FOR CONTRACT No.: 10-0E6134

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REVISED FINAL FOUNDATION REPORT

LATHROP ROAD OVERCROSSING

BRIDGE NO. 29-0331
10-SJ-99, PM 9.18
Unit: 1455
Project Number & Phase: 10000204421
Contract No.: 10-OE6131

Prepared by:

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For:

HDR Engineering, Inc.
Sacramento, California

August 2011

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Geotechnical • Construction Services • Forensics

File No. 1201.5d
August 17, 2011

Mr. John Klemunes
HDR Engineering, Inc.
1325 J Street, Suite 1300
Sacramento, CA 95814

Subject: **REVISED FINAL FOUNDATION REPORT**
Lathrop Road Overcrossing, Bridge No. 29-0331
10-SJ-99, PM 9.18, Unit: 1455
Project Number & Phase: 10000204421
Contract No.: 10-OE6131
San Joaquin County, California

Dear Mr. Klemunes:

Blackburn Consulting (BCI) prepared this Revised Final Foundation Report for the Lathrop Road Overcrossing in San Joaquin County, California. BCI prepared this report in accordance with our November 15, 2008 Agreement.

Thank you for the opportunity to be part of your design team. Please call if you have questions or require additional information.

Sincerely,

BLACKBURN CONSULTING

REGISTERED PROFESSIONAL ENGINEER
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REVISED FINAL FOUNDATION REPORT
Lathrop Road Overcrossing, Bridge No. 29-0331
10-SJ-99, PM 9.18, Unit: 1455
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1 INTRODUCTION

1.1 Purpose

Blackburn Consulting (BCI) prepared this Final Foundation Report for the Lathrop Road Overcrossing Structure on State Route 99 in San Joaquin County, California. It contains our subsurface findings, conclusions and recommendations for bridge design.

This report is for HDR Engineering, Inc. (HDR), San Joaquin Council of Governments (SJCOG), and California Department of Transportation (Caltrans) to use during bridge design and construction. It shall not be used or relied upon by others, or for different locations or improvements without the written consent of BCI.

1.2 Scope of Services

To prepare this report, BCI:

1. Discussed the project with Mr. Titus Keng of HDR, the bridge designer.
2. Attended the September 10, 2009 Type Selection Meeting with the design team and Caltrans.
3. Reviewed HDR's August 5, 2009 Structure Type Selection Report for the structure.
4. Reviewed "As-Built" plans for the existing Lathrop Road Overcrossing (29-136).
5. Reviewed published maps and literature related to site geologic and seismic conditions.
6. Observed, logged and sampled three exploratory borings to depths ranging from 99.5 to 111 feet (ft.) below existing grade near the proposed abutment and bent locations.
7. Reviewed Caltrans comments regarding our December 8, 2010 Draft Foundation Report and prepared responses. See Appendix G for Caltrans comments and BCI responses.
8. Performed engineering analysis based on soil conditions and structure loads and foundation data provided by HDR.

1.3 Site Description

The new Lathrop Road Overcrossing Structure site is located along SR 99, just north of the existing Lathrop Road Overcrossing (Bridge No. 29-0136) in San Joaquin County, California. The approximate site coordinates are 37.8265 degrees north latitude, 121.2173 degrees west longitude. We show the project location on Figure 1 in Appendix A.

The existing Lathrop Road Overcrossing was completed between 1955 and 1956 and consists of a two-span, concrete box girder structure approximately 35 ft. wide and 183 ft. long. Existing site grade ranges from elevation 32 to 35 ft. (NGVD 29). The existing Lathrop Road approach embankments (which will be removed) are about 20 ft. high with 2:1 (horizontal:vertical distance) side-slopes and 1.5:1 end-slopes. The existing slopes will encroach into the planned structure footprint from the north.

The South San Joaquin Irrigation District (SSJID) operates an existing 48-inch diameter waterline that crosses beneath the footprint of the new overcrossing structure foundations.

1.4 Project Description

The project will construct a new Lathrop Road Overcrossing Structure with a two-span, cast-in-place prestressed box girder bridge 280 ft. long and 98.5 ft. wide. The new deck grade will be on a vertical curve that passes through elev. 61.56 at Abutment 1 (west) and elev. 61.48 at Abutment 3 (east). The new substructure will consist of seat-type abutments and a multi-column bent, all pile supported. The abutments include cantilever wingwalls.

Approach fill heights will be approximately 27 ft. at the abutment locations. The new approach embankments will have 4:1 (horizontal:vertical distance) side-slopes and 1.5:1 end-slopes. The project also includes a total of four new architectural pilasters, one at the end of each wingwall. The pilasters will be supported on spread footings established within approach fill and will be separated from the wingwalls by an expansion joint.

Based on information provided by HDR, we understand the SSJID 48-inch waterline will be relocated outside and clear of the new overcrossing structure footprint and new approach fills to avoid damage to the pipeline.

2 SUBSURFACE EXPLORATION

BCI retained Precision Sampling, Inc. to drill and sample three exploratory borings at the site to characterize the subsurface conditions and obtain samples for laboratory testing. The drillers used a CME 75 truck-mounted rig to drill the borings using 8-inch O.D. hollow stem auger, switching to 3-inch O.D. rotary wash auger below groundwater.

For the Lathrop Road Overcrossing, BCI observed, logged and sampled Boring R-09-L1 on March 15-16, 2009; Boring R-09-L2 on May 21, 2009; and Boring R-09-L3 on May 4, 2009 to depths ranging from 99.5 to 111 ft. BCI determined boring locations and elevations using topography and elevation data provided by HDR.

The drillers obtained relatively undisturbed samples using both Modified California Samplers (equipped with 2.4-inch I.D. brass liners), and Standard Penetration Test (SPT) samplers (1.4-inch I.D.). Samplers were driven into the ground with a 140 pound automatic trip hammer falling 30 inches. The N-values shown on the Log of Test Borings in Appendix A are uncorrected “field” values. For the Modified California Sampler, BCI multiplied the field N-value by 0.65 to obtain an approximate SPT N-value.

FHWA’s Soil and Foundations Reference Manual, Volume 1 (FHWA-NHI-06-088, December 2006) indicates that the hammer energy transfer ratio ranges between 80-100% for automatic trip hammers. BCI assumed a hammer energy transfer ratio of 75% for this project in the absence of recent hammer calibration data.

BCI’s project geologist, Mr. Andrew Shinnefield, logged the borings consistent with the Unified Soil Classification System (USCS). BCI retained soil samples recovered with the drive samplers in moisture-proof containers for laboratory testing and reference. BCI also obtained bulk samples from auger drill cuttings and made ground water observations in the borings during and at completion of drilling operations.

3 LABORATORY TESTING

We conducted the following preliminary laboratory tests on samples from the test boring for this study:

- Moisture Content and Dry Density
- Unconfined Compressive Strength
- Undrained-Unconsolidated Triaxial Compression
- Grain Size Analysis
- Atterberg Limits
- Consolidation
- Sulfate/Chloride Content
- pH/Minimum Resistivity

BCI performed laboratory tests in conformance with current ASTM and Caltrans test procedures. We present the laboratory test results summary and laboratory test results in Appendix B.

4 GEOLOGY AND SUBSURFACE CONDITIONS

4.1 Regional Geology

Literature published by the California Geological Survey (CGS) indicates that the site is located in the San Joaquin Valley within the central portion of the Great Valley Geomorphic Province. This province encompasses the San Joaquin Valley in the south and the Sacramento Valley in the north. The province is bound by the Sierra Nevada to the east, the Coast Ranges to the west, the Klamath Mountains and Cascade Range to the north.

The Great Valley is a broad, elongated, northwest trending, structural trough that has been filled with a thick sequence of sediments. The eastern margin of the valley is formed by the west sloping Sierran bedrock surface that extends westward beneath the alluvium and older sedimentary bedrock within the valley. The western border is underlain by east dipping rock of the Coast Ranges that form a deeply buried trough.

During the late Mesozoic and through most of Tertiary time (approximately 100 million to 20 million years ago), deposition of thousands of feet of marine sediments occurred within the Great Valley. Continental deposits (generally alluvium) of late Tertiary and Quaternary age (approximately 20 million years ago to the present) overlie these marine deposits. Both the continental deposits and the underlying marine sediments form a wedge of sediments that generally thickens from east to west. The accumulated thickness of the marine and continental sediments is at least several thousand feet at the site.

4.2 Local Geology

BCI evaluated the geology of the area by review of published geologic maps and literature, site review, and subsurface exploration. Mapping by the California Geologic Survey[1] shows the site is underlain by sediments of the Pleistocene-age Modesto Formation. These sediments are alluvium comprised mostly of sand, silt and clay. We present a Geologic Map as Figure 2 in Appendix A.

4.3 Subsurface Conditions

4.3.1 Soil

In general, the soil profile at this site is comprised of medium dense (locally loose) silty to poorly graded sand interlayered with stiff to very stiff silt and lean clay to depths of about 32.5 to 35 feet (0.0 ft., NGVD 29). Below elev. 0.0, we generally observed interlayered very stiff to hard lean clay, very stiff to hard silt/sandy silt, and dense to very dense sand (silty sand, poorly graded sand and clayey sand). BCI encountered locally soft clay layers at depths of 49 to 57 feet (elev. -14.0 to -22.0) in Boring R-09-L1, 69 to 73 feet (elev. -36.5 to -40.5) in Boring R-09-L2, and 44-49 feet (elev. -10.5 to -15.5) in Boring R-09-L3.

The above soil conditions are relatively similar to those shown on the As-Built Log of Test Borings (LOTB) for the existing Lathrop Road Overcrossing (Bridge No. 29-136), although these borings extended to elevations ranging from +15.0 to -9.0.

Based on our laboratory testing, the dry density of the soil units ranged from 83 pcf to 112.5 pcf, at moisture contents between 3.8% and 42.8%. Triaxial testing (unconsolidated, undrained) of the silt at a depth of 41-41.5 feet in Boring R-09-L1 yielded an undrained cohesion of 4,630 psf. Triaxial testing (unconsolidated, undrained) of the sandy lean clay at a depth of 46-46.5 feet in Boring R-09-L3 yielded an undrained cohesion of 856 psf.

Refer to the Log of Test Borings (LOTB) and As-Built Log of Test Borings in Appendix A for more specific soil descriptions, laboratory test results, and blow count data. *We include the required LOTB Sheet Checklist in Appendix A.*

4.3.2 Ground Water

Table 1 presents the ground water depth/elevations measured in our borings during drilling.

Table 1: Ground Water Elevations

Boring Number	Reading Date	Ground Water Depth (ft.)	Ground Water Elevation (ft.*)
R-09-L1	3/15/2009	29.0	6.0
R-09-L2	5/21/2009	29.0	3.5
R-09-L3	5/4/2009	25.0	8.5

*NGVD 29 datum

[1] Geologic Map of the San Francisco-San Jose Quadrangle, 1:250,000, California Division of Mines and Geology, 1990.

The As-Built LOTB sheet for the existing structures shows ground water within about 5 ft. (elev. 30 ft.) of ground surface (drilled October 1953).

According to the San Joaquin County Internal Groundwater Data Center interactive website (http://www.sjmap.org/groundwater/), ground water elevations in the vicinity of the site have dropped 15-20 ft. since the late 1950's. Data from a well located about ¼ of a mile southeast of the site indicate the ground water elevation has fluctuated between elev. +5.0 to +19.0 within the last 20 years.

BCI used a design ground water level at elev. 10 ft. in our geotechnical analysis for this site.

Ground water levels can fluctuate due to changes in precipitation, nearby waterway levels, irrigation, pumping of wells, and other factors.

5 CORROSION EVALUATION

We performed corrosion testing on two samples obtained from the borings. Table 2 presents the test results for pH, resistivity, sulfates and chlorides.

Table 2: Soil Corrosion Test Summary

Boring/Sample Number	Depth (ft)	Elevation (ft, NGVD 29)	Minimum Resistivity (ohm-cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
R-09-L1/7c	22.5 to 23.0	12.5 to 12.0	670	8.01	106.8	314.4
R-09-L1/13c	46.0 to 46.5	-11.0 to -11.5	960	7.32	17.1	6.4
R-09-L1/15c	51.0 to 51.5	-16.0 to -16.5	910	7.52	26.4	20.2

Note: Caltrans considers a site to be corrosive to foundation elements if one or more of the following conditions exist: Chloride concentration is greater than or equal to 500 ppm, sulfate concentration is greater than or equal to 2000 ppm, or the pH is 5.5 or less (Caltrans, "Corrosion Guidelines", version 1.0, September 2003).

According to Caltrans Corrosion Guidelines (Version 1.0, September 2003), the site is not considered corrosive to structural foundation elements. Appendix B contains the soil corrosion test results.

6 SEISMIC DATA AND EVALUATION

6.1 Caltrans seismic design criteria

Based on the Caltrans 1996 California Seismic Hazard Map, the peak horizontal rock acceleration for the site is approximately 0.18g. The causative fault is the Midway-San Joaquin/N Fault located about 17 miles to the southwest. According to the 1996 Caltrans Seismic Map (Technical Report), the style of faulting is not known/published and this fault is listed as a new earthquake source. The estimated Maximum Earthquake Moment Magnitude for this fault is 6.75. BCI includes a Regional Fault Map showing peak bedrock accelerations as Figure 3 in Appendix A.

We classify the site soil profile as Type D using Table B.1 of the June 2006 Caltrans Seismic Design Criteria (SDC), Version 1.4, with SPT values ranging from 15 to 50.

Based on the above information, use the 0.2g peak horizontal rock acceleration curve (0.28g peak ground acceleration) from Figure B.7 (Soil Profile Type D, Magnitude: 6.5± 0.25) of the SDC for bridge structure design. We include our recommended ARS curve for bridge design as Figure 4 in Appendix A.

For geotechnical purposes, a peak ground acceleration of 0.26g (interpolated from Figure B.7 between the 0.1g and 0.2g ARS curves for the peak horizontal acceleration of 0.18g at the site) is appropriate for liquefaction and seismic settlement potential evaluations.

6.2 Liquefaction and Seismic Settlement Potential

Liquefaction can occur when relatively loose, saturated granular soil and specific soft, saturated fine-grained soils are subject to ground shaking sufficient to increase pore pressures to trigger liquefaction. Based on the soil and ground water conditions encountered in our borings, we consider the potential for detrimental liquefaction at the site to be nonexistent for the design peak ground acceleration of 0.26g.

During a seismic event, ground shaking can cause densification of granular soil above the water table that can result in settlement of the ground surface. Based on the soil and ground water conditions encountered in our borings, we consider the potential for detrimental seismic settlement at the site to be nonexistent for the design peak ground acceleration of 0.26g.

7 SCOUR EVALUATION

Since the site is not located adjacent to any waterways, scour is not a consideration for this project.

8 AS-BUILT FOUNDATION DATA

The As-Built LOTB indicates that the existing structure is supported on 45-ton, 11" O.D. diameter "Armco Welded Pipe Piling" with 3/16" thick steel shells. The As-Built LOTB displays five logged piles with tip elevations ranging from about elev. 18.0 to elev. 8.0.

9 FOUNDATION RECOMMENDATIONS

9.1 Foundation data and loading

The subsurface conditions encountered in our borings indicate that the site is conducive for either driven or cast-in-drilled-hole (CIDH) piles. Since CIDH piles would require temporary casing and slurry drilling due to the potential for encountering caving sands, we favor the use of driven piles over CIDH piles. Spread footings are not considered feasible for support due to the potential for excessive settlement.

Based on the above information, driven Class 140 (Alt. X) precast, prestressed concrete piles were selected for abutment support and driven Class 200 (Alt. X) precast, prestressed concrete piles were selected for the bent support. We recommend a minimum T dimension (pile width) of 14 inches for the Class 140 (Alt. X) piles at the abutments to maintain a pile tip elevation well above the soft clay layers encountered in the borings.

HDR provided the following foundation design information in Tables 3 and 4.

Table 3: Foundation Design Data Provided By HDR

Foundation Design Data								
Support No.	Design Method	Pile Type	Finish Grade Elev. (ft)*	Pile Cut-off Elevation (ft)*	Pile Cap Size (ft)		Permissible Settlement – Service Load (in)	Number of Piles Per Support
					B	L		
Abut 1	WSD	Class 140 (Alt. X, T=14”)	50.70**	42.25	8.0	100.0	1	45
Bent 2	LRFD	Class 200 (Alt. X)	36.00	29.50	13.5	17.0	1	18
Abut 3	WSD	Class 140 (Alt. X, T=14”)	49.50**	42.25	8.0	100.0	1	45

* Finished Grade and Pile Cut-off Elevation are approximate and are subjected to change once more accurate final survey data would become available.
**Finish Grade indicates the ground elevation in front of abut at top of slope paving.

Table 4: Foundation Design Loads Provided By HDR

Foundation Design Loads											
Support No.	**Service-I Limit State (kips)**			**Strength Limit State (Controlling Group, kips)**				**Extreme Limit State (Controlling Group, kips)**			
	Total Load		Permanent Loads	Compression		Tension		Compression		Tension	
	Per Support	Per Pile	Per Support	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile	Per Support	Max. Per Pile
Abut 1	3850	125	3315	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Bent 2	3100	175	2605	4130	235	0	0	2650	155	0	0
Abut 3	3850	125	3315	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

9.2 Foundation Recommendations and Pile Data Table

BCI used the above foundation design data and loading conditions to evaluate bent foundations using AASHTO LRFD Bridge Design Specifications-4th Edition with current Caltrans Amendments. We evaluated abutment foundations using Caltrans November 2003 Bridge Design Specifications for foundations using Working Stress Design methods. We present our foundation recommendations in Tables 5, 6 and 7 on the following pages.

Table 5: Foundation Recommendations for Abutments

Abutment Foundation Design Recommendations										
Support	Pile Type	Cut-off Elev. (ft.)	**LRFD Service-I Limit State Load – Compression (kips)**			Required Nominal Resistance (kips)		Design Tip Elevations (ft.)	Specified Tip Elevation (ft.)	Nominal Driving Resistance (kips)
			Per Support		Per Pile	Comp.	Tens.			
			Total	Permanent						
Abut 1	Class 140 (Alt. X, T=14")	42.25	3850	3315	125	250	0	-4.0(a), 17.0(b)	-4.0	250
Abut 3	Class 140 (Alt. X, T=14")	42.25	3850	3315	125	250	0	-4.0(a), 17.0(b)	-4.0	250

Notes: 1) Design tip elevations for **Abutments** are controlled by (a) Compression, (b) Lateral Load, respectively.

Table 6: Foundation Recommendations for Bents

Bent Foundation Design Recommendations											
Support	Pile Type	Cut-off Elev. (ft.)	LRFD Service-I Limit State Load Per Support – Compression (kips)	Total Permissible Support Settlement (in.)	Required Factored Nominal Resistance (kips) Per Pile				Design Tip Elevations (ft.)	Specified Tip Elevations (ft.)	Nominal Driving Resistance Required (kips)
					Strength Limit		Extreme Event				
					Comp $\varphi = 0.7$	Tens. $\varphi = 0.7$	Comp $\varphi = 1.0$	Tens $\varphi = 1.0$			
Bent 2	Class 200 (Alt. X)	29.50	3100	1	235	0	155	0	-30.0(a), 7.0(b)	-30.0	340

Notes:
1) Design tip elevations for **Bents** are controlled by (a) Compression (Strength Limit), (b) Lateral Load, respectively.
2) The nominal driving resistance required for Bent piles is equal to the required nominal resistance needed to support the factored load plus driving resistance from the penetrated soil layers, if any, which do not contribute to the required nominal resistance.

Based on our analysis presented in the following sections, BCI presents our recommended Pile Data Table as Table 7:

Table 7: Pile Data Table

Pile Data Table						
Support	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft.)	Specified Tip Elevation (ft.)	Nominal Driving Resistance (kips)
		Compression	Tension			
Abut 1	Class 140 (Alt. X, T=14”)	250	0	-4.0(a), 17.0(b)	-4.0	250
Bent 2	Class 200 (Alt. X)	340	0	-30.0(a), 7.0(b)	-30.0	340
Abut 3	Class 140 (Alt. X, T=14”)	250	0	-4.0(a), 17.0(b)	-4.0	250

Notes:
1) Design tip elevations are controlled by (a) Compression, (b) Lateral Load, respectively.
2) The nominal driving resistance required is equal to the nominal resistance needed to support the factored load plus driving resistance from the unsuitable penetrated soil layers (very soft, liquefiable, scourable, etc.), if any, which do not contribute to the required design resistance.
3) Do not raise pile tip elevations above elev. -25.0 at Bent 2 due to potential for excessive pile settlement due to soft clay layer above specified tip.

9.3 Engineering Parameters

The following engineering parameters are generalized and based on:

- Unit weights represent average values based on our laboratory tests, local experience and published typical values.
- Cohesion was conservatively assumed based on average values from unconfined compressive strength testing, triaxial testing (unconsolidated, undrained), field pocket penetrometer testing, and published blow count correlations.
- Friction angles were based on published blow count correlations.
- Modulus and E_{50} strain values for lateral pile analysis were obtained from the July 2004 LPILE Plus 5.0 Technical Manual for appropriate soil type and consistency.
- Engineering experience and judgment.
- BCI used a ground water elevation of 10.0 ft. (NGVD29) for design.

We used the generalized soil parameters in Table 8 in our bearing capacity and lateral deflection analysis.

Table 8: Generalized Soil Parameters

Elevation (NVGD29)	Soil Type	Total Unit Weight (lb/ft^3)	Friction Angle (degrees)	Cohesion (psf)	Modulus, k (lb/in^3)*	E_{50}
60 to 33	Approach Fill	125	34	---	120	---
33 to 10	Sand	110	32	---	40	---
10 to 0	Sand	125 (*62.6)	34	---	60	---
0 to -10.0	Silt/Clay	120 (*57.6)	---	3,000	1,000	0.005
-10.0 to -14	Silt/Clay	118 (*55.6)	---	2,000	500	0.007
-14 to -22	Clay	105 (*42.6)	---	500	250	0.01
-22 to -26	Clay	110 (*47.6)	---	1,000	400	0.01
-26 to -40	Sand	120 (*57.6)	34	---	60	---
-40 to -64	Silt/Clay	125 (*62.6)	---	3,000	1,000	0.005
-64 to -78	Sand	116 (*53.6)	36	---	80	---

*Buoyant unit weight below design ground water level.

9.4 Abutment Piles (Class 140)

In accordance with current Caltrans specifications, we used Working Stress Design (WSD) for the abutment piles. BCI evaluated Alternative "X" Class 140 piles with a T dimension of 14 inches for the abutments. BCI presents the results of our compressive resistance and settlement analysis below. No tension demand is indicated for abutment piles.

9.4.1 Compressive Resistance

The tips of the Class 140 precast, prestressed concrete (PPC) piles will bear in dense sand or very stiff to hard silt/clay about 40 feet below existing SR99 grade.

Our calculations indicate that the nominal compressive resistance of the PPC piles can be obtained through about 15% end bearing and 85% skin friction. Actual contributions to end bearing and skin friction could vary depending on how the load is transferred to the piles. We neglected the approach fill in our skin friction and end bearing analysis.

We determined the compressive resistance using the Federal Highway Administration's Driven 1.2 (March 20, 2001) computer program developed by Blue-Six Software, Inc.

Refer to the Driven output files in Appendix C for the analysis results.

9.4.2 Settlement

We calculated immediate settlement of approximately 0.6 inches for the Service-I Limit State total load (per pile) using the method outlined in Section 16-10 of Foundation Analysis and Design, 5th edition, Joseph E. Bowles, 1996. We do not anticipate long-term settlement since pile compressive resistance is primarily derived by skin friction with competent soil along the pile length. We include the pile settlement calculations in Appendix C.

Our calculated pile settlement is less than the permissible settlement of 1-inch specified for the structure foundations.

9.4.3 Lateral Load Analysis

We used LPILE Plus Version 5.0 software to evaluate lateral pile capacity. BCI determined the allowable lateral pile design loads which would produce approximately ¼-inch and 1-inch top-of-pile deflection assuming a pinned head condition. To account for group effects, BCI used p-multipliers of 0.93 and 0.55 for lateral loads in the longitudinal and transverse bridge directions, respectively.

For ¼-inch top-of-pile deflection, our analysis yielded a lateral resistance of 15 kips per pile in the longitudinal bridge direction, and 10.5 kips per pile in the transverse bridge direction. For 1-inch top-of-pile deflection, our analysis yielded a lateral resistance of 30.5 kips per pile in the longitudinal bridge direction, and 23.5 kips per pile in the transverse bridge direction.

BCI calculated a minimum tip elevation of 17.0 ft. for Abut 1 and Abut 2 using a factor of safety of 1.5.

Refer to the LPILE output files in Appendix C for additional information.

9.4.4 Negative Skin Friction

We do not anticipate negative skin friction at the abutments given the competent soil conditions.

9.5 Bent Piles (Class 200)

We used AASHTO LRFD Bridge Design Specifications-4th Edition and current Caltrans Amendments for evaluating driven Alternative "X" Class 200 piles with a T dimension of 14 inches. BCI presents the results of our compressive resistance, settlement and lateral load analysis below. No tension demand is indicated for abutment piles.

9.5.1 Compressive Resistance

The tips of the Class 200 precast, prestressed concrete (PPC) piles will bear in medium dense to very dense sand about 65 feet below existing SR99 grade.

Our calculations indicate that the nominal compressive resistance of the piles can be obtained through about 25% end bearing and 75% skin friction. Actual contributions to end bearing and skin friction could vary depending on how the load is transferred to the pile.

We determined the required nominal compressive resistance using the Federal Highway Administration's Driven 1.2 (March 20, 2001) computer program developed by Blue-Six Software, Inc.

BCI determined the required factored nominal resistance by comparing the Factored Strength Limit Load (Geotechnical Resistance Factor = 0.7) with the Extreme Event Load (Resistance Factor = 1.0). We then used the higher value as the required factored nominal resistance. In this case, the Factored Strength Limit Load (235 kips/0.7 = 336 kips per pile) is controlling over the 155 kips per pile for the Extreme Event. We rounded the Factored Strength Limit Load to 340 kips to estimate the design tip elevation using the Driven software.

Refer to the Driven output files in Appendix D for additional information.

9.5.2 Settlement

We calculated immediate settlement of approximately 0.7 inches for the Service-I Limit State total load (per pile) using the method outlined in Section 16-10 of Foundation Analysis and Design, 5th edition, Joseph E. Bowles, 1996. We do not anticipate significant long-term settlement settlement due to the competent soil conditions above and below the pile tips. We include the pile settlement calculations in Appendix D.

Our calculated pile settlement is less than the permissible settlement of 1-inch specified for the structure foundations.

9.5.3 Lateral Load Analysis

We used LPILE Plus Version 5.0 software to evaluate lateral pile capacity. BCI determined the allowable lateral pile design loads which would produce approximately ¼-inch and 1-inch top-of-pile deflection assuming a pinned head condition. To account for group effects, BCI used a p-multiplier 0.65 for lateral loads in both the longitudinal and transverse bridge directions.

For ¼-inch top-of-pile deflection, our analysis yielded a lateral resistance of 20 kips per pile. For 1-inch top-of-pile deflection, our analysis yielded a lateral resistance of 48 kips per pile.

BCI calculated a minimum tip elevation of 7.0 ft. for Bent 2, using a factor of safety of 1.5.

Refer to the LPILE output files in Appendix D for additional information.

9.5.4 Negative Skin Friction

We do not anticipate negative skin friction at the bents given the competent soil conditions.

10 PILASTERS

BCI used Working Stress Design (WSD) to evaluate the architectural pilasters at the abutments. Due to the irregular shape of the footing, we conservatively used an overall footing dimension of 9.0 ft by 17.0 ft for our analysis. For WSD, we used a Factor of Safety equal to 3.0. The base of footing for each pilaster will be at least 3.5 ft below finished grade, established at elev. 56.75 ft within new approach fill with 4:1 (horizontal: vertical distance) side slopes.

For all four pilasters we recommend the following:

- Allowable Gross Bearing Capacity (q_{all}) = 4.0 ksf
- Permissible Net Contact Stress (q_{pn}) for ≤1.0 inch settlement = 4.0 ksf
- Allowable Passive Equivalent Fluid Weight (FS=3.0) = 90 psf/ft
- Coefficient of Friction = 0.48

Our analysis includes considerations for a footing located at the top of the 4:1 slope. We present our calculations for the pilasters in Appendix E.

11 APPROACH FILLS

11.1 Fill Materials

Embankments will be constructed using imported borrow material, supplemented with material excavated from shallow on-site cuts. The source(s) of borrow material for construction of approach fills has not been identified. Proposed borrow must be tested and approved for use by the project engineer prior to transporting to the site.

Expansive soil (Expansion Index > 50 and Sand Equivalent < 20) should not be used as fill within 5 ft. of the abutment backwall.

11.2 Slope Geometry and Stability

Maximum fill heights at the bridge abutments will be approximately 27 ft. Approach embankments will be constructed utilizing side-slopes with gradients of 4:1 (horizontal to vertical) or flatter. The end-slopes will have a gradient of 1.5:1 with slope paving.
The existing Lathrop Road Overcrossing approach fill slopes have side-slopes that are approximately 2:1 or flatter, and approximately 1.5:1 for abutment end-slopes. The approach slopes appear stable (no noticeable slumping or slope failures) in their present configuration.

In our opinion, the proposed new 4:1 side-slopes and 1.5:1 end-slopes (with paving or concrete) will be stable based on the relatively stable condition of the existing slopes, provided the new slopes are constructed in accordance with current Caltrans Standard Specifications.

11.3 Settlement

We used FoSSA 2.0 software developed by ADAMA Engineering, Inc. to evaluate immediate and "longterm" consolidation settlement of the proposed approach fill embankments. We modeled a 27 foot high, 100 foot wide (crown) fill embankment with 4:1 side slopes in our analysis. We used the soil parameters in Table 9 for our settlement analysis:

Table 9: Soil Parameters for Settlement Analysis

Elevation (NVGD29)	Soil Type	Total Unit Weight (lb/ft^3)	Elastic Soil Modulus (ksf)	Poisson's Ratio	e_o	C_c	C_r	C_v (ft^2/day)	Considered Immediate Settlement Only	Considered Immediate & Consolidation Settlement
60 to 33	New Fill	125	N/A	0.3	---	---	---	---	X	
33 to 10	Sand	110	310	0.3	---	---	---	---	X	
10 to 0	Sand	125	380	0.3	---	---	---	---	X	
0 to -10.0	Silt/Clay	120	1,000	0.3	---	---	---	---	X	
-10.0 to -14	Silt/Clay	118	700	0.3	---	---	---	---	X	
-14 to -22	Clay	105	250	0.45	1.54	0.55	0.03	0.44		X
-22 to -26	Clay	110	400	0.45	1.27	0.48	0.03	1.27		X
-26 to -40	Sand	120	1,500	0.3	---	---	---	---	X	

Note: e_o = initial void ratio; C_c = Compression Index; C_r = Recompression Index; C_v = Coefficient of Consolidation

Our analysis indicates that total embankment settlement (immediate plus "longterm" consolidation settlement) will be on the order of 10 to 14 inches. Our analysis indicates that 4 to 6 inches of "immediate" ground settlement will occur beneath the highest part of the embankments during and shortly following embankment construction. We anticipate that an additional 6 to 8 inches of "longterm" consolidation settlement could occur as a result of compression of the localized soft clay layer where present at depth.

Based on our analysis, we recommend a minimum embankment waiting period of 40 days from the end of embankment construction to the beginning of pile driving at the abutments.

We present our embankment settlement analysis results in Appendix F.

11.4 Lateral Earth Pressures

The following equivalent fluid weights (EFWs) may be used to design the abutment walls and wing walls for Abutments 1 and 4 assuming level backfill conditions:

Condition	EFW Static	EFW Seismic
Active	36 lb/ft^3	45 lb/ft^3
At-Rest	56 lb/ft^3	70 lb/ft^3
Passive	220 lb/ft^3	202 lb/ft^3

As noted in the Caltrans Seismic Design Criteria (SDC), the maximum passive pressure is 5.0 ksf for longitudinal abutment response, which must be used with the proportionality factor presented in Section 7.8.1 of the SDC.

The EFWs shown above assume embankment fill meeting the requirements of Caltrans standard for Structure Backfill, a soil unit weight of approximately 125 pcf, a minimum angle of internal friction equal to 34 degrees, and that drainage is placed behind the walls in accordance with Caltrans Standard Plans and Specifications.

We estimated the EFWs for seismic loading using the Mononobe-Okabe equation for Active and Passive lateral coefficients K_a and K_p. We estimated the At-Rest coefficient, K_o, for the seismic condition using an increase ratio similar to the Active condition. We used a pseudostatic horizontal acceleration of 0.15g in the Mononobe-Okabe equation. We calculated the above static EFW's using methods presented in the 1982 Naval Facilities (NAVFAC) Design Manual 7.2.

Apply the resultant of the seismic active and at-rest pressures at a depth 0.5H from the base of the wall, where H equals the wall height in meters. The passive pressures are applicable for concrete placed directly against undisturbed soil or compacted fill.

For surcharge loads, apply an additional uniform lateral load behind the wall equivalent to (0.30)x(surcharge pressure).

Use a coefficient of friction of 0.48 to resist sliding for concrete placed on native undisturbed soil or compacted fill.

12 CONSTRUCTION CONSIDERATIONS

Where referenced below, "Standard Specifications" refers to Caltrans Standard Specifications (May 2006).

12.1 Abutment and Bent Piles

Piles shall conform with Section 49-1 of the Standard Specifications.

As required by Caltrans, perform oversize pre-drilling or spudding through the abutment fill to elevation 33.0 ft. in accordance with Section 49-1.06 of the Standard Specifications.
Difficult pile installation is anticipated due to the presence of locally hard or dense soil layers above the specified tip elevations. Drilling to assist pile driving may be necessary to achieve the specified tip elevations. Undersize drilling should be performed in accordance with Section 49-1.05 of the Standard Specifications, *except the drill hole should be no greater than 10-inches in diameter and drilling should not extend within 10 ft of specified tip elevations.* The contractor should drill and drive the first pile at each pile group location, and then adjust the drilling procedure as necessary to achieve the specified tip elevation on remaining piles.

Do not raise pile tip elevations above elev. -25.0 at Bent 2 due to potential for detrimental pile settlement associated with a soft clay layer above specified tip.

Jetting or vibratory hammers should not be used to obtain the specified pile penetration.

Verify pile capacity during placement using energy equations in accordance with Caltrans Standard Specification 49-1.08. A pile load test is not necessary.

The contractor shall provide a Pile Driving System Submittal in accordance with Caltrans Bridge Reference Specification 49-208 (49HAMR) to verify that the pile driving system is adequate.

Pile driving should not negatively impact the existing Lathrop Road Overcrossing abutments or bent since they are supported on piles.

12.2 Embankment Waiting Period

We recommend a minimum settlement waiting period of 40 days from the end of embankment construction to the beginning of pile driving at the abutments. Settlement monitoring devices are not required. Refer to Section 11.3 of this report for embankment settlement analysis results.

12.3 Temporary shoring

The contractor is responsible for design and construction of excavation sloping and shoring in accordance with CalOSHA Standards.

12.4 Perched ground water and over-optimum soil moisture

During our exploration we locally encountered clay/silt layers within the upper 10 feet of the soil profile, which may inhibit infiltration and cause perched water during the rainy season. If perched ground water or surface water is encountered, sump pumps may be required to facilitate construction.

Excessively over-optimum (wet) soil conditions can make proper compaction difficult or impossible. Wet soil is commonly encountered during the winter and spring months, or in excavations where ground water or perched ground water is encountered.

In general, wet soil can be mitigated by:

- Discing the soil during prolonged periods of dry weather
- Overexcavating and replacement with drier material
- Lime treatment or stabilization using aggregate and/or stabilization fabric

If wet, unstable soil is encountered, BCI can observe the conditions and provide more specific mitigation recommendations.

13 RISK MANAGEMENT

Our experience and that of our profession clearly indicates that the risks of costly design, construction, and maintenance problems can be significantly lowered by retaining the geotechnical engineer of record to provide additional services. For this project, BCI should be retained to:

1. Review and provide written comments on the (civil, structural) plans and specifications prior to construction.
2. Monitor construction to check and document our report assumptions. At a minimum, we should monitor pile installation.
3. Update this report if:
    - design changes occur
    - 2 years or more lapse between this report and construction
    - site conditions change

If BCI is not retained to perform the above applicable services, we are not responsible for any other parties' interpretation of our report, and subsequent addenda, letters, and discussions.

14 LIMITATIONS

BCI performed services in accordance with the generally accepted geotechnical standard of practice currently used in this area. Where referenced, we used ASTM and Caltrans Standards as a general (not strict) *guideline* only. We do not warranty our services.

BCI based this report on the current site and project conditions. We assumed the soil/ground water conditions encountered in our exploratory borings were representative of the subsurface conditions across the site. Actual conditions between borings could be different. Ground water may be higher in other locations than measured in the borings.

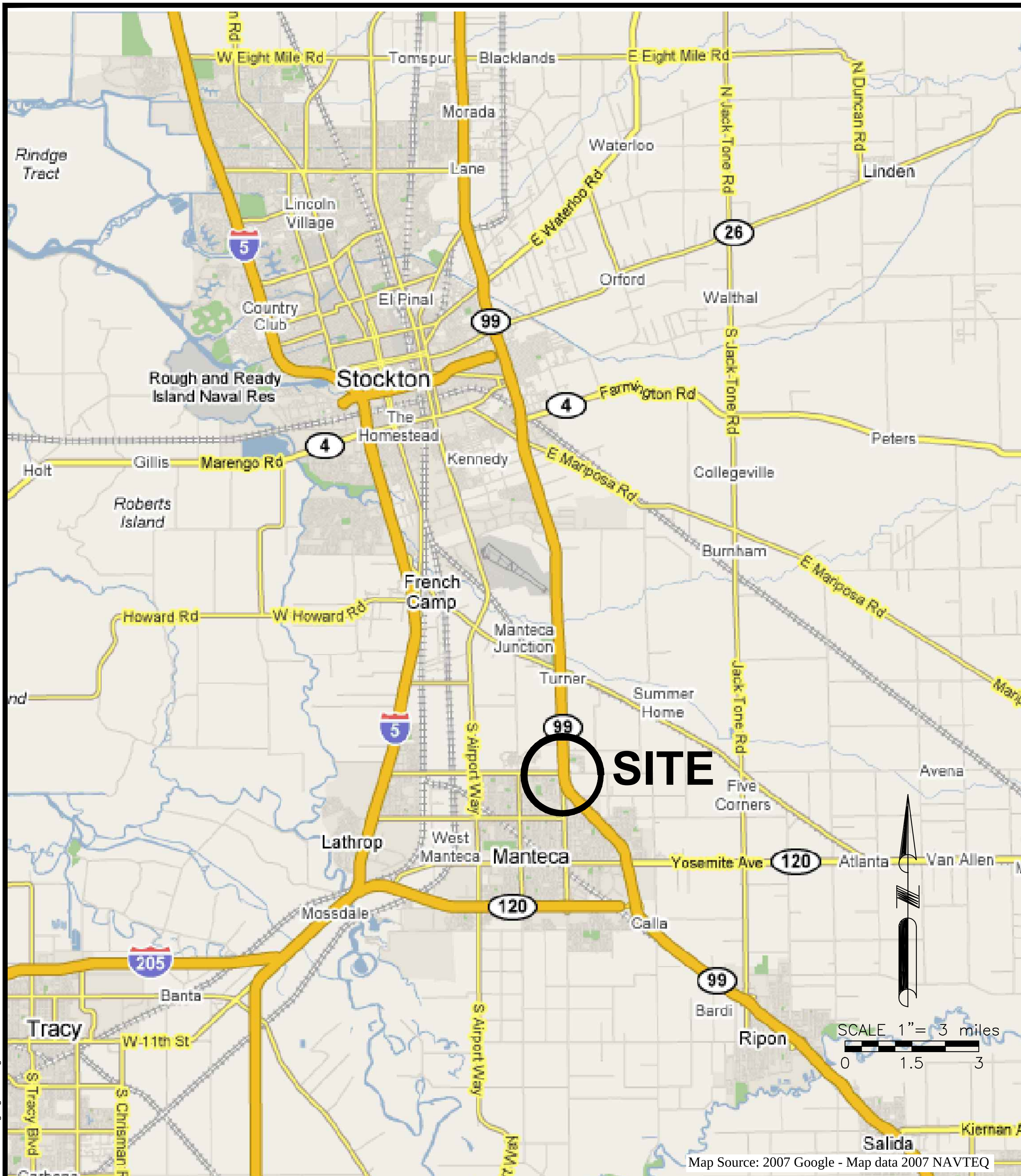
The interface between soil types on the logs is approximate. The transition between soil types may be abrupt or gradual. We based our recommendations on the final logs, which represent our interpretation of the field logs and general knowledge of the site and geologic conditions.

Our scope did not include evaluation of flooding or hazardous materials on site.

This report should only be used for design and construction of the Lathrop Road Overcrossing project, as described herein.

Modern design and construction is complex, with many regulatory sources, restrictions, involved parties, construction alternatives, etc. It is common to experience changes and delays. The owner should set aside a reasonable contingency fund based on complexities and cost estimates to cover changes and delays.

APPENDIX A



8/17/2011 1201.5 Lathrop Road Overcrossing Figure 1.dwg

blackburn consulting

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Auburn, CA 95603
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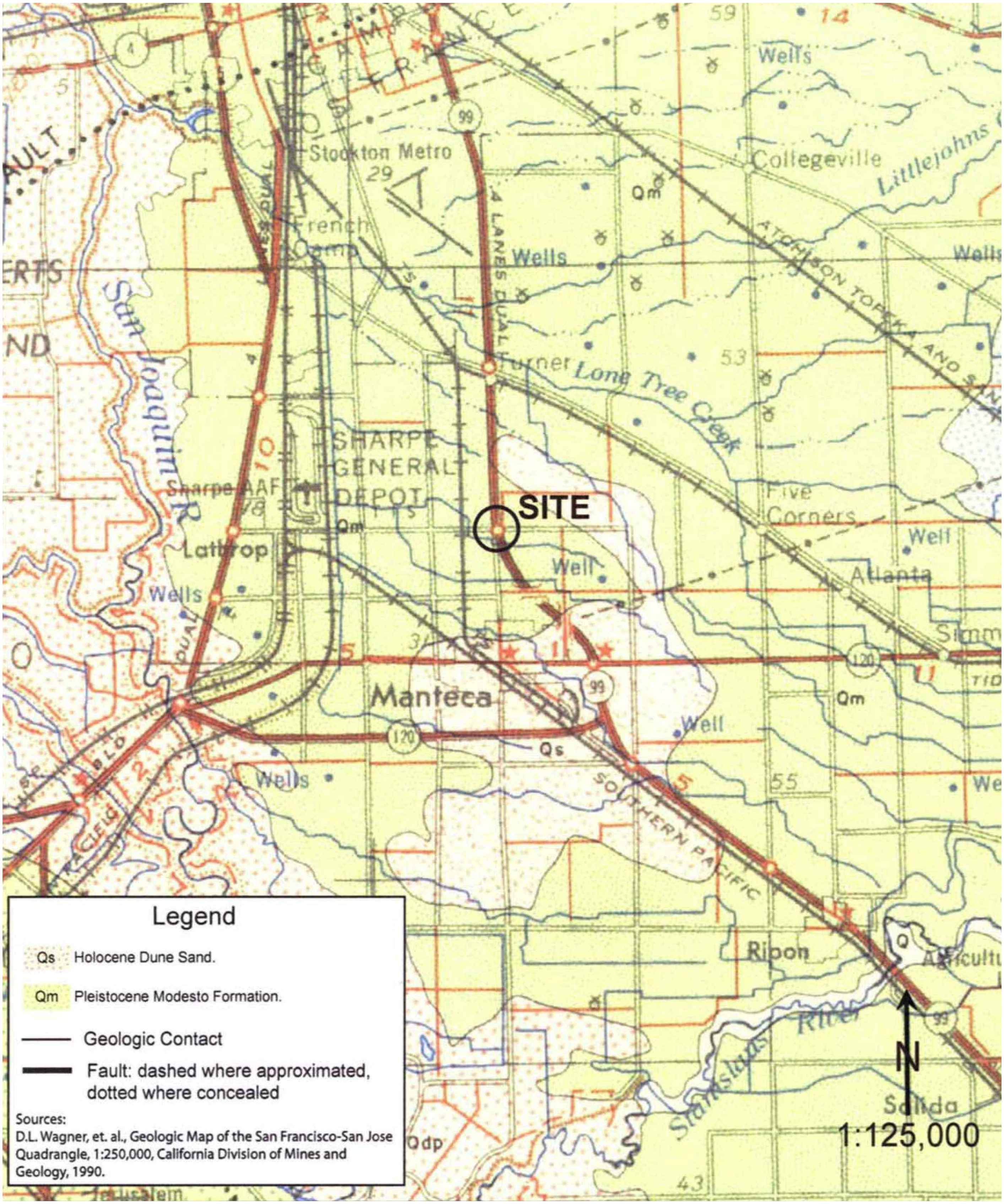
VICINITY MAP
Lathrop Road Overcrossing
San Joaquin County, California

File: 1201.5d

August 2011

Figure 1



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GEOLOGIC MAP

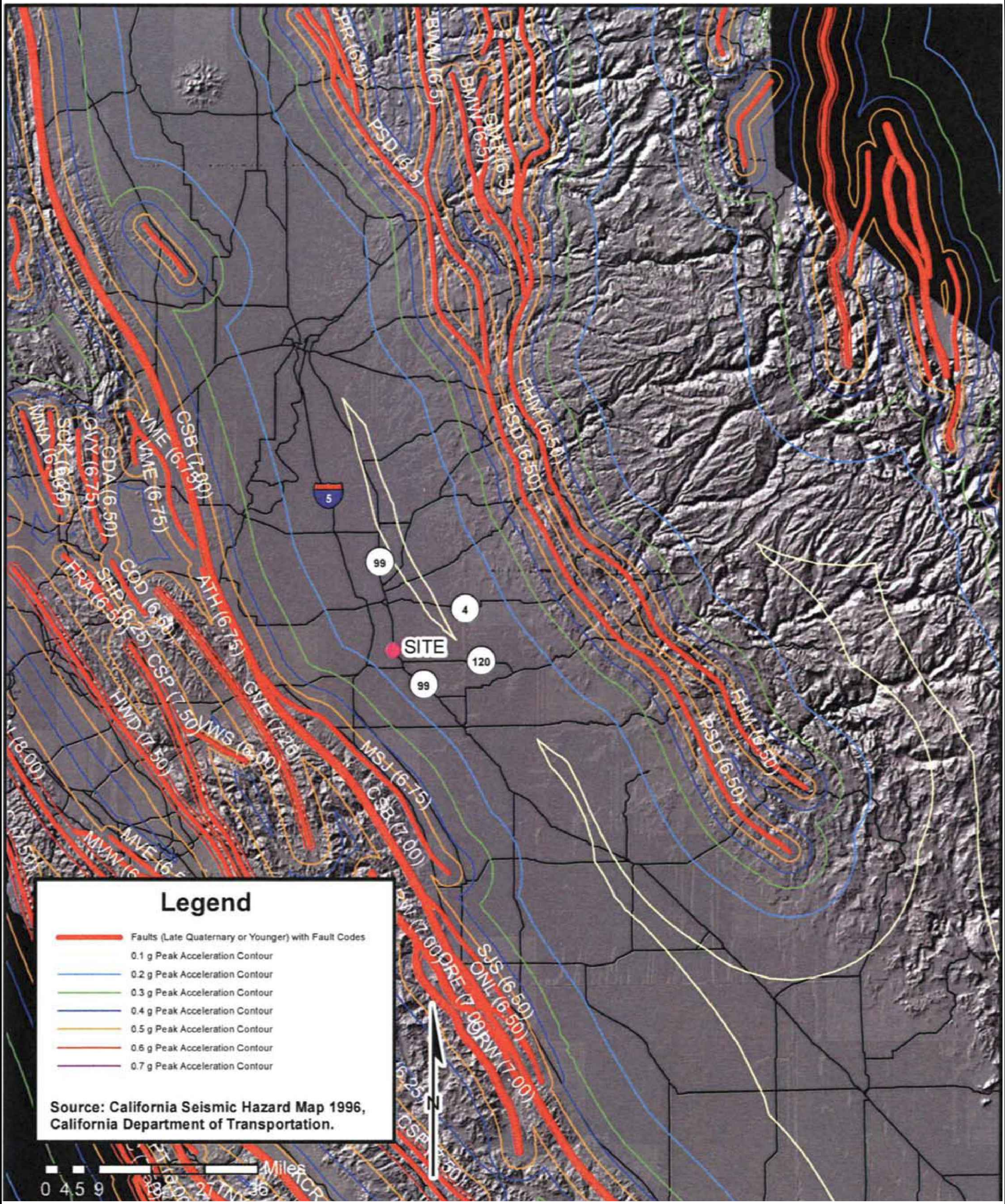
Lathrop Road Overcrossing
San Joaquin County, California

File No. 1201.5d

August 2011

Figure 2

8/17/2011 1201.5 Lathrop Road Overcrossing Figure 2.dwg



REGIONAL FAULT MAP

Lathrop Road Overcrossing

San Joaquin County, California

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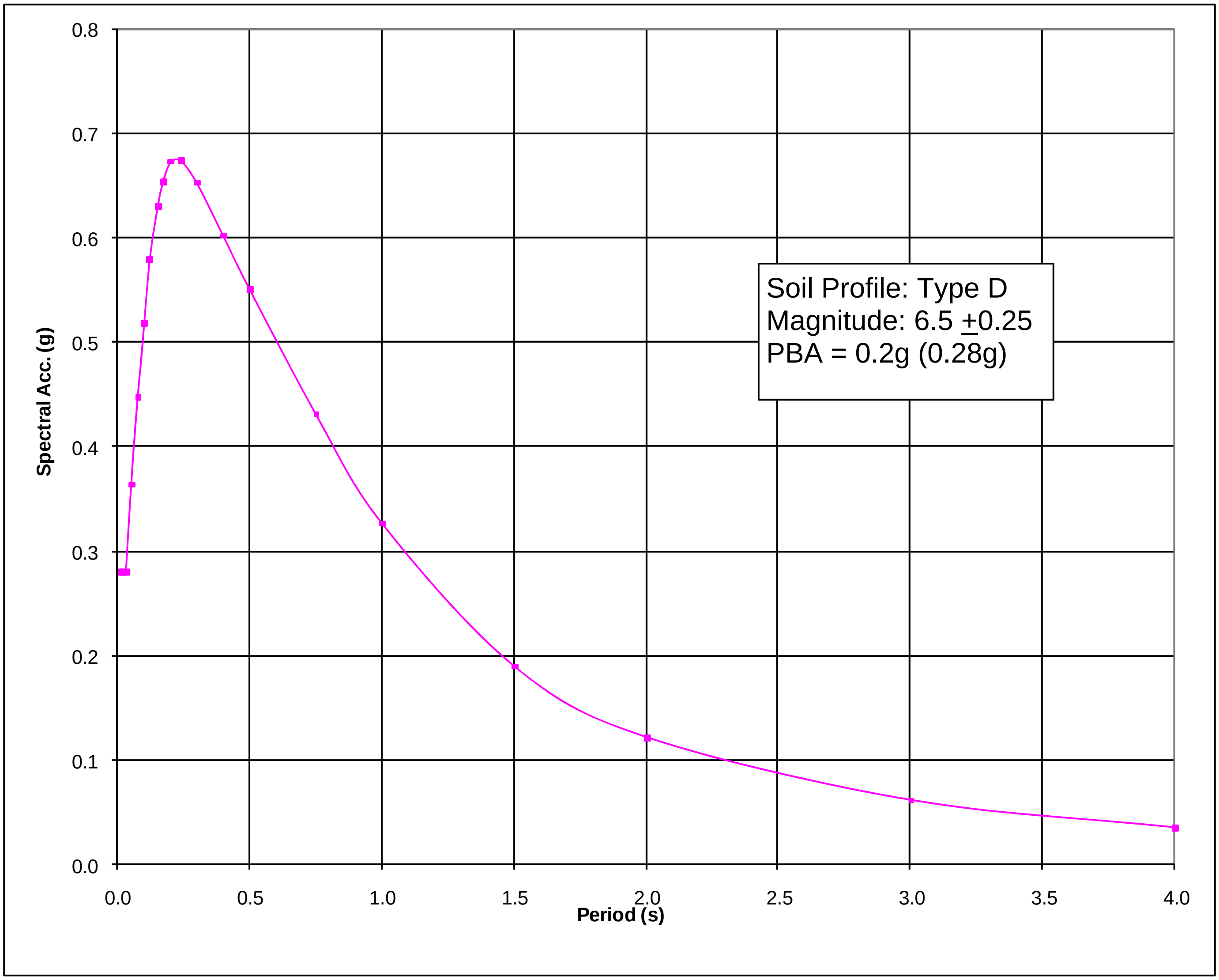
File No. 1201.5d

August 2011

Figure 3



Reference: Figure B.7, Caltrans Seismic Design Criteria, Ver. 1.4, June 2006

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ARS CURVE
Lathrop Road Overcrossing
San Joaquin County, California

File No. 1201.5d

August 2011

Figure 4

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	SJ	99			

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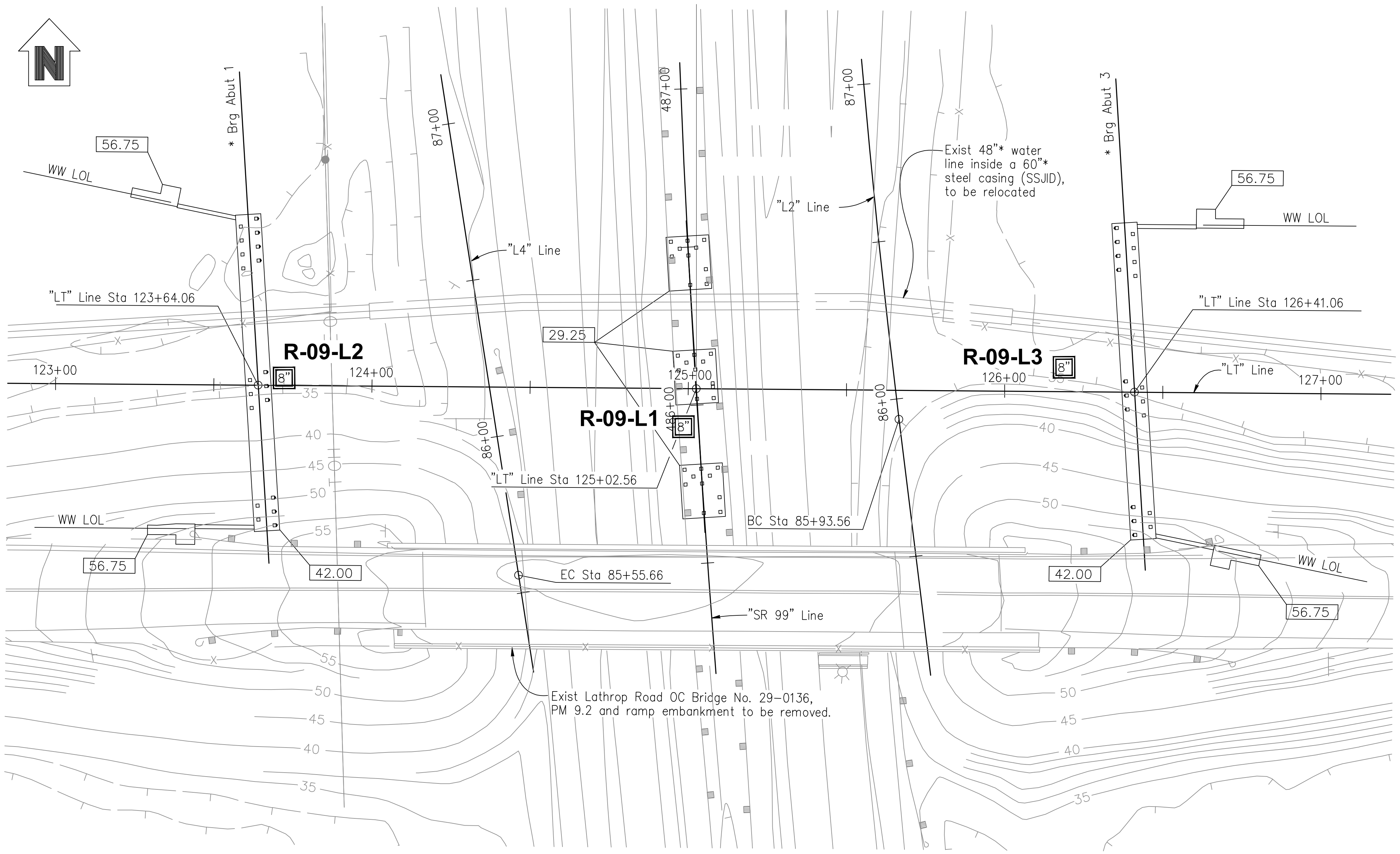
WEST SACRAMENTO, CA 95691 FILE No. 1201.5d

HDR ENGINEERING, INC.
2365 IRON POINT ROAD, SUITE 300
FOLSOM, CA 95630



PLAN

1" = 20'

NOTES:

1. Field classification of soils was in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007). See Log of Test Borings 3 and 4, "Soil Legend".
2. Standard Penetration tests were performed in accordance with ASTM D 1586-99 using a hammer operated with an automated drop system. Drill rods were 1 5/8-inch diameter "A"-rods; sampler was driven with brass liners.
3. "2.4 inch sampler": ID=2.4 inch, OD=2.9 inch. Driven in same manner as SPT ("1.4 inch") sampler.
4. Where less than the 0.5 inches of penetration is achieved, the blow count shown is for that fraction of the interval actually penetrated.
5. If laboratory tests are not shown as being performed, the soil descriptions presented in the LOTB are based solely on the visual practices described in the before mentioned Manual.
6. The length of each sampled interval is shown graphically on the boring log.
7. Consistency of soils shown in ( ) where estimated.
8. Groundwater surface (GWS) reflect the fluid level in the borings on the specified date. Groundwater surface is subject to seasonal fluctuations and may occur at higher or lower elevations depending on the conditions at any particular time.
9. Electronic media for plan view provided by HDR Engineering, March 2011.
10. Boring elevations are approximate and based on "Alternate 4, Planning Study" plans dated 1/23/09 provided by HDR Engineering, Inc.
11. The "Log of Test Borings" drawing is included with plans in accordance with Section 2-1.03 of Caltrans "Standard Specifications".

BENCH MARKS

BENCHMARK# 608 ELEV. 35.24 Ft
DESCRIPTION: KSN CONTROL POINT, ½" REBAR WITH A YELLOW CAP STAMPED "KSN CONTROL", LOCATED AT APPROXIMATE CENTERLINE STATION 484+75, ON THE NORTHBOUND MAINLINE, ON THE OUTSIDE SHOULDER, APPROXIMATELY 10' EAST OF THE EDGE OF TRAVELED WAY, 8' NORTH OF THE END OF THE GUARDRAIL.
NGVD 29, N2124114.87, E6354564.41.

BENCHMARK# 627 ELEV. 36.96 Ft
KSN CONTROL POINT, ½" REBAR WITH A YELLOW CAP STAMPED "KSN CONTROL", LOCATED AT APPROXIMATE CENTERLINE STATION 484+75, ON THE SOUTHBOUND MAINLINE, ON THE OUTSIDE SHOULDER, APPROXIMATELY 9' WEST OF THE EDGE OF TRAVELED WAY, 60' SOUTH OF THE SOUTH SIDE OF LATHROP ROAD OVERCROSSING..
NGVD 29, N2124122.05, E6354453.7.

90% SUBMITTAL

TIME PLOTTED => $TIME DATE PLOTTED => $DATE USERNAME => $USER

3/17/2011 1201.5 Lathrop Road Overcrossing LOTB.dwg

DESIGN OVERSIGHT	DRAWN BY	M. ROBERTSON	A. SHINNEFIELD FIELD INVESTIGATION BY:	
SIGN OFF DATE	CHECKED BY	K. CHAPMAN	DATE: MARCH & MAY 2009	

PREPARED FOR THE **STATE OF CALIFORNIA** DEPARTMENT OF TRANSPORTATION

JOHN A. KLEMUNES, JR. PROJECT ENGINEER

BRIDGE NO. 29-0331 POST MILE 9.18

LATHROP ROAD OVERCROSSING

LOG OF TEST BORINGS 1 OF 5

GS GEOLOGIST LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 1455
PROJECT NUMBER & PHASE: 10000204421 CONTRACT NO.: 10-0E6131

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES 03/11/10 12/01/10 03/17/11 SHEET OF

FILE => $REQUEST

FOR PLAN VIEW AND BORING NOTES SEE LOG OF TEST BORINGS 1 OF 5

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	SJ	99			

REGISTERED CIVIL ENGINEER DATE

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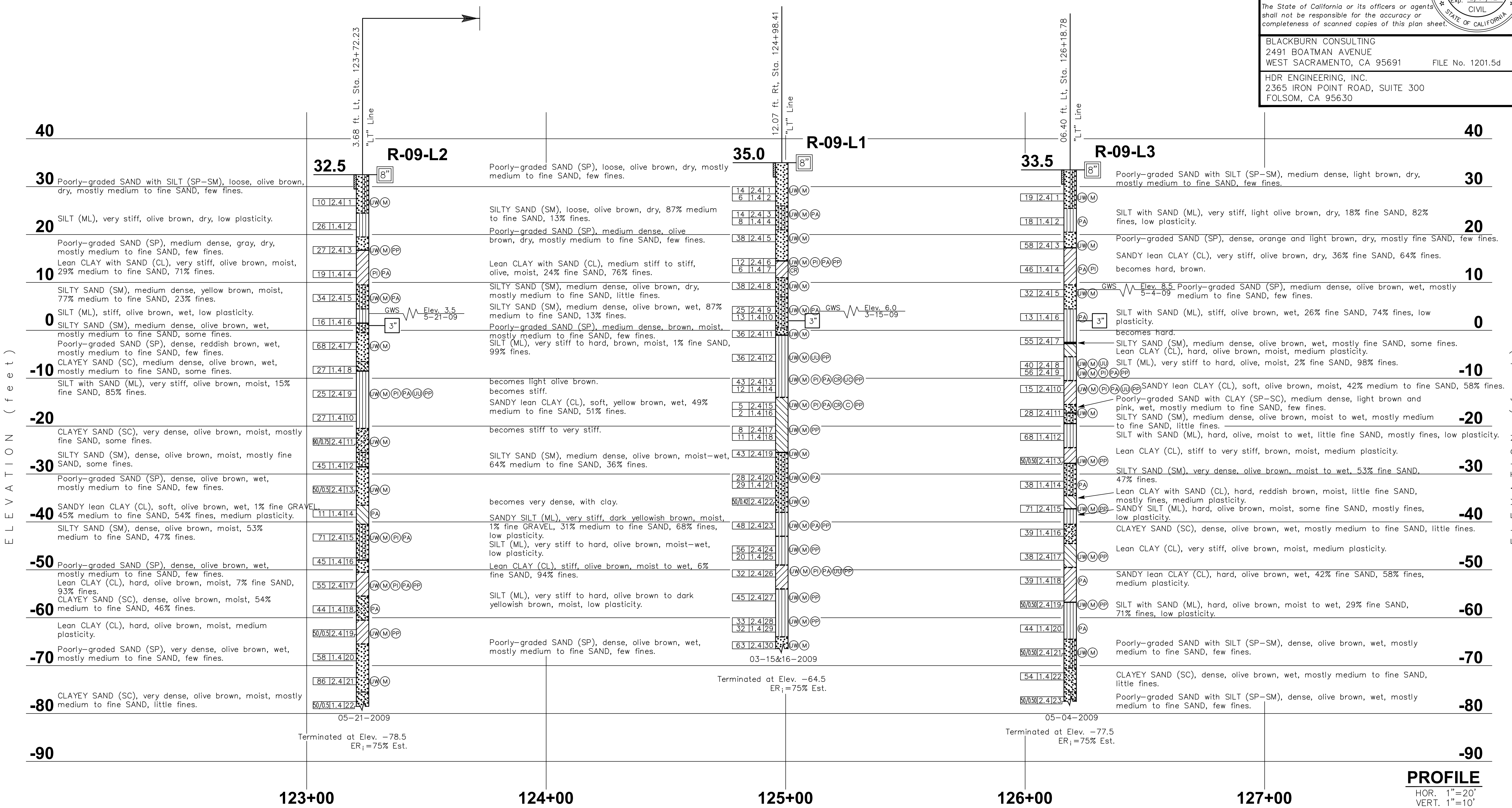
FOLSOM, CA 95630



PROFILE
HOR. 1"=20'
VERT. 1"=10'

90% SUBMITTAL

DESIGN OVERSIGHT	DRAWN BY	M. ROBERTSON	A. SHINNEFIELD FIELD INVESTIGATION BY:
SIGN OFF DATE	CHECKED BY	K. CHAPMAN	DATE: MARCH & MAY 2009

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

JOHN A. KLEMUNES, JR. PROJECT ENGINEER

BRIDGE NO. 29-0331 POST MILE 9.18

LATHROP ROAD OVERCROSSING
LOG OF TEST BORINGS 2 OF 5

GS GEOLOGIST LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 1455
PROJECT NUMBER & PHASE: 10000204421 CONTRACT NO.: 10-0E6131

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 03/11/10 12/01/10 03/17/11

REVISION DATES SHEET OF

FILE => $REQUEST

1201.5 Lathrop Road Overcrossing LOTB.dwg 3/17/2011

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	SJ	99			

REGISTERED CIVIL ENGINEER DATE

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FOLSOM, CA 95630

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

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.

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

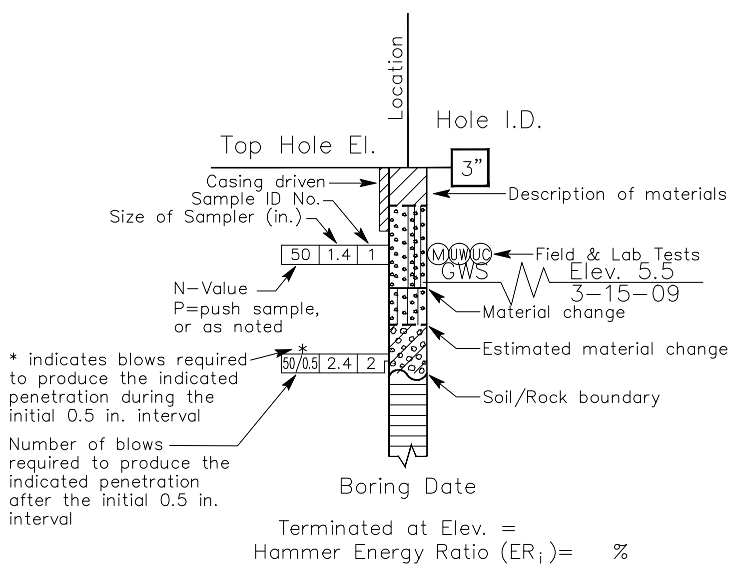
BOREHOLE IDENTIFICATION

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)
	O	Other

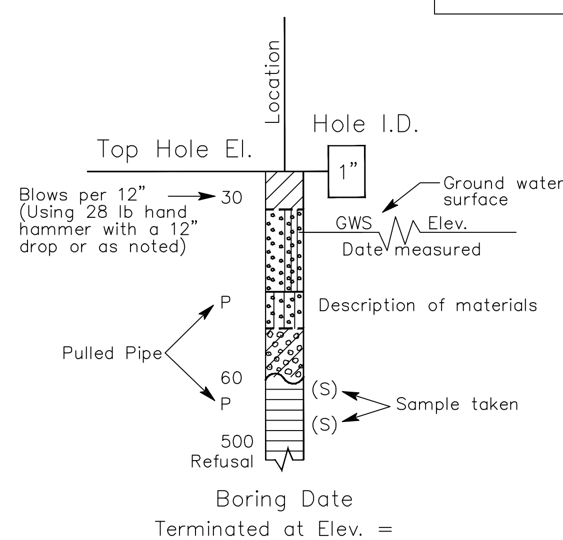
NOTE: Size in inches.

PLASTICITY OF FINE-GRAINED SOILS

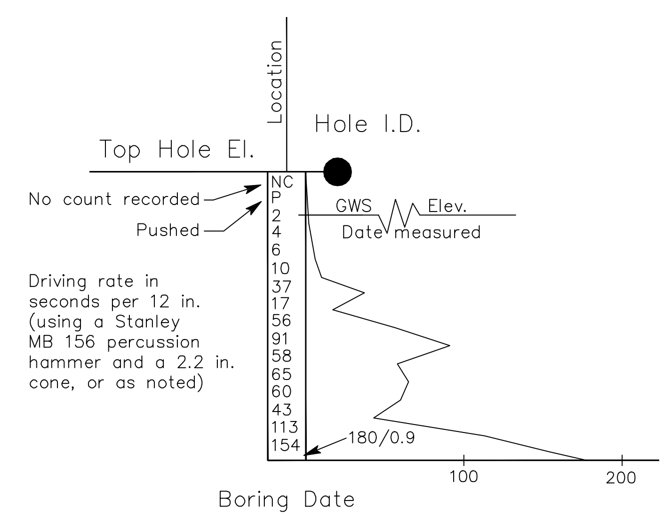
Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be 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.



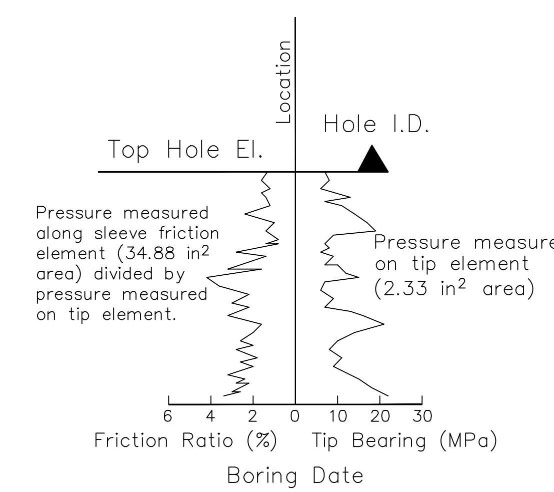
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

90% SUBMITTAL

SOIL LEGEND

LATHROP ROAD OVERCROSSING

LOG OF TEST BORINGS 3 OF 5

DESIGN OVERSIGHT	DRAWN BY	M. ROBERTSON	A. SHINNEFIELD FIELD INVESTIGATION BY:
SIGN OFF DATE	CHECKED BY	K. CHAPMAN	DATE: MARCH & MAY 2009

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

JOHN A. KLEMUNES, JR.
PROJECT ENGINEER

BRIDGE NO. 29-0331
POST MILE 9.18

GS LOTB SOIL LEGEND SHEET 1 (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 1455
PROJECT NUMBER & PHASE: 10000204421
CONTRACT NO.: 10-0E6131

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 03/11/10 12/01/10 03/17/11 SHEET OF

FILE => $REQUEST

3/17/2011 1201.5 Lathrop Road Overcrossing LOTB.dwg

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	SJ	99			

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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HDR ENGINEERING, INC.
2365 IRON POINT ROAD, SUITE 300
FOLSOM, CA 95630

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
OH/OL	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 2937)
- VS Vane Shear (AASHTO T 223)

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60}-Value (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

90% SUBMITTAL

SOIL LEGEND

LATHROP ROAD OVERCROSSING

LOG OF TEST BORINGS 4 OF 5

DESIGN OVERSIGHT

SIGN OFF DATE

DRAWN BY M. ROBERTSON

CHECKED BY K. CHAPMAN

A. SHINNEFIELD
FIELD INVESTIGATION BY:
DATE: MARCH & MAY 2009

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

JOHN A. KLEMUNES, JR.
PROJECT ENGINEER

BRIDGE NO. 29-0331
POST MILE 9.18

GS LOTB SOIL LEGEND SHEET 2 (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: 1455
PROJECT NUMBER & PHASE: 10000204421
CONTRACT NO.: 10-0E6131

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES 03/11/10 12/01/10 03/17/11 SHEET OF

FILE => $REQUEST

3/17/2011 1201.5 Lathrop Road Overcrossing LOTB.dwg

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

I-139(5)

FED. ROAD DIST. NO.	STATE	PROJ. No	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
2	CAL.			88	88

DIST.	COUNTY	ROUTE	SECTION	SHEET No.	TOTAL SHEETS
X	SJ	4-R	5	-5-	

BRIDGE ENGINEER — CIVIL ENGINEER

APPROVED MAY 3, 1954

As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	POST MILES–TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
10	SJ	99			

REGISTERED CIVIL ENGINEER — DATE

LATHROP ROAD OVERCROSSING

LOG OF TEST BORINGS 5 of 5

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA.

UNIT: 1455
PROJECT NUMBER & PHASE: 10000204421

BRIDGE No.	SHEET	OF
29-0331		

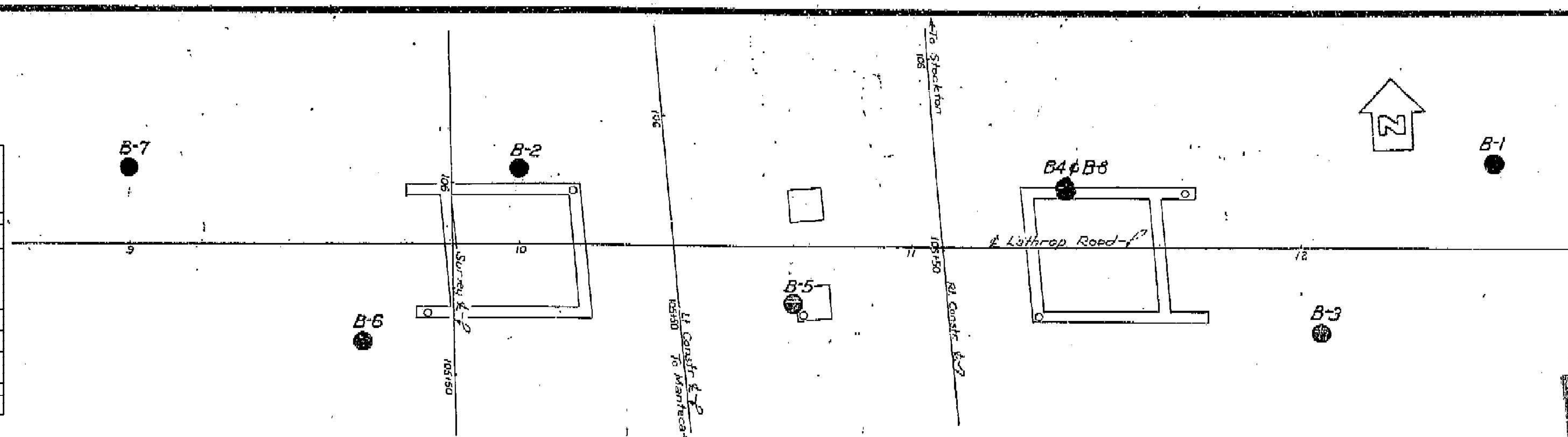
Revisions made to this Log of Test Borings from the original 1963 Log of Test Borings are the addition of the following table and notes.

Boring	Station	Offset from "LT" Line
B-1	126+82.43	41.77 ft Rt
B-2	124+32.96	45.22 ft Rt
B-3	126+38.39	86.50 ft Rt
B-4	125+72.51	48.20 ft Rt
B-5	125+03.00	79.59 ft Rt
B-6	123+93.71	91.14 ft Rt
B-7	123+32.69	45.73 ft Rt
B-8	125+72.74	49.65 ft Rt

REGISTERED PROFESSIONAL ENGINEER — DAVID J. MORRELL — No. 60578 — Exp. 12/31/12 — CIVIL — STATE OF CALIFORNIA

1. See Log of Test Borings 1 of 5 for stationing.

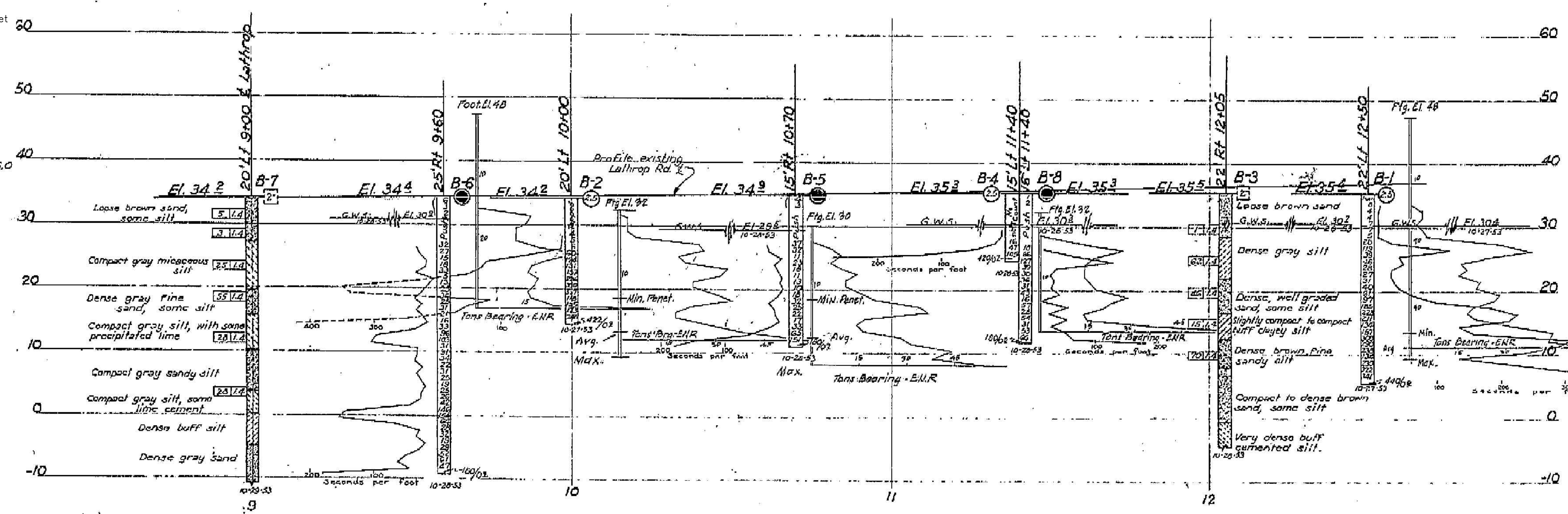
2. Boring locations are approximate based on proposed new structure location. This table is presented on the As Built Log of Test Boring sheet for the convenience of any bidder, contractor or other interested party.



AS BUILT PLANS
Contract No. 55-10TC2-0
Date Completed
Document No. 00001016

Design Pile Loading 45T
Type Pile Armco Welded Pipe Piling
Diameter 11" O.D. Shell 3/16
Total Number of Piles 62
Lineal ft of Piles "As Built" 1676.0
Lineal ft of Piles Called for on Plans 1516.0
Hammer Vulcan "2"

BM Nº 10
Painted square on concrete gas island 42' Rt 105+30 Survey ℄ Elev. 35.36



AS BUILT
Date Jan. 13, 1956
By

Classification of Material Based on Standard Grade Size Limits

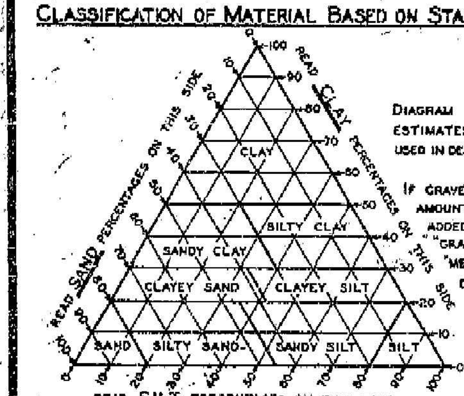


Diagram showing the basis for estimates of grade size distribution used in determination of class names

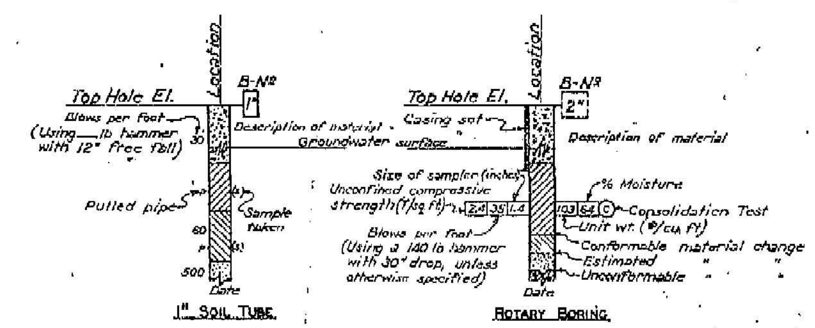
If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, vis. "gravelly sand". The terms "coarse", "medium" and "fine" when used to describe gravel, sand and silt refer to standard grade size limits.

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/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



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.

Penetrometer borings having a rate of penetration measured in seconds per foot are driven with a Nº 2 McKiernan-Terry air hammer at 115 PSI.

State of California
Department of Public Works
Division of Highways

LATHROP ROAD OVERCROSSING

LOG OF TEST BORINGS

Scale: Horiz. 1" = 20' Vert. 1" = 10' | Bridge 29-136 | File | Drawing L-3626-5

PREL. DRAWING NO. P-3626 2

BRIDGE DEPARTMENT

FIELD STUDY	DRAWN	CHECKED

1201.5 Lathrop Road Overcrossing LOTB.dwg

Log of Test Boring (LOTB) Sheet Checklist

This checklist shall be used by the *checker* in his/her evaluation of a LOTB sheet's conformance with the Caltrans *Soil & Rock Logging, Classification, and Presentation Manual,* and other applicable standards. To facilitate a quality check, the checker shall be provided with the draft final LOTB sheets, pertinent laboratory test results, copies of approved *Request for Exceptions*, and the field logs. This checklist is not comprehensive and does not attempt to account for all logging and presentation standards. As such, the checker must be familiar with the entire manual in order to successfully perform a quality check. **One checklist shall be completed per LOTB plan sheet. One signature sheet may be used for each structure (Bridge No.).**

Project Information

Dist – EA: 10-OE6131 County: SJ Route: 99 PM: 9.18

Bridge No.: 29-0331

Sheet Title: Lathrop Road Overcrossing

Revision Date: N/A

Are there approved exceptions to the manual? ☐ Yes ☒ No (attach, if yes)

General

	Yes	No	N/A	
1.1	☒	☐	☐	Does the Plan View meet the requirements of Sec 5.2.3.3?
1.2	☒	☐	☐	Does the Border meet the requirements of Sec 5.2.3.1 and Sec 5.2.3.2?
1.3	☒	☐	☐	Are the Notes clear and do they meet the requirements of Sec 5.2.2?
1.4	☒	☐	☐	If As-Built LOTB, does it meet the requirements of Sec 5.2.4?
1.5	☒	☐	☐	Is the soil legend sheet attached and properly labeled?
1.6	☐	☐	☒	If rock is presented, is the rock legend attached and properly labeled?
1.7	☐	☐	☒	If approved "Exception to Policy" form is attached, does the LOTB meet the requirements of the approved exceptions?

Elevation View

	Yes	No	N/A	
2.1	☒	☐	☐	Are the Hole Identifications correct? (Sec 2.3) (Sec. 5.2.3.4)
2.2	☒	☐	☐	Are the location descriptions correct?
2.3	☒	☐	☐	Are the holes located properly on the profile?
2.4	☒	☐	☐	Is the elevation scale correct? (Sec 5.2.3.4)
2.5	☒	☐	☐	Is the top of hole elevation presented and correct? (Sec 5.2.3.4)

Log of Test Boring (LOTB) Sheet Checklist

Bridge No.: 29-0331 Sheet Title: Lathrop Road Overcrossing

	Yes	No	N/A	
2.6	☒	☐	☐	Is the correct hole diameter presented in the correct Borehole Symbol? (Sec 5.2.5.6)
2.7	☒	☐	☐	Does the stationing match the profile view?
2.8	☒	☐	☐	Are the Boring Date and Termination Elevation presented at the bottom of each boring log? (Sec 5.2.3.4)
2.9	☒	☐	☐	If SPT tests were performed, is the correct hammer efficiency reported at the bottom of each borehole?
2.10	☒	☐	☐	Are lab tests reported at the correct elevations? (Sec 5.2.5.2)
2.11	☒	☐	☐	Are SPT blow counts reported at the correct elevations? (Sec 5.2.5.2)
2.12	☒	☐	☐	Is the groundwater presented at the correct elevation? (Sec 5.2.5.2)
2.13	☒	☐	☐	Are the soil/rock layers and graphics presented correctly? (Sec 4, Sec 5.2.5.7)
2.14	☒	☐	☐	Are the required descriptors presented and in the correct order? (Sec 2.4.1, Sec 2.5.1)
2.15	☒	☐	☐	Are the descriptors presented consistent with those allowed in the manual?
2.16	☒	☐	☐	Are the soil identifications consistent with the field observations? (Sec 2)
2.17	☒	☐	☐	Are the soil classifications consistent with reported lab test results? (Sec 3)
2.18	☒	☐	☐	Are the consistency descriptors consistent with field observations and/or lab test results? (Sec 2.4.3, Sec 3.2.3)
2.19	☒	☐	☐	Are the apparent density descriptors consistent with the SPT results and hammer efficiency? (Sec 2.4.4)
2.20	☐	☐	☒	Are % recovery (REC) and rock quality designation (RQD) presented at the required elevations?
2.21	☐	☐	☒	Is rock strength presented where lab tests are reported? (Sec 3.3.1)
2.22	☒	☐	☐	Considering the field observations, are lab test results properly applied to the descriptors within a layer per Sec 4.3?
2.23	☒	☐	☐	Are the presentations consistent with the rules presented in Sec 4?
2.24	☒	☐	☐	Are the presentations consistent with the rules presented in Sec 5?

List all variances identified during initial review of the LOTB sheet and steps needed to resolve the discrepancy (include item number). Also note any recommendations for revisions to the manual or procedures that might reduce or eliminate similar errors in the future.

N/A

Log of Test Boring QC/QA Signature Sheet

Dist – EA: 10-OE6131 Bridge No.: 29-0331

Sheet Titles:

Lathrop Road Overcrossing (Sheets 1 through 5)

I, the undersigned on the date following my signature, hereby certify that I have performed a quality check of the referenced LOTB sheets and that the referenced LOTB sheets *substantially* comply with the Caltrans Soil and Rock Logging, Classification and Presentation Manual (June 2007) and related policy and standards.

Kristy Chapman	Project Engineer
Checker (Print)	Title
Kristy Chapman	3/17/11
Checker (Signature)	Date

I, the undersigned on the date following my signature, hereby certify that the referenced LOTB sheets *substantially* comply with Geotechnical Service's Quality Control/Quality Assurance procedures, as described in the memorandum, "Quality Control/Quality Assurance Documentation on LOTB Sheets", dated July 1, 2007.

Eric Nichols	Senior Project Manager
Functional Supervisor (Print)	Title
W. Eric Nichols	3/17/11
Functional Supervisor (Signature)	Date

(This original checklist and signature sheet shall be placed in the geotechnical project file, and a copy sent to the Geotechnical Services Corporate Unit (Mark Willian))

APPENDIX B

Laboratory Test Results Summary

Laboratory Results

Laboratory Test Summary
Samples from Exploratory Borings
Lathrop Road Overcrossing

Boring	Sample	Depth (feet)	Unified Soil Classification	Dry Density (pcf)	Natural Moisture (%)	Plastic Limit	Liquid Limit	Plasticity Index	Gravel (%)	Sand (%)	Fines (%)	Consolidation Test	Pocket Pen (tsf)	Unconfined Compressive Strength (tsf)	Triaxial Test Results				Corrositvity Test
															Total		Effective		
															Phi (degrees)	Cohesion (psf)	Phi (degrees)	Cohesion (psf)	
R-09-L1	1b	5.0-6.5	SP	106.5	7.1														
R-09-L1	3b	10.5-11.0	SM	102.9	6.1														
R-09-L1	3c	11.0-11.5	SM						0.5	86.3	13.2								
R-09-L1	5b	15.0-16.5	SP	99.4	14.0														
R-09-L1	6b	20.5-21.0	CL	90.9	20.7														
R-09-L1	6c	21.0-21.5	CL			21	30	9	0.0	23.5	76.5		1.75						
R-09-L1	7	21.5-23.0	CL																Test
R-09-L1	8b	25.0-26.5	SM	112.5	15.2														
R-09-L1	9b	30.0-31.5	SM	105.8	17.4														
R-09-L1	9c	31.0-31.5	SM						0.5	86.2	13.3								
R-09-L1	11b	35.5-36.0	SP	89.0	32.9														
R-09-L1	12c	41.0-41.5	ML	94.3	29.1								>4.5		0	4,630			
R-09-L1	13b	45.5-46.0	ML	89.0	34.1								>4.5						
R-09-L1	13c	46.0-46.5	ML			30	46	16	0.0	0.7	99.3								Test
R-09-L1	15b	50.5-51.0	CL	71.9	42.8							Consolidation							
R-09-L1	15c	51.0-51.5	CL			19	48	29	0.0	49.5	50.5		0.50						Test
R-09-L1	17b	55.5-56.0	CL	83.1	35.5								1.25						
R-09-L1	19b	60.5-61.0	SM	106.9	22.1														
R-09-L1	20b	65.5-66.0	SM	97.7	28.8				0.0	63.5	36.5								
R-09-L1	22b	70.5-71.0	SM	86.9	31.5														
R-09-L1	23b	75.5-76.0	ML	82.8	36.5								0.50						
R-09-L1	23c	76.0-76.5	ML						1.1	30.6	68.3								
R-09-L1	24b	80.5-81.0	ML	104.0	23.3								>4.5						
R-09-L1	26b	85.5-86.0	CL	84.5	36.6								1.75						
R-09-L1	26c	86.0-86.5	CL			24	43	19	0.0	6.0	94.0								
R-09-L1	27b	90.5-91.0	ML	99.9	25.9								>4.5						
R-09-L1	28b	95.5-96.0	ML	103.0	22.3								>4.5						
R-09-L1	30b	100.5-101.0	SP	105.9	21.2														
R-09-L2	1b	5.5-6.0	SP-SM	103.3	5.4														
R-09-L2	3b	15.5-16.0	CL	100.6	8.2								4.5						
R-09-L2	4	20.0-21.5	CL			19	44	25	0.0	29.3	70.7								
R-09-L2	5b	25.5-26.0	SM	111.1	16.4				0.0	76.7	23.3								
R-09-L2	7b	33.5-36.0	SP	100.0	25.3														
R-09-L2	9b	45.5-46.0	ML			30	47	17	0.0	14.7	85.3		4.0						
R-09-L2	9c	46.0-46.5	ML	95.9	28.5										0	2,942			
R-09-L2	11b	55.25-55.75	SC	105.5	22.7														
R-09-L2	13b	65.0-65.5	SP	110.6	18.6														
R-09-L2	14	70.0-71.5	CL						0.9	44.7	54.4								
R-09-L2	15c	76.0-76.5	SM	102.5	23.3	28	45	17	0.0	53.0	47.0								
R-09-L2	17b	85.5-86.0	CL	99.3	24.2	23	46	23	0.0	6.7	93.3		>4.5						
R-09-L2	18	90.0-91.5	SC						0.0	53.9	46.1								
R-09-L2	19b	95.0-95.5	CL	88.2	34.5								>4.5						
R-09-L2	21b	105.5-106.0	SP	102.3	23.4														

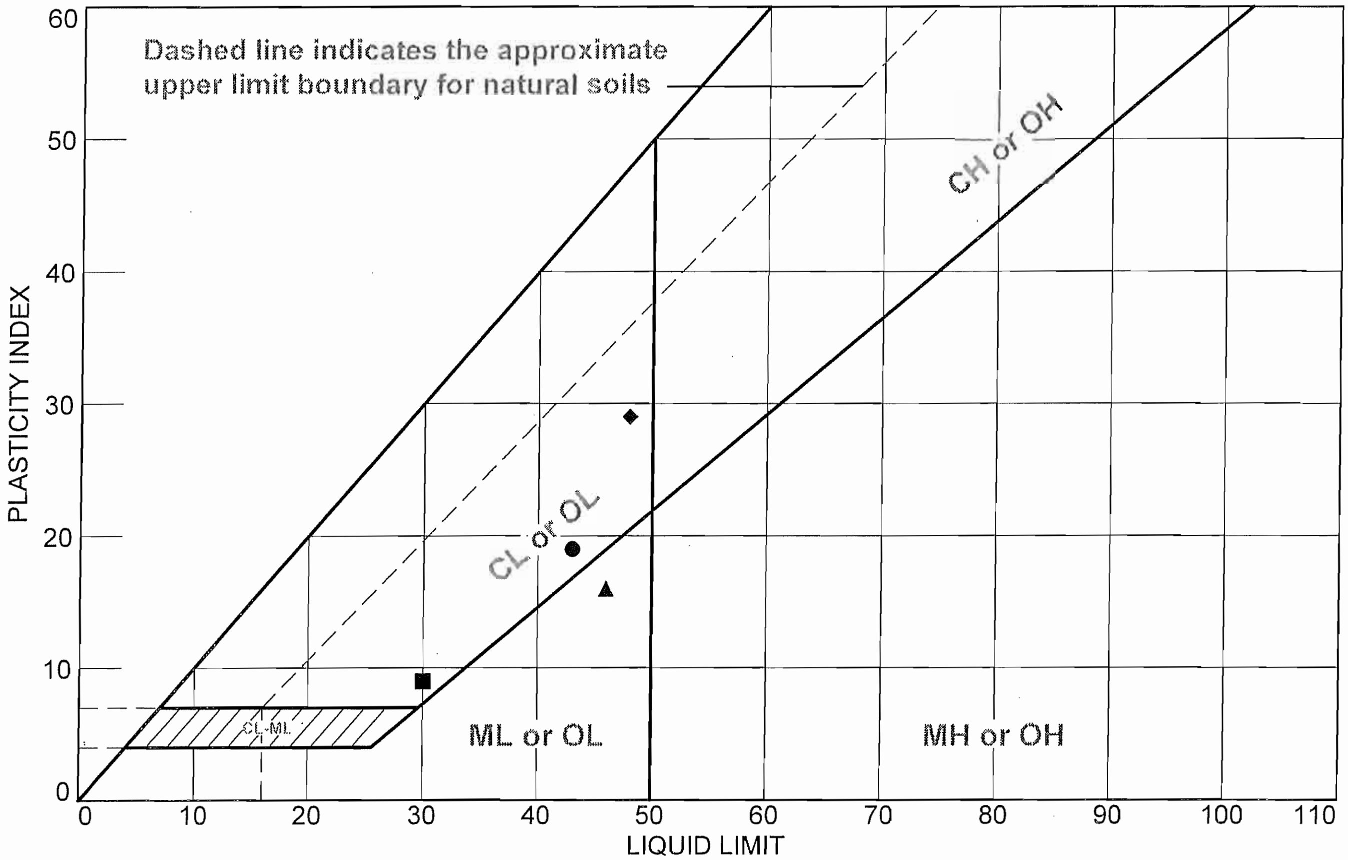
* Staged Test

Laboratory Test Summary
Samples from Exploratory Borings
Lathrop Road Overcrossing

Boring	Sample	Depth (feet)	Unified Soil Classification	Dry Density (pcf)	Natural Moisture (%)	Plastic Limit	Liquid Limit	Plasticity Index	Gravel (%)	Sand (%)	Fines (%)	Consolidation Test	Pocket Pen (tsf)	Unconfined Compressive Strength (tsf)	Triaxial Test Results: Total Phi (degrees)	Triaxial Test Results: Total Cohesion (psf)	Triaxial Test Results: Effective Phi (degrees)	Triaxial Test Results: Effective Cohesion (psf)	Corrositvity Test
R-09-L3	1b	5.5-6.0	SP-SM	103.5	3.8														
R-09-L3	2	10.0-11.5	ML						0.0	18.0	82.0								
R-09-L3	3b	15.5-16.0	SP	97.7	13.2														
R-09-L3	4	20.0-21.5	CL			15	26	11	0.0	36.0	64.0								
R-09-L3	5b	25.5-26.0	SP	104.6	22.2														
R-09-L3	6	30.0-31.5	ML						0.0	25.6	74.4								
R-09-L3	8c	41.0-41.5	ML	90.4	30.6										0	4,923			
R-09-L3	9c	42.5-43.0	ML	95.6	33.9	30	42	12	0.0	2.3	97.7		4.5						
R-09-L3	10b	45.5-46.0	CL			25	48	23	0.4	41.9	57.7		2.5						
R-09-L3	10c	46.0-46.5	CL	89.6	32.1										0	856			
R-09-L3	11c	51.0-51.5	SM	100.1	26.5														
R-09-L3	13b	60.5-61.0	CL	97.6	28.5								2.5						
R-09-L3	14	65.0-66.5	SM						0.0	53.4	46.6								
R-09-L3	15b	70.5-71.0	CL	94.7	29.0								3.0						
R-09-L3	17b	80.5-81.0	CL	101.0	27.3								>4.5						
R-09-L3	18	85.0-86.5	CL						0.0	41.9	58.1								
R-09-L3	19b	90.0-90.5	ML	102.3	25.2								>4.5						
R-09-L3	20	95.0-96.5	ML						0.0	29.4	70.6								
R-09-L3	21b	100.0-100.5	SP-SM	87.0	33.5														

* Staged Test

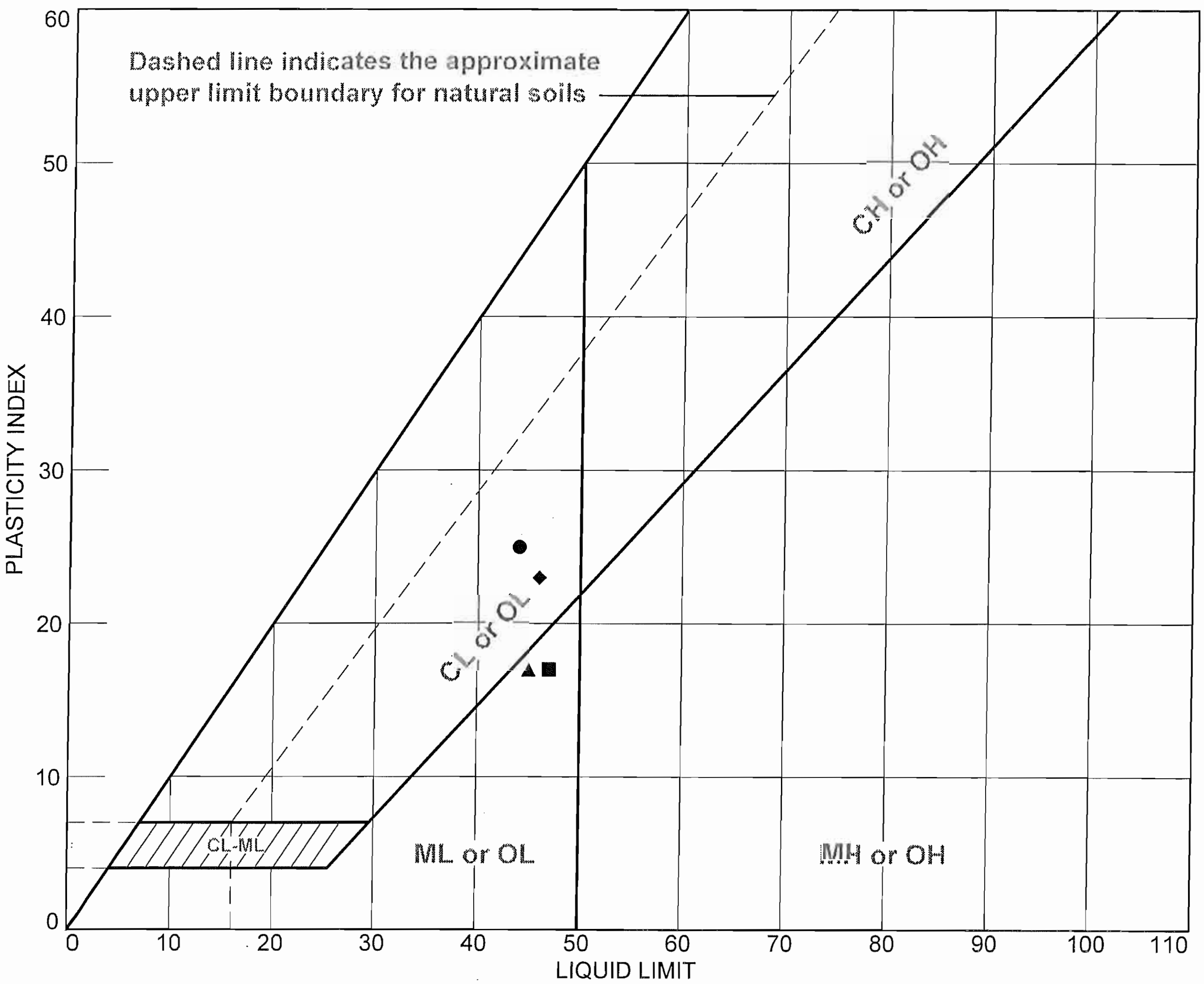
LIQUID AND PLASTIC LIMITS TEST REPORT



	SOIL DATA								
	SOURCE	SAMPLE NO.	DEPTH (ft.)	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	LIQUIDITY INDEX	USCS
●		L1-26 c	86.0'-86.5'		24	43	19		CL
■		L1-6 c	21.0'-21.5'		21	30	9		CL
▲		L1-13 c	46.0'-46.5'		30	46	16		ML
◆		L1-15 c	51.0'-51.5'		19	48	29		CL

Blackburn Consulting **Auburn, CA**	**Client:** HDR INC. **Project:** SR 99 Widending - Lathrop Road Overcrossing **Project No.:** 1201.5D **Figure**

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●		L2-4	20.0'-21.5		19	44	25	CL
■		L2-9B	45.5'-46.0'		30	47	17	ML
▲		L2-15C	76.0'-76.5'		28	45	17	SM
◆		L2-17B	85.5'-86.0'		23	46	23	CL

Blackburn Consulting

Auburn, CA

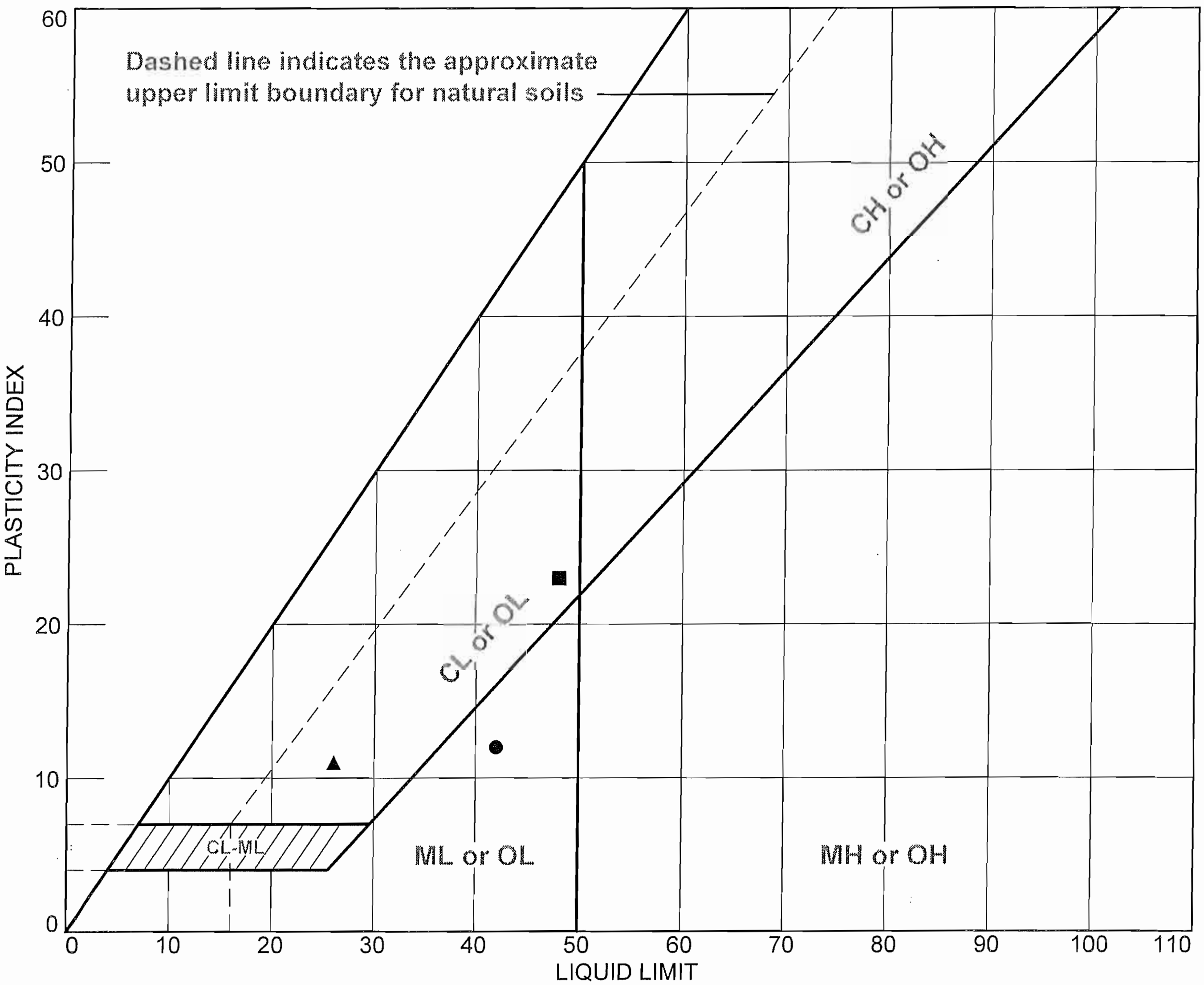
Client: HDR Inc.

Project: SR 99 Median Widening - Lathrop Road Overcrossing

Project No.: 1201.5D

Figure

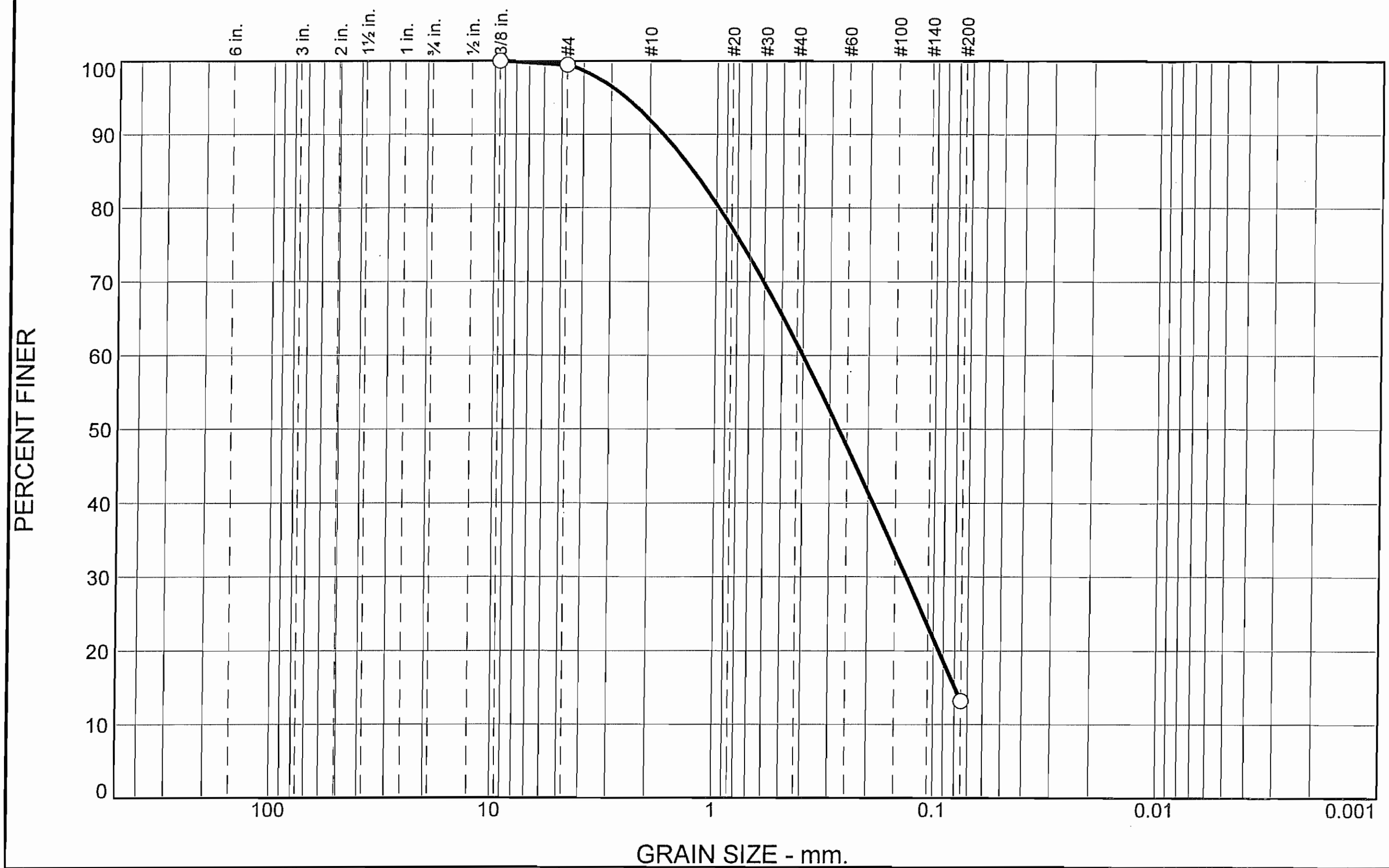
LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●		L3-9C	42.5'-43.0'		30	42	12	ML
■		L3-10B	45.5'-46.0'		25	48	23	CL
▲		L3-4	20.0'-21.5'		15	26	11	CL

Blackburn Consulting **Auburn, CA**	**Client:** HDR Inc. **Project:** SR 99 Median Widening - Lathrop Road Overcrossing **Project No.:** 1201.5D **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	7.5	30.5	48.3	13.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	99.5		
#200	13.2		

* (no specification provided)

Material Description

Light Olive Brown Silty SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.7339 D_{85}= 1.2697 D_{60}= 0.3998
D_{50}= 0.2725 D_{30}= 0.1334 D_{15}= 0.0798
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO=

Remarks

Sample Number: L1-3 c **Depth:** 10.0'-11.5'

Date: 3-19-09

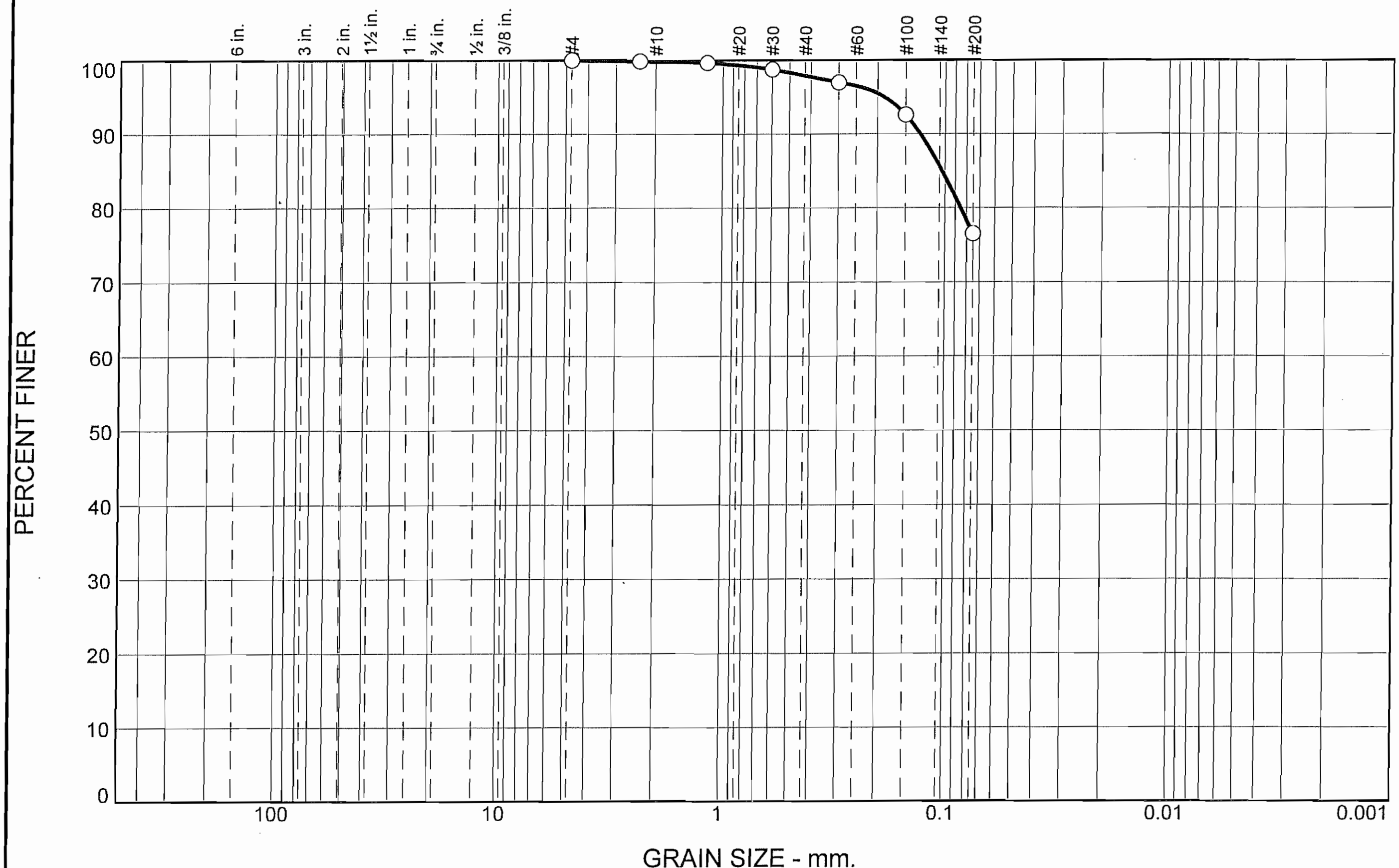
Blackburn Consulting

Auburn, CA

Client: HDR INC.
Project: SR 99 Widending - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: ECH **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	1.9	21.4	76.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.9		
#16	99.6		
#30	98.7		
#50	97.0		
#100	92.6		
#200	76.5		

* (no specification provided)

Material Description

Gray Lean CLAY with Sand

Atterberg Limits

PL= 21 LL= 30 PI= 9

Coefficients

D_{90}= 0.1292 D_{85}= 0.1033 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-4(6)

Remarks

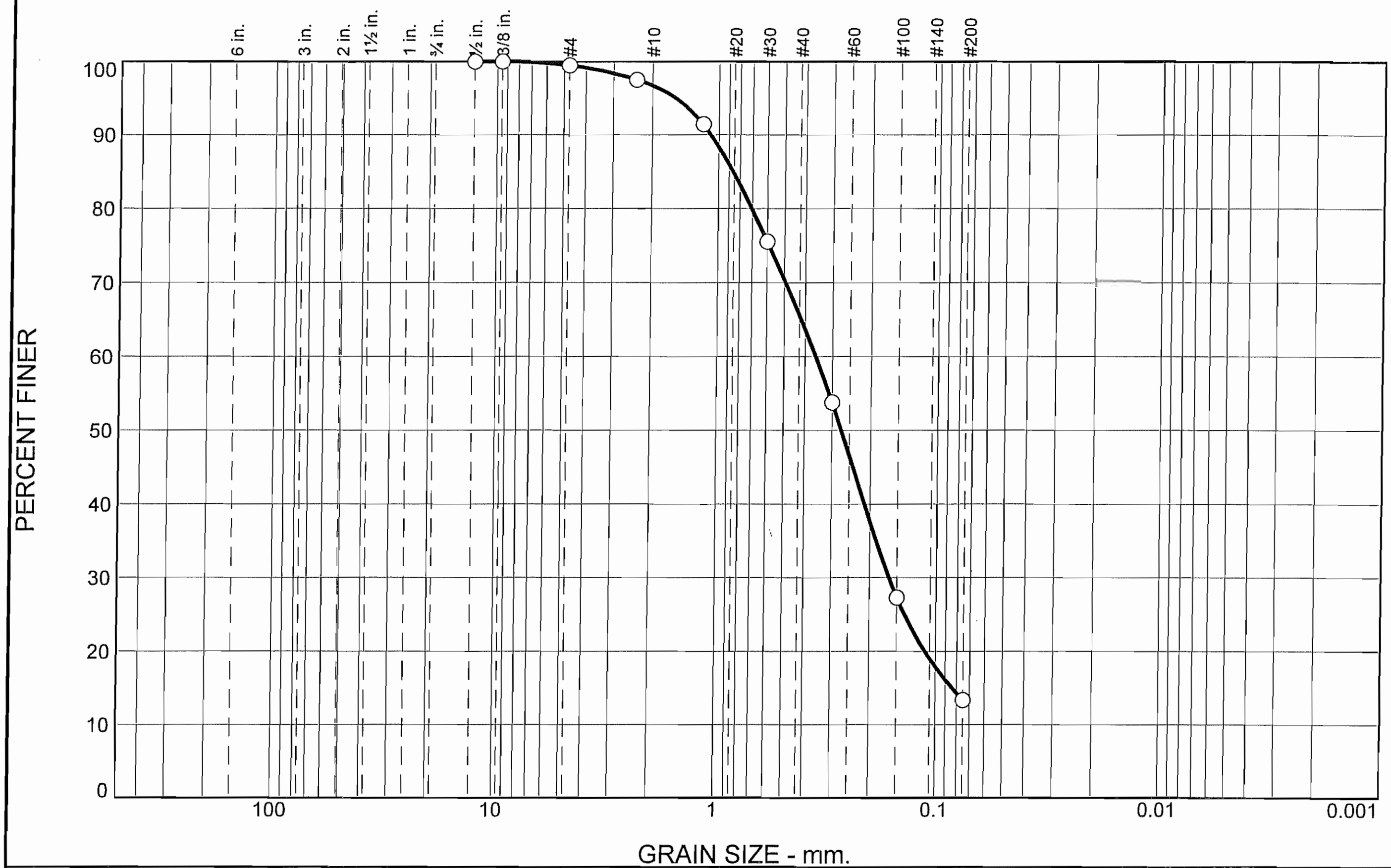
Sample Number: L1-6 c **Depth:** 21.0'-21.5'

Date: 3-17-09

Blackburn Consulting Auburn, CA	**Client:** HDR INC. **Project:** SR 99 Widending - Lathrop Road Overcrossing **Project No:** 1201.5D **Figure**

Tested By: ECH **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.5	2.8	31.1	52.3	13.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.500	100.0		
.375	100.0		
#4	99.5		
#8	97.5		
#16	91.5		
#30	75.5		
#50	53.8		
#100	27.3		
#200	13.3		

* (no specification provided)

Material Description

Light Olive Brown Poorly Graded SAND with Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.0862 D_{85}= 0.8605 D_{60}= 0.3572
D_{50}= 0.2719 D_{30}= 0.1630 D_{15}= 0.0838
D_{10}= C_u= C_c=

Classification

USCS= SP-SM AASHTO=

Remarks

Sample Number: L1-9 c **Depth:** 31.0'-31.5'

Date: 3-17-09

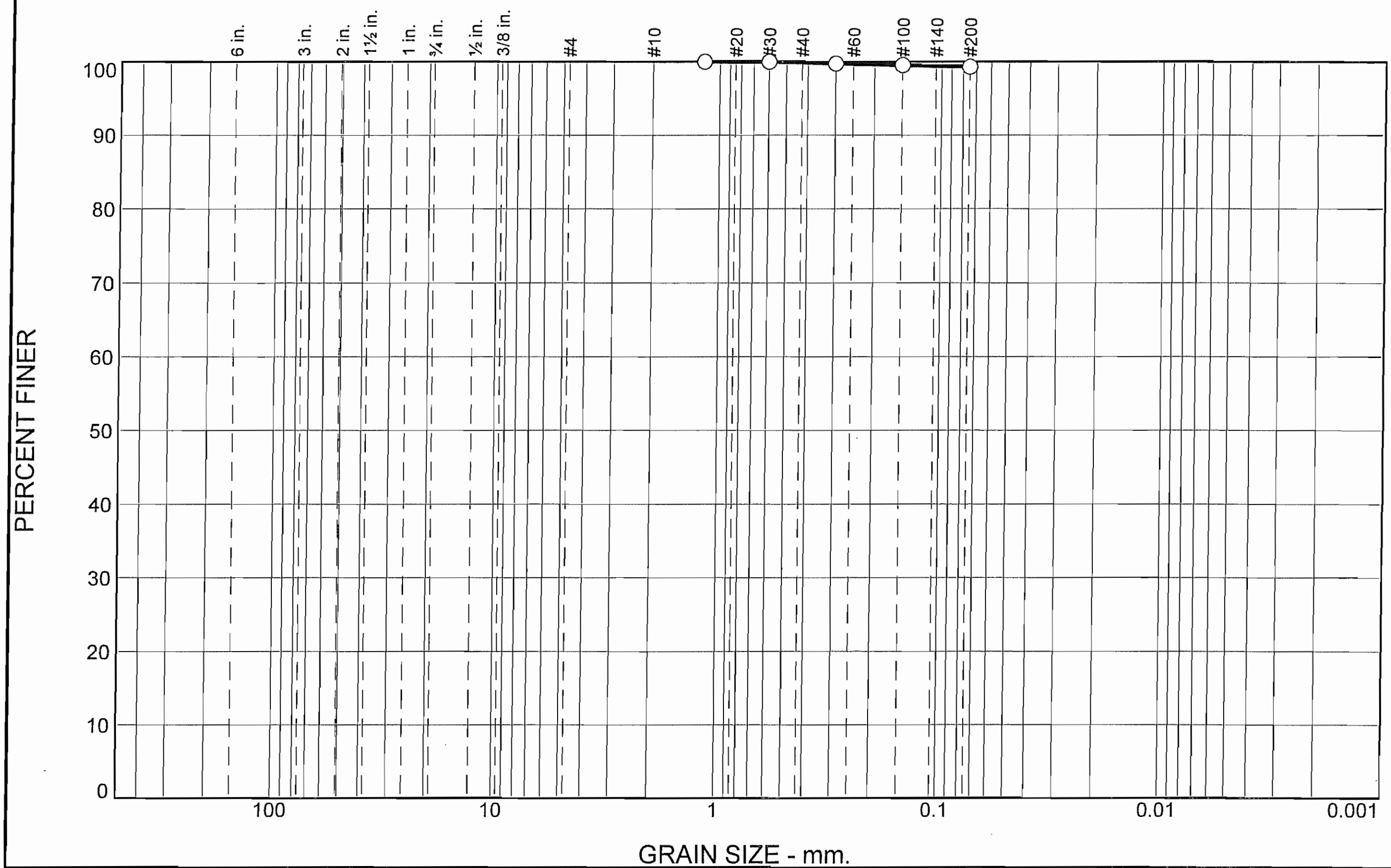
Blackburn Consulting

Auburn, CA

Client: HDR INC.
Project: SR 99 Widending - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: ECH **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	0.6	99.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#16	100.0		
#30	100.0		
#50	99.8		
#100	99.5		
#200	99.3		

* (no specification provided)

Material Description

Light Olive Brown SILT

Atterberg Limits

PL= 30 LL= 46 PI= 16

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-7-5(20)

Remarks

Sample Number: L1-13 c **Depth:** 46.0'-46.5'

Date: 3-19-09

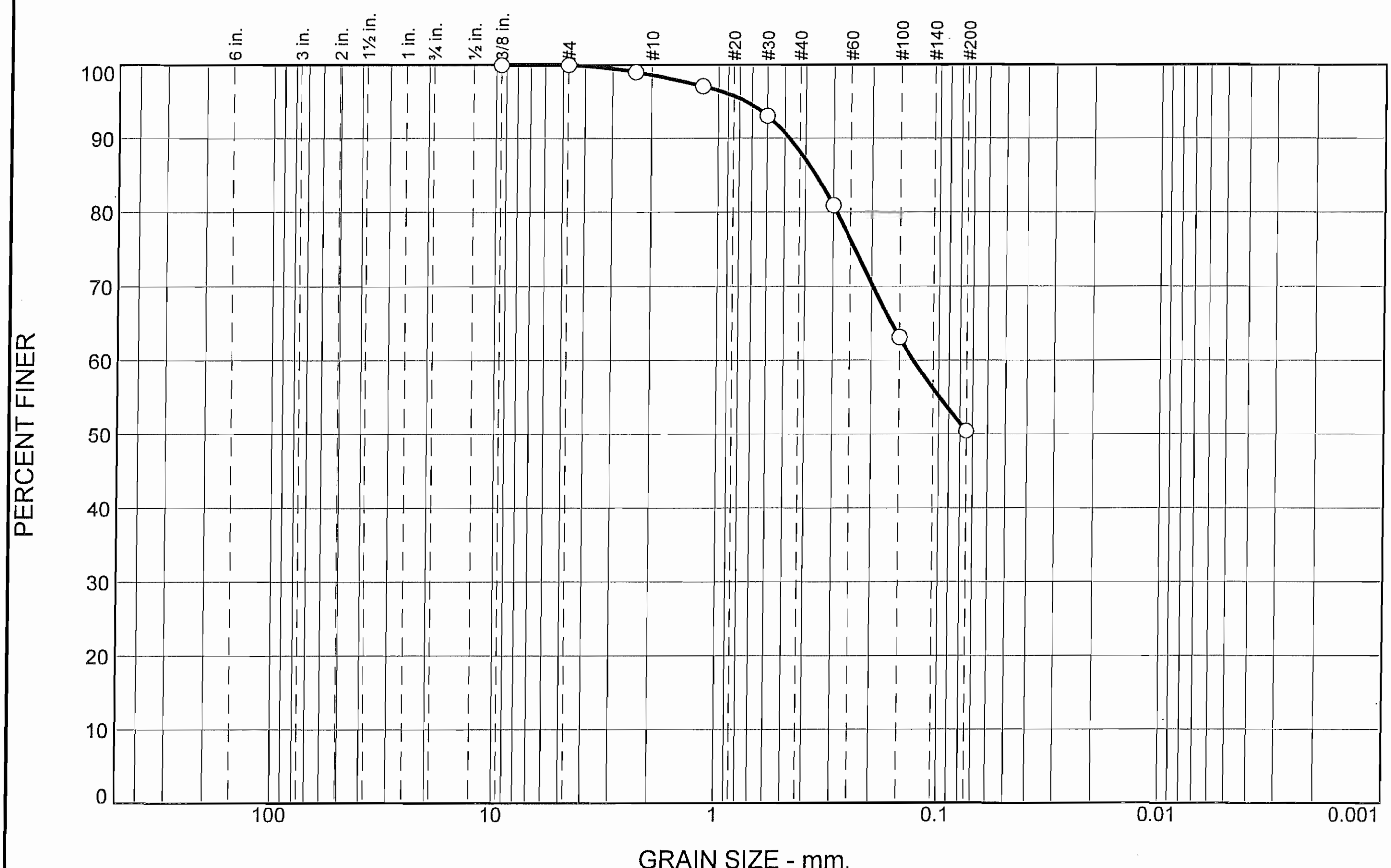
Blackburn Consulting

Auburn, CA

Client: HDR INC.
Project: SR 99 Widending - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: ECH **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	1.4	10.4	37.7	50.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.375	100.0		
#4	100.0		
#8	99.0		
#16	97.1		
#30	93.1		
#50	80.9		
#100	63.1		
#200	50.5		

* (no specification provided)

Material Description

Light Yellowish Brown Sandy Lean CLAY

Atterberg Limits

PL= 19 LL= 48 PI= 29

Coefficients

D_{90}= 0.4736 D_{85}= 0.3596 D_{60}= 0.1300
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(10)

Remarks

Sample Number: L1-15 c **Depth:** 51.0'-51.5'

Date: 3-17-09

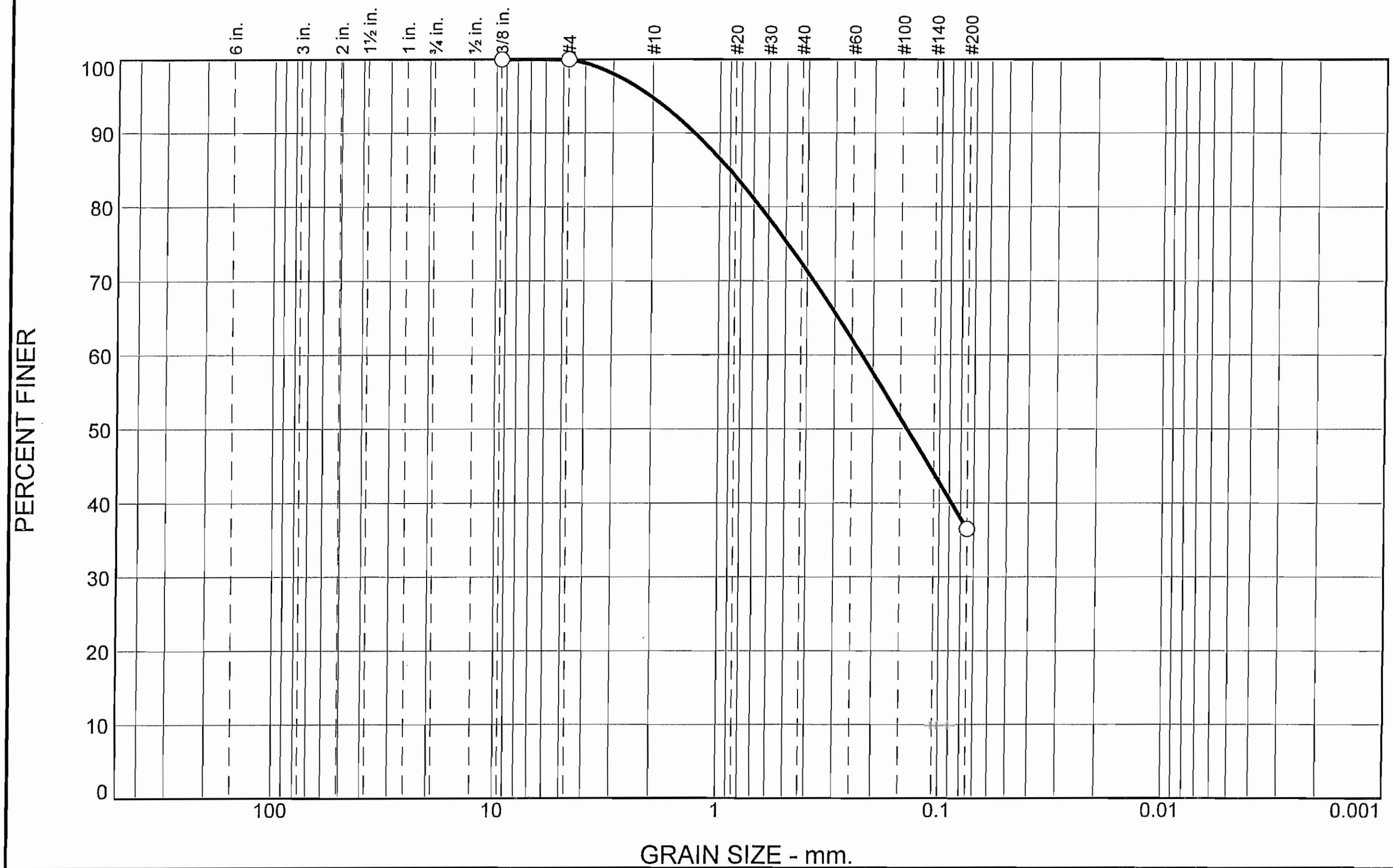
Blackburn Consulting

Auburn, CA

Client: HDR INC.
Project: SR 99 Widending - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: ECH **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	5.2	22.4	35.9	36.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8	100.0		
#4	100.0		
#200	36.5		

* (no specification provided)

Material Description

Light Olive Brown Silty SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.2978 D_{85}= 0.9013 D_{60}= 0.2249
D_{50}= 0.1397 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

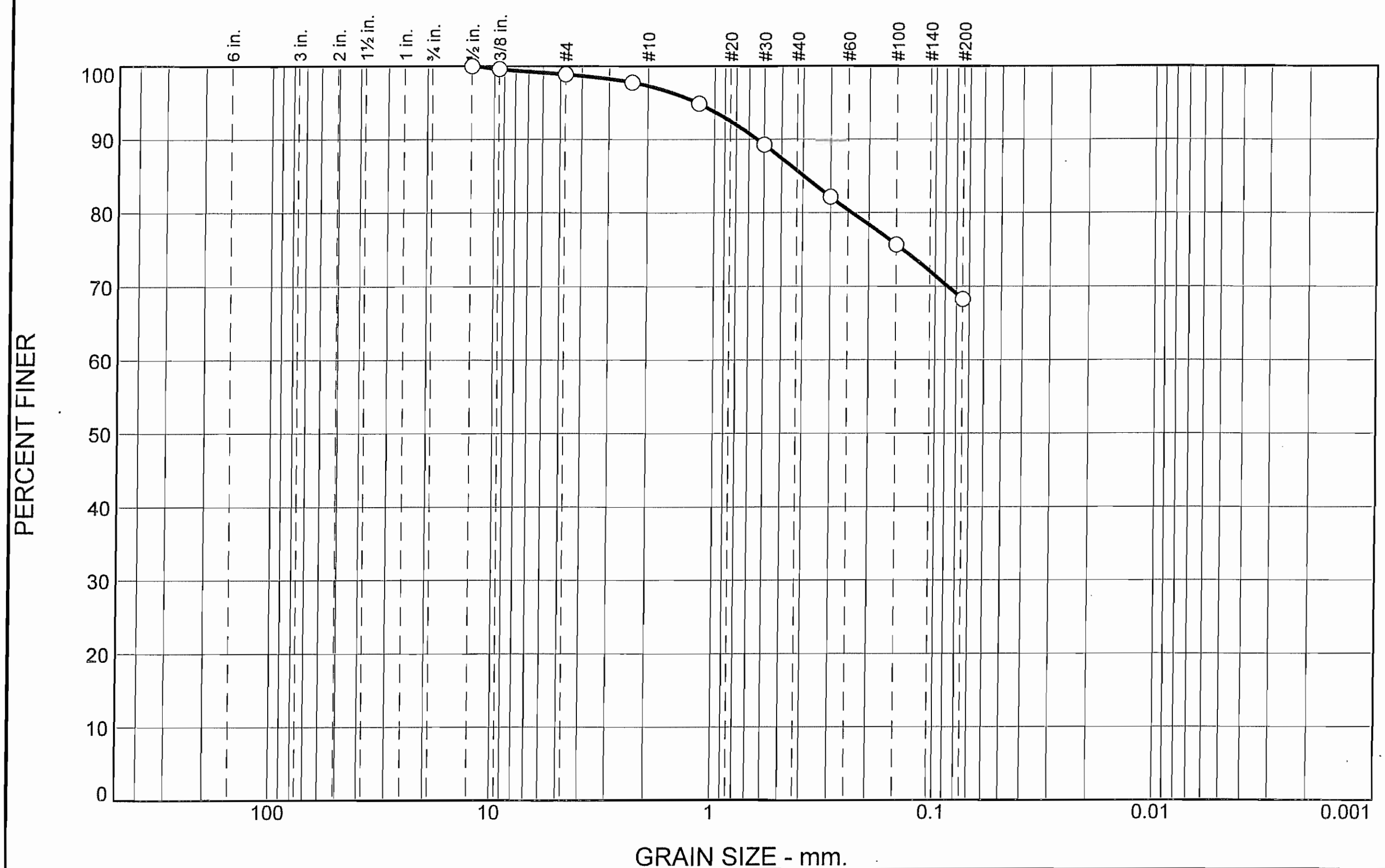
Sample Number: L1-20 b **Depth:** 65.5'-66.0'

Date: 3-19-09

Blackburn Consulting **Auburn, CA**	**Client:** HDR INC. **Project:** SR 99 Widending - Lathrop Road Overcrossing **Project No:** 1201.5D **Figure**

Tested By: ECH **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	1.6	11.6	17.4	68.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.500	100.0		
.375	99.6		
#4	98.9		
#8	97.7		
#16	94.9		
#30	89.3		
#50	82.2		
#100	75.7		
#200	68.3		

* (no specification provided)

Material Description

Dark Yellowish Brown Sandy SILT

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6467 D_{85}= 0.3963 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

Sample Number: L1-23 c **Depth:** 76.0'76.5'

Date: 3-17-09

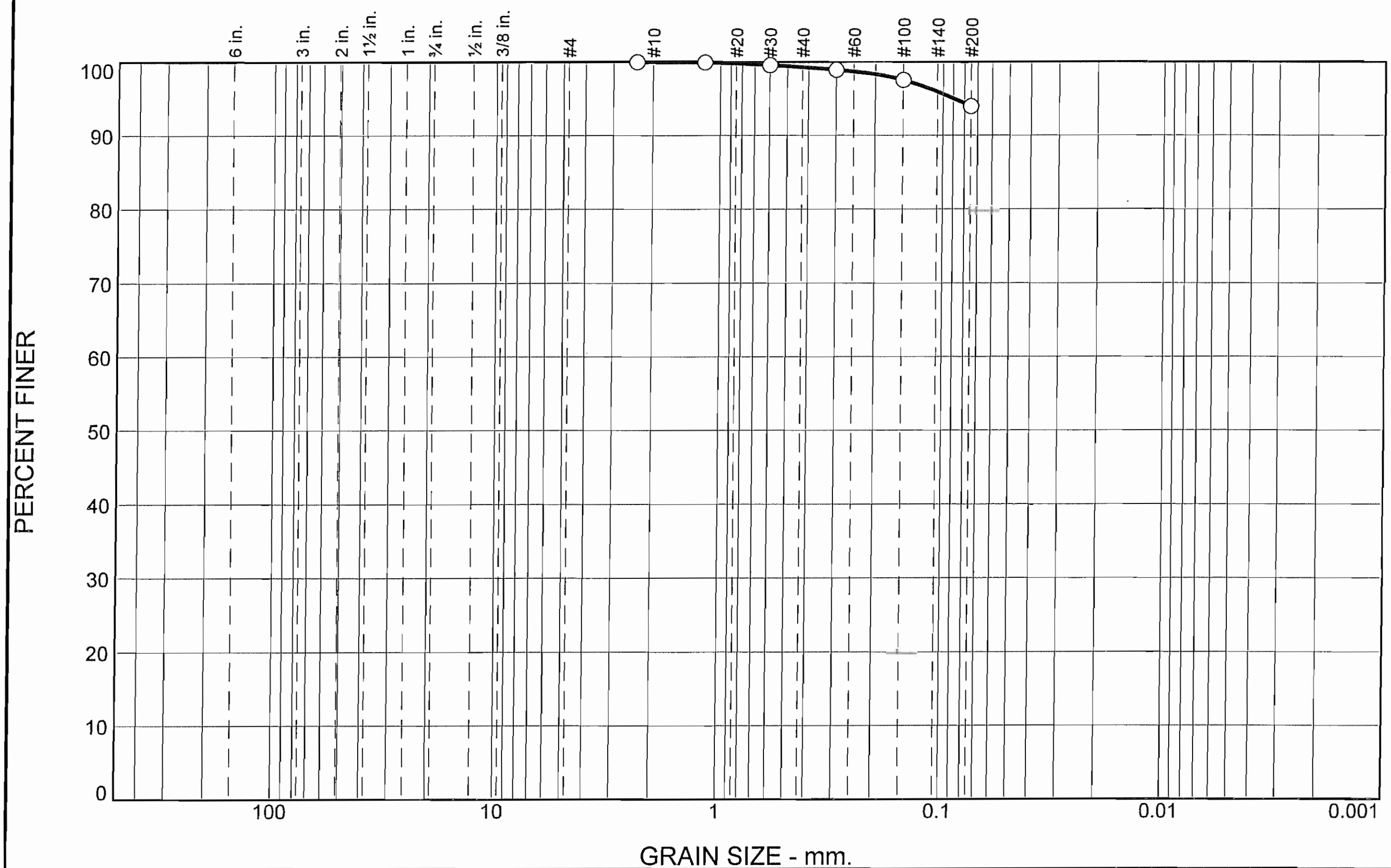
Blackburn Consulting

Auburn, CA

Client: HDR INC.
Project: SR 99 Widending - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: ECH **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.7	5.3	94.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#8	100.0		
#16	99.9		
#30	99.6		
#50	98.9		
#100	97.5		
#200	94.0		

* (no specification provided)

Material Description

Light Olive Brown Lean CLAY

Atterberg Limits

PL= 24 LL= 43 PI= 19

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(20)

Remarks

Sample Number: L1-26 c **Depth:** 86.0'-86.5'

Date: 3-17-09

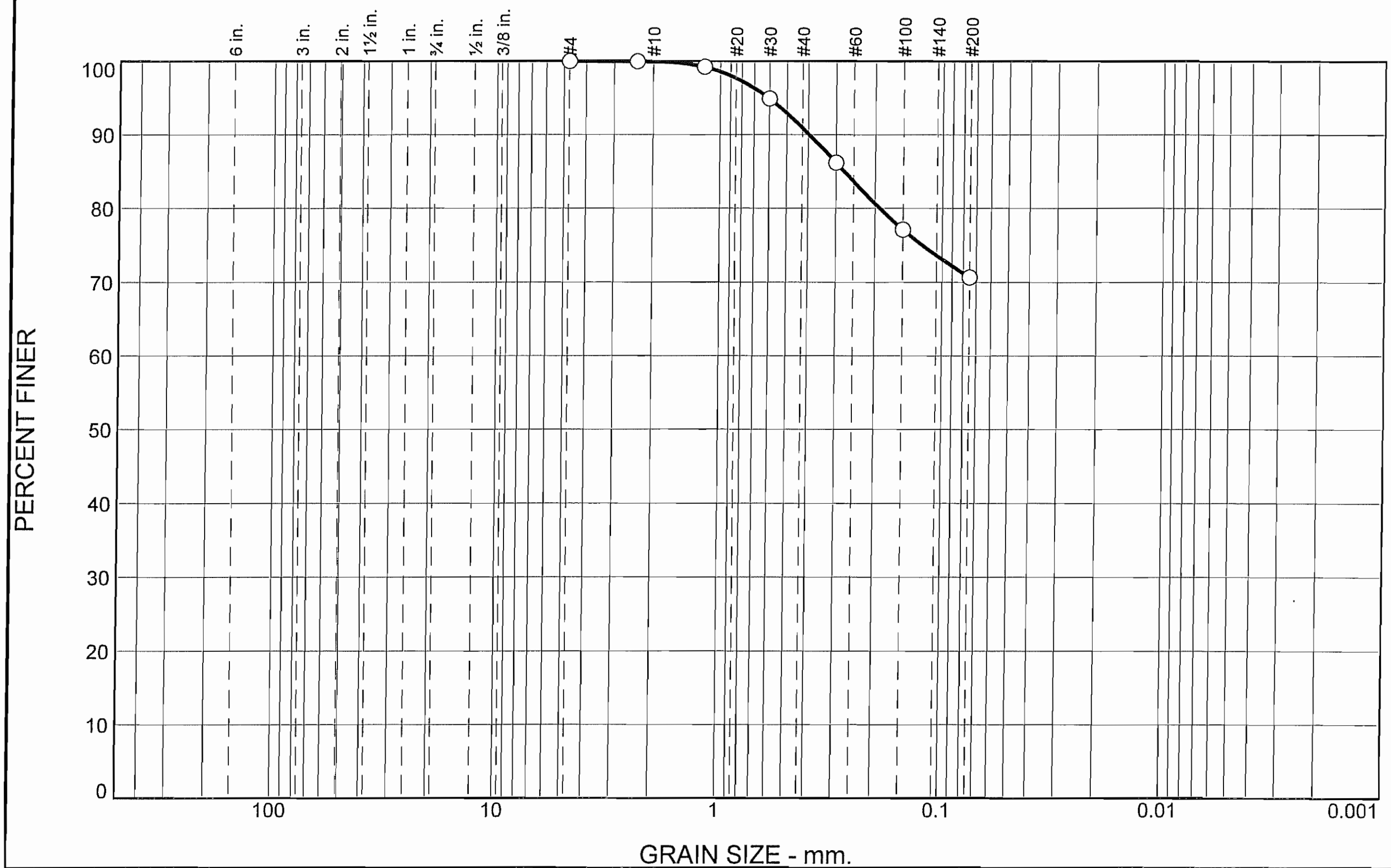
Blackburn Consulting

Auburn, CA

Client: HDR INC.
Project: SR 99 Widending - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: ECH **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	9.0	20.2	70.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.9		
#16	99.2		
#30	94.9		
#50	86.2		
#100	77.1		
#200	70.7		

* (no specification provided)

Material Description

Dark Yellowish Brown Lean CLAY with Sand

Atterberg Limits

PL= 19 LL= 44 PI= 25

Coefficients

D_{90}= 0.3955 D_{85}= 0.2747 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(16)

Remarks

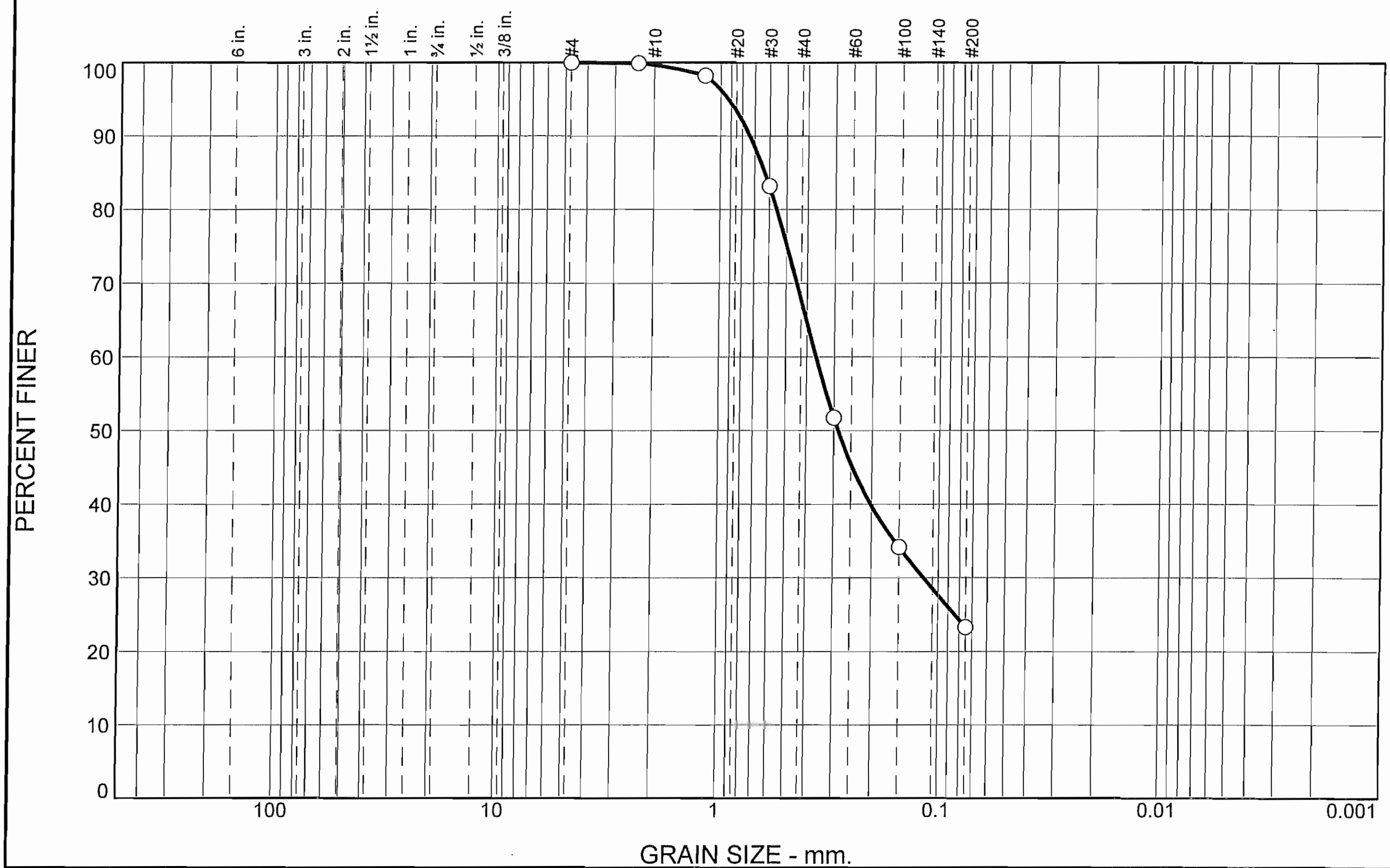
Sample Number: L2-4 **Depth:** 20.0'-21.5

Date: 6-2-09

Blackburn Consulting Auburn, CA	**Client:** HDR Inc. **Project:** SR 99 Median Widening - Lathrop Road Overcrossing **Project No:** 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	32.1	44.3	23.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.9		
#16	98.2		
#30	83.2		
#50	51.8		
#100	34.2		
#200	23.3		

* (no specification provided)

Material Description

Yellowish Brown Silty SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.7381 D_{85}= 0.6300 D_{60}= 0.3626
D_{50}= 0.2862 D_{30}= 0.1166 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Sample Number: L2-5B **Depth:** 25.5'-26.0'

Date: 6-2-09

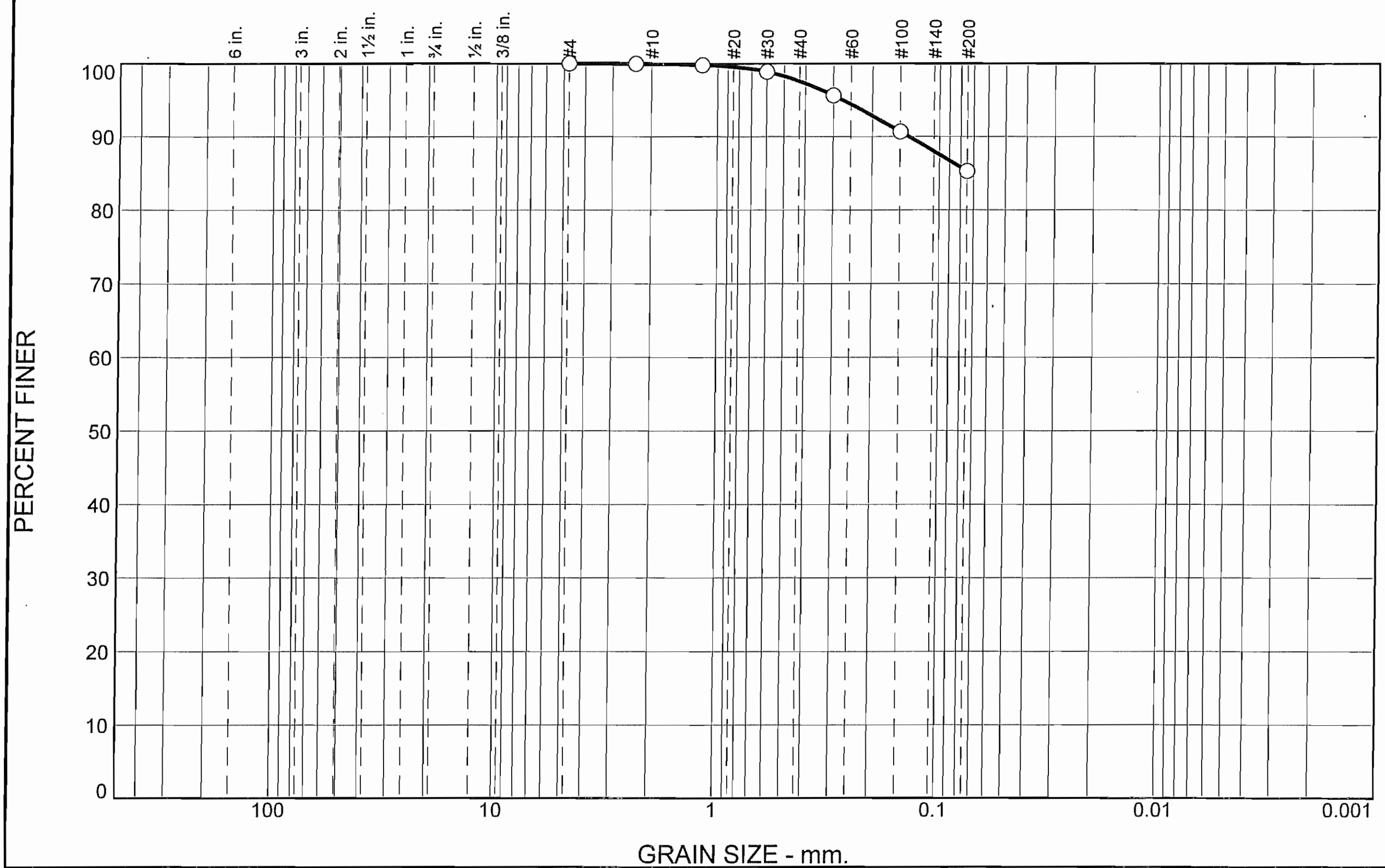
Blackburn Consulting

Auburn, CA

Client: HDR Inc.
Project: SR 99 Median Widening - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	2.3	12.3	85.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.9		
#16	99.8		
#30	98.9		
#50	95.6		
#100	90.7		
#200	85.3		

* (no specification provided)

Material Description

Light Olive Brown SILT

Atterberg Limits

PL= 30 LL= 47 PI= 17

Coefficients

D_{90}= 0.1370 D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-7-5(17)

Remarks

Sample Number: L2-9B **Depth:** 45.5'-46.0'

Date: 6-2-09

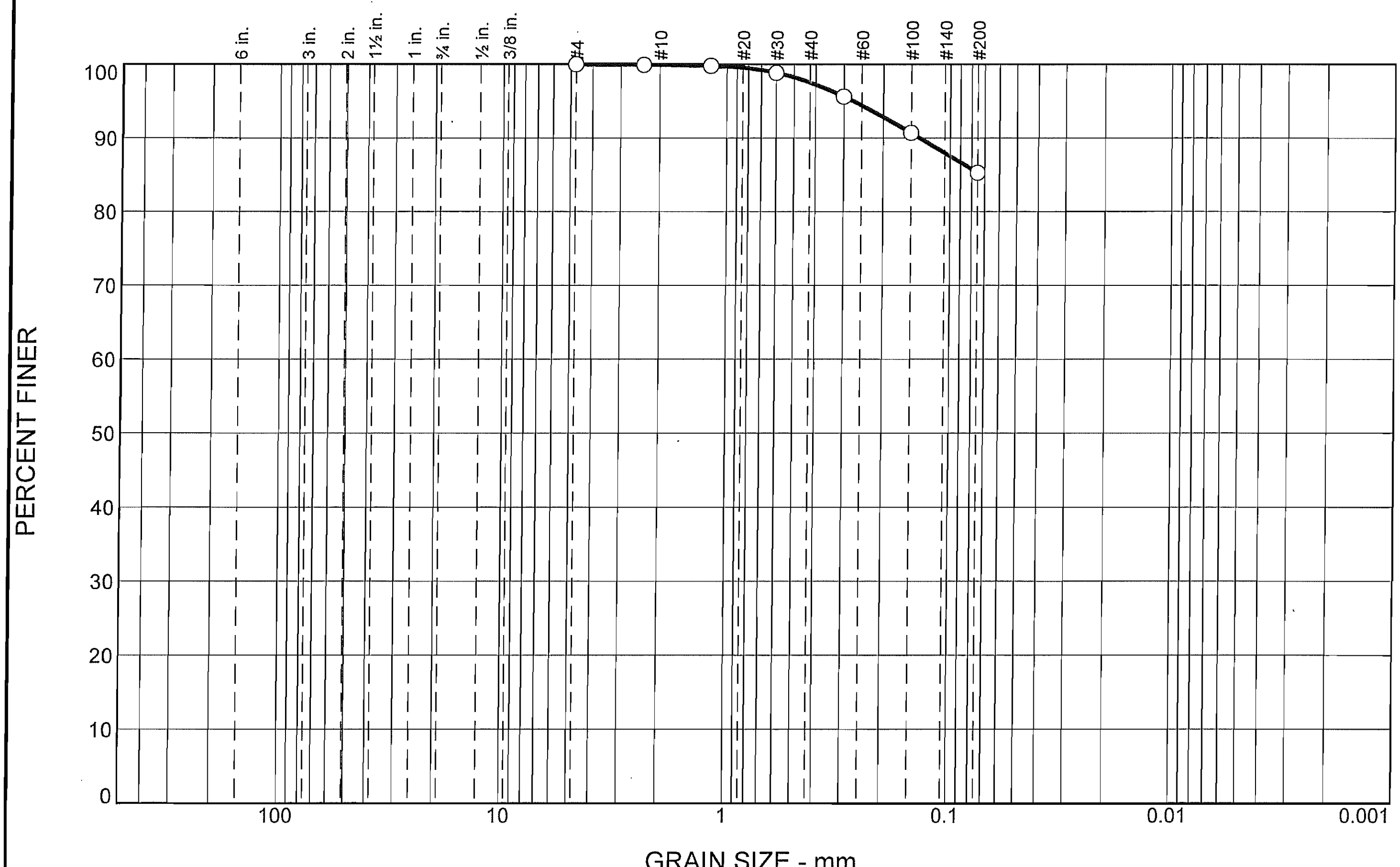
Blackburn Consulting

Auburn, CA

Client: HDR Inc.
Project: SR 99 Median Widening - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	2.3	12.3	85.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.9		
#16	99.8		
#30	98.9		
#50	95.6		
#100	90.7		
#200	85.3		

* (no specification provided)

Material Description

Light Olive Brown SILT

Atterberg Limits

PL= 30 LL= 47 PI= 17

Coefficients

D_{90}= 0.1370 D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-7-5(17)

Remarks

Sample Number: L2-9B **Depth:** 45.5'-46.0'

Date: 6-2-09

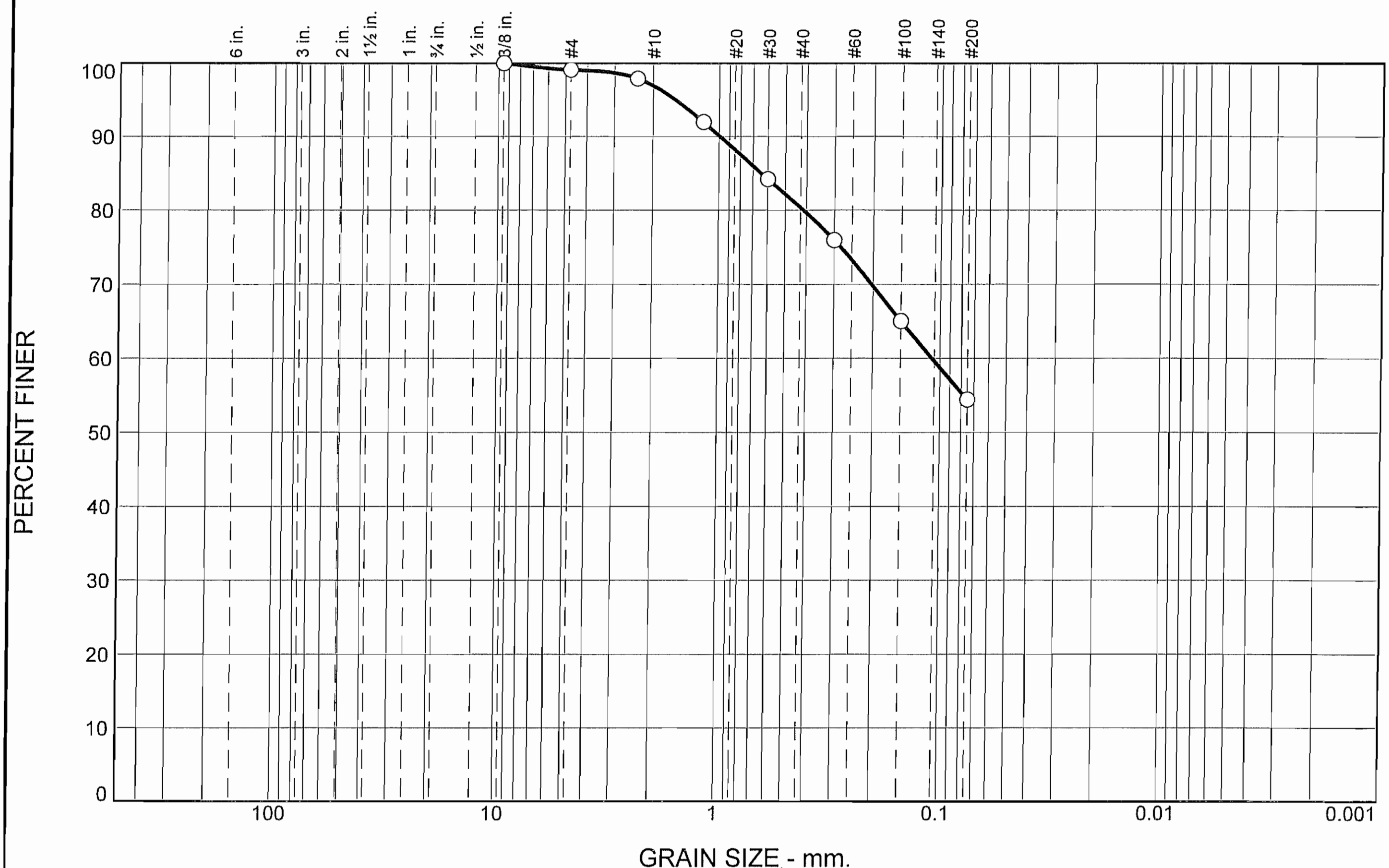
Blackburn Consulting

Auburn, CA

Client: HDR Inc.
Project: SR 99 Median Widening - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.9	2.2	16.5	26.0	54.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.1		
#8	97.9		
#16	92.0		
#30	84.2		
#50	76.0		
#100	65.0		
#200	54.4		

* (no specification provided)

Material Description

Brown Sandy Lean CLAY

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.9880 D_{85}= 0.6417 D_{60}= 0.1087
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

Sample Number: L2-14 **Depth:** 70.0'-71.5'

Date: 6-2-09

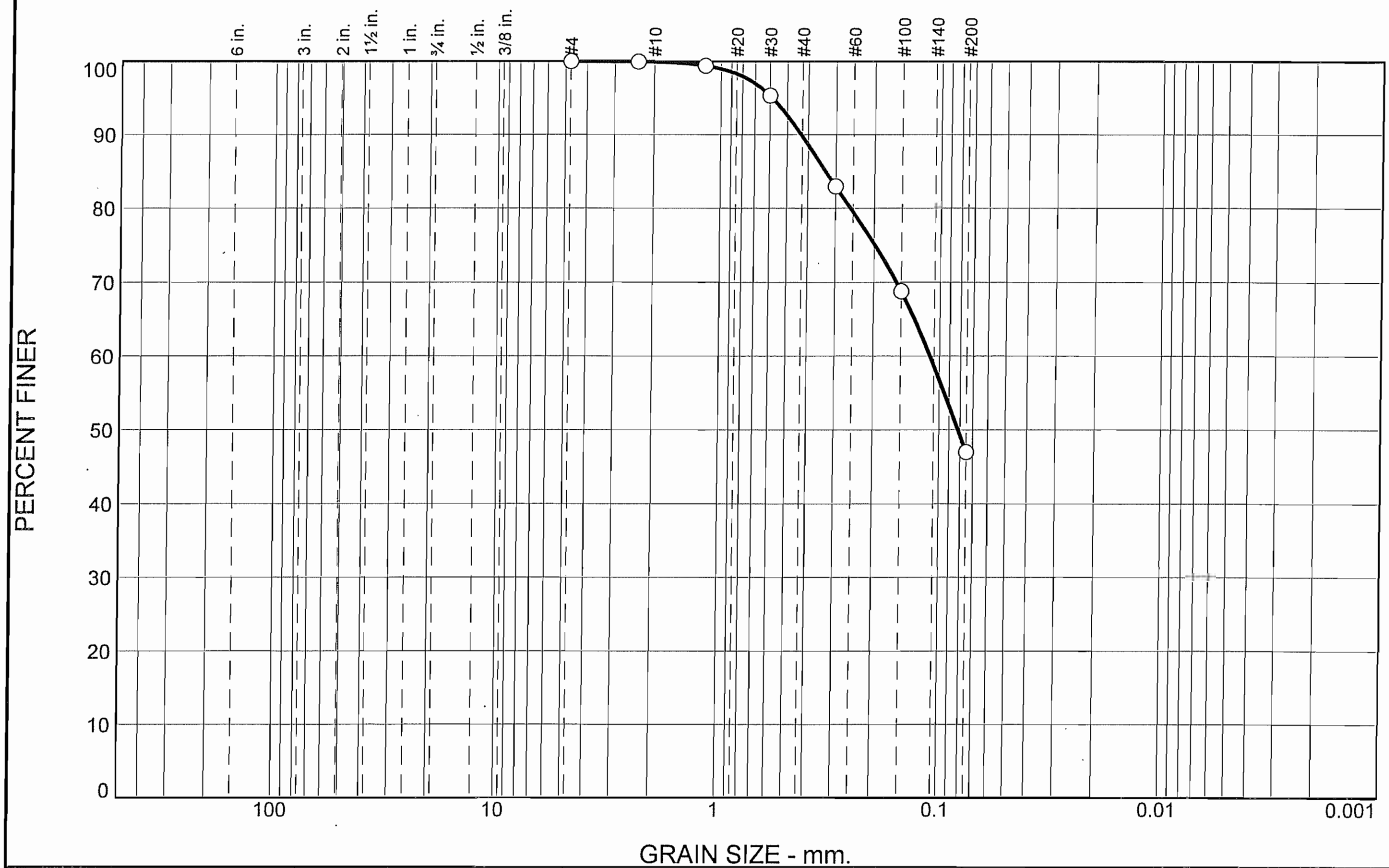
Blackburn Consulting

Auburn, CA

Client: HDR Inc.
Project: SR 99 Median Widening - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	10.1	42.8	47.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	100.0		
#16	99.4		
#30	95.3		
#50	83.0		
#100	68.8		
#200	47.0		

* (no specification provided)

Material Description

Yellowish Brown Silty SAND

Atterberg Limits

PL= 28 LL= 45 PI= 17

Coefficients

D_{90}= 0.4306 D_{85}= 0.3329 D_{60}= 0.1106
D_{50}= 0.0818 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-7-6(5)

Remarks

Sample Number: L2-15C **Depth:** 76.0'-76.5'

Date: 6-2-09

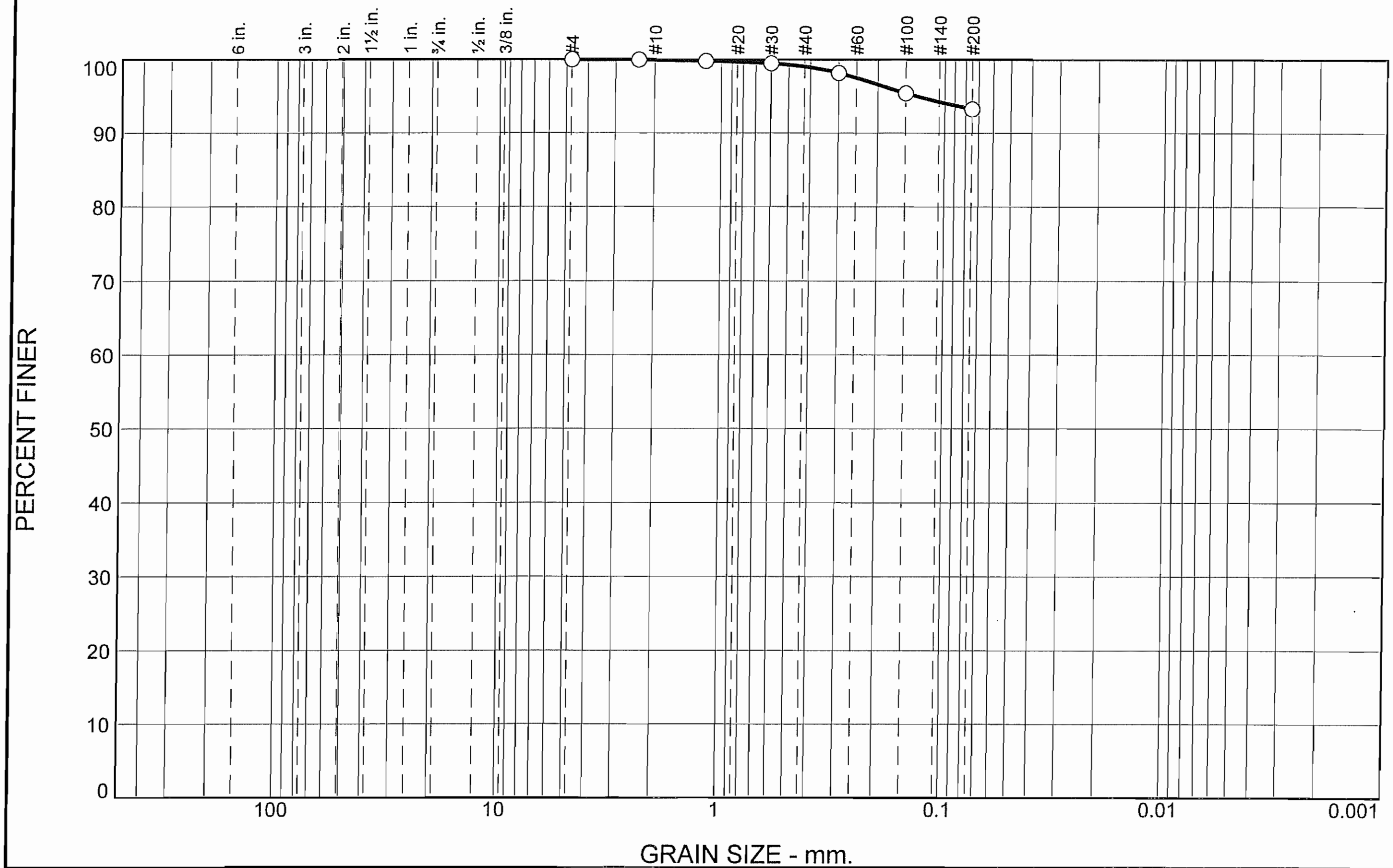
Blackburn Consulting

Auburn, CA

Client: HDR Inc.
Project: SR 99 Median Widening - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.9	5.7	93.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	100.0		
#16	99.8		
#30	99.5		
#50	98.2		
#100	95.4		
#200	93.3		

* (no specification provided)

Material Description

Yellowish Brown Lean CLAY

Atterberg Limits

PL= 23 LL= 46 PI= 23

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(23)

Remarks

Sample Number: L2-17B **Depth:** 85.5'-86.0'

Date: 6-2-09

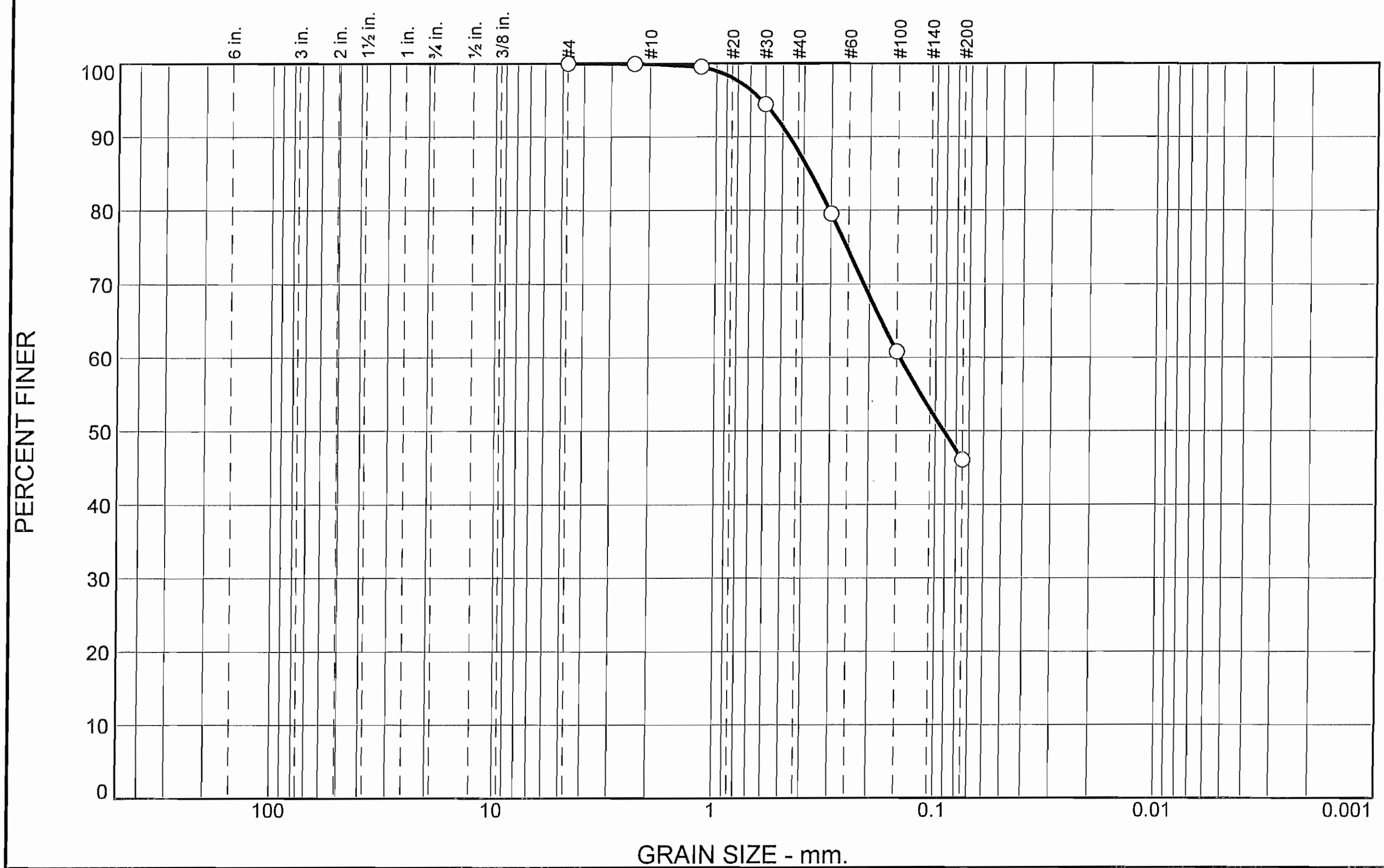
Blackburn Consulting

Auburn, CA

Client: HDR Inc.
Project: SR 99 Median Widening - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	11.8	42.0	46.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	100.0		
#16	99.5		
#30	94.4		
#50	79.6		
#100	60.8		
#200	46.1		

* (no specification provided)

Material Description

Strong Brown Clayey SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.4649 D_{85}= 0.3714 D_{60}= 0.1451
D_{50}= 0.0914 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO=

Remarks

Sample Number: L2-18 **Depth:** 90.0'-91.5'

Date: 6-2-09

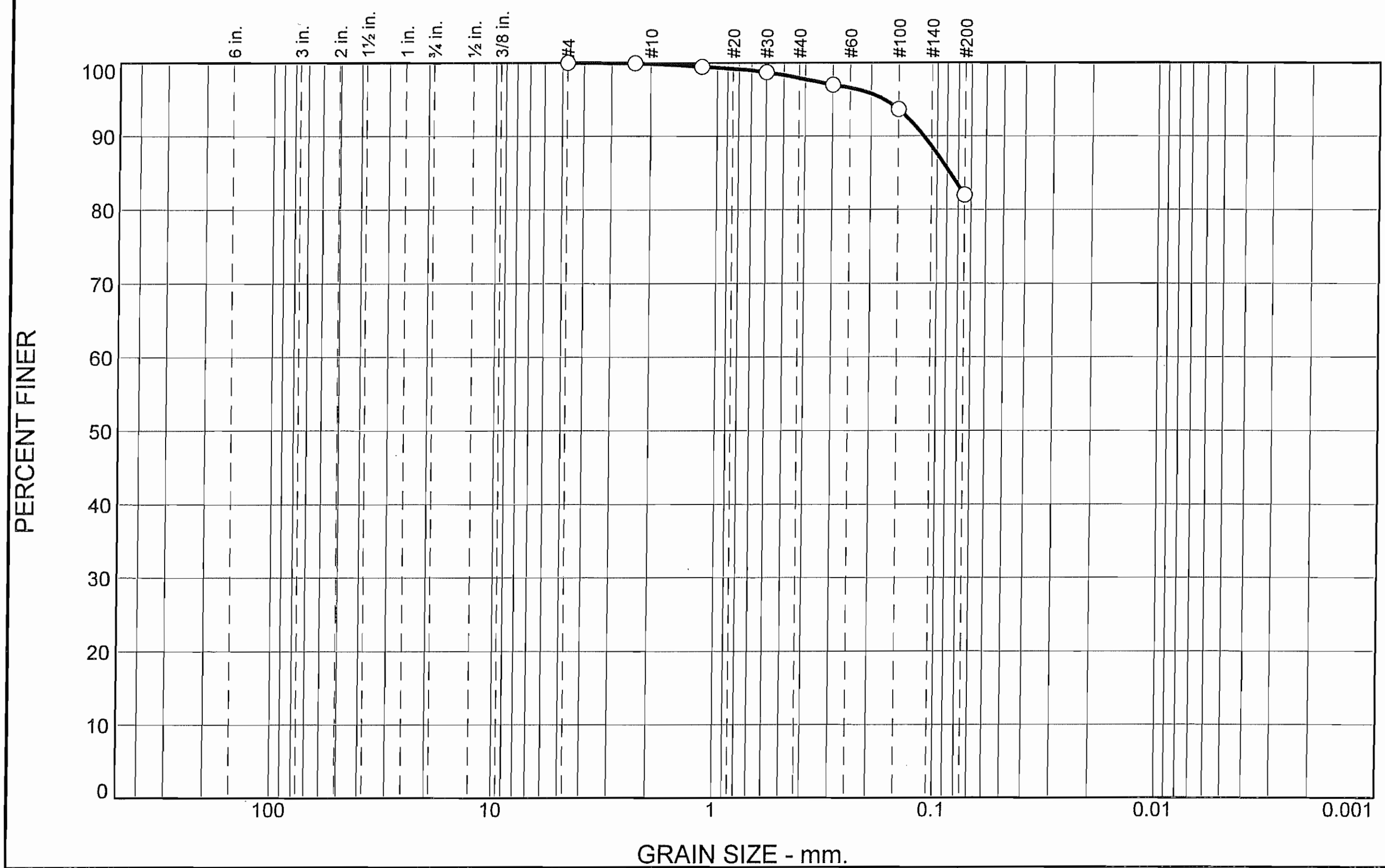
Blackburn Consulting

Auburn, CA

Client: HDR Inc.
Project: SR 99 Median Widening - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	2.0	15.9	82.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.9		
#16	99.4		
#30	98.7		
#50	97.0		
#100	93.6		
#200	82.0		

* (no specification provided)

Material Description

Olive Yellow SILT with Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1150 D_{85}= 0.0872 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

Sample Number: L3-2 **Depth:** 10.0'-11.5'

Date: 6-2-09

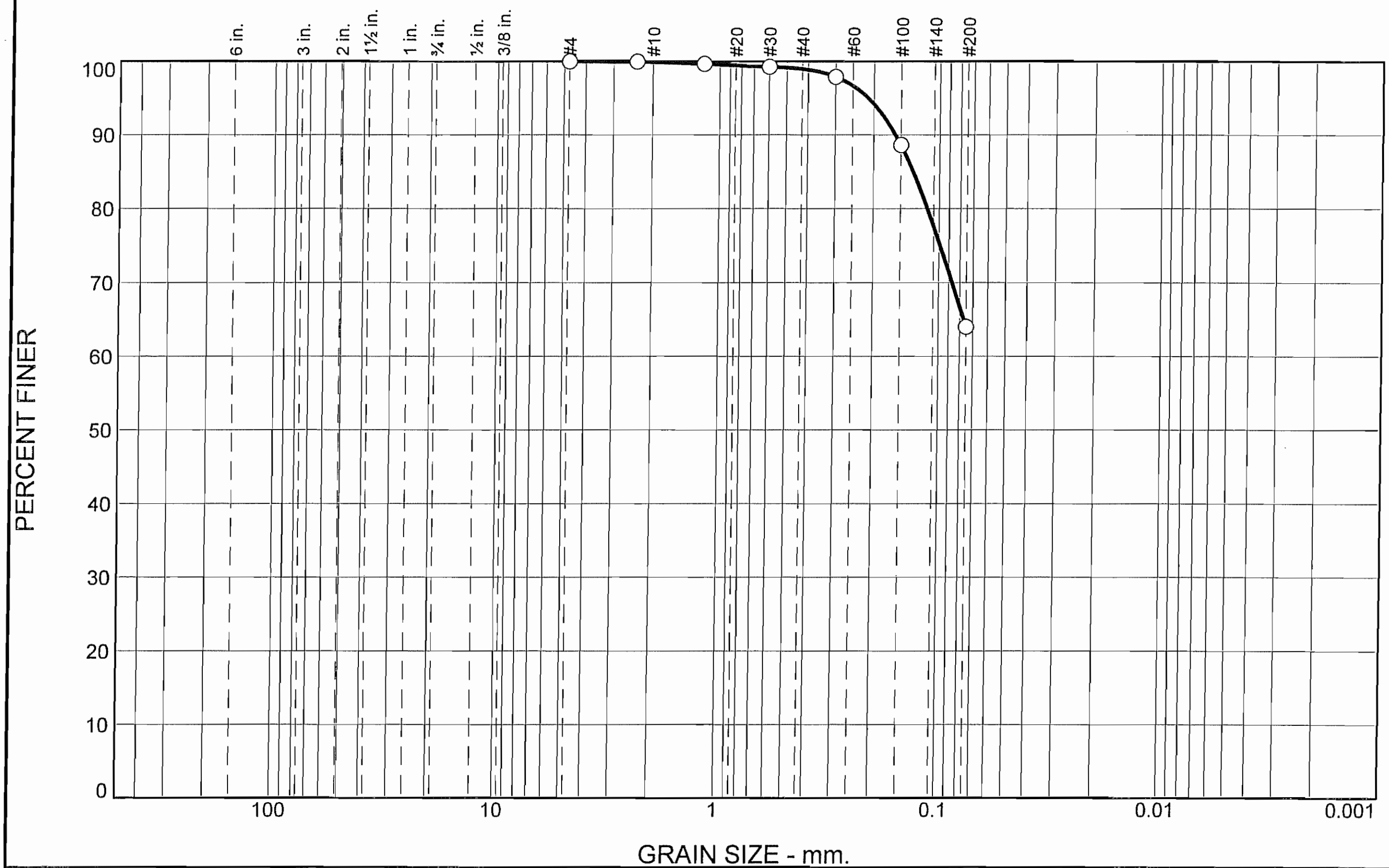
Blackburn Consulting

Auburn, CA

Client: HDR Inc.
Project: SR 99 Median Widening - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.9	35.0	64.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.9		
#16	99.6		
#30	99.2		
#50	97.9		
#100	88.6		
#200	64.0		

* (no specification provided)

Material Description

Pale Brown Sandy Lean CLAY

Atterberg Limits

PL= 15 LL= 26 PI= 11

Coefficients

D_{90}= 0.1588 D_{85}= 0.1317 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(4)

Remarks

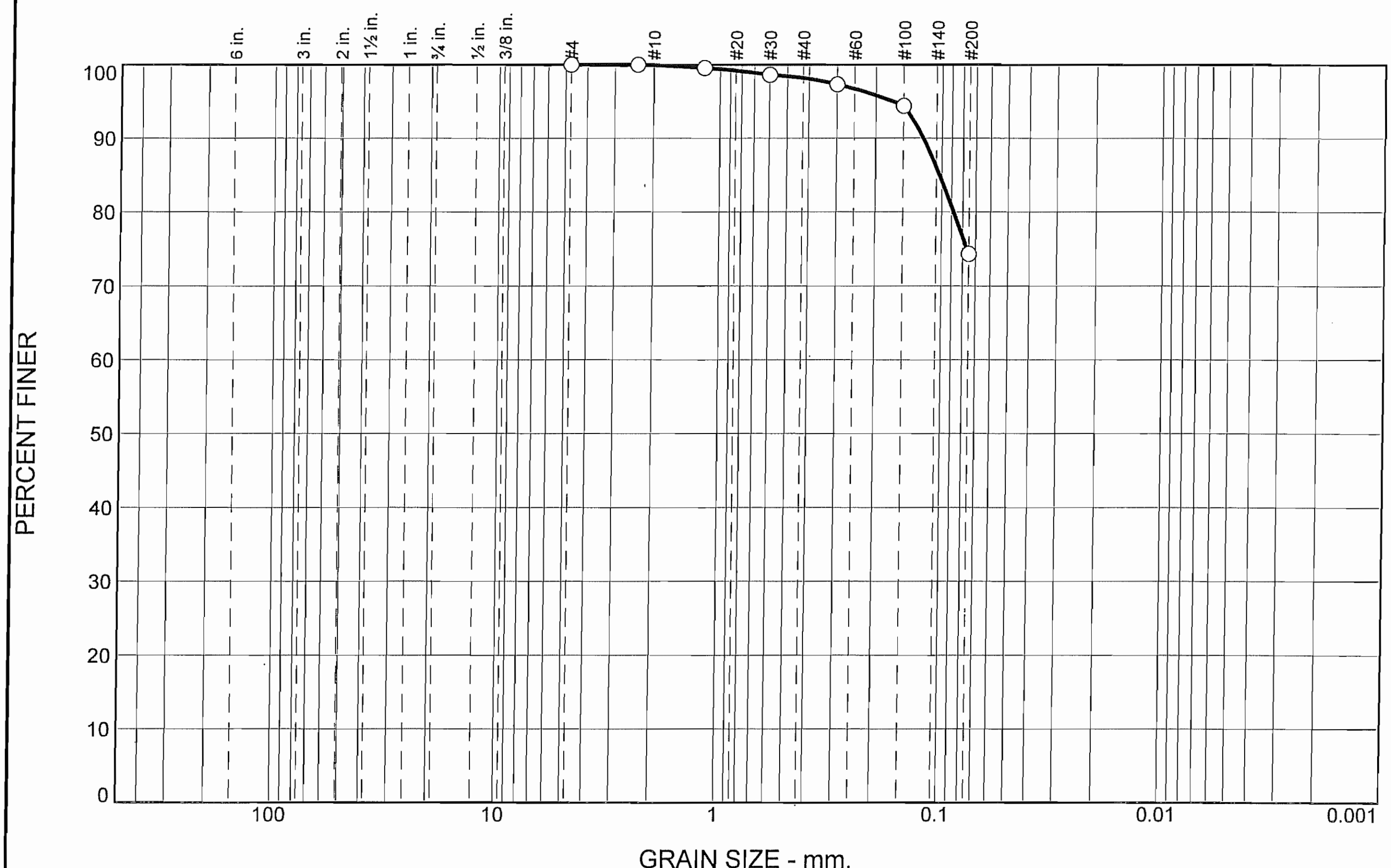
Sample Number: L3-4 **Depth:** 20.0'-21.5'

Date: 6-2-09

Blackburn Consulting **Auburn, CA**	**Client:** HDR Inc. **Project:** SR 99 Median Widening - Lathrop Road Overcrossing **Project No:** 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	1.7	23.8	74.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	100.0		
#16	99.6		
#30	98.6		
#50	97.3		
#100	94.4		
#200	74.4		

* (no specification provided)

Material Description

Olive Brown SILT with Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1219 D_{85}= 0.1025 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

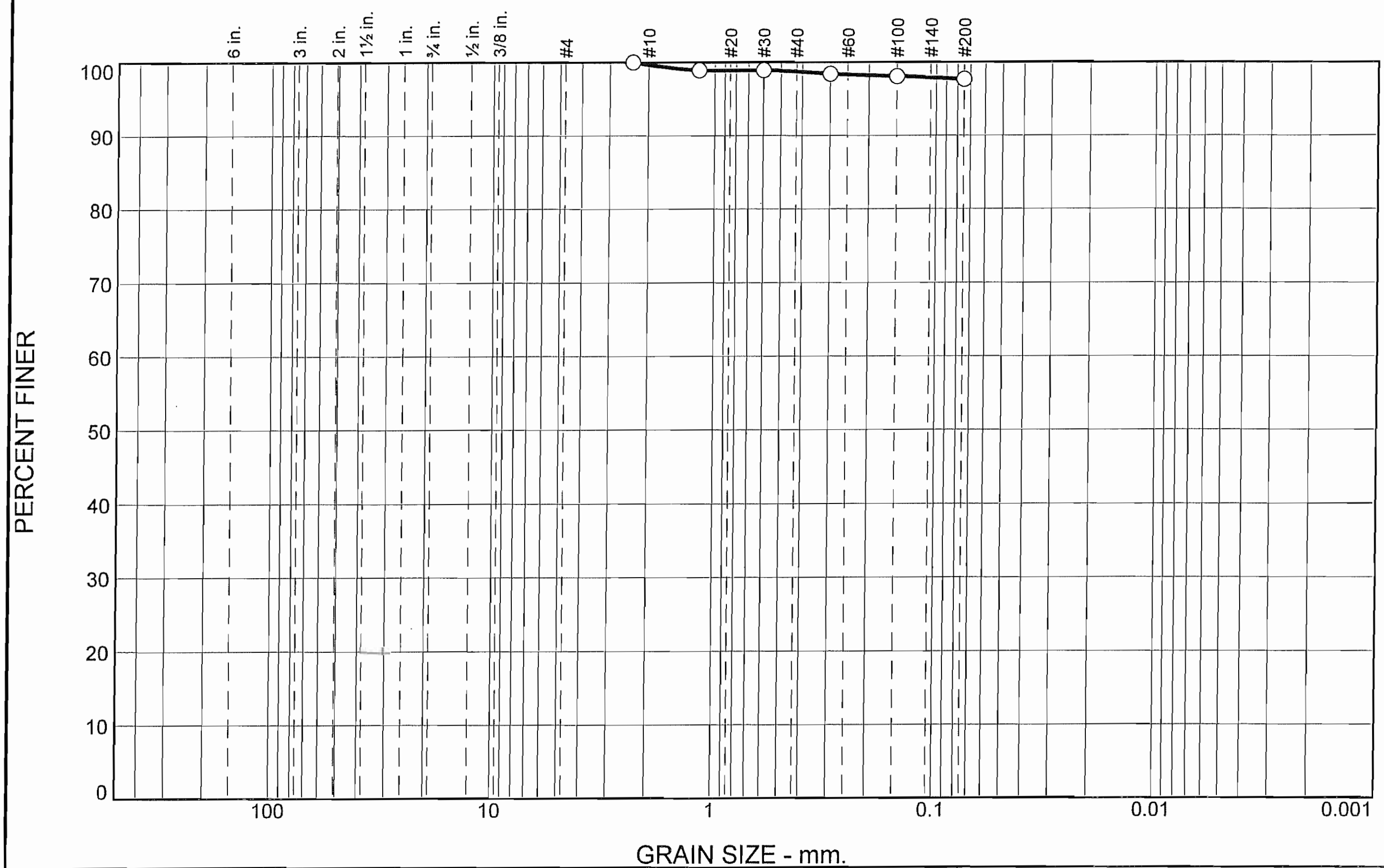
Sample Number: L3-6 **Depth:** 30.0'-31.5'

Date: 6-3-09

Blackburn Consulting **Auburn, CA**	**Client:** HDR Inc. **Project:** SR 99 Median Widening - Lathrop Road Overcrossing **Project No:** 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.3	1.0	1.0	97.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#8	100.0		
#16	98.9		
#30	98.9		
#50	98.4		
#100	98.1		
#200	97.7		

* (no specification provided)

Material Description

Light Olive Brown SILT

Atterberg Limits

PL= 30 LL= 42 PI= 12

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-7-5(15)

Remarks

Sample Number: L3-9C **Depth:** 42.5'-43.0'

Date: 6-3-09

Blackburn Consulting

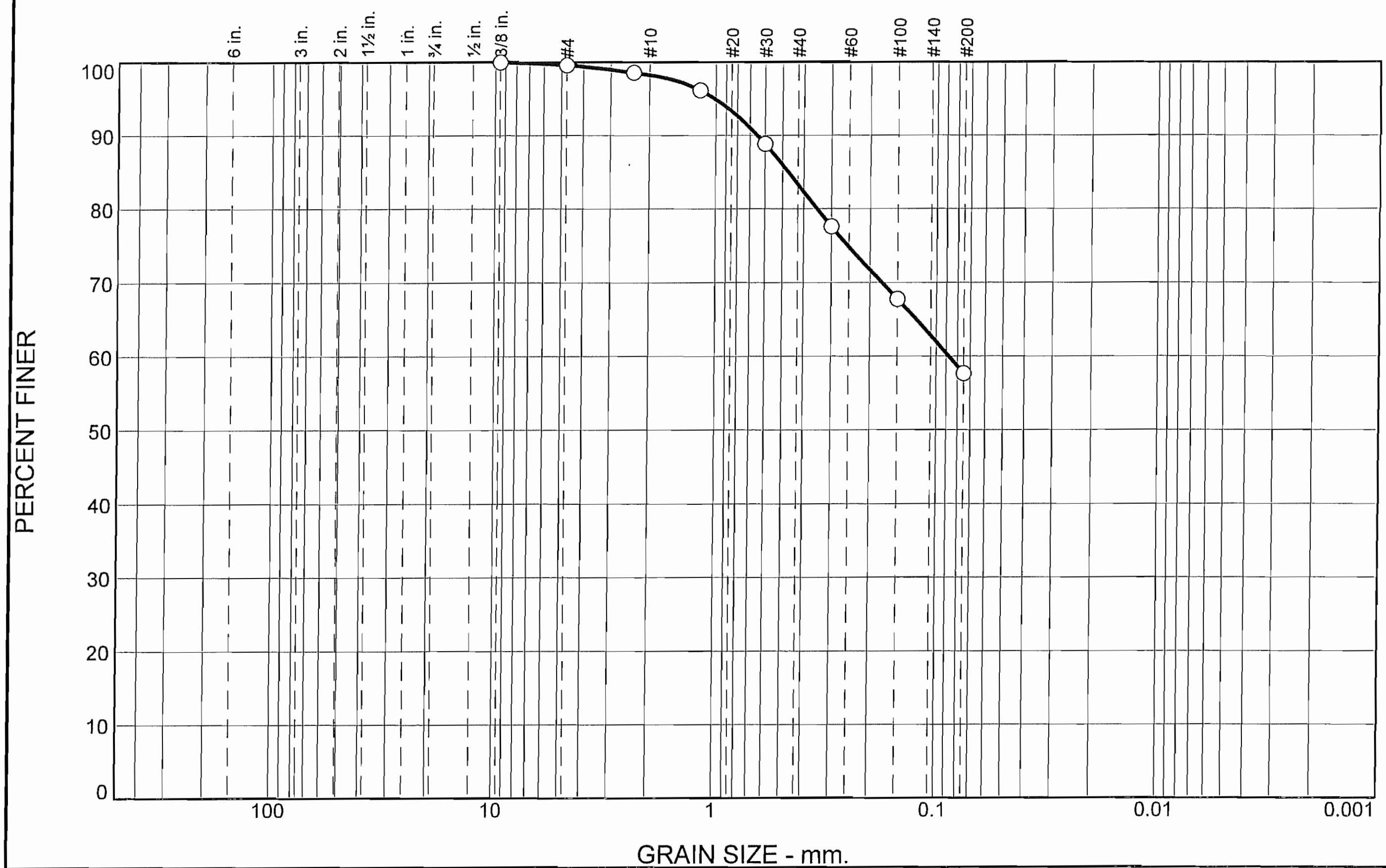
Auburn, CA

Client: HDR Inc.
Project: SR 99 Median Widening - Lathrop Road Overcrossing

Project No: 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.4	1.4	14.9	25.6	57.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.6		
#8	98.6		
#16	96.2		
#30	88.8		
#50	77.6		
#100	67.8		
#200	57.7		

* (no specification provided)

Material Description

Light Olive Brown Sandy Lean CLAY

Atterberg Limits

PL= 25 LL= 48 PI= 23

Coefficients

D_{90}= 0.6503 D_{85}= 0.4698 D_{60}= 0.0876
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-7-6(11)

Remarks

Sample Number: L3-10B **Depth:** 45.5'-46.0'

Date: 6-3-09

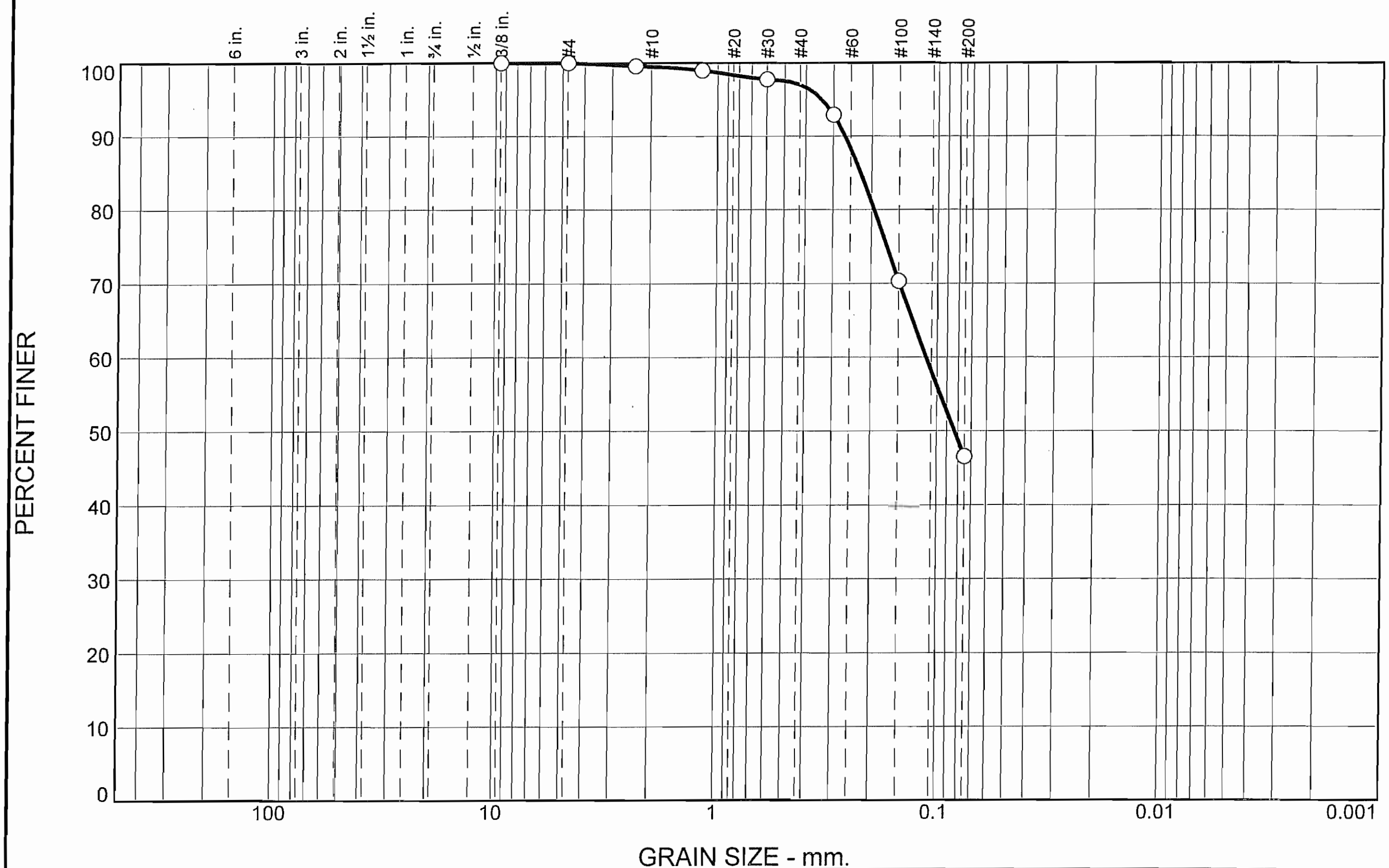
Blackburn Consulting

Auburn, CA

Client: HDR Inc.
Project: SR 99 Median Widening - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.5	2.5	50.4	46.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	100.0		
#8	99.6		
#16	99.0		
#30	97.7		
#50	92.9		
#100	70.3		
#200	46.6		

* (no specification provided)

Material Description

Olive Brown Silty SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2650 D_{85}= 0.2245 D_{60}= 0.1120
D_{50}= 0.0832 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Sample Number: L3-14 **Depth:** 65.0'-66.5

Date: 6-3-09

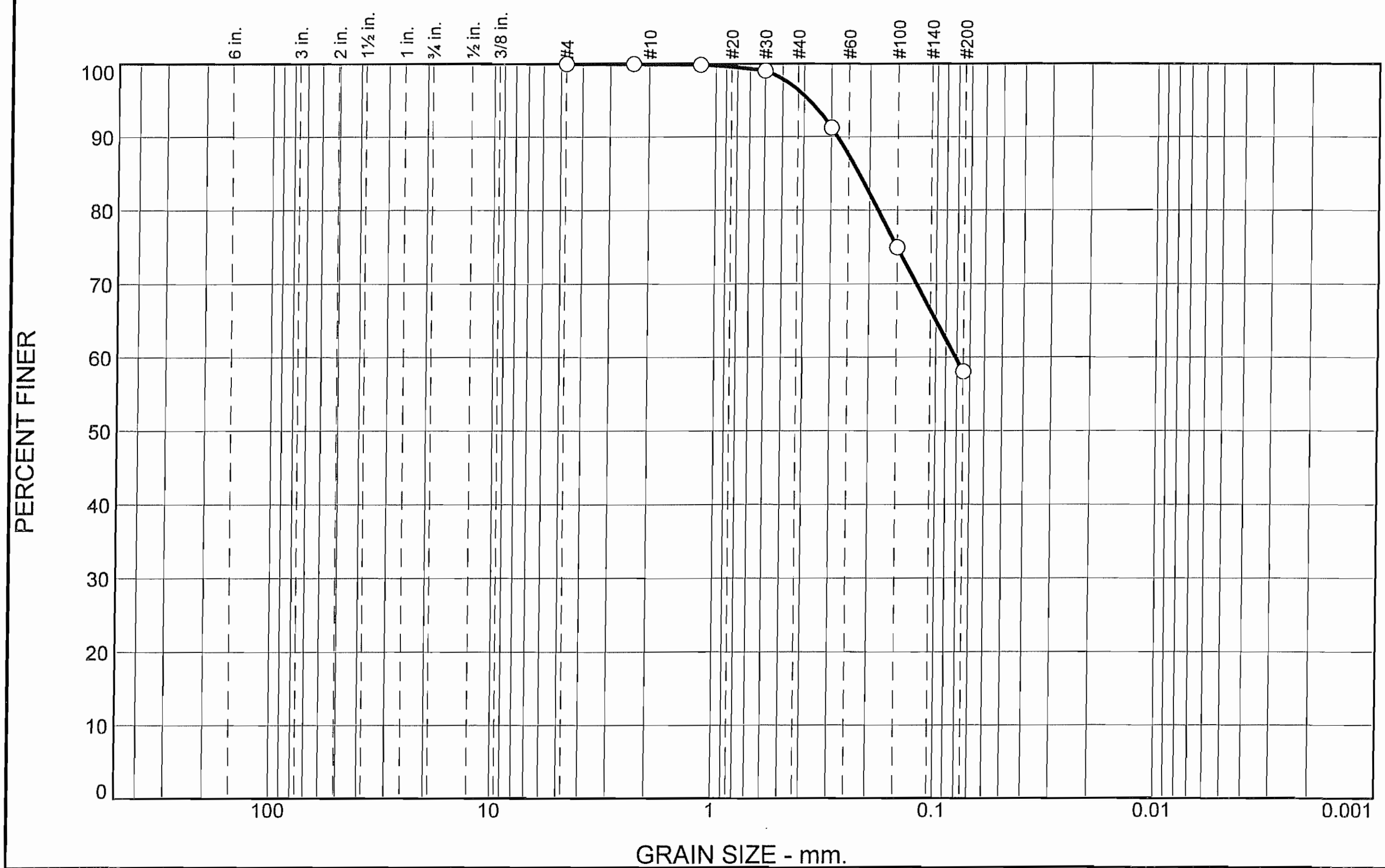
Blackburn Consulting

Auburn, CA

Client: HDR Inc.
Project: SR 99 Median Widening - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	3.6	38.3	58.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	100.0		
#16	99.9		
#30	99.1		
#50	91.3		
#100	75.0		
#200	58.1		

* (no specification provided)

Material Description

Brown Sandy Lean CLAY

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2808 D_{85}= 0.2237 D_{60}= 0.0813
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

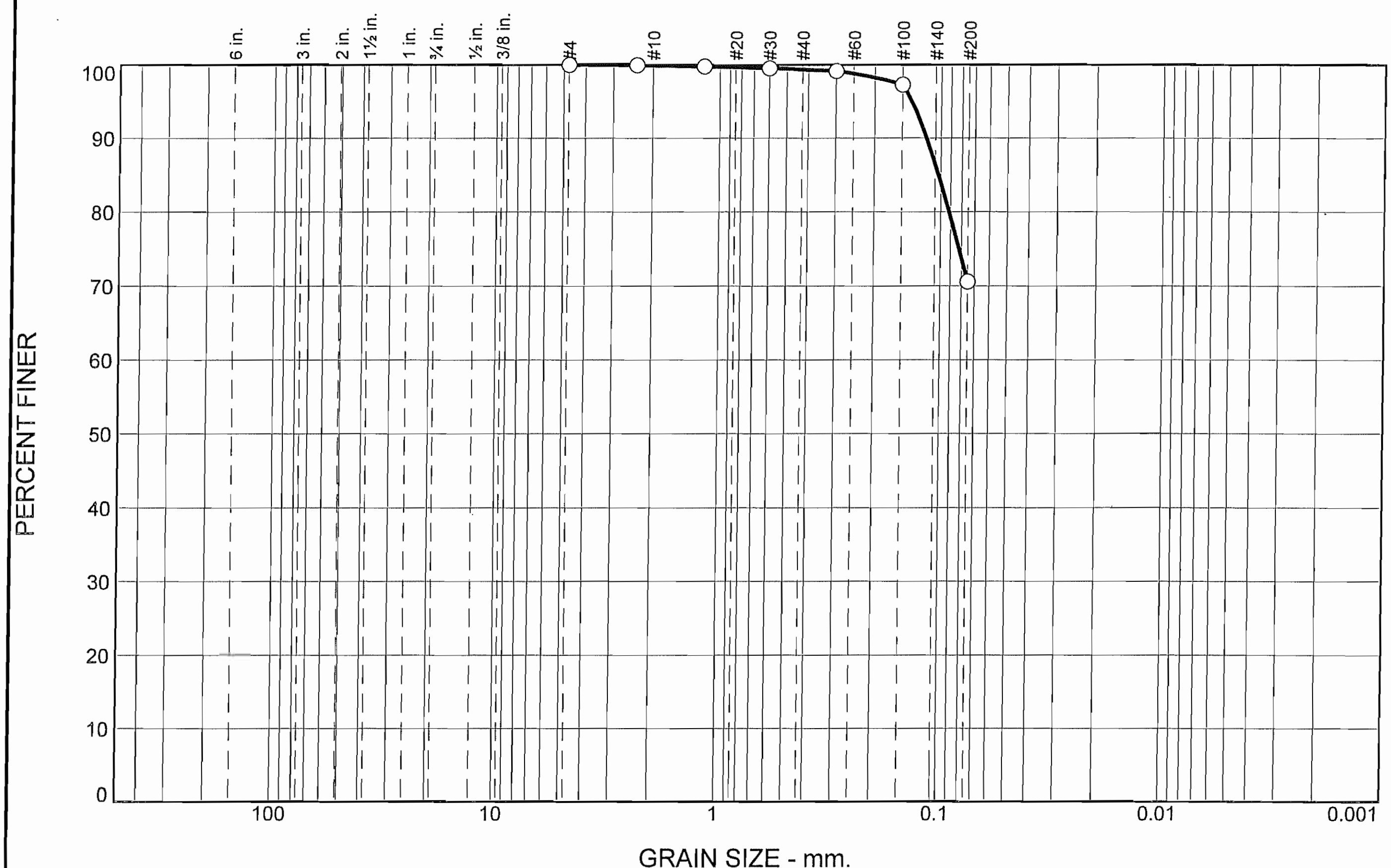
Sample Number: L3-18 **Depth:** 85.0'-86.5'

Date: 6-3-09

Blackburn Consulting Auburn, CA	**Client:** HDR Inc. **Project:** SR 99 Median Widening - Lathrop Road Overcrossing **Project No:** 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.5	28.8	70.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.9		
#16	99.8		
#30	99.5		
#50	99.1		
#100	97.3		
#200	70.6		

* (no specification provided)

Material Description

Dark Grayish Brown SILT with Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1163 D_{85}= 0.1025 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

Sample Number: L3-20 **Depth:** 95.0'-96.5'

Date: 6-3-09

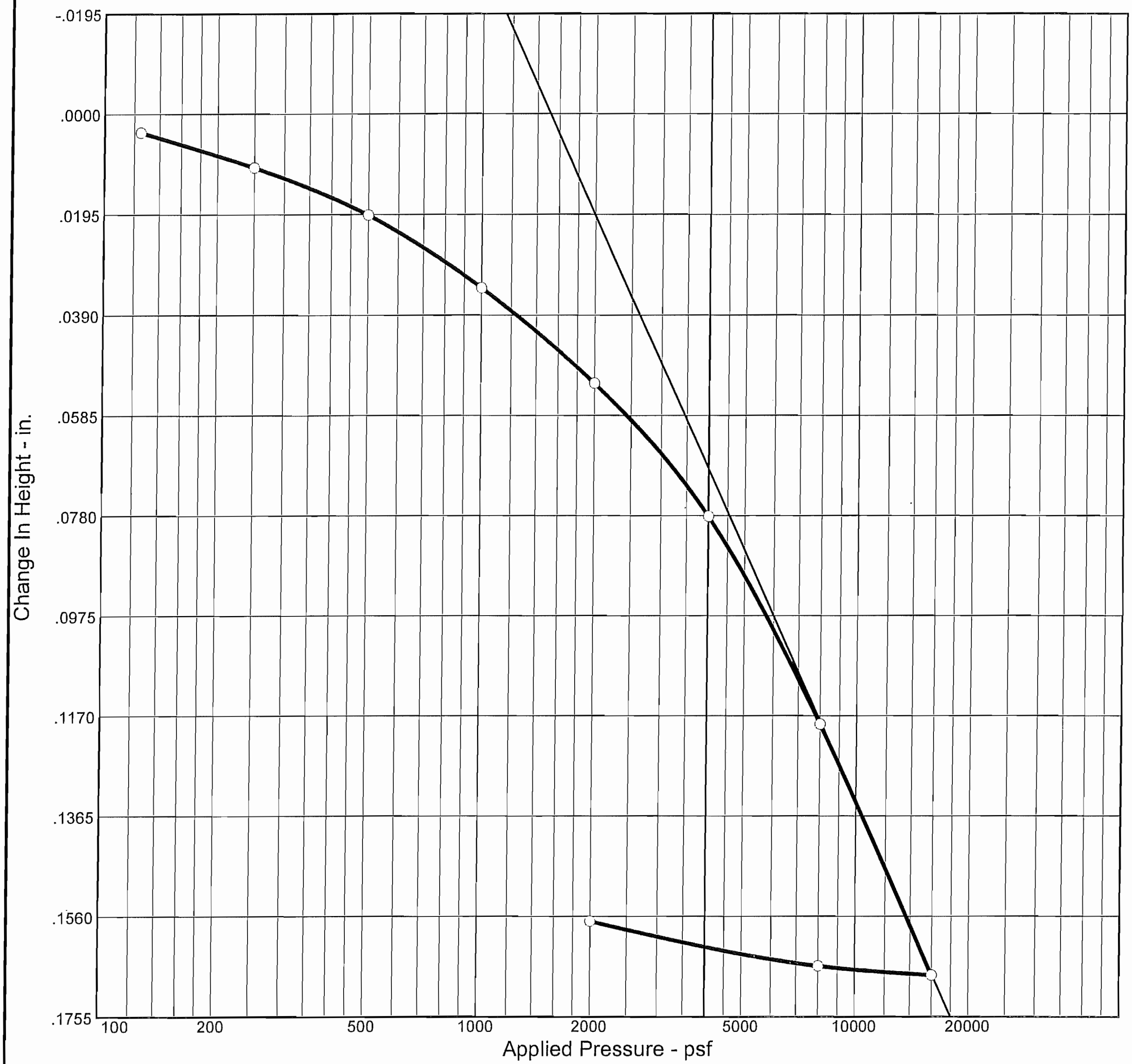
Blackburn Consulting

Auburn, CA

Client: HDR Inc.
Project: SR 99 Median Widening - Lathrop Road Overcrossing
Project No: 1201.5D **Figure**

Tested By: KLC **Checked By:** KLC

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (psf)	P_c (psf)	C_c	C_r	Initial Void Ratio
Saturation	Moisture									
75.2 %	42.8 %	71.9			2.70	4750	4871	0.55	0.03	1.538

MATERIAL DESCRIPTION	USCS	AASHTO
CLAY (CL), light olive brown, partially cemented.	CL	

Project No. 1201.5 **Client:** HDR Engineering, Inc.

Project: SR 99 Widening / Lathrop Road Overcrossing

Source: L1 **Sample No.:** 15b **Elev./Depth:** 50.5-51.0'

Remarks:

Blackburn Consulting

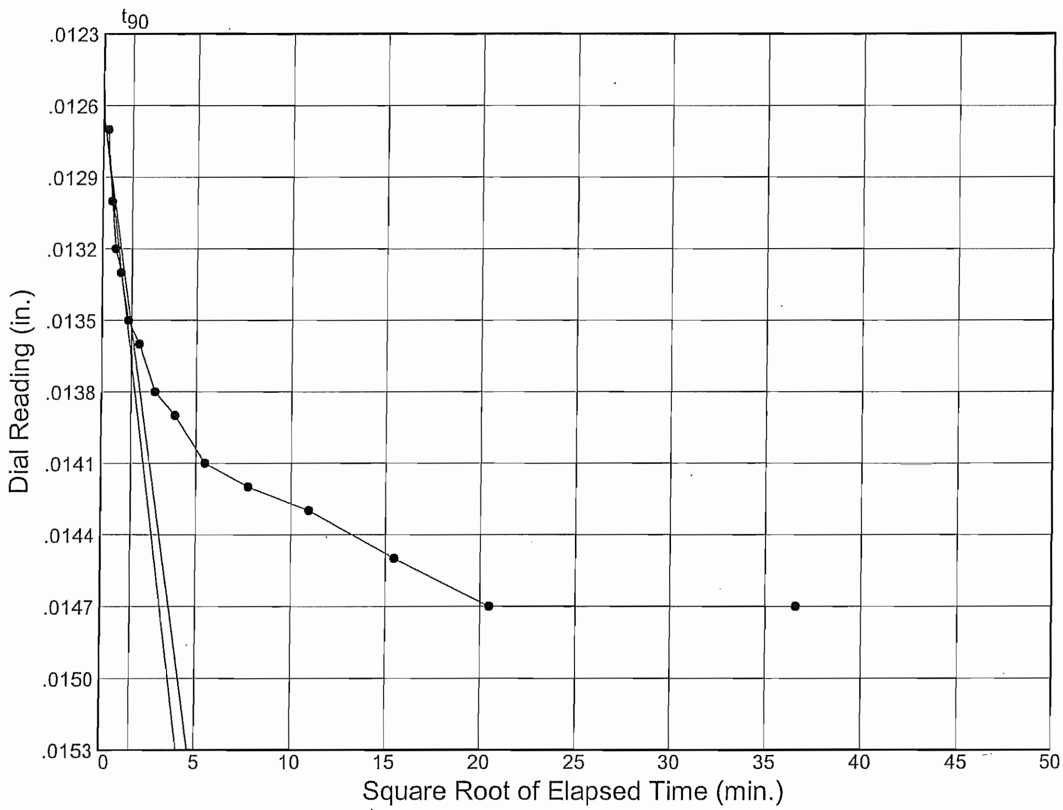
W. Sacramento, CA

Figure

Dial Reading vs. Time

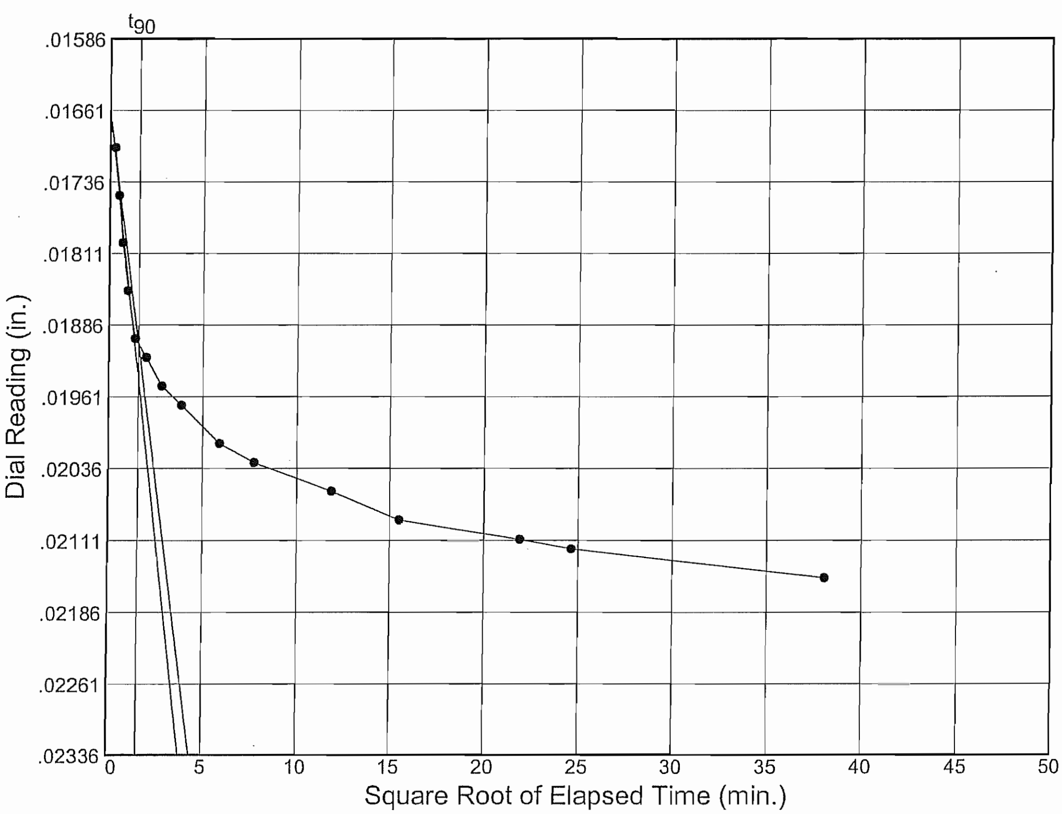
Project No.: 1201.5
Project: SR 99 Widening / Lathrop Road Overcrossing

Source: L1 Sample No.: 15b Elev./Depth: 50.5-51.0'



Load No.= 1
Load= 125 psf
D_0 = 0.01262
D_{90} = 0.01353
D_{100} = 0.01363
T_{90} = 2.46 min.

C_v @ T_{90}
0.48 ft.^{2}/day



Load No.= 2
Load= 250 psf
D_0 = 0.01662
D_{90} = 0.01906
D_{100} = 0.01933
T_{90} = 2.52 min.

C_v @ T_{90}
0.46 ft.^{2}/day

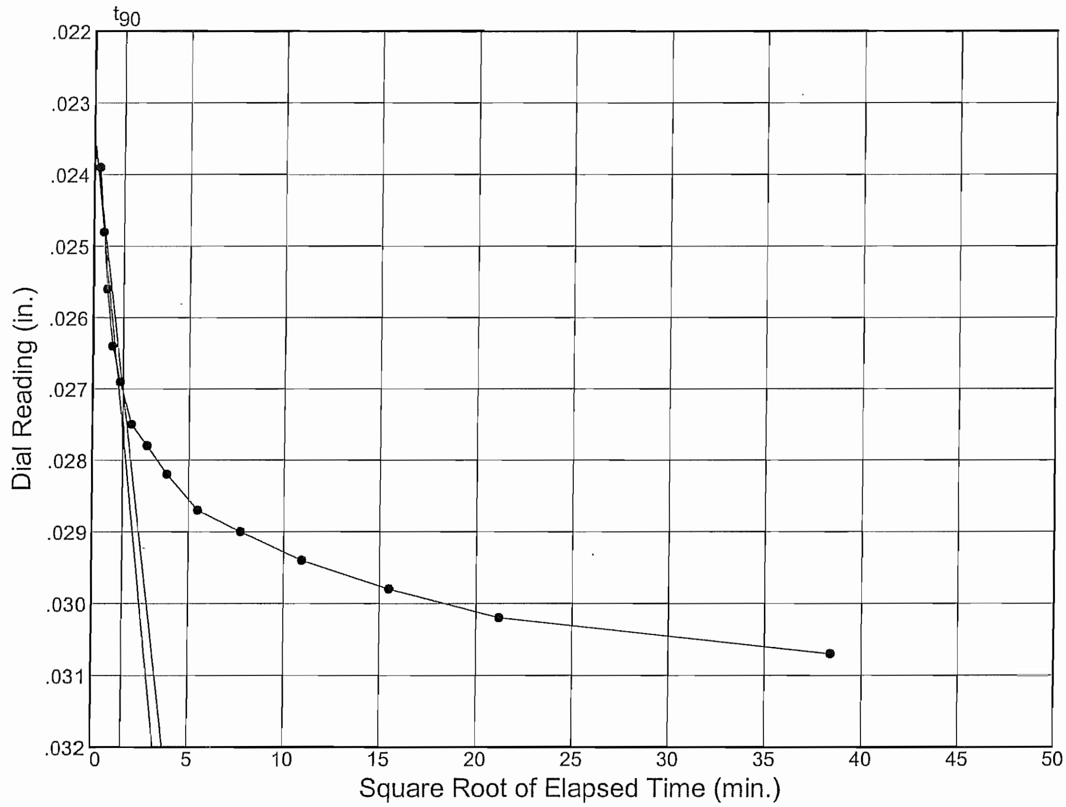
Figure

Blackburn Consulting

Dial Reading vs. Time

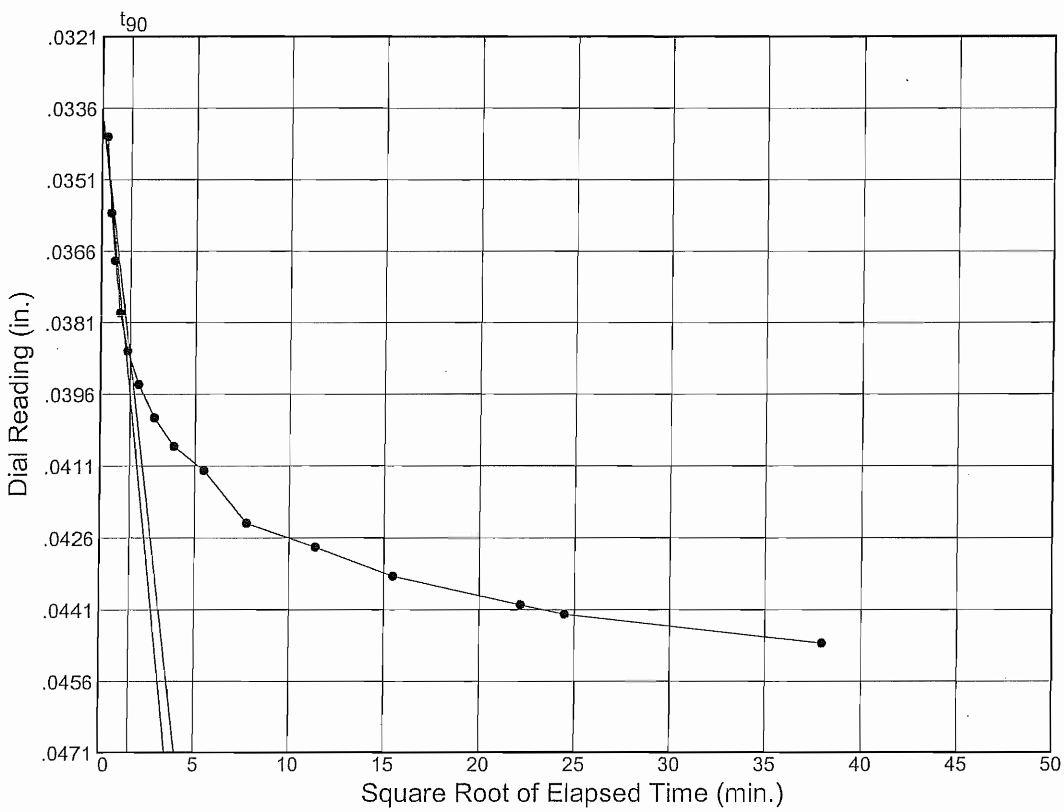
Project No.: 1201.5
Project: SR 99 Widening / Lathrop Road Overcrossing

Source: L1 Sample No.: 15b Elev./Depth: 50.5-51.0'



Load No.= 3
Load= 500 psf
D_0 = 0.02345
D_{90} = 0.02705
D_{100} = 0.02745
T_{90} = 2.44 min.

C_v @ T_{90}
0.47 ft.^{2}/day



Load No.= 4
Load= 1000 psf
D_0 = 0.03366
D_{90} = 0.03886
D_{100} = 0.03943
T_{90} = 2.39 min.

C_v @ T_{90}
0.46 ft.^{2}/day

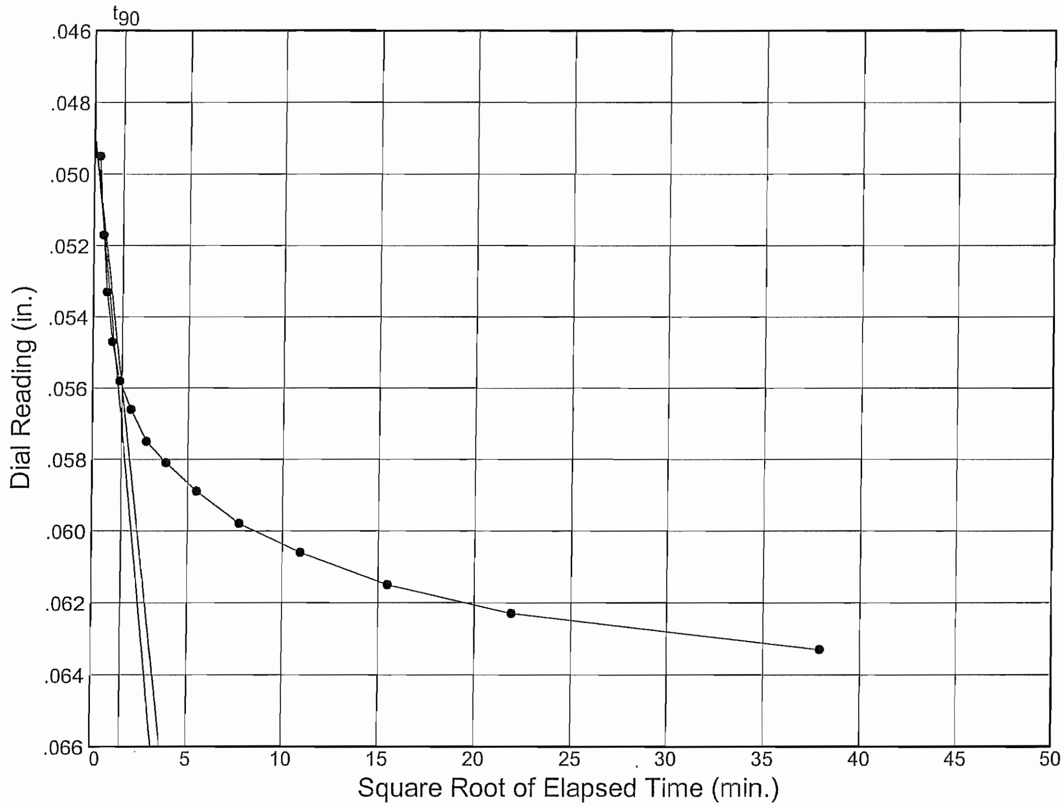
Figure

Blackburn Consulting

Dial Reading vs. Time

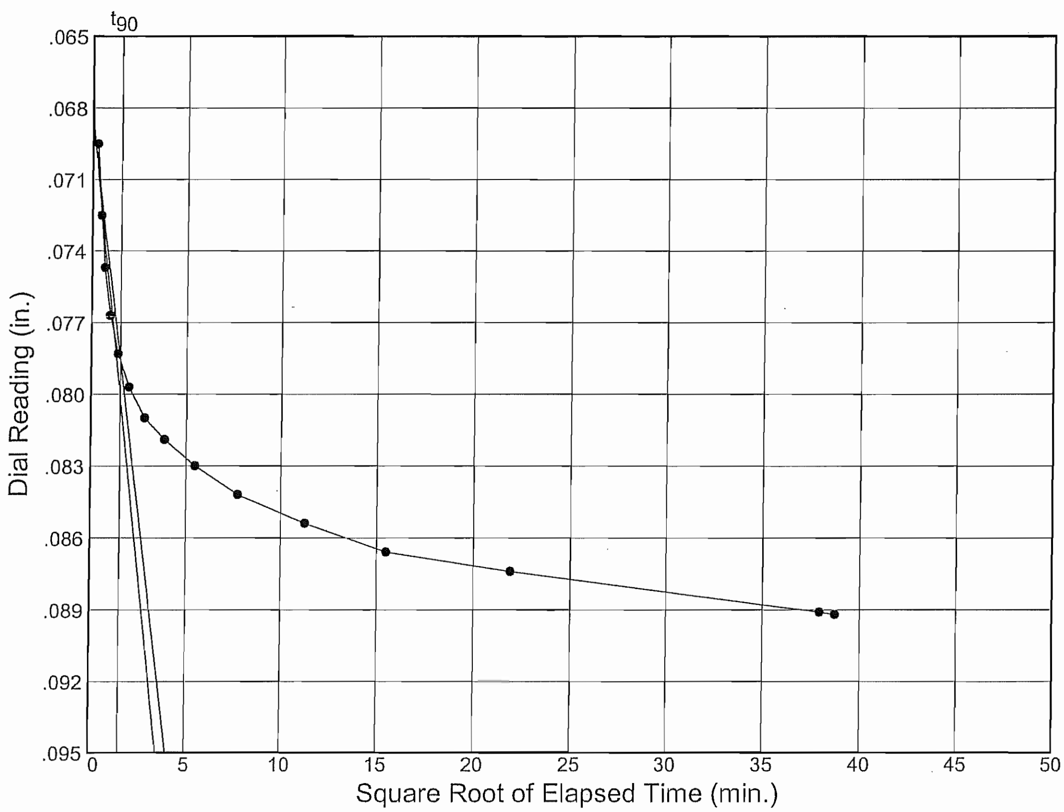
Project No.: 1201.5
Project: SR 99 Widening / Lathrop Road Overcrossing

Source: L1 | Sample No.: 15b | Elev./Depth: 50.5-51.0'



Load No.= 5
Load= 2000 psf
D_0 = 0.04877
D_{90} = 0.05595
D_{100} = 0.05675
T_{90} = 2.32 min.

C_V @ T_{90}
0.46 ft.^{2}/day



Load No.= 6
Load= 4000 psf
D_0 = 0.06842
D_{90} = 0.07862
D_{100} = 0.07975
T_{90} = 2.39 min.

C_V @ T_{90}
0.42 ft.^{2}/day

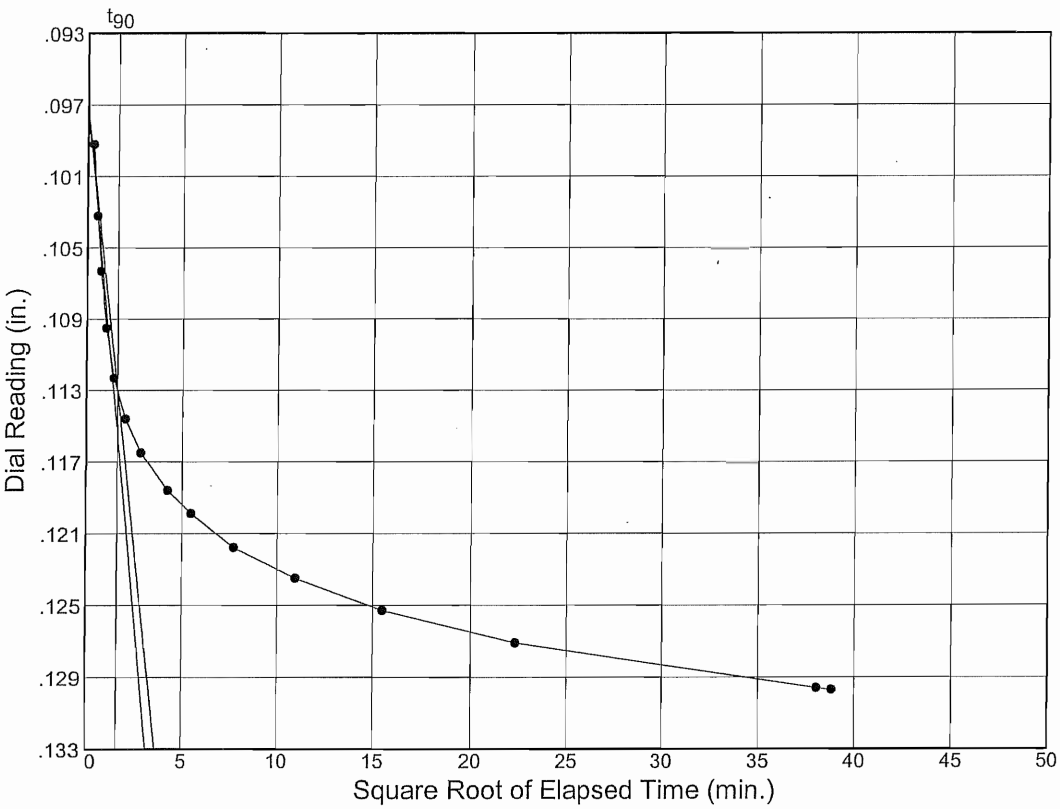
Figure

Blackburn Consulting

Dial Reading vs. Time

Project No.: 1201.5
Project: SR 99 Widening / Lathrop Road Overcrossing

Source: L1 Sample No.: 15b Elev./Depth: 50.5-51.0'



Load No.= 7

Load= 8000 psf

D_0 = 0.09720

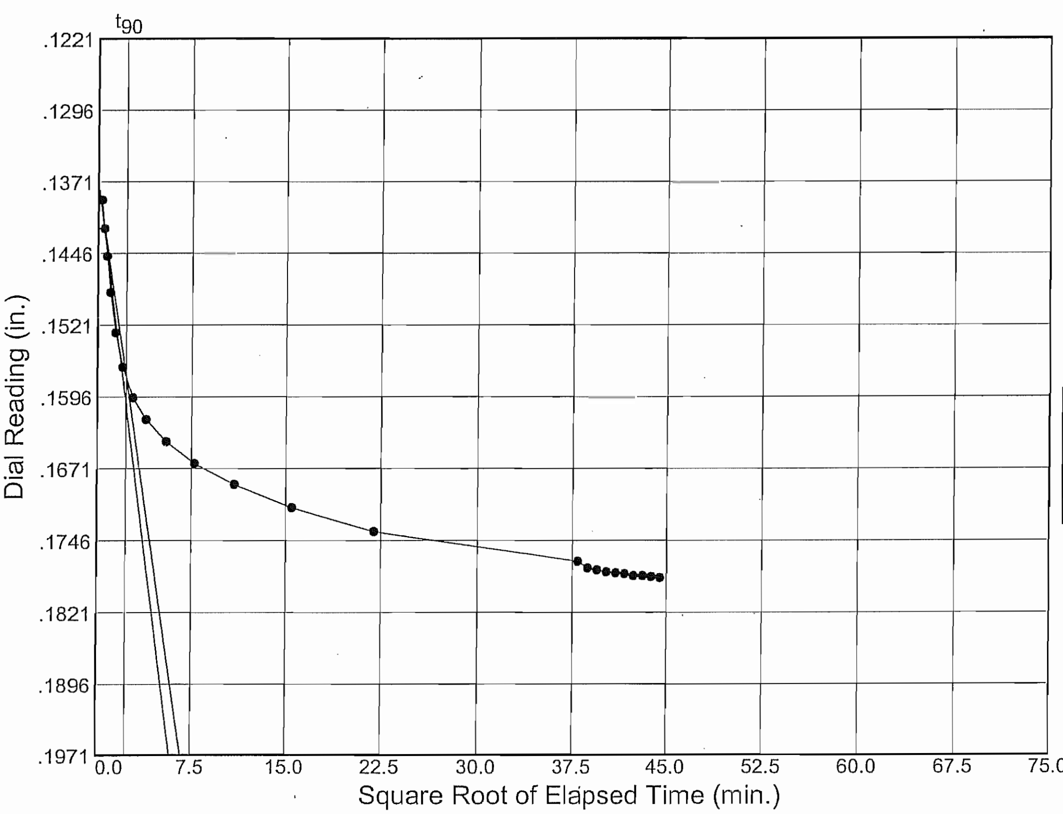
D_{90} = 0.11301

D_{100} = 0.11477

T_{90} = 2.54 min.

C_v @ T_{90}

0.35 ft.^{2}/day



Load No.= 8

Load= 16000 psf

D_0 = 0.13719

D_{90} = 0.15755

D_{100} = 0.15981

T_{90} = 5.16 min.

C_v @ T_{90}

0.15 ft.^{2}/day

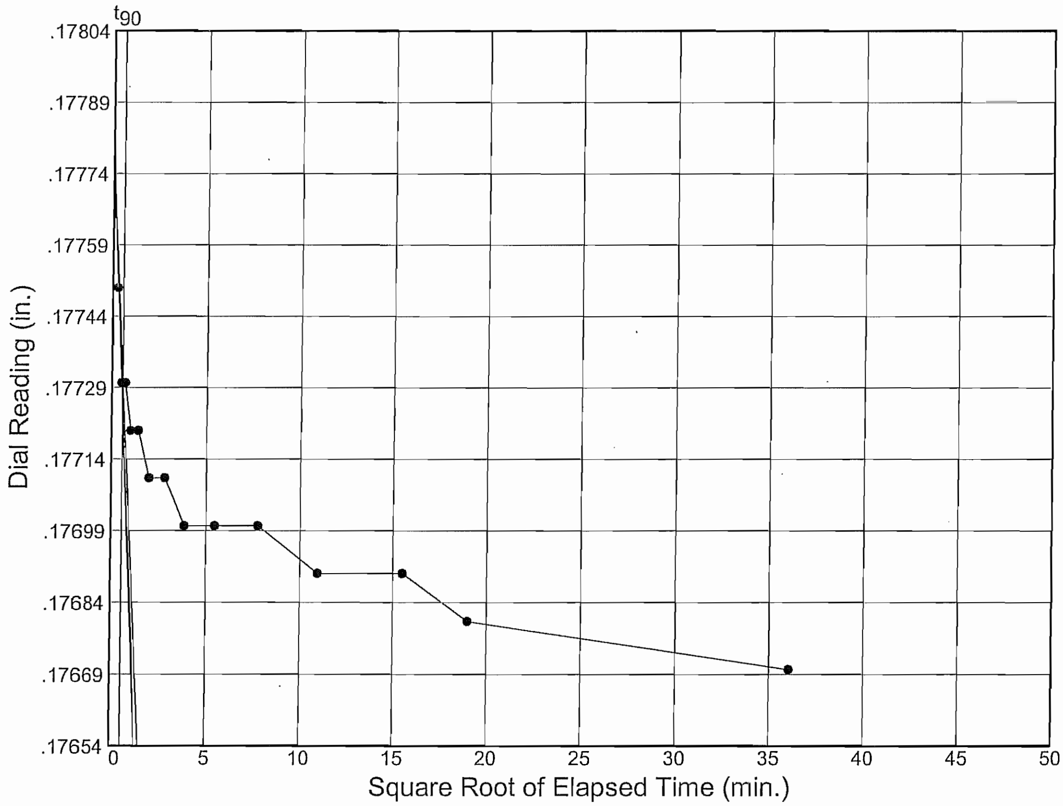
Figure

Blackburn Consulting

Dial Reading vs. Time

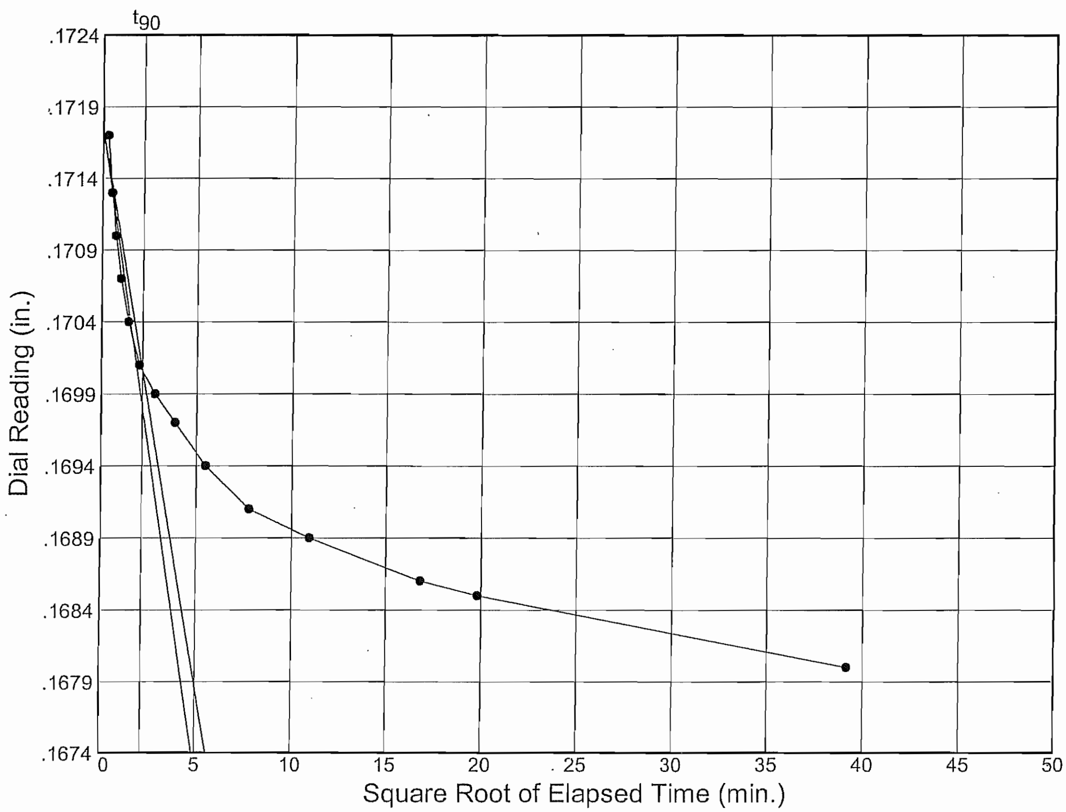
Project No.: 1201.5
Project: SR 99 Widening / Lathrop Road Overcrossing

Source: L1 | Sample No.: 15b | Elev./Depth: 50.5-51.0'



Load No.= 9
Load= 8000 psf
D_0 = 0.17776
D_{90} = 0.17730
D_{100} = 0.17725
T_{90} = 0.33 min.

C_v @ T_{90}
2.18 ft.^{2}/day

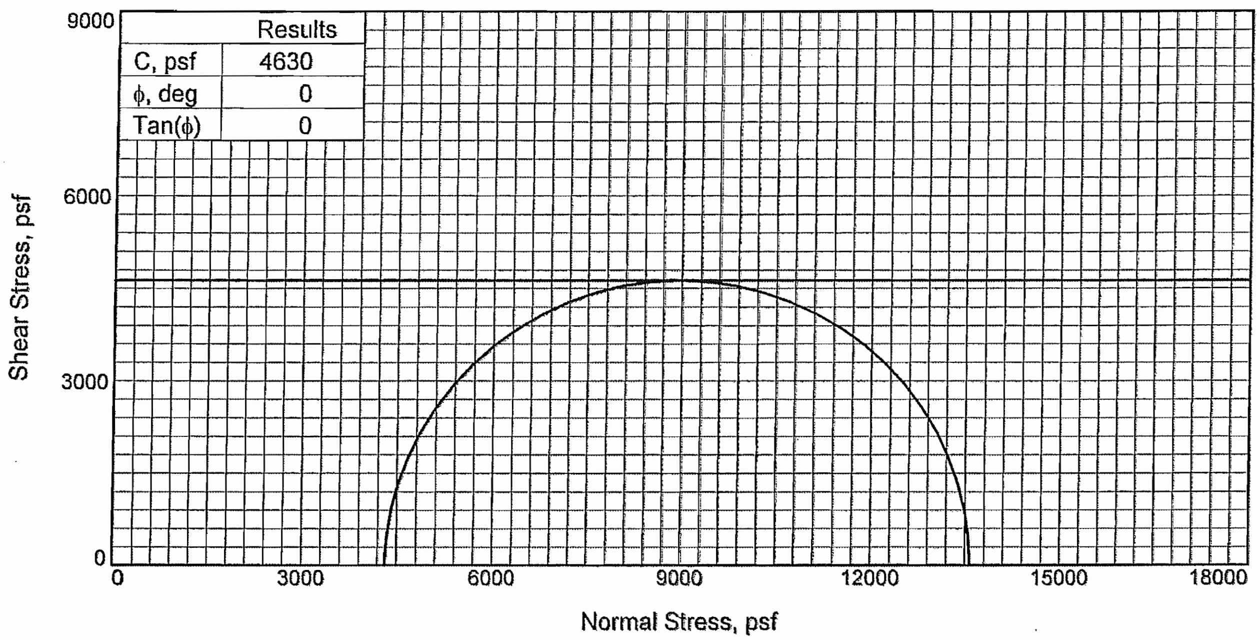


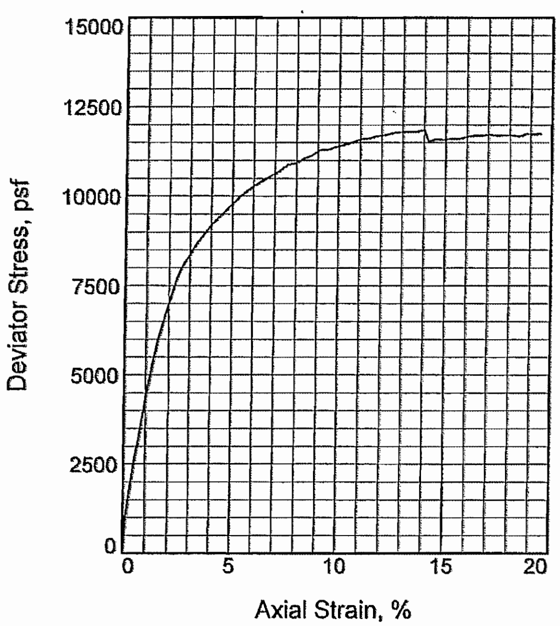
Load No.= 10
Load= 2000 psf
D_0 = 0.17175
D_{90} = 0.17006
D_{100} = 0.16987
T_{90} = 4.69 min.

C_v @ T_{90}
0.16 ft.^{2}/day

Figure

Blackburn Consulting





Specimen No.		1
Initial	Water Content, %	29.1
	Dry Density, pcf	94.3
	Saturation, %	99.7
	Void Ratio	0.7877
	Diameter, in.	2.430
	Height, in.	5.860
At Test	Water Content, %	29.2
	Dry Density, pcf	94.3
	Saturation, %	100.0
	Void Ratio	0.7877
	Diameter, in.	2.430
	Height, in.	5.860
Strain rate, %/min.		0.30
Back Pressure, psf		0
Cell Pressure, psf		4320
Fail. Stress, psf		9259
Strain, %		4.1
Ult. Stress, psf		11855
Strain, %		
σ_1 Failure, psf		13579
σ_3 Failure, psf		4320

Type of Test:
Unconsolidated Undrained

Sample Type: 2.4" Cal Mod

Description: SILT (ML), brown

Assumed Specific Gravity= 2.70

Remarks: Failure chosen at 5% strain, Ultimate at 14%.

Figure ________

Client: HDR Engineering, Inc.

Project: SR 99 Widening / Lathrop Road Overcrossing

Source of Sample: L1 **Depth:** 41.0-41.5

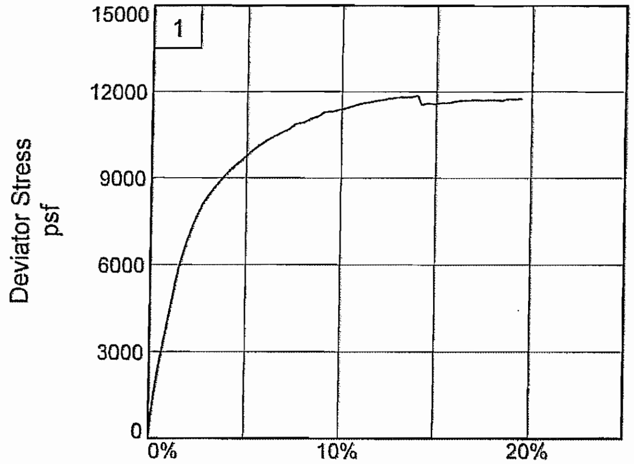
Sample Number: 12c

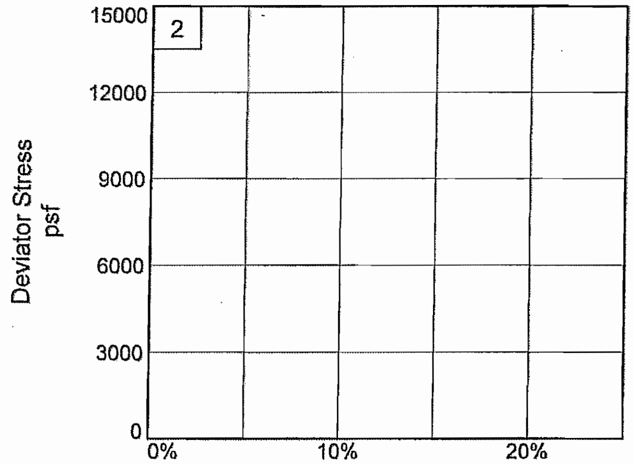
Proj. No.: 1201.5 **Date Sampled:** 3/15/09

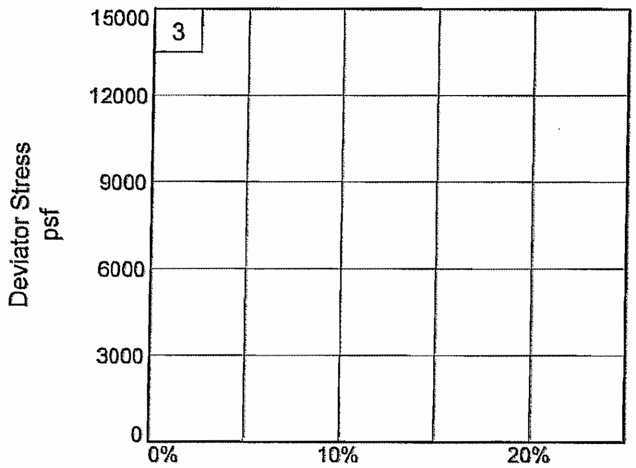
TRIAXIAL SHEAR TEST REPORT

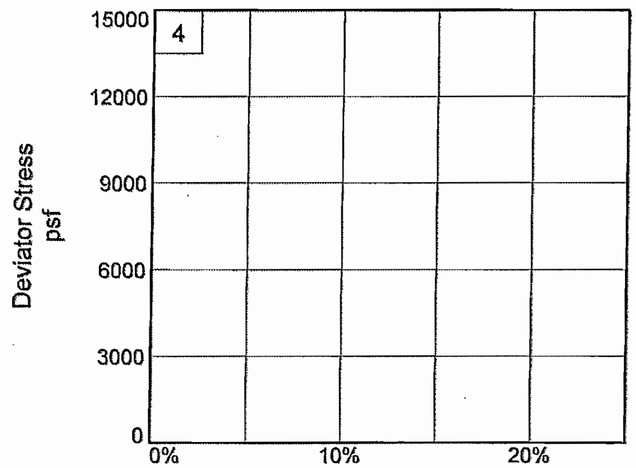
Blackburn Consulting

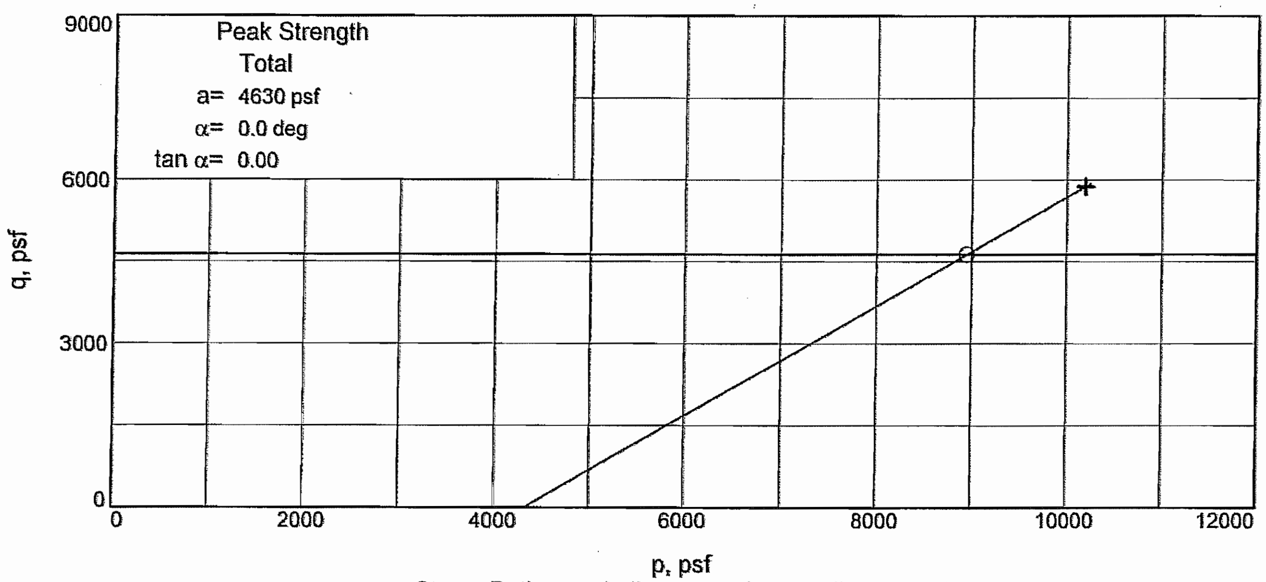
Tested By: MDR **Checked By:** RBL











Stress Paths: o indicates peak + indicates end

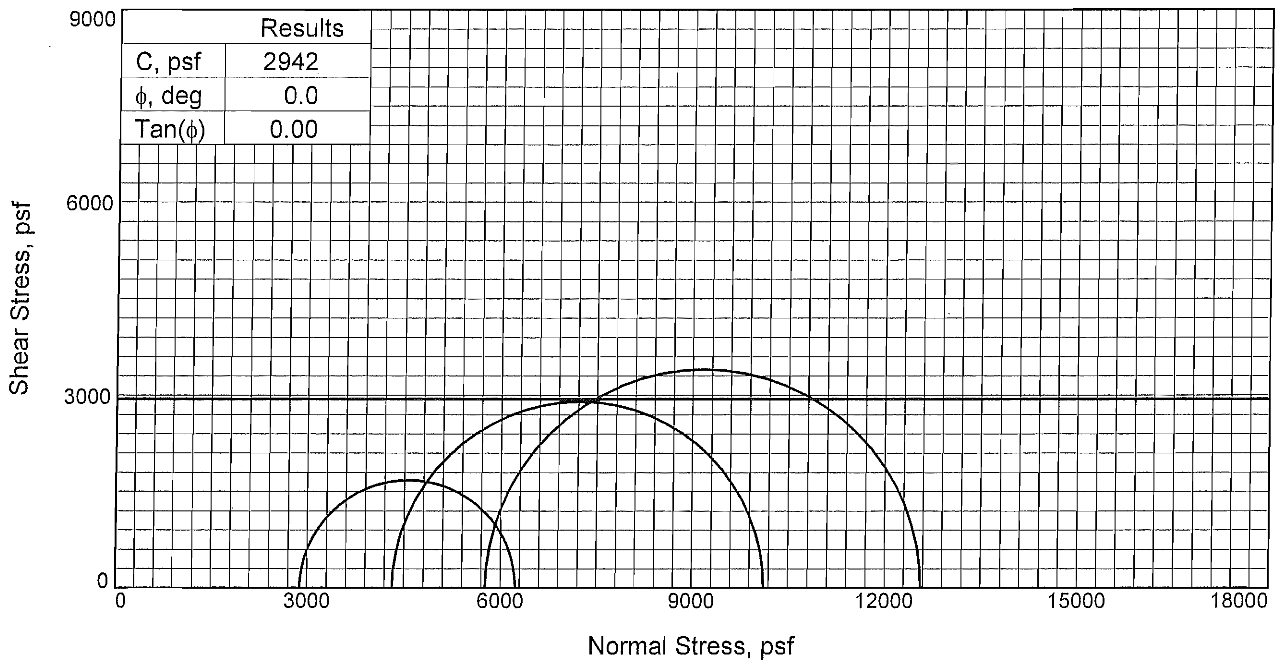
Client: HDR Engineering, Inc.

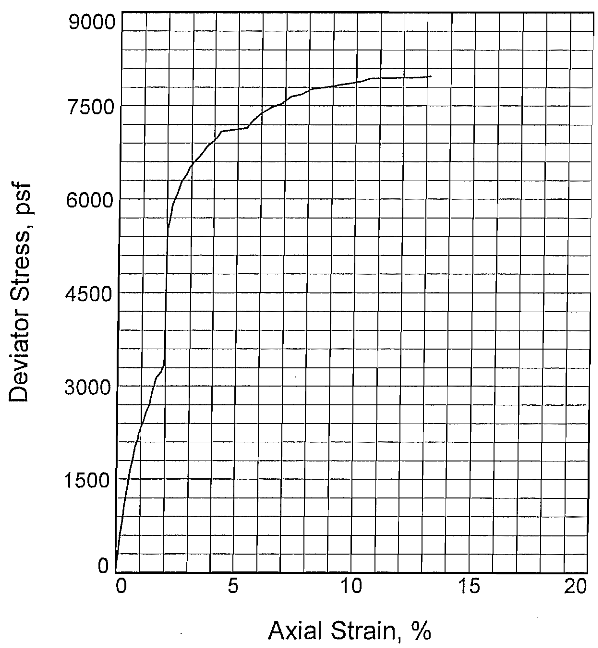
Project: SR 99 Widening / Lathrop Road Overcrossing

Source of Sample: L1 **Depth:** 41.0-41.5 **Sample Number:** 12c

Project No.: 1201.5 **Figure** ________ **Blackburn Consulting**

Tested By: MDR **Checked By:** RBL





Specimen No.		1	2	3
Initial	Water Content, %	28.5	26.9	26.9
	Dry Density, pcf	95.9	97.1	97.1
	Saturation, %	95.0	92.1	92.1
	Void Ratio	0.8552	0.8317	0.8317
	Diameter, in.	2.395	2.395	2.395
	Height, in.	4.966	4.966	4.966
At Test	Water Content, %	28.7	28.7	28.7
	Dry Density, pcf	95.9	97.1	97.1
	Saturation, %	95.7	98.4	98.4
	Void Ratio	0.8552	0.8317	0.8317
	Diameter, in.	2.395	2.419	2.448
	Height, in.	4.966	4.869	4.754
Strain rate, %/min.		0.30	0.30	0.30
Back Pressure, psf		0	0	0
Cell Pressure, psf		2880	4320	5760
Fail. Stress, psf		3353	5804	6806
Strain, %		2.0	2.2	4.8
Ult. Stress, psf				7849
Strain, %				17.5
σ_1 Failure, psf		6233	10124	12566
σ_3 Failure, psf		2880	4320	5760

Type of Test:
Unconsolidated Undrained
Sample Type: 2.4" Cal Mod
Description: SILT (ML), olive, slightly cemented

Assumed Specific Gravity= 2.85
Remarks: Staged test.

Figure ________

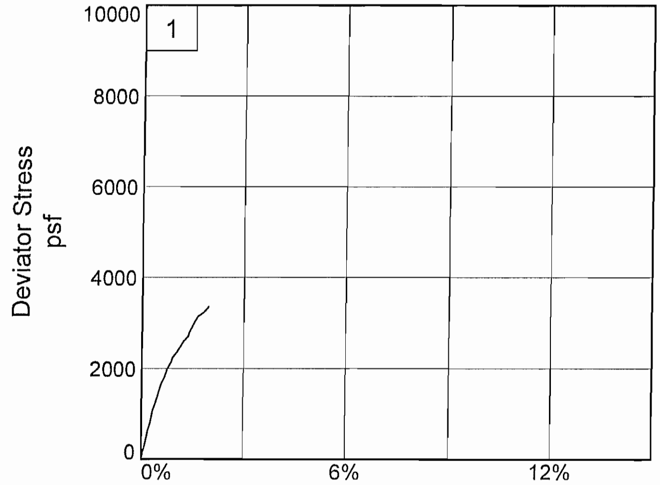
Client: HDR Engineering, Inc.

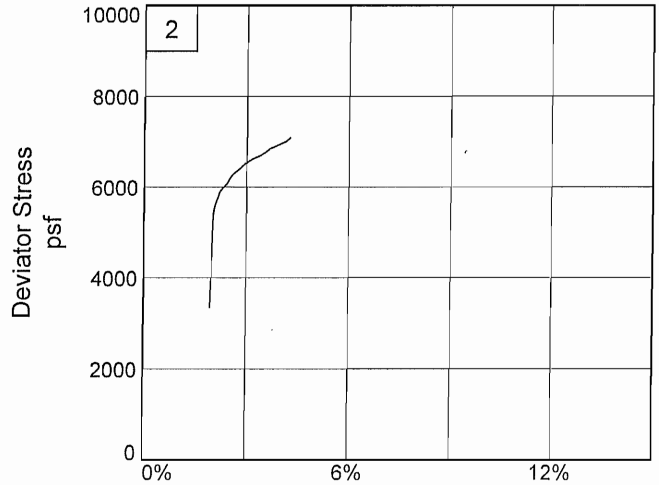
Project: Main Street Interchange

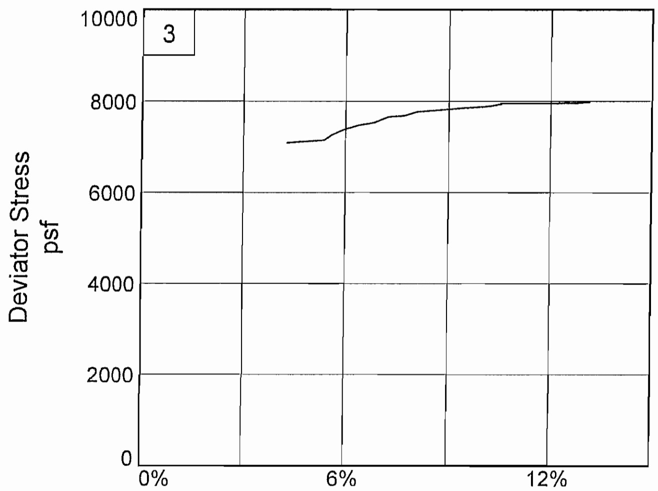
Source of Sample: L2 **Depth:** 46.0-46.5
Sample Number: 9c
Proj. No.: 1201.5 **Date Sampled:**

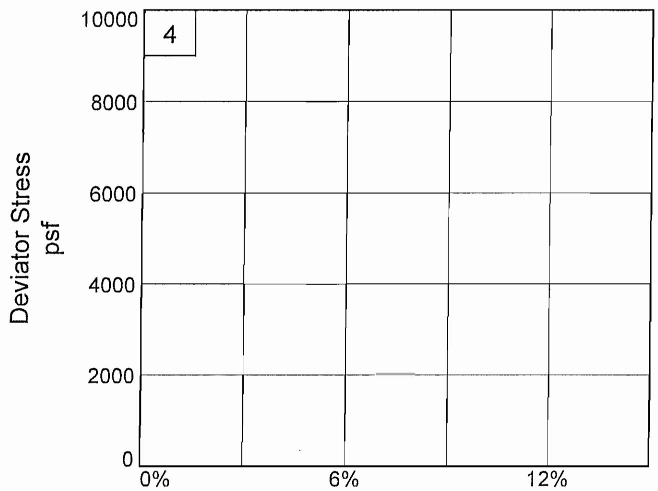
TRIAXIAL SHEAR TEST REPORT
Blackburn Consulting
W. Sacramento, CA

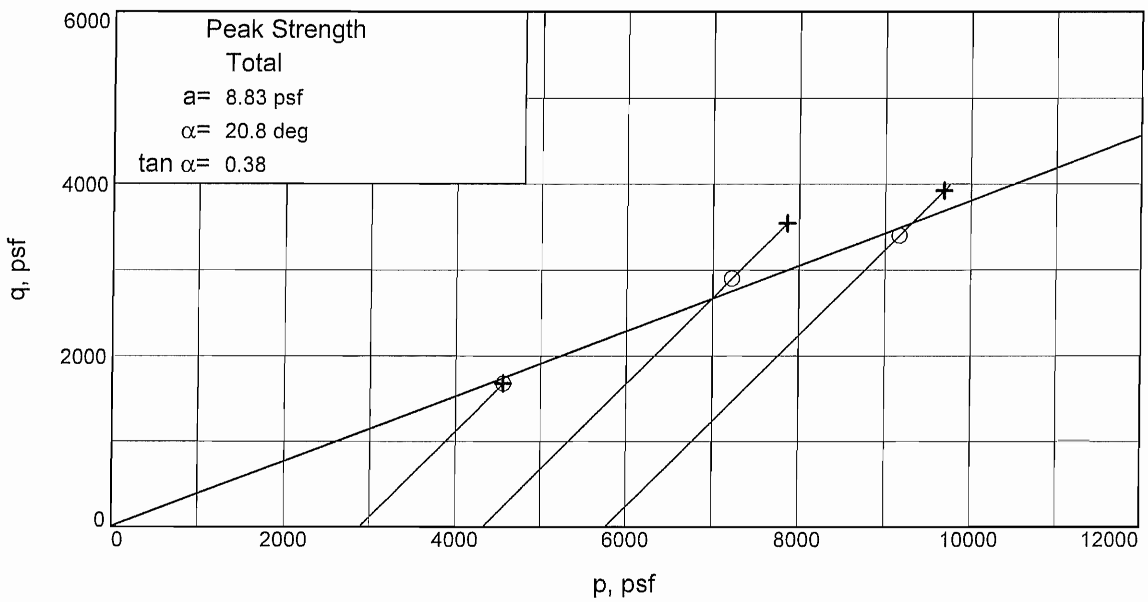
Tested By: MDR **Checked By:** RDS











Stress Paths: o indicates peak + indicates end

Client: HDR Engineering, Inc.

Project: Main Street Interchange

Source of Sample: L2 **Depth:** 46.0-46.5 **Sample Number:** 9c

Project No.: 1201.5 **Figure** ________

Blackburn Consulting

Tested By: MDR **Checked By:** RDS

Triaxial Compression UU no pore pressure

blackburn consulting

Project Name: SR 99 Widening - Lathrop Road Overcrossing
Project Number: 1201.5d
Sample ID: L2-9c Depth (ft): 46.0-46.5
Sample Description: SILT (ML), olive, slightly cemented
Date: 6/13/2009 Tested By: MDR

UU	X
CU	

Staged test	
psf	psi
2880	20.00
4320	30.00
5760	40.00

Specimen			
initial moisture		final moisture	
tare #	RR	tare #	PP
wet + t =	245.26	wet + t =	830.11
dry + t =	215.57	dry + t =	668.42
tare =	105.06	tare =	105.22
Water (g)	29.69		161.69
Dry Weight	110.51		563.20
% Moisture	26.87		28.71
Length of Sample =	4.966 in		
Diameter of Sample =	2.395 in		
moist soil =	723.68 gm		

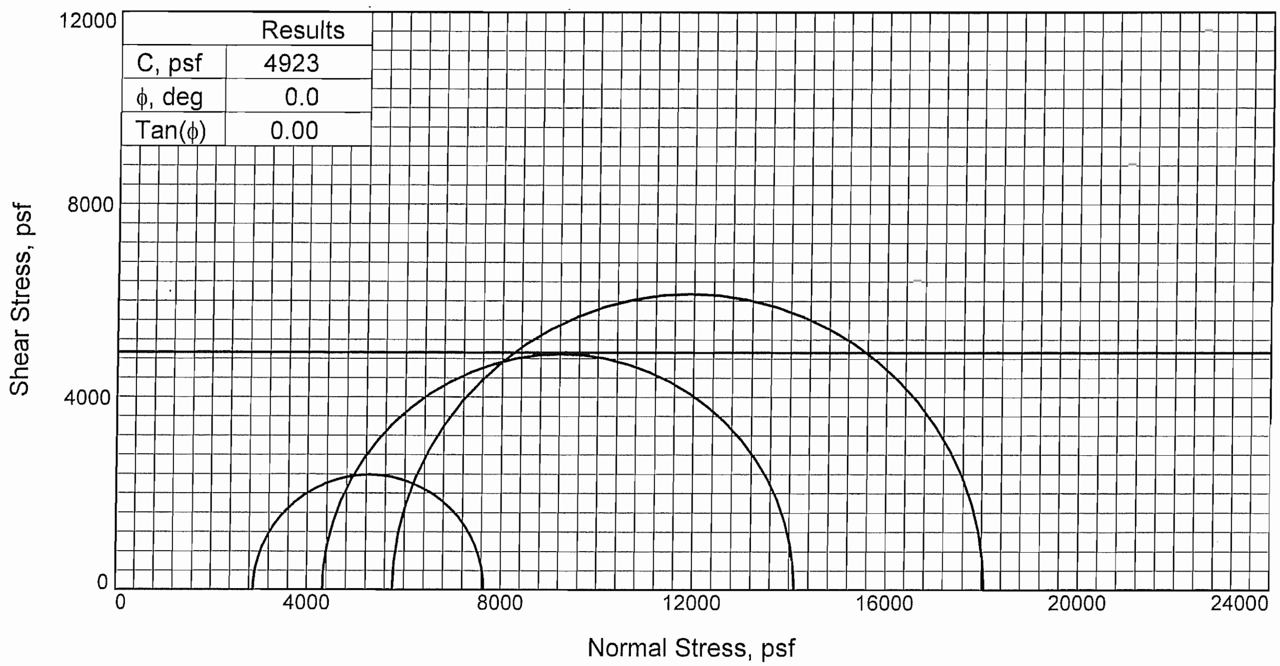
Specific Gravity = 2.85

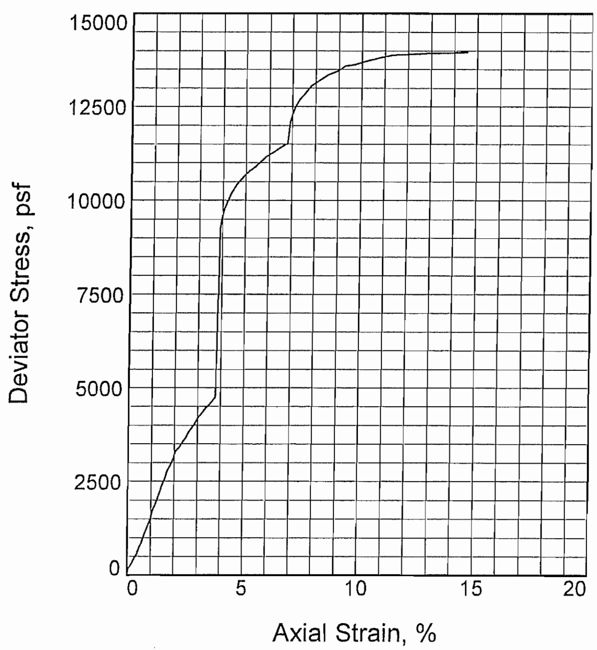
strain %	Strain (in)
2.0	0.0993
4.0	0.1986
6.0	0.298
8.0	0.3973
10.0	0.4966
15.0	0.7449
20.0	0.9932

NOTES:

USE FOR SOFT SOIL PREPARATION

0	weight of tube, membrane, plastic tops(2) and confining tube
0	weight of confining mold assy.
0	weight of membrane and plastic tops(2)
0	Moist soil weight (g)





	Specimen No.	1	2	3
Initial	Water Content, %	30.6	30.6	30.6
	Dry Density, pcf	90.4	90.4	90.4
	Saturation, %	91.7	91.7	91.7
	Void Ratio	0.9340	0.9340	0.9340
	Diameter, in.	2.410	2.410	2.410
	Height, in.	5.075	5.075	5.075
At Test	Water Content, %	32.7	32.7	32.7
	Dry Density, pcf	90.4	90.4	90.4
	Saturation, %	98.1	98.1	98.1
	Void Ratio	0.9340	0.9340	0.9340
	Diameter, in.	2.410	2.457	2.497
	Height, in.	5.075	4.883	4.729
	Strain rate, %/min.	0.30	0.30	0.30
	Back Pressure, psf	0	0	0
	Cell Pressure, psf	2880	4320	5760
	Fail. Stress, psf	4769	9787	12288
	Strain, %	3.8	4.1	7.0
	Ult. Stress, psf			13744
	Strain, %			20.3
	σ_1 Failure, psf	7649	14107	18048
	σ_3 Failure, psf	2880	4320	5760

Type of Test:
Unconsolidated Undrained

Sample Type: 2.4" Cal Mod

Description: SILT (ML), olive, slightly cemented

Assumed Specific Gravity= 2.80

Remarks: Staged Test.

Figure ________

Client: HDR Engineering, Inc.

Project: Main Street Interchange

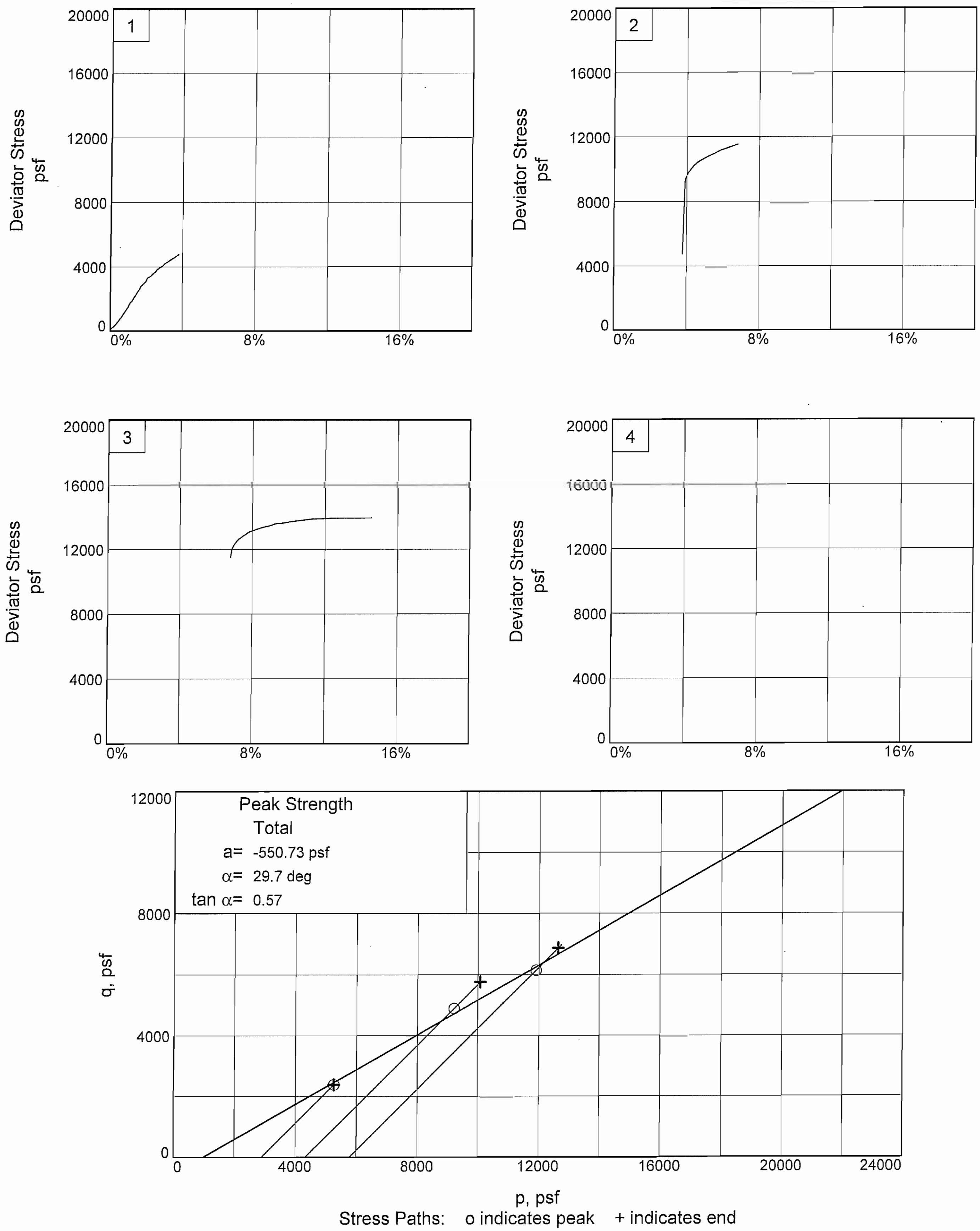
Source of Sample: L3 **Depth:** 41.0-41.5

Sample Number: 8c

Proj. No.: 1201.5 **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT
Blackburn Consulting
W. Sacramento, CA

Tested By: MDR **Checked By:** RDS



Client: HDR Engineering, Inc.

Project: Main Street Interchange

Source of Sample: L3 **Depth:** 41.0-41.5 **Sample Number:** 8c

Project No.: 1201.5 **Figure** ________ **Blackburn Consulting**

Tested By: MDR **Checked By:** RDS

Triaxial Compression UU no pore pressure

blackburn consulting

Project Name: SR 99 Widening - Lathrop Road Overcrossing
Project Number: 1201.5d
Sample ID: L3-8c Depth (ft): 41.0-41.5
Sample Description: SILT (ML), olive, slightly cemented
Date: 6/13/2009 Tested By: MDR

UU	X
CU	

Staged test	
psf	psi
2880	20.00
4320	30.00
5760	40.00

Specimen			
initial moisture		final moisture	
tare #	VV	tare #	OO
wet + t =	207.00	wet + t =	831.39
dry + t =	183.12	dry + t =	652.08
tare =	105.01	tare =	103.94
Water (g)	23.88		179.31
Dry Weight	78.11		548.14
% Moisture	30.57		32.71
Length of Sample =	5.075 in		
Diameter of Sample =	2.410 in		
moist soil =	717.16 gm		

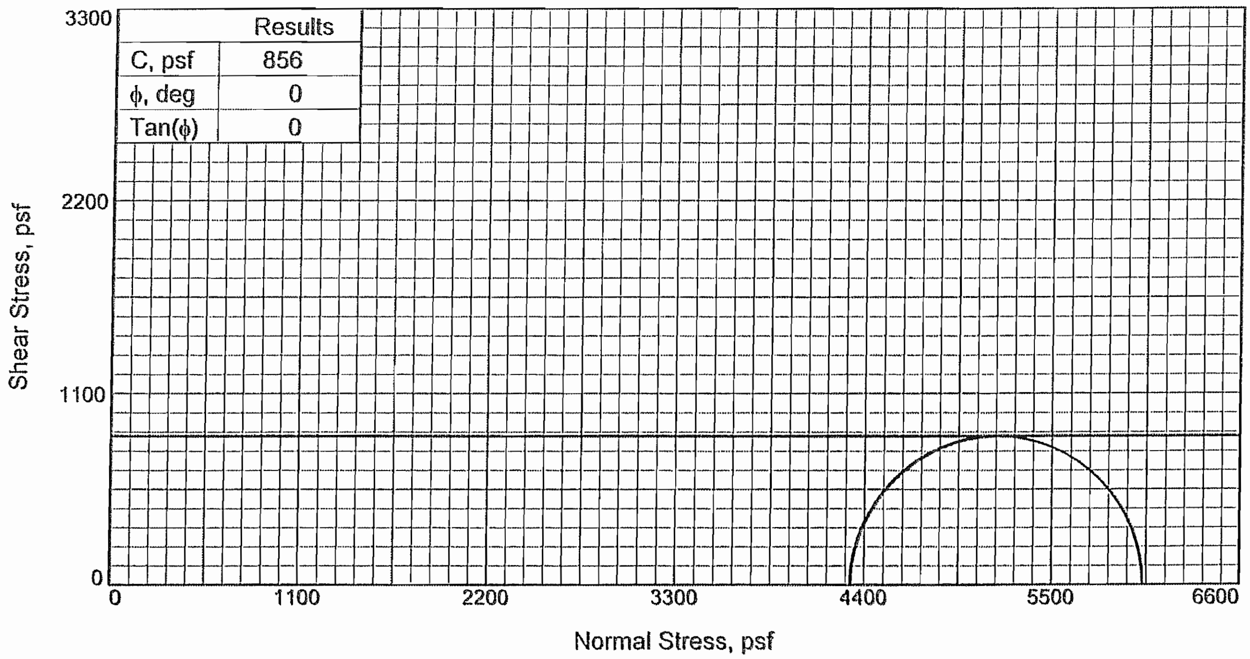
Specific Gravity = 2.80

strain %	Strain (in)
2.0	0.1015
4.0	0.203
6.0	0.3045
8.0	0.406
10.0	0.5075
15.0	0.7613
20.0	1.015

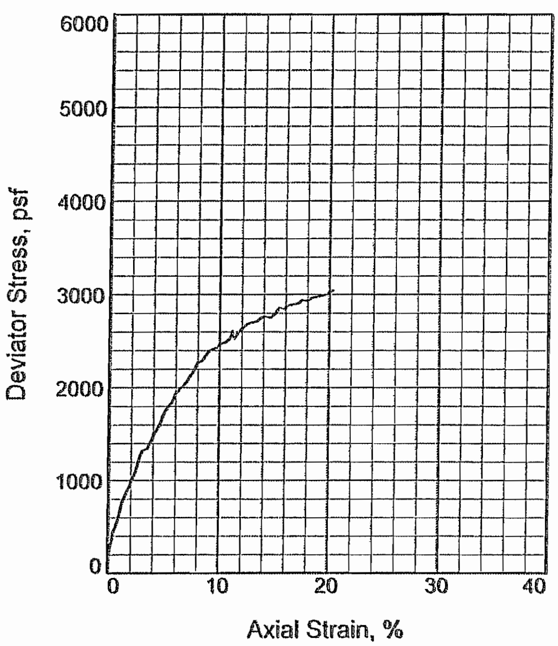
NOTES:

USE FOR SOFT SOIL PREPARATION

0 weight of tube, membrane, plastic tops(2) and confining tube
0 weight of confining mold assy.
0 weight of membrane and plastic tops(2)
0 **Moist soil weight (g)**



	Results
C, psf	856
ϕ, deg	0
Tan(ϕ)	0



Specimen No.		1
Initial	Water Content, %	32.1
	Dry Density, pcf	89.6
	Saturation, %	98.5
	Void Ratio	0.8811
	Diameter, in.	2.410
	Height, in.	5.500
At Test	Water Content, %	32.3
	Dry Density, pcf	89.6
	Saturation, %	98.9
	Void Ratio	0.8811
	Diameter, in.	2.410
	Height, in.	5.500
Strain rate, %/min.		0.30
Back Pressure, psf		0
Cell Pressure, psf		4320
Fail. Stress, psf		1712
Strain, %		4.9
Ult. Stress, psf		2789
Strain, %		
σ_1 Failure, psf		6032
σ_3 Failure, psf		4320

Type of Test:
Unconsolidated Undrained

Sample Type: 2.4" Cal Mod

Description: SANDY lean CLAY (CL), olive brown

Assumed Specific Gravity= 2.70

Remarks: Failure chosen at 5% strain, Ultimate at 15% strain.

Figure ________

Client: HDR Engineering, Inc.

Project: SR 99 Widening / Lathrop Road Overcrossing

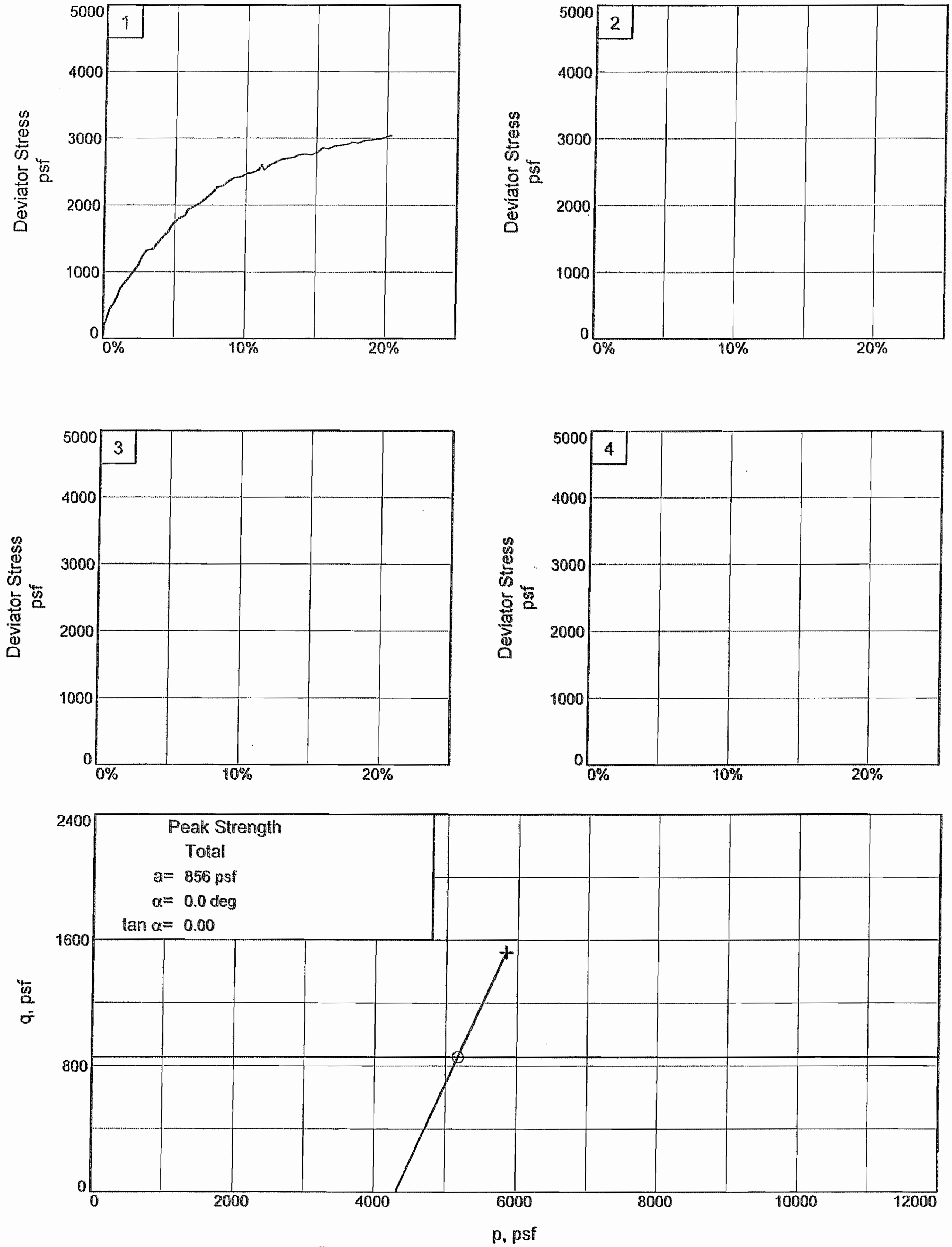
Source of Sample: L3 **Depth:** 46.0-46.5

Sample Number: 10c

Proj. No.: 1201.5 **Date Sampled:** 5-4-09

TRIAXIAL SHEAR TEST REPORT

Blackburn Consulting



Stress Paths: o indicates peak + indicates end

Client: HDR Engineering, Inc.

Project: SR 99 Widening / Lathrop Road Overcrossing

Source of Sample: L3 **Depth:** 46.0-46.5 **Sample Number:** 10c

Project No.: 1201.5 Figure ________ **Blackburn Consulting**

Triaxial Compression UU no pore pressure

blackburn consulting

Project Name: SR 99 Widening - Lathrop Road Overcrossing

Project Number: 1201.5d

Sample ID: L3-10c Depth (ft): 46.0-46.5

Sample Description: SANDY lean CLAY (CL), olive brown

Date: 6/6/2009 Tested By: MDR

		PSI
UU	X	30
CU		

Staged test	
psf	psi
0	0.00
0	0.00
0	0.00

Specific Gravity = 2.70

Specimen			
initial moisture		final moisture	
tare #	OO	tare #	WW
wet + t =	160.08	wet + t =	885.73
dry + t =	145.85	dry + t =	695.20
tare =	103.97	tare =	105.07
Water (g)	14.23		190.53
Dry Weight	41.88		590.13
% Moisture	33.98		32.29

Length of Sample = 5.50 in

Diameter of Sample = 2.41 in

moist soil = 779.76 gm

strain %	Strain (in)
15.0	0.825
20.0	1.1

NOTES:

USE FOR SOFT SOIL PREPARATION

0 weight of tube, membrane, plastic tops(2) and confining tube

0 weight of confining mold assy.

0 weight of membrane and plastic tops(2)

0 Moist soil weight (g)

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/21/2009
Date Submitted 08/18/2009

To: Ken Colburn
Blackburn Consulting
11521 Blocker Dr. Ste. 110
Auburn, CA 95603

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : LATHROP RD SR99 MED. Site ID : L1-7.
Your purchase order number is 1201.5D.
Thank you for your business.

* For future reference to this analysis please use SUN # 56549-114217.

EVALUATION FOR SOIL CORROSION

Soil pH	8.01		
Minimum Resistivity	0.67 ohm-cm (x1000)		
Chloride	106.8 ppm	00.01068	%
Sulfate	314.4 ppm	00.03144	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 03/20/2009
Date Submitted 03/17/2009

To: Ken Colburn
Blackburn Consulting
11521 Blocker Dr. Ste. 110
Auburn, CA 95603

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : LATHROP ROAD Site ID : L1-15III.
Your purchase order number is 1201.5.
Thank you for your business.

* For future reference to this analysis please use SUN # 55269-111049.

EVALUATION FOR SOIL CORROSION

Soil pH	7.52	
Minimum Resistivity	0.91 ohm-cm (x1000)	
Chloride	26.4 ppm	00.00264 %
Sulfate	20.2 ppm	00.00202 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 03/20/2009
Date Submitted 03/17/2009

To: Ken Colburn
Blackburn Consulting
11521 Blocker Dr. Ste. 110
Auburn, CA 95603

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager RH

The reported analysis was requested for the following location:
Location : LATHROP ROAD Site ID : L1-13III.
Your purchase order number is 1201.5.
Thank you for your business.

* For future reference to this analysis please use SUN # 55269-111048.

EVALUATION FOR SOIL CORROSION

Soil pH	7.32		
Minimum Resistivity	0.96 ohm-cm (x1000)		
Chloride	17.1 ppm	00.00171	%
Sulfate	6.4 ppm	00.00064	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

APPENDIX C

Abutments 1 & 3, Class 140 Pile Calculations

DRIVEN 1.2

GENERAL PROJECT INFORMATION

Filename: Z:\ACTIVE~1\1201~1.XSR\1201~1.5LA\ENGINE~1\ABUT14.DVN
Project Name: Lathrop Road OC   Project Date: 12/06/2010
Project Client: HDR, Inc.
Computed By: DJM
Project Manager: DJM

PILE INFORMATION

Pile Type: Concrete Pile
Top of Pile: 0.00 ft
Length of Square Side: 14.00 in

ULTIMATE CONSIDERATIONS

Water Table Depth At Time Of:	- Drilling:	25.00 ft
	- Driving/Restrike	25.00 ft
	- Ultimate:	25.00 ft
Ultimate Considerations:	- Local Scour:	0.00 ft
	- Long Term Scour:	0.00 ft
	- Soft Soil:	0.00 ft

ULTIMATE PROFILE

Layer	Type	Thickness	Driving Loss	Unit Weight	Strength	Ultimate Curve
1	Cohesionless	24.00 ft	0.00%	110.00 pcf	32.0/32.0	Nordlund
2	Cohesionless	10.00 ft	0.00%	125.00 pcf	34.0/34.0	Nordlund
3	Cohesive	3.00 ft	0.00%	120.00 pcf	3000.00 psf	T-79 Concrete
4	Cohesive	7.00 ft	0.00%	120.00 pcf	3000.00 psf	T-79 Concrete
5	Cohesive	4.00 ft	0.00%	118.00 pcf	2000.00 psf	T-79 Concrete
6	Cohesive	8.00 ft	0.00%	105.00 pcf	500.00 psf	T-79 Concrete
7	Cohesive	3.00 ft	0.00%	110.00 pcf	1000.00 psf	T-79 Concrete
8	Cohesionless	14.00 ft	0.00%	120.00 pcf	34.0/34.0	Nordlund
9	Cohesive	25.00 ft	0.00%	120.00 pcf	3000.00 psf	T-79 Concrete
10	Cohesionless	13.00 ft	0.00%	120.00 pcf	36.0/36.0	Nordlund

ULTIMATE - SKIN FRICTION

Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.55 psf	26.94	N/A	0.00 Kips
9.01 ft	Cohesionless	495.55 psf	26.94	N/A	12.90 Kips
18.01 ft	Cohesionless	990.55 psf	26.94	N/A	51.52 Kips
23.99 ft	Cohesionless	1319.45 psf	26.94	N/A	91.42 Kips
24.01 ft	Cohesionless	2640.63 psf	28.62	N/A	91.59 Kips
24.99 ft	Cohesionless	2701.87 psf	28.62	N/A	101.03 Kips
25.01 ft	Cohesionless	2765.31 psf	28.62	N/A	101.23 Kips
33.99 ft	Cohesionless	3046.39 psf	28.62	N/A	198.75 Kips
34.01 ft	Cohesive	N/A	N/A	1293.45 psf	198.93 Kips
36.99 ft	Cohesive	N/A	N/A	1343.26 psf	217.61 Kips
37.01 ft	Cohesive	N/A	N/A	1343.60 psf	217.74 Kips
43.99 ft	Cohesive	N/A	N/A	1460.26 psf	265.31 Kips
44.01 ft	Cohesive	N/A	N/A	1771.98 psf	265.46 Kips
47.99 ft	Cohesive	N/A	N/A	1805.00 psf	298.99 Kips
48.01 ft	Cohesive	N/A	N/A	500.00 psf	299.10 Kips
55.99 ft	Cohesive	N/A	N/A	500.00 psf	317.72 Kips
56.01 ft	Cohesive	N/A	N/A	1100.00 psf	317.79 Kips
58.99 ft	Cohesive	N/A	N/A	1100.00 psf	333.09 Kips
59.01 ft	Cohesionless	4610.69 psf	28.62	N/A	333.30 Kips
68.01 ft	Cohesionless	4869.89 psf	28.62	N/A	489.54 Kips
72.99 ft	Cohesionless	5013.31 psf	28.62	N/A	583.14 Kips
73.01 ft	Cohesive	N/A	N/A	1505.00 psf	583.40 Kips
82.01 ft	Cohesive	N/A	N/A	1505.00 psf	646.61 Kips
91.01 ft	Cohesive	N/A	N/A	1505.00 psf	709.82 Kips
97.99 ft	Cohesive	N/A	N/A	1505.00 psf	758.84 Kips
98.01 ft	Cohesionless	6857.09 psf	30.30	N/A	759.23 Kips
107.01 ft	Cohesionless	7116.29 psf	30.30	N/A	1053.27 Kips
110.99 ft	Cohesionless	7230.91 psf	30.30	N/A	1190.13 Kips

ULTIMATE - END BEARING

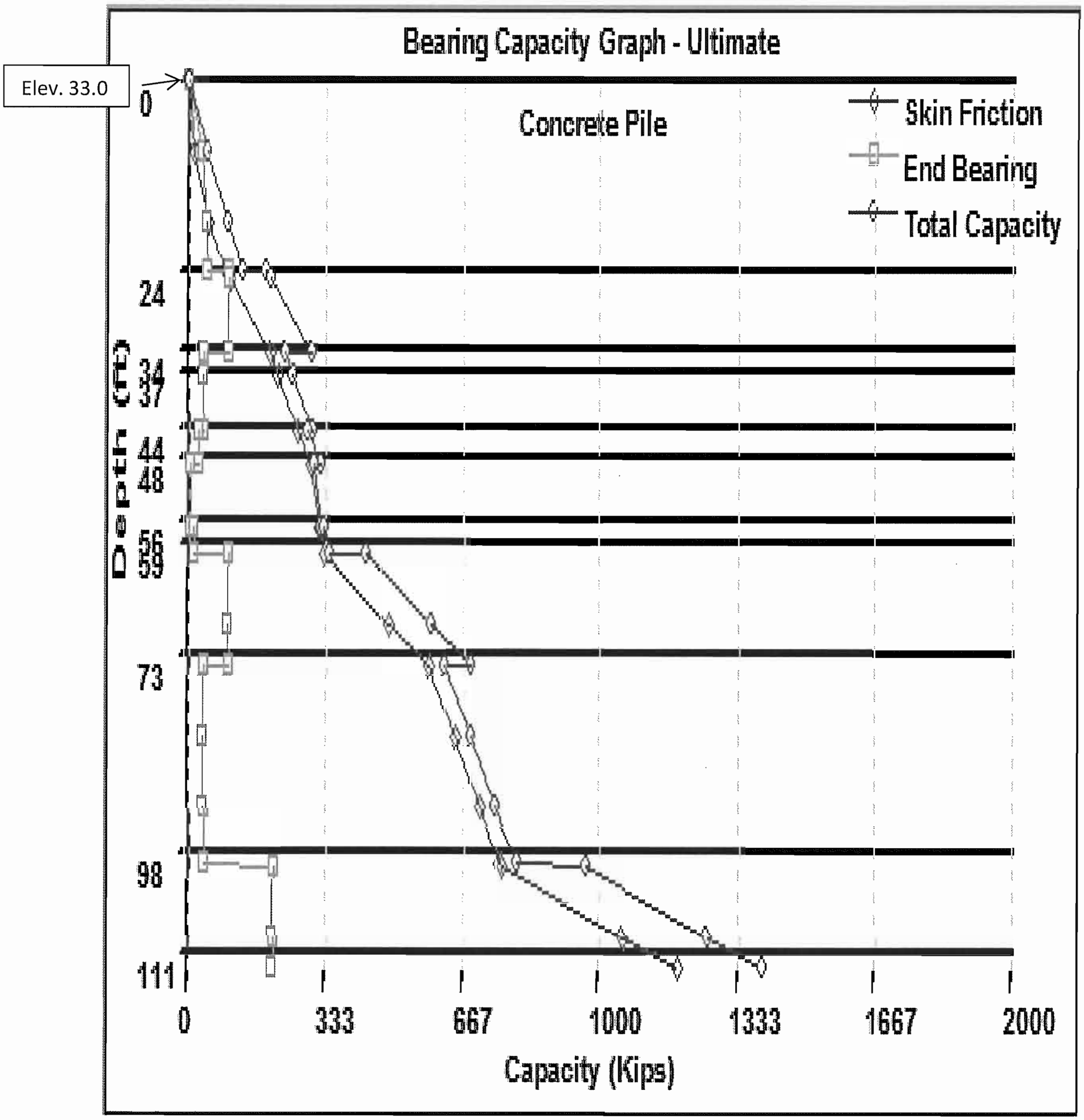
Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	1.10 psf	40.40	44.92 Kips	0.04 Kips
9.01 ft	Cohesionless	991.10 psf	40.40	44.92 Kips	34.09 Kips
18.01 ft	Cohesionless	1981.10 psf	40.40	44.92 Kips	44.92 Kips
23.99 ft	Cohesionless	2638.90 psf	40.40	44.92 Kips	44.92 Kips
24.01 ft	Cohesionless	2641.25 psf	55.60	100.07 Kips	100.07 Kips
24.99 ft	Cohesionless	2763.75 psf	55.60	100.07 Kips	100.07 Kips
25.01 ft	Cohesionless	2765.63 psf	55.60	100.07 Kips	100.07 Kips
33.99 ft	Cohesionless	3327.77 psf	55.60	100.07 Kips	100.07 Kips
34.01 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
36.99 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
37.01 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
43.99 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
44.01 ft	Cohesive	N/A	N/A	N/A	24.50 Kips
47.99 ft	Cohesive	N/A	N/A	N/A	24.50 Kips
48.01 ft	Cohesive	N/A	N/A	N/A	6.12 Kips
55.99 ft	Cohesive	N/A	N/A	N/A	6.12 Kips
56.01 ft	Cohesive	N/A	N/A	N/A	12.25 Kips
58.99 ft	Cohesive	N/A	N/A	N/A	12.25 Kips
59.01 ft	Cohesionless	4610.98 psf	55.60	100.07 Kips	100.07 Kips
68.01 ft	Cohesionless	5129.38 psf	55.60	100.07 Kips	100.07 Kips
72.99 ft	Cohesionless	5416.22 psf	55.60	100.07 Kips	100.07 Kips
73.01 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
82.01 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
91.01 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
97.99 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
98.01 ft	Cohesionless	6857.38 psf	77.60	206.34 Kips	206.34 Kips
107.01 ft	Cohesionless	7375.78 psf	77.60	206.34 Kips	206.34 Kips
110.99 ft	Cohesionless	7605.02 psf	77.60	206.34 Kips	206.34 Kips

ULTIMATE - SUMMARY OF CAPACITIES

Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.04 Kips	0.04 Kips
9.01 ft	12.90 Kips	34.09 Kips	46.99 Kips
18.01 ft	51.52 Kips	44.92 Kips	96.44 Kips
23.99 ft	91.42 Kips	44.92 Kips	136.34 Kips
24.01 ft	91.59 Kips	100.07 Kips	191.66 Kips
24.99 ft	101.03 Kips	100.07 Kips	201.10 Kips
25.01 ft	101.23 Kips	100.07 Kips	201.29 Kips
33.99 ft	198.75 Kips	100.07 Kips	298.82 Kips
34.01 ft	198.93 Kips	36.75 Kips	235.68 Kips
36.99 ft	217.61 Kips	36.75 Kips	254.36 Kips
37.01 ft	217.74 Kips	36.75 Kips	254.49 Kips
43.99 ft	265.31 Kips	36.75 Kips	302.06 Kips
44.01 ft	265.46 Kips	24.50 Kips	289.96 Kips
47.99 ft	298.99 Kips	24.50 Kips	323.49 Kips
48.01 ft	299.10 Kips	6.12 Kips	305.22 Kips
55.99 ft	317.72 Kips	6.12 Kips	323.84 Kips
56.01 ft	317.79 Kips	12.25 Kips	330.04 Kips
58.99 ft	333.09 Kips	12.25 Kips	345.34 Kips
59.01 ft	333.30 Kips	100.07 Kips	433.37 Kips
68.01 ft	489.54 Kips	100.07 Kips	589.61 Kips
72.99 ft	583.14 Kips	100.07 Kips	683.20 Kips
73.01 ft	583.40 Kips	36.75 Kips	620.15 Kips
82.01 ft	646.61 Kips	36.75 Kips	683.36 Kips
91.01 ft	709.82 Kips	36.75 Kips	746.57 Kips
97.99 ft	758.84 Kips	36.75 Kips	795.59 Kips
98.01 ft	759.23 Kips	206.34 Kips	965.57 Kips
107.01 ft	1053.27 Kips	206.34 Kips	1259.61 Kips
110.99 ft	1190.13 Kips	206.34 Kips	1396.47 Kips

Lathrop Road Overcrossing
BCI No. 1201.5

ABUT 1 & 3: CLASS 140 PILE COMPRESSION



Lathrop Road Overcrossing

BCI No. 1201.5
12/06/10
By: DJM

Abutment Pile Settlement Calculations: Class 140 Piles

(Foundation Analysis and Design, Bowles, 5th edition, 1996)

Axial Pile Compression

Service-I Limit Per Pile Load (lbs)		125000
A	*Average Axial Load (lbs)	31250
B	Pile Length (in.)	558
C	Tip Area (sq. in.)	196
D	Concrete Modulus of Elasticity (psi)	4415201
Axial Compression (in.)		**0.02**

*Allowable Capacity Reduced by 75% Due to Skin Friction

Axial Compression = (A x B)/(C x D)

Point Settlement

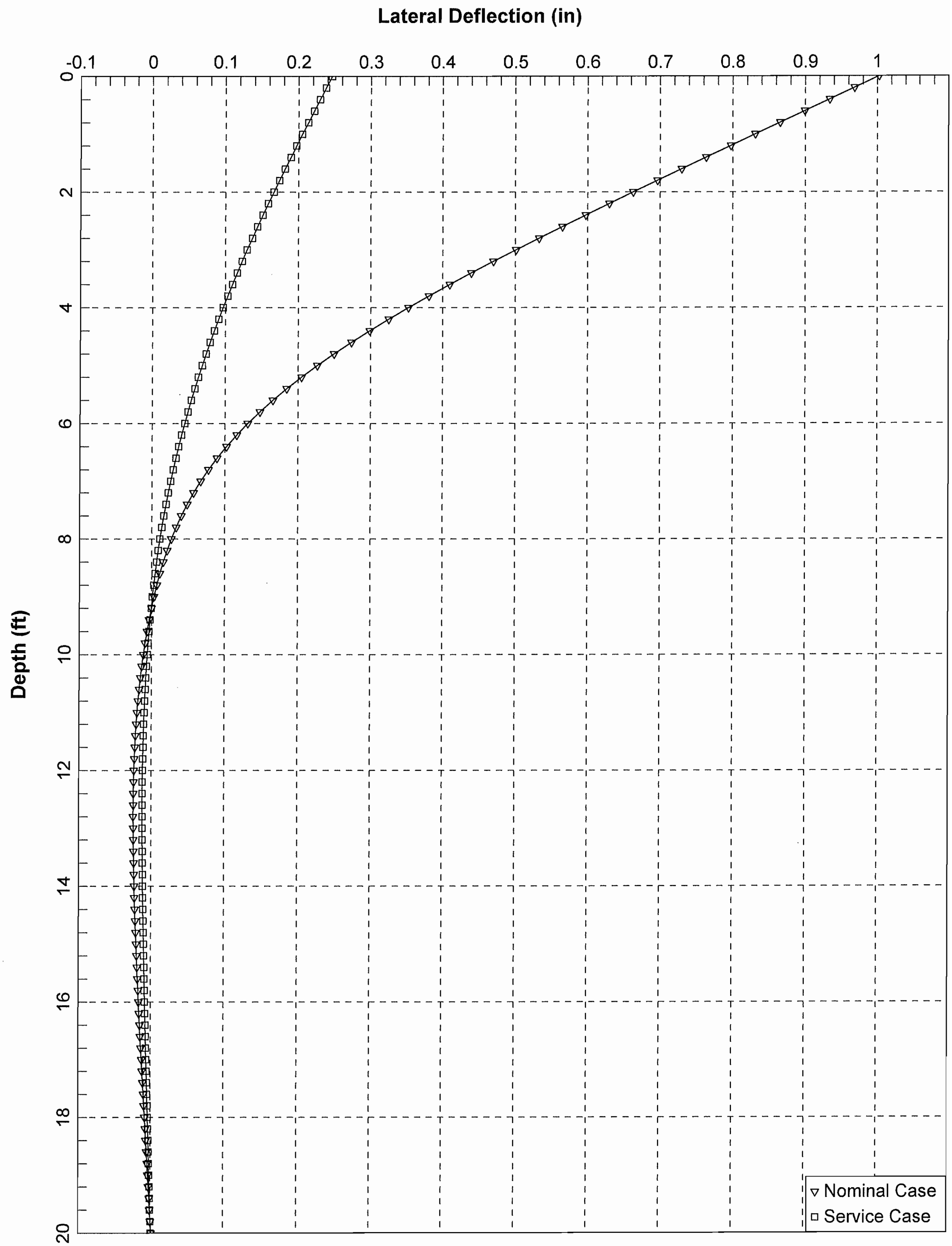
A	Point Bearing Pressure (psi)	637.8
B	Pile Diameter (in.)	14
C	Poisson's Ratio	0.3
D	Point Soil Stress-Strain Modulus (psi)	3472
E	Shape Factor	1
F	Fox Embeddment Factor	0.5
G	Reduction Factor for Skin Friction	0.5
Point Settlement (in.)		**0.59**

A = Allowable Pile Capacity x Tip Area

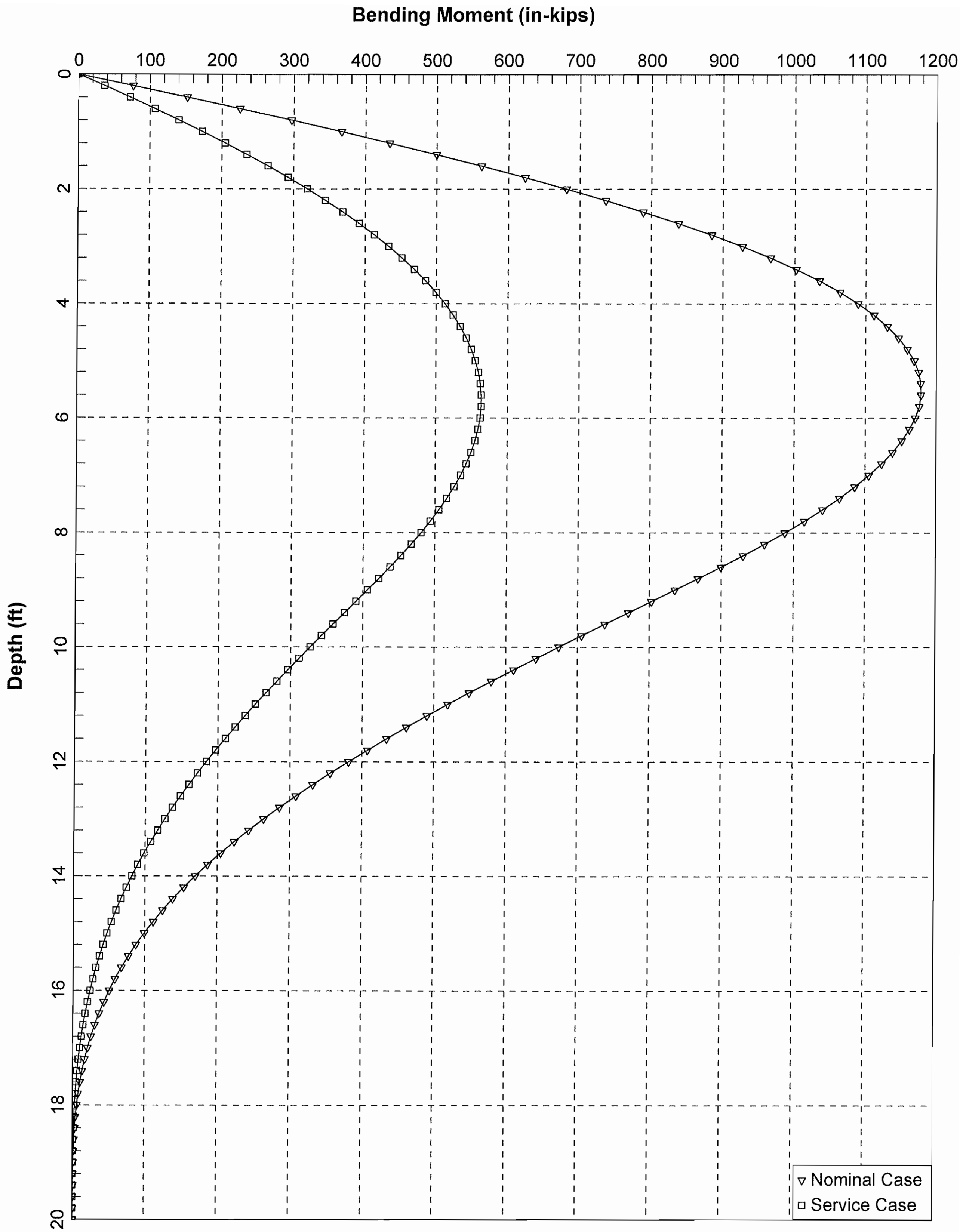
F = 0.55 if L/D >/= to 5, 0.5 if greater than 5

Point Settlement = A x {B x (1-C^2)/D} x E x F x G

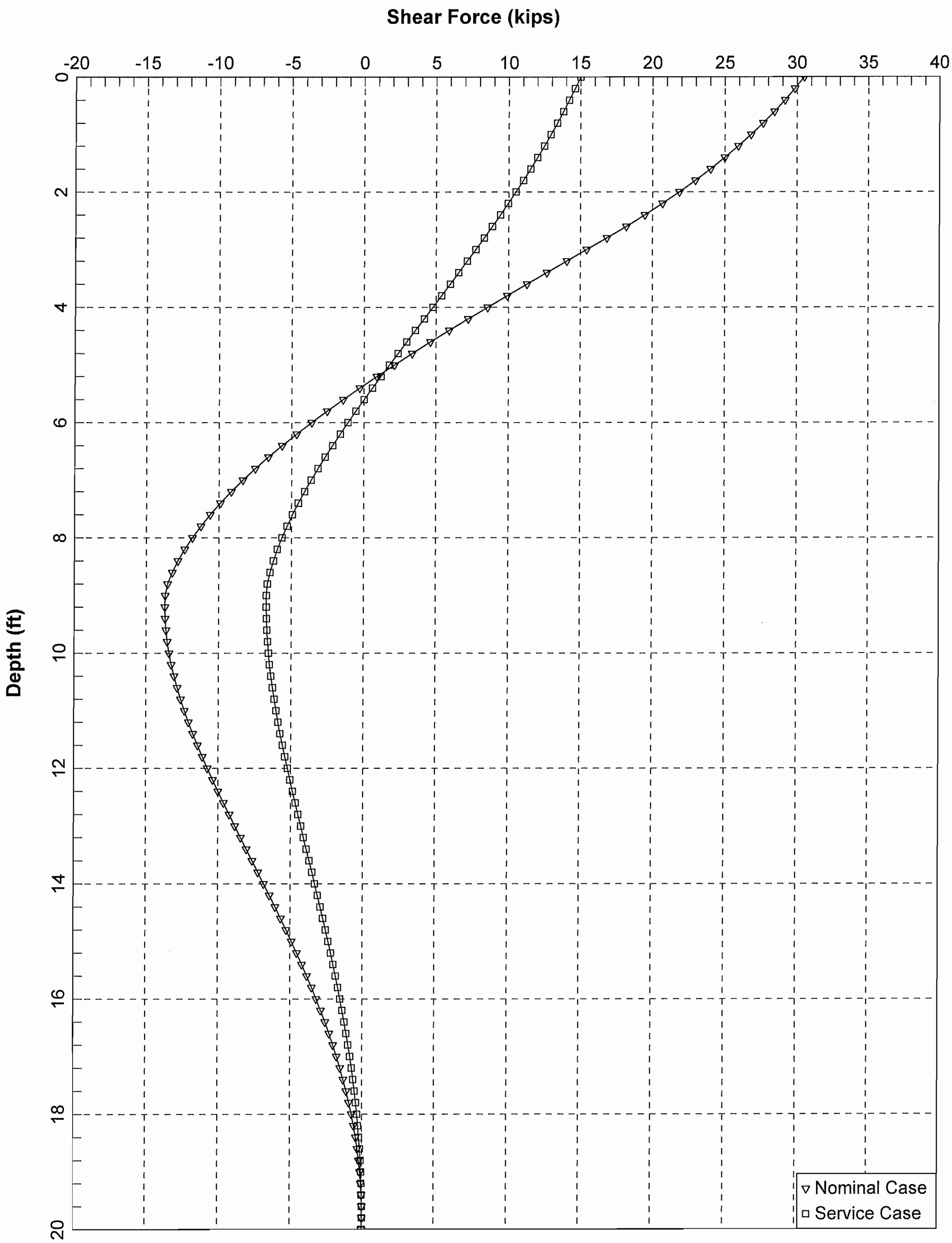
Total Pile Settlement = **0.61** in.
15.4 mm



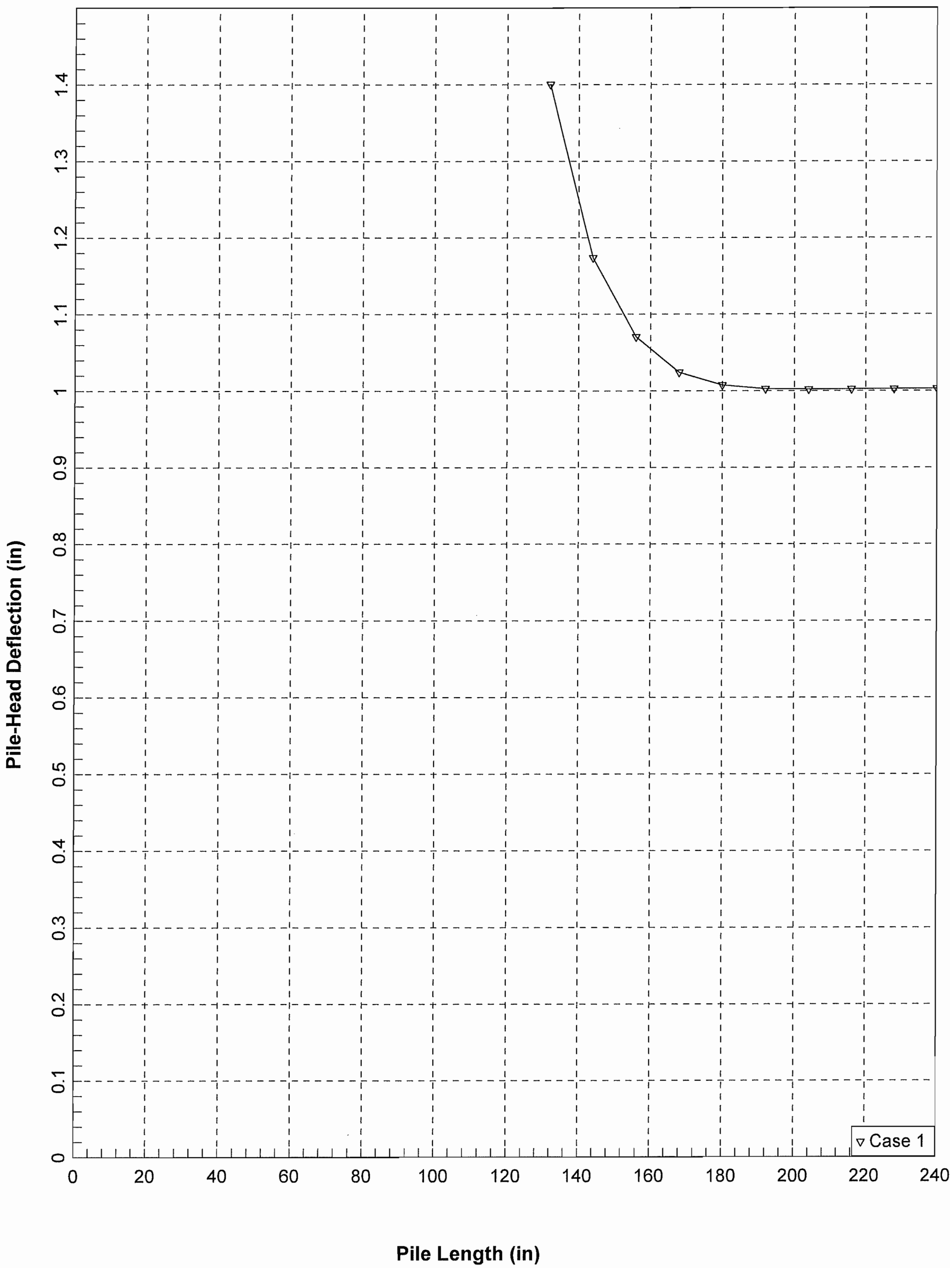
Lathrop Road OC - Abut 1/3, Class 140 (Alt. X, T = 14") Piles, LONGITUDINAL DIRECTION



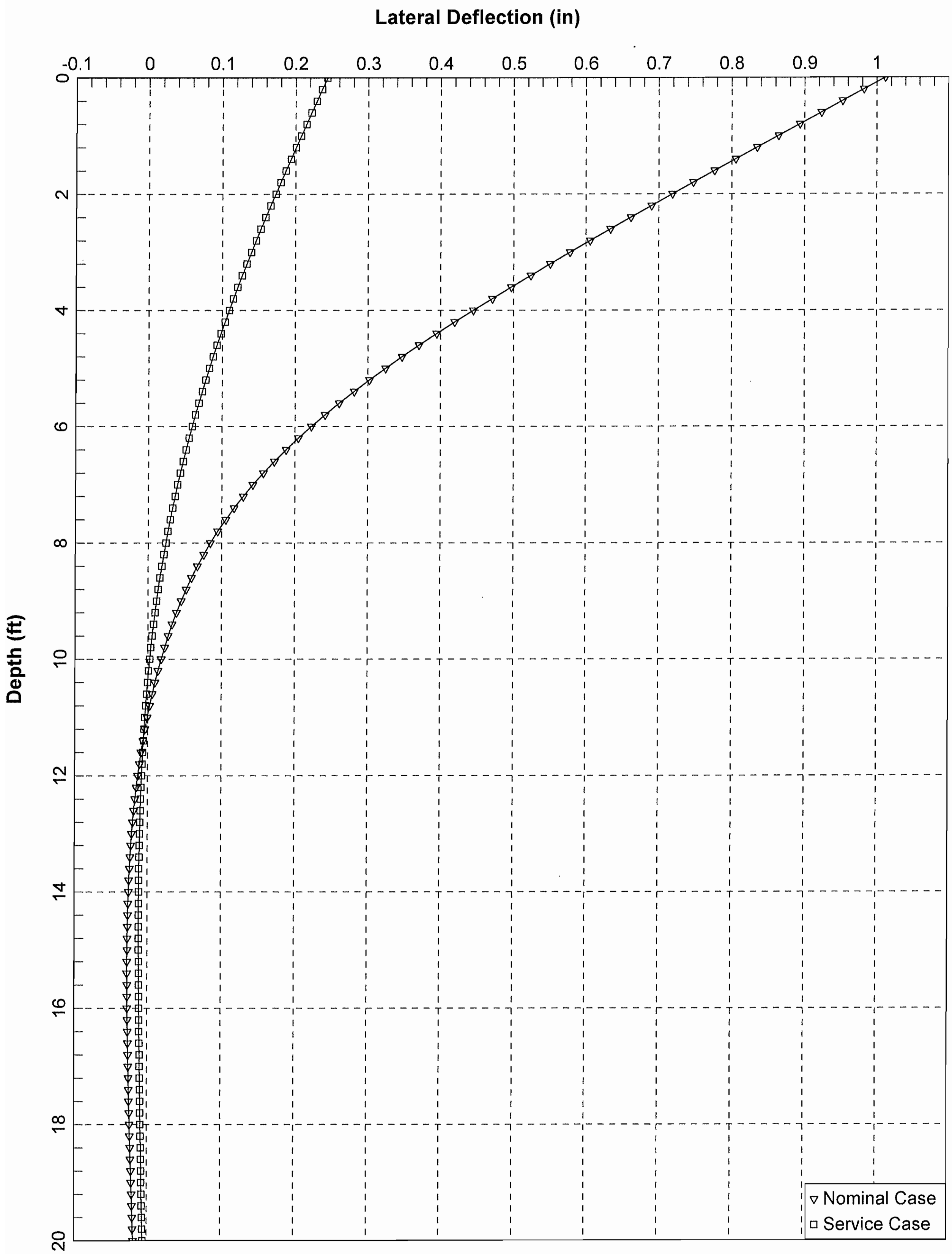
Lathrop Road OC - Abut 1/3, Class 140 (Alt. X, T = 14") Piles, LONGITUDINAL DIRECTION



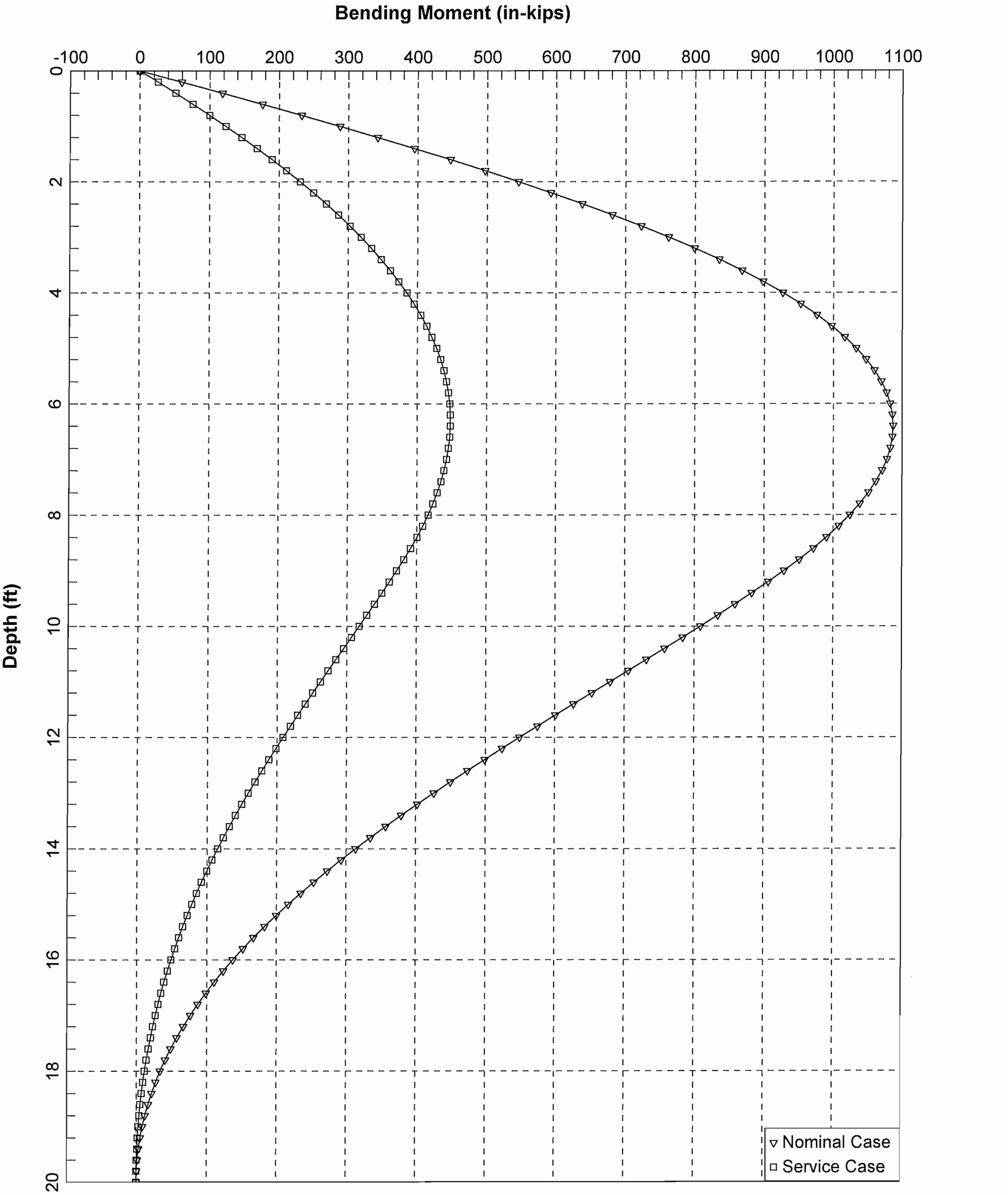
Lathrop Road OC - Abut 1/3, Class 140 (Alt. X, T = 14") Piles, LONGITUDINAL DIRECTION



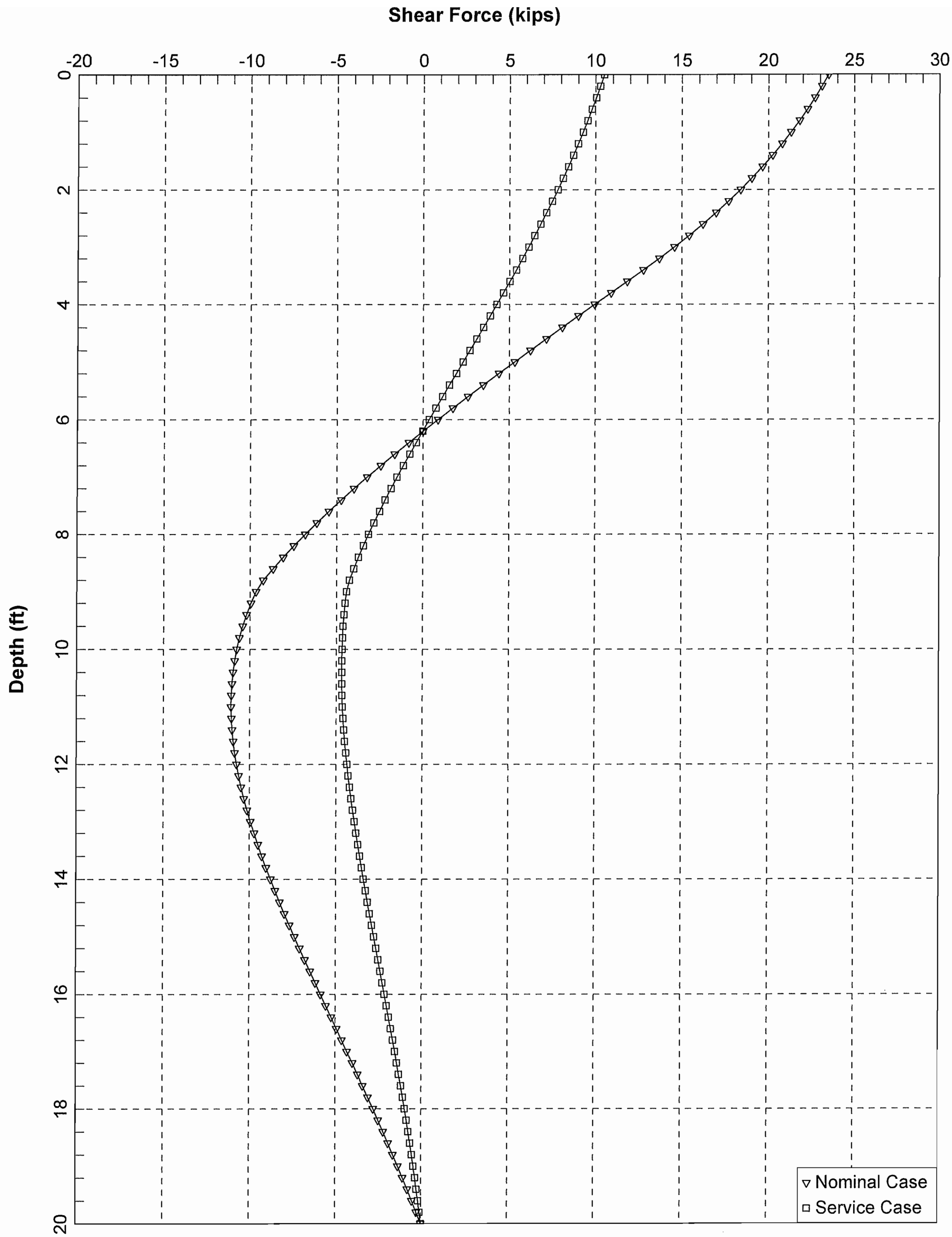
Lathrop Road OC - Abut 1/3, Class 140 (Alt. X, T = 14") Piles, LONGITUDINAL DIRECTION



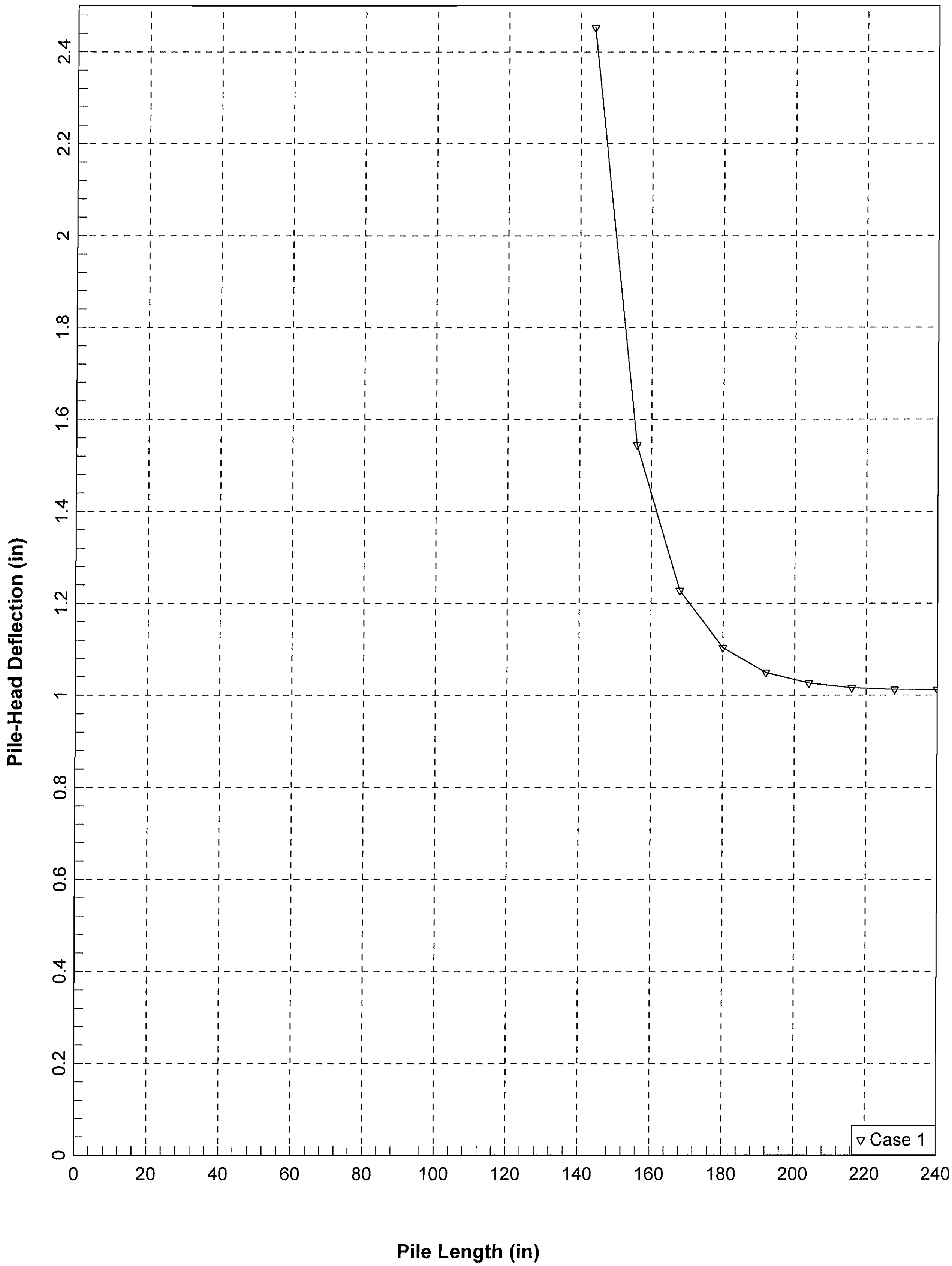
Lathrop Road OC - Abut 1/3, Class 140 (Alt. X, T = 14") Piles, TRANSVERSE DIRECTION



Lathrop Road OC - Abut 1/3, Class 140 (Alt. X, T = 14") Piles, TRANSVERSE DIRECTION



Lathrop Road OC - Abut 1/3, Class 140 (Alt. X, T = 14") Piles, TRANSVERSE DIRECTION



Lathrop Road OC - Abut 1/3, Class 140 (Alt. X, T = 14") Piles, TRANSVERSE DIRECTION

APPENDIX D

Bent 2, Class 200 Pile Calculations

DRIVEN 1.2

GENERAL PROJECT INFORMATION

Filename: Z:\ACTIVE~1\1201~1.XSR\1201~1.5LA\ENGINE~1\BENT14.DVN
Project Name: Lathrop Road OC   Project Date: 12/06/2010
Project Client: HDR, Inc.
Computed By: DJM
Project Manager: DJM

PILE INFORMATION

Pile Type: Concrete Pile
Top of Pile: 6.50 ft
Length of Square Side: 14.00 in

ULTIMATE CONSIDERATIONS

Water Table Depth At Time Of:	- Drilling:	25.00 ft
	- Driving/Restrike	25.00 ft
	- Ultimate:	25.00 ft
Ultimate Considerations:	- Local Scour:	0.00 ft
	- Long Term Scour:	0.00 ft
	- Soft Soil:	0.00 ft

ULTIMATE PROFILE

Layer	Type	Thickness	Driving Loss	Unit Weight	Strength	Ultimate Curve
1	Cohesionless	26.00 ft	0.00%	110.00 pcf	32.0/32.0	Nordlund
2	Cohesionless	10.00 ft	0.00%	125.00 pcf	34.0/34.0	Nordlund
3	Cohesive	10.00 ft	0.00%	120.00 pcf	3000.00 psf	T-79 Concrete
4	Cohesive	4.00 ft	0.00%	118.00 pcf	2000.00 psf	T-79 Concrete
5	Cohesive	8.00 ft	0.00%	105.00 pcf	500.00 psf	T-79 Concrete
6	Cohesive	4.00 ft	0.00%	110.00 pcf	1000.00 psf	T-79 Concrete
7	Cohesionless	14.00 ft	0.00%	120.00 pcf	34.0/34.0	Nordlund
8	Cohesive	24.00 ft	0.00%	120.00 pcf	3000.00 psf	T-79 Concrete
9	Cohesionless	11.00 ft	0.00%	120.00 pcf	36.0/36.0	Nordlund

ULTIMATE - SKIN FRICTION

Depth	Soil Type	Effective Stress At Midpoint	Sliding Friction Angle	Adhesion	Skin Friction
0.01 ft	Cohesionless	0.00 psf	0.00	N/A	0.00 Kips
6.49 ft	Cohesionless	0.00 psf	0.00	N/A	0.00 Kips
6.50 ft	Cohesionless	715.00 psf	26.94	N/A	0.00 Kips
9.01 ft	Cohesionless	853.05 psf	26.94	N/A	6.18 Kips
18.01 ft	Cohesionless	1348.05 psf	26.94	N/A	44.81 Kips
24.99 ft	Cohesionless	1731.95 psf	26.94	N/A	92.49 Kips
25.01 ft	Cohesionless	2750.24 psf	26.94	N/A	92.65 Kips
25.99 ft	Cohesionless	2773.56 psf	26.94	N/A	100.50 Kips
26.01 ft	Cohesionless	2797.91 psf	28.62	N/A	100.68 Kips
35.01 ft	Cohesionless	3079.61 psf	28.62	N/A	199.48 Kips
35.99 ft	Cohesionless	3110.29 psf	28.62	N/A	211.33 Kips
36.01 ft	Cohesive	N/A	N/A	1326.88 psf	211.51 Kips
45.01 ft	Cohesive	N/A	N/A	1477.31 psf	273.57 Kips
45.99 ft	Cohesive	N/A	N/A	1493.69 psf	281.09 Kips
46.01 ft	Cohesive	N/A	N/A	1796.84 psf	281.25 Kips
49.99 ft	Cohesive	N/A	N/A	1805.00 psf	314.78 Kips
50.01 ft	Cohesive	N/A	N/A	500.00 psf	314.88 Kips
57.99 ft	Cohesive	N/A	N/A	500.00 psf	333.50 Kips
58.01 ft	Cohesive	N/A	N/A	1100.00 psf	333.58 Kips
61.99 ft	Cohesive	N/A	N/A	1100.00 psf	354.01 Kips
62.01 ft	Cohesionless	4753.49 psf	28.62	N/A	354.23 Kips
71.01 ft	Cohesionless	5012.69 psf	28.62	N/A	515.04 Kips
75.99 ft	Cohesionless	5156.11 psf	28.62	N/A	611.18 Kips
76.01 ft	Cohesive	N/A	N/A	1505.00 psf	611.44 Kips
85.01 ft	Cohesive	N/A	N/A	1505.00 psf	674.65 Kips
94.01 ft	Cohesive	N/A	N/A	1505.00 psf	737.86 Kips
99.99 ft	Cohesive	N/A	N/A	1505.00 psf	779.86 Kips
100.01 ft	Cohesionless	6942.29 psf	30.30	N/A	780.25 Kips
109.01 ft	Cohesionless	7201.49 psf	30.30	N/A	1077.81 Kips
110.99 ft	Cohesionless	7258.51 psf	30.30	N/A	1146.15 Kips

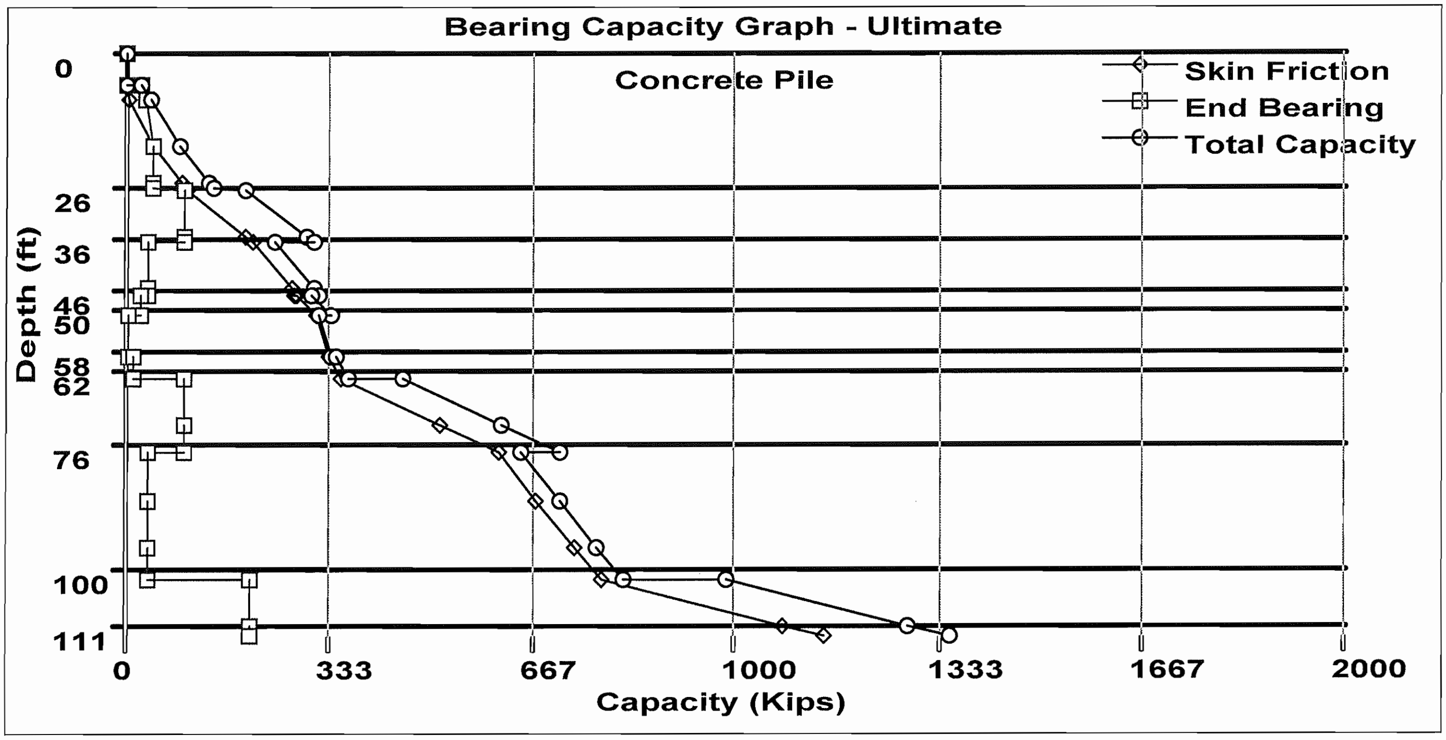
ULTIMATE - END BEARING

Depth	Soil Type	Effective Stress At Tip	Bearing Cap. Factor	Limiting End Bearing	End Bearing
0.01 ft	Cohesionless	0.00 psf	40.40	44.92 Kips	0.00 Kips
6.49 ft	Cohesionless	0.00 psf	40.40	44.92 Kips	0.00 Kips
6.50 ft	Cohesionless	715.00 psf	40.40	44.92 Kips	24.60 Kips
9.01 ft	Cohesionless	991.10 psf	40.40	44.92 Kips	34.09 Kips
18.01 ft	Cohesionless	1981.10 psf	40.40	44.92 Kips	44.92 Kips
24.99 ft	Cohesionless	2748.90 psf	40.40	44.92 Kips	44.92 Kips
25.01 ft	Cohesionless	2750.48 psf	40.40	44.92 Kips	44.92 Kips
25.99 ft	Cohesionless	2797.12 psf	40.40	44.92 Kips	44.92 Kips
26.01 ft	Cohesionless	2798.23 psf	55.60	100.07 Kips	100.07 Kips
35.01 ft	Cohesionless	3361.63 psf	55.60	100.07 Kips	100.07 Kips
35.99 ft	Cohesionless	3422.97 psf	55.60	100.07 Kips	100.07 Kips
36.01 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
45.01 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
45.99 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
46.01 ft	Cohesive	N/A	N/A	N/A	24.50 Kips
49.99 ft	Cohesive	N/A	N/A	N/A	24.50 Kips
50.01 ft	Cohesive	N/A	N/A	N/A	6.12 Kips
57.99 ft	Cohesive	N/A	N/A	N/A	6.12 Kips
58.01 ft	Cohesive	N/A	N/A	N/A	12.25 Kips
61.99 ft	Cohesive	N/A	N/A	N/A	12.25 Kips
62.01 ft	Cohesionless	4753.78 psf	55.60	100.07 Kips	100.07 Kips
71.01 ft	Cohesionless	5272.18 psf	55.60	100.07 Kips	100.07 Kips
75.99 ft	Cohesionless	5559.02 psf	55.60	100.07 Kips	100.07 Kips
76.01 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
85.01 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
94.01 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
99.99 ft	Cohesive	N/A	N/A	N/A	36.75 Kips
100.01 ft	Cohesionless	6942.58 psf	77.60	206.34 Kips	206.34 Kips
109.01 ft	Cohesionless	7460.98 psf	77.60	206.34 Kips	206.34 Kips
110.99 ft	Cohesionless	7575.02 psf	77.60	206.34 Kips	206.34 Kips

ULTIMATE - SUMMARY OF CAPACITIES

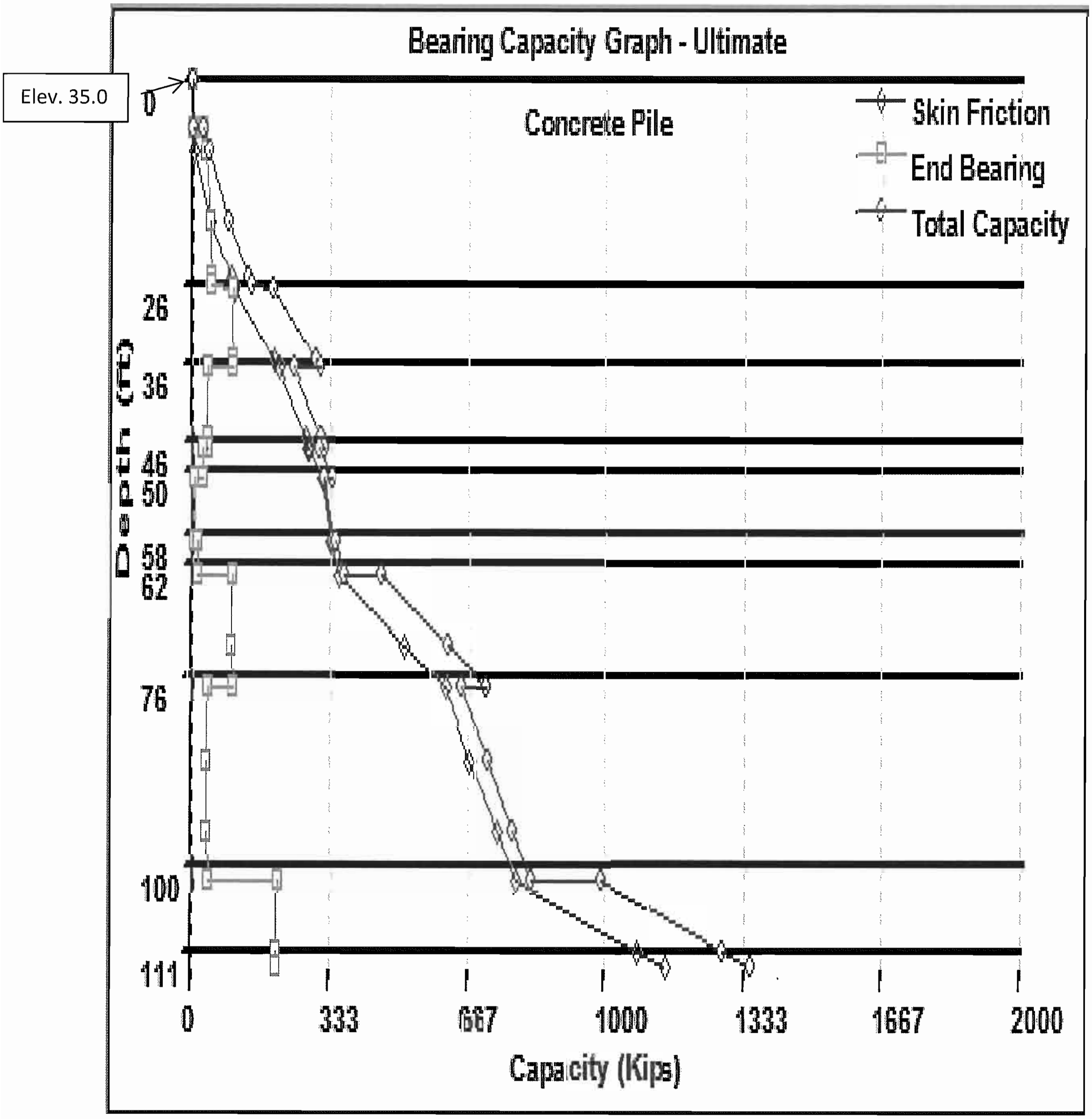
Depth	Skin Friction	End Bearing	Total Capacity
0.01 ft	0.00 Kips	0.00 Kips	0.00 Kips
6.49 ft	0.00 Kips	0.00 Kips	0.00 Kips
6.50 ft	0.00 Kips	24.60 Kips	24.60 Kips
9.01 ft	6.18 Kips	34.09 Kips	40.28 Kips
18.01 ft	44.81 Kips	44.92 Kips	89.73 Kips
24.99 ft	92.49 Kips	44.92 Kips	137.40 Kips
25.01 ft	92.65 Kips	44.92 Kips	137.56 Kips
25.99 ft	100.50 Kips	44.92 Kips	145.41 Kips
26.01 ft	100.68 Kips	100.07 Kips	200.75 Kips
35.01 ft	199.48 Kips	100.07 Kips	299.55 Kips
35.99 ft	211.33 Kips	100.07 Kips	311.40 Kips
36.01 ft	211.51 Kips	36.75 Kips	248.26 Kips
45.01 ft	273.57 Kips	36.75 Kips	310.32 Kips
45.99 ft	281.09 Kips	36.75 Kips	317.84 Kips
46.01 ft	281.25 Kips	24.50 Kips	305.75 Kips
49.99 ft	314.78 Kips	24.50 Kips	339.28 Kips
50.01 ft	314.88 Kips	6.12 Kips	321.01 Kips
57.99 ft	333.50 Kips	6.12 Kips	339.63 Kips
58.01 ft	333.58 Kips	12.25 Kips	345.83 Kips
61.99 ft	354.01 Kips	12.25 Kips	366.26 Kips
62.01 ft	354.23 Kips	100.07 Kips	454.30 Kips
71.01 ft	515.04 Kips	100.07 Kips	615.11 Kips
75.99 ft	611.18 Kips	100.07 Kips	711.24 Kips
76.01 ft	611.44 Kips	36.75 Kips	648.19 Kips
85.01 ft	674.65 Kips	36.75 Kips	711.40 Kips
94.01 ft	737.86 Kips	36.75 Kips	774.61 Kips
99.99 ft	779.86 Kips	36.75 Kips	816.61 Kips
100.01 ft	780.25 Kips	206.34 Kips	986.60 Kips
109.01 ft	1077.81 Kips	206.34 Kips	1284.16 Kips
110.99 ft	1146.15 Kips	206.34 Kips	1352.50 Kips

Filename: Z:\ACTIVE~1\1201~1.XSR\1201~1.5LA\ENGINE~1\BENT14.DVN



Lathrop Road Overcrossing
BCI No. 1201.5

BENT 2: CLASS 200 PILE COMPRESSION



Lathrop Road Overcrossing
BCI No. 1201.5
12/06/10
By: DJM

Bent 2 Pile Settlement Calculations: Class 200 Piles

(Foundation Analysis and Design, Bowles, 5th edition, 1996)

Axial Pile Compression

Service-I Limit Per Pile Load (lbs)		175000
A	*Average Axial Load (lbs)	43750
B	Pile Length (in.)	708
C	Tip Area (sq. in.)	196
D	Concrete Modulus of Elasticity (psi)	4415201
Axial Compression (in.)		**0.04**

*Allowable Capacity Reduced by 75% Due to Skin Friction

Axial Compression = (A x B)/(C x D)

Point Settlement

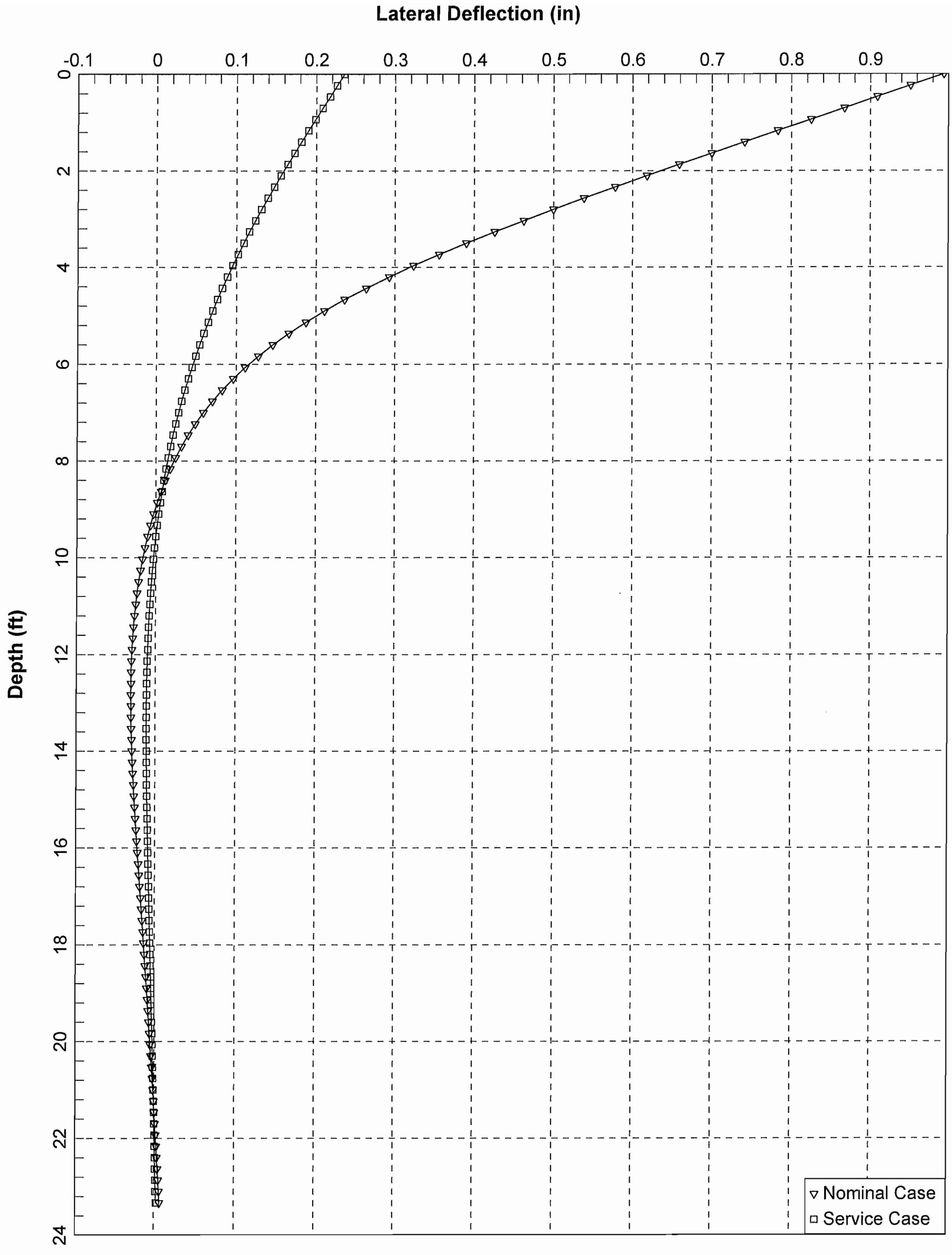
A	Point Bearing Pressure (psi)	892.9
B	Pile Diameter (in.)	14
C	Poisson's Ratio	0.3
D	Point Soil Stress-Strain Modulus (psi)	4166
E	Shape Factor	1
F	Fox Embeddment Factor	0.5
G	Reduction Factor for Skin Friction	0.5
Point Settlement (in.)		**0.68**

A = Allowable Pile Capacity x Tip Area

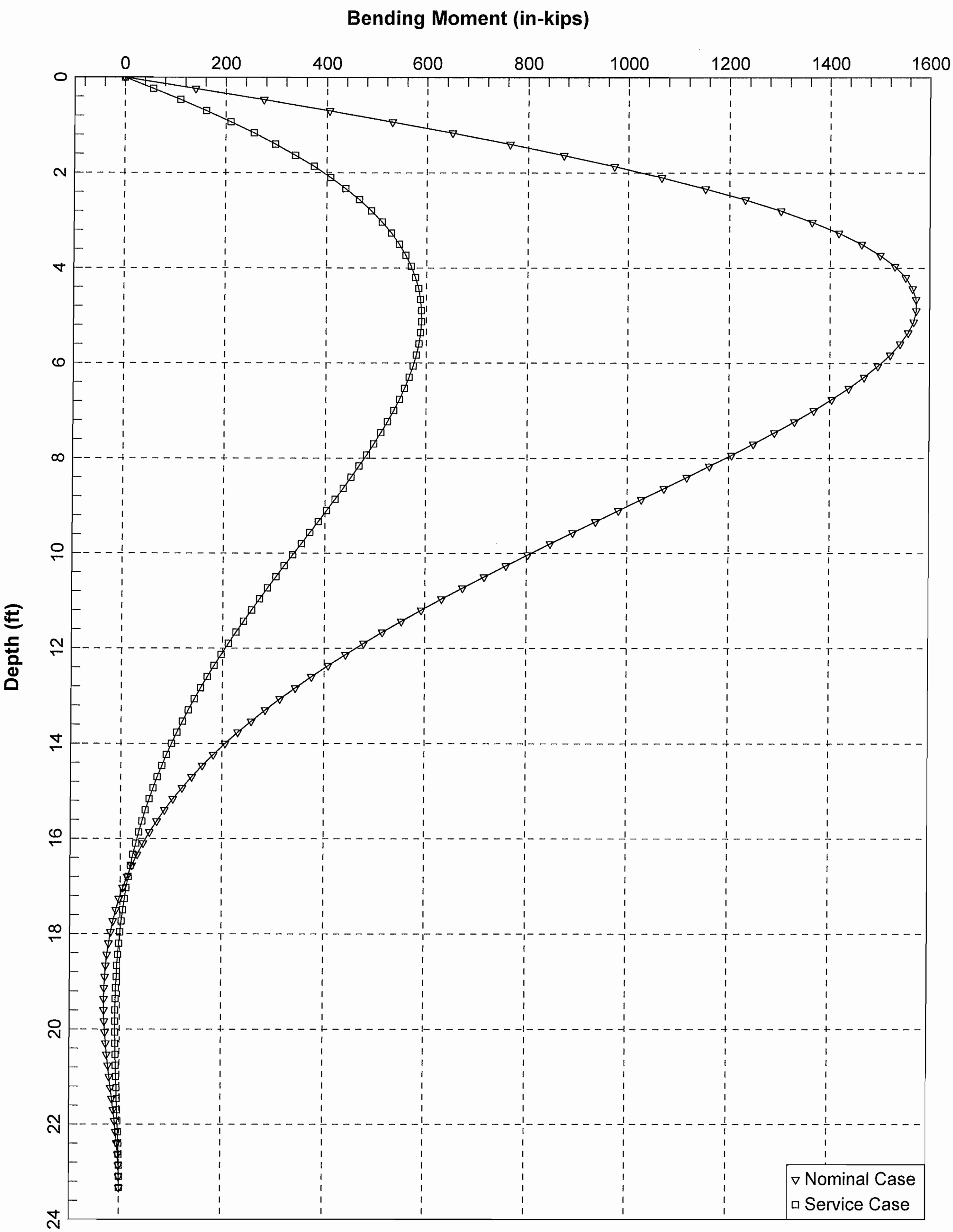
F = 0.55 if L/D >/= to 5, 0.5 if greater than 5

Point Settlement = A x {B x (1-C^2)/D} x E x F x G

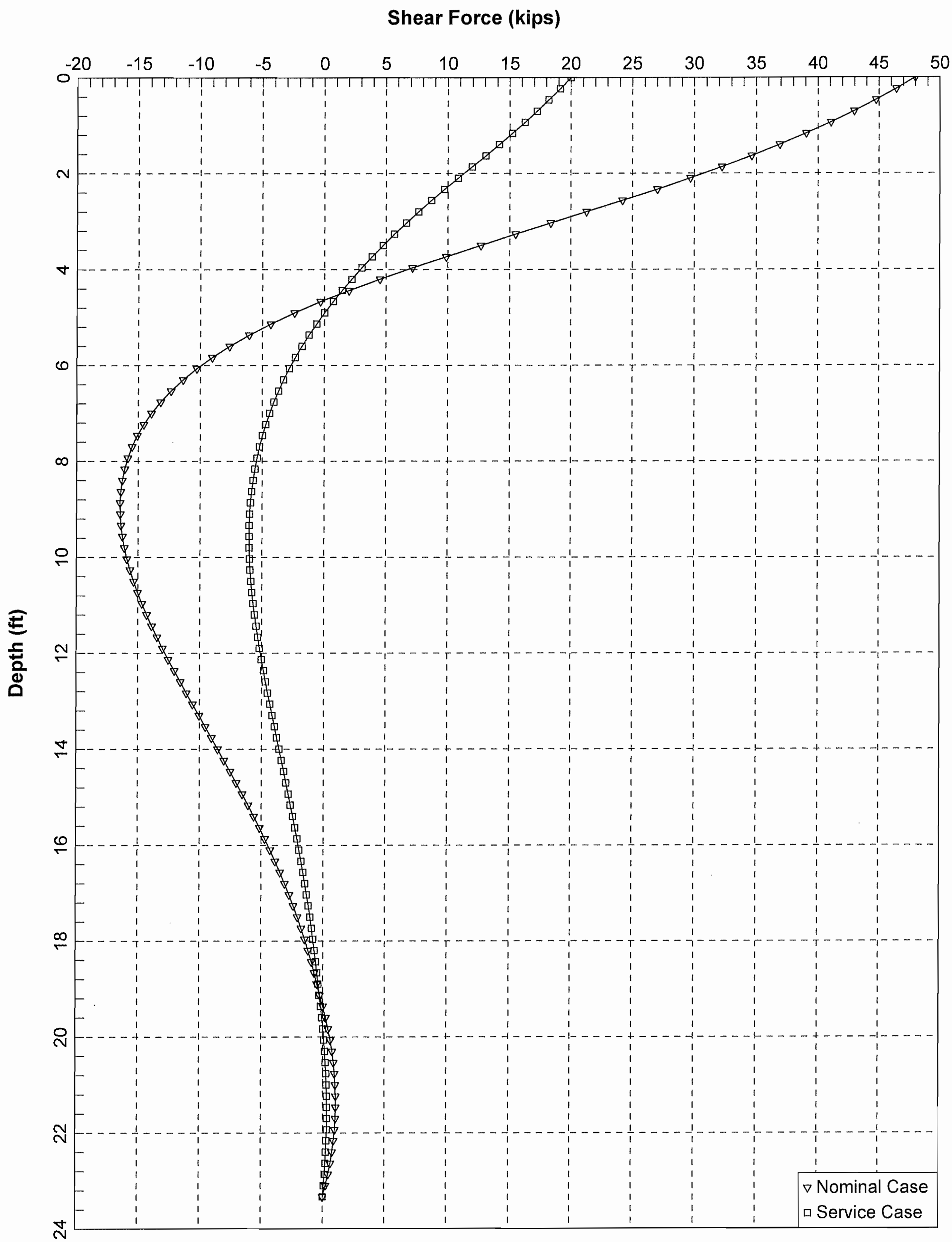
Total Pile Settlement = 0.72 in.
18.2 mm



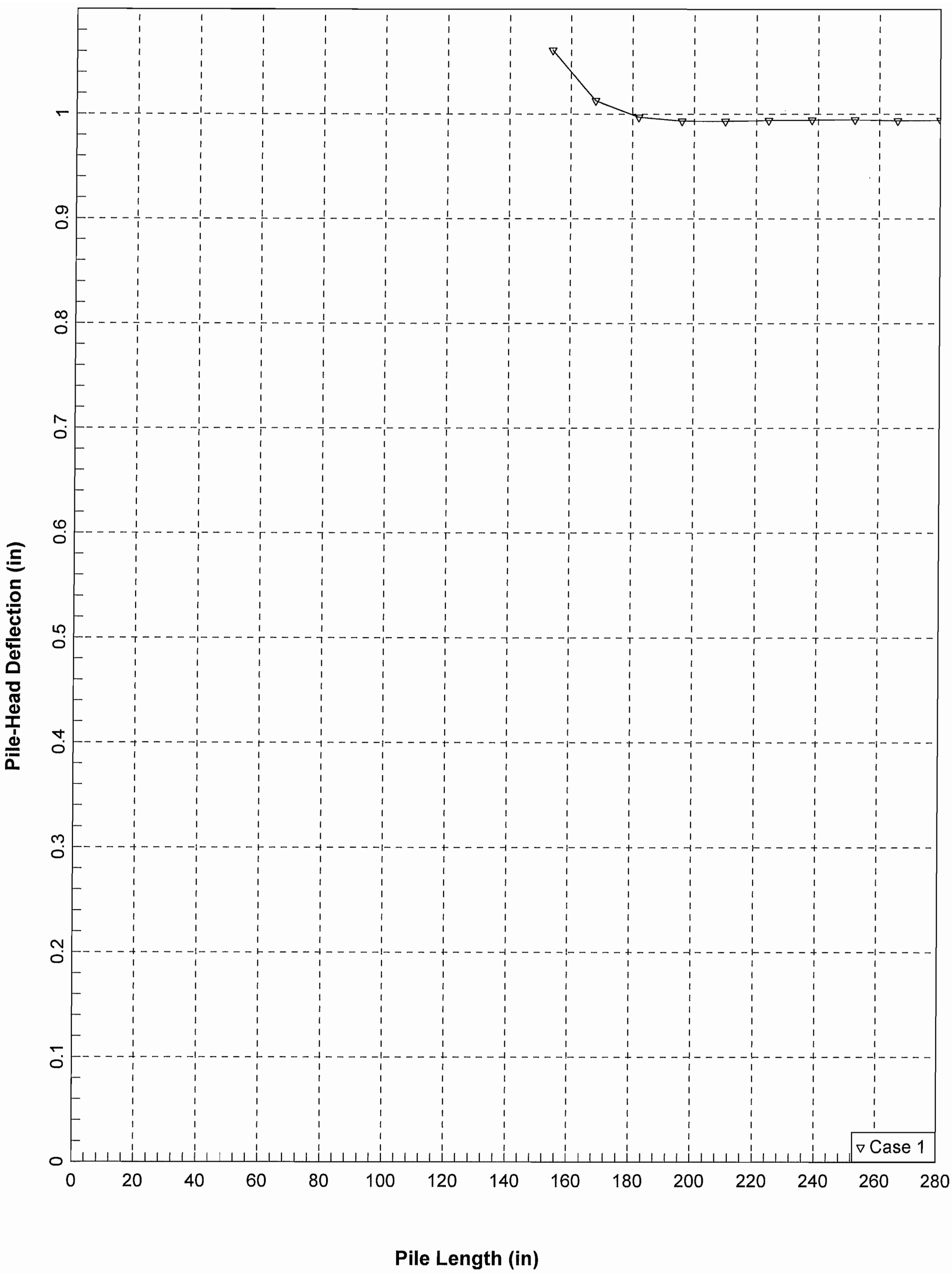
Lathrop Road OC - Bent 2, Class 200 (Alt. X) Piles



Lathrop Road OC - Bent 2, Class 200 (Alt. X) Piles



Lathrop Road OC - Bent 2, Class 200 (Alt. X) Piles



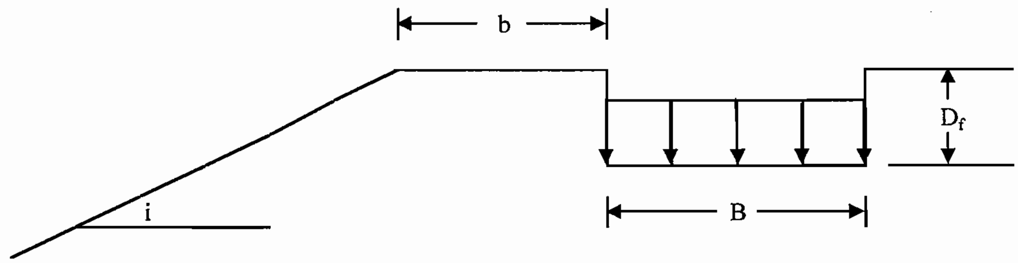
Lathrop Road OC - Bent 2, Class 200 (Alt. X) Piles

APPENDIX E

Pilaster Calculations

Modified Bearing Capacity Factor for Footing Adjacent to Sloping Ground after Meyerhof (1957)

Date: 3/11/2011
Project: Lathrop Road Overcrossing
Support: Pilasters at Abutments
Boring: R-09-L2
BCI No.: 1201.5d
By: WEN



Input Parameters:

Depth to Bottom of Footing, D_f = 3.50 feet

Footing Width, B = 9.00 feet

Footing to Slope Distance, b = 0.00 feet

Slope Inclination, i = 14.0 degrees

D_f/B = 0.39 ($D/B \le 1$)

b/B = 0.00

Soil Unit Weight, γ = 125 (pcf)

Friction Angle, ϕ = 34 ($\phi \ge 30°$)

Cohesion, c = 0 (psf)

By Interpolation:

At $D_f/B = 0$

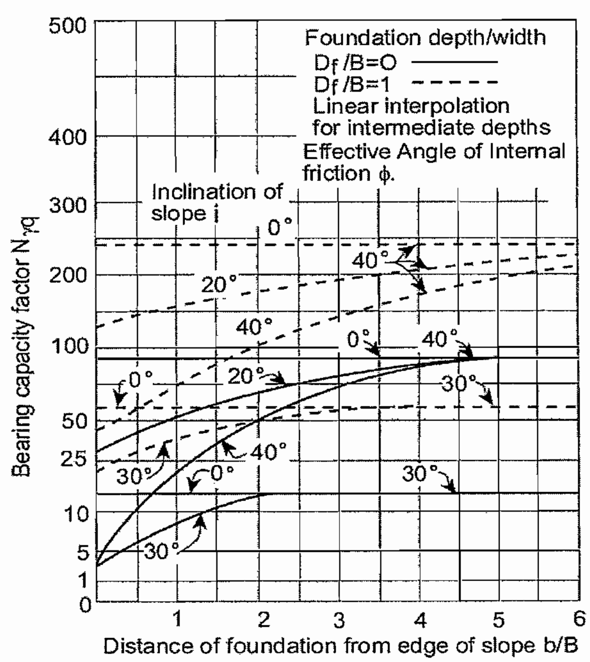
ϕ	$N\gamma q$
30	8.9
34	25.3
40	50.0

At $D_f/B = 1$

ϕ	$N\gamma q$
30	41.1
34	88.2
40	158.8

D_f/B	$N\gamma q$
0.00	25.3
0.39	**49.8**
1.00	88.2

$N\gamma q$ = **49.8** (Modified Bearing Capacity Factor)



Cohesionless Soil

Reference: AASHTO LRFD Bridge Design Specifications, 4th Edition, 2007.

Figure 10.6.3.1.2c-2 Modified Bearing Capacity Factors for Footing in Cohesionless Soils and Adjacent to Sloping Ground after Meyerhof (1957).

Allowable Bearing and Immediate Settlement Worksheet (WSD)

Date: 3/11/2011
Project: Lathrop Road Overcrossing
BCI No: 1201.5d
Support: Pilasters at Abutments
Boring: R-09-L2

LRFD Service Limit State I Vertical Load (kips):		
Effective Footing Width, B'_f (feet):	9.00	
Effective Footing Length, L'_f (feet):	17.00	
Ground Surface Elevation (feet):	56.75	(equal to footing bottom for a footing in fill above ex. grnd. surface)
Ground Water Elevation (feet):	3.5	
Depth to Ground Water (feet):	53.3	(for settlement analysis)
Depth of footing (feet):	0.0	(for settlement analysis)
Time to Settlement (t):	1.2	(for settlement analysis)
Bottom Footing Elevation (feet):	56.75	
Finished Grade (feet):	59.75	
Depth to Ground Water (feet):	56.3	(for bearing resistance analysis)
Depth of footing (feet):	3.0	(for bearing resistance analysis)
γ (pcf) =	125	Soil Parameters at base of footing
ϕ (degrees) =	34	Soil Parameters at base of footing
c (psf) =	0	Soil Parameters at base of footing
Factor of Safety =	3.0	

Layer	Depth Bottom Layer (feet)	Layer Thickness (feet)	Top Elev. (feet)	Bottom Elev. (feet)	Soil Unit Weight (pcf)	Soil Type (1, 2, 3, or 4)	$N1_{60}$	Es (tsf)	or	Estimated Es (tsf)
1	24.75	24.75	56.8	32.0	125	2				250
2	31.75	7	32.0	25.0	114	3	11	110		
3	37.75	6	25.0	19.0	114	1	38	152		
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										

Soil Types
1) Silts, sandy silts, slightly cohesive mixtures
2) Clean fine to medium sands and slightly silty sands
3) Coarse sands and sands with little gravel
4) Sandy gravel and gravels

Ulimate Gross Bearing Capacity q_{ult} (ksf)	Allowable Gross Bearing Capacity q_{all} (ksf)
22.07	7.36

Gross Uniform Bearing Stress q_o (ksf)	Net Bearing Stress q'_o (ksf)	Immediate Settlement S_i (inches)

Sevice Limit State Settlement (2.0 inches) Check	
q_o (ksf)	q_{pg} (ksf)
	4.35

Permissible Net Contact Stress q_{pn} (ksf)	Permissible Gross Contact Stress q_{pg} (ksf)	Immediate Settlement S_i (inches)
4.35	4.35	1.00

Sevice Limit State Bearing Capacity Check	
q_o (ksf)	q_{all} (ksf)
	7.36

References
1) Caltrans, Memo To Designers 4-1 Spread Footings, April 2008.
2) Nominal Bearing Resistance Equation (10.6.3.1.2a-1) Modified for Footing Near Slope, AASHTO LRFD Bridge Design Specifications, 4th Edition, 2007.
3) Schmertmann's Modified Method for Calculation of Immediate Settlements (1978), Soils and Foundations - Volume II, FHWA NHI-06-089, December 2006.
4) Elastic Constants of Various Soils (Table C10.4.6.3-1) AASHTO LRFD Bridge Design Specifications, 4th Edition, 2007.

BEARING CAPACITY for FOOTING LOCATED ADJACENT to SLOPING GROUND

STRENGTH LIMIT STATE (AASHTO Bridge Design Specifications)

Date: 3/11/2011
Project: Lathrop Road Overcrossing
BCI No: 1201.5d

Support: Pilasters at Abutments
Boring: R-09-L2

Equation: $q_n = cN_{cqm} + 0.5\gamma BN_{\gamma qm}C_{w\gamma}$

in which:

$N_{cqm} = N_{cq} s_c i_c$

$N_{\gamma qm} = N_{\gamma q} s_\gamma i_\gamma$

D_w	$C_{w\gamma}$
0	0.5
D_f	0.5
$>1.5B+D_f$	1.0

where:

q_n = nominal bearing resistance

c = cohesion (psf)

B' = effective footing width (feet)

γ = total (moist) unit weight of soil (pcf)

D_f = footing embedment depth (feet)

N_{cq} and $N_{\gamma q}$ = modified bearing capacity factors

$C_{w\gamma}$ = correction factor for location of ground water

s_c and s_γ = footing shape correction factors

i_c and i_γ = load inclination factors

D_w = depth to ground water taken from the ground surface (feet)

Input Parameters

γ =	125	(pcf)
ϕ =	34	(degrees)
c =	0	(psf)
D_f =	3	(feet)
D_w =	56.25	(feet)

i_c =	1.0
i_γ =	1.0

Bottom Footing Elevation (feet):	56.8
Finished Grade (feet):	59.8
Ground Water Elevation (feet):	3.5

Strength Limit State

Solve for Ultimate Gross Bearing Capacity

Effective Footing Dimensions B'	Effective Footing Dimensions L'		$C_{w\gamma}$	s_c	s_γ		Ulimate Gross Bearing Capacity (psf)	Ulimate Gross Bearing Capacity (ksf)	Ulimate Gross Bearing Capacity (tsf)	Allowable Gross Bearing Capacity, Factor of Safety = 3.0 (psf)	Allowable Gross Bearing Capacity (ksf)	Allowable Gross Bearing Capacity (tsf)
(feet)												
9.0	17.0		1.00	1.00	0.79		22074	22.07	11.0	7358	7.36	3.7

Modified Bearing Capacity Factors

N_{cq} =	NA
$N_{\gamma q}$ =	49.8

Shape Correction Factors

ϕ	s_c	s_γ
$\phi = 0$	1 + (B/5L)	1.0
$\phi > 0$	1	1 - 0.4(B/L)

Notes: If L > 5B, then s_c and s_γ = 1.0 (Geotechnical Engineering Circular No. 6, FHWA-SA-02-054, pgs 55-56)

Nγq determined from Figure 10.6.3.1.2c-2, AASHTO LRFD Bridge Design Specifications, 4th Edition, 2007.

REDUCED PASSIVE EQUIVALENT FLUID WEIGHT FOR SLOPING GROUND IN FRONT OF WALL

Project: Lathrop Road Overcrossing
BCI No.: 1201.5d
Calculated by: WEN — Date: 3/16/2011
Checked by: — Date:

Unit wieght of soil (pcf), γ =	125.0	
Internal friction angle of soil (degrees), ϕ =	34.0	(<45°)
Inclination of soil surface in front of wall footing (degrees), i =	-14.0	

Coefficient of Friction (sliding) = tan(0.75ϕ) = 0.48

Passive Pressure Coefficient (K_P) = $[\cos\phi/\{1 - [\sin\phi(\sin\phi + \cos\phi\tan i)]^{0.5}\}]^2$

K_P = 2.22

Passive Equivalent Fluid Weight = $K_p\gamma$			
Factor of Safety	1.0	2.0	3.0
Passive EFW (psf/f)	277.00	138.00	92.00

Reference: Naval Facilities (NAVFAC) Design Manual 7.2

APPENDIX F

Embankment Settlement Analysis Results

Lathrop Road OC - Embankment Settlement

PROJECT IDENTIFICATION

Title:	Lathrop Road OC - Embankment Settlement
Project Number:	1201 - 5
Client:	HDR, Inc.
Designer:	DJM
Station Number:	

Description:
27' High Embankment, 100-foot Wide Crest, 4:1 Side Slopes

Company's information:

Name:	Blackburn Consulting, Inc.
Street:	2491 Boatman Avenue West Sacramento, CA 95691
Telephone #:	
Fax #:	
E-Mail:	

Original file path and name: Z:\Active ..... nt Settlement\Draft Foundation Report Analysis.2ST
Original date and time of creating this file: Thu Dec 09 13:33:49 2010

GEOMETRY: Analysis of a 2D geometry

INPUT DATA – FOUNDATION LAYERS – 8 layers

	Wet Unit Weight, γ [lb/ft³]	Poisson's Ratio μ	Description of Soil
1	110.00	0.30	Medium Dense Sand
2	125.00	0.30	Medium Dense Sand
3	120.00	0.30	Very Stiff to Hard Silt/Clay
4	118.00	0.30	Very Stiff Silt/Clay
5	105.00	0.45	Soft Clay
6	110.00	0.45	Stiff Clay
7	120.00	0.30	Medium Dense Sand
8	125.00	0.30	Clay

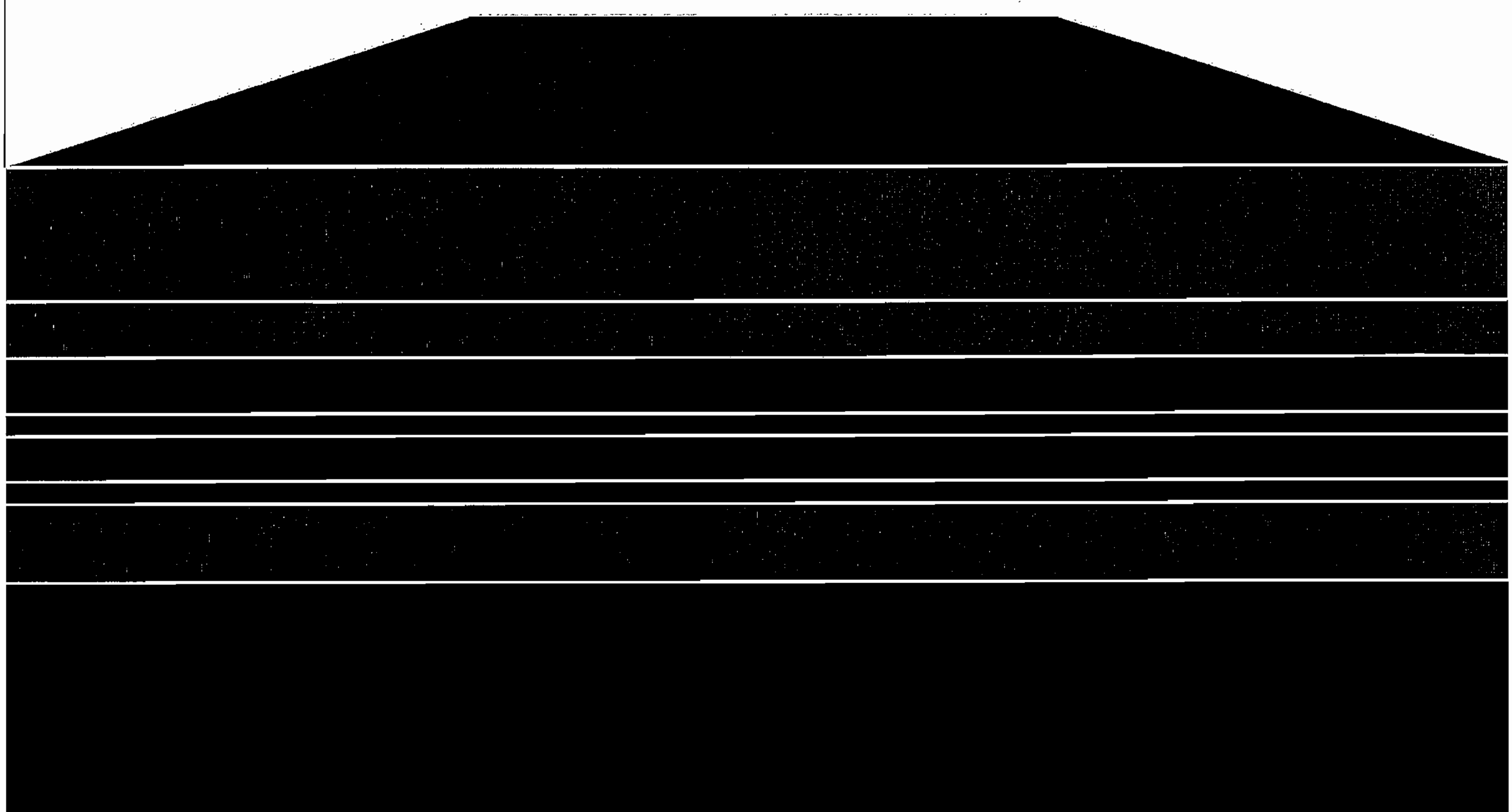
INPUT DATA – EMBANKMENT LAYERS – 1 layers

	Wet Unit Weight, γ [lb/ft³]	Description of Soil
1	125.00	

INPUT DATA OF WATER

Point #	Coordinates (X, Z) : (X) [ft.]	(Z) [ft.]
1	-100.00	76.00
2	328.08	76.00
3	344.49	76.00
4	360.89	76.00
5	400.00	76.00

DRAWING OF SPECIFIED GEOMETRY



INPUT DATA FOR CONSOLIDATION — $\alpha = 1/6$

Layer #	Underging Consolidation [Yes/No]	OCR = Pc / Po	Cc	Cr	e0	Cv [ft²/day]	Drains at :
1	No	N/A	N/A	N/A	N/A	N/A	N/A
2	No	N/A	N/A	N/A	N/A	N/A	N/A
3	No	N/A	N/A	N/A	N/A	N/A	N/A
4	No	N/A	N/A	N/A	N/A	N/A	N/A
5	Yes	1.00	0.55	0.03	1.54	0.4400	Top & Bot.
6	Yes	1.00	0.48	0.03	1.27	0.4400	Top & Bot.
7	No	N/A	N/A	N/A	N/A	N/A	N/A
8	No	N/A	N/A	N/A	N/A	N/A	N/A

IMMEDIATE SETTLEMENT, Si

Node #	Settlement along section: X [ft.]	Y [ft.]	Layer (k)	Young's Modulus, E [lb/ft ²]	Poisson's Ratio, μ	Settlement of each layer, Si(k) [ft.]	Initial Z [ft.]	Final Z * [ft.]	Total Settlement Sum of Si(k), [ft.]
1	200.00	0.00	1	310000	0.3000	0.1581	100.00	99.60	0.40
			2	380000	0.3000	0.0598			
			3	1000000	0.3000	0.0235			
			4	700000	0.3000	0.0143			
			5	250000	0.4500	0.0549			
			6	500000	0.4500	0.0146			
			7	500000	0.3000	0.0659			
			8	1500000	0.3000	0.0096			

*Note: Final Z is calculated assuming only 'Immediate Settlement' exists.

ULTIMATE SETTLEMENT, Sc

Node #	X [ft.]	Y [ft.]	Original Z [ft.]	Settlement Sc [ft.]	Final Z * [ft.]
1	200.00	0.00	100.00	0.61	99.39

*Note: Final Z is calculated assuming only 'Ultimate Settlement' exists.

TABULATED GEOMETRY: INPUT OF FOUNDATION SOILS

Found. Soil #	Point #	Coordinates (X, Z) : (X) [ft.]	(Z) [ft.]	DESCRIPTION
1	1	200.00	100.00	Medium Dense Sand
2	1	200.00	76.00	Medium Dense Sand
3	1	200.00	66.00	Very Stiff to Hard Silt/Clay
4	1	200.00	56.00	Very Stiff Silt/Clay
5	1	200.00	52.00	Soft Clay
6	1	200.00	44.00	Stiff Clay
7	1	200.00	40.00	Medium Dense Sand
8	1	200.00	26.00	Clay

TABULATED GEOMETRY: INPUT OF EMBANKMENT SOILS

Embankment footprint width = 270.00 [ft]. Side slope of embakment: 18.00 degrees.

Embank. Soil #	Coordinates (X, Z) of center line : (X) [ft.]	(Z) [ft.]	DESCRIPTION
1	200.00	127.00	

Lathrop Road Overcrossing
BCI No. 1201.5
12/06/10
By: DJM

TIME RATE EMBANKMENT SETTLEMENT RESULTS (FoSSA 2.0)

LAYER 5 (Elev. -14.0 to -22.0)

	t0	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10
Total Number of Days	0	4	8	12	16	20	24	28	32	36	40
Average Degree of Consolidation, U (%)	0	38.1	53.7	65	73.6	80	84.9	88.6	91.4	93.5	95.1

	t0	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10
Settlement, Sc [ft]	0	0.159	0.225	0.272	0.308	0.335	0.355	0.371	0.382	0.391	0.398

LAYER 6 (Elev. -22.0 to -26.0)

	t0	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10
Total Number of Days	0	4	8	12	16	20	24	28	32	36	40
Average Degree of Consolidation, U (%)	0	73.7	91.4	97.2	99.1	99.7	99.9	100	100	100	100

	t0	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10
Settlement, Sc [ft]	0	0.141	0.175	0.186	0.19	0.191	0.192	0.192	0.192	0.192	0.192

APPENDIX G

Caltrans Review Comments and BCI Response

Office of Special Funded Projects
Comment & Response Form
(Revised 10/21/09)

General Project Information (OSFP Liaison to complete)	Review Phase (OSFP Liaison to complete)	Reviewer Information (Reviewer Liaison to complete)
Dist: 10 **EA: 0E6101** **Project Name: SR99 Manteca Widening** **OSFP Liaison: John Fujimoto** **Phone: 916-227-8757** **e-mail:** **john_fujimoto@dot.ca.gov**	__ PSR/PDS (Review No.__ __ APS/PSR (Review No.__) __ APS/PR (Review No.__) __ Type Selection __ 65% PS&E Unchecked Details __ PS&E (Review No.__) __ Construction X Other: 1st 65% Review	**Reviewer Name: Ben Barnes** **Functional Unit: Geotechnical Services** **Cost Center: 59-323** **Phone Number: 916-227-1039** **e-mail: benjamin_barnes@dot.ca.gov** **Date of Review: 1/19/2011** **Structure Name*: Lathrop Road OC (Widen)** **Br No*: 29-0331** (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	Structure Consultant Firm	Phone Number	e-mail	Response Date

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR	NA	This is the 1st 65% review of the Draft Foundation Report prepared by Blackburn Consulting, dated December 2010, by Caltrans Office of Geotechnical Design – North.	NA	
2	FR	Piles, Abutments 1 and 3	Based on LOTB, the piles for Abutments 1 and 3 are tipped in a layer overlying a less dense layer. Bearing layer may give less capacity than anticipated. Please verify anticipated capacity of piles.	BCI reviewed compressive strength calculations for the Class 140 (Alt X, T=14") piles. As stated in our report, we expect the nominal compressive resistance of 250 kips for the PPC piles will be obtained substantially (~85%) through skin friction with minor (~15%) end bearing contribution. We	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved (for Reviewer's use)

				neglected the approach fill in our skin friction and end bearing analysis. Our calculations also show that nominal compression of 250 kips and greater is available at/below the specified tip elevation for abutment piles. We do not anticipate that the less dense layer below specified will affect the nominal compressive resistance of the piles since resistance is primarily derived through skin friction along the pile shaft.	
3	FR	LOTB, Pile Driving	LOTB's indicate relatively high blow counts, is difficult driving anticipated?	BCI added the following statement in Section 12.1, "Difficult pile installation is anticipated due to the presence of locally hard or dense soil layers above the specified tip elevations. Drilling to assist pile driving may be necessary to achieve the specified tip elevations. Undersize drilling should be performed in accordance with Section 49-1.05 of the Standard Specifications, *except the drill hole should be no greater than 10-inches in diameter and drilling should not extend within 10 ft of specified tip elevations.* The contractor	

				should drill and drive the first pile at each pile group location, and then adjust the drilling procedure as necessary to achieve the specified tip elevation on remaining piles."	
4	FR	11.1 Abutment and Bent Piles	Previous FR's were revised to include the following sentence "The contractor shall provide a Pile Driving System Submittal in accordance with Caltrans Bridge Reference Specification 49-208 (49HAMR) to verify that the pile driving system is adequate." Should this be added to this FR as well?	BCI added the following statement in Section 12.1, "The contractor shall provide a Pile Driving System Submittal in accordance with Caltrans Bridge Reference Specification 49-208 (49HAMR) to verify that the pile driving system is adequate."	

Office of Special Funded Projects
Comment & Response Form

(Revised 10/21/09)

General Project Information (OSFP Liaison to complete)	Review Phase (OSFP Liaison to complete)	Reviewer Information (Reviewer Liaison to complete)
Dist: 10 EA: 0E6131 Project Name: Lathrop Road OC OSFP Liaison: Reza Erfanian Phone: 916-227-8196 e-mail: reza_erfanian@dot.ca.gov	__ PSR/PDS (Review No.___ __ APS/PSR (Review No.___) __ APS/PR (Review No.___) __ Type Selection __ 65% PS&E Unchecked Details X PS&E (Review No. 1) __ Construction ___ Other:	Reviewer Name: Ben Barnes Functional Unit: Geotechnical Services Cost Center: 59-323 Phone Number: 916-227-1039 e-mail: benjamin_barnes@dot.ca.gov Date of Review: 7/27/2011 Structure Name*: Lathrop Road OC Br No*: 29-0331 (*Use if necessary to when comment sheets are by individual structure)

Consultant Information (to be filled in by Consultant)

Consultant Structure Lead (First and Last Name)	Structure Consultant Firm	Phone Number	e-mail	Response Date

#	Doc. (See Note 1)	Page, Section, or SSP	Review Comments	Consultant Responses	✓
1	FR	NA	This is the 1st review of the Final Foundation Report prepared by Blackburn Consulting, dated March 2011, by Caltrans Office of Geotechnical Design – North.	NA	
2	FR	NA	Comments to the December 2010 Draft Foundation Report have been sufficiently addressed in this report.	NA	
3	FR	Appendix E	The title sheet for Appendix E reads "Embankment Settlement Analysis Results, should read "Pilaster Calculations".	Changed title sheet accordingly.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

✓= Comment Resolved (for Reviewer's use)

Submittal Data (Reviewer to complete)

Dist-EA:_______ Reviewer:_______ Str Name*:_______

Date of Review:_______ Functional Unit:_______ Br No*.____ *=if applicable

4	FR	Section 12.2	States "Refer to Section 10.3 of this report for embankment settlement analysis results." Should be Section 11.3.	Changed accordingly.	
5	FR	NA	(C2) Approved subject to OSFP Verification	NA	

GEOTECHNICAL DESIGN REPORT

Main Street Interchange Improvements

10-SJ-99, PM 8.9 to PM 9.5

EA: 0E-6101, CU: 06241

Prepared by:

BLACKBURN CONSULTING
1720 G Street
Modesto, CA 95354
(209) 522-6273

February 16, 2012

Prepared for:

HDR Engineering, Inc.
1325 J Street, Suite 1300
Sacramento, CA 95814-2928

Modesto Office:
1720 G Street • Modesto, CA 95354
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blackburn consulting

Main Office: (530) 887-1494
11521 Blocker Drive, Suite 110 • Auburn, CA 95603
West Sacramento Office: (916) 375-8706

Geotechnical • Construction Services • Forensics

File No. 1201.5a
February 16, 2012

John Klemunes
HDR Engineering, Inc.
1325 J Street, Suite 1300
Sacramento, CA 95814-2928

Subject: **GEOTECHNICAL DESIGN REPORT**
Main Street Interchange Improvements
10-SJ-99, PM 8.9 to PM 9.5, EA: 0E-6101
Manteca, California

Dear Mr. Klemunes,

Blackburn Consulting (BCI) is pleased to submit this Geotechnical Design Report for the Main Street Interchange Improvements as part of the State Route 99 Manteca Widening Project. BCI prepared this report in accordance with our November 15, 2008 agreement. This report defines the geotechnical conditions as evaluated from field and laboratory test data, and provides geotechnical recommendations and specifications for project design and construction.

Thank you for selecting BCI to be on your design team. Please call if you have questions or require additional information.

Sincerely;

BLACKBURN CONSULTING

Reviewed By:

REGISTERED PROFESSIONAL ENGINEER
BENJAMIN D. CRAWFORD
No. GE 2861
GEOTECHNICAL
STATE OF CALIFORNIA

David P. Castro, P.E.
Project Engineer

Benjamin D. Crawford, P.E., G.E.
Principal

GEOTECHNICAL DESIGN REPORT

Main Street Interchange Improvements

10-SJ-99, PM 8.9 to PM 9.5, EA: 0E-6101

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1 INTRODUCTION

1.1 Purpose

BCI prepared this Geotechnical Design Report for design and construction of Main Street Interchange Improvements associated with the State Route 99 (SR 99) Manteca Widening Project, from Austin Road to Arch Road, between PM 5.1 (Station 269+28 "SR99") to PM 15.0 (Station 792+00 "SR99") in San Joaquin County, California.

The purpose of this report is to document subsurface geotechnical conditions, provide analyses of the anticipated site conditions as they pertain to the project described herein, and to recommend design and construction criteria for the proposed interchange improvements. This report also establishes a geotechnical baseline to be used in assessing the existence and scope of changed site conditions.

1.2 Scope of Services

To prepare this report, BCI:

1. Discussed the proposed improvements with the design team.
2. Reviewed preliminary project plans provided by HDR Engineering (HDR).
3. Reviewed pertinent reports and historical information as described in Section 3 of this report.
4. Observed the subsurface conditions in 29 exploratory borings excavated between June 2 and July 14, 2009.
5. Performed laboratory tests on soil samples obtained from the exploratory borings.
6. Performed engineering analysis and calculations to develop our conclusions and recommendations.

2 EXISTING FACILITIES AND PROPOSED IMPROVEMENTS

2.1 Project Description

The objective of the SR 99 Widening Project is to improve traffic flow along SR 99 from Austin Road in Manteca to Arch Road in Stockton, California. As part of the widening project, the new Main Street Interchange will be constructed in the vicinity of the Lathrop Road Interchange to improve access to Main Street and Lathrop Road. The existing Lathrop Road Interchange consists of a two-span, reinforced concrete box girder structure and short north and south bound on and off ramps. Based on our review of the information provided by HDR, and review of the preliminary plans, the interchange improvements will include:

- New SR 99 north/southbound loop on-ramps.
- New SR 99 northbound off-ramp.
- New SR 99 southbound on and off-ramps.
- Realign and widen Lathrop Road to 3 lanes in each direction.
- Replace the existing Lathrop Road overhead bridge with a two-span cast-in-place concrete box girder bridge.

- Approximately 5,194 linear feet (ft.) of new two-lane frontage road.
- Realign North Main Street near the intersection of Lathrop Road.
- A new retaining wall along the SR 99 northbound off-ramp.
- Utility relocation and improvements.
- Construction of new drainage basins.
- New drainage culverts.

Figure 1 in Appendix A displays the Vicinity Map. Refer to Figure 4 (Site Plan and Boring Location Map) in Appendix A for project limits and the proposed improvements.

2.2 Site Description and Existing Facilities

State Route 99 ("SR 99" Line)
The Main Street interchange improvements will include relocating the existing on/off ramps for Lathrop Road and Main Street, the widening of the Lathrop Road Overcrossing structure, and adding frontage roads. Existing SR 99 consists of a four lane divided highway (two lanes in each direction) with an approximately 30 ft. wide unpaved median. Within the project limits, SR 99 elevations range from approximately 35 ft.[1] to 41 ft.

Lathrop Road ("LT" Line)
Lathrop Road improvements at the Main Street/SR 99 interchange will include shifting the road alignment 80 ft. north of existing, constructing new approach embankments and widening the roadway from two lanes to six lanes. The improvements will begin at "LT" line Station 108+91 and continue to 142+46. Existing Lathrop Road consists of a two lane rural road; approach fills at the SR 99 overcrossing of about 380 ft. long and 20 ft. high and 2.5:1 (Horizontal: Vertical) approach fill side slopes. There is an existing 48 inch water main pipeline about 100 ft. north of Lathrop Road running east and west.

Northbound Off-ramp
The SR 99 northbound off-ramp improvements will replace the existing single lane off-ramp alignment and relocate the off-ramp to the south side of Lathrop Road. The proposed off-ramp will increase the deceleration distance from SR 99 to Lathrop Road. The new off-ramp "L1" Line will extend from Station 72+5.97 to Station 129+17.70. The existing off-ramp loops a field located within the northeast quadrant of the interchange. The existing profile is relatively flat from an elevation of 36 ft. at SR 99 to 37 ft. where it intersects with Lathrop Road.

Northbound On-ramp
The SR 99 northbound on-ramp improvements will remove the existing single lane on-ramp alignment and relocate the on-ramp to the south side of Lathrop Road. The proposed on-ramp will be part of a partial clover leaf configuration. The existing on-ramp defines an existing field located within the northeast quadrant of the interchange. "L2" Line will extend from Station 76+24.33 to Station 88+34.69. The existing profile is relatively flat from an elevation of 37 ft. at Lathrop Road to 38 ft. where it intersects with SR 99.

[1] Based on the elevations provided by HDR Engineering Inc., June 2009.

Southbound Off-ramp
The SR 99 southbound off-ramp improvements will remove the existing single lane off-ramp alignment and relocate the off-ramp to intersect at Lathrop Road. The proposed off-ramp will increase the deceleration distance from SR 99 to Lathrop Road. The new "L5" Line will extend from Station 85+39 to Station 100+82. The existing off-ramp defines an existing field located within the northwest quadrant of the interchange. The existing profile is relatively flat from an elevation of 41 ft. at SR 99 to 39 ft. where it intersects with Lathrop Road.

Southbound On-ramp
The SR 99 southbound on-ramp improvements will remove the existing single lane on-ramp alignment and relocate the on-ramp next to Lathrop Road. The proposed on-ramp will be part of a partial clover leaf configuration. The new on-ramp "L3" Line will extend from Station 69+11 to Station 86+48 and a second on-ramp. "L4" Line will extend from Station 80+85 to Station 95+86. The existing on-ramp defines an existing field, a residence and a gas station located within the northwest quadrant of the interchange. The existing profile is relatively flat from an elevation of 39 ft. at Lathrop Road to 38 ft. where it intersects with SR 99.

Existing Culverts
Based on our conversations with HDR, the existing culverts will not be extended for the proposed interchange improvements.

3 PERTINENT REPORTS AND INVESTIGATIONS

In preparing this report, BCI reviewed the following information pertinent to the project.

- "Preliminary Geotechnical/Geologic Memorandum for State Route 99 Widening," Blackburn Consulting, January 30, 2008.
- "Geotechnical Design" and "Materials Report" for the SR 99 Manteca Widening project, Blackburn Consulting, February, 16 2012.
- "California Seismic Hazard Map," State of California Department of Transportation, 1996.
- "Geologic Map of the San Francisco-San Jose Quadrangle, California" Wagner, D.L., Bortugno, E.J. and McJunkin, R.D., 1991, 1:250,000: California Division of Mines and Geology, Regional Geologic Map 5A.
- As-Built Log of Test Borings (LOTBs), Foundation Reports, Geologic Reports and project plans for Caltrans structures located along the project alignment. Appendix D lists the Caltrans information reviewed.

4 PHYSICAL SETTING

4.1 Climate Data

We reviewed climate data for Manteca, California, that is available at the Western Regional Climate Center website (http://www.wrcc.dri.edu). Table 1 presents monthly climatic data averages (1948-2008) for this project.

Table 1: Site Climate Data

Data Type	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Total Precipitation (in.)	Stockton WSO (048558)	2.85	2.25	2.01	1.13	0.41	0.08	0.03	0.04	0.26	0.71	1.74	2.31	13.82
Average Maximum Temperature (F)	Stockton WSO (048558)	53.6	60.6	66.0	72.9	81.1	88.6	94.3	92.7	88.2	78.4	64.5	53.9	74.6
Average Minimum Temperature (F)	Stockton WSO (048558)	37.6	40.5	42.6	46.1	51.7	57.0	60.5	59.9	57.0	50.2	42.3	37.5	48.6

The above data indicates that approximately 94 percent of the total annual precipitation occurs from October through April. The data above indicates that the number of days with temperatures above 50 degrees Fahrenheit (required for paving operations) is reduced between November and March.

4.2 Topography and Drainage

The majority of the Main Street Interchange site topography is relatively level with an average elevation of about 34 ft. Topography along the Lathrop Road alignment slopes up from an elevation of approximately 36 ft. (approximately original grade) to 57 ft. at the top of the existing Lathrop Road embankment fill (PM 9.19).

Shallow swales and ditches direct surface drainage away from the on/off-ramps and SR 99 into various drainage basins located within the improvement area. Drainage within the median of SR99 is provided by drop inlets and pipes that transfer water to the north and southbound shoulder swales.

4.3 Man-made and Natural Features of Engineering and Construction Significance

Other than the planned improvements at the Main Street Interchange, BCI is not aware of any natural features that could affect, or be adversely affected by the project. However, the proposed improvements will have a significant impact on the existing SSJID 48 inch water main located about 100 ft. north of Lathrop Road. See sections 9.1.2 and 10.3 for more information on the existing water line. Other existing utilities will likely have to be relocated at various locations within the improvement area.

4.4 Regional Geology and Seismicity

Literature published by the California Department of Mines and Geology (CDMG) indicates that the site is located within the Great Valley Province. The Great Valley extends northwest to southeast through the central portion of California. It is speculated that the Great Valley became isolated from the Pacific Ocean about 140 million years ago. Since that time, sediments derived from the mountains to the east and west have continually filled the Great Valley. The depth of the sediments is estimated to be up to 10,000 ft. deep.

Based on Caltrans' Seismic Hazard Map (1996), the closest recognized Late Quaternary or younger faults are the Midway-San Joaquin Fault (MSJ), located approximately 18 miles southwest of the site, and the Coast Ranges-Sierran Block Boundary Zone (CSB), and located approximately 22 miles southwest of the site. Figure 3 shows the significant seismic sources (per Caltrans) in the project vicinity.

The MSJ fault has the greatest potential to affect the site, with an estimated maximum moment Magnitude of 6.75. An event of this magnitude, at a distance of 18 miles, would produce a maximum horizontal Peak Bedrock Acceleration (PBA) of about 0.18g (Mualchin, 1996). Based on our preliminary test boring, we classify the site soil profile as Type D (stiff soil).

Figure 2 in Appendix A presents the Geologic Map for the site. Figure 3 presents a Fault Map for the site.

5 EXPLORATION

5.1 Drilling and Sampling

To characterize subsurface conditions at the site, BCI observed and logged 29 borings between June 2 and July 14, 2009, to maximum depths of 41½ ft. below ground surface.

Borings were advanced using hollow stem auger and hand auger drilling methods. Where hollow stem methods were used to advance the borings, BCI obtained relatively undisturbed soil samples using a 3-inch O.D. Modified California Sampler (equipped with 2.5-inch O.D. brass liners). These samplers were driven into the ground by the force of a 140-pound automatic-trip hammer falling approximately 30 inches. We sealed the sample liners with plastic caps. We also obtained bulk soil samples from the auger cuttings. At hand auger locations, we obtained bulk soil samples using a 4-inch diameter hand auger. Bulk samples were placed in plastic bags for transport to the laboratory.

The boring locations are shown on Figure 4 in Appendix A.

5.2 Geologic Mapping

BCI evaluated site geologic conditions based on observations made in our borings, and on review of the 1991 Geologic Map of the San Francisco-San Jose Quadrangle (California Department of Conservation, Division of Mines and Geology Map No. 5A). We discuss the results of our evaluation in Section 7.1.

5.3 Exploration Notes

BCI did not encounter adverse drilling conditions such as caving or hard drilling during borings conducted for this project.

6 GEOTECHNICAL TESTING

We performed the following laboratory tests on representative soil samples from the exploratory borings:

- Moisture content (ASTM D2216) and unit weight (ASTM D2937)
- Triaxial and direct shear (ASTM D2166 and ASTM D3080)
- Plasticity index (ASTM D4318)
- Sieve analysis (ASTM D422)

We attach our laboratory test results, including a summary table, in Appendix C.

7 GEOTECHNICAL CONDITIONS

7.1 Site Geology

BCI evaluated the geology of the area through available geologic maps and literature, site review, and subsurface exploration.

The referenced geologic mapping shows surface materials at the project site as Pleistocene age Modesto Formation. The Modesto Formation consists of older Pleistocene age alluvium composed predominantly of sand and silty sand; overlain by sand, silt and clay deposited by present day streams and rivers. The soil encountered in our borings is consistent with the published geologic mapping.

We present a Geologic Map as Figure 2 in Appendix A.

7.2 Existing Slope Stability

The project area is relatively level with no significant native or cut slopes. Existing Lathrop Road Overcrossing approach fill slopes have 2.5:1 or flatter side slopes, and vertical concrete abutments. The approach slopes appear stable (no noticeable slumping or slope failures) in their present configuration.

7.3 Subsurface Soil Conditions

We present the following discussion of soil conditions based on our drilling and sampling program described in Section 5.1. Refer to the Boring Logs in Appendix B for specific subsurface conditions encountered at each boring location.

<u>SR 99 Mainline</u>
In general, we observed loose to medium dense, poorly graded silty sand to the maximum depth explored. We also observed approximately 5 ft. of silty sand underlain by stiff clay.

Lathrop Road (“LT” Line)
In general, we observed 5 to 13 ft. of loose to medium dense silty sand in the vicinity of the proposed Lathrop Road improvements. Underlying the near surface soil we observed 3 to 6 ft. of stiff to hard silt. Underlying the silt we encountered interbedded layers of poorly graded sand, lean clay, fat clay and silty sand extending to the depths explored.

Southbound On/Off Ramps (“L3” and “L4” / “L5” and “NWL” Lines)
In general, we observed 5 to 12 ft. of loose to medium dense silty sand in the vicinity of the proposed southbound on and off ramp improvements. Underlying the near surface soil we observed 3 to 5 ft. of stiff to hard silt. Underlying the silt we encountered interbedded layers of poorly graded sand, clayey sand and silty sand extending to the depths explored.

Northbound On/Off Ramps (“L1” and “L2” Lines)
In general, we observed 3 to 15 ft. of loose to medium dense silty sand in the vicinity of the proposed northbound on and off ramp improvements. Underlying the near surface soil we observed interbedded layers of poorly graded sand, lean clay and silt extending to the depths explored.

Frontage Roads (“SEL”, “NEL”, and “NWL” Lines)
In general, we observed 4 to 12 ft. of loose to medium dense silty sand in the vicinity of the proposed southbound on and off ramp improvements. Underlying the near surface soil we observed 2 to 4 ft. of stiff to hard silt extending to the depths explored.

Refer to the Boring Logs in Appendix B for specific subsurface conditions encountered at each boring location.

7.4 Water

7.4.1 Surface Water

During our site reconnaissance between June and August 2009, we did not observe surface water at the site. Due to the sandy, free draining soil, ponding of surface water is not expected to significantly impact the project.

7.4.2 Scour

We did not observe evidence of scour at the site since the project is not located near rivers, streams, creeks or lakes.

7.4.3 Erosion

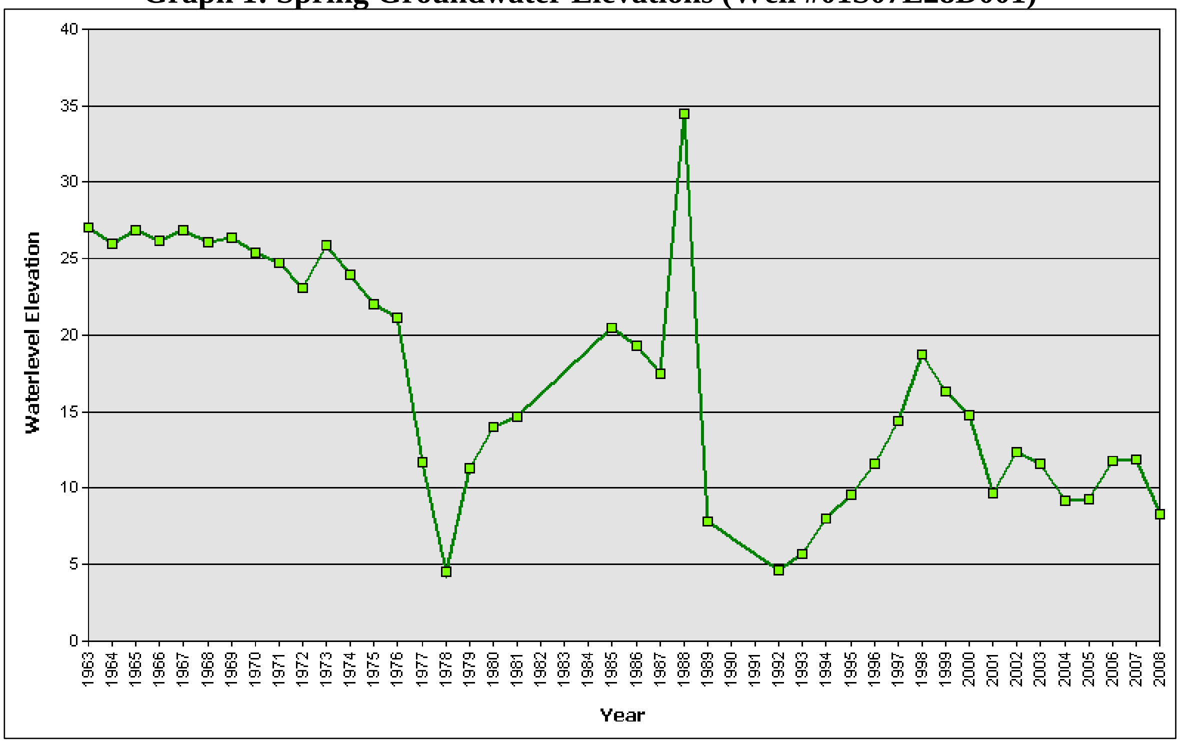
We did not observe significant erosional features along the SR 99 corridor. However, the near surface sandy soils are erodible if subject to concentrated surface flows.

7.4.4 Ground Water

We encountered static ground water during our subsurface exploration for the Main Street Foundation Report at elevations ranging from 3½ to 8½ ft. in May 2009.

Based on our review of the San Joaquin Online Groundwater Reporting Tool (www.sjmap.org/groundwater) the spring groundwater elevations have ranged between elevations of 11.8 and 8.3 ft. (approximately 22.7 to 26.2 ft. below existing grade). Graph 1 below displays the measured spring groundwater elevations for the nearby monitoring well.

Graph 1: Spring Groundwater Elevations (Well #01S07E28D001)



Based on our subsurface exploration and the nearby well data, we used a design ground water elevation of +12 ft. Mean Sea Level (MSL) for this project.

Ground water and perched water levels can fluctuate due to changes in precipitation, irrigation/pumping, and other factors.

7.5 Project Site Seismicity

7.5.1 Ground Motions

Based on Caltrans' Seismic Hazard Map (1996), the closest recognized Late Quaternary or younger faults are the Midway-San Joaquin Fault (MSJ) located approximately 18 miles southwest of the site, and the Coast Ranges-Sierran Block Boundary Zone (CSB), located approximately 22 miles southwest of the site. Figure 3 in Appendix A shows the significant seismic sources (per Caltrans) in the project vicinity.

The MSJ fault has the greatest potential to affect the site, with an estimated maximum moment Magnitude of 6.75. An event of this magnitude, at a distance of 18 miles, would produce a maximum horizontal Peak Bedrock Acceleration (PBA) of about 0.18g (Mualchin, 1996). Based on our preliminary test boring, we classify the site soil profile as Type D (stiff soil).

For design, use the 0.2g peak horizontal rock acceleration curve (0.28g peak ground acceleration) from Figure B.7 (Soil Profile Type D for a Magnitude of 6.5+0.25) of the Caltrans Seismic Design Criteria (2006, Version 1.4). The proposed structure is not located within 10 miles of the controlling fault; therefore, no adjustment to the response spectrum is required for near fault proximity.

7.5.2 Ground Rupture

Our review of published geologic mapping and preliminary site review did not reveal the presence of Late Quaternary (displacement within the last 700,000 years) or younger faults within the project site. Therefore, BCI considers the potential for ground rupture at the site to be low to nonexistent.

7.5.3 Liquefaction

Liquefaction can occur when loose to medium dense, granular, saturated soils (generally within 50 ft. of the surface) are subjected to ground shaking. We evaluated the potential for liquefaction at this site using data from Borings R-09-L1 through R-09-L3 (from the Foundation Report); a design ground water elevation of 12 ft. MSL and liquefaction evaluation criteria consistent with the 1996 National Center for Earthquake Engineer Research (NCEER) Workshop procedures. BCI corrected field blow counts (N-values) to $(N1)_{60}$ values using procedures outline in "Foundation Analysis and Design," 5th edition, Joseph Bowles, 1996. For our analysis we used a peak horizontal ground acceleration (PGA) of 0.28g.

Our liquefaction analysis indicates that the sands between elevations 20 ft. and -1 ft. are not subject to liquefaction during the design earthquake event (PGA = 0.28g). Factors of safety (FS) for this interval range from 1.3 to 2.0, and average $(N_1)_{60}$ of 22.

7.5.4 Seismic Settlement

During a seismic event, ground shaking can cause seismic settlement of relatively loose granular soil above the water table, which can result in settlement of the ground surface.

BCI evaluated potential seismic settlement of the native loose to medium dense sand above the ground water level using the Tokimatsu and Seed (1987) method outlined in "Geotechnical Earthquake Engineering Handbook," Robert W. Day, 2002. Using this method and a PGA of 0.28g, our analysis indicates that seismic settlement of the native sand above the ground water level will be low (approximately 0.2 inches).

8 GEOTECHNICAL ANALYSIS AND DESIGN

8.1 Cuts and Excavations

8.1.1 Stability

The project will involve shallow unreinforced fill slopes less than 5 ft. in thickness. Fill slopes should be stable at an inclination of 2:1 (horizontal:vertical) or flatter, provided that proper erosion control is implemented and surface water is directed away from the slope face.

Slope and/or shore temporary excavations in accordance with current Cal OSHA requirements.

8.1.2 Rippability

Native soil and existing fill should be excavatable with conventional earth moving equipment.

8.1.3 Grading Factors

We understand that project fills will be derived primarily from imported borrow material, supplemented with material excavated from the SR 99 mainline widening project and shallow on-site cuts.

We present the following estimated grading factors for State Route 99 mainline silty sand soil, based on our experience, laboratory test results, and subsurface conditions observed in our borings.

Table 2: Estimated Grading Factors

Material Type	Location	Estimated Grading Factor
Native silty sand (0 to 5 feet)	Main Street Interchange	10% to 20% Shrinkage
Silty sand and sandy clay (0 - 5 feet)	SR 99 Median	5% to 15% Shrinkage

Since the project borrow source(s) has not been determined, additional subsurface exploration, laboratory testing and engineering analysis will be required to provide estimated grading factors for this material.

The above grading factor ranges are for estimation purposes only. Actual grading factors may be significantly different due to differing soil conditions, over or undercompaction, stripping losses, staking errors, and possible differences in actual topography not reflected on the site topographic map.

8.2 Unreinforced Embankments

New embankment fills for the project will be approximately 27 ft. high with 4:1 (horizontal to vertical) side slopes.

8.2.1 Embankment Material

Embankments will be constructed using imported borrow material, supplemented with material excavated from shallow on-site cuts and existing embankment fill. Since the project borrow source(s) has not been determined, additional subsurface exploration, laboratory testing, and engineering analysis will be required to evaluate proposed borrow materials for use on this project.

8.2.2 Slope Stability

The proposed embankment slopes will be stable based on the relatively stable condition of the existing 2.5:1 approach fill side slopes. The generally loose to medium dense nature of the underlying native soil will provide a stable base on which to construct the fills.

New embankments should be constructed in accordance with the 2006 Caltrans Standard Specifications, with proper erosion control and surface drainage directed away from embankment slope faces.

8.2.3 Settlement

We used FoSSA 2.0 software developed by ADAMA Engineering, Inc. to evaluate immediate and long-term consolidation settlement. We modeled a 27 foot high, 269 foot wide approach fill embankment with 4:1 side slopes. BCI used an average unit weight of 125 pounds per cubic foot for the new approach fill weight. For consolidation settlement analysis, we used consolidation test data presented in Appendix B. For elastic settlement analysis, we used data from the borings to estimate soil parameters using Foundation Analysis and Design, 5th edition, Joseph E. Bowles, 1996.

Our analysis indicates that about 5 inches of elastic (immediate) settlement will occur during approach and abutment fill placement. Because of the clay layers underlying the site, we anticipate “long-term” consolidation settlement of about 6 inches. See section 10.4 for special provisions regarding embankment settlement waiting period and monitoring.

8.3 Type 1 Retaining Walls

At heights less than 18 ft., Caltrans Type 1 Retaining Walls (2006 Caltrans Standard Plans) are proposed at the end of the northbound off ramp. The wall will be located along the new SR 99 northbound off ramp north of the frontage road from “L1” line station 82+00.00 to 134+30.00.

Based on our calculations and review, the 2006 Caltrans Standard Plans B3-1 and B3-8 can be used to design the Type 1 retaining walls on spread footings provided the recommendations in Table 3 below are followed.

Table 3: Type 1 Retaining Wall Embedment Depths

Retaining Wall	Length (ft.)	Max Height(ft.)	Embedment Depth*
Main Street northbound off ramp	797	18	Minimum 2 ft. below lowest adjacent grade

*Assumes the footing is constructed in firm undisturbed native soils.

Temporary excavations required to construct the retaining walls should be sloped and shored in accordance with current Cal OSHA requirements.

8.4 Culverts

8.4.1 Support

Native soil, existing embankment and new embankment fill are suitable for support of proposed pipe culverts. Based on our conversation with HDR no culvert extensions are planned for this project.

8.4.2 Backfill

Backfill culverts in accordance with Section 19 of the Caltrans Standard Specifications.

9 CONSTRUCTION CONSIDERATIONS

9.1 Construction Advisories

9.1.1 Perched Ground Water and Over-optimum Soil Moisture

During our exploration we encountered sandy clay and silt layers at depths of approximately 16 ft. below existing grade, which may inhibit infiltration and cause perched water during the rainy season. However, the depth to the clay and silt layer is below the expected improvement depths; therefore, perched water is not expected to impact grading.

Excessively over-optimum (wet) soil conditions can make proper compaction difficult or impossible. Wet soil is commonly encountered during the winter and spring months, or in excavations where ground water or perched ground water is encountered.

In general, wet soil can be mitigated by:

- Discing the soil during prolonged periods of dry weather
- Overexcavating and replacement with drier material
- Lime treatment or stabilization using aggregate and/or stabilization fabric

If wet, unstable soil is encountered, BCI can observe the conditions and provide more specific mitigation recommendations.

9.1.2 Existing Underground Utilities

Our analysis indicates that proposed ramp embankments along the “LT” Line will cause pipe settlement of the existing 48 inch diameter SSJID water line. This could potentially damage the pipe line.

Currently the design team is working with SSJID to mitigate detrimental settlement of the existing SSJID water line in the vicinity of the proposed embankments.

The contractor is responsible for protecting existing underground utilities from damage in accordance with Section 7-1.11 and 8-1.10 of the Caltrans Standard Specifications (May 2006).

9.2 Differing Site Conditions

BCI based this report on the current site conditions. We assume the soil and ground water conditions encountered in our borings are representative of the subsurface conditions across the site. Actual conditions between borings could be different. If differing site conditions are encountered, contact BCI immediately to provide additional recommendations.

10 GEOTECHNICAL RECOMMENDATIONS AND SPECIFICATIONS

This section presents our recommended geotechnical specifications, and special provisions, to be used in design and construction of the project. If designers have questions or problems with any of these recommendations, or if conditions are found to be different during construction, contact BCI to determine if additional field work, analysis, or recommendations are required.

Where referenced below, Standard Specifications and Standard Plans refer to the Caltrans 2006 Standard Plans and Specifications.

10.1 Earthwork

Earthwork shall be performed in accordance with Section 19 of the Standard Specifications. *Structural Backfill* shall conform to Section 19-3 of the Standard Specifications. In addition, earthwork and structural backfill shall be performed in accordance with the following Special Provisions. If a conflict exists between the Standard Specifications and Special Provisions below, the Special Provisions govern.

10.2 Special Provision for Acceptable Fill and Borrow Material

On-site soil is suitable for project fill provided it is free of organics, debris, and meets particle size requirements of the Standard Specifications and Special Provisions. As mentioned in our February 16, 2012, Geotechnical Design and Materials Report for the SR 99 Manteca Widening project, the near surface soil excavated within the median may meet the requirements for structure backfill for this project. However, additional laboratory testing will be required during construction to confirm the quality.

Borrow material should have a minimum R-value of 30 and contain no vegetation or debris. Borrow material for structure backfill must meet requirements of Section 19 of the Standard Specifications.

10.3 Special Provision for Protection of Existing Underground Utilities

The design team is currently working with SSJID to mitigate detrimental settlement and lateral loads on the existing SSJID 48 inch diameter water line.

BCI will provide pipe settlement and loading estimates for the 48 inch water main pipe line within the proposed interchange area in the Foundation Design Report fro the Main Street structure. BCI is currently performing design assistance for the embankment and pipeline design being performed by HDR.

The contractor is responsible for protecting existing underground utilities from damage in accordance with Section 7-1.11 and 8-1.10 of the Caltrans Standard Specifications (May 2006).

10.4 Special Provision for Embankment Settlement Waiting Period and Monitoring

Based on our consolidation analysis, BCI recommends a “waiting period” of at least 60 days from the end of embankment fill placement to beginning pile driving.

A settlement monitoring program, utilizing surface hubs or other acceptable methods, should be used to record the actual settlement magnitudes/rates for the bridge approach fills. At least two settlement monitors should be installed near the center of the highest part of <u>each</u> embankment near the abutment. The settlement monitoring program, including installation of the monitoring devices, should be performed in accordance with California Test Method 112.

The actual waiting period should be determined based on engineering review/analysis of the settlement monitoring program records, and could potentially extend beyond the minimum 60 day waiting period.

11 RISK MANAGEMENT

Our experience and that of our profession clearly indicates that the risks of costly design, construction, and maintenance problems can be significantly lowered by retaining the geotechnical engineer of record to provide additional services during design and construction. For this project, BCI should be retained to:

- Review and provide comments on the civil plans and specifications prior to construction.
- Monitor construction to check and document our report assumptions. At a minimum, BCI should monitor grading, pavement subgrade and aggregate base compaction.
- Update this report if design changes occur, a lapse of 2 years or more between this report and construction, and/or site conditions have changed.

If we are not retained to perform the above applicable services, we are not responsible for any other party’s interpretation of our report, and subsequent addenda, letters, and discussions.

12 LIMITATIONS

BCI performed services in accordance with generally accepted geotechnical engineering principles and practices currently used in this area. Where referenced, we used ASTM or Caltrans standards as a general (not strict) *guideline* only. We do not warranty our services. Do not use or rely on this report for different locations or improvements without the written consent of Blackburn Consulting (BCI).

Our scope for this report did not include evaluation of on-site hazardous material, flood potential, aerial photograph review, or biological pollutants. Please contact BCI if you would like an evaluation of one or more of these potentially damaging issues or if off-site borrow sources are identified and require sampling and testing.

Borings Logs are presented in Appendix B. The lines designating the interface between soil types are approximate. The transition between material types may be abrupt or gradual. Our recommendations are based on the final logs, which represent our interpretation of the field logs and general knowledge of the site and geological conditions.

Modern design and construction is complex, with many regulatory sources/restrictions, involved parties, construction alternatives, etc. It is common to experience changes and delays. The owner should set aside a reasonable contingency fund based on project complexities and cost estimates to cover changes and delays.

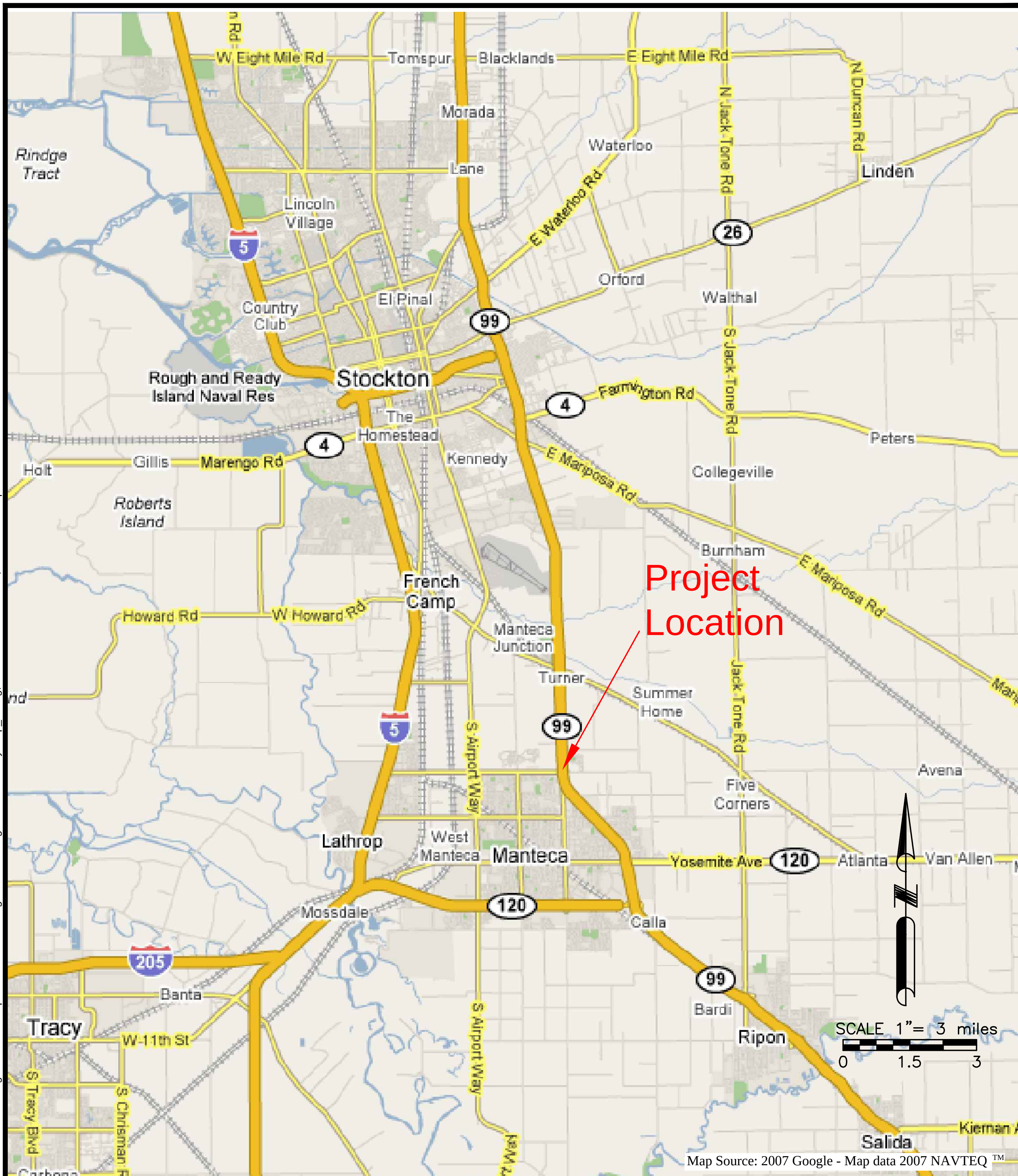
APPENDIX A

Figure 1: Vicinity Map

Figure 2: Geologic Map

Figure 3: Fault Map

Figure 4: Site Plan and Boring Location Map



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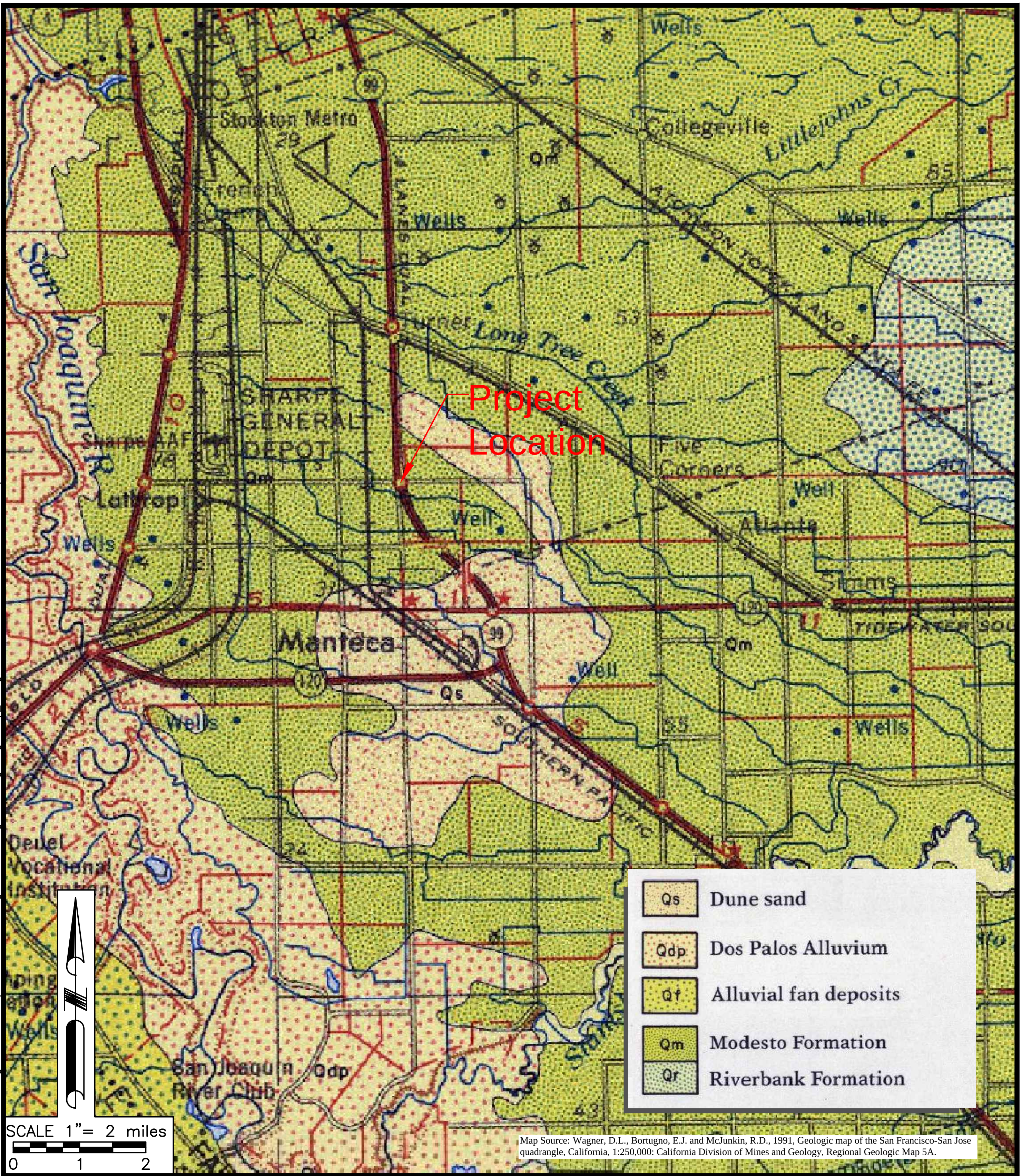
VICINITY MAP
Main Street Interchange
San Joaquin County, California

File: 1201.5

February 2012

Figure 1



Map Source: Wagner, D.L., Bortugno, E.J. and McJunkin, R.D., 1991, Geologic map of the San Francisco-San Jose quadrangle, California, 1:250,000: California Division of Mines and Geology, Regional Geologic Map 5A.

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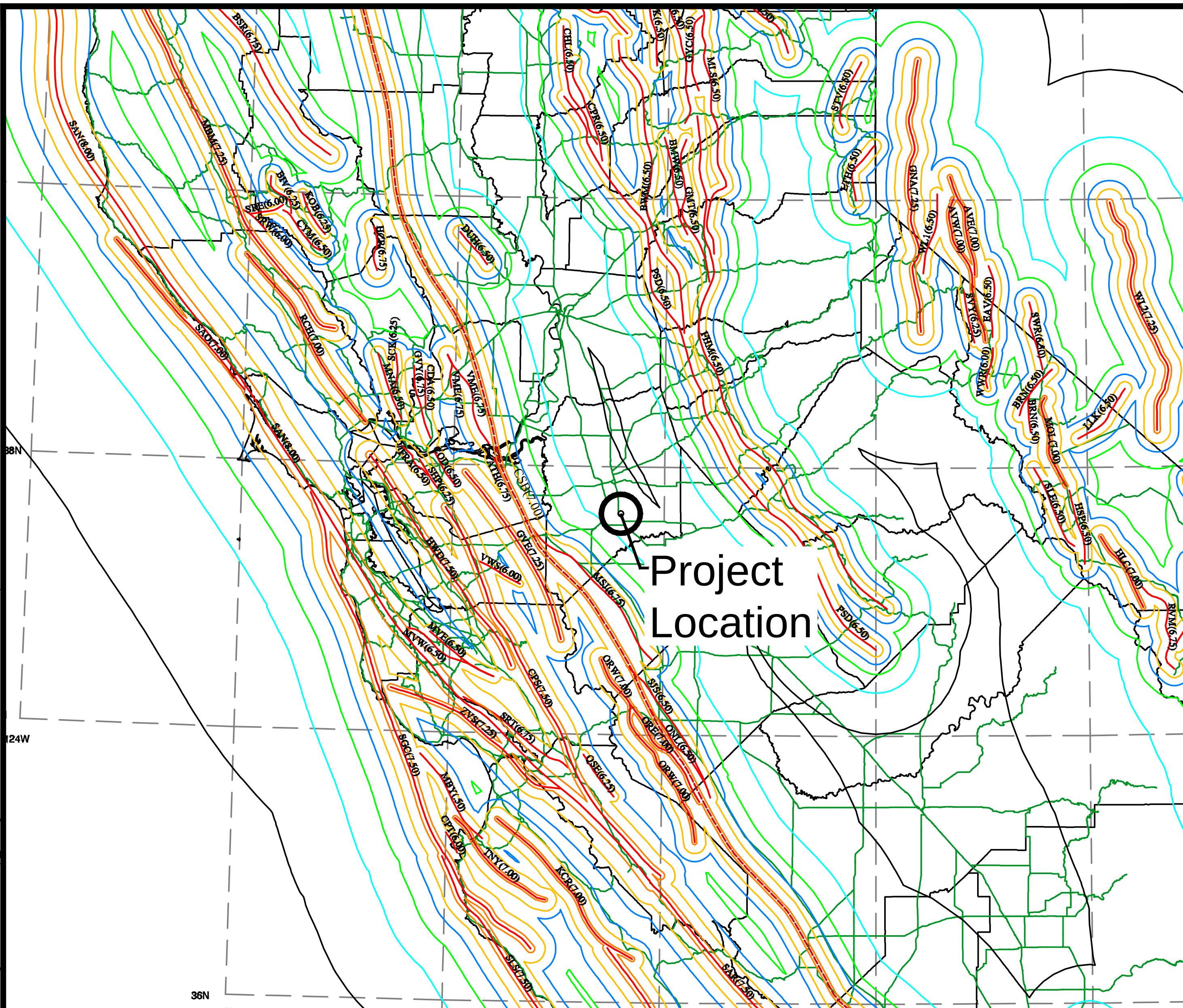
GEOLOGIC MAP

Main Street Interchange
San Joaquin County, California

File: 1201.5

February 2012

Figure 2



Source: Mualchin, L., California Seismic Hazard Detail Index Map 1996, California Department of Transportation, 1996

LEGEND:

- 0.7g Peak Acceleration Contour
- 0.6g Peak Acceleration Contour
- 0.5g Peak Acceleration Contour
- 0.4g Peak Acceleration Contour
- 0.3g Peak Acceleration Contour
- 0.2g Peak Acceleration Contour
- 0.1g Peak Acceleration Contour
- Special Seismic Source (SSS)
- Faults with Fault Codes (MCE)
- State Highways
- County Boundary
- Latitude & Longitude

SCALE 1"=40 miles
0 20 40

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FAULT MAP

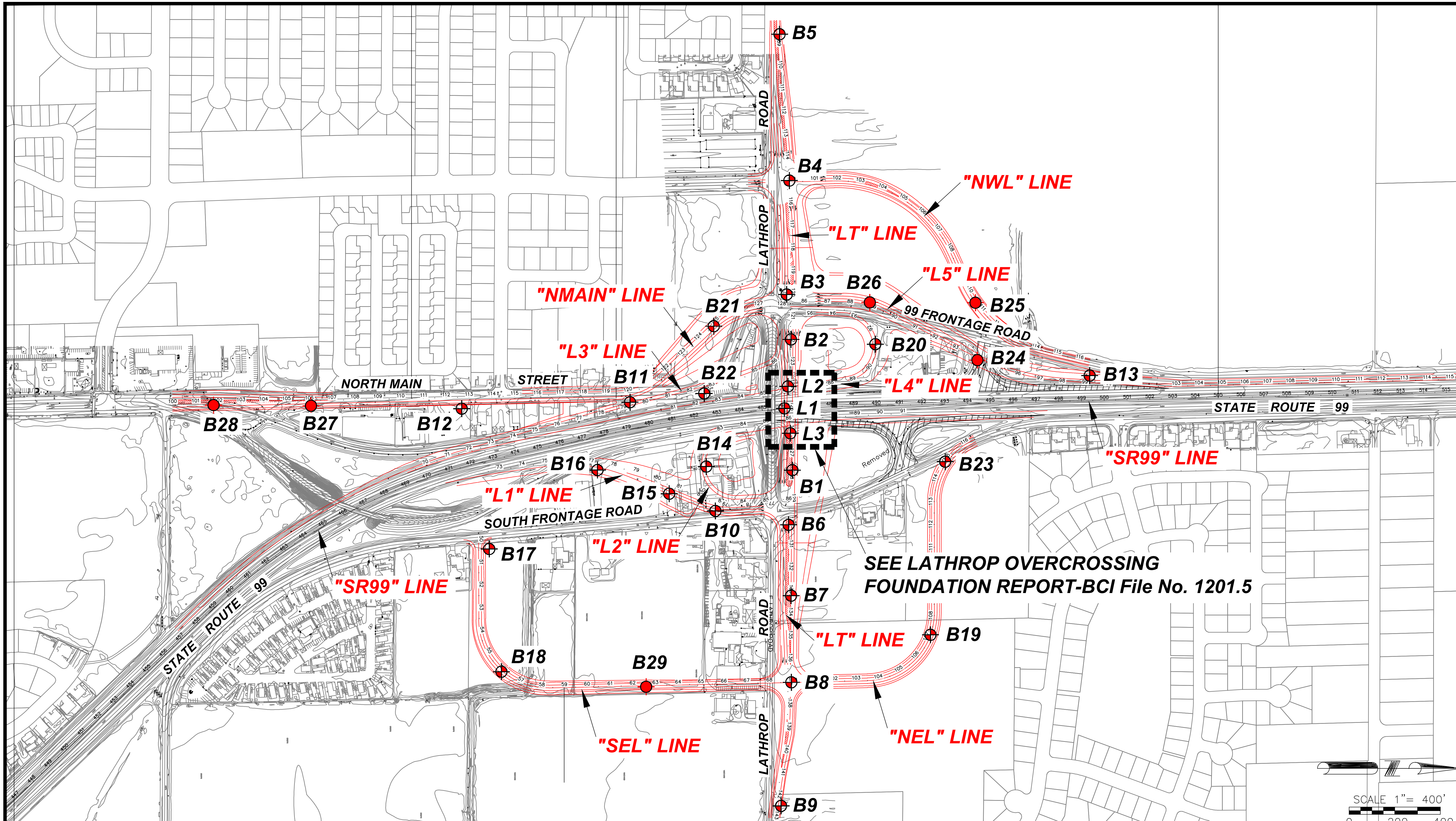
Main Street Interchange
San Joaquin County, California

File: 1201.5

February 2012

Figure 3

Z:\Active Projects\1201.X SR 99 Widening\1201.5 Lathrop Road Overcrossing\CAD Drawings\1201.5-fault map 3.dwg, 2/15/2012 4:32:39 PM, DWG To PDF.pc3



LEGEND

- Approximate Boring Location
- Approximate Hand Boring Location

Source: Preliminary Base Map by HDR, June 2008.

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SITE PLAN AND BORING LOCATION MAP

Main Street Interchange
San Joaquin County, California

File: 1201.5

February 2012

Figure 4

APPENDIX B

Legend and Boring Logs

UNIFIED SOIL CLASSIFICATION (ASTM D 2487-06)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES			GRAPHIC SYMBOL	GROUP SYMBOL	SOIL GROUP NAMES
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS <5% FINES	Cu $\geq$ 4 AND 1 $\leq$ Cc $\leq$ 3		GW	WELL-GRADED GRAVEL
			Cu < 4 AND/OR 1 > Cc > 3		GP	POORLY-GRADED GRAVEL
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR MH		GM	SILTY GRAVEL
			FINES CLASSIFY AS CL OR CH		GC	CLAYEY GRAVEL
	SANDS <50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN SANDS <5% FINES	Cu $\geq$ 6 AND 1 $\leq$ Cc $\leq$ 3		SW	WELL-GRADED SAND
			Cu < 6 AND/OR 1 > Cc > 3		SP	POORLY-GRADED SAND
		SANDS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR MH		SM	SILTY SAND
			FINES CLASSIFY AS CL OR CH		SC	CLAYEY SAND
FINE-GRAINED SOILS >50% PASSING NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT <50	INORGANIC	PI>7 AND PLOTS ON OR ABOVE "A" LINE		CL	LEAN CLAY
			PI>4 AND PLOTS BELOW "A" LINE		ML	SILT
		ORGANIC	LL (oven dried)<0.75/LL (not dried)		OL	ORGANIC CLAY OR SILT
	SILTS AND CLAYS LIQUID LIMIT >50	INORGANIC	PI PLOTS ON OR ABOVE "A" LINE		CH	FAT CLAY
			PI PLOTS BELOW "A" LINE		MH	ELASTIC SILT
		ORGANIC	LL (oven dried)<0.75/LL (not dried)		OH	ORGANIC CLAY OR SILT
HIGHLY ORGANIC SOILS		PRIMARILY ORGANIC MATTER, DARK COLOR, ORGANIC ODOR			PT	PEAT

NOTE: $Cu = D_{60}/D_{10}$

$Cc = (D_{30})^2 / D_{10} \times D_{60}$

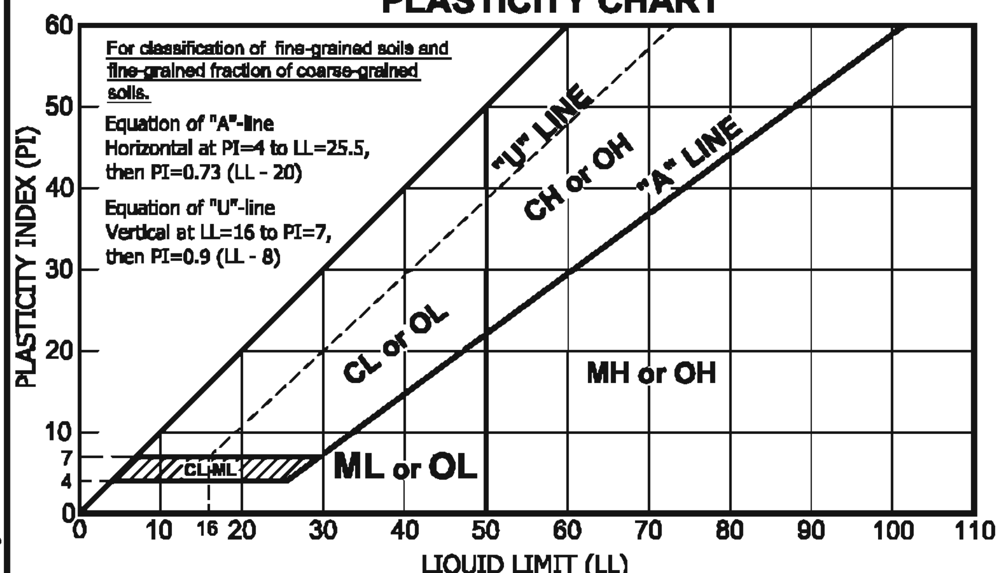
SAMPLE TYPES

- Auger or backhoe cuttings
- Modified California
- Shelby tube
- Rock core
- Standard Penetration (SPT)

BLOW COUNT

The number of blows of a 140-lb. hammer falling 30-inches required to drive the sampler the last 12-inches of an 18-inch drive. The notation 50/4 indicates 4-inches of penetration achieved in 50 blows.

PLASTICITY CHART



ADDITIONAL TESTS

C	- Consolidation
CP	- Compaction Curve
CR	- Corrosivity Testing
CU	- Consolidated Undrained Triaxial
DS	- Direct Shear
EI	- Expansion Index
P	- Permeability
PA	- Partical Size Analysis
PI	- Plasticity Index
PP	- Pocket Penetrometer
R	- R-Value
SE	- Sand Equivalent
SG	- Specific Gravity
SL	- Shrinkage Limit
SW	- Swell Potential
TV	- Pocket Torvane Shear Test
UC	- Unconfined Compression
UU	- Unconsolidated Undrained Triaxial

GROUND WATER LEVELS

- Later water level after drilling
- Water level at time of drilling

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BORING LOG / TEST PIT LEGEND AND SOIL DESCRIPTIONS

12/17/2009 Boring Test Pit Legend with Graphics.dwg

LOG OF BORING B1

FILE NO.: 1201.5
PROJECT: Main Street Interchange GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/2/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 33.1 feet
DATUM: MSL
WATER DEPTH: 31 feet
READING TAKEN:

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	TRIAXIAL SHEAR C (PSF)	TRIAXIAL SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B1-1				**SILTY SAND (SM),** loose, yellowish brown, moist, fine to medium SAND.				NP			
5		B1-2	12										
							96.6	9.6					
10		B1-3	13			olive gray							
									44				
											264	19	
						Poorly-graded SAND (SP), medium dense, gray, fine SAND.							
15		B1-4	29										
						SANDY SILT (ML), very stiff, olive gray, moist, fine SAND.							
				4.0			97.3	28.6					
						SANDY lean CLAY (CL), stiff to very stiff, olive gray, moist, fine SAND.							
20		B1-5	13	2.8									
							103.4	22.0	60				
						olive brown							

LOG OF BORING B1

FILE NO.: 1201.5
PROJECT: Main Street Interchange GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/2/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 33.1 feet
DATUM: MSL
WATER DEPTH: 31 feet
READING TAKEN:

blackburn consulting

FIELD					GRAPHIC LOG	DESCRIPTION	LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)			DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	TRIAXIAL SHEAR C (PSF)	TRIAXIAL SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B1-6	18	4.1									
						CLAYEY SAND (SC), medium dense, medium brown, moist, fine to medium SAND.	111.4	20.5	41				
						SILTY SAND (SM), medium dense, dark yellowish brown, wet, fine to medium SAND.							
30		B1-7	24										
						▼	101.8	26.9					
						SANDY SILT (ML), hard, olive brown, moist, fine SAND.							
35		B1-8	47	>4.5									
									72				
							101.6	25.3					
						CLAYEY SAND (SC), medium dense, olive gray, moist, fine to medium SAND with SILT.							
40		B1-9	32										
							103.1	23.4	39				

Total Depth = 41.5 feet
Groundwater encountered at 31 feet

LOG OF BOREHOLE 1201.5A B1-9.GPJ BLACKBURN.GDT 11/30/09

LOG OF BORING B2

FILE NO.: 1201.5
PROJECT: Main Street Interchange GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/2/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 33.4 feet
DATUM: MSL
WATER DEPTH: 31 feet
READING TAKEN:

FIELD						LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	TRIAXIAL SHEAR C (PSF)	TRIAXIAL SHEAR ɸ ANGLE	ADDITIONAL TESTS
		B2-1			**SILTY SAND (SM),** loose, dark yellowish brown, dry, fine to medium SAND.							
5		B2-2	12		moist	92.7	8.2			115	26	
10		B2-3	17		medium dense, olive gray, fine SAND	91.1	7.0					
					SANDY SILT (ML), stiff to very stiff, medium brown, moist, fine SAND.							
15		B2-4	21	4.3				81				
					Fat CLAY (CH); stiff, olive gray, moist.	82.5	37.9		27			
20		B2-5	70	1.5	stiff to hard, olive brown, fine SAND, slightly cemented	85.8	17.3					
					SILTY SAND (SM), dense to very dense, dark yellowish brown, wet, fine to medium SAND.							

LOG OF BORING B2

FILE NO.: 1201.5
PROJECT: Main Street Interchange GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/2/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 33.4 feet
DATUM: MSL
WATER DEPTH: 31 feet
READING TAKEN:

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	TRIAXIAL SHEAR C (PSF)	TRIAXIAL SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B2-6	29										
						Poorly-graded SAND (SP), medium dense, yellowish brown, wet, fine to medium SAND.							
						SILTY SAND (SM), medium dense, reddish brown, wet, fine to medium SAND.							
30		B2-7	29										
						Lean CLAY (CL), very stiff, olive brown, moist.	92.3	28.7					
				3.8									
						Poorly-graded SAND with CLAY (SP-SC), very dense, olive gray, wet, fine to medium SAND.							
35		B2-8	64										
							107.8	18.1	12				
						Lean CLAY (CL), hard, olive gray, moist.							
40		B2-9	46	>4.5									
										23			
							96.0	27.1					
						Total Depth = 41.5 feet Groundwater encountered at 31 feet							

LOG OF BORING B3

FILE NO.: 1201.5
PROJECT: Main Street Interchange GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/3/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 33.9 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD					GRAPHIC LOG	DESCRIPTION	LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)			DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	TRIAXIAL SHEAR C (PSF)	TRIAXIAL SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B3-1				**SILTY SAND (SM),** loose, yellowish brown, moist, fine to medium SAND.							
5		B3-2	9				104.7	7.5					
						SILT (ML), stiff to very stiff, olive gray, moist.							
10		B3-3	19	2.6									
						SILTY SAND (SM), medium dense, medium brown, moist, fine SAND.	92.8	23.8					

Total Depth = 11.5 feet
No groundwater encountered

LOG OF BORING B4

FILE NO.: 1201.5
PROJECT: Main Street Interchange GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/3/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 34.0 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	TRIAXIAL SHEAR C (PSF)	TRIAXIAL SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B4-1				**SILTY SAND (SM),** loose, yellowish brown, moist, fine to medium SAND.							
5		B4-2	9				111.4	6.1					
						SILT (ML), stiff to very stiff, olive gray, moist.							
10		B4-3	22	3.5			95.2	28.3	91	NP			
						Total Depth = 11.5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B1-9.GPJ BLACKBRN.GDT 11/30/09

LOG OF BORING B5

FILE NO.: 1201.5
PROJECT: Main Street Interchange GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/3/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 32.0 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	TRIAXIAL SHEAR C (PSF)	TRIAXIAL SHEAR ɸ ANGLE	ADDITIONAL TESTS
		B5-1				**SILTY SAND (SM),** loose, yellowish brown, moist, fine to medium SAND.							
5		B5-2	19										
						SILT (ML), very stiff to hard, olive gray, moist.	100.7	20.6		3			
				>4.5									
10		B5-3	30	4.3									
							102.8	22.1					
						Total Depth = 11.5 feet No groundwater encountered							

LOG OF BORING B6

FILE NO.: 1201.5
PROJECT: Main Street Interchange GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/3/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 35.0 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	TRIAXIAL SHEAR C (PSF)	TRIAXIAL SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B6-1				**SILTY SAND (SM),** loose, yellowish brown, moist, fine to medium SAND.							
5		B6-2	7				99.1	9.5					
						SILT (ML), very stiff, olive gray, moist, interbedded layers of SILTY SAND.							
10		B6-3	26	3.8			94.0	18.0					
						Total Depth = 11.5 feet No groundwater encountered							

LOG OF BORING B7

FILE NO.: 1201.5
PROJECT: Main Street Interchange GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/3/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 34.3 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	TRIAXIAL SHEAR C (PSF)	TRIAXIAL SHEAR ɸ ANGLE	ADDITIONAL TESTS
		B7-1				**SILTY SAND (SM),** medium dense, yellowish brown, moist, fine SAND.							
5		B7-2	22				95.9	15.8					
						Total Depth = 6.5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B1-9.GPJ BLACKBRN.GDT 11/30/09

LOG OF BORING B8

FILE NO.: 1201.5
PROJECT: Main Street Interchange GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/3/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 35.4 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	TRIAXIAL SHEAR C (PSF)	TRIAXIAL SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B8-1				**SILTY SAND (SM),** loose, yellowish brown, moist, fine to medium SAND.							
5		B8-2	8				103.5	8.9					
						SANDY SILT (ML), very stiff, olive gray, moist, fine SAND.							
10		B8-3	31	2.5			82.1	29.3	79				
						Total Depth = 11.5 feet No groundwater encountered							

LOG OF BORING B9

FILE NO.: 1201.5
PROJECT: Main Street Interchange GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/3/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 39.0 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	TRIAXIAL SHEAR C (PSF)	TRIAXIAL SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B9-1				**SILTY SAND (SM),** medium dense, yellowish brown, moist, fine to medium SAND.							
5		B9-2	21				110.6	3.4					
						Total Depth = 6.5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B1-9.GPJ BLACKBRN.GDT 11/30/09

LOG OF BORING B10

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/3/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 35.0 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B10-1				**SILTY SAND (SM),** loose, yellowish brown, moist, fine to medium SAND.							
5		B10-2	9										
							108.8	8.7					
						SANDY CLAY (CL), medium stiff, olive gray, moist, fine SAND.							
10		B10-3	34	4.3		very stiff to hard							
						SILTY SAND (SM), medium dense, olive gray, moist, fine SAND.	93.6	26.7					
						SANDY SILT (ML), stiff to very stiff, olive brown, moist.							
15		B10-4	30	1.0									
									66				
						Poorly-graded SAND (SP), medium dense, gray, moist, fine to medium SAND.	96.7	6.4	5				
						Lean CLAY (CL), hard, olive brown, moist.							
20		B10-5	33	4.0									
							103.1	20.2	82	20			
						Total Depth = 21.5 feet No groundwater encountered							

LOG OF BORING B11

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/3/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 33.0 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B11-1				**SILTY SAND (SM),** medium dense, medium brown, moist, fine SAND.							
5		B11-2	46			dense, olive gray	95.6	18.4					
						Total Depth = 6.5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

LOG OF BORING B12

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/3/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 33.0 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B12-1				**SILTY SAND (SM),** medium dense, medium brown, moist, fine SAND.							
5		B12-2	57			dense, olive gray, fine SAND	96.7	18.0	47				
						Total Depth = 6.5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

LOG OF BORING B13

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/9/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 37.6 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B13-1				**SILTY SAND (SM),** loose, dark yellowish brown, dry, fine to medium SAND.			24				
5		B13-2	12				105.2	1.6					
						Total Depth = 6.5 feet No groundwater encountered							

LOG OF BORING B14

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/9/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 33.6 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B14-1				**SILTY SAND (SM),** loose, dark yellowish brown, moist, fine to medium SAND.							
5		B14-2	12			loose, dry	104.2	6.1	22				
10		B14-3	18			medium dense, olive gray, moist, fine SAND	92.9	26.4	20	NP			
						SILT (ML), stiff, olive brown, moist.							
						Poorly-graded SAND (SP), medium dense, yellowish brown, moist, fine to coarse SAND.							
15		B14-4	26				92.8	4.5					
						Total Depth = 16.5 feet No groundwater encountered							

LOG OF BORING B15

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/9/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 33.1 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B15-1				**SILTY SAND (SM),** loose, dark yellowish brown, moist, fine to medium SAND.							
5		B15-2	7			yellowish brown	100.3	7.0					
10		B15-3	14			medium dense, gray, moist, fine SAND	89.4	13.2	27				
						Total Depth = 11.5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

LOG OF BORING B16

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/9/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 32.5 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B16-1				**SILTY SAND (SM),** medium dense, dark yellowish brown, moist, fine to medium SAND.							
						SANDY SILT (ML), hard, olive gray, moist, fine SAND, strongly cemented.							
5		B16-2	100				72.9	19.6					
						SILTY SAND (SM), medium dense, gray, moist, fine to medium SAND.							
10		B16-3	22				93.6	24.9					
						Total Depth = 11.5 feet No groundwater encountered							

LOG OF BORING B17

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/9/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 33.5 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ɸ ANGLE	ADDITIONAL TESTS
		B17-1				**SILTY SAND (SM),** loose to medium dense, dark yellowish brown, moist, fine SAND.							
5		B17-2	18			medium dense, yellowish brown	87.7	12.6					
						Total Depth = 6.5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

LOG OF BORING B18

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/9/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 33.3 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B18-1				**SILTY SAND (SM),** loose to medium dense, dark yellowish brown, moist, fine to medium SAND.							
						SANDY SILT (ML), medium stiff to stiff, gray, moist, fine SAND.							
5		B18-2	8	4.0			95.6	8.9					
							89.7	14.3	57				

Total Depth = 6.5 feet
No groundwater encountered

LOG OF BORING B19

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 6/9/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 35.2 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B19-1				**SILTY SAND (SM),** loose, yellowish brown, moist, fine to medium SAND.							
5		B19-2	5			very loose							
10		B19-3	12			loose	101.0	4.2					
						Total Depth = 11.5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

LOG OF BORING B20

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 7/7/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 34.0 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
0						**SILTY SAND (SM),** loose to medium dense, yellowish brown, dry, fine to medium SAND.							
5		B20-1	12			loose							
8						**SILT (ML),** hard, gray, dry.							
10		B20-2	53										
13						**Poorly-graded SAND (SP),** medium dense, light gray, dry, fine to medium SAND.							
15		B20-3	26										
						Total Depth = 16.5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

LOG OF BORING B21

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 7/7/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 32.0 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

FIELD					GRAPHIC LOG	DESCRIPTION	LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)			DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B21-1				**SILTY SAND (SM),** loose to medium dense, yellowish brown, dry, fine to medium SAND.							
5		B21-2	21			medium dense							
						SILT (ML), stiff, gray, moist, fine SAND.							
						SILTY SAND (SM), loose to medium dense, dark yellowish brown, moist, fine SAND.							
10		B21-3	13										
						Total Depth = 11.5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

LOG OF BORING B22

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 7/7/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 35.0 feet
DATUM: MSL
WATER DEPTH: 31 feet
READING TAKEN:

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
0						**SILTY SAND (SM),** loose, dark yellowish brown, moist, fine to medium SAND.							
5		B22-1	9										
10		B22-2	17			medium dense, gray							
13						**CLAYEY SAND (SC),** medium dense, olive gray, moist, fine to medium SAND.							
15		B22-3	35										
16						**Poorly-graded SAND (SP),** medium dense, yellowish brown, dry, fine to medium SAND.							
18						**SANDY CLAY (CL),** very stiff, olive brown, moist, fine SAND.							
20		B22-4	25										
23						**SILTY SAND (SM),** medium dense, medium brown, moist, fine to medium SAND with CLAY.							

LOG OF BORING B22

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 7/7/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 35.0 feet
DATUM: MSL
WATER DEPTH: 31 feet
READING TAKEN:

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B22-5	27										
30		B22-6	24			dark yellowish brown, wet, fine to medium SAND							
						Total Depth = 31.5 feet Groundwater encountered at 31 feet							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

LOG OF BORING B23

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 7/7/09
DRILLING METHOD: Hollow-stem auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 36.0 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B23-1				**SILTY SAND (SM),** loose, dark yellowish brown, moist, fine to medium SAND.							
5		B23-2	9										
						Total Depth = 6.5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

LOG OF BORING B24

blackburn consulting

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 7/14/09
DRILLING METHOD: Hand auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 37.5 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B24-1				**SILTY SAND (SM),** medium dense, dark yellowish brown, moist, fine to medium SAND.							
5						Total Depth = 5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

LOG OF BORING B25

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 7/14/09
DRILLING METHOD: Hand auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 33.7 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B25-1				**SILTY SAND (SM),** loose to medium dense, yellowish brown, dry, fine to medium SAND.							
5						Total Depth = 5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

LOG OF BORING B26

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 7/14/09
DRILLING METHOD: Hand auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 33.4 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B26-1				**SILTY SAND (SM),** loose to medium dense, dark yellowish brown, moist, fine to medium SAND.							
5						Total Depth = 5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

LOG OF BORING B27

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 7/14/09
DRILLING METHOD: Hand auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 36.0 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B27-1				**SILTY SAND (SM),** medium dense, dark yellowish brown, moist, fine to medium SAND.							
5						Total Depth = 5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

LOG OF BORING B28

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 7/14/09
DRILLING METHOD: Hand auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 36.0 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B28-1				**SILTY SAND (SM),** medium dense, dark yellowish brown, dry, fine to medium SAND, trace fine GRAVEL. Refusal at 2 feet							
						Total Depth = 2 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

LOG OF BORING B29

FILE NO.: 1201.5a
PROJECT: SR 99 - Lathrop Rd GDR
LOCATION: Manteca
CLIENT: HDR Engineering

DRILLING DATE: 7/14/09
DRILLING METHOD: Hand auger
LOGGED BY: AGW
CHECKED BY: BDC

ELEVATION: 33.7 feet
DATUM: MSL
WATER DEPTH:
READING TAKEN:

blackburn consulting

FIELD							LABORATORY						
DEPTH (FEET)	SAMPLE	SAMPLE NO.	Blows/Foot	POCKET PEN. (TSF)	GRAPHIC LOG	DESCRIPTION	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	% <200 SIEVE	PLASTICITY INDEX	DIRECT SHEAR C (PSF)	DIRECT SHEAR ϕ ANGLE	ADDITIONAL TESTS
		B29-1				**SILTY SAND (SM),** medium dense, dark yellowish brown, moist, fine to medium SAND.							
5													
						Total Depth = 5 feet No groundwater encountered							

LOG OF BOREHOLE 1201.5A B10-29.GPJ BLACKBRN.GDT 10/26/09

APPENDIX C

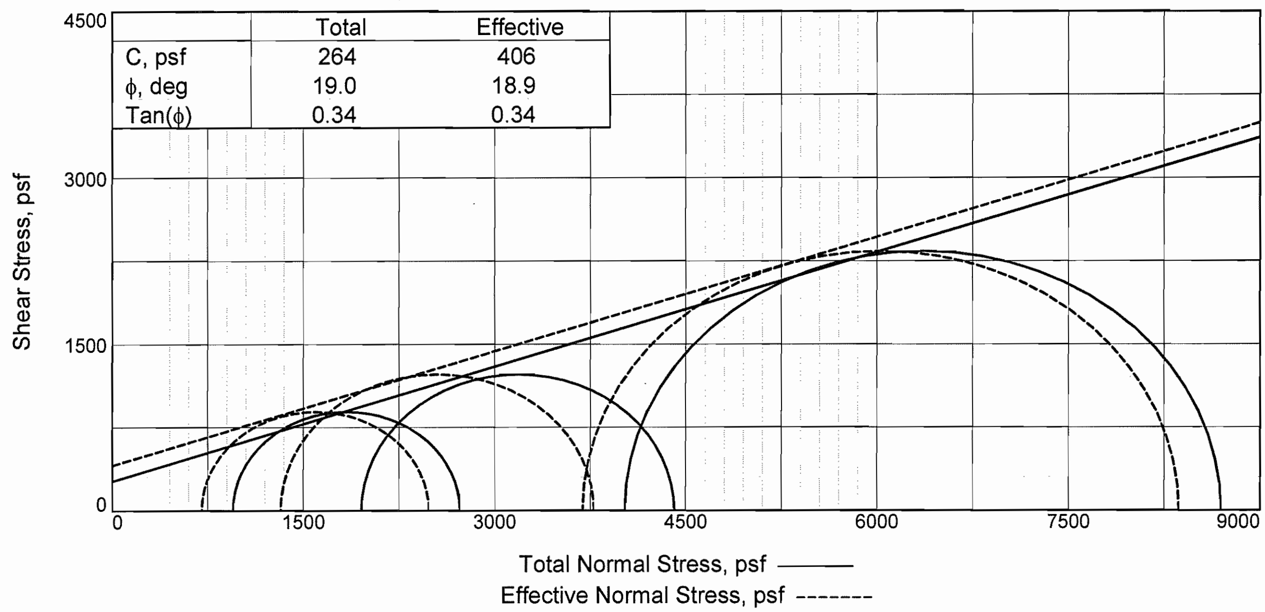
Laboratory Summary Sheet and Test Results

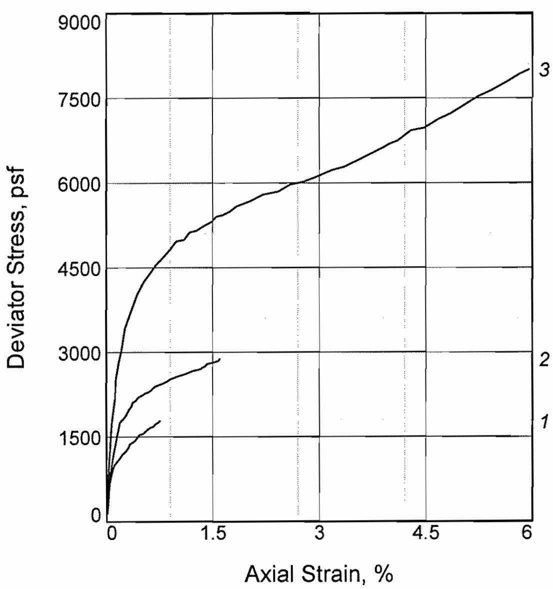
Laboratory Testing Summary

							Atterberg Limits		Particle Size Analysis			Triaxial Shear	
Boring ID / Sample No.	Sample Depth (feet)	Sample Type	USCS Classification	Blow Count	Moisture Content (%)	Dry Density, ρ_{dry} (pcf)	Plastic Limit	Plasticity Index	% Passing No.200	% Passing No.30	% Passing No.4	Cohesion (psf)	Phi Angle (degrees)
B1-1	0-5	BULK	SM	N/A			NP	NP					
B1-2C	6-6.5	2.4	SM	12	9.6	96.6							
B1-3B	10.5-11	2.4	SM	13					44.3	95.8	99.9		
B1-3C	11-11.5	2.4	SM	13								264.0	19.0
B1-4C	16-16.5	2.4	ML	29	28.6	97.3							
B1-5B	20.5-21	2.4	CL	13	22.0	103.4			60.0	99.7	100.0		
B1-6B	25.5-26	2.4	SC	18	20.5	111.4			40.9	95.5	100.0		
B1-7B	30.5-31	2.4	SM	24	26.9	101.8							
B1-8B	35.5-36	2.4	ML	47					71.8	99.0	100.0		
B1-8C	36-36.5	2.4	SM	47	25.3	101.6							
B1-9C	41-41.5	2.4	SC	32	23.4	103.1			38.9	80.7	100.0		
B2-2B	5.5-6	2.4	SM	12	8.2	92.7							
B2-2C	6-6.5	2.4	SM	12								115.0	25.6
B2-3C	11-11.5	2.4	SM	17	7.0	91.1							
B2-4B	15.5-16	2.4	ML	21					80.9	97.9	100.0		
B2-4C	16-16.5	2.4	CH	21	37.9	82.5	25	27					
B2-5B	20.5-21	2.4	CH	70	17.3	85.8							
B2-7C	31-31.5	2.4	CL	29	28.7	92.3							
B2-8B	35.5-36	2.4	SP-SC	64									
B2-8C	36-36.5	2.4	SP-SC	64	18.1	107.8			12.1	88.2	100.0		
B2-9B	40.5-41	2.4	CL	46			26	23					
B2-9C	41-41.5	2.4	CL	46	27.1	96.0							
B3-2C	6-6.5	2.4	SM	9	7.5	104.7							
B3-3C	11-11.5	2.4	SM	19	23.8	92.8							
B4-2C	6-6.5	2.4	SM	9	6.1	111.4							
B4-3B	10.5-11	2.4	ML	22			NP	NP	91.1				
B4-3C	11-11.5	2.4	ML	22	28.3	95.2							
B5-2C	6-6.5	2.4	ML	19	20.6	100.7	22	3					
B5-3C	11-11.5	2.4	ML	30	22.1	102.8							
B6-2C	6-6.5	2.4	SM	7	9.5	99.1							
B6-3B	10.5-11	2.4	ML	26			NP	NP					
B6-3C	11-11.5	2.4	ML	26	18.0	94.0							
B7-2C	6-6.5	2.4	SM	22	15.8	95.9							
B8-1	0-5	BULK	SM	N/A			NP	NP					
B8-2C	6-6.5	2.4	SM	8	8.9	103.5							
B8-3B	10.5-11	2.4	ML	31	29.3	82.1			78.9				
B9-2C	6-6.5	2.4	SM	21	3.4	110.6							
B10-2C	6-6.5	2.4	SM	9	8.7	108.8							
B10-3B	10.5-11	2.4	ML	34								370.0	32.6
B10-3C	11-11.5	2.4	SM	34	26.7	93.6							
B10-4B	15.5-16	2.4	ML	30					66.2				
B10-4C	16-16.5	2.4	SP	30	6.4	96.7			5.0				
B10-5B	20.5-21	2.4	CL	33								397.0	17.2
B10-5C	21-21.5	2.4	CL	33	20.2	103.1	20	20	81.5				
B11-2C	6-6.5	2.4	SM	46	18.4	95.6							
B12-2B	5.5-6	2.4	SM	57	18.0	96.7			46.5	95.5	100.0		
B13-1	0-5	BULK	SM	N/A					23.9	88.1	97.6		
B13-2C	6-6.5	2.4	SM	12	1.6	105.2							
B14-2B	5.5-6	2.4	SM	12					22.3	96.6	99.3		
B14-2C	6-6.5	2.4	SM	12	6.1	104.2							
B14-3B	10.5-11	2.4	SM	18					19.8	99.2	100.0		
B14-3C	11-11.5	2.4	ML	18	26.4	92.9	NP	NP					
B14-4C	16-16.5	2.4	SP	26	4.5	92.8							
B15-2B	5.5-6	2.4	SM	7	7.0	100.3							
B15-2C	6-6.5	2.4	SM	7									

Laboratory Testing Summary

Boring ID / Sample No.	Sample Depth (feet)	Sample Type	USCS Classification	Blow Count	Moisture Content (%)	Dry Density, ρ_{dry} (pcf)	Atterberg Limits		Particle Size Analysis			Triaxial Shear	
							Plastic Limit	Plasticity Index	% Passing No.200	% Passing No.30	% Passing No.4	Cohesion (psf)	Phi Angle (degrees)
B15-3B	10.5-11	2.4	SM	14					26.8	99.8	100.0		
B15-3C	11-11.5	2.4	SP	14	13.2	89.4							
B16-2C	6-6.5	2.4	ML	148	19.6	72.9							
B16-3C	11-11.5	2.4	SP-SM	22	24.9	93.6							
B17-2C	6-6.5	2.4	SM	18	12.6	87.7							
B18-2C	6-6.5	2.4	ML	8	14.3	89.7			57.3	94.5	98.5		
B19-2B	5.5-6	2.4	SM	5	8.9	95.6							
B19-3C	11-11.5	2.4	SP	12	4.2	101.0							
B20-1C	6-6.5	2.4	SM	12	3.3	96.2							
B20-2B	10.5-11	2.4	ML	53			NP	NP	90.4				
B20-2C	11-11.5	2.4	ML	53	17.5	96.8							
B20-3C	16-16.5	2.4	SP	26	2.1	100.6							
B21-2C	6-6.5	2.4	ML	21	19.1	95.4							
B21-3C	11-11.5	2.4	SM	13	14.7	87.0							
B22-1B	5.5-6	2.4	SM	9	6.8	100.0			34.4				
B22-1C	6-6.5	2.4	SM	9	7.2	107.6							
B22-2C	11-11.5	2.4	SM	17	11.5	97.4							
B22-3C	16-16.5	2.4	SM	35	7.6	96.6			15.7				
B22-4B	20.5-21	2.4	CL	25			17	23					
B22-4C	21-21.5	2.4	CL	25	23.3	98.0							
B22-5B	25.5-26	2.4	SM/SC	27			17	5					
B22-5C	26-26.5	2.4	SM/SC	27	12.1	114.7							
B22-6C	31-31.5	2.4	SP-SM	24	25.3	97.9							





	Specimen No.	1	2	3
Initial	Water Content, %	14.2	27.4	24.3
	Dry Density, pcf	94.1	96.9	101.8
	Saturation, %	48.3	100.0	99.9
	Void Ratio	0.7908	0.7401	0.6559
	Diameter, in.	2.397	2.374	2.335
	Height, in.	5.433	5.382	5.294
At Test	Water Content, %	28.9	27.4	24.2
	Dry Density, pcf	94.6	96.9	102.0
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.7809	0.7392	0.6531
	Diameter, in.	2.393	2.374	2.334
	Height, in.	5.423	5.381	5.291
	Strain rate, %/min.	0.18	0.17	0.17
	Eff. Cell Pressure, psf	948	1956	4019
	Fail. Stress, psf	1780	2454	4676
	Excess Pore Pr., psf	245	634	331
	Strain, %	0.8	0.8	0.8
	Ult. Stress, psf	1780	2882	8010
	Excess Pore Pr., psf	245	749	634
	Strain, %	0.8	1.6	6.0
	$\bar{\sigma}_1$ Failure, psf	2483	3776	8364
	$\bar{\sigma}_3$ Failure, psf	703	1322	3688

Type of Test:
CU with Pore Pressures

Sample Type: 2.4" Mod Cal

Description: Yellowish Brown Sandy CLAY (CL)

Assumed Specific Gravity= 2.70

Remarks: Failure chosen at 0.8% Strain

Figure ________

Client: HDR Engineering, Inc.

Project: Main Street Interchange GDR

Source of Sample: B1 **Depth:** 11.0-11.5

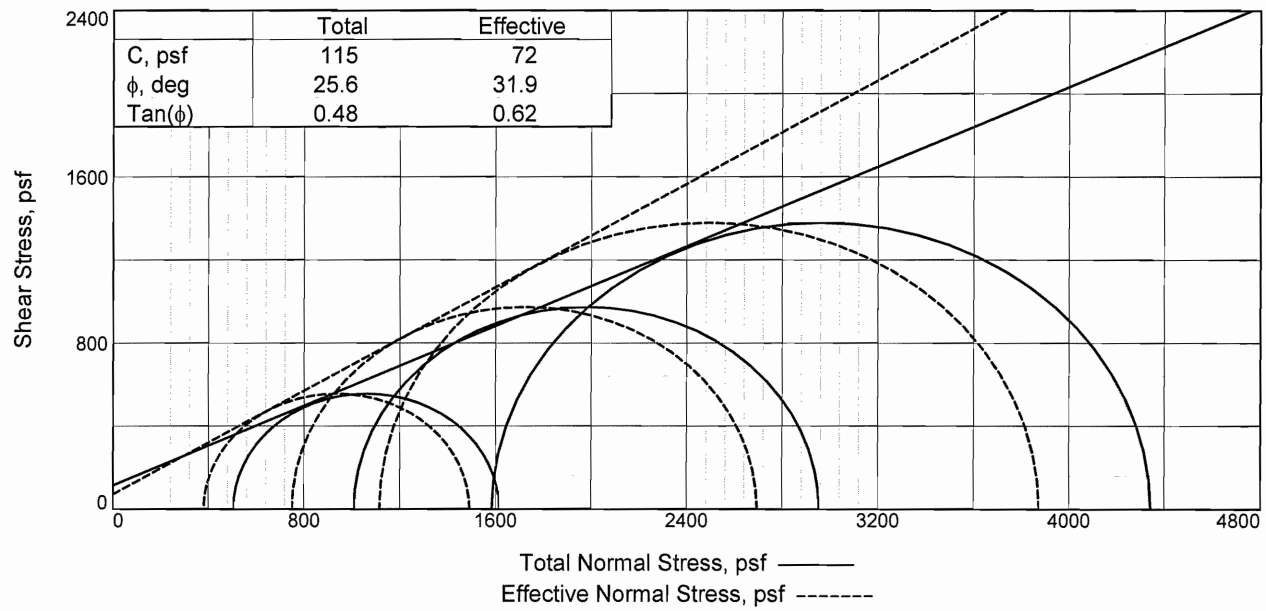
Sample Number: 3c

Proj. No.: 1201.5a **Date Sampled:**

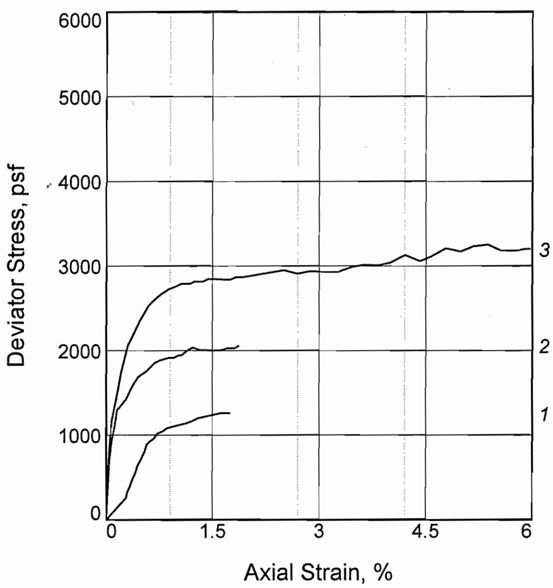
TRIAXIAL SHEAR TEST REPORT

Blackburn Consulting

Tested By: KISB **Checked By:** RBL



	Total	Effective
C, psf	115	72
ϕ, deg	25.6	31.9
Tan(ϕ)	0.48	0.62



	Specimen No.	1	2	3
Initial	Water Content, %	6.0	21.9	18.5
	Dry Density, pcf	96.7	105.9	112.4
	Saturation, %	21.7	100.0	99.9
	Void Ratio	0.7433	0.5912	0.4997
	Diameter, in.	2.421	2.348	2.302
	Height, in.	5.481	5.319	5.215
At Test	Water Content, %	25.2	21.7	19.0
	Dry Density, pcf	100.3	106.2	111.4
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.6808	0.5867	0.5135
	Diameter, in.	2.392	2.346	2.309
	Height, in.	5.415	5.314	5.231
	Strain rate, %/min.	0.22	0.22	0.22
	Eff. Cell Pressure, psf	504	1008	1584
	Fail. Stress, psf	1111	1946	2758
	Excess Pore Pr., psf	124	259	469
	Strain, %	1.0	1.0	1.0
	Ult. Stress, psf	1260	2060	3201
	Excess Pore Pr., psf	138	360	1132
	Strain, %	1.7	1.9	6.0
	$\bar{\sigma}_1$ Failure, psf	1491	2695	3873
	$\bar{\sigma}_3$ Failure, psf	380	749	1115

Type of Test:
CU with Pore Pressures
Sample Type: 2.4" Mod Cal
Description: Yellowish Brown Silty SAND (SM)

Assumed Specific Gravity= 2.70
Remarks: Failure chosen at 1.0% Strain

Figure ______

Client: HDR Engineering, Inc.

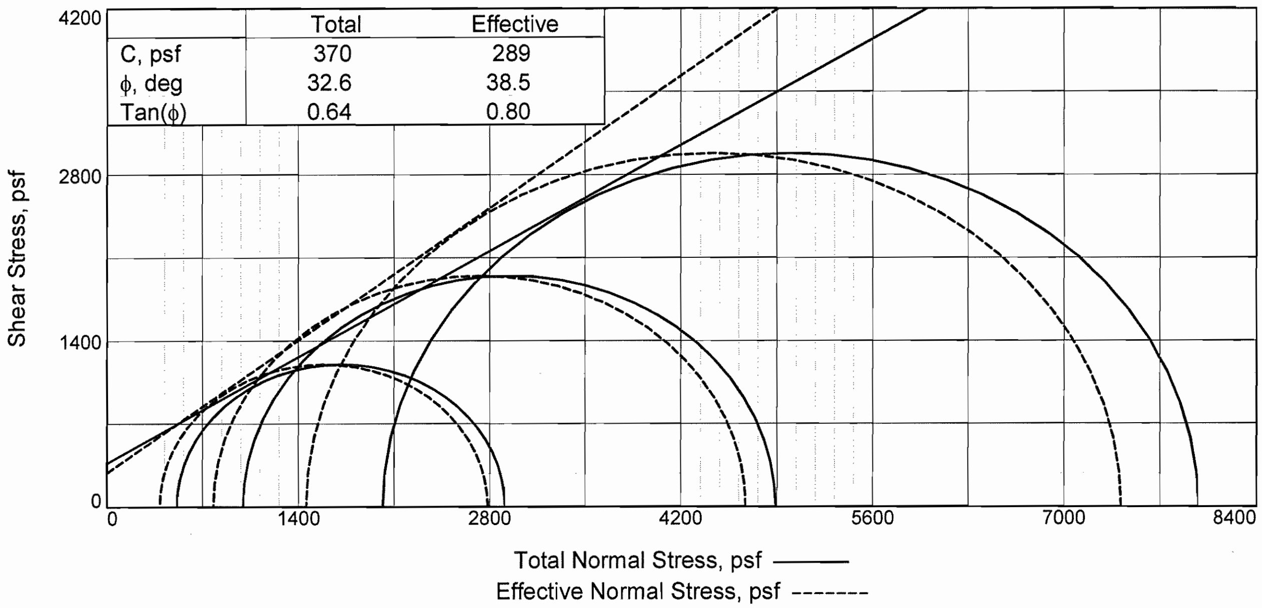
Project: Main Street Interchange GDR

Source of Sample: B2 **Depth:** 6.0-6.5
Sample Number: 2c
Proj. No.: 1201.5a **Date Sampled:** 6-2-09

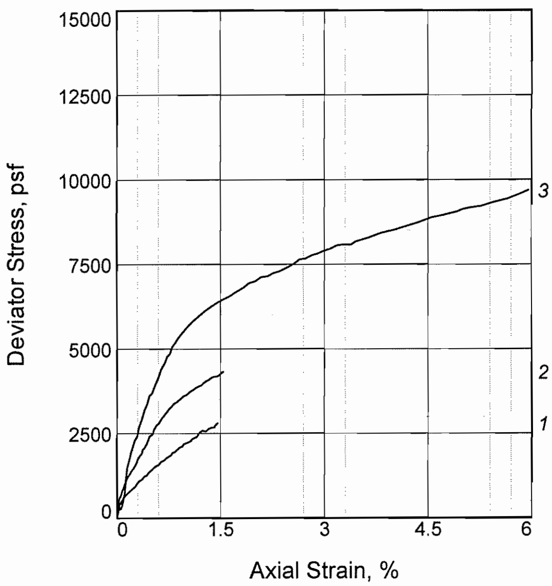
TRIAXIAL SHEAR TEST REPORT

Blackburn Consulting

Tested By: KISB **Checked By:** RBL



	Total	Effective
C, psf	370	289
ϕ, deg	32.6	38.5
Tan(ϕ)	0.64	0.80



	Specimen No.	1	2	3
Initial	Water Content, %	29.4	27.9	26.3
	Dry Density, pcf	89.5	96.1	98.5
	Saturation, %	89.8	99.9	99.9
	Void Ratio	0.8841	0.7536	0.7117
	Diameter, in.	2.401	2.344	2.325
	Height, in.	5.667	5.534	5.490
At Test	Water Content, %	31.0	29.5	27.0
	Dry Density, pcf	91.8	93.8	97.5
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.8365	0.7966	0.7285
	Diameter, in.	2.381	2.363	2.333
	Height, in.	5.619	5.579	5.508
	Strain rate, %/min.	0.20	0.17	0.12
	Eff. Cell Pressure, psf	511	995	2016
	Fail. Stress, psf	2398	3894	5961
	Excess Pore Pr., psf	125	217	560
	Strain, %	1.2	1.2	1.2
	Ult. Stress, psf	2805	4332	9697
	Excess Pore Pr., psf	111	174	315
	Strain, %	1.5	1.5	6.0
	$\overline{\sigma}_1$ Failure, psf	2784	4671	7416
	$\overline{\sigma}_3$ Failure, psf	386	778	1456

Type of Test:
CU with Pore Pressures

Sample Type: 2.4" Mod Cal

Description: Olive Brown Lean CLAY (CL)

Assumed Specific Gravity= 2.70

Remarks: Failure chosen at 1.2% Strain

Figure ________

Client: HDR Engineering, Inc.

Project: Main Street Interchange GDR

Source of Sample: B10 **Depth:** 10.5-11.0

Sample Number: 3b

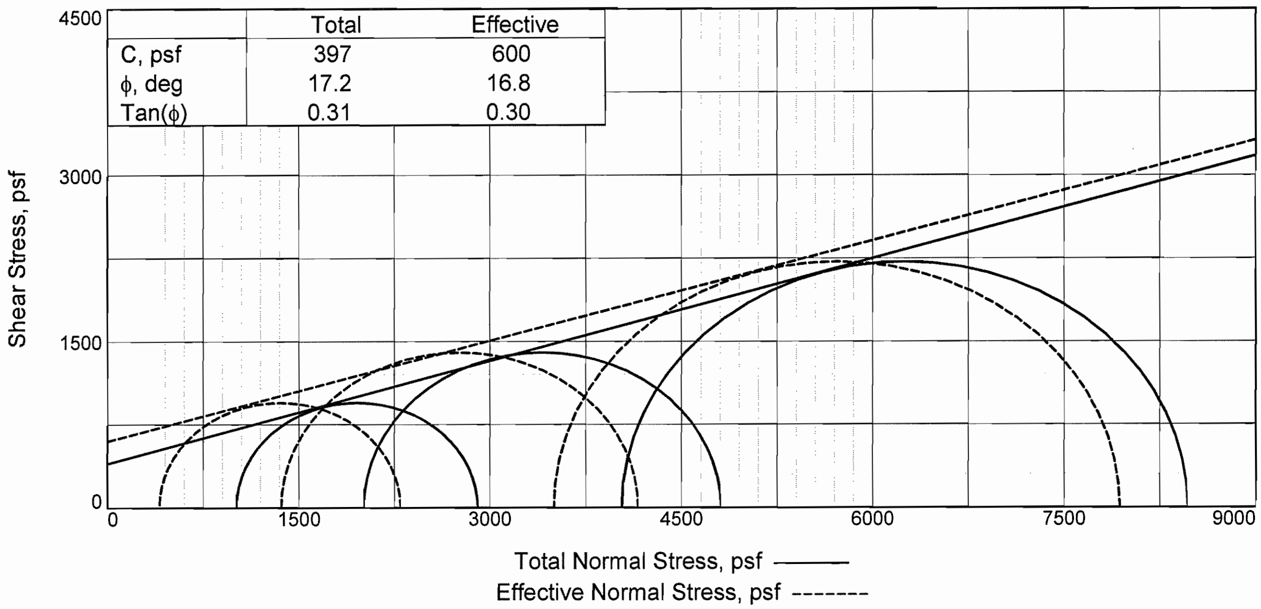
Proj. No.: 1201.5a **Date Sampled:** 6-13-09

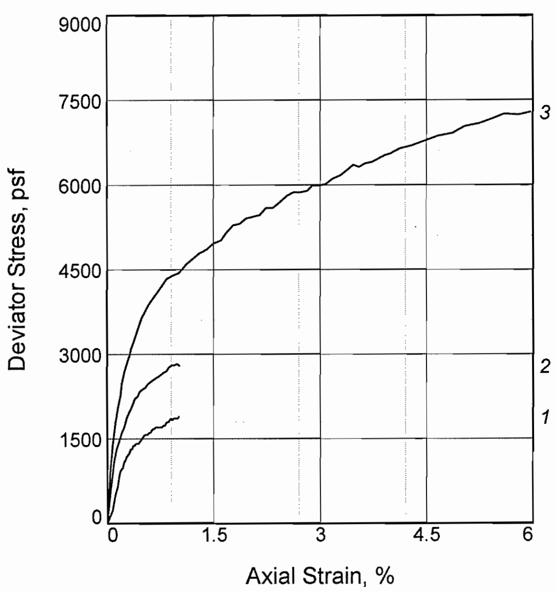
TRIAXIAL SHEAR TEST REPORT

Blackburn Consulting

Tested By: KISB **Checked By:** RBL

	Total	Effective
C, psf	397	600
ϕ, deg	17.2	16.8
Tan(ϕ)	0.31	0.30





	Specimen No.	1	2	3
Initial	Water Content, %	22.1	20.3	18.6
	Dry Density, pcf	102.9	108.9	112.1
	Saturation, %	93.3	99.9	99.8
	Void Ratio	0.6385	0.5477	0.5040
	Diameter, in.	2.378	2.333	2.311
	Height, in.	5.527	5.424	5.372
At Test	Water Content, %	22.1	20.4	18.3
	Dry Density, pcf	105.5	108.7	112.8
	Saturation, %	100.0	100.0	100.0
	Void Ratio	0.5978	0.5503	0.4948
	Diameter, in.	2.358	2.334	2.306
	Height, in.	5.481	5.427	5.361
	Strain rate, %/min.	0.15	0.21	0.18
	Eff. Cell Pressure, psf	1009	2009	4031
	Fail. Stress, psf	1893	2798	4436
	Excess Pore Pr., psf	605	648	531
	Strain, %	1.0	1.0	1.0
	Ult. Stress, psf	1893	2798	7293
	Excess Pore Pr., psf	605	648	1655
	Strain, %	1.0	1.0	6.0
	$\bar{\sigma}_1$ Failure, psf	2298	4159	7935
	$\bar{\sigma}_3$ Failure, psf	405	1361	3499

Type of Test:
CU with Pore Pressures

Sample Type: 2.4" Mod Cal

Description: Medium Brown Sandy Lean CLAY (CL)

Assumed Specific Gravity= 2.70

Remarks: Failure chosen at 1.0% Strain

Figure ________

Client: HDR Engineering, Inc.

Project: Main Street Interchange GDR

Source of Sample: B10 **Depth:** 20.5-21.0

Sample Number: 5b

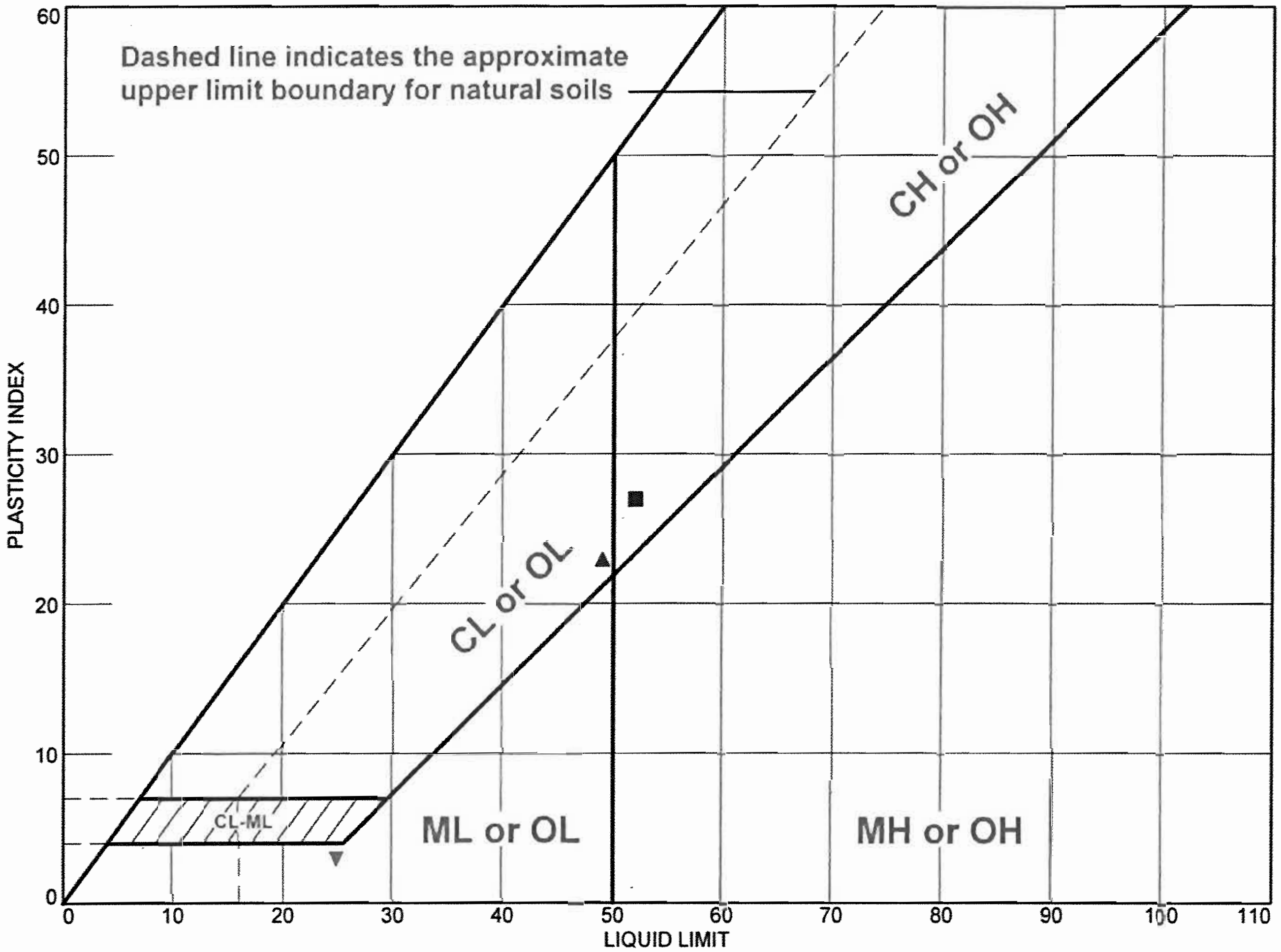
Proj. No.: 1201.5a **Date Sampled:** 6-3-09

TRIAXIAL SHEAR TEST REPORT

Blackburn Consulting

Tested By: KISB **Checked By:** RBL

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Brown Silty SAND	NV	NP	NP			SM
■	Grayish Brown Fat CLAY	52	25	27			CH
▲	Olive Brown Lean CLAY	49	26	23			CL
◆	Olive Brown SILT	NV	NP	NP	95.5	91.0	ML
▼	Olive Brown SILT	25	22	3			ML

Project No. 1201.5 **Client:** HDR Engineering

Project: Main Street Interchange

● **Depth:** 0.0'-5.0' **Sample Number:** B1-1
■ **Depth:** 16.0'-16.5' **Sample Number:** B2-4C
▲ **Depth:** 40.5'-41.0' **Sample Number:** B2-9B
◆ **Depth:** 10.5'-11.0' **Sample Number:** B4-3B
▼ **Depth:** 6.0'-6.5' **Sample Number:** B5-2C

Remarks:

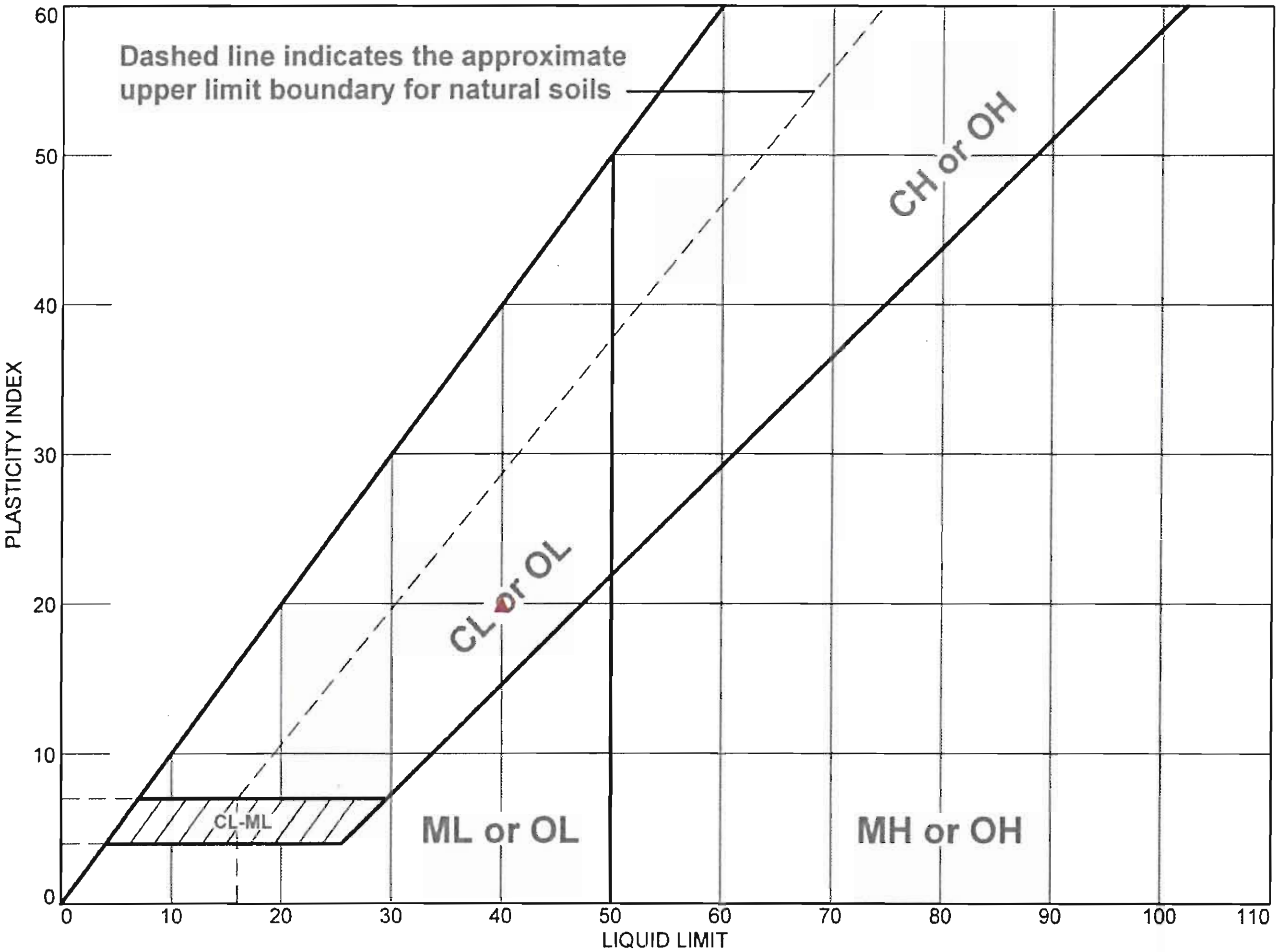
Blackburn Consulting

Aulburn, CA

Figure

Tested By: KLC **Checked By:** KLC

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Olive Brown SILT	NV	NP	NP			ML
■	Brown Silty SAND	NV	NP	NP			SM
▲	Brown Lean CLAY with Sand	40	20	20	89.3	81.5	CL
◆	Olive Brown Sandy SILT	NV	NP	NP			ML

Project No. 1201.5 **Client:** HDR Engineering

Project: Main Street Interchange

● **Depth:** 10.5'-11.0' **Sample Number:** B6-3B
■ **Depth:** 0.0'-5.0' **Sample Number:** B8-1
▲ **Depth:** 21.0'-21.5' **Sample Number:** B10-5C
◆ **Depth:** 11.0'-11.5' **Sample Number:** B14-3C

Remarks:

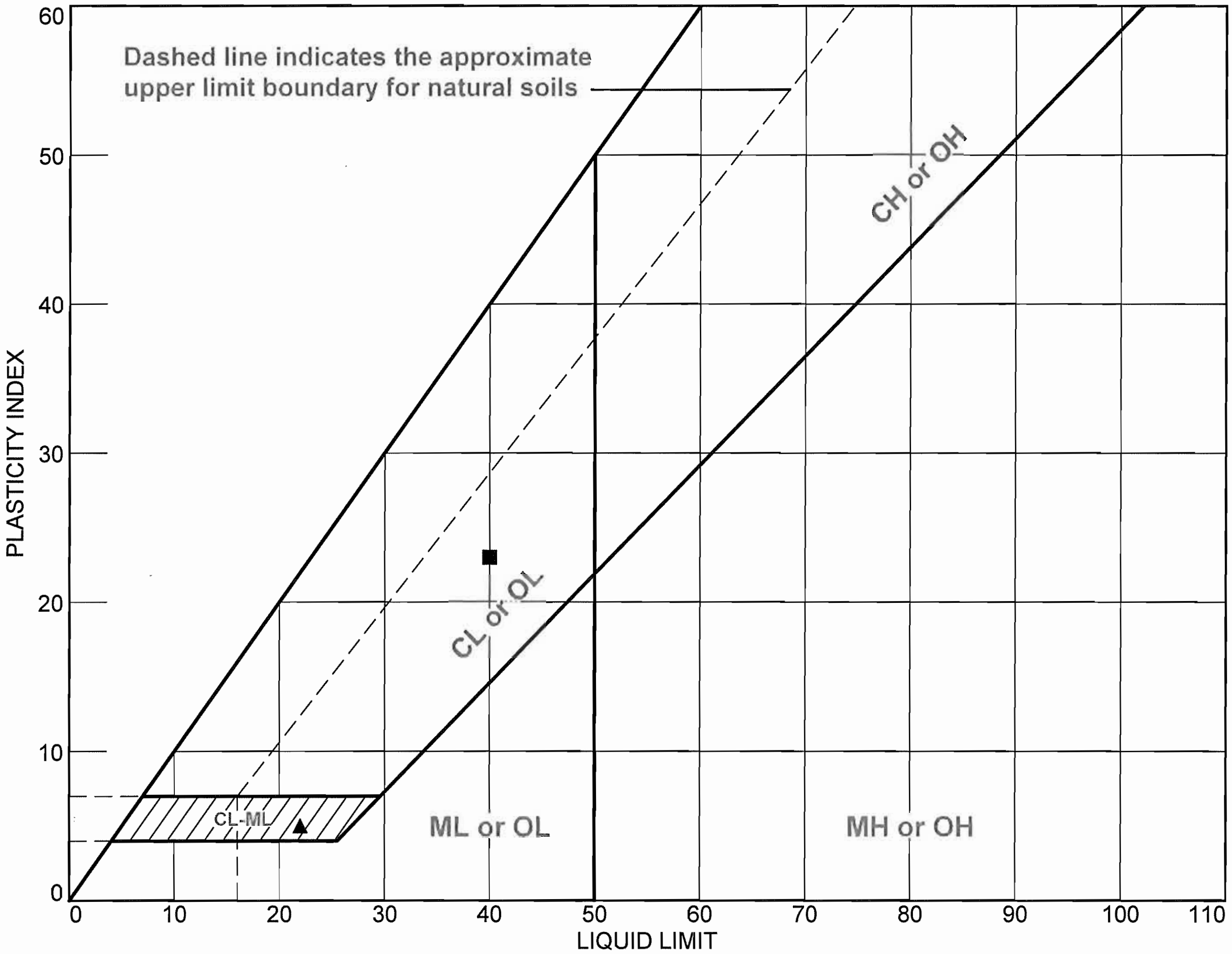
Blackburn Consulting

Auburn, CA

Figure

Tested By: KLC **Checked By:** KLC

LIQUID AND PLASTIC LIMITS TEST REPORT

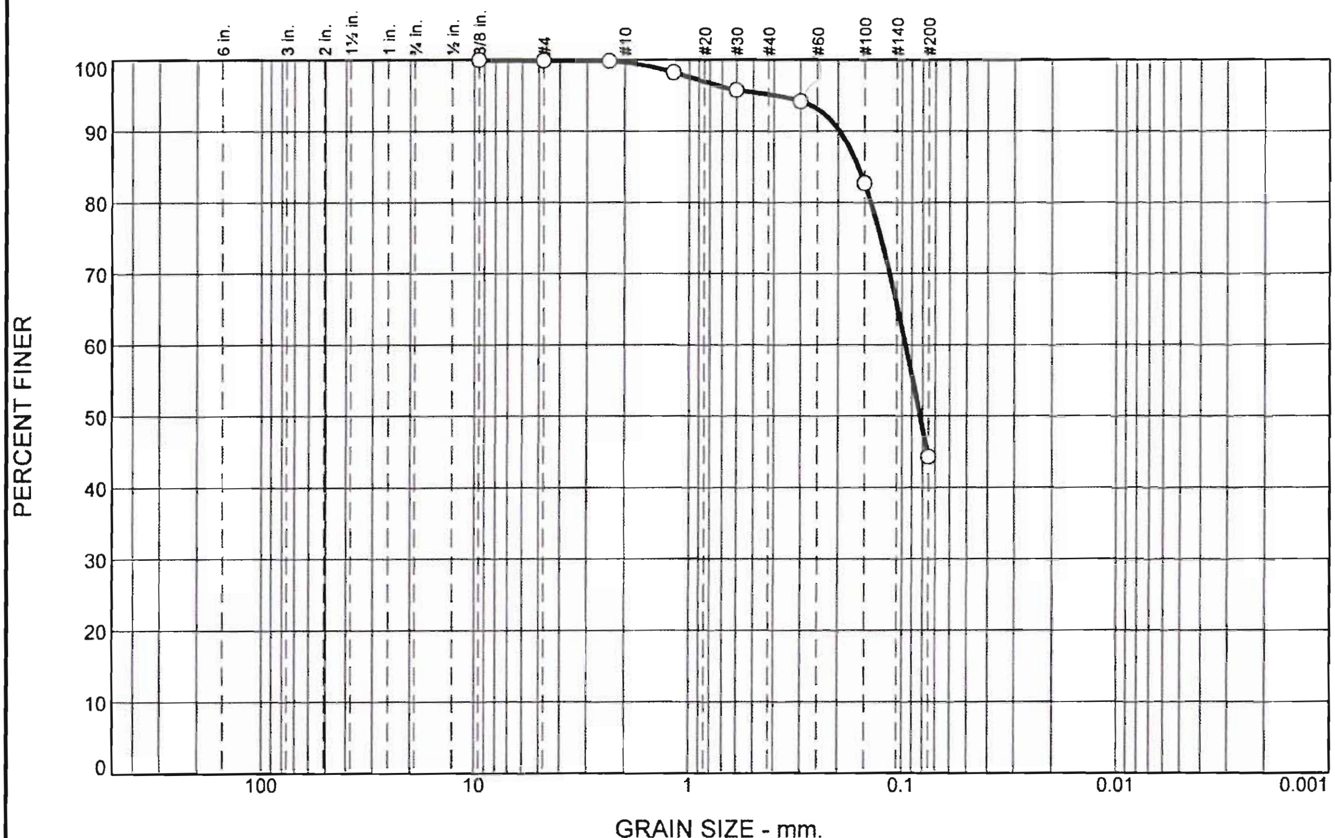


SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	Boring 20	B20-2b	10.5-11					Non-plastic
■	Boring 22	B22-4b	20.5-21		17	40	23	CL
▲	Boring 22	B22-5b	25.5-26		17	22	5	CL-ML

Blackburn Consulting **W. Sacramento, CA**	**Client:** HDR **Project:** French Camp Road Interchange **Project No.:** 1201.6 **Figure**

Tested By: AGW **Checked By:** DPC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.2	4.5	50.9	44.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.9		
#8	99.9		
#16	98.3		
#30	95.8		
#50	94.2		
#100	82.7		
#200	44.3		

* (no specification provided)

Material Description

Olive Brown Silty SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1962 D_{85}= 0.1604 D_{60}= 0.0960
D_{50}= 0.0819 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Sample Number: B1-3B **Depth:** 10.5'-11.0'

Date: 7-15-09

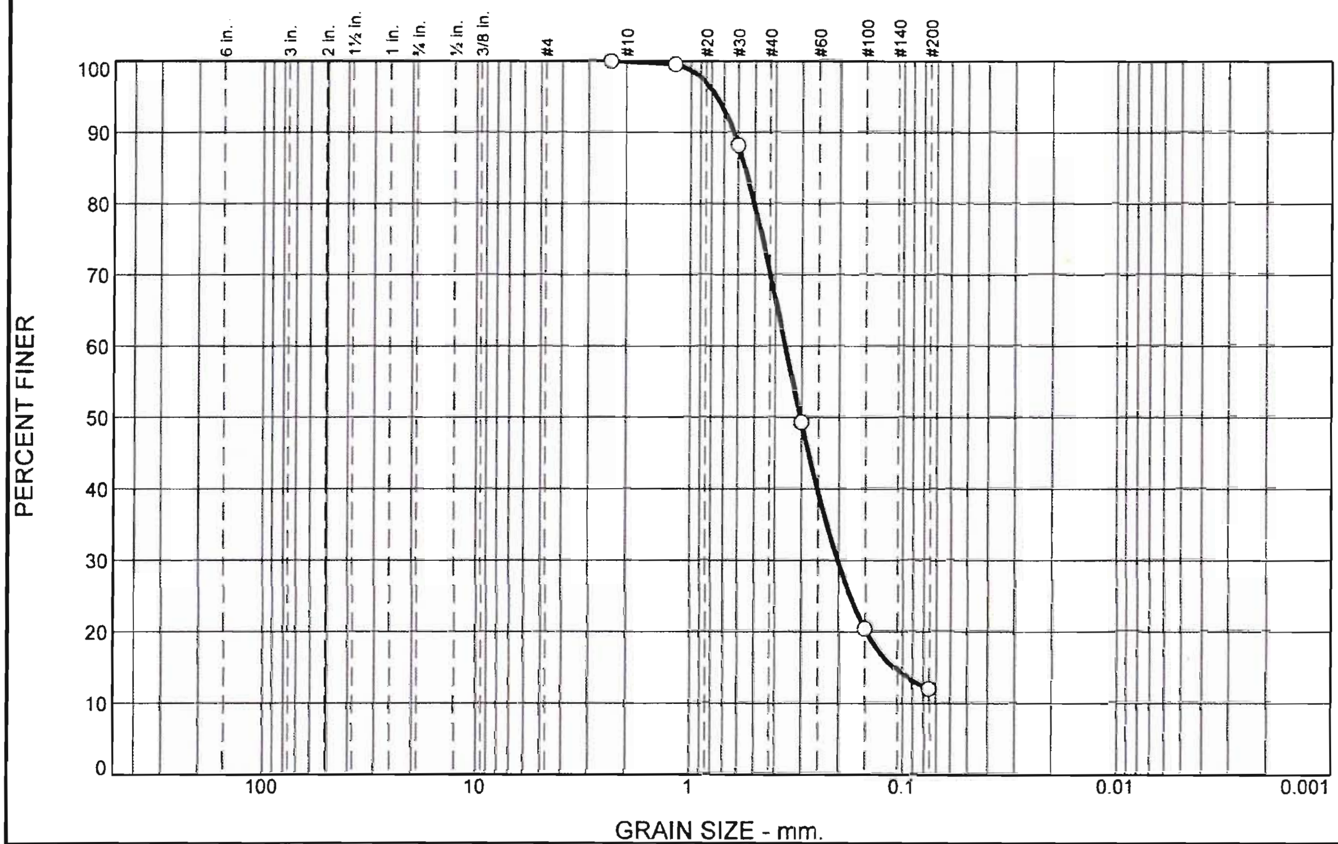
Blackburn Consulting

Auburn, CA

Client: HDR Engineering
Project: Main Street Interchange
Project No: 1201.5 **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	29.4	58.4	12.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#8	100.0		
#16	99.6		
#30	88.2		
#50	49.4		
#100	20.5		
#200	12.1		

* (no specification provided)

Material Description

Light Olive Brown Poorly Graded SAND with Clay

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6296 D_{85}= 0.5563 D_{60}= 0.3581
D_{50}= 0.3033 D_{30}= 0.2016 D_{15}= 0.1095
D_{10}= C_u= C_c=

Classification

USCS= SP-SC AASHTO=

Remarks

Sample Number: B2-8C **Depth:** 36.0'-36.5

Date: 7-15-09

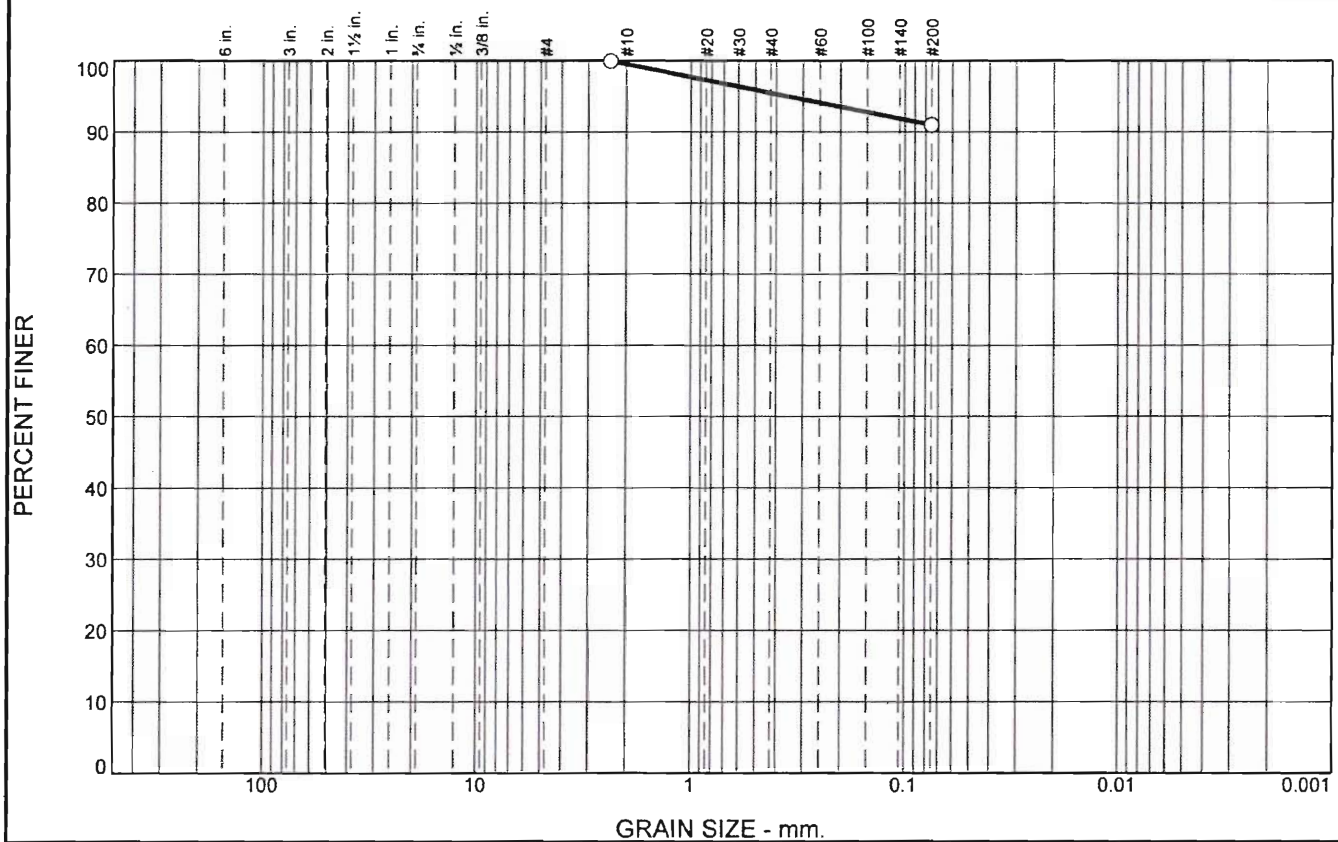
Blackburn Consulting

Auburn, CA

Client: HDR Engineering
Project: Main Street Interchange
Project No: 1201.5 **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
				4.0	4.5	91.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#8	100.0		
#200	91.0		

* (no specification provided)

Material Description

Olive Brown SILT

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO= A-4(0)

Remarks

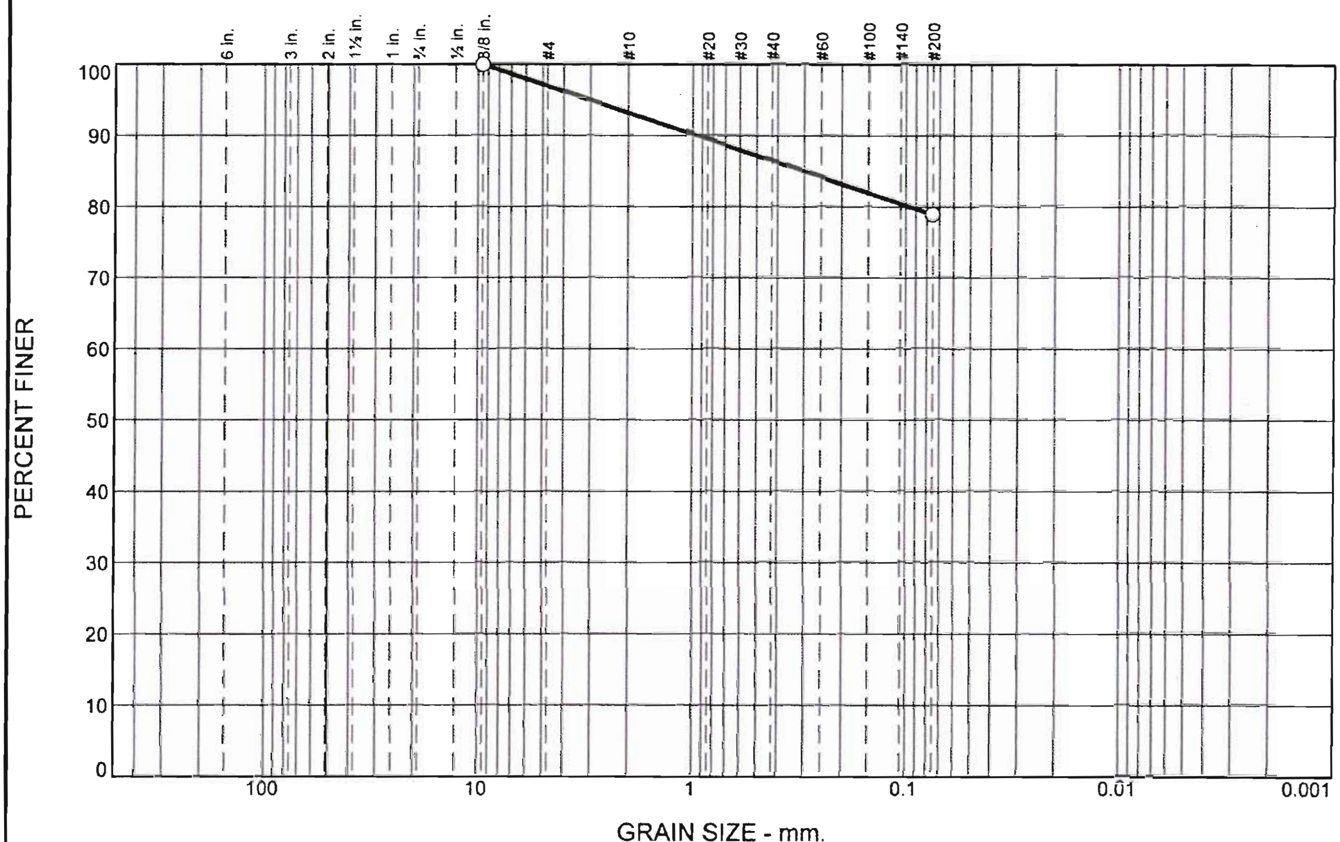
Sample Number: B4-3B **Depth:** 10.5'-11.0'

Date: 7-14-09

Blackburn Consulting Auburn, CA	**Client:** HDR Engineering **Project:** Main Street Interchange **Project No:** 1201.5 **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.0	3.8	6.7	7.6	78.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#200	78.9		

* (no specification provided)

Material Description

Olive Brown SILT with Sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.9546 D_{85}= 0.3022 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

Sample Number: B8-3B **Depth:** 10.5'-11.0'

Date: 7-15-09

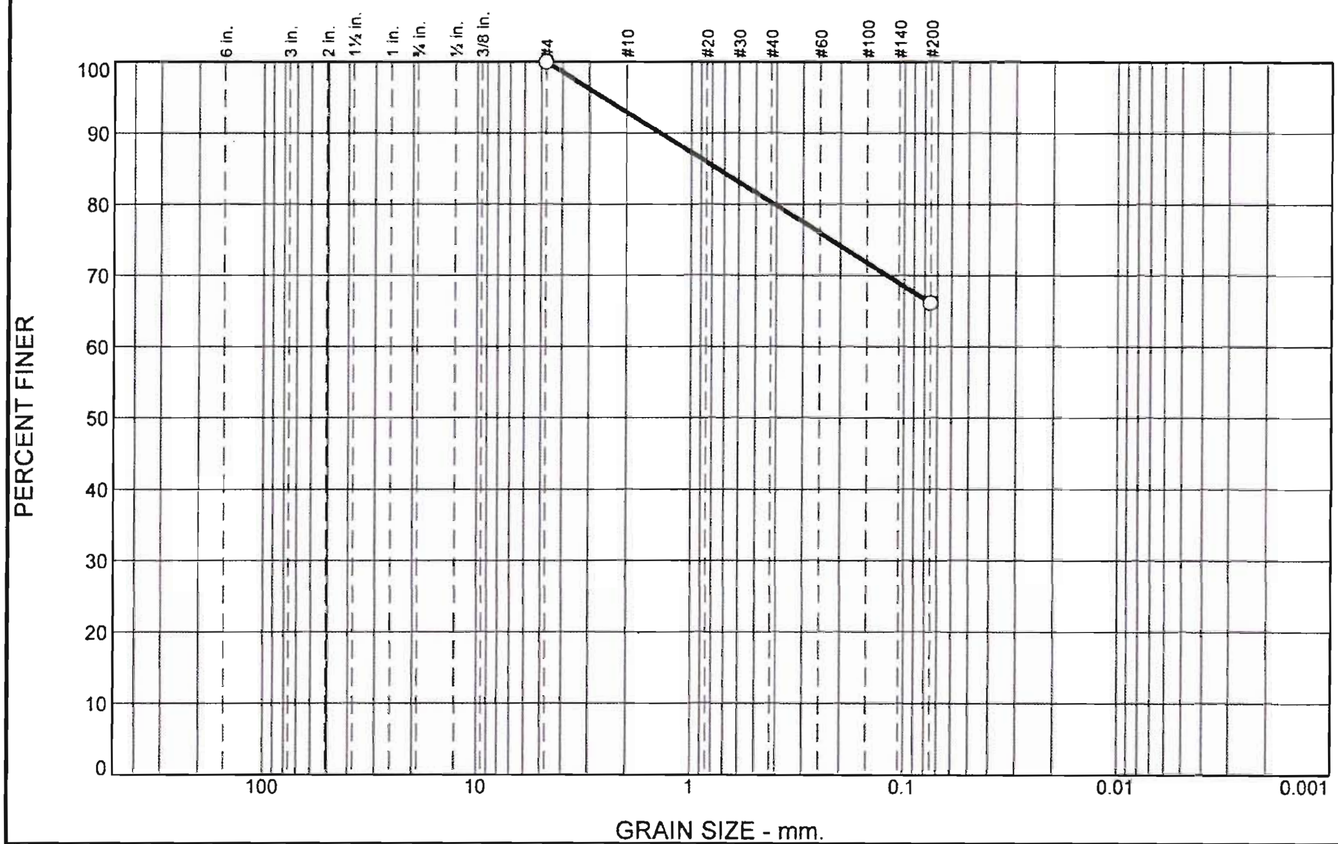
Blackburn Consulting

Auburn, CA

Client: HDR Engineering
Project: Main Street Interchange
Project No: 1201.5 **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	7.1	12.6	14.1	66.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#200	66.2		

* (no specification provided)

Material Description

Olive Brown Sandy SILT

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.3932 D_{85}= 0.7545 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

Sample Number: B10-4B **Depth:** 15.5'-16.0'

Date: 7-15-09

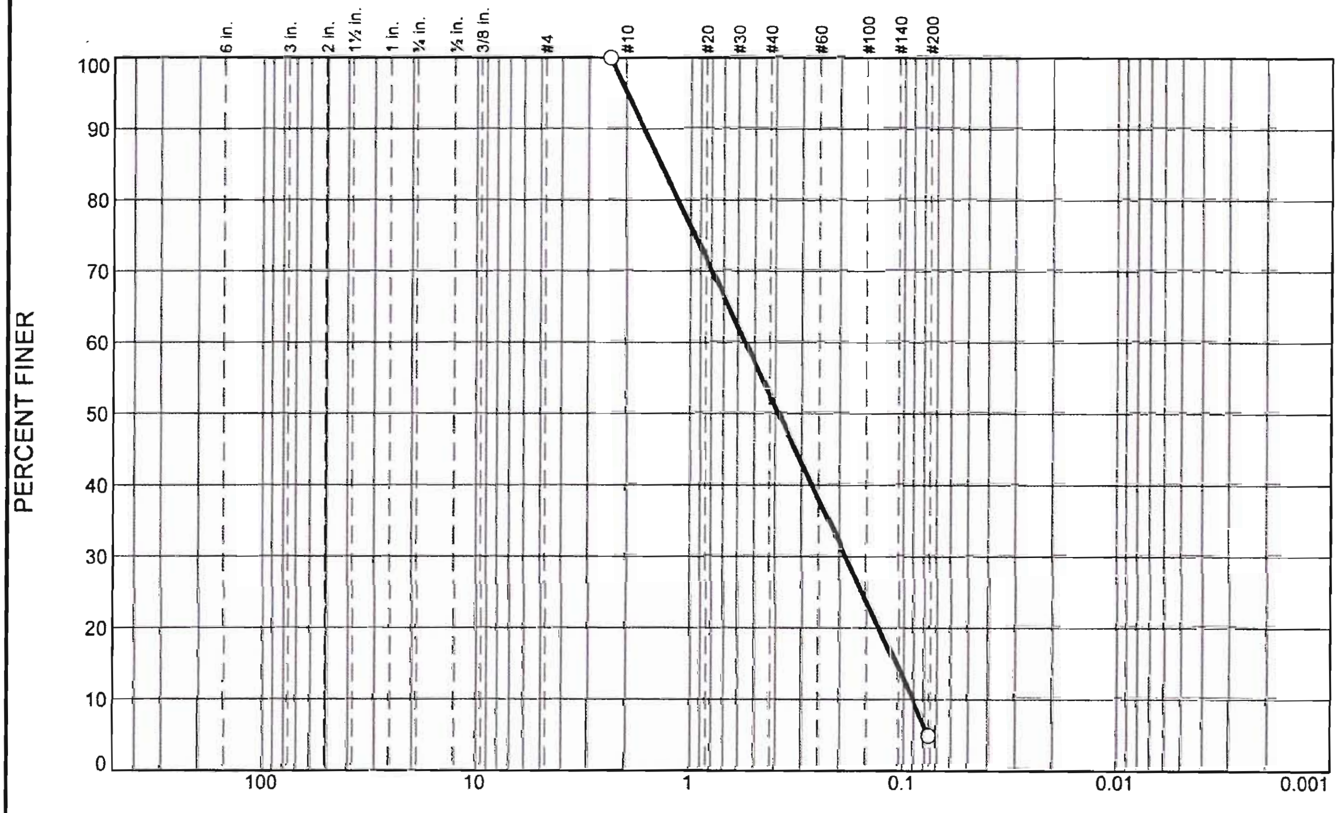
Blackburn Consulting

Auburn, CA

Client: HDR Engineering
Project: Main Street Interchange
Project No: 1201.5 **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	4.6	42.6	47.8	5.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#8	100.0		
#200	5.0		

* (no specification provided)

Material Description

Olive Brown Poorly Graded SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.6418 D_{85}= 1.3694 D_{60}= 0.5527
D_{50}= 0.3845 D_{30}= 0.1861 D_{15}= 0.1080
D_{10}= 0.0901 C_u= 6.14 C_c= 0.70

Classification

USCS= SP AASHTO=

Remarks

Sample Number: B10-4C **Depth:** 16.0'-16.5'

Date: 7-15-09

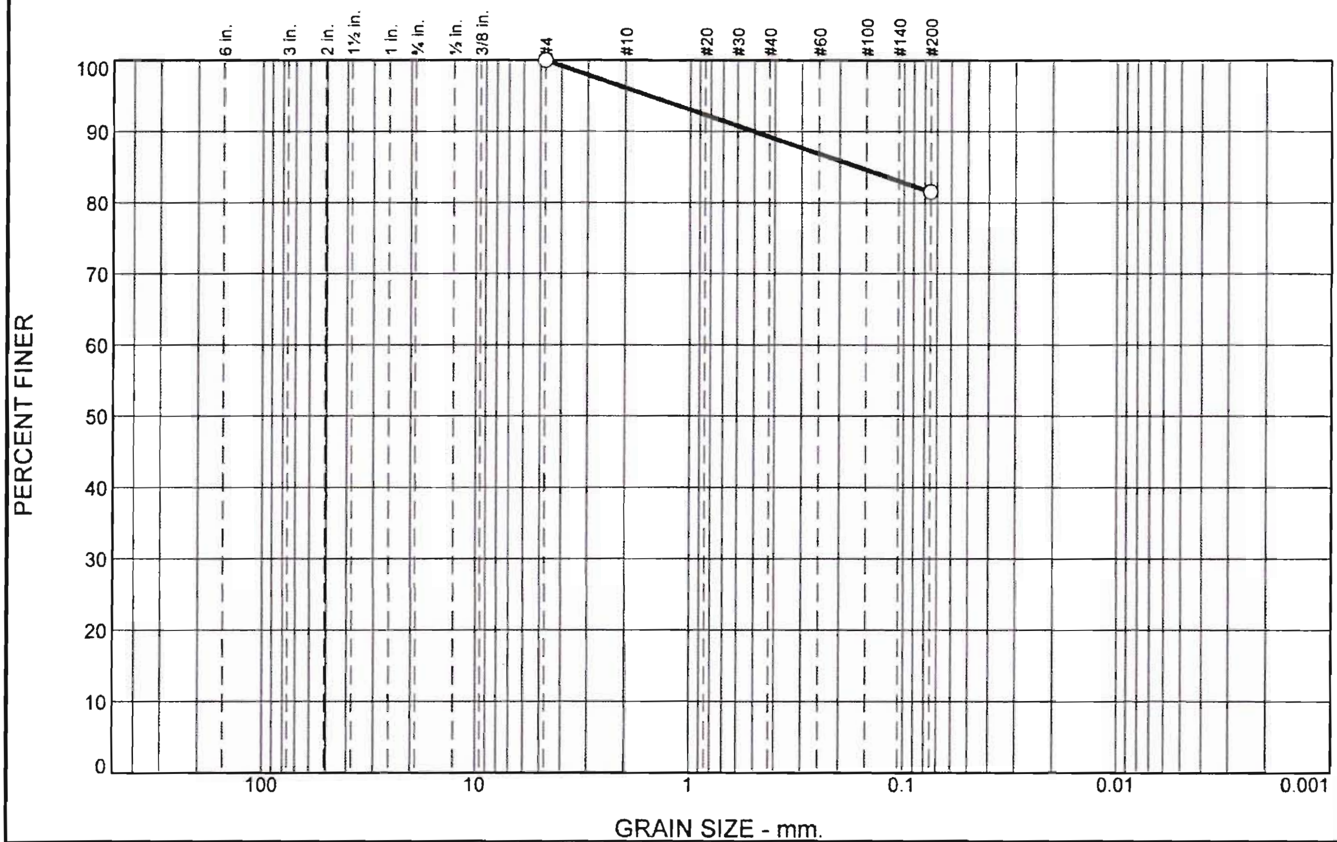
Blackburn Consulting

Auburn, CA

Client: HDR Engineering
Project: Main Street Interchange
Project No: 1201.5 **Figure**

Tested By: KLC Checked By: KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	3.8	6.9	7.8	81.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#200	81.5		

* (no specification provided)

Material Description

Brown Lean CLAY with Sand

Atterberg Limits

PL= 20 LL= 40 PI= 20

Coefficients

D_{90}= 0.5021 D_{85}= 0.1632 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= CL AASHTO= A-6(16)

Remarks

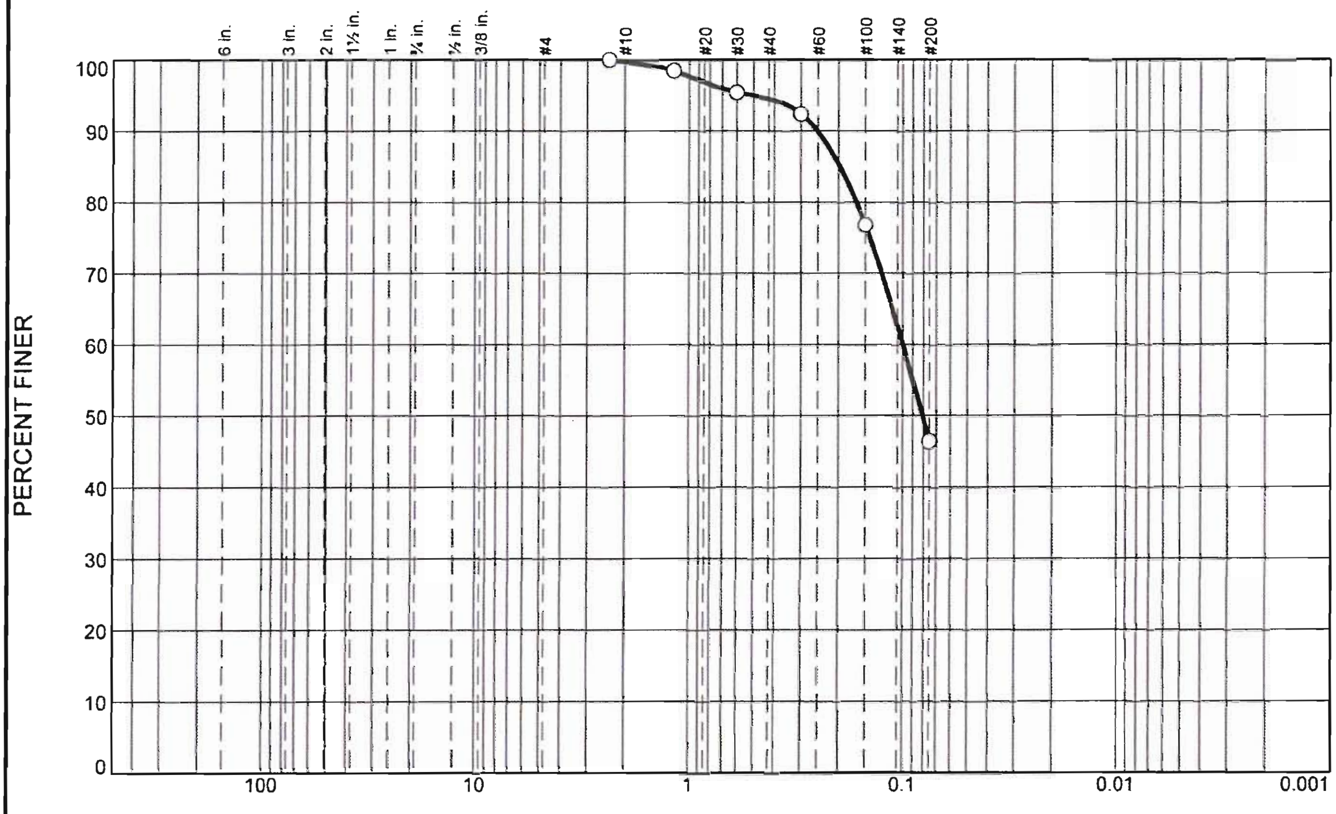
Sample Number: B10-5C **Depth:** 21.0'-21.5'

Date: 7-15-09

Blackburn Consulting **Auburn, CA**	**Client:** HDR Engineering **Project:** Main Street Interchange **Project No:** 1201.5 **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.2	5.2	48.1	46.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#8	100.0		
#16	98.5		
#30	95.5		
#50	92.4		
#100	76.9		
#200	46.5		

* (no specification provided)

Material Description

Olive Brown Silty SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2512 D_{85}= 0.1971 D_{60}= 0.0997
D_{50}= 0.0807 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Sample Number: B12-2B **Depth:** 5.5'-6.0'

Date: 7-16-09

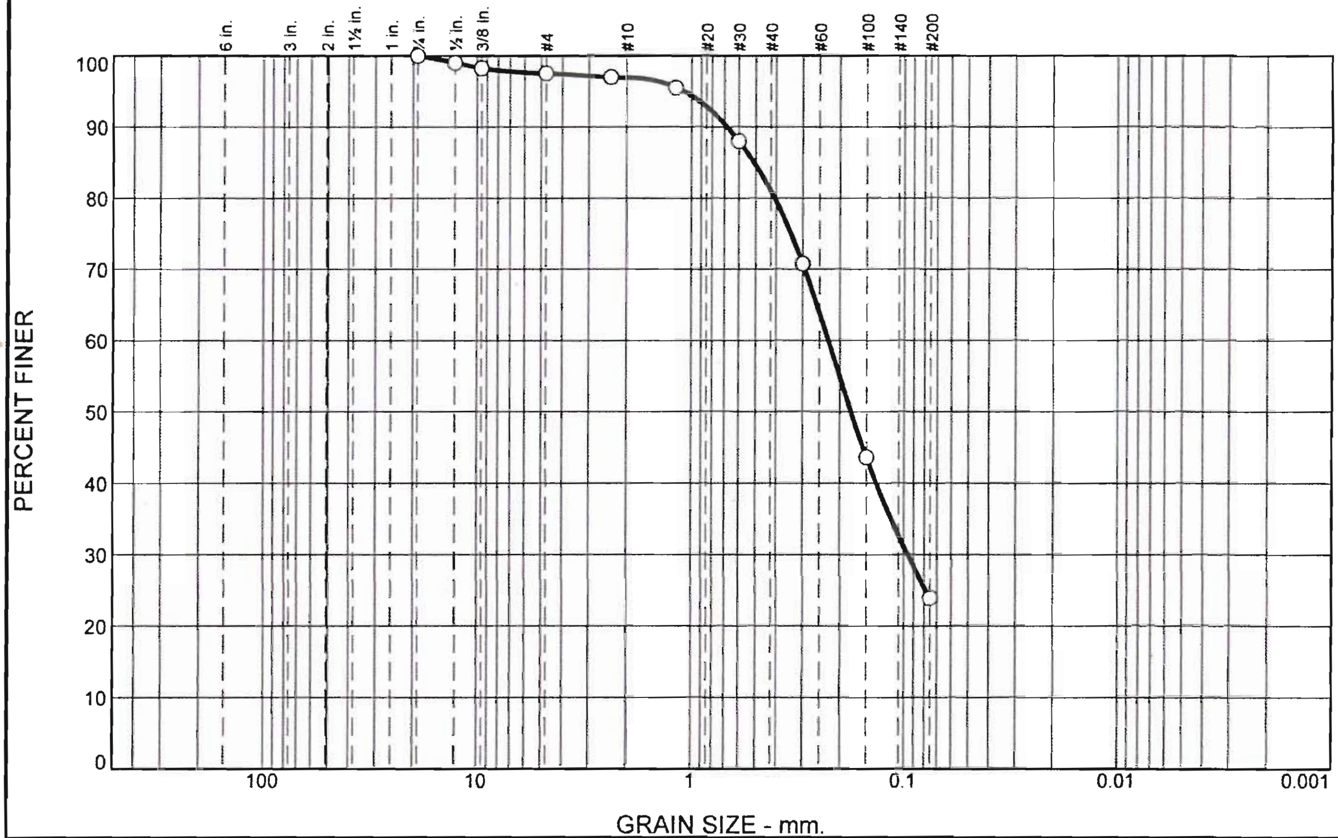
Blackburn Consulting

Auburn, CA

Client: HDR Engineering
Project: Main Street Interchange
Project No: 1201.5 **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.4	0.7	15.8	57.2	23.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	99.0		
3/8"	98.3		
#4	97.6		
#8	97.0		
#16	95.6		
#30	88.1		
#50	70.8		
#100	43.6		
#200	23.9		

* (no specification provided)

Material Description

Brown Silty SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.6790 D_{85}= 0.5079 D_{60}= 0.2265
D_{50}= 0.1773 D_{30}= 0.0956 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Sample Number: B13-1 **Depth:** 0.0'-5.0'

Date: 7-20-09

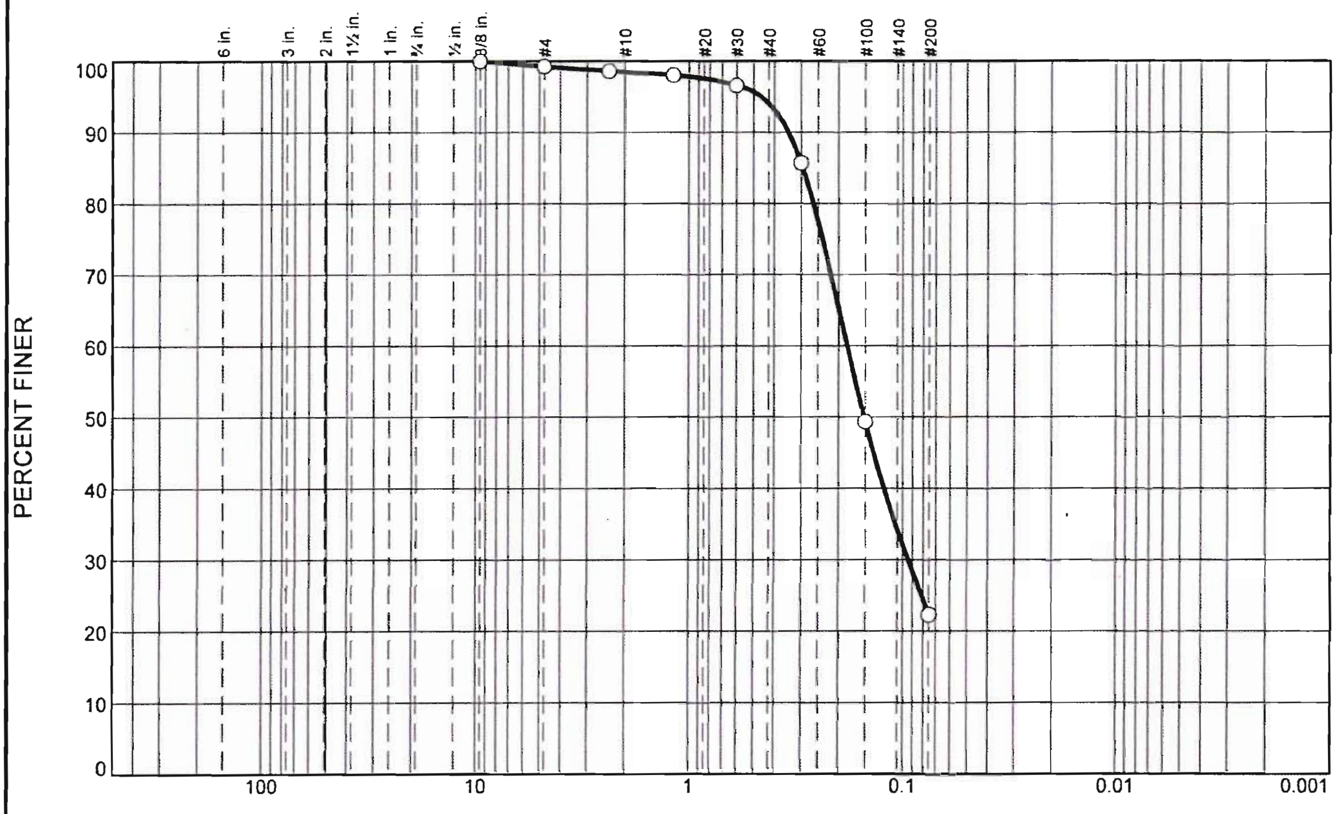
Blackburn Consulting

Auburn, CA

Client: HDR Engineering
Project: Main Street Interchange
Project No: 1201.5 **Figure**

Tested By: DKB **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	0.8	4.4	71.8	22.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	99.3		
#8	98.6		
#16	98.1		
#30	96.6		
#50	85.7		
#100	49.4		
#200	22.3		

* (no specification provided)

Material Description

Yellowish Brown Silty SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3432 D_{85}= 0.2943 D_{60}= 0.1822
D_{50}= 0.1519 D_{30}= 0.0942 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Sample Number: B14-2B **Depth:** 5.5'-6.0'

Date: 7-15-09

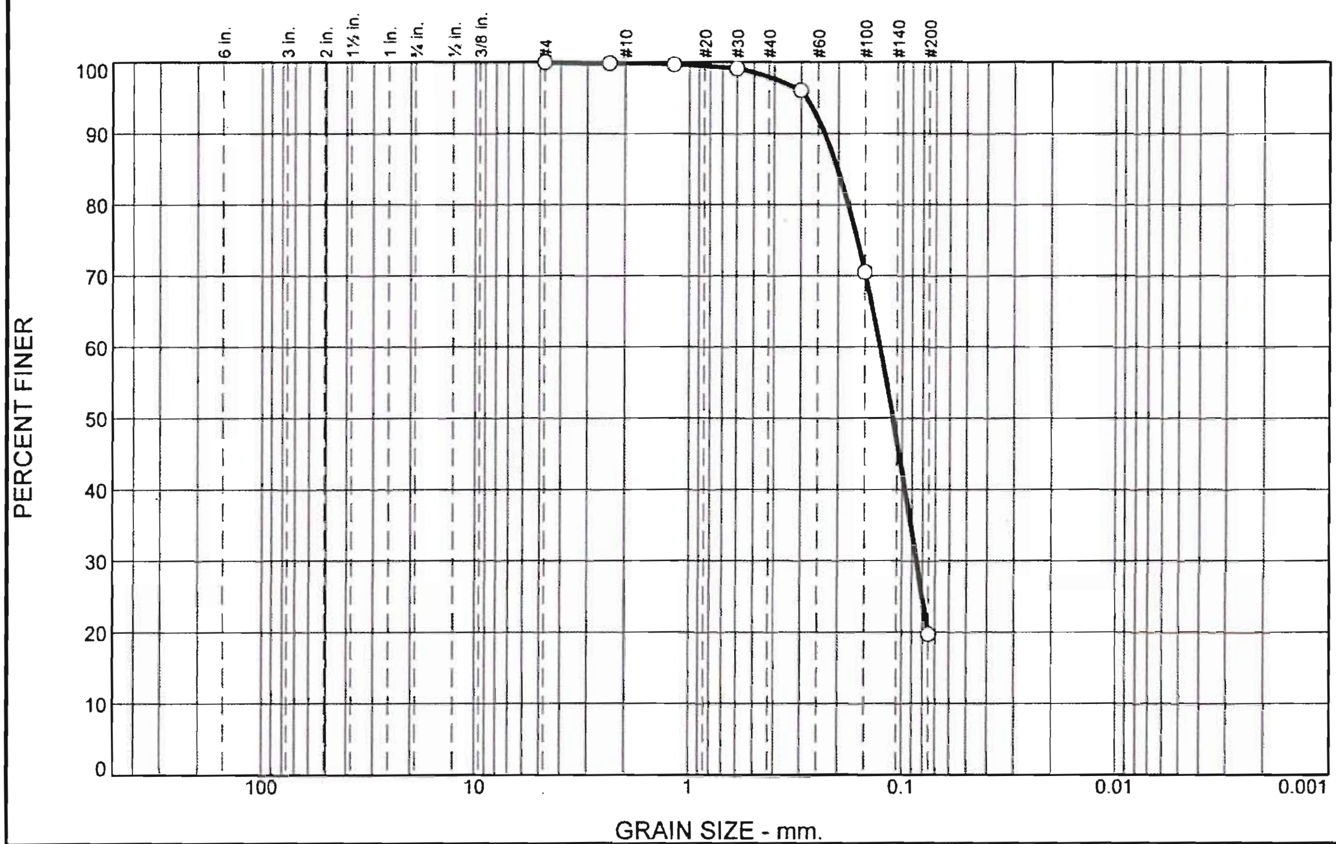
Blackburn Consulting

Auburn, CA

Client: HDR Engineering
Project: Main Street Interchange
Project No: 1201.5 **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	2.0	78.1	19.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.9		
#16	99.7		
#30	99.2		
#50	96.1		
#100	70.5		
#200	19.8		

* (no specification provided)

Material Description

Olive Brown Silty SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2323 D_{85}= 0.2017 D_{60}= 0.1270
D_{50}= 0.1103 D_{30}= 0.0852 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

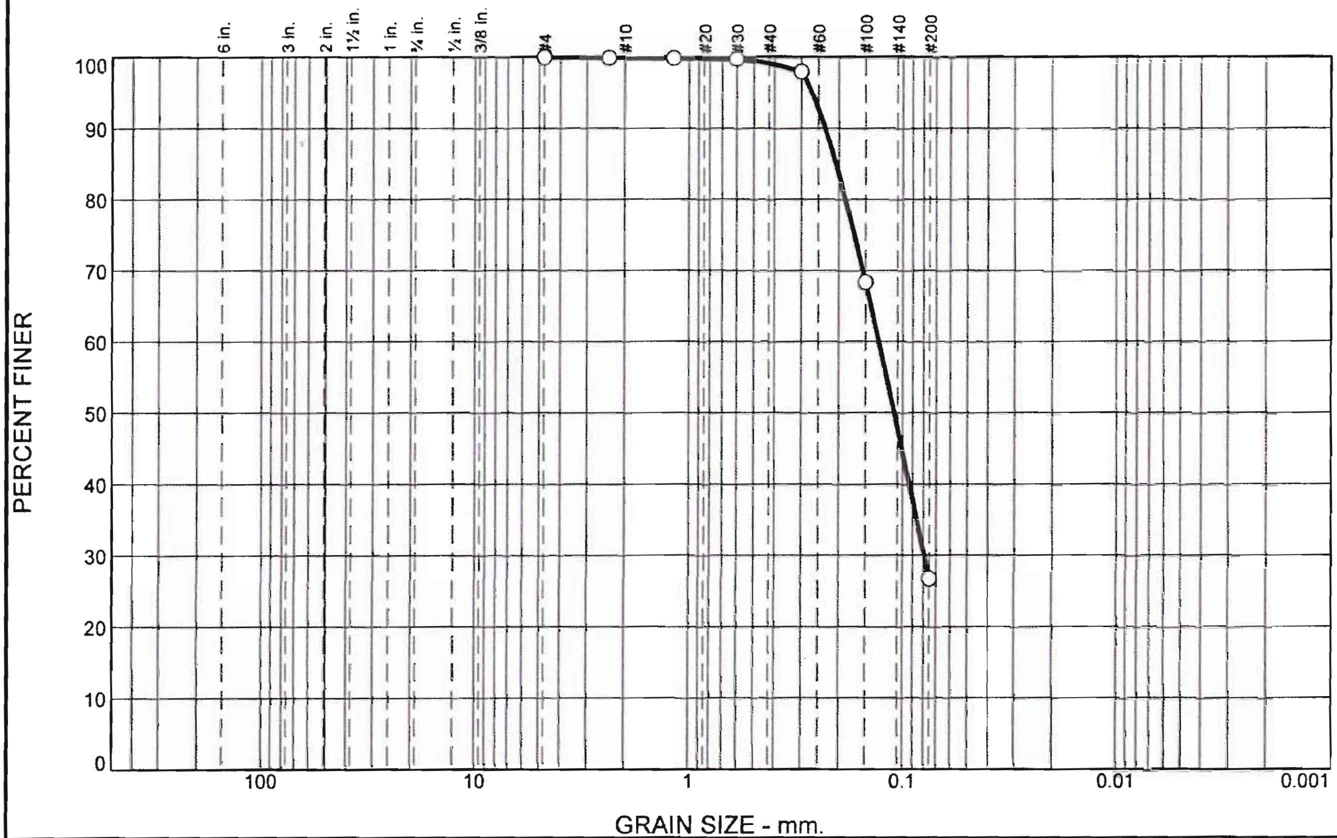
Sample Number: B14-3B **Depth:** 10.5'-11.0'

Date: 7-15-09

Blackburn Consulting **Auburn, CA**	**Client:** HDR Engineering **Project:** Main Street Interchange **Project No:** 1201.5 **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.1	0.8	72.3	26.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#8	99.9		
#16	99.9		
#30	99.8		
#50	98.0		
#100	68.4		
#200	26.8		

* (no specification provided)

Material Description

Olive Brown Silty SAND

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.2317 D_{85}= 0.2063 D_{60}= 0.1297
D_{50}= 0.1096 D_{30}= 0.0790 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

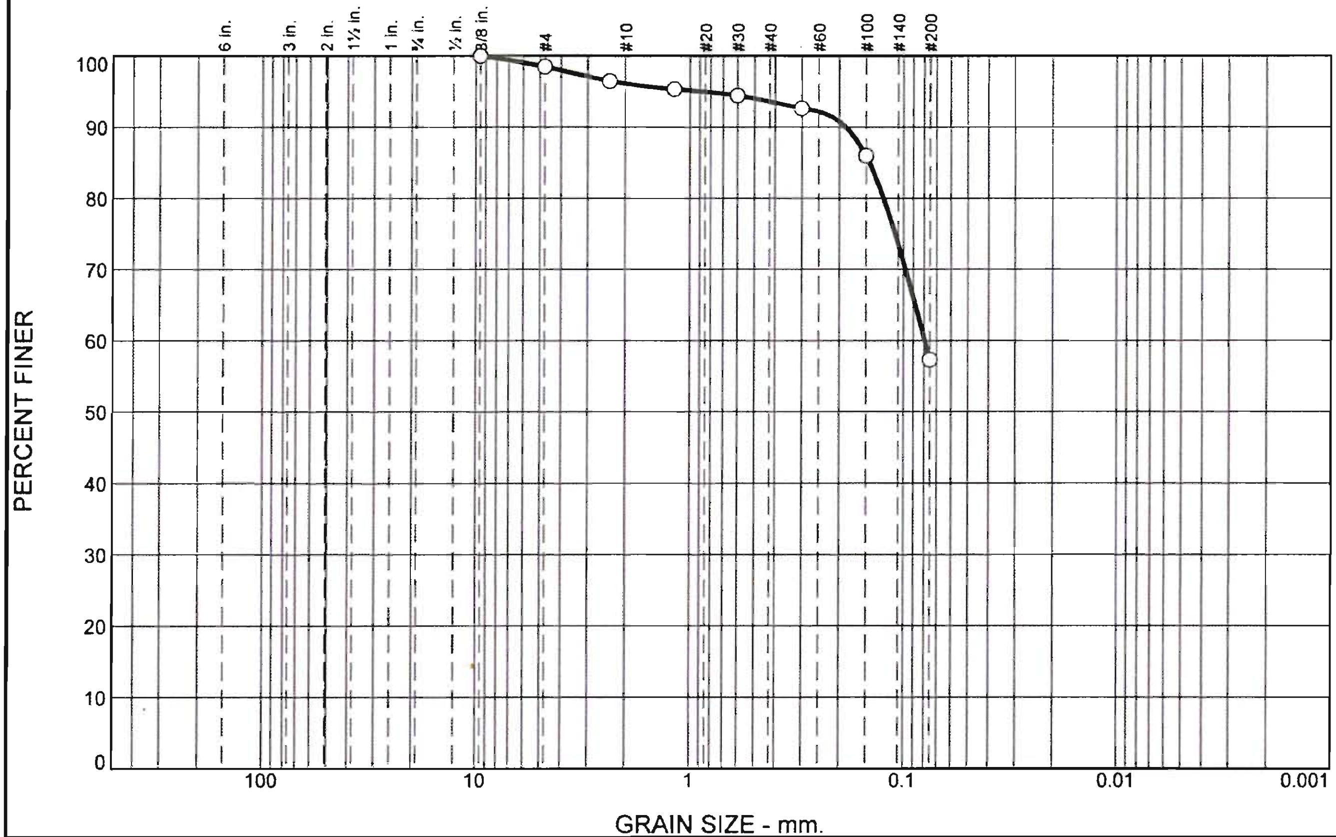
Sample Number: B15-3B **Depth:** 10.5'-11.0'

Date: 7-15-09

Blackburn Consulting Auburn, CA	**Client:** HDR Engineering **Project:** Main Street Interchange **Project No:** 1201.5 **Figure**

Tested By: KLC **Checked By:** KLC

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.5	2.4	2.5	36.3	57.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/8"	100.0		
#4	98.5		
#8	96.5		
#16	95.4		
#30	94.5		
#50	92.7		
#100	86.0		
#200	57.3		

* (no specification provided)

Material Description

Olive Brown Sandy SILT

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1862 D_{85}= 0.1446 D_{60}= 0.0792
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

Sample Number: B18-2C **Depth:** 6.0'-6.5'

Date: 7-17-09

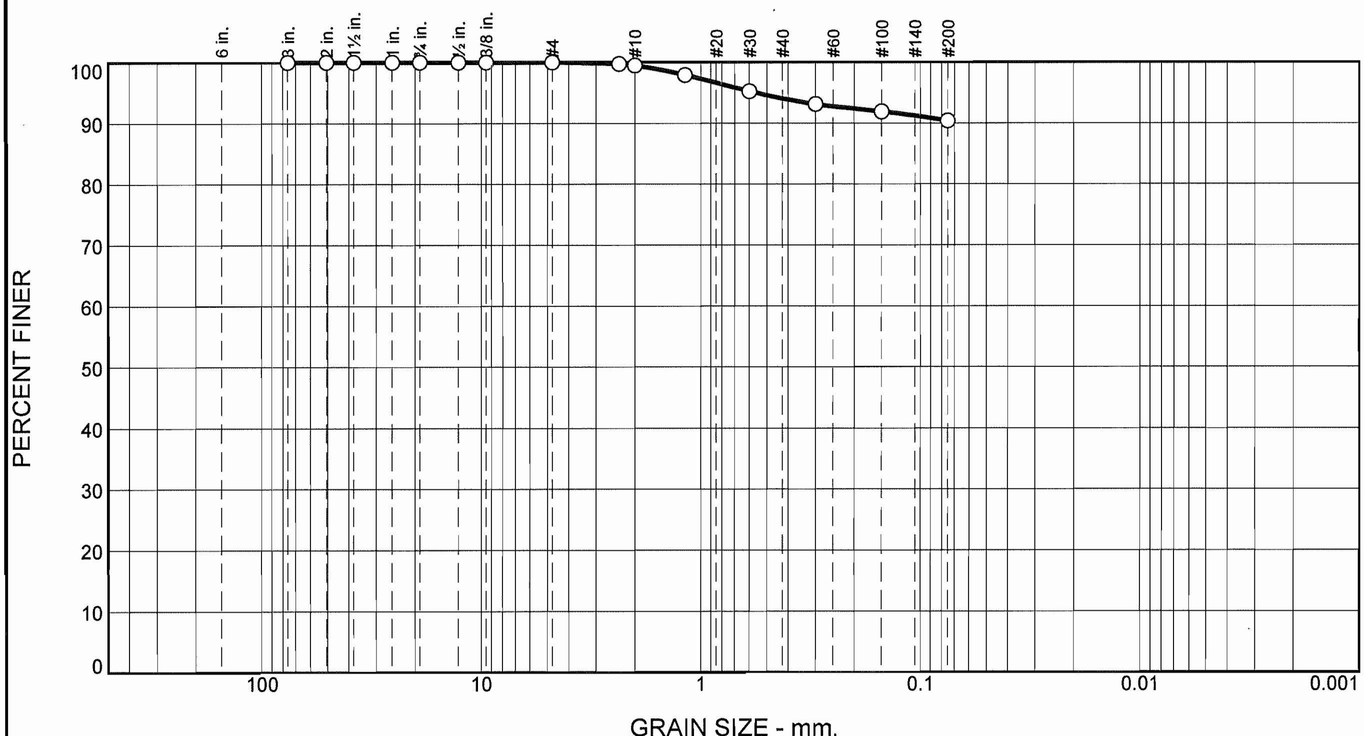
Blackburn Consulting

Auburn, CA

Client: HDR Engineering
Project: Main Street Interchange
Project No: 1201.5 **Figure**

Tested By: DKB **Checked By:** KLC

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.5	5.5	3.6	90.4	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○										

Material Description	USCS	AASHTO
○ Light olive brown SILT	ML	

Project No. 1201.5 **Client:** HDR Engineering, Inc.

Project: Main Street Interchange GDR

○ **Source of Sample:** B20-09 **Depth:** 10.5-11.0 **Sample Number:** 2b

Remarks:

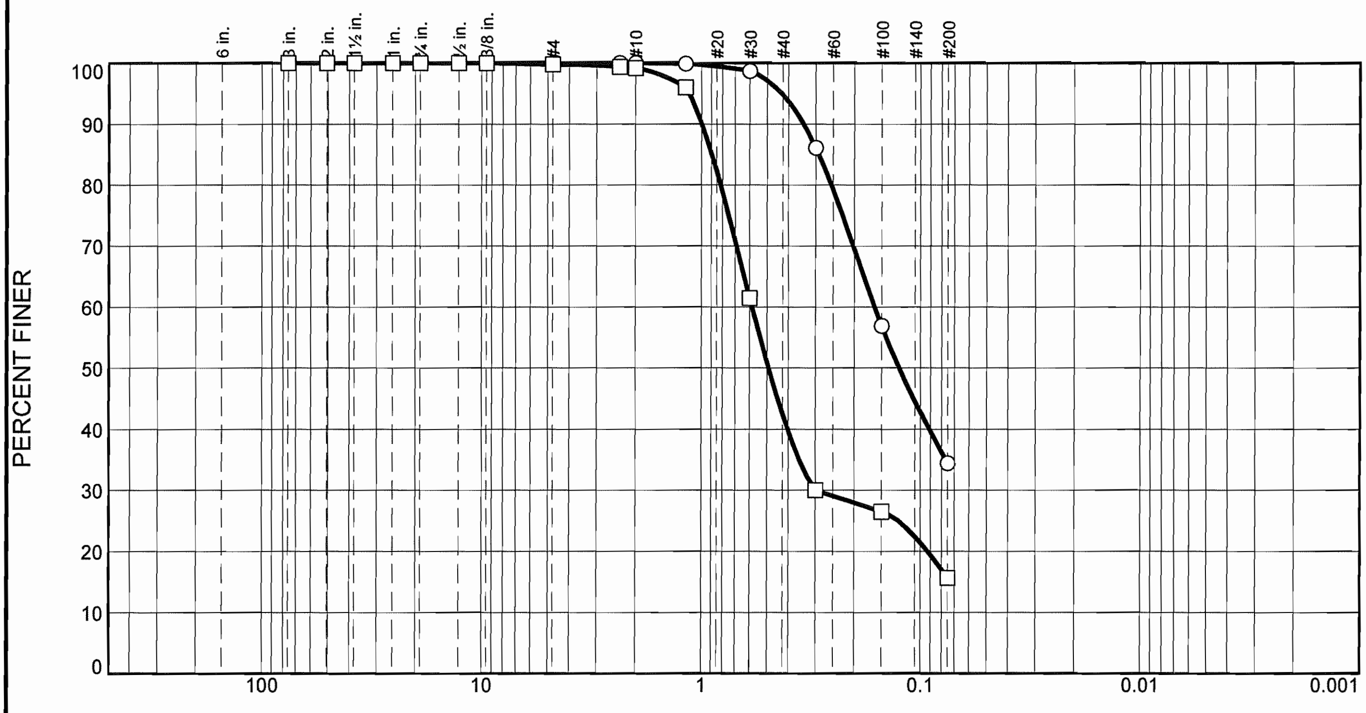
Blackburn Consulting

W. Sacramento, CA

Figure

Tested By: ______________________ **Checked By:** ______________________

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	5.2	60.4	34.4	
□	0.0	0.0	0.2	0.6	56.8	26.7	15.7	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.2904	0.1617	0.1249					
□			0.8947	0.5859	0.4928	0.3002				

Material Description	USCS	AASHTO
○ Dark yellowish brown SILTY SAND	SM	
□ Light yellowish brown SILTY SAND	SM	

Project No. 1201.5 **Client:** HDR Engineering, Inc.

Project: Main Street Interchange GDR

○ **Source of Sample:** B22-09 **Depth:** 5.5-6.0' **Sample Number:** 1b

□ **Source of Sample:** B22-09 **Depth:** 16.0-16.5' **Sample Number:** 3c

Remarks:

Blackburn Consulting

W. Sacramento, CA

Figure

Tested By: ____________ **Checked By:** ____________

APPENDIX D

Historical Caltrans Information

HISTORICAL CALTRANS INFORMATION

Little Johns Creek Bridge

- Sheets 42 to 45 of the October 25, 1954 As Built Log of Test Borings, sheets 98, 99, 107 of the July 7th, 1998 “Little Johns Creek Bridge (Widen),”
- August 6th, 1954 Foundation Study by C. H. Harned,
- August 27th, 1954 Foundation Review by C. H. Harned,
- November 14th, 1994 “Preliminary Geologic/Geotechnical Information” by R. R. Price,
- September 19th, 1997 “Foundation Investigation” by R. R. Price,
- August 15th, 1997 “Preliminary Report (Hydrography)” for Littlejohns Creek (Bridge No. 29-0017).

Lone Tree Slough Bridge

- Sheets 33 to 35 of the October 23rd, 1954 As Built Plans and sheet 12 of the Log of Test Borings (undated),
- Sheets 80 to 82 and 89 to 90 of the May 5th, 1998 “Lone Tree Slough Bridge (Widen),”
- August 6th, 1954 Foundation Study by C. H. Harned,
- August 27th, 1954 Foundation Review by C. H. Harned,
- November 14th, 1994 “Preliminary Geologic/Geotechnical Information” by R. R. Price,
- September 15th, 1997 “Foundation Investigation” by R. R. Price,
- August 15th, 1997 “Preliminary Report (Hydrography)” for Lone Tree Slough (Bridge No. 29-0023).

French Camp Slough Bridge

- Reviewed sheets 37 to 39 of the October 25th, 1954 As Built Plans and sheet 41 Log of Test Borings, the August 6th, 1954 Foundation Data Report by C. H. Harned,
- November 14th, 1994 “Preliminary Geologic/Geotechnical Information” by R. R. Price,
- December 21st, 1999 “Stability Rating for Scour Critical Program” by A. M. Gugino,
- January 23rd, 2002 “Foundation Evaluation for the Scour Critical Program” by W. J. Baker for French Camp Slough Bridges (Bridge No. 29-0019).

Turner Station Overcrossing

- Sheets 32 to 35 and 41 to 42 of the November 28th, 1955 As Built Log of Test Borings,
- Sheets 67 to 70 of the July 27th, 1998 “Turner Station Overhead (Widen),
- February 7th, 1955 Foundation Data Report by C. H. Harned,
- June 25th, 1956 filled-in log of test boring sheet by E. F. Nordlin,
- February 16th, 1977 “Preliminary Geologic/Geotechnical Information” by M. Heaney,
- January 9th, 1995 “Preliminary Seismic Geologic Foundation Information” by R. R. Price,
- September 3rd, 1997 “Foundation Investigation” by R. R. Price,
- December 16th, 1997 “Revised Piles Recommendations” by R. R. Price,
- March 30th, 2006 “District Preliminary Geotechnical Report” by Qiang Huang, for Turner Station Overhead crossing (Bridge No. 29-0071).

Lathrop Road Overcrossing

- Reviewed the December 11th, 1953 Log of Test Borings and the November 19, 1953 Foundation Data Report by H. R. Taber for Lathrop Road Overcrossing (Bridge No. 29-136).

North Connector Overcrossing

- Reviewed the January 5th, 1976 Log of Test Borings, the August 22nd, 1977 General Plan Sheet and Foundation Plan Sheet, and the January 19th, 1976 Foundation Study by R. W. Fox for North Connector Overcrossing (Bridge No. 29-286).

Louise Avenue Overcrossing

- Reviewed the December 9th, 1953 Log of Test Borings and the November 19th, 1953 Foundation Data Report by H. R. Taber for Louise Avenue Overcrossing (Bridge No. 29-135).

Cottage Avenue Overcrossing

- Reviewed the January 13th, 1956 As Built Log of Test Borings and the Foundation Data Report by H. R. Taber (undated) for the Cottage Avenue Overcrossing (Bridge No. 29-133).

SR 99 and SR 120 Interchange

- Reviewed the October 31st, 2003 Foundation Investigation and the October 29th, 2003 Log of Test Borings by William Eric Nichols for the Route 99/120 Separation (Replace) project (Bridge No. 29-0125).

MATERIALS REPORT

Main Street Interchange

10-SJ-99, PM 8.6 to PM 9.8

10-0E6101

Prepared by:

BLACKBURN CONSULTING
1720 G Street
Modesto, CA 95354
(209)522-6273

February 16, 2012

Prepared for:

HDR Engineering, Inc.
1325 J Street, Suite 1300
Sacramento, CA 95814-2928

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blackburn consulting

Main Office: (530) 887-1494
11521 Blocker Drive, Suite 110 • Auburn, CA 95603
West Sacramento Office: (916) 375-8706

Geotechnical • Construction Services • Forensics

File No. 1201.5b
February 16, 2012

John Klemunes
HDR Engineering, Inc.
1325 J Street, Suite 1300
Sacramento, CA 95814-2928

Subject: **MATERIALS REPORT**
Main Street Interchange Improvements
10-SJ-99, PM 8.6 to PM 9.8, EA: 0E-6101
Manteca, California

Dear Mr. Klemunes,

Blackburn Consulting (BCI) is pleased to submit this Materials Report for the Main Street Interchange Improvements as part of the State Route 99 Manteca Widening Project. BCI prepared this report in accordance with our November 15, 2008 agreement. This report contains laboratory test results, and conclusions and recommendations regarding structural pavement sections and culvert design.

Thank you for selecting BCI to be on your design team. Please call if you have questions or require additional information.

Sincerely;

BLACKBURN CONSULTING

Reviewed By:

For

REGISTERED PROFESSIONAL ENGINEER
BENJAMIN D. CRAWFORD
No. GE 2861
GEOTECHNICAL
STATE OF CALIFORNIA

Aaron Wood, P.G., C.E.G.
Project Geologist

Benjamin D. Crawford, P.E., G.E.
Principal

MATERIALS REPORT

Main Street Interchange Improvements
10-SJ-99, PM 8.6 to PM 9.8, EA: 0E-6101
Manteca, California

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APPENDIX A

APPENDIX B

APPENDIX C

INTRODUCTION

Scope of Services

To prepare this report, BCI:

1. Reviewed preliminary project plans provided by HDR Engineering, Inc. (HDR).
2. Observed the subsurface conditions in 29 exploratory borings.
3. Performed laboratory tests on soil samples obtained from the exploratory borings.
4. Performed engineering analysis and calculations.

Project Description

The objective of the State Route 99 (SR 99) Widening Project is to improve traffic flow along SR 99 from Austin Road in Manteca to Arch Road in Stockton, California. As part of the widening project, a new Main Street interchange will be constructed in the vicinity of the existing Lathrop Road Interchange. The new interchange will improve access to Main Street and Lathrop Road. The existing Lathrop Road Interchange consists of a 2 span concrete overcrossing bridge and short north and south bound on and off ramps. Based on our review of the information provided by HDR, and review of the preliminary plans, the interchange improvements will include:

- New SR 99 north and south bound loop on-ramps.
- New SR 99 north bound off-ramp.
- New SR 99 south bound on and off-ramps.
- Realign and widen Lathrop Road to 3 lanes in each direction.
- Replace the existing Lathrop Road overhead bridge with a 2-span cast-in-place concrete box girder bridge.
- Approximately 5,194 linear feet of new two-lane frontage road.
- Realign North Main Street near the intersection of Lathrop Road.
- New Caltrans Type 1 retaining wall along the SR 99 northbound off-ramp.
- Utility relocation and improvements.
- Construction of new drainage basins.
- New drainage improvements.

Figure 1 in Appendix A displays the Vicinity Map. Refer to Figure 2 (Site Plan and Boring Location Map) for project limits, site topography and the proposed improvements.

LABORATORY TESTING

BCI obtained near-surface (upper 5 feet) soil samples at various locations throughout the improvement area for R-value and corrosion testing. We obtained the samples from borings performed in conjunction with the Geotechnical Design Report (GDR).

We display our approximate boring locations on the Site Plan and Boring Location Map (Figure 2).

Resistance Value Test Results

Table 1 presents our R-value test results.

Table 1: R-value Test Results (CTM 301)

Sample Location	Sample Depth (feet)	Soil Description	R-value
B3	0-5	Silty Sand	77
B4	0-5	Sand with silt	76
B6	0-5	Sand with silt	77
B9	0-5	Sand	73
B11	0-5	Silty Sand	69
B13	0-5	Sand	76
B16	3-5	Sandy Silt	23
B18	0-5	Silty Sand	55
B19	0-5	Silty Sand	74
B27	0-5	Sand with silt	73

R-value test results are included in Appendix B.

Soil Corrosion Test Results

Table 2 presents our soil corrosion test results.

Table 2: Corrosion Test Results (CTM 417, 422, 643)

Sample Number	Description	pH	Min. Resistivity (ohm-cm)	Sulfate (ppm)	Chloride (ppm)
B3	Silty Sand	6.65	5900	5.0	4.2
B4	Sand with silt	5.72	5360	3.9	6.2
B6	Sand with silt	6.78	6700	9.6	6.5
B9	Sand	6.22	10450	4.2	6.7
B11	Silty Sand	7.20	5900	3.2	6.4
B13	Sand	6.61	9380	0.3	5.9
B14	Sandy Silt	7.10	6970	17.5	4.3
B16	Sandy Silt	7.73	2570	12.4	10.2
B18	Silty Sand	7.44	3750	3.1	11.2
B19	Silty Sand	6.40	6700	6.9	9.6
B27	Sand with silt	6.60	6160	7.2	8.7

The soil corrosion test results are included in Appendix B.

STRUCTURAL PAVEMENT SECTIONS

Pavement Section Recommendations

We recorded R-values ranging from 55 to 77 for the near-surface sandy soil over the majority of the site. However, we encountered sandy silt in boring B16 along the northbound off-ramp that has an R-value of 23. To further define the extent of the lower R-value area, we performed multiple shallow hand auger borings along the portion of the off-ramp that will be constructed on existing subgrade soil. We were able to determine that the sandy silt is isolated around boring B16 and the majority of the off-ramp is underlain by silty sand with an R-value above 50. Due to the planned profile changes along the northbound off-ramp, the lower R-value soil encountered in boring B16 should not impact the design pavement sections.

Based on our subsurface exploration and the planned profile changes, a design subgrade R-value of 40 is appropriate for the Main Street Interchange Improvements.

HDR requested that BCI use a Traffic Index (TI) of 6 and 8 for the frontage roads and a TI of 12 for the freeway improvements. Using an R-value of 40, the above traffic indexes, and Chapter 600 of the Caltrans Highway Design Manual (CHDM), 5th Edition, we recommend the pavement sections in Table 3.

Table 3: Recommended Pavement Sections

Location	Traffic Index	R-value	Material Type/Depth Required	
			Hot Mix Asphalt (HMA)*	Aggregate Base (AB)
Frontage Roads	6	40	0.25 feet	0.55 feet
	8	40	0.40 feet	0.65 feet
Freeway On and Off-ramps	12	40	0.60 feet	1.20 feet

*HMA may be replaced with an equal thickness of rubberized asphaltic concrete to a maximum thickness of 0.2 feet.

Our pavement section calculations are included in Appendix C. Pavement subgrade and compaction recommendations are presented in the GDR.

Pavement Materials

Hot Mix Asphalt (HMA-A) shall be Type A, ¾-inch maximum and conform to the provision of the May 2006 Caltrans Standard Specifications, Section 39.

Open Graded Friction Course (OGFC) shall be 3/8-inch maximum and conform to the provision of the May 2006 Caltrans Standard Specifications, Section 39.

Pavement Reinforcing Fabric shall conform to the provisions of the May 2006 Caltrans Standard Specifications, Sections 39-4.03 and 88-1.02.

Prime Coat and Paint Binder (Tack Coat) shall conform to the provisions of the May 2006 Caltrans Standard Specifications, Sections 39-4.02 and 94.

Aggregate Base (AB) shall be Caltrans Class 2, ¾-inch maximum grading and shall conform to provisions in Section 26 of the May 2006 Caltrans Standard Specifications.

Portland Cement Concrete Pavement (PCCP) shall conform to the provisions of the May 2006 Caltrans Standard Specifications, Sections 40 and 90.

CULVERTS

New Culvert Design

Based on our pH, sulfate and chloride testing, and Table 854.1A of the CHDM, there are no restrictions on cementitious materials with respect to soil corrosivity. However; a maximum water-to-cementation material ratio of 0.45 is recommended for concrete pipe. Table 4 presents our recommended metal corrugated pipe culvert material and minimum unprotected thicknesses for new culverts with a 50-year maintenance free service life with respect to soil corrosivity. Based on our conversations with HDR no extensions of existing culverts are proposed. The recommendations are based on our pH and resistivity testing, and Table 854.3B of the CHDM. We used a soil pH of 5.72 and minimum resistivity of 5360 ohm-cm in our analysis.

Table 4: Recommended Metal Corrugated Pipe Culvert Material

Recommended Metal Corrugated Pipe Culvert Material	Minimum 50-year Design Thickness
Galvanized Steel-Metal	10 ga. (0.138”)

16 gage Aluminum or 16 gage Aluminized Steel (Type 2) is also available for use. The above minimum thicknesses do not take pipe abrasion resistance and overfill height into consideration. BCI provides culvert foundation and backfill recommendations in the Geotechnical Design Report.

LIMITATIONS

BCI performed services in accordance with generally accepted geotechnical engineering principles and practices currently used in this area. Where referenced, we used ASTM or Caltrans standards as a general (not strict) *guideline* only. We do not warranty our services.

BCI based this report on the current site conditions. We assumed the soil and ground water conditions encountered in our borings are representative of the subsurface conditions across the site. Actual conditions between our borings could be different.

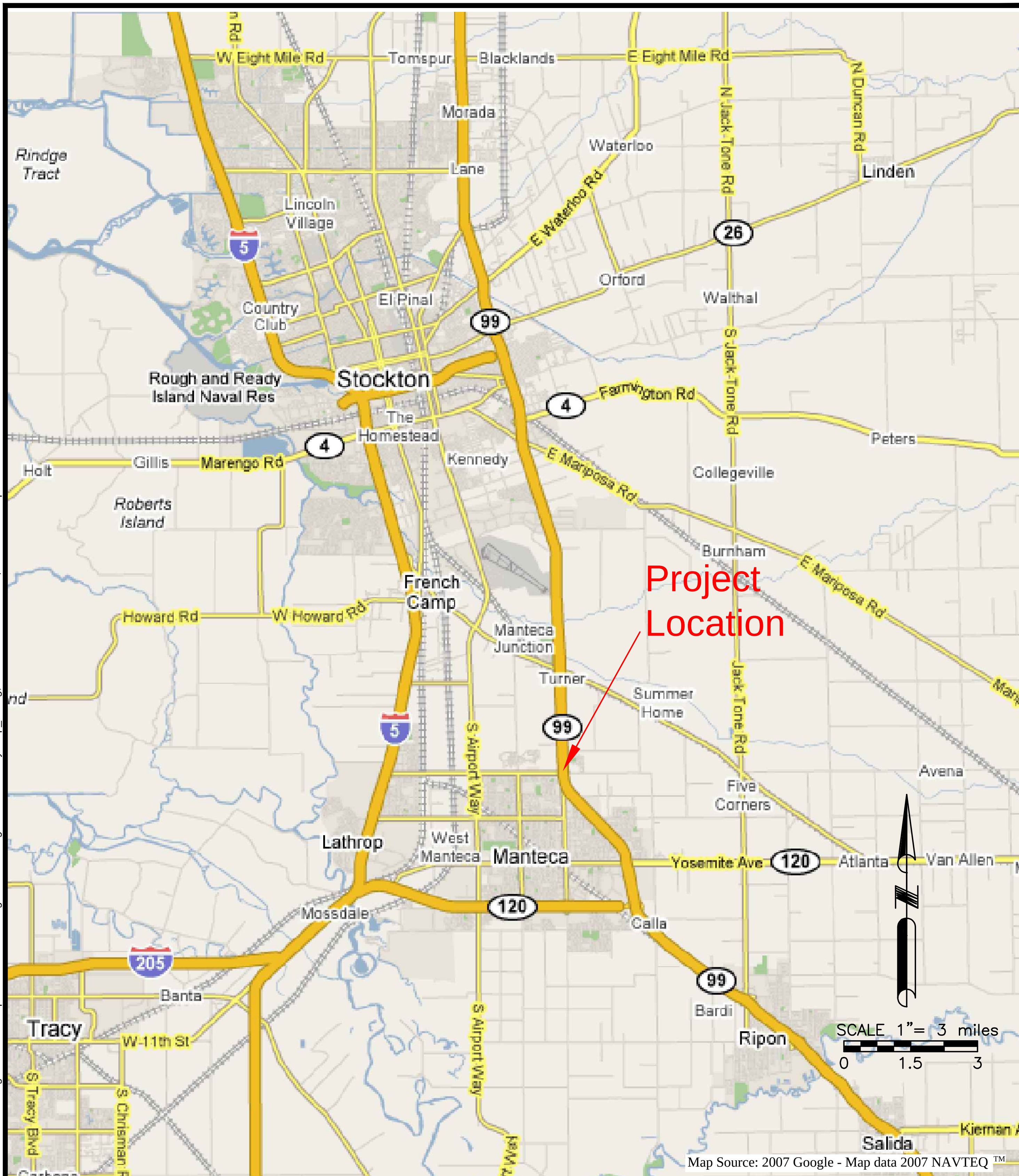
Our scope did not include evaluation of on-site hazardous material, flood potential, aerial photograph review, or biological pollutants. Please contact BCI if you would like an evaluation of one or more of these potentially damaging issues.

Modern design and construction issues are complex, with many regulatory sources/restrictions, involved parties, construction alternatives, etc. It is common to experience changes and delays. The owner should set aside a reasonable contingency fund based on complexities and cost estimates to cover changes and delays.

APPENDIX A

Figure 1: Vicinity Map

Figure 2: Site Plan and Boring Location Map



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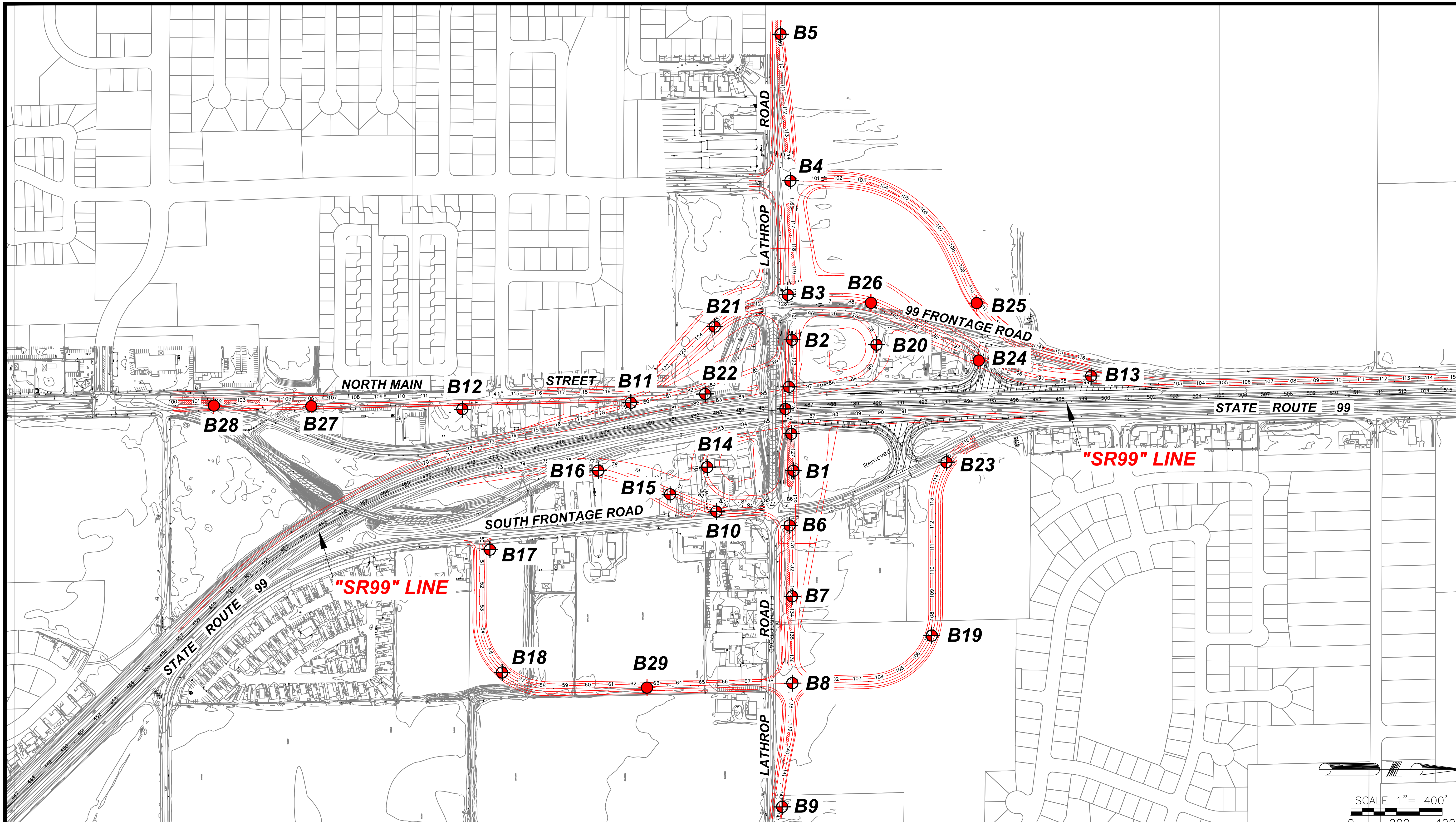
VICINITY MAP

Main Street Interchange
San Joaquin County, California

File: 1201.5

February 2012

Figure 1



Z:\Active Projects\1201.X SR 99 Widening\1201.5 Lathrop Road Overcrossing\CAD Drawings\1201.5-site plan_4.dwg, 2/15/2012 4:42:18 PM, DWG To PDF.pc3

Source: Preliminary Base Map by HDR, June 2008.

LEGEND

- Approximate Boring Location
- Approximate Hand Boring Location

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SITE PLAN AND BORING LOCATION MAP

Main Street Interchange
San Joaquin County, California

File: 1201.5

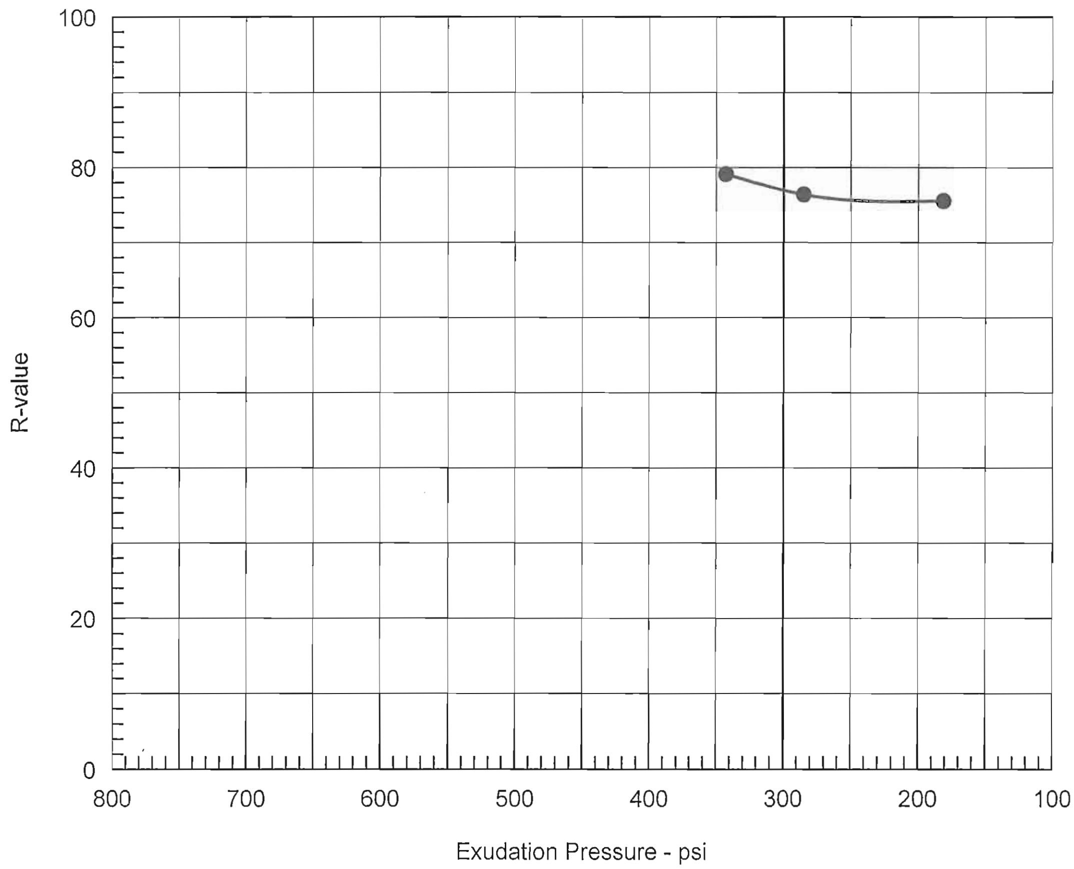
February 2012

Figure 2

APPENDIX B

Laboratory Test Results

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psf	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	119.8	10.3	0	22	2.49	343	79	79
2	350	118.4	10.6	0	25	2.53	285	76	76
3	350	118.1	10.9	0	27	2.56	182	75	76

Test Results	Material Description
R-value at 300 psi exudation pressure = 77	Strong brown SILTY SAND

Project No.: 1201.5b
Project: SR99 Widening - Main Street Interchange Materials Report
Source of Sample: 1201.5a, Boring B3 **Depth:** 0-5.0'
Sample Number: 1
Date: 10/26/2009

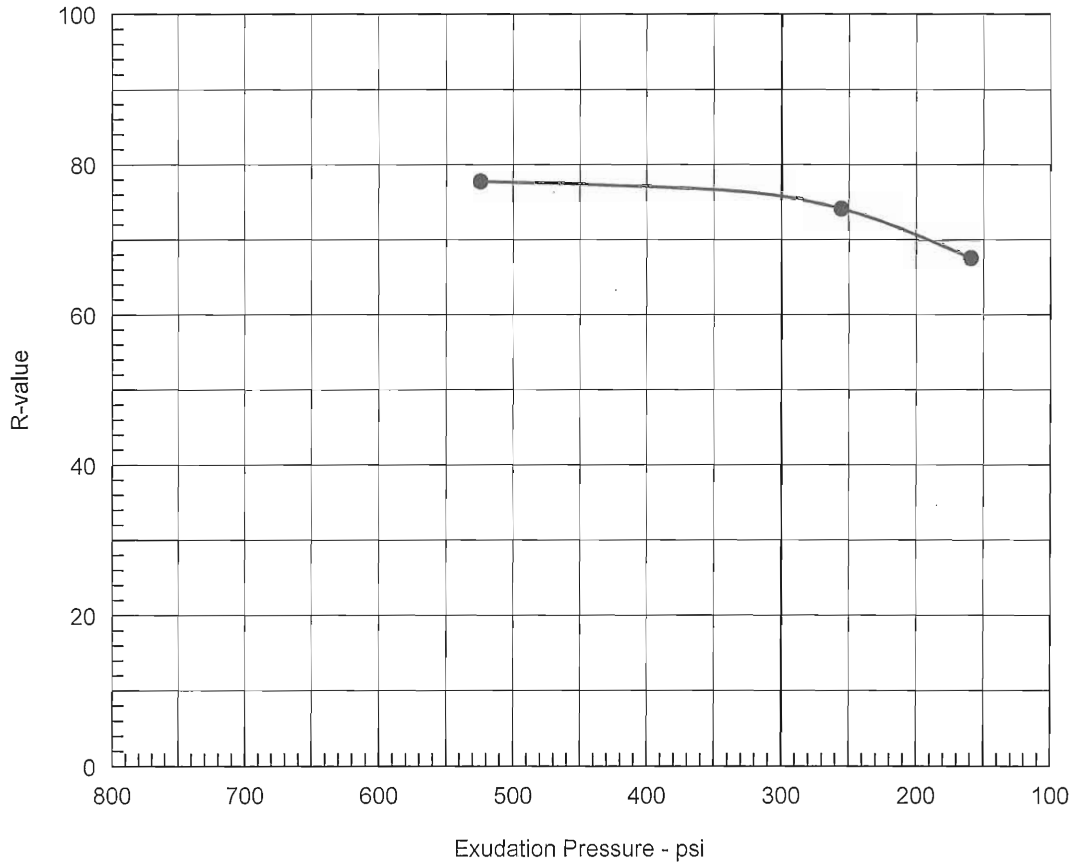
Tested by: KAO/MDR
Checked by: BDC
Remarks:

R-VALUE TEST REPORT

Blackburn Consulting

Figure ______

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psf	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	122.4	9.6	0	23	2.44	524	79	78
2	350	122.0	10.2	0	28	2.45	255	74	74
3	350	121.3	10.7	0	36	2.47	159	68	68

Test Results	Material Description
R-value at 300 psi exudation pressure = 76	Poorly-graded SAND with SILT (SP), dark yellowish brown

Project No.: 1201.5b
Project: SR99 Widening - Main Street Interchange Materials Report
Source of Sample: 1201.5a, Boring B4 **Depth:** 0-5.0'
Sample Number: 1
Date: 10/26/2009

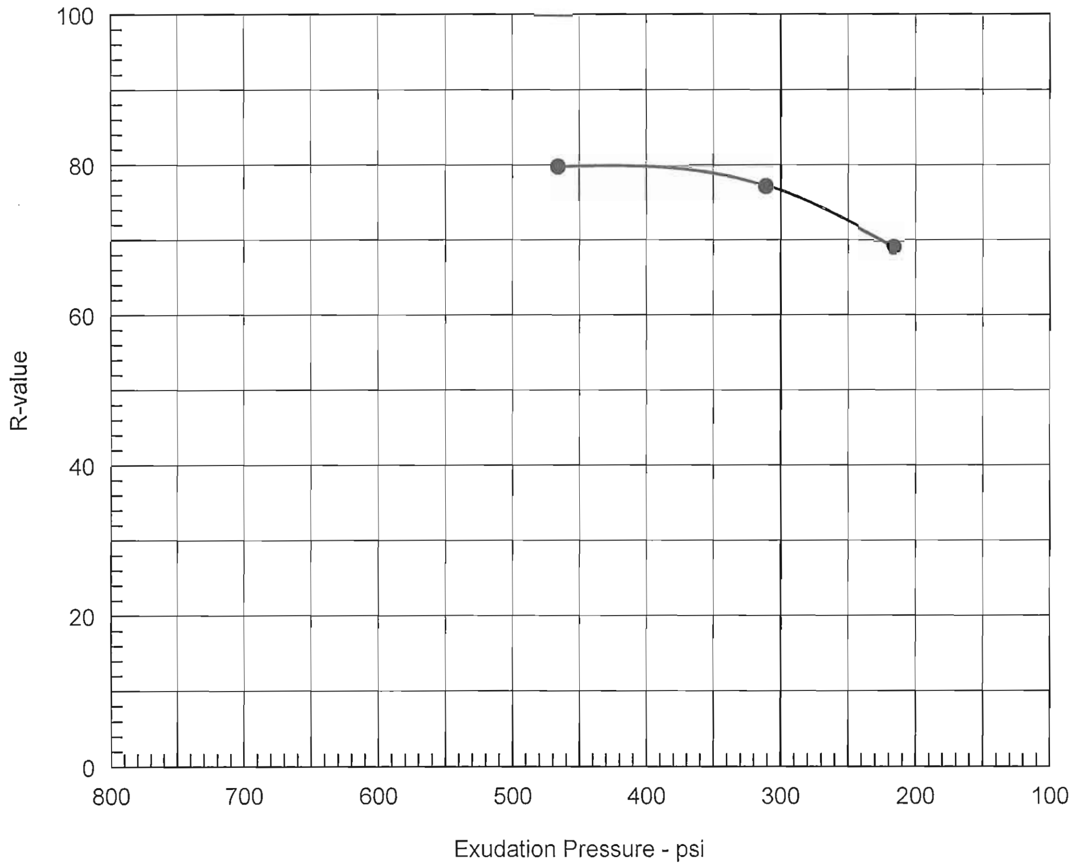
R-VALUE TEST REPORT

Blackburn Consulting

Tested by: MDR
Checked by: BDC
Remarks:

Figure ______

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psf	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	121.7	10.0	0	22	2.48	466	80	80
2	350	120.5	10.5	0	26	2.58	311	76	77
3	350	118.9	10.9	0	35	2.57	216	68	69

Test Results	Material Description
R-value at 300 psi exudation pressure = 77	Poorly-graded SAND with SILT, dark yellowish brown

Project No.: 1201.5b
Project: SR99 Widening - Main Street Interchange Materials Report
Source of Sample: 1201.5a, Boring B6 **Depth:** 0.0-5.0'
Sample Number: 1
Date: 10/26/2009

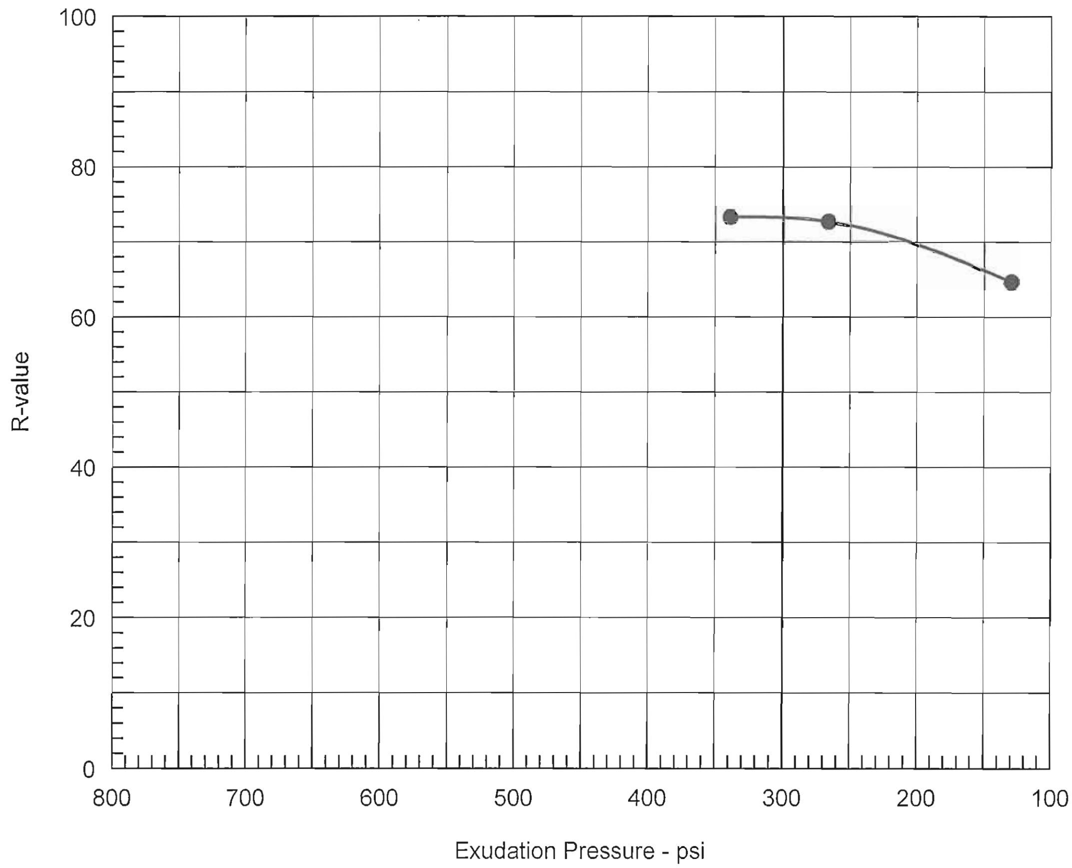
Tested by: KAO
Checked by: MDR
Remarks:

R-VALUE TEST REPORT

Blackburn Consulting

Figure ______

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psf	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	112.2	11.1	0	31	2.51	339	73	73
2	350	112.0	11.6	0	31	2.46	267	73	73
3	304	111.8	12.7	0	39	2.53	130	65	65

Test Results	Material Description
R-value at 300 psi exudation pressure = 73	Poorly-graded SAND (SP), yellowish brown

Project No.: 1201.5b
Project: SR99 Widening - Main Street Interchange Materials Report
Source of Sample: 1201.5a, Boring B9 **Depth:** 0-5.0'
Sample Number: 1
Date: 10/26/2009

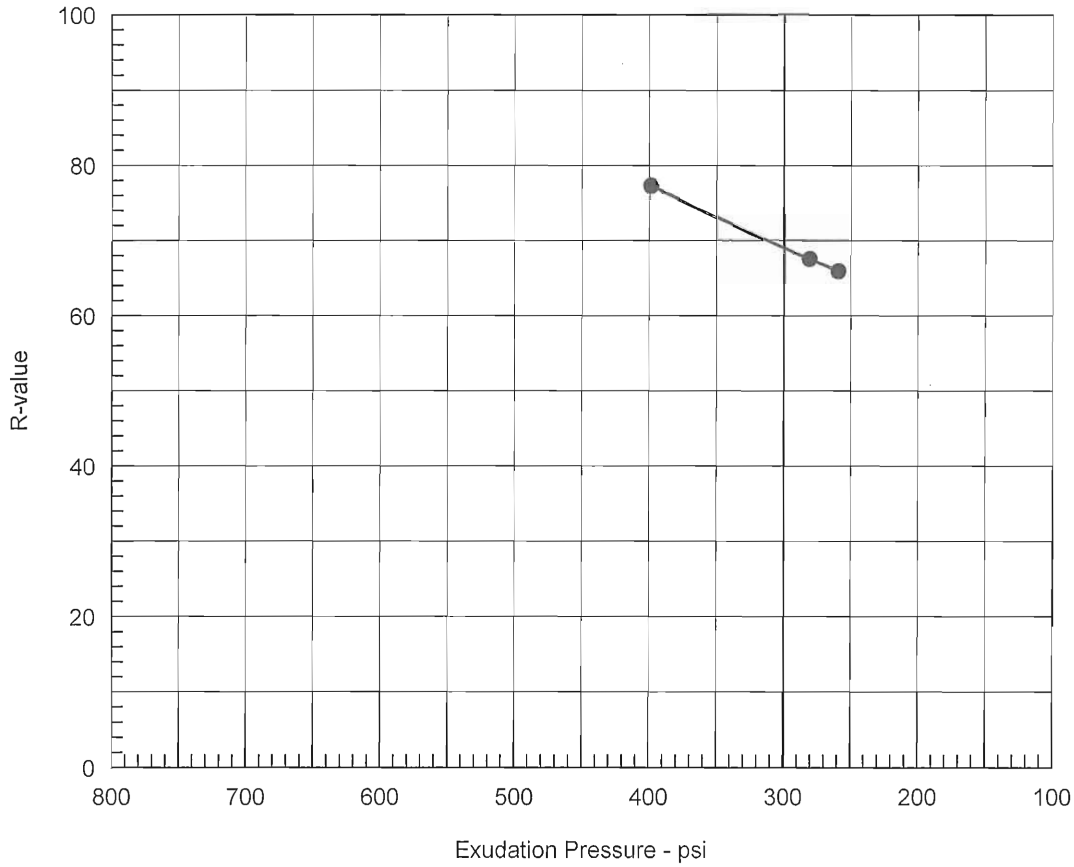
Tested by: MDR
Checked by: BDC
Remarks:

R-VALUE TEST REPORT

Blackburn Consulting

Figure ______

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psf	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	122.7	9.1	0	25	2.42	399	78	77
2	350	122.3	9.9	0	36	2.41	281	69	67
3	350	121.1	10.4	0	38	2.54	260	66	66

Test Results	Material Description
R-value at 300 psi exudation pressure = 69	Brown SILTY SAND

Project No.: 1201.5b
Project: SR99 Widening - Main Street Interchange Materials Report
Source of Sample: 1201.5a, Boring B11 **Depth:** 0.0-5.0'
Sample Number: 1
Date: 10/26/2009

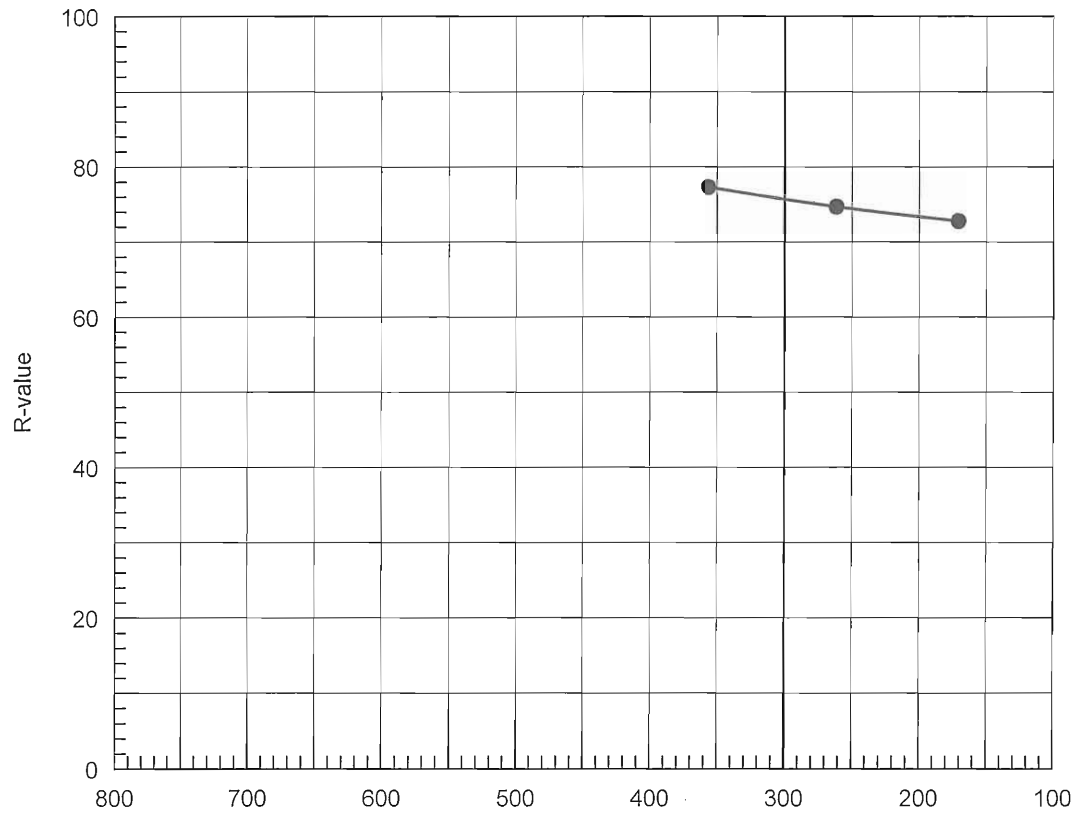
Tested by: MAR
Checked by: MDR
Remarks:
8.2% Retained on No. 4 sieve. Sample batched.

R-VALUE TEST REPORT

Blackburn Consulting

Figure ______

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psf	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	118.9	10.5	0	24	2.51	357	77	77
2	350	118.5	10.7	0	27	2.52	262	75	75
3	350	116.8	11.5	0	30	2.57	171	71	73

Test Results	Material Description
R-value at 300 psi exudation pressure = 76	Poorly-graded SAND (SP), dark yellowish brown

Project No.: 1201.5b

Project: SR99 Widening - Main Street Interchange Materials Report

Source of Sample: 1201.5a, Boring B13 **Depth:** 0-5.0'

Sample Number: 1

Date: 10/26/2009

Tested by: MDR

Checked by: BDC

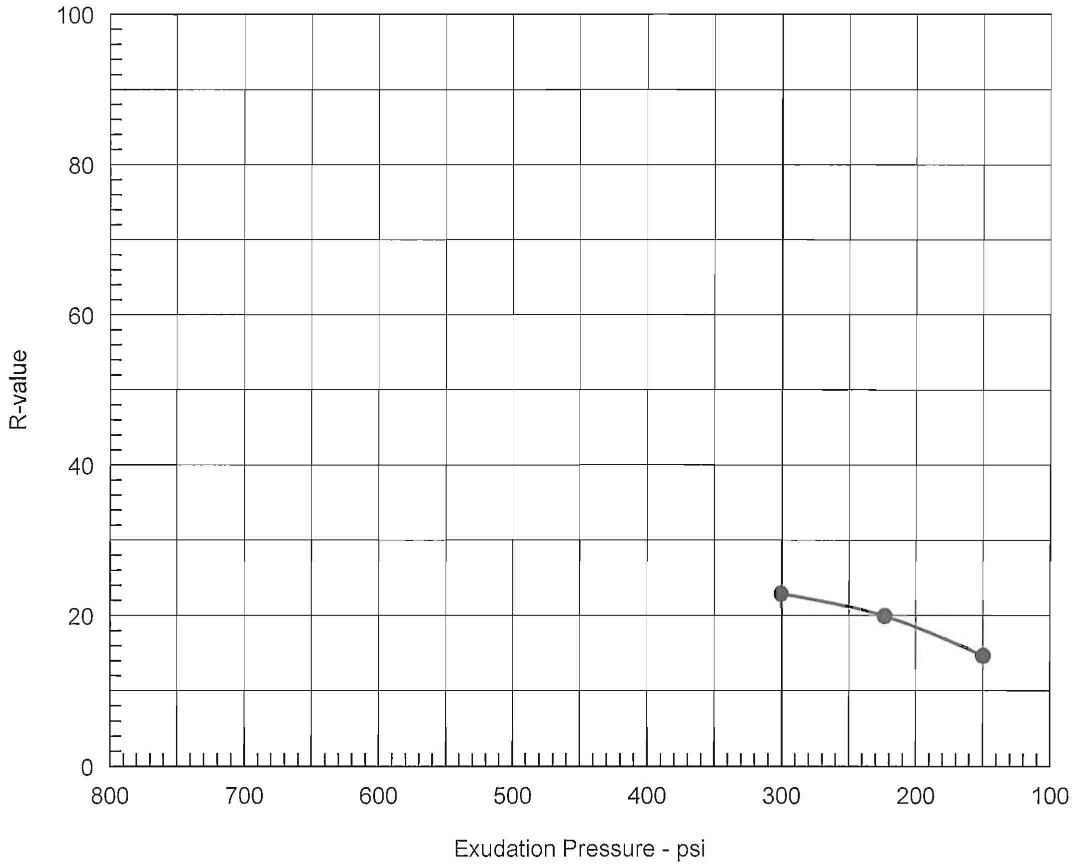
Remarks:

R-VALUE TEST REPORT

Blackburn Consulting

Figure ______

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psf	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	121.7	12.3	0	94	2.43	300	24	23
2	304	119.2	13.3	0	103	2.47	223	20	20
3	164	116.8	14.4	0	115	2.50	150	15	15

Test Results	Material Description
R-value at 300 psi exudation pressure = 23	Olive brown SANDY SILT

Project No.: 1201.5b

Project: SR99 Widening - Main Street Interchange Materials Report

Source of Sample: 1201.5a, Boring B16 **Depth:** 3.0-5.0'

Sample Number: 2

Date: 10/26/2009

Tested by: MDR

Checked by: BDC

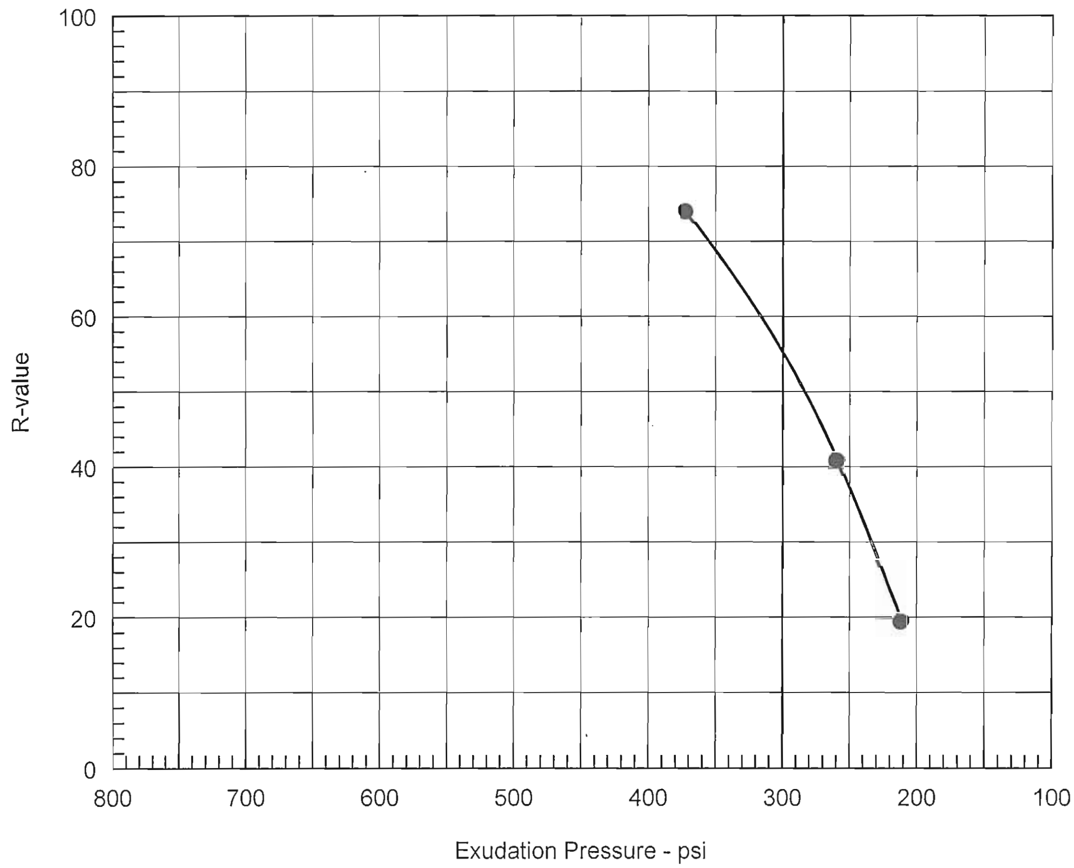
Remarks:

R-VALUE TEST REPORT

Blackburn Consulting

Figure ______

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psf	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	121.9	10.9	13	28	2.52	373	74	74
2	350	121.2	11.6	0	67	2.46	259	41	41
3	350	120.2	12.5	0	102	2.40	211	21	20

Test Results	Material Description
R-value at 300 psi exudation pressure = 55	Dark yellowish brown SILTY SAND

Project No.: 1201.5b
Project: SR99 Widening - Main Street Interchange Materials Report
Source of Sample: 1201.5a, Boring B18 **Depth:** 0-5.0'
Sample Number: 1
Date: 10/26/2009

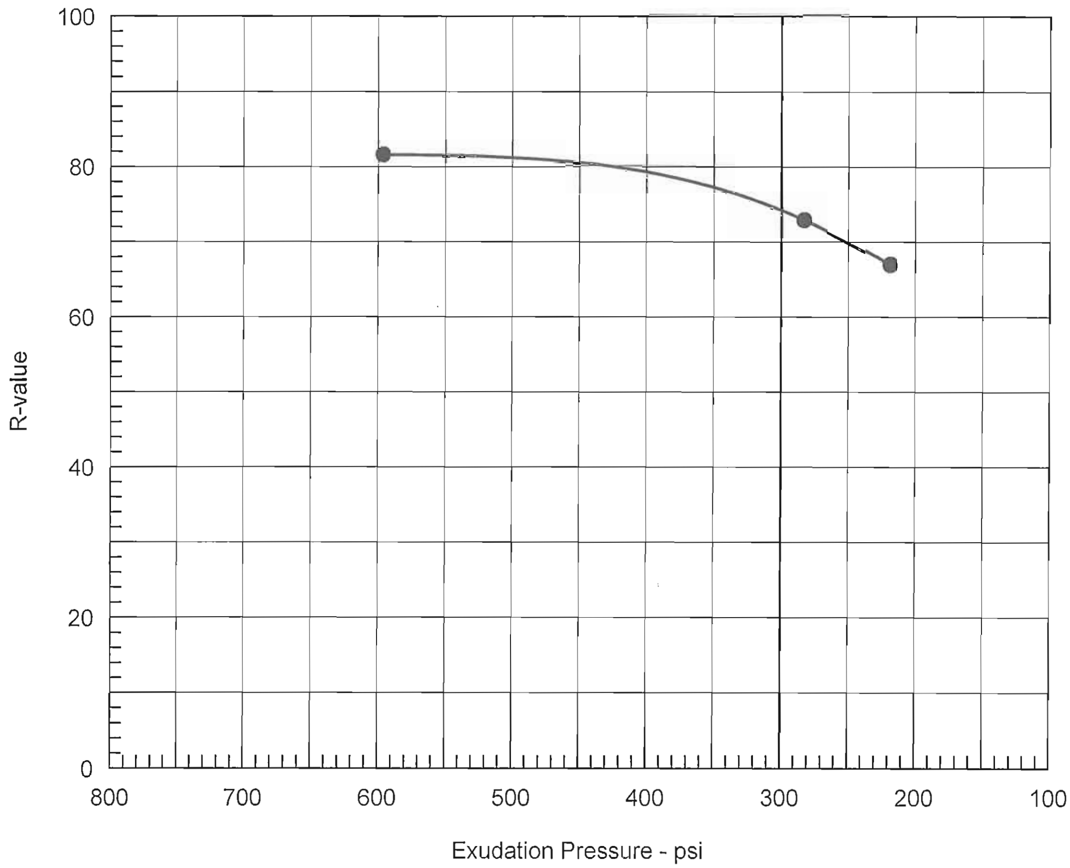
Tested by: KAO/MDR
Checked by: BDC
Remarks:

R-VALUE TEST REPORT

Blackburn Consulting

Figure ______

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psf	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	122.9	9.5	17	22	2.62	597	80	81
2	350	122.6	10.4	0	27	2.35	283	75	73
3	350	121.6	11.3	0	35	2.49	219	67	67

Test Results	Material Description
R-value at 300 psi exudation pressure = 74	Brown SILTY SAND

Project No.: 1201.5b
Project: SR99 Widening - Main Street Interchange Materials Report
Source of Sample: 1201.5a, Boring B19 **Depth:** 0.0-5.0'
Sample Number: 1
Date: 10/26/2009

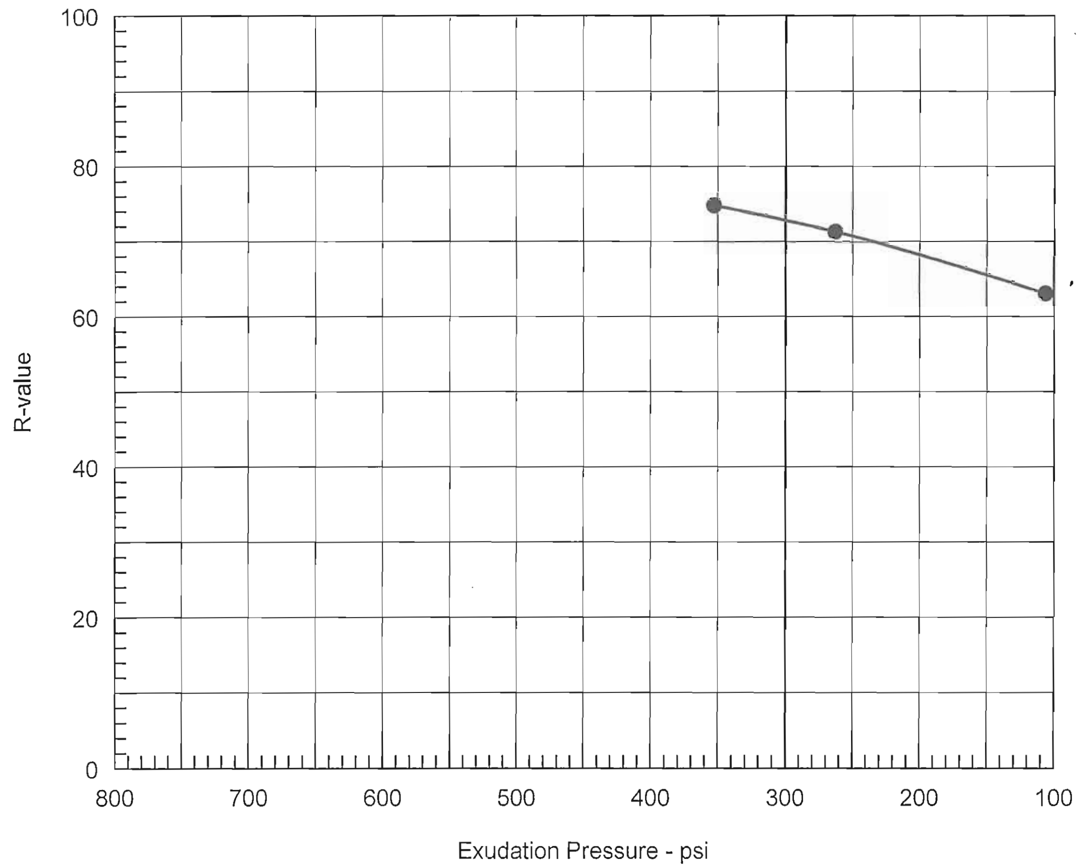
Tested by: MAR
Checked by: MDR
Remarks:

R-VALUE TEST REPORT

Blackburn Consulting

Figure ______

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psf	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	117.3	10.6	26	27	2.51	353	75	75
2	350	117.2	11.0	39	27	2.52	263	71	71
3	350	116.4	12.1	4	40	2.53	106	63	63

Test Results	Material Description
R-value at 300 psi exudation pressure = 73	Poorly-graded SAND with SILT (SP), yellowish brown

Project No.: 1201.5b
Project: SR99 Widening - Main Street Interchange Materials Report
Source of Sample: 1201.5a, Boring B27 **Depth:** 0-5.0'
Sample Number: 1
Date: 10/26/2009

Tested by: MDR
Checked by: BDC
Remarks:

R-VALUE TEST REPORT

Blackburn Consulting

Figure ______

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/12/2009
Date Submitted 08/06/2009

To: Mark Robertson
Blackburn Consulting
2491 Boatman Avenue
W. Sacramento, CA 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 1201.5A:SR99 WIDEN. Site ID : B3-1.
Your purchase order number is 1201.5B.
Thank you for your business.

* For future reference to this analysis please use SUN # 56454-113987.

EVALUATION FOR SOIL CORROSION

Soil pH	6.65		
Minimum Resistivity	5.90	ohm-cm (x1000)	
Chloride	4.2 ppm	00.00042	%
Sulfate	5.0 ppm	00.00050	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/12/2009
Date Submitted 08/06/2009

To: Mark Robertson
Blackburn Consulting
2491 Boatman Avenue
W. Sacramento, CA 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 1201.5A:SR99 WIDEN. Site ID : B4-1.
Your purchase order number is 1201.5B.
Thank you for your business.

* For future reference to this analysis please use SUN # 56454-113988.

EVALUATION FOR SOIL CORROSION

Soil pH	5.72		
Minimum Resistivity	5.36	ohm-cm (x1000)	
Chloride	6.2 ppm	00.00062	%
Sulfate	3.9 ppm	00.00039	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/12/2009
Date Submitted 08/06/2009

To: Mark Robertson
Blackburn Consulting
2491 Boatman Avenue
W. Sacramento, CA 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 1201.5A:SR99 WIDEN. Site ID : B6-1.
Your purchase order number is 1201.5B.
Thank you for your business.

* For future reference to this analysis please use SUN # 56454-113989.

EVALUATION FOR SOIL CORROSION

Soil pH	6.78	
Minimum Resistivity	6.70 ohm-cm (x1000)	
Chloride	6.5 ppm	00.00065 %
Sulfate	9.6 ppm	00.00096 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/12/2009
Date Submitted 08/06/2009

To: Mark Robertson
Blackburn Consulting
2491 Boatman Avenue
W. Sacramento, CA 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 1201.5A:SR99 WIDEN. Site ID : B9-1.
Your purchase order number is 1201.5B.
Thank you for your business.

* For future reference to this analysis please use SUN # 56454-113990.

EVALUATION FOR SOIL CORROSION

Soil pH	6.22		
Minimum Resistivity	10.45	ohm-cm (x1000)	
Chloride	6.7 ppm	00.00067	%
Sulfate	4.2 ppm	00.00042	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/12/2009
Date Submitted 08/06/2009

To: Mark Robertson
Blackburn Consulting
2491 Boatman Avenue
W. Sacramento, CA 95691

From: Gene Oliphant, Ph.D. \ Randy Horney RH
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 1201.5A:SR99 WIDEN. Site ID : B11-1.
Your purchase order number is 1201.5B.
Thank you for your business.

* For future reference to this analysis please use SUN # 56454-113991.

EVALUATION FOR SOIL CORROSION

Soil pH	7.20		
Minimum Resistivity	5.90	ohm-cm (x1000)	
Chloride	6.4 ppm	00.00064	%
Sulfate	3.2 ppm	00.00032	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/26/2009
Date Submitted 08/21/2009

To: Mark Robertson
Blackburn Consulting
2491 Boatman Avenue
W. Sacramento, CA 95691

From: Gene Oliphant, Ph.D. \ Randy Horney MO
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 1201.5A SR99 WIDENIN Site ID : B13-1.
Your purchase order number is 1201.6B.
Thank you for your business.

* For future reference to this analysis please use SUN # 56594-114322.

EVALUATION FOR SOIL CORROSION

Soil pH	6.61	
Minimum Resistivity	9.38 ohm-cm (x1000)	
Chloride	5.9 ppm	00.00059 %
Sulfate	0.3 ppm	00.00003 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/12/2009
Date Submitted 08/06/2009

To: Mark Robertson
Blackburn Consulting
2491 Boatman Avenue
W. Sacramento, CA 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 1201.5A:SR99 WIDEN. Site ID : B14-1.
Your purchase order number is 1201.5B.
Thank you for your business.

* For future reference to this analysis please use SUN # 56454-113992.

EVALUATION FOR SOIL CORROSION

Soil pH	7.10		
Minimum Resistivity	6.97	ohm-cm (x1000)	
Chloride	4.3 ppm	00.00043	%
Sulfate	17.5 ppm	00.00175	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/26/2009
Date Submitted 08/21/2009

To: Mark Robertson
Blackburn Consulting
2491 Boatman Avenue
W. Sacramento, CA 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

MO

The reported analysis was requested for the following location:
Location : 1201.5A SR99 WIDENIN Site ID : B16-2.
Your purchase order number is 1201.6B.
Thank you for your business.

* For future reference to this analysis please use SUN # 56594-114323.

EVALUATION FOR SOIL CORROSION

Soil pH	7.73	
Minimum Resistivity	2.57 ohm-cm (x1000)	
Chloride	10.2 ppm	00.00102 %
Sulfate	12.4 ppm	00.00124 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/12/2009
Date Submitted 08/06/2009

To: Mark Robertson
Blackburn Consulting
2491 Boatman Avenue
W. Sacramento, CA 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 1201.5A:SR99 WIDEN. Site ID : B18-1.
Your purchase order number is 1201.5B.
Thank you for your business.

* For future reference to this analysis please use SUN # 56454-113993.

EVALUATION FOR SOIL CORROSION

Soil pH	7.44			
Minimum Resistivity	3.75	ohm-cm (x1000)		
Chloride	11.2	ppm	00.00112	%
Sulfate	3.1	ppm	00.00031	%

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/12/2009
Date Submitted 08/06/2009

To: Mark Robertson
Blackburn Consulting
2491 Boatman Avenue
W. Sacramento, CA 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager RH

The reported analysis was requested for the following location:
Location : 1201.5A:SR99 WIDEN. Site ID : B19-1.
Your purchase order number is 1201.5B.
Thank you for your business.

* For future reference to this analysis please use SUN # 56454-113994.

EVALUATION FOR SOIL CORROSION

Soil pH	6.40	
Minimum Resistivity	6.70 ohm-cm (x1000)	
Chloride	9.6 ppm	00.00096 %
Sulfate	6.9 ppm	00.00069 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

Sunland Analytical
11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 08/12/2009
Date Submitted 08/06/2009

To: Mark Robertson
Blackburn Consulting
2491 Boatman Avenue
W. Sacramento, CA 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 1201.5A:SR99 WIDEN. Site ID : B27-1.
Your purchase order number is 1201.5B.
Thank you for your business.

* For future reference to this analysis please use SUN # 56454-113995.

EVALUATION FOR SOIL CORROSION

Soil pH	6.60	
Minimum Resistivity	6.16 ohm-cm (x1000)	
Chloride	8.7 ppm	00.00087 %
Sulfate	7.2 ppm	00.00072 %

METHODS
pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422

APPENDIX C

Pavement Section Calculations

Pavement Section Calculations

Lathrop Road and On and Off Ramps
TI = 12 R-value = 40

1) GEt = .0032(12)(100 – 40) = 2.30
2) GEac = .0032(12)(100 – 78) + .2 = 1.05
3) GEat = 1.02, tac = 0.60 feet
4) GEab = 2.30 – 1.02 = 1.28
5) tab = 1.28/1.1 = 1.16 feet
6) Pavement Section for TI = 12: 0.60 feet AC
R-value = 40 1.20 feet AB

Frontage Roads:
TI = 8 R-value = 40

1) GEt = .0032(8)(100 – 40) = 1.54
2) GEac = .0032(8)(100 – 78) + .2 = 0.76
3) GEat = 0.80, tac = 0.40 feet
4) GEab = 1.54 – 0.80 = 0.74
5) tab = 0.74/1.1 = 0.67 feet
6) Pavement Section for TI = 8: 0.40 feet AC
R-value = 40 0.65 feet AB

Frontage Roads:
TI = 6 R-value = 40

1) GEt = .0032(6)(100 – 40) = 1.15
2) GEac = .0032(6)(100 – 78) + .2 = 0.62
3) GEat = 0.58, tac = 0.25 feet
4) GEab = 1.15 – 0.58 = 0.57
5) tab = 0.57/1.1 = 0.52 feet
6) Pavement Section for TI = 6: 0.25 feet AC
R-value = 40 0.55 feet AB

FINAL
GEOTECHNICAL DESIGN REPORT

State Route 99 Manteca Widening Project

Sound Walls

10-SJ-99 - PM 5.1/PM 15.0

EA 10-0E6100

Prepared by:

BLACKBURN CONSULTING
1720 G Street
Modesto, CA   95354
(209)522-6273

July 2010

Prepared for:

HDR Engineering, Inc.
1325 J Street, Suite 1300
Sacramento, CA 95814-2928

Modesto Office:
1720 G Street ‰ Modesto, CA 95354
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blackburn consulting

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11521 Blocker Drive, Suite 110 ‰ Auburn, CA 95603
West Sacramento Office: (916) 375-8706

Geotechnical ‰ Construction Services ‰ Forensics

File No. 1201.3
July 21, 2010

John Klemunes
HDR Engineering, Inc.
1325 J Street, Suite 1300
Sacramento, CA 95814-2928

Subject: **FINAL GEOTECHNICAL DESIGN REPORT**
State Route 99 Manteca Widening Project
Sound Walls
10-SJ-99, PM 5.1 to PM 15.0, EA: 0E-6100
Manteca, California

Dear Mr. Klemunes,

Blackburn Consulting (BCI) is pleased to submit this Final Geotechnical Design Report for the proposed Sound Walls associated with the State Route 99 Manteca Widening Project. BCI prepared this report in accordance with our November 15, 2008 agreement. This report defines the geotechnical conditions as evaluated from field and laboratory test data, and provides geotechnical recommendations and specifications for project design and construction.

This Final Report incorporates the Caltrans Review Comments dated 7/1/2010. The comments and our responses are included in Appendix D.

Thank you for selecting BCI to be on your design team. Please call if you have questions or require additional information.

Sincerely;

BLACKBURN CONSULTING,

Reviewed By:

Aaron Wood, P.G.
Project Geologist

Benjamin D. Crawford, P.E., G.E.
Principal

FINAL GEOTECHNICAL DESIGN REPORT
State Route 99 Manteca Widening Project
Sound Walls
10-SJ-99, PM 5.1 to PM 15.0, EA: 0E-6100
Manteca, California

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APPENDIX C

Laboratory Test Results

APPENDIX D

Caltrans Review Comment and Response Form

1 INTRODUCTION

1.1 Purpose

BCI prepared this Final Geotechnical Design Report for the design and construction of five sound walls associated with the State Route 99 (SR 99) Manteca Widening Project.

The purpose of this report is to document subsurface geotechnical conditions, provide analyses of the anticipated site conditions as they pertain to the project described herein, and to recommend design and construction criteria for the proposed sound walls. This report addresses the sound walls shown in Table 1 below.

Table 1: Sound Wall Locations

Sound Wall	Shoulder	Location	Length (ft)
PB-13	North bound	PM 6.88 to PM 7.25 (Sta. 363+26 to Sta. 382+80)	2,000
PB-12	South bound	PM 7.44 to PM 7.92 (Sta. 392+83 to Sta. 418+17)	2,400
PB-11	South bound	PM 7.96 to PM 8.61 (Sta. 420+29 to Sta. 454+61)	3,400
PB-10-4	North bound	PM 8.58 to PM 8.85 (Sta. 453+02 to Sta. 467+28)	1,365
PB-7	North bound	PM 9.36 to PM 9.61 (Sta. 494+21 to Sta. 507+41)	1,300

Sound wall numbers and locations were taken from the “Noise Abatement Decision Report” dated March 2009, prepared by Bollard Acoustical, lengths are based on the current August 2009 design.

Based on our conversation with HDR, the sound walls will be constructed in accordance with current Caltrans Standards. The sound walls will be Masonry Block on Type 736S/SV Barriers, supported on CIDH foundations with pile caps.

Refer to the Log of Test Borings (LOTBs) Figures 1 through 7 in Appendix B for the proposed sound wall locations.

1.2 Scope of Services

To prepare this report, BCI:

1. Discussed the proposed improvements with the design team.
2. Reviewed preliminary project plans provided by HDR Engineering (HDR).
3. Reviewed the 95% Sound Wall plans dated July 2, 2010, prepared by HDR.
4. Reviewed pertinent reports and historical information as described in Section 3 of this report.
5. Observed the subsurface conditions in 16 exploratory borings excavated between April 27 and April 30, 2009.
6. Performed laboratory tests on soil samples obtained from the exploratory borings.
7. Performed engineering analysis and calculations to develop our conclusions and recommendations.
8. Reviewed and responded to Caltrans comments prepared on July 1, 2010.

2 EXISTING FACILITIES AND PROPOSED IMPROVEMENTS

2.1 Project Description

The objective of the SR 99 Manteca Widening Project is to improve traffic flow along SR 99 from Austin Road in Manteca to Arch Road in Stockton, California. Based on our review of the information provided by HDR dated June 2008, the project will consist of constructing two additional lanes (one in each direction) within the existing center median along a 10-mile section of SR 99 between Post Mile (PM) 5.1 (Station 269+28) and PM 15.0 (Station 792+00). This report addresses the proposed sound walls located along SR 99 between PM 6.88 (Station 363+26) and PM 9.61 (Station 507+60). The sound walls will be standard Caltrans Masonry Block on Type 736S/SV Barriers. BCI completed a Draft Geotechnical Design and Materials report for the widening project dated April 24, 2009.

We expect cuts for this project will be less than 3 ft. in thickness and fills will be less than 1 ft. in thickness.

Figure 1 in Appendix A shows the project location. Refer to the Log of Test Borings (LOTBs) Sheets 1 through 7 in Appendix B for project limits, site topography and the proposed sound wall locations.

2.2 Site Description

Within the sound wall project limits, SR 99 is a four lane divided highway (two lanes in each direction) with an approximately 30 foot wide unpaved median and an approximately 8 foot outside paved shoulder. The corridor is relatively flat with approximately 15 feet of relief. Within the sound wall project limits, SR 99 is constructed on shallow fills ranging from approximately 3 to 5 feet in thickness. Existing drainage improvements generally consist of shallow, unlined v-ditches and basins.

The proposed sound walls will be located beyond the existing outside paved shoulder in relatively flat unimproved areas. Currently the sound wall areas consist of a mix of seasonal grasses, light to dense shrubs and trees. In general the proposed sound wall areas are below the exiting pavement elevation and appear to be at or near original grade.

3 PERTINENT REPORTS AND INVESTIGATIONS

In preparing this report, BCI reviewed the following information pertinent to the project.

- "Noise Abatement Decision Report" for the State Route 99 Manteca Widening Project, Bollard Acoustical Consultants, April 2009.
- "Preliminary Geotechnical/Geologic Memorandum for State Route 99 Widening", Blackburn Consulting, January 30, 2008.
- "Draft Geotechnical Design and Materials Report for State Route 99 Median Widening", Blackburn Consulting, April 24, 2009.
- "California Seismic Hazard Map", State of California Department of Transportation, 1996.
- "Geologic Map of the San Francisco-San Jose Quadrangle, California" Wagner, D.L., Bortugno, E.J. and McJunkin, R.D., 1991, 1:250,000: California Division of Mines and Geology, Regional Geologic Map 5A.
- As-Built Log of Test Borings (LOTBs), Foundation Reports, Geologic Reports and project plans for Caltrans structures located along the project alignment.

4 PHYSICAL SETTING

4.1 Topography

The average elevations for the sound wall areas range between about 48 ft[1] near the south end of sound wall PB-13 (PM 6.88, Station 363+26) to about 40 ft near the north end of sound wall PB-7 (PM 9.61, Station 507+41). The elevation changes across each proposed sound wall area varies by less than 4 feet.

We expect cuts for this project will be less than 3 ft. in thickness and fills will be less than 1 ft. in thickness.

4.2 Man-made and Natural Features of Engineering and Construction Significance

Proposed sound wall PB-10-4 could impact existing Southland Road (Original CA-99 Highway) depending on the foundation design and final location of the wall. Existing electrical poles and overhead power lines may have to be relocated at various locations within the planned improvement areas. The proposed sound walls appear to be located within or adjacent to existing drainage swales, ditches and shallow basins. Depending on the final location of the sound wall, these drainage features will likely be impacted by the sound wall project.

[1] Elevations are relative to mean sea level and topography provided by HDR June 2009.

4.3 Regional Geology and Seismicity

Literature published by the California Department of Mines and Geology (CDMG) indicates that the site is located within the Great Valley Province. The Great Valley extends northwest to southeast through central California. It is speculated that the Great Valley became isolated from the Pacific Ocean about 140 million years ago. Since that time, sediments derived from the mountains to the east and west have continually filled the Great Valley to depths of several thousand feet.

Based on the Caltrans 1996 California Seismic Hazard Map, the peak horizontal rock acceleration along the alignment ranges from approximately 0.12g to 0.18g. The controlling fault is the Midway-San Joaquin/N Fault, located about 20 miles southwest of the alignment. According to the 1996 Caltrans Seismic Map (Technical Report), the style of faulting is “not known/published” and this fault is listed as a new earthquake source. Recent publications consider this fault to be strike-slip. The estimated Maximum Earthquake Moment Magnitude for this fault is 6.75.

Based on the borings completed for the sound walls and the Preliminary Foundation Reports at SR99/Turner Station and SR99/Lathrop Road, we classify the site soil profile as Type D using Table B.1 of the June 2006 Caltrans Seismic Design Criteria (SDC), with Standard Penetration Test (SPT) values ranging from 15 to 50. Based on the above information, use the 0.2g peak horizontal rock acceleration curve (0.28g peak ground acceleration) from Figure B.7 (Soil Profile Type D, Magnitude: 6.5± 0.25) of the SDC for preliminary design.

Figure 2 in Appendix A presents the Geologic Map for the site. Figure 3 presents a Fault Map for the site.

5 EXPLORATION

5.1 Drilling and Sampling

To characterize subsurface conditions at the site, BCI observed and logged 16 borings to maximum depths of 21½ feet below ground surface.

Borings were advanced using a CME 75 truck-mounted drill rig equipped with hollow stem auger drilling methods. BCI obtained relatively undisturbed soil samples using Modified California Sampler (equipped with 2.4-inch I.D. brass liners) and Standard Penetration Test (SPT) samplers (1.4 I.D.). These samplers were driven into the ground by the force of a 140-pound automatic-trip hammer falling approximately 30 inches. The N-values shown on the Log of Test Borings in the Appendix B are uncorrected “field” values. For the Modified California Sampler, the N-value may be multiplied by 0.65 to obtain an approximate SPT N-value.

We sealed the sample liners with plastic caps. We also obtained bulk soil samples from the auger cuttings. Bulk samples were placed in plastic bags for transport to the laboratory. Borings were backfilled with auger cuttings or grout in compliance with the boring permit.

FHWA's soil and Foundation Manual, Volume 1 (FHWA-NHI-06-088, December 2006) indicates that the hammer energy transfer ratio ranges between 80-100% for automatic trip hammers. To be conservative, BCI assumed a hammer energy transfer ratio of 75% in the absence of recent hammer calibration data.

The boring locations are shown on the LOTBs in Appendix B. We also included the required LOTB sheet checklist in Appendix B.

5.2 Geologic Mapping

BCI reviewed the "Wagner, D.L. Bortugno, E.J. and McJunkin, R.D., 1991, Geologic Map of the San Francisco-San Jose quadrangle, California, 1:250,000; California Division of Mines and Geology, Regional Geologic Map 5A." We include a Geologic Map as Figure 2 in the Appendix A.

5.3 Geophysical Studies and Instrumentation

Geophysical studies and Instrumentation were not performed for this project.

5.4 Exploration Notes

The site soils were readily drillable with hollow-stem auger equipment to the full depth of exploration (21½ ft).

6 GEOTECHNICAL TESTING

We obtained in-situ blow counts using a 140-pound automatic-trip hammer with a 30-inch drop and pocket penetrometer values in the field. We performed the following laboratory tests on representative soil samples from the exploratory borings:

- Moisture content (ASTM D2216) and unit weight (ASTM D2937)
- Plasticity Index (ASTM D4318)
- Sieve Analysis (ASTM D6913)
- Triaxial Shear Test (ASTM D4767)

We attach our laboratory test results in Appendix C.

7 GEOTECHNICAL CONDITIONS

7.1 Site Geology

BCI evaluated the geology of the project area through available geologic maps and literature, site review, and our subsurface investigation.

Our review indicates that sound walls PB-11, PB-10-4, PB-7, and approximately half of PB-12 are located within the Pleistocene age Modesto Formation. Holocene age Dune Sand is shown extending south of PM 7.5 (Station 396+00), placing the southern portion of wall PB-12 and the entirety of PB-13 in this unit. The dune sands consist of young deposits of unconsolidated (loose) sands. The Modesto Formation consists of older Pleistocene age alluvium composed predominantly of sand, silt and clay deposited by present day streams and rivers.

We present a Geologic Map as Figure 2 in Appendix A.

7.2 Subsurface Soil Conditions

We present the following discussion of soil conditions based on our drilling and sampling program described in Section 5.1.

In general, we observed loose to dense silty sand and poorly graded sand in the upper ten feet of the sound wall areas. In the areas of walls PB-13 and PB-7 we encountered loose to dense poorly graded sand and silty sand below 10 feet. In the areas of walls PB-10-4, PB-12 and PB-11 underlying the near surface sand and silty sand we observed very stiff to hard clays and silts. Refer to the Log of Test Borings (LOTBs) in Appendix B for specific subsurface conditions encountered at each boring location.

7.3 Water

7.3.1 Surface Water

During our site reconnaissance in April of 2009, we did not observe surface water at the site. Due to the free draining sandy soil, ponding of surface water is generally not expected to impact the project.

7.3.1.1 Erosion

We did not observe significant erosional features along the SR 99 corridor. However, the near surface sandy soils are erodible if subject to concentrated surface flows.

7.3.2 Ground Water

We did not observe static groundwater in any of our exploratory borings and do not expect groundwater to be a factor during grading for this project. However, ground water and perched water levels can fluctuate due to changes in precipitation, irrigation/pumping and other factors.

8 GEOTECHNICAL ANALYSIS AND DESIGN

8.1 Sound Walls

Based on our review of the 95% Sound Wall Plan Sheets SW-1 through SW-21 prepared by HDR (dated July 2, 2010), the sound walls will be Masonry Block on Type 736S/SV Barriers supported on CIDH piles. The sound wall will have front and rear maximum slopes of about 4 to 1 (horizontal to vertical).

In our opinion, the 2006 Caltrans Revised Standard Plans RSP B15-6, B15-7, B15-8, and B15-15 for "Sound Wall – Masonry Block Type 736S/SV Barrier Details" can be used for foundation design for the sound walls.

To design the sound walls, we recommend using a design soil friction angle of 30 degrees. We selected this friction angle based on the soil types, blow count correlations, and unit weight tests obtained from our borings. Specific segments of each sound wall should be designed using either Case 1 (level ground) or Case 2 (sloping ground) from the above Standard Plan Sheets, depending on adjacent finish grades. Use Figure 1 from Caltrans August 2004 Memo to Designers 22-1 (Sound Wall Criteria) to determine the criteria for Case 1 level ground conditions. Per Memo to Designers 22-1, seismic dead load can be calculated by multiplying 0.57 by the sound wall dead load.

8.2 Soil Corrosivity

Based on the Caltrans Corrosion Guidelines (Version 1.0, September 2003), a corrosive soil for reinforced concrete has more than 500 ppm chlorides, more than 2000 ppm sulfates, or a pH<5.5. We performed corrosion testing on samples obtained from the borings excavated in the median of SR 99 for the April 24, 2009 "Draft Geotechnical Design and Materials Report for State Route 99 Median Widening". In general, these results indicated that the subsurface soil has chlorides ranging from 4.1 to 344.5 ppm, and sulfates ranging from 1.8 to 835 ppm. The pH ranged from 5.90 to 8.57 with resistivities between 430 and 21,170 ohm-cm. Given the corrosion test results, special corrosion protection is not necessary for the planned concrete foundations.

8.3 Excavations

8.3.1 Rippability

The onsite native soil should be excavatable with conventional earth moving and/or drilling equipment to the depths of the planned wall foundations.

9 CONSTRUCTION CONSIDERATIONS

9.1 Construction Advisories

9.1.1 Caving Conditions

During our exploration we encountered areas of loose "clean" sand that may be susceptible to sluffing and/or caving if left open for extending periods of time. The contractor is responsible for stability of temporary excavations.

At a minimum, all shoring should be in accordance with current CalOSHA requirements. In accordance with these requirements, the soil type for shoring design should correspond to the weakest layer. The contractor is responsible for final excavation and shoring design and construction based on actual excavation conditions encountered during construction.

9.2 Differing Site Conditions

BCI based this report on the current site conditions. We assume the soil and ground water conditions encountered in our borings are representative of the subsurface conditions across the site. Actual conditions between borings could be different. If differing site conditions are encountered, contact BCI immediately to provide additional recommendations.

10 GEOTECHNICAL RECOMMENDATIONS AND SPECIFICATIONS

This section presents our recommended geotechnical specifications, and special provisions, to be used in design and construction of the soundwall portions of the project. If designers have questions or problems with any of these recommendations, or if conditions are found to be different during construction, contact BCI to determine if additional field work, analysis, or recommendations are required.

Where referenced below, Standard Specifications and Standard Plans refer to the Caltrans 2006 Standard Plans and Specifications.

10.1 Earthwork

Earthwork shall be performed in accordance with Section 19 of the Standard Specifications. *Structural Backfill* shall conform to Section 19-3 of the Standard Specifications.

11 RISK MANAGEMENT

Our experience and that of our profession clearly indicates that the risks of costly design, construction, and maintenance problems can be significantly lowered by retaining the geotechnical engineer of record to provide additional services during design and construction. For this project, BCI should be retained to:

- Review and provide comments on the civil plans and specifications prior to construction.
- Monitor construction to check and document our report assumptions. At a minimum, BCI should monitor the grading and compaction, and observe the bottom of the foundation excavations.
- Update this report if design changes occur, a lapse of 2 years or more between this report and construction, and/or site conditions have changed.

If we are not retained to perform the above applicable services, we are not responsible for any other party's interpretation of our report, and subsequent addendums, letters, and discussions.

12 LIMITATIONS

BCI performed services in accordance with generally accepted geotechnical engineering principles and practices currently used in this area. Where referenced, we used ASTM or Caltrans standards as a general (not strict) *guideline* only. We do not warranty our services. Do not use or rely on this report for different locations or improvements without the written consent of Blackburn Consulting (BCI).

Our scope for this report did not include evaluation of on-site hazardous material, flood potential, aerial photograph review, or biological pollutants. Please contact BCI if you would like an evaluation of one or more of these potentially damaging issues. Or if off-site borrow sources are identified and require sampling and testing.

Log of Test Borings are presented in Appendix B. The lines designating the interface between soil types are approximate. The transition between material types may be abrupt or gradual. Our recommendations are based on the final logs, which represent our interpretation of the field logs and general knowledge of the site and geological conditions.

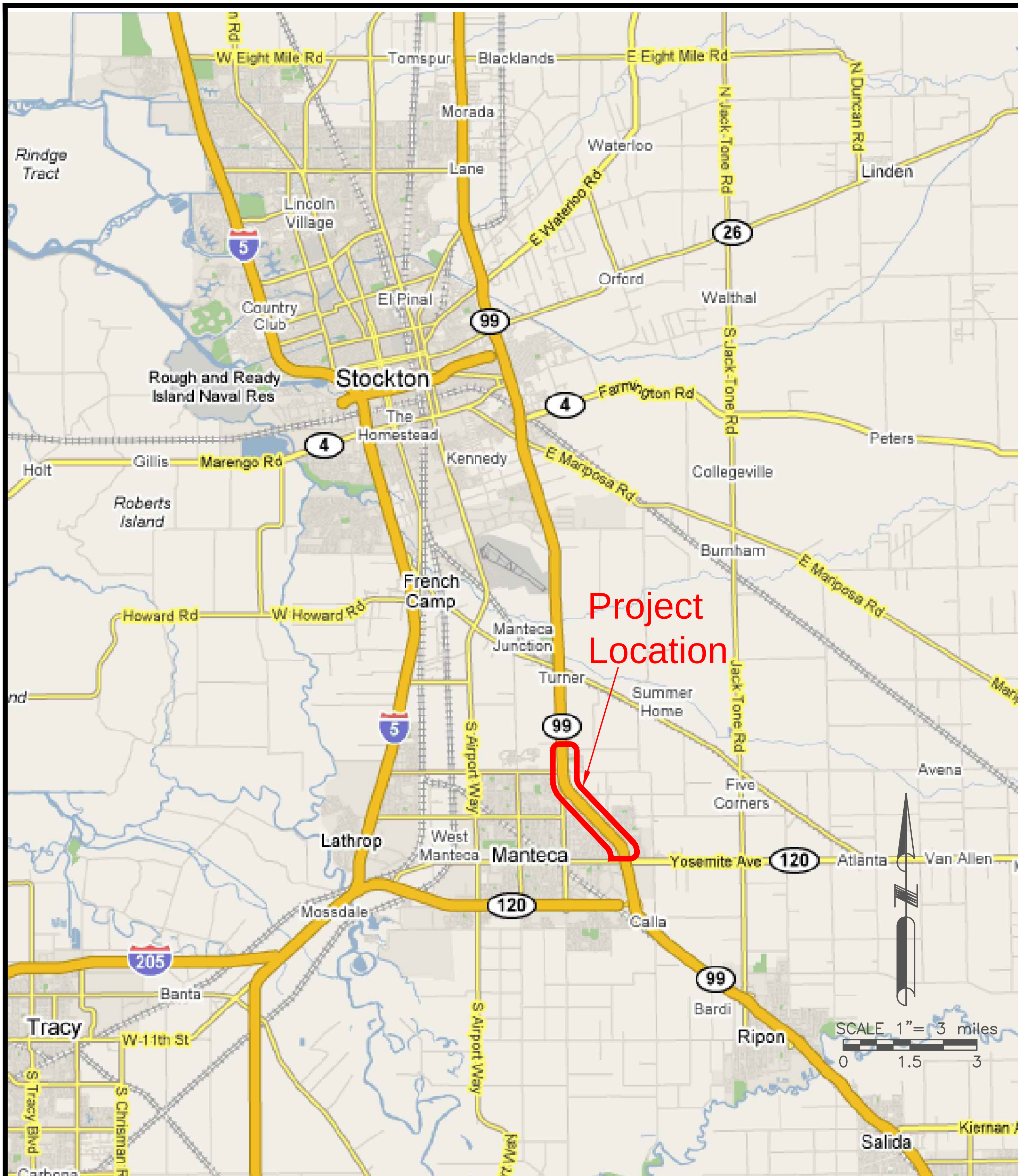
Modern design and construction is complex, with many regulatory sources/restrictions, involved parties, construction alternatives, etc. It is common to experience changes and delays. The owner should set aside a reasonable contingency fund based on project complexities and cost estimates to cover changes and delays.

APPENDIX A

Figure 1: Vicinity Map

Figure 2: Geologic Map

Figure 3: Fault Map



blackburn consulting

1720 G Street
Modesto, CA 95354
Phone (209) 522 6273
Fax (209) 522 6274
www.blackburnconsulting.com

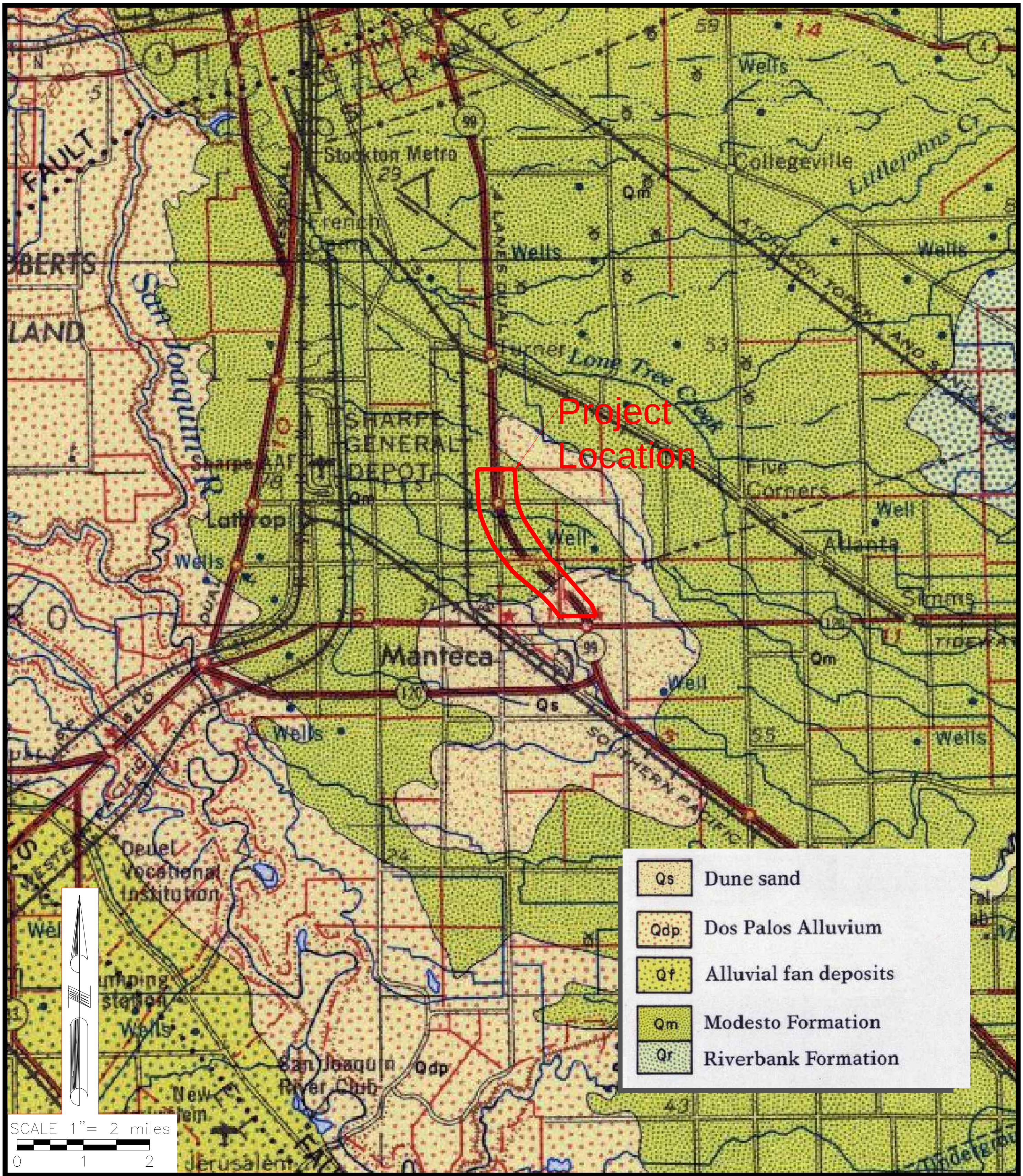
VICINITY MAP

SR 99 Median Widening Sound Walls
San Joaquin County, CA

File: 1201.3a

July 2010

Figure 1



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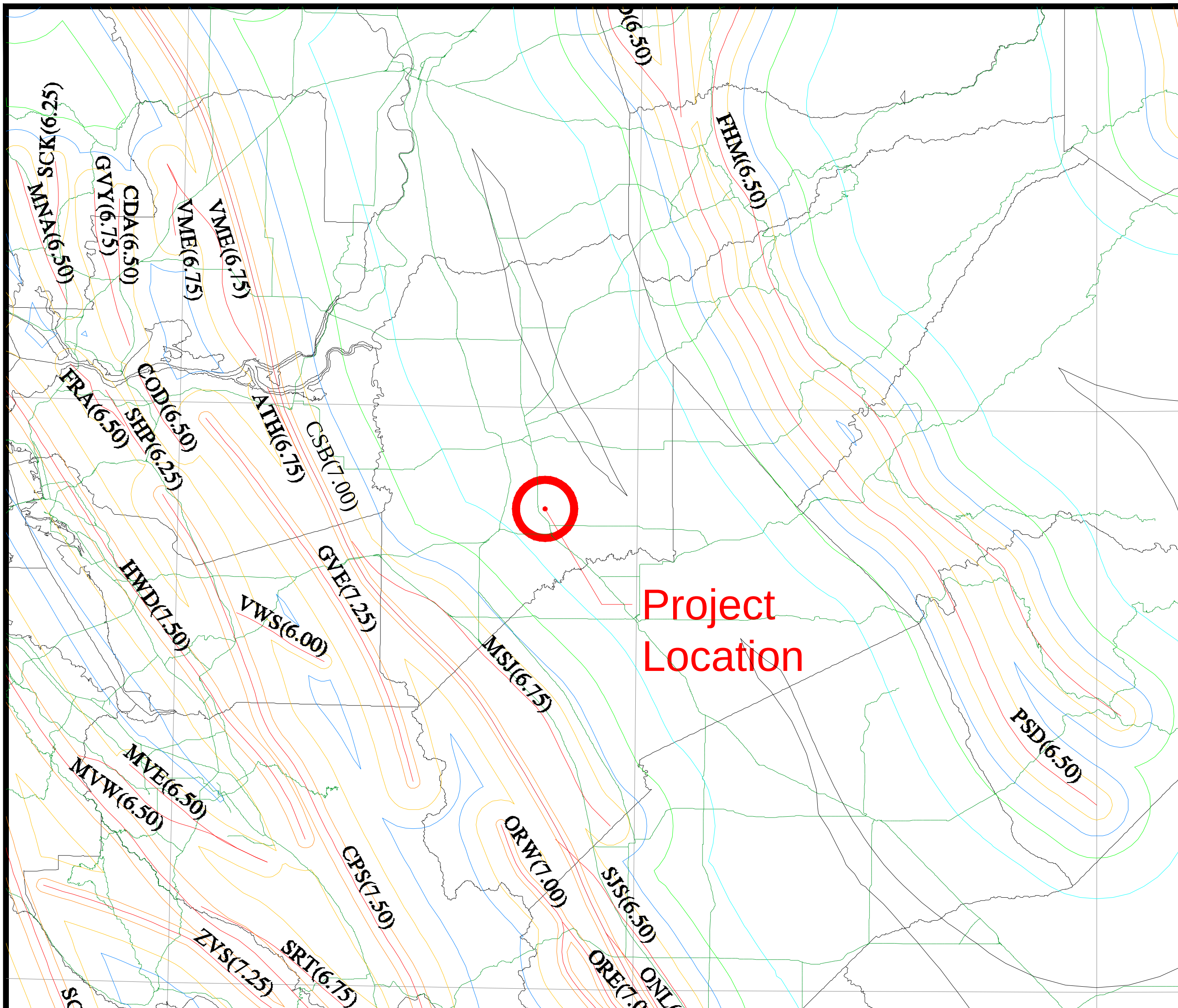
GEOLOGIC MAP

SR 99 Median Widening Sound Walls
San Joaquin County, CA

File: 1201.3a

July 2010

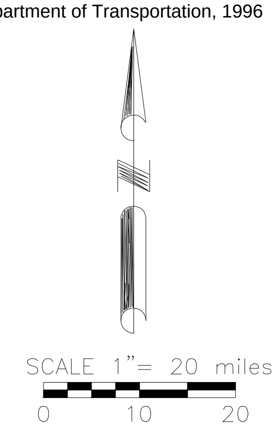
Figure 2



Source: Mualchin, L., California Seismic Hazard Map 1996, California Department of Transportation, 1996

LEGEND:

- 0.7g Peak Acceleration Contour
- 0.6g Peak Acceleration Contour
- 0.5g Peak Acceleration Contour
- 0.4g Peak Acceleration Contour
- 0.3g Peak Acceleration Contour
- 0.2g Peak Acceleration Contour
- 0.1g Peak Acceleration Contour
- Special Seismic Source (SSS)
- Faults with Fault Codes (MCE)
- State Highways
- County Boundary
- Latitude & Longitude



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FAULT MAP

SR 99 Median Widening Sound Walls
San Joaquin County, CA

File: 1201.3a

July 2010

Figure 3

APPENDIX B

Log of Test Borings Sheets 1 through 7

Caltrans Log of Test Boring (LOTB) Sheet Checklist

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	SJ	99			

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER BENJAMIN D. CRAWFORD No. 68457 Exp. 6/30/11 CIVIL STATE OF CALIFORNIA

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WEST SACRAMENTO, CA 95691 FILE No. 1201.3a

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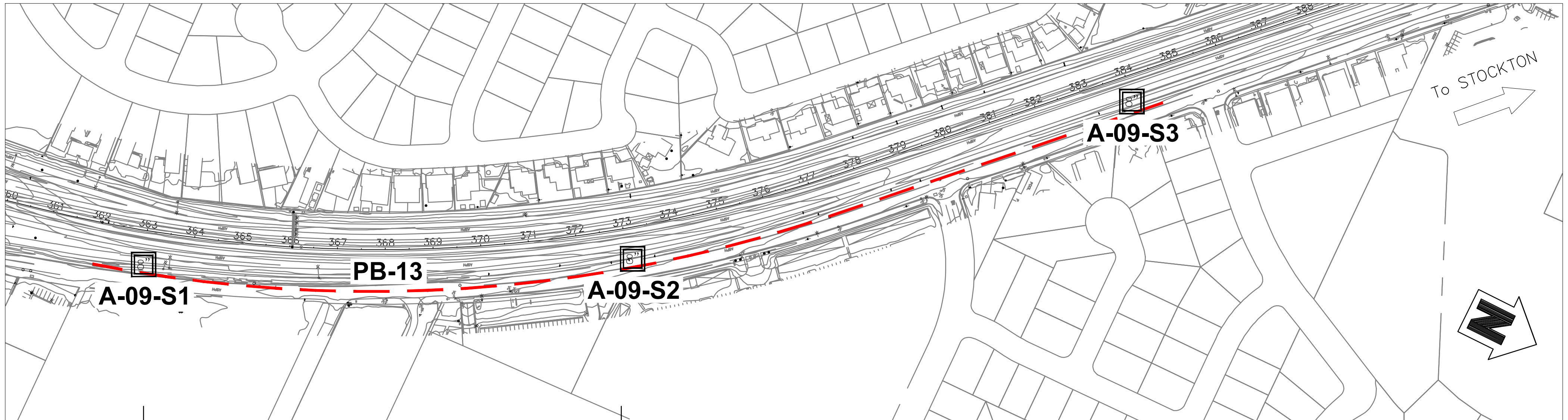
FOLSOM, CA 95630



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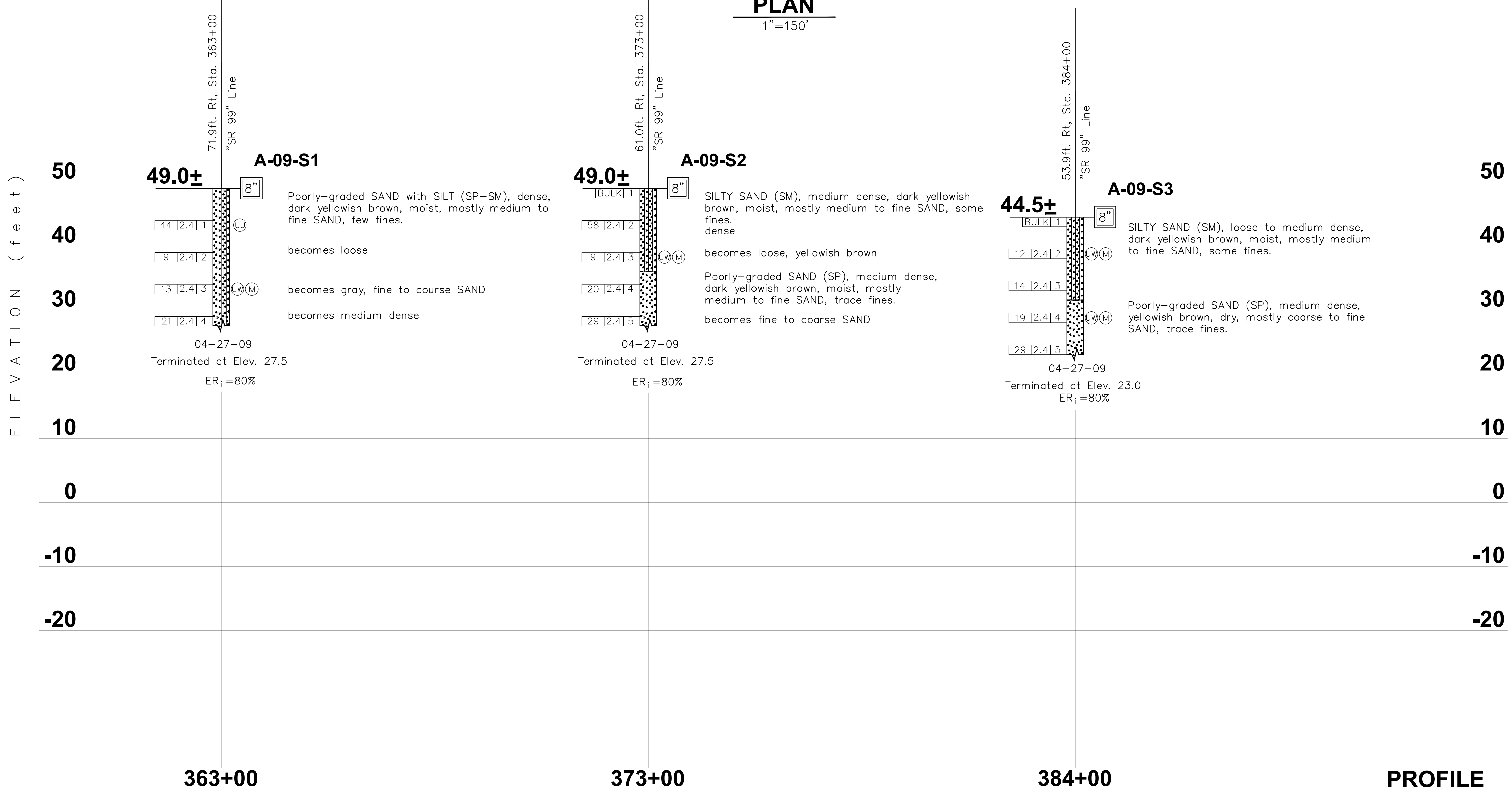

PROFILE

HOR. 1"=150'
VERT. 1"=10'

NOTES:

1. Field classification of soils was in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007). See Log of Test Borings No. 4 and 5, "Soil Legend".
2. Standard Penetration tests were performed in accordance with ASTM D 1586–99 using a hammer operated with an automated drop system. Drill rods were 1 5/8–inch diameter "A"–rods; sampler was driven with brass liners.
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9. Electronic media for plan view provided by HDR Engineering, Foundation Plans, 65%, plot date 11/19/09.
10. Boring elevations are approximate and based on "Planning Study" plans dated 1/23/09 provided by HDR Engineering, Inc.
11. The "Log of Test Borings" drawing is included with plans in accordance with Section 2–1.03 of Caltrans "Standard Specifications".

BENCH MARKS

BENCHMARK# 645 ELEV. 58.24 Ft

DESCRIPTION: KSN Control Point, 1/2" REBAR WITH YELLOW CAP STAMPED "KSN CONTROL", LOCATED AT APPROXIMATE CENTERLINE STATION 605+95 ON THE SOUTHBOUND MAINLINE, ON THE INSIDE SHOULDER, 3.5' EAST OF THE EDGE OF PAVEMENT, 11' WEST OF THE FACE OF THE GUARDRAIL, AND 4' SOUTH OF THE SOUTHEAST CORNER OF THE FRENCH CAMP OVER CROSSING BRIDGE.
NGVD 29, N2136239.71, E6354178.61.

BENCHMARK# 641 ELEV. 56.89 Ft

DESCRIPTION: KSN Control Point, 1/2" REBAR WITH YELLOW CAP STAMPED "KSN CONTROL", LOCATED APPROXIMATE CENTERLINE STATION 608+14 ON THE NORTHBOUND MAINLINE, ON THE INSIDE SHOULDER, 2' WEST OF THE EDGE OF PAVEMENT, 10.5' EAST OF THE FACE OF THE GUARDRAIL, 6' NORTH OF THE FRENCH CAMP OVER CROSSING BRIDGE.
NGVD 29, N2136459.41, E6354207.75.

95% SUBMITTAL

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	JOHN A. KLEMUNES, JR. PROJECT ENGINEER	BRIDGE NO.	SR 99 MEDIAN WIDENING SOUND WALLS
FUNCTIONAL SUPERVISOR X	DRAWN BY: D. CASTRO / CHECKED BY: K. CHAPMAN	FIELD INVESTIGATION BY: A. WOOD			POST MILE	LOG OF TEST BORINGS 1 OF 7

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 06241
EA 0E6101

DISREGARD PRINTS BEARING EARLIER REVISION DATES

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	SJ	99			

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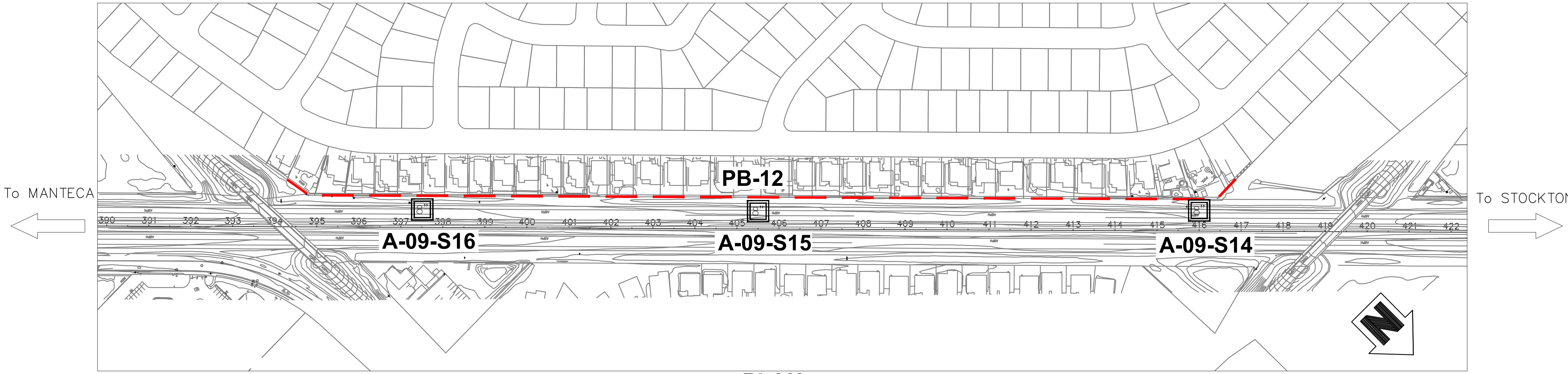

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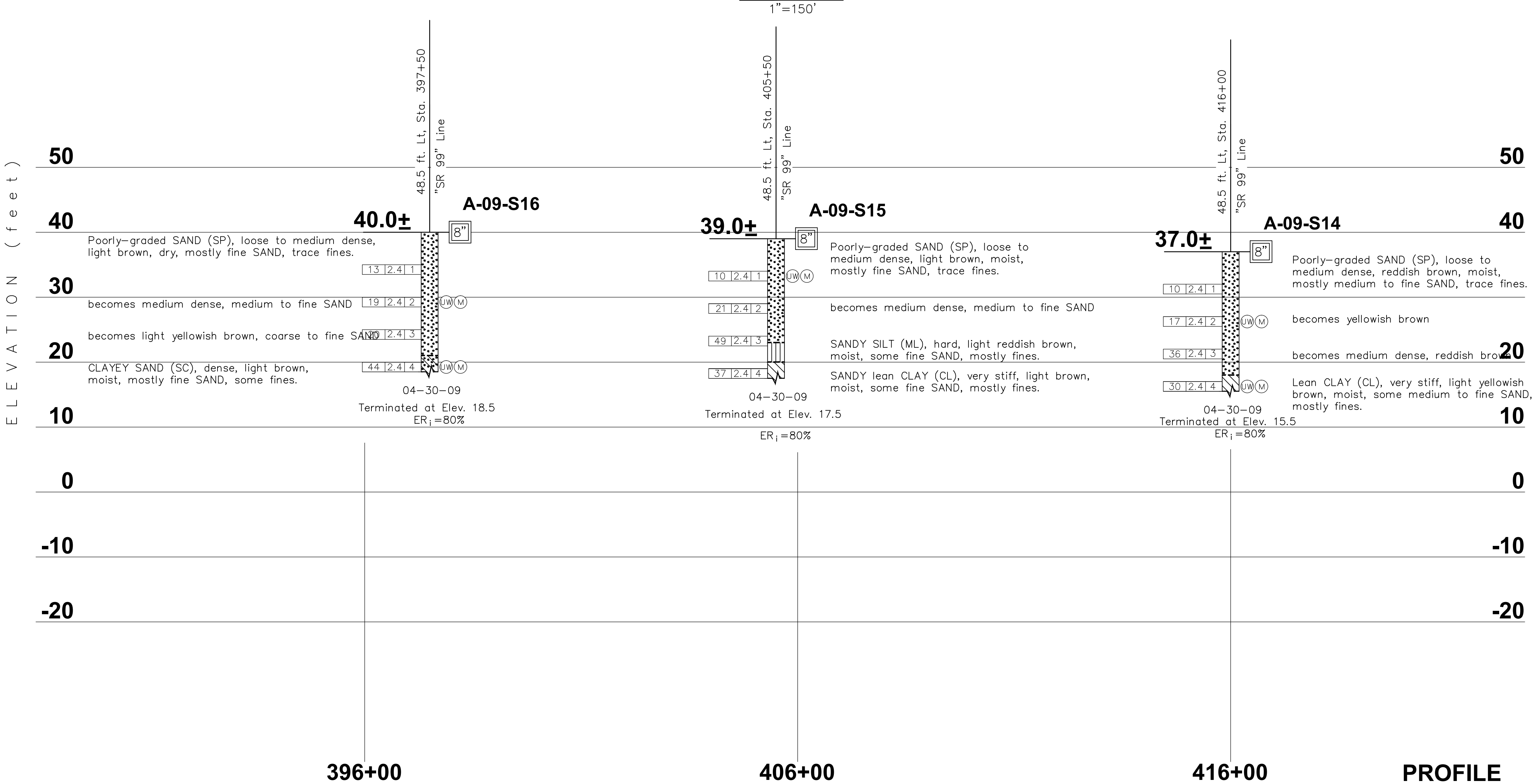

PROFILE

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NGVD 29, N2136459.41, E6354207.75.

95% SUBMITTAL

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USERNAME => $USER

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	JOHN A. KLEMUNES, JR. PROJECT ENGINEER	BRIDGE NO.	SR 99 MEDIAN WIDENING SOUND WALLS
FUNCTIONAL SUPERVISOR X	DRAWN BY: D. CASTRO / CHECKED BY: K. CHAPMAN	FIELD INVESTIGATION BY: A. WOOD			POST MILE	LOG OF TEST BORINGS 2 OF 7

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
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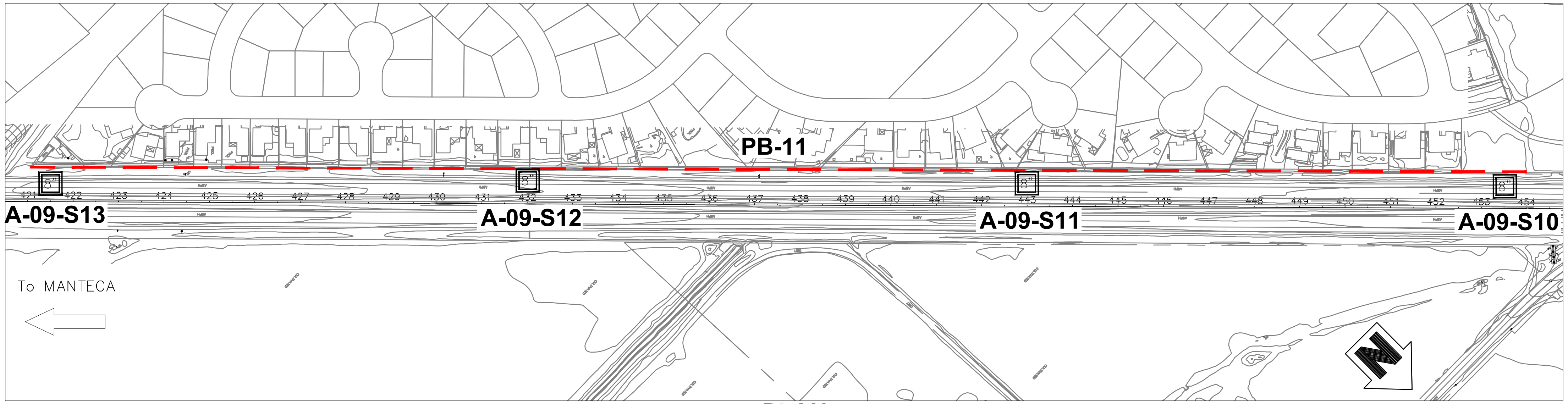

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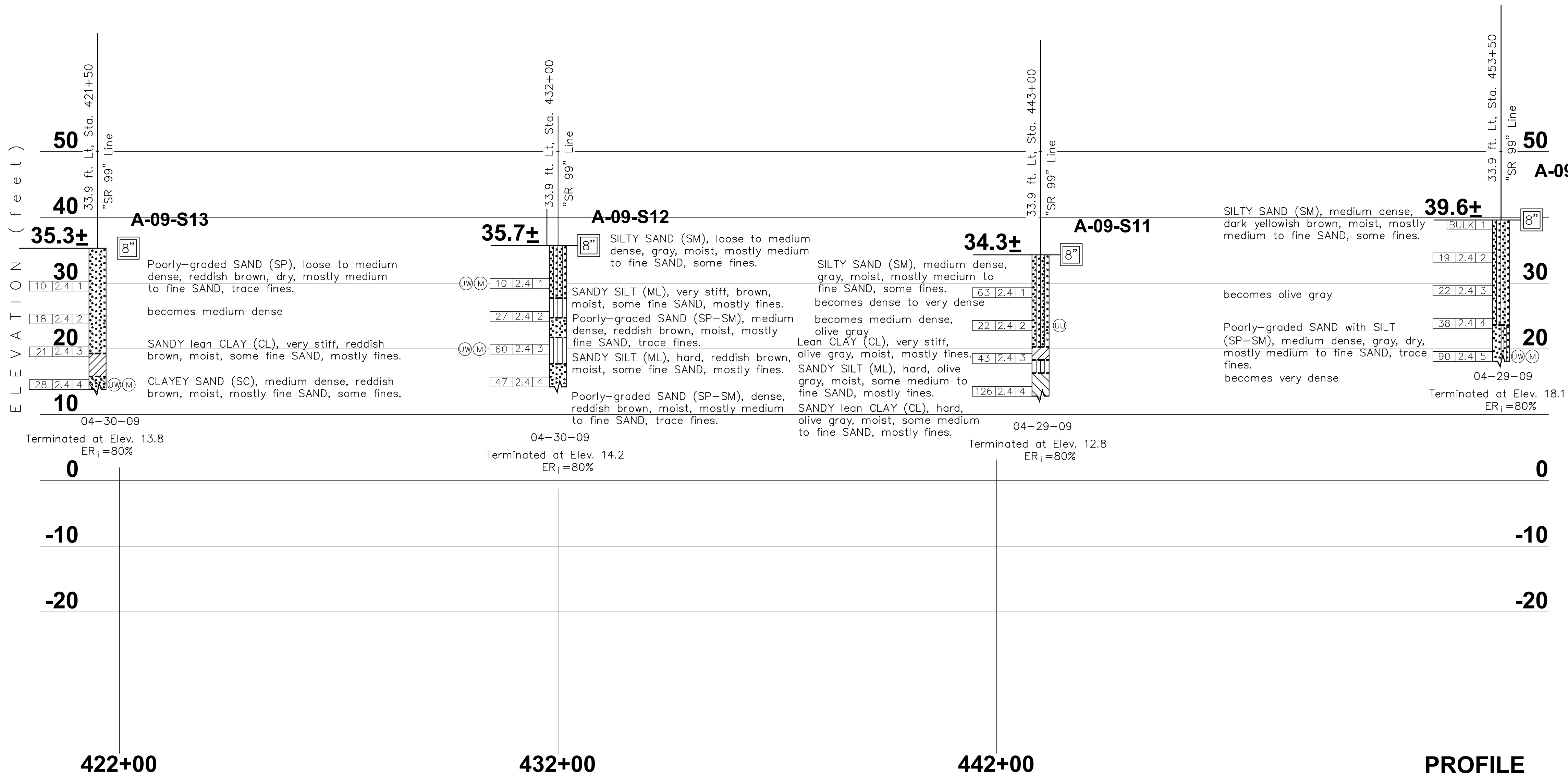

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NGVD 29, N2136459.41, E6354207.75.

95% SUBMITTAL

TIME PLOTTED => $TIME
DATE PLOTTED => $DATE
USERNAME => $USER

Z:\Active Projects\1201.X SR 99 Median Widening\1201.3 SR 99 Median Widening\CAD Drawings\Sound Walls\LOTB\1201.3a Soundwall LOTB.dwg, 6/29/2010 3:09:50 PM, DWG To PDF.pc3
4/20/2010 1201.3a Soundwall LOTB.dwg

ENGINEERING SERVICES
FUNCTIONAL SUPERVISOR X
DRAWN BY: D. CASTRO
CHECKED BY: K. CHAPMAN
GEOTECHNICAL SERVICES
FIELD INVESTIGATION BY: A. WOOD
PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
JOHN A. KLEMUNES, JR.
PROJECT ENGINEER
BRIDGE NO.
POST MILE

SR 99 MEDIAN WIDENING SOUND WALLS

LOG OF TEST BORINGS 3 OF 7

OGS CIVIL LOG OF TEST BORINGS SHEET
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3
CU 06241
EA 0E6101
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF
FILE => $REQUEST

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	SJ	99			

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER BENJAMIN D. CRAWFORD No. 68457 Exp. 6/30/11 CIVIL STATE OF CALIFORNIA

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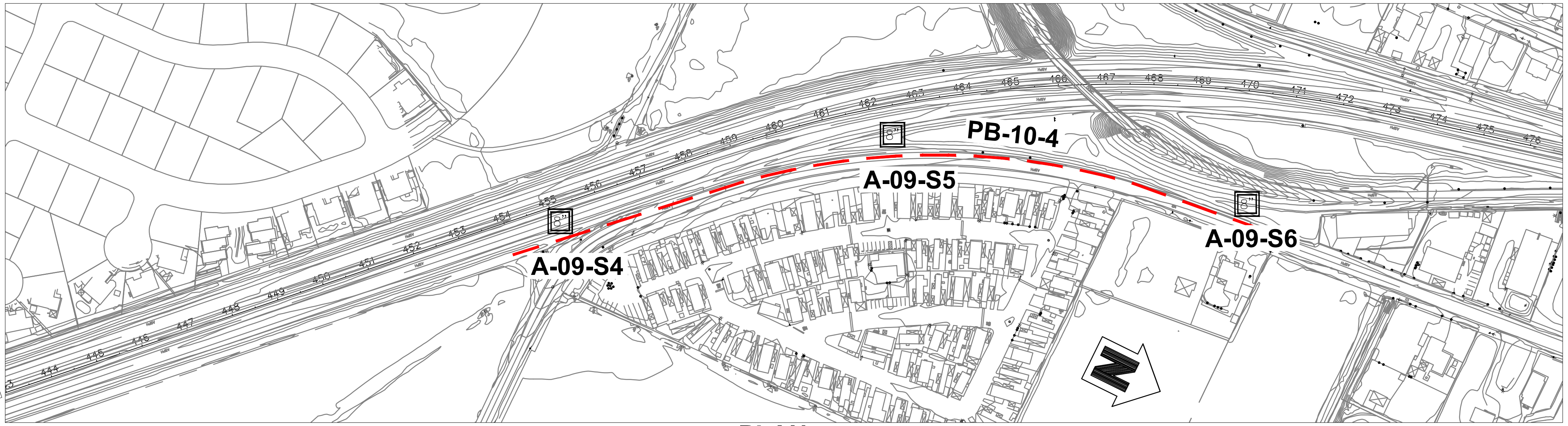
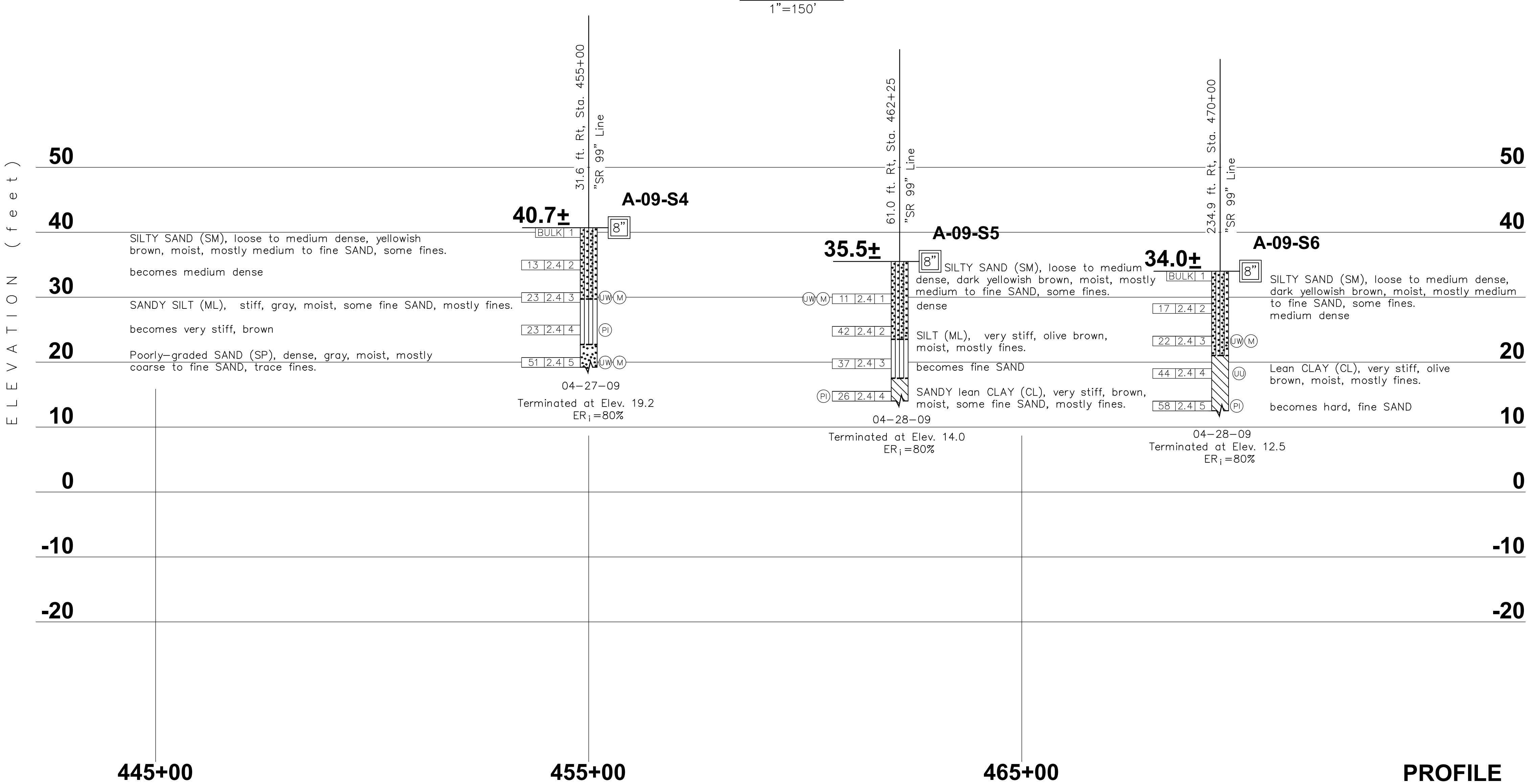
BLACKBURN CONSULTING
2491 BOATMAN AVENUE
WEST SACRAMENTO, CA 95691 FILE No. 1201.3a

HDR ENGINEERING, INC.
2365 IRON POINT ROAD, SUITE 300
FOLSOM, CA 95630



PLAN
1"=150'



PROFILE
HOR. 1"=150'
VERT. 1"=10'

NOTES:

1. Field classification of soils was in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (June 2007). See Log of Test Borings No. 4 and 5, "Soil Legend".
2. Standard Penetration tests were performed in accordance with ASTM D 1586-99 using a hammer operated with an automated drop system. Drill rods were 1 5/8-inch diameter "A"-rods; sampler was driven with brass liners.
3. "2.4 inch sampler": ID=2.4 inch, OD=2.9 inch. Driven in same manner as SPT ("1.4 inch") sampler.
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6. The length of each sampled interval is shown graphically on the boring log.
7. Consistency of soils shown in ( ) where estimated.
8. Groundwater surface (GWS) reflect the fluid level in the borings on the specified date. Groundwater surface is subject to seasonal fluctuations and may occur at higher or lower elevations depending on the conditions at any particular time.
9. Electronic media for plan view provided by HDR Engineering, Foundation Plans, 65%, plot date 11/19/09.
10. Boring elevations are approximate and based on "Planning Study" plans dated 1/23/09 provided by HDR Engineering, Inc.
11. The "Log of Test Borings" drawing is included with plans in accordance with Section 2-1.03 of Caltrans "Standard Specifications".

BENCH MARKS

BENCHMARK# 645 ELEV. 58.24 Ft
DESCRIPTION: KSN Control Point, 1/2" REBAR WITH YELLOW CAP STAMPED "KSN CONTROL", LOCATED AT APPROXIMATE CENTERLINE STATION 605+95 ON THE SOUTHBOUND MAINLINE, ON THE INSIDE SHOULDER, 3.5' EAST OF THE EDGE OF PAVEMENT, 11' WEST OF THE FACE OF THE GUARDRAIL, AND 4' SOUTH OF THE SOUTHEAST CORNER OF THE FRENCH CAMP OVER CROSSING BRIDGE.
NGVD 29, N2136239.71, E6354178.61.

BENCHMARK# 641 ELEV. 56.89 Ft
DESCRIPTION: KSN Control Point, 1/2" REBAR WITH YELLOW CAP STAMPED "KSN CONTROL", LOCATED APPROXIMATE CENTERLINE STATION 608+14 ON THE NORTHBOUND MAINLINE, ON THE INSIDE SHOULDER, 2' WEST OF THE EDGE OF PAVEMENT, 10.5' EAST OF THE FACE OF THE GUARDRAIL, 6' NORTH OF THE FRENCH CAMP OVER CROSSING BRIDGE.
NGVD 29, N2136459.41, E6354207.75.

95% SUBMITTAL

TIME PLOTTED => $TIME
DATE PLOTTED => $DATE
USERNAME => $USER

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	
FUNCTIONAL SUPERVISOR X	DRAWN BY: D. CASTRO; CHECKED BY: K. CHAPMAN	FIELD INVESTIGATION BY: A. WOOD

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

JOHN A. KLEMUNES, JR.
PROJECT ENGINEER

BRIDGE NO.
POST MILE

SR 99 MEDIAN WIDENING SOUND WALLS

LOG OF TEST BORINGS 4 OF 7

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 06241
EA 0E6101

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

FILE => $REQUEST

4/20/2010 1201.3a Soundwall LOTB.dwg

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REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER BENJAMIN D. CRAWFORD No. 68457 Exp. 6/30/11 CIVIL STATE OF CALIFORNIA

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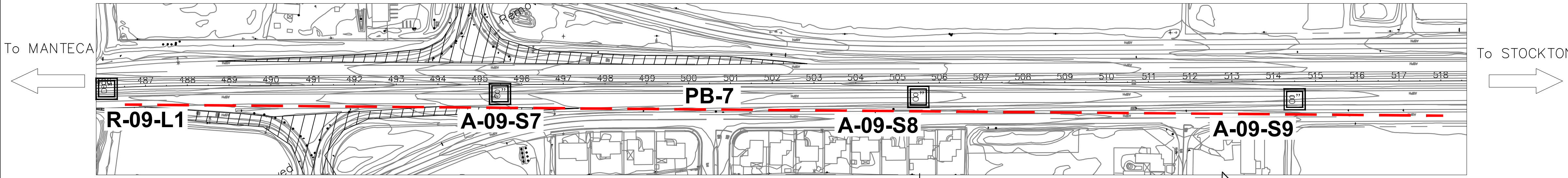
WEST SACRAMENTO, CA 95691 FILE No. 1201.3a

HDR ENGINEERING, INC.
2365 IRON POINT ROAD, SUITE 300
FOLSOM, CA 95630



PLAN
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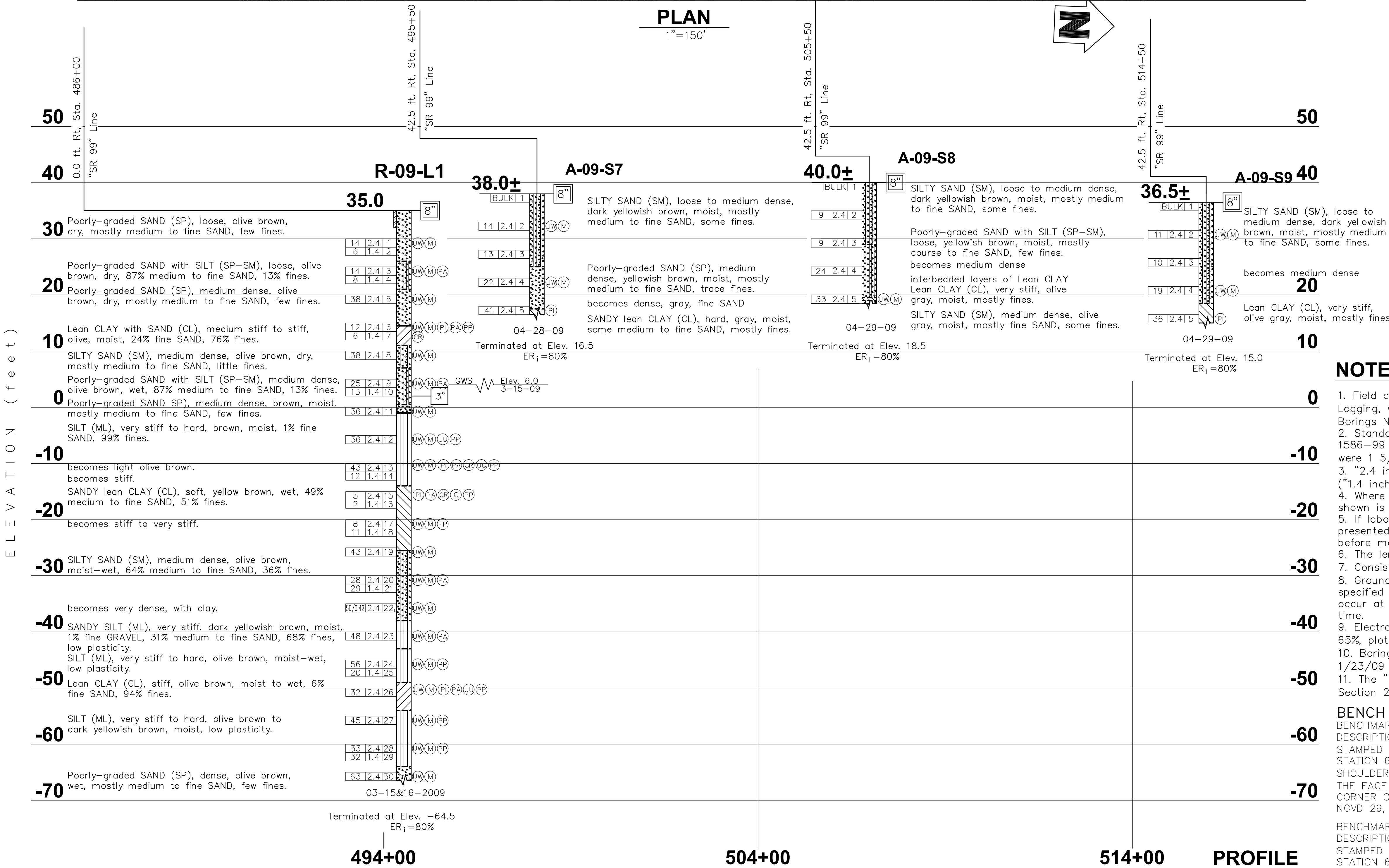

PROFILE
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NGVD 29, N2136459.41, E6354207.75.

95% SUBMITTAL

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO.	SR 99 MEDIAN WIDENING SOUND WALLS
FUNCTIONAL SUPERVISOR X	DRAWN BY: D. CASTRO / CHECKED BY: K. CHAPMAN	FIELD INVESTIGATION BY: A. WOOD		JOHN A. KLEMUNES, JR. PROJECT ENGINEER	POST MILE	LOG OF TEST BORINGS 5 OF 7

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 06241
EA 0E6101

DISREGARD PRINTS BEARING EARLIER REVISION DATES

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4/20/2010 1201.3a Soundwall LOTB.dwg

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10	SJ	99			

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER BENJAMIN D. CRAWFORD No. 68457 Exp. 6/30/11 CIVIL STATE OF CALIFORNIA

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BLACKBURN CONSULTING
2491 BOATMAN AVENUE
WEST SACRAMENTO, CA 95691 FILE No. 1201.3a

HDR ENGINEERING, INC.
2365 IRON POINT ROAD, SUITE 300
FOLSOM, CA 95630

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

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)
	O	Other

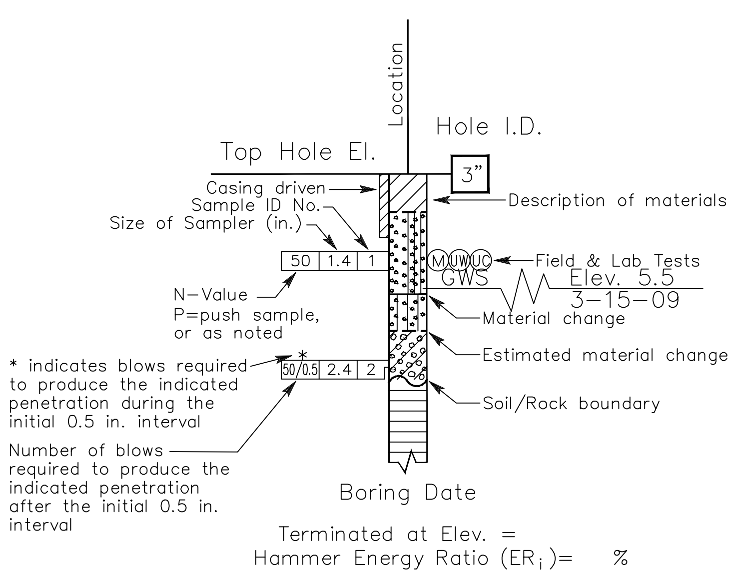
NOTE: Size in inches.

CONSISTENCY OF COHESIVE SOILS

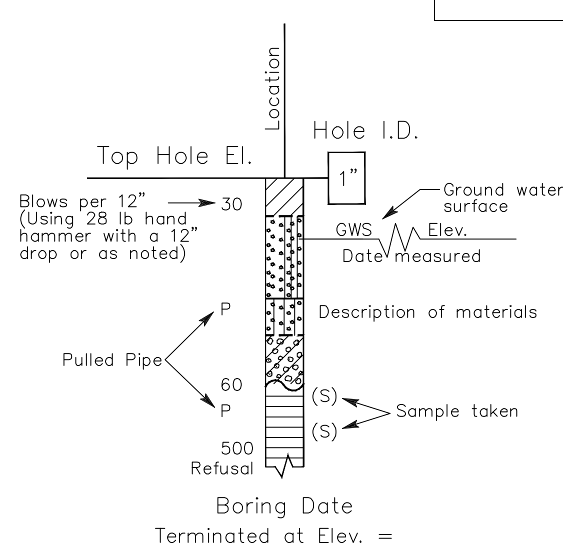
Description	Unconfined Compressive Strength (tsf)	Pocket Penetrometer Measurement (tsf)	Torvane Measurement (tsf)	Field Approximation
Very Soft	<0.25	<0.25	<0.12	Easily penetrated several inches by fist
Soft	0.25 to 0.50	0.25 to 0.50	0.12 to 0.25	Easily penetrated several inches by thumb
Medium Stiff	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

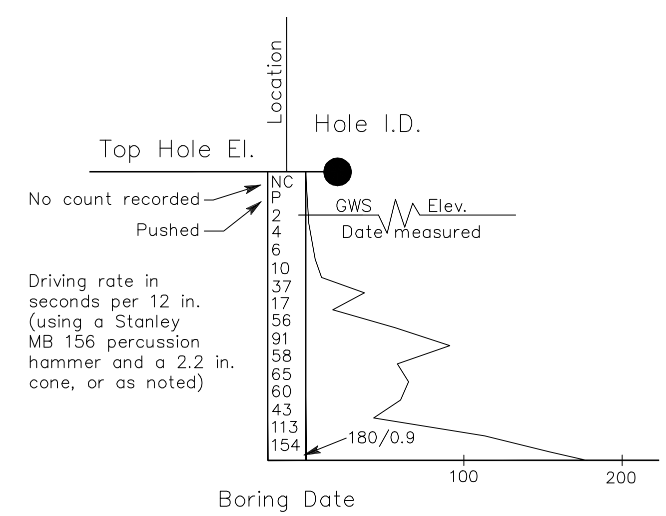
Description	Criteria
Nonplastic	A 1/8-inch thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be 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.



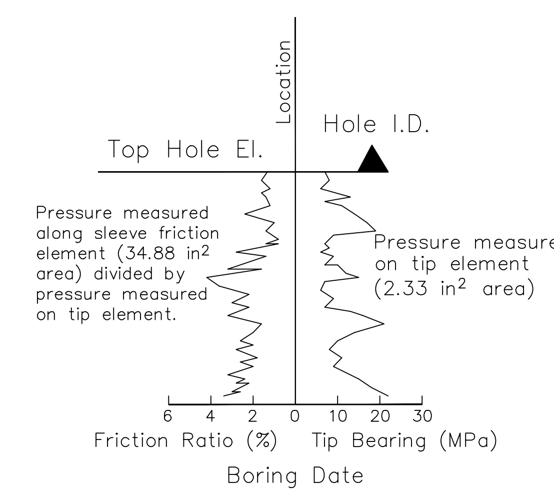
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) SOUNDING

95% SUBMITTAL

SOIL LEGEND

SR 99 MEDIAN WIDENING SOUND WALLS

LOG OF TEST BORINGS 6 OF 7

ENGINEERING SERVICES | GEOTECHNICAL SERVICES

DRAWN BY: M. ROBERTSON

CHECKED BY: K. CHAPMAN

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

JOHN A. KLEMUNES, JR.
PROJECT ENGINEER

BRIDGE NO.

POST MILE

OGS CIVIL LOG OF TEST BORINGS SHEET

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 06241
EA 0E6101

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

FILE => $REQUEST

USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

4/20/2010 1201.3a Soundwall LOTB.dwg

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
OH/OL	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 2937)
- VS Vane Shear (AASHTO T 223)

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60}–Value (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

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	SJ	99			

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
BENJAMIN D. CRAWFORD
No. 68457
Exp. 6/30/11
CIVIL
STATE OF CALIFORNIA

BLACKBURN CONSULTING
2491 BOATMAN AVENUE
WEST SACRAMENTO, CA 95691 FILE No. 1201.3a

HDR ENGINEERING, INC.
2365 IRON POINT ROAD, SUITE 300
FOLSOM, CA 95630

60% SUBMITTAL

SOIL LEGEND

SR 99 MEDIAN WIDENING SOUND WALLS

LOG OF TEST BORINGS 7 OF 7

ENGINEERING SERVICES

GEOTECHNICAL SERVICES

DRAWN BY: M. ROBERTSON

CHECKED BY: K. CHAPMAN

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

JOHN A. KLEMUNES, JR.
PROJECT ENGINEER

BRIDGE NO.

POST MILE

OGS CIVIL LOG OF TEST BORINGS SHEET

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CU 06241
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Log of Test Boring (LOTB) Sheet Checklist

This checklist shall be used by the *checker* in his/her evaluation of a LOTB sheet's conformance with the Caltrans *Soil & Rock Logging, Classification, and Presentation Manual,* and other applicable standards. To facilitate a quality check, the checker shall be provided with the draft final LOTB sheets, pertinent laboratory test results, copies of approved *Request for Exceptions*, and the field logs. This checklist is not comprehensive and does not attempt to account for all logging and presentation standards. As such, the checker must be familiar with the entire manual in order to successfully perform a quality check. **One checklist shall be completed per LOTB plan sheet. One signature sheet may be used for each structure (Bridge No.).**

Project Information

Dist – EA: 10 County: SJ Route: 99 PM: N/A

Bridge No.: 29-0332

Sheet Title: SR 99 Median Widening Soundwalls

Revision Date: ____________

Are there approved exceptions to the manual? ☐ Yes ☑ No (attach, if yes)

General

	Yes	No	N/A	
1.1	☑	☐	☐	Does the Plan View meet the requirements of Sec 5.2.3.3?
1.2	☑	☐		Does the Border meet the requirements of Sec 5.2.3.1 and Sec 5.2.3.2?
1.3	☑	☐	☐	Are the Notes clear and do they meet the requirements of Sec 5.2.2?
1.4	☐	☐	☑	If As-Built LOTB, does it meet the requirements of Sec 5.2.4?
1.5	☑	☐		Is the soil legend sheet attached and properly labeled?
1.6	☐	☐	☑	If rock is presented, is the rock legend attached and properly labeled?
1.7	☐	☐	☑	If approved "Exception to Policy" form is attached, does the LOTB meet the requirements of the approved exceptions?

Elevation View

	Yes	No	N/A	
2.1	☑	☐		Are the Hole Identifications correct? (Sec 2.3) (Sec. 5.2.3.4)
2.2	☑	☐		Are the location descriptions correct?
2.3	☑	☐		Are the holes located properly on the profile?
2.4	☑	☐		Is the elevation scale correct? (Sec 5.2.3.4)
2.5	☑	☐		Is the top of hole elevation presented and correct? (Sec 5.2.3.4)

Log of Test Boring (LOTB) Sheet Checklist

Bridge No.: 29-0332 Sheet Title: SR 99 Median Widening Soundwalls

	Yes	No	N/A	
2.6	☑	☐		Is the correct hole diameter presented in the correct Borehole Symbol? (Sec 5.2.5.6)
2.7	☑	☐		Does the stationing match the profile view?
2.8	☑	☐		Are the Boring Date and Termination Elevation presented at the bottom of each boring log? (Sec 5.2.3.4)
2.9	☑	☐	☐	If SPT tests were performed, is the correct hammer efficiency reported at the bottom of each borehole?
2.10	☑	☐	☐	Are lab tests reported at the correct elevations? (Sec 5.2.5.2)
2.11	☑	☐	☐	Are SPT blow counts reported at the correct elevations? (Sec 5.2.5.2)
2.12	☑	☐	☐	Is the groundwater presented at the correct elevation? (Sec 5.2.5.2)
2.13	☑	☐		Are the soil/rock layers and graphics presented correctly? (Sec 4, Sec 5.2.5.7)
2.14	☑	☐		Are the required descriptors presented and in the correct order? (Sec 2.4.1, Sec 2.5.1)
2.15	☑	☐		Are the descriptors presented consistent with those allowed in the manual?
2.16	☑	☐		Are the soil identifications consistent with the field observations? (Sec 2)
2.17	☑	☐		Are the soil classifications consistent with reported lab test results? (Sec 3)
2.18	☑	☐	☐	Are the consistency descriptors consistent with field observations and/or lab test results? (Sec 2.4.3, Sec 3.2.3)
2.19	☑	☐	☐	Are the apparent density descriptors consistent with the SPT results and hammer efficiency? (Sec 2.4.4)
2.20	☐	☐	☑	Are % recovery (REC) and rock quality designation (RQD) presented at the required elevations?
2.21	☐	☐	☑	Is rock strength presented where lab tests are reported? (Sec 3.3.1)
2.22	☑	☐	☐	Considering the field observations, are lab test results properly applied to the descriptors within a layer per Sec 4.3?
2.23	☑	☐		Are the presentations consistent with the rules presented in Sec 4?
2.24	☑	☐		Are the presentations consistent with the rules presented in Sec 5?

Log of Test Boring (LOTB) Sheet Checklist

List all variances identified during initial review of the LOTB sheet and steps needed to resolve the discrepancy (include item number). Also note any recommendations for revisions to the manual or procedures that might reduce or eliminate similar errors in the future.

Log of Test Boring QC/QA Signature Sheet

Dist – EA: 10 Bridge No.: 29-0332

Sheet Titles: SR 99 Median Widening Soundwalls

I, the undersigned on the date following my signature, hereby certify that I have substantially performed a quality check of the referenced LOTB sheets and that the referenced LOTB sheets comply with the Caltrans *Soil and Rock Logging, Classification and Presentation Manual* (June 2007) and related policy and standards.

David Castro — Project Engineer

Checker (Print) — Title

7.19.10

Checker (Signature) — Date

I, the undersigned on the date following my signature, hereby certify that the referenced LOTB sheets substantially comply with the Geotechnical Service's Quality Control/Quality Assurance procedures, as described in the memorandum, "Quality Control/Quality Assurance Documentation on LOTB Sheets", dated July1, 2007.

Benjamin D. Crawford, P.E., G.E. — Principal

Functional Supervisor (Print) — Title

7/20/2010

Functional Supervisor (Signature) — Date

(This original checklist and signature sheet shall be placed in the geotechnical project file, and a copy sent to the Geotechnical Services Corporate Unit (Mark Willian))

APPENDIX C

Laboratory Test Results

blackburn consulting

Project Name: SR 99 Soundwalls
BCI File No: 1201.3a
Date: 5/15/2009
Technician: AGW

MOISTURE-DENSITY TESTS

Sample No.	S1-3B	S2-3B	S3-2B	S3-4B	S4-3B	S4-5B	S5-1B
Depth (ft.)	15.5-16	10.5-11	5.5-6	15.5-16	10.5-11	20.5-21	5.5-6
Sample Length (in.)	6.000	6.000	6.000	6.000	6.000	6.000	6.000
Diameter (in.)	2.438	2.438	2.438	2.438	2.438	2.438	2.438
Sample Volume (ft^3)	0.01621	0.01621	0.01621	0.01621	0.01621	0.01621	0.01621
Tare No.	A	B	C	D	E	F	G
Tare (g)	192.8	191.6	188.5	189.4	193.8	193.1	193.2
Wet Soil + Tare (g)	971.9	990.3	972.6	937.8	950.3	946.3	1019.9
Dry Soil + Tare (g)	925.7	955.4	931.8	910.6	868.7	909.2	952.6
Dry Soil Weight (g)	732.9	763.8	743.3	721.2	674.9	716.1	759.4
Water (g)	46.2	34.9	40.8	27.2	81.6	37.1	67.3
Moisture (%)	**6.3**	**4.6**	**5.5**	**3.8**	**12.1**	**5.2**	**8.9**
Dry Density (pcf)	**99.7**	**103.9**	**101.1**	**98.1**	**91.8**	**97.4**	**103.3**

Sample No.	S6-3B	S7-2B	S7-4B	S8-5B	S9-2B	S9-4B	S10-2B
Depth (ft.)	10.5-11	5.5-6	15.5-16	20.5-21	5.5-6	15.5-16	5.5-6
Sample Length (in.)	6.000	6.000	6.000	6.000	6.000	6.000	6.000
Diameter (in.)	2.438	2.438	2.438	2.438	2.438	2.438	2.438
Sample Volume (ft^3)	0.01621	0.01621	0.01621	0.01621	0.01621	0.01621	0.01621
Tare No.	H	I	J	K	L	N	M
Tare (g)	190.8	188.0	187.5	189.9	189.4	187.5	187.9
Wet Soil + Tare (g)	1031.8	985.1	853.7	1036.5	990.9	1007.4	1027.5
Dry Soil + Tare (g)	953.6	940.7	839.4	901.2	915.2	881.5	951.8
Dry Soil Weight (g)	762.8	752.7	651.9	711.3	725.8	694.0	763.9
Water (g)	78.2	44.4	14.3	135.3	75.7	125.9	75.7
Moisture (%)	**10.3**	**5.9**	**2.2**	**19.0**	**10.4**	**18.1**	**9.9**
Dry Density (pcf)	**103.7**	**102.4**	**88.7**	**96.7**	**98.7**	**94.4**	**103.9**

Diameter = 1.44" for 1.5-inch Tubes
Diameter = 1.938" for 2-inch Tubes
Diameter = 2.438" for 2.5-inch Tubes
Diameter= 2.850" for 3.0-inch Shelby Tubes

Project Name: SR 99 Soundwalls
BCI File No: 1201.3a
Date: 5/15/2009
Technician: AGW

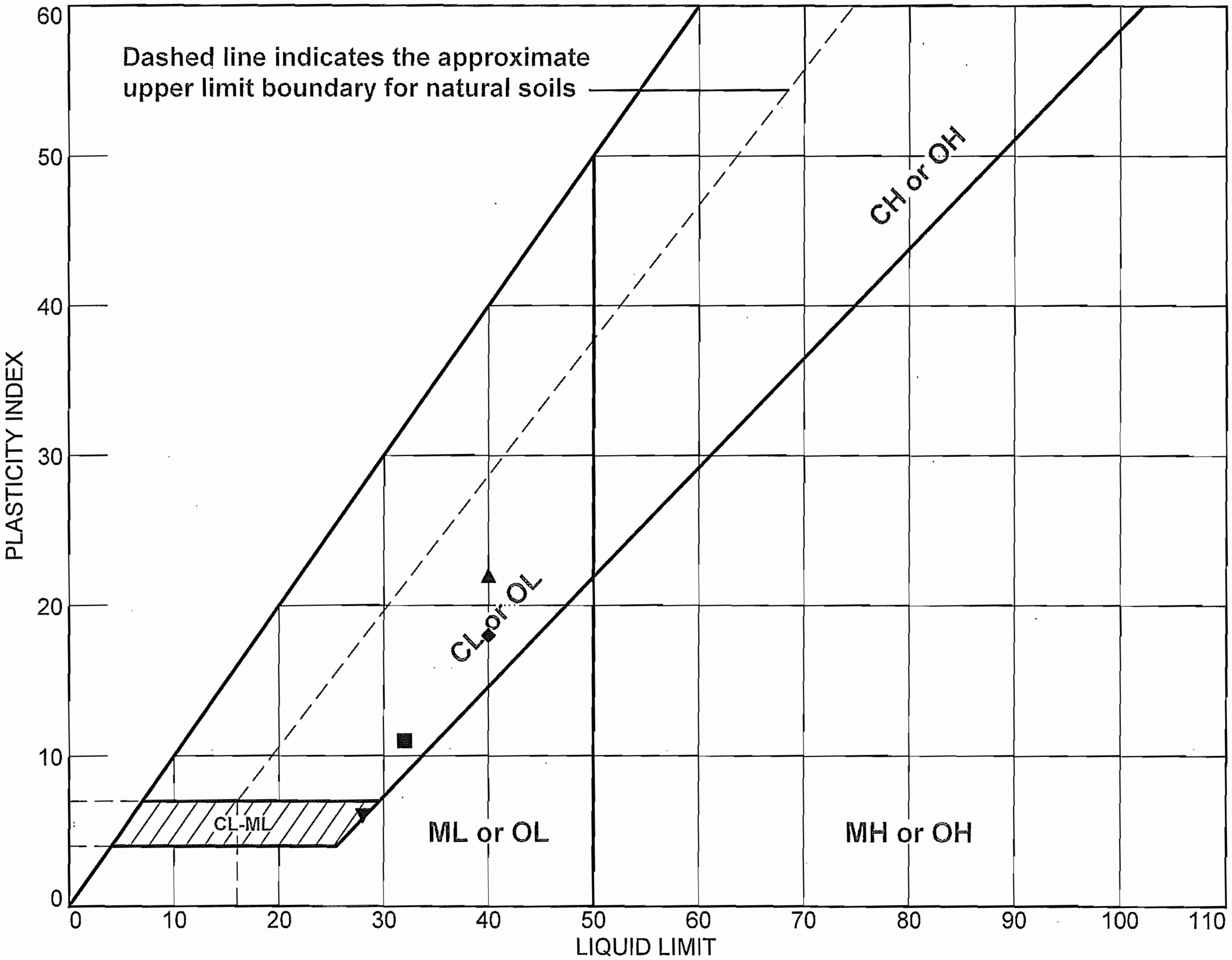
MOISTURE-DENSITY TESTS

Sample No.	S10-4B	S12-1B	S12-3B	S13-4B	S14-2B	S14-4B	S15-1B
Depth (ft.)	15.5-16	5.5-6	15.5-16	20.5-21	10.5-11	20.5-21	5.5-6
Sample Length (in.)	6.000	6.000	6.000	5.750	5.500	5.900	6.000
Diameter (in.)	2.438	2.438	2.438	2.438	2.438	2.438	2.438
Sample Volume (ft^3)	0.01621	0.01621	0.01621	0.01553	0.01486	0.01594	0.01621
Tare No.	O	P	A	B	C	D	E
Tare (g)	189.8	189.1	192.7	191.6	188.5	189.4	193.7
Wet Soil + Tare (g)	1046.3	884.4	1045.6	1000.0	837.3	1046.7	972.3
Dry Soil + Tare (g)	986.0	819.7	846.5	793.0	816.9	856.7	932.0
Dry Soil Weight (g)	796.2	630.6	653.8	601.4	628.4	667.3	738.3
Water (g)	60.3	64.7	199.1	207.0	20.4	190.0	40.3
Moisture (%)	**7.6**	**10.3**	**30.5**	**34.4**	**3.2**	**28.5**	**5.5**
Dry Density (pcf)	**108.3**	**85.8**	**88.9**	**85.4**	**93.2**	**92.3**	**100.4**

Sample No.	S16-2B	S16-4B					
Depth (ft.)	10.5-11	20.5-21					
Sample Length (in.)	5.400	6.000					
Diameter (in.)	2.438	2.438					
Sample Volume (ft^3)	0.01459	0.01621	0.00000	0.00000	0.00000	0.00000	0.00000
Tare No.	F	G					
Tare (g)	192.7	192.9					
Wet Soil + Tare (g)	881.2	1139.3					
Dry Soil + Tare (g)	866.6	1002.1					
Dry Soil Weight (g)	673.9	809.2	0.0	0.0	0.0	0.0	0.0
Water (g)	14.6	137.2	0.0	0.0	0.0	0.0	0.0
Moisture (%)	**2.2**	**17.0**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**
Dry Density (pcf)	**101.8**	**110.1**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**

Diameter = 1.44" for 1.5-inch Tubes
Diameter = 1.938" for 2-inch Tubes
Diameter = 2.438" for 2.5-inch Tubes
Diameter= 2.850" for 3.0-inch Shelby Tubes

LIQUID AND PLASTIC LIMITS TEST REPORT

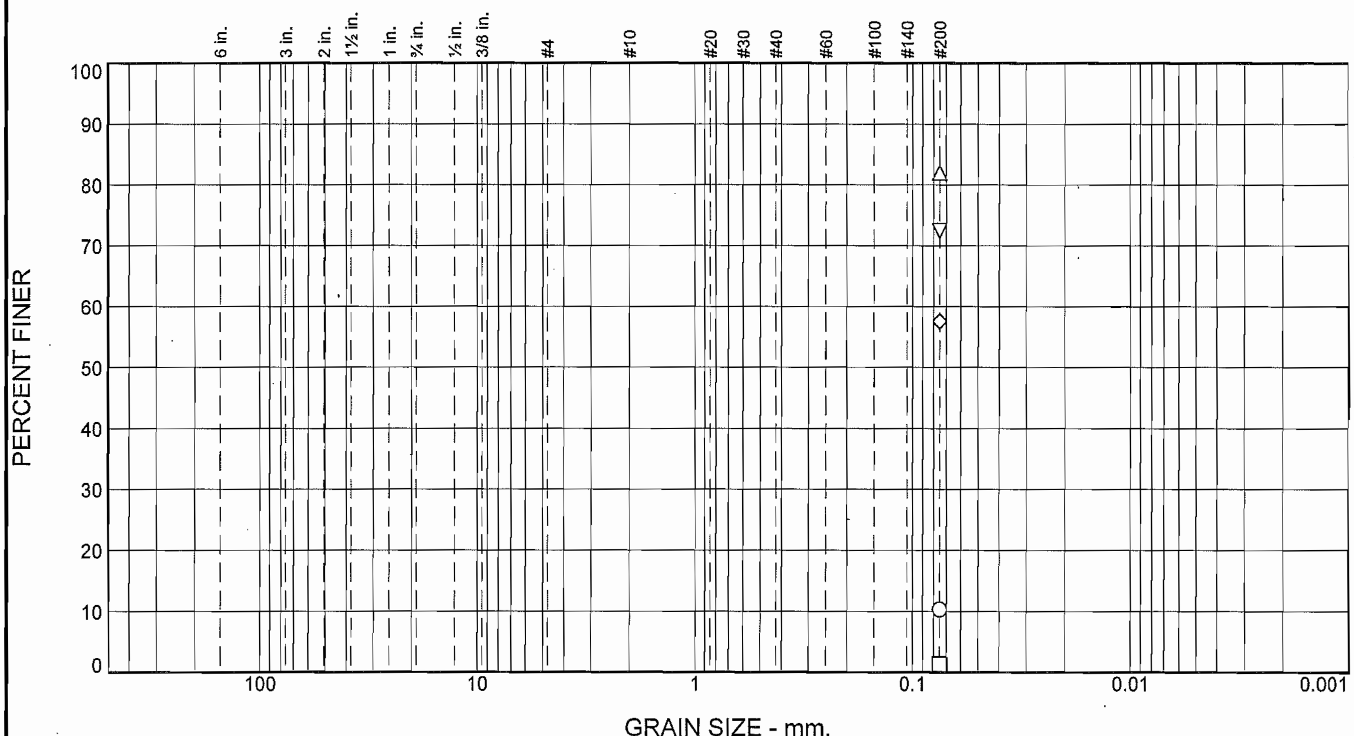


SOIL DATA								
SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	S4	4c	16.0-16.5					Non-Plastic
■	S5	4b	20.5-21		21	32	11	CL
▲	S6	5b	20.5-21.0		18	40	22	CL
◆	S7	5c	21.0-21.5		22	40	18	CL
▼	S12	2b	10.5-11		22	28	6	CL-ML

Blackburn Consulting **W. Sacramento, CA**	**Client:** HDR **Project:** SR 99 Median Widening **Project No.:** 1201.3a **Figure**

Tested By: ○ MAR □ AGW △ MAR ◇ MAR ▽ AGW **Checked By:** MDR

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○							10.3	
□							1.3	
△							82.0	
◇							57.6	
▽							72.4	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○										
□										
△	NV	NP								
◇	40	18								
▽	40	22								

Material Description	USCS	AASHTO
○ Dark yellowish brown poorly graded sand with silt	SP-SM	
□ Yellowish brown poorly graded sand	SP	
△ Olive brown silt with sand	ML	
◇ Olive brown sandy lean clay	CL	
▽ Olive brown Lean clay with sand	CL	

Project No. 1201.3A **Client:** HDR Engineering

Project: SR 99 Widening

○ **Location:** S1 **Depth:** 16.0-16.5 **Sample Number:** 3c

□ **Location:** S2 **Depth:** 21.0-21.5 **Sample Number:** 5c

△ **Location:** S4 **Depth:** 16.0-16.5 **Sample Number:** 4c

◇ **Location:** S6 **Depth:** 20.5-21.0 **Sample Number:** 5b

▽ **Location:** S7 **Depth:** 21.0-21.5 **Sample Number:** 5c

Remarks:

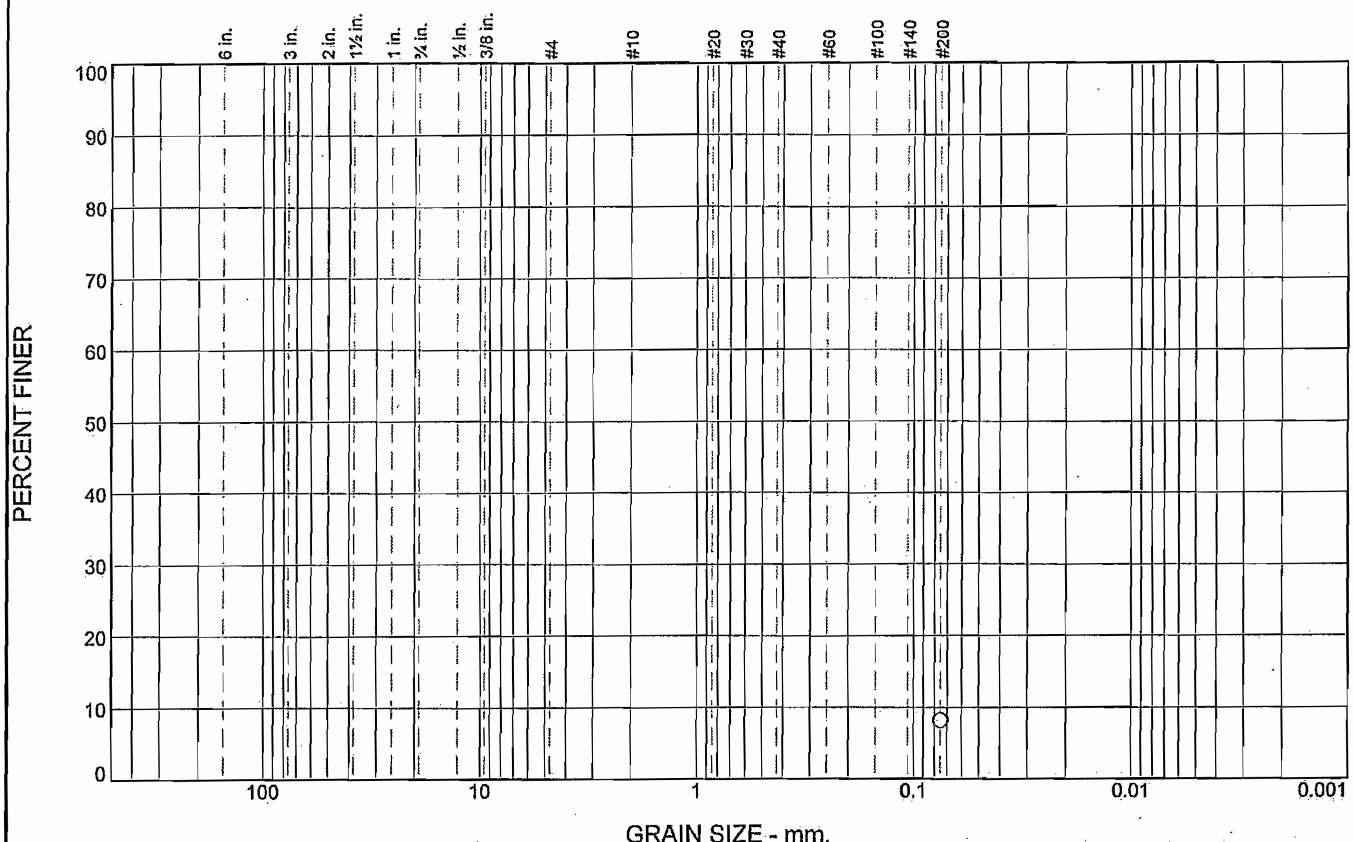
Blackburn Consulting

W. Sacramento, CA

Figure

Tested By: MAR **Checked By:** MAR

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						8.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	8.1		

Material Description

Poorly-graded SAND with SILT (SP-SM), dark olive brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= AASHTO=

Remarks

* (no specification provided)

Location: S1
Sample Number: 1c **Depth:** 6.0-6.5 **Date:**

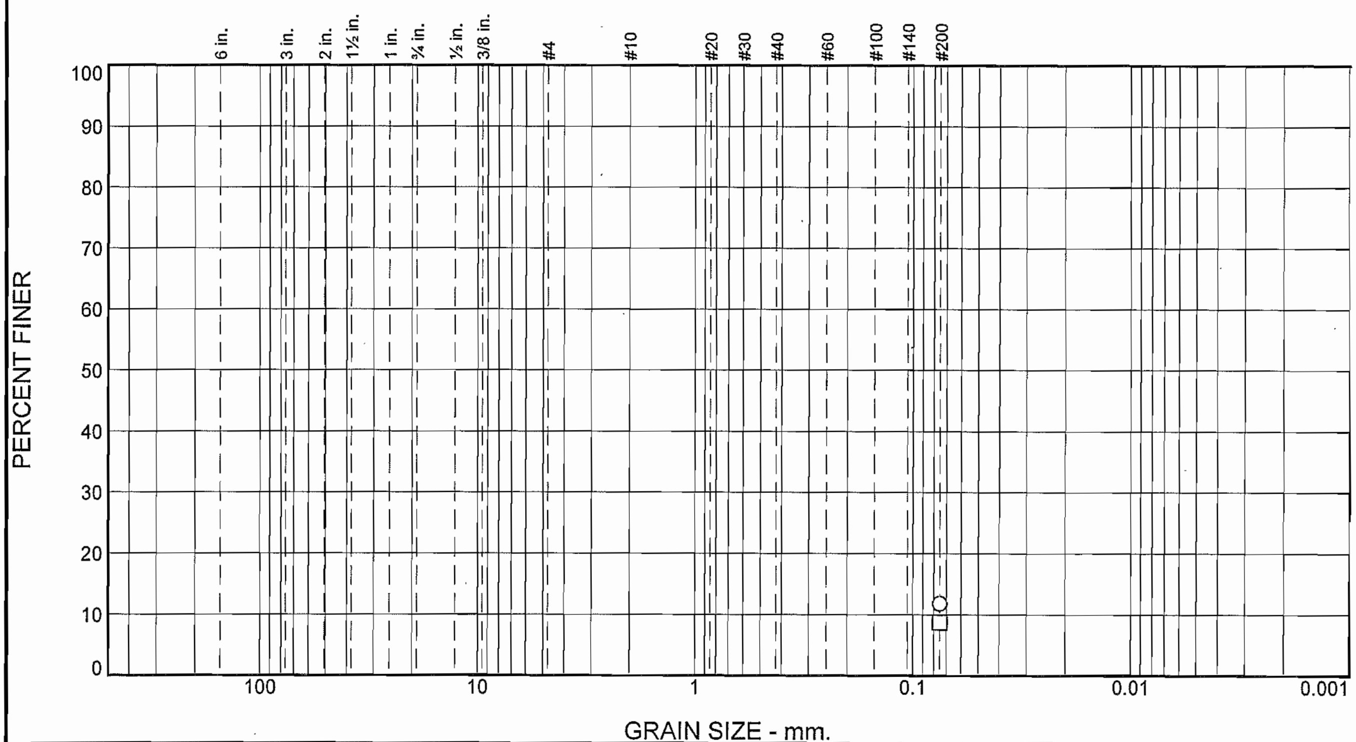
Blackburn Consulting

W. Sacramento, CA

Client: HDR Engineering
Project: SR 99 Widening
Project No: 1201.3a **Figure**

Tested By: ____________ **Checked By:** ____________

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○							11.8	
□							8.7	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○										
□										

Material Description	USCS	AASHTO
○ Dark yellowish brown poorly graded sand with silt	SP-SM	
□ Gray poorly graded sand with silt	SP-SM	

Project No. 1201.3A **Client:** HDR Engineering

Project: SR 99 Widening

○ **Location:** S8 **Depth:** 11.0-11.5 **Sample Number:** 3c

□ **Location:** S10 **Depth:** 20.5-21.0 **Sample Number:** 5b

Remarks:

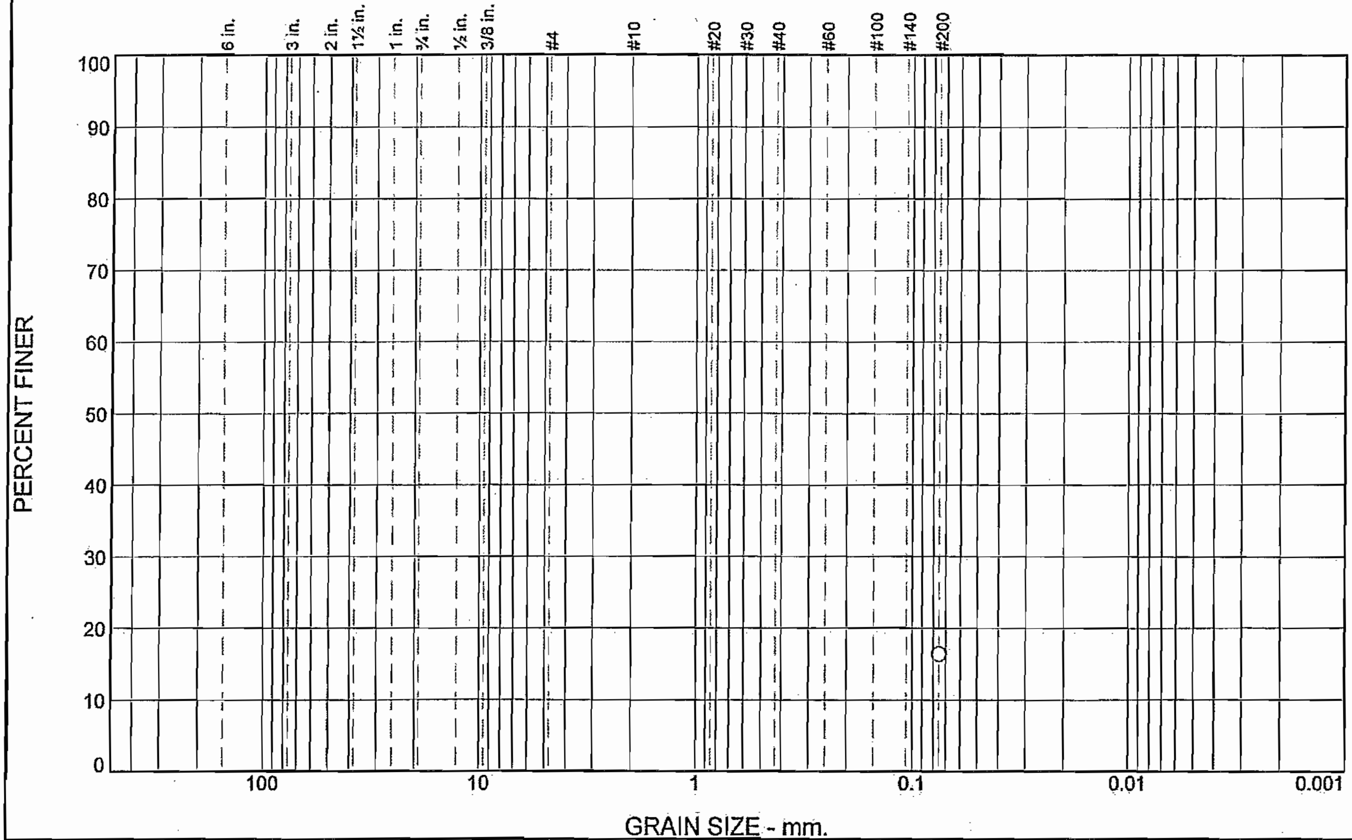
Blackburn Consulting

W. Sacramento, CA

Figure

Tested By: MAR **Checked By:** MAR

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
						16.4	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#200	16.4		

* (no specification provided)

Material Description

SILTY SAND (SM), olive brown

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= D_{85}= D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

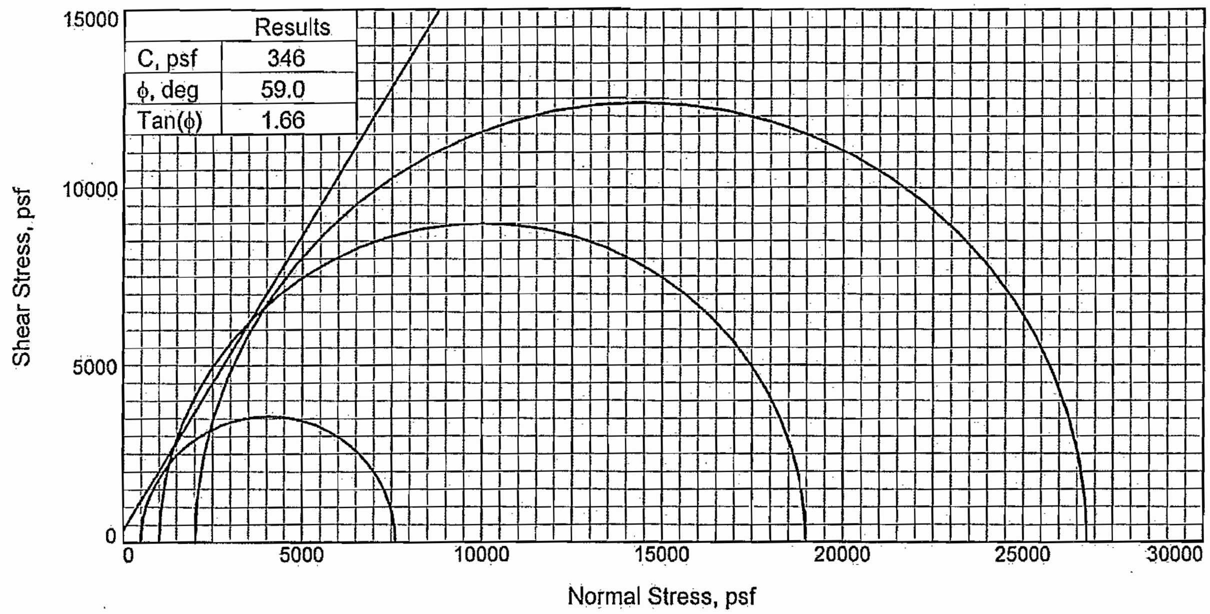
USCS= AASHTO=

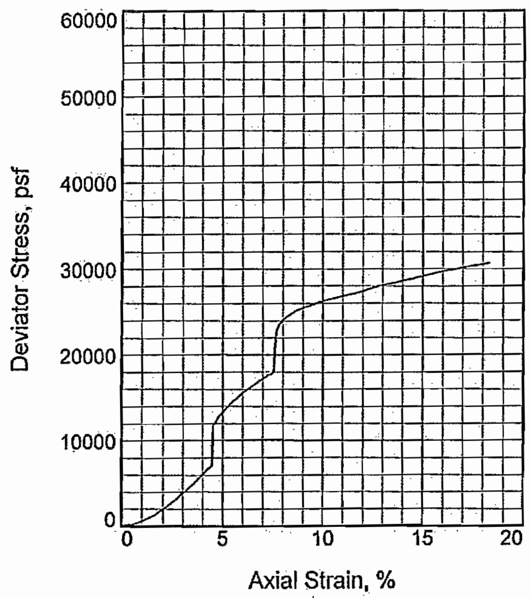
Remarks

Location: S11
Sample Number: 2c **Depth:** 11.0-11.5 **Date:** 6/15/09

Blackburn Consulting **W. Sacramento, CA**	**Client:** HDR Engineering **Project:** SR 99 Widening **Project No:** 1201.3a **Figure**

Tested By: MDR **Checked By:**





Specimen No.		1	2	3
Initial	Water Content, %	5.2	5.2	5.2
	Dry Density, pcf	110.3	110.3	110.3
	Saturation, %	26.6	26.6	26.6
	Void Ratio	0.5286	0.5286	0.5286
	Diameter, in.	2.401	2.401	2.401
	Height, in.	4.980	4.980	4.980
At Test	Water Content, %	9.9	9.9	9.9
	Dry Density, pcf	110.3	110.3	110.3
	Saturation, %	50.4	50.4	50.4
	Void Ratio	0.5286	0.5286	0.5286
	Diameter, in.	2.401	2.457	2.497
	Height, in.	4.980	4.757	4.604
Strain rate, %/min.		0.30	0.30	0.30
Back Pressure, psf		0	0	0
Cell Pressure, psf		504	1008	2016
Fail. Stress, psf		7109	17976	24770
Strain, %		4.5	7.6	8.4
Ult. Stress, psf				29078
Strain, %				
σ_1 Failure, psf		7613	18984	26786
σ_3 Failure, psf		504	1008	2016

Type of Test:
Unconsolidated Undrained

Sample Type: 2.4" Cal Mod

Description: Poorly-graded SAND with SILT (SP-SM), dark olive brown

Assumed Specific Gravity= 2.70

Remarks:

Client: HDR Engineering

Project: SR 99 Widening

Location: S1

Sample Number: 1c **Depth:** 6.0-6.5

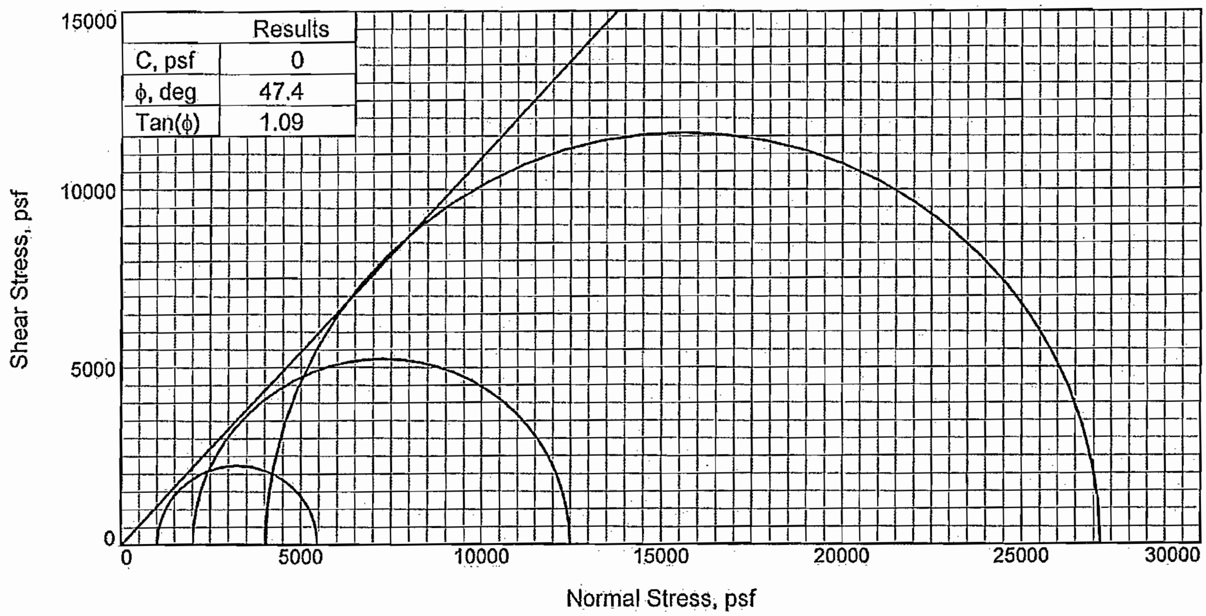
Proj. No.: 1201.3a **Date Sampled:**

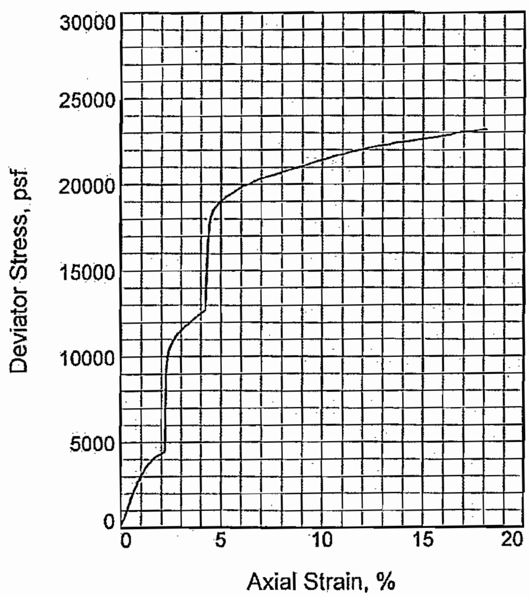
TRIAXIAL SHEAR TEST REPORT

Blackburn Consulting

Figure ________

Tested By: MDR





Specimen No.		1	2	3
Initial	Water Content, %	7.4	7.4	7.4
	Dry Density, pcf	108.8	108.8	108.8
	Saturation, %	36.4	36.4	36.4
	Void Ratio	0.5495	0.5495	0.5495
	Diameter, in.	2.400	2.400	2.400
	Height, in.	5.491	5.491	5.491
At Test	Water Content, %	13.8	13.8	13.8
	Dry Density, pcf	108.8	108.8	108.8
	Saturation, %	67.8	67.8	67.8
	Void Ratio	0.5495	0.5495	0.5495
	Diameter, in.	2.400	2.427	2.453
	Height, in.	5.491	5.371	5.258
Strain rate, %/min.		0.30	0.30	0.30
Back Pressure, psf		0	0	0
Cell Pressure, psf		1008	2016	4032
Fail. Stress, psf		4452	10479	23162
Strain, %		2.2	2.4	18.1
Ult. Stress, psf				
Strain, %				
σ_1 Failure, psf		5460	12495	27194
σ_3 Failure, psf		1008	2016	4032

Type of Test:
Unconsolidated Undrained

Sample Type: 2.4" Cal Mod

Description: SILTY SAND (SM), olive brown

Assumed Specific Gravity= 2.70

Remarks:

Figure ________

Client: HDR Engineering

Project: SR 99 Widening

Location: S11

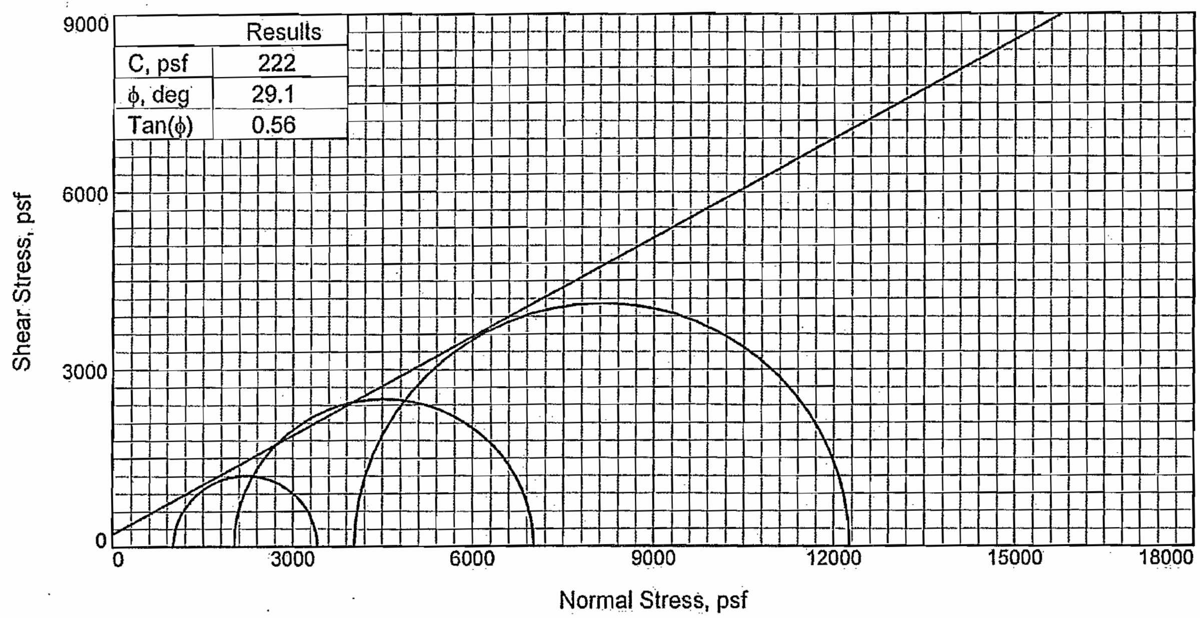
Sample Number: 2c **Depth:** 11.0-11.5

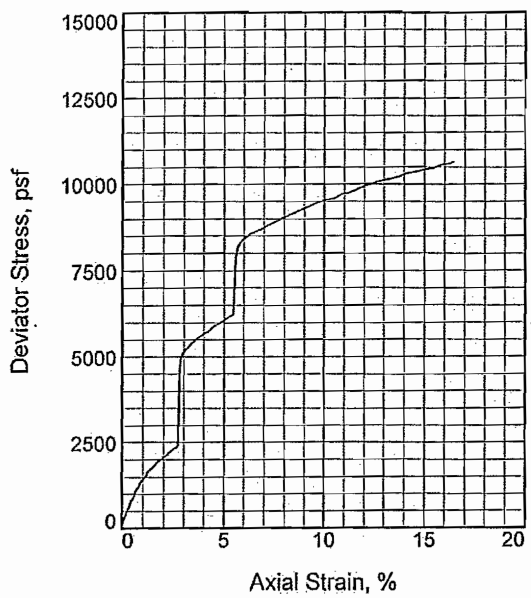
Proj. No.: 1201.3a **Date Sampled:** 6/15/09

TRIAXIAL SHEAR TEST REPORT

Blackburn Consulting

Tested By: MDR





Specimen No.		1	2	3
Initial	Water Content, %	21.6	21.6	21.6
	Dry Density, pcf	105.2	105.2	105.2
	Saturation, %	96.8	96.8	96.8
	Void Ratio	0.6025	0.6025	0.6025
	Diameter, in.	2.390	2.390	2.390
	Height, in.	5.030	5.030	5.030
At Test	Water Content, %	20.9	20.9	20.9
	Dry Density, pcf	105.2	105.2	105.2
	Saturation, %	93.5	93.5	93.5
	Void Ratio	0.6025	0.6025	0.6025
	Diameter, in.	2.390	2.423	2.458
	Height, in.	5.030	4.893	4.754
Strain rate, %/min.		0.30	0.30	0.30
Back Pressure, psf		0	0	0
Cell Pressure, psf		1008	2016	4032
Fail. Stress, psf		2404	4999	8228
Strain, %		2.7	2.9	5.7
Ult. Stress, psf				10422
Strain, %				
σ_1 Failure, psf		3412	7015	12260
σ_3 Failure, psf		1008	2016	4032

Type of Test:
Unconsolidated Undrained

Sample Type: 2.4" Cal Mod

Description: Lean CLAY with SAND (CL), olive brown

Assumed Specific Gravity= 2.70

Remarks:

Figure ________

Client: HDR Engineering

Project: SR 99 Widening

Location: S6

Sample Number: 4b **Depth:** 15.5-16.0

Proj. No.: 1201.3a **Date Sampled:**

TRIAXIAL SHEAR TEST REPORT

Blackburn Consulting

Tested By: MDR

APPENDIX D

Caltrans Review Comments and Response Form

OGDN Review Comment & Response Form

<table>
<tr><th>General Project Information</th><th colspan="2">Review Phase</th><th>Reviewer Information</th></tr>
<tr><td rowspan="3">Dist: 10 EA: 0E6101
Project Name:
10-SJ-99-PM 8.9 / 9.5
SR 99 Median Widening Sound Walls
Design Manager:
Caroline Reyes
Project Engineer:
Jes Padda</td><td>☐ PSR/PDS (Review No. _)
☐ APS/PSR (Review No. _)
☐ APS/PR (Review No. _)
☐ Type Selection
☐ 65% PS&E Unchecked Details</td><td>☐ PS&E (Review No. _)
☐ Construction Support
☒ Other:
Draft Geotechnical Design Report</td><td rowspan="3">Reviewer: Ben Barnes
Functional Unit: 59-323 (Geotech North)
Phone Number: 916-227-1039
e-mail: benjamin_barnes@dot.ca.gov

Date of Review: 7/1/2010</td></tr>
<tr><th colspan="2">Structure Information</th></tr>
<tr><td colspan="2">Structure Name: N/A
Bridge No: N/A</td></tr>
</table>

<table>
<tr><th colspan="5">Consultant Information (to be filled in by Consultant)</th></tr>
<tr><td>Consultant Structure Lead (First and Last Name)
Benjamin D. Crawford, PE, GE</td><td>Structure Consultant Firm
Blackburn Consulting</td><td>Phone Number
(209) 522 6273</td><td>e-mail
benc@blackburnconsulting.com</td><td>Response Date
7/16/2010</td></tr>
</table>

No.	Document Location (Page, Section, SSP)	OGDN Review Comment	Response	Y
1	General	This is the 1st review of the Draft Geotechnical Design Report for SR 99 Median Widening Sound Walls prepared by Blackburn Consulting, dated July 2009, by the Caltrans Office of Geotechnical Design-North, Geotechnical Services (GS-OGDN).		
2	Section 5.1 Drilling and Sampling / Boring Logs	The following information is needed: drill rig used, hammer type, and hammer efficiency.	We updated this section to include the requested additional information.	
3	Boring Logs	Boring logs show blow counts for mod cal samplers, were the mod cal blow counts corrected to SPT values for design?	They were, additional information is included in Section 5.1.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

Y = Comment Resolved
(for Reviewer's use)

4	Boring Logs	Blow counts should be corrected for hammer efficiency for use in design.	They were, additional information is included in Section 5.1.	
5	Boring Logs	Boring logs should follow the Caltrans Soil and Rock Logging, Classification, and Presentation Manual, June 2007.	Updated the logs to LOTB format, they match Caltrans soil and rock logging manual.	
6	Boring Logs	Please verify that density and consistency descriptors follow CT Logging Manual.	See response to Comment 5 above.	
7	General, slope ratios	Please add (H:V) to slope ratios.	Added this to the wall section.	
8	Lab Results	Other reports for this project have a lab data summary sheet, why not on this report?	We didn't feel it was necessary given the number of the lab tests associated with the report.	
9	Section 6, Geotechnical Testing, Appendix C, Lab Results	Moisture content and unit weight lab results not found in Appendix C.	They were presented on the Boring Logs, however now that we have included LOTBs they are now included.	

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
P=Structure Plans	SP=Special Provisions	FR=Foundation Rpt	DC=Design Calcs	TS=Type Sel. Report	QCC=Quant. Check Calcs
RP=Road Plans	E=Estimate	H=Hydraulics Rpt	CC=Check Calcs	QC=Quant. Calcs	

Y = Comment Resolved
(for Reviewer's use)

California Regional Water Quality Control Board
Central Valley Region
Katherine Hart, Chair

Linda S. Adams
Secretary for Environmental Protection

11020 Sun Center Drive #200, Rancho Cordova, California 95670-6114
Phone (916) 464-3291 • FAX (916) 464-4645
http://www.waterboards.ca.gov/centralvalley

Arnold Schwarzenegger
Governor

22 November 2010

Zachary Parker
California Department of Transportation (Caltrans)
2015 East Shields Avenue, Suite 100-A
Fresno, CA 93726

CLEAN WATER ACT §401 TECHNICALLY CONDITIONED WATER QUALITY CERTIFICATION FOR DISCHARGE OF DREDGED AND/OR FILL MATERIALS FOR THE STATE ROUTE 99 MANTECA WIDENING PROJECT (WDID#5B39CR00188), SAN JOAQUIN COUNTY

This Order responds to your 4 August 2010 application submittal for the Water Quality Certification of a linear transportation project permanently impacting approximately 0.077 acre of waters of the United States and 0.04 acre of non-federal waters of the State.

WATER QUALITY CERTIFICATION STANDARD CONDITIONS:

1. This certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to §13330 of the California Water Code and §3867 of Title 23 of the California Code of Regulations (23 CCR).

2. This certification action is not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to 23 CCR subsection 3855(b) and the application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

3. The validity of any non-denial certification action shall be conditioned upon total payment of the full fee required under 23 CCR §3833, unless otherwise stated in writing by the certifying agency.

4. Certification is valid for the duration of the described project. This certification is no longer valid if the project (as currently described) is modified, or coverage under Section 404 of the Clean Water Act has expired.

5. All reports, notices, or other documents required by this Water Quality Certification or requested by the Central Valley Regional Water Quality Control Board (Central Valley Water Board) shall be signed by a person described below or by a duly authorized representative of that person.

a. For a corporation: by a responsible corporate officer such as (1) a president, secretary, treasurer, or vice president of the corporation in charge of a principal business function; (2) any other person who performs similar policy or decision-making functions for the corporation; or (3) the manager of one or more manufacturing, production, or operating facilities if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

b. For a partnership or sole proprietorship: by a general partner or the proprietor.

c. For a municipality, State, federal, or other public agency: by either a principal executive officer or ranking elected official.

6. Any person signing a document under Standard Condition number 5 shall make the following certification, whether written or implied:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

ADDITIONAL TECHNICALLY CONDITIONED CERTIFICATION CONDITIONS:

In addition to the above standard conditions, Caltrans shall satisfy the following:

1. Caltrans shall notify the Central Valley Water Board in writing 7 days in advance of the start of any in-water activities.

2. Except for activities permitted by the U.S. Army Corps under §404 of the Clean Water Act, soil, silt, or other organic materials shall not be placed where such materials could pass into surface water or surface water drainage courses.

3. All areas disturbed by project activities shall be protected from washout or erosion.

4. Caltrans shall maintain a copy of this Certification and supporting documentation (Project Information Sheet) at the Project site during construction for review by site personnel and agencies. All personnel (employees, contractors, and subcontractors) performing work on the proposed project shall be adequately informed and trained regarding the conditions of this Certification.

5. All temporarily affected areas will be restored to pre-construction contours and conditions upon completion of construction activities.

6. Caltrans shall perform surface water sampling: 1) When performing any in-water work; 2) In the event that project activities result in any materials reaching surface waters or; 3) When any activities result in the creation of a visible plume in surface waters. The following monitoring shall be conducted immediately upstream out of the influence of the project and 300 feet downstream of the active work area. Sampling results shall be submitted to this office within two weeks of initiation of sampling and every two weeks thereafter. The sampling frequency may be modified for certain projects with written permission from the Central Valley Water Board.

Parameter	Unit	Type of Sample	Frequency of Sample
Turbidity	NTU	Grab	Every 4 hours during in water work
Settleable Material	ml/l	Grab	Same as above.
Visible construction related pollutants	Observations	Visible Inspections	Continuous throughout the construction period

7. Activities shall not cause turbidity increases in surface water to exceed:

(a) where natural turbidity is less than 1 Nephelometric Turbidity Units (NTUs), controllable factors shall not cause downstream turbidity to exceed 2 NTU;
(b) where natural turbidity is between 1 and 5 NTUs, increases shall not exceed 1 NTU;
(c) where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent;
(d) where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTUs;
(e) where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.

Except that these limits will be eased during in-water working periods to allow a turbidity increase of 15 NTU over background turbidity as measured in surface waters 300 feet downstream from the working area. In determining compliance with the above limits, appropriate averaging periods may be applied provided that beneficial uses will be fully protected. Averaging periods may only be assessed by prior permission of the Central Valley Water Board.

8. Activities shall not cause settleable matter to exceed 0.1 ml/l in surface waters as measured in surface waters 300 feet downstream from the project.

9. The discharge of petroleum products or other excavated materials to surface water is prohibited. Activities shall not cause visible oil, grease, or foam in the work area or downstream. Caltrans shall notify the Central Valley Water Board immediately of any spill of petroleum products or other organic or earthen materials.

10. Caltrans shall notify the Central Valley Water Board immediately if the above criteria for turbidity, settleable matter, oil/grease, or foam are exceeded.

11. Caltrans shall comply with all California Department of Fish and Game 1600 requirements for the project.

12. Caltrans must obtain coverage under the NPDES General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities issued by the State Water Resources Control Board for any project disturbing an area of 1 acre or greater.

13. The Conditions in this water quality certification are based on the information in the attached "Project Information." If the information in the attached Project Information is modified or the project changes, this water quality certification is no longer valid until amended by the Central Valley Water Board.

14. The mitigation measures specified in the mitigation monitoring and reporting program for the approved Mitigated Negative Declaration for the project, as they pertain to biology, hydrology and water quality impacts, are included in this Water Quality Certification, as required by California Public Resource Code Section 21081.6 and CEQA Guidelines, California Code of Regulations Section 15097.

15. In the event of any violation or threatened violation of the conditions of this Order, the violation or threatened violation shall be subject to any remedies, penalties, process, or sanctions as provided for under State law and section 401 (d) of the federal Clean Water Act. The applicability of any State law authorizing remedies, penalties, process, or sanctions for the violation or threatened violation constitutes a limitation necessary to ensure compliance with this Order.
    a. If Caltrans or a duly authorized representative of the project fails or refuses to furnish technical or monitoring reports, as required under this Order, or falsifies any information provided in the monitoring reports, the applicant is subject to civil, for each day of violation, or criminal liability.
    b. In response to a suspected violation of any condition of this Order, the Central Valley Water Board may require Caltrans to furnish, under penalty of perjury, any technical or monitoring reports the Central Valley Water Board deems appropriate, provided that the burden, including cost of the reports, shall be in reasonable relationship to the need for the reports and the benefits to be obtained from the reports.
    c. Caltrans shall allow the staff(s) of the Central Valley Water Board, or an authorized representative(s), upon the presentation of credentials and other documents, as may be required by law, to enter the project premises for inspection, including taking photographs and securing copies of project-related records, for the purpose of assuring compliance with this certification and determining the ecological success of the project.

16. Caltrans shall provide a Notice of Completion (NOC) no later than 30 days after the project completion. The NOC shall demonstrate that that the project has been carried out in accordance with the project's description (and any amendments approved). The NOC shall include a map of the project location(s), including final boundaries of any in situ restoration area(s), if appropriate, and representative pre and post construction photographs. Each photograph shall include a descriptive title, date taken, photographic site, and photographic orientation.

17. When work in a flowing stream is unavoidable, the entire stream flow shall be diverted around or through the work area during the excavation and/or construction operations.

Stream flow shall be diverted using gravity flow through temporary culverts/pipes or pumped around the work site with the use of hoses. When any dam or other artificial obstruction is being constructed, maintained, or placed in operation, sufficient water shall at all times be allowed to pass downstream to maintain aquatic life below the dam pursuant to Fish and Game Code section 5937. Any temporary dam or other artificial obstruction constructed shall only be built from clean materials such as sandbags, gravel bags, water dams, or clean/washed gravel which will cause little or no siltation. Construction, dewatering, and removal of the temporary cofferdam shall not create conditions where the above criteria for turbidity, settleable matter, oil/grease, or foam are exceeded. If water quality criteria are exceeded Caltrans shall notify the Central Valley Water Board immediately. All temporary affected areas must be restored to pre-construction contours and conditions upon completion of construction activities.

ADDITIONAL STORM WATER QUALITY CONDITIONS:

Caltrans shall also satisfy the following additional storm water quality conditions:

1. During the construction phase, Caltrans must employ strategies to minimize erosion and the introduction of pollutants into storm water runoff. These strategies must include the following:
   (a) the Storm Water Pollution Prevention Plan (SWPPP) must be prepared during the project planning and design phases and implemented, as appropriate, before construction;
   (b) an effective combination of erosion and sediment control Best Management Practices (BMPs) must be implemented and adequately working prior to the rainy season and during all phases of construction.

2. Caltrans must minimize the short and long-term impacts on receiving water quality from the State Route 99 Manteca Widening Project by implementing the following post-construction storm water management:
   (a) minimize the amount of impervious surface;
   (b) reduce peak runoff flows;
   (c) provide treatment BMPs to reduce pollutants in runoff;
   (d) ensure existing waters of the State (e.g., wetlands, vernal pools, or creeks) are not used as pollutant source controls and/or treatment controls;
   (e) preserve and, where possible, create or restore areas that provide important water quality benefits, such as riparian corridors, wetlands, and buffer zones;
   (f) limit disturbances of natural water bodies and natural drainage systems caused by development (including development of roads, highways, and bridges);
   (g) control post-development peak storm water run-off discharge rates and velocities to prevent or reduce downstream erosion, and to protect stream habitat.

REGIONAL WATER QUALITY CONTROL BOARD CONTACT PERSON:

Daniel Worth, Environmental Scientist
11020 Sun Center Drive #200
Rancho Cordova, California 95670-6114
dworth@waterboards.ca.gov
(916) 464-4709

WATER QUALITY CERTIFICATION:

I hereby issue an order certifying that any discharge from the Caltrans, State Route 99 Manteca Widening Project (WDID# 5B39CR00188) will comply with the applicable provisions of §301 ("Effluent Limitations"), §302 ("Water Quality Related Effluent Limitations"), §303 ("Water Quality Standards and Implementation Plans"), §306 ("National Standards of Performance"), and §307 ("Toxic and Pretreatment Effluent Standards") of the Clean Water Act. This discharge is also regulated under State Water Resources Control Board Water Quality Order No. 2003-0017 DWQ "Statewide General Waste Discharge Requirements For Dredged Or Fill Discharges That Have Received State Water Quality Certification (General WDRs)".

Except insofar as may be modified by any preceding conditions, all certification actions are contingent on (a) the discharge being limited and all proposed mitigation being completed in strict compliance with Caltrans' project description and the attached Project Information Sheet, and (b) compliance with all applicable requirements of the *Water Quality Control Plan for the Sacramento River and San Joaquin River*, Fourth Edition, revised September 2009.

for Pamela C. Creedon
Executive Officer

Enclosure: Project Information

cc: See enclosure, page 10

PROJECT INFORMATION

Application Date: 4 August 2010

Applicant: Zachary Parker
California Department of Transportation (Caltrans)
2015 East Shields Avenue, Suite 100-A
Fresno, CA 93726

Applicant Representatives: Serge Stanich
HDR Engineering, Inc.
1610 Arden Way , Suite 175
Sacramento, CA 95815

Project Name: State Route 99 Manteca Widening Project

Application Number: WDID# 5B39CR00188

Type of Project: Linear Transportation Project

Project Location (Centralized): Section 29, Township 1 South, Range 7 East, MDB&M. Latitude: 37.8391° and Longitude: -121.213°

County: San Joaquin County

Receiving Water(s) (hydrologic unit): Lone Tree Creek, South Fork Littlejohns Creek and North Fork South Littlejohns Creek, San Joaquin Hydrologic Basin, North Valley Floor Hydrologic Unit #531.40, Duck-Littlejohns HA

Water Body Type: Wetlands, Streambed

Designated Beneficial Uses: The *Water Quality Control Plan for the Sacramento River and San Joaquin River*, Fourth Edition, revised September 2009 (Basin Plan) has designated beneficial uses for surface and ground waters within the region. Beneficial uses that could be impacted by the project include, but are not limited to: Municipal and Domestic Water Supply (MUN); Agricultural Supply (AGR); Industrial Supply (IND), Hydropower Generation (POW); Groundwater Recharge, Water Contact Recreation (REC-1); Non-Contact Water Recreation (REC-2); Warm Freshwater Habitat (WARM); Cold Freshwater Habitat (COLD); and Wildlife Habitat (WILD). A comprehensive and specific list of the Beneficial Uses applicable for the project area can be found at:
http://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/

303(d) List of Water Quality Limited Segments: The project does not impact an already impaired water body. The most recent list of approved water quality limited segments can be found at: http://www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303dlists2006/epa/r5_06_303d_reqtmdls.pdf

Project Description (purpose/goal): The State Route 99 Manteca Widening Project proposes to widen State Route 99 (SR 99) from the existing four-lane configuration to a six lane configuration. The road widening will occur within the median from Austin Road interchange in the city of Manteca, to Arch Road interchange in the city of Stockton. Widening of the existing bridges at North Fork South Littlejohns Creek, Lone Tree Creek, and South Fork South Littlejohns Creek will result in the permanent loss of waters of the United States due to the construction of new bridge piles. Approximately 8 new bridge piles are required at North Fork South Littlejohns Creek, approximately 12 new bridge piles are required at South Fork South Littlejohns, and approximately 22 new bridge piles are required at Lone Tree Creek. Each new bridge pile will permanently impact 1.23 square feet of aquatic surface, therefore all 42 new bridge piles will impact approximately 52 square feet (0.001 acre) of aquatic surface.

Additionally, permanent impacts will occur in South Fork South Littlejohns Creek due to the placement of rock slope protection to address scour problems. Approximately 2,100 cubic yards or rock slope protection will be placed on the north bank of South Fork South Littlejohns Creek and will occupy approximately 0.013 acre. Additional permanent impacts to Lone Tree Creek will consist of installing a sloped paving area to address scour problems. This paving area will occupy approximately 0.014 acre. Additional impacts to North Fork South Littlejohns Creek are not anticipated. Total permanent impacts to these three creeks (waters of the United States) will be approximately 0.027 acre.

Temporary impacts are expected to occur within the channels of the three above mentioned creeks due to access by construction equipment and personnel. Construction within the creeks will require temporary dewatering to minimize water quality impacts. The contractor will construct cofferdams approximately 30 feet upstream and downstream of the proposed crossings. The cofferdams will be constructed of clean sand bags or sheet metal. Water will be diverted around/through the project site to ensure compliance with Fish and Game Code 5937. The total area of temporary disturbance to waters of the United States is approximately 0.046 acre.

The construction at the Main Street interchange will require an agricultural ditch to be culverted for approximately 171 feet (0.05 acre) due to the realignment of East Frontage Road.

This project will also impact non-federal waters of the State by permanently filling approximately 0.04 acre of wetlands. These wetlands are located within the drainage basins of the on/off hook ramps adjacent to SR 99. Realignment of these ramps will require that these isolated wetland areas are filled with clean dirt and asphalt.

Preliminary Water Quality Concerns: Construction activities may impact surface waters with increased turbidity and settleable matter.

Proposed Mitigation to Address Concerns: Caltrans will implement Best Management Practices (BMPs) to control sedimentation and erosion. All temporary affected areas will be restored to pre-construction contours and conditions upon completion of construction activities. Caltrans will conduct turbidity and settleable matter testing during in-water work, stopping work if the Basin Plan criteria are exceeded or are observed.

Fill/Excavation Area: Approximately 1,364 cubic yards of clean concrete and 2,100 cubic yards of clean rock slope protection will be placed into 0.077 acre of waters of the United States. Approximately 0.05 acre of agricultural ditch (waters of the United States) will be permanently culverted. Additionally, approximately 20 cubic yards of clean earthen fill will be placed in 0.04 acre of non-federal waters of the State.

Dredge Volume: None

U.S. Army Corps File Number: SPK-2009-01109

U.S. Army Corps of Engineers Permit Number: Nationwide Permit #14

Department of Fish and Game Streambed Alteration Agreement: Caltrans applied for a Streambed Alteration Agreement in June 2010.

Possible Listed Species: Giant garter snake, Central Valley steelhead, Swainson's hawk

Status of CEQA Compliance: Caltrans approved the Mitigated Negative Declaration and filed a Notice of Determination on 26 March 2010 (State Clearinghouse Number SCH#2009112045).

As a Responsible Agency under the California Environmental Quality Act (CEQA), the Central Valley Water Board reviewed the Mitigated Negative Declaration and found that impacts to water quality were adequately addressed. With regard to the remaining potential impacts identified in the Mitigated Negative Declaration, such potential impacts and mitigation measures do not relate to water quality or related nuisance, and therefore fall outside of the Central Valley Water Board's jurisdiction.

Compensatory Mitigation: As required by the Army Corps of Engineers, Caltrans must mitigate for the permanent loss of 0.077 acre, by submitting a check to the Army Corps of Engineers in the amount of $11,550.00 payable to the National Fish and Wildlife Foundation. This mitigation requirement must be fulfilled prior to the start of construction.

Application Fee Provided: Total fees of $4,328.00 have been submitted to the Central Valley Water Board as required by 23 CCR §3833b(3)(A) and by 23 CCR §2200(e).

DISTRIBUTION LIST

United States Army Corp of Engineers
Sacramento District Office
Regulatory Section, Room 1480
1325 J Street
Sacramento, CA 95814-2922

United States Fish & Wildlife Service
Sacramento Fish & Wildlife Office
2800 Cottage Way
Sacramento, CA 95825

Jeff Drongesen
Department of Fish and Game
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670

Bill Jennings
CA Sportfishing Protection Alliance
3536 Rainier Avenue
Stockton, CA 95204

(Electronic copy only) Bill Orme
State Water Resources Control Board
401 Certification and Wetlands Unit Chief

(Electronic copy only) Dave Smith
Wetlands Section Chief (W-3)
United States Environmental Protection Agency

Serge Stanich
HDR Engineering, Inc.
1610 Arden Way , Suite 175
Sacramento, CA 95815

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

October 5, 2010

Regulatory Division (SPK-2009-01109)

Mr. Zachary K. Parker
State of California
Department of Transportation, District 6
2015 East Shields Avenue, Suite A-100
Fresno, California 93726-5428

Dear Mr. Parker:

We are responding to your July 29, 2010 request for a Department of the Army permit for the State Route 99/Manteca Widening Project. This approximately 1,052-acre project involves activities, including discharge of dredged or fill material, in waters of the United States to widen bridge structure medians at Lone Tree Creek, South Fork South Littlejohns Creek, and North Fork South Littlejohns Creek, and to install a 36" RCP culvert at East Frontage Road and Agricultural Ditch 2. The project is located on or near Littlejohns Creek, Section 29, Township 1 South, Range 7 East, MDB&M Survey, Latitude 37.839190°, Longitude -121.212373°, San Joaquin County, California.

Based on the information you have provided, the proposed activity, resulting in the permanent loss of approximately 0.077 acres and temporary impacts to approximately 0.46 acres of waters of the United States, is authorized by Nationwide Permit Number 14, Linear Transportation Projects. However, until Section 401 Water Quality Certification for the activity has been issued or waived, our authorization is denied without prejudice. Once you have provided us evidence of water quality certification, the activity is authorized and the work may proceed subject to the conditions of certification and the Nationwide Permit. Your work must comply with the general terms and conditions listed on the enclosed Nationwide Permit information sheets and the following special conditions:

Special Conditions

1. This permit is contingent upon the permittee applying for and being issued a Section 401 Water Quality Certification. Evidence of a water quality certification must be submitted to this office, prior to commencing work in Waters of the U.S. All terms and conditions of the Section 401 Water Quality Certification are expressly incorporated as conditions of this permit

2. We understand the State of California, Department of Transportation (Caltrans) is the National Environmental Policy Act (NEPA) lead federal agency for this project, and as such, will ensure the authorized work complies with the National Environmental Policy Act, the Endangered Species Act, the National Historical Preservation Act and any other applicable federal laws. This authorization is contingent upon the permittee implementing all actions necessary to comply with these requirements.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register.

4. This Corps permit does not authorize you to take an endangered species, in particular the Federally-listed giant garter snake *(Themnophis gigas)*, or their designated critical habitat. In order to legally take a listed species, you must have separate authorization under the Endangered Species Act (e.g., an Endangered Species Act Section 10 permit, or a Biological Opinion under Endangered Species Act Section 7, with "incidental take" provisions with which you must comply). The enclosed Fish and Wildlife Service Biological Opinion (Service File Number 81420-2009-F-0366-3, dated October 7, 2009), contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the Biological Opinion. Your authorization under this Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with incidental take of the attached Biological Opinion, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the Biological Opinion, where a "take" of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Corps permit. The Fish and Wildlife Service is the appropriate authority to determine compliance with the terms and conditions of its Biological Opinion, and with the Endangered Species Act. You must comply with all conditions of this Biological Opinion, including those ascribed to Caltrans and the Corps.

5. This Corps permit does not authorize you to take an endangered species, in particular the Federally-listed Central Valley steelhead *(Oncorhynchus mykiss)*, or their designated critical habitat. To insure your project complies with the Federal Endangered Species Act, you must implement all of the mitigating measures identified in the enclosed National Marine Fisheries letter of concurrence (NMFS File Number 2009/00370, dated April 15, 2009), including those ascribed to Caltrans and the Corps therein. If you are unable to implement any of these measures, you must immediately notify the appropriate Caltrans office, the U.S. Army Corps of Engineers Regulatory office, and the appropriate U.S. Fish and Wildlife office so that Caltrans acting as the lead Federal agency for this project may consult as appropriate, prior to initiating the work, in accordance with Federal law.

6. To mitigate for the permanent loss of 0.077 acres, you shall submit a check to this office in the amount of $11,550.00 payable to the National Fish and Wildlife Foundation (NFWF). The Middle San Joaquin-Lower Merced Hydrologic Unit Code (18040002) must be indicated in the in-lieu fee agreement in order to insure the proper location of future mitigation. Prior to proceeding with any activity otherwise authorized by this permit, we must receive written notification from you that the check has been deposited in NFWF's Sacramento District Wetlands Conservation Fund.

7. To compensate for temporary and/or indirect impacts to waters of the United States and associated aquatic resources, you shall revegetate temporarily disturbed areas with regionally appropriate native vegetation. Removal of native trees and shrubs within temporary impact areas shall be replaced at a 2:1 ratio to insure their long-term survival.

8. Temporary fills, access roads and/or work structures shall be removed in their entirety and the affected areas returned to pre-construction elevations, contours and conditions within 30 days of activity completion. The affected areas must be revegetated with appropriate native trees, shrubs and/or seed mix, using techniques or other methods approved by Caltrans.

9. To ensure avoidance and minimization measures are successful and temporary fills have been removed, you shall take pre-construction, numbered and dated, photographs of the affected Waters of the U.S. no more than one year **prior** to construction impact. You shall take post-construction, numbered and dated, photographs of the affected Waters of the U.S. within 30 days **after** construction impact. You shall submit the photographs within 30 days after construction completion. The camera positions and view angles of pre- and post-photographs shall be identical and taken from designated locations documented on the plan drawing(s).

10. Your responsibility to complete the required compensatory mitigation as set forth in Special Conditions 6, 7, and 8 will not be considered fulfilled until you have demonstrated mitigation success and have received written verification from the U.S. Army Corps of Engineers.

11. All equipment staging, including Temporary Construction Areas (TCA's), shall take place within Caltrans approved areas within the project boundary. Prior to construction implementation, you shall ensure all equipment staging, TCA's, demolition and excavation, off pavement detours, borrow and fill areas, and upland disposal areas have been evaluated under National Environmental Policy Act, Section 401 and 404 of the Clean Water Act, Section 7 of the Endangered Species Act and Section 106 of the National Historical Preservation Act and all required permits have been obtained.

12. Prior to proceeding with any activity otherwise authorized by this permit, you shall install Environmentally Sensitive Area (ESA) fencing and employ appropriate water quality protection measures and/or Best Management Practices (BMP's), in accordance with Caltrans' standards, to ensure unauthorized fills and unforeseen impacts to Waters of the U.S. are avoided. All fencing surrounding avoidance areas shall allow unrestricted visibility of these areas to discourage vandalism, destruction or disturbance. An example of fencing includes high-visibility orange plastic or similar type.

13. You shall follow Caltrans specifications and standards described in the Storm Water Pollution Prevention Plan (SWPPP) and/or Water Pollution Control Plan (WPCP), to prevent erosion and sedimentation during and after construction. Construction work within waters shall be performed when the flows are at their seasonal low or when they have ceased and the areas are dry, typically late summer through early fall. Between construction seasons all equipment and materials, with the exception of ESA fencing, will be removed from the waterways and all disturbed areas will be stabilized to prevent erosion and sedimentation.

14. Culverts placed in streams must be installed to maintain low flow conditions, and must be constructed to withstand expected high flows.

15. You shall notify the Sacramento District, Regulatory Division Office immediately if any of the above conditions are violated or unauthorized activities occur, and shall provide a description of measures taken to remedy the violation.

16. The Permittee (Caltrans) is responsible for all work authorized herein. To ensure that involved contractors are aware of the terms, conditions and limitations of this authorization, the permittee shall post a copy of the permit authorization and associated drawings at the project site during all phases of construction to ensure that contractors are aware of the terms and conditions of the authorization.

17. You shall notify this office of the start of the authorized work within seven (7) calendar days of initiating construction activities. Along with this notification, you shall submit a copy of the project construction/work schedule or similar report.

18. You must allow representatives from the Corps of Engineers to inspect the authorized activity and any mitigation, preservation, or avoidance areas at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

19. You shall notify this office of any proposed modifications to the project, including revisions to any of the work plans or documents cited in this authorization, for review and approval prior to construction work associated with the proposed modification.

You must sign the enclosed Compliance Certification and return it to this office within 30 days after completion of the authorized work.

This verification is valid for two years from the date of this letter or until the Nationwide Permit is modified, reissued, or revoked, whichever comes first. All of the existing NWPs are scheduled to be modified, reissued, or revoked prior to March 18, 2012. It is incumbent upon you to remain informed of changes to the NWPs. We will issue a public notice when the NWPs are reissued. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant NWP is modified or revoked, you will have twelve (12) months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this nationwide permit. Failure to comply with the General Conditions of this Nationwide Permit, or the project-specific Special Conditions of this authorization, may result in the suspension or revocation of your authorization.

We appreciate your feedback. At your earliest convenience, please tell us how we are doing by completing the customer survey on our website under *Customer Service Survey*.

Please refer to identification number SPK-2009-01109 in any correspondence concerning this project. If you have any questions, please contact Ms. Leah Fisher at the Sacramento South Branch, 1325 J Street, Room 1480, Sacramento, California 95814-2922, email *Leah.M.Fisher@usace.army.mil*, or telephone 916-557-6639. For more information regarding our program, please visit our website at *www.spk.usace.army.mil/regulatory.html*.

Sincerely,

Paul M. Maniccia

Paul M. Maniccia
Chief, California South Branch

Enclosure:

1. Nationwide Permit Summary Sheet, 14 – Linear Transportation Project
2. Figures 7-10 prepared by HDR Engineering for Caltrans, dated May 28, 2010

Copies furnished without enclosure:

Chief, San Joaquin Valley Branch, Endangered Species Division, U.S. Fish and Wildlife Service, 2800 Cottage Way, Suite W2605, Sacramento, California 95825-3901

Jason Brush, Wetlands Regulatory Office, United States Environmental Protection Agency, 75 Hawthorne Street, San Francisco, California 94105

Dan Radulescu, Central Valley Regional Water Quality Control Board, 11020 Sun Center Drive #200, Rancho Cordova, California 95670-6114

COMPLIANCE CERTIFICATION

Permit File Number: SPK-2009-01109

Nationwide Permit Number: 14, Linear Transportation Projects

Permittee: Zachary K. Parker
California Department of Transportation, District 6
2015 East Shields Avenue, Suite A-100
Fresno, California 93726-5428

County: San Joaquin

Date of Verification: October 5, 2010

Within 30 days after completion of the activity authorized by this permit, sign this certification and return it and the items requested in special condition numbers 6, 7, 8 and 9, to the following address:

U.S. Army Corps of Engineers
Regulatory Division
1325 J Street, Room 1480
Sacramento, California 95814-2922
DLLS-CESPK-RD-Compliance@usace.army.mil

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with the terms and conditions of the permit your authorization may be suspended, modified, or revoked. If you have any questions about this certification, please contact the Corps of Engineers.

* * * * * * * * *

I hereby certify that the work authorized by the above-referenced permit, including all the required mitigation, was completed in accordance with the terms and conditions of the permit verification.

Signature of Permittee   Date

Nationwide Permit Summary

U S Army Corps of Engineers
Sacramento District

33 CFR Part 330; Issuance of Nationwide Permits – March 19, 2007 includes corrections of May 8, 2007 and addition of regional conditions December 2007

14. Linear Transportation Projects. Activities required for the construction, expansion, modification, or improvement of linear transportation projects (e.g., roads, highways, railways, trails, airport runways, and taxiways) in waters of the United States. For linear transportation projects in non-tidal waters, the discharge cannot cause the loss of greater than 1/2-acre of waters of the United States. For linear transportation projects in tidal waters, the discharge cannot cause the loss of greater than 1/3-acre of waters of the United States. Any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project.

This NWP also authorizes temporary structures, fills, and work necessary to construct the linear transportation project. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

This NWP cannot be used to authorize non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) the loss of waters of the United States exceeds 1/10 acre; or (2) there is a discharge in a special aquatic site, including wetlands. (See general condition 27.) (Sections 10 and 404)

Note: Some discharges for the construction of farm roads or forest roads, or temporary roads for moving mining equipment, may qualify for an exemption under Section 404(f) of the Clean Water Act (see 33 CFR 323.4)

A. Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as appropriate, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP.

☐ **1. Navigation.**

☐ (a) No activity may cause more than a minimal adverse effect on navigation.

☐ (b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

☐ (c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

☐ **2. Aquatic Life Movements**. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. Culverts placed in streams must be installed to maintain low flow conditions.

☐ **3 Spawning Areas.** Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

☐ **4. Migratory Bird Breeding Areas.** Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

☐ **5. Shellfish Beds**. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48.

☐ **6. Suitable Material**. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

☐ **7. Water Supply Intakes**. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

☐ **8. Adverse Effects From Impoundments**. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

☐ **9. Management of Water Flows**. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

☐ **10. Fills Within 100-Year Floodplains**. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

☐ **11. Equipment**. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

☐ **12. Soil Erosion and Sediment Controls**. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

☐ **13. Removal of Temporary Fills**. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

☐ **14. Proper Maintenance**. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety.

☐ **15. Wild and Scenic Rivers**. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

☐ **16. Tribal Rights**. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

☐ **17. Endangered Species**.

☐ (a) No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

☐ (b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

☐ (c) Non-federal permittees shall notify the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed.

☐ (d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.

☐ (e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, both lethal and non-lethal "takes" of protected species are in violation of the ESA. Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide Web pages at http://www.fws.gov/ and http://www.noaa.gov/fisheries.html respectively.

☐ **18. Historic Properties**.

☐ (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

☐ (b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

☐ (c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

☐ (d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed.

☐ (e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, explaining the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

☐ **19. Designated Critical Resource Waters.** Critical resource waters include, NOAA-designated marine sanctuaries, National Estuarine Research Reserves, state natural heritage sites, and outstanding national resource waters or other waters officially designated by a state as having particular environmental or ecological significance and identified by the district engineer after notice and opportunity for public comment. The district engineer may also designate additional critical resource waters after notice and opportunity for comment.

☐ (a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, and 50 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

☐ (b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 27, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

☐ **20 Mitigation.** The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

☐ (a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

☐ (b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

☐ (c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10 acre and require pre-construction notification, unless the district engineer determines in writing that some other form of mitigation would be more environmentally appropriate and provides a project-specific waiver of this requirement. For wetland losses of 1/10 acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

☐ (d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream restoration, to ensure that the activity results in minimal adverse effects on the aquatic environment.

☐ (e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2 acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2 acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

☐ (f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

☐ (g) Permittees may propose the use of mitigation banks, in-lieu fee arrangements or separate activity-specific compensatory mitigation. In all cases, the mitigation provisions will specify the party responsible for accomplishing and/or complying with the mitigation plan.

☐ (h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

☐ **21. Water Quality.** Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

☐ **22. Coastal Zone Management**. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

☐ **23. Regional and Case-By-Case Conditions**. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

☐ **24. Use of Multiple Nationwide Permits**. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

☐ **25. Transfer of Nationwide Permit Verifications**. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

> "When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."
>
> ---
>
> (Transferee)
>
> ---
>
> (Date)

☐ **26. Compliance Certification**. Each permittee who received an NWP verification from the Corps must submit a signed certification regarding the completed work and any required mitigation. The certification form must be forwarded by the Corps with the NWP verification letter and will include:

☐ (a) A statement that the authorized work was done in accordance with the NWP authorization, including any general or specific conditions;

☐ (b) A statement that any required mitigation was completed in accordance with the permit conditions; and

☐ (c) The signature of the permittee certifying the completion of the work and mitigation.

☐ **27. Pre-Construction Notification.**

☐ (a) **Timing**.. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, as a general rule, will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

☐ (1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

☐ (2) Forty-five calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 17 that listed species or critical habitat might affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 18 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) is completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee cannot begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

☐ (b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

☐ (1) Name, address and telephone numbers of the prospective permittee;

☐ (2) Location of the proposed project;

☐ (3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided result in a quicker decision.);

☐ (4) The PCN must include a delineation of special aquatic sites and other waters of the United States on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters of the United States, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, where appropriate;

☐ (5) If the proposed activity will result in the loss of greater than 1/10 acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

☐ (6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

☐ (7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

☐ (c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

☐ (d) Agency Coordination:

☐ (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

☐ (2) For all NWP 48 activities requiring pre-construction notification and for other NWP activities requiring pre-construction notification to the district engineer that result in the loss of greater than 1/2-acre of waters of the United States, the district engineer will immediately provide (e.g., via facsimile transmission, overnight mail, or other expeditious manner) a copy of the PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will then have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame, but will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

☐ (3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

☐ (4) Applicants are encouraged to provide the Corps multiple copies of pre-construction notifications to expedite agency coordination.

☐ (5) For NWP 48 activities that require reporting, the district engineer will provide a copy of each report within 10 calendar days of receipt to the appropriate regional office of the NMFS.

☐ (e) In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If the proposed activity requires a PCN and will result in a loss of greater than 1/10 acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for projects with smaller impacts. The district engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed work are minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the district engineer will notify the permittee and include any conditions the district engineer deems necessary. The district engineer must approve any compensatory mitigation proposal before the permittee commences work. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the district engineer to be minimal, the district engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the NWP.

If the district engineer determines that the adverse effects of the proposed work are more than minimal, then the district engineer will notify the applicant either: (1) That the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (2) that the project is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level; or (3) that the project is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period. The authorization will include the necessary conceptual or specific mitigation or a requirement that the applicant submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan.

☐ **(a) 28. Single and Complete Project.** The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

B. Regional Conditions:

I. Sacramento District (All States, except Colorado)

1. When pre-construction notification (PCN) is required, the prospective permittee shall notify the Sacramento District in accordance with General Condition 27 using either the South Pacific Division Preconstruction Notification (PCN) Checklist or a completed application form (ENG Form 4345). In addition, the PCN shall include:

a. A written statement explaining how the activity has been designed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States;

b. Drawings, including plan and cross-section views, clearly depicting the location, size and dimensions of the proposed activity. The drawings shall contain a title block, legend and scale, amount (in cubic yards) and size (in acreage) of fill in Corps jurisdiction, including both permanent and temporary fills/structures. The ordinary high water mark or, if tidal waters, the high tide line should be shown (in feet), based on National Geodetic Vertical Datum (NGVD) or other appropriate referenced elevation; and

c. Pre-project color photographs of the project site taken from designatedlocations documented on the plan drawing.

2. The permittee shall complete compensatory mitigation required by special conditions of the NWP verification before or concurrent with construction of the authorized activity, except when specifically determined to be impracticable by the Sacramento District. When project mitigation involves use of a mitigation bank or in-lieu fee program, payment shall be made before commencing construction.

3. The permittee shall record the NWP verification with the Registrar of Deeds or other appropriate official charged with the responsibility for maintaining records of title to or interest in real property against areas (1) designated to be preserved as part of mitigation for authorized impacts, including any associated covenants or restrictions, or (2) where structures such as boat ramps or docks, marinas, piers, and permanently moored vessels will be constructed in or adjacent to navigable waters (Section 10 and Section 404). The recordation shall also include a map showing the surveyed location of the authorized structure and any associated areas preserved to minimize or compensate for project impacts.

4. The permittee shall place wetlands, other aquatic areas, and any vegetative buffers preserved as part of mitigation for impacts into a separate "preserve" parcel prior to discharging dredged or fill material into waters of the United States, except where specifically determined to be impracticable by the Sacramento District. Permanent legal protection shall be established for all preserve parcels, following Sacramento District approval of the legal instrument.

5. The permittee shall allow Corps representatives to inspect the authorized activity and any mitigation areas at any time deemed necessary to determine compliance with the terms and conditions of the NWP verification. The permittee will be notified in advance of an inspection.

6. For NWPs 29, 39, 40, 42, 43, 44, and 46, requests to waive the 300 linear foot limitation for intermittent or ephemeral waters of the U.S. shall include an evaluation of functions and services provided by the waterbody taking into account the watershed, measures to be implemented to avoid and minimize impacts, other measures to avoid and minimize that were found to be impracticable, and a mitigation plan for offsetting impacts.

7. Road crossings shall be designed to ensure fish passage, especially for anadromous fisheries. Permittees shall employ bridge designs that span the stream or river, utilize pier or pile supported structures, or involve large bottomless culverts with a natural streambed, where the substrate and streamflow conditions approximate existing channel conditions. Approach fills in waters of the United States below the ordinary high water mark are not authorized under the NWPs, except where avoidance has specifically been determined to be impracticable by the Sacramento District.

8. For NWP 12, clay blocks, bentonite, or other suitable material shall be used to seal the trench to prevent the utility line from draining waters of the United States, including wetlands.

9. For NWP 13, bank stabilization shall include the use of vegetation or other biotechnical design to the maximum extent practicable. Activities involving hard-armoring of the bank toe or slope requires submission of a PCN per General Condition 27.

10. For NWP 23, the PCN shall include a copy of the signed Categorical Exclusion document and final agency determinations regarding compliance with Section 7 of the Endangered Species Act, Essential Fish Habitat under the Magnussen-Stevens Act, and Section 106 of the National Historic Preservation Act.

11. For NWP 44, the discharge shall not cause the loss of more than 300 linear feet of streambed. For intermittent and ephemeral streams, the 300 linear foot limit may be waived in writing by the Sacramento District. This NWP does not authorize discharges in waters of the United States supporting anadromous fisheries.

12. For NWPs 29 and 39, channelization or relocation of intermittent or perennial drainage, is not authorized, except when, as determined by the Sacramento District, the relocation would result in a net increase in functions of the aquatic ecosystem within the watershed.

13. For NWP 33, temporary fills for construction access in waters of the United States supporting fisheries shall be accomplished with clean, washed spawning quality gravels where practicable as determined by the Sacramento District, in consultation with appropriate federal and state wildlife agencies.

14. For NWP 46, the discharge shall not cause the loss of greater than 0.5 acres of waters of the United States or the loss of more than 300 linear feet of ditch, unless this 300 foot linear foot limit is waived in writing by the Sacramento District.

15. For NWPs 29, 39, 40, 42, and 43, upland vegetated buffers shall be established and maintained in perpetuity, to the maximum extent practicable, next to all preserved open waters, streams and wetlands including created, restored, enhanced or preserved waters of the U.S., consistent with General Condition 20. Except in unusual circumstances, vegetated buffers shall be at least 50 feet in width.

16. All NWPs except 3, 6, 20, 27, 32, 38, and 47, are revoked for activities in histosols and fens and in wetlands contiguous with fens. Fens are defined as slope wetlands with a histic epipedon that are hydrologically supported by groundwater. Fens are normally saturated throughout the growing season, although they may not be during drought conditions. For NWPs 3, 6, 20, 27, 32, and 38, prospective permittees shall submit a PCN to the Sacramento District in accordance with General Condition 27.

17. For all NWPs, when activities are proposed within 100 feet of the point of groundwater discharge of a natural spring, prospective permittees shall submit a PCN to the Sacramento District in accordance with General Condition 27. A spring source is defined as any location where ground water emanates from a point in the ground. For purposes of this condition, springs do not include seeps or other discharges which lack a defined channel.

II. California Only

1. In the Lake Tahoe Basin, all NWPs are revoked. Activities in this area shall be authorized under Regional General Permit 16 or through an individual permit.

2. In the Primary and Secondary Zones of the Legal Delta, NWPs 29 and 39 are revoked. New development activities in the Legal Delta will be reviewed through the Corps' standard permit process.

III. Nevada Only

1. In the Lake Tahoe Basin, all NWPs are revoked. Activities in this area shall be authorized under Regional General Permit 16 or through an individual permit.

IV. Utah Only

1. For all NWPs, except NWP 47, prospective permittees shall submit a PCN in accordance with General Condition 27 for any activity, in waters of the United States, below 4217 feet mean sea level (msl) adjacent to the Great Salt Lake and below 4500 feet msl adjacent to Utah Lake.

2. A PCN is required for all bank stabilization activities in a perennial stream that would affect more than 100 linear feet of stream

3. For NWP 27, facilities for controlling stormwater runoff, construction of water parks such as kayak courses, and use of grout or concrete to construct in-stream structures are not authorized. A PCN is required for all projects exceeding 1500 linear feet as measured on the stream thalweg, using in stream structures exceeding 50 cubic yards per structure and/or incorporating grade control structures exceeding 1 foot vertical drop. For any stream restoration project, the post project stream sinuosity shall be appropriate to the geomorphology of the surrounding area and shall be equal to, or greater than, pre project sinuosity. Sinuosity is defined as the ratio of stream length to project reach length. Structures shall allow the passage of aquatic organisms, recreational water craft or other navigational activities unless specifically waived in writing by the District Engineer.

V. Colorado Only

1. Final Regional Conditions Applicable to Specific Nationwide Permits within Colorado.

a. Nationwide Permit Nos. 12 and 14, Utility Line Activities and Linear Transportation Projects. In the Colorado River Basin, utility line and road activities crossing perennial water or special aquatic sites require notification to the District Engineer in accordance with General Condition 27 (Pre-Construction Notification).

b. Nationwide Permit No. 13 Bank Stabilization. In Colorado, bank stabilization activities necessary for erosion prevention in streams that average less than 20 feet in width (measured between the ordinary high water marks) are limited to the placement of no more than 1/4 cubic yard of suitable fill* material per running foot below the plane of the ordinary high water mark. Activities greater than 1/4 cubic yard may be authorized if the permittee notifies the District Engineer in accordance with General Condition 27 (Pre-Construction Notification) and the Corps determines the adverse environmental effects are minimal. [* See (g) for definition of Suitable Fill]

c. Nationwide Permit No. 27 Aquatic Habitat Restoration, Establishment, and Enhancement Activities.

(1) For activities that include a fishery enhancement component, the Corps will send the Pre-Construction Notification to the Colorado Division of Wildlife (CDOW) for review. In accordance with General Condition 27 (Pre-Construction Notification), CDOW will have 10 days from the receipt of Corps notification to indicate that they will be commenting on the proposed project. CDOW will then have an additional 15 days after the initial 10-day period to provide those comments. If CDOW raises concerns, the applicant may either modify their plan, in coordination with CDOW, or apply for a standard individual permit.

(2) For activities involving the length of a stream, the post-project stream sinuosity will not be significantly reduced, unless it is demonstrated that the reduction in sinuosity is consistent with the natural morphological evolution of the stream (sinuosity is the ratio of stream length to project reach length).

(3) Structures will allow the upstream and downstream passage of aquatic organisms, including fish native to the reach, as well as recreational water craft or other navigational activities, unless specifically waived in writing by the District Engineer. The use of grout and/or concrete in

building structures is not authorized by this nationwide permit.

(4) The construction of water parks (i.e., kayak courses) and flood control projects are not authorized by this nationwide permit.

d. Nationwide Permits Nos. 29 and 39; Residential Developments and Commercial and Institutional Developments. A copy of the existing FEMA/locally-approved floodplain map must be submitted with the Pre-Construction Notification. When reviewing proposed developments, the Corps will utilize the most accurate and reliable FEMA/locally-approved pre-project floodplain mapping, not post-project floodplain mapping based on a CLOMR or LOMR. However, the Corps will accept revisions to existing floodplain mapping if the revisions resolve inaccuracies in the original floodplain mapping and if the revisions accurately reflect pre-project conditions.

2. Final Regional Conditions Applicable to All Nationwide Permits within Colorado

e. Removal of Temporary Fills. General Condition 13 (Removal of Temporary Fills) is amended by adding the following: When temporary fills are placed in wetlands in Colorado, a horizontal marker (i.e. fabric, certified weed-free straw, etc.) must be used to delineate the existing ground elevation of wetlands that will be temporarily filled during construction.

f. Spawning Areas. General Condition 3 (Spawning Areas) is amended by adding the following: In Colorado, all Designated Critical Resource Waters (see enclosure 1) are considered important spawning areas. Therefore, In accordance with General Condition 19 (Designated Critical Resource Waters), the discharge of dredged or fill material in not authorized by the following nationwide permits in these waters: NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, and 50. In addition, in accordance with General Condition 27 (Pre-Construction Notification), notification to the District Engineer is required for use of the following nationwide permits in these waters: NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37 and 38".

g. Suitable Fill. In Colorado, use of broken concrete as fill material requires notification to the District Engineer in accordance with General Condition 27 (Pre-Construction Notification). Permittees must demonstrate that soft engineering methods utilizing native or non-manmade materials are not practicable (with respect to cost, existing technology, and logistics), before broken concrete is allowed as suitable fill. Use of broken concrete with exposed rebar is prohibited in perennial waters and special aquatic sites.

h. Invasive Aquatic Species. General Condition 11 is amended by adding the following condition for work in perennial or intermittent waters of the United States: If heavy equipment is used for the subject project that was previously working in another stream, river, lake, pond, or wetland within 10 days of initiating work, one the following procedures is necessary to prevent the spread of New Zealand Mud Snails and other aquatic hitchhikers:

(1) Remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, etc.) and keep the equipment dry for 10 days. OR

(2) Remove all mud and debris from Equipment (tracks, turrets, buckets, drags, teeth, etc.) and spray/soak equipment with either a 1:1 solution of Formula 409 Household Cleaner and water, or a solution of Sparquat 256 (5 ounces Sparquat per gallon of water). Treated equipment must be kept moist for at least 10 minutes. OR

(3) Remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, etc.) and spray/soak equipment with water greater than 120 degrees F for at least 10 minutes.

3. Final Regional Conditions for Revocation/Special Notification Specific to Certain Geographic Areas

i. Fens: All Nationwide permits, except permit Nos. 3, 6, 20, 27, 32, 38 and 47, are revoked in fens and wetlands adjacent to fens. Use of nationwide permit Nos. 3, 20, 27 and 38, requires notification to the District Engineer, in accordance with General Condition 27 (Pre-Construction Notification), and the permittee may not begin the activity until the Corps determines the adverse environmental effects are minimal. The following defines a fen:

Fen soils (histosols) are normally saturated throughout the growing season, although they may not be during drought conditions. The primary source of hydrology for fens is groundwater. Histosols are defined in accordance with the U.S. Department of Agriculture, Natural Resources Conservation Service publications on Keys to Soil Taxonomy and Field Indicators of Hydric Soils in the United States (http://soils.usda.gov/technical/classification/taxonomy).

j. Springs: Within the state of Colorado, all NWPs, except permit 47 (original 'C'), require preconstruction notification pursuant to General Condition 27 for discharges of dredged or fill material within 100 feet of the point of groundwater discharge of natural springs. A spring source is defined as any location where groundwater emanates from a point in the ground. For purposes of this regional condition, springs do not include seeps or other discharges which do not have a defined channel.

4. Additional Information

The following provides additional information regarding minimization of impacts and compliance with existing general Conditions:

a. Permittees are reminded of the existing General Condition No. 6 which prohibits the use of unsuitable material. Organic debris, building waste, asphalt, car bodies, and trash are not suitable material. Also, General Condition 12 requires appropriate erosion and sediment controls (i.e. all fills must be permanently stabilized to prevent erosion and siltation into waters and wetlands at the earliest practicable date). Streambed material or other small aggregate material placed along a bank as stabilization will not meet General Condition 12. Also, use of erosion control mates that contain plastic netting may not meet General Condition 12 if deemed harmful to wildlife.

b. Designated Critical Resource Waters in Colorado. In Colorado, a list of designated Critical Resource Waters has been published in accordance with General Condition 19 (Designated Critical Resource Waters). This list will be published on the Albuquerque District Regulatory home page (http://www.spa.usace.army.mil/reg/)

c. Federally-Listed Threatened and Endangered Species. General condition 17 requires that nod-federal permittees notify the District Engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project. Information on such species, to include occurrence by county in Colorado, may be found at the following U.S. Fish and Wildlife Service website: http://www.fws.gov/mountain%2Dprairie/endspp/name_county_search.htm

C. Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.

3. NWPs do not grant any property rights or exclusive privileges.

4. NWPs do not authorize any injury to the property or rights of others.

5. NWPs do not authorize interference with any existing or proposed Federal project.

D. Definitions

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration, establishment (creation), enhancement, or preservation of aquatic resources for the purpose of compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Discharge: The term "discharge" means any discharge of dredged or fill material.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete project in the Corps regulatory program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. The loss of stream bed includes the linear feet of stream bed that is filled or excavated. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities eligible for exemptions under Section 404(f) of the Clean Water Act are not considered when calculating the loss of waters of the United States.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. The definition of a wetland can be found at 33 CFR 328.3(b). Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of standing or flowing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: An ordinary high water mark is a line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas (see 33 CFR 328.3(e)).

Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands adjacent to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects waterbodies with their adjacent uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 20.)

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete project: The term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete project must have independent utility (see definition). For linear projects, a "single and complete project" is all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single waterbody several times at separate and distant locations, each crossing is considered a single and complete project. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a wetland (i.e., water of the United States) that is inundated by tidal waters. The definitions of a wetland and tidal waters can be found at 33 CFR 328.3(b) and 33 CFR 328.3(f), respectively. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line, which is defined at 33 CFR 328.3(d).

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a jurisdictional water of the United States that, during a year with normal patterns of precipitation, has water flowing or standing above ground to the extent that an ordinary high water mark (OHWM) or other indicators of jurisdiction can be determined, as well as any wetland area (see 33 CFR 328.3(b)). If a jurisdictional wetland is adjacent--meaning bordering, contiguous, or neighboring--to a jurisdictional waterbody displaying an OHWM or other indicators of jurisdiction, that waterbody and its adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)). Examples of "waterbodies" include streams, rivers, lakes, ponds, and wetlands.

State of California – The Natural Resources Agency
DEPARTMENT OF FISH AND GAME
North Central Region
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670-4599
916-358-2900
http://www.dfg.ca.gov

September 14, 2010

Zachary Parker
California Department of Transporation
2015 East Shields Avenue, Suite A-100
Fresno, California 93726-5428

Subject: Final Lake or Streambed Alteration Agreement
Notification No. 1600-2010-0130 -R2
State Route 99 Manteca Widening Project

Dear Mr. Parker:

Enclosed is the final Streambed Alteration Agreement ("Agreement") for the State Route 99 Manteca Widening ("Project"). Before the Department may issue an Agreement, it must comply with the California Environmental Quality Act ("CEQA"). In this case, the Department, acting as a responsible agency, filed a notice of determination ("NOD") on the same date it signed the Agreement. The NOD was based on information contained in the Mitigated Negative Declaration Caltrans (CEQA lead agency) prepared for the Project.

Under CEQA, filing a NOD starts a 30-day period within which a party may challenge the filing agency's approval of the project. You may begin your project before the 30-day period expires if you have obtained all necessary local, state, and federal permits or other authorizations,. However, if you elect to do so, it will be at your own risk.

If you have any questions regarding this matter, please contact Gary Hobgood, Staff Environmental Scientist at 916-983-6920 or ghobgood@dfg.ca.gov.

Sincerely,

J Dwyer

for Kent Smith
Regional Manager

ec: Gary Hobgood

ghobgood@dfg.ca.gov

Charles Walbridge

Charles.Walbridge@dot.ca.gov

CALIFORNIA DEPARTMENT OF FISH AND GAME
NORTH CENTRAL REGION
1701 NIMBUS ROAD, SUITE A
RANCHO CORDOVA, CA 95670

Streambed Alteration Agreement
Notification No. 1600-2010-0130 -R2
Lone Tree Creek Bridge, South Fork South Littlejohns Creek (French Camp Slough), North Fork South Littlejohns Creek
California Department of Transportation
State Route 99 Manteca Widening Project

This Streambed Alteration Agreement (Agreement) is entered into between the California Department of Fish and Game (DFG) and California Department of Transportation (Permittee) as represented by Zachary Parker.

RECITALS

WHEREAS, pursuant to Fish and Game Code (FGC) section 1602, Permittee notified DFG on August 4, 2010 that Permittee intends to complete the project described herein.

WHEREAS, pursuant to FGC section 1603, DFG has determined that the project could substantially adversely affect existing fish or wildlife resources and has included measures in the Agreement necessary to protect those resources.

WHEREAS, Permittee has reviewed the Agreement and accepts its terms and conditions, including the measures to protect fish and wildlife resources.

NOW THEREFORE, Permittee agrees to complete the project in accordance with the Agreement.

PROJECT LOCATION

The project is located at Lone Tree Creek Bridge, South Fork South Littlejohns Creek (French Camp Slough), North Fork South Littlejohns Creek, in the County of San Joaquin, State of California; Latitude 37.8391, Longitude -121.213.

PROJECT DESCRIPTION

Caltrans proposes to widen State Route 99 from the existing four-lane facility to six lanes within the median from the Austin Road interchange in the city of Manteca (Post Mile 4.9) to the Arch Road interchange in the city of Stockton (Post Mile 15.0) by adding two 12-foot lanes in the median and constructing a concrete median barrier. The construction of the project includes the following improvements:

• Widen bridge structure medians at Lone Tree Creek, South Fork South Littlejohns Creek, and North Fork South Littlejohns Creek.

• Close existing hook ramp (North Fork South Littlejohns Creek hook ramps) connections south of the Stockton Metropolitan Airport.

A detailed project description is provided in the notification materials submitted to DFG. The notification, together with all supporting documents submitted with the notification, are hereby incorporated into this agreement to describe the location, features, avoidance measures and mitigation measures of the proposed project.

PROJECT IMPACTS

Existing fish or wildlife resources the project could substantially adversely affect include: Central Valley Steelhead trout, giant garter snake, cliff swallows, black phoebes, warm water fish species, amphibians, and other aquatic and terrestrial plant and wildlife species.

The adverse effects the project could have on the fish or wildlife resources identified above include: loss of natural bed or bank; change in contour of bed, channel or bank; change in gradient of bed, channel or bank; loss of bank stability during construction; increase of bank erosion during construction; soil compaction or other disturbance to soil layer; increased turbidity; increased sedimentation (chronic or episodic); short-term release of contaminants (e.g., incidental from construction); loss or decline of riparian and/or emergent marsh habitat; loss or decline of instream channel habitat; loss or decline of instream woody material; change to, or loss or decline of natural bed substrate; direct impacts from dredging on benthic organisms; hydroacoustic impacts to fish by pile driving; construction pits and trenches that can capture terrestrial organisms; disruption to nesting birds and other wildlife; direct take of terrestrial species; disturbance from project activity; loss or decline of aquatic species' habitat: migration corridors, spawning or rearing areas; loss of wildlife connectivity to water source; loss or impediment of terrestrial animal species travel routes due to permanent structures; loss or impediment of terrestrial animal species travel routes due to temporary structures (e.g., survey tape, sandbags, erosion protection materials etc.);
and diversion of flow water from, or around, activity site;

STREAM ZONE DEFINED

The Stream Zone comprises all components of a stream, including the channel, bed, banks, and floodplains. The Stream Zone is the land, including vegetation, that bounds a lake or the channel of a stream and that defines the lateral extent of their waters.

MEASURES TO PROTECT FISH AND WILDLIFE RESOURCES

1. Administrative Measures

Permittee shall meet each administrative requirement described below.

1.1 Documentation at Project Site. Permittee shall make the Agreement, any extensions and amendments to the Agreement, and all related notification materials and California Environmental Quality Act (CEQA) documents, readily available at the project site at all times and shall be presented to DFG personnel, or personnel from another state, federal, or local agency upon request.

1.2 Providing Agreement to Persons at Project Site. Permittee shall provide copies of the Agreement and any extensions and amendments to the Agreement to all persons who will be working on the project at the project site on behalf of Permittee, including but not limited to contractors, subcontractors, inspectors, and monitors.

1.3 Notification of Conflicting Provisions. Permittee shall notify DFG if Permittee determines or learns that a provision in the Agreement might conflict with a provision imposed on the project by another local, state, or federal agency. In that event, DFG shall contact Permittee to resolve any conflict.

1.4 Project Site Entry. Permittee agrees that DFG personnel may enter the project site to verify compliance with the Agreement. DFG personnel may only enter the project site when it is safe to do so. When appropriate, DFG personnel shall contact the Permittee prior to entering the construction area.

1.5 Authorized Work. The notification, together with all supporting documents submitted with the notification, is hereby incorporated into this agreement to describe the location and features of the proposed project. The Permittee agrees that all work shall be done as described in the notification and supporting documents, incorporating all project modifications, wildlife resource protection features, mitigation measures, and provisions as described in this agreement. Where apparent conflicts exist between the notification and the provisions listed in this agreement, the Permittee shall comply with the provisions listed in this agreement. The Permittee further agrees to notify DFG of any modifications made to the project plans submitted to DFG. At the discretion of DFG, this agreement will be amended to accommodate modifications to the project plans submitted to DFG and/or new project activities.

2. Avoidance and Minimization Measures

To avoid or minimize adverse impacts to fish and wildlife resources identified above, Permittee shall implement each measure listed below.

2.1 Work Period. The time period for completing the work within the stream zone shall be restricted to periods of low stream flow and dry weather and shall be confined to the period of June 15 to October 15. Construction activities shall be timed with awareness of precipitation forecasts and likely increases in stream flow. Construction activities within the stream zone shall cease until all reasonable erosion control measures, inside and outside of the stream zone, have been implemented prior to all storm events. Revegetation, restoration and erosion control work is not confined to this time period. This provision does not apply to work above and outside the stream zone.

2.2 Work Period Extensions. At DFG's discretion, the work period may be extended based on the extent of the work remaining, on site conditions and reasonably anticipated future conditions. If the Permittee finds more time is needed to complete the authorized activity, the Permittee shall submit a written request for a work period time extension to DFG. The work period extension request shall provide the following information: 1) Describe the extent of work already completed; 2) Provide specific detail of the activities that remain to be completed within the stream zone; and 3) Detail the actual time required to complete each of the remaining activities within the stream zone. The work period extension request should consider the effects of increased stream conditions, rain delays, increased erosion control measures, limited access due to saturated soil conditions, and limited growth of erosion control grasses due to cool weather. Photographs of the work completed and the proposed work areas are helpful in assisting DFG in its evaluation. Time extensions are issued at the discretion of DFG. DFG will have ten calendar days to approve the proposed work period extension. DFG reserves the right to require additional measures designed to protect natural resources.

2.3 Stream Diversions / Dewatering. The Dewatering Plans submitted with the notification may be used with the following modification. Temporary culvert(s) of sufficient size to handle anticipated storm events shall be placed on the stream bottom. Gravel or sand bags with plastic sheeting shall be used to divert the flow into the temporary culvert(s). If a temporary equipment crossing is necessary to complete operations, crush rock (gravel or rip rap) shall not be placed directly on the stream bottom. A layer of clean round river cobble (2 to 8 inch diameter in size) shall be placed as the bottom layer of rock. A layer of clean "washed" crushed gravel may be placed on the layer of river cobbles. The top layer may be fill material found at the work site or imported from off site. Crushed gravel and earthen fill material shall not extend beyond the layer of river cobble. Upon completion of the project, the fill material and most of the crushed gravel shall be removed from the stream bottom. The river cobble may remain in the stream. The temporary culvert crossing shall be removed prior to storm events that are likely to wash out the crossing. The dewatering structure and temporary crossing shall be removed upon completion of the project or October 15, which ever comes first.

2.4 Bird Nests. It is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird except as otherwise provided by the Fish and Game Code. No trees that contain active nests of birds shall be disturbed until all eggs have hatched and young birds have fledged without prior consultation and approval of a Department representative.

2.5 Cliff Swallows. No active cliff swallow nests shall be disturbed until all eggs have hatched and young birds have fledged without prior consultation and approval of a Department representative and the U.S. Fish and Wildlife Service. This may require the Permittee to use exclusion netting and/or daily removal of nest material with high-pressure water spray.

2.6 Vegetation Removal. Disturbance or removal of vegetation shall not exceed the minimum necessary to complete operations. Except for the trees specifically identified for removal in the notification, no native trees with a trunk diameter at breast height (DBH) in excess of four (4) inches shall be removed or damaged without prior consultation and approval of a Department representative. Using hand tools (clippers, chain saw, etc.), trees may be trimmed to the extent necessary to gain access to the work sites. All cleared material/vegetation shall be removed out of the riparian/stream zone.

2.7 Sediment Control. Precautions to minimize turbidity/siltation shall be taken into account during project planning and implementation. This may require the placement of silt fencing, coir logs, coir rolls, straw bale dikes, or other siltation barriers so that silt and/or other deleterious materials are not allowed to pass to downstream reaches. Passage of sediment beyond the sediment barrier(s) is prohibited. If any sediment barrier fails to retain sediment, corrective measures shall be taken. The sediment barrier(s) shall be maintained in good operating condition throughout the construction period and the following rainy season. Maintenance includes, but is not limited to, removal of accumulated silt and/or replacement of damaged silt fencing, coir logs, coir rolls, and/or straw bale dikes. The Permittee is responsible for the removal of non-biodegradable silt barriers (such as plastic silt fencing) after the disturbed areas have been stabilized with erosion control vegetation (usually after the first growing season). Upon Department determination that turbidity/siltation levels resulting from project related activities constitute a threat to aquatic life, activities associated with the turbidity/siltation shall be halted until effective Department approved control devices are installed or abatement procedures are initiated.

2.8 Pollution Control. Utilize Best Management Practices (BMPs) to prevent spills and leaks into water bodies. If maintenance or refueling of vehicles or equipment must occur on-site, use a designated area and/or a secondary containment, located away from drainage courses to prevent the runoff of storm water and the runoff of spills. Ensure that all vehicles and equipment are in good working order (no leaks). Place drip pans or absorbent materials under vehicles and equipment when not in use. Ensure that all construction areas have proper spill clean up materials (absorbent pads, sealed containers, booms, etc.) to contain the movement of any spilled substances. Any other substances which could be hazardous to aquatic life, resulting from project related activities, shall be prevented from contaminating the soil and/or entering the waters of the state. Any of these materials, placed within or where they may enter a stream or lake by the Applicant or any party working under contract or with the permission of the Permittee, shall be removed immediately. DFG shall be notified immediately by the Permittee of any spills and shall be consulted regarding clean-up procedures.

3. Compensatory Measures

To compensate for adverse impacts to fish and wildlife resources identified above that cannot be avoided or minimized, Permittee shall implement each measure listed below.

3.1 Site Restoration. All exposed/disturbed areas and access points within the stream zone left barren of vegetation as a result of the construction activities shall be restored using locally native grass seeds, locally native grass plugs and/or a mix of quick growing sterile non-native grass with locally native grass seeds. Seeded areas shall be covered with broadcast straw and/or jut netted (monofilament erosion blankets are not authorized).

4. Reporting Measures

Permittee shall meet each reporting requirement described below.

4.1 The Permittee shall notify DFG within two working days of beginning work within the stream zone of name of waterway(s). Notification shall be submitted as instructed in Contact Information section below. Email notification is preferred.

4.2 Upon completion of the project activities described in this agreement, the work area within the stream zone shall be digitally photographed. Photographs shall be submitted to DFG within two days of completion. Photographs and project commencement notification shall be submitted as instructed in Contact Information section below. Email submittal is preferred.

CONTACT INFORMATION

Any communication that Permittee or DFG submits to the other shall be in writing and any communication or documentation shall be delivered to the address below by U.S. mail, fax, or email, or to such other address as Permittee or DFG specifies by written notice to the other. Refer to the project's Notification Number when submitting documents to DFG.

<u>To Permittee:</u>

Zachary Parker
California Department of Transporation
2015 East Shields Avenue, Suite A-100
Fresno, California 93726-5428

Email: Zachary.Parker@dot.ca.gov

<u>To DFG</u>:

Department of Fish and Game
North Central Region
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670
Attn: Lake and Streambed Alteration Program – Gary L. Hobgood
Notification #1600-2010-0130 R2
Fax: 916-358-2912
ghobgood@dfg.ca.gov

LIABILITY

Permittee shall be solely liable for any violations of the Agreement, whether committed by Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents or contractors and subcontractors, to complete the project or any activity related to it that the Agreement authorizes.

This Agreement does not constitute DFG's endorsement of, or require Permittee to proceed with the project. The decision to proceed with the project is Permittee's alone.

SUSPENSION AND REVOCATION

DFG may suspend or revoke in its entirety the Agreement if it determines that Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, is not in compliance with the Agreement.

Before DFG suspends or revokes the Agreement, it shall provide Permittee written notice by certified or registered mail that it intends to suspend or revoke. The notice shall state the reason(s) for the proposed suspension or revocation, provide Permittee an opportunity to correct any deficiency before DFG suspends or revokes the Agreement, and include instructions to Permittee, if necessary, including but not limited to a directive to immediately cease the specific activity or activities that caused DFG to issue the notice.

ENFORCEMENT

Nothing in the Agreement precludes DFG from pursuing an enforcement action against Permittee instead of, or in addition to, suspending or revoking the Agreement.

Nothing in the Agreement limits or otherwise affects DFG's enforcement authority or that of its enforcement personnel.

OTHER LEGAL OBLIGATIONS

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from obtaining any other permits or authorizations that might be required under other federal, state, or local laws or regulations before beginning the project or an activity related to it.

This Agreement does not relieve Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, from complying with other applicable statutes in the FGC including, but not limited to, FGC sections 2050 et seq. (threatened and endangered species), 3503 (bird nests and eggs), 3503.5 (birds of prey), 5650 (water pollution), 5652 (refuse disposal into water), 5901 (fish passage), 5937 (sufficient water for fish), and 5948 (obstruction of stream).

The Permittee shall notify DFG where conflicts exist between the provisions of this agreement and those imposed by other regulatory agencies. Unless otherwise notified, the Permittee shall comply with the provision that offers the greatest protection to water quality, species of special concern and/or critical habitat.

Nothing in the Agreement authorizes Permittee or any person acting on behalf of Permittee, including its officers, employees, representatives, agents, or contractors and subcontractors, to trespass.

AMENDMENT

DFG may amend the Agreement at any time during its term, provided the amendment is mutually agreed to in writing by Permittee and DFG.

Permittee may amend the Agreement at any time during its term, provided the amendment is mutually agreed to in writing by DFG and Permittee. To request an amendment, Permittee shall submit to DFG a completed DFG "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the corresponding amendment fee identified in DFG's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

TRANSFER AND ASSIGNMENT

This Agreement may not be transferred or assigned to another entity, and any purported transfer or assignment of the Agreement to another entity shall not be valid or effective, unless the transfer or assignment is requested by Permittee in writing, as specified below, and thereafter DFG approves the transfer or assignment in writing.

The transfer or assignment of the Agreement to another entity shall constitute a minor amendment, and therefore to request a transfer or assignment, Permittee shall submit to DFG a completed DFG "Request to Amend Lake or Streambed Alteration" form and include with the completed form payment of the minor amendment fee identified in DFG's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5).

EXTENSIONS

In accordance with FGC section 1605(b), Permittee may request one extension of the Agreement, provided the request is made prior to the expiration of the Agreement's term. To request an extension, Permittee shall submit to DFG a completed DFG "Request to Extend Lake or Streambed Alteration" form and include with the completed form payment of the extension fee identified in DFG's current fee schedule (see Cal. Code Regs., tit. 14, § 699.5). DFG shall process the extension request in accordance with FGC 1605(b) through (e).

If Permittee fails to submit a request to extend the Agreement prior to its expiration, Permittee must submit a new notification and notification fee before beginning or continuing the project the Agreement covers (Fish & G. Code, § 1605, subd. (f)).

EFFECTIVE DATE

The Agreement becomes effective on the date of DFG's signature, which shall be: 1) after Permittee's signature; 2) after DFG complies with all applicable requirements under the California Environmental Quality Act (CEQA); and 3) after payment of the applicable FGC section 711.4 filing fee listed at http://www.dfg.ca.gov/habcon/ceqa/ceqa_changes.html.

TERM

This Agreement shall expire on December 31 2014, unless it is terminated or extended before then. All provisions in the Agreement shall remain in force throughout its term. Permittee shall remain responsible for implementing any provisions specified herein to protect fish and wildlife resources after the Agreement expires or is terminated, as FGC section 1605(a)(2) requires.

AUTHORITY

If the person signing the Agreement (signatory) is doing so as a representative of Permittee, the signatory hereby acknowledges that he or she is doing so on Permittee's behalf and represents and warrants that he or she has the authority to legally bind Permittee to the provisions herein.

AUTHORIZATION

This Agreement authorizes only the project described herein. If Permittee begins or completes a project different from the project the Agreement authorizes, Permittee may be subject to civil or criminal prosecution for failing to notify DFG in accordance with FGC section 1602.

CONCURRENCE

The undersigned accepts and agrees to comply with all provisions contained herein.

FOR CALIFORNIA DEPARTMENT OF TRANSPORTATION

ZACHARY E. PARKER — 9/7/10

Print Name of Representative — Date

Signature of Representative

FOR DEPARTMENT OF FISH AND GAME

J Thorpe ______________________ 9/15/10 ______________

Kent Smith Date

f/ Regional Manager

Prepared by: Gary L. Hobgood
Staff Environmental Scientist

LEGEND: (THIS SHEET ONLY)

PTS = POWER TRANSFER SWITCH
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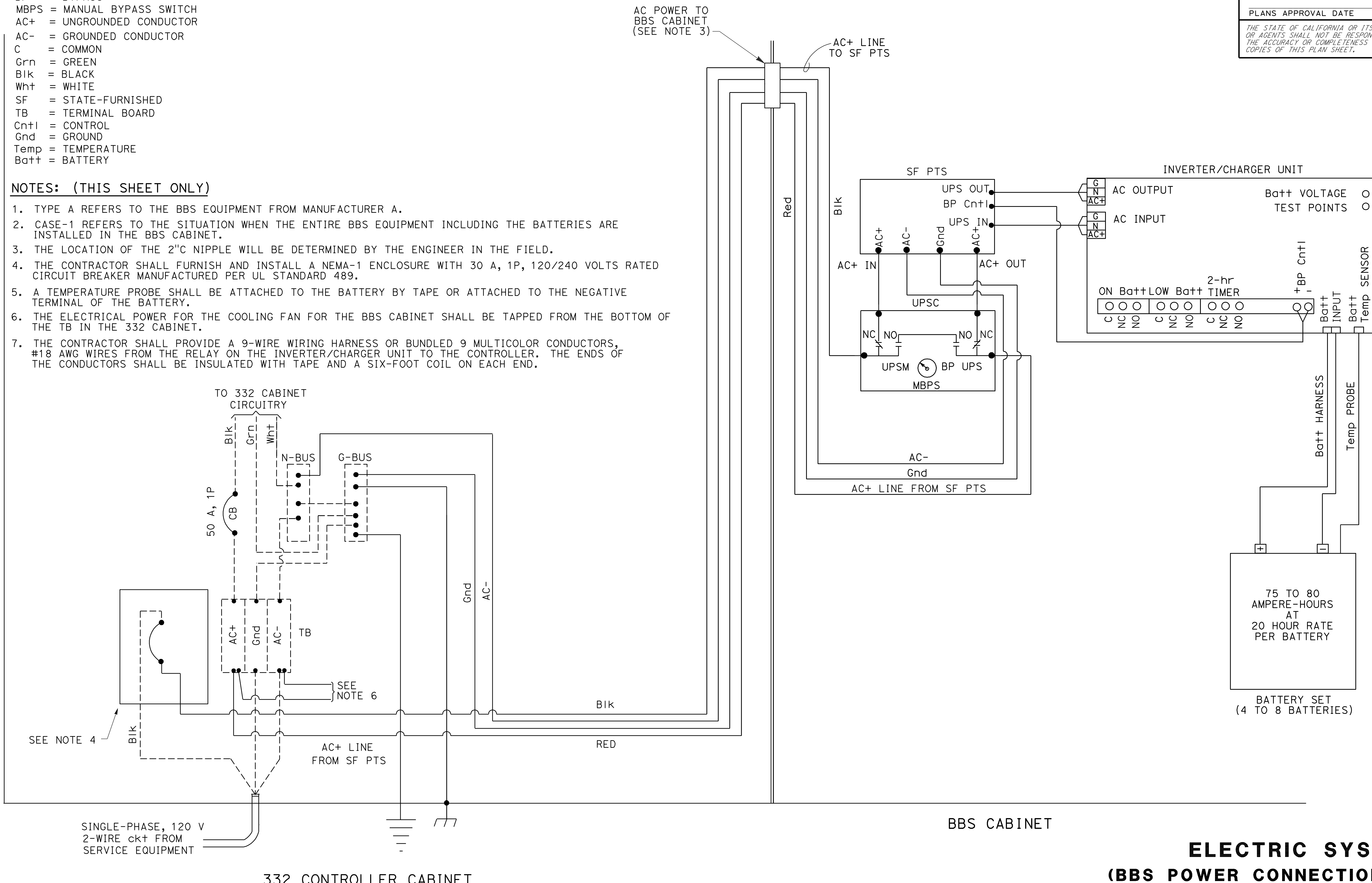
TB = TERMINAL BOARD
Cntl = CONTROL
Gnd = GROUND
Temp = TEMPERATURE
Batt = BATTERY

NOTES: (THIS SHEET ONLY)

1. TYPE A REFERS TO THE BBS EQUIPMENT FROM MANUFACTURER A.
2. CASE-1 REFERS TO THE SITUATION WHEN THE ENTIRE BBS EQUIPMENT INCLUDING THE BATTERIES ARE INSTALLED IN THE BBS CABINET.
3. THE LOCATION OF THE 2"C NIPPLE WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEMA-1 ENCLOSURE WITH 30 A, 1P, 120/240 VOLTS RATED CIRCUIT BREAKER MANUFACTURED PER UL STANDARD 489.
5. A TEMPERATURE PROBE SHALL BE ATTACHED TO THE BATTERY BY TAPE OR ATTACHED TO THE NEGATIVE TERMINAL OF THE BATTERY.
6. THE ELECTRICAL POWER FOR THE COOLING FAN FOR THE BBS CABINET SHALL BE TAPPED FROM THE BOTTOM OF THE TB IN THE 332 CABINET.
7. THE CONTRACTOR SHALL PROVIDE A 9-WIRE WIRING HARNESS OR BUNDLED 9 MULTICOLOR CONDUCTORS, #18 AWG WIRES FROM THE RELAY ON THE INVERTER/CHARGER UNIT TO THE CONTROLLER. THE ENDS OF THE CONDUCTORS SHALL BE INSULATED WITH TAPE AND A SIX-FOOT COIL ON EACH END.



ELECTRIC SYSTEM
(BBS POWER CONNECTION DIAGRAM, TYPE A, CASE-1)

Dist	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Theresa Gabriel 12-20-07
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Theresa A. Gabriel No. E15129 Exp. 6-30-10 ELECT STATE OF CALIFORNIA

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

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

FUNCTIONAL SUPERVISOR
CALCULATED-DESIGNED BY
CHECKED BY
REVISED BY
DATE REVISED

DATE PLOTTED => 13-MAR-2009
TIME PLOTTED => 09:06
LAST REVISION 3-11-09

Dist	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

Theresa Gabriel 12-20-07
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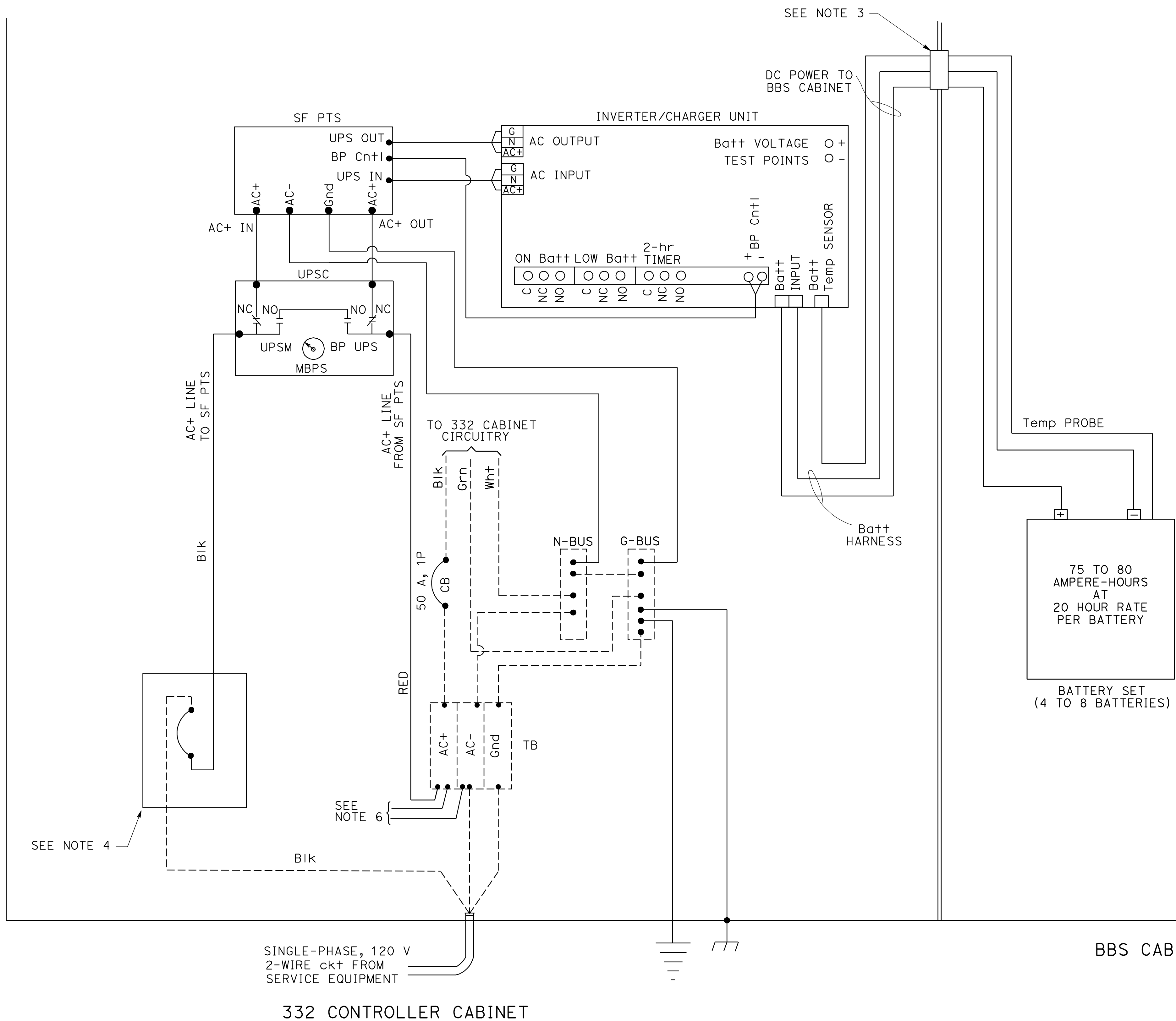

LEGEND: (THIS SHEET ONLY)

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1. TYPE B REFERS TO THE BBS EQUIPMENT FROM MANUFACTURER B.
2. CASE-2 REFERS TO THE SITUATION WHEN ONLY THE BATTERIES ARE INSTALLED IN THE BBS CABINET. THE REMAINING EQUIPMENT IS PLACED IN THE 332 CONTROLLER CABINET.
3. THE LOCATION OF THE 2"C NIPPLE WILL BE DETERMINED BY THE ENGINEER IN THE FIELD.
4. THE CONTRACTOR SHALL FURNISH AND INSTALL A NEMA-1 ENCLOSURE WITH 30 A, 1P, 120/240 VOLTS RATED CIRCUIT BREAKER MANUFACTURED PER UL STANDARD 489.
5. A TEMPERATURE PROBE SHALL BE ATTACHED TO THE BATTERY BY TAPE OR ATTACHED TO THE NEGATIVE TERMINAL OF THE BATTERY.
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ELECTRICAL SYSTEMS
(BBS POWER CONNECTION DIAGRAM, TYPE A, CASE-2)

NO SCALE

REVISED BY | DATE REVISED
CALCULATED-DESIGNED BY | CHECKED BY
FUNCTIONAL SUPERVISOR
STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans®

DATE PLOTTED => 13-MAR-2009
TIME PLOTTED => 09:07
LAST REVISION 2-2-09

LEGEND: (THIS SHEET ONLY)

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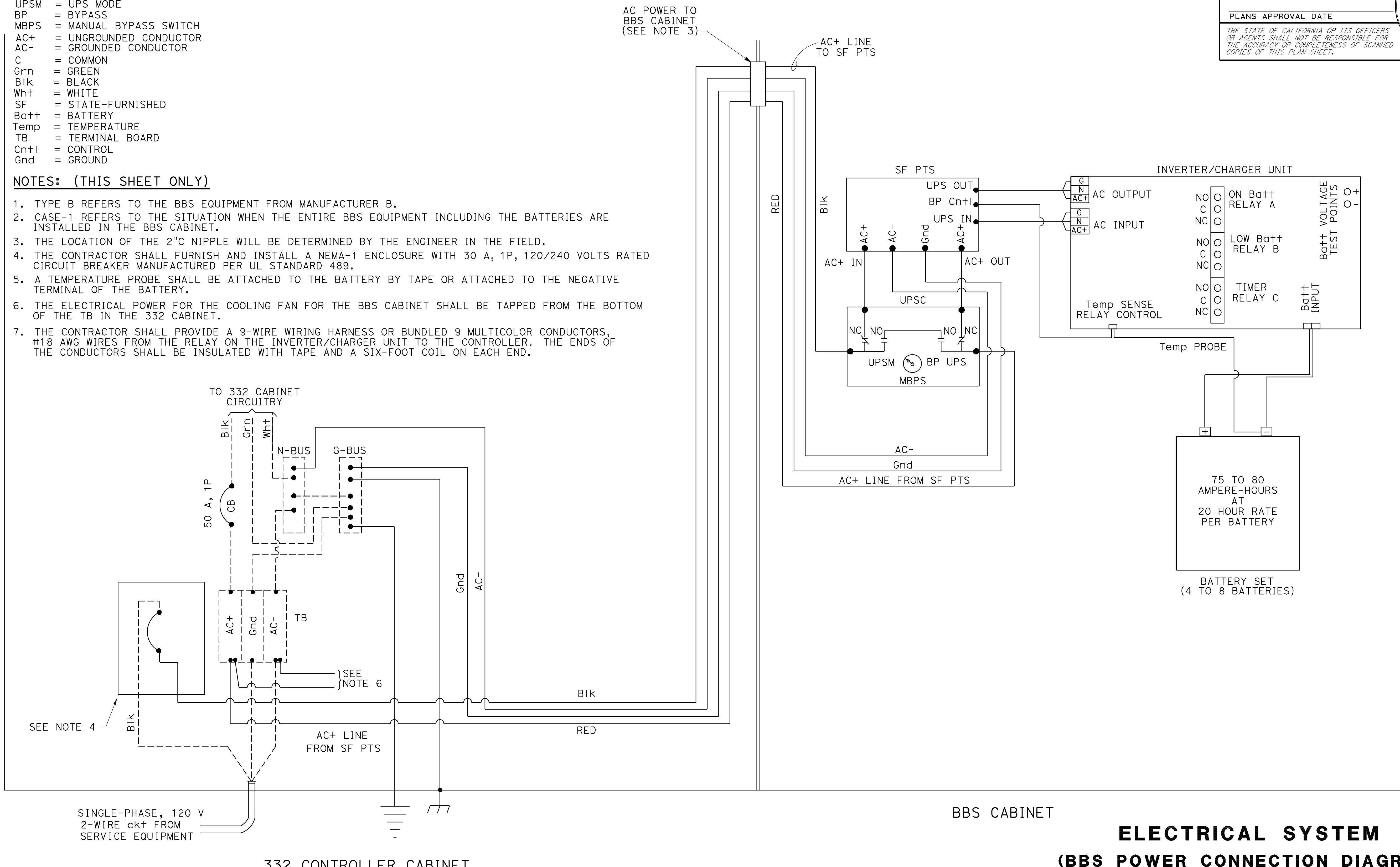

ELECTRICAL SYSTEM

(BBS POWER CONNECTION DIAGRAM, TYPE B, CASE-1)

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Theresa Gabriel 12-20-07
REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Theresa A. Gabriel
No. E15129
Exp. 6-30-10
ELECT
STATE OF CALIFORNIA

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

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REVISED BY
DATE REVISED

LAST REVISION 3-11-09
DATE PLOTTED => 21-SEP-2009
TIME PLOTTED => 13:33

Dist	COUNTY	LOCATION CODE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS

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REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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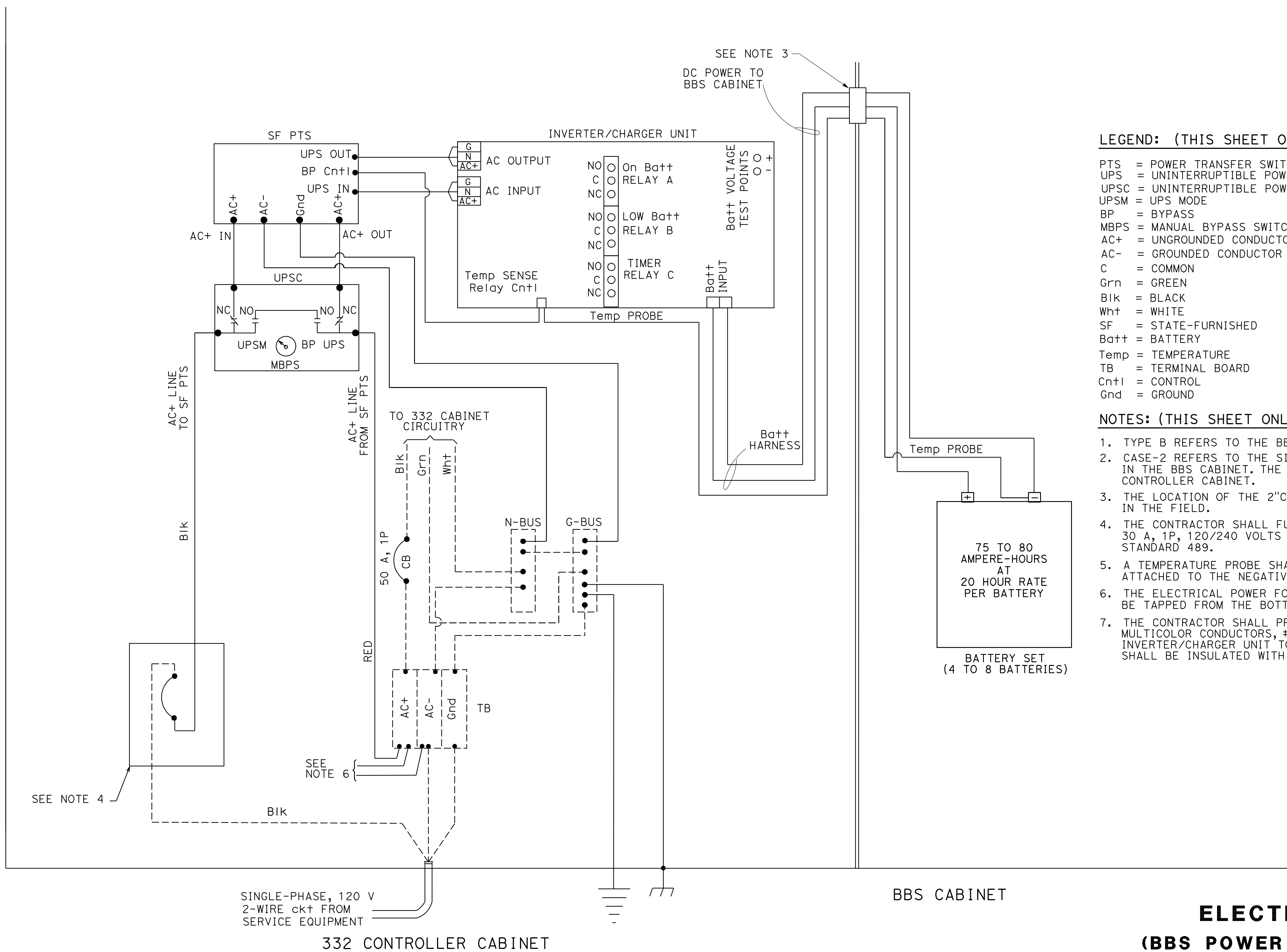

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ELECTRICAL SYSTEM

(BBS POWER CONNECTION DIAGRAM, TYPE B, CASE-2)

REVISED BY | DATE REVISED | CALCULATED-DESIGNED BY | CHECKED BY | FUNCTIONAL SUPERVISOR

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
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