEAR TEST
Undisturbed



Sand	COHESION	psf.
SP	FRICTION ANGLE	degrees

symbol	boring	depth (ft.)	symbol	boring	depth (ft.)
●	B-06	70.00			

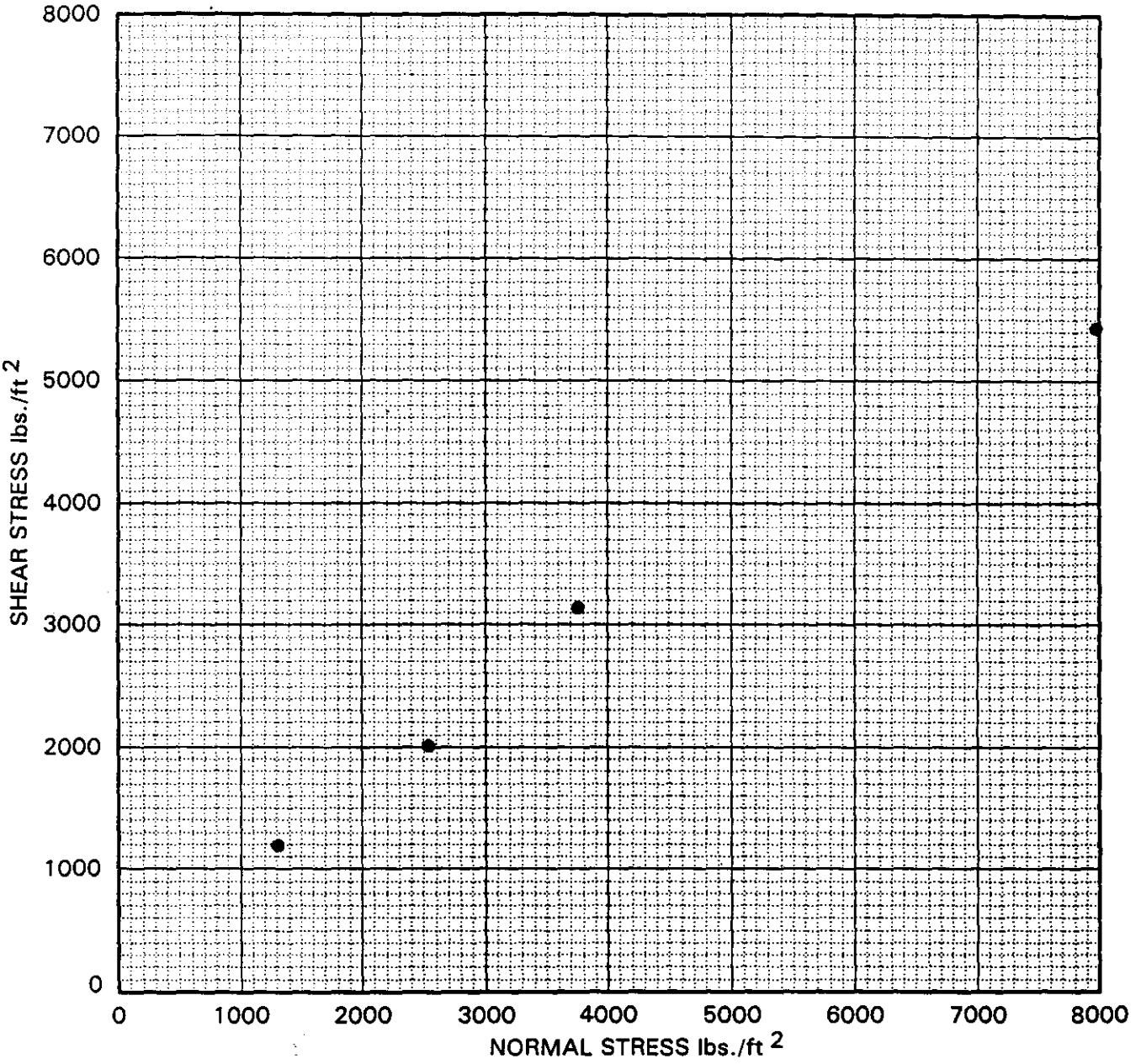
DIRECT SHEAR TEST

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 PLATE B-25

A-105

DIRECT SHEAR TEST
undisturbed



Sand	COHESION 400 psf.
SP	FRICTION ANGLE 33.0 degrees

symbol	boring	depth (ft.)	symbol	boring	depth (ft.)
●	B-08	65.00			

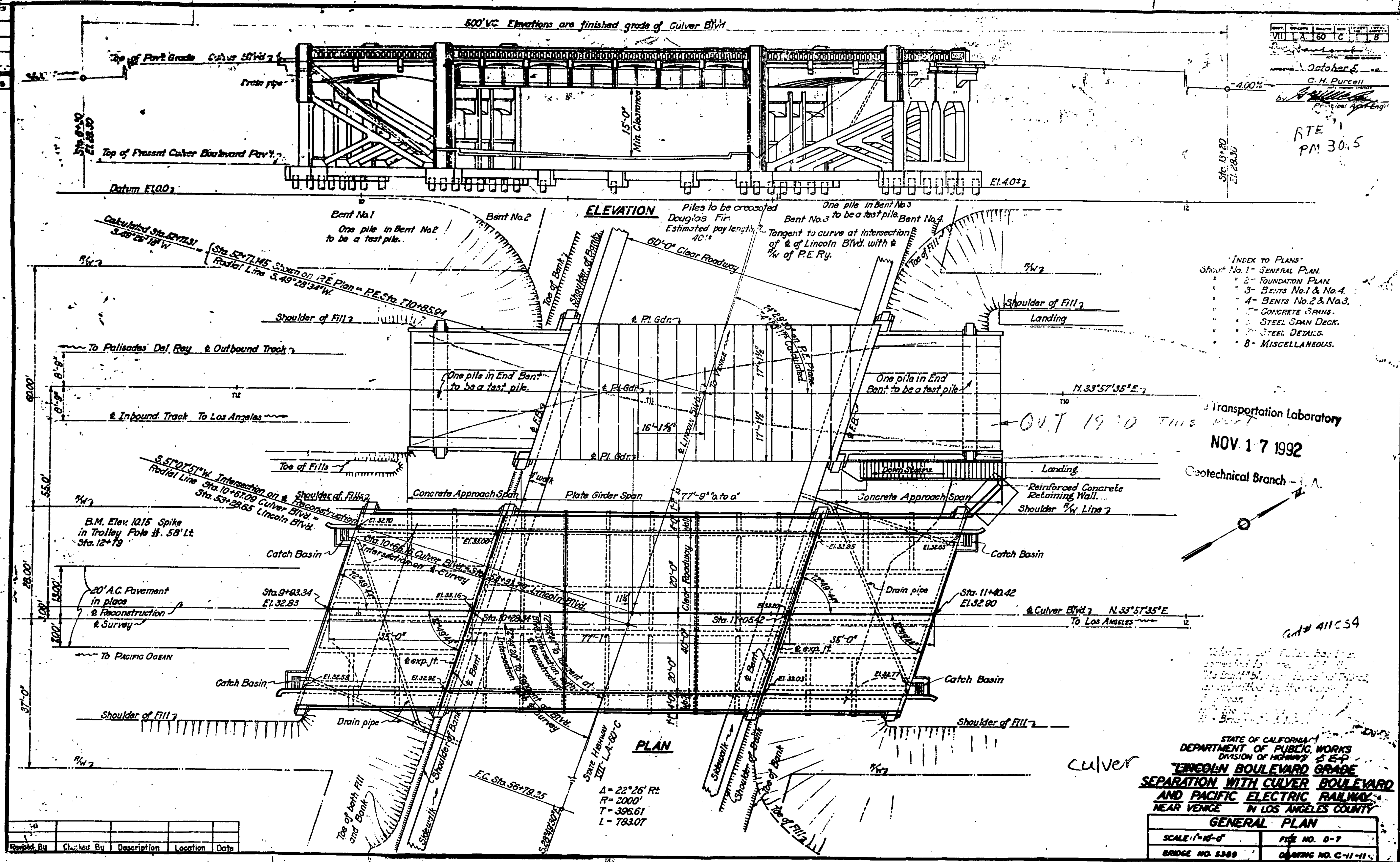
DIRECT SHEAR TEST

PACIFIC SOILS ENGINEERING, INC.
3002 DOW AVE., TUSTIN, CA 92680 714-730-2122

W.O. 500464 **PLATE B-26**

A-106

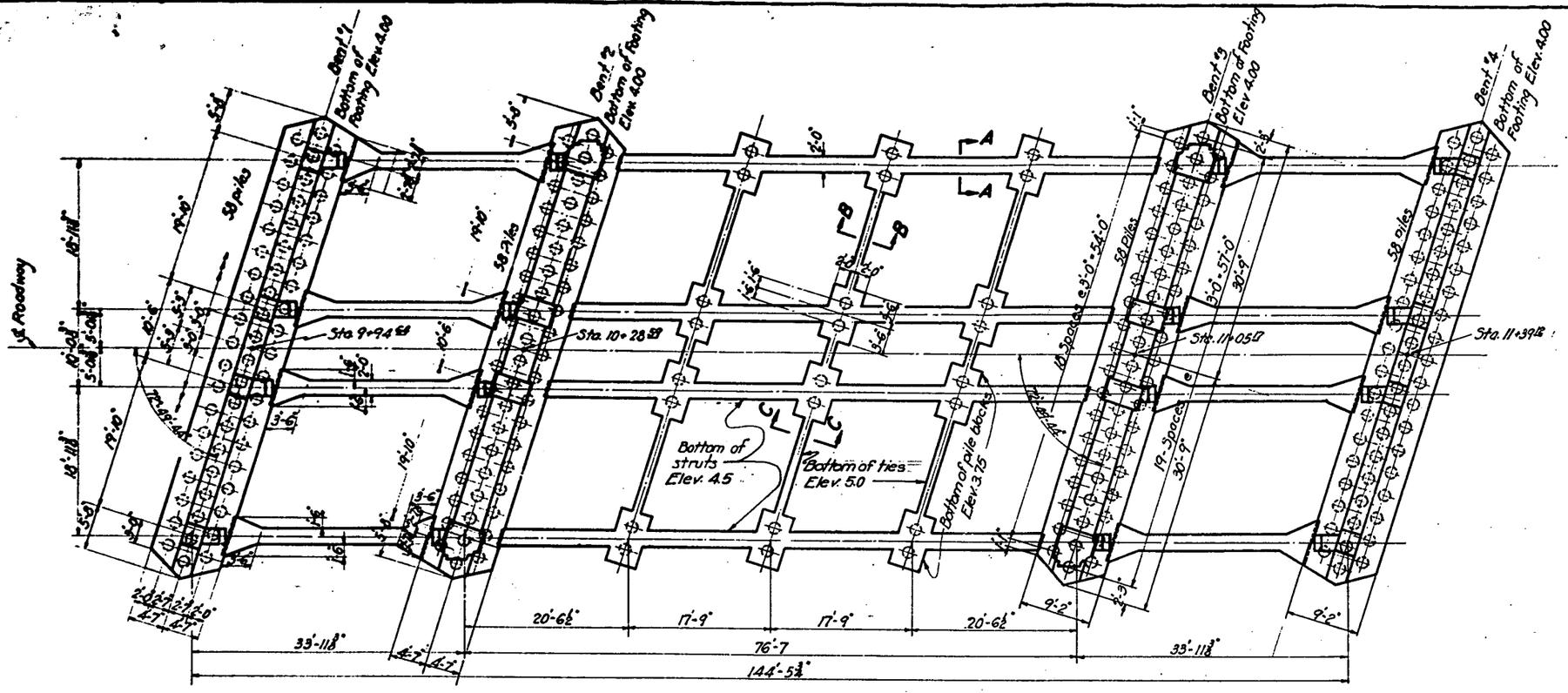
APPENDIX C
RELEVANT AS-BUILT DRAWINGS



AS BUILT PLANS
Contract No. 411C54

DIST.	COUNTY	ROUTE	LOG	SHEET NO.	TOTAL SHEETS
VII	L.A.	60	C	2	6

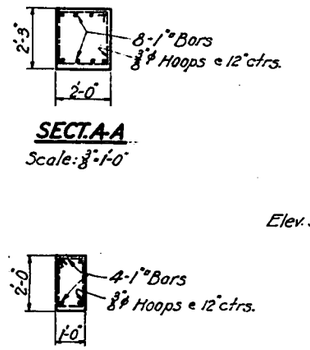
"October 5

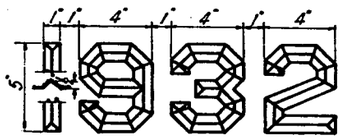


FOUNDATION PLAN

Scale: ⅛"-1'-0"

Pile spacing the same for all bents.



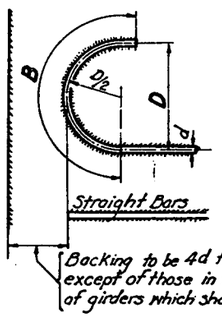


Date to be recessed into curbs. One at each end of bridge on the right hand side as approached.

DATE

GENERAL NOTES

Rails and posts to be class "E" concrete.
Class "F" concrete in bottom of beams to be paid for as class "A" concrete.
See Section 26 Standard Specifications.
All other concrete to be class "A" concrete.
All exposed edges to be chamfered 1" except rail posts which shall be chamfered ½".
All reinforcing steel to be intermediate grade deformed bars. Unless otherwise shown they shall be embedded at least two diameters and where spliced to lap of least 45 diameters.
All piles to be treated douglas fir. See Sect. 39 and 40 Stand. Specifications.
Minimum bearing value per pile to be 22 tons. Minimum penetration to be 12'.
One pile in bent #2 and #3 to be used as a test pile.
Length of piles for estimating purposes taken as 35'.
Design, fabrication and construction to conform with the Special Provisions for this project and the Standard Specifications of the California State Dept. of Public Works, Division of Highways, dated Jan. 1930.
H-15 Loading is used throughout.



Backing to be 4d for all bars except of those in the bottom of girders which shall be 2d.

SIZE	D	B
⅜	2	5
½	2½	6
⅝	3	7
¾	3⅜	8
⅞	4½	9
1	5	10½
1⅛	5½	11½
1¼	6½	12

BAR DATA

Transportation Laboratory

NOV 17 1992

Geotechnical Branch — L.A.

Culver

AS BUILT PLANS
Contract No. 5111C54
Date Completed
Document No. 7000 2622

LOCATION	REVISION	DATE	BY	CK.

BRIDGE ACROSS LINCOLN BLVD.
FOUNDATION PLAN

SCALE	AS SHOWN	FILE NO.	
BRIDGE NO.	53-89	DRAWING NO.	C-11-12

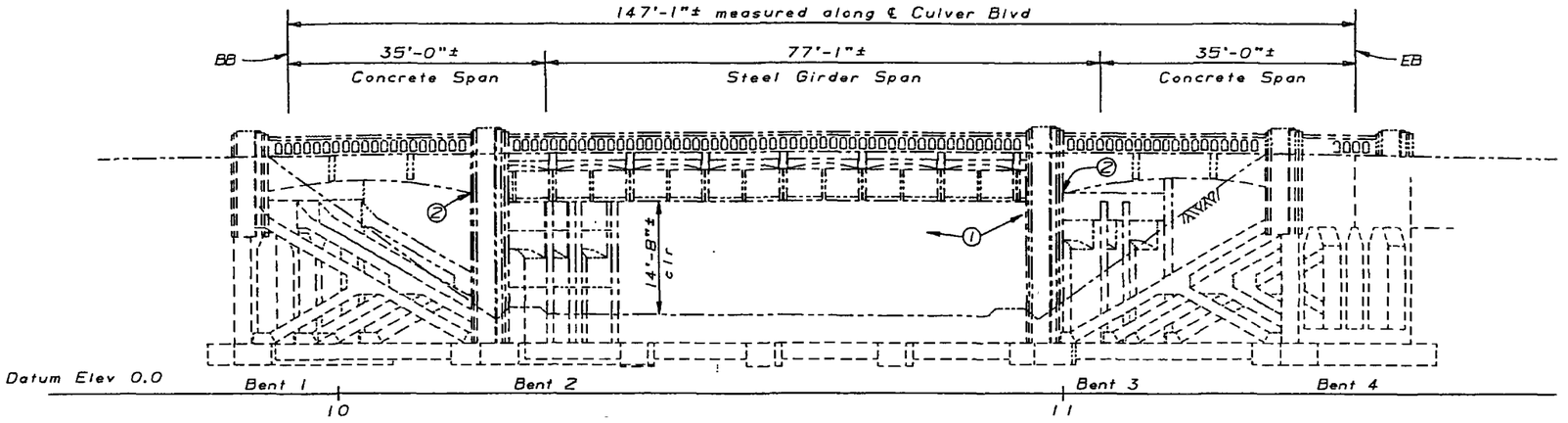
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT FILED

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
07	LA	1, 90, 405	Var	166	167

M.Z. Haleem
REGISTERED ENGINEER - CIVIL

REGISTERED PROFESSIONAL ENGINEER
M.Z. HALEEM
No. 24743
Exp. 12-31-97
CIVIL
STATE OF CALIFORNIA

9-19-94
PLANS APPROVAL DATE



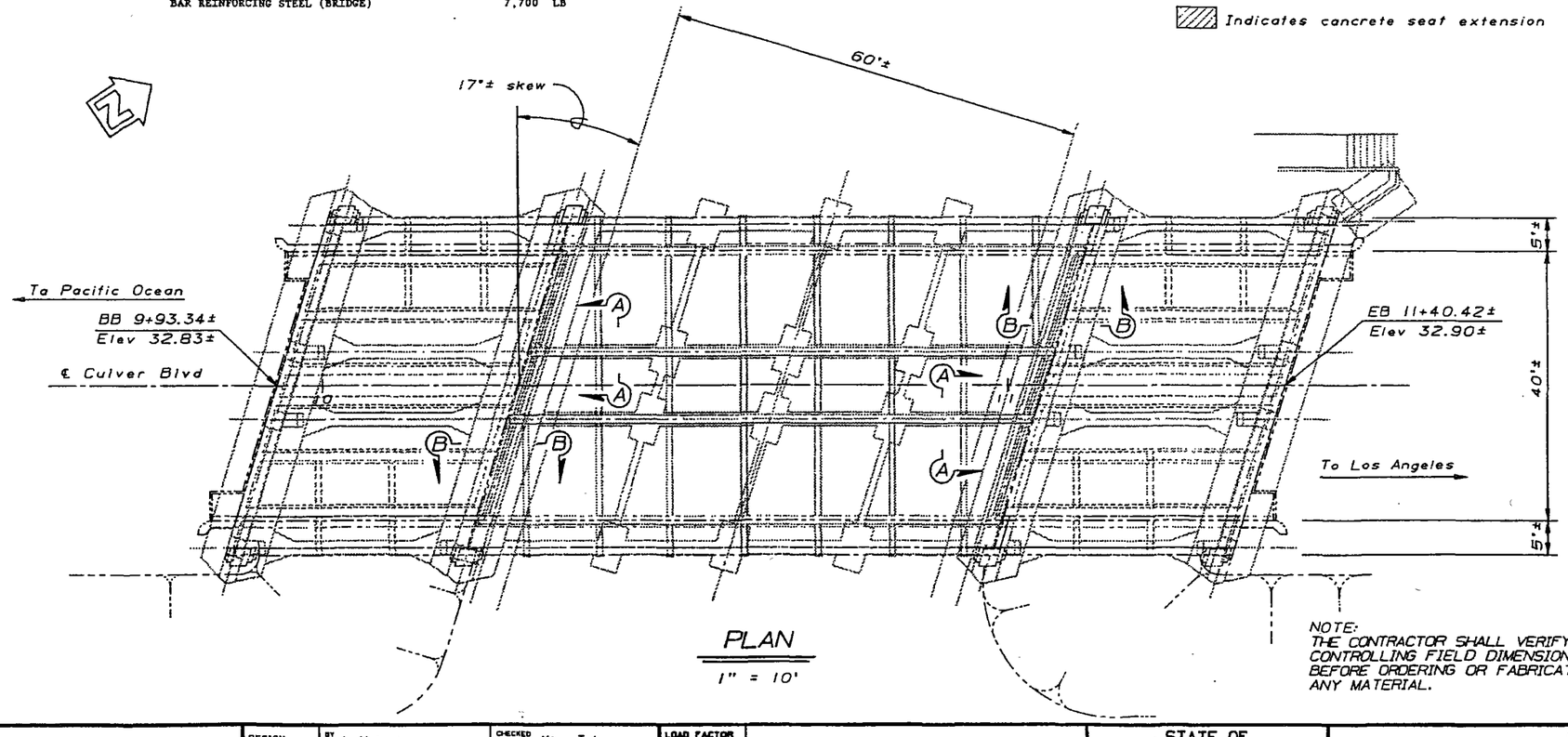
ELEVATION

1" = 10'

- CULVER BLVD. OVERCROSSING 53-89

QUANTITIES

STRUCTURAL CONCRETE, BRIDGE	34	CY
DRILL AND BOND DOWEL	134	LF
CURE CONCRETE (1")	265	LF
REPLACE BEARINGS LOCATION A	8	EA
BAR REINFORCING STEEL (BRIDGE)	7,700	LB



PLAN

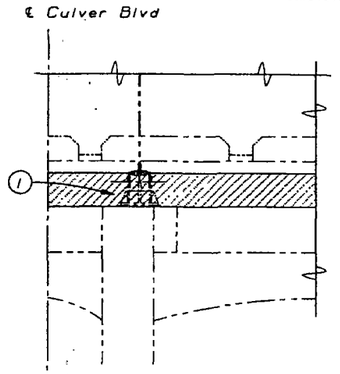
1" = 10'

① Under steel girders only. Replace bearing & sole plate with concrete seat extension & bearing pad.

② Under concrete girders. Install new Elastomeric Brg Pads on concrete seat extensions.

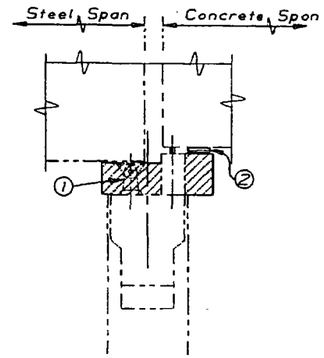
Indicates concrete seat extension

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



SECTION A-A

1/4" = 1'-0"



SECTION B-B

1/4" = 1'-0"

INDEX TO PLANS

GENERAL NOTES
LOAD FACTOR DESIGN

DESIGN: BRIDGE DESIGN SPECIFICATIONS (1983 AASHTO with Interims and Revisions by CALTRANS)

SEISMIC LOADING: Peak Rock Acceleration = 0.7 g
Depth of Alluvium ≥ 150 ft.

REINFORCED CONCRETE: (EXIST)
f_y = 40,000 psi
f'_c = 5,000 psi
n = 9

(NEW CONST)
f_s = 60,000 psi
f'_c = 4,000 psi
n = 9

STRUCTURAL STEEL: f_y = 36,000 psi

NO CORRECTIONS THIS SHEET

AS BUILT

CORRECTIONS BY M.D. HILL / RJE

CONTRACT NO. 07-119964

DATE 6-12-96/9-9-97

Ramin Rashedi
DESIGN ENGINEER

DESIGN	BY J. Holombo	CHECKED Kien T Le	LOAD FACTOR DESIGN		
DETAILS	BY Rich Kuroko 3-92	CHECKED Kien T Le	LAYOUT	BY J. Holombo	CHECKED Kien T Le
QUANTITIES	BY Lai Fong	CHECKED Doe Yoo 1-94	SPECIFICATIONS	BY	PLANS AND SPECS COMPARED

DS 050 2138 (CADD 4/89)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN 11

CU 07
EA 119961

BRIDGE NO.	53-89
POST MILE	30.47

EARTHQUAKE RETROFIT PROJECT NO.198

CULVER BOULEVARD OVERCROSSING

GENERAL PLAN

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY)
5-30-92 | 6-1-92 | 2-1-93 | 2-8-93 | 12-9-93 | 8-8-94 | 8-12-94

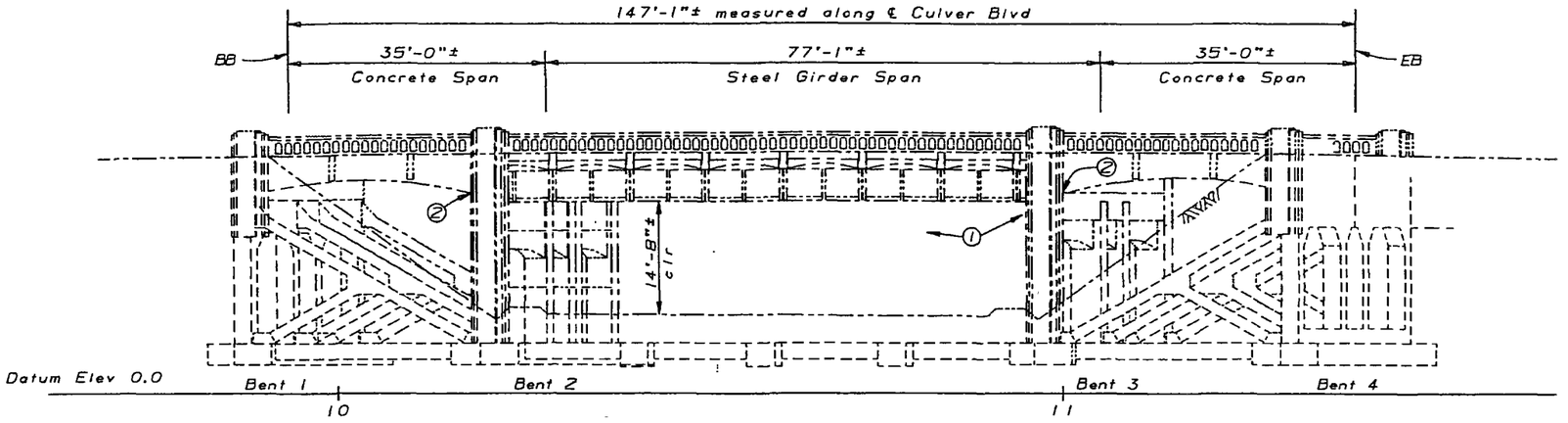
SHEET	OF
1	2

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
07	LA	1, 90, 405	Var	166	167

M.Z. Haleem
REGISTERED ENGINEER - CIVIL

REGISTERED PROFESSIONAL ENGINEER
M.Z. HALEEM
No. 24743
Exp. 12-31-97
CIVIL
STATE OF CALIFORNIA

9-19-94
PLANS APPROVAL DATE



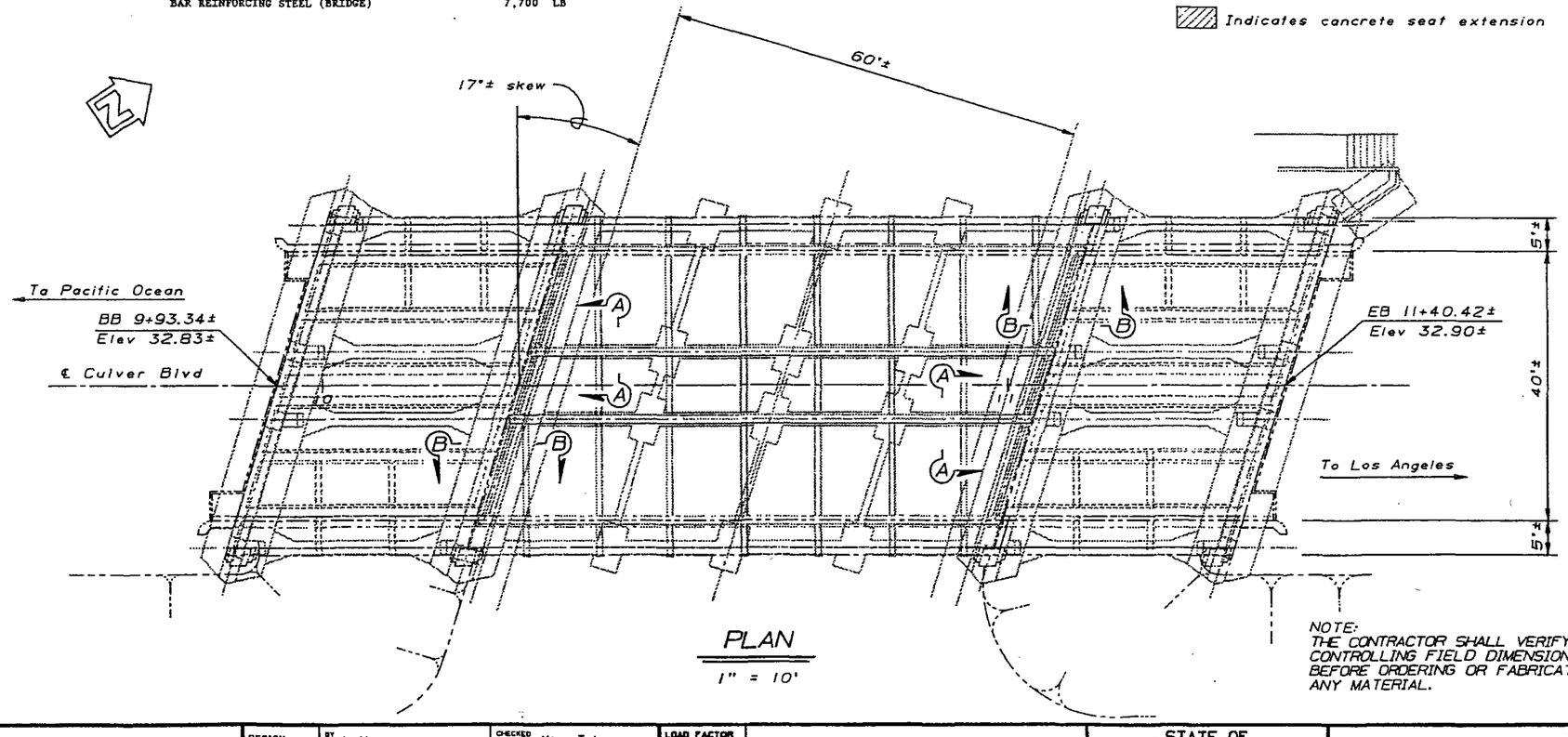
ELEVATION

1" = 10'

- CULVER BLVD. OVERCROSSING 53-89

QUANTITIES

STRUCTURAL CONCRETE, BRIDGE	34	CY
DRILL AND BOND DOWEL	134	LF
CURE CONCRETE (1")	265	LF
REPLACE BEARINGS LOCATION A	8	EA
BAR REINFORCING STEEL (BRIDGE)	7,700	LB



PLAN

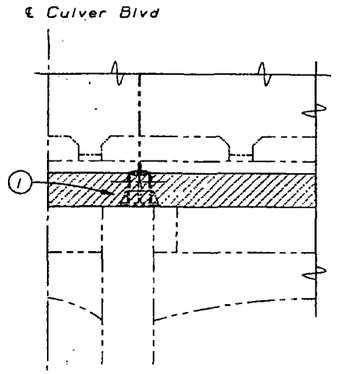
1" = 10'

① Under steel girders only. Replace bearing & sole plate with concrete seat extension & bearing pad.

② Under concrete girders. Install new Elastomeric Brg Pads on concrete seat extensions.

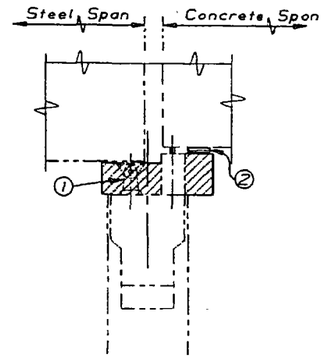
Indicates concrete seat extension

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



SECTION A-A

1/4" = 1'-0"



SECTION B-B

1/4" = 1'-0"

INDEX TO PLANS

GENERAL NOTES
LOAD FACTOR DESIGN

DESIGN: BRIDGE DESIGN SPECIFICATIONS (1983 AASHTO with Interims and Revisions by CALTRANS)

SEISMIC LOADING: Peak Rock Acceleration = 0.7 g
Depth of Alluvium ≥ 150 ft.

REINFORCED CONCRETE: (EXIST)
f_y = 40,000 psi
f'_c = 5,000 psi
n = 9

(NEW CONST)
f_s = 60,000 psi
f'_c = 4,000 psi
n = 9

STRUCTURAL STEEL: f_y = 36,000 psi

NO CORRECTIONS THIS SHEET

AS BUILT

CORRECTIONS BY M.D. HILL / RJE

CONTRACT NO. 07-119964

DATE 6-12-96/9-9-97

Ramin Rashedi
DESIGN ENGINEER

DESIGN	BY J. Holombo	CHECKED Kien T Le	LOAD FACTOR DESIGN		
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DS 050 2138 (CADD 4/89)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN 11

CU 07
EA 119961

BRIDGE NO.	53-89
POST MILE	30.47

EARTHQUAKE RETROFIT PROJECT NO.198

CULVER BOULEVARD OVERCROSSING

GENERAL PLAN

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

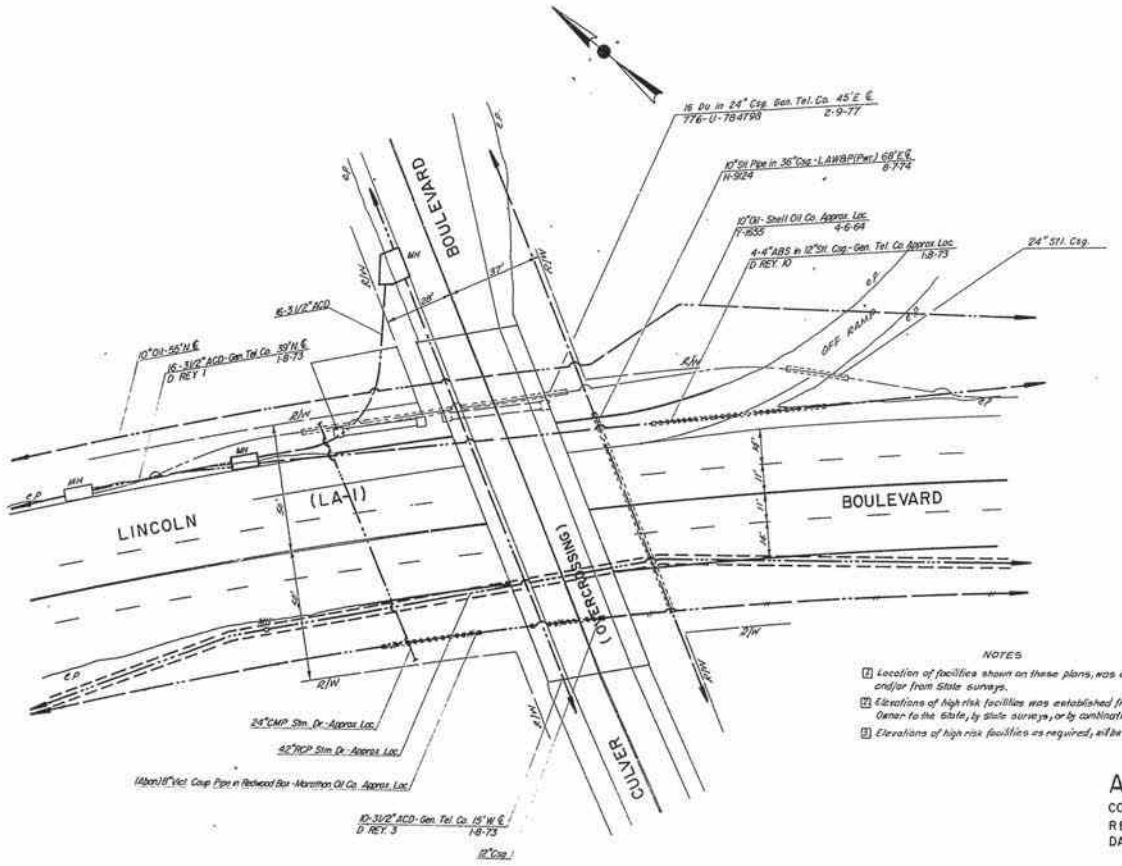
REVISION DATES (PRELIMINARY STAGE ONLY)
5-30-92 | 6-1-92 | 2-1-93 | 2-8-93 | 12-9-93 | 8-8-94 | 8-12-94

SHEET	OF
1	2

Dist.	County	Route	Post Mile/Total Project	Sheet No.	Total Sheets
07	LA	1	30.3/32.3	16	36

UTILITY ENGINEER REGISTERED CIVIL ENGINEER NO. C-14521

DATE APPROVED February 6, 1978



NOTES

1. Location of facilities shown on these plans, was obtained either from Owner's records and/or from State surveys.
2. Elevations of high risk facilities was established from information furnished from by the Owner to the State, by State surveys, or by combination ob both.
3. Elevations of high risk facilities as required, will be determined at time of construction.

AS BUILT

CONTRACT NO. 07-330104

RESIDENT ENGR. W. J. Steele (ET)

DATE October 15 1979

LOCATION "2"
UTILITY PLAN
LINCOLN BOULEVARD at CULVER BOULEVARD

0 20 40 60 80 100 FEET

1977

4

FORM HD 82 PF

07351 330101

AS BUILT PLANS
Contract No. 07-330104
Date Completed 10-15-79
Document No. 7000 8368

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTION OF TRANSPORTATION.

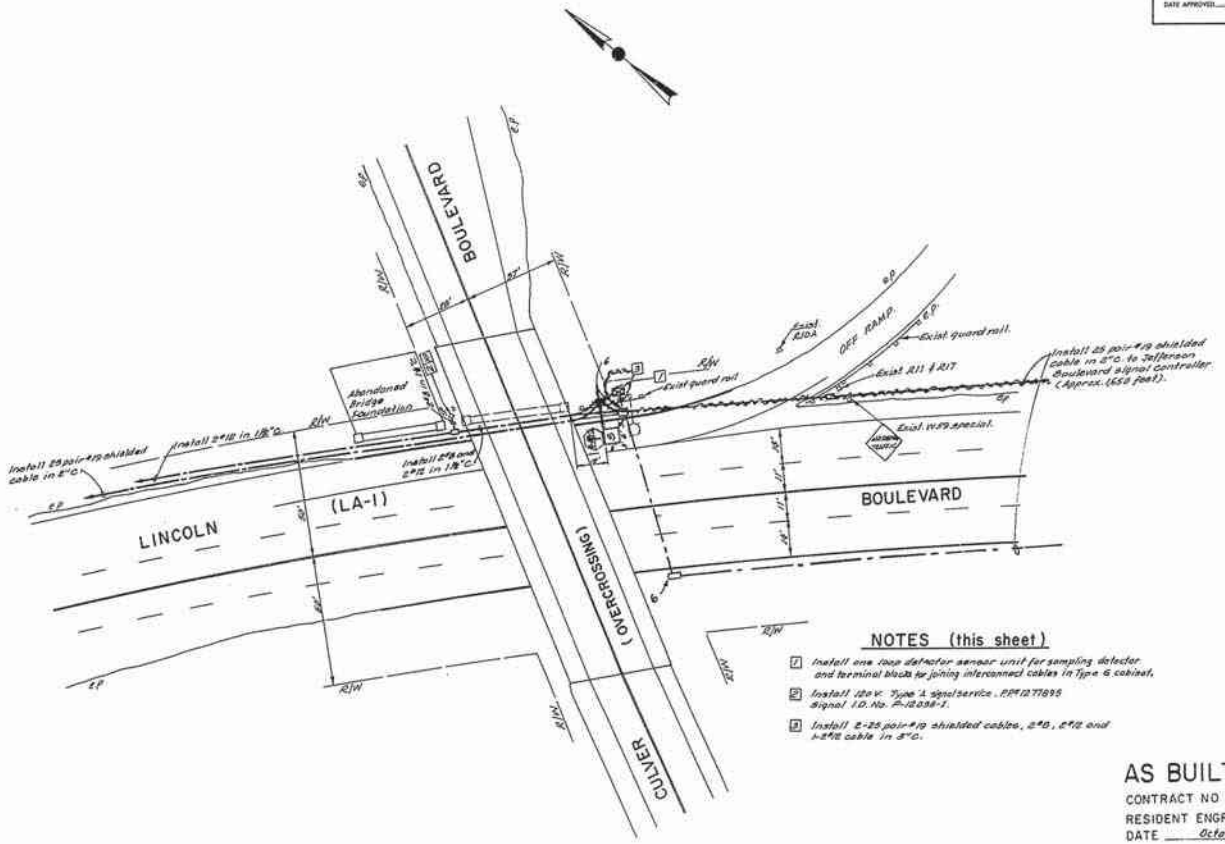
2-14-80 Joseph M Gatto

MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

Dist	County	Route	Post Mile Total Project	Sheet No.	Total Sheets
07	LA	1	30.3/323	15	36

R. J. Bamm
R. J. ELCESSER REGISTERED TRAFFIC ENGINEER
NO. 96

DATE APPROVED February 6, 1978



NOTES (this sheet)

1. Install one loop detector sensor unit for sampling detector and terminal blocks for joining interconnect cables in Type 6 cabinet.
2. Install 120 v. Type 1 signal service. PP# 1271895 Signal I.D. No. P-12098-1.
3. Install 2-25 pair #19 shielded cables, 2#8, 2#12 and 1-2#12 cable in 3"C.

AS BUILT
CONTRACT NO 07-330104
RESIDENT ENGR W.J.Steele (AT)
DATE October 15,1979

LOCATION " 2 "
TRAFFIC SIGNAL PLAN
LINCOLN BOULEVARD
at
CULVER BOULEVARD

0 20 40 60 80 100
FEET

1927

TRAFFIC	INIT	DATE
DESIGNED	LQ	
TOPO	LQ	
ELECT	LQ	
TOPO	LQ	
ELECT	DBT	
SIGNING	DR	
STRIPING		
AREA ENGR		

Engineer	Date	Project Engineer	Approval Recommended By	Date
Randy Quast 5/17		Ben Talamantes		5/17

NOTE THIS PLAN ACCURATE FOR SIGNALS, LIGHTING, SIGNING, STRIPING AND PAVEMENT MARKINGS

07351 330101

15

FORM 820 82 PT

AS BUILT PLANS
Contract No. 07-330104
Date Completed 10-15-79
Document No. 7000 8368

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.
2-14-80 Joseph M Lotta

MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

NOTES:

1. FOR COMPLETE RIGHT OF WAY DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

2. FOR LEGEND AND ADDITIONAL NOTES, SEE SHEET L-1.

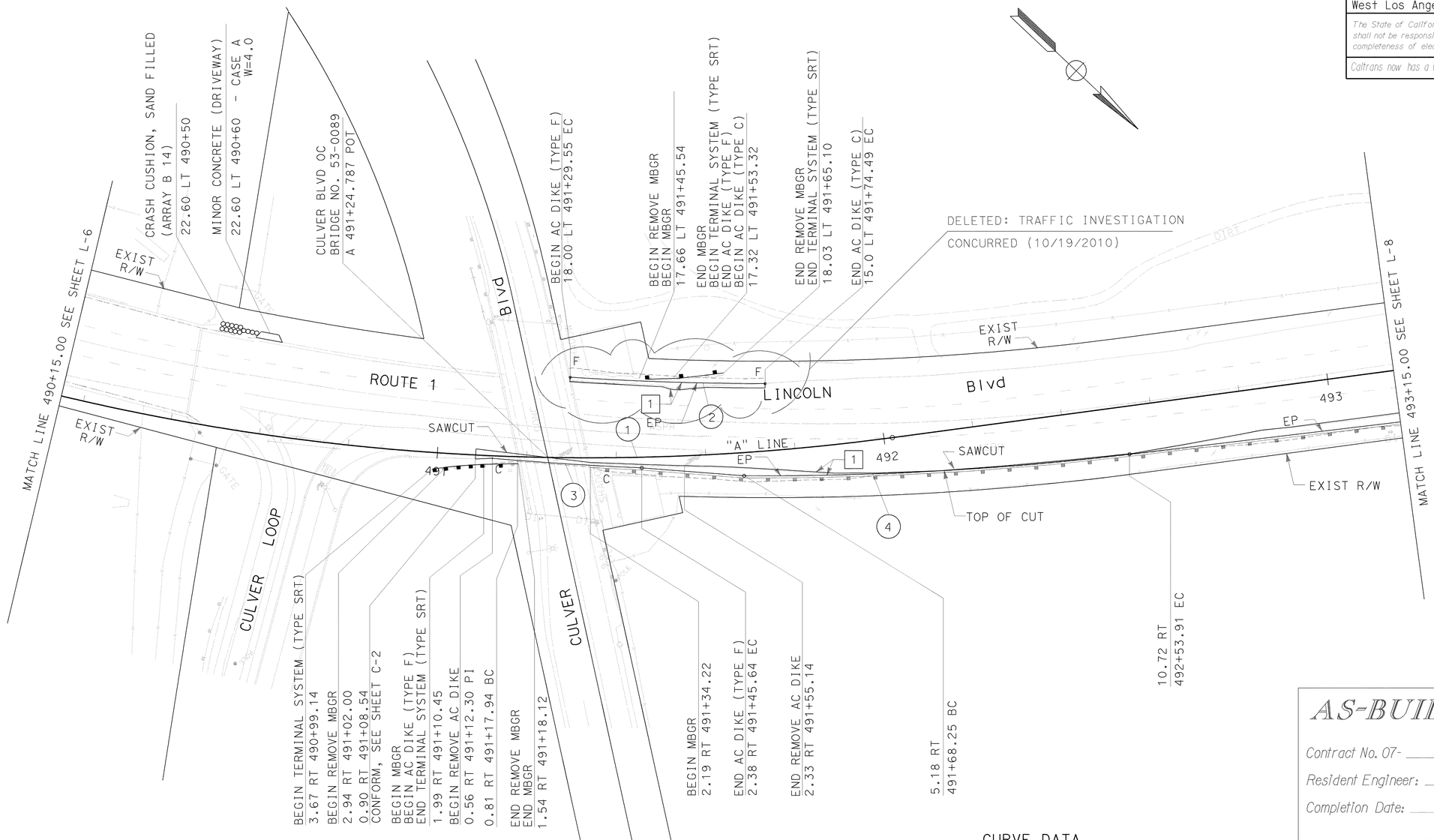
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
07	LA	1	43.9/50.0	19	277

11-26-03
REGISTERED CIVIL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
BG Wright
No. C59331
Exp.6-30-07
CIVIL
STATE OF CALIFORNIA

P S O M A S
11444 West Olympic Boulevard
West Los Angeles, CA 90064-1549



CURVE DATA

NO	R	△	L	T
1	510.000	24°07′01″	214.668	108.947
2	665.600	3°45′06″	43.583	21.800
3	685.000	2°19′42″	27.837	13.920
4	687.400	7°44′28″	92.874	46.508

AS-BUILT

Contract No. 07- 1660U4

Resident Engineer: G.TRUJILLO

Completion Date: 08/31/10

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

LAYOUT LOCATION 2

SCALE 1:500 **L-7**

DATE	REVISED BY
GM 8/02	
BW 8/02	DATE REVISED

CALCULATED/ DESIGNED BY
CHECKED BY

DESIGN OVERSIGHT
FEKADE S. MESFIN

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

LAST REVISION 10-22-03
DATE PLOTTED => 07-JUN-2011
TIME PLOTTED => 10:01

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

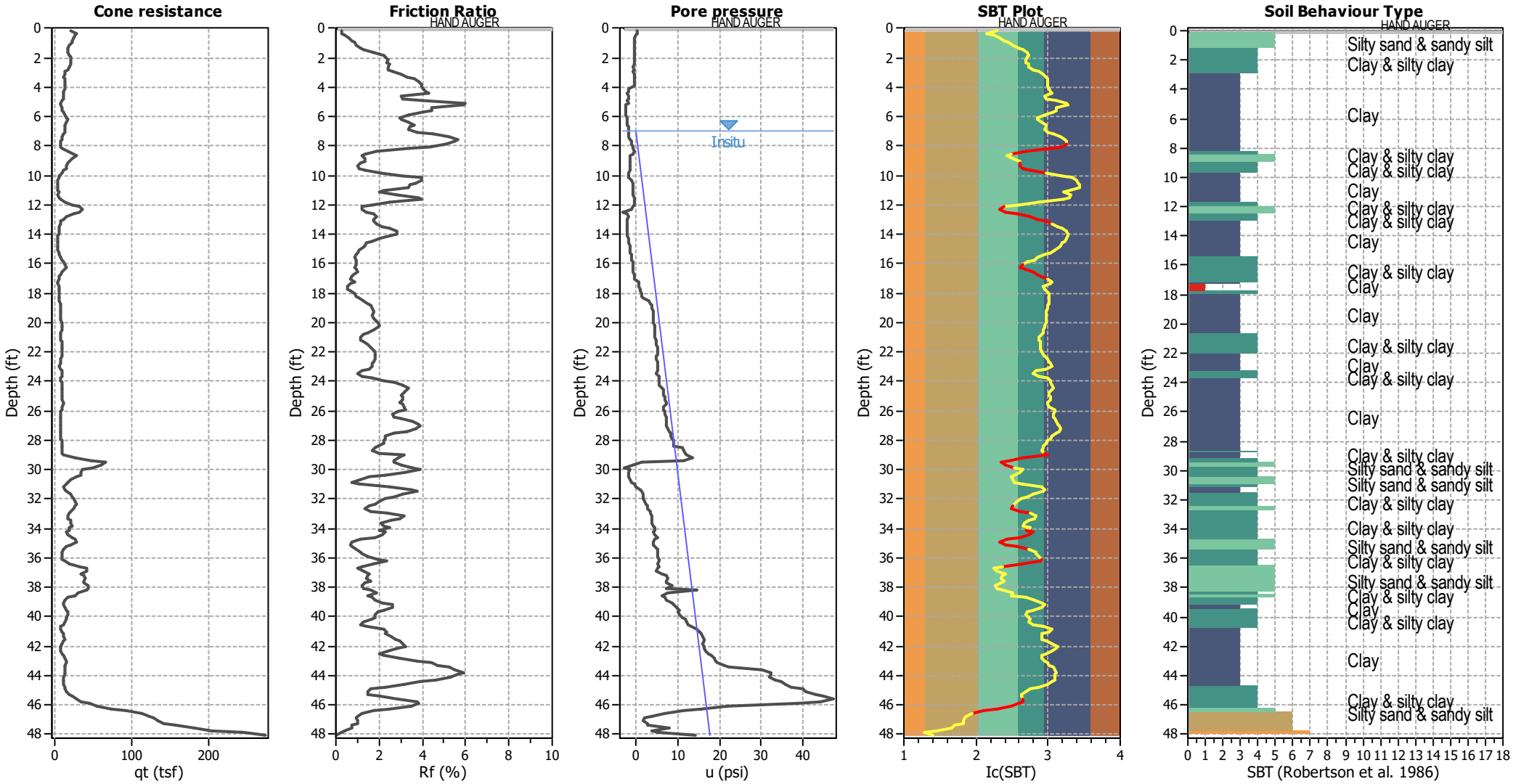
USERNAME => s129112
DGN FILE => 71660Uea007.dgn

CU 07279

EA 1660U1

APPENDIX D
LIQUEFACTION ANALYSIS

CPT basic interpretation plots



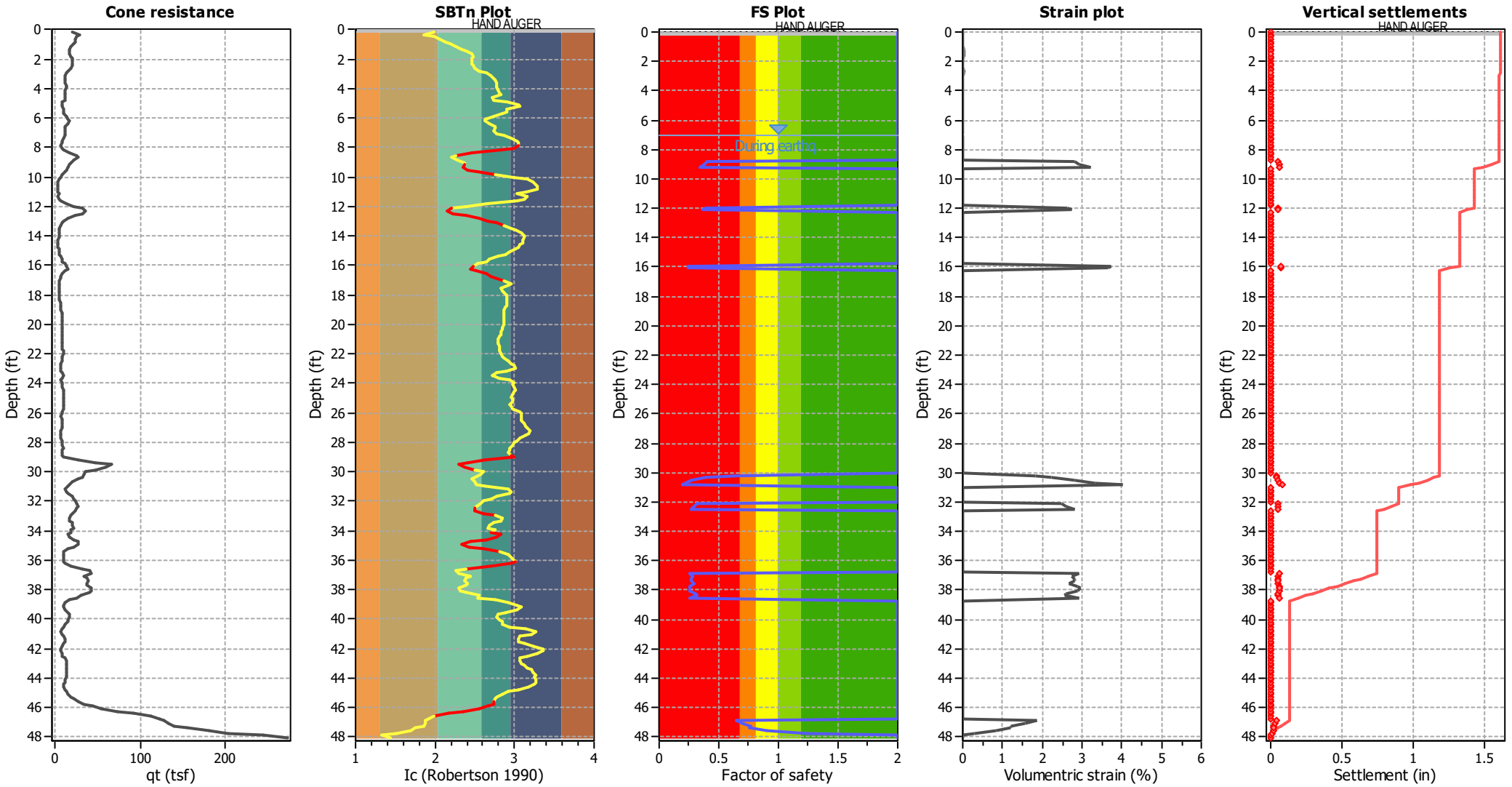
Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	7.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.60	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.60	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	7.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

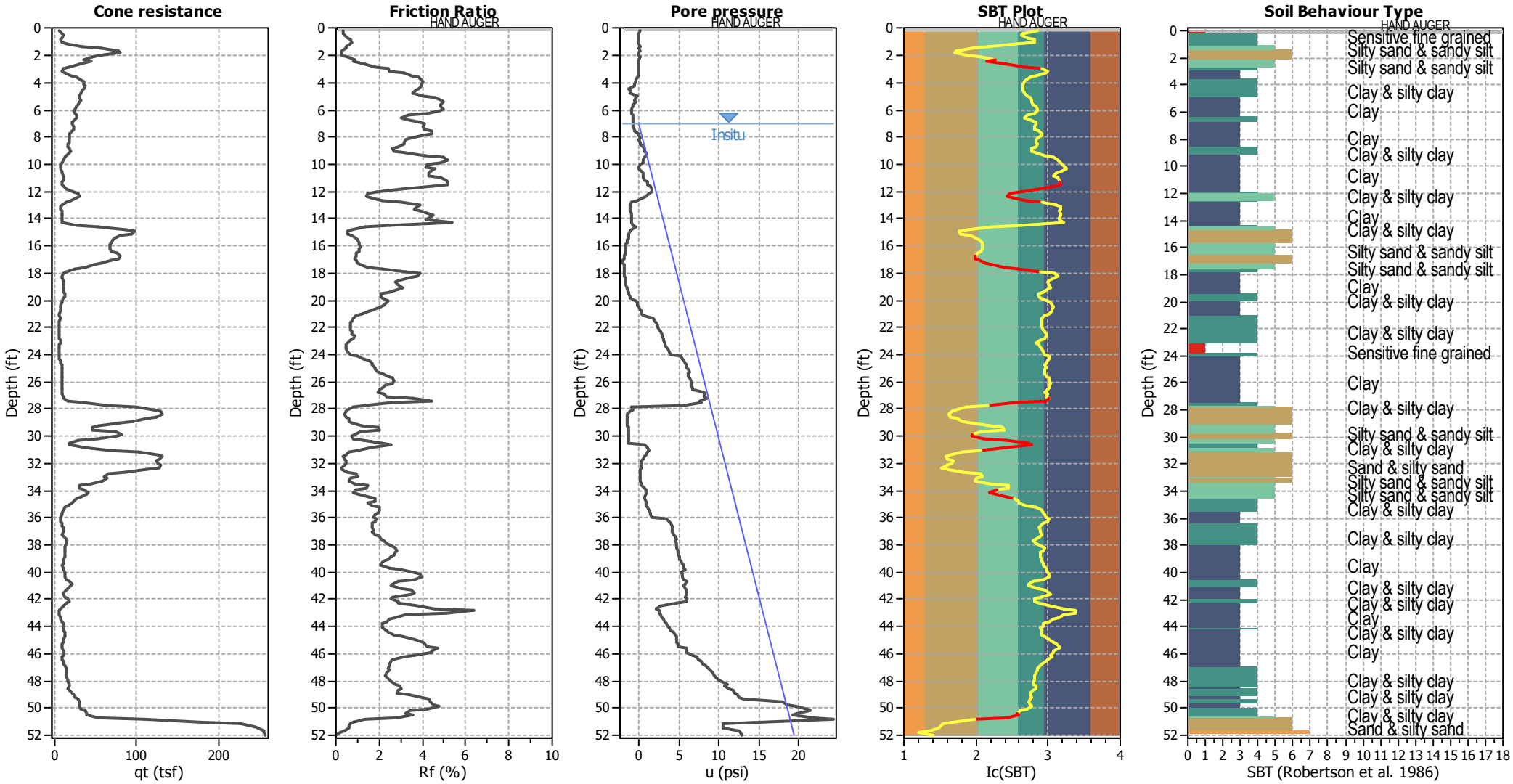
Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

CPT basic interpretation plots



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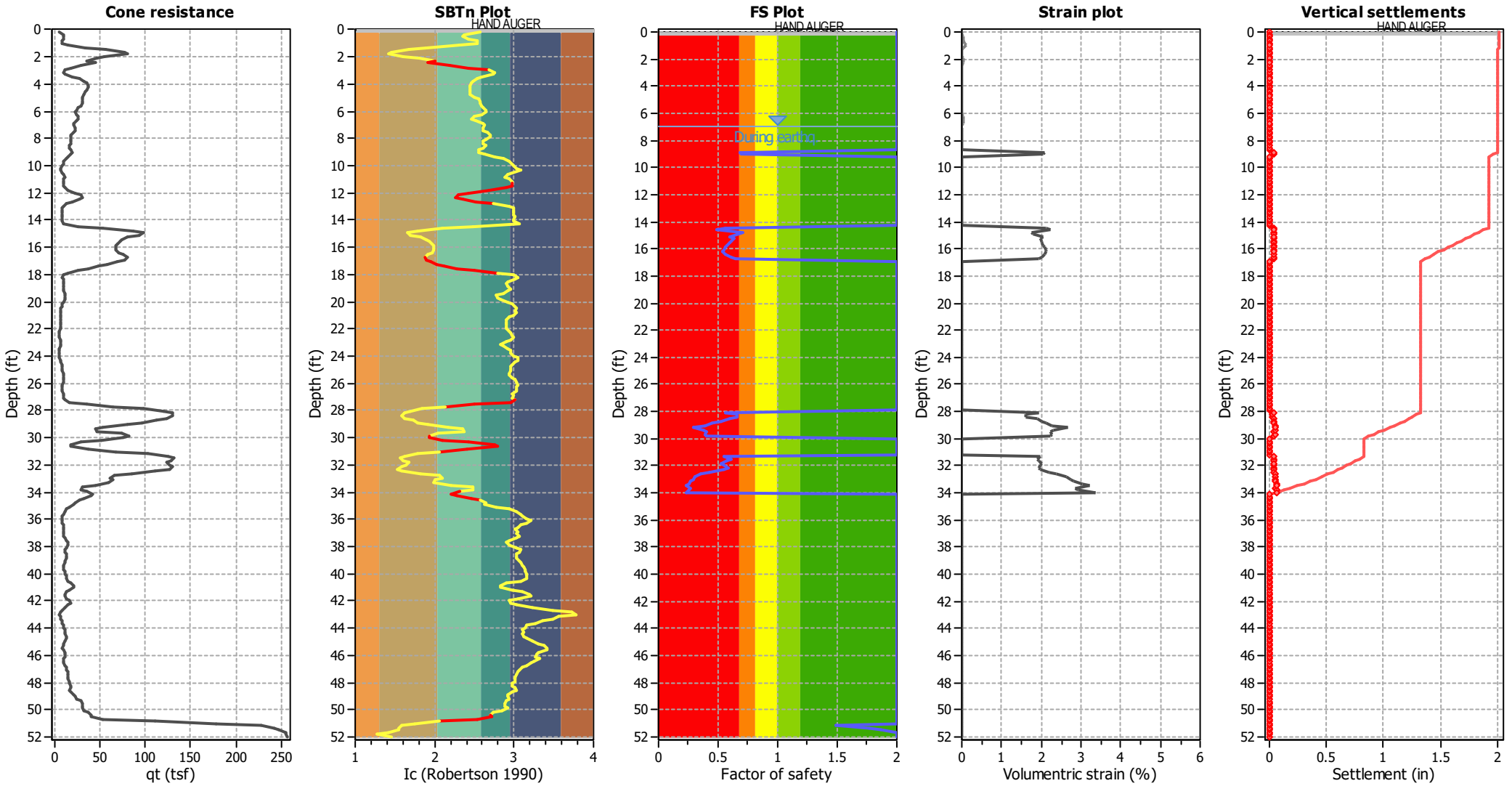
7. Gravely sand to sand
8. Very stiff sand to
9. Very stiff fine grained

Estimation of post-earthquake settlements



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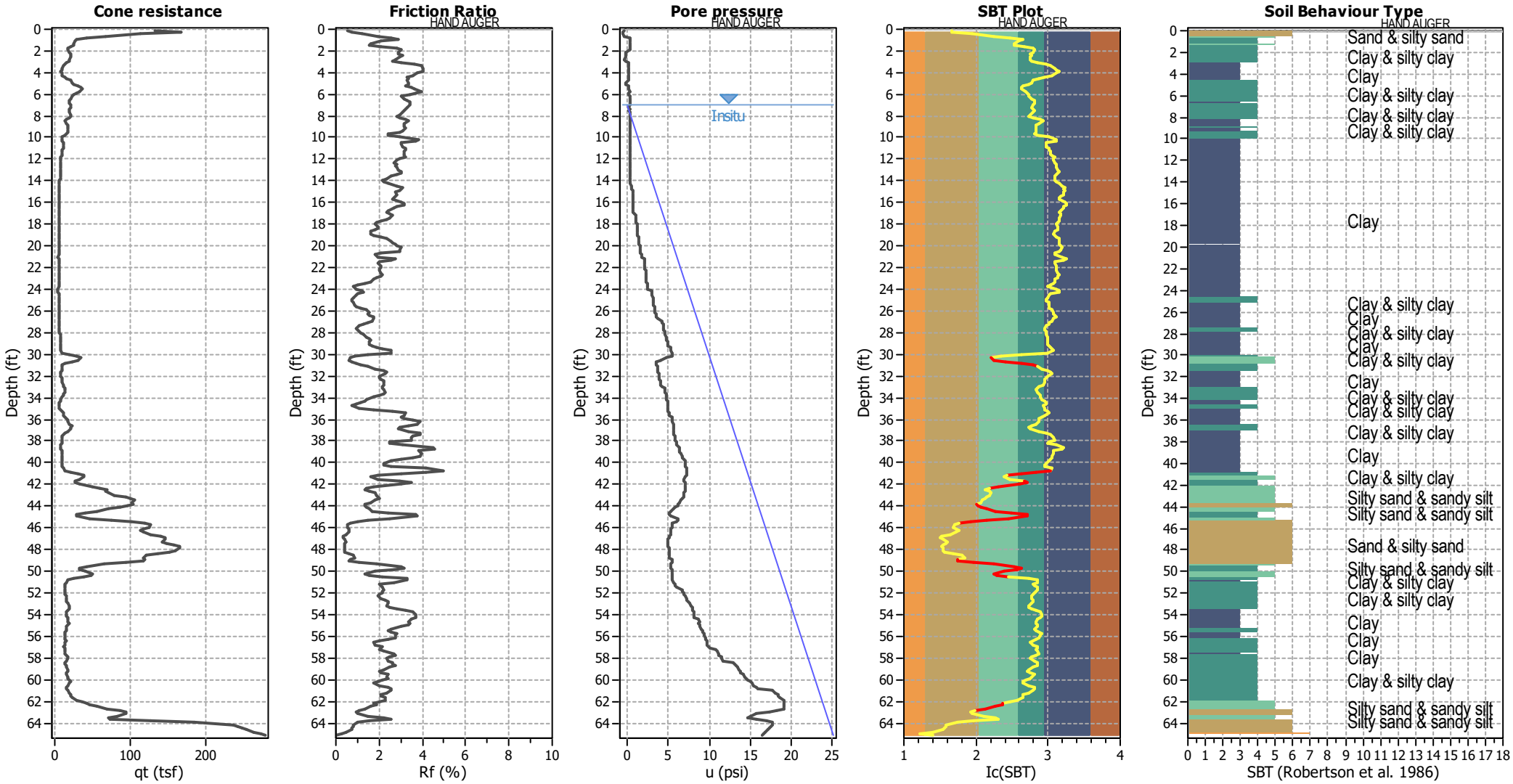

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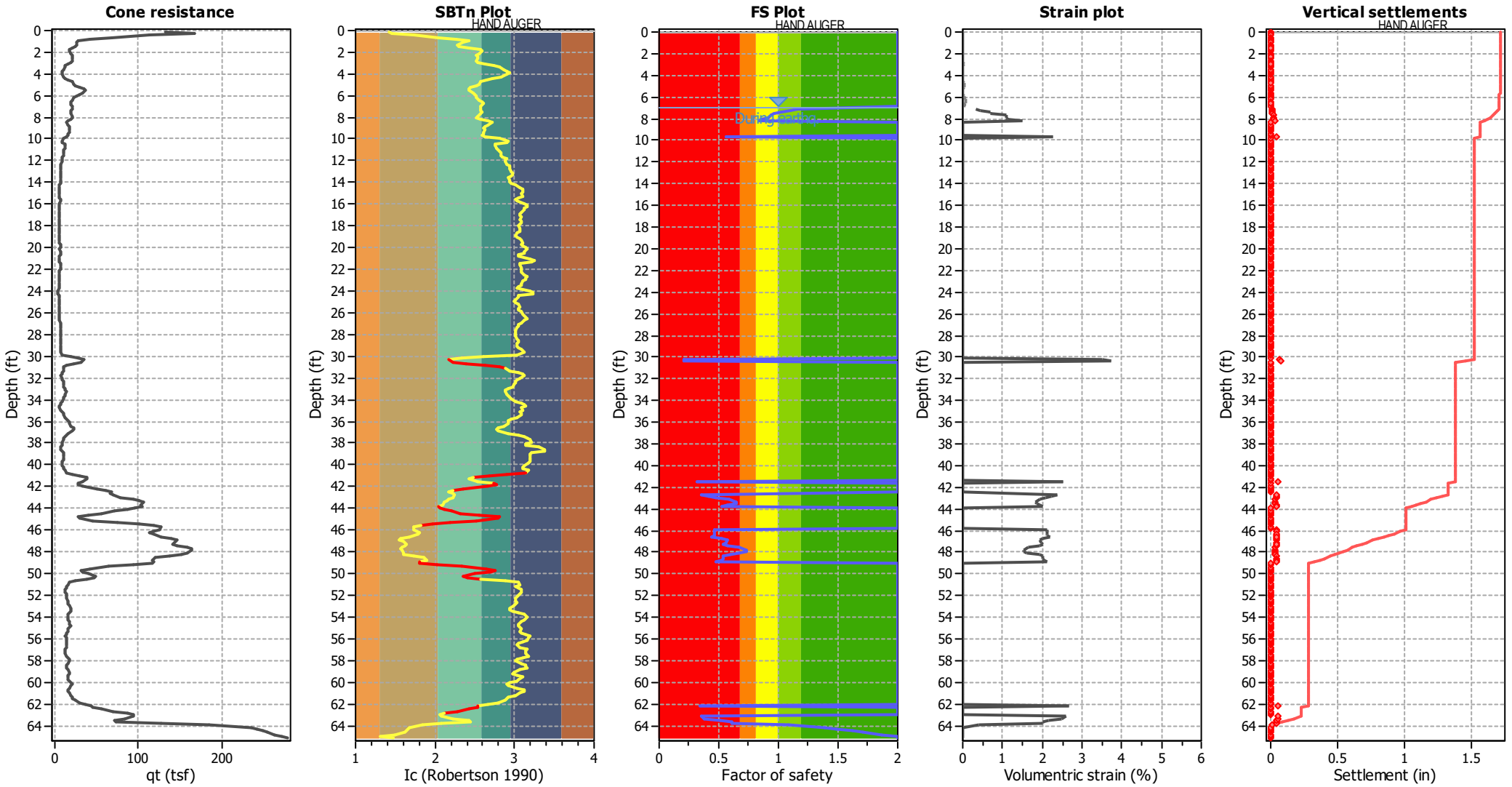
Estimation of post-earthquake settlements



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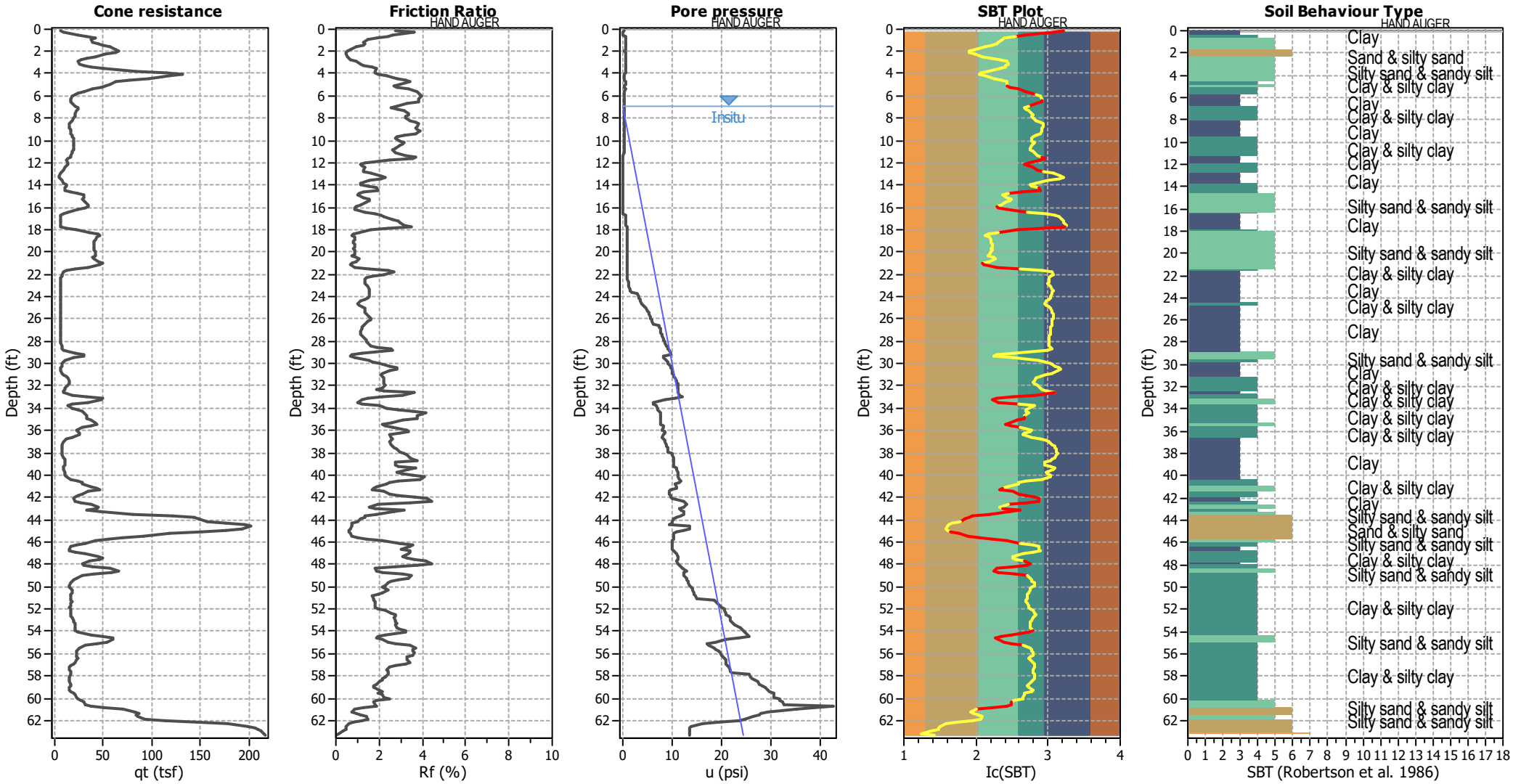

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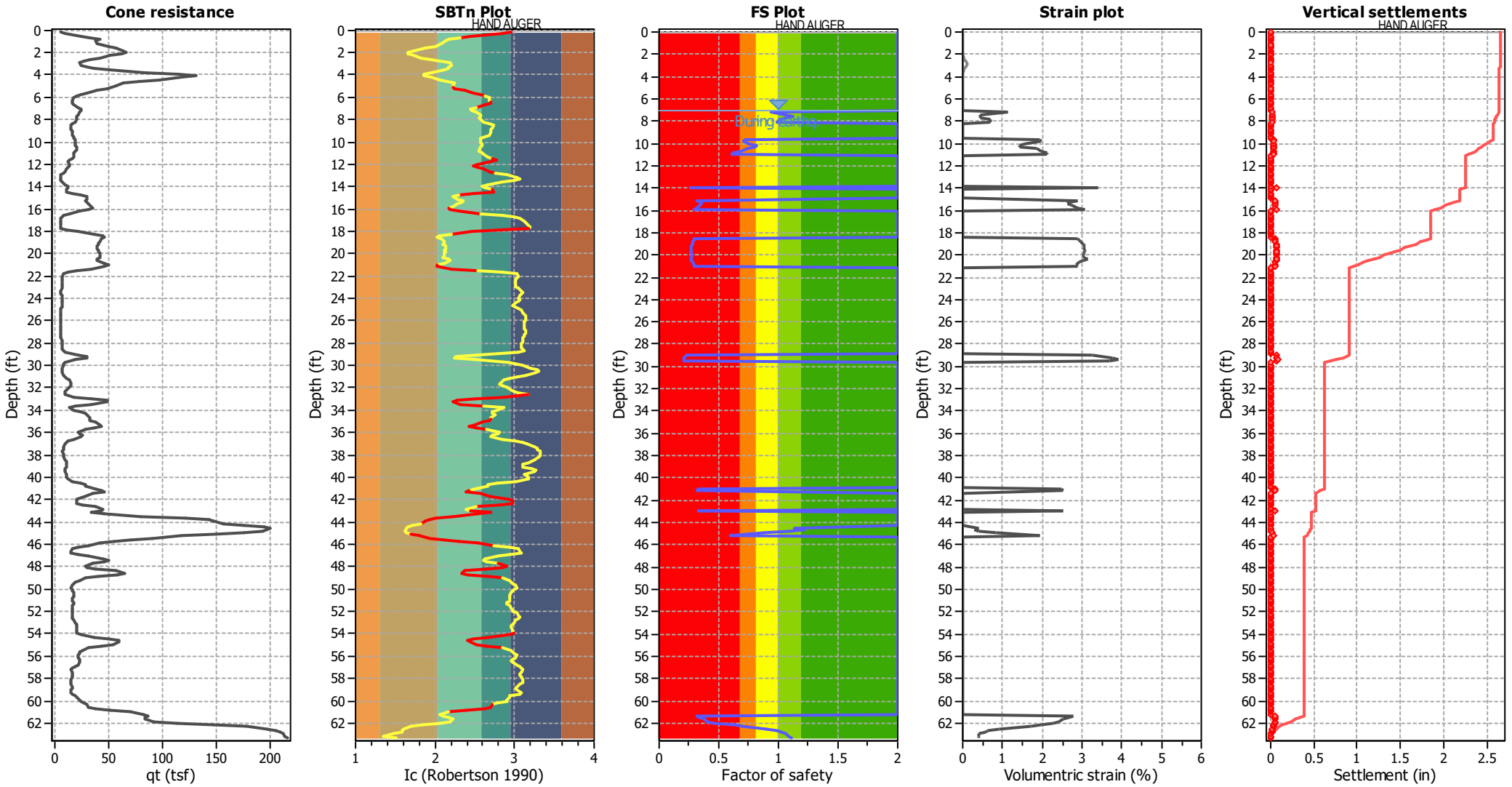
Estimation of post-earthquake settlements



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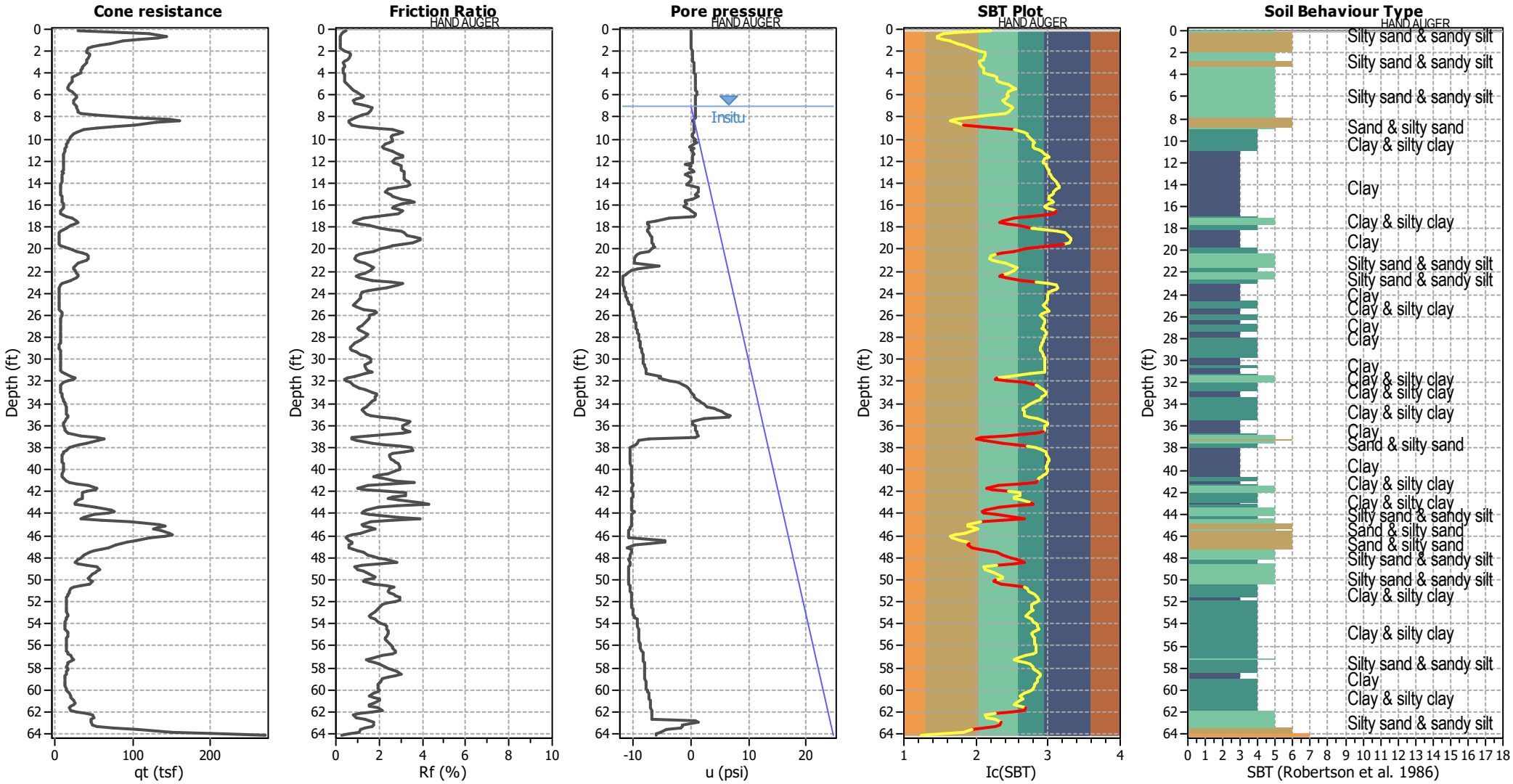

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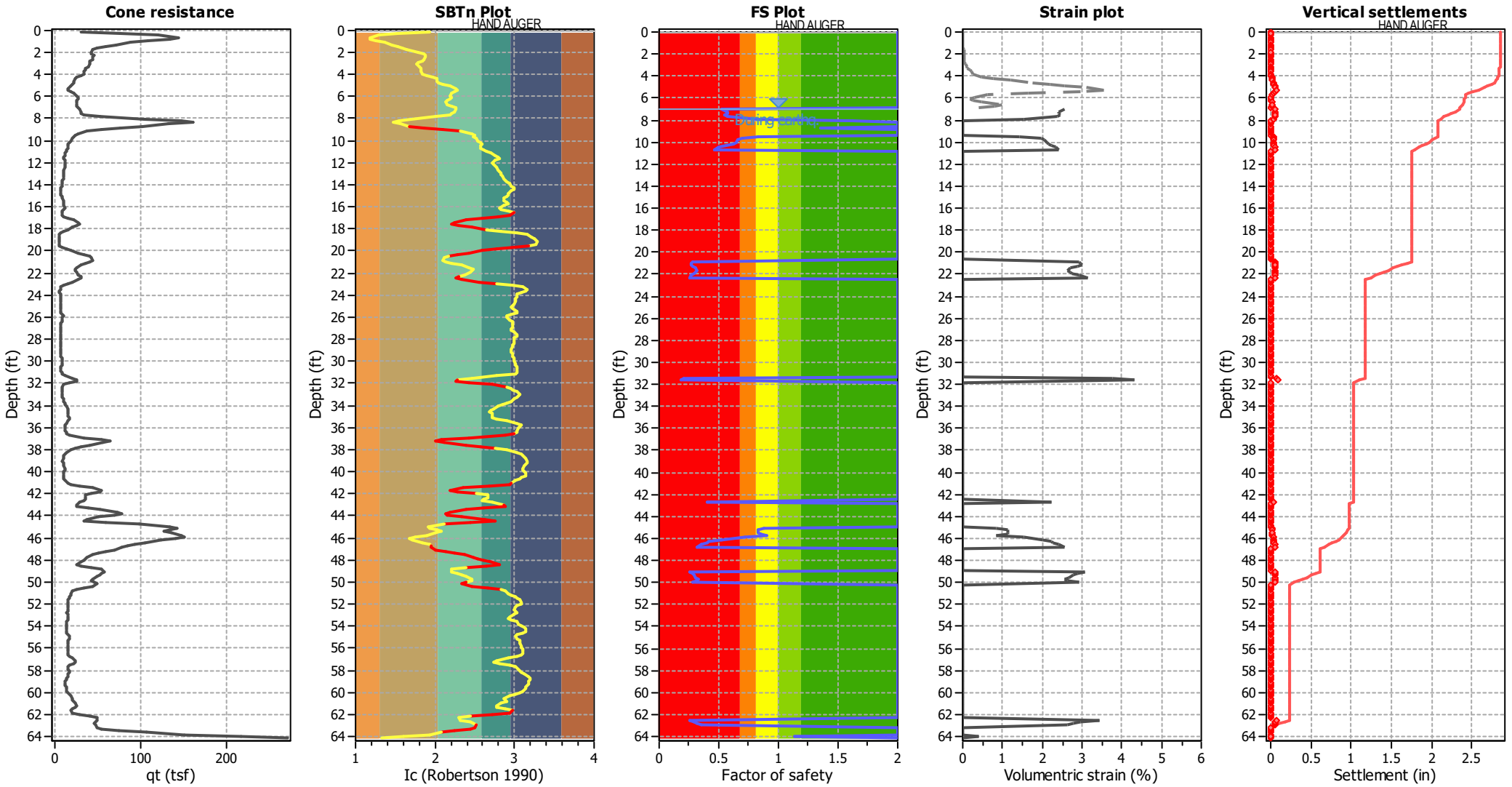

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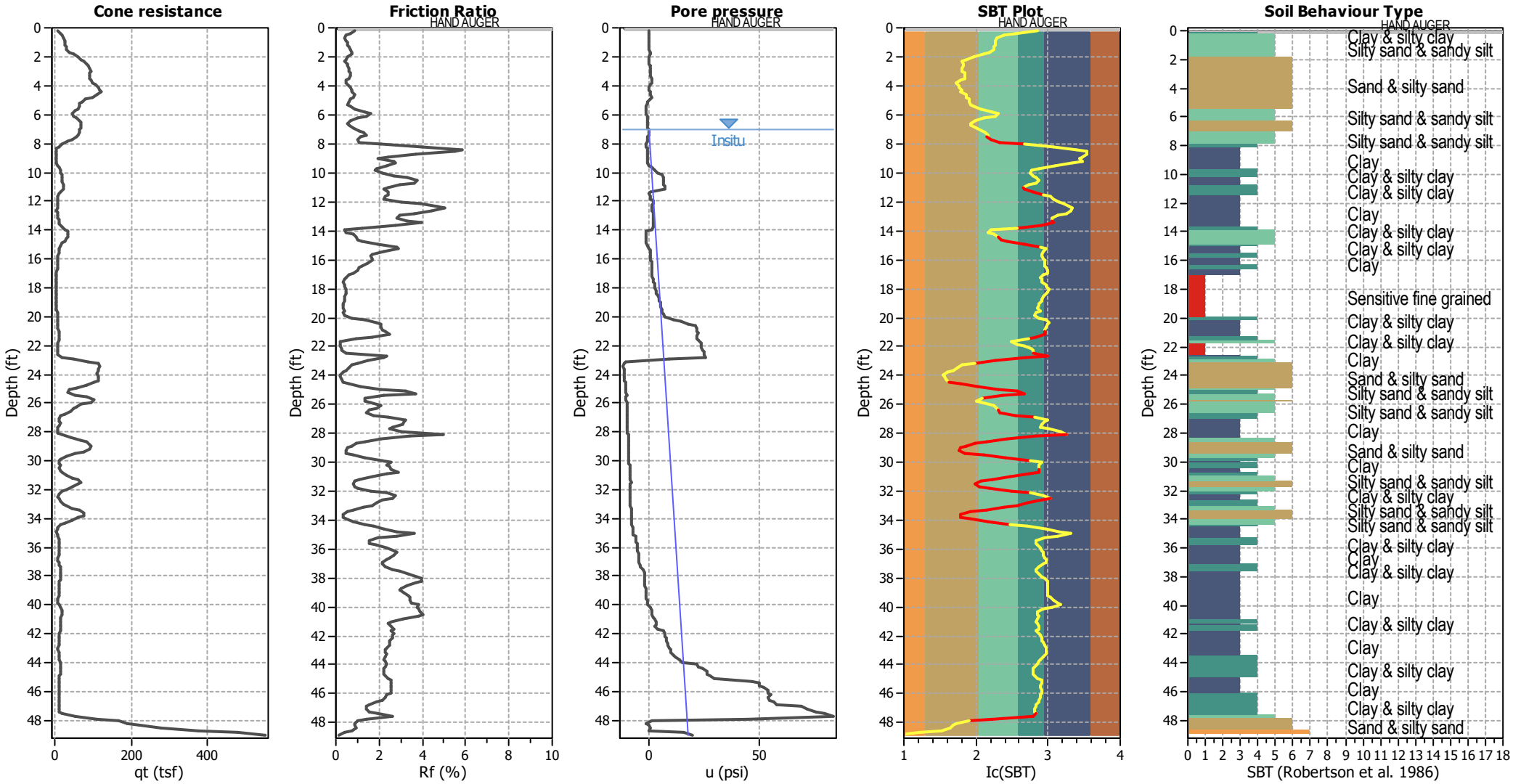

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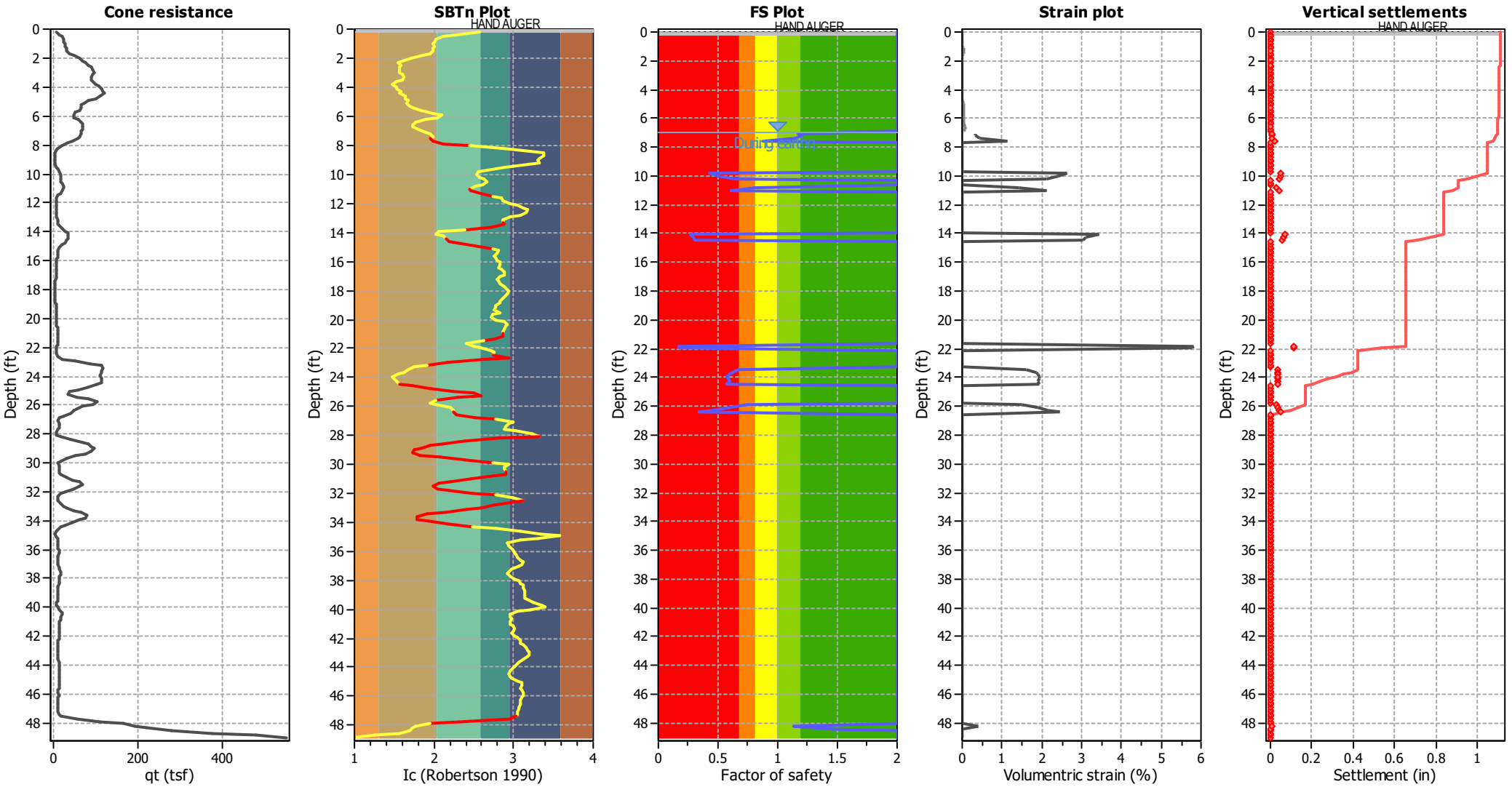
Estimation of post-earthquake settlements



Abbreviations

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FS:	Calculated Factor of Safety against liquefaction
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