February 13, 2015
File No.: 20152361.001A

Omni-Means, Ltd.
330 Hartnell Avenue, Suite B
Redding, California 96002

Attention: Russ Wenham, PE

SUBJECT: Final Geotechnical Design Report
Proposed SR99/Fulkerth Avenue Interchange Project
Retaining Walls (38E0005 and 380006), On and Off Ramps, and Drainage Basins
Turlock, California

Mr. Wenham:

The attached report presents the results of the geotechnical study for the proposed anchored and standard retaining walls, on and off ramps and drainage basins located at Fulkerth Avenue and State Route (SR) 99 in Turlock, California. This report supersedes Kleinfelder's report dated September 3, 2014 and describes the study and provides conclusions and recommendations for use in design of the project.

Kleinfelder appreciates the opportunity to provide geotechnical engineering services to Omni-Means, Ltd., the City of Turlock, and other project designers. It is trusted this information will meet your current needs. If there are any questions concerning the information presented in this report, please contact this office at your convenience.

Respectfully submitted,

KLEINFELDER, INC.

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FINAL GEOTECHNICAL DESIGN REPORT
PROPOSED SR99/FULKERTH AVENUE
INTERCHANGE PROJECT
RETAINING WALLS 38E0005 and 38E0006, ON AND
OFF RAMPS, AND DRAINAGE BASINS
TURLOCK, CALIFORNIA

A report prepared for:

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1. INTRODUCTION

1.1. GENERAL

This Geotechnical Design Report (GDR) presents the results of a geotechnical investigation for the proposed State Route (SR) 99 and Fulkerth Avenue Interchange Project located in Turlock, California. The location of the site is shown on Plate 1, Site Vicinity Map. The project includes: relocation of the southbound on- and off-ramps approximately 260 feet west of the existing ramps; the widening of Fulkerth Avenue below SR99 with construction of anchored and standard retaining walls near SR99 bridge abutments; and, construction of three storm water drainage basins on the west side of SR99. This GDR supersedes Kleinfelder's report dated September 3, 2014 for the proposed project.

A separate Foundation Report dated February 13, 2015) was prepared for the anchored walls.

1.2. PROJECT DESCRIPTION

The proposed project will involve removal of the structural section of the existing southbound on- and off-ramps, the construction of new southbound on- and off- ramps approximately 260 feet west of the current ramps, construction of anchored and standard retaining walls at the SR99 bridge abutments, widening Fulkerth Avenue below SR99, and construction of three storm water drainage basins on the west side of SR99. It is understood the proposed on- and off-ramps will be constructed using on-site fill from excavation of the three storm water drainage basins. Two (2) of the drainage basins will be located between the proposed on- and off-ramps and SR99 and the third basin will be located immediately west of the proposed on-ramp.

Wall information used in this study was based on the Tie-Back Wall Location Plan and Sections dated November 16, 2010 (Sheets EX21 1 of 2 and 2 of 2) by Omni-Means, Inc. (attached) and the Fulkerth Retaining Wall Plans prepared by Cornerstone Structural Engineering, Inc. (attached). RW1 (Retaining Wall 38E00006) (the northern wall) is approximately 252.5 feet long and will extend from Sta. 20+58.00 to Sta. 23+10.45 ("F" Line) and RW2 (Retaining Wall 38E0005) (the southern wall) is approximately 247.8 feet long and will extend from Sta. 21+28.01 to 23+75.79 ("F" Line). The center 200 feet of each wall will consist of a ground

anchor wall and Standard Type 1 retaining walls are planned at both ends of each anchored wall. As such, the anchor walls will extend from Sta. 20+94 to Sta. 22+94 ("F" Line) for RW1 and Sta. 21+46 to 23+46 ("F" Line) for RW2. The Standard Type 1 walls will extend from Sta. 20+58.00 to 20+94 and Sta. 22+94 to 23+10.45 ("F" Line) for RW1 and from Sta. 21+28.01 to 21+46 and Sta. 23+46 to 23+75.79 ("F" Line) for RW2. The Type 1 retaining walls will be up to 14 feet in height.

The bottoms of the anchored walls are expected to extend approximately 1.5 feet below proposed sidewalk grade. The tops of the walls are planned to extend just above the current slope face. Additional information can be gleaned from the attached retaining wall plans by Cornerstone Structural Engineering.

It is anticipated that the use of an A-B-C slot-cut excavation procedure will be required to facilitate the construction of the planned tie-back retaining walls adjacent to the existing abutment footings. This procedure requires that two slots widths on each side of the current slot width being excavated are either yet to be made or have been completed with the tie-back anchors and portions of the retaining wall. Recommendations for the A-B-C slot-cut excavation procedure are included in the referenced Foundation Report for the project.

1.3. PURPOSE AND SCOPE OF WORK

The purpose of this investigation was to evaluate the general soil conditions, and provide geotechnical recommendations and opinions to aid in project design. The authorized scope of services consisted of the following:

- A geotechnical field exploration program included drilling two borings near the two proposed retaining walls, drilling three borings along the proposed on- and off-ramps, coring the existing pavement structural section at four locations along Fulkerth Avenue, and conducting three double ring infiltration tests in test pits excavated within the vicinity of three proposed storm water drainage basins;
- Geotechnical laboratory testing;
- Engineering analysis; and,
- Preparation of this written report.

This report provides the following:

- A description of the proposed project, including a site vicinity map, showing the approximate location of the site, and plot plan, showing the approximate locations of the conducted borings, test pits, and cores, and planned improvements;
- A summary of the field exploration and laboratory testing programs;
- A description of the site surface and subsurface conditions encountered during the field investigation, including a Log of Test Borings sheets for the retaining walls and boring logs for the on- and off-ramps;
- Comments on the regional geology and site engineering seismology, including liquefaction potential and seismically induced settlement;
- Comments on the general corrosion characteristics of the site soils;
- Recommendations for design of standard retaining walls;
- Recommended flexible pavement structural sections for the ramp travel way and Fulkerth widening;
- Recommendations for general earthwork grading, including stripping, benching, fill placement and any modifications to the Caltrans Standard Specifications;
- Comments on embankment settlement for proposed on- and off-ramps; and,
- Recommended infiltration rates for use in the design of drainage basins

Appendix A presents the logs of the borings and test pits excavated for this project. Laboratory test results are presented in Appendix B. The results of laboratory tests from a prior study by Kleinfelder are presented in Appendix C. The results of the double ring infiltration tests are presented in Appendix D. Supporting calculations for the liquefaction analyses conducted on the current exploration data are presented in Appendix E. Appendix F presents the completed Caltrans Comment and Response Form for our September 3, 2014 Draft Geotechnical Report.

2. FIELD AND LABORATORY PROGRAMS

2.1. FIELD INVESTIGATION AND TESTING

The field exploration for the current study was conducted March 17 and 18, and April 4, 2011. A site reconnaissance by a staff engineer, the drilling of five (5) test borings and four (4) cores were completed on March 17 and 18, 2011. Three (3) test pits were excavated to a depth of approximately 5 feet below grade to perform double ring infiltration tests on April 4, 2011. The borings were drilled with a CME 75 truck-mounted drill rig using hollow stem auger techniques. The borings depth ranged from approximately 16½ to 51½ feet below the existing ground surface. The cores were performed with a 12-inch diameter barrel and the test pits were excavated using a rubber tire backhoe equipped with an 18-inch bucket. The approximate locations of the test borings, cores, and test pits are shown on Plate 2, Plot Plan.

The earth materials encountered in the borings and test pits were visually classified in the field and a continuous log was recorded. In-place samples of the soils encountered were collected from the borings at selected depths by driving a 2.5-inch I.D. split barrel sampler containing brass liners into the undisturbed soil with a 140-pound automatic safety hammer free falling a distance of 30-inches. In addition, an ASTM D1586 standard penetrometer without liners (barrel I.D. of 1.5 inches) was driven 18-inches in the same manner. This latter sampling procedure generally conformed to the ASTM D1586 test procedure. Resistance to sampler penetration for each 6 inch interval is noted on the Boring Logs and over the last 12-inches on Log of Test Boring sheets as the "Penetration Index". The penetration indices listed on the logs have not been corrected for the effects of overburden pressure, sampler size, rod length, or hammer efficiency. In addition, bulk samples were obtained from auger cuttings at selected borings.

The Logs of Borings for all five borings are presented in Appendix A. Borings A-11-001 and A-11-002 are also presented on the attached Log of Test Boring sheets. The As-Built Log of Test Borings sheet for the original Fulkerth Avenue Undercrossing is also attached.

Penetration rates determined in general accordance with ASTM D1586 were used to aid in evaluating the consistency, compression, and strength characteristics of the foundation soils.

The three test pits (DRI-1, DRI-2, and DRI-3) were excavated at the locations of the proposed storm water drainage basins. The pits were excavated to depths of approximately 5 feet below the existing grade to facilitate conducting double ring infiltration tests near the planned bottoms of the basins. Logs of the test pits are presented in Appendix A. The infiltration tests were performed in general accordance with ASTM D3385 and are presented in Appendix D. The results are also discussed in Section 6.1 of this report.

The four pavement cores (C-1 through C-4) were conducted in Fulkerth Avenue at the approximate locations shown on Plate 2. The pavement sections encountered are presented in Section 9.2 of this report.

2.2. LABORATORY TESTING PROGRAM

Laboratory tests were performed on selected samples to evaluate pertinent engineering properties. The laboratory testing program was designed with emphasis on the evaluation of geotechnical properties of the soil conditions as they pertain to the proposed construction. The laboratory testing program included performing the following tests:

- Unit Weight (ASTM D2937)
- Moisture Content (ASTM D2216)
- Direct Shear (ASTM D3080)
- Grain Size Distribution (ASTM D422, without hydrometer)
- Amount of Soil Finer than 75µ (ASTM D1140)
- Resistance Value (California Test Method No. 301)
- Soluble Sulfates (California Test Method No.417)
- Soluble Chlorides (California Test Method No.422)
- Resistivity and pH (California Test Method No. 643)

Unit weight and moisture content test results are shown on the attached Log of Test Borings Sheets and on the boring logs in Appendix A. The soluble sulfate, soluble chloride, pH, and minimum resistivity results are presented in Section 4.0, “Corrosion Evaluation”. The direct shear test results, resistance value (R-value) and sieve analysis are provided in Appendix B.

Note that direct shear test results are presented for ultimate strength which is defined at 20 percent strain and for peak strength which typically occurred between 5 and 10 percent strain.

2.3. PREVIOUS GEOTECHNICAL LABORATORY TESTING

A bulk sample was obtained by Kleinfelder in 2009 from the surface of existing embankment slopes near the abutment foundations. The sample was visually classified as silty sand and a direct shear test was performed on the remolded sample of the near surface soils obtained from the embankment. The results are presented in Appendix C.

3. SITE GEOLOGY AND SUBSURFACE CONDITIONS

3.1. SURFACE CONDITIONS AND TOPOGRAPHY

The natural terrain in the project area is relatively flat. SR99 is elevated with earth embankments and is generally about 25 feet in elevation above Fulkerth Avenue. The existing southbound on- and off-ramps are immediately west of the bridge abutments. The areas of the proposed SR99 southbound on- and off-ramps are undeveloped with a heavy growth of annual weeds and grasses. The existing parallel bridges (38-142R/L) are overcrossings, which are approximately 128 feet long and 53 feet wide. The slopes in front of the abutments are currently lined with concrete with a gradient of approximately 1½:1 (H:V). Fulkerth Avenue is a 4-lane asphalt concrete roadway throughout the project limits.

3.2. REGIONAL GEOLOGY

The project site lies in the central portion of the San Joaquin Valley and the Great Valley geomorphic province in California. This province was formed by the filling of a large structural trough or downwarp in the underlying bedrock. The trough is situated between the Sierra Nevada Range on the east and south and the Coast Range on the west. Both of these mountain ranges were initially formed by uplifts that occurred during the Jurassic and Cretaceous periods of geologic time (greater than 65 million years ago). Renewed uplift began in the Sierra Nevada during the Tertiary time, and is continuing today. The trough that underlies the valley is asymmetrical, with the greatest depths of sediments near the western margin. The sediments that fill the trough originated as erosion material from the adjacent mountains and foothills.

3.3. EARTH MATERIALS

At the location of the proposed project, the native sediments in the project area have been mapped by Wagner, Bortugno and McJunkin, 1991 (San Jose 2° geologic sheet) by the United States Geological Survey (USGS) as Modesto Formation sediments of the Pleistocene age (Qm). These sediments are described as typically consisting of fine to coarse-grained sediments deposited from streams emerging from the eastern highlands.

In general, the soils encountered in the borings and test pits consisted of silty sand (SM), poorly graded sand (SP), and sand with silt (SP-SM). A layer of sandy silt (ML) was encountered in test pit DRI-3 from approximately 2 to 5 feet below grade. In the two borings drilled behind the abutments (Borings A-11-001 and A-11-002), approximately 24 to 27 feet of compacted fill was encountered over the native materials. The fill soils below the level of the existing spread foundations appear to consist of alternating layers, 5 to 10 feet in thickness, of sands with 4 to 14 percent fines (passing the No. 200 sieve) and silty sands with 17 to 26 percent fines. The natural soils in these borings consisted of interbedded layers of sands and silty sands. The soils encountered at the boring and test pit locations were medium dense to very dense to the depths explored.

A more detailed description of the materials encountered in the test borings is noted on the attached Log of Test Borings and the boring logs in Appendix A of this report.

3.4. GEOLOGIC HAZARDS

Landslides are not anticipated due to the relatively flat nature of the site.

Deep ground subsidence due to over drafting of groundwater is not evident in the area, and is not anticipated to affect the site.

Hydrocompactive soils are not generally present in the area, and were not observed in the test borings.

Soils at the site have a low expansion potential. Experience in the area and performance of existing structures in the area indicate low potential for heaving at the site.

Other than the potential for slight to moderate ground motion, no seismically related hazards are anticipated to impact the site.

3.5. GROUNDWATER CONDITIONS

Groundwater was encountered at approximately 40½ feet below existing ground surface at boring A-11-001 (drilled within the existing fill embankment between and behind the southern

overcrossing abutment) and approximately 16 feet below existing grade in Borings B-2 and B-3. A-11-001 is approximately 25 feet above the general grade of the area and Borings B-2 and B-3, indicating groundwater was generally 15 to 16 feet below the natural ground surface or at approximate Elevation 80. Anchors extending below ground water will require special drilling techniques to reduce the potential for caving. Groundwater conditions at the site may experience minor change at times in the future.

4. CORROSION EVALUATION

4.1. CORROSION SCREENING

Soil samples from borings A-11-001and A-11-002 were tested to evaluate the soluble sulfate content, soluble chloride content, Minimum resistivity and pH. Specific test results are presented in Table 4.1-1.

TABLE 4.1-1
CORROSION RELATED TESTING

Boring No.	Depth (ft)	Soluble Sulfate (mg/kg)	Soluble Chloride (mg/kg)	Minimum Resistivity (ohm-cm)	pH
A-11-001	17.5	--	--	3760	7.4
	22.5	6.9	39	--	
A-11-002	20	--	--	5950	7.4
	25	3.1	45	--	

Laboratory tests indicate the soluble sulfates, soluble chlorides, and resistivity are all outside the Caltrans threshold limits. Accordingly, the soils are not considered to be corrosive to buried metals and concrete in contact with the site soils.

5. SEISMIC RECOMMENDATIONS

5.1. LOCAL FAULTING

There are no known faults, which cut through the local soil at the site. The project site is not located in an Alquist-Priolo Earthquake Fault Zone, as defined by Special Publication 42 (revised 2007) published by the California Geologic Survey (CGS). Numerous faults and shear zones within the region could influence the project site. The more significant of these faults, with respect to the project site, are Segments 7 and 8 of the Great Valley Fault (17 miles southwest), the Ortigalita Fault (27 miles southwest), and the Foothills Fault System (27 miles east)

5.2. SEISMIC DESIGN CRITERIA

Seismic design parameters were developed in accordance with the Caltrans Seismic Design Criteria Version 1.7

The project site is located in a region with the potential for slight to moderate seismic activity. The more significant faults that could influence the project site include Segment 7 of the Great Valley Fault (Fault ID No. 25) and the Santa Cruz Mountains Section of the San Andreas Fault (Fault ID No. 310). According to the Caltrans fault database, the Great Valley Fault is a reverse fault with a dip angle of 15 degrees towards the west and assigned Maximum Magnitude (M_{Max}) of 6.7; and the Santa Cruz Mountains Section of the San Andreas Fault is a right-lateral strike slip (RLSS) with a dip angle of 90 degrees and assigned Maximum Magnitude (M_{Max}) of 7.9. The characteristics of these two faults are summarized in Table 5.2-1.

Based on the subsurface data for the site, an evaluation of the shear wave velocity in the upper 30 meters (V_{s30}) is estimated to be 361 meters per second (m/s). Based on the subsurface data and per Figure B.12 of Caltrans SDC the site can be classified as Soil Profile Type D. The site is not located within a California deep soil basin region, as defined by Caltrans so $Z_{1.0}$=263 m and $Z_{2.5}$=2 km were used in the probabilistic analysis and deterministic analysis. Site characteristics and governing deterministic faults are summarized in Table 5.2-1 below.

TABLE 5.2-1
SITE CHARACTERISTICS AND GOVERNING DETERMINISTIC FAULTS PARAMETERS

Site Coordinates	Lat = 37.5072 deg, Long = -120.8778 deg
Shear Wave Velocity	361 m/s
Depth to V_s=1.0 km/s, $Z_{1.0}$	263 m
Depth to V_s=2.5 km/s, $Z_{2.5}$	2 km
Fault Name and ID Number	Great Valley fault (Segment 7), No. 25
Maximum Magnitude (M_{Max})	6.7
Fault Type	Reverse
Fault Dip	15 degrees
Dip Direction	West
Bottom of Rupture Plane	10 km
Top of Rupture Plane (Z_{tor})	7 km
R_{RUP}[1]	26.7 km
R_{jB}[2]	25.7 km
R_X[3]	21.6 km
F_{norm} (1 for normal, 0 for others)	0
F_{rev} (1 for reverse, 0 for others)	1
Fault Name and ID Number	San Andreas fault (Santa Cruz Mountains section), No. 310
Maximum Magnitude (M_{Max})	7.9
Fault Type	Right Lateral Strike Slip (RLSS)
Fault Dip	90 degrees
Dip Direction	Vertical
Bottom of Rupture Plane	15 km
Top of Rupture Plane (Z_{tor})	0 km
R_{RUP}[1]	93.7 km
R_{jB}[2]	93.7 km
R_X[3]	93.7 km
F_{norm} (1 for normal, 0 for others)	0
F_{rev} (1 for reverse, 0 for others)	0

Notes:
[1]R_{RUP} = Closest distance from the site to the fault rupture plane.
[2]R_{JB} = Joyner-Boore distance; the shortest horizontal distance to the surface projection of the rupture area.
[3]R_X = Horizontal distance from the site to the fault trace or surface projection of the top of the rupture plane.

5.2.1 Deterministic Response Spectrum

The deterministic response spectrum was calculated using the Caltrans Deterministic Spreadsheet and checked using ARS Online as required by Caltrans. The deterministic response spectrum from the Minimum Spectrum for California governed.

5.2.2 Probabilistic Response Spectrum

The probabilistic response spectrum was developed using the ARS Online as suggested by Caltrans, for $V_{s30} > 300$ m/s.

5.2.3 Design Response Spectrum

The upper envelope of the deterministic and probabilistic spectral values determines the design response spectrum. The probabilistic response spectra was found to govern for all periods. The recommended acceleration and displacement design response spectra are presented graphically on Figure 1-1 and numerically on Figure 1-2.

5.2.4 References

Caltrans. Caltrans ARS Online, http://dap3.dot.ca.gov/shake_stable/.
Caltrans. Geotechnical Services Manual, Version 1.0, August 2009.
Caltrans. Seismic Design Criteria, Appendix B Design Spectrum
Caltrans. Website http://dap3.dot.ca.gov/shake_stable/technical.php

5.3. LIQUEFACTION POTENTIAL AND DYNAMIC COMPACTION

In order for liquefaction of soils due to ground shaking to occur, it is generally accepted that four conditions will exist:

- The subsurface soils are in a relatively loose state,
- The soils are saturated,
- The soils are non-plastic,
- Ground motion is of sufficient intensity to act as a triggering mechanism.

Based on the relative density of the site soils, groundwater conditions encountered and the design PHGA of 0.28g, evaluation based on Youd et al (2001) indicates anticipated cyclic stress from a design event (default minimum response) is not likely sufficient to result in liquefaction or seismically induced settlement. The results of the liquefaction and seismic induced settlement analyses are presented in Appendix E.

Dynamic compaction is another type of seismically induced settlement that can occur in unsaturated loose granular material or uncompacted fill soils. The subsurface conditions encountered in the borings advanced at the site are generally not considered conducive to dynamic compaction. Based on methods by Tokimatsu and Seed (1987), approximately 0.1 inch of settlement due to dynamic compaction was calculated to potentially occur during a design earthquake.

6. DRAINIANGE BASINS

6.1. DOUBLE RING INFILTRATION TESTING

Results from double ring infiltration tests conducted in test pits DRI-1, DRI-2 and DRI-3 in the areas of the three proposed storm water basins are presented in Table 6.1-1. No factors of safety have been applied. The infiltration tests were performed in general accordance with ASTM D3385.

TABLE 6.1-1
INFILTRATION TEST RESULTS

Test Pit	Depth Below Ground Surface (feet)	Soil Type	Percolation Rate (min/inch)	Infiltration Rate (feet/day)
DRI-1	5	Silty Sand (SM)	74	1.6
DRI-2	5	Sand with Silt (SP-SM)	22.2	5.4
DRI-3	5	Sandy Silt (ML)	222	0.5

The small scale testing from the double-ring infiltration test cannot model the complexity of the effect interbedded layering of soils has on long-term and large area pond infiltration. In using the double-ring data to estimate long-term and large area infiltration, it is necessary to apply some type of reduction factor, which is usually based on observation and/or drop measurements from large area ponds. For example, the EPA suggests using 2 to 4 percent of the small scale test results. Recent testing at some 30-acre ponds provided similar relationships (3.2%) between double-ring tests and drop in measurements.

For typical winter storms that are expected to drain within a few days, the values provided could be used in design. The longer the water sits in the basin, the slower the percolation rate will become, until reaching an equilibrium rate that could be on the order of approximately 3 to 4 inches per day. This equilibrium rate is anticipated to occur in approximately 1 to 3 months.

Pond maintenance procedures should consider skimming and removal of any sediment build-up. Such an approach will tend to optimize infiltration. Bottom disking and/or ripping will tend to gradually increase fines content of the bottom soil and likely lead to long-term reduction of infiltration rates.

7. RETAINING WALLS

7.1. GENERAL

Based on the field exploration, laboratory testing, and geotechnical analyses, the soils at the site are suitable for supporting the planned retaining walls RW1 (Wall 38E0006) and RW2 (Wall 38E0005). Recommendations are provided for the anchored wall portions of RW1 and RW2 on the north and south side of Fulkerth Avenue in the referenced Foundation Report dated February 13, 2015. Recommendations for the Standard Type 1 portions of RW1 and RW2 are presented below in Section 7.2.

7.2. CONCLUSIONS AND RECOMMENDATIONS FOR STANDARD WALLS

Table 7.2-1 presents the location for each planned Standard Type 1 retaining wall.

TABLE 7.2-1
TYPE 1 RETAINING WALL LOCATION

Retaining Wall	Beginning Station (F-Line)	Ending Station (F-Line)
RW1	20+58.00	20+94
RW1	22+94	23+10.45
RW1	21+28.01	21+46
RW2	23+46	23+75.79

Where Type 1 Caltrans Standard Plan retaining walls are planned, backfill material within a zone 0.8H horizontally behind the heel of the wall should have an angle of internal friction of 34^0, where H is the retained wall height. Generally most of the on-site soil is considered suitable for use as backfill. The foundation soil should have an allowable maximum toe pressure greater than the Caltrans Standard Plans maximum toe pressure.

Should project specific wall design be necessary, the parameters presented in Tables 7.2-2 and 7.2-3 can be used. The passive pressure considers a conservative value of wall friction (δ) equal to one-half the angle of internal friction (ϕ), to allow for formed foundations. If the deflection resulting from the strain necessary to develop the passive pressure is within structure tolerance, the passive pressure and frictional resistance can be used in combination.

Otherwise, additional passive pressure values need to be developed based on tolerable deflection. It is suggested this strain compatibility approach be considered instead of an arbitrary reduction in the passive pressure.

TABLE 7.2-2
LATERAL EARTH PRESSURES FOR RETAINING WALLS

Condition	Service Limit ϕ 0.5	Strength Limit		Extreme Event ϕ = 1.0
		ϕ = 0.5	ϕ = 0.8	
Uniform Surcharge Coefficient (Ka)	0.28	0.28	0.28	0.28
Active Earth Pressure Level Ground 2:1 Backslope	 39 psf/ft 60 psf/ft	 39 psf/ft 60 psf/ft	 39 psf/ft 60 psf/ft	 39 psf/ft 60 psf/ft
Frictional Coefficient	0.31	-	0.50	0.62
Passive Pressure	330 psf/ft	330psf/ft	-	660 psf/ft
Lateral Translation Needed to Develop Passive Pressure	0.005D	0.005D	-	0.018D

Note: D is the foundation depth below adjacent grade. Lateral translation will be in the same units as D.

TABLE 7.2-3
AVAILABLE BEARING CAPACITY

Condition	Available Bearing Capacity (psf)
Service Limit	
Average Contact Pressure (ϕ = 0.35)	3150
Maximum Toe Pressure (ϕ = 0.5)	4500
Strength Limit (ϕ = 0.5)	4500
Extreme Limit (ϕ = 1.0)	9000

The estimated settlement of a 12-foot high Type 1A wall is less than 0.25-inch. Settlement analysis was based on Schmertmann's method.

8. EARTHWORK

8.1. EXCAVATION

According to existing plans, cuts are anticipated to include:

- Sloped or shored excavations for construction of the standard plan retaining walls;
- Vertical excavations for construction of the tie-back anchor walls; and,
- Shallow excavations to construct the new pavement structural sections.

8.1.1. Stability

Safe inclinations of temporary excavations should conform to regulatory requirements and are the contractor's responsibility. A discussion regarding use of the slot cut excavation method for vertical excavations for the anchor walls is foundation report dated February 13, 2015. It is estimated that un-surcharged temporary excavations in the silty sand materials steeper than about 3/4:1 (H:V) will require worker protection and/or shoring. Unshored temporary excavations in clean sands should be laid back at 1:1 or flatter if over 4 feet in height. These cuts in clean sands will slough with time and as they dry out.

Where worker safety or support of adjacent improvements is of concern, excavations should be shored. Heavy construction equipment, construction materials, excavated soil, and vehicular traffic should be kept sufficiently away from the top of any excavation to prevent any unanticipated surcharging. As a general guideline, spoil piles or heavy equipment should be set back 0.75H from the top of shoring and 0.35H (minimum 5 feet) behind the top of unsupported excavation slopes, where H is the excavation depth in feet. If it becomes necessary to encroach within these general setbacks, surcharging effects should be evaluated.

8.1.2. Rippability

Based on site observation and soil borings, the soils along the roadway alignment are generally normally consolidated to possibly slightly over-consolidated alluvium. It is anticipated the soils present can be excavated with well maintained, conventional construction equipment. Bedrock will not be present.

8.1.3. Grading Factors

Insufficient data is available to estimate the shrinkage or bulking that would be experienced from cut to fill volume.

8.1.4. Embankment Fill

The existing embankment fill for SR99 has unpaved side slopes at approximately 2:1 (H:V) and 1½:1 (H:V) paved slopes underneath the overcrossing where the retaining walls are planned adjacent to Fulkerth Avenue.

The on- and off-ramp embankments will be constructed using on-site soil. The soils will be excavated from three (3) areas on-site currently planned to be storm water drainage basis. Two (2) of the basins are between the proposed ramps and SR 99 and the third area is immediately west on the southbound on-ramp. The embankment fill is anticipated to be no more than 10 feet in height, have a maximum crown width of approximately 55 feet, and have side slopes of no steeper than 4:1 (H:V).

8.1.5. Stripping and Preparation

In general, clearing and grubbing should be consistent with Section 16 of the Caltrans Standard Specifications (CSS). All areas to receive fill should be stripped of any vegetation, debris, undocumented fill or other deleterious matter. Special Provisions should require removal of any stumps and root systems from the embankment area regardless of the thickness of fill to achieve the grading plane. Special Provisions should also require the cleared approved subgrade in areas to receive fill be scarified to a depth of 8 inches, moisture conditioned to at, or above the optimum and compacted to at least 90% of maximum density. The proximity of the cleared subgrade to the pavement surface may require a higher level of compaction (i.e., 95% compaction to 2.5 feet below the pavement surface or 0.5 feet below the subgrade grading plane, whichever is deeper).

8.1.6. Material

In general, any on-site excavated soil is considered suitable for use as Local Borrow. Special Provisions should require import for embankment construction meet the following criteria:

TABLE 8.1-1
GENERAL IMPORTED BORROW

Sieve Size	Percent Passing
75 mm (3 inch)	100
4.75 mm (No. 4)	70-100
75 µm (No. 200)	20-50
Expansion Index	
30 max.	
R-value	
40 min.	

The Resistance Value requirement would only apply to the upper 1.5 feet of the grading plane for the paved width of roadways. The RE Pending File could indicate the R-value requirement could be waived for material with an SE greater than 30.

A pocket of silt was encountered in test pit DRI-3 (drainage basin west of proposed on-ramp). It is not known to what extent this layer extends. The silt material should not be used in the upper 1.5 feet of the ramp fills.

8.1.7. Placement and Compaction

Embankment should be placed and compacted in accordance with Section 19-5 and 19-6 of the CSS. Compaction will need to be achieved to the embankment face. The RE Pending File could indicate the embankment face could be backrolled a minimum of every 3 feet of vertical fill thickness or the slope could be overfilled and trimmed back to the compacted core.

8.1.8. Embankment Slope Stability

The static stability of planned slopes were evaluated using dimensional analyses by Janbu. The analyses utilized the ultimate shear strength parameters and satisfied a minimum FS of 1.5. Based on the analyses, the planned slopes are considered stable against deep-seated failure.

8.1.9. Settlement

It is anticipated the embankments will be about 40 to 55 feet in width, and up to 10 feet high. The potential embankment settlement was evaluated using Schmertmann's method. Analysis indicates settlement should be less than 1-inch. Due to the granular nature of the foundation soil, settlement is expected to occur rapidly as the embankments are constructed. Consequently, no appreciable post construction settlement is anticipated and no monitoring or construction delay is recommended.

9. PAVEMENT DESIGN

9.1. GENERAL

The subgrade R-value for the on-site soil was evaluated in the laboratory on two (2) soil samples obtained from the test borings B-1 and B-2. Testing was in conformance with California Test Method 301. The soil tested had measured R-values of 69 and 40 by exudation, respectively. During testing expansion pressures were observed, however were not significant enough to control design.

9.2. EXISTING PAVEMENT SECTIONS ON FULKERTH AVENUE

Pavement sections were measured at four (4) locations along Fulkerth Avenue within the project limits. Table 9.2-1 provides the pavement sections encountered at various points of exploration.

TABLE 9.2-1
EXISTING PAVEMENT SECTIONS FROM CORES

Location	Approximate Station (feet)	Lane	Approximate HMA Thickness (feet)	Approximate Base Thickness (feet)
C-1	9+83	Eastbound Lane 2	0.46	0.71
C-2	26+21	Westbound Lane 1	0.42	0.42
C-3	20+41	Eastbound Lane 1	0.42	0.58
C-4	17+73	Westbound Lane 2	0.38	0.63

9.3. NEW CONVENTIONAL FLEXIBLE PAVEMENT

New conventional asphalt concrete (AC) pavement has been evaluated using Caltrans design methods and criteria. Table 9.3-1 provides the recommended flexible pavement sections for the various design traffic indexes (TI) provided by designers.

TABLE 9.3-1
RECOMMENDED PAVEMENT SECTIONS

TI	Recommended Minimum Section*
6.0	0.25'HMA-A/0.55'AB
8.0	0.40'HMA-A/0.70'AB
10.0	0.50'HMA-A/0.95'AB

Based on R-Value = 40

The Type A hot mix asphalt (HMA-A) and Class 2 aggregate base (AB) should be in conformance with the latest revision of the Caltrans Standard Specifications. The pavement subgrade should be compacted to 95% relative compaction to 2.5 feet below the pavement surface or 0.5 feet below the subgrade surface, whichever is greater. If the City of Turlock has less stringent criteria for subgrade compaction, it could be used for Fulkerth Avenue, provided the subgrade is unyielding at the time of AB laydown.

10. LIMITATIONS

Recommendations contained in this report are based on the field observations, subsurface explorations, laboratory tests, and present knowledge of the proposed construction, as described in this report. It is possible that soil conditions vary between or beyond the points explored. If soil or groundwater conditions are encountered during construction that differ from those described herein, Kleinfelder should be notified immediately in order that a review may be made and any supplemental recommendations provided. If the scope of the proposed construction changes from that described in this report, the recommendations should also be reviewed. Kleinfelder has not reviewed the final grading plans or foundation plans for the project.

Kleinfelder has strived to present the findings, conclusions and recommendations in this report in a manner consistent with the standards of care and skill ordinarily exercised by members of this profession practicing under similar conditions in the vicinity of the project site, and at the time the services were performed. No warranty, express or implied, is made. The recommendations provided in this report are based on the assumption that an adequate program of tests and observations will be conducted by Kleinfelder during project construction in order to evaluate compliance with the recommendations and/or to provide supplemental recommendations, as needed, if anticipated subsurface conditions are encountered.

This report may be used only by the client and only for the purposes stated, within a reasonable time from its issuance, but in no event later than one year (without review) from the date of the report. Land use, site conditions or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client who wishes to use this report shall notify Kleinfelder of such intended use. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party, and client agrees to defend, indemnify, and hold harmless Kleinfelder from any claim or liability associated with such unauthorized use or non-compliance.

The scope of the geotechnical services did not include any environmental site assessment for the presence or absence of hazardous/toxic materials. Kleinfelder will assume no responsibility or liability whatsoever for any claim, damage, or injury which results from pre-existing hazardous materials being encountered or present on the project site, or from the discovery of such hazardous materials.

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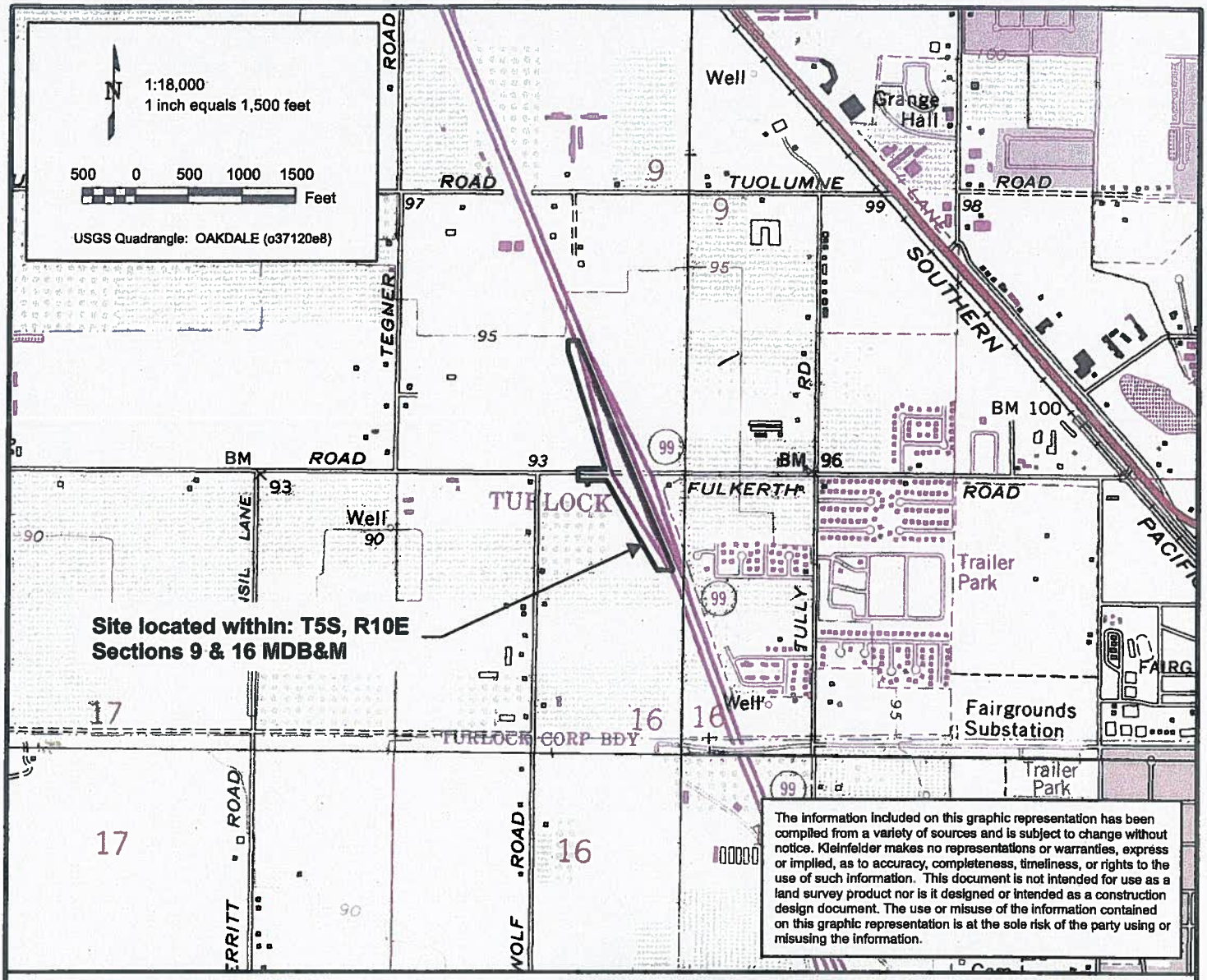
PLATES



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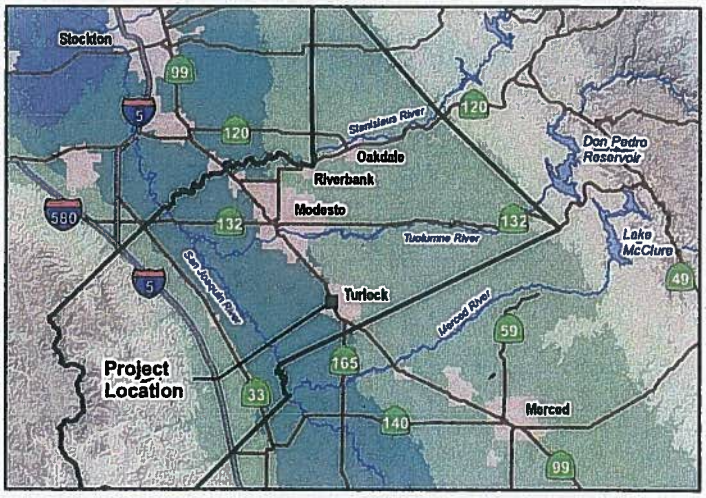


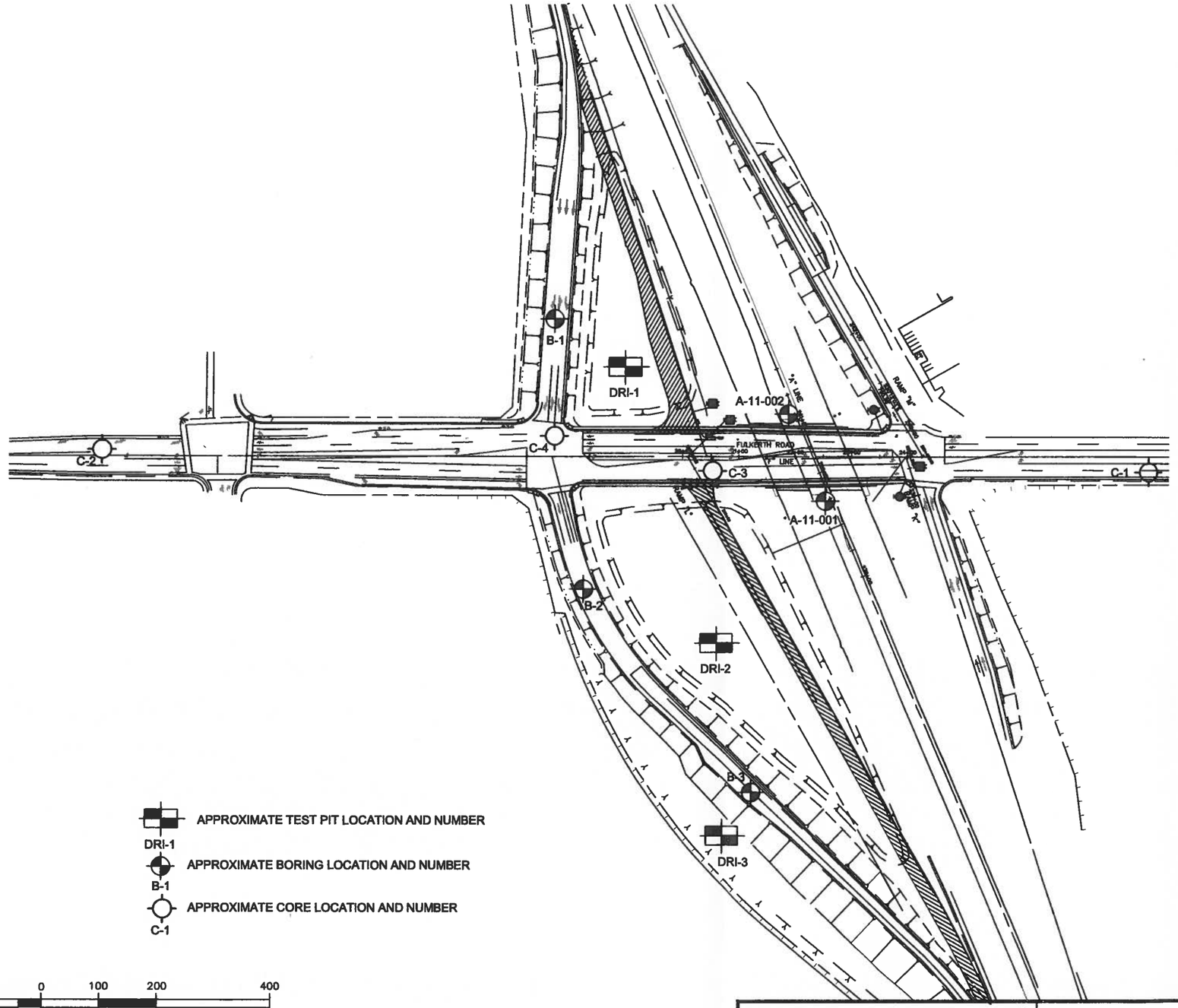
KLEINFELDER
1410 F Street
Fresno, CA 93706
o| 559.486.0750 • f| 559.442.5081
www.kleinfelder.com

SITE VICINITY MAP

Proposed SR99/Fulkerth Road Interchange
City of Turlock
Stanislaus County, California

Plate 1

Cartography By: S. Kapoor	Date: 02/12/09	Project Number: 98834	File Name: 98834_P1_02-12-09.mxd



APPROXIMATE TEST PIT LOCATION AND NUMBER
DRI-1

APPROXIMATE BORING LOCATION AND NUMBER
B-1

APPROXIMATE CORE LOCATION AND NUMBER
C-1

N

200 0 100 200 400

SCALE: 1 inch = 200 ft.

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PROJECT NO.	98834
DRAWN:	05/11/11
DRAWN BY:	MRB
CHECKED BY:	JJK
FILE NAME:	plot_plan.dwg

PLOT PLAN

SR99 & FULKERTH ROAD INTERCHANGE
RETAINING WALL STUDY
TURLOCK, CALIFORNIA

PLATE
2

ATTACHMENTS

PRELIMINARY
NOT FOR
CONSTRUCTION

DIST	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	STA	99	4.3	7	19

REGISTERED CIVIL ENGINEER _____ DATE _____

REGISTERED PROFESSIONAL ENGINEER * No. _____ Exp. _____ CIVIL * STATE OF CALIFORNIA

PLANS APPROVAL DATE _____

CITY OF TURLOCK
156 SOUTH BROADWAY
TURLOCK, CA 95380

OMNI-MEANS, LTD.
330 HARTNELL AVE., SUITE B
REDDING, CA 96002

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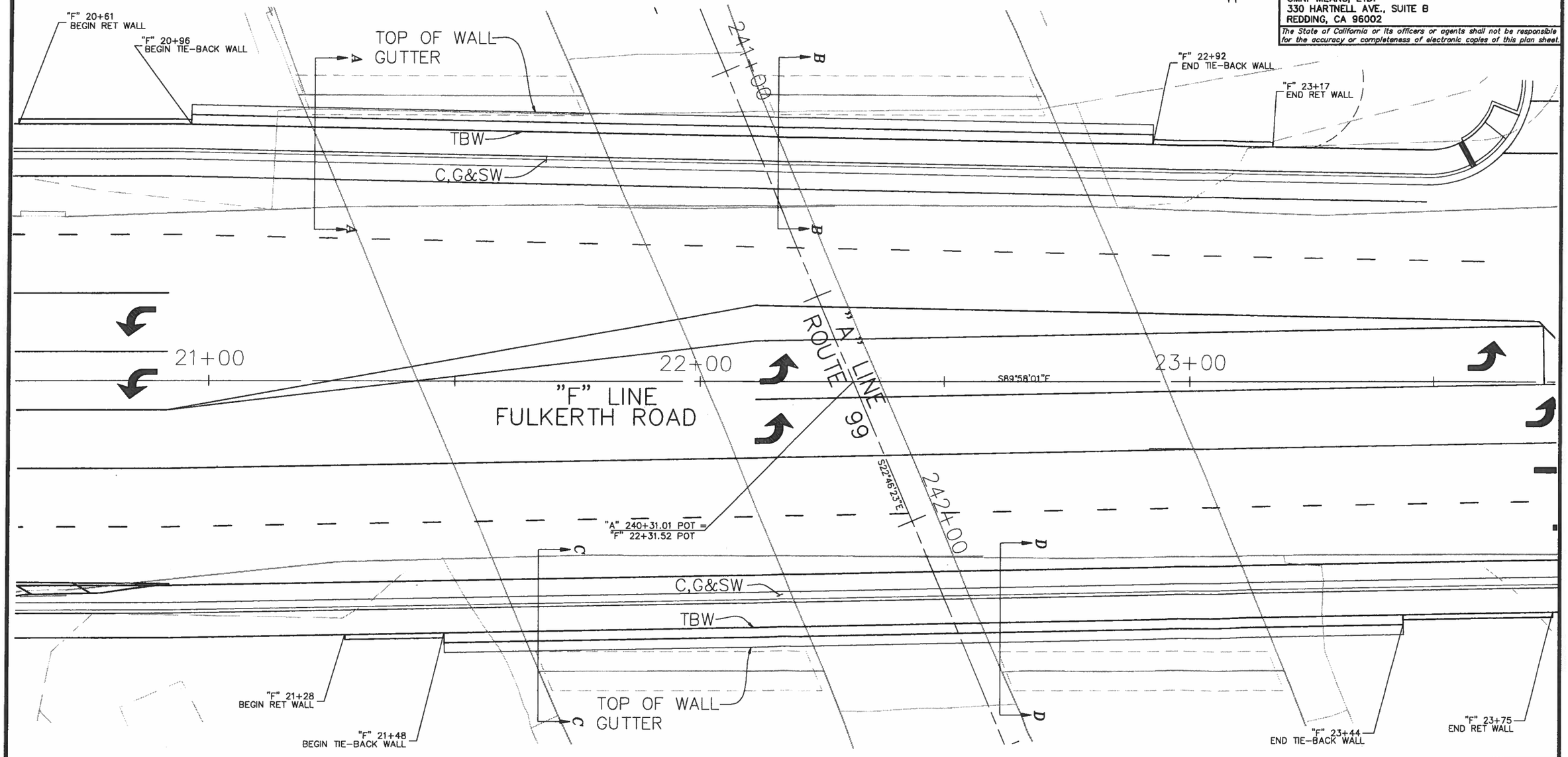

REVISIONS			
NO.	DESCRIPTION	DATE	BY

50 0 50
1 inch = 50 ft.

omni • means
ENGINEERS PLANNERS
REDDING
330 Hartnell Ave. Suite B
Redding, CA 96002
(530) 242-1700
With offices in:
ROSEVILLE
WALNUT CREEK
VISALIA
JOB NO. 45-7328-39

TIE-BACK WALL LOCATION

ROUTE 99 / FULKERTH ROAD
CITY OF TURLOCK

SCALE	1" = 10'
DESIGNED	RAW
DRAWN	WSB
CHECKED	KEM
FILE NAME	164EX021
DATE	11/16/10

10-0T910

SHEET No. EX21

1 OF 2

PRELIMINARY
NOT FOR
CONSTRUCTION

DIST	COUNTY	ROUTE	POST MILE TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	STA	99	4.3	7	19

REGISTERED CIVIL ENGINEER _____ DATE _____

PLANS APPROVAL DATE _____

REGISTERED PROFESSIONAL ENGINEER — No. _____ Exp. _____ CIVIL — STATE OF CALIFORNIA

CITY OF TURLOCK
156 SOUTH BROADWAY
TURLOCK, CA 95380

OMNI-MEANS, LTD.
330 HARTNELL AVE., SUITE B
REDDING, CA 96002

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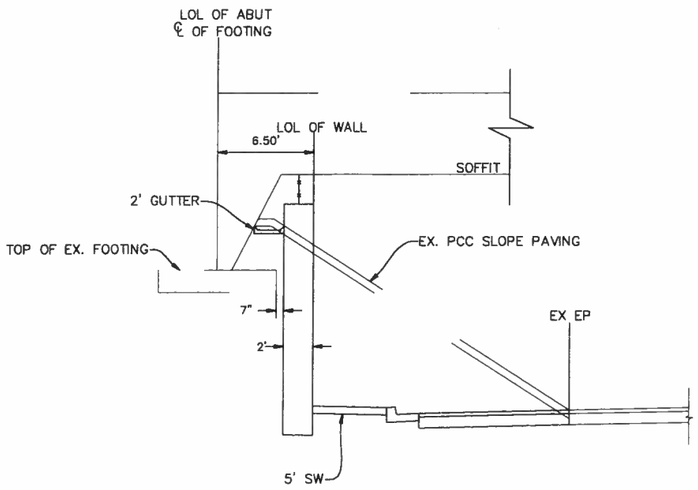
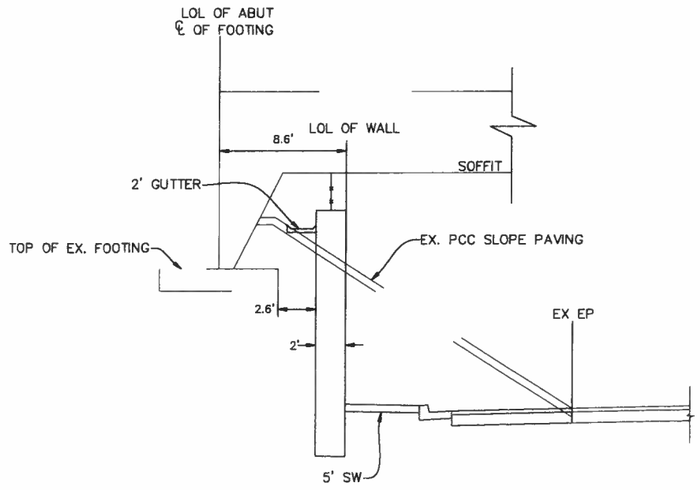


SECTION A-A



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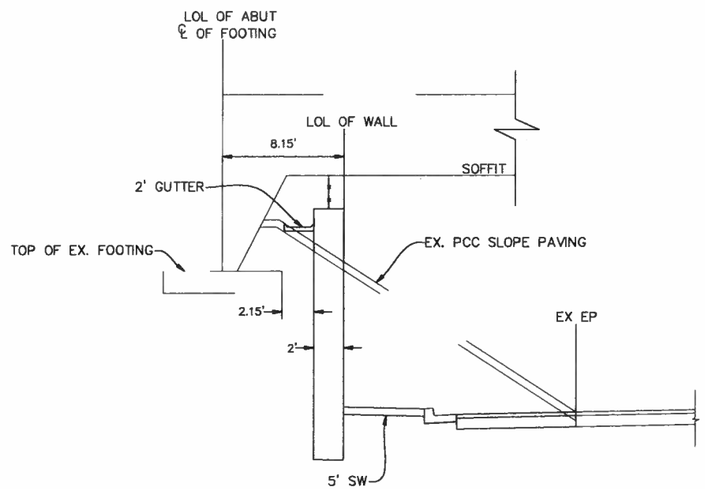
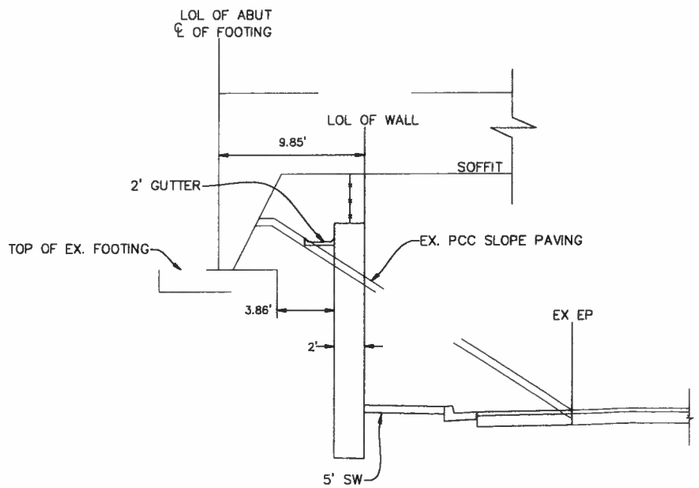


SECTION C-C



SECTION D-D

REVISIONS			
NO.	DESCRIPTION	DATE	BY

1' 0 1'
1 inch = 1 ft.

omni • means
ENGINEERS PLANNERS
REDDING 330 Hartnell Ave. Suite B Redding, CA 96002 (530) 242-1700
With offices in: ROSEVILLE WALNUT CREEK VISALIA
JOB NO. 45-7328-39

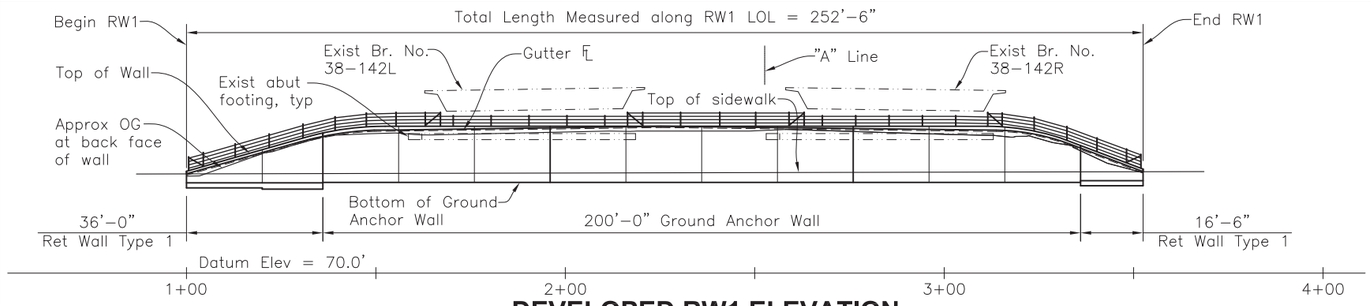
TIE-BACK WALL LOCATION

ROUTE 99 / FULKERTH ROAD
CITY OF TURLOCK

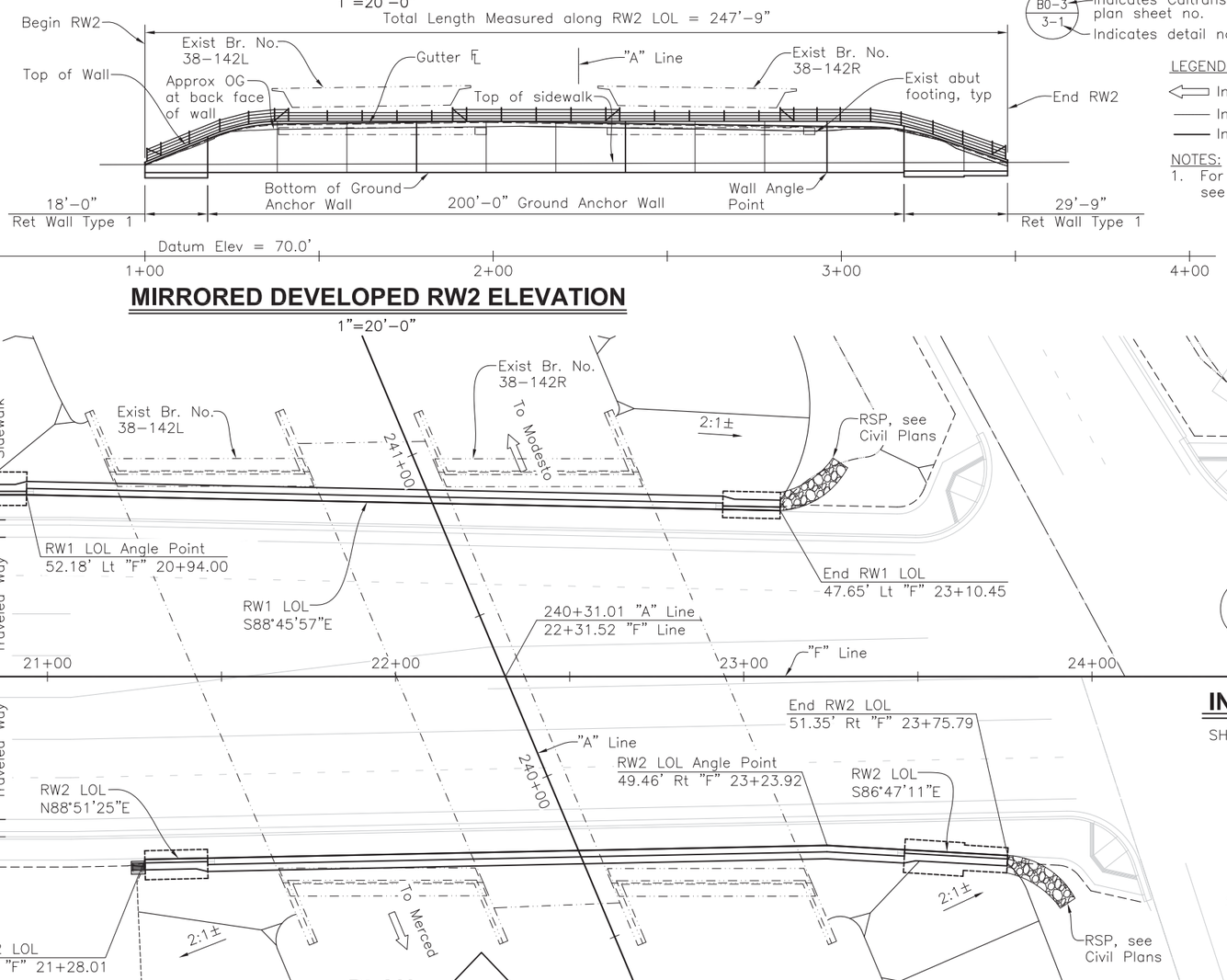
10-0T910

SCALE	NTS
DESIGNED	RAW
DRAWN	WSB
CHECKED	KEM
FILE NAME	164EX021
DATE	11/16/10

SHEET No. EX21
2 OF 2



DEVELOPED RW1 ELEVATION



MIRRORED DEVELOPED RW2 ELEVATION

PLAN

1"=20'–0"

N

CALTRANS STANDARD PLANS DATED 2010

A10A	ABBREVIATIONS (SHEET 1 OF 2)
A10B	ABBREVIATIONS (SHEET 2 OF 2)
A10C	LINES AND SYMBOLS (SHEET 1 OF 3)
A10D	LINES AND SYMBOLS (SHEET 2 OF 3)
A10E	LINES AND SYMBOLS (SHEET 3 OF 3)
A62B	LIMITS OF PAYMENT FOR EXCAVATION AND BACKFILL
B0–1	BRIDGE DETAILS
B0–3	BRIDGE DETAILS
RSP B3–1A	RETAINING WALL TYPE 1 (CASE 1)
RSP B3–5	RETAINING WALL DETAILS No. 1
B3–6	RETAINING WALL DETAILS No. 2
RSP B11–47	CABLE RAILING

B0–3 / 3–1 — Indicates Caltrans standard plan sheet no. / Indicates detail no.

LEGEND:

⇦ Indicates direction of traffic
—— Indicates existing structure
—— Indicates new construction

NOTES:
1. For General Notes and Quantities see FOUNDATION PLAN sheet.

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	STA	99	R4.1/R4.9	1	X

REGISTERED STRUCTURAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — TODD M. GOOLKASIAN — No. S3543 EXP. 3/31/15 — STRUCTURAL — STATE OF CALIFORNIA

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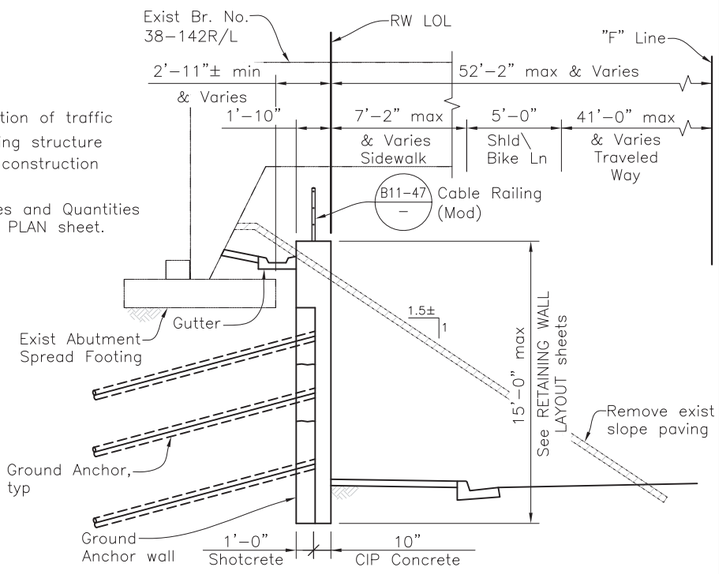
CORNERSTONE STRUCTURAL ENGINEERING GROUP
986 W. Alluvial Ave, Suite 201
Fresno, California 93711
(559)320–3200

CITY OF TURLOCK
156 SOUTH BROADWAY
TURLOCK, CA 95830



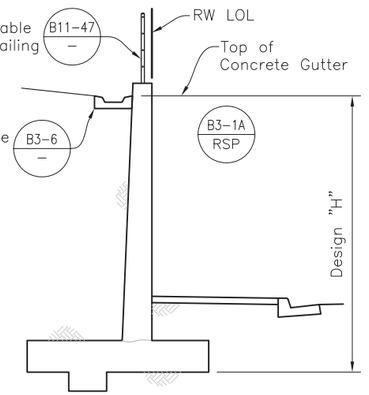
TYPICAL GROUND ANCHOR WALL SECTION

No Scale

60% SUBMITTAL PRELIMINARY, NOT FOR CONSTRUCTION

INDEX TO PLANS

SHEET NO.	TITLE
S–1	GENERAL PLAN
S–2	FOUNDATION PLAN
S–3	RETAINING WALL No. 1 LAYOUT
S–4	RETAINING WALL No. 2 LAYOUT
S–5	RETAINING WALL DETAILS No. 1
S–6	RETAINING WALL DETAILS No. 2
S–7	DRAINAGE DETAILS
S–8	LOG OF TEST BORINGS (1 OF 4)
S–9	LOG OF TEST BORINGS (2 OF 4)
S–10	LOG OF TEST BORINGS (3 OF 4)
S–11	LOG OF TEST BORINGS (4 OF 4)



TYPICAL TYPE 1 RETAINING WALL SECTION

No Scale

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

PLAN CHECK SET - NOT FOR CONSTRUCTION

DESIGN OVERSIGHT	DESIGN	BY Chris Ingle	CHECKED	LRFD	LIVE LOADING: "LOAD & RESISTANCE FACTOR DESIGN", & "HL93 W/ 'LOW BOY' & PERMIT DESIGN VEHICLE"		
	DETAILS	BY Scott Hamm	CHECKED	LAYOUT	BY Mark Weaver	CHECKED	
SIGN OFF DATE	QUANTITIES	BY Chris Ingle	CHECKED	SPECIFICATIONS	BY Mark Weaver	PLANS AND SPECS COMPARED	

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

Mark Weaver, PROJECT ENGINEER

BRIDGE NO. 38–142 R/L; POST MILE 4.55

FULKERTH RETAINING WALLS
GENERAL PLAN

DESIGN GENERAL PLAN SHEET (ENGLISH) (REV. 03/14/12)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: – PROJECT NUMBER & PHASE: – CONTRACT NO.: 10–0T9100

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
				1	11

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DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	STA	99	R4.1/R4.9	2	X

REGISTERED STRUCTURAL ENGINEER

PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER — TODD M. GOOLKASIAN — No. S3543 EXP. 3/31/15 — STRUCTURAL — STATE OF CALIFORNIA

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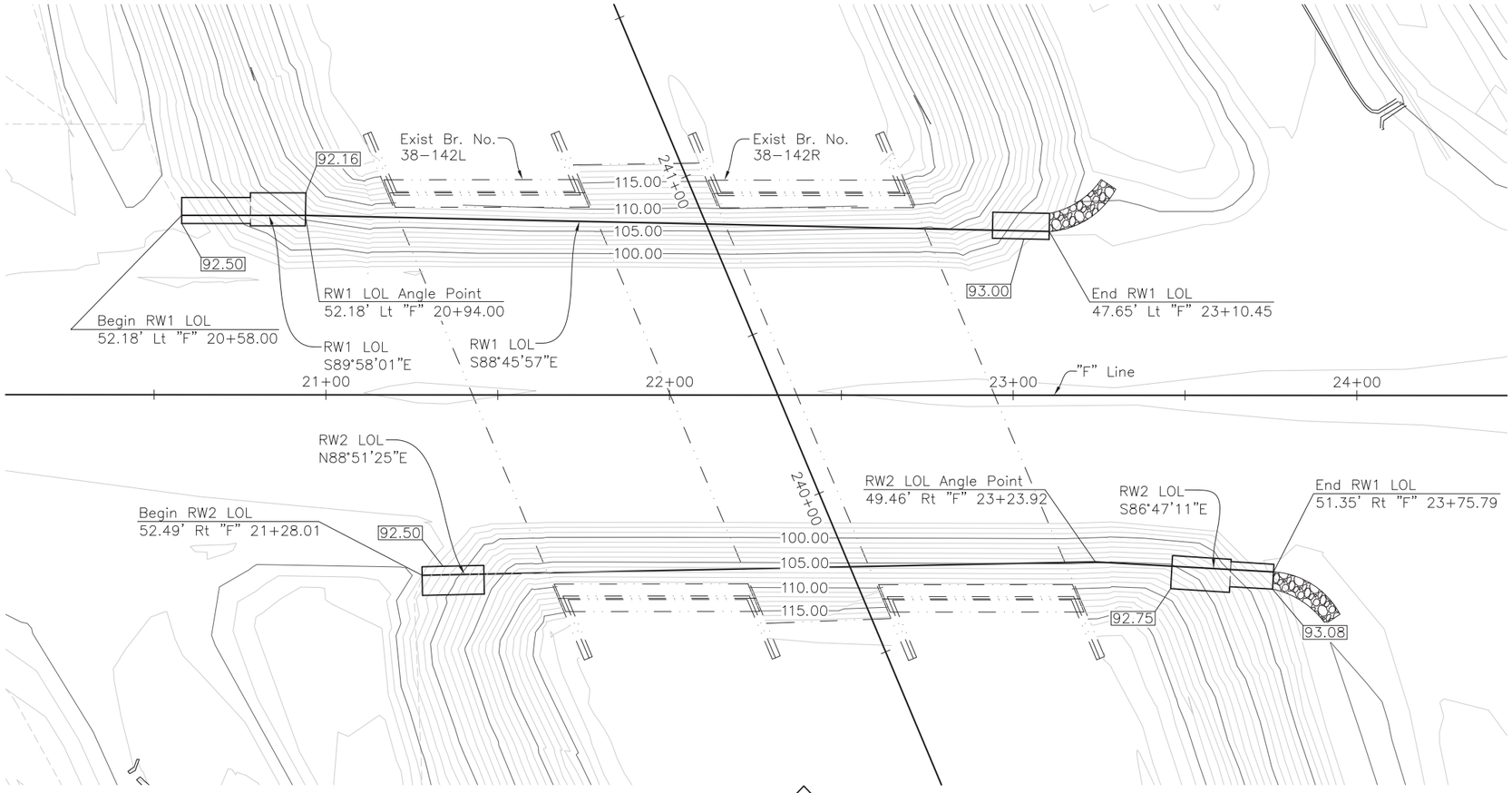
986 W. Alluvial Ave, Suite 201
Fresno, California 93711
(559)320-3200

CITY OF TURLOCK
156 SOUTH BROADWAY
TURLOCK, CA 95830

QUANTITIES

STRUCTURE EXCAVATION (RETAINING WALL)	292	CY
STRUCTURE EXCAVATION (GROUND ANCHOR WALL)	574	CY
STRUCTURE BACKFILL (RETAINING WALL)	185	CY
STRUCTURE BACKFILL (GROUND ANCHOR WALL)	30	CY
GROUND ANCHOR	116	EA
STRUCTURE CONCRETE, RETAINING WALL	298	CY
SHOTCRETE	177	CY
BAR REINFORCING STEEL (RETAINING WALL)	100289	LB
MINOR CONCRETE (GUTTER)	506	LF
CABLE RAILING	507	LF
REMOVE SLOPE PAVING	7668	CY



PLAN
1"=20'-0"

GENERAL NOTES
LOAD AND RESISTANCE FACTOR DESIGN

DESIGN: AASHTO LRFD Bridge Design Specifications, 2012 (Sixth Edition) with California Amendments (AASHTO-CA BDS-6)

WALL DESIGN LOADING: Lateral Earth load based on Caltrans Memo to Designers 5-12 "Earth Retaining Systems Using Ground Anchors"

SOIL PARAMETERS: Geotechnical Design Report by Kleinfelder, dated September 2, 2011

$\phi = 32°$
$\gamma = 118$ pcf
c = 160 psf

SEISMIC: $k_h = 0.278$
$k_v = 0.000$

REINFORCED CONCRETE: f'c = 3600 psi
fy = 60 ksi

REINFORCED SHOTCRETE: f'c = 4000 psi
f'ci = 3600 ksi
fy = 60 ksi

GROUND ANCHORS: See RETAINING WALL DETAILS No. 2 sheet.
LL = Anchor lock-off load = 0.67 (FDL)
Unbonded Length = 15'-0"

Ground Anchor Factored Test Load (FTL)			
Lift	FTL	FDL	LL
First	80	80	54
Second	90	90	60
Third	80	80	54

LEGEND:

92.50 Indicates bottom of footing elevation

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

60% SUBMITTAL PRELIMINARY, NOT FOR CONSTRUCTION

PLAN CHECK SET - NOT FOR CONSTRUCTION

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

GEOTECHNICAL PROFESSIONAL APPROVAL DATE

DESIGN OVERSIGHT

SIGN OFF DATE

SCALE: AS NOTED	VERT.DATUM NAVD 88	HORZ.DATUM NAD 83 Epoch 2007.00	DESIGN	BY Chris Ingle	CHECKED	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Mark Weaver, PROJECT ENGINEER
PHOTOGRAMMETRY AS OF: N/A	ALIGNMENT TIES N/A		DETAILS	BY Scott Hamm	CHECKED		BRIDGE NO. 38-142 R/L
SURVEYED BY B. Howard	DRAFTED BY J. Wunschel		QUANTITIES	BY Chris Ingle	CHECKED		POST MILE 4.55
FIELD CHECKED BY T. Eckerman	CHECKED BY R. Blais						

FULKERTH RETAINING WALLS
FOUNDATION PLAN

FOUNDATION PLAN SHEET (ENGLISH) (REV. 03/14/12)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: —
PROJECT NUMBER & PHASE: —
CONTRACT NO.: 10-0T9100

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
				2	11

FILE => W:\2014\2014003 Fulkerth Tieback Wall PS&E\2014003S2 - Foundation Plan.dwg

USERNAME => shamm DATE PLOTTED => 5/6/2014 TIME PLOTTED => 4:27:18 PM

CONSTRUCTION SEQUENCE

Stage 1 – Excavate and construct ground anchor wall for segment ① of Lift 1
Stage 2 – Excavate and construct ground anchor wall for segment ② of Lift 1
Stage 3 – Excavate and construct ground anchor wall for segment ③ of Lift 1
Stage 4 – Repeat Stages 1 through 3 for Lift 2 along full length of wall
Stage 5 – Repeat Stages 1 through 3 for Lift 3 along full length of wall
Stage 6 – Construct cast–in–place concrete facing in front of ground anchor wall along full length of wall
Stage 7 – Excavate and construct Type 1 retaining walls, see B3-1A / RSP

NOTE:
Excavation for a lower lift of ground anchors must not be started until the wall has been completely installed in the lift above.

NOTES:

1. For "Section A–A", see RETAINING WALL DETAILS No. 1 sheet.
2. For Type 1 Retaining wall drainage, see DRAINAGE DETAILS sheet

LEGEND:

- ⊠ Indicates Ground Anchor locations
- - - - Indicates existing structure
- —— Indicates new construction
- TOW Indicates top of wall
- TOG Indicates top of gutter

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

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	STA	99	R4.1/R4.9	3	X

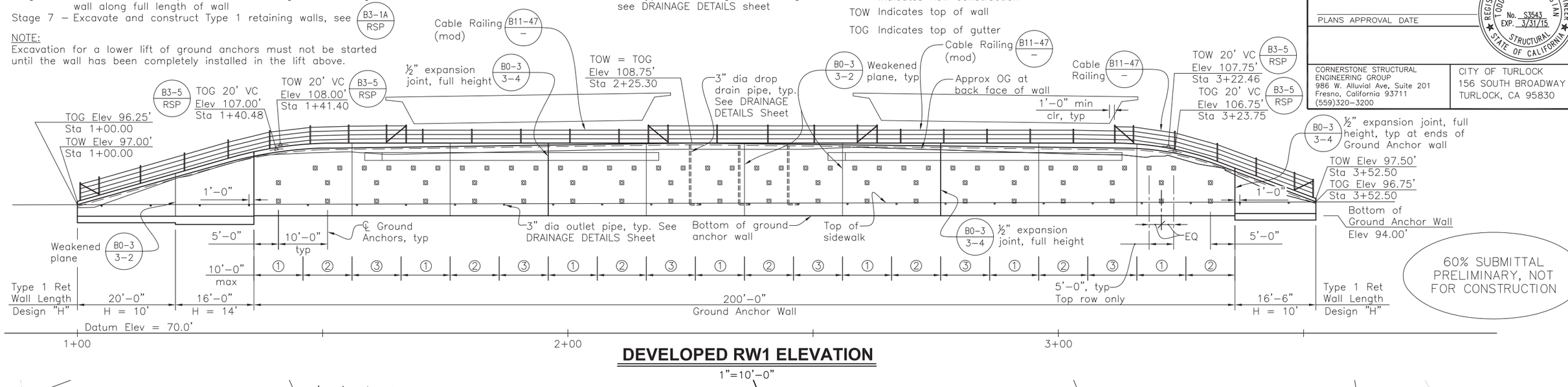
REGISTERED STRUCTURAL ENGINEER

REGISTERED PROFESSIONAL ENGINEER · TODD M. GOOLKASIAN · No. S3543 EXP. 3/31/15 · STRUCTURAL · STATE OF CALIFORNIA

PLANS APPROVAL DATE

CORNERSTONE STRUCTURAL ENGINEERING GROUP
986 W. Alluvial Ave, Suite 201
Fresno, California 93711
(559)320–3200

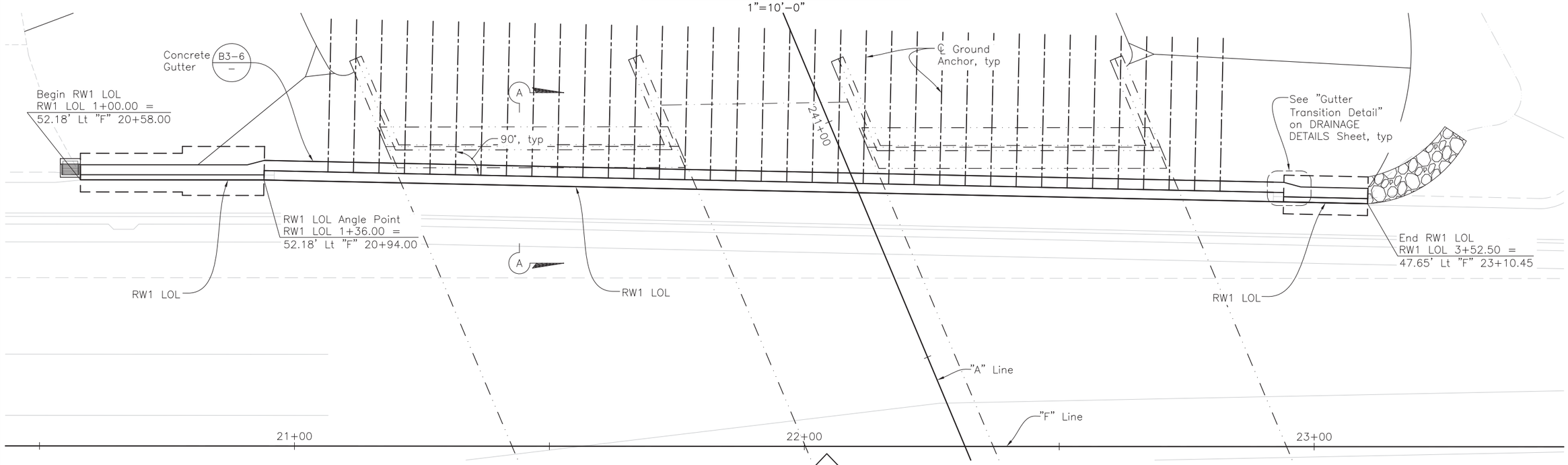
CITY OF TURLOCK
156 SOUTH BROADWAY
TURLOCK, CA 95830



60% SUBMITTAL PRELIMINARY, NOT FOR CONSTRUCTION

DEVELOPED RW1 ELEVATION

1"=10'–0"



PLAN

1"=10'–0"

N

PLAN CHECK SET - NOT FOR CONSTRUCTION

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

DESIGN OVERSIGHT		DESIGN	BY Chris Ingle	CHECKED	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Mark Weaver PROJECT ENGINEER
SIGN OFF DATE		DETAILS	BY Scott Hamm	CHECKED		BRIDGE NO. 38–142 R/L; POST MILES 4.55
DESIGN DETAIL SHEET (ENGLISH) (REV. 7/16/10)		QUANTITIES	BY Chris Ingle	CHECKED	ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3	UNIT: – PROJECT NUMBER & PHASE: – CONTRACT NO.: 10–0T9100

FULKERTH RETAINING WALLS

RETAINING WALL No. 1 LAYOUT

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
				3	11

FILE => W:\2014\2014003 Fulkerth Tieback Wall PS&E\2014003S3 – Retaining Wall No.1 Layout.dwg

USERNAME => shamm DATE PLOTTED => 5/8/2014 TIME PLOTTED => 3:32:54 PM

CONSTRUCTION SEQUENCE

Stage 1 – Excavate and construct ground anchor wall for segment ① of Lift 1
Stage 2 – Excavate and construct ground anchor wall for segment ② of Lift 1
Stage 3 – Excavate and construct ground anchor wall for segment ③ of Lift 1
Stage 4 – Repeat Stages 1 through 3 for Lift 2 along full length of wall
Stage 5 – Repeat Stages 1 through 3 for Lift 3 along full length of wall
Stage 6 – Construct cast–in–place concrete facing in front of ground anchor wall along full length of wall
Stage 7 – Excavate and construct Type 1 retaining walls, see B3-1A / RSP

NOTE:
Excavation for a lower lift of ground anchors must not be started until the wall has been completely installed in the lift above.

NOTES:

1. For "Section A–A", see RETAINING WALL DETAILS No. 1 sheet.
2. For Type 1 Retaining wall drainage, see DRAINAGE DETAILS sheet.

LEGEND:

- ⊠ Indicates Ground Anchor locations
- – · – Indicates existing structure
- —— Indicates new construction
- TOW Indicates top of wall
- TOG Indicates top of gutter

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

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	STA	99	R4.1/R4.9	4	X

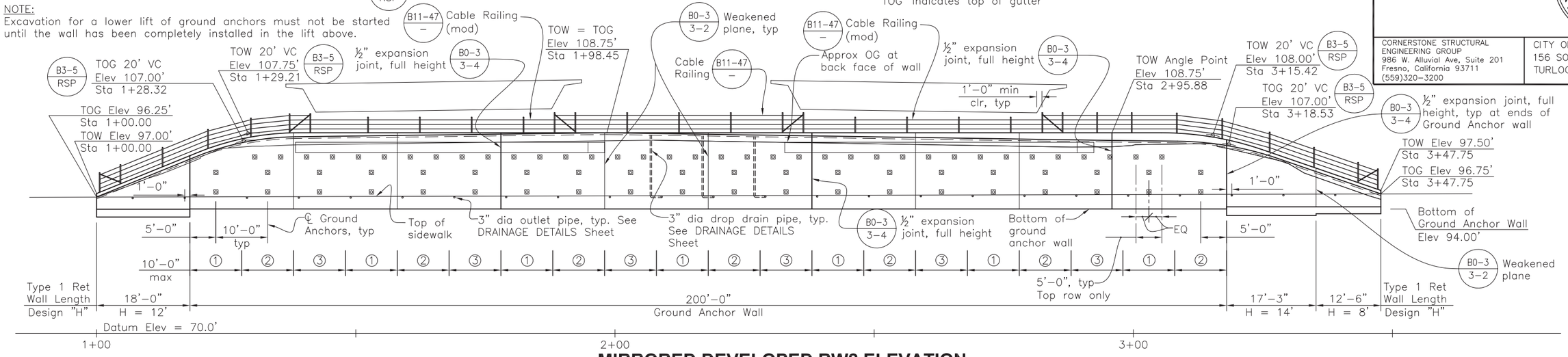
REGISTERED STRUCTURAL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER · TODD M. GOOLKASIAN · No. S3543 EXP. 3/31/15 · STRUCTURAL · STATE OF CALIFORNIA

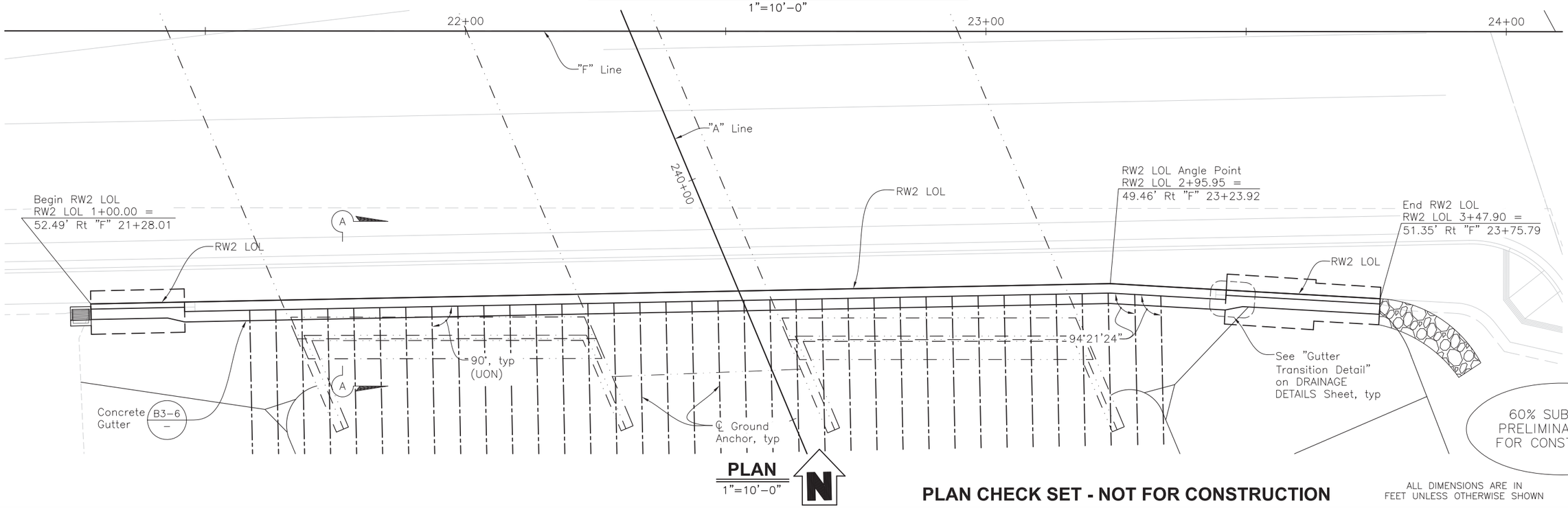
CORNERSTONE STRUCTURAL ENGINEERING GROUP
986 W. Alluvial Ave, Suite 201
Fresno, California 93711
(559)320–3200

CITY OF TURLOCK
156 SOUTH BROADWAY
TURLOCK, CA 95830



MIRRORED DEVELOPED RW2 ELEVATION

1"=10'–0"



PLAN

1"=10'–0"

60% SUBMITTAL PRELIMINARY, NOT FOR CONSTRUCTION

PLAN CHECK SET - NOT FOR CONSTRUCTION

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

DESIGN OVERSIGHT

SIGN OFF DATE

	BY	CHECKED
DESIGN	Chris Ingle	
DETAILS	Scott Hamm	
QUANTITIES	Chris Ingle	

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

Mark Weaver
PROJECT ENGINEER

BRIDGE NO. 38–142 R/L
POST MILES 4.55

FULKERTH RETAINING WALLS

RETAINING WALL No. 2 LAYOUT

DESIGN DETAIL SHEET (ENGLISH) (REV. 7/16/10)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: –
PROJECT NUMBER & PHASE: –
CONTRACT NO.: 10–0T9100

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
				4	11

FILE => W:\2014\2014003 Fulkerth Tieback Wall PS&E\2014003S4 – Retaining Wall No.2 Layout.dwg

USERNAME => shamm DATE PLOTTED => 5/8/2014 TIME PLOTTED => 3:57:38 PM

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	STA	99	R4.1/R4.9	213	216

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Justin J. Kempton — No. 2385 — Exp. 9/30/15 — GEOTECHNICAL — STATE OF CALIFORNIA

Prepared for:
OMNI-MEANS, LTD
330 HARTNELL AVE., SUITE B
REDDING, CALIFORNIA 96002

Prepared by:
KLEINFELDER
5125 N. GATES AVE., SUITE 102
FRESNO, CALIFORNIA 93722

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.

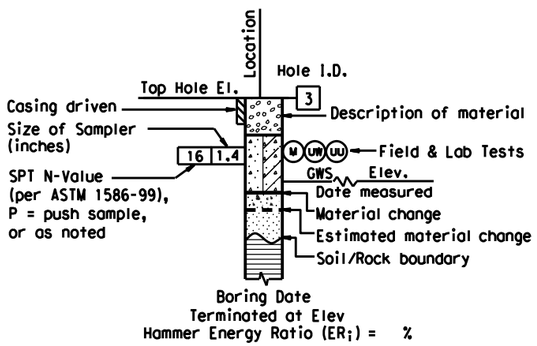
BOREHOLE IDENTIFICATION

Symbol	Hole Type	Description
Size	A	Auger Boring (hollow or solid stem bucket)
Size	R RW RC P	Rotary drilled boring (conventional) Rotary drilled with self-casing wire-line Rotary core with continuously-sampled, self-casing wire-line 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 on LOTB)

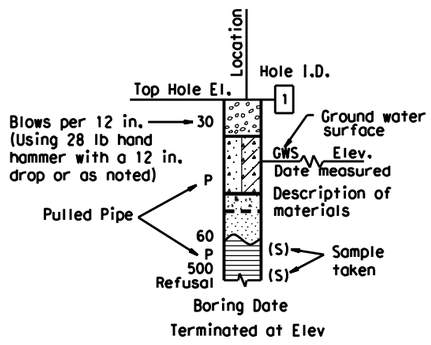
Note: Size in inches.

CONSISTENCY OF COHESIVE SOILS

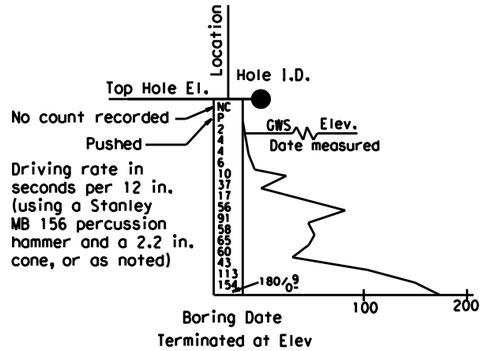
Description	Shear Strength (tsf)	Pocket Penetrometer Measurement, PP, (tsf)	Torvane Measurement, TV, (tsf)	Vane Shear Measurement, VS, (tsf)
Very Soft	Less than 0.12	Less than 0.25	Less than 0.12	Less than 0.12
Soft	0.12 - 0.25	0.25 - 0.5	0.12 - 0.25	0.12 - 0.25
Medium Stiff	0.25 - 0.5	0.5 - 1	0.25 -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



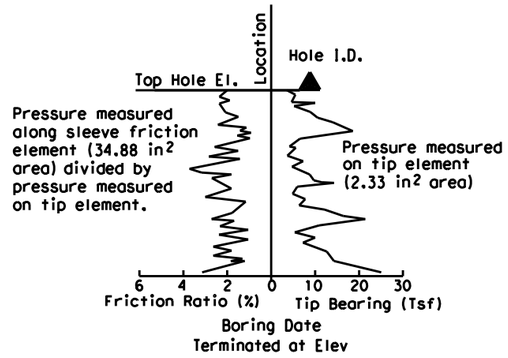
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) BORING

X DESIGN OVERSIGHT X SIGN OFF DATE	DRAWN BY CHECKED BY	D. FAHRNEY M. BELTRAN	M. SHUBERT FIELD INVESTIGATION BY: DATE: X	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	X PROJECT ENGINEER	BRIDGE NO. 38-142 R/L POST MILES R4.55	SR99 AND FULKERTH ROAD INTERCHANGE LOG OF TEST BORINGS (1 of 3)

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 03/14/12)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: X
PROJECT NUMBER & PHASE: X
CONTRACT NO.: X

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES				SHEET	OF
X				9	12

FILE => $REQUEST

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

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

GROUP SYMBOLS AND NAMES

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

FIELD AND LABORATORY TESTING

- (C) Consolidation (ASTM D 2435)
- (CL) Collapse Potential (ASTM D 5333)
- (CP) Compaction Curve (CTM 216)
- (CR) 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
- (R) R-Value (CTM 301)
- (SE) Sand Equivalent (CTM 217)
- (SG) Specific Gravity (AASHTO T 100)
- (SL) Shrinkage Limit (ASTM D 427)
- (SW) Swell Potential (ASTM D 4546)
- (UC) Unconfined Compression-Soil (ASTM D 2166) Unconfined Compression-Rock (ASTM D 2938)
- (UU) Unconsolidated Undrained Triaxial (ASTM D 2850)
- (UW) Unit Weight (ASTM D 4767)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	STA	99	R4.1/R4.9	214	216

GEOTECHNICAL PROFESSIONAL DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Justin J. Kempton — No. 2385 — Exp. 9/30/15 — GEOTECHNICAL — 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.

Prepared for:
OMNI-MEANS, LTD
330 HARTNELL AVE., SUITE B
REDDING, CALIFORNIA 96002

Prepared by:
KLEINFELDER
5125 N. GATES AVE., SUITE 102
FRESNO, CALIFORNIA 93722

APPARENT DENSITY OF COHESIONLESS SOILS

Description	SPT N_{60} (Blows / 12 in.)
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

MOISTURE

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

PERCENT OR PROPORTION OF SOILS

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

PARTICLE SIZE

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

X
DESIGN OVERSIGHT

X
SIGN OFF DATE

DRAWN BY: D. FAHRNEY
CHECKED BY: M. BELTRAN

M. SHUBERT
FIELD INVESTIGATION BY:
DATE: X

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

X
PROJECT ENGINEER

BRIDGE NO. 38-142 R/L
POST MILES R4.55

SR99 AND FULKERTH ROAD INTERCHANGE
LOG OF TEST BORINGS (2 of 3)

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 03/14/12)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: X
PROJECT NUMBER & PHASE: X
CONTRACT NO.: X

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES: X

SHEET 10 OF 12

FILE => $REQUEST

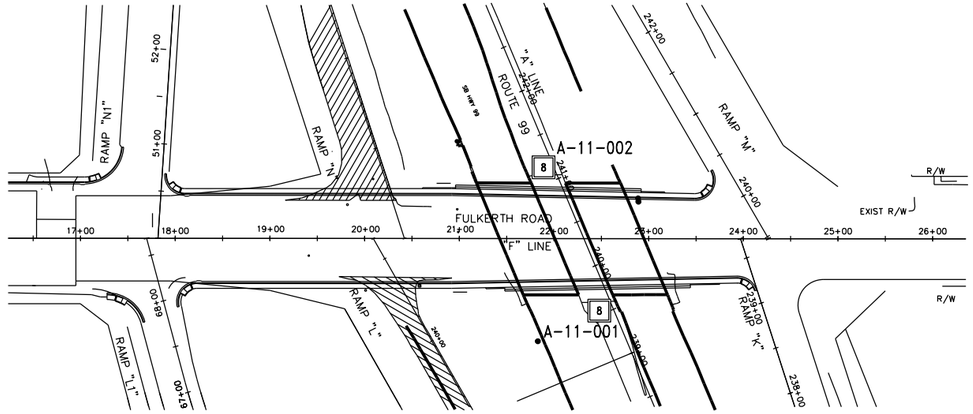
USERNAME => $USER DATE PLOTTED => $DATE TIME PLOTTED => $TIME

NOTES:

1. B.M. R.P. No. 3 Elev. 290.85
   1 1/4" I.P. w/ H&T, dn 0.6'
   34" Lt 22+25.00 "C"

2. Groundwater was encountered within the depths of exploration at 40.5 feet below existing grade in boring A-11-001.

3. Hammer type – Automatic safety hammer with a 140 lb safety drop hammer dropping 30 inches.



PLAN
1" = 80'

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No	TOTAL SHEETS
10	STA	99	R4.1/R4.9	215	216

GEOTECHNICAL PROFESSIONAL DATE

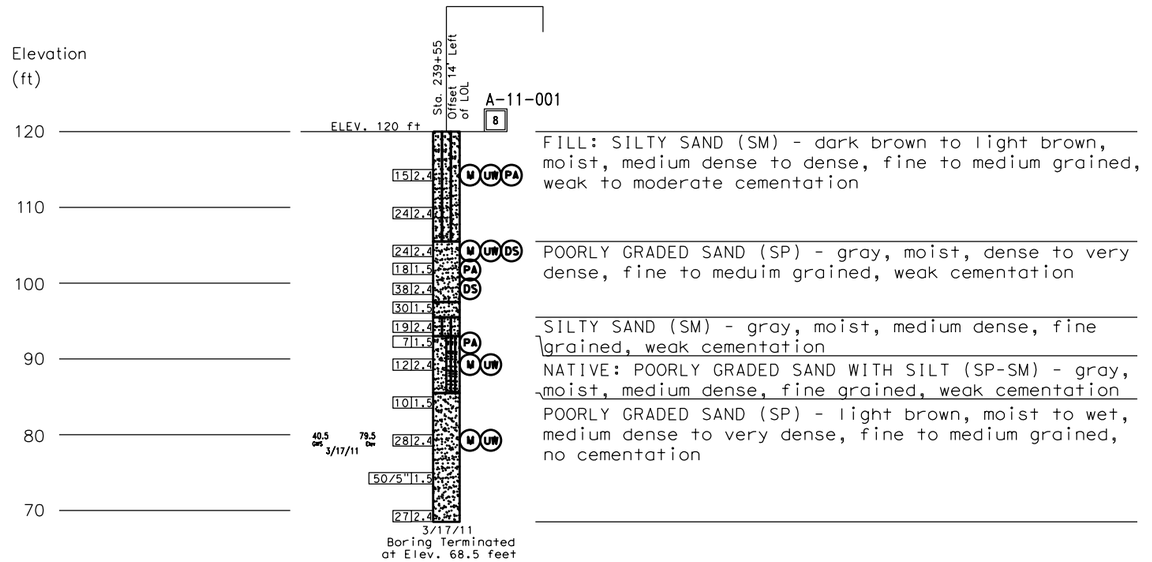
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
Justin J. Kempton
No. 2385
Exp. 9/30/15
GEOTECHNICAL
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.

Prepared for:
OMNI-MEANS, LTD
330 HARTNELL AVE., SUITE B
REDDING, CALIFORNIA 96002

Prepared by:
KLEINFELDER
5125 N. GATES AVE., SUITE 102
FRESNO, CALIFORNIA 93722



PROFILE
Vertical 1" = 10'
Horizontal 1" = 10'

X DESIGN OVERSIGHT	DRAWN BY	D. FAHRNEY	M. SHUBERT FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	X PROJECT ENGINEER	BRIDGE NO. 38-142 R/L	SR99 AND FULKERTH ROAD INTERCHANGE
X SIGN OFF DATE	CHECKED BY	M. BELTRAN	DATE: X			POST MILES R4.55	LOG OF TEST BORINGS (3 of 3)

GS GEOTECHNICAL LOG OF TEST BORINGS SHEET (ENGLISH) (REV. 03/14/12)

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

UNIT: X
PROJECT NUMBER & PHASE: X
CONTRACT NO.: X

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES: X

SHEET 11 OF 12

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

DIVISION OF ENGINEERING SERVICES - GEOTECHNICAL SERVICES

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. 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	STA	99	R4.1/R4.9	216	216

REGISTERED GETECHNICAL ENGINEER — DATE

LOG OF TEST BORINGS

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

UNIT: X
PROJECT NUMBER & PHASE: X

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

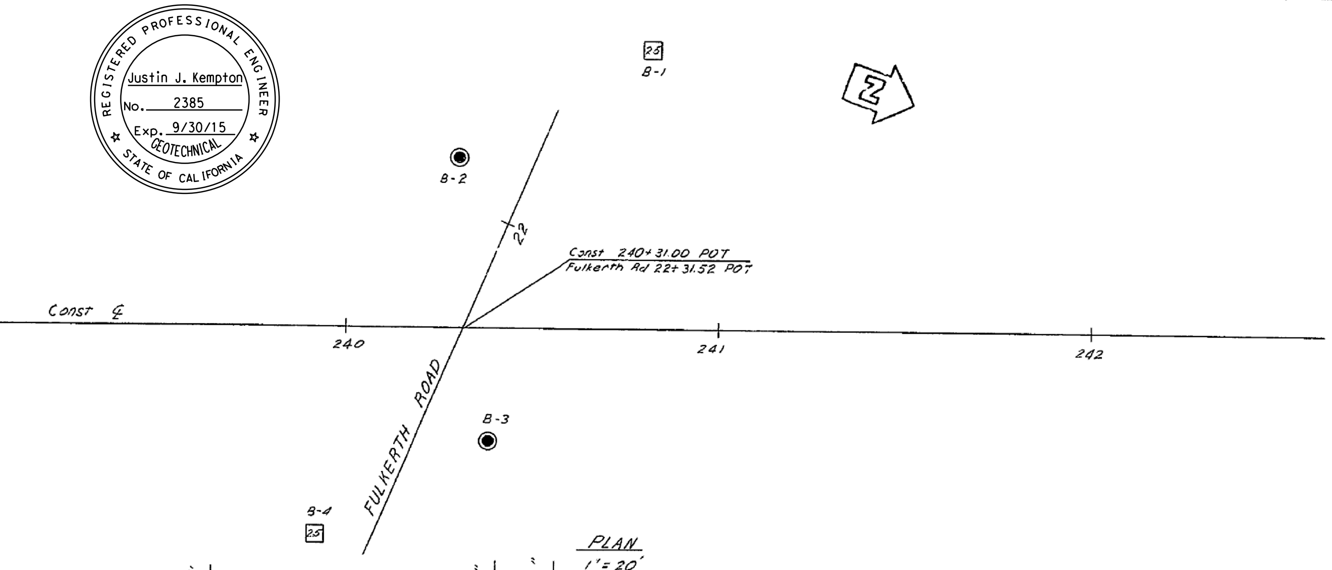
BRIDGE No.	Sheet	of
38-142 R/L	11	12

239

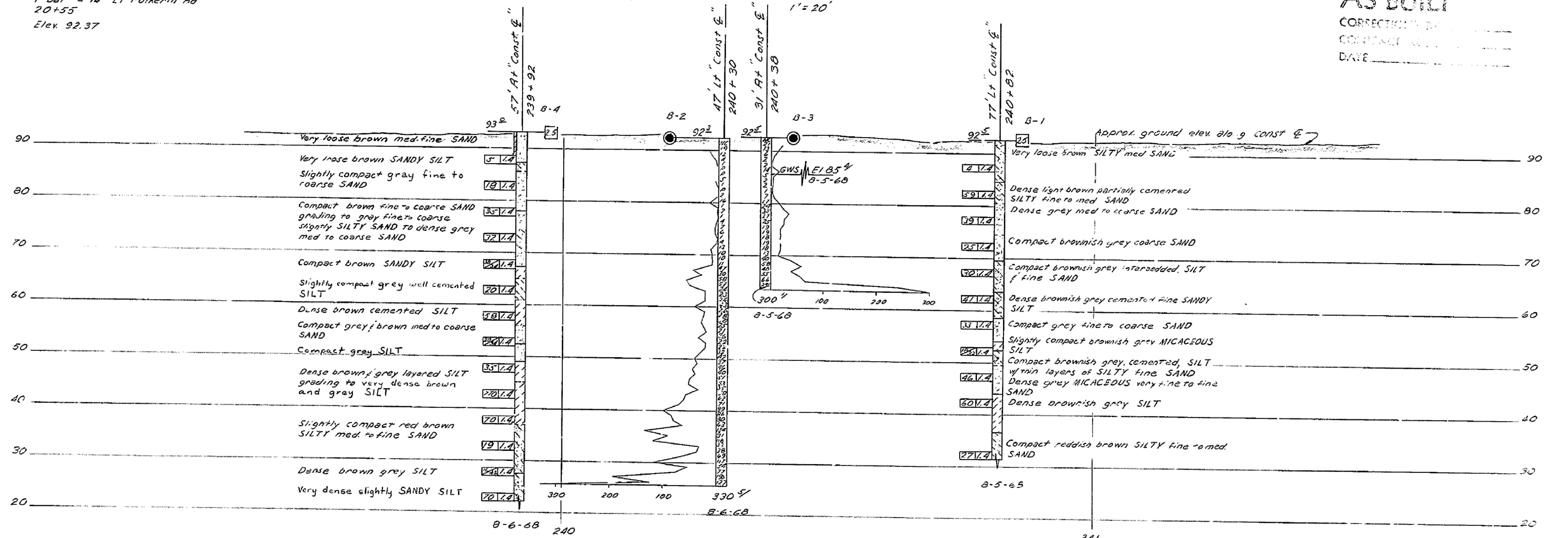
REGISTERED PROFESSIONAL ENGINEER — Justin J. Kempton — No. 2385 — Exp. 9/30/15 — GEOTECHNICAL — STATE OF CALIFORNIA

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
10	Mer, Sta	99	R36.2 / R7.3	278	309

DATE APPROVED May 17 1971



AS BUILT
CORRECTIONS BY
CONTRACT NO.
DATE



PROFILE
1" = 10'

LEGEND OF BORING OPERATIONS

LEGEND OF EARTH MATERIALS

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

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

BRIDGE DEPARTMENT
ENGINEERING GEOLOGY SECTION

AS BUILT PLANS
Contract No. 10-030104
Date Completed 05-71
Document No. 00001989

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

FULKERTH ROAD UNDERCROSSING

LOG OF TEST BORINGS

BRIDGE NO.	POST MILE	DRAWING NO.	SHEET	OF
38-142 R/L			9	9

WO 030101
CU 10203
PR38142-2

Disregard prints bearing earlier revision dates → REVISION DATES (PRELIMINARY STAGE ONLY) 2/8/68 4/7/70

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

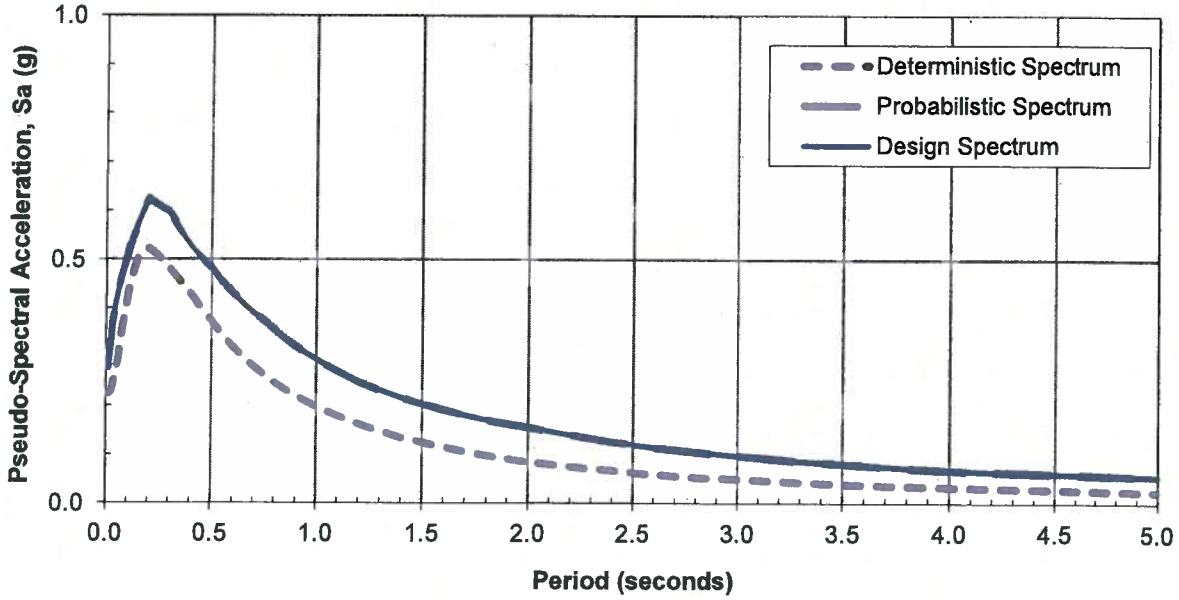
DATE 8-26-74

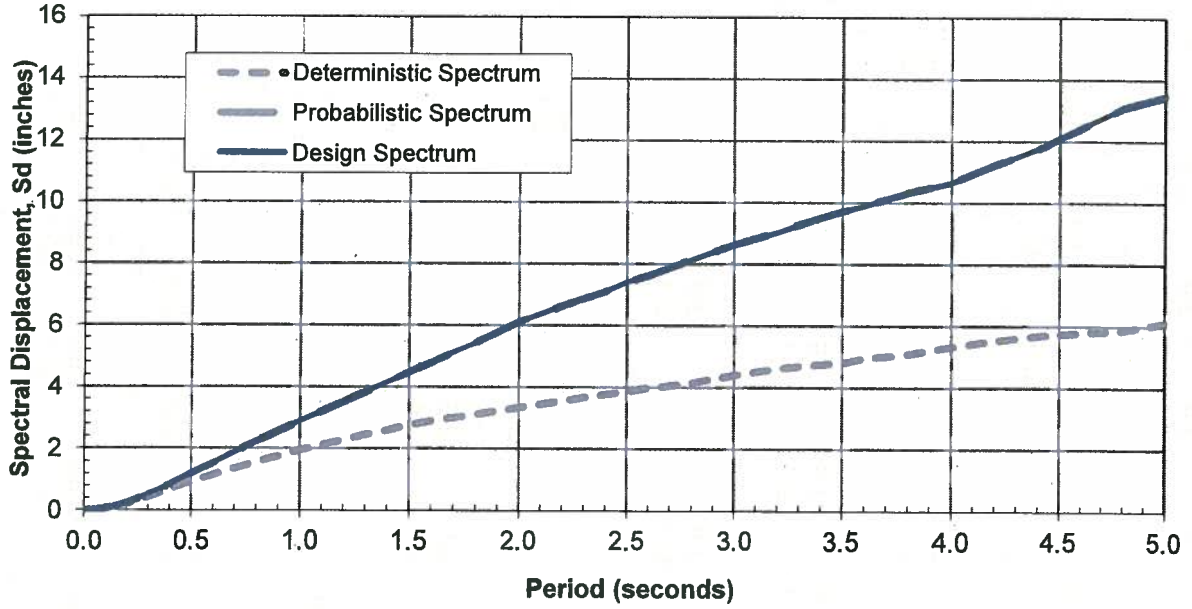
278

FIGURES

SITE DATA

Latitude (degrees):	37.5072	Shear Wave Velocity, V_{s30}:	361 m/s
Longitude (degrees):	-120.8778	Depth to Vs = 1.0 km/s, $Z_{1.0}$:	263 m
		Depth to Vs = 2.5 km/s, $Z_{2.5}$:	2 km





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PROJECT NO	98834
DRAWN:	5/2/11
DRAWN BY:	MB
CHECKED BY:	
FILE NAME:	Design ARS.xls

2009 CALTRANS SDC ARS CURVES

GEOTECHNICAL DESIGN REPORT
SR99 AND FULKERTH ROAD INTERCHANGE
TURLOCK, CALIFORNIA

FIGURE
1-1

DESIGN ARS CURVE ORDINATES

Period (s)	Sa (g)	Sd (inches)	Period (s)	Sa (g)	Sd (inches)
0.010	0.278	0.000	0.360	0.554	0.703
0.020	0.333	0.001	0.380	0.541	0.765
0.022	0.341	0.002	0.400	0.529	0.828
0.025	0.353	0.002	0.420	0.519	0.896
0.029	0.367	0.003	0.440	0.509	0.964
0.030	0.370	0.003	0.450	0.504	0.999
0.032	0.376	0.004	0.460	0.499	1.033
0.035	0.385	0.005	0.480	0.490	1.105
0.036	0.388	0.005	0.500	0.482	1.179
0.040	0.399	0.006	0.550	0.454	1.344
0.042	0.404	0.007	0.600	0.430	1.515
0.044	0.409	0.008	0.650	0.409	1.691
0.045	0.411	0.008	0.667	0.402	1.750
0.046	0.414	0.009	0.700	0.390	1.870
0.048	0.418	0.009	0.750	0.374	2.059
0.050	0.423	0.010	0.800	0.355	2.224
0.055	0.434	0.013	0.850	0.337	2.383
0.060	0.444	0.016	0.900	0.322	2.553
0.065	0.453	0.019	0.950	0.308	2.721
0.067	0.457	0.020	1.000	0.295	2.887
0.070	0.462	0.022	1.100	0.270	3.198
0.075	0.470	0.026	1.200	0.249	3.509
0.080	0.478	0.030	1.300	0.232	3.838
0.085	0.486	0.034	1.400	0.216	4.144
0.090	0.493	0.039	1.500	0.203	4.470
0.095	0.500	0.044	1.600	0.191	4.786
0.100	0.507	0.050	1.700	0.181	5.120
0.110	0.522	0.062	1.800	0.171	5.423
0.120	0.536	0.076	1.900	0.163	5.759
0.130	0.549	0.091	2.000	0.156	6.107
0.133	0.552	0.096	2.200	0.140	6.632
0.140	0.561	0.108	2.400	0.126	7.103
0.150	0.573	0.126	2.500	0.121	7.402
0.160	0.584	0.146	2.600	0.115	7.609
0.170	0.595	0.168	2.800	0.106	8.134
0.180	0.605	0.192	3.000	0.098	8.633
0.190	0.615	0.217	3.200	0.090	9.020
0.200	0.625	0.245	3.400	0.084	9.504
0.220	0.618	0.293	3.500	0.081	9.712
0.240	0.612	0.345	3.600	0.078	9.894
0.250	0.610	0.373	3.800	0.073	10.317
0.260	0.607	0.402	4.000	0.068	10.649
0.280	0.602	0.462	4.200	0.065	11.222
0.290	0.600	0.494	4.400	0.062	11.748
0.300	0.598	0.527	4.600	0.060	12.426
0.320	0.582	0.583	4.800	0.058	13.079
0.340	0.567	0.642	5.000	0.055	13.458

APPENDIX A

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM 2487)

MAJOR DIVISIONS				GRAPHIC LOG		TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS (More than half of material is larger than the #200 sieve)	GRAVELS (More than half of coarse fraction is larger than the #4 sieve)	CLEAN GRAVELS WITH <5% FINES	Cu≥4 and 1≤Cc≤3		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			Cu<4 and/or 1>Cc>3		GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GRAVELS WITH 5 to 12% FINES	Cu≥4 and 1≤Cc≤3		GW-GM	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES
					GW-GC	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES
			Cu<4 and/or 1>Cc>3		GP-GM	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES
					GP-GC	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES
		GRAVELS WITH >12% FINES			GM	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
					GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
					GC-GM	CLAYEY GRAVELS, GRAVEL-SAND-CLAY-SILT MIXTURES
	SANDS (More than half of coarse fraction is smaller than the #4 sieve)	CLEAN SANDS WITH <5% FINES	Cu≥6 and 1≤Cc≤3		SW	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
			Cu<6 and/or 1>Cc>3		SP	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
		SANDS WITH 5 to 12% FINES	Cu≥6 and 1≤Cc≤3		SW-SM	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
					SW-SC	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES
			Cu<6 and/or 1>Cc>3		SP-SM	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
					SP-SC	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES
		SANDS WITH >12% FINES			SM	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
					SC	CLAYEY SANDS, SAND-GRAVEL-CLAY MIXTURES
					SC-SM	CLAYEY SANDS, SAND-SILT-CLAY MIXTURES
FINE GRAINED SOILS (More than half of material is smaller than the #200 sieve)	SILTS AND CLAYS (Liquid limit less than 50)				ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, SILTS WITH SLIGHT PLASTICITY,
					CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
					CL-ML	INORGANIC CLAYS-SILTS OF LOW PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
					OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (Liquid limit greater than 50)				MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
					CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
					OH	ORGANIC CLAYS & ORGANIC SILTS OF MEDIUM-TO-HIGH PLASTICITY

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Project Number: 98834	**UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D2487)**	**Plate**
Date: 03-22-11		
Entry By: M. BELTRAN	**GEOTECHNICAL DESIGN REPORT SR99 & FULKERTH RD INTERCHANGE TURLOCK, CALIFORNIA**	**A-1**
Checked By: J. KEMPTON		
File Name:		

USCS (D2487) KA CORPORATE STD.GDT KA CORPORATE STD - FEBRUARY 02.GLB 98834.GPJ 5/2/11

SOIL DESCRIPTION KEY

MOISTURE CONTENT

DESCRIPTION	ABBR	FIELD TEST
Dry	D	Absence of moisture, dusty, dry to the touch
Moist	M	Damp but no visible water
Wet	W	Visible free water, usually soil is below water table

CEMENTATION

DESCRIPTION	FIELD TEST
Weakly	Crumbles or breaks with handling or slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumble or break with finger pressure

PLASTICITY

DESCRIPTION	ABBR	FIELD TEST
Non-plastic	NP	A 1/8-in. (3 mm) thread cannot be rolled at any water content.
Low (L)	LP	The thread can barely be rolled and the lump or thread cannot be formed when drier than the plastic limit.
Medium (M)	MP	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 or thread crumbles when drier than the plastic limit
High (H)	HP	It takes considerable time rolling and kneeding to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump or thread can be formed without crumbling when drier than the plastic limit

STRUCTURE

DESCRIPTION	CRITERIA
Stratified	Alternating layers of varying material or color with layers at least 1/4 in. thick, note thickness
Laminated	Alternating layers of varying material or color with the layer less than 1/4 in. thick, note thickness
Fissured	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided	Fracture planes appear polished or glossy, sometimes striated
Blocky	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay; note thickness
Homogeneous	Same color and appearance throughout

CONSISTENCY - FINE-GRAINED SOIL

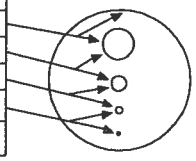
CONSISTENCY	ABBR	FIELD TEST
Very Soft	VS	Thumb will penetrate soil more than 1 in. (25 mm)
Soft	S	Thumb will penetrate soil about 1 in. (25 mm)
Firm	F	Thumb will indent soil about 1/4 in. (6 mm)
Hard	H	Thumb wil not indent soil but readily indented with thumbnail
Very Hard	VH	Thumbnail will not indent soil

GRAIN SIZE

DESCRIPTION		SIEVE SIZE	GRAIN SIZE	APPROXIMATE SIZE
Boulders		>12"	>12"	Larger than basketball-sized
Cobbles		3 - 12'	3 - 12"	Fist-sized to basketball-sized
Gravel	coarse	3/4 -3"	3/4 -3"	Thumb-sized to fist-sized
	fine	#4 - 3/4"	0.19 - 0.75"	Pea-sized to thumb-sized
Sand	coarse	#10 - #4	0.079 - 0.19"	Rock salt-sized to pea-sized
	medium	#40 - #10	0.017 - 0.079"	Sugar-sized to rock salt-sized
	fine	#200 - #10	0.0029 - 0.017"	Flour-sized to sugar-sized
Fines		Passing #200	<0.0029	Flour-sized and smaller

REACTION WITH HCL

DESCRIPTION	FIELD TEST
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming immediately



ANGULARITY

DESCRIPTION	ABBR	CRITERIA
Angular	A	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular	SA	Particles are similar to angular description but have rounded edges
Subrounded	SR	Particles have nearly plane sides but have well-rounded corners and edges
Rounded	R	Particles have smoothly curved sides and no edges

APPARENT / RELATIVE DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	ABBR	SPT (# blows/ft)	MODIFIED CA SAMPLER (# blows/ft)	CALIFORNIA SAMPLER (# blows/ft)	RELATIVE DENSITY (%)	FIELD TEST
Very Loose	VL	<4	<4	<5	0 - 15	Easily penetrated with 1/2-inch reinforcing rod by hand
Loose	L	4 - 10	5 - 12	5 - 15	15 - 35	Difficult to penetrate with 1/2-inch reinforcing rod pushed by hand
Medium Dense	MD	10 - 30	12- 35	15 - 40	35 - 65	Easily penetrated a foot with 1/2-inch reinforcing rod driven with 5-lb. hammer
Dense	D	30 - 50	35 - 60	40 - 70	65 - 85	Difficult to penetrate a foot with 1/2-inch reinforcing rod driven with 5-lb. hammer
Very Dense	VD	>50	>60	>70	85 - 100	Penetrated only a few inches with 1/2-inch reinforcing rod driven with 5-lb. hammer

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Project Number: 98834	**SOIL DESCRIPTION KEY**	**Plate**
Date: 03-22-11		**A-2**
Entry By: M. BELTRAN	**GEOTECHNICAL DESIGN REPORT**	
Checked By: J. KEMPTON	**SR99 & FULKERTH RD INTERCHANGE**	
File Name:	**TURLOCK, CALIFORNIA**	

SOIL BORING KEY KA CORPORATE STD.GDT KA CORPORATE STD - FEBRUARY 02.GLB 98834.GPJ 5/2/11

LOG SYMBOLS

	BULK / BAG SAMPLE	-4	PERCENT FINER THAN THE NO. 4 SIEVE (ASTM Test Method C 136)
	MODIFIED CALIFORNIA SAMPLER (2-1/2 inch outside diameter)	-200	PERCENT FINER THAN THE NO. 200 SIEVE (ASTM Test Method C 117)
	CALIFORNIA SAMPLER (3 inch outside diameter)	LL	LIQUID LIMIT (ASTM Test Method D 4318)
	STANDARD PENETRATION SPLIT SPOON SAMPLER (2 inch outside diameter)	PI	PLASTICITY INDEX (ASTM Test Method D 4318)
	CONTINUOUS CORE	TXUU	CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION (EM 1110-1-1906)/ASTM TEST METHOD D2850
	SHELBY TUBE	EI	EXPANSION INDEX (UBC STANDARD 18-2)
	ROCK CORE	COL	COLLAPSE POTENTIAL
	WATER LEVEL (level where first encountered)	UC	UNCONFINED COMPRESSION (ASTM Test Method D 2166)
	WATER LEVEL (level after completion)		
	SEEPAGE	MC	MOISTURE CONTENT (ASTM Test Method D 2216)

GENERAL NOTES

Boring log data represents a data snapshot.

This data represents subsurface characteristics only to the extent encountered at the location of the boring.

The data inherently cannot accurately predict the entire subsurface conditions to be encountered at the project site relative to construction or other subsurface activities.

Lines between soil layers and/or rock units are approximate and may be gradual transitions.

The information provided should be used only for the purposes intended as described in the accompanying documents.

In general, Unified Soil Classification System designations presented on the logs were evaluated by visual methods.

Where laboratory tests were performed, the designations reflect the laboratory test results.

KLEINFELDER *Bright People Right Solutions*	**Project Number:** 98834	**LOG KEY**	**Plate**
	Date: 03-22-11		
	Entry By: M. BELTRAN	**GEOTECHNICAL DESIGN REPORT SR99 & FULKERTH RD INTERCHANGE TURLOCK, CALIFORNIA**	**A-3**
	Checked By: J. KEMPTON		
	File Name:		

KA LOG KEY KA CORPORATE STD.GDT KA CORPORATE STD - FEBRUARY 02.GLB 98834.GPJ 5/2/11

Boring Number:A-11-001	Location:	Drilling Method:Hollow-stem auger
Boring Total Depth:51.5 ft	Coordinates (X/Y, Lat/Long)N/A° / N/A°	Drilling Equipment:CME 75
Depth to Rock:No Rock was Encountered	Datum/Coordinate System:	Drilling Company:SLAGLE DRILLING
Date Begin/End:03-17-11 / 03-17-11	Top of Boring Elevation:	Bit Size/Type:8-inch / N/A
Surface Conditions:Grass and Weeds	Coordinate Data Source:	Hammer Type/Method:FREEFALL / AUTO
WL Measurement Point:Ground Surface	Depth to Groundwater Initial/Time:10.5 ft	Hammer Drop/Weight:30 in. / 140 lbs.
Logged By:M. SHUBERT	Depth to Groundwater Final/Time:	Angle From Horizontal/Bearing:90°

Depth (ft)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
							The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.									
							FILL: SILTY SAND (SM)- dark brown to light brown, moist, fine to medium grained, weak to moderate cementation		Np							
5			21 14 15					Md	Np			12	104		47	
10			11 17 24					D	Np							
							POORLY GRADED SAND (SP) gray, moist, fine to meduim grained, weak cementation									
15			23 26 24					D	Np			7	117			
			10 16 18					D.	Np					100	4	
20			16 35 38					Vd	Np			9	115			

SOIL BORING LOG KA CORPORATE STD.GDT KA CORPORATE STD - FEBRUARY 02.GLB 98834.GPJ 5/11/11

KLEINFELDER
Bright People. Right Solutions.

Project Number: 98834	**BORING LOG A-11-001**
Date: 03-22-11	
Entry By: M. BELTRAN	GEOTECHNICAL DESIGN REPORT SR99 & FULKERTH RD INTERCHANGE TURLOCK, CALIFORNIA
Checked By: J. KEMPTON	
File Name:	

Plate
1 of 3
A-4

Boring Number:A-11-001	Location:	Drilling Method:Hollow-stem auger
Boring Total Depth:51.5 ft	Coordinates (X/Y, Lat/Long)N/A° / N/A°	Drilling Equipment:CME 75
Depth to Rock:No Rock was Encountered	Datum/Coordinate System:	Drilling Company:SLAGLE DRILLING
Date Begin/End:03-17-11 / 03-17-11	Top of Boring Elevation:	Bit Size/Type:8-inch / N/A
Surface Conditions:Grass and Weeds	Coordinate Data Source:	Hammer Type/Method:FREEFALL / AUTO
WL Measurement Point:Ground Surface	Depth to Groundwater Initial/Time:40.5 ft	Hammer Drop/Weight:30 in. / 140 lbs.
Logged By:M. SHUBERT	Depth to Groundwater Final/Time:	Angle From Horizontal/Bearing:90°

Depth (ft)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
			13 26 30				**POORLY GRADED SAND (SP)** gray, moist, fine grained, weak cementation	Vd	Np							
25			10 17 19				**SILTY SAND (SM)**- gray, moist, fine grained, weak cementation	Md	Np							
			5 6 7				**NATIVE: POORLY GRADED SAND WITH SILT (SP-SM)** - gray, moist, fine grained, weak cementation	Md	Np						14	
30			7 10 12					Md	Np			5	112			
35			6 7 10				**POORLY GRADED SAND (SP)** light brown, moist to wet, fine to medium grained, no cementation	Md	Np							
40			9 20 28					D	Np			16	116			

SOIL BORING LOG KA CORPORATE STD.GDT KA CORPORATE STD - FEBRUARY 02.GLB 98834.GPJ 5/11/11

KLEINFELDER
Bright People. Right Solutions.

Project Number: 98834	**BORING LOG A-11-001**
Date: 03-22-11	
Entry By: M. BELTRAN	GEOTECHNICAL DESIGN REPORT SR99 & FULKERTH RD INTERCHANGE TURLOCK, CALIFORNIA
Checked By: J. KEMPTON	
File Name:	

Plate
2 of 3
A-4

Boring Number:A-11-001	Location:	Drilling Method:Hollow-stem auger
Boring Total Depth:51.5 ft	Coordinates (X/Y, Lat/Long)N/A° / N/A°	Drilling Equipment:CME 75
Depth to Rock:No Rock was Encountered	Datum/Coordinate System:	Drilling Company:SLAGLE DRILLING
Date Begin/End:03-17-11 / 03-17-11	Top of Boring Elevation:	Bit Size/Type:8-inch / N/A
Surface Conditions:Grass and Weeds	Coordinate Data Source:	Hammer Type/Method:FREEFALL / AUTO
WL Measurement Point:Ground Surface	Depth to Groundwater Initial/Time:40.5 ft	Hammer Drop/Weight:30 in. / 140 lbs.
Logged By:M. SHUBERT	Depth to Groundwater Final/Time:	Angle From Horizontal/Bearing:90°

Depth (ft)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
			10				*The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.*	Vd	Np							
			25													
			50 / 5"													
50			17					Md	Np							
			25													
			27													
							Boring completed at a depth of 51.5 ft below existing site grade.									
55																
60																
65																

SOIL BORING LOG KA CORPORATE STD.GDT KA CORPORATE STD - FEBRUARY 02.GLB 98834.GPJ 5/11/11

KLEINFELDER
Bright People. Right Solutions.

Project Number: 98834	**BORING LOG A-11-001**
Date: 03-22-11	
Entry By: M. BELTRAN	GEOTECHNICAL DESIGN REPORT SR99 & FULKERTH RD INTERCHANGE TURLOCK, CALIFORNIA
Checked By: J. KEMPTON	
File Name:	

Plate
3 of 3
A-4

Boring Number:A-11-002	Location:	Drilling Method:Hollow-stem auger
Boring Total Depth:36.5 ft	Coordinates (X/Y, Lat/Long)N/A° / N/A°	Drilling Equipment:CME 75
Depth to Rock:No Rock was Encountered	Datum/Coordinate System:	Drilling Company:SLAGLE DRILLING
Date Begin/End:03-17-11 / 03-18-11	Top of Boring Elevation:	Bit Size/Type:8-inch / N/A
Surface Conditions:Grass and Weeds	Coordinate Data Source:	Hammer Type/Method:FREEFALL / AUTO
WL Measurement Point:N/A	Depth to Groundwater Initial/Time:	Hammer Drop/Weight:30 in. / 140 lbs.
Logged By:M. SHUBERT	Depth to Groundwater Final/Time:	Angle From Horizontal/Bearing:90°

Depth (ft)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
							The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.									
							FILL: SILTY SAND (SM)- light brown to light gray, moist, fine to medium grained, moderate cementation		Np							
5			7 14 21					Md/D	Np							
							POORLY GRADED SAND WITH SILT (SP-SM) light brown, moist, fine to medium grained, weak cementation									
10			15 20 25					D	Np			5	113		12	
							SILTY SAND (SM)- light brown to light gray, moist, fine to medium grained, moderate cementation									
15			12 20 22					D	Np							
							POORLY GRADED SAND WITH SILT (SP-SM) brown, moist, fine grained, weak cementation									
			11 22 46					D	Np			9	116			
20			10 18 41					Vd	Np							
							SILTY SAND (SM)- brown, moist, fine grained									

SOIL BORING LOG KA CORPORATE STD.GDT KA CORPORATE STD - FEBRUARY 02.GLB 98834.GPJ 5/11/11

KLEINFELDER
Bright People. Right Solutions.

Project Number: 98834	**BORING LOG A-11-002**
Date: 03-22-11	
Entry By: M. BELTRAN	GEOTECHNICAL DESIGN REPORT SR99 & FULKERTH RD INTERCHANGE TURLOCK, CALIFORNIA
Checked By: J. KEMPTON	
File Name:	

Plate
1 of 2
A-5

Boring Number: A-11-002	Location:	Drilling Method: Hollow-stem auger
Boring Total Depth: 36.5 ft	Coordinates (X/Y, Lat/Long) N/A° / N/A°	Drilling Equipment: CME 75
Depth to Rock: No Rock was Encountered	Datum/Coordinate System:	Drilling Company: SLAGLE DRILLING
Date Begin/End: 03-17-11 / 03-18-11	Top of Boring Elevation:	Bit Size/Type: 8-inch / N/A
Surface Conditions: Grass and Weeds	Coordinate Data Source:	Hammer Type/Method: FREEFALL / AUTO
WL Measurement Point: N/A	Depth to Groundwater Initial/Time:	Hammer Drop/Weight: 30 in. / 140 lbs.
Logged By: M. SHUBERT	Depth to Groundwater Final/Time:	Angle From Horizontal/Bearing: 90°

Depth (ft)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
			20 31 44					Vd	Np			9	121		26	
25			17 28 41				**NATIVE: POORLY GRADED SAND WITH SILT (SP-SM)** - brown, moist, fine grained	Vd	Np					100	6	
			10 13 16				**SILTY SAND (SM)** - brown, moist, fine grained	Md	Np			6	113		17	
30			9 12 15					Md	Np							
35			8 9 10				**POORLY GRADED SAND (SP)** red brown, moist, fine to medium grained, weak cementation	Md	Np			7	102			
							Boring completed at a depth of 36.5 ft below existing site grade.									
40																

SOIL BORING LOG KA CORPORATE STD.GDT KA CORPORATE STD - FEBRUARY 02.GLB 98834.GPJ 5/11/11

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Project Number: 98834	**BORING LOG A-11-002**
Date: 03-22-11	
Entry By: M. BELTRAN	GEOTECHNICAL DESIGN REPORT SR99 & FULKERTH RD INTERCHANGE TURLOCK, CALIFORNIA
Checked By: J. KEMPTON	
File Name:	

Plate
2 of 2
A-5

Boring Number:B-1	Location:	Drilling Method:Hollow-stem auger
Boring Total Depth:21.5 ft	Coordinates (X/Y, Lat/Long)N/A° / N/A°	Drilling Equipment:CME 75
Depth to Rock:No Rock was Encountered	Datum/Coordinate System:	Drilling Company:SLAGLE DRILLING
Date Begin/End:03-18-11 / 03-18-11	Top of Boring Elevation:	Bit Size/Type:8-inch / N/A
Surface Conditions:Grass and Weeds	Coordinate Data Source:	Hammer Type/Method:FREEFALL / AUTO
WL Measurement Point:N/A	Depth to Groundwater Initial/Time:	Hammer Drop/Weight:30 in. / 140 lbs.
Logged By:M. SHUBERT	Depth to Groundwater Final/Time:	Angle From Horizontal/Bearing:90°

Depth (ft)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
							POORLY GRADED SAND (SP) red brown to light tan, moist, fine to medium grained	L	Np					100	3	
5			5 7 10					Md	Np			5	120			
10			2 3 4													
15			10 17 27					D	Np			6	117			
20			10 16 28					D	Np							
							Boring completed at a depth of 21.5 ft below existing site grade.									

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Project Number: 98834	**BORING LOG B-1**
Date: 03-22-11	
Entry By: M. BELTRAN	GEOTECHNICAL DESIGN REPORT SR99 & FULKERTH RD INTERCHANGE TURLOCK, CALIFORNIA
Checked By: J. KEMPTON	
File Name:	

Plate
1 of 1
A-6

Boring Number:B-2	Location:	Drilling Method:Hollow-stem auger
Boring Total Depth:16.5 ft	Coordinates (X/Y, Lat/Long)N/A° / N/A°	Drilling Equipment:CME 75
Depth to Rock:No Rock was Encountered	Datum/Coordinate System:	Drilling Company:SLAGLE DRILLING
Date Begin/End:03-18-11 / 03-18-11	Top of Boring Elevation:	Bit Size/Type:8-inch / N/A
Surface Conditions:Grass and Weeds	Coordinate Data Source:	Hammer Type/Method:FREEFALL / AUTO
WL Measurement Point:Ground Surface	Depth to Groundwater Initial/Time16.0 ft	Hammer Drop/Weight:30 in. / 140 lbs.
Logged By:M. SHUBERT	Depth to Groundwater Final/Time:	Angle From Horizontal/Bearing:90°

Depth (ft)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
							POORLY GRADED SAND (SP) red brown, moist to wet, fine to medium grained		Np							
5			4 6 10					Md	Np			3	105			
10			5 8 15					Md	Np							
15			7 14 29					D	Np			9	116			
20							Boring completed at a depth of 16.5 ft below existing site grade.									

SOIL BORING LOG KA CORPORATE STD.GDT KA CORPORATE STD - FEBRUARY 02.GLB 98834.GPJ 5/11/11

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Project Number: 98834	**BORING LOG B-2**
Date: 03-22-11	
Entry By: M. BELTRAN	**GEOTECHNICAL DESIGN REPORT** **SR99 & FULKERTH RD INTERCHANGE** **TURLOCK, CALIFORNIA**
Checked By: J. KEMPTON	
File Name:	

Plate
1 of 1
A-7

Boring Number:B-3	Location:	Drilling Method:Hollow-stem auger
Boring Total Depth:21.5 ft	Coordinates (X/Y, Lat/Long)N/A° / N/A°	Drilling Equipment:CME 75
Depth to Rock:No Rock was Encountered	Datum/Coordinate System:	Drilling Company:SLAGLE DRILLING
Date Begin/End:03-18-11 / 03-18-11	Top of Boring Elevation:	Bit Size/Type:8-inch / N/A
Surface Conditions:Grass and Weeds	Coordinate Data Source:	Hammer Type/Method:FREEFALL / AUTO
WL Measurement Point:Ground Surface	Depth to Groundwater Initial/Time:	Hammer Drop/Weight:30 in. / 140 lbs.
Logged By:M. SHUBERT	Depth to Groundwater Final/Time:	Angle From Horizontal/Bearing:90°

Depth (ft)	Sample Type Symbol	Sample Number	Blows per 6 in.	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification *The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.* Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
							SILTY SAND (SM)- gray, moist, fine grained, moderate cementation		Np							
5			7 22 39					D	Np			19	106			
							POORLY GRADED SAND WITH SILT (SP-SM) light brown, moist to wet, fine to medium grained									
10			9 18 20					D	Np						11	
15			6 12 26					Md	Np			22	110			
							SILT (ML)- gray, wet, iron oxide staining									
20			7 15 20					Md/D	Np							
							Boring completed at a depth of 21.5 ft below existing site grade.									

SOIL BORING LOG KA CORPORATE STD.GDT KA CORPORATE STD - FEBRUARY 02.GLB 98834.GPJ 5/11/11

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Project Number: 98834	**BORING LOG B-3**
Date: 03-22-11	
Entry By: M. BELTRAN	GEOTECHNICAL DESIGN REPORT SR99 & FULKERTH RD INTERCHANGE TURLOCK, CALIFORNIA
Checked By: J. KEMPTON	
File Name:	

Plate
1 of 1
A-8

Test Pit Number:DRI-1	Location:	Excavation Method:Bucket
Test Pit Total Depth:5.0 ft	Coordinates (X/Y, Lat/Long)N/A° / N/A°	Excavation Equipment:Backhoe
Depth to Rock:No Rock was Encountered	Datum/Coordinate System:	Excavation Company:BRISCOE
Date Begin/End:04-05-11 / 04-05-11	Ground Surface Elevation:	Bucket Size:36-INCH / N/A
Surface Conditions:Grass and Weeds	Coordinate Data Source:	Hammer Type/Method:N/A
WL Measurement Point:N/A	Depth to Groundwater Initial/Time:	Hammer Drop/Weight:N/A
Logged By:M. BELTRAN	Depth to Groundwater Final/Time:	Angle From Horizontal/Bearing:N/A

Depth (ft)	Sample Type Symbol	Sample Number	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Laboratory: Consistency / Apparent Density	Plasticity	Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.									
						POORLY GRADED SAND (SP) brown, moist, fine to medium grained									
5						Test Pit completed at a depth of 5.0 ft below existing site grade.									
10															
15															
20															

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Project Number: 98834	**TEST PIT LOG DRI-1**
Date: 03-22-11	
Entry By: M. BELTRAN	GEOTECHNICAL DESIGN REPORT SR99 & FULKERTH RD INTERCHANGE TURLOCK, CALIFORNIA
Checked By: J. KEMPTON	
File Name:	

Plate 1 of 1

A-9

SOIL BORING LOG KA CORPORATE STD.GDT KA CORPORATE STD - FEBRUARY 02.GLB 98834.GPJ 5/11/11

Test Pit Number:DRI-2	Location:	Excavation Method:Bucket
Test Pit Total Depth:5.0 ft	Coordinates (X/Y, Lat/Long)N/A° / N/A°	Excavation Equipment:Backhoe
Depth to Rock:No Rock was Encountered	Datum/Coordinate System:	Excavation Company:BRISCOE
Date Begin/End:04-05-11 / 04-05-11	Ground Surface Elevation:	Bucket Size:36-INCH / N/A
Surface Conditions:Grass and Weeds	Coordinate Data Source:	Hammer Type/Method:N/A
WL Measurement Point:N/A	Depth to Groundwater Initial/Time:	Hammer Drop/Weight:N/A
Logged By:M. BELTRAN	Depth to Groundwater Final/Time:	Angle From Horizontal/Bearing:N/A

Depth (ft)	Sample Type Symbol	Sample Number	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.									
						POORLY GRADED SAND (SP) brown, moist, fine to coarse grained									
5						Test Pit completed at a depth of 5.0 ft below existing site grade.									
10															
15															
20															

SOIL BORING LOG KA CORPORATE STD.GDT KA CORPORATE STD - FEBRUARY 02.GLB 98834.GPJ 5/11/11

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Project Number: 98834	**TEST PIT LOG DRI-2**
Date: 03-22-11	
Entry By: M. BELTRAN	GEOTECHNICAL DESIGN REPORT SR99 & FULKERTH RD INTERCHANGE TURLOCK, CALIFORNIA
Checked By: J. KEMPTON	
File Name:	

Plate
1 of 1
A-10

Test Pit Number:DRI-3	Location:	Excavation Method:Bucket
Test Pit Total Depth:5.0 ft	Coordinates (X/Y, Lat/Long)N/A° / N/A°	Excavation Equipment:Backhoe
Depth to Rock:No Rock was Encountered	Datum/Coordinate System:	Excavation Company:BRISCOE
Date Begin/End:04-05-11 / 04-05-11	Ground Surface Elevation:	Bucket Size:36-INCH / N/A
Surface Conditions:Grass and Weeds	Coordinate Data Source:	Hammer Type/Method:N/A
WL Measurement Point:N/A	Depth to Groundwater Initial/Time:	Hammer Drop/Weight:N/A
Logged By:M. BELTRAN	Depth to Groundwater Final/Time:	Angle From Horizontal/Bearing:N/A

Depth (ft)	Sample Type Symbol	Sample Number	Pocket Pen. (tsf)	Graphic Log	ASTM Symbol	Field Soil Description & Classification: Description	Consistency / Apparent Density	Plasticity	Laboratory: Plasticity Index	Liquid Limit	Water Content (%)	Dry Unit Weight (pcf)	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests and Field Notes
						The report and log key are an integral part of these logs. All data and interpretations in this log are subject to those stated explanations and limitations.									
						SILTY SAND (SM)- brown, moist, fine to medium grained									
						SANDY SILT (ML)- light tan, moist, hard, fine grained sand									
5						Test Pit completed at a depth of 5.0 ft below existing site grade.									
10															
15															
20															

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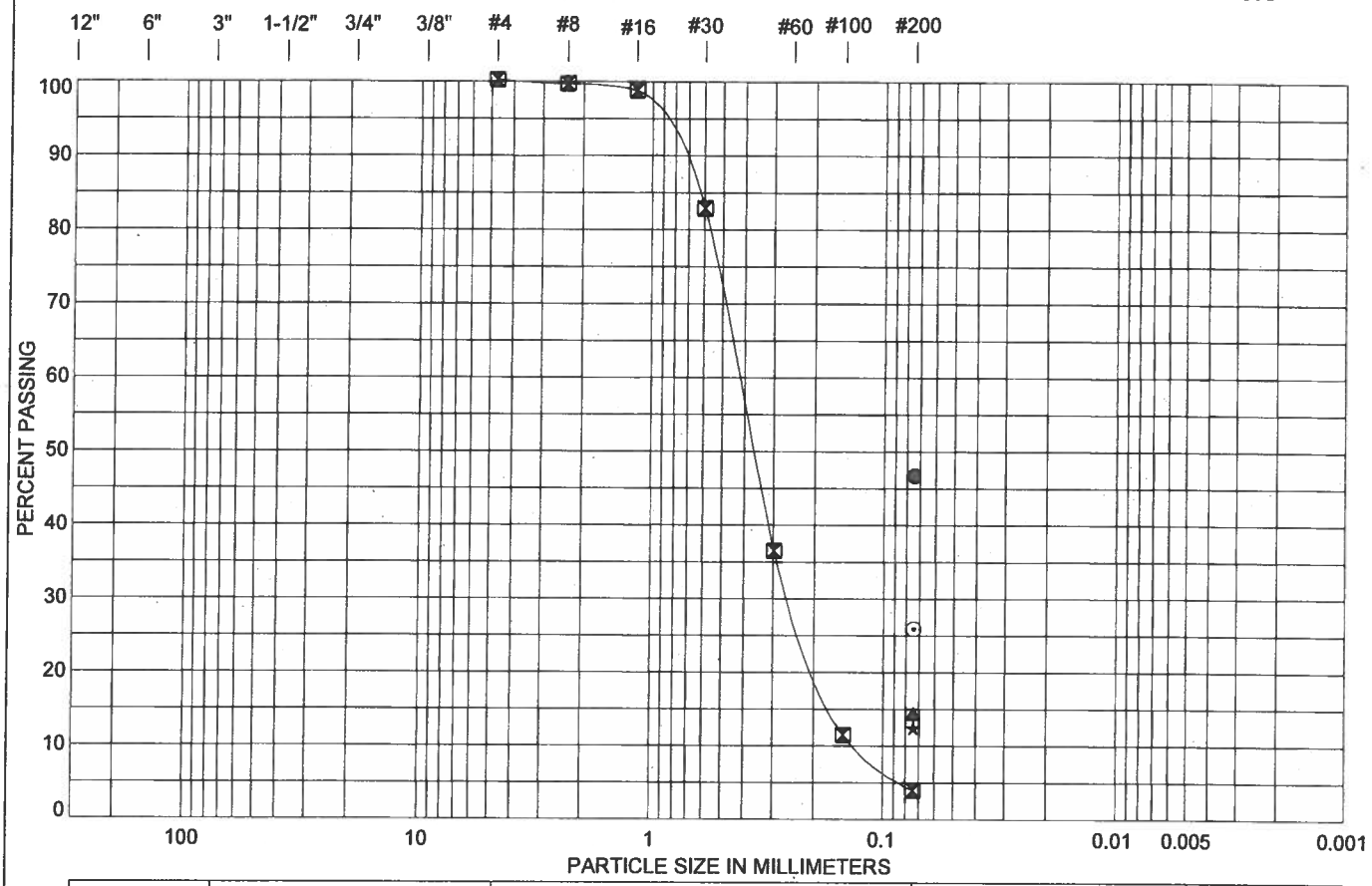
Project Number: 98834	**TEST PIT LOG DRI-3**
Date: 03-22-11	
Entry By: M. BELTRAN	GEOTECHNICAL DESIGN REPORT SR99 & FULKERTH RD INTERCHANGE TURLOCK, CALIFORNIA
Checked By: J. KEMPTON	
File Name:	

Plate
1 of 1
A-11

SOIL BORING LOG KA CORPORATE STD.GDT KA CORPORATE STD - FEBRUARY 02.GLB 98834.GPJ 5/11/11

APPENDIX B

SIEVE ANALYSIS **HYDROMETER ANALYSIS**



COBBLE	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

LEGEND:	SOURCE	DEPTH (ft)	DESCRIPTION
●	A-11-001	6.0	Silty SAND (SM)
⊠	A-11-001	17.5	Poorly Graded SAND (SP)
▲	A-11-001	27.5	Poorly Graded SAND with silt (SP-SM)
★	A-11-002	11.0	Poorly Graded SAND with silt (SP-SM)
⊙	A-11-002	23.5	Silty SAND (SM)

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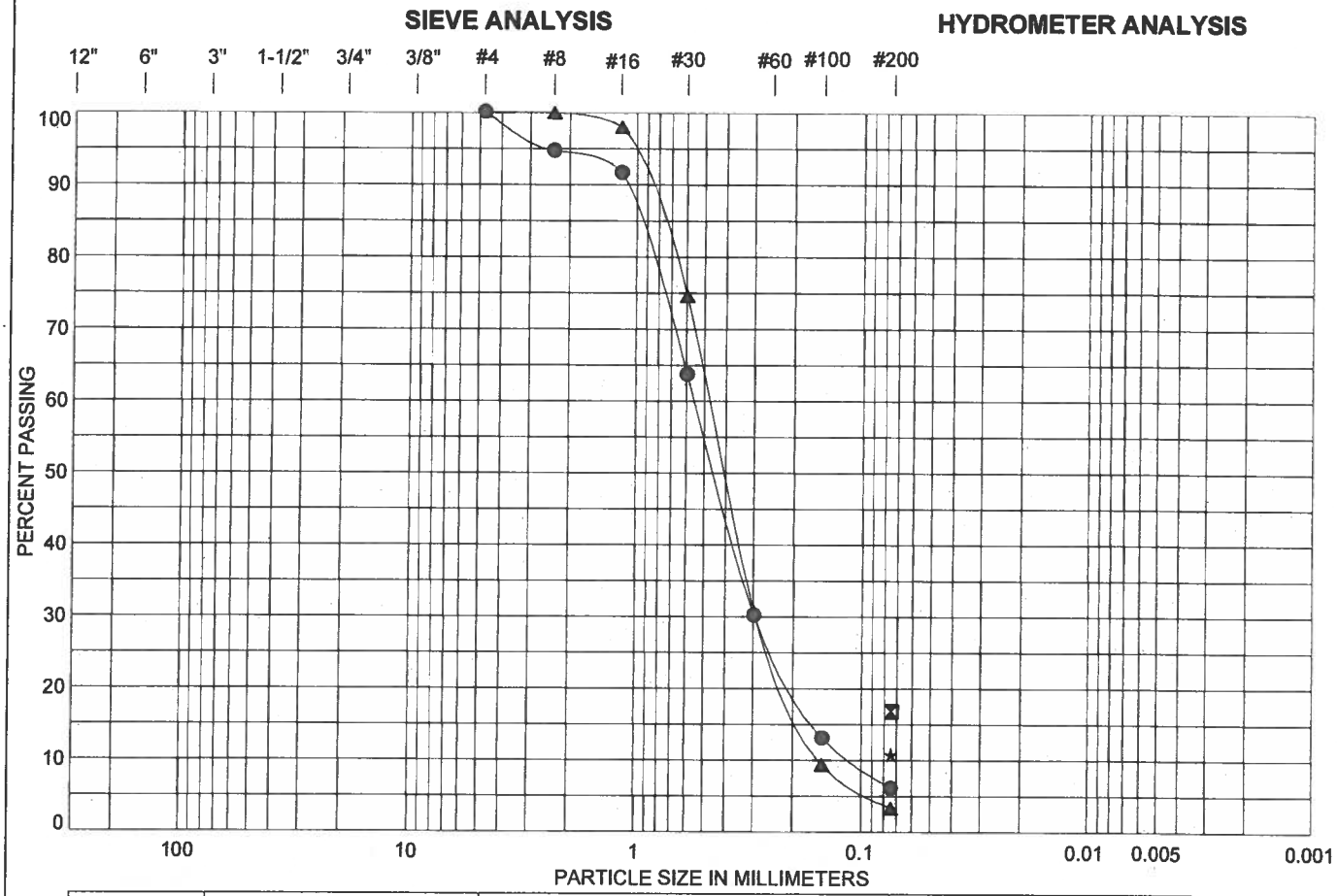
Date: 5/11/2011
Project No.: 98834
File Number:

GRAIN SIZE ANALYSIS
GEOTECHNICAL DESIGN REPORT
SR99 & FULKERTH RD INTERCHANGE
TURLOCK, CALIFORNIA

PLATE
B-1

KA_GRAIN_SIZE KA_CORPORATE_STD.GDT KLEINFELDER_GINT_LIBRARY_R2B.GLB 98834.GPJ 5/11/11



COBBLE	GRAVEL		SAND			SILT	CLAY
	coarse	fine	coarse	medium	fine		

LEGEND:	SOURCE	DEPTH (ft)	DESCRIPTION
●	A-11-002	25.0	Poorly Graded SAND with silt (SP-SM)
⊠	A-11-002	28.5	Silty SAND (SM)
▲	B-1	0.0	Poorly Graded SAND (SP)
★	B-3	10.0	Poorly Graded SAND with silt (SP-SM)

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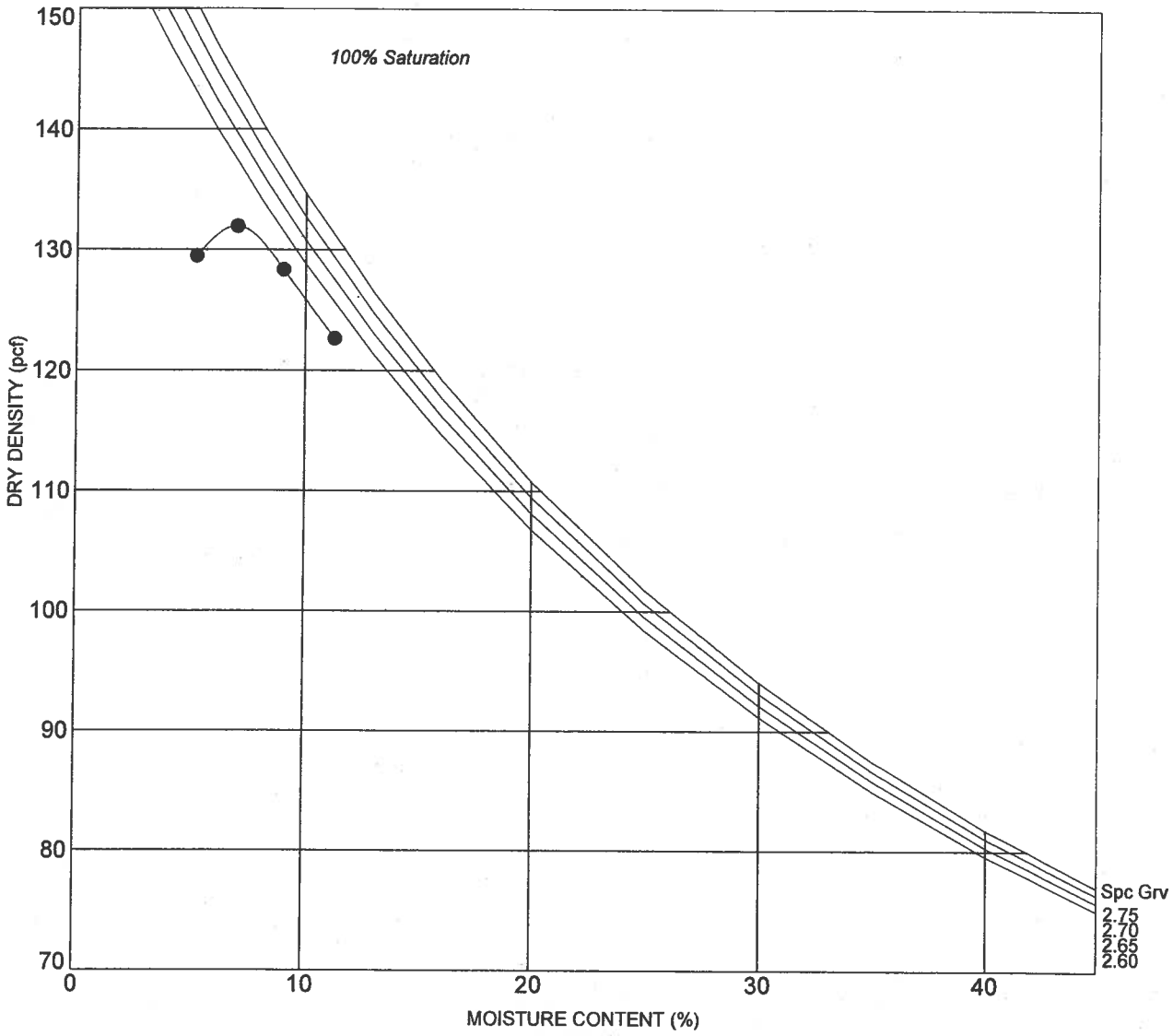
Date: 5/11/2011
Project No.: 98834
File Number:

GRAIN SIZE ANALYSIS
GEOTECHNICAL DESIGN REPORT
SR99 & FULKERTH RD INTERCHANGE
TURLOCK, CALIFORNIA

PLATE
B-2

KA_GRAIN_SIZE KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_R2B.GLB 98834.GPJ 5/11/11



LEGEND:	SOURCE	DEPTH (ft)	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)	TEST METHOD	DESCRIPTION
●	B-1	0.0 - 5.0	6.5	132.0	ASTM D1557 Method A	Poorly Graded SAND (SP)

KA-COMPACTION KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_R2B.GLB 98834.GPJ 5/11/11

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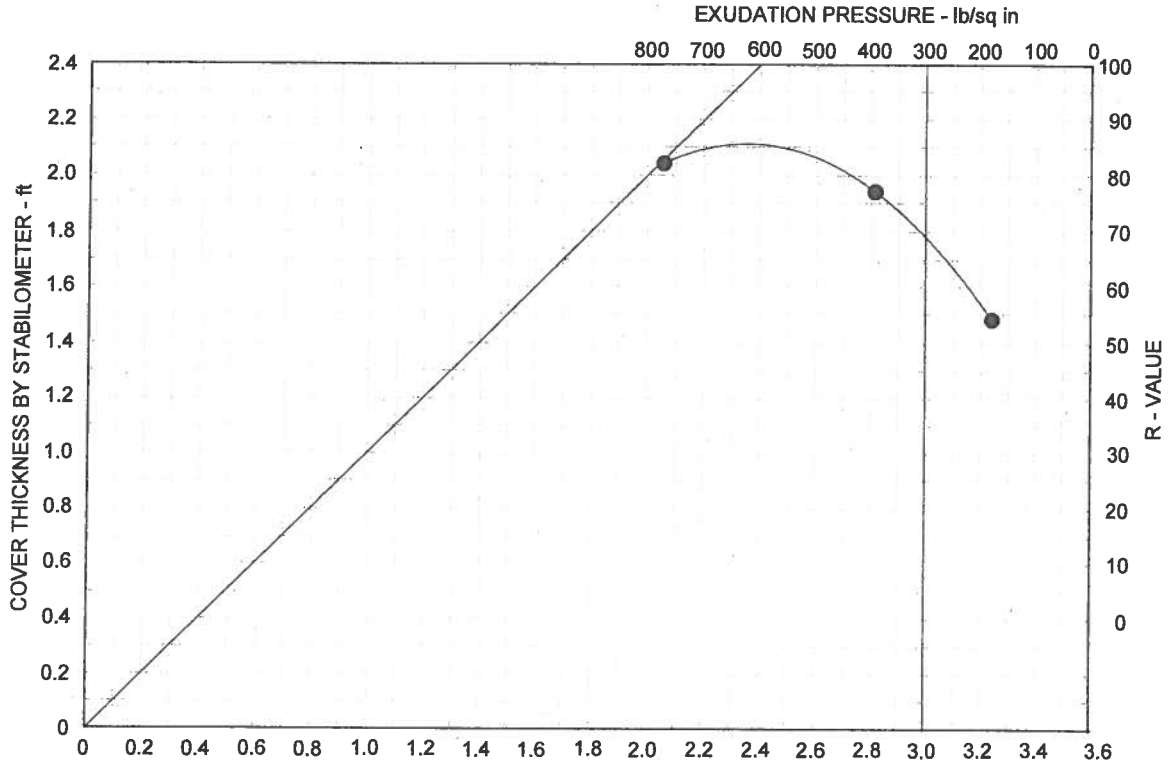
Date: 5/11/2011	File Number:

COMPACTION CURVE
GEOTECHNICAL DESIGN REPORT
SR99 & FULKERTH RD INTERCHANGE
TURLOCK, CALIFORNIA

PLATE
B-3

SAMPLE LOCATION: B-1 @ 0 - 5 feet

SAMPLE DESCRIPTION: Poorly Graded SAND (SP)



SPECIMEN	A	B	C
EXUDATION PRESSURE, lb/sq in	772	394	182
EXPANSION PRESSURE, lb/sq ft	0	0	0
RESISTANCE VALUE, R	82	77	54
MOISTURE AT TEST, %	7	8	10
DRY DENSITY AT TEST, lb/cu ft	129.4	128.2	126.6
R-VALUE AT 300 lb/sq in EXUDATION PRESSURE		**69**	

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Project No.: 98834
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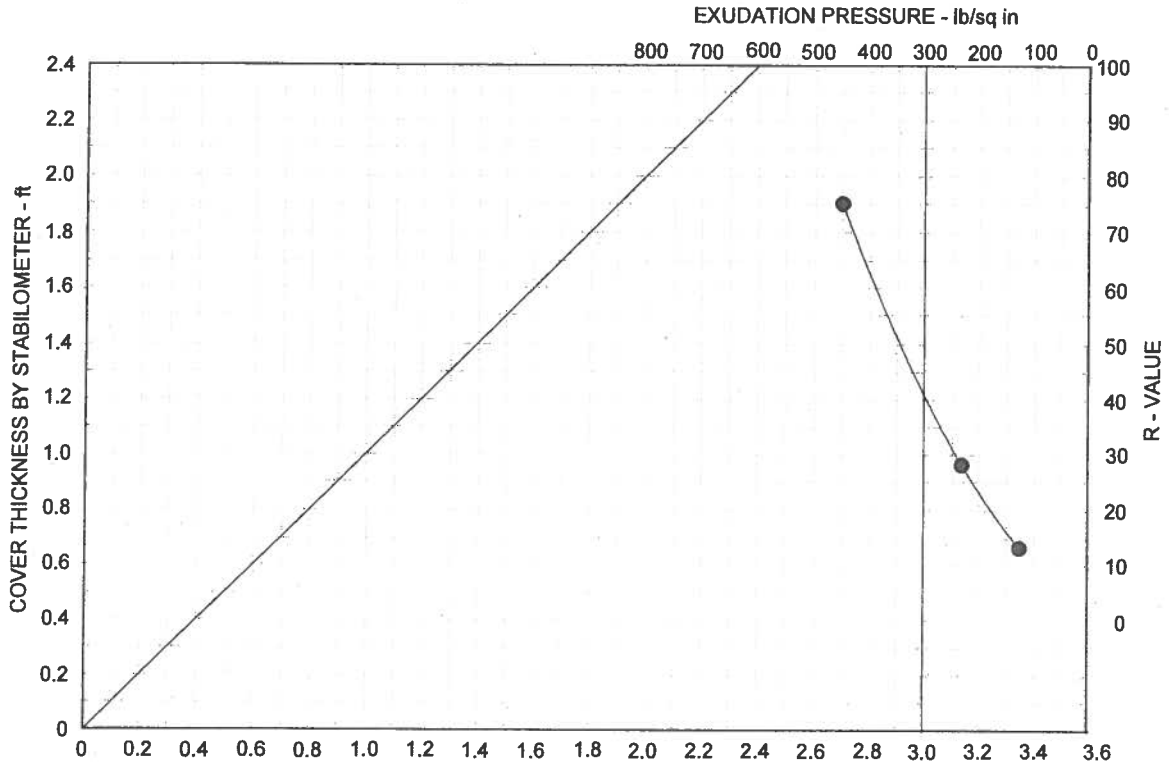
RESISTANCE VALUE
GEOTECHNICAL DESIGN REPORT
SR99 & FULKERTH RD INTERCHANGE
TURLOCK, CALIFORNIA

PLATE
B-4

SAMPLE LOCATION: B-2 @ 0 - 5 feet

SAMPLE DESCRIPTION: Poorly Graded SAND (SP)



SPECIMEN	A	B	C
EXUDATION PRESSURE, lb/sq in	451	234	129
EXPANSION PRESSURE, lb/sq ft	0	0	0
RESISTANCE VALUE, R	75	28	13
MOISTURE AT TEST, %	9	11	12
DRY DENSITY AT TEST, lb/cu ft	126.7	122.8	120
R-VALUE AT 300 lb/sq in EXUDATION PRESSURE		**40**	

KA_R_VALUE KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_R2B.GLB 98834.GPJ 5/11/11

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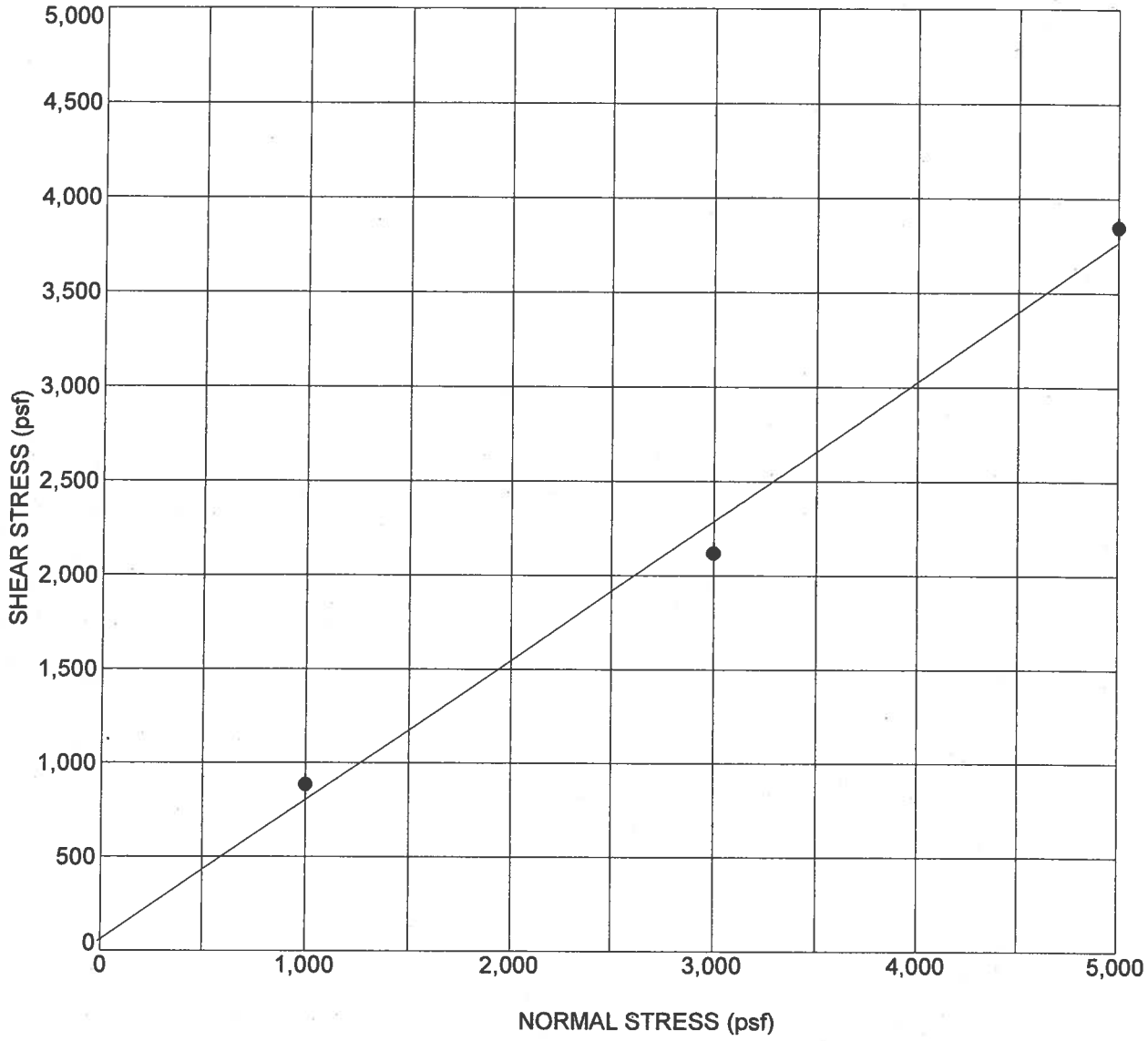
RESISTANCE VALUE
GEOTECHNICAL DESIGN REPORT
SR99 & FULKERTH RD INTERCHANGE
TURLOCK, CALIFORNIA

PLATE
B-5



SOURCE: A-11-001
DEPTH: 16 ft (PEAK STRENGTH)
SOIL DESCRIPTION: Poorly Graded SAND (SP)

FRICTION ANGLE = 37 deg
COHESION = 60 psf

FINAL DRY DENSITY (pcf)	116.6	116.5	108.0
INITIAL WATER CONTENT (%)	6.9	6.9	6.9
FINAL WATER CONTENT (%)	18.4	20.1	19.1
NORMAL STRESS (psf)	1000	3000	5000
MAXIMUM SHEAR (psf)	885	2119	3847

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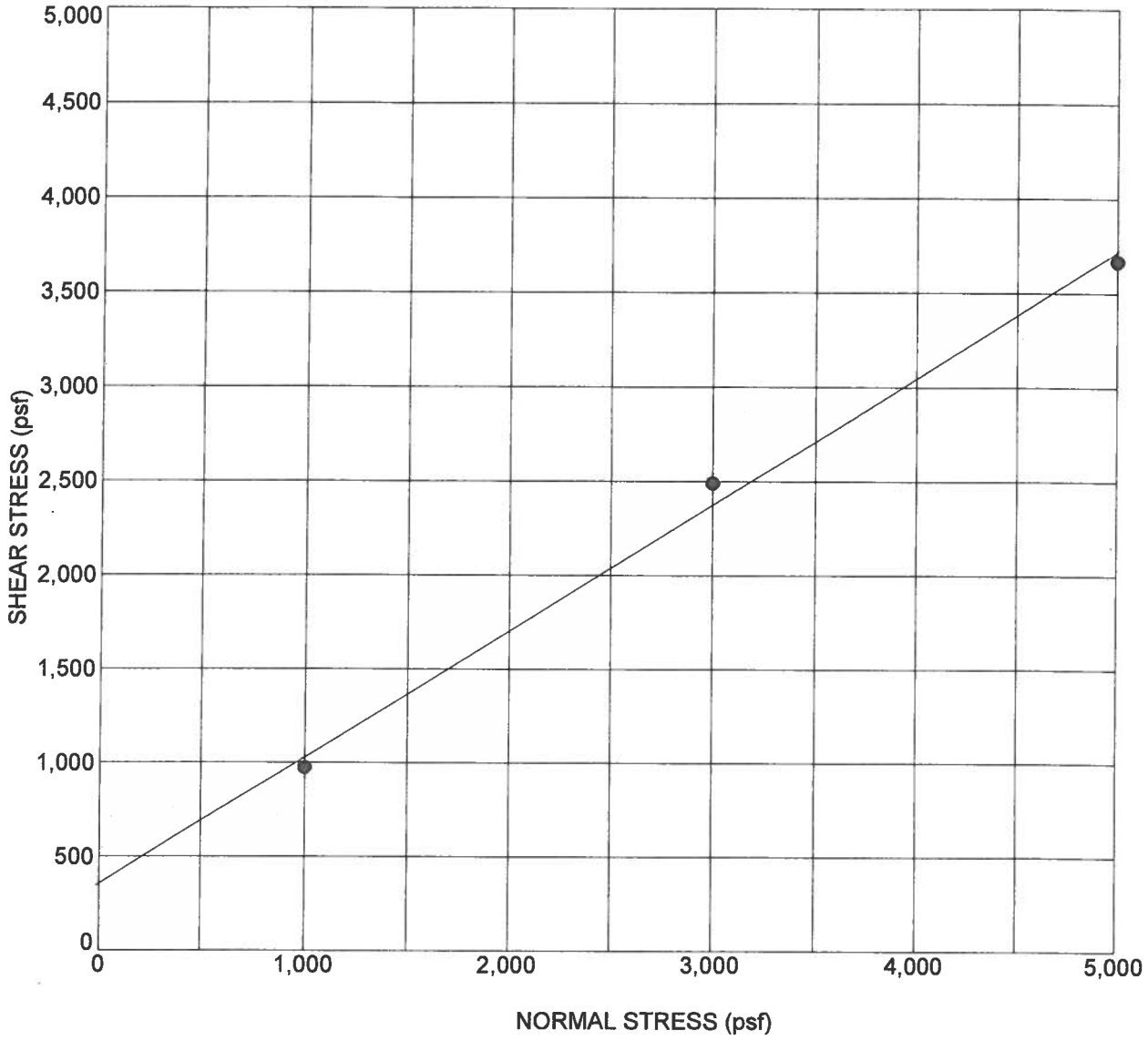
Drafted By:
Date: 5/11/2011
Project No.: 98834
File Number:

DIRECT SHEAR TEST
GEOTECHNICAL DESIGN REPORT
SR99 & FULKERTH RD INTERCHANGE
TURLOCK, CALIFORNIA

PLATE
B-6

KA_DIRECT_SHEAR KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_R2B.GLB 98834.GPJ 5/11/11



SOURCE: A-11-001
DEPTH: 21 ft (PEAK STRENGTH)
SOIL DESCRIPTION: Poorly Graded SAND (SP)

FRICTION ANGLE = 34 deg
COHESION = 355 psf

FINAL DRY DENSITY (pcf)	114.3	114.5	114.5
INITIAL WATER CONTENT (%)	8.7	8.7	8.7
FINAL WATER CONTENT (%)	18.7	18.2	16.1
NORMAL STRESS (psf)	1000	3000	5000
MAXIMUM SHEAR (psf)	974	2490	3668

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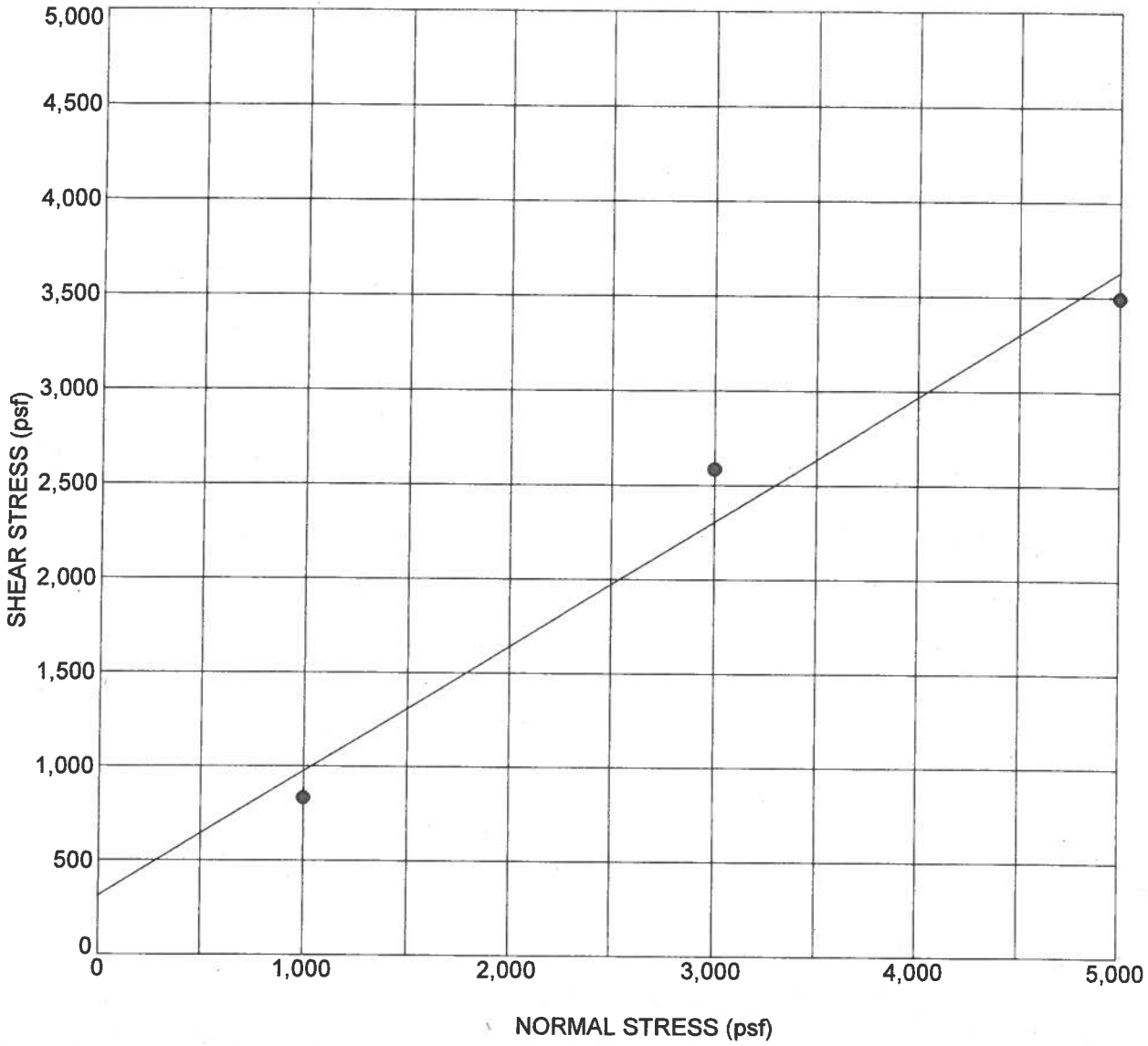
Date: 5/11/2011
Project No.: 98834
File Number:

DIRECT SHEAR TEST
GEOTECHNICAL DESIGN REPORT
SR99 & FULKERTH RD INTERCHANGE
TURLOCK, CALIFORNIA

PLATE
B-7

KA_DIRECT_SHEAR KA_CORPORATE_STD.GDT KLEINFELDER_GINT_LIBRARY_R2B.GLB 98834.GPJ 5/11/11



SOURCE: A-11-002
DEPTH: 23.5 ft (PEAK STRENGTH)
SOIL DESCRIPTION: Silty SAND (SM)

FRICTION ANGLE = 34 deg
COHESION = 310 psf

FINAL DRY DENSITY (pcf)	120.7	121.8	121.7
INITIAL WATER CONTENT (%)	8.6	8.6	8.6
FINAL WATER CONTENT (%)	13.8	12.8	11.9
NORMAL STRESS (psf)	1000	3000	5000
MAXIMUM SHEAR (psf)	833	2585	3494

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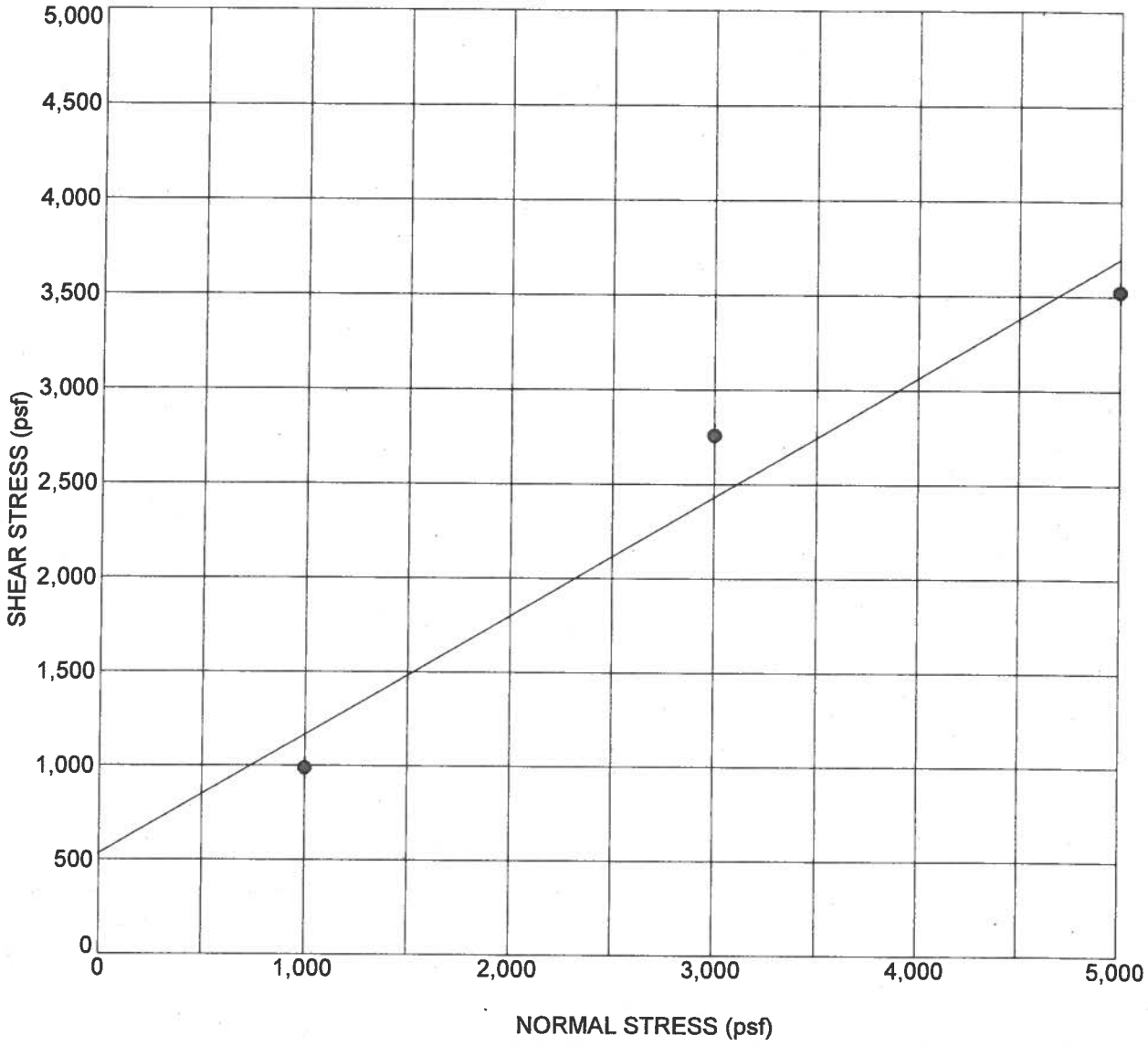
Date: 5/11/2011
Project No.: 98834
File Number:

DIRECT SHEAR TEST
GEOTECHNICAL DESIGN REPORT
SR99 & FULKERTH RD INTERCHANGE
TURLOCK, CALIFORNIA

PLATE
B-8

KA_DIRECT_SHEAR KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_R2B.GLB 98834.GPJ 5/11/11



SOURCE: B-1
DEPTH: 0 to 5 ft (REMOLDED PEAK STRENGTH)
SOIL DESCRIPTION: Poorly Graded SAND (SP)

FRICTION ANGLE = 32 deg
COHESION = 520 psf

FINAL DRY DENSITY (pcf)	118.8	118.8	118.7
INITIAL WATER CONTENT (%)	6.5	6.5	6.5
FINAL WATER CONTENT (%)	13.4	13.1	13.8
NORMAL STRESS (psf)	1000	3000	5000
MAXIMUM SHEAR (psf)	988	2759	3523

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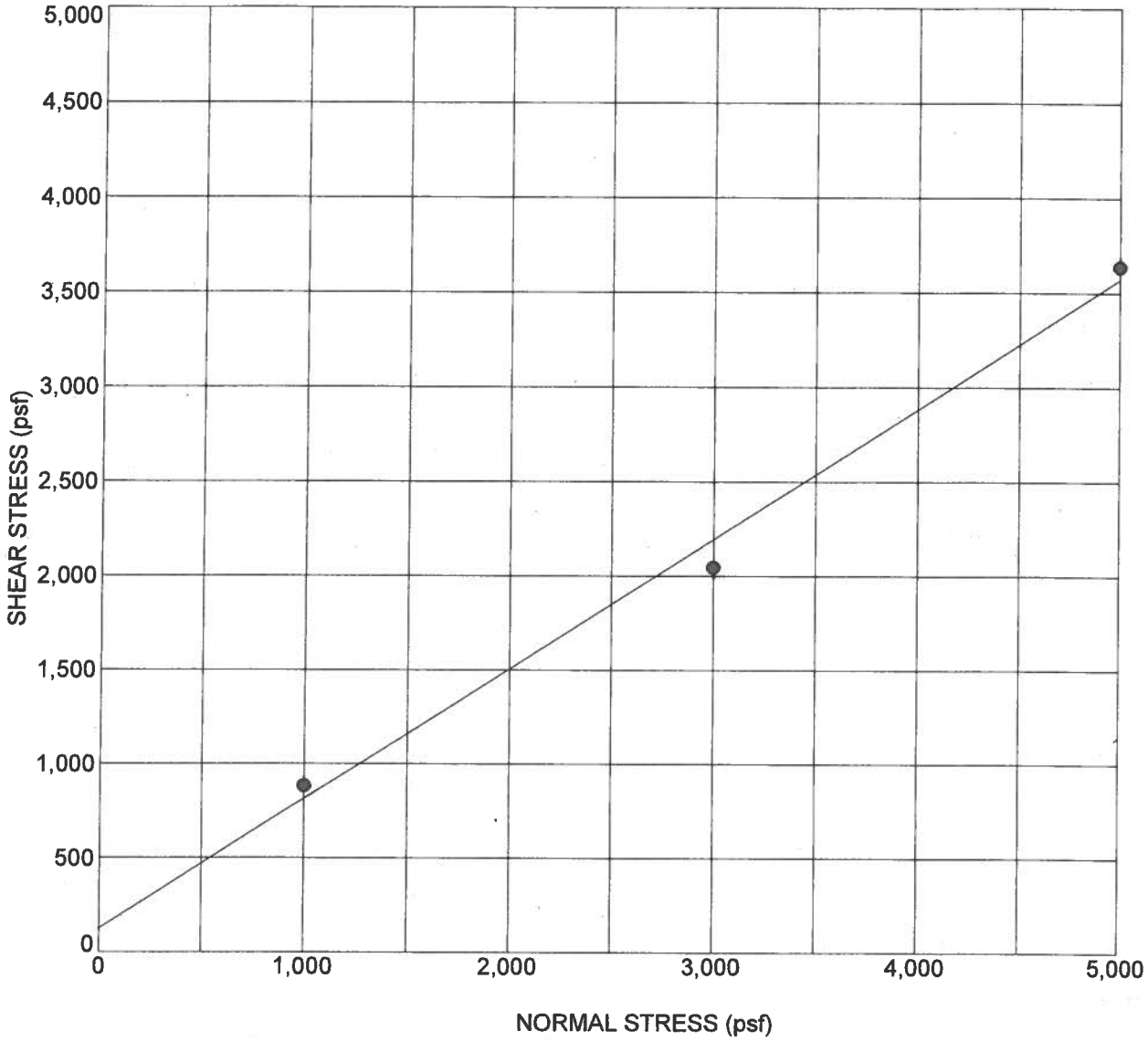
Date: 5/11/2011
Project No.: 98834
File Number:

DIRECT SHEAR TEST
GEOTECHNICAL DESIGN REPORT
SR99 & FULKERTH RD INTERCHANGE
TURLOCK, CALIFORNIA

PLATE
B-9

KA_DIRECT_SHEAR KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_R2B.GLB 98834.GPJ 5/11/11



SOURCE: A-11-001
DEPTH: 16 ft (ULTIMATE STRENGTH)
SOIL DESCRIPTION: Poorly Graded SAND (SP)

FRICTION ANGLE = 35 deg
COHESION = 125 psf

FINAL DRY DENSITY (pcf)	116.6	116.5	108.0
INITIAL WATER CONTENT (%)	6.9	6.9	6.9
FINAL WATER CONTENT (%)	18.4	20.1	19.1
NORMAL STRESS (psf)	1000	3000	5000
MAXIMUM SHEAR (psf)	883.6	2044.8	3637.7

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Drafted By:
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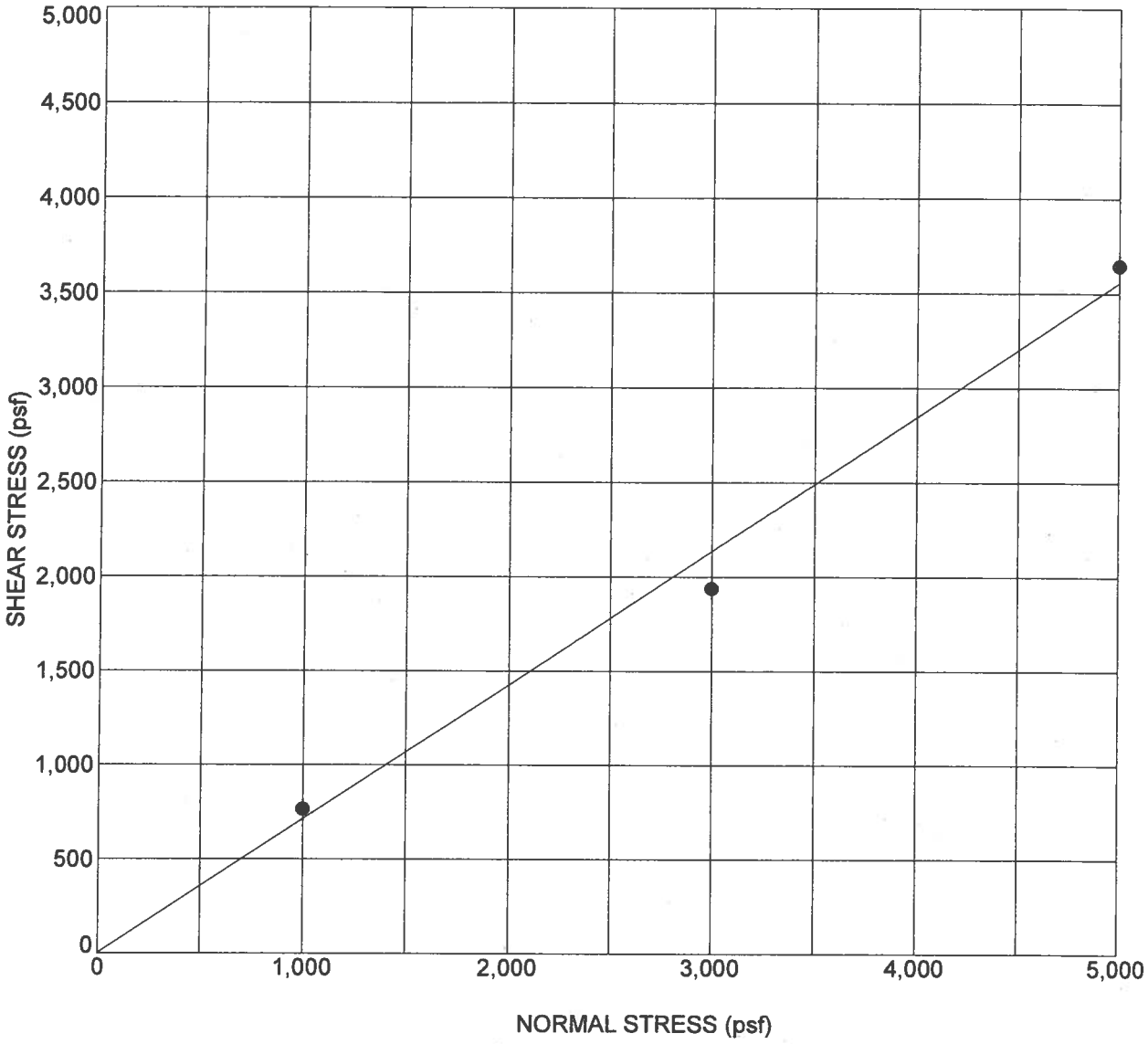
DIRECT SHEAR TEST
GEOTECHNICAL DESIGN REPORT
SR99 & FULKERTH RD INTERCHANGE
TURLOCK, CALIFORNIA

PLATE
B-10

KA_DIRECT_SHEAR KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_R2B.GLB 98834.GPJ 5/11/11



SOURCE: A-11-001
DEPTH: 21 ft (ULTIMATE STRENGTH)
SOIL DESCRIPTION: Poorly Graded SAND (SP)

FRICTION ANGLE = 35 deg
COHESION = 0 psf

FINAL DRY DENSITY (pcf)	114.3	114.5	114.5
INITIAL WATER CONTENT (%)	8.7	8.7	8.7
FINAL WATER CONTENT (%)	18.7	18.2	16.1
NORMAL STRESS (psf)	1000	3000	5000
MAXIMUM SHEAR (psf)	765.3	1938.1	3646.1

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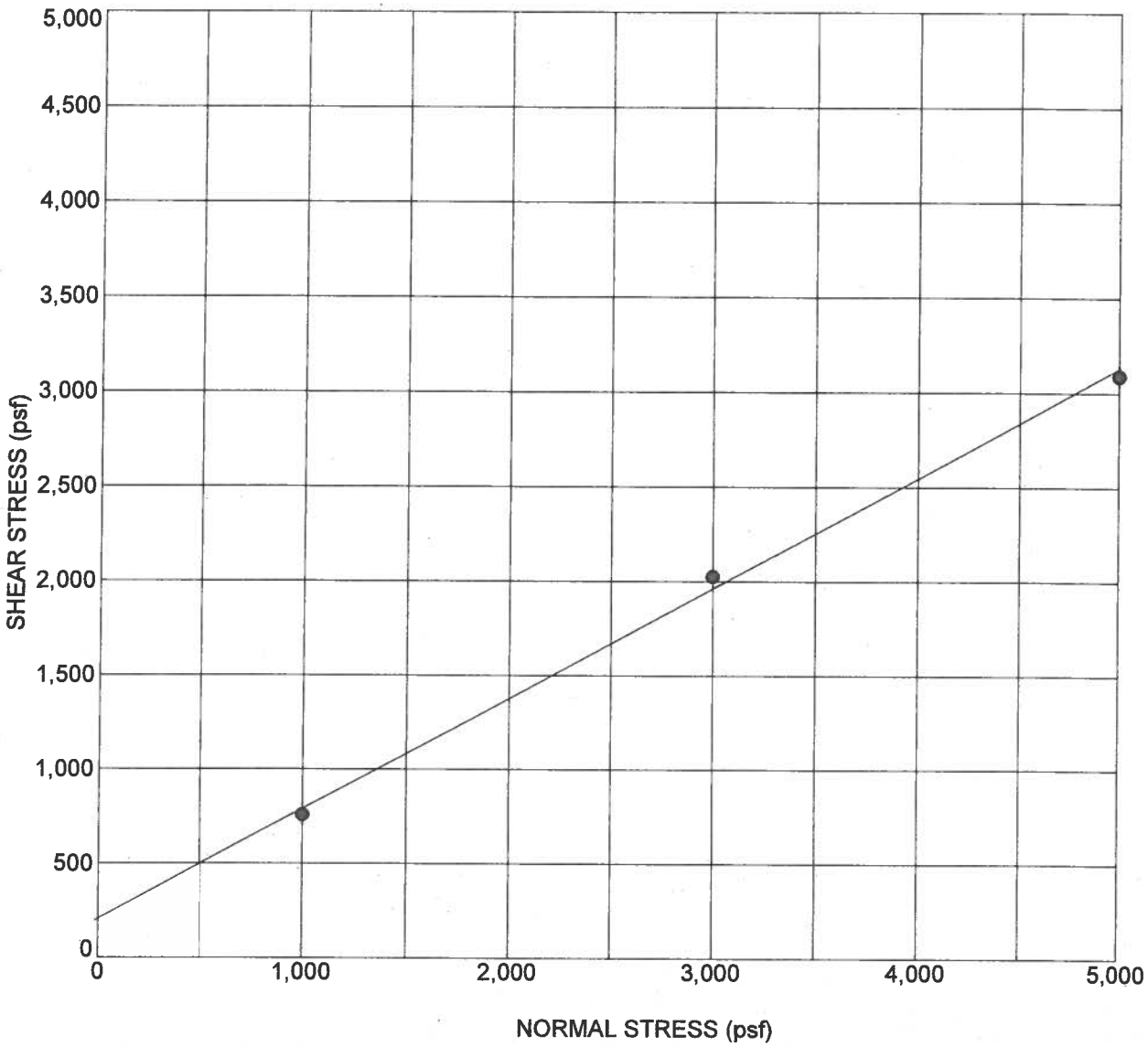
DIRECT SHEAR TEST
GEOTECHNICAL DESIGN REPORT
SR99 & FULKERTH RD INTERCHANGE
TURLOCK, CALIFORNIA

PLATE
B-11

KA_DIRECT_SHEAR KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_R2B.GLB 98834.GPJ 5/11/11



SOURCE: A-11-002
DEPTH: 23.5 ft (ULTIMATE STRENGTH)
SOIL DESCRIPTION: Silty SAND (SM)

FRICTION ANGLE = 30 deg
COHESION = 210 psf

FINAL DRY DENSITY (pcf)	120.7	121.8	121.7
INITIAL WATER CONTENT (%)	8.6	8.6	8.6
FINAL WATER CONTENT (%)	13.8	12.8	11.9
NORMAL STRESS (psf)	1000	3000	5000
MAXIMUM SHEAR (psf)	758.7	2026	3089.9

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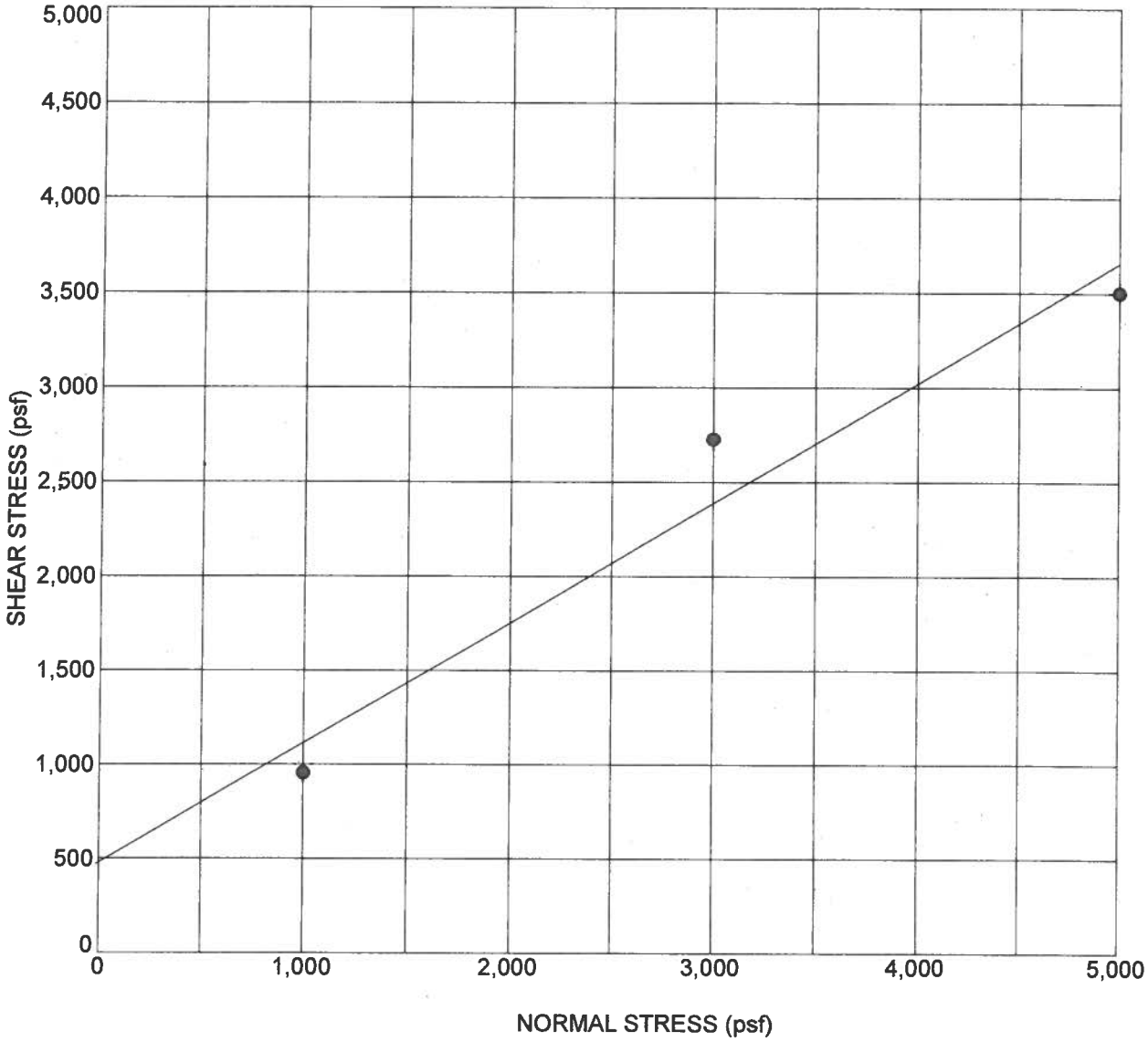
DIRECT SHEAR TEST
GEOTECHNICAL DESIGN REPORT
SR99 & FULKERTH RD INTERCHANGE
TURLOCK, CALIFORNIA

PLATE
B-12

KA_DIRECT_SHEAR KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_R2B.GLB 98834.GPJ 5/11/11



SOURCE: B-1
DEPTH: 0 to 5 ft (REMOLDED ULTIMATE STRENGTH)
SOIL DESCRIPTION: Poorly Graded SAND (SP)

FRICTION ANGLE = 32 deg
COHESION = 485 psf

FINAL DRY DENSITY (pcf)	118.8	118.8	118.7
INITIAL WATER CONTENT (%)	6.5	6.5	6.5
FINAL WATER CONTENT (%)	13.4	13.1	13.8
NORMAL STRESS (psf)	1000	3000	5000
MAXIMUM SHEAR (psf)	955.6	2726.5	3501.8

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File Number:

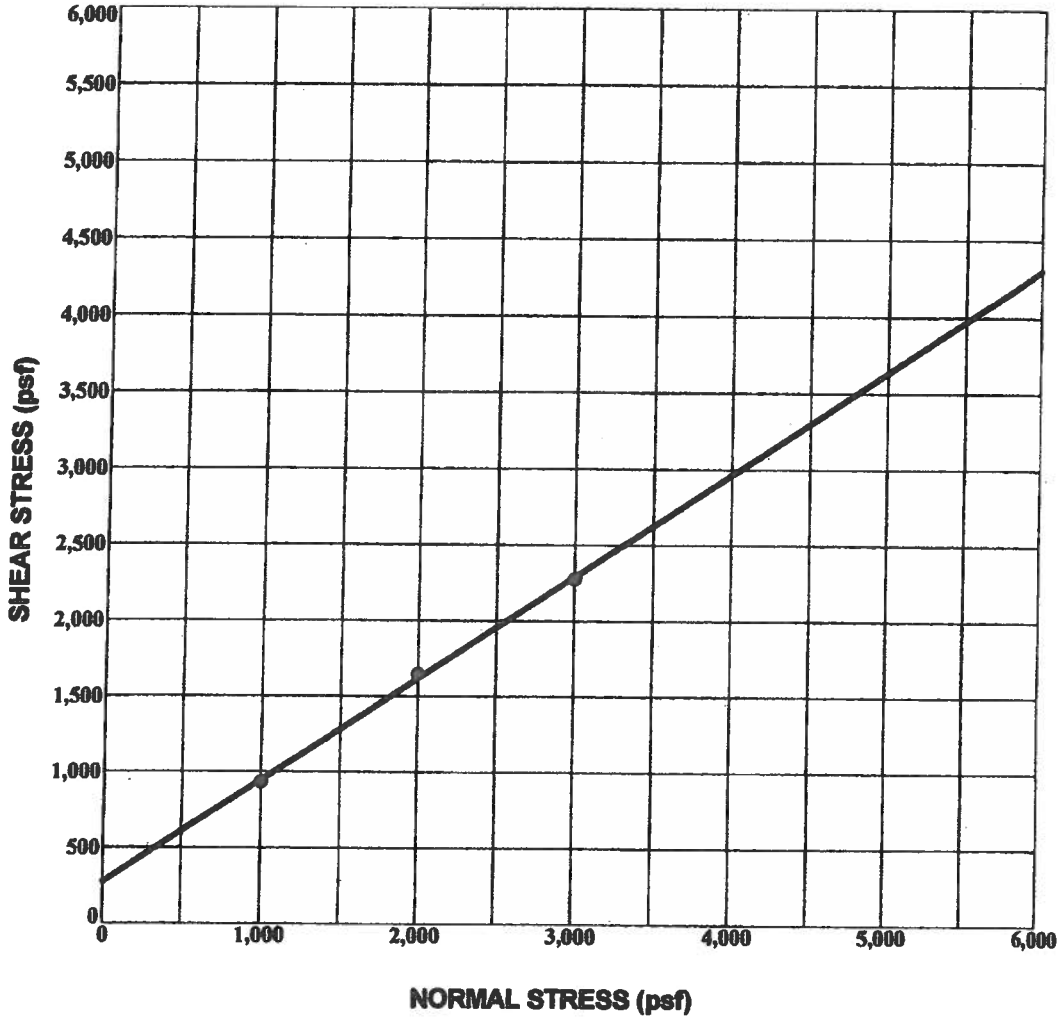
DIRECT SHEAR TEST
GEOTECHNICAL DESIGN REPORT
SR99 & FULKERTH RD INTERCHANGE
TURLOCK, CALIFORNIA

PLATE
B-13

KA_DIRECT_SHEAR KA CORPORATE STD.GDT KLEINFELDER_GINT_LIBRARY_R2B.GLB 98834.GPJ 5/11/11

APPENDIX C

DIRECT SHEAR



Source: TP-1
Depth: 1.0 ft
Test Type: Consolidated - Drained
Soil Description: Silty Sand (SM)

Friction Angle = 34 deg
Cohesion = 275 psf

Dry Density (pcf)	108.9	109.0	109.8
Initial Water Content (%)	9.0	9.0	9.0
Final Water Content (%)	19.1	18.8	18.0
Normal Stress (psf)	1000	2000	3000
Shear Stress(psf)	932	1648	2276

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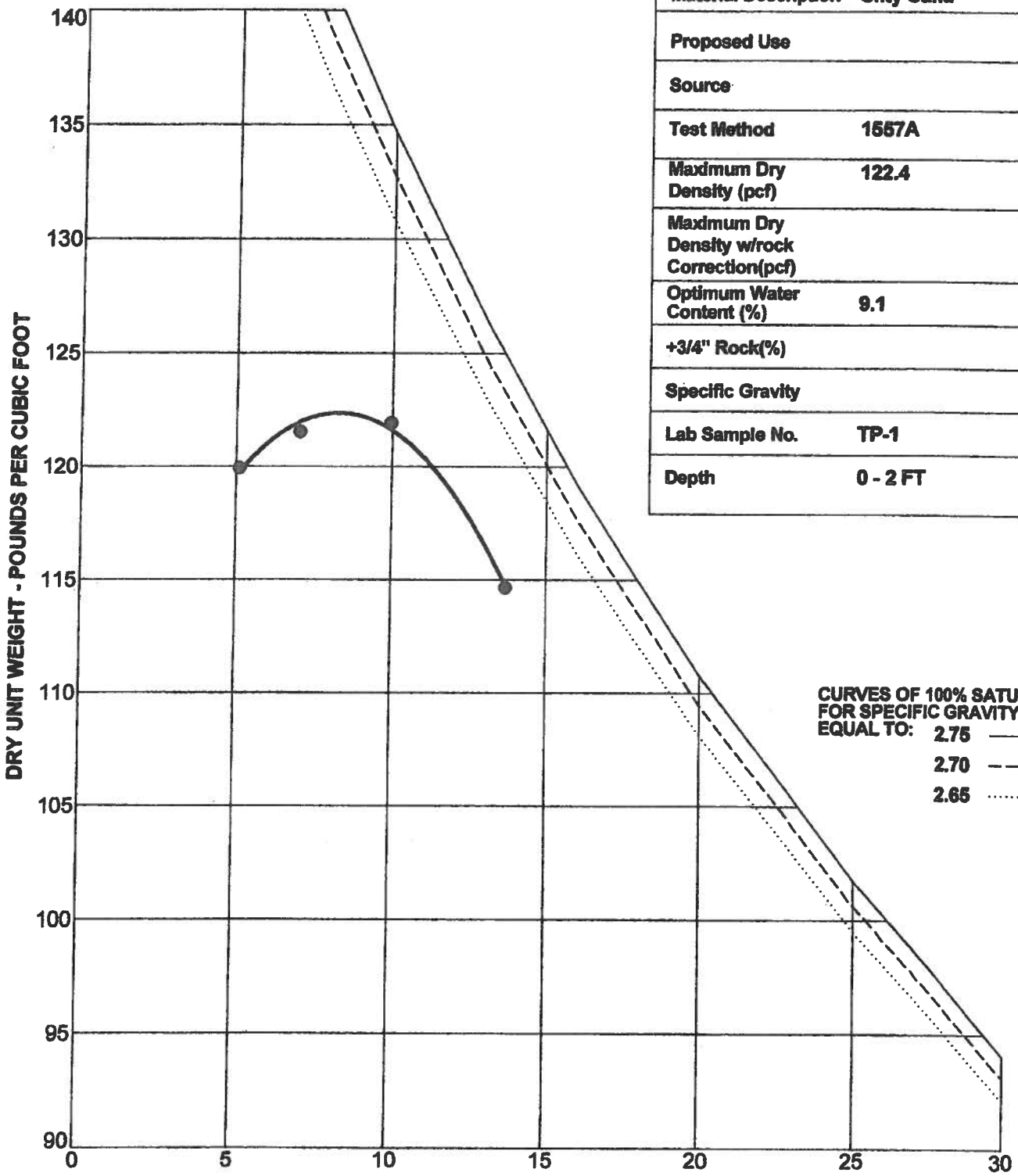
PROJECT NO. 98834

DIRECT SHEAR TEST
SR99/Fulkerth Road Interchange Project
Fulkerth Road & SR99
TURLOCK, CA

PLATE
A-1

SUMMARY OF TEST RESULTS	
Material Description	Silty Sand
Proposed Use	
Source	
Test Method	1557A
Maximum Dry Density (pcf)	122.4
Maximum Dry Density w/rock Correction(pcf)	
Optimum Water Content (%)	9.1
+3/4" Rock(%)	
Specific Gravity	
Lab Sample No.	TP-1
Depth	0 - 2 FT



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PROJECT NO. 98834

MOISTURE DENSITY RELATIONSHIP
SR99/Fulkerth Road Interchange Project
Fulkerth Road & SR99
TURLOCK, CA

PLATE
A-2

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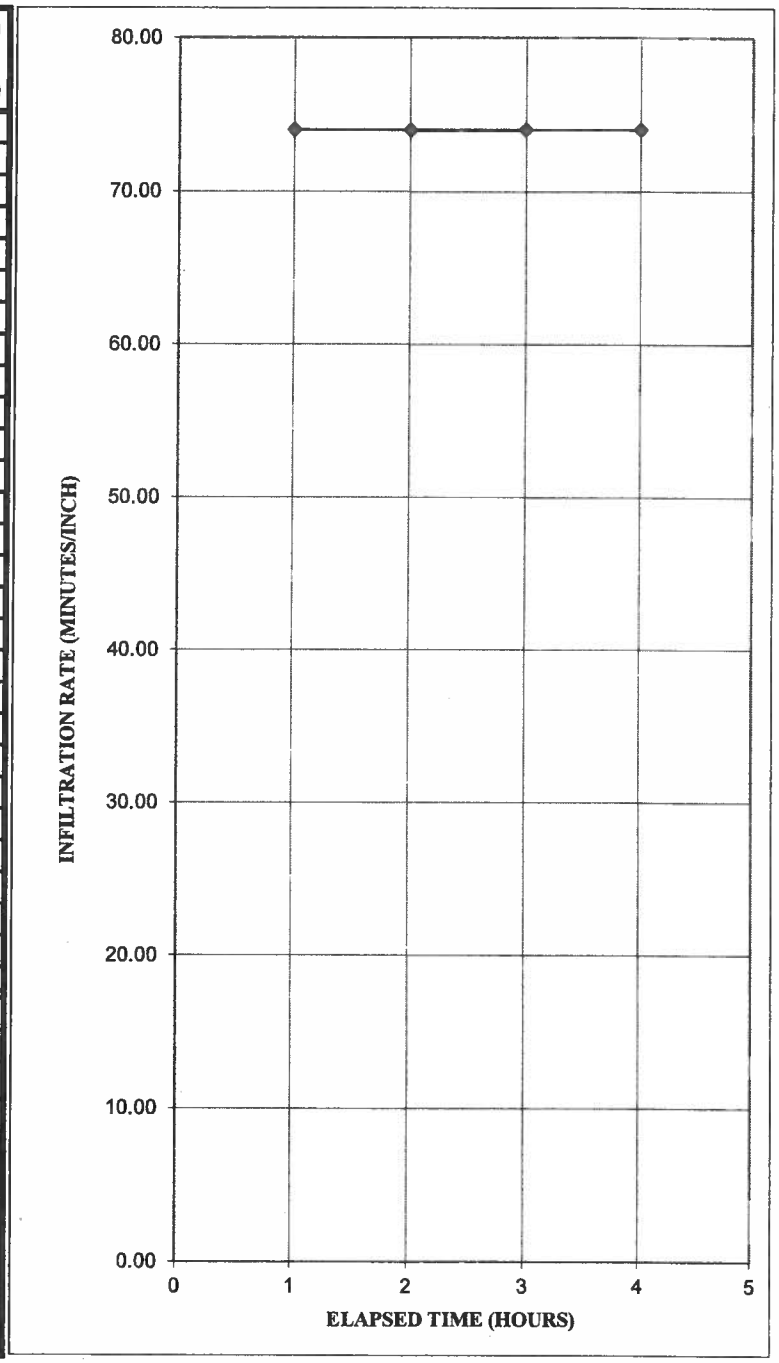
APPENDIX D

Project: SR99 & FULKERTH AVE. Location: DRI-1
Method: ASTM D 3385
Technician: M. BELTRAN
Date: April 5, 2011

Between Readings (minutes)	Elapsed Time (hours)	Quantity of Water (liters)	Infiltration Rate (min/inch)
60	1.00	1.5	74.0
60	2.00	1.5	74.0
60	3.00	1.5	74.0
60	4.00	1.5	74.0



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Project No.: 98834

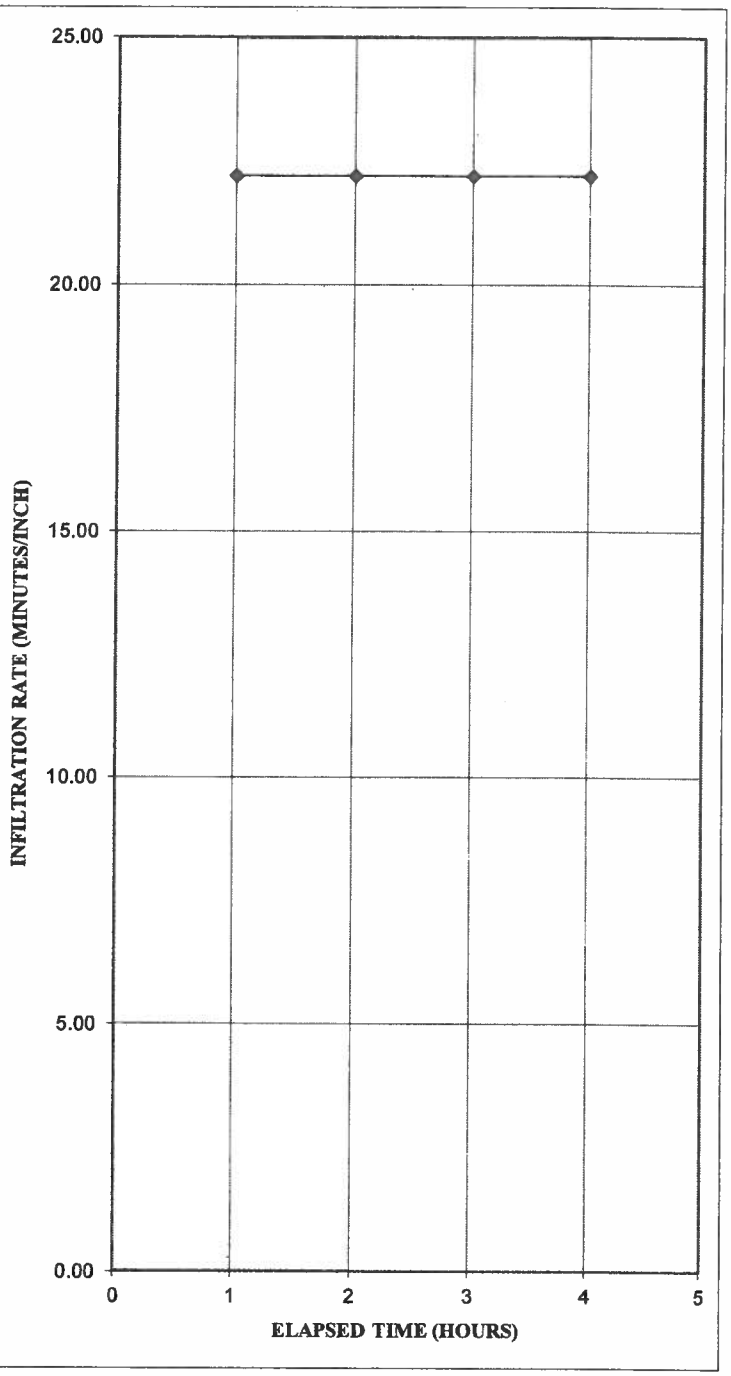
DOUBLE RING INFILTRATION TEST

GEOTECHNICAL DESIGN REPORT
SR 99 AND FULKERTH AVE INTERCHANGE
TURLOCK, CALIFORNIA

Plate
D-1

Project: SR99 & FULKERTH AVE. Location: DRI-2
Method: ASTM D 3385
Technician: M. BELTRAN
Date: April 5, 2011

Between Readings (minutes)	Elapsed Time (hours)	Quantity of Water (liters)	Infiltration Rate (min/inch)
60	1.00	5.0	22.2
60	2.00	5.0	22.2
60	3.00	5.0	22.2
60	4.00	5.0	22.2



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Project No.: 98834

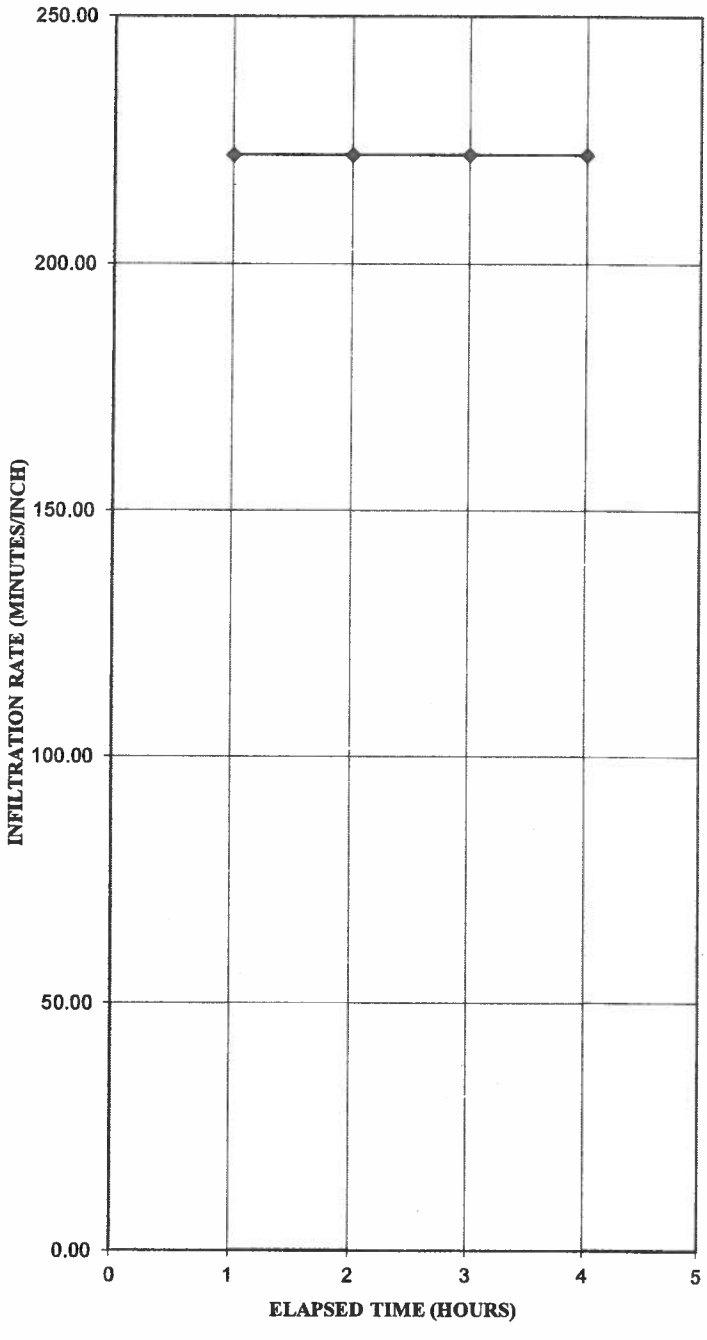
DOUBLE RING INFILTRATION TEST

GEOTECHNICAL DESIGN REPORT
SR 99 AND FULKERTH AVE INTERCHANGE
TURLOCK, CALIFORNIA

Plate
D-2

Project: SR99 & FULKERTH AVE. Location: DRI-3
Method: ASTM D 3385
Technician: M. BELTRAN
Date: April 5, 2011

Between Readings (minutes)	Elapsed Time (hours)	Quantity of Water (liters)	Infiltration Rate (min/inch)
60	1.00	0.5	222.0
60	2.00	0.5	222.0
60	3.00	0.5	222.0
60	4.00	0.5	222.0



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Project No.: 98834

DOUBLE RING INFILTRATION TEST

GEOTECHNICAL DESIGN REPORT
SR 99 AND FULKERTH AVE INTERCHANGE
TURLOCK, CALIFORNIA

Plate
D-3

APPENDIX E

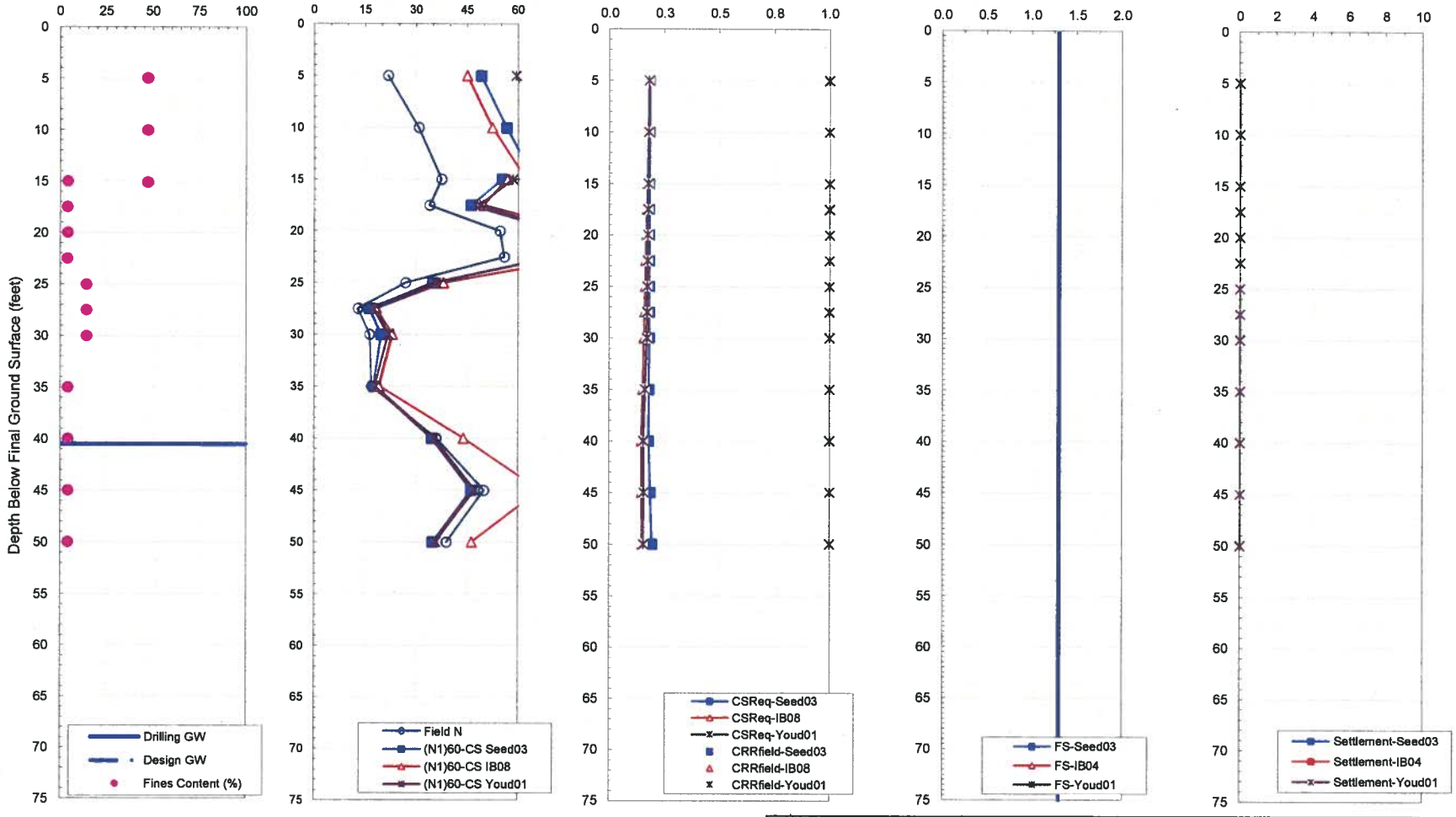
Boring ID: **A-11-001**

M_w= **6.7**
PGA= **0.28g**

Groundwater Depth During Drilling (ft) = **40.5 ft**
Design Groundwater Depth (ft) = **40.5 ft**

Existing Ground Elevation = **0.0 ft**
Final Ground Elevation = **0.0 ft**

Ana. by: M. BELTRAN
Checked by: J. KEMPTON



1. $(N_1)_{60\text{-}CS}$ capped at 60; 2. CRRfield = 1 for non-liquefiable soils; 3. FS is capped at 2.0 for liquefiable soils and not plotted for non-liquefiable soils including soils above G.W.T.

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Merced, California 95341
t: 209 384 7552 f: 209 384 8218

Project Name: SR 99 & Fulkerth Ave.
Project No.: 98834
Project Location: TURLOCK, CA

LIQUEFACTION ANALYSIS

Date 5/2/2011

PLATE E-1

APPENDIX F

Geotechnical Design Report Review Form

(09/06/12)

General Project Information (District Liaison to complete)	Review Phase (District Liaison to complete)	Reviewer Information (METS/GS to complete)
Dist: 10 EA: 0T910 **EFIS: 1000000306** **Project Name: Fulkerth Rd GDR** **District Liaison: Mason Leung** **Phone: (209) 948-7073** **e-mail:**	__ PSR/PDS (Review No.__ __ APS/PSR (Review No.__) __ APS/PR (Review No.__) __ Type Selection __ 65% PS&E Unchecked Details _X_ PS&E (Review No. 2__) __ Construction __ Other:	**Reviewer Name: John Huang** **Functional Unit: METS/GS** **Cost Center: 59-3657** **Phone Number: e-mail: qiang_huang@dot.ca.gov** **Date of Review: 12/10/14**

Consultant Information (to be filled in by Consultant)

Consultant Lead (First and Last Name)	Geotech Consultant Firm	Phone Number	e-mail	Response Date
Omni - Means, Ltd	Kleinfelder, Inc	559-486-0750	jkempton@kleinfelder.com	1/27/15

#	Doc. (See Note 1)	Page, Section	Review Comments	Consultant Responses	✓
1	GDR	general	Please remove tie-back wall related contents, they are included in FR	Noted. Will comply.	
2	GDR	19	(Please clarify how the 4 ksf/ft for seismic incremental was developed, it seems to be small.	The seismic increment was determined by calculating the difference between the Total Seismic+ Static Force (obtained from Mononobe-Okabe with a K_h= 1/3 PGA = 0.09g) and the static Rankine Active Lateral Earth Pressure.	
3	GDR		(C2) Approved subject to District Verification	Noted.	
4					
5					
6	Note		GDR by Kleinfeleder dated 9/3/14		
7					
8					
9					

Note 1: Abbreviations for Typical Documents (if Abbr. is not below, type in the document type)					
PGDR=Preliminary Geotech Report	GDR=Geotech Design Report	DP – Drilling Plan			

✓= Comment Resolved
(for Reviewer's use)