STRUCTURAL SYSTEMS

RESEARCH PROJECT

Report No.
SSRP–05/02

FIELD INVESTIGATION REPORT FOR ABUTMENT BACKFILL CHARACTERIZATION

by

EARTH MECHANICS, INC.

Final Report Submitted to the California Department of Transportation (Caltrans), under Contract No. 59A0288

July 2005

Department of Structural Engineering
University of California, San Diego
La Jolla, California 92093-0085

University of California, San Diego

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16. Abstract

This report presents the results of a review of over 100 bridge abutments across the state of California. It includes characterizations of typical backfill materials used behind abutments. It was part of an overall effort to improve on current methods of analyzing the seismic response for abutments systems.

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EXECUTIVE SUMMARY

This project is a result of Request for Proposal (#0213DCT) dated 8/6/02 for geotechnical consulting firms to perform a field drilling program to assist a larger research program being conducted by Caltrans and University of California at San Diego (UCSD). Earth Mechanics, Inc. (EMI) was selected to undertake the scope work described in the RFP under Task 3 (Abutment Backfill Characterization) of RTA Contract No. 59A0337 (Response Assessment of Bridge Systems - Seismic, Live, and Long Term Loads). The California Department of Transportation (Caltrans) is the ultimate client and end-user of this project.

The Abutment Backfill Characterization task of this project is divided into two phases:

- Phase I was to consist of a review of approximately 90 bridges state-wide and selection of approximately 20 bridge sites as potential candidates for further geotechnical field investigation of abutment backfills. It was the mutual understanding that Caltrans would provide bridge plans and logs of test borings for approximately 90 bridges.

- Phase II was to consist of the actual investigation of 10 of the potential candidate bridges. The investigation consists of soil borings with sampling, laboratory testing, CPT soundings with shear wave velocity measurement, and data analysis. The analysis was to be supplemented with some pressuremeter testing (PMT) to further characterize the properties of the abutment backfill. A report was to be provided at completion of Phase II.

At the end of Phase I, our database had grown to a total of 115 bridges. Caltrans provided plans for 105 sites and selected 26 bridge sites for investigation. We conducted site reconnaissance at a total of 35 of the bridge sites to verify that they met selection criteria, feasibility for site investigation, and to establish logistics requirements (traffic control). A Draft Report has been submitted earlier summarizing the progress of Phase I work.

At the end of Phase II, we had tested a total of 15 bridge sites. Site investigation was performed at 11 bridge sites with a total of 26 soil borings, 22 CPT’s and 14 PMT’s. Caltrans provided bulk samples from 4 additional sites which we tested in the laboratory as well. The field and laboratory data was then evaluated and 4 soil type categories developed with representative geotechnical properties. The present report provides a final presentation of both Phase I and II work performed by EMI and serves as a project deliverable for both phases.

1.0 INTRODUCTION

The California Department of Transportation (CALTRANS) provides a contract through the University of California, San Diego (UCSD) for conducting soil investigation of abutment backfill on ten selected bridges. This investigation is part of a larger research program being sponsored by CALTRANS. The purpose of this investigation program is to provide data to establish the types of abutment soil backfill that have been used in California highway bridges to allow a characterization of backfill behavior.

2.0 PHASE I – REVIEW AND SELECTION OF BRIDGES

2.1 Background

The objective of this project is to investigate and characterize the structure backfill behavior when the bridge structure is subjected to seismic loading. The current design practice for ordinary bridges assumes that the abutment backwall shears off in the beginning of seismic loading and does not contribute to the abutment's ability to resist external loads. The only load-resisting source is the soil backfills behind the wall, providing passive pressure against the wall movement when the superstructure is pushed into the soil. The amount of passive resistance mobilized depends on the load-deformation characteristics of the soil backfills.

Caltrans design practice makes use of the load-deformation curve established from the full-scale testing of a 5.5 ft high abutment conducted at the University of California, Davis (Caltrans 2001). The abutment was backfilled with silty clay loam. Current design criteria given in Caltrans Seismic Design Criteria (2001) are based on an interpretation of the test results and disregard actual soil backfill conditions. It would be highly desirable to develop site- and/or soil-specific abutment load-deformation relationships for bridge design. It is our understanding that Caltrans is moving towards this direction.

From experience and our review of typical bridge plans (Caltrans, 1999b) and the requirements presented in the Caltrans Standard Specifications (Caltrans, 1999a), it is obvious that there is tremendous variation in soil types used for structural abutment backfills and therefore load-deformation behavior in true field conditions. It will be a key effort to quantify typical abutment backfills and the potential range of variation in the field for improving current abutment design procedures and hence our ability to predict the overall bridge behavior for ordinary bridges.

2.2 Typical Abutment Backfills

Prior to 1995-96, the construction of abutment backfill did not require a particular soil type. Sections 19.306 and 19-3.065 of the current Caltrans Standard Specifications (Caltrans, 1999a) only contain gradation requirements and a compaction requirement of 95% relative compaction. Given these specifications, soils with high clay content (meeting the grain size requirements) could be used as abutment backfills as long as the required degree of compaction was achieved. This led to poor performance of some abutments, such as heaving and cracking of pavement overlying the backfill. Recognizing the shortcomings of these Standard Specifications, Caltrans encouraged the designers to include additional requirements in the project special provisions. The additional requirements are:

- The materials behind the abutment wall should be low-expansive soil with an Expansion Index (EI) of less than 50 as determined per ASTM D-4829.

- The backfill materials should have a Sand Equivalent of more than 20 determined per Caltrans Test Method 217.

These two additional requirements necessitate that the backfill behind abutments and retaining walls be predominantly sandy soil. A typical area of soil backfills that is to meet the soil type and compaction requirements is schematically shown in Figure 1. These two additional requirements do not yet appear in the current Standard Specifications. It is thought that these new requirements have probably been implemented in the final contract documents for most new bridge design after 1996, but may not have been enforced for all bridges. It is possible that some new bridge construction include clayey soil in structural backfill.

2.3 Review and Selection of Bridges

Caltrans provided us with As-Built plans or Log-Of-Test-Boring (LOTB) sheets for a total of 105 bridges state-wide in December 2003. The As-Built Plans consisted of General Plans showing bridge structure of test borings. We have located these bridge sites on the maps as shown in Figures 3 to 6. We then created a bridge database presented in Table 1 using Microsoft Access software. This database included:

- bridge number,
- bridge name,
- site location,
- site longitude and latitude coordinates,
- number of lanes,
- bridge width,
- year of original construction and modification,
- indicators for site reconnaissance conducted,
- indicator for potential bridge candidates to be investigated further,
- as-performed filed investigation: boring, CPT and PMT depth and locations.

From these bridge plans, we selected bridges to be targeted for investigation of the soil backfill. It is important to understand what kinds of soil types have been used in California highway bridges. Our goal was to collect sufficient abutment backfill properties to develop “typical” soil parameters statewide that can be used to develop site- and soil-specific load-deformation characteristics of the backfill. As a result, our review and selection process considered a number of issues, including:

- Abutment type,
- geographic distribution,
- backfill soil type,
- accessibility and safety for site drilling (requirement of traffic control),
- fill height that could be sampled and tested, and

- ease of securing encroachment permits considering the time constraints.

We conducted site reconnaissance at a total of 35 of the bridge sites to verify that they met selection criteria, that site investigation was feasible, and to establish logistics requirements such as traffic control.

The potential candidates sites included highway over- and undercrossings, river crossings, and railroad, pedestrian or utility underpasses. A few bridges selected are relatively new structures conforming to the latest structure detailing and soil type requirements. Other bridges are older bridges which constitute the bulk of the present day bridge improvement projects undertaken by various state, city and local agencies. New construction sites have the advantage of safe environment, virgin undisturbed soil condition, and easy encroachment permissions obtained from Caltrans.

A total of up to 26 potential candidate bridges were found to be suitable for further investigation as identified in Table 1. Bridge plans and photographs for the selected bridges are provided in Appendix A. Bridge plans and photographs of the remaining bridges can be provided upon request.

3.0 PHASE II - FIELD INVESTIGATIONS

3.1 General

The original scope for the field program called for drilling of two soil borings and two Cone Penetration Tests (CPT) with shear wave velocity measurements for each of 10 bridge sites. During Phase II, site investigation was actually performed at a total of 11 bridges, and Caltrans collected bulk samples from 4 additional sites. Table 2 lists the resulting 25 locations at 15 bridges. The site locations are shown on the state map of Figure 2, and on selected area street maps in Figures 3 to 6. The state map of Figure 2 also shows the number of bridges in each county.

At some sites, bridges were currently under construction and we took the opportunity of investigating the new fills before the roadways were completed. For those sites, Mr. Shamsabadi of Caltrans arranged for permission with the construction site resident engineers.

3.2 Testing

Each site included up to 1 to 3 borings, CPT's and Pressuremeter tests. A total number of 26 soil borings, 22 CPT's and 14 PMT's were performed. The borings, CPT's and PMT's were performed a small distance behind the abutment walls as listed in Table 1. The distance and depths are given in Table 1.

3.2.1 Soil Borings

Subsurface soils and conditions were logged and samples of soils were collected for laboratory testing. The borings were drilled using a truck-mounted drill rig equipped with 8" diameter hollow-stem augers. Large bulk samples of near-surface soils were collected at many sites for laboratory testing. Standard Penetration Test (SPT) samples and relatively undisturbed ring samples were logged in the field and collected for laboratory testing. The SPT sampler and

Modified California Drive sampler were used at approximately 5-ft intervals. The SPT sampler (1.4" ID, 2" OD) was driven a total depth of 18" or until refusal, using a 140-lb hammer falling 30". SPT blowcounts for the last 12" of penetration were recorded on the boring logs and were used to correlate in-situ soil strengths.

The relatively undisturbed ring samples were collected at 10 ft intervals (alternating with the SPT sampler) by driving the Drive sampler a total of depth of 18" or until refusal, using the same hammer and drop height. The Drive sampler is a split-barrel sampler (2.5" ID) with a tapered cutting tip and lined with a series of 1" tall brass rings.

3.2.2 Seismic Cone Penetrometer

Conventional CPT's were by Holguin Fahin Associates and Gregg Drilling using 10 cm^2 cones and 25-ton trucks with on-board data acquisition. The soundings were performed a small distance behind the abutment walls. The CPT report with measured data of cone tip resistance and sleeve friction is provided in Appendix A. The reports also include correlated data such as soil behavior types, undrained shear strengths and friction angles. The data is provided in graphical and tabular form over depth.

Shear wave and compression wave velocities were also measured with the seismic cone at discrete depths, typically every 5 feet. Excitation was generated by impacting a timber log at the surface, which was weighed down by the truck's dead weight, using a sledge hammer. The impact triggers the electronic recording of the arrival time which was measured by the seismic cone at the tip.

3.2.3 Pressuremeter

Testing was performed in the dry augered boreholes at selected depths using our mechanical Texam Pressuremeter device manufactured by RocTest using NX drill bit. The tests were performed a small distance behind the abutment walls as shown in Table 3.

The device, probe and tubes were carefully saturated and calibrated for pressure, volume measurement and creep. The probe used consists of a single 70-mm diameter inflatable rubber membrane enclosed in a flexible metal shield. The device operates by means of water injected through high-pressure tubing into a rubber balloon which exerts lateral pressure to the soil of the borehole walls. The incremental amounts of water injected to achieve a predefined increment of pressure is measured. The increments of amounts of water are then correlated to lateral in-situ strain (and displacement) yield of the soil. We performed cycles of unloading and reloading. The test data results are provided in Appendix A in terms of lateral soil stress versus radial strain. Appendix C contains information on the device used.

It can be noted that some of these resulting curves exhibit an initial upward trend at the departure of the curves that is not typical for loading behavior of soil. The upward departure is attributed to initial side effects of the test balloon when it is being filled with water and borehole disturbance when the hole is drilled. At that stage, the balloon elongates vertically and develops uniform contact with the borehole walls.

3.3 Results

Appendix A provides the following information for each bridge (as available):

- Bridge number and site location of the bridge,

- Brief discussion of the field program with boring/test location relative to the abutment (if applicable)
- Photographs from site reconnaissance and testing,
- Bridge plans as provided by Caltrans,
- Boring logs,
- CPT logs,
- Seismic wave velocities, and
- Pressuremeter test results.

The boring logs represent records of field observations; soil types shown on the boring logs may be revised depending on visual re-classification and testing in the laboratory. Refer to Table 1 and Appendix B for final soil classification.

4.0 LABORATORY TESTING

Caltrans planned to test about 20 structural backfill soil samples from state-wide construction sites and 10 drilled samples using Modified California Sampler from the existing bridges as part of Caltrans' abutment drilling program. Caltrans had some of the samples delivered to our office.

Laboratory testing was performed by EMI on selected soil samples from the bridge sites to provide backfill characterization. A summary of the test procedures and results is provided below. All test results are summarized in Table 3 in order of borehole and depth. The actual test results are provided in Appendix B.

4.1 Moisture/Density

Soil samples collected in brass ring containers were taped in the field to prevent moisture change during transport and storage. Field moist density was determined in the laboratory. Dry density and field moisture were determined in the laboratory by oven drying. The standards used were ASTM D-2937 for dry density and D-2216 for moisture. The densities and moisture contents are given in the summary Table 3.

4.2 Gradation

For the sand samples were run through a standard sieve test per Caltrans Test Methods 202/203 to analyze grain size distributions. The grain size curves show the presence of fines and coarse fractions and are provided in Appendix A.

4.3 Plasticity

Atterberg limits were performed on the cohesive samples to determine their plasticity index (PI) from the liquid limit (LL) and plastic limits (PL) using Caltrans Test Method 204. The PI determines whether a soil is a silt or clay (See Table 3).

4.4 Expansion Index

This test was performed using ASTM D-4829-95/UBC 29-2 on samples from soils to be UU-

tested. This test provides a measure of the expansion potential of any type of soil samples. Typically, expansion potential increase with presence of montmorillionite, which tends to be present more in fine-grained (cohesive) soils. Granular (sandy) soil typically have low EI (less than 20). Caltrans standard specifications for Abutment backfill require that the EI be less than 50.

4.5 Sand Equivalent

This test was performed using CT Test Method 217 on samples from sandy soils to be UU-tested. This test provides a measure of the amount of fines and coarse fractions in predominantly granular samples. Caltrans standard specifications for Abutment backfill require that the SE be 20 or more.

4.6 Maximum Density

The maximum density and optimum moisture content was determined per ASTM D-1557 for each bulk sample representing a soil to be UU-tested. This method uses the Modified Proctor Test in a 4” diameter mold and requires four points to develop the dry density versus moisture curve. The Caltrans standard Test CT 216 requires only three points and was not used in our study. As a result, The ASTM method requires more effort. Nevertheless, we elected to use the ASTM method because our experience has shown that the CT 216 method can underpredict the maximum density.

4.7 Direct Shear Tests

Direct shear tests were conducted using ASTM-D3080 on a few ring samples of sandy soils as an alternate method to determine shear strength parameters of sandy soils. The test is run at three vertical pressures. Plots of the load-displacement curves and the three associated Mohr circles for the peak and the residual states are provided in Appendix B. The interpreted shear strength parameters are summarized in Table 3.

4.8 UU Tests

Samples were selected from the bridge sites following the criteria we defined above. We selected samples that were considered representative of the various soil types, the range in field density and that were from different locations in the State.

The samples were prepared following ASTM D-2850. Preparation included oven drying and passing the sample through a #4 sieve if it contained gravel. Cohesive samples were extruded directly from five of our brass rings (2.42” ID, 2.5” OD, 1” high) and trimmed at the top and bottom ends for testing in the triaxial cell. Those samples are labeled “in-situ” in this report. Certain cohesive samples that could not be extruded were remolded in a 2.42” ID brass cylinder 5” high by compacting to 95% relative compaction (95% of the field dry density) in accordance with Caltrans Standard Specifications. A rubber membrane was then applied to the surface of the samples. Granular samples were carefully compacted to the same criteria in a 2.8” ID aluminum split mold (5.75” high) lined with a rubber membrane under vacuum. All specimens were then capped by a filter stone and loading plate at each end, inside the rubber membrane. The membrane was then secured with outside O-rings outside the membrane to prevent water infiltration.

Specimens were then consolidated and tested in a Geomatic triaxial apparatus to failure under unconsolidated undrained (UU) conditions at three different confining pressures in order to obtain the total-stress friction angle and cohesion value at failure. The depth of interest in this study was in the upper few feet of the abutment walls where the wall engages (pushes into) the backfill soils and the passive wedge is expected to mobilize. If the sample was from this shallow depth zone, the first confining pressure was typically set equivalent to its original in-situ overburden pressure, otherwise an equivalent test pressure was calculated from the desired depth and the sample's field density. The second and third confining pressure levels were set at arbitrary multiples of the first pressure to cover an equivalent soil depth range of up to about 20 ft.

The results in terms of deviatoric stress versus axial strain curves are plotted in Appendix B typically showing three unloading and reloading cycles. The plots include the three associated Mohr circles for the three failure states and the interpreted shear strength parameters (Mohr-Coulomb failure criteria).

5.0 CONCLUSIONS

Soil Types. For each bridge site shown in Table 3, representative soil types were defined from the soil samples in the upper 15 ft of the boreholes. The resulting 23 bridge-specific soil types were then sorted by USCS soil type. Because there are many soil types in the USCS system, the data was then grouped into four key soil categories: clean sands, "dirty" sands containing fines, clayey sands, and cohesive soils. Table 4 defines these four categories and provides the number of sites and soil samples and depth range that these categories are based on. Overall, we found that the majority of fills are silty sands with gravels. The blowcounts and shear wave velocities vary significantly, even within the same backfill, and it is difficult to find trends. Blowcounts frequently have more variation and are lower in older fills compared to more recent constructions. Newer fills tend to have higher strength and in-situ density due to a better quality compaction effort.

Geotechnical Properties. For each of the selected soil type category, Table 4 shows the ranges of geotechnical properties measured in the field and laboratory:

- SPT blowcount. Uncorrected SPT blowcount. Non-standard blowcounts were converted to SPT-equivalent blowcounts.
- Field density. Dry density determined from ring samples, and moisture.
- Grain size distribution. Percentage of gravel, sand and fines fractions, and qualitative assessment (fine, medium, coarse).
- Plasticity. Plasticity Index (PI) and qualitative assessment (none, low, medium, high) for cohesive portion of the sample.
- Sand Equivalent (SE)
- Expansion Index (EI)
- Compaction. Maximum dry density and optimum moisture per ASTM-1557.
- Compacted fill parameters. Dry density of the soil compacted to 95% R.C., and shear strength parameters (friction angle, cohesion) from the UU triaxial tests at failure and

residual values from direct shear tests (peak values were high and were ignored).

Values shown in the table in parentheses are typical values based on straight average and some judgment. In addition to soil descriptions and shear strength properties indicated in Table 4, shear wave velocities and pressuremeter test results were evaluated.

Shear Wave Velocities. Shear wave velocities were measured using a seismic cone which as a built-in seismometer to measure seismic velocities. Shear waves are generated by striking a beam coupled to the ground surface by a hydraulic cylinder under the CPT rig. The sledgehammer strikes the beam and triggers seismic wave sending the impulse signal down the ground surface. Geophones embedded in the piezocone pickup the arriving signal to determine arrival times. A presumptive shear wave velocity of 800 feet per second for compacted backfills as indicated in Caltrans BDS is a reasonable average value to be used for the cohesionless soils such as Soil Type Categories I, II, and III in Table 4. The typical shear wave velocities range from 700 to 1000 feet per second for those soil categories. The clayey soil such as Soil Type Category IV tends to show a lower shear wave velocity than the cohesionless soils. Representative shear wave velocities for the Soil Type Category IV are 550 to 800 feet per second. These values are also shown in Table 4.

Soil Moduli. Pressuremeter tests were performed for initial monotonic loading, followed by cycles of unloading and reloading. The Young's modulus is determined as a ratio of pressure increment to the increment of radial strains. The modulus determined for unloading/reloading is larger than the modulus determined from initial loading. Since a borehole must be made prior to inserting a pressuremeter probe, the initial branch of stress versus strain relation is often influenced by the borehole disturbance. While there are no quantitative measures of borehole disturbance, some considerations were given to account for this effect. The following secant modulus is judged to be appropriate based on the limited pressuremeter test results:

Soil Type Categories I, II, III:	Initial Modulus 2,000 to 4,000 kPa
	Unloading/Reloading Modulus 10,000 to 15,000 kPa
Soil Type Category IV:	Initial Modulus 1,500 to 3,000 kPa
	Unloading/Reloading Modulus 6,000 to 10,000 kPa

These moduli ranges are also shown in Table 4.

In conclusion, we find that the number of bridges and soil samples tested so far in this project are relatively few comparing to the variability of site conditions, structures, and geographic locations. To establish firm trends for abutment backfill properties statewide, more field work would be needed at bridge sites throughout the state, particularly in the northern and in-land areas.

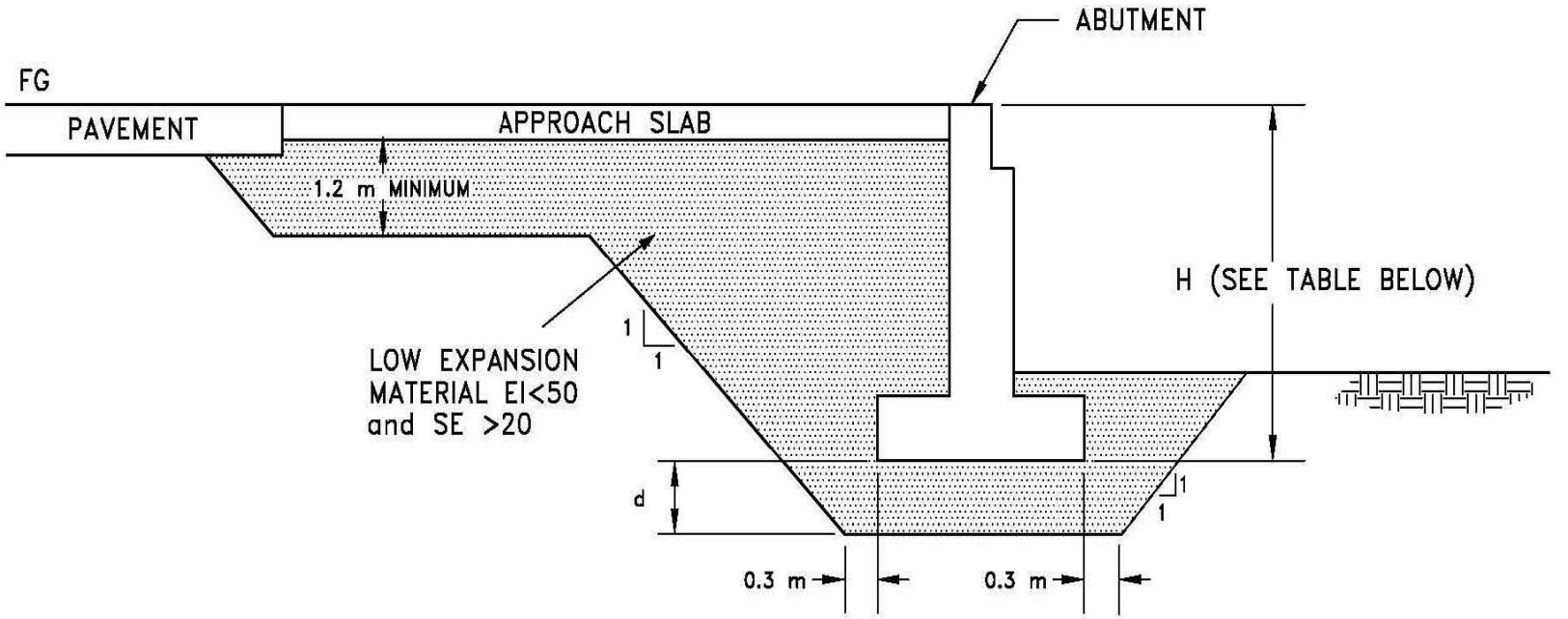
6.0 REFERENCES

Caltrans (2002), Guideline for Foundation Investigations and Reports, Division of Engineering Services.

Caltrans (2001), Seismic Design Criteria, December.

Caltrans (1999a), Standard Specifications, July.

Caltrans (1999b), Standard Plans, July.



H	d
<4.9 m	1.2 m
>4.9 m	0 m

NO SCALE

EXPANSION INDEX TO BE DETERMINED BY ASTM D4829
SAND EQUIVALENT TO BE DETERMINED
BY CALIFORNIA TEST METHOD 217

FIGURE 1. CURRENT CALTRANS BACKFILL REQUIREMENTS

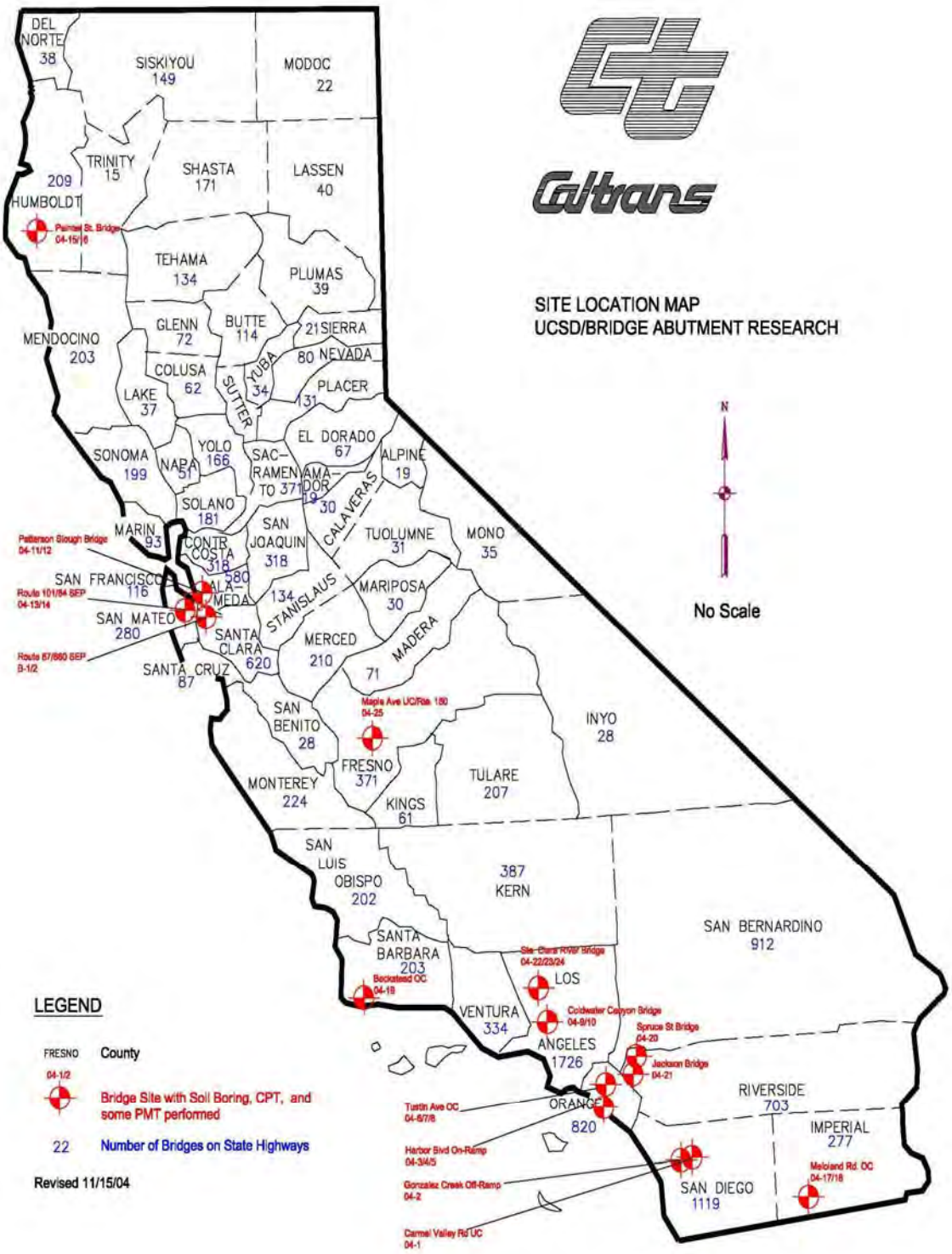


Figure 2. Map of Site Locations and Bridge Counts by County

Figure 3. Map of Bridge Sites in San Francisco Bay Area

Figure 4. Map of Bridge Sites in Central California

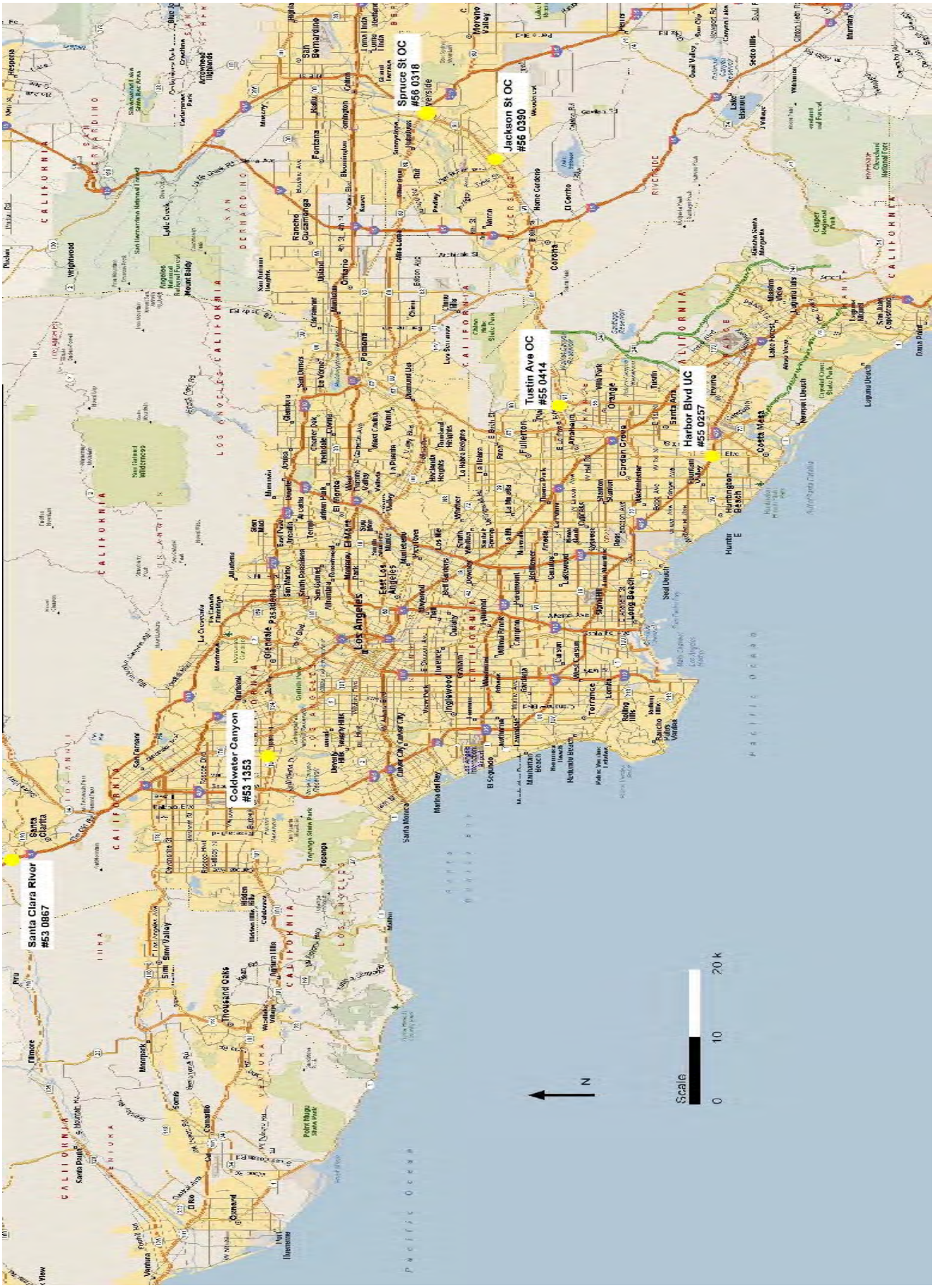


Figure 5. Map of Bridge Sites in Los Angeles/Orange County/San Bernardino Areas

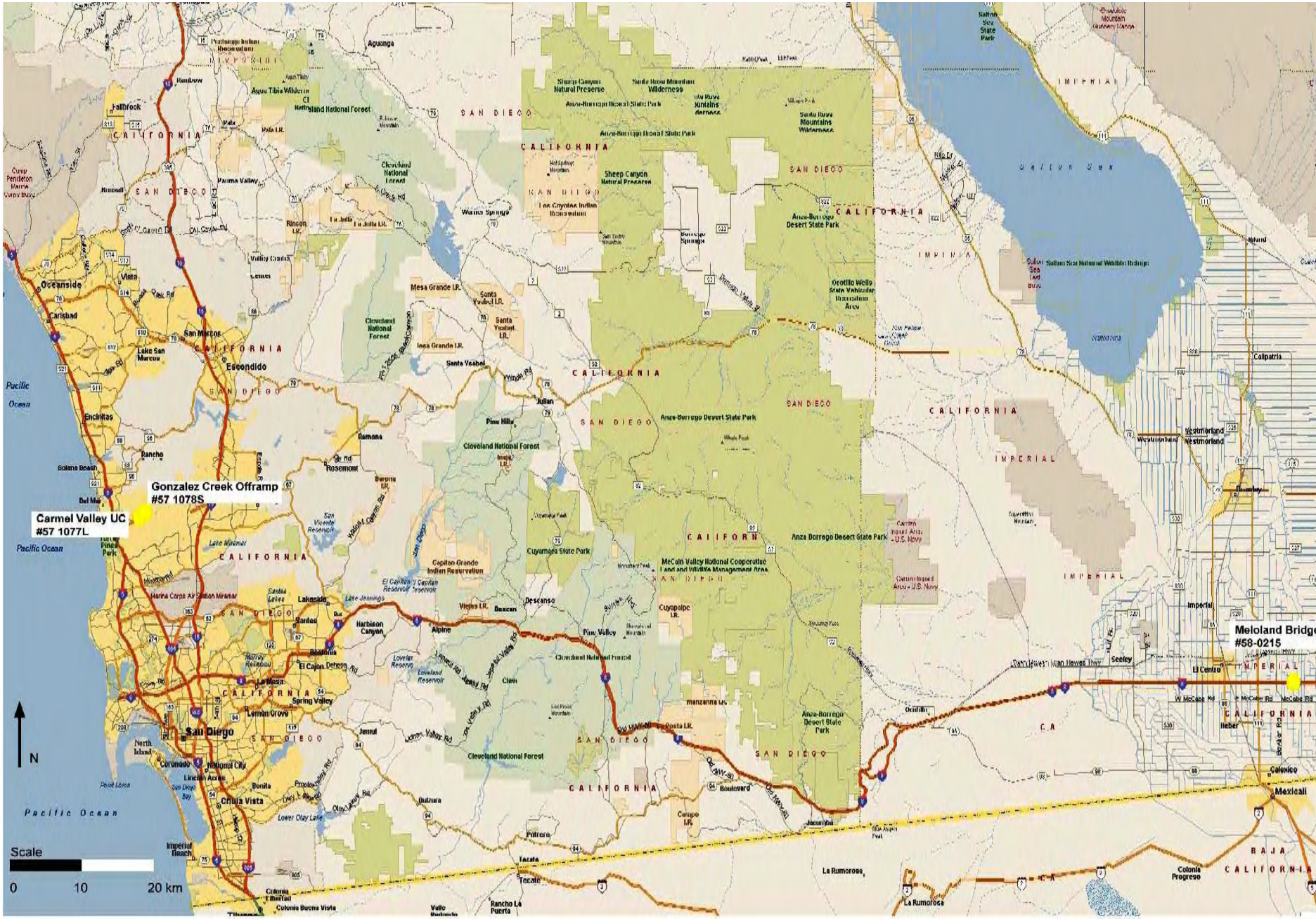


Figure 6. Map of Bridge Sites in San Diego Area

Table 1. Bridge Database

Date: 5/31/2005 10:33:56 MK/EMI

ID#	Bridge No.	Bridge Name	County	Route	Date Built	Have Plans?	Visited	Candidate for Drilling?	Comments	# of Lanes	Rdwy Width	Latitude	Longitude	Location Description
86	57-0791 S	"E" Street On-Ramp	San Diego	I-5	1992	Y	N	N?	drill thru conc. appr. Slabs	2	11, 13.7	32.6396	-117.0998	Chula Vista, I-5/route 54 intersection
17	23-0213	Allison Drive OC	Solano	I-80	1997	Y	N			4	28	38.3615	-121.9693	Vacaville, just south of Nut Tree Factory
87	57-0935	Ammo Rd OC	San Diego	I-15	1982	Y	N	N		2	8.5	32.8751	-117.1070	Miramar Marine Corps Airstation--Difficult to pinpoint
29	39-0154	Arburua Rd OC	Merced	I-5	1971	Y	N			2	24.1	36.9643	-120.8824	~7 mi SW of Los Banos
72	54-1107	Archibald Ave Offramp SEP	San Bernardino	I-10	1996	Y	Y	N		2	11.2	34.0676	-117.5933	North of Ontario Airport
51	53-1204	Atlantic Ave OC	Los Angeles	I-405	1963	Y	Y	Y*		4	28	33.8153	-118.1851	Long Beach
54	53-1986	Balboa Boulevard OC	Los Angeles	I-5	1971	Y	N	N	no struct. Plans, T/C diff. @ north abut	2	12.2	34.3209	-118.4964	LA, near I-5/I-210
33	44-0124	Bardin Rd OC	Monterey	US-101	1955	Y	N			2	8.5	36.6610	-121.6230	Near Salinas Municipal Airport--CAN'T FIND SPECIFIC ON MAP
21	28-0083 S	Barrett Ave UC	Contra Costa	I-80	1997	Y	Y	Y	busy, may require TC	1	7.3	37.9355	-122.3268	Richmond over Barrett Ave
53	53-1605	Barrington Ave	Los Angeles	I-10	1963	Y	Y	N		10	42.7	34.0296	-118.4441	LA, just west of I-10, I-405 intersection
23	34-0047 S	Bay Shore Ave UC	San Francisco	US-101	1950	Y	Y	N	No LOTB avail, busy loc, TC req'd, permit	2	7.9	37.71592	-122.3985	San Francisco, US-101 south of 280
114	51-0234	Beckstead OC	Santa Barbara			N	Y	Y	Collected bulk sample			34.4738	-120.2090	Santa Barbara
43	52-0247	Borchard Rd OC	Ventura	US-101	1962, 1992	Y	N	N	T/C not feas.	2	11.3	34.1844	-118.9256	7.1 mi west of LA County line in Ventura County
34	44-0131 L	Boronda Rd OC	Monterey	US-101	1965	Y	N	N	has MSE walls	2	12.3	36.7220	-121.6599	Salinas
65	54-0415	Bridge Across Colorado River at	San Bernardino	I-40	1966	Y	N	Y?	req. T/C	4	18.3	34.71696	-114.48657	Colorado River Crossing on I-40 at CA/AZ border
50	53-1203	California Ave OC	Los Angeles	I-405	1964	Y	Y	Y		2	17.1	33.8143	-118.1806	Signal Hill
92	57-1083 R/L	Camino Ruiz UC	San Diego	SR-56	2002	Y	Y	Y				32.9580	-117.1553	San Diego, on SR-56 between I-5 and I-15
100	57-1077 L	Carmel Valley Rd UC	San Diego	SR-56	2004	N	Y	Y	Drilled 2/7/04. Collected bulk sample			32.9487	-117.2031	San Diego, on new SR-56 between I-5 and I-15
89	57-0991 S	Carmel Valley UC	San Diego	I-5	1996	Y	Y	Y		2	11.9	32.9326	-117.2410	Del Mar, north of 1-5/I-805 merge
48	53-1200	Cherry Ave OC	Los Angeles	I-405	1964	Y	Y	Y*		4	25.6	33.8135	-118.1676	Long Beach
108	53-1353	Coldwater Canyon	Los Angeles	SR-101	1971	Y	Y	Y	Drilled 4/19/04			34.1569	-118.4137	101 over Coldwater Canyon
56	53-2264	Colorado Boulevard SEP	Los Angeles	SR-134	1975	Y	N	N		5	26.5	34.1457	-118.1549	Pasadena

ID#	Bridge No.	Bridge Name	County	Route	Date Built	Have Plans?	Visited	Candidate for Drilling?	Comments	# of Lanes	Rdwy Width	Latitude	Longitude	Location Description
97	28-0185	Concord Ave OH	Contra Costa	I-680	1963 (2000	N	Y				38.9	37.9762	-122.0634	Pacheco/Concord
15	22-0144	County Rd 102 OC	Yolo	I-5	1969	Y	N			2	9.8	38.6738	-121.7286	2 miles east of Woodland
10	11-0083	County Rd 68 OC	Glenn	I-5	1970	Y	N			2	9.8	39.4072	-122.1954	North of Norman, intersection of county road 68 and I-5
63	53-2831	Del Amo Boulevard OC	Los Angeles	I-405	2002	Y	N	N				33.8464	-118.2696	Carson
22	29-0259	Durham Ferry OC	San Joaquin	I-5	1971	Y	N			2	9.8	37.6673	-121.3432	~20 mi west of Modesto
40	51-0224	El Rincon OC	Santa Barbara	US-101	1963	Y	N			2	8.5	34.3837	-119.4847	Carpenteria, 1.6 mi west of Ventura/Santa Barbara County line
69	54-0964 L	Etiwanda Creek Bridge	San Bernardino	I-15	1976	Y	N	(Y)	T/C not feas. on S/B	6	32.6	34.1268	-117.5075	Etiwanda, north of California Speedway
39	51-0117 (51-0328?)	Fairview Ave OC (AKA Linden Ave	Santa Barbara	US-101	2001	Y	N				10.2	34.44	-119.832	Goleta
78	55-1025 S	Fairview Rd On-Ramp OC	Orange	I-405	2004	Y	Y	Y				33.6877	-117.9076	Costa Mesa
8	10-0269	Forsythe Creek Bridge	Mendocino	US-101	1990	Y	N			4	24.1	39.2547	-123.2127	~9 mi North of Ukiah in Redwood Valley
7	08-0123 L	Gay Creek Bridge	Tehama	I-5	1966	Y	N			2	11.9	39.8002	-122.1999	~8 miles south of Corning, just north of Glenn/Tehama County line
101	57-1078 S	Gonzalez Creek Off-Ramp	San Diego	SR-56	2004	N	Y	Y	Drilled 2/7/04			32.9510	-117.1979	San Diego, on new SR-56 between I-5 and I-15
106	55-0257	Harbor Blvd UC (Widen)	Orange	I-405	2003	Y	Y	Y	Drilled 2/28/04	1	7.3+	33.6890	-117.9194	I-405 S/B On-Ramp over Harbor Blvd, Costa Mesa
96	28-0143	Hercules OH	Contra Costa	I-80	1998	N	Y	N			46.3	38.0121	-122.2708	Pinole/Hercules
76	55-0822 E	HOV Ramp OC	Orange	I-5	1996	Y	N		busy HOV br.	2	15.3	33.6447	-117.7353	Irvine, I-405 and I-5 split
20	27-0083	Ignacio Blvd OC	Marin	US-101	1964	Y	Y	N	T/C req'd	5	23.2	38.0662	-122.5373	~3.5 miles south of Novato on Hwy 101
81	56-0390	Jackson St OC (Replace)	Riverside	SR-91	2001	Y	Y	Y	Bulk sample collected	2	15.6	33.9185	-117.4346	Riverside, intersection of Jackson St and SR-91
30	42-0238	Jeffery Ave OC	Fresno	I-5	1968	Y	N			2	805	36.3701	-120.3357	Coalinga
70	54-0971	Jurupa St OC	San Bernardino	I-15	1977, 1995	Y	Y	N		6	34.1	34.0481	-117.5500	Ontario, south of I-15, I-10 intersection
2	01-0032	Klamath River Overflow Bridge	Del Norte	US-101	1965	Y	N			2	8.5	41.5182	-124.0309	1000 ft south of Klamath River over Klamath Beach blvd and Waukett Creek
44	53-0061	La Canada Arch Bridge Widening	Los Angeles	SR-2	1930, 1966	Y	Y	N		4	20.7	34.207	-118.200	La Canada Flintridge
60	53-2791 S	La Cienga-Venice Outer SEP	Los Angeles	I-10	1994	Y	Y	N		1	6.1	34.0363	-118.3773	LA, East of I-10, I-405 intersection
19	24-0287 R	Lambert Rd UC	Sacramento	I-5	1975	Y	N			2	12.2	38.3206	-121.4652	South of Sacramento near Elk Grove

ID#	Bridge No.	Bridge Name	County	Route	Date Built	Have Plans?	Visited	Candidate for Drilling?	Comments	# of Lanes	Rdwy Width	Latitude	Longitude	Location Description
6	06-0180	Lamoine Rd OC	Shasta	I-5	1991	Y	N			2	12.2	40.9775	-122.4333	Lamoine, ~20 miles north of Redding
38	50-0270	Lebec OC	Kern	I-5	1964	Y	N	N	T/C not feas.	2	9.8	34.8356	-118.8634	Northside of Lebec, just south of Grapevine
32	43-0019	Lomerias OC	San Benito	US-101	1969	Y	N			2	10.4	36.8952	-121.5564	~7 mi south of Gilroy
52	53-1205	Long Beach Boulevard OC	Los Angeles	I-405	1963	Y	Y	N		12	47.5	33.8174	-118.1893	Long Beach
116	42-0398	Maple Ave UC	Fresno	SR-168	200X	Y	Y	N	Collected bulk sample			36.7361	-119.7456	Olive Ave
95	28-0087	McBryde Ave OC	Contra Costa	I-80	1997	N	Y			4	23.1	37.9482	-122.3255	Richmond
111	58-0215	Meloland Rd OC	Imperial	I-8	1969	Y	Y	Y	Drilled 8/20/04	2	44	32.7738	-115.4478	El Centro
12	19-0056 S	Miners Ravine Bridge	Placer	I-80	1989	Y	N			1	7.3	38.7537	-121.2644	Roseville, just south of Atlantic St, I-80 intersection
80	56-0315	Mission Inn Ave UC (Widen)	Riverside	SR-91	1957, 2002	LOTB only	N	N	AKA 7th St., T/C not feas.			33.9807	-117.3690	Riverside, intersection of Mission Inn Ave and SR-91
58	53-2602	Montana Ave Pedestrian OC	Los Angeles	US-1	1979	Y	Y	N				34.0216	-118.5083	Santa Monica
71	54-0986 L	MWD Pipeline UC	San Bernardino	I-15	1975	Y	Y	N		4	20.4	34.110	-117.528	North of Ontario Mills CAN'T PINPOINT ON MAP
11	15-0062 L	North Arbuckle UC	Colusa	I-5	1967	Y	N			2	11.9	39.0246	-122.0628	0.5 mi North of Arbuckle over Salt Creek Dr
68	54-0910 F	Northeast Connector OC	San Bernardino	I-10 and I-15	1975	Y	Y	N		2	11	34.0672	-117.5447	9.9 miles east of LA county line, intersection of I-10 and I-15
104	55-0447G	Northwest Connector OC	Orange	SR-91/SR-57	1969	Y	N	N	busy connector		12.5	33.8521	-117.8768	Santa Ana
16	23-0145	Nut Tree Rd OC	Solano	I-80	1963	Y	N			2	9.8	38.3696	-121.9578	~2 miles east of Vacaville
49	53-1202	Orange Ave OC	Los Angeles	I-405	1964	Y	Y	Y		3	17.1	33.8143	-118.1763	Signal Hill
55	53-2195	Orange Grove Boulevard OC	Los Angeles	I-210	1973	Y	Y	Y*	busy	4	19.5	34.1469	-118.1610	Pasadena
75	55-0459	Orangethorpe Ave UC	Orange	SR-57	1969	Y	Y	N	have CT Max.	13	59.4	33.8705	-117.8799	Placentia
112	04-0236	Painter St	Humboldt		1973	Y	Y	Y	Drilled 7/1/04	2-4	52	40.5032	-124.1024	in city of Rio Dell
82	56-0563	Palm Drive OC	Riverside	I-10	1968	Y	N	Y?		13	59.4	33.8796	-116.5038	Palm Springs
109	33-0250	Patterson Slough	Fremont	Patterson Channel	1955	Y	Y	Y	Drilled 6/17/04	6-8	94	37.5837	-122.0502	Patterson
24	34-0056	Paul Ave UC	San Francisco	US-101	1954	Y	Y	N	Busy location, TC req'd, permit concerns	10	43.7	37.7236	-122.4011	San Francisco, US-101 south of 280
90	57-1080	Rancho Santa Fe Farms OC	San Diego	SR-56	2002	Y	Y	Y				32.9647	-117.1777	San Diego, on SR-56 between I-5 and I-15

ID#	Bridge No.	Bridge Name	County	Route	Date Built	Have Plans?	Visited	Candidate for Drilling?	Comments	# of Lanes	Rdwy Width	Latitude	Longitude	Location Description
77	55-0959	Redhill Ave (replace)	Orange	I-405	2002	Y	Y	N	site not found	2	22.2	33.6868	-117.8670	Costa Mesa, near I-405/SR-55 intersection
4	04-0028	Redwood Creek Bridge	Humboldt	US-101	1988	Y	N			2	12.2	41.2884	-124.0581	Northside of Orick
98	28-0308	Richmond Parkway OC	Contra Costa	I-80	1997	N	Y			7	34.8	37.9867	-122.3145	San Pablo/Pinole
14	20-0235	Rohnert Park Expressway OC	Sonoma	US-101	1973	Y	Y	N	T/C req'd	8	16.2	38.3483	-122.7131	Rohnert Park
13	19-0177	Roseville Parkway OC	Placer	I-80	2001	Y	N					38.7638	-121.2578	Roseville, NE of Sacramento
1	01-0026	Route 101/169 SEP	Del Norte	US-101	1965	Y	N			2	12.4	41.5231	-124.0339	0.25 mi south of Klamath over SR 169 and Hoppaw Creek
110	35-0083	Route 101/84 SEP	San Mateo	SR-101/84	19XX	Y	Y	Y	Drilled 6/13/04	2	202	37.4892	-122.2128	101/84 Interchange
57	53-2317	Route 134/7 SEP	Los Angeles	I-210/SR-134/I-710	1975	Y	N	N		6	47.9	34.1497	-118.1554	Pasadena
62	53-2795 G	Route 14/5 SEP & OH	Los Angeles	I-5	1994	Y	Y	Y		3	15.5	34.3350	-118.5084	South of Santa Clarita
61	53-2795 F	Route 14/5 SEP and OH	Los Angeles	I-5	1994	Y	Y	Y		3	15.5	34.3357	-118.5079	South of Santa Clarita
42	51-0329	Route 154/US-101 SEP	Santa Barbara	US-101	2000	Y	N	N	T/C not feas.	2	12.1	34.6813	-120.1570	North of Beullton
85	57-0551 G	Route 209/5 SEP	San Diego	I-5	1969	Y	N	N		2	11	32.7548	-117.2016	San Diego, south of I-5/I-8 I/C-- Route 209 is AKA Rosecrans
67	54-0764	Route 259/30 SEP	San Bernadino	SR-30/SR-259	1968	Y	N	N	T/C not feas.		15.5	34.1456	-117.2981	San Bernadino
46	53-1196	Route 405/19 SEP	Los Angeles	I-405	1964	Y	Y	N		11	50.6	33.8056	-118.1425	Long Beach
18	24-0207 L	Route 5/880 SEP	Sacramento	I-80	1968	Y	N			5	20.1	38.6249	-121.5172	Sacramento, I-80 (No longer called 880!) I-5 intersection
74	55-0446	Route 57/91 SEP	Orange	SR-57/SR-91	1969	Y	Y	N		9	45.1	33.8498	-117.858	0.41 of Anaheim City Park
83	56-0656	Route 79/15 SEP	Riverside	I-15	1979	LOTB only	N	N	tiebacks @ north abut	4	18.6	33.5224	-117.1629	Temecula, Winchester Road and I-15
25	35-0066	Route 84/101 SEP	San Mateo	US-101	1998	Y	N			5	23.2	37.4889	-122.2128	Menlo Park, intersection of Marsh Rd and US-101
73	55-0217	Route 91/250 SEP	Orange	SR-91	1967	Y	Y	N	have CT Max., replace br. 55-852			33.8541	-117.8892	0.25 mi west of intersection of Placentia Ave and Riverside Freeway
27	37-0609	Rte 87/880 SEP	Santa Clara	I-880	2004	Y	Y	Y	Drilled 1/30/04	10	17	37.3543	-121.91112	San Jose, near airport
31	42-0250	Russell Ave OC	Fresno	I-5	1966	Y	N			2	8.5	36.6855	-120.6578	20 miles SW of Mendota, intersection with I-5
9	10-0273	Russsian River Bridge & OH	Mendocino	US-101	1989	Y	N			4	22.6	38.8563	-123.0364	just north of Sonoma-Mendocino county line on US-101
3	02-0002	Sacramento River Bridge and OH	Siskiyou	I-5	1955	Y	N			5	25.3	41.2206	-122.2751	Dunsmuir, north of Redding

ID#	Bridge No.	Bridge Name	County	Route	Date Built	Have Plans?	Visited	Candidate for Drilling?	Comments	# of Lanes	Rdwy Width	Latitude	Longitude	Location Description
93	58-0325	Sand Hills OC	Imperial	I-8	1989	Y	N	Y?	site not found	2	9.8	32.75	-114.75	I-8 P.M. 80.5
113	53-0687	Santa Clara River (Replace)	Los Angeles	I-5	2004	Y	Y	Y	Collected bulk sample. Drilled 6/5-6/04	6	23	34.4257	-118.5841	I-5 over Santa Clara River, Santa Clarita (by Magic Mountain Park)
36	49-0153 R	Santa Margarita Creek	San Luis Obispo	US-101	1996	Y	N			3	18.1	35.3842	-120.6288	Santa Margarita, Route 58/US-101 intersection
26	37-0006 L	Sargent Bridge and OH	Santa Clara	US-101	1970	Y	N			2	11.9	36.9297	-121.5482	1.8 miles south of Gilroy city limits
45	53-1102 L	Sepulveda Boulevard UC (widen)	Los Angeles	US-101	1959, 2000	Y	Y	N	busy connector	5	23.0	34.1595	-118.4662	Los Angeles, intersection of I-405 and UW-101
28	38-0104 L	Shells (Shiells) Rd UC	Stanislaus	I-5	1967	Y	N			2	11	37.2966	-121.1011	~4 miles north of Merced/Stanislaus County line, west of Newman
94	28-0085	Solano Ave OC	Contra Costa	I-80	1997	N	Y				15.8	37.9373	-122.3259	Richmond
99	28-0306	South Main Lilac RW	Contra Costa	I-680	1990	N	Y	N				37.8901	-122.0593	Walnut Creek
5	04-0285	South Prairie Creek Park UC	Humboldt	US-101	1990	Y	N			4	21.3	41.3089	-124.0453	~5 miles north of Orick
84	56-0318	Spruce Street OC (Replace)	Riverside	SR-91	2002	Y	Y	Y	Collected bulk sample	6	27.1	33.9910	-117.3588	Riverside, intersection of Spruce St and SR-91
103	55-0852	State College UC	Orange	SR-91	1999	Y	Y	Y		9	46.7	33.8552	-117.8890	Santa Ana
105	51-0322	Storke OH	Santa Barbara	SPT. R/R	1995	Y	N	N	has MSE walls	5+				over SPT Co. Track
41	51-0307	Storke Rd OC	Santa Barbara	US-101	1997	Y	N	N		6	28.6	34.4345	-119.8707	Goleta
37	49-0240	Tefft Street OC	San Luis Obispo	US-101	1996	Y	N		T/C req'd	6	25	35.0368	-120.4846	Nipomo, South of San Luis Obispo
47	53-1198	Temple Ave OC	Los Angeles	I-405	1964	Y	Y	Y*	T/C on city st.	4	22.6	33.8102	-118.1589	Long Beach
102	33-0264	Thorton Ave SEP	Oakland	I-880	1997	N	Y				32.5	37.5473	-122.0223	Newark
107	55-0414	Tustin Ave OC (Widen)	Orange	SR-91	2004	Y	Y	Y	Drilled 3/6/04	2	20.8	33.8512	-117.8380	Tustin Ave over Riverside Fwy, Olive
35	45-0067	Utica Ave OC	Kings	I-5	1971	Y	N			2	9.8	35.9347	-119.9125	5 miles south of Kettleman City
59	53-2775	Valley Circle Blvd OC	Los Angeles	US-101	1996	Y	N	Y?		6	24.7	34.1595	-118.6373	Calabasas, just east of Thousand Oaks, intersection of Mulholland and US 101
91	57-1081 R/L	Vehicular UC	San Diego	SR-56	2002	Y	N	N				32.9654	-117.1723	San Diego, on SR-56 between I-5 and I-15
66	54-0439	Vineyard Ave OC	San Bernardino	I-10	1971	Y	Y	N		5	43.2	34.0706	-117.6111	North of Ontario Airport
88	57-0986 F	West Connector OC	San Diego	I-8	1991	Y	N		busy connector	2	11	32.7627	-117.1630	University Heights, I-8/Route 163 intersection
79	56-0004 R/L	Whitewater River Bridge (Widen)	Riverside	I-10	1952, 1967	Y	N	Y*?	high fill	4	20.3	33.9226	-116.6356	West of Palm Springs

ID#	Bridge No.	Bridge Name	County	Route	Date Built	Have Plans?	Visited	Candidate for Drilling?	Comments	# of Lanes	Rdwy Width	Latitude	Longitude	Location Description
64	53-86	Woodwardia Canyon Bridge	Los Angeles	SR-2	1931	Y	N	N		2	10.4	34.226	-118.188	La Canada Flintridge

Bridge count 116 Candidate Count: 26

Notes:

*) Site proposed for Phase-2 drilling

T/C=Traffic Control

OC=Overcrossing

UC=Undercrossing

SEP=Separation

I/C=Interchange

HOV=High Occupancy Vehicle

CT=Caltrans

S/B=southbound

N/B=northbound

W/B=westbound

E/B=eastbound

Table 2. Bridge Sites Investigated

Date: 5/31/2005 10:34:34 AM MK/EMI

ID#	Bridge No.	Bridge Name, County	Drilled	Abut Wall Height	Borings/SPT No.	Borings/SPT Depth (ft)	Borings/SPT Setback (ft)	CPT No.	CPT Depth (ft)	CPT Setback (ft)	PMT No.	PMT Depth (ft)	PMT Setback (ft)
27	37-0609	Rte 87/880 SEP	Drilled 1/30/04	13.6	**B-1**	31.5	42.5	**CPT-1**	30.0	44.5			
		Santa Clara		12.2	**B-2**	31.5	45.0	**CPT-2**	30.0	47.0			
101	57-1078 S	Gonzalez Creek Off-Ramp	Drilled 2/7/04	8.0	**04-1**	25.5	2.0	**04-1C**	17.4	7.0			
		San Diego											
100	57-1077 L	Carmel Valley Rd UC	Drilled 2/7/04. Collected bulk sample	8.0	**04-2**	22.8	8.0	**04-2C**	25.0	8.0			
		San Diego											
106	55-0257	Harbor Blvd UC (Widen)	Drilled 2/28/04	27.3	**04-3**	21.5	13.0	**04-3C**	15.0	13.0			
		Orange		10.0	**04-4**	21.5	2.0	**04-4C**	20.0	3.7			
				27.3				**04-5C**	20.0	5.0			
107	55-0414	Tustin Ave OC (Widen)	Drilled 3/6/04	20.3	**04-6**	21.5	5.5	**04-6C**	20.0	16.0			
		Orange		25.4	**04-7**	21.5	6.5	**04-7C**	20.0	16.0			
				25.4	**04-8**	11.5	18.0						
108	53-1353	Coldwater Canyon	Drilled 4/19/04		**04-9**	16.5	5.0	**04-9C**	14.3	5.0	**04-9P**	7.5	5.0
		Los Angeles									**04-9P**	12.5	5.0
					04-10	16.5	5.0	**04-10C**	14.9	5.0	**04-10P**	10.0	5.0
109	33-0250	Patterson Slough	Drilled 6/17/04	5.5	**04-11A**	21.5	3.0	**04-11C**	20.0	3.0	**04-11P**	5.0	3.0
		Fremont		5.5	**04-12A**	21.5	3.0	**04-11C**	20.0	3.0	**04-12P**	5.0	3.0
110	35-0083	Route 101/84 SEP	Drilled 6/13/04		**04-14A**	21.5	6.0	**04-14C**	28.0		**04-14P**	7.5	6.0
		San Mateo			**04-13A**	21.5	9.0	**04-13C**	20.0		**04-13P**	7.5	9.0

ID#	Bridge No.	Bridge Name, County	Drilled	Abut Wall Height	Borings/SPT			CPT			PMT		
					No.	Depth (ft)	Setback (ft)	No.	Depth (ft)	Setback (ft)	No.	Depth (ft)	Setback (ft)
112	04-0236	Painter St	Drilled 7/1/04	12.3	**04-15A**	15.5	5.0	**04-15C**	14.0	4.0	**04-15P**	8.0	5.0
		Humboldt		11.5	**04-16A**	14.0	4.0	**04-15D**	9.5	5.0	**04-16P**	12.5	2.0
				12.3				**04-16C**	12.5	5.0			
111	58-0215	Meloland Rd OC	Drilled 8/20/04	13.0	**04-17A**	21.5	3.0	**04-17C**	30.0	3.0	**04-17P**	11.0	3.0
		Imperial		13.0	**04-18A**	21.5	2.5	**04-18C**	4.0	3.0	**04-18P**	7.5	2.5
											04-18P	11.5	2.5
114	51-0234	Beckstead OC	Collected bulk sample		**04-19**	3.0							
		Santa Barbara											
84	56-0318	Spruce Street OC (Replace)	Collected bulk sample		**04-20**	3.0							
		Riverside											
81	56-0390	Jackson St OC (Replace)	Bulk sample collected		**04-21**	3.0							
		Riverside											
113	53-0687	Santa Clara River (Replace)	Collected bulk sample. Drilled 6/5-6/04		**04-22**	3.0							
		Los Angeles			**04-23**	25.0	3.0	**04-23C**	25.0	5.0	**04-23P**	5.5	4.0
					04-24	25.0	5.0	**04-24C**	25.0	7.0	**04-24P**	7.5	4.0
116	42-0398	Maple Ave UC	Collected bulk sample		**04-25**	10.0							
		Fresno											

Total Count of Bridges Selected: 15 **Total Counts:** **26 Boreholes** **22 CPT's** **14 PMT's**

*) Depth is in ft below existig grade. Setback is distance in ft behind back face of abutment wall

Table 3 SUMMARY OF SOIL LABORATORY TEST RESULTS
CT-UCSD/ABUTMENT RESEARCH PROGRAM

Bridge	County	Boring No.	Sample No.	Depth	Soil Type	SPT Blow-count	Moist. Content	Dry Density	Void Ratio	Poro-sity	Grain Size Distribution				Atterberg Limits				Sand Equi-valent	Expan-sion Index	Com-paction		Unconsolidated Undrained Triaxial				Direct Shear				PMT
						N_{SPT}	w	ρ_d	e	n	Gravel	Sand	Fines	sand size	LL	PL	PI	plast.	SE	EI	$\rho_{d,max}$	w_{opt}	ρ_d	σ_c	ϕ	c	ϕ_{peak}	c_{peak}	ϕ_{res}	c_{res}	Depth
				(ft)	(USCS)	(bpf)	(%)	(pcf)	(-)	(%)	(%)	(%)	(%)	(-)	(%)	(%)	(%)	(-)	(-)	(-)	(pcf)	(%)	(pcf)	(ksf)	(deg)	(ksf)	(deg)	(ksf)	(deg)	(ksf)	(ft)
Route 87/880 SEP	Santa Clara	B-1	B-0	0-5	SM															1										
			D-1	2.50	SM	88	6.0	123.9	0.36	26.46	25	55	20	coarse				low												
			S-2	5.00	SM	47	5.8				30	50	20	coarse				n-l												
			D-3	7.50	SM w/ Gr	65	4.4	109.7	0.54	34.89	25	55	20	coarse				none									48.8	0.17	45.8	0.06	
		B-1	S-4	10.00	Cl-ML	28	17.7				0	30	70	medium				l-m												
			D-5	20.00	CH	32	29.7				0	10	90	fine	62	24	38	high												
			S-6A	25.00	CL		30.4	88.3	0.91	47.59	0	10	90	fine				med.												
			S-6B	25.50	ML	17	21.4				0	30	70	medium				low												
			D-7	30.00	CL	27	28.2	92.3	0.83	45.22	0	20	80	fine				med.												
			B-0	0-5	ML w/ Gr		11.6							coarse																
			S-1A	1.00	Sa. CL	91	16.1							coarse																
			S-1	2.50	Sa. CL	47	11.6							coarse				low												
			D-2	5.00	Sa. CL	35	16.1	104.1	0.62	38.21				medium				m-h					115.1	0.57	0.0	2.80					
		B-2	S-3	7.50	CL-CH	21	24.6				50	22	28	medium	50	22	28	m-h		77										
			D-4	10.00	Sa. CL w/ Gr	34	14.4	111.8	0.51	33.64				coarse				m-h					111.6	1.28	0.0	3.40					
			S-5	20.00	Sa. CH	31	31.9				65	29	36	fine	65	29	36	high												
			D-6	25.00	Sa. CL	50	29.2	92.5	0.82	45.10				fine				med.												
			S-7	30.00	Sa. CL	22	19.4							fine				med.												
Gonzalez Creek Br	San Diego	04-1	B-0	0-5	SM/ML w/ Gr						28	57	15						37	0	127.0	8.0	120.7	0.72/1.03/1.54	34.7	0.25					
			D-1A	2.50	SM/ML		15.9	105.2	0.60	37.56	0	50	50	fine					6												
			D-1B	3.00	SM/ML	65	15.2	114.3	0.47	32.16	0	50	50	medium				low												
			D-2A	5.00	SM/ML		14.7	101.3	0.66	39.87	0	50	50	medium				low												
			D-2B	6.00	SM/ML	70	14.2	115.2	0.46	31.62	0	50	50	medium				low												
			S-3	6.50	SM/ML	33	12.3				0	50	50	medium				low												
			D-4A	8.50	SM/ML		12.3	114.3	0.47	32.16	0	50	50	medium				low					115.7	1.14/2.3/4.6	24.1	3.50					
			D-4B	9.00	SC/CL	44	14.4	112.9	0.49	32.99	0	50	50	medium				l-m					115.7	1.14/2.3/4.6	22.5	6.00					
			D-5A	10.00	SC/CL		17.4	108.2	0.56	35.78	0	56	44	medium				low												
			D-5B	10.50	SC/CL	68	15.0	113.9	0.48	32.40	0	50	50	medium				low												
			S-6	11.50	SM/ML	29	12.6				0	50	50	medium				low												
			D-7A	15.00	SM/ML/CL		11.2	111.9	0.51	33.58	0	65	35	medium				low		16										
			D-7B	16.00	SM/ML/CL	48	11.7	117.0	0.44	30.56	0	65	35	medium				low												
			D-8	17.50	SM	50/3"								medium																
			S-9	19.00	SM	44								medium																
			D-10	22.00	SC/CL	42	9.2	115.0	0.47	31.74	0	50	50	medium				med.												
			S-11	25.00	SM	58	10.8				0	65	35	medium				low												
Carmel Valley Rd UC		04-2	B-0	0-5	SM w/ Gr						22	56	22						17	4									
			D-1A	3.00	SM w/ Gr		7.6	124.8	0.35	25.93	5	70	25	coarse				none												
			D-1B	3.50	SM w/ Gr	61	7.1	124.8	0.35	25.93	5	70	25	coarse				none												
			D-2A	5.50	SM w/ Gr		8.0	125.4	0.34	25.57	10	65	25	coarse				none												
			D-2B	6.00	SM w/ Gr	63	8.6	120.5	0.40	28.48	10	65	25	coarse				none												
			S-3	7.00	SM w/ Gr	30	9.1	129.2	0.30	23.31	0	65	35	coarse				low												
			D-4	9.50	SM w/ Gr	47	5.6				10	65	25	coarse				none									39.4	0.46	34.6	0.33	
			D-5A	13.00	SM w/ Gr		7.1	109.0	0.55	35.30	10	65	25	coarse				none												
			D-5B	13.50	SM w/ Gr	14	6.2	110.0	0.53	34.71	10	65	25	coarse				none												
			S-6	14.00	SM w/ Gr	6	10.8	92.1	0.83	45.33	10	65	25	coarse				none												
			D-7A	18.00	SM w/ Gr	27	9.2	125.2	0.35	25.69	10	65	25	coarse				none												
			D-7B	18.50	SC-SM	50/3"	9.0	124.2	0.36	26.28	10	60	40	coarse				none												
			S-8	20.00	SM	67	5.9				0	65	35	medium				low												
			D-9	21.50	SM/CL	50/3"	5.7	109.9	0.53	34.77	0	30	70	medium				l-m												

Table 3 (Cont'd)

Bridge	County	Boring No.	Sample No.	Depth	Soil Type	SPT Blow-count	Moist. Content	Dry Density	Void Ratio	Poro-sity	Grain Size Distribution				Atterberg Limits				Sand Equi-valent	Expan-sion Index	Com-paction		Unconsolidated Undrained Triaxial				Direct Shear				PMT
						N_{SPT}	w	ρ_d	e	n	Gravel	Sand	Fines	sand size	LL	PL	PI	plast.	SE	EI	$\rho_{d,max}$	w_{opt}	ρ_d	σ_c	ϕ	c	ϕ_{peak}	c_{peak}	ϕ_{res}	c_{res}	Depth
				(ft)	(USCS)	(bpf)	(%)	(pcf)	(-)	(%)	(%)	(%)	(%)	(-)	(%)	(%)	(%)	(-)	(-)	(-)	(pcf)	(%)	(pcf)	(ksf)	(deg)	(ksf)	(deg)	(ksf)	(deg)	(ksf)	(ft)
Harbor Blvd On-Ramp	Orange	04-3	B-0	0-1.5	SM w/ Gr																										
			D-1A	2.50	SM w/ Gr		8.4	118.1	0.43	29.90	15	60	25	coarse				none													
			D-1B	3.00	SC	25	5.0	114.9	0.47	31.80	10	60	30	coarse				none													
			D-2A	5.00	SM w/ Gr	14	14.4	106.5	0.58	36.79	5	60	35	coarse				low					115.7	0.42/0.86/1.72	28.1	1.44					
			D-2B	5.50	SM w/ Gr & CL		14.0	108.7	0.55	35.48	8	72	20	fine-co.	22	18	4	n-l	8	60							32.3	0.85	44.4	0.03	
			D-3A	7.00	SM w/ Gr & CL		8.5	97.0	0.74	42.43	5	70	25	coarse																	
			D-3B	7.50	SM w/ Gr	9	7.8	104.7	0.61	37.86	5	70	25	coarse				none					115.0	1.08/2.14/4.31	33.2	0.67					
			D-4A	10.00	SM w/ Gr		8.0	108.4	0.55	35.66	0	70	30	medium				none													
			D-4B	10.50	SM	20	6.4	101.3	0.66	39.87	10	65	25	coarse				none													
			D-5A	12.50	SM w/ Gr		9.1	98.9	0.70	41.30	5	70	25	fine				none													
			D-5B	13.00	SM w/ Gr	35	8.3	106.5	0.58	36.79	0	70	30	fine				none													
			D-6	20.00	SM	16																									
		04-4	D-1A	2.50	SP w/ ML & Gr		6.2	110.2	0.53	34.59	5	80	15																		
			D-1B	3.00	SP w/ ML & Gr	20	10.1	113.9	0.48	32.40	5	80	15	coarse				none													
			D-2A	5.00	SP w/ ML & Gr		6.4	120.1	0.40	28.72	5	80	15	coarse				none													
			D-2B	5.50	SP w/ ML & Gr	54	6.0	119.7	0.41	28.95	10	75	15	coarse				none	37	7							45.4	0.30	34.8	0.26	
			D-3A	7.50	SP w/ ML & Gr		7.7	119.5	0.41	29.07	6	82	12	coarse				none													
			D-3B	8.00	SP w/ ML & Gr	29	7.7	116.4	0.45	30.91	5	80	15	fine-co.				n-l													
			D-4A	10.00	SM		17.1	101.5	0.66	39.76	0	70	30	coarse				none													
			D-4B	10.50	SP w/ ML & Gr	27	17.5	104.6	0.61	37.92	0	70	30	medium				none													
			D-5A	12.50	SP w/ ML & Gr		16.1	103.1	0.63	38.81	0	70	30	medium				none													
			D-5B	13.00	SP w/ ML & Gr	35	15.4	106.1	0.59	37.03	0	70	30	medium				none													
			D-6	20.00	SP w/ ML & Gr	20																									
Tustin Ave Br	Orange	04-6	B-0	0-2.5	SM w/ Gr						26	61	13	coarse																	
			D-1	2.50	SM w/ Gr	29	9.8	117.8	0.43	30.08	10	70	20	coarse				none													
			D-2	5.00	SC	20					8	54	38	coarse					11				118.8	0.71/1.43/2.87	24.5	1.30					
			D-3	7.50	SM w/ Gr	20	11.5	117.1	0.44	30.50	10	60	30	coarse				low													
			D-4	10.00	SM w/ Gr	32	8.3	121.6	0.39	27.83	10	60	30	coarse				low													
			D-5	12.50	CL	16	16.3	111.5	0.51	33.82	0	25	75	coarse				med.													
			D-6	15.00	CL w/ SP & Gr	19	9.8	108.3	0.56	35.72	5	75	20	coarse				med.													
			D-7	20.00	SM w/ Gr	22	7.3	125.2	0.35	25.69	5	60	35	coarse				low													
		04-7	B-0	0.00	SM/SC w/ Gr		7.6				10	60	30	coarse				n-l			133.0	8.0	126.4								
			D-1	2.50	SC w/ Gr	16	8.5	128.9	0.31	23.49	10	60	30	coarse				low													
			D-2	5.00	SC w/ Gr	10	8.9	121.7	0.38	27.77	10	60	30	coarse				low													
			D-3	7.50	SM w/ Gr	16	7.3	115.8	0.45	31.27	10	60	30	coarse				none													
			D-4	10.00	SM w/ Gr	29	6.9	122.3	0.38	27.41	10	60	30	coarse				none													
			D-5	12.50	SM w/ Gr	9	9.7	105.2	0.60	37.56	10	60	30	coarse				none													
			D-6	15.00	SM w/ Gr	13	8.1	99.4	0.69	41.00	10	60	30	coarse				none													
			D-7	20.00	SM w/ Gr	20	4.5	108.1	0.56	35.84	10	60	30	coarse				none													
		04-8	D-1	5.00	SM w/ Gr	25	10.2	123.7	0.36	26.58	10	60	30	coarse				low													
			D-2	10.00	SM w/ Gr	63	9.0	123.2	0.37	26.88	10	60	30	coarse				low													
Coldwater Canyon	Los Angeles	04-9	B-0	0-5	SM w/ Gr		8.5				17	70	13	coarse				none	26	1	123.0	10.0	116.9								
			D-1	5.00	SP-SM w/ Gr	31	4.7	118.8	0.42	29.49	15	70	15	coarse				none													7.5
			D-2	10.00	SP w/ Gr	19	3.5	118.8	0.42	29.49	15	80	5	coarse				none													12.5
			D-3	15.00	SP w/ Gr	10	4.1	110.2	0.53	34.59	10	85	5	coarse				none													
		04-10	B-0	0.00	SP-SM w/ Gr		6.2				10	75	15	coarse				none													
			D-1	5.00	SP-SM w/ Gr	23	10.9	108.3	0.56	35.72	10	75	15	coarse				none													
			D-2	7.50	SP-SM w/ Gr	18	5.4	116.7	0.44	30.73	15	70	15	coarse				none													
			D-3	12.50	SP w/ Gr	18	9.0	107.6	0.57	36.13	15	80	5	coarse				none													7.5
			D-4-1	15.00	CL		22.3	93.9	0.79	44.27				fine	43	24	19	med.					105.9	1.88/3.74/7.48	17.3	2.13					
			D-4-2	16.00	CL	24								fine				med.													

Table 3 (Cont'd)

Bridge	County	Boring No.	Sample No.	Depth	Soil Type	SPT Blow-count	Moist. Content	Dry Density	Void Ratio	Poro-sity	Grain Size Distribution				Atterberg Limits				Sand Equi-valent	Expan-sion Index	Com-paction		Unconsolidated Undrained Triaxial				Direct Shear				PMT
						N_{SPT}	w	ρ_d	e	n	Gravel	Sand	Fines	sand size	LL	PL	PI	plast.	SE	EI	$\rho_{d,max}$	w_{opt}	ρ_d	σ_c	ϕ	c	ϕ_{peak}	c_{peak}	ϕ_{res}	c_{res}	Depth
				(ft)	(USCS)	(bpf)	(%)	(pcf)	(-)	(%)	(%)	(%)	(%)	(-)	(%)	(%)	(%)	(-)	(-)	(-)	(pcf)	(%)	(pcf)	(ksf)	(deg)	(ksf)	(deg)	(ksf)	(deg)	(ksf)	(ft)
Patterson Slough	Alameda	04-11A	B-0	0-5	ML/CL																										
			D-1	8.00	ML/CL	18																	120.7	1.08/2.15/4.32	6.9	0.92					
			S-2	10.00	Sa. CL	12	15.5				0	30	70	fine	28	16	12	med.													
			D-3	12.50	ML/CL	23								fine									121.8	1.73/3.46/6.91	15.2	4.34					
			S-4	15.00	Sa. CL	32	15.7				0	15	85	fine	37	17	20	med.													
			D-5	20.00	Sa. CL	19	18.7	107.7	0.56	36.08	0	35	65	fine				l-m													
		04-12A	B-0	0-5																											
			D-1	2.50	SM w/ Gr	26	5.1	125.9	0.34	25.27	20	50	25	coarse				none													
			D-2	5.00	Sa. CL w/ Gr	30	10.7	120.8	0.39	28.30	10	30	60	coarse				low													5.0
			S-3	7.50	Sa. CL	15	15.4				0	25	75	fine				med.													
			D-4	10.00	Sa. CL	32	19.2	115.8	0.45	31.27	0	30	70	fine				l-m													11.0
			S-5	12.50	SM w/ SP	32	18.3				0	25	75	fine	38	26	12	med.													
			D-6	15.00	Sa. CL	45	15.7	107.6	0.57	36.13	0	30	70	fine				med.													
			S-7	20.00	Sa. CL	19	21.0				0	30	70	fine				med.													
Route 10/84 SEP	San Mateo	04-13A	B-0	0-	Sa. CL w/ Gr		11.8							coarse				med.	9												
			D-1	2.50	SP	19	21.0	95.7	0.76	43.20	0	95	5	medium				none													
			S-2	5.00	SM w/ Gr						10	70	20	coarse				none													
			D-3	7.50	SP	10	5.8	89.8	0.88	46.70	0	95	5	medium				none													7.5
			S-4	10.00	SP	2	7.3				0	95	5	medium				none													
			D-5	12.50	SP-SM	10	7.2	95.2	0.77	43.49	0	90	10	medium				none													
			D-6	15.00	SP-SM	11	7.9				0	90	10	medium				none													
			S-7	18.50	CL		8.1																								
			D-8	20.00	Sa. CL w/ Gr	27	7.6	125.9	0.34	25.27	10	25	65	coarse				med.													
			S-9	25.00	SC w/ Gr	37	11.0							coarse				l-m													
			D-10	30.00	CL-CH	39	28.2	94.6	0.78	43.85				fine				m-h													
		04-14A	D-1	2.50	SC w/ Gr	45	6.7	124.1	0.36	26.34	20	55	25	coarse				low													
			D-2	7.50	SC-SM	22	10.0	114.4	0.47	32.10	10	60	30	coarse				low													7.5
			D-3	10.00	SC w/ Gr		7.3				5	60	35	coarse	29	15	14	low					125.1	1.37/2.73/5.47	22.8	1.28					
			S-4	12.50	Sa. CL	26	8.6				0	35	65	coarse				l-m													
			D-5	15.00	Sa. CL/SC w/ Gr	36	10.0	115.0	0.47	31.74	20	40	40	coarse				low													
			S-6	20.00	SM w/ Gr	24	16.4				0	65	35	fine				low													
Painter St	Humboldt	04-15A	B-0	0.00	GW-GM		2.2				59	35	6	coarse				none	43												
			S-1	2.50	SP w/ Gr	59	3.1				25	70	5	coarse				none													
			S-2B	5.00	SP w/ Gr	47	3.9				25	70	5	coarse				none					129.5	0.87/1.01/1.3	43.3	0.13					
			B-3A	7.00	SP w/ CL		4.5							coarse				none													
			Comp.	2.5-7	SP																		129.5	1.00	NA	NA					
			D-3B	7.50	Sa. CL	32	19.9				3	35	62	coarse	34	19	15	low					115.7	1.0/2.01/4.02	11.5	3.90					8.0
			S-4	10.00	CL w/ Sa.	16	16.4							medium				med.													
			D-5	12.50	CL w/ Sa.	18	21.0	116.2	0.45	31.03				coarse				med.					116.2	1.07	0.0	7.75					
			S-6	14.00	ML	20								medium				med.													
		04-16A	B-0	0.00	SP		2.2				35	60	5	coarse				none													
			S-1	2..5	SP	63	4.2				25	70	5	coarse				none													
			D-2	5.00	SP	90	4.1	124.5	0.35	26.10	20	75	5	coarse				none													
			S-3A	7.50	CL		19.6				0	20	80	fine				med.													
			S-3B	7.50	SP	11	5.8				10	85	5	coarse				none													
			D-4	10.00	CL w/ ML	19	28.9	90.2	0.87	46.46	0	25	75	fine	42	27	15	med.					115.2	1.3/2.59/5.46	7.1	3.30					
			S-5	12.50	CL	19	21.2				0	25	75	fine				med.													12.5

Table 3 (Cont'd)

Bridge	County	Boring No.	Sample No.	Depth	Soil Type	SPT Blow-count	Moist. Content	Dry Density	Void Ratio	Poro-sity	Grain Size Distribution				Atterberg Limits				Sand Equi-valent	Expan-sion Index	Com-paction		Unconsolidated Undrained Triaxial				Direct Shear				PMT
						N_{SPT}	w	ρ_d	e	n	Gravel	Sand	Fines	sand size	LL	PL	PI	plast.	SE	EI	$\rho_{d,max}$	w_{opt}	ρ_d	σ_c	ϕ	c	ϕ_{peak}	c_{peak}	ϕ_{res}	c_{res}	Depth
				(ft)	(USCS)	(bpf)	(%)	(pcf)	(-)	(%)	(%)	(%)	(%)	(-)	(%)	(%)	(%)	(-)	(-)	(-)	(pcf)	(%)	(pcf)	(ksf)	(deg)	(ksf)	(deg)	(ksf)	(deg)	(ksf)	(ft)
Meloland Rd	Imperial		B-0	0-2.5	SM w/ Gr		6.2				18	64	18	coarse				n-l	21				127.0	0.77/1.0/1.28	32.4	0.83					
																							127.0	1.00							
			S-1	2.50	SM w/ Gr	15	6.1				2	70	28	coarse				none			133.0	7.0									
			D-2	5.00	SP w/ Gr	27	2.5	123.7	0.36	26.58	15	80	5	coarse				none													
		04-17A	S-3	7.50	SP w/ Gr	15	4.2				15	80	5	coarse				none													11.0
			D-4	10.00	CL w/ Sa.	9	31.6				15	80	5	fine				high													
			S-5	12.50	CL	5																									
			D-6	15.00	CL w/ SP	18									64	24	41				122.4	17.0	105.0	1.87/3.73/7.49	3.1	2.55					
			S-7	20.00	CL	12								fine				m-h													
			B-0	0-2.5	SP w/ Gr		3.6				20	75	5	coarse				none													
			S-1	2.50	SP w/ Gr	22	3.8							medium				none													
			D-2	5.00	SM w/ Gr	48	4.1	118.6	0.42	29.61				medium				none													
			S-3	7.50	SM w/ Gr	19	8.3							medium				none													7.5
		04-18A	D-4	10.00	CH	3									62	24	38				114.3	22.0	93.7	1.15/2.3/4.6	3.6	0.57					11.5
			S-5	12.50	CL w/ Sa.	2	28.4							fine				m-h													
			D-6	15.00	CL w/ Sa.	12	27.5	94.6	0.78	43.85				fine				m-h													
			S-7	20.00	CL w/ Sa.	10	24.5				0	20	80	fine				m-h													
Br. 51-0234	Santa Barbara	04-19	B-0	0-5	SP-SM		0.6				1	87	12	fine-med.					29	0	108.5	12.5	103.0	0.6/0.87/1.31	34.3	0.31					
Br. 56-0800	Riverside	04-20	B-0	0-5	SM		3.6				14	72	14	medium					27	0	135.5	6.5									
Jackson	Riverside	04-21	B-0	0-5	SM		0.7				5	75	20	medium					31	2	127.0	8.0	120.7	0.72/1.03/1.55	32.6	0.43					
Sta. Clara River Bridge	Santa Clarita	04-22	B-0	0-5	SW-SM		4.8							coarse					52	2	131.0	8.5	124.5	0.75/1.0/1.25	23.7	1.42					
		04-23	B-0	0-4.0	SM w/ Gr		7.1	134.6	0.25	20.11																					
			S-1	2.00	SM w/ Gr	47	6.7				10	60	30	coarse				none													
			S-2	5.00	SM		6.7				13	66	21	coarse				none	32												5.5
			D-3	7.50	SM	78	6.6	126.2	0.34	25.09	10	60	30	coarse				none													
			S-4	10.00	SM	13	5.8				10	60	30	coarse				none													
			S-5	15.00	ML/SM	8	7.5				10	60	30	coarse				none													
			S-6	20.00	SM	30	21.2				0	30	70	fine				low													
			S-7	25.00	SM	27	7.9				5	65	30	coarse				none													
		04-24	B-0	0.00	SM																										
			S-1	2.00	SM	19								coarse				none													
			S-2	5.00	SM	22								coarse				none													
			S-3	7.50	SM	26		141.9	0.19	15.78				coarse				none													7.5
			D-4	10.00	SM	50								coarse				none													
			S-5	15.00	SM	11								coarse				none													
			S-6A	20.00	SM									coarse				low													
			S-6B	20.50	SM w/ Gr	21								fine-co.				none													
			S7-	25.00	SM w/ Gr	17								coarse				none													
Maple Ave UC	Fresno	04-25	B-0	10.00	SM w/ Gr																		120.7	0.77/1.03/1.29	33.6	0.46					
																							120.7	1.00	NA	NA					
TOTALS:		**25**	**184 samples**			**134**	**153**	**93**	**93**	**93**	**136**				**13**				**15**	**11**	**10**		**26**				**4**		**4**		**14**

Notes: *Plasticity (qualitative): l=low, n=none

Table 4 **SOIL TYPE CATEGORIES**
CT-UCSD/ABUTMENT RESEARCH PROGRAM

Soil Type Categories		Number of bridges	Number of samples tested	Depth (ft)	Sand grain size	Plasticity	SPT Blow-count	Field Moisture Content	Field Dry Density	Grain Size Distribution			Plas-ticity	Sand Equi-valent	Expan-sion Index	Compaction		Shear strengths of compacted soil (95% R.C.)			Shear wave velocity	Secant Modulus	Secant Modulus
							N_{SPT}	w	ρ_d	Gravel	Sand	Fines	PI	SE	EI	$\gamma_{d,max}$	w_{opt}	ρ_d	ϕ	c	v_S	initial E_S	reload E_R
							(bpf)	(%)	(pcf)	(%)	(%)	(%)	(%)	(-)	(-)	(pcf)	(%)	(pcf)	(deg)	(ksf)	(fps)	(MPa)	(MPa)
I	DENSE TO VERY DENSE SANDS WITH GRAVEL	2	2	2.5-7.5	coarse	none-low	52-59	3-6	120	8-25	70-79	5-13	<5 (0)	37-43 (40)	0-7	NM	NM	125-130 (125)	35-43 (38)	0.13-0.3 (0)	700-1,000 (800)	2-4	10-15
II	MEDIUM DENSE SILTY SANDS, SOME WITH GRAVEL	9	10	0-9.5 (0-5)	fine-coarse	none-low	9-15	5-14	105-120	1-28	60-87	12-35	5-10 (8)	21-52 (34)	0-2	109-127	8-12	116-127 (120)	24-35 (33)	0.25-1.5 (0.5)			
III	MEDIUM DENSE CLAYEY SANDS, SOME WITH GRAVEL	4	4	5-10	medium coarse	low	20-44	7-15	113-114	0-8	50-60	35-50	6-14 (10)	11	0	NM	NM	116-125 (120)	22.5-24 (23)	1.3-6 (2)			
IV	STIFF-HARD CLAYS WITH FINE TO COARSE-GRAINED SANDS, SOME WITH SILTS	5	10	5-12.5	fine-coarse	medium-high	18-35	14-29	90-116	0-3	25-35	62-75	12-41 (22)	0-3 (0)	20-77	114-122	17-22	106-122 (110)	0-17 (6)	1-8 (3.5)	550-800	1.5-3	6-10

Typical parameters are in ()
NM=Not measured

APPENDIX A

Field Investigations and Logs

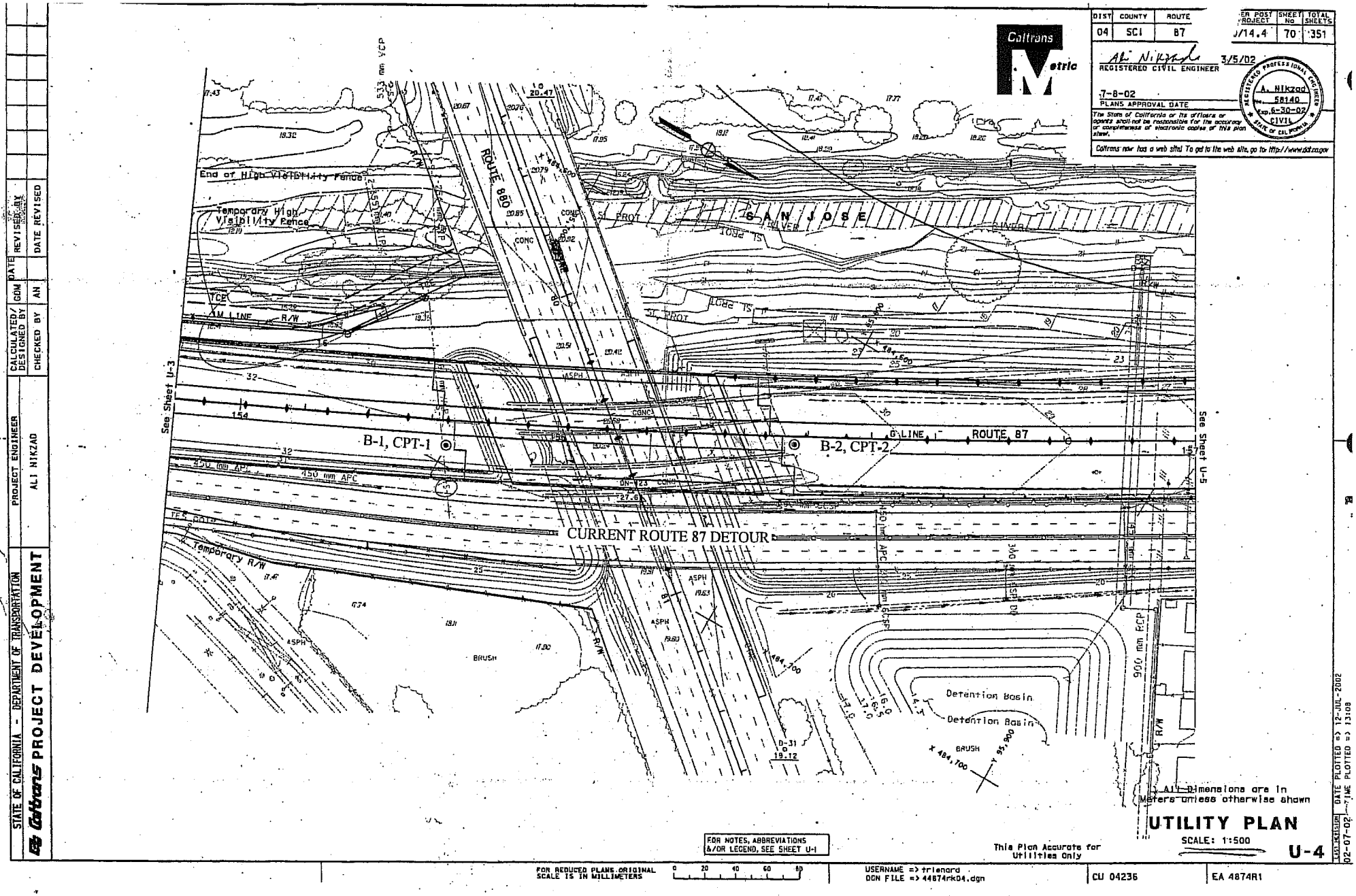
Caltrans Bridge 37-0609
Route 87/880 Separation, Santa Clara

Caltrans Bridge 37-0609, Route 87/880 Separation, Santa Clara

The field investigation for the Route 87/880 bridge was conducted on 1/30/04, consisting of (2) 30-ft deep soil borings and (2) 30-ft deep CPT's. Drilling was performed by Gregg Drilling of Martinez, CA. Boring 04-1 and CPT 04C-1 were located on the south bridge abutment in the north-bound lane, near the approach slab. Boring 04-2 and CPT 04C-2 were located on the north bridge abutment in the north-bound lane, also near the approach slab. Geotechnical soil sampling consisted of ring samples collected using a Modified California sampler and small bulk samples collected with a SPT sampler. Samples were taken at 2.5-ft intervals for the first 10 feet and at 5-ft intervals below. No groundwater was encountered during the investigation.

North Abutment

South Abutment



Route 87/I-880 Boring Locations

4a

INDEX OF SHEETS

Sheet No.	Description
1	Title and Location Map
2-5	Typical Cross Sections
6	Key Map and Line Index
7-16	Layouts
17-25	Profiles
26-32	Construction Details
33-35	Contour Grading
36-66	Drainage Plans, Edge Drain Plan, Drainage Profiles, Details and Quantities
67-73	Utility Plans
74-97	Stage Construction Plans
98-100	Construction Area Signs
101-116	Pavement Delineation Plans
117-122	Summary of Quantities
123-141	Sign Plans
142-144	Temporary Water Pollution Control Details
145-153	Erosion Control Plans and Details
154-161	Sound Wall Plans
162-199	Electrical Plans
200-217	Revised Standard Plans

STRUCTURE PLANS

218-257	Taylor Street Urban Interchange
258-272	MSE Retaining Wall
273-294	Hedding Street Undercrossing
295-317	RTE 87/880 Separation
318-338	Taylor Street Frontage Road Pumping Plant
339-348	Electrical for Taylor Street Pump Plant
349-351	Juvenile Hall Sign & Army Corps Stairs

THE STANDARD PLANS LIST APPLICABLE TO THIS CONTRACT IS INCLUDED IN THE NOTICE TO CONTRACTORS AND SPECIAL PROVISIONS BOOK.

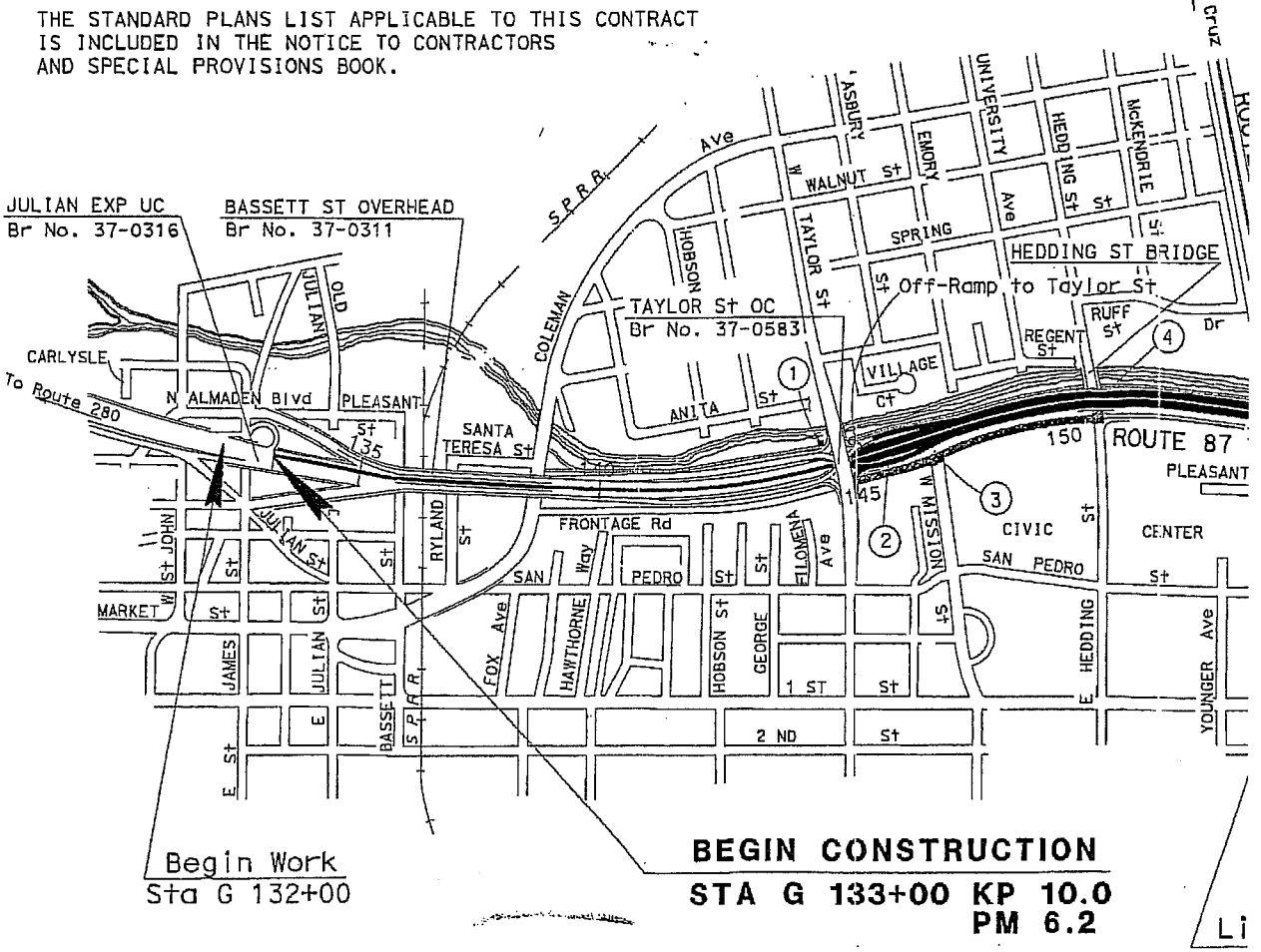
STATE DEPARTMENT

PROJECT PLANS STATE

IN SANTA IN FROM JULIAN EXP TO ROUTE 8

To be supplemented by

SAN JOSE



The Contractor shall possess the Class (or classes) of license as specified in the ''Notice to Contractors''.

PROJECT ENGINEER	DATE	PROJECT MANAGER	DATE
SAN D. DO		GENE GONZALO	

NPS

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
04	SCl	87	10.0/14.4	1	351

CALIFORNIA
TRANSPORTATION

ACNH-S087(023)E

46

OR CONSTRUCTION ON
HIGHWAY

.ARA COUNTY
N JOSE
SSWAY UNDERCROSSING
101 SEPARATION

lard Plans dated July, 1999

STRUCTURE LIST

1. Frontage Road Pumping Plant (No.37-0583W)
2. Route 87 On Ramp from Taylor St (No. 37-0583)
3. Retaining Wall No.1 (No. 37-0583)
4. Hedding Street Undercrossing (No. 37-0608)
5. Route 87/880 Separation (No. 37-0609)
6. Soundwall No.1

LOCATION MAP

Caltrans

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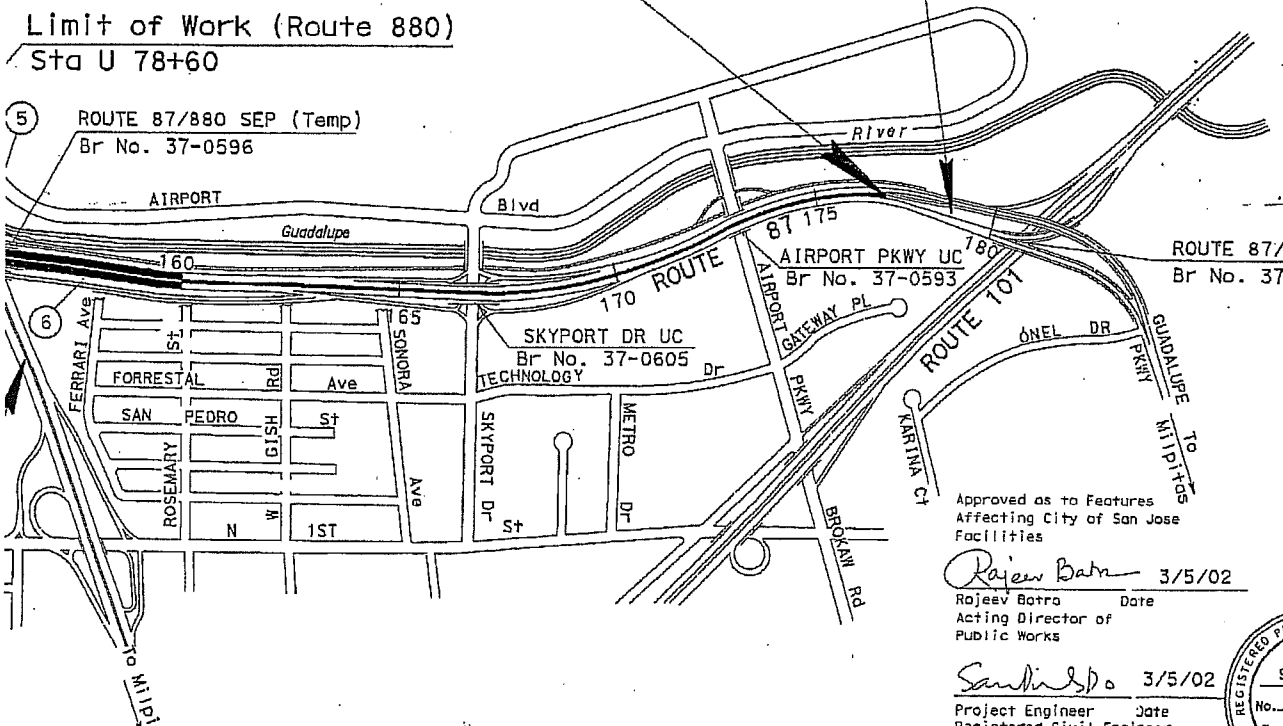
END CONSTRUCTION
STA G 177+80 KP 14.4
PM 9.0

SAN JOSE
INTERNATIONAL AIRPORT

End Work
Sta G 178+60

Limit of Work (Route 880)
Sta U 78+60



of Work (Route 880)
80+70

Approved as to Features Affecting City of San Jose Facilities

Rajeev Batra 3/5/02
Rajeev Batra Date
Acting Director of
Public Works

S.D. Do 3/5/02
Project Engineer Date
Registered Civil Engineer

REGISTERED PROFESSIONAL ENGINEER
S.D. Do
No. 56515
Exp. 6-30-05
CIVIL
STATE OF CALIFORNIA

July 8, 2002
Plans Approval Date

SCALE
20 40 60 80

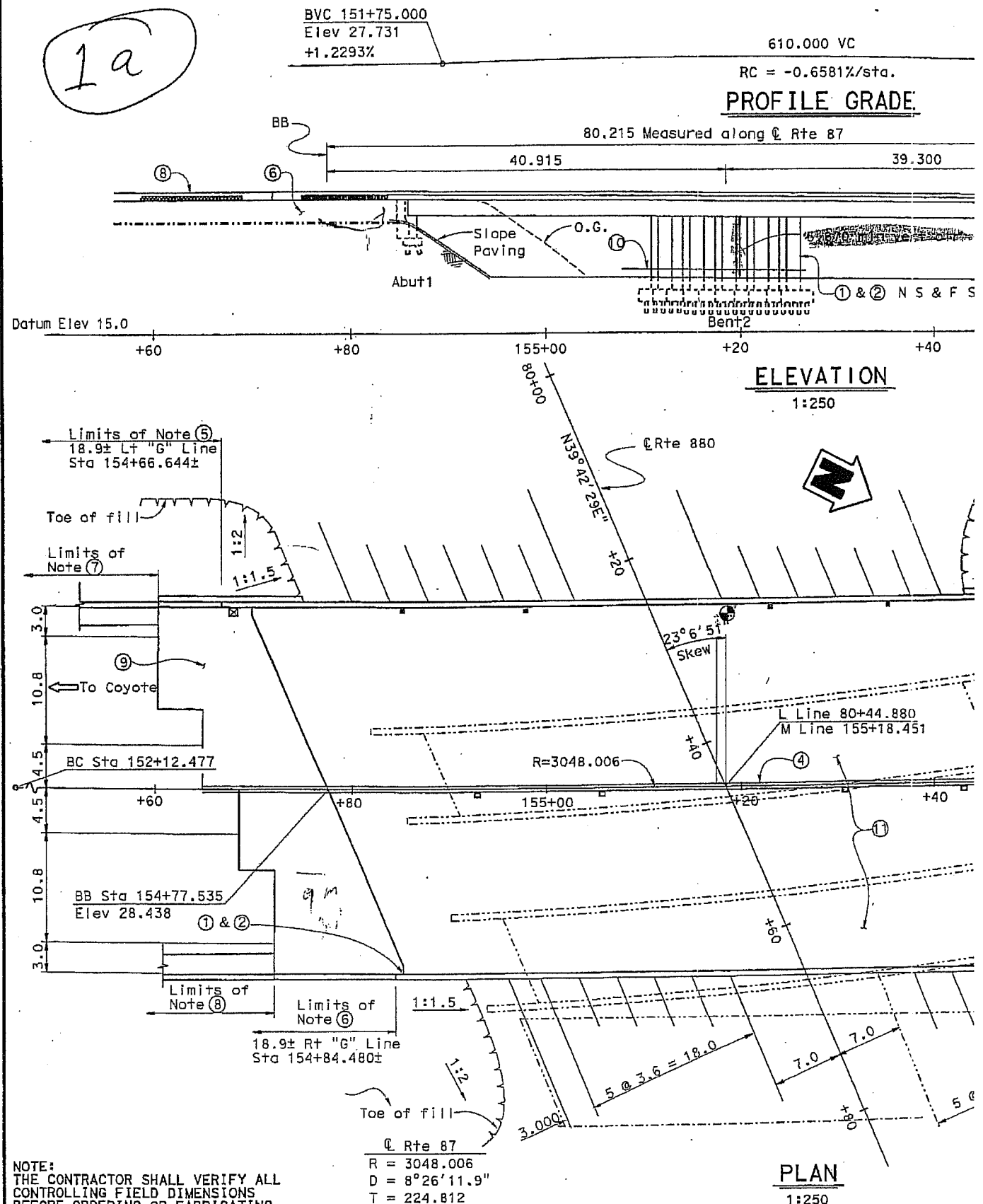
Contract No. 04-4874R4

USERNAME => trienard
DGN FILE => 44874rp01.dgn

CU 04236 EA 4874R1

LAST REVISION 05-31-02
DATE PLOTTED => 18-JUL-2002
TIME PLOTTED => 14:03

1a



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

DESIGN ENGINEER	DESIGN	BY Reza Erfanian	CHECKED Julie Wolf	LOAD FACTOR DESIGN	LIVE LOADING: HS20-44 AND ALTERNATIVE AND PERMIT DESIGN LOAD		
	DETAILS	BY Bill Costa	CHECKED Julie Wolf	LAYOUT	BY Reza Erfanian	CHECKED Julie Wolf	
	QUANTITIES	BY Abhijit Naik	CHECKED Ling Wang	SPECIFICATIONS	BY Lugi Yang	PLANS AND SPECS COMPARED Lugi Yang	

STRUCTURES DESIGN GENERAL PLAN SHEET (METRIC) (REV.3/1/99)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SCl	87	10.0/14.4	295	351

Reza Erfanian 3-13-02
REGISTERED CIVIL ENGINEER

7-8-02
PLANS APPROVAL DATE

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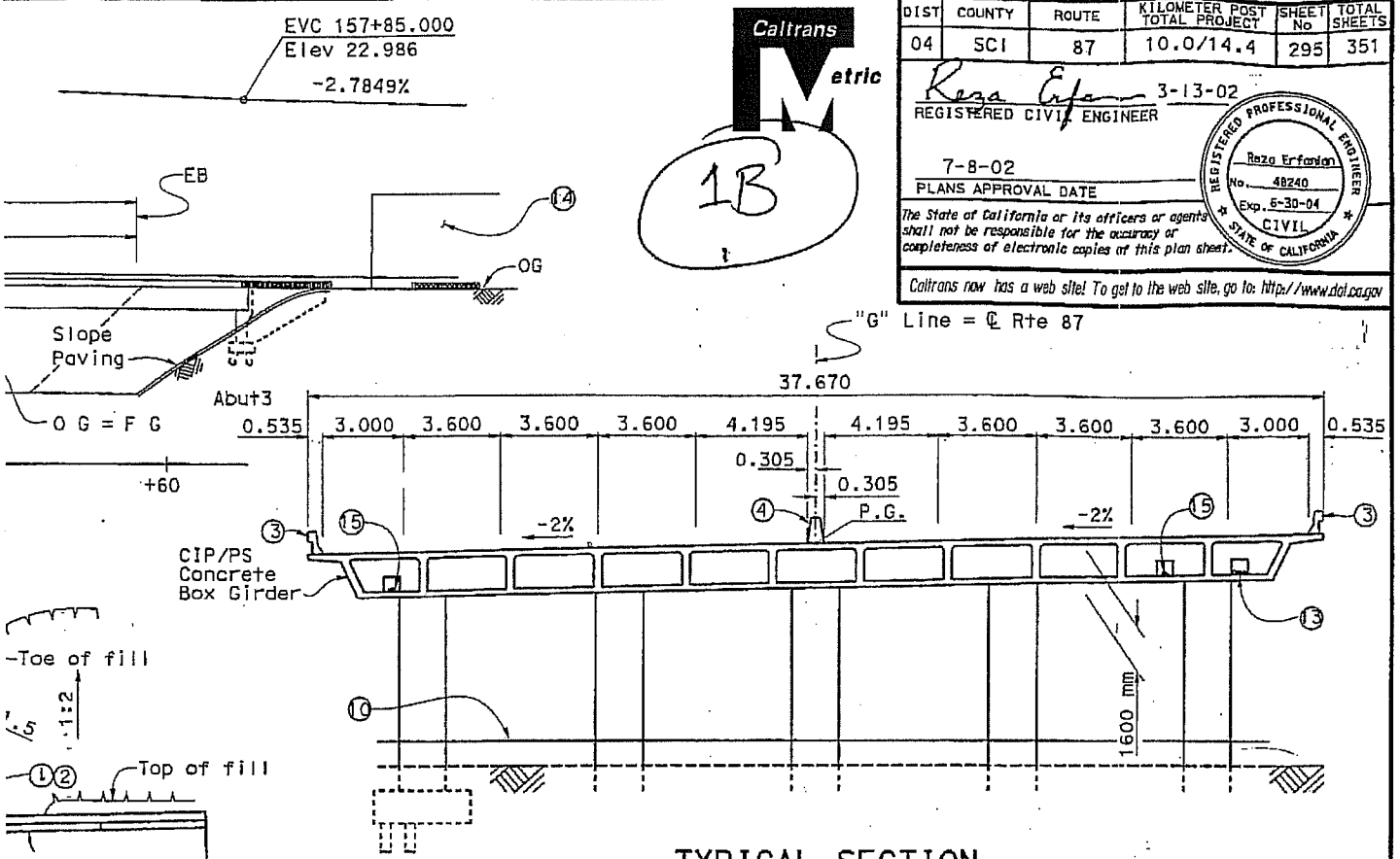
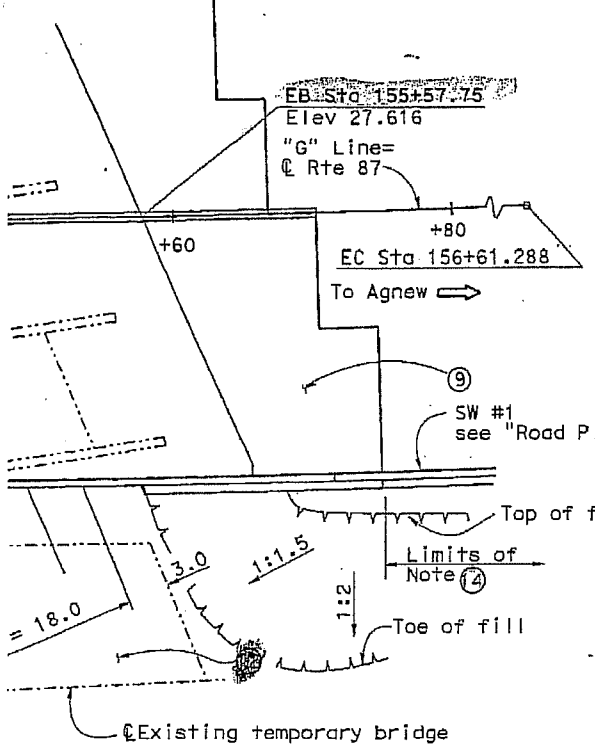
1B



TYPICAL SECTION

1:125



Notes:

1. Paint "Br. No. 37-0609".
2. Paint " Rte 87/880 Separation".
3. Concrete Barrier Type 25(Mod).
4. Concrete Barrier Type 60A.
5. Existing MSE Wall No.3 Br.No. 37-590M, see "MSE Wall (Mod)" elsewhere in these plans.
6. Existing MSE Wall No.4 Br.No. 37-591M, see "MSE Wall (Mod)" elsewhere in these plans.
7. Barrier Slab on existing MSE Wall No.3, see "MSE Wall (Mod)" elsewhere in this Contract.
8. Barrier Slab on existing MSE Wall No.4, see "MSE Wall (Mod)" elsewhere in this Contract.
9. Structural Approach Slab Type N(9S).
10. Concrete Barrier Type 60E, see Road Plans.
11. Existing Bridge No. 37-181 & 37-182 to be removed.
12. Existing Temporary Bridge No. 37-0595 to be removed.
13. TOS & Fiber optic conduit, see "Road Plans". (3-89mm & 1-102mm)
14. Sound Wall No. 1, see "Road Plans"
15. Utility Opening for 75 mm ø irrigation line.

◔ Indicates Points of Minimum Vertical Clearance.
------ Indicates existing structure.
▫ - indicates Deck Drain Type D-2
▪ - indicates Deck Drain Type D-3
⊠ - indicates Terminal Drainage Inlet

For Pile Data, Index to Plans, Std Plans list, General Notes, and Quantities, see "Index to Plans" sheet.

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES STRUCTURE DESIGN 7

BRIDGE NO. 37-0609

KILOMETER POST 12.5

RTE 87/880 SEPARATION
GENERAL PLAN

CU 04
EA 4874R1

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY): 5-25-01 | 9-20-01 | 10-19-01 | 11-14-01 | 3-4-02 | 11-2-00 | 11-15-00 | 1-22-01 | 3-21-01

SHEET 1 OF 23

FILE => 37-0609-a-gp.dgn

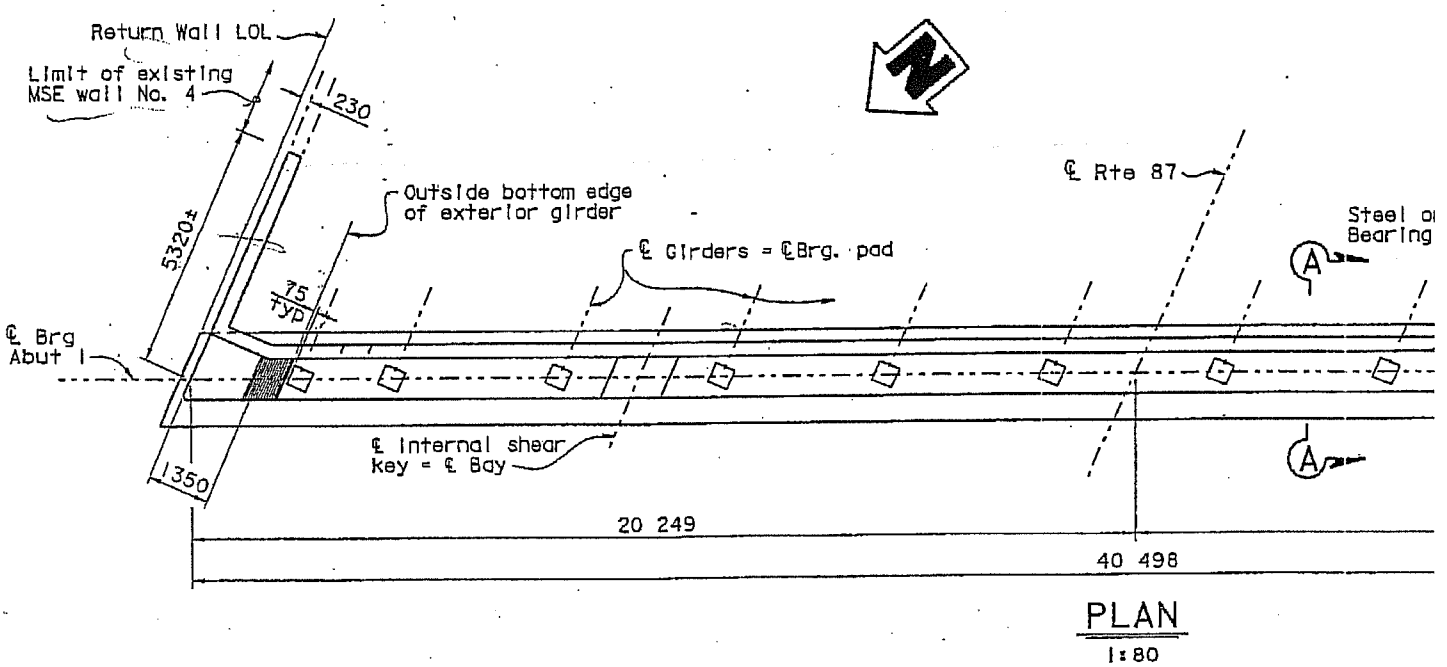
DATE PLOTTED => 15-JUL-2002 TIME PLOTTED => 13:18 USERNAME => trding

30

MARK	DATE	DESCRIPTIONS	BY	CH'D
		REVISIONS		
1	2-24-03	Modify wall	RE	

PROFESSIONAL ENGINEER — Reza Erfanian — No. 48240 — Exp. 6-30-04 — CIVIL — STATE OF CALIFORNIA — 2-24-03

CONTRACT CHANGE ORDER NO. ____
SHEET ___ OF ___



PLAN
1:80

Notes:

1. For new barrier slab on existing MSE W "MSE Modifications" elsewhere in this
2. For Abutment Elevation and Footing Pl see "Abutment 3 Layout" sheet.
3. For location of Section A-A, see "Abut

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

DESIGN	BY Reza Erfanian	CHECKED Julie Wolf
DETAILS	BY Sandra McNealy	CHECKED Julie Wolf
QUANTITIES	BY Abhijit Naik	CHECKED Ling Wang

36

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SCI	87	10.0/14.4	299R	351

Reza Erfanian 3-13-02
REGISTERED CIVIL ENGINEER

7-8-02
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Reza Erfanian No. 48240 Exp. 6-30-04 CIVIL STATE OF CALIFORNIA

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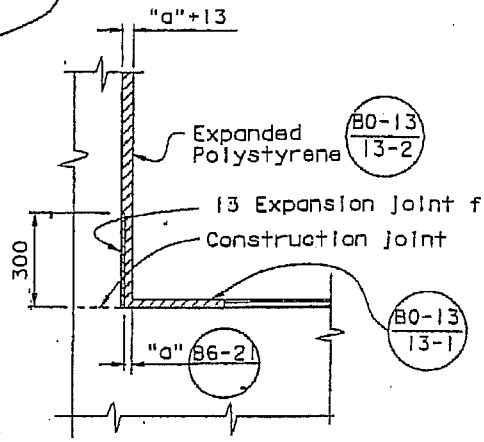
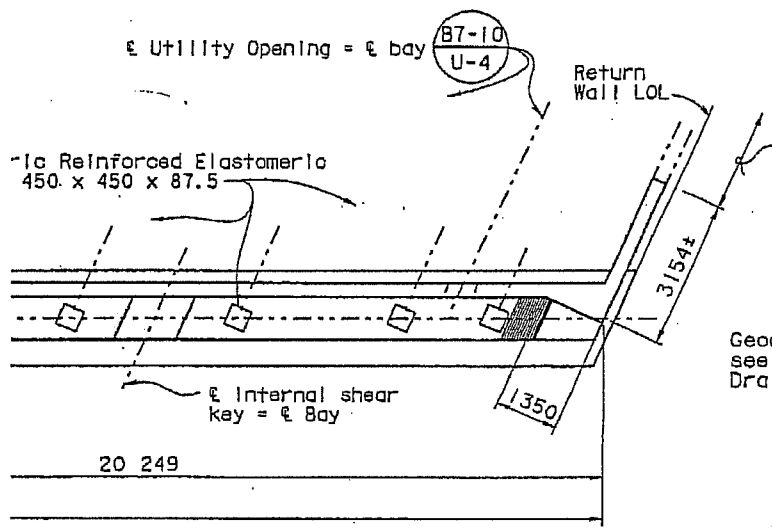
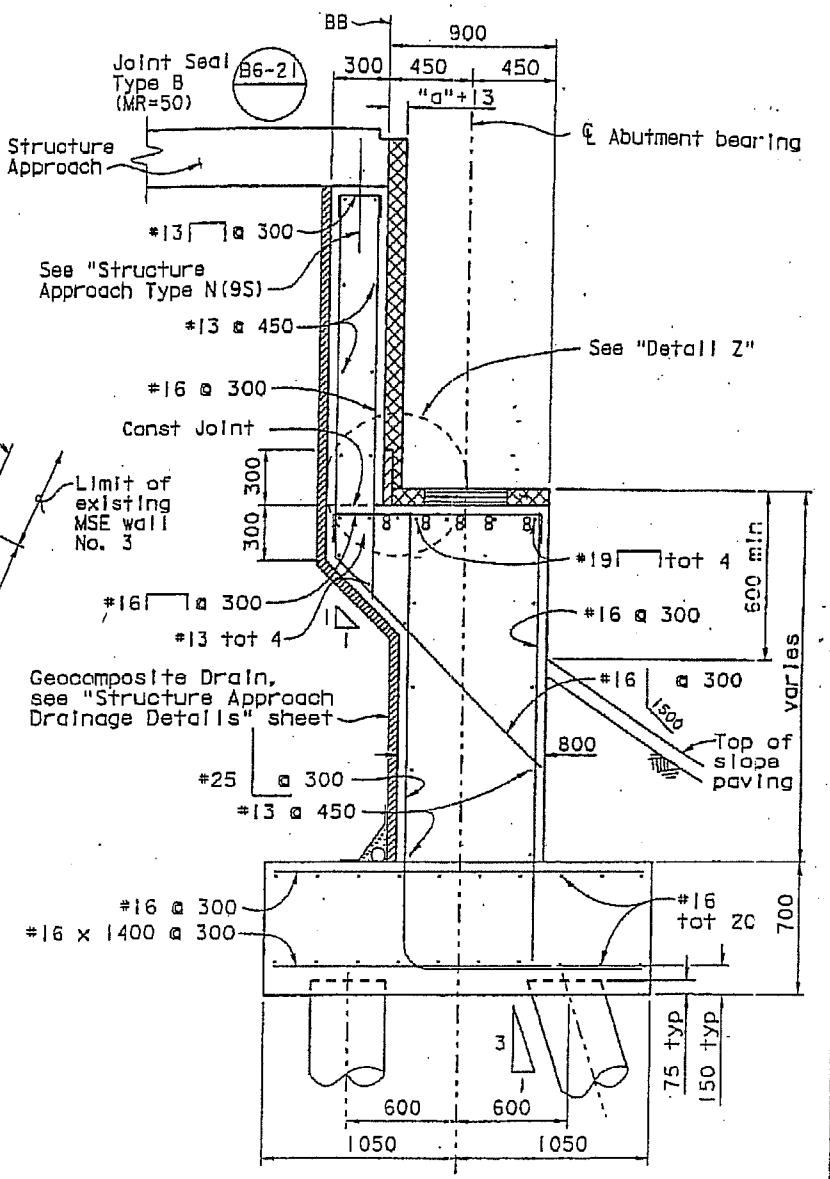


DETAIL Z
No scale





SECTION A-A
1:20

see
tract.

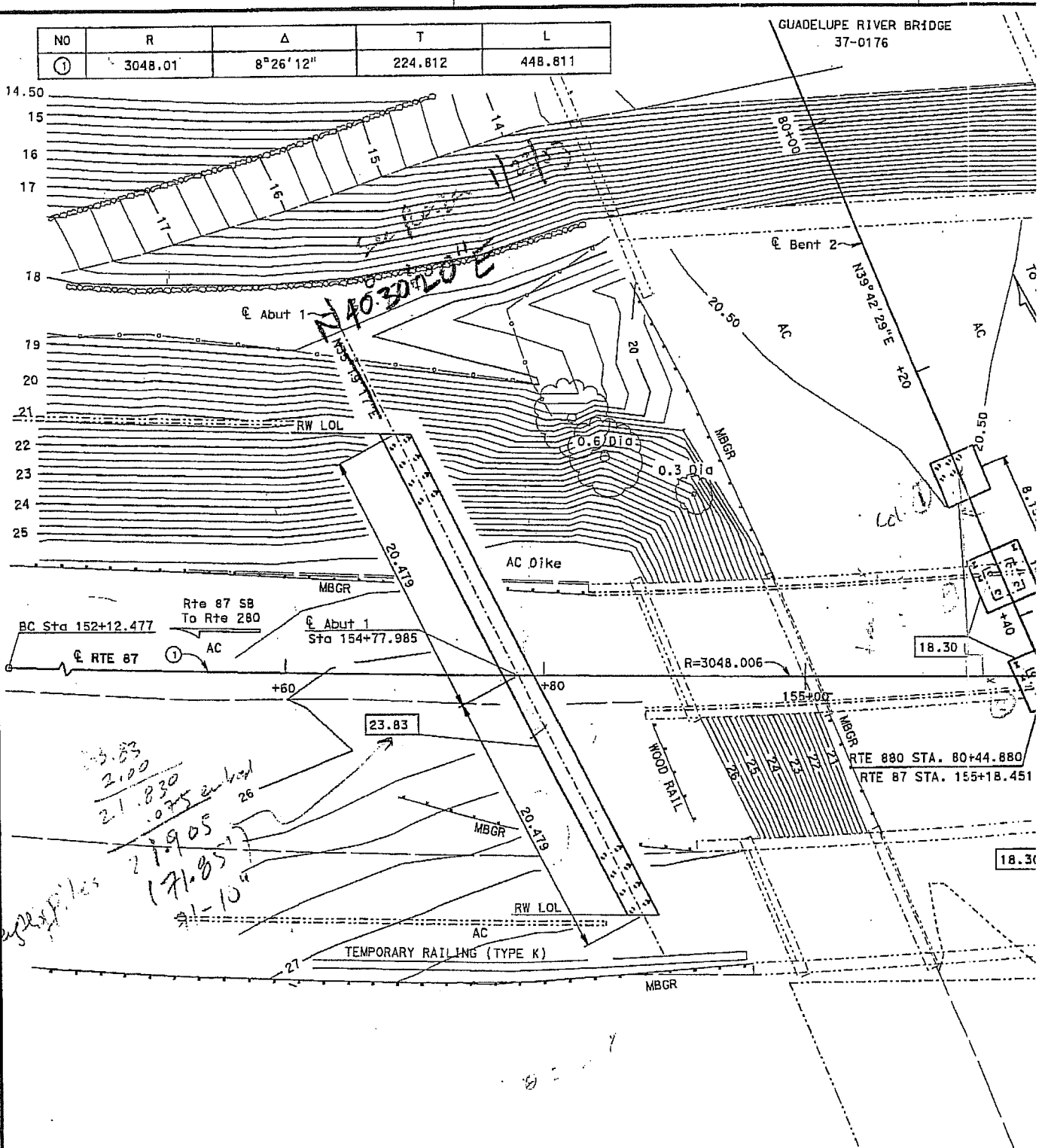
3 Layout" sheet.

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF STRUCTURES STRUCTURE DESIGN 7	BRIDGE NO. 37-0609	RTE 87/880 SEPARATION
		KILOMETER POST 12.5	ABUTMENT 1 LAYOUT

5a

NO	R	Δ	T	L
①	3048.01'	8°26'12"	224.812	448.811



SURVEY CONTROL

PT-60

Fnd L & T in bridge 37-0181 NB Rte 87 @ Rte 880 OC. 0.1 back fr top face PCC Curb. 30 N of BB. 19.816 RT. L RTE 87 STA. 155+25.945
N= 95759.940 E= 484677.127 Elev. = 27.971

DN 430

Fnd PK nail in AC shldr of SB Rte 87 Approx. 90 S'ly of call box SC-87-75, 12 N'ly of Electrolier 10K148. 7.859 LT. L RTE 87 STA. 151+53.854
N= 95407.934 E= 484802.745 Elev. = 18.619

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

Note: Indicates bottom of footing elevation.

PRELIMINARY INVESTIGATION SECTION										
SCALE	VERT.DATUM NAD27	PHOTOGRAMMETRY AS OF:						DESIGN	BY Reza Erfanian	CHECKED Julie Wolf
1:200	HORZ.DATUM NGVD29	SURVEYED	BY B.W. LETCHER 6-1997	DRAFTED	BY B.W. LETCHER 3-2000			DETAILS	BY Sandra McNealy	CHECKED Julie Wolf
ALIGNMENT TIES DISTRICT TRAV. SHEETS		FIELD CHECKED	BY T.C. GILLETT 3-2000	CHECKED	BY J. RING 6/2000			QUANTITIES	BY Abhijit Naik	CHECKED Ling Wang

STRUCTURES FOUNDATION PLAN SHEET (METRIC) (REV. 3/1/99)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS

SB

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL
04	SCl	87	10.0/14.4	298	351

Reza Erfanian 3-13-02
REGISTERED CIVIL ENGINEER

7-8-02
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Reza Erfanian — No. 48240 — Exp. 6-30-04 — CIVIL — STATE OF CALIFORNIA

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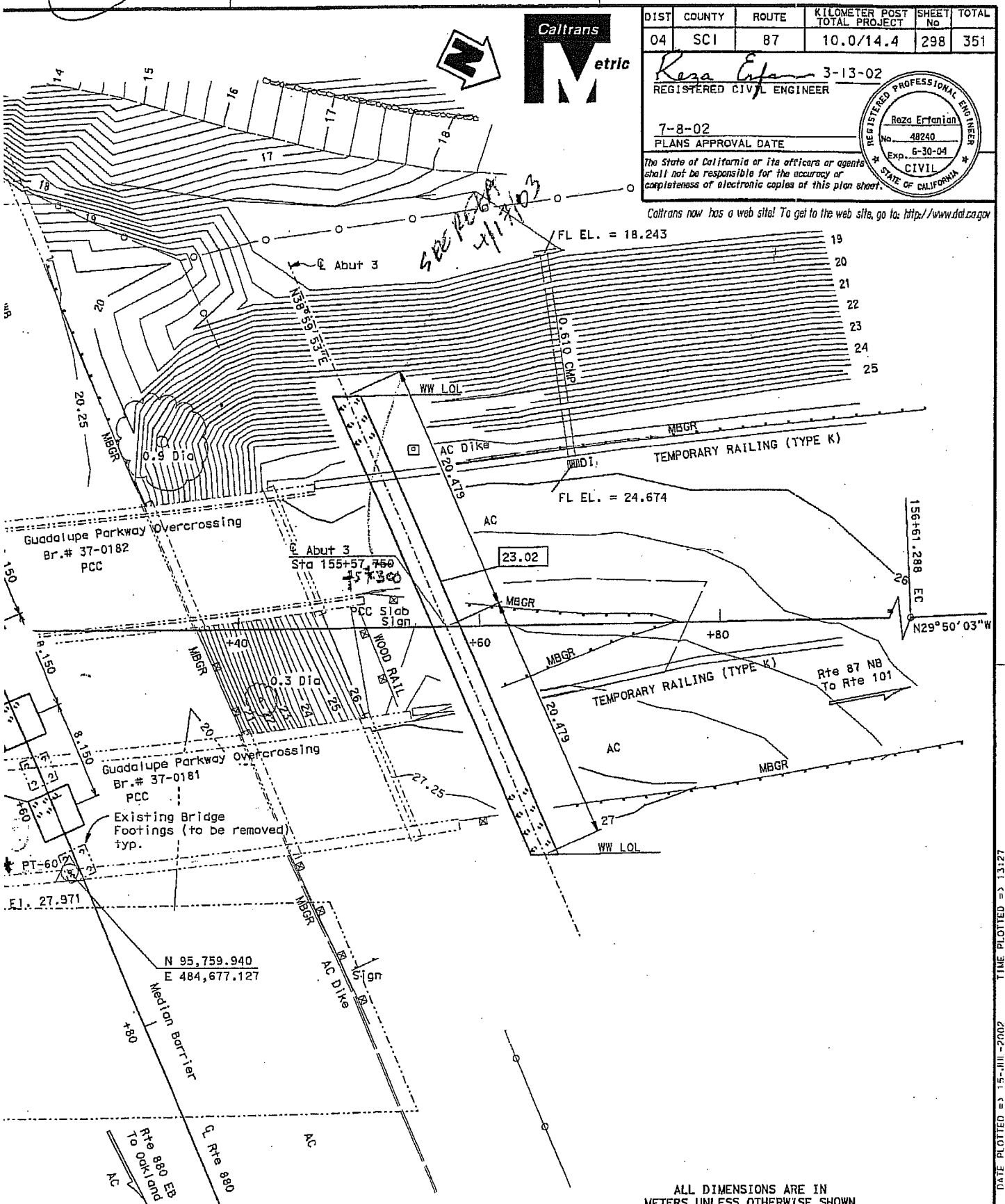


ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF STRUCTURES STRUCTURE DESIGN 7	BRIDGE NO. 37-0609	RTE 87/880 SEPARATION
		KILOMETER POST 12.5	FOUNDATION PLAN
	CU 04237 EA 4874R1	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY) 8-31-2000 12-26-00 2-21-01 3-15-01 4-2-01 5-2-01 3-26-01 3-4-02 3-12-02
			SHEET 4 OF 23

FILE => 37-0609-e-fp.dgn

DATE PLOTTED => 15-JAN-2002 TIME PLOTTED => 13:27

6a

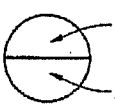
INDEX TO PLANS

Sheet No.	Title
1	GENERAL PLAN
2	INDEX TO PLANS
3	DECK CONTOURS
4	FOUNDATION PLAN
5	ABUTMENT 1 LAYOUT
6	ABUTMENT 3 LAYOUT
7	ABUTMENT DETAILS NO. 1
8	ABUTMENT DETAILS NO. 2
9	BENT LAYOUT
10	BENT DETAILS NO. 1
11	BENT DETAILS NO. 2
12	TYPICAL SECTION
13	GIRDER LAYOUT
14	ADDITIONAL REINFORCEMENT
15	MISCELLANEOUS DETAILS
16	CONCRETE BARRIER TYPE 25 (MOD)
17	TERMINAL DRAINAGE INLET DETAILS
18	STRUCTURE APPROACH TYPE N(9S)
19	ABUTMENT 1 APPROACH SLAB DETAILS
20	STRUCTURE APPROACH DRAINAGE DETAILS
21	SLOPE PAVING - FULL SLOPE
22	LOG OF TEST BORINGS 1 OF 2
23	LOG OF TEST BORINGS 2 OF 2

BRIDGE REMOVAL, LOCATION
BRIDGE REMOVAL, LOCATION
BRIDGE REMOVAL, LOCATION
STRUCTURE EXCAVATION (BR
STRUCTURE BACKFILL (BRID
NPS 3 SUPPLY LINE (BRIDG
FURNISH STEEL PILING (HP
DRIVE STEEL PILE (HP 250
FURNISH PILING (CLASS 62
DRIVE PILE (CLASS 625)
PRESTRESSING CAST-IN-PLA
STRUCTURAL CONCRETE, BRI
STRUCTURAL CONCRETE, BRI
STRUCTURAL CONCRETE, APP
(TYPE N)
ARCHITECTURAL TREATMENT
JOINT SEAL (MR 50 MM)
BAR REINFORCING STEEL (BF
SLOPE PAVING (MASONRY BL
MISCELLANEOUS METAL (BRI
CONCRETE BARRIER (TYPE 2
CONCRETE BARRIER (TYPE 6

STANDARD PLANS DATED JULY 1999

A10A	ABBREVIATIONS
A62C	LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL - BRIDGE
A76A	CONCRETE BARRIER TYPE 60
B0-1	BRIDGE DETAILS
B0-5	BRIDGE DETAILS
B2-5	PILE DETAILS-CLASS 400 AND CLASS 625
B6-21	JOINT SEALS (MAXIMUM MOVEMENT RATING=50 mm)
B7-10	UTILITY OPENING-BOX GIRDER
B8-5	CAST-IN-PLACE PRESTRESSED GIRDER DETAILS
B11-53	CONCRETE BARRIER TYPE 25
B14-5	WATER SUPPLY LINE (DETAILS)(PIPE SIZES LESS THAN NPS 4)



PILE D

Location	Pile Type	Design Loading	Nominc Compres
Abut 1	Class 625 Alt "V" or "X"	625 kN	1250
Bent 2 columns 1,4,&5	Class 625 Alt "V" or "X"	625 kN	1250
Bent 2 columns 2&3	Steel HP 250X85	625 kN	1250
Abut 3	Class 625 Alt "V" or "X"	625 kN	1250

Design tip elvations control
[1] Compression, [2] Tension

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

DESIGN	BY Reza Erfanian	CHECKED Julie Wolf
DETAILS	BY Sandra McNealy	CHECKED Julie Wolf
QUANTITIES	BY Abhijit Naik	CHECKED Ling Wang

STRUCTURES DESIGN DETAIL SHEET (METRIC) REV. 4/20/00)

ORIGINAL SCALE IN MILLIMETERS
FOR REDUCED PLANS

(65)

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
04	SCl	87	10.0/14.4	296	351

Reza Erfanian 3-13-02
REGISTERED CIVIL ENGINEER

7-8-02
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Reza Erfanian — No. 48240 — Exp. 6-30-04 — CIVIL — STATE OF CALIFORNIA

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

Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov

ITIES		
ect of Br.	LUMP	SUM
Gr. B	LUMP	SUM
Temp. Support Precast Br.	LUMP	SUM
	810	m^3
	546	m^3
	208	m
X 85)	655	m
)	32	EA
	2 765	m
	156	EA
NCRETE	LUMP	SUM
OOTING	210	m^3
	2 088	m^3
SLAB	248	m^3
	42	m^2
	81	m
)	294 500	kg
	970	m^2
	920	kg
IFIED)	205	m
	103	m

GENERAL NOTES
LOAD FACTOR DESIGN

DESIGN: BRIDGE DESIGN SPECIFICATIONS (1996 AASHTO with Interims and Revisions by CALTRANS)

SEISMIC DESIGN: Caltrans Seismic Design Criteria (SDC), Version 1.1 July 1999

DEAD LOAD: Includes 1675 Pa for future wearing surface.

LIVE LOADING: HS20-44 and alternative and permit design load.

SEISMIC LOADING: SDC ARS Curve For Soil Profile D (M=7.25 ± .25) (Peak Rock Acceleration = 0.6 g)

REINFORCED CONCRETE:
f_y = 416 MPa
f'_c = 28 MPa
n = 8

TRANSVERSE DECK SLAB : (WORKING STRESS DESIGN)
f_s = 140 MPa
f'_c = 8 MPa
n = 10

PRESTRESSED CONCRETE: See "Prestressing Notes" on "Girder Layout" sheet.

B2-5

TABLE

sistance Tension	Bottom of Footing Elev.	Design Tip Elev.	Specified Tip Elev.
N/A	23.826 m	~~+2.0~~(1) +5.1	~~+2.0~~ +5.1
350 kN	18.3 m	+3.96(1) +7.9(2) Δ=3.94m = 12.92'	+3.96
350 kN	18.3 m	-2.1(1) +2.44(2)	-2.1
N/A	23.016 m	+7.6(1)	+7.6

y the following demands:

14.415 m × 3.28 = 47.28'

20.4 m × 3.28 = 66.91'

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

STATE OF ALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF STRUCTURES STRUCTURE DESIGN 7	BRIDGE NO. 37-0609	RTE 87/880 SEPARATION
		KILOMETER POST 12.5	INDEX TO PLANS
CU 04 EA 4874R1	DISREGARD PRINTS BEARING EARLIER REVISION DATES →	REVISION DATES (PRELIMINARY STAGE ONLY) 2-21-01 5-7-01 5-25-01 9-20-01 2-4-02	SHEET 2 OF 23

FILE => 37-0609-a-itp.dgn

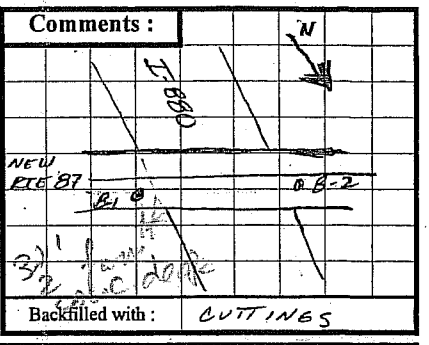
USERNAME => trding DATE PLOTTED => 15-JUL-2002 TIME PLOTTED => 13:18

LOG OF BORING NO. (B-1)

Earth Mechanics
Geotechnical and Earthquake

Project Name	:	UCSD BRIDGE ABUTMENT STUDY, 87/880			
Project Location	:	SAN JOSE, CA — RTE 87/I-880 BRIDGE-SOUTH ABUTMENT			
E.M.I. Project No.	:	02-165	Site Condition :	DAVE D	
Weather	:	CLOUDY, LT RAIN	Elevation :	32 m	
Traffic Control	:	N/A	Operator :	—	
Drilling Company	:	GREGG DRILLING	Operator :	JASON	
Type of Rig	:	MOBILE B61-HDX	Drop (in) :	30"	
Borehole Diameter (inch)	:	6" - HOLLOW STEM AUGER	Drive Wt. (lbs) :	140 lbs	
Logged By	:	J.C.	Date Drilled :	1-30-04	

Comments :



Backfilled with : CUTTINGS

	Time										Back to	Proposed Depth
	Depature	Arrival	Start	Break	Resume	Lunch	Resume	Break	Finish	Off	Office	30 ft
Driller												Water Table
Traffic Control												N/A ft
Logger												Caving
Total												N/A ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color	Description	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O²/LEL/PID
0	B	D					DRK BRN	ASPHALT 6" BASE			: :					
2.5	D	1		40	18"	ML	YELLOW-BRN	GRAVELLY SILT W/ SAND, SL. MOIST, ANG. GRAVEL UP TO 1", FINE-V. FINE GRAINED SAND LOW PLASTICITY, HARD	SL. M							
				38												
				50												
5	S	2		13	18"	ML	BRN	GRAVELLY SILT W/ SAND, SL MOIST, ANGULAR GRAVELS ½"-1" DIAM., V. FINE GRAINED SAND, LOW PLASTICITY, HARD			: :					
				20												
				27												
~~10~~											: :					
7.5	D	3		26	18"	ML		SAME, ANGULAR GRAVELS ~ ½" DIAM.								
				31												
				34												
~~15~~							SILT-	SILTY CLAY W/ TRACE GRAVEL			: :					
10	S	4		11	18"	CL/ML	BRN/GRAY	W/ ORGANICS (WOOD, ROOTS) MOD PLASTICITY								
				12				V. STIFF, MOTTLED GRAY/BROWN/BLACK								
				16				LAMINATED - LIKELY NATIVE MATERIAL								
20							DARK				: :					
	D	5		11	18"	CL	BRN/GRAY	CLAY W/ SILT, TRACE ORGANICS,								
				16				MOIST, MOD PLASTICITY, V. STIFF,								
				16				SOME LAMINATION								
25											: :					
	S	6A		8	18"	CL/ML	BROWN	CLAY W/ SILT, MOIST, MOD PLASTICITY GRADING TO →								
				8				SILT W/ CLAY @ 20.75', LOW-NONPLASTIC, V. STIFF								
		6B		9												

LOG OF BORING NO. (B-1 SOUTH ABUTMENT)

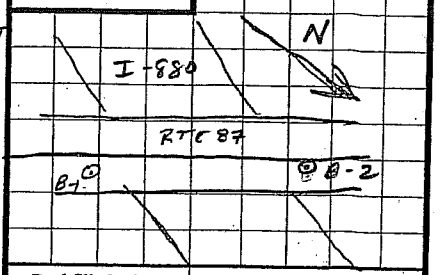
Project No. : 02-165 Project Name : BRIDGE ABUTMENT STUDY, 87/880

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color		Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O^2/LEL/PID
30	D	7		12 13	16"	CL	OLIVE/ BROWN/	CLAY W/ SILT, MOIST, MOD-SL PLASTICITY, V. STIFF, TRACE ORGANICS, MOTTLED			: :				
				14			ORANGE	ORANGE BROWN OXIDATION, LAMINATED TRACE GRAVELS			: :				
35											: :				
											: :				
40											: :				
											: :				
45											: :				
											: :				
50											: :				
											: :				
55											: :				
											: :				
60											: :				
											: :				
65											: :				
70											: :				

LOG OF BORING NO. (B-2)

Project Name	: UCSD BRIDGE ABUTMENT STUDY		
Project Location	: SAN JOSE, CA - RTE 87/I-880 BRIDGE - NORTH ABUTMENT		
E.M.I. Project No.	: 02-165	Site Condition :	PAVED
Weather	: CLOUDY, LT RAIN	Elevation :	
Traffic Control	: N/A	Operator :	—
Drilling Company	: GREGG DRILLING	Operator :	JASON
Type of Rig	: MOBILE B-61 HDX	Drop (in) :	30"
Borehole Diameter (inch)	: 6" - HOLLOW STEM AUGER	Drive Wt. (lbs) :	140 lbs
Logged By	: J.C.	Date Drilled :	1-30-04

Comments :



Backfilled with : CUTTINGS

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Resume	Lunch	Resume	Break	Finish	Off		30 ft
Driller												Water Table
Traffic Control								3'				N/A ft
Logger												Caving
Total												N/A ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Color	Description (ASTM D-2488-93)	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O^2/LEL/PID
0	B	0									: :					
~~2.5~~	S	—		30 41 50	∅	—		INITIAL ATTEMPT - NO RECOVERY, TIP PLUGGED W/ GRAVEL REPEAT SAMPLE @ 2.5 1'?								
2.5	S	1		8 21 26	18"	ML	DRK BROWN	SILT W/ CLAY + TRACE GRAVEL, NON-LOW PLASTIC, HARD, MOIST			: :					
~~10~~ 5	D	2		12 15 20	18"	CL	DRK BROWN/ GRAY	SILTY CLAY, MOIST, LOW PLASTICITY, HARD, TRACE ORGANICS, LAMINATED SOME ORANGE-BRN OXIDATION			: :					
~~15~~ 7.5	S	3		7 10 11	18"	CL	BROWN/ GRAY/	SILTY CLAY, MOIST, LOW-MOD PLASTICITY V. STIFF,			: :					
~~20~~ 10	D	4		12 14 20	18"	CL	BROWN/ GRAY/ ORANGE	SILTY CLAY, MOIST, MOD PLASTICITY, HARD, TRACE SUBANGULAR PEA GRAVEL, TRACE ORGANICS, ORANGE-BRN OXIDATION			: :					
5 20	S	5		8 13 18	18"	CL	GRAY	SILTY CLAY, MOIST, MOD PLASTICITY, HARD, TRACE ORGANICS - WOOD/PLANT, LAMINATED, ORANGE-BRN OXIDATION			: :					

2 - 5

LOG OF BORING NO. (B-2 NORTH ABUTMENT)

Earth Mechanics, Inc.

Project No. : 02-165 **Project Name :** BRIDGE ABUTMENT STUDY, 87/880

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color		Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O²/LEL/PID
~~20~~		~~5~~		M	16"	CL	GRAY/	SAME	SL M		: :					
25	D	6		22			ORANGE									
				28							: :					
~~25~~				8	18'	CL	BLACK →	SILTY CLAY, → CLAYEY SILT MOIST, TRACE SUB-ANGULAR			: :					
30	S	7		10		/ML	DRK GRAY	GRAVEL & ORGANICS, LOW PLASTICITY								
				12				M. STIFF			: :					
40											: :					
											: :					
45											: :					
											: :					
50											: :					
											: :					
55											: :					
											: :					
60											: :					
											: :					
65											: :					
70											: :					

GREGG DRILLING AND TESTING, INC.
GREGG IN SITU, INC.
ENVIRONMENTAL AND GEOTECHNICAL INVESTIGATION SERVICES

March 5, 2004

Earth Mechanics
Attn: Jody Castle
7700 Edgewater Drive
Oakland, California 94621

Subject: CPT Site Investigation
87 & I-880
San Jose, California
GREGG Project Number: 04-022ma

Dear Jody:

The following report presents the results of GREGG IN SITU's Cone Penetration Test investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	X
2	Pore Pressure Dissipation Tests	(PPD)	☐
3	Seismic Cone Penetration Tests	(SCPTU)	☐
4	Resistivity Cone Penetration Tests	(RCPTU)	☐
5	UVIF Cone Penetration Tests	(UVIFCPTU)	☐
6	Groundwater Sampling	(GWS)	☐
7	Soil Sampling	(SS)	☐
8	Vapor Sampling	(VS)	☐
9	Vane Shear Testing	(VST)	☐
10	SPT Energy Calibration	(SPTE)	☐

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (562) 427-6899.

Sincerely,
GREGG IN SITU, Inc.

Mary Walden
Operations Manager

GREGG DRILLING AND TESTING, INC.
GREGG IN SITU, INC.
ENVIRONMENTAL AND GEOTECHNICAL INVESTIGATION SERVICES

Bibliography

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Robertson, P.K., R.G. Campanella, D. Gillespie and A. Rice, "Seismic CPT to Measure In-Situ Shear Wave Velocity", Journal of Geotechnical Engineering ASCE, Vol. 112, No. 8, 1986
pp. 791-803.

Robertson, P.K., T. Lunne and J.J.M. Powell, "Geo-Environmental Application of Penetration Testing", Geotechnical Site Characterization, Robertson & Mayne (editors), 1998 Balkema, Rotterdam, ISBN 90 5410 939 4 pp 35-47.

Roberston, P.K., "Soil Classification using the Cone Penetration Test", Canadian Geotechnical Journal, Vol. 27, 1990 pp. 151-158.

Woeller, D.J., P.K. Robertson, T.J. Boyd and Dave Thomas, "Detection of Polyaromatic Hydrocarbon Contaminants Using the UVIF-CPT", 53rd Canadian Geotechnical Conference Montreal, QC October pp. 733-739, 2000.

Zemo, D.A., T.A. Delfino, J.D. Gallinatti, V.A. Baker and L.R. Hilpert, "Field Comparison of Analytical Results from Discrete-Depth Groundwater Samplers" BAT EnviroProbe and QED HydroPunch, Sixth national Outdoor Action Conference, Las Vegas, Nevada Proceedings, 1992, pp 299-312.

Copies of ASTM Standards are available through www.astm.org

Cone Penetration Testing Procedure (CPT)

Gregg In Situ, Inc. carries out all Cone Penetration Tests (CPT) using an integrated electronic cone system, *Figure CPT*. The soundings were conducted using a 20 ton capacity cone with a tip area of 15 cm^2 and a friction sleeve area of 225 cm^2. The cone is designed with an equal end area friction sleeve and a tip end area ratio of 0.85.

The cone takes measurements of cone bearing (q_c), sleeve friction (f_s) and dynamic pore water pressure (u_2) at 5-cm intervals during penetration to provide a nearly continuous hydrogeologic log. CPT data reduction and interpretation is performed in real time facilitating on-site decision making. The above mentioned parameters are stored on disk for further analysis and reference. All CPT soundings are performed in accordance with revised (2002) ASTM standards (D 5778-95).

The cone also contains a porous filter element located directly behind the cone tip (u_2), *Figure CPT*. It consists of porous plastic and is 5.0mm thick. The filter element is used to obtain dynamic pore pressure as the cone is advanced as well as Pore Pressure Dissipation Tests (PPDT's) during appropriate pauses in penetration. It should be noted that prior to penetration, the element is fully saturated with silicon oil under vacuum pressure to ensure accurate and fast dissipation.

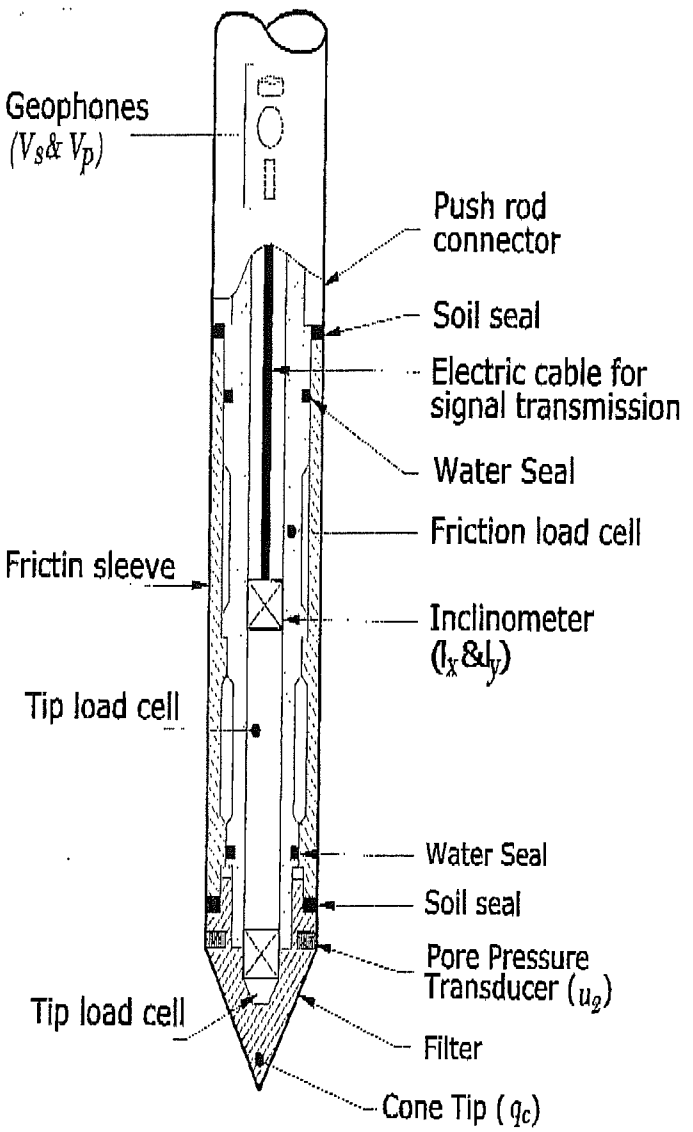


Figure CPT

When the soundings are complete, the test holes are grouted using a Gregg In Situ support rig. The grouting procedure consists of pushing a hollow CPT rod with a "knock out" plug to the termination depth of the test hole. Grout is then pumped under pressure as the tremie pipe is pulled from the hole. Disruption or further contamination to the site is therefore minimized.

Gregg In Situ

Environmental and Geotechnical Site Investigation Contractors

Gregg In Situ CPT Interpretations as of January 7, 1999 (Release 1.00.19)

Gregg In Situ's interpretation routine should be considered a calculator of current published CPT correlations and is subject to change to reflect the current state of practice. The interpreted values are not considered valid for all soil types. The interpretations are presented only as a guide for geotechnical use and should be carefully scrutinized for consideration in any geotechnical design. Reference to current literature is strongly recommended.

The CPT interpretations are based on values of tip, sleeve friction and pore pressure averaged over a user specified interval (typically 0.25m). Note that Qt is the recorded tip value, Qc, corrected for pore pressure effects. Since all Gregg In Situ cones have equal end area friction sleeves, pore pressure corrections to sleeve friction, Fs, are not required.

The tip correction is: $Qt = Qc + (1-a) \bullet Ud$

where: *Qt* is the corrected tip load
Qc is the recorded tip load
Ud is the recorded dynamic pore pressure
a is the Net Area Ratio for the cone (typically 0.85 for Gregg In Situ cones)

Effective vertical overburden stresses are calculated based on a hydrostatic distribution of equilibrium pore pressures below the water table or from a user defined equilibrium pore pressure profile (this can be obtained from CPT dissipation tests). The stress calculations use unit weights assigned to the Soil Behavior Type zones or from a user defined unit weight profile.

Details regarding the interpretation methods for all of the interpreted parameters is given in table 1. The appropriate references referred to in table 1 are listed in table 2.

The estimated Soil Behavior Type is based on the charts developed by Robertson and Campanella shown in figure 1.

Table 1 CPT Interpretation Methods

Interpreted Parameter	Description	Equation	Ref
Depth	mid layer depth		
AvgQt	Averaged corrected tip (Qt)	$AvgQt = \frac{1}{n}\sum_{i=1}^{n} Qt_i$	
AvgFs	Averaged sleeve friction (Fs)	$AvgFs = \frac{1}{n}\sum_{i=1}^{n} Fs_i$	
AvgRf	Averaged friction ratio (Rf)	$AvgRf = 100\% \bullet \frac{AvgFs}{AvgQt}$	
AvgUd	Averaged dynamic pore pressure (Ud)	$AvgUd = \frac{1}{n}\sum_{i=1}^{n} Ud_i$	
SBT	Soil Behavior Type as defined by Robertson and Campanella		1

CPT Interpretations

U.Wt.	Unit Weight of soil determined from: 1) uniform value or 2) value assigned to each SBT zone 3) user supplied unit weight profile		
TStress	Total vertical overburden stress at mid layer depth	$TStress = \sum_{i=1}^{n} \gamma_i h_i$ where γ_i is layer unit weight h_i is layer thickness	
EStress	Effective vertical overburden stress at mid layer depth	$EStress = TStress - Ueq$	
Ueq	Equilibrium pore pressure determined from: 1) hydrostatic from water table depth 2) user supplied profile		
Cn	SPT N_{60} overburden correction factor	$Cn=(\sigma_v')^{-0.5}$ where σ_v' is in tsf $0.5 < C_n < 2.0$	3
N_{60}	SPT N value at 60% energy calculated from Qt/N ratios assigned to each SBT zone		3
$(N1)_{60}$	SPT N_{60} value corrected for overburden pressure	$N1_{60} = Cn * N_{60}$	3
$\Delta(N1)_{60}$	Equivalent Clean Sand Correction to $(N1)_{60}$	$\Delta(N1)_{60} = \frac{K_{SPT}}{1 - K_{SPT}} * (N1)_{60}$ Where: K_{SPT} is defined as: 0.0 for FC < 5% 0.0167 * (FC - 5) for 5% < FC < 35% 0.5 for FC > 35% FC - Fines Content in %	7
$(N1)_{60cs}$	Equivalent Clean Sand $(N1)_{60}$	$(N1)_{60cs} = (N1)_{60} + \Delta(N1)_{60}$	7
Su	Undrained shear strength - Nkt is use selectable	$Su = \frac{Qt - \sigma_v}{N_{kt}}$	2
k	Coefficient of permeability (assigned to each SBT zone)		6
Bq	Pore pressure parameter	$Bq = \frac{\Delta u}{Qt - \sigma_v}$	2
Qtn	Normalized Qt for Soil Behavior Type classification as defined by Robertson, 1990	$Qtn = \frac{Qt - \sigma_v}{\sigma_v'}$	4
Rfn	Normalized Rf for Soil Behavior Type classification as defined by Robertson, 1990	$Rfn = 100\% * \frac{f_s}{Qt - \sigma_v}$	4
SBTn	Normalized Soil Behavior Type (slightly modified from that published by Robertson, 1990. This version includes all the soil zones of the original non-normalized SBT chart - see figure 1)		4
Qc1	Normalized Qt for seismic analysis	$qc1 = qc * (Pa/\sigma_v')^{0.5}$ where: Pa = atm. pressure	5
Qc1N	Dimensionless Normalized Qt1	$qc1N = qc1 / Pa$ where: Pa = atm. pressure	

CPT Interpretations

ΔQc1N1	Equivalent clean sand correction	$\Delta qc1N = \frac{K_{CPT}}{1 - K_{CPT}} * qc1N$ Where: K_{CPT} is defined as: 0.0 for FC < 5% 0.0267 * (FC - 5) for 5% < FC < 35% 0.5 for FC > 35% FC - Fines Content in %	5
Qc1Ncs	Clean Sand equivalent Qc1N	$qc1Ncs = qc1N + \Delta qc1N$	5
Ic	Soil Index for estimating grain characteristics	$Ic = [(3.47 - \log Q)^2 + (\log F + 1.22)^2]^{0.5}$	5
FC	Fines content (%)	$FC=1.75(Ic^{3.25}) - 3.7$ $FC=100$ for $Ic > 3.5$ $FC=0$ for $Ic < 1.26$ $FC = 5\%$ if $1.64 < Ic < 2.6$ AND $Rfn<0.5$	8
PHI	Friction Angle	Campanella and Robertson Durunoglu and Mitchel Janbu	1
Dr	Relative Density	Ticino Sand Hokksund Sand Schmertmann 1976 Jamiolkowski - All Sands	1
OCR	Over Consolidation Ratio		1
State Parameter			9
CRR	Cyclic Resistance Ratio		7

GREGG

CPT Interpretations

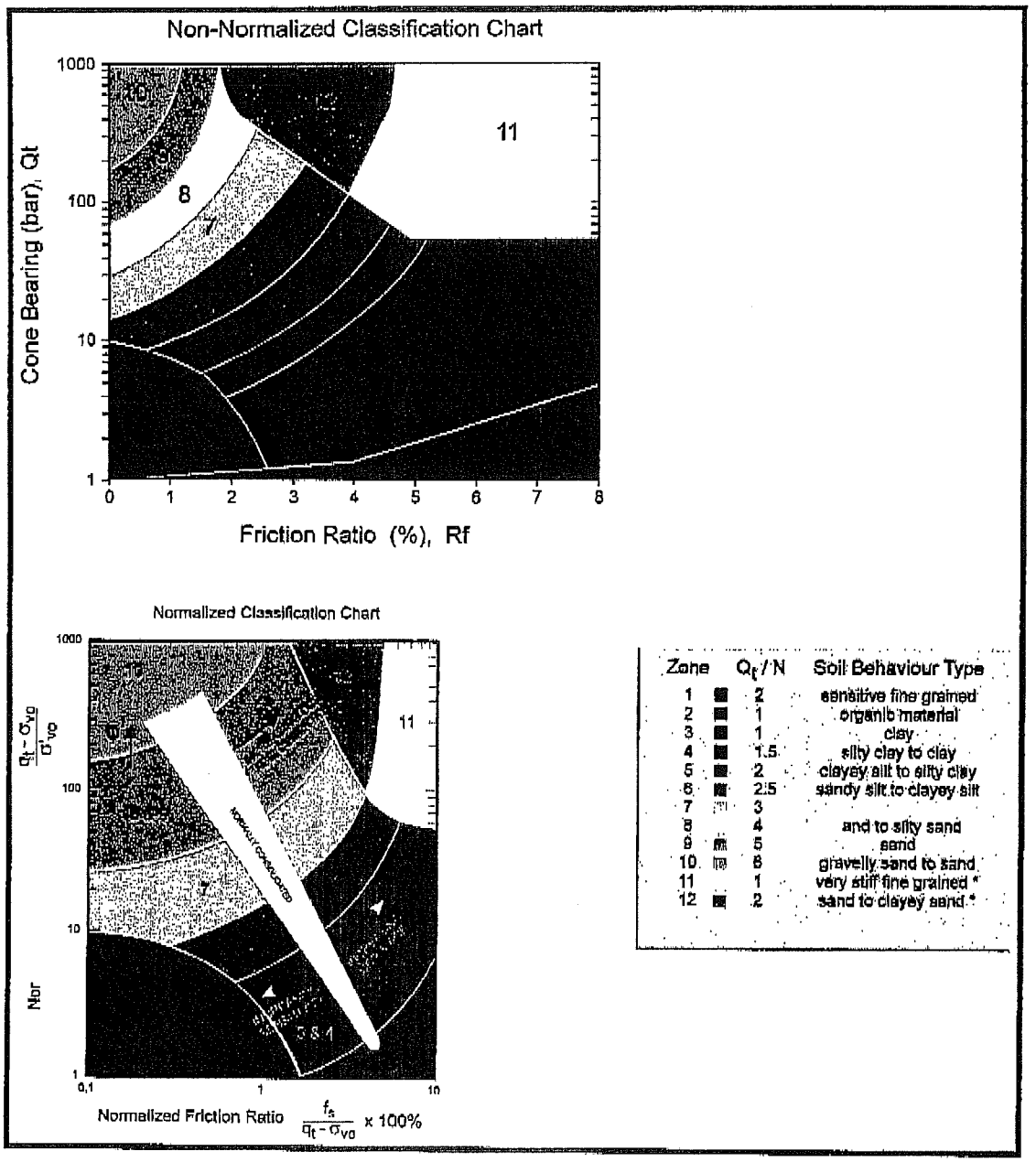


Figure 1 Non-Normalized and Normalized Soil Behavior Type Classification Charts

Table 2 References

No.	Reference
1	Robertson, P.K. and Campanella, R.G., 1986, "Guidelines for Use, Interpretation and Application of the CPT and CPTU", UBC, Soil Mechanics Series No. 105, Civil Eng. Dept., Vancouver, B.C., Canada
2	Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, "Use of Piezometer Cone Data", Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.
3	Robertson, P.K. and Campanella, R.G., 1989, "Guidelines for Geotechnical Design Using CPT and CPTU", UBC, Soil Mechanics Series No. 120, Civil Eng. Dept., Vancouver, B.C., Canada
4	Robertson, P.K., 1990, "Soil Classification Using the Cone Penetration Test", Canadian Geotechnical Journal, Volume 27.
5	Robertson, P.K. and Fear, C.E., 1995, "Liquefaction of Sands and its Evaluation", Keynote Lecture, First International Conference on Earthquake Geotechnical Engineering, Tokyo, Japan.
6	Gregg In Situ Internal Report
7	Robertson, P.K. and Wride, C.E., 1997, "Cyclic Liquefaction and its Evaluation Based on SPT and CPT", NCEER Workshop Paper, January 22, 1997
8	Wride, C.E. and Robertson, P.K., 1997, "Phase II Data Review Report (Massey and Kidd Sites, Fraser River Delta)", Volume 1 - Data Report (June 1997), University of Alberta.
9	Plewes, H.D., Davies, M.P. and Jefferies, M.G., 1992, "CPT Based Screening Procedure for Evaluating Liquefaction Susceptibility", 45th Canadian Geotechnical Conference, Toronto, Ontario, October 1992.

Cone Penetration Test Data & Interpretation

Soil behavior type and stratigraphic interpretation is based on relationships between cone bearing (q_c), sleeve friction (f_s), and pore water pressure (u_2). The friction ratio (R_f) is a calculated parameter defined by $100f_s/q_c$ and is used to infer soil behavior type. Generally:

Cohesive soils (clays)

- High friction ratio (R_f) due to small cone bearing (q_c)
- Generate large excess pore water pressures (u_2)

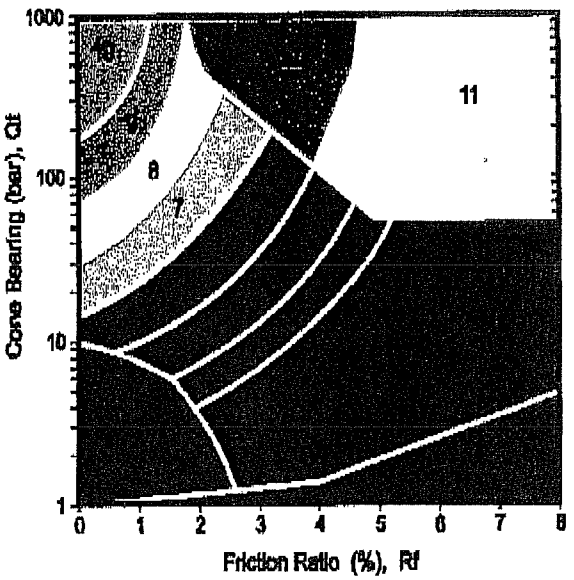
Cohesionless soils (sands)

- Low friction ratio (R_f) due to large cone bearing (q_c)
- Generate very little excess pore water pressures (u_2)

A complete set of baseline readings are taken prior to and at the completion of each sounding to determine temperature shifts and any zero load offsets. Corrections for temperature shifts and zero load offsets can be extremely important, especially when the recorded loads are relatively small. In sandy soils, however, these corrections are generally negligible.

The cone penetration test data collected from your site is presented in graphical form in Appendix CPT. The data includes CPT logs of measured soil parameters, computer calculations of interpreted soil behavior types (SBT), and additional geotechnical parameters. A summary of locations and depths is available in Table 1. Note that all penetration depths referenced in the data are with respect to the existing ground surface.

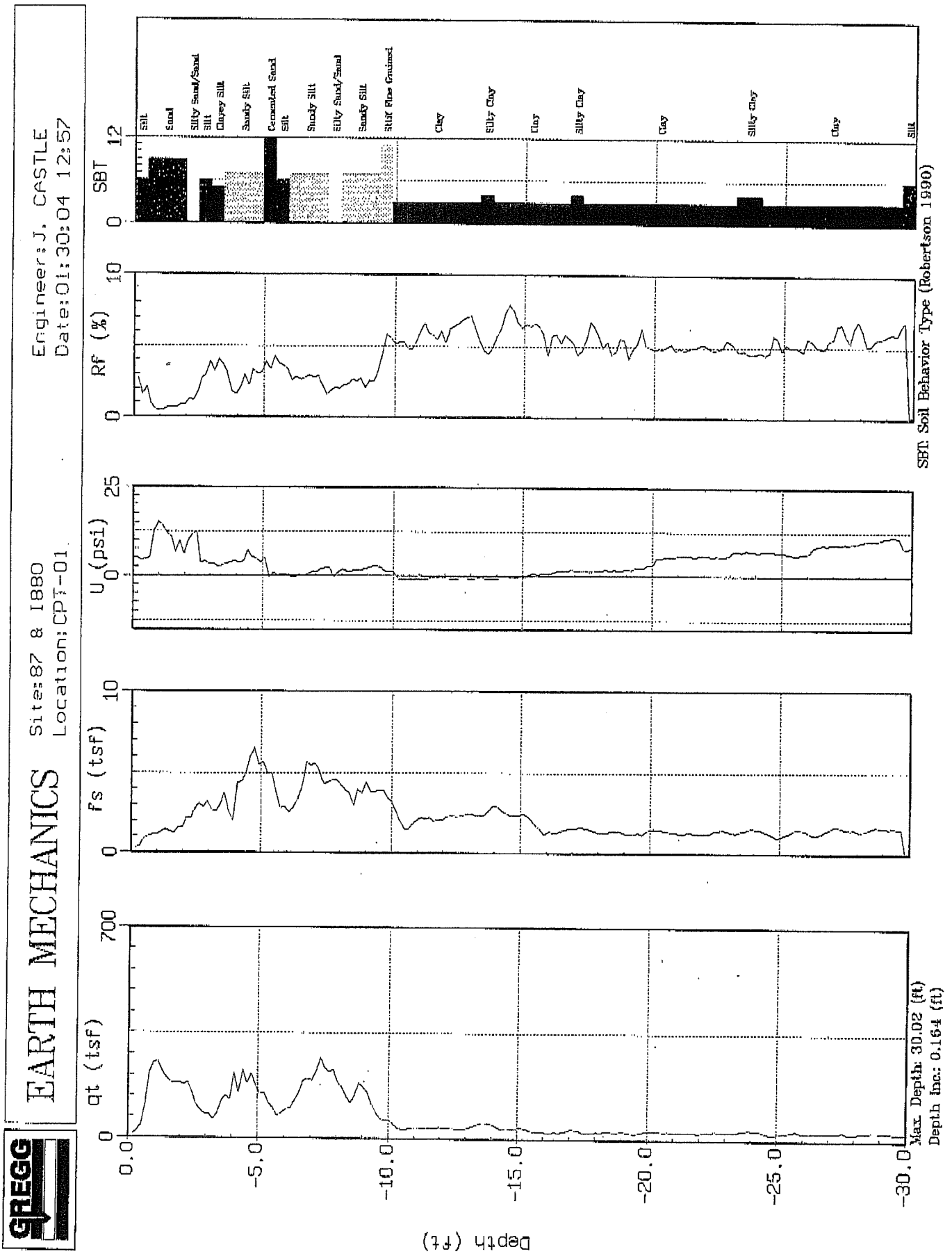
Soil interpretation for this project was conducted using recent correlations developed by Robertson et al, 1990, *Figure SBT*. Note that it is not always possible to clearly identify a soil type based solely on q_c, f_s, and u_2. In these situations, experience, judgment, and an assessment of the pore pressure dissipation data should be used to infer the soil behavior type.

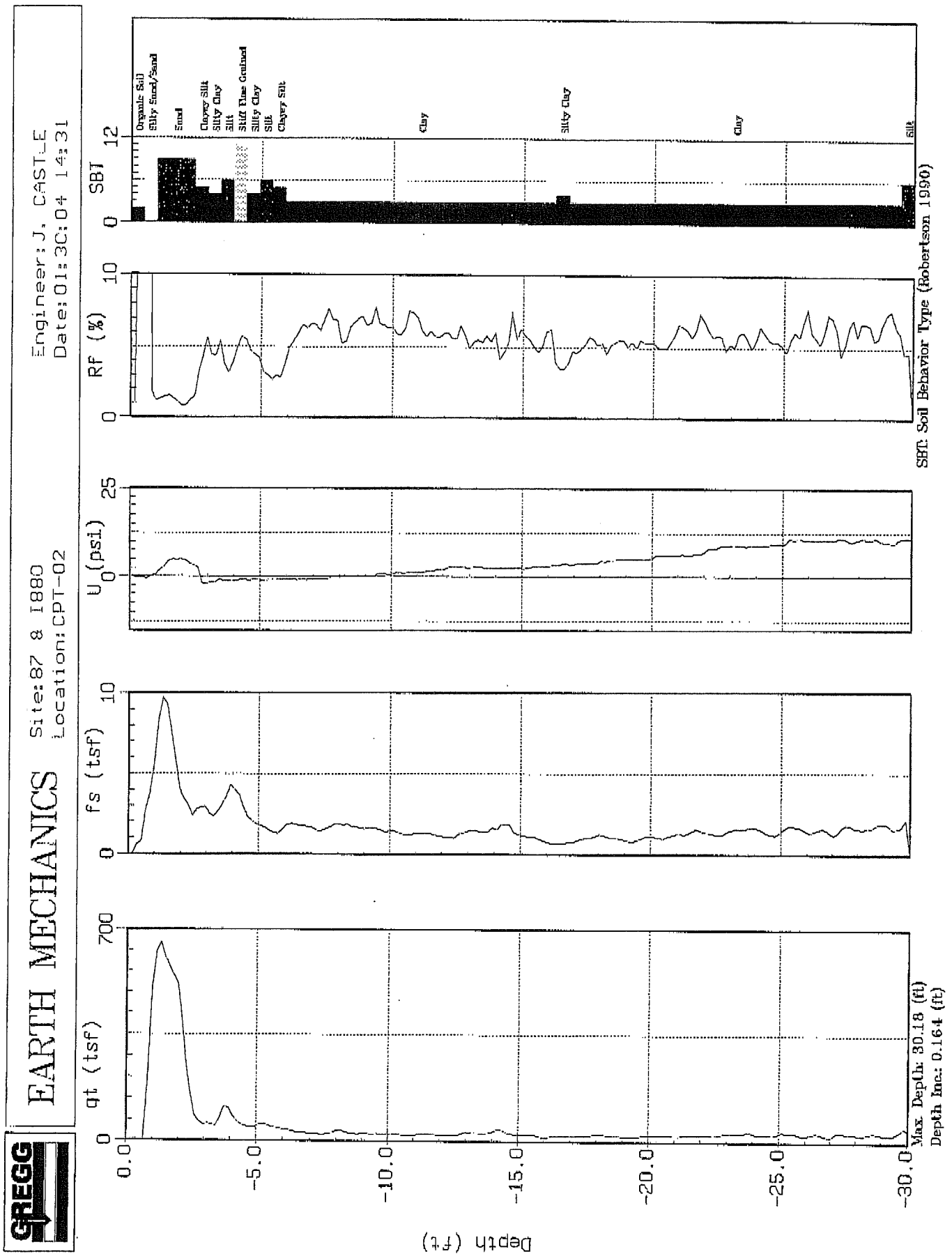


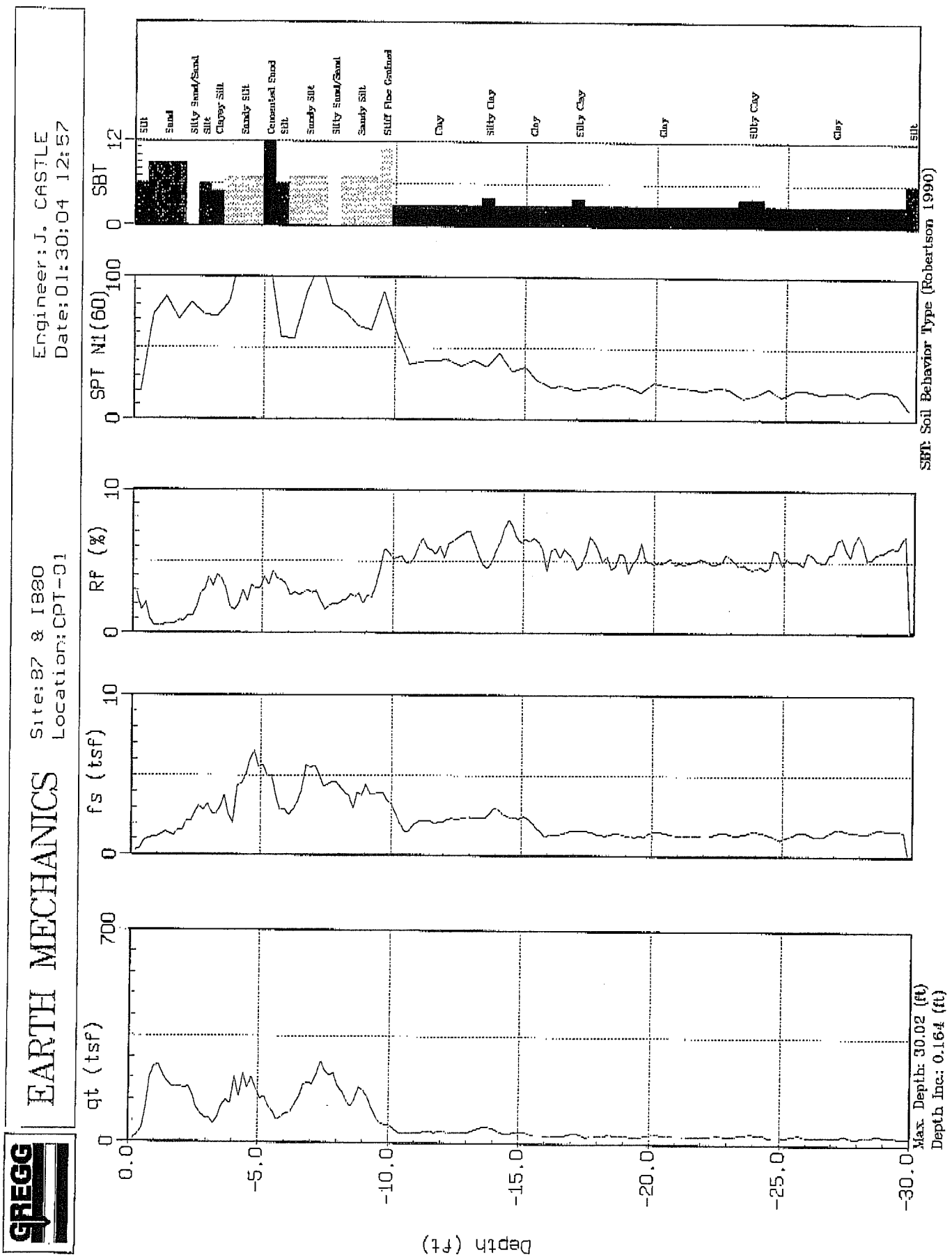
ZONE	Qt/N	SBT
1	2	Sensitive, fine grained
2	1	Organic materials
3	1	Clay
4	1.5	Silty clay to clay
5	2	Clayey silt to silty clay
6	2.5	Sandy silt to clayey silt
7	3	Silty sand to sandy silt
8	4	Sand to silty sand
9	5	Sand
10	6	Gravely sand to sand
11	1	Very stiff fine grained*
12	2	Sand to clayey sand*

*over consolidated or cemented

Figure SBT


GREGG
EARTH MECHANICS
Site:87 & 1880
Location:CPT-01
Engineer:J. CASTLE
Date:01:30:04 12:57
qt (tsf)
Fs (tsf)
U_0(psi)
Rf (%)
SBT
Silt
Sand
Silty Sand/Sand Silt
Clayey Silt
Sandy Silt
Cemented Sand Silt
Sandy Silt
Silty Sand/Sand
Sandy Silt
Stiff Fine Grained
Clay
Silty Clay
Clay
Silty Clay
Clay
Silty Clay
Clay
Silt
SBT: Soil Behavior Type (Robertson 1990)
Max Depth: 30.02 (ft)
Depth Inc: 0.164 (ft)
Depth (ft)


GREGG
EARTH MECHANICS
Site:87 & 1880
Location:CPT-02
Engineer:J. CASTLE
Date:01:3C:04 14:31
qt (tsf)
Fs (tsf)
U0(psi)
RF (%)
SBT
Organic Soil
Silty Sand/Sand
Sand
Clayey Silt
Silty Clay
Silt
Stiff Fine Grained
Silty Clay
Silt
Clayey Silt
Clay
Silty Clay
Clay
Silt
SBT: Soil Behavior Type (Robertson 1990)
Max Depth: 30.18 (ft)
Depth Inc: 0.164 (ft)
Depth (ft)

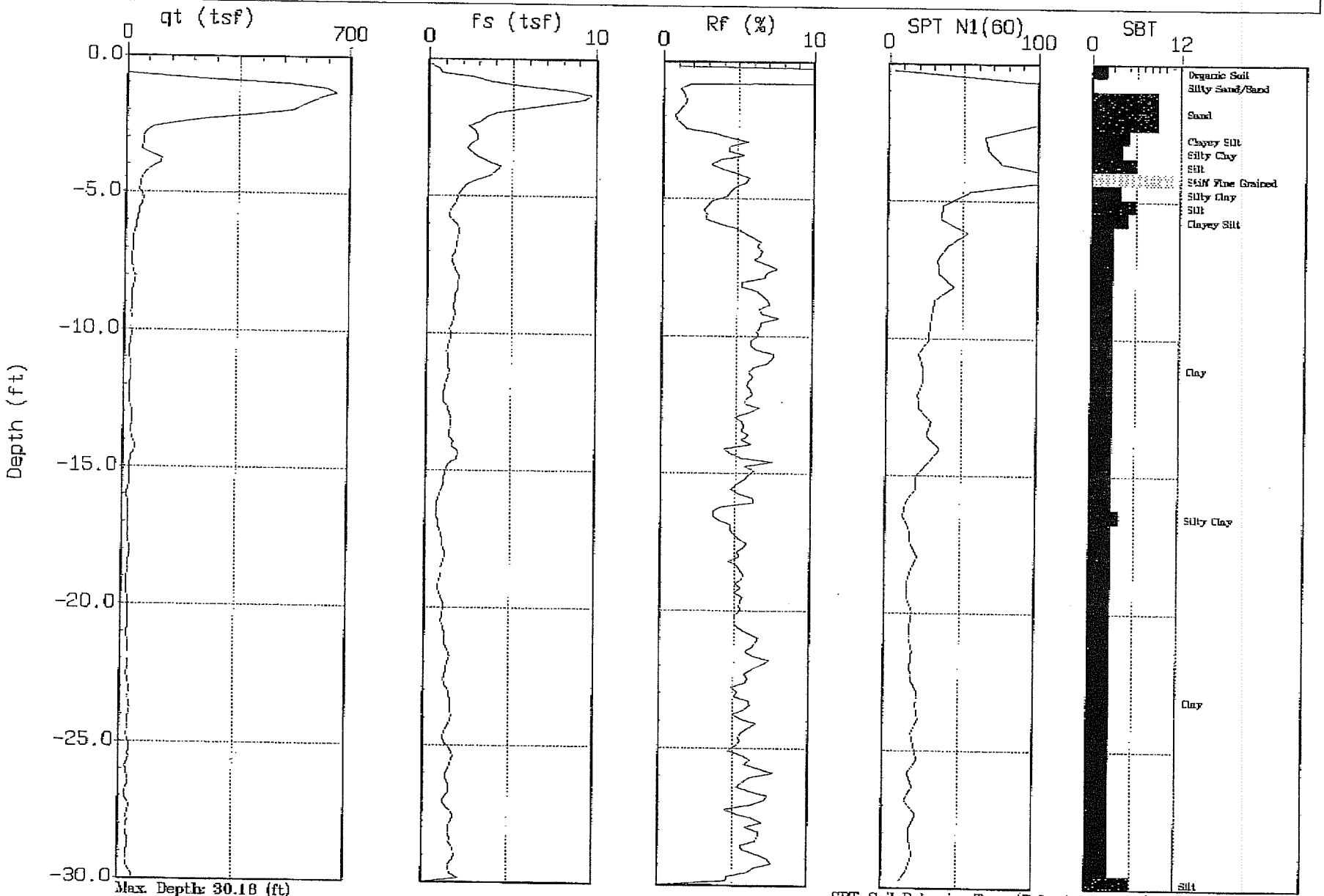

GREGG
EARTH MECHANICS
Site:87 & I880
Location:CPT-01
Engineer:J. CASTLE
Date:01:30:04 12:57
qt (tsf)
fs (tsf)
RF (%)
SPT N1(60)
SBT
Silt
Sand
Silty Sand/Sand Silt
Clayey Silt
Sandy Silt
Cemented Sand Silt
Sandy Silt
Silty Sand/Sand
Sandy Silt
Stiff Fine Grained
Clay
Silty Clay
Clay
Silty Clay
Clay
Silty Clay
Clay
Silt
SBT: Soil Behavior Type (Robertson 1990)
Max. Depth: 30.02 (ft)
Depth Inc: 0.164 (ft)
Depth (ft)

GREGG

EARTH MECHANICS

Site: 87 & I880
Location: CPT-02

Engineer: J. CASTLE
Date: 01:30:04 14:31



Max. Depth: 30.18 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

Gregg In Situ, Inc.
Interpretation Output - Release 1.00.19e
Page: 1a

Run No: 04-0305-0954-0126
Job No: 04-022MA
Client: EARTH MECHANICS
Project: CPT SITE INVESTIGATION
Site: 87 & I880
Location: CPT-01
Engineer: J. CASTLE
CPT Date: 04/30/01
CPT Time: 12:57
CPT File: 022C01.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 12.19 (ft): 40.0
Su Nkt used: 12.50
Averaging Increment (m): 0.15
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
0.25	24.9	0.51	2.04	10.6	6	114.6	0.01	0.01	0.00	2.00	9.5	19.1	1.99	0.00
0.74	191.1	1.07	0.56	25.3	9	124.1	0.04	0.04	0.00	2.00	36.6	73.2	UnDef	0.00
1.23	223.7	1.33	0.59	28.3	9	124.1	0.07	0.07	0.00	2.00	42.8	85.7	UnDef	0.00
1.72	182.5	1.41	0.77	17.3	9	124.1	0.10	0.10	0.00	2.00	34.9	69.9	UnDef	0.00
2.21	171.0	2.34	1.37	25.9	8	120.9	0.13	0.13	0.00	2.00	40.9	81.9	UnDef	0.00
2.71	95.9	3.02	3.15	8.2	6	114.6	0.16	0.16	0.00	2.00	36.7	73.4	7.66	0.00
3.20	74.8	2.73	3.64	6.7	5	114.6	0.19	0.19	0.00	2.00	35.8	71.7	5.97	0.00
3.61	129.4	3.13	2.42	8.0	7	117.8	0.22	0.22	0.00	2.00	41.3	82.6	UnDef	0.00
4.02	163.4	3.59	2.20	8.8	7	117.8	0.24	0.24	0.00	2.00	52.2	104.3	UnDef	0.00
4.51	207.0	5.88	2.84	13.4	7	117.8	0.27	0.27	0.00	1.93	66.1	127.5	UnDef	0.00
5.00	156.9	5.39	3.43	6.3	6	114.6	0.30	0.30	0.00	1.83	60.1	110.2	12.52	0.00
5.50	97.7	3.87	3.96	0.9	5	114.6	0.33	0.33	0.00	1.75	46.8	82.0	7.79	0.00
5.99	93.4	2.74	2.93	-0.5	6	114.6	0.35	0.35	0.00	1.68	35.8	60.2	7.45	0.00
6.56	164.6	4.64	2.82	1.0	7	117.8	0.39	0.39	0.00	1.61	52.5	84.4	UnDef	0.00

Gregg In Situ, Inc.
Run No: 04-0305-0954-0126
CPT File: 022C01.CCR

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60	(N1)60 (blows/ft)	Su (tsf)	CRR
7.14	227.8	4.98	2.19	3.9	7	117.8	0.42	0.42	0.00	1.54	72.7	112.1	UnDef	0.00
7.63	228.0	4.50	1.98	2.3	8	120.9	0.45	0.45	0.00	1.49	54.6	81.4	UnDef	0.00
8.12	164.0	3.96	2.42	3.5	7	117.8	0.48	0.48	0.00	1.44	52.3	75.6	UnDef	0.00
8.61	147.3	3.54	2.40	3.7	7	117.8	0.51	0.51	0.00	1.40	47.0	65.9	UnDef	0.00
9.10	145.1	4.03	2.77	5.8	7	117.8	0.54	0.54	0.00	1.36	46.3	63.2	UnDef	0.00
9.60	70.9	3.75	5.29	3.8	11	130.5	0.57	0.57	0.00	1.33	67.9	90.1	UnDef	0.00
10.09	48.9	2.57	5.25	-0.6	3	111.4	0.60	0.60	0.00	1.29	46.8	60.6	3.86	0.00
10.58	31.8	1.59	5.01	-2.4	3	111.4	0.63	0.63	0.00	1.26	30.5	38.5	2.49	0.00
11.07	34.4	2.14	6.22	-2.1	3	111.4	0.65	0.65	0.00	1.24	33.0	40.8	2.70	0.00
11.56	36.1	2.09	5.78	-1.2	3	111.4	0.68	0.68	0.00	1.21	34.6	41.9	2.83	0.00
12.06	37.0	2.20	5.94	-1.8	3	111.4	0.71	0.71	0.00	1.19	35.5	42.2	2.91	0.00
12.55	33.8	2.31	6.83	-1.5	3	111.4	0.73	0.73	0.00	1.17	32.4	37.8	2.65	0.00
13.04	38.4	2.38	6.21	-1.7	3	111.4	0.76	0.76	0.00	1.15	36.8	42.1	3.01	0.00
13.53	52.3	2.47	4.71	-1.8	4	114.6	0.79	0.79	0.00	1.13	33.4	37.6	4.12	0.00
14.03	44.3	2.81	6.34	-1.6	3	111.4	0.82	0.82	0.00	1.11	42.5	47.0	3.48	0.00
14.52	32.6	2.39	7.32	-1.2	3	111.4	0.85	0.85	0.00	1.09	31.2	33.9	2.54	0.00
15.01	36.5	2.35	6.42	-0.5	3	111.4	0.87	0.87	0.00	1.07	35.0	37.5	2.85	0.00
15.50	27.5	1.74	6.32	1.3	3	111.4	0.90	0.90	0.00	1.05	26.4	27.8	2.13	0.00
15.99	23.7	1.25	5.28	1.9	3	111.4	0.93	0.93	0.00	1.04	22.7	23.5	1.82	0.00
16.49	24.4	1.35	5.56	3.4	3	111.4	0.96	0.96	0.00	1.02	23.3	23.9	1.87	0.00
16.98	32.4	1.55	4.77	3.5	3	111.4	0.98	0.98	0.00	1.01	31.0	31.3	2.51	0.00
17.47	24.6	1.51	6.16	3.0	3	111.4	1.01	1.01	0.00	1.00	23.5	23.4	1.88	0.00
17.96	24.2	1.29	5.35	3.7	3	111.4	1.04	1.04	0.00	0.98	23.2	22.7	1.85	0.00
18.45	27.8	1.36	4.88	3.8	3	111.4	1.06	1.06	0.00	0.97	26.6	25.8	2.14	0.00
18.95	26.0	1.25	4.80	4.0	3	111.4	1.09	1.09	0.00	0.96	24.9	23.8	1.99	0.00
19.44	21.6	1.20	5.53	5.4	3	111.4	1.12	1.12	0.00	0.95	20.7	19.6	1.64	0.00
19.93	29.5	1.44	4.89	8.6	3	111.4	1.15	1.15	0.00	0.93	28.2	26.4	2.27	0.00
20.42	28.0	1.41	5.04	12.0	3	111.4	1.17	1.17	0.00	0.92	26.8	24.7	2.15	0.00
20.92	26.4	1.27	4.82	13.0	3	111.4	1.20	1.20	0.00	0.91	25.3	23.1	2.02	0.00
21.41	25.8	1.27	4.94	12.9	3	111.4	1.23	1.23	0.00	0.90	24.7	22.3	1.96	0.00
21.90	24.3	1.23	5.06	13.5	3	111.4	1.26	1.26	0.00	0.89	23.2	20.7	1.84	0.00
22.39	27.7	1.35	4.87	12.8	3	111.4	1.28	1.28	0.00	0.88	26.5	23.4	2.11	0.00
22.88	26.4	1.39	5.27	14.1	3	111.4	1.31	1.31	0.00	0.87	25.2	22.0	2.00	0.00
23.38	28.6	1.33	4.67	16.4	3	111.4	1.34	1.34	0.00	0.86	27.4	23.6	2.18	0.00
23.87	33.0	1.50	4.55	15.9	3	111.4	1.37	1.37	0.00	0.86	31.6	27.1	2.53	0.00
24.36	27.8	1.35	4.87	16.3	3	111.4	1.39	1.39	0.00	0.85	26.6	22.6	2.11	0.00

Gregg In Situ, Inc.
Run No: 04-0305-0954-0126
CPT File: 022C0I.COR

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60	Su (tsf)	CRR
24.85	20.4	1.06	5.20	15.5	3	111.4	1.42	1.42	0.00	0.84	19.6	16.4	1.52	0.00
25.34	27.0	1.35	4.98	14.2	3	111.4	1.45	1.45	0.00	0.83	25.9	21.5	2.05	0.00
25.84	27.2	1.43	5.24	15.0	3	111.4	1.48	1.48	0.00	0.82	26.1	21.5	2.06	0.00
26.33	24.2	1.21	4.98	19.9	3	111.4	1.50	1.50	0.00	0.82	23.2	18.9	1.82	0.00
26.82	25.6	1.50	5.85	20.5	3	111.4	1.53	1.53	0.00	0.81	24.5	19.8	1.93	0.00
27.31	26.8	1.59	5.92	21.0	3	111.4	1.56	1.56	0.00	0.80	25.7	20.6	2.02	0.00
27.80	22.4	1.45	6.49	21.8	3	111.4	1.59	1.59	0.00	0.79	21.4	17.0	1.66	0.00
28.30	27.8	1.47	5.28	23.3	3	111.4	1.61	1.61	0.00	0.79	26.6	21.0	2.09	0.00
28.79	28.4	1.63	5.74	24.4	3	111.4	1.64	1.64	0.00	0.78	27.2	21.3	2.14	0.00
29.28	25.7	1.57	6.11	25.7	3	111.4	1.67	1.67	0.00	0.77	24.6	19.0	1.92	0.00

Gregg In Situ, Inc. Page: 1b
Interpretation Output - Release 1.00.19e
Run No: 04-0305-0954-0126
Job No: 04-022MA
Client: EARTH MECHANICS
Project: CPT SITE INVESTIGATION
Site: 87 & I980
Location: CPT-01
Engineer: J. CASTLE
CPT Date: 04/30/01
CPT Time: 12:57
CPT File: 022C01.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 12.19 (ft): 40.0
Su Nkt used: 12.50
Averaging Increment (m): 0.15
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(N1)60	(N1)60cs
0.25	5.0E-05	0.01	1000.0	2.04	47.7	UnDef	UnDef	0.0	50	87.9	10.0	-0.52	UnDef	UnDef
0.74	5.0E-02	0.00	1000.0	0.56	365.9	0.0	365.9	0.0	50	95.0	1.0	-0.34	0.0	73.2
1.23	5.0E-02	0.00	1000.0	0.59	428.4	0.0	428.4	0.0	50	95.0	1.0	-0.35	0.0	85.7
1.72	5.0E-02	0.00	1000.0	0.78	349.5	0.0	349.5	0.0	50	95.0	1.0	-0.38	0.0	69.9
2.21	5.0E-03	0.00	1000.0	1.37	327.5	UnDef	UnDef	0.0	50	95.0	1.0	-0.45	UnDef	UnDef
2.71	5.0E-05	0.00	584.7	3.16	183.6	UnDef	UnDef	0.0	50	91.4	10.0	-0.58	UnDef	UnDef
3.20	5.0E-06	0.00	389.0	3.65	143.3	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
3.61	5.0E-04	0.00	599.0	2.43	247.8	UnDef	UnDef	0.0	50	95.0	1.0	-0.50	UnDef	UnDef
4.02	5.0E-04	0.00	680.6	2.20	313.9	UnDef	UnDef	0.0	50	95.0	1.0	-0.49	UnDef	UnDef
4.51	5.0E-04	0.00	769.1	2.85	390.7	UnDef	UnDef	0.0	50	95.0	1.0	-0.58	UnDef	UnDef
5.00	5.0E-05	0.00	526.6	3.44	281.5	UnDef	UnDef	0.0	48	95.0	10.0	-0.60	UnDef	UnDef
5.50	5.0E-06	0.00	299.1	3.97	167.5	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
5.99	5.0E-05	0.00	263.1	2.94	153.7	UnDef	UnDef	0.0	46	79.6	10.0	-0.45	UnDef	UnDef
6.56	5.0E-04	0.00	424.1	2.83	258.9	UnDef	UnDef	0.0	48	94.5	1.0	-0.50	UnDef	UnDef

Gregg In Situ, Inc.
Run No: 04-0305-0954-0125
CPT File: 022C01.CCR

Page: 2b

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	QcIN	DeltaQcIN	QclNcs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
7.14	5.0E-04	0.00	540.3	2.19	343.7	UnDef	UnDef	0.0	50	95.0	1.0	-0.47	UnDef	UnDef
7.63	5.0E-03	0.00	505.4	1.98	332.5	UnDef	UnDef	0.0	48	95.0	1.0	-0.44	UnDef	UnDef
8.12	5.0E-04	0.00	340.8	2.42	231.7	UnDef	UnDef	0.0	48	91.4	1.0	-0.43	UnDef	UnDef
8.61	5.0E-04	0.00	288.5	2.41	202.2	UnDef	UnDef	0.0	46	87.5	1.0	-0.41	UnDef	UnDef
9.10	5.0E-04	0.00	269.0	2.78	193.7	UnDef	UnDef	0.0	46	86.2	1.0	-0.44	UnDef	UnDef
9.60	1.0E-15	0.00	123.8	5.33	92.1	UnDef	UnDef	0.0	42	64.9	1.0	-0.65	UnDef	UnDef
10.09	5.0E-08	0.00	80.8	5.31	61.9	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
10.58	5.0E-08	0.00	49.9	5.11	39.4	157.4	196.8	36.3	UnDef	UnDef	6.0	UnDef	38.5	77.0
11.07	5.0E-08	0.00	51.7	6.34	41.7	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
11.56	5.0E-08	0.00	52.1	5.89	42.8	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
12.06	5.0E-08	0.00	51.3	6.05	43.1	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
12.55	5.0E-08	0.00	45.0	6.98	38.6	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
13.04	5.0E-08	0.00	49.3	6.33	43.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
13.53	5.0E-07	0.00	65.2	4.79	57.6	141.1	198.7	31.6	UnDef	UnDef	10.0	UnDef	30.0	67.6
14.03	5.0E-08	0.00	53.2	6.46	48.0	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
14.52	5.0E-08	0.00	37.5	7.52	34.7	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
15.01	5.0E-08	0.00	40.9	6.59	38.3	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
15.50	5.0E-08	0.00	29.6	6.54	28.4	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
15.99	5.0E-08	0.00	24.5	5.50	24.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
16.49	5.0E-08	0.00	24.5	5.78	24.4	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
16.98	5.0E-08	0.00	32.0	4.92	32.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
17.47	5.0E-08	0.00	23.3	6.43	23.9	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
17.96	5.0E-08	0.00	22.3	5.59	23.2	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
18.45	5.0E-08	0.00	25.1	5.07	26.4	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
18.95	5.0E-08	0.01	22.8	5.01	24.3	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
19.44	5.0E-08	0.01	18.3	5.83	20.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
19.93	5.0E-08	0.01	24.7	5.09	26.9	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
20.42	5.0E-08	0.01	22.8	5.26	25.3	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
20.92	5.0E-08	0.02	21.0	5.05	23.6	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
21.41	5.0E-08	0.02	20.0	5.18	22.8	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
21.90	5.0E-08	0.02	18.3	5.33	21.2	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
22.39	5.0E-08	0.02	20.6	5.11	23.9	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
22.88	5.0E-08	0.02	19.1	5.55	22.5	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
23.38	5.0E-08	0.02	20.3	4.90	24.2	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
23.87	5.0E-08	0.02	23.2	4.75	27.7	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
24.36	5.0E-08	0.02	18.9	5.12	23.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef

Gregg In Situ, Inc.
Run No: 04-0305-0954-0126
CPT File: 022C01.COR

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	QclN	DeltaQclN	QclNcs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
24.85	5.0E-08	0.03	13.4	5.59	16.8	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
25.34	5.0E-08	0.02	17.7	5.26	22.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
25.84	5.0E-08	0.02	17.4	5.54	21.9	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
26.33	5.0E-08	0.03	15.1	5.30	19.3	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
26.82	5.0E-08	0.03	15.7	6.23	20.3	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
27.31	5.0E-08	0.03	16.2	6.29	21.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
27.80	5.0E-08	0.03	13.1	6.98	17.4	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
28.30	5.0E-08	0.03	16.2	5.60	21.4	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
28.79	5.0E-08	0.03	16.3	6.09	21.7	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
29.28	5.0E-08	0.03	14.4	6.53	19.4	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef

Gregg In Situ, Inc.
Interpretation Output - Release 1.00.19e
Run No: 04-0305-0954-0186
Job No: 04-022MA
Client: EARTH MECHANICS
Project: CPT SITE INVESTIGATION
Site: B7 & I860
Location: CPT-02
Engineer: J. CASTLE
CPT Date: 04/30/01
CPT Time: 14:31
CPT File: 022C02.CCR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 12.19 (ft): 40.0
Su Nkt used: 12.50
Averaging Increment (m): 0.15
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60	(N1)60 (blows/ft)	Su (tsf)	CRR
0.25	2.0	0.45	22.53	-0.6	2	111.4	0.01	0.01	0.00	2.00	1.9	3.8	0.16	0.00
0.74	238.6	4.03	1.69	0.0	8	120.9	0.04	0.04	0.00	2.00	57.1	114.2	UnDef	0.00
1.23	630.9	9.15	1.45	7.1	9	124.1	0.07	0.07	0.00	2.00	120.8	241.7	UnDef	0.00
1.72	549.2	5.88	1.07	11.4	9	124.1	0.10	0.10	0.00	2.00	105.2	210.4	UnDef	0.00
2.21	265.4	2.93	1.10	8.8	9	124.1	0.13	0.13	0.00	2.00	50.8	101.7	UnDef	0.00
2.71	67.2	2.86	4.25	-1.2	5	114.6	0.16	0.16	0.00	2.00	32.2	64.4	5.36	0.00
3.20	52.6	2.48	4.71	-3.3	4	114.6	0.19	0.19	0.00	2.00	33.6	67.2	4.19	0.00
3.61	94.4	3.28	3.48	-2.9	6	114.6	0.21	0.21	0.00	2.00	36.2	72.3	7.54	0.00
4.02	84.9	3.98	4.70	-2.8	11	130.5	0.24	0.24	0.00	2.00	81.2	162.4	UnDef	0.00
4.51	48.3	2.39	4.95	-2.2	3	111.4	0.27	0.27	0.00	1.93	46.3	89.1	3.84	0.00
5.00	50.3	1.74	3.46	-2.4	5	114.5	0.30	0.30	0.00	1.83	24.1	44.1	4.00	0.00
5.50	46.8	1.33	2.84	-2.2	6	114.6	0.33	0.33	0.00	1.75	17.9	31.4	3.71	0.23
5.99	36.8	1.73	4.70	-1.9	3	111.4	0.35	0.35	0.00	1.68	35.2	59.2	2.91	0.00
6.56	27.2	1.73	6.35	-1.8	3	111.4	0.39	0.39	0.00	1.61	26.1	42.0	2.15	0.00

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Gregg In Situ, Inc.
Run No: 04-0305-0954-0186
CPT File: 022C02.CCR

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
7.14	22.7	1.48	6.54	-1.8	3	111.4	0.42	0.42	0.00	1.55	21.7	33.6	1.78	0.00
7.63	23.8	1.69	7.10	-0.6	3	111.4	0.44	0.44	0.00	1.50	22.8	34.2	1.87	0.00
8.12	32.2	1.81	5.63	-0.1	3	111.4	0.47	0.47	0.00	1.46	30.9	44.9	2.54	0.00
8.61	23.6	1.64	6.93	0.1	3	111.4	0.50	0.50	0.00	1.41	22.6	32.0	1.85	0.00
9.10	23.0	1.59	6.92	0.3	3	111.4	0.53	0.53	0.00	1.38	22.0	30.3	1.80	0.00
9.60	22.3	1.45	6.50	1.7	3	111.4	0.55	0.55	0.00	1.34	21.4	28.7	1.74	0.00
10.09	22.5	1.37	6.07	2.1	3	111.4	0.58	0.58	0.00	1.31	21.6	28.3	1.75	0.00
10.58	17.4	1.22	7.00	2.6	3	111.4	0.61	0.61	0.00	1.28	16.7	21.4	1.34	0.00
11.07	20.3	1.27	6.26	3.0	3	111.4	0.64	0.64	0.00	1.25	19.4	24.3	1.57	0.00
11.56	21.0	1.23	5.86	4.2	3	111.4	0.66	0.66	0.00	1.23	20.1	24.6	1.62	0.00
12.06	18.4	1.08	5.86	5.6	3	111.4	0.69	0.69	0.00	1.20	17.6	21.1	1.41	0.00
12.55	19.3	1.16	6.00	6.3	3	111.4	0.72	0.72	0.00	1.18	18.5	21.8	1.49	0.00
13.04	27.5	1.44	5.26	6.3	3	111.4	0.75	0.75	0.00	1.16	26.3	30.4	2.14	0.00
13.53	25.1	1.39	5.53	5.9	3	111.4	0.77	0.77	0.00	1.14	24.1	27.4	1.95	0.00
14.03	34.2	1.65	4.84	6.0	3	111.4	0.80	0.80	0.00	1.12	32.7	36.6	2.67	0.00
14.52	27.5	1.65	6.02	6.2	3	111.4	0.83	0.83	0.00	1.10	26.3	28.9	2.13	0.00
15.01	19.7	1.16	5.88	5.7	3	111.4	0.86	0.86	0.00	1.08	18.8	20.4	1.50	0.00
15.50	20.1	0.99	4.93	6.7	3	111.4	0.88	0.88	0.00	1.06	19.3	20.5	1.54	0.00
15.99	13.6	0.72	5.30	7.2	3	111.4	0.91	0.91	0.00	1.05	13.0	13.7	1.02	0.00
16.49	18.2	0.66	3.65	8.2	4	114.6	0.94	0.94	0.00	1.03	11.6	12.0	1.38	0.15
16.98	16.8	0.80	4.75	8.3	3	111.4	0.97	0.97	0.00	1.02	16.1	16.3	1.27	0.00
17.47	18.0	1.00	5.52	8.7	3	111.4	0.99	0.99	0.00	1.00	17.3	17.3	1.36	0.00
17.96	23.2	1.16	4.99	9.7	3	111.4	1.02	1.02	0.00	0.99	22.2	22.0	1.77	0.00
18.45	18.8	1.01	5.36	11.0	3	111.4	1.05	1.05	0.00	0.98	18.0	17.6	1.42	0.00
18.95	16.1	0.86	5.32	11.4	3	111.4	1.08	1.08	0.00	0.96	15.4	14.8	1.20	0.00
19.44	16.7	0.89	5.31	11.4	3	111.4	1.10	1.10	0.00	0.95	16.0	15.3	1.25	0.00
19.93	21.1	1.11	5.26	12.7	3	111.4	1.13	1.13	0.00	0.94	20.2	19.0	1.60	0.00
20.42	20.0	1.02	5.10	14.4	3	111.4	1.16	1.16	0.00	0.93	19.1	17.8	1.51	0.00
20.92	19.3	1.22	6.32	14.5	3	111.4	1.19	1.19	0.00	0.92	18.5	17.0	1.45	0.00
21.41	22.2	1.34	6.04	14.7	3	111.4	1.21	1.21	0.00	0.91	21.3	19.3	1.68	0.00
21.90	21.0	1.43	6.80	16.4	3	111.4	1.24	1.24	0.00	0.90	20.1	18.0	1.58	0.00
22.39	21.4	1.24	5.81	19.4	3	111.4	1.27	1.27	0.00	0.89	20.5	18.2	1.61	0.00
22.88	27.1	1.37	5.05	20.7	3	111.4	1.30	1.30	0.00	0.88	25.9	22.8	2.06	0.00
23.38	26.5	1.56	5.90	20.3	3	111.4	1.32	1.32	0.00	0.87	25.4	22.1	2.02	0.00
23.87	28.7	1.60	5.58	20.9	3	111.4	1.35	1.35	0.00	0.86	27.5	23.6	2.19	0.00
24.36	23.6	1.33	5.65	21.1	3	111.4	1.38	1.38	0.00	0.85	22.6	19.2	1.78	0.00

Gregg In Situ, Inc.
Run No: 04-0305-0954-0186
CPT File: 022C02.COR

Page: 3a

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgLd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
24.85	26.2	1.32	5.05	21.6	3	111.4	1.41	1.41	0.00	0.84	25.1	21.2	1.98	0.00
25.34	29.2	1.70	5.83	24.8	3	111.4	1.43	1.43	0.00	0.84	27.9	23.4	2.22	0.00
25.84	21.7	1.47	6.79	24.4	3	111.4	1.46	1.46	0.00	0.83	20.8	17.2	1.62	0.00
26.33	26.1	1.48	5.68	24.6	3	111.4	1.49	1.49	0.00	0.82	25.0	20.5	1.97	0.00
26.82	19.1	1.32	6.93	24.5	3	111.4	1.51	1.51	0.00	0.81	18.3	14.9	1.41	0.00
27.31	29.9	1.60	5.36	25.0	3	111.4	1.54	1.54	0.00	0.81	28.6	23.1	2.27	0.00
27.80	25.0	1.62	6.49	24.0	3	111.4	1.57	1.57	0.00	0.80	23.9	19.1	1.87	0.00
28.30	25.2	1.57	6.23	24.8	3	111.4	1.60	1.60	0.00	0.79	24.1	19.1	1.89	0.00
28.79	28.0	1.83	6.54	23.8	3	111.4	1.62	1.62	0.00	0.78	26.8	21.0	2.11	0.00
29.28	24.2	1.61	6.66	23.0	3	111.4	1.65	1.65	0.00	0.78	23.2	18.1	1.81	0.00
29.77	41.5	1.27	3.06	25.7	5	114.6	1.68	1.68	0.00	0.77	19.8	15.3	3.18	0.44

Gregg In Situ, Inc.
Interpretation Output - Release 1.00.19e

Run No: 04-0305-0954-0186
Job No: 04-022MA
Client: EARTH MECHANICS
Project: CPT SITE INVESTIGATION
Site: 87 & I880
Location: CPT-02
Engineer: J. CASTLE
CPT Date: 04/30/01
CPT Time: 14:31
CPT File: 022C02.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 12.19 (ft): 40.0
Su Nkt used: 12.50
Averaging Increment (m): 0.15
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(N1)60	(N1)60cs
0.25	1.0E-15	-0.01	145.1	10.00	3.8	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
0.74	5.0E-03	0.00	1000.0	1.69	457.0	UnDef	UnDef	0.0	50	95.0	1.0	-0.48	UnDef	UnDef
1.23	5.0E-02	0.00	1000.0	1.45	1208.4	UnDef	UnDef	0.0	50	95.0	1.0	-0.46	UnDef	UnDef
1.72	5.0E-02	0.00	1000.0	1.07	1051.8	0.0	1051.8	0.8	50	95.0	1.0	-0.41	0.0	210.4
2.21	5.0E-02	0.00	1000.0	1.10	508.4	0.0	508.4	0.9	50	95.0	1.0	-0.42	0.0	101.7
2.71	5.0E-06	0.00	411.6	4.26	128.7	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
3.20	5.0E-07	0.00	274.3	4.72	100.8	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
3.61	5.0E-05	0.00	438.9	3.49	180.8	UnDef	UnDef	0.0	48	87.1	10.0	-0.58	UnDef	UnDef
4.02	1.0E-15	0.00	352.2	4.71	162.4	UnDef	UnDef	0.0	48	82.4	1.0	-0.73	UnDef	UnDef
4.51	5.0E-08	0.00	176.0	4.97	91.0	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
5.00	5.0E-06	0.00	168.0	3.48	90.2	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
5.50	5.0E-05	0.00	142.5	2.86	80.2	36.7	116.9	15.8	44	60.9	10.0	-0.37	7.7	39.1
5.99	5.0E-08	0.00	103.0	4.74	60.5	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
6.56	5.0E-08	0.00	69.6	6.44	42.9	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	QclN	DeltaQclN	QclNcs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(nl)60	(Nl)60cs
7.14	5.0E-08	0.00	53.3	6.66	34.4	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
7.63	5.0E-08	0.00	52.5	7.23	35.0	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
8.12	5.0E-08	0.00	67.2	5.71	45.9	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
8.61	5.0E-08	0.00	46.3	7.08	32.7	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
9.10	5.0E-08	0.00	42.6	7.08	31.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
9.60	5.0E-08	0.00	39.2	6.66	29.3	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
10.09	5.0E-08	0.00	37.7	6.23	28.9	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
10.58	5.0E-08	0.00	27.6	7.26	21.8	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
11.07	5.0E-08	0.00	30.9	6.46	24.9	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
11.56	5.0E-08	0.01	30.6	6.05	25.2	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
12.06	5.0E-08	0.01	25.5	6.09	21.6	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
12.55	5.0E-08	0.01	25.9	6.23	22.3	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
13.04	5.0E-08	0.01	35.8	5.40	31.1	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
13.53	5.0E-08	0.01	31.5	5.71	28.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
14.03	5.0E-08	0.01	41.7	4.96	37.4	149.5	186.8	38.5	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
14.52	5.0E-08	0.01	32.2	6.21	29.5	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	36.6	73.1
15.01	5.0E-08	0.01	22.0	6.15	20.8	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
15.50	5.0E-08	0.01	21.8	5.16	20.9	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
15.99	5.0E-08	0.02	13.9	5.68	14.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
16.49	5.0E-07	0.01	18.4	3.84	18.4	73.7	92.1	48.9	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
16.98	5.0E-08	0.02	16.4	5.05	16.7	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	12.0	24.0
17.47	5.0E-08	0.02	17.1	5.84	17.7	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
17.96	5.0E-08	0.01	21.7	5.22	22.4	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
18.45	5.0E-08	0.02	17.0	5.67	18.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
18.95	5.0E-08	0.02	13.9	5.71	15.2	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
19.44	5.0E-08	0.02	14.2	5.69	15.6	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
19.93	5.0E-08	0.02	17.7	5.56	19.4	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
20.42	5.0E-08	0.02	16.2	5.42	18.2	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
20.92	5.0E-08	0.03	15.3	6.73	17.3	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
21.41	5.0E-08	0.02	17.3	6.39	19.7	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
21.90	5.0E-08	0.03	15.9	7.23	18.4	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
22.39	5.0E-08	0.03	15.9	6.17	18.6	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
22.88	5.0E-08	0.03	19.9	5.30	23.3	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
23.38	5.0E-08	0.03	19.0	6.21	22.6	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
23.87	5.0E-08	0.02	20.2	5.86	24.1	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
24.36	5.0E-08	0.03	16.1	6.00	19.7	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef

05/05/2004 11:38 0105050954 EARTH MECH PAGE 19

Gregg In Situ, Inc.
Run No: 04-0305-0954-0186
CPT File: 022C02.COR

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	QclN	DeltaQclN	QclNcs	Fc (%)	Phi (Deg)	Dr (%)	CCR	State Param	Del(nl)60	(N1)60cs
24.85	5.0E-08	0.03	17.6	5.34	21.6	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
25.34	5.0E-08	0.03	19.4	6.13	23.9	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
25.84	5.0E-08	0.04	13.9	7.28	17.6	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
26.33	5.0E-08	0.03	16.5	6.02	20.9	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
26.82	5.0E-08	0.04	11.6	7.53	15.2	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
27.31	5.0E-08	0.03	18.4	5.65	23.6	UnDef	UnDef	100.0	UnDef	UnDef	3.0	UnDef	UnDef	UnDef
27.80	5.0E-08	0.03	14.9	6.93	19.5	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
28.30	5.0E-08	0.03	14.8	6.65	19.5	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
28.79	5.0E-08	0.03	16.2	6.95	21.5	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
29.28	5.0E-08	0.03	13.7	7.15	18.5	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
29.77	5.0E-06	0.02	23.7	3.19	31.3	125.2	156.5	41.2	UnDef	UnDef	6.0	UnDef	15.3	30.6

Caltrans Bridge 57-1078D
Gonzalez Creek Rd UC, San Diego

And

Caltrans Bridge 57-1077L
Carmel Valley Rd UC, San Diego

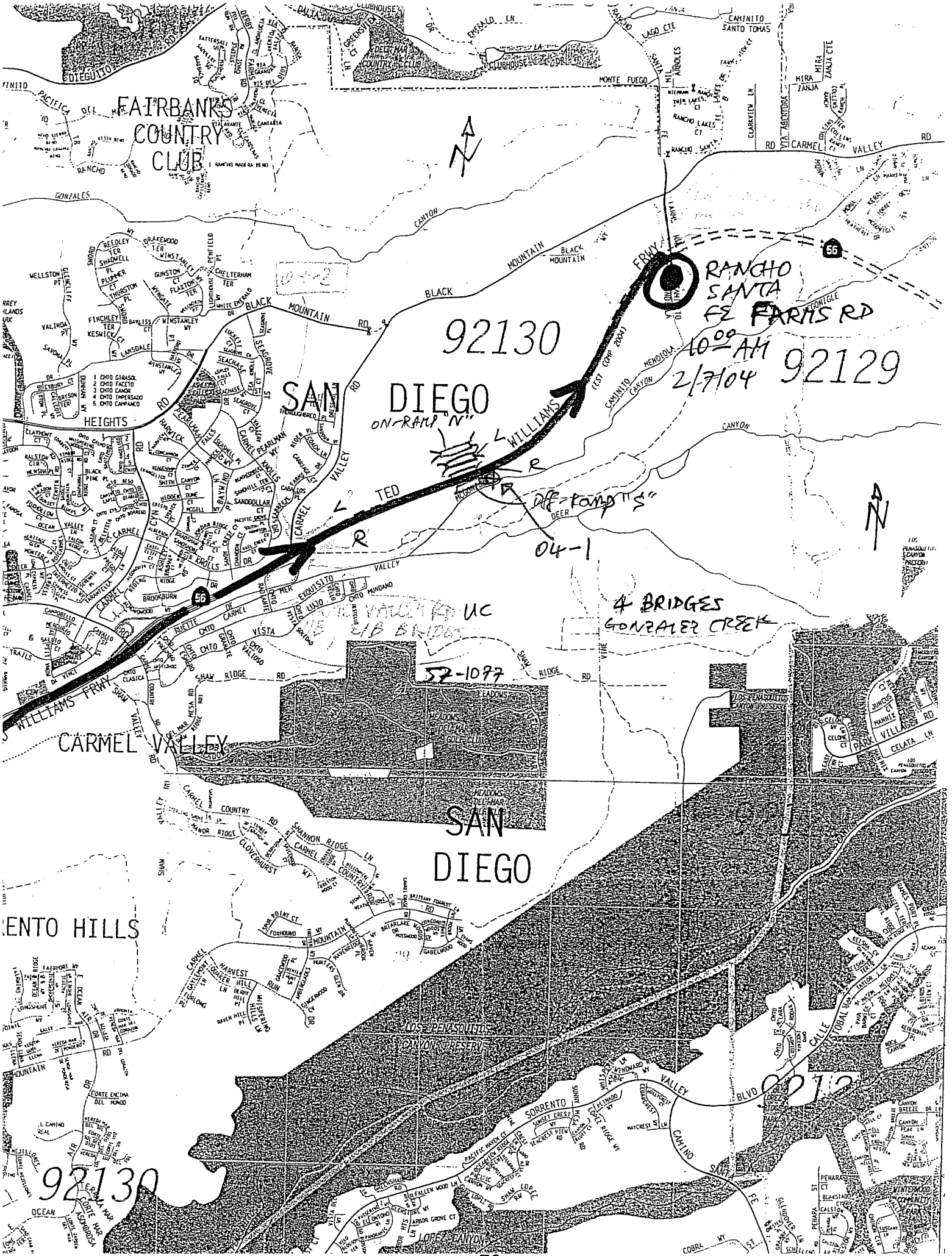
Caltrans Bridge 57-1078D, Gonzalez Creek Rd UC, San Diego

This Route 56 bridge is located in the Carmel Valley area of San Diego where SR56 is being built. This bridge is one of four parallel bridges in construction. The site is located 1-2 miles southwesterly from Rancho Santa Fe Springs Rd bridge over SR57. The field investigation was conducted on 2/7/04 and consisted of (1) 25.5-ft deep soil boring performed by 2R Drilling, and (1) 17.4-ft deep seismic CPT sounding performed by HFA. Boring 04-1 and CPT 04-1C were located at the north bridge abutment, adjacent to the newly cast concrete approach slab. Geotechnical soil sampling consisted of 11 ring and bag samples collected at dense (2.5-ft) intervals using a Modified California and SPT samplers, and one bulk sample was collected. Seven seismic wave measurements were taken at <3-ft intervals. Groundwater was not encountered.

ELECTRONIC CONE PENETROMETER
AND
IN SITU TESTING SYSTEM

Caltrans Bridge 57-1077L, Carmel Valley Rd UC, San Diego

This bridge is located in the same Carmel Valley area of San Diego where the SR56 is being built. The bridge is one of two parallel bridges in construction. This site is located about 2,500 ft westerly of Gonzalez Creek bridge. The field investigation for this bridge was conducted on 2/7/04, consisting of (1) 22.8-ft deep soil boring and (1) 25-ft conventional and seismic CPT sounding. Drilling was performed by 2R Drilling and CPT was performed by HFA. Boring 04-2 and CPT 04-2C were located at the south bridge abutment, between the two newly cast wingwalls. Geotechnical soil sampling consisted of 9 ring and bag samples collected at 2.5-ft intervals using a Modified California and SPT samplers, and one bulk sample was collected. 10 seismic wave measurements were taken at 2.5-ft intervals. Groundwater was not encountered during the investigation.


FAIRBANKS COUNTRY CLUB
92130
SAN DIEGO
RANCHO SANTA FE FARMS RD
10:00 AM
2/7/04
92129
ON-RAMP "N"
Off-Ramp "S"
04-1
4 BRIDGES
GONZALEZ CREEK
UC
57-1077
CARMEL VALLEY
SAN DIEGO
RENTO HILLS
92130
LOS PENASQUITOS CANYON PRESERVE
BLACK MOUNTAIN RD
CARMEL VALLEY RD
WILLIAMS FRWY
TED WILLIAMS
SHAW RIDGE RD
SORRENTO VALLEY BLVD
CAMINO SANTA FE
LOPEZ CANYON

57-1078S Gonzalez Creek Rd 04-1

ALL EAST ABUT

57-1078S Gonzalez Creek Rd 04-1

TO: ANDOSH 714 751 3928
FROM: M. LIMON Mike

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	56	2.9/10.6	664	856

REGISTERED CIVIL ENGINEER 11-9-01

4-1-02
PLANS APPROVAL DATE

Mark DeSalvatory No. 39499 Exp. 12-31-01 CIVIL STATE OF CALIFORNIA REGISTERED PROFESSIONAL ENGINEER

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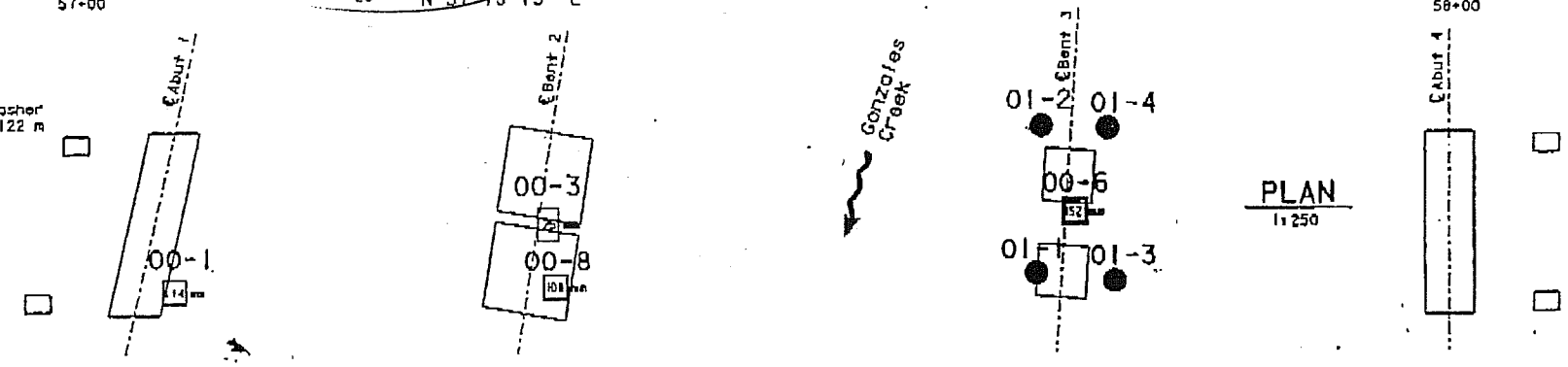
Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov

BENCH MARK

BM MP 59 L Elev. 69.485 m

1 in. Iron Pipe With Nail & Washer
N 587,563.961 m, E 1,911,638.122 m
Vertical Datum NAVD 1988
Horizontal Datum NAD 83

"A" Line
N 57° 18' 15" E
57+00 +20 +40 +60 +80 58+00



PLAN
1:250

21.8 m Rt. Sta. 57+06.6 C/L "A" Line

00-1

50.85 m

CLAYEY SAND (SC), medium dense, brown, dry to moist, with thin lenses of SILTY SAND (SM), trace fine to coarse GRAVEL (5%).

SANDSTONE, poorly indurated, slightly weathered, comprised of a SILTY SAND (SM), very dense to dense, light yellowish brown and yellowish brown, moist, fine grained SAND.

SANDSTONE, poorly indurated, slightly to moderately weathered, comprised of a SILTY SAND (SM) with GRAVEL (20%), dense, light yellowish brown to yellowish brown, moist, fine grained SAND, fine to coarse GRAVEL.

SANDSTONE, poorly indurated, slightly to moderately weathered, comprised of a SILTY SAND (SM), dense to very dense, light yellowish brown and yellowish brown, moist, with thin 25 mm thick lenses of SILT (ML), fine grained SAND.

SANDSTONE, poorly indurated, slightly weathered, comprised of a SILTY SAND (SM), very dense, light yellowish brown, moist, fine to medium grained SAND.

SANDSTONE, poorly indurated, slightly weathered, comprised of a well graded SAND (SW), very dense, light yellowish brown and yellowish brown, moist, fine to medium SAND with scattered coarse SAND.

SANDSTONE, poorly indurated, slightly weathered, comprised of a SILTY SAND (SW), very dense, yellowish brown to light yellowish brown, moist, fine grained SAND, interbeds of SILT (ML), from elev. 42.77 m to elev. 41.46 m and elev. 41.28 m to elev. 40.79 m.

SANDSTONE, poorly indurated, comprised of a SILTY SAND (SW), very dense, grey to dark grey, moist, fine grained SAND with localized intensely weathered, moderately soft rock zones from elev. 36.95m to elev. 36.06 m and elev. 33.78 m to elev. 32.80 m.

100 mm thick hard rock zone

215 mm thick hard rock zone

SANDSTONE, poorly indurated, comprised of a SILTY SAND (SW), with GRAVEL, very dense, gray, moist, fine to coarse GRAVEL, fine grained SAND.

SANDSTONE CONGLOMERATE, yellowish brown and gray, moderately weathered, moderately soft, fine grained SAND matrix, SANDY SILT clast up to 150 mm in size.

SANDSTONE, gray, poorly indurated, comprised of a SILTY SAND (SW), very dense, moist, medium to high dry strength, fine grained SAND.

8-8-00

17.25 m Rt. Sta. 57+34.0 C/L "A" Line

00-3

45.54 m

25 mm SILTY SAND (SM), light yellowish brown, dry, fine grained.

Driving rate in seconds per 300 mm (using a wacker powered engine jack-hammer).

300 for 31 mm

8-10-00

Notes:

1. No attempt was made to measure ground water in Borings 00-1, 00-3, 00-8, 01-1, 01-2, 01-3 and 01-4 during 2000/2001 field investigation.
2. Groundwater level indicated in the Log of Test Borings (LOBT) sheets reflect the measured groundwater level measurement in the borehole on the specified date. Ground water surface elevations are subject to seasonal fluctuations and will be encountered at higher or lower elevations depending on conditions at time of construction.
3. The descriptions and classifications of rock and/or soil, including consistency and relative density descriptors, used by the field and/or office personnel for the exploration boreholes shown on this sheet are based on the "Soil and Rock Logging Classification Manual (Field Guide), "Engineering Service Center, Office of Structural Foundations, August 1996.
4. Soil colors were determined by using Munsel Soil Color Charts (1994, Revised Edition), Rock colors were determined using USGS rock color charts (1995, revised text).
5. Test borings 00-1, 00-6, 01-8, were advanced using a combination of tungsten carbide drill bits and wireline diamond coring methods.
6. Test borings 00-1, 00-6, 00-8 utilized a Diedrich automatic hammer to advance the sampler. Penetration index values shown on the LOTB sheets are the actual blow counts recorded in the field.
7. Soil consistency classification for test borings 00-1, 00-6, 00-8 are based on a conversion factor of 1.5 times the actual blow count recorded in the field.
8. E- Blow count for 0.3 m penetration extrapolated from blow count for less than 0.3 m penetration (due to change in material or hard driving).
9. Penetration index value designated "Ref" means sampler refusal.
10. Refusal in earth material is defined as severely limited or halted penetration (less than 60 mm penetration in 50 blow counts) of the Standard Penetration Test (SPT) sampler due to the presence of GRAVEL, COBBLES, BOULDERS or ROCK FORMATION materials.
11. The Boring 00-3 information was obtained using a wacker gas powered engine jack-hammer to drive 25 mm steel rods into the earth materials. Soil samples utilized a 25 mm hollow tip and advanced using a 12.7 kg hand hammer with a 300 mm drop.

50 m
47 m
44 m
41 m
38 m
35 m
32 m
29 m
26 m
23 m

57+00 57+50

PROFILE
HOR. 1:100
VER. 1:100

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	FIELD INVESTIGATION BY:
DRAWN BY F. Nguyen 8/01		H. Valencia
CHECKED BY E. Neupert 10/4/01		

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN 12

BRIDGE NO. 57-1078R
KILOMETER POST 4.76

GONZALES CREEK BRIDGE
LOG OF TEST BORINGS 1 OF 5

CU 11
EA 172821

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

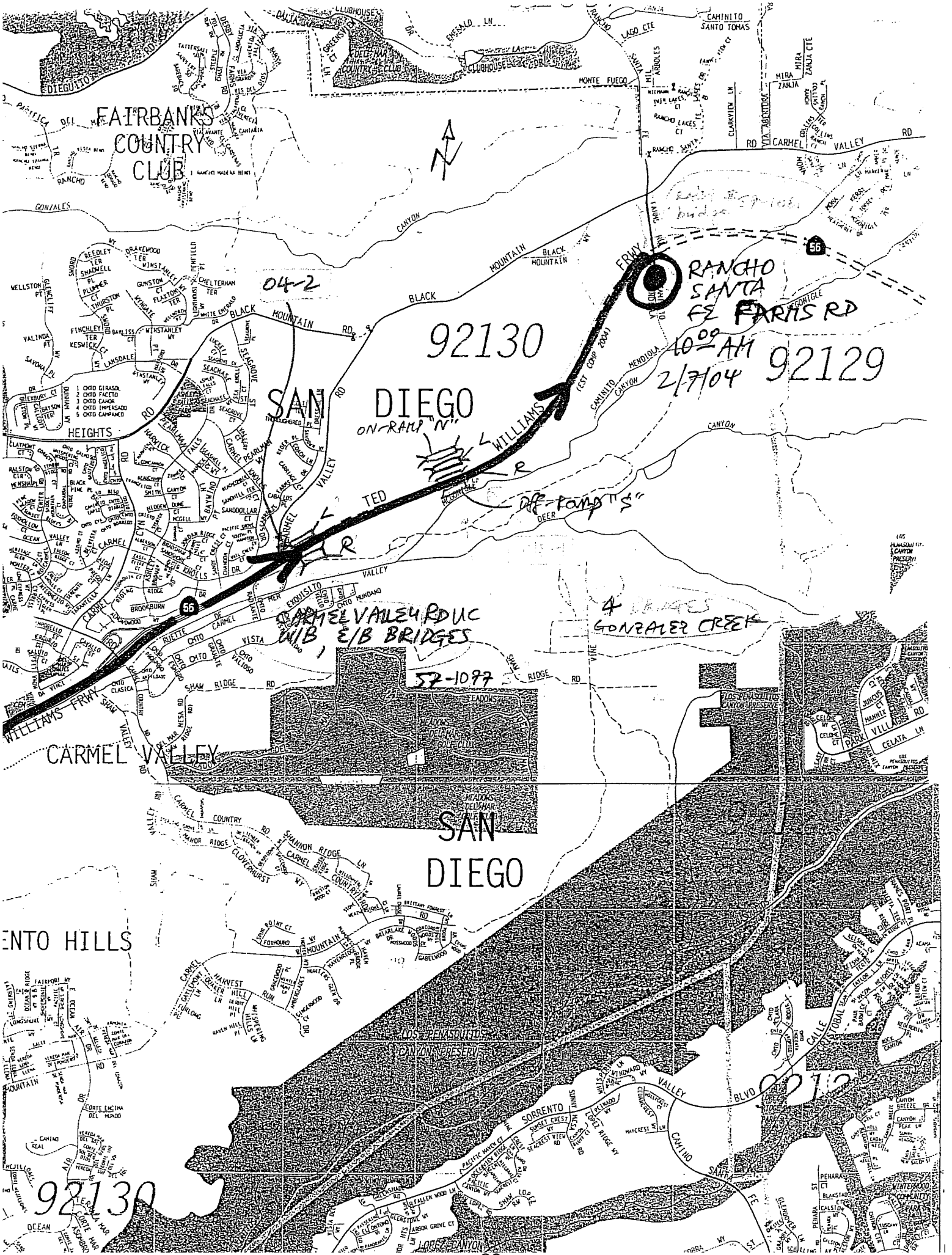
SHEET 25 OF 29

FILE => 57-1078r1-1-ltb05.dgn

USERNAME => RDG425 DATE PLOTTED => 30-JAN-2002 TIME PLOTTED => 11:01

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

79


FAIRBANKS COUNTRY CLUB
DEL MAR COUNTRY CLUB
CLUBHOUSE
CAMINITO SANTO TOMAS
MONTE FUEGO
CARMEL VALLEY RD
BLACK MOUNTAIN RD
BLACK MOUNTAIN
GONZALES CANYON
04-2
92130
92129
RANCHO SANTA FE FARMS RD
10:00 AM
2/7/04
SAN DIEGO
ON-RAMP "N"
Off-Ramp "S"
WILLIAMS FRWY
TED WILLIAMS
CARMEL VALLEY RD UC W/B, E/B BRIDGES
4 GONZALEZ CREEK
57-1077
CARMEL VALLEY
SAN DIEGO
ENTO HILLS
LOS PENASQUITOS CANYON PRESERVE
SORRENTO VALLEY BLVD
92130

DIST	COUNTY	ROUTE	K/LOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	56	2.9/10.6	637	856

11-7-01
REGISTERED CIVIL ENGINEER

4-1-02
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Mark DeSalvatore — No. 39499 — Exp. 12-31-01 — CIVIL — STATE OF CALIFORNIA

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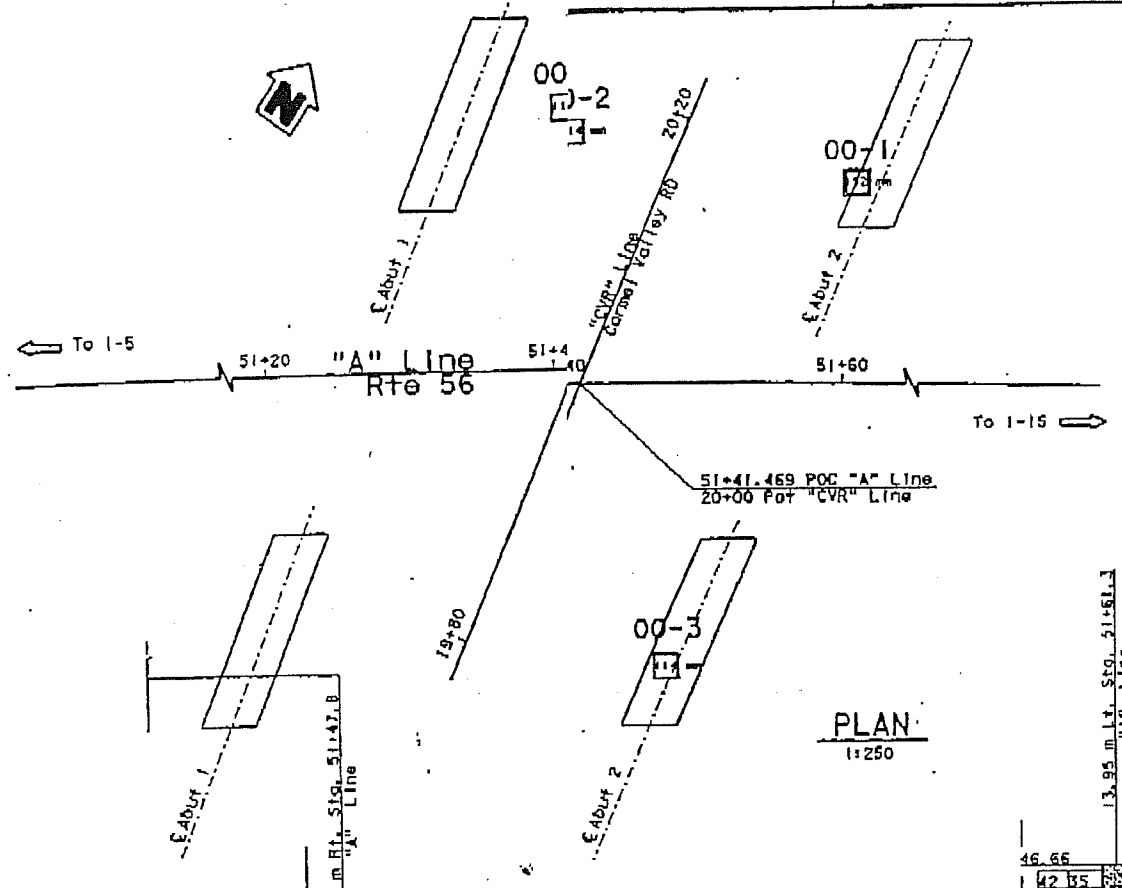
BENCH MARK

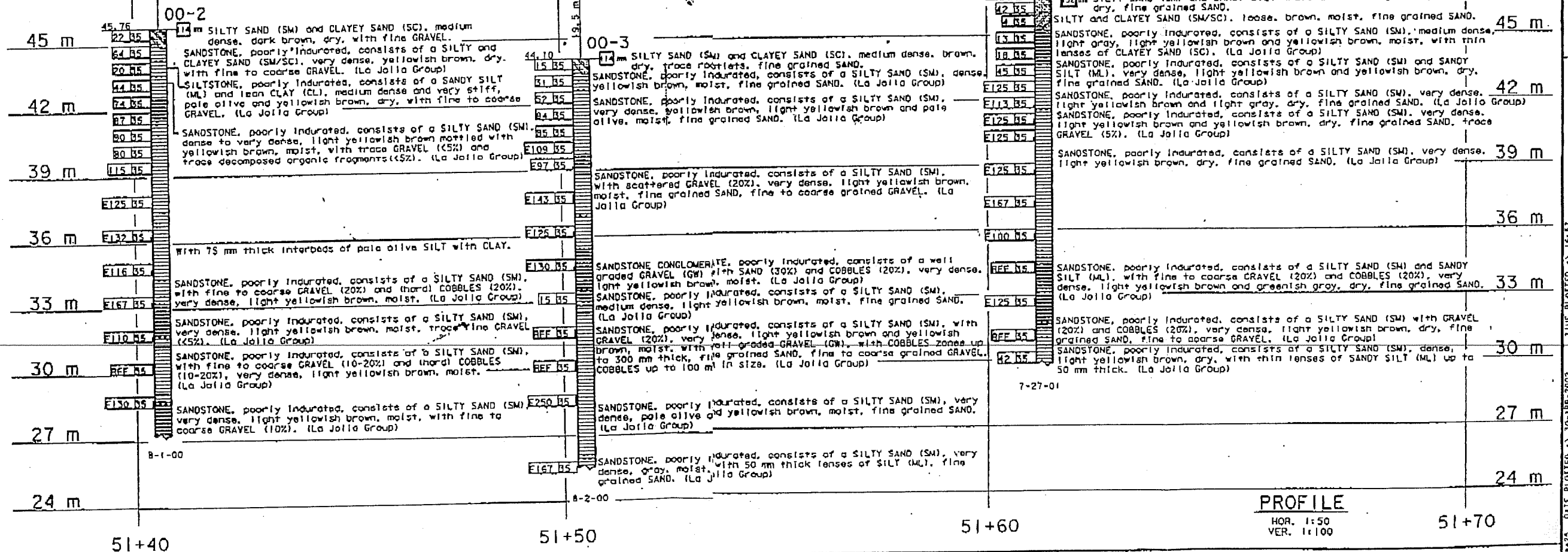
BM WP52L Elev. 63.54 m

1 in. Iron Pipe w/ Nail & Washer
N587270.976 m, E1910973.547 m
Vertical Datum: NAVD 1988
Horizontal Datum: NAD 83



Notes:

1. No attempt was made to measure ground water in Borings 00-2 and 00-3 during the field investigation.
2. Ground water was not encountered in Boring 00-1 during the field investigation.
3. The descriptions and classifications of rock and/or soil, including consistency and relative density descriptors, used by the field and/or office personnel for the exploration boreholes shown on this sheet are based on the "Soil and Rock Logging Classification Manual (Field Guide)," Engineering Service Center, Office of Structural Foundations, August 1996.
4. Soil colors were determined by using Munsel Soil Color Charts (1994, Revised Edition). Rock colors were determined using USGS rock color charts (1995, revised text).
5. All test borings utilized a Diedrich automatic hammer to advance the sampler. Penetration index values shown on the LOTB sheets are the actual blow counts recorded in the field.
6. Soil consistency classification for all test borings are based on a conversion factor of 1.5 times the uncorrected blow count.
7. E= Blow count for 0.3 m penetration extrapolated from blow count for less than 0.3 m penetration (due to change in material or hard driving).
8. Penetration index value designated "Ref" means sampler refusal.
9. Refusal in earth material is defined as severly limited or halted penetration (less than 60 mm penetration in 50 blow counts) of the Standard Penetration Test (SPT) sampler due to the presence of COBBLES, BOULDERS or ROCK formation materials.



PROFILE
HOR. 1:50
VER. 1:100

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
DRAWN BY W. Tang 8/01	FIELD INVESTIGATION BY: H. Valencia
CHECKED BY N. Sandoval 10/01	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES
STRUCTURE DESIGN 12

CU 11
EA 172821

BRIDGE NO. 57-1077 R/L
KILOMETER POST 4.1

CARMEL VALLEY ROAD UNDERCROSSING
LOG OF TEST BORINGS 1 OF 3

BENCHMARK SHEET'S REGARDING EARLIER REVISION DATES —
REVISION DATES (PRELIMINARY STAGE ONLY)
SHEET 19 OF 21

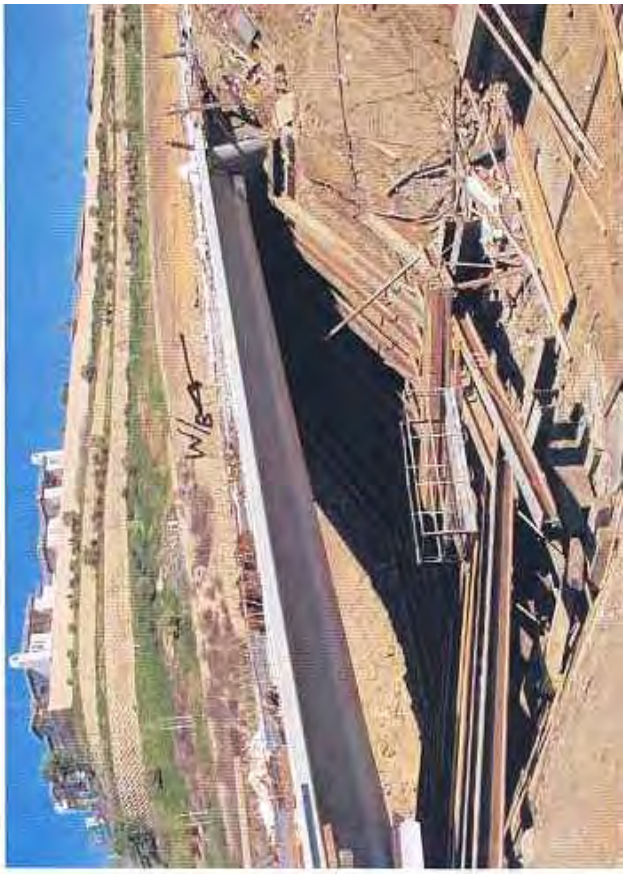
FILE => 57-1077r1-1-lt001.dgn

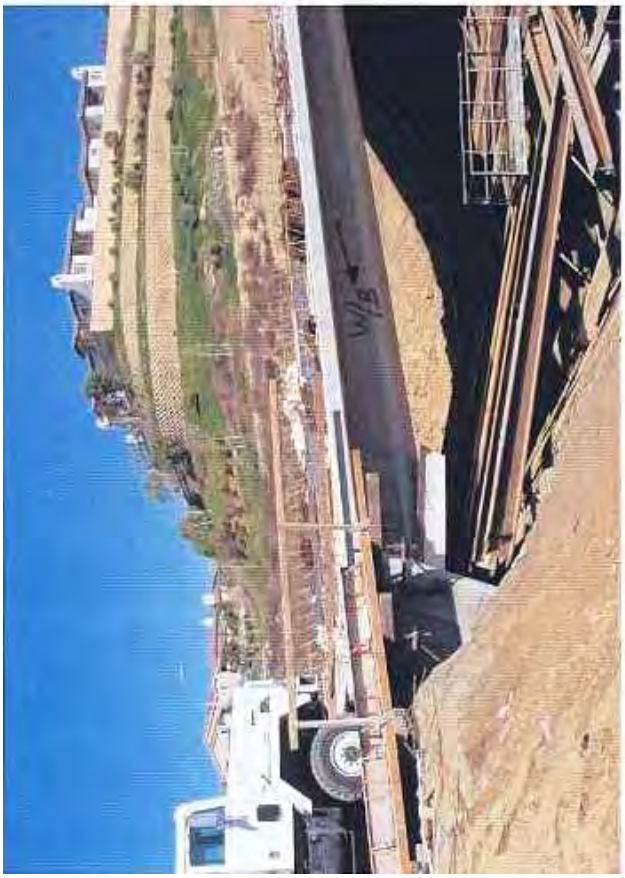
ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS

ETRIC) REV. 3/13/01

TIME PLOTTED => 16:57
DATE PLOTTED => 30-APR-2002
USERNAME => bgbeck

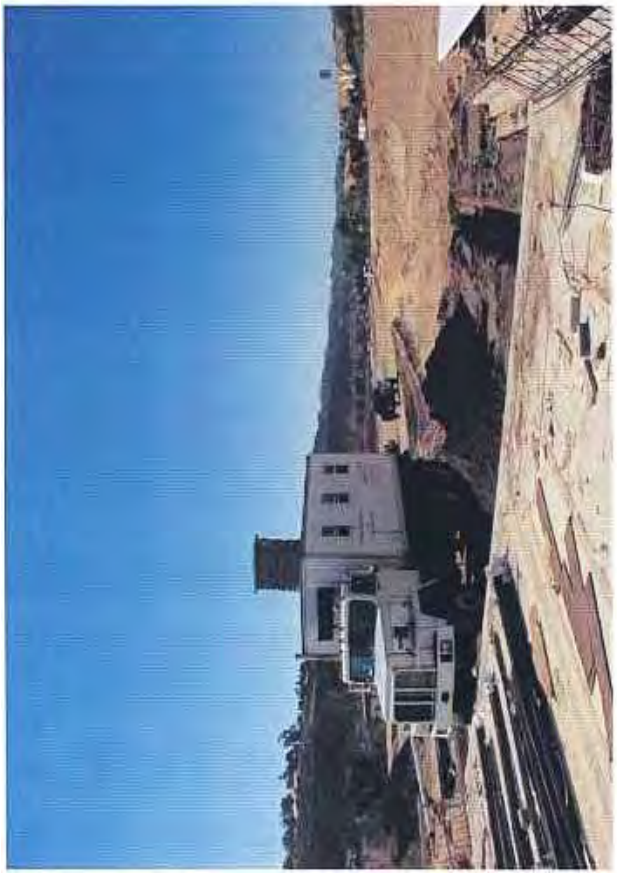
** TOTAL PAGE.04 **



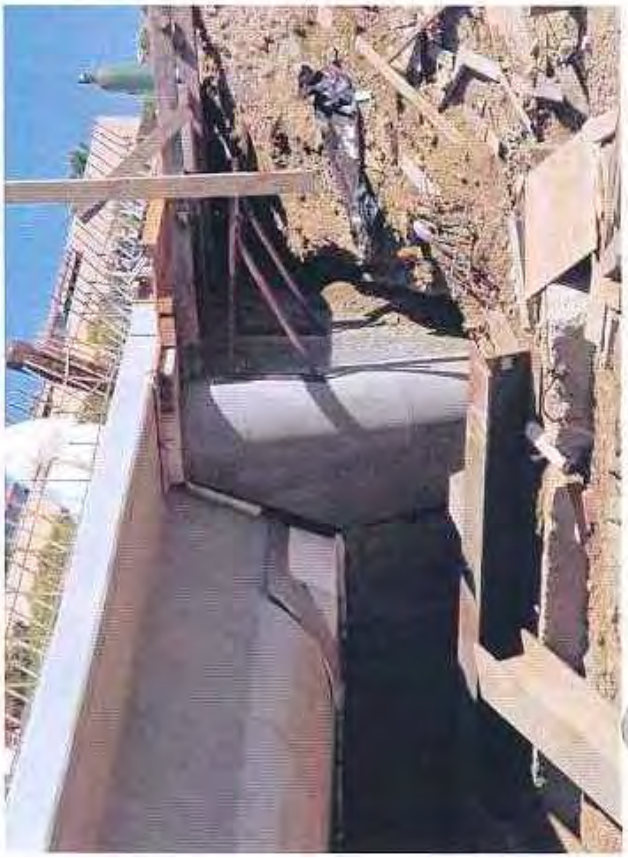


57-1077L Carmen Valley Rd UC 04-2

57-1077L Carmen Valley Rd UC 04-2



57-1077L Carmen Valley Rd UC 04-2



57-1077L Carmen Valley Rd UC 04-2

1 - 2

EASTERN HOLE

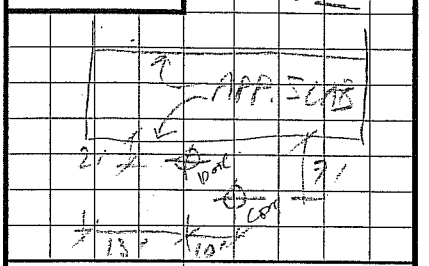
LOG OF BORING NO. (04-1)

N. SR 56

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project Name	: CT / UCSD - Abutment Research @ Rancho Santa Fe Farm		
Project Location	: San Diego, CA		
E.M.I. Project No.	: 02-165	Site Condition :	New Road Fill
Weather	: WARM, SUNNY	Elevation :	
Traffic Control	: None	Operator :	NICK
Drilling Company	: 2R DRILLING	Operator :	
Type of Rig	: CME 55 AUTO HAMMER	Drop (in) :	30.0
Borehole Diameter (inch)	: 8"	Drive Wt. (lbs) :	140.0
Logged By	: Bruce Schell	Date Drilled :	2- 7 -04

Comments :



Backfilled With : Cuttings + Cement

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Rework	Lunch	Rework	Break	Finish	Off		35.0
Driller												Water Table
Traffic Control												ft
Logger												Caving
Total												ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O^2/LEL/PID
0	B	0								: :					
2½	D	1		18/25/40	12	Typical clay/sand/gravel	SILTY SAND: Yell Brn with white & Red Brn Streaks, moist, dense (FILL), trace of fractured hard rocks (Friable)								
5	D	2		20/20/50	12 or 5"		Same w/ SILTSTONE fragments; multicolored Brns, yell-Brn, Red Brn, Blk, moist, dense to hard but friable								
	S	3		10/16/17	18		SANDY SILT: Multicolored, moist, v. dense, all is friable								
9½	D	4		8/16/22	12		SILTY CLAY & SANDY SILT with frags of Siltstone, multicolored, moist, dense/Stiff (FILL)								
10	D	5		13/38/40	12		SILT w/ Sand/Gravel; multicolored, moist, v. dense/Stiff; looks like decomposed siltstone frags in Silt/Sandy Silt Matrix (FILL)								
13	S	6		10/12/17	18	More Uniform FILL	Same in upper 3" Then SILTSTONE; Gray with yell Brn Spots, moist, v. Stiff friable; looks like Bedrock within fill (Probably a large block of bedrock (soft) in fill								
15	D	7		12/18/30	12		SILTY SAND/SANDY SILT, Multicolored, moist, v. dense, friable, Nearly Horiz layering but crude with scattered decomposed rock frags. (FILL)								
17½	D	8		50 for 3"	NSR										
	S	9		12/22/22	18	7" Rec	SANDY SILT w/ Hard Gray Rocks; Multicolored Brns & Grays, moist, v. dense, (Fill)								
20							Approx. Contact								
							NATIVE SOIL DEVELOPED ON SILTY/SANDY BEDROCK								
	D	10		18/19/23	12	Soil	SILTY SAND & SILTY CLAY; DK Brn with yell Brn & Reddish-Brn Spots & Streaks, Sl. Moist to dry, hard/V. Stiff plant & root matter and Tiny (<1mm) vesicles (root holes) this is an argillic soil horizon.								
25	S	11		8/25/33	18	ROCK	Same in upper 4" - sharp contact with well-developed Ang. blocky soil structure SANDY SILTSTONE & SILTSTONE: v. pale Brn to h. Gray with few yell-Brn / Red-Brn Spots & Streaks; Sl. Moist to dry, hard soil (Soft Rock) friable. Sand is fine grained								

LOG OF BORING NO. (04-2)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Carmel Valley Rd W/B

Project Name	: CT / UCSD - Abutment Research @ Rancho Santa Fe Farm		
Project Location	: San Diego, CA		
E.M.I. Project No.	: 02-165	Site Condition :	New Road Fill
Weather	: Warm Sunny	Elevation :	
Traffic Control	: None	Operator :	NICK
Drilling Company	: 2R DRILLING	Operator :	
Type of Rig	: CME 55 AUTO HAMMER	Drop (in) :	30.0
Borehole Diameter (inch)	: 8"	Drive Wt. (lbs) :	140.0
Logged By	: Bruce Schell	Date Drilled :	2- 7 -04

Comments : PP= Pocket Penetrom
8ft - W of Concrete Deck
9ft N of Southern edge
Deck - W. Bound Lanes

Backfilled With : Cuttings + Cement

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Rework	Lunch	Rework	Break	Finish	Off		35.0
Driller												Water Table
Traffic Control												None ft
Logger												Caving
Total												ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Color	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%)	Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O^2/LEL/PID
							Description (ASTM D-2488-93)									
							CPT 15½ ft from approach deck									
0	B	B					CLAYEY SAND w/GRAVEL (FILL): DK. Grayish Brown, dry to moist, v. dense									
	D	1		21/34/27	12		CLAYEY SAND w/ GRAVEL (FILL): DK Gry-Brn, Moist, V dense/V stiff (PP > 4.5 TSF) with black angular frags and round hard asph. pcs. to 1½" size; plant frags, earthy smell.									
5	D	2		15/23/40	12		Same but lighter DK. brown color (TSF > 4.5) still with black pcs. of asph. micaceous									
	S	3		12/4/16	18		Same, some of rocks are well-rounded & polished (Quartzite) & some angular. Some color variations from Brn to V. dk Brn									
	D	4		13/19/28	12		Same CLAYEY SAND w/ GRAVEL, DK Brn, Moist, v dense/v. stiff. 20-30% small asph. pcs.; many are black									
10																
12½	D	5		6/7/7	12		Same but less cohesive; otherwise same color & mixture at rock frags. Pea size to 1½" (FILL)									
	S	6		3/3/3	7"		Same - tip blocked by 2" Rock frag (FILL)									
15																
							GRAVELLY CLAY: DK Brn, V. moist, soft in cuttings & waste barrel									
	D	7		18/27/50 for 3"	12		GRAVELLY CLAY: DK Brn, Sl. moist, heavy/stiff, with plant material (Soil)									
							Bottom Ring & tip is SILTY SANDSTONE; H. yell Brn, Sl. moist, v. dense, friable with near-horizontal banding (Bedding) (Bedrock)									
20	S	8		17/27/40	18		Same H yell Brn - H gray SILTY SANDSTONE; Sl. Moist, v. dense, - hard (Soft - friable rock). Trace coarse grains									
	D	9		50 for 3"			Same SILTY SANDSTONE H. gray with yell brown spots, streaks, & near horiz. laminations									
25																
							Terminated drilling @ 22'9"									

HOLGUIN, FAHAN & ASSOCIATES, INC.
ENVIRONMENTAL MANAGEMENT CONSULTANTS
948 North Lemon Street, Orange, CA 92867 (714)-210-5971 FAX (714) 210-5975

February 18, 2004

Mr. Mike Kapuskar
Earth Mechanics, Inc.
17660 Newhope St, Suite E
Fountain Valley, CA 92708

PROJECT NAME: CPT Testing at UCSD Abut Research;
PROJECT NO.: TBD

Dear Mr. Kapuskar:

Enclosed please find copies of the cone penetrometer testing (CPT) data for the above referenced project along with a copy of the corresponding invoice.

The cone penetrometer testing conducted for this project consisted of pushing an instrumented cone-tipped probe into the ground while simultaneously recording the resistance to penetration at the cone tip and along the friction sleeve.

The cone penetrometer testing described in this report was conducted in general accordance with the current ASTM specifications (ASTM D5778-95 and D3441-94) using an electronic cone penetrometer.

The CPT equipment operated by Holguin, Fahan & Associates, Inc. (HFA) consists of a cone assembly mounted at the end of a series of hollow sounding rods. A set of hydraulic rams is used to continuously push the cone and rods into the soil at a rate of 20-mm per second (approximately four feet per minute) while the cone tip resistance and sleeve friction resistance are recorded every 50-mm (approximately two inches) and stored in digital form. A specially designed all wheel drive 23-ton truck provides the required reaction weight for pushing the cone assembly and is also used to transport and house the test equipment.

The cone penetrometer assembly used for this project consists of a conical tip and a cylindrical friction sleeve. The conical tip has a 60° apex angle and a diameter of 35.6-mm (1.40-inch) resulting in a projected cross-sectional area of 10 cm^2 (1.5 square inches). The cylindrical friction sleeve is 133-mm (5.25-inch) in length and has an outside diameter of 35.8-mm (1.41-inch), resulting in a surface area of 150 cm^2 (23 square inches).

The interior of the cone penetrometer is instrumented with strain gauges that allow simultaneous measurement of cone tip and friction sleeve resistance during penetration. Continuous electric signals from the strain gauges are transmitted by a shielded cable in the sounding rods to the PC-based data acquisition hardware in the CPT truck. The sounding log is also displayed on a monitor.

The CPT data processing is performed using the truck mounted computer based data acquisition and presentation system. The computer generated graphical logs include cone resistance, friction resistance, friction ratio, and pore pressure ratio versus depth at a user selectable scale.

Soil behavior type interpretations are based on the following reference: Robertson, P.K. and Campanella, R.C., 1989, "Guidelines for Geotechnical Design using the Cone Penetrometer Test and CPT with Pore Pressure Measurement." Soil Mechanics series No. 120, Civil Engineering Department, University of British Columbia, Vancouver, B.C., V6T 1Z4, September 1989.

Interpretations and plotting has been done using HFA's proprietary data interpretation and presentation software. It is important to note that the data is not averaged. All interpretations are point interpretations at the corresponding depth listed.

It is also important to note that the soil behavior type correlations are based on a combination of theory, field research, research performed under laboratory conditions, and literature review. The information presented in the tabulated and/or graphical logs should, therefore, be viewed as a guideline rather than as precise measurements.

Some care is recommended when using the soil behavior type interpretations. If a tabulation depth happens to fall on a soil layer interface, or a seam of soil differing from the rest of the layer, the tabulated data can be misleading. The solution to this problem is the proper use of the graphical CPT logs. The tip and sleeve penetration resistance logs are the primary source of profile description; the soil behavior type logs are supplemental. The graphical logs of tip and sleeve resistance should be examined and layer boundaries delineated in accordance with the project requirements. The soil behavior type interpretations are only representative of the response of the soil to the large shear deformations imposed during cone penetration. This is not necessarily a prediction of grain size distribution. However, it has been found that the interpreted soil behavior types generally agree well with the soil types defined in accordance with the grain size distribution methods such as used in the Unified Soil Classification System.

Limitations

Holguin, Fahan & Associates, Inc. (HFA) presents the attached data in accordance with ASTM Standards D5778-95 and D3441-94 and generally accepted cone penetrometer testing practices and standards. The attached data further relates only to the specific project and location discussed in the data. Judgement may be required to verify the CPT soil behavior interpretations.

The "Client" may distribute this data or excerpts therefrom provided the following statement is prominently displayed and included with the distribution:

"Neither CLIENT nor HFA make any guarantee or warranty, express or implied, regarding this data. THE USE OF THIS INFORMATION SHALL BE AT THE USER'S SOLE RISK REGARDLESS OF ANY FAULT OR NEGLIGENCE OF THE CLIENT OR HFA."

Please feel free to call if you have any questions.

Respectfully submitted,

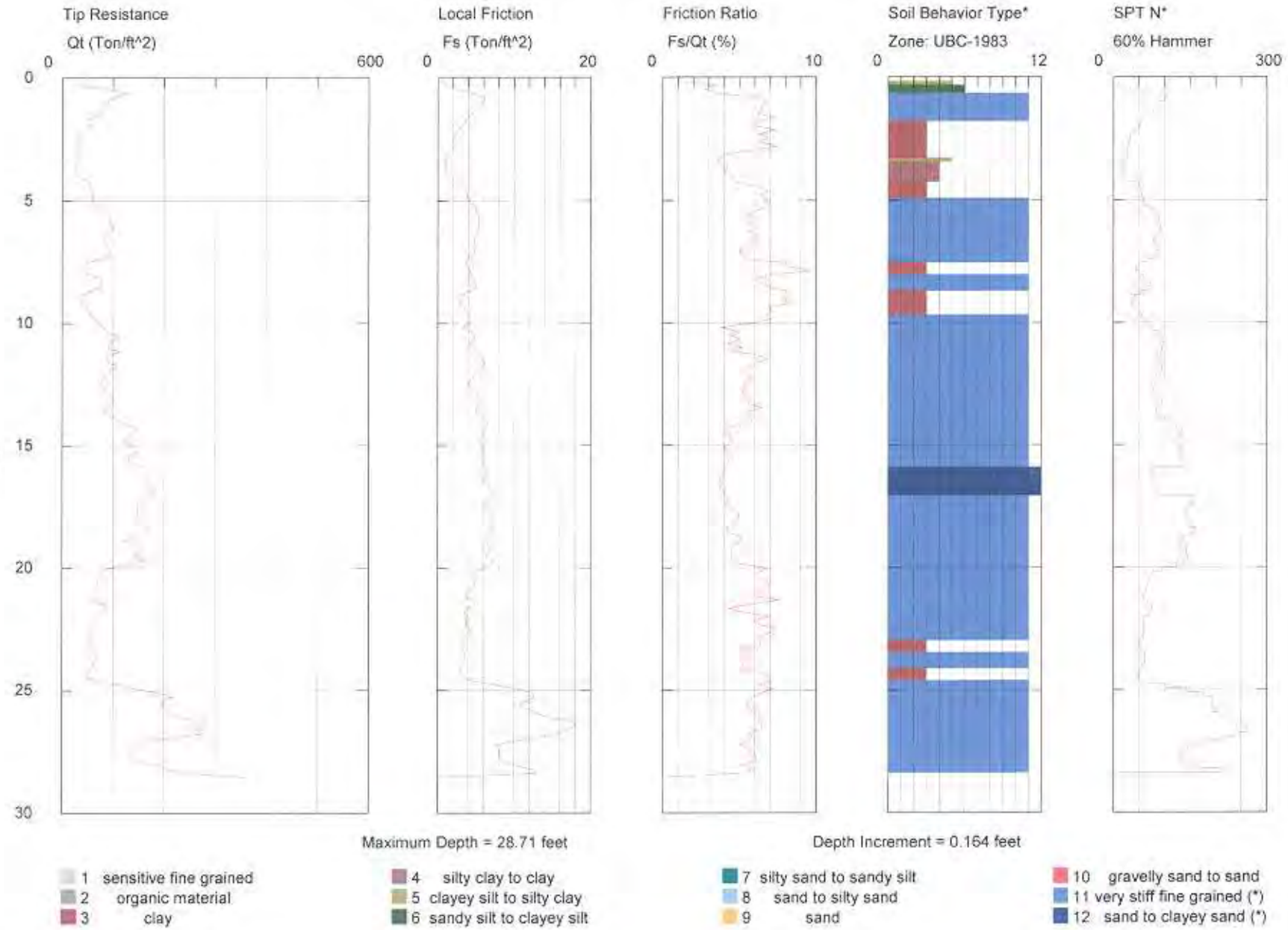
Amanda Hancock
CPT Operations Manager
Holguin, Fahan & Associates, Inc.

:AH\Enclosures

Earth Mechanics

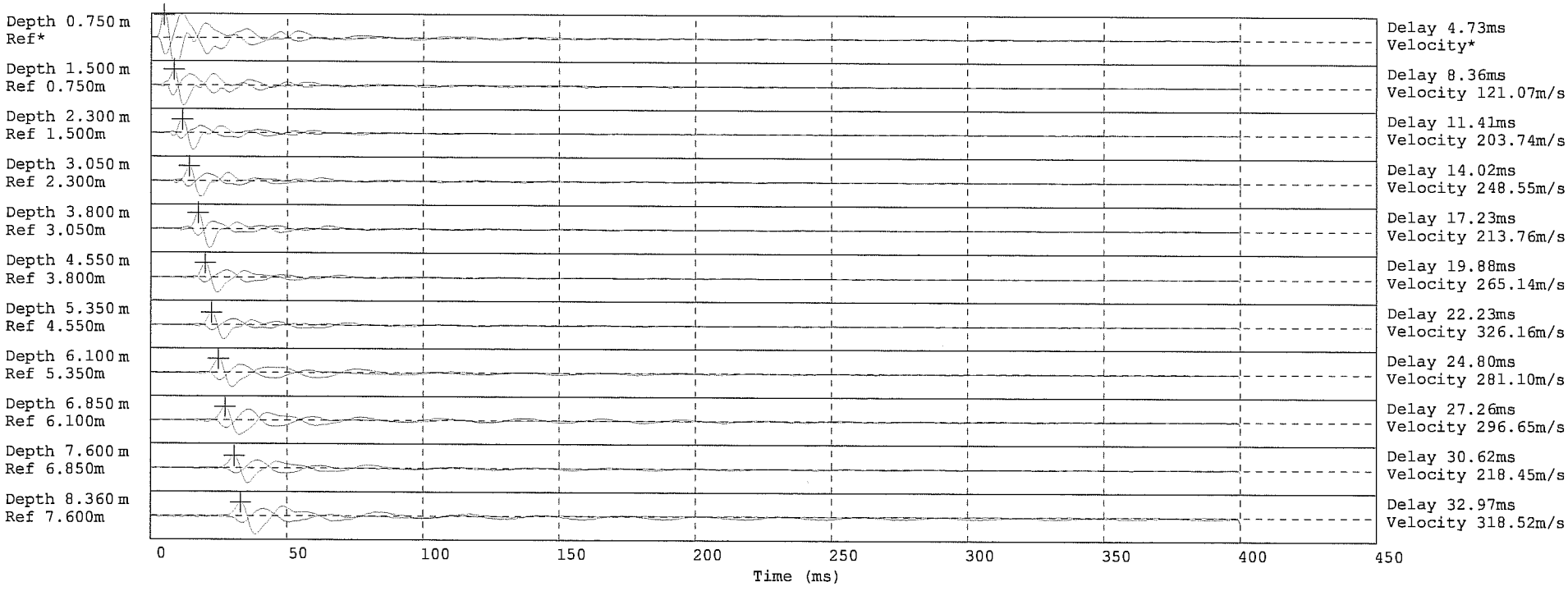
Operator: Vic-Ian
Sounding: 04-1
Cone Used: DSG0409

CPT Date/Time: 2/7/2004 12:55
Location: UCSD Abut Research
Job Number: 02-165 Carmel Valley B-2



ehavior type and SPT based on data from UBC-1983

Earth Mechanics
04-1



Hammer to Rod String Distance 1.524 (m)
* = Not Determined

CPT INTERPRETATIONS

SOUNDING : 04-1 PROJECT No.: 02-165 Carme
PROJECT : UCSD Abut Resear CONE/RIG : DSG0409
DATE/TIME: 2/7/2004 12:55

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	97.43	2.69	SANDY SILT to CLAYEY SILT	39	62		5.7	
.300	.98	88.60	6.80	*VERY STIFF FINE GRAINED	89	100			
.450	1.48	71.96	6.21	*VERY STIFF FINE GRAINED	72	100			
.600	1.97	52.87	5.73	CLAY	53	85		3.1	
.750	2.46	29.86	6.88	CLAY	30	48		1.7	
.900	2.95	27.82	6.15	CLAY	28	44		1.6	
1.050	3.44	30.12	3.55	CLAYEY SILT to SILTY CLAY	15	24		2.0	
1.200	3.94	26.23	4.42	CLAY to SILTY CLAY	17	28		1.5	
1.350	4.43	53.69	6.13	CLAY	54	86		3.1	
1.500	4.92	58.74	6.61	CLAY	59	94		3.4	
1.650	5.41	82.72	6.14	*VERY STIFF FINE GRAINED	83	100			
1.800	5.91	91.22	5.85	*VERY STIFF FINE GRAINED	91	100			
1.950	6.40	83.08	6.19	*VERY STIFF FINE GRAINED	83	100			
2.100	6.89	89.70	5.55	*VERY STIFF FINE GRAINED	90	100			
2.250	7.38	70.70	5.34	*VERY STIFF FINE GRAINED	71	100			
2.400	7.87	44.65	9.74	CLAY	45	63		2.6	
2.550	8.37	76.96	6.52	*VERY STIFF FINE GRAINED	77	100			
2.700	8.86	39.76	8.23	CLAY	40	53		2.3	
2.850	9.35	47.25	6.87	CLAY	47	61		2.7	
3.000	9.84	61.71	7.04	CLAY	62	78		3.6	
3.150	10.33	88.06	4.80	*VERY STIFF FINE GRAINED	88	100			
3.300	10.83	98.35	4.26	CLAYEY SILT to SILTY CLAY	49	59		5.7	
3.450	11.32	88.28	6.25	*VERY STIFF FINE GRAINED	88	100			
3.600	11.81	106.64	5.60	*VERY STIFF FINE GRAINED	100	100			
3.750	12.30	77.94	5.79	*VERY STIFF FINE GRAINED	78	88			
3.900	12.80	91.08	5.13	*VERY STIFF FINE GRAINED	91	100			
4.050	13.29	96.52	5.63	*VERY STIFF FINE GRAINED	97	100			
4.200	13.78	97.67	5.63	*VERY STIFF FINE GRAINED	98	100			
4.350	14.27	148.13	4.15	*VERY STIFF FINE GRAINED	100	100			
4.500	14.76	123.09	4.56	*VERY STIFF FINE GRAINED	100	100			
4.650	15.26	147.79	4.17	*VERY STIFF FINE GRAINED	100	100			
4.800	15.75	145.27	4.04	*VERY STIFF FINE GRAINED	100	100			
4.950	16.24	163.08	3.92	*SAND to CLAYEY SAND	82	80			
5.100	16.73	186.63	3.64	*SAND to CLAYEY SAND	93	91			
5.250	17.22	167.76	4.33	*VERY STIFF FINE GRAINED	100	100			
5.400	17.72	147.19	4.71	*VERY STIFF FINE GRAINED	100	100			
5.550	18.21	161.80	4.42	*VERY STIFF FINE GRAINED	100	100			
5.700	18.70	142.81	4.91	*VERY STIFF FINE GRAINED	100	100			
5.850	19.19	156.45	4.49	*VERY STIFF FINE GRAINED	100	100			
6.000	19.69	165.25	4.45	*VERY STIFF FINE GRAINED	100	100			
6.150	20.18	78.64	6.28	*VERY STIFF FINE GRAINED	79	70			

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 126 pcf
ASSUMED DEPTH OF WATER TABLE = 50.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.
Interpretations based on ROBERTSON and CAMPANELLA, 1989

SOUNDING : 04-1

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	70.32	7.00	*VERY STIFF FINE GRAINED	70	61			
6.450	21.16	58.87	6.20	CLAY	59	51		3.4	
6.600	21.65	87.76	4.28	CLAYEY SILT to SILTY CLAY	44	37		5.1	
6.750	22.15	63.19	5.86	CLAY	63	53		3.6	
6.900	22.64	64.90	6.98	*VERY STIFF FINE GRAINED	65	54			
7.050	23.13	47.28	6.46	CLAY	47	39		2.7	
7.200	23.62	71.28	5.13	*VERY STIFF FINE GRAINED	71	58			
7.350	24.11	56.71	5.36	CLAY	57	46		3.2	
7.500	24.61	63.01	7.09	CLAY	63	50		3.6	
7.650	25.10	190.31	6.52	*VERY STIFF FINE GRAINED	100	100			
7.800	25.59	195.90	5.49	*VERY STIFF FINE GRAINED	100	100			
7.950	26.08	224.59	6.42	*VERY STIFF FINE GRAINED	100	100			
8.100	26.57	262.07	6.45	*VERY STIFF FINE GRAINED	100	100			
8.250	27.07	163.46	6.02	*VERY STIFF FINE GRAINED	100	100			
8.400	27.56	134.72	6.01	*VERY STIFF FINE GRAINED	100	100			
8.550	28.05	192.85	5.23	*VERY STIFF FINE GRAINED	100	100			
8.700	28.54	362.13	*****		0	0			.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 126 pcf
ASSUMED DEPTH OF WATER TABLE = 50.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

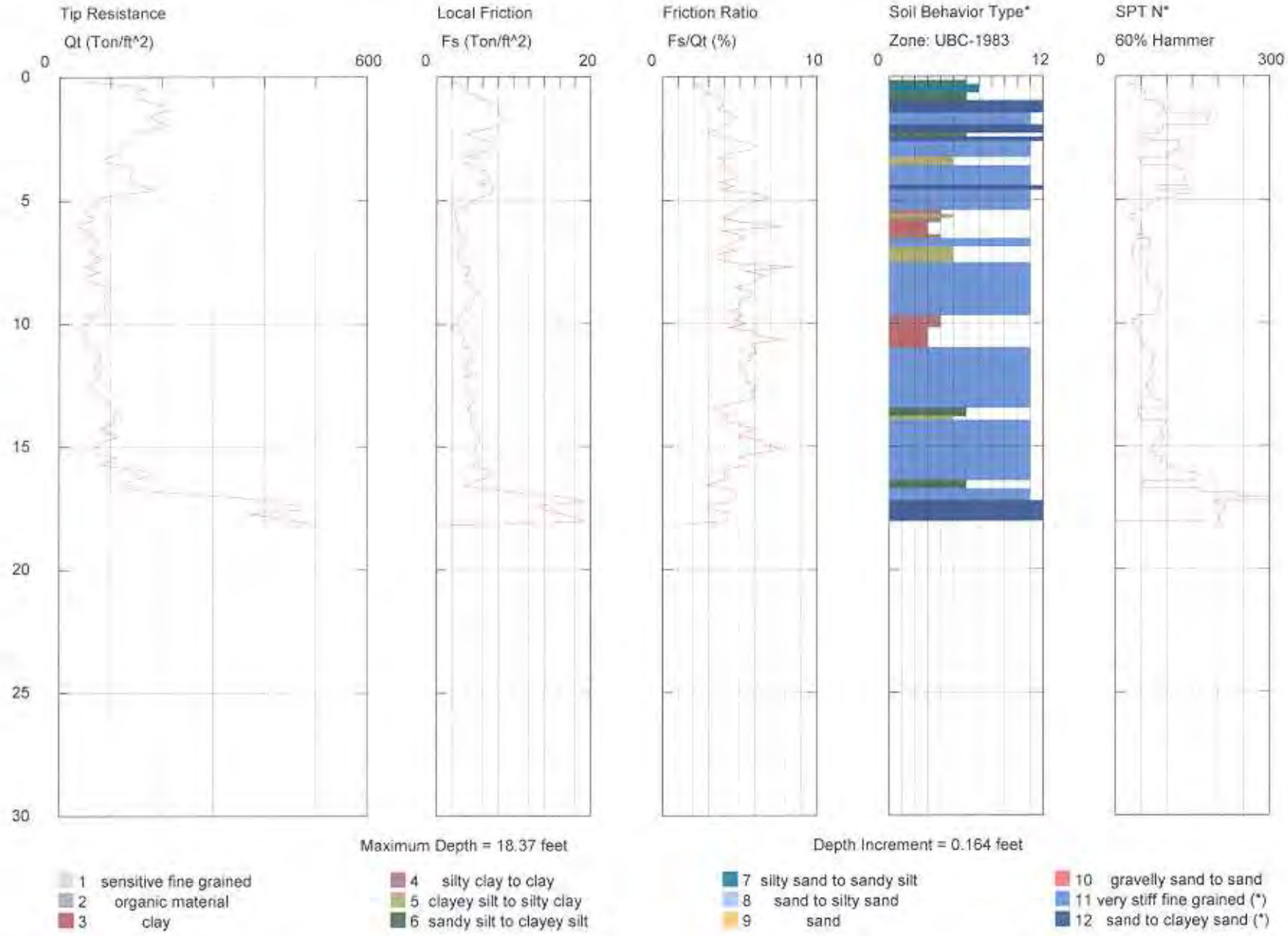
HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on ROBERTSON and CAMPANELLA, 1989

Earth Mechanics

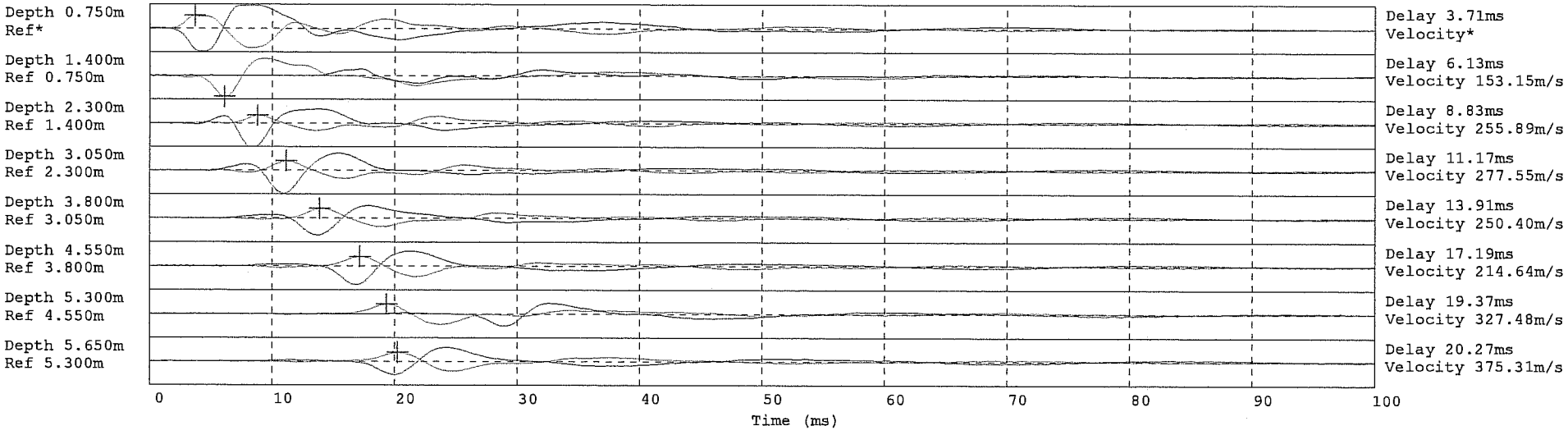
Operator: Vic-Ian
Sounding: 04-2B
Cone Used: DSG0409

CPT Date/Time: 2/7/2004 2:51
Location: UCSD Abut Research
Job Number: 02-165 Carmel Valley B-2



ehavior type and SPT based on data from UBC-1983

Earth Mechanics
04-2B



Hammer to Rod String Distance 1.524 (m)
* = Not Determined

CPT INTERPRETATIONS

SOUNDING : 04-2B
PROJECT : UCSD Abut Resear
DATE/TIME: 2/7/2004 2:51

PROJECT No.: 02-165
CONE/RIG : DSG0409

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
2.100	6.89	72.30	4.22	CLAYEY SILT to SILTY CLAY	36	54		4.2	
2.250	7.38	83.39	3.53	SANDY SILT to CLAYEY SILT	33	49		4.9	
2.400	7.87	77.85	5.39	*VERY STIFF FINE GRAINED	78	100			
2.550	8.37	76.40	5.76	*VERY STIFF FINE GRAINED	76	100			
2.700	8.86	87.00	5.85	*VERY STIFF FINE GRAINED	87	100			
2.850	9.35	90.11	5.06	*VERY STIFF FINE GRAINED	90	100			
3.000	9.84	62.59	4.64	CLAY to SILTY CLAY	42	53		3.6	
3.150	10.33	45.56	6.13	CLAY	46	56		2.6	
3.300	10.83	56.18	5.74	CLAY	56	67		3.3	
3.450	11.32	80.89	5.59	*VERY STIFF FINE GRAINED	81	95			
3.600	11.81	69.36	5.16	*VERY STIFF FINE GRAINED	69	80			
3.750	12.30	68.05	5.35	*VERY STIFF FINE GRAINED	68	77			
3.900	12.80	77.94	5.72	*VERY STIFF FINE GRAINED	78	86			
4.050	13.29	107.73	4.18	CLAYEY SILT to SILTY CLAY	54	58		6.3	
4.200	13.78	104.40	4.30	*VERY STIFF FINE GRAINED	100	100			
4.350	14.27	81.15	5.91	*VERY STIFF FINE GRAINED	81	85			
4.500	14.76	85.14	6.69	*VERY STIFF FINE GRAINED	85	88			
4.650	15.26	72.40	6.40	*VERY STIFF FINE GRAINED	72	73			
4.800	15.75	82.78	5.71	*VERY STIFF FINE GRAINED	83	82			
4.950	16.24	163.03	4.29	*VERY STIFF FINE GRAINED	100	100			
5.100	16.73	143.30	4.47	*VERY STIFF FINE GRAINED	100	100			
5.250	17.22	409.33	4.71	*VERY STIFF FINE GRAINED	100	100			
5.400	17.72	369.90	4.38	*VERY STIFF FINE GRAINED	100	100			

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 128 pcf
ASSUMED DEPTH OF WATER TABLE = 50.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

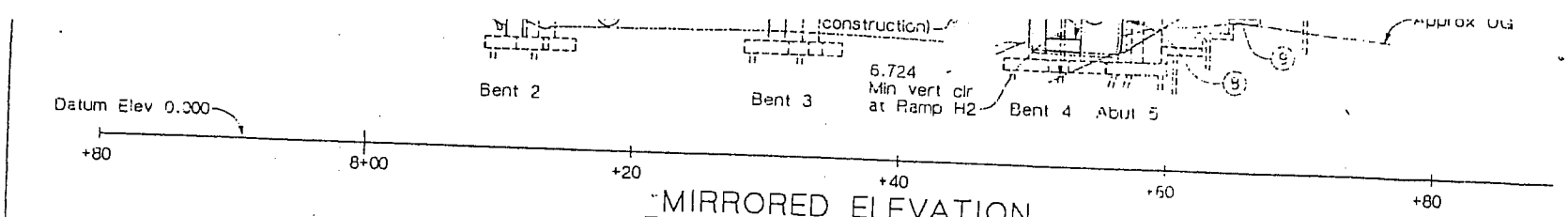
Interpretations based on ROBERTSON and CAMPANELLA, 1989

Caltrans Bridge 55-0257
Harbor Blvd UC (Widen), Orange Co.

Caltrans Bridge 55-0257, Harbor Blvd., Costa Mesa, Orange Co.

This bridge undercrossing is located in Santa Ana in Orange County. The I-405 runs on high raised embankments in this area. The subject bridge is skewed and consists of older bridges that were subsequently widened in the median and the outer sides. A subject bridge is part of the SB loop ramp recently added in 2004. The east Abutment No. 1 is a small monolithic abutment 10 ft tall and on one row of piles. The west Abutment 5 is a tall, heavy seat-type abutment on three rows of piles.

The field investigation for this bridge was conducted on 2/28/04, consisting of (2) 21.5-ft deep soil borings and (3) 15 to 20-ft deep conventional and seismic CPT's. Drilling was performed by 2R Drilling and CPT was performed by HFA. Borehole 04-3 and CPT 04-3C were performed at Abutment 1 behind the approach slab (at about 13 feet away from the abutment wall). Borehole 04-4 and CPT's 04-4C and 04-5C were performed at Abutment 5 through the approach slab (about 4 to 5 ft from the abutment wall), which was precored using an electric coring machine. Geotechnical soil sampling consisted of ring samples collected at 2.5-ft depth intervals using a Modified California and SPT samplers. Seismic wave measurements were taken at 2.5-ft intervals. Groundwater was not encountered.



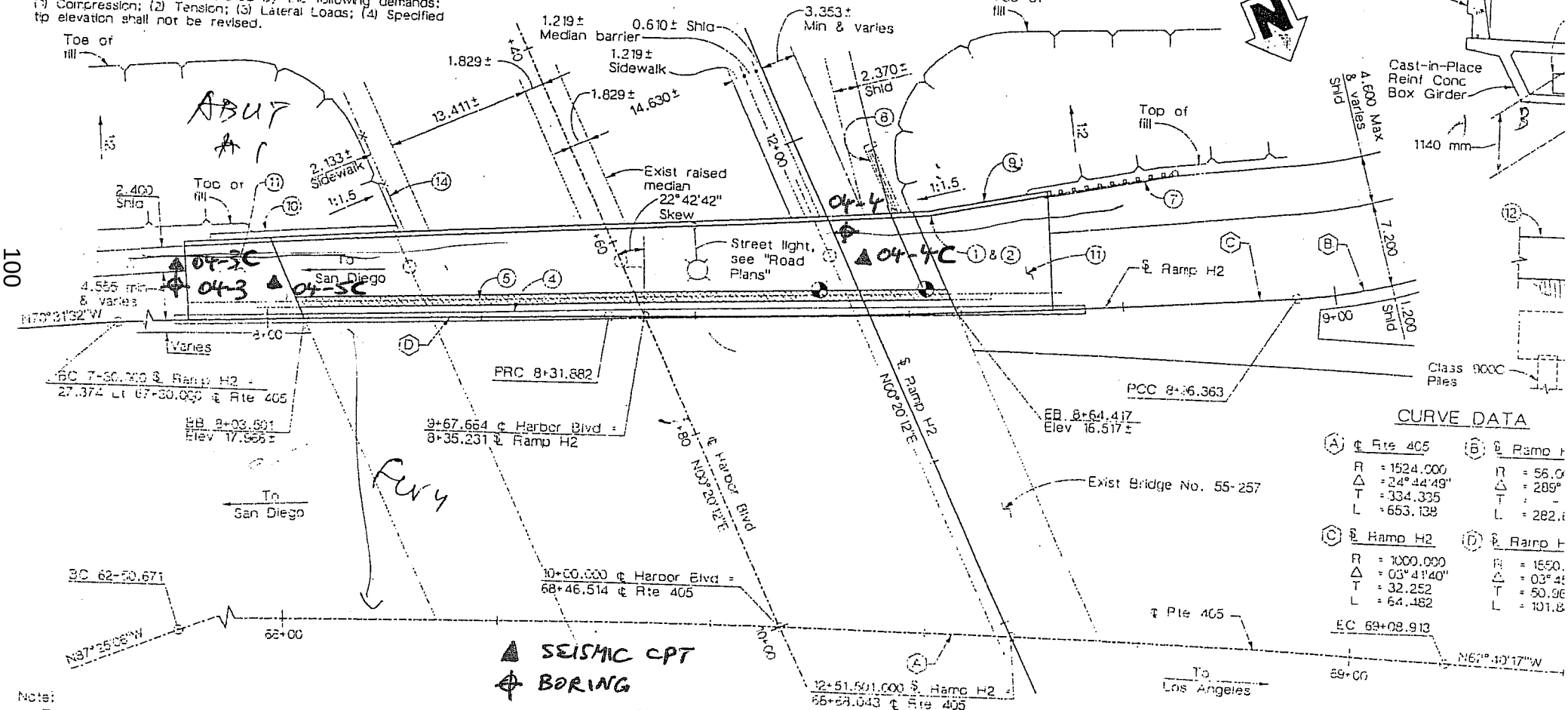
MIRRORED ELEVATION

1:250

PILE DATA - CLASS 400C AND CLASS 900C PILES

Location	Pile Type	Design Loading (Service)	Nominal Resistance		Design Tip Elevation	Specified Tip Elevation
			Compression	Tension		
Abutment 1	Class 900C	400 kN	800 kN	0 kN	+ 2.5 (1) & 6.5 (3)	+ 2.5
Bent 2	Class 900C	675 kN	1350 kN	900 kN	-6.0 (1), -7.00 (2) & -2.0 (3)	-7.0(4)
Bent 3	Class 900C	750 kN	1500 kN	800 kN	-6.0 (1), -6.00 (2) & -2.0 (3)	-6.0(4)
Bent 4	Class 900C	725 kN	1450 kN	850 kN	-6.0 (1), -6.00 (2) & -2.0 (3)	-6.0(4)
Abutment 5	Class 900C	625 kN	1250 kN	0 kN	-5.0 (1) & -0.5 (3)	-5.0
Retaining Wall	Class 400C	375 kN	750 kN	0 kN	+1.5 (1 & 3	+1.5

Design tip elevation is controlled by the following demands: (1) Compression; (2) Tension; (3) Lateral Loads; (4) Specified tip elevation shall not be revised.



PLAN

1:250

CURVE DATA

(A) ℄ Rte 405
R = 1524.000
Δ = 24°44'49"
T = 334.335
L = 653.138

(B) ℄ Ramp H
R = 56.0
Δ = 289°
T = -
L = 282.

(C) ℄ Ramp H2
R = 1000.000
Δ = 03°41'40"
T = 32.252
L = 64.482

(D) ℄ Ramp H
R = 1550.
Δ = 03°4
T = 50.96
L = 101.8

Note:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material

Note: For "Index to Plans", "Standard Plans Dated July 1997" and "General Notes Load Factor Design", see "Index to Plans" sh

Nguyen 3/3/00	DESIGN BY A. Salama	CHECKED A. Moubayed/O. Jaradat	LOAD FACTOR DESIGN	LIVE LOADING HS20-44 AND ALTERNATIVE AND PERMIT DESIGN LOADING
	DETAILS BY G. Buelow	CHECKED A. Wang	LAYOUT BY G. Buelow	CHECKED A. Moubayed
	QUANTITIES BY O. Jaradat/M. Harouni	CHECKED T.J. Chou	SPECIFICATIONS BY V. Trinh	PLANS AND SPECS

PREPARED FOR THE STATE OF CALIFORNIA

Vinh Trinh
PROJECT ENGINEER

55-257 Harbor Blvd UC (Widen)

CPT-04-5
N/B ABUT #5
SLAB

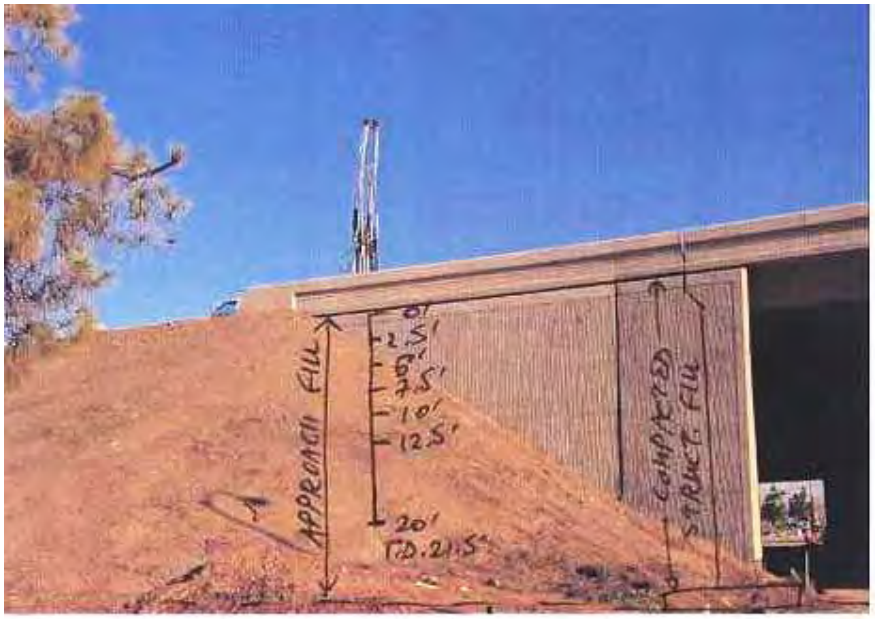
CPT 04-3
N/B ABUT #5
APPROACH SLAB
DECK

NORTH ABUT #5
#4
#3
#2
#1
SOUTH ABUT #1
BORE 04-4
S/B ABUT #1

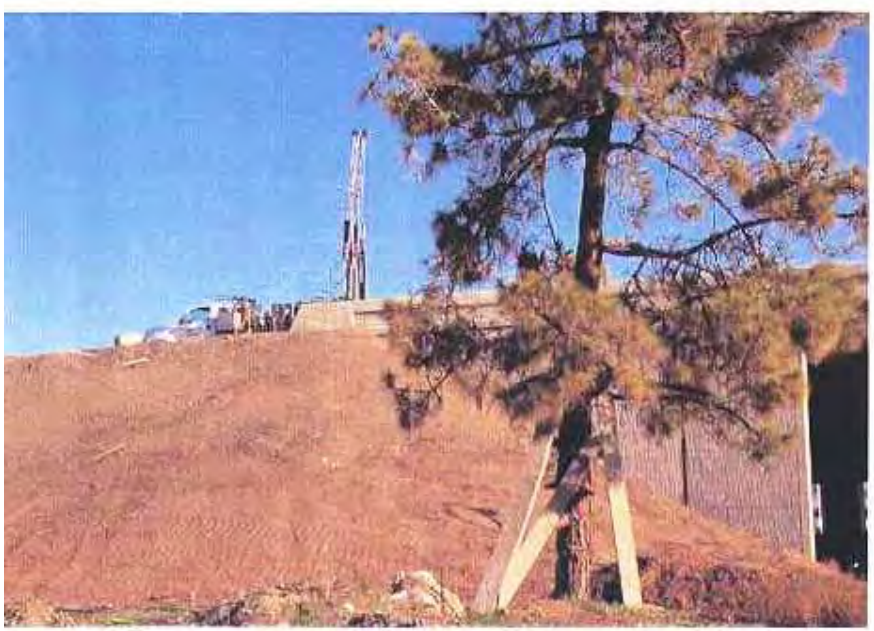
BORE 04-3
N/B ABUT #5

55-257 Harbor Blvd (Widen)
EXP WALL
02/10/2004
STRUCT. BACKFILL (SILTY SAND)
04-5 CPT
04-3 CPT
04-3 BORE
BORE 04-3
CPT 04-3
CPT 04-5
N/B ABUT #5
HARBOR BLVD (WIDEN)

55-257 Harbor Blvd (Widen)


APPROACH FILL
0'
2.5'
5'
7.5'
10'
12.5'
20'
T.D. 21.5'
COMPACTED STRUCT. FILL

(CPT)
04-3 (BORING)
04-5 (CPT)
02/10/2004



04-5 (CPT)
04-3 (CPT)
04-3 (BORING)
02/10/2004

NORTH ABUT #5

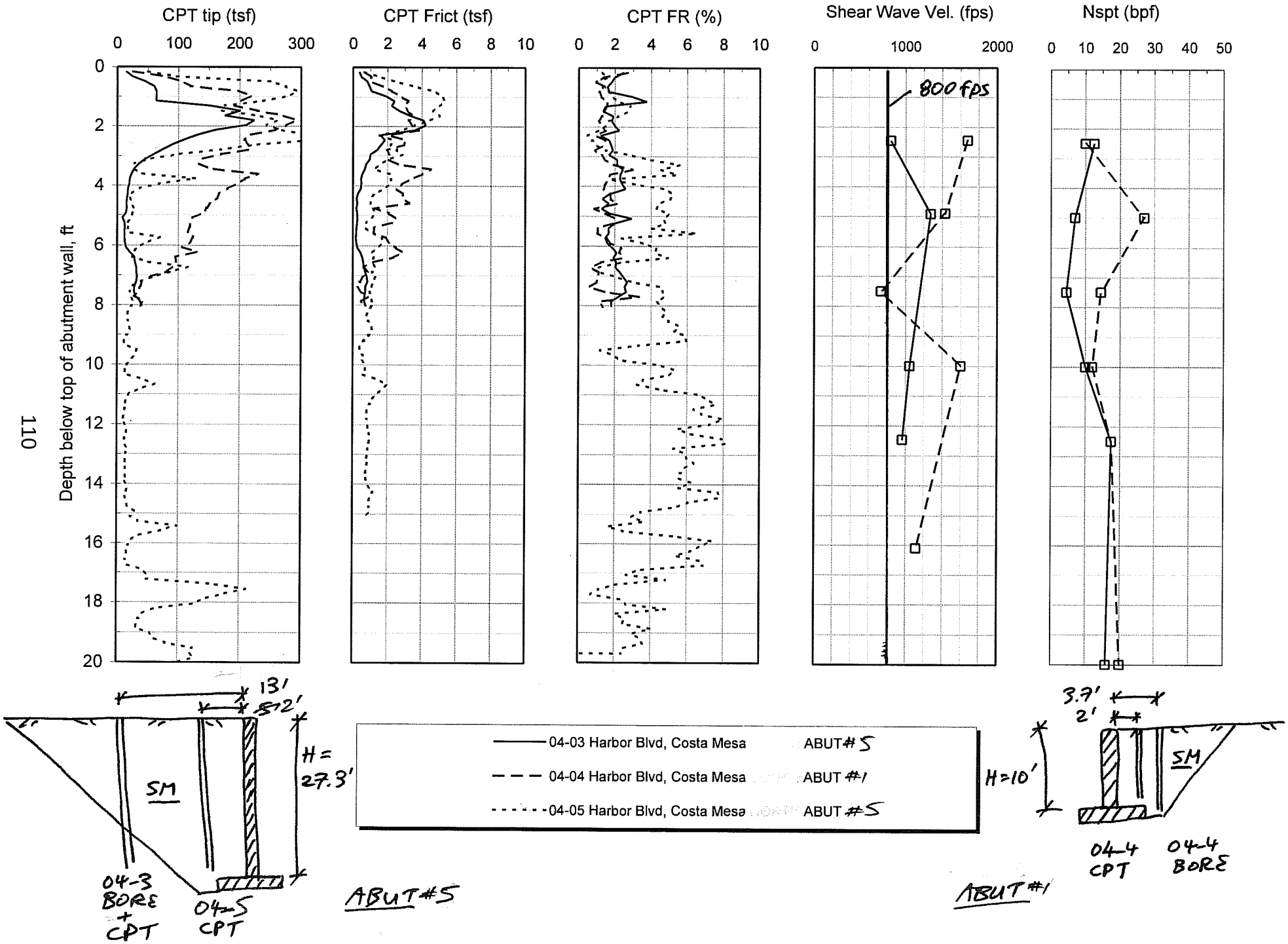
55-527 Harbor Blvd UC (Widen)

55-257 Harbor Blvd UC (Widen)

55-257 Harbor Blvd UC (Widen)

55-257 Harbor Blvd UC (Widen)

BOREHOLE & CPT DATA FOR HARBOR DR. ABUTMENTS

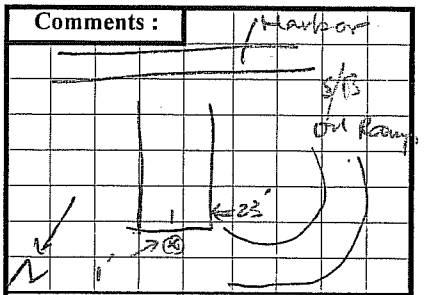


LOG OF BORING NO. (04-3)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project Name	: CT / UCSD - Abutment Research		
Project Location	: Costa Mesa, CA (Harbor Blvd. & I-405)		
E.M.I. Project No.	: 02-165	Site Condition :	dirt road
Weather	: Sunny, mild	Elevation :	
Traffic Control	: N/A	Operator :	
Drilling Company	: 2R DRILLING	Operator :	Jeff / Steve
Type of Rig	: CME 55 AUTO HAMMER	Drop (in) :	30.0
Borehole Diameter (inch)	: 8"	Drive Wt. (lbs) :	140.0
Logged By	: R.J.	Date Drilled :	2-28-04

Comments :



Backfilled With : Cuttings + Cement

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Rework	Lunch	Rework	Break	Finish	Off		25.0
Driller		0740	0830									Water Table
Traffic Control												— ft
Logger		0730										Caving
Total												14.0 ft

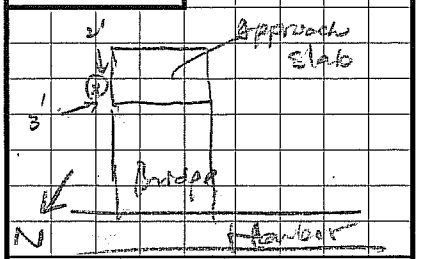
Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Color	Description (ASTM D-2488-93)	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O^2/LEL/PID
0	Bu	Bu									: :					
2.5	D	1		20 11 14	12/18	SM	Brn	SILTY SAND w/gvl F-m. some c.sa gvl to 3/4"	m	3/4	15:72:12	F-C	N.P	M.D	N	
5	D	2		6 6 8	11/18	Sm	Brn	SILTY SAND w/gvl F-m. sa tr. c. sa. gvl to 1/2"	m	1/2	10:75:15	F-C	N.P	L	N	
7.5	D	3		8 5 4	12/18	Sm	DK Yel Brn	SILTY SAND. F. sa. tr. m. sa tr. pea gvl	m	#4	5:75:20	F-m	N.P.	L	N	
10	D	4	B-O	7 8 12	12/18	Sm	DK Yel. brn & Brn	SILTY SAND F. sa unif. tr. mica	m	#40	0:75:25	F	N.P.	L	N	
12.5	D	5		8 15 20	12/18	Sm	Brn	SAME								
15											: :					
20	S	6		7 7 9	14/18	Sm	Brn	SILTY SAND. Unif. F. sa	m	#40	0:70:30	F	N.P	M.D	N	
								T.D 21.5' No G/W encountered								
25											: :					

LOG OF BORING NO. (04-4)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project Name	: CT / UCSD - Abutment Research		
Project Location	: Costa Mesa, CA (Harbor Blvd. & I-405)		
E.M.I. Project No.	: 02-165	Site Condition :	Asphalt
Weather	: Sunny, mild	Elevation :	
Traffic Control	: N/A	Operator :	
Drilling Company	: 2R DRILLING	Operator :	Jeff / Steve
Type of Rig	: CME 55 AUTO HAMMER	Drop (in) :	30.0
Borehole Diameter (inch)	: 8"	Drive Wt. (lbs) :	140.0
Logged By	: R.J.	Date Drilled :	2-28-04

Comments :



Backfilled With : Cuttings + Cement

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Rework	Lunch	Rework	Break	Finish	Off		25.0
Driller			0930							1030		Water Table
Traffic Control												— ft
Logger												Caving
Total												12.5 ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Color	Description (ASTM D-2488-93)	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O^2/LEL/PID
0	VB	0									: :					
2.5	D	1		5 15	12/18	SPSM	Yel. brn	SAND w/ silt. F-C. pea tr. gvl to 1"	m	1"	10:83:7	F-C	N.P	L	N	
								(1B sl. disturbed, broke at 3")								
5	D	2		21 31 23	12/18	SPSM	Yel. brn	SAME			15:78:7			MD		
7.5	D	3		16 15 14	12/18			SAME						MD		
10	D	4		9 11 16	12/18	SM	Brn to Red brn	SILTY SAND Unif. F. pea tr. mica	m	#40	0:70:30	F	N.P	MD	N	
12.5	D	5		8 15 20	12/18	ML	Brn	SANDY SILT unif F. pea, tr. mica	m	#40	0:45:55	F	N.P.	V.St	N	
15											: :					
20	S	6		9 8 12	10/18			SAME AS D-5			: :					
								T.D. 21.5' No G/W encountered								
25											: :					

HOLGUIN, FAHAN & ASSOCIATES, INC.
ENVIRONMENTAL MANAGEMENT CONSULTANTS
948 North Lemon Street, Orange, CA 92867 (714)-210-5971 FAX (714) 210-5975

March 8, 2004

Mr. Mike Kapuskar
Earth Mechanics, Inc.
17660 Newhope St, Suite E
Fountain Valley, CA 92708

PROJECT NAME: CPT Testing for UCSD Abut Research: ~~Tustin Ave over 91~~ Harbor Blvd;
PROJECT NO.: ~~TBD~~

Dear Mr. Kapuskar:

Enclosed please find copies of the cone penetrometer testing (CPT) data for the above referenced project along with a copy of the corresponding invoice.

The cone penetrometer testing conducted for this project consisted of pushing an instrumented cone-tipped probe into the ground while simultaneously recording the resistance to penetration at the cone tip and along the friction sleeve.

The cone penetrometer testing described in this report was conducted in general accordance with the current ASTM specifications (ASTM D5778-95 and D3441-94) using an electronic cone penetrometer.

The CPT equipment operated by Holguin, Fahan & Associates, Inc. (HFA) consists of a cone assembly mounted at the end of a series of hollow sounding rods. A set of hydraulic rams is used to continuously push the cone and rods into the soil at a rate of 20-mm per second (approximately four feet per minute) while the cone tip resistance and sleeve friction resistance are recorded every 50-mm (approximately two inches) and stored in digital form. A specially designed all wheel drive 23-ton truck provides the required reaction weight for pushing the cone assembly and is also used to transport and house the test equipment.

The cone penetrometer assembly used for this project consists of a conical tip and a cylindrical friction sleeve. The conical tip has a 60° apex angle and a diameter of 35.6-mm (1.40-inch) resulting in a projected cross-sectional area of 10 cm^2 (1.5 square inches). The cylindrical friction sleeve is 133-mm (5.25-inch) in length and has an outside diameter of 35.8-mm (1.41-inch), resulting in a surface area of 150 cm^2 (23 square inches).

The interior of the cone penetrometer is instrumented with strain gauges that allow simultaneous measurement of cone tip and friction sleeve resistance during penetration. Continuous electric signals from the strain gauges are transmitted by a shielded cable in the sounding rods to the PC-based data acquisition hardware in the CPT truck. The sounding log is also displayed on a monitor.

The CPT data processing is performed using the truck mounted computer based data acquisition and presentation system. The computer generated graphical logs include cone resistance, friction resistance, friction ratio, and pore pressure ratio versus depth at a user selectable scale.

Soil behavior type interpretations are based on the following reference: Robertson, P.K. and Campanella, R.C., 1989, "Guidelines for Geotechnical Design using the Cone Penetrometer Test and CPT with Pore Pressure Measurement." Soil Mechanics series No. 120, Civil Engineering Department, University of British Columbia, Vancouver, B.C., V6T 1Z4, September 1989.

Interpretations and plotting has been done using HFA's proprietary data interpretation and presentation software. It is important to note that the data is not averaged. All interpretations are point interpretations at the corresponding depth listed.

It is also important to note that the soil behavior type correlations are based on a combination of theory, field research, research performed under laboratory conditions, and literature review. The information presented in the tabulated and/or graphical logs should, therefore, be viewed as a guideline rather than as precise measurements.

Some care is recommended when using the soil behavior type interpretations. If a tabulation depth happens to fall on a soil layer interface, or a seam of soil differing from the rest of the layer, the tabulated data can be misleading. The solution to this problem is the proper use of the graphical CPT logs. The tip and sleeve penetration resistance logs are the primary source of profile description; the soil behavior type logs are supplemental. The graphical logs of tip and sleeve resistance should be examined and layer boundaries delineated in accordance with the project requirements. The soil behavior type interpretations are only representative of the response of the soil to the large shear deformations imposed during cone penetration. This is not necessarily a prediction of grain size distribution. However, it has been found that the interpreted soil behavior types generally agree well with the soil types defined in accordance with the grain size distribution methods such as used in the Unified Soil Classification System.

Limitations

Holguin, Fahan & Associates, Inc. (HFA) presents the attached data in accordance with ASTM Standards D5778-95 and D3441-94 and generally accepted cone penetrometer testing practices and standards. The attached data further relates only to the specific project and location discussed in the data. Judgement may be required to verify the CPT soil behavior interpretations.

The "Client" may distribute this data or excerpts therefrom provided the following statement is prominently displayed and included with the distribution:

"Neither CLIENT nor HFA make any guarantee or warranty, express or implied, regarding this data. THE USE OF THIS INFORMATION SHALL BE AT THE USER'S SOLE RISK REGARDLESS OF ANY FAULT OR NEGLIGENCE OF THE CLIENT OR HFA."

Please feel free to call if you have any questions.

Respectfully submitted,

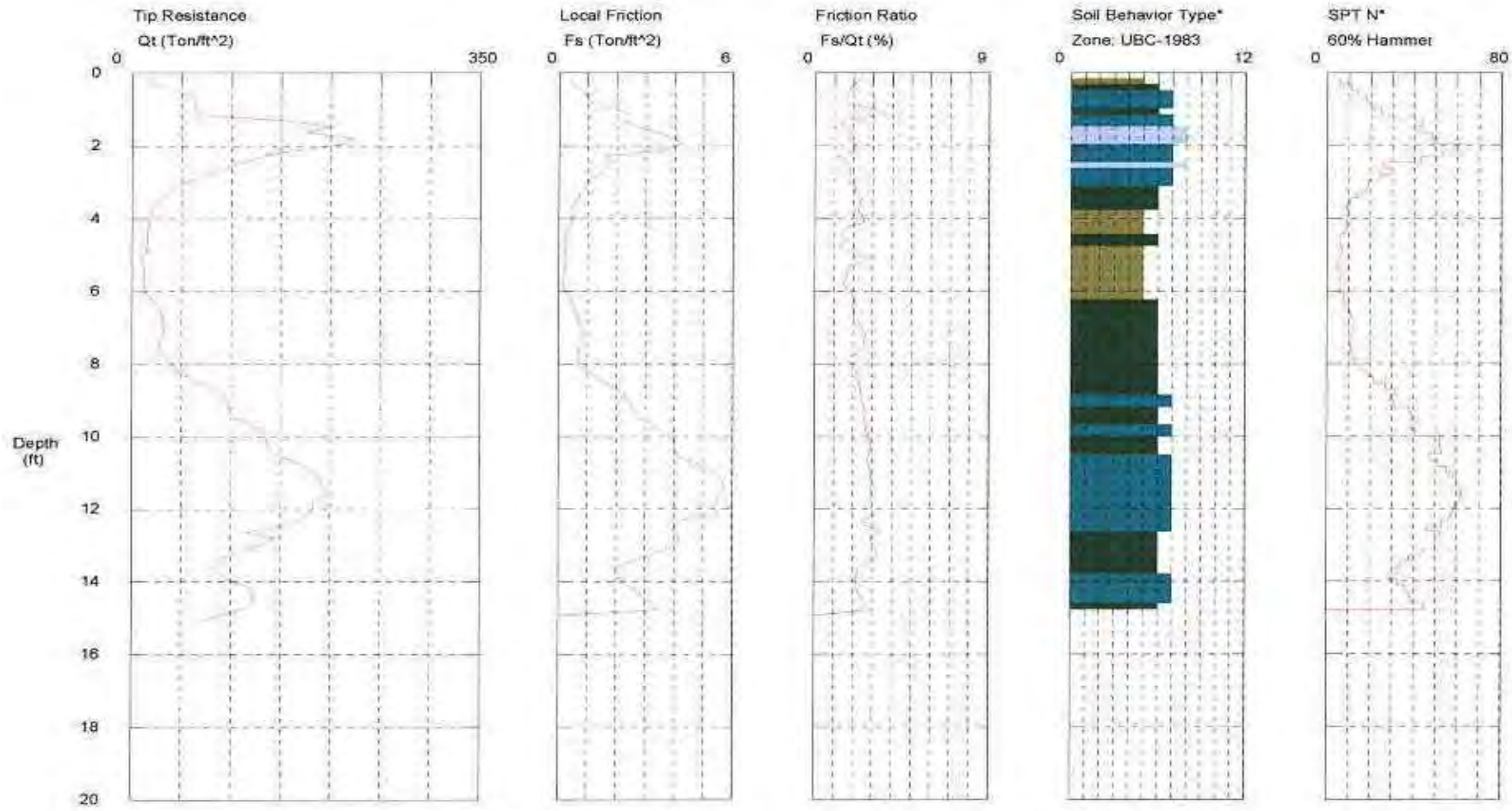
Amanda Hancock
CPT Operations Manager
Holguin, Fahan & Associates, Inc.

:AH\Enclosures

Earth Mechanics

Operator: BOBBY-VICTOR
Sounding: CPT-04-3C
Cone Used: DSG0409

CPT Date/Time: 2/28/2004 10:49
Location: UCSD Abut Research
Job Number: 02-165 Harbor Dr



Maximum Depth = 15.09 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

ehavior type and SPT based on data from UBC-1983

CPT INTERPRETATIONS

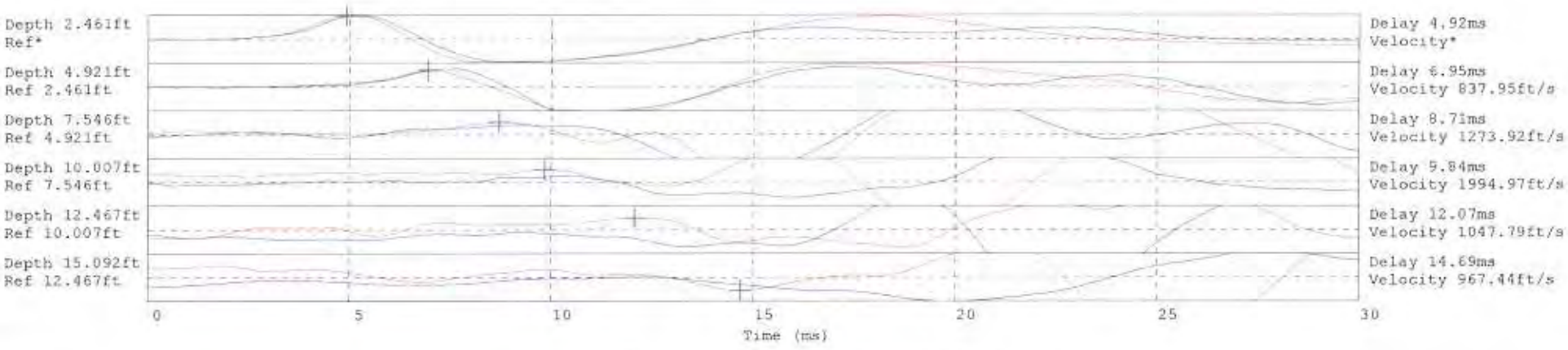
SOUNDING : CPT-4-3 (04-3C) PROJECT No.: 02-165 Harbo
PROJECT : UCSD Abut Resear CONE/RIG : DSG0409
DATE/TIME: 2/28/2004 10:49

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	45.11	1.82	SANDY SILT to CLAYEY SILT	18	29		3.0	
.300	.98	64.15	2.94	SANDY SILT to CLAYEY SILT	26	41		4.3	
.450	1.48	200.99	1.34	SAND to SILTY SAND	50	80	96		
.600	1.97	210.57	2.00	SAND to SILTY SAND	53	84	98		
.750	2.46	109.27	1.68	SILTY SAND to SANDY SILT	36	58	79		49.0
.900	2.95	60.28	1.67	SILTY SAND to SANDY SILT	20	32	62		46.0
1.050	3.44	28.11	2.44	SANDY SILT to CLAYEY SILT	11	18		1.9	
1.200	3.94	20.14	2.42	CLAYEY SILT to SILTY CLAY	10	16		1.3	
1.350	4.43	15.82	1.31	SANDY SILT to CLAYEY SILT	6	10		1.2	
1.500	4.92	14.36	1.71	CLAYEY SILT to SILTY CLAY	7	11		1.1	
1.650	5.41	12.52	1.65	CLAYEY SILT to SILTY CLAY	6	10		1.0	
1.800	5.91	12.55	1.59	CLAYEY SILT to SILTY CLAY	6	10		1.0	
1.950	6.40	28.33	1.93	SANDY SILT to CLAYEY SILT	11	18		2.2	
2.100	6.89	31.57	2.29	SANDY SILT to CLAYEY SILT	13	20		2.1	
2.250	7.38	28.34	2.54	CLAYEY SILT to SILTY CLAY	14	21		1.9	
2.400	7.87	36.85	1.79	SANDY SILT to CLAYEY SILT	15	21		2.9	
2.550	8.37	57.32	2.28	SANDY SILT to CLAYEY SILT	23	32		3.8	
2.700	8.86	93.91	2.43	SILTY SAND to SANDY SILT	31	43	74		43.0
2.850	9.35	99.76	2.61	SANDY SILT to CLAYEY SILT	40	53		5.8	
3.000	9.84	132.94	2.65	SILTY SAND to SANDY SILT	44	58	83		44.0
3.150	10.33	137.97	2.92	SANDY SILT to CLAYEY SILT	55	70		8.1	
3.300	10.83	172.03	2.86	SILTY SAND to SANDY SILT	57	71	89		45.0
3.450	11.32	190.42	2.99	SILTY SAND to SANDY SILT	63	77	91		45.0
3.600	11.81	183.07	2.98	SILTY SAND to SANDY SILT	61	72	89		44.5
3.750	12.30	170.62	2.52	SILTY SAND to SANDY SILT	57	66	87		44.5
3.900	12.80	145.77	2.88	SILTY SAND to SANDY SILT	49	55	82		43.5
4.050	13.29	95.85	3.32	SANDY SILT to CLAYEY SILT	38	43		5.6	
4.200	13.78	90.07	2.14	SILTY SAND to SANDY SILT	30	33	67		40.5
4.350	14.27	123.47	2.26	SILTY SAND to SANDY SILT	41	44	75		42.0
4.500	14.76	112.25	3.07	SANDY SILT to CLAYEY SILT	45	48		6.6	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 50.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.
Interpretations based on ROBERTSON and CAMPANELLA, 1989

Earth Mechanic
CPT-04-3C

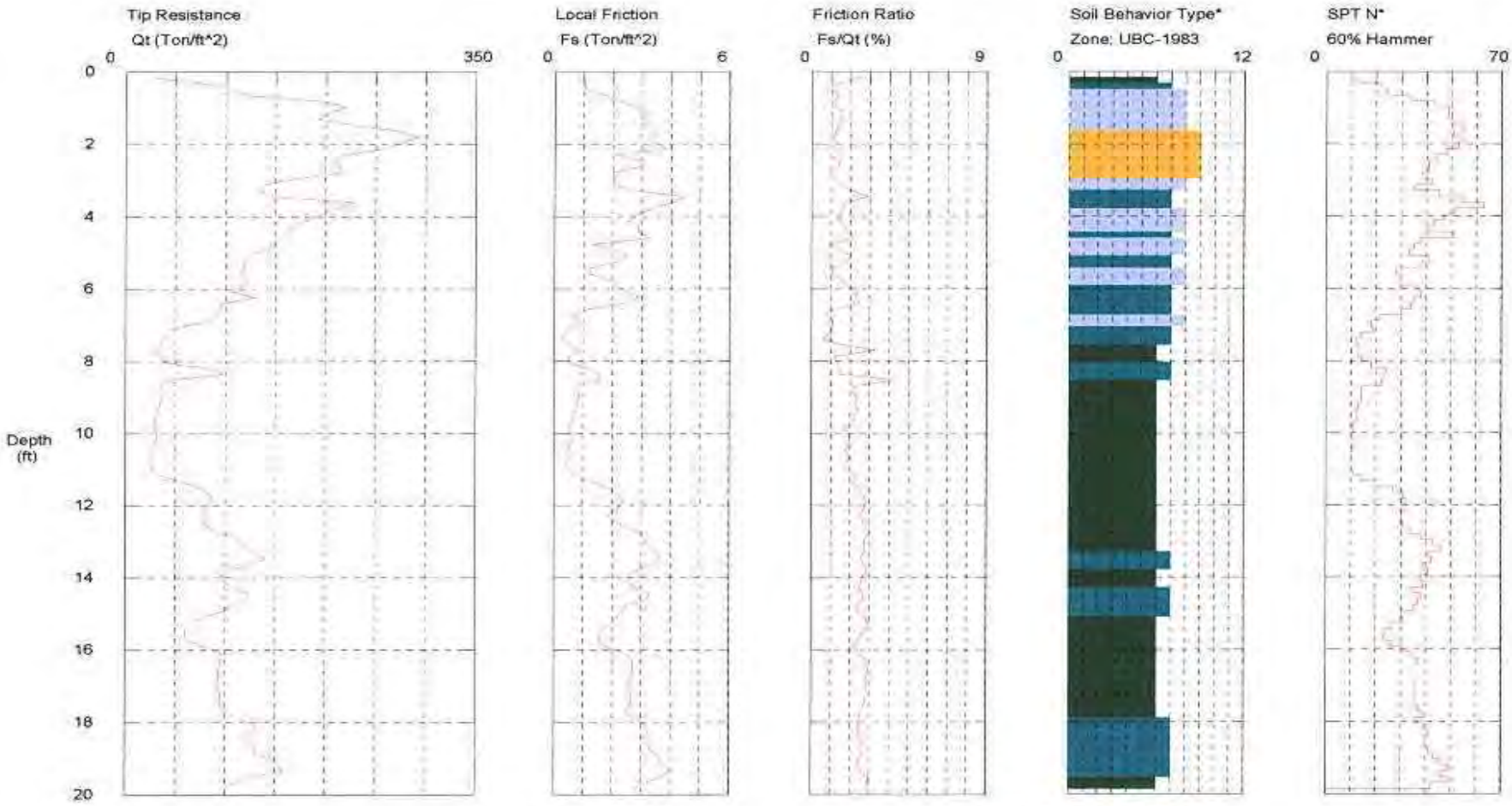


Hammer to Rod String Distance 1.143 (m)
* = Not Determined

Earth Mechanics

Operator: BOBBY-VICTOR
Sounding: CPT-04-4C
Cone Used: DSG0409

CPT Date/Time: 2/28/2004 11:36
Location: UCSD Abut Research
Job Number: 02-165 Harbor Dr



Maximum Depth = 20.18 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

ehavior type and SPT based on data from UBC-1983

CPT INTERPRETATIONS

SOUNDING : CPT-4-4 (04-4C) PROJECT No.: 02-165 Harbo
PROJECT : UCSD Abut Resear CONE/RIG : DSG0409
DATE/TIME: 2/28/2004 11:36

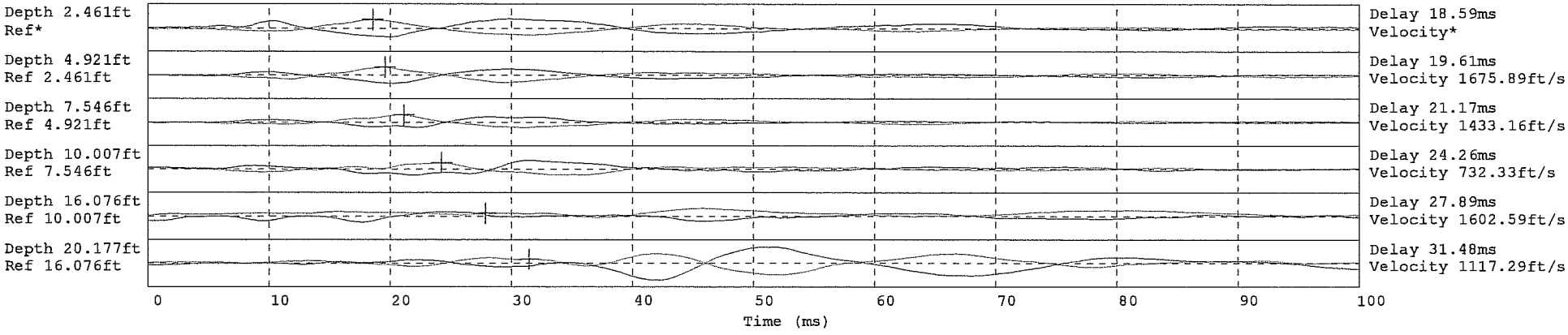
DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	105.27	.96	SAND to SILTY SAND	26	42	78		
.300	.98	219.40	1.25	SAND to SILTY SAND	55	88	99		
.450	1.48	229.05	1.39	SAND to SILTY SAND	57	92	100		
.600	1.97	275.95	1.24	SAND	55	88	100		
.750	2.46	207.79	1.46	SAND to SILTY SAND	52	83	97		
.900	2.95	169.33	1.24	SAND to SILTY SAND	42	68	91		
1.050	3.44	152.06	2.97	SANDY SILT to CLAYEY SILT	61	97		8.9	
1.200	3.94	195.77	1.45	SAND to SILTY SAND	49	78	96		49.5
1.350	4.43	163.12	1.78	SAND to SILTY SAND	41	65	90		48.0
1.500	4.92	141.77	1.47	SAND to SILTY SAND	35	57	86		47.0
1.650	5.41	118.85	1.04	SAND to SILTY SAND	30	48	81		46.0
1.800	5.91	118.83	1.78	SILTY SAND to SANDY SILT	40	63	81		46.0
1.950	6.40	95.64	2.45	SILTY SAND to SANDY SILT	32	51	75		44.5
2.100	6.89	81.66	1.12	SAND to SILTY SAND	20	32	71		43.5
2.250	7.38	38.51	.59	SILTY SAND to SANDY SILT	13	19	49		39.0
2.400	7.87	42.69	1.16	SILTY SAND to SANDY SILT	14	21	52		39.5
2.550	8.37	98.04	1.53	SILTY SAND to SANDY SILT	33	46	76		43.5
2.700	8.86	38.68	2.15	SANDY SILT to CLAYEY SILT	15	21		2.5	
2.850	9.35	32.49	2.37	SANDY SILT to CLAYEY SILT	13	17		2.1	
3.000	9.84	29.44	1.69	SANDY SILT to CLAYEY SILT	12	15		2.3	
3.150	10.33	28.81	1.87	SANDY SILT to CLAYEY SILT	12	15		2.3	
3.300	10.83	24.43	1.78	SANDY SILT to CLAYEY SILT	10	12		1.9	
3.450	11.32	54.30	2.12	SANDY SILT to CLAYEY SILT	22	26		3.6	
3.600	11.81	86.89	2.77	SANDY SILT to CLAYEY SILT	35	41		5.1	
3.750	12.30	75.94	2.43	SANDY SILT to CLAYEY SILT	30	35		5.0	
3.900	12.80	102.84	2.96	SANDY SILT to CLAYEY SILT	41	47		6.0	
4.050	13.29	128.86	2.73	SILTY SAND to SANDY SILT	43	48	77		42.5
4.200	13.78	101.65	2.88	SANDY SILT to CLAYEY SILT	41	45		5.9	
4.350	14.27	108.50	2.52	SILTY SAND to SANDY SILT	36	39	72		42.0
4.500	14.76	105.30	2.33	SILTY SAND to SANDY SILT	35	37	70		41.0
4.650	15.26	67.80	2.92	SANDY SILT to CLAYEY SILT	27	28		4.5	
4.800	15.75	63.45	2.44	SANDY SILT to CLAYEY SILT	25	26		4.2	
4.950	16.24	95.57	2.80	SANDY SILT to CLAYEY SILT	38	39		5.6	
5.100	16.73	92.96	2.85	SANDY SILT to CLAYEY SILT	37	37		5.4	
5.250	17.22	95.28	2.79	SANDY SILT to CLAYEY SILT	38	37		5.5	
5.400	17.72	100.59	2.46	SILTY SAND to SANDY SILT	34	33	66		39.5
5.550	18.21	130.77	2.50	SILTY SAND to SANDY SILT	44	42	73		41.5
5.700	18.70	130.16	2.52	SILTY SAND to SANDY SILT	43	41	73		41.0
5.850	19.19	154.67	2.45	SILTY SAND to SANDY SILT	52	48	77		42.0
6.000	19.69	105.16	2.94	SANDY SILT to CLAYEY SILT	42	39		6.1	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 50.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on ROBERTSON and CAMPANELLA, 1989

Earth Mechanic
CPT-04-4C

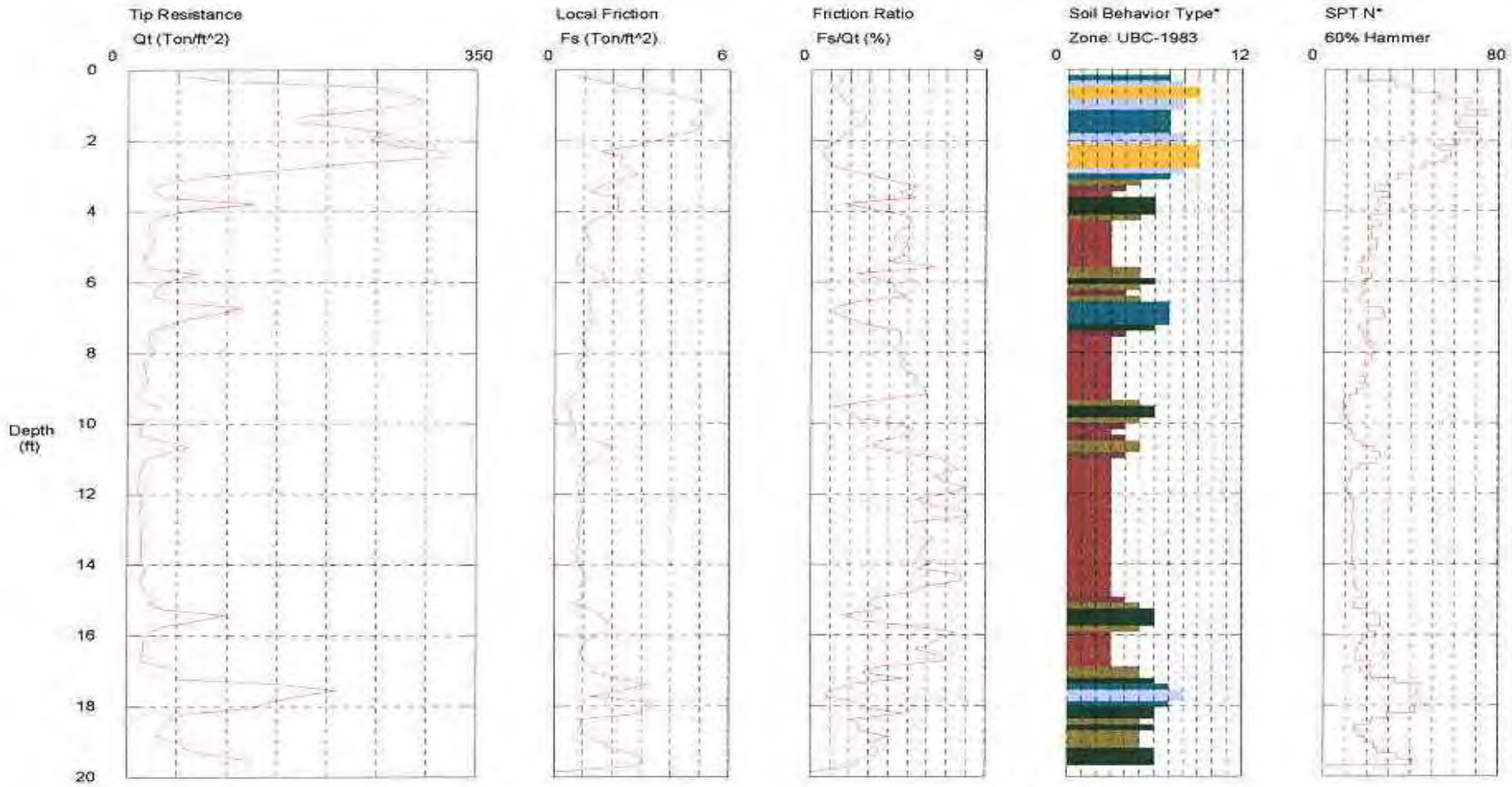


Hammer to Rod String Distance 1.143 (m)
* = Not Determined

Earth Mechanics

Operator: BOBBY-VICTOR
Sounding: CPT-04-5C
Cone Used: DSG0409

CPT Date/Time: 2/28/2004 2:22:
Location: UCSD Abut Research
Job Number: 02-165 Harbor Dr



Maximum Depth = 20.01 feet

Depth Increment = 0.164 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

ehavior type and SPT based on data from UBC-1983

CPT INTERPRETATIONS

SOUNDING : CPT-4-5 (04-5C) PROJECT No.: 02-165 Harbo
PROJECT : UCSD Abut Resear CONE/RIG : DSG0409
DATE/TIME: 2/28/2004 2:22

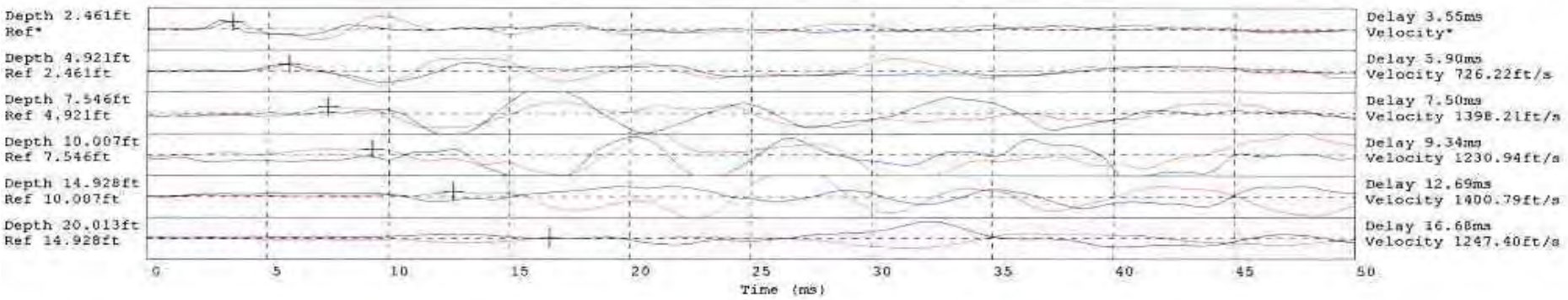
DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	249.99	.97	SAND	50	80	100		
.300	.98	280.58	1.84	SAND to SILTY SAND	70	100	100		
.450	1.48	170.28	2.73	SILTY SAND to SANDY SILT	57	91	92		
.600	1.97	243.64	1.47	SAND to SILTY SAND	61	97	100		
.750	2.46	319.63	.72	SAND	64	100	100		
.900	2.95	101.95	2.82	SANDY SILT to CLAYEY SILT	41	65		6.0	
1.050	3.44	26.74	4.56	CLAY	27	43		1.6	
1.200	3.94	69.63	3.14	SANDY SILT to CLAYEY SILT	28	45		4.1	
1.350	4.43	20.30	5.04	CLAY	20	32		1.3	
1.500	4.92	25.46	5.01	CLAY	25	41		1.5	
1.650	5.41	17.34	4.06	CLAY to SILTY CLAY	12	18		1.1	
1.800	5.91	49.04	3.56	CLAYEY SILT to SILTY CLAY	25	39		2.9	
1.950	6.40	24.78	4.92	CLAY	25	40		1.4	
2.100	6.89	89.03	1.24	SAND to SILTY SAND	22	35	73		44.0
2.250	7.38	23.49	4.58	CLAY	23	35		1.5	
2.400	7.87	25.67	4.30	CLAY to SILTY CLAY	17	25		1.7	
2.550	8.37	16.54	4.64	CLAY	17	23		1.1	
2.700	8.86	21.18	5.28	CLAY	21	29		1.2	
2.850	9.35	11.90	3.30	CLAY to SILTY CLAY	8	11		.8	
3.000	9.84	22.14	2.31	CLAYEY SILT to SILTY CLAY	11	14		1.4	
3.150	10.33	11.94	5.03	CLAY	12	15		.8	
3.300	10.83	38.22	4.49	CLAY to SILTY CLAY	25	32		2.2	
3.450	11.32	13.06	7.58	CLAY	13	16		.8	
3.600	11.81	10.19	7.99	CLAY	10	12		.6	
3.750	12.30	15.39	6.10	CLAY	15	18		1.0	
3.900	12.80	16.40	5.27	CLAY	16	19		1.0	
4.050	13.29	13.29	6.38	CLAY	13	15		.8	
4.200	13.78	13.69	5.52	CLAY	14	15		.9	
4.350	14.27	15.26	7.71	CLAY	15	16		1.0	
4.500	14.76	17.36	5.41	CLAY	17	18		1.1	
4.650	15.26	35.06	3.63	CLAYEY SILT to SILTY CLAY	18	18		2.3	
4.800	15.75	34.66	5.36	CLAY	35	36		2.0	
4.950	16.24	15.98	6.23	CLAY	16	16		1.0	
5.100	16.73	15.11	6.90	CLAY	15	15		.9	
5.250	17.22	49.21	4.84	CLAY to SILTY CLAY	33	32		2.8	
5.400	17.72	173.42	.72	SAND	35	34	82		43.0
5.550	18.21	61.52	4.84	CLAY to SILTY CLAY	41	39		3.6	
5.700	18.70	32.90	2.46	SANDY SILT to CLAYEY SILT	13	12		2.1	
5.850	19.19	58.38	3.43	CLAYEY SILT to SILTY CLAY	29	27		3.4	
6.000	19.69	119.26	2.38	SILTY SAND to SANDY SILT	40	37	70		40.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 50.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on ROBERTSON and CAMPANELLA, 1989

Earth Mechanic
CPT-04-5C



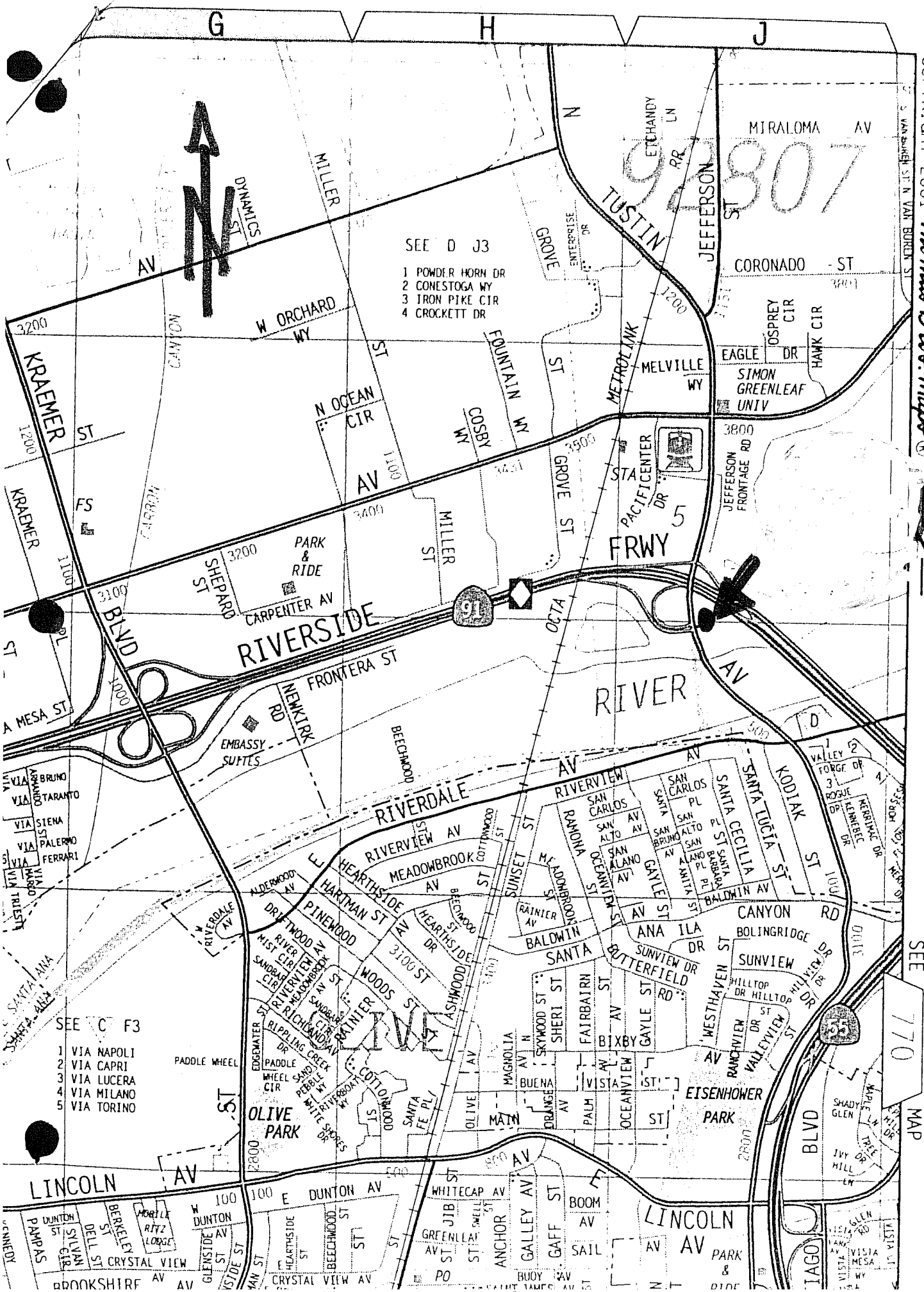
Hammer to Rod String Distance 1.143 (m)
* = Not Determined

Caltrans Bridge 55-0414
Tustin Ave OC (Widen), Orange Co.

Caltrans Bridge 55-0414, Tustin Ave OC (Widen), Orange Co.

This bridge is located in Riverside in Orange County and is in construction next to an existing Tustin Ave bridge over SR90. The new abutments are seat-type with rigid walls about 20 to 25 ft tall on piles and boxed in by existing and new wingwalls.

The field investigation for this bridge was conducted on 3/6/04, consisting of (3) up to 21.5-ft deep soil borings and (2) 20-ft conventional and seismic CPT's. Drilling was performed by 2R Drilling and CPT by HFA. Borehole 04-6 and CPT 04-6C were performed at the south abutment. Borehole 04-7 and CPT 04-7C were performed at the north abutment. Another borehole 04-8 was added at CPT 04-7C to define the extent of the structural backfill. Geotechnical soil sampling consisted of ring samples collected at 2.5-ft depth intervals using a Modified California and SPT samplers. Seismic wave measurements were taken at 2.5-ft intervals. Groundwater was not encountered.



G
H
J
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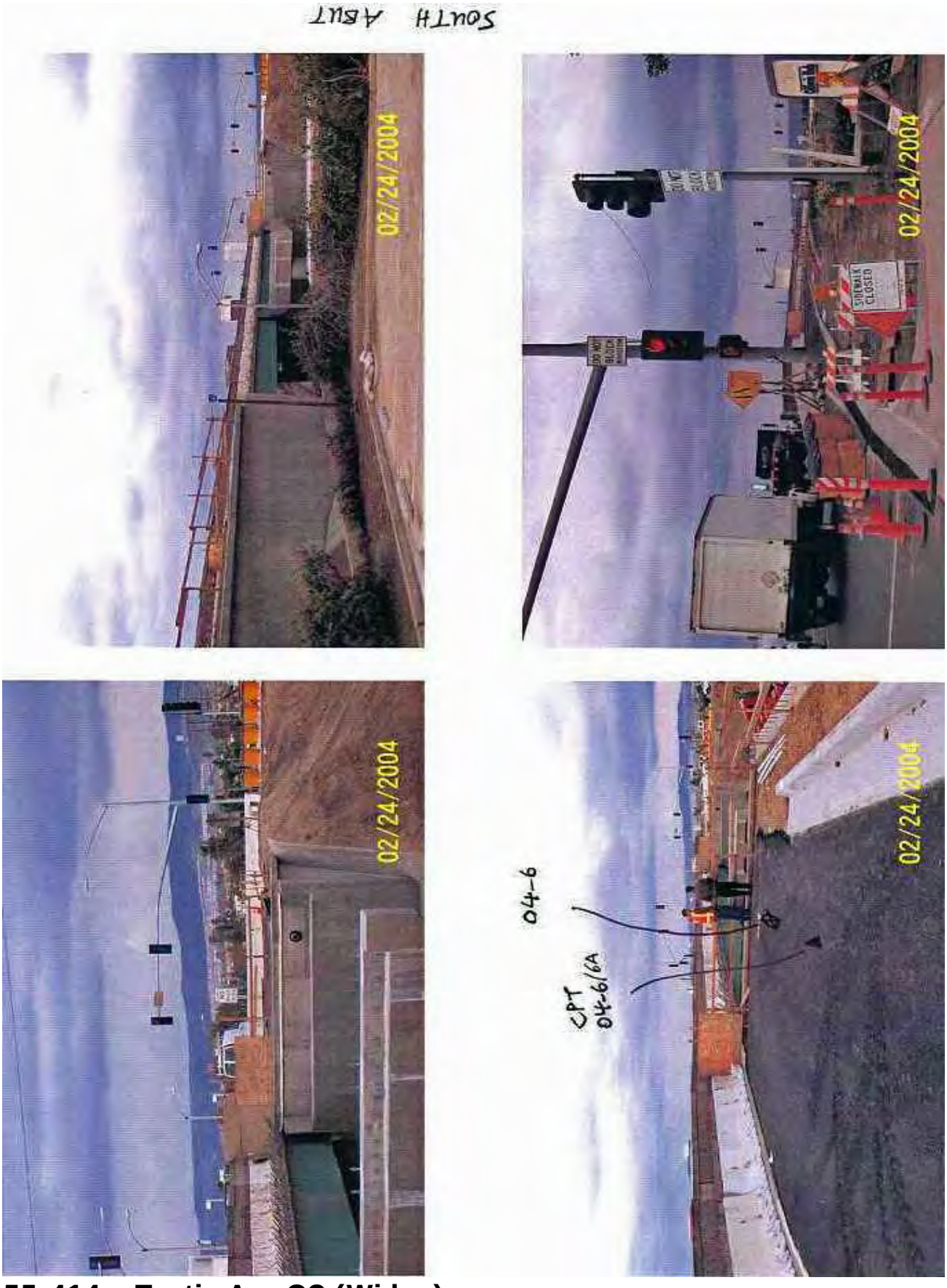
92807
SEE D J3
1 POWDER HORN DR
2 CONESTOGA WY
3 IRON PIKE CIR
4 CROCKETT DR
SEE C F3
1 VIA NAPOLI
2 VIA CAPRI
3 VIA LUCERA
4 VIA MILANO
5 VIA TORINO
MIRALOMA AV
CORONADO ST
TUSTIN
JEFFERSON
ETCHANDY LN
ENTERPRISE DR
GROVE
MILLER
DYNAMICS ST
W ORCHARD WY
KRAEMER
CANYON
N OCEAN CIR
FOUNTAIN WY
COSBY WY
METROLINK
MELVILLE WY
EAGLE DR
OSPREY CIR
HAWK CIR
SIMON GREENLEAF UNIV
PACIFICENTER DR
JEFFERSON FRONTAGE RD
FRWY
PARK & RIDE
SHEPARD ST
CARPENTER AV
RIVERSIDE
BLVD
FRONTERA ST
NEWKIRK RD
EMBASSY SUITES
BEECHWOOD
OCTA
RIVER
RIVERDALE
RIVERVIEW AV
MEADOWBROOK AV
HEARTHSIDE
HARTMAN ST
PINEWOOD
DRIFTWOOD
WOODS ST
ASHWOOD
RAINIER
SUNSET ST
RAMONA
SAN CARLOS
SAN ALTO
SAN ALANO
SANTA CECILIA
SANTA LUCIA ST
KODIAK ST
BALDWIN AV
CANYON RD
ANA ILA DR
BOLINGRIDGE DR
SUNVIEW
SUNVIEW DR
BUTTERFIELD RD
WESTHAVEN ST
HILLTOP DR
RANCHVIEW
VALLEYVIEW
SHERI ST
FAIRBAIRN
BIXBY
GAYLE ST
SKYWOOD ST
MAGNOLIA
BUENA
VISTA
OCEANVIEW
PALM
ORANGE
MAIN
OLIVE
EISENHOWER PARK
OLIVE PARK
PADDLE WHEEL
COTTONWOOD
SANTA FE PL
LINCOLN AV
E DUNTON AV
W DUNTON
CRYSTAL VIEW
BROOKSHIRE AV
PAMPAS
SYLVAN CIR
DELL ST
BERKELEY ST
MOBILE RITZ LODGE
GLENSIDE ST
WHITECAP AV
GREENLEAF AV
JIB ST
ANCHOR
GALLEY AV
GAFF ST
BOOM AV
SAIL
BUOY AV
PARK & RIDE
SHADY GLEN
IVY HILL LN
VISTA MESA
SEE MAP
770
55
91

55-414 Tustin Ave OC (Widen)

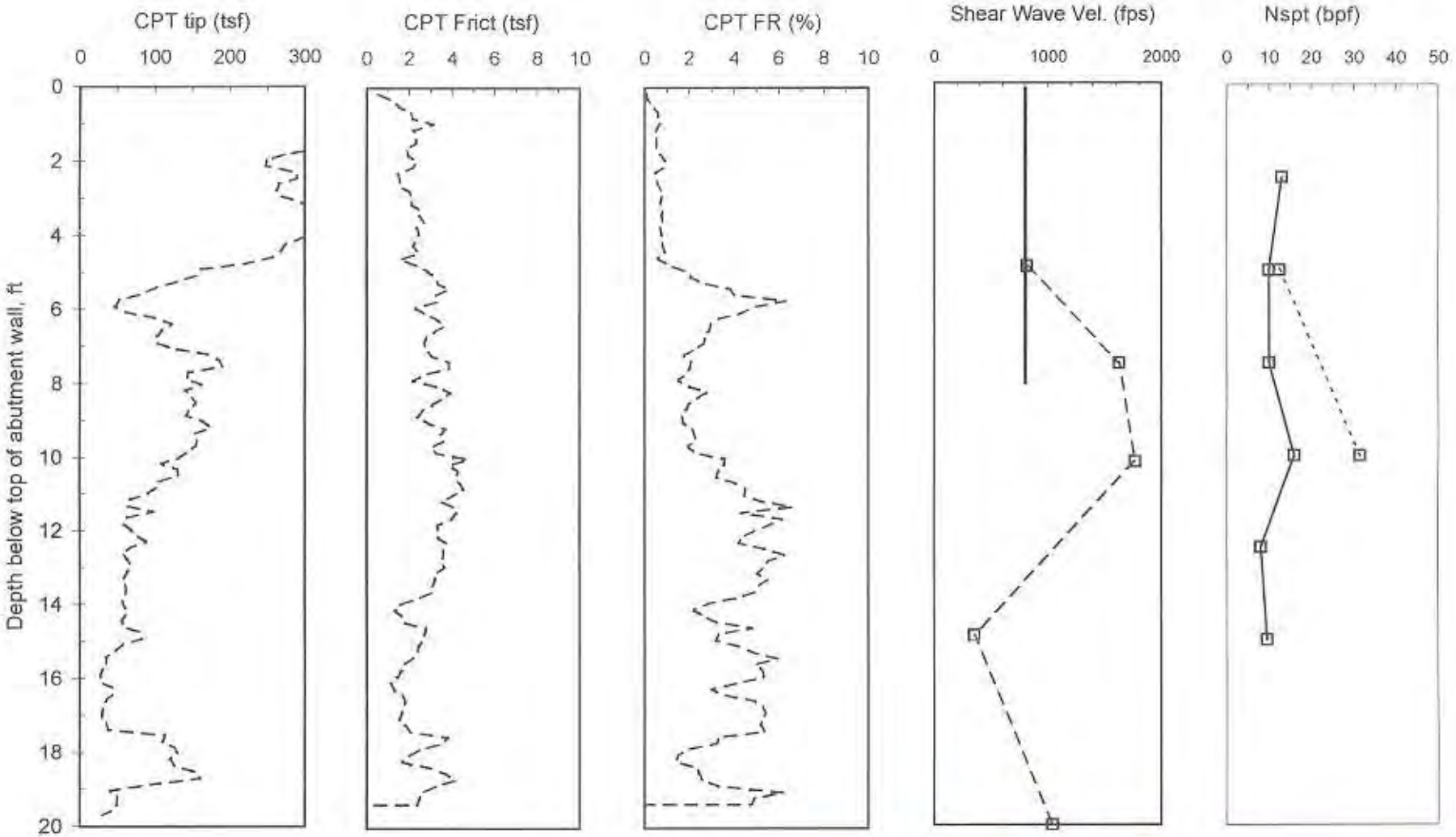
55-414 Tustin Ave OC (Widen)



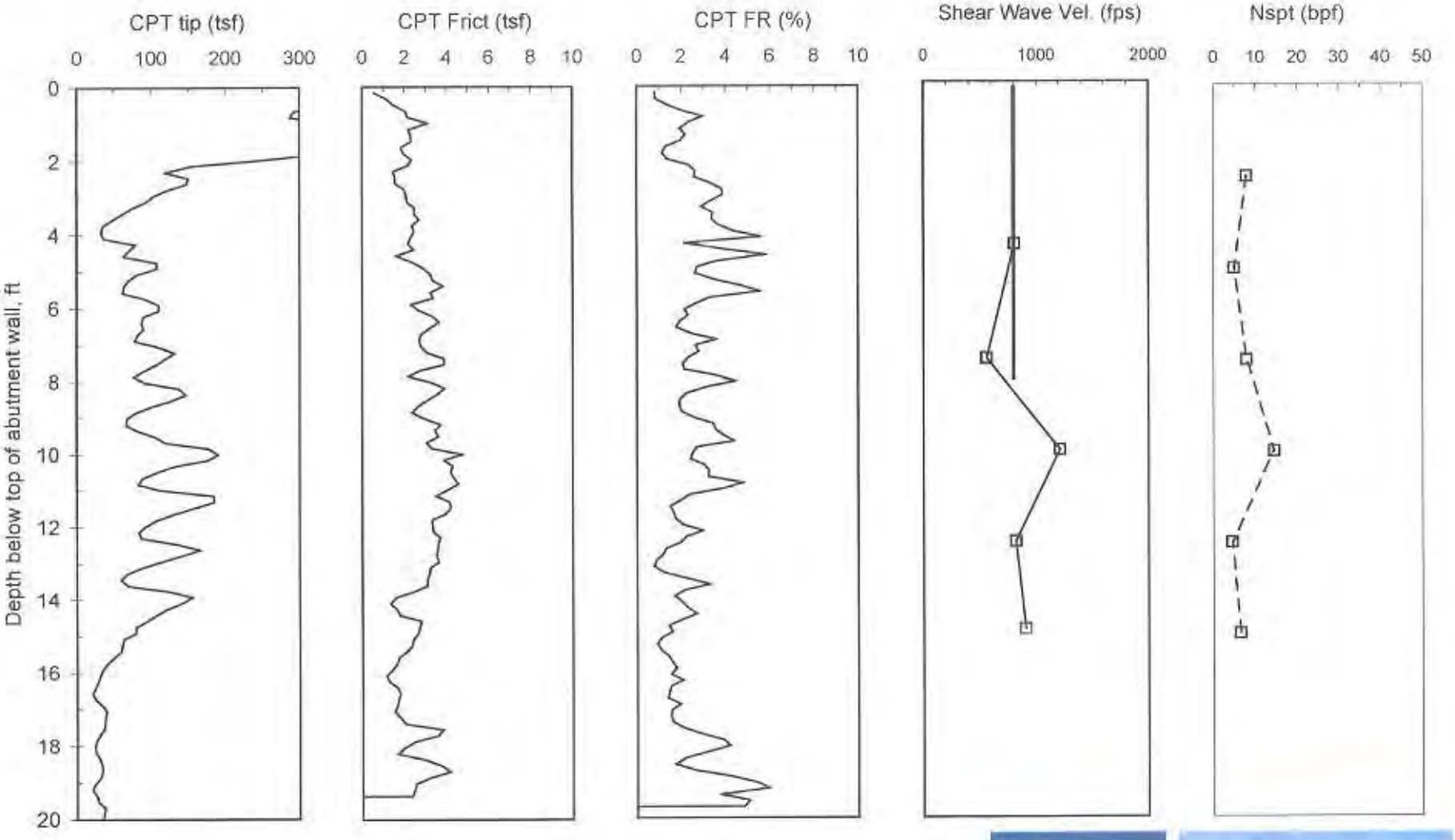
55-414 Tustin Ave OC (Widen)

55-414 Tustin Ave OC (Widen)

BOREHOLE & CPT DATA FOR TUSTIN AVE OC NORTH ABUTMENT



BOREHOLE & CPT DATA FOR TUSTIN AVE OC ABUTMENTS



DIST.	COUNTY	ROUTE	POST km TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	ORA	91	13.5	65	104

Caltrans Metric

Perry C Schacht
REGISTERED CIVIL ENGINEER

Perry C. Schacht No. C41095 Exp. 3-31-03 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

PLANS APPROVAL DATE

TYLIN INTERNATIONAL
5030 CAMINO DE LA SIESTA, SUITE 204, SAN DIEGO, CA. 92108
(619) 692-1920 www.tylin.com

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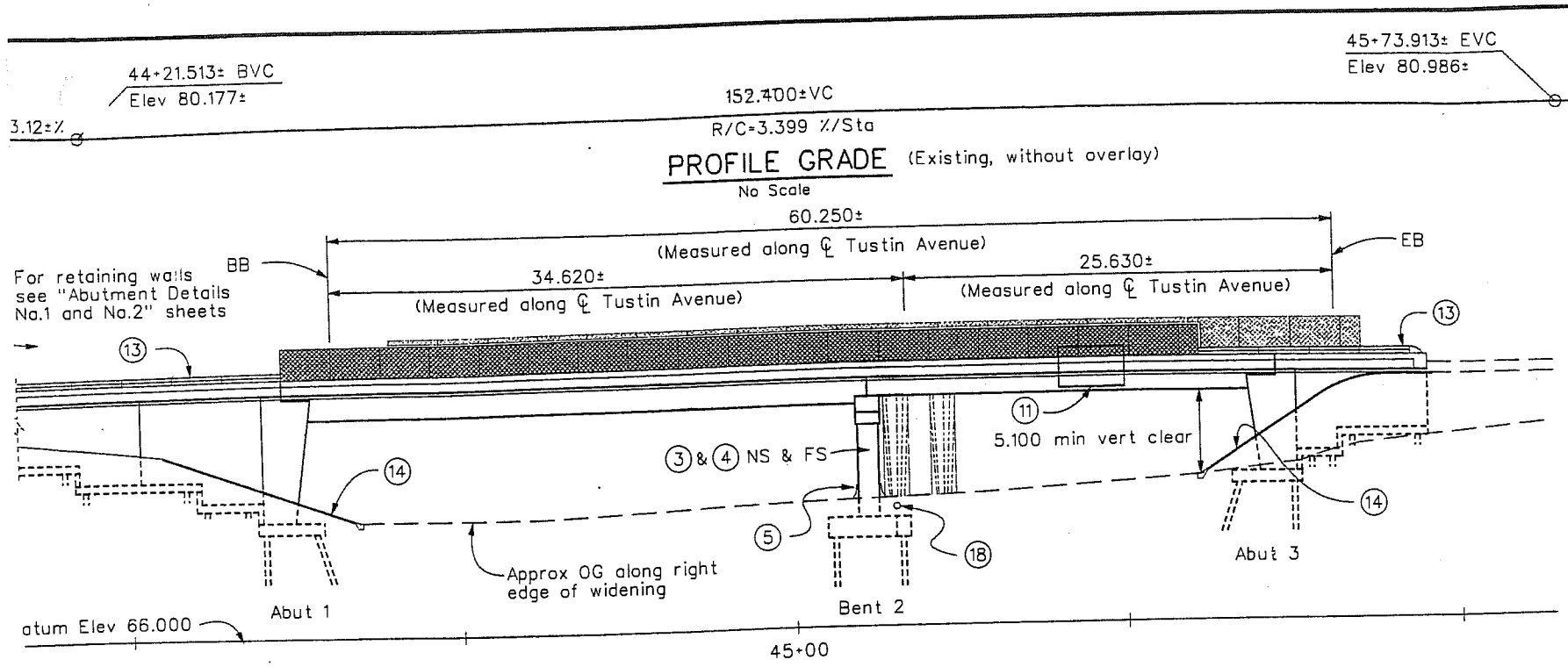
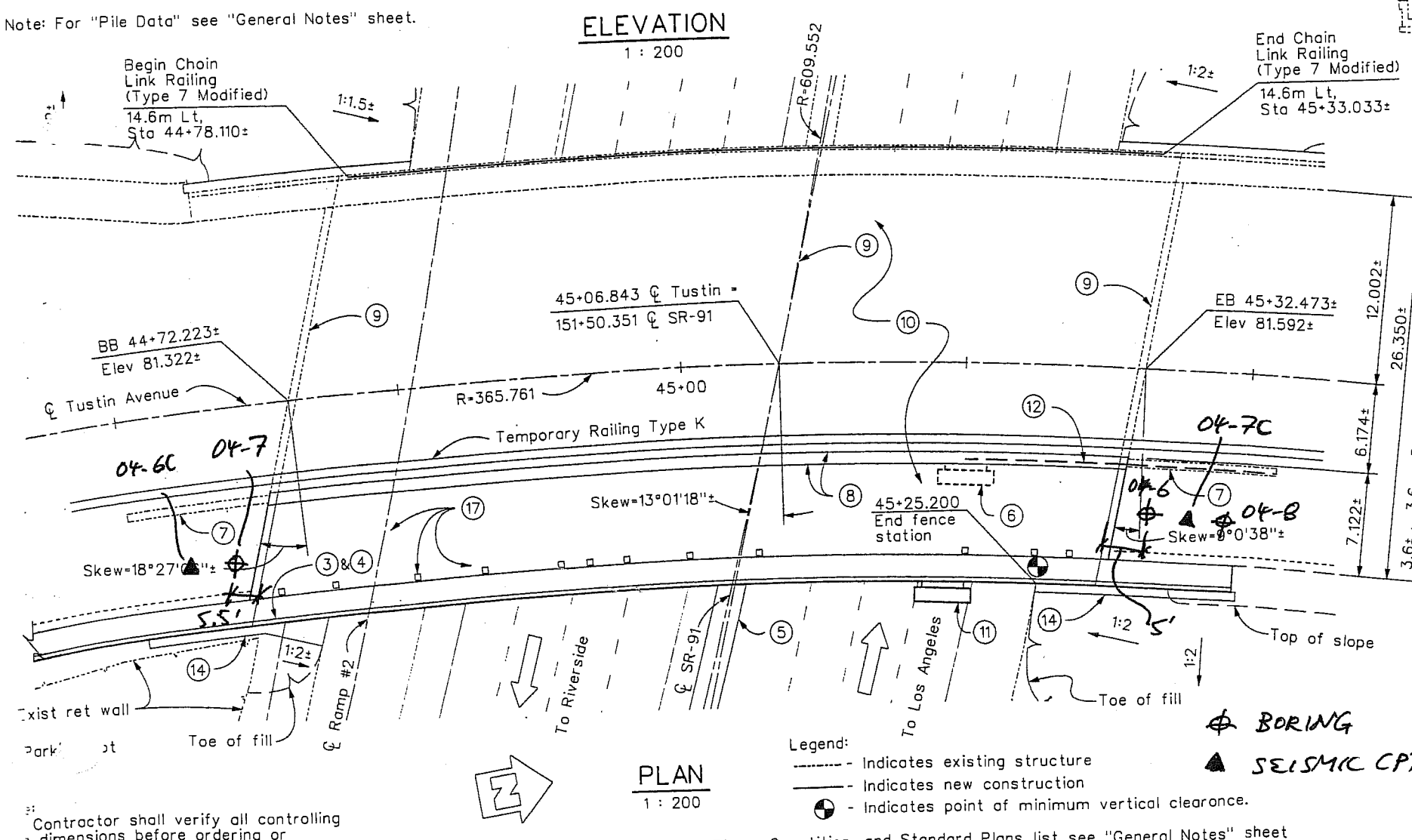
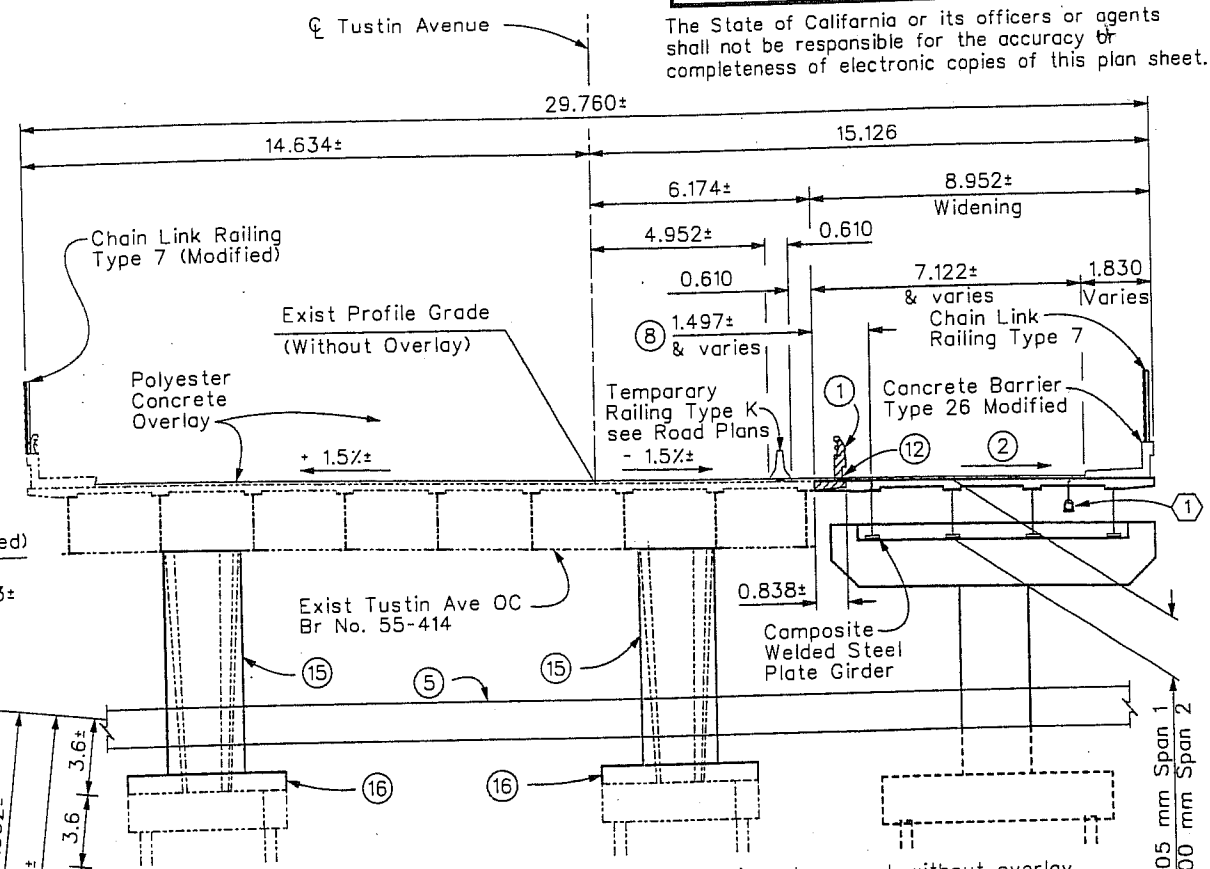


Utilities:

(1) - Steel Drainage Pipe

Note: For "Pile Data" see "General Notes" sheet.





Notes:

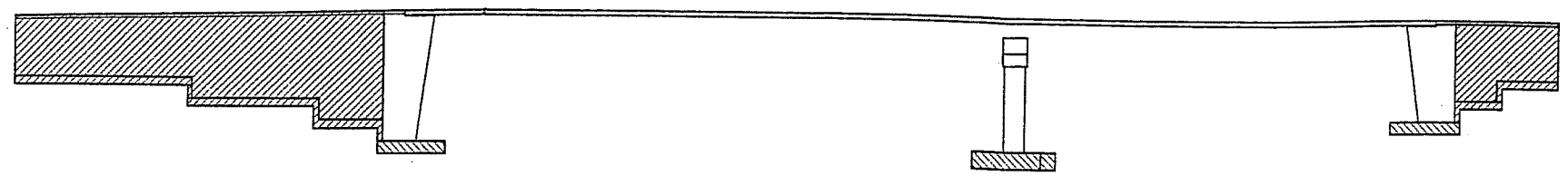
1. Bridge removal (Portion), Remove existing concrete barrier, hand railing and overhang.
2. Match existing grades and cross slope.
3. Paint "Tustin Ave Overcrossing"
4. Paint "Bridge No. 54-414"
5. Concrete Barrier Type 60, see "Road Plans"
6. Existing Structure Mounted Sign to be relocated
7. Remove top 1.0 m of existing retaining wall and exist concrete barrier. See "Miscellaneous Details" sheet
8. Closure Pour
9. Reploce existing joint seal
10. Polyester Concrete Overlay
11. Relocate existing structure mounted sign
12. Remove and relocate existing electrical conduit for structure mounted sign, see "Electrical Plans"
13. Tubular Hond Railing
14. Slope Paving
15. Steel Column Casing
16. Footing Retrofit
17. Deck Drains Type D-1, tot 12.
18. Remove and Reconstruct Existing 380mm dia. SCSP: See "Road Plans".

All dimensions ore in meters unless otherwise shown

Contractor shall verify all controlling dimensions before ordering or fabricating any material.

For General Notes, Index to Bridge Plans, Quantities, and Standard Plans list see "General Notes" sheet

DESIGN BY	CHECKED	LOAD FACTOR DESIGN	LIVE LOADING	PREPARED FOR THE	BRIDGE No.	TUSTIN AVENUE OVERCROSSING-WIDEN
Perry Schacht	Rick Chan		HS20-44 AND ALTERNATIVE AND PERMIT DESIGN LOAD	Perry Schacht	55-414	



CONCRETE STRENGTH AND TYPE LIMITS

No Scale

- Structural Concrete, Bridge (28 MPa @ 28 days).
- Structural Concrete, Bridge Footing (28 MPa @ 28 days).
- Structural Concrete, Retaining Wall

GENERAL NOTES
LOAD FACTOR DESIGN

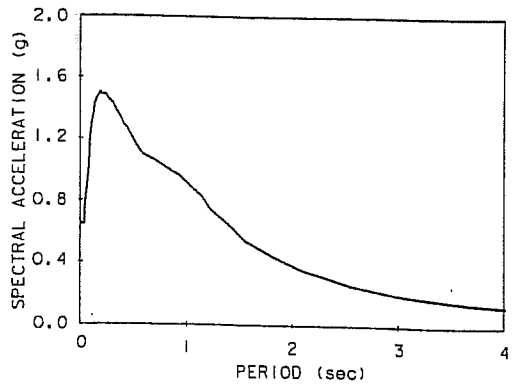
DESIGN: Caltrans Bridge Design Specifications - April 2000 (LFD) 1996 AASHTO with Interims and Revisions by Caltrans

SEISMIC DESIGN: Caltrans Seismic Design Criteria (SDC), Version 1.1 July 1999

DEAD LOAD: Includes 1675 N/m² for future wearing surface

LIVE LOADING: HS20-44 and alternative and permit design load

SEISMIC LOADING: SDC ARS Curve For Soil Profile D (M=6.5 ±0.25) and (M=7.25 ±0.25), (Peak Rock Acceleration = 0.5g) with Modifications, see curve below



REINFORCED CONCRETE:
fy = 420 MPa
fc = 28 MPa
n = 8

Transverse Deck Slabs (Warking Stress Design)
fs = 138 MPa
fc = 8.3 MPa
n = 10

STRUCTURAL STEEL:
fy = 345 MPa

HS BOLTS: ASTM A325, Type 1

ANCHOR RODS: ASTM A449

Note:
The Contractor shall verify all controlling field dimensions before ordering or fabricating any material.

PILE DATA - CLASS 400C PILE

Location	Design Loading (Service Load)	Nominal Resistance		Design Tip Elevation	Specified Tip Elevation
		Compression	Tension		
Abut 1	400 kN	800 kN	-	61 (1) & 64 (2)	61
Bent 2	400 kN	800 kN	400 kN	61 (1) & 64 (2) (3)	61
Abut 3	400 kN	800 kN	-	61 (1) & 64 (2)	61
Ret Walls	400 kN	800 kN	-	64 (2)	64

(1) Compression
(2) Lateral Loading
(3) Uplift

STANDARD PLANS
DATED JULY, 1999 *

	A10A	ABBREVIATIONS
	A10B	SYMBOLS
	A62C	LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL BRIDGE
	B0-1	BRIDGE DETAILS
RSP	B0-3	BRIDGE DETAILS
	B0-5	BRIDGE DETAILS
	B0-13	BRIDGE DETAILS
	B2-6	PILE DETAILS CLASS 400C AND CLASS 625C
RSP	B3-1	RETAINING WALL TYPE 1 H=1200 THROUGH 9100 mm
RSP	B3-8	RETAINING WALL DETAILS NO. 1
	B6-21	JOINT SEALS (MOVEMENT RATING = 50 mm)
	B7-1	BOX GIRDER DETAILS
	B7-6	DECK DRAINS TYPES D-1 AND D-2
	B8-5	CAST-IN-PLACE PRESTRESSED GIRDER DETAILS
	B11-51	TUBULAR HAND RAILING
	B11-52	CHAIN LINK RAILING TYPE 7
	B11-54	CONCRETE BARRIER TYPE 26

* - RSP Indicates Revised Standard Plan per Standard Plans Doted July, 1999, Erratum No. 99-1

INDEX TO BRIDGE PLANS

SHEET NO.	TITLE
1	GENERAL PLAN
2	GENERAL NOTES
3	FOUNDATION PLAN
4	ABUTMENT 1 LAYOUT
5	ABUTMENT 3 LAYOUT
6	ABUTMENT DETAILS NO. 1
7	ABUTMENT DETAILS NO. 2
8	ABUTMENT DETAILS NO. 3
9	ABUTMENT DETAILS NO. 4
10	BENT DETAILS
11	BENT RETROFIT DETAILS
12	TYPICAL SECTION
13	GIRDER LAYOUT
14	GIRDER DETAILS NO. 1
15	GIRDER DETAILS NO. 2
16	FRAMING DETAILS
17.	MISCELLANEOUS DETAILS
18	STEEL GIRDER DETAILS
19	STEEL COLUMN CASINGS
20	CHAIN LINK RAILING TYPE 7 (MODIFIED) DETAILS NO. 1
21	CHAIN LINK RAILING TYPE 7 (MODIFIED) DETAILS NO. 2
22	DECK DRAIN LAYOUT
23	DECK DRAIN DETAILS
24	SLOPE PAVING - FULL SLOPE
25	LOG OF TEST BORINGS
26	AS-BUILT LOG OF TEST BORINGS

Caltrans Metric.

DIST.	COUNTY	ROUTE	POST km TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	ORA	91	13.5	66	104

Perry C Schacht
REGISTERED CIVIL ENGINEER

PROFESSIONAL ENGINEER — Perry C. Schacht — No. C41095 — Exp. 3-31-03 — CIVIL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

T·Y LIN INTERNATIONAL
5030 CAMINO DE LA SIESTA, SUITE 204, SAN DIEGO, CA. 92108
(619) 692-1920 www.tylin.com

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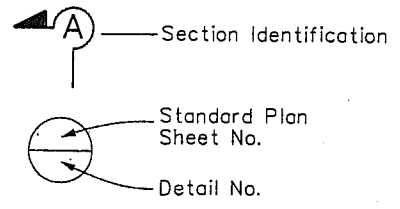
APPROXIMATE PAY QUANTITIES

CLEAN BRIDGE DECK	1,548.	M2
BRIDGE REMOVAL (PORTION)		LS
FURNISH PILE (CLASS 400C)	1,195.	M
DRIVE PILE (CLASS 400C)	98.	M
DRILL AND BOND DOWEL	163.	M
FURNISH POLYESTER CONCRETE OVERLAY	36.	M3
CLEAN AND PAINT STRUCTURAL STEEL		LS
TREAT BRIDGE DECK	1,548	M2
FURNISH BRIDGE DECK TREATMENT MATERIAL (Low Odor)		LS
RECONSTRUCT SIGN STRUCTURE	1.	EA
MOBILIZATION		LS

FINAL PAY QUANTITIES

STRUCTURE EXCAVATION (BRIDGE)	264.	M3
STRUCTURE EXCAVATION (RETAINING WALL)	247.	M3
STRUCTURE BACKFILL (BRIDGE)	251.	M3
STRUCTURE BACKFILL (RETAINING WALL)	331.	M3
STRUCTURAL CONCRETE, BRIDGE FOOTING	68.	M3
STRUCTURAL CONCRETE, BRIDGE	277.	M3
STRUCTURAL CONCRETE, RETAINING WALL	94.	M3
PLACE POLYESTER CONCRETE OVERLAY	1548.	M2
JOINT SEAL (MR 30 mm)	93.	M
BAR REINFORCING STEEL (BRIDGE)	36,245.	Kg
BAR REINFORCING STEEL (RETAINING WALL)	7,082.	Kg
COLUMN CASING	5,346.	Kg
FURNISH STRUCTURAL STEEL (BRIDGE)	100,646.	Kg
ERECT STRUCTURAL STEEL (BRIDGE)	100,646.	Kg
SLOPE PAVING (CONCRETE)	37.	M3
CHAIN LINK RAILING (TYPE 7)	51.	M
CHAIN LINK RAILING (TYPE 7 MODIFIED)	56.	M
MISCELLANEOUS METAL (BRIDGE)	2,442.	Kg
TUBULAR HAND RAILING	41.	M
CONCRETE BARRIER (TYPE 26) MODIFIED	92.	M

PLAN SYMBOLS



All dimensions are in meters unless otherwise shown

DESIGN BY Perry Schocht | CHECKED Rick Chan | PREPARED FOR THE | BRIDGE No. _

135

DIST.	COUNTY	ROUTE	POST km TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	ORA	91	13.5	67	104

Perry C Schacht
REGISTERED CIVIL ENGINEER

Perry C. Schacht
No. C41095
Exp. 3-31-03
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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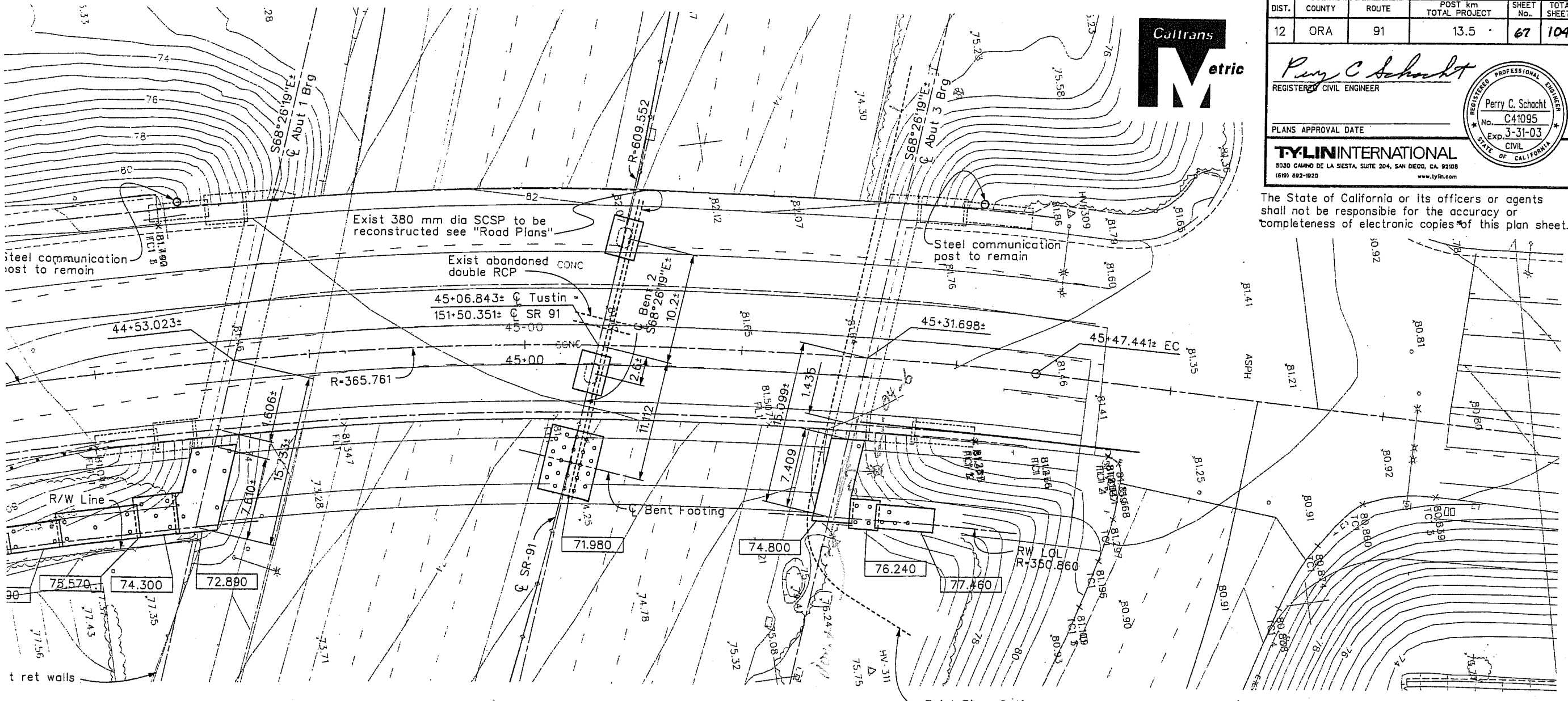
Caltrans Metric



℄ Tustin Ave Curve Data

R = 365.761

Δ = 66° 40' 56"

L = 425.681

T = 240.636

PLAN
1 : 200

Notes:

1. [ ] - Indicates bottom of footing elevation.
2. For limits of excavation & backfill, see A62C
3. Not all piles shown.

CH MARKS

Elev 234.70

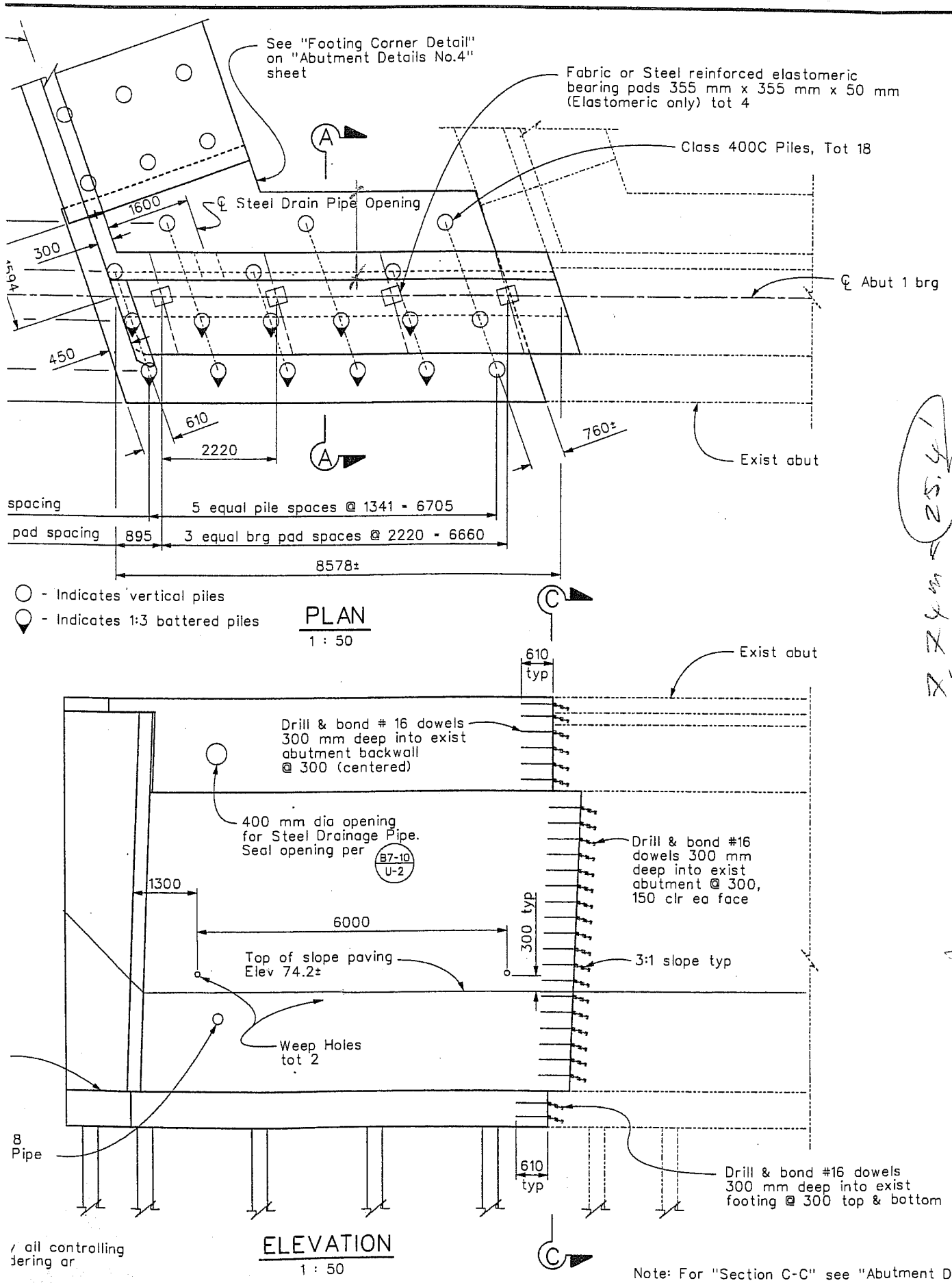
C headwall East
Grove St Ora-175-B

Elev 239.32

CC headwall 18.0 m right
-B

controlling
g or

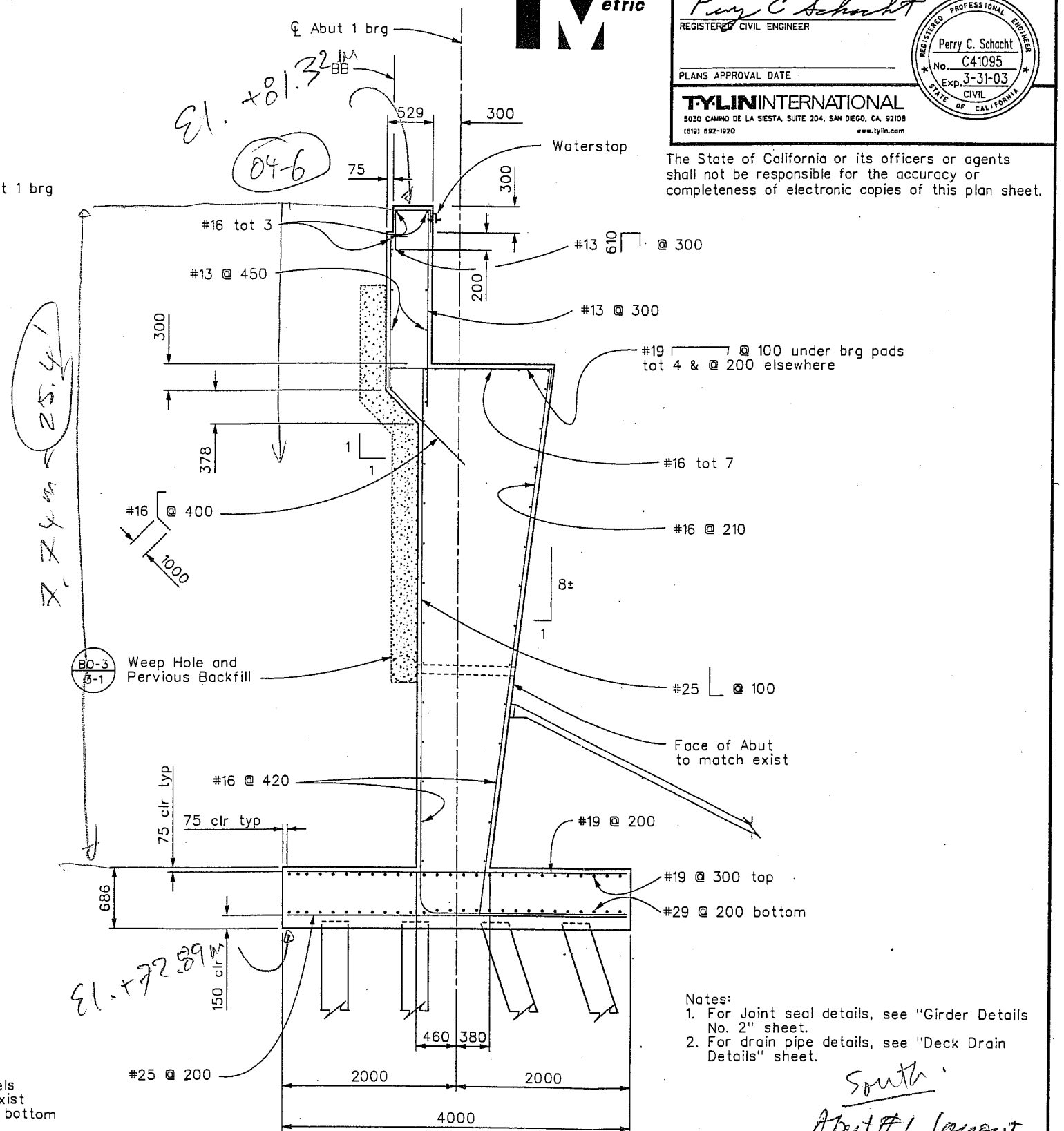
All dimensions are in meters unless otherwise shown



PLAN
1 : 50

ELEVATION
1 : 50

Note: For "Section C-C" see "Abutment Details No.3" sheet.



SECTION A-A
1 : 30

Notes:
1. For Joint seal details, see "Girder Details No. 2" sheet.
2. For drain pipe details, see "Deck Drain Details" sheet.

South Abut #1 Layout

All dimensions are shown in millimeters unless otherwise shown

DIST.	COUNTY	ROUTE	POST km TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	ORA	91	13.5	68	104

Perry C Schacht
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Perry C. Schacht — No. C41095 — Exp. 3-31-03 — CIVIL — STATE OF CALIFORNIA

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DIST.	COUNTY	ROUTE	POST km TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	ORA	91	13.5	69	104

Caltrans Metric

Perry C Schacht
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Perry C. Schacht
No. C41095
Exp. 3-31-03
CIVIL
STATE OF CALIFORNIA

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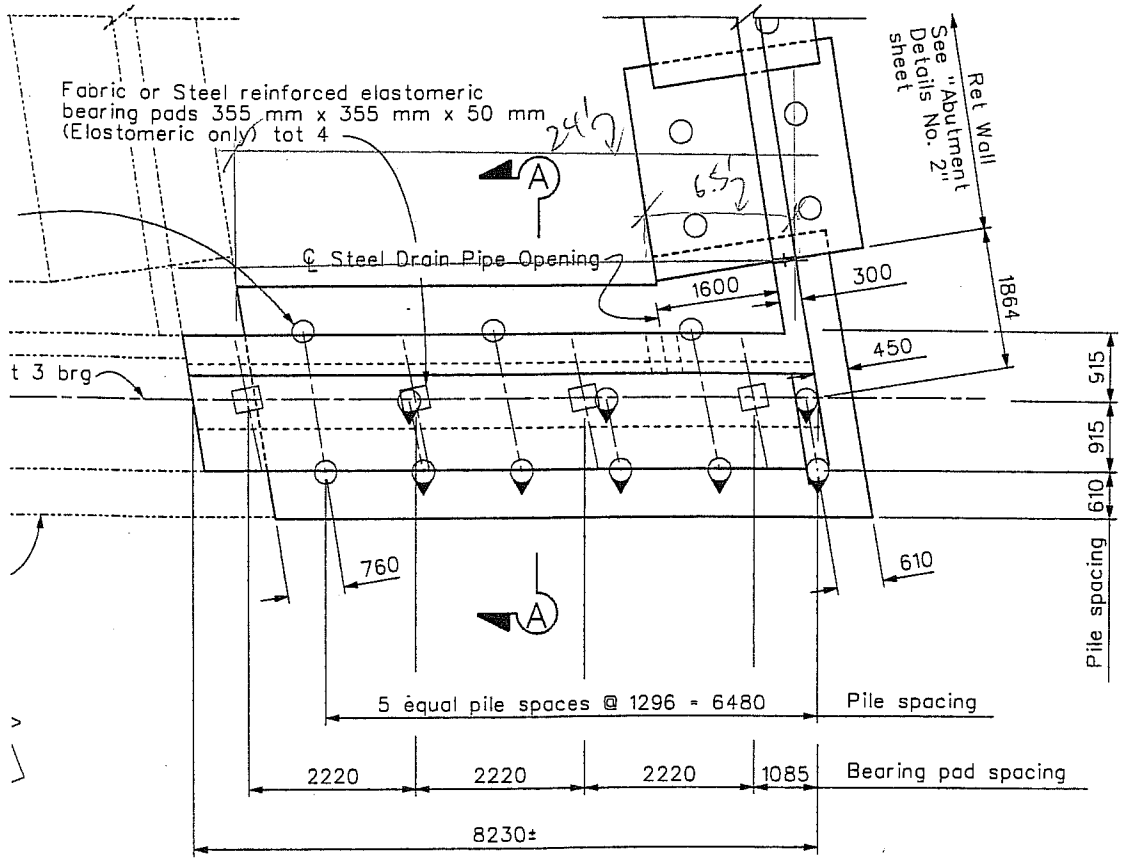
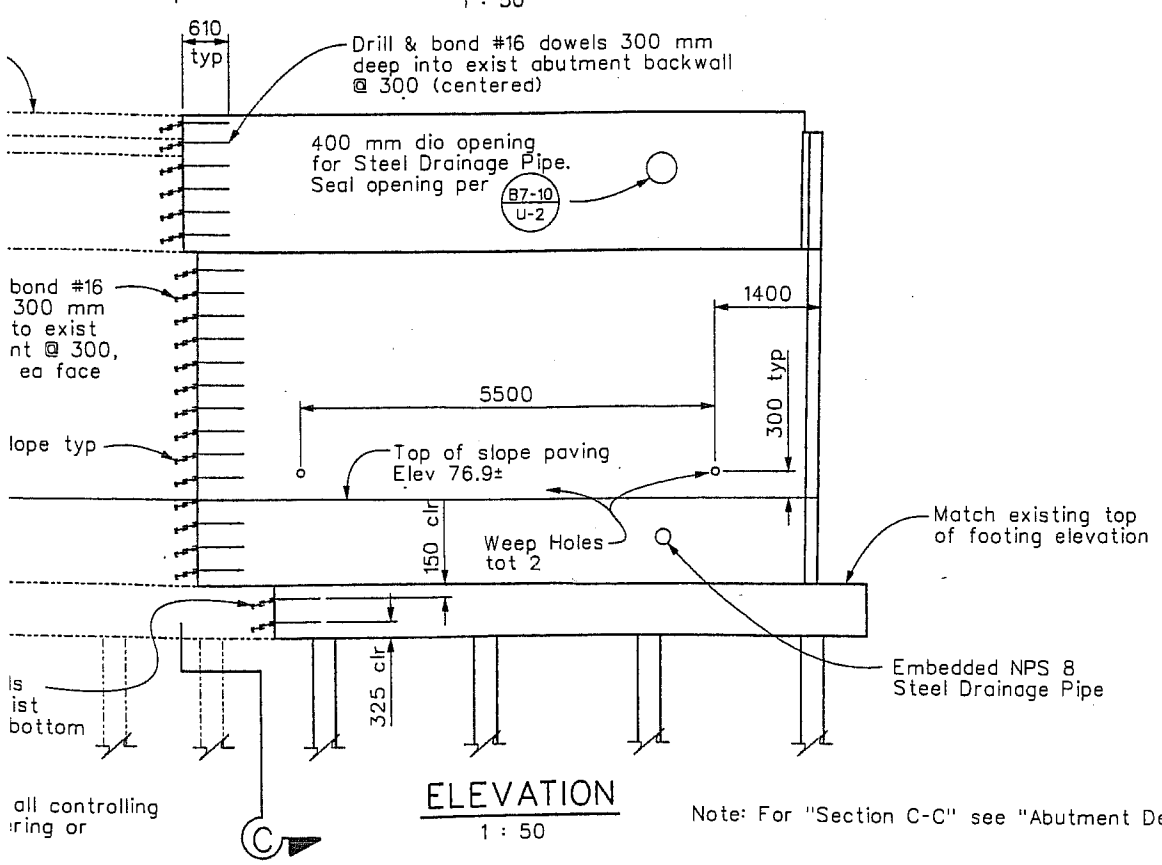


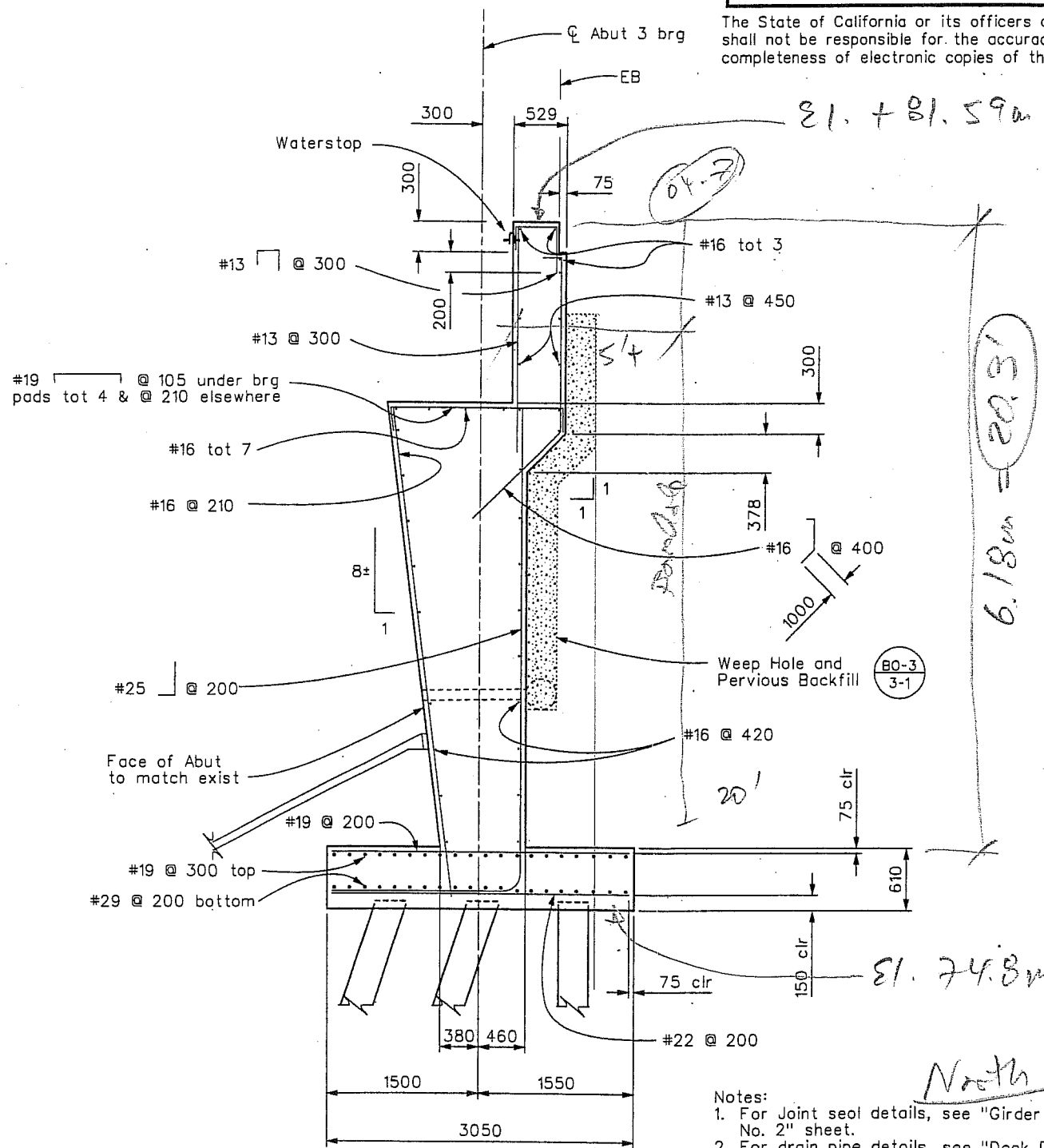
○ - Indicates vertical piles
◐ - Indicates 1:3 battered piles

PLAN
1 : 50



ELEVATION
1 : 50

Note: For "Section C-C" see "Abutment Details No.3" sheet.



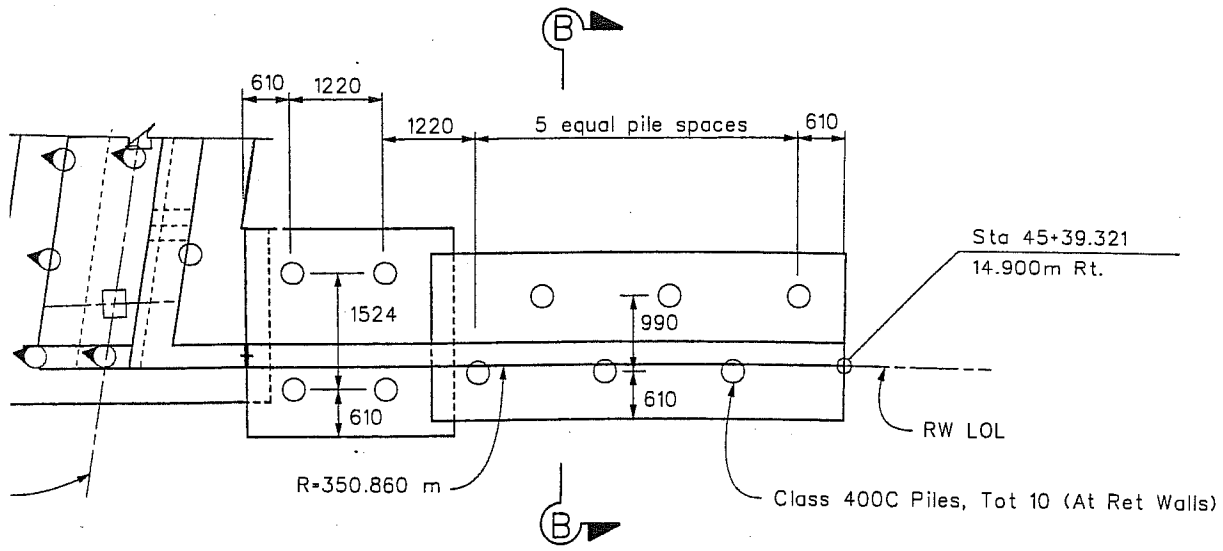
SECTION A-A
1 : 30

Notes:
1. For Joint seal details, see "Girder Details No. 2" sheet.
2. For drain pipe details, see "Deck Drain Details" sheet.

North

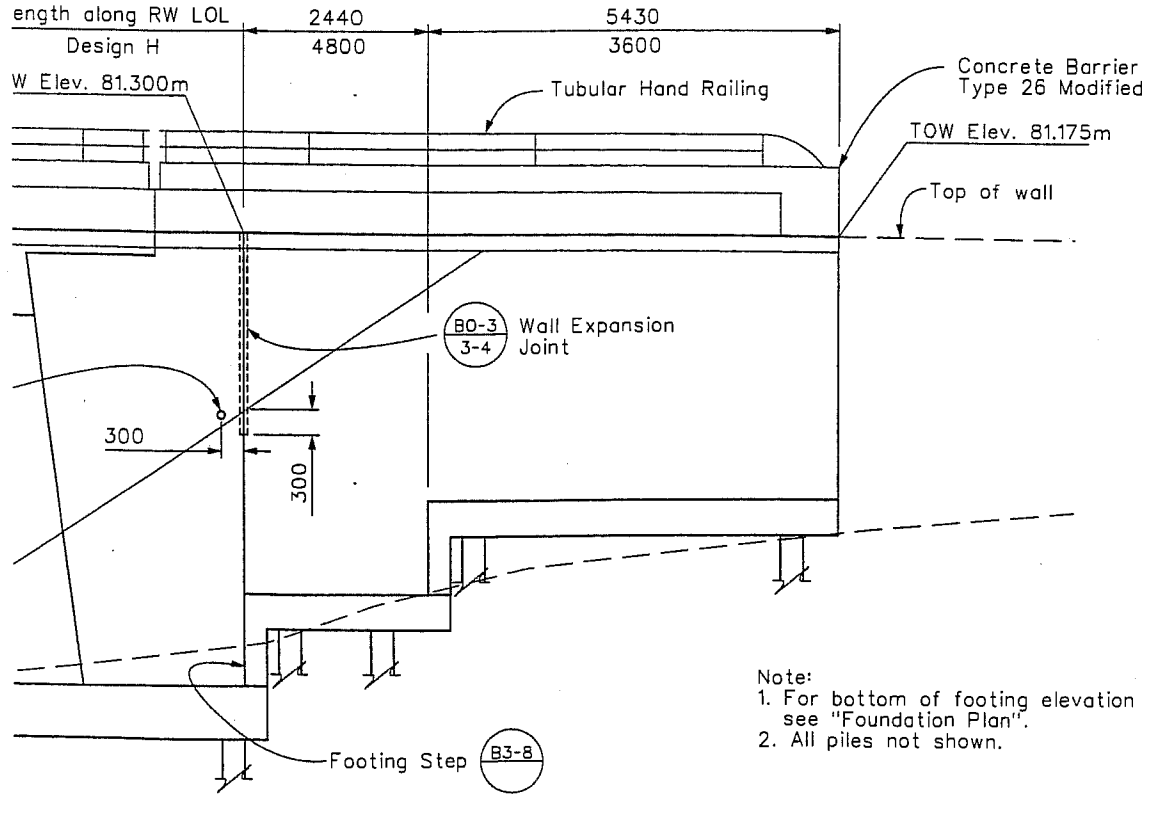
Abut #3 layout

All dimensions are shown in millimeters unless otherwise shown



PLAN
1 : 200

Note: Pile spacing measured along RW LOL.

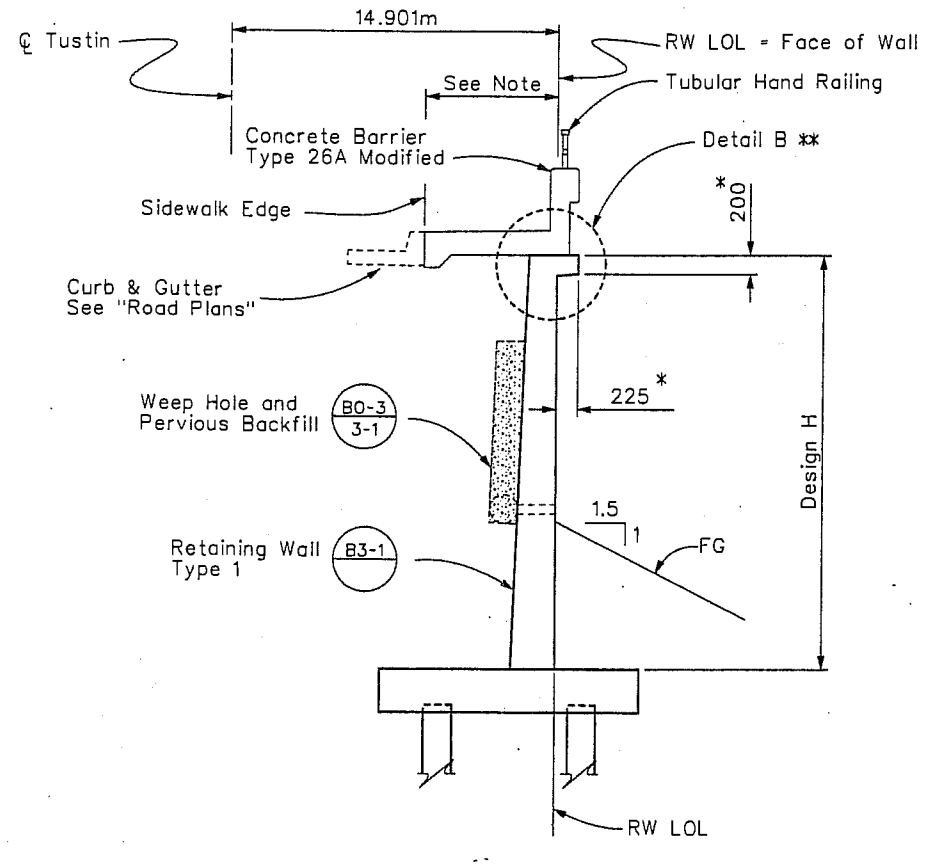


Note:
1. For bottom of footing elevation see "Foundation Plan".
2. All piles not shown.

ELEVATION
1 : 200

ABUTMENT 3 RETAINING WALL
1 : 50

ontrolling
or



SECTION B-B
1 : 40

* - Match deck overhang.

** - For "Detail B" see "Abutment Details No.1" sheet

Note: For Location of Sidewalk Edge, See "Sidewalk Plan" on "Miscellaneous Details" Sheet.

Abut #3

DIST.	COUNTY	ROUTE	POST km TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	ORA	91	13.5	71	104

Caltrans Metric

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

Perry C. Schacht — No. C41095 — Exp. 3-31-03 — CIVIL — STATE OF CALIFORNIA — REGISTERED PROFESSIONAL ENGINEER

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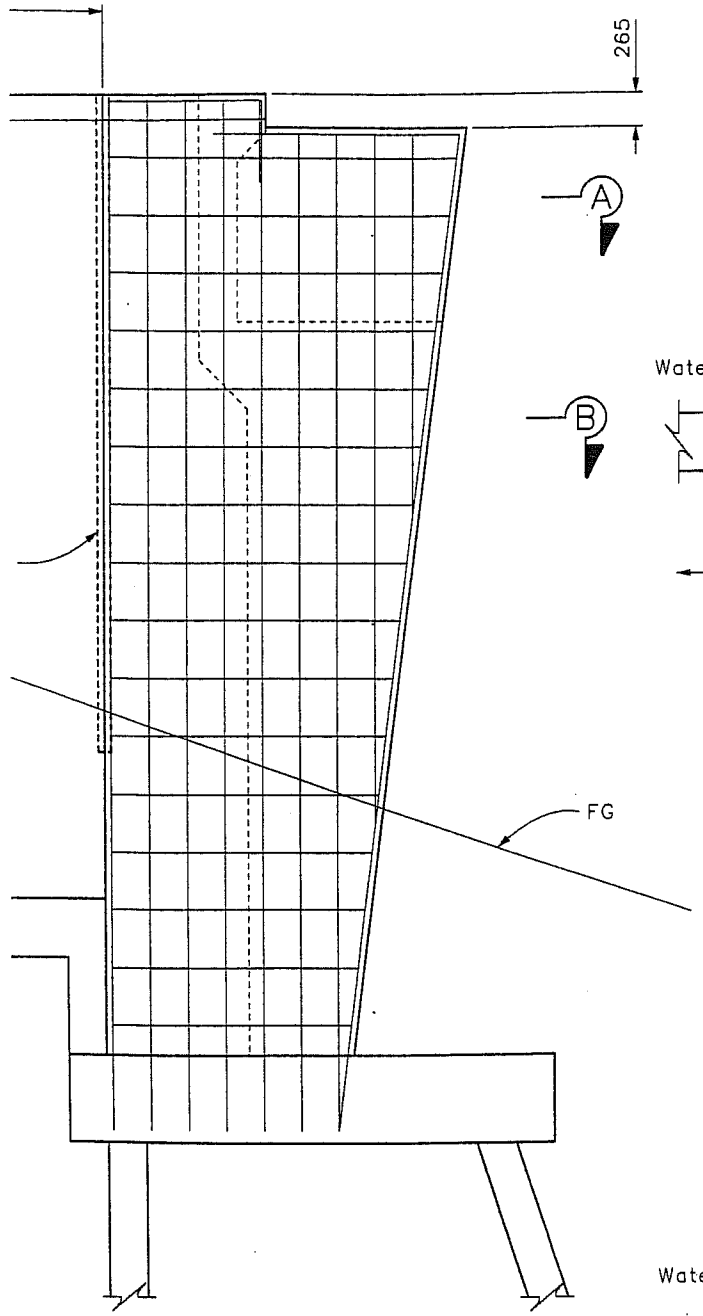
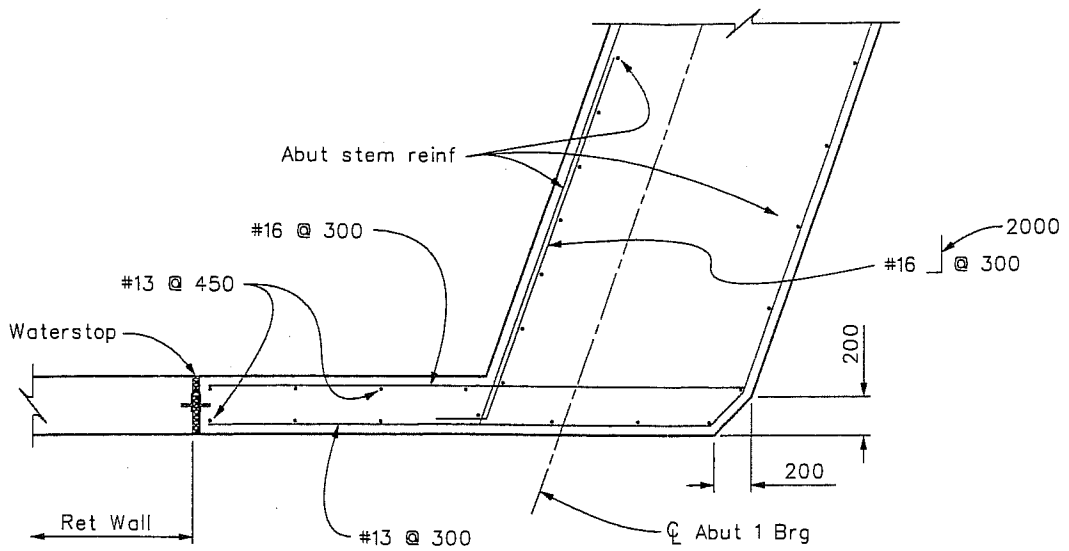


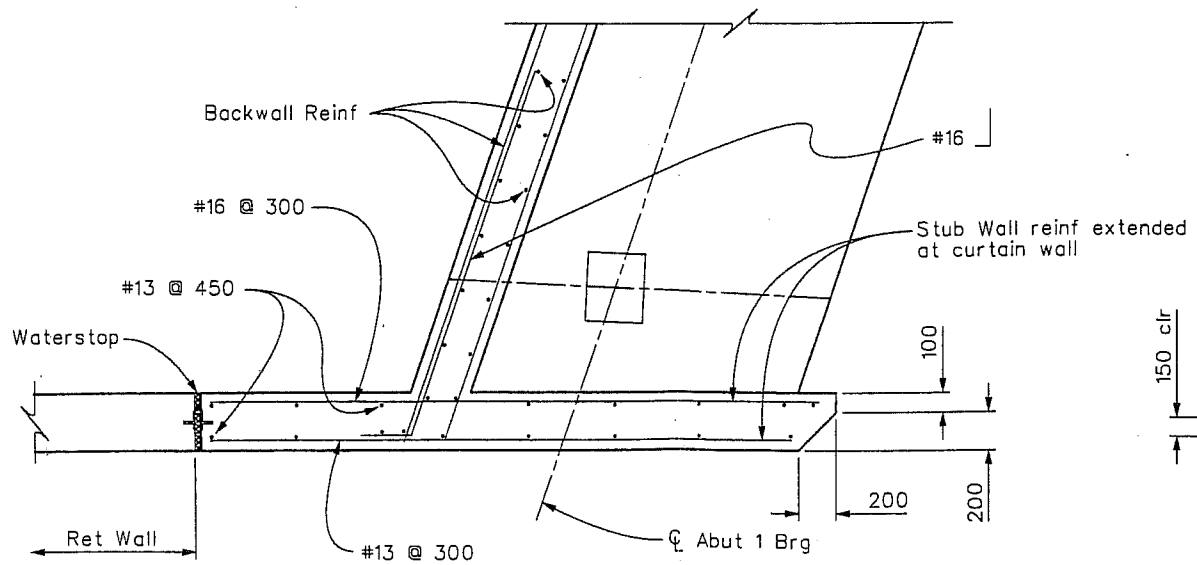
Note:
Details similar for Abut 3 stub wall
unless otherwise noted.

TMENT 1 STUB WALL ELEVATION
1 : 30

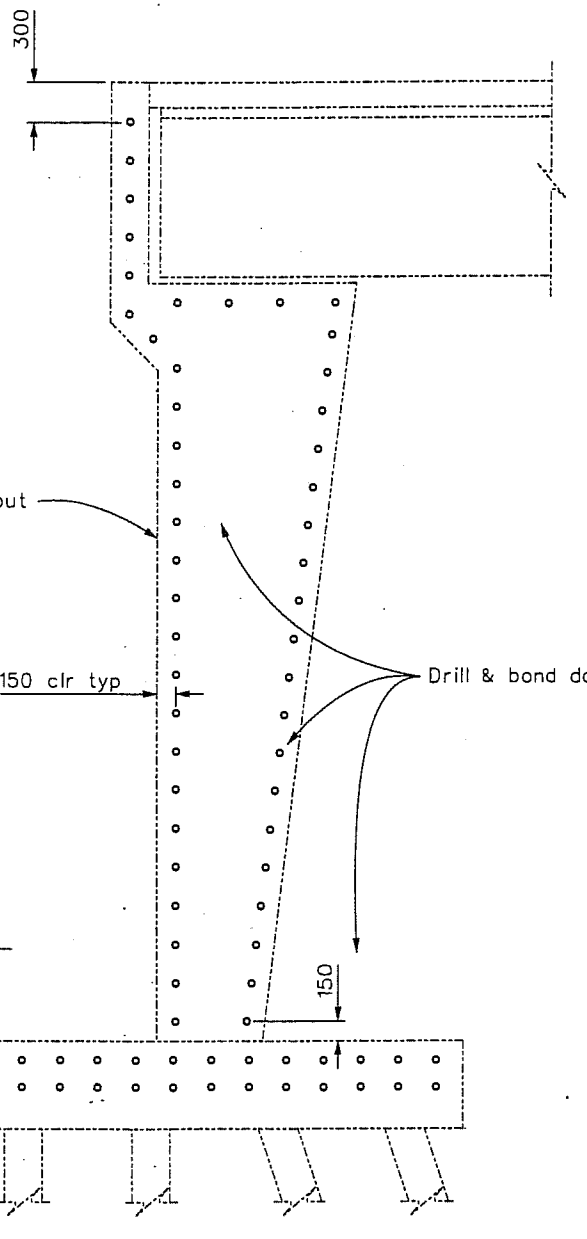
controlling
g or



SECTION B-B
1 : 20



SECTION A-A
1 : 20



SECTION C-C
No Scale

Abut #1

DIST.	COUNTY	ROUTE	POST km TOTAL PROJECT	SHEET No.	TOTAL SHEETS
12	ORA	91	13.5	72	104

Caltrans Metric

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Perry C. Schacht
No. C41095
Exp. 3-31-03
CIVIL
STATE OF CALIFORNIA

T·Y LIN INTERNATIONAL
5030 CAMINO DE LA SIESTA, SUITE 204, SAN DIEGO, CA. 92108
(619) 692-1920
www.tylin.com

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All dimensions are shown in millimeters unless otherwise shown

DESIGN	BY	CHECKED	PREPARED FOR THE	BRIDGE No.
	Perry Schacht	Rick Chan		TUSTIN AVENUE OVERCROSSING WIDEN

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
12	Ora	091	13.5 (8.4)	25/184	26/184

REGISTERED CIVIL ENGINEER — 6/21/02 DATE

REGISTERED PROFESSIONAL ENGINEER ROBERT G. TRUJILLO No. 60912 Exp. Dec. 31, 2004 CIVIL STATE OF CALIFORNIA

PLANS APPROVAL DATE

CITY OF ANAHEIM
200 S. ANAHEIM BLVD.
ANAHEIM, CALIFORNIA 92805

Goffman, McCormick & Urban, Inc.
23241 Arroyo Vista, Rancho Santa Margarita, CA 92688
Telephone: (949) 888-6513

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Caltrans Metric

BENCH MARKS

TBM #175-B-17-55
Chis Knob top of PCC Headwall East Opposite Sta 10+75 Grove St. Ora-175-B.

TBM #175-B-18-55
Chis Knob Top of PCC Headwall 59' Right of Centerline Sta 497+05 Ora-175-B.

North

PLAN

1:100

ALL DIMENSIONS ARE SHOWN IN METERS EXCEPT AS NOTED

Notes:

1) Two types of samplers were utilized during subsurface exploration in order to:
a) obtain standard penetration test readings and
b) obtain undisturbed soil samples for laboratory testing

2) The two types of samplers are as follows:

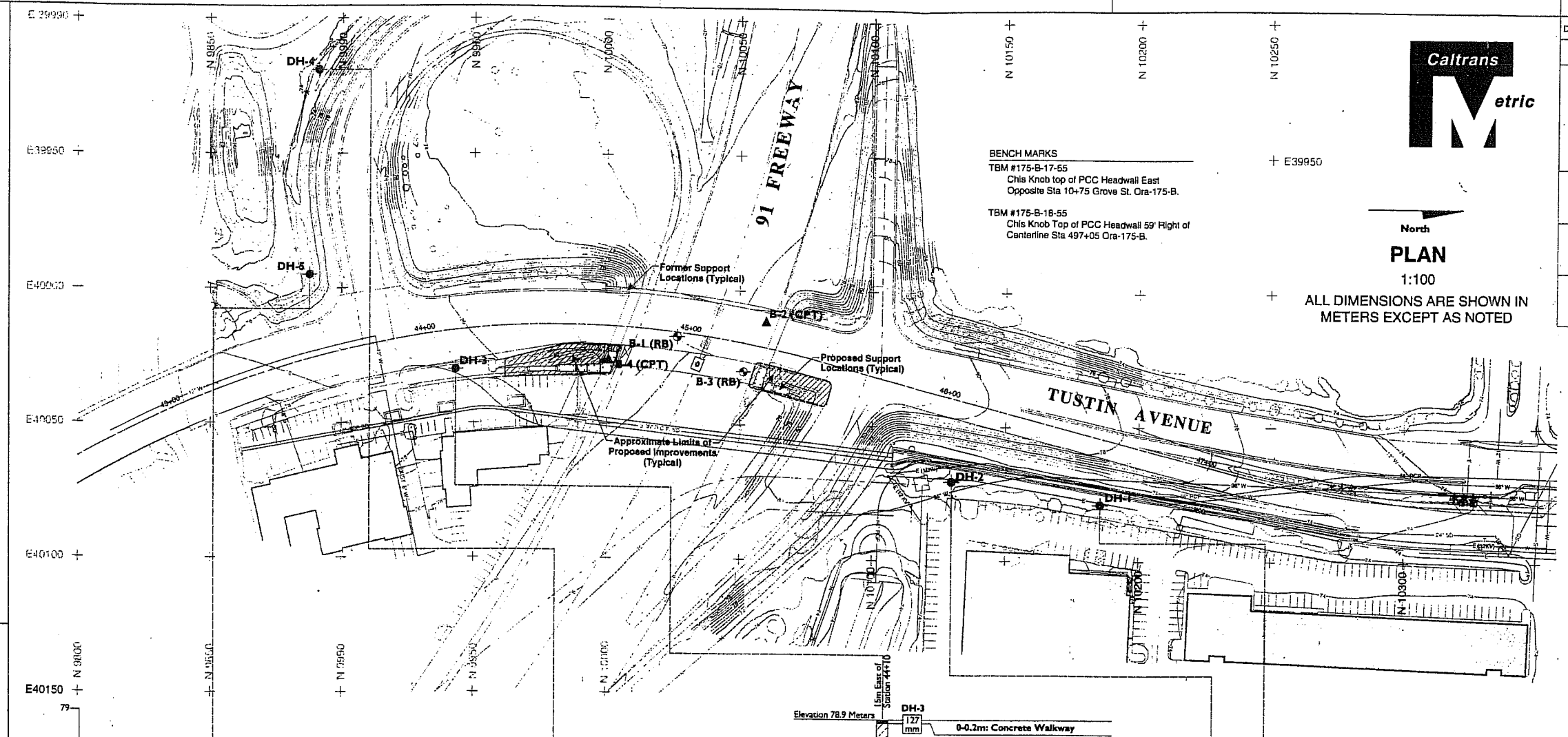
Sampler Type	Inside Diameter	Outside Diameter	Hammer Used	Hammer Weight	Lift & Drop Method	Drop Height
SPT	35mm	51mm	Donut Hammer	63.4kg	Free Line Lift and Drop	762mm
Drive (Non-SPT)	67mm	86mm	Donut Hammer	181.2kg	Free Line Lift and Drop	457mm

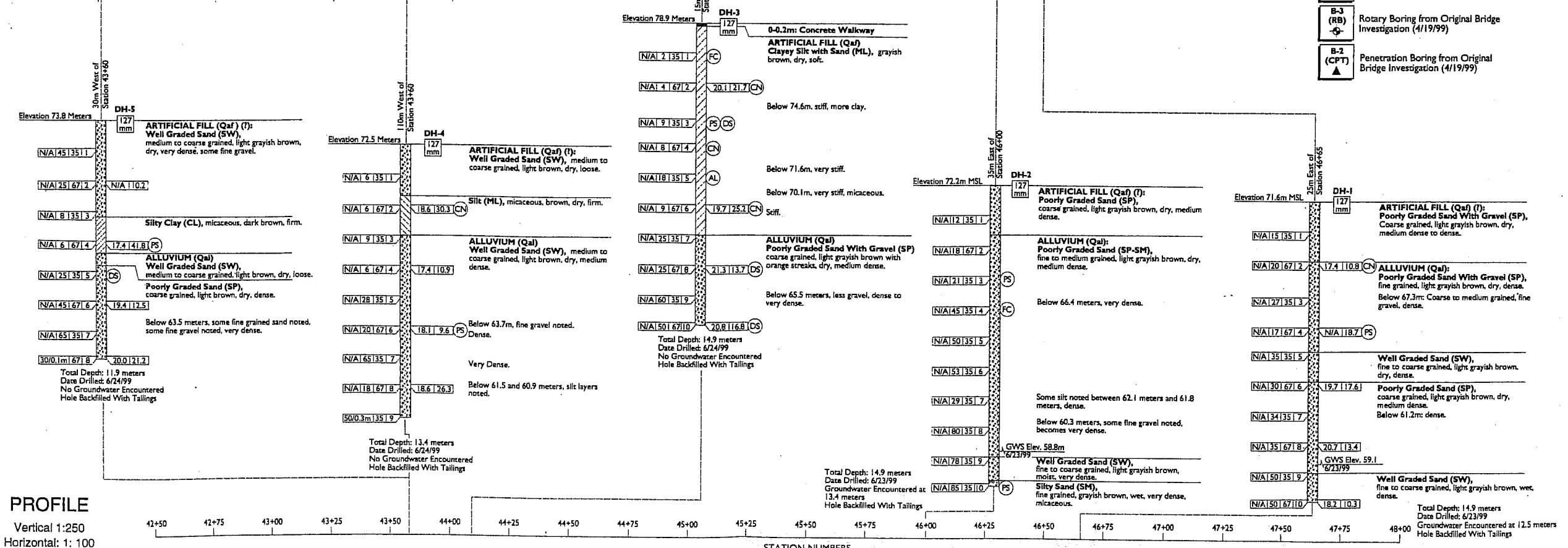
3) In order to distinguish between the two types of samplers used, we indicated the inside diameters for each sample taken in the individual boring logs.

4) The blow counts obtained from the nonstandard penetration tests may be converted to standard blow counts by multiplying the blow counts by 0.6 based on formulas by Lacroix and Horn (1973). Please note that this factor is approximate. Determinations of soil consistency should be based on blow counts obtained using the SPT sampler.

EXPLANATION

- DH-5 — Borings from Current Field Investigation
- B-3 (RB) — Rotary Boring from Original Bridge Investigation (4/19/99)
- B-2 (CPT) — Penetration Boring from Original Bridge Investigation (4/19/99)





PROFILE

Vertical 1:250
Horizontal: 1: 100

CHEMICAL ANALYSIS (CA) · CONSOLIDATION (CN) · CONSOLIDATED UNDRAINED TRIAXIAL (CU) · DIRECT SHEAR (DS) · MAXIMUM DRY DENSITY (MD) · POCKET PENETROMETER (PP) · SIEVE ANALYSIS (SA) · TORVANE (TV) · UNCONFINED COMPRESSION (UC) · UNCONSOLIDATED UNDRAINED TRIAXIAL (UU) · VANE SHEAR (VS)

ROTARY WASH · ELECTRONIC CONE PENETROMETER · AUGER BORING (DRY) · TEST PIT · DIAMOND CORE BORING · SOIL TUBE

WELL-GRADED SAND (SW) · SILTY SAND (SM) · CLAYEY SAND (SC) or SANDY CLAY · COBBLES/BOULDERS · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC ROCK

PEAT and/or ORGANIC MATTER · WELL-GRADED GRAVEL (GW) · POORLY-GRADED GRAVEL (GP) · SILTY GRAVEL (GM) · CLAYEY GRAVEL (GC)

FOR SOILS (Standard Penetration Test)

SPT N-Value (Blows/305mm)	Cohesive
<2	Very Soft
2-4	Soft
5-8	Firm
9-15	Stiff
16-30	Very Stiff
>30	Hard

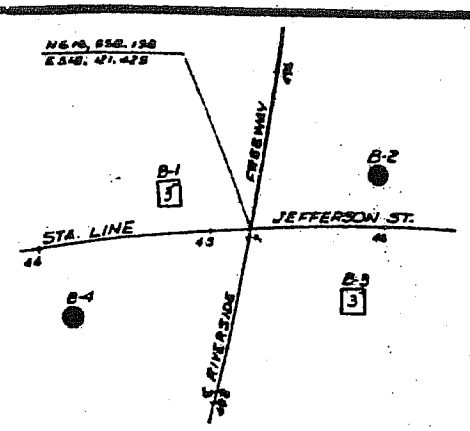
Classification of earth materials based on field inspection are confirmed or revised by laboratory tests if necessary.

7	CAL.				

07	ORA	37	5.1/R 29.8/32.3		

April 19, 1965

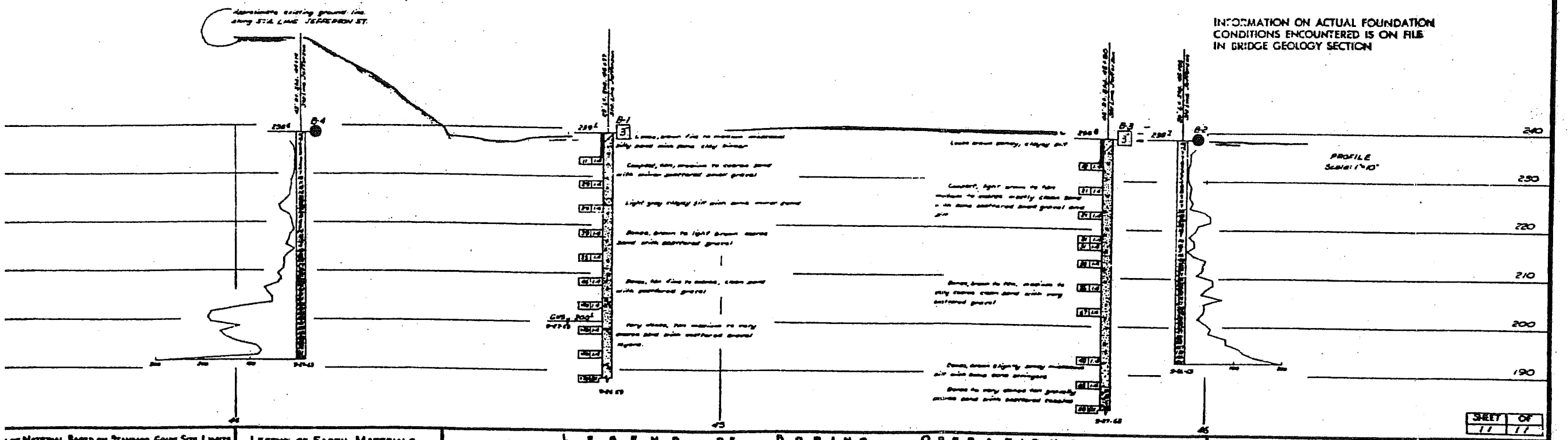
TBM = 175-B-18-55 Elev. 239.52
Chis. Knob cap of PCC. nestmail 58' Rt of ℄ Sta 407+05, Ore -175-B



PLAN
Scale: 1"=50'

AS BUILT PLANS
Bridge No. 55-44
Date Contract Accepted
Document No. 74

INFORMATION ON ACTUAL FOUNDATION CONDITIONS ENCOUNTERED IS ON FILE IN BRIDGE GEOLOGY SECTION



LOG MATERIAL BASED ON STANDARD GRAIN SIZE LIMITS

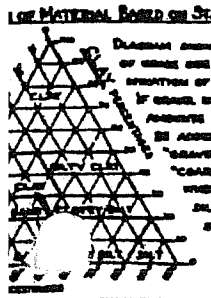


DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRAIN SIZE DISTRIBUTION USED IN DESCRIPTION OF CLASS NAMES.

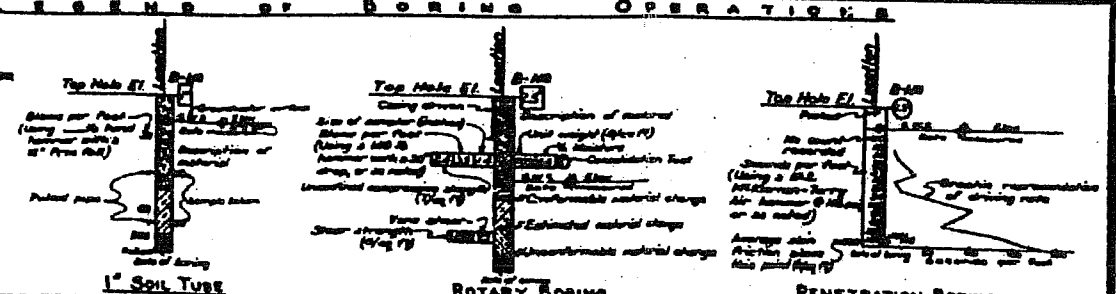
IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND." THE TERMS "COARSE," "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRAIN SIZE LIMITS.

LEGEND OF EARTH MATERIALS

- GRAVEL
- SAND
- SILT
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SANDY SILT OR SILTY SAND
- SILTY CLAY OR CLAYEY SILT
- PEAT AND/OR ORGANIC MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PENETROMETER
- 2½" CORE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



NOTE

Classification of rock material as shown on this sheet is based upon field inspection and is not to be construed to imply mathematical analysis.

NORTH JEFFERSON ST. OC.

LOG OF TEST BORINGS

SCALE As Noted	BRIDGE 55-44F	FILE	DRAWING 55414-11

SHEET	OF
11	11

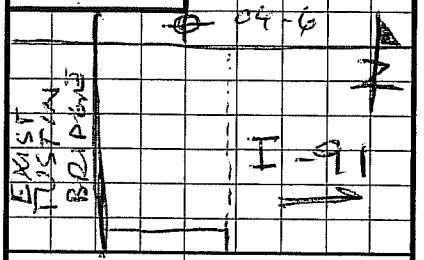
192

LOG OF BORING NO. (04-6)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project Name	:	Abutment Research		
Project Location	:	JUSTIN AVE over I-91		
M.I. Project No.	:	02-165	Site Condition	:
Weather	:	Sunny	Elevation	:
Traffic Control	:	N/A	Operator	: Duane
Drilling Company	:	ZR	Operator	: Steve
Type of Rig	:	#5 Trip h.	Drop (in)	: 30.0
Borehole Diameter (inch)	:	8.0"	Drive Wt. (lbs)	: 140.0
Logged By	:	SS	Date Drilled	: 3/6/04

Comments :



Back Filled By :

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Rework	Lunch	Rework	Break	Finish	Off		ft
Driller												Water Table
Traffic Control												ft
Logger												Caving
Total												ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blowcounts/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O²/LEL/PID
0							N. ABUT per MK loc'n. map 6" A/C over 11" base			: :					
							FINE SAND W/ SILT								
2.5	D	1			12	SP-SM	lt. brown, moist, fine-gr., med dense								
					13		tr. mica			: :					
					16										
5	D	2			9	SM	SILTY SAND W/ GRAVEL								
					8					: :					
					12		dk brown, moist, fine-gr. w/ gravel up to 1/2"								
							med dense, w/ wood fragments								
7.5	D	3													
					5	SM	SILTY SAND w/ some gravel			: :					
					8		dk brown, moist, fine-gr., some gravel to 1/2",								
					12		loose, tr. mica								
10	D	4			10	SM	same as above								
					16		but med dense & gravel up to 1" :								
					16										
12.5	D	5			3	ML	SILT W/ FINE SAND & GRAVEL								
					6		brown, moist, stiff, gravel to 1/2" :								
					10		(only 8" recovered)								
15	D	6			7	ML	TOP MTG = ML same as above								
					9		BOT. MTG = SP-SM w/ gravel to 1/2", reddish brown								
					10		loose								

LOG OF BORING NO. (04-6)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project No. : 02-165 **Project Name :** Abutment Research

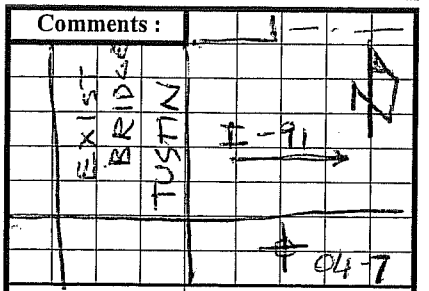
Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93)	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O^2/LEL/PID
20	D	7		8 9 13		SM	SAND W/ SILT & GRAVEL lt. reddish brown, moist, med dense, fr. mica			: :	grave: to 2"				
							TD = 21.5'			: :					
	3RD	BOREHOLE					04-8 N. ABUT - 11.5' N of 04-5			: :					
5'	D	1		9 13 17		SM	SILTY SAND W/ GRAVEL lt. brown to brown, moist, fine fr. w/ gravel to 1/2" med dense			: :					
10	D	2		17 32 31		SM	same as above but lt. yell. brown, dense			: :					
							TD = 11.5'			: :					

LOG OF BORING NO. (04-7)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project Name	:	Abutment Research		
Project Location	:	TUSTIN Ave over I-91		
E.M.I. Project No.	:	02-165	Site Condition :	A/C
Weather	:	Sunny	Elevation :	
Traffic Control	:	N/A	Operator :	Steve
Drilling Company	:	ZR	Operator :	Duane
Type of Rig	:	HS | Trip h.	Drop (in) :	30.0
Borehole Diameter (inch)	:	8.0"	Drive Wt. (lbs) :	140.0
Logged By	:	SS	Date Drilled :	3/16/04

Comments :



Back Filled By :

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Rework	Lunch	Rework	Break	Finish	Off		ft
Driller												Water Table
Traffic Control												ft
Logger												Caving
Total												ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S,R/T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O^2/LEL/PID
0	B	0				ML	S. ABUT 6.5" A/C over 6" base (MK measured boring loc'n.) SILT w/ SAND & GRAVEL lt. brown, moist, gravel to 1/2"			: :					
2.5	D	1		8 8 8		SM	SILTY SAND w/ GRAVEL lt. brown, moist, fine-gr. w/ gravel: to 1/2" loose, locally w/ silt pockets								
5	D	2		7 5 5		SM	SILTY SAND w/ GRAVEL lt. brown, moist, fine to med w/ gravel up to 1", loose, w/ silt pockets								
7.5	D	3		6 7 9		SM	same as above but brown			: :					
10	D	4		9 11 18		SM	same as above, w/ silt lumps & pockets (sample disturbed due to gravel)			: :					
12.5	D	5		2 4 5		SM	SILTY SAND w/ GRAVEL brown, moist fine-gr. w/ gravel to: 1", loose w/ silt pockets								
15	D	6		6 6 7		SM	same as above, w/ rock ϕ > 2.5" @ tip of sampler								

LOG OF BORING NO. (04-7)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project No. : 02-165 **Project Name :** Abutment Research

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O^2/LEL/PID
20		7		10		SM	SILTY SAND w/ GRAVEL			: :					
				11			lt. yell brown, moist, fine-gr.			w/ : gravel					to 1½"
				9			loose, tr. mica								
							TD = 21.5'								
										: :					
										: :					
										: :					
										: :					
										: :					
										: :					

HOLGUIN, FAHAN & ASSOCIATES, INC.
ENVIRONMENTAL MANAGEMENT CONSULTANTS
948 North Lemon Street, Orange, CA 92867 (714)-210-5971 FAX (714) 210-5975

March 20, 2004

Mr. Mike Kapuskar
Earth Mechanics, Inc.
17660 Newhope St, Suite E
Fountain Valley, CA 92708

PROJECT NAME: CPT Testing for UCSD Abut Research: Tustin Ave over 91;
PROJECT NO.: 021-65-Tusin Ave & 91

Dear Mr. Kapuskar:

Enclosed please find copies of the cone penetrometer testing (CPT) data for the above referenced project along with a copy of the corresponding invoice.

The cone penetrometer testing conducted for this project consisted of pushing an instrumented cone-tipped probe into the ground while simultaneously recording the resistance to penetration at the cone tip and along the friction sleeve.

The cone penetrometer testing described in this report was conducted in general accordance with the current ASTM specifications (ASTM D5778-95 and D3441-94) using an electronic cone penetrometer.

The CPT equipment operated by Holguin, Fahan & Associates, Inc. (HFA) consists of a cone assembly mounted at the end of a series of hollow sounding rods. A set of hydraulic rams is used to continuously push the cone and rods into the soil at a rate of 20-mm per second (approximately four feet per minute) while the cone tip resistance and sleeve friction resistance are recorded every 50-mm (approximately two inches) and stored in digital form. A specially designed all wheel drive 23-ton truck provides the required reaction weight for pushing the cone assembly and is also used to transport and house the test equipment.

The cone penetrometer assembly used for this project consists of a conical tip and a cylindrical friction sleeve. The conical tip has a 60° apex angle and a diameter of 35.6-mm (1.40-inch) resulting in a projected cross-sectional area of 10 cm^2 (1.5 square inches). The cylindrical friction sleeve is 133-mm (5.25-inch) in length and has an outside diameter of 35.8-mm (1.41-inch), resulting in a surface area of 150 cm^2 (23 square inches).

The interior of the cone penetrometer is instrumented with strain gauges that allow simultaneous measurement of cone tip and friction sleeve resistance during penetration. Continuous electric signals from the strain gauges are transmitted by a shielded cable in the sounding rods to the PC-based data acquisition hardware in the CPT truck. The sounding log is also displayed on a monitor.

The CPT data processing is performed using the truck mounted computer based data acquisition and presentation system. The computer generated graphical logs include cone resistance, friction resistance, friction ratio, and pore pressure ratio versus depth at a user selectable scale.

Soil behavior type interpretations are based on the following reference: Robertson, P.K. and Campanella, R.C., 1989, "Guidelines for Geotechnical Design using the Cone Penetrometer Test and CPT with Pore Pressure Measurement." Soil Mechanics series No. 120, Civil Engineering Department, University of British Columbia, Vancouver, B.C., V6T 1Z4, September 1989.

Interpretations and plotting has been done using HFA's proprietary data interpretation and presentation software. It is important to note that the data is not averaged. All interpretations are point interpretations at the corresponding depth listed.

It is also important to note that the soil behavior type correlations are based on a combination of theory, field research, research performed under laboratory conditions, and literature review. The information presented in the tabulated and/or graphical logs should, therefore, be viewed as a guideline rather than as precise measurements.

Some care is recommended when using the soil behavior type interpretations. If a tabulation depth happens to fall on a soil layer interface, or a seam of soil differing from the rest of the layer, the tabulated data can be misleading. The solution to this problem is the proper use of the graphical CPT logs. The tip and sleeve penetration resistance logs are the primary source of profile description; the soil behavior type logs are supplemental. The graphical logs of tip and sleeve resistance should be examined and layer boundaries delineated in accordance with the project requirements. The soil behavior type interpretations are only representative of the response of the soil to the large shear deformations imposed during cone penetration. This is not necessarily a prediction of grain size distribution. However, it has been found that the interpreted soil behavior types generally agree well with the soil types defined in accordance with the grain size distribution methods such as used in the Unified Soil Classification System.

Limitations

Holguin, Fahan & Associates, Inc. (HFA) presents the attached data in accordance with ASTM Standards D5778-95 and D3441-94 and generally accepted cone penetrometer testing practices and standards. The attached data further relates only to the specific project and location discussed in the data. Judgement may be required to verify the CPT soil behavior interpretations.

The "Client" may distribute this data or excerpts therefrom provided the following statement is prominently displayed and included with the distribution:

"Neither CLIENT nor HFA make any guarantee or warranty, express or implied, regarding this data. THE USE OF THIS INFORMATION SHALL BE AT THE USER'S SOLE RISK REGARDLESS OF ANY FAULT OR NEGLIGENCE OF THE CLIENT OR HFA."

Please feel free to call if you have any questions.

Respectfully submitted,

Amanda Hancock
CPT Operations Manager
Holguin, Fahan & Associates, Inc.

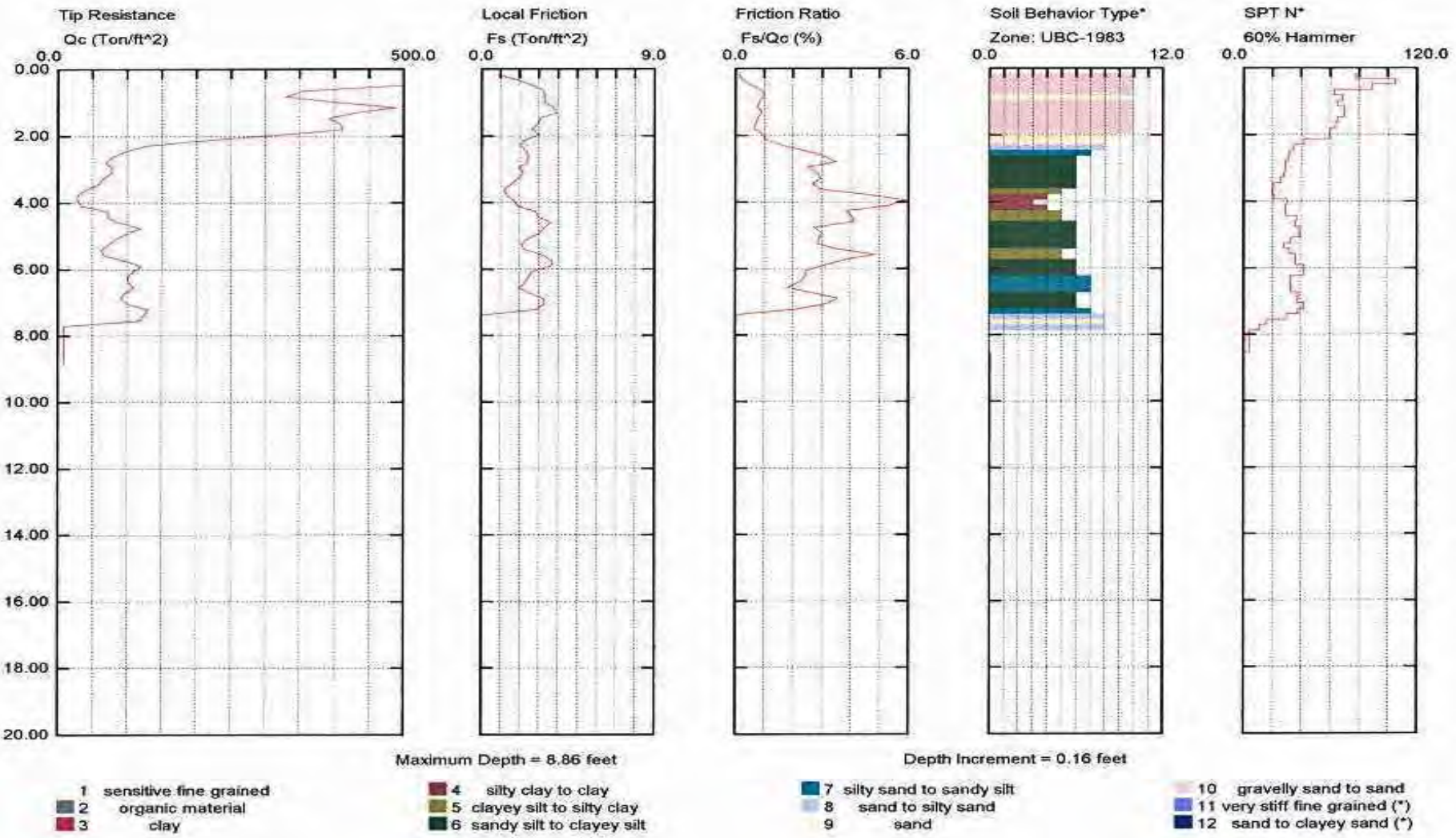
:AH\Enclosures

behavior type and SPT based on data from UBC-1983

Earth Mechanics

Operator: Bob-Victor
Sounding: CPT-04-6<
Cone Used: DSG0409

CPT Date/Time: 3/6/2004 10:18
Location: UCSD Abut Research
Job Number: 02165



CPT INTERPRETATIONS

SOUNDING : CPT-04-6C
PROJECT : UCSD Abut Resear
DATE/TIME: 3/6/2004 10:18

PROJECT No.: 02165
CONE/RIG : DSG0409

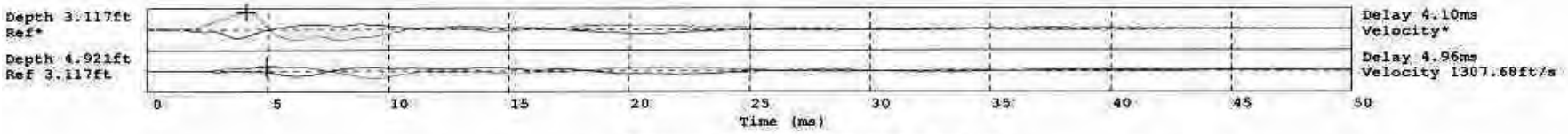
DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	510.06	.52	GRAVELLY SAND to SAND	85	100	100		
.300	.98	400.41	.81	SAND	80	100	100		
.450	1.48	391.75	.78	SAND	78	100	100		
.600	1.97	313.65	.96	SAND	63	100	100		
.750	2.46	98.08	2.42	SILTY SAND to SANDY SILT	33	52	76		48.5
.900	2.95	78.23	2.49	SANDY SILT to CLAYEY SILT	31	50		5.2	
1.050	3.44	58.04	2.67	SANDY SILT to CLAYEY SILT	23	37		3.9	
1.200	3.94	29.17	5.89	CLAY	29	47		1.7	
1.350	4.43	73.43	4.06	CLAYEY SILT to SILTY CLAY	37	59		4.3	
1.500	4.92	100.64	3.00	SANDY SILT to CLAYEY SILT	40	64		5.9	
1.650	5.41	63.43	3.55	CLAYEY SILT to SILTY CLAY	32	51		3.7	
1.800	5.91	121.35	3.01	SANDY SILT to CLAYEY SILT	49	78		7.1	
1.950	6.40	102.76	2.25	SILTY SAND to SANDY SILT	34	55	77		45.0
2.100	6.89	91.69	3.55	SANDY SILT to CLAYEY SILT	37	58		5.4	
2.250	7.38	125.30	.00		0	0			.0
2.400	7.87	9.17	.03	SENSITIVE FINE GRAINED	5	7		.9	
2.550	8.37	9.19	.01	SENSITIVE FINE GRAINED	5	7		.9	
2.700	8.86	9.09	*****		0	0			.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 118 pcf
ASSUMED DEPTH OF WATER TABLE = 30.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on ROBERTSON and CAMPANELLA, 1989

Earth Mechanics
CPT-04-6C



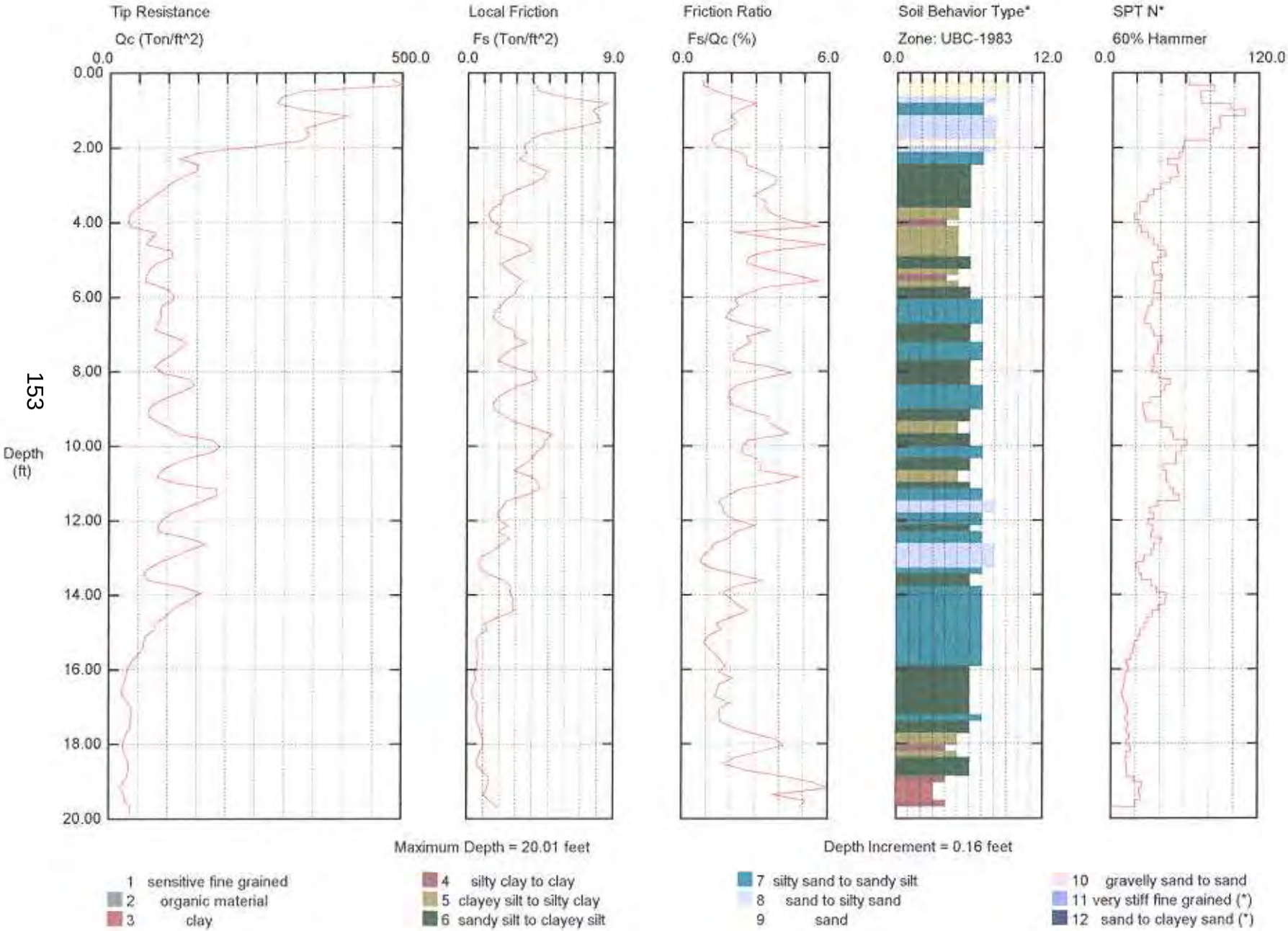
Hammer to Rod String Distance 1.524 (m)
* = Not Determined

behavior type and SPT based on data from UBC-1983

Earth Mechanics

Operator: Bob-Victor
Sounding: CPT-04-6C
Cone Used: DSG0409

CPT Date/Time: 3/6/2004 10:39
Location: UCSD Abut Research
Job Number: 02165



CPT INTERPRETATIONS

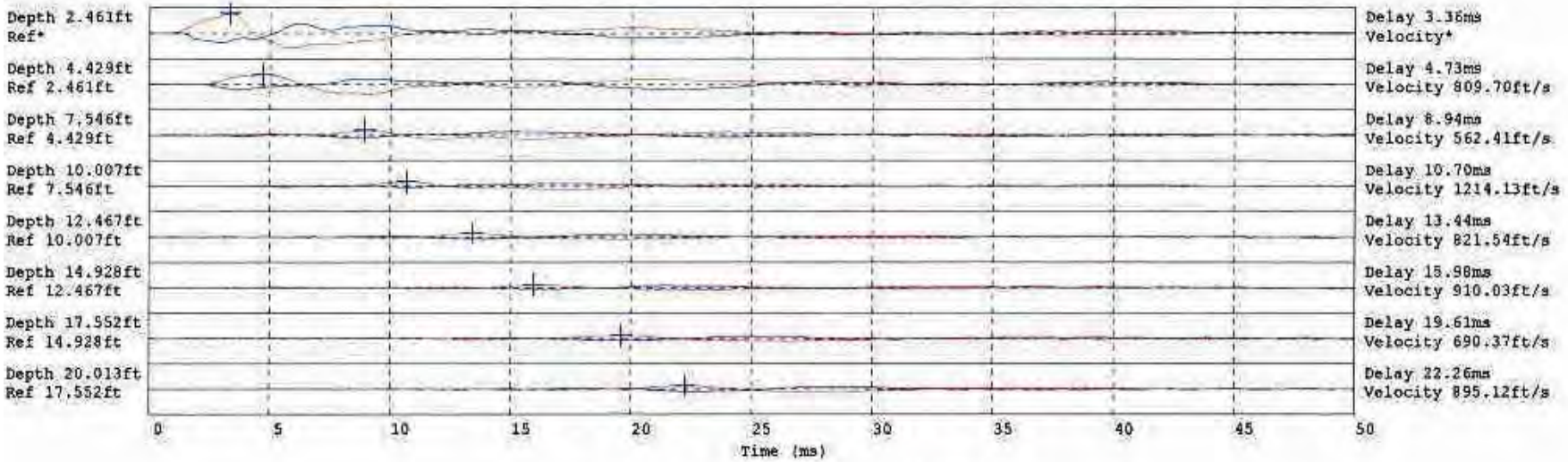
SOUNDING : CPT-04-6C PROJECT No.: 02165
PROJECT : UCSD Abut Resear CONE/RIG : DSG0409
DATE/TIME: 3/6/2004 10:39

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	330.90	1.32	SAND	66	100	100		
.300	.98	331.05	2.33	SILTY SAND to SANDY SILT	100	100	100		
.450	1.48	334.20	1.96	SAND to SILTY SAND	84	100	100		
.600	1.97	246.62	1.39	SAND to SILTY SAND	62	99	100		
.750	2.46	150.81	2.61	SILTY SAND to SANDY SILT	50	80	88		
.900	2.95	103.79	3.86	CLAYEY SILT to SILTY CLAY	52	83		6.1	
1.050	3.44	61.08	3.44	CLAYEY SILT to SILTY CLAY	31	49		3.6	
1.200	3.94	32.74	4.36	CLAY to SILTY CLAY	22	35		1.9	
1.350	4.43	70.54	3.83	CLAYEY SILT to SILTY CLAY	35	56		4.1	
1.500	4.92	107.70	2.71	SANDY SILT to CLAYEY SILT	43	69		6.3	
1.650	5.41	63.09	4.63	CLAY to SILTY CLAY	42	67		3.7	
1.800	5.91	110.21	2.66	SILTY SAND to SANDY SILT	37	59	79		45.5
1.950	6.40	86.93	1.92	SILTY SAND to SANDY SILT	29	46	72		44.5
2.100	6.89	78.27	3.63	CLAYEY SILT to SILTY CLAY	39	61		4.6	
2.250	7.38	119.11	2.32	SILTY SAND to SANDY SILT	40	60	81		45.0
2.400	7.87	76.91	3.55	CLAYEY SILT to SILTY CLAY	38	56		4.5	
2.550	8.37	146.95	2.24	SILTY SAND to SANDY SILT	49	70	87		45.5
2.700	8.86	77.96	2.03	SILTY SAND to SANDY SILT	26	36	69		42.5
2.850	9.35	82.07	3.56	CLAYEY SILT to SILTY CLAY	41	55		4.8	
3.000	9.84	177.83	2.72	SILTY SAND to SANDY SILT	59	78	91		45.5
3.150	10.33	131.68	3.03	SANDY SILT to CLAYEY SILT	53	67		7.7	
3.300	10.83	82.78	4.82	*VERY STIFF FINE GRAINED	83	100			
3.450	11.32	184.80	1.97	SILTY SAND to SANDY SILT	62	75	90		45.0
3.600	11.81	107.36	1.75	SILTY SAND to SANDY SILT	36	43	74		42.5
3.750	12.30	86.92	2.24	SILTY SAND to SANDY SILT	29	34	68		41.5
3.900	12.80	138.43	1.19	SAND to SILTY SAND	35	40	80		43.5
4.050	13.29	67.37	1.23	SILTY SAND to SANDY SILT	22	25	59		39.0
4.200	13.78	126.24	2.15	SILTY SAND to SANDY SILT	42	47	77		42.5
4.350	14.27	120.58	2.32	SILTY SAND to SANDY SILT	40	44	75		42.0
4.500	14.76	79.48	1.44	SILTY SAND to SANDY SILT	26	28	62		39.5
4.650	15.26	60.85	.92	SILTY SAND to SANDY SILT	20	21	54		38.5
4.800	15.75	41.05	1.60	SILTY SAND to SANDY SILT	14	14	42		37.0
4.950	16.24	28.74	2.08	SANDY SILT to CLAYEY SILT	11	12		1.9	
5.100	16.73	25.10	1.39	SANDY SILT to CLAYEY SILT	10	10		1.9	
5.250	17.22	38.15	1.53	SILTY SAND to SANDY SILT	13	13	39		36.0
5.400	17.72	30.23	2.93	CLAYEY SILT to SILTY CLAY	15	15		1.9	
5.550	18.21	25.75	3.20	CLAYEY SILT to SILTY CLAY	13	12		1.6	
5.700	18.70	34.20	2.64	SANDY SILT to CLAYEY SILT	14	13		2.2	
5.850	19.19	20.89	6.00	CLAY	21	20		1.2	
6.000	19.69	38.09	4.85	CLAY	38	35		2.2	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 118 pcf
ASSUMED DEPTH OF WATER TABLE = 30.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.
Interpretations based on ROBERTSON and CAMPANELLA, 1989

Earth Mechanics
CPT-04-6 C



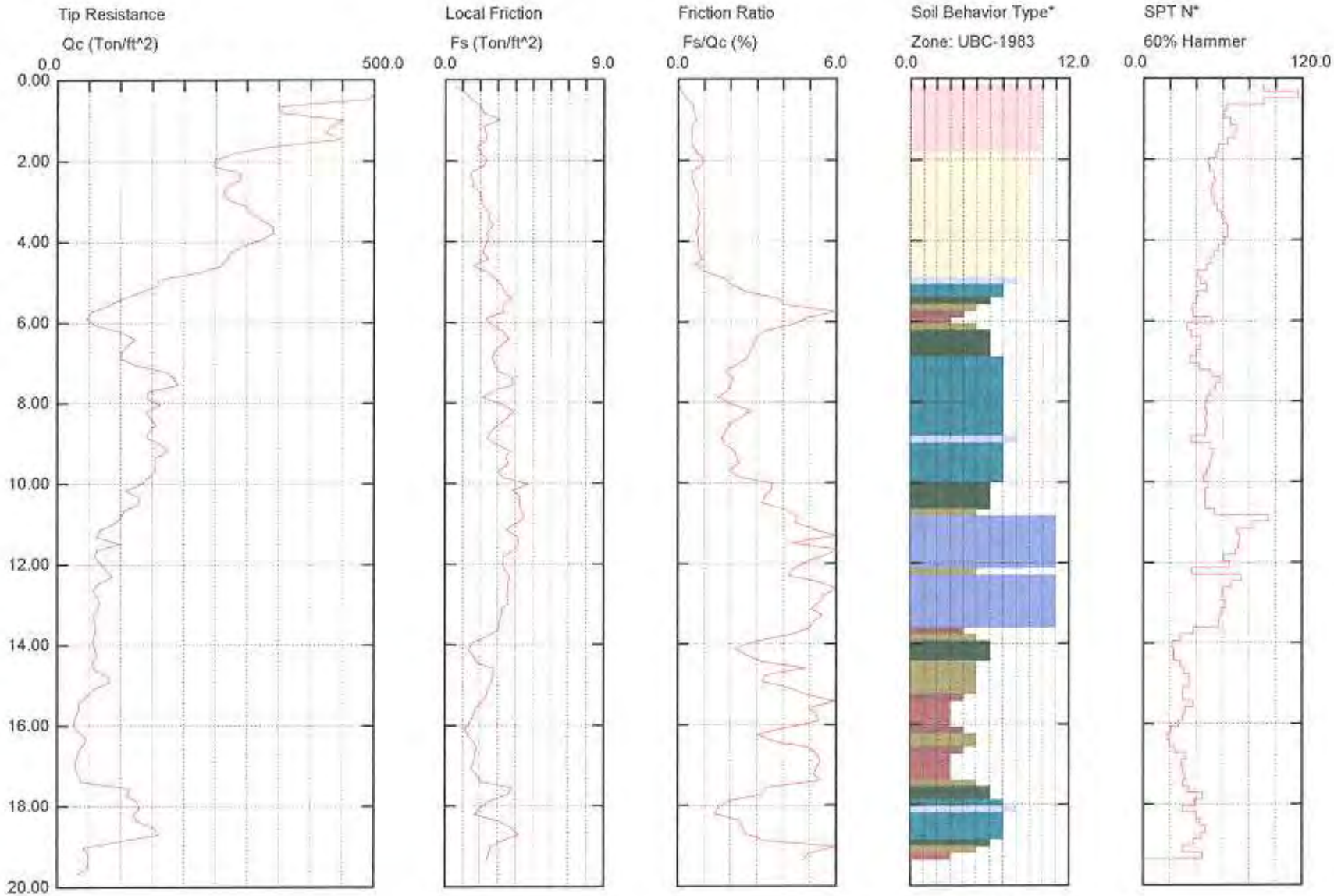
Hammer to Rod String Distance 1.524 (m)
* = Not Determined

behavior type and SPT based on data from UBC-1983

Earth Mechanics

Operator: Bob-Victor
Sounding: CPT-04-7C
Cone Used: DSG0409

CPT Date/Time: 3/6/2004 9:03
Location: UCSD Abut ResearCH
Job Number: 02165



Maximum Depth = 19.69 feet

Depth Increment = 0.16 feet

1 sensitive fine grained
2 organic material
3 clay
4 silty clay to clay
5 clayey silt to silty clay
6 sandy silt to clayey silt
7 silty sand to sandy silt
8 sand to silty sand
9 sand
10 gravelly sand to sand
11 very stiff fine grained (*)
12 sand to clayey sand (*)

CPT INTERPRETATIONS

SOUNDING : CPT-04-7C
PROJECT : UCSD Abut Resear
DATE/TIME: 3/6/2004 9:03
PROJECT No.: 02165
CONE/RIG : DSG0409

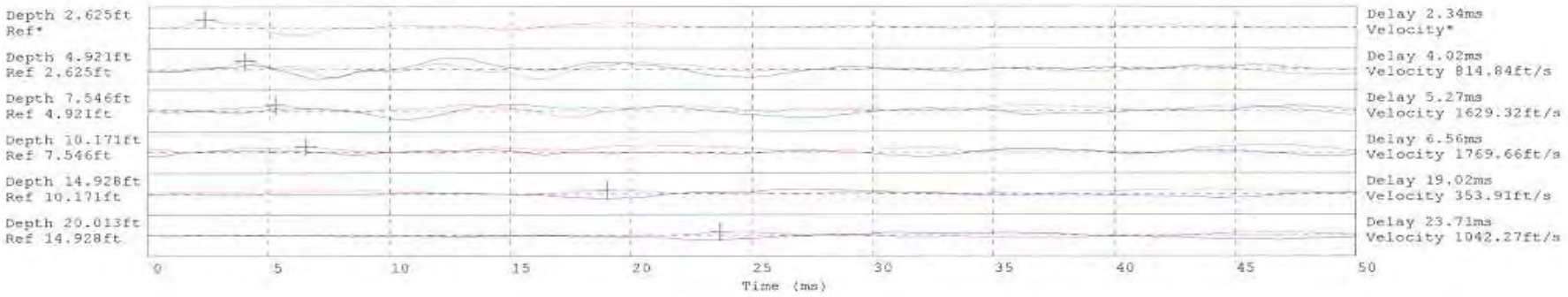
DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	489.96	.30	GRAVELLY SAND to SAND	82	100	100		
.300	.98	450.88	.70	GRAVELLY SAND to SAND	75	100	100		
.450	1.48	446.60	.52	GRAVELLY SAND to SAND	74	100	100		
.600	1.97	249.40	.94	SAND	50	80	100		
.750	2.46	290.12	.53	SAND	58	93	100		
.900	2.95	269.97	.78	SAND	54	86	100		
1.050	3.44	321.80	.77	SAND	64	100	100		
1.200	3.94	323.42	.76	SAND	65	100	100		
1.350	4.43	267.63	.92	SAND	54	86	100		
1.500	4.92	162.54	1.77	SAND to SILTY SAND	41	65	90		48.0
1.650	5.41	101.35	3.78	CLAYEY SILT to SILTY CLAY	51	81		5.9	
1.800	5.91	47.30	4.88	CLAY to SILTY CLAY	32	50		2.8	
1.950	6.40	122.88	2.96	SANDY SILT to CLAYEY SILT	49	79		7.2	
2.100	6.89	101.76	2.64	SANDY SILT to CLAYEY SILT	41	64		6.0	
2.250	7.38	185.39	2.08	SILTY SAND to SANDY SILT	62	94	94		46.5
2.400	7.87	142.02	1.53	SAND to SILTY SAND	36	52	86		45.5
2.550	8.37	148.24	2.38	SILTY SAND to SANDY SILT	49	70	88		45.5
2.700	8.86	142.09	1.67	SAND to SILTY SAND	36	49	86		45.0
2.850	9.35	154.69	2.22	SILTY SAND to SANDY SILT	52	69	88		45.0
3.000	9.84	144.11	2.27	SILTY SAND to SANDY SILT	48	63	85		44.5
3.150	10.33	129.60	3.31	SANDY SILT to CLAYEY SILT	52	66		7.6	
3.300	10.83	100.97	4.51	*VERY STIFF FINE GRAINED	100	100			
3.450	11.32	62.66	6.60	CLAY	63	77		3.6	
3.600	11.81	59.15	5.59	CLAY	59	71		3.4	
3.750	12.30	87.92	4.21	CLAYEY SILT to SILTY CLAY	44	52		5.1	
3.900	12.80	63.41	5.54	CLAY	63	73		3.7	
4.050	13.29	58.13	5.49	CLAY	58	66		3.4	
4.200	13.78	58.78	4.19	CLAYEY SILT to SILTY CLAY	29	33		3.4	
4.350	14.27	62.34	2.60	SANDY SILT to CLAYEY SILT	25	27		4.1	
4.500	14.76	81.10	3.34	SANDY SILT to CLAYEY SILT	32	35		4.7	
4.650	15.26	48.40	4.88	CLAY to SILTY CLAY	32	34		2.8	
4.800	15.75	30.90	5.27	CLAY	31	32		1.8	
4.950	16.24	42.45	3.00	CLAYEY SILT to SILTY CLAY	21	22		2.8	
5.100	16.73	32.30	5.26	CLAY	32	33		1.8	
5.250	17.22	34.71	5.17	CLAY	35	34		2.0	
5.400	17.72	110.42	3.22	SANDY SILT to CLAYEY SILT	44	43		6.4	
5.550	18.21	120.39	1.39	SAND to SILTY SAND	30	29	71		41.0
5.700	18.70	161.34	2.59	SILTY SAND to SANDY SILT	54	51	79		42.5
5.850	19.19	49.96	4.96	CLAY to SILTY CLAY	33	31		2.9	
6.000	19.69	30.79	*****		0	0			.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 118 pcf
ASSUMED DEPTH OF WATER TABLE = 30.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on ROBERTSON and CAMPANELLA, 1989

Earth Mechanics
CPT-04-7C



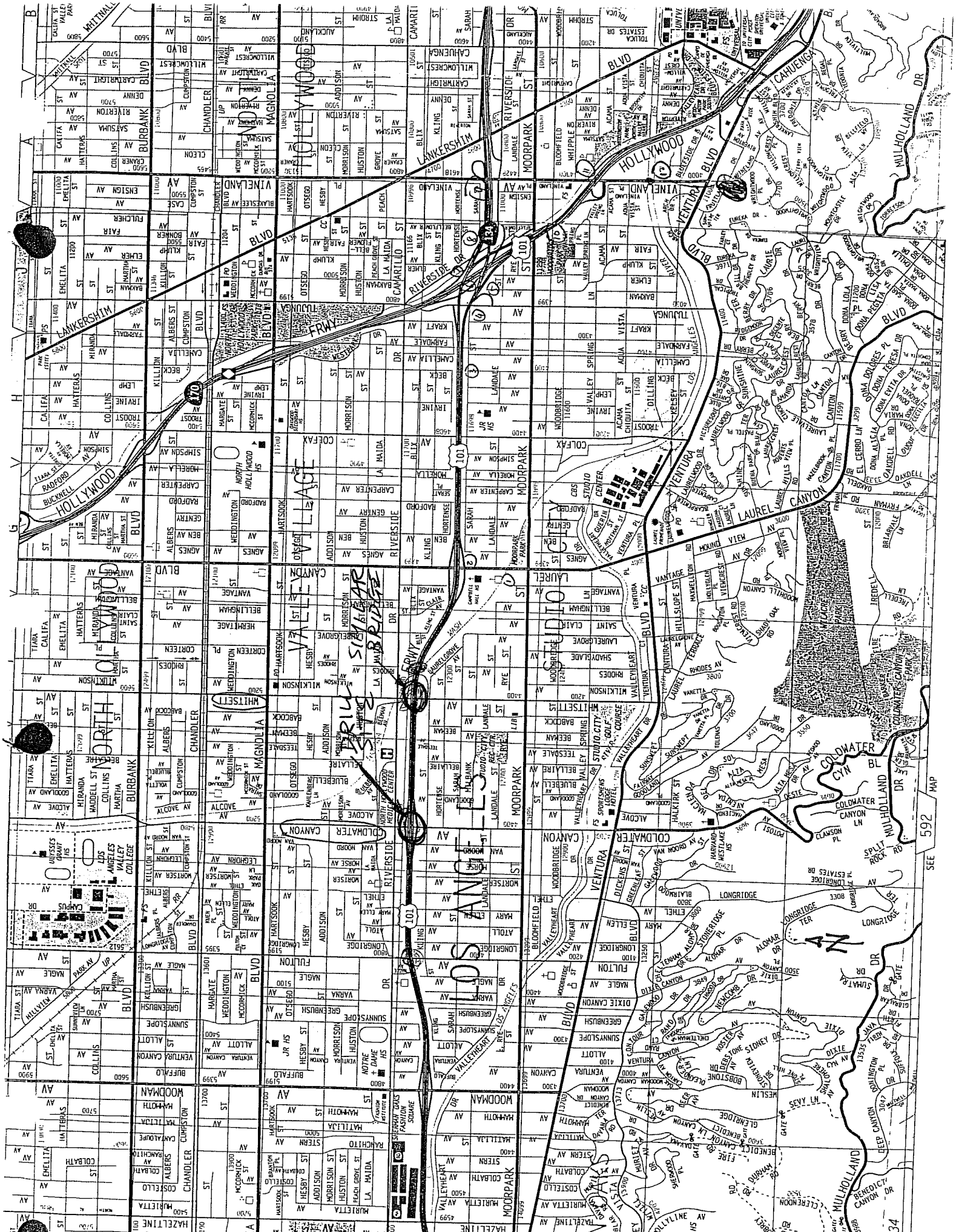
Hammer to Rod String Distance 1.524 (m)
* = Not Determined

Caltrans Bridge 55-0131
Coldwater Canyon, Los Angeles

Caltrans Bridge 55-0131, Coldwater Canyon, Los Angeles

This freeway undercrossing is located in Studio City in the Los Angeles area. The 101 freeway runs on a high raised embankment in this area. The abutments are tall monolithic abutments on piles, but one has a horizontal joint with a transverse shear key (hinge) at the deck soffit level (see Abutment detail plan), which is an unusual location for Caltrans bridges. Caltrans provided plans for the adjacent Whitsett Ave UC bridge which is about 2500 ft east of the Coldwater Canyon bridge.

The field investigation for this bridge was conducted on 3/6/04 at nighttime on the EB slow-lane.and required traffic control. The investigation consisted of (2) 16.5-ft deep soil borings and (2) about 14.5-ft deep conventional and seismic CPT soundings. Drilling was performed by 2R Drilling and CPT by HFA. All locations were precored by Penhall and were about set back about 5 ft from the abutment walls. Borehole 04-9 and CPT 04-9C were performed at the west abutment, and Borehole 04-10 and CPT 04-10C were performed at the east abutment. Geotechnical soil sampling consisted of ring samples collected at 5-ft or 2.5-ft depth intervals using a Modified California sampler. Groundwater was not encountered. Seismic wave measurements were taken at 2.5-ft intervals. Three pressuremeter tests were performed in the two boreholes at 7.5, 10 and 12.5 depths.

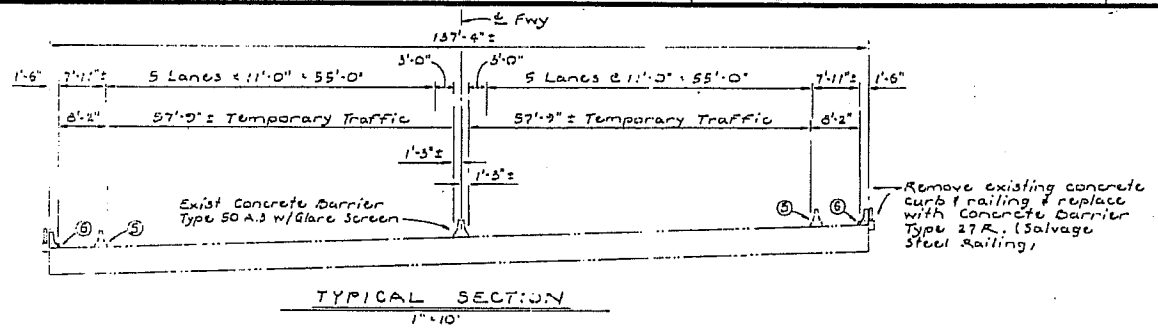

HOLLYWOOD
LANKERSHIM
VINELAND
VENTURA
LAUREL CANYON
COLDWATER CANYON
MULHOLLAND
VALLEY VILLAGE
STUDIO CITY
NORTH HOLLYWOOD
LOS ANGELES
FRIULI SIMILAR BRIDGE
SHERMAN OAKS FASHION SQUARE
LOS ANGELES VALLEY COLLEGE
MAP
SEE

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
07	LA	101	10.4/25.4	445	575

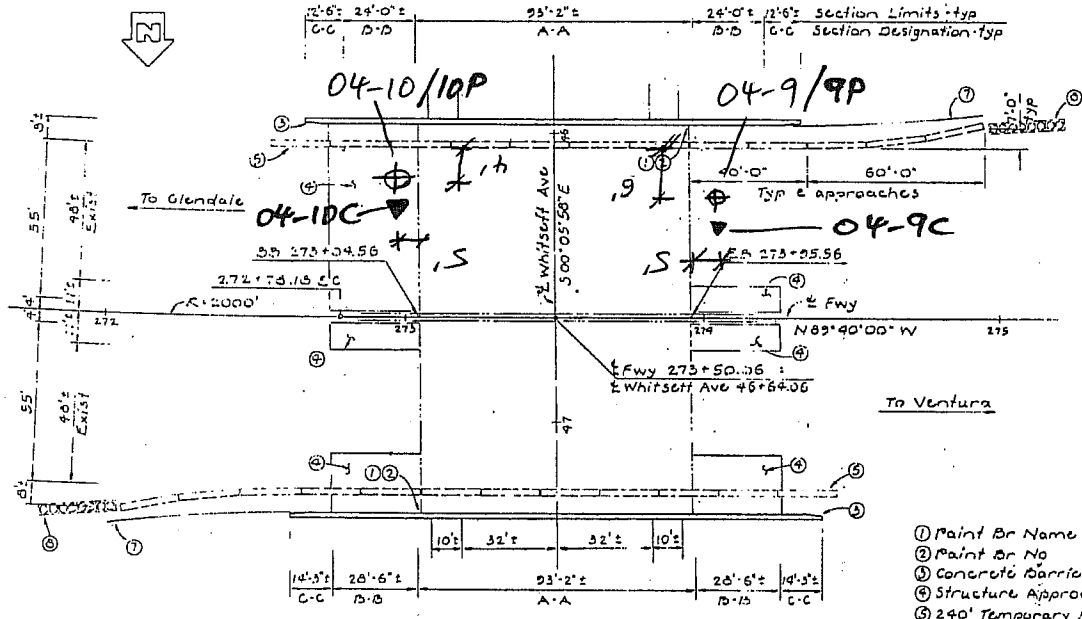
Stanley D. Newell
CHIEF, OFFICE OF STRUCTURE DESIGN
REGISTERED CIVIL ENGINEER

5-30-89
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — S. D. NEWELL — No. 13798 — Exp. 03/31/93 — CIVIL — STATE OF CALIFORNIA



TYPICAL SECTION
1" = 10'



PLAN
1" = 20'

BORING / PRESSUREMETER

▼ SEISMIC CPT

APPROXIMATE QUANTITIES

TEMPORARY RAILING (TYPE K)	480	LF
TEMPORARY CRASH CUSHION MODULE	16	EA
SALVAGE METAL BRIDGE RAILING	345	LF
BRIDGE REMOVAL (PORTION), LOCATION 24	LUMP SUM	
AGGREGATE BASE (APPROACH SLAB)	15	CY
PAVING NOSE EXTENSION	99	CF
REFINISH BRIDGE DECK	32	SQFT
JOINT SEAL (MR 1/2")	132	LF

FINAL PAY QUANTITIES

STRUCTURAL CONCRETE, APPROACH SLAB (TYPE A)	147	CY
CONCRETE BARRIER (TYPE 27R)	345	LF

INDEX TO PLANS

SHEET NO.	TITLE
1	GENERAL PLAN
2	CONCRETE BARRIER TYPE 27R
3	STRUCTURE APPROACH TYPE R(30D)

STANDARD PLANS DATED JANUARY 1988

A35-A	P.C.C. PAVING DETAILS
B6-21	JOINT SEALS
B11-30	TEMPORARY RAILING (TYPE K)

AS BUILT

CORRECTIONS BY G. KIESZNER

CONTRACT NO. 07-104164

DATE 2-16-93 AS MET 10/1/93

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

① Paint Br Name
② Paint Br No
③ Concrete Barrier Type 27R
④ Structure Approach Type R(30D)-construct along exist lane lines.
⑤ 240' Temporary Railing (Type K)-Layout shown for railing replacement only.
⑥ Refinish deck
⑦ MBGR, see "Road Plans"
⑧ Temporary Crash Cushion

Standard Plan Sheet No.
Detail No.

RAILING REPLACEMENT & PAVEMENT REHAB

Submitted by: T.M. Rowan C17514	DESIGN	By: Mario P. Marcellana	Checked: Geoffrey B. Woody	LOAD FACTOR DESIGN	LIVE LOADING: HS20-44 AND ALTERNATIVE AND PERMIT DESIGN LOAD
Approval Recommended by: Gary M. Willmarth C-8198	DETAILS	By: R. Kiesz	Checked: Geoffrey B. Woody	LAYOUT	By: Mario P. Marcellana Checked: Geoffrey B. Woody
	QUANTITIES	By: Ramon L. Mendoza	Checked: [illegible]	SPECIFICATIONS	By: [illegible] Checked: [illegible]

State of CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN 11
Mario P. Marcellana 41689
PROJECT ENGINEER — REGISTERED CIVIL ENGINEER NO.

BRIDGE NO. 53-1340
POST MILE 13.39

WHITSETT AVENUE UNDERCROSSING
GENERAL PLAN

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS: 0 1 2 3

CU 07
EA ~~265981~~ 104161

Disregard prior bearing number revision dates

REVISION DATES (PRELIMINARY STAGE ONLY)

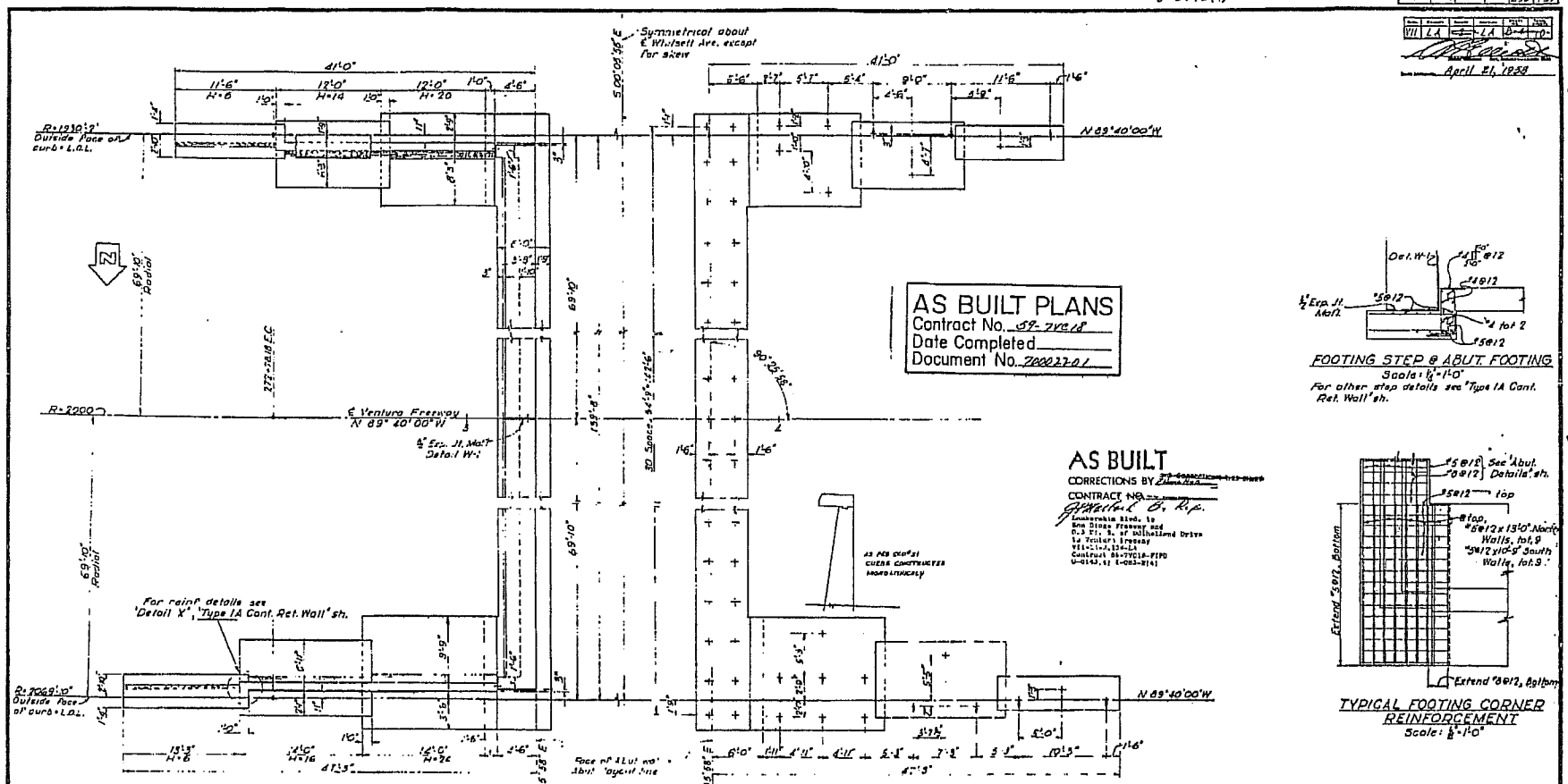
SHEET 1 OF 2

(SIMILAR BRIDGE)

U-0143(4) I-083-2(4)

FED. ROAD DIST. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
7	CALIF.			295	439

April 21, 1958



AS BUILT PLANS
Contract No. 59-7VC18
Date Completed
Document No. 700022-01

AS BUILT
CORRECTIONS BY
CONTRACT NO.

FOOTING LAYOUT
Abut. 1 shown, Abut. 2 similar except for skew.
Wall dimen. shown are meas. along L.O.L.

PLAN

PILE LAYOUT
Abut. 2 shown, Abut. 1 similar except for skew.

Note:
+ Indicates Vertical Pile
+ " Batter Pile (1:3)
Batter every other pile in each row
Abut. Flg except as shown.
For wall details not shown see 'Type 1A Cont. Ret. Wall' sh.

FOOTING STEP @ ABUT. FOOTING
Scale: ¼"=1'-0"
For other step details see 'Type 1A Cont. Ret. Wall' sh.

TYPICAL FOOTING CORNER REINFORCEMENT
Scale: ½"=1'-0"

BRIDGE DESIGNATION ADAPTED FROM BR# 53-1069
DESIGN SECTION 8

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

WHITSETT AVENUE UNDERCROSSING

ABUTMENT LAYOUT

Except as shown SCALE 3/32"=1'-0" BRIDGE 53-1340 FILE DRAWING 5-5132-4

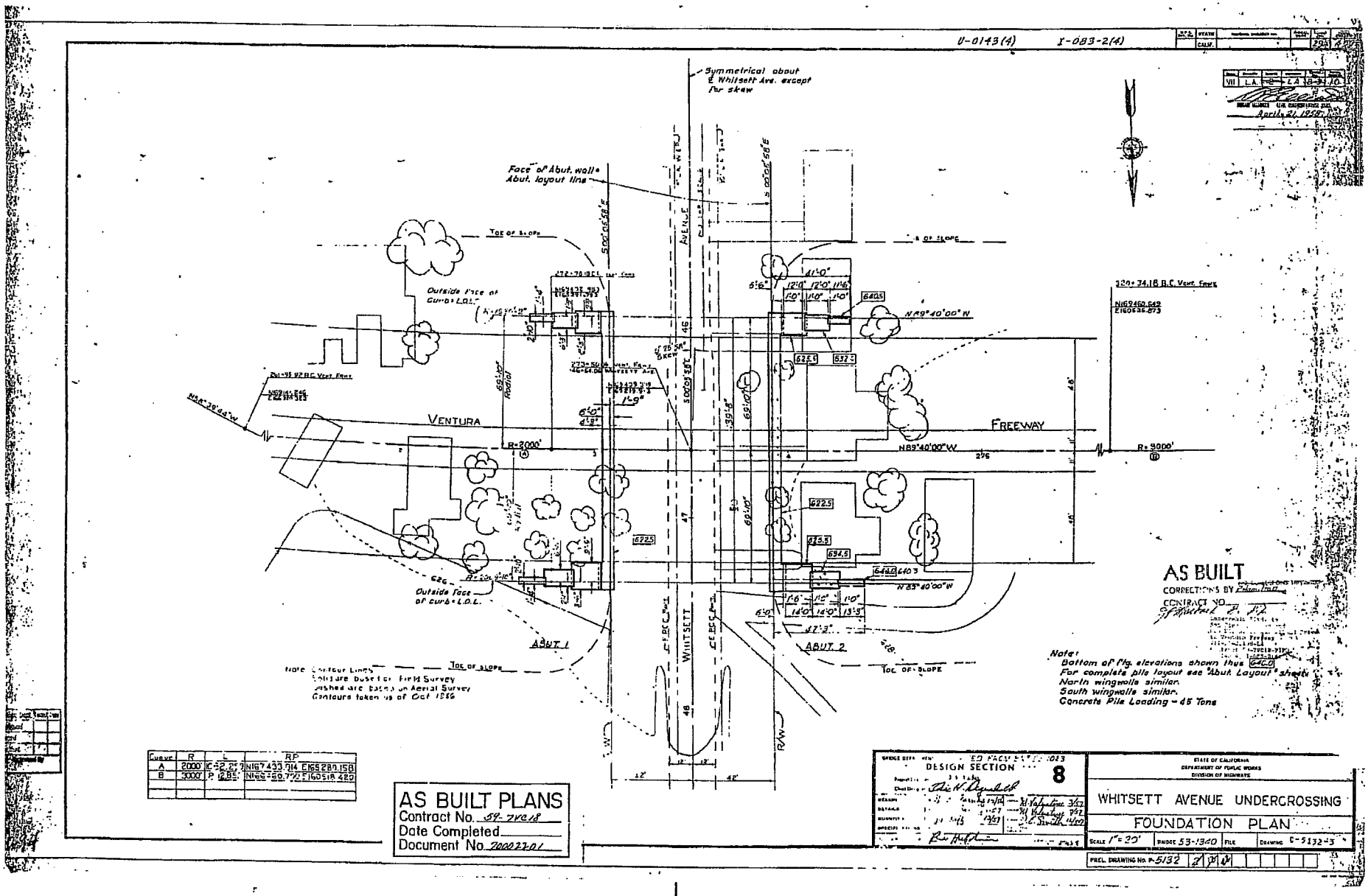
PROJ. DRAWING NO. 5132

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 PUBLIC WORKS.

DATE 9/24/71 SIGNATURE [signature] TITLE HAC II

163

295



Curve	R	L	RP
A	2000'	C-52.25'	N167 433.914 E165 280.158
B	3000'	P 12.85'	N166 460.792 E160 518.420

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 PUBLIC WORKS.

DATE 9/24/71 SIGNATURE [illegible] TITLE [illegible]

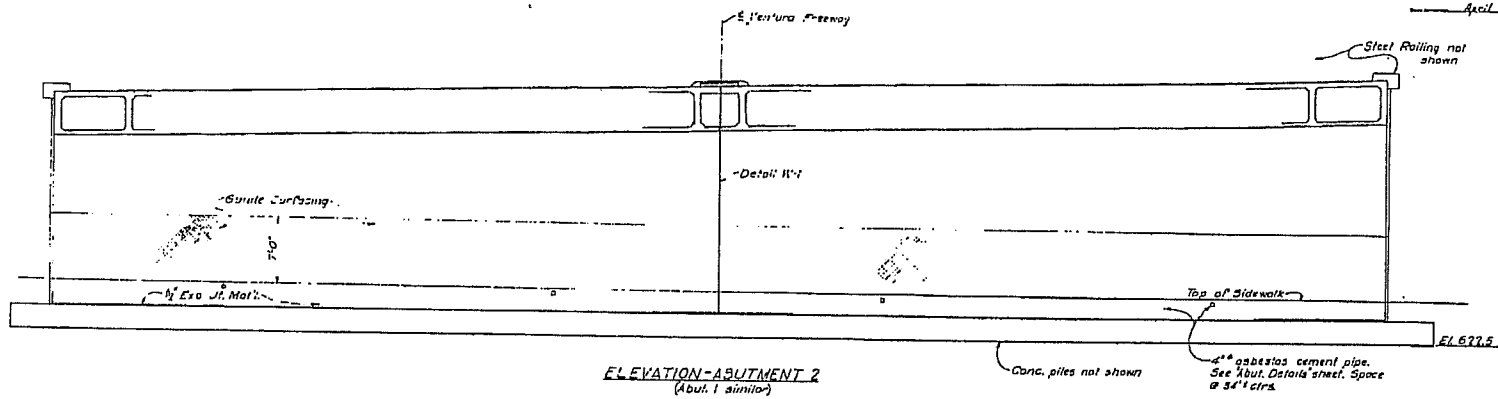
CMPDF - www.ks-tm.com

U-0143(4) I-083-2(4)

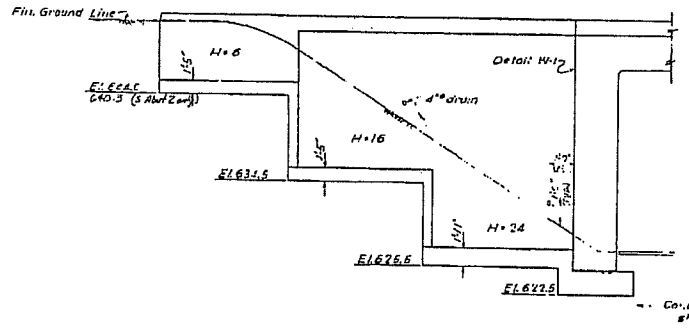
DIST.	COUNTY	ROUTE	KILOPOST	SHEET NO.	TOTAL SHEETS
7	CALIF.			297	459

DIST.	COUNTY	ROUTE	POST MILE	PHASE	PROJECT NO.
VII	LA		LA	B-6	10

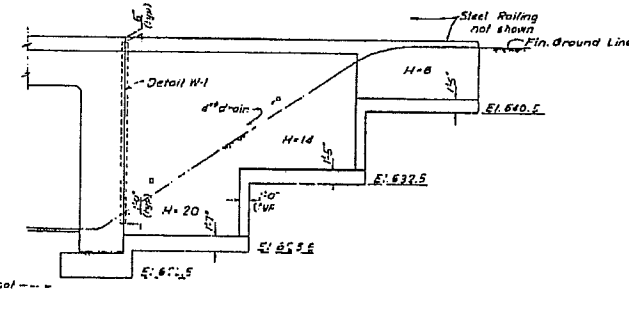
April 24, 1968



ELEVATION-ABUTMENT 2
(Abut. 1 similar)



NORTH WINGWALL ABUTMENT 1
(North wall Abut 2 similar)



SOUTH WINGWALL ABUTMENT 1
(South wall Abut 2 similar)

AS BUILT
CORRECTIONS BY E Hamilton
CONTRACT NO.
Lankershim Blvd. to San Diego Freeway and O.H. Bk. to Hollywood Drive to Ventura Freeway
VII-LA-7.158-LA
Construct 4&6-7W018-P1FD
U-0143(4) I-083-2(4)

AS BUILT PLANS
Contract No. 59-7W018
Date Completed
Document No. 7000220-01

Note: For wall data & steel dtls see "Type 1A Conc Ret Wall" (Abut. Layout) sheets. Wall "H" values are for determining wall & fig. reinf. only. For curb details & top of wall see Abut. Details sheet.

BRIDGE NOMENCLATURE ADAPTED FROM 32-65-1063
*** DESIGN SECTION *** 8

DESIGNED	O. L. Yoder
DETAILED	J. R. Mann, Jr.
QUANTITIES	J. R. Mann, Jr.
SPECIFICATIONS	J. R. Mann, Jr.
Chief Designer	Alan W. Lyon, A.I.A.
Approved for Publication	

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

WHITSETT AVENUE UNDERCROSSING

ABUTMENT & WINGWALL ELEVATIONS

Plotted as noted | Bridge No. 53-1360 | File | Drawing B-5132-6

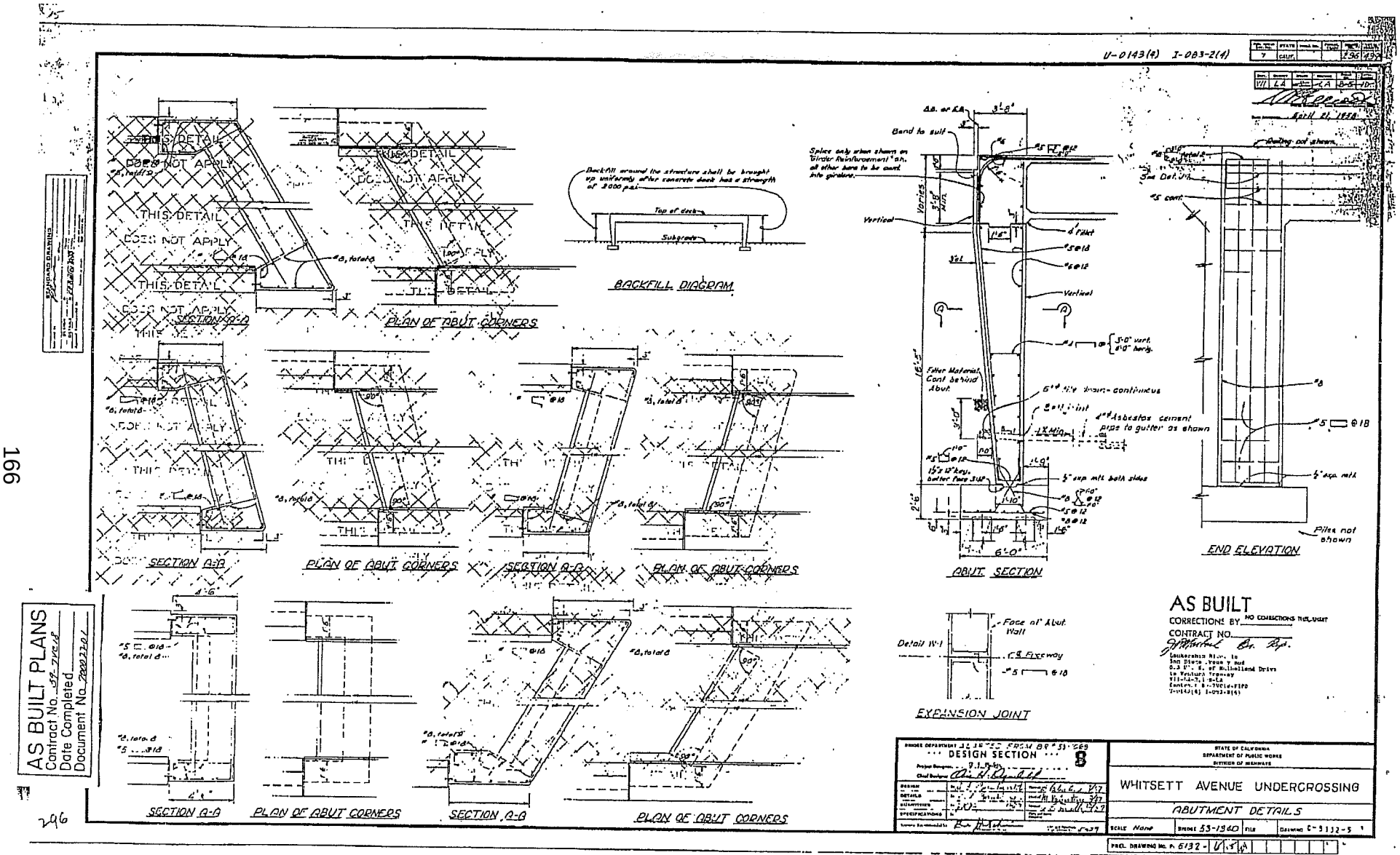
PRELIM. DRAWING NO. P-5132

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN FROM ITS DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE 7/24/70 SIGNATURE [illegible] TITLE Asst II

165

297



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 PUBLIC WORKS.

DATE 9/24/71 SIGNATURE TITLE HAC II

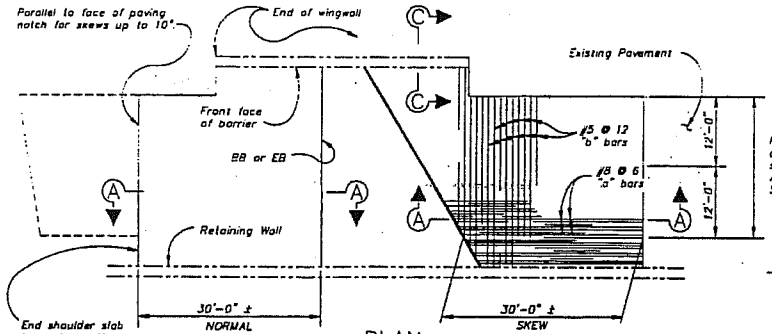
DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
07	LA	101	10.4/25.4	447	575

REGISTERED ENGINEER – CIVIL

5-30-89

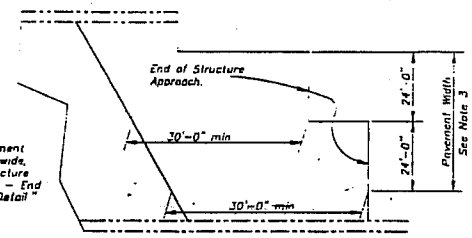
PLANS APPROVAL DATE

P.M. SEMANS C 17514 Exp. 6-30-89 CIVIL STATE OF CALIFORNIA



PLAN

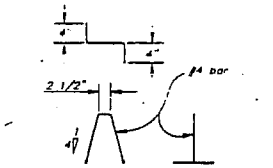
1" = 10'



For pavement over 36' wide, see "Structure Approach – End Stagger Detail"

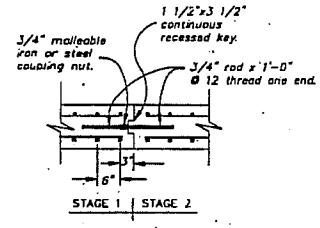
STRUCTURE APPROACH – END STAGGER DETAIL

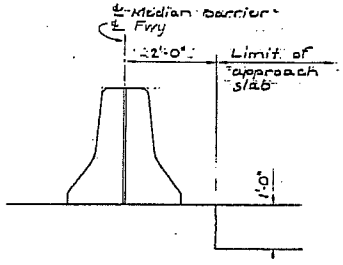
No Scale



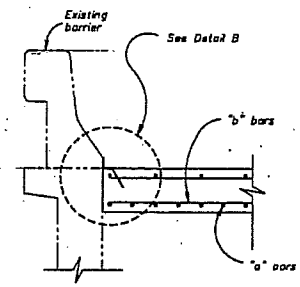
BAR CHAIR DETAIL

1" = 1'-0"



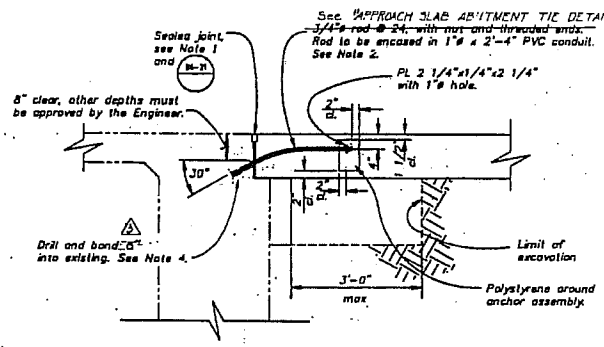


SECTION AT MEDIAN BARRIER 1 2



SECTION C–C

3/4" = 1'-0"



TIE DETAIL

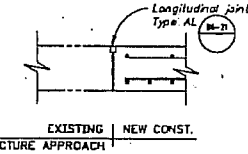
3/4" = 1'-0"

AS BUILT

CORRECTIONS BY G. KIRZHNER

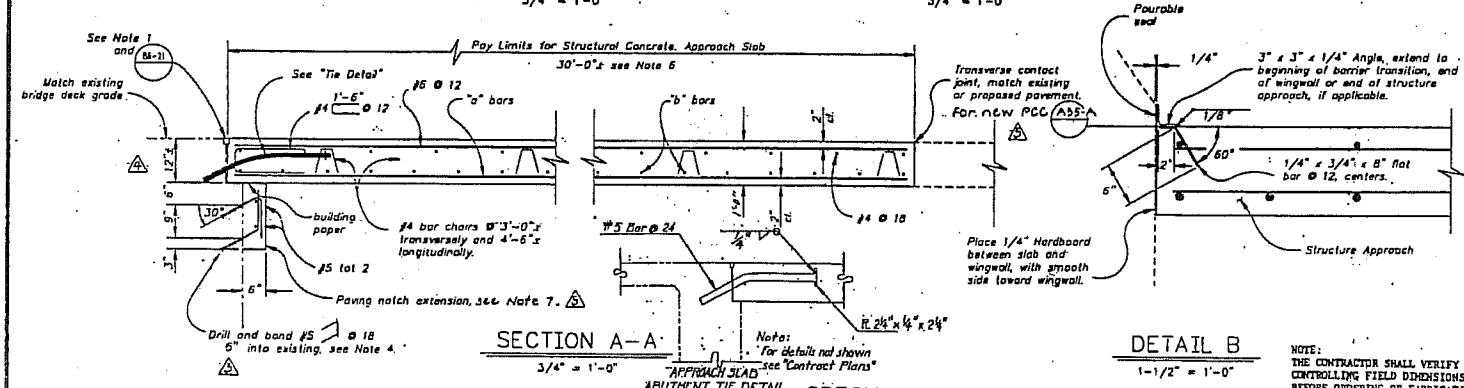
CONTRACT NO. 07-104164

DATE 2-16-93 04 MET 10/4/93



LONGITUDINAL CONSTRUCTION JOINT ALTERNATIVES

3/4" = 1'-0"



SECTION A–A

3/4" = 1'-0"

Note: For details not shown see "Contract Plans"

APPROACH SLAB ABUTMENT TIE DETAIL SPECIAL DETAIL

DETAIL B

1-1/2" = 1'-0"

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

NOTES

1. ~~Sealed joint for MR= (Movement Rating) ± ½" (Type A Seal) reinforcement to clear a sawcut for sealed joint when required.~~
2. #5 bar may be substituted for 3/4" rod. Place rod or bar parallel to ℄ roadway.
3. Structure Approach to skewed structures shall be staggered at lane lines. Staggered lines may be 24' or 36' apart for skews of 45° or less and at any lane line for skews greater than 45°.
4. Space to avoid existing prestress anchorages and main reinforcement.
5. Longitudinal construction joints shall be permitted as approved by the Engineer.
6. Transverse contact joint shall be a minimum of 5' from an existing or constructed recessed plane joint.
7. Paving notch extension is required when the existing paving notch is less than 6" wide.

STANDARD DRAWING

FILE No. XS 22-19 | DESIGN | BY | Checked | Approved Recommended By

DRAWING | DETAILS | BY | Checked

DATE REVISED | SUBMITTED BY

1 Delete detail 4 Delete note
2 New detail 5 Revise note
3 Revise dim 6 New note

State of CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES STRUCTURE DESIGN 11

Chris P. Ostrom 4/1/93

BRIDGE NO. 53-1340

POST MILE 13.30

WHITSETT AVENUE UNDERCROSSING

STRUCTURE APPROACH TYPE R(30D)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

CU 07 EA ~~065901~~ 104161

Designed prints bearing earlier revision dates ——

BEFORE DATES STRIPPED, MAY STAMP ONLY!

SHEET 3 OF 3

DS 0RD 21478 (12/88)

CalPDF www.calpdf.com

BRIDGE DEPARTMENT

U-0143(4) I-083-2(4)

DIST.	COUNTY	ROUTE	POST MILE	SHEET NO.	TOTAL SHEETS
VII	LA	134	8.8/8.16		

FED. AID PROJ. NO.	STATE	FISCAL NO.	PROJECT NO.	SHEET NO.	TOTAL SHEETS
7	CAL.			301	439

FOR
A. R. Rosendale
DISTRICT ENGINEER
April 21, 1958

AS BUILT PLANS
Contract No. 53-72418
Date Completed
Document No. 20002201

N

E. VENTURA FREEWAY

N. WHITSETT AVE.

Driven Pile Lengths: 45 Tons
Type Pile Cutoff Made at Design Head
Diameter: 16"
Total Number Piles: 168
Lineal Ft. Piles "As Built": 5,744.1
Lineal Ft. Piles Called for in Plans: 5,110.8
Remarks: Driven with Diesel Type D-46

B.M. 30-3142-55
Wire Spike in West Curb WHITSETT AVE. 2' N. & 2' E. RIVERSIDE DRIVE.
ELEV. 636.22

AS BUILT
CORRECTIONS BY.
NO CORRECTIONS THIS SHEET
DATE

NOTES
The contractor's attention is directed to Section 2, Article (c) of the Standard Specifications and to the Special Provisions accompanying this set of plans.
Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

Loose brown fine to medium sand.
Slightly compact to compact fine to medium silty sand.
Compact to dense fine to medium slightly silty sand & scattered gravel.
Compact brown fine to medium slightly silty sand & scattered gravel.
Dense brown fine to medium sand gravel & scattered cobbles.
Loose-slightly compact brown fine to coarse silty sand & small gravel.
Gravelly beds
Slightly compact brown fine to medium slightly silty sand & scattered gravel.
Slightly compact light grey clayey sand & scattered gravel.
Compact to dense brown fine to coarse sand & fine gravel.
Approx. profile of existing ground along E Trwy.

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

Diagram showing the basis for estimates of grade size distribution used in determination of class names. If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, viz. "gravelly sand." The terms "coarse," "medium" and "fine" when used to describe sand, silt and gravel refer to standard grade size limits.

LEGEND OF EARTH MATERIALS

- Gravel
- Sand
- Silt
- Clay
- Sandy Clay or Clayey Sand
- Sandy Silt or Silty Sand
- Silty Clay or Clayey Silt
- Peat and Organic Matter
- Fill Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

LEGEND OF BORING OPERATIONS

- Plan of any boring
- Penetrometer
- 2½" Cone Penetrometer
- Sampler boring (dry)
- Rotary boring (wet)
- Auger boring (dry)
- Jet boring
- Core boring
- Test pit

1st Soil Tube — Rotary Boring — Penetration Boring

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

WHITSETT AVENUE U.C.

LOG OF TEST BORINGS

Horiz. 1"=20'
Scale Vert. 1"=10'
Bridge 53-1390
File
Drawing 8-5132-10

Full Drawing No. B-5132 4

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 AUTHORIZATIONS BY THE DIRECTOR OF PUBLIC WORKS.

DATE 9/24/01 SIGNATURE [signature] TITLE HAE II

301

CutePDF - www.lastin.com

LOG OF BORING NO. (04-9)

E/B West Abut

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project Name	: CT / UCSD - Abutment Research		
Project Location	: North Hollywood, CA (101 FWY @ Coldwater Canyon Rd.)		
E.M.I. Project No.	: 02-165	Site Condition :	FWY Bridge Abut
Weather	: Night	Elevation :	
Traffic Control	: N/A (provided by other)	Operator :	
Drilling Company	: 2R DRILLING	Operator :	Brian / Ray
Type of Rig	: CME 55 AUTO HAMMER	Drop (in) :	30.0
Borehole Diameter (inch)	: 8"	Drive Wt. (lbs) :	140.0
Logged By	: R.J.	Date Drilled :	4-19-04

Comments : 15' West of joint. 4' off lane

Backfilled With : Cuttings + Cement

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Rework	Lunch	Rework	Break	Finish	Off		15.0
Driller		1050	1200									Water Table
Traffic Control												— ft
Logger												Caving
Total												— ft

Description (ASTM D-2488-93)

3 1/4" O.D. Sampler
1" A/C, 12" Concrete, 12" base

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Color	Description	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O^2/LEL/PID
0	B	0				SPSM	Yel. brn w/brn	SAND w/ plt and grl to 1 1/2" F-c. pa	M	1 1/2	8:85:7	F-C	N.P.			
2.5																
5	D	1		8 12 19	12/18	SPSM	Brn to ol. brn	SAND w/ plt F-c pa grl to 1/2"	M	1/2	5:90:5	F-C	N.D.	M.D	N	
7.5																
10	D	2		6 10 9	12/18	SP	Brn to ol. brn	SAND F-c. pa. grl to 3/4	M	3/4	7:90:3	F-C	N.P.	L	N	
15	D	3		5 5 5	14/18	SP		SAME			: :					
								T.D 16.5' no G/W encountered								
20											: :					
25											: :					

'+33"
MT
1
00,
1.5 ☐
+
29"
01 5

LOG OF BORING NO. (04-10)

E/B East Abut.

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project Name	:	CT / UCSD - Abutment Research		
Project Location	:	North Hollywood, CA (101 FWY @ Coldwater Canyon Rd.)		
E.M.I. Project No.	:	02-165	**Site Condition :**	FWY Bridge Abut.
Weather	:		**Elevation :**	
Traffic Control	:	N/A (Provided by others)	**Operator :**	
Drilling Company	:	2R DRILLING	**Operator :**	Brian / Ray
Type of Rig	:	CME 55 AUTO HAMMER	**Drop (in) :**	30.0
Borehole Diameter (inch)	:	8"	**Drive Wt. (lbs) :**	140.0
Logged By	:	R.J.	**Date Drilled :**	4-19-04

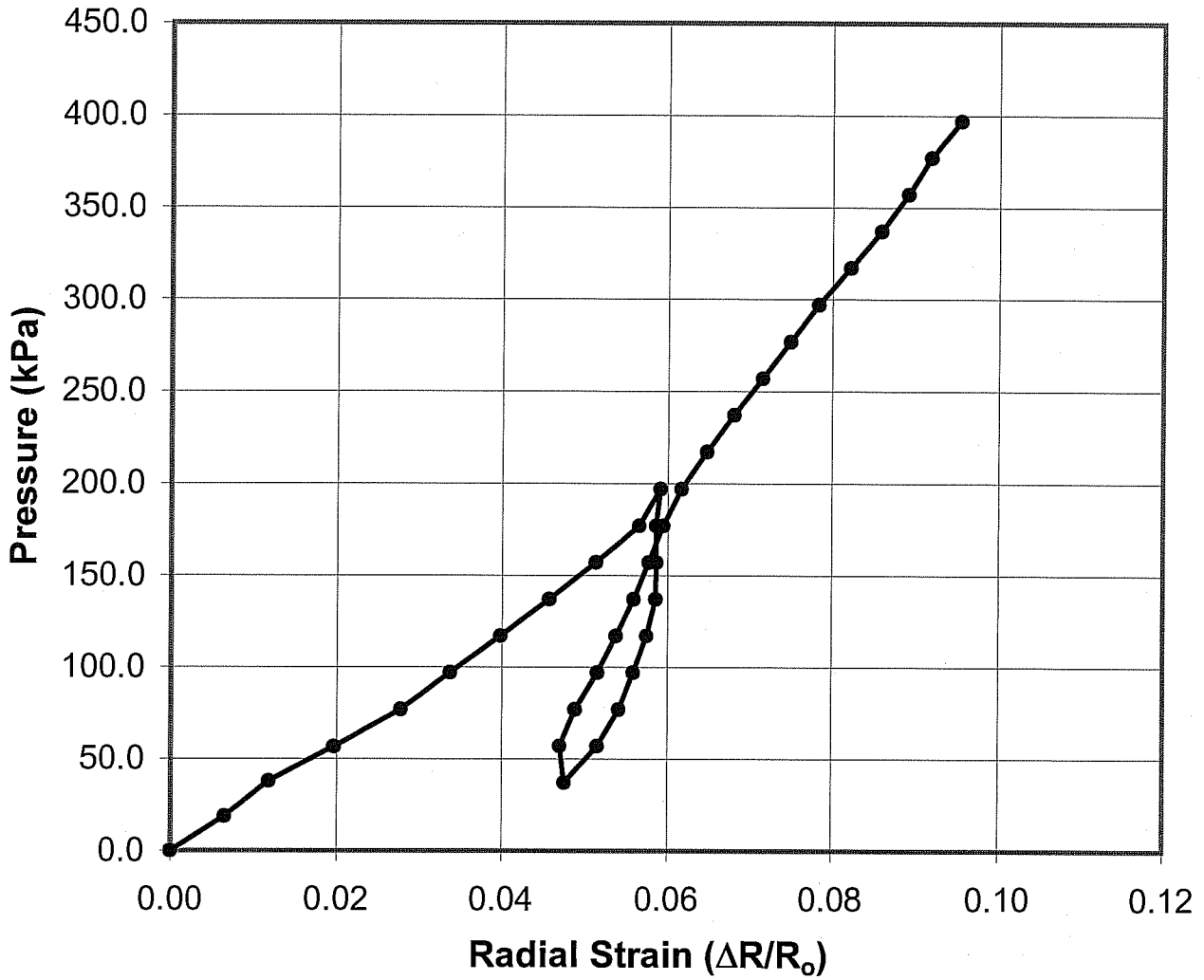
Comments :
5 East of Joint
4 off lane

Backfilled With : Cuttings + Cement

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Rework	Lunch	Rework	Break	Finish	Off		15.0
Driller		0216	0233							0355		Water Table — ft
Traffic Control												
Logger												Caving — ft
Total												

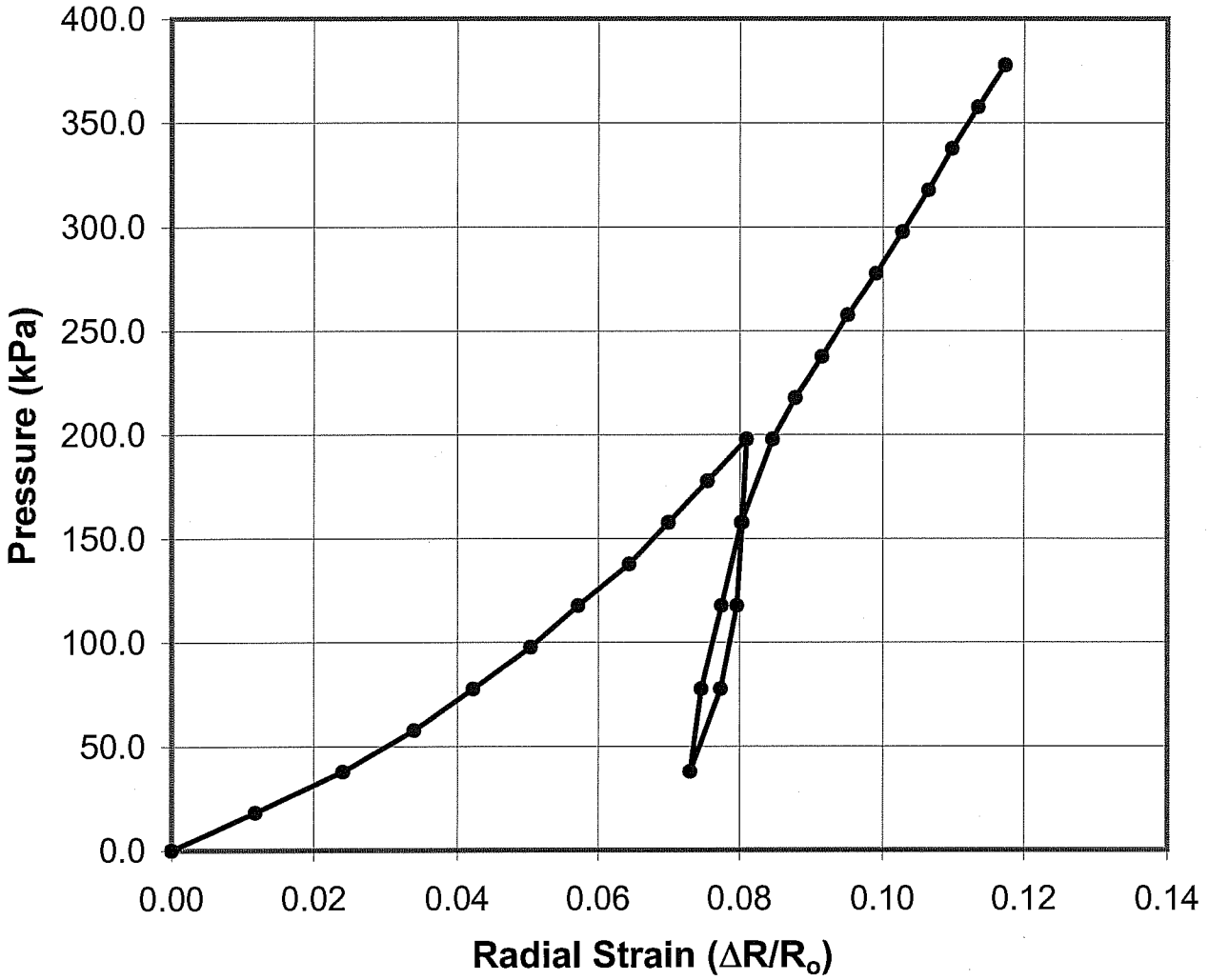
Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (D/DS/B/T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93)	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O²/LEL/PID
							Color								
0	B	0				SP-SM	Yel. brn to brn	1" a/c 12" Concrete 12" base. 3 1/4" O.D. sampler. Sand w/ silt and grvl. to 1/2" F-C. pa	M	1/2	6:89:5	F-C	NP		
2.5															
5	D	1		9 10	12/18	SP-SM	brn	SAND w/ silt and grvl. to 3/4 F-C. pa	M	3/4	7:88:5	F-C	N.P.	M.D	M
7.5	D	2		16 18 8	12/18	SP-SM CL	Red. brn	SAME SAND [CLAY] w/ tr. grvl. to 3/4" L P.I.	M	3/4	3:32:65	F-M	L	V.Stiff	M
10											: :				
12.5	D	3		4 6 12	12/18	SP	Brn.	SAND w/ grvl to 1" F-C. pa	M	1"	7:90:3	F-C	N.P.	M.D	M
15	D	4		5 8 10	12/18	SP CL	Brn. to Red. brn	1" SAME LEAN CLAY w/ silt & F-C sa. tr. grvl to 3/4. pl. oxidation L P.I.	M	3/4	4::	F	L	St.	M
20								T.D. 16.5' NO G/W encountered			: :				
25											: :				

Pressuremeter Test Result



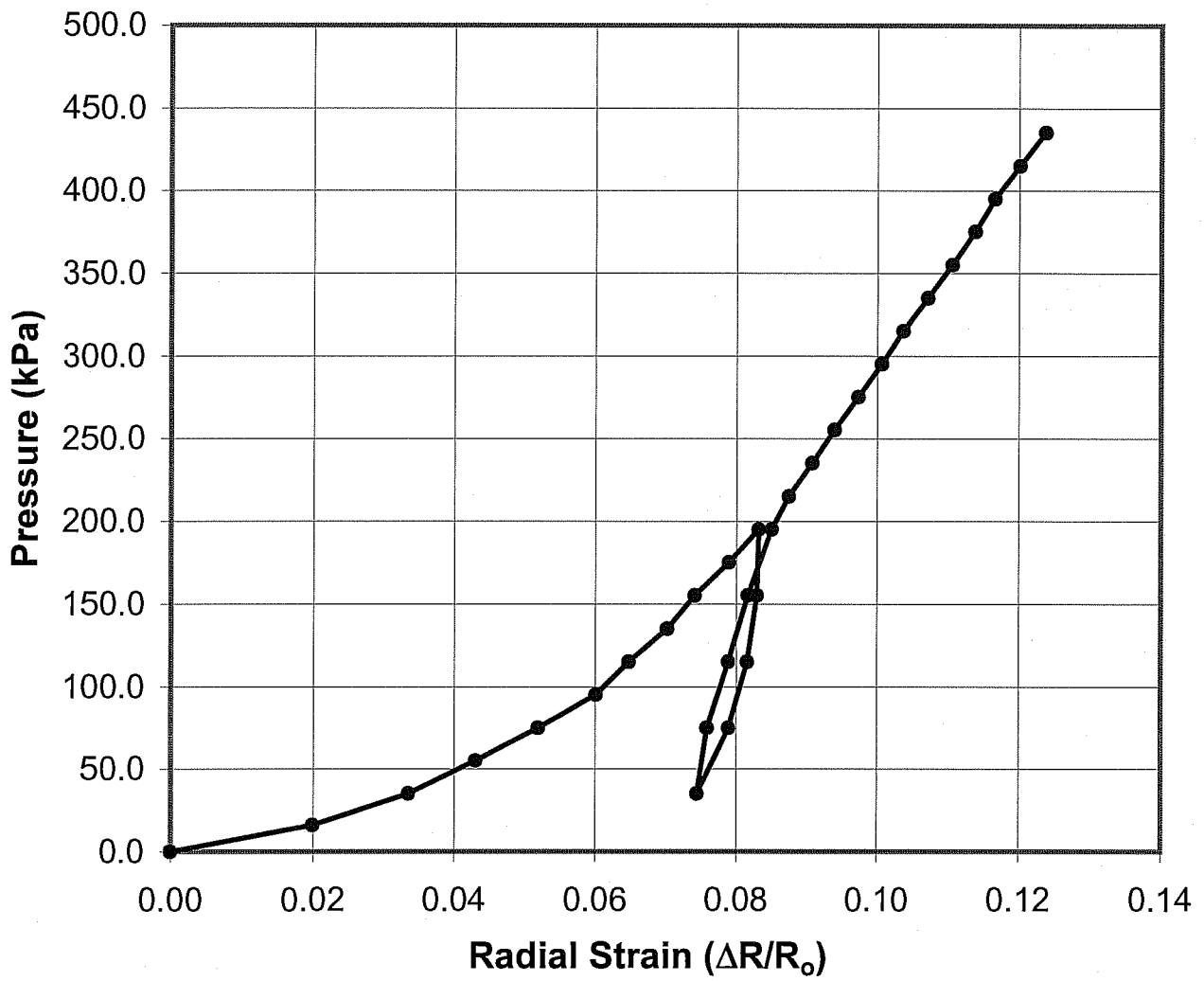
Boring No.:	**04-9P**
Location:	**Coldwater Canyon**
	Los Angeles County
Test Date:	**4/19/04**
Test Depth:	**7.5 ft**
Soil Type:	**Poorly Graded Sand with Silt and Gravel**

Pressuremeter Test Result



Boring No.:	**04-9P**
Location:	**Coldwater Canyon**
	Los Angles County
Test Date:	**4/19/04**
Test Depth:	**12.5 ft**
Soil Type:	**Poorly Graded Sand with Gravel**

Pressuremeter Test Result



Boring No.:	**04-10P**
Location:	**Coldwater Canyon**
	Los Angeles County
Test Date:	**4/19/04**
Test Depth:	**7.5 ft**
Soil Type:	**Poorly Graded Sand with Silt and Gravel**

HOLGUIN, FAHAN & ASSOCIATES, INC.
ENVIRONMENTAL MANAGEMENT CONSULTANTS
948 North Lemon Street, Orange, CA 92867 (714)-210-5971 FAX (714) 210-5975

April 16, 2004

Mr. (Raj) S. Varatharaj
Earth Mechanics, Inc.
17660 Newhope St, Suite E
Fountain Valley, CA 92708

PROJECT NAME: CPT Testing at UCSD Abut Research-Coldwater Canyon;
PROJECT NO.: 02-165

Dear Mr. Varatharaj:

Enclosed please find copies of the cone penetrometer testing (CPT) data for the above referenced project along with a copy of the corresponding invoice.

The cone penetrometer testing conducted for this project consisted of pushing an instrumented cone-tipped probe into the ground while simultaneously recording the resistance to penetration at the cone tip and along the friction sleeve.

The cone penetrometer testing described in this report was conducted in general accordance with the current ASTM specifications (ASTM D5778-95 and D3441-94) using an electronic cone penetrometer.

The CPT equipment operated by Holguin, Fahan & Associates, Inc. (HFA) consists of a cone assembly mounted at the end of a series of hollow sounding rods. A set of hydraulic rams is used to continuously push the cone and rods into the soil at a rate of 20-mm per second (approximately four feet per minute) while the cone tip resistance and sleeve friction resistance are recorded every 50-mm (approximately two inches) and stored in digital form. A specially designed all wheel drive 23-ton truck provides the required reaction weight for pushing the cone assembly and is also used to transport and house the test equipment.

The cone penetrometer assembly used for this project consists of a conical tip and a cylindrical friction sleeve. The conical tip has a 60° apex angle and a diameter of 35.6-mm (1.40-inch) resulting in a projected cross-sectional area of 10 cm^2 (1.5 square inches). The cylindrical friction sleeve is 133-mm (5.25-inch) in length and has an outside diameter of 35.8-mm (1.41-inch), resulting in a surface area of 150 cm^2 (23 square inches).

The interior of the cone penetrometer is instrumented with strain gauges that allow simultaneous measurement of cone tip and friction sleeve resistance during penetration. Continuous electric signals from the strain gauges are transmitted by a shielded cable in the sounding rods to the PC-based data acquisition hardware in the CPT truck. The sounding log is also displayed on a monitor.

The CPT data processing is performed using the truck mounted computer based data acquisition and presentation system. The computer generated graphical logs include cone resistance, friction resistance, friction ratio, and pore pressure ratio versus depth at a user selectable scale.

Soil behavior type interpretations are based on the following reference: Robertson, P.K. and Campanella, R.C., 1989, "Guidelines for Geotechnical Design using the Cone Penetrometer Test and CPT with Pore Pressure Measurement." Soil Mechanics series No. 120, Civil Engineering Department, University of British Columbia, Vancouver, B.C., V6T 1Z4, September 1989.

Interpretations and plotting has been done using HFA's proprietary data interpretation and presentation software. It is important to note that the data is not averaged. All interpretations are point interpretations at the corresponding depth listed.

It is also important to note that the soil behavior type correlations are based on a combination of theory, field research, research performed under laboratory conditions, and literature review. The information presented in the tabulated and/or graphical logs should, therefore, be viewed as a guideline rather than as precise measurements.

Some care is recommended when using the soil behavior type interpretations. If a tabulation depth happens to fall on a soil layer interface, or a seam of soil differing from the rest of the layer, the tabulated data can be misleading. The solution to this problem is the proper use of the graphical CPT logs. The tip and sleeve penetration resistance logs are the primary source of profile description; the soil behavior type logs are supplemental. The graphical logs of tip and sleeve resistance should be examined and layer boundaries delineated in accordance with the project requirements. The soil behavior type interpretations are only representative of the response of the soil to the large shear deformations imposed during cone penetration. This is not necessarily a prediction of grain size distribution. However, it has been found that the interpreted soil behavior types generally agree well with the soil types defined in accordance with the grain size distribution methods such as used in the Unified Soil Classification System.

Limitations

Holguin, Fahan & Associates, Inc. (HFA) presents the attached data in accordance with ASTM Standards D5778-95 and D3441-94 and generally accepted cone penetrometer testing practices and standards. The attached data further relates only to the specific project and location discussed in the data. Judgement may be required to verify the CPT soil behavior interpretations.

The "Client" may distribute this data or excerpts therefrom provided the following statement is prominently displayed and included with the distribution:

"Neither CLIENT nor HFA make any guarantee or warranty, express or implied, regarding this data. THE USE OF THIS INFORMATION SHALL BE AT THE USER'S SOLE RISK REGARDLESS OF ANY FAULT OR NEGLIGENCE OF THE CLIENT OR HFA."

Please feel free to call if you have any questions.

Respectfully submitted,

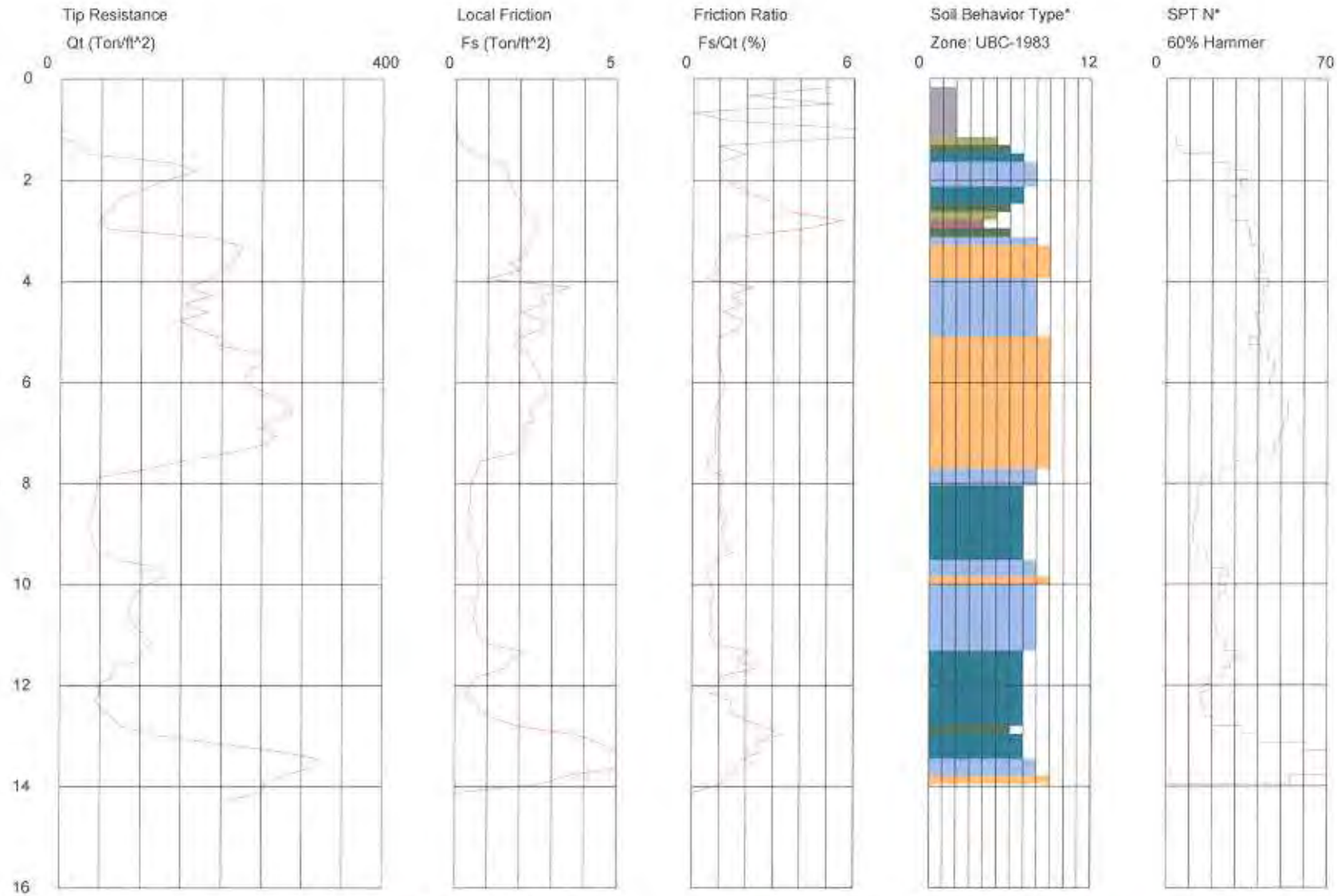
Amanda Hancock
CPT Operations Manager
Holguin, Fahan & Associates, Inc.

:AH\Enclosures

Earth Mechanics

Operator: Bobby-Mike
Sounding: 04-09
Cone Used: DSG0409

CPT Date/Time: 4/20/2004 2:37
Location: Coldwater Canyon
Job Number: 02-165



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behavior type and SPT based on data from UBC-1983

CPT INTERPRETATIONS

SOUNDING : 04-09C
PROJECT : Coldwater Canyon
DATE/TIME: 4/20/2004 2:37

PROJECT No.: 02-165
CONE/RIG : DSG0409

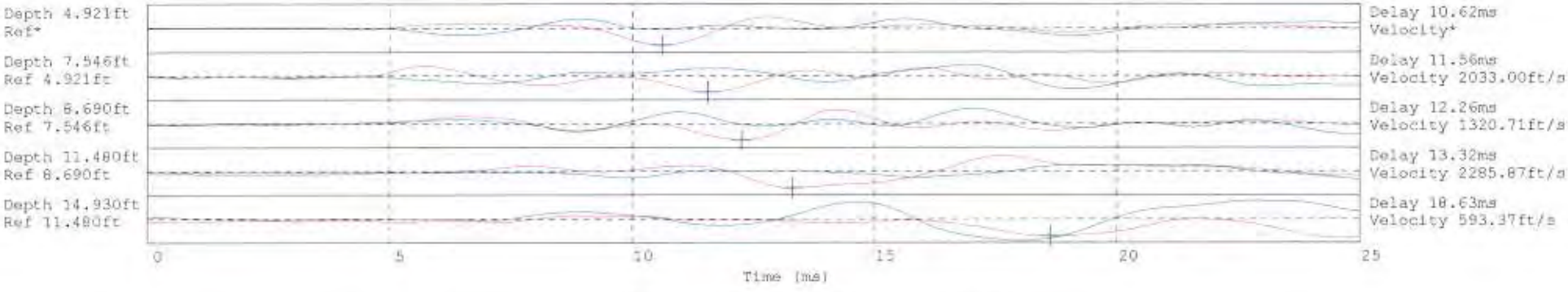
DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	.04	5.00	ORGANIC MATERIAL	0	0		.0	
.300	.98	.15	14.67	ORGANIC MATERIAL	0	0		.0	
.450	1.48	32.86	1.93	SANDY SILT to CLAYEY SILT	13	21		2.6	
.600	1.97	132.29	1.24	SAND to SILTY SAND	33	53	84		
.750	2.46	65.28	3.16	SANDY SILT to CLAYEY SILT	26	42		3.8	
.900	2.95	58.62	4.10	CLAYEY SILT to SILTY CLAY	29	47		3.4	
1.050	3.44	220.88	1.03	SAND	44	71	99		
1.200	3.94	186.52	.50	SAND	37	60	94		49.0
1.350	4.43	153.63	1.82	SILTY SAND to SANDY SILT	51	82	89		48.0
1.500	4.92	166.06	1.65	SAND to SILTY SAND	42	66	91		48.0
1.650	5.41	248.83	.91	SAND	50	80	100		49.0
1.800	5.91	227.25	1.15	SAND	45	73	100		48.5
1.950	6.40	279.15	.90	SAND	56	89	100		49.0
2.100	6.89	250.45	.82	SAND	50	78	100		48.0
2.250	7.38	210.42	.88	SAND	42	63	98		47.0
2.400	7.87	45.83	1.18	SILTY SAND to SANDY SILT	15	22	54		39.5
2.550	8.37	42.64	1.10	SILTY SAND to SANDY SILT	14	20	52		39.0
2.700	8.86	36.61	1.04	SILTY SAND to SANDY SILT	12	17	47		38.5
2.850	9.35	47.41	1.50	SILTY SAND to SANDY SILT	16	21	54		39.0
3.000	9.84	126.79	.60	SAND	25	33	81		44.0
3.150	10.33	88.65	.64	SAND to SILTY SAND	22	28	70		42.0
3.300	10.83	93.37	.74	SAND to SILTY SAND	23	29	71		42.0
3.450	11.32	100.99	2.12	SILTY SAND to SANDY SILT	34	41	73		42.5
3.600	11.81	65.58	1.06	SILTY SAND to SANDY SILT	22	26	60		39.5
3.750	12.30	43.74	1.49	SILTY SAND to SANDY SILT	15	17	48		38.0
3.900	12.80	76.12	2.57	SANDY SILT to CLAYEY SILT	30	35		5.0	
4.050	13.29	270.19	2.54	SILTY SAND to SANDY SILT	90	100	99		46.0
4.200	13.78	275.76	1.26	SAND	55	61	99		46.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 20.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on ROBERTSON and CAMPANELLA, 1989

Earth Mechanics
04-09C

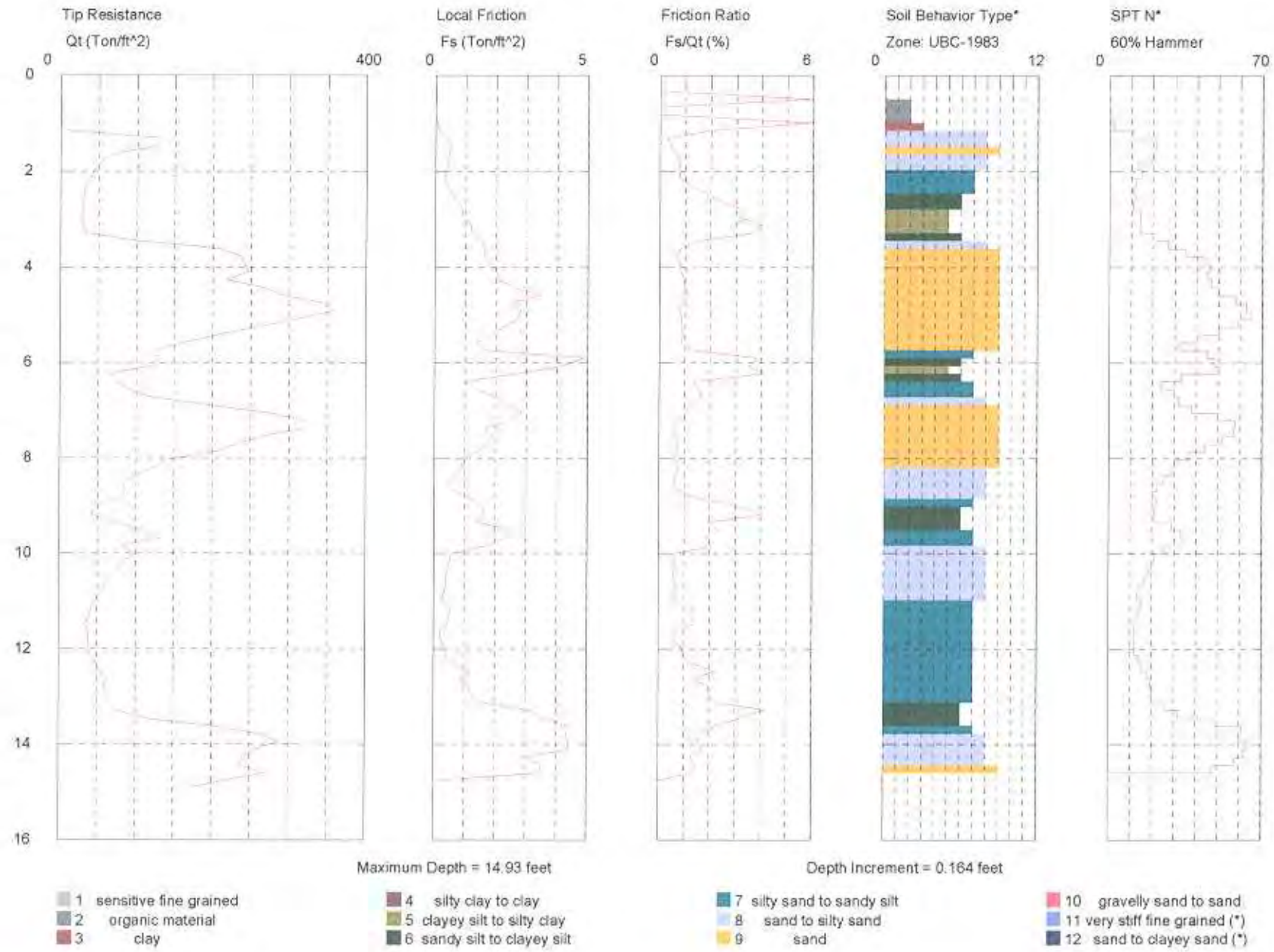


Hammer to Rod String Distance 1.778 (m)
* = Not Determined

Earth Mechanics

Operator: Bobby-Mike
Sounding: 04-10C
Cone Used: DSG0409

CPT Date/Time: 4/20/2004 1:11
Location: Coldwater Canyon
Job Number: 02-165



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ehavior type and SPT based on data from UBC-1983

CPT INTERPRETATIONS

SOUNDING : 04-10C
PROJECT : Coldwater Canyon
DATE/TIME: 4/20/2004 1:11

PROJECT No.: 02-165
CONE/RIG : DSG0409

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	.35	6.86	ORGANIC MATERIAL	0	1		.0	
.300	.98	.39	15.38	ORGANIC MATERIAL	0	1		.0	
.450	1.48	125.87	.44	SAND	25	40	83		
.600	1.97	44.38	.80	SILTY SAND to SANDY SILT	15	24	53		46.0
.750	2.46	31.02	1.79	SANDY SILT to CLAYEY SILT	12	20		2.5	
.900	2.95	27.77	3.13	CLAYEY SILT to SILTY CLAY	14	22		1.8	
1.050	3.44	97.71	1.55	SILTY SAND to SANDY SILT	33	52	76		47.0
1.200	3.94	240.27	.79	SAND	48	77	100		
1.350	4.43	264.73	.97	SAND	53	85	100		
1.500	4.92	356.83	.79	SAND	71	100	100		
1.650	5.41	207.61	.91	SAND	42	66	97		48.5
1.800	5.91	128.22	3.82	SANDY SILT to CLAYEY SILT	51	82		7.5	
1.950	6.40	74.12	1.35	SILTY SAND to SANDY SILT	25	40	68		43.5
2.100	6.89	196.01	1.21	SAND to SILTY SAND	49	76	96		47.0
2.250	7.38	316.42	.53	GRAVELLY SAND to SAND	53	79	100		48.5
2.400	7.87	199.86	.67	SAND	40	58	96		46.5
2.550	8.37	100.96	.65	SAND to SILTY SAND	25	36	77		44.0
2.700	8.86	76.89	1.62	SILTY SAND to SANDY SILT	26	35	68		42.5
2.850	9.35	72.91	1.92	SILTY SAND to SANDY SILT	24	32	66		42.0
3.000	9.84	82.19	2.09	SILTY SAND to SANDY SILT	27	36	69		42.0
3.150	10.33	75.16	.57	SAND to SILTY SAND	19	24	66		41.5
3.300	10.83	53.41	.63	SAND to SILTY SAND	13	17	55		39.0
3.450	11.32	39.19	1.27	SILTY SAND to SANDY SILT	13	16	46		38.0
3.600	11.81	37.98	.59	SILTY SAND to SANDY SILT	13	15	44		37.5
3.750	12.30	48.08	1.30	SILTY SAND to SANDY SILT	16	19	50		38.5
3.900	12.80	58.66	1.98	SILTY SAND to SANDY SILT	20	22	55		39.0
4.050	13.29	75.04	4.17	CLAYEY SILT to SILTY CLAY	38	42		4.4	
4.200	13.78	265.23	1.64	SAND to SILTY SAND	66	73	98		46.0
4.350	14.27	240.60	1.25	SAND	48	52	94		45.0
4.500	14.76	214.13	*****		0	0			.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 20.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
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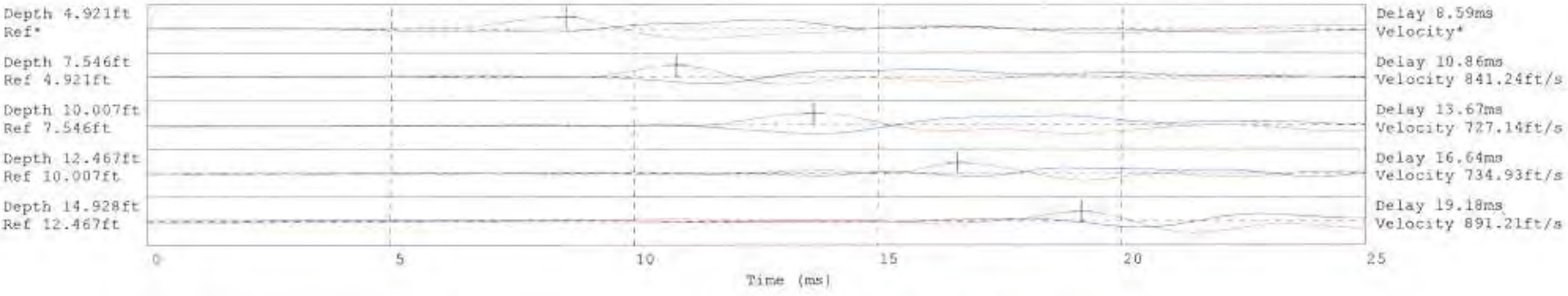
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on ROBERTSON and CAMPANELLA, 1989

Earth Mechanics
04-10C



Hammer to Rod String Distance 1.778 (m)
* = Not Determined

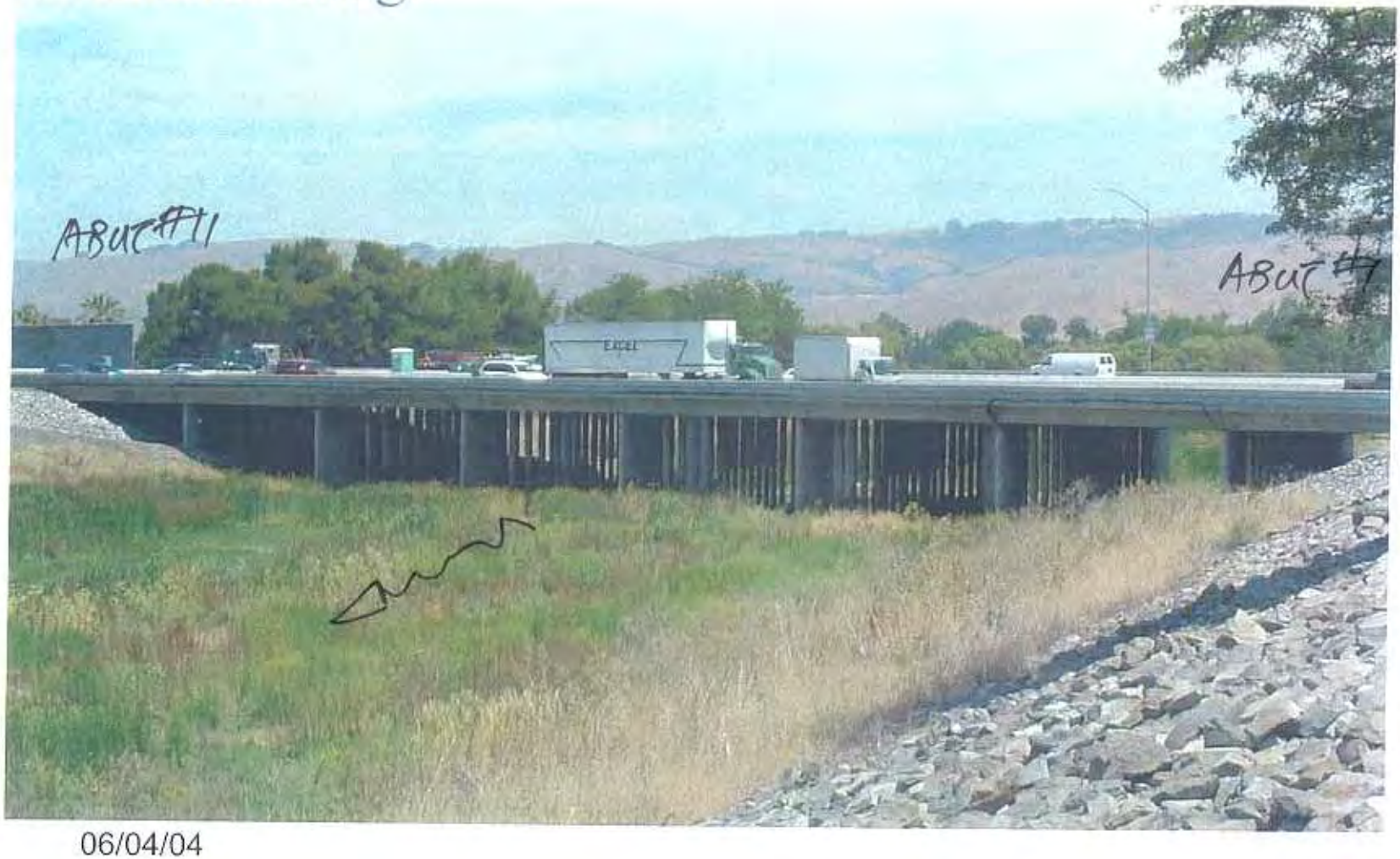
Caltrans Bridge 33-0250
Patterson Slough Bridge, Fremont

Caltrans Bridge 33-0250, Patterson Slough Bridge, Fremont

The field investigation for the Patterson Slough Bridge, conducted on 6/11/04 and 6/12/04, consisted of 2 soil borings (04-11A and 04-12A), 2 PMT borings (04-11P and 04-12P), and 2 CPT's (04-11C and 04-12C). Soil and PMT borings were drilled by Pitcher Drilling of Palo Alto. CPT's were performed by Gregg Drilling of Martinez. Locations 04-11x were located on the north bridge abutment in the south-bound carpool lane. Locations 04-12x were located on the south bridge abutment in the south-bound carpool lane.

Geotechnical soil sampling consisted of ring samples collected using a Modified California sampler and small bulk samples collected with a SPT sampler. Samples were taken at 2.5-ft intervals to 15 ft depth and at 20 ft depth. No groundwater was encountered during the investigation. One pressuremeter tests was performed at each abutment at 5 ft depth.

View to the northeast from walking trail along Patterson Slough



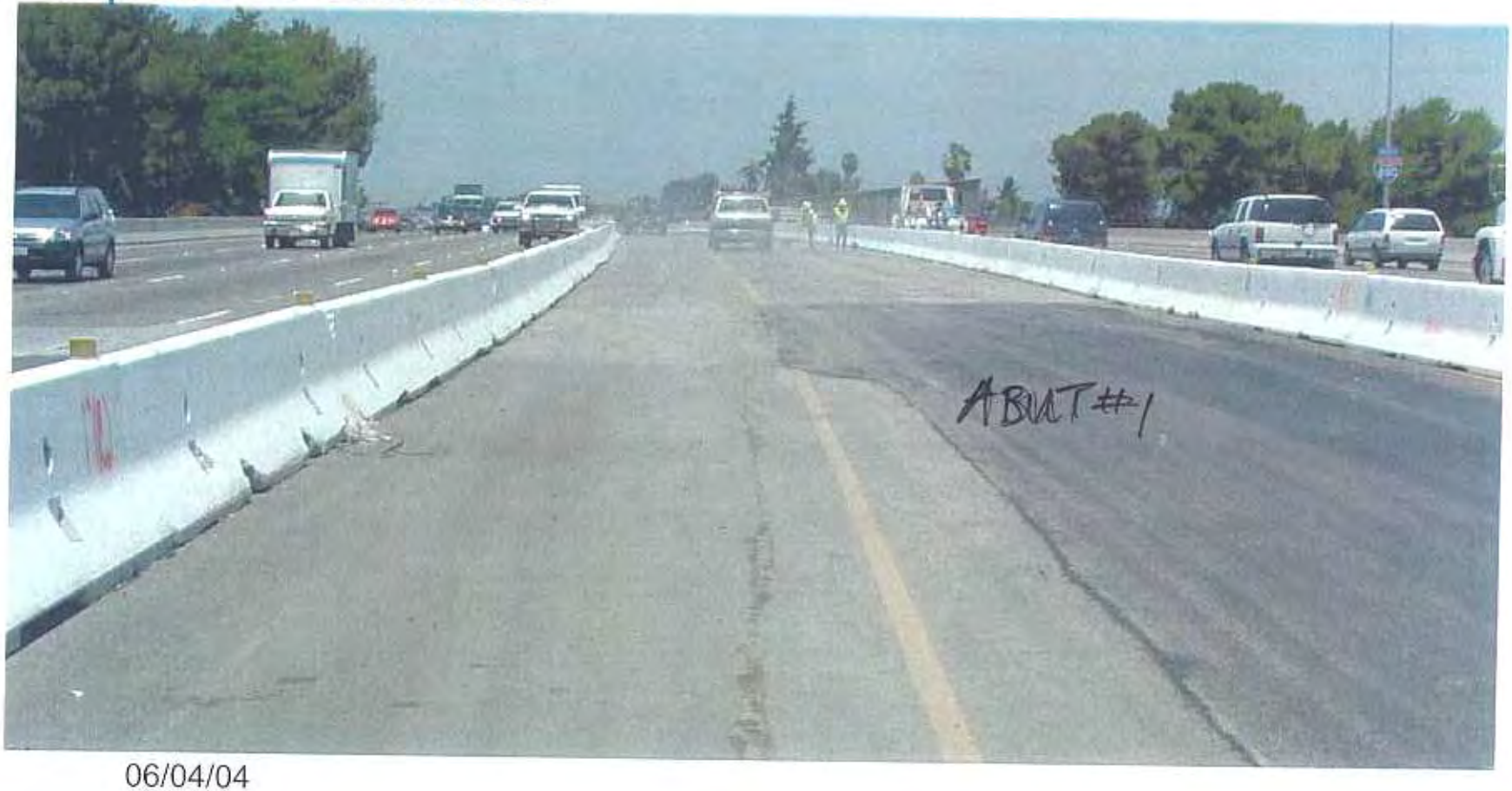
06/04/04

06/04/04

Drilling will be from the center of I-880. Separated from traffic by K-rail barriers on both sides. **Note, No Overhead Power Lines, utilities along side of bridge.**

06/04/04

View to the north from south bridge abutment at approximately Sta. 163+80. Note transition from asphalt to concrete.



06/04/04

South abutment, boring B-1 planned location

06/04/04

ABUT #1

View to the south from north bridge abutment at approximately Sta. 169+00.

06/04/04

ABUT #11

North abutment, boring B-2 planned location

06/04/04

ABUT #1

ABUT #11

ABUT #1

ABUT #1 2

ABUT #11 2

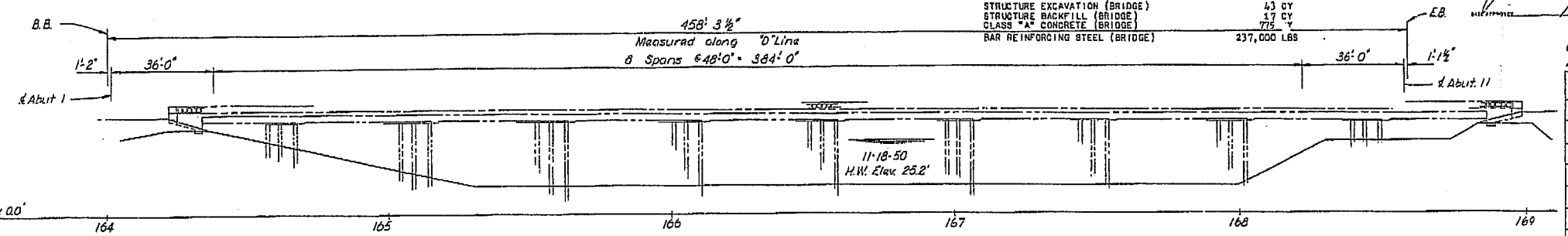
AS BUILT PLANS
Contract No. 04-358204
Date Completed
Document No. 4000173?

193

APPROXIMATE QUANTITIES	
TEMPORARY RAILING (TYPE "J")	1,016 LF
REMOVE PORTIONS OF BRIDGE	LUMP SUM
FURNISHING CONCRETE PILING (CLASS I)	5,305 LF
DRIVING CONCRETE PILES	80 EA
WATERSTOPS	98 LF
MISCELLANEOUS METAL (BRIDGE)	2,700 LBS
FINAL QUANTITIES	
STRUCTURE EXCAVATION (BRIDGE)	43 CY
STRUCTURE BACKFILL (BRIDGE)	17 CY
CLASS "A" CONCRETE (BRIDGE)	775 CY
BAR REINFORCING STEEL (BRIDGE)	237,000 LBS

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	17	10.0/12.5	28	33

May 13 1968



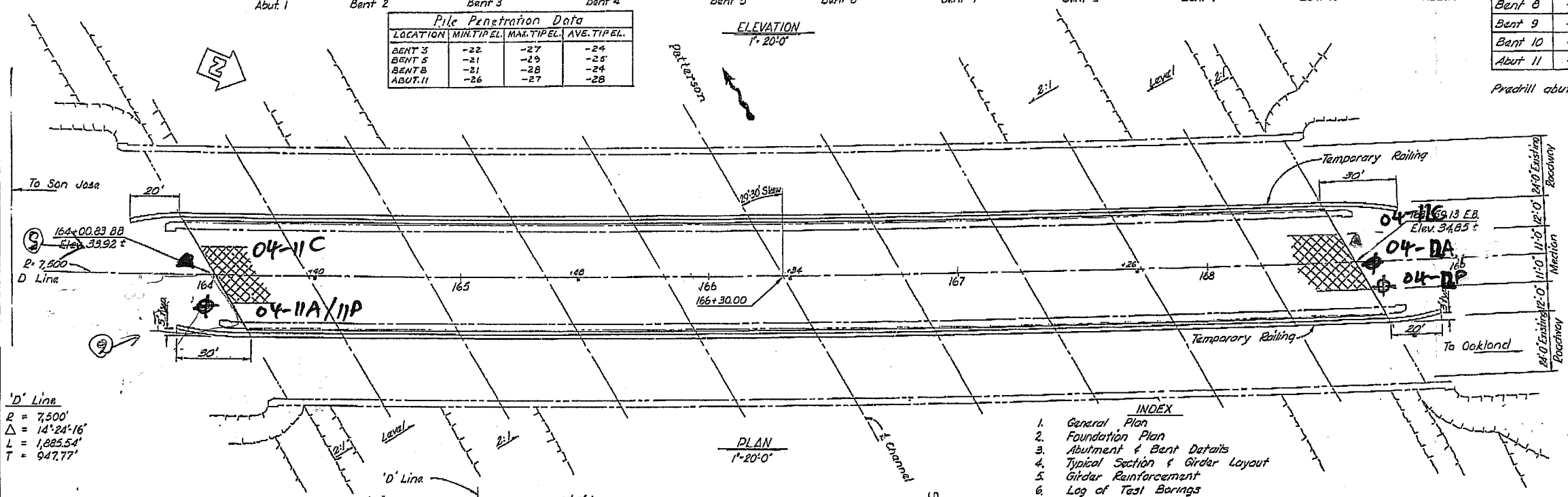
ELEVATION
1" = 20'-0"

Pile Penetration Data			
LOCATION	MIN. TIP EL.	MAX. TIP EL.	AVE. TIP EL.
BENT 3	-22	-27	-24
BENT 5	-21	-29	-25
BENT 8	-21	-28	-24
ABUT. 11	-26	-27	-28

CLASS I DRIVEN CONCRETE PILE (45 TON BRG.)

	Specified Tip Elev.	Estimated Tip Elev.
Abut 1	-20	-32
Bent 2	-28	-35
Bent 3	-30	-35
Bent 4	-28	-34
Bent 5	-30	-35
Bent 6	-30	-35
Bent 7	-28	-32
Bent 8	-30	-40
Bent 9	-25	-35
Bent 10	-25	-35
Abut 11	-26	-32

Predrill abut piles 15'±



'D' Line
P = 7,500'
Δ = 14°24'16"
L = 1,885.54'
T = 947.77'

PLAN
1"=20'-0"

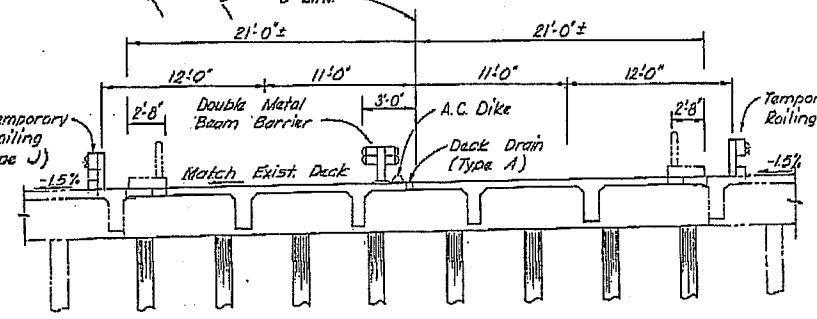
INDEX

1. General Plan
2. Foundation Plan
3. Abutment & Bent Details
4. Typical Section & Girder Layout
5. Girder Reinforcement
6. Log of Test Borings

Standard Plans dated February 1968
B2-1 Concrete Pile Details
B6-1 T-Beam Details No. 1
B6-20 T-Beam Hinge Details - Steel
B9-2 Drain Details
B11-30 Temporary Railings

NO AS BUILT
CORRECTIONS BY L.G. FRANCIS JAN 3-70
CONTRACT NO. 04-358204
DATE 3-12-69

NOTE
Indicates existing structure
Indicates deck drain (Type A)
Denotes contrast treatment



TYPICAL SECTION
3/8" = 1'-0"

Notes:
The contractor shall verify all dependent dimensions in the field before ordering or fabricating any material.
Remove interfering portions of existing structure.

FOR GENERAL NOTES SEE Foundation Plan
LIVE LOADING HS20-44 AND ALTERNATIVE

BRIDGE DEPARTMENT
DESIGN SECTION "J" 1
Section Supervisor: Glenn A. Hoard Jr.
Project Designer:

DESIGN	by Stancik 1/68	Checked	
DETAILS	by B. Keefe 8-67	Checked	
LAYOUT	by Stancik 1/68	Checked	
QUANTITIES	by R. Sepe 1/68	Checked	
SPECIFICATIONS	by J.P. Hunter 1/68	Final Unit Prices Computed	

Approval Recommended by: [signature] Bridge Engineer — Registered Civil Engr. Date Signed

STATE OF CALIFORNIA
HIGHWAY TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

PATTERSON SLOUGH BRIDGE (WIDENING)

LOCATED ABOUT 5 MILES N. OF FREMONT BOULEVARD IN ALAMEDA COUNTY

GENERAL PLAN

BRIDGE NO.	POST MILE	DRAWING NO.	SHEET	OF
33-250		33250-1	1	6

REVISION DATES (PRELIMINARY GRADE ONLY)

WO 358201 CU 04219

Disregard prints bearing earlier revision dates.

28

FED. ROAD DIV. NO.	STATE	PROJ. No.	FISCAL YEAR	SHEET No.	TOTAL SHEETS
7	CALIF.			164	202

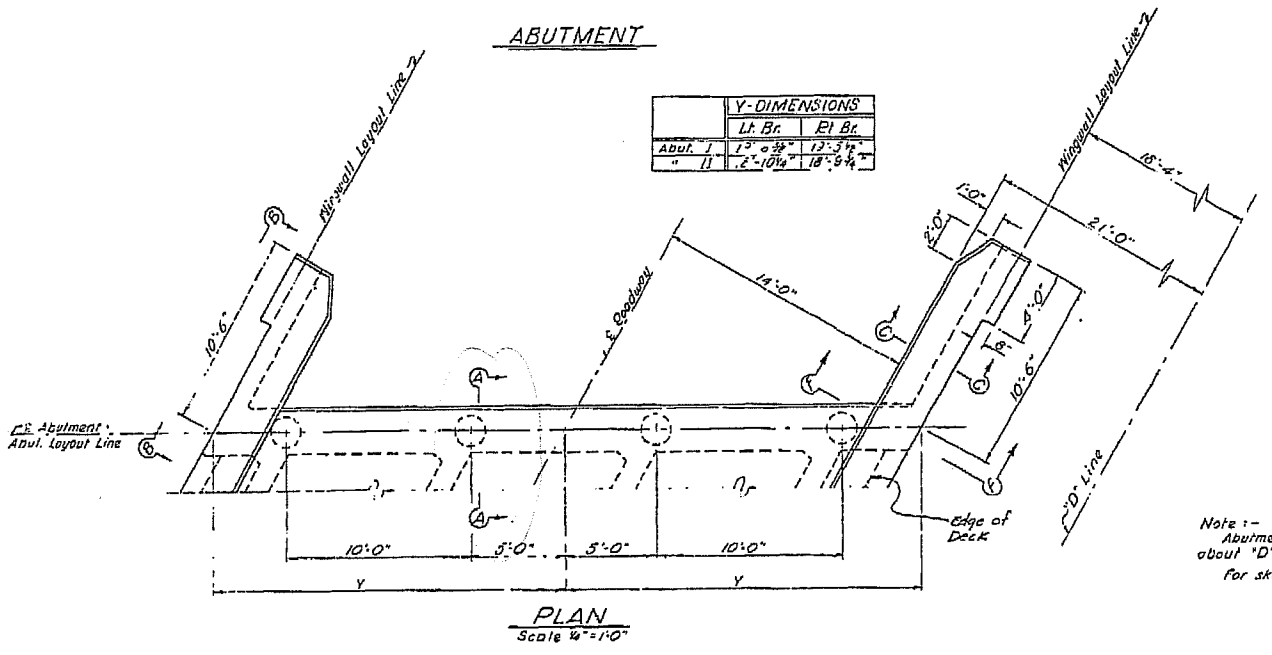
F-341 (14)

DIST.	COUNTY	ROUTE	SECTION	PROJECT No.	TOTAL SHEETS
IV	Ala.	69	D		11

DATE APPROVED November 14, 1955

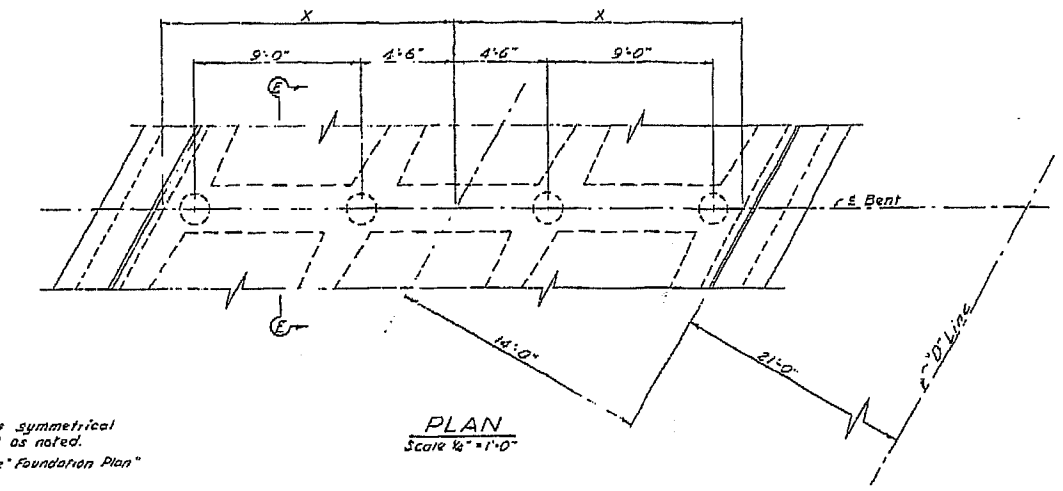
ABUTMENT

	Y-DIMENSIONS	
	Lt. Br.	Rt. Br.
Abut. 1	13'-3 3/8"	12'-3 7/8"
" 11	2'-10 1/4"	18'-9 3/4"



PLAN
Scale 1/4"=1'-0"

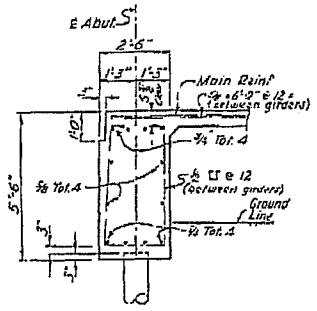
BENT



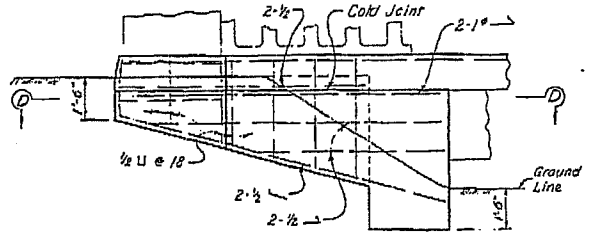
PLAN
Scale 1/4"=1'-0"

Note :-
Abutments & Bents symmetrical about "D" Line except as noted.
For skew angles see "Foundation Plan"

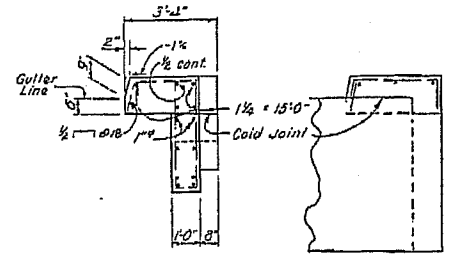
	X-DIMENSIONS	
	Lt. Br.	Rt. Br.
Bent 2	15'-10 1/4"	15'-9 7/8"
" 3	15'-9 1/4"	15'-9"
" 4	15'-9"	15'-8 3/8"
" 5	15'-8 1/2"	15'-7 7/8"
" 6	15'-7 1/2"	15'-7"
" 7	15'-6 7/8"	15'-6 3/8"
" 8	15'-6 1/8"	15'-5 3/4"
" 9	15'-5 1/2"	15'-5 1/8"
" 10	15'-4 7/8"	15'-4 3/8"



SECTION A-A
Scale 1/8"=1'-0"

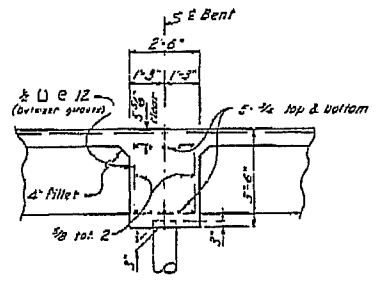


VIEW B-B
Scale 1/8"=1'-0"

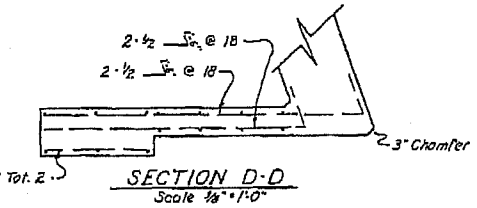


SECTION C-C
Scale 1/8"=1'-0"

SECTION F-F
Scale 1 1/2"=1'0"



SECTION E-E
Scale 1/8"=1'-0"



SECTION D-D
Scale 1/8"=1'-0"

AS BUILT PLANS
Contract No. 56-47C57
Date Completed
Document No. 40002296

NO CORRECTIONS
CONTRACT No. 56-47C57-F
DATE ACCEPTED Dec 6 1957
AS BUILT
RESIDENT ENGINEER Glogiette
REVISIONS BY S.R.E. DATE 7-18-57

BRIDGE DEPARTMENT
··· DESIGN SECTION ··· 7
Project Designer: E.F. Linney
Chief Designer: J.H. Beaver Jr.

DESIGN	by Linney 3-55	Checked W.Allen 8-55	
DETAILS	by Bill Stiver 4-55	Checked C.C.Allen 8-55	
QUANTITIES	by P. Mimms 8-55	Checked C.C.Allen 8-55	
SPECIFICATIONS	By	Date and Init. Completed	
Approval Recommended by: K.V. Johnson, Engineer of Design		Date and Approved For Letting to Contract	5-6-57

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

PATTERSON SLOUGH BRIDGE

ABUTMENT & BENT DETAILS

SCALE As Noted | BRIDGE 33-250 1/2 | FILE | DRAWING B-4135-3

PREL. DRAWING No. P-4135 | 32

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 PUBLIC WORKS.
DATE June 21, 1971 SIGNATURE W.J. Oberlin TITLE Henry J. Peterson Sub. Office

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Alc.	17	10.0/12.5	33	33

ENGINEER IN CHARGE — REGISTERED CIVIL ENGINEER NO. 5265

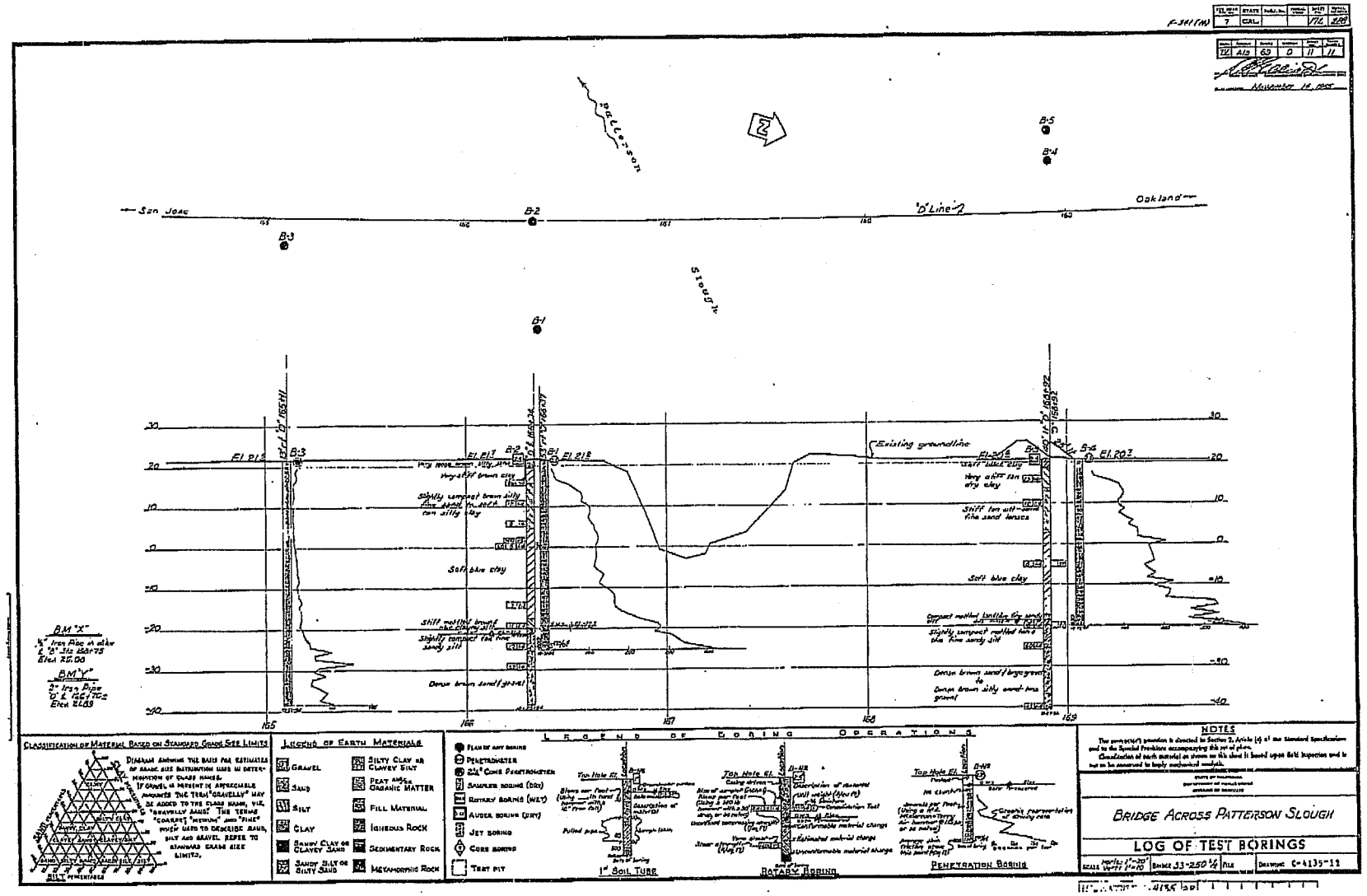
DATE APPROVED May 13 1968

F-341(14)

FED. ROAD DIV. NO.	STATE	FISCAL YEAR	PROJECT NO.	SHEET NO.	TOTAL SHEETS
7	CAL.			172	229

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
172	Alc	63	0	11	11

DATE November 14 1967



NOTES

The contractor's attention is directed to Section 5, Article 5-6 of the standard specifications and to the Special Provisions accompanying this set of plans.
Classification of each material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

BRIDGE ACROSS PATTERSON SLOUGH

LOG OF TEST BORINGS

Scale Horiz. 1"=20' Vert. 1"=10' | Bridge 33-250½ | File | Drawing C-4135-11

FIELD STUDY — By
Recommended — By
CHECKED — By
Approved — Bridge Engineer

BRIDGE DEPARTMENT
ENGINEERING GEOLOGY SECTION

Legend of Boring Operations
Penetrometer
2½" Core Penetrometer
Sampler Boring (SDB)
Rotary Boring (WET)
Auger Boring (DRY)
Jet Boring
Core Boring
Test Pit
1st Soil Tube
Rotary Boring
Penetration Boring

Legend of Earth Materials
Gravel
Sand
Silt
Clay
Sandy Clay or Clayey Sand
Sandy Silt or Silty Sand
Silty Clay or Clayey Silt
Peat and/or Organic Matter
Fill Material
Igneous Rock
Sedimentary Rock
Metamorphic Rock

Classification of Material Based on Standard Grade Size Limits

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

AS BUILT PLANS
Contract No. 04-358204
Date Completed
Document No. 40001739

INFORMATION ON ACTUAL FOUNDATION CONDITIONS ENCOUNTERED IS ON FILE IN BRIDGE GEOLOGY SECTION

AS BUILT
CORRECTIONS BY J.G. FRANCIS 1-20-70
CONTRACT NO. 04-358204
DATE 9-12-69

STATE OF CALIFORNIA
TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

PATTERSON SLOUGH WIDEN

LOG OF TEST BORINGS

BRIDGE NO.	POST MILE	DRAWING NO.	SHEET	OF
33-250½			6	6

REVISION DATES (PRELIMINARY STAGE ONLY)

WO 358201
CU 04213

Disregard prints bearing earlier revision dates →

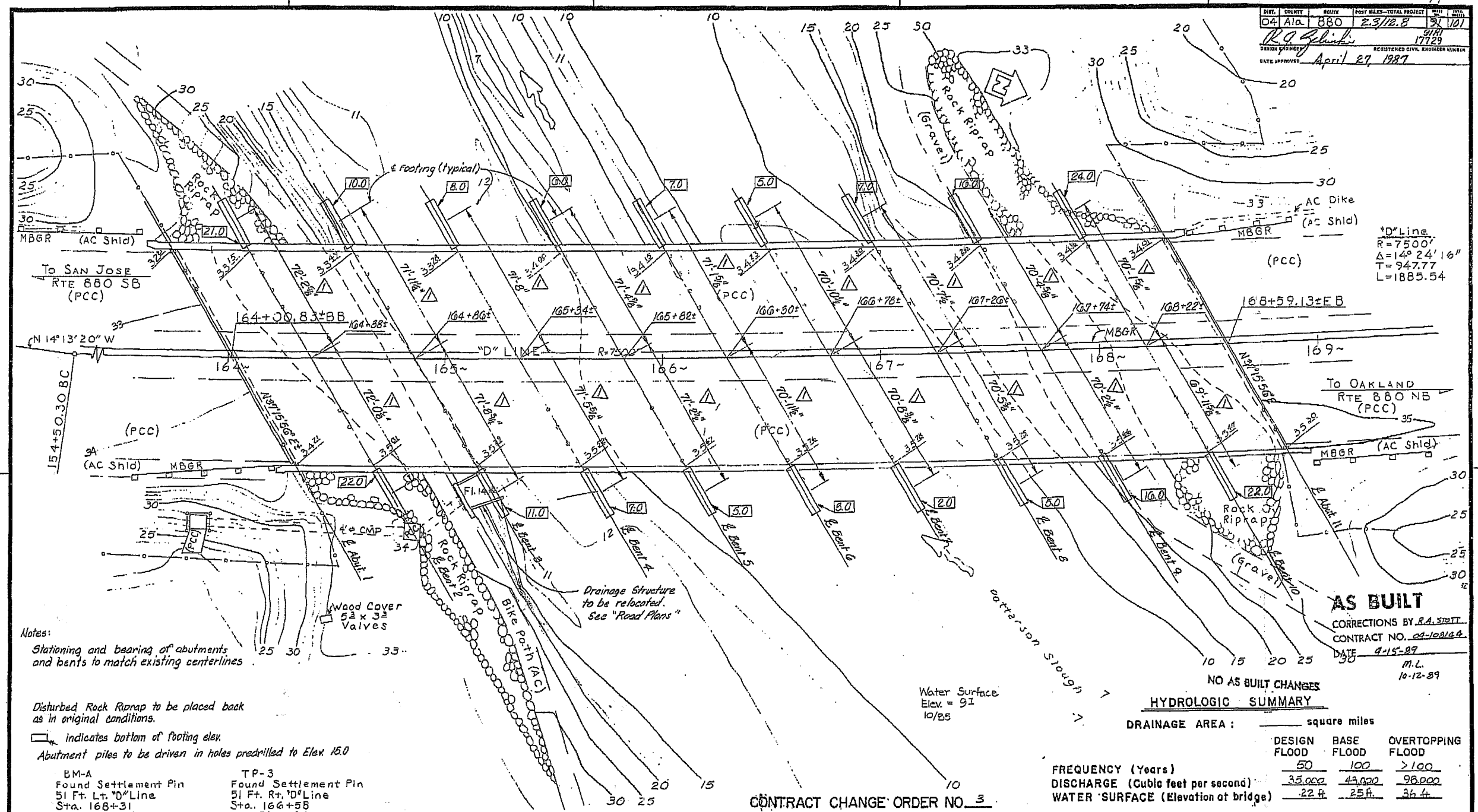
33

195

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	880	2.3/12.8	91	101

DESIGN ENGINEER: R. A. Gelinski — REGISTERED CIVIL ENGINEER NUMBER: 91R1 17729

DATE APPROVED: April 27, 1987



Notes:

Stationing and bearing of abutments and bents to match existing centerlines

Disturbed Rock Riprap to be placed back as in original conditions.

Indicates bottom of footing elev.

Abutment piles to be driven in holes predrilled to Elev. 15.0

BM-A
Found Settlement Pin
51 Ft. Lt. "D" Line
Sta. 168+31
Elev. 34.77

TP-3
Found Settlement Pin
51 Ft. Rt. "D" Line
Sta. 166+58
Elev. 36.51

AS BUILT
CORRECTIONS BY R.A. STOTT
CONTRACT NO. 04-108144
DATE 9-15-89
M.L. 10-12-89

NO AS BUILT CHANGES

HYDROLOGIC SUMMARY

DRAINAGE AREA: _____ square miles

	DESIGN FLOOD	BASE FLOOD	OVERTOPPING FLOOD
FREQUENCY (Years)	50	100	>100
DISCHARGE (Cubic feet per second)	35,000	43,000	98,000
WATER SURFACE (Elevation at bridge)	22 ft	25 ft.	36 ft

Flood plain data are based upon information available when the plans were prepared and are shown to meet Federal requirements. The accuracy of said information is not warranted by the State and interested or affected parties should make their own investigation.

CONTRACT CHANGE ORDER NO. 3
SHEET 3 OF 9

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

MARK	DATE	DESCRIPTION	BY	CHKD
1	6/87	Dimension Change	TAH	JGS

REVISIONS

PR-33250-1

91

PRELIMINARY INVESTIGATION SECTION

SCALE	DATUM	PHOTOGRAMMETRY AS OF:		DRAWN	By	RKB	11/85
1" = 20'	1957 As Built	SURVEYED	By TCF 11/85	TRACED	By	D.A.W.	11/85
ALIGNMENT TIES 1969 "As Built" Plans		FIELD CHKD	By	CHECKED	By	TCF	12/85

DESIGN	By J. Strootman 1/86	Checked	1/86
DETAILS	By J. Thorne 1/86	Checked	1/86
QUANTITIES	By T.A. Hanson 1/86	Checked J. Thorne	1/86

State of CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STRUCTURES - DESIGN 4
PROJECT ENGINEER: J. Strootman — REGISTERED CIVIL ENGINEER NO. 35509

BRIDGE NO. 33-250
POST MILE 11.8

PATTERSON SLOUGH BRIDGE (WIDEN)
FOUNDATION PLAN

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04334
WO 108141

Disregard prints bearing earlier revision dates

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 3 OF 13

AS BUILT PLANS
Contract No. 04-108144
Date Completed 9-15-89
Document No.

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.

DATE 12/11/89 — SIGNATURE Donald Blackford — TITLE SUPERVISOR OF MICROFILM SERVICES

1-5

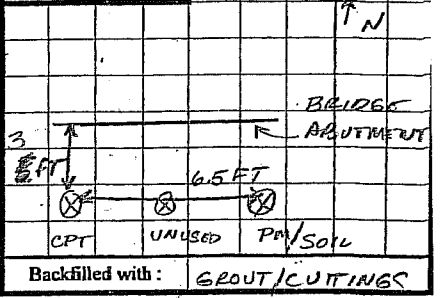
LOG OF BORING NO. (04-11A SOUTH ABUTMENT)

34"

Earth Mechanics, Inc.

Project Name	:	UCSD BRIDGE ABUTMENT STUDY		
Project Location	:	PATTERSON SLOUGH BRIDGE, I-880, FREMONT, CA		
E.M.I. Project No.	:	02-165	**Site Condition :**	PAVED, CONCRETE
Weather	:	SUNNY, WARM	**Elevation :**	33.92 FT
Traffic Control	:	CALTRANS	**Operator :**	
Drilling Company	:	PITCHER	**Operator :**	RON PITCHER
Type of Rig	:	FAILING 150	**Drop (in) :**	
Borehole Diameter (inch)	:	6"	**Drive Wt. (lbs) :**	
Logged By	:	J.C.	**Date Drilled :**	6-12-04

Comments :



Backfilled with : GROUT/CUTTINGS

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Resume	Lunch	Resume	Break	Finish	Off		20 ft
Driller												Water Table
Traffic Control												N/A ft
Logger												Caving
Total												2-4 ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93)	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O²/LEL/PID
0							0-22" CONCRETE, 22"-4FT PEA GRAVEL, NO MATRIX.								
2.5							HOLE CAVING IN. NO SAMPLE POSSIBLE @ 2.5'. ADDED BENTONITE TO HOLE. DUE TO DIFFICULTY KEEPING HOLE OPEN, DECIDED TO KEEP SAME HOLE FOR PMT AND SAMPLING.								
~~5~~	8	1	D	3		ML/CL	CLAYEY SILT - SILTY CLAY, GRAY/BRN-ORANGE MOTTLED; MOIST								
				4			SL. PLASTICITY, STIFF								
				14/	10"										
10		2	S	4		ML/CL	CLAYEY SILT, GRAY - OLIVE BROWN MOTTLED, NO PLASTICITY,								
				5	15"		SL. MOIST, STIFF								
				7/											
~~15~~		3	D	7		ML/CL	SILTY CLAY/CLAYEY SILT, BLACK, DRY, LOW PLASTICITY, STIFF								
12.5				15	11"		SL. SULFIDE ODOR? (ROTTEN EGG)								
				18/											
~~20~~		4	S	6		CL	SILTY CLAY - DK GRAY W/ BRN-ORANGE MOTTLED, SL. MOIST								
15				13	18"		HARD, PLASTIC, ORGANICS, LAMINATED								
				19/											
~~25~~		5	D	5	10"	CL	[* - LOST TIP SAMPLER - FELL OUT INTO HOLE RING: SAMPLE								
20				9			IS BOTTOM 4"-10" RINGS] SANDY CLAY, BRN, SL MOIST, PLASTIC, GRADING TO								
				10/		SM	SILTY SAND, YELLOW BRN, SL MOIST, M. DENSE, NO PLASTICITY								

1-5

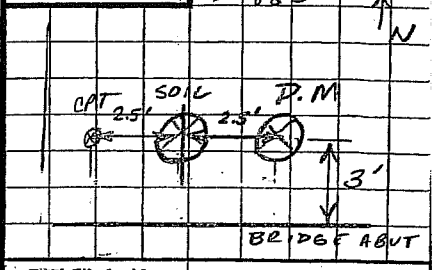
LOG OF BORING NO. (04-12A)

NORTH ABUTMENT

Earth Mechanics, Inc.

Project Name	: VCSD BRIDGE ABUTMENT STUDY				
Project Location	: PATTERSON SLOUGH BRIDGE, I-880, FREMONT, CA				
E.M.I. Project No.	: 02-165	**Site Condition :**	PAVED, CONCRETE		
Weather	: SUNNY, WARM	**Elevation :**	34.85 FT		
Traffic Control	: CALTRANS	**Operator :**			
Drilling Company	: PITCHER	**Operator :**	RON PITCHER		
Type of Rig	: FAILING 150	**Drop (in) :**			
Borehole Diameter (inch)	: 6"	**Drive Wt. (lbs) :**			
Logged By	: J.C.	**Date Drilled :**	6-12-04		

Comments : I-880



Backfilled with :

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Resume	Lunch	Resume	Break	Finish	Off		20 ft
Driller												Water Table
Traffic Control												NA ft
Logger												Caving
Total												ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (D/U/S.R./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O²/LEL/PID
0							0-17" - CONCRETE, 17"-24" DEA GRAVEL			: :					
2.5	D	1		5 11 12	14"	SM	SILTY SAND W/GRAVEL - YELLOW BROWN - GRAY, MOIST, M DENSE, ROUNDED GRAVELS TO 2.5" DIAM - MOISTURE MAY BE FROM CONCRETE CORING								
5	D	2		10 14 16	15"	ML/SM	SANDY SILT W/GRAVEL - GRAY/BLK MOTTLED, MOIST, MED. DENSE, GRAVELS TO ~1.5" DIAM, FINE GRAINED SAND			: :					
~~10~~ 7.5	S	3		8 7 8	12"	ML	SILT W/ SAND, OLIVE BRN, SL. MOIST STIFF, NO PLASTICITY, TRACE GRAVELS, <0.5" DIAM								
10 ~~15~~	D	4		7 14 18	15"	CL	SILTY CLAY W/GRAVEL, BRN, MOIST TO WET, PLASTIC, SUBROUNDED TO SUBANG GRAVELS TO 3/4" DIAM HARD								
12.5 ~~28~~	S	5		7 14 18	18	CL	CLAY W/SILT - BLUE/GRAY MOTTLED W/ YELLOW BROWN, MOIST, HARD, PLASTIC								
15 ~~28~~	D	6		16 22 23	16"	MH/ML	ELASTIC SILT W/ SAND - BLK/GRAY MOTTLED, SL. MOIST, MED. TO SL. PLASTICITY, HARD								

2-5

LOG OF BORING NO. (~~B-4~~ 04-12A)

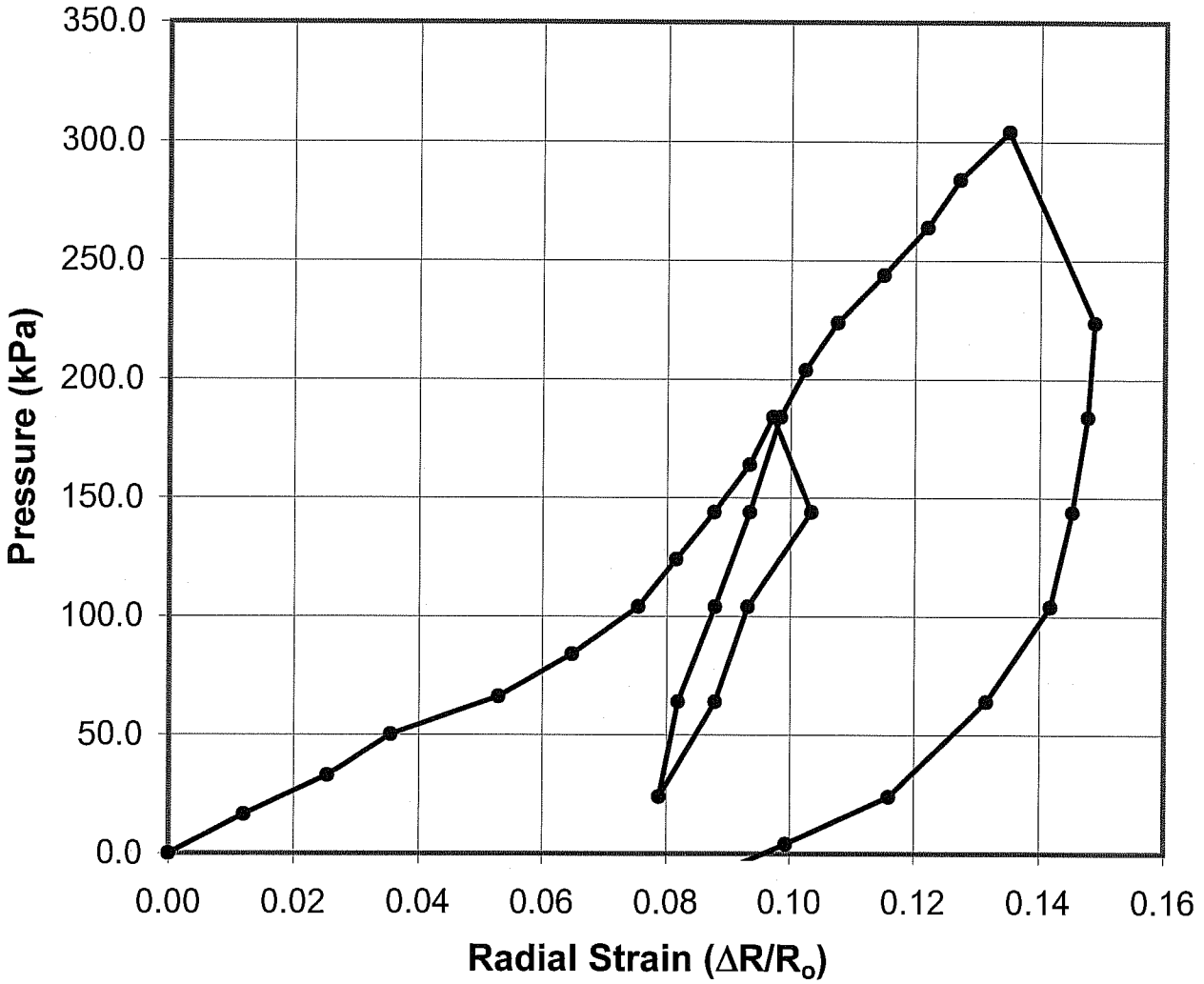
NORTH ABUTMENT

Earth Mechanics, Inc.

Project No. : 02-165 **Project Name :** UCSD - PATTERSON SLOUGH

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O²/LEL/PID
20 30	S	7		4	18"	CL	SILTY CLAY W/SAND YELLOWBRN MOTTLED W/GRAY, TRACE			: :					
				8			ORGANICS, MOIST, PLASTIC, V. STIFF, V. FINE GRAINED								
				11			SAND			: :					
35							@ AT 19' - CHANGE IN COLOR FROM GRAY BLACK TO YELLOW BROWN								
							HIGHER CLAY CONTENT.			: :					
40										: :					
										: :					
45										: :					
										: :					
50										: :					
										: :					
55										: :					
										: :					
60										: :					
										: :					
65										: :					
70										: :					

Pressuremeter Test Result



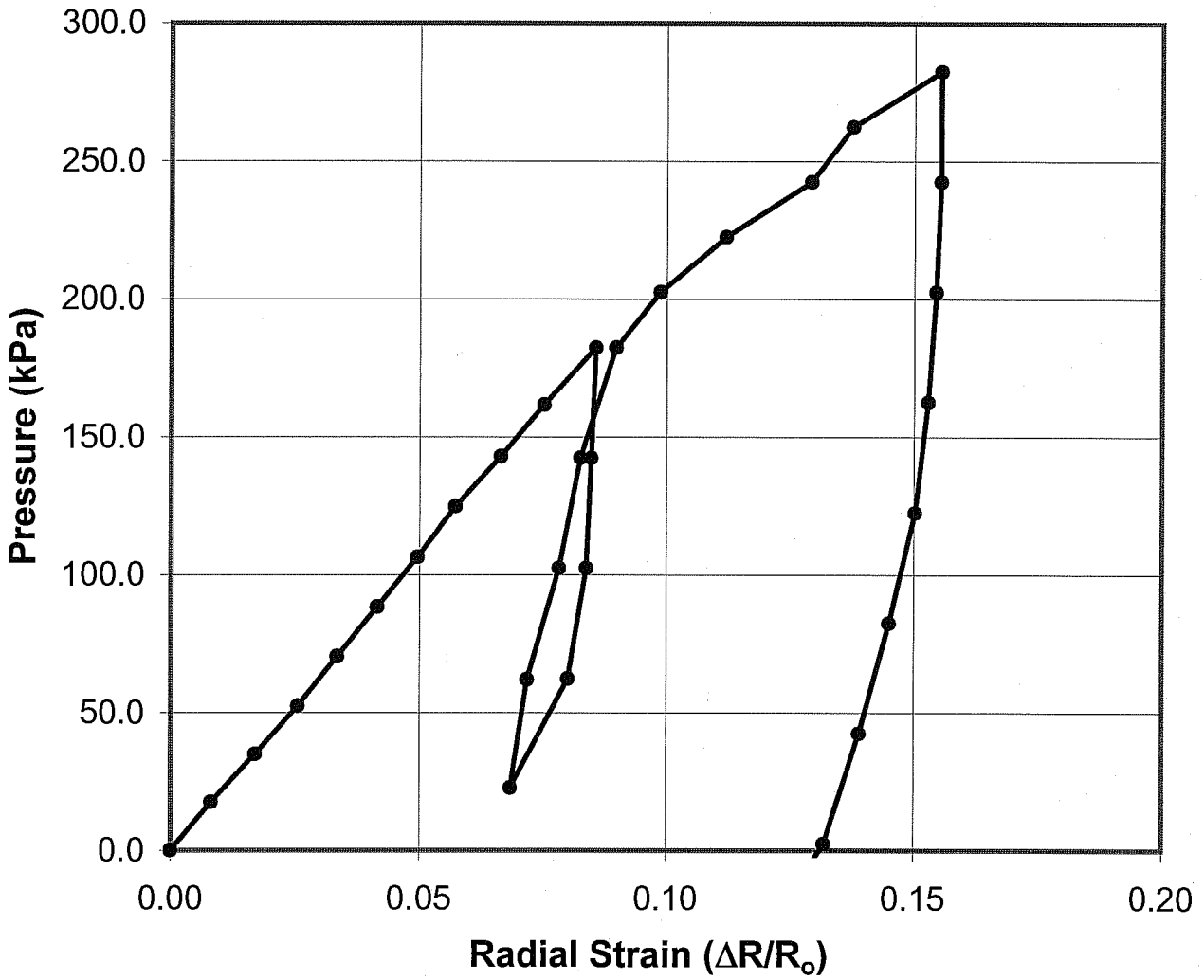
Boring No.:	**04-11P**
Location:	**Patterson Slough, Abut #1**
	Frement County
Test Date:	**6/17/2004**
Test Depth:	**5 ft**
Soil Type:	**Silt and Clay**

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

CALTRANS-UCSD / Abutment Research

Project No : 02-165 | Date : 12/22/2004

Pressuremeter Test Result



Boring No.:	**04-12P**
Location:	**Patterson Slough, Abut #3**
	Frement County
Test Date:	**6/17/2004**
Test Depth:	**5 ft**
Soil Type:	**Sandy Clay with Gravel**

GREGG DRILLING AND TESTING, INC.
GREGG IN SITU, INC.
ENVIRONMENTAL AND GEOTECHNICAL INVESTIGATION SERVICES

June 17, 2004

Earth Mechanics
Attn: Jody Castle
7700 Edgewater Drive Suite 846
Oakland, California 94621

Subject: CPT Site Investigation
Peterson Slough Bridge
Fremont, California
GREGG Project Number: 04-201ma

Dear Jody:

The following report presents the results of GREGG IN SITU's Cone Penetration Test investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	X
2	Pore Pressure Dissipation Tests	(PPD)	☐
3	Seismic Cone Penetration Tests	(SCPTU)	X
4	Resistivity Cone Penetration Tests	(RCPTU)	☐
5	UVIF Cone Penetration Tests	(UVIFCPTU)	☐
6	Groundwater Sampling	(GWS)	☐
7	Soil Sampling	(SS)	☐
8	Vapor Sampling	(VS)	☐
9	Vane Shear Testing	(VST)	☐
10	SPT Energy Calibration	(SPTE)	☐

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (562) 427-6899.

Sincerely,
GREGG IN SITU, Inc.

Mary Walden
Operations Manager

Bibliography

Campanella, R.G. and I. Weemees, "Development and Use of An Electrical Resistivity Cone for Groundwater Contamination Studies", Canadian Geotechnical Journal, Vol. 27 No. 5, 1990 pp. 557-567.

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Copies of ASTM Standards are available through www.astm.org

Gregg In Situ CPT Interpretations as of January 7, 1999 (Release 1.00.19)

Gregg In Situ's interpretation routine should be considered a calculator of current published CPT correlations and is subject to change to reflect the current state of practice. The interpreted values are not considered valid for all soil types. The interpretations are presented only as a guide for geotechnical use and should be carefully scrutinized for consideration in any geotechnical design. Reference to current literature is strongly recommended.

The CPT interpretations are based on values of tip, sleeve friction and pore pressure averaged over a user specified interval (typically 0.25m). Note that Qt is the recorded tip value, Qc, corrected for pore pressure effects. Since all Gregg In Situ cones have equal end area friction sleeves, pore pressure corrections to sleeve friction, Fs, are not required.

The tip correction is: $Qt = Qc + (1-a) \bullet Ud$

where: *Qt* is the corrected tip load
Qc is the recorded tip load
Ud is the recorded dynamic pore pressure
a is the Net Area Ratio for the cone (typically 0.85 for Gregg In Situ cones)

Effective vertical overburden stresses are calculated based on a hydrostatic distribution of equilibrium pore pressures below the water table or from a user defined equilibrium pore pressure profile (this can be obtained from CPT dissipation tests). The stress calculations use unit weights assigned to the Soil Behavior Type zones or from a user defined unit weight profile.

Details regarding the interpretation methods for all of the interpreted parameters is given in table 1. The appropriate references referred to in table 1 are listed in table 2.

The estimated Soil Behavior Type is based on the charts developed by Robertson and Campanella shown in figure 1.

Table 1 CPT Interpretation Methods

Interpreted Parameter	Description	Equation	Ref
Depth	mid layer depth		
AvgQt	Averaged corrected tip (Qt)	$AvgQt = \frac{1}{n}\sum_{i=1}^{n} Qt_i$	
AvgFs	Averaged sleeve friction (Fs)	$AvgFs = \frac{1}{n}\sum_{i=1}^{n} Fs_i$	
AvgRf	Averaged friction ratio (Rf)	$AvgRf = 100\% \bullet \frac{AvgFs}{AvgQt}$	
AvgUd	Averaged dynamic pore pressure (Ud)	$AvgUd = \frac{1}{n}\sum_{i=1}^{n} Ud_i$	
SBT	Soil Behavior Type as defined by Robertson and Campanella		1

U.Wt.	Unit Weight of soil determined from: 1) uniform value or 2) value assigned to each SBT zone 3) user supplied unit weight profile		
TStress	Total vertical overburden stress at mid layer depth	$TStress = \sum_{i=1}^{n} \gamma_i h_i$ where γ_i is layer unit weight h_i is layer thickness	
EStress	Effective vertical overburden stress at mid layer depth	$EStress = TStress - Ueq$	
Ueq	Equilibrium pore pressure determined from: 1) hydrostatic from water table depth 2) user supplied profile		
Cn	SPT N_{60} overburden correction factor	$Cn=(\sigma_v')^{-0.5}$ where σ_v' *is in tsf* $0.5 < C_n < 2.0$	
N_{60}	SPT N value at 60% energy calculated from Qt/N ratios assigned to each SBT zone		3
$(N1)_{60}$	SPT N_{60} value corrected for overburden pressure	$N1_{60} = Cn \bullet N_{60}$	3
$\Delta(N1)_{60}$	Equivalent Clean Sand Correction to $(N1)_{60}$	$\Delta(N1)_{60} = \frac{K_{SPT}}{1-K_{SPT}} \bullet (N1)_{60}$ Where: K_{SPT} is defined as: 0.0 for FC < 5% 0.0167 • (FC - 5) for 5% < FC < 35% 0.5 for FC > 35% FC - Fines Content in %	7
$(N1)_{60cs}$	Equivalent Clean Sand $(N1)_{60}$	$(N1)_{60cs} = (N1)_{60} + \Delta(N1)_{60}$	7
Su	Undrained shear strength - Nkt is use selectable	$Su = \frac{Qt - \sigma_v}{N_{kt}}$	2
k	Coefficient of permeability (assigned to each SBT zone)		6
Bq	Pore pressure parameter	$Bq = \frac{\Delta u}{Qt - \sigma_v}$	2
Qtn	Normalized Qt for Soil Behavior Type classification as defined by Robertson, 1990	$Qtn = \frac{Qt - \sigma_v}{\sigma_v'}$	4
Rfn	Normalized Rf for Soil Behavior Type classification as defined by Robertson, 1990	$Rfn = 100\% \bullet \frac{f_s}{Qt - \sigma_v}$	4
SBTn	Normalized Soil Behavior Type (slightly modified from that published by Robertson, 1990. This version includes all the soil zones of the original non-normalized SBT chart - see figure 1)		4
Qc1	Normalized Qt for seismic analysis	$qc1 = qc \bullet (Pa/\sigma_v')^{0.5}$ where: Pa = atm. pressure	5
Qc1N	Dimensionless Normalized Qt1	qc1N = qc1 / Pa where: Pa = atm. pressure	

ΔQc1N1	Equivalent clean sand correction	$\Delta qc1N = \frac{K_{CPT}}{1-K_{CPT}} \bullet qc1N$ Where: K_{CPT} is defined as: 0.0 for FC < 5% 0.0267 • (FC - 5) for 5% < FC < 35% 0.5 for FC > 35% FC - Fines Content in %	5
Qc1Ncs	Clean Sand equivalent Qc1N	*qc1Ncs = qc1N + Δqc1N*	5
Ic	Soil index for estimating grain characteristics	$Ic = [(3.47 - logQ)^2 + (log F + 1.22)^2]^{0.5}$	5
FC	Fines content (%)	*FC=1.75(Ic$^{3.25}$) - 3.7* *FC=100 for Ic > 3.5* *FC=0 for Ic < 1.26* *FC = 5% if 1.64 < Ic < 2.6 AND Rfn<0.5*	8
PHI	Friction Angle	Campanella and Robertson Durunoglu and Mitchel Janbu	1
Dr	Relative Density	Ticino Sand Hokksund Sand Schmertmann 1976 Jamiolkowski - All Sands	1
OCR	Over Consolidation Ratio		1
State Parameter			9
CRR	Cyclic Resistance Ratio		7

APPENDIX CPT

Cone Penetration Testing Procedure (CPT)

Gregg In Situ, Inc. carries out all Cone Penetration Tests (CPT) using an integrated electronic cone system, *Figure CPT.* The soundings were conducted using a 20 ton capacity cone with a tip area of 15 cm^2 and a friction sleeve area of 225 cm^2. The cone is designed with an equal end area friction sleeve and a tip end area ratio of 0.85.

The cone takes measurements of cone bearing (q_c), sleeve friction (f_s) and dynamic pore water pressure (u_2) at 5-cm intervals during penetration to provide a nearly continuous hydrogeologic log. CPT data reduction and interpretation is performed in real time facilitating on-site decision making. The above mentioned parameters are stored on disk for further analysis and reference. All CPT soundings are performed in accordance with revised (2002) ASTM standards (D 5778-95).

The cone also contains a porous filter element located directly behind the cone tip (u_2), *Figure CPT.* It consists of porous plastic and is 5.0mm thick. The filter element is used to obtain dynamic pore pressure as the cone is advanced as well as Pore Pressure Dissipation Tests (PPDT's) during appropriate pauses in penetration. It should be noted that prior to penetration, the element is fully saturated with silicon oil under vacuum pressure to ensure accurate and fast dissipation.

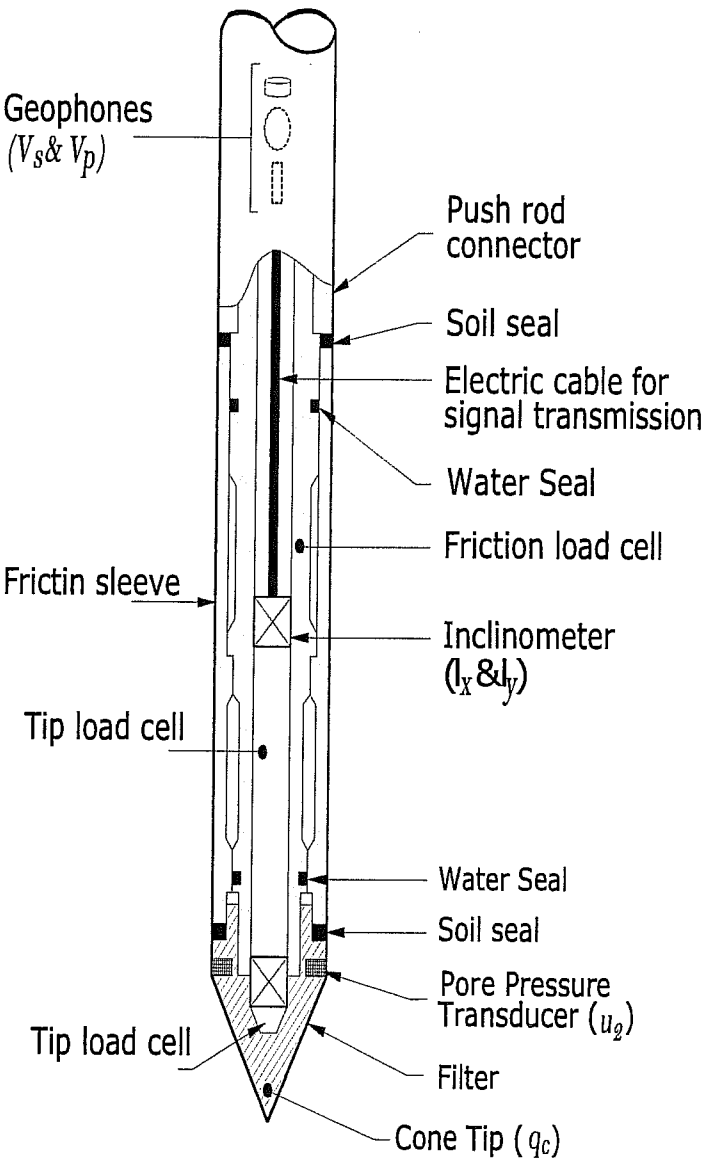


Figure CPT

When the soundings are complete, the test holes are grouted using a Gregg In Situ support rig. The grouting procedure consists of pushing a hollow CPT rod with a "knock out" plug to the termination depth of the test hole. Grout is then pumped under pressure as the tremie pipe is pulled from the hole. Disruption or further contamination to the site is therefore minimized.

Cone Penetration Test Data & Interpretation

Soil behavior type and stratigraphic interpretation is based on relationships between cone bearing (q_c), sleeve friction (f_s), and pore water pressure (u_2). The friction ratio (R_f) is a calculated parameter defined by $100 f_s/q_c$ and is used to infer soil behavior type. Generally:

Cohesive soils (clays)

- High friction ratio (R_f) due to small cone bearing (q_c)
- Generate large excess pore water pressures (u_2)

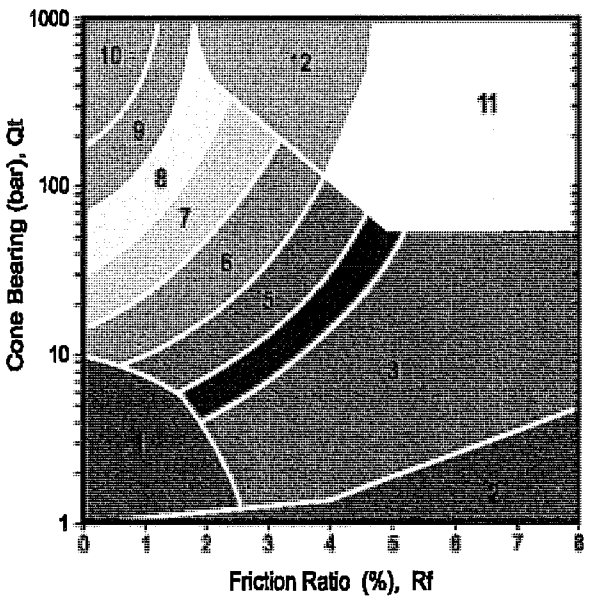
Cohesionless soils (sands)

- Low friction ratio (R_f) due to large cone bearing (q_c)
- Generate very little excess pore water pressures (u_2)

A complete set of baseline readings are taken prior to and at the completion of each sounding to determine temperature shifts and any zero load offsets. Corrections for temperature shifts and zero load offsets can be extremely important, especially when the recorded loads are relatively small. In sandy soils, however, these corrections are generally negligible.

The cone penetration test data collected from your site is presented in graphical form in Appendix CPT. The data includes CPT logs of measured soil parameters, computer calculations of interpreted soil behavior types (SBT), and additional geotechnical parameters. A summary of locations and depths is available in Table 1. Note that all penetration depths referenced in the data are with respect to the existing ground surface.

Soil interpretation for this project was conducted using recent correlations developed by Robertson et al, 1990, *Figure SBT*. Note that it is not always possible to clearly identify a soil type based solely on q_c, f_s, and u_2. In these situations, experience, judgment, and an assessment of the pore pressure dissipation data should be used to infer the soil behavior type.



ZONE	Qt/N	SBT
1	2	Sensitive, fine greained
2	1	Organic materials
3	1	Clay
4	1.5	Silty clay to clay
5	2	Clayey silt to silty clay
6	2.5	Sandy silt to clayey silt
7	3	Silty sand to sandy silt
8	4	Sand to silty sand
9	5	Sand
10	6	Gravely sand to sand
11	1	Very stiff fine grained*
12	2	Sand to clayey sand*

*over consolidated or cemented

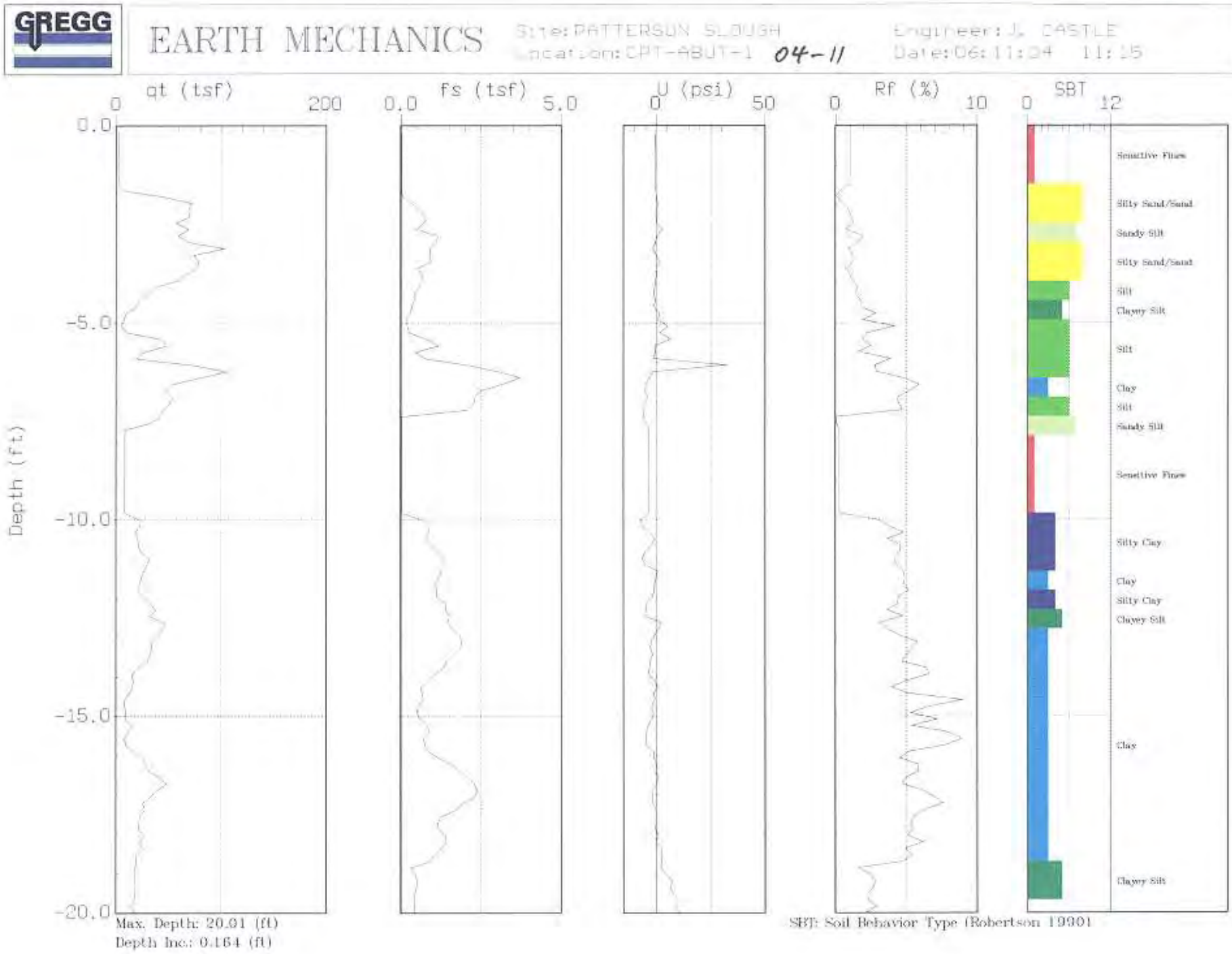
Figure SBT

GREGG

EARTH MECHANICS

Site: PATTERSON SLOUGH
Location: CPT-ABUT-1 04-11

Engineer: J. CASTLE
Date: 06:11:04 11:15

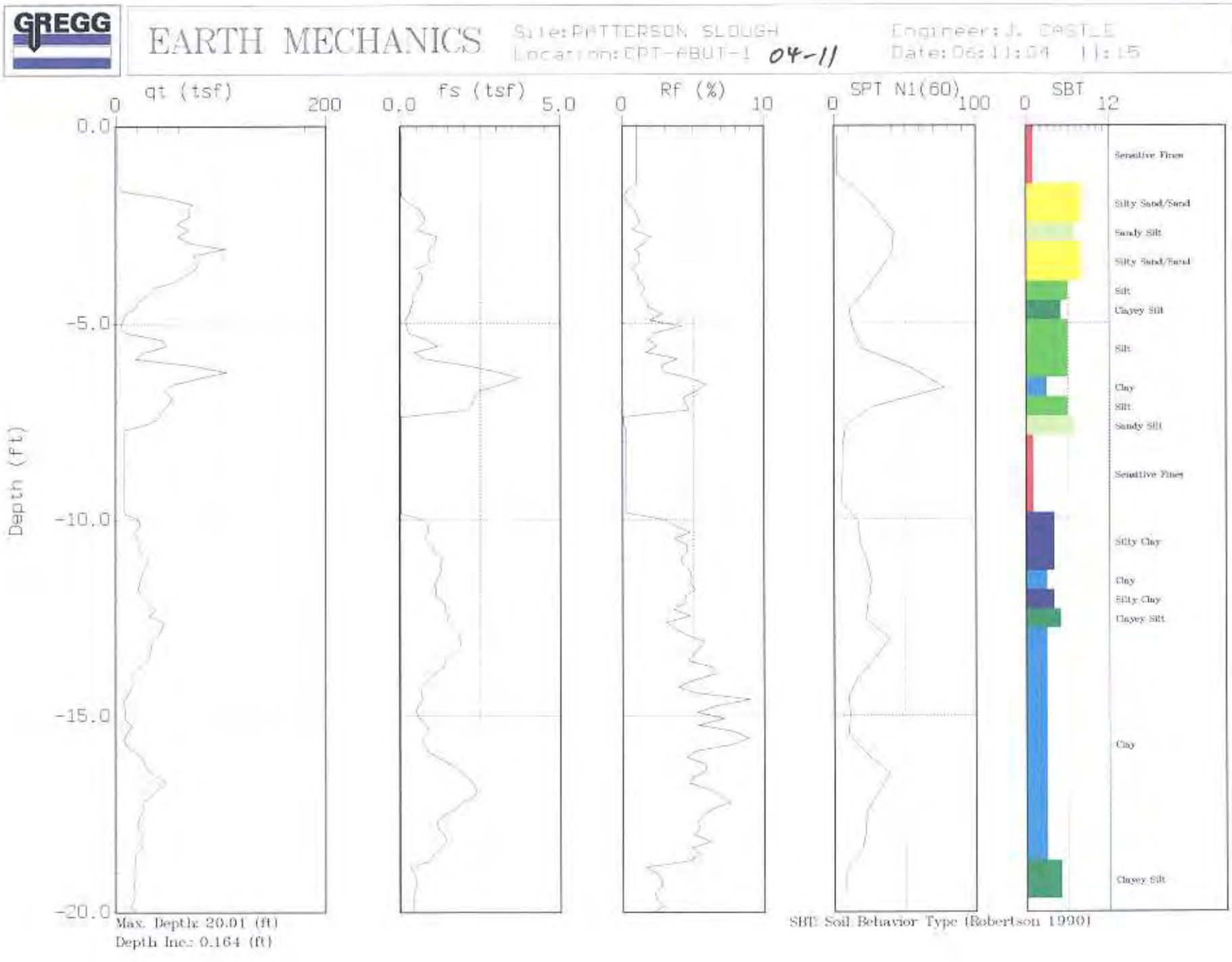


GREGG

EARTH MECHANICS

Site: PATTERSON SLOUGH
Location: CPT-ABUT-1 04-11

Engineer: J. CASTLE
Date: 06:11:04 11:15

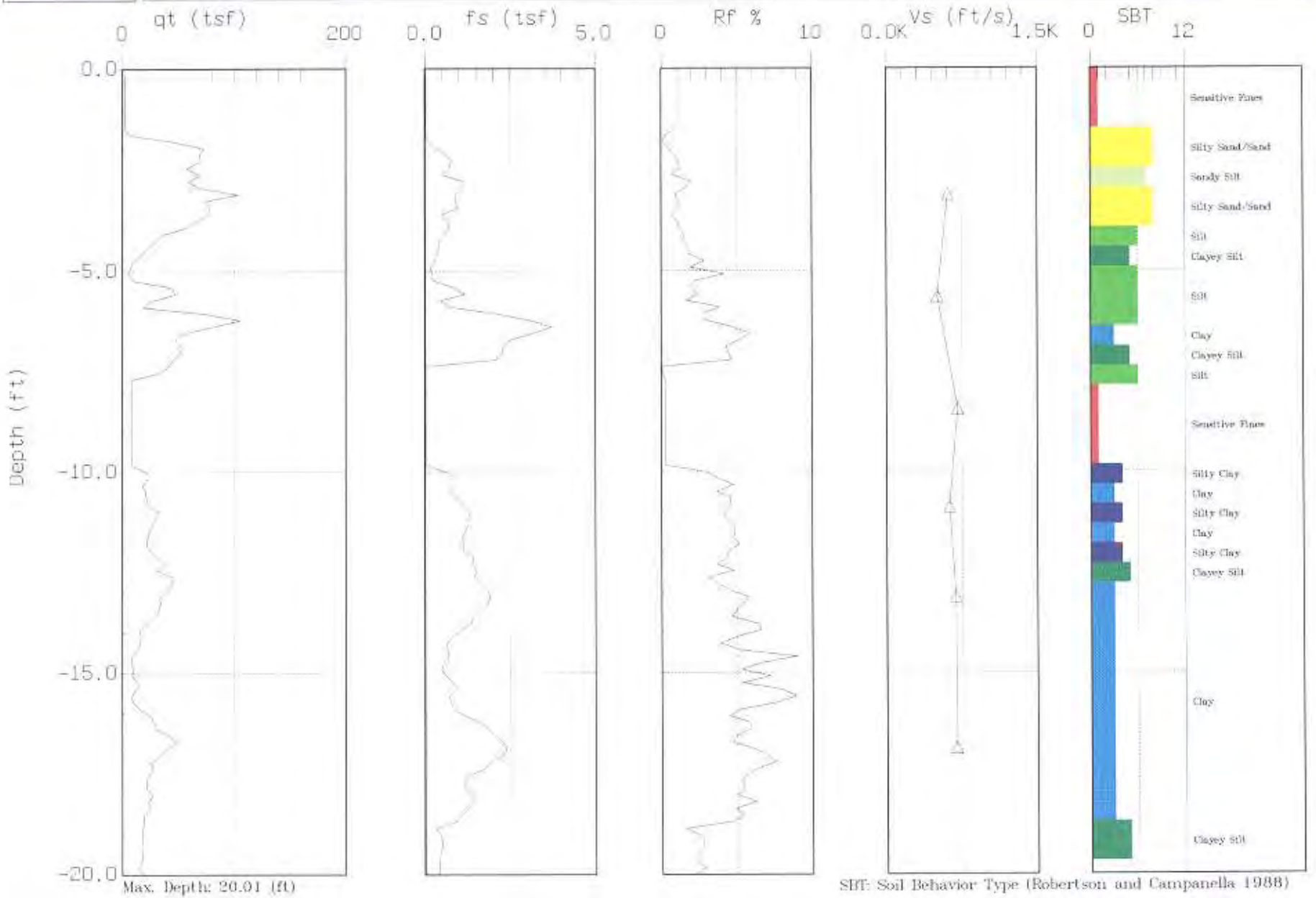


GREGG

EARTH MECHANICS

Site: PATTERSON SLOUGH
Location: CPT-ABUT-1 04-11

Engineer: J. CASTLE
Date: 06:11:04 11:15



Max. Depth: 20.01 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

Gregg In Situ, Inc.
Interpretation Output - Release 1.00.19e
Run No: 04-0617-1644-0326
Job No: 04-201MA
Client: EARTH MECHANICS
Project: CPT SITE INVESTIGATION
Site: PATTERSON SLOUGH
Location: CPT-ABUT-1 04-11C
Engineer: J. CASTLE
CPT Date: 04/11/06
CPT Time: 11:15
CPT File: 201S01.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 9.14 (ft): 30.0
Su Nkt used: 12.50
Averaging Increment (m): 0.15
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60	Su (tsf)	CRR
0.25	2.0	0.02	1.00	-0.8	1	79.6	0.01	0.01	0.00	2.00	1.0	1.9	0.16	0.00
0.74	2.0	0.02	1.00	-0.6	1	79.6	0.03	0.03	0.00	2.00	1.0	1.9	0.16	0.00
1.23	2.0	0.02	1.00	-0.6	1	79.6	0.05	0.05	0.00	2.00	1.0	1.9	0.16	0.00
1.72	41.6	0.12	0.30	0.5	8	120.9	0.07	0.07	0.00	2.00	10.0	19.9	UnDef	0.13
2.21	65.4	0.69	1.06	0.9	8	120.9	0.10	0.10	0.00	2.00	15.7	31.3	UnDef	0.26
2.71	65.9	0.91	1.37	2.1	7	117.8	0.13	0.13	0.00	2.00	21.1	42.1	UnDef	0.27
3.20	85.3	0.91	1.07	0.2	8	120.9	0.16	0.16	0.00	2.00	20.4	40.8	UnDef	0.00
3.61	71.3	0.58	0.81	0.3	8	120.9	0.19	0.19	0.00	2.00	17.1	34.2	UnDef	0.32
4.02	41.0	0.54	1.31	-2.2	7	117.8	0.21	0.21	0.00	2.00	13.1	26.2	UnDef	0.14
4.51	16.5	0.33	2.02	-0.1	5	114.6	0.24	0.24	0.00	2.00	7.9	15.8	1.30	0.09
5.00	7.3	0.19	2.55	5.9	4	114.6	0.27	0.27	0.00	1.93	4.6	9.0	0.56	0.11
5.50	39.3	0.80	2.04	4.2	6	114.6	0.30	0.30	0.00	1.84	15.1	27.7	3.12	0.16
5.99	66.0	1.94	2.94	22.8	6	114.6	0.32	0.32	0.00	1.76	25.3	44.4	5.26	0.00
6.56	58.4	2.91	4.98	-9.9	11	130.5	0.36	0.36	0.00	1.67	55.9	93.2	UnDef	0.00

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
7.14	45.5	1.45	3.18	-13.4	5	114.6	0.40	0.40	0.00	1.59	21.8	34.7	3.61	0.23
7.63	16.1	0.02	0.12	-8.6	6	114.6	0.42	0.42	0.00	1.54	6.2	9.5	1.25	0.00
8.12	8.3	0.02	0.24	-7.3	1	79.6	0.45	0.45	0.00	1.49	4.0	5.9	0.63	0.00
8.61	8.3	0.02	0.24	-7.3	1	79.6	0.47	0.47	0.00	1.46	4.0	5.8	0.62	0.00
9.10	8.3	0.02	0.24	-7.3	1	79.6	0.49	0.49	0.00	1.43	4.0	5.7	0.62	0.00
9.60	8.3	0.02	0.24	-7.3	1	79.6	0.51	0.51	0.00	1.41	4.0	5.6	0.62	0.00
10.09	20.9	0.79	3.78	-12.9	4	114.6	0.53	0.53	0.00	1.37	13.3	18.3	1.63	0.34
10.58	21.8	0.93	4.25	-6.1	3	111.4	0.56	0.56	0.00	1.34	20.9	27.9	1.70	0.35
11.07	29.3	1.28	4.35	-8.3	4	114.6	0.59	0.59	0.00	1.31	18.7	24.5	2.30	0.00
11.56	22.6	1.12	4.95	-1.6	3	111.4	0.61	0.61	0.00	1.28	21.7	27.7	1.76	0.00
12.06	31.8	1.29	4.07	-8.3	4	114.6	0.64	0.64	0.00	1.25	20.3	25.4	2.49	0.00
12.55	40.6	1.52	3.75	-1.6	5	114.6	0.67	0.67	0.00	1.22	19.4	23.8	3.19	0.34
13.04	35.8	1.86	5.19	-4.6	3	111.4	0.70	0.70	0.00	1.20	34.3	41.1	2.81	0.00
13.53	27.6	1.45	5.23	-6.0	3	111.4	0.72	0.72	0.00	1.17	26.5	31.1	2.15	0.00
14.03	15.8	0.81	5.14	-2.9	3	111.4	0.75	0.75	0.00	1.15	15.1	17.5	1.20	0.00
14.52	9.5	0.63	6.57	-3.1	3	111.4	0.78	0.78	0.00	1.13	9.1	10.3	0.70	0.00
15.01	11.0	0.64	5.79	-5.4	3	111.4	0.81	0.81	0.00	1.11	10.6	11.8	0.82	0.00
15.50	9.6	0.78	8.13	-11.0	3	111.4	0.83	0.83	0.00	1.09	9.2	10.0	0.70	0.00
15.99	23.3	1.21	5.18	-1.8	3	111.4	0.86	0.86	0.00	1.08	22.3	24.0	1.79	0.00
16.49	40.3	2.06	5.11	0.9	3	111.4	0.89	0.89	0.00	1.06	38.6	40.9	3.15	0.00
16.98	32.3	2.19	6.79	-4.4	3	111.4	0.92	0.92	0.00	1.04	30.9	32.3	2.51	0.00
17.47	23.9	1.38	5.77	-0.4	3	111.4	0.94	0.94	0.00	1.03	22.9	23.5	1.84	0.00
17.96	23.8	1.32	5.54	0.1	3	111.4	0.97	0.97	0.00	1.01	22.8	23.1	1.83	0.00
18.45	21.1	1.06	5.02	5.6	3	111.4	1.00	1.00	0.00	1.00	20.2	20.3	1.61	0.00
18.95	18.0	0.41	2.26	10.3	5	114.6	1.03	1.03	0.00	0.99	8.6	8.5	1.36	0.14
19.44	17.7	0.43	2.43	18.6	5	114.6	1.05	1.05	0.00	0.97	8.5	8.3	1.33	0.14

Gregg In Situ, Inc.
Interpretation Output - Release 1.00.19e
Run No: 04-0617-1644-0326
Job No: 04-201MA
Client: EARTH MECHANICS
Project: CPT SITE INVESTIGATION
Site: PATTERSON SLOUGH
Location: CPT-ABUT-1 04-11C
Engineer: J. CASTLE
CPT Date: 04/11/06
CPT Time: 11:15
CPT File: 201S01.COR
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Easting (m): 0.000
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Water Table (m): 9.14 (ft): 30.0
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State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
0.25	1.0E-07	-0.01	203.0	1.01	3.8	0.1	3.9	5.9	UnDef	UnDef	10.0	UnDef	0.0	1.9
0.74	1.0E-07	-0.01	67.0	1.02	3.8	1.3	5.1	14.4	UnDef	UnDef	10.0	UnDef	0.4	2.3
1.23	1.0E-07	-0.01	39.8	1.03	3.8	2.7	6.5	20.3	UnDef	UnDef	6.0	UnDef	0.7	2.6
1.72	5.0E-03	0.00	564.7	0.30	79.8	0.0	79.8	0.0	50	78.9	1.0	-0.24	0.0	19.9
2.21	5.0E-03	0.00	632.1	1.06	125.3	0.0	125.3	1.7	50	87.0	1.0	-0.37	0.0	31.3
2.71	5.0E-04	0.00	495.8	1.38	126.3	0.0	126.3	3.8	48	83.7	1.0	-0.38	0.0	42.1
3.20	5.0E-03	0.00	525.2	1.07	163.4	0.0	163.4	2.3	48	88.2	1.0	-0.35	0.0	40.8
3.61	5.0E-03	0.00	380.6	0.81	136.6	0.0	136.6	2.0	48	81.0	1.0	-0.29	0.0	34.2
4.02	5.0E-04	0.00	192.8	1.32	78.5	6.6	85.0	7.9	44	63.4	1.0	-0.28	1.3	27.5
4.51	5.0E-06	0.00	67.8	2.05	31.6	22.2	53.8	20.4	UnDef	UnDef	10.0	UnDef	5.5	21.3
5.00	5.0E-07	0.03	26.1	2.65	13.8	55.0	68.8	36.8	UnDef	UnDef	6.0	UnDef	9.0	17.9
5.50	5.0E-05	0.00	131.8	2.06	70.7	22.8	93.6	14.1	44	57.4	10.0	-0.30	5.0	32.7
5.99	5.0E-05	0.01	202.5	2.95	113.4	UnDef	UnDef	0.0	46	70.9	10.0	-0.42	UnDef	UnDef
6.56	1.0E-15	-0.01	161.1	5.01	95.2	UnDef	UnDef	0.0	44	65.9	1.0	-0.64	UnDef	UnDef

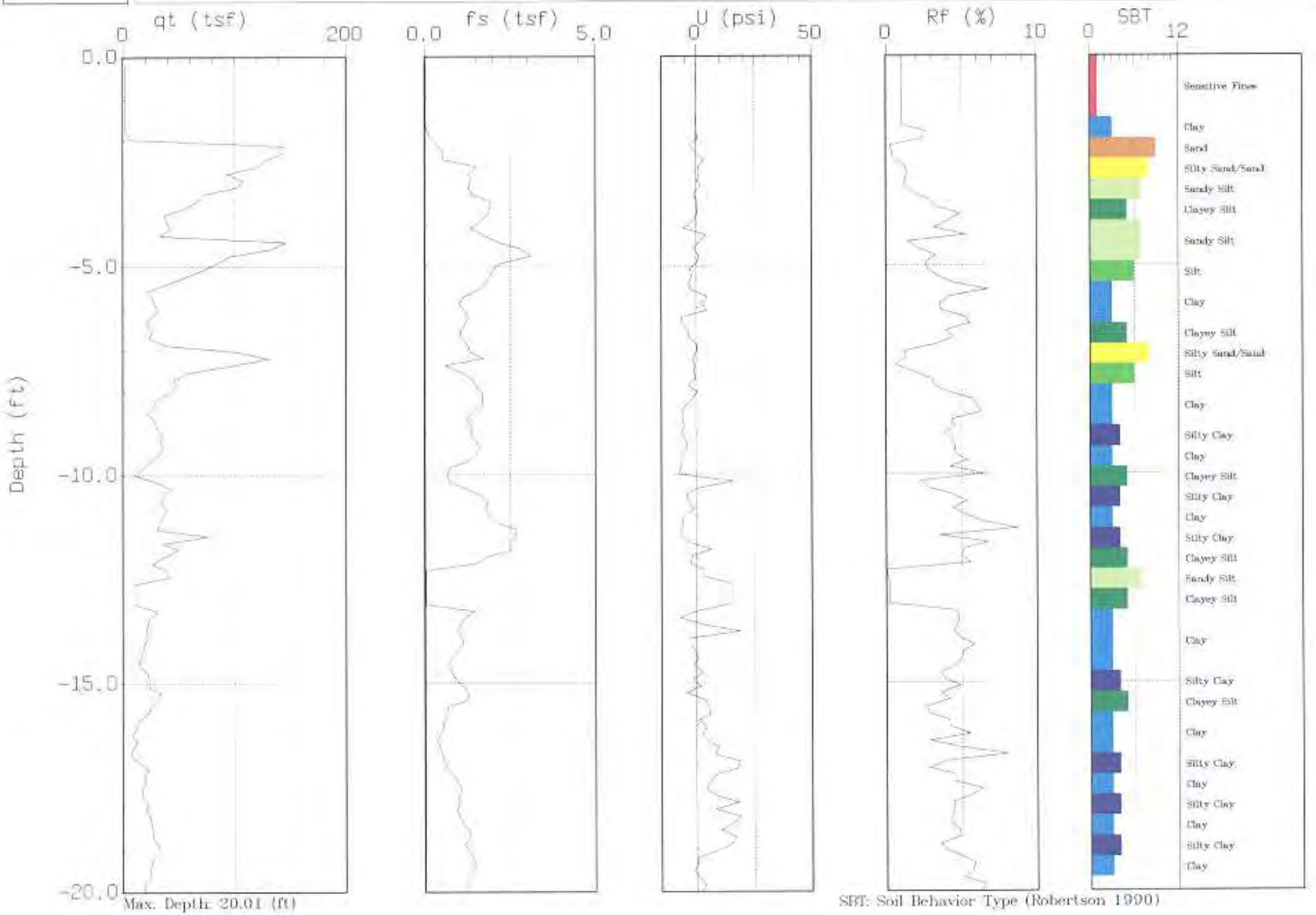
04-11C

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
7.14	5.0E-06	-0.01	114.1	3.21	70.8	47.5	118.3	20.0	UnDef	UnDef	10.0	UnDef	11.6	46.3
7.63	5.0E-05	-0.02	36.9	0.13	24.2	0.0	24.2	5.0	38	30.0	6.0	0.07	0.0	9.5
8.12	1.0E-07	-0.03	17.5	0.26	12.1	0.0	12.1	5.0	UnDef	UnDef	6.0	UnDef	0.0	5.9
8.61	1.0E-07	-0.03	16.7	0.26	11.9	0.0	11.9	5.0	UnDef	UnDef	6.0	UnDef	0.0	5.8
9.10	1.0E-07	-0.03	16.0	0.26	11.6	0.0	11.6	5.0	UnDef	UnDef	6.0	UnDef	0.0	5.7
9.60	1.0E-07	-0.03	15.4	0.26	11.4	0.0	11.4	5.0	UnDef	UnDef	6.0	UnDef	0.0	5.6
10.09	5.0E-07	-0.02	38.4	3.88	28.1	112.4	140.5	36.0	UnDef	UnDef	6.0	UnDef	18.3	36.7
10.58	5.0E-08	-0.01	38.0	4.36	28.5	114.1	142.6	37.9	UnDef	UnDef	6.0	UnDef	27.9	55.8
11.07	5.0E-07	-0.01	49.1	4.44	37.5	135.8	173.4	34.3	UnDef	UnDef	6.0	UnDef	23.5	48.0
11.56	5.0E-08	0.00	35.9	5.09	28.3	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
12.06	5.0E-07	-0.01	48.6	4.15	38.9	123.8	162.6	33.5	UnDef	UnDef	6.0	UnDef	23.0	48.4
12.55	5.0E-06	0.00	59.6	3.81	48.6	91.8	140.3	29.5	UnDef	UnDef	10.0	UnDef	16.4	40.2
13.04	5.0E-08	0.00	50.3	5.30	42.0	167.9	209.8	36.7	UnDef	UnDef	10.0	UnDef	41.1	82.1
13.53	5.0E-08	-0.01	37.1	5.37	31.8	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
14.03	5.0E-08	-0.01	20.0	5.40	17.8	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
14.52	5.0E-08	-0.01	11.2	7.16	10.6	UnDef	UnDef	100.0	UnDef	UnDef	3.0	UnDef	UnDef	UnDef
15.01	5.0E-08	-0.02	12.7	6.25	12.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
15.50	5.0E-08	-0.04	10.5	8.90	10.3	UnDef	UnDef	100.0	UnDef	UnDef	3.0	UnDef	UnDef	UnDef
15.99	5.0E-08	0.00	26.0	5.38	24.5	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
16.49	5.0E-08	0.00	44.3	5.22	41.8	167.2	209.0	38.4	UnDef	UnDef	6.0	UnDef	40.9	81.8
16.98	5.0E-08	0.00	34.2	6.99	33.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
17.47	5.0E-08	0.00	24.3	6.01	24.1	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
17.96	5.0E-08	0.00	23.5	5.77	23.6	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
18.45	5.0E-08	0.01	20.2	5.27	20.7	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
18.95	5.0E-06	0.02	16.5	2.40	17.4	69.5	86.8	43.9	UnDef	UnDef	6.0	UnDef	8.5	17.0
19.44	5.0E-06	0.03	15.8	2.59	16.9	67.5	84.4	45.8	UnDef	UnDef	6.0	UnDef	8.3	16.5

GREGG

EARTH MECHANICS

Site: PATTERSON SLOUGH
Location: CPT-ABUT-11 04-12
Engineer: J. CASTLE
Date: 06:11:04 12:18



Max. Depth: 20.01 (ft)
Depth Inc.: 0.164 (ft)

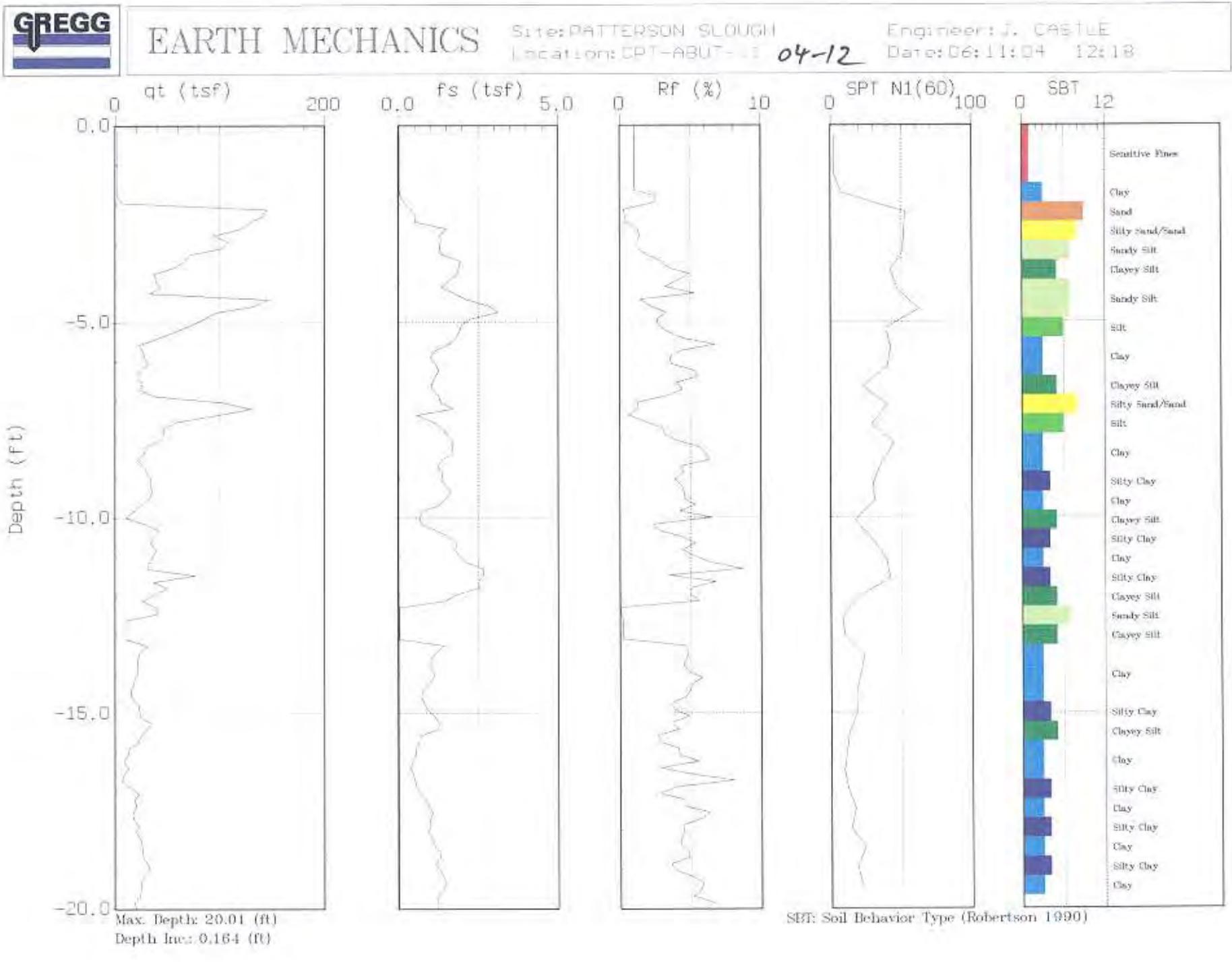
SBT: Soil Behavior Type (Robertson 1990)

GREGG

EARTH MECHANICS

Site: PATTERSON SLOUGH
Location: CPT-ABUT-[illegible] 04-12

Engineer: J. CASTLE
Date: 06:11:04 12:18



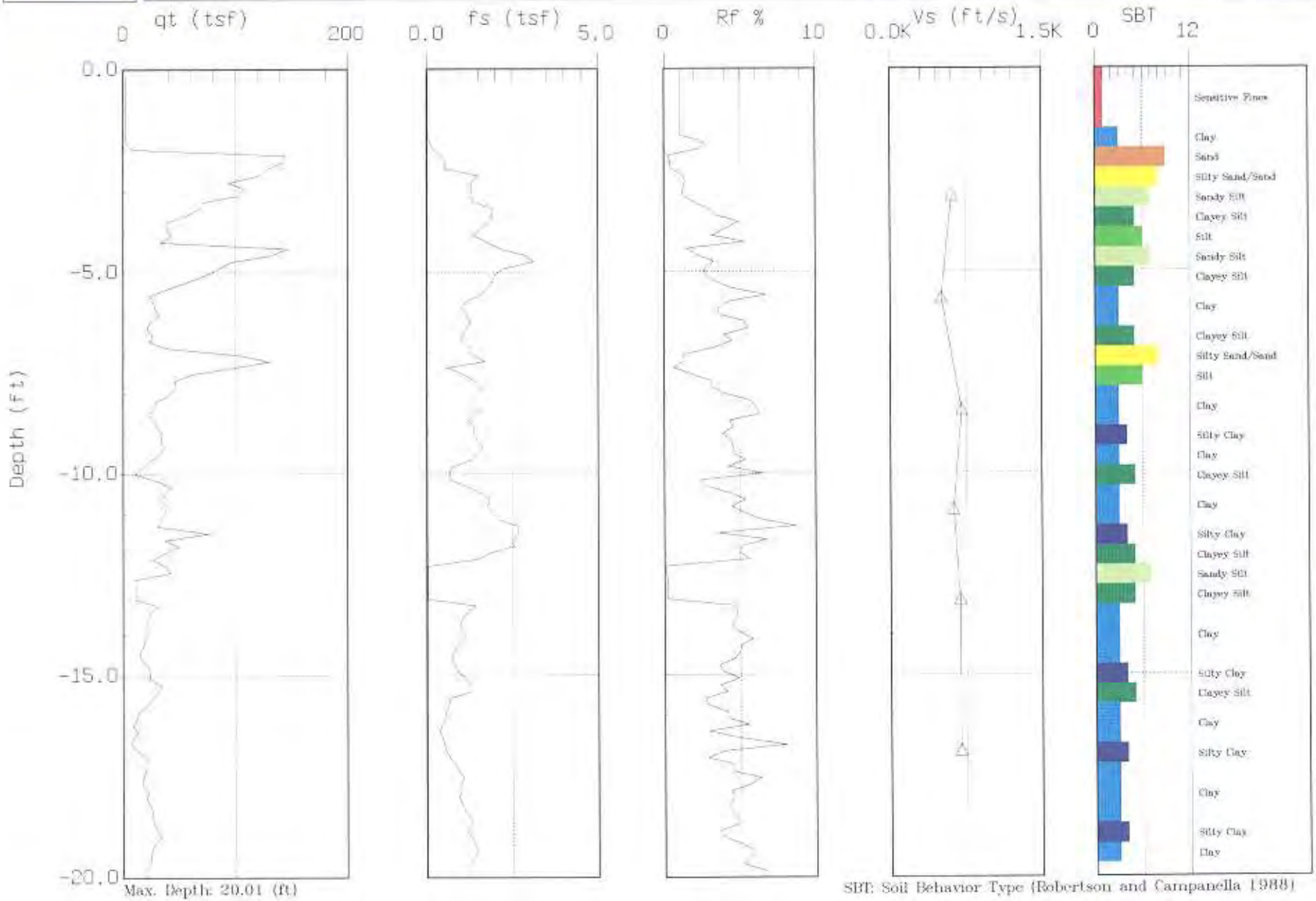
Max. Depth: 20.01 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

EARTH MECHANICS

Site: PATTERSON SLOUGH Engineer: J. CASTLE
Location: CPT-ABLT-11 04-12 Date: 06:11:04 12:18



Max. Depth: 20.01 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

Gregg In Situ, Inc.
Interpretation Output - Release 1.00.19e
Run No: 04-0617-1644-0403
Job No: 04-201MA
Client: EARTH MECHANICS
Project: CPT SITE INVESTIGATION
Site: PATTERSON SLOUGH
Location: CPT-ABUT-11 04-12C
Engineer: J. CASTLE
CPT Date: 04/11/06
CPT Time: 12:18
CPT File: 201S11.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 9.14 (ft): 30.0
Su Nkt used: 12.50
Averaging Increment (m): 0.15
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60	(N1)60 (blows/ft)	Su (tsf)	CRR
0.25	2.0	0.02	1.00	-0.4	1	79.6	0.01	0.01	0.00	2.00	1.0	1.9	0.16	0.00
0.74	2.0	0.02	1.00	-0.1	1	79.6	0.03	0.03	0.00	2.00	1.0	1.9	0.16	0.00
1.23	2.0	0.02	1.00	-0.2	1	79.6	0.05	0.05	0.00	2.00	1.0	1.9	0.16	0.00
1.72	3.8	0.08	2.14	0.6	3	111.4	0.07	0.07	0.00	2.00	3.6	7.2	0.30	0.00
2.21	138.5	0.47	0.34	0.5	9	124.1	0.10	0.10	0.00	2.00	26.5	53.0	UnDef	0.00
2.71	107.5	1.37	1.27	2.2	8	120.9	0.13	0.13	0.00	2.00	25.7	51.5	UnDef	0.00
3.20	80.3	1.51	1.88	1.0	7	117.8	0.16	0.16	0.00	2.00	25.6	51.3	UnDef	0.00
3.61	46.5	1.86	4.01	1.0	5	114.6	0.18	0.18	0.00	2.00	22.3	44.6	3.71	0.00
4.02	38.1	1.56	4.10	-1.5	5	114.6	0.21	0.21	0.00	2.00	18.3	36.5	3.03	0.00
4.51	124.5	2.69	2.16	1.2	7	117.8	0.24	0.24	0.00	2.00	39.8	79.5	UnDef	0.00
5.00	70.9	2.03	2.87	-3.3	6	114.6	0.27	0.27	0.00	1.94	27.2	52.7	5.65	0.00
5.50	29.8	1.48	4.97	-0.8	3	111.4	0.29	0.29	0.00	1.85	28.5	52.7	2.36	0.00
5.99	27.8	1.13	4.06	0.1	4	114.6	0.32	0.32	0.00	1.76	17.8	31.3	2.20	0.20
6.56	27.2	1.12	4.11	-7.1	4	114.6	0.35	0.35	0.00	1.68	17.4	29.2	2.15	0.22

Gregg In Situ, Inc.
Run No: 04-0617-1644-0403
CPT File: 201S11.COR

04-12C

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60	Su (tsf)	CRR
7.14	109.6	1.19	1.08	-1.4	8	120.9	0.39	0.39	0.00	1.61	26.2	42.1	UnDef	0.00
7.63	50.7	1.31	2.58	-3.5	6	114.6	0.42	0.42	0.00	1.55	19.4	30.1	4.02	0.22
8.12	32.6	1.67	5.11	-4.8	3	111.4	0.44	0.44	0.00	1.50	31.2	46.8	2.57	0.00
8.61	26.6	1.31	4.92	-13.2	3	111.4	0.47	0.47	0.00	1.46	25.5	37.1	2.09	0.00
9.10	34.8	1.48	4.24	-11.5	4	114.6	0.50	0.50	0.00	1.41	22.2	31.4	2.74	0.33
9.60	24.4	1.15	4.73	-14.7	3	111.4	0.53	0.53	0.00	1.38	23.4	32.2	1.91	0.00
10.09	27.4	0.84	3.09	7.2	5	114.6	0.56	0.56	0.00	1.34	13.1	17.6	2.15	0.19
10.58	36.9	1.72	4.67	-6.8	3	111.4	0.58	0.58	0.00	1.31	35.3	46.2	2.90	0.00
11.07	33.1	2.22	6.70	-13.6	3	111.4	0.61	0.61	0.00	1.28	31.7	40.6	2.60	0.00
11.56	54.5	2.55	4.69	-1.9	4	114.6	0.64	0.64	0.00	1.25	34.8	43.5	4.31	0.00
12.06	34.0	1.10	3.25	-0.9	5	114.6	0.67	0.67	0.00	1.23	16.3	19.9	2.66	0.25
12.55	20.9	0.02	0.10	25.8	7	117.8	0.70	0.70	0.00	1.20	6.7	8.0	UnDef	0.00
13.04	17.4	0.49	2.80	23.8	5	114.6	0.72	0.72	0.00	1.18	8.3	9.8	1.33	0.17
13.53	22.2	1.04	4.66	11.4	3	111.4	0.75	0.75	0.00	1.15	21.3	24.6	1.72	0.00
14.03	19.6	1.03	5.24	-4.2	3	111.4	0.78	0.78	0.00	1.13	18.8	21.3	1.51	0.00
14.52	17.4	0.74	4.27	1.3	3	111.4	0.81	0.81	0.00	1.11	16.6	18.5	1.32	0.00
15.01	26.8	1.09	4.07	-3.3	4	114.6	0.83	0.83	0.00	1.10	17.1	18.7	2.08	0.35
15.50	25.6	0.84	3.27	11.2	5	114.6	0.86	0.86	0.00	1.08	12.3	13.2	1.98	0.31
15.99	11.1	0.49	4.46	5.9	3	111.4	0.89	0.89	0.00	1.06	10.6	11.2	0.81	0.00
16.49	9.2	0.43	4.64	17.1	3	111.4	0.92	0.92	0.00	1.04	8.8	9.2	0.66	0.00
16.98	18.4	0.67	3.65	33.8	4	114.6	0.95	0.95	0.00	1.03	11.7	12.1	1.40	0.15
17.47	18.2	0.98	5.41	14.0	3	111.4	0.97	0.97	0.00	1.01	17.4	17.6	1.37	0.00
17.96	22.3	0.97	4.37	34.8	3	111.4	1.00	1.00	0.00	1.00	21.4	21.4	1.70	0.00
18.45	26.3	1.22	4.65	32.9	3	111.4	1.03	1.03	0.00	0.99	25.1	24.8	2.02	0.00
18.95	30.7	1.27	4.14	19.1	4	114.6	1.06	1.06	0.00	0.97	19.6	19.1	2.37	0.37
19.44	24.4	1.36	5.56	0.5	3	111.4	1.08	1.08	0.00	0.96	23.4	22.5	1.87	0.00

Gregg In Situ, Inc.
Interpretation Output - Release 1.00.19e
Run No: 04-0617-1644-0403
Job No: 04-201MA
Client: EARTH MECHANICS
Project: CPT SITE INVESTIGATION
Site: PATTERSON SLOUGH
Location: CPT-ABUT-11 04-12C
Engineer: J. CASTLE
CPT Date: 04/11/06
CPT Time: 12:18
CPT File: 201S11.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 9.14 (ft): 30.0
Su Nkt used: 12.50
Averaging Increment (m): 0.15
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
0.25	1.0E-07	-0.01	203.2	1.01	3.8	0.1	3.9	5.9	UnDef	UnDef	10.0	UnDef	0.0	1.9
0.74	1.0E-07	0.00	67.1	1.02	3.8	1.3	5.1	14.4	UnDef	UnDef	10.0	UnDef	0.4	2.3
1.23	1.0E-07	0.00	39.9	1.03	3.8	2.6	6.5	20.3	UnDef	UnDef	6.0	UnDef	0.7	2.6
1.72	5.0E-08	0.00	51.2	2.19	7.2	7.9	15.1	24.5	UnDef	UnDef	10.0	UnDef	3.5	10.7
2.21	5.0E-02	0.00	1000.0	0.34	265.2	0.0	265.2	0.0	50	95.0	1.0	-0.30	0.0	53.0
2.71	5.0E-03	0.00	815.8	1.28	205.8	0.0	205.8	2.0	50	95.0	1.0	-0.42	0.0	51.5
3.20	5.0E-04	0.00	498.1	1.89	153.8	UnDef	UnDef	0.0	48	86.6	1.0	-0.43	UnDef	UnDef
3.61	5.0E-06	0.00	250.8	4.02	89.1	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
4.02	5.0E-06	0.00	182.0	4.12	73.0	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
4.51	5.0E-04	0.00	524.7	2.17	238.5	UnDef	UnDef	0.0	48	93.6	1.0	-0.46	UnDef	UnDef
5.00	5.0E-05	0.00	266.1	2.88	134.7	UnDef	UnDef	0.0	46	75.8	10.0	-0.45	UnDef	UnDef
5.50	5.0E-08	0.00	100.6	5.02	53.8	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
5.99	5.0E-07	0.00	85.6	4.10	48.0	62.0	110.0	26.1	UnDef	UnDef	10.0	UnDef	17.1	48.4
6.56	5.0E-07	-0.01	75.9	4.17	44.8	69.0	113.8	27.7	UnDef	UnDef	10.0	UnDef	17.9	47.1

Gregg In Situ, Inc.
Run No: 04-0617-1644-0403
CPT File: 201S11.COR

04-12C

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
7.14	5.0E-03	0.00	281.6	1.09	172.2	0.0	172.2	4.7	46	82.9	1.0	-0.29	0.0	42.1
7.63	5.0E-05	0.00	120.6	2.60	76.8	37.2	114.0	17.2	42	59.7	10.0	-0.33	7.7	37.8
8.12	5.0E-08	0.00	72.3	5.19	47.8	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
8.61	5.0E-08	-0.02	55.5	5.01	38.0	140.0	178.0	34.5	UnDef	UnDef	10.0	UnDef	36.0	73.1
9.10	5.0E-07	-0.01	68.6	4.30	48.2	90.0	138.2	29.4	UnDef	UnDef	10.0	UnDef	21.6	53.0
9.60	5.0E-08	-0.02	45.3	4.83	32.9	131.5	164.4	36.8	UnDef	UnDef	6.0	UnDef	32.2	64.4
10.09	5.0E-06	0.01	48.3	3.15	35.9	69.9	105.8	29.7	UnDef	UnDef	6.0	UnDef	12.4	30.0
10.58	5.0E-08	-0.01	62.2	4.74	47.2	123.1	170.3	32.1	UnDef	UnDef	10.0	UnDef	38.1	84.4
11.07	5.0E-08	-0.01	53.3	6.82	41.5	UnDef	UnDef	100.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
11.56	5.0E-07	0.00	84.4	4.74	66.7	UnDef	UnDef	0.0	UnDef	UnDef	10.0	UnDef	UnDef	UnDef
12.06	5.0E-06	0.00	50.0	3.31	40.7	81.1	121.8	29.9	UnDef	UnDef	6.0	UnDef	14.2	34.1
12.55	5.0E-04	0.04	29.0	0.10	24.5	0.0	24.5	5.0	36	30.0	1.0	0.11	0.0	8.0
13.04	5.0E-06	0.04	23.0	2.93	20.0	80.0	100.0	40.4	UnDef	UnDef	6.0	UnDef	9.8	19.6
13.53	5.0E-08	0.02	28.6	4.82	25.1	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
14.03	5.0E-08	-0.01	24.2	5.46	21.7	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
14.52	5.0E-08	0.00	20.5	4.48	18.9	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
15.01	5.0E-07	0.00	31.1	4.20	28.7	114.8	143.5	40.6	UnDef	UnDef	6.0	UnDef	18.7	37.5
15.50	5.0E-06	0.01	28.7	3.38	27.0	107.9	134.8	38.7	UnDef	UnDef	6.0	UnDef	13.2	26.4
15.99	5.0E-08	0.02	11.4	4.85	11.5	UnDef	UnDef	100.0	UnDef	UnDef	3.0	UnDef	UnDef	UnDef
16.49	5.0E-08	0.06	9.0	5.15	9.4	UnDef	UnDef	100.0	UnDef	UnDef	3.0	UnDef	UnDef	UnDef
16.98	5.0E-07	0.06	18.5	3.85	18.5	74.1	92.6	48.9	UnDef	UnDef	6.0	UnDef	12.1	24.2
17.47	5.0E-08	0.03	17.7	5.72	18.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
17.96	5.0E-08	0.05	21.3	4.57	21.8	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
18.45	5.0E-08	0.04	24.5	4.84	25.3	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
18.95	5.0E-07	0.02	28.1	4.29	29.2	116.9	146.1	42.7	UnDef	UnDef	6.0	UnDef	19.1	38.1
19.44	5.0E-08	0.00	21.6	5.82	23.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef

APPENDIX SEISMIC

Seismic Cone Penetrometer Testing
(SCPTu)

Gregg In Situ, Inc. uses a modified CPT cone that contains a built in seismometer to measure compression and shear wave velocities in addition to the standard piezocone parameters (q_c, f_s, and u_2). Therefore, four independent readings are compiled with depth in a single sounding. The standard CPT parameters are recorded continuously while the seismic test is usually performed at 5-foot intervals.

Shear waves are generated by striking a seismic beam coupled to the ground surface by a hydraulic cylinder under the CPT rig, *Figure SCPTu*. Compression waves are generated by striking an auger in the ground. The sledgehammer that strikes the beam/auger acts as a trigger, initiating the recording of the seismic wave trace. Before measurements are taken, the rods are decoupled from the CPT rig to prevent energy transmission down the rods.

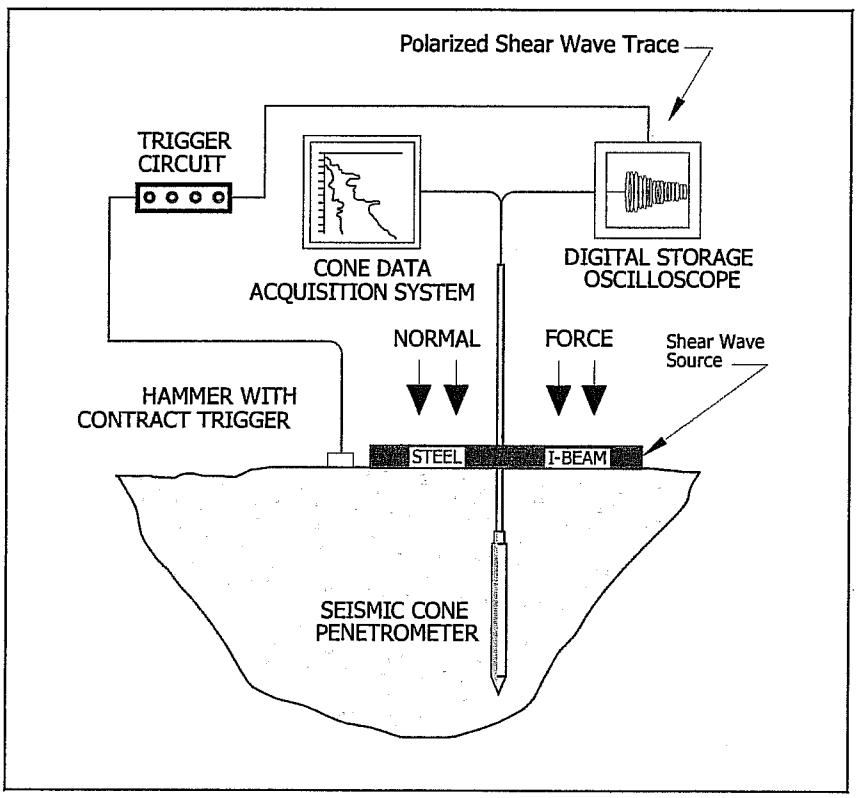


Figure SCPTu

Geophones in the body of the piezocone recognize the arriving waves generated at the ground surface, *Figure Seismic*. Any waves received by the geophones on the cone penetrometer are sent back up to the truck to be displayed on an oscilloscope. On site software then plots the wave amplitude versus time to calculate wave velocities.

At least two waves are recorded for each test depth so the operator can check consistency of the waveforms. Shear wave data is sampled at a frequency of 20kHz (20,000 samples per second) and compression wave data is sampled at 50kHz (50,000 samples per second). To maintain a desired signal resolution, the input sensitivity (gain) is increased with depth.

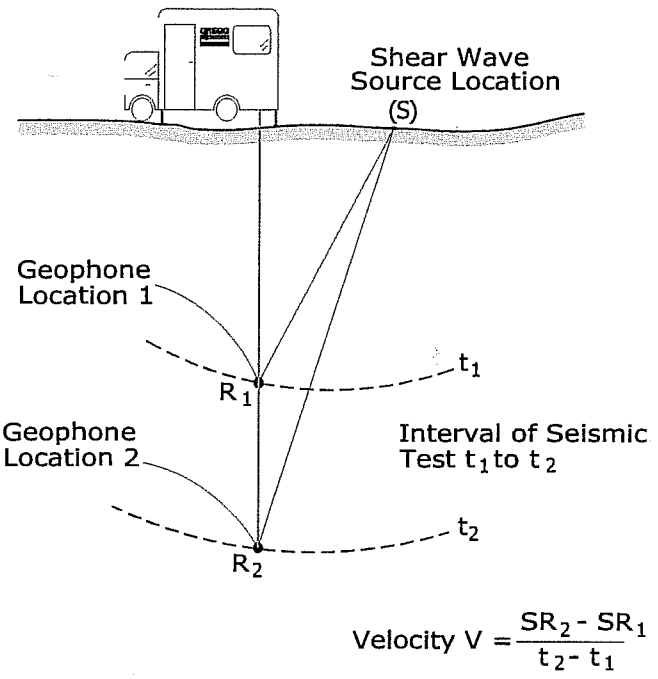


Figure Seismic

Offset distances of the beam from the cone and the location of the geophone are all taken into account in calculations.

The shear wave velocity (V_s) provides information about small-strain stiffness while the penetration data provides information about large-strain failures. From interval shear wave velocity (V_s) and the mass density (ρ) of a soil layer, the dynamic shear modulus (G_o) of the soil can be calculated in a specific depth interval. The dynamic shear modulus (G_0) is a key parameter for the analysis of soil behavior in response to dynamic loading from earthquakes, ice, vibrating machine foundations, waves and wind.

A summary of the data collected including the depth and location identification is displayed in Table 1 and graphical formats and can be found with the corresponding CPT plot.

For a detailed reference on seismic CPT, refer to Robertson et. al., 1986.

GREGG

GIS Project No: 04-201MA
Client: Earth Mechanics
Site: Patterson Slough Bridge
Location ABUT-1
Sounding Date: June 11, 2004

Shear Wave Velocity Calculations

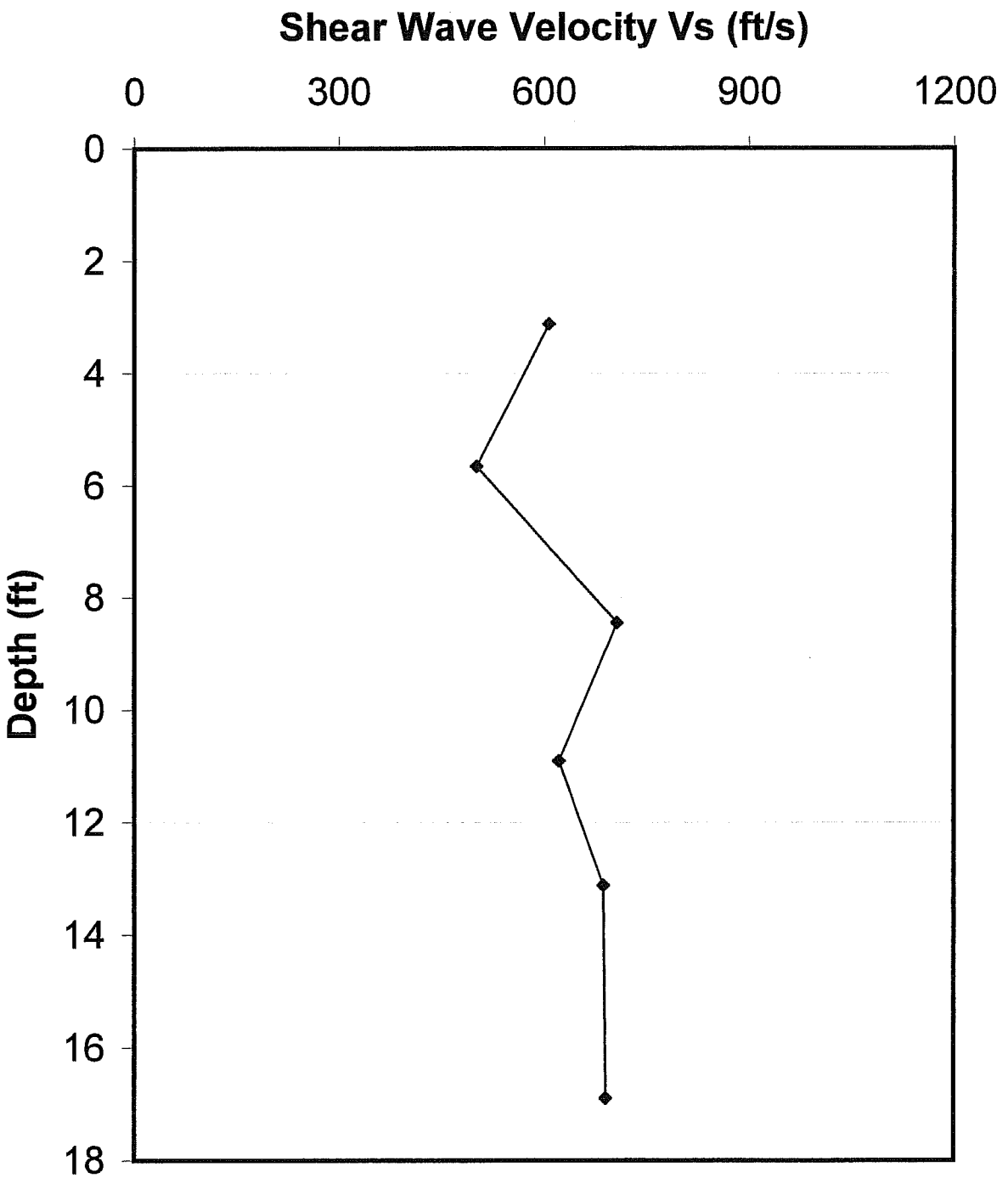
Geophone Offset (feet) 0.66
Source Offset (feet) 2.50

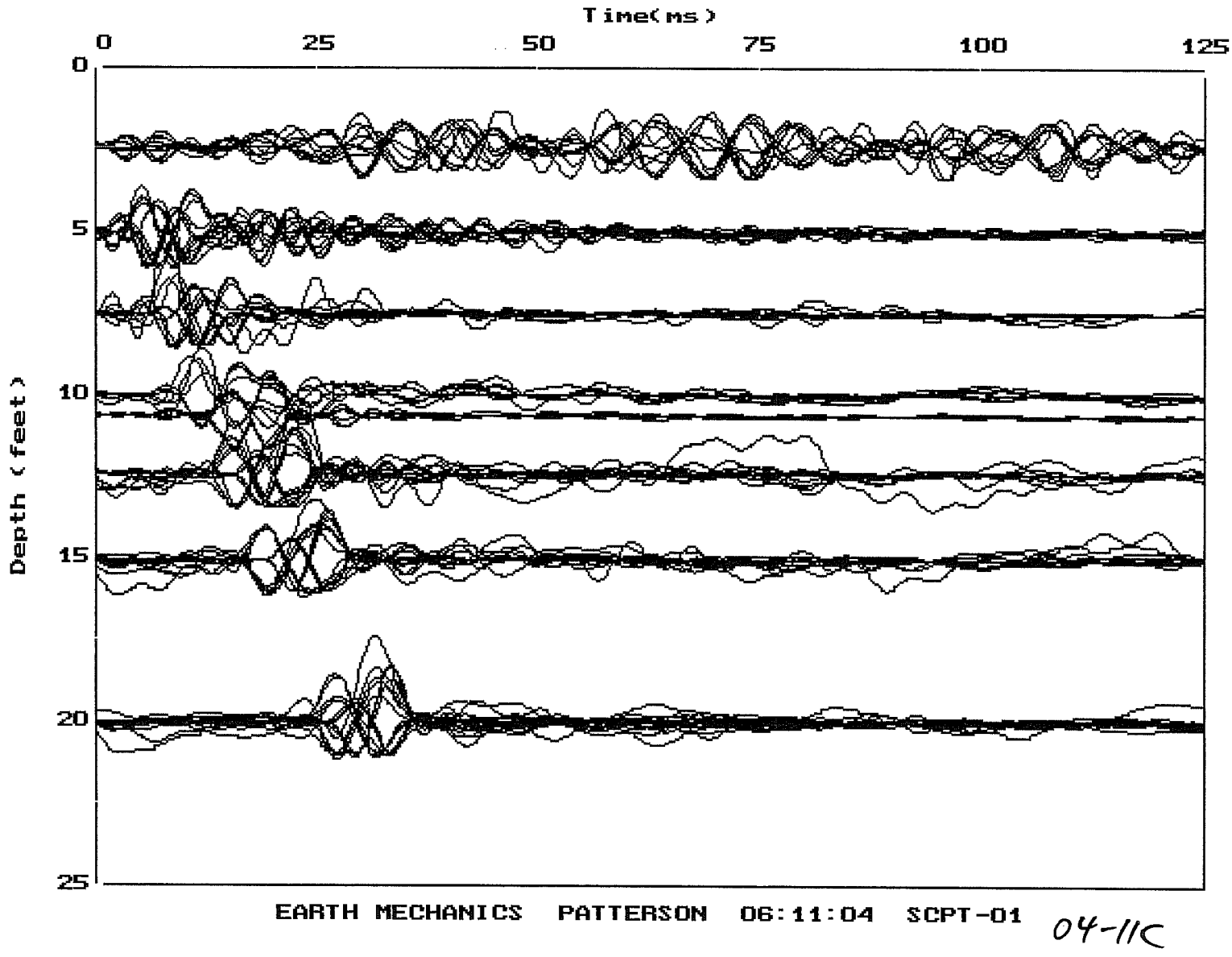
Test Depth (feet)	Geophone Depth (feet)	Ray Path (feet)	Incremental Distance (feet)	Time Interval (ms)	Interval Velocity (ft/s)	Interval Depth (feet)	Interval Depth (feet)	Vs (ft/s)	Vs (m/s)	Interval Depth (m)
2.46	1.80	3.08								
5.08	4.42	5.08	2.00	3.29	607	3.11	3.11	607	185	0.95
7.54	6.88	7.32	2.24	4.47	502	5.65	5.65	502	153	1.72
10.66	10.00	10.31	2.99	4.23	706	8.44	8.44	706	215	2.57
12.46	11.80	12.07	1.75	2.82	622	10.90	10.90	622	190	3.32
15.09	14.43	14.65	2.58	3.76	687	13.12	13.12	687	209	4.00
20.01	19.35	19.51	4.87	7.05	690	16.89	16.89	690	210	5.15

Shear Wave Velocity Profile

GREGG

Client: 04-201ma - Earth Mechanics
Site: Patterson Slough Bridge
Location: ABUT-1 04-11C
Sounding Date: June 11, 2004




Time(ms)
0
25
50
75
100
125
Depth (feet)
0
5
10
15
20
25
EARTH MECHANICS PATTERSON 06:11:04 SCPT-01
04-11C

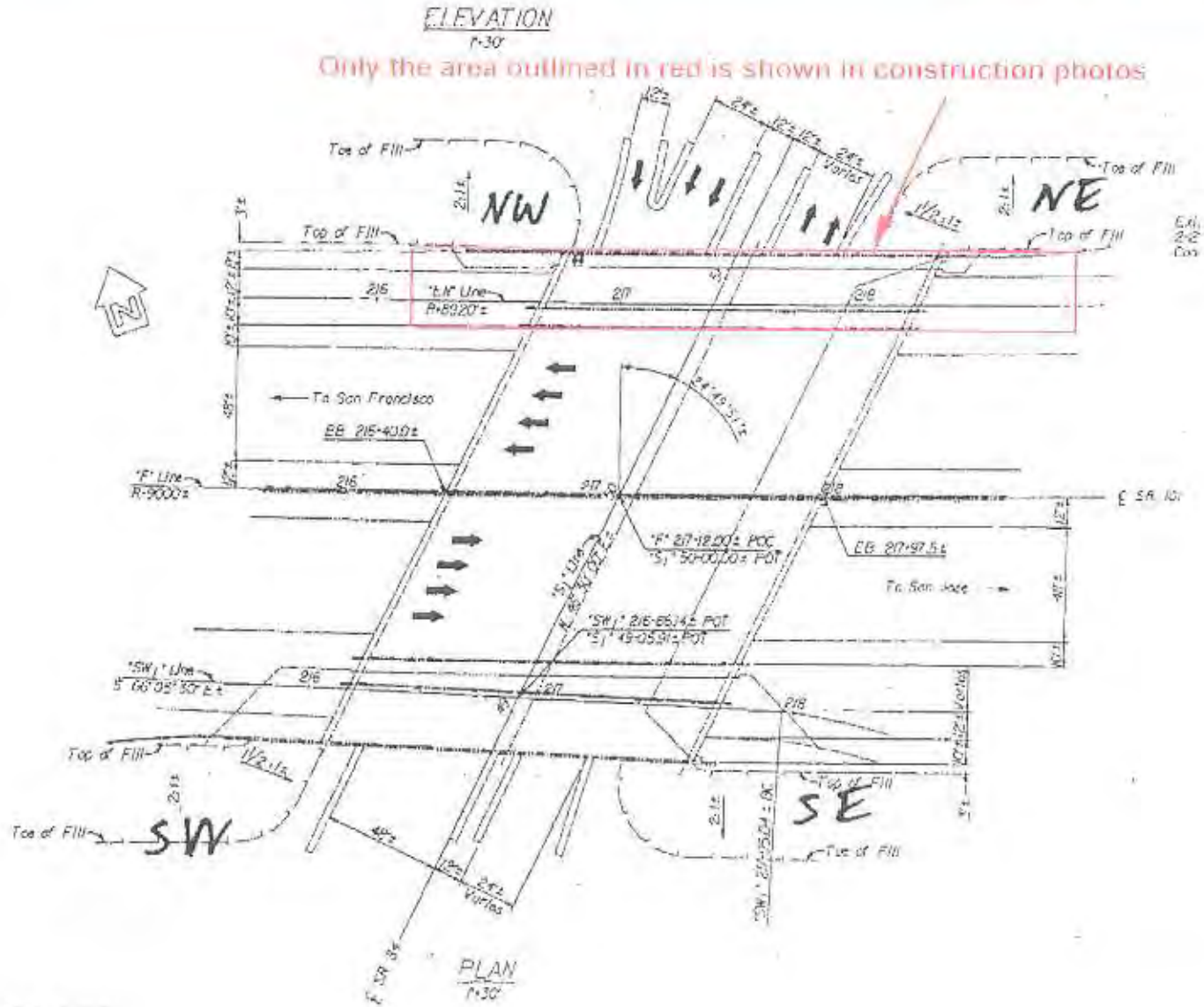
Caltrans Bridge 35-0083
Route 101/84 Separation, San Mateo

Caltrans Bridge 35-0083, Route 101/84 Separation, San Mateo

The field investigation for the Route 101/84 Separation Bridge, conducted on 6/11/04 and 6/12/04, consisted of 2 soil borings (04-13A and 04-14A), PMT in the soil borings, and 2 CPT (04-13 and 04-14). Soil/PMT borings were drilled by Pitcher Drilling of Palo Alto. CPT's were performed by Gregg Drilling of Martinez. Locations 04-13x were located on the northeast bridge abutment in the north-bound lane. Locations 04-14x were located on the northwest bridge abutment in the north-bound lane.

Geotechnical soil sampling consisted of ring samples collected using a Modified California sampler and small bulk samples collected with a SPT sampler. Samples were taken at 2.5-ft intervals to 15 ft depth and at 20 ft depth for 04-14A. Samples were taken at 2.5-ft intervals to 15 ft depth and at 20, 25, and 28 ft depth for 04-13A. No groundwater was encountered during the investigation. One pressuremeter test was performed at 7.5 ft depth in each boring.

06/13/2004


ELEVATION
1"=30'
Only the area outlined in red is shown in construction photos
NW
NE
SW
SE
Top of Fill
Toe of Fill
"LN" Line
R=8920'±
To San Francisco
EB 215.40.0±
"F" Line
R=9000±
"F" 217.18.00± POC
"S1" 50.00.00± POT
EB 217.97.5±
To San Jose
"SW1" 216.66.14± POT
"S1" 49.05.31± POT
"SW1" Line
S 66°08'35" E±
PLAN
1"=30'

View to the east from northwest corner of bridge abutment.

06/04/04

NW abut #1

View to the east, no pavement on western abutment.

06/04/04

NW abut #1

View to the east

Earth Mechanics, Inc.
Geotechnical & Earthquake Engineering

06/04/04

NW about #1

View to the west from northeast corner of bridge abutment, installing new guardrail. Note wall shape.

06/04/04

NE abut #3

View to the west, asphalt on eastern abutment.

06/04/04

NE abut #3

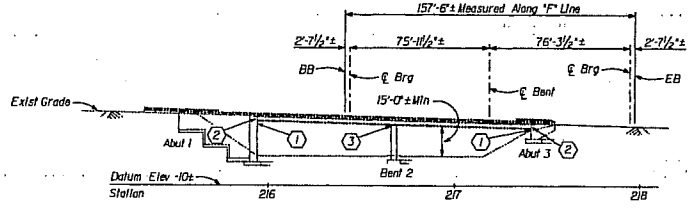
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SM	84,101	24.7/24.9, 1.9/15.9	27	52

William R Earl
REGISTERED CIVIL ENGINEER

7-11-94
PLANS APPROVAL DATE

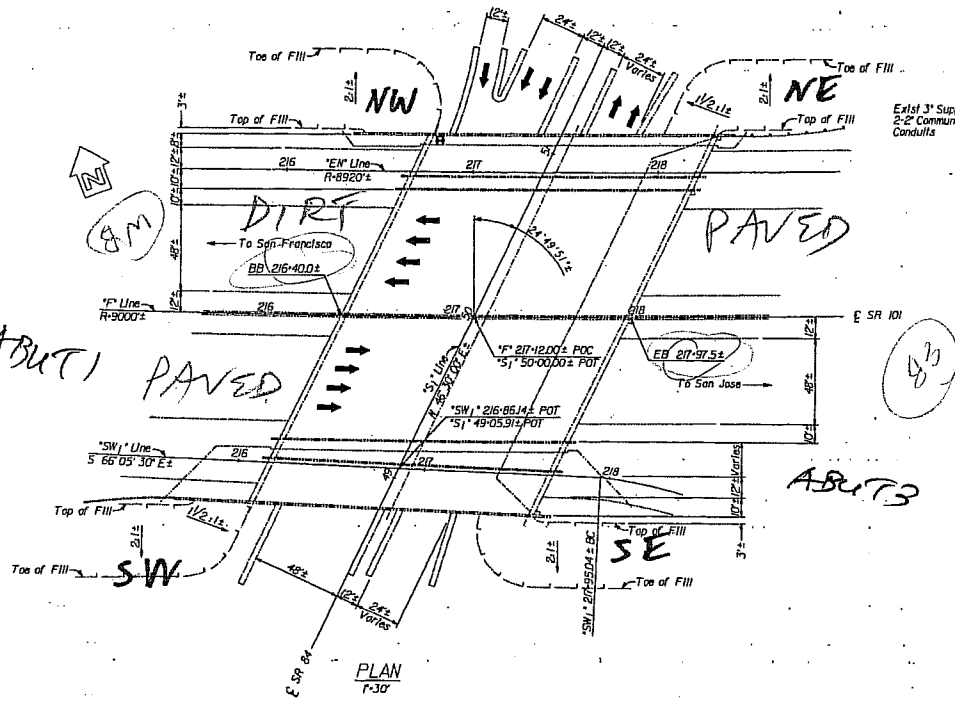
William R. Earl
No. 45652
Exp. 12-31-94
CIVIL
REGISTERED PROFESSIONAL ENGINEER
STATE OF CALIFORNIA

INCA ENGINEERS, INC.
510 BERCUT DRIVE, SUITE V
SACRAMENTO, CA 95814

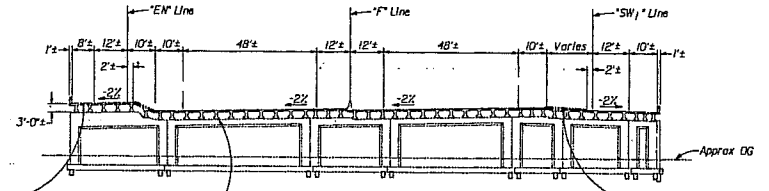


ELEVATION
1"=30'

Legend:
1 Supplemental Support
2 Treated Timber Restraint Block
3 Drill & Bond Dowels
BB Indicates Point Of Min Vert Clr
Indicates Exist Structure
Indicates New Construction
Indicates Direction of Traffic



PLAN
1"=30'



TYPICAL SECTION
1"=20'

Note:
See Roadway Plans For Traffic Control Requirements

GENERAL NOTES
LOAD FACTOR DESIGN

DESIGN
Bridge Design Specifications: 1983 AASHTO with Interims and Revisions by Caltrans

DESIGN SEISMIC LOAD
Peak Rock Acceleration .57g
Depth of Alluvium >150 ft

CORED AND DRILLED HOLES
Location of Cored and Drilled Holes Shown in the Plans are Approximate. Prior to Placing Holes in Concrete the Contractor Shall Locate all Reinf Steel and Adjust the Location of the Holes to Clear all Reinf Bars (Except as Noted). Final Hole Locations are Subject to Approval of the Engineer.

REINFORCED CONCRETE
(Assumed for Retrofit Evaluation)
f'c = 5,000 psi
fy = 40,000 psi

REINFORCED CONCRETE (NEW)
f'c = 3250 psi
fy = 60,000 psi

DATUM
Datum and Elevations Shown are Based on As-Built Drawings.

QUANTITIES

	LUMP SUM
BRIDGE REMOVAL (PORTION)	
STRUCTURE EXCAVATION (BRIDGE)	20 CY
STRUCTURE BACKFILL (BRIDGE)	11 CY
STRUCTURAL CONCRETE, BRIDGE	30 CY
DRILL AND BOND DOWEL	446 LF
CORE CONCRETE (1 1/2")	320 LF
JOINT SEAL (MR 1/2")	200 LF
BAR REINFORCING STEEL (BRIDGE)	7,100 LB
TREATED DOUGLAS FIR TIMBER	1.8 MFBM

INDEX TO PLANS

Sheet No.	Sheet Title
1	General Plan
2	Abutment 1 Layout 1
3	Abutment 1 Layout 2
4	Abutment 3 Layout 1
5	Abutment 3 Layout 2
6	Abutment Details
7	Bent 2 Layout 1
8	Bent 2 Layout 2
9	As-Built Log Of Test Borings

INDEX TO STANDARD PLANS (DATED JULY 1992)

A-10A	Abbreviations
A-10B	Symbols
B6-21	Joint Seals (Max Movement Rating <2")

NO CHANGES W.R.E. 7-24-95
AS BUILT
CORRECTIONS BY Tim Ehrich
CONTRACT NO. 04-141304
DATE 4-22-95

The Contractor Shall Verify all Controlling Field Dimensions Before Ordering or Fabricating Materials.

Thomas Post / Randy Anderson OK OVERNIGHT SCHOFF DATE 5/02/94	DESIGN	BY C.Shenoy	CHECKED T.Kang				
	DETAILS	BY L.Davis	CHECKED W.Earl	LAYOUT	BY L.Davis	CHECKED W.Earl	
	QUANTITIES	BY C.Shenoy	CHECKED G.Rowe	SPECIFICATIONS	BY W.Earl	PLANS AND SPECS CHECKED G.Rowe	

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

W.Earl
PROJECT ENGINEER

CU 04
EA 141301

BRIDGE NO. 35-83 R/L & OL
POST MILE 5.39

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

590046-2

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 1 OF 9

EARTHQUAKE RETROFIT PROJECT NO 414
ROUTE 101/84 SEPARATION
GENERAL PLAN

SR-GLDN 12-30-93 9:44AM WS

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SM	84,101	24.7/24.9, 1.9/5.9	30	52

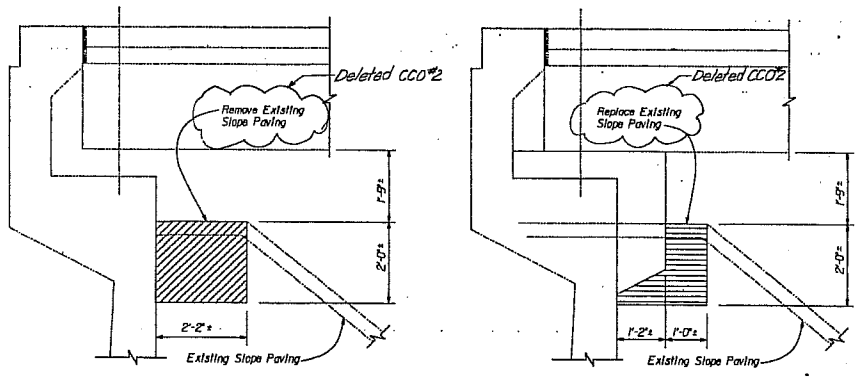
William R Earl
REGISTERED CIVIL ENGINEER
7-11-94
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — William R. Earl — No. 45652 — Exp. 12-31-94 — CIVIL — STATE OF CALIFORNIA

INCA ENGINEERS, INC.
510 BERCUT DRIVE, SUITE V
SACRAMENTO, CA 95814

Notes:

1. For Supplemental Support and Longitudinal Treated Timber Restraint Block See "Abutment Details" Sheet.
2. Exist Superstructure and Piles not Shown for Clarity.



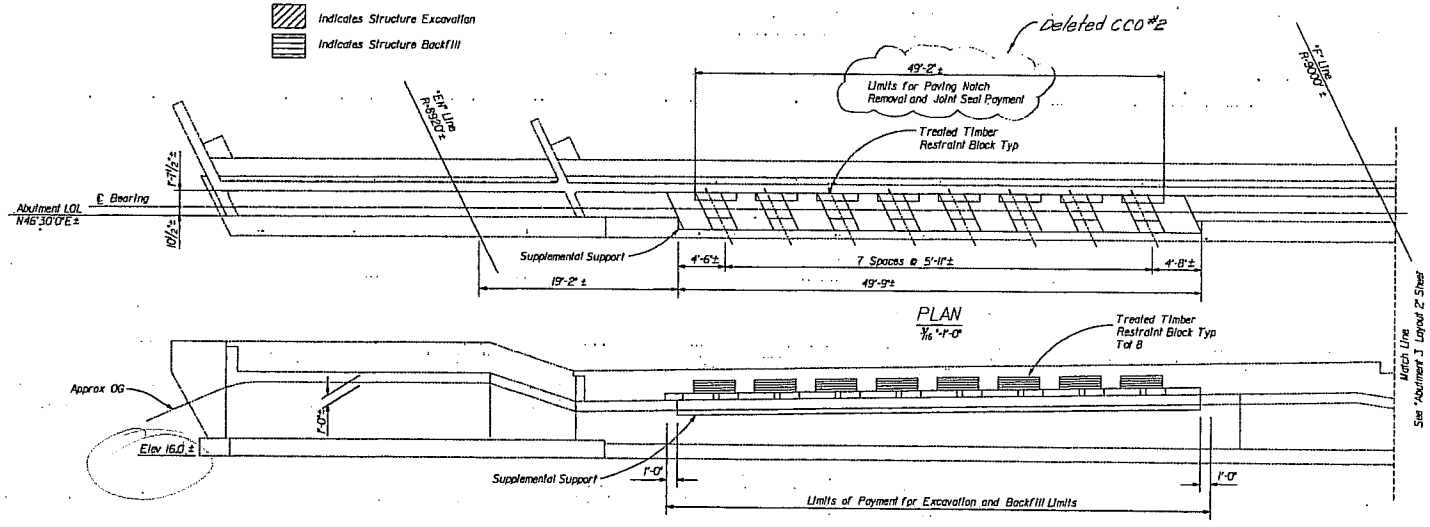
LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL LIMITS

No Scale

Legend:

Indicates Structure Excavation

Indicates Structure Backfill



The Contractor Shall Verify All Controlling Field Dimensions Before Ordering Or Fabricating any Material

7-24-95

AS BUILT
CORRECTIONS BY Tim Ehrich
CONTRACT NO. 04-141304
DATE 5-9-95

Thomas Post / Randy Anderson (RA) DESIGN OVERSIGHT		DESIGN	C. Shenoy	T. Kang	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
8/02/94 SIGN OFF DATE		DETAILS	W. Simonsma	W. Earl	W. Earl PROJECT ENGINEER
		QUANTITIES	C. Shenoy	G. Rowe	CU 04 EA 141301

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

BRIDGE NO.	EARTHQUAKE RETROFIT PROJECT NO 414
35-83 R/L & OL	ROUTE 101/84 SEPARATION
POST MILE 5.39	ABUTMENT 3 LAYOUT 1

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)						SHEET	OF
6-23-93	7-30-93	10-25-93	12-23-93	4-27-94		4	9

SR-84/LOCH 12-29-93 9:12AM WS

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SM	84,101	24.7/24.9, 1.9/5.9	31	52

William R. Earl
REGISTERED CIVIL ENGINEER

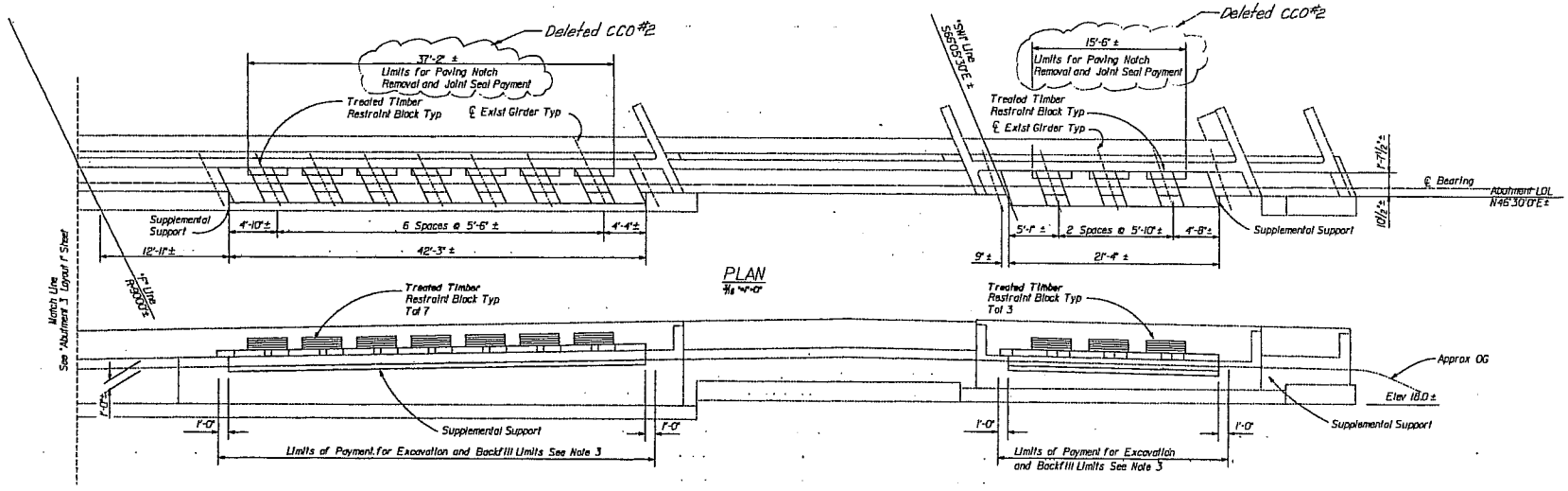
7-11-94
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — William R. Earl — No. 45652 — Exp. 12-31-94 — CIVIL — STATE OF CALIFORNIA

INCA ENGINEERS, INC.
510 BERCUT DRIVE, SUITE V
SACRAMENTO, CA 95814

Notes:

1. For Supplemental Support and Longitudinal Treated Timber Restraint Block See "Abutment Details" Sheet
2. Exist Superstructure and Piles Not Shown For Clarity
3. See "Abutment 3 Layout 1" Sheet for Limits of Payment for Excavation and Backfill Limits.



AS BUILT 7-22-95

CORRECTIONS BY Tim Ehrlich

CONTRACT NO. 04-141304

DATE 5-9-95

The Contractor Shall Verify All Controlling Field Dimensions Before Ordering Or Fabricating any Material.

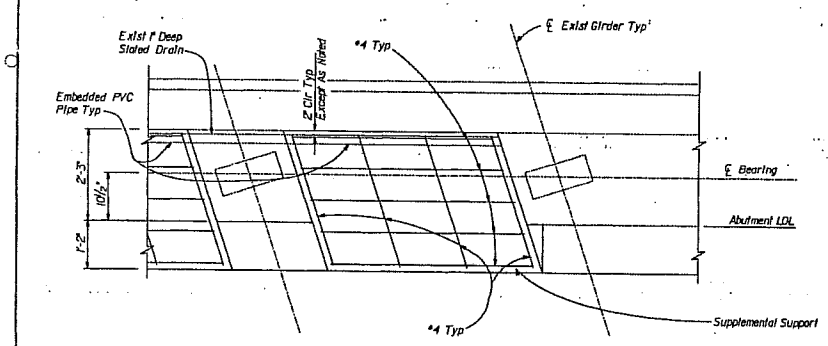
RA Thomas Post / Randy Anderson DESIGN OVERSIGHT 5/22/94 SIGN OFF DATE	DESIGN	BY C. Shaney	CHECKED T. Kang	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	W. Earl PROJECT ENGINEER
	DETAILS	BY W. Simonsma	CHECKED W. Earl		
	QUANTITIES	BY C. Shaney	CHECKED G. Rowe		
	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3			CU 04 EA 141301	

BRIDGE NO.	EARTHQUAKE RETROFIT PROJECT NO 414
35-83 R/L & OL	ROUTE 101/84 SEPARATION
POST MILE 5.39	ABUTMENT 3 LAYOUT 2

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) 6-29-93 7-30-93 9-30-93 12-30-93 4-29-94

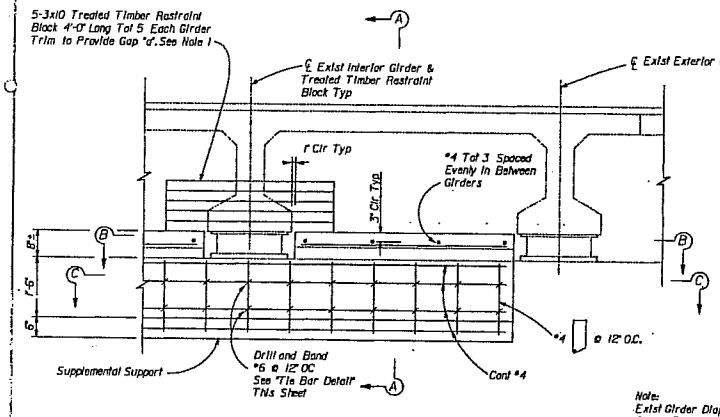
SHEET 5 OF 9

SR-ALLOCH 12-31-93 9:22AM WS



Note:
Treated Timber Restraint Blocks and Exist Girder Diaphragm Not Shown For Clarity

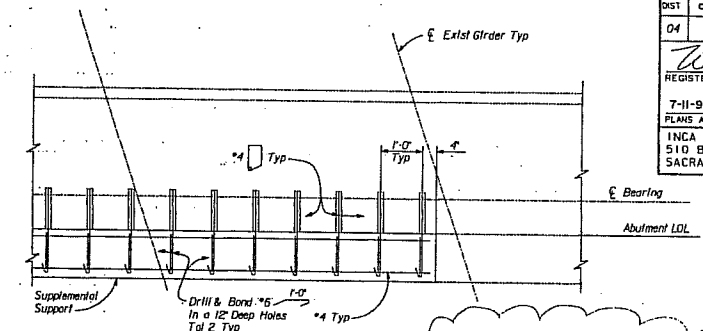
SECTION B-B
¾"=1'-0"



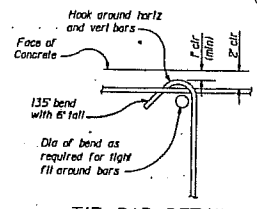
Note:
Exist Girder Diaphragm Not Shown For Clarity

PARTIAL ELEVATION
¾"=1'-0"

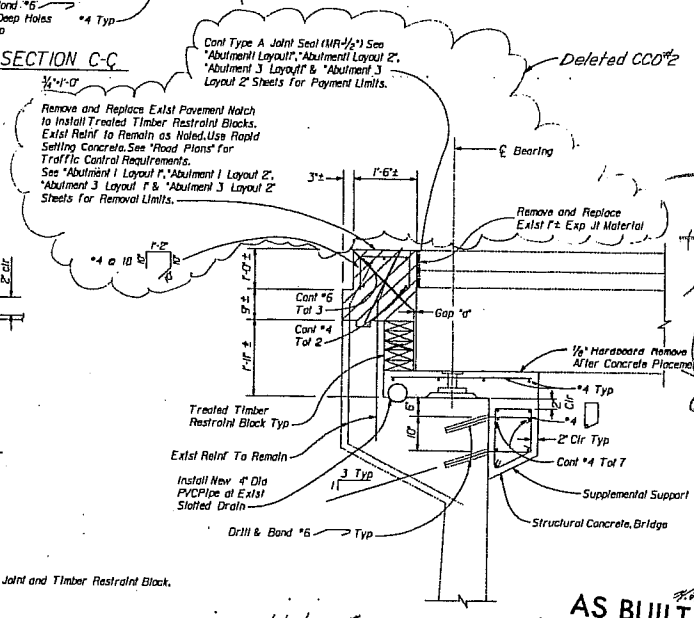
Note: The Contractor Shall Verify all Controlling Field Dimensions Before Ordering or Fabricating any Material.



SECTION C-C
¾"=1'-0"



TIE BAR DETAIL
No Scale



Notes:
1. Gap "d" Same for Joint and Timber Restraint Block.

Legend:
Indicates Limits of Bridge Removal (Portion) and Rapid Setting Concrete

Deleted CCO #2

SECTION A-A
¾"=1'-0"

AS BUILT
CORRECTIONS BY Tim Ehrich
CONTRACT NO. 04-141304
DATE 5-9-05

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SM	84,101	24.7/24.9, 1.9/5.8	32	52

William R. Earl
REGISTERED CIVIL ENGINEER
7-11-94
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — William R. Earl — No. 45652 — Exp 12-31-94 — CIVIL — STATE OF CALIFORNIA

INCA ENGINEERS, INC.
510 BERCUT DRIVE, SUITE V
SACRAMENTO, CA 95814

RE
Thomas Post / Randy Anderson
DESIGN OVERSIGHT
SIGN OFF DATE 5/12/94

	BY	CHECKED
DESIGN	C. Sheney	T. Kehg
DETAILS	W. Simonsma	W. Earl
QUANTITIES	C. Sheney	G. Rava

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

W. Earl
PROJECT ENGINEER

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 04
EA 14130I

BRIDGE NO. 35-83 R/L & OL
POST MILE 5.39

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)
6-24-93 | 1-20-93 | 9-20-93 | 10-26-93 | 4-27-94

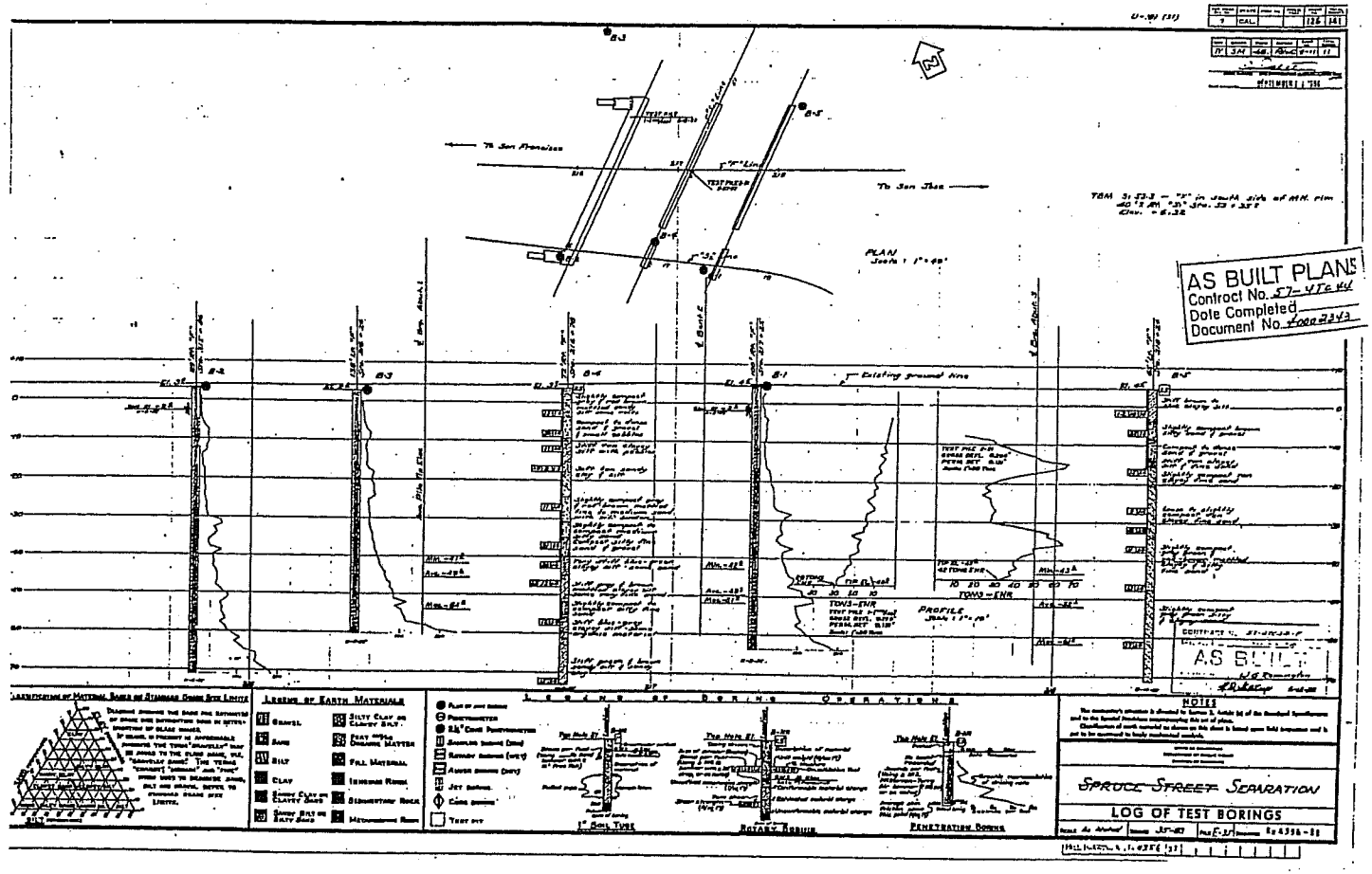
EARTHQUAKE RETROFIT PROJECT NO 414
ROUTE 101/84 SEPARATION
ABUTMENT DETAILS

SHEET 6 OF 9

SR-ALL.DGN 12-31-91 9:09AM WS

245

7-11-94 TO ACCOMPANY PLANS DATED	DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
	04	SM	84,101	24.7/24.9, 1.9/5.8	35	52



REGISTERED PROFESSIONAL ENGINEER — FRANKLIN P. FABER — 816 — EXP. 3-31-96 — GEOTECHNICAL — STATE OF CALIFORNIA

The As-Built Log of Test Boring Sheet Was Used to Prepare the Geotechnical Report

NO CHANGES 7-25-95

AS BUILT

CORRECTIONS BY Tim Ehrlich

CONTRACT NO. 04-141304

DATE 4-27-95

Post/Randy Anderson	NOTE: ADDITIONAL AS-BUILT FOUNDATION DATA MAY BE AVAILABLE AT THE DIVISION OF NEW TECHNOLOGY, MATERIALS AND RESEARCH 5900 FOLSOM BOULEVARD, SACRAMENTO, CALIFORNIA 95819	DESIGN: C. Shenoy / W. Earl; T. Kang / G. Rowe	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	W. Earl PROJECT ENGINEER	BRIDGE NO. 35-83 N/L & OL; POST MILE 5.39
5/12/95		DETAILS: W. Simonsma; C. Shenoy; G. Rowe / W. Earl			
		QUANTITIES: C. Shenoy; G. Rowe		CU 04 EA 141301	

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3 4 5

DISREGARD PRINTS BEARING EARLIER REVISION DATES —

REVISION DATES (PRELIMINARY STAGE ONLY)

EARTHQUAKE RETROFIT PROJECT NO 414

ROUTE 101/84 SEPARATION

AS-BUILT LOG OF TEST BORINGS

SHEET 9 OF 9

1-5

LOG OF BORING NO. (~~B-T~~ 04-13A)

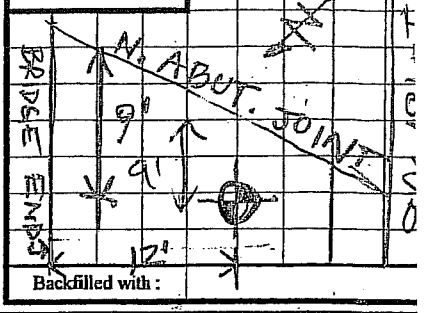
04-13A

NW ABUTMENT

Steve Gona (650) 223-7209

Project Name	: UCSD - RTE 101/84 SEPARATION		
Project Location	: REDWOOD CITY, CA		
E.M.I. Project No.	: 02-165	Site Condition :	DIRT
Weather	: SUNNY, WARM	Elevation :	4FT
Traffic Control	: N/A	Operator :	
Drilling Company	: PITCHER	Operator :	RON PITCHER
Type of Rig	: FAILING 1500	Drop (in) :	
Borehole Diameter (inch)	: 6"	Drive Wt. (lbs) :	
Logged By	: J.C.	Date Drilled :	6-13-04

Comments :



Backfilled with :

	Time										Back to	Proposed Depth
	Depature	Arrival	Start	Break	Resume	Lunch	Resume	Break	Finish	Off	Office	ft
Driller												Water Table
Traffic Control												ft
Logger												Caving
Total												ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O²/LEL/PID
0										: :					
2.5	D	1		6 8 11	16"	SP	SAND, BROWN/BLACK, DRY, FINE-MED GRAINED, LOOSE, WELL SORTED, MICACEOUS, ARTIFICIAL FILL								
5						SP	SAME			: :					
		2					BULK SAMPLE - PM TEST - NO BLOW COUNTS								
~~10~~ 7.5	D	3		4 5 5	17"	SP	SAME			: :					
~~15~~	S	4		1 1 1	17.5"	SP	SAME			: :					
~~20~~	D	5		3 5 5	18"	SP	SAME			: :					
~~25~~		6		2 5 6	18		SAME			: :					

NW ABUTMENT

Project No. : 02-165 **Project Name :** UCSD- RTE 101/84 SEPARATION

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation
30										: :				
18.5	B	7				CL	* At 18.5' - change in lithology - native mat'l clay w/ serpentinite alluvium. Took bulk sample from 18.5'-20'							
~~35~~ 20		8	D	6 10 17	15"	CL	CLAY W/ GRAVEL - BROWN - ORANGE MOTTLED, H. WEATHERED DRY - SL. MOIST, PLASTIC, V. STIFF, AND GRAVELS TO 2" DIAM, COMPRISED OF FRANCISCAN - SERPENTINITE/SANDSTONE							
5 ~~40~~		9	S	30 22 15	12"	CL	SAME			: :				
										: :				
~~45~~		10	D	8 17 22	17	OH	* DRILLER RPTS MORE MORE MOISTURE IN CUTTINGS @ 26' DEPTH - LIKELY PERCHED H_2O CLAY - BLK, ORGANIC, HIGHLY PLASTIC, SL. MOIST BAY MD							
50										: :				
										: :				
55										: :				
										: :				
60										: :				
										: :				
65										: :				
										: :				

1-5

LOG OF BORING NO. (B-3 04-14A)

NB Abutment

Earth Mechanics, Inc.

Project Name	: VCSD - 101/RR SEPARATION			
Project Location	: REDWOOD CITY			
E.M.I. Project No.	: 02-165	**Site Condition :**	ASPHALT	
Weather	: SUNNY WARM	**Elevation :**	4.5 FT	
Traffic Control	: N/A	**Operator :**		
Drilling Company	: PITCHER	**Operator :**	RON PITCHER	
Type of Rig	: FAILING 1500	**Drop (in) :**		
Borehole Diameter (inch)	: 6"	**Drive Wt. (lbs) :**		
Logged By	: J.C.	**Date Drilled :**	6-13-04	

Comments : 61 from Abutment

Backfilled with :

	Time										Back to Office	Proposed Depth ft
	Depature	Arrival	Start	Break	Resume	Lunch	Resume	Break	Finish	Off		
Driller												**Water Table** ft
Traffic Control												
Logger												**Caving** ft
Total												

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (SD/S.S./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O²/LEL/PID
0															
2.5	D	1		12 24 21	15"	SP-SC	CLAYEY SAND W/ GRAVEL, BRN ORANGE, SL. PLASTIC, DRY - SL. MOIST, V. STIFF GRAVELS COMPRISED OF SERPENTINITE & FRANCISCAN								
5							- SHELBY TUBE - 5 TO 7.5' CAPPED & SHIPPED (1.5' REC. IN SHELBY) (HYDR. PRESSURE 100 - 115 psi APPLIED)								
~~10~~ 7.5	D	2		10 11 11	14"	CL	SANDY CLAY W GRAVEL, GRAY, SL. PLASTIC, SL. MOIST, STIFF ANG. GRAVELS TO ½" DIAM OF MUDSTONE								
						ML	SANDY SILT, BRN-ORANGE, NO PLASTICITY, M. DENSE, SL. MOIST								
10 ~~15~~	D	3					[NO BLOW COUNTS - JUST PUSHED SAMPLER FOR PM TEST INTERVAL]								
						CL	SILTY CLAY, BRN-ORANGE, SL MOIST, M. PLASTICITY								
12.5 ~~20~~	S	4		8 11 13	4"	CL	SAME - LOW PLASTICITY, ANG. GRAVELS TO 1½" DIAM, V. STIFF V. POOR RECOVERY								
~~25~~	D	5		6 23 13	4"	CL	SILTY CLAY W/ GRAVEL - GRAY/BRN, SL MOIST, LOW PLASTICITY, HARD.								

2-5

LOG OF BORING NO. (~~B-3~~ 04-14A.)

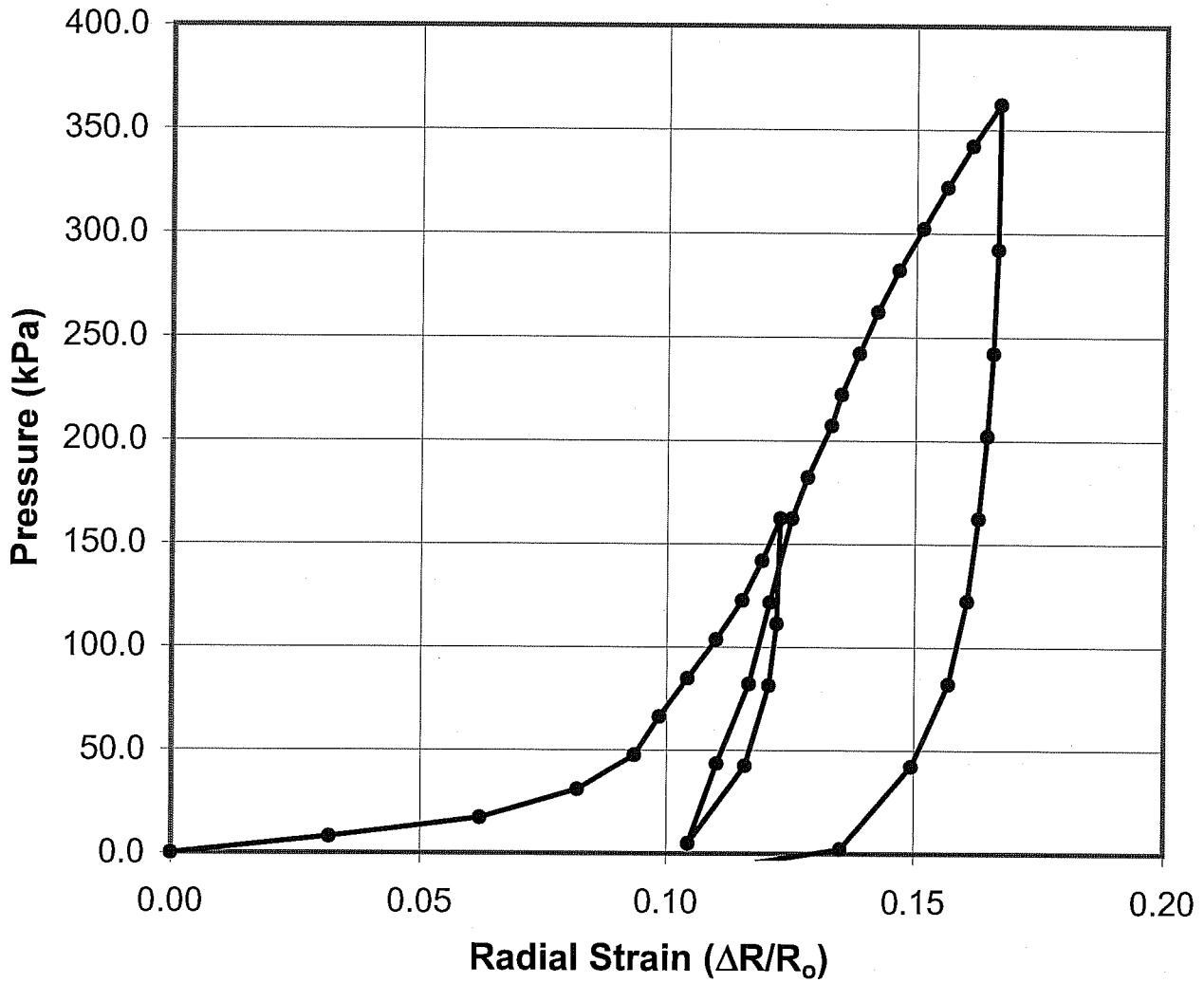
NE ABUTMENT

Earth Mechanics, Inc.

Project No.: 02-165 **Project Name:** UCSD - RTE 101/84 SEPARATION

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B/T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93): Color	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O²/LEL/PID
~~30~~ 20	S	6		9		SC	CLAYEY SAND W/ GRAVEL - BRN ORANGE, COARSE-FINE			: :					
				13	10		GRAINED, SL MOIST, SL. PLASTICITY, ANG GRAVELS ½-1" DIAM								
				11			M. DENSE.			: :					
35										: :					
										: :					
40										: :					
										: :					
45										: :					
										: :					
50										: :					
										: :					
55										: :					
										: :					
60										: :					
										: :					
65										: :					
70										: :					

Pressuremeter Test Result



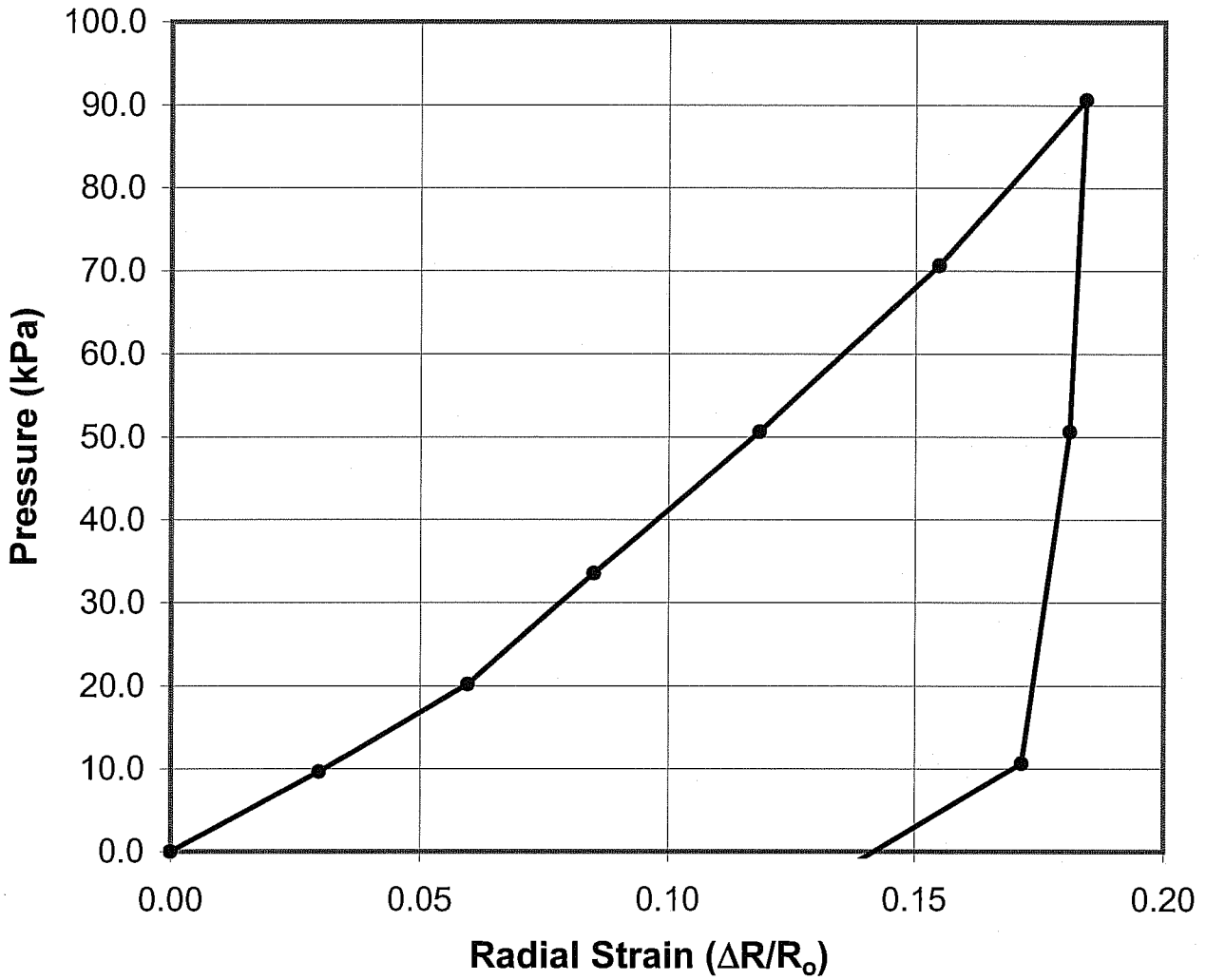
Boring No.:	**04-13P**
Location:	**Route 101/84 SEP**
	San Mateo County
Test Date:	**6/13/2004**
Test Depth:	**7.5 ft**
Soil Type:	**Sand to Silty Sand with Gravel**

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

CALTRANS-UCSD / Abutment Research

Project No : 02-165 | Date : 12/22/2004

Pressuremeter Test Result



Boring No.:	**04-14P**
Location:	**Route 101/84 SEP**
	San Mateo County
Test Date:	**6/13/2004**
Test Depth:	**7.5 ft**
Soil Type:	**Silty to Clayey Sand with Gravel**

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

CALTRANS-UCSD / Abutment Research

Project No : 02-165 | Date : 12/22/2004

June 18, 2004

Earth Mechanics
Attn: Jody Castle
7700 Edgewater Drive, Suite 846
Oakland, California 94621

Subject: CPT Site Investigation
Highway 101 & Route 84
Redwood City, California
GREGG Project Number: 04-202ma

Dear Jody:

The following report presents the results of GREGG IN SITU's Cone Penetration Test investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	X
2	Pore Pressure Dissipation Tests	(PPD)	☐
3	Seismic Cone Penetration Tests	(SCPTU)	X
4	Resistivity Cone Penetration Tests	(RCPTU)	☐
5	UVIF Cone Penetration Tests	(UVIFCPTU)	☐
6	Groundwater Sampling	(GWS)	☐
7	Soil Sampling	(SS)	☐
8	Vapor Sampling	(VS)	☐
9	Vane Shear Testing	(VST)	☐
10	SPT Energy Calibration	(SPTE)	☐

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (562) 427-6899.

Sincerely,
GREGG IN SITU, Inc.

Mary Walden
Operations Manager

Bibliography

Campanella, R.G. and I. Weemees, "Development and Use of An Electrical Resistivity Cone for Groundwater Contamination Studies", Canadian Geotechnical Journal, Vol. 27 No. 5, 1990 pp. 557-567.

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Zemo, D.A., T.A. Delfino, J.D. Gallinatti, V.A. Baker and L.R. Hilpert, "Field Comparison of Analytical Results from Discrete-Depth Groundwater Samplers" BAT EnviroProbe and QED HydroPunch, Sixth national Outdoor Action Conference, Las Vegas, Nevada Proceedings, 1992, pp 299-312.

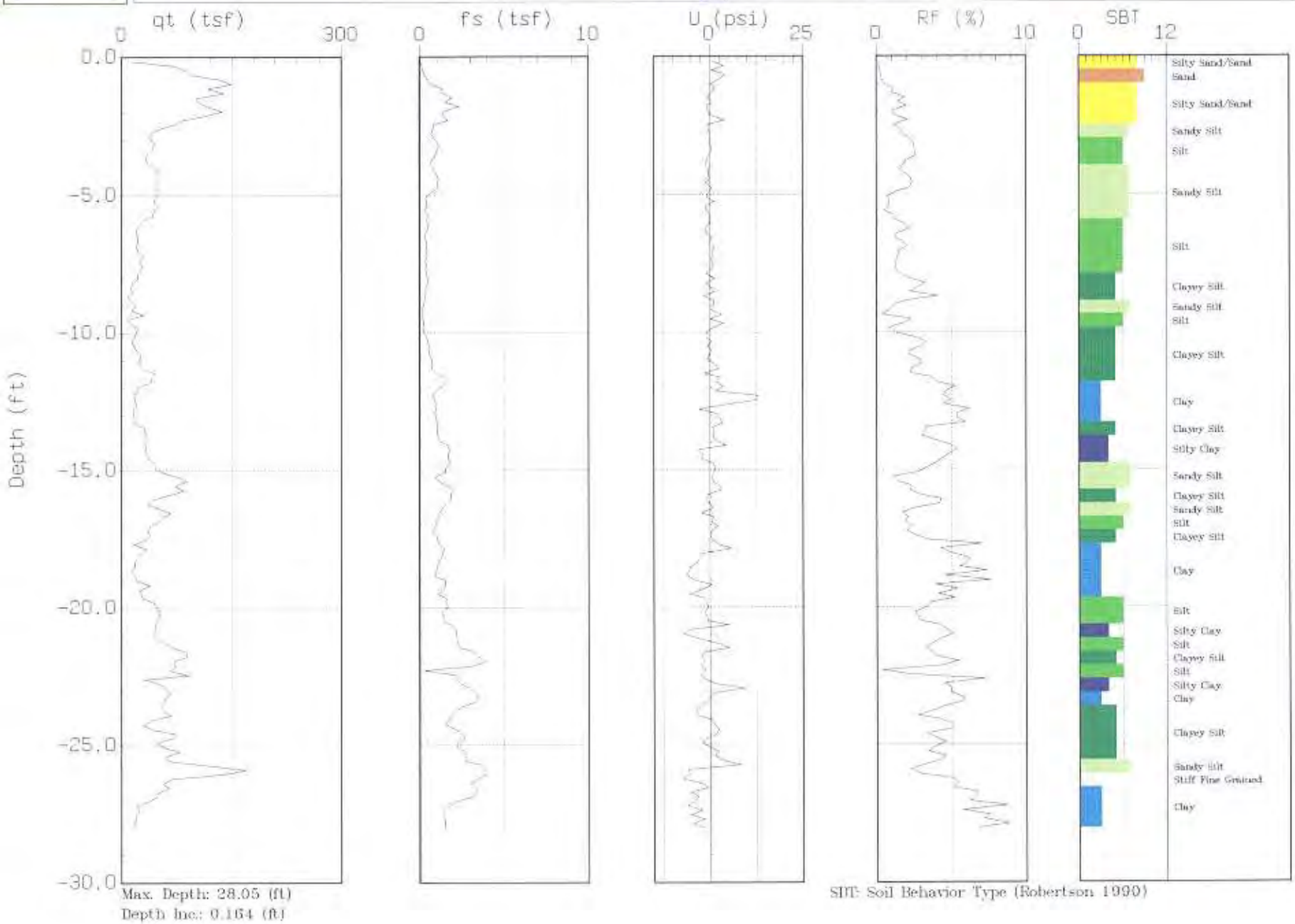
Copies of ASTM Standards are available through www.astm.org

~~SOUTH~~ NW ABUT

GREGG

EARTH MECHANICS

Site: HWY 101 ROUTE 84
Location: B-1 04-13
Engineer: J. CASTLE
Date: 06:11:04 15:32



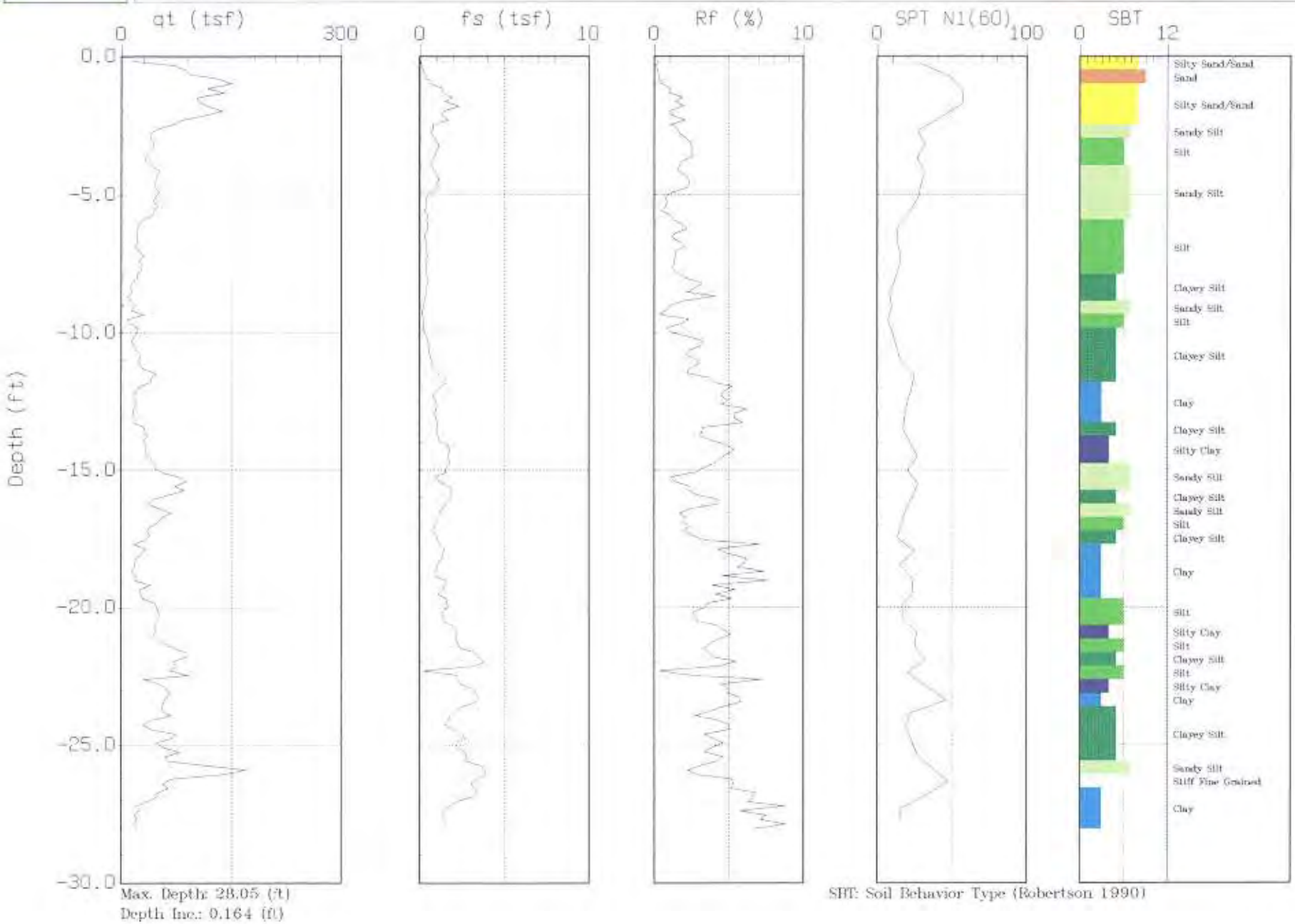
Max. Depth: 28.05 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

EARTH MECHANICS

Site: HWY 101/ROUTE 84 04-13
Location: ~~B-2~~ B-1
Engineer: J. CASTLE
Date: 06:11:04 15:32



Max. Depth: 28.05 (ft)
Depth Inc.: 0.164 (ft)

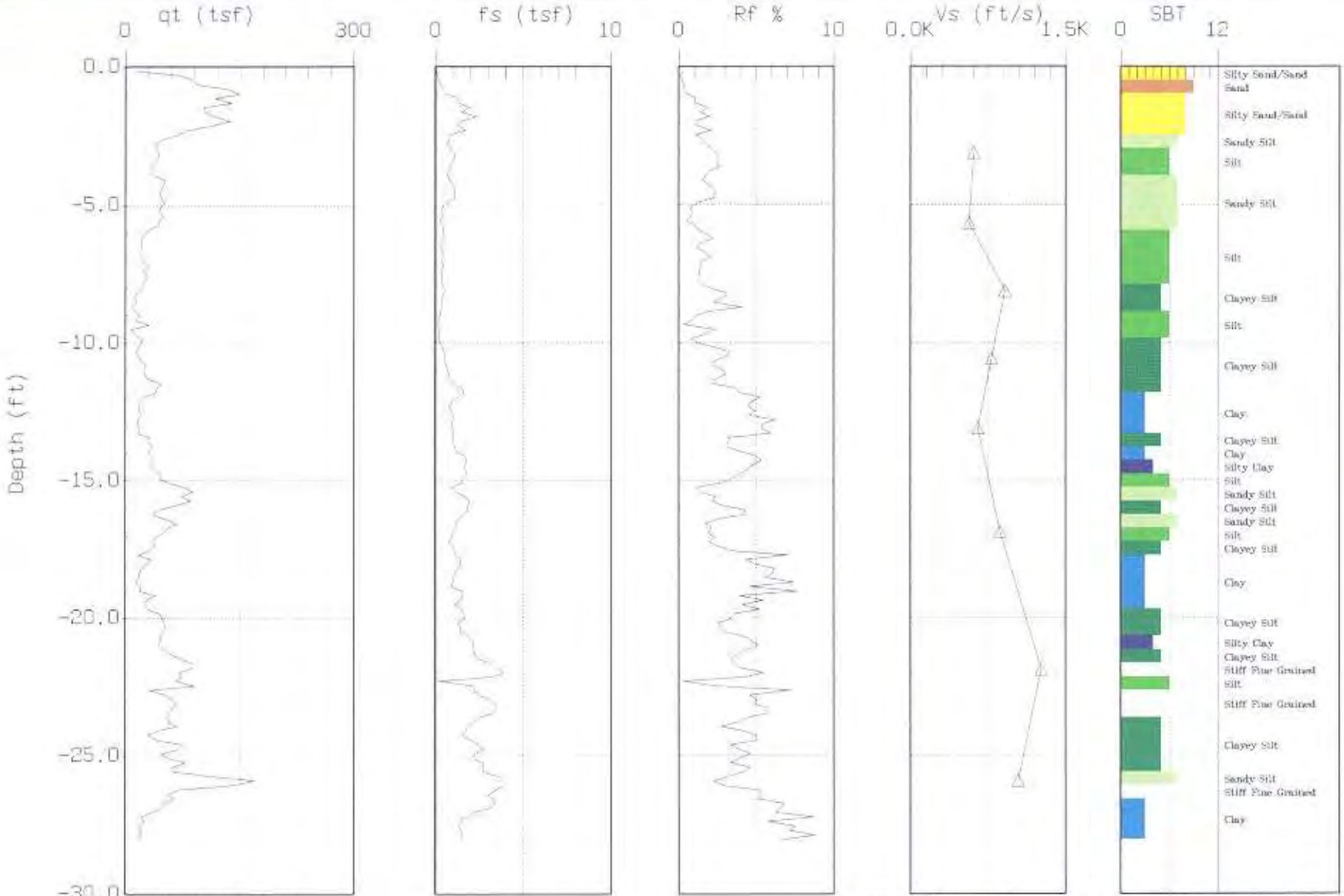
SBT: Soil Behavior Type (Robertson 1990)

GREGG

EARTH MECHANICS

Site: HWY 101/ROUTE 84
Location: ~~B-2~~ B-1 04-13

Engineer: J. CASTLE
Date: 06:11:04 15:32



Max. Depth: 28.05 (ft)

Depth Inc.: 0.164 (ft)

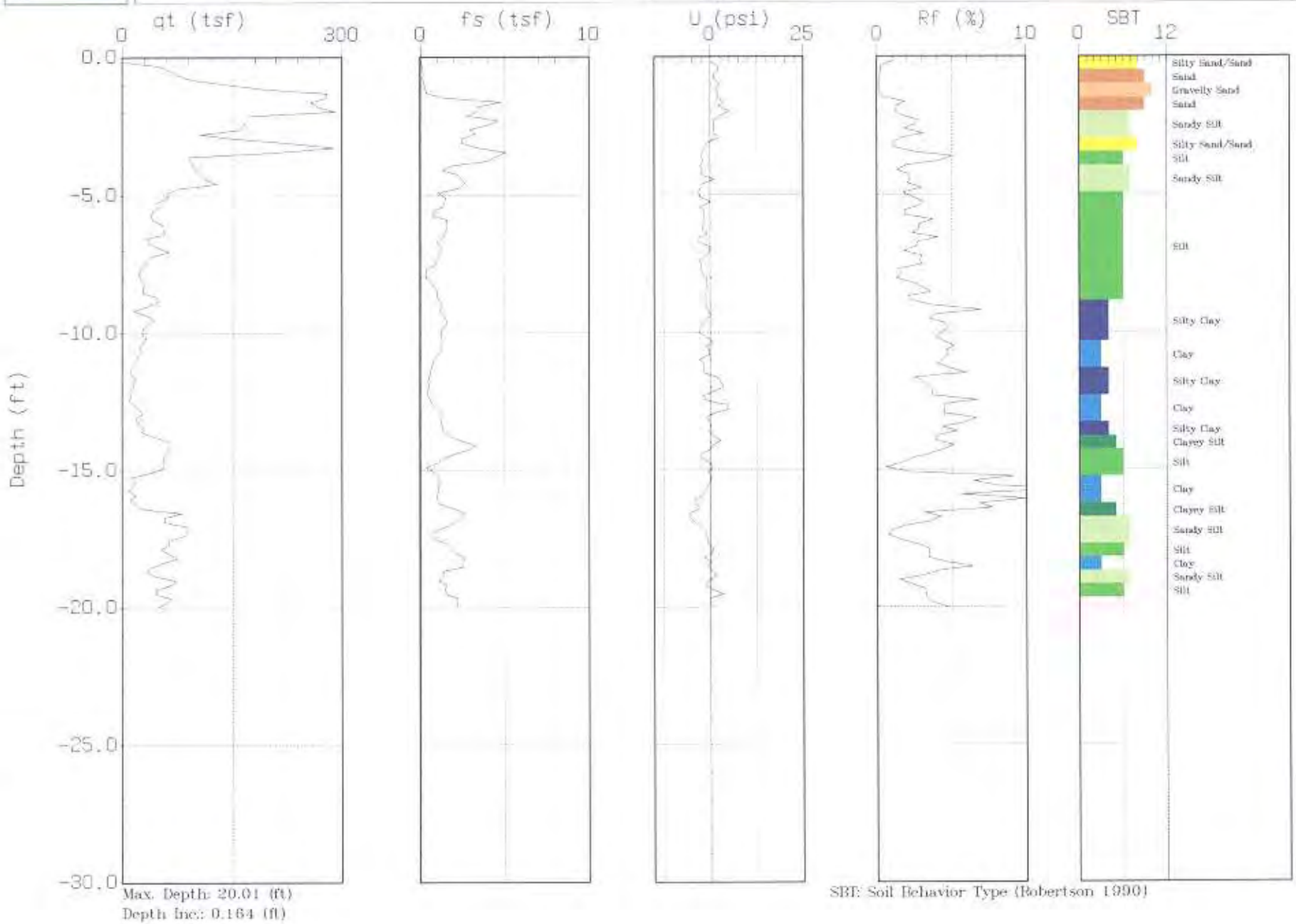
SBT: Soil Behavior Type (Robertson and Campanella 1988)

NE ABUT

GREGG

EARTH MECHANICS

Site: HWY 101 - ROUTE 84
Location: (B-1) B-3 04-14
Engineer: J. CASTLE
Date: 06:11:04 14:36



Max. Depth: 20.01 (ft)
Depth Inc: 0.164 (ft)

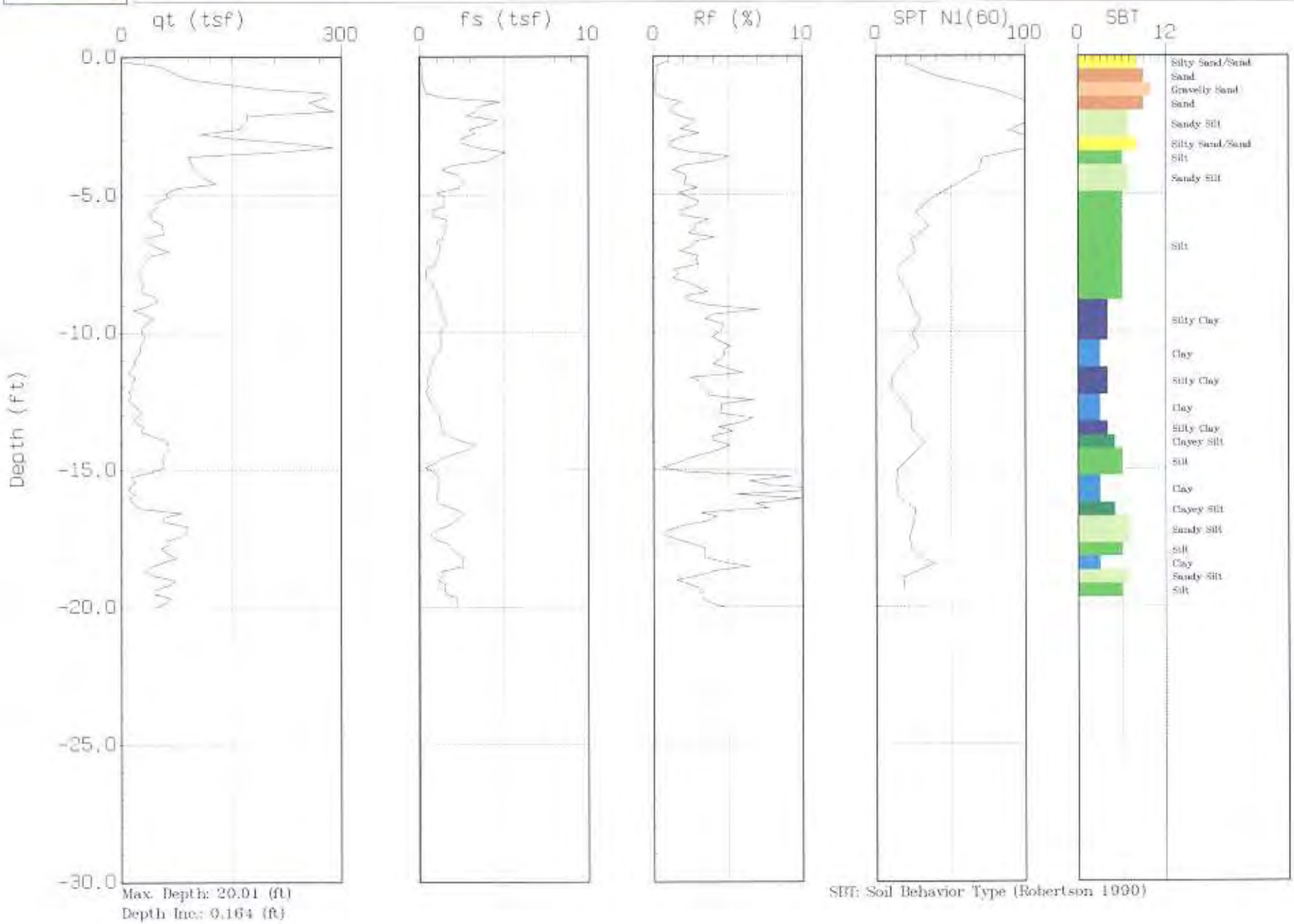
SBT: Soil Behavior Type (Robertson 1990)

GREGG

EARTH MECHANICS

Site: Hwy 101/ROUTE 84
Location: ~~B-1~~ B-3 04-14

Engineer: J. CASTLE
Date: 06:11:04 14:36



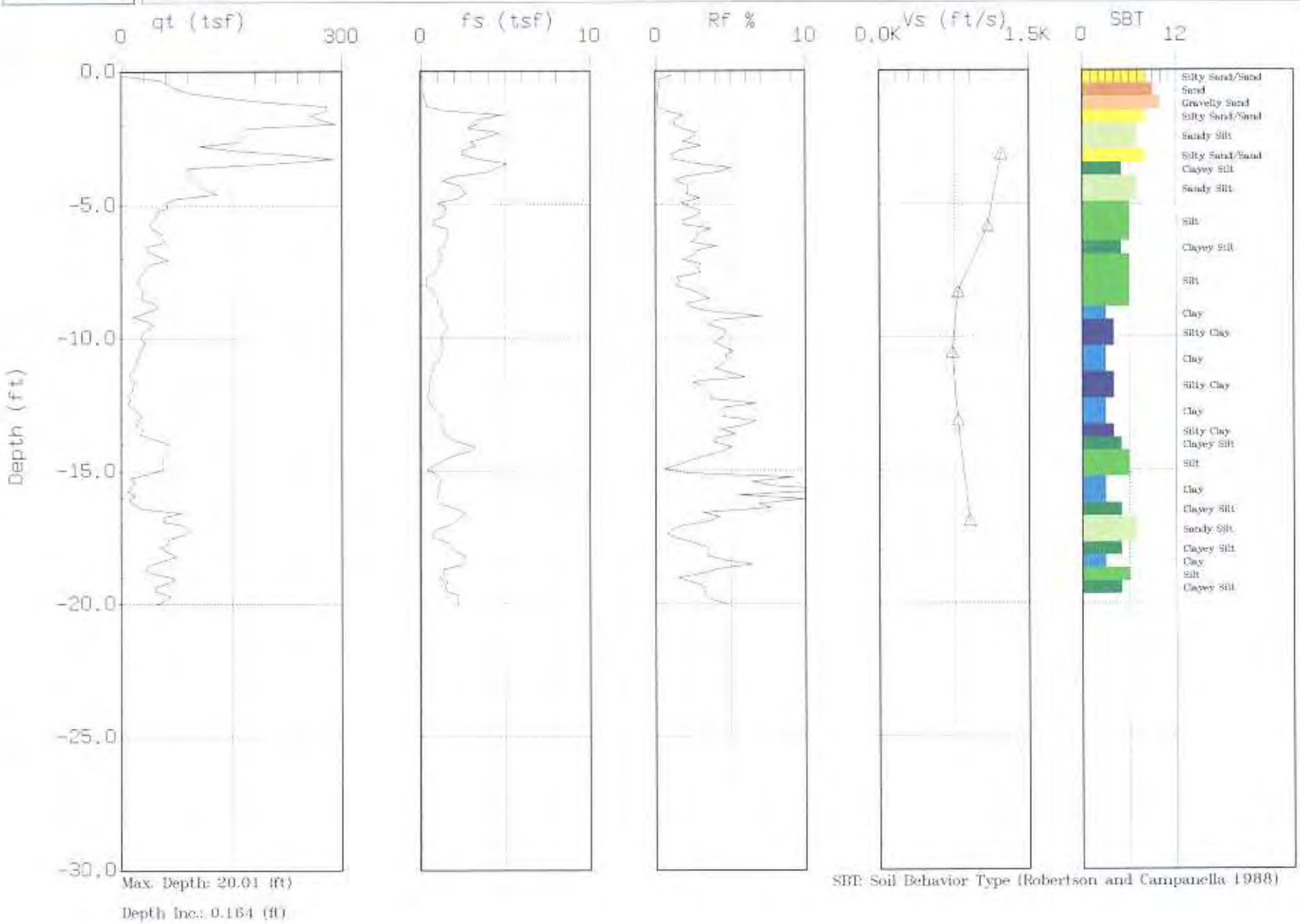
Max. Depth: 20.01 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)

GREGG

EARTH MECHANICS

Site: HWY 101/ROUTE 84 04-14
Location: B-3
Engineer: J. CASTLE
Date: 06:11:04 14:36



Max. Depth: 20.01 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

APPENDIX CPT

Cone Penetration Testing Procedure (CPT)

Gregg In Situ, Inc. carries out all Cone Penetration Tests (CPT) using an integrated electronic cone system, *Figure CPT*. The soundings were conducted using a 20 ton capacity cone with a tip area of 15 cm^2 and a friction sleeve area of 225 cm^2. The cone is designed with an equal end area friction sleeve and a tip end area ratio of 0.85.

The cone takes measurements of cone bearing (q_c), sleeve friction (f_s) and dynamic pore water pressure (u_2) at 5-cm intervals during penetration to provide a nearly continuous hydrogeologic log. CPT data reduction and interpretation is performed in real time facilitating on-site decision making. The above mentioned parameters are stored on disk for further analysis and reference. All CPT soundings are performed in accordance with revised (2002) ASTM standards (D 5778-95).

The cone also contains a porous filter element located directly behind the cone tip (u_2), *Figure CPT*. It consists of porous plastic and is 5.0mm thick. The filter element is used to obtain dynamic pore pressure as the cone is advanced as well as Pore Pressure Dissipation Tests (PPDT's) during appropriate pauses in penetration. It should be noted that prior to penetration, the element is fully saturated with silicon oil under vacuum pressure to ensure accurate and fast dissipation.

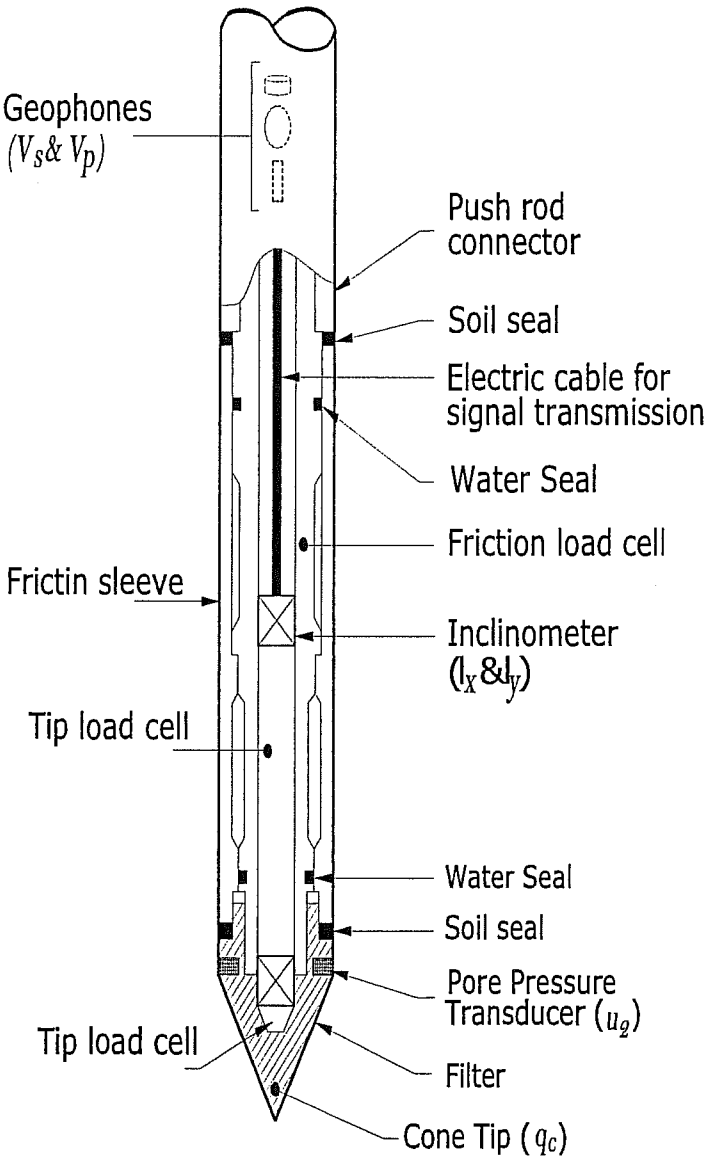


Figure CPT

When the soundings are complete, the test holes are grouted using a Gregg In Situ support rig. The grouting procedure consists of pushing a hollow CPT rod with a "knock out" plug to the termination depth of the test hole. Grout is then pumped under pressure as the tremie pipe is pulled from the hole. Disruption or further contamination to the site is therefore minimized.

Cone Penetration Test Data & Interpretation

Soil behavior type and stratigraphic interpretation is based on relationships between cone bearing (q_c), sleeve friction (f_s), and pore water pressure (u_2). The friction ratio (R_f) is a calculated parameter defined by $100f_s/q_c$ and is used to infer soil behavior type. Generally:
Cohesive soils (clays)

- High friction ratio (R_f) due to small cone bearing (q_c)
- Generate large excess pore water pressures (u_2)

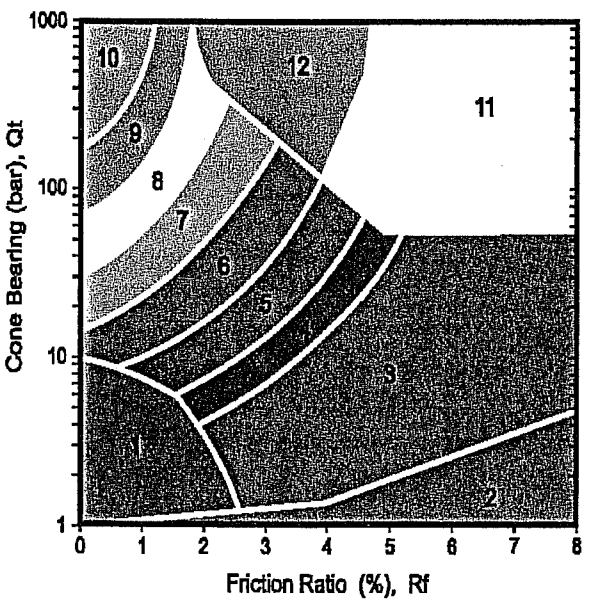
Cohesionless soils (sands)

- Low friction ratio (R_f) due to large cone bearing (q_c)
- Generate very little excess pore water pressures (u_2)

A complete set of baseline readings are taken prior to and at the completion of each sounding to determine temperature shifts and any zero load offsets. Corrections for temperature shifts and zero load offsets can be extremely important, especially when the recorded loads are relatively small. In sandy soils, however, these corrections are generally negligible.

The cone penetration test data collected from your site is presented in graphical form in Appendix CPT. The data includes CPT logs of measured soil parameters, computer calculations of interpreted soil behavior types (SBT), and additional geotechnical parameters. A summary of locations and depths is available in Table 1. Note that all penetration depths referenced in the data are with respect to the existing ground surface.

Soil interpretation for this project was conducted using recent correlations developed by Robertson et al, 1990, *Figure SBT*. Note that it is not always possible to clearly identify a soil type based solely on q_c, f_s, and u_2. In these situations, experience, judgment, and an assessment of the pore pressure dissipation data should be used to infer the soil behavior type.



ZONE	Qt/N	SBT
1	2	Sensitive, fine greained
2	1	Organic materials
3	1	Clay
4	1.5	Silty clay to clay
5	2	Clayey silt to silty clay
6	2.5	Sandy silt to clayey silt
7	3	Silty sand to sandy silt
8	4	Sand to silty sand
9	5	Sand
10	6	Gravely sand to sand
11	1	Very stiff fine grained*
12	2	Sand to clayey sand*

*over consolidated or cemented

Figure SBT

Cone Penetration Test Sounding Summary

-Table 1-

CPT Sounding Identification	Date	Termination Depth (Feet)	Number of Groundwater Samples	Number of Soil Samples	Depth of Pore Pressure Dissipation Tests
B-1	6/11/04	20	-	-	-
B-2	6/11/04	28	-	-	-

04-14
04-13

264

APPENDIX SEISMIC

Seismic Cone Penetrometer Testing
(SCPTu)

Gregg In Situ, Inc. uses a modified CPT cone that contains a built in seismometer to measure compression and shear wave velocities in addition to the standard piezocone parameters (q_c, f_s, and u_2). Therefore, four independent readings are compiled with depth in a single sounding. The standard CPT parameters are recorded continuously while the seismic test is usually performed at 5-foot intervals.

Shear waves are generated by striking a seismic beam coupled to the ground surface by a hydraulic cylinder under the CPT rig, *Figure SCPTu*. Compression waves are generated by striking an auger in the ground. The sledgehammer that strikes the beam/auger acts as a trigger, initiating the recording of the seismic wave trace. Before measurements are taken, the rods are decoupled from the CPT rig to prevent energy transmission down the rods.

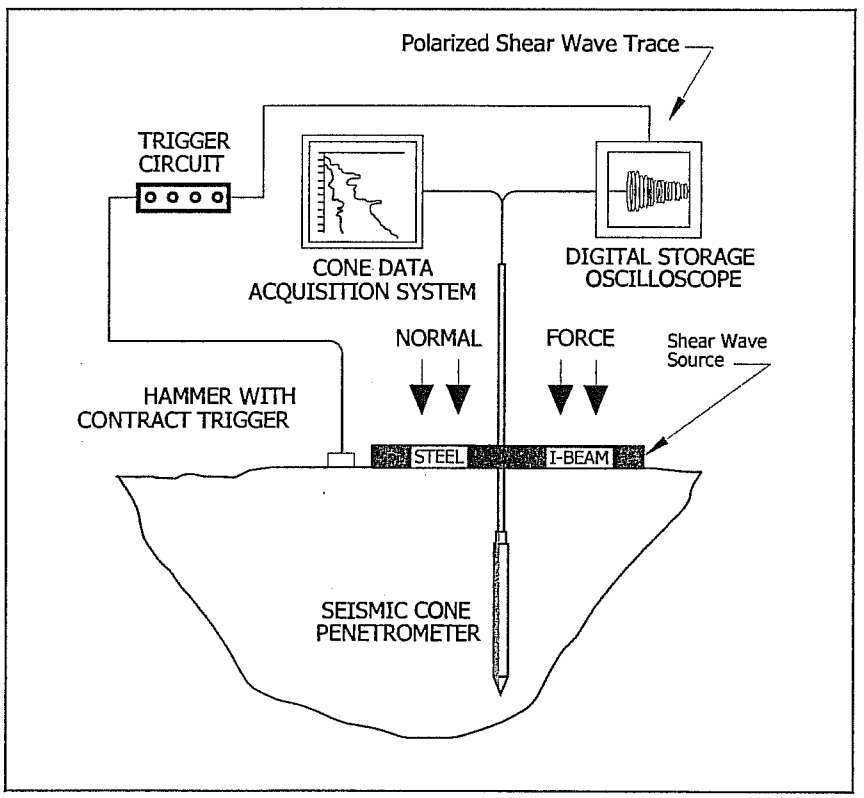


Figure SCPTu

Geophones in the body of the piezocone recognize the arriving waves generated at the ground surface, *Figure Seismic*. Any waves received by the geophones on the cone penetrometer are sent back up to the truck to be displayed on an oscilloscope. On site software then plots the wave amplitude versus time to calculate wave velocities.

At least two waves are recorded for each test depth so the operator can check consistency of the waveforms. Shear wave data is sampled at a frequency of 20kHz (20,000 samples per second) and compression wave data is sampled at 50kHz (50,000 samples per second). To maintain a desired signal resolution, the input sensitivity (gain) is increased with depth.

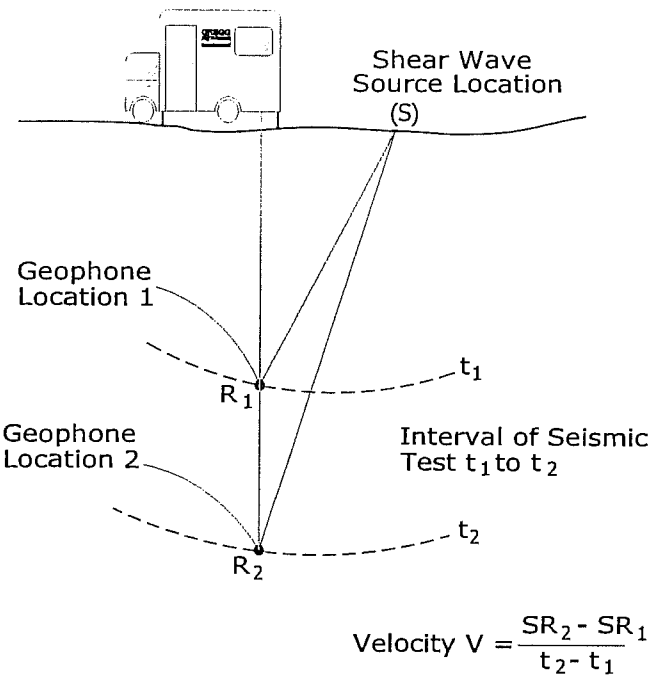


Figure Seismic

Offset distances of the beam from the cone and the location of the geophone are all taken into account in calculations.

The shear wave velocity (V_s) provides information about small-strain stiffness while the penetration data provides information about large-strain failures. From interval shear wave velocity (V_s) and the mass density (ρ) of a soil layer, the dynamic shear modulus (G_o) of the soil can be calculated in a specific depth interval. The dynamic shear modulus (G_0) is a key parameter for the analysis of soil behavior in response to dynamic loading from earthquakes, ice, vibrating machine foundations, waves and wind.

A summary of the data collected including the depth and location identification is displayed in Table 1 and graphical formats and can be found with the corresponding CPT plot.

For a detailed reference on seismic CPT, refer to Robertson et. al., 1986.

GIS Project No: 04-202MA
Client: Earth Mechanics
Site: Highway 101 & Route 84
Location B-2 04-13
Sounding Date: June 11, 2004

Shear Wave Velocity Calculations

Geophone Offset	(feet)	0.66
Source Offset	(feet)	2.50

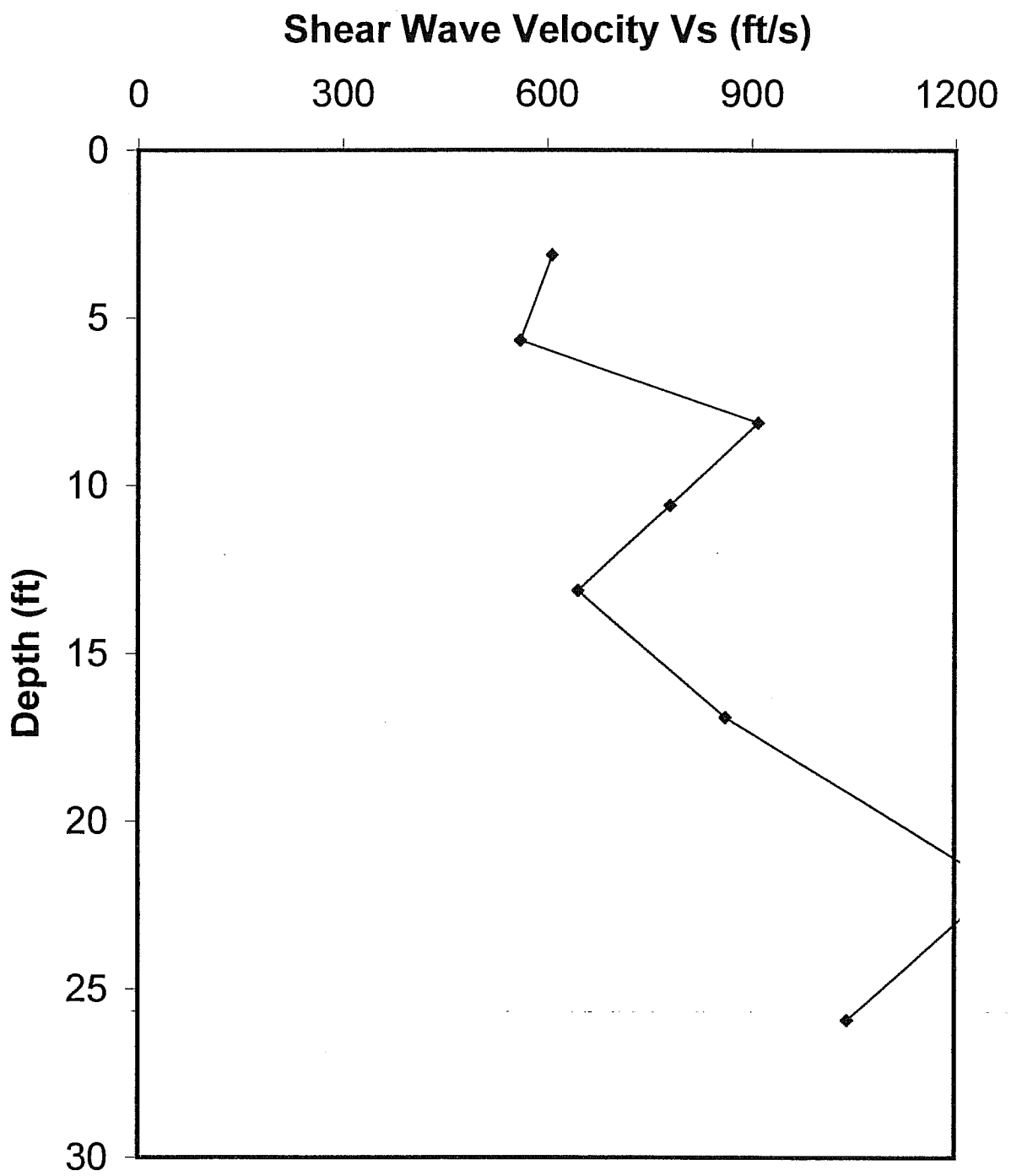
Test Depth (feet)	Geophone Depth (feet)	Ray Path (feet)	Incremental Distance (feet)	Time Interval (ms)	Interval Velocity (ft/s)	Interval Depth (feet)	Interval Depth (feet)	Vs (ft/s)	Vs (m/s)	Interval Depth (m)
2.46	1.80	3.08								
5.08	4.42	5.08	2.00	3.29	607	3.11	3.11	607	185	0.95
7.54	6.88	7.32	2.24	4.00	561	5.65	5.65	561	171	1.72
10.00	9.34	9.67	2.35	2.58	910	8.11	8.11	910	277	2.47
12.46	11.80	12.07	2.39	3.06	782	10.57	10.57	782	238	3.22
15.09	14.43	14.65	2.58	3.99	647	13.12	13.12	647	197	4.00
20.01	19.35	19.51	4.87	5.64	863	16.89	16.89	863	263	5.15
25.09	24.43	24.56	5.05	3.99	1265	21.89	21.89	1265	386	6.67
28.04	27.38	27.50	2.94	2.82	1041	25.91	25.91	1041	317	7.90

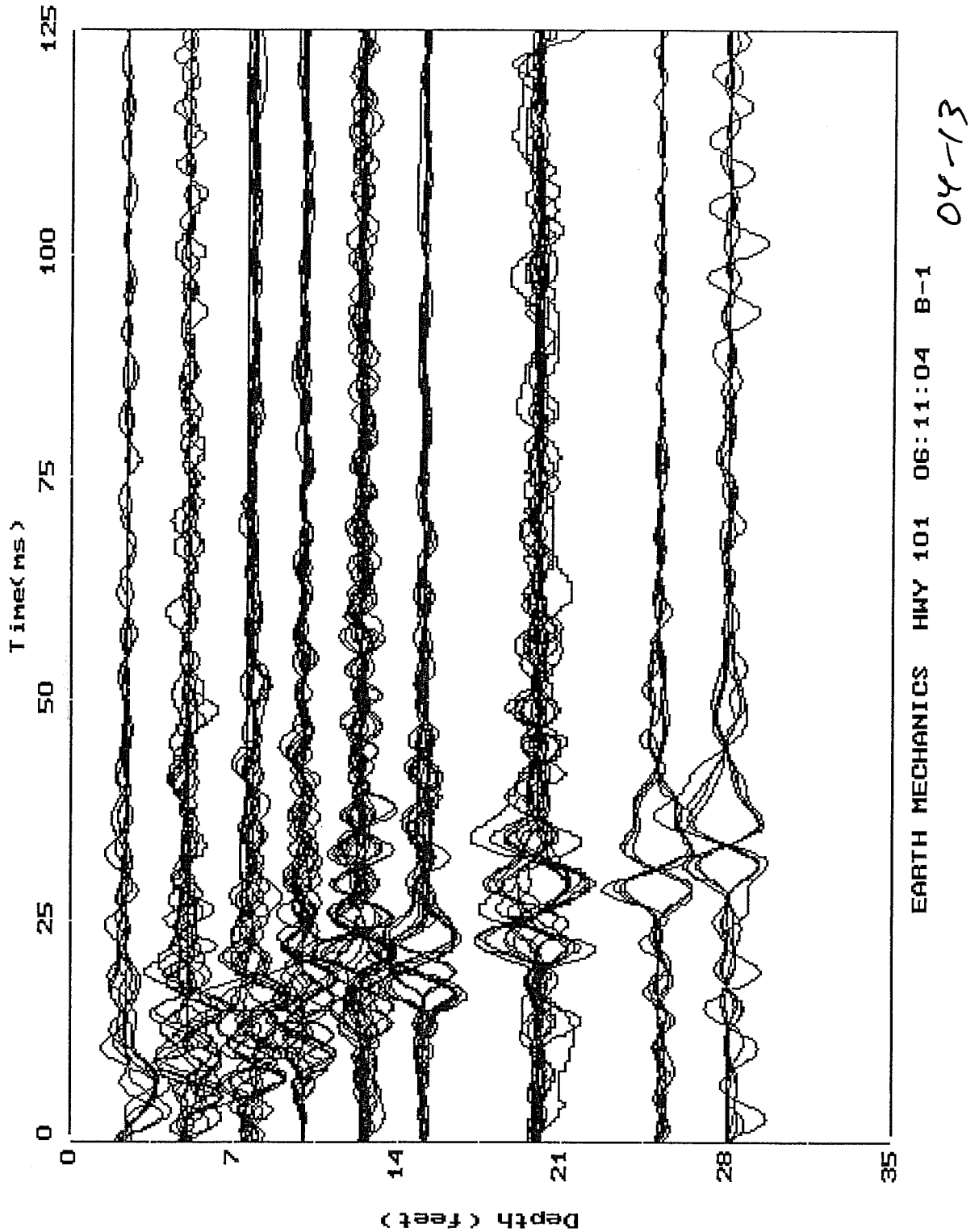
Shear Wave Velocity Profile

GREGG

Client: 04-202ma - Earth Mechanics
Site: Highway 101 & Route 84
Location: B-2
Sounding Date: June 11, 2004

04-13C




Time(ms)
0
25
50
75
100
125
Depth (feet)
0
7
14
21
28
35
EARTH MECHANICS HWY 101 06:11:04 B-1
04-13

GREGG

GIS Project No: 04-202MA
Client: Earth Mechanics
Site: Highway 101 & Route 84
Location B-1
Sounding Date: June 11, 2004

04-14C

Shear Wave Velocity Calculations

Geophone Offset	(feet)	0.66
Source Offset	(feet)	2.50

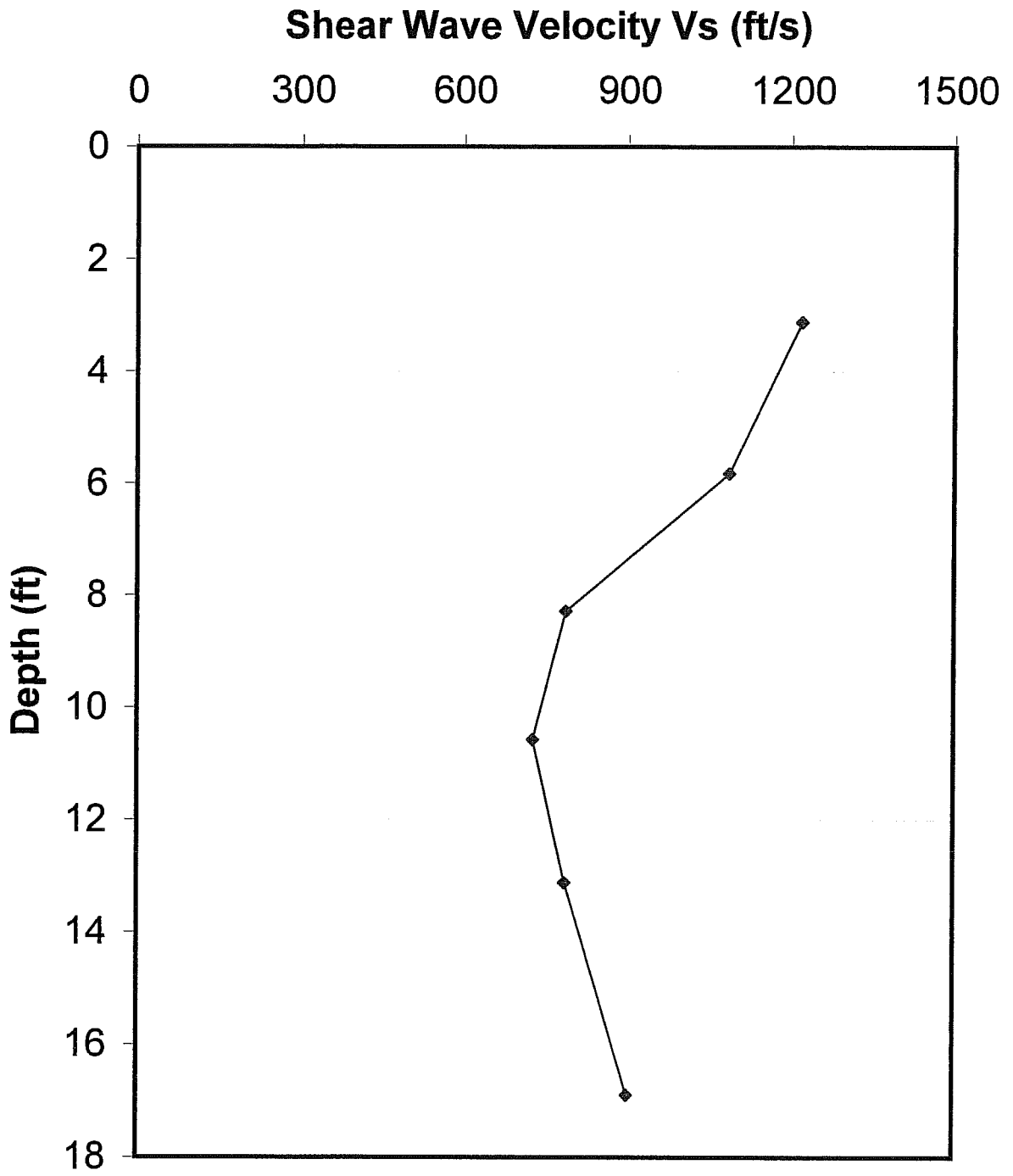
Test Depth (feet)	Geophone Depth (feet)	Ray Path (feet)	Incremental Distance (feet)	Time Interval (ms)	Interval Velocity (ft/s)	Interval Depth (feet)	Interval Depth (feet)	Vs (ft/s)	Vs (m/s)	Interval Depth (m)
2.46	1.80	3.08								
5.08	4.42	5.08	2.00	1.64	1219	3.11	3.11	1219	371	0.95
7.87	7.21	7.63	2.55	2.35	1087	5.82	5.82	1087	331	1.77
10.00	9.34	9.67	2.04	2.59	787	8.28	8.28	787	240	2.52
12.46	11.80	12.07	2.39	3.29	727	10.57	10.57	727	222	3.22
15.09	14.43	14.65	2.58	3.29	785	13.12	13.12	785	239	4.00
20.01	19.35	19.51	4.87	5.40	901	16.89	16.89	901	275	5.15

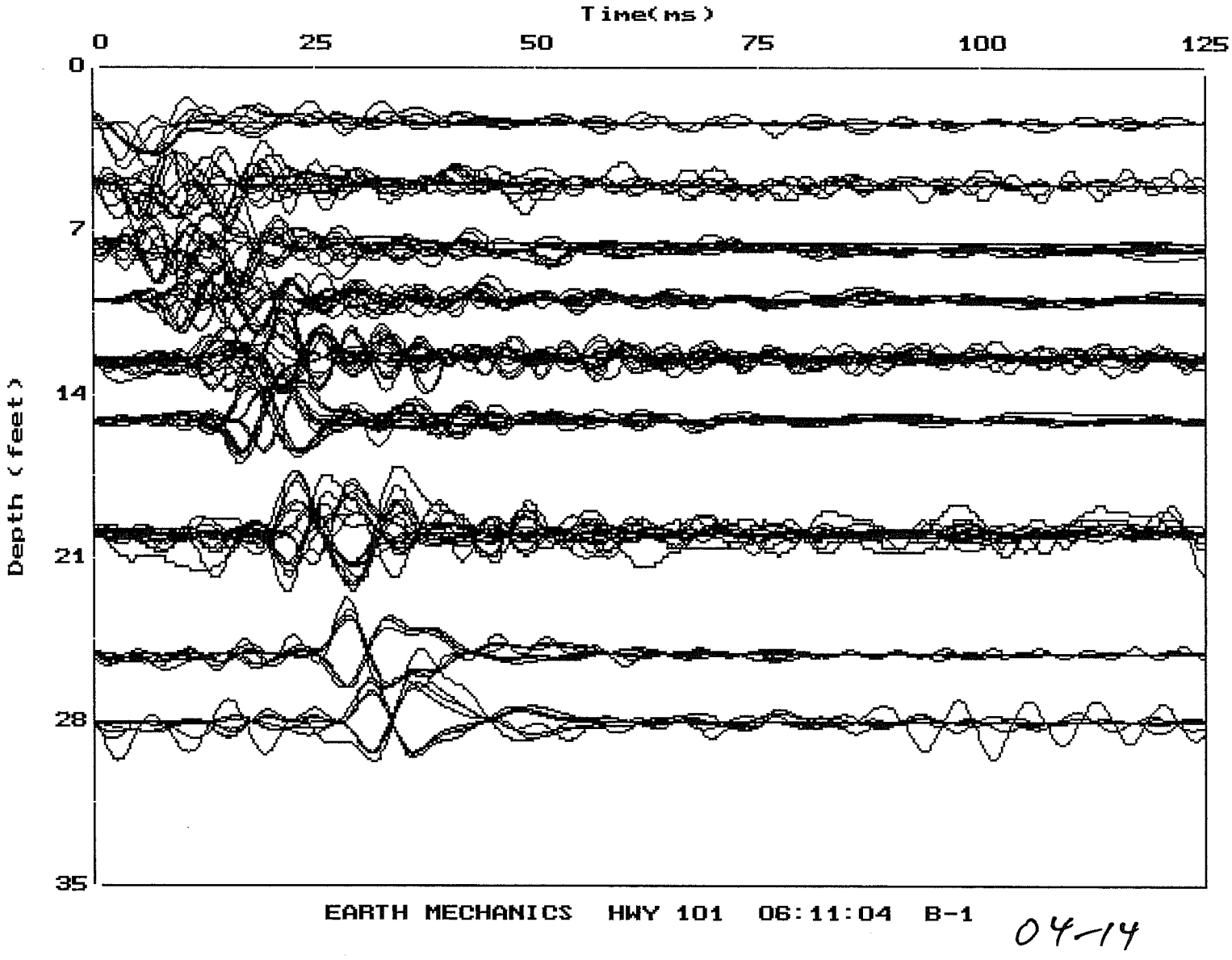
Shear Wave Velocity Profile

GREGG

Client: 04-202ma - Earth Mechanics
Site: Highway 101 & Route 84
Location: B-1
Sounding Date: June 11, 2004

04-14C




Time(ms)
0
25
50
75
100
125
0
7
14
21
28
35
Depth (feet)
EARTH MECHANICS HWY 101 06:11:04 B-1
04-14

Caltrans Bridge 04-0236
Painter St. Bridge, Humboldt Co.

Caltrans Bridge 04-0236, Painter St Bridge, Humboldt Co.

Painter St. is one of the Caltrans bridges that are seismically instrumented and focus of numerous research studies. The field investigation for the Painter Street Bridge, conducted on 6/30/04 and 7/01/04, consisted of 2 soil borings (04-15A and 04-16A), 2 PMT borings (04-15P and 04-16P), and 2 CPT (04-15C/D and 04-16C). Soil and PMT borings were drilled by PC Exploration of Rocklin. CPT's were performed by Gregg Drilling of Martinez. Locations 04-15x were located on the west bridge abutment in the east-bound lane, near the approach slab and locations 04-16x were located on the west bridge abutment, in the east-bound lane, also near the approach slab.

Geotechnical soil sampling consisted of ring samples collected using a Modified California sampler and small bulk samples collected with a SPT sampler. Samples were taken at 2.5-ft intervals. No groundwater was encountered during the investigation. One pressuremeter test was performed in each boring.

6-30-04, Painter St Bridge, view to NE

6-30-04, Painter St Bridge, view to W. Gregg CPT truck

6-30-04, Painter St Bridge, West Abutment.
First CPT attempt, 04-15, refusal at 9.5' depth.

6-30-04, Painter St Bridge, West Abutment.
Second CPT attempt, 04-15C, completed to 14.5'

6-30-04, Painter St Bridge,
Gregg Drilling CPT truck
Powder-Free
Ansell

6-30-04, Painter St Bridge, West Abutment.
First CPT attempt, 04-15, refusal at 9.5' depth.

6-30-04, Painter St Bridge, East Abutment
First CPT attempt, 04-16, two feet behind abutment,
refusal at 2' depth. Moved to 04-16c, five feet behind abutment
04-16

6-30-04, Painter St Bridge, East Abutment
First CPT attempt, 04-15, two feet behind abutment,
refusal at 9.5' depth. Moved to 04-15C, four feet behind abutment

7-1-04, Painter St Bridge, West Abutment
PC Exploration drilling 04-15A soil sampling

7-1-04, Painter St, West Abutment
PC Exploration Drilling 04-15A

7-1-04, Painter St, West Abutment
PC Exploration Drilling 04-15A

7-1-04, Painter St, West Abutment
Saverio Siciliano preparing pressuremeter

7-1-04, Painter St, West Abutment
PMT boring 04-15D

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
01	Hum	101	R51.5/R53.9	129	10

Abel J. Carreira
REGISTERED CIVIL ENGINEER

DATE APPROVED November 19, 1977

Sta. 16+50.00 BVC
E 128.00

+4.30%

700 V.C.
Rate of Change = +1.11%/Station

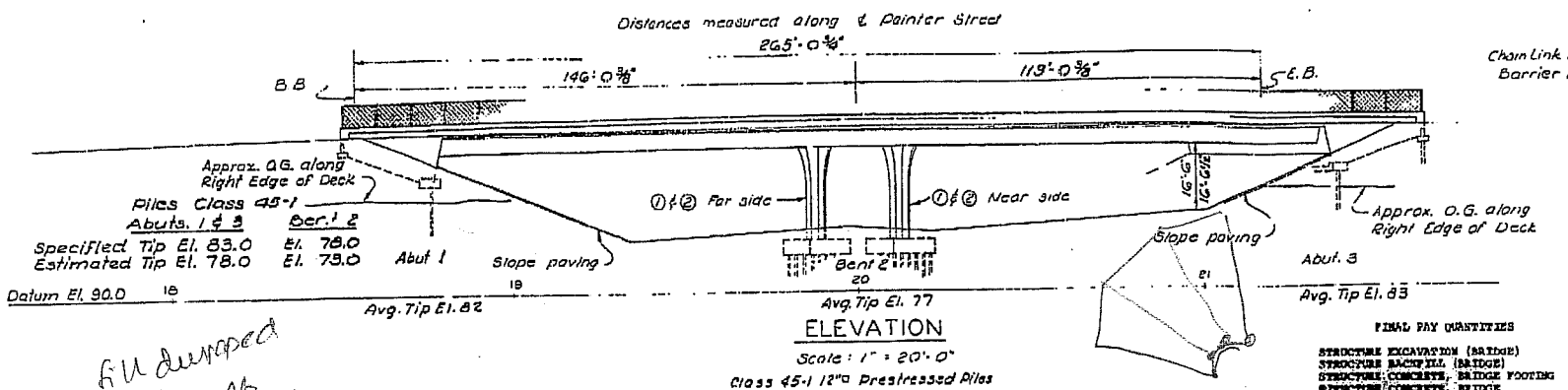
Sta. 23+50.00 E.V.C.
El. 128.70

-3.80%

PROFILE GRADE

No Scale

Distances measured along ℄ Painter Street



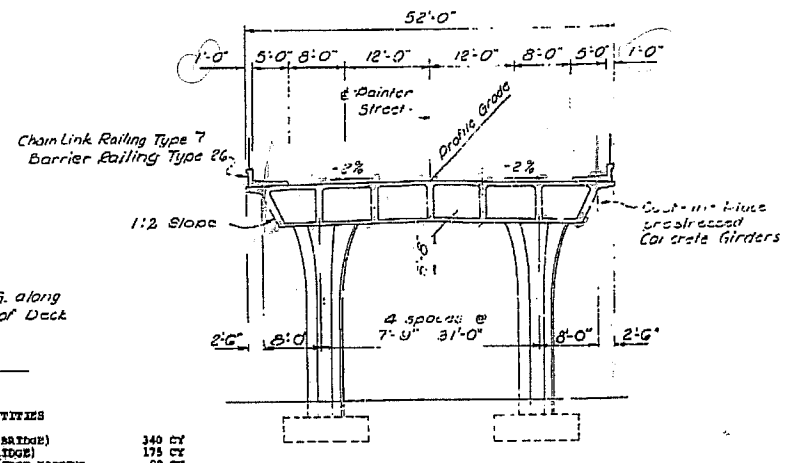
ELEVATION

Scale : 1" = 20'-0"

Class 45-1 12"ø Prestressed Piles

FINAL PAY QUANTITIES

STRUCTURE EXCAVATION (BRIDGE)	340 CY
STRUCTURE BACKFILL (BRIDGE)	175 CY
STRUCTURE CONCRETE, BRIDGE FOOTING	88 CY
STRUCTURE CONCRETE, BRIDGE	230 CY
CAST-IN-PLACE PRESTRESSED CONCRETE (GRADE 35-50)	1,025 CY
BAR REINFORCING STEEL (BRIDGE)	225,000 LB



TYPICAL SECTION

Scale : 1" = 10'-0"

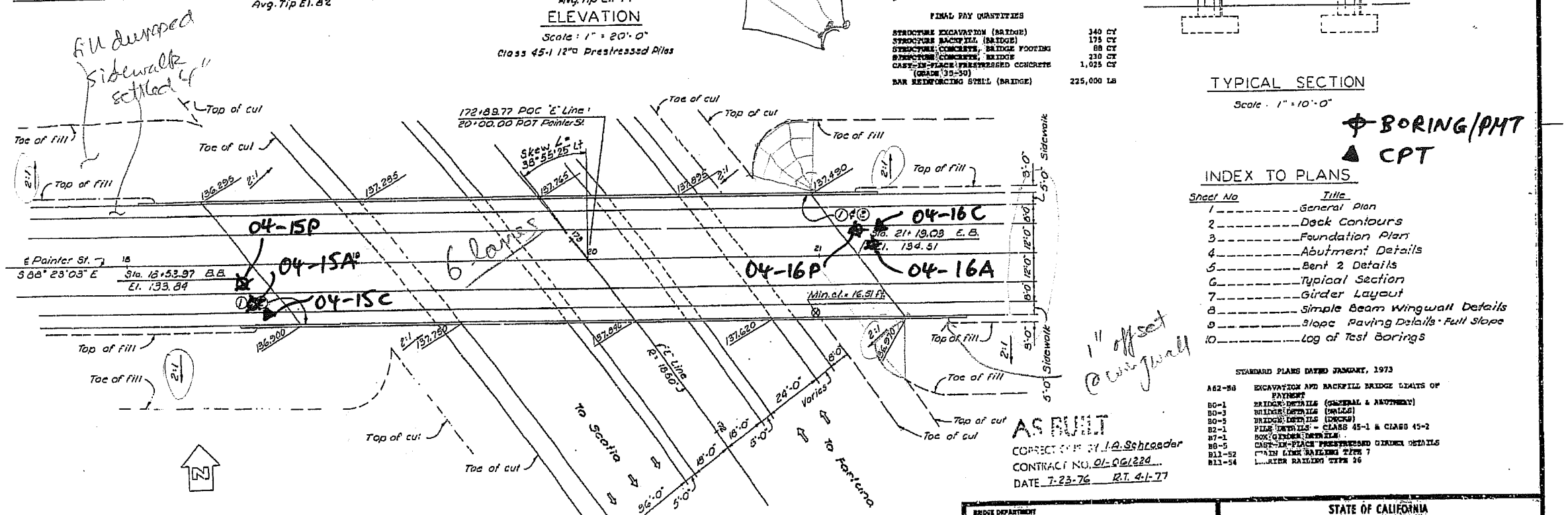
BORING/PMT
CPT

INDEX TO PLANS

Sheet No	Title
1	General Plan
2	Deck Contours
3	Foundation Plan
4	Abutment Details
5	Bent 2 Details
6	Typical Section
7	Girder Layout
8	Simple Beam Wingwall Details
9	Slope Paving Details - Full Slope
10	Log of Test Borings

STANDARD PLANS DATED JANUARY, 1973

A62-B8	EXCAVATION AND BACKFILL BRIDGE DEATS OF PAYMENT
B0-1	BRIDGE DETAILS (GENERAL & ABUTMENT)
B0-3	BRIDGE DETAILS (PILES)
B0-5	BRIDGE DETAILS (DECK)
B2-1	PILE DETAILS - CLASS 45-1 & CLASS 45-2
B7-1	BOX GIRDER DETAILS
B8-5	CAST-IN-PLACE PRESTRESSED GIRDER DETAILS
B11-52	CHAIN LINK RAILING TYPE 7
B11-54	BARRIER RAILING TYPE 26



PLAN

Scale : 1" = 20'-0"

APPROXIMATE QUANTITIES

FURNISH PILING (CLASS 45-1)	2,460 LF
DRIVE PILE (CLASS 45)	70 EA
PRESTRESSING CAST-IN-PLACE CONCRETE	LUMP SUM
WATERSTOP	35 LF
STRIP WATERSTOP	60 LF
8" PERFORATED STEEL PIPE UNDERDRAIN (.064" THICK)	116 LF
CLASS 1 PERMEABLE MATERIAL (BRIDGE)	30 CY
8" CORRUGATED STEEL PIPE DOWNDRAIN (.064" THICK)	92 LF
SLOPE PAVING (CONCRETE)	69 CY
CHAIN LINK RAILING (TYPE 7)	635 LF

⊗ Point of minimum vertical clearance.
① Point Bridge No. 4-236 ℄ year constructed.
② Point "Painter Street Overcrossing".

FOR GENERAL NOTES SEE "Deck Contours" sheet

LIVE LOADING HS20-44 AND ALTERNATIVE

AS BUILT
CORRECTED BY I.A. Schroeder
CONTRACT NO. 01-061224
DATE 7-23-76 R.T. 4-1-77

BRIDGE DEPARTMENT
DESIGN SECTION 6
Section Engineer Charles Sholes
Project Designer P.N. Olson 10-73

DESIGN	M. Nelson 3/10	Checked	P.N.O'Olson
DETAILS	M. W. Chee 2-69	Checked	P.N.O'Olson
LAYOUT	M. Nelson 3/10	Checked	P.N.O'Olson
QUANTITIES	M. Z. Zaccarini 9/11	Checked	R.Green
SPECIFICATIONS	M. Reed 11/73	Checked	R.B.R 11/73
Approved for Contract	M.G. Gardner	Date	7-23-76

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAINTER STREET OVERCROSSING

LOCATED IN THE CITY OF RIO DELL IN HUMBOLDT COUNTY

GENERAL PLAN

BRIDGE NO.	POST MILE	DRAWING NO.	SHEET	OF
04-236	53.2	04236-1	1	10

WO 051221
CU 01201

Changed plans bearing earlier revision dates →

1/10	5/10	7/10	8/10	9/10	10/10

AS BUILT PLANS
Contract No. 01-061224
Date Completed
Document No. 1000 2617

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.

DATE 10-6-78 SIGNATURE Joseph M. Roth TITLE Supervisor of Microfilm

MICROFILMED OCT 6 1978

129

283

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
1	HUM	101	R51.5/R53.9	131	150

DESIGN SERVICES — REGISTERED CIVIL ENGINEER — DATE APPROVED November 19, 1973

18G+68.24 EC

"E" LINE R = 1850'

TO FORTUNA

Fr Gar

1 St Fr

18+54.51 ℄ Abut 1

℄ Abut 1 S 37°18'28" E

Dirt Dr

Timb Br

WWLOL S 88°23'03" E

Wescott Pl.

Dirt

Timb Br

℄ Bent 2 S 37°18'28" E

174'

20+00.00 POT Painter St.
172+89.77 POC "E" Line

1 St Fr

2 St Fr

21+18.49 ℄ Abut 3

℄ Abut 3 S 37°18'28" E

WWLOL S 88°23'03" E

Dirt Dr

Δ H-1-E 025

"P" Line = ℄ Painter Street
S 88° 23' 03" E

10" Sewer MH

102.0

121.5

PAINTER ST (AC)

2 HV. - 2 LV.

S 88°23'03" E WWLOL

S 88°23'03" E WWLOL

Dirt 2

Radial Bearing S 52° 41' 32" W

1 St Fr

"P" 20+00.00 POT
172+89.77 POC

"E" Line
R = 1850'
Δ = 69°32'00"
T = 1284.13
L = 2245.13

To Scotia

26'-0" Typical

NO AS BUILT CORRECTION

AS BUILT
CORRECTIONS BY I.A. Schroeder
CONTRACT NO. 01-061224
DATE 8-03-76 R.T. 4-1-77

Indicates bottom footing elevation

PR-4236-1

BM "H-1-E 025
Fd-Std CHC disc 22.5' Lt "E" 175+45
El 116.80

NOTE: 2-Ft Contours

SCALE 1" = 20'
LEVEL DATUM: MSL
FOR ALIGNMENT TIES SEE PR-4236-4
CONTROLS AS OF: October 1968
SITE PLAN: FROM BRIDGE DATA
SURVEY BY: EGG DATE 10-68
DRAWN BY: RBB DATE 11-68
TRACED BY: RBB DATE 11-68

AS BUILT PLANS
Contract No. 01-061224
Date Completed —
Document No. Issued 1977

BRIDGE DEPARTMENT
DESIGN SECTION
Project Engineer P.N. Chiu

DESIGN	By Holmes Yau	Checked P.N. Chiu
DETAILS	By R. Green 4/70	Checked P.N. Chiu
QUANTITIES	By P. Chiu 9/73	Checked R. Green

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAINTER STREET OVERCROSSING

FOUNDATION PLAN

BRIDGE NO.	POST MILE	DRAWING NO.	SHEET	OF
4-236	53.2	℄	8	10

Disregard prints bearing earlier revision dates →

REVISION DATES (PRELIMINARY STAGE ONLY)

WO 061221
CU 01201

131

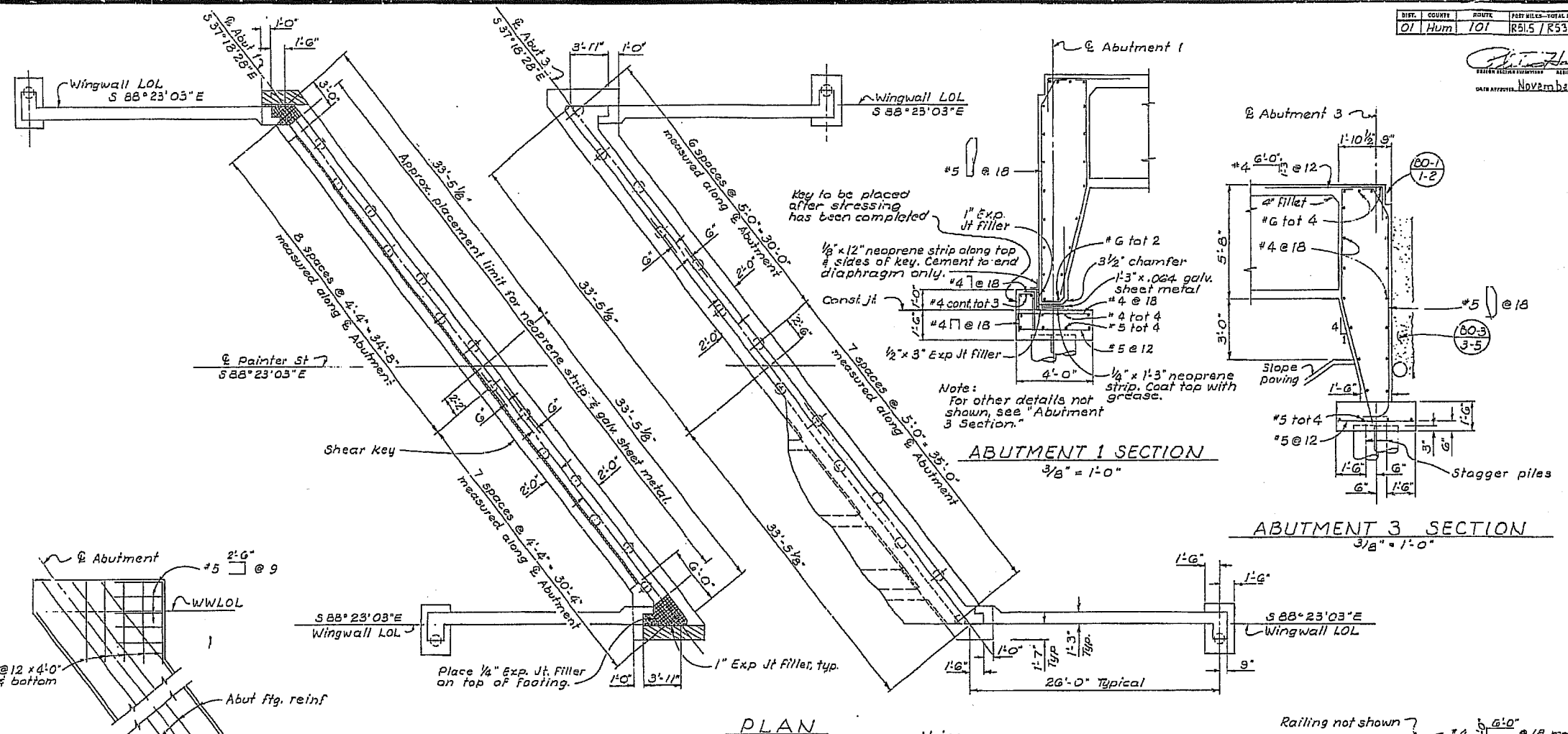
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.

DATE 4/14/77 SIGNATURE Joseph M. Cota TITLE Supervisor

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
01	Hum	101	R51.5 / R53.9	132	150

DESIGN ENGINEER REGISTRATION — REGISTERED CIVIL ENGINEER NO. 16607

DATE APPROVED November 19, 1973



NO AS BUILT CORRECTION

AS BUILT

CORRECTIONS BY I.G. Schroeder

CONTRACT NO. 01-06122d

DATE 8-03-76 R.T. 4-1-77

BRIDGE DEPARTMENT DESIGN SECTION 6		
Project Engineer P.N. Olson		
DESIGN	In Hollister 3/70	
	Checked P.N. Olson	
DETAILS	By R. Green 3/70	
	Checked P.N. Olson	
QUANTITIES	By D. Olivera 7/73	
	Checked R. Green	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAINTER STREET OVERCROSSING

ABUTMENT DETAILS

BRIDGE NO.	POST MILE	DRAWING NO.	SHEET	OF
4-236	53.2		4	10

REVISION DATES (PRELIMINARY STAGE ONLY)

Dimgard prints bearing earlier revision dates →

3/74	2/76	7/76	9/76			

AS BUILT PLANS
Contract No. 01-061224
Date Completed —
Document No. 1000-3617

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.

DATE 7/14/77 SIGNED Joseph M. Cota TITLE Engineer

132

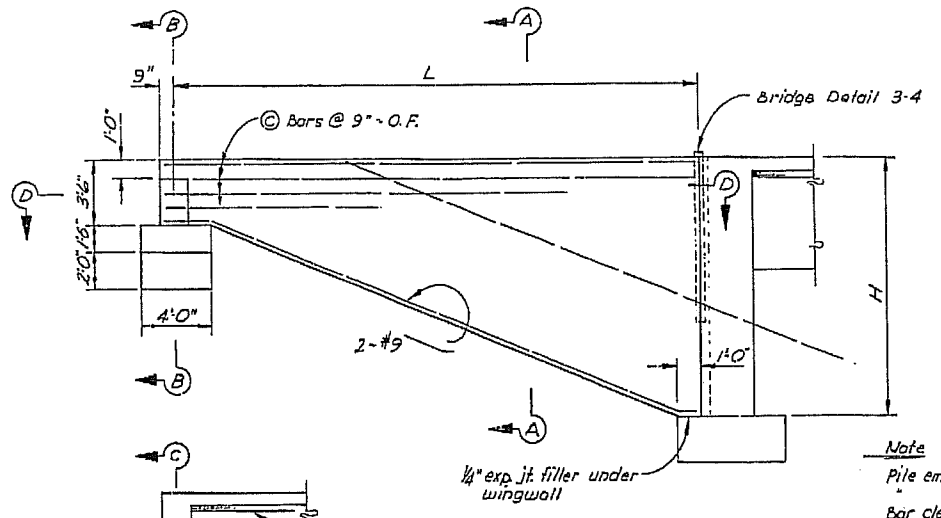
WO
CU

MICROFILM – STATE OF CALIFORNIA – DEPARTMENT OF TRANSPORTATION – MICROFILM
SCALE 1" = 50'
SCALE 1" = 100'
SCALE 1" = 20'
SCALE 1" = 40'

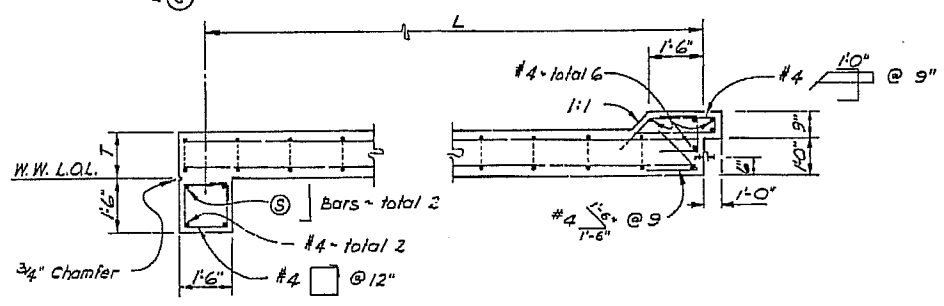
DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
01	Hum	101	R51.5/R93.4	134	150

DATE APPROVED November 14, 1975

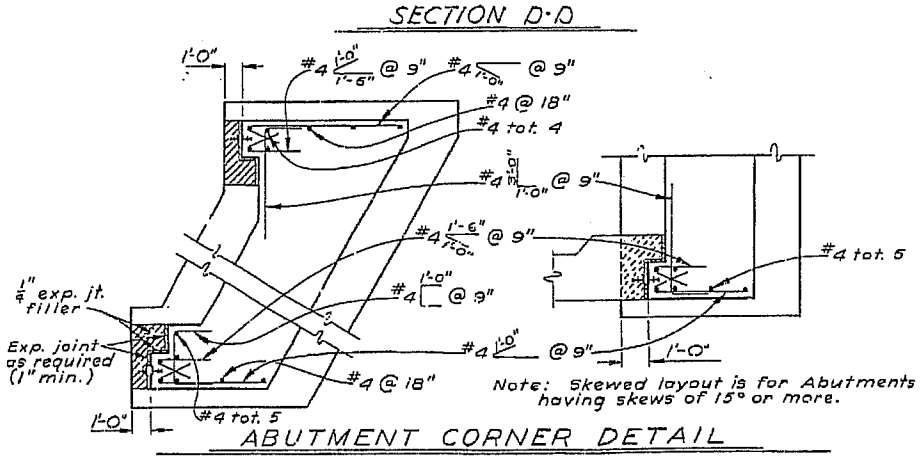
WINGWALL DATA				
L (ft)	H (ft)	T	Ⓒ & Ⓢ bars	No. piles
20	10	1'-0"	7	1
	11	1'-0"	7	1
	12	1'-0"	7	1
	13	1'-0"	7	1
	14	1'-0"	8	1
22	10	1'-0"	8	1
	11	1'-0"	8	1
	12	1'-0"	8	1
	13	1'-0"	8	1
	14	1'-0"	8	1
24	10	1'-0"	8	1
	11	1'-0"	8	1
	12	1'-3"	8	1
	13	1'-3"	8	1
	14	1'-3"	8	2
26	10	1'-3"	8	1
	11	1'-3"	8	1
	12	1'-3"	8	1
	13	1'-3"	8	2
	14	1'-3"	8	2
28	10	1'-3"	8	1
	11	1'-3"	8	1
	12	1'-3"	9	2
	13	1'-3"	9	2
	14	1'-3"	9	2
30	10	1'-3"	9	1
	11	1'-3"	9	1
	12	1'-5"	9	2
	13	1'-3"	9	2
	14	1'-6"	9	2
32	10	1'-3"	9	1
	11	1'-6"	9	2
	12	1'-6"	9	2
	13	1'-6"	9	2
	14	1'-6"	9	2
34	10	1'-6"	9	1
	11	1'-6"	9	2
	12	1'-6"	9	2
	13	1'-6"	10	2
	14	1'-6"	10	2
36	10	1'-6"	10	2
	11	1'-6"	10	2
	12	1'-6"	10	2
	13	1'-6"	10	2
	14	1'-6"	10	2
38	10	1'-6"	10	2
	11	1'-6"	10	2
	12	1'-6"	10	2
	13	1'-6"	10	2
	14	1'-9"	10	2
40	10	1'-6"	10	2
	11	1'-6"	10	2
	12	1'-9"	10	2
	13	1'-9"	10	2
	14	1'-9"	10	2



ELEVATION

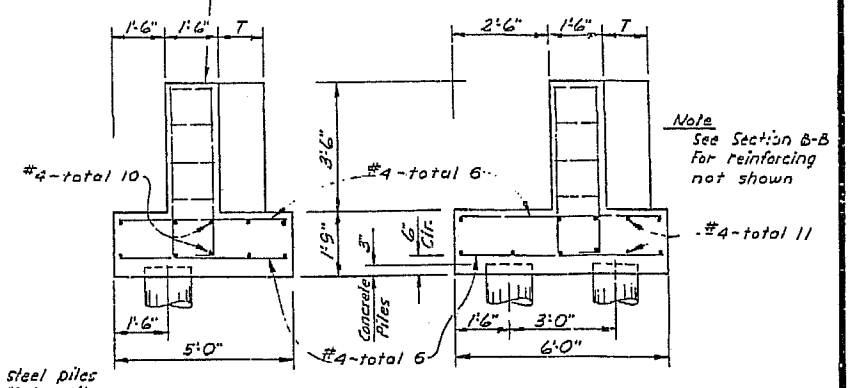


SECTION D-D



ABUTMENT CORNER DETAIL

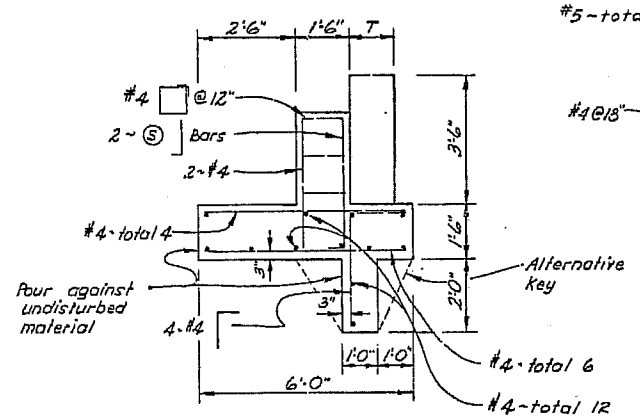
Support post to be full height (3'-6") when wall with overhang is used.



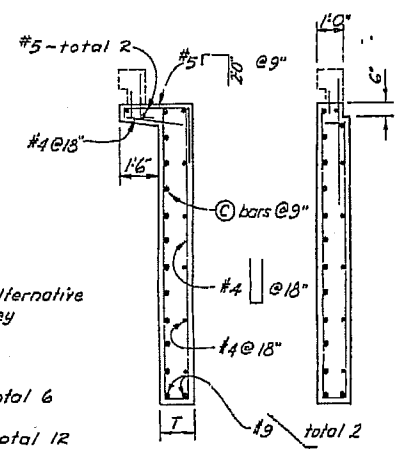
Note
See Section B-B for reinforcing not shown

SECTION C-C

Note
Pile embedment : 5" for steel piles
" " : 6" for Timber piles
Bar clearance : 6" for Steel Piles
" " : 9" for Timber Piles
Increase footing depth to 2'-0" if Timber Piles are used.



SECTION B-B



Match deck overhang shape

Notch to accommodate conc gutter at approaches, (No notch if T = 1'-0").

1'-6" OVERHANG NO OVERHANG

SECTION A-A

Note: When superstructure is prestressed, the wingwall must be placed after stressing is completed. Backfill material inside of walls must be placed prior to placing backfill outside of walls.

NO AS BUILT CORRECTION

AS BUILT
CORRECTIONS BY I.A. Schroeder
CONTRACT NO. 01-06:224
DATE 9-03-76 R.T. 1-17

STATE OF CALIFORNIA
6/71 DEPARTMENT OF TRANSPORTATION XS-4-25

PAINTER STREET OVERCROSSING

SIMPLE BEAM WINGWALL DETAILS

BRIDGE NO.	POST MILE	DRAWING NO.	SHEET	OF
4-236	53.2		8	10

REVISION DATES (PRELIMINARY STAGE ONLY)

Clearprint prints bearing earlier revision dates →

STANDARD DRAWING
Dist. 01 Co. Hum Rte. 101 P.M. R51.5/R53.4
Design Detailed Checked Approved
Supervising Engineer
Project Engineer
Dist. Bridge Engineer

136

AS BUILT PLANS
Contract No. 01-06:224
Date Completed —
Document No. Less Salt

WO
CU

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.
DATE 11/14/77 SIGNATURE Joseph M. Coda TITLE Supervisor

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
01	HUM	101	R51.5 / R53.9	138	150

PROJECT ENGINEER — REGISTERED CIVIL ENGINEER

DATE APPROVED November 19, 1973

N

"P" 20+00.00 POT
"E" 172+89.77 POC

B-3
B-2 2.5
B-1

"P" LINE

18 19 21 22

"E" LINE

BM "H-1-E-025"
Std CHC brass cap burried 0.2'± 25'± Lt "P" Sta. 16+70± Elev. 118.80

PLAN
1"=20'

LEGEND OF BORINGS OPERATIONS

PENETROMETER
2½" Cone Penetrometer
Shannon Boring (SHN)
Rotary Boring (ROT)
Fraser Boring (FRA)
Jet Boring
Core Boring
Test Pit

Thin Wall Ft. Shelby Sample
Cone Penetrometer
Standard Penetration Split Spoon Sample
Undisturbed Sample (Diam. 2.42 in.) (Diam. 3.00 in.)
Undisturbed Sample (Diam. 4.00 in.)
Undisturbed Sample (Diam. 5.00 in.)
Undisturbed Sample (Diam. 6.00 in.)
Undisturbed Sample (Diam. 7.00 in.)
Undisturbed Sample (Diam. 8.00 in.)
Undisturbed Sample (Diam. 9.00 in.)
Undisturbed Sample (Diam. 10.00 in.)
Undisturbed Sample (Diam. 11.00 in.)
Undisturbed Sample (Diam. 12.00 in.)
Undisturbed Sample (Diam. 13.00 in.)
Undisturbed Sample (Diam. 14.00 in.)
Undisturbed Sample (Diam. 15.00 in.)
Undisturbed Sample (Diam. 16.00 in.)
Undisturbed Sample (Diam. 17.00 in.)
Undisturbed Sample (Diam. 18.00 in.)
Undisturbed Sample (Diam. 19.00 in.)
Undisturbed Sample (Diam. 20.00 in.)
Undisturbed Sample (Diam. 21.00 in.)
Undisturbed Sample (Diam. 22.00 in.)
Undisturbed Sample (Diam. 23.00 in.)
Undisturbed Sample (Diam. 24.00 in.)
Undisturbed Sample (Diam. 25.00 in.)
Undisturbed Sample (Diam. 26.00 in.)
Undisturbed Sample (Diam. 27.00 in.)
Undisturbed Sample (Diam. 28.00 in.)
Undisturbed Sample (Diam. 29.00 in.)
Undisturbed Sample (Diam. 30.00 in.)
Undisturbed Sample (Diam. 31.00 in.)
Undisturbed Sample (Diam. 32.00 in.)
Undisturbed Sample (Diam. 33.00 in.)
Undisturbed Sample (Diam. 34.00 in.)
Undisturbed Sample (Diam. 35.00 in.)
Undisturbed Sample (Diam. 36.00 in.)
Undisturbed Sample (Diam. 37.00 in.)
Undisturbed Sample (Diam. 38.00 in.)
Undisturbed Sample (Diam. 39.00 in.)
Undisturbed Sample (Diam. 40.00 in.)
Undisturbed Sample (Diam. 41.00 in.)
Undisturbed Sample (Diam. 42.00 in.)
Undisturbed Sample (Diam. 43.00 in.)
Undisturbed Sample (Diam. 44.00 in.)
Undisturbed Sample (Diam. 45.00 in.)
Undisturbed Sample (Diam. 46.00 in.)
Undisturbed Sample (Diam. 47.00 in.)
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Undisturbed Sample (Diam. 593.00 in.)
Undisturbed Sample (Diam. 594.00 in.)
Undisturbed Sample (Diam. 595.00 in.)
Undisturbed Sample (Diam. 596.00 in.)
Undisturbed Sample (Diam. 597.00 in.)
Undisturbed Sample (Diam. 598.00 in.)
Undisturbed Sample (Diam. 599.00 in.)
Undisturbed Sample (Diam. 600.00 in.)

LEGEND OF EARTH MATERIALS

Gravel
Sand
Silt
Clay
Sandy Clay or Clayey Sand
Sandy Silt or Silty Sand
Igneous Rock
Sedimentary Rock
Metamorphic Rock

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRAIN SIZE LIMITS

Boulders or cobbles with no appreciable amount of fine grained soil or sand
Gravel or gravelly soil
Sand
Silt or clay
Sandy clay or silty clay
Clay

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

GWS ▽ El. 1122 10-27-67
GWS ▽ El. 1125 10-27-67

B-3: 300/6 10-26-67
B-2: 10-26-67
B-1: 300/6 10-26-67

B-2 2.5
- 8" 0.0 — Base & base.
- 19" 0.8 — Dark brown SILTY CLAY.
- 25" 1.6 — Soft brown CLAYEY SILT with SAND.
- 21" 2.4 — Slightly compact brown SILTY medium to fine SAND with CLAY binder.
- 25" 3.0 — Compact PEA GRAVEL.
- 55" 4.6 — Slightly compact olive-brown SILTY fine SAND with some CLAY binder.
- 36" 7.6 — Compact olive SANDY SILT with CLAY binder.
- 24" 9.2 — Very stiff brown CLAYEY fine SAND.
- 100" 10.0 — Compact light brown SILT.
- Compact to slightly compact light brown SILTY fine SAND.
- Very dense brown GRAVELLY, SILTY poorly sorted SAND.

PROFILE
Vert. 1"=10'
Horiz. 1"=20'

NO AS BUILT CORRECTION

AS BUILT
CORRECTIONS BY I.A. Schroeder
CONTRACT NO. 01-061224
DATE 8-03-76 R.T. 9-1-77

AS BUILT PLANS
Contract No. 01-061224
Date Completed —
Document No. 1000 3617

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.
DATE 4/14/77 SIGNATURE Joseph M. Cote TITLE Supervisor

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PAINTER STREET OVERCROSSING

LOG OF TEST BORINGS

BRIDGE NO.	POST MILE	DRAWING No.	SHEET	OF
4-236	53.2		10	10

REVISION DATES (PRELIMINARY STAGE ONLY)
11/24/67

WO 061221
CU 01201
PR-4-236-2
Disregard prints bearing earlier revision dates

HELD BRIDGE
DRAWN
CHECKED
Kyrm J. Lorenzo Jr. 10-27-67

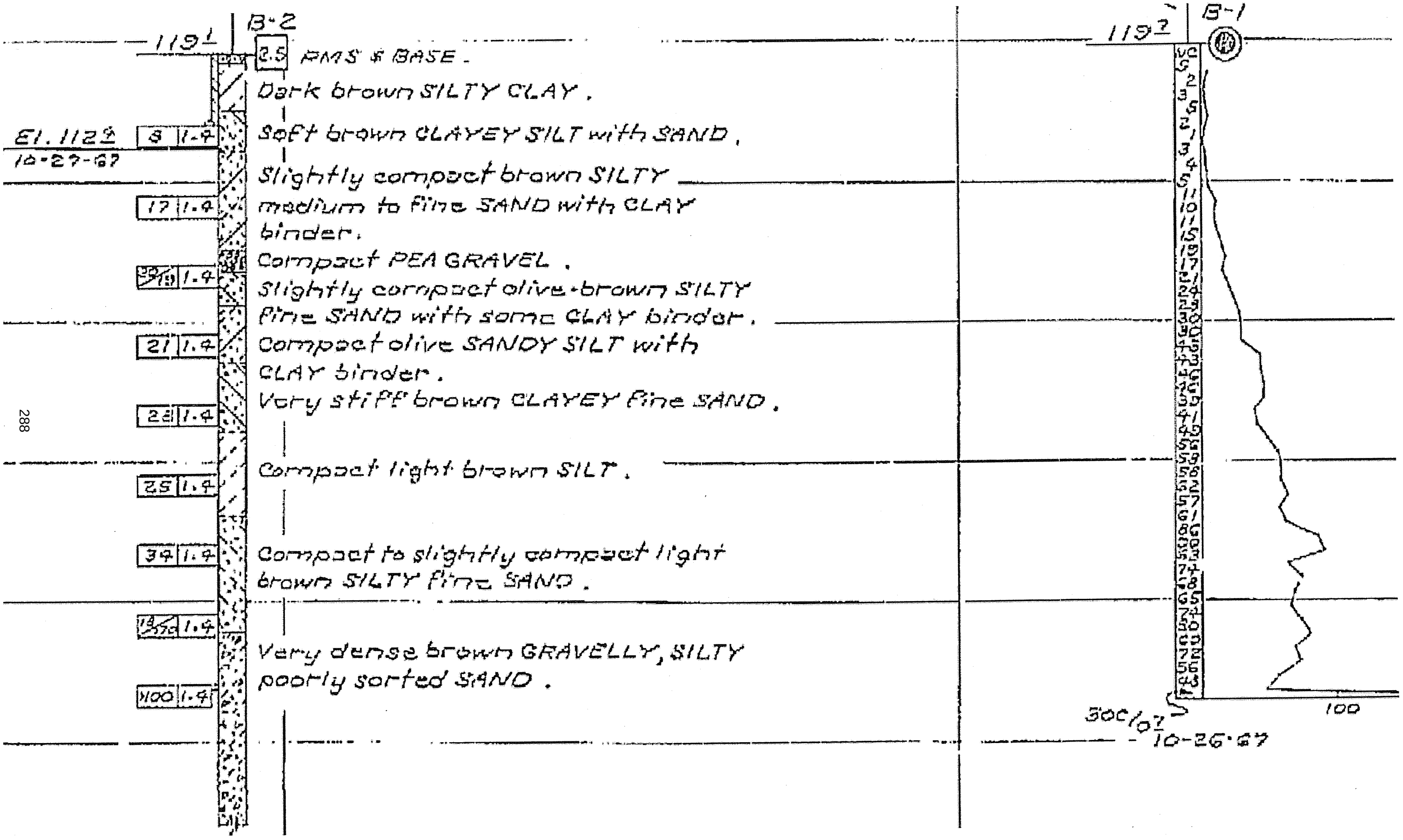
1. H.E. Beaston 10-27-67
2. M.K. Endow 11-13-67
3. H.E. Beaston 11-14-67

BRIDGE DEPARTMENT
ENGINEERING GEOLOGY SECTION

136

287

SCALE 1"=50 SCALE 1"=30 SCALE 1"=40 SCALE 1"=20 SCALE 1"=40
MICROFILM • STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION • MICROFILM


B-2
119¹
2.5 PMS & BASE.
Dark brown SILTY CLAY.
El. 112⁴
10-27-67
8 1.4
Soft brown CLAYEY SILT with SAND.
Slightly compact brown SILTY
17 1.4
medium to fine SAND with CLAY
binder.
Compact PEA GRAVEL.
1.4
Slightly compact olive-brown SILTY
fine SAND with some CLAY binder.
21 1.4
Compact olive SANDY SILT with
CLAY binder.
Very stiff brown CLAYEY fine SAND.
28 1.4
Compact light brown SILT.
25 1.4
34 1.4
Compact to slightly compact light
brown SILTY fine SAND.
1.4
Very dense brown GRAVELLY, SILTY
poorly sorted SAND.
100 1.4
B-1
119²
100
30C/0⁷
10-26-67

1-5

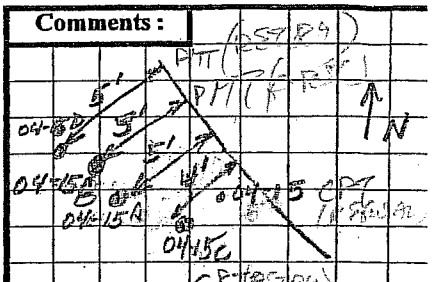
LOG OF BORING NO. (04-15A)

4' behind abutment

Earth Mechanics, Inc.
Geotechnical and Applied Engineering

Project Name	:	UCSD BRIDGE STUDY - PAINTER ST WEST ABUTMENT #1		
Project Location	:	RIO DELL, HUMBOLDT COUNTY		
E.M.I. Project No.	:	02-165	**Site Condition :**	PAVED
Weather	:	FOGGY, COOL	**Elevation :**	133.8 FT
Traffic Control	:	CALTRANS	**Operator :**	
Drilling Company	:	PC EXPLORATION	**Operator :**	FRANK
Type of Rig	:	MOBILE B61	**Drop (in) :**	
Borehole Diameter (inch)	:	7¼" - HSA	**Drive Wt. (lbs) :**	
Logged By	:	J.C.	**Date Drilled :**	7-1-04

Comments :



Backfilled with : CUTTINGS

	Time										Back to	Proposed Depth
	Depature	Arrival	Start	Break	Resume	Lunch	Resume	Break	Finish	Off	Office	ft
Driller												Water Table
Traffic Control												ft
Logger												Caving
Total												ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (BD/DS/R/T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O²/LEL/PID
0	B					SP	SILTY SAND W/GRAVEL, BROWN, DRY, COARSE-FINE GRAINED W/GRAVEL TO 1" DIAM.								
2.5	S	1		24 27 32	14"	SP	SAND, DK GRAY-BLK, MOIST, V. DENSE, COARSE-FINE GRAINED SAND W/GRAVEL TO 1" DIAM								
5	D	2A		50/6"	0	—	NO RECOVERY - TRY SPT SAMPLER			: :					
				16 22 25	14"										
	S	2B				SP	SAME. DENSE								
7.0	B	3A		—		SP	SAME. COARSE GRAINED. GRAVEL > 1" DIAM, DRY								
7.5	D	3B		50 16 16	18"	ML	(NOTE - AFTER 50 BLOWS, RIGHT AT 6", DECIDED TO CONTINUE) CLAYEY SILT, BLACK W ORANGE MOTTLING, MOIST, V. STIFF, SL. PLASTIC, ORGANICS, ROUNDED GRAVELS TO ½", TR. F. GRAD SAND								
10	S	4		7 8 8	18"	ML	CLAYEY SILT, GRAY-BROWN, MOIST, V. STIFF, NO PLASTIC, TR. ORGANICS & GRAVELS TO ~⅛" DIAM			: :					
12.5	D	5		7 10 8	18"	ML	CLAYEY SILT, DK GRAY, MOIST, STIFF, SL-NO PLASTIC, ROUNDED GRAVELS TO ¼" DIAM, ORGANICS			: :					
14	S	6		5 7 13	16"	ML	SILT W/SAND, BLACK-GRAY, MOIST, V. STIFF, NO PLASTIC FINE-MED SAND, TRACE GRAVELS & ORGANICS			: :					
							BOH = 14'								

1-5

LOG OF BORING NO. (04-15D)

SUCCESSFUL PMT BORING

Earth Mechanics, Inc.

Project Name	:	PAINTER ST / UCSD STUDY		
Project Location	:	RIDGE		
E.M.I. Project No.	:	02-165	Site Condition :	PAVED
Weather	:	FOGGY	Elevation :	139.8 '
Traffic Control	:	CALTRANS	Operator :	
Drilling Company	:	PC EXPLORATION	Operator :	FRANK
Type of Rig	:	MOBILE B61	Drop (in) :	
Borehole Diameter (inch)	:	7¾" HSA	Drive Wt. (lbs) :	
Logged By	:	J.C.	Date Drilled :	7-1-04

Comments :	
Backfilled with :	CUTTINGS

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Resume	Lunch	Resume	Break	Finish	Off		ft
Driller												Water Table
Traffic Control												ft
Logger												Caving
Total												ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.a./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O^2/LEL/PID
0										: :					
2.5															
5										: :					
										: :					
8-9.5						ML	CLAYEY SILT, BLACK-DK GRAY W/ BROWN-ORANGE MOTTLING, SL MOIST, STIFF-FIRM, FT. GRAVELS TO ½" FINE-MED SAND								
15										: :					
20										: :					
25										: :					

1-5

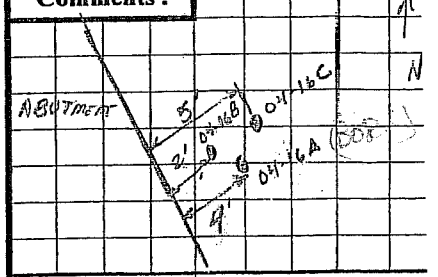
LOG OF BORING NO. (04-16A)

4' behind abutment

Earth Mechanics, Inc.

Project Name	:	PAINTED CAVE - EAST ABUTMENT #3		
Project Location	:	EUREKA, HUMBOLDT COUNTY	**Site Condition :**	PAVED ROADWAY
E.M.I. Project No.	:	02-116	**Elevation :**	134.5FT
Weather	:	CLOUDY, COOL	**Operator :**	
Traffic Control	:	CALTRANS	**Operator :**	FRANK
Drilling Company	:	PC EXPLORATION	**Drop (in) :**	
Type of Rig	:	MOBILE 861 - HSA	**Drive Wt. (lbs) :**	
Borehole Diameter (inch)	:	7 1/4"	**Date Drilled :**	7-1-04
Logged By	:	J.C.		

Comments :



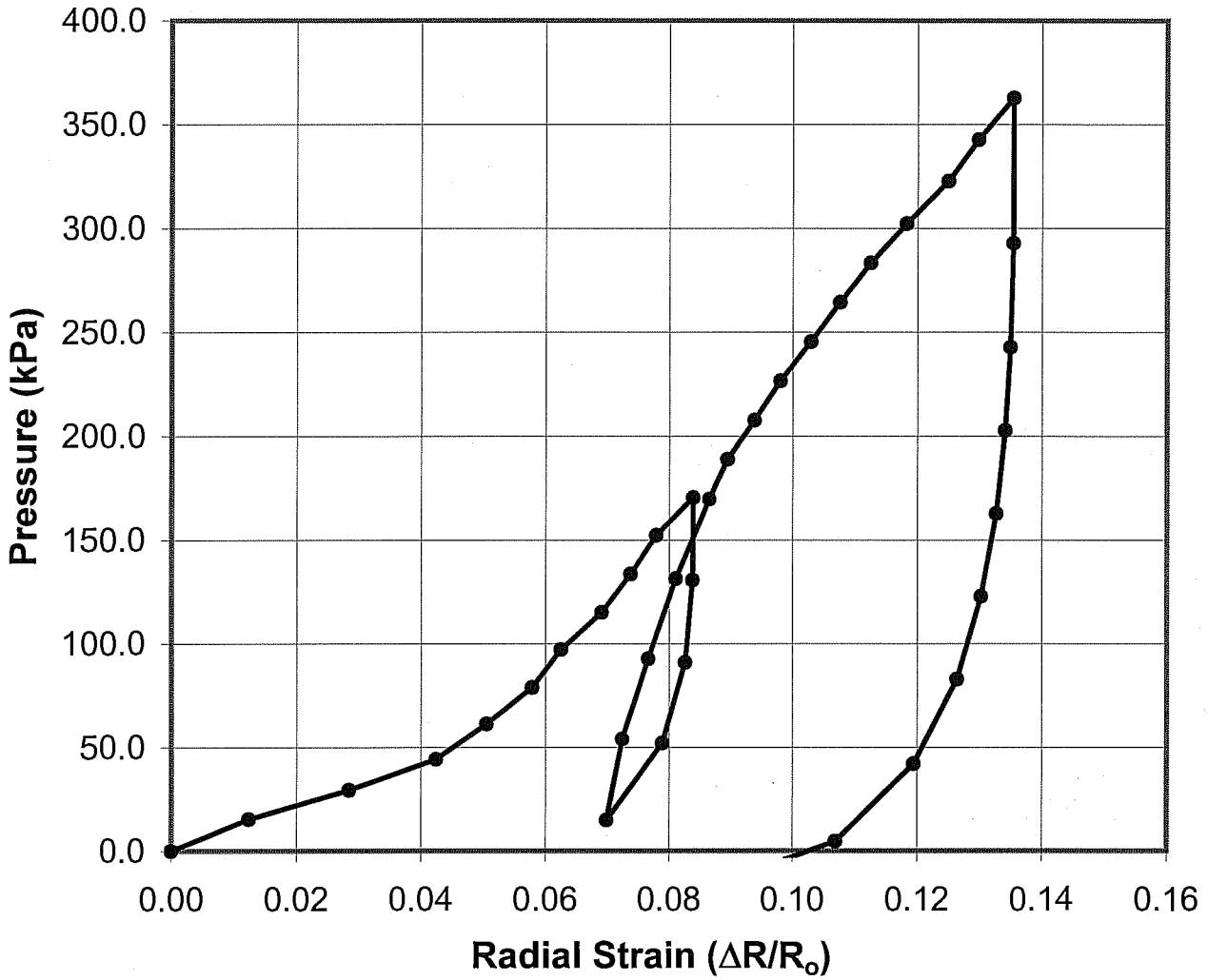
Backfilled with : CUTTINGS

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Resume	Lunch	Resume	Break	Finish	Off		12.5 ft
Driller												Water Table
Traffic Control												N/A ft
Logger												Caving
Total												N/A ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (BAG/SHLT)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O²/LEL/PID
0	B	0				SP	BULK - SAND W/GRAVEL, BROWN, DRY, NO PLASTIC		GRAVELS ≤ ½" DIAM						
2.5	S	1		19 30 33	16"	SP	SAND W/ GRAVEL, GRAY-BROWN, DENSE DRY, NO PLASTIC, GRAVELS ¼"-¾" DIAM								
5	D	2		19 40 50	15"	SP	SAME			: :					
7.5 ~~10~~	S			3 4 7	17" 13"	CL	SILTY CLAY, OLIVE-GRAY, FIRM, SL MOIST, SL. PLASTICITY COARSE SAND & GRAVELS TO ½" DIAM								
		3A 3B			4"	SP	SAND W/GRAVEL, GRAY-BROWN, SL MOIST, GRAVELS TO ½" DIAM LOOSE								
10 ~~15~~	D	4		5 7 12	18"	CL	CLAY W/SILT - BLACK/OLIVE/GRAY MOTTLING, V. STIFF, MOIST, PLASTIC, ORGANICS (ROOTS) PRESENT,			: :					
12.5 ~~20~~	S	5		5 7 12	17"	CL	SILTY CLAY, OLIVE-BROWN, MOIST, V. STIFF SL. PLASTIC, TR. FINE-GRAINED SAND, MOTTLED W/ BROWN-ORANGE & GRAY.			: :					
25										: :					

BOH = 12.5'

Pressuremeter Test Result



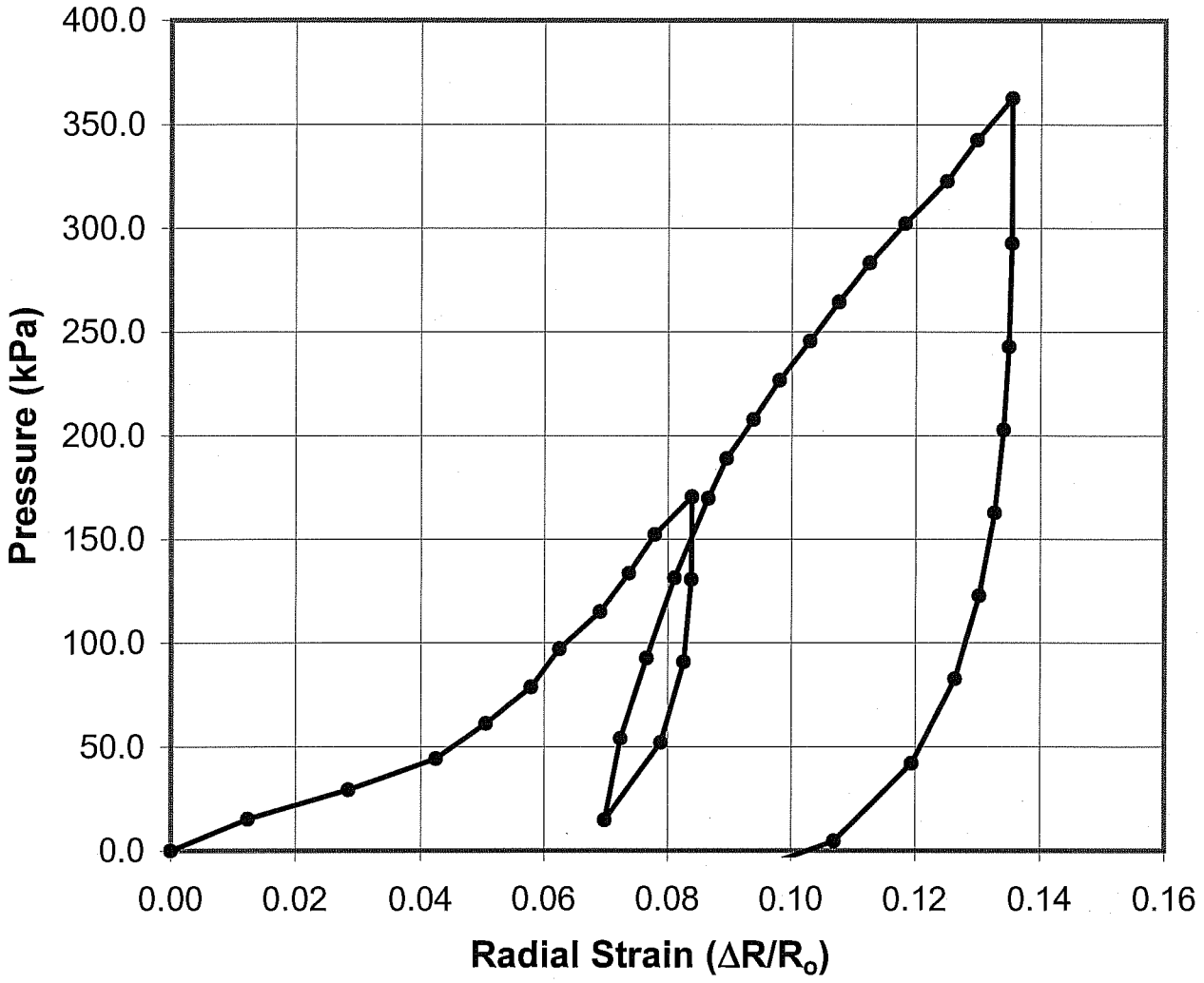
Boring No.:	**04-15P**
Location:	**Painter St. Abut#1**
	Humboldt County
Test Date:	**7/1/04**
Test Depth:	**8 ft**
Soil Type:	**Poorly Graded Sand with Clay**

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

CALTRANS-UCSD / Abutment Research

Project No : 02-165 | Date : 12/22/2004

Pressuremeter Test Result



Boring No.:	**04-16P**
Location:	**Painter St. Abut#3**
	Humboldt County
Test Date:	**7/1/04**
Test Depth:	**12.5 ft**
Soil Type:	**Sandy Clay**

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

CALTRANS-UCSD / Abutment Research

Project No : 02-165 | Date : 12/22/2004

July 14, 2004

Earth Mechanics
Attn: Jody Castle
7700 Edgewater Drive #846
Oakland, California 94621

Subject: CPT Site Investigation
Painter Street Bridge
Rio Dell, California
GREGG Project Number: 04-226ma

Dear Jody:

The following report presents the results of GREGG IN SITU's Cone Penetration Test investigation for the above referenced site. The following testing services were performed:

1	Cone Penetration Tests	(CPTU)	x
2	Pore Pressure Dissipation Tests	(PPD)	☐
3	Seismic Cone Penetration Tests	(SCPTU)	x
4	Resistivity Cone Penetration Tests	(RCPTU)	☐
5	UVIF Cone Penetration Tests	(UVIFCPTU)	☐
6	Groundwater Sampling	(GWS)	☐
7	Soil Sampling	(SS)	☐
8	Vapor Sampling	(VS)	☐
9	Vane Shear Testing	(VST)	☐
10	SPT Energy Calibration	(SPTE)	☐

A list of reference papers providing additional background on the specific tests conducted is provided in the bibliography following the text of the report. If you would like a copy of any of these publications or should you have any questions or comments regarding the contents of this report, please do not hesitate to contact our office at (562) 427-6899.

Sincerely,
GREGG IN SITU, Inc.

Mary Walden
Operations Manager

Bibliography

Campanella, R.G. and I. Weemees, "Development and Use of An Electrical Resistivity Cone for Groundwater Contamination Studies", Canadian Geotechnical Journal, Vol. 27 No. 5, 1990 pp. 557-567.

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Mayne, P.W., "NHI (2002) Manual on Subsurface Investigations: Geotechnical Site Characterization", available through www.ce.gatech.edu/~geosys/Faculty/Mayne/papers/index.html, Section 5.3, pp. 107-112.

Robertson, P.K., R.G. Campanella, D. Gillespie and A. Rice, "Seismic CPT to Measure In-Situ Shear Wave Velocity", Journal of Geotechnical Engineering ASCE, Vol. 112, No. 8, 1986
pp. 791-803.

Robertson, P.K., T. Lunne and J.J.M. Powell, "Geo-Environmental Application of Penetration Testing", Geotechnical Site Characterization, Robertson & Mayne (editors), 1998 Balkema, Rotterdam, ISBN 90 5410 939 4 pp 35-47.

Roberston, P.K., "Soil Classification using the Cone Penetration Test", Canadian Geotechnical Journal, Vol. 27, 1990 pp. 151-158.

Woeller, D.J., P.K. Robertson, T.J. Boyd and Dave Thomas, "Detection of Polyaromatic Hydrocarbon Contaminants Using the UVIF-CPT", 53rd Canadian Geotechnical Conference Montreal, QC October pp. 733-739, 2000.

Zemo, D.A., T.A. Delfino, J.D. Gallinatti, V.A. Baker and L.R. Hilpert, "Field Comparison of Analytical Results from Discrete-Depth Groundwater Samplers" BAT EnviroProbe and QED HydroPunch, Sixth national Outdoor Action Conference, Las Vegas, Nevada Proceedings, 1992, pp 299-312.

Copies of ASTM Standards are available through www.astm.org

APPENDIX CPT

Cone Penetration Testing Procedure (CPT)

Gregg In Situ, Inc. carries out all Cone Penetration Tests (CPT) using an integrated electronic cone system, *Figure CPT*. The soundings were conducted using a 20 ton capacity cone with a tip area of 15 cm^2 and a friction sleeve area of 225 cm^2. The cone is designed with an equal end area friction sleeve and a tip end area ratio of 0.85.

The cone takes measurements of cone bearing (q_c), sleeve friction (f_s) and dynamic pore water pressure (u_2) at 5-cm intervals during penetration to provide a nearly continuous hydrogeologic log. CPT data reduction and interpretation is performed in real time facilitating on-site decision making. The above mentioned parameters are stored on disk for further analysis and reference. All CPT soundings are performed in accordance with revised (2002) ASTM standards (D 5778-95).

The cone also contains a porous filter element located directly behind the cone tip (u_2), *Figure CPT*. It consists of porous plastic and is 5.0mm thick. The filter element is used to obtain dynamic pore pressure as the cone is advanced as well as Pore Pressure Dissipation Tests (PPDT's) during appropriate pauses in penetration. It should be noted that prior to penetration, the element is fully saturated with silicon oil under vacuum pressure to ensure accurate and fast dissipation.

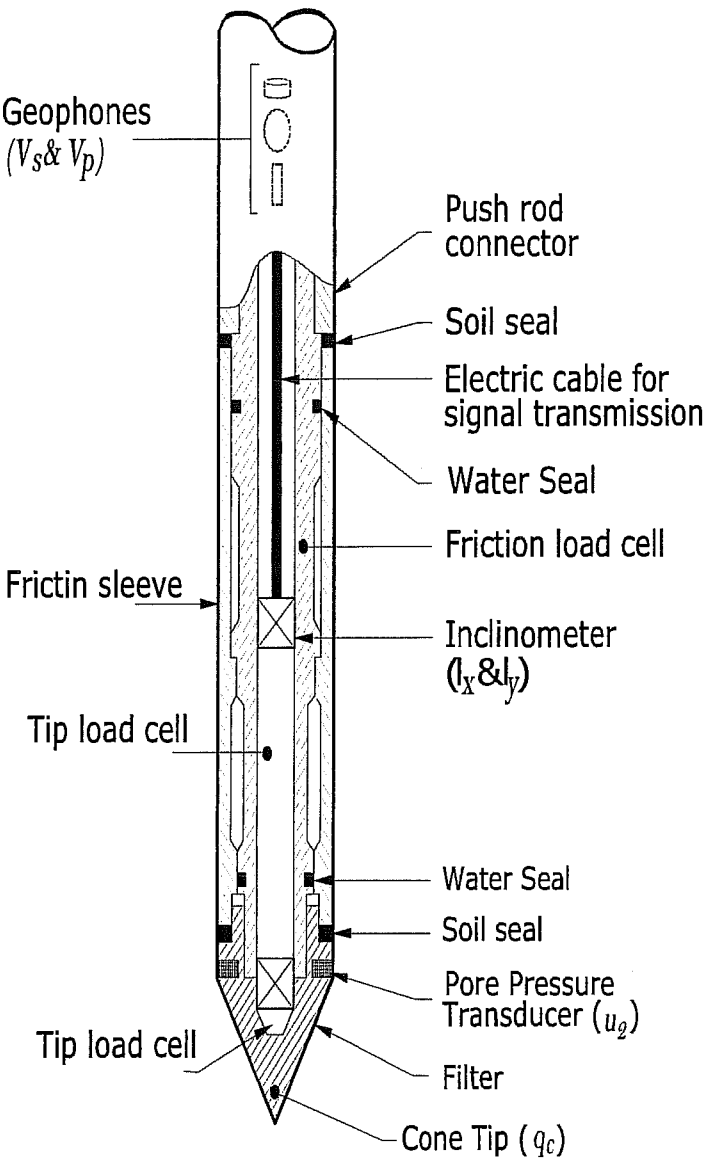


Figure CPT

When the soundings are complete, the test holes are grouted using a Gregg In Situ support rig. The grouting procedure consists of pushing a hollow CPT rod with a "knock out" plug to the termination depth of the test hole. Grout is then pumped under pressure as the tremie pipe is pulled from the hole. Disruption or further contamination to the site is therefore minimized.

Cone Penetration Test Data & Interpretation

Soil behavior type and stratigraphic interpretation is based on relationships between cone bearing (q_c), sleeve friction (f_s), and pore water pressure (u_2). The friction ratio (R_f) is a calculated parameter defined by $100f_s/q_c$ and is used to infer soil behavior type. Generally:

Cohesive soils (clays)

- High friction ratio (R_f) due to small cone bearing (q_c)
- Generate large excess pore water pressures (u_2)

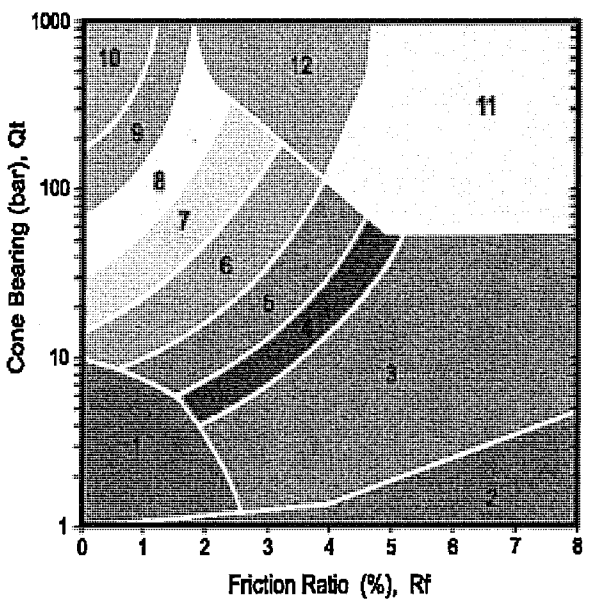
Cohesionless soils (sands)

- Low friction ratio (R_f) due to large cone bearing (q_c)
- Generate very little excess pore water pressures (u_2)

A complete set of baseline readings are taken prior to and at the completion of each sounding to determine temperature shifts and any zero load offsets. Corrections for temperature shifts and zero load offsets can be extremely important, especially when the recorded loads are relatively small. In sandy soils, however, these corrections are generally negligible.

The cone penetration test data collected from your site is presented in graphical form in Appendix CPT. The data includes CPT logs of measured soil parameters, computer calculations of interpreted soil behavior types (SBT), and additional geotechnical parameters. A summary of locations and depths is available in Table 1. Note that all penetration depths referenced in the data are with respect to the existing ground surface.

Soil interpretation for this project was conducted using recent correlations developed by Robertson et al, 1990, *Figure SBT*. Note that it is not always possible to clearly identify a soil type based solely on q_c, f_s, and u_2. In these situations, experience, judgment, and an assessment of the pore pressure dissipation data should be used to infer the soil behavior type.



ZONE	Qt/N	SBT
1	2	Sensitive, fine greained
2	1	Organic materials
3	1	Clay
4	1.5	Silty clay to clay
5	2	Clayey silt to silty clay
6	2.5	Sandy silt to clayey silt
7	3	Silty sand to sandy silt
8	4	Sand to silty sand
9	5	Sand
10	6	Gravely sand to sand
11	1	Very stiff fine grained*
12	2	Sand to clayey sand*

*over consolidated or cemented

Figure SBT

Gregg In Situ CPT Interpretations as of January 7, 1999 (Release 1.00.19)

Gregg In Situ's interpretation routine should be considered a calculator of current published CPT correlations and is subject to change to reflect the current state of practice. The interpreted values are not considered valid for all soil types. The interpretations are presented only as a guide for geotechnical use and should be carefully scrutinized for consideration in any geotechnical design. Reference to current literature is strongly recommended.

The CPT interpretations are based on values of tip, sleeve friction and pore pressure averaged over a user specified interval (typically 0.25m). Note that Qt is the recorded tip value, Qc, corrected for pore pressure effects. Since all Gregg In Situ cones have equal end area friction sleeves, pore pressure corrections to sleeve friction, Fs, are not required.

The tip correction is: $Qt = Qc + (1-a) \bullet Ud$

where: *Qt* is the corrected tip load
Qc is the recorded tip load
Ud is the recorded dynamic pore pressure
a is the Net Area Ratio for the cone (typically 0.85 for Gregg In Situ cones)

Effective vertical overburden stresses are calculated based on a hydrostatic distribution of equilibrium pore pressures below the water table or from a user defined equilibrium pore pressure profile (this can be obtained from CPT dissipation tests). The stress calculations use unit weights assigned to the Soil Behavior Type zones or from a user defined unit weight profile.

Details regarding the interpretation methods for all of the interpreted parameters is given in table 1. The appropriate references referred to in table 1 are listed in table 2.

The estimated Soil Behavior Type is based on the charts developed by Robertson and Campanella shown in figure 1.

Table 1 CPT Interpretation Methods

Interpreted Parameter	Description	Equation	Ref
Depth	mid layer depth		
AvgQt	Averaged corrected tip (Qt)	$AvgQt = \frac{1}{n}\sum_{i=1}^{n} Qt_i$	
AvgFs	Averaged sleeve friction (Fs)	$AvgFs = \frac{1}{n}\sum_{i=1}^{n} Fs_i$	
AvgRf	Averaged friction ratio (Rf)	$AvgRf = 100\% \bullet \frac{AvgFs}{AvgQt}$	
AvgUd	Averaged dynamic pore pressure (Ud)	$AvgUd = \frac{1}{n}\sum_{i=1}^{n} Ud_i$	
SBT	Soil Behavior Type as defined by Robertson and Campanella		1

U.Wt.	Unit Weight of soil determined from: 1) uniform value or 2) value assigned to each SBT zone 3) user supplied unit weight profile		
TStress	Total vertical overburden stress at mid layer depth	$TStress = \sum_{i=1}^{n} \gamma_i h_i$ where γ_i is layer unit weight h_i is layer thickness	
EStress	Effective vertical overburden stress at mid layer depth	$EStress = TStress - Ueq$	
Ueq	Equilibrium pore pressure determined from: 1) hydrostatic from water table depth 2) user supplied profile		
Cn	SPT N_{60} overburden correction factor	$Cn=(\sigma_v')^{-0.5}$ where σ_v' *is in tsf* $0.5 < C_n < 2.0$	
N_{60}	SPT N value at 60% energy calculated from Qt/N ratios assigned to each SBT zone		3
$(N1)_{60}$	SPT N_{60} value corrected for overburden pressure	$N1_{60} = Cn \bullet N_{60}$	3
$\Delta(N1)_{60}$	Equivalent Clean Sand Correction to $(N1)_{60}$	$\Delta(N1)_{60} = \frac{K_{SPT}}{1 - K_{SPT}} \bullet (N1)_{60}$ Where: K_{SPT} is defined as: 0.0 for FC < 5% 0.0167 • (FC - 5) for 5% < FC < 35% 0.5 for FC > 35% FC - Fines Content in %	7
$(N1)_{60cs}$	Equivalent Clean Sand $(N1)_{60}$	$(N1)_{60cs} = (N1)_{60} + \Delta(N1)_{60}$	7
Su	Undrained shear strength - Nkt is use selectable	$Su = \frac{Qt - \sigma_v}{N_{kt}}$	2
k	Coefficient of permeability (assigned to each SBT zone)		6
Bq	Pore pressure parameter	$Bq = \frac{\Delta u}{Qt - \sigma_v}$	2
Qtn	Normalized Qt for Soil Behavior Type classification as defined by Robertson, 1990	$Qtn = \frac{Qt - \sigma_v}{\sigma'_v}$	4
Rfn	Normalized Rf for Soil Behavior Type classification as defined by Robertson, 1990	$Rfn = 100\% \bullet \frac{f_s}{Qt - \sigma_v}$	4
SBTn	Normalized Soil Behavior Type (slightly modified from that published by Robertson, 1990. This version includes all the soil zones of the original non-normalized SBT chart - see figure 1)		4
Qc1	Normalized Qt for seismic analysis	$qc1 = qc \bullet (Pa/\sigma_v')^{0.5}$ where: Pa = atm. pressure	5
Qc1N	Dimensionless Normalized Qt1	qc1N = qc1 / Pa where: Pa = atm. pressure	

ΔQc1N1	Equivalent clean sand correction	$\Delta qc1N = \frac{K_{CPT}}{1 - K_{CPT}} \bullet qc1N$ Where: K_{CPT} is defined as: 0.0 for FC < 5% 0.0267 • (FC - 5) for 5% < FC < 35% 0.5 for FC > 35% FC - Fines Content in %	5
Qc1Ncs	Clean Sand equivalent Qc1N	$qc1Ncs = qc1N + \Delta qc1N$	5
Ic	Soil index for estimating grain characteristics	$Ic = [(3.47 - logQ)^2 + (log\ F + 1.22)^2\ ]^{0.5}$	5
FC	Fines content (%)	$FC=1.75(Ic^{3.25}) - 3.7$ $FC=100$ for $Ic > 3.5$ $FC=0$ for $Ic < 1.26$ $FC = 5\%$ if $1.64 < Ic < 2.6$ AND $Rfn<0.5$	8
PHI	Friction Angle	Campanella and Robertson Durunoglu and Mitchel Janbu	1
Dr	Relative Density	Ticino Sand Hokksund Sand Schmertmann 1976 Jamiolkowski - All Sands	1
OCR	Over Consolidation Ratio		1
State Parameter			9
CRR	Cyclic Resistance Ratio		7

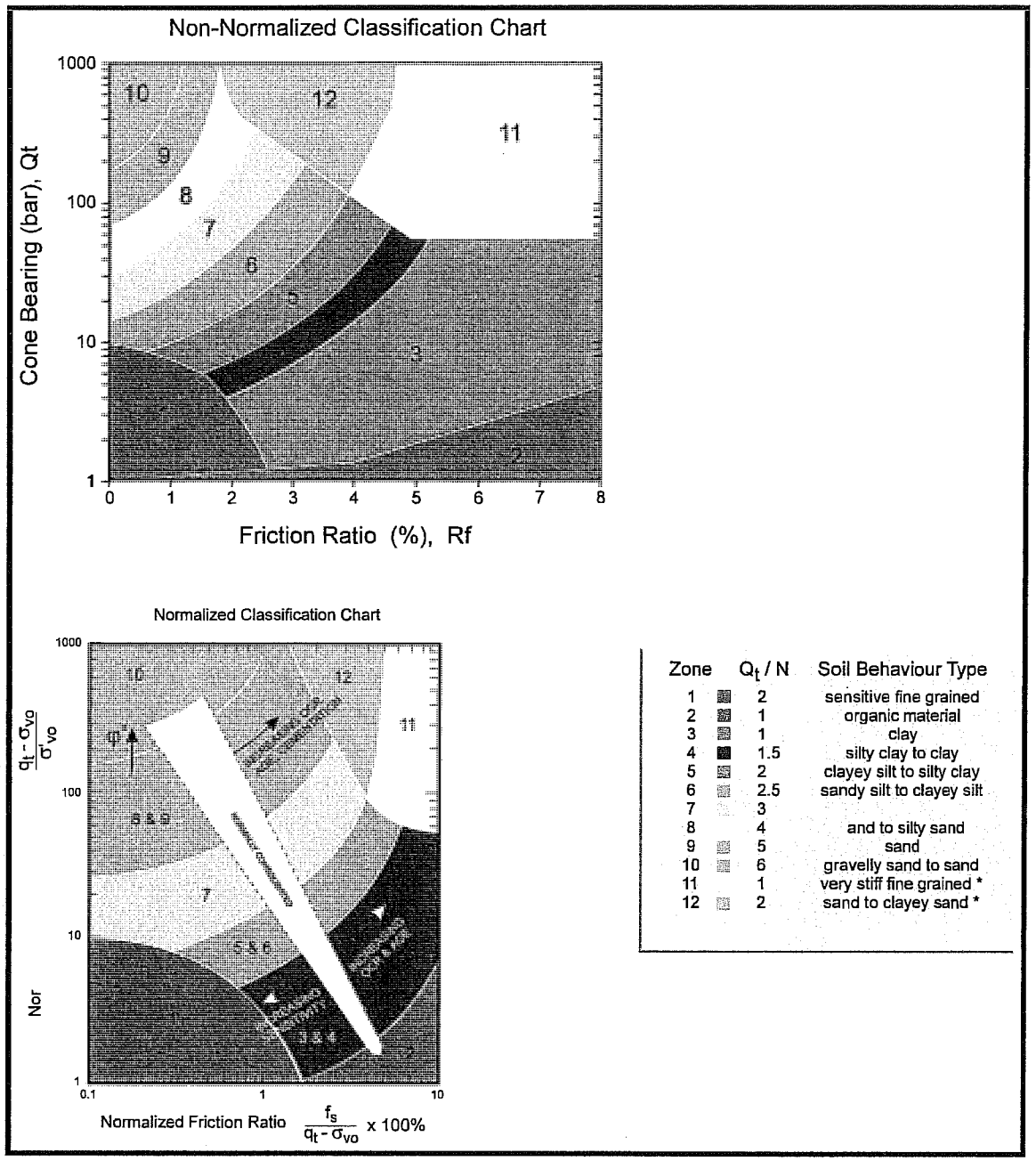


Figure 1 Non-Normalized and Normalized Soil Behavior Type Classification Charts

Table 2 References

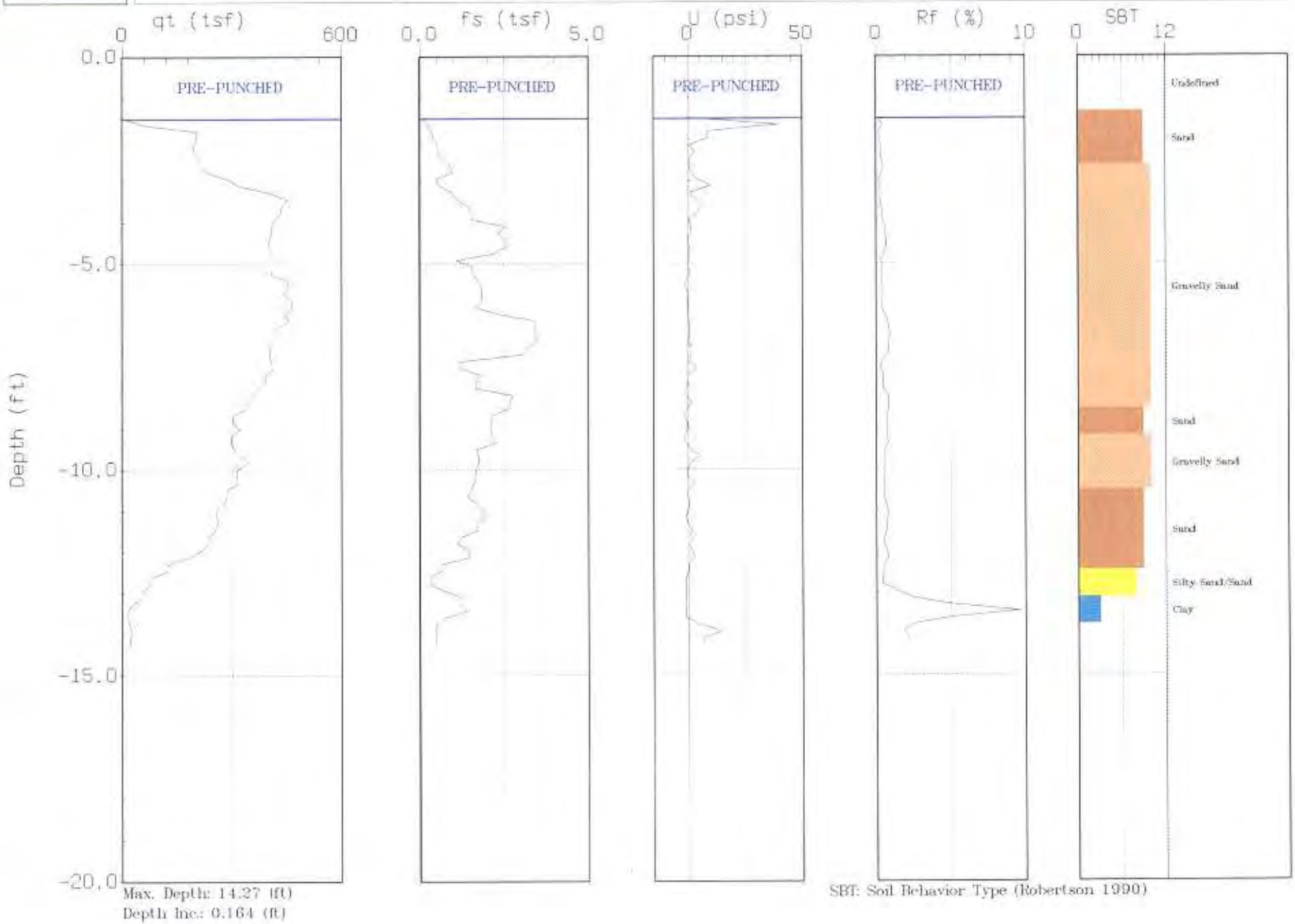
No.	Reference
1	Robertson, P.K. and Campanella, R.G., 1986, "Guidelines for Use, Interpretation and Application of the CPT and CPTU", UBC, Soil Mechanics Series No. 105, Civil Eng. Dept., Vancouver, B.C., Canada
2	Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, "Use of Piezometer Cone Data", Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.
3	Robertson, P.K. and Campanella, R.G., 1989, "Guidelines for Geotechnical Design Using CPT and CPTU", UBC, Soil Mechanics Series No. 120, Civil Eng. Dept., Vancouver, B.C., Canada
4	Robertson, P.K., 1990, "Soil Classification Using the Cone Penetration Test", Canadian Geotechnical Journal, Volume 27.
5	Robertson, P.K. and Fear, C.E., 1995, "Liquefaction of Sands and its Evaluation", Keynote Lecture, First International Conference on Earthquake Geotechnical Engineering, Tokyo, Japan.
6	Gregg In Situ Internal Report
7	Robertson, P.K. and Wride, C.E., 1997, "Cyclic Liquefaction and its Evaluation Based on SPT and CPT", NCEER Workshop Paper, January 22, 1997
8	Wride, C.E. and Robertson, P.K., 1997, "Phase II Data Review Report (Massey and Kidd Sites, Fraser River Delta)", Volume 1 - Data Report (June 1997), University of Alberta.
9	Plewes, H.D., Davies, M.P. and Jefferies, M.G., 1992, "CPT Based Screening Procedure for Evaluating Liquefaction Susceptibility", 45th Canadian Geotechnical Conference, Toronto, Ontario, October 1992.

GREGG

EARTH MECHANICS

Site: PAINTER ST. BR.
Location: CPT-04-15C

Engineer: J. CASTLE
Date: 06:30:04 14:34



Max. Depth: 14.27 (ft)
Depth Inc: 0.164 (ft)

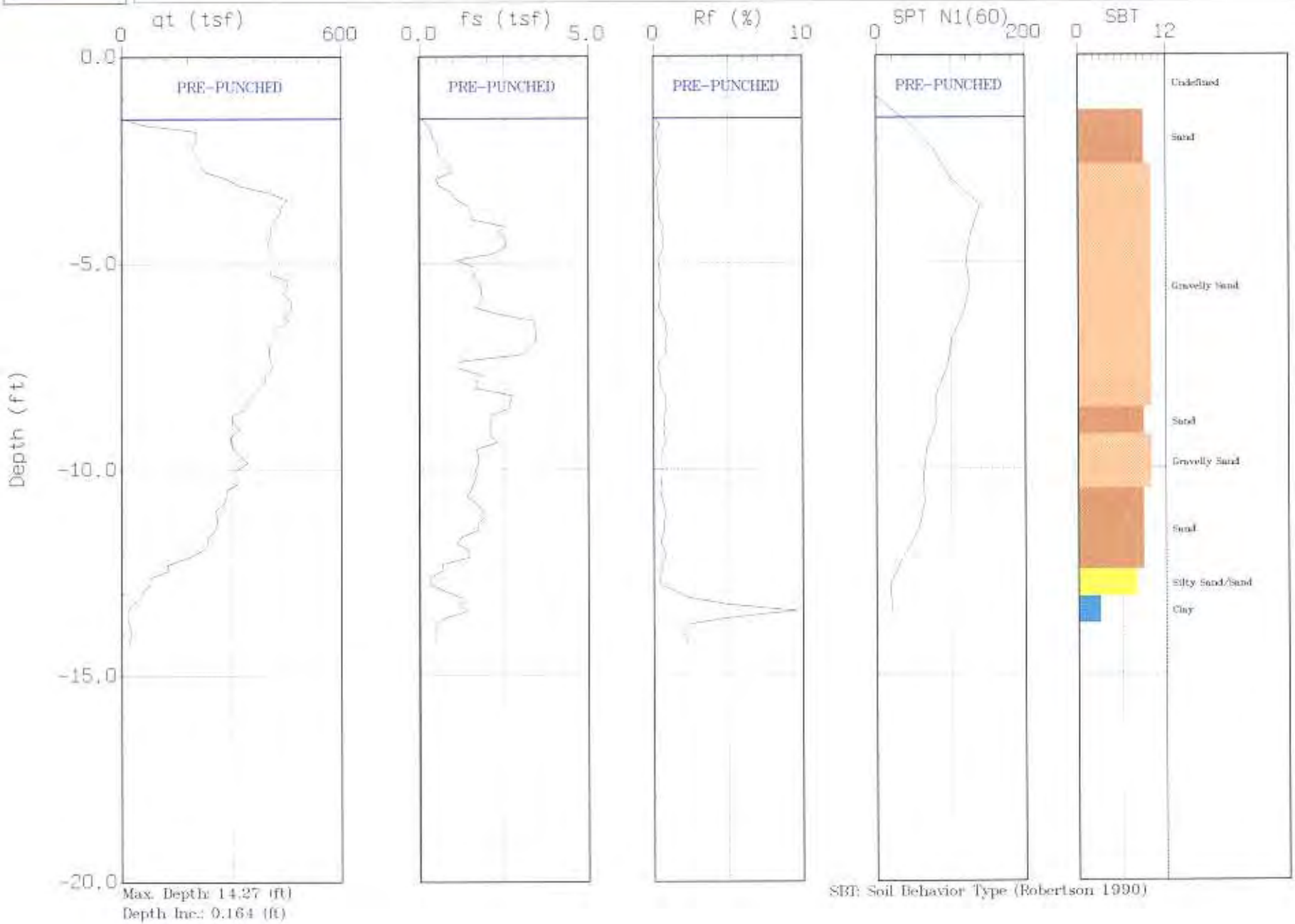
SBT: Soil Behavior Type (Robertson 1990)

GREGG

EARTH MECHANICS

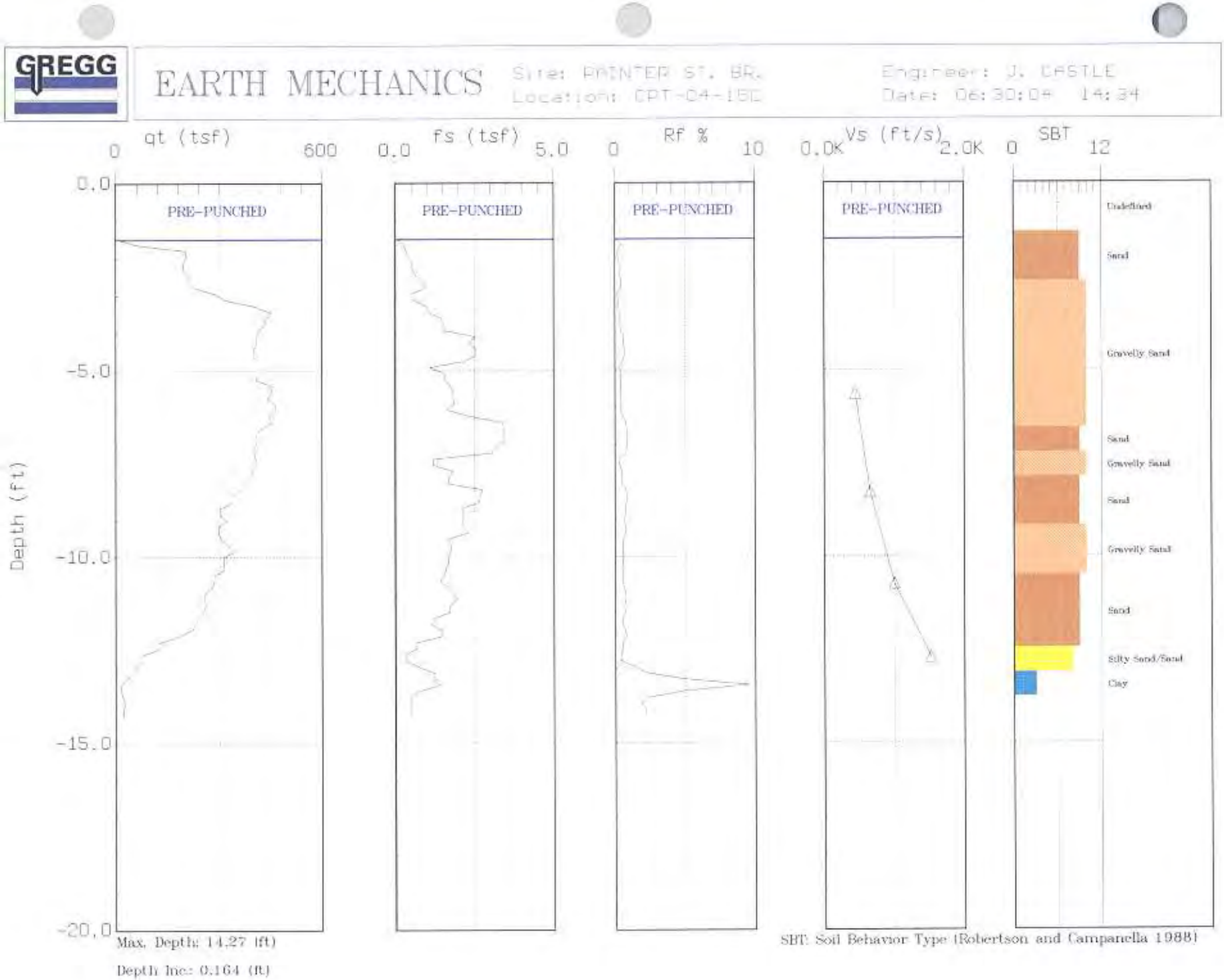
Site: PAINTER ST. BR.
Location: CPT-04-15C

Engineer: J. CASTLE
Date: 06:30:04 14:34



Max. Depth: 14.27 (ft)
Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson 1990)


GREGG
EARTH MECHANICS
Site: PAINTER ST. BR.
Location: CPT-04-15C
Engineer: J. CASTLE
Date: 06:30:04 14:34
qt (tsf)
0
600
fs (tsf)
0.0
5.0
Rf %
0
10
Vs (ft/s)
0.0K
2.0K
SBT
0
12
PRE-PUNCHED
0.0
-5.0
-10.0
-15.0
-20.0
Depth (ft)
Undefined
Sand
Gravelly Sand
Sand
Gravelly Sand
Sand
Gravelly Sand
Sand
Silty Sand/Sand
Clay
Max. Depth: 14.27 (ft)
Depth Inc: 0.164 (ft)
SBT: Soil Behavior Type (Robertson and Campanella 1988)

Gregg In Situ, Inc.
Interpretation Output - Release 1.00.19e
Run No: 04-0714-0947-2272
Job No: 04-226MA
Client: EARTH MECHANICS
Project: CPT SITE INVESTIGATION
Site: PAINTER ST. BR.
Location: CPT-04-15C
Engineer: J. CASTLE
CPT Date: 04/30/06
CPT Time: 14:34
CPT File: 226SC15C.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 7.62 (ft): 25.0
Su Nkt used: 12.50
Averaging Increment (m): 0.15
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
0.25	0.0	0.00	0.00	0.0	UnDef	124.1	0.02	0.02	0.00	2.00	UnDef	UnDef	UnDef	0.00
0.74	0.0	0.00	0.00	0.0	UnDef	124.1	0.05	0.05	0.00	2.00	UnDef	UnDef	UnDef	0.00
1.23	0.0	0.00	0.00	0.0	UnDef	124.1	0.08	0.08	0.00	2.00	UnDef	UnDef	UnDef	0.00
1.72	154.7	0.32	0.21	43.0	9	124.1	0.11	0.11	0.00	2.00	29.6	59.2	UnDef	0.00
2.21	200.2	0.55	0.28	3.2	9	124.1	0.14	0.14	0.00	2.00	38.3	76.7	UnDef	0.00
2.71	243.3	0.76	0.31	4.5	10	127.3	0.17	0.17	0.00	2.00	38.8	77.7	UnDef	0.00
3.20	391.0	0.86	0.22	10.5	10	127.3	0.20	0.20	0.00	2.00	62.4	124.8	UnDef	0.00
3.61	436.5	1.47	0.34	11.8	10	127.3	0.23	0.23	0.00	2.00	69.7	139.3	UnDef	0.00
4.02	410.6	2.11	0.51	2.2	10	127.3	0.25	0.25	0.00	1.99	65.5	130.6	UnDef	0.00
4.51	402.9	2.44	0.60	0.4	10	127.3	0.28	0.28	0.00	1.88	64.3	120.8	UnDef	0.00
5.00	409.5	1.40	0.34	0.9	10	127.3	0.31	0.31	0.00	1.78	65.4	116.6	UnDef	0.00
5.50	450.0	1.78	0.39	-1.5	10	127.3	0.35	0.35	0.00	1.70	71.8	122.1	UnDef	0.00
5.99	458.4	1.94	0.42	-0.7	10	127.3	0.38	0.38	0.00	1.63	73.2	119.1	UnDef	0.00
6.56	424.0	3.42	0.81	0.9	9	124.1	0.41	0.41	0.00	1.56	81.2	126.3	UnDef	0.00

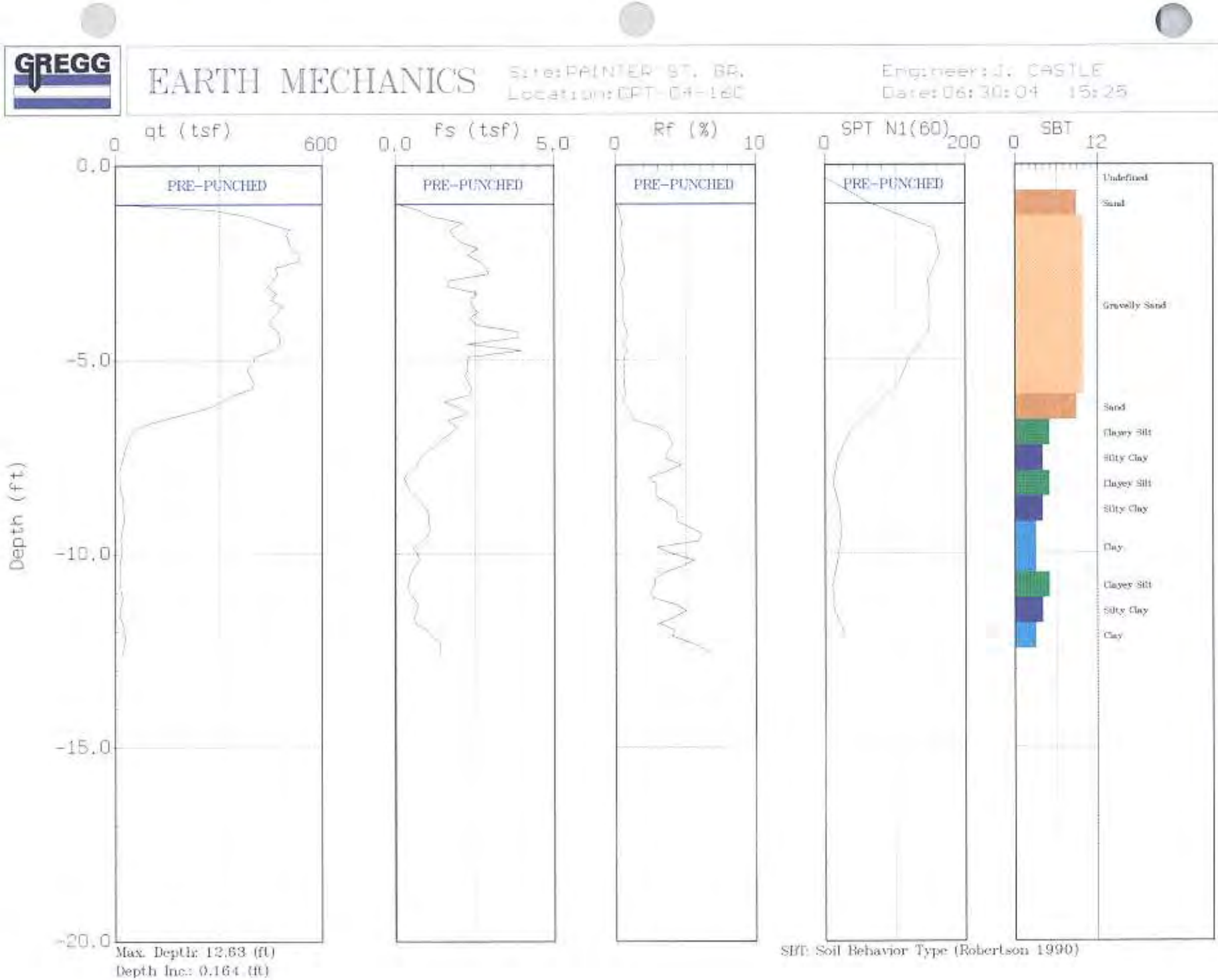
Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
7.14	402.4	2.46	0.61	1.9	10	127.3	0.45	0.45	0.00	1.49	64.2	95.8	UnDef	0.00
7.63	398.0	1.56	0.39	3.0	10	127.3	0.48	0.48	0.00	1.44	63.5	91.6	UnDef	0.00
8.12	356.5	2.36	0.66	-0.6	10	127.3	0.51	0.51	0.00	1.40	56.9	79.5	UnDef	0.00
8.61	313.1	2.29	0.73	-2.1	9	124.1	0.54	0.54	0.00	1.36	60.0	81.4	UnDef	0.00
9.10	304.2	2.17	0.71	-2.6	9	124.1	0.57	0.57	0.00	1.32	58.3	76.9	UnDef	0.00
9.60	324.1	1.72	0.53	5.7	10	127.3	0.60	0.60	0.00	1.29	51.7	66.6	UnDef	0.00
10.09	313.0	1.63	0.52	1.1	10	127.3	0.64	0.64	0.00	1.25	50.0	62.7	UnDef	0.00
10.58	282.4	1.53	0.54	0.3	10	127.3	0.67	0.67	0.00	1.22	45.1	55.2	UnDef	0.00
11.07	256.9	1.82	0.71	-1.1	9	124.1	0.70	0.70	0.00	1.20	49.2	58.9	UnDef	0.00
11.56	238.9	1.34	0.56	1.5	9	124.1	0.73	0.73	0.00	1.17	45.8	53.6	UnDef	0.00
12.06	173.1	1.18	0.68	3.4	9	124.1	0.76	0.76	0.00	1.15	33.2	38.1	UnDef	0.00
12.55	92.0	0.41	0.45	-1.3	8	120.9	0.79	0.79	0.00	1.13	22.0	24.8	UnDef	0.18
13.04	44.0	1.05	2.40	-2.5	6	114.6	0.82	0.82	0.00	1.11	16.8	18.6	3.45	0.19
13.53	16.3	0.86	5.28	2.3	3	111.4	0.85	0.85	0.00	1.09	15.6	16.9	1.23	0.00

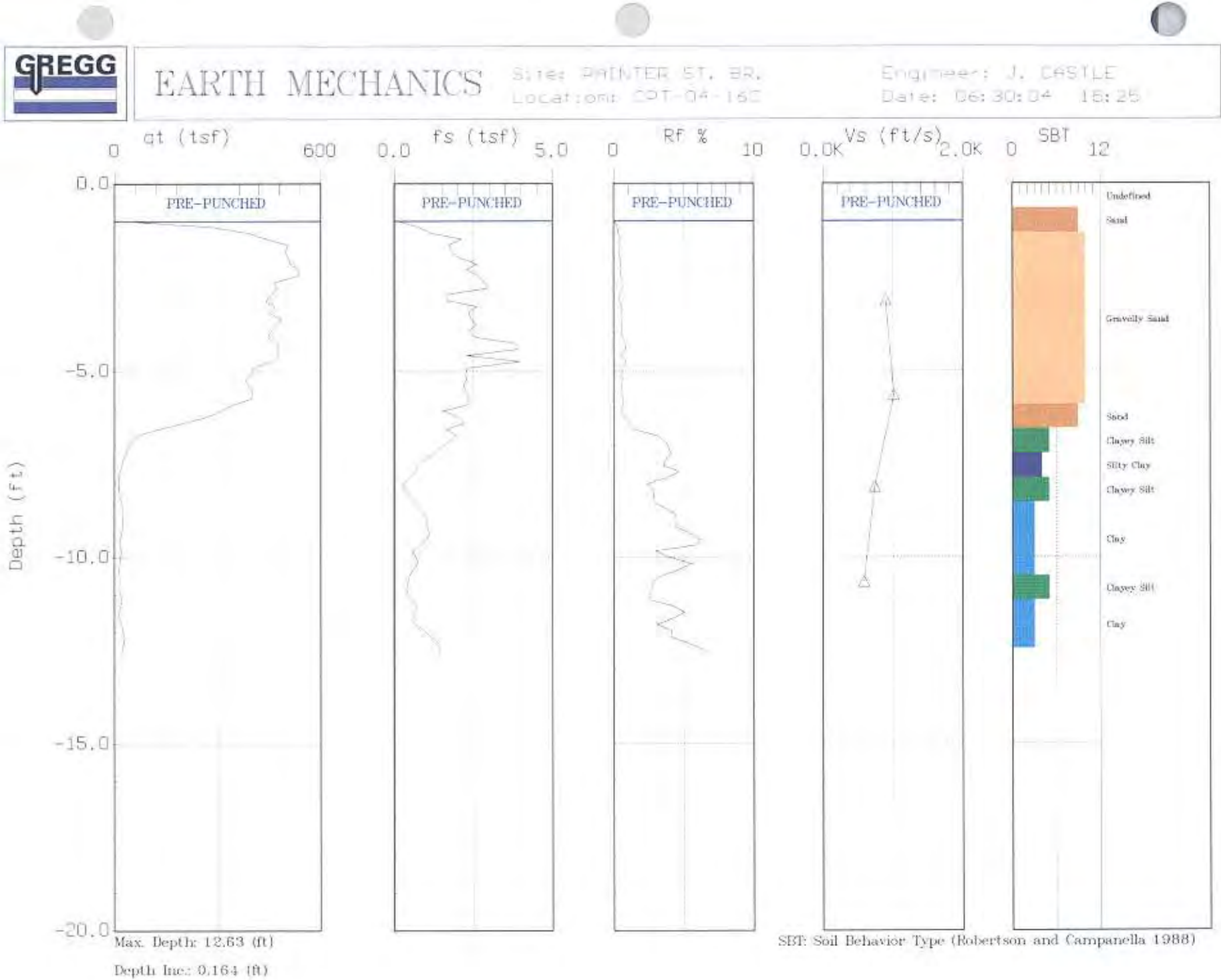
Gregg In Situ, Inc.
Interpretation Output - Release 1.00.19e
Run No: 04-0714-0947-2272
Job No: 04-226MA
Client: EARTH MECHANICS
Project: CPT SITE INVESTIGATION
Site: PAINTER ST. BR.
Location: CPT-04-15C
Engineer: J. CASTLE
CPT Date: 04/30/06
CPT Time: 14:34
CPT File: 226SC15C.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 7.62 (ft): 25.0
Su Nkt used: 12.50
Averaging Increment (m): 0.15
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
0.25	1.0E-15	0.00	5.8	0.10	0.2	UnDef	UnDef	100.0	UnDef	UnDef	1.0	UnDef	UnDef	UnDef
0.74	1.0E-15	0.00	1.3	0.10	0.2	UnDef	UnDef	100.0	UnDef	UnDef	1.0	UnDef	UnDef	UnDef
1.23	1.0E-15	0.00	0.4	0.10	0.2	UnDef	UnDef	100.0	UnDef	UnDef	1.0	UnDef	UnDef	UnDef
1.72	5.0E-02	0.01	1000.0	0.21	296.2	0.0	296.2	0.0	50	95.0	1.0	-0.25	0.0	59.2
2.21	5.0E-02	0.00	1000.0	0.28	383.4	0.0	383.4	0.0	50	95.0	1.0	-0.28	0.0	76.7
2.71	5.0E+00	0.00	1000.0	0.31	466.1	0.0	466.1	0.0	50	95.0	1.0	-0.29	0.0	77.7
3.20	5.0E+00	0.00	1000.0	0.22	748.9	0.0	748.9	0.0	50	95.0	1.0	-0.26	0.0	124.8
3.61	5.0E+00	0.00	1000.0	0.34	836.0	0.0	836.0	0.0	50	95.0	1.0	-0.30	0.0	139.3
4.02	5.0E+00	0.00	1000.0	0.52	786.3	0.0	786.3	0.0	50	95.0	1.0	-0.33	0.0	130.6
4.51	5.0E+00	0.00	1000.0	0.61	740.8	0.0	740.8	0.0	50	95.0	1.0	-0.35	0.0	120.8
5.00	5.0E+00	0.00	1000.0	0.34	714.5	0.0	714.5	0.0	50	95.0	1.0	-0.30	0.0	116.6
5.50	5.0E+00	0.00	1000.0	0.40	748.7	0.0	748.7	0.0	50	95.0	1.0	-0.31	0.0	122.1
5.99	5.0E+00	0.00	1000.0	0.42	730.4	0.0	730.4	0.0	50	95.0	1.0	-0.32	0.0	119.1
6.56	5.0E-02	0.00	1000.0	0.81	645.5	0.0	645.5	0.0	50	95.0	1.0	-0.38	0.0	126.3

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
7.14	5.0E+00	0.00	894.7	0.61	587.5	0.0	587.5	0.0	50	95.0	1.0	-0.34	0.0	95.8
7.63	5.0E+00	0.00	827.2	0.39	561.9	0.0	561.9	0.0	50	95.0	1.0	-0.29	0.0	91.6
8.12	5.0E+00	0.00	695.4	0.66	487.6	0.0	487.6	0.0	50	95.0	1.0	-0.33	0.0	79.5
8.61	5.0E-02	0.00	575.8	0.73	415.9	0.0	415.9	0.4	50	95.0	1.0	-0.32	0.0	81.4
9.10	5.0E-02	0.00	529.5	0.71	393.1	0.0	393.1	0.5	48	95.0	1.0	-0.31	0.0	76.9
9.60	5.0E+00	0.00	535.4	0.53	408.0	0.0	408.0	0.0	50	95.0	1.0	-0.28	0.0	66.6
10.09	5.0E+00	0.00	491.4	0.52	384.2	0.0	384.2	0.0	48	95.0	1.0	-0.27	0.0	62.7
10.58	5.0E+00	0.00	422.4	0.54	338.4	0.0	338.4	0.2	48	95.0	1.0	-0.26	0.0	55.2
11.07	5.0E-02	0.00	367.1	0.71	300.9	0.0	300.9	1.6	48	95.0	1.0	-0.28	0.0	58.9
11.56	5.0E-02	0.00	327.0	0.56	274.0	0.0	274.0	1.1	48	95.0	1.0	-0.24	0.0	53.6
12.06	5.0E-02	0.00	227.1	0.69	194.5	0.0	194.5	3.3	46	86.3	1.0	-0.23	0.0	38.1
12.55	5.0E-03	0.00	115.6	0.45	101.4	0.0	101.4	5.0	42	67.7	1.0	-0.13	0.0	24.8
13.04	5.0E-05	0.00	52.7	2.44	47.6	57.0	104.5	25.4	38	46.0	10.0	-0.22	9.6	28.2
13.53	5.0E-08	0.00	18.2	5.57	17.3	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef


GREGG
EARTH MECHANICS
Site:PAINTER ST. BR.
Location:CPT-04-16C
Engineer:J. CASTLE
Date:06:30:04 15:25
qt (tsf)
0
600
fs (tsf)
0.0
5.0
Rf (%)
0
10
SPT N1(60)
0
200
SBT
0
12
PRE-PUNCHED
PRE-PUNCHED
PRE-PUNCHED
PRE-PUNCHED
Undefined
Sand
Gravelly Sand
Sand
Clayey Silt
Silty Clay
Clayey Silt
Silty Clay
Clay
Clayey Silt
Silty Clay
Clay
Depth (ft)
0.0
-5.0
-10.0
-15.0
-20.0
Max. Depth: 12.63 (ft)
Depth Inc.: 0.164 (ft)
SBT: Soil Behavior Type (Robertson 1990)


GREGG
EARTH MECHANICS
Site: PRINTER ST. BR.
Location: CPT-04-15C
Engineer: J. CASTLE
Date: 06:30:04 15:25
qt (tsf)
0
600
fs (tsf)
0.0
5.0
Rf %
0
10
Vs (ft/s)
0.0K
2.0K
SBT
0
12
PRE-PUNCHED
PRE-PUNCHED
PRE-PUNCHED
PRE-PUNCHED
Undefined
Sand
Gravelly Sand
Sand
Clayey Silt
Silty Clay
Clayey Silt
Clay
Clayey Silt
Clay
Depth (ft)
0.0
-5.0
-10.0
-15.0
-20.0
Max. Depth: 12.63 (ft)
Depth Inc: 0.164 (ft)
SBT: Soil Behavior Type (Robertson and Campanella 1988)

Gregg In Situ, Inc.
Interpretation Output - Release 1.00.19e
Run No: 04-0714-0947-2327
Job No: 04-226MA
Client: EARTH MECHANICS
Project: CPT SITE INVESTIGATION
Site: PAINTER ST. BR.
Location: CPT-04-16C
Engineer: J. CASTLE
CPT Date: 04/30/06
CPT Time: 15:25
CPT File: 226SC16C.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 7.62 (ft): 25.0
Su Nkt used: 12.50
Averaging Increment (m): 0.15
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
0.25	0.0	0.00	0.00	0.0	UnDef	124.1	0.02	0.02	0.00	2.00	UnDef	UnDef	UnDef	0.00
0.74	0.0	0.00	0.00	0.0	UnDef	124.1	0.05	0.05	0.00	2.00	UnDef	UnDef	UnDef	0.00
1.23	371.0	1.32	0.35	3.8	10	127.3	0.08	0.08	0.00	2.00	59.2	118.4	UnDef	0.00
1.72	502.8	1.86	0.37	3.6	10	127.3	0.11	0.11	0.00	2.00	80.3	160.5	UnDef	0.00
2.21	527.5	2.49	0.47	10.3	10	127.3	0.14	0.14	0.00	2.00	84.2	168.4	UnDef	0.00
2.71	465.2	2.47	0.53	-0.5	10	127.3	0.17	0.17	0.00	2.00	74.3	148.5	UnDef	0.00
3.20	453.5	2.19	0.48	1.5	10	127.3	0.20	0.20	0.00	2.00	72.4	144.8	UnDef	0.00
3.61	479.3	2.49	0.52	5.1	10	127.3	0.23	0.23	0.00	2.00	76.5	153.0	UnDef	0.00
4.02	459.2	2.90	0.63	2.0	10	127.3	0.25	0.25	0.00	1.98	73.3	145.4	UnDef	0.00
4.51	470.4	3.37	0.72	1.1	10	127.3	0.29	0.29	0.00	1.87	75.1	140.5	UnDef	0.00
5.00	393.2	2.28	0.58	0.4	10	127.3	0.32	0.32	0.00	1.78	62.8	111.5	UnDef	0.00
5.50	394.6	2.29	0.58	-0.2	10	127.3	0.35	0.35	0.00	1.69	63.0	106.7	UnDef	0.00
5.99	305.1	1.95	0.64	-1.3	9	124.1	0.38	0.38	0.00	1.62	58.4	94.9	UnDef	0.00
6.56	109.0	1.88	1.73	-1.1	7	117.8	0.41	0.41	0.00	1.55	34.8	54.1	UnDef	0.00

Gregg In Situ, Inc.
Run No: 04-0714-0947-2327
CPT File: 226SC16C.COR

04-16C

Depth (ft)	AvgQt (tsf)	AvgFs (tsf)	AvgRf (%)	AvgUd (ft)	SBT	U.Wt. pcf	TStress (tsf)	EStress (tsf)	Ueq (tsf)	Cn	N60 (blows/ft)	(N1)60 (blows/ft)	Su (tsf)	CRR
7.14	30.8	1.20	3.89	1.4	5	114.6	0.45	0.45	0.00	1.50	14.8	22.1	2.43	0.24
7.63	15.6	0.61	3.92	-7.6	3	111.4	0.47	0.47	0.00	1.45	15.0	21.7	1.21	0.21
8.12	12.8	0.35	2.72	-8.4	5	114.6	0.50	0.50	0.00	1.41	6.1	8.6	0.98	0.14
8.61	21.9	0.80	3.65	-6.8	4	114.6	0.53	0.53	0.00	1.37	14.0	19.2	1.71	0.35
9.10	22.5	1.05	4.67	-7.2	3	111.4	0.56	0.56	0.00	1.34	21.6	28.9	1.76	0.38
9.60	16.4	0.80	4.88	-8.9	3	111.4	0.59	0.59	0.00	1.31	15.7	20.5	1.27	0.00
10.09	14.3	0.67	4.66	-4.3	3	111.4	0.61	0.61	0.00	1.28	13.7	17.5	1.10	0.00
10.58	14.3	0.42	2.98	-1.5	5	114.6	0.64	0.64	0.00	1.25	6.8	8.5	1.09	0.14
11.07	17.8	0.55	3.08	-0.7	5	114.6	0.67	0.67	0.00	1.22	8.5	10.4	1.37	0.19
11.56	15.8	0.62	3.91	-2.3	3	111.4	0.70	0.70	0.00	1.20	15.1	18.1	1.21	0.15
12.06	25.8	1.16	4.49	-0.2	3	111.4	0.72	0.72	0.00	1.17	24.7	29.0	2.00	0.38

Gregg In Situ, Inc.
Interpretation Output - Release 1.00.19e
Run No: 04-0714-0947-2327
Job No: 04-226MA
Client: EARTH MECHANICS
Project: CPT SITE INVESTIGATION
Site: PAINTER ST. BR.
Location: CPT-04-16C
Engineer: J. CASTLE
CPT Date: 04/30/06
CPT Time: 15:25
CPT File: 226SC16C.COR
Northing (m): 0.000
Easting (m): 0.000
Elevation (m): 0.000

Water Table (m): 7.62 (ft): 25.0
Su Nkt used: 12.50
Averaging Increment (m): 0.15
Phi Method : Robertson and Campanella, 1983
Dr Method : Jamiolkowski - All Sands
State Parameter M: 1.20
Used Unit Weights Assigned to Soil Zones
Values of 1.0E9 or UnDef are printed for parameters that are not valid for the material type (SBT)

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
0.25	1.0E-15	0.00	5.8	0.10	0.2	UnDef	UnDef	100.0	UnDef	UnDef	1.0	UnDef	UnDef	UnDef
0.74	1.0E-15	0.00	1.3	0.10	0.2	UnDef	UnDef	100.0	UnDef	UnDef	1.0	UnDef	UnDef	UnDef
1.23	5.0E+00	0.00	1000.0	0.35	710.7	0.0	710.7	0.0	50	95.0	1.0	-0.30	0.0	118.4
1.72	5.0E+00	0.00	1000.0	0.37	963.0	0.0	963.0	0.0	50	95.0	1.0	-0.30	0.0	160.5
2.21	5.0E+00	0.00	1000.0	0.47	1010.3	0.0	1010.3	0.0	50	95.0	1.0	-0.33	0.0	168.4
2.71	5.0E+00	0.00	1000.0	0.53	891.1	0.0	891.1	0.0	50	95.0	1.0	-0.34	0.0	148.5
3.20	5.0E+00	0.00	1000.0	0.48	868.5	0.0	868.5	0.0	50	95.0	1.0	-0.33	0.0	144.8
3.61	5.0E+00	0.00	1000.0	0.52	917.9	0.0	917.9	0.0	50	95.0	1.0	-0.34	0.0	153.0
4.02	5.0E+00	0.00	1000.0	0.63	879.6	0.0	879.6	0.0	50	95.0	1.0	-0.36	0.0	145.4
4.51	5.0E+00	0.00	1000.0	0.72	861.4	0.0	861.4	0.0	50	95.0	1.0	-0.37	0.0	140.5
5.00	5.0E+00	0.00	1000.0	0.58	683.5	0.0	683.5	0.0	50	95.0	1.0	-0.35	0.0	111.5
5.50	5.0E+00	0.00	1000.0	0.58	654.4	0.0	654.4	0.0	50	95.0	1.0	-0.35	0.0	106.7
5.99	5.0E-02	0.00	803.6	0.64	484.8	0.0	484.8	0.0	50	95.0	1.0	-0.34	0.0	94.9
6.56	5.0E-04	0.00	262.4	1.73	165.8	14.8	180.6	8.1	46	81.8	1.0	-0.35	2.9	57.0

04-16 c

Depth (ft)	k (cm/s)	Bq	Qtn	Rfn	Qc1N	DeltaQc1N	Qc1Ncs	Fc (%)	Phi (Deg)	Dr (%)	OCR	State Param	Del(n1)60	(N1)60cs
7.14	5.0E-06	0.00	68.0	3.95	45.1	74.5	119.6	28.3	UnDef	UnDef	10.0	UnDef	14.1	36.2
7.63	5.0E-08	-0.02	31.9	4.04	22.2	88.8	111.0	39.6	UnDef	UnDef	6.0	UnDef	21.7	43.4
8.12	5.0E-06	-0.02	24.4	2.83	17.7	70.6	88.3	38.9	UnDef	UnDef	6.0	UnDef	8.6	17.3
8.61	5.0E-07	-0.01	40.2	3.74	29.4	113.7	143.1	34.8	UnDef	UnDef	6.0	UnDef	18.9	38.1
9.10	5.0E-08	-0.01	39.3	4.79	29.5	118.0	147.5	38.9	UnDef	UnDef	6.0	UnDef	28.9	57.8
9.60	5.0E-08	-0.02	27.0	5.06	21.0	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
10.09	5.0E-08	-0.01	22.3	4.87	17.9	UnDef	UnDef	100.0	UnDef	UnDef	6.0	UnDef	UnDef	UnDef
10.58	5.0E-06	0.00	21.2	3.12	17.4	69.7	87.1	42.8	UnDef	UnDef	6.0	UnDef	8.5	17.1
11.07	5.0E-06	0.00	25.6	3.20	21.3	85.3	106.7	39.8	UnDef	UnDef	6.0	UnDef	10.4	20.9
11.56	5.0E-08	0.00	21.6	4.09	18.5	74.0	92.5	46.8	UnDef	UnDef	6.0	UnDef	18.1	36.2
12.06	5.0E-08	0.00	34.6	4.62	29.6	118.5	148.1	40.4	UnDef	UnDef	6.0	UnDef	29.0	58.0

APPENDIX SEISMIC

Seismic Cone Penetrometer Testing
(SCPTu)

Gregg In Situ, Inc. uses a modified CPT cone that contains a built in seismometer to measure compression and shear wave velocities in addition to the standard piezocone parameters (q_c, f_s, and u_2). Therefore, four independent readings are compiled with depth in a single sounding. The standard CPT parameters are recorded continuously while the seismic test is usually performed at 5-foot intervals.

Shear waves are generated by striking a seismic beam coupled to the ground surface by a hydraulic cylinder under the CPT rig, *Figure SCPTu*. Compression waves are generated by striking an auger in the ground. The sledgehammer that strikes the beam/auger acts as a trigger, initiating the recording of the seismic wave trace. Before measurements are taken, the rods are decoupled from the CPT rig to prevent energy transmission down the rods.

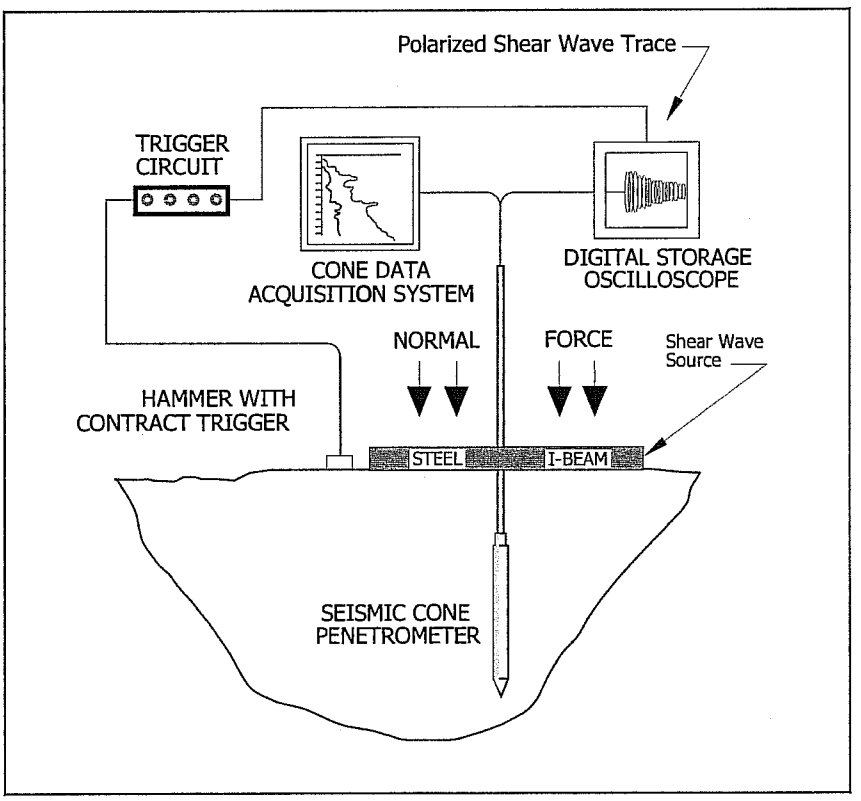


Figure SCPTu

Geophones in the body of the piezocone recognize the arriving waves generated at the ground surface, *Figure Seismic*. Any waves received by the geophones on the cone penetrometer are sent back up to the truck to be displayed on an oscilloscope. On site software then plots the wave amplitude versus time to calculate wave velocities.

At least two waves are recorded for each test depth so the operator can check consistency of the waveforms. Shear wave data is sampled at a frequency of 20kHz (20,000 samples per second) and compression wave data is sampled at 50kHz (50,000 samples per second). To maintain a desired signal resolution, the input sensitivity (gain) is increased with depth.

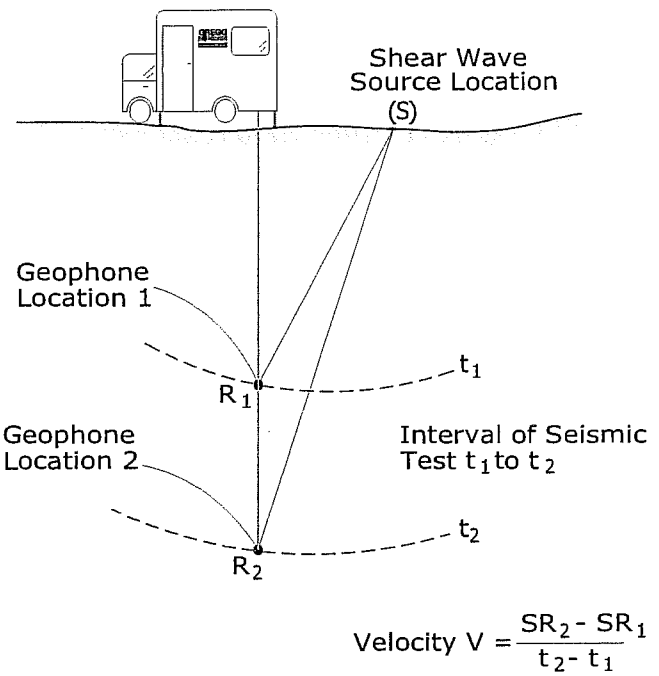


Figure Seismic

Offset distances of the beam from the cone and the location of the geophone are all taken into account in calculations.

The shear wave velocity (V_s) provides information about small-strain stiffness while the penetration data provides information about large-strain failures. From interval shear wave velocity (V_s) and the mass density (ρ) of a soil layer, the dynamic shear modulus (G_o) of the soil can be calculated in a specific depth interval. The dynamic shear modulus (G_0) is a key parameter for the analysis of soil behavior in response to dynamic loading from earthquakes, ice, vibrating machine foundations, waves and wind.

A summary of the data collected including the depth and location identification is displayed in Table 1 and graphical formats and can be found with the corresponding CPT plot.

For a detailed reference on seismic CPT, refer to Robertson et. al., 1986.

GREGG

GIS Project No: 04-226MA
Client: Earth Mechanics
Site: Painter Street Bridge
Location SCPT-04-15C
Sounding Date: June 30, 2004

Shear Wave Velocity Calculations

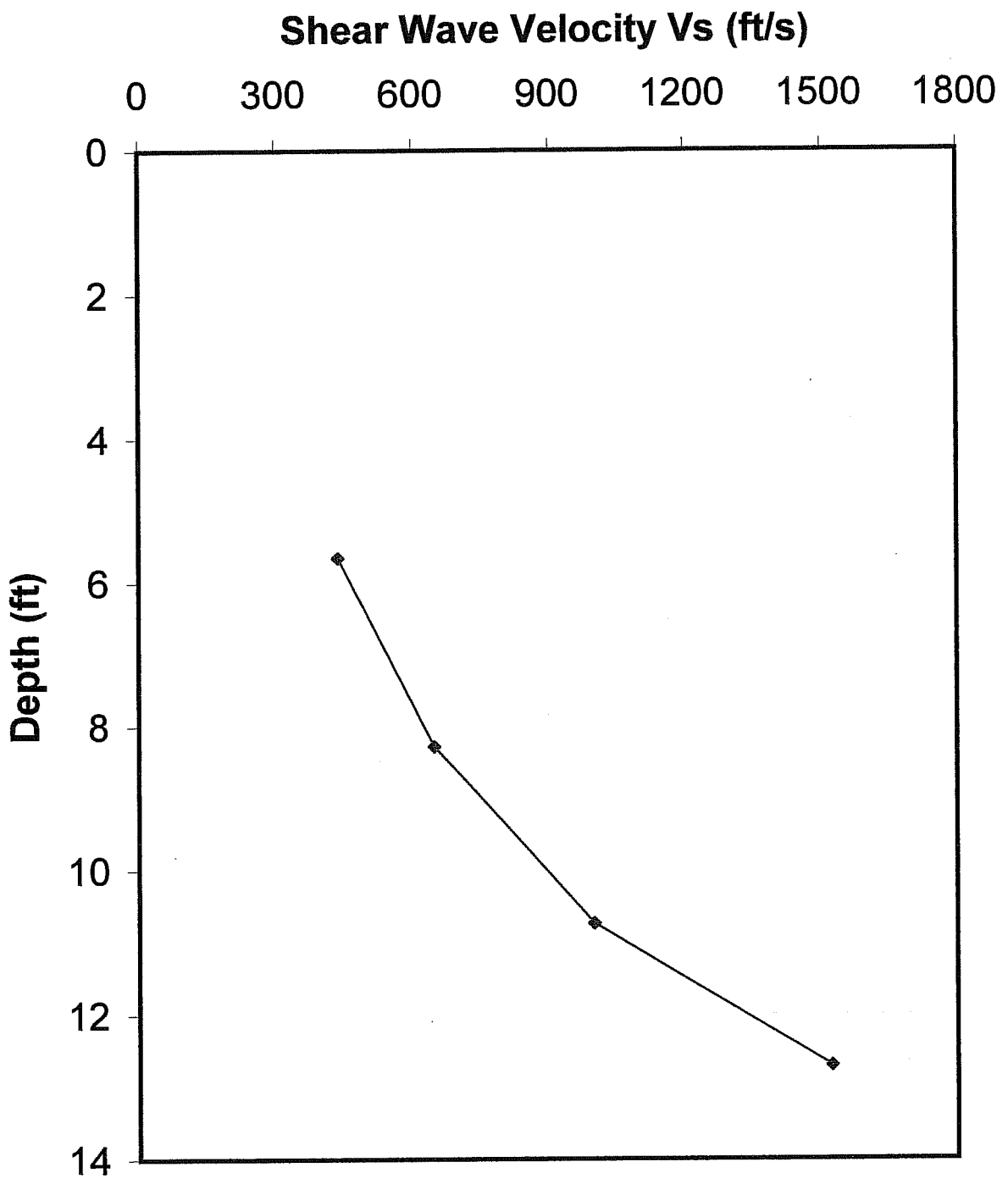
Geophone Offset (feet) 0.66
Source Offset (feet) 1.50

Test Depth (feet)	Geophone Depth (feet)	Ray Path (feet)	Incremental Distance (feet)	Time Interval (ms)	Interval Velocity (ft/s)	Interval Depth (feet)	Interval Depth (feet)	Vs (ft/s)	Vs (m/s)	Interval Depth (m)
5.08	4.42	4.67								
7.54	6.88	7.05	2.37	5.41	439	5.65	5.65	439	134	1.72
10.33	9.67	9.79	2.74	4.23	649	8.28	8.28	649	198	2.52
12.46	11.80	11.90	2.11	2.11	1000	10.74	10.74	1000	305	3.27
14.27	13.61	13.70	1.80	1.18	1523	12.71	12.71	1523	464	3.87

Shear Wave Velocity Profile

GREGG

Client: 04-226ma Earth Mechanics
Site: Painter Street Bridge
Location: SCPT-4-15C
Sounding Date: June 30, 2004



GREGG

GIS Project No: 04-226MA
Client: Earth Mechanics
Site: Painter Street Bridge
Location SCPT-04-16C
Sounding Date: June 30, 2004

Shear Wave Velocity Calculations

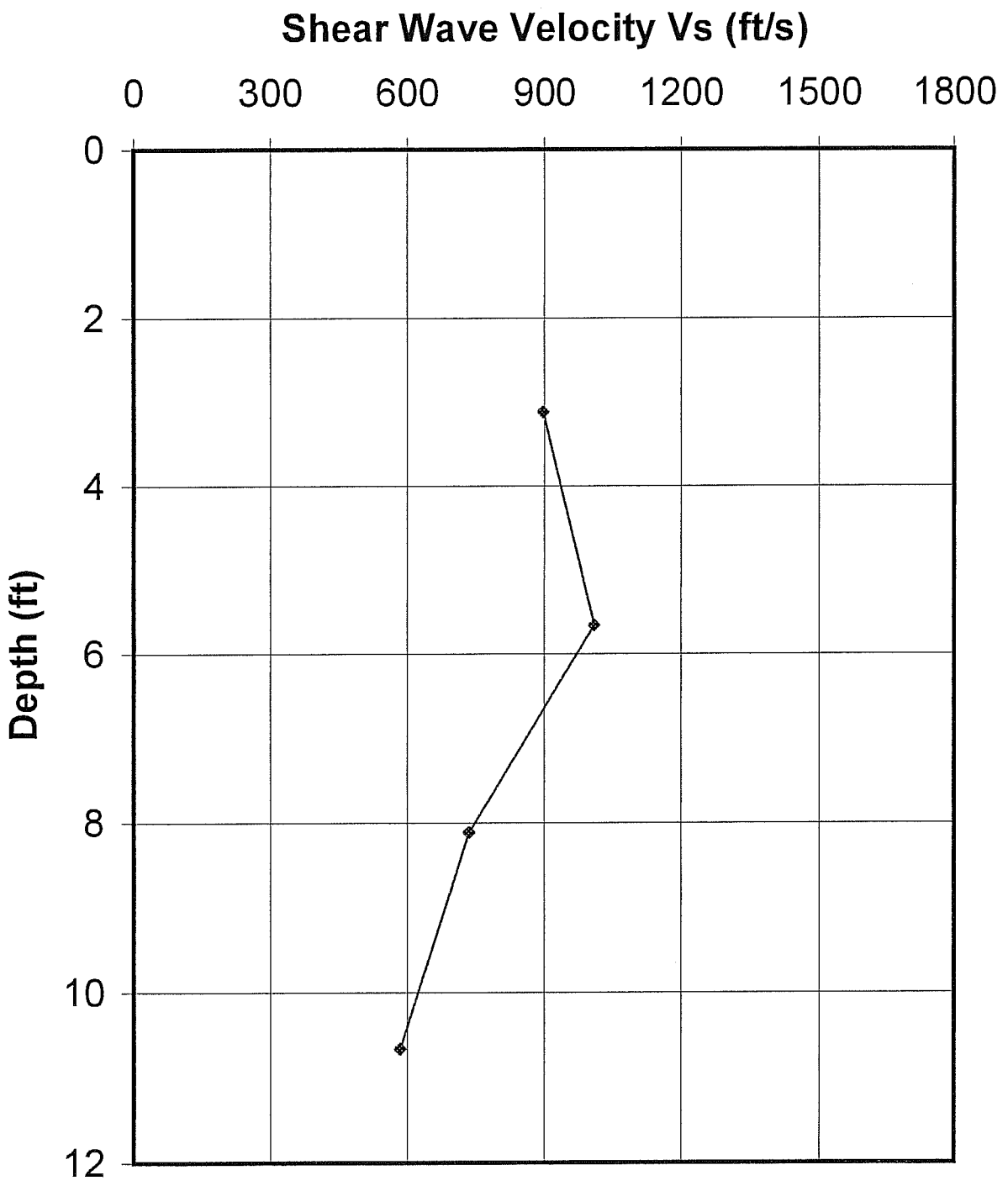
Geophone Offset	(feet)	0.66
Source Offset	(feet)	1.50

Test Depth (feet)	Geophone Depth (feet)	Ray Path (feet)	Incremental Distance (feet)	Time Interval (ms)	Interval Velocity (ft/s)	Interval Depth (feet)
2.46	1.80	2.35				
5.08	4.42	4.67	2.33	2.59	898	3.11
7.54	6.88	7.05	2.37	2.35	1010	5.65
10.00	9.34	9.46	2.42	3.29	735	8.11
12.63	11.97	12.07	2.60	4.46	584	10.66

Shear Wave Velocity Profile

GREGG

Client: 04-226ma Earth Mechanics
Site: Painter Street Bridge
Location: SCPT-4-16C
Sounding Date: June 30, 2004



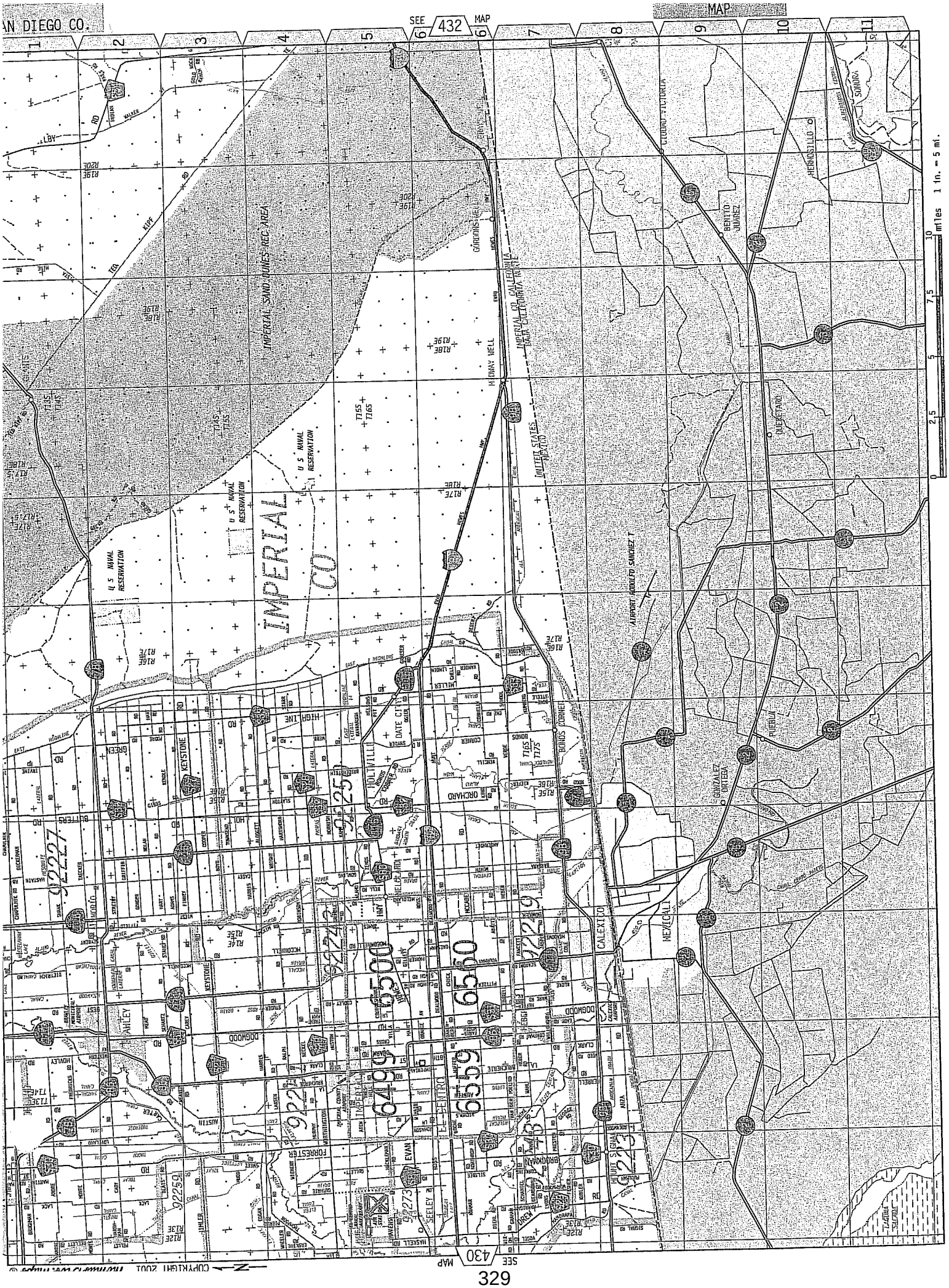
Caltrans Bridge 58-0215
Meloland Rd. OC, Imperial Co.

Caltrans Bridge 58-0215, Meloland Rd. OC, Imperial Co.

Meloland Rd bridge is one of the Caltrans bridges that are seismically instrumented. The field investigation for this bridge, conducted on 8/20/04, consisted of 2 soil borings (04-17A and 04-18A), 2 PMT borings (04-17P and 04-18P), and 1 CPT sounding (04-18C). Soil and PMT borings were drilled by 2R Drilling of Chino. CPT were performed by Holguin, Fahan, and Associates (HFA) of Orange. Locations 04-17 and 04-17P were located on the south bridge abutment in the north-bound lane, near the approach slab and locations 04-18, 04-18P, and 04-18C were located on the north bridge abutment, in the north-bound lane, also near the approach slab.

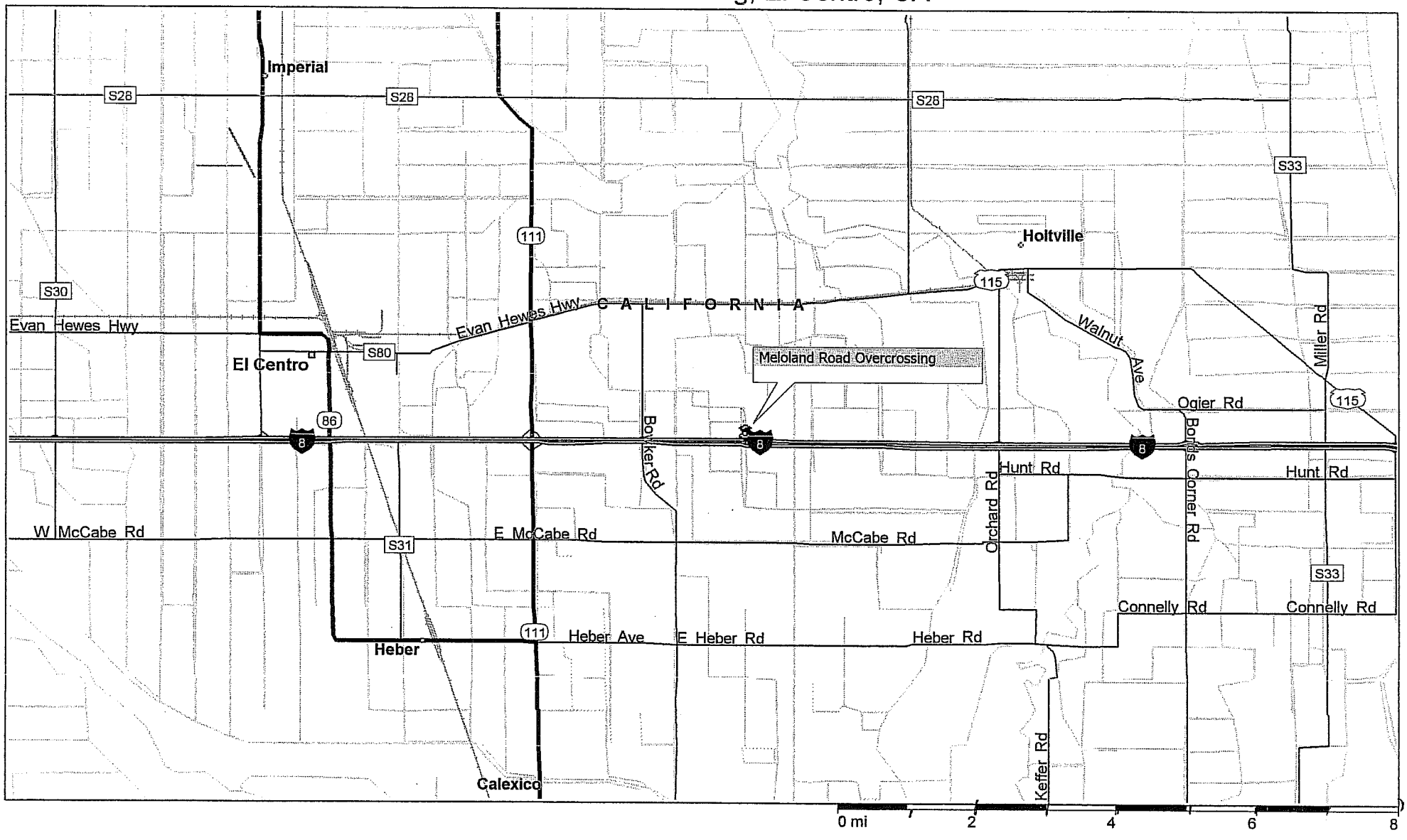
Geotechnical soil sampling consisted of ring samples collected using a Modified California sampler and small bulk samples collected with a SPT sampler. Samples were taken at 2.5-ft intervals to 15 ft depth and at 20 ft depth. No groundwater was encountered during the investigation. One pressuremeter test was performed at the south end and two tests at the north end. No CPT boring was conducted at the south abutment due to equipment malfunction. HFA returned to the site at a later date to conduct the north abutment CPT investigation.

ker Road
/4 MILES



AN DIEGO CO.
SEE 432 MAP
MAP
IMPERIAL SAND DUNES REC AREA
U S NAVAL RESERVATION
IMPERIAL CO
IMPERIAL CO CALIFORNIA
BAJA CALIFORNIA NORTE
UNITED STATES
MEXICO
CIUDAD VICTORIA
BENITO JUAREZ
HERMOSILLO
SONORA
QUERETARO
PUEBLA
GONZALEZ ORTEGA
MEXICALI
CALEXICO
AIRPORT RODOLFO SANCHEZ T
MIDWAY WELL
GORDONS WELL
HOLTVILLE
DATE CITY
BONDS CORNER
ORCHARD
KEYSTONE
HIGHLINE
DOGWOOD
FORRESTER
EVAN
SEELEY
EL CENTRO
BROCKMAN
DREW
92227
92250
92249
92229
92259
92273
6499
6500
6550
6559
miles 1 in. = 5 mi.
0 2.5 5 7.5 10
SEE 430 MAP
COPYRIGHT 2001

Meloland Overcrossing, El Centro, CA



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I-008-2(23)117

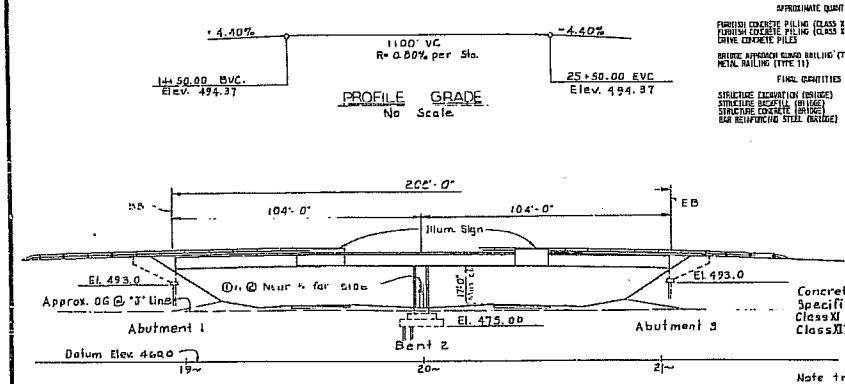
DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	Imp	8	240.6/R54.3	208	338

APPROXIMATE QUANTITIES

FURNISH CONCRETE PILING (CLASS 45)	990	LF
FURNISH CONCRETE PILING (CLASS XII)	1,120	LF
DRIVE CONCRETE PILES	39	EA
BRIDGE APPROACH GUARD RAILING (TYPE 8)	234	LF
METAL RAILING (TYPE 11)	496	LF

FINAL QUANTITIES

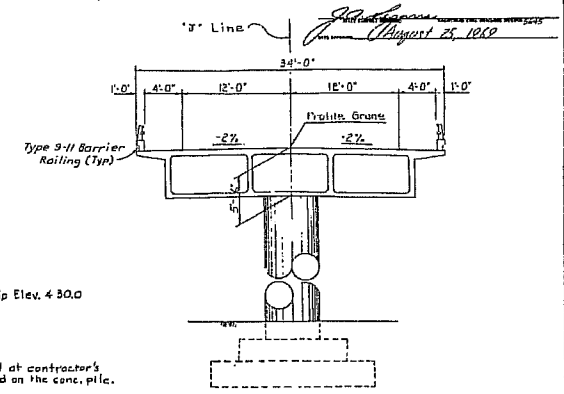
STRUCTURE EXCAVATION (BRIDGE)	180	CY
STRUCTURE BACKFILL (BRIDGE)	130	CY
STRUCTURE CONCRETE (BRIDGE)	555	CY
BAR REINFORCING STEEL (BRIDGE)	160,000	LB



ELEVATION
Scale 1"=20'

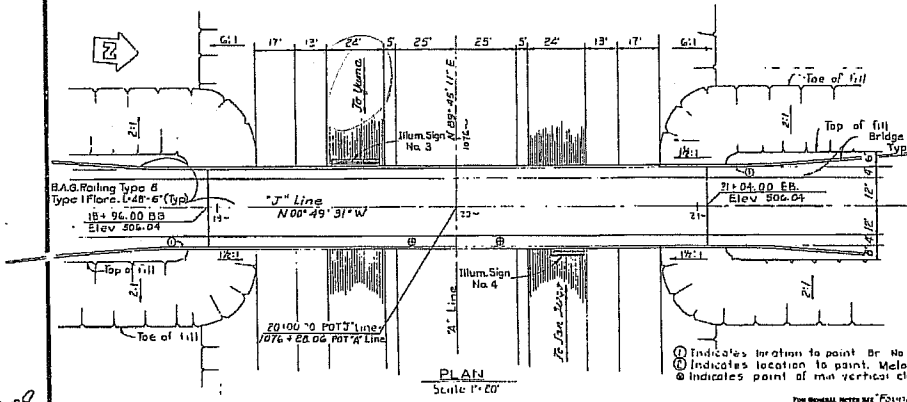
Concrete piles (45 ton bearing)
Specified tip elev. 435.0 Estimated tip Elev. 430.0
ClassXI @ Abutments
ClassXII @ Bents

Note treated timber piles may be used at contractor's option. The engineers estimated is based on the conc. pile.



TYPICAL SECTION
Scale 3/4"=1'-0"

AS BUILT PLANS
Contract No. 11-029821-4
Date Completed 7-1-71
Document No. A0000853



PLAN
Scale 1"=20'

① Indicates location to point Br No 58-215 and year.
Ⓒ Indicates location to point, Meloland Rd. O.C.
Ⓟ Indicates point of min vertical clearance.

For General Notes see "Foundation Plan" sheet
For Log of Bore Holes see Alternative

INDEX TO PLANS

SHEET NO	TITLE
1	General Plan
2	Grid Grades
3	Foundation Plan
4	Abutment Details
5	Bent Details
6	Typical Section & Girder Layout
7	Girder Reinforcement
8	Corrosion Resistant Concrete Pile Details 45 Ton
9	Log of Test Borings
	Std Plans Dated July 1969
A62-B2	Exc. & Backfill Br. & Walls-Limits of Payment
B0-1	Bridge Details
B0-5	"
B7-1	Box Grd. Details
B11-96	B.A.G.R. Type 8 (Layout)
B11-97	" " (Details)
B11-43	Metal Railing Det.-Types 9, 10 & 11
B11-45	Barrier Railing Type 9-11

NO AS BUILT
CORRECTIONS BY R.J. Druill
CONTRACT NO. 029 823

BRIDGE DEPARTMENT
··· DESIGN SECTION ··· 14

DESIGN	In Charge	W. E. Stone, Jr.
DETAILS	In Charge	W. E. Stone, Jr.
LAYOUT	In Charge	W. E. Stone, Jr.
QUANTITIES	In Charge	W. E. Stone, Jr.
SPECIFICATIONS	In Charge	

Approved for Bridge Engineer: O. Pendleton
Bridge Engineer: O. Pendleton

STATE OF CALIFORNIA
HIGHWAY TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

MELOLAND ROAD OVERCROSSING

LOCATED APPROX. 3.1 MILES E. OF EXISTING STATE ROUTE 111 AND APPROX. 2.1 MILES S. OF EXISTING U.S. SIGN ROUTE 80
IN IMPERIAL COUNTY

GENERAL PLAN

BRIDGE NO.	POST MILE	TELEPHONE NO.	SHEET	NO.
58-215	43.6	58215-1	1	9

WO 029821
CU 11205

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 OF THE DIRECTOR OF PUBLIC WORKS.

DATE 10/6/71 SIGNATURE [illegible] TITLE DRAFT

331

208

1968 D
1969 Contract Bridge

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
11	Imp.	8	R20.6/R26.3	210	304

A.P. Bonzano
Assistant Bridge Engineer
August 25, 1960

UTILITIES

① PP" 401348 H
4 wires & Tel Cable @ El 502± NES

② PP" 401347 H
4 wires El 51 Cable @ El 502± NES

③ PP" 562510
3 wires @ El 510± NES
4 wires @ El 515± NES

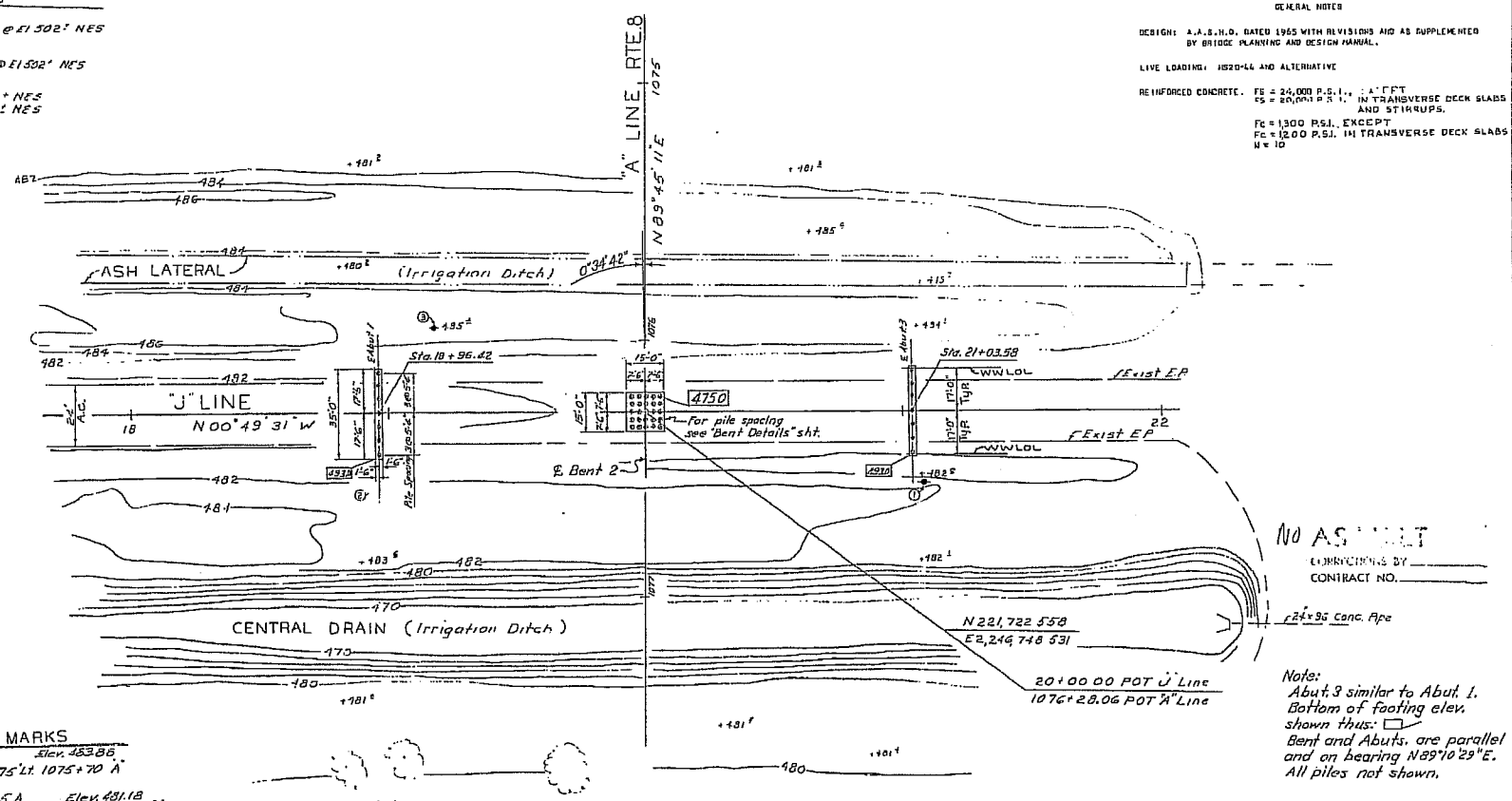
GENERAL NOTES

DESIGN: A.A.S.H.O. DATED 1965 WITH REVISIONS AND AS SUPPLEMENTED BY BRIDGE PLANNING AND DESIGN MANUAL.

LIVE LOADING: HS20-44 AND ALTERNATIVE

REINFORCED CONCRETE. f'_c = 24,000 P.S.I. EXCEPT f'_c = 20,000 P.S.I. IN TRANSVERSE DECK SLABS AND STIRRUPS.

f'_c = 1,300 P.S.I. EXCEPT f'_c = 1200 P.S.I. IN TRANSVERSE DECK SLABS N≠10



No AS BUILT
CORRECTIONS BY _____
CONTRACT NO. _____

BENCH MARKS

B.M. "80" Elev. 483.86
Chsld "O" on hdwl 275' Lt. 1075+70 A

B.M. "A S Mon 27C-215 A" Elev. 481.18
RR spike in J Rd 156' 31' Lt. 1076+25.41 A
N 221,878.859 E 2,246,745.209

A.S. BUILT PLANS
Contract No. 11-0.1 8
Date Completed 7-7-65
Document No. 100815

BRIDGE DEPARTMENT	
DESIGN SECTION	14
Project Engr.	C. Pauley
DESIGN	by DHC Lindsey
DETAILS	by A.E. Shepherd Date 4-25-60 Checked by Ken Anderson
QUANTITIES	by Date

STATE OF CALIFORNIA
HIGHWAY TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

MELOLAND ROAD OVERCROSSING

FOUNDATION PLAN

BRIDGE NO.	DRAWING NO.	SCALE	SHEET	OF
58-215	58215-3	1"=2'	3	9

REVISION DATES (PRELIMINARY ERASE ONLY)

WO

Stamped and pencil boxes below earlier revision dates

E-58

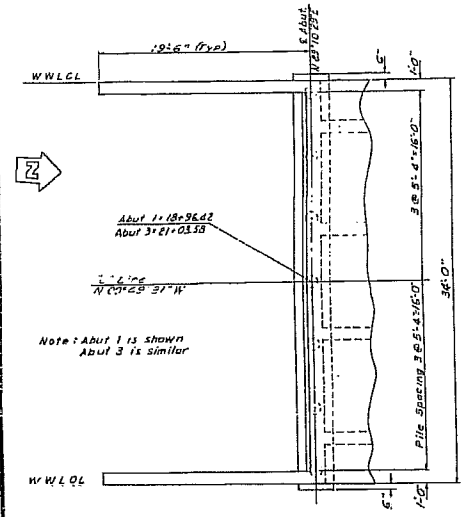
332

210

Dist.	County	Route	Post Mile/Kilometer	Sheet No.	Total Sheets
11	Imp.	8	R23.8/R38.3	211	300

A. P. Bygum
August 25, 1970

300.04



PLAN
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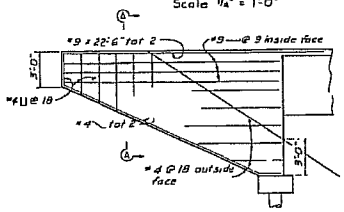

WINGWALL ELEVATION
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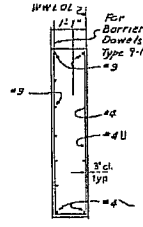

SECTION A-A
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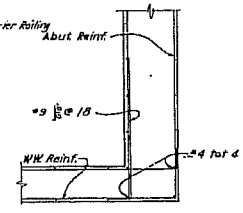

CORNER DETAIL
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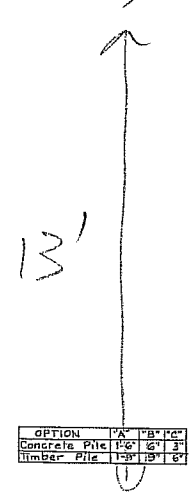
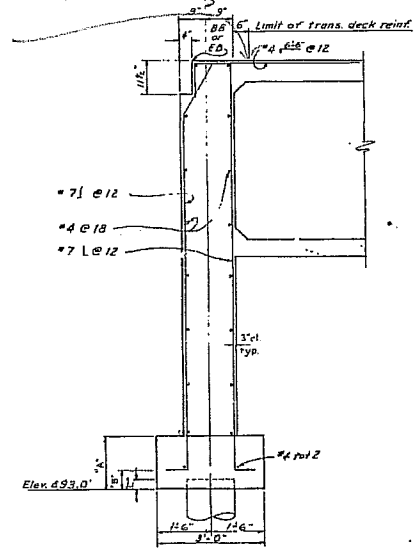


OPTION	"A"	"B"	"C"
Concrete Pile	1'-6"	6"	3"
Timber Pile	1'-9"	9"	6"



ABUTMENT SECTION
Scale 3/4" = 1'-0"

NO AS BUILT
CORRECTIONS BY
CONTRACT NO.

AS BUILT PLANS
Contract No. 11-029814
Date Completed 7-1-71
Document No. A00002853

DESIGN SECTION 14
Project Engineer O. Bender
DESIGN — 2nd C. Conley — Asst. H. A. Shelby
DETAILS — 1st — Asst. H. A. Shelby — 8-12-68
QUANTITIES — 1st Syed Hasanain — Asst. Leo Schumann

STATE OF CALIFORNIA
TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

MELOLAND ROAD OVERCROSSING
ABUTMENT DETAILS

Bridge No.	Post Mile	Drawing No.	Sheet	Of
58-215	43.6	58215-4	4	9

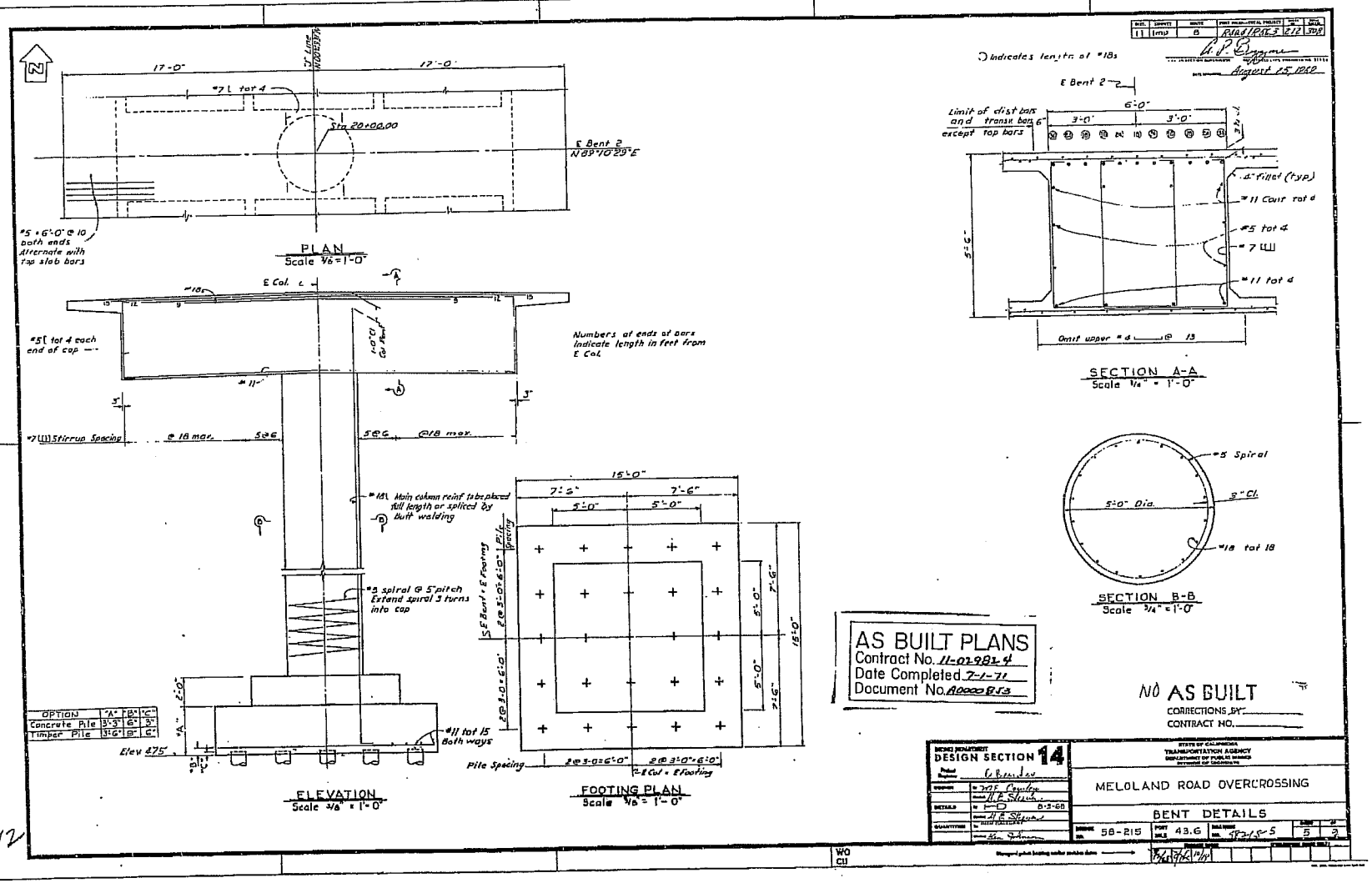
WO
CU

Checked prior bearing number revision dates

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 PUBLIC WORKS.

DATE 10/5/71 SIGNATURE [signature] TITLE ASST.

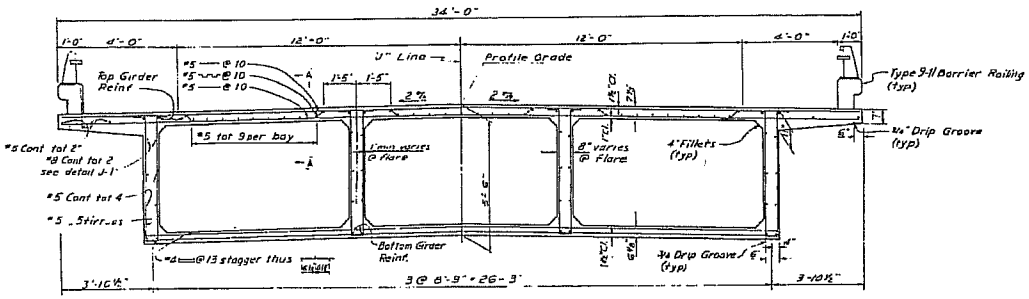
211



2/2

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 PUBLIC WORKS.

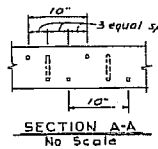
NAME _____ SIGNATURE _____ TITLE _____



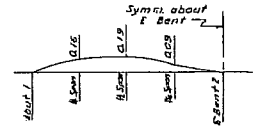
TYPICAL SECTION
Scale ½" = 1'-0"

Note: For girder reinf not shown see "Girder Reinforcement" sht
For Details D-1, V-1 & J-1 see "Box Girder Details No. 1" sheet.
For Barrier Railing Reinf see "Barrier Railing Type 9-11" sheet

Note: At contractor's option the soffit maybe cast on a straight line between outside edges of box girder. Slab thickness to remain as shown. Stem and stirrup heights to vary to meet finished grades and provide clearances shown.

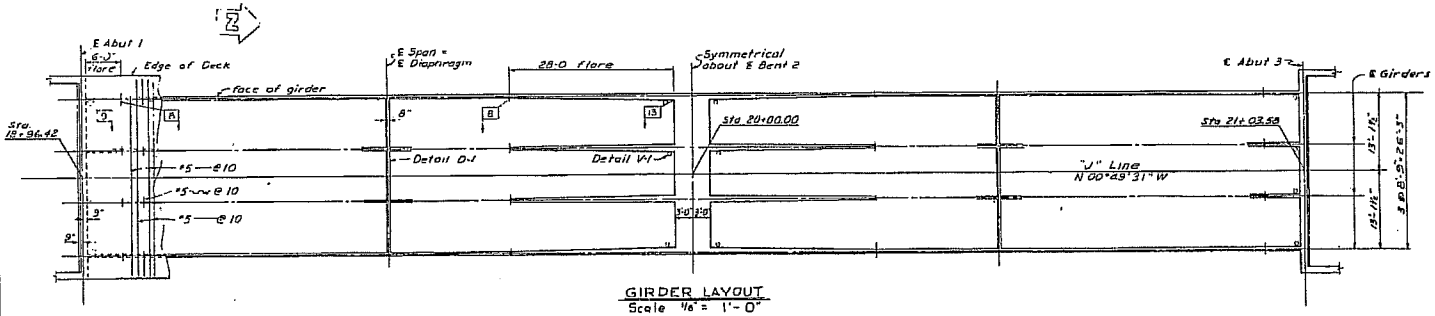


SECTION A-A
No Scale

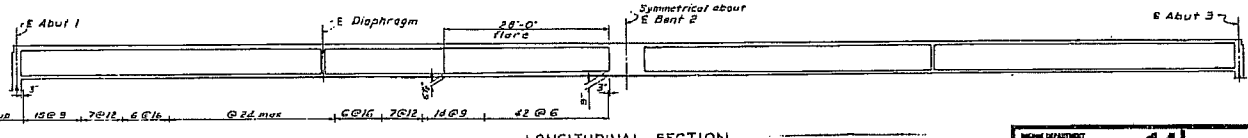


CAMBER DIAGRAM
No Scale

Total girder deflection due to dead loads. The amount of camber for construction will be determined by the Engineer.



GIRDER LAYOUT
Scale 1/16" = 1'-0"



LONGITUDINAL SECTION
Scale : 1/8" = 1'-0"

NO AS BUILT
CORRECTIONS BY
CONTRACT NO.

AS BUILT PLANS
Contract No. 11-021982 4
Date Completed 7-1-71
Document No. A0002853

DESIGN DEPARTMENT
DESIGN SECTION 14
Project Engr O. Bender
Design W. Tate Crosby
Detailed M. C. Stovall
Checked M. E. Shaw
Quantities W. Reid Habrana
Checked C. J. Hoffman
Detailed 8-12-68

STATE OF CALIFORNIA
TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

MELCLAND ROAD OVERCROSSING

TYPICAL SECTION & GIRDER LAYOUT

BRIDGE NO. 58-215
POST MILE 43.6
DRAWING NO. 5 of 5 C-6
SHEET G 9

RECOMMENDED [illegible]
APPROVED 8/24/72

WO
CH

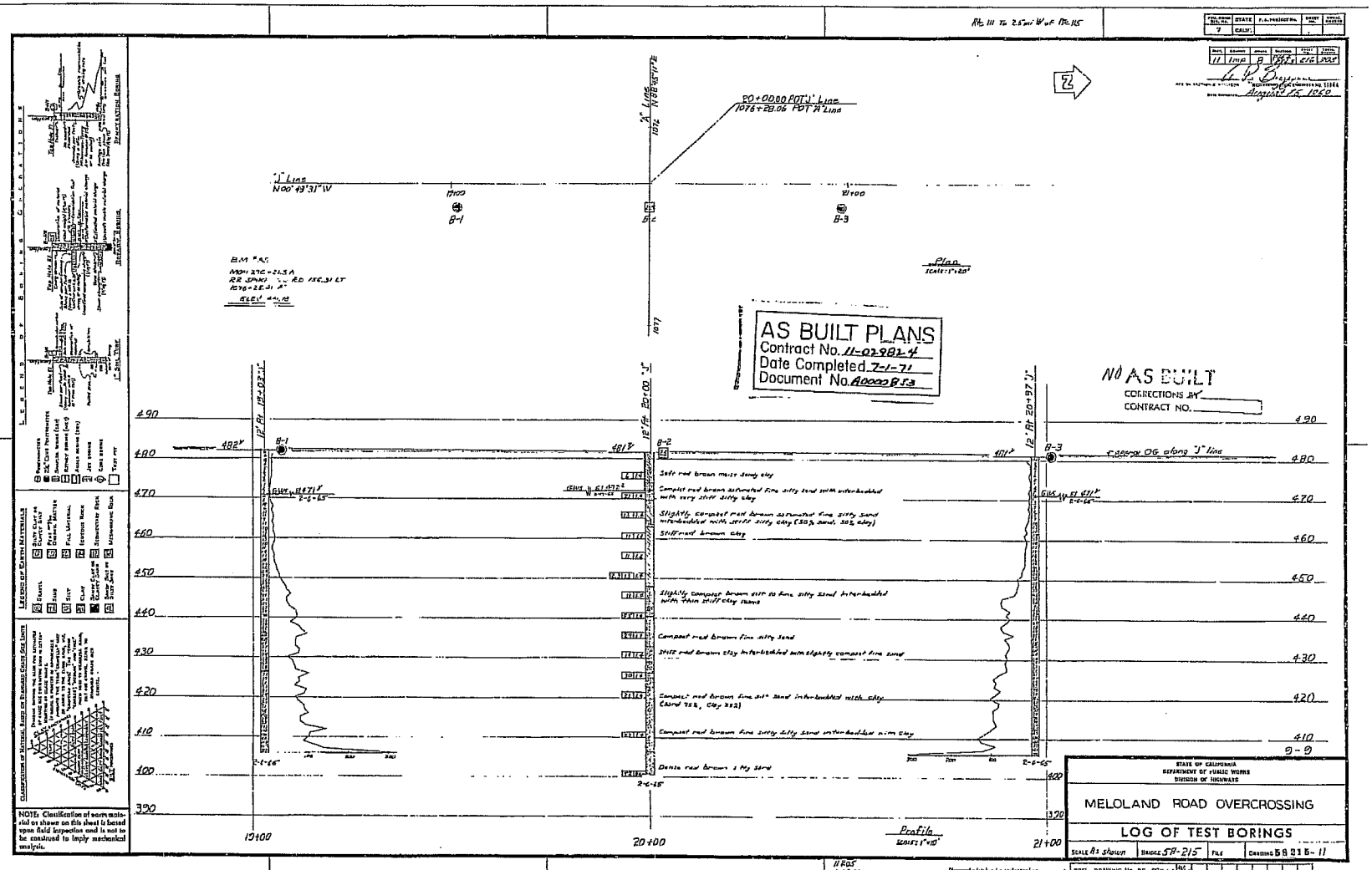
213

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 PUBLIC WORKS.

DATE 11/27/72 SIGNATURE [signature] TITLE DRAFT

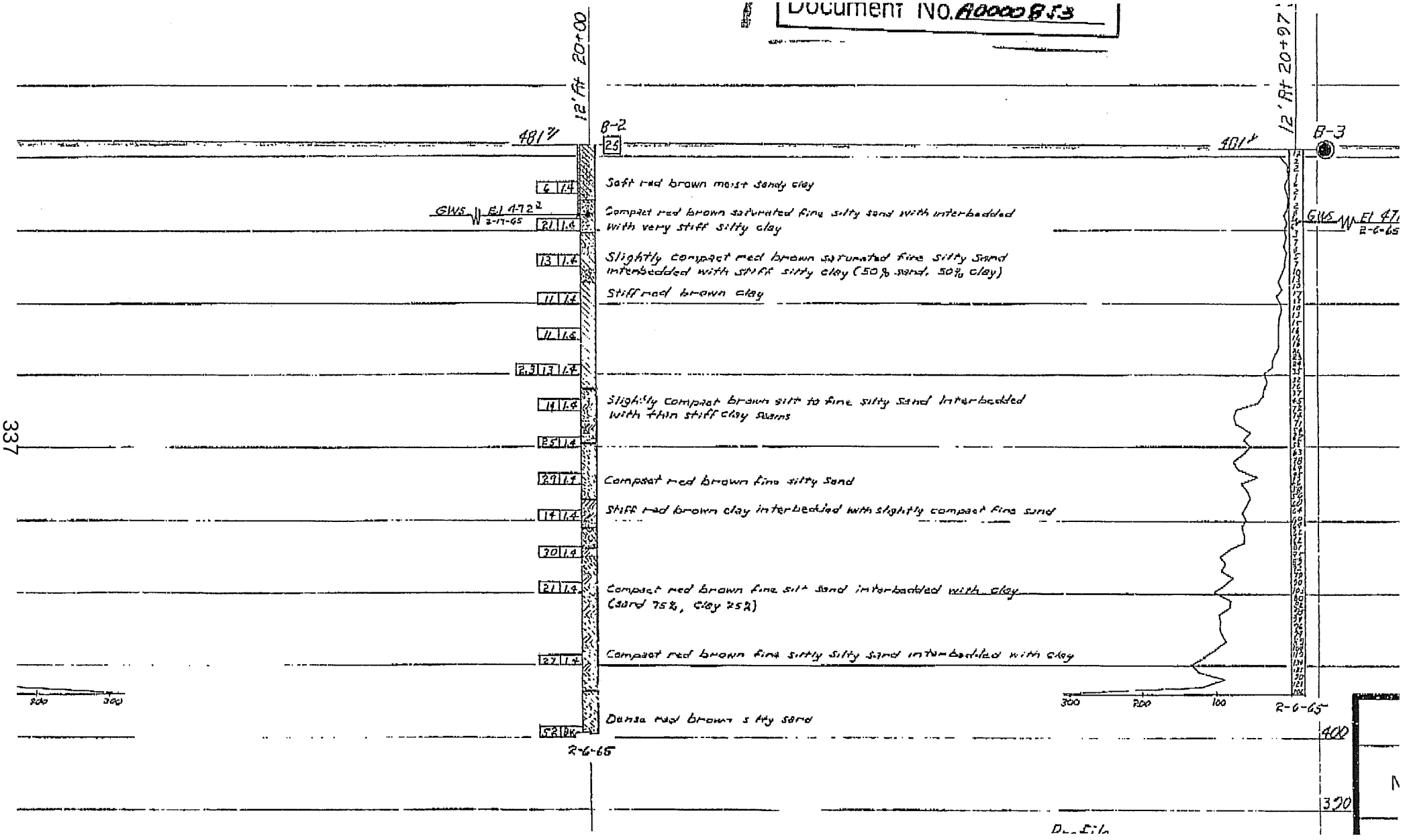
Route 08

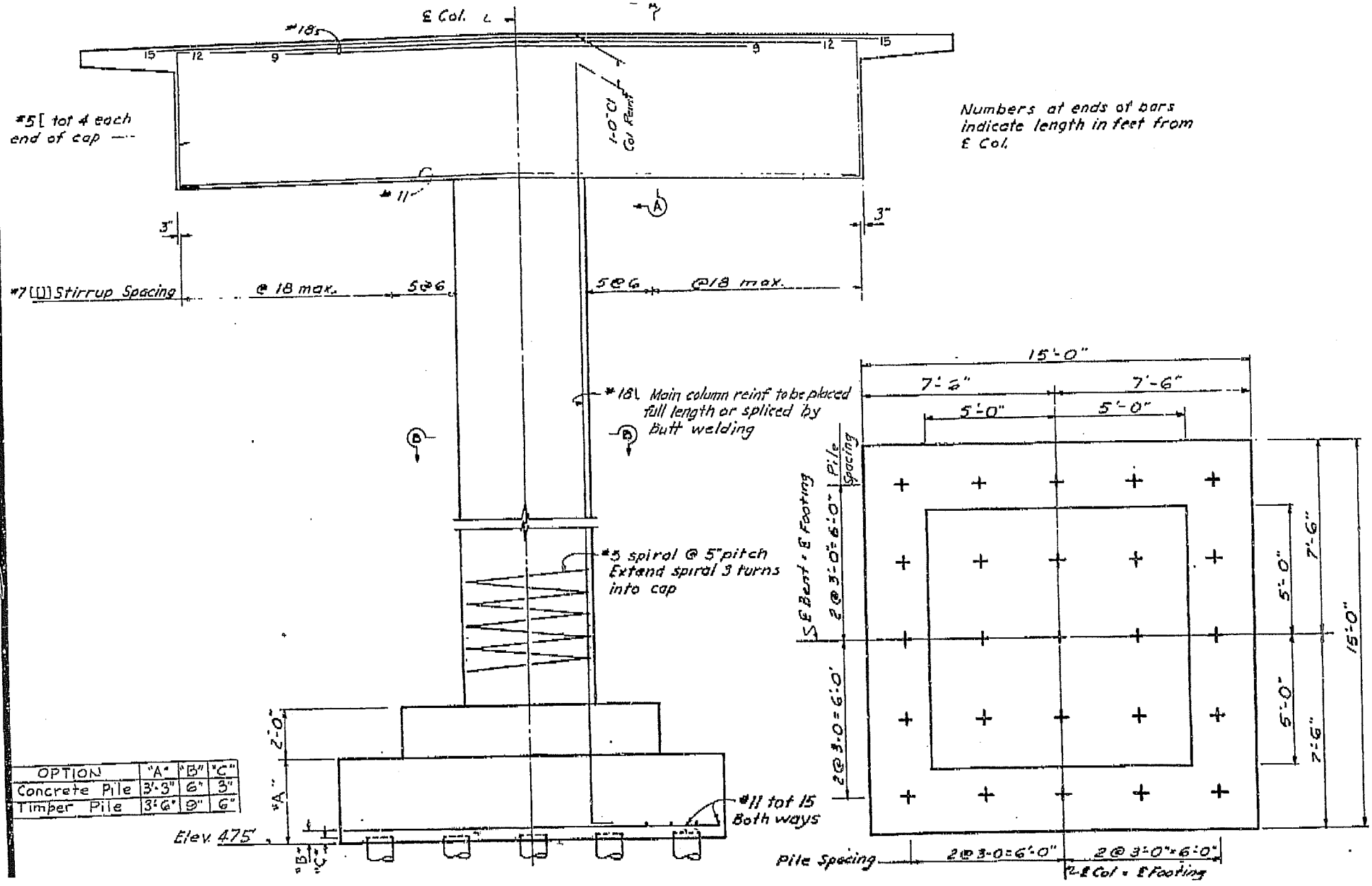
336

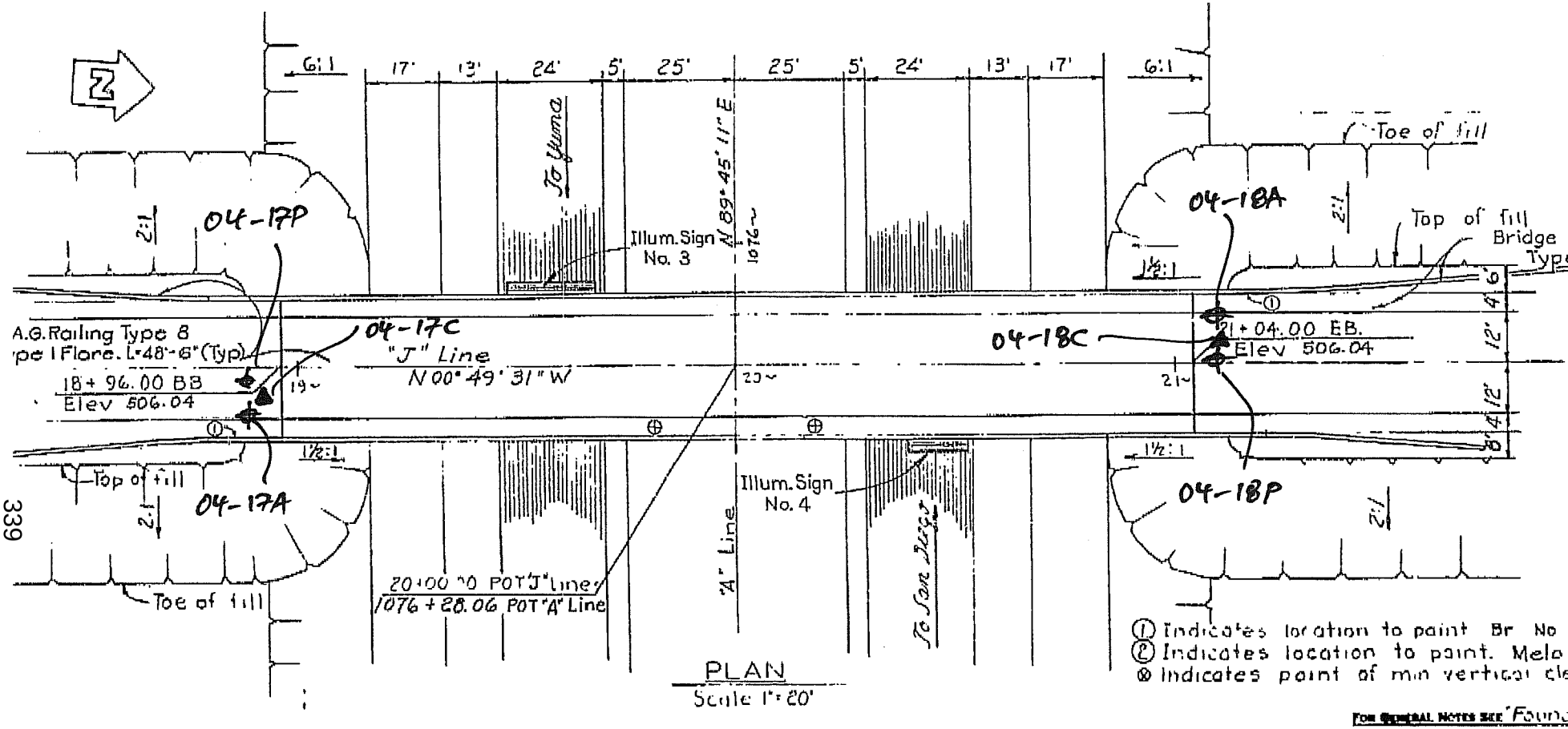


216

Document No. A0000853




℄ Col.
#18s
15
12
9
9
12
15
#5 [tot 4 each end of cap
1'-0" Col Reinf
#11
A
3"
3"
#7 [U] Stirrup Spacing
@ 18 max.
5@6
5@6
@18 max.
Numbers at ends of bars indicate length in feet from ℄ Col.
#18\ Main column reinf to be placed full length or spliced by Butt welding
B
#5 spiral @ 5" pitch Extend spiral 3 turns into cap
2'-0"
"A"
"B"
"C"
#11 tot 15 Both ways
Elev. 475'
OPTION | "A" | "B" | "C"
Concrete Pile | 3'-3" | 6" | 3"
Timber Pile | 3'-6" | 9" | 6"
15'-0"
7'-6"
7'-6"
5'-0"
5'-0"
℄ Bent = ℄ Footing
2@3'-0"=6'-0"
Pile Spacing
2@3'-0"=6'-0"
5'-0"
5'-0"
7'-6"
15'-0"
Pile Spacing
2@3'-0"=6'-0"
2@3'-0"=6'-0"
℄ Col = ℄ Footing



339

⊕ BOREHOLE / PMT

▲ CPT

I HEREB
UNDER M
AUTHORI

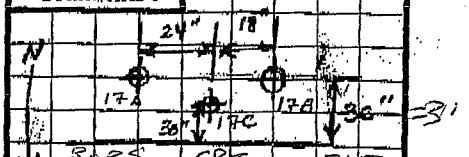
DATE

BORING NO. (04-17A)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project Name	:	UCSD Bridge Abutment Study/Meloland Bridge		
Project Location	:	6 Miles east of El Centro		
E.M.I. Project No.	:	02-165	Site Condition :	Paved, concrete
Weather	:	Sunny	Elevation :	
Traffic Control	:	Caltrans	Operator :	
Drilling Company	:	2R Drilling, Inc.	Operator :	JERRY/JORGE
Type of Rig	:	CME 55	Drop (in) :	30.0
Borehole Diameter (inch)	:	8.0"	Drive Wt. (lbs) :	140.0
Logged By	:	M.T.	Date Drilled :	08-20-04

Comments :



Back Filled By : CUTTINGS

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Rework	Lunch	Rework	Break	Finish	Off		20.0 ft
Driller												Water Table
Traffic Control												NA ft
Logger												Caving
Total												ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (MODIFIED)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93)	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%)	Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O²/LEL/PID
0	B	0					7" ASPHALT									
2.5	S	1		11 10 5	5 6 9		Medium dense Yellowish Brown Silty Sand, fine grain with peat gravel, 0.5" gravel									
5	D	2		5 11 18			Yellowish brown Silty Sand with many gravel- gravel- up to 1"									
7.5	S	3		10 8 7	15"		Yellowish Brown, Medium dense Silty Sand with many gravel 1.5"									
10	D	4	Big Gyp	7 4 5			Dark Brown Silty Clay, Firm									
12.5	S	5	0.1"	1 2 3			Sample was disturbed by cutting Dark Brown Soft - Silty Clay Sample could be found only at the tip of shoe									
15	D	6		5 8 10			Dark B Stiff Silty Clay									
20	S	7	15"	3 5 7			Dark B Stiff Silty clay, moisture									
25																

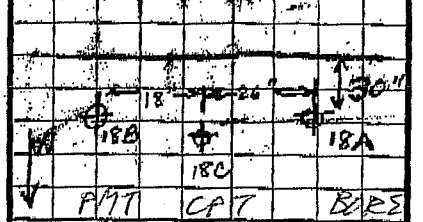
LOG OF BORING NO. (04 - 18A)

04-18A

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project Name	: UCSD Bridge Abutment Study/Meloland Bridge		
Project Location	: 6 Miles east of El Centro		
E.M.I. Project No.	: 02-165	Site Condition :	Paved, concrete
Weather	: Sunny	Elevation :	
Traffic Control	: Caltrans	Operator :	GENE
Drilling Company	: 2R Drilling, Inc.	Operator :	JERRY/JORGE
Type of Rig	: CME 55	Drop (in) :	30.0
Borehole Diameter (inch)	: 8.0"	Drive Wt. (lbs) :	140.0
Logged By	:	Date Drilled :	08-20-04

Comments :



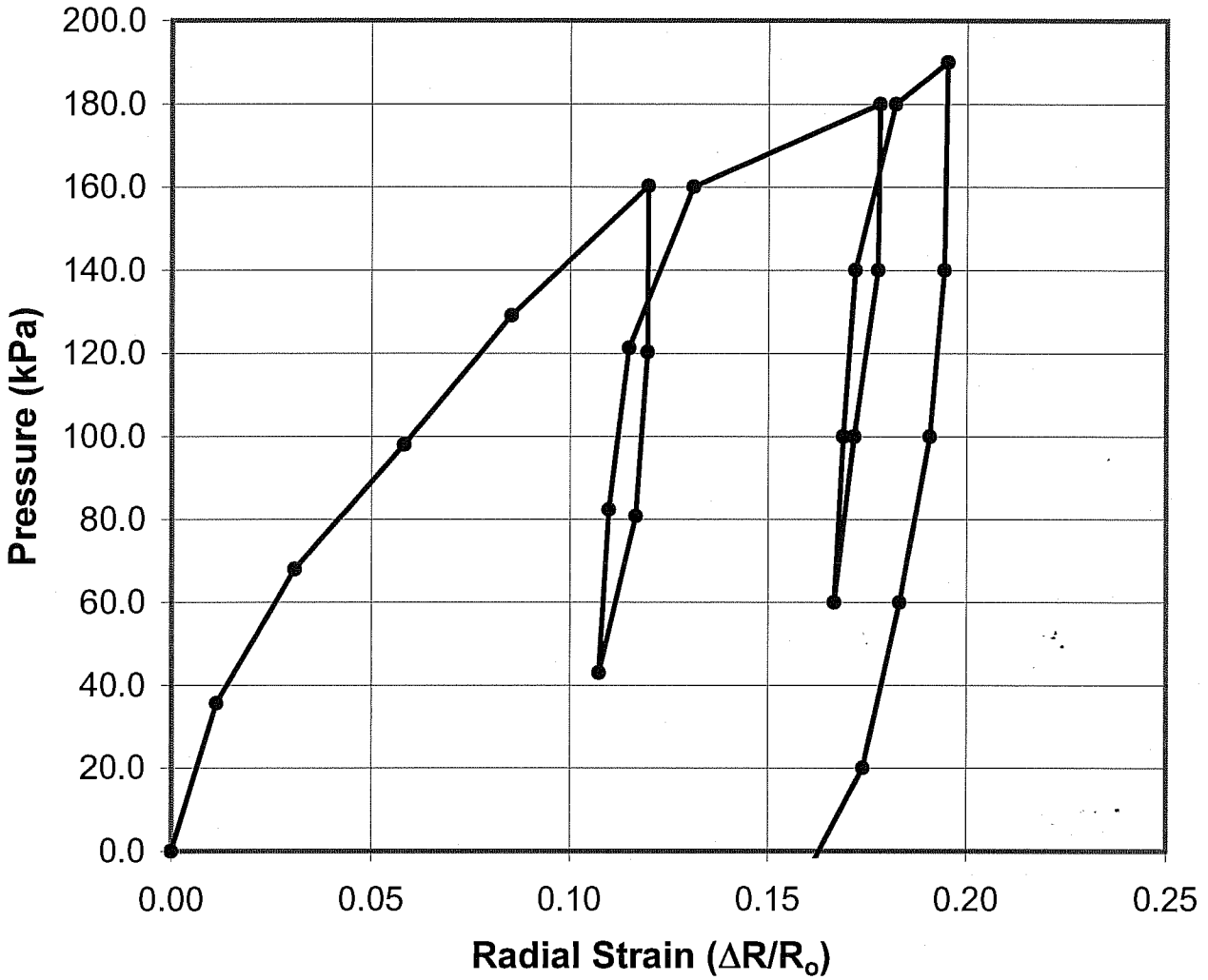
Back Filled By : CUTTINGS

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Rework	Lunch	Rework	Break	Finish	Off		20.0 ft
Driller												Water Table
Traffic Control												N/A ft
Logger												Caving
Total												ft

Description (ASTM D-2488-93)

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S/B/T)	Blows/6"	Recovery (inch)	U.S.C.S.	Color	5½" ASPHALT -	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O^2/LEL/PID
0	B	0				SP		SAND, BRN-YELLOW, DRY, F-MED GRAINED TR PEA GRAVEL			: :					
2.5	S	1		8 11 11	18"	SP		SAND, BROWN-PINK, DRY, MED DENSE, TR PEA GRAVEL, FINE TO MEDGRAINED,			5:90:5					
5	D	2	13 19 29	13 19 29	12"	SP/SM		SAME, SLIGHT INCREASE IN SILT			5:85:10					
7.5	S	3		6 10 9	14.5"	SP		SAME, MOIST, SLIGHT INCREASE IN GRAVELS								
10	D	4		2 1 2	12"	CL		CLAY, DK BROWN, V. SOFT, WET, PLASTIC, *LIKELY ONLY PERCHED H_2O @ CLAY/SAND INTERFACE			: :					
12.5	S	5		1 1 1	18"	CL		SAME								
15	D	6		4 5 7	12"	CL		SAME, FIRM, MOIST, LOW PLASTICITY			: :					
20	S	7		3 4 6	17.5"	CL		SAME, STIFF, MOIST, LOW PLASTICITY			: :					
						BOH = 20'										
25						GW = N/A					: :					

Pressuremeter Test Result



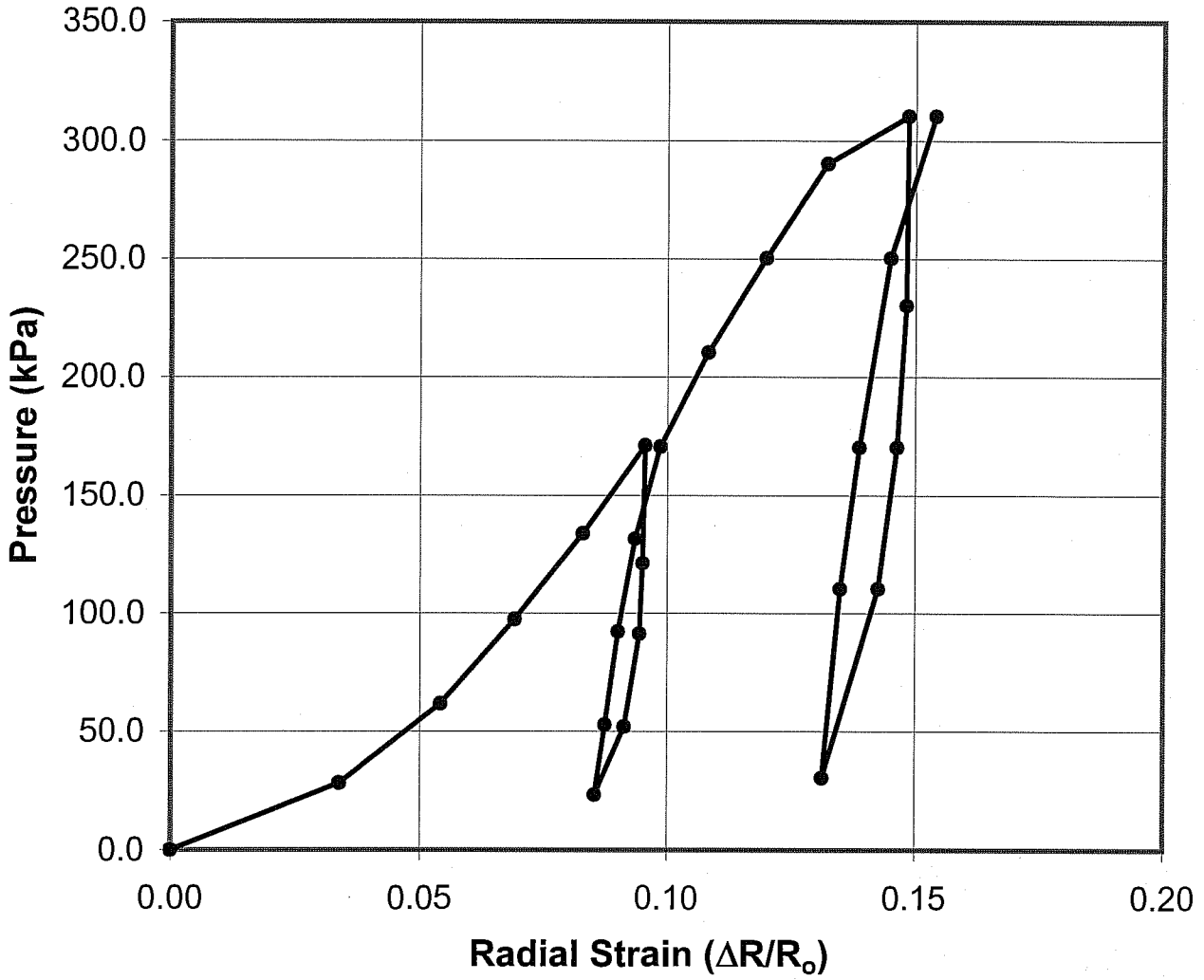
Boring No.:	**04-17P**
Location:	**Meloland Overcrossing, Abut#1**
	Imperial County
Test Date:	**8/20/04**
Test Depth:	**11 ft**
Soil Type:	**Clay with Sand**

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

CALTRANS-UCSD / Abutment Research

Project No : 02-165 | Date : 12/22/2004

Pressuremeter Test Result



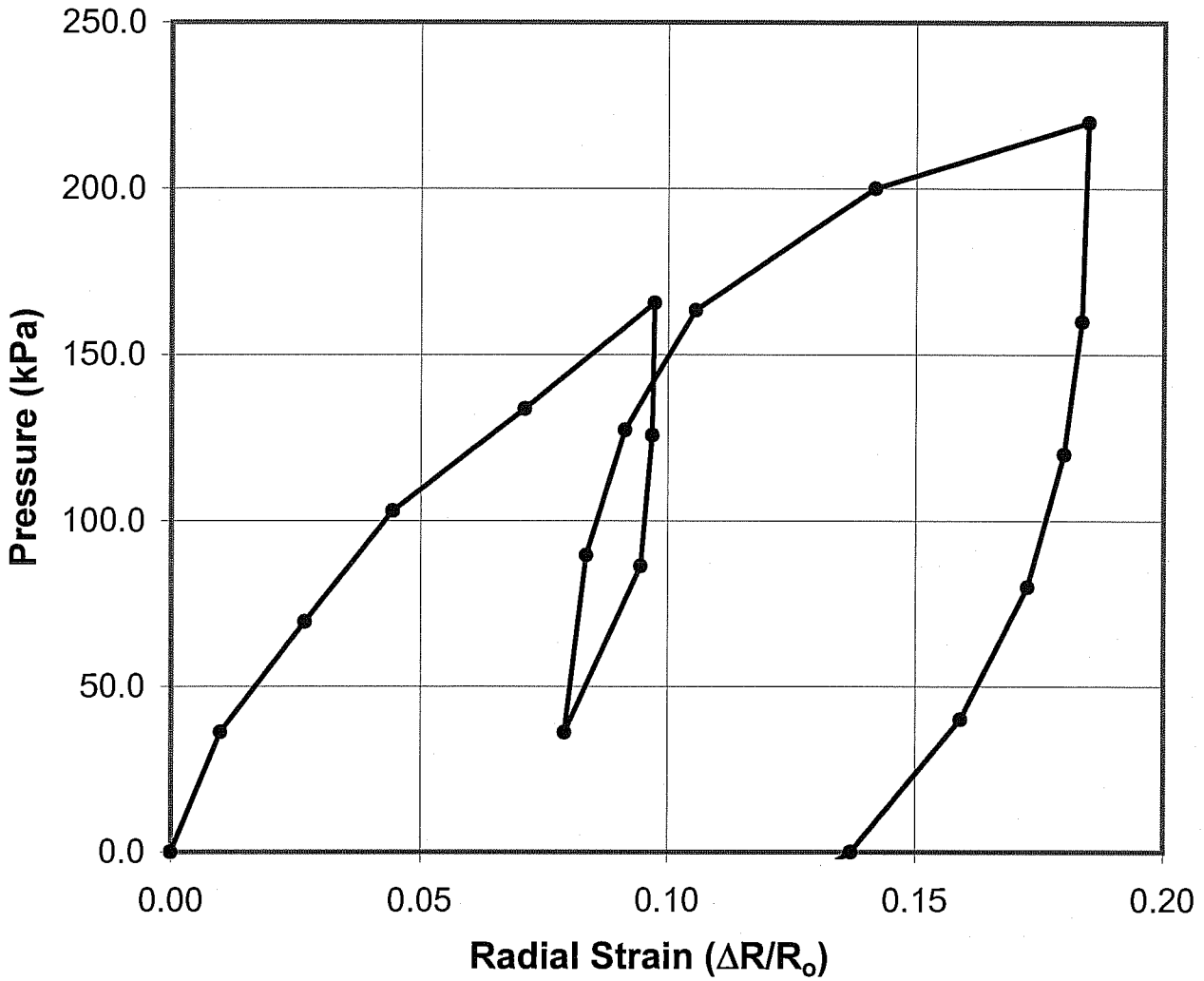
Boring No.:	**04-18P**
Location:	**Meloland Overcrossing, Abut#3**
	Imperial County
Test Date:	**8/20/04**
Test Depth:	**7.5 ft**
Soil Type:	**Silty Sand with Gravel**

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

CALTRANS-UCSD / Abutment Research

Project No : 02-165 | Date : 12/22/2004

Pressuremeter Test Result



Boring No.:	**04-18P**
Location:	**Meloland Overcrossing, Abut#3**
	Imperial County
Test Date:	**8/20/04**
Test Depth:	**11.5 ft**
Soil Type:	**Clay with Sand**

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**CALTRANS-UCSD / Abutment Research**	
	Project No : 02-165	Date : 12/22/2004

HOLGUIN, FAHAN & ASSOCIATES, INC.
ENVIRONMENTAL MANAGEMENT CONSULTANTS
948 North Lemon Street, Orange, CA 92867 (714)-210-5971 FAX (714) 210-5975

August 31, 2004

Mr. Mike Kapuskar
Earth Mechanics, Inc.
17660 Newhope St, Suite E
Fountain Valley, CA 92708

PROJECT NAME: CPT Testing at UCSD Bridge Study in El Centro, CA;
PROJECT NO.: 02165

Dear Mr. Kapuskar:

Enclosed please find copies of the cone penetrometer testing (CPT) data for the above referenced project along with a copy of the corresponding invoice.

The cone penetrometer testing conducted for this project consisted of pushing an instrumented cone-tipped probe into the ground while simultaneously recording the resistance to penetration at the cone tip and along the friction sleeve.

The cone penetrometer testing described in this report was conducted in general accordance with the current ASTM specifications (ASTM D5778-95 and D3441-94) using an electronic cone penetrometer.

The CPT equipment operated by Holguin, Fahan & Associates, Inc. (HFA) consists of a cone assembly mounted at the end of a series of hollow sounding rods. A set of hydraulic rams is used to continuously push the cone and rods into the soil at a rate of 20-mm per second (approximately four feet per minute) while the cone tip resistance and sleeve friction resistance are recorded every 50-mm (approximately two inches) and stored in digital form. A specially designed all wheel drive 23-ton truck provides the required reaction weight for pushing the cone assembly and is also used to transport and house the test equipment.

The cone penetrometer assembly used for this project consists of a conical tip and a cylindrical friction sleeve. The conical tip has a 60° apex angle and a diameter of 35.6-mm (1.40-inch) resulting in a projected cross-sectional area of 10 cm^2 (1.5 square inches). The cylindrical friction sleeve is 133-mm (5.25-inch) in length and has an outside diameter of 35.8-mm (1.41-inch), resulting in a surface area of 150 cm^2 (23 square inches).

The interior of the cone penetrometer is instrumented with strain gauges that allow simultaneous measurement of cone tip and friction sleeve resistance during penetration. Continuous electric signals from the strain gauges are transmitted by a shielded cable in the sounding rods to the PC-based data acquisition hardware in the CPT truck. The sounding log is also displayed on a monitor.

The CPT data processing is performed using the truck mounted computer based data acquisition and presentation system. The computer generated graphical logs include cone resistance, friction resistance, friction ratio, and pore pressure ratio versus depth at a user selectable scale.

Soil behavior type interpretations are based on the following reference: Robertson, P.K. and Campanella, R.C., 1989, "Guidelines for Geotechnical Design using the Cone Penetrometer Test and CPT with Pore Pressure Measurement." Soil Mechanics series No. 120, Civil Engineering Department, University of British Columbia, Vancouver, B.C., V6T 1Z4, September 1989.

Interpretations and plotting has been done using HFA's proprietary data interpretation and presentation software. It is important to note that the data is not averaged. All interpretations are point interpretations at the corresponding depth listed.

It is also important to note that the soil behavior type correlations are based on a combination of theory, field research, research performed under laboratory conditions, and literature review. The information presented in the tabulated and/or graphical logs should, therefore, be viewed as a guideline rather than as precise measurements.

Some care is recommended when using the soil behavior type interpretations. If a tabulation depth happens to fall on a soil layer interface, or a seam of soil differing from the rest of the layer, the tabulated data can be misleading. The solution to this problem is the proper use of the graphical CPT logs. The tip and sleeve penetration resistance logs are the primary source of profile description; the soil behavior type logs are supplemental. The graphical logs of tip and sleeve resistance should be examined and layer boundaries delineated in accordance with the project requirements. The soil behavior type interpretations are only representative of the response of the soil to the large shear deformations imposed during cone penetration. This is not necessarily a prediction of grain size distribution. However, it has been found that the interpreted soil behavior types generally agree well with the soil types defined in accordance with the grain size distribution methods such as used in the Unified Soil Classification System.

Limitations

Holguin, Fahan & Associates, Inc. (HFA) presents the attached data in accordance with ASTM Standards D5778-95 and D3441-94 and generally accepted cone penetrometer testing practices and standards. The attached data further relates only to the specific project and location discussed in the data. Judgement may be required to verify the CPT soil behavior interpretations.

The "Client" may distribute this data or excerpts therefrom provided the following statement is prominently displayed and included with the distribution:

"Neither CLIENT nor HFA make any guarantee or warranty, express or implied, regarding this data. THE USE OF THIS INFORMATION SHALL BE AT THE USER'S SOLE RISK REGARDLESS OF ANY FAULT OR NEGLIGENCE OF THE CLIENT OR HFA."

Please feel free to call if you have any questions.

Respectfully submitted,

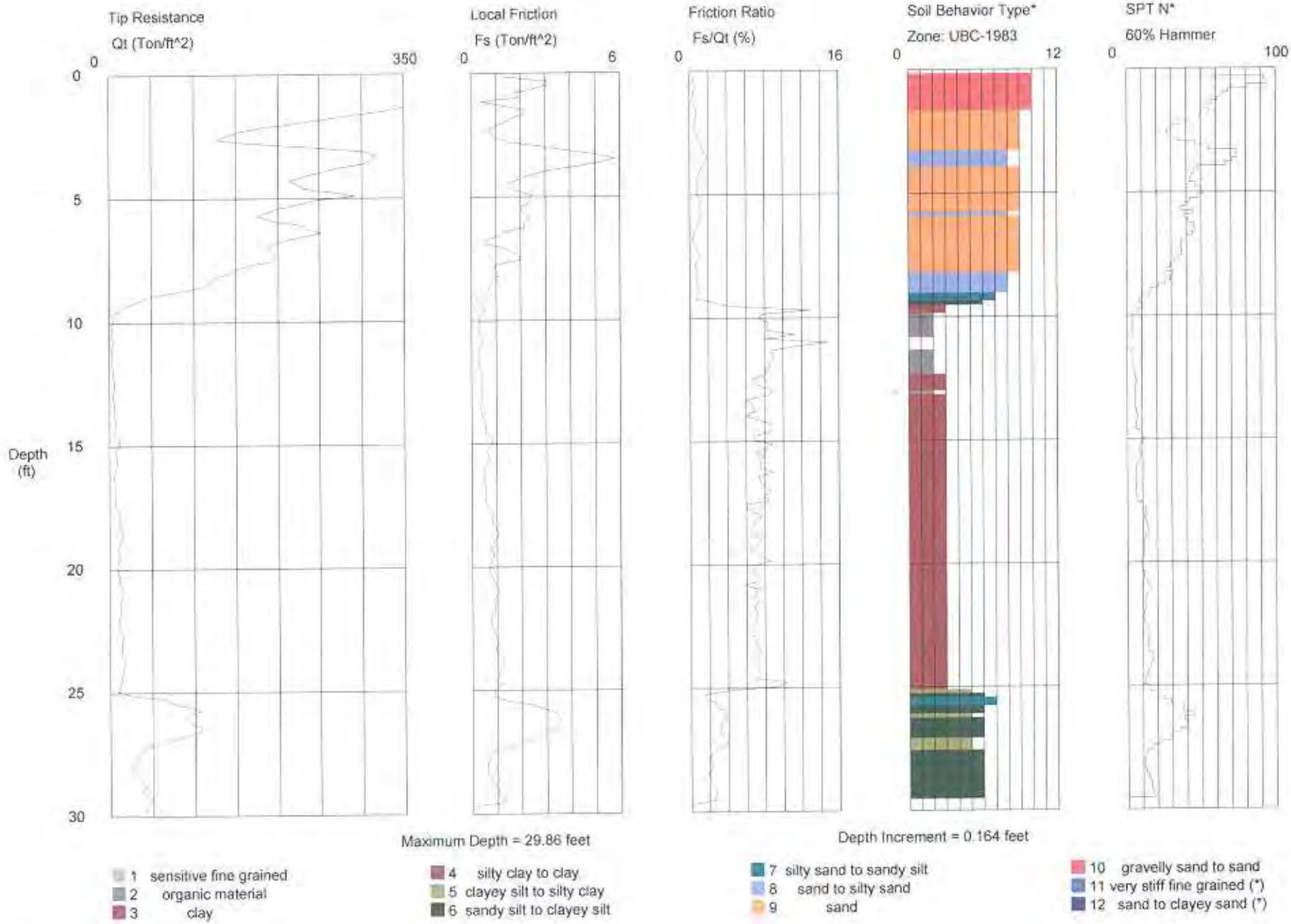
Amanda Hancock
CPT Operations Manager
Holguin, Fahan & Associates, Inc.

:AH\Enclosures

Earth Mechanics

Operator: ML-VO
Sounding: 04-18C
Cone Used: DSG786

CPT Date/Time: 8/20/2004 12:47
Location: UCSD Bridge Study
Job Number: 02165



*Soil behavior type and SPT based on data from UBC-1983

CPT INTERPRETATIONS

SOUNDING : 04-18C
PROJECT : UCSD Bridge Stud
DATE/TIME: 8/20/2004 12:47
PROJECT No.: 2165
CONE/RIG : DSG786

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	641.26	.47	GRAVELLY SAND to SAND	100	100	100		
.300	.98	400.56	.48	GRAVELLY SAND to SAND	67	100	100		
.450	1.48	330.72	.64	SAND	66	100	100		
.600	1.97	220.07	.62	SAND	44	70	99		
.750	2.46	139.38	.57	SAND	28	45	86		
.900	2.95	244.64	1.14	SAND	49	78	100		
1.050	3.44	312.19	1.86	SAND to SILTY SAND	78	100	100		
1.200	3.94	252.59	1.22	SAND	51	81	100		
1.350	4.43	222.84	.68	SAND	45	71	99		49.5
1.500	4.92	292.07	.82	SAND	58	93	100		
1.650	5.41	198.00	1.01	SAND	40	63	96		48.0
1.800	5.91	191.28	1.26	SAND to SILTY SAND	48	76	95		47.5
1.950	6.40	251.72	.53	SAND	50	81	100		48.5
2.100	6.89	189.12	.28	SAND	38	59	95		47.0
2.250	7.38	197.07	.98	SAND	39	59	96		47.0
2.400	7.87	150.12	.59	SAND	30	44	88		45.5
2.550	8.37	120.41	.73	SAND to SILTY SAND	30	42	82		44.5
2.700	8.86	63.22	1.05	SILTY SAND to SANDY SILT	21	29	63		41.0
2.850	9.35	18.70	2.49	CLAYEY SILT to SILTY CLAY	9	12		1.2	
3.000	9.84	4.25	7.60	ORGANIC MATERIAL	4	6		.4	
3.150	10.33	3.46	8.27	ORGANIC MATERIAL	3	4		.3	
3.300	10.83	5.31	8.15	CLAY	5	7		.3	
3.450	11.32	3.42	8.63	ORGANIC MATERIAL	3	4		.3	
3.600	11.81	3.65	8.27	ORGANIC MATERIAL	4	4		.3	
3.750	12.30	5.38	7.97	CLAY	5	6		.3	
3.900	12.80	5.31	7.87	CLAY	5	6		.3	
4.050	13.29	6.31	5.93	CLAY	6	7		.4	
4.200	13.78	6.11	6.96	CLAY	6	7		.4	
4.350	14.27	6.82	8.52	CLAY	7	7		.4	
4.500	14.76	12.91	6.71	CLAY	13	14		.8	
4.650	15.26	7.18	8.13	CLAY	7	8		.4	
4.800	15.75	8.66	7.37	CLAY	9	9		.5	
4.950	16.24	5.63	8.93	CLAY	6	6		.3	
5.100	16.73	6.95	7.74	CLAY	7	7		.4	
5.250	17.22	6.81	7.81	CLAY	7	7		.4	
5.400	17.72	13.74	6.01	CLAY	14	13		.8	
5.550	18.21	12.21	6.78	CLAY	12	12		.7	
5.700	18.70	15.48	6.92	CLAY	15	15		1.0	
5.850	19.19	10.18	6.91	CLAY	10	9		.6	
6.000	19.69	10.54	7.75	CLAY	11	10		.6	
6.150	20.18	10.36	6.77	CLAY	10	9		.6	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 40.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : 04-18C

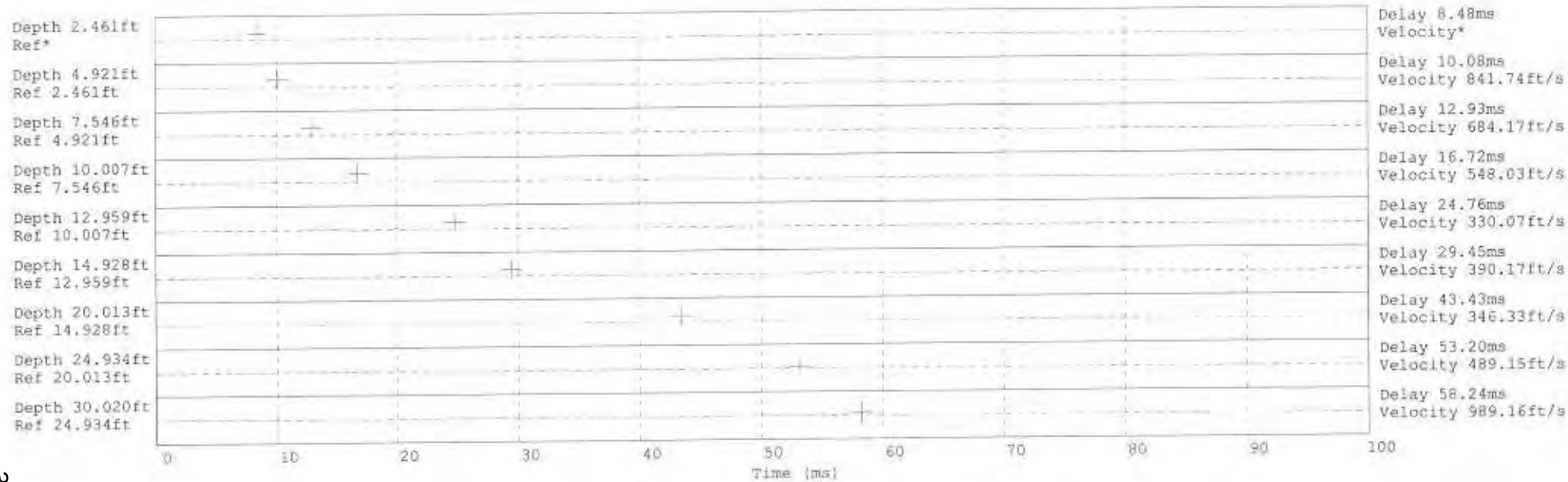
DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	13.00	7.19	CLAY	13	12		.8	
6.450	21.16	14.02	7.07	CLAY	14	12		.9	
6.600	21.65	13.25	6.86	CLAY	13	12		.8	
6.750	22.15	10.49	7.00	CLAY	10	9		.6	
6.900	22.64	14.82	6.04	CLAY	15	13		.9	
7.050	23.13	14.47	7.00	CLAY	14	12		.9	
7.200	23.62	16.71	6.75	CLAY	17	14		1.0	
7.350	24.11	15.13	7.20	CLAY	15	13		.9	
7.500	24.61	12.85	6.87	CLAY	13	11		.8	
7.650	25.10	22.68	3.97	CLAY to SILTY CLAY	15	12		1.4	
7.800	25.59	92.56	2.59	SANDY SILT to CLAYEY SILT	37	30		6.1	
7.950	26.08	91.07	3.76	CLAYEY SILT to SILTY CLAY	46	36		5.3	
8.100	26.57	104.89	3.08	SANDY SILT to CLAYEY SILT	42	33		6.1	
8.250	27.07	58.37	3.67	CLAYEY SILT to SILTY CLAY	29	23		3.3	
8.400	27.56	33.36	2.40	SANDY SILT to CLAYEY SILT	13	10		2.1	
8.550	28.05	27.00	2.22	SANDY SILT to CLAYEY SILT	11	8		1.7	
8.700	28.54	37.15	1.97	SANDY SILT to CLAYEY SILT	15	11		2.4	
8.850	29.04	38.73	2.58	SANDY SILT to CLAYEY SILT	15	12		2.5	
9.000	29.53	46.60	2.62	SANDY SILT to CLAYEY SILT	19	14		3.0	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
ASSUMED TOTAL UNIT WT = 120 pcf
ASSUMED DEPTH OF WATER TABLE = 40.0 ft
N(60) = EQUIVALENT SPT VALUE (60% Energy)
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

Earth Mechanics
04-18C

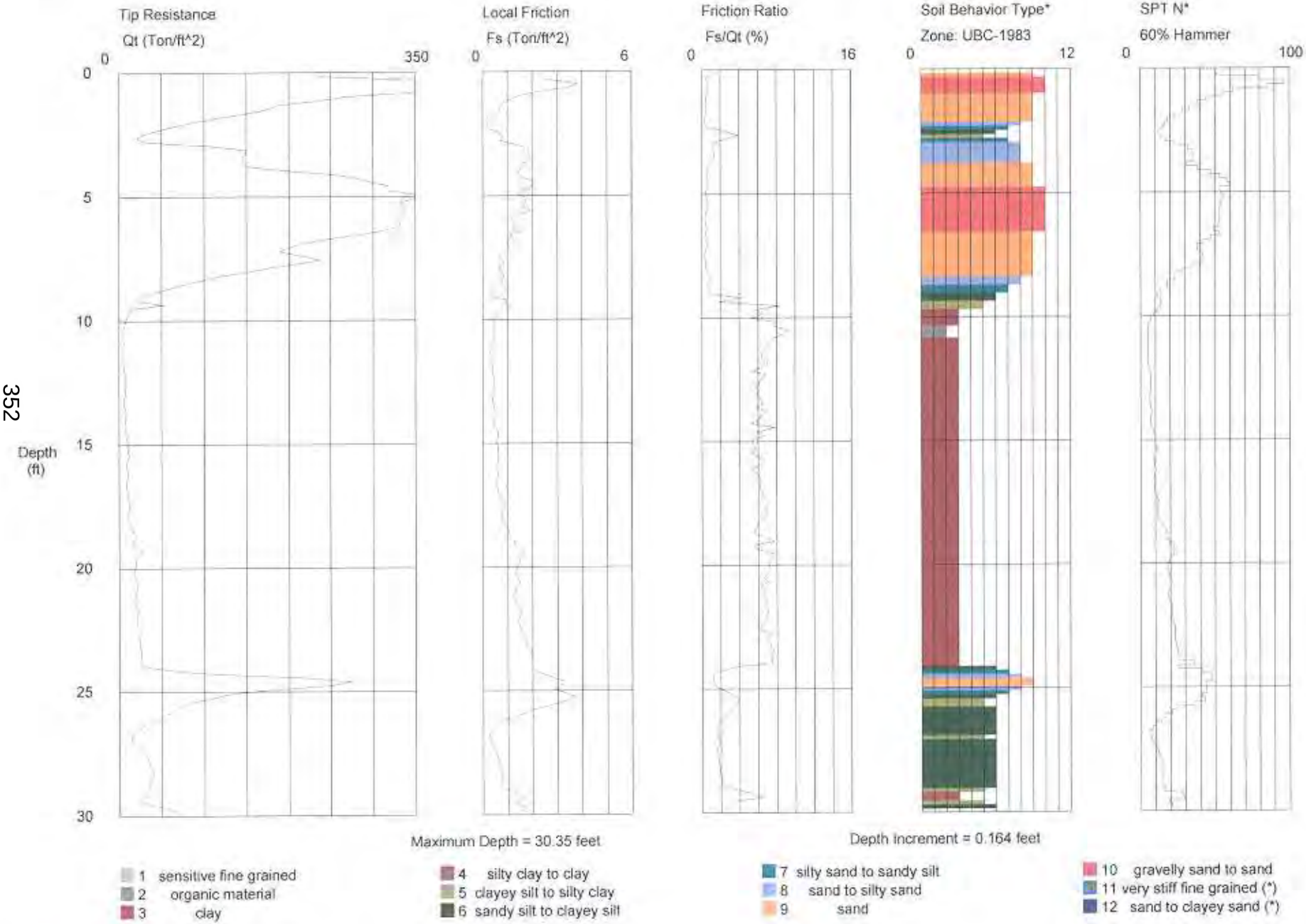


Hammer to Rod String Distance 1.6891 (m)
* = Not Determined

Earth Mechanics

Operator: ML-VO
Sounding: 04-17C
Cone Used: DSG786

CPT Date/Time: 8/24/2004 10:27
Location: UCSD Bridge Study
Job Number: 02165



*Soil behavior type and SPT based on data from UBC-1983

CPT INTERPRETATIONS

SOUNDING : 04-17C
PROJECT : UCSD Bridge Stud
DATE/TIME: 8/24/2004 10:27

PROJECT No.: 2165
CONE/RIG : DSG786

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
.150	.49	709.44	.54	GRAVELLY SAND to SAND	100	100	100		
.300	.98	268.46	.51	SAND	54	86	100		
.450	1.48	175.93	.41	SAND	35	56	93		
.600	1.97	91.13	.32	SAND to SILTY SAND	23	36	74		49.0
.750	2.46	29.28	2.50	SANDY SILT to CLAYEY SILT	12	19		1.9	
.900	2.95	109.40	1.25	SAND to SILTY SAND	27	44	79		48.0
1.050	3.44	144.92	1.31	SAND to SILTY SAND	36	58	87		48.5
1.200	3.94	194.39	.78	SAND	39	62	95		49.5
1.350	4.43	301.28	.70	SAND	60	96	100		
1.500	4.92	352.37	.41	GRAVELLY SAND to SAND	59	94	100		
1.650	5.41	334.16	.48	GRAVELLY SAND to SAND	56	89	100		
1.800	5.91	328.92	.34	GRAVELLY SAND to SAND	55	88	100		
1.950	6.40	307.21	.54	SAND	61	98	100		49.0
2.100	6.89	215.26	.44	SAND	43	67	98		47.5
2.250	7.38	213.63	.31	SAND	43	64	98		47.0
2.400	7.87	173.81	.38	SAND	35	51	92		46.0
2.550	8.37	96.71	.81	SAND to SILTY SAND	24	34	75		43.5
2.700	8.86	40.38	.87	SILTY SAND to SANDY SILT	13	18	50		38.5
2.850	9.35	52.57	1.78	SILTY SAND to SANDY SILT	18	23	57		39.5
3.000	9.84	9.19	6.54	CLAY	9	12		.6	
3.150	10.33	5.33	7.75	CLAY	5	7		.3	
3.300	10.83	5.78	7.56	CLAY	6	7		.3	
3.450	11.32	4.65	6.34	CLAY	5	6		.3	
3.600	11.81	5.61	7.06	CLAY	6	7		.3	
3.750	12.30	6.92	6.76	CLAY	7	8		.4	
3.900	12.80	7.62	5.68	CLAY	8	9		.5	
4.050	13.29	6.11	6.27	CLAY	6	7		.4	
4.200	13.78	8.01	6.93	CLAY	8	9		.5	
4.350	14.27	8.12	5.21	CLAY	8	9		.5	
4.500	14.76	9.18	6.63	CLAY	9	10		.6	
4.650	15.26	10.50	5.80	CLAY	11	11		.6	
4.800	15.75	8.78	6.75	CLAY	9	9		.5	
4.950	16.24	10.58	5.71	CLAY	11	11		.6	
5.100	16.73	9.20	6.23	CLAY	9	9		.5	
5.250	17.22	12.04	6.34	CLAY	12	12		.7	
5.400	17.72	11.67	6.76	CLAY	12	11		.7	
5.550	18.21	12.43	6.43	CLAY	12	12		.8	
5.700	18.70	20.22	5.54	CLAY	20	19		1.1	
5.850	19.19	24.76	5.52	CLAY	25	23		1.4	
6.000	19.69	19.21	7.60	CLAY	19	18		1.2	
6.150	20.18	17.44	7.34	CLAY	17	16		1.1	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
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Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : 04-17C

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	20.88	7.12	CLAY	21	19		1.3	
6.450	21.16	19.00	6.66	CLAY	19	17		1.2	
6.600	21.65	22.66	6.61	CLAY	23	20		1.3	
6.750	22.15	20.93	6.80	CLAY	21	18		1.2	
6.900	22.64	24.06	6.58	CLAY	24	21		1.3	
7.050	23.13	24.07	7.31	CLAY	24	20		1.3	
7.200	23.62	26.47	7.38	CLAY	26	22		1.5	
7.350	24.11	58.04	3.45	CLAYEY SILT to SILTY CLAY	29	24		3.3	
7.500	24.61	274.20	1.17	SAND	55	45	90		43.5
7.650	25.10	127.15	2.59	SILTY SAND to SANDY SILT	42	35	68		39.0
7.800	25.59	72.20	3.76	CLAYEY SILT to SILTY CLAY	36	29		4.2	
7.950	26.08	44.38	2.61	SANDY SILT to CLAYEY SILT	18	14		2.9	
8.100	26.57	20.33	1.44	SANDY SILT to CLAYEY SILT	8	6		1.5	
8.250	27.07	16.46	1.76	CLAYEY SILT to SILTY CLAY	8	6		1.2	
8.400	27.56	32.46	1.66	SANDY SILT to CLAYEY SILT	13	10		2.5	
8.550	28.05	38.32	1.79	SANDY SILT to CLAYEY SILT	15	12		2.9	
8.700	28.54	37.76	1.99	SANDY SILT to CLAYEY SILT	15	12		2.4	
8.850	29.04	35.53	3.36	CLAYEY SILT to SILTY CLAY	18	13		2.3	
9.000	29.53	38.14	3.45	CLAYEY SILT to SILTY CLAY	19	14		2.4	
9.150	30.02	76.41	2.06	SILTY SAND to SANDY SILT	25	19	51		36.5

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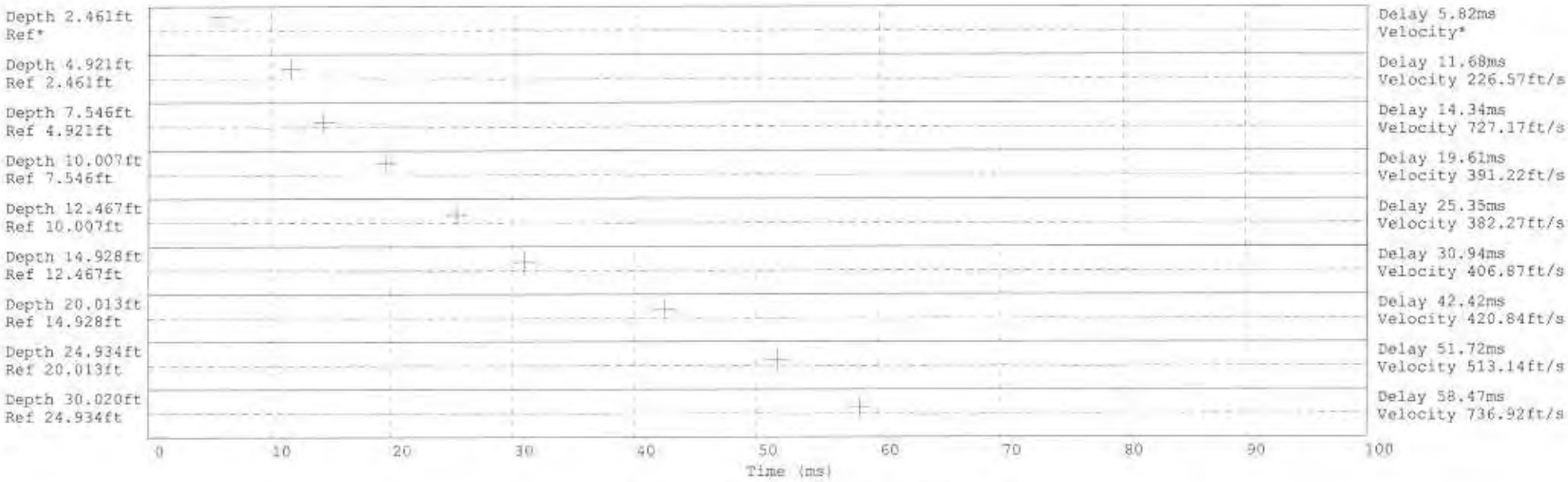
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

Earth Mechanics
04-17C



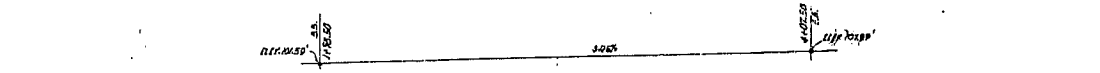
Hammer to Rod String Distance 1.7272 (m)
* = Not Determined

Caltrans Bridge 51-0234
Becksead OC, Santa Barbara Co.

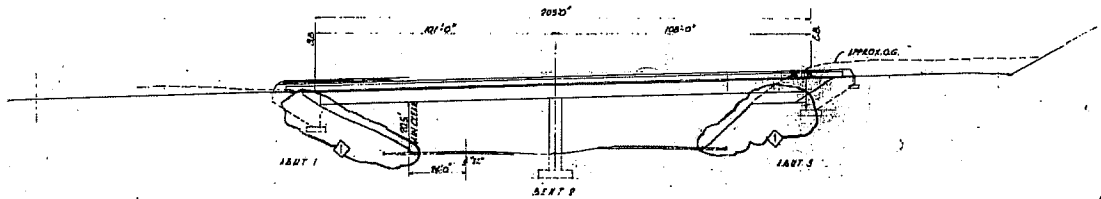
Caltrans Bridge 51-0234, Becksead OC, Santa Barbara Co.

This bridge is located northwest of the city of Santa Barbara in Santa Barbara County. The bridge is an overcrossing over Rte 101.

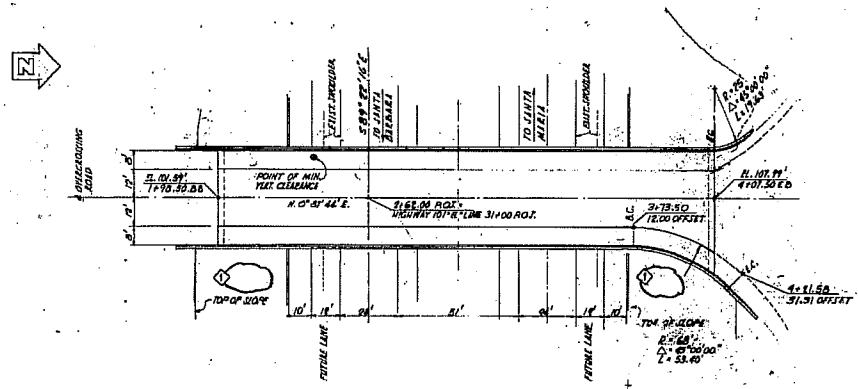
Caltrans provided a bulk sample taken from this bridge site. We have performed UU testing on this sample. Test results are in Appendix C.



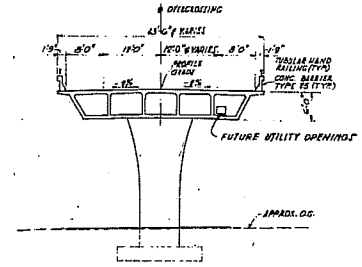
PROFILE GRADE



ELEVATION
1"=10'-0"



PLAN
1"=10'-0"



TYPICAL SECTION
1"=10'-0"

INDEX TO PLANS

DRAWING NO	TITLE
F-11042	GENERAL PLAN
F-11043	LOG OF TEST PITS
F-11044	ABUTMENT PLANS & DETAILS
F-11045	ABUTMENT DETAILS
F-11046	SECTIONS AND GIRDER LAYOUT
STANDARD PLANS, DATED JANUARY, 1981	
50-1, 3, 5 & 13	BRIDGE DETAILS
57-1	BOX GIRDER DETAILS
57-6	DECK DRAINS - TYPES D-1 & D-2
57-10	UTILITY OPENING - BOX GIRDER
81-31	TUBULAR HANDRAILING
81-33	CONCRETE BARRIER - TYPE 26
81-30	REINFORCED RAILING (TYPE K)

NOTE:
MINIMUM OPENING WIDTH FOR FALSEWORK IS 44'.
MINIMUM TEMPORARY VERTICAL CLEARANCE IS 16'-6".

GENERAL NOTES
LOAD FACTOR DESIGN

DESIGN: BRIDGE DESIGN SPECIFICATIONS (1977 AASHTO with Interims and Caltrans Supplements)

DEAD LOAD: Includes 24 psf for future wearing surface.

LIVE LOADING: HS20-44 and alternative and permit design load.

REINFORCED CONCRETE: f'_c = 4,000 psi
f_y = 60,000 psi
f'_c = 3,250 psi
n = 8

Transverse deck slabs (working stress design)
f_s = 20,000 psi
f'_c = 1,600 psi
n = 10

FOOTING PRESSURE (TONS PER SF)

STRUCTURE	ALLOWABLE	DESIGN
ABUT 1	6.0	3.0
BENT 2	5.0	2.5
ABUT 3	4.0	3.0

AS BUILT
CORRECTIONS BY
CONTRACT NO. 05-301900
DATE 2-8-85

AS BUILT PLANS
Contract No. 05-301900
Date Completed 2-8-85
Document No.

GRAPHIC SCALE 0 10' 20' 40' 60'

Davy McKee
CIVIL ENGINEERS & CONSTRUCTORS
SAN FRANCISCO, CALIFORNIA

REFERENCE DRAWINGS

REVISIONS

1	AS-BUILT	4-23-85	2	ADDED INDEX PLAN, GENERAL NOTES & REVISED TITLE BLOCK
3	ISSUED FOR APPROVAL	5-8-85	4	ISSUED FOR CONSTRUCTION 5-14-85

WORK Noted
DATE 10/5/84 BY LAT
DR. APPR.
CHIEF DRFT.
DES. ENGR.
ASST. ENGR. 2-9-85

Chevron
Chevron U.S.A. Inc.
Offshore Projects Department,
Western Region

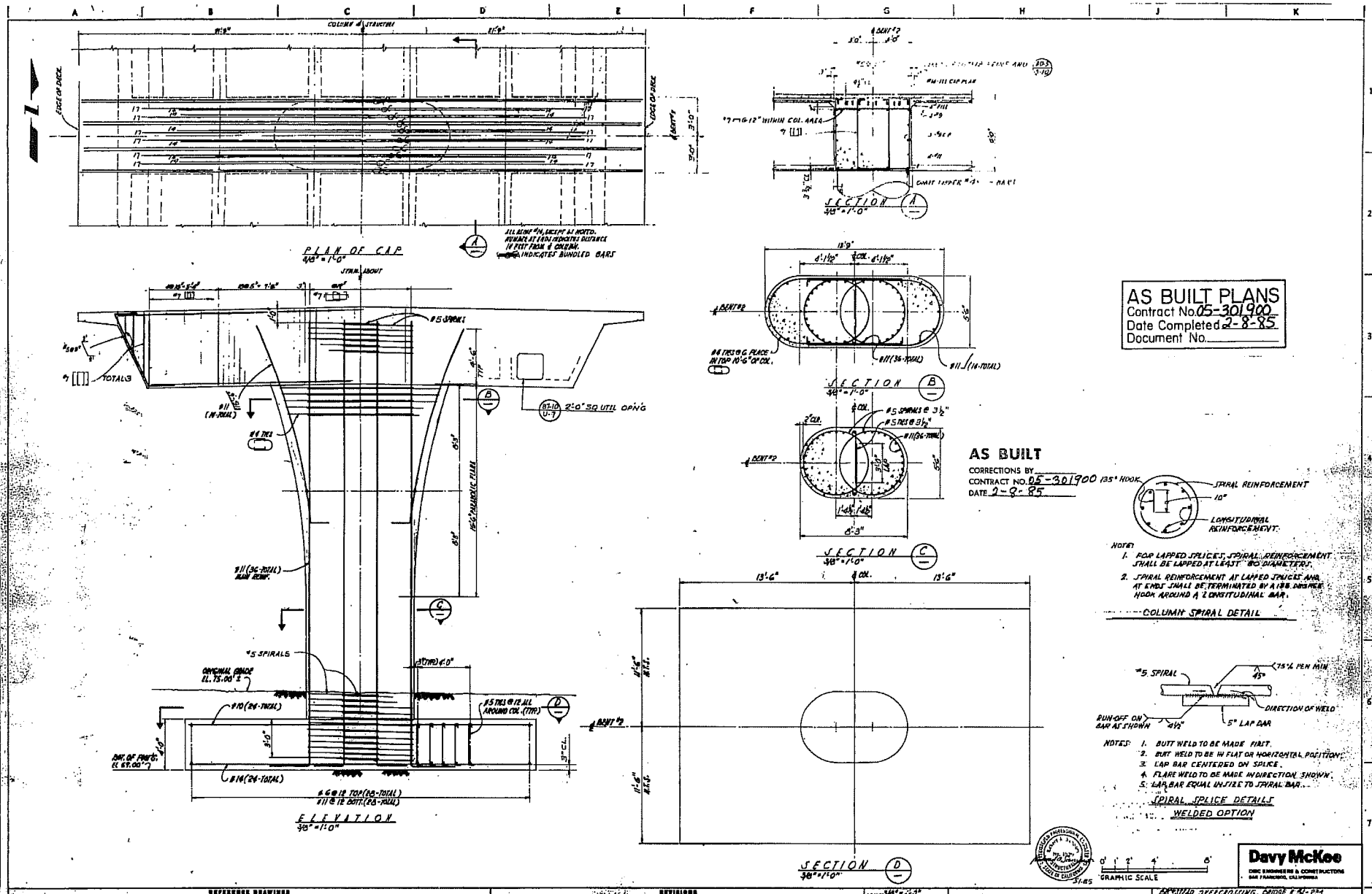
SAN PABLO OVERCROSSING, BRIDGE # 51-834
GENERAL PLAN
ACCESS TO INTERCHANGE, 5-SB-101-44.7
POINT ARGUELLO OIL & GAS SYSTEM (PHASE I-SEG.)

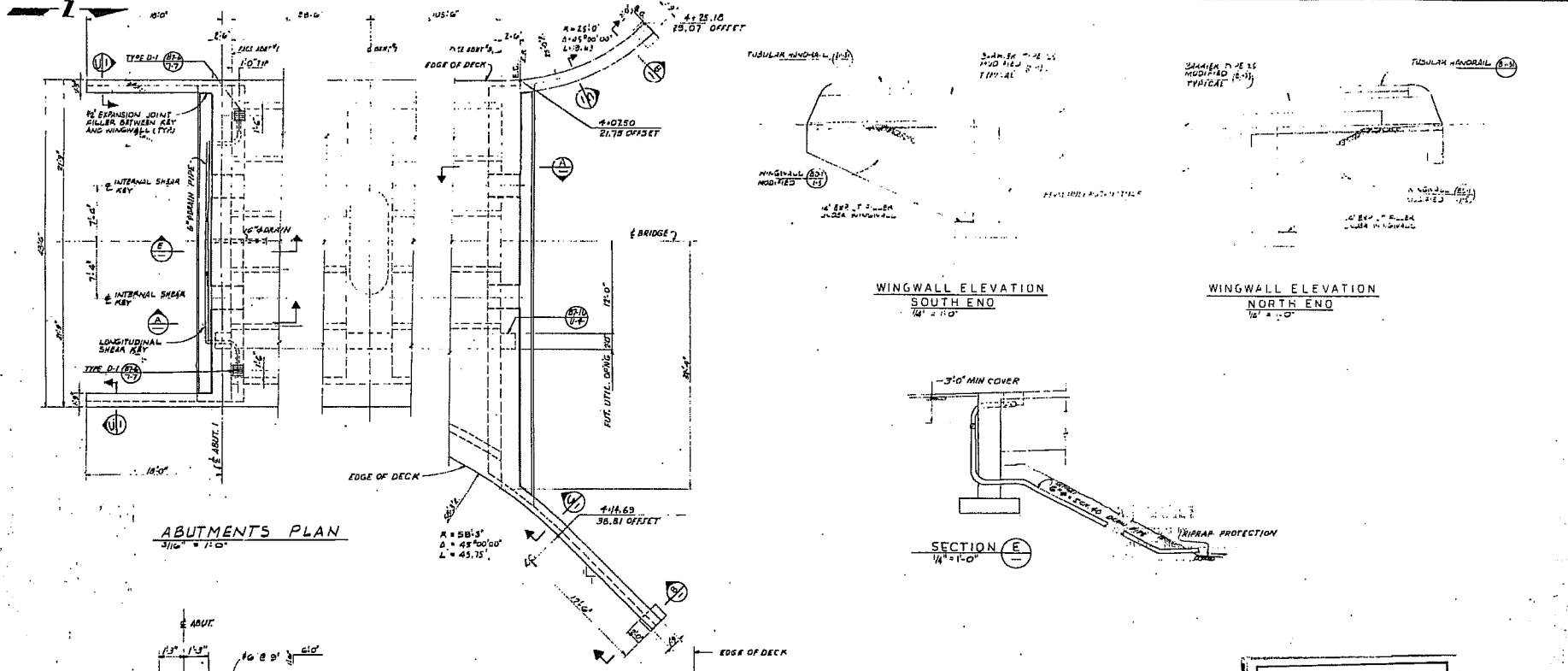
S W.O. B.O. F-11042-1

MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

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.

9/11/90 Ronald Blackburn


PLAN OF CAP
3/8" = 1'-0"
ELEVATION
3/8" = 1'-0"
SECTION A
3/8" = 1'-0"
SECTION B
3/8" = 1'-0"
SECTION C
3/8" = 1'-0"
SECTION D
3/8" = 1'-0"
AS BUILT PLANS
Contract No. 05-301900
Date Completed 2-8-85
Document No.
AS BUILT
CORRECTIONS BY
CONTRACT NO. 05-301900
DATE 2-8-85
SPIRAL REINFORCEMENT
LONGITUDINAL REINFORCEMENT
NOTE:
1. FOR LAPPED SPLICES, SPIRAL REINFORCEMENT SHALL BE LAPPED AT LEAST 80 DIAMETERS.
2. SPIRAL REINFORCEMENT AT LAPPED SPLICES AND AT ENDS SHALL BE TERMINATED BY A 135 DEGREE HOOK AROUND A LONGITUDINAL BAR.
COLUMN SPIRAL DETAIL
#5 SPIRAL
75% PEN MIN
DIRECTION OF WELD
RUN-OFF ON BAR AS SHOWN
5" LAP BAR
NOTES: 1. BUTT WELD TO BE MADE FIRST.
2. BUTT WELD TO BE IN FLAT OR HORIZONTAL POSITION.
3. LAP BAR CENTERED ON SPLICE.
4. FLARE WELD TO BE MADE IN DIRECTION SHOWN.
5. LAP BAR EQUAL IN SIZE TO SPIRAL BAR.
SPIRAL SPLICE DETAILS
WELDED OPTION
GRAPHIC SCALE
Davy McKee
DISC ENGINEERS & CONSTRUCTORS
SAN FRANCISCO, CALIFORNIA
REFERENCE DRAWINGS
REVISIONS
ISSUED FOR REVIEW & COMMENTS
ISSUED FOR APPROVAL
REVISED TITLE BLOCK
ISSUED FOR CONSTRUCTION
Chevron U.S.A. Inc.
Offshore Projects Department, Western Region
BRITISH OVERCROSSING, BRIDGE # 51-234
ABUTMENT DETAILS
BECKSTEAD INTERCHANGE, S-38-101-44.7
POINT ARGUELLO OIL & GAS SYSTEM (PAOS) (PAOS)
S
F-11045-0
MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM
SCALE 1" = 50'
SCALE 1" = 20'
SCALE 1" = 40'
SCALE 1" = 10' or 1" = 100'
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.
9/11/90
Donald Blackford



AS BUILT PLANS
Contract No. 05-301900
Date Completed 2-8-85
Document No.

AS BUILT
CORRECTIONS BY
CONTRACT NO. 05-301900
DATE 2-8-85

Davy McKee
CIVIL ENGINEERS & CONSTRUCTORS
SAN FRANCISCO, CALIFORNIA

REFERENCE DRAWINGS

REVISIONS

A	ISSUED FOR REVIEW & COMMENTS 1-25-85	KC	4 REVISED TITLE BLOCK	S.D. MAL
3	ISSUED FOR APPROVAL 2-1-85	AS KSC	5 ISSUED FOR CONSTRUCTION 5-1-85	AS AGC

SCALE AS SHOWN
DATE 1-12-85 for LDE
DR. APPR.
CHIEF DESIGN
PROJ. ENGR.
CHIEF ENGR.

Chevron U.S.A. Inc.
Western Region

ESCALON OVERCROSSING, BRIDGE # 39-234
ABUTMENTS PLANS & DETAILS
5/ESCALON INTERCHANGE, 5-SJ-101-44.7
POINT ARGUELLO OIL & GAS SYSTEM (PAOG)(PAGS)

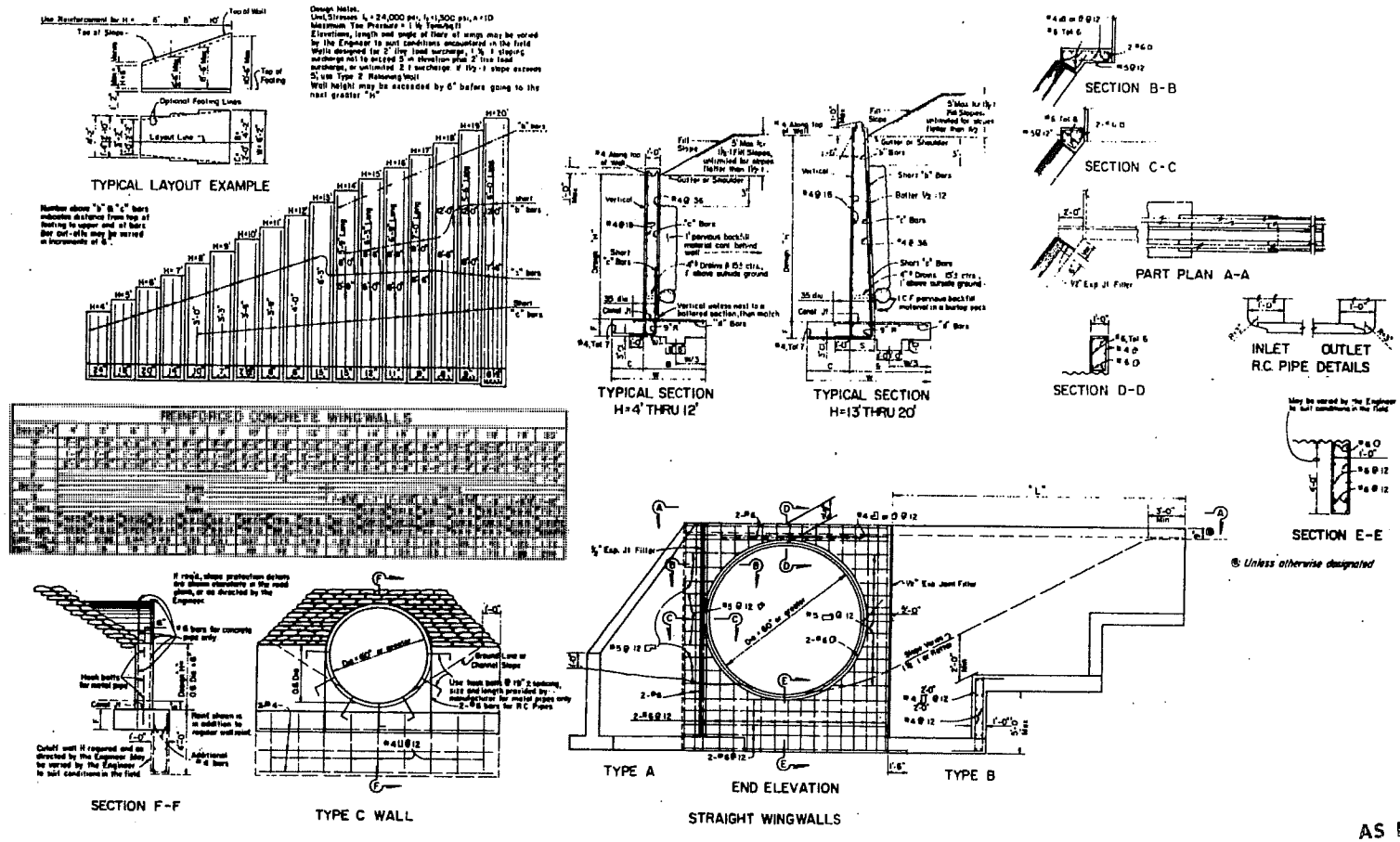
S | W.O. | F-110447-0

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.

DATE 9/11/90 SUPERVISOR OF MICROFILMING

MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

360



AS BUILT
CORRECTIONS BY
CONTRACT NO. 05-301900
DATE 2-8-85

AS BUILT PLANS
Contract No. 05-301900
Date Completed 2-8-85
Document No.

Davy McKee
DMC ENGINEERS & CONSTRUCTORS
SAN FRANCISCO, CALIFORNIA

REFERENCE DRAWINGS

ROUGH GRADING	SHT. 2	F-11007
ROUGH GRADING	SHT. 4	F-11009

REVISIONS

② AS-BUILT	0-30-85	
③ ISSUED FOR 3rd PARTY REVIEW	2-1-85	
⓪ ISSUED FOR CONSTRUCTION	5-2-85	
① REISSUED FOR THIRD PARTY REVIEW	8-7-86	

SCALE None

Chevron U.S.A. Inc.
Offshore Projects Department,
Western Region

PIPE COLLECT FEEDWALLS

POINT ARGUELLO OIL & GAS SYSTEM (PIGS) (PIGS)

S | W.O. | B.O. | F-11091-2

SP-CS-01

13

SCALE 1"=50' MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

SCALE 1"=10' or 1"=100' MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

SCALE 1"=20' MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

SCALE 1"=40' MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION - MICROFILM

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.

DATE 9/11/90 Donald Blackford SUPERVISOR OF MICROFILM

Caltrans Bridge 56-0318
Spruce St. OC, Riverside Co.

Spruce St. OC, Bridge 56-0318, Riverside Co.

This overcrossing over SR 91 is located south of the Rte 215/91 interchange in Riverside County.

Caltrans provided a bulk sample taken from this bridge site. However, UU testing was not performed on this sample because of the limited testing program. As a replacement, soil from the Jackson St. bridge, which is also in this county, was tested instead. Caltrans provided maximum density test results using a nuclear gauge. The data showed the in-situ fills had a relative compaction of 90 to 95%..

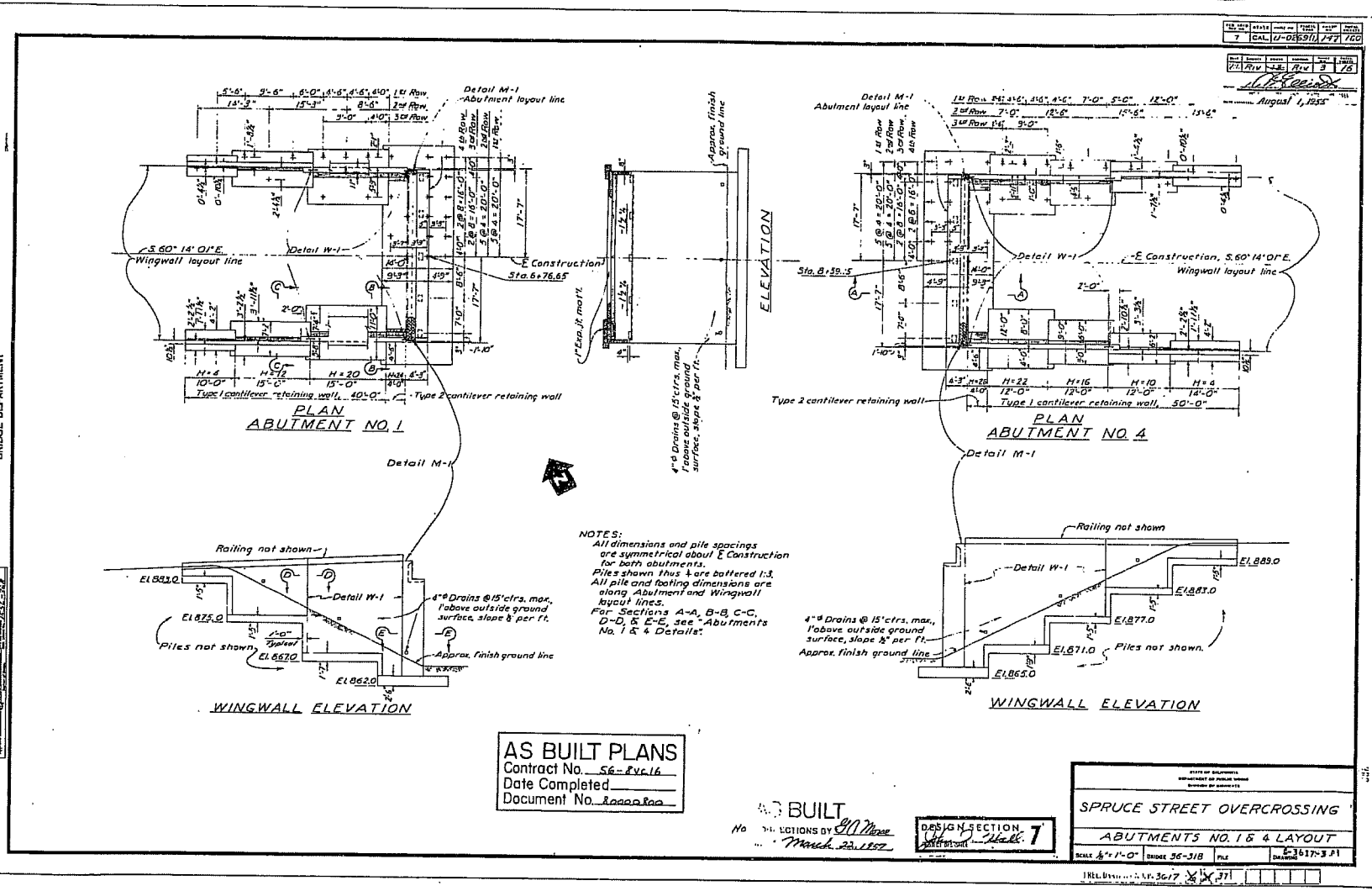
02/05/2004

02/05/2004

02/05/2004

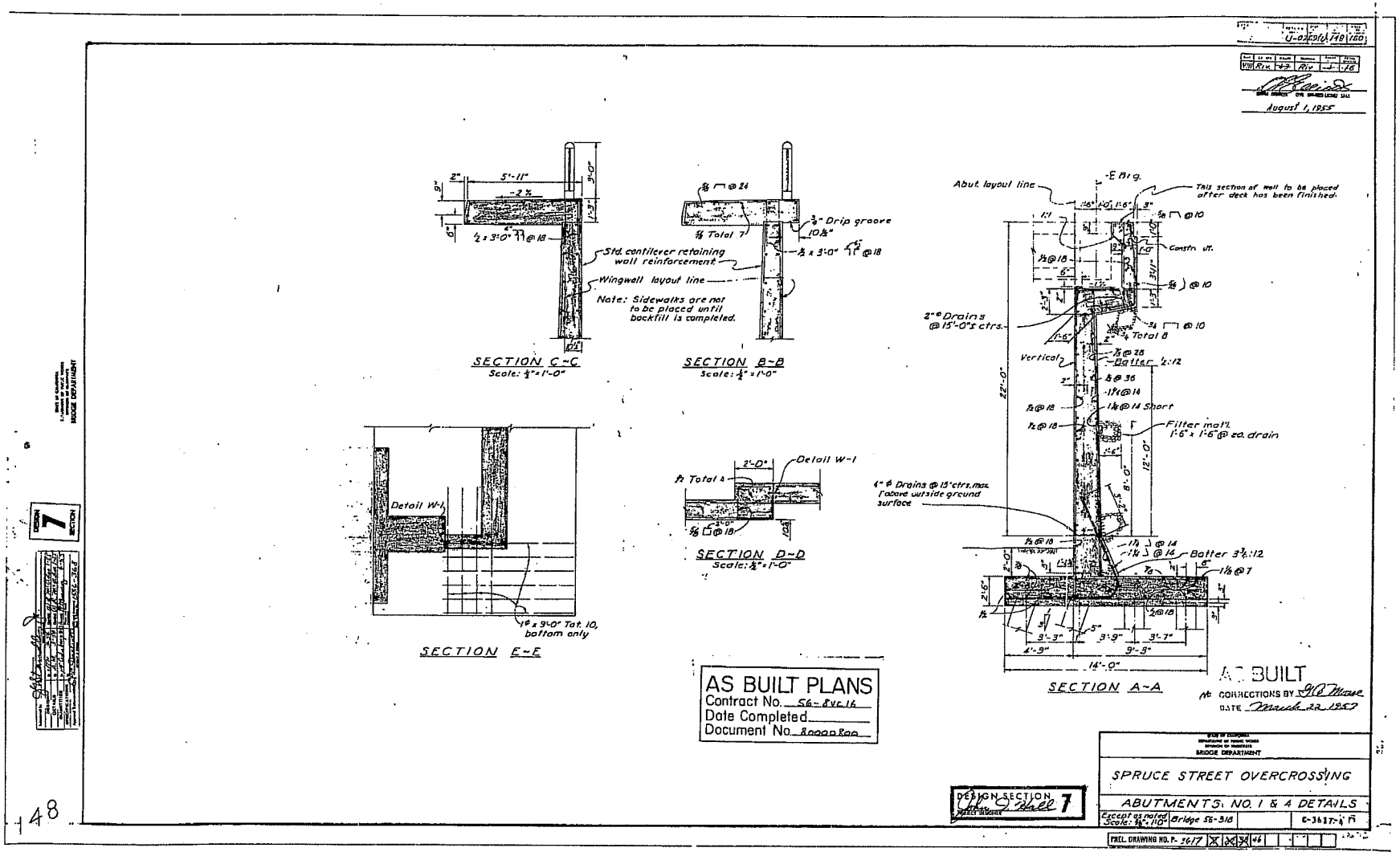
02/05/2004

02/05/2004



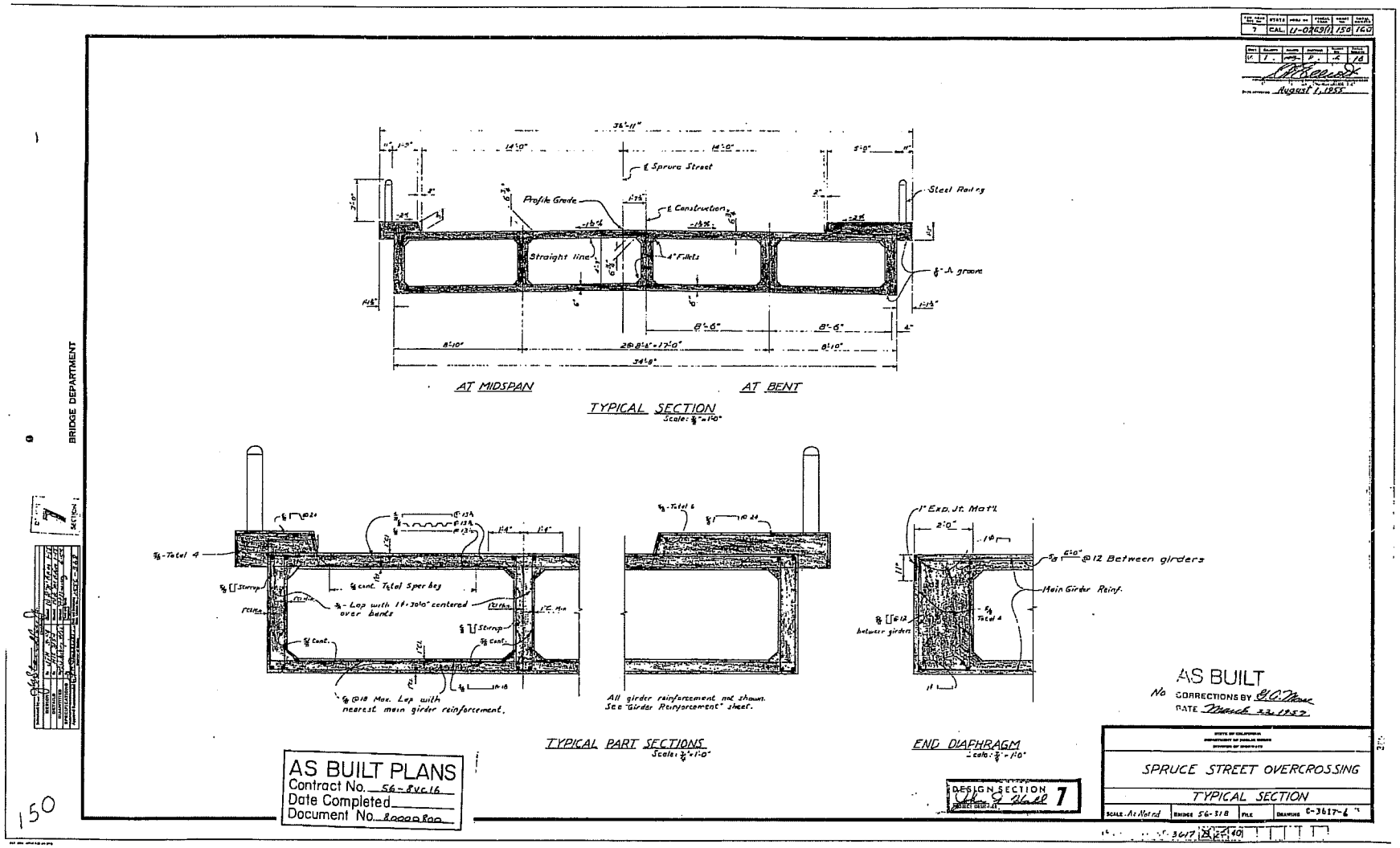
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE 9/31/11 SIGNATURE [illegible] TITLE [illegible]



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 PUBLIC WORKS.

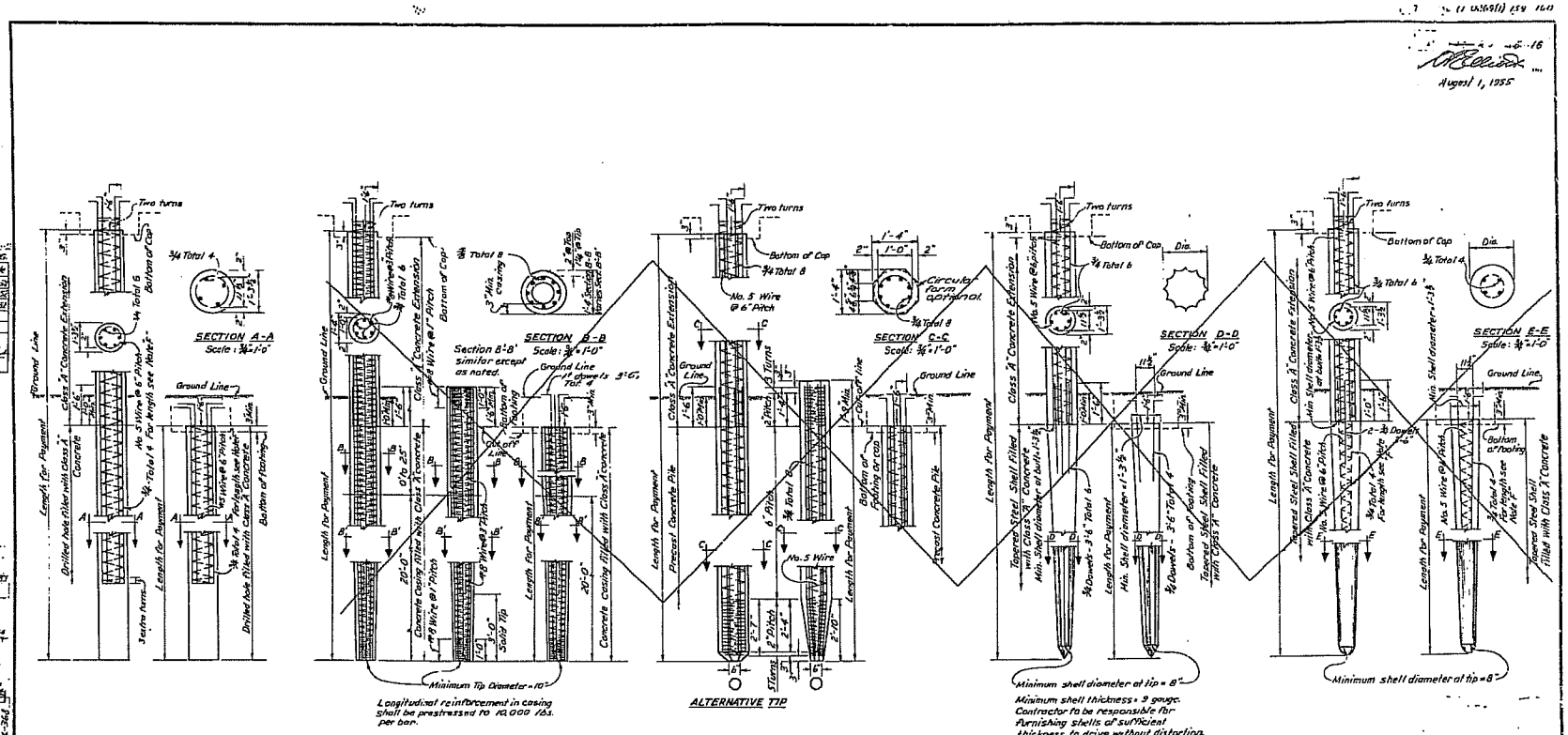
DATE _____ SIGNATURE _____ TITLE _____



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 PUBLIC WORKS.

DATE 9/13/71 SIGNATURE [illegible] TITLE [illegible]

MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF PUBLIC WORKS - MICROFILM



CAST-IN-DRILLED-HOLE CONCRETE PILE ALTERNATIVE "V"

~~CAST-IN-PLACE CONCRETE PILE ALTERNATIVE "W"~~

~~PRECAST CONCRETE PILE ALTERNATIVE "X"~~

~~CAST-IN-PLACE CONCRETE PILE ALTERNATIVE "Y"~~

~~CAST-IN-PLACE CONCRETE PILE ALTERNATIVE "Z"~~

~~Note: For Alternatives "W" and "X" the piles may be driven full length and cut off without extension or they may be extended as shown at the option of the Contractor.~~

AS BUILT PLANS
Contract No. 56-8vc16
Date Completed
Document No. 80000800

AS BUILT
CORRECTIONS BY G.A. Moore
DATE March 22, 1952

Note F Length of 3/4 round bars, measured below ground line or bottom of footing, to be either minimum of 5/8 penetration or 12" whichever is the greater. For total length of bars, add extension or splice.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

SPRUCE STREET OVERCROSSING

PILE DETAILS

Except as Noted Scale: 1/2"=1'-0" | BRIDGE | FILE XS-10-15 | DRAWING 03617-15

PREL DRAWING NO. P-

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 PUBLIC WORKS.

DATE [illegible] SIGNATURE [illegible] TITLE [illegible]

MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF PUBLIC WORKS - MICROFILM

AS BUILT PLANS
Contract No. 56-8vc16
Date Completed
Document No. 80000800
Test Boring By Bridge Dept.
No ground water encountered
AS BUILT
CORRECTIONS BY
DATE
August 1, 1955
CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS
DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES
IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND". THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE GRAVEL, SAND AND SILT REFER TO STANDARD GRADE SIZE LIMITS.
READ CLAY PERCENTAGES ON THIS SIDE
READ SAND PERCENTAGES ON THIS SIDE
READ SILT PERCENTAGES ON THIS SIDE
CLAY
SILTY CLAY
SANDY CLAY
CLAYEY SAND
CLAYEY SILT
SAND
SILTY SAND
SANDY SILT
SILT
LEGEND OF EARTH MATERIALS
GRAVEL
SAND
SILT
CLAY
SANDY CLAY OR CLAYEY SAND
SANDY SILT OR SILTY SAND
SILTY CLAY OR CLAYEY SILT
PEAT AND/OR ORGANIC CLAY
FILLED MATERIAL
IGNEOUS ROCK
SEDIMENTARY ROCK
METAMORPHIC ROCK
LEGEND OF BORING OPERATIONS
PLAN OF ANY BORING
PENETROMETER
2½" CONE PENETROMETER
SAMPLER BORING (DRY)
ROTARY BORING (WET)
AUGER BORING (DRY)
JET BORING
CORE BORING
TEST PIT
Top Hole El.
Location
B-No
Blows per foot (Using ___ lb hammer with 12" free fall)
Description of material
Groundwater surface
Pulled pipe
Sample taken
Core
1" Soil Tube
Casing set
Size of sample (inches)
Unconfined compressive strength (T/sq ft)
Blows per foot (Using a 140 lb hammer with 30" drop, unless otherwise specified)
% Moisture
Consolidation Test
Unit wt (lb/cu ft)
Conformable material change
Estimated
Unconformable
Rotary Boring
NOTES
THE CONTRACTOR'S ATTENTION IS DIRECTED TO SECTION 2, ARTICLE (2) OF THE STANDARD SPECIFICATIONS AND TO THE SPECIAL PROVISIONS ACCOMPANYING THIS SET OF PLANS. CLASSIFICATION OF EARTH MATERIAL AS SHOWN ON THIS SHEET IS BASED UPON FIELD INSPECTION AND IS NOT TO BE CONSTRUED TO IMPLY MECHANICAL ANALYSIS.
PENETROMETER BORINGS HAVING A RATE OF PENETRATION MEASURED IN SECONDS PER FOOT ARE DRIVEN WITH A No 3 MCKIERNAN-TERRY AIR HAMMER AT 115 PSI.
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS
SPRUCE STREET O.C.
LOG OF TEST BORINGS
U-3617-16
CAL.
U-OE
6910
160
16
BRIDGE DEPARTMENT
FIELD STUDY
DRAWN
CHECKED
160
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 PUBLIC WORKS.
DATE
SIGNATURE
TITLE
MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF PUBLIC WORKS - MICROFILM
SCALE

Caltrans Bridge 56-0390
Jackson St. OC (Replace), Riverside Co.

Caltrans Bridge 56-0390, Jackson St. OC (Replace), Riverside Co.

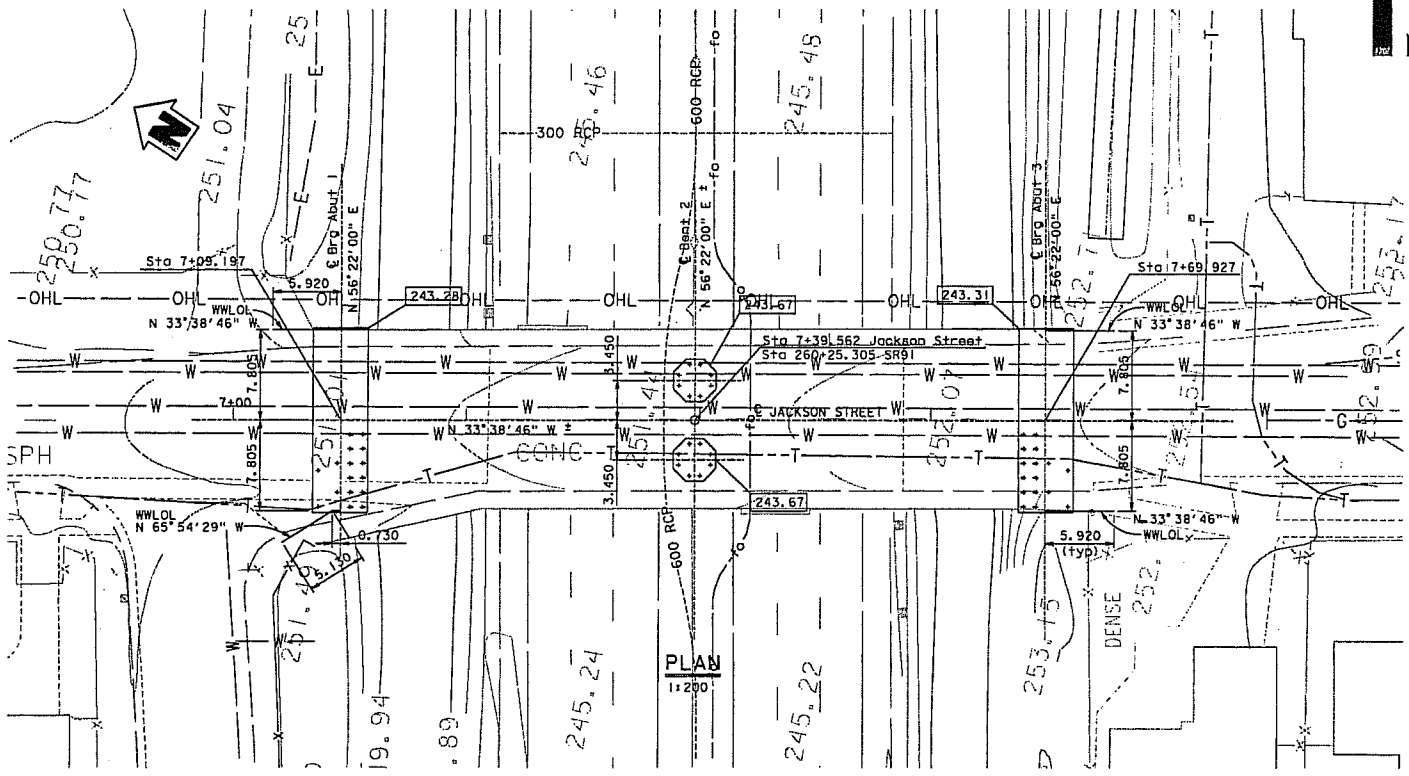
This bridge is located at Jackson St. over SR 91, halfway between Corona and Riverside cities in Riverside County.

Caltrans provided a bulk sample taken from this bridge site for determination of fill properties. We have performed UU testing on this sample. Caltrans provided maximum density test results using a nuclear gauge. Test results from our UU testing are in Appendix C. The data showed the in-situ fills had a relative compaction of 92 to 97%.

02/05/2004

02/05/2004

02/05/2004



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
08	Riv	91	18.0/28.5	367	377

REGISTERED ENGINEER - CIVIL

1-22-01

PLANS APPROVAL DATE

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

REGISTERED PROFESSIONAL ENGINEER — DAVID A. ANDERSON — No. 36066 — Exp. 6-30-04 — CIVIL — STATE OF CALIFORNIA

URS GREINER WOODWARD CLYDE
2020 East First Street
Suite 400
Santa Ana CA, 92705-4032

RIVERSIDE COUNTY
TRANSPORTATION COMMISSION
3560 University Avenue, Suite 100
Riverside, California 92501

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NO AS BUILT CHANGES

AS BUILT

CORRECTIONS BY Alex Angka

CONTRACT NO. 08-435314

DATE 12/16/03

BENCH MARKS

BM: RCTC Pt No. 3226, Elev 811.17' (247.245 m) (NGVD DATUM, 1929) 2" brass disk in 2" IP with 10" concrete collar stamped "California Dept of Transportation RIV 91-14.85 LS 5679 1990" per RCTC horizontal and vertical control book, page 167.

BM: RCTC Pt No. 3224, Elev 797.98' (243.225 m) (NGVD DATUM, 1929) 2" brass disk in 2" IP with 10" concrete collar stamped "California Dept of Transportation RIV 91-14.33 LS 5679 1990" per RCTC horizontal and vertical control book, page 165.

PILE DATA TABLE

Location	Pile Type Alternative "Y"	Design Loading	Nominal Resistance Compression	Nominal Resistance Tension	Design Tip Elevations	Specified Tip Elevations
Abutment 1	Class 625	600 kN	1200 kN	0	+233.5(1) m	+233.5 m
Bent 2	Class 625	550 kN	1100 kN	0	+232.5(1) m	+232.5 m
Abutment 3	Class 625	600 kN	1200 kN	0	+233.5(1) m	+233.5 m

Design tip elevation is controlled by the following demands:
(1) Compression, (2) Tension

LEGEND:

= Indicates bot of ftg elev

+ = Vertical piles

-+ = Battered piles, 1:3 typ

NOTES:

1. For Bent 2 pile layout see 'Bent Details No.2' Sheet.
2. For Abut 1 & Abut 3 pile layout see 'Abutment details No.1' Sheet.
3. For limits of payment for structure excavation and backfill see A62-C
4. For pile details, see B2-5, Alternative "Y" for all piles.

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

Ross Khaboni 07/19/00
GEOTECHNICAL PROFESSIONAL APPROVAL DATE

DESIGN OVERSIGHT

Oct. 6, 2000
SIGN OFF DATE

FOUNDATION PLAN SHEET (METRIC) (REV. 8/2/98)

SCALE:	VERT. DATUM	HORZ. DATUM	DESIGN	N. Patel	A. Athalye
PHOTOGRAMMETRY AS OF: N/A	ALIGNMENT TIES N/A		DETAILS	P. Zucchi	A. Athalye
SURVEYED T. Thacker	DRAFTED D. Bouldin		QUANTITIES	N. Patel	S. Callan
FIELD CHECKED T. Thacker	CHECKED D. Williams				

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

PREPARED FOR THE STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

J. Chapman
PROJECT ENGINEER

CU 08110
EA 435301

FILE => $REQUEST

BRIDGE NO.	JACKSON STREET OC (REPLACE)
56-0390	
KILOMETER POST 23.6(14.6)	FOUNDATION PLAN

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 4 OF 14

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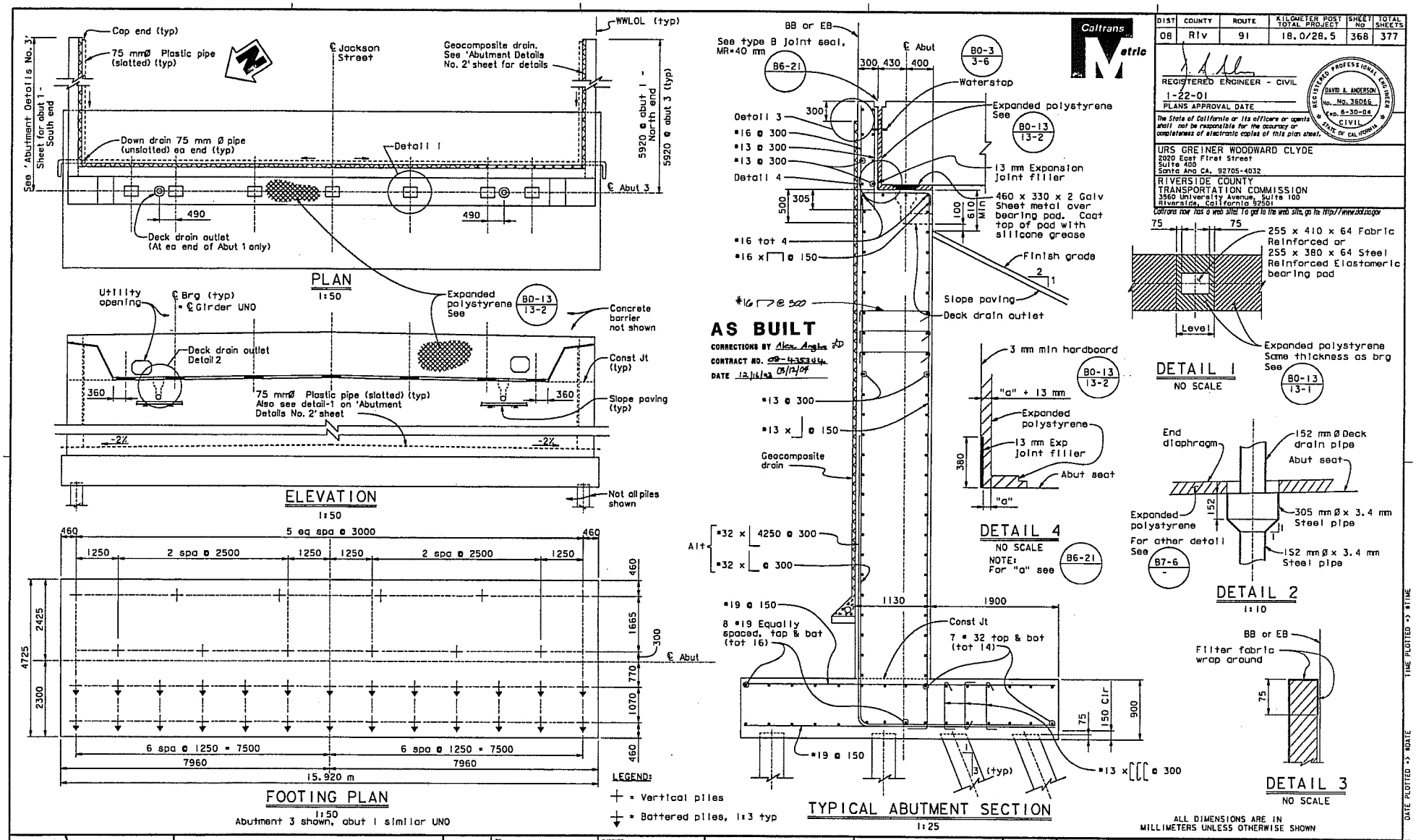
#TIME



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
08	Riv	91	18.0/28.5	368	377

Caltrans Metric

REGISTERED ENGINEER - CIVIL
1-22-01
PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER DAVID A. ANDERSON No. No. 36066 Exp. 6-30-04 CIVIL STATE OF CALIFORNIA

URS GREINER WOODWARD CLYDE
2020 East First Street
Suite 400
Santa Ana CA. 92705-4032

RIVERSIDE COUNTY TRANSPORTATION COMMISSION
3560 University Avenue, Suite 100
Riverside, California 92501

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DESIGN OVERSIGHT
Oct. 6, 2000
SIGN OFF DATE

DESIGN DETAIL SHEET (METRIC) (REV. 9/2/98)

DESIGN	BY N. Patel	CHECKED A. Athalye	
DETAILS	BY P. Zucchi	CHECKED A. Athalye	
QUANTITIES	BY N. Patel	CHECKED S. Callan	

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

J. Chapman
PROJECT ENGINEER

CU 08110
EA 4353U1

FILE => $REQUEST

BRIDGE NO. 56-0390
KILOMETER POST 23.6(14.6)

JACKSON STREET OC (REPLACE)
ABUTMENT DETAILS NO. 1

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 5 OF 14

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
08	Riv	91	18.0/28.5	369	377

Caltrans Metric

REGISTERED ENGINEER - CIVIL
1-22-01
PLANS APPROVAL DATE

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2020 East First Street
Suite 400
Santa Ana CA. 92705-4032

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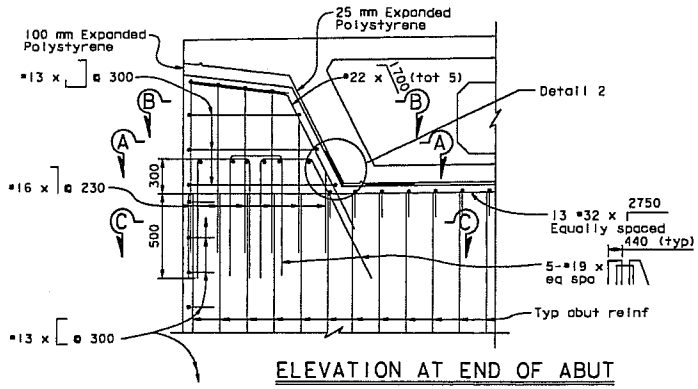
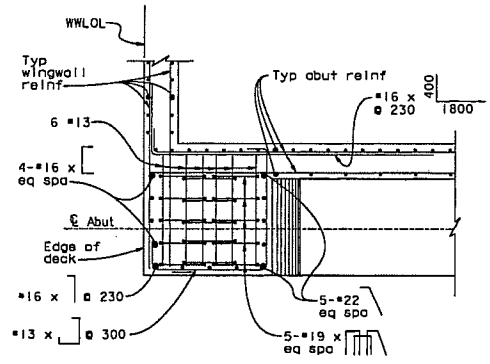
NO AS BUILT CHANGES
AS BUILT
CORRECTIONS BY Alex Angle
CONTRACT NO. [illegible]
DATE 12/18/03



ELEVATION AT END OF ABUT
1:20
North End of Abut 3 Shown, other locations similar except Layout of South End Wingwall at Abut 1



SECTION A-A
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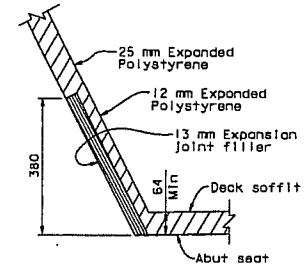

DETAIL 2
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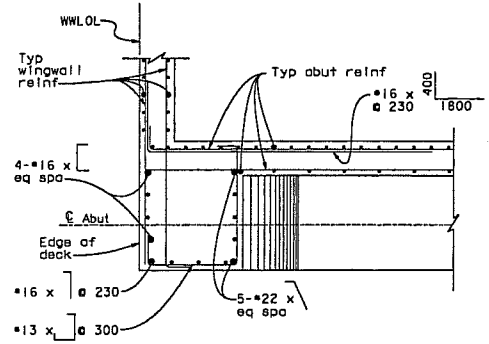
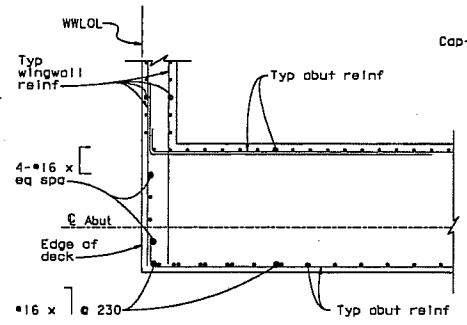


SECTION B-B
1:20



SECTION C-C
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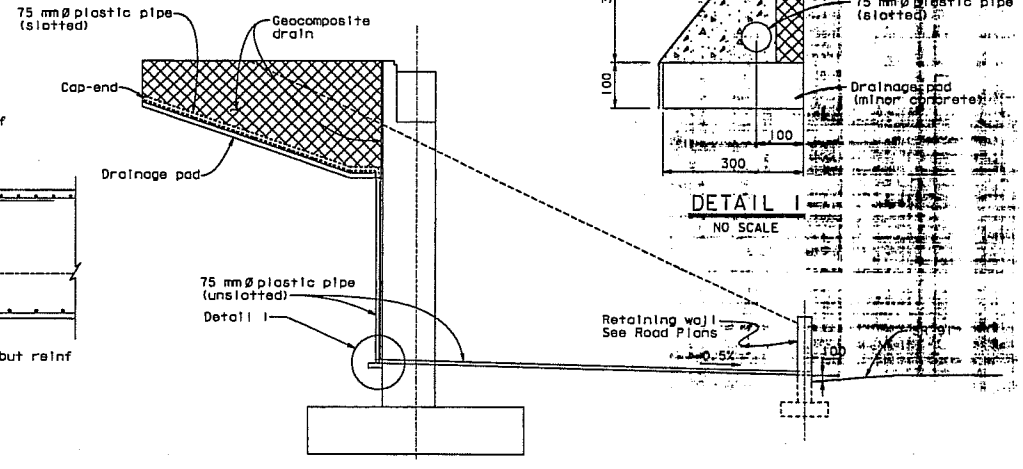

DETAIL 1
NO SCALE

ABUT DRAINAGE DETAILS
NO SCALE

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN OVERSIGHT Oct. 6, 2000 SIGN OFF DATE	DESIGN BY N. Patel	CHECKED A. Athalye	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	J. Chapman PROJECT ENGINEER	BRIDGE NO. 56-0390
	DETAILS BY P. Zucchi	CHECKED A. Athalye			KILOMETER POST 23.6(14.6)
	QUANTITIES BY N. Patel	CHECKED S. Callan			

JACKSON STREET OC (REPLACE)
ABUTMENT DETAILS NO. 2

DESIGN DETAIL SHEET (METRIC) (REV. 9/2/98)
ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100
CU 08110
EA 4353U1
FILE -> #REQUEST
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES (PRELIMINARY STAGE ONLY)
SHEET 6 OF 14
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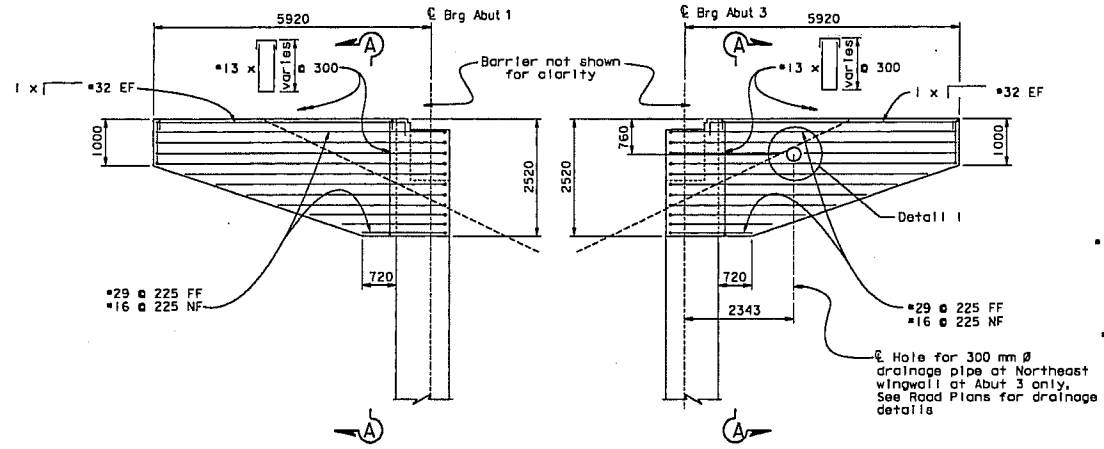
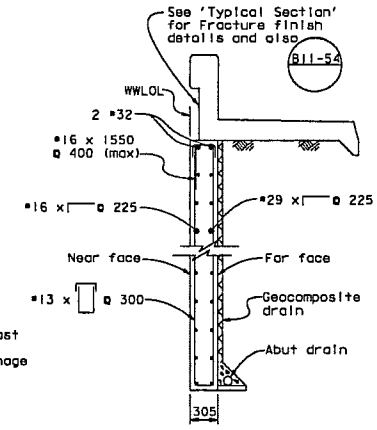


ELEVATION AT ABUT 1

1:50

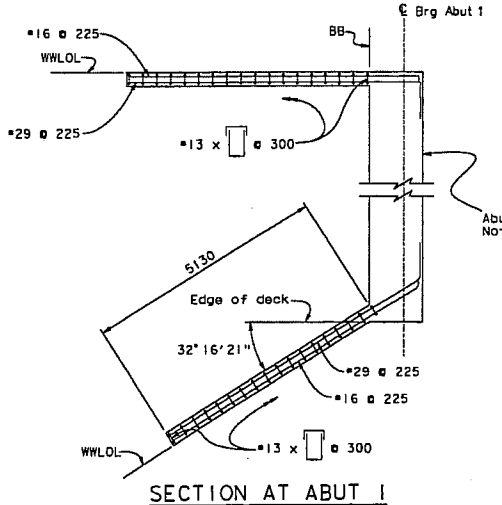
ELEVATION AT ABUT 3

1:50



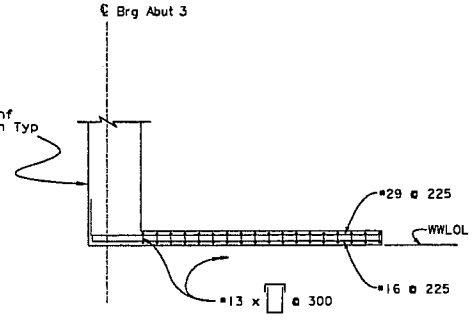
SECTION A-A

1:25



SECTION AT ABUT 1

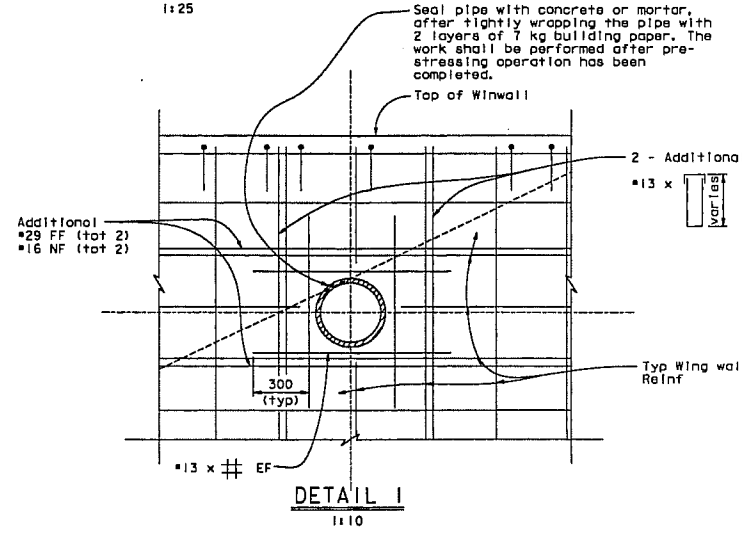
1:50



SECTION AT ABUT 3

1:50

Note: South Wing Wall Shown, North Similar



DETAIL 1

1:10

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
08	Riv	91	18.0/28.5	370	377

REGISTERED ENGINEER - CIVIL

1-22-01

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER DAVID A. ANDERSON No. No. 36066 EXP. 6-30-04 CIVIL STATE OF CALIFORNIA

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2020 East First Street
Suite 400
Santa Ana CA. 92705-4032

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NO AS BUILT CHANGES

AS BUILT

CORRECTIONS BY Alex Angle

CONTRACT NO. 08-4353U1

DATE 12/18/03

DESIGN OVERSIGHT Oct. 6 2000
SIGN OFF DATE

DESIGN DETAIL SHEET (METRIC) (REV. 9/2/98)

	BY	CHECKED
DESIGN	N. Patel	A. Athalye
DETAILS	P. Zucchi	A. Athalye
QUANTITIES	N. Patel	S. Collan

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

J. Chapman
PROJECT ENGINEER

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 08110
EA 4353U1

FILE => @REQUEST

BRIDGE NO. 56-0390
KILOMETER POST 23.6(14.6)

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

JACKSON STREET OC (REPLACE)
ABUTMENT DETAILS NO. 3

SHEET 7 OF 14

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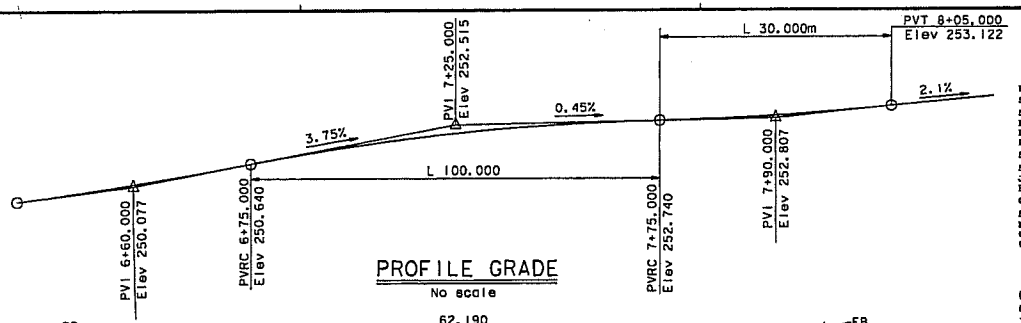
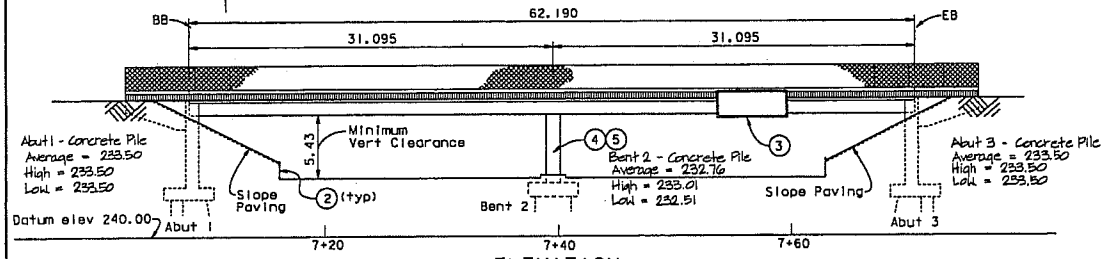


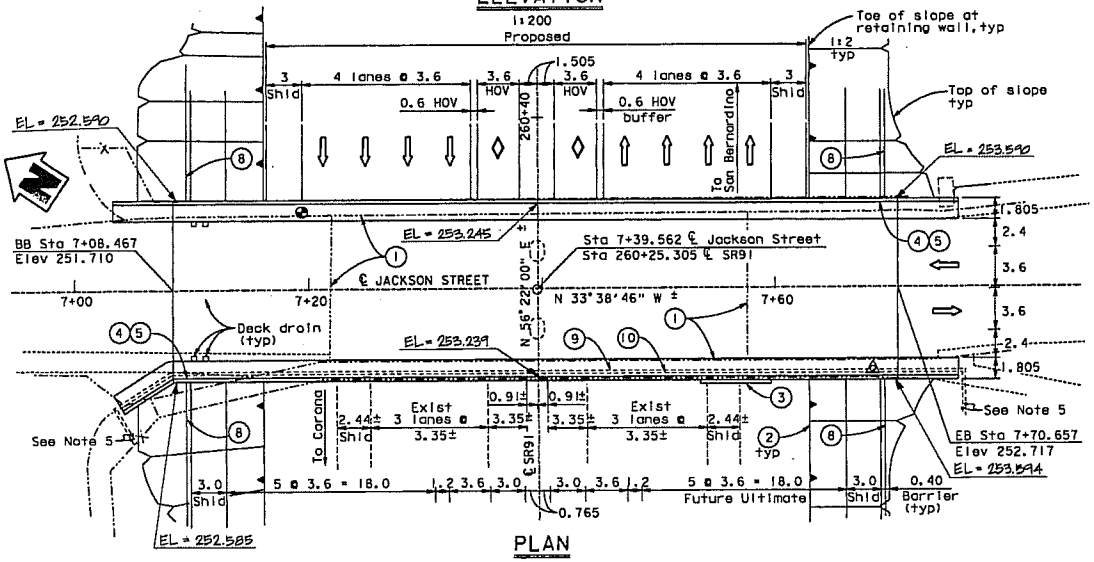
PROFILE GRADE

No scale



ELEVATION

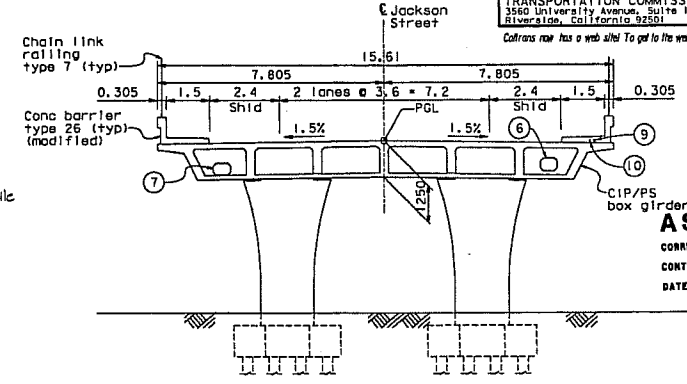
1:200



PLAN

1:200

QUANTITIES		
	LUMP SUM	
BRIDGE REMOVAL	1,625	m^3
STRUCTURE EXCAVATION (BRIDGE)	965	m^3
STRUCTURE BACKFILL (BRIDGE)	1,048	m
FURNISH PILING (CLASS 625)	100	EA
DRIVE PILE (CLASS 625)	LUMP SUM	
PRESTRESSING CAST-IN-PLACE CONCRETE	161	m^3
STRUCTURAL CONCRETE, BRIDGE FOOTING	775	m^3
STRUCTURAL CONCRETE, BRIDGE	32	m
JOINT SEAL (TYPE B - MR 40 MM)	105,000	kg
BAR REINFORCING STEEL (BRIDGE)	270	m^3
GEOCOMPOSITE DRAIN	29	m^3
SLOPE PAVING (CONCRETE)	1,175	kg
MISCELLANEOUS METAL (BRIDGE)	145	m
CHAIN LINK RAILING (TYPE 7)	145	m
CONCRETE BARRIER (TYPE 26 MODIFIED)		



TYPICAL SECTION

1:80

AS BUILT

CORRECTIONS BY Alex Angba

CONTRACT NO. 08-433304

DATE 12/19/03 03/12/04

LEGEND:

1. Remove existing structure
2. Retaining wall (see Road Plans)
3. See 'Bridge Mounted Sign' sheet and Road Plans for details
4. Paint "Jackson Street Overcrossing"
5. Paint "Br No. 56-0390"
6. Opening for 622 mm wide x 400 mm deep casing for Pacbell Utilities
7. Opening for 585 mm wide x 400 mm deep casing for Riverside Electric Utilities
8. Future retaining wall (see Road Plans)
9. 75mm GSP Irrigation Supply Line
10. 53mm Irrigation Control Conduit with pullwire

Denotes Existing structure

Point of minimum vertical clearance

NOTES:

1. For "Standard Plans", See 'Index to Plans' sheet
2. For "Pile Data Table", See 'Foundation Plan' sheet
3. For "General Notes", see 'Index to Plans' sheet
4. The contractor shall verify all controlling field dimensions before ordering or fabricating any material.
5. For continuation of Irrigation Supply Line and Control Conduit, see "Road Plans"

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
08	Riv	91	18.0/28.5	364	377

REGISTERED ENGINEER - CIVIL

1-22-01

PLANS APPROVAL DATE

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

REGISTERED PROFESSIONAL ENGINEER — DAVID A. ANDERSON — No. 36066 — Exp. 6-30-04 — CIVIL — STATE OF CALIFORNIA

URS GREINER WOODWARD CLYDE
2020 East First Street
Suite 400
Santa Ana CA. 92705-4032

RIVERSIDE COUNTY
TRANSPORTATION COMMISSION
3560 University Avenue, Suite 100
Riverside, California 92501

Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov

DESIGN OVERSIGHT	DESIGN	BY N. Patel	CHECKED A. Athalye	LOAD FACTOR DESIGN	LIVE LOADING: HS20-44 AND ALTERNATIVE AND PERMIT DESIGN LOAD	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	J. Chapman PROJECT ENGINEER
Oct. 6, 2000 SIGN OFF DATE	DETAILS	BY P. Zucchi	CHECKED A. Athalye	LAYOUT	BY P. Zucchi CHECKED N. Patel		
	QUANTITIES	BY N. Patel	CHECKED S. Callan	SPECIFICATIONS	BY D. Harnagel PLANS AND SPECS COMPARED D. Harnagel		

DESIGN GENERAL PLAN SHEET (METRIC) (REV. 8/2/99)

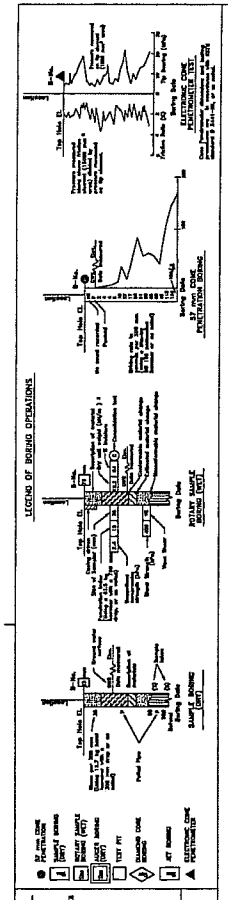
ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

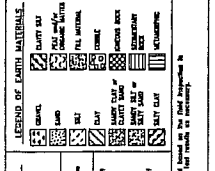
CU 08110
EA 4353U1

BRIDGE NO.	JACKSON STREET OC (REPLACE)
56-0390	GENERAL PLAN
KILOMETER POST 23.6(14.6)	

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STATE ONLY): 3/27/03 | 5/29/03 | 8/29/03 | 10/3/03

SHEET 1 OF 14





Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov

Caltrans Metric

NO AS BUILT CHANGES

AS BUILT

CORRECTIONS BY Alex Angle

CONTRACT NO. 08-433204

DATE 12/18/03

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
08	Riv	91	18.0/28.5	377	377

REGISTERED CIVIL ENGINEER

1-22-01
PLANS APPROVAL DATE

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

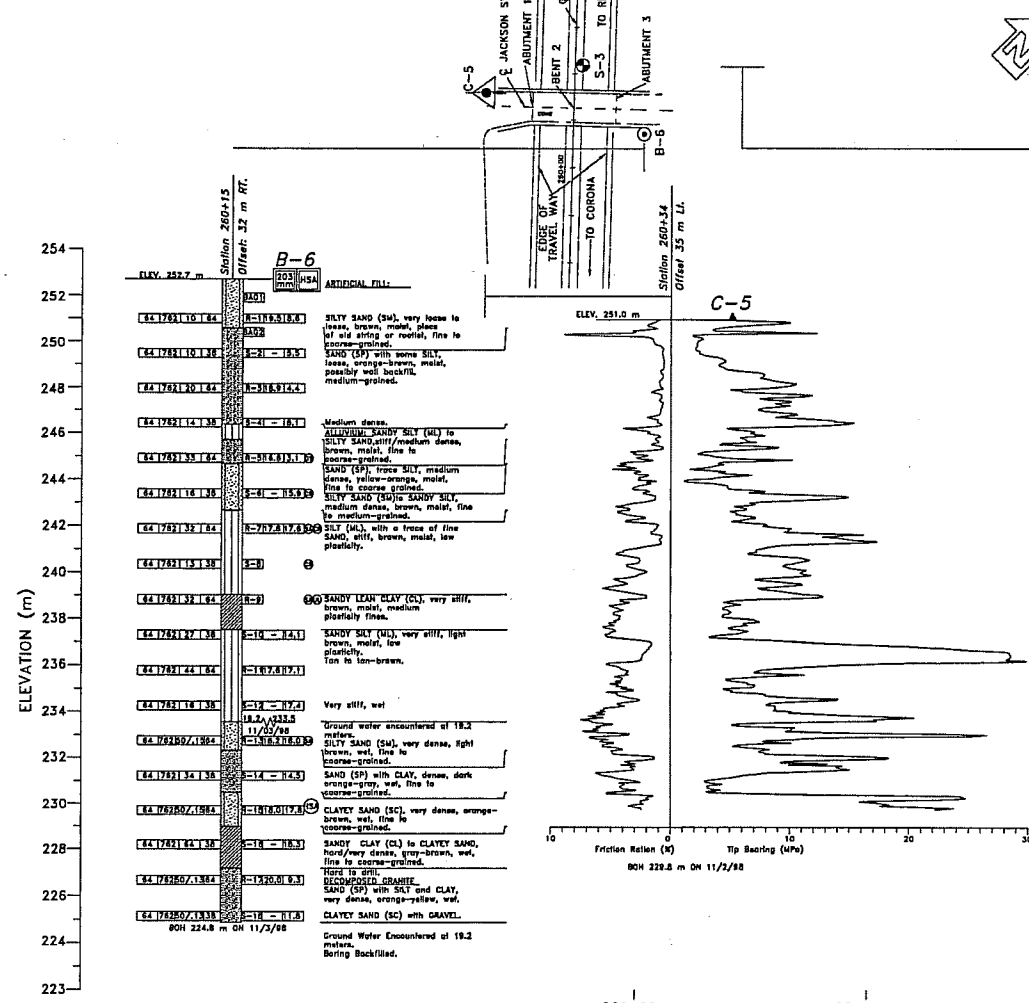
REGISTERED PROFESSIONAL ENGINEER — ROSS KHABAHI — No. 2202 — Exp. 9/30/04 — STATE OF CALIFORNIA

RIVERSIDE COUNTY TRANSPORTATION COMMISSION
3560 UNIVERSITY AVENUE, SUITE 100
RIVERSIDE, CALIFORNIA 92501

LEIGHTON & ASSOCIATES, INC.
17781 COWAN AVENUE
IRVINE, CA-92614

PLAN

SCALE 1 : 1000



HORIZONTAL SCALE 1 : 1000
VERTICAL SCALE 1 : 100

ATTACHMENT B-5

DESIGN OVERSIGHT	DRAWN BY	Karen Perez	JOH/ENG	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Jeffrey O. Chapman PROJECT ENGINEER	BRIDGE NO. 56-390	JACKSON STREET OC
SIGN OFF DATE Oct. 6, 2000	CHECKED BY	Ross Khabani	FIELD INVESTIGATOR DATE 1/92 and 11/98			POST MILE 23.6	LOG OF TEST BORINGS

OSF CIVIL LOG OF TEST BORING SHEET (METRIC) (REV. 4/20/00) Modified for an geotechnical consultants

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 08110
EA 4353U1

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 14 OF 14

pidrafting/980236/001/sf_8-1-00/fig_3-2.dwg

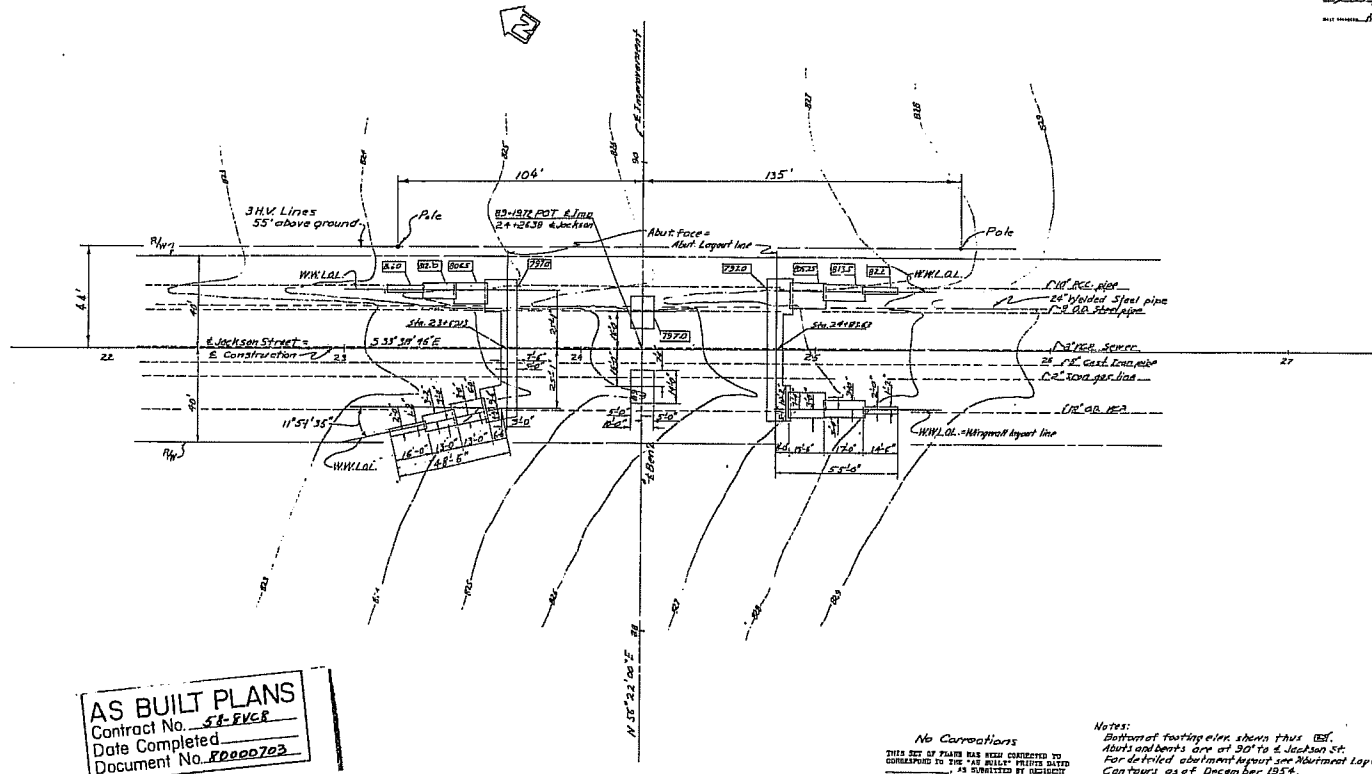
br560390#14of14.tif

PROFILE GRADE
No Scale
ELEVATION
Scale: 1"=20'
TYPICAL SECTION
Scale: 1"=10'
PLAN
Scale: 1"=20'
APPROXIMATE QUANTITIES
STRUCTURE EXCAVATION 980 C.Y.
STRUCTURE BACKFILL 1,060 C.Y.
CLASS A CONCRETE (BRIDGES)(950 C.Y.) LUMP SUM
RUBBER WATERSTOPS 130 L.F.
BAR REINFORCING STEEL (BRIDGES)(168,000 LBS.) LUMP SUM
STEEL RAILING 437 L.F.
Note: All utilities by others.
B.M. 9-D-57 El. 821.62 Sp.hd. nail in lead in P.C.C. curb 192' Lt. Sta. 89+02 ℄ Improv.
B.M. 9-E-57 El. 829.52 Sp.hd. nail in lead in P.C.C. curb 169' Rt. ℄ Improv. Sta. 89+02
INDEX TO PLANS
Sheet No. Title
1 General Plan
2 Foundation Plan
3 Abutment Layout
4 Abutment Details
5 Type 1A Cantilever Retaining Wall
6 Type 2 Cantilever Retaining Wall
7 Bent 2
8 Typical Section
9 Girder Layout and Reinforcement
10 Standard Details No. 1
11 Standard Details No. 2
12 Standard Utility Details No. 1
13 Steel Railing
14 Log of Test Borings
For General Notes see "Standard Details No. 2" sheet.
58-8VC8
Live Loading: H20-S16-44
AS BUILT PLANS
Contract No. 58-8VC8
Date Completed
Document No. 80000703
DESIGN SECTION 7
STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS
JACKSON STREET OVERCROSSING
LOCATED IN THE CITY OF RIVERSIDE, ABOUT 1.8 MILES NORTHEAST OF THE SOUTHEASTERLY CITY LIMIT
GENERAL PLAN
SCALE AS NOTED
BRIDGE 56-390
May 13, 1957

FED. ROAD DIV. NO.	STATE	PROJ. NO.	FEDERAL FUND NO.	SHEET NO.	TOTAL SHEETS
7	CALIF.	0041(1)		83	197

DATE	REVISION	BRIDGE NO.	SHEET NO.	TOTAL SHEETS
7/28	R.V.	53-190	2	12

May 15, 1957



AS BUILT PLANS
Contract No. 58-EVCR
Date Completed
Document No. RD000703

No Corrections
THIS SET OF PLANS HAS BEEN CORRECTED TO CORRESPOND TO THE "AS BUILT" PRINTS DATED ____, AS SUBMITTED BY RESIDENT ENGINEER
DRAWINGS CORRECTED BY [illegible] DATE: 7-15-57

Notes:
Bottom of footing elev. shown thus (87).
Abuts and bents are at 90° to ℄ Jackson St.
For detailed abutment layout see Northeast Layout sheet.
Contours as of December 1954.

B.M. (Indiana - Donald) '54
Spk'd Mod in 2"x2" Rwld. hub buried 18"
315' Rt. 83+19 POT ℄ Imp
El. 828.38

B.M. (Indiana - Jackson) '54
Spk'd nail in 2"x2" Rwld. hub buried 18"
127' Rt. 83+42 POT ℄ Imp
El. 827.97

BRIDGE DEPARTMENT — DESIGN SECTION — 7

DESIGN	W. V. Johnson 12-55	Traced	Approved 5/12
DETAILS	W. Date Planned 12-55	Traced	Approved 5/24
QUANTITIES	W. Date Measured 4-56	Traced	Checked 7-15
SPECIFICATIONS	W.	Date Last Revised	

Approved for Recommendation by [signature] Date 5/31/57

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

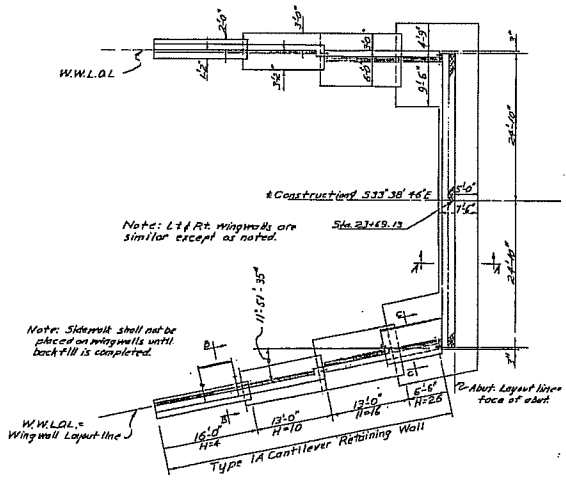
JACKSON ST. OVERCROSSING

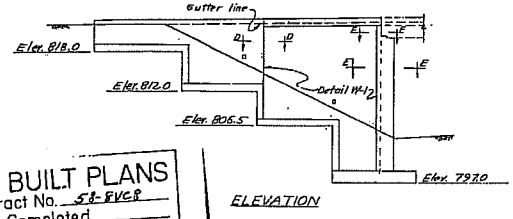
FOUNDATION PLAN

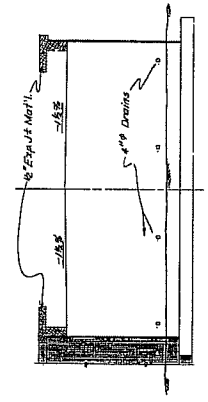
SCALE 1"=20' | BRIDGE 53-190 | FILE | DRAWING 0-43A2-2

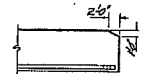
PREL. DRAWING No. P- 43 42

83

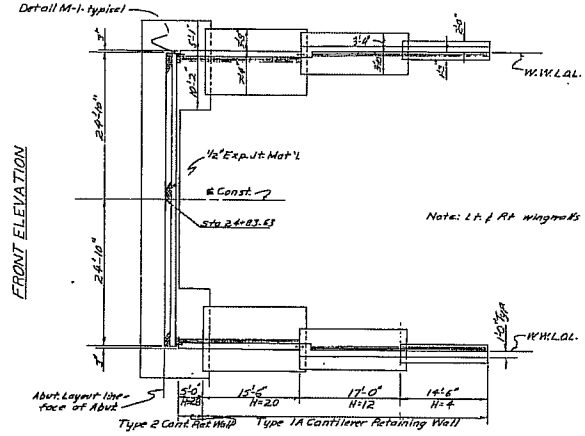


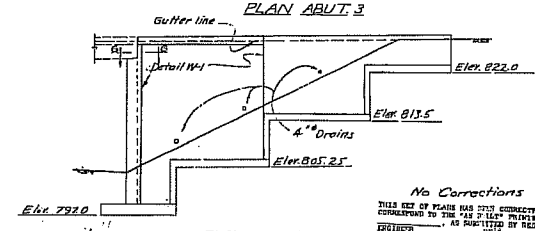






Note: For details of sections "A-A", "B-B", "C-C", "D-D", "E-E", "F-F", and "G-G" see "Abutment Details" sheet.





No Corrections
THIS SET OF PLANS HAS BEEN CORRECTED TO CORRESPOND TO THE "AS BUILT" PRINTS DATED ____, AS SUBMITTED BY RESIDENT ENGINEER.
TRACINGS CORRECTED BY ____ DATE: ____

AS BUILT PLANS
Contract No. 58-8VC8
Date Completed ____
Document No. 80000703

BRIDGE DEPARTMENT
DESIGN SECTION 7
Project Designer: Grant Kuo
Chief Designer: Walter Lum
DESIGN — D. Tsunokuni 12-66 — Checked: A.W.C. Williams 4/68
DETAILS — Jorge Moore 12-65 — Checked: DCD
QUANTITIES — Jorge Moore 6/66 — Checked: (P.C.B. & Lum) 7/66
SPECIFICATIONS — by — Checked: —
Approved Recommended for: [signature] 5-69

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

JACKSON ST. OVERCROSSING

ABUTMENT LAYOUT

SCALE 1/8" = 1'-0" | BRIDGE 58-390 | FILE | DRAWING 02-4342-3 1

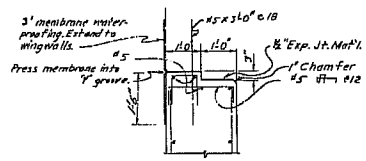
PREL. DRAWING NO. P- 93 42 | 25 | 26 | 27 | 28

May. 18, 1967

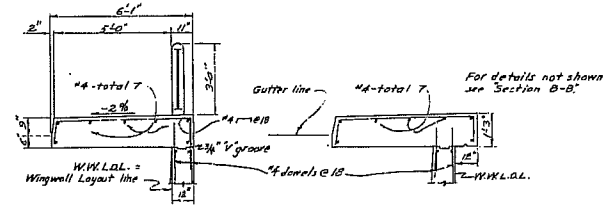
DIST.	COUNTY	ROUTE	POST MILE	SHEET NO.	TOTAL SHEETS
7	CALIF.	242/31		53	87

REVISIONS	BY	APPROVED	DATE

May 19 1952

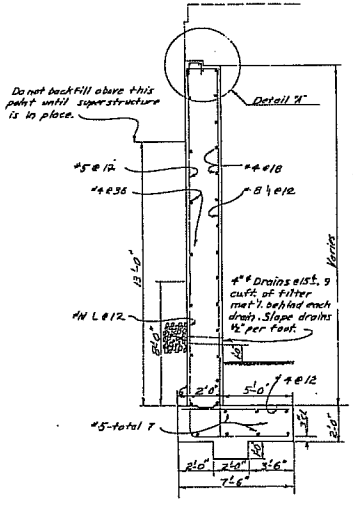


DETAIL A"
Scale: 3/4"=1'-0"

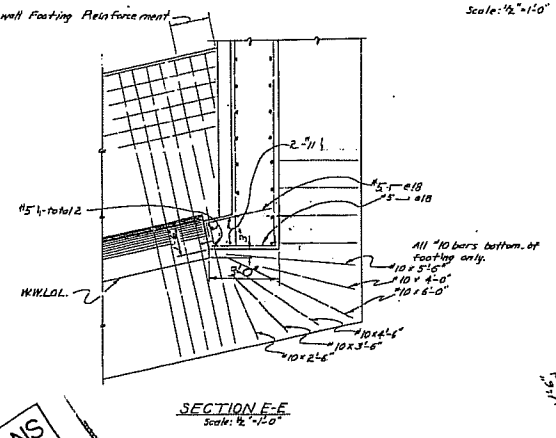


SECTION B-B
Scale: ½"=1'-0"

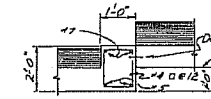
SECTION C-C
Scale: ½"=1'-0"



SECTION A-A
Scale: ¾"=1'-0"

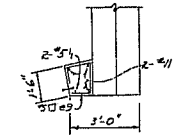


SECTION E-E
Scale: ½"=1'-0"

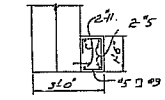


SECTION D-D
Scale: ½"=1'-0"

No Corrections
THIS SET OF PLANS HAS BEEN CORRECTED TO CONSTRUCTED TO THE "AS BUILT" PRINTS DATED ____, AS SUBMITTED BY RESIDENT ENGINEER
TRACINGS CORRECTED BY [illegible] DATE: 7-15-59



SECTION F-F
Scale: ½"=1'-0"



SECTION G-G
Scale: ½"=1'-0"

AS BUILT PLANS
Contract No. 53-8K68
Date Completed
Document No. 80200702

Note: For location of sections on this sheet see "Abutment Layout" sheet.

BRIDGE DEPARTMENT — DESIGN SECTION — 7		
Project Designer	Edward Elliott	
Chief Designer	[illegible]	
DESIGN	D. Jensen 12-53	Checked W.H. Johnson 9/52
DETAILS	Bruce Mercer 12-53	Checked [illegible]
QUANTITIES	Boyd Moore 8/52	Checked PCC February 7 '52
SPECIFICATIONS	[illegible]	
Approved for submission to	[illegible]	[illegible]

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

JACKSON ST. OVERCROSSING

ABUTMENT DETAILS

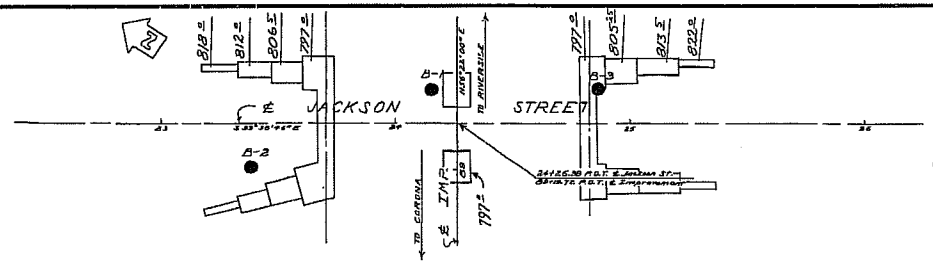
SCALE As Noted	BRIDGE 56-390	FILE	DRAWING No. 43342-A

PREL. DRAWING No. P-4342 | X | [illegible]

DIST.	COUNTY	ROUTE	POST MILES	SHEET NO.	TOTAL SHEETS
7	CAL.	[illegible]		95	187

DIST.	COUNTY	ROUTE	POST MILES	SHEET NO.	TOTAL SHEETS
VIII	RIV	79	21.1/L	14	14

May 14, 1951



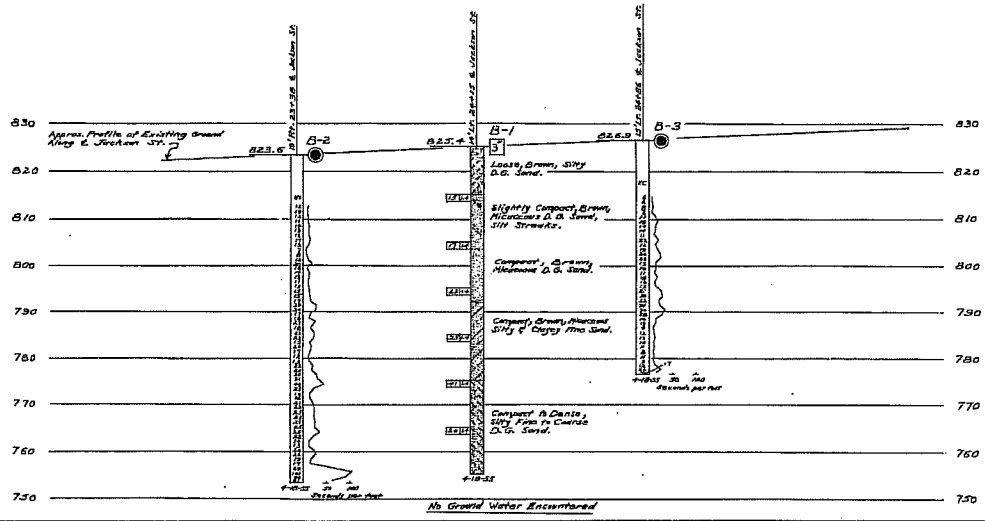
Construction Notes:

1 Elev shown at ftgs. are 'As Built' ftg subgrade, ftgs some as shown on plans. Elev. Sym about E Jackson.

2 No ground water encountered

3 Material uncovered at subgrade similar to that on Borings.

4 Fdtns. on spread ftgs. - no piling



AS BUILT PLANS
Contract No. 54-Riv-4
Date Completed
Document No. 1866263

B.M. Ind-Donald-St
Spike Nail in 2"X2" Rwd. Hub buried 18" S15°W. 83.1 ft. A.C.T. E. Imp.
El. 849.38'

B.M. Ind-Jackson St.
Spike Nail in 2"x2" Rwd. Hub buried 18" S87°W. 88.4 ft. A.C.T. E. Imp.
El. 827.47'

Test Boring by Bridge Dept.

THIS SET OF PLANS WAS NOT CORRECTED TO CORRESPOND TO THE "AS BUILT" PRINTS DATED ..... AS SUBMITTED BY RESIDENT ENGINEER ..... DATE 7-52

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

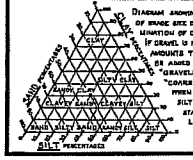


Diagram showing the basis for estimates of grade size distribution used in determination of class names.

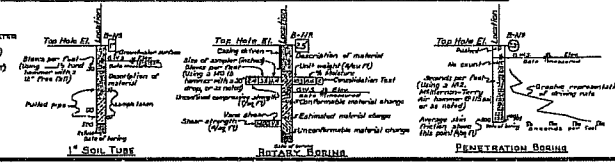
If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, viz. "gravelly sand." The terms "coarse", "medium" and "fine" when used to describe sand, silt and gravel refer to standard grade size limits.

LEGEND OF EARTH MATERIALS

- Gravel
- Sand
- Silt
- Clay
- Sandy Clay or Clayey Sand
- Sandy Silt or Silty Sand
- Silty Clay or Clayey Silt
- Peat and Other Organic Matter
- Fill Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

LEGEND OF BORING OPERATIONS

- Plan of any boring
- Penetrometer
- 2½" Cone Penetrometer
- Sampler boring (dry)
- Rotary boring (wet)
- Auger boring (dry)
- Jet boring
- Core boring
- Test pit



NOTES

The contractor's attention is directed to Section 7, Article (c) of the Standard Specifications and to the Special Provisions accompanying this set of plans.

Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

JACKSON ST. O. C.

LOG OF TEST BORINGS

Alberta Yard
SCALE Horiz. 1"=10' Vert. 1"=10'
BRIDGE 54-380
FILE 8-56
DRAWING 8E 4342-14

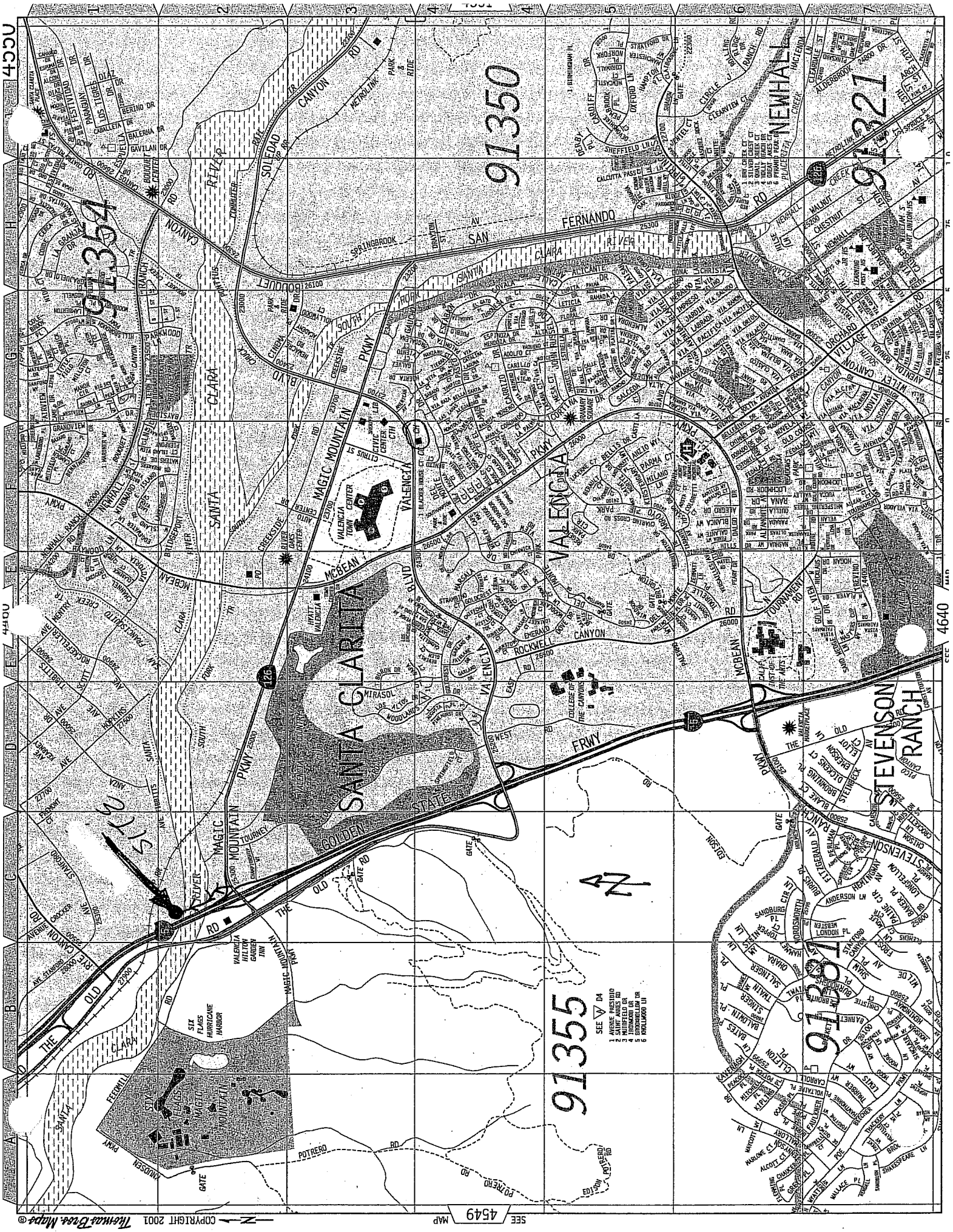
PREL. DRAWING No. P. 4342 Dec 29 57

Caltrans Bridge 53-2928
Santa Clara River Bridge,
Los Angeles Co./Santa Clarita

**Caltrans Bridge 53-2928, Santa Clara River Bridge,
Los Angeles Co./Santa Clarita**

This freeway undercrossing is located in Santa Clarita in Santa Clara County, near Magic Mountain Parkway. Two new bridge are being built on the outside of the two existing bridges. The four bridges span over a deep gorge. The abutments of the two new bridges are monolithic abutments on piles.

The field investigation for the new bridges was conducted on 3/6/04 on the freshly compacted fill. The investigation consisted of (2) 25-ft deep soil borings and (2) 25-ft deep conventional and seismic CPT soundings. Drilling was performed by 2R Drilling and CPT by HFA. All locations were set back 3 to 5 ft behind the abutment walls. Borehole 04-23 and CPT 04-23C were performed at the north abutment of the east bridge, and Borehole 04-24 and CPT 04-24C were performed at the north abutment of the west. Drilling at the south abutments of either bridge was not feasible. Geotechnical soil sampling consisted of ring samples collected at 2.5-ft depth intervals using a Modified California and SPT sampler. Groundwater was not encountered. Seismic wave measurements were taken at 2.5-ft intervals. Two pressuremeter tests were performed in the two boreholes at 5.5 and 7.5-ft depth.



91350
91354
91321
91355
91381
SANTA CLARITA
VALENCIA
NEWHALL
STEVENSON RANCH
SAN FERNANDO
SANTA CLARA RIVER
MAGIC MOUNTAIN PKWY
SOLEDAD CANYON RD
SPRINGBROOK AV
BOUQUET CANYON RD
MCBEAN PKWY
ROCKWELL CANYON RD
GOLDEN STATE FRWY
THE OLD RD
POTRERO RD
SIX FLAGS HURRICANE HARBOR
VALENCIA HILTON GARDEN INN
VALENCIA TOWN CENTER
COLLEGE OF THE CANYONS
SEE D4
1 AVENUE PRESIDIO
2 SAINT ANDES RD
3 MUIRFIELD DR
4 IRONWOOD DR
5 BROOKWOOD LN
6 KNOLLWOOD LN
SEE 4549 MAP
COPYRIGHT 2001 Thomas Bros. Maps

INDEX OF SHEETS

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1	Title and Location Map
2-4	Typical Cross Sections
5-12	Layouts
13-16	Profiles
17-33	Construction Details
34-38	Contour Grading
39-79	Drainage Plans, Profiles and Details
80-85	Utility Plans
86-89	Transportation Management Plans
90-163	Stage Construction and Traffic Handling Plans
164	Detour Plan
165-167	Construction Area Signs
168-183	Pavement Delineation Plans and Quantities
184-187	Summary of Quantities
188-194	Sign Plan, Details and Quantities
195-196	Retaining Wall Plans, Details, and Quantities
197-203	Highway Planting Plans
204-220	Electrical Plans
221-230	Revised Standard Plans

STRUCTURE PLANS

231-244	Bridge No. 53-1625, Route 5/126 Separation (Temp. Bridge)
245-272	Bridge No. 53-2928, Route 5/126 Separation (Replace)
273-291	Bridge No. 53-0687R/L, Santa Clara River Bridge (Temp. Widening)
292-301	Bridge No. 53-0688, Santa Clara Overhead (Widen)
302-312	Bridge No. 53-1688, Rye Canyon Road UC (Widen)
313-350	Bridge No. 53-2925, Santa Clara River Bridge (Replace)

THE STANDARD PLANS LIST APPLICABLE TO THIS CONTRACT IS INCLUDED IN THE NOTICE TO CONTRACTORS AND SPECIAL PROVISIONS BOOK.

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

ACNHI-005-3(026)170N

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
07	LA	5, 126	R85 3/R87.6, R9.3/R9.6	1	350

PROJECT PLANS FOR CONSTRUCTION ON

STATE HIGHWAY

IN LOS ANGELES COUNTY IN SANTA CLARITA ON ROUTE 5 FROM 0.8 km NORTH OF VALENCIA BOULEVARD OVERCROSSING TO 0.6 km NORTH OF RYE CANYON BOULEVARD UNDERCROSSING AND ON ROUTE 126 FROM 0.1 km WEST OF ROUTE 5/126 SEPARATION TO 0.2 km EAST OF ROUTE 5/126 SEPARATION

To be supplemented by Standard Plans dated July, 1999

LOCATION MAP

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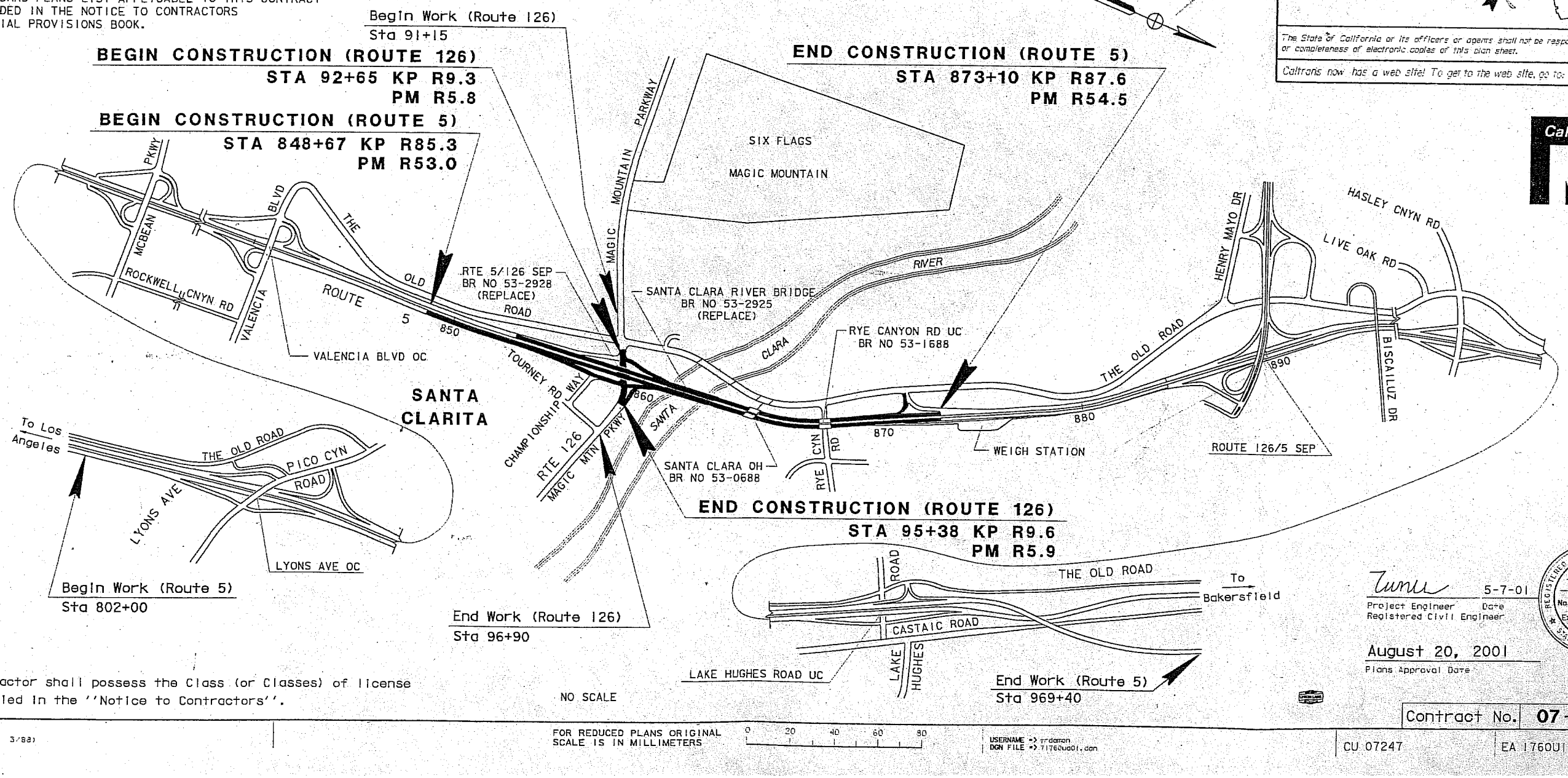


The Contractor shall possess the Class (or Classes) of license as specified in the ''Notice to Contractors''.

NO SCALE

Caltrans Metric

PROJECT ENGINEER	C. LOERA	DESIGN OVERSIGHT	GREGORY DAMICO
DATE		DATE	
PROJECT MANAGER			

Tung To 5-7-01
Project Engineer Date
Registered Civil Engineer

REGISTERED PROFESSIONAL ENGINEER — TUNG TO — No. 37314 — Exp. 6-30-04 — CIVIL — STATE OF CALIFORNIA

August 20, 2001
Plans Approval Date

Contract No. 07-1760U4

CU 07247 EA 1760U1

LAST REVISION 00-00-00 DATE PLOTTED → 30-AUG-2001 14:11

USERNAME => trdamon
DGN FILE => 1760u001.dgn

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

FORM DC-OE-93-FF (REV. 3/88)

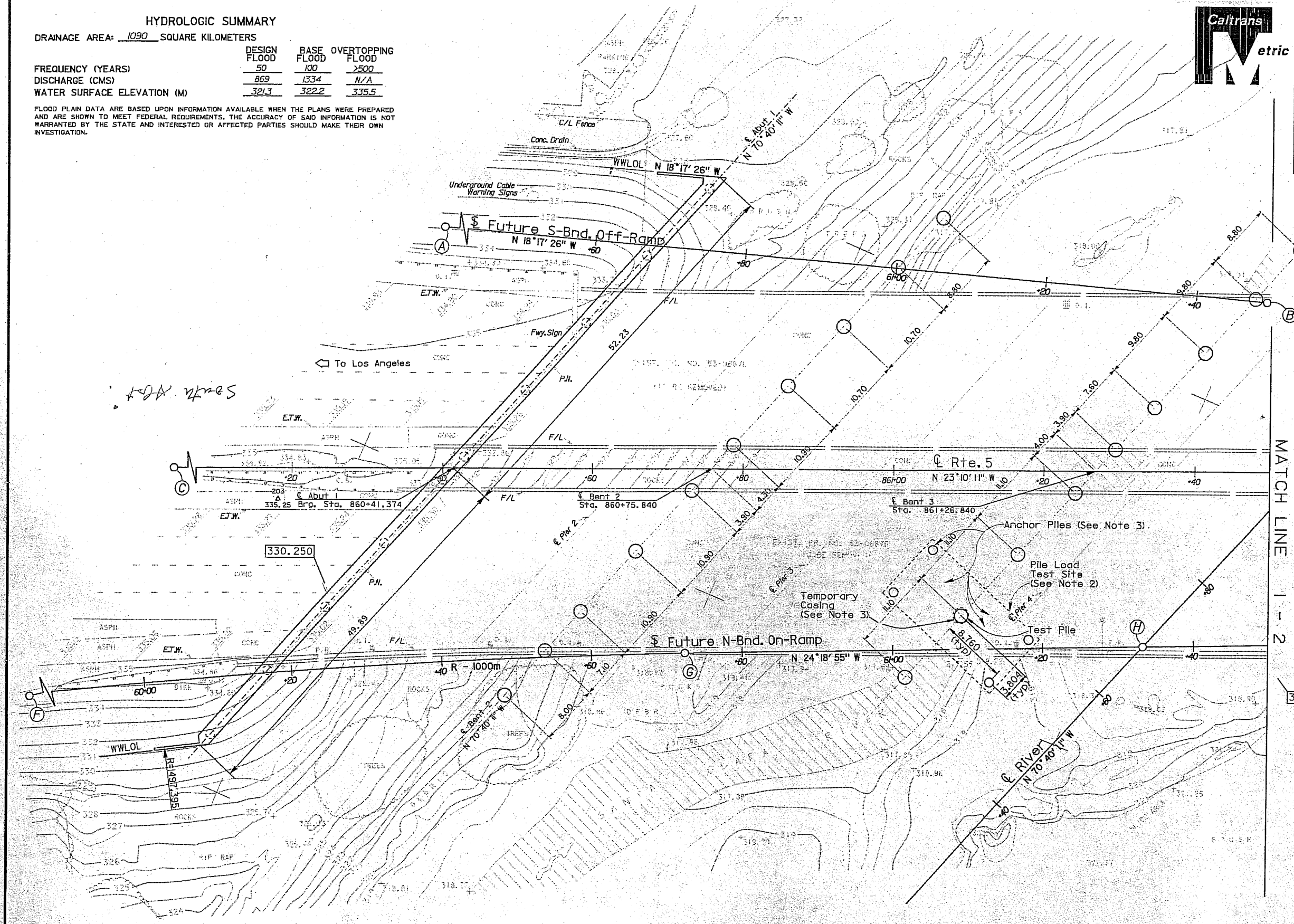
390

HYDROLOGIC SUMMARY

DRAINAGE AREA: 1090 SQUARE KILOMETERS

	DESIGN FLOOD	BASE FLOOD	OVERTOPPING FLOOD
FREQUENCY (YEARS)	50	100	>500
DISCHARGE (CMS)	869	1334	N/A
WATER SURFACE ELEVATION (M)	321.3	322.2	335.5

FLOOD PLAIN DATA ARE BASED UPON INFORMATION AVAILABLE WHEN THE PLANS WERE PREPARED AND ARE SHOWN TO MEET FEDERAL REQUIREMENTS. THE ACCURACY OF SAID INFORMATION IS NOT WARRANTED BY THE STATE AND INTERESTED OR AFFECTED PARTIES SHOULD MAKE THEIR OWN INVESTIGATION.



CURVE DATA

℄ Prop. N-Bnd. On-Ramp
R - 1000m
Δ - 06° 02' 37"
L - 105.481
T - 52.789
N 6032111.845
E 1947219.736

BENCH MARKS

Refer to Sht. 2 of 2.

LEGEND

+ denotes spot elevation.
denotes electroller.
330.250 denotes bottom of Abutment elevation

NOTES

1. For call-outs, refer to sheet 2 of 2.
2. Test Pile to be Pile Load Tested @ EL. 285 then @ EL. 282 (If necessary). See "Column Details" sheet.
3. Anchor Piles and Temporary Casing to be removed after Pile Load Test is complete.

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
07	LA	5, 126	R85.3/R87.6 R9.3/R9.6	316	350

Mario A. Bernardone 5-30-01
REGISTERED ENGINEER-CIVIL

8-20-01
PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER — M. Bernardone — No. C 050736 — Exp. 9-30-01 — CIVIL — STATE OF CALIFORNIA

PRELIMINARY INVESTIGATION SECTION

SCALE 1:250	DATUM NAVD 1988	PHOTOGRAMMETRY AS OF:	DRAWN	BY M. HENNING 3/99	
ALIGNMENT TIES		SURVEYED BY	TRACED	BY	
		FIELD CHECKED BY A. LEE 3/10/99	CHECKED	BY L. MANABO 3/31/99	

DESIGN	BY Mario Bernardone	CHECKED Glenn Matthews
DETAILS	BY A. Onodera	CHECKED Mario Bernardone
QUANTITIES	BY Genaro M. Dorla	CHECKED Joel Magana

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES
STRUCTURE DESIGN 13

CU 07
EA 1760U1

BRIDGE NO. 53-2925
KILOMETER POST R86.4

SANTA CLARA RIVER BRIDGE (REPLACE)
FOUNDATION PLAN 1

DISREGARD PRINTS BEARING EARLIER REVISION DATES →
REVISION DATES (PRELIMINARY STAGE ONLY): 10-23-00 | 2-14-00 | 2-21-00 | 3-27-00 | 5-3-00 | 6-1-00 | 8-14-00 | 10-31-00 | 12-15-00 | 4-25-01

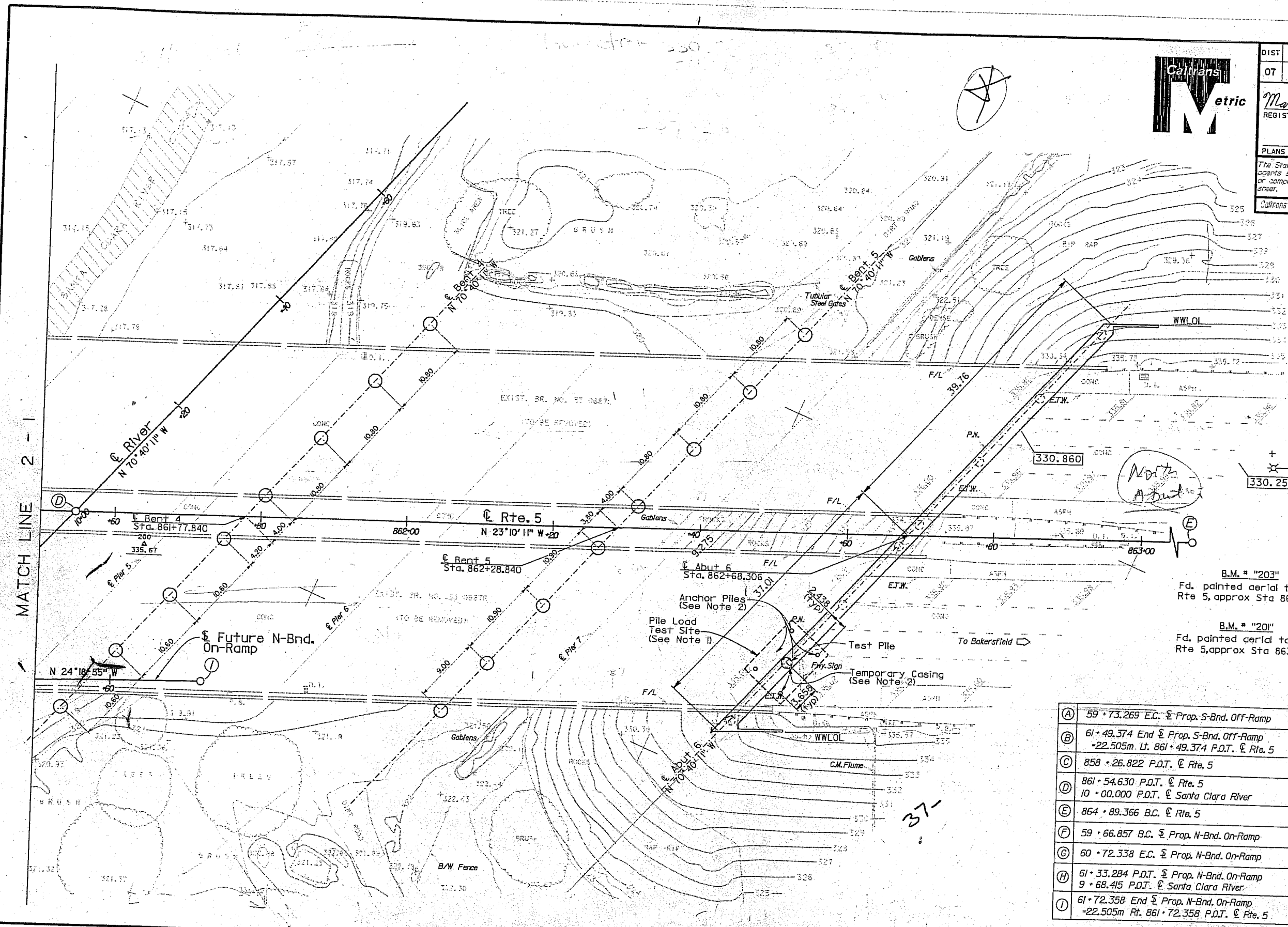
SHEET 4 OF 38

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

DS OSMI MDET (CADD 5-95)
DS OSD 2145 (4/89)

dcfna01.cgn

391



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
07	LA	5,126	R85.3/R87.6, R9.3/R9.6	317	350

Mario A. Bernardone 5-30-01
REGISTERED ENGINEER-CIVIL

8-20-01
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — M. Bernardone — No. C 050736 — Exp. 9-30-01 — CIVIL — STATE OF CALIFORNIA

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N

NOTE

1. Test Pile to be Pile Load Tested @ El. 294. See "Column Details" sheet.
2. Anchor Piles and Temporary Casing to be removed after Pile Load Test is complete.

LEGEND

+ denotes spot elevation.
denotes electroller.
330.250 denotes bottom of Abutment elevation

BENCH MARKS

B.M. # "203" Elev. 335.247m
Fd. painted aerial target on w'ly asph shldr of N-Bnd Rte 5, approx Sta 860 + 18. N602742.211, E1946311.053

B.M. # "201" Elev. 335.976m
Fd. painted aerial target on w'ly asph shldr of N-Bnd Rte 5, approx Sta 863 + 07. N603007.691, E1946197.517

		NORTH	EAST
(A)	59 + 73.269 E.C. ℄ Prop. S-Bnd. Off-Ramp	602685.187	1946290.190
(B)	61 + 49.374 End ℄ Prop. S-Bnd. Off-Ramp =22.505m Lt. 861 + 49.374 P.O.T. ℄ Rte. 5	602852.395	1946234.922
(C)	858 + 26.822 P.O.T. ℄ Rte. 5	602564.714	1946382.522
(D)	861 + 54.630 P.O.T. ℄ Rte. 5 10 + 00.000 P.O.T. ℄ Santa Clara River	602866.082	1946253.544
(E)	864 + 89.366 B.C. ℄ Rte. 5	603173.819	1946121.840
(F)	59 + 66.857 B.C. ℄ Prop. N-Bnd. On-Ramp	602706.430	1946356.860
(G)	60 + 72.338 E.C. ℄ Prop. N-Bnd. On-Ramp	602800.087	1946308.443
(H)	61 + 33.284 P.O.T. ℄ Prop. N-Bnd. On-Ramp 9 + 68.415 P.O.T. ℄ Santa Clara River	602855.627	1946283.348
(I)	61 + 72.358 End ℄ Prop. N-Bnd. On-Ramp =22.505m Rt. 861 + 72.358 P.O.T. ℄ Rte. 5	602891.235	1946267.259

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

PRELIMINARY INVESTIGATION SECTION

SCALE 1:250	DATUM NAVD 1988	PHOTOGRAMMETRY AS OF:	DRAWN BY M. HENNING 3/99	DESIGN BY Mario Bernardone	CHECKED Glenn Matthews
ALIGNMENT TIES		SURVEYED BY	TRACED BY	DETAILS BY A. Onodera	CHECKED Mario Bernardone
OS OSMI MDET (CADD 5-95) DS OSD 2145 (4/89)		FIELD CHECKED BY A. LEE 3/10/99	CHECKED BY L. MANABO 3/31/99	QUANTITIES BY Genaro M. Doria	CHECKED Joel Magana

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES STRUCTURE DESIGN 13

CU 07 EA 1760U1

BRIDGE NO. 53-2925
KILOMETER POST R86.4

SANTA CLARA RIVER BRIDGE (REPLACE)
FOUNDATION PLAN 2

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY)								SHEET	OF
12-23-99	2-14-00	2-23-00	3-28-00	6-2-00	8-10-00	4-25-01		5	38

392

NOTES:

1. For Section A-A, see "Abutment Details 1" sheet.
2. For Section B-B and C-C, see "Abutment Details 2" sheet.
3. Existing piles that conflict with new pile placement shall be removed.
4. Temporary Shoring Required for Stage Construction.

——— Indicates existing structure.

I Indicates existing steel pile.

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
07	LA	5, 126	R85.3/R87.6, R9.3/R9.6	318	450

Mario A. Bernardone 5-30-01
REGISTERED CIVIL ENGINEER

8-20-01
PLANS APPROVAL DATE

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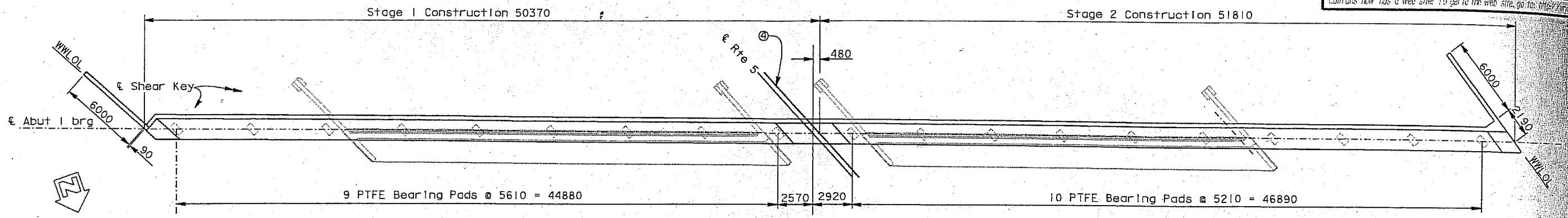
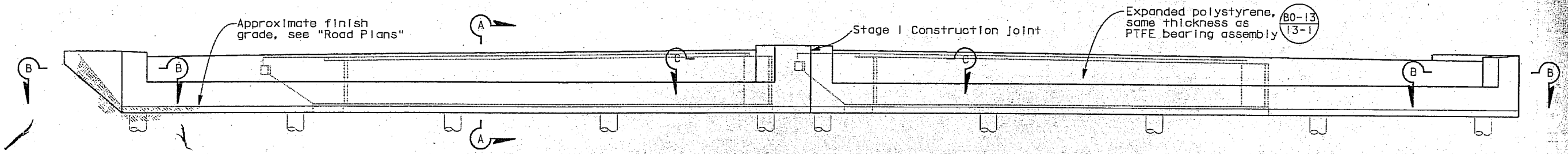
REGISTERED PROFESSIONAL ENGINEER M. Bernardone No. C 050736 Exp. 6-30-01 CIVIL STATE OF CALIFORNIA



PLAN
1:150



ELEVATION
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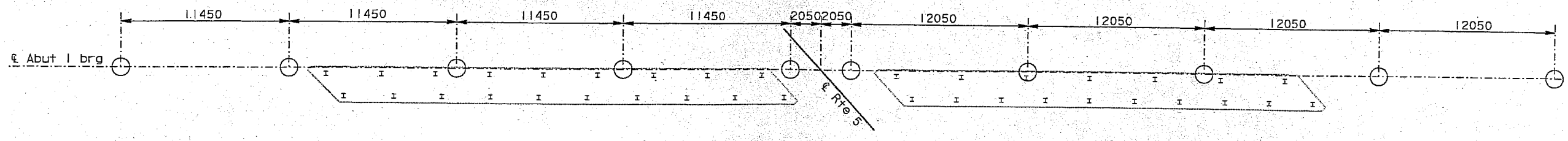

PILE LAYOUT
1:150

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

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

	BY	CHECKED
DESIGN	David Selfert	Genaro M. Dorla
DETAILS	A. Onodera	David Selfert
QUANTITIES	Genaro M. Dorla	Joel Magana

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES
STRUCTURE DESIGN 13

BRIDGE NO. 53-2925
KILOMETER POST R86.4

SANTA CLARA RIVER BRIDGE (REPLACE)
ABUTMENT 1 LAYOUT

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV. 3/1/99)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 07
EA 1760U1

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINAR) STAGE ONLY: 2-10-00 | 2-14-00 | 2-29-00 | 3-8-00 | 3-23-00 | 3-29-00 | 3-30-00 | 5-25-01 | 5-22-01

SHEET 6 OF 38

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393

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	LA	5, 126	R85.3/R87.6, R9.3/R9.6	319	350

Caltrans Metric

Mario A. Bernardone 5-30-01
REGISTERED CIVIL ENGINEER

8-20-01
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER M. Bernardone No. C 050736 Exp. 9-30-01 CIVIL STATE OF CALIFORNIA

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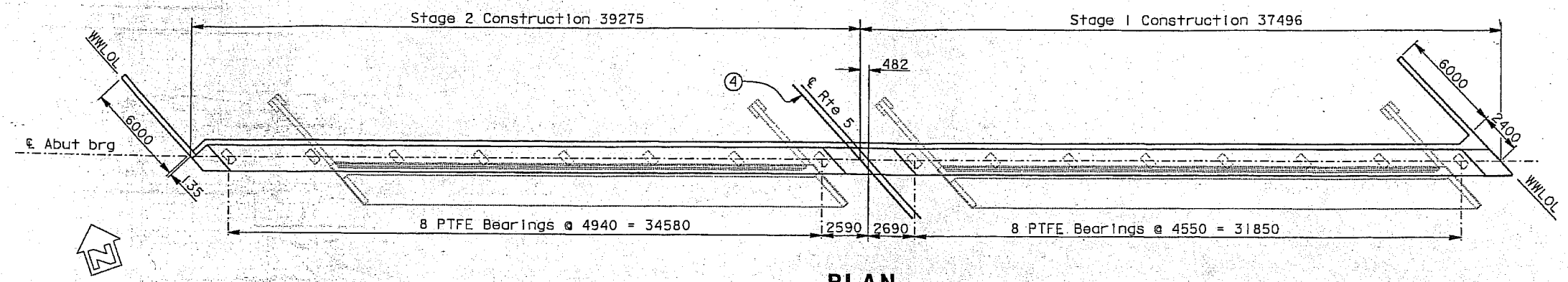

PLAN
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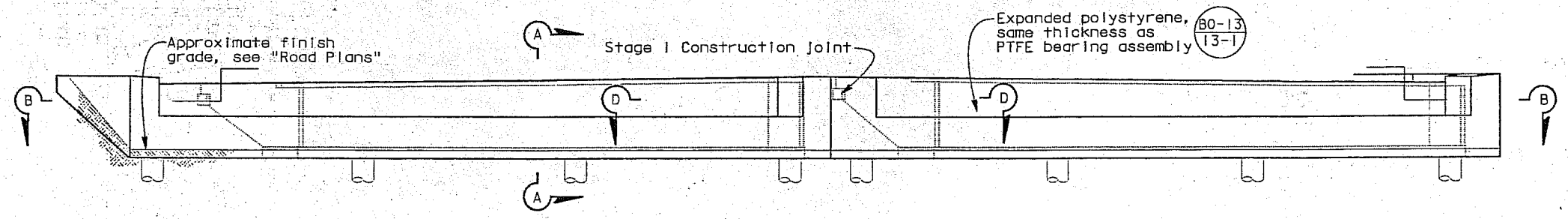

ELEVATION
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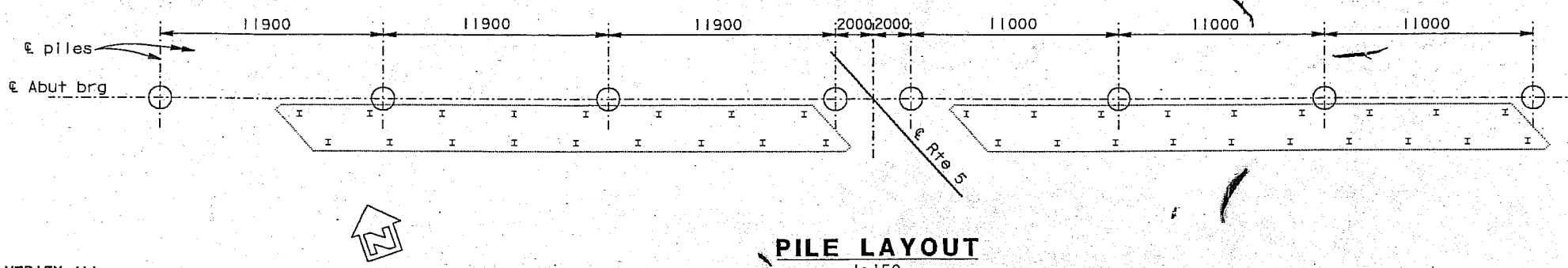

PILE LAYOUT
1:150

NOTES:
1. For Section A-A, see "Abutment Details 1" sheet.
2. For Section B-B, C-C, and D-D, see "Abutment Details 2" sheet.
3. Existing piles that conflict with new pile placement shall be removed.
4. Temporary Shoring Required for Stage Construction.

——— Indicates existing structure.
I Indicates existing steel pile.

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

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

	BY	CHECKED
DESIGN	David Seifert	Genaro M. Doria
DETAILS	A. Onodera	David Seifert
QUANTITIES	Gerano M. Doria	Joel Magana

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN 13

BRIDGE NO. 53-2925
KILOMETER POST R86.4

SANTA CLARA RIVER BRIDGE (REPLACE)
ABUTMENT 6 LAYOUT

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV. 3/1/99)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 07
EA 1760U1

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 2-15-00 3-24-00 3-28-00 3-30-00 5-5-00 6-1-00 4-25-01 5-22-01

SHEET 7 OF 38

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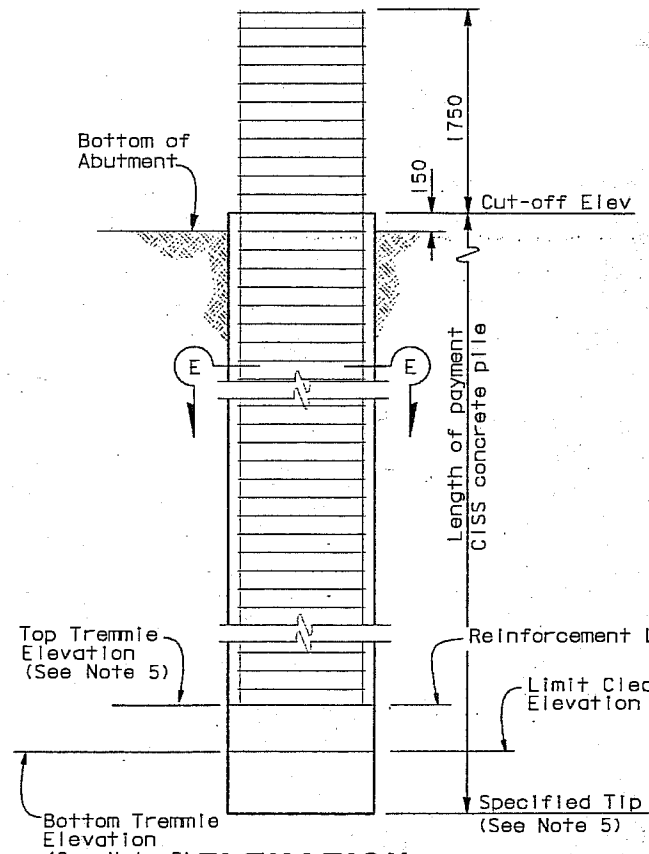
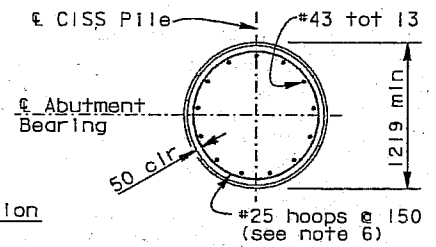
394



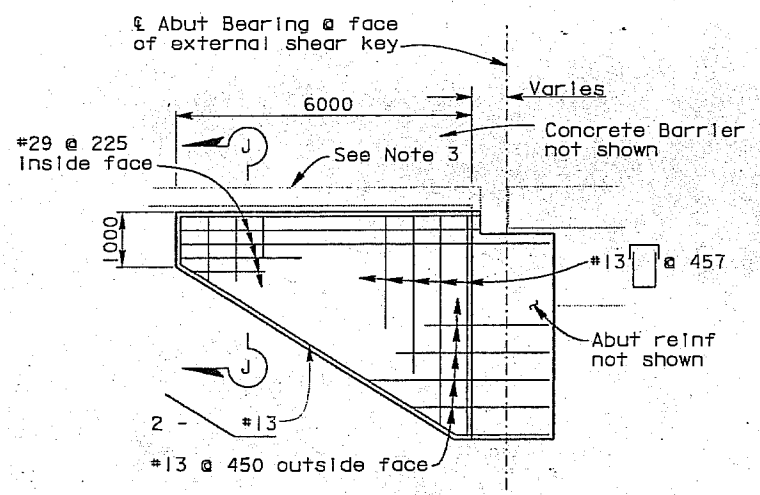
ELEVATION



SECTION E-E

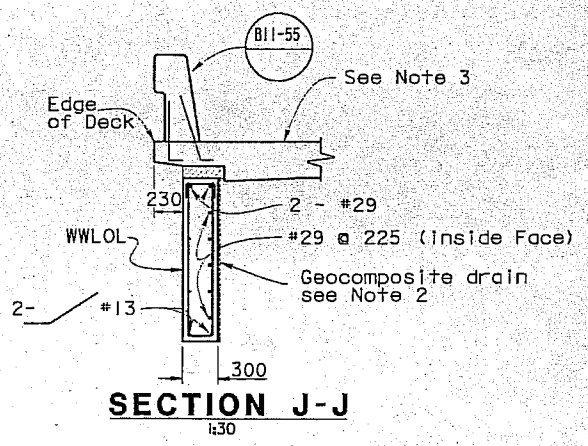
1219 CISS CONCRETE PILE DETAILS

1:30



WINGWALL ELEVATION

No scale



SECTION J-J

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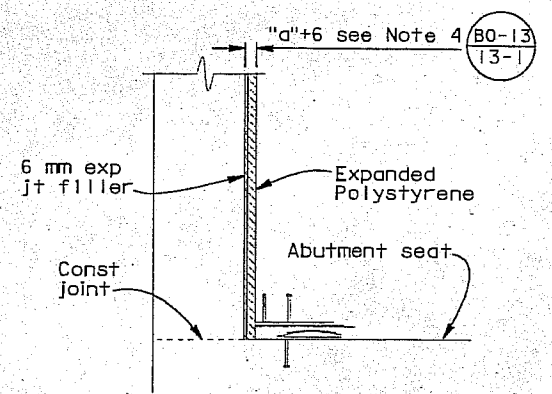
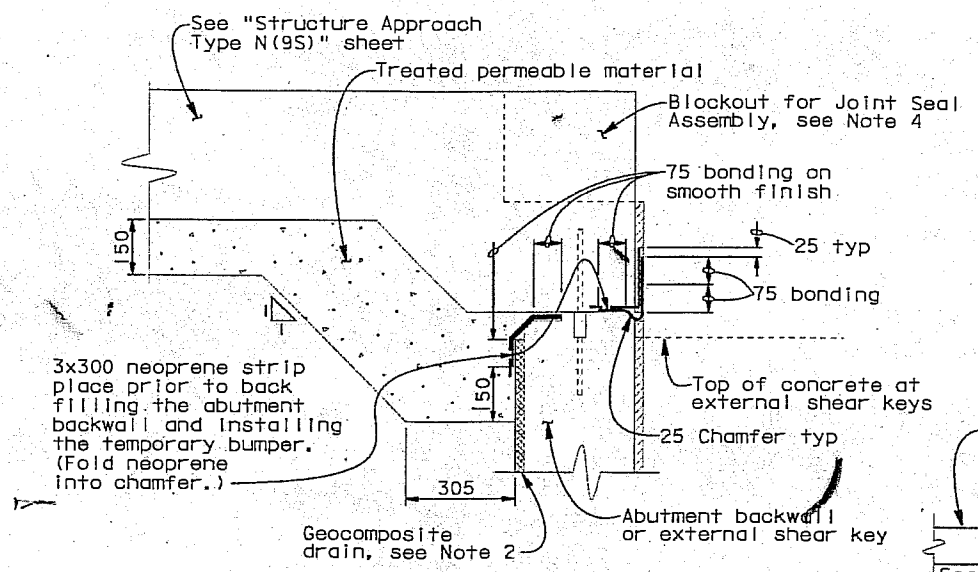


BACK WALL BASE DETAIL

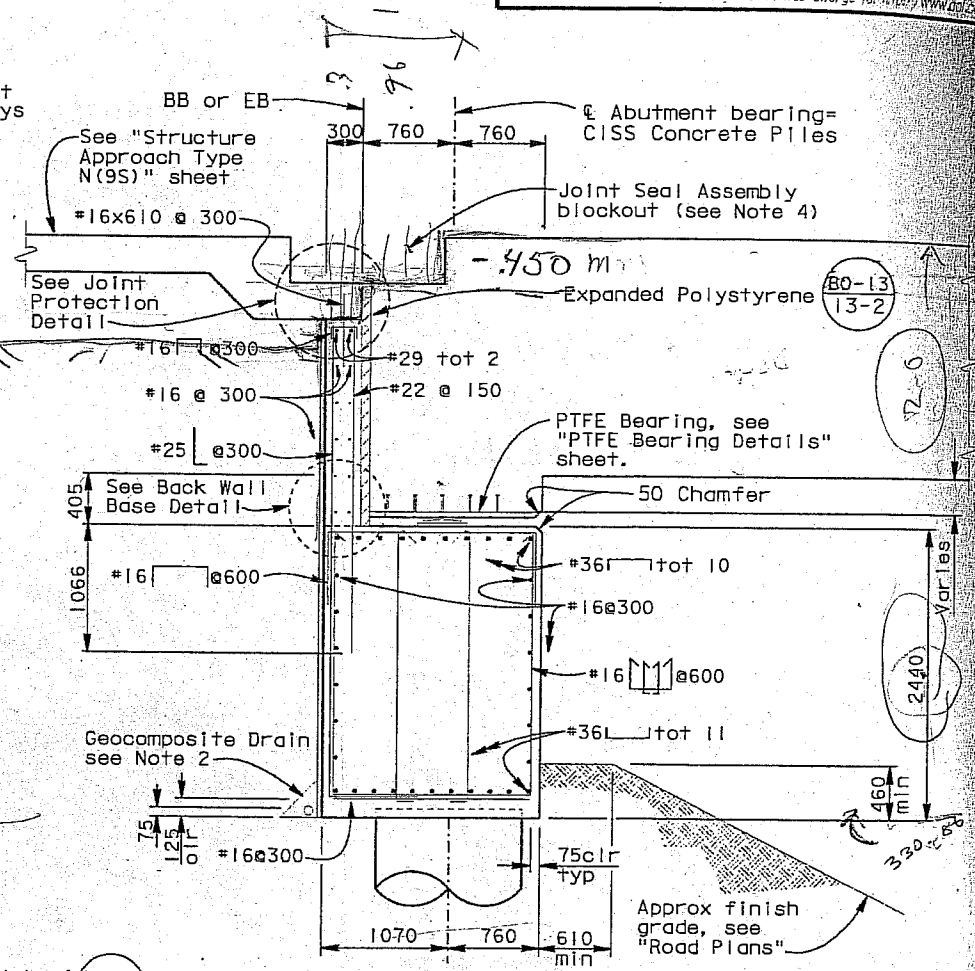
No Scale



JOINT PROTECTION DETAIL

B0-1 1-4

No scale



SECTION A-A

1:30

NOTES:

1. For location of Section A-A, see "Abutment 1 Layout" and "Abutment 6 Layout" sheets.
2. See "Structure Approach Drainage Details" sheet.
3. Structure Approach, see "Structure Approach Type N(9S)" sheet.
4. For MR "a" dimension and Joint Seal details, see "Abutment Joint Seal Details" sheet.
5. See "Column Details" sheet.
6. All hoops are "utlimate" butt splices continuous.

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	5, 126	R85.3/R87.6 R9.3/R9.6	320	350

Caltrans Metric

Mario A. Bernardo 5-30-01
REGISTERED CIVIL ENGINEER

8-20-01
PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER M. Bernardo No. C 050736 Exp. 9-30-01 CIVIL STATE OF CALIFORNIA

	BY	CHECKED
DESIGN	David Selfert	Genaro M. Dorla
DETAILS	A. Onodera	David Selfert
QUANTITIES	Genaro M. Dorla	Joel Magana

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES
STRUCTURE DESIGN 13

BRIDGE NO. 53-2925
KILOMETER POST R86.4

SANTA CLARA RIVER BRIDGE (REPLACE)
ABUTMENT DETAILS 1

CU 07
EA 1760U1

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY):

SHEET 8 OF 38

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV. 3/1/99)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

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ddabt3det1.dgn

USERNAME => frtonyv DATE PLOTTED => 24-AUG-2001 TIME PLOTTED => 13:38

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	LA	5,126	R85.3/R87.6. R9.3/R9.6	321	350

Caltrans Metric

Mario A. Bernardone 5-30-01
REGISTERED CIVIL ENGINEER

8-20-01
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER M. Bernardone No. C 050736 Exp. 9-30-01 CIVIL STATE OF CALIFORNIA

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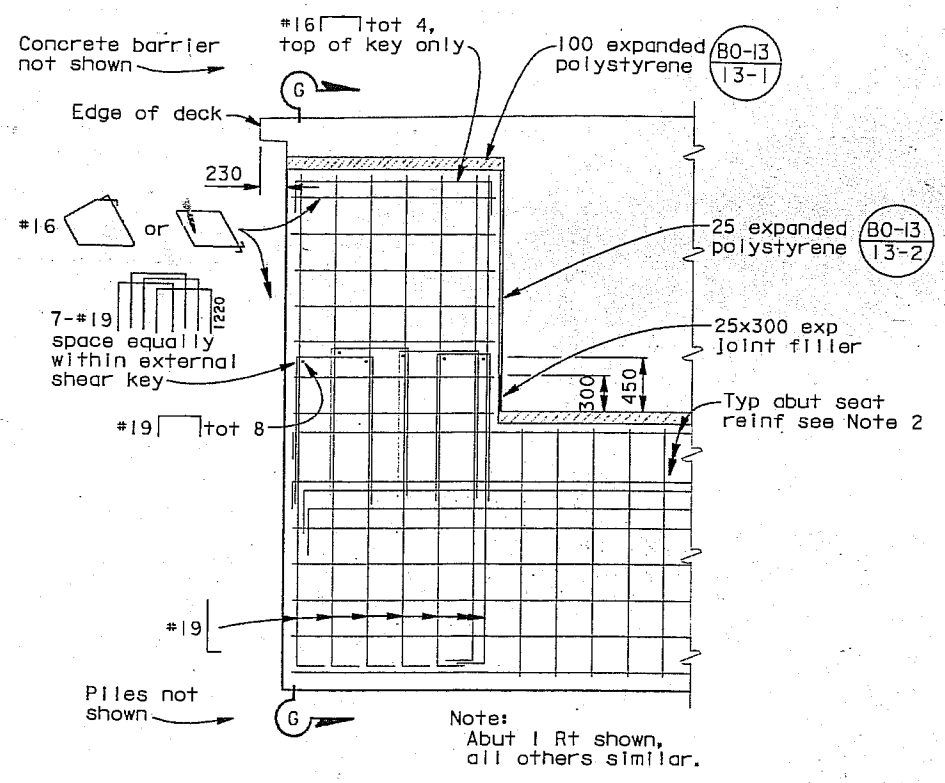
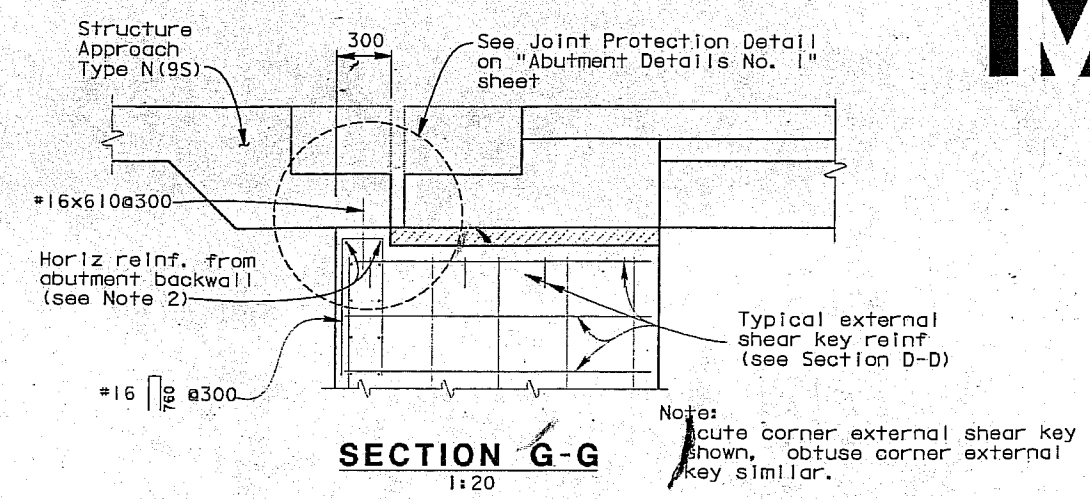


Note: Abut 1 Rt shown, all others similar.

PART ELEVATION
1:30

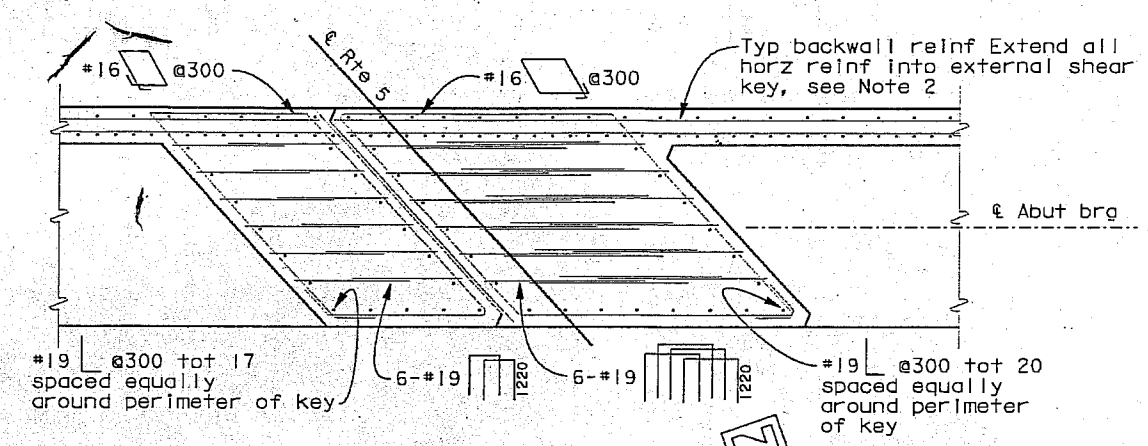


Note: Acute corner external shear key shown, obtuse corner external key similar.

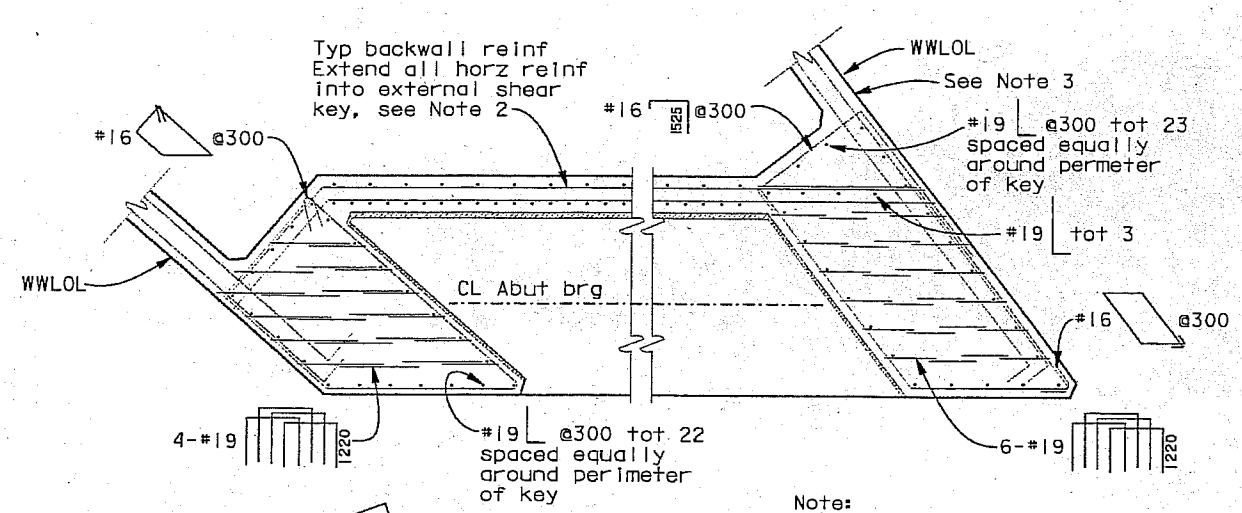
SECTION G-G
1:20

NOTES:

1. See Section A-A on "Abutment Details No. 1" sheet for details not shown.
2. See Wingwall Elevation on "Abutment Details 1" sheet.

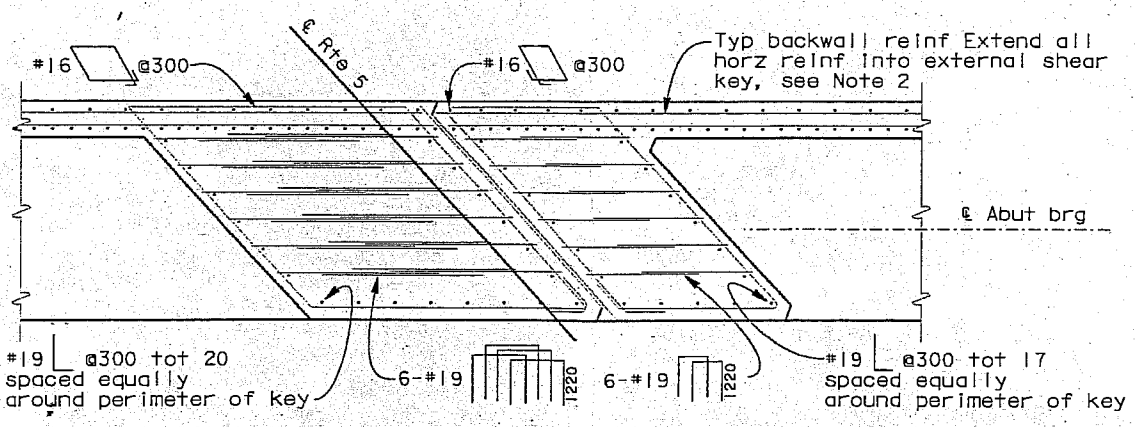


SECTION C-C
1:30



Note: Abut 1 shown Abut 6 similar.

SECTION B-B
1:30



SECTION D-D
1:30

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DESIGN	BY David Seifert	CHECKED Genaro M. Doria	
DETAILS	BY A. Onodera	CHECKED David Seifert	
QUANTITIES	BY Genaro M. Doria	CHECKED Joel Magana	

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES
STRUCTURE DESIGN 13

BRIDGE NO. 53-2925
KILOMETER POST R86.4

SANTA CLARA RIVER BRIDGE (REPLACE)
ABUTMENT DETAILS 2

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV. 3/1/99)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 07
EA 1760U1

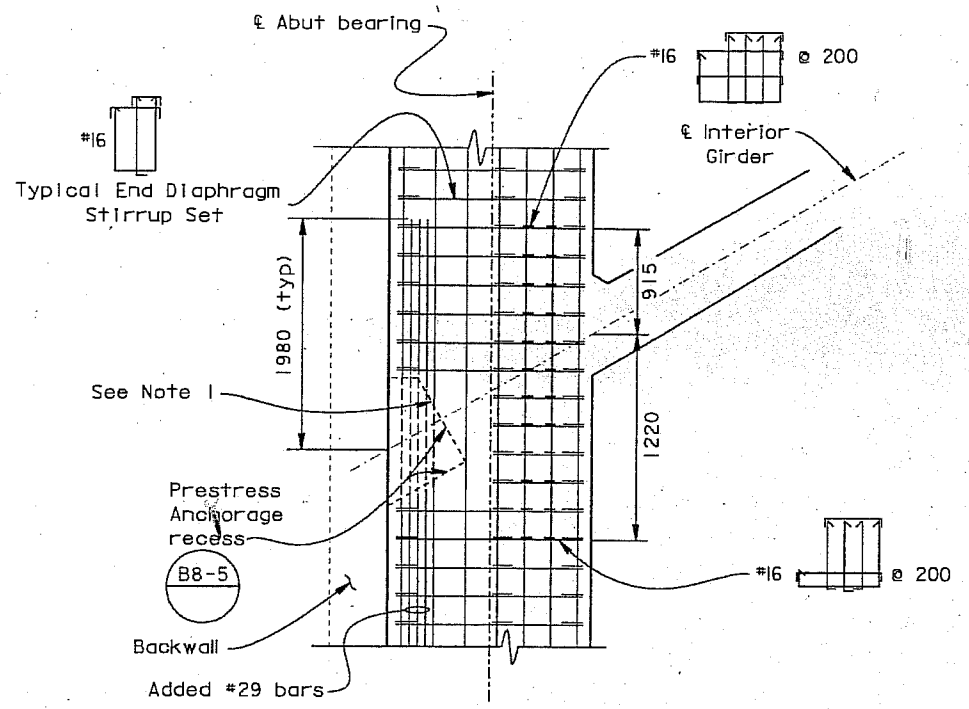
DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 1-26-00 2-2-00 2-17-00 3-27-00 5-5-00 1-25-01

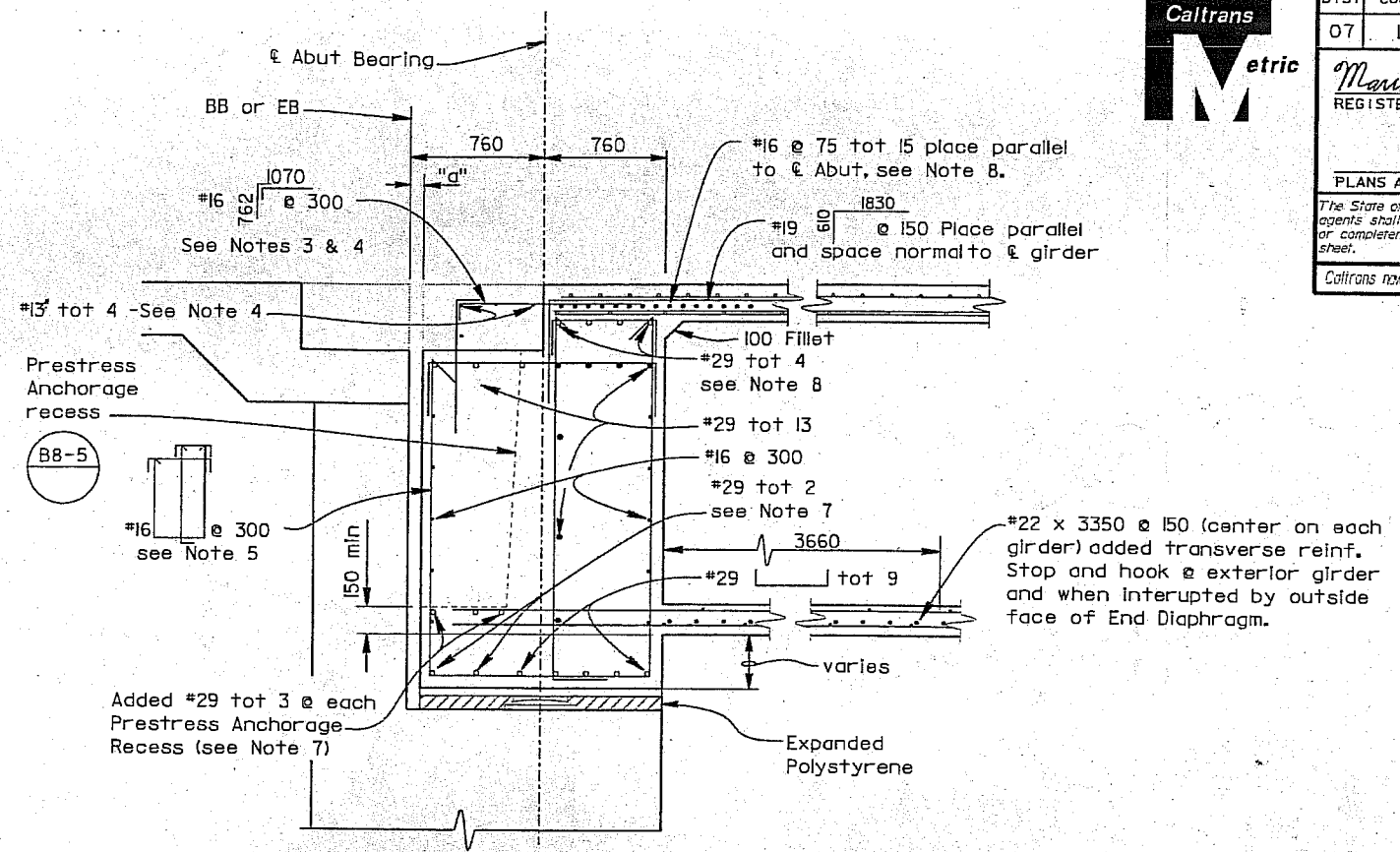
SHEET 9 OF 38

FILE => ddabt4det2.dgn

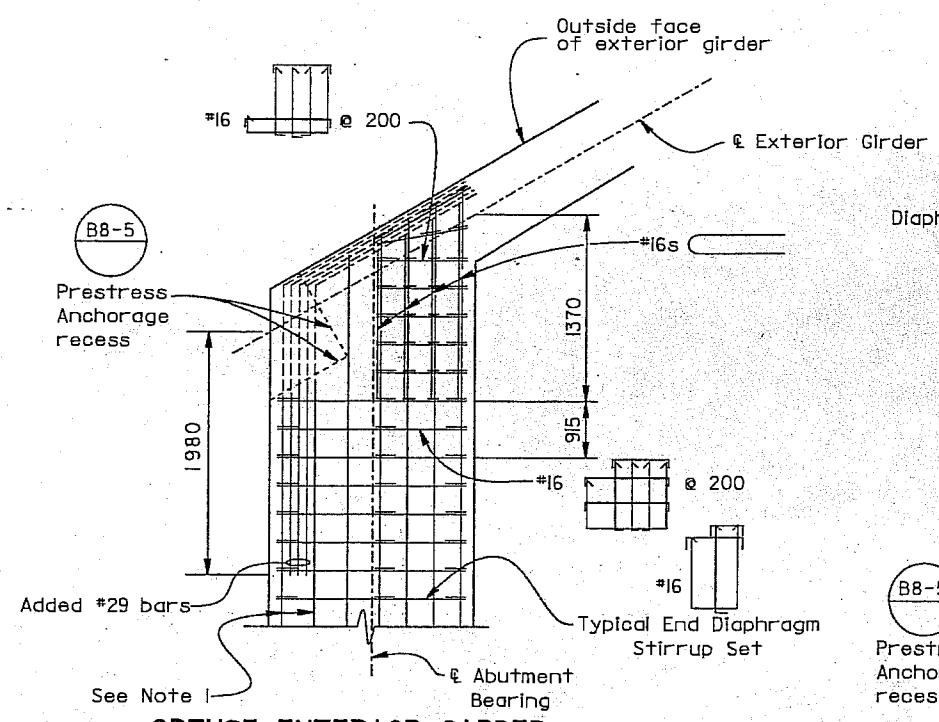
USERNAME => trtonyv DATE PLOTTED => 24-AUG-2001 TIME PLOTTED => 13:38



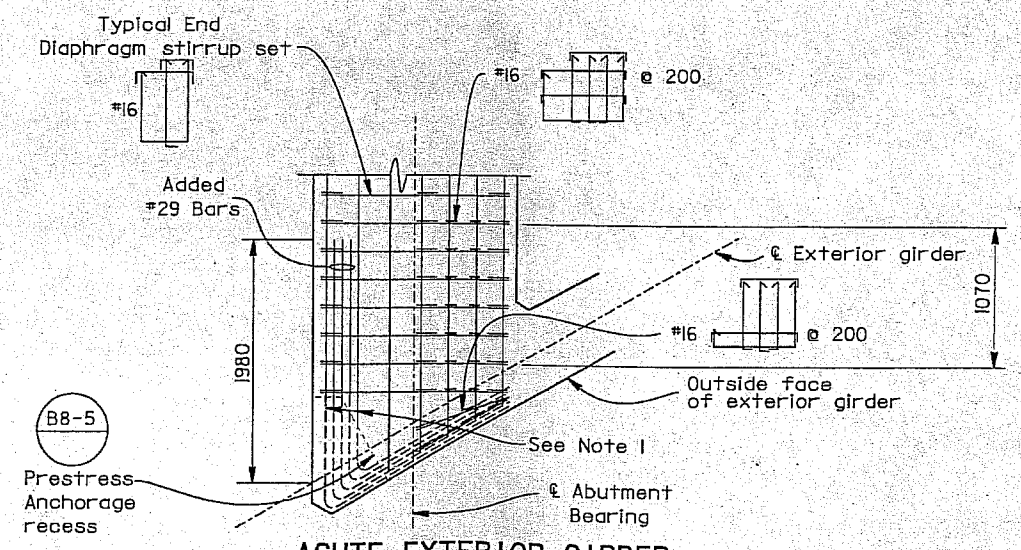
TYPICAL INTERIOR GIRDER
(See Note 2)



END DIAPHRAGM SECTION
No scale (See Notes 6 & 9)



OBTUSE EXTERIOR GIRDER
(See Note 2)



ACUTE EXTERIOR GIRDER
(See Note 2)

END DIAPHRAGM PLANS
No scale

NOTES:

1. Stop End Diaphragm Longitudinal Reinf. when in conflict with Prestress Anchorage Recess (max 3 bars).
2. End Diaphragm Longitudinal & stirrup Reinf. shown only.
3. Place normal to & space along ℄ brg.
4. Reinf. may be adjusted as necessary to accomodate installation of joint seal assembly upon approval by the engineer.
5. See End Diaphragm Plans for additional End Diaphragm Stirrup Set requirements @ Girders.
6. Abutment & Structural approach slab reinf. not shown.
7. Bars to be hooked @ outside girders as shown on "End Diaphragm Plans" details.
8. Extend to edge of deck. Stop and hook at joint seal blockout where occurs.
9. Additional bars w/in End Diaphragm are required at deck overhang, see "Abutment Joint Seal Details" sheet.

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	LA	5,126	R85.3/R87.6, R9.3/R9.6	322	350

Mario A. Bernardone 5-30-01
REGISTERED CIVIL ENGINEER

8-20-01
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER M. Bernardone No. C 050736 Exp. 9-30-01 CIVIL STATE OF CALIFORNIA

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DESIGN	BY David Seifert	CHECKED Genaro M. Doria	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF STRUCTURES STRUCTURE DESIGN 13	BRIDGE NO. 53-2925
DETAILS	BY A. Onodera	CHECKED David Seifert			KILOMETER POST R86.4
QUANTITIES	BY Genaro M. Doria	CHECKED Joel Magana			

SANTA CLARA RIVER BRIDGE (REPLACE)
ABUTMENT DETAILS 3

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV. 3/1/99)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 07
EA 1760U1

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) 2-2-00 2-15-00 3-23-00 5-5-00 4-25-01

SHEET 10 OF 38

FILE => ddabt5det3.dgn

ddabt5det3.dgn

USERNAME => trtonyv DATE PLOTTED => 24-AUG-2001 TIME PLOTTED => 13:38

STATIONS NO - 862 +55

Elevation Foundation 330.86
Column 24.40
Cap 2.00
357.26

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
07	LA	5,126	R85.3/R87.6, R9.3/R9.6	317	350

Mario A. Bernardone 5-30-01
REGISTERED ENGINEER-CIVIL

8-20-01
PLANS APPROVAL DATE

M. Bernardone No. C 050736 Exp. 9-30-01 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

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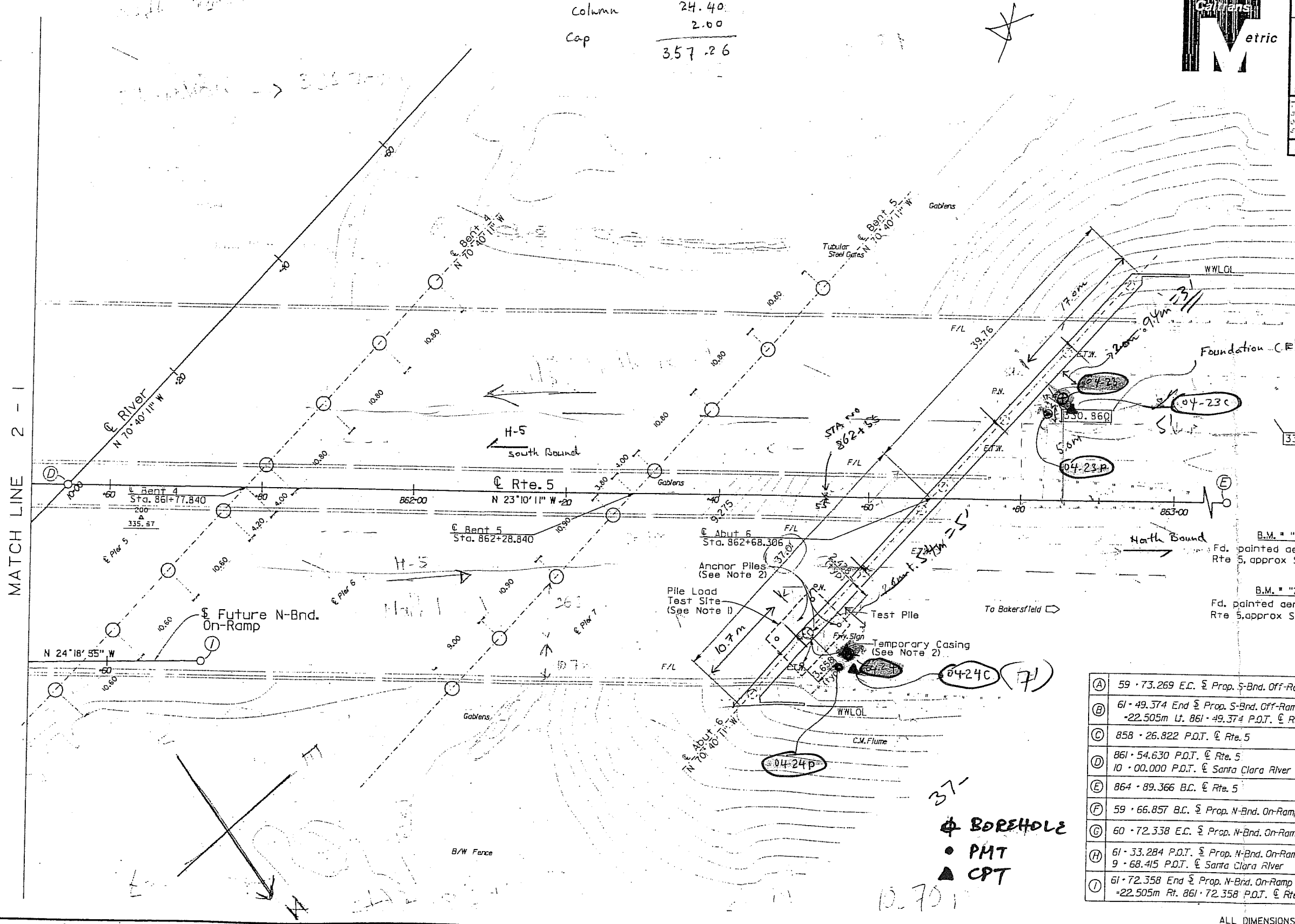


NOTE

1. Test Pile to be Pile Load Tested @ El. 294. See "Column Details" sheet.
2. Anchor Piles and Temporary Casing to be removed after Pile Load Test is complete.

LEGEND

+ denotes spot elevation.
denotes electrolier.
330.250 denotes bottom of Abutment elevation

BENCH MARKS

B.M. = "203" Elev. 335.247m
Fd. painted aerial target on w'ly asph shldr of N-Bnd Rte 5, approx Sta 860 + 18. N602742.211, E1946311.053

B.M. = "201" Elev. 335.976m
Fd. painted aerial target on w'ly asph shldr of N-Bnd Rte 5, approx Sta 863 + 07. N603007.691, E1946197.517

		NORTH	EAST
(A)	59 - 73.269 E.C. ℄ Prop. S-Bnd. Off-Ramp	602685.187	1946290.190
(B)	61 - 49.374 End ℄ Prop. S-Bnd. Off-Ramp =22.505m Lt. 861 - 49.374 P.O.T. ℄ Rte. 5	602852.395	1946234.922
(C)	858 - 26.822 P.O.T. ℄ Rte. 5	602564.714	1946382.522
(D)	861 - 54.630 P.O.T. ℄ Rte. 5 10 - 00.000 P.O.T. ℄ Santa Clara River	602866.082	1946253.544
(E)	864 - 89.366 B.C. ℄ Rte. 5	603173.819	1946121.840
(F)	59 - 66.857 B.C. ℄ Prop. N-Bnd. On-Ramp	602706.430	1946356.860
(G)	60 - 72.338 E.C. ℄ Prop. N-Bnd. On-Ramp	602800.087	1946308.443
(H)	61 - 33.284 P.O.T. ℄ Prop. N-Bnd. On-Ramp 9 - 68.415 P.O.T. ℄ Santa Clara River	602855.627	1946283.348
(I)	61 - 72.358 End ℄ Prop. N-Bnd. On-Ramp =22.505m Rt. 861 - 72.358 P.O.T. ℄ Rte. 5	602891.235	1946267.259

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

PRELIMINARY INVESTIGATION SECTION

SCALE 1:250	DATUM NAVD 1988	PHOTOGRAMMETRY AS OF:	DRAWN BY M. HENNING 3/99	DESIGN BY Mario Bernardone	CHECKED Glenn Matthews
ALIGNMENT TIES		SURVEYED BY	TRACED BY	DETAILS BY A. Onodera	CHECKED Mario Bernardone
		FIELD CHECKED BY A. LEE 3/10/99	CHECKED BY L. MANABO 3/31/99	QUANTITIES BY Genaro M. Darla	CHECKED Joel Magana

DS OSD 2145 (4/89)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES
STRUCTURE DESIGN 13

CU 07
EA 176CU1

BRIDGE NO. 53-2925
KILOMETER POST R86.4

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY)

SANTA CLARA RIVER BRIDGE (REPLACE)

FOUNDATION PLAN 2

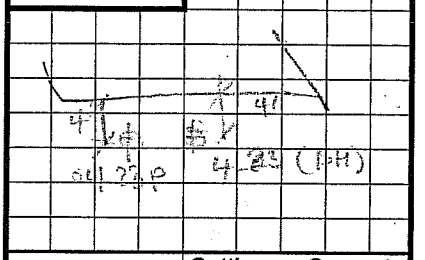
SHEET 5 OF 38

LOG OF BORING NO. (04-23)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project Name	: UCSD / Abutment Research-Santa Clara River Bridge		
Project Location	: City of Santa Clarita, CA		
E.M.I. Project No.	: 02-165	Site Condition :	Finished subgrade
Weather	: SUNNY	Elevation :	
Traffic Control	: N/A	Operator :	2R / NICK
Drilling Company	: 2R DRILLING	Operator :	
Type of Rig	: CME 55 AUTO HAMMER	Drop (in) :	30
Borehole Diameter (inch)	: 8"	Drive Wt. (lbs) :	140
Logged By	: Mike K.	Date Drilled :	10-5-04

Comments :



Backfilled with Cuttings + Cement

	Time										Back to Office	Proposed Depth
	Depature	Arrival	Start	Break	Rework	Lunch	Rework	Break	Finish	Off		25.0 ft
Driller												Water Table
Traffic Control												ft
Logger												Caving
Total												ft

Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6" 04-23 BORE	Blows/8" 04-23 P ~~Recovery (inch)~~	U.S.C.S.	Color	Description (ASTM D-2488-93)	Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O^2/LEL/PID
0	B	0									: :					
2	S	1	7 9 12	18/18	19 19 28	SM	DK BRN TO BRN	Si. SA., FI-CO, W/ SOME GR.								
5	~~D~~ S	2	8 13 20	18/18	30 36 42	SM	D Brown	Si SA, F-C, w/gr up to 3/4"	M	3/4	1 89:10	F.C	N	MD-N		
7.5	~~S~~ D	3	20 38 42	18/18		SM	"	" " gr 2"	M	2"	1	FC	N			
10	~~D~~ S	4	5 5 8	18/18		SM	.	Si SA, F.C w/gr 3/4	M	3/4	: :	FC	N	MD		
15	S	5	2 4 4	18/18		ML		Sandy Silt, Fine Sa. w/ mica	M	#200	0:10:90	~~FC~~ F	N	loose		
		16				SM		SM at 16', Silty Sa, F-C w/gr 3/4"								
20	S	6	10 13 17	18/18		SM	D. Brown	Silty SA, F-C w/gr 1/2"	M		2:87:11	F-C	N	M-D		
25	S	7	14 14 13	18/18		SM	D. Brown	Silty SA, F-C, w/gr 3/4"	M		3:85:12	FC	N	M-D		
								Terminated 26.5', Backfill w/ on-site soil + water								

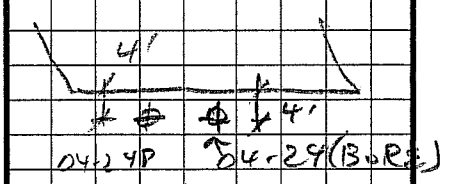
shifted location 1' away, when rig hit hard layer at 7.5'

LOG OF BORING NO. (04-24)

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Project Name	:	UCSD / Abutment Research-Santa Clara River Bridge		
Project Location	:	City of Santa Clarita, CA		
E.M.I. Project No.	:	02-165	Site Condition :	Finished subgrade
Weather	:	SUNNY	Elevation :	
Traffic Control	:	N/A	Operator :	2R/NICK
Drilling Company	:	2R DRILLING	Operator :	
Type of Rig	:	CME 55 AUTO HAMMER	Drop (in) :	30
Borehole Diameter (inch)	:	8"	Drive Wt. (lbs) :	140
Logged By	:	Mike K.	Date Drilled :	10-5-04

Comments :

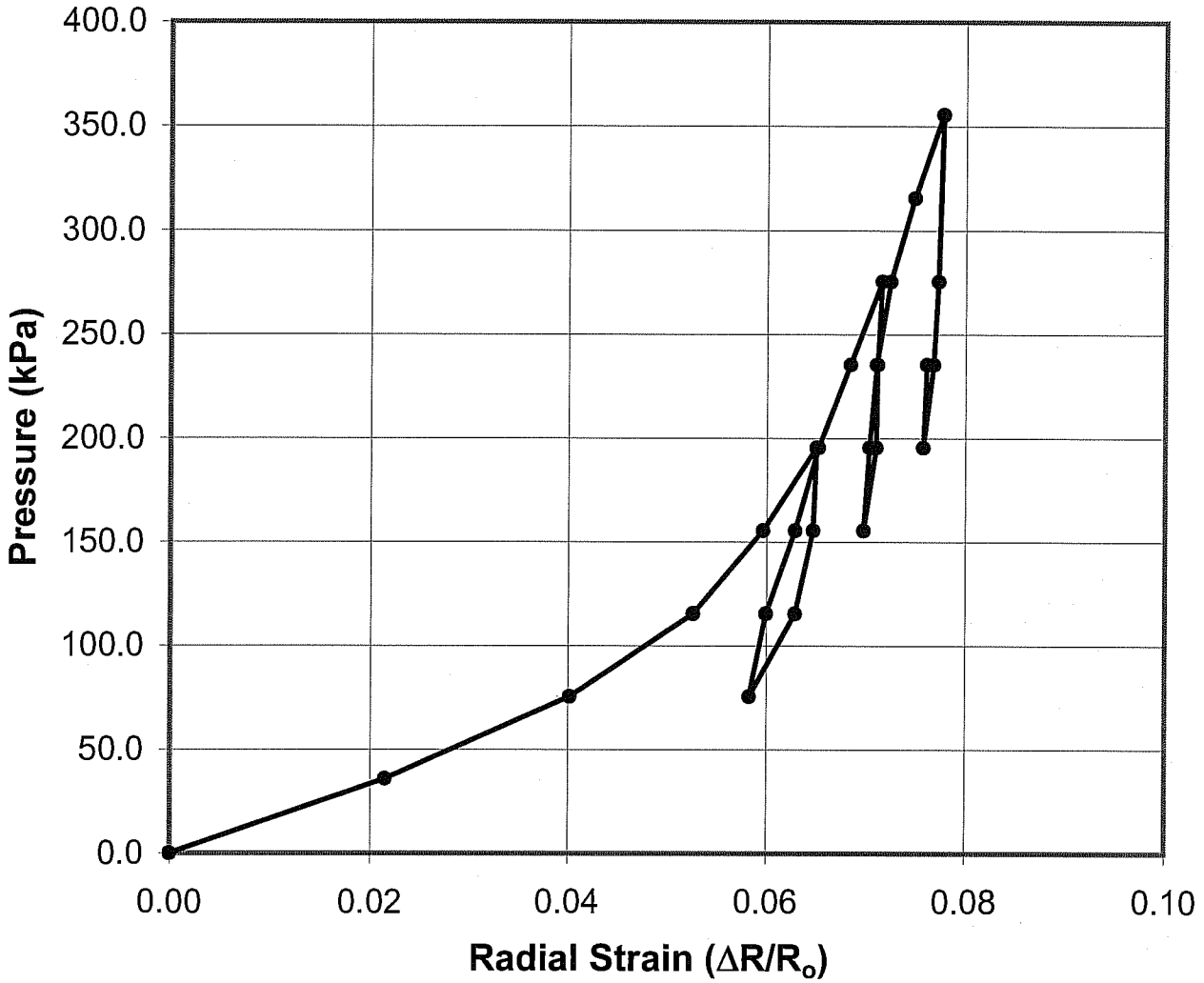


Backfilled with Cuttings + Cement

	Time										Back to	Proposed Depth
	Depature	Arrival	Start	Break	Rework	Lunch	Rework	Break	Finish	Off	Office	25.0 ft
Driller												Water Table
Traffic Control												ft
Logger												Caving
Total												ft

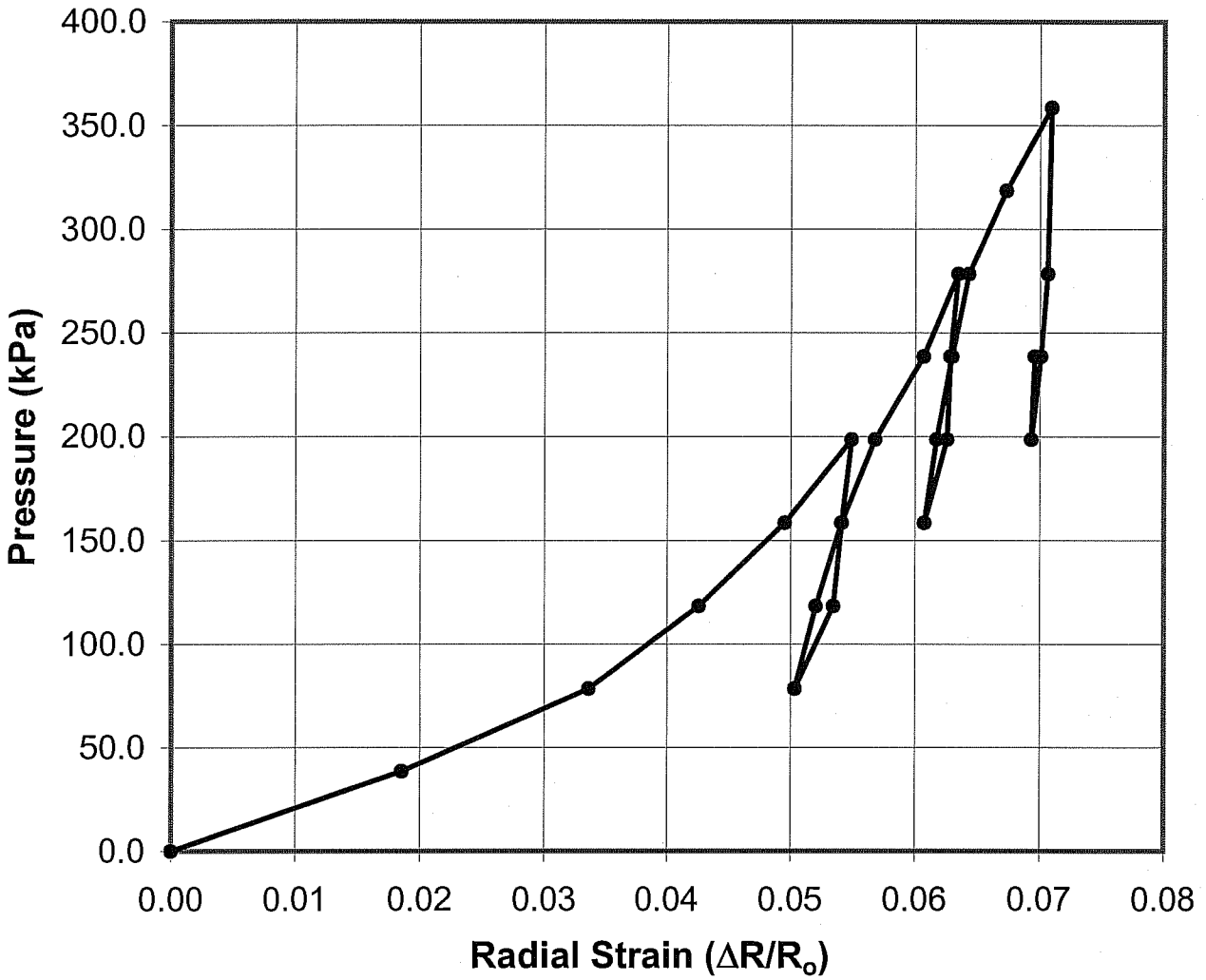
Depth (ft)	Sampler Type (Bulk, Drive, SPT, Tube)	Sample Number	Sample Type (B/D/S.B./T)	Blows/6"	Recovery (inch)	U.S.C.S.	Description (ASTM D-2488-93) Color		Moisture State (Dry, Moist, Wet)	Max. Size	Grain Size (%) Gravel : Sand : Fines	Sand Size	Plasticity	Consistency	Cementation	O^2/LEL/PID
0	B	0		4 9							: :					
2	D S	1		8 9 10		SM	DK BRN GRAY, WHITE	SI. SA., FI-MED, SOME GR.								
5	S	2		9 10½		SM	"	SI. SA., FI-CO., MULTI-COLORED FRAG'S	GRAVEL		: :					
7.5	S	3		10 11 15		SM	"	SAME								
10	D	4A → 4B →		13 26 24		SM	"	SAME			: :					
15	S	5		5 5 6	!	SM	"	SI. SA., FI-CO.			: :					
						SM	BR									
20	S	6A → 6B →		4 5 16		SM	BR	SI. SA., FI-MED			: :					
						SM	DK BRN	SI. SA., FI-CO, SOME GR. (LIKE 'B ID')								
25	S	7		5 8 9		"	"	"			: :					
						TERMINATED	@ 26.5'. BACKFILLED W/ ON-SITE SOIL + WATER									

Pressuremeter Test Result



Boring No.:	**04-23P**
Location:	**Santa Clara River (Replace)**
	Los Angeles County
Test Date:	**6/5/04-6/6/04**
Test Depth:	**5.5 ft**
Soil Type:	**Silty Sand**

Pressuremeter Test Result



Boring No.:	**04-24P**
Location:	**Santa Clara River (Replace)**
	Los Angeles County
Test Date:	**6/5/04-6/6/04**
Test Depth:	**7.5 ft**
Soil Type:	**Silty Sand**

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

CALTRANS-UCSD / Abutment Research

Project No : 02-165 | Date : 12/22/2004

HOLGUIN, FAHAN & ASSOCIATES, INC.
ENVIRONMENTAL MANAGEMENT CONSULTANTS
948 North Lemon Street, Orange, CA 92867 (714)-210-5971 FAX (714) 210-5975

October 14, 2004

Mr. Mike Kapuskar
Earth Mechanics, Inc.
17660 Newhope St, Suite E
Fountain Valley, CA 92708

PROJECT NAME: CPT Testing at UCSD Santa Clarita River Bridge in Santa Clarita, CA;
PROJECT NO.: 02-165

Dear Mr. Kapuskar:

Enclosed please find copies of the cone penetrometer testing (CPT) data for the above referenced project along with a copy of the corresponding invoice.

The cone penetrometer testing conducted for this project consisted of pushing an instrumented cone-tipped probe into the ground while simultaneously recording the resistance to penetration at the cone tip and along the friction sleeve.

The cone penetrometer testing described in this report was conducted in general accordance with the current ASTM specifications (ASTM D5778-95 and D3441-94) using an electronic cone penetrometer.

The CPT equipment operated by Holguin, Fahan & Associates, Inc. (HFA) consists of a cone assembly mounted at the end of a series of hollow sounding rods. A set of hydraulic rams is used to continuously push the cone and rods into the soil at a rate of 20-mm per second (approximately four feet per minute) while the cone tip resistance and sleeve friction resistance are recorded every 50-mm (approximately two inches) and stored in digital form. A specially designed all wheel drive 23-ton truck provides the required reaction weight for pushing the cone assembly and is also used to transport and house the test equipment.

The cone penetrometer assembly used for this project consists of a conical tip and a cylindrical friction sleeve. The conical tip has a 60° apex angle and a diameter of 35.6-mm (1.40-inch) resulting in a projected cross-sectional area of 10 cm^2 (1.5 square inches). The cylindrical friction sleeve is 133-mm (5.25-inch) in length and has an outside diameter of 35.8-mm (1.41-inch), resulting in a surface area of 150 cm^2 (23 square inches).

The interior of the cone penetrometer is instrumented with strain gauges that allow simultaneous measurement of cone tip and friction sleeve resistance during penetration. Continuous electric signals from the strain gauges are transmitted by a shielded cable in the sounding rods to the PC-based data acquisition hardware in the CPT truck. The sounding log is also displayed on a monitor.

The CPT data processing is performed using the truck mounted computer based data acquisition and presentation system. The computer generated graphical logs include cone resistance, friction resistance, friction ratio, and pore pressure ratio versus depth at a user selectable scale.

Soil behavior type interpretations are based on the following reference: Robertson, P.K. and Campanella, R.C., 1989, "Guidelines for Geotechnical Design using the Cone Penetrometer Test and CPT with Pore Pressure Measurement." Soil Mechanics series No. 120, Civil Engineering Department, University of British Columbia, Vancouver, B.C., V6T 1Z4, September 1989.

Interpretations and plotting has been done using HFA's proprietary data interpretation and presentation software. It is important to note that the data is not averaged. All interpretations are point interpretations at the corresponding depth listed.

It is also important to note that the soil behavior type correlations are based on a combination of theory, field research, research performed under laboratory conditions, and literature review. The information presented in the tabulated and/or graphical logs should, therefore, be viewed as a guideline rather than as precise measurements.

Some care is recommended when using the soil behavior type interpretations. If a tabulation depth happens to fall on a soil layer interface, or a seam of soil differing from the rest of the layer, the tabulated data can be misleading. The solution to this problem is the proper use of the graphical CPT logs. The tip and sleeve penetration resistance logs are the primary source of profile description; the soil behavior type logs are supplemental. The graphical logs of tip and sleeve resistance should be examined and layer boundaries delineated in accordance with the project requirements. The soil behavior type interpretations are only representative of the response of the soil to the large shear deformations imposed during cone penetration. This is not necessarily a prediction of grain size distribution. However, it has been found that the interpreted soil behavior types generally agree well with the soil types defined in accordance with the grain size distribution methods such as used in the Unified Soil Classification System.

Limitations

Holguin, Fahan & Associates, Inc. (HFA) presents the attached data in accordance with ASTM Standards D5778-95 and D3441-94 and generally accepted cone penetrometer testing practices and standards. The attached data further relates only to the specific project and location discussed in the data. Judgement may be required to verify the CPT soil behavior interpretations.

The "Client" may distribute this data or excerpts therefrom provided the following statement is prominently displayed and included with the distribution:

"Neither CLIENT nor HFA make any guarantee or warranty, express or implied, regarding this data. THE USE OF THIS INFORMATION SHALL BE AT THE USER'S SOLE RISK REGARDLESS OF ANY FAULT OR NEGLIGENCE OF THE CLIENT OR HFA."

Please feel free to call if you have any questions.

Respectfully submitted,

Rachel Carter for AH

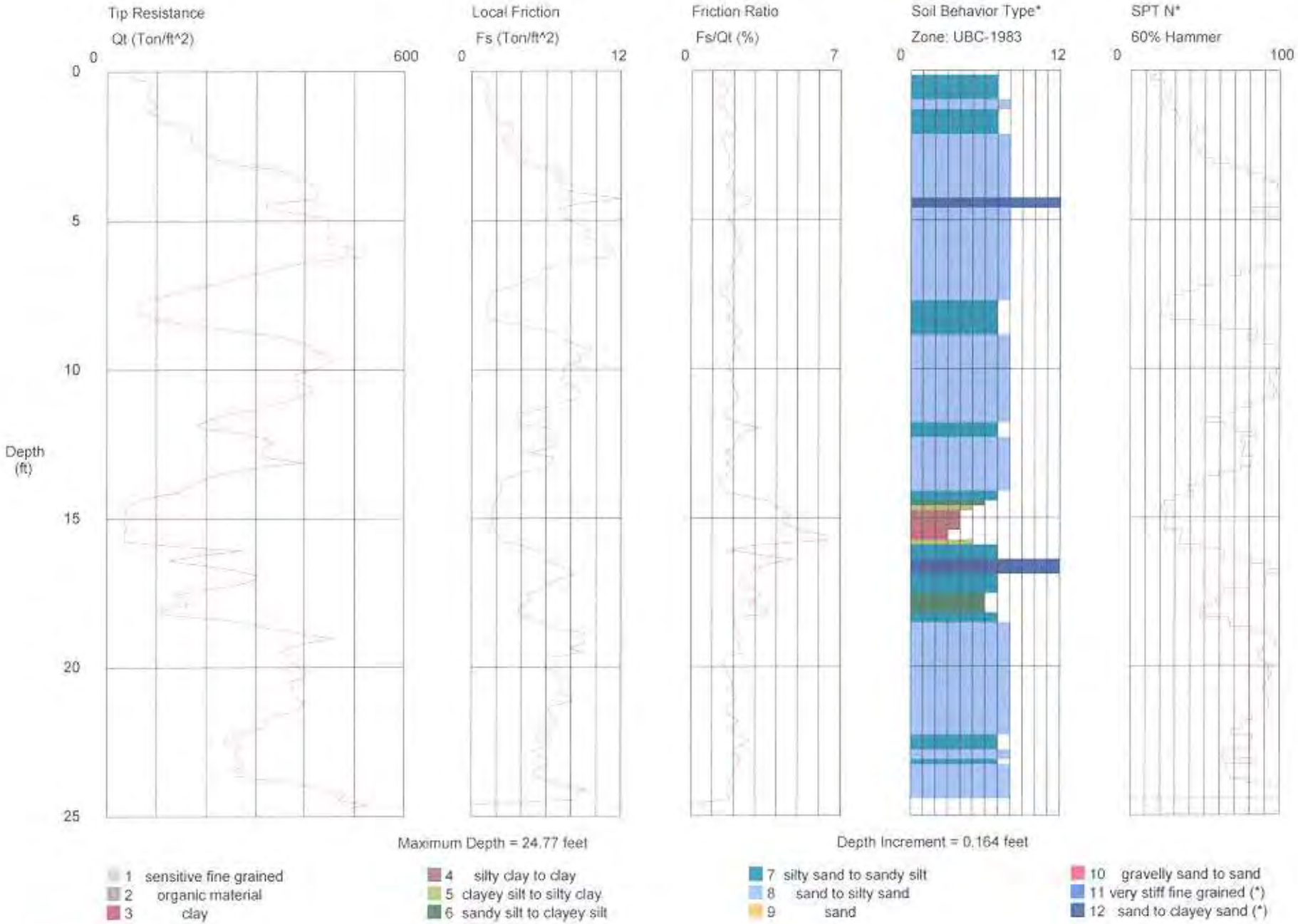
Amanda Hancock
CPT Operations Manager
Holguin, Fahan & Associates, Inc.

:AH\Enclosures

Earth Mechanics

Operator: BH-JH
Sounding: 04-23C
Cone Used: DSG0705

CPT Date/Time: 10/6/2004 12:02
Location: UCSD Santa Clarita Bridge
Job Number: 02-165



*Soil behavior type and SPT based on data from UBC-1983

UCSD Santa Clarita River Bridge

Project ID: Earth Mechanics
ata File: SDF(362).cpt
/T Date: 10/6/2004 12:02:41 PM

Sounding ID: 04-23C A
Project No: 02-165

Depth ft	qc PS tsf	Slv Stss tsf	Frct Rato %	* Material Behavior Description	Qc to N	* SPT N1 60%	SPT N 60%	* Rel Den %	* Ftn Ang deg	* Und Shr tsf	* % Fin Ic
0.33	81.6	0.9	1.1	clean SAND to silty SAND	5.0	26	16	76	48	-	9
0.49	92.1	1.4	1.5	clean SAND to silty SAND	5.0	30	18	80	48	-	11
0.66	83.6	1.5	1.7	clean SAND to silty SAND	5.0	27	17	77	48	-	13
0.82	78.2	1.2	1.6	clean SAND to silty SAND	5.0	25	16	74	48	-	12
0.98	87.2	1.0	1.2	clean SAND to silty SAND	5.0	28	17	78	48	-	9
1.15	102.8	1.3	1.3	clean SAND to silty SAND	5.0	33	21	84	48	-	9
1.31	86.2	1.4	1.7	clean SAND to silty SAND	5.0	28	17	78	48	-	12
1.48	99.6	1.6	1.7	clean SAND to silty SAND	5.0	32	20	82	48	-	11
1.64	110.3	2.1	1.9	clean SAND to silty SAND	5.0	35	22	86	48	-	11
1.80	148.2	3.1	2.1	clean SAND to silty SAND	5.0	48	30	95	48	-	10
1.97	157.7	3.3	2.1	clean SAND to silty SAND	5.0	51	32	95	48	-	10
2.13	168.2	3.2	1.9	clean SAND to silty SAND	5.0	54	34	95	48	-	9
2.30	167.8	2.4	1.4	clean SAND to silty SAND	5.0	54	34	95	48	-	7
2.46	170.3	2.7	1.6	clean SAND to silty SAND	5.0	55	34	95	48	-	7
2.62	194.8	3.1	1.6	clean SAND to silty SAND	5.0	62	39	95	48	-	7
2.79	207.9	3.6	1.7	clean SAND to silty SAND	5.0	67	42	95	48	-	7
2.95	221.2	3.9	1.8	clean SAND to silty SAND	5.0	71	44	95	48	-	7
3.12	264.1	4.6	1.7	clean SAND to silty SAND	5.0	85	53	95	48	-	6
3.28	341.0	6.1	1.8	clean SAND to silty SAND	5.0	100	68	95	48	-	5
3.44	376.6	7.4	2.0	stiff SAND to clayy SAND	1.0	100	100	95	-	37.7	5
3.61	386.6	7.1	1.8	stiff SAND to clayy SAND	1.0	100	100	95	-	38.7	5
3.77	416.0	7.3	1.7	stiff SAND to clayy SAND	1.0	100	100	95	-	41.7	5
3.94	421.6	7.1	1.7	stiff SAND to clayy SAND	1.0	100	100	95	-	42.2	5
4.10	427.8	9.0	2.1	stiff SAND to clayy SAND	1.0	100	100	95	-	42.9	6
4.26	426.3	12.0	2.8	stiff SAND to clayy SAND	1.0	100	100	95	-	42.7	8
4.43	321.6	8.7	2.7	stiff SAND to clayy SAND	1.0	100	100	95	-	32.2	9
4.59	320.3	7.0	2.2	stiff SAND to clayy SAND	1.0	100	100	95	-	32.1	7
4.76	386.7	0.3	0.1	grvly SAND to dense SAND	6.0	100	64	95	48	-	5
4.92	443.5	0.3	0.1	grvly SAND to dense SAND	6.0	100	74	95	48	-	5
5.08	63.7	0.3	0.5	clean SAND to silty SAND	5.0	20	13	68	44	-	6
5.25	63.7	9.2	9.9	very stiff fine SOIL	2.0	51	32	-	44	-	38
5.41	63.7	9.3	9.9	very stiff fine SOIL	2.0	51	32	-	44	-	38
5.58	451.0	9.2	2.1	stiff SAND to clayy SAND	1.0	100	100	95	-	45.2	5
5.74	439.4	10.7	2.4	stiff SAND to clayy SAND	1.0	100	100	95	-	44.0	7
5.90	488.9	10.6	2.2	stiff SAND to clayy SAND	1.0	100	100	95	-	49.0	5
6.07	481.0	11.4	2.4	stiff SAND to clayy SAND	1.0	100	100	95	-	48.0	6
6.23	506.4	10.8	2.1	stiff SAND to clayy SAND	1.0	100	100	95	-	49.9	5
6.40	392.5	7.9	2.0	stiff SAND to clayy SAND	1.0	100	100	95	-	38.2	6
6.56	353.5	6.3	1.8	clean SAND to silty SAND	5.0	100	71	95	48	-	5
6.72	313.3	5.7	1.8	clean SAND to silty SAND	5.0	95	63	95	48	-	6
6.89	262.3	5.2	2.0	clean SAND to silty SAND	5.0	79	52	95	48	-	7
7.05	236.6	4.3	1.8	clean SAND to silty SAND	5.0	70	47	95	48	-	7

* Indicates the parameter was calculated using the normalized point stress.
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Holguin, Fahan & Associates, Inc.

UCSD Santa Clarita River Bridge

Project ID: Earth Mechanics
Data File: SDF(362).cpt
T Date: 10/6/2004 12:02:41 PM

Sounding ID: 04-23C
Project No: 02-165

Depth ft	qc PS tsf	Slv Stss tsf	Frct Ratio %	* Material Behavior Description	Qc to N	* SPT N1 60%	SPT N 60%	* Rel Den %	* Ftn Ang deg	* Und Shr tsf	* % Fin Ic
7.22	187.1	3.2	1.7	clean SAND to silty SAND	5.0	55	37	95	47	-	8
7.38	139.8	1.8	1.3	clean SAND to silty SAND	5.0	41	28	90	46	-	7
7.54	103.5	1.5	1.5	clean SAND to silty SAND	5.0	30	21	80	45	-	10
7.71	69.6	1.2	1.8	silty SAND to sandy SILT	4.0	25	17	67	43	-	15
7.87	61.3	1.1	1.8	silty SAND to sandy SILT	4.0	22	15	62	42	-	17
8.04	60.5	1.2	2.0	silty SAND to sandy SILT	4.0	21	15	61	42	-	18
8.20	78.4	1.4	1.7	silty SAND to sandy SILT	4.0	27	20	69	43	-	14
8.36	118.6	2.1	1.8	clean SAND to silty SAND	5.0	32	24	83	45	-	11
8.53	196.4	4.2	2.1	clean SAND to silty SAND	5.0	53	39	95	47	-	10
8.69	261.4	6.1	2.3	stiff SAND to clayy SAND	1.0	100	100	95	-	21.8	9
8.86	337.7	7.9	2.3	stiff SAND to clayy SAND	1.0	100	100	95	-	27.9	8
9.02	383.8	7.6	2.0	stiff SAND to clayy SAND	1.0	100	100	95	-	31.4	6
9.18	411.7	8.5	2.1	stiff SAND to clayy SAND	1.0	100	100	95	-	33.4	6
9.35	420.1	9.7	2.3	stiff SAND to clayy SAND	1.0	100	100	95	-	33.8	7
9.51	440.0	8.5	1.9	stiff SAND to clayy SAND	1.0	100	100	95	-	35.1	6
9.68	452.5	8.8	1.9	stiff SAND to clayy SAND	1.0	100	100	95	-	35.9	6
9.84	442.1	7.7	1.7	clean SAND to silty SAND	5.0	100	88	95	48	-	5
10.00	411.1	7.4	1.8	clean SAND to silty SAND	5.0	100	82	95	48	-	5
10.17	379.3	7.5	2.0	clean SAND to silty SAND	5.0	94	76	95	48	-	6
10.33	380.2	7.1	1.9	clean SAND to silty SAND	5.0	93	76	95	48	-	6
10.50	402.1	7.7	1.9	clean SAND to silty SAND	5.0	98	80	95	48	-	6
10.66	417.1	8.3	2.0	stiff SAND to clayy SAND	1.0	100	100	95	-	31.4	6
10.82	405.5	8.8	2.2	stiff SAND to clayy SAND	1.0	100	100	95	-	30.4	7
10.99	378.5	8.3	2.2	stiff SAND to clayy SAND	1.0	100	100	95	-	28.1	7
11.15	335.2	6.9	2.1	clean SAND to silty SAND	5.0	79	67	95	48	-	7
11.32	300.0	5.6	1.9	clean SAND to silty SAND	5.0	70	60	95	48	-	7
11.48	247.2	3.6	1.5	clean SAND to silty SAND	5.0	58	49	95	47	-	6
11.64	210.4	3.7	1.8	clean SAND to silty SAND	5.0	49	42	95	46	-	9
11.81	184.1	4.0	2.2	clean SAND to silty SAND	5.0	42	37	92	45	-	11
11.97	197.4	6.2	3.2	stiff SAND to clayy SAND	1.0	100	100	94	-	14.0	14
12.14	273.7	6.8	2.5	stiff SAND to clayy SAND	1.0	100	100	95	-	19.3	10
12.30	317.8	7.0	2.2	clean SAND to silty SAND	5.0	72	64	95	47	-	8
12.46	335.5	7.0	2.1	clean SAND to silty SAND	5.0	75	67	95	48	-	8
12.63	313.8	6.3	2.0	clean SAND to silty SAND	5.0	70	63	95	47	-	8
12.79	307.9	4.8	1.6	clean SAND to silty SAND	5.0	68	62	95	47	-	6
12.96	324.2	6.6	2.0	clean SAND to silty SAND	5.0	71	65	95	47	-	8
13.12	395.7	6.5	1.6	clean SAND to silty SAND	5.0	86	79	95	48	-	5
13.28	296.7	6.1	2.1	clean SAND to silty SAND	5.0	64	59	95	47	-	8
13.45	238.7	4.0	1.7	clean SAND to silty SAND	5.0	51	48	95	46	-	8
13.61	206.5	3.0	1.5	clean SAND to silty SAND	5.0	44	41	93	45	-	8
13.78	176.7	2.3	1.3	clean SAND to silty SAND	5.0	38	35	88	44	-	8
13.94	162.1	2.3	1.4	clean SAND to silty SAND	5.0	34	32	85	44	-	9
14.10	144.4	2.4	1.7	clean SAND to silty SAND	5.0	30	29	81	43	-	11

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Holguin, Fahan & Associates, Inc.

UCSD Santa Clarita River Bridge

Project ID: Earth Mechanics
Data File: SDF(362).cpt
CPT Date: 10/6/2004 12:02:41 PM

Sounding ID: 04-23C
Project No: 02-165

Depth ft	qc PS tsf	Slv Stss tsf	Frct Ratio %	* Material Behavior Description	Qc to N	* SPT N1 60%	SPT N 60%	* Rel Den %	* Ftn Ang deg	* Und Shr tsf	* % Fin Ic
14.27	87.7	2.2	2.5	silty SAND to sandy SILT	4.0	23	22	64	41	-	19
14.43	53.6	2.0	3.8	clayy SILT to silty CLAY	2.0	28	27	48	-	3.6	31
14.60	42.1	1.7	4.0	clayy SILT to silty CLAY	2.0	22	21	39	-	2.8	35
14.76	38.0	0.2	0.6	silty SAND to sandy SILT	4.0	10	10	36	36	-	17
14.92	37.0	1.6	4.6	clayy SILT to silty CLAY	2.0	20	18	-	-	2.7	38
15.09	9.4	1.7	9.9	silty CLAY to CLAY	1.5	7	6	-	-	0.6	85
15.25	35.6	1.5	4.3	clayy SILT to silty CLAY	2.0	19	18	-	-	2.5	38
15.42	38.0	1.7	4.6	clayy SILT to silty CLAY	2.0	20	19	-	-	2.6	38
15.58	36.6	1.9	5.3	silty CLAY to CLAY	1.5	26	24	-	-	2.5	41
15.74	36.2	2.3	6.5	silty CLAY to CLAY	1.5	25	24	-	-	2.5	45
15.91	33.7	2.2	6.6	silty CLAY to CLAY	1.5	23	22	-	-	2.3	47
16.07	134.0	4.1	3.1	silty SAND to sandy SILT	4.0	33	34	76	42	-	18
16.24	272.0	5.0	1.8	clean SAND to silty SAND	5.0	53	54	95	46	-	8
16.40	187.0	5.8	3.1	stiff SAND to clayy SAND	1.0	100	100	87	-	11.3	16
16.56	122.9	5.8	4.8	very stiff fine SOIL	2.0	60	61	73	42	-	25
16.73	194.9	7.0	3.6	stiff SAND to clayy SAND	1.0	100	100	88	-	11.7	17
16.89	263.4	7.8	3.0	stiff SAND to clayy SAND	1.0	100	100	95	-	15.8	13
17.06	298.1	8.2	2.8	stiff SAND to clayy SAND	1.0	100	100	95	-	17.8	12
17.22	296.8	6.8	2.3	clean SAND to silty SAND	5.0	57	59	95	46	-	10
17.38	261.5	5.9	2.3	clean SAND to silty SAND	5.0	50	52	95	45	-	11
17.55	196.1	5.5	2.8	silty SAND to sandy SILT	4.0	46	49	87	44	-	15
17.71	137.4	4.5	3.3	silty SAND to sandy SILT	4.0	32	34	75	42	-	19
17.88	151.8	4.7	3.1	silty SAND to sandy SILT	4.0	35	38	79	42	-	18
18.04	163.2	4.4	2.7	silty SAND to sandy SILT	4.0	38	41	81	43	-	16
18.20	114.0	3.8	3.3	silty SAND to sandy SILT	4.0	26	28	69	41	-	21
18.37	104.8	3.8	3.7	silty SAND to sandy SILT	4.0	24	26	66	40	-	24
18.53	219.1	4.6	2.1	clean SAND to silty SAND	5.0	40	44	90	44	-	11
18.70	295.2	5.9	2.0	clean SAND to silty SAND	5.0	54	59	95	45	-	9
18.86	323.6	6.7	2.1	clean SAND to silty SAND	5.0	59	65	95	46	-	9
19.02	392.1	9.2	2.3	stiff SAND to clayy SAND	1.0	100	100	95	-	22.1	9
19.19	455.9	8.9	2.0	clean SAND to silty SAND	5.0	82	91	95	47	-	7
19.35	402.3	9.1	2.3	stiff SAND to clayy SAND	1.0	100	100	95	-	22.5	9
19.52	359.1	7.9	2.2	clean SAND to silty SAND	5.0	64	72	95	46	-	9
19.68	351.0	8.9	2.5	stiff SAND to clayy SAND	1.0	100	100	95	-	19.5	10
19.84	373.0	6.0	1.6	clean SAND to silty SAND	5.0	66	75	95	46	-	6
20.01	375.4	5.9	1.6	clean SAND to silty SAND	5.0	66	75	95	46	-	6
20.17	387.7	5.9	1.5	clean SAND to silty SAND	5.0	68	78	95	46	-	6
20.34	404.8	6.8	1.7	clean SAND to silty SAND	5.0	71	81	95	46	-	6
20.50	398.1	7.0	1.8	clean SAND to silty SAND	5.0	69	80	95	46	-	7
20.66	363.9	7.0	1.9	clean SAND to silty SAND	5.0	63	73	95	46	-	8
20.83	375.0	7.1	1.9	clean SAND to silty SAND	5.0	65	75	95	46	-	8
20.99	374.8	7.1	1.9	clean SAND to silty SAND	5.0	65	75	95	46	-	8
21.16	374.9	8.1	2.2	clean SAND to silty SAND	5.0	64	75	95	46	-	9

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Holguin, Fahan & Associates, Inc.

UCSD Santa Clarita River Bridge

Project ID: Earth Mechanics
Data File: SDF(362).cpt
CPT Date: 10/6/2004 12:02:41 PM

Sounding ID: 04-23C
Project No: 02-165

Depth ft	qc PS tsf	Slv Stss tsf	Frct Rato %	Material Behavior Description	Qc to N	* SPT N1 60%	SPT N 60%	* Rel Den %	* Ftn Ang deg	* Und Shr tsf	* % Fin Ic
21.32	400.2	8.1	2.0	clean SAND to silty SAND	5.0	68	80	95	46	-	8
21.48	391.9	6.2	1.6	clean SAND to silty SAND	5.0	67	78	95	46	-	6
21.65	373.0	6.2	1.7	clean SAND to silty SAND	5.0	63	75	95	46	-	7
21.81	331.7	6.3	1.9	clean SAND to silty SAND	5.0	56	66	95	45	-	8
21.98	318.5	7.0	2.2	clean SAND to silty SAND	5.0	54	64	95	45	-	10
22.14	321.3	6.4	2.0	clean SAND to silty SAND	5.0	54	64	95	45	-	9
22.30	286.5	5.5	1.9	clean SAND to silty SAND	5.0	48	57	95	44	-	10
22.47	246.2	5.2	2.1	clean SAND to silty SAND	5.0	41	49	91	44	-	11
22.63	234.8	6.5	2.8	silty SAND to sandy SILT	4.0	49	59	89	43	-	14
22.80	271.7	6.3	2.3	clean SAND to silty SAND	5.0	45	54	94	44	-	11
22.96	256.8	5.0	2.0	clean SAND to silty SAND	5.0	42	51	92	44	-	10
23.12	257.7	5.5	2.1	clean SAND to silty SAND	5.0	42	52	92	44	-	11
23.29	268.5	6.2	2.3	clean SAND to silty SAND	5.0	44	54	93	44	-	12
23.45	275.4	6.0	2.2	clean SAND to silty SAND	5.0	45	55	94	44	-	11
23.62	255.5	5.0	2.0	clean SAND to silty SAND	5.0	41	51	91	43	-	10
23.78	255.9	5.0	2.0	clean SAND to silty SAND	5.0	41	51	91	43	-	11
23.94	326.9	6.0	1.8	clean SAND to silty SAND	5.0	53	65	95	45	-	9
24.11	392.8	6.9	1.8	clean SAND to silty SAND	5.0	63	79	95	45	-	7
24.27	455.6	9.3	2.0	clean SAND to silty SAND	5.0	73	91	95	46	-	8
24.44	481.0	8.4	1.8	clean SAND to silty SAND	5.0	77	96	95	46	-	6
24.60	466.8	8.5	1.8	clean SAND to silty SAND	5.0	74	93	95	46	-	7

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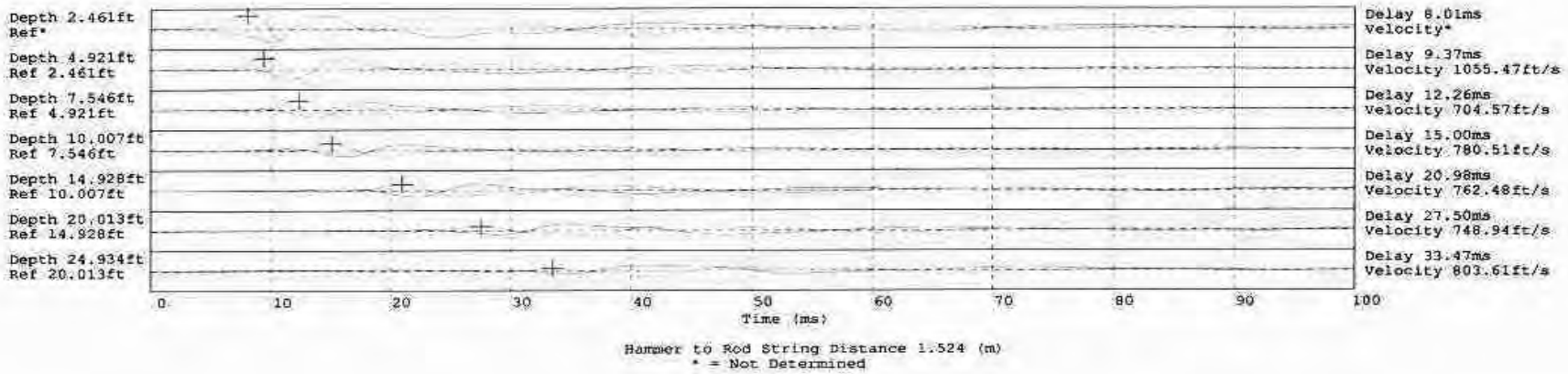
Holguin, Fahan & Associates, Inc.

Earth Mechanics
04-23C

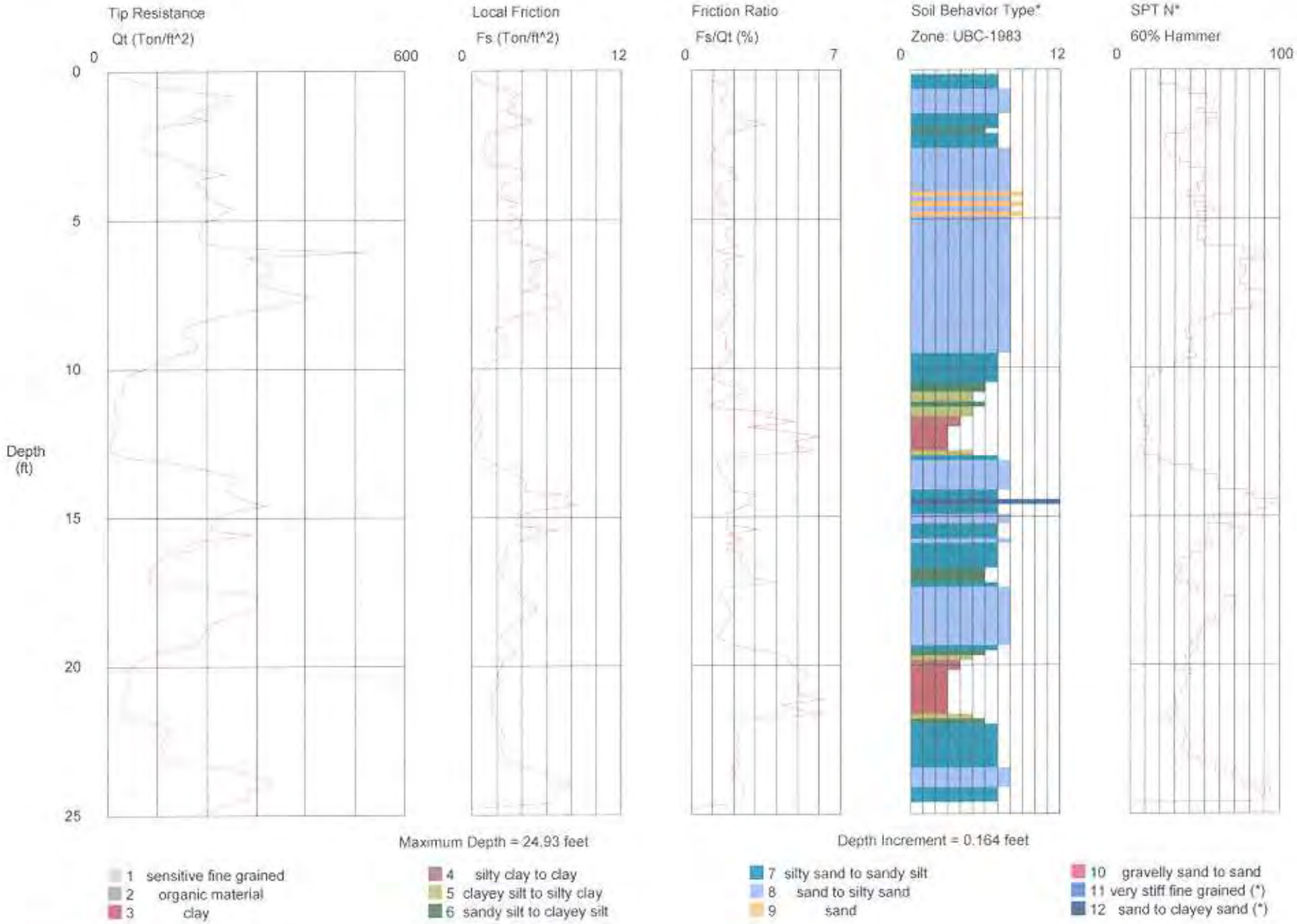


Hammer to Rod String Distance 1.524 (m)
* = Not Determined

Earth Mechanics

Operator: BH-JH
Sounding: 04-24C
Cone Used: DSG0705

CPT Date/Time: 10/6/2004 8:53
Location: UCSD Santa Clarita Bridge
Job Number: 02-165



*Soil behavior type and SPT based on data from UBC-1983

UCSD Santa Clarita River Bridge

Project ID: Earth Mechanics
ta File: SDF(359).cpt
T Date: 10/6/2004 8:53:21 AM

Sounding ID: 04-24C
Project No: 02-165

Depth ft	qc PS tsf	Slv Stss tsf	Frct Ratio %	* Material Behavior Description	Qc to N	* SPT N1 60%	SPT N 60%	* Rel Den %	* Ftn Ang deg	* Und Shr tsf	* % Fin Ic
0.33	56.6	0.4	0.8	clean SAND to silty SAND	5.0	18	11	64	48	-	10
0.49	86.1	1.3	1.5	clean SAND to silty SAND	5.0	28	17	78	48	-	11
0.66	153.7	2.7	1.8	clean SAND to silty SAND	5.0	49	31	95	48	-	9
0.82	248.4	3.8	1.5	clean SAND to silty SAND	5.0	80	50	95	48	-	5
0.98	235.1	3.1	1.3	clean SAND to silty SAND	5.0	75	47	95	48	-	5
1.15	213.0	3.4	1.6	clean SAND to silty SAND	5.0	68	43	95	48	-	6
1.31	180.9	2.7	1.5	clean SAND to silty SAND	5.0	58	36	95	48	-	6
1.48	163.9	3.3	2.0	clean SAND to silty SAND	5.0	53	33	95	48	-	9
1.64	198.6	4.8	2.4	stiff SAND to clayy SAND	1.0	100	100	95	-	19.9	10
1.80	123.1	4.2	3.4	stiff SAND to clayy SAND	1.0	100	100	89	-	12.3	16
1.97	84.1	2.1	2.5	silty SAND to sandy SILT	4.0	34	21	77	48	-	16
2.13	75.2	1.3	1.7	clean SAND to silty SAND	5.0	24	15	73	48	-	13
2.30	68.5	1.1	1.5	clean SAND to silty SAND	5.0	22	14	70	48	-	13
2.46	71.6	1.0	1.4	clean SAND to silty SAND	5.0	23	14	72	48	-	12
2.62	72.8	0.8	1.1	clean SAND to silty SAND	5.0	23	15	72	48	-	10
2.79	108.0	1.0	0.9	clean SAND to silty SAND	5.0	35	22	85	48	-	6
2.95	145.2	1.3	0.9	clean SAND to silty SAND	5.0	47	29	95	48	-	5
3.12	163.1	1.7	1.0	clean SAND to silty SAND	5.0	52	33	95	48	-	5
3.28	188.3	3.9	2.1	clean SAND to silty SAND	5.0	60	38	95	48	-	9
3.44	237.9	4.2	1.8	clean SAND to silty SAND	5.0	76	48	95	48	-	6
3.61	183.9	4.0	2.2	clean SAND to silty SAND	5.0	59	37	95	48	-	9
3.77	180.6	2.5	1.4	clean SAND to silty SAND	5.0	58	36	95	48	-	6
3.94	195.4	2.4	1.2	clean SAND to silty SAND	5.0	63	39	95	48	-	5
4.10	198.4	2.5	1.3	clean SAND to silty SAND	5.0	64	40	95	48	-	5
4.26	203.8	2.3	1.1	clean SAND to silty SAND	5.0	65	41	95	48	-	5
4.43	224.9	3.6	1.6	clean SAND to silty SAND	5.0	72	45	95	48	-	6
4.59	249.8	2.9	1.2	clean SAND to silty SAND	5.0	80	50	95	48	-	5
4.76	229.5	3.0	1.3	clean SAND to silty SAND	5.0	74	46	95	48	-	5
4.92	222.6	3.4	1.5	clean SAND to silty SAND	5.0	71	45	95	48	-	6
5.08	187.3	4.0	2.1	clean SAND to silty SAND	5.0	60	37	95	48	-	9
5.25	191.8	3.6	1.9	clean SAND to silty SAND	5.0	62	38	95	48	-	8
5.41	185.2	2.9	1.6	clean SAND to silty SAND	5.0	59	37	95	48	-	7
5.58	183.1	3.0	1.6	clean SAND to silty SAND	5.0	59	37	95	48	-	7
5.74	194.7	3.4	1.8	clean SAND to silty SAND	5.0	62	39	95	48	-	7
5.90	234.4	5.2	2.2	stiff SAND to clayy SAND	1.0	100	100	95	-	23.5	8
6.07	521.0	5.8	1.1	clean SAND to silty SAND	5.0	100	100	95	48	-	5
6.23	281.7	6.6	2.4	stiff SAND to clayy SAND	1.0	100	100	95	-	27.5	8
6.40	307.9	4.7	1.5	clean SAND to silty SAND	5.0	95	62	95	48	-	5
6.56	328.1	5.6	1.7	clean SAND to silty SAND	5.0	100	66	95	48	-	5
6.72	331.7	5.1	1.5	clean SAND to silty SAND	5.0	100	66	95	48	-	5
6.89	305.2	4.7	1.5	clean SAND to silty SAND	5.0	91	61	95	48	-	5
7.05	300.6	4.6	1.5	clean SAND to silty SAND	5.0	88	60	95	48	-	5

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Holguin, Fahan & Associates, Inc.

UCSD Santa Clarita River Bridge

Project ID: Earth Mechanics
ta File: SDF(359).cpt
:T Date: 10/6/2004 8:53:21 AM

Sounding ID: 04-24C
Project No: 02-165

Depth ft	qc PS tsf	Slv Stss tsf	Frct Ratio %	* Material Behavior Description	Qc to N	* SPT N1 60%	SPT N 60%	* Rel Den %	* Ftn Ang deg	* Und Shr tsf	* % Fin Ic
7.22	313.4	5.4	1.7	clean SAND to silty SAND	5.0	91	63	95	48	-	6
7.38	354.8	4.1	1.2	clean SAND to silty SAND	5.0	100	71	95	48	-	5
7.54	406.2	6.6	1.6	clean SAND to silty SAND	5.0	100	81	95	48	-	5
7.71	394.1	7.0	1.8	clean SAND to silty SAND	5.0	100	79	95	48	-	5
7.87	338.2	7.3	2.2	stiff SAND to clayy SAND	1.0	100	100	95	-	29.4	7
8.04	282.8	5.3	1.9	clean SAND to silty SAND	5.0	78	57	95	48	-	7
8.20	228.5	3.9	1.7	clean SAND to silty SAND	5.0	62	46	95	48	-	7
8.36	193.0	2.8	1.5	clean SAND to silty SAND	5.0	52	39	95	47	-	7
8.53	164.2	2.4	1.5	clean SAND to silty SAND	5.0	44	33	93	46	-	8
8.69	148.8	1.7	1.2	clean SAND to silty SAND	5.0	39	30	89	46	-	7
8.86	156.6	2.6	1.7	clean SAND to silty SAND	5.0	41	31	91	46	-	9
9.02	169.3	2.7	1.6	clean SAND to silty SAND	5.0	44	34	93	46	-	8
9.18	183.4	3.0	1.6	clean SAND to silty SAND	5.0	47	37	95	46	-	8
9.35	171.0	2.7	1.6	clean SAND to silty SAND	5.0	44	34	93	46	-	9
9.51	135.4	2.6	1.9	clean SAND to silty SAND	5.0	34	27	85	45	-	12
9.68	110.8	1.9	1.8	clean SAND to silty SAND	5.0	28	22	78	44	-	12
9.84	88.2	1.3	1.5	clean SAND to silty SAND	5.0	22	18	70	42	-	13
10.00	70.1	0.9	1.3	clean SAND to silty SAND	5.0	17	14	62	41	-	14
10.17	43.3	0.6	1.3	silty SAND to sandy SILT	4.0	13	11	46	38	-	19
10.33	36.1	0.3	1.0	silty SAND to sandy SILT	4.0	11	9	40	37	-	19
10.50	30.3	0.4	1.5	silty SAND to sandy SILT	4.0	9	8	34	36	-	25
10.66	30.7	0.7	2.3	silty SAND to sandy SILT	4.0	9	8	34	36	-	30
10.82	20.2	0.5	2.6	clayy SILT to silty CLAY	2.0	13	10	-	-	1.7	37
10.99	13.1	0.3	2.0	clayy SILT to silty CLAY	2.0	10	7	-	-	1.2	39
11.15	12.9	0.1	1.2	clayy SILT to silty CLAY	2.0	8	6	-	-	1.1	36
11.32	14.3	0.1	0.9	silty SAND to sandy SILT	4.0	4	4	8	31	-	33
11.48	16.1	0.6	4.0	silty CLAY to CLAY	1.5	15	11	-	-	1.5	46
11.64	22.9	0.8	3.6	clayy SILT to silty CLAY	2.0	16	11	-	-	2.1	38
11.81	11.7	0.6	5.2	silty CLAY to CLAY	1.5	11	8	-	-	1.0	58
11.97	8.8	0.2	2.9	silty CLAY to CLAY	1.5	8	6	-	-	0.7	55
12.14	17.3	0.8	4.6	silty CLAY to CLAY	1.5	15	12	-	-	1.5	48
12.30	11.3	0.7	6.4	silty CLAY to CLAY	1.5	10	8	-	-	0.9	64
12.46	6.2	0.3	5.5	silty CLAY to CLAY	1.5	5	4	-	-	0.5	79
12.63	6.5	0.3	5.6	silty CLAY to CLAY	1.5	6	4	-	-	0.5	78
12.79	7.7	0.4	6.4	silty CLAY to CLAY	1.5	7	5	-	-	0.6	76
12.96	41.0	0.9	2.3	silty SAND to sandy SILT	4.0	11	10	40	37	-	27
13.12	125.9	1.5	1.2	clean SAND to silty SAND	5.0	27	25	77	43	-	10
13.28	174.7	2.2	1.3	clean SAND to silty SAND	5.0	38	35	88	44	-	8
13.45	217.2	2.9	1.3	clean SAND to silty SAND	5.0	47	43	95	45	-	7
13.61	250.0	3.7	1.5	clean SAND to silty SAND	5.0	53	50	95	46	-	7
13.78	258.7	4.2	1.6	clean SAND to silty SAND	5.0	55	52	95	46	-	7
13.94	241.9	4.4	1.8	clean SAND to silty SAND	5.0	51	48	95	46	-	9
14.10	238.8	4.2	1.8	clean SAND to silty SAND	5.0	50	48	95	46	-	9

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Holguin, Fahan & Associates, Inc.

UCSD Santa Clarita River Bridge

Project ID: Earth Mechanics
Data File: SDF(359).cpt
CPT Date: 10/6/2004 8:53:21 AM

Sounding ID: 04-24C
Project No: 02-165

Depth ft	qc PS tsf	Slv Stss tsf	Frct Ratio %	* Material Behavior Description	Qc to N	* SPT N1 60%	SPT N 60%	* Rel Den %	* Ftn Ang deg	* Und Shr tsf	* % Fin Ic
14.27	255.4	7.8	3.1	stiff SAND to clayy SAND	1.0	100	100	95	-	16.5	13
14.43	284.1	7.4	2.6	stiff SAND to clayy SAND	1.0	100	100	95	-	18.3	11
14.60	318.0	8.4	2.7	stiff SAND to clayy SAND	1.0	100	100	95	-	20.4	10
14.76	250.5	5.2	2.1	clean SAND to silty SAND	5.0	51	50	95	46	-	10
14.92	233.8	4.0	1.7	clean SAND to silty SAND	5.0	48	47	95	45	-	9
15.09	215.8	3.7	1.7	clean SAND to silty SAND	5.0	44	43	93	45	-	9
15.25	207.2	3.5	1.7	clean SAND to silty SAND	5.0	42	41	91	45	-	9
15.42	212.8	6.8	3.2	stiff SAND to clayy SAND	1.0	100	100	92	-	13.2	15
15.58	292.0	5.1	1.8	clean SAND to silty SAND	5.0	58	58	95	46	-	8
15.74	185.1	4.4	2.4	silty SAND to sandy SILT	4.0	46	46	87	44	-	13
15.91	162.3	2.8	1.8	clean SAND to silty SAND	5.0	32	32	82	43	-	11
16.07	166.0	2.7	1.6	clean SAND to silty SAND	5.0	33	33	83	43	-	11
16.24	115.7	2.8	2.5	silty SAND to sandy SILT	4.0	28	29	71	41	-	17
16.40	102.7	2.4	2.3	silty SAND to sandy SILT	4.0	25	26	67	41	-	18
16.56	94.8	2.2	2.3	silty SAND to sandy SILT	4.0	23	24	64	40	-	19
16.73	85.5	2.2	2.6	silty SAND to sandy SILT	4.0	21	21	60	40	-	21
16.89	82.5	2.3	2.8	silty SAND to sandy SILT	4.0	20	21	59	39	-	22
17.06	86.3	2.5	2.9	silty SAND to sandy SILT	4.0	21	22	60	39	-	22
17.22	74.9	3.0	4.1	clayy SILT to silty CLAY	2.0	35	37	56	-	4.7	29
17.38	210.1	3.3	1.6	clean SAND to silty SAND	5.0	40	42	90	44	-	9
17.55	279.8	3.8	1.4	clean SAND to silty SAND	5.0	52	56	95	45	-	6
17.71	302.9	4.2	1.4	clean SAND to silty SAND	5.0	57	61	95	46	-	6
17.88	296.5	4.7	1.6	clean SAND to silty SAND	5.0	55	59	95	45	-	7
18.04	288.8	5.2	1.8	clean SAND to silty SAND	5.0	53	58	95	45	-	8
18.20	272.1	4.9	1.8	clean SAND to silty SAND	5.0	50	54	95	45	-	9
18.37	233.4	4.4	1.9	clean SAND to silty SAND	5.0	43	47	92	44	-	10
18.53	211.5	3.6	1.7	clean SAND to silty SAND	5.0	39	42	89	44	-	10
18.70	202.3	3.1	1.5	clean SAND to silty SAND	5.0	37	40	87	43	-	9
18.86	191.6	2.7	1.4	clean SAND to silty SAND	5.0	35	38	85	43	-	9
19.02	189.2	2.2	1.2	clean SAND to silty SAND	5.0	34	38	85	43	-	8
19.19	177.2	2.8	1.6	clean SAND to silty SAND	5.0	32	35	82	43	-	10
19.35	152.3	3.3	2.2	silty SAND to sandy SILT	4.0	34	38	77	42	-	15
19.52	101.6	3.5	3.5	silty SAND to sandy SILT	4.0	23	25	64	40	-	24
19.68	73.0	3.3	4.6	clayy SILT to silty CLAY	2.0	32	37	53	-	4.2	31
19.84	54.7	2.5	4.6	clayy SILT to silty CLAY	2.0	23	27	-	-	2.9	37
20.01	49.5	2.4	5.0	silty CLAY to CLAY	1.5	27	33	-	-	2.6	39
20.17	41.5	2.1	5.3	silty CLAY to CLAY	1.5	22	28	-	-	2.2	44
20.34	36.8	2.0	5.7	silty CLAY to CLAY	1.5	20	25	-	-	1.9	47
20.50	41.8	2.2	5.5	silty CLAY to CLAY	1.5	22	28	-	-	2.1	44
20.66	40.8	2.0	5.1	silty CLAY to CLAY	1.5	22	27	-	-	2.1	44
20.83	35.6	1.8	5.3	silty CLAY to CLAY	1.5	19	24	-	-	1.8	47
20.99	31.0	1.6	5.2	silty CLAY to CLAY	1.5	16	21	-	-	1.5	50
21.16	25.1	1.6	6.5	silty CLAY to CLAY	1.5	13	17	-	-	1.2	59

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A Professional Engineer must determine their suitability for analysis and design.

Holguin, Fahan & Associates, Inc.

UCSD Santa Clarita River Bridge

Project ID: Earth Mechanics
Data File: SDF(359).cpt
CPT Date: 10/6/2004 8:53:21 AM

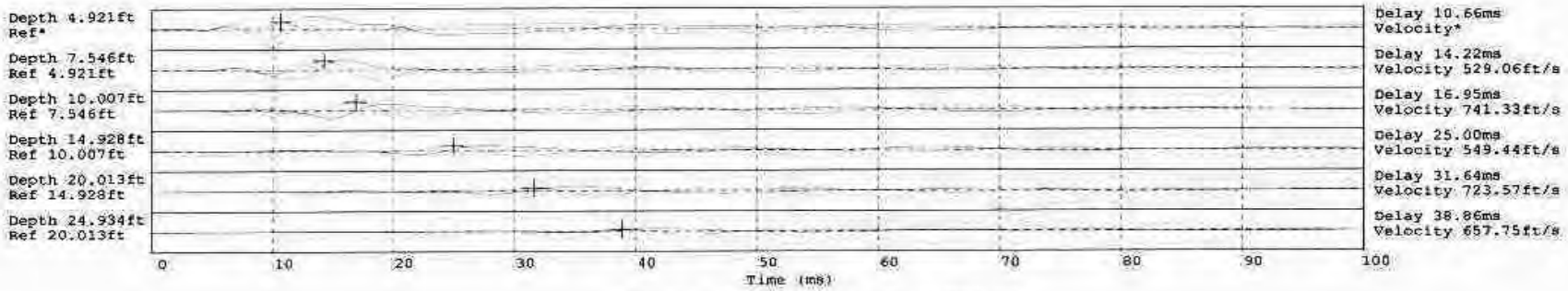
Sounding ID: 04-24C
Project No: 02-165

Depth ft	qc PS tsf	Slv Stss tsf	Frct Rato %	* Material Behavior Description	Qc to N	* SPT N1 60%	SPT N 60%	* Rel Den %	* Ftn Ang deg	* Und Shr tsf	* % Fin Ic
21.32	40.9	1.7	4.4	silty CLAY to CLAY	1.5	21	27	-	-	2.0	42
21.48	32.2	1.6	5.3	silty CLAY to CLAY	1.5	16	21	-	-	1.6	49
21.65	25.8	1.6	6.5	silty CLAY to CLAY	1.5	13	17	-	-	1.2	58
21.81	80.0	2.0	2.5	silty SAND to sandy SILT	4.0	17	20	54	38	-	23
21.98	107.4	2.5	2.4	silty SAND to sandy SILT	4.0	23	27	64	39	-	19
22.14	122.6	2.4	1.9	silty SAND to sandy SILT	4.0	26	31	68	40	-	16
22.30	120.1	2.6	2.2	silty SAND to sandy SILT	4.0	25	30	67	40	-	17
22.47	113.8	2.5	2.2	silty SAND to sandy SILT	4.0	24	28	65	40	-	18
22.63	105.9	2.2	2.1	silty SAND to sandy SILT	4.0	22	26	63	39	-	18
22.80	111.2	2.4	2.2	silty SAND to sandy SILT	4.0	23	28	64	39	-	18
22.96	120.1	2.6	2.2	silty SAND to sandy SILT	4.0	25	30	67	40	-	17
23.12	130.9	2.7	2.1	silty SAND to sandy SILT	4.0	27	33	69	40	-	16
23.29	181.5	4.1	2.2	silty SAND to sandy SILT	4.0	37	45	80	42	-	14
23.45	250.0	4.6	1.9	clean SAND to silty SAND	5.0	41	50	90	43	-	10
23.62	284.6	5.9	2.1	clean SAND to silty SAND	5.0	46	57	95	44	-	10
23.78	336.0	6.5	1.9	clean SAND to silty SAND	5.0	54	67	95	45	-	9
23.94	322.6	7.9	2.5	clean SAND to silty SAND	5.0	52	65	95	45	-	11
24.11	288.5	7.0	2.4	clean SAND to silty SAND	5.0	46	58	95	44	-	12
24.27	274.5	6.7	2.4	clean SAND to silty SAND	5.0	44	55	93	44	-	12
24.44	284.7	6.6	2.3	clean SAND to silty SAND	5.0	45	57	94	44	-	11
24.60	253.7	6.2	2.5	silty SAND to sandy SILT	4.0	50	63	90	43	-	13

* Indicates the parameter was calculated using the normalized point stress.
The parameters listed above were determined using empirical correlations.
A Professional Engineer must determine their suitability for analysis and design.

Holguin, Fahan & Associates, Inc.

Earth Mechanics
04-24C



Hammer to Rod String Distance 1.8288 (m)
* = Not Determined

Caltrans Bridge 04-0398
Maple Ave UC Bridge,
Fresno Co.

Caltrans Bridge 04-0398,
Maple Ave UC Bridge, Fresno Co.

This undercrossing is located at Route 168 over Olive Ave in Fresno County. The bridge has set-type abutments on spread footings

Caltrans provided bulk samples taken from this bridge site for determination of fill properties. We have performed UU testing on this sample. Test results are in Appendix C. Caltrans provided maximum density test results using a nuclear gauge. The data showed the in-situ fills had a relative compaction of 95 to 97%.

09/30/2004

09/30/2004

09/30/2004

09/30/2004

09/30/2004

09/30/2004

10/05/2004

10/05/2004

10/05/2004

CME
10/05/2004

10/05/2004

PEPSI
10/05/2004

10/05/2004

10/05/2004

NOTE: For complete Right of Way and Accurate Access Data, See Right of Way record maps at District Office.

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No
06	Fre	180	R97.1/R103.1	12

Caltrans Metric

11-20-01
REGISTERED CIVIL ENGINEER

3-25-02
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL OSCAR V. SHERRILL No. 57629 Exp. 12-31-05 CIVIL STATE OF CALIFORNIA

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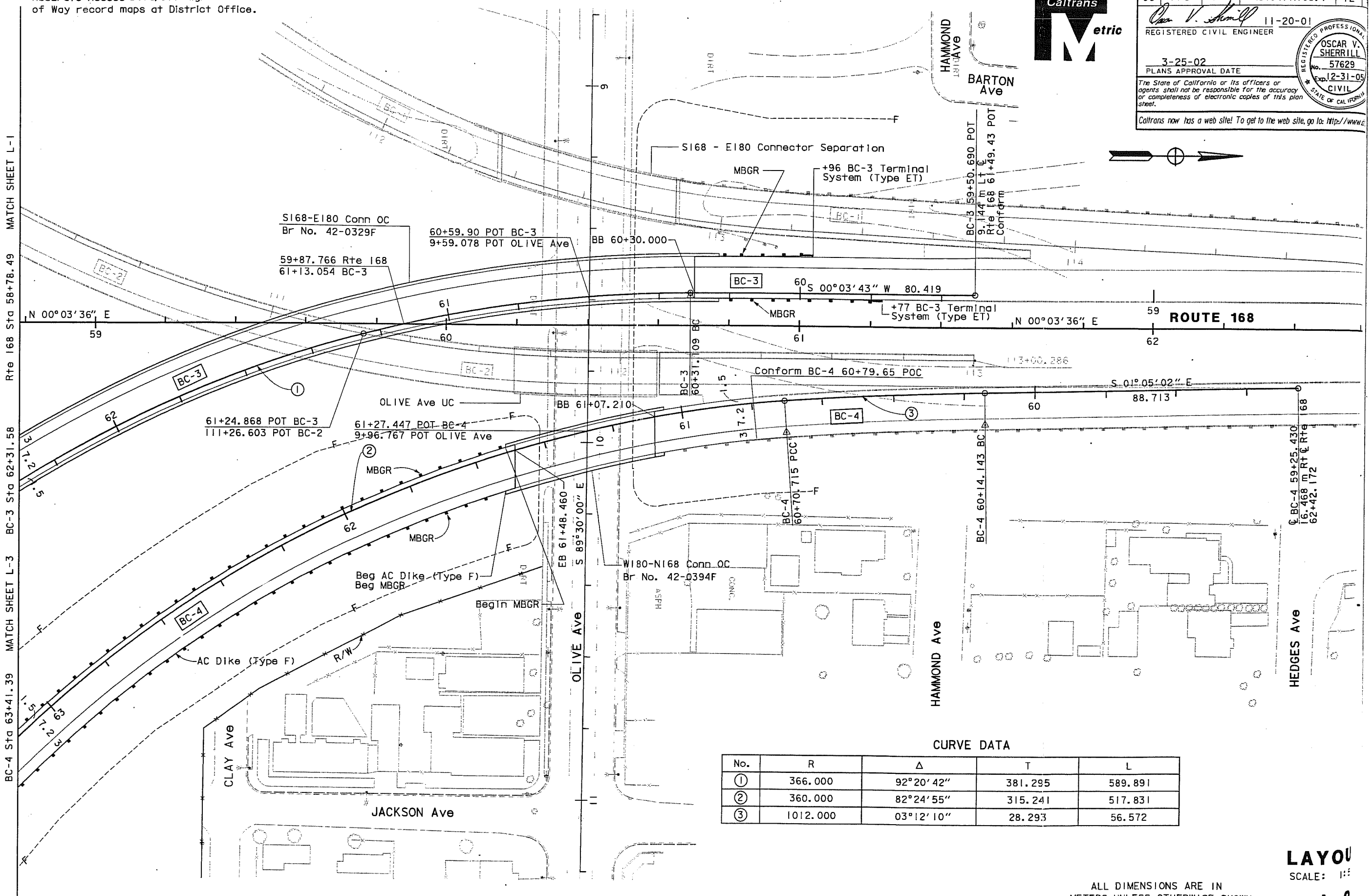
Caltrans now has a web site! To get to the web site, go to: http://www.



CURVE DATA

No.	R	Δ	T	L
1	366.000	92°20'42"	381.295	589.891
2	360.000	82°24'55"	315.241	517.831
3	1012.000	03°12'10"	28.293	56.572

LAYOU
SCALE: 1:
L-2

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

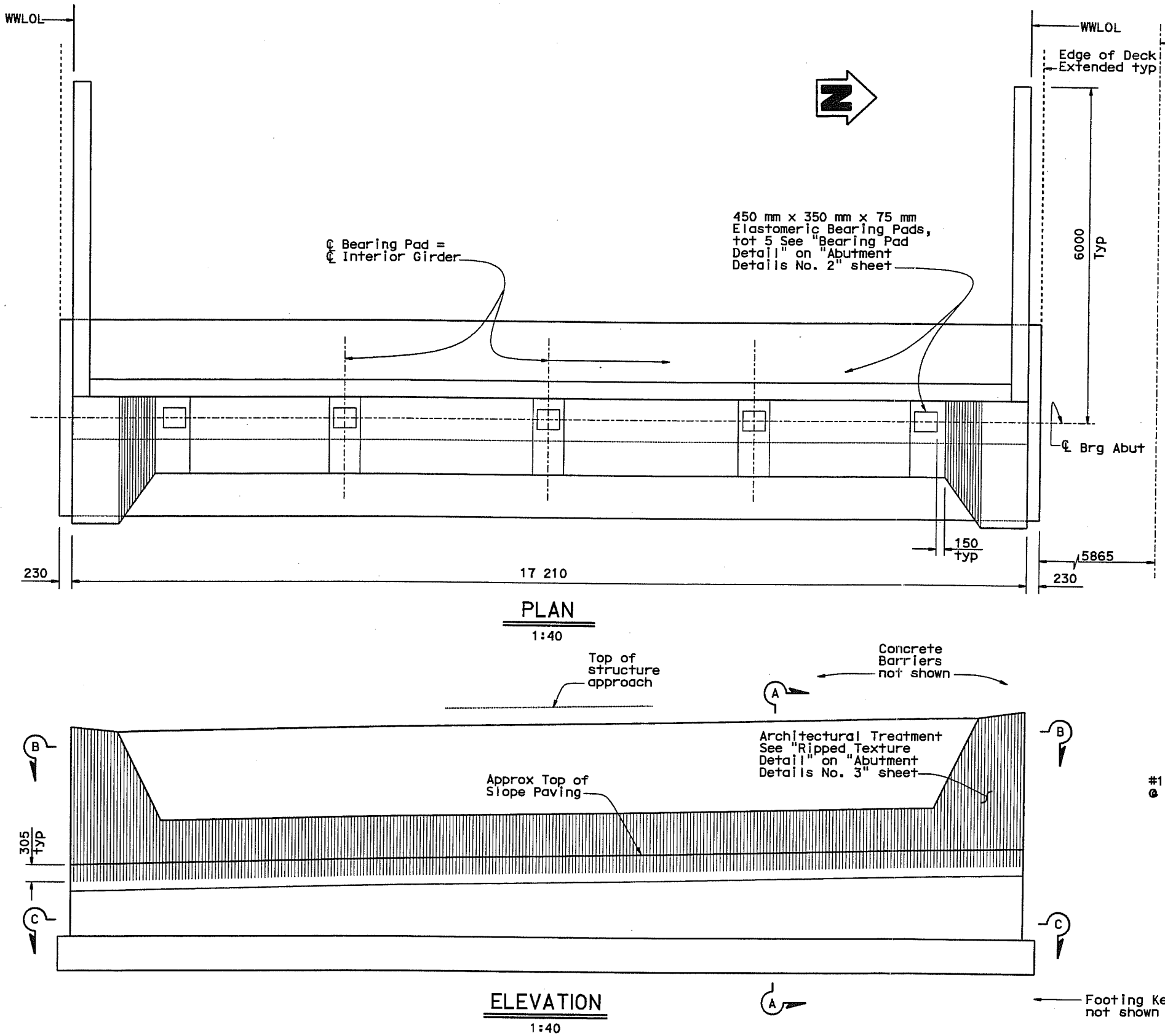
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans PROJECT DEVELOPMENT
PROJECT ENGINEER OSCAR SHERRILL
CALCULATED/DESIGNED BY
CHECKED BY
DATE
REVISED BY
DATE REVISED

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS

USERNAME => trplerce
DGN FILE => 634242e02.dgn

CU 06245

EA 342421



PLAN

1:40

ELEVATION

1:40

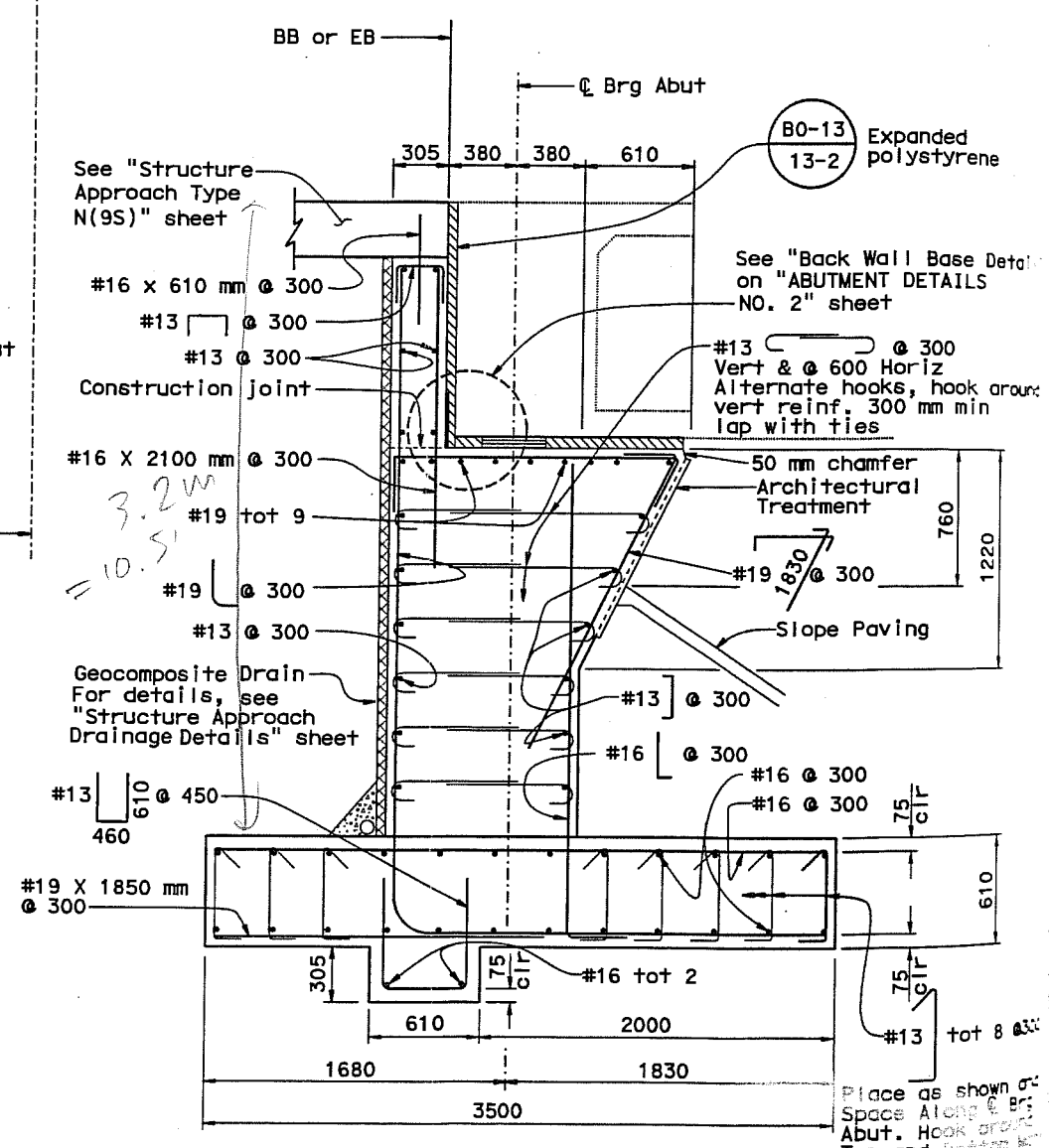
NOTES:

Details are symmetrical about ℄ Rte 180.

Abut 1 right shown
Abut 2 similar

For Sections B-B, and C-C see "Abutment Details No. 1" sheet

Place Back wall after Prestressing



SECTION A-A

1:20

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.
06	Fre	180	R97.1/R103.1	60

REGISTERED CIVIL ENGINEER — 11-28-01

PHILIP E. LUTZ No. C55831 Exp. 12-31-02 CIVIL — REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA

3-25-02
PLANS APPROVAL DATE

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42-0398

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

	BY		CHECKED	
DESIGN	B. Leon	01-01	P. Lutz	02-01
DETAILS	S. Pugh	01-01	P. Lutz	06-01
QUANTITIES	O. Rodriguez	06-01	R. Hathaway	06-01

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES
STRUCTURE DESIGN 9

BRIDGE NO. 42-0398R/L
KILOMETER POST 97.38

MAPLE AVENUE UNDERCROSSING
ABUTMENT LAYOUT

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV. 4/20/00)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

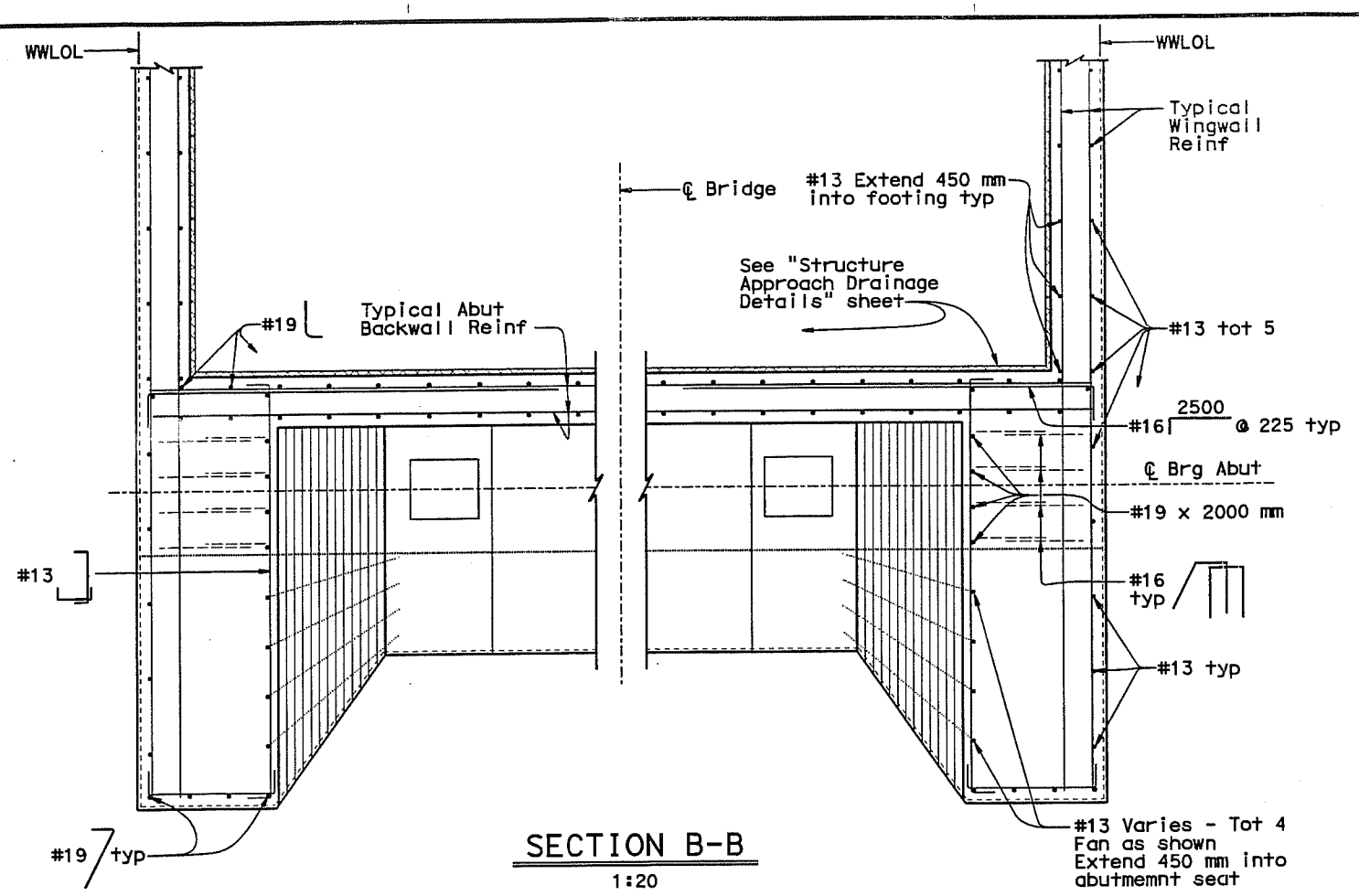
CU 06245
EA 342421

FILE => aaabt01yr.dgn

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 1-29-01 | 2-2-01 | 7-27-01 | 11-14-01

SHEET 5



SECTION B-B

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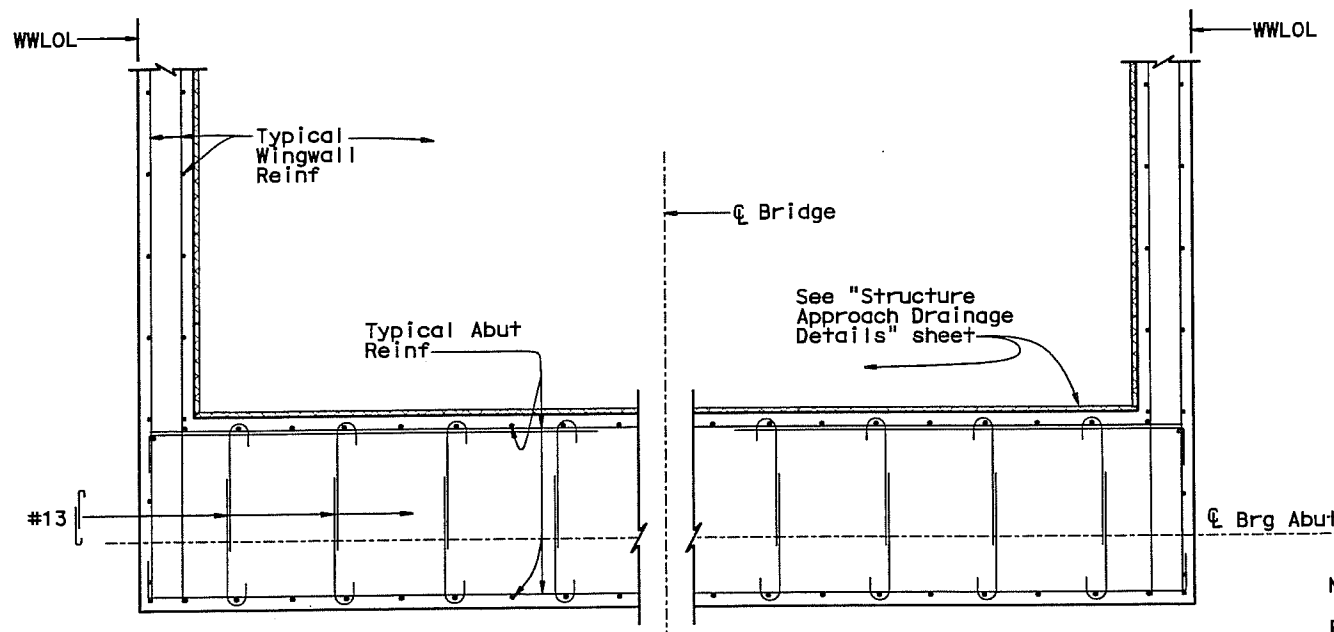


NOTE:

For details and reinforcement not shown see Section B-B

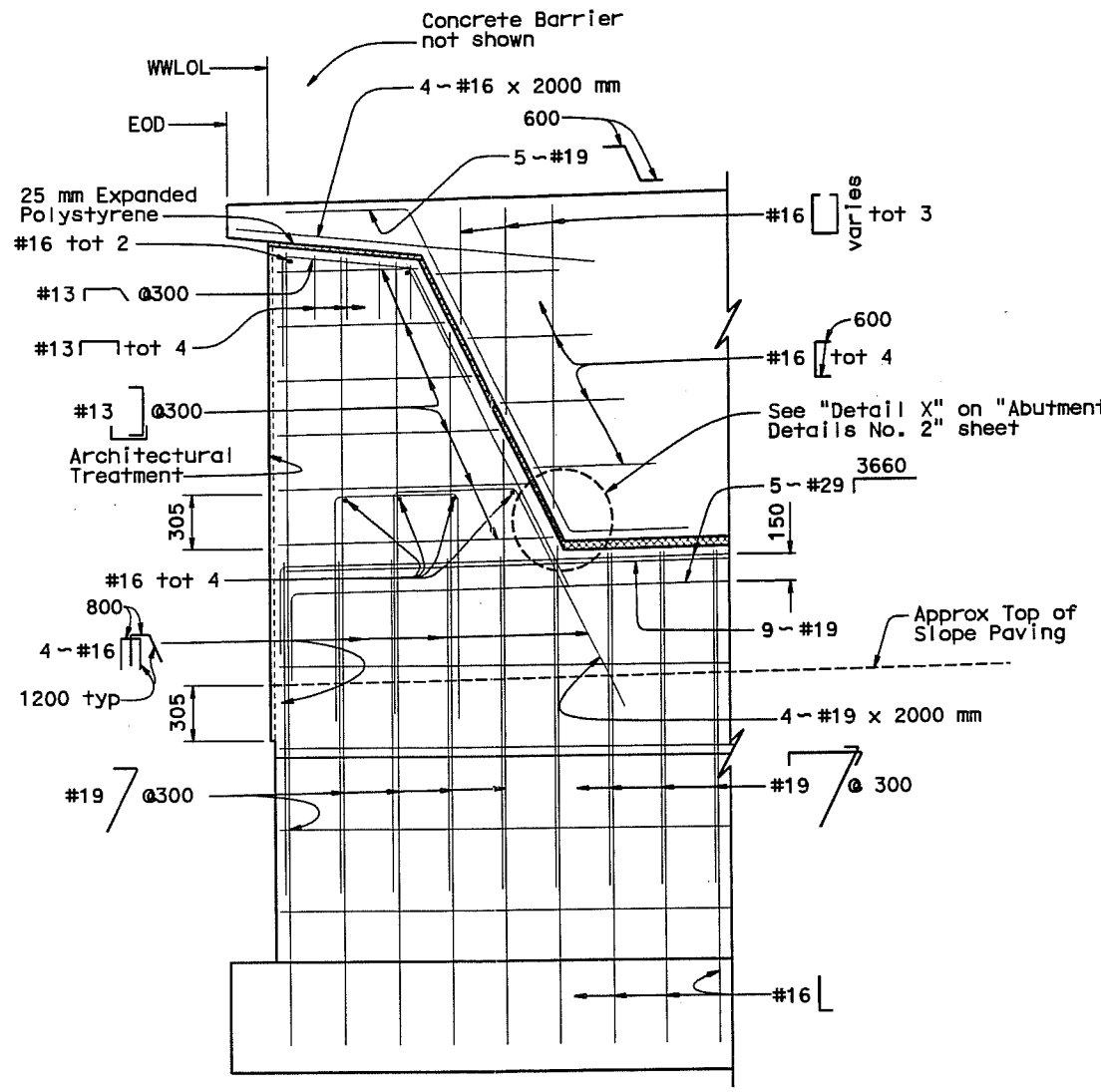
SECTION C-C

1:20

NOTE:

See Detail "X" on "Abutment Details No. 2" sheet

Details are symmetrical about ℄ Rte 180



PART ELEVATION

1:20

NOTES:

For location of Section B-B and C-C see "Abutment Layout" sheet

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
06	Fre	180	R97.1/R103.1	608	944

Caltrans Metric

REGISTERED CIVIL ENGINEER — 11-28-01

3-25-02
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — PHILIP E. LUTZ No. C55839 Exp. 12-31-04 CIVIL STATE OF CALIFORNIA

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DESIGN	B. Leon 01-01	P. Lutz 01-01	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF STRUCTURES STRUCTURE DESIGN 9
DETAILS	S. Pugh 01-01	P. Lutz 01-01		
QUANTITIES	O. Rodriguez 06-01	H. Hathaway 06-01		

BRIDGE NO. 42-0398R/L
KILOMETER POST 97.38

MAPLE AVENUE UNDERCROSSING
ABUTMENT DETAILS NO. 1

CU 06245
EA 342421
FILE => adabtdet01.dgn

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 2-4-01, 5-23-01, 10-2-01, 11-14-01

SHEET 6 OF 16

STRUCTURES DESIGN DETAIL SHEET (METRIC) REV. 4/20/00

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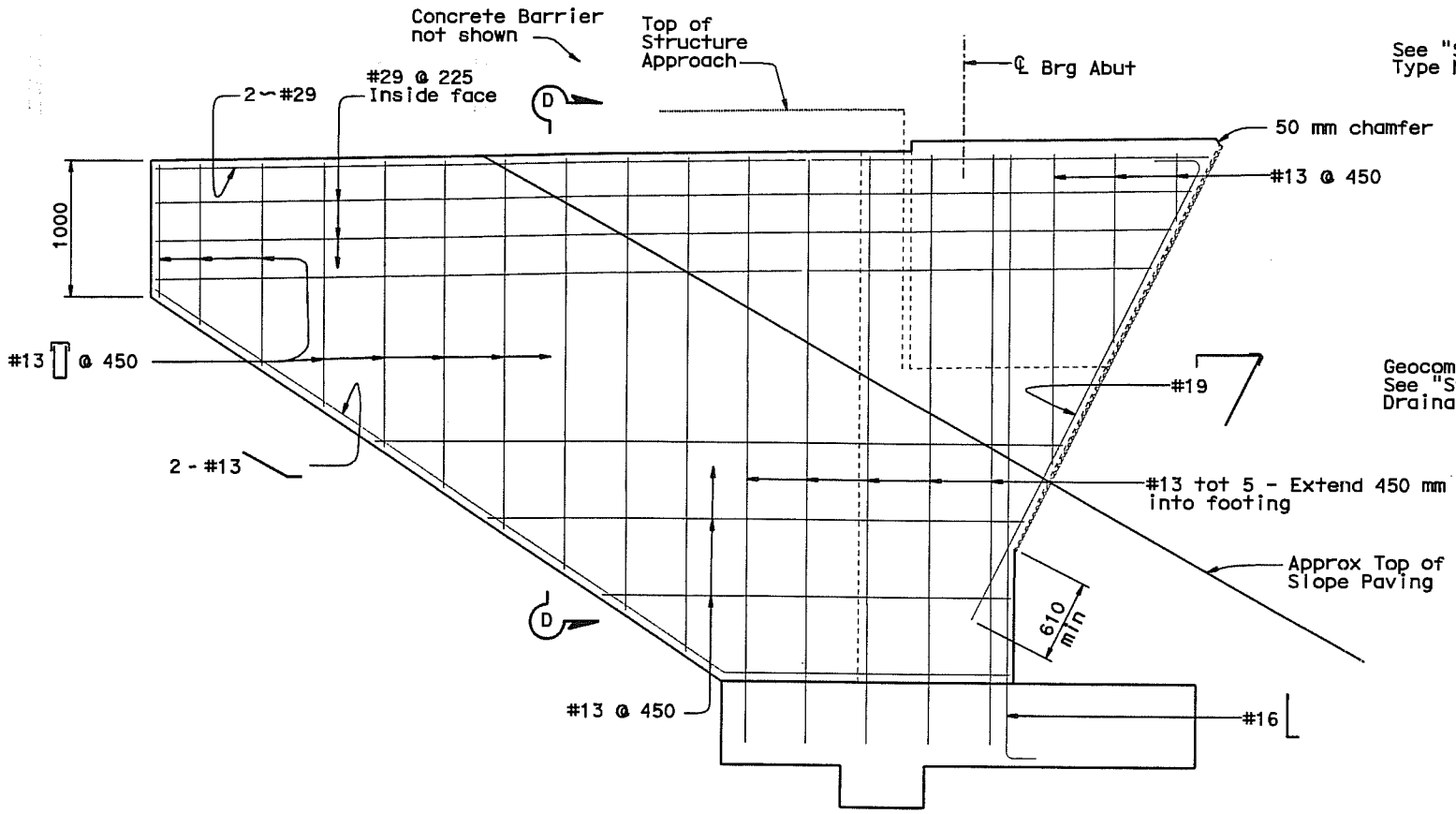
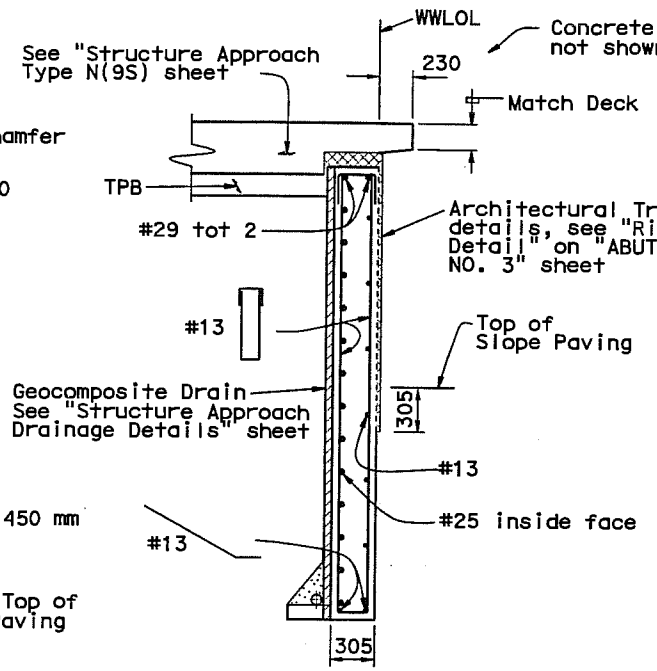
USERNAME => frdamon DATE PLOTTED => 12-APR-2002 TIME PLOTTED => 08:42



TYPICAL WINGWALL ELEVATION

1:25



SECTION D-D

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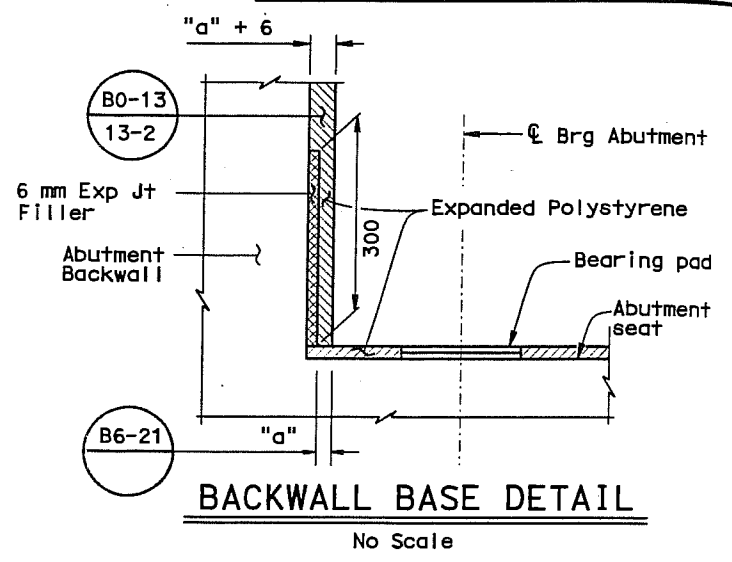
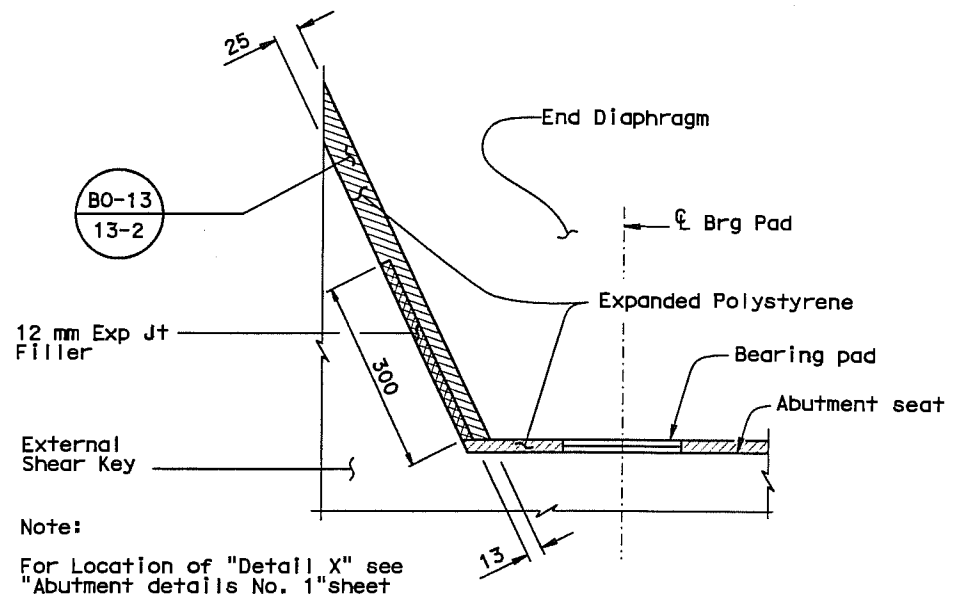


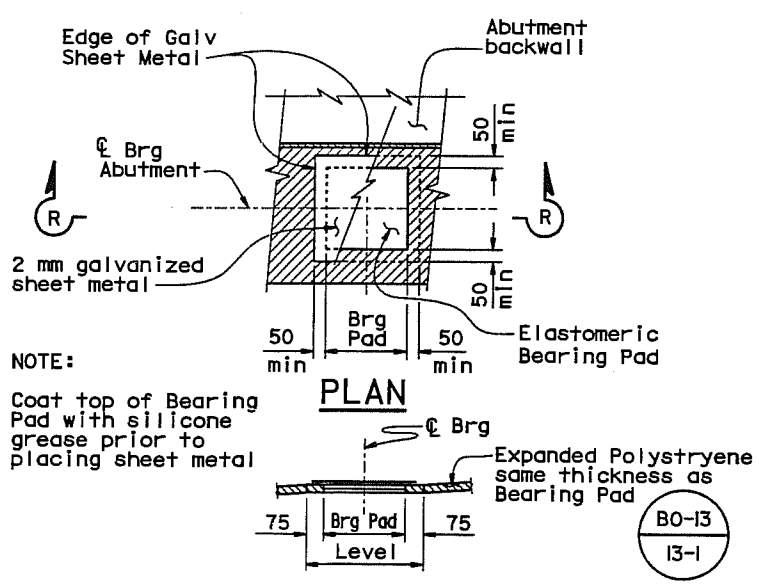
BACKWALL BASE DETAIL

No Scale



DETAIL "X"

No Scale

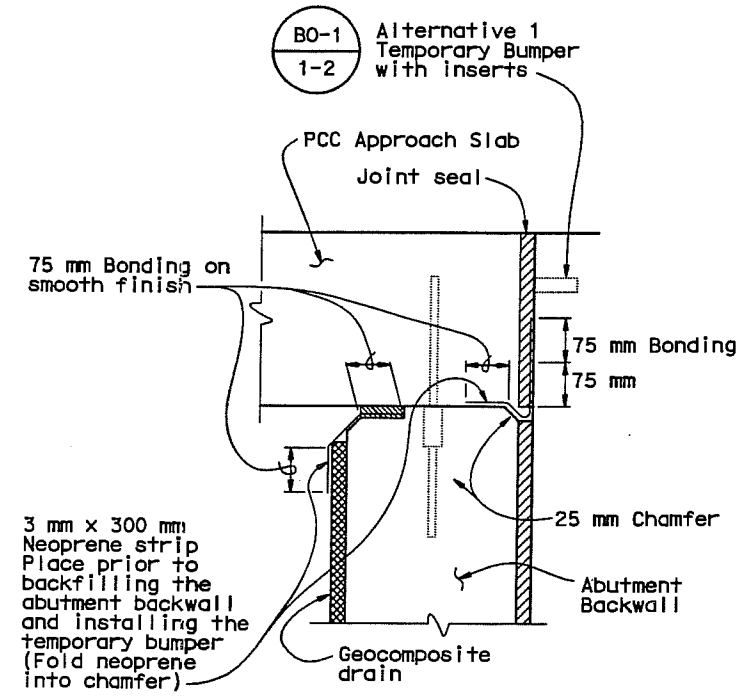


SECTION R-R

BEARING PAD DETAIL

No Scale

Details typical at all bearing pads



JOINT PROTECTION DETAIL

No Scale

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
06	Fre	180	R97.1/R103.1	609	944

Caltrans Metric

Philip E. Lutz 11-28-01
REGISTERED CIVIL ENGINEER

3-25-02
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER * PHILIP E. LUTZ * No. C55839 * Exp. 12-31-04 * CIVIL * STATE OF CALIFORNIA *

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DETAILS	S. Pugh	01-01	P. Lutz	06-01	DIVISION OF STRUCTURES STRUCTURE DESIGN 9
QUANTITIES	O. Rodriguez	06-01	M. Hathaway	06-01	

BRIDGE NO. 42-0398R/L
KILOMETER POST 97.38

MAPLE AVENUE UNDERCROSSING

ABUTMENT DETAILS NO. 2

STRUCTURES DESIGN DETAIL SHEET (METRIC) (REV. 4/20/00)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 06245
EA 342421

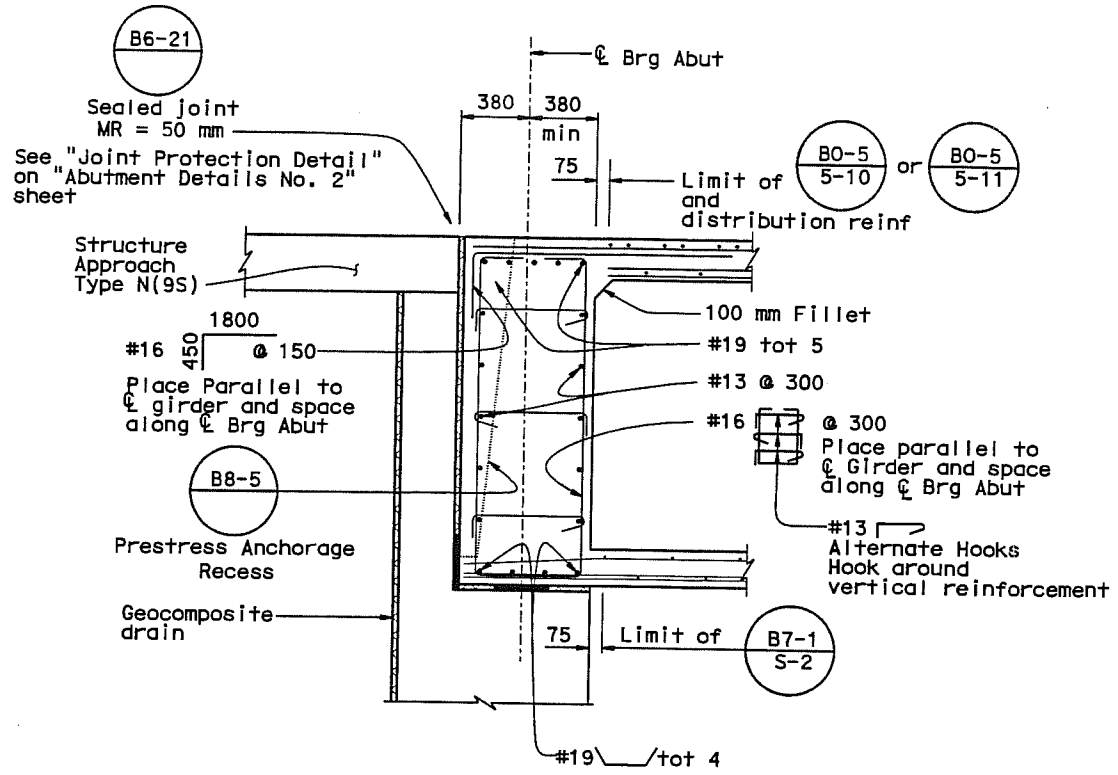
FILE => dabbtdet01.dgn

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY): 2-14-01 | 8-28-01 | 11-14-01

7

PROFESSIONAL ENGINEER
PHILIP E. LUTZ
C55839
Exp. 12-31-04
STATE OF CALIFORNIA
http://www.dot.ca.gov



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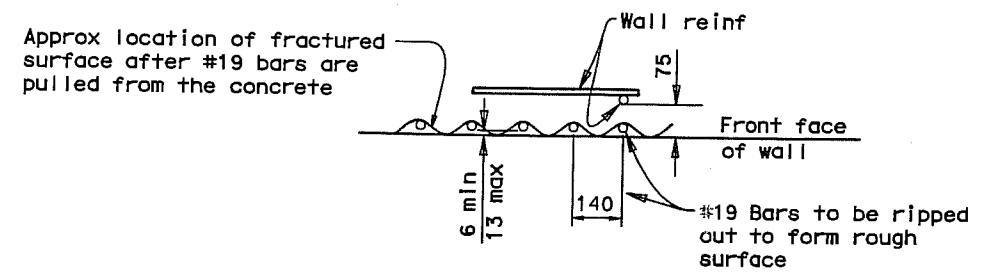

RIPPED TEXTURE DETAIL
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Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
06	Fre	180	R97.1/R103.1	610	944

Philip E Lutz 2-15-02
REGISTERED CIVIL ENGINEER

REGISTERED PROFESSIONAL ENGINEER — PHILIP E. LUTZ — No. C55839 — Exp. 12-31-04 — CIVIL — STATE OF CALIFORNIA

3-25-02
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DESIGN	BY B. Leon	01-01	CHECKED P. Lutz	02-01
DETAILS	BY S. Pugh	01-01	CHECKED P. Lutz	06-01
QUANTITIES	BY O. Rodriguez	06-01	CHECKED H. Hathaway	06-01

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES
STRUCTURE DESIGN 9

BRIDGE NO. 42-0398R/L
KILOMETER POST 97.38

CU 06245
EA 342421
FILE => ddabtdet03.dgn

ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

MAPLE AVENUE UNDERCROSSING
ABUTMENT DETAILS NO. 3

STRUCTURES DESIGN DETAIL SHEET (METRIC) REV. 4/20/00)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY)
2-14-01 | 8-28-01 | 11-14-01

SHEET 16 OF 16

DATE PLOTTED => 12-APR-2002 TIME PLOTTED => 08:43

APPENDIX B

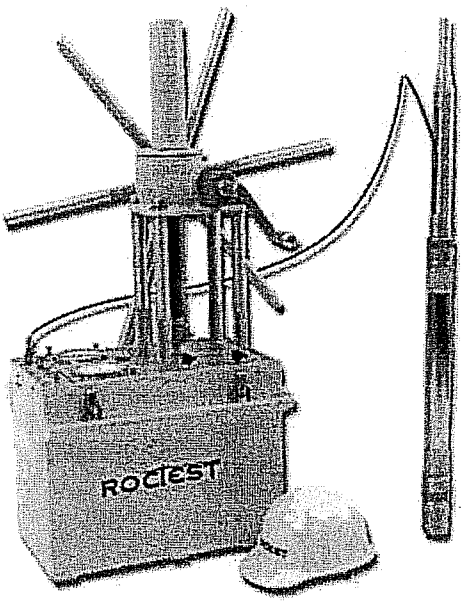
Pressuremeter Test Device

PRESSUREMETER
Model TEXAM®

APPLICATIONS

The TEXAM® pressuremeter is a reliable and economical instrument for the evaluation of most ground engineering problems. It is used to run in situ loading tests at various depths on a routine basis. The well-proven method developed by Louis Menard is utilized to interpret the test results for calculation of:

- **Bearing capacity** of shallow and deep foundations
- **Settlement** of all types of foundations
- **Deformation** of laterally loaded piles and sheet piles
- **Resistance** of anchors



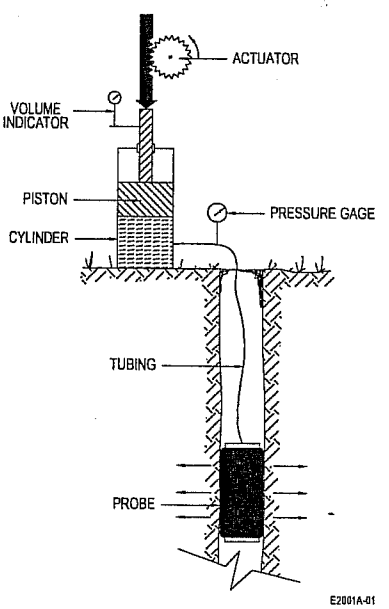
DESCRIPTION

The probe - A cylindrical hollow body fitted with inflatable sheath.

The control unit

- A metal case which houses a cylinder with piston, two pressure gages for low and maximum pressure tests, a connector for an auxiliary pressure gage, and the control valves.
- A manual actuator to operate the piston.

The tubing - A high-pressure single conduit fitted with a shut-off quick connect to keep the probe and tubing saturated.



FEATURES

- ✔ RUGGED CONSTRUCTION
- ✔ VERY SIMPLE TO OPERATE
- ✔ MEASUREMENT OF THE TOTAL VOLUMETRIC CHANGE OF THE CAVITY TO AVOID POSSIBLE ERRORS RELATED TO MEASUREMENT OF THE VARIATIONS OF DIAMETER IN ONE PLANE
- ✔ CONTROLLED RATE OF DEFORMATION
- ✔ EASY CYCLIC TESTING
- ✔ OPTIONAL EQUIPMENT IS AVAILABLE FOR:
  - CREEP TESTING
  - SELF BORING
  - AUTOMATION

TEST PROCEDURE

The probe is placed at the test depth in a pre-drilled borehole obtained by a method adapted to the soil conditions: augering, rotation with drag bit and bentonite, shelby tube driving, etc. In granular soils below the water table, the probe can be driven directly within a slotted casing.

The test is run either with a constant rate of deformation by using a uniform rate of rotation of the actuator or with equal increments of pressure as for the Menard pressuremeter test.

TEST RESULTS

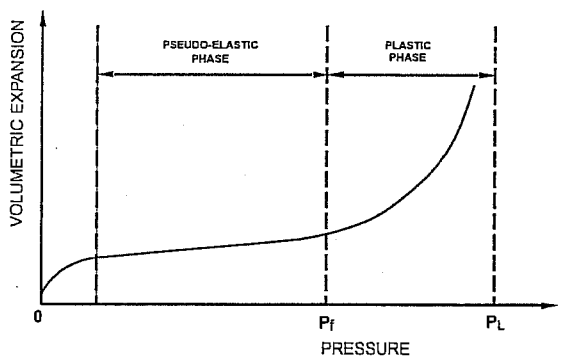
An in situ stress strain curve is obtained by plotting the injected volume versus pressure.

- The "limit pressure" = "P_L" is the pressure at which failure occurs and it reflects directly the bearing capacity:

$$Qa = (C/F) \times P_L$$

- The modulus of deformation E is used to calculate settlements and is given by:

$$E = \left((1 + \mu)\ 2V\ \Delta P\right) / \Delta V$$



SPECIFICATIONS

CONTROL UNIT	
Dimensions:	L = 52 cm W = 31 cm H = 46 cm
Weight:	30 kg
Max working pressure:	10 000 kPa (1500 psi)
Actuator capacity:	10 tons
Actuator weight:	28 kg

PROBES			
Diameter:	44 mm (AX)	60 mm (BX)	70 mm (NX)
Length:	84 cm	70 cm	70 cm
Weight:	4.5 kg	4.3 kg	6.4 kg

ACCESSORIES

- Slotted casing assembly for direct driving of the AX size probe in granular soils below the water table
- Self-boring conversion kit for the NX size probe, for the fine gravel-free soils
- Creep test kit for long term testing at constant pressure
- Automation kit for recording or direct plotting of the pressuremeter curve

Reference: *"The TEXAM pressuremeter" by J.-L. Briaud, L. Babb and J.-F. Capelle. Geotechnical Testing journal of the American Society for Testing and Materials. July 1983.*

Products and specifications are subject to change without notice.
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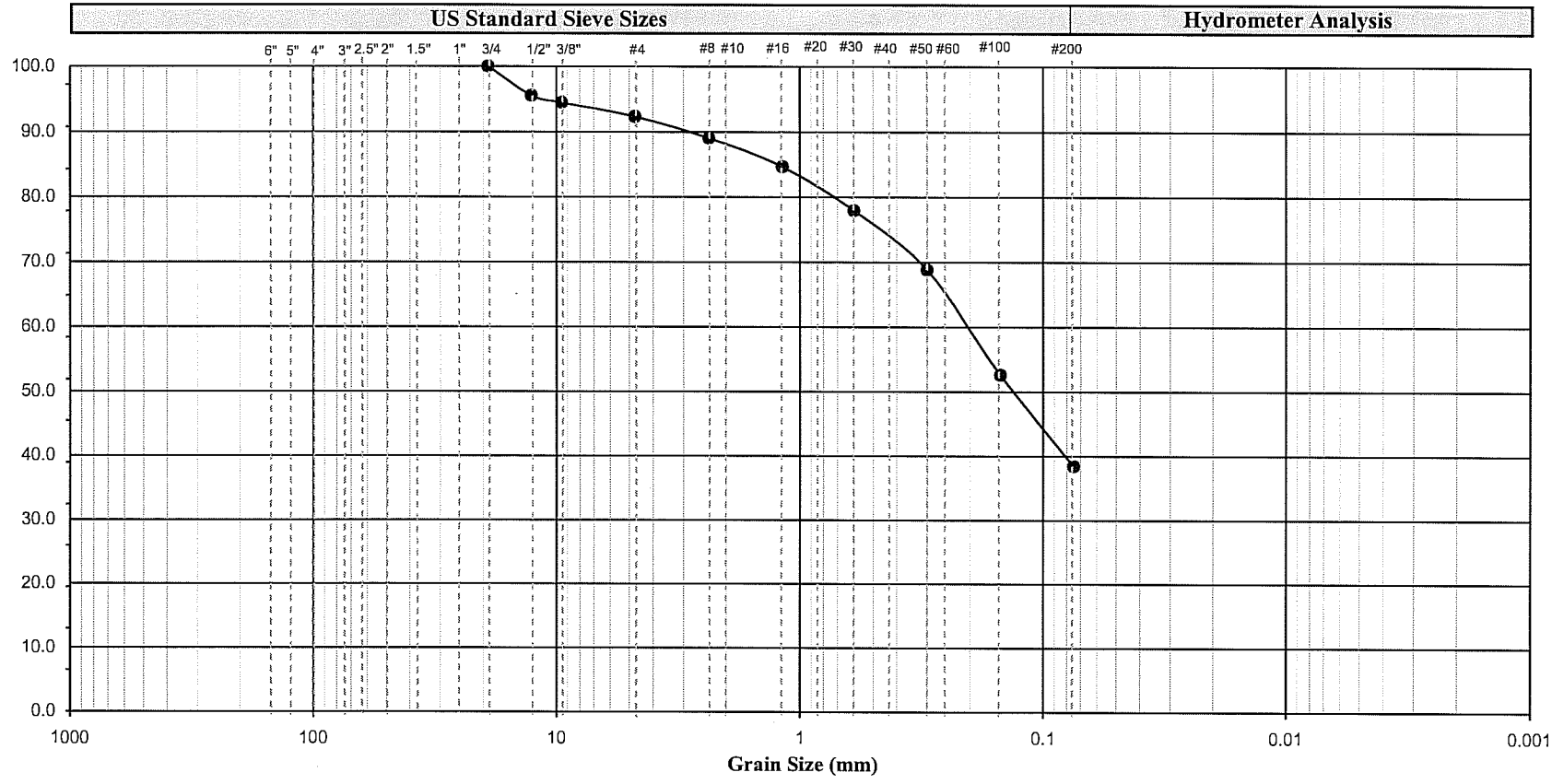
APPENDIX C

Laboratory Test Results



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

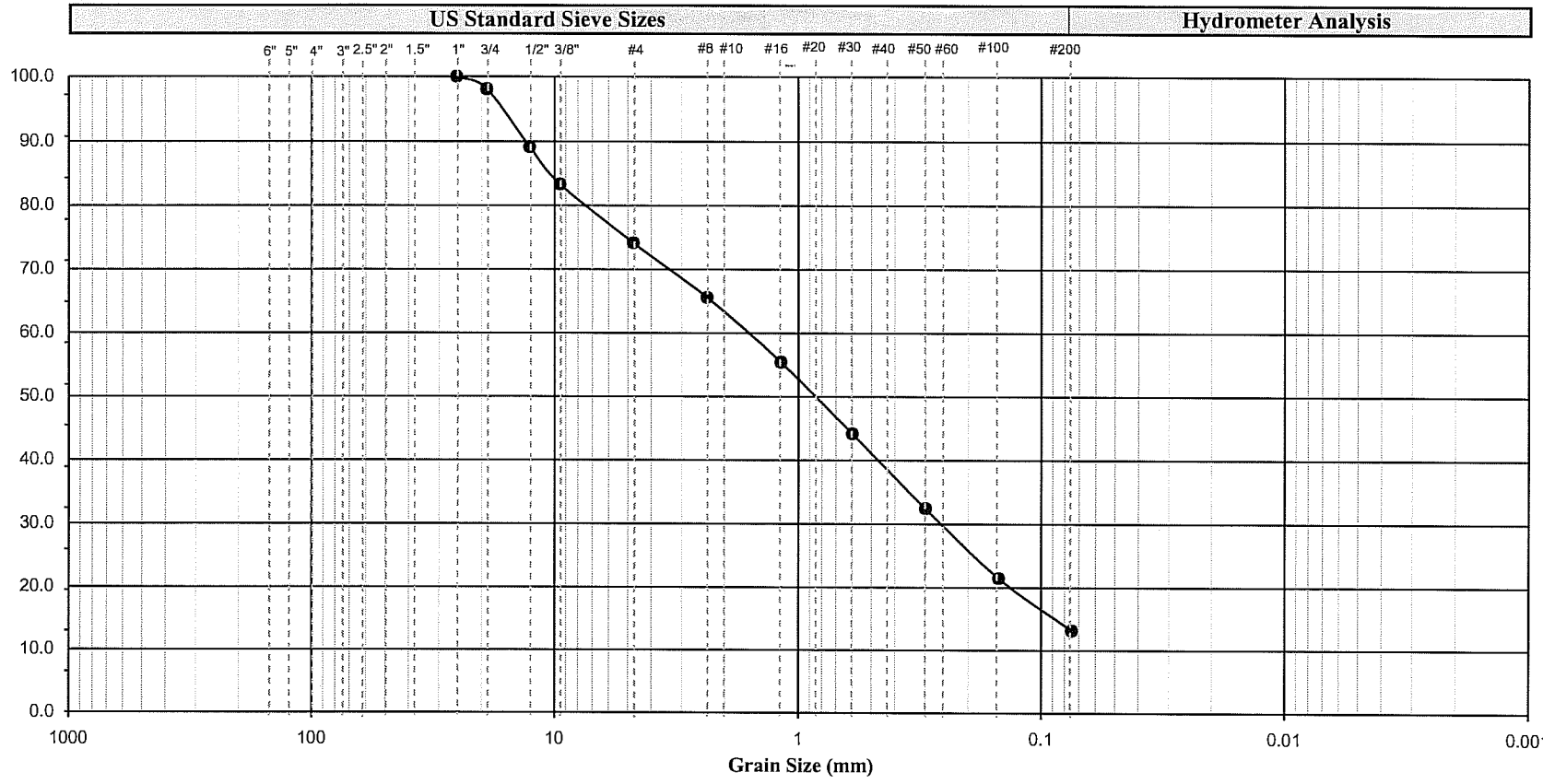
Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	04-6	D-2	5.0	6.5	1.53	1.98	Gray	Clayey sand	SC
Remark									

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

UCSD / Abutment Research

Project No. : *02-165* **Date :** *10/04/04*

GRAIN SIZE ANALYSIS
(ASTM D-422-63)



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	04-6	B-0	0.0	1.5	0.00	0.46	Brown	Silty sand with gravel	SM
Remark									

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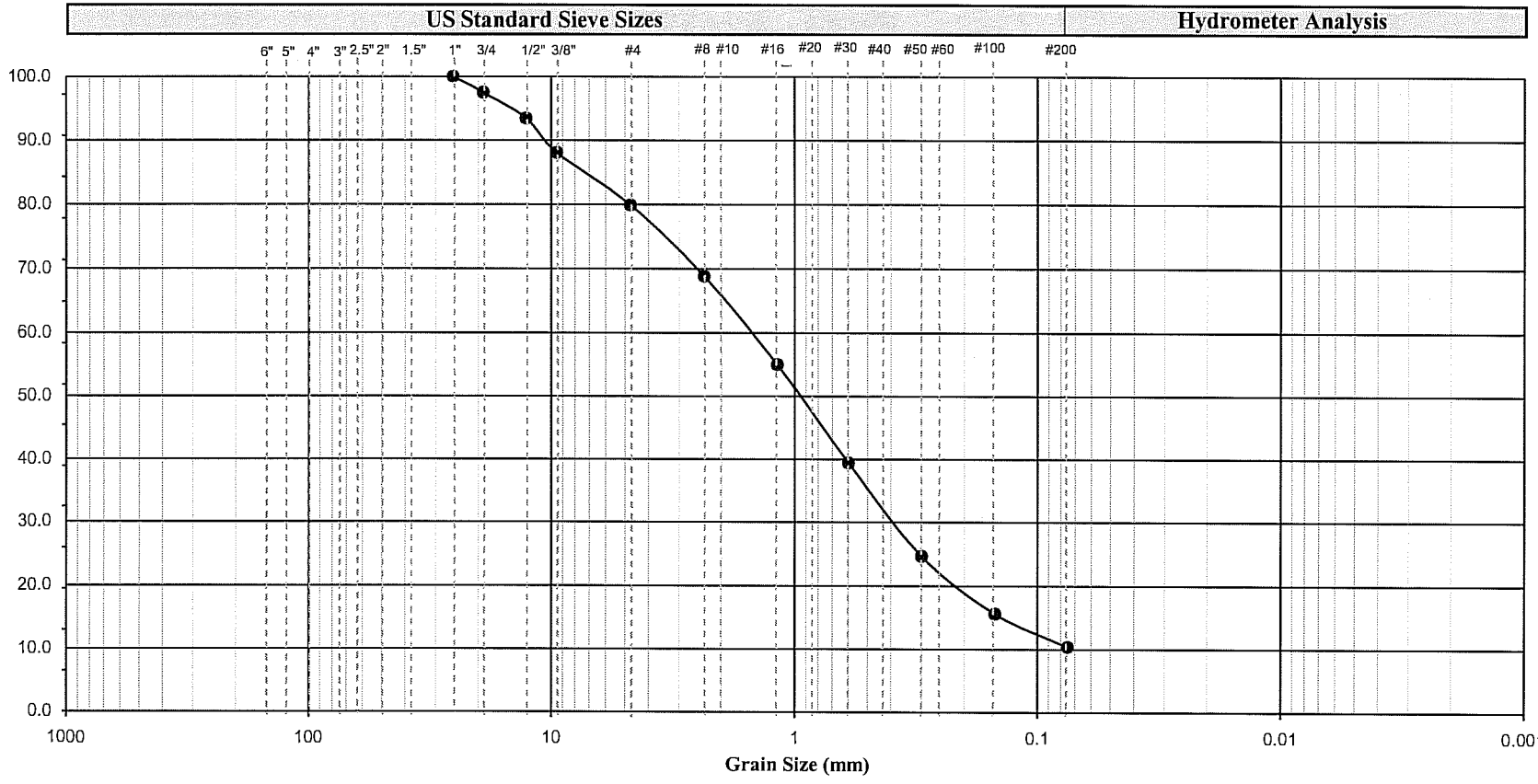
UCSD / Abutment Research

Project No. : *02-165* **Date :** *10/04/04*

GRAIN SIZE ANALYSIS
(ASTM D-422-63)



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	04-22	B-0	0.0	1.5	0.00	0.46	Olive Brown	Well graded sand with silt with gravel	SW-SM
Remark									

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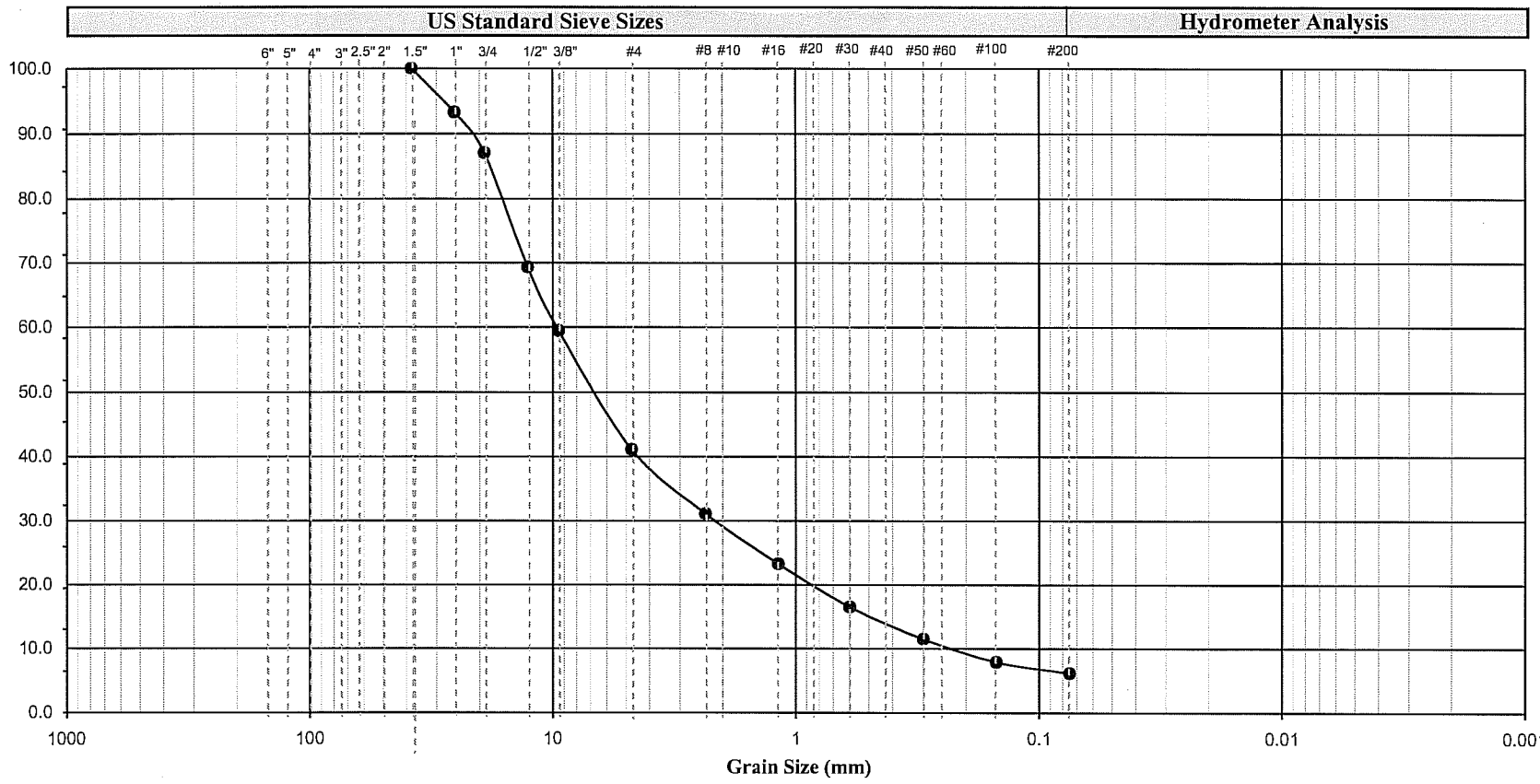
Project No. : *02-165* **Date :** *10/04/04*

GRAIN SIZE ANALYSIS
(ASTM D-422-63)



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	04-15A	B-0	0.0	1.5	0.00	0.46	Olive Brown	Well graded gravel with silt and sand	GW-GM
Remark	Plenty of A/C chips and grinds < 3/8"								

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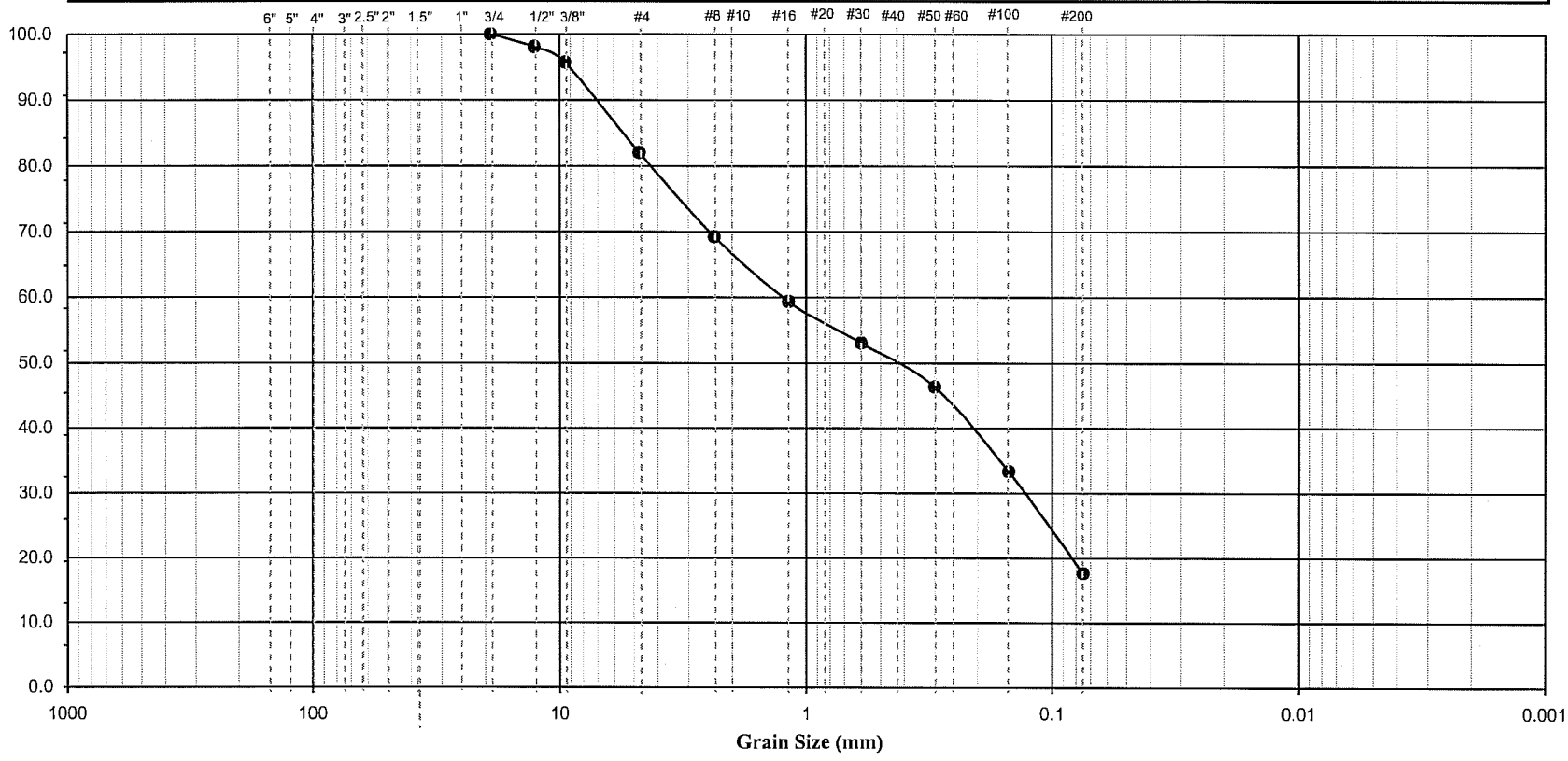
GRAIN SIZE ANALYSIS
(ASTM D-422-63)



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	04-17A	B-0	0.0	1.5	0.00	0.46	Dark Brown	Silty sand with gravel	SM
Remark									

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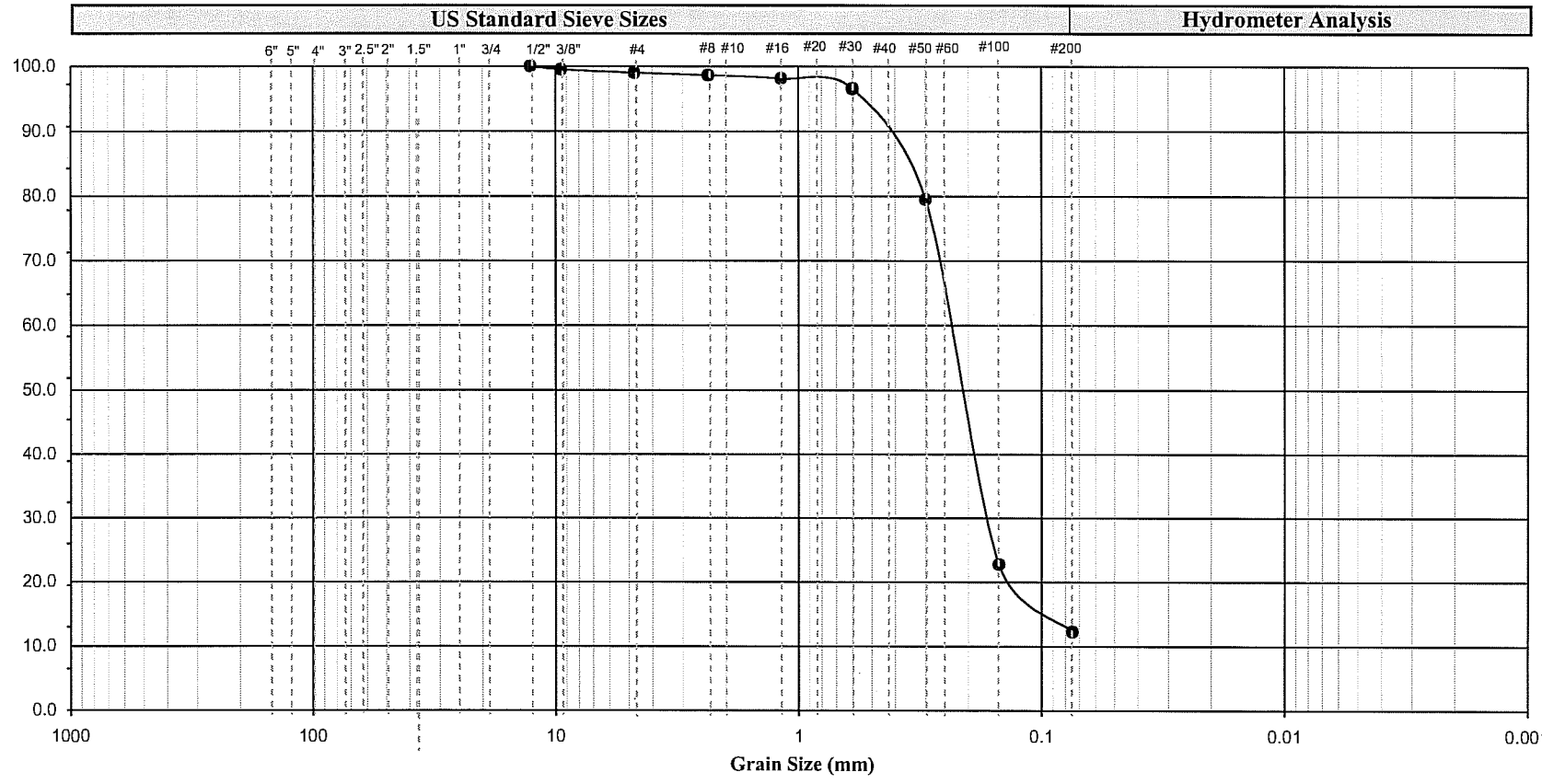
Project No. : 02-165 Date : 10/04/04

GRAIN SIZE ANALYSIS
(ASTM D-422-63)



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	04-19	B-0	0.0	1.5	0.00	0.46	Olive Brown	Poorly graded sand with silt	SP-SM
Remark	Wealy Cemented Sand Stone Nods > #30								

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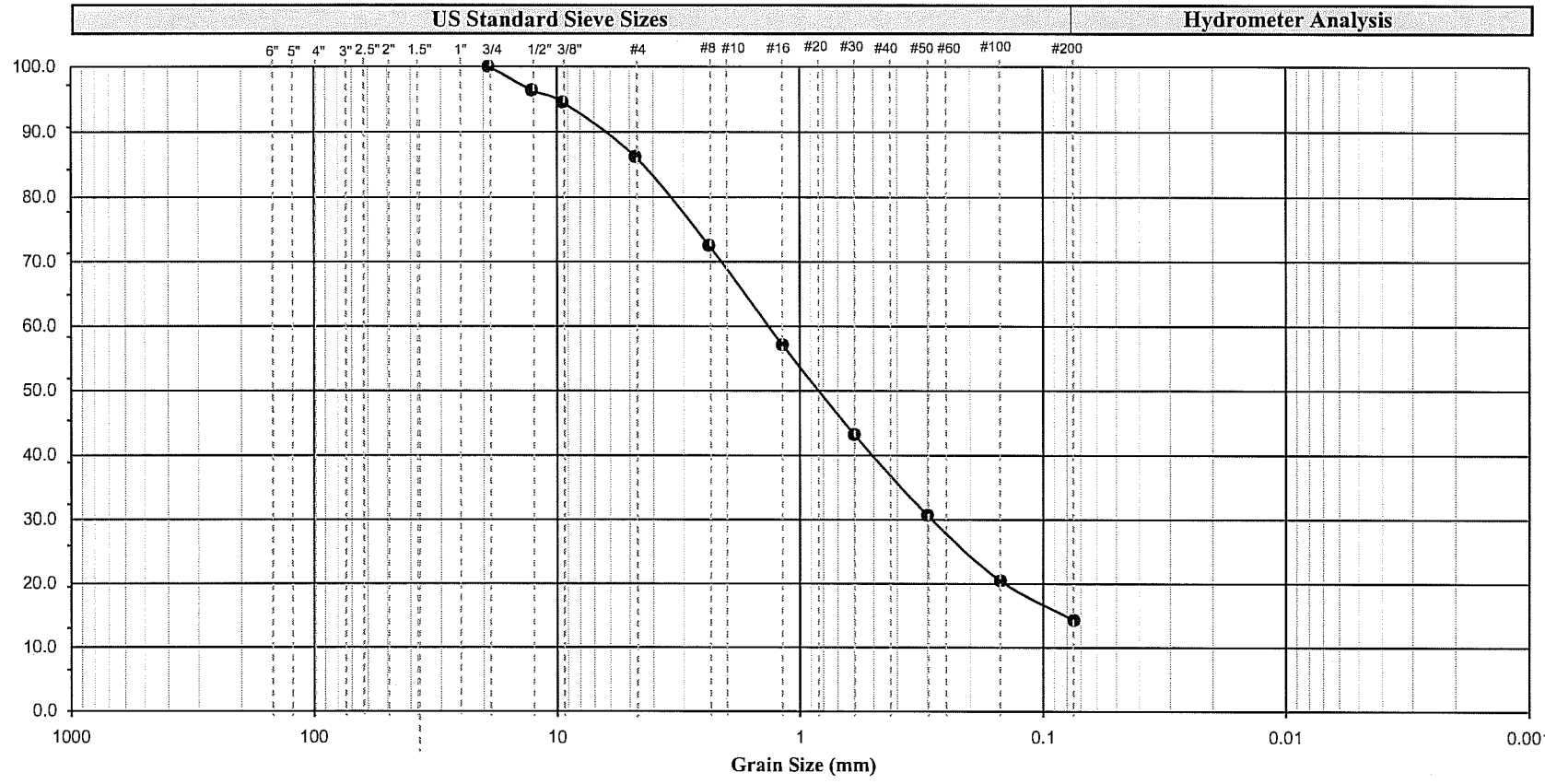
GRAIN SIZE ANALYSIS
(ASTM D-422-63)



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	04-20	B-0	0.0	1.5	0.00	0.46	Brown	Silty sand	SM
Remark	Abundent Mica								

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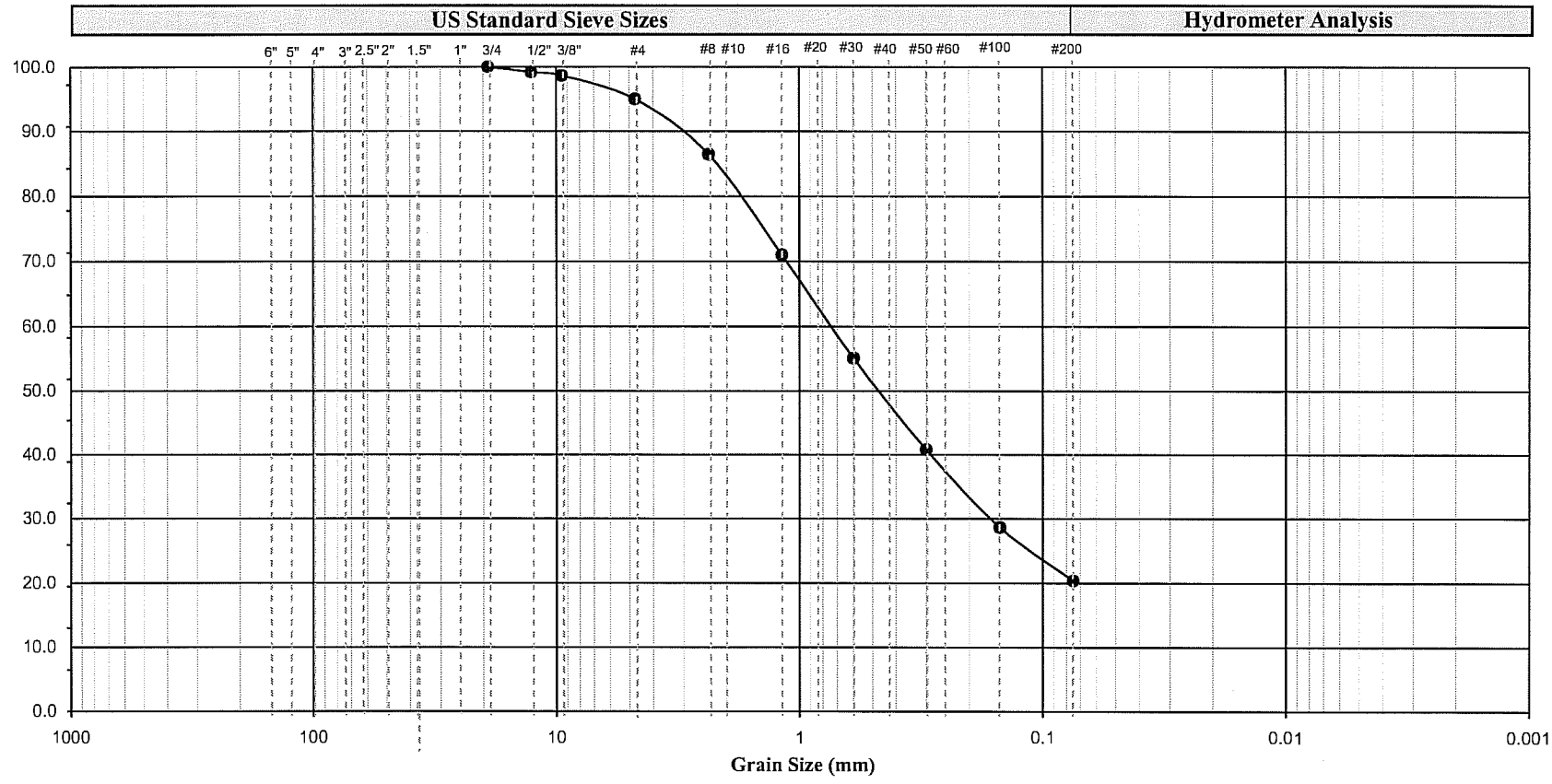
Project No. : *02-165* **Date :** *10/04/04*

GRAIN SIZE ANALYSIS
(ASTM D-422-63)



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	04-21	B-0	0.0	1.5	0.00	0.46	Brown	Silty sand	SM
Remark									

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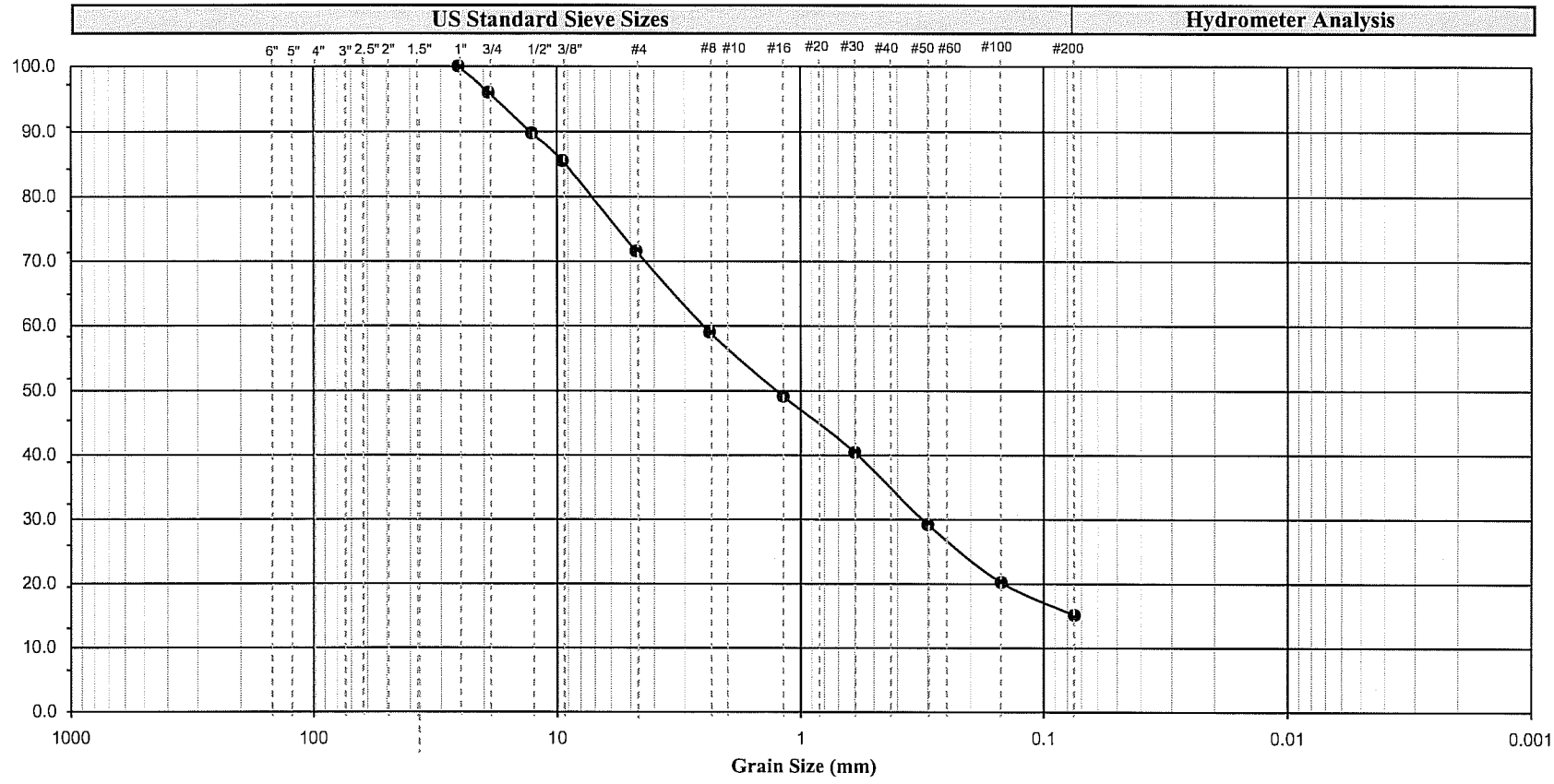
Project No. : *02-165* **Date :** *10/04/04*

GRAIN SIZE ANALYSIS
(ASTM D-422-63)



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	04-1	B-0	0.0	1.5	0.00	0.46	Olive	Silty sand with gravel	SM

Remark: Plenty of A/C Chunks and Grinds between 3/8" and #100

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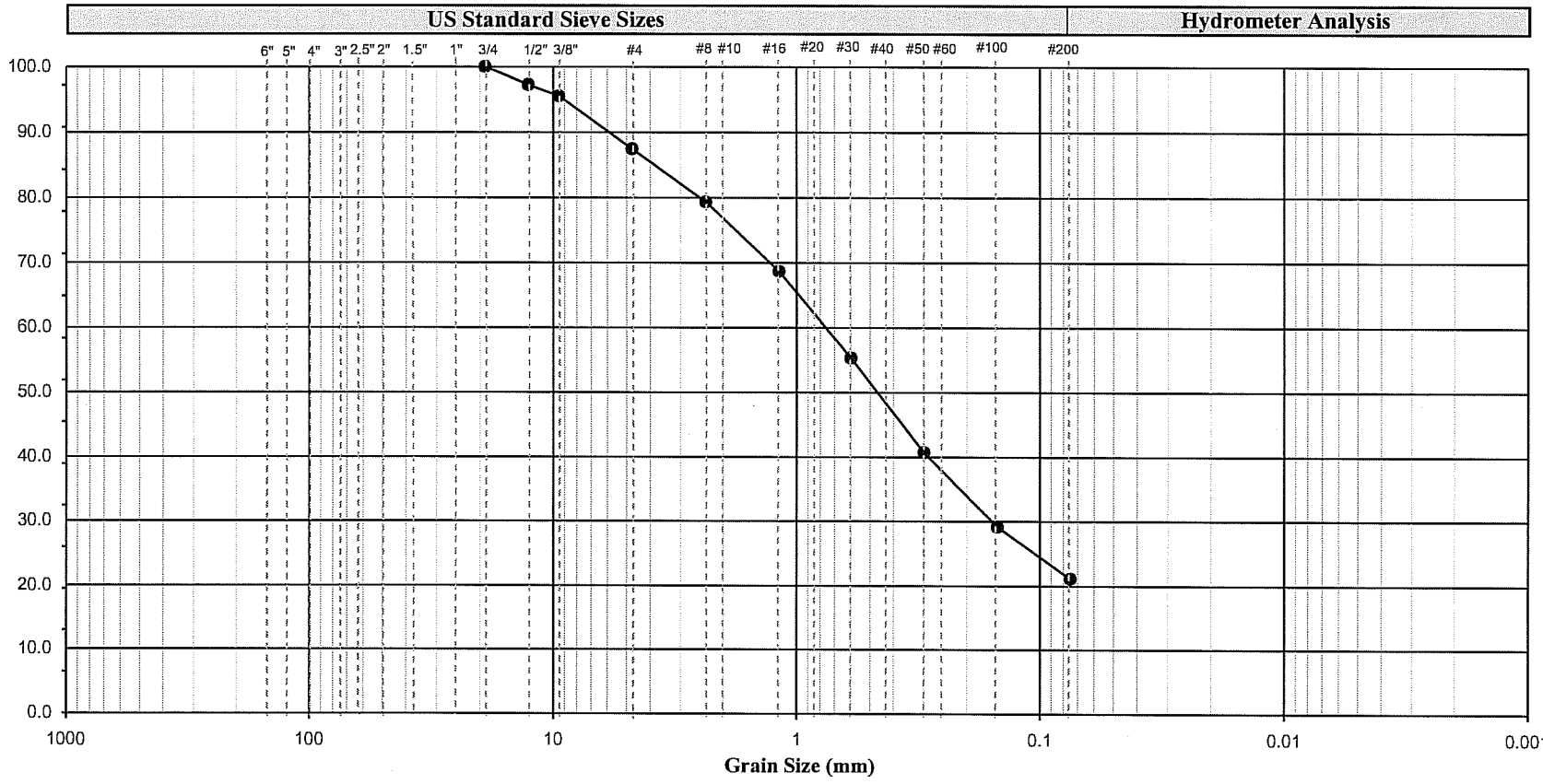
Project No. : 02-165

Date : 10/04/04

GRAIN SIZE ANALYSIS
(ASTM D-422-63)



Cobbles	Gravel		Sand			Silt or Clay
	Coarse	Fine	Coarse	Medium	Fine	

Symbol	Boring Number	Sample Number	Depth (ft)		Depth (m)		Soil Color	Soil Description	U.S.C.S.
●	04-23	2	5.0	6.5	1.53	1.98	Brown	Silty sand	SM
Remark									

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Geotechnical and Earthquake Engineering

UCSD / Abutment Research

Project No. : *02-165* **Date :** *11/03/04*

GRAIN SIZE ANALYSIS
(ASTM D-422-63)

JOB NAME : EMI / UCSD

JOB NUMBER: EMI#02--165

SAMPLE NUMBER : 04-1 @ 0 - 5'

TESTED BY : RMC

SAMPLE LOCATION : -

DATE : 22-Sep-04

SAMPLE DESCRIPTIONS/CLASSIFICATION : DK. BROWN SILTY SAND WITH GRAVEL (SM)

TEST STANDARD	ASTM D-698 - 00			**ASTM D-1557- 02**		
METHOD	A	B	C	**A**	B	C
TRIAL NUMBER	1	2	3	4	5	
WATER ADDED (ML)	50	100	150	200		
WT. SOIL + MOLD (GMS)	3904	4029	4093	4059		
WT.OF MOLD (GMS)	2018	2018	2018	2018		
WT. OF WET SOIL (GMS)	1886	2011	2075	2041		
WET DENSITY (PCF)	124.7	133.0	137.2	135.0		
CAN NUMBER	R3	R4	R5	R8		
WET SOIL + TARE (GMS)	699.83	654.01	688.67	708.37		
DRY SOIL + TARE (GMS)	678.55	626.72	649.77	659.77		
TARE (GMS)	188.26	188.81	188.09	188.27		
DRY SOIL (GMS)	490.29	437.91	461.68	471.50		
WATER (GMS)	21.28	27.29	38.90	48.60		
MOISTURE CONTENT (%)	4.3	6.2	8.4	10.3		
DRY DENSITY (PCF)	119.5	125.2	126.6	122.4		

DIAMETER OF MOLD: 4 In.

VOLUME OF MOLD: 0.0333 Cu.Ft.

SCALPED ON SIEVE SIZE/NO.: #4

PERCENT RETAINED,(%) : 25.0

MAXIMUM DRY DENSITY: 127.0 Pcf.

OPT. MOIST. CONTENT : 8.0 %

FOR OVERSIZE CORRECTION (ASTM D4718):

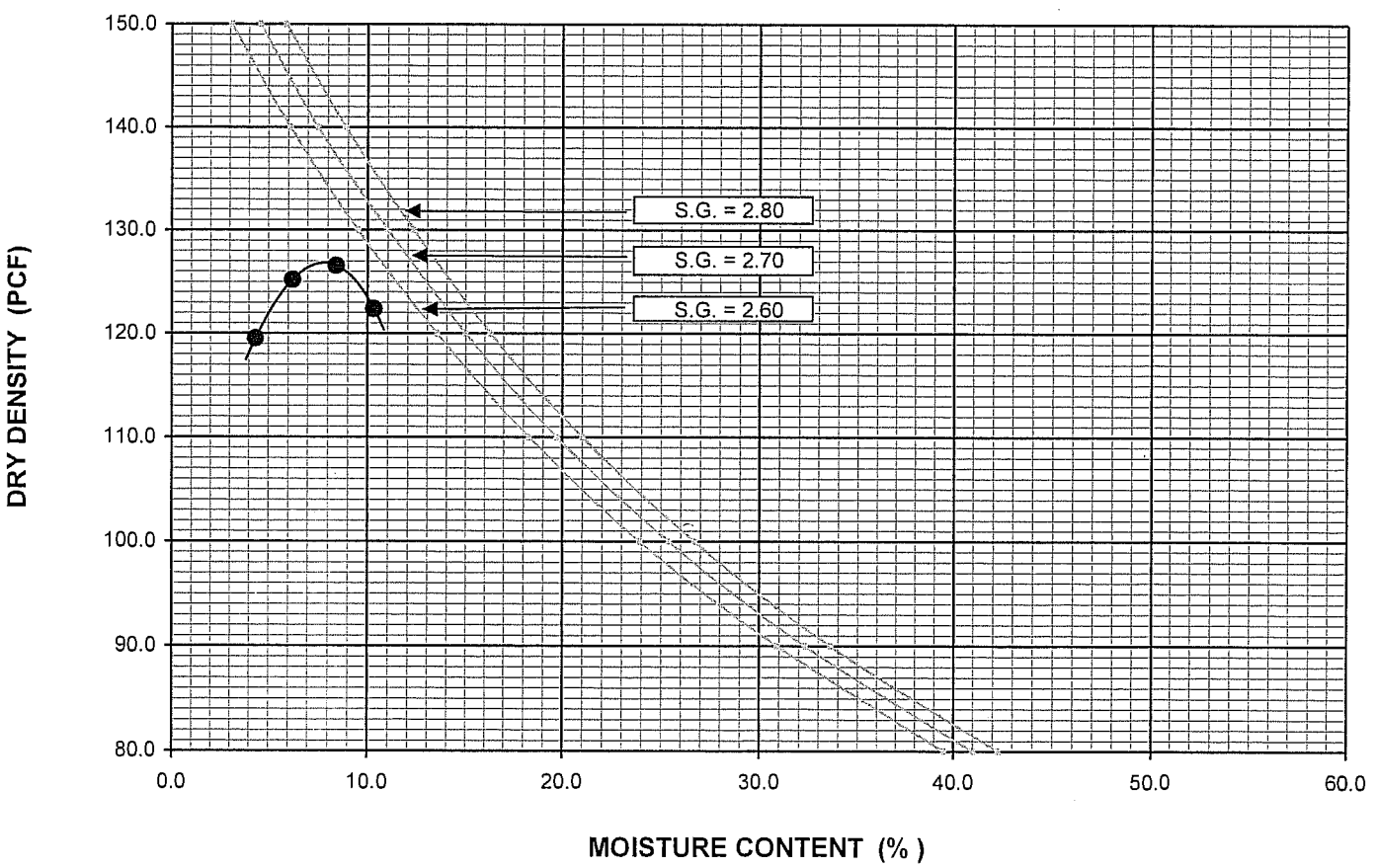
%,Finer Fraction = 75.0 % Moisture = 2.20

%,Oversize Fraction = 25.0 Assumed Sp.Gr. 2.64

Corrected MDD of Total Materials,(PCF) = **134.7**

Corrected OMC of Total Materials, (%) = **6.0**

REMARKS : "SAMPLE NOT SUFFICIENT FOR METHOD C"



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MAXIMUM DENSITY TEST

JOB NAME :	EMI / UCSD	JOB NUMBER:	EMI#02-165
SAMPLE NUMBER :	04-7 @ 0 - 5'	TESTED BY :	RMC
SAMPLE LOCATION :	-	DATE :	22-Sep-04

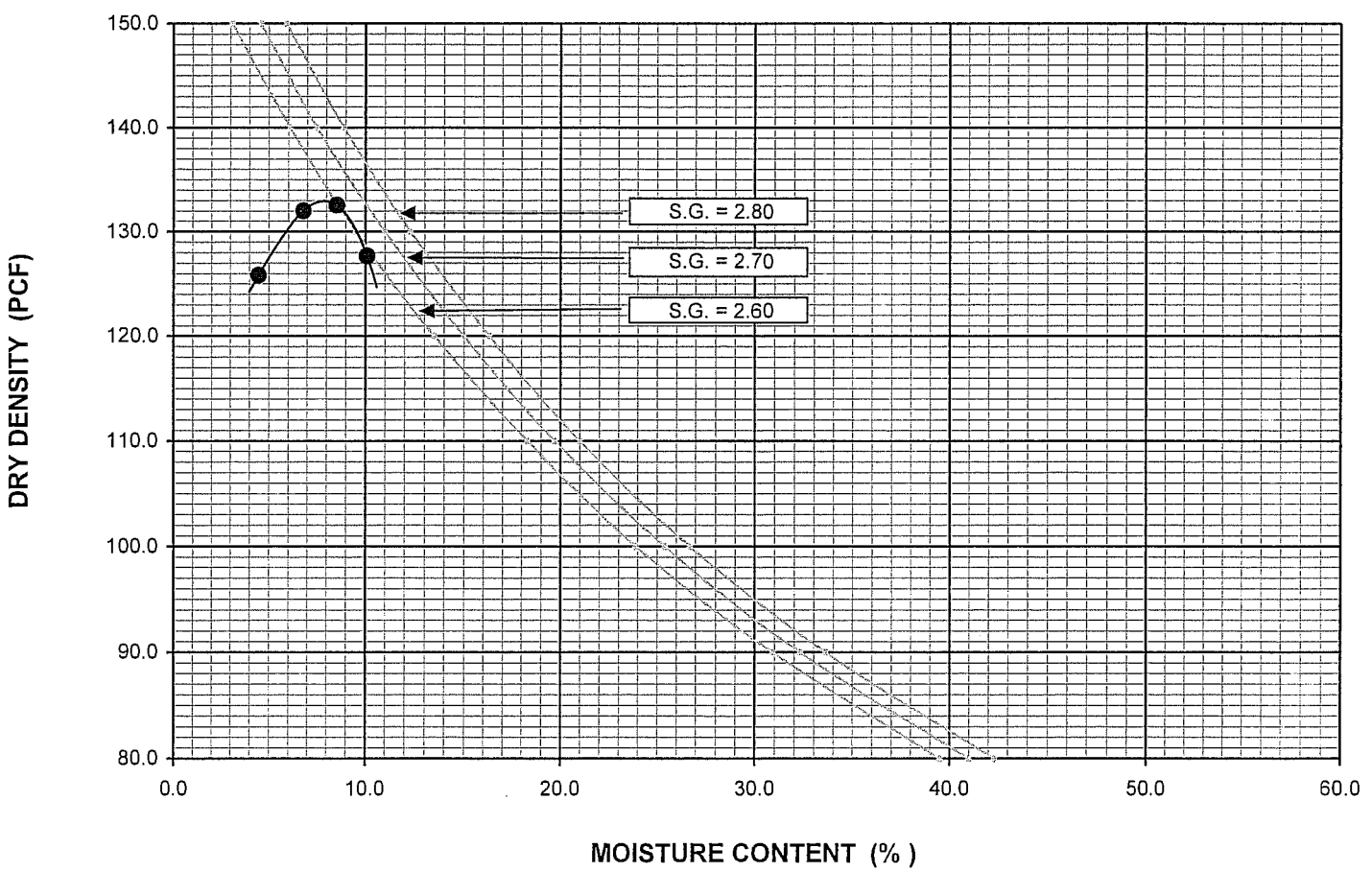
SAMPLE DESCRIPTIONS/CLASSIFICATION : BROWN SILTY SAND WITH GRAVEL & CLAY (SM/SC)

TEST STANDARD	ASTM D-698 - 00			**ASTM D-1557- 02**		
METHOD	A	B	C	**A**	B	C
TRIAL NUMBER	1	2	3	4	5	
WATER ADDED (ML)	-	-	-	0		
WT. SOIL + MOLD (GMS)	4006	4150	4193	4143		
WT.OF MOLD (GMS)	2018	2018	2018	2018		
WT. OF WET SOIL (GMS)	1988	2132	2175	2125		
WET DENSITY (PCF)	131.5	141.0	143.8	140.5		
CAN NUMBER	R9	R14	R7	R15		
WET SOIL + TARE (GMS)	777.09	737.59	766.98	774.99		
DRY SOIL + TARE (GMS)	751.89	702.39	721.50	721.31		
TARE (GMS)	188.66	185.13	188.56	188.85		
DRY SOIL (GMS)	563.23	517.26	532.94	532.46		
WATER (GMS)	25.20	35.20	45.48	53.68		
MOISTURE CONTENT (%)	4.5	6.8	8.5	10.1		
DRY DENSITY (PCF)	125.9	132.0	132.5	127.7		

DIAMETER OF MOLD: 4 In.
VOLUME OF MOLD: 0.0333 Cu.Ft.
SCALPED ON SIEVE SIZE/NO.: #4
PERCENT RETAINED,(%) : 2.3
MAXIMUM DRY DENSITY: 133.0 Pcf.
OPT. MOIST. CONTENT : 8.0 %

FOR OVERSIZE CORRECTION (ASTM D4718):
%,Finer Fraction = 97.7 % Moisture = 10.10
%,Oversize Fraction = 2.3 Assumed Sp.Gr. 2.64
Corrected MDD of Total Materials,(PCF) = **133.6**
Corrected OMC of Total Materials, (%) = **7.8**

REMARKS :



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MAXIMUM DENSITY TEST

JOB NAME :	EMI / UCSD	JOB NUMBER:	EMI#02-165
SAMPLE NUMBER :	04-9 @ 0 - 5'	TESTED BY :	RMC
SAMPLE LOCATION :	-	DATE :	23-Sep-04

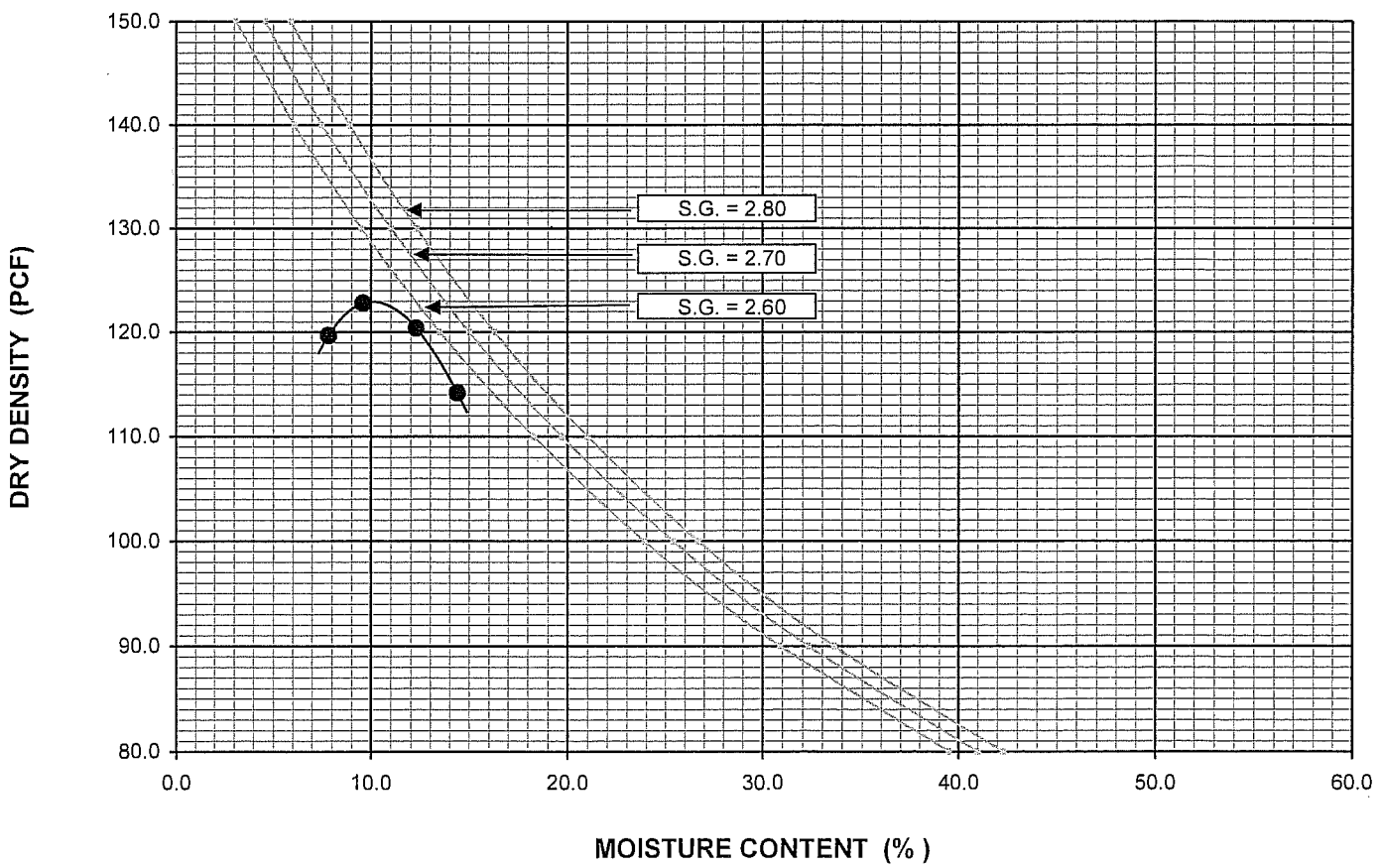
SAMPLE DESCRIPTIONS/CLASSIFICATION : GRAYISH BROWN SILTY SAND (SM)

TEST STANDARD	ASTM D-698 - 00			**ASTM D-1557- 02**		
METHOD	A	B	C	**A**	B	C
TRIAL NUMBER	1	2	3	4	5	
WATER ADDED (ML)	-	-	0	50		
WT. SOIL + MOLD (GMS)	3970	4053	4062	3993		
WT.OF MOLD (GMS)	2018	2018	2018	2018		
WT. OF WET SOIL (GMS)	1952	2035	2044	1975		
WET DENSITY (PCF)	129.1	134.6	135.2	130.6		
CAN NUMBER	R14	R10	R2	R3		
WET SOIL + TARE (GMS)	687.05	657.47	624.95	670.00		
DRY SOIL + TARE (GMS)	650.56	616.56	577.14	609.39		
TARE (GMS)	185.11	190.24	187.71	188.22		
DRY SOIL (GMS)	465.45	426.32	389.43	421.17		
WATER (GMS)	36.49	40.91	47.81	60.61		
MOISTURE CONTENT (%)	7.8	9.6	12.3	14.4		
DRY DENSITY (PCF)	119.7	122.8	120.4	114.2		

DIAMETER OF MOLD: 4 In.
VOLUME OF MOLD: 0.0333 Cu.Ft.
SCALPED ON SIEVE SIZE/NO.: #4
PERCENT RETAINED,(%) : 23.5
MAXIMUM DRY DENSITY: 123.0 Pcf.
OPT. MOIST. CONTENT : 10.0 %

FOR OVERSIZE CORRECTION (ASTM D4718):
%,Finer Fraction = 76.5 % Moisture = 12.30
%,Oversize Fraction = 23.5 Assumed Sp.Gr. 2.64
Corrected MDD of Total Materials,(PCF) = **130.8**
Corrected OMC of Total Materials, (%) = **7.6**

REMARKS :
"SAMPLE NOT SUFFICIENT FOR METHOD C"



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MAXIMUM DENSITY TEST

JOB NAME :	EMI / UCSD	JOB NUMBER:	EMI#02-165
SAMPLE NUMBER :	04-17A @ 2' - 5'	TESTED BY :	RMC
SAMPLE LOCATION :	-	DATE :	23-Sep-04
SAMPLE DESCRIPTIONS / CLASSIFICATION :	BROWN SILTY SAND WITH GRAVEL (SM)		

TEST STANDARD	ASTM D-698 - 00			ASTM D 1557-02		
METHOD	A	B	C	A	B	C
TRIAL NUMBER	1	2	3	4	5	
WATER ADDED (ML)	-	-	0	100		
WT. SOIL + MOLD (GMS)	7345	7490	7562	7445		
WT.OF MOLD (GMS)	2718	2718	2718	2718		
WT. OF WET SOIL (GMS)	4627	4772	4844	4727		
WET DENSITY (PCF)	136.0	140.3	142.4	138.9		
CAN NUMBER	R8	R12	R4	R5		
WET SOIL + TARE (GMS)	1168.20	1281.00	1402.00	1401.00		
DRY SOIL + TARE (GMS)	1126.50	1220.80	1315.40	1298.20		
TARE (GMS)	188.03	188.19	189.60	188.03		
DRY SOIL (GMS)	938.47	1032.61	1125.80	1110.17		
WATER (GMS)	41.70	60.20	86.60	102.80		
MOISTURE CONTENT (%)	4.4	5.8	7.7	9.3		
DRY DENSITY (PCF)	130.2	132.5	132.2	127.2		

DIAMETER OF MOLD:	6	In.	
VOLUME OF MOLD:	0.0750	Cu.Ft.	
SCALPED ON SIEVE SIZE/NO.:	3/4"		
PERCENT RETAINED,(%) :	1.3		
MAXIMUM DRY DENSITY:	**133.0**	Pcf.	
OPT. MOIST. CONTENT :	**7.0**	%	

FOR OVERSIZE CORRECTION (ASTM D4718):

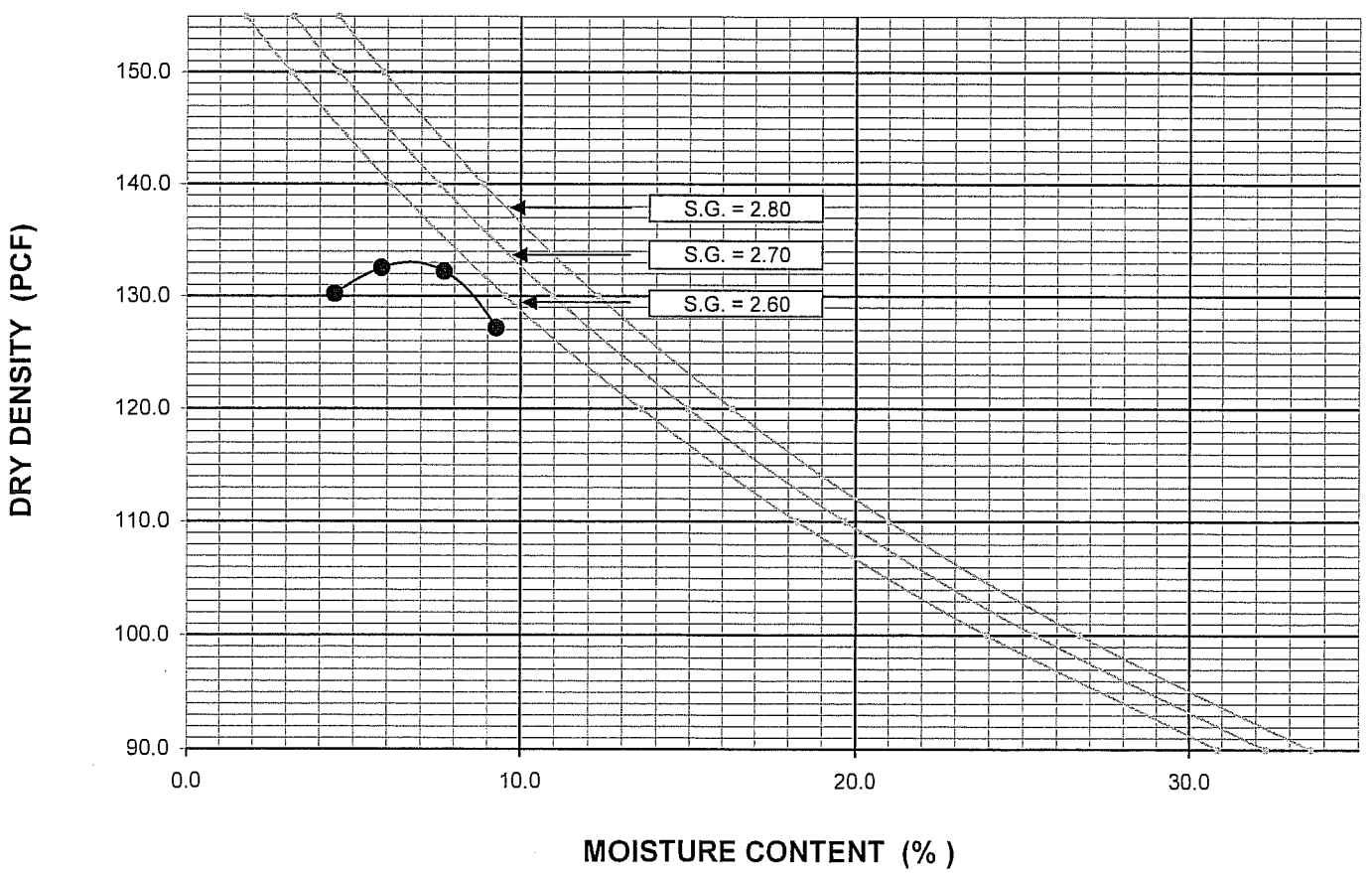
%,Finer Fraction = 98.7 % Moisture = -

%,Oversize Fraction = 1.3 Assumed Sp.Gr. 2.64

Corrected MDD of Total Materials,(PCF) = **133.3**

Corrected OMC of Total Materials, (%) = **6.9**

REMARKS :



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MAXIMUM DENSITY TEST

JOB NAME : EMI / UCSD

JOB NUMBER: EMI#02-165

SAMPLE NUMBER : 04-19 @ 0 - 5'

TESTED BY : RMC

SAMPLE LOCATION :

DATE : 21-Sep-04

SAMPLE DESCRIPTIONS/CLASSIFICATION : LT. BROWN SILTY SAND (SM/SP)

TEST STANDARD	ASTM D-698 - 00			**ASTM D-1557- 02**		
METHOD	A	B	C	**A**	B	C
TRIAL NUMBER	1	2	3	4	5	
WATER ADDED (ML)	140	260	335	410		
WT. SOIL + MOLD (GMS)	3707	3842	3879	3845		
WT.OF MOLD (GMS)	2018	2018	2018	2018		
WT. OF WET SOIL (GMS)	1689	1824	1861	1827		
WET DENSITY (PCF)	111.7	120.6	123.1	120.8		
CAN NUMBER	R2	R10	R14	R12		
WET SOIL + TARE (GMS)	643.02	696.79	647.13	542.04		
DRY SOIL + TARE (GMS)	614.94	645.24	587.90	489.63		
TARE (GMS)	187.76	190.43	185.16	189.70		
DRY SOIL (GMS)	427.18	454.81	402.74	299.93		
WATER (GMS)	28.08	51.55	59.23	52.41		
MOISTURE CONTENT (%)	6.6	11.3	14.7	17.5		
DRY DENSITY (PCF)	104.8	108.4	107.3	102.9		

DIAMETER OF MOLD: 4 In.

VOLUME OF MOLD: 0.0333 Cu.Ft.

SCALPED ON SIEVE SIZE/NO.: #4

PERCENT RETAINED,(%) : 0.0

MAXIMUM DRY DENSITY: 108.5 Pcf.

OPT. MOIST. CONTENT : 12.5 %

FOR OVERSIZE CORRECTION (ASTM D4718):

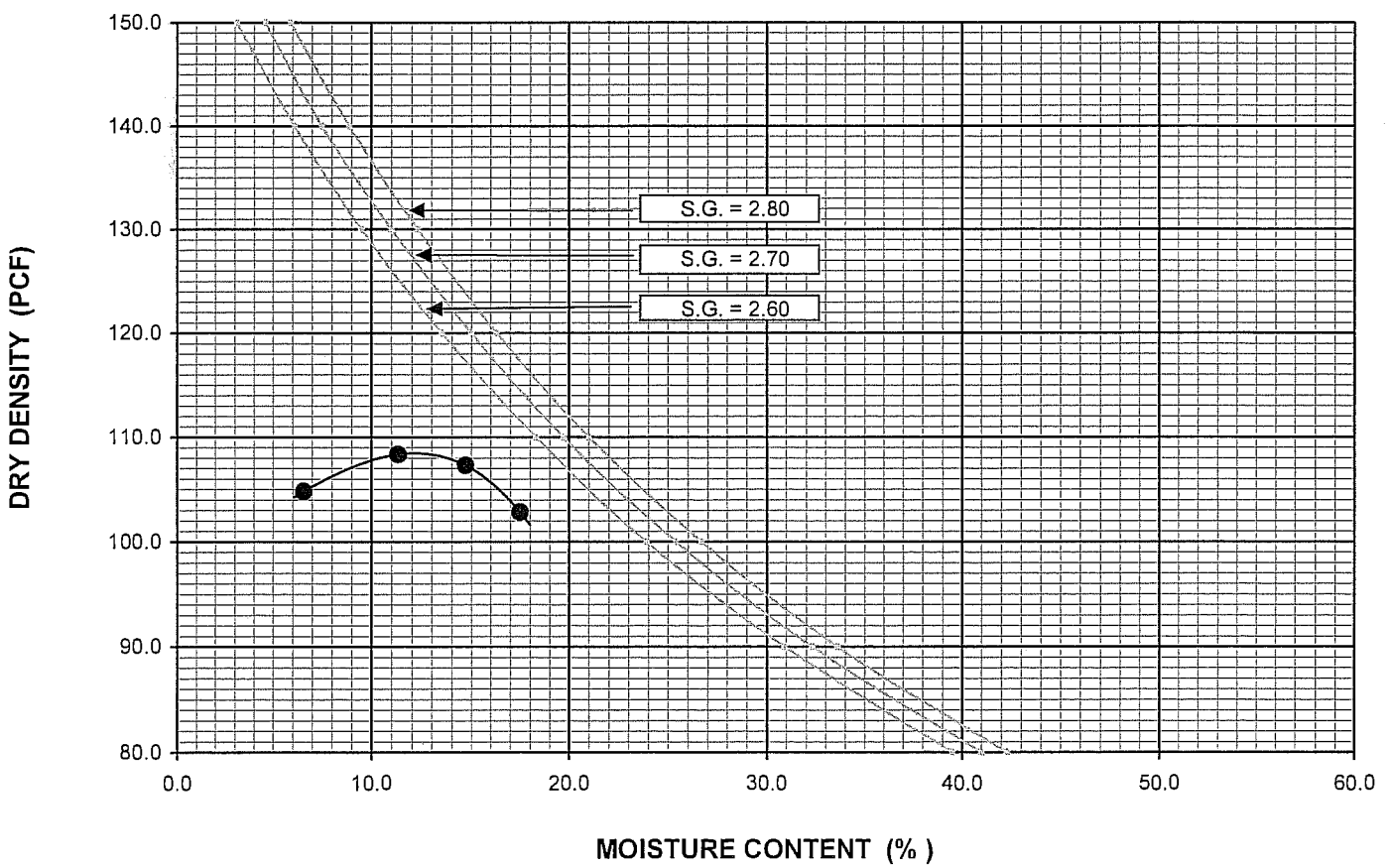
%,Finer Fraction = - % Moisture = -

%,Oversize Fraction = 0.0 Assumed Sp.Gr. 2.64

Corrected MDD of Total Materials,(PCF) = -

Corrected OMC of Total Materials, (%) = -

REMARKS : NO RETAINED ON #4 SIEVE



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MAXIMUM DENSITY TEST

JOB NAME :	EMI / UCSD	JOB NUMBER:	EMI#02-165
SAMPLE NUMBER :	04-20 @ 0 - 5'	TESTED BY :	RMC
SAMPLE LOCATION :	-	DATE :	21-Sep-04
SAMPLE DESCRIPTIONS/CLASSIFICATION :	LT. BROWN SILTY SAND (SM)		

TEST STANDARD	ASTM D-698 - 00			ASTM D-1557- 02		
METHOD	A	B	C	A	B	C
TRIAL NUMBER	1	2	3	4	5	
WATER ADDED (ML)	0	50	100	150		
WT. SOIL + MOLD (GMS)	4132	4195	4204	4133		
WT.OF MOLD (GMS)	2018	2018	2018	2018		
WT. OF WET SOIL (GMS)	2114	2177	2186	2115		
WET DENSITY (PCF)	139.8	144.0	144.6	139.9		
CAN NUMBER	21	2	X1	K		
WET SOIL + TARE (GMS)	645.85	648.03	701.75	653.31		
DRY SOIL + TARE (GMS)	627.15	621.06	663.78	611.52		
TARE (GMS)	193.02	190.67	198.68	199.03		
DRY SOIL (GMS)	434.13	430.39	465.10	412.49		
WATER (GMS)	18.70	26.97	37.97	41.79		
MOISTURE CONTENT (%)	4.3	6.3	8.2	10.1		
DRY DENSITY (PCF)	134.0	135.5	133.7	127.0		

DIAMETER OF MOLD:	4	In.	
VOLUME OF MOLD:	0.0333	Cu.Ft.	
SCALPED ON SIEVE SIZE/NO.:	#4		
PERCENT RETAINED,(%) :	8.6		
MAXIMUM DRY DENSITY:	**135.5**	Pcf.	
OPT. MOIST. CONTENT :	**6.5**	%	

FOR OVERSIZE CORRECTION (ASTM D4718):

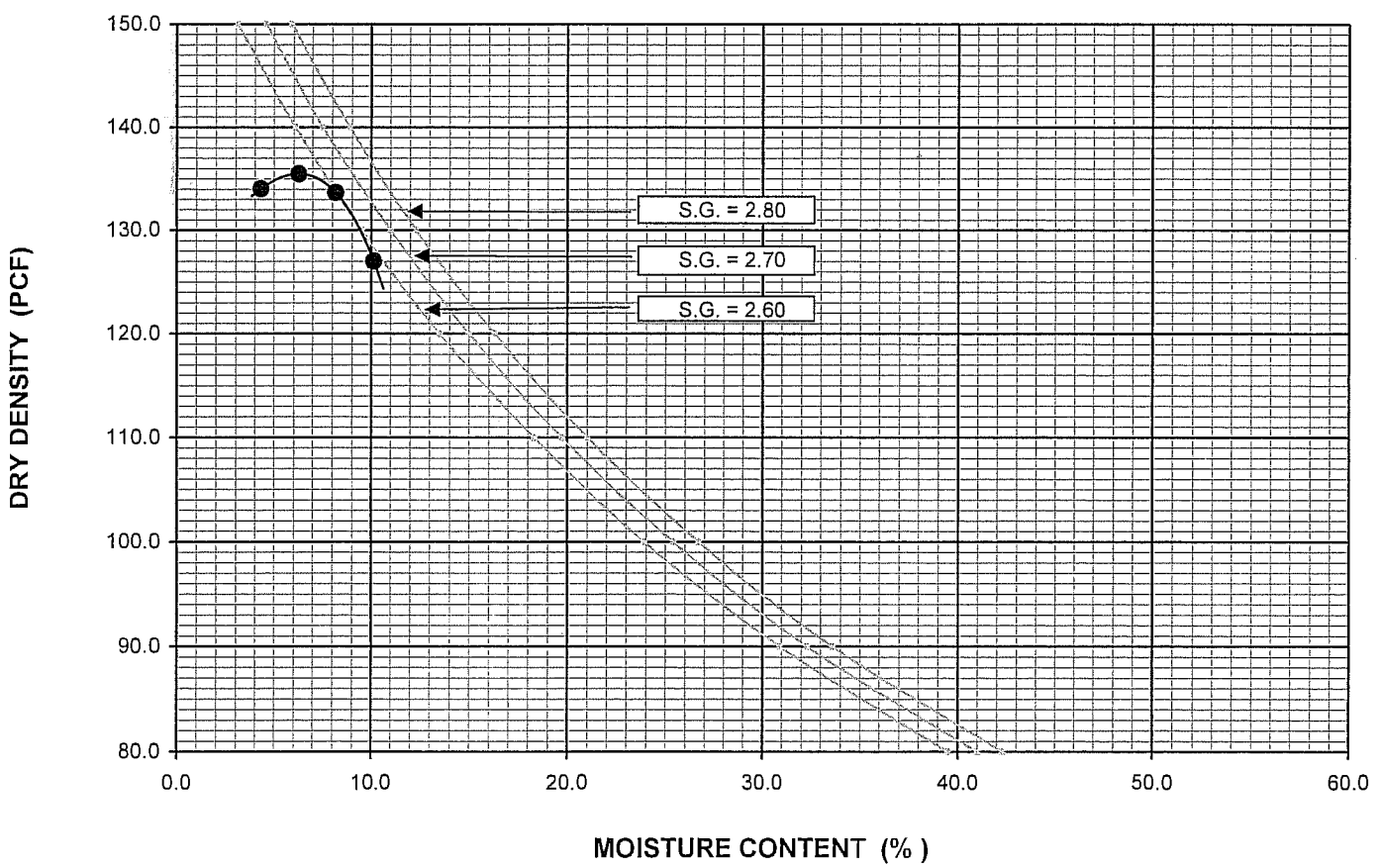
%,Finer Fraction = 91.4 % Moisture = -

%,Oversize Fraction = 8.6 Assumed Sp.Gr. 2.64

Corrected MDD of Total Materials,(PCF) = **137.6**

Corrected OMC of Total Materials, (%) = **5.9**

REMARKS :



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MAXIMUM DENSITY TEST

JOB NAME :	EMI / UCSD	JOB NUMBER:	EMI#02-165
SAMPLE NUMBER :	04-21 @ 0 - 5'	TESTED BY :	RMC
SAMPLE LOCATION :	-	DATE :	21-Sep-04
SAMPLE DESCRIPTIONS/CLASSIFICATION :	LT. BROWN SILTY SAND (SM/SP)		

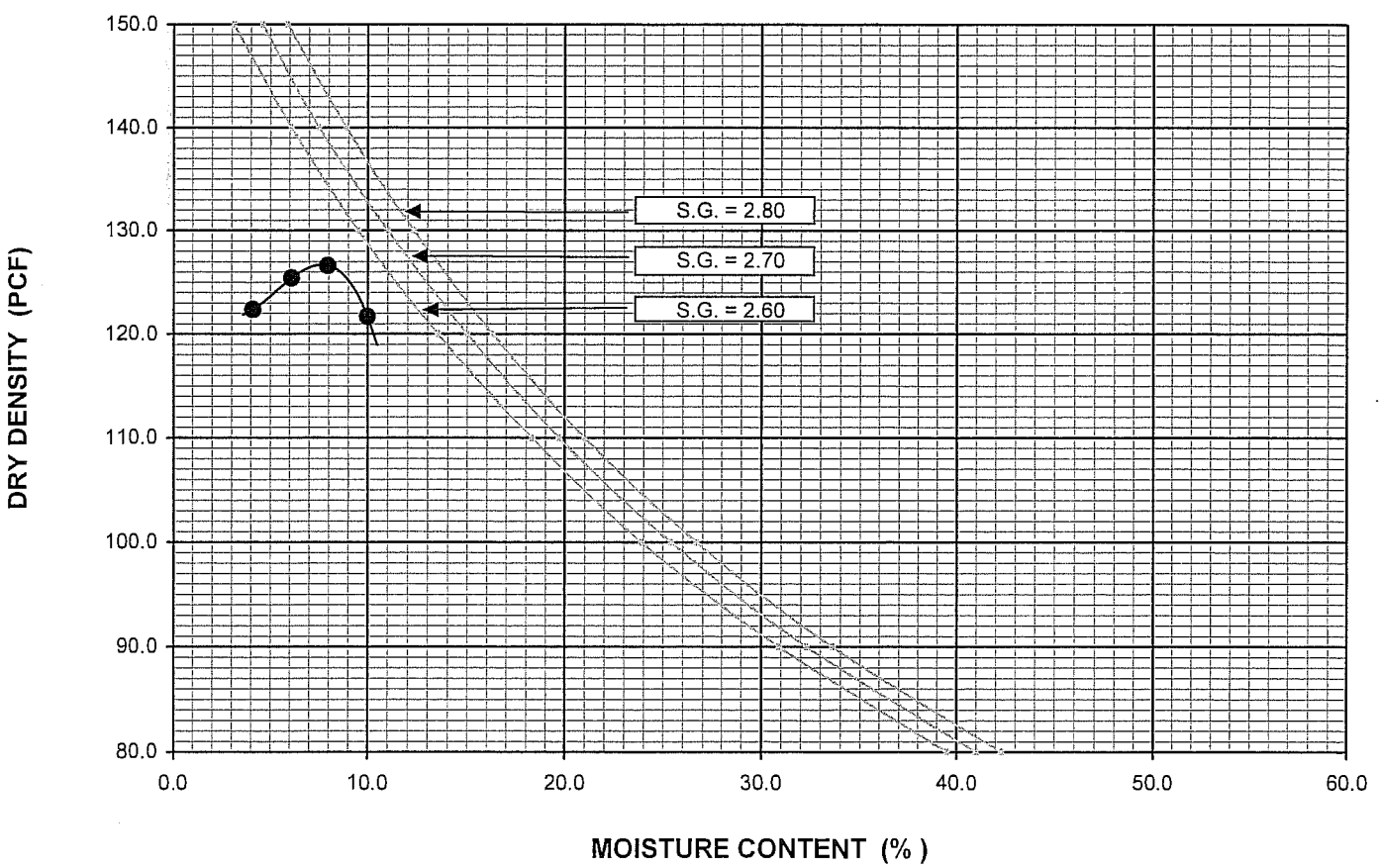
TEST STANDARD	ASTM D-698 - 00			**ASTM D-1557- 02**		
METHOD	A	B	C	**A**	B	C
TRIAL NUMBER	1	2	3	4	5	
WATER ADDED (ML)	75	125	175	225		
WT. SOIL + MOLD (GMS)	4044	4130	4185	4142		
WT.OF MOLD (GMS)	2118	2118	2118	2118		
WT. OF WET SOIL (GMS)	1926	2012	2067	2024		
WET DENSITY (PCF)	127.4	133.1	136.7	133.9		
CAN NUMBER	R4	R5	R15	R3		
WET SOIL + TARE (GMS)	596.85	641.02	709.43	651.42		
DRY SOIL + TARE (GMS)	580.80	614.96	671.06	609.38		
TARE (GMS)	188.75	188.22	188.86	188.23		
DRY SOIL (GMS)	392.05	426.74	482.20	421.15		
WATER (GMS)	16.05	26.06	38.37	42.04		
MOISTURE CONTENT (%)	4.1	6.1	8.0	10.0		
DRY DENSITY (PCF)	122.4	125.4	126.6	121.7		

DIAMETER OF MOLD:	4	In.	
VOLUME OF MOLD:	0.0333	Cu.Ft.	
SCALPED ON SIEVE SIZE/NO.:	#4		
PERCENT RETAINED,(%) :	5.4		
MAXIMUM DRY DENSITY:	**127.0**	Pcf.	
OPT. MOIST. CONTENT :	**8.0**	%	

FOR OVERSIZE CORRECTION (ASTM D4718):

%,Finer Fraction =	94.6	% Moisture =	-
%,Oversize Fraction =	5.4	Assumed Sp.Gr.	2.64
Corrected MDD of Total Materials,(PCF) =			**128.6**
Corrected OMC of Total Materials, (%) =			**7.6**

REMARKS :



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MAXIMUM DENSITY TEST

JOB NAME :	EMI / UCSD	JOB NUMBER:	EMI#02-165
SAMPLE NUMBER :	04-22 @ 0 - 5'	TESTED BY :	RMC
SAMPLE LOCATION :	-	DATE :	9 21 04
SAMPLE DESCRIPTIONS / CLASSIFICATION :	BROWN SILTY SAND WITH GRAVEL (SM)		

TEST STANDARD	ASTM D-698 - 00			**ASTM D 1557-02**		
METHOD	A	B	C	A	B	**C**
TRIAL NUMBER	1	2	3	4	5	
WATER ADDED (ML)	0	130	260	390		
WT. SOIL + MOLD (GMS)	7218	7509	7562	7305		
WT.OF MOLD (GMS)	2718	2718	2718	2718		
WT. OF WET SOIL (GMS)	4500	4791	4844	4587		
WET DENSITY (PCF)	132.3	140.8	142.4	134.8		
CAN NUMBER	R9	R8	R7	R16		
WET SOIL + TARE (GMS)	1004.90	1055.60	1040.60	1129.70		
DRY SOIL + TARE (GMS)	966.00	994.20	963.60	1021.00		
TARE (GMS)	188.70	188.30	188.70	187.70		
DRY SOIL (GMS)	777.30	805.90	774.90	833.30		
WATER (GMS)	38.90	61.40	77.00	108.70		
MOISTURE CONTENT (%)	5.0	7.6	9.9	13.0		
DRY DENSITY (PCF)	126.0	130.9	129.5	119.3		

DIAMETER OF MOLD:	6	In.	
VOLUME OF MOLD:	0.0750	Cu.Ft.	
SCALPED ON SIEVE SIZE/NO.:	3/4"		
PERCENT RETAINED,(%) :	3.7		
MAXIMUM DRY DENSITY:	**131.0**	Pcf.	
OPT. MOIST. CONTENT :	**8.5**	%	

FOR OVERSIZE CORRECTION (ASTM D4718):

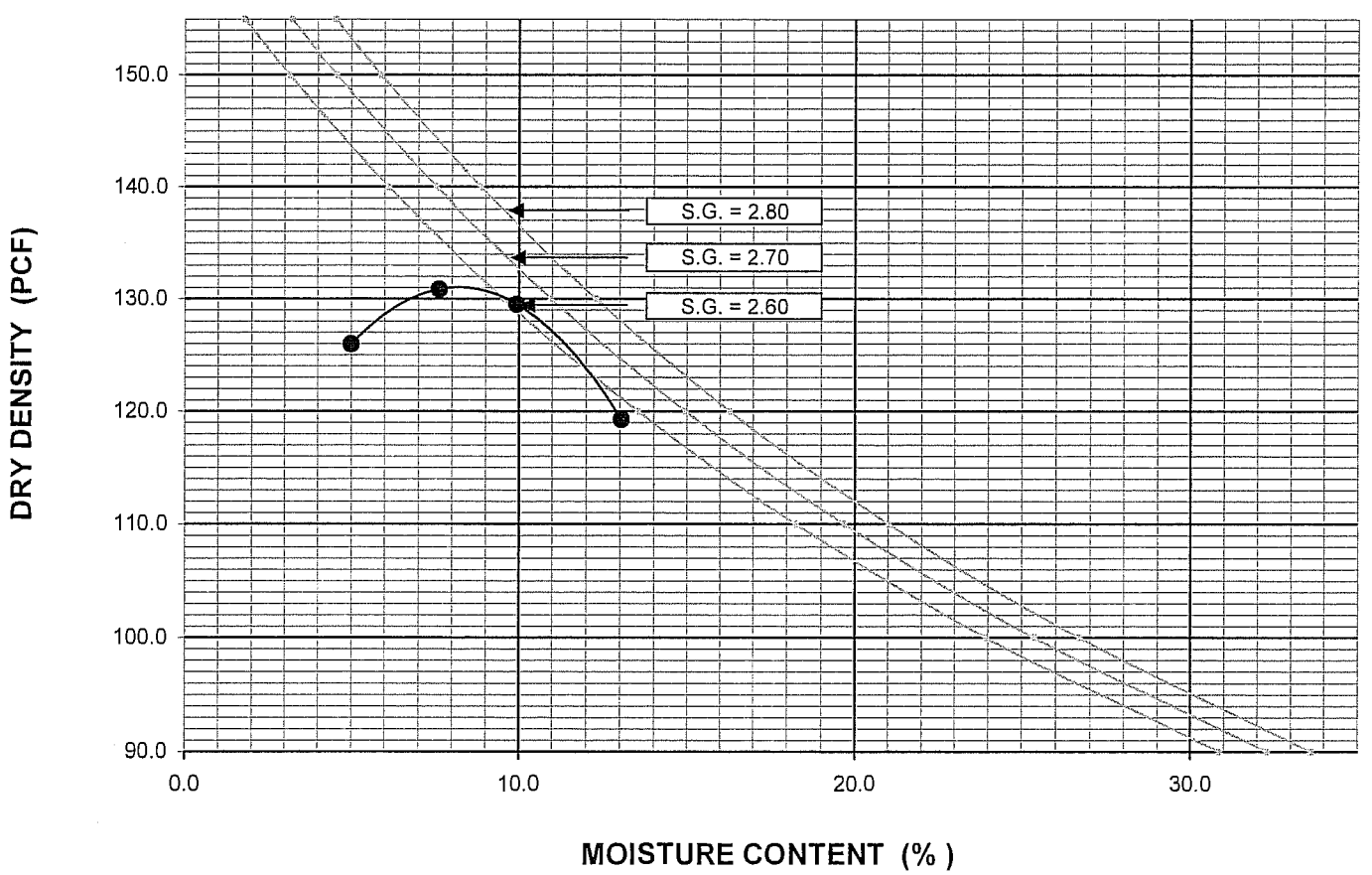
%,Finer Fraction = 96.3 % Moisture = -

%,Oversize Fraction = 3.7 Assumed Sp.Gr. 2.64

Corrected MDD of Total Materials,(PCF) = **132.0**

Corrected OMC of Total Materials, (%) = **8.2**

REMARKS :



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MAXIMUM DENSITY TEST

UCSD Abutment Research
Unconsolidated Undrained Triaxial Tests

No:	Bridge Name, County	Boring No:	Depth (ft)	Sample No:	Sample Type	Soil Description	Friction Angle (Degree) Cohesion (ksf)
1	Carmel Valley Rd UC San Diego Co.	04-1	8.5	4A	Remolded	SM/ML	24.1 3.5
2	Carmel Valley Rd UC San Diego Co.	04-1	9	4B	Remolded	SC/CL-ML	22.5 6
3	Harbor Blvd UC (Widen) Orange Co.	04-3	5	2A	Remolded	SM /GR	28.1 1.44
4	Harbor Blvd UC (Widen) Orange	04-3	8	3B	In-Situ	SM/GR	33.2 0.67
5	Tustin Ave OC (widen) Orange Co.	04-6	5	2A	In-Situ	SM/GR	24.5 1.3
6	Coldwater Canyon Los Angeles Co.	04-10	16	D-4-2	In-Situ	CL	17.3 2.13
7	Patterson Slough Fremont Co.	04-11A	8	D-1	In-Situ	ML/CL	7.8 1.5
8	Patterson Slough Fremont Co.	04-11A	8	D-1	Remolded	ML/CL	6.9 0.92
9	Patterson Slough Fremont	04-11A	12.5	D-3	In-Situ	ML/CL	15.2 4.34
10	Route 101/84 Sep. San Mateo Co.	04-14A	10	3	In-Situ	CL	22.8 1.28
11	Painter Street Humboldt Co.	04-15A	7.5	3B	In-Situ	ML	11.5 3.9

12	Painter Street Humboldt Co.	04-15A	12.5	D-5	Remolded	CL	***
13	Painter Street Humboldt Co.	04-16A	10	4	In-Situ	CL	7.1 3.3
14	Meloland Rd OC Imperial Co.	04-17A	15	6	In-Situ	CL	3.1 2.55
15	Meloland Rd OC Imperial Co.	04-18A	10	4	In-Situ	CL	3.6 0.57
16	Painter Street Humboldt Co	04-15A	12.5	3	In-Situ	ML	11.5 3.9
17	Painter Street Humboldt Co	04-15A	Composit e 1 Cycle	2.5-7	Remolded	SP	***
18	Painter Street Humboldt Co	04-15A	Composit 3 Cycles	2.5-7	Remolded	SP	43.3 0.13
19	Meloland Rd OC Imperial Co.	04-17A	Bulk,B-0 1 Cycle	2.5	Remolded	SM	***
20	Meloland Rd OC Imperial Co.	04-17A	Bulk,B-0 3Cycles	2.5	Remolded	SM	32.4 0.83
21	Santa Clara River Bridge, Los Angeles Co.	04-22	Bulk, B-0 3 Cycles	0-5	Remolded	SW-SM	23.7 1.42
22	Br#51-234, Santa Barbara Co.	04-19	Bulk, B-0 3 Cycles	0-5	Remolded	SP/SM	34.3 0.31
23	Jackson Bridge, Riverside Co.	04-21	Bulk, B-0 3 Cycles	0-5	Remolded	SM	32.6 0.43
24	Rancho Santa Fe Bridge, San Diego Co.	04-1	Bulk, B-0 3 Cycles	0-5	Remolded	SM w/ Gravel	34.7 0.25
25	Maple Ave UC, Fresno Co.	04-25	Bulk, B-0 1 Cycle	10	Remolded	SM w/ Gravel	***
26	Meloland Rd OC Imperial Co.	04-17A	Bulk,B-0 1Cycle	5	Remolded	SM	***
27	Maple Ave UC, Fresno Co.	04-25	Bulk, B-0 3 Cycles	10	Remolded	SM w/ Gravel	33.6 0.46

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Carmel Valley Rd UC\San Diego			**Project No:**	02-165
Boring No.:	04-1	**Tested by:**	J.R.	**Date:**	11/11/04
Depth (ft):	0-5	**Checked by:**		**Date:**	
Sample No.	B-0	**Sample Type:**	Bulk		
Soil Description:	**Silty Sand w Gravel**	**Comments:**			

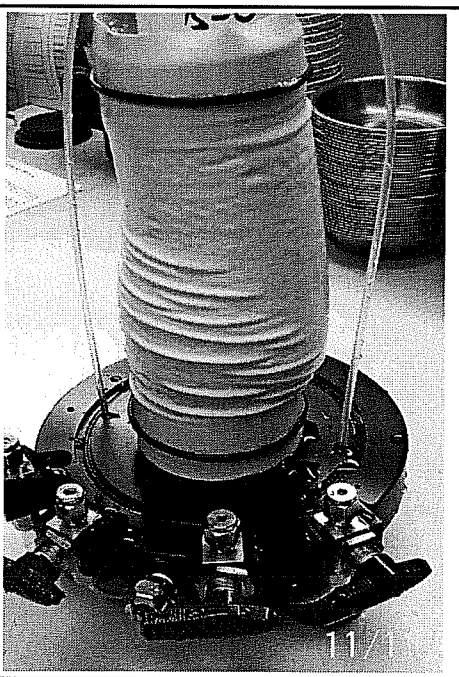
	1	2	3		
Diameter (in.):	2.862	2.862	2.862	Average:	2.862
Height (in.):	5.750	5.750	5.750	Average:	5.750

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	
Wt. Dry Sample + Container (g) :	
Container (g) : No.	
Moisture Content (%) :	**7.2**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**129.4**
Dry Density (pcf) :	**120.7**
Void Ratio :	**0.396**
% Saturation :	**49.1**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:



Shear	
Cycle	**1, 2, 3**
Confining Stress (ksf) :	**0.72, 1.03, 1.54**
Deformation Rate (% / min) :	**4**
Failure Criterion:	
the maximum deviator stress	

At Failure	
Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**2.87, 3.65, 5.07**
Eff. Minor Principal Stress (ksf) :	**0.72, 1.03, 1.54**
Eff. Major Principal Stress (ksf) :	**3.58, 4.68, 6.61**
Axial Strain (%) :	**2.7, 5.6, 14.8**

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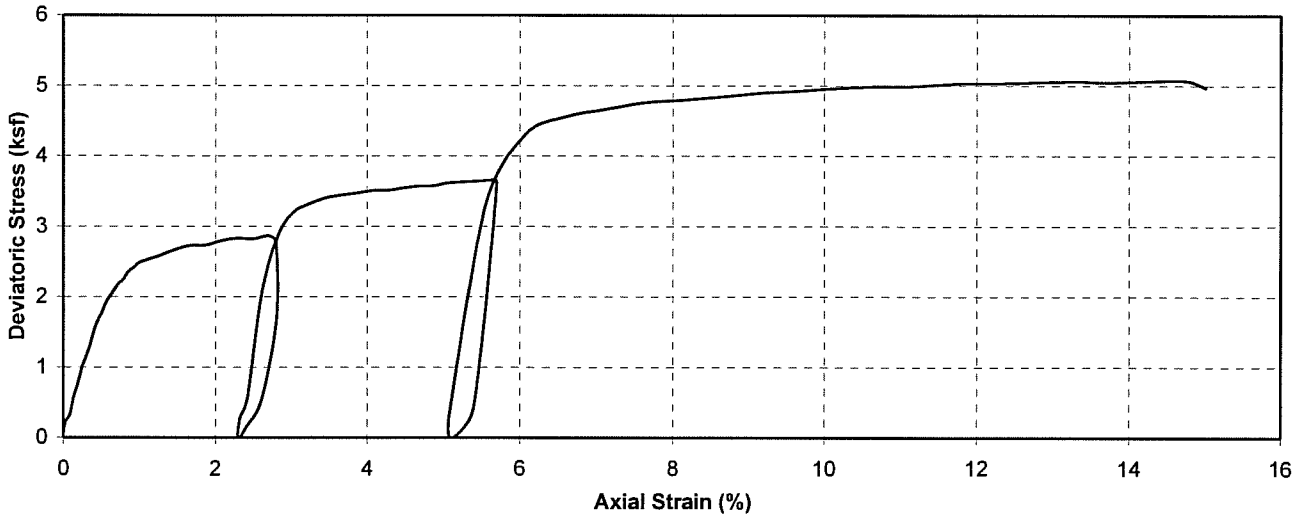

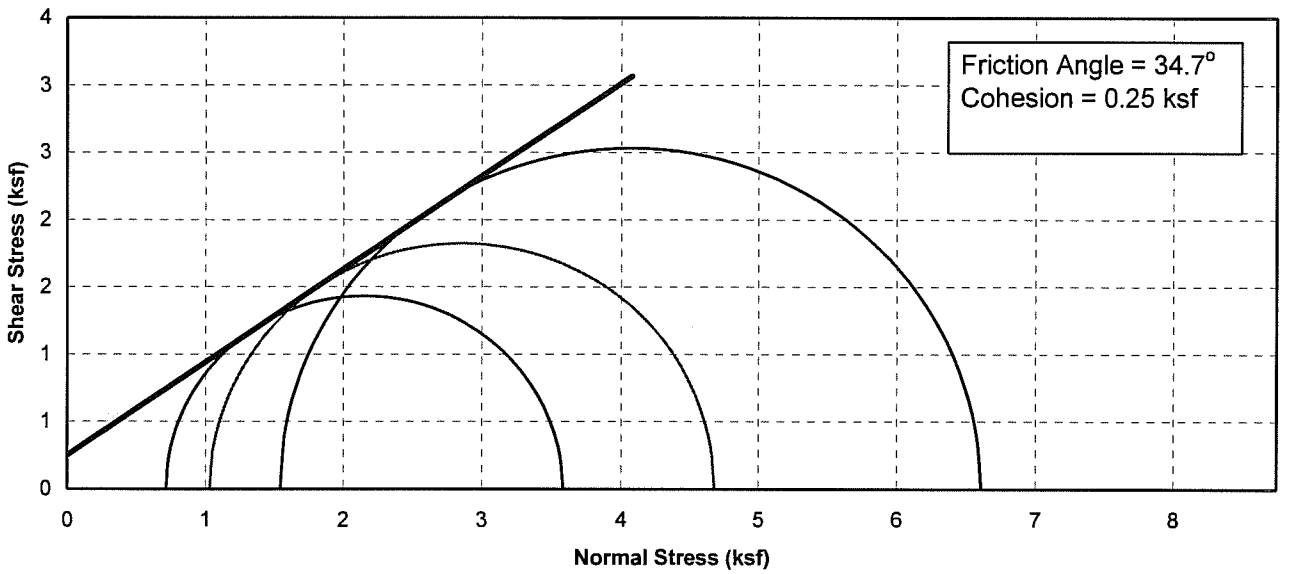

Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-1	B-0	0-5	Sity Sand w Gravel	120.7	7.2	0.72, 1.03, 1.54	2.87, 3.65, 5.07	49.1

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Caltrans\UCSD \ Abutment Research
Project No. : 02-165 Date : 11/11/04	UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Carmel Valley Rd UC\San Diego Co.			**Project No:**	02-165
Boring No.:	04-1	**Tested by:**	J.R	**Date:**	07/21/04
Depth (ft):	8.5	**Checked by:**		**Date:**	
Sample No.	4A	**Sample Type:**	Remolded		
Soil Description:	**Brown, SM/ML**	**Comments:**			

	1	2	3		
Diameter (in.):	2.429	2.432	2.43	Average:	2.430
Height (in.):	4.930	4.875	5.000	Average:	4.935

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	173.95
Wt. Dry Sample + Container (g) :	161.7
Container (g) : No.	8.48
Moisture Content (%) :	**8.0**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**125.0**
Dry Density (pcf) :	**115.7**
Void Ratio :	**0.456**
% Saturation :	**47.4**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:

Shear Cycle	**1, 2, 3**
Confining Stress (ksf) :	**1.14, 2.3, 4.6**
Deformation Rate (% / min) :	**4**
Failure Criterion: the maximum deviator stress	

At Failure Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**12.29, 13.64, 17.12**
Eff. Minor Principal Stress (ksf) :	**1.14, 2.3, 4.6**
Eff. Major Principal Stress (ksf) :	**13.43, 15.93, 21.72**
Axial Strain (%) :	**4.1, 5.6, 15.1**

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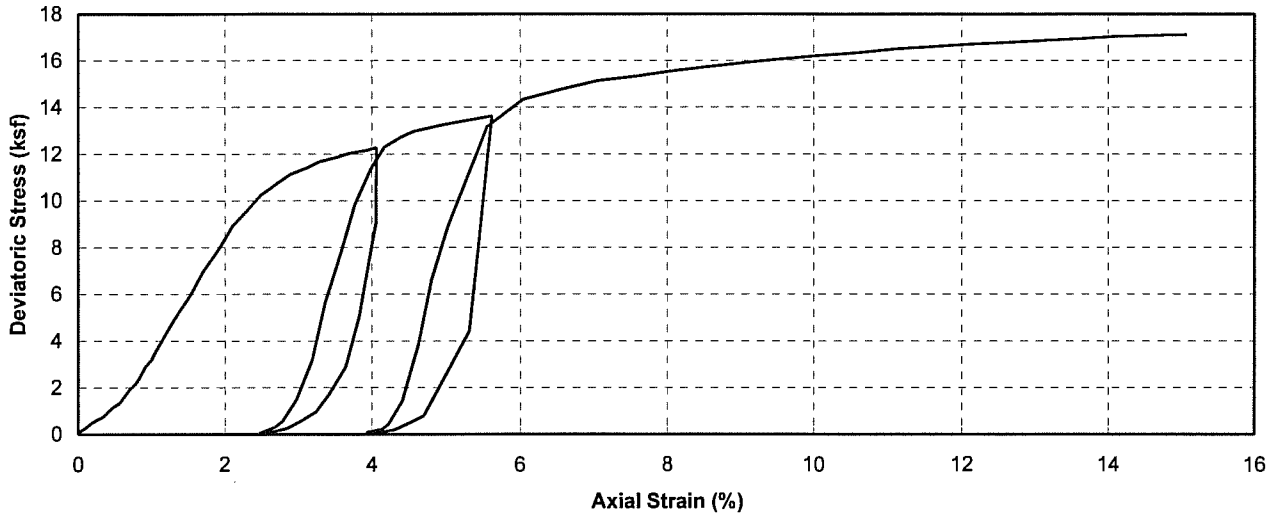
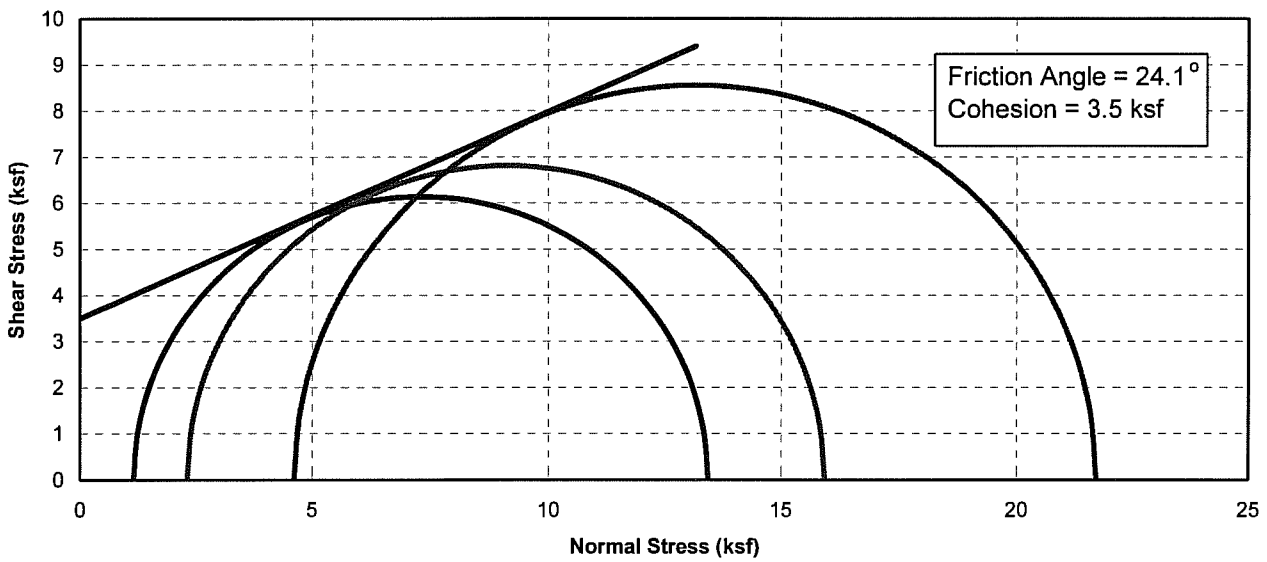




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-1	4A	8.50	Brown, SM/ML	115.7	8.0	1.14, 2.3, 4.6	12.29, 13.64, 17.12	47.4

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Caltrans\UCSD \ Abutment Research
Project No. : 02-165 Date : 07/21/04	UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Carmel Valley Rd UC\San Diego			**Project No:**	02-165
Boring No.:	04-1	**Tested by:**	J.R	**Date:**	07/22/04
Depth (ft):	9	**Checked by:**		**Date:**	
Sample No.	4B	**Sample Type:**	Remolded		
Soil Description:	**Brown,SC/CL- ML**	**Comments:**			

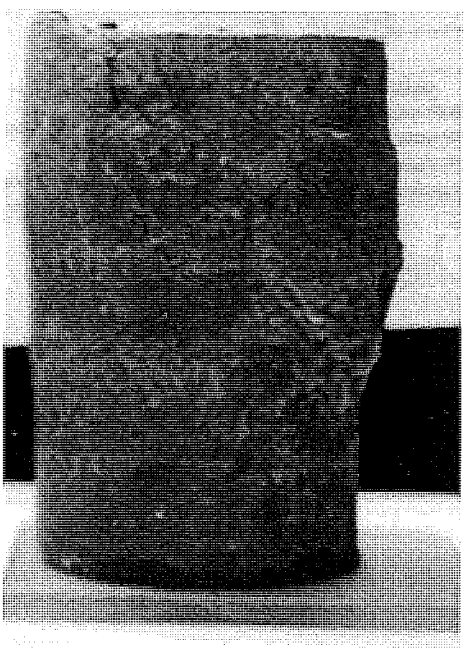
	1	2	3		
Diameter (in.):	2.43	2.422	2.441	Average:	2.431
Height (in.):	5.090	5.120	5.060	Average:	5.090

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	179.08
Wt. Dry Sample + Container (g) :	166.45
Container (g) : No.	8.48
Moisture Content (%) :	**8.0**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**125.0**
Dry Density (pcf) :	**115.7**
Void Ratio :	**0.456**
% Saturation :	**47.4**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:



Shear Cycle	**1, 2, 3**
Confining Stress (ksf) :	**1.14, 2.29, 4.6**
Deformation Rate (% / min) :	**4**
Failure Criterion: the maximum deviator stress	

At Failure Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**19.19, 20.88, 23.35**
Eff. Minor Principal Stress (ksf) :	**1.14, 2.29, 4.6**
Eff. Major Principal Stress (ksf) :	**20.33, 23.17, 27.94**
Axial Strain (%) :	**4.3, 4.8, 7**

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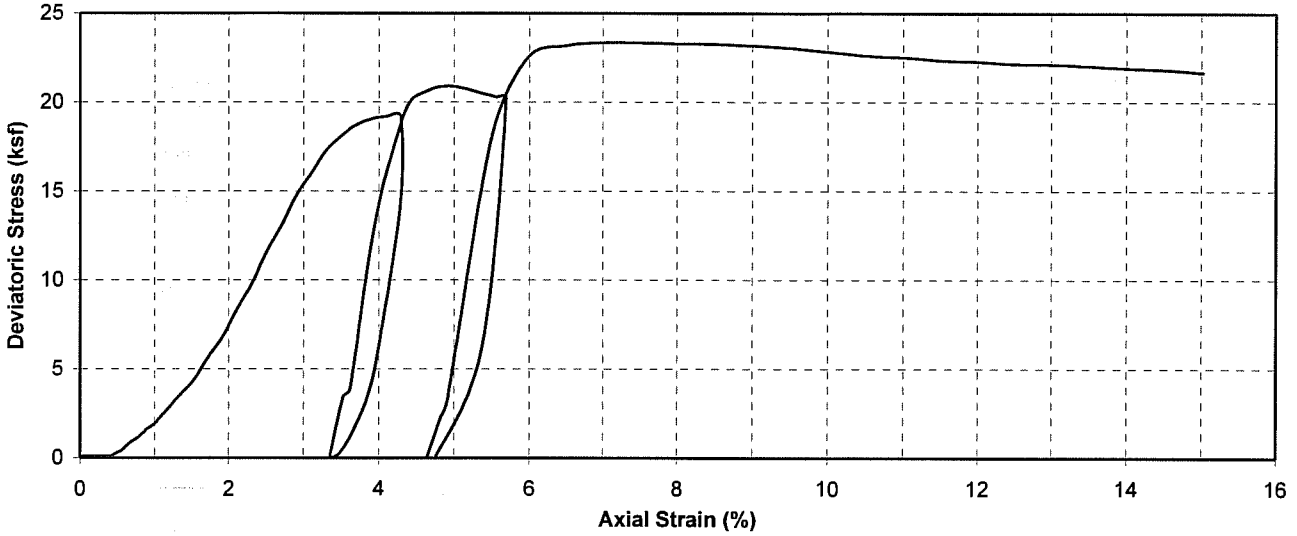
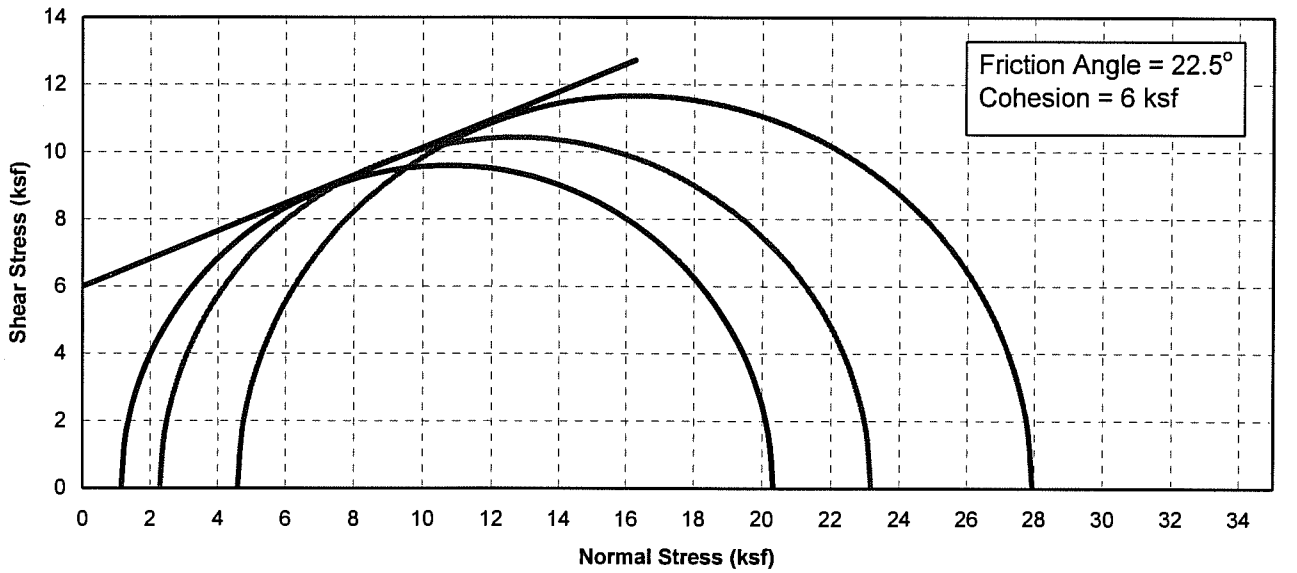
Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-1	4B	9.00	Brown,SC/CL- ML	115.7	8.0	1.14, 2.29, 4.6	19.19, 20.88, 23.35	47.4

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

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UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

Project No. : 02-165 **Date :** 07/22/04

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Harbor Blvd UC (Widen)\Orange			**Project No:**	02-165
Boring No.:	04-3	**Tested by:**	J.R	**Date:**	07/26/04
Depth (ft):	5	**Checked by:**		**Date:**	
Sample No.	2A	**Sample Type:**	Remolded		
Soil Description:	**SM w/GR**	**Comments:**			

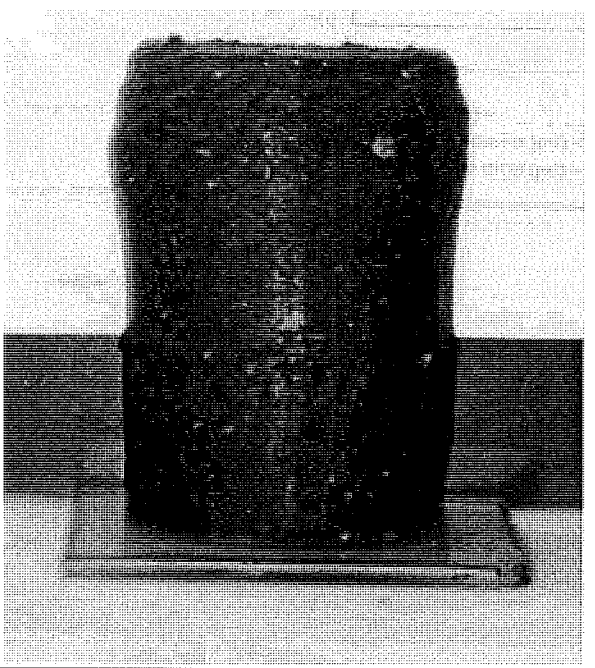
	1	2	3		
Diameter (in.):	2.43	2.42	2.414	Average:	2.421
Height (in.):	4.930	4.930	4.960	Average:	4.940

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	185.02
Wt. Dry Sample + Container (g) :	171.95
Container (g) : No.	8.48
Moisture Content (%) :	**8.0**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**125.0**
Dry Density (pcf) :	**115.7**
Void Ratio :	**0.456**
% Saturation :	**47.4**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:



Shear Cycle	**1, 2, 3**
Confining Stress (ksf) :	**0.42, 0.86, 1.72**
Deformation Rate (% / min) :	**4**
Failure Criterion: the maximum deviator stress	

At Failure Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**5.42, 6.42, 7.63**
Eff. Minor Principal Stress (ksf) :	**0.42, 0.86, 1.72**
Eff. Major Principal Stress (ksf) :	**5.84, 7.27, 9.34**
Axial Strain (%) :	**3.9, 8.2, 14.7**

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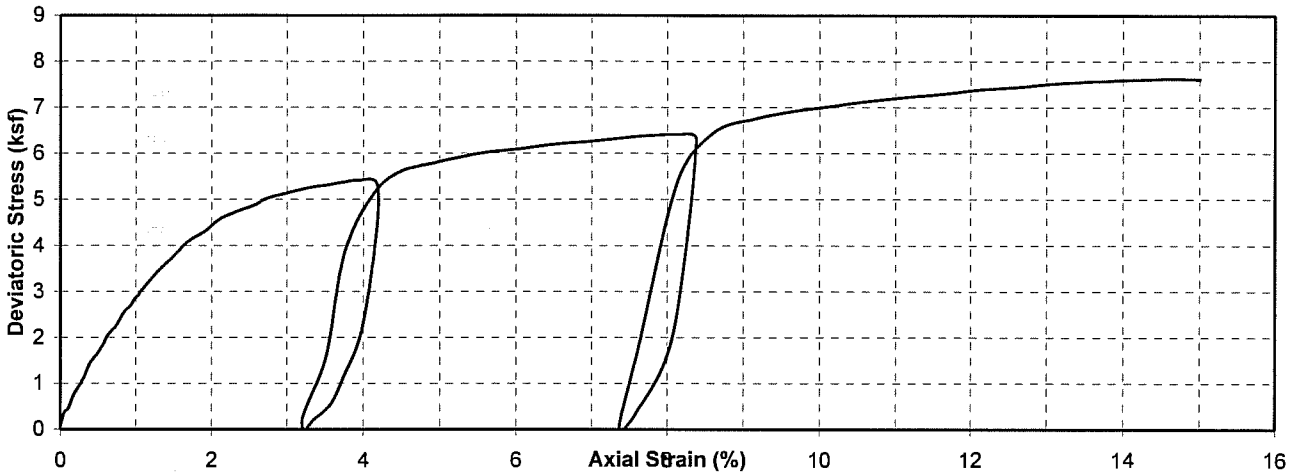
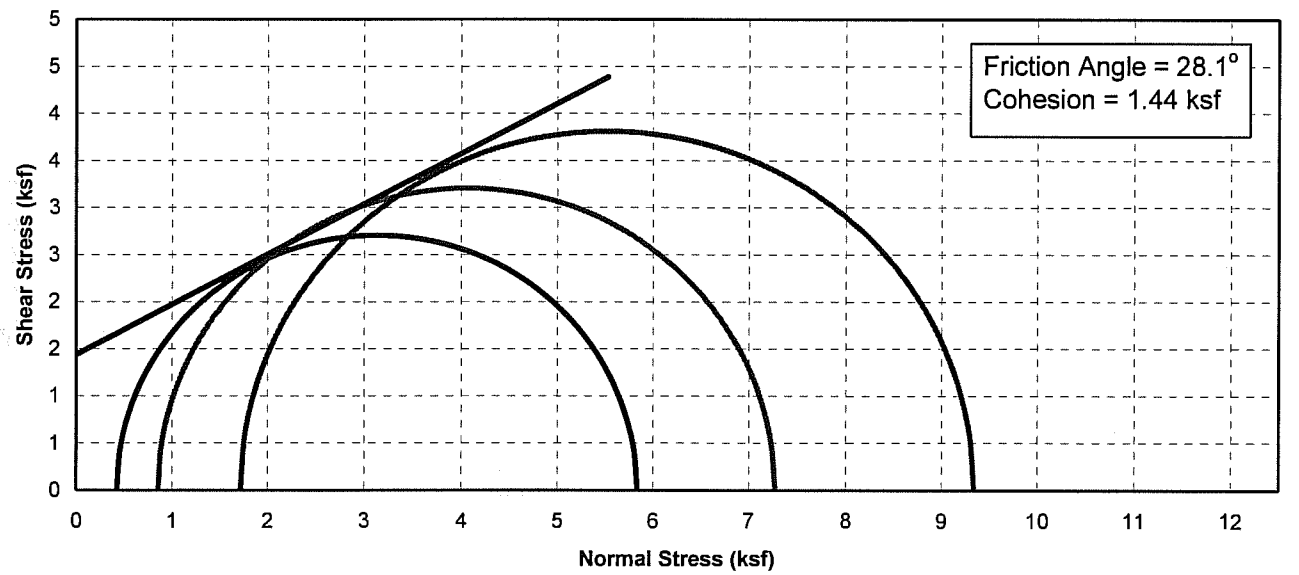




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-3	2A	5.00	SM/GR	115.7	8.0	0.42, 0.86, 1.72	5.42, 6.42, 7.63	47.4

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Caltrans\UCSD \ Abutment Research
Project No. : 02-165 Date : 07/26/04	UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Harbor Blvd UC (Widen)\Orange Co.			**Project No:**	02-165
Boring No.:	04-3	**Tested by:**	J.R	**Date:**	07/26/04
Depth (ft):	8	**Checked by:**		**Date:**	
Sample No.	3B	**Sample Type:**	In-Situ		
Soil Description:	**SM w/GR**	**Comments:**	Slight weackness at the top first ring		

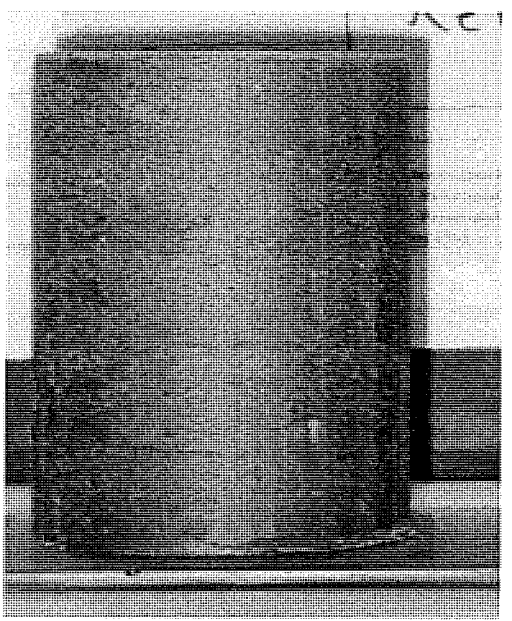
	1	2	3		
Diameter (in.):	2.42	2.41	2.43	Average:	2.420
Height (in.):	5.000	5.000	5.000	Average:	5.000

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	
Wt. Dry Sample + Container (g) :	
Container (g) : No.	
Moisture Content (%) :	**5.0**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**120.7**
Dry Density (pcf) :	**115.0**
Void Ratio :	**0.466**
% Saturation :	**29.0**

Gs=2.70 (assumed)

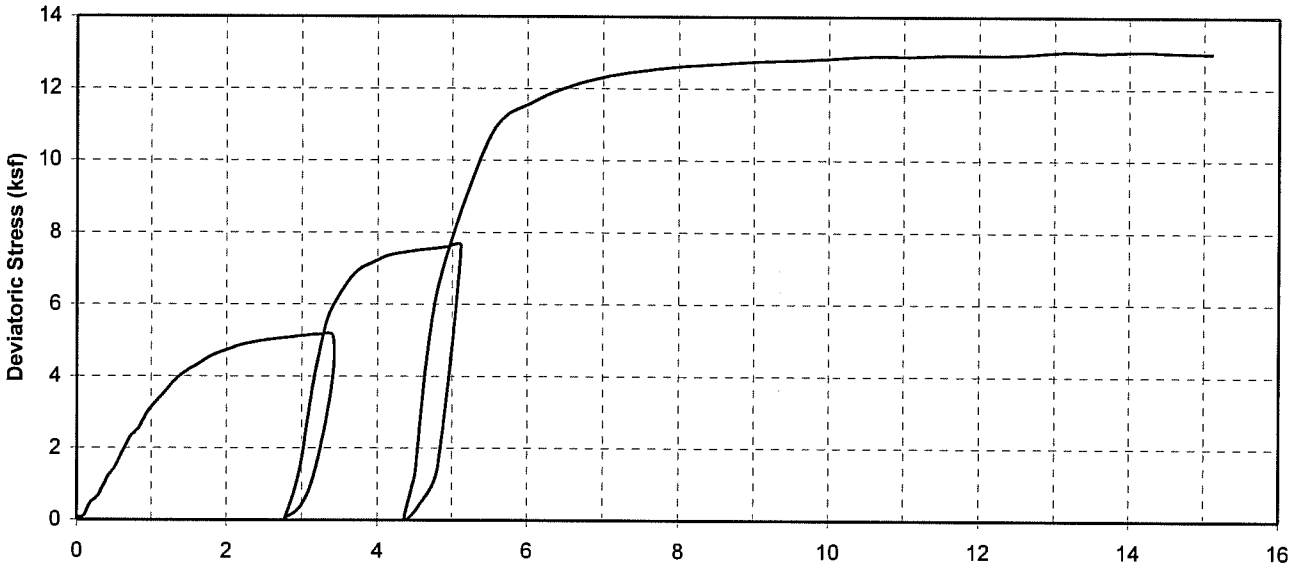
SKETCH / PHOTO AFTER TEST:

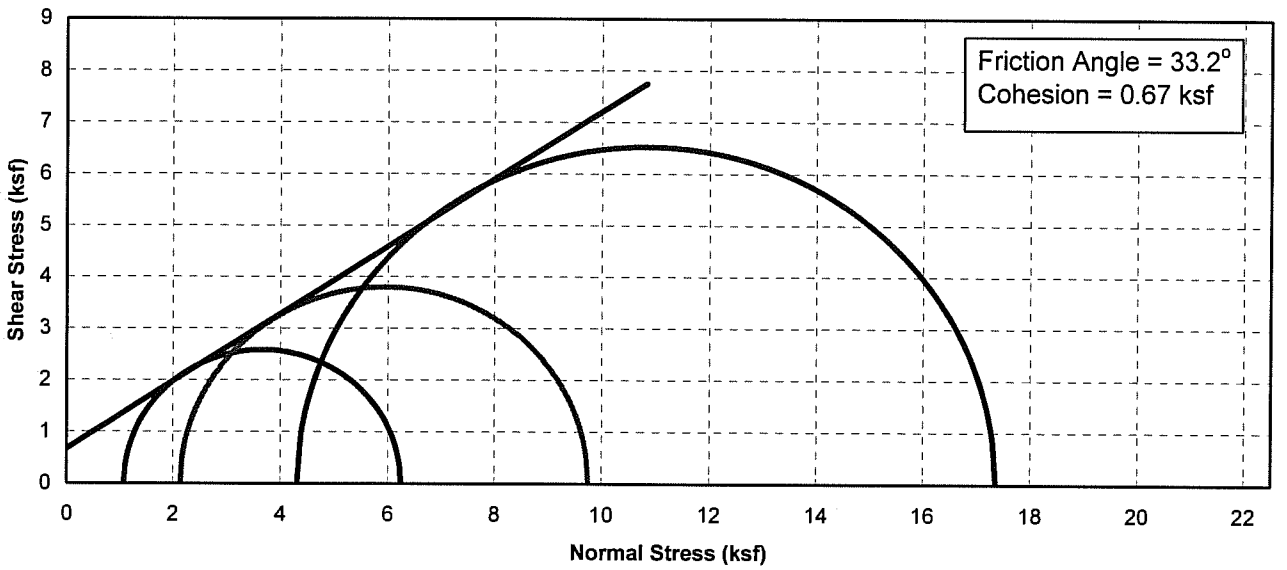


Shear Cycle	**1, 2, 3**	**At Failure** Cycle	**1, 2, 3**
Confining Stress (ksf) :	**1.08, 2.14, 4.31**	Deviator Stress (ksf) :	**5.17, 7.61, 13.05**
Deformation Rate (% / min) :	**4**	Eff. Minor Principal Stress (ksf) :	**1.08, 2.14, 4.31**
Failure Criterion:		Eff. Major Principal Stress (ksf) :	**6.25, 9.76, 17.36**
the maximum deviator stress		Axial Strain (%) :	**3.2, 5.1, 14.1**

Earth Mechanics, Inc.

Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-3	3B	8.00	SM w/GR	115.0	5.0	1.08, 2.14, 4.31	5.17, 7.61, 13.05	29.0

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Caltrans\UCSD \ Abutment Research
Project No. : 02-165 Date : 07/26/04	UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Tustin Ave OC(Widen)\Orange Co.			**Project No:**	02-165
Boring No.:	04-6	**Tested by:**	J.R	**Date:**	07/27/04
Depth (ft):	5	**Checked by:**		**Date:**	
Sample No.	2A	**Sample Type:**	In.Situ		
Soil Description:	**SM w/GR**	**Comments:**	Slight weackness at the top first ring		

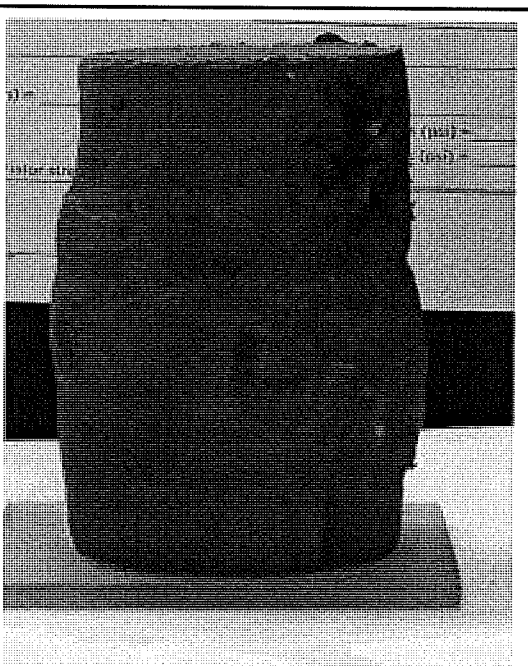
	1	2	3		
Diameter (in.):	2.42	2.421	2.423	Average:	2.421
Height (in.):	5.000	5.000	5.000	Average:	5.000

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	
Wt. Dry Sample + Container (g) :	
Container (g) : No.	
Moisture Content (%) :	**12.0**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**133.0**
Dry Density (pcf) :	**118.8**
Void Ratio :	**0.419**
% Saturation :	**77.4**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:

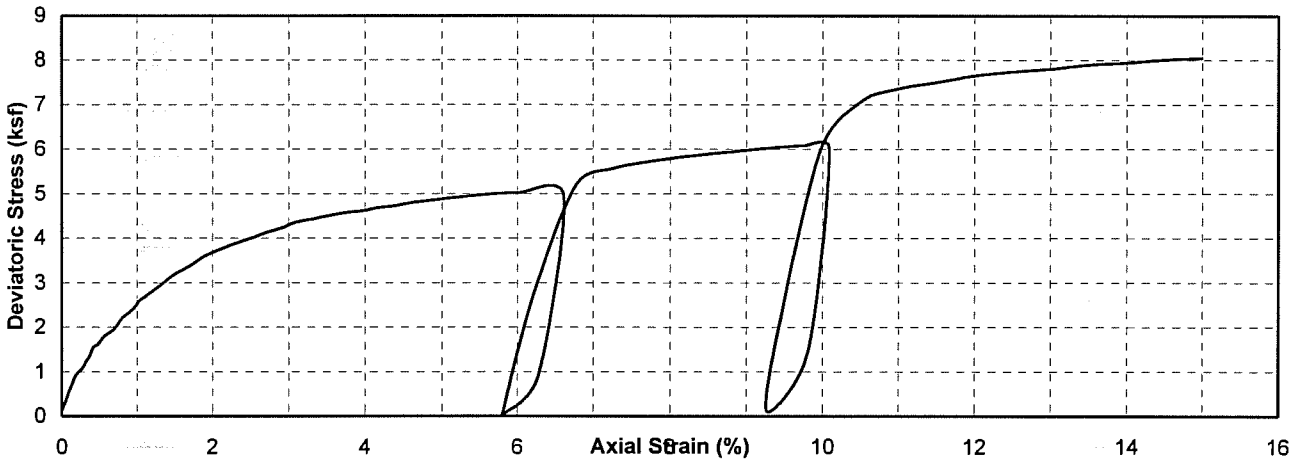


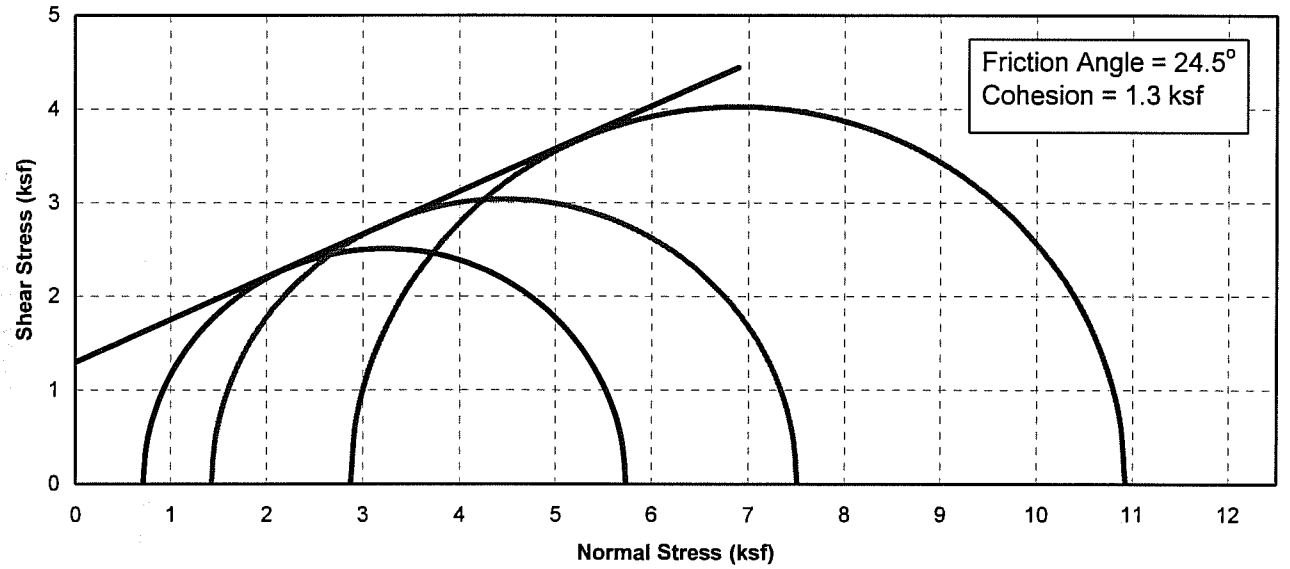
Shear Cycle	**1, 2, 3**
Confining Stress (ksf) :	**0.71, 1.43, 2.87**
Deformation Rate (% / min) :	**4**
Failure Criterion: the maximum deviator stress	

At Failure Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**5.02, 6.08, 8.06**
Eff. Minor Principal Stress (ksf) :	**0.71, 1.43, 2.87**
Eff. Major Principal Stress (ksf) :	**5.74, 7.51, 10.93**
Axial Strain (%) :	**6, 9.8, 15**

Earth Mechanics, Inc.

Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-6	2A	5.00	SM w/GR	118.8	12.0	0.71, 1.43, 2.87	5.02, 6.08, 8.06	77.4

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Caltrans\UCSD \ Abutment Research
Project No. : 02-165 Date : 07/27/04	UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Coldwater Canyon\Los Angeles Co.			**Project No:**	02-165
Boring No.:	04-10	**Tested by:**	J.R	**Date:**	09/03/04
Depth (ft):	16	**Checked by:**		**Date:**	
Sample No.	D-4-2	**Sample Type:**	In-Situ		
Soil Description:	**Brown, CL**	**Comments:**			

	1	2	3		
Diameter (in.):	2.42	2.43	2.42	Average:	2.423
Height (in.):	5.060	5.120	5.060	Average:	5.080

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	146.96
Wt. Dry Sample + Container (g) :	129.15
Container (g) : No.	16.18
Moisture Content (%) :	**13.6**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**120.3**
Dry Density (pcf) :	**105.9**
Void Ratio :	**0.591**
% Saturation :	**62.2**

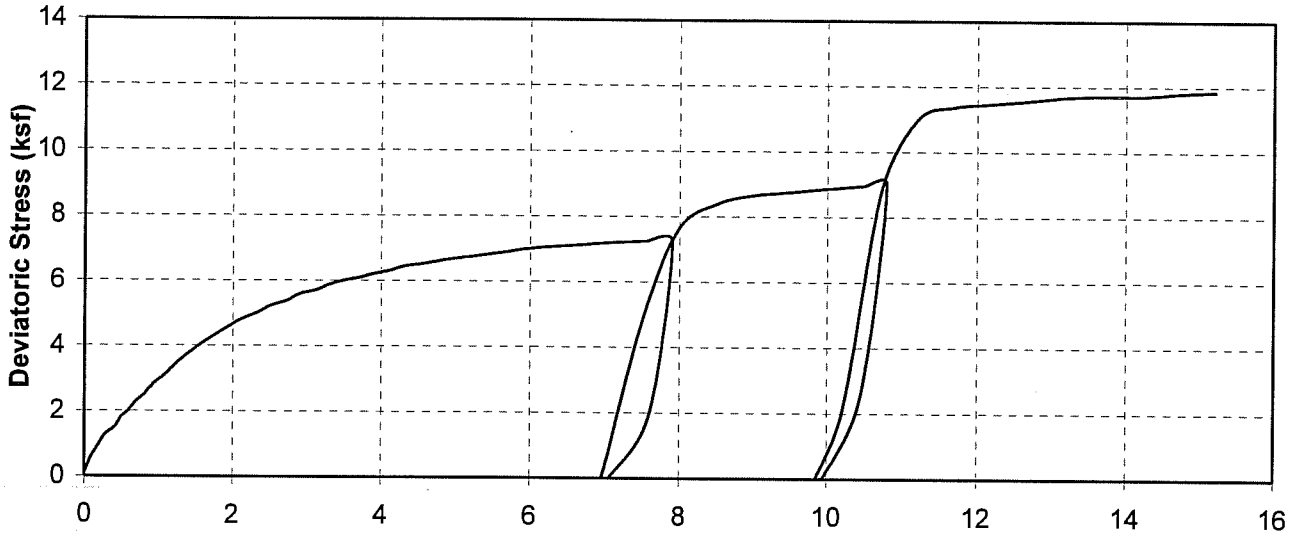
Gs=2.70 (assumed)

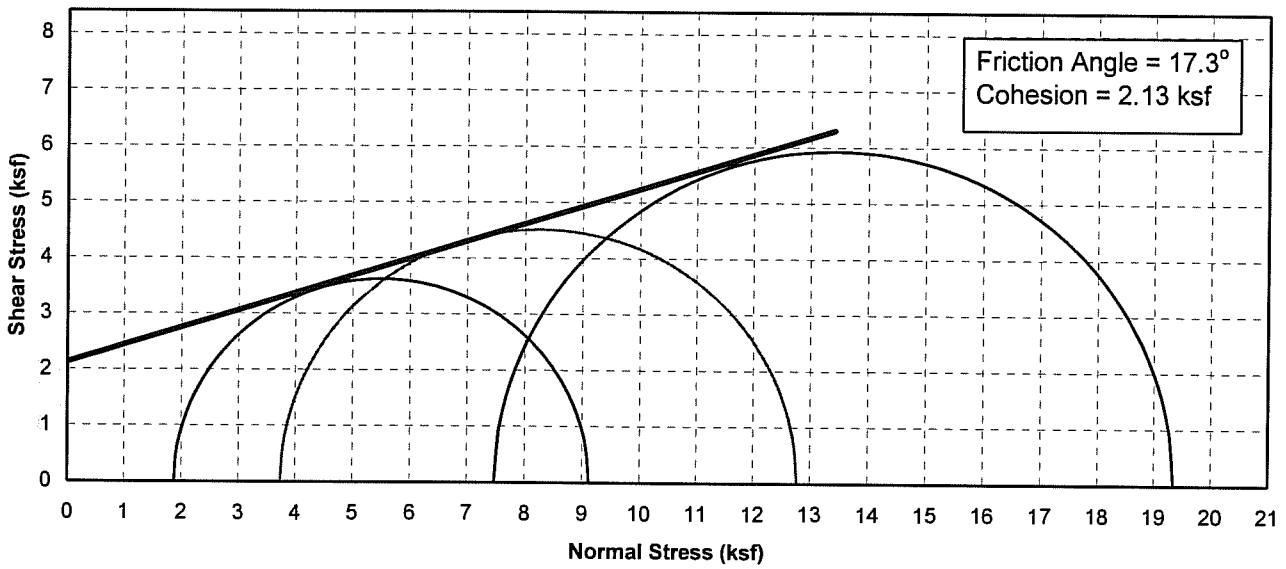
SKETCH / PHOTO AFTER TEST:

Shear Cycle	**1, 2, 3**	**At Failure** Cycle	**1, 2, 3**
Confining Stress (ksf) :	**1.88, 3.74, 7.48**	Deviator Stress (ksf) :	**7.25, 9.04, 11.87**
Deformation Rate (% / min) :	**4**	Eff. Minor Principal Stress (ksf) :	**1.88, 3.74, 7.48**
Failure Criterion: the maximum deviator stress		Eff. Major Principal Stress (ksf) :	**9.13, 12.77, 19.34**
		Axial Strain (%) :	**7.5, 10.8, 15.2**

Earth Mechanics, Inc.

Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-10	D-4-2	16.00	Brown, CL	105.9	13.6	1.88 3.74 7.48	7.25 9.04 11.87	62.2

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**Caltrans\UCSD \ Abutment Research**
Project No. : 02-165 **Date :** 09/03/04	**UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)**

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Patterson Slough\Fremont			**Project No:**	02-165
Boring No.:	04-11A	**Tested by:**	J.R	**Date:**	08/09/04
Depth (ft):	8	**Checked by:**		**Date:**	
Sample No.	D-1	**Sample Type:**	Remolded		
Soil Description:	**Dark Grey, ML/CL**	**Comments:**			

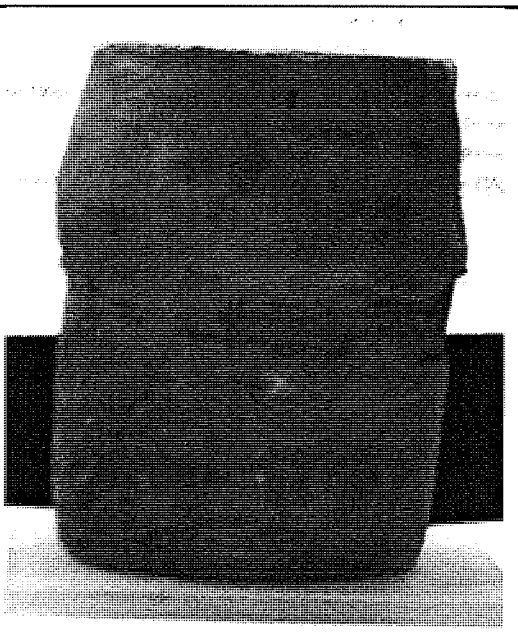
	1	2	3		
Diameter (in.):	2.421	2.424	2.422	Average:	2.422
Height (in.):	5.090	5.000	5.000	Average:	5.030

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	
Wt. Dry Sample + Container (g) :	
Container (g) : No.	
Moisture Content (%) :	**11.0**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**134.0**
Dry Density (pcf) :	**120.7**
Void Ratio :	**0.396**
% Saturation :	**75.2**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:



Shear Cycle	**1, 2, 3**
Confining Stress (ksf) :	**1.08, 2.15, 4.32**
Deformation Rate (% / min) :	**4**
Failure Criterion: the maximum deviator stress	

At Failure Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**2.29, 2.7, 3.11**
Eff. Minor Principal Stress (ksf) :	**1.08, 2.15, 4.32**
Eff. Major Principal Stress (ksf) :	**3.37, 4.85, 7.43**
Axial Strain (%) :	**10.8, 14.9, 19.7**

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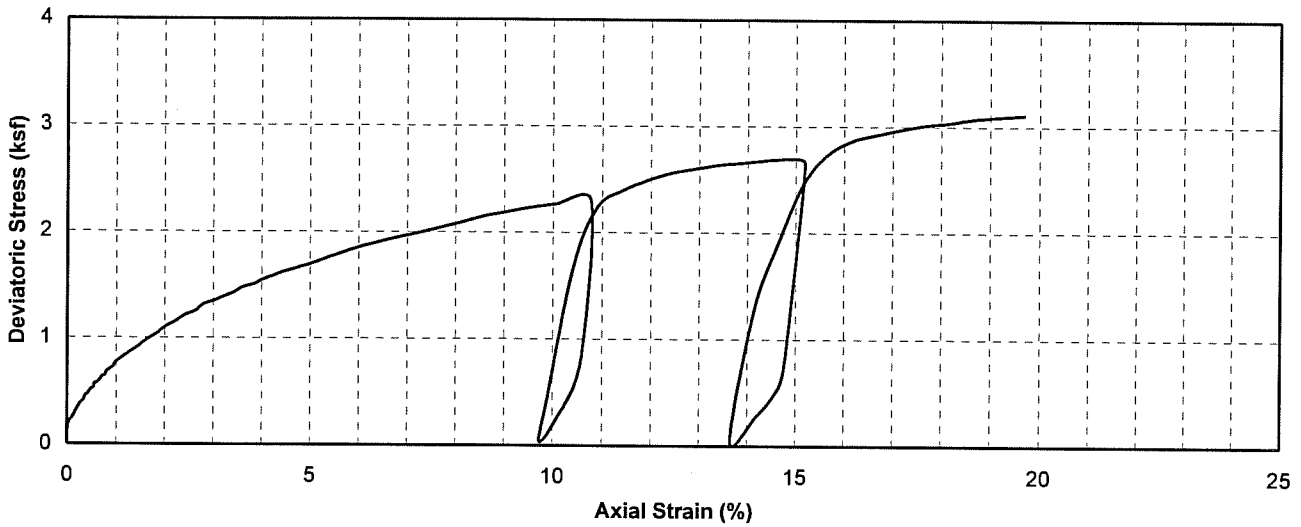
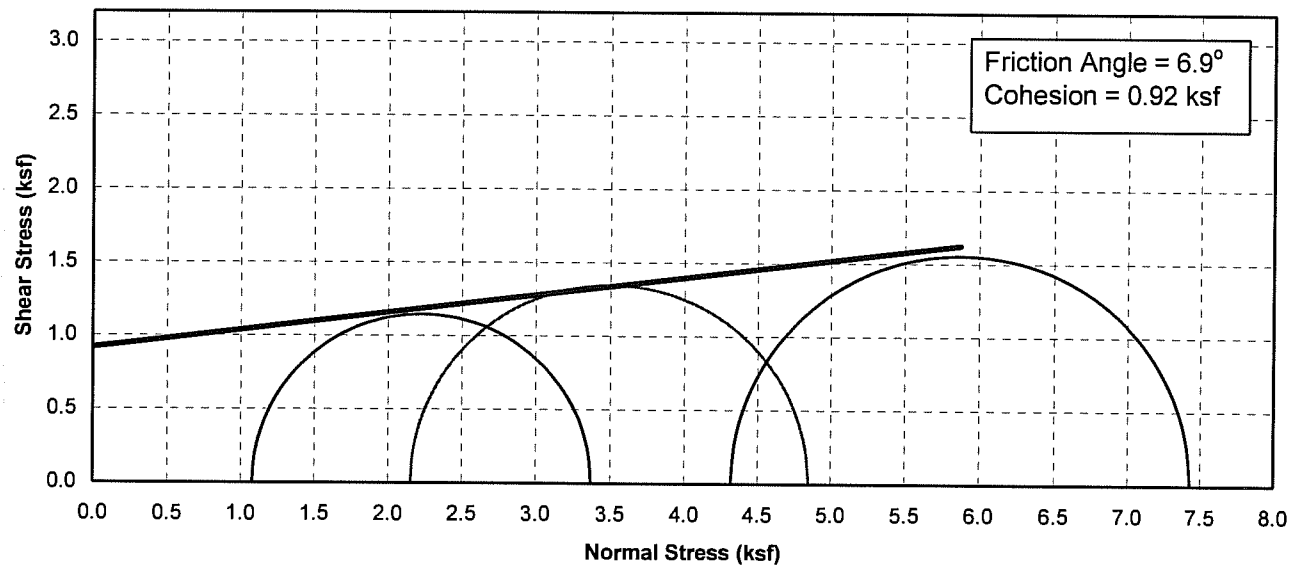




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-11A	D-1	8.00	Dark Grey, ML/CL	120.7	11.0	1.08, 2.15, 4.32	2.29, 2.7, 3.11	75.2

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Caltrans\UCSD \ Abutment Research
Project No. : 02-165 Date : 08/09/04	UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Patterson Slough\Fremont Co.			**Project No:**	02-165
Boring No.:	04-11	**Tested by:**	J.R	**Date:**	08/06/04
Depth (ft):	12.5	**Checked by:**		**Date:**	
Sample No.	D3	**Sample Type:**	In-Situ		
Soil Description:	**Dark grey, ML/CL**	**Comments:**			

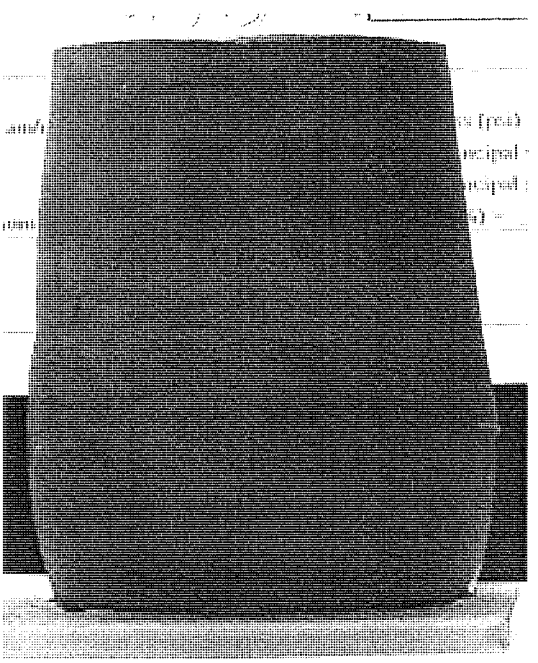
	1	2	3		
Diameter (in.):	2.421	2.422	2.42	Average:	2.421
Height (in.):	5.000	5.000	5.000	Average:	5.000

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	
Wt. Dry Sample + Container (g) :	
Container (g) : No.	
Moisture Content (%) :	**10.0**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**134.0**
Dry Density (pcf) :	**121.8**
Void Ratio :	**0.383**
% Saturation :	**70.5**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:



Shear		**At Failure**	
Cycle	**1, 2, 3**	Cycle	**1, 2, 3**
Confining Stress (ksf) :	**1.73, 3.46, 6.91**	Deviator Stress (ksf) :	**12.55, 13.84, 16.2**
Deformation Rate (% / min) :	**4**	Eff. Minor Principal Stress (ksf) :	**1.73, 3.46, 6.91**
Failure Criterion:		Eff. Major Principal Stress (ksf) :	**14.27, 17.3, 23.11**
the maximum deviator stress		Axial Strain (%) :	**10.6, 14.6, 24.4**

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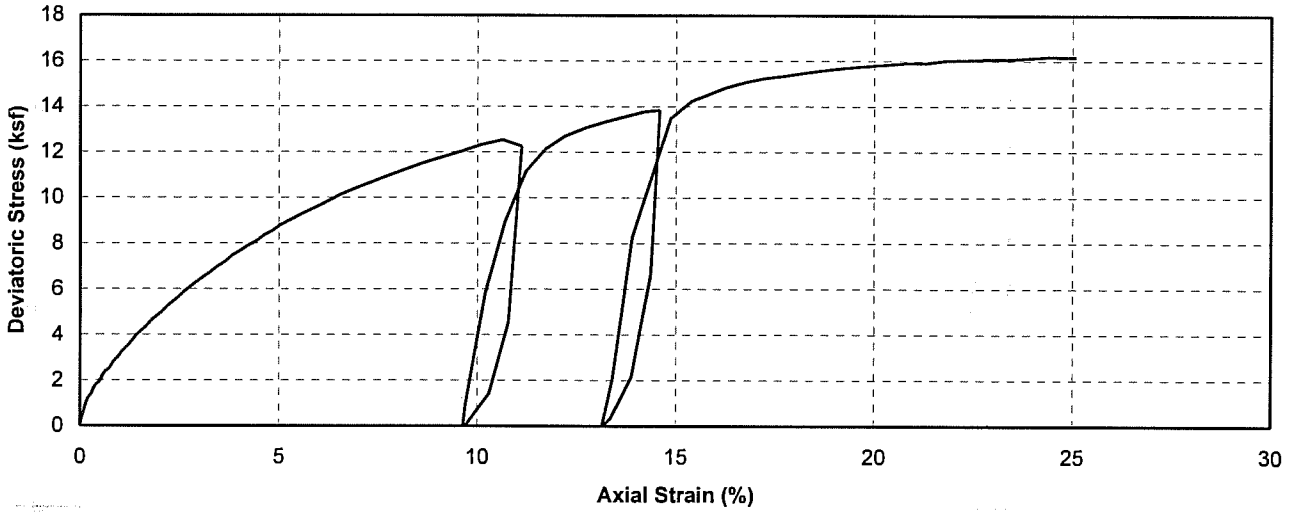
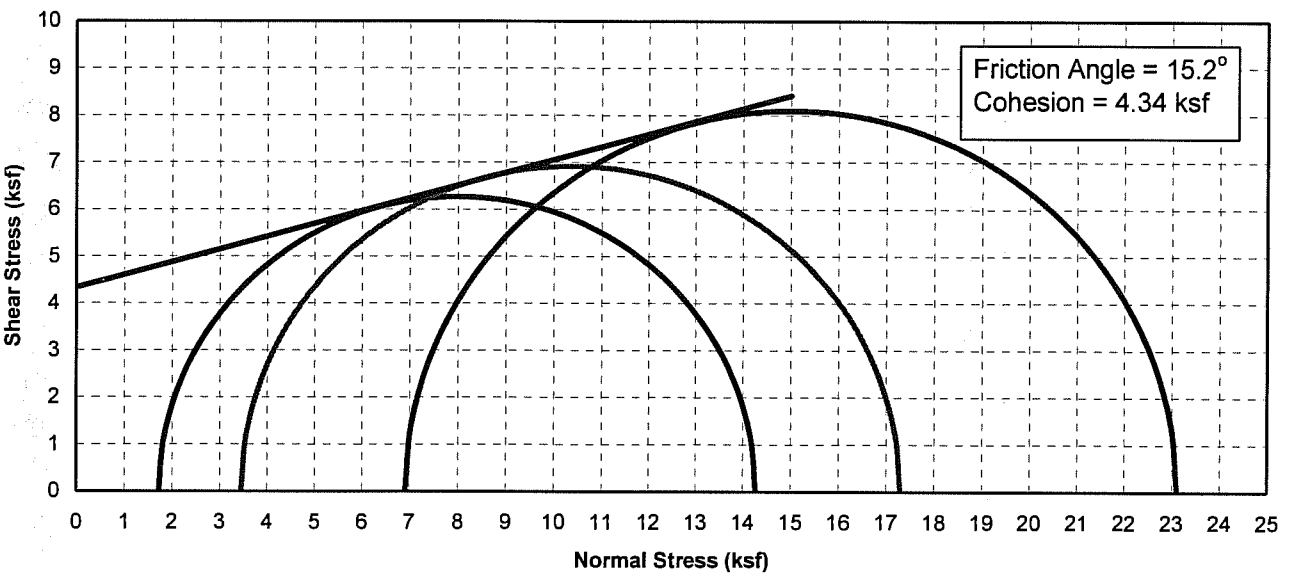




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-11A	D3	12.50	Dark grey, ML/CL	121.8	10.0	1.73, 3.46, 6.91	12.55, 13.84, 16.2	70.5

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Caltrans\UCSD \ Abutment Research
Project No. : 02-165 Date : 08/06/04	UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Route 101/84 Sep.\San Mateo			**Project No:**	02-165
Boring No.:	04-14A	**Tested by:**	J.R.	**Date:**	08/23/04
Depth (ft):	10	**Checked by:**		**Date:**	
Sample No.	3	**Sample Type:**	In-Situ		
Soil Description:	**Brown, CL**	**Comments:**	A crack was observed in top first ring		

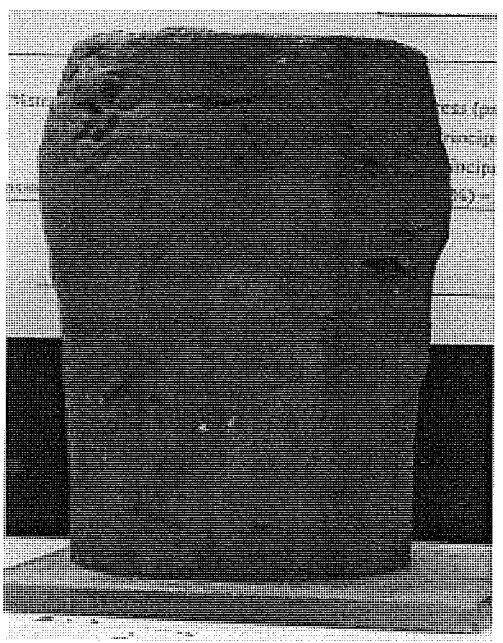
	1	2	3		
Diameter (in.):	2.421	2.423	2.423	Average:	2.422
Height (in.):	5.063	5.090	5.063	Average:	5.072

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	118.4
Wt. Dry Sample + Container (g) :	109.5
Container (g) : No.	15.9
Moisture Content (%) :	**8.7**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**136.0**
Dry Density (pcf) :	**125.1**
Void Ratio :	**0.346**
% Saturation :	**67.7**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:



Shear Cycle	**1, 2, 3**
Confining Stress (ksf) :	**1.37, 2.73, 5.47**
Deformation Rate (% / min) :	**4**
Failure Criterion: the maximum deviator stress	

At Failure Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**5.36, 7.44, 10.38**
Eff. Minor Principal Stress (ksf) :	**1.37, 2.73, 5.47**
Eff. Major Principal Stress (ksf) :	**6.74, 10.16, 15.84**
Axial Strain (%) :	**8.5, 13.1, 19.9**

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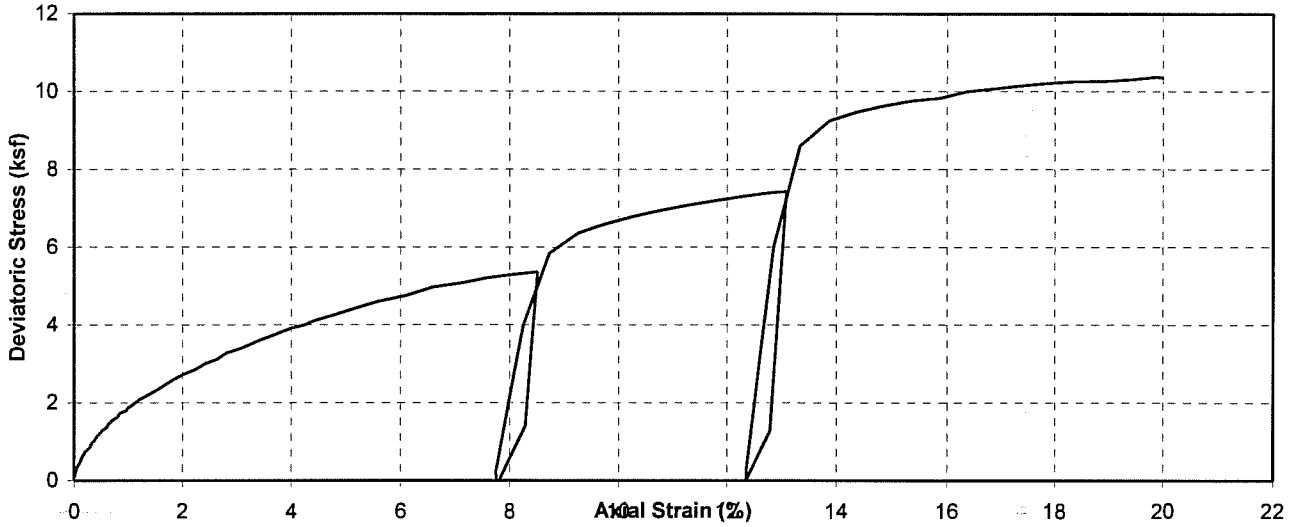
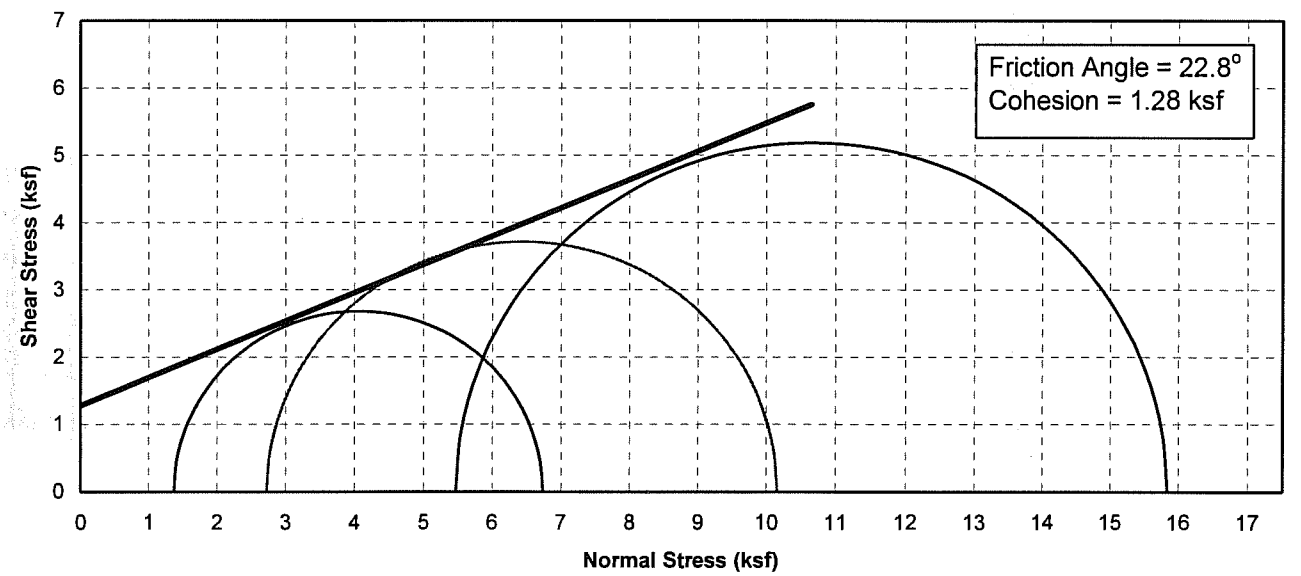




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-14A	3	10.00	Brown, CL	125.1	8.7	1.37, 2.73, 5.47	5.36, 7.44, 10.38	67.7

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Caltrans\UCSD \ Abutment Research
Project No. : 02-165 Date : 08/23/04	UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Painter Street, Humboldt Co			**Project No:**	02-165
Boring No.:	04-15A	**Tested by:**	J.R.	**Date:**	11/02/04
Depth (ft):	2.5-7	**Checked by:**		**Date:**	
Sample No.	B-0, S-1, S-2B, S-3A	**Sample Type:**	composite		
Sample Description:	SP, Bulk	**Comments:**	(Bad test) Dense coarse sand w/ gravel		

	1	2	3		
Diameter (in.):	2.8	2.8	2.8	Average:	2.800
Height (in.):	6.000	6.000	6.000	Average:	6.000

Moisture Content Calculation	
Wt. Wet Sample + Container (gms):	
Wt. Dry Sample + Container (gms):	
Container (gms) No.	
Moisture Content (%)	**4.0**

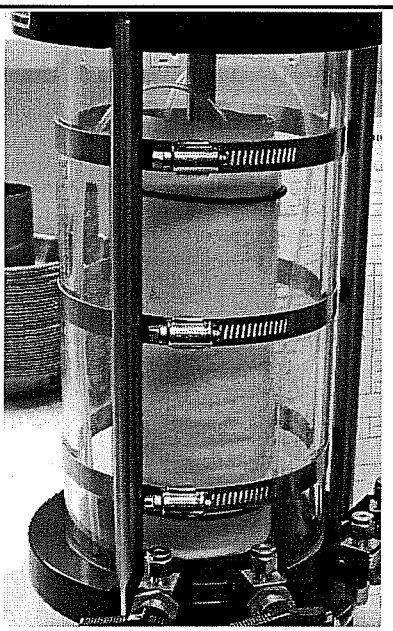
Density and Saturation	
Wt. Wet Sample + Container (gms)	
Container (gms)	
Wet Density (pcf)	**134.7**
Dry Density (pcf)	**129.5**
Void Ratio	**0.301**
% Saturation	**35.9**

Assume Gs=2.70

Test Data Filename:	04-15A,2B,Remold#1.trx

SKETCH / PHOTO AFTER TEST:

PHOTO FILE NAME:



Shear	
Rate of Deformation (% strain / min) =	**4**
Confining Stress (ksf):	**0.86**

Failure Criterion: **criterion 2 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**5.19**
Eff. Minor Principal Stress (ksf)=	**0.86**
Eff. Major Principal Stress (ksf)=	**6.05**
Axial Strain (%)=	**6.02**

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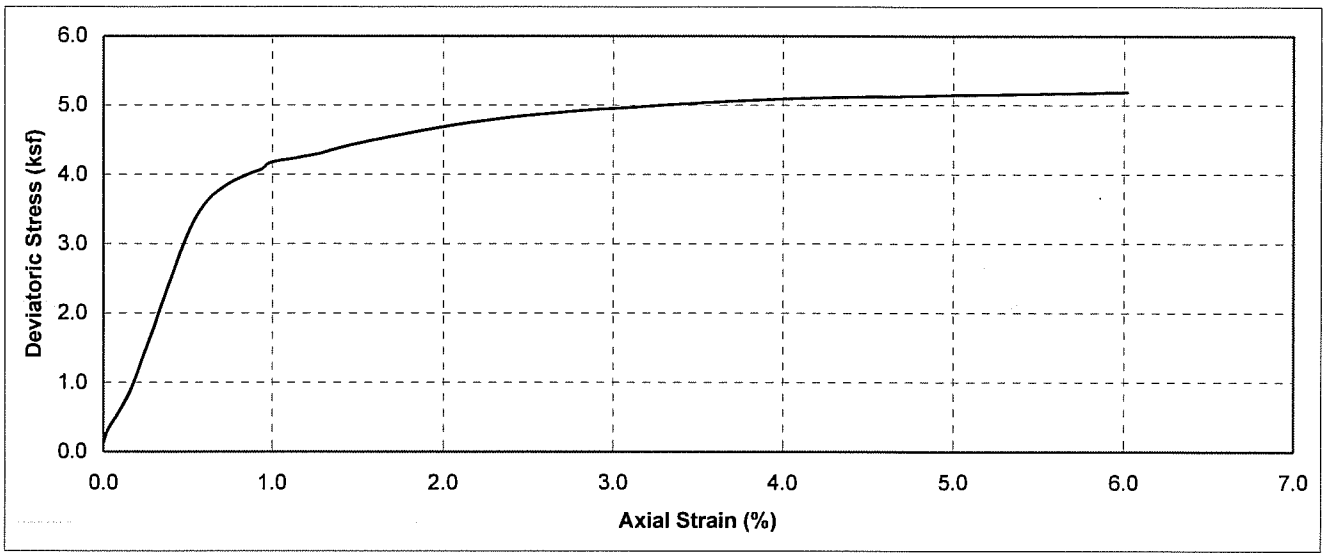
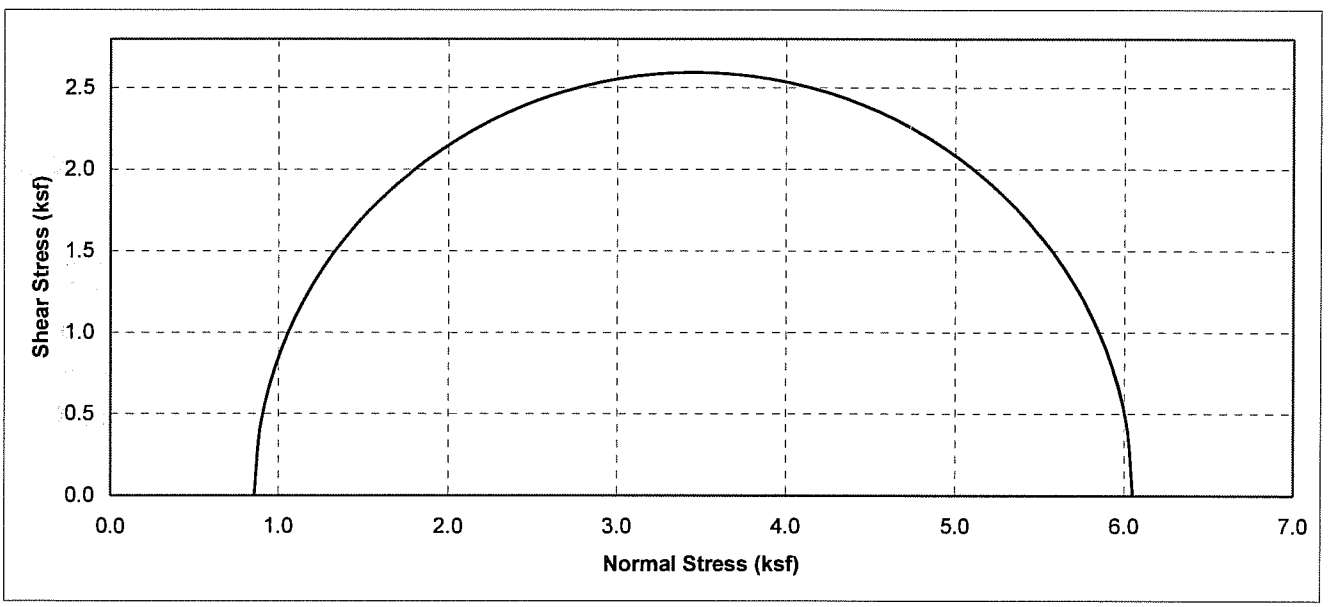




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	Max. Dev. Stress (ksf)	Initial Saturation (%)
04-15A	B,1,2B,3A	10	SP, Bulk	129.5	4.00	0.86	5.19	35.9

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**Caltrans\UCSD \ Abutment Research**
Project No. : 02-165 **Date :** 11/02/04	**UNCONSOLIDATED UNDRAINED TEST** **(ASTM D2850)** Figure No. :

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Painter Street, Humboldt Co			**Project No:**	02-165
Boring No.:	04-15A	**Tested by:**	J.R	**Date:**	11/04/04
Depth (ft):	2.5-7	**Checked by:**		**Date:**	
Sample No.	B-0, S-1, S-2B, S-3A	**Sample Type:**	composite		
Sample Description:	Dense coarse sand w/ gravel	**Comments:**			

	1	2	3		
Diameter (in.):	2.862	2.862	2.862	Average:	2.862
Height (in.):	5.750	5.750	5.750	Average:	5.750

Moisture Content Calculation	
Wt. Wet Sample + Container (gms):	
Wt. Dry Sample + Container (gms):	
Container (gms) No.	
Moisture Content (%)	**4.0**

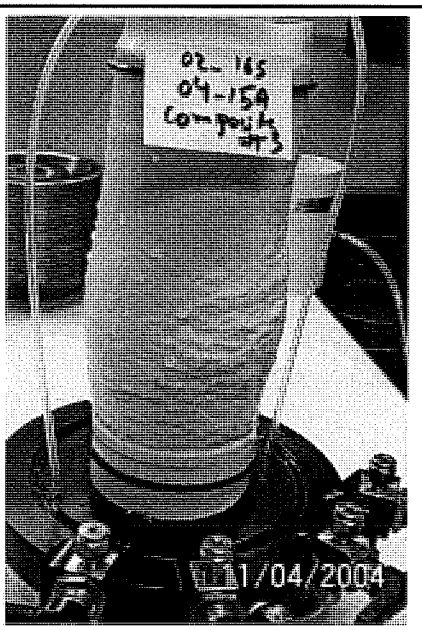
Density and Saturation	
Wt. Wet Sample + Container (gms)	
Container (gms)	229.06
Wet Density (pcf)	**129.5**
Dry Density (pcf)	**124.5**
Void Ratio	**0.353**
% Saturation	**30.6**

Assume Gs=2.70

Test Data Filename:	04-15A,2B,Remold#3.trx

SKETCH / PHOTO AFTER TEST:

PHOTO FILE NAME:



Shear	
Rate of Deformation (% strain / min) =	**4**
Confining Stress (ksf):	**1.00**

Failure Criterion: **criterion 1 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**5.64**
Eff. Minor Principal Stress (ksf)=	**1.00**
Eff. Major Principal Stress (ksf)=	**6.64**
Axial Strain (%)=	**6.08**

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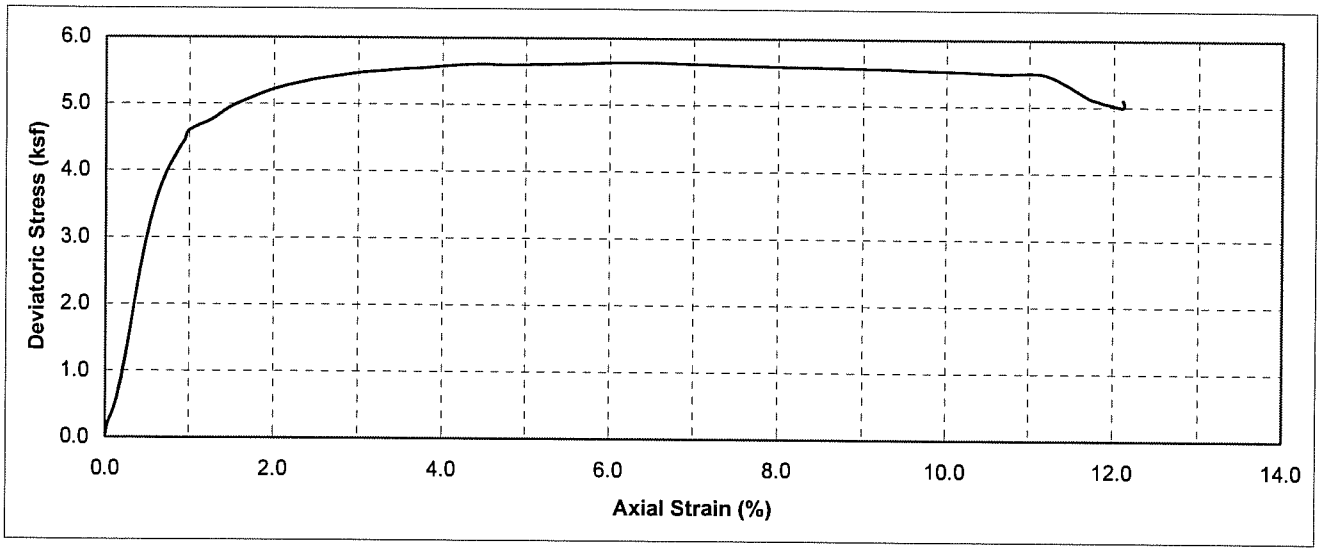
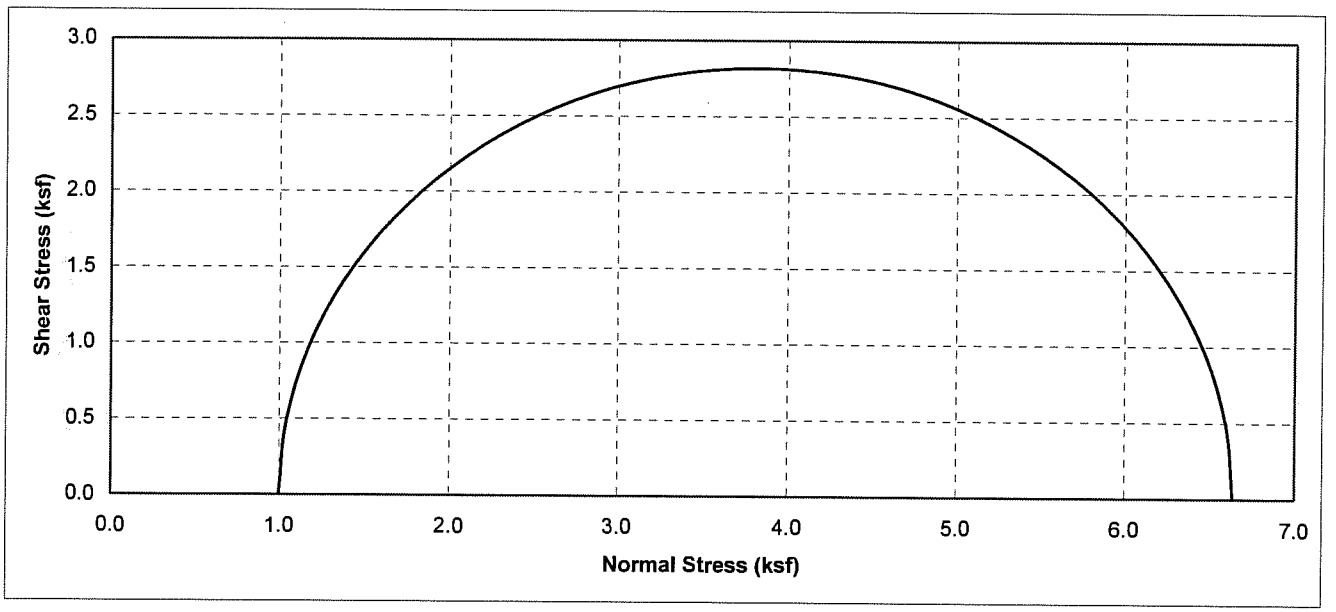
Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	Max. Dev. Stress (ksf)	Initial Saturation (%)
04-15A	Composite	2.5-7	Dense coarse sand w/ gravel	124.5	4.00	1.00	5.64	30.6

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**Caltrans\UCSD \ Abutment Research**
Project No. : 02-165 **Date :** 11/04/04	**UNCONSOLIDATED UNDRAINED TEST** **(ASTM D2850)** Figure No. :

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Painter Street, Humboldt Co			**Project No:**	02-165
Boring No.:	04-15A	**Tested by:**	J.R	**Date:**	08/25/04
Depth (ft):	7.5	**Checked by:**		**Date:**	
Sample No.	3B	**Sample Type:**	In-Situ		
Soil Description:	**Black, ML, Very Stiff Clayey Silt**	**Comments:**			

	1	2	3		
Diameter (in.):	2.423	2.421	2.44	Average:	2.428
Height (in.):	5.000	5.060	5.090	Average:	5.050

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	156.87
Wt. Dry Sample + Container (g) :	141.43
Container (g) : No.	16.08
Moisture Content (%) :	**11.0**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**128.4**
Dry Density (pcf) :	**115.7**
Void Ratio :	**0.456**
% Saturation :	**64.9**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:

Shear Cycle	**1, 2, 3**
Confining Stress (ksf) :	**1, 2.01, 4.02**
Deformation Rate (% / min) :	**4**
Failure Criterion: the maximum deviator stress	

At Failure Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**8.3, 10.26, 11.38**
Eff. Minor Principal Stress (ksf) :	**1, 2.01, 4.02**
Eff. Major Principal Stress (ksf) :	**9.31, 12.27, 15.41**
Axial Strain (%) :	**11.1, 18.6, 27.6**

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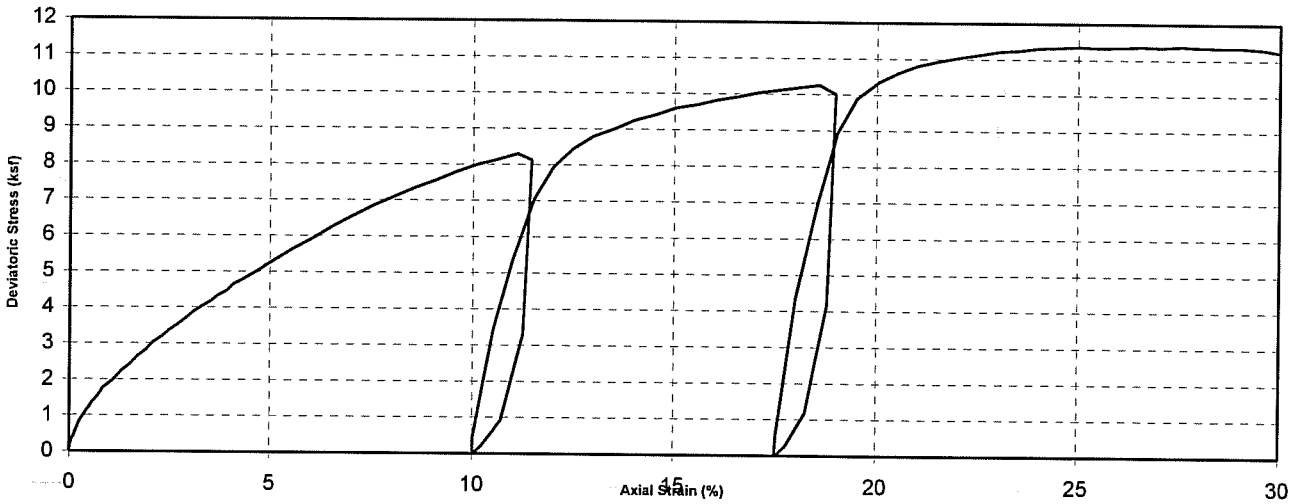
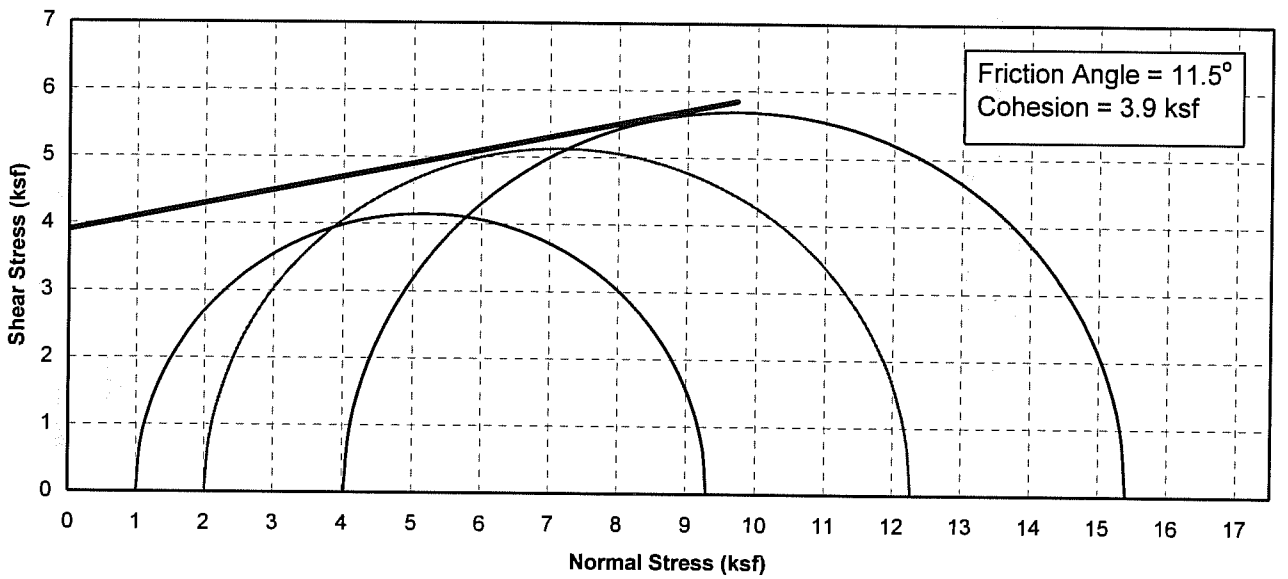
Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-15A	3B	7.50	Black, ML	115.7	11.0	1 2.01 4.02	8.3 10.26 11.38	64.9

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Caltrans\UCSD \ Abutment Research
Project No. : 02-165 Date : 08/25/04	UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Painter Street, Humboldt Co			**Project No:**	02-165
Boring No.:	04-15A	**Tested by:**	J.R.	**Date:**	10/27/04
Depth (ft):	12.5	**Checked by:**		**Date:**	
Sample No.	D-5	**Sample Type:**	Remolded		

Sample Description: Stiff Lean Clay w/Coarse Sand **Comments:**

Grain ize: 0:25:75 0% Fines Finer than #200

	1	2	3		
Diameter (in.):	2.43	2.424	2.432	Average:	2.429
Height (in.):	5.060	5.090	5.090	Average:	5.080

Moisture Content Calculation	
Wt. Wet Sample + Container (gms):	
Wt. Dry Sample + Container (gms):	
Container (gms) No.	
Moisture Content (%)	**16.4**

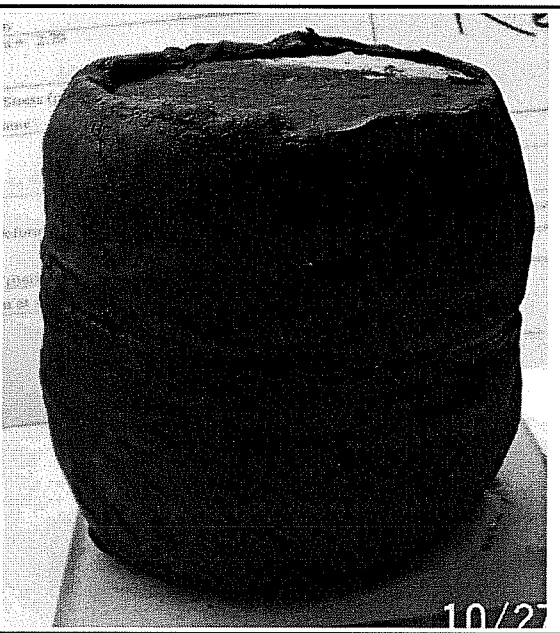
Density and Saturation	
Wt. Wet Sample + Container (gms)	
Container (gms)	229.06
Wet Density (pcf)	**135.3**
Dry Density (pcf)	**116.2**
Void Ratio	**0.450**
% Saturation	**98.6**

Assume Gs=2.70

Test Data Filename:	04-15A,D-5,Remold#1.trx

SKETCH / PHOTO AFTER TEST:

PHOTO FILE NAME:



Shear	
Rate of Deformation (% strain / min) =	**4**
Confining Stress (ksf):	**1.07**

Failure Criterion: **criterion 2 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**4.06**
Eff. Minor Principal Stress (ksf)=	**1.07**
Eff. Major Principal Stress (ksf)=	**5.13**
Axial Strain (%)=	**10.19**

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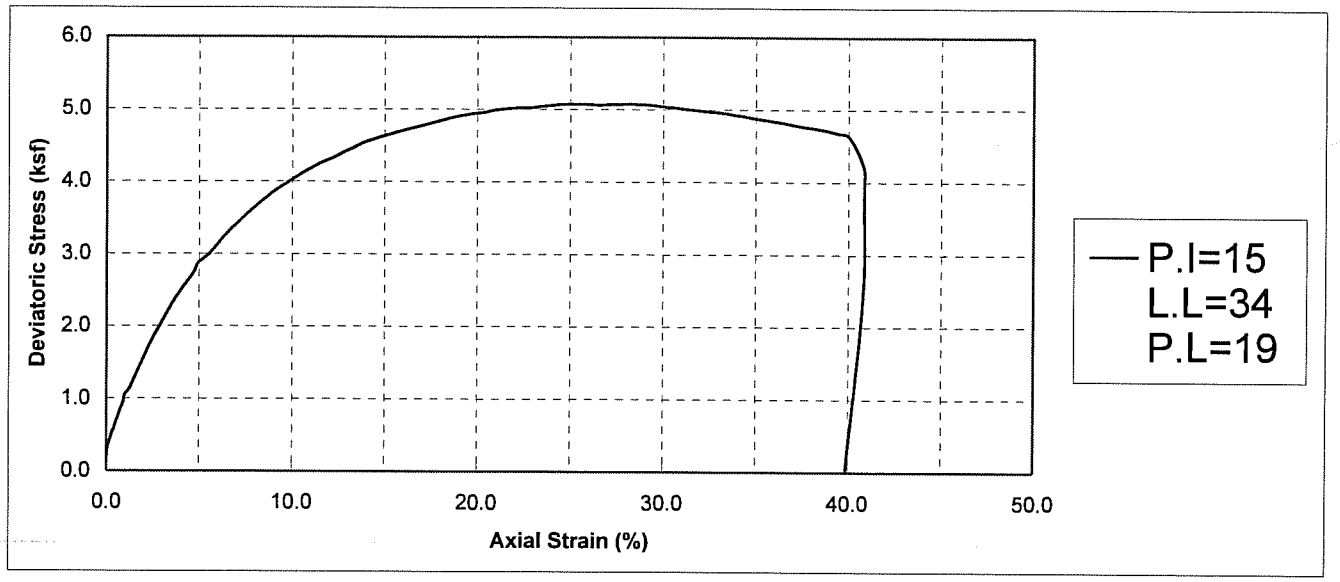
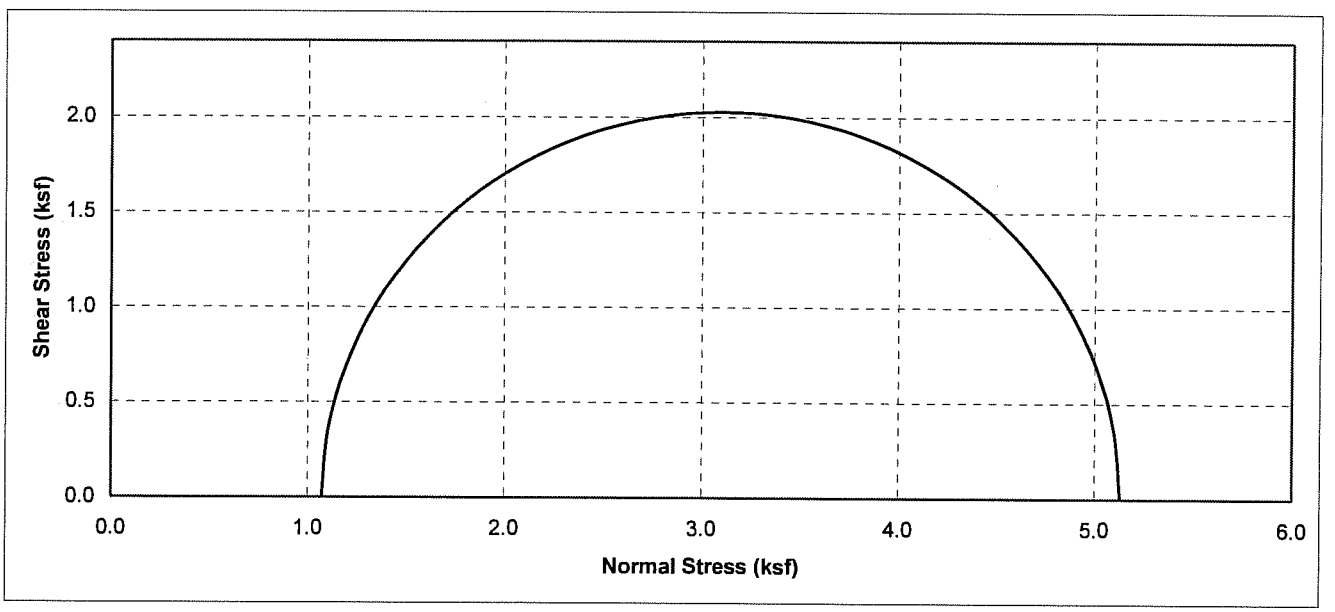
Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	Max. Dev. Stress (ksf)	Initial Saturation (%)
04-15A	D-5	12.5	Black gray , CL	116.2	16.42	1.07	4.06	98.6

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**Caltrans\UCSD \ Abutment Research**
Project No. : 02-165 **Date :** 10/27/04	**UNCONSOLIDATED UNDRAINED TEST** **(ASTM D2850)** Figure No. :

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Painter Street, Humboldt Co			**Project No:**	02-165
Boring No.:	04-15A	**Tested by:**	J.R.	**Date:**	11/03/04
Depth (ft):	2.5-7	**Checked by:**		**Date:**	11/03/04
Sample No.	B-0, S-1, S-2B, S-3A	**Sample Type:**	composite		
Soil Description:	**Dense coarse sand w/ gravel**	**Comments:**			

	1	2	3		
Diameter (in.):	2.862	2.862	2.862	Average:	2.862
Height (in.):	5.750	5.750	5.750	Average:	5.750

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	
Wt. Dry Sample + Container (g) :	
Container (g) : No.	
Moisture Content (%) :	**4.0**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**134.7**
Dry Density (pcf) :	**129.5**
Void Ratio :	**0.301**
% Saturation :	**35.9**

Gs=2.70 (assumed)

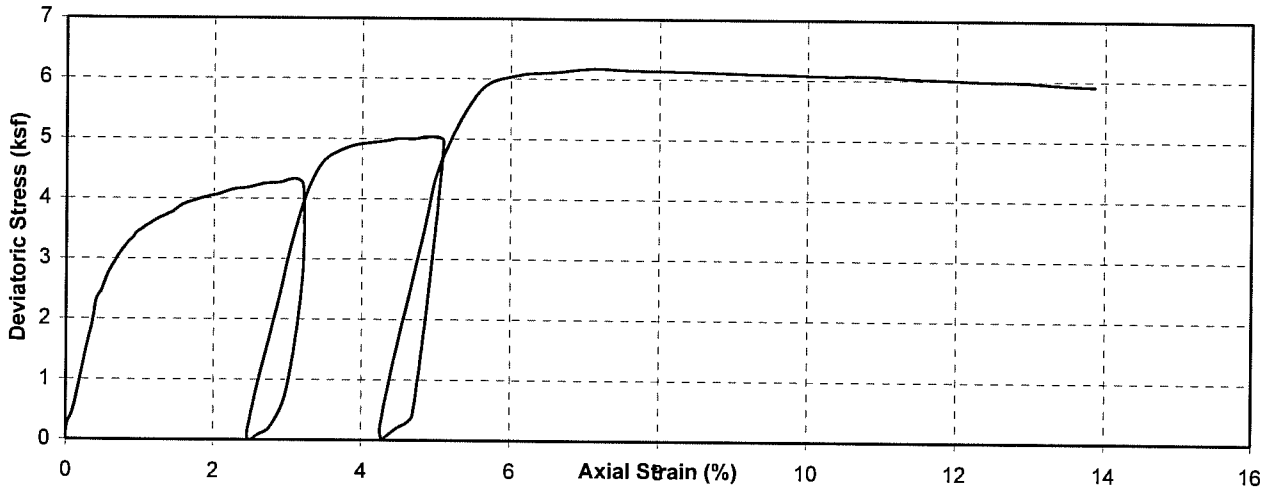
SKETCH / PHOTO AFTER TEST:

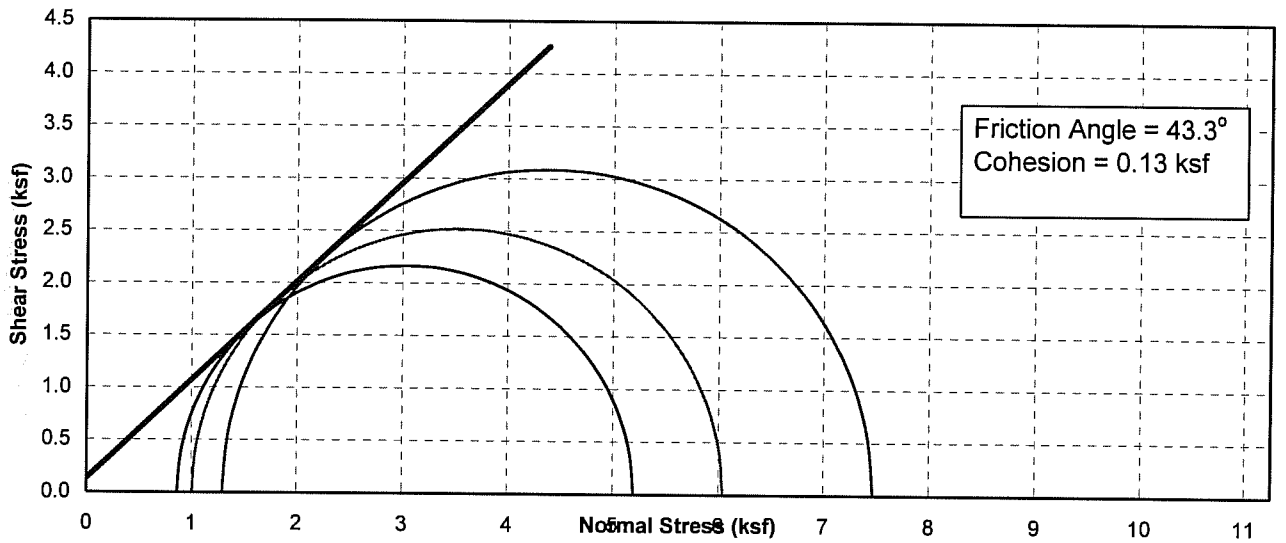
Shear	
Cycle	**1, 2, 3**
Confining Stress (ksf) :	**0.87, 1.01, 1.3**
Deformation Rate (% / min) :	**4**
Failure Criterion:	
the maximum deviator stress	

At Failure	
Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**4.33, 5.04, 6.18**
Eff. Minor Principal Stress (ksf) :	**0.87, 1.01, 1.3**
Eff. Major Principal Stress (ksf) :	**5.2, 6.04, 7.47**
Axial Strain (%) :	**3.1, 4.9, 7.1**

Earth Mechanics, Inc.

Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-15A	Composite	2.5-7	Dense coarse sand w/ gravel	129.5	4.0	0.87 1.01 1.3	4.33 5.04 6.18	35.9

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**Caltrans\UCSD \ Abutment Research**
Project No. : 02-165 **Date :** 11/03/04	**UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)**

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Painter Street, Humboldt Co			**Project No:**	02-165
Boring No.:	04-16A	**Tested by:**	J.R.	**Date:**	08/26/04
Depth (ft):	10	**Checked by:**		**Date:**	
Sample No.	4	**Sample Type:**	In-Situ		
Soil Description:	**CL, Very Stiff Clay with Silt**	**comments:**			

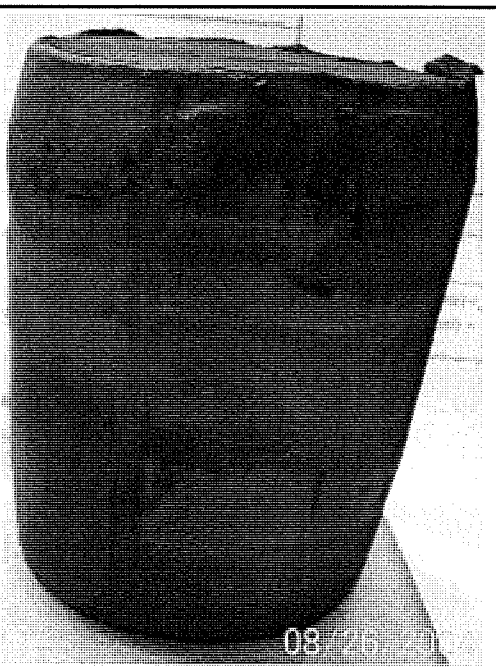
	1	2	3		
Diameter (in.):	2.421	2.423	2.423	Average:	2.422
Height (in.):	5.060	5.060	5.000	Average:	5.040

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	157.08
Wt. Dry Sample + Container (g) :	142.27
Container (g) : No.	16.64
Moisture Content (%) :	**10.5**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**127.3**
Dry Density (pcf) :	**115.2**
Void Ratio :	**0.463**
% Saturation :	**61.5**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:



Shear Cycle	**1, 2, 3**
Confining Stress (ksf) :	**1.3, 2.59, 5.46**
Deformation Rate (% / min) :	**4**
Failure Criterion: the maximum deviator stress	

At Failure Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**7.03, 7.97, 9.08**
Eff. Minor Principal Stress (ksf) :	**1.3, 2.59, 5.46**
Eff. Major Principal Stress (ksf) :	**8.33, 10.56, 14.54**
Axial Strain (%) :	**10.5, 15.5, 24.8**

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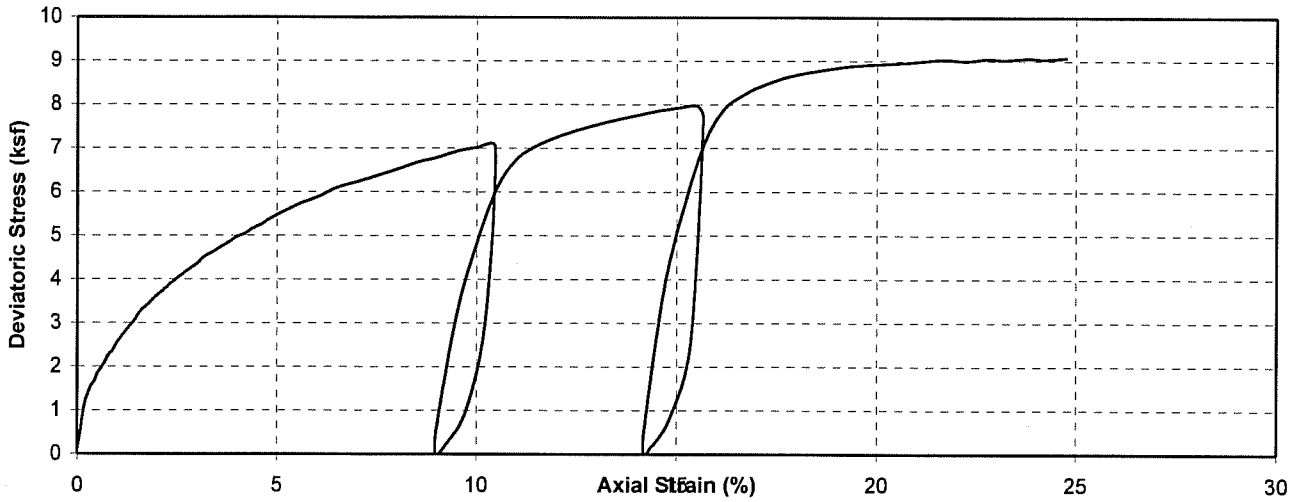
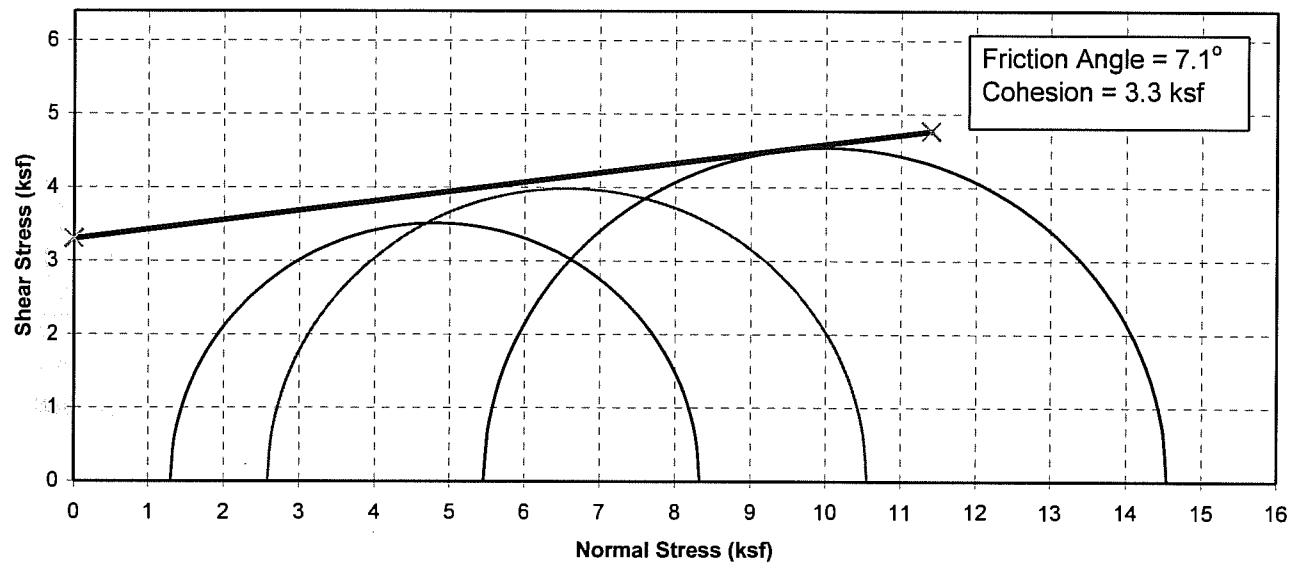
Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-16A	4	10.00	CL, Very Stiff Clay with Silt	115.2	10.5	1.3 2.59 5.46	7.03, 7.97, 9.08	61.5

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Caltrans\UCSD \ Abutment Research
Project No. : 02-155 Date : 08/26/04	UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Meloland Rd OC\Imperial			**Project No:**	02-165
Boring No.:	04-17A	**Tested by:**	J.R.	**Date:**	09/02/04
Depth (ft):	15	**Checked by:**		**Date:**	
Sample No.	6	**Sample Type:**	In-Situ		
Soil Description:	**Brown,CL**	**Comments:**			

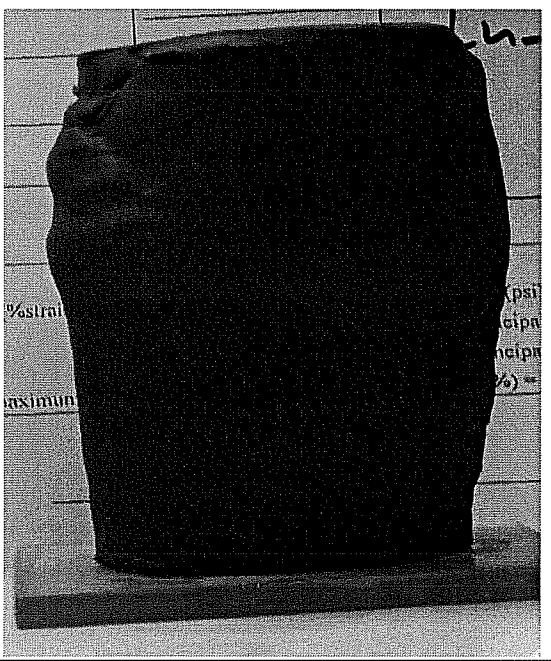
	1	2	3		
Diameter (in.):	2.422	2.421	2.423	Average:	2.422
Height (in.):	5.060	5.090	5.100	Average:	5.083

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	93.46
Wt. Dry Sample + Container (g) :	80.63
Container (g) : No.	16.18
Moisture Content (%) :	**16.6**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**122.4**
Dry Density (pcf) :	**105.0**
Void Ratio :	**0.605**
% Saturation :	**74.1**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:



Shear Cycle	**1, 2, 3**
Confining Stress (ksf) :	**1.87, 3.73, 7.49**
Deformation Rate (% / min) :	**4**
Failure Criterion: the maximum deviator stress	

At Failure Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**5.52, 5.87, 6.09**
Eff. Minor Principal Stress (ksf) :	**1.87, 3.73, 7.49**
Eff. Major Principal Stress (ksf) :	**7.39, 9.6, 13.58**
Axial Strain (%) :	**8.6, 12.6, 17.6**

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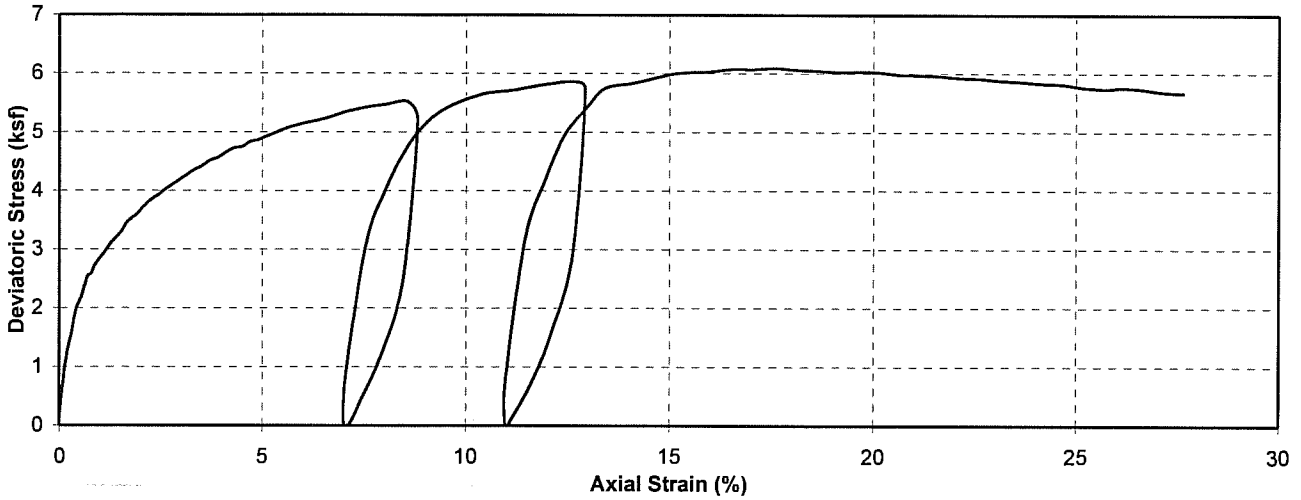
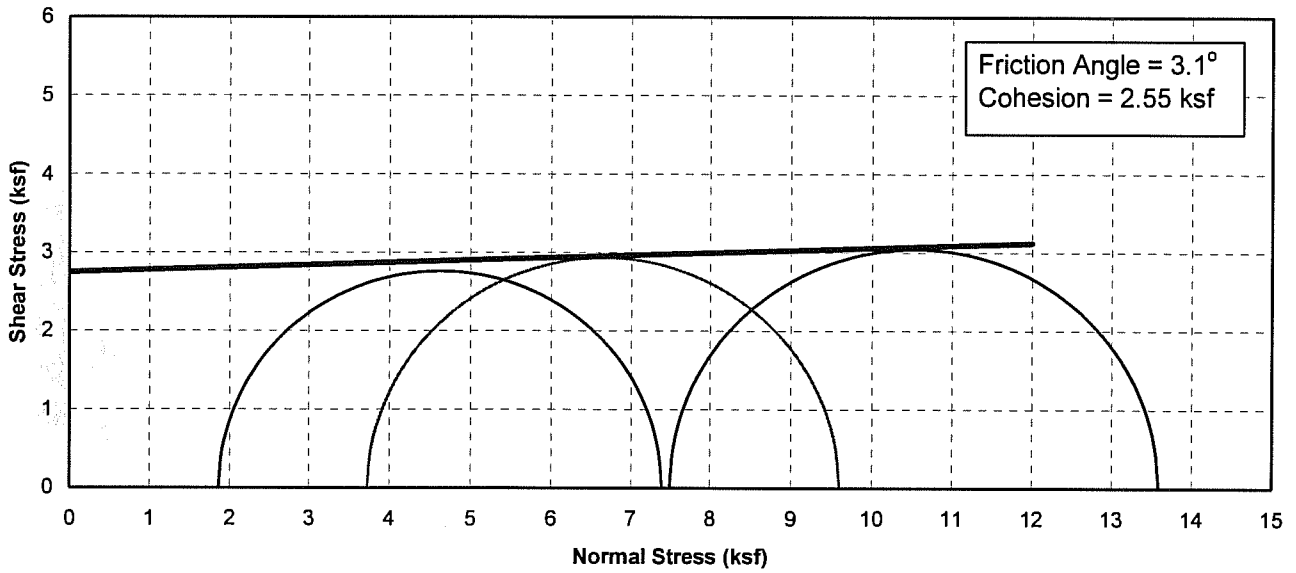
Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-17A	6	15.00	Brown,CL	105.0	16.6	1.87 3.73 7.49	5.52 5.87 6.09	74.1

Earth Mechanics, Inc.
Geotechnical and Earthquake Engineering

Caltrans\UCSD \ Abutment Research

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST
(ASTM D2850)

Project No. : 02-165 **Date :** 09/02/04

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Meloland Rd OC\Imperial Co.			**Project No:**	02-165
Boring No.:	04-17A	**Tested by:**	J.R.	**Date:**	11/04/04
Depth (ft):	2.5	**Checked by:**		**Date:**	11/04/04
Sample No.	Bulk, B-0	**Sample Type:**	Bulk		
Soil Description:	**SM**	**Comments:**			

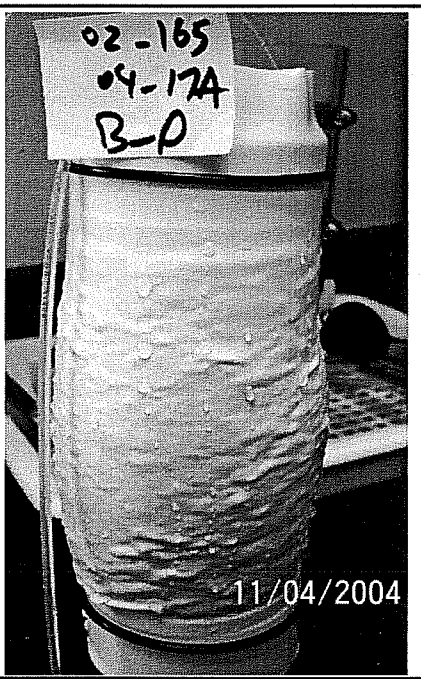
	1	2	3		
Diameter (in.):	2.862	2.862	2.862	Average:	2.862
Height (in.):	5.750	5.750	5.750	Average:	5.750

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	
Wt. Dry Sample + Container (g) :	
Container (g) : No.	
Moisture Content (%) :	**6.3**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**135.0**
Dry Density (pcf) :	**127.0**
Void Ratio :	**0.327**
% Saturation :	**52.1**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:



Shear	
Cycle	**1, 2, 3**
Confining Stress (ksf) :	**0.77, 1, 1.28**
Deformation Rate (% / min) :	**4**
Failure Criterion:	
the maximum deviator stress	

At Failure	
Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**4.73, 5.35, 5.92**
Eff. Minor Principal Stress (ksf) :	**0.77, 1, 1.28**
Eff. Major Principal Stress (ksf) :	**5.5, 6.35, 7.2**
Axial Strain (%) :	**6.6, 9.1, 12.6**

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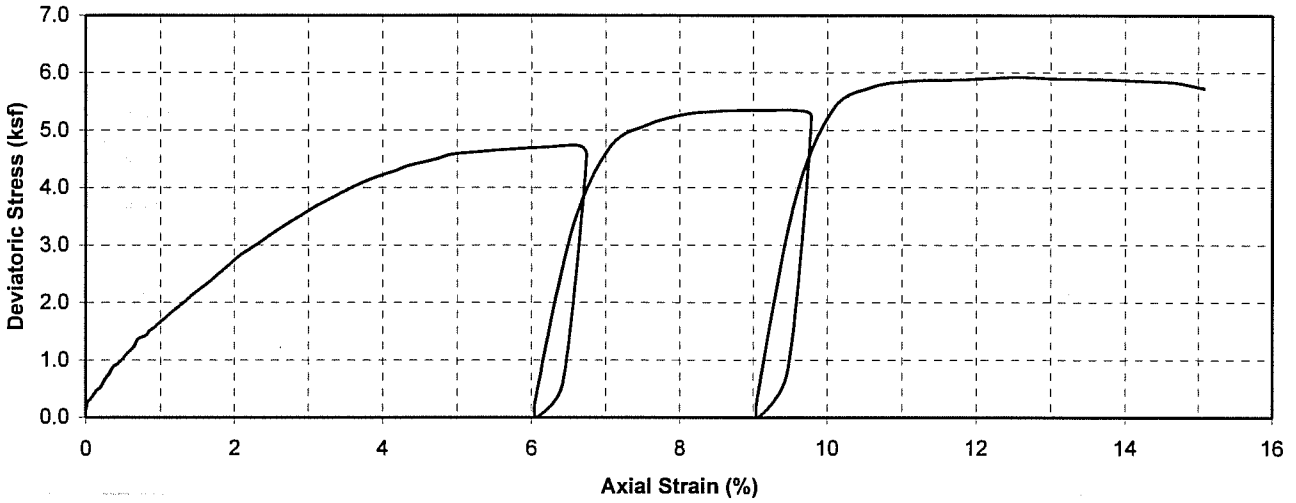
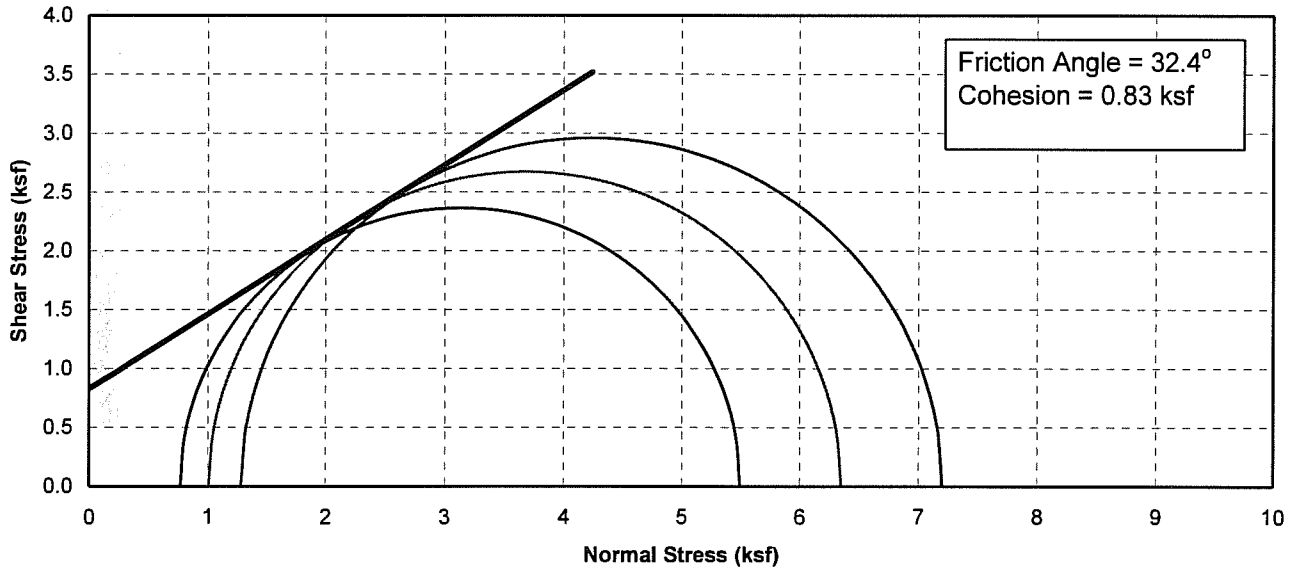
Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-17A	Bulk, B-0	2.50	SM	127.0	6.3	0.77 1 1.28	4.73, 5.35, 5.92	52.1

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Caltrans\UCSD \ Abutment Research
Project No. : 02-165 Date : 11/04/04	UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Meloland Rd OC\Imperial			**Project No:**	02-165
Boring No.:	04-17A	**Tested by:**	J.R.	**Date:**	11/05/04
Depth (ft):	2.5	**Checked by:**		**Date:**	11/05/04
Sample No.	B-0	**Sample Type:**	Bulk		
Sample Description:	SM	**Comments:**			

	1	2	3		
Diameter (in.):	2.862	2.862	2.862	Average:	2.862
Height (in.):	5.750	5.750	5.750	Average:	5.750

Moisture Content Calculation	
Wt. Wet Sample + Container (gms):	
Wt. Dry Sample + Container (gms):	
Container (gms) No.	
Moisture Content (%)	**6.3**

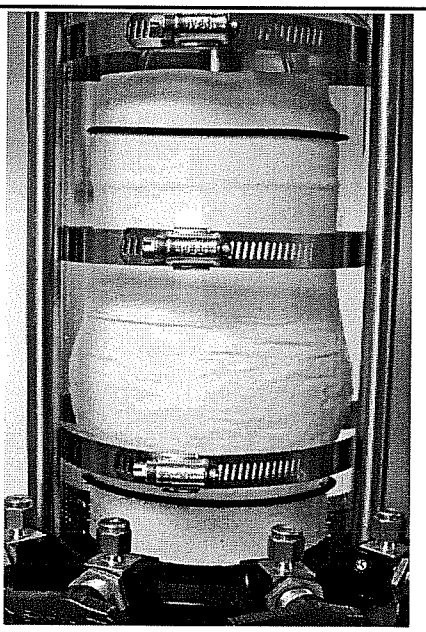
Density and Saturation	
Wt. Wet Sample + Container (gms)	
Container (gms)	229.06
Wet Density (pcf)	**135.0**
Dry Density (pcf)	**127.0**
Void Ratio	**0.327**
% Saturation	**52.1**

Assume Gs=2.70

Test Data Filename:	04-17A,B-0,Remold#2.trx

SKETCH / PHOTO AFTER TEST:

PHOTO FILE NAME:



Shear	
Rate of Deformation (% strain / min) =	**4**
Confining Stress (ksf):	**1.01**

Failure Criterion: **criterion 1 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**4.33**
Eff. Minor Principal Stress (ksf)=	**1.01**
Eff. Major Principal Stress (ksf)=	**5.34**
Axial Strain (%)=	**14.34**

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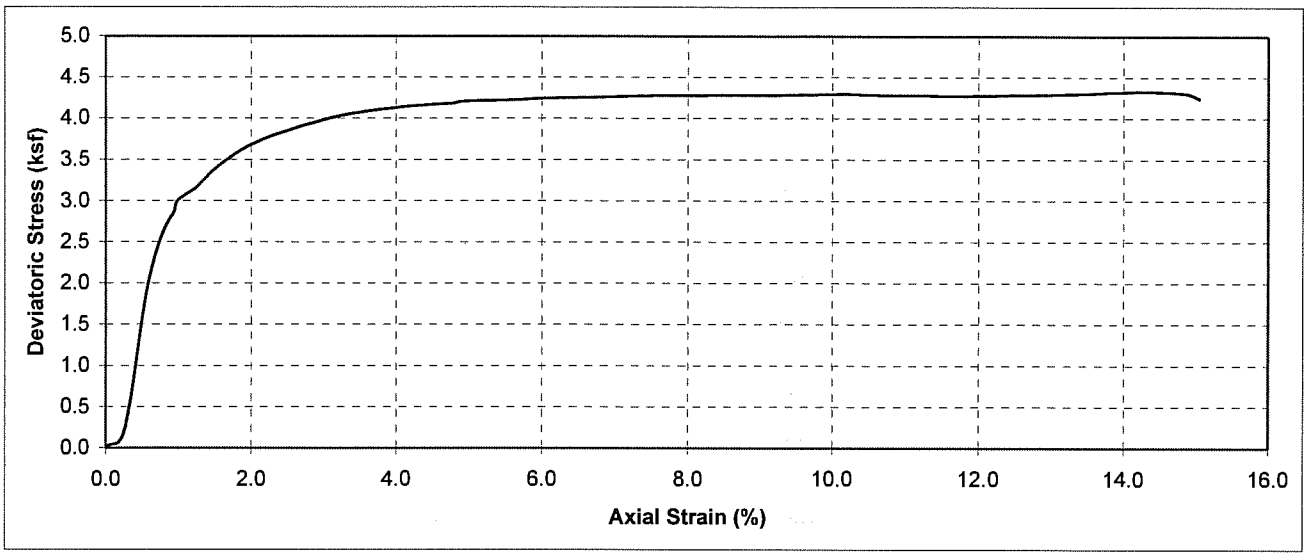
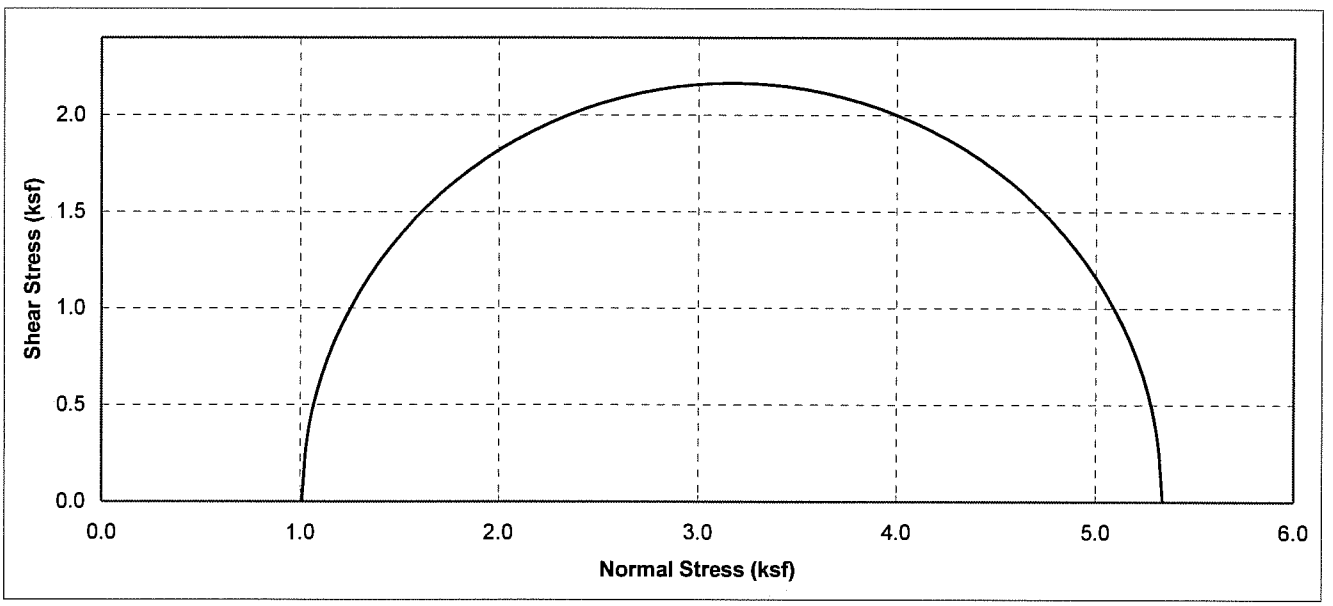
Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	Max. Dev. Stress (ksf)	Initial Saturation (%)
04-17A	B-0	2.5	SM	127.0	6.30	1.01	4.33	52.1

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**Caltrans\UCSD \ Abutment Research**
Project No. : 02-165 **Date :** 11/05/04	**UNCONSOLIDATED UNDRAINED TEST** **(ASTM D2850)** Figure No. :

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Meloland Rd OC\Imperial			**Project No:**	02-165
Boring No.:	04-17A	**Tested by:**	J.R.	**Date:**	11/04/04
Depth (ft):	5	**Checked by:**		**Date:**	
Sample No.	B-0	**Sample Type:**	R		
Sample Description:	Silty Sand, SM	**Comments:**			

	1	2	3		
Diameter (in.):	2.862	2.862	2.862	Average:	2.862
Height (in.):	5.750	5.750	5.750	Average:	5.750

Moisture Content Calculation	
Wt. Wet Sample + Container (gms):	
Wt. Dry Sample + Container (gms):	
Container (gms) No.	
Moisture Content (%)	**7.5**

Density and Saturation	
Wt. Wet Sample + Container (gms)	
Container (gms)	229.06
Wet Density (pcf)	**135.0**
Dry Density (pcf)	**127.0**
Void Ratio	**0.327**
% Saturation	**62.0**

Assume Gs=2.70

Test Data Filename:	04-17A,B-0,Remold#3.trx

SKETCH / PHOTO AFTER TEST:

PHOTO FILE NAME:

Shear	
Rate of Deformation (% strain / min) =	**4**
Confining Stress (ksf):	**1.00**

Failure Criterion: **criterion 1 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**5.85**
Eff. Minor Principal Stress (ksf)=	**1.00**
Eff. Major Principal Stress (ksf)=	**6.85**
Axial Strain (%)=	**2.28**

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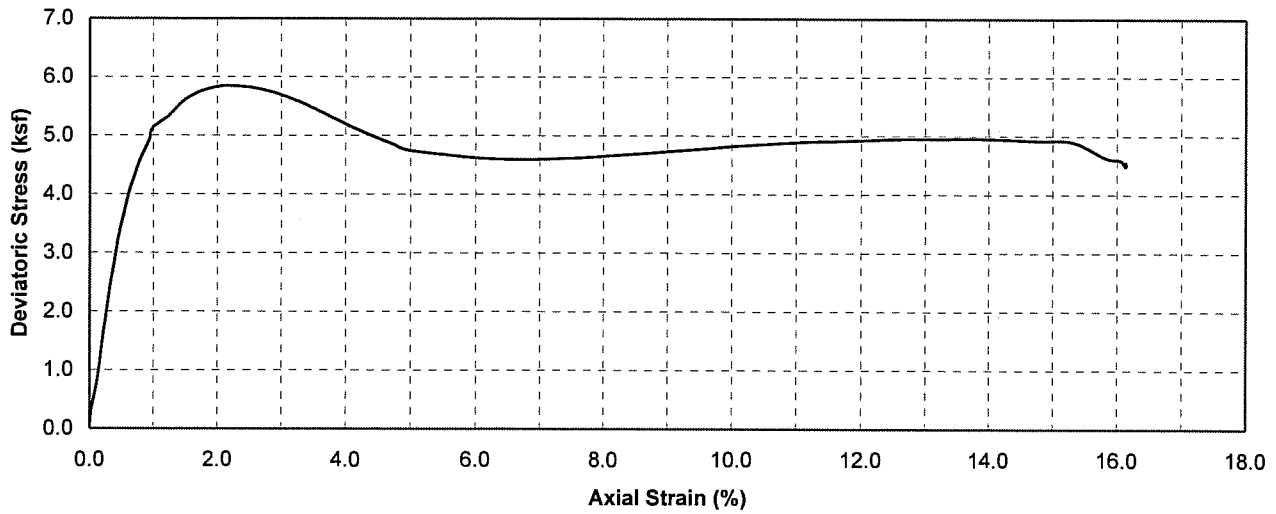
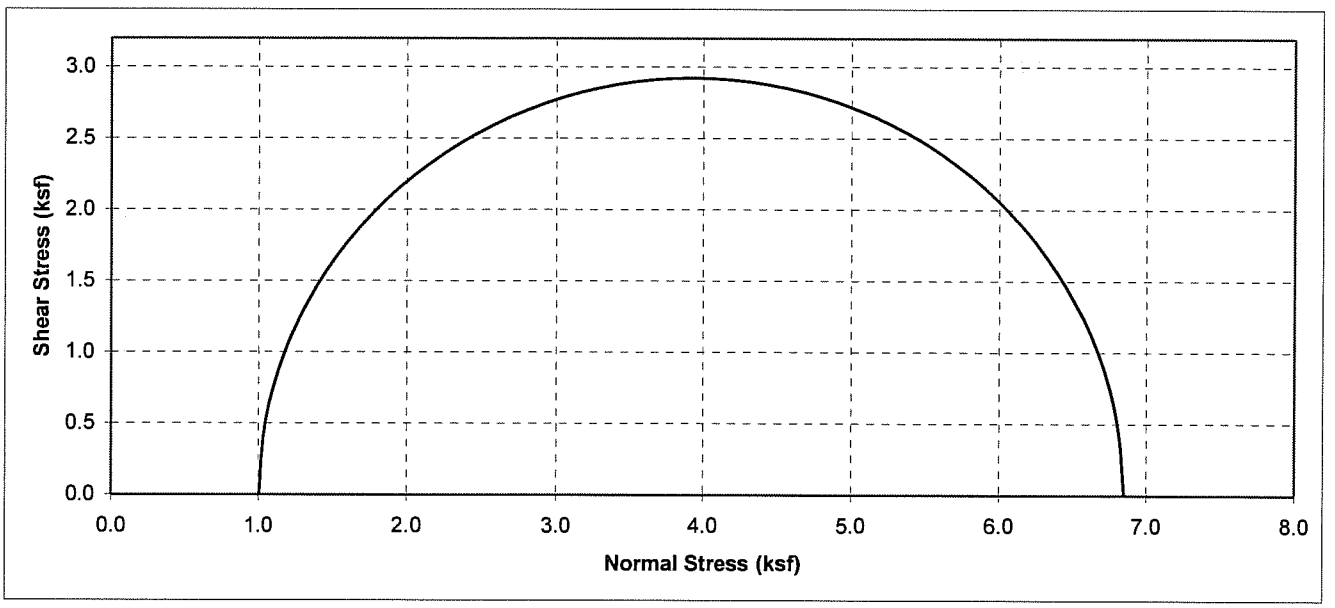
Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	Max. Dev. Stress (ksf)	Initial Saturation (%)
04-17A	B-0	5	Silty Sand, SM	127.0	7.50	1.00	5.85	62.0

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**Caltrans\UCSD \ Abutment Research**
Project No. : 02-165 **Date :** 11/04/04	**UNCONSOLIDATED UNDRAINED TEST** **(ASTM D2850)** Figure No. :

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Meloland Rd OC\Imperial			**Project No:**	02-165
Boring No.:	04-18A	**Tested by:**	J.R	**Date:**	09/02/04
Depth (ft):	10	**Checked by:**		**Date:**	
Sample No.	4	**Sample Type:**	In-Situ		
Soil Description:	**Brown, CL**	**Comments:**			

	1	2	3		
Diameter (in.):	2.421	2.422	2.422	Average:	2.422
Height (in.):	5.060	5.080	5.060	Average:	5.067

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	145.23
Wt. Dry Sample + Container (g) :	116.8
Container (g) : No.	16.18
Moisture Content (%) :	**22.0**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**114.3**
Dry Density (pcf) :	**93.7**
Void Ratio :	**0.799**
% Saturation :	**74.5**

Gs=2.70 (assumed)

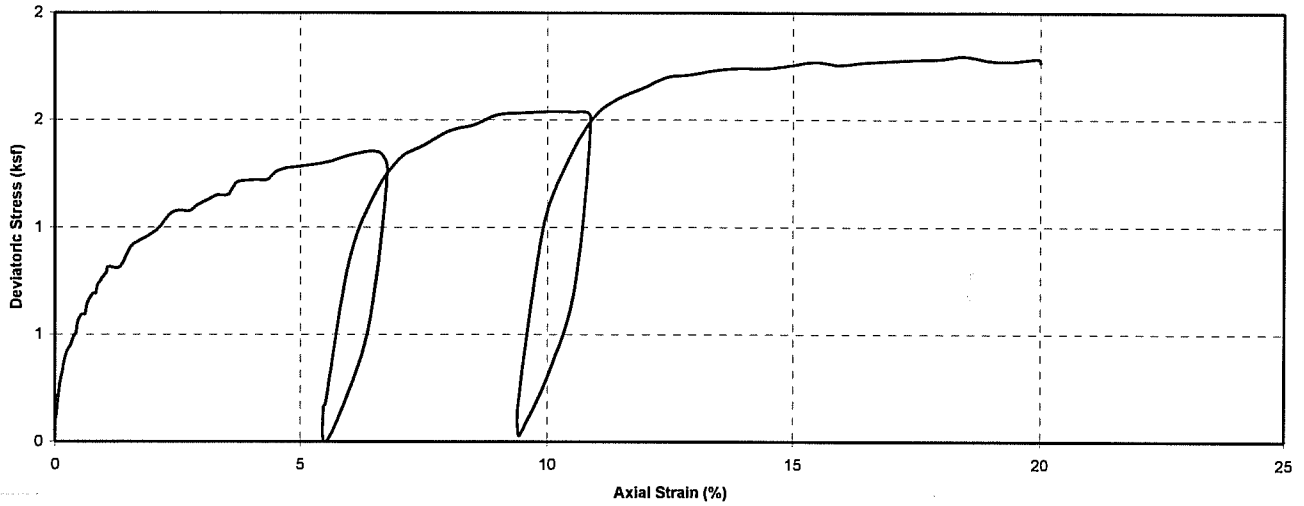
SKETCH / PHOTO AFTER TEST:

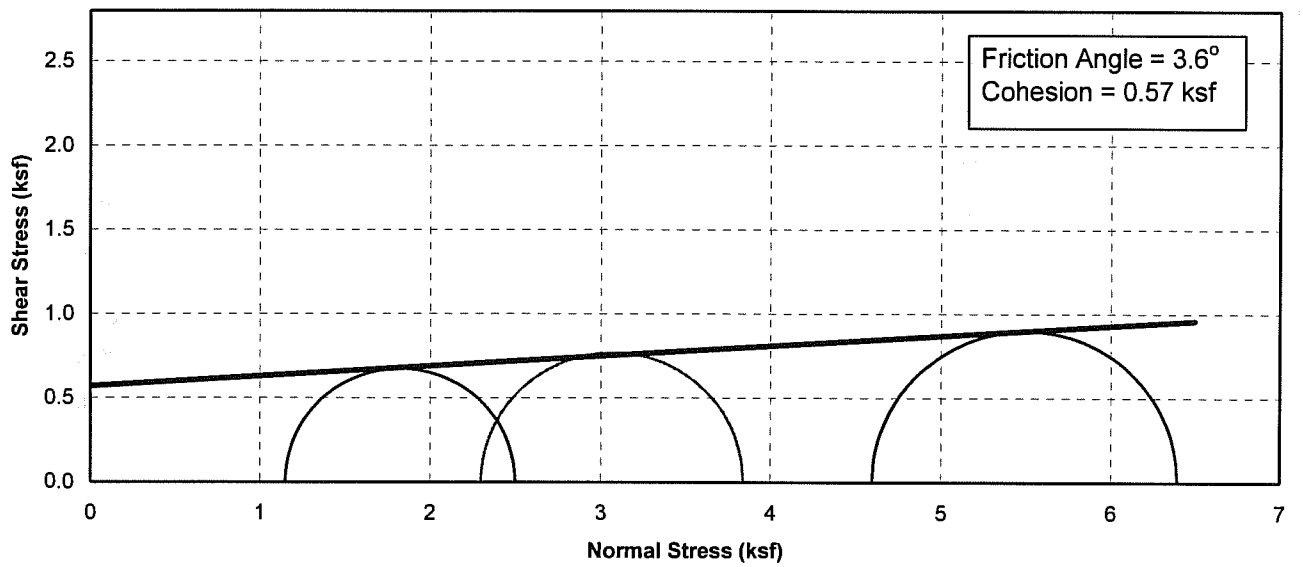
Shear	
Cycle	**1, 2, 3**
Confining Stress (ksf) :	**1.15, 2.3, 4.6**
Deformation Rate (% / min) :	**4**
Failure Criterion:	
the maximum deviator stress	

At Failure	
Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**1.35, 1.54, 1.8**
Eff. Minor Principal Stress (ksf) :	**1.15, 2.3, 4.6**
Eff. Major Principal Stress (ksf) :	**2.5, 3.84, 6.4**
Axial Strain (%) :	**6.6, 10, 18.4**

Earth Mechanics, Inc.

Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-18A	4	10.00	Brown, CL	93.7	22.0	1.15 2.3 4.6	1.35 1.54 1.8	74.5

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**Caltrans\UCSD \ Abutment Research**
Project No. : 02-165 **Date :** 09/02/04	**UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)**

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Bridge#51-234\Santa Barbara Co.			**Project No:**	02-165
Boring No.:	04-19	**Tested by:**	J.R.	**Date:**	11/10/04
Depth (ft):	5	**Checked by:**		**Date:**	
Sample No.	B-0	**Sample Type:**	Bulk		
Soil Description:	**SP/SM**	**Comments:**			

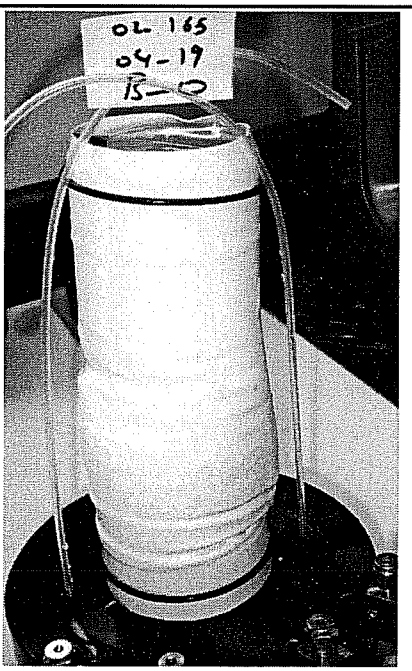
	1	2	3		
Diameter (in.):	2.862	2.862	2.862	Average:	2.862
Height (in.):	5.750	5.750	5.750	Average:	5.750

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	
Wt. Dry Sample + Container (g) :	
Container (g) : No.	
Moisture Content (%) :	**6.5**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**109.7**
Dry Density (pcf) :	**103.0**
Void Ratio :	**0.636**
% Saturation :	**27.6**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:

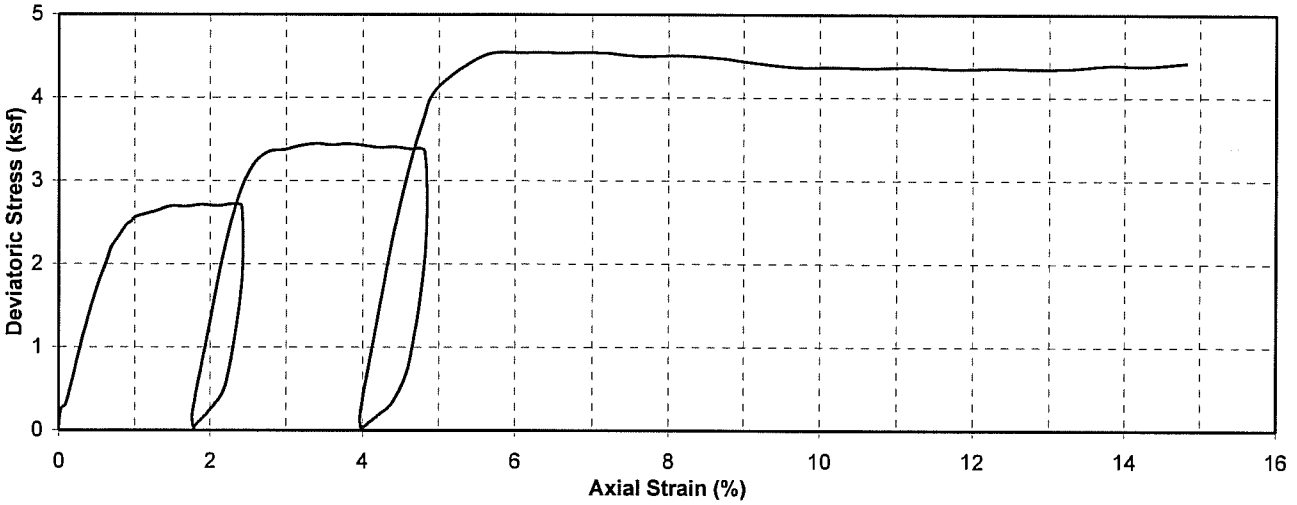


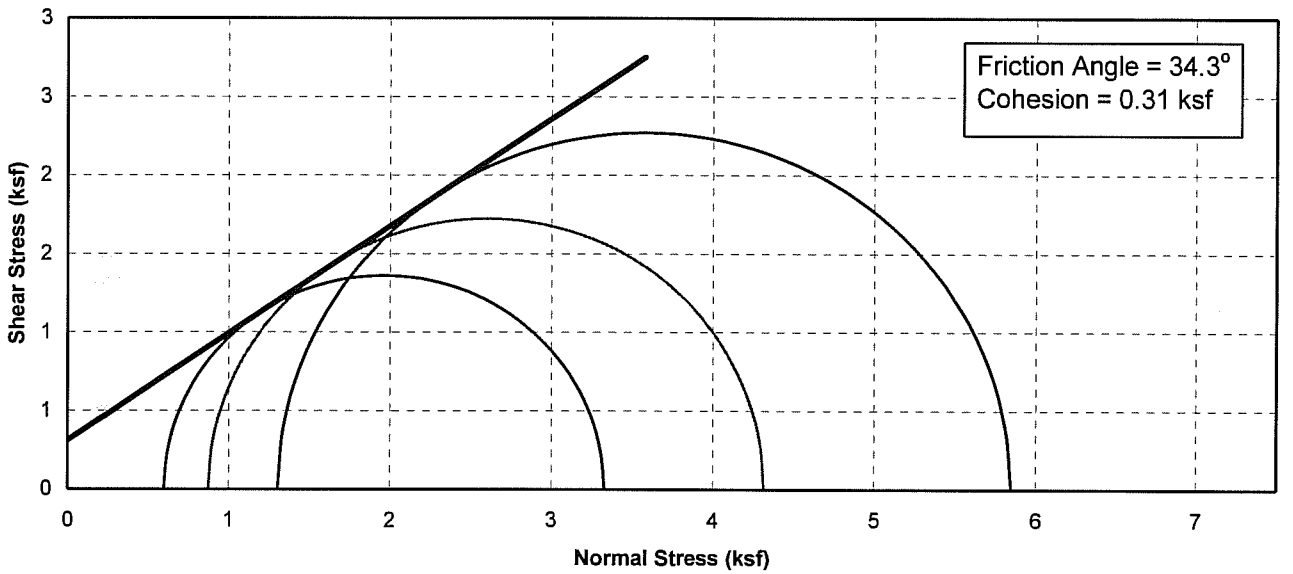
Shear	
Cycle	**1, 2, 3**
Confining Stress (ksf) :	**0.6, 0.87, 1.31**
Deformation Rate (% / min) :	**4**
Failure Criterion:	
the maximum deviator stress	

At Failure	
Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**2.72, 3.45, 4.54**
Eff. Minor Principal Stress (ksf) :	**0.6, 0.87, 1.31**
Eff. Major Principal Stress (ksf) :	**3.32, 4.32, 5.85**
Axial Strain (%) :	**2.3, 3.4, 6.1**

Earth Mechanics, Inc.

Geotechnical and Earthquake Engineering





Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-19	B-0	5.00	SP/SM	103.0	6.5	0.6, 0.87, 1.31	2.72, 3.45, 4.54	27.6

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Caltrans\UCSD \ Abutment Research
Project No. : 02-165 Date : 11/10/04	UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Jackson, Riverside Co.			**Project No:**	02-165
Boring No.:	04-21	**Tested by:**	J.R.	**Date:**	11/10/04
Depth (ft):	10	**Checked by:**		**Date:**	
Sample No.	B-0	**Sample Type:**	Bulk		
Soil Description:	**SM**	**Comments:**			

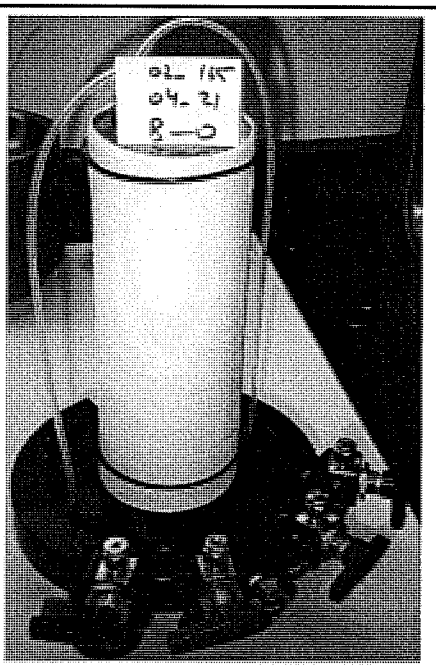
	1	2	3		
Diameter (in.):	2.862	2.862	2.862	Average:	2.862
Height (in.):	5.750	5.750	5.750	Average:	5.750

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	
Wt. Dry Sample + Container (g) :	
Container (g) : No.	
Moisture Content (%) :	**7.2**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**129.4**
Dry Density (pcf) :	**120.7**
Void Ratio :	**0.396**
% Saturation :	**49.1**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:



Shear	
Cycle	**1, 2, 3**
Confining Stress (ksf) :	**0.72, 1.03, 1.55**
Deformation Rate (% / min) :	**4**
Failure Criterion:	
the maximum deviator stress	

At Failure	
Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**3.29, 3.99, 5.25**
Eff. Minor Principal Stress (ksf) :	**0.72, 1.03, 1.55**
Eff. Major Principal Stress (ksf) :	**4, 5.02, 6.8**
Axial Strain (%) :	**2.3, 4.7, 7.7**

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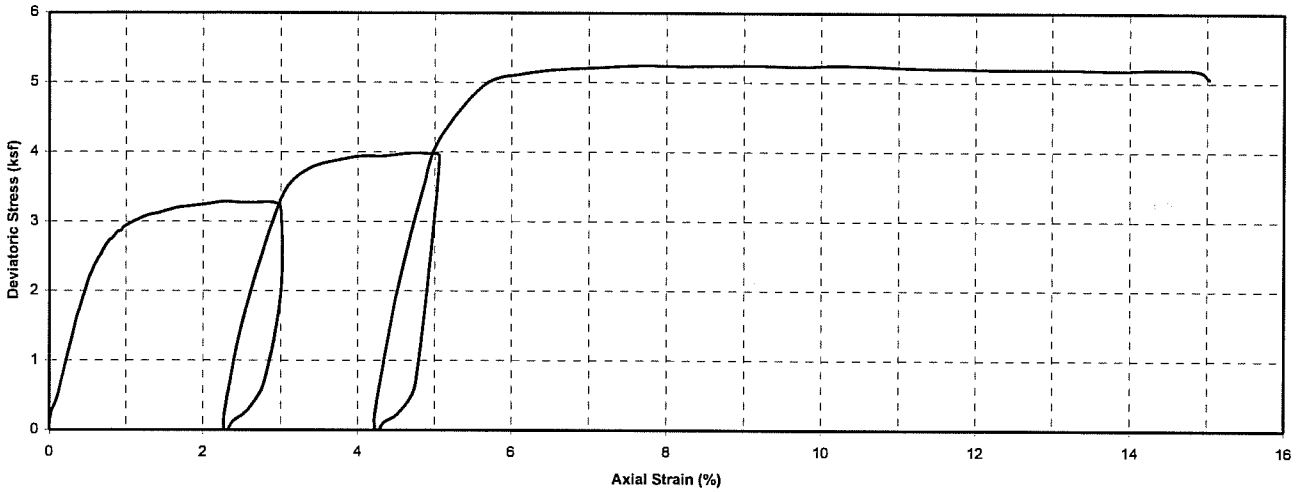
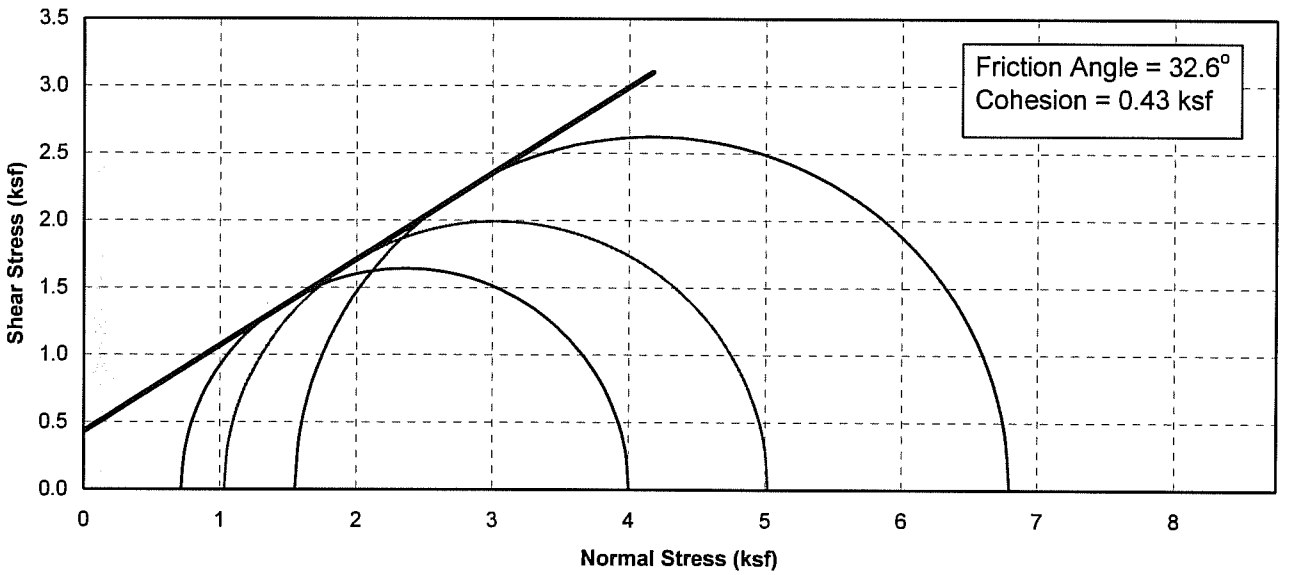




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-21	B-0	10.00	SM	120.7	7.2	0.72, 1.03, 1.55	3.29, 3.99, 5.25	49.1

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Caltrans\UCSD \ Abutment Research
Project No. : 02-165 Date : 11/10/04	UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST
ASTM D2850

Project Name:	UCSD \ Abutment Research\Santa Clara River Bridge			**Project No:**	02-165
Boring No.:	04-22	**Tested by:**	J.R.	**Date:**	11/09/04
Depth (ft):	0-5	**Checked by:**		**Date:**	
Sample No.	B-0	**Sample Type:**	Bulk		
Soil Description:	**SW-SM**	**Comments:**			

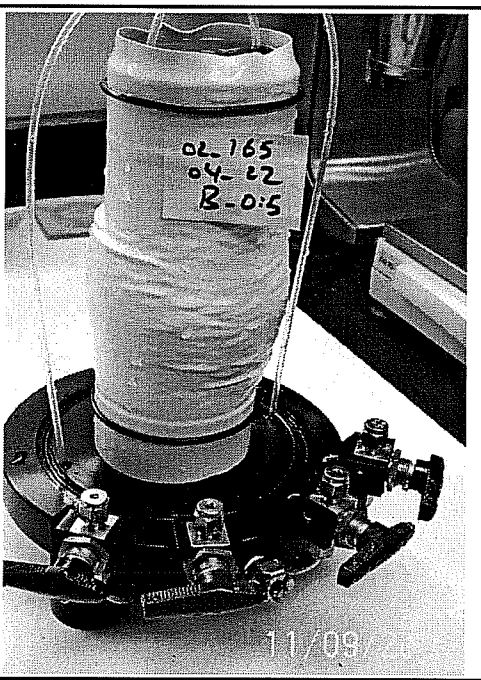
	1	2	3		
Diameter (in.):	2.862	2.862	2.862	Average:	2.862
Height (in.):	5.750	5.750	5.750	Average:	5.750

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	
Wt. Dry Sample + Container (g) :	
Container (g) : No.	
Moisture Content (%) :	**6.5**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**132.6**
Dry Density (pcf) :	**124.5**
Void Ratio :	**0.353**
% Saturation :	**49.7**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:



Shear	
Cycle	**1, 2, 3**
Confining Stress (ksf) :	**0.75, 1, 1.25**
Deformation Rate (% / min) :	**4**
Failure Criterion:	
the maximum deviator stress	

At Failure	
Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**5.39, 5.64, 6.08**
Eff. Minor Principal Stress (ksf) :	**0.75, 1, 1.25**
Eff. Major Principal Stress (ksf) :	**6.14, 6.64, 7.33**
Axial Strain (%) :	**4.5, 6.1, 8.7**

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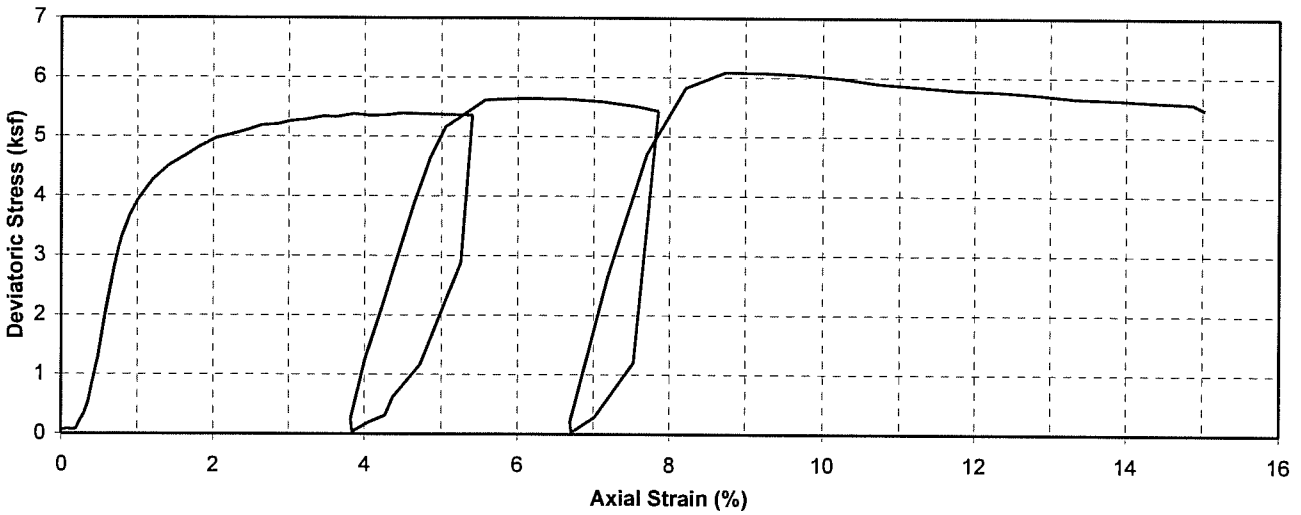
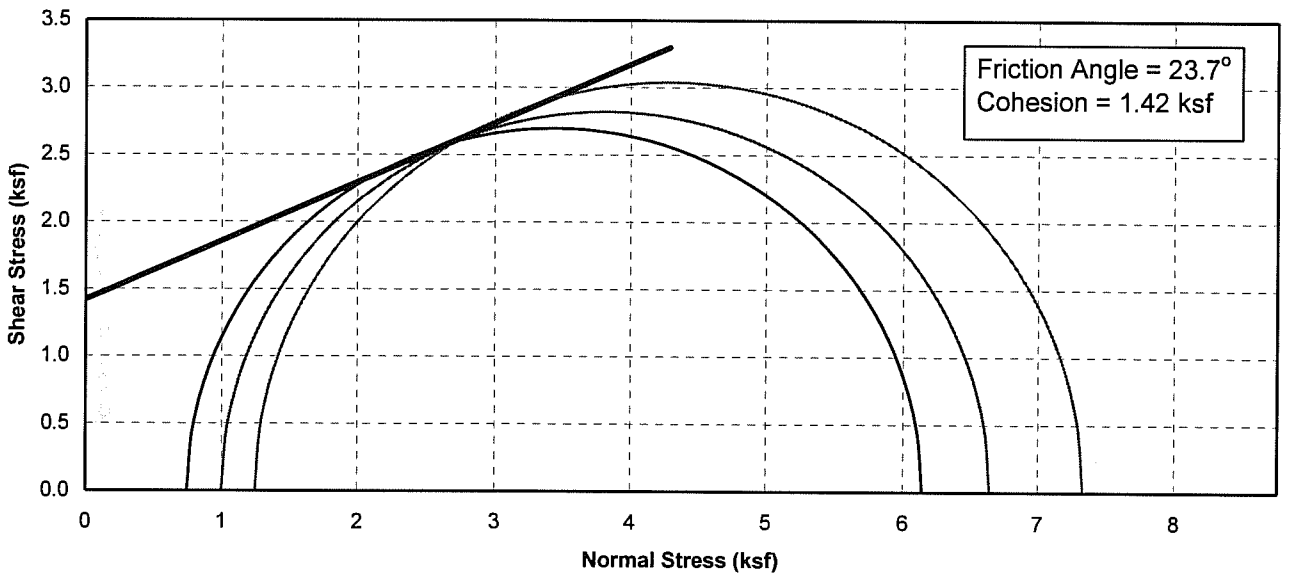




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-22	B-0	0-5.00	SW-SM	124.5	6.5	0.75 1 1.25	5.39, 5.64, 6.08	49.7

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	Caltrans\UCSD \ Abutment Research
Project No. : 02-165 Date : 11/09/04	UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Maple Ave UC, Fresno Co.			**Project No:**	02-165
Boring No.:	04-25	**Tested by:**	J.R.	**Date:**	11/12/04
Depth (ft):	10	**Checked by:**		**Date:**	
Sample No.	B-0	**Sample Type:**	Bulk		
Soil Description:	**SM w/gravel**	**Comments:**			

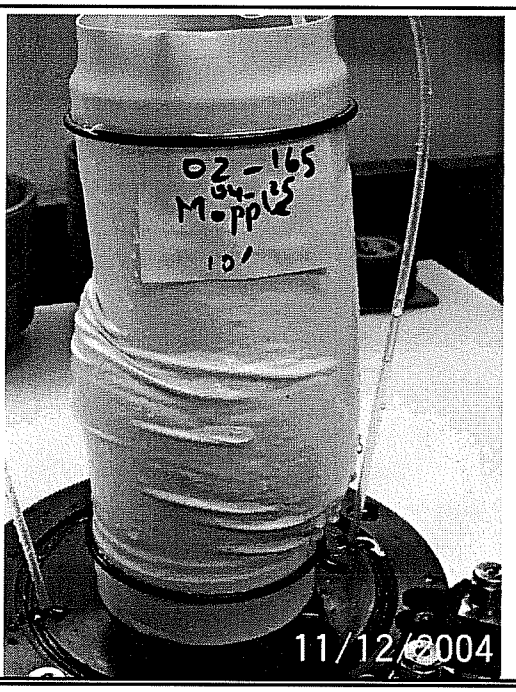
	1	2	3		
Diameter (in.):	2.862	2.862	2.862	Average:	2.862
Height (in.):	5.750	5.750	5.750	Average:	5.750

Moisture Content Calculation	
Wt. Wet Sample + Container (g) :	
Wt. Dry Sample + Container (g) :	
Container (g) : No.	
Moisture Content (%) :	**7.5**

Density and Saturation	
Wt. Wet Sample + Container (g) :	
Container (g) :	
Wet Density (pcf) :	**129.8**
Dry Density (pcf) :	**120.7**
Void Ratio :	**0.396**
% Saturation :	**51.2**

Gs=2.70 (assumed)

SKETCH / PHOTO AFTER TEST:



Shear	
Cycle	**1, 2, 3**
Confining Stress (ksf) :	**0.77, 1.03, 1.29**
Deformation Rate (% / min) :	**4**
Failure Criterion:	
the maximum deviator stress	

At Failure	
Cycle	**1, 2, 3**
Deviator Stress (ksf) :	**3.66, 4.29, 4.93**
Eff. Minor Principal Stress (ksf) :	**0.77, 1.03, 1.29**
Eff. Major Principal Stress (ksf) :	**4.43, 5.32, 6.22**
Axial Strain (%) :	**2.1, 3.2, 14.2**

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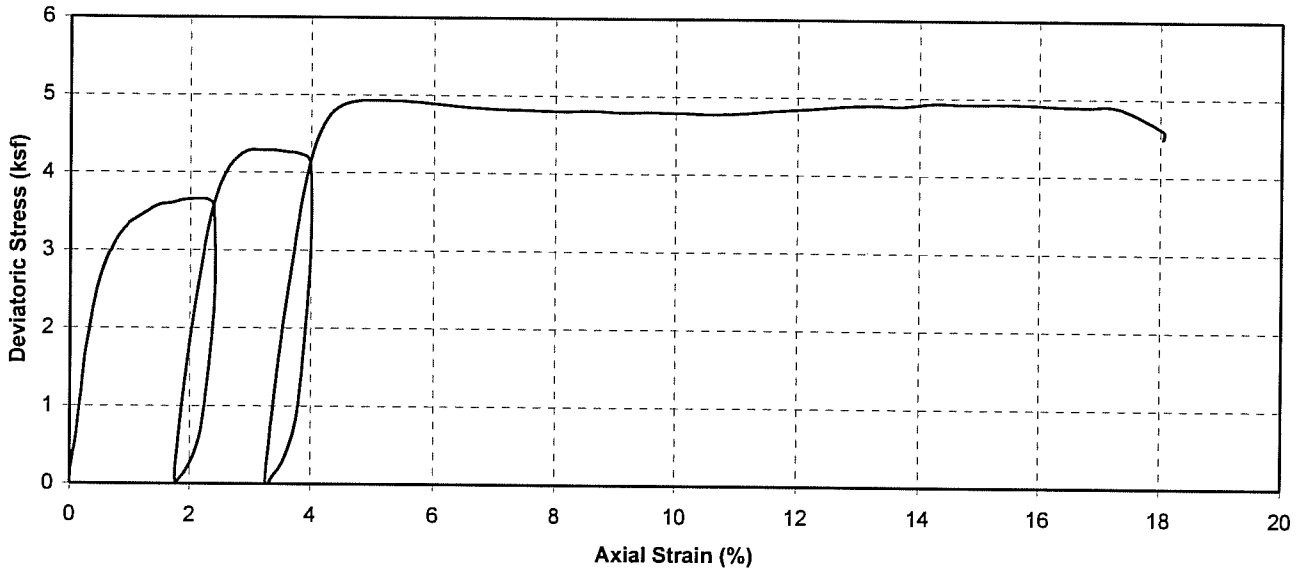
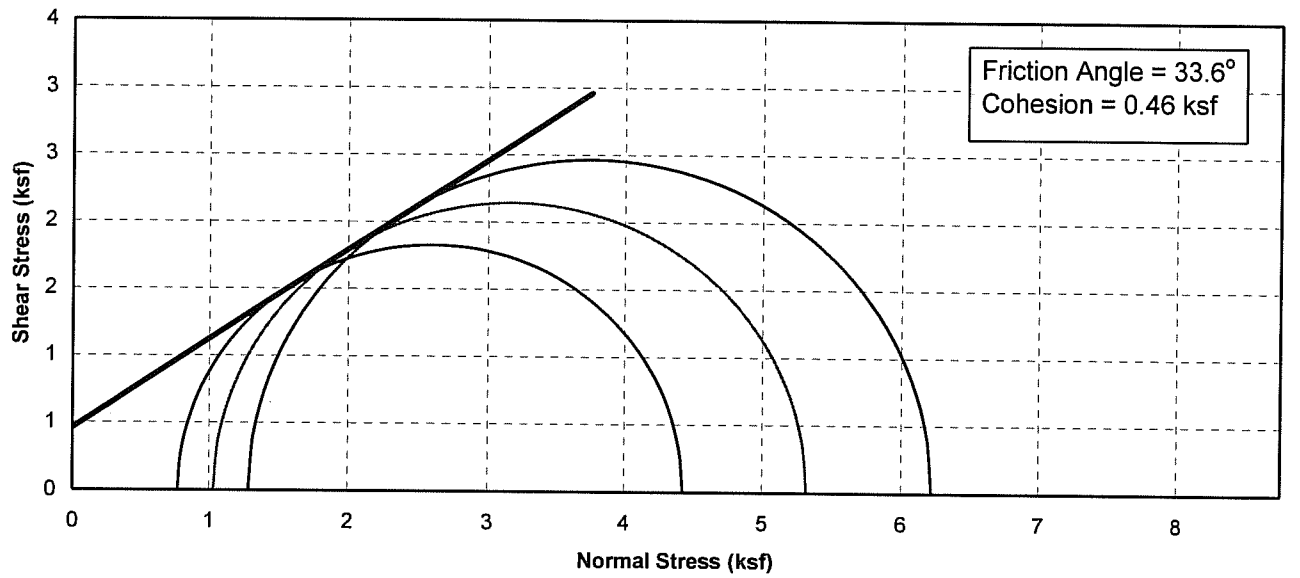




Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf) Cycle 1, 2, 3	Max. Dev. Stress (ksf) Cycle 1, 2, 3	Initial Saturation (%)
04-25	B-0	10.00	SM w/gravel	120.7	7.5	0.77 1.03 1.29	3.66, 4.29, 4.93	51.2

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**Caltrans\UCSD \ Abutment Research**
Project No. : 02-165 **Date :** 11/12/04	**UNCONSOLIDATED UNDRAINED TRIAXIAL TEST (ASTM D2850)**

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST

ASTM D2850

Project Name:	UCSD \ Abutment Research\Maple Ave UC, Fresno Co.			**Project No:**	02-165
Boring No.:	04-25	**Tested by:**	J.R.	**Date:**	11/12/04
Depth (ft):	10	**Checked by:**		**Date:**	
Sample No.	B-0	**Sample Type:**	Bulk		
Sample Description:	SM	**Comments:**			

	1	2	3		
Diameter (in.):	2.862	2.862	2.862	Average:	2.862
Height (in.):	5.750	5.750	5.750	Average:	5.750

Moisture Content Calculation	
Wt. Wet Sample + Container (gms):	
Wt. Dry Sample + Container (gms):	
Container (gms) No.	
Moisture Content (%)	**7.5**

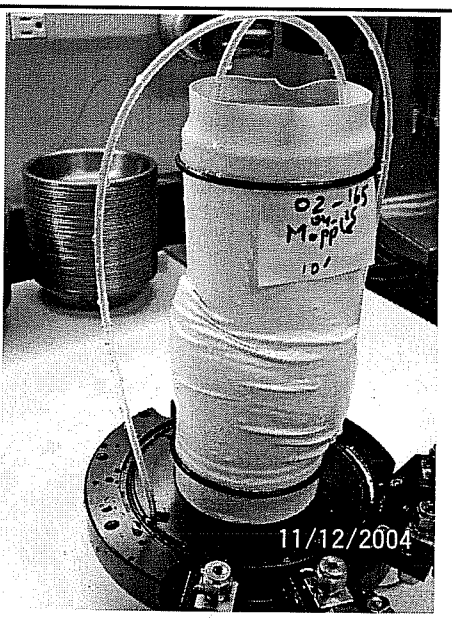
Density and Saturation	
Wt. Wet Sample + Container (gms)	
Container (gms)	229.06
Wet Density (pcf)	**129.8**
Dry Density (pcf)	**120.7**
Void Ratio	**0.395**
% Saturation	**51.2**

Assume Gs=2.70

Test Data Filename:	04-25,B-0,Remold#2.trx

SKETCH / PHOTO AFTER TEST:

PHOTO FILE NAME:



Shear	
Rate of Deformation (% strain / min) =	**4**
Confining Stress (ksf):	**0.77**

Failure Criterion: **criterion 1 is used**

1. the maximum deviator stress within 15% strain
2. the stress at 10% strain for no peak stress.

At Failure	
Deviator Stress (ksf)	**7.40**
Eff. Minor Principal Stress (ksf)=	**0.77**
Eff. Major Principal Stress (ksf)=	**8.17**
Axial Strain (%)=	**2.49**

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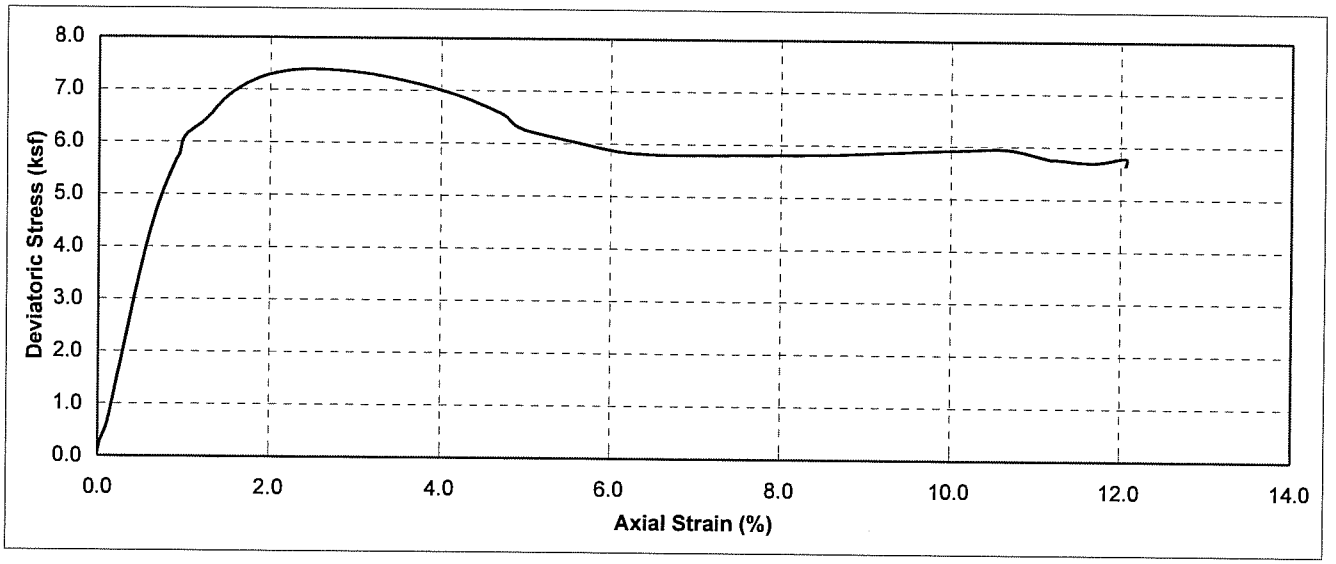

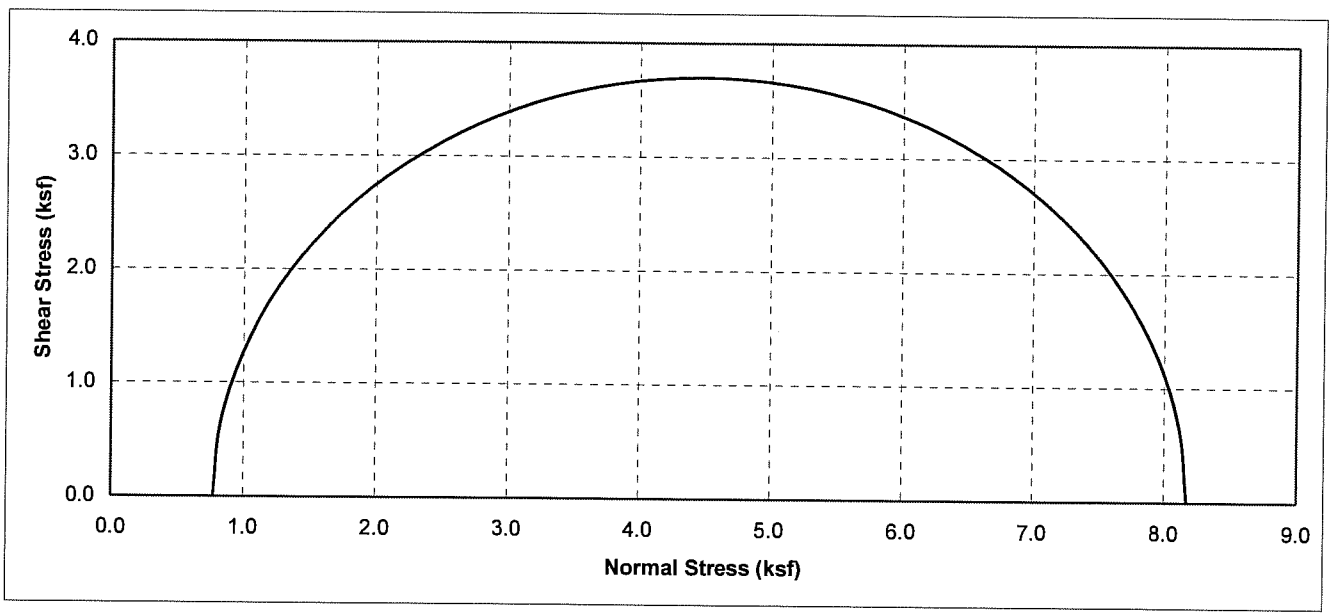

Boring No.	Sample No.	Depth (ft)	Soil Type	Dry Density (pcf)	Moisture Content (%)	Conf. Stress (ksf)	Max. Dev. Stress (ksf)	Initial Saturation (%)
04-25	B-0	10	Maple Bridge Abutment "sm"	120.7	7.50	0.77	7.40	51.2

Earth Mechanics, Inc. Geotechnical and Earthquake Engineering	**Caltrans\UCSD \ Abutment Research**
Project No. : 02-165 **Date :** 11/12/04	**UNCONSOLIDATED UNDRAINED TEST** **(ASTM D2850)** Figure No. :