FOR CONTRACT NO.: 07-4Y3801

INFORMATION HANDOUT

MATERIALS INFORMATION

SUMMARY OF FOUNDATION RECOMMENDATION REPORT Oct 21, 2009
SOIL PROFILE/LOG OF TEST BORINGS

ROUTE: 07-LA-60 PM 0.1

State of California

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. SHAFIQUL ISLAM– DISTRICT 07
Senior Transportation Engineer

Date: October 21, 2009

File: 07-LA-60-PM 0.1
EA 07-4Y3801
Overhead Sign Replacement
Sign No. 10

Attention: Paul Fok

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

Subject: Foundation Recommendation for Overhead Sign Replacement (FINAL)

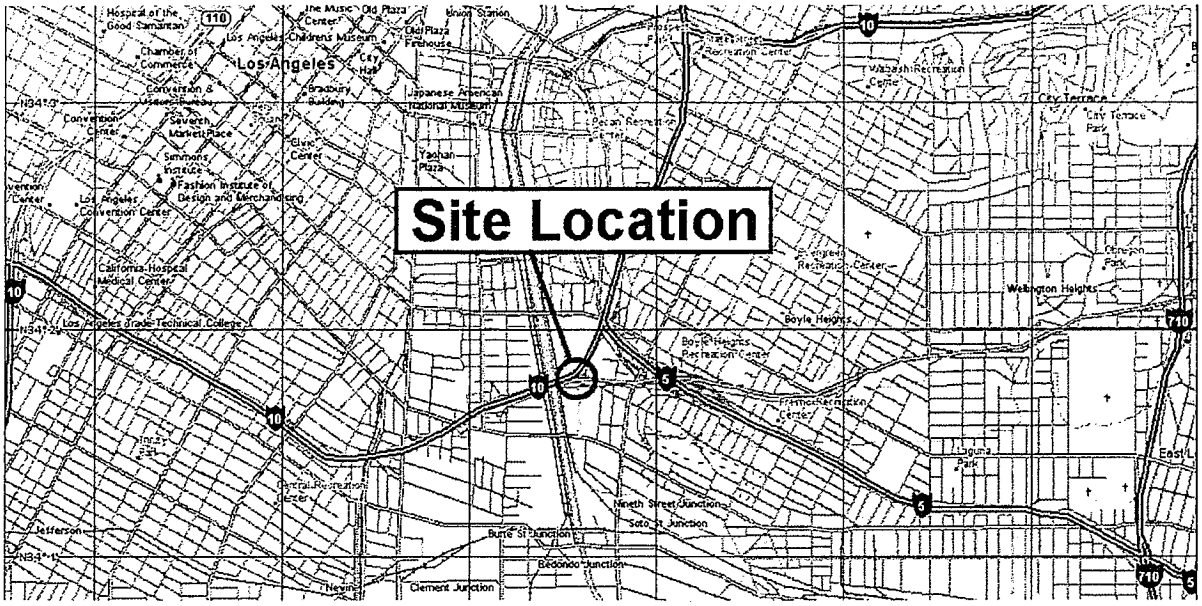
1.0 INTRODUCTION

The Office of Geotechnical Design South 1 (OGDS-1), Branch B is providing a Foundation Report (FR) pursuant to the request by your office on June 15, 2009 for a foundation investigation and recommendations for the proposed overhead sign replacement to be supported on Cast in Drilled Hole (CIDH) pile foundations. The sign is at LA-60-PM 0.10 Westbound STA 14+66.00. Mr. K.C. Liu of the Office of Design and Technical Services provided the pile head loading conditions for the subject overhead signs via e-mail dated September 23, 2009. A site map of the project site is shown on Figure 1.

2.0 SITE DESCRIPTION

The proposed overhead sign is located at Santa Fe Ave. off ramp in City of Los Angeles, in Los Angels County. The site is bounded by industrial buildings to the north and south of 60-10 connector freeway. The freeway section is on an embankment fill. The elevation of sign posts base plate will be 257.80 ft. MSL for the left post and 256.11 ft. MSL for the right sign post. Left and right sign posts are taken from Sign Detail SD-1 dated September 24, 2009 provided in Appendix A.

Site Map Figure 1.



3.0 GEOTECHNICAL INVESTIGATION

Our geotechnical investigation consisted of drilling two exploratory borings R-09-001 and R-09-002 at the location of the proposed overhead sign on August 11and 31, 2009. The boring R-09-001 was terminated at 12 ft. depth due to refusal. The borings were advanced utilizing a mud rotary method with a CS 2000 drill rig equipped with an automatic hammer. Boring location was determined based upon design plan dated June 25, 2009. The elevation of the boring location is based on Sign Details Plan SD-1 dated September 24, 2009. LOTB (Log of Test Borings) is being prepared by the Office of Geotechnical Support and will be submitted to District Office upon completion.

Table 1 - Summary of Boring Information

Boring No.	~Station	~Offset (ft)	Reference Line	~Surface Elevation (ft) (1)	Depth (ft)	Date
R-09-001	14+780	62 LT	LA-60 Alignment	254	12.00	08/11/09
R-09-002	14+78	65 LT	LA-60 Alignment	254	50.75	08/31/09

(1) Elevations are above mean sea level (MSL) (1988 NAVD Datum).

3.1 Subsurface Conditions:

According to design information obtained for this project, an approximate elevation for the top of the borings is 254 ft MSL. The deepest drilled depth of the borings was to an elevation of about 203.25 ft. MSL.

According to the boring, the subsurface is generally underlain by loose to dense clayey sand and poorly graded sand to an elevation of about 221.00 ft MSL. This is underlain by stiff lean clay to about elevation 207.00 ft MSL, which is in turn underlain by poorly graded medium dense sand to depth explored (203.25 ft.).

3.2 Groundwater:

No groundwater was encountered to the deepest depth explored during drilling (203.25 ft MSL). A soil boring on December 26, 1967 shown in LOTB for Structure 53-1407 indicates no water to boring depth of elevation 230 ft.

4.0 LABORATORY TESTING

Selected samples, SPT soils samples and bulk sample obtained from Borings were tested for following laboratory testing:

Mechanical Analysis
Plasticity Index
Corrosion

Testing was performed in accordance with California Test Methods (see Table 2 below). Laboratory tests were performed at the Material Laboratory in Los Angeles. The corrosion test results are presented in Table No. 3 in this report. A summary of the laboratory test results are provided in Appendix B.

Table 2 – Laboratory Test Methods

Test	Standard
Atterberg Limits of Soils	CTM 204
Corrosion – Resistivity, pH	CTM 643
Corrosion – Chloride content	CTM 422
Corrosion – Sulfate content	CTM 417

5.0 GEOLOGY

5.1 Regional Geology

The site is located within the Los Angeles Basin. The basin is underlain by a thick sequence of sediments and sedimentary rocks, which overlie crystalline basement rocks at great depth. Most of the project lies on alluvial sediments derived from the surrounding hills and mountains. No waterways run through the project boundaries. The Los Angeles Basin is located within the Peninsular Ranges Geomorphic Province. Northwest trending mountain ranges and valleys associated with faults that are similar in nature to and associated with the San Andreas Fault characterize the Peninsular Ranges Province.

5.2 Site Geology

According to as-built Log of Test Borings (LOTBs) for structure 53-1407 and our geotechnical investigation, the subsurface soil encountered at the location of the proposed overhead signs is artificial fill overlying alluvium. The fill is composed of approximately 8 feet of medium dense to dense clayey sand. The alluvium is composed of layers of loose to medium dense sand, silty sand, and clayey sand and very soft to stiff clays and sandy clays.

6.0 SEISMICITY

At a distance of approximately 1.80 miles (2.9 km), the controlling fault for the site is the Puente Hills Blind Thrust. It is a reverse thrust fault with a maximum moment magnitude M_w of 7.00. Recommended ARS Curve and data are provided in Appendix C.

6.1 Liquefaction Potential

Based on fine content, plasticity and relatively high blow counts, and a depth of groundwater deeper than elevation 203.25 ft; liquefaction is not considered to affect the subject site and consequently the pile foundations.

7.0 CORROSION EVALUATION

Composite bulk soil sample from the exploratory boring was tested at the District 7 Transportation Laboratory in Los Angeles for corrosion potential. Because the resistivity results were less than 1000 Ohm-cm, the samples were sent to the Translab in Sacramento for further analysis. The test results summarized in Table No. 3 indicate that the soil at the site is generally corrosive to metal and reinforced concrete (Corrosion Guidelines, 2003). Caltrans currently defines a corrosive area as an area where the soil and/or water contains more than 500 PPM of chlorides, more than 2000 PPM of sulfates, and a minimum resistivity of less than 1000 ohm-centimeters or has a pH of 5.5 or less.

Table 3- Corrosion Test Summary-Composite Sample

Boring No.	Sample Depth (ft)	pH	Minimum Resistivity (Ohm-cm)	Sulfate Content (PPM)*	Chloride Content (PPM)*
R-09-002	0-35	5.88	540	16	2300

* The Corrosion Technology Section policy states that if the minimum resistivity is greater than 1000 Ohm-Cm the sample is considered to be non-corrosive and testing to determine sulfate and chloride is not performed.

It is recommended that Corrosion Technology Branch be consulted regarding corrosion protection of buried metal and reinforced concrete at the project site.

8.0 FOUNDATION RECOMMENDATIONS

8.1 Axial and Lateral Pile Capacity Analysis

The axial pile capacity evaluation for the proposed CIDH piles was performed using SHAFT for Windows, V5.0 by ENSOFT Inc. The axial capacity was based on skin friction only which exceeds the nominal resistance. The lateral load-deformation response of single pile was analyzed utilizing the LPILE plus for Windows, V5.0m by ENSOFT Inc. The depth of sign foundation was computed based on the boundary conditions shown in Table 4. Pile data is shown in Table 5. Recommended pile depths are given in Table 6. Maximum bending moments and maximum shear forces computed are presented in Table 7.

Table 4 – Unfactored Load

Sign Post No.	Bending Moment at Pile Head (Kip-ft)	Shear Force at Pile Head (Kips)	Design Axial Load (Kips)
1 & 2 Right & Left	502	18.4	17.6

Table 5- Pile Data

Sign Post No.	Pile Type	Design Loading (Kips)	Nominal Resistance		Design Tip Elevation (ft)*	Specified Tip Elevation (ft)*
			Compression (Kips)	Tension (Kips)		
1-Right Pile	5.0' CIDH	17.6	35.2	N/A	236.00 (1) 216.11 (2)	216.11
2 -Left Pile	5.0' CIDH	17.6	35.2	N/A	237.00 (1) 217.80 (2)	217.80

*Top of Right Pile is at Elev. 256.11'
*Top of Left Pile is at Elev. 257.80'
(1) Compression Load

(2) Lateral Loads

Table 6 below summarizes proposed CIDH piles diameter and length for support of subject overhead signs.

Table 6 - Recommended Pile Depths

Sign Post No.	Pile Diameter/ Pile Type	Pile Depth (Length from pile head to pile tip) (feet)
1 Right Pile	5.0'/ CIDH	40.00
2 Left Pile	5.0'/ CIDH	40.00

Maximum bending moments and maximum shear forces computed are presented in Table 7 below.

Table 7-Maximum Bending Moments and Maximum Shear Forces

Sign Post No.	Max. BM (Kip-ft)	Depth of Max BM below the pile head (feet)	Max. Shear (Kips)	Depth of Max Shear below the pile head (feet)	Maximum lateral pile head deflection (inches)
1 Right Pile	1720	13.0	18.4	0	0.051
2 Left Pile	1720	13.0	18.4	0	0.051

9.0 CONSTRUCTION CONSIDERATIONS

The following recommendations are made for CIDH piles installation and construction and are recommended to be incorporated in the Special Provisions of the project.

- The contractor shall be required to clean out the bottom of the shaft prior to placing the cage and the concrete.

  Concrete placement for construction of the CIDH piling shall be completed within the same day that excavation of the drilled hole has been completed.

  Moderate caving may be anticipated during excavation of the pile boring and during CIDH pile construction. A method to control caving such as the use of a temporary casing should be employed by the contractor.

  It is recommended that GS representative from our office be onsite during pile construction.

- Project plan and specifications should be reviewed by our office prior to finalization.

If you have any questions or comments, please call Mushtaq Ahmed at 213-620-2132 or Sam Sukiasian at or 213-620-2135.

Prepared by: Date: 10.21.09

Mushtaq Ahmed P.E.
Transportation Engineer - Civil
Office of Geotechnical Design – South 1
Branch B

Reviewed by: Date: 10/21/09

Sam Sukiasian G.E.,
Senior Transportation Engineer
Office of Geotechnical Design – South 1
Branch B

Kristopher Barker 10-21-09

Kristopher Barker, C.E.G.
Engineering Geologist
Office of Geotechnical Design – South 1
Branch B

cc: OGDS1- LA File
OGDS1- Sac. File
GS- Sac. File

9.0 REFERENCES

Mualchin, "Caltrans California Seismic Hazard Map", 1996.

9.0 REFERENCES

Mualchin, "Caltrans California Seismic Hazard Map", 1996.

Morton, P.K. and Miller, R.V., "Geologic Map of Orange County California", 1981.

APPENDIX A

PANEL (c)

LEGEND				ARROW DEG	ROUTE SHIELD SIZE (in x in)
LINE #	UC (in)	LC (in)	NUW (in)		
1	12E		15E		36 x 36
2	16	12			
3				32" x 22" DOWN	

PANEL (a)

PANEL (c)

LEGEND				ARROW DEG
LINE #	UC (in)	LC (in)	NUW (in)	
1	8E		12E	
2	16	12	15E	
3	16	12		
4	16	12		45°, 16" CAP 1-LINE

PANEL (b)

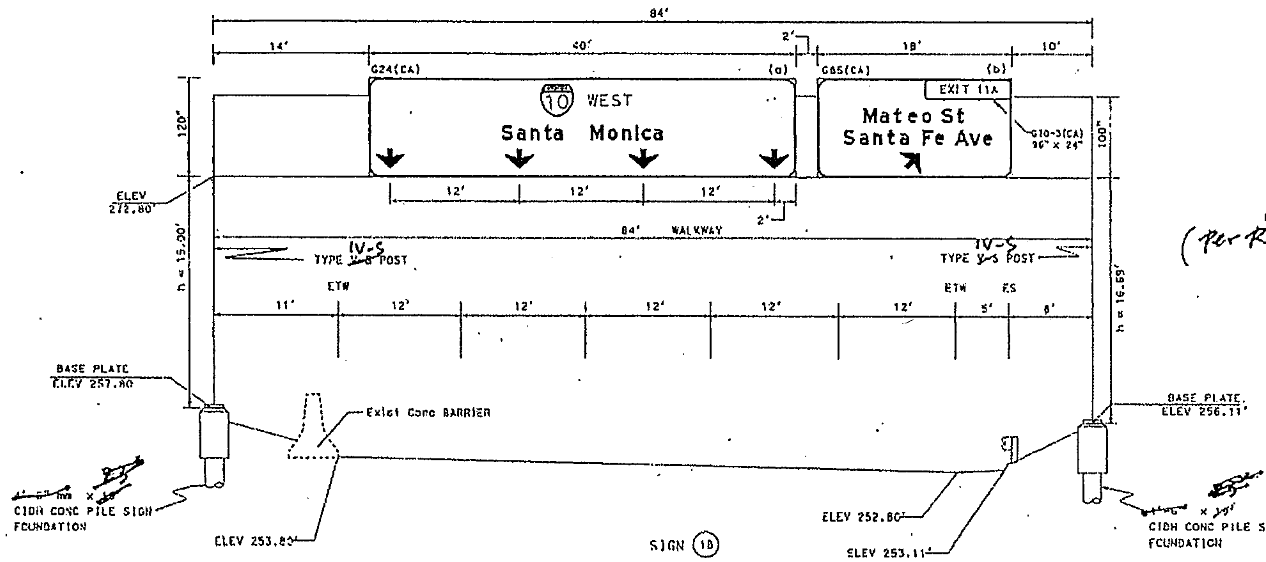
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

EDGAR HERRERA No. C67603 Exp. 6/30/09 CIVIL



SIGN (10)

FEBT STA 14+63

1. INSTALL SIGN STRUCTURE (TRUSS)
2. ILLUMINATE PANELS
3. INSTALL FORMED PANELS AND RSPF

ALL DIMENSION ARE IN FEET UNLESS OTHERWISE SHOWN
THIS PLAN ACCURATE FOR SIGN WORK ONLY

SIGN DETAILS

NO SCALE

SD-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans TRAFFIC DESIGN

FUNCTIONAL SUPERVISOR: GRISH BIGLARIAN
CALCULATED-DESIGNED BY / CHECKED BY: EDGAR HERRERA
REVISED BY / DATE REVISED

BORDER LAST REVISED 4/11/2008

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

CU 07380

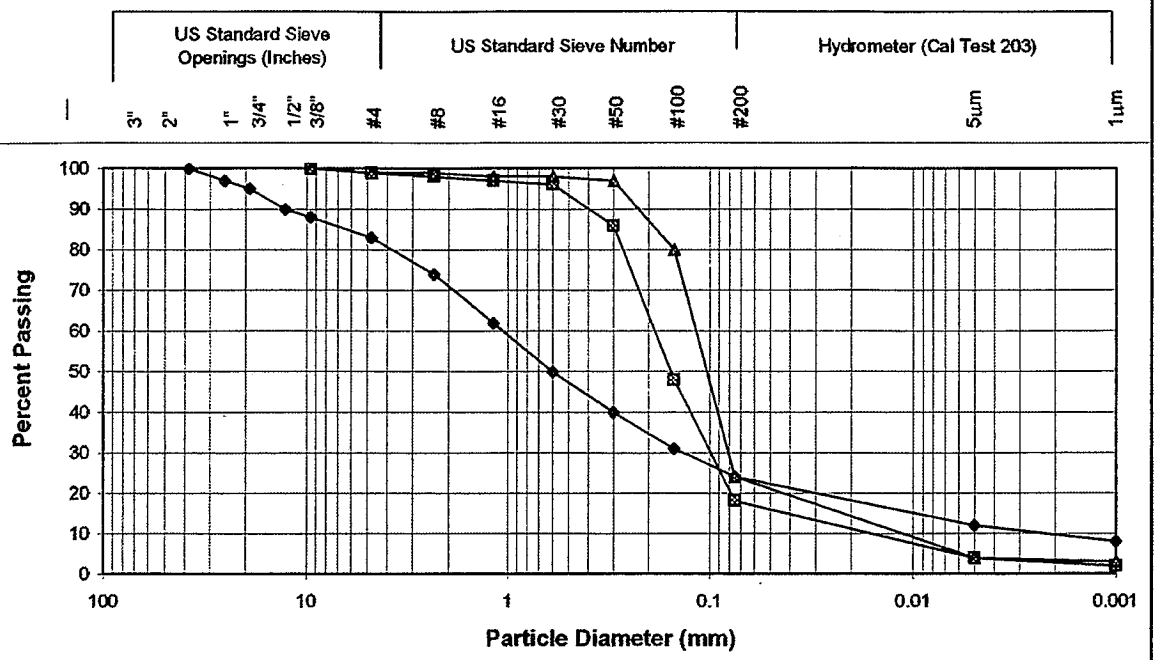
EA 4Y3801

07-15-09

DATE PLOTTED => 24-SEP-2009 TIME PLOTTED => 12:53

APPENDIX B

Gradation Analysis Test Results



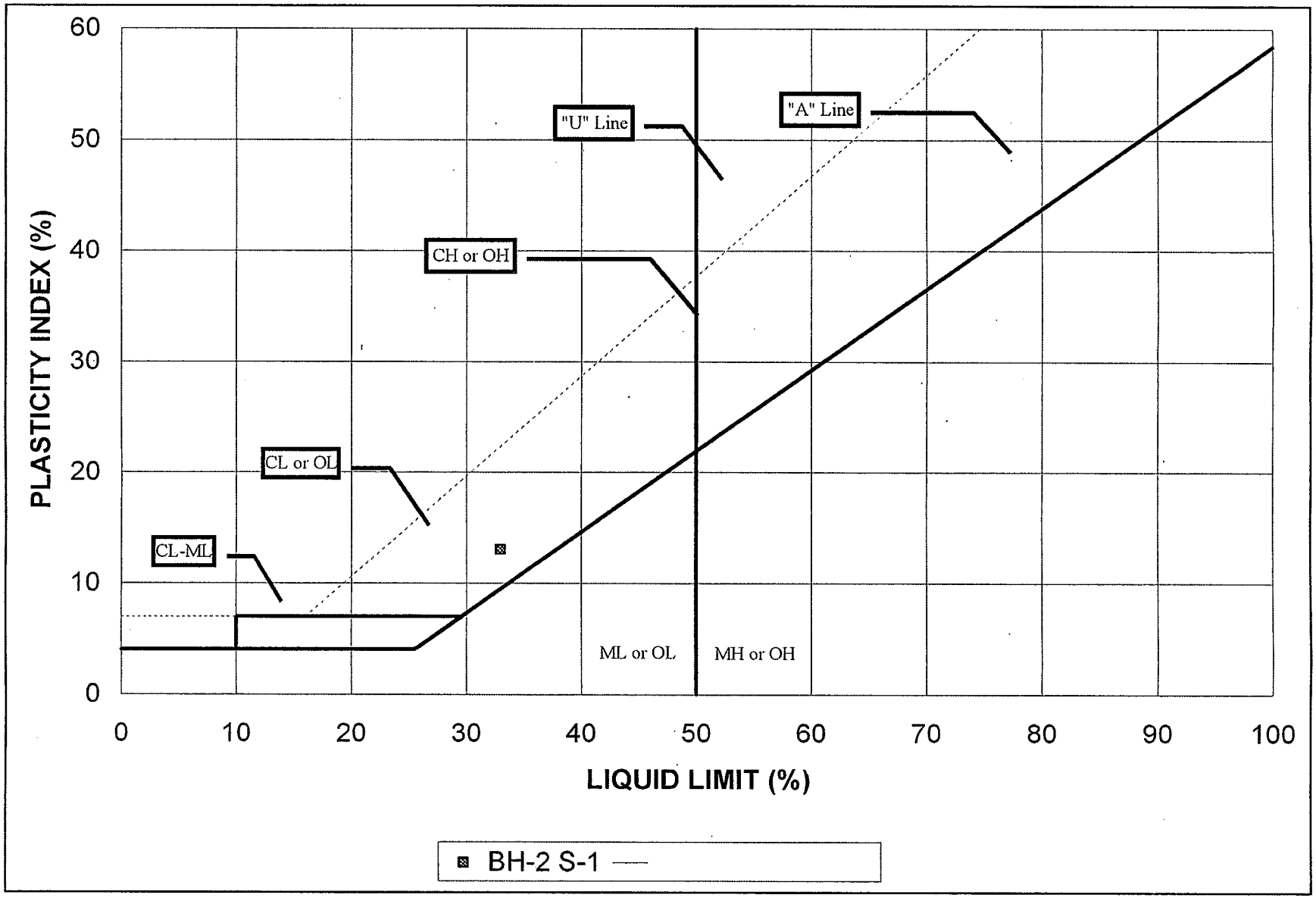
Sample ID:	B-1@5'	B-1@15'	B-1@5'	

COBBLES	GRAVELS		SANDS			SILT	CLAY
	Coarse	Fine	Crse.	Medium	Fine		

Caltrans

Engineering Services
Division of Geotechnical Services
Office of Geotechnical
Design - South 1

Project:	Overhead Sign
EA:	07-4Y3801
Dist-Co-Rte-PM:	07-LA-60-PM 0.10


PLASTICITY INDEX (%)
60
50
40
30
20
10
0
"U" Line
"A" Line
CH or OH
CL or OL
CL-ML
ML or OL
MH or OH
0
10
20
30
40
50
60
70
80
90
100
LIQUID LIMIT (%)
BH-2 S-1

APPENDIX C

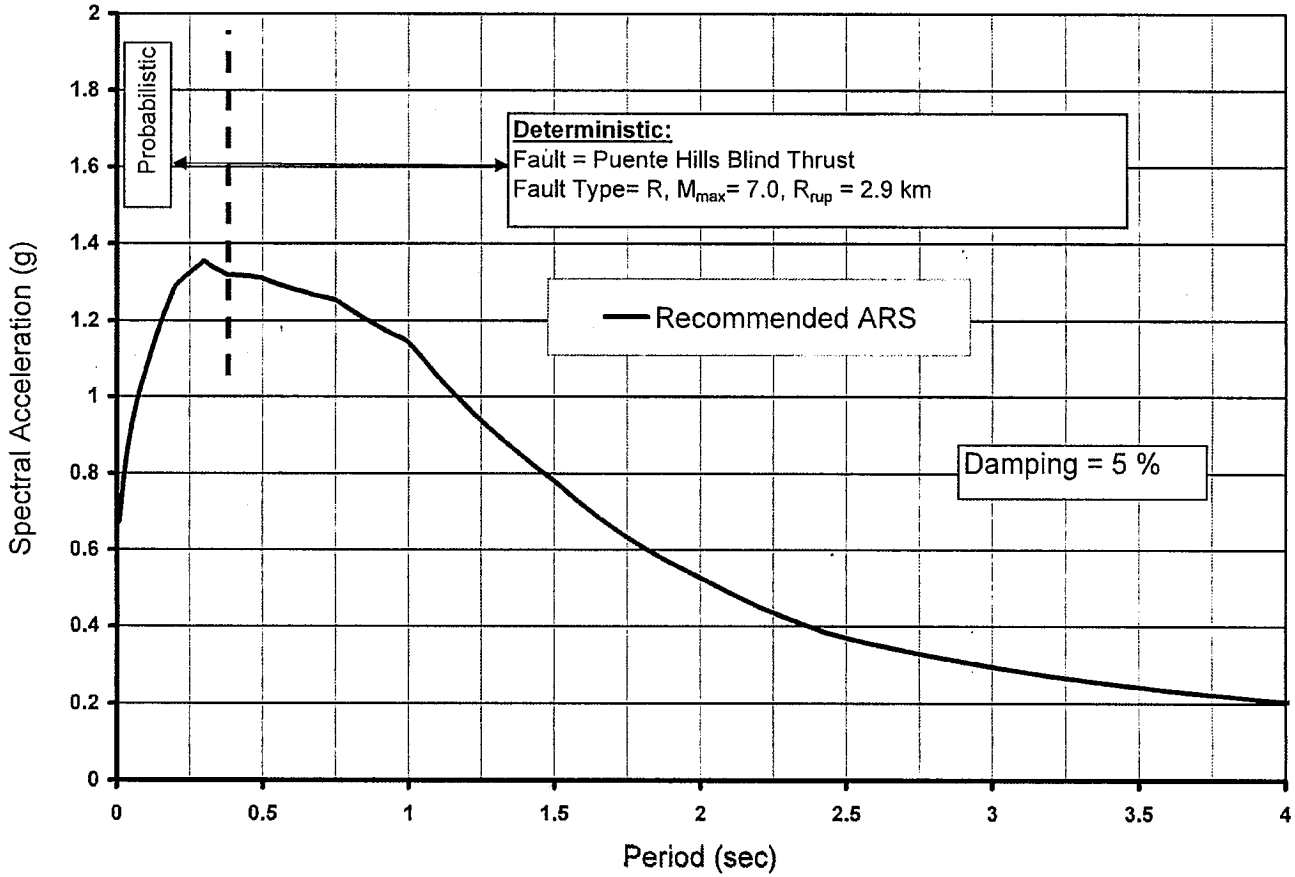


Figure 1. Recommended Design ARS Curve for the OH Sign at LA-60- PM 0.1 (EA: 07-4Y3801)

OH SIGN, 07-LA-60-PM 0.1
EA: 4Y3801

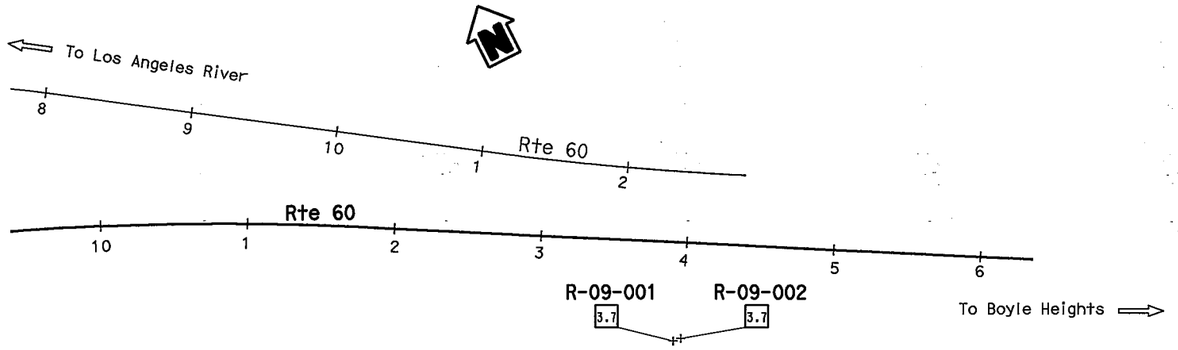
Data for the Recommended ARS

Period (Sec.)	Spectral Acceleration, g	Period (Sec.)	Spectral Acceleration, g	Period (Sec.)	Spectral Acceleration, g
0.01	0.673	0.24	1.318	2.20	0.451
0.02	0.749	0.25	1.324	2.40	0.392
0.02	0.765	0.26	1.331	2.50	0.369
0.03	0.787	0.28	1.343	2.60	0.352
0.03	0.813	0.29	1.348	2.80	0.321
0.03	0.819	0.30	1.354	3.00	0.295
0.03	0.831	0.32	1.344	3.20	0.272
0.04	0.847	0.34	1.335	3.40	0.252
0.04	0.852	0.35	1.331	3.50	0.243
0.04	0.872	0.36	1.327	3.60	0.234
0.04	0.882	0.38	1.319	3.80	0.219
0.04	0.891	0.40	1.319	4.00	0.205
0.05	0.895	0.42	1.318	4.20	0.196
0.05	0.900	0.44	1.316	4.40	0.187
0.05	0.908	0.45	1.316	4.60	0.179
0.05	0.916	0.46	1.315	4.80	0.172
0.06	0.935	0.48	1.312	5.00	0.166
0.06	0.953	0.50	1.310		
0.07	0.970	0.55	1.296		
0.07	0.977	0.60	1.284		
0.07	0.986	0.65	1.273		
0.08	1.001	0.67	1.269		
0.08	1.016	0.70	1.263		
0.09	1.029	0.75	1.253		
0.09	1.042	0.80	1.229		
0.10	1.055	0.85	1.206		
0.10	1.067	0.90	1.184		
0.11	1.095	0.95	1.164		
0.12	1.121	1.00	1.143		
0.13	1.146	1.10	1.054		
0.13	1.153	1.20	0.974		
0.14	1.169	1.30	0.903		
0.15	1.192	1.40	0.839		
0.16	1.213	1.50	0.781		
0.17	1.233	1.60	0.716		
0.18	1.253	1.70	0.659		
0.19	1.271	1.80	0.609		
0.20	1.289	1.90	0.565		
0.22	1.304	2.00	0.526		

BENCH MARK

SURVEY CONTROL

Horizontal Datum: NAD '83 EPOCH 1991.35
Vertical Datum: NAVD '88
Point 101, Code 103:
RTK CHS X Boyle
S.W. Ely Side Bridge @ 60
N 558737.210
E 1979648.209
Elev 296.93'
Point 102, Code 130:
RTK CHS X Soto
S.W. Sly Side Bridge @ 60
N 558749.88942
E 1979781.168
Elev 282.27'



PLAN
1" = 50'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	LA	60	0.1	1	3

M. Mushtaq Ahmed 01-05-10
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
M. Mushtaq Ahmed
No. C56390
Exp. 6-30-11
CIVIL
STATE OF CALIFORNIA

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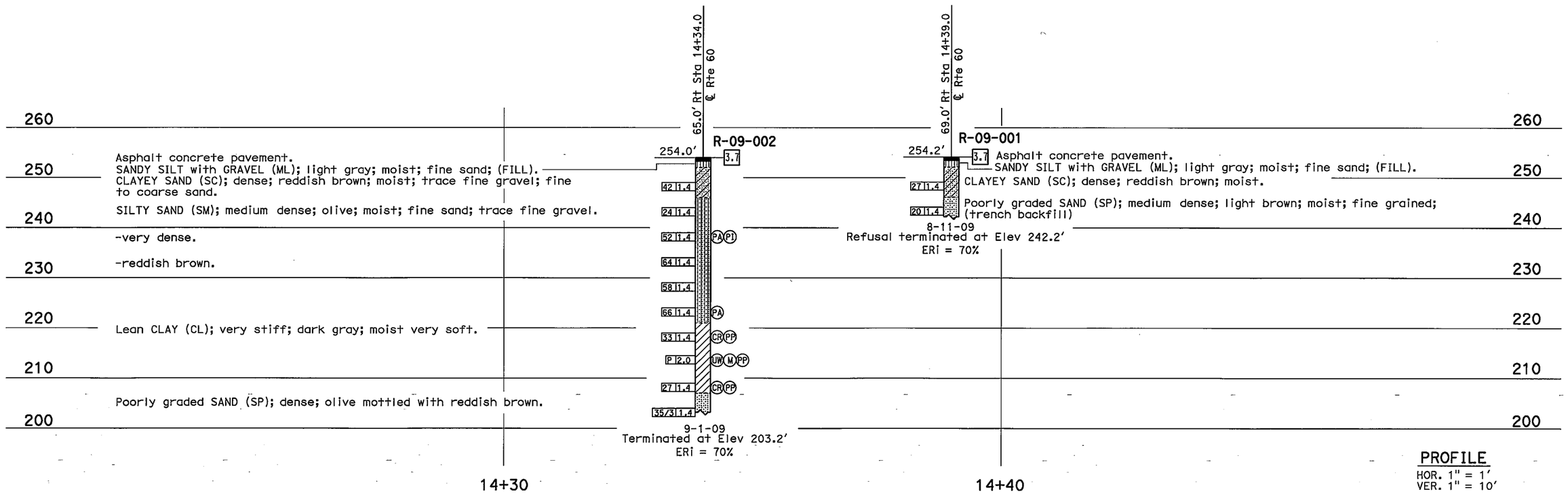
This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, & Presentation Manual (June 2007).

Note: Ground water not encountered.



PROFILE
HOR. 1" = 1'
VER. 1" = 10'

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN	BRIDGE NO. XX-XXXX	OVERHEAD SIGN 2 POSTS
FUNCTIONAL SUPERVISOR NAME: S. Sukiasian	DRAWN BY: C. Christian/ F. Nguyen; CHECKED BY: N. Srour	FIELD INVESTIGATION BY: M. AHMED	DESIGN BRANCH	POST MILES 0.1	LOG OF TEST BORINGS 1 OF 3

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 07
EA 4Y3801

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES										SHEET	OF
12-15-09	12-30-09										

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USERNAME => s1128268 DATE PLOTTED => 21-JAN-2010 TIME PLOTTED => 08:30

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	Ven	60	0.1	2	3

M. Mushtaq Ahmed 01-05-10
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — M. Mushtaq Ahmed — No. C56390 — Exp. 6-30-11 — CIVIL — STATE OF CALIFORNIA

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CEMENTATION

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

BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring
Size	R P	Rotary drilled boring Rotary percussion boring (air)
Size	R	Rotary drilled diamond core
Size	HD HA	Hand driven (1-inch soil tube) Hand Auger
●	D	Dynamic Cone Penetration Boring
▲	CPT	Cone Penetration Test (ASTM D 5778-95)
⬚	O	Other

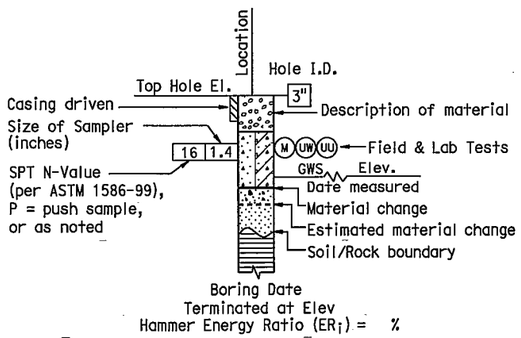
Note: Size in inches.

CONSISTENCY OF COHESIVE SOILS

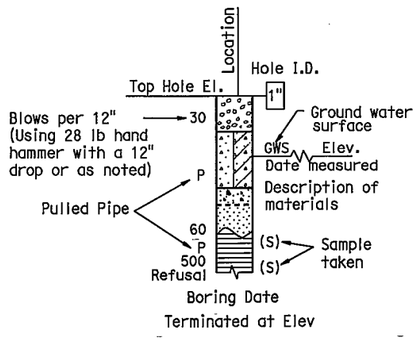
Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	< 0.25	< 0.25	< 0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	0.50 to 1.0	0.50 to 1.0	0.25 to 0.50	Penetrated several inches by thumb with moderate effort
Stiff	1 to 2	1 to 2	0.50 to 1.0	Readily indented by thumb but penetrated only with great effort
Very Stiff	2 to 4	2 to 4	1.0 to 2.0	Readily indented by thumbnail
Hard	> 4.0	> 4.0	> 2.0	Indented by thumbnail with difficulty

PLASTICITY OF FINE-GRAINED SOILS

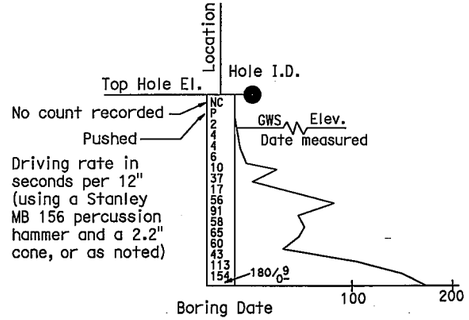
Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be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



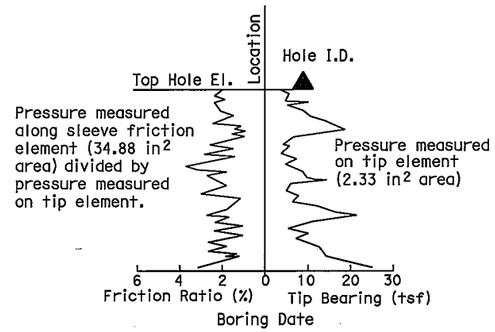
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN	BRIDGE NO.	OVERHEAD SIGN 2 POSTS
	PREPARED BY: F. Nguyen		DESIGN BRANCH	XX POST MILE 0.1	LOG OF TEST BORINGS 2 OF 3

GS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 07
EA 4Y3801

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

FILE => ohsign2pst2of3.dgn

USERNAME => s128268 DATE PLOTTED => 21-JAN-2010 TIME PLOTTED => 09:10

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (JUNE 2007)

GROUP SYMBOLS AND NAMES

Graphic/Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic/Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY ORGANIC elastic SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) Corrosivity Testing (CTM 643, CTM 422, CTM 417)
- (CU) Consolidated Undrained Triaxial (ASTM D 4767)
- (DS) Direct Shear (ASTM D 3080)
- (EI) Expansion Index (ASTM D 4829)
- (M) Moisture Content (ASTM D 2216)
- (OC) Organic Content-% (ASTM D 2974)
- (P) Permeability (CTM 220)
- (PA) Particle Size Analysis (ASTM D 422)
- (PI) Plasticity Index (AASHTO T 90) Liquid Limit (AASHTO T 89)
- (PL) Point Load Index (ASTM D 5731)
- (PM) Pressure Meter
- (PP) Pocket Penetrometer
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (TV) Pocket Torvane
- (UC) Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)
- (VS) Vane Shear (AASHTO T 223)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
07	Ven	60	0.1	3	3

M. Mushtaq Ahmed 01-05-10
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — M. Mushtaq Ahmed — No. C56390 — EXP. 6-30-11 — 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.

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 inches)
Very loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	> 50

MOISTURE

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, usually soil is below water table

PERCENT OR PROPORTION OF SOILS

Description	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

PARTICLE SIZE

Description		Size
Boulder		> 12"
Cobble		3" to 12"
Gravel	Coarse	3/4" to 3"
	Fine	No. 4 to 3/4"
Sand	Coarse	No. 10 to No. 4
	Medium	No. 40 to No. 10
	Fine	No. 200 to No. 40

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN	BRIDGE NO.	OVERHEAD SIGN 2 POSTS
	PREPARED BY: F. Nguyen		DESIGN BRANCH	XX POST MILE 0.1	LOG OF TEST BORINGS 3 OF 3

GS LOTB SOIL LEGEND

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 07 EA 4Y3801

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES | SHEET | OF

FILE => ohsign2ps+3of3.dgn

USERNAME => s128268 DATE PLOTTED => 21-JAN-2010 TIME PLOTTED => 09:13