FOR CONTRACT NO.: 10-3A3404

INFORMATION HANDOUT

MATERIALS INFORMATION

FOUNDATION RECOMMENDATION FOR CHANGEABLE MESSAGE SIGNS
(dated June 22, 2007)

FOUNDATION RECOMMENDATION FOR CHANGEABLE MESSAGE SIGNS ON SR 99
AT LOCATION 2
(dated December 20, 2007)

ROUTE: 10-Mer, Sta, SJ-99-Var

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. NICHOLAS CHAN
Design Manager, Design IV- Branch P

Date: June 22, 2007

File: 10-MER-99-PM18.02
10-MER-99-PM36.78
10-STA-99-PM12.81
10-STA-99-PM23.30
10-SJ-205-PM8.20
10-SJ-205-PM11.13
EA: 10-3A3400

Attention: John Carter

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Foundation Recommendations for Changeable Message Signs

Introduction

This report has been prepared to provide foundation recommendations for the changeable message signs (CMS) proposed at several locations along State Route 99 and State Route 205 in Merced, Stanislaus, and San Joaquin Counties. The proposed CMS will be constructed using Model 500 as listed on Caltrans Standard Plans dated May 2006. The location numbers are based on the foundation request provided by the District and are presented in Table 1 below.

Table 1: CMS Locations

	County	State Route	Postmile	Direction	Description
Location 2	Merced	99	18.02	SB	South of Franklin Rd OC
Location 4	Merced	99	36.71	SB	North of Griffith Rd OC
Location 5	Stanislaus	99	12.85	NB	South of Hatch Rd OC
Location 6	Stanislaus	99	23.30	SB	South of Hammett Rd OC
Location 7	San Joaquin	205	8.28	WB	East of MacArthur Drive OC
Location 8	San Joaquin	205	11.20	EB	West of East Banta OH

Site Geology, Subsurface Conditions, Groundwater, and Seismicity

The topography and the site geology were determined using published maps for the CMS locations. Delorme 3-D Topo Quads dated 1999 were used to approximate the boring

elevations and the *Geologic Map of the San Francisco-San Jose Quadrangle, California* (California Division of Mines and Geology, compiled by D.L. Wagner, E.J. Bortugno, and R.D. McJunkin, 1991) was reviewed to determine the geologic formations at each CMS location.

A subsurface investigation was conducted for this project during the week of April 23, 2007. The subsurface investigation consisted of one hollow stem auger boring at each CMS location (with the exception of Location 8, where mud rotary was also used). The borings were drilled using a trailer-mounted Mobile B-47 drill rig. Soil samples were recovered from these borings at 5 feet intervals by driving a 1.375-inch inner diameter split spoon sampler 1.5 feet into the subsurface with a 140 lb safety hammer dropped 2.5 feet. The number of hammer blows required to drive the sampler the last 1.0-foot into the ground was recorded on the borings logs. Soil recovered from the split spoon sampler was used for soil classification purposes. The boring locations are included in this report and are attached as Plate 1 through Plate 6. The boring logs are presented in Appendix A as Plate Nos. A-1 through A-8.

The log of test borings (LOTB) have been submitted to the Geotechnical Services, Office of Geotechnical Support, Branch D – Contracts, Graphics, and Records and will be forwarded when completed. As-built LOTB for Griffith Road Overcrossing (adjacent to Location 4) and MacArthur Drive Undercrossing (adjacent to Location 7) also have been submitted and will be added to the project plans. Ms. Irma Gamarra-Remmen of the Contracts, Graphics, and Records branch may be contacted directly at (916) 227-7203 for further information on the LOTB.

The depth to groundwater was determined during the subsurface investigation. Groundwater conditions may have changed significantly since the time of the subsurface investigations and will vary according to variations in rainfall, well pumping, and other activities.

Seismicity and liquefaction potential for the various CMS locations was evaluated and included in this report. The seismicity was determined using the Department's California Seismic Hazard Map, 1996. Liquefaction is a loss of soil strength and stiffness due to an increase in pore water pressure during cyclic loading, such as occurs during an earthquake. Soils with liquefaction potential include loose cohesionless soils that may

become saturated. Based on the boring logs, there is liquefaction potential at some of the CMS locations.

Location 2, SR 99 - Merced - PM 18.02

Based on the Delorme Topo Quads, in general, the terrain is flat with an elevation of approximately 161 feet above sea level at the project site. The site is located in the Great Valley geomorphic province of California.

Based on the referenced geologic map, the project location is mapped as being in an area of alluvium (Qm). The alluvium was formed during the Quaternary Period of the Cenozoic Era, approximately 10 thousand to 1.6 million years ago.

Boring B-3 was performed on the shoulder of the northbound lanes of State Route 99 at approximate Post Mile 18.0. The CMS location is on the shoulder of the southbound lanes of State Route 99, however due to existing utilities at the CMS location the boring was moved to the northbound side of the highway. Boring B-3 was drilled to a final depth of 31.5 feet. Based on the subsurface investigation, the foundation material at the site consists of clay, silt, sand, and mixtures thereof ranging from medium dense and hard to very dense and very stiff in consistency. Groundwater was encountered at a depth of approximately 13 feet below the ground surface.

Based on the Department's California Seismic Hazard Map, 1996, the controlling fault for Location 2 is the Prairie Creek-Spenceville-Dentman (PSD) with a maximum credible earthquake moment magnitude of Mw=6.5 located approximately 22.4 miles southwest of the site. The Peak Bedrock Acceleration at this site, based on the referenced map is estimated to be 0.2g. The potential for surface rupture at this site due to fault movement is considered insignificant since there are no known faults projecting toward or passing directly through the project site. The liquefaction potential at the project location is considered minimal.

Location 4, SR 99 - Merced - PM 36.78

Based on the Delorme Topo Quads, in general, the terrain is flat with an elevation of approximately 112 feet above sea level at the project site. The site is located in the Great

Valley geomorphic province of California.

Based on the referenced geologic map, the project location is mapped as being in an area of alluvium (Qm). The alluvium was formed during the Quaternary Period of the Cenozoic Era, approximately 10 thousand to 1.6 million years ago.

Boring B-2 was performed on the shoulder of the southbound lanes of State Route 99 at approximate post mile 36.7. Boring B-2 was drilled to a final depth of 30.0 feet. Based on the subsurface investigation, the foundation material at the site consists of clay, silt, sand, and mixtures thereof ranging from very loose and hard to very dense in consistency. In general, the very loose foundation material was located in the top 15 feet of the boring. Groundwater was encountered at a depth of approximately 3.5 feet below the ground surface.

Based on the Department's California Seismic Hazard Map, 1996, the controlling fault for Location 4 is the Midway San Joaquin/N (MSJ) with a maximum credible earthquake moment magnitude of Mw=6.75 located approximately 18.0 miles southwest of the site. The Peak Bedrock Acceleration at this site, based on the referenced map is estimated to be 0.2g. The potential for surface rupture at this site due to fault movement is considered insignificant since there are no known faults projecting toward or passing directly through the project site. The liquefaction potential at the project location is considered low to moderate due to the very loose, saturated silty sand layer found in the top 15 feet of Boring B-2.

Location 5, SR 99 - Stanislaus - PM 12.85

Based on the Delorme Topo Quads, in general, the terrain is flat with an elevation of approximately 95 feet above sea level at the project site. The site is located in the Great Valley geomorphic province of California.

Based on the referenced geologic map, the project location is mapped as being in an area of alluvium (Qm). The alluvium was formed during the Quaternary Period of the Cenozoic Era, approximately 10 thousand to 1.6 million years ago.

Boring B-4 was performed on the shoulder of the northbound lanes of State Route 99 at

approximate post mile 12.9. Boring B-4 was drilled to a final depth of 31.5 feet. Based on the subsurface investigation, the foundation material at the site consists of silt, sand, and mixtures thereof ranging from loose and very stiff to dense and hard in consistency. Groundwater was not encountered at the time of drilling.

Based on the Department's California Seismic Hazard Map, 1996, the controlling fault for Location 5 is the Midway San Joaquin/N (MSJ) with a maximum credible earthquake moment magnitude of Mw=6.75 located approximately 15.5 miles southwest of the site. The Peak Bedrock Acceleration at this site, based on the referenced map is estimated to be 0.2g. The potential for surface rupture at this site due to fault movement is considered insignificant since there are no known faults projecting toward or passing directly through the project site. The liquefaction potential at the project location is considered minimal.

Location 6 SR 99- Stanislaus - PM 23.30

Based on the Delorme Topo Quads, in general, the terrain is flat with an elevation of approximately 72 feet above sea level at the project site. The site is located in the Great Valley geomorphic province of California.

Based on the referenced geologic map, the project location is mapped as being in an area of alluvium (Qm). The alluvium was formed during the Quaternary Period of the Cenozoic Era, approximately 10 thousand to 1.6 million years ago.

Boring B-1 was performed on the shoulder of the southbound lanes of State Route 99 at approximate post mile 23.3. Boring B-1 was drilled to a final depth of 31.5 feet. Based on the subsurface investigation, the foundation material at the site consists of clay, silt, sand, and mixtures thereof ranging from medium dense and stiff to very dense in consistency. Groundwater was encountered at a depth of approximately 23.5 feet below the ground surface.

Based on the Department's California Seismic Hazard Map, 1996, the controlling fault for Location 6 is the Midway San Joaquin/N (MSJ) with a maximum credible earthquake moment magnitude of Mw=6.75 located approximately 16.2 miles southwest of the site. The Peak Bedrock Acceleration at this site, based on the referenced map is estimated to be 0.2g. The potential for surface rupture at this site due to fault movement is considered

insignificant since there are no known faults projecting toward or passing directly through the project site. The liquefaction potential at the project location is considered minimal.

Location 7, SR 205- San Joaquin - PM 8.28

Based on the Delorme Topo Quads, in general, the terrain is flat with an elevation of approximately 43 feet above sea level at the project site. The site is located in the Great Valley geomorphic province of California.

Based on the referenced geologic map, the project location is mapped as being in an area of alluvial fan deposits (Qf). The alluvial fan deposits were formed during the Quaternary Period of the Cenozoic Era, approximately 10 thousand to 1.6 million years ago.

Boring B-5 was performed on the shoulder of the MacArthur Drive off ramp for the westbound lanes of State Route 205 at approximate post mile 8.3. Boring B-5 was drilled to a final depth of 36.5 feet. Based on the subsurface investigation, the foundation material at the site consists of clay, silt, sand, gravel, and mixtures thereof ranging from medium dense and stiff to dense and very stiff in consistency. In general, the medium dense foundation material was located 20 to 30 feet below the ground surface. Groundwater was encountered at a depth of approximately 17 feet below the ground surface.

Based on the Department's California Seismic Hazard Map, 1996, the controlling fault for the Location 7 is the Midway San Joaquin/N (MSJ) with a maximum credible earthquake moment magnitude of Mw=6.75 located approximately 6.8 miles south of the site. The Peak Bedrock Acceleration at this site, based on the referenced map is estimated to be 0.4g. The potential for surface rupture at this site due to fault movement is considered insignificant since there are no known faults projecting toward or passing directly through the project site. The liquefaction potential at the project location is considered low to moderate due to the 10-foot medium dense, saturated sand layer found 20 feet below the ground surface in Boring B-5.

Based on Boring B-5, a Caltrans Seismic Design Criteria (CSDC) Acceleration Response Spectrum (ARS) Curve corresponding to soil profile Type D is recommended for design.

Due to the close proximity of the CMS to the controlling fault, the recommended ARS Curve must be modified in accordance with CSDC Version 1.4 Section 6.1.2.1.

Location 8, SR 205- San Joaquin - PM 11.20

Based on the Delorme Topo Quads, in general, the terrain is flat with an elevation of approximately 50 feet above sea level at the project site. The site is located in the Great Valley geomorphic province of California.

Based on the referenced geologic map, the project location is mapped as being in an area of alluvial fan deposits (Qf). The alluvial fan deposits were formed during the Quaternary Period of the Cenozoic Era, approximately 10 thousand to 1.6 million years ago.

Boring B-6 was performed in the median of State Route 205 at approximate post mile 11.2. Boring B-6 was drilled to a final depth of 46.5 feet. Based on the subsurface investigation, the foundation material at the site consists of clay, silt, sand, and mixtures thereof, which were either medium dense or very stiff in consistency. In general, the medium dense foundation material was located 15 to 40 feet below the ground surface. Groundwater was encountered at a depth of approximately 18 feet below the ground surface.

Based on the Department's California Seismic Hazard Map, 1996, the controlling fault for the Location 8 is the Midway San Joaquin/N (MSJ) with a maximum credible earthquake moment magnitude of Mw=6.75 located approximately 8.7 miles southwest of the site. The Peak Bedrock Acceleration at this site, based on the referenced map is estimated to be 0.3g. The potential for surface rupture at this site due to fault movement is considered insignificant since there are no known faults projecting toward or passing directly through the project site. The liquefaction potential at the project location is considered low to moderate due to the 25-foot medium dense saturated sand layer found 15 feet below the ground surface in Boring B-6.

Based on the LOTB, a Caltrans Seismic Design Criteria (CSDC) Acceleration Response Spectrum (ARS) Curve corresponding to soil profile Type D is recommended for design. Due to the close proximity of the CMS to the controlling fault, the recommended ARS

Curve must be modified in accordance with CSDC Version 1.4 Section 6.1.2.1.

Laboratory Testing

Laboratory testing was performed to determine the amount of silt and clay particles in the soil samples and to determine corrosiveness at the CMS locations. The following laboratory tests were performed on selected samples obtained from the borings:

Mechanical Analysis – CTM 203
Plasticity Index – CTM 204
Corrosion – CTM 643
Sulfates – CTM 417
Chlorides – CTM 422

Corrosion

The Department currently defines a corrosive area as an area where the soil contains more than 500 ppm of chlorides, or more than 2000 ppm of sulfates, or has a pH of 5.5 or less. With the exception of MSE walls, chloride and sulfate tests are not required if the minimum resistivity is greater than 1000 ohm-cm. Based on the lab results, the soils in the project areas are considered non-corrosive. The corrosion test results are summarized in Table 2 below.

Table 2: Corrosion Test Results

	Sample No.	Depth (ft)	PH	Minimum Resistivity (ohm-cm)	Sulfate Content (ppm)	Chloride Content (ppm)
Location 2	B3-2	5.0-10.0	7.62	2200	N/A	N/A
Location 4	B2-2	5.0-10.0	8.19	11000	N/A	N/A
Location 5	B4-2	5.0-10.0	7.57	21000	N/A	N/A
Location 6	B1-2	5.0-10.0	8.26	3000	N/A	N/A
Location 7	B5-3	10.0-15.0	8.68	1600	N/A	N/A
Location 8	B6-2	5.0-10.0	8.68	1700	N/A	N/A

Foundation Recommendations and Construction Considerations

The following foundation recommendations are based on the May 2006 Standard Plans for a Model 500 Changeable Message Sign, conversations with Mr. Jeff Woody (signer of the CMS Standard Plans), and the subsurface investigation conducted at the sites. A single-post overhead sign-truss CMS supported by a single concrete cast-in-drilled-hole (CIDH) pile is proposed at the project sites. According to the design sheet on page S116 of the Standards Plans, the applicable foundation soils are assumed to posses a minimum unit weight of 120 lb/ft^3 and a minimum internal friction angle of 30° for a CIDH pile of a single-post CMS. Our recommendation for each CMS location is discussed below.

Location 2, SR 99 - Merced - PM 18.02

Based on Boring B-3, the subsurface soils at Location 2 either meet or exceed the minimum strength requirements stated in the Standard Plans. Therefore, it is our opinion that the CIDH foundation proposed in the Standard Plans will be applicable to support the new CMS at Location 2. The minimum depth and diameter of the CIDH foundation shown in the Standard Plans for the Model 500 CMS are 22.0 feet and 5.0 feet, respectively.

Caving soil should be anticipated during CIDH pile construction due to the presence of granular materials and groundwater encountered during the subsurface investigation as well as the vibration from traffic on the Highway. Temporary casing and/or wet method may be required to prevent caving. Since groundwater was present, gamma-gamma acceptance testing during CIDH pile installation will be required.

Location 4, SR 99 - Merced - PM 36.78

Based on Boring B-2, the subsurface soils at Location 4 do not meet the minimum strength requirements stated in the Standard Plans. Loose saturated granular material was encountered in the top 15 feet of Boring B-2. This soil layer also has a low to moderate potential for liquefaction. The top 15 feet of soil will be disregarded for design and a modification to lengthen the CIDH pile in the Standard Plans for a Model 500 CMS should be made. The minimum diameter of the CIDH foundation as seen in the Standard Plans will remain 5 feet, however the CIDH pile length should be extended to a minimum

of 40 feet. If this modification is made, the CIDH pile will be adequate to support the CMS at Location 4.

Caving soil should be anticipated during CIDH pile construction due to the presence of granular materials and groundwater encountered during the subsurface investigation as well as the vibration from traffic on the Highway. Temporary casing and/or wet method may be required to prevent caving. Since groundwater was present, gamma-gamma acceptance testing during CIDH pile installation will be required.

Location 5, SR 99 - Stanislaus - PM 12.85

Based on Boring B-4, the subsurface soils at Location 5 either meet or exceed the minimum strength requirements stated in the Standard Plans. Therefore, it is our opinion that the CIDH foundation proposed in the Standard Plans will be applicable to support the new CMS at Location 5. The minimum depth and diameter of the CIDH foundation shown in the Standard Plans for the Model 500 CMS are 22.0 feet and 5.0 feet, respectively.

Caving soil should be anticipated during CIDH pile construction due to the presence of granular materials encountered during the subsurface investigation as well as the vibration from traffic on the Highway. Temporary casing and/or wet method may be required to prevent caving. If groundwater is encountered during construction, gamma-gamma acceptance testing during CIDH pile installation will be required.

Location 6 SR 99- Stanislaus - PM 23.30

Based on Boring B-1, the subsurface soils at Location 6 either meet or exceed the minimum strength requirements stated in the Standard Plans. Therefore, it is our opinion that the CIDH foundation proposed in the Standard Plans will be applicable to support the new CMS at Location 6. The minimum depth and diameter of the CIDH foundation shown in the Standard Plans for the Model 500 CMS are 22.0 feet and 5.0 feet, respectively.

Caving soil should be anticipated during CIDH pile construction due to the presence of granular materials encountered during the subsurface investigation as well as the

vibration from traffic on the Highway. Temporary casing and/or wet method may be required to prevent caving. If groundwater is encountered during construction, gamma-gamma acceptance testing during CIDH pile installation will be required.

Location 7, SR 205- San Joaquin - PM 8.28

Based on Boring B-5, the subsurface soils at Location 7 meet the minimum strength requirements stated in the Standard Plans, however the liquefaction potential approximately 20 to 30 feet below the ground surface is considered low to moderate. As such, the top 30 feet of soil will not be used for design. Two alternatives for the foundation type for Location 7 are discussed below.

A modification to the CIDH foundation shown in the Standard Plans for the Model 500 CMS could be made to compensate for the liquefiable soil layer. The minimum diameter of the CIDH foundation as seen in the Standard Plans would remain 5 feet, however the CIDH pile length should be extended to a minimum of 60 feet. If this modification were made, the CIDH pile would be adequate to support the CMS at Location 7. However, caving soil to a depth of 60 feet should be anticipated during CIDH pile construction due to the presence of granular materials and groundwater encountered during the subsurface investigation as well as the vibration from traffic on the Highway. Temporary casing and/or wet method may be required to prevent caving. Since groundwater was present, gamma-gamma acceptance testing during CIDH pile installation will be required.

The preferred alternative for the CMS foundation would be a special design using driven piles. A request for a special design to Mr. Jeff Woody of Special Design Branch 1 (Special Designs for System Structures) should be submitted if this alternative is selected. Using driven piles would eliminate the use of casing and/or wet method and gamma-gamma testing would no longer be required.

Location 8, SR 205- San Joaquin - PM 11.20

Based on Boring B-6, the subsurface soils at Location 8 do not meet the minimum strength requirements stated in the Standard Plans. Medium dense saturated granular material was encountered at a depth of 15 to 40 feet below the ground surface of Boring B-6. This soil layer also has a low to moderate potential for liquefaction. As such, the

top 40 feet of soil will not be used for design. Two alternatives for the foundation type for Location 8 are discussed below.

A modification to the CIDH foundation shown in the Standard Plans for the Model 500 could be made to compensate for this medium dense liquefiable soil layer. The minimum diameter of the CIDH foundation as seen in the Standard Plans would remain 5 feet, however the CIDH pile length should be extended to a minimum of 80 feet. If this modification were made, the CIDH pile would be adequate to support the CMS at Location 7. However, caving soil to a depth of 80 feet should be anticipated during CIDH pile construction due to the presence of granular materials and groundwater encountered during the subsurface investigation as well as the vibration from traffic on the Highway. Temporary casing and/or wet method may be required to prevent caving. Since groundwater was present, gamma-gamma acceptance testing during CIDH pile installation will be required.

The preferred alternative for the CMS foundation would be a special design using driven piles. A request for a special design to Mr. Jeff Woody of Special Design Branch 1 (Special Designs for System Structures) should be submitted if this alternative is selected. Using driven piles would eliminate the use of casing and/or wet method and gamma-gamma testing would no longer be required.

Project Information

Standard Special Provision S5-280, "Project Information", discloses to bidders and contractors a list of pertinent information available for their inspection prior to bid opening. The following is an excerpt from SSP S5-280 disclosing information originating from Geotechnical Services. Items listed to be included in the Information Handout will be provided in Acrobat (.pdf) format to the addressee(s) of this report via electronic mail.

Data and information attached with the project plans are:

A. As-built Log of Test Borings, Griffith Road OC (Br# 39-0192).
B. As-built Log of Test Borings, MacArthur DriveUC (Br# 29-0184R/L).
C. Log of Test Borings for all locations, performed in April 2007.

Data and Information included in the Information Handout provided to the bidders and Contractors are:

A. Foundation Recommendations for Changeable Message Signs On SR 99 and SR 205, dated June 22, 2007.

Data and Information available for inspection at the District Office:

A. None

Data and Information available for inspection at the Transportation Laboratory are:

A. None

The information contained in this report is applicable for the six CMS and may not be valid outside of these locations. Subsurface conditions were evaluated only at the boring locations and may deviate elsewhere within the project areas. If changes in the locations of the CMS are proposed, this Office should be consulted to provide supplementary recommendations, if necessary.

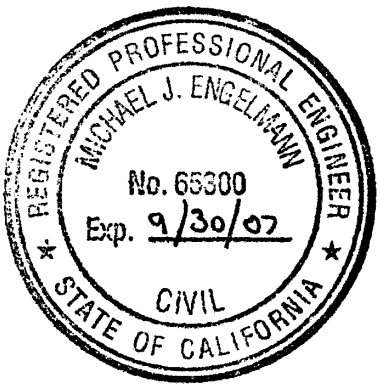
If you have any questions, please contact Michael Engelmann at (916) 227-7153 or Reza Mahallati at (916) 227-7189.

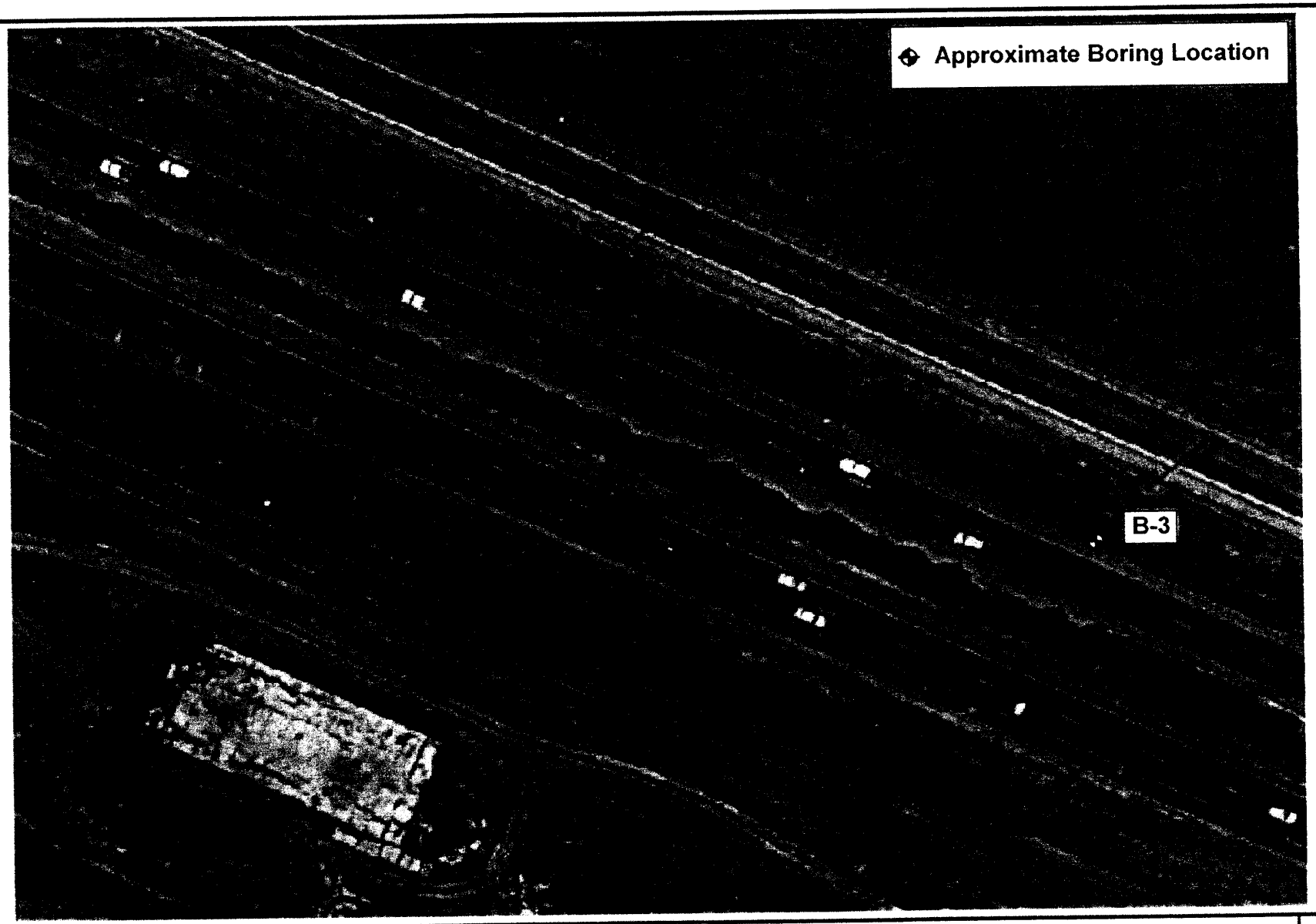
MICHAEL ENGELMANN, P.E.
Transportation Engineer - Civil
Office of Geotechnical Design – North

REZA MAHALLATI, P.E.
Senior Materials and Research Engineer
Office of Geotechnical Design - North

Attachments
Appendix A – Boring Logs

C: John Huang
Dave Dhillon (E-copy)
GDN File





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

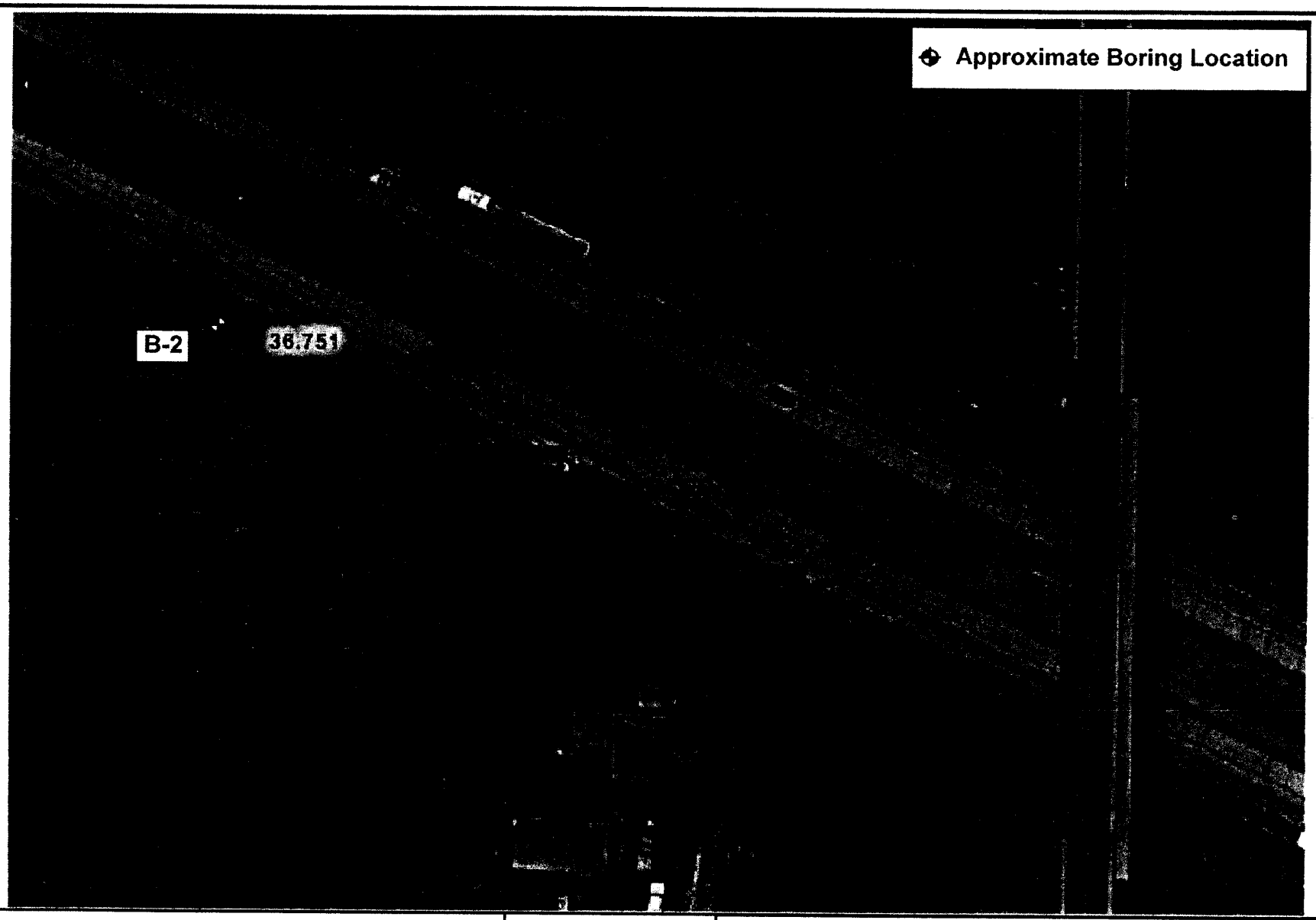
EA: 10-3A3400

Date: June 2007

BORING LOCATION

Plate No. 1

10-MER-99 PM 18.0
FOUNDATION RECOMMENDATIONS FOR CMS



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Office of Geotechnical Design - North

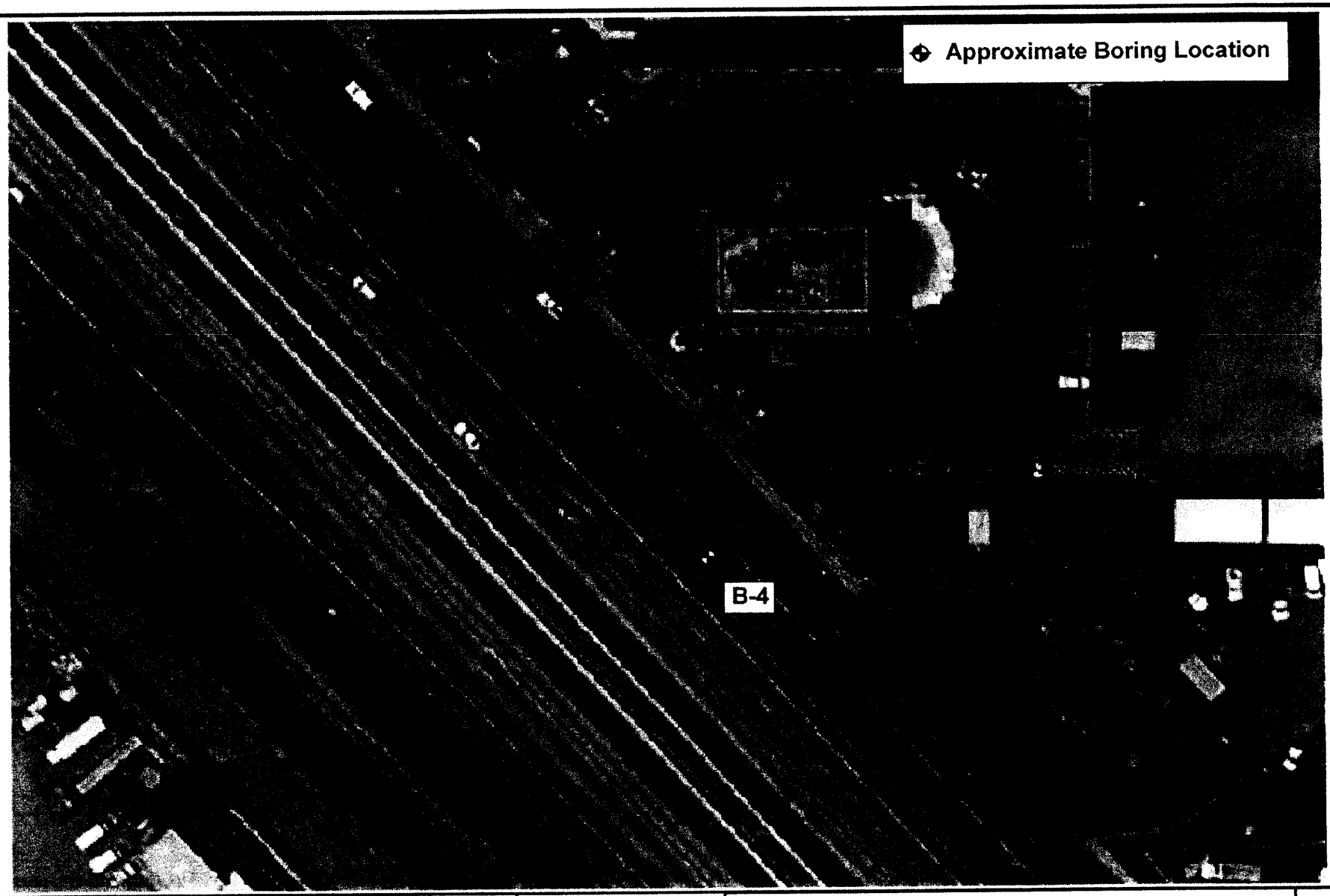
EA: 10-3A3400

Date: June 2007

BORING LOCATION

Plate No. 2

10-MER-99 PM 36.8
FOUNDATION RECOMMENDATIONS FOR CMS



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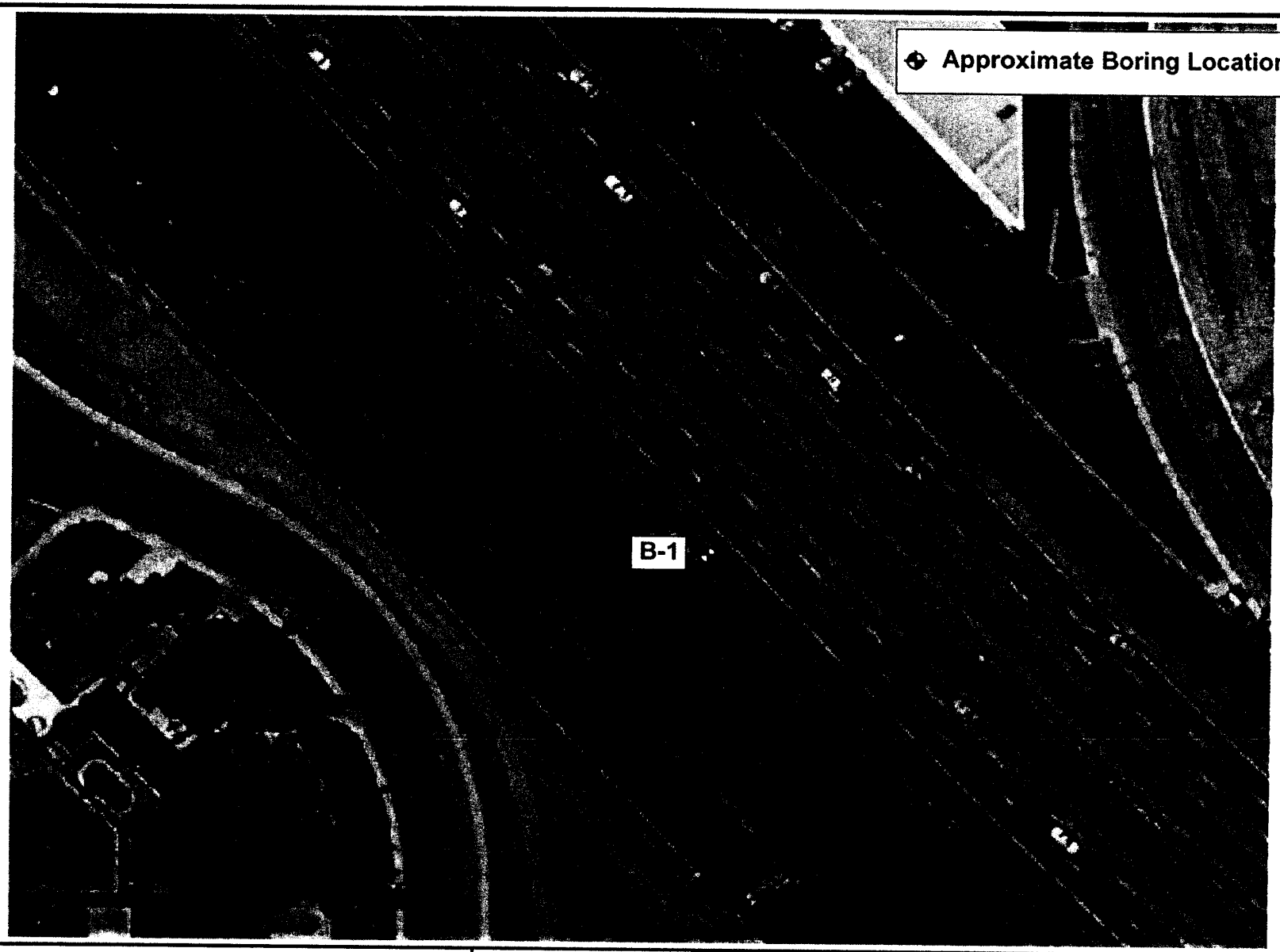
EA: 10-3A3400

Date: June 2007

BORING LOCATION

Plate No. 3

10-STA-99 PM 12.9
FOUNDATION RECOMMENDATIONS FOR CMS



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

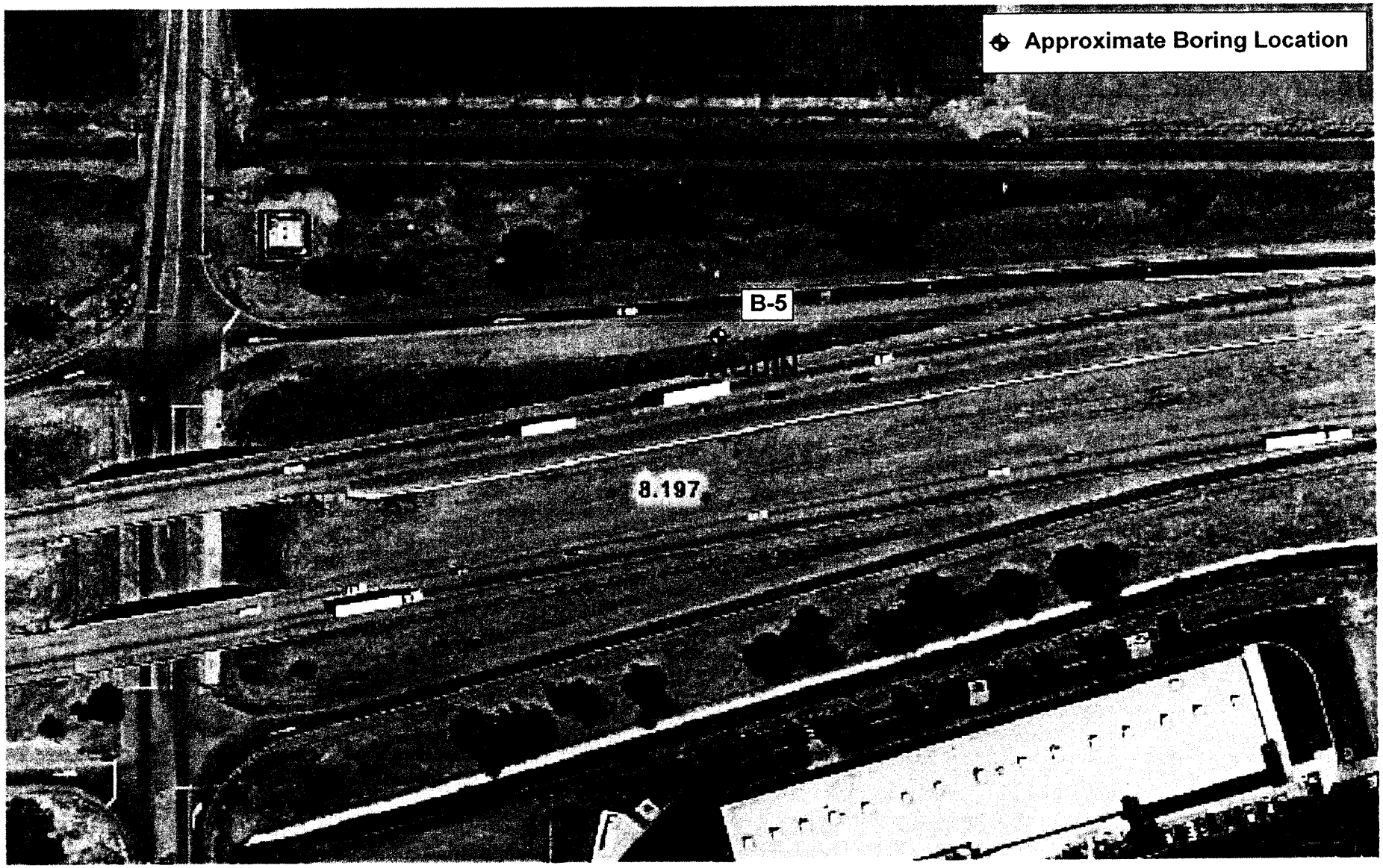
EA: 10-3A3400

Date: June 2007

BORING LOCATION

Plate No. 4

10-STA-99 PM 23.3
FOUNDATION RECOMMENDATIONS FOR CMS



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

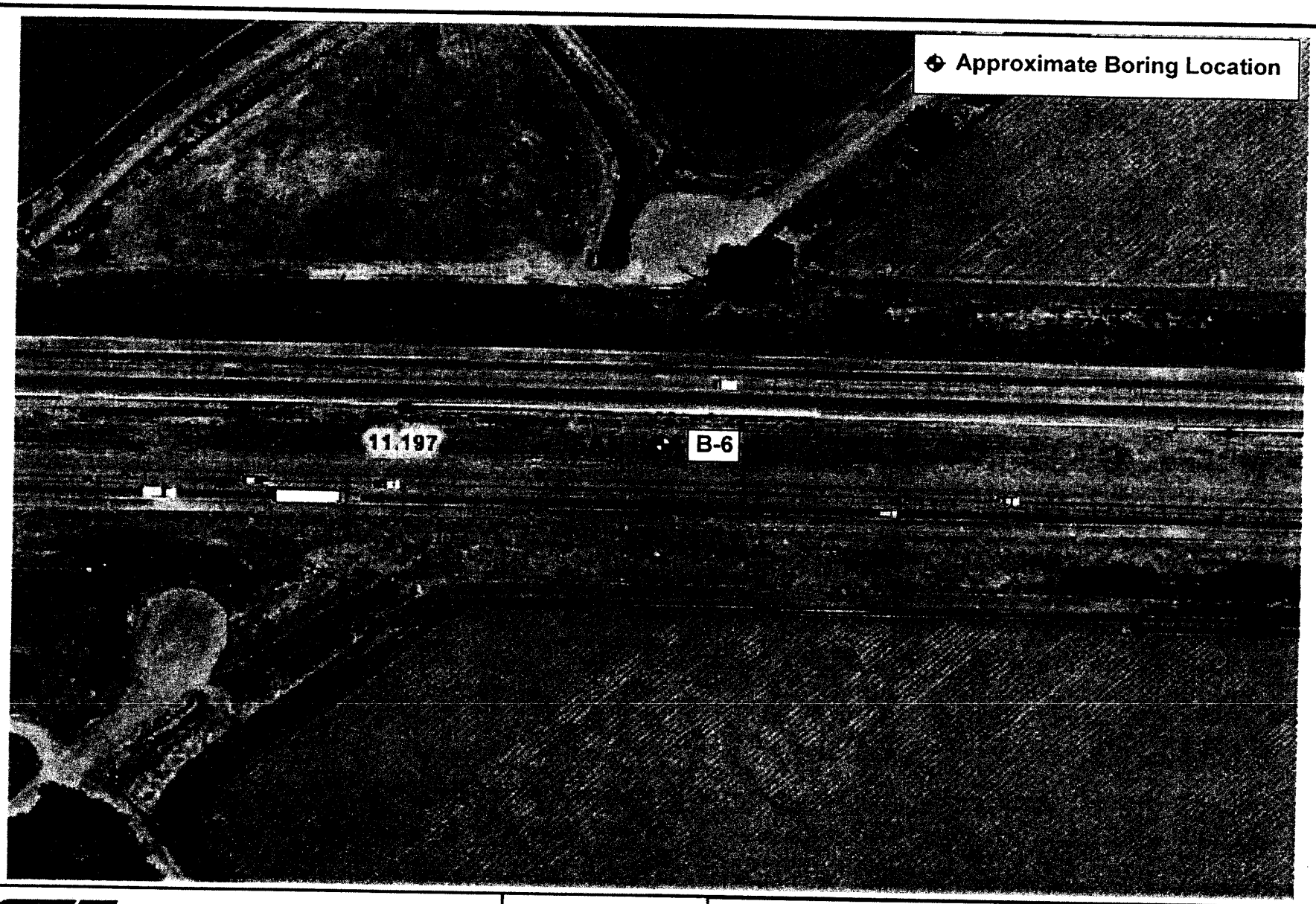
EA: 10-3A3400

Date: June 2007

BORING LOCATION

Plate No. 5

10-SJ-205 PM 8.3
FOUNDATION RECOMMENDATIONS FOR CMS



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

EA: 10-3A3400

Date: June 2007

BORING LOCATION

Plate No. 6

10-SJ-205 PM 11.2
FOUNDATION RECOMMENDATIONS FOR CMS

APPENDIX A

Logs of Test Borings

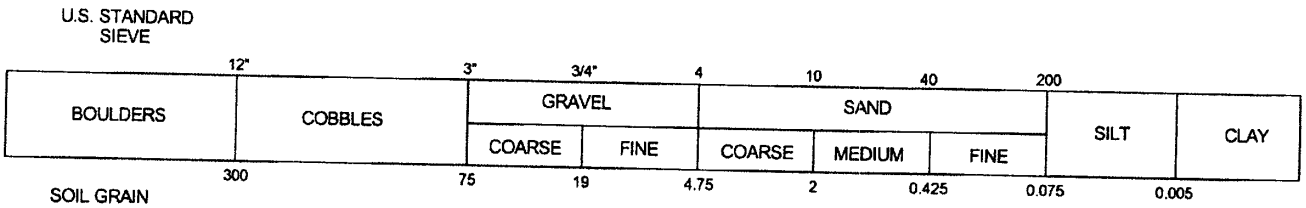
GRAPHIC SYMBOLS

- Bulk Sample
- Rock Core
- Modified California Sampler
- Standard Penetration Sampler
- Shelby Tube
- Vane Shear
- Auger
- Diamond Core
- Rotary
- California Sampler
- Water Level - 1st Reading
- Water Level - 2nd Reading
- Water Level - 3rd Reading

TESTING

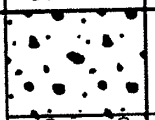
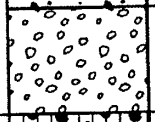
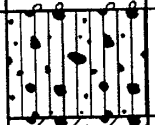
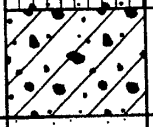
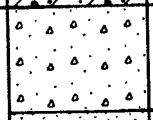
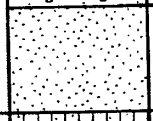
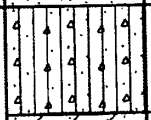
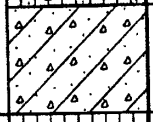
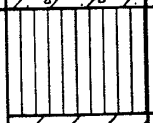
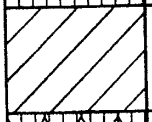
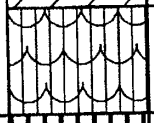
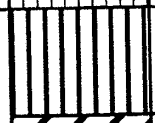
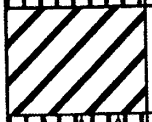
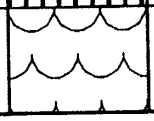
CONS	Consolidation (Cal Test 219)
UU	Unconsolidated Undrained Triaxial (Cal Test 230)
CU	Consolidated Undrained Triaxial (Cal Test 230)
DS	Direct Shear (ASTM D3080)
UC	Unconfined Compression (Cal Test 221)
LL	Liquid Limit-% (Cal Test 204)
PI	Plasticity Index-% (Cal Test 204)
PP	Pocket Penetrometer
TV	Pocket Torvane
RQD	Rock Quality Designation (ASTM D6032)
CP	Compaction Test (Cal Test 216)
PERM	Permeability (Cal Test 220)
COR	Corrosivity Testing (Cal Test 532/643)
GRAD	Gradation Analysis (Cal Tests 202/203)
EP	Expansion Pressure (Cal Test 354)
OC	Organic Content-% (ASTM D2974)
SE	Sand Equivalent (Cal Test 217)

SOIL GRAIN SIZE



GENERAL NOTES

1. Logs represent general subsurface conditions observed at the point of exploration on the date indicated.
2. In general, USCS designations presented on logs were established by visual methods only; therefore, actual designations (based on laboratory tests) may vary.
3. No warranty is provided as to the continuity of soil conditions between individual sample locations.
4. Lines separating strata on the logs represent approximate boundaries only; actual transitions may be different or gradual.
5. Pocket penetrometer values reported on the logs under shear strength are actual values as recorded in the field. (To be used in analysis, the pocket penetrometer value should be divided by two)

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

Equipment:	Station/KP:	Boring ID.:
Mobile B47		B-1
Hammer:	Offset Distance/Line:	Date Completed:
Safety semi-automatic drop (140#/ 30")		4-23-07
Drilling Method:	North/East:	Hole Diameter:
6-inch hollow stem auger		6in
Sampling Method:	Ground Surface Elevation:	Total Depth:
SPT, Bulk	~72.0ft	31.5ft
Notes:	~Depth to GW/date measured:	Logged By:
Boring performed for Location #6	23.5ft on 4-23-07	M Engelmann

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Graphic Log	Description	Sample Type	Sample Number	Sample Blows	Blows per Foot	Recovery (%)	RQD (%)	w/c (%)	Dry Density (pcf)	Shear Strength (tsf)	Drilling Method/ Casing	Remarks
21.64	0.30	1		SILTY SAND (SM): medium dense, brown, moist, fine sand.											
21.34	0.61	2													
21.03	0.91	3													
20.73	1.22	4													
20.42	1.52	5													
20.12	1.83	6				1	11 9 6	15							
19.81	2.13	7				2									
19.51	2.44	8													
19.20	2.74	9													
18.90	3.05	10													
18.59	3.35	11		Poorly graded SAND (SP): very dense, light brown to tan, moist, fine sand.		3	33 40 37	77							
18.29	3.66	12													
17.98	3.96	13													
17.68	4.27	14													
17.37	4.57	15													
17.07	4.88	16				4	33 27 34	61							
16.76	5.18	17													
16.46	5.49	18													
16.15	5.79	19													
15.85	6.10	20													
15.54	6.40	21		becomes medium dense.		5	12 9 13	22							
15.24	6.71	22		SILTY CLAY (CL): stiff, grayish brown, moist, medium plasticity.											
14.94	7.01	23													
14.63	7.32	24													
14.33	7.62	25													
14.02	7.92	26		SILTY SAND (SM): medium dense, grayish brown, wet, fine sand.		6	5 8 11	19							
13.72	8.23	27													
13.41	8.53	28													
13.11	8.84	29													
12.80	9.14	30													
12.50	9.45	31		Poorly graded SAND (SP): medium dense, grayish brown, wet, medium sand.		7	4 10 14	24							
12.19	9.75	32		Bottom of Hole at 9.60 m (31.5 ft) on 4-23-07											
11.89	10.06	33													
11.58	10.36	34													
11.28	10.67	35													

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

EA:	10-3A3400
Date:	5-21-07
Drafted By:	M Engelmann

B-1

10-STA-99 / KP 37.50 (PM 23.3)

Structure Foundation Report

Equipment:	Station/KP:	Boring ID.:
Mobile B47		B-2
Hammer:	Offset Distance/Line:	Date Completed:
Safety semi-automatic drop (140#/ 30")		4-23-07
Drilling Method:	North/East:	Hole Diameter:
6-inch hollow stem auger		6in
Sampling Method:	Ground Surface Elevation:	Total Depth:
SPT, Bulk	~112.0ft	30.0ft
Notes:	~Depth to GW/date measured:	Logged By:
Boring performed for Location #4	3.5ft on 4-23-07	M Engelmann

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Graphic Log	Description	Sample Type	Sample Number	Sample Blows	Blows per Foot	Recovery (%)	RQD (%)	w/c (%)	Dry Density (pcf)	Shear Strength (tsf)	Drilling Method/ Casing	Remarks
33.83	0.30	1		SILTY SAND (SM): very loose, grayish brown, moist, fine sand.											
33.53	0.61	2													
33.22	0.91	3													
32.92	1.22	4													
32.61	1.52	5													
32.31	1.83	6			X	1	3 2 2	4							
32.00	2.13	7				2									
31.70	2.44	8													
31.39	2.74	9													
31.09	3.05	10													
30.78	3.35	11		becomes medium dense, fine to meduim sand, wet.	X	3	11 7 5	12							
30.48	3.66	12													
30.18	3.96	13													
29.87	4.27	14													
29.57	4.57	15													
29.26	4.88	16		becomes dense.	X	4	9 25 50	75					P = 2.00		
28.96	5.18	17		CLAYEY SILT (ML): hard, grayish brown, wet, low plasticity.											
28.65	5.49	18													
28.35	5.79	19													
28.04	6.10	20													
27.74	6.40	21		SANDY SILT (ML): very dense, brown, wet, fine to medium sand.	X	5	16 21 34	55							
27.43	6.71	22													
27.13	7.01	23													
26.82	7.32	24													
26.52	7.62	25													
26.21	7.92	26		SILTY SAND (SM): dense, brown, wet, fine to medium sand.	X	6	8 16 21	37							
25.91	8.23	27													
25.60	8.53	28													
25.30	8.84	29													
24.99	9.14	30		Bottom of Hole at 9.14 m (30.0 ft) on 4-23-07											
24.69	9.45	31													
24.38	9.75	32													
24.08	10.06	33													
23.77	10.36	34													
23.47	10.67	35													

Equipment: Mobile B47	Station/KP:	Boring ID.: B-3
Hammer: Safety semi-automatic drop (140#/ 30")	Offset Distance/Line:	Date Completed: 4-24-07
Drilling Method: 6-inch hollow stem auger	North/East:	Hole Diameter: 6in
Sampling Method: SPT, Bulk	Ground Surface Elevation: ~161.0ft	Total Depth: 31.5ft
Notes: Boring performed for Location #2	~Depth to GW/date measured: 13.0ft on 4-24-07	Logged By: M Engelmann

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Graphic Log	Description	Sample Type	Sample Number	Sample Blows	Blows per Foot	Recovery (%)	RQD (%)	w/c (%)	Dry Density (pcf)	Shear Strength (tsf)	Drilling Method/ Casing	Remarks
48.77	0.30	1		CLAYEY SILT (ML): very stiff, dark brown, moist, medium plasticity.											
48.46	0.61	2													
48.16	0.91	3													
47.85	1.22	4													
47.55	1.52	5													
47.24	1.83	6				1	6 9 17	26					P = 2.00		
46.94	2.13	7													
46.63	2.44	8				2									
46.33	2.74	9													
46.02	3.05	10													
45.72	3.35	11				3	8 8 10	18					P = 1.50		
45.42	3.66	12		SILTY SAND (SM): medium dense, light brown, moist, fine to medium sand.											
45.11	3.96	13													
44.81	4.27	14													
44.50	4.57	15													
44.20	4.88	16				4	11 26 43	69							
43.89	5.18	17		SILT (ML): hard, grayish brown, moist.											
43.59	5.49	18													
43.28	5.79	19													
42.98	6.10	20													
42.67	6.40	21		SANDY SILT (ML): very dense, brown, moist, fine sand.		5	16 26 30	56							
42.37	6.71	22													
42.06	7.01	23													
41.76	7.32	24													
41.45	7.62	25													
41.15	7.92	26		SILTY SAND (SM): dense, brown, wet, medium sand.		6	15 18 20	38							
40.84	8.23	27													
40.54	8.53	28													
40.23	8.84	29													
39.93	9.14	30													
39.62	9.45	31		Poorly graded SAND (SP): dense, grayish brown, wet, medium sand.		7	11 13 20	33							
39.32	9.75	32		Bottom of Hole at 9.60 m (31.5 ft) on 4-24-07											
39.01	10.06	33													
38.71	10.36	34													
38.40	10.67	35													

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

EA:	10-3A3400
Date:	5-21-07
Drafted By:	M Engelmann

B-3

10-MER-99 / KP 29.00 (PM 18.0)

Structure Foundation Report

Equipment: Mobile B47	Station/KP:	Boring ID.: B-4
Hammer: Safety semi-automatic drop (140#/ 30")	Offset Distance/Line:	Date Completed: 4-24-07
Drilling Method: 6-inch hollow stem auger	North/East:	Hole Diameter: 6in
Sampling Method: SPT, Bulk	Ground Surface Elevation: ~95.0ft	Total Depth: 31.5ft
Notes: Boring performed for Location #5	~Depth to GW/date measured: Not Encountered on 4-24-07	Logged By: M Engelmann

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Graphic Log	Description	Sample Type	Sample Number	Sample Blows	Blows per Foot	Recovery (%)	RQD (%)	w/c (%)	Dry Density (pcf)	Shear Strength (tsf)	Drilling Method/ Casing	Remarks
28.65	0.30	1		SILTY SAND (SM): loose, brown, moist, fine sand.											
28.35	0.61	2													
28.04	0.91	3													
27.74	1.22	4													
27.43	1.52	5													
27.13	1.83	6			X	1	4 5 5	10							
26.82	2.13	7				2									
26.52	2.44	8													
26.21	2.74	9													
25.91	3.05	10													
25.60	3.35	11		becomes medium dense.	X	3	7 8 8	16							
25.30	3.66	12													
24.99	3.96	13													
24.69	4.27	14													
24.38	4.57	15													
24.08	4.88	16		Poorly graded SAND (SP): medium dense, grayish brown, moist, fine sand.	X	4	7 10 13	23							
23.77	5.18	17													
23.47	5.49	18													
23.16	5.79	19													
22.86	6.10	20													
22.56	6.40	21			X	5	4 10 16	26							
22.25	6.71	22		SILT (ML): very stiff, grayish brown, moist, low plasticity.											
21.95	7.01	23													
21.64	7.32	24													
21.34	7.62	25													
21.03	7.92	26		SILTY SAND (SM): dense, grayish brown, moist, fine sand.	X	6	13 21 25	46							
20.73	8.23	27													
20.42	8.53	28													
20.12	8.84	29													
19.81	9.14	30													
19.51	9.45	31		SILT (ML): hard, grayish brown mottled with rust, moist.	X	7	8 13 19	32					P = 2.50		
19.20	9.75	32		Bottom of Hole at 9.60 m (31.5 ft) on 4-24-07											
18.90	10.06	33													
18.59	10.36	34													
18.29	10.67	35													

Department of Transportation
Division of Engineering Services
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EA:	10-3A3400
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Drafted By:	M Engelmann

B-4

10-STA-99 / KP 20.74 (PM 12.9)

Structure Foundation Report

Equipment:	Station/KP:	Boring ID.:
Mobile B47		B-5
Hammer:	**Offset Distance/Line:**	**Date Completed:**
Safety semi-automatic drop (140#/ 30")		4-25-07
Drilling Method:	**North/East:**	**Hole Diameter:**
6-inch hollow stem auger		6in
Sampling Method:	**Ground Surface Elevation:**	**Total Depth:**
SPT, Bulk	~43.0ft	36.5ft
Notes:	**~Depth to GW/date measured:**	**Logged By:**
Boring performed for Location #7	17.0ft on 4-25-07	M Engelmann

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Graphic Log	Description	Sample Type	Sample Number	Sample Blows	Blows per Foot	Recovery (%)	RQD (%)	w/c (%)	Dry Density (pcf)	Shear Strength (tsf)	Drilling Method/ Casing	Remarks
12.80	0.30	1		**FILL** SILTY SAND with GRAVEL (SM): dense, grayish brown, moist, fine sand, fine gravel.											
12.50	0.61	2													
12.19	0.91	3													
11.89	1.22	4													
11.58	1.52	5													
11.28	1.83	6			X	1	16 16 15	31							
10.97	2.13	7													
10.67	2.44	8													
10.36	2.74	9		SANDY lean CLAY (CL): stiff, brown, moist, medium plasticity.											
10.06	3.05	10													
9.75	3.35	11			X	2	3 8 7	15							
9.45	3.66	12													
9.14	3.96	13			X	3									
8.84	4.27	14													
8.53	4.57	15													
8.23	4.88	16		Lean CLAY (CL): very stiff, brown, moist, high plasticity.	X	4	6 11 13	24					P = 3.00		
7.92	5.18	17													
7.62	5.49	18													
7.32	5.79	19													
7.01	6.10	20													
6.71	6.40	21		Poorly graded SAND (SP): medium dense, gray, wet, fine sand.	X	5	8 10 13	23							
6.40	6.71	22													
6.10	7.01	23													
5.79	7.32	24													
5.49	7.62	25													
5.18	7.92	26		becomes grayish brown with interbedded thin clay lenses.	X	6	10 11 17	28							
4.88	8.23	27													
4.57	8.53	28													
4.27	8.84	29													
3.96	9.14	30													
3.66	9.45	31		SILTY CLAY (CL): very stiff, grayish brown, moist, medium plasticity.	X	7	6 11 14	25					P = 2.00		
3.35	9.75	32													
3.05	10.06	33													
2.74	10.36	34													
2.44	10.67	35													
2.13	10.97	36		CLAYEY SAND (SC): dense, grayish brown, wet, fine sand, low plasticity.	X	8	5 15 28	43							
1.83	11.28	37		Bottom of Hole at 11.13 m (36.5 ft) on 4-25-07											
1.52	11.58	38													

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

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Drafted By:	M Engelmann

B-5

10-SJ-205 / KP 13.33 (PM 8.3)

Structure Foundation Report

Equipment: Mobile B47	Station/KP:	Boring ID.: B-6
Hammer: Safety semi-automatic drop (140#/ 30")	Offset Distance/Line:	Date Completed: 4-25-07
Drilling Method: 6-inch hollow stem auger and Rotary wash	North/East:	Hole Diameter: 6 and 4
Sampling Method: SPT, Bulk	Ground Surface Elevation: ~50.0ft	Total Depth: 46.5ft
Notes: Boring performed for Location #8	~Depth to GW/date measured: 18.0ft on 4-25-07	Logged By: M Engelmann

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Graphic Log	Description	Sample Type	Sample Number	Sample Blows	Blows per Foot	Recovery (%)	RQD (%)	w/c (%)	Dry Density (pcf)	Shear Strength (tsf)	Drilling Method/ Casing	Remarks
14.94	0.30	1		**FILL** SILTY CLAY (CL): very stiff, grayish brown, moist, medium plasticity.											
14.63	0.61	2													
14.33	0.91	3													
14.02	1.22	4													
13.72	1.52	5													
13.41	1.83	6			X	1	7 8 10	18							
13.11	2.13	7				2									
12.80	2.44	8													
12.50	2.74	9													
12.19	3.05	10													
11.89	3.35	11		**FILL** SANDY lean CLAY (CL): very stiff, grayish brown, moist, fine sand.	X	3	8 8 12	20					P = 3.00		
11.58	3.66	12													
11.28	3.96	13													
10.97	4.27	14													
10.67	4.57	15													
10.36	4.88	16		Poorly graded SAND (SP): medium dense, grayish brown, moist, fine sand.	X	4	5 6 9	15							
10.06	5.18	17													
9.75	5.49	18	▼												
9.45	5.79	19													
9.14	6.10	20													
8.84	6.40	21		becomes wet.	X	5	5 5 6	11							
8.53	6.71	22													
8.23	7.01	23													
7.92	7.32	24													
7.62	7.62	25													
7.32	7.92	26			X	6	3 4 9	13							Switched from 6 in auger to 4 in mud rotary at 25 ft.
7.01	8.23	27													
6.71	8.53	28													
6.40	8.84	29													
6.10	9.14	30		becomes bluish gray.	X	7	3 5 8	13							
5.79	9.45	31													
5.49	9.75	32													

(continued)

ELEVATION (m)	DEPTH (m)	DEPTH (ft)	Graphic Log	Description	Sample Type	Sample Number	Sample Blows	Blows per Foot	Recovery (%)	RQD (%)	w/c (%)	Dry Density (pcf)	Shear Strength (tsf)	Drilling Method/ Casing	Remarks
5.18	10.06	33		Poorly graded SAND (SP): medium dense, grayish brown, moist, fine sand. *(continued)*											
4.88	10.36	34													
4.57	10.67	35													
4.27	10.97	36		becomes medium grained.	X	8	7 8 11	19							
3.96	11.28	37													
3.66	11.58	38													
3.35	11.89	39													
3.05	12.19	40													
2.74	12.50	41			X	9	7 14 16	30							
2.44	12.80	42													
2.13	13.11	43													
1.83	13.41	44													
1.52	13.72	45													
1.22	14.02	46		Lean CLAY (CL): very stiff, brown, moist, high plasticity.	X	10	4 8 10	18					P = 1.50		
0.91	14.33	47		Bottom of Hole at 14.17 m (46.5 ft) on 4-25-07											
0.61	14.63	48													
0.30	14.94	49													
0.00	15.24	50													
-0.30	15.54	51													
-0.61	15.85	52													
-0.91	16.15	53													
-1.22	16.46	54													
-1.52	16.76	55													
-1.83	17.07	56													
-2.13	17.37	57													
-2.44	17.68	58													
-2.74	17.98	59													
-3.05	18.29	60													
-3.35	18.59	61													
-3.66	18.90	62													
-3.96	19.20	63													
-4.27	19.51	64													
-4.57	19.81	65													
-4.88	20.12	66													
-5.18	20.42	67													
-5.49	20.73	68													
-5.79	21.03	69													
-6.10	21.34	70													
-6.40	21.64	71													

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

EA: 10-3A3400
Date: 5-21-07
Drafted By: M Engelmann

B-6

10-SJ-205 / KP 18.02 (PM 11.2)
Structure Foundation Report

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. NICHOLAS CHAN
Design Manager, Design IV- Branch P

Attention: Cheong-Yew Cheng

Date: December 20, 2007

File: 10-MER-99-PM19.2
EA: 10-3A3401
CMS on SR 99

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Foundation Recommendations for Changeable Message Sign on SR 99 at Location 2

Introduction

The Office of Geotechnical Design-North (OGDN) provided foundation recommendations in a memorandum dated June 22, 2007 for six changeable message signs (CMSs) proposed for this project. However, we understand that during a recent project development team (PDT) meeting, it was determined that the CMS for Location 2 in Merced County on southbound State Route (SR) 99 have to be relocated to post mile (PM) 19.2 (previously 18.02), north of Franklin Road Overcrossing. This memorandum has been prepared to provide foundation recommendations for the Location 2 CMS at the new location (PM 19.2 on southbound SR 99 in Merced County). Foundation recommendations provided in this memorandum supersede the recommendations provided in our June 22, 2007 memorandum for the CMS at Location 2. The proposed CMS will be constructed using Model 500 as listed on Caltrans Standard Plans dated May 2006.

Pertinent Reports and Investigations

The following listed publications and information were reviewed to assist in the assessment of site conditions:

1. Geologic Map of California, San Jose Sheet, Division of Mines and Geology, State of California, Compiled by Rogers, T.H., 1966 (Scale 1:250,000)
2. Franklin Road Overcrossing (Bridge No. 39-84, As Built Log of Test Borings, State of California, Department of Public Works, Division of Highways, August 1962.

3. Groundwater Level data, Well Number: 07S13E22C001M, Department of Water Resources, San Joaquin District.
4. Project Layout Sheet L-2- CMS provided by the District 10, October 2007.

Site Geology and Soil Conditions

The topography at the Location 2 is generally flat. Based on the Topozone map, the surface elevation is about 158 feet above sea level at the proposed CMS location.

Based on the published California Geologic Map, San Jose Sheet, the site is underlain by Dune Sand (Qs).

On November 21, 2007, personnel from Geotechnical Services, Office of Geotechnical Support, Geotechnical Instrumentation performed a cone penetration test (CPT) at Location 2 to a depth of about 17 feet. Plate 1 included at the end of this report shows the approximate location of the CPT sounding. Although the test was originally planned to a depth of about 35 feet, the hard/very dense soil conditions present at the site precluded penetrations beyond a depth of about 17 feet. Based on the soil behavior type classification system proposed by Robertson (1990), the interpreted CPT results show that subsurface materials consist of sands and sand mixtures to a depth of about 6½ feet underlain by very stiff sandy fine materials and sands to the maximum depth explored. A Copy of the CPT Record is included at the end of this report.

The log of test borings (LOTB) of the existing Franklin Road OC (located about 0.67 miles south of the CMS location) shows that the subsurface materials consist of loose to compact silty sand from the surface to a depth of about 8 feet underlain by dense to very dense silty sand, sand, and hard silt to the maximum depth explored of 45 feet. Some thin layers of cemented silt are also noted on the LOTB at a depth of about 15 feet.

Ground Water

Immediately after completing the CPT at this site, test rods were removed and an attempt to measure the groundwater level was made using an electronic sounder. The CPT hole remained open and no groundwater was observed within the maximum depth explored of 17 feet. However, groundwater was encountered at a depth of about 13 feet in a boring drilled

about 1.2 miles south of this CMS location in April 2007. Based on this information, it appears that the groundwater in the site vicinity fluctuates with time. This fluctuation appears to be influenced by the variations in rainfall and proximity to the Bear Creek that is located about 2.5 miles south of the planned CMS location.

Based on this information, groundwater will likely be encountered within the foundation depth for the CMS if construction takes place during the winter, spring or early summer period.

Seismicity

Based on the Department's California Seismic Hazard Map 1996, the controlling fault for Location 2 is the Prairie Creek-Spenceville-Dentman (PSD, normal fault) with a maximum credible earthquake moment magnitude of Mw=6.5 located approximately 21.6 miles northeast of the site. The Peak Bedrock Acceleration at this site, based on the referenced map is estimated to be 0.2g. The potential for surface rupture at this site due to fault movement is considered insignificant since there are no known faults projecting toward or passing directly through the project site. The liquefaction potential at the project location is considered minimal.

Foundation Recommendations

Based on the LOTB of the existing bridge in the site vicinity and the CPT test results, the subsurface soils at the proposed CMS location meet the minimum strength requirements stated in the May 2006 Standard Plan S116. Therefore, we expect that the Cast-in-drilled-hole (CIDH) foundation proposed in the Standard Plan S116 will be applicable to support the new CMS. The minimum depth and diameter of the CIDH foundation shown in the Standard Plan S116 for the Model 500 CMS are 22.0 feet and 5.0 feet, respectively.

Construction Considerations

Caving soil should be anticipated during CIDH pile construction due to the presence of granular materials and the vibration from traffic on the SR 99. Temporary casing and/or wet method may be required to prevent caving. If groundwater is encountered within the foundation excavation, gamma-gamma acceptance testing during CIDH pile construction

will be required.

During the CPT fieldwork, we observed some overhead as well as underground utilities in the immediate vicinity of the proposed CMS location. Based on our field observation, relocation of some of these utilities may be necessary during construction. We understand that the District Design Engineers are currently collecting the information about the utilities present at the site.

Project Information

Standard Special Provision S5-280, "Project Information", discloses to bidders and contractors a list of pertinent information available for their inspection prior to bid opening. The following is an excerpt from SSP S5-280 disclosing information originating from Geotechnical Services. Items listed to be included in the Information Handout will be provided in Acrobat (.pdf) format to the addressee(s) of this report via electronic mail.

Data and information attached with the project plans are:

Data and Information included in the Information Handout provided to the bidders and Contractors are:

A. Foundation Recommendations for Changeable Message Sign On SR 99 at Location 2, dated December 20, 2007.

Data and Information available for inspection at the District Office:

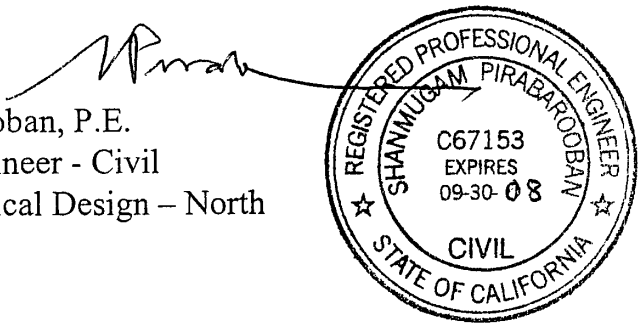
A. None

Data and Information available for inspection at the Transportation Laboratory are:

A. None

The information contained in this report is applicable for the CMS at Location 2 and may not be valid outside of this location. If a change to the location of the CMS is proposed, this Office should be consulted to evaluate the need for supplementary recommendations.

If you have any questions, please contact Praba Pirabarooban at (916) 227-1040.



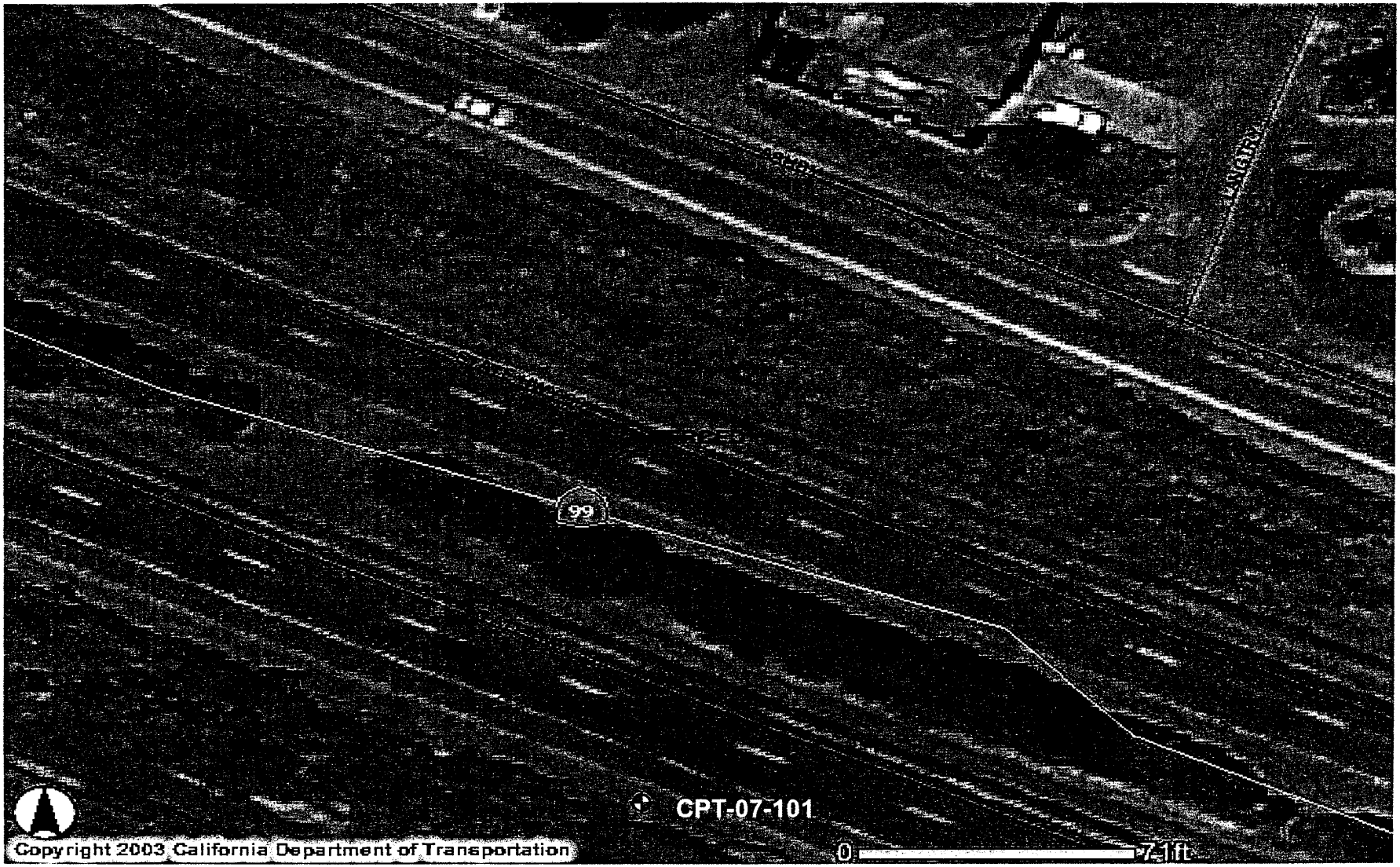
S. (Praba) Pirabarooban, P.E.
Transportation Engineer - Civil
Office of Geotechnical Design – North

Attachments:

Plate 1 – CPT Location Map
CPT Record
As-built LOTB – Franklin Road Overcrossing (Bridge # 39-84)

C: John Huang (E-copy)
Dave Dhillon (E-copy)
GDN File

Approximate CPT Location



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

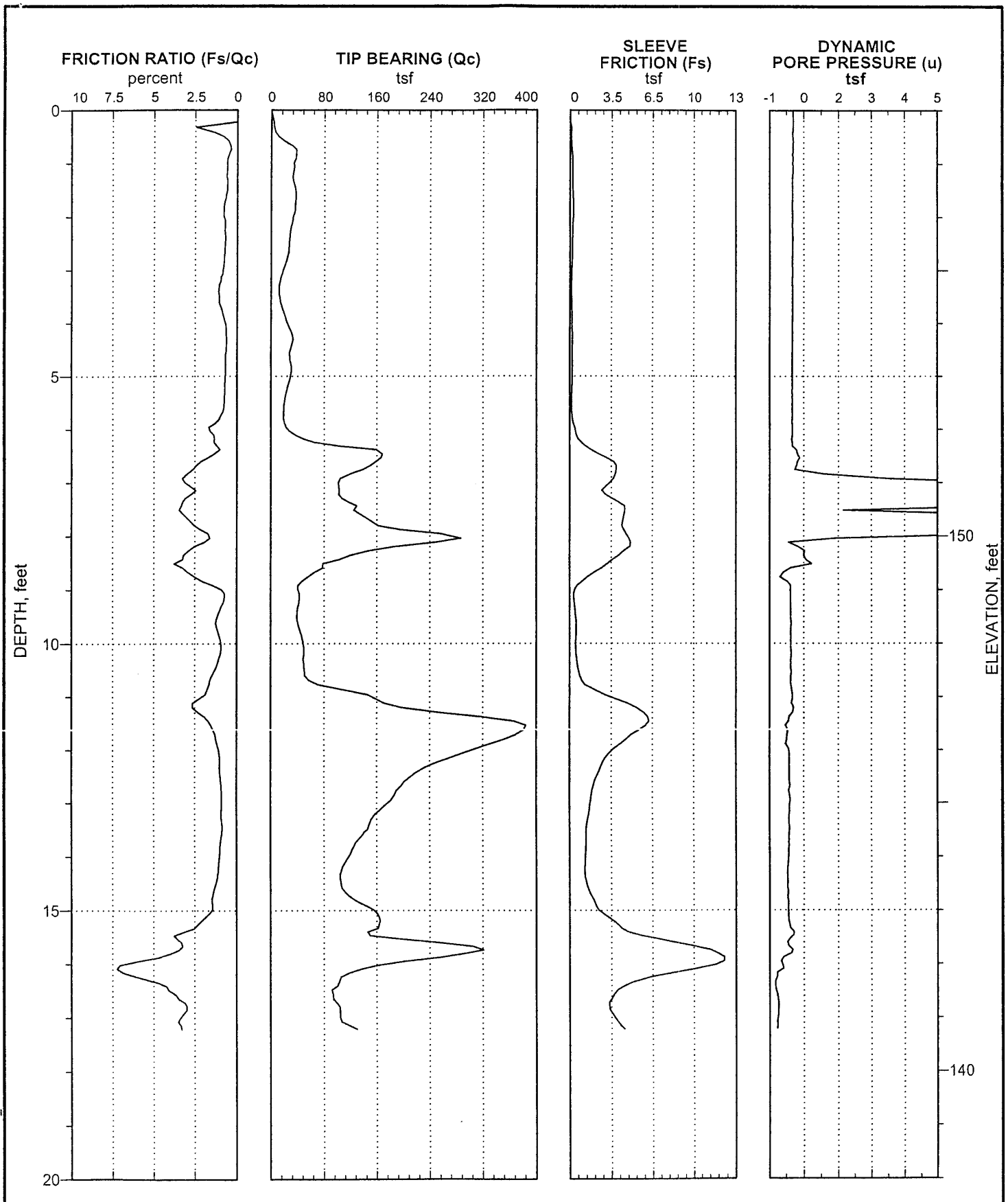
EA: 10-3A3401

Date: December 2007

CPT LOCATION

Plate No. 1

10-MER-99 PM 19.2
FOUNDATION RECOMMENDATIONS FOR CMS AT LOCATION 2



CALTRAN I RECORD 052007 CPT1_LOCATION 2.GPJ CT SACTO 053107.GDT 12/26/07

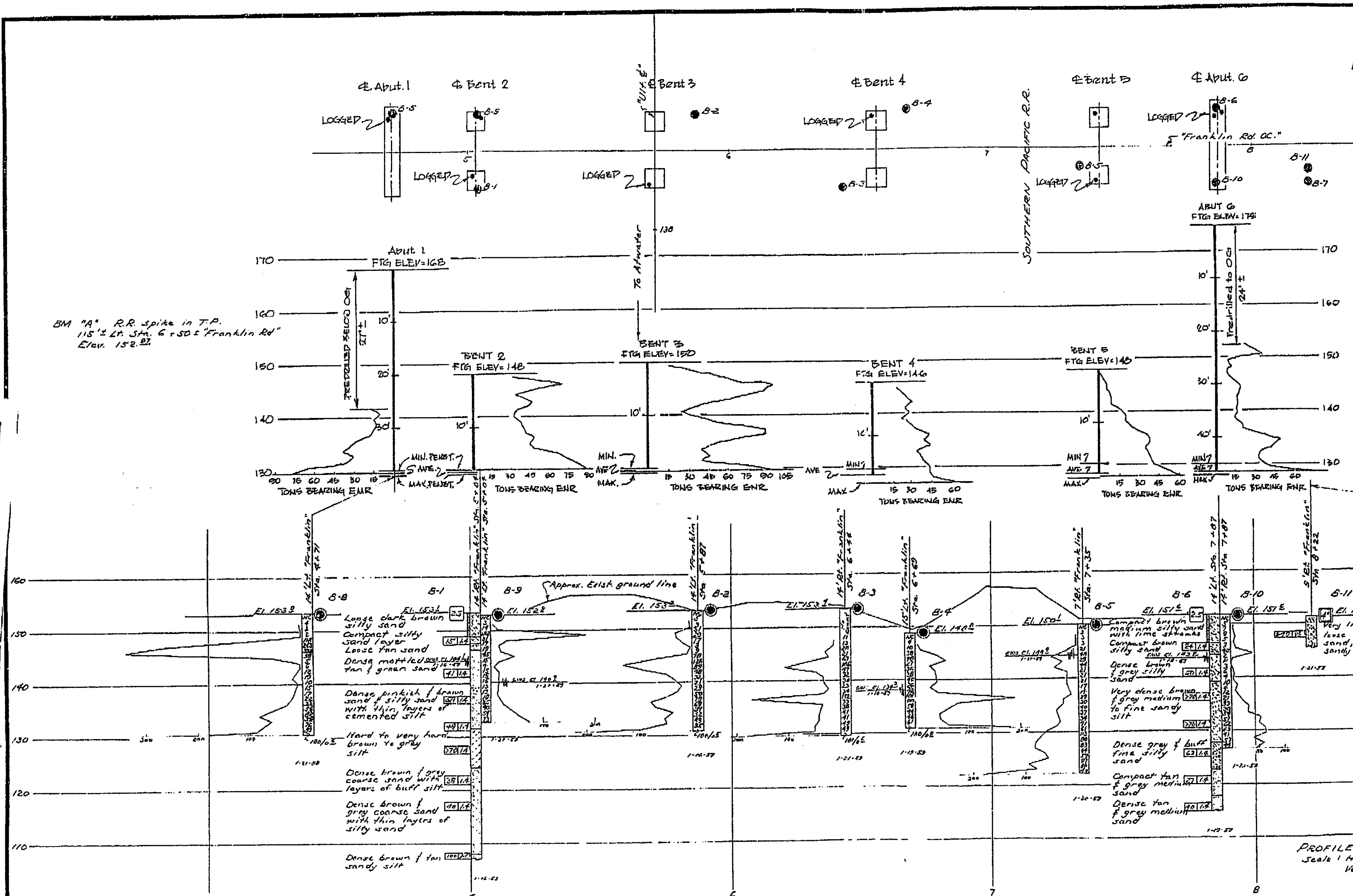
Department of Transportation
Division of Engineering Services
Geotechnical Services
Office of Geotechnical Design - North

REPORT TITLE: CPT RECORD				HOLE ID: CPT-07-101
DIST.: 10	COUNTY: Merced	ROUTE: 99	POSTMILE: 19.2	EA: 10-3A3401
PROJECT OR BRIDGE NAME: FOG CMS - LOCATION 2				
BRIDGE NUMBER	PREPARED BY: Pirabarooban, S.		DATE: 12-20-07	SHEET: 1 of 1

FED. ROAD DIV. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
7	CAL.			276	290

AS BUILT PLANS
Contract No. 63-10T13C9
Date Completed
Document No. 00001193

Date approved AUG 13 1962

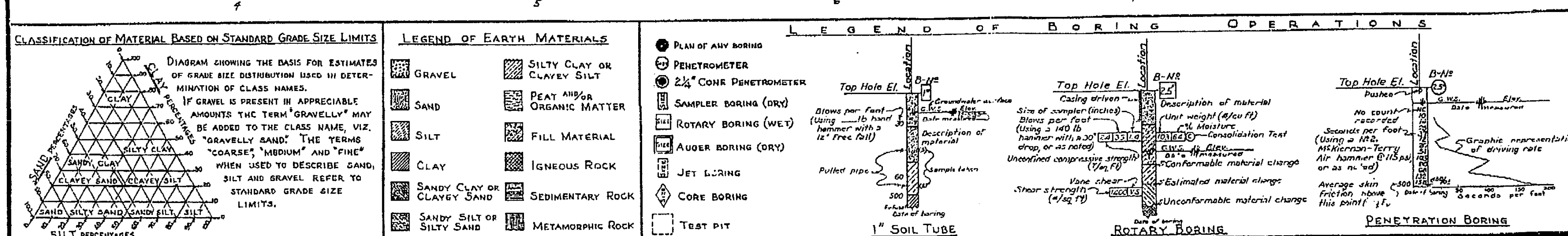


℄ Abut. 1
℄ Bent 2
℄ Bent 3
℄ Bent 4
℄ Bent 5
℄ Abut. 6
LOGGED
"Franklin Rd OC."
SOUTHERN PACIFIC R.R.
To Atwater
Abut 1 FTG ELEV=168
BENT 2 FTG ELEV=148
BENT 3 FTG ELEV=150
BENT 4 FTG ELEV=146
BENT 5 FTG ELEV=148
ABUT 6 FTG ELEV=171
PREDRILLED SELOO OG
TONS BEARING ENR
MIN. PENET.
AVE.
MAX. PENET.
BM "A" R.R. spike in T.P. 115'± Lt. Sta. 6+50± "Franklin Rd" Elev. 152.87
Approx. Exist ground line
Loose dark brown silty sand
Compact silty sand layer
Loose tan sand
Dense mottled tan & green sand
Dense pinkish & brown sand & silty sand with thin layers of cemented silt
Hard to very hard brown to grey silt
Dense brown & grey coarse sand with layers of buff silt
Dense brown & grey coarse sand with thin layers of silty sand
Dense brown & tan sandy silt
Compact brown medium silty sand with lime streaks
Compact brown silty sand
Dense brown & grey silty sand
Very dense brown & grey medium to fine sandy silt
Dense grey & buff fine silty sand
Compact tan & grey medium sand
Dense tan & grey medium sand
Very loose to loose brown fine sand, silt & sandy silt
PROFILE
Scale: Horiz. 1" = 20'
Vert. 1" = 10'

PLAN
Scale: 1" = 20'

DESIGN PILE LOADING: 45 TON
TYPE PILE: RAYMOND STEP TAPER
DIAMETER: TIP=11", BUTT=15"(CL. I), 13" (CL. II)
TOTAL NUMBER PILES: 50 EACH
LINEAR FT. PILES "AS BUILT": 610.4 (CLASS I) 692.1 (CLASS II)
LINEAR FT. PILES CALLED FOR ON PLANS: 600 (CLASS I) 660 (CLASS II)
HAMMER: VULCAN MODIFIED 65C

16 APR 63
KH
2 SEP 64



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.
CLAY
SILTY CLAY
SANDY CLAY
CLAYEY SAND
CLAYEY SILT
SAND
SILTY SAND
SANDY SILT
SILT
SAND PERCENTAGES
CLAY PERCENTAGES
SILT PERCENTAGES
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
PLAN OF ANY BORING
PENETROMETER
2½" CONE PENETROMETER
SAMPLER BORING (DRY)
ROTARY BORING (WET)
AUGER BORING (DRY)
JET BORING
CORE BORING
TEST PIT
1" SOIL TUBE
ROTARY BORING
PENETRATION BORING

NOTES

[redacted]

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

FRANKLIN ROAD OVERCROSSING

LOG OF TEST BORINGS

SCALE As Noted	BRIDGE 39-84	FILE	DRAWING C-4332-12

PREL. DRAWING NO. P-4332 20 18

PR-4332-4

276

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 ______