STRUCTURES PRELIMINARY GEOTECHNICAL REPORT
INTERSTATE 80/STATE ROUTE 65
INTERCHANGE IMPROVEMENT PROJECT

Placer County, California
EA 03-4E3200; 03-PLA-80/65-PM 1.9–6.1/ R4.8–R7.3

Prepared by:
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Prepared for:
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Mr. Christopher Benson
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Subject: **Structures Preliminary Geotechnical Report**
Interstate 80/State Route 65 Interchange Improvement Project
Placer County, California
EA 03-4E3200; 03-PLA-80/65
PM 1.9–6.1/ R4.8–R7.3

Dear Mr. Benson,

Blackburn Consulting (BCI) prepared this Structures Preliminary Geotechnical Report for the Interstate 80 and State Route 65 Interchange improvement project located in Placer County, California.

BCI prepared this report in accordance with the February 2011 Agreement between BCI and CH2M Hill. We submit this draft report for review and comment.

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

Sincerely;

BLACKBURN CONSULTING

Patrick Fischer, P.E., C.E.G.
Engineering Geologist, Principal

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Structures Preliminary Geotechnical Report

Interstate 80 & State Route 65 Interchange Improvement Project
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1 INTRODUCTION

1.1 Purpose

CH2M Hill retained Blackburn Consulting (BCI) to prepare this Structures Preliminary Geotechnical Report (SPGR) for the proposed improvements at the Interstate 80 (I-80)/State Route 65 (SR 65) Interchange located in Placer County, California. This report provides preliminary geotechnical/geologic information for advance planning purposes. Additional geotechnical studies are required for design level recommendations.

BCI prepared this SPGR for CH2M Hill for advance planning purposes only. Do not use or rely upon this report for other locations or for final project design.

1.2 Scope of Services

To prepare this report, BCI:

- Discussed the project with the project team
- Reviewed preliminary site plans prepared by the team
- Reviewed published maps and literature related to site soil, rock, and geologic conditions
- Reviewed published geotechnical data and as-built information for existing structures in the project area
- Conducted a preliminary geologic site reconnaissance to confirm reported conditions

1.3 Site Location and Description

The project site is located in the area of the I-80/SR 65 interchange in the Cities of Rocklin and Roseville, Placer County, California. Figure 1 shows the overall project area.

In the project area, I-80 has three to six lanes in each direction and SR 65 is a divided highway with two to three lanes in each direction. The overall project consists of modifications along I-80 from the Douglas Boulevard Interchange to the Rocklin Road Interchange (Post Miles 1.9-6.1), and along SR 65 from the I-80 junction to the Pleasant Grove Boulevard Interchange (Post Miles R4.8-R7.3).

Area topography is characterized by rolling hills with southwest trending ridges and relatively gentle slope gradients. Elevations range from a high of approximately 250 feet along SR 65 to a low of approximately 150 feet at the west end of the project area along I-80. In the project area, I-80 is constructed near natural grade with some cuts through ridges and fills across low lying areas. SR 65 is mostly elevated (by fills and bridges) above natural grade from the interchange area to the northwest side of Antelope Creek (near PM 5.4). Northwest of Antelope Creek to Pleasant Grove Blvd., SR 65 is constructed near natural grade with some cuts and fills.

Several west-southwest flowing creeks are located in and near the project area. The major creeks flowing through this area are:

- Antelope Creek located northwest of I-80 with a crossing beneath SR 65
- Secret Ravine located southeast of I-80
- Miners Ravine located southeast of I-80 with a crossing beneath I-80 west of Eureka Road

These creeks (and their ancestral equivalents) have created a low southwest trending valley in the project area along which I-80 is constructed. Storm drainage at I-80 and SR 65 is directed through roadside ditches that flow to the local drainages.

2 PROJECT DESCRIPTION

Three "Build" alternatives are proposed (after the screening process) for the project and are as follows:

- Alternative 1 – Taylor Road Full Access Interchange
- Alternative 2 – Collector-Distributor System Ramps
- Alternative 3 – Taylor Road Interchange Eliminated

The alternatives propose to add capacity, a bi-directional HOV system, and high-speed connections. Local and regional circulation and access would be improved along I-80 between Eureka Road/Atlantic Street, Taylor Road, and along SR 65 between the I-80/SR 65 Interchange and Pleasant Grove Boulevard.

This SPGR focuses on preliminary geotechnical information for new structures included under all three "Build" alternatives. Figures 2A through 2C (Alternatives 1, 2, and 3) show the preliminary configuration of interchange modifications and proposed structure locations based on preliminary Planning Study maps (CH2M Hill, 2014) . The proposed structures are:

Structures Common to Alternatives 1 through 3

- East I-80/North SR 65 Connector
- I-80/SR 65 HOV Connector
- South SR 65/East I-80 Connector
- Taylor Road Overcrossing (Replace)
- East Roseville Viaduct Widening (two structures)Roseville Parkway Tieback Wall
- Galleria Boulevard Tieback Wall

Structures Common to Alternative 2 and 3

- Collector-Distributor (CD), Northbound SR 65 On-Ramp
- Collector-Distributor (CD), Eastbound I-80 On-Ramp

Structures in Alternative 1 Only

- T –Undercrossing at Eastbound/Westbound 80 (two structures)
- South SR 65/West I-80 Connector

Structures in Alternative 2 Only

- Miners Ravine Bridge
- Eureka Road On-Ramp Undercrossing (cut and cover tunnel)

Structures in Alternative 3 Only

- Miners Ravine Eastbound Off-Ramp Widening

3 EXCEPTIONS TO POLICY

No exceptions to Caltrans departmental policy are included for this SPGR.

4 FIELD INVESTIGATION AND TESTING PROGRAM

4.1 Subsurface Investigation and Laboratory Testing

New subsurface investigation and laboratory testing was not completed for this SPGR. Subsurface data obtained for existing structures was used to evaluate site conditions within the project area. See Appendix A for copies of the Logs of Test Borings (LOTB's) used in our review.

4.2 Site Review and Geologic Mapping

BCI completed a site reconnaissance to observe the site and confirm published geologic conditions. A discussion of area geology is included below.

5 DOCUMENT REVIEW

For preliminary evaluation of site subsurface conditions, our review included the following documents:

- Log of Test Borings, Atlantic Street Overcrossing, Caltrans, As-Built, 12/29/1989, Sheets 18 and 19 of 19
- Log of Test Borings, Harding Boulevard Overcrossing (Galleria Blvd.), CH2M Hill, As-Built, 10/17/1988, Sheet 12 of 12
- Log of Test Borings, Roseville Parkway Overcrossing, Kleinfelder Inc., As-Built, 11/10/2000, Sheets 47 to 51 of 51
- Memorandum, Foundation Investigation, Taylor Road Overcrossing, Caltrans, 11/20/1986

- Log of Test Borings, Miners Ravine Bridge (EB off-ramp), Caltrans, As-Built, 12/29/1989, Sheets 13 and 14 of 14
- Log of Test Borings, Miners Ravine Bridge (WB on-ramp), Caltrans, As-Built, 12/29/1989, Sheets 10 to 12 of 12
- Log of Test Borings, Miners Ravine Bridge (Widen), Kleinfelder, Inc., 11/17/2008, Sheets 477 to 481 of 539
- Log Borings, Roseville 150 Joint Venture, Road "E" & Antelope Creek Bridge, Roseville 150 Center, The Spink Corporation (Logs by Wallace Kuhl & Associates Inc.), 1995, Sheet 17 of 17
- Memorandum, Route 65/80 Separation Foundation Recommendations, Caltrans, 3/21/1984
- Highway 65 and I-80, Site Exploration Results, Anderson Geotechnical Consultants, Inc., 11/29/1984
- Log of Test Borings, Route 65/80 Separation, Caltrans, As-Built, 10/6/1987, Sheet 14 of 14
- Log of Test Borings, East Roseville Viaduct, Caltrans, As-Built, 8/6/1987, Sheet 173 to 175 of 175
- Log of Test Borings, Retaining Wall – 39E-41E, Kleinfelder, Inc., 12/2006, Sheet 24 to 29 of 29
- Log of Test Borings, Retaining Wall – 40W-42W, Kleinfelder, Inc., 12/2006, Sheet 23 to 29 of 29
- Log of Test Borings, Retaining Wall – 48W, Kleinfelder, Inc., 11/2008, Sheet 11 to 14 of 14
- Log of Test Borings, Retaining Wall – 49E, Kleinfelder, Inc., 9/2008, Sheet 11 to 14 of 14
- Log of Test Borings, Retaining Wall – 58E, Kleinfelder, Inc., 9/2008, Sheet 11 to 14 of 14
- Log of Test Borings, Retaining Wall – 59W, Kleinfelder, Inc., 11/2008, Sheet 10 to 13 of 13

Appendix A contains copies of the applicable Logs of Test Borings (LOTB's) sheets from the above references.

6 SITE GEOLOGY AND SUBSURFACE CONDITIONS

6.1 General Project Area Geology

The project area lies on the eastern margin of the Great Valley Geomorphic Province (Sacramento Valley portion). The Great Valley is bordered by the Cascade and Klamath Ranges to the north, the Coast Ranges to the west, and the Sierra Nevada to the east. The valley was

formed by tilting of the Sierran Block with the western side dropping to form the valley and the eastern side uplifted to form the Sierra Nevada. The western slope of the Sierra Nevada is underlain by intrusive, volcanic, and metamorphic rock. Valley deposits are characterized by a thick sequence of alluvial, lacustrine, and marine sediments. The thickness of the sediments varies from a thin veneer at the valley margin, to thousands of feet in the central portion. In the project area, granitic rock and volcanic deposits occur along the valley margin.

Based on review of published geologic maps (Livingston, 1974, Wagner et al, 1981; Loyd, 1995, Mulder, 2007), our site review, and available subsurface information, the project area is underlain by the following:

Granitic Rock

Granitic rock in the project area is known as the Rocklin Pluton; it is comprised of quartz diorite and is deeply weathered (decomposed) in many areas. Within the project area, granitic rock occurs immediately west of the Rocklin Road Interchange. The rock is typically decomposed to intensely weathered within approximately 5 to 10 feet of the surface with isolated "boulders" (or bodies) of moderately to slightly weathered, hard rock. Figure 3 shows mapped locations of granitic rock as "Mzg".

Mehrten Formation

Deposits of the Mehrten Formation in the project area consist primarily of andesitic, volcanic mudflow breccia, and cobble conglomerate. This formation is likely to be encountered along I-80 between Eureka Road and Douglas Blvd., within the eastern portion of the I-80/SR 65 interchange, and northwest of Antelope Creek along SR 65. The breccia consists of a gray mixture of gravel to boulder size, angular, andesitic fragments. These fragments are well cemented in a matrix of volcanic lapilli and ash (tuff). The conglomerate consists primarily of cobbles in a well-cemented matrix of andesitic sand and silt, and often contains interbedded layers of sandstone, siltstone, and lenses of mudflow breccia. In the project area, the lowest portions of the Mehrten Formation are often underlain by claystones possibly associated with the Valley Springs or Ione Formations. Bedding of sediments and flows within the Mehrten Formation typically dip gently (2 to 4 degrees) to the west/southwest. These volcanic materials were deposited during Miocene time (5 to 20 million years ago). Figure 3 shows mapped locations of the Mehrten Formation as "Tva".

Riverbank and Turlock Lake Formations

Sediments of the Riverbank and Turlock Lake Formation occur in the central portion of the project area. These are alluvial deposits that are typically composed of interbedded medium dense to dense sands (often cemented) and gravels, and stiff to hard silts and clays. Bedding is typically horizontal, lenticular, and discontinuous. These sediments are Late to Middle Pleistocene age (deposited over 150,000 years ago). Figure 3 shows mapped locations of the Riverbank and Turlock Lake Formations as "Qa".

Other Geologic Units

Several shallow waterways cross the project area (including Secret Ravine, Miners Ravine, and Antelope Creek) and we expect these waterways will contain a certain thickness of young alluvial

deposits. This includes alluvial deposits at the banks (stream terrace deposits) as well as active channel deposits. Alluvium likely consists of several feet of loose sand and gravel with some cobbles and boulders.

Highway embankment fill is also present at a number of locations along the project corridor. We expect embankment fill to be engineered fill, placed in accordance with Caltrans specifications, that consists of locally derived clay, silt, sand, and gravel with occasional boulders (from the Mehrten Formation).

6.2 Faulting

Faulting is not identified within or adjacent to the site. Based on the Caltrans ARS Online (V2.3.06), the closest seismic source is a portion of the Foothills Fault System (Deadman Fault) located approximately 9 miles (14.8 km) to the east. Figure 4 shows general fault locations in the region.

6.3 Subsurface Soil and Rock

Table 1 below summarizes the expected soil and rock conditions for various portions of the project. The descriptions are based on mapped geologic conditions, subsurface data made available for the project area, and our site reconnaissance.

TABLE 1 – PRELIMINARY SUBSURFACE CONDITIONS

General Project Area	Planned Structures in Area	General Soil and Rock Conditions
East End, I-80 Between South SR 65/East I-80 Connector and Rocklin Road; Approximate PM 4.7 to 6.1	• No new bridge structures are planned in this area • Retaining walls along eastbound I-80	Underlain by granitic rock that transitions to andesitic volcanic deposits and alluvial deposits at the west end. Very stiff/dense silt and sand associated with weathered granitic rock and alluvial deposits are anticipated. Isolated occurrence of shallow, hard, granitic rock can occur. Moderately hard sandstone and conglomerate associated with andesitic volcanics are anticipated at the west end of this area.
South Interchange Area, I-80 between South SR 65/East I-80 Connector Ramp and South SR 65/West I-80 Connector Ramp; Approximate PM 4.1 to 4.7	• E80/N65 Connector • 80/65 HOV Connector • S65/E80 Connector • T –Undercrossing at EB/WB 80 • CD EB80 On-Ramp • CD NB65 On-Ramp	Transition area between engineered fill placed for ramps and abutments, andesitic volcanics that consist of moderately hard breccia and sandstone, and alluvium that consists of medium dense to dense sands, and hard silts and clays.

TABLE 1 – PRELIMINARY SUBSURFACE CONDITIONS

General Project Area	Planned Structures in Area	General Soil and Rock Conditions
Northwest End, SR 65 between 80/65 Connector and northwest end of East Roseville Viaduct; Approximate PM R5.1 to R5.4	• East Roseville Viaduct Widening	Underlain by alluvial deposits that typically consist of dense sands and very stiff to hard silts and clays. At the northwest end of this area (northwest side of Antelope Creek), there is a transition to andesitic volcanics that consist of moderately hard, breccia and sandstone. Significant depth of engineered fill is present at the south viaduct abutment.
Northwest End, SR 65 between East Roseville Viaduct and Stanford Ranch Road; Approximate PM R5.4 to R5.9	• Galleria Blvd Tieback Wall	Underlain by andesitic volcanic deposits. Moderately hard breccia, sandstone and conglomerate are anticipated at shallow depths.
West End, I-80 between South SR 65/West I-80 Connector and Miners Ravine; Approximate PM 2.9 to 4.1	• S65/W80 Connector • 80/65 HOV Connector • Taylor Road Overcrossing (Replace) • Roseville Parkway Tieback Wall • Eureka Road On-Ramp UC • Miners Ravine EB Off-Ramp Widening • Miners Ravine Bridge	Underlain by alluvial deposits that typically consist of medium dense to dense sands and very stiff to hard silts and clays. At the east and west ends of this area, andesitic volcanics that consist of breccia, conglomerate, sandstone, and siltstone are present at the surface and at relatively shallow depths below alluvial deposits. Significant depths of engineered fill are present at existing ramps and abutments.
West End, I-80 between Miners Ravine and Douglas Blvd.; Approximate PM 1.9 to 2.9	No new bridge structures are planned in this area	Underlain by andesitic volcanic deposits. Moderately hard breccia, sandstone and conglomerate are anticipated very shallow depths. The west end, near Douglas Blvd, transitions to alluvial deposits expected to consist of medium dense to dense sands and very stiff to hard silts and clays.

6.4 Groundwater

The depth to groundwater beneath the project area is variable due to:

- Significant changes in ground surface elevation
- The presence of alluvial sediments that extend through the central portion of the area
- Relatively hard, well consolidated sediments and hard rock on the project perimeter
- Presence of several creek beds

Regionally, MWH (2007) shows groundwater elevation ranging from approximately 45 feet above mean sea level (msl) at the west end of the project to approximately 65 feet at the east end. Figure 5 is a portion of the MWH (2007) groundwater elevation map. Based on this map, regional groundwater levels are generally greater than 100 feet below the ground surface and the gradient is to the west-southwest.

While the groundwater mapping provides the approximate elevation of the deeper/regional groundwater conditions, perched groundwater that can impact project design and construction may occur much shallower. In general, groundwater should be expected near the elevation of water in the adjacent creek beds such as Secret Ravine, Miners Ravine, and Antelope Creek. Existing subsurface data that we reviewed indicates shallow groundwater occurrence at the locations and elevations shown in Table 2.

TABLE 2 – SUMMARY OF SHALLOW GROUNDWATER OCCURRENCE

General Location	Approximate Depth to Groundwater (ft)	Approximate Groundwater Elevation (ft)	Reference Used	Notes
West end (Miners Ravine)	2 to 5 feet	151	Topographic map and Miners Ravine Bridge LOTB (1989)	At Miners Ravine
West end (Atlantic St)	15	165	Atlantic St. OC LOTB (1988)	
West End (Roseville Pkwy)	17 to 20	154 – 185	Roseville Pkwy OC LOTB (1998)	Groundwater elevation increases to the southeast
West Central (Taylor Road)	29	171	Taylor Road OC, Foundation Investigation (1986)	
Central (65/80 Separation)	<0.5 – 25	193 to 207	Route 65/80 Separation LOTB (1984)	Shallow water appears to be a localized condition
East Central	10 – 25	200	Topographic map	Adjacent to Secret Ravine
Northwest (East Roseville Viaduct)	12 – 14	199 – 202	East Roseville Viaduct LOTB (1984)	Near Taylor Road
Northwest (East Roseville Viaduct)	<0.5 – 9	169 -175	East Roseville Viaduct LOTB (1984)	Near Antelope Creek

7 PRELIMINARY GEOLOGIC HAZARDS AND SEISMIC DATA

7.1 Geologic Hazards

Available site information and our site review did not indicate significant geologic hazards (such as landsliding, ground settlement, very soft soils, severe erosion, etc) within the project area. There is a potential for weak claystones to occur near the base of the Mehrten Formation (area labeled as "Tva" on Figure 3), particularly at the eastern portion of the I-80/SR 65 interchange; the claystone can impact slope stability and design parameters for new structures.

7.2 Seismic Data

7.2.1 Ground Motion

The project area is subject to ground motions from a seismic event. BCI used seismic design procedures outlined by Caltrans 'Geotechnical Services Manual' to develop the preliminary Acceleration Response Spectrum (ARS) Curve for preliminary design of new bridge structures. We summarize the data in Table 3. Figure 6a shows a graphical display of the Preliminary Design Response Spectrum. Figure 6b shows tabled spectrum data.

TABLE 3 – PRELIMINARY GROUND MOTION STUDY RESULTS	
Peak Ground Acceleration (PGA)	0.21g
V_{S30} (Small Strain Shear Wave Velocity)[1]	1,800 feet per second (560 m/s)
Near Fault Factor	Yes
Basin Amplification Factor	NA
Controlling Deterministic Scenario	Minimum Deterministic: ➢ Style: Vertical strike-slip ➢ Maximum Magnitude (Mmax): 6.5 ➢ Site to fault distance (R_{RUP})[2]: 7.5 mi
Nearest Late Quaternary Fault	Foothills Fault System – Deadman Fault ➢ Fault ID Number: 422 ➢ Style: Normal ➢ Dip: 50 degrees, West ➢ Maximum Magnitude (Mmax): 6.2 ➢ Site-to-Fault Distance (R_{RUP})[2]: 9 miles/14.8 km (from central portion of interchange)
RECOMMENDED PRELIMINARY DESIGN RESPONSE SPECTRUM	Envelope that consists of the minimum deterministic spectrum and the probabilistic spectrum (probability of exceedance equal to 5% in 50 years, a 975-year return period). ➢ ARS Response Spectra - See Figure 6a/6b ➢ PGA = 0.21g (based on minimum deterministic spectrum) ➢ Mmax = 6.5

1) Preliminary V_{S30} value based on Soil Profile Type C (very dense soil and soft rock) present throughout the project area
2) R_{RUP} is defined as the closest distance to the fault rupture plane (as defined in Caltrans' "Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations," Appendix B, November 2012)

The information provided in Table 3 and the Preliminary Design Response Spectrum will need to be updated for final design. Each structure needs to be analyzed separately and ARS developed based on site specific data (such as V_{S30}).

7.2.2 Liquefaction

Liquefaction can occur when saturated, loose to medium dense, granular soils (generally within 50 feet of the surface), or specifically defined cohesive soils, are subjected to ground shaking. According to our document and site review, non-liquefiable soils (medium dense to very dense granular soils, very stiff to hard, cohesive soils, and/or soft rock) are present at relatively shallow depths at planned structure locations. We consider the potential for detrimental liquefaction to be low at planned structure locations throughout the project.

7.2.3 Fault Rupture

Faulting is not mapped through the site, and the site does not lie within or adjacent to a Fault Rupture Hazard Zone (Bryant and Hart, 2007). Based on the Caltrans ARS Online (V2.3.06) , the closest seismic source is a portion of the Foothills Fault System (Deadman Fault) located approximately 9 miles (14.8 km) to the east. We consider the potential for fault rupture within the project area to be very low. Figure 4 shows the general fault locations in the region.

7.2.4 Seismic Settlement

During a seismic event, ground shaking can cause densification of granular soil above the water table that can result in settlement of the ground surface. Based on our review, medium dense to dense soils and/or rock is present at relatively shallow depths throughout the project area and probable ground motions are relatively low (Peak Ground Acceleration of 0.21g). We consider the potential for detrimental seismic settlement within the project area to be low for native soil/rock and engineered fill, provided engineered fills are constructed in accordance with Caltrans guidelines.

7.2.5 Seismic Slope Instability

Based on geologic conditions and past performance, we consider the potential for seismic slope instability in the form of landslides and mudslides within the project area to be very low. Similarly, we consider the potential for seismic instability of engineered cut or fill slopes constructed at typical allowable gradients of (2.1H:1V or flatter) to be low. An exception to this may be at cut slopes and/or structure locations at the base of the Mehrten Formation (area labeled as “Tva” on Figure 3) where there is a potential for weak claystones to occur (particularly at the eastern portion of the I-80/SR 65 interchange).

8 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

8.1 Structure Foundations

Variable soil and groundwater conditions in the project area make different foundation types better suited for each structure location. Table 4 below summarizes the suitable foundation types anticipated for each planned structure location (based on the preliminary Planning Study by CH2M Hill dated 7/24/14). Subsurface investigation will need to be completed to verify suitable foundation types and provide final design parameters.

TABLE 4 - PRELIMINARY STRUCTURE FOUNDATION TYPES				
Structure (Alternate)	**Existing Foundation Reference Data**	**Foundation Geology and Expected Soil Conditions**	**Suitable Foundation Types Anticipated**	**Installation Notes**
E80/N65 Connector (1, 2, and 3)	Located west of the S65/E80 Connector bridge which is the closest existing structure and supported on CIDH (Abut 1) and H-Piles (Abut 3, N end) with spread footing at Bent 2.	Dense silt and sand of the Turlock and/or Riverbank Formations) on north end and embankment fill over Turlock and/or Mehrten Formations at southwest end.	Driven H-piles for Abutment 1 through Bent 2, and Bent 6 through Abutment 11 (or through Abutment 13 for Alt. 2 and 3). Spread footings for Bent 3 through 5 (or Bent 4 through 6 for Alt. 2 and 3). CIDH are possible option at all locations. Large diameter shaft is feasible in median and adjacent to I-80.	CIDH may require temporary casing due to existing fill, and loose surface soil and groundwater near Secret Ravine.
80/65 HOV Connector (1, 2, and 3)	Located west of the S65/E80 connector bridge which has H-Piles (Abut 3 – N end) with spread footing at Bent 2.	Dense silt and sand of the Riverbank and/or Turlock Formations, with some Mehrten (sandstone/siltstone) possible (below embankment fill) at depth at the west end.	Driven H-piles and CIDH are possible options for Abutment 1 through Bent 5. Driven H-piles, spread footings and CIDH are possible options at Bent 6 through Abutment 10. Large diameter shaft is feasible in median and adjacent to I-80. MSE wall is suitable at approaches.	Temporary casing may be necessary for installation of large diameter shaft or CIDH due to existing fill depths.
S65/E80 Connector (1, 2, and 3)	The east end of this structure will be close to the existing S65/E80 Separation which is supported on a mix of CIDH, Spread and H-Piles.	Dense silt and sand (likely Turlock Formation) on north end and fill over Mehrten (likely conglomerate) at south-southeast end. Possible embankment fill placed over granitic rock at the far east end.	Driven H-piles or spread footings are possible options at the north end (to Bent 8). Large diameter shaft feasible in median. Spread footings likely best option from Bent 9 to Abutment 19 (Abut 17 for Alt 2 and 3). CIDH is an option at all locations.	
S65/W80 Connector (1 only)	Located south of E. Roseville Viaduct. Should be similar to the conditions for the 65/Taylor Road Undercrossing at the viaduct which has H-Piles.	Medium dense to dense, silty sand underlain by hard silt and clay of the Turlock and/or Riverbank Formations.	Driven H-Piles. Spread footings and CIDH are possible options (particularly at Abutment 2 where original ground is higher).	
CD NB65 On-Ramp (2 and 3)	Located west of the S65/E80 Connector Bridge and east of Taylor Road OC (south of I-80 EB). These bridges are supported on CIDH, H-Piles, and spread footings.	Dense silt and sand of the Turlock and/or Riverbank Formation. Mehrten (sandstone/siltstone) possible at depth.	Driven H-Piles, spread footings and CIDH are possible options.	

TABLE 4 - PRELIMINARY STRUCTURE FOUNDATION TYPES

Structure (Alternate)	**Existing Foundation Reference Data**	**Foundation Geology and Expected Soil Conditions**	**Suitable Foundation Types Anticipated**	**Installation Notes**
CD EB80 On-Ramp (2 and 3)	Located west of the S65/E80 Connector Bridge and east of Taylor Road OC (south of I-80 EB). These bridges are supported on CIDH, H-Piles, and spread footings.	Dense silt and sand of the Turlock and/or Riverbank Formation. Mehrten (sandstone/siltstone) possible at depth at west end, and expected to be shallow at the east end.	Driven H-piles for Abutment 1 through Bent 3. Spread footing for Bent 4 through Abutment 8. CIDH are possible option at all locations. MSE wall is suitable at the west and east ends.	CIDH may require temporary casing due to existing loose surface soil and groundwater near Secret Ravine.
T -Undercrossing at EB/WB 80 (1 only)	At and west of the S65/E80 Connector bridge which is supported on CIDH (Abut 1) and H-Piles (Abut 3, N end) with spread footing at Bent 2.	Transition area between breccia/sandstone of the Mehrten Formation, and dense sands/hard silts of Turlock or Riverbank Formations.	Spread footings or CIDH are possible options.	
Taylor Road Overcrossing (Replace) (1, 2, and 3)	Located west of the existing Taylor Overcrossing which is supported on H-Piles.	Medium dense to very dense and hard, interbedded, silt, sand, and gravel with clay, Riverbank Formation	Driven H-Piles or Concrete Piles. CIDH and spread footings are possible options. Large diameter shaft is feasible in median.	
E. Roseville Viaduct Widening (1, 2, and 3)	Located adjacent to existing viaduct which is supported on H-Piles and spread footings.	Predominately dense sands and hard clays of the Riverbank and Turlock Formations	Driven H-Piles and spread footings – preliminary plans should match the existing foundation types. CIDH is an option at all support locations.	CIDH may require temporary casing (10-20ft) at abutment fill (Abut 1) and isolated Bent locations due to groundwater and loose, upper soils (such as at Bents 2, 3, 6, 9 and 10)
Eureka Road On-Ramp Overcrossing (2 only)	Located adjacent/behind Abutment 3 (east) of the Atlantic St OC. Abutment 3 is supported on driven piles with base of cap at elevation 189.00 to 189.75	Engineered fill at approach/abutment on the order of 26 feet in depth (down to near elevation 180 ft). Underlain by medium dense to dense silty sand with gravel and sandy gravel of the Riverbank Formation and breccia of the Mehrten Formation at greater depth.	Suitable for strip footing support of cut and cover tunnel walls.	Excavations and foundation placement will need to consider the presence of adjacent piles. Lateral loading from abutments will need to be considered for adjacent tunnel wall.
Miners Ravine Bridge (2 only)	Between the existing eastbound Miners Ravine Bridge and eastbound off-ramp bridge. These bridges are supported on a combination of driven H-Piles, CIDH, and spread footings.	Engineered fill adjacent to existing approach/abutment for Miners Ravine Bridge (I-80). Underlain by medium dense to dense silty sand with gravel and sandy gravel of the Riverbank Formation and sandstone/breccia of the Mehrten Formation at greater depth.	Driven H-Piles at abutments and CIDH at bents – preliminary plans should match the existing bridge foundation types for the I-80 EB Miners Ravine Bridge (Widen). CIDH is an option at the abutments.	CIDH may require temporary casing due to presence of fill, loose surface soils, and groundwater.

TABLE 4 - PRELIMINARY STRUCTURE FOUNDATION TYPES				
Structure (Alternate)	**Existing Foundation Reference Data**	**Foundation Geology and Expected Soil Conditions**	**Suitable Foundation Types Anticipated**	**Installation Notes**
Miners Ravine EB Off-Ramp Widening (3 only)	Adjacent to the existing Miners Ravine EB Off-Ramp Bridge which is supported on driven H-Piles at abutments and spread footings at bents. Spread footings at bents are deep (16 to 26 feet).	Engineered fill at abutments, medium dense to dense sand and very stiff to hard silt of the Riverbank Formation overlying breccia, conglomerate, sandstone, and siltstone of the Mehrten Formation.	Driven H-Piles at abutments and spread footings at bents – preliminary plans should match the existing bridge foundation types. CIDH is an option at abutments and bents.	CIDH may require temporary casing due to presence of fill, loose surface soils, and groundwater. Deep spread footings at existing bridge will require significant excavation.
Roseville Parkway Tieback Wall (1, 2, and 3)	Located beneath the Roseville Parkway OC at east abutment.	Engineered fill at abutment slope with dense, clayey sand of the Riverbank Formation behind the slope.	Tieback wall is appropriate at this location.	
Galleria Blvd Tieback Wall (1, 2, and 3)	Located beneath Galleria Blvd OC (old Harding Blvd OC) at east abutment	Engineered fill at abutments and approach overlying breccia, conglomerate and sandstone of the Mehrten Formation.	Tieback wall is appropriate at this location.	Increased tieback length/depth due to presence of approximately 30 ft. of engineered fill.

8.2 Cuts and Cut-slopes

Most cuts and cut slopes are expected to occur within engineered fill placed for existing improvements, and within older alluvial sediments that consist of medium dense to dense, silty sands and hard silts and clays. We expect that cut-slopes will be stable at slopes of 2H:1V or flatter within native soils and engineered fills.

Moderately hard rock can be encountered near the surface where underlain by andesitic volcanics (labeled as "Tva" on Figure 3) or granitic rock ("Mzg" on Figure 3). Granitic rock in the eastern portion of the project area is typically deeply weathered and excavatable with isolated, hard knobs that may require blasting and/or drilling/splitting to aid in removal.

Volcanic mudflow breccia, associated with the andesitic volcanics, can be difficult to excavate but is typically rippable with heavy equipment. Oversize material (boulders) can be generated. The breccia is likely to be encountered along I-80 between Eureka Road and Douglas Blvd. and northwest of Antelope Creek along SR 65. For preliminary excavation considerations, minimize cut depth in the areas labeled as "Tva" and "Mzg" on Figure 3.

8.3 Fill and Fill-slopes

We did not identify areas of potentially soft/compressible soils within the existing subsurface information or during our site reconnaissance for those areas that are likely to have significant, engineered fills constructed. We anticipate that settlement of engineered fill established on appropriately prepared subgrade will be minimal and occur primarily during fill placement. Long settlement waiting periods are not expected. We expect engineered fill slopes constructed of local materials will be stable at gradients of 2H:1V or flatter. A slope gradient of 1.5H:1V can be used in front of abutments. Consider the use of slope paving where abutment slopes have a gradient steeper than 2H:1V; slope paving is used to minimize erosion and slope maintenance.

8.4 Erosion

Embankment slopes and areas disrupted by grading are susceptible to erosion from surface runoff. Cut and fill slopes will require erosion control, such as vegetation, and control of surface runoff. Cuts within the andesitic volcanics and granitic rock will be less susceptible to erosion and likely not suitable for planting.

8.5 Scour

Several structures will be located over or adjacent to creek beds and subject to potential scour, these are:

- SR 65 East Roseville Viaduct Widening over Antelope Creek
- I-80 Eastbound Off-Ramp Widening at Miners Ravine
- Miners Ravine Bridge

- E80/N65 Connector, Northbound SR 65 On-Ramp, Eastbound I-80 On-Ramp
- South SR 65/East I-80 Connector adjacent to Secret Ravine

At the East Roseville Viaduct, the As-Built LOTB's indicate that within the main channel area (north end of the viaduct) hard and/or dense cohesive soils are present within 5 to 8 feet of the ground surface. These soils will be resistant to scour.

At the I-80 Eastbound Off-Ramp Widening at Miners Ravine, the As-Built LOTB's indicate that adjacent to the main channel dense to very dense, sandy gravel and silt, and hard, volcanic breccia present within 8 feet of the ground surface. These soils will be resistant to scour.

At Miners Ravine Bridge, the As-Built LOTB's indicate that adjacent to the main channel (approximately elevation 154 ft) very stiff and weakly cemented silt and moderately hard, volcanic breccia is present within 12 to 23 feet of the ground surface. These soils will be resistant to scour.

At the E80/N65 Connector, Northbound SR 65 On-Ramp, and Eastbound I-80 On-Ramp, there is no available subsurface data where these structures will be located within and/or adjacent to Secret Ravine. However, we expect this location to be underlain at relatively shallow depths (on the order of 5 to 10 feet) by scour resistant soils and/or rock of the Turlock Lake Formation and/or Mehrten Formation. Existing and/or newly constructed embankment fill located adjacent to the creek bed will have a high scour potential.

At the South SR 65/East I-80 Connector, there is no available subsurface data where the connector will be adjacent to Secret Ravine. However, we expect this location to be underlain at relatively shallow depths (on the order of 4 to 8 feet) by scour resistant rock of the Mehrten Formation and possibly granitic rock at the east end. Existing embankment fill located adjacent to the creek bed will have a high scour potential.

9 PRELIMINARY SOIL CORROSION EVALUATION

Soil corrosivity has not yet been evaluated for this project. Based on available subsurface data, the soil and rock within the project area is generally expected to be non-corrosive to structural elements (as defined by Caltrans, 2012, Corrosion Guidelines, Version 2.0). Andesitic volcanics (labeled as "Tva" on Figure 3) found in the interchange area, west of Miners Ravine, and northwest of Antelope Creek can have a relatively low pH and require concrete water/cement ratio considerations.

According to the USDA Web Soil Survey (http://websoilsurvey.nrcs.usda.gov/app/), the risk of corrosion of concrete is considered low to moderate throughout the project area. The risk of corrosion of steel is considered moderate to high. Corrosion testing and analysis will be completed during the design-level investigations.

10 CONSTRUCTION CONSIDERATIONS

Excavation: As noted above, moderately hard rock can be encountered near the surface in portions of the project area where underlain by volcanic mudflow breccia of the Mehrten Formation (labeled as "Tva" on Figure 3) or granitic rock (labeled as "Mzg" on Figure 3). Excavation of some of these materials can be difficult and can generate large diameter material that will need to be screened and/or crushed prior to use as engineered fill.

Dewatering: We expect that shallow groundwater, if encountered, will be of limited quantity and controllable with sump pumps. In general, we do not anticipate the presence of significant groundwater at shallow depth within footing excavations during dry season construction (June through October) unless adjacent to active creek beds (such as at Antelope Creek, Secret Ravine, and Miners Ravine structure locations). Deep foundations (such as drilled shafts in the interchange median) can encounter perched groundwater and wet foundation construction conditions should be anticipated.

Rock Drilling/Coring: Drilling for Cast-in-drilled-hole (CIDH) piles at locations underlain by volcanic mudflow breccia of the Mehrten Formation (labeled as "Tva" on Figure 3) or granitic rock (labeled as "Mzg" on Figure 3) can require drilling with rock bits and/or rock coring to achieve adequate pile penetration.

11 SUBSURFACE EXPLORATION AND LABORATORY TESTING

To provide design level reports, subsurface exploration and laboratory testing is required. Specifically, we recommend the following:

- Drill, log and sample a minimum of one boring at each proposed bridge abutment and bent location (this can be modified based on applicability of existing data)
- Complete borings and/or exploratory trenches along ramps and at wall locations
- Anticipate rock coring in areas adjacent to or underlain by Mehrten volcanics or granitic rock (shown as areas labeled as "Tva" and "Mzg" on Figure 3).
- Record groundwater depths during drilling
- Complete laboratory tests that include moisture content, density, unconfined compressive strength, direct shear, maximum density (proctor), R-value, and corrosivity

12 LIMITATIONS

This SPGR is based on site review and subsurface information provided to BCI and is not intended for final design. Additional study, including subsurface exploration, laboratory testing, and analyses are required for final design. BCI performed these services in accordance with generally accepted geotechnical engineering principles and practices currently used in this area. We do not warranty our services.

13 REFERENCES

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- Roseville Parkway Overcrossing, Kleinfelder Inc., As-Built, 11/10/2000, Sheets 47 to 51 of 51
- Miners Ravine Bridge (EB off-ramp), Caltrans, As-Built, 12/29/1989, Sheets 13 and 14 of 14
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- Retaining Wall - 39E-41E, Kleinfelder, Inc., 12/2006, Sheet 24 to 29 of 29
- Retaining Wall – 40W-42W, Kleinfelder, Inc., 12/2006, Sheet 23 to 29 of 29
- Retaining Wall – 48W, Kleinfelder, Inc., 11/2008, Sheet 11 to 14 of 14
- Retaining Wall – 49E, Kleinfelder, Inc., 9/2008, Sheet 11 to 14 of 14
- Retaining Wall – 58E, Kleinfelder, Inc., 9/2008, Sheet 11 to 14 of 14
- Retaining Wall – 59W, Kleinfelder, Inc., 11/2008, Sheet 10 to 13 of 13

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FIGURES

Figure 1 – Vicinity Map

Figure 2A -2C – Site Map

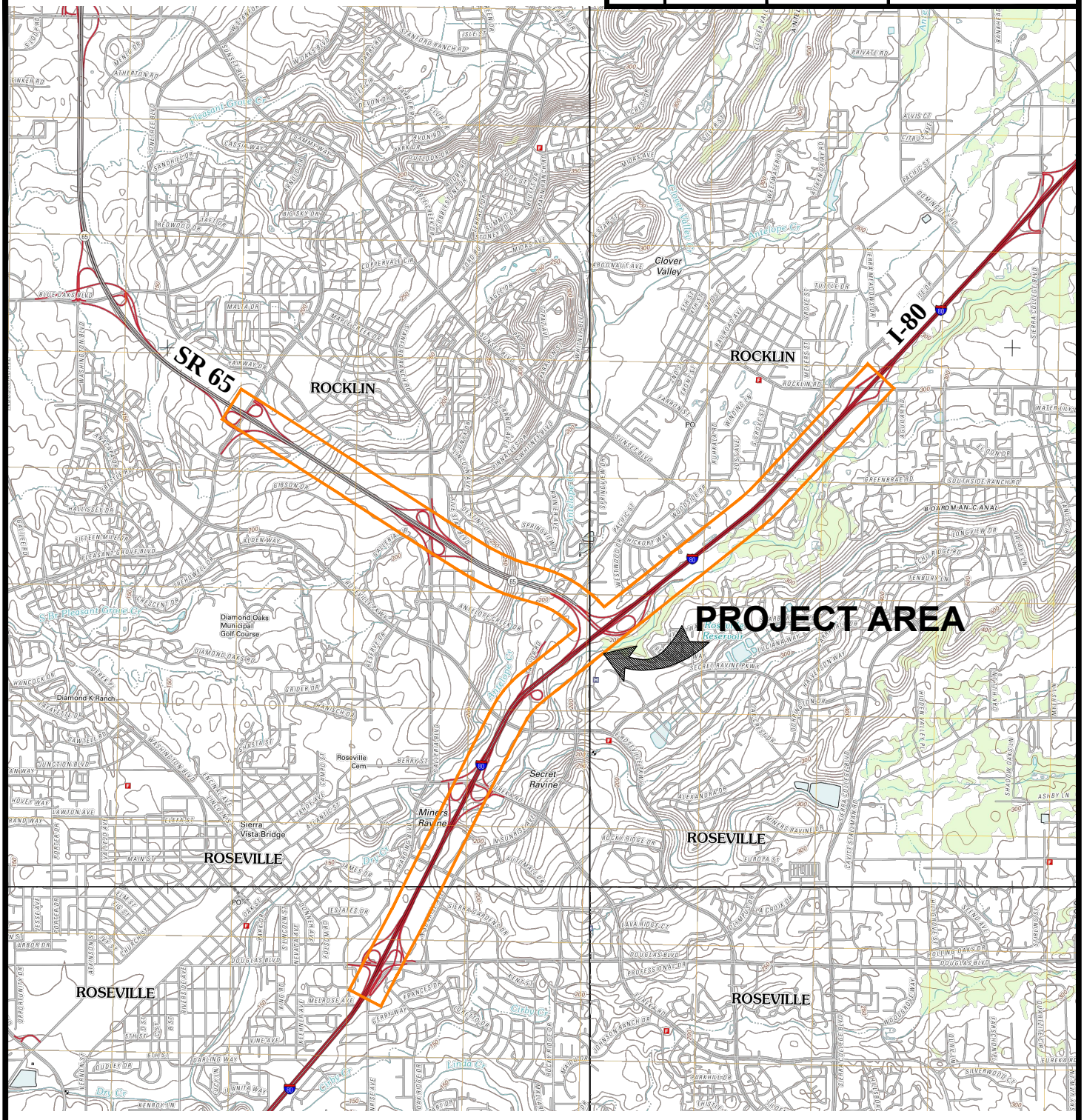
Figure 3 – Geologic Map

Figure 4 – Regional Fault Map

Figure 5 – Groundwater Elevation Map

Figure 6a and 6b – Preliminary ARS Response Spectra

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
03	Pla	80/65	1.9-6.1/R4.8-R7.3



SOURCE: USGS Roseville, Rocklin, Citrus Heights and Folsom Quadrangles, 7.5 Minute Series topographic, 1:24000, dated 2012.

N

SCALE: 1"=4,000'

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VICINITY MAP

Interstate 80/State Route 65 Interchange Improvement Project, EA 03-4E3200
Placer County, California

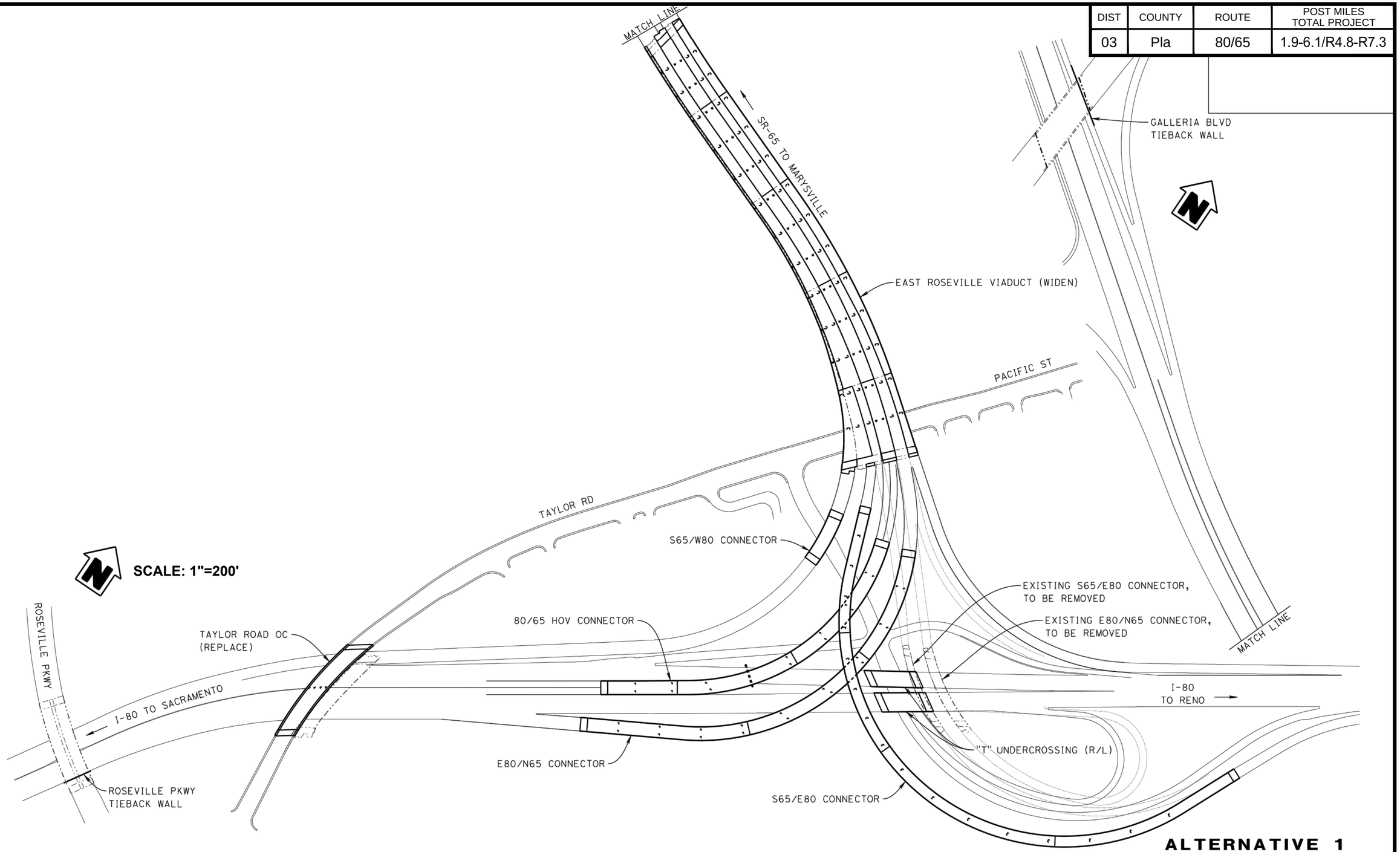
File No. 1980.4.1

November 2014

Figure 1

9/8/2014 1980.4.1 Fig 1 I80_SR65 Interchange.dwg

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
03	Pla	80/65	1.9-6.1/R4.8-R7.3



SOURCE: Preliminary plans by CH2MHILL, Planning Study Location Map, Alternate 1, plot date July 24, 2014.

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SITE MAP

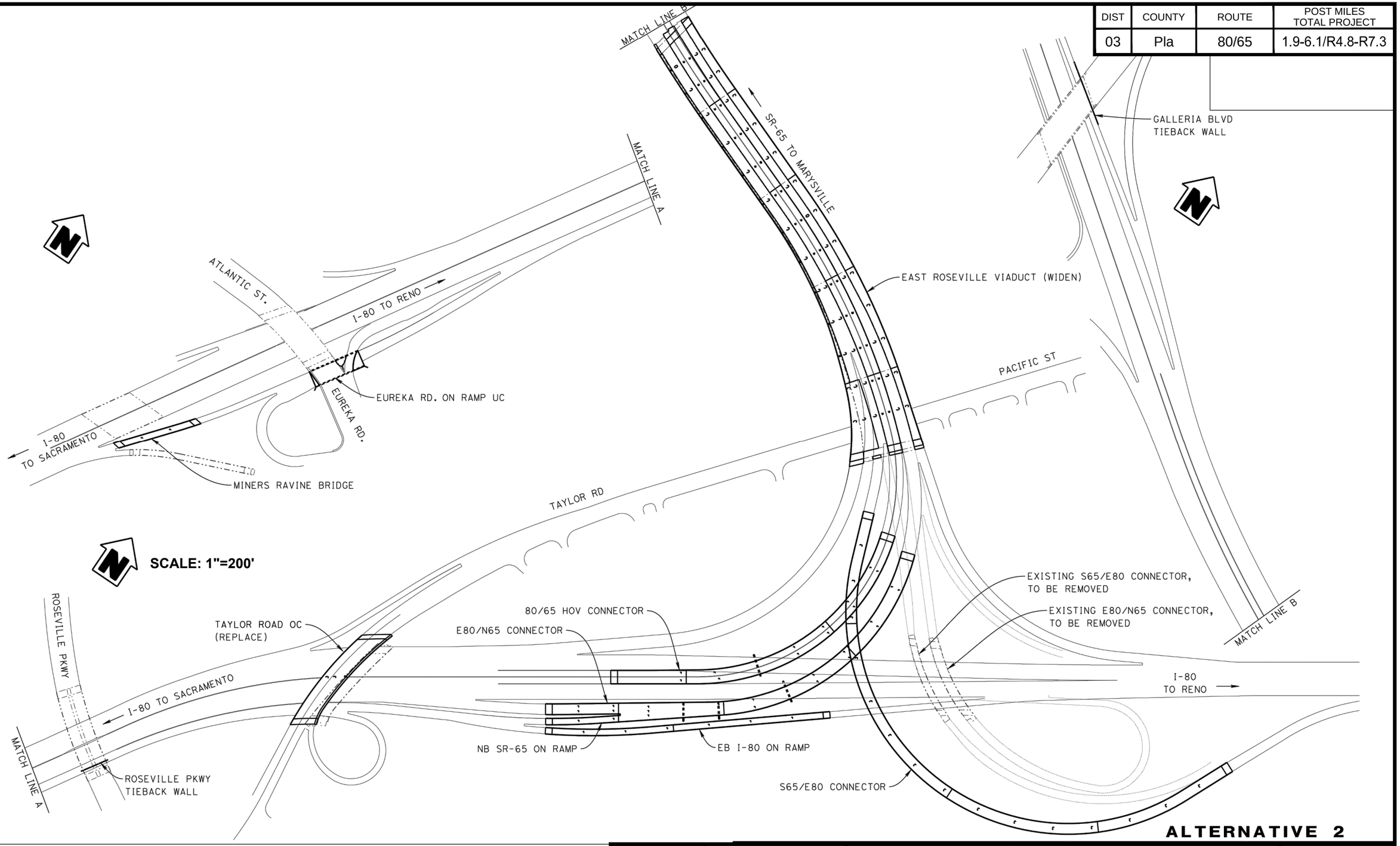
Interstate 80/State Route 65
Interchange Improvement Project, EA 03-4E3200
Placer County, California

File No. 1980.4.1

November 2014

Figure 2a

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
03	Pla	80/65	1.9-6.1/R4.8-R7.3



SOURCE: Preliminary plans by CH2MHILL, Planning Study Location Map, Alternate 2, plot date July 24, 2014.

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SITE MAP

Interstate 80/State Route 65
Interchange Improvement Project, EA 03-4E3200
Placer County, California

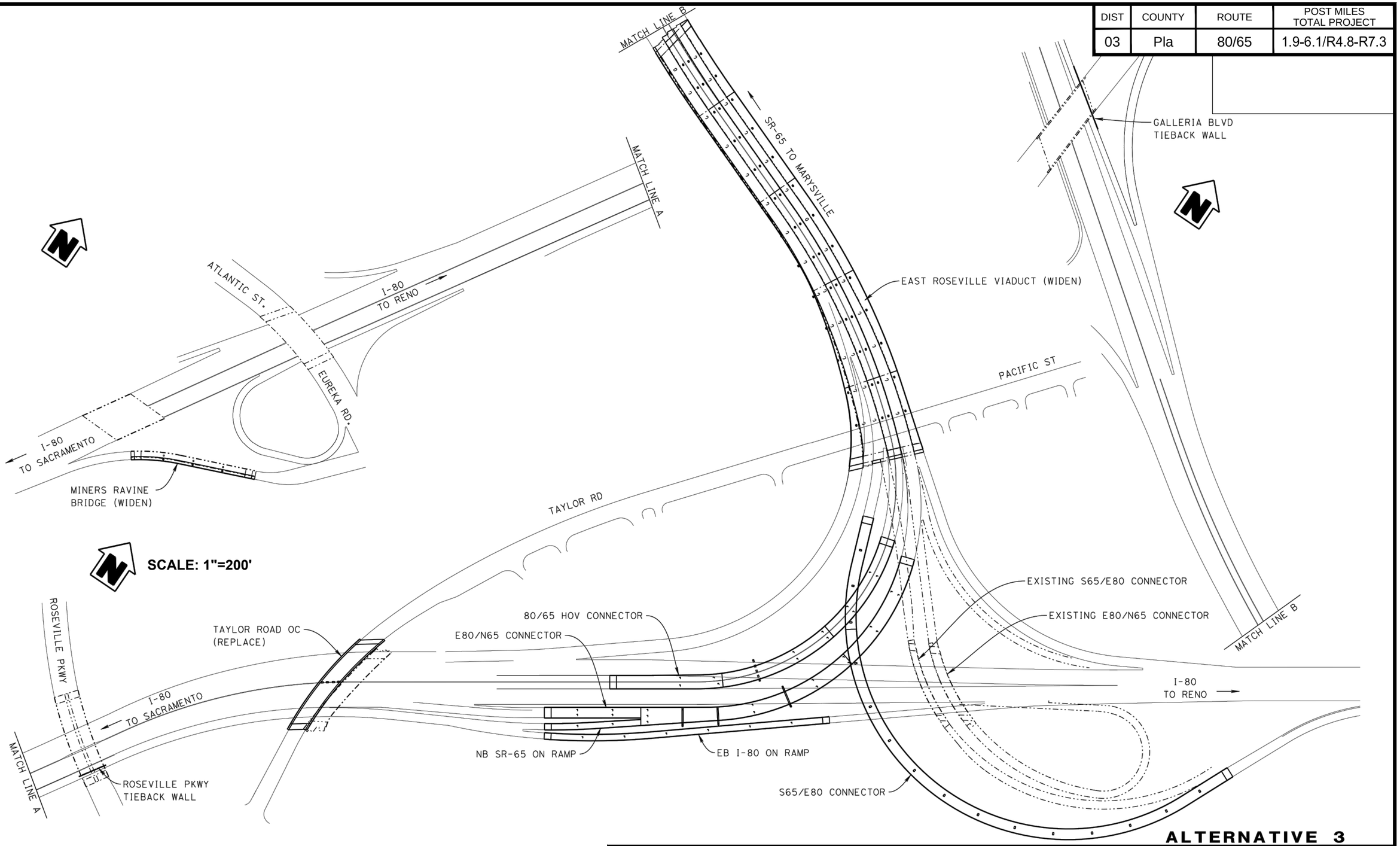
File No. 1980.4.1

November 2014

Figure 2b

9/8/2014 1980.4.1 Fig 2 I80_SR65 Interchange.dwg

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
03	Pla	80/65	1.9-6.1/R4.8-R7.3



ALTERNATIVE 3

SOURCE: Preliminary plans by CH2MHILL, Planning Study Location Map, Alternate 3, plot date July 24, 2014.

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SITE MAP

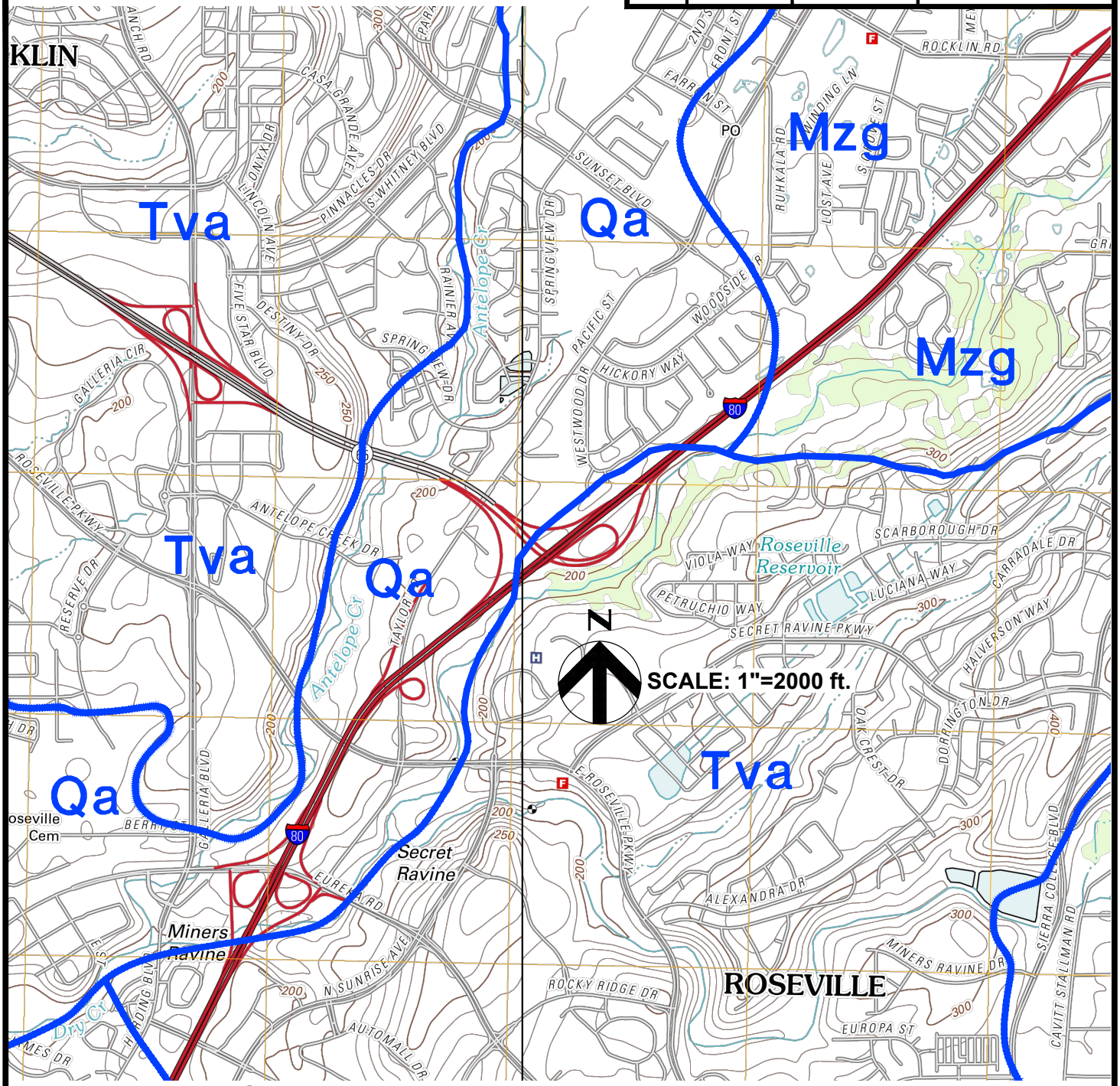
Interstate 80/State Route 65
Interchange Improvement Project, EA 03-4E3200
Placer County, California

File No. 1980.4.1

November 2014

Figure 2c

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
03	Pla	80/65	1.9-6.1/R4.8-R7.3



LEGEND

Qa - Alluvium (Riverbank and Turlock Lake Formations)

Tva - Andesitic, volcanic mudflows, breccia, and sediments (Mehrten Formation)

Mzg - Granitic rock of the Rocklin Pluton

- Approximate Geologic Contact

Base Source: USGS Roseville and Rocklin Quadrangles, 7.5 Minute Series topographic, 1:24000, dated 2012.
Geologic Source: Modified after Livingston, 1974, and Loyd, 1995.

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GEOLOGIC MAP

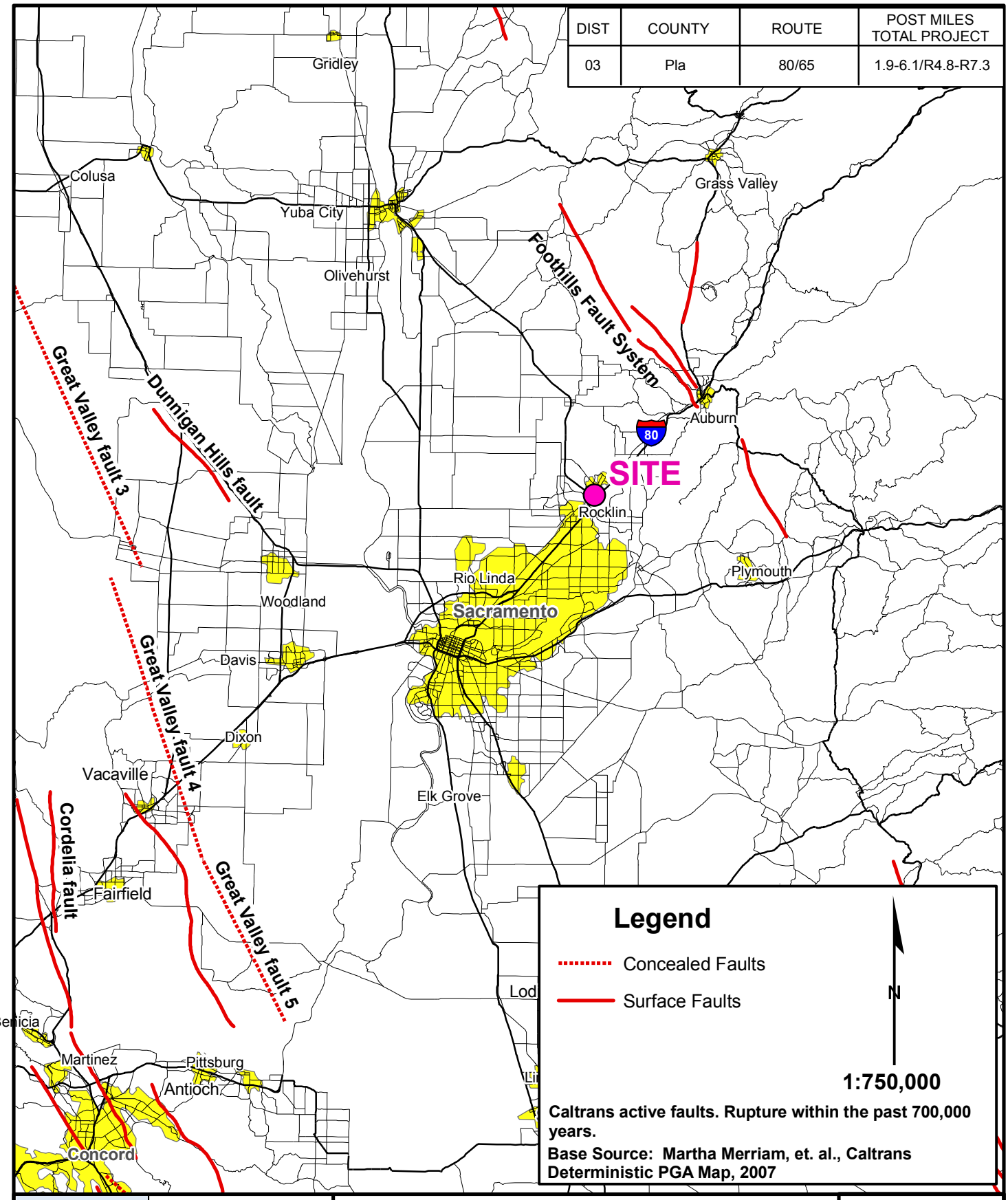
Interstate 80/State Route 65 Interchange Improvement Project, EA 03-4E3200
Placer County, California

File No. 1980.4.1

November 2014

Figure 3

9/8/2014 1980.4.1 Fig 3 I80_SR65 Interchange.dwg



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REGIONAL FAULT MAP

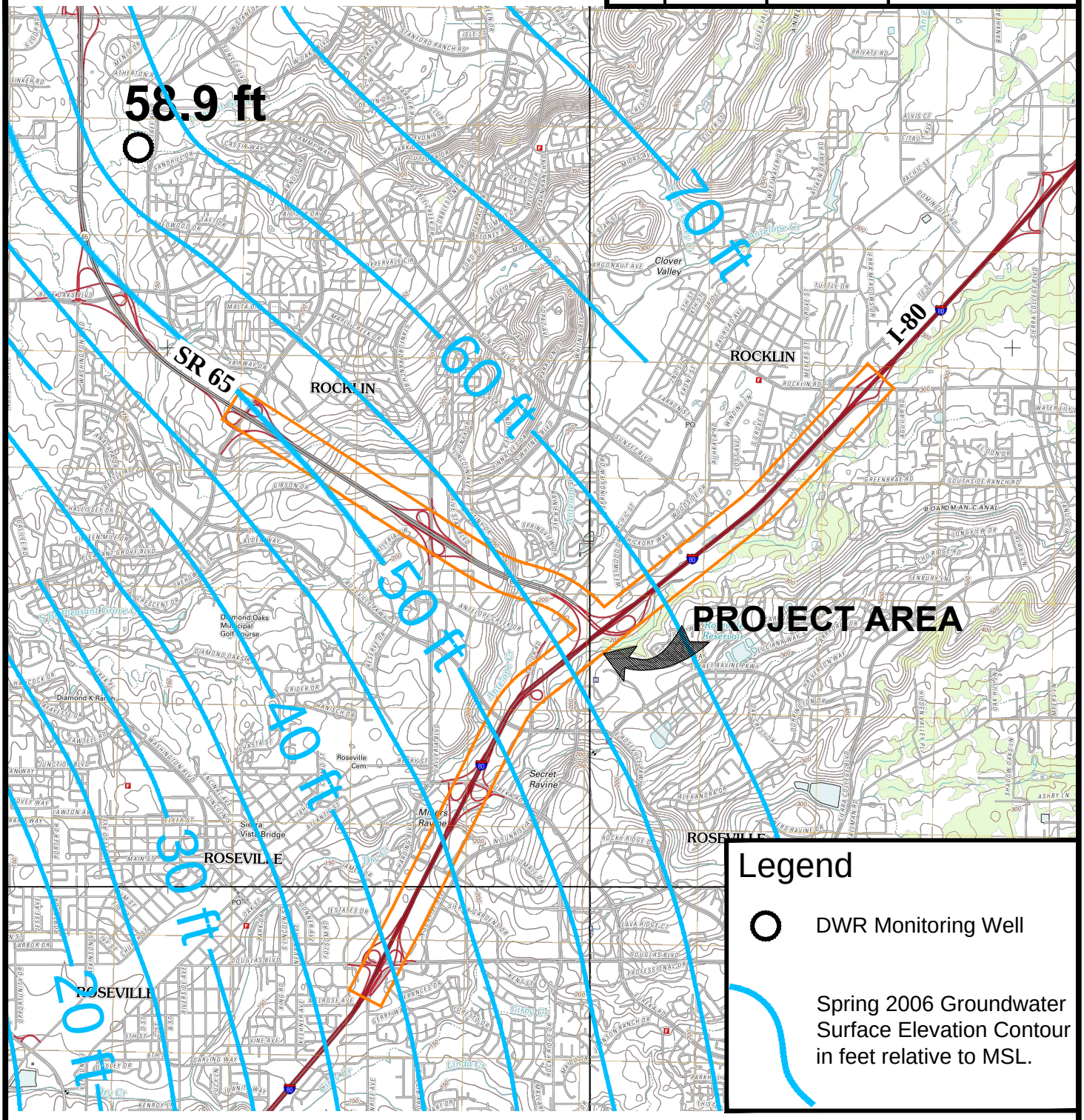
Interstate 80 / State Route 65 Interchange Improvement Project, EA 03-4E3200
Placer County, California

File No. 1980.4.1

November 2014

Figure 4

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
03	Pla	80/65	1.9-6.1/R4.8-R7.3



Legend

- DWR Monitoring Well
- Spring 2006 Groundwater Surface Elevation Contour in feet relative to MSL.

SOURCE: Figure 2-4 - Groundwater Elevation Map, Western Placer County Groundwater Management Plan by MWH, dated May 2007 and USGS Roseville, Rocklin, Citrus Heights and Folsom Quadrangles, 7.5 Minute Series topographic, 1:24000, dated 2012.

N

SCALE: 1"=4,000'

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GROUNDWATER ELEVATION MAP

Interstate 80/State Route 65 Interchange Improvement Project, EA 03-4E3200
Placer County, California

File No. 1980.4.1

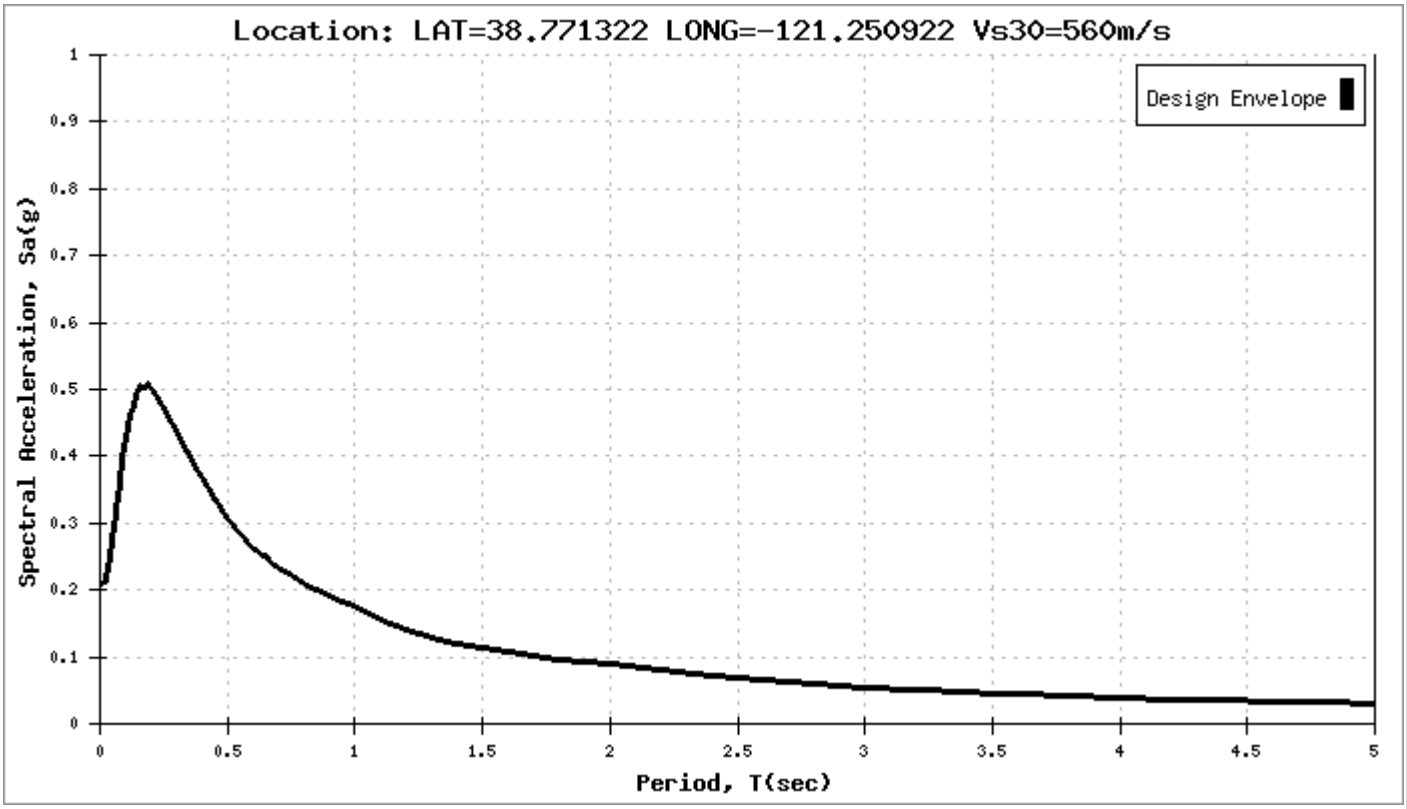
November 2014

Figure 5

9/8/2014 1980.4.1 Fig 5 I80_SR65 Interchange.dwg

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT
03	Pla	80/65	1.9 -6.1/R4.8 -R7.3

Preliminary Design ARS Curve (5% Damping)



Caltrans ARS Online (V 2.3.06)

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PRELIMINARY ARS

Interstate 80/State Route 65 Interchange Improvement Project, EA 03-4E3200
Placer County, California

File No. 1980.4.1

November 2014

Figure 6a

Figure 6b
Preliminary Design ARS Spectrum Data

Period	SA	Period	SA	Period	SA	Period	SA
0	0.210	**0.085**	0.386	**0.35**	0.400	**1.4**	0.121
0.01	0.210	**0.09**	0.399	**0.36**	0.394	**1.5**	0.114
0.02	0.214	**0.095**	0.413	**0.38**	0.381	**1.6**	0.108
0.022	0.217	**0.1**	0.425	**0.4**	0.369	**1.7**	0.102
0.025	0.221	**0.11**	0.444	**0.42**	0.355	**1.8**	0.097
0.029	0.227	**0.12**	0.461	**0.44**	0.341	**1.9**	0.093
0.03	0.228	**0.13**	0.476	**0.45**	0.335	**2**	0.089
0.032	0.233	**0.133**	0.480	**0.46**	0.329	**2.2**	0.079
0.035	0.240	**0.14**	0.488	**0.48**	0.317	**2.4**	0.072
0.036	0.243	**0.15**	0.499	**0.5**	0.306	**2.5**	0.068
0.04	0.252	**0.16**	0.502	**0.55**	0.278	**2.6**	0.065
0.042	0.257	**0.17**	0.503	**0.6**	0.254	**2.8**	0.06
0.044	0.262	**0.18**	0.504	**0.65**	0.233	**3**	0.055
0.045	0.265	**0.19**	0.505	**0.667**	0.227	**3.2**	0.051
0.046	0.267	**0.2**	0.504	**0.7**	0.216	**3.4**	0.047
0.048	0.272	**0.22**	0.490	**0.75**	0.201	**3.5**	0.045
0.05	0.277	**0.24**	0.477	**0.8**	0.188	**3.6**	0.043
0.055	0.294	**0.25**	0.470	**0.85**	0.180	**3.8**	0.04
0.06	0.310	**0.26**	0.463	**0.9**	0.173	**4**	0.038
0.065	0.326	**0.28**	0.449	**0.95**	0.167	**4.2**	0.036
0.067	0.332	**0.29**	0.442	**1**	0.161	**4.4**	0.035
0.07	0.342	**0.3**	0.436	**1.1**	0.148	**4.6**	0.033
0.075	0.357	**0.32**	0.421	**1.2**	0.138	**4.8**	0.032
0.08	0.371	**0.34**	0.407	**1.3**	0.128	**5**	0.031

Period = seconds; SA = Spectral Acceleration (g)

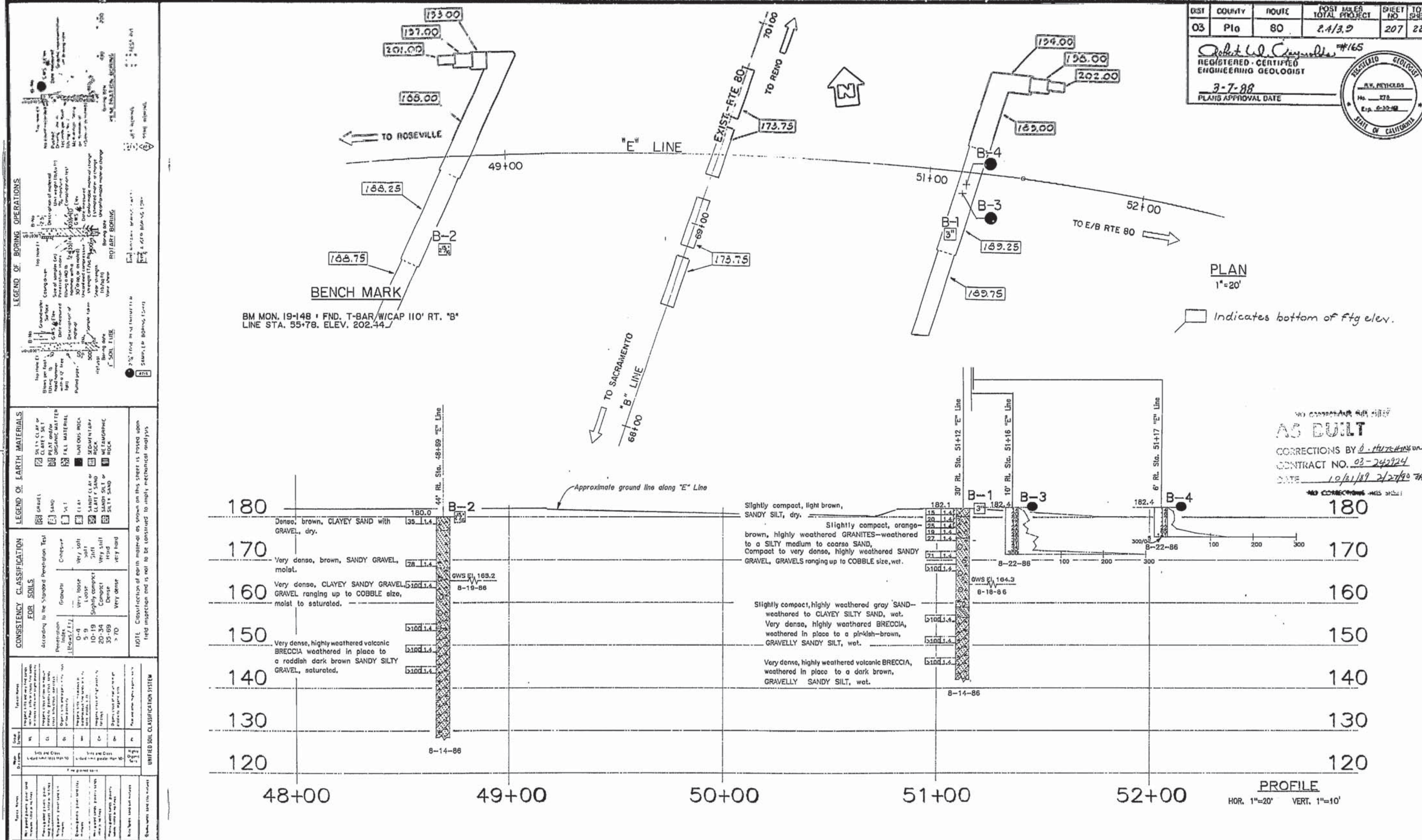
APPENDIX A

Logs of Test Borings

Atlantic Street Overcrossing
Harding Boulevard OC
Roseville Parkway Overcrossing
Miners Ravine Bridge (EB off-ramp)
Miners Ravine Bridge (WB on-ramp)
Miners Ravine Bridge (Widen)
Route 65/80 Separation
East Roseville Viaduct
Retaining Wall - 39E-41E
Retaining Wall – 40W-42W
Retaining Wall – 48W
Retaining Wall – 49E
Retaining Wall – 58E
Retaining Wall – 59W

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
03	Plo	80	2.4/3.9	207	226

REGISTERED - CERTIFIED ENGINEERING GEOLOGIST
#165
3-7-88
PLANS APPROVAL DATE



193.00
197.00
201.00
188.00
TO ROSEVILLE
"E" LINE
49+00
188.25
B-2
188.75
BENCH MARK
BM MON. 19-148 : FND. T-BAR W/CAP 110' RT. "B" LINE STA. 55+78. ELEV. 202.44
EXIST. RTE 80
TO RENO
173.75
TO SACRAMENTO
"B" LINE
68+00
69+00
194.00
198.00
202.00
189.00
B-4
B-3
B-1
51+00
52+00
189.25
189.75
TO E/B RTE 80
PLAN
1"=20'
Indicates bottom of ftg elev.
Approximate ground line along "E" Line
Dense, brown, CLAYEY SAND with GRAVEL, dry.
Very dense, brown, SANDY GRAVEL, moist.
Very dense, CLAYEY SANDY GRAVEL-GRAVEL ranging up to COBBLE size, moist to saturated.
Very dense, highly weathered volcanic BRECCIA weathered in place to a reddish dark brown SANDY SILTY GRAVEL, saturated.
GWS El. 163.2
8-19-86
8-14-86
Slightly compact, light brown, SANDY SILT, dry.
Slightly compact, orange-brown, highly weathered GRANITES—weathered to a SILTY medium to coarse SAND.
Compact to very dense, highly weathered SANDY GRAVEL, GRAVELS ranging up to COBBLE size, wet.
Slightly compact, highly weathered gray SAND—weathered to CLAYEY SILTY SAND, wet.
Very dense, highly weathered BRECCIA, weathered in place to a pinkish-brown, GRAVELLY SANDY SILT, wet.
Very dense, highly weathered volcanic BRECCIA, weathered in place to a dark brown, GRAVELLY SANDY SILT, wet.
GWS El. 164.3
8-18-86
8-22-86
180
170
160
150
140
130
120
48+00
49+00
50+00
51+00
52+00
PROFILE
HOR. 1"=20' VERT. 1"=10'

AS BUILT
CORRECTIONS BY D. HUTCHINSON
CONTRACT NO. 03-242924
DATE 10/21/89

GEOTECHNICAL BRANCH - TRANSPORTATION LABORATORY	State of CALIFORNIA DEPARTMENT OF TRANSPORTATION	STRUCTURES - DESIGN 11	BRIDGE NO. 19-58	ATLANTIC STREET OVERCROSSING
DRAWN BY Leony L. Lopez 10/86			POST MILE 3.0	LOG OF TEST BORINGS 1 OF 2

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

CU 03
EA 242921

SHEET 18 OF 19

AS BUILT PLANS
Contract No. 03-242924
Date Completed 12-29-89
Document No.

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

207

FI-0157(1) Unit 1

Dist	County	Route	Total Project	Sheet No.	Total Sheets
03	Pla	80	21/8.7	208	226

Dist	County	Route	Section	Sheet No.	Total Sheets
III	Pla	17	A	B-7	56

April 15, 1955

GEOTECHNICAL BRANCH - TRANSPORTATION LABORATORY

Robert W. Reynolds #165

9-7-88

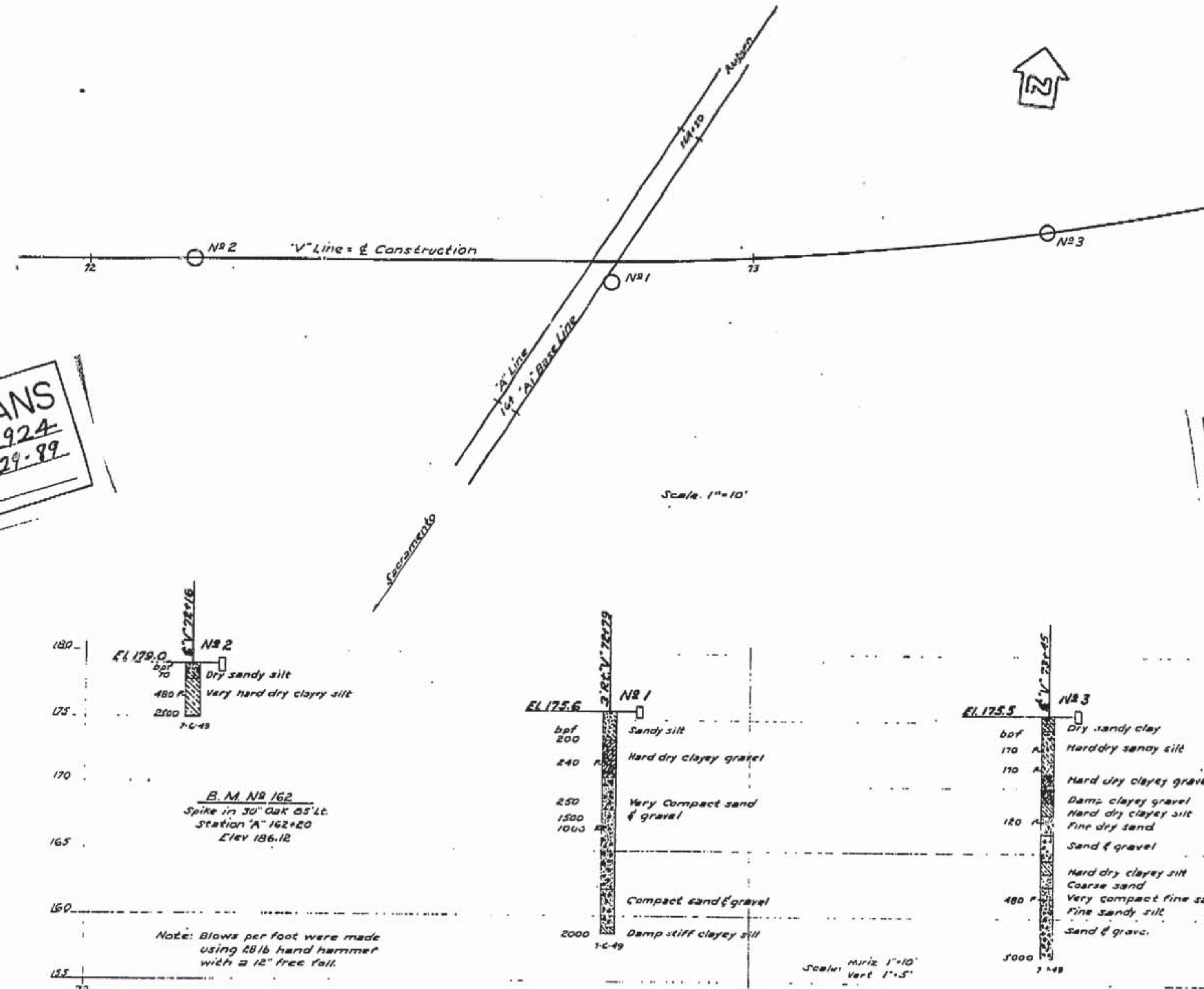
ATLANTIC STREET OVERCROSSING

LOG OF TEST BORINGS 2 OF 2

CU: 03 EA: 242921 — Bridge No. 19-58

R.C. Williams 560

Registered Geologist — R. W. Reynolds — No. 278 — Exp. 6/30/88 — State of California



AS BUILT PLANS
Contract No. 03-242924
Date Completed 12-29-89
Document No.

AS BUILT PLANS
Contract No. 54-3TC2
Date Completed
Document No. 3000 1133

AS BUILT
CORRECTIONS BY O. Hutchinson
CONTRACT NO. 03-242924
DATE 10/21/89 2/27/90

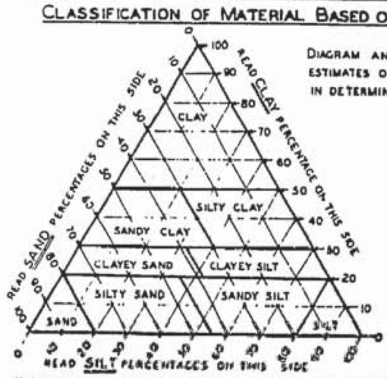
NO CORRECTIONS THIS SHEET

AS BUILT
CORRECTIONS BY W.W.S.
DATE 2-4-55
No corrections.

BRIDGE DEPARTMENT

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

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



Grouping used in Triangular Classification

Class Name	Sand	Silt	Clay
Sand	80-100	0-20	0-20
Silty Sand	45-80	0-55	0-20
Sandy Silt	0-45	35-80	0-20
Silt	0-20	80-100	0-20
Clayey Sand	38-80	0-42	20-30
Clayey Silt	0-38	32-80	20-30
Sandy Clay	30-70	0-40	30-50
Silty Clay	0-30	20-70	30-50
Clay	0-50	0-50	50-100

If gravel is present in appreciable amounts the term "Gravelly" may be added to the class name, viz "Gravelly Sand". The terms "Coarse", "Medium" and "Fine" when used to describe Gravel, Sand and Silt refer to Standard Grade Size Limits.

LEGEND OF BORING OPERATIONS

- Plan of any boring
- 1" Sampler boring
- Rotary wash boring
- 1" Closed sampler driven
- Core boring
- 2½" Penetrometer driven
- 1⅜" Sampler boring
- 2" to 5" Auger boring
- 6" to 20" Auger boring
- Casing driven
- Jet boring
- (S) Sample taken
- 1⅝" A-Rod driven

The appropriate boring symbols designating the method of operation are shown at the upper right-hand corner of the respective boring. Where tool changes were made during the boring operation symbols are shown at the point of change.

LEGEND OF EARTH MATERIALS

- Gravel — G
- Sand — S
- Silt — Si
- Clay — C
- Silty Sand — Si S
- Clayey Sand — C S
- Sandy Silt — S Si
- Clayey Silt — C Si
- Sandy Clay — SC
- Silty Clay — Si C
- Peat and/or Organic Clay — O
- Sandstone — SS
- Shale — Sh
- Broken Rock (fragments) — Br
- Rock — R
- Fill Material

ABBREVIATIONS

- EL. 69.4 — Elevation of ground at test hole
- bpf — Blows per foot — (see note above)
- P — Pulled pipe
- M — Moisture as % dry weight
- EL. 64.3 6-12-49 — Elevation of ground water and date

NOTES

The contractor's attention is directed to Section 2, Article (c) of the Standard Specifications and to the Special Provisions accompanying this set of plans.

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

MICROFILMED

EAST ROSEVILLE OVERCROSSING

LOG OF TEST BORINGS

Scale As shown — File No.

Bridge No. 19-58 — Drawing No. 2300-7

Sheet 19 of 19

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

6-19-90 — Daniel Blackford

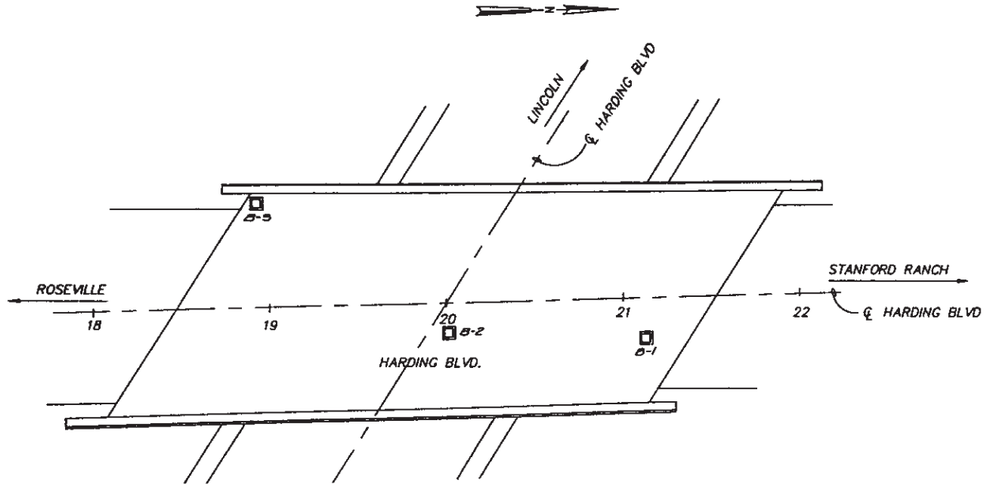
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
03	Pla	65	R5.51 / R6.38	7/	7/

REGISTERED GEOTECHNICAL ENGINEER

OCTOBER 18, 1988
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — STUART WILLIAMSON JR. — No. GE 898 — Exp. 12/31/89 — GEOTECHNICAL — STATE OF CALIFORNIA

CH2M HILL
2840 ROSIN COURT
SACRAMENTO, CA. 95834



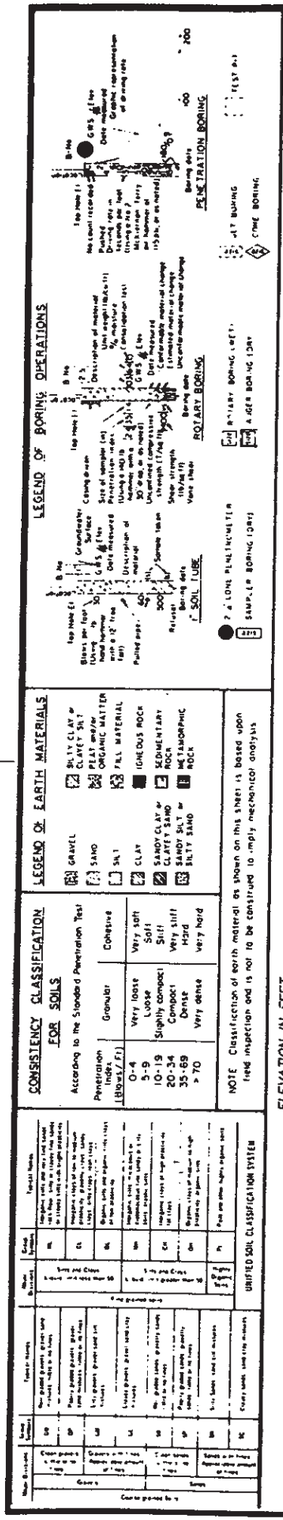
SURVEY CONTROL POINT:
FOUND T-BAR AND CAP IN CONCRETE
MARKED P.1.9.5, EL 296.20
N 406,761.03
E 2,207,792.01

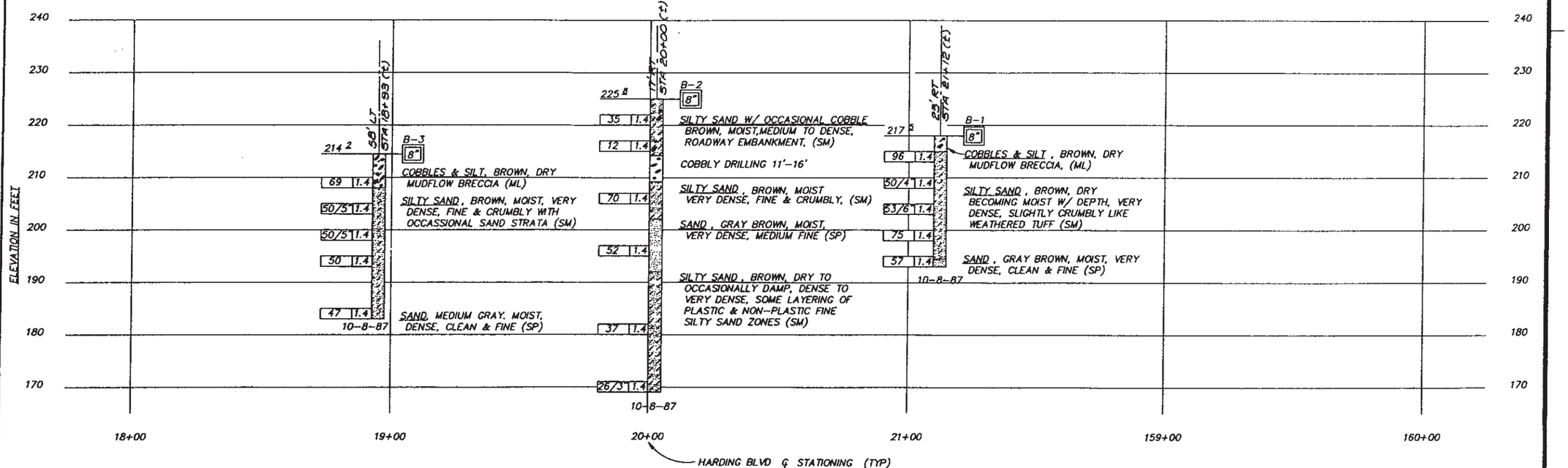
SITE PLAN

1" = 40"

NOTES:

1. THE BORING LOGS AND RELATED INFORMATION REPRESENT THE OPINION OF THE GEOTECHNICAL ENGINEER AS TO THE CHARACTER OF THE MATERIALS AT THE LOCATIONS SHOWN. SOIL, ROCK AND GROUND WATER CONDITIONS BETWEEN ADJACENT TEST HOLES AND AT OTHER LOCATIONS MAY DIFFER FROM THOSE SHOWN. GROUND WATER CONDITIONS MAY CHANGE WITH PASSAGE OF TIME. ALL LOCATIONS AND ELEVATIONS ARE APPROXIMATE.
2. SOIL TEST BORINGS WERE DRILLED WITH A CME 550 DRILL RIG.
3. ELEVATIONS ARE BASED ON USC & GS 1929 DATUM.
4. NO WATER WAS ENCOUNTERED DURING DRILLING.





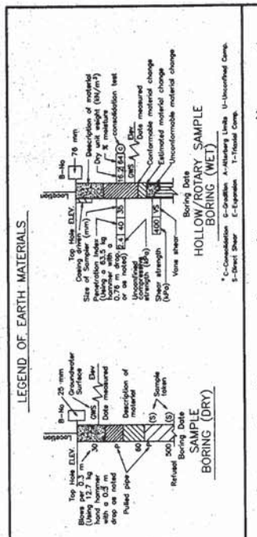
DESIGN	By	Checked	D. HYBY
DETAILS	By	Checked	
QUANTITIES	By	Checked	

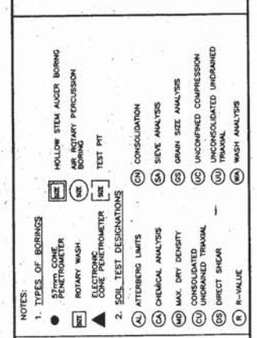
VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING.
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

CH2M HILL — PROJECT MANAGER

BRIDGE NO.	HARDING BOULEVARD OVERCROSSING
19- 160	
POST MILE	LOG OF TEST BORINGS
R5.92	

PROJECT NO.	SHEET	OF
M21963.C1	12	12





Note:

1. 63 mm samples were taken using a modified California split-barrel sampler with an inside diameter of 49 mm and an outside diameter of 63 mm.
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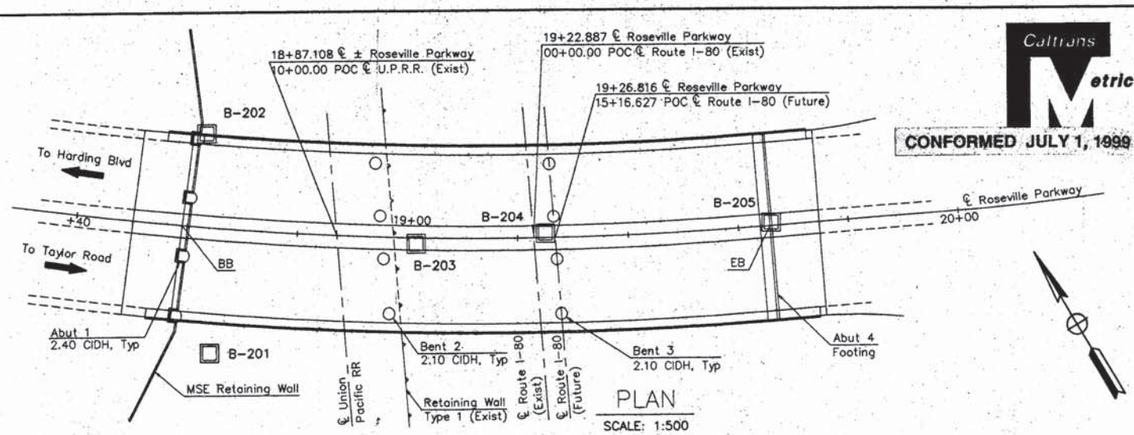
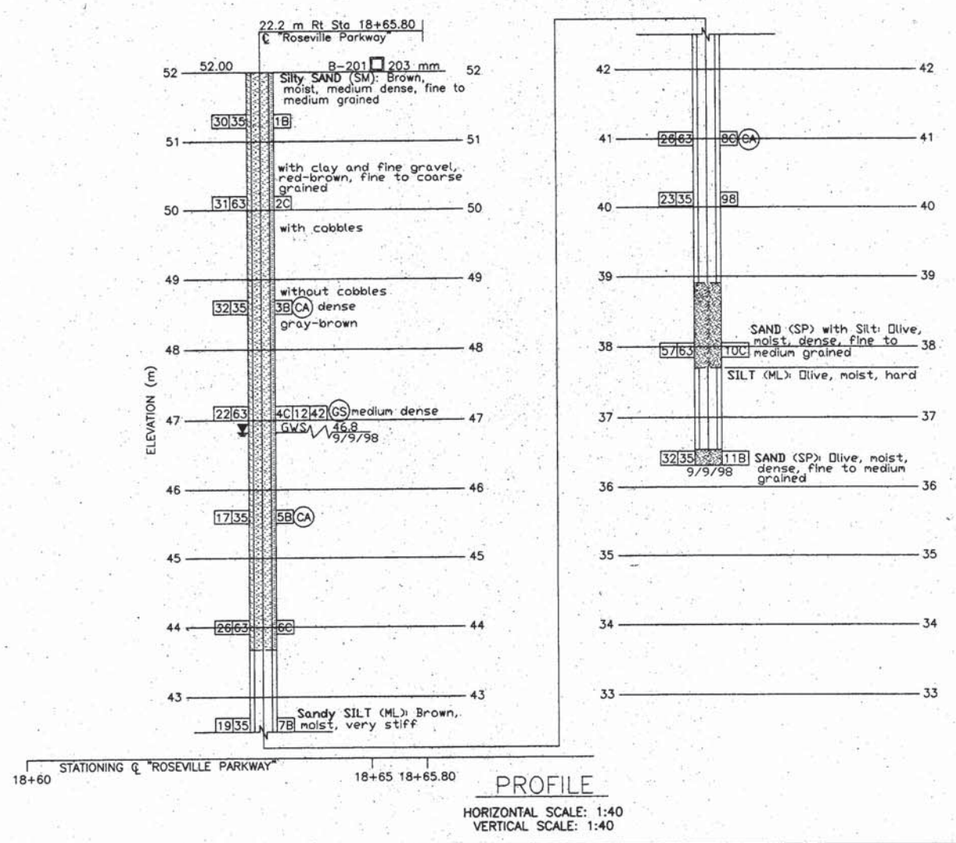
7. Benchmark: Mark 19-147-3 (CALTRANS Designation) 1/2" rebar with metal cap in well 240.402 (788.72') LT. B 47+92.10 POT (Interstate 80) "U.S.G.S." Elevation 51.039 (167.45')





Caltrans Metric

CONFORMED JULY 1, 1999

DIST	COUNTY	ROUTE	POST KILOMETERS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	Pla	80		119	152

Elizabeth M. Smith
GEOTECHNICAL PROFESSIONAL

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Elizabeth M. Smith No. GE2373 Exp. 6/30/99 GEOTECHNICAL STATE OF CALIFORNIA

KLEINFELDER INC.
3077 FITE CIRCLE
SACRAMENTO, CA 95827

CITY OF ROSEVILLE
ENGINEERING DEPARTMENT
316 VERNON ST. ROOM 106
ROSEVILLE, CA 95678

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

AS BUILT
CORRECTION BY: Z. Lulla
CONTRACT NO.: 03-2A4804
DATE: 11-10-00
No Changes

JOEL ESCABAR Joel R Escabar 6-18-99	DRAWN BY	D. CLENDENEN	L. REAGAN, ENG.
DESIGN OVERSIGHT	CHECKED BY	E.M. SMITH	FIELD INVESTIGATION BY:
SIGN OFF DATE			DATE: 9/9/98

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

Walt LaFranchi
PROJECT ENGINEER

BRIDGE NO. 19-0177
POST KM 5.62

ROSEVILLE PARKWAY OVERCROSSING
LOG OF TEST BORINGS NO. 1

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 2 4 6 8

CU 03
EA 2A4801

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 1/12/99 3/02/99 5/5/99

SHEET 47 OF 51

FILE PATH: 23-483459

DIST	COUNTY	ROUTE	POST KILOMETERS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	Pla	80		120	152

Elizabeth M. Smith
GEOTECHNICAL PROFESSIONAL

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Elizabeth M. Smith — No. GE2373 — Exp. 6/30/99 — GEOTECHNICAL — STATE OF CALIFORNIA

KLEINFELDER INC.
3077 FITE CIRCLE
SACRAMENTO, CA 95827

CITY OF ROSEVILLE
ENGINEERING DEPARTMENT
316 VERNON ST. ROOM 106
ROSEVILLE, CA 95678

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Caltrans Metric

CONFORMED JULY 1, 1999

AS BUILT
CORRECTION BY: Joel Escabar
CONTRACT NO.: 03-234804
DATE: 11-10-00
No Changes

LEGEND OF EARTH MATERIALS

HOLLOW/ROTARY SAMPLE BORING (WET)
SAMPLE BORING (DRY)

NOTES:
1. TYPES OF BORINGS
2. SOIL TEST DESIGNATIONS

LEGEND OF EARTH MATERIALS (USCS) BASED ON ASTM D2487, D2488

RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION BASED ON ASTM D1586 AND SOWERS, 1979

Note:

1. 63 mm samples were taken using a modified California split-barrel sampler with an inside diameter of 49 mm and an outside diameter of 63 mm.
2. The boring logs and related information represent the opinion of the geotechnical engineer as to the character of the materials at the locations shown. Soil and groundwater conditions between adjacent test holes and at other locations may differ from those shown. Groundwater conditions may change with passage of time.
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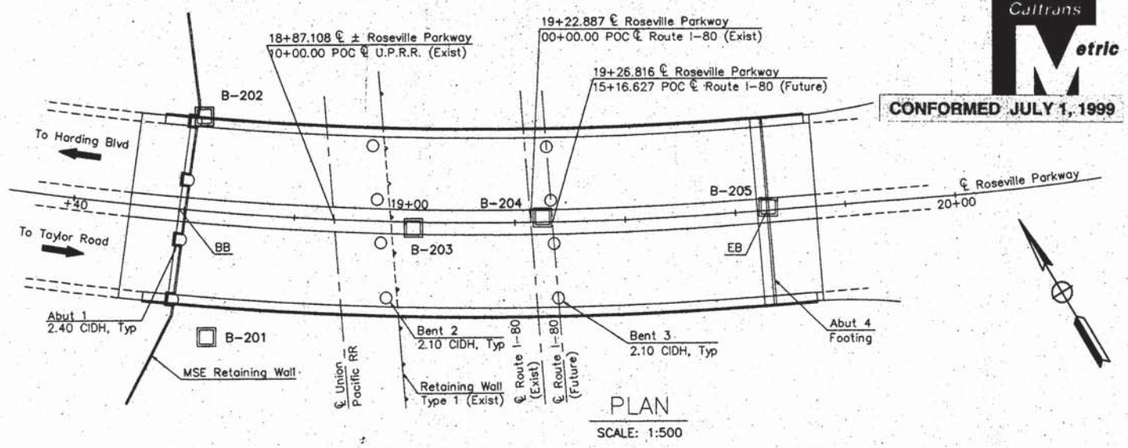
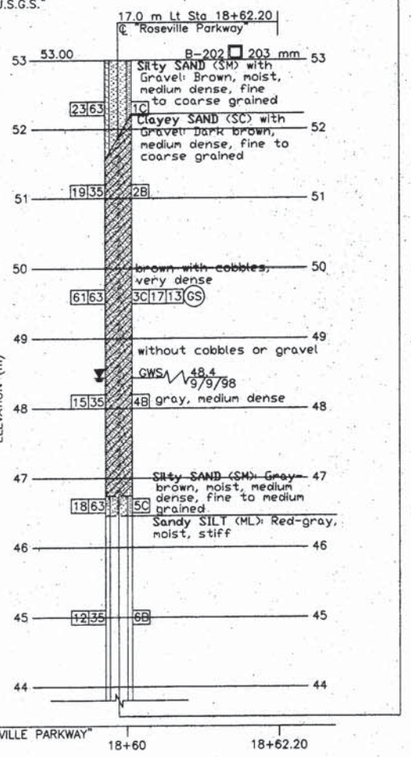
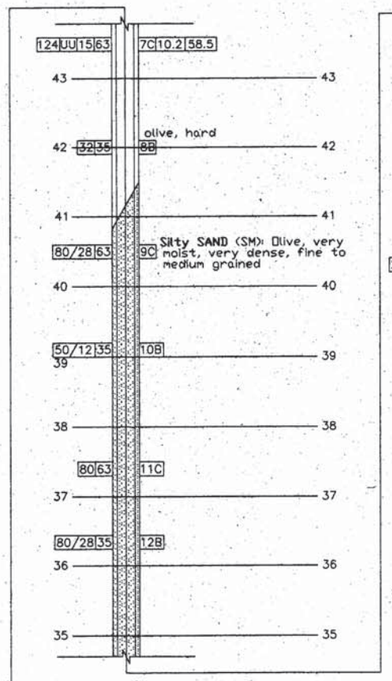
7. Benchmark: Mark 19-147-3 (CALTRANS Designation) 1/2" rebar with metal cap in well 240.402 (788.72') LT. B 47+92.10 POT (Interstate 80) "U.S.G.S." Elevation 51.039 (167.45')

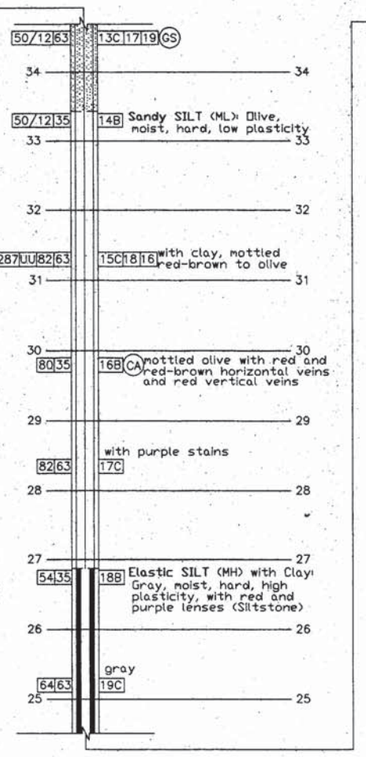


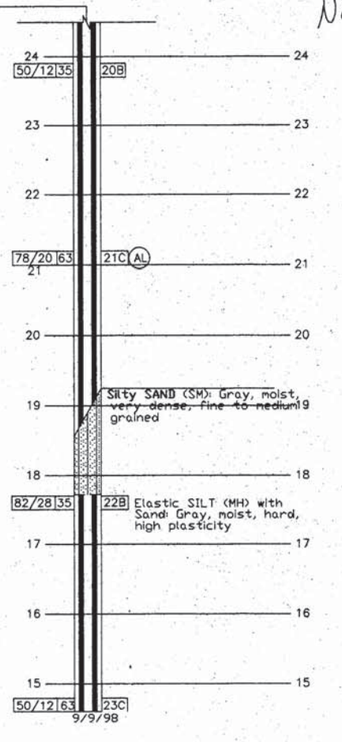
PLAN
SCALE: 1:500





PROFILE
HORIZONTAL SCALE: 1:40
VERTICAL SCALE: 1:40





JOEL ESCABAR DESIGN OVERSIGHT Joel Escabar 6-16-99 SIGN OFF DATE	DRAWN BY D. CLENDENEN	L. REAGAN, ENG. FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY E.M. SMITH	DATE: 9/9/98	

Walt LaFranchi
PROJECT ENGINEER

CU 03
EA 2A4801

BRIDGE NO. 19-0177
POST KM 5.62

ROSEVILLE PARKWAY OVERCROSSING

LOG OF TEST BORINGS NO. 2

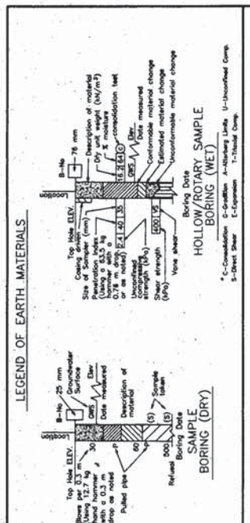
DISREGARD PRINTS BEARING EARLIER REVISION DATES →

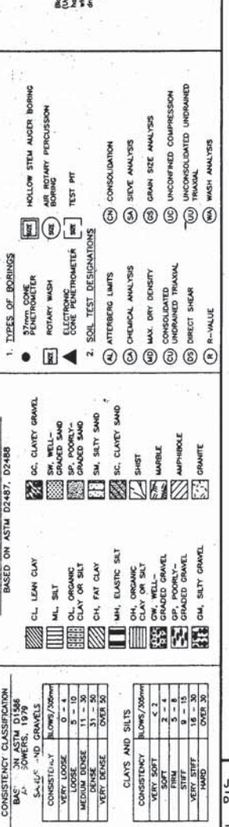
REVISION DATES (PRELIMINARY STAGE ONLY): 1/27/99 3/22/99 5/5/99

SHEET 48 OF 51

FILE PATH: 23-483459

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 2 4 6 8





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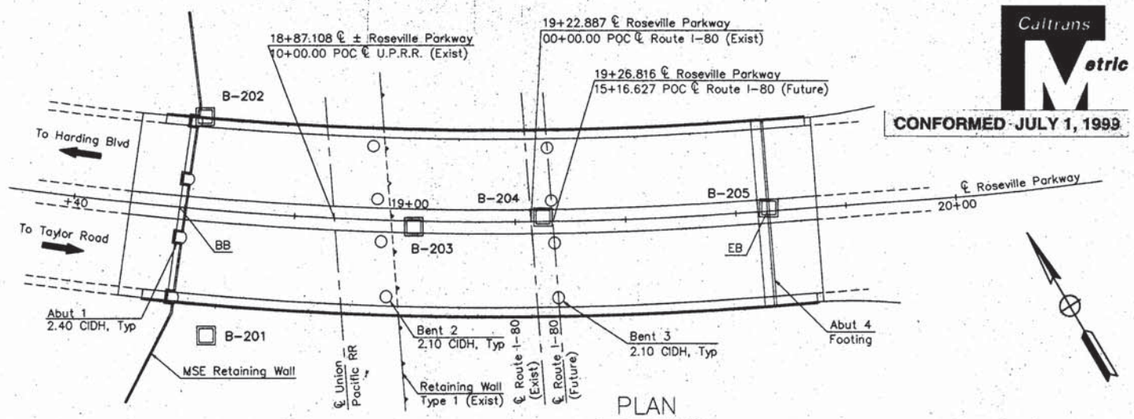
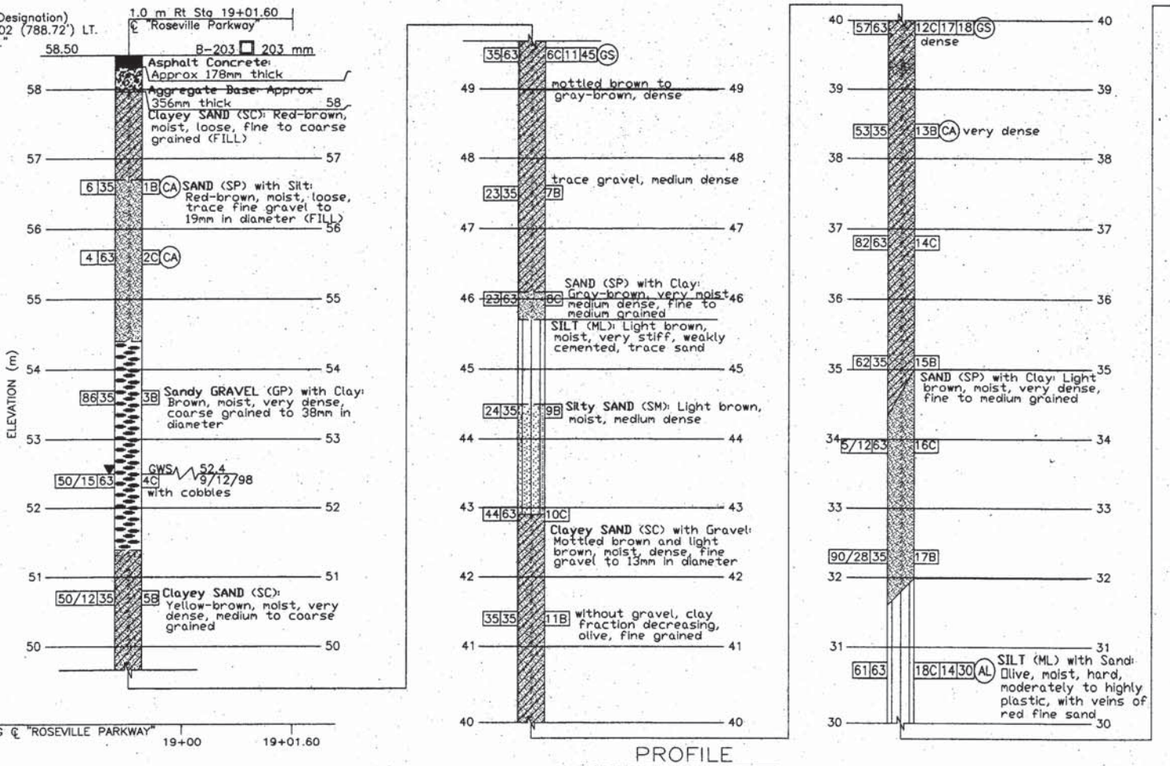


PLAN
SCALE: 1:500



PROFILE
HORIZONTAL SCALE: 1:40
VERTICAL SCALE: 1:40

Caltrans Metric

CONFORMED JULY 1, 1999

DIST	COUNTY	ROUTE	POST KILOMETERS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	Pla	80		121	152

Elizabeth M. Smith
GEOTECHNICAL PROFESSIONAL

REGISTERED PROFESSIONAL ENGINEER — Elizabeth M. Smith — No. GE2373 — Exp. 6/30/99 — GEOTECHNICAL — STATE OF CALIFORNIA

PLANS APPROVAL DATE

KLEINFELDER INC.
3077 FITE CIRCLE
SACRAMENTO, CA 95827

CITY OF ROSEVILLE
ENGINEERING DEPARTMENT
316 VERNON ST. ROOM 106
ROSEVILLE, CA 95678

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

AS BUILT
CORRECTION BY:
CONTRACT NO.: 03-244804
DATE:
No Changes

Bent 2 TP

JOEL ESCABAR — DESIGN OVERSIGHT — 6-18-99 — SIGN OFF DATE

DRAWN BY: D. CLENDENEN
CHECKED BY: E.M. SMITH

L. REAGAN, ENG. — FIELD INVESTIGATION BY:
DATE: 9/12/98

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

Walt LaFranchi — PROJECT ENGINEER

BRIDGE NO. 19-0177
POST KM 5.62

ROSEVILLE PARKWAY OVERCROSSING
LOG OF TEST BORINGS NO. 3

FILE PATH: 23-483459

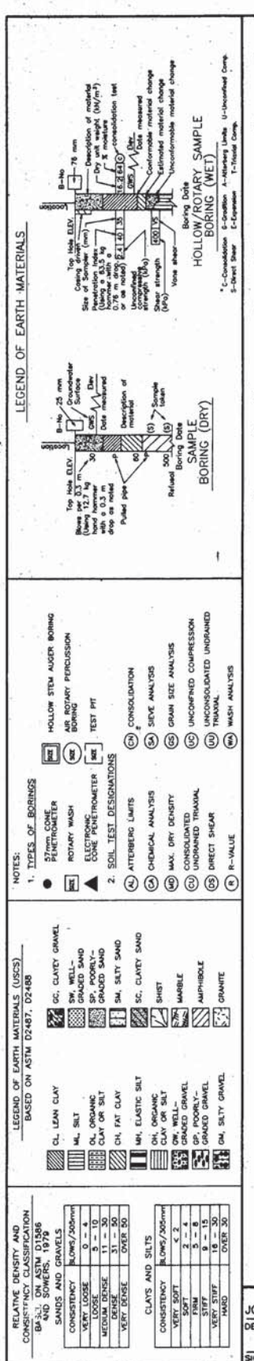
ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 2 4 6 8

CU 03
EA 2A4801

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 1/27/99 3/22/99 5/5/99

SHEET 49 OF 51



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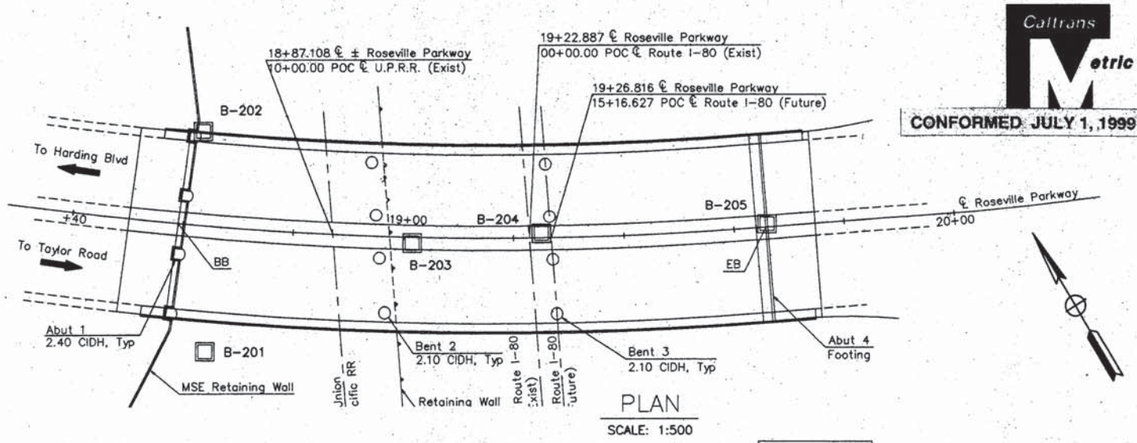
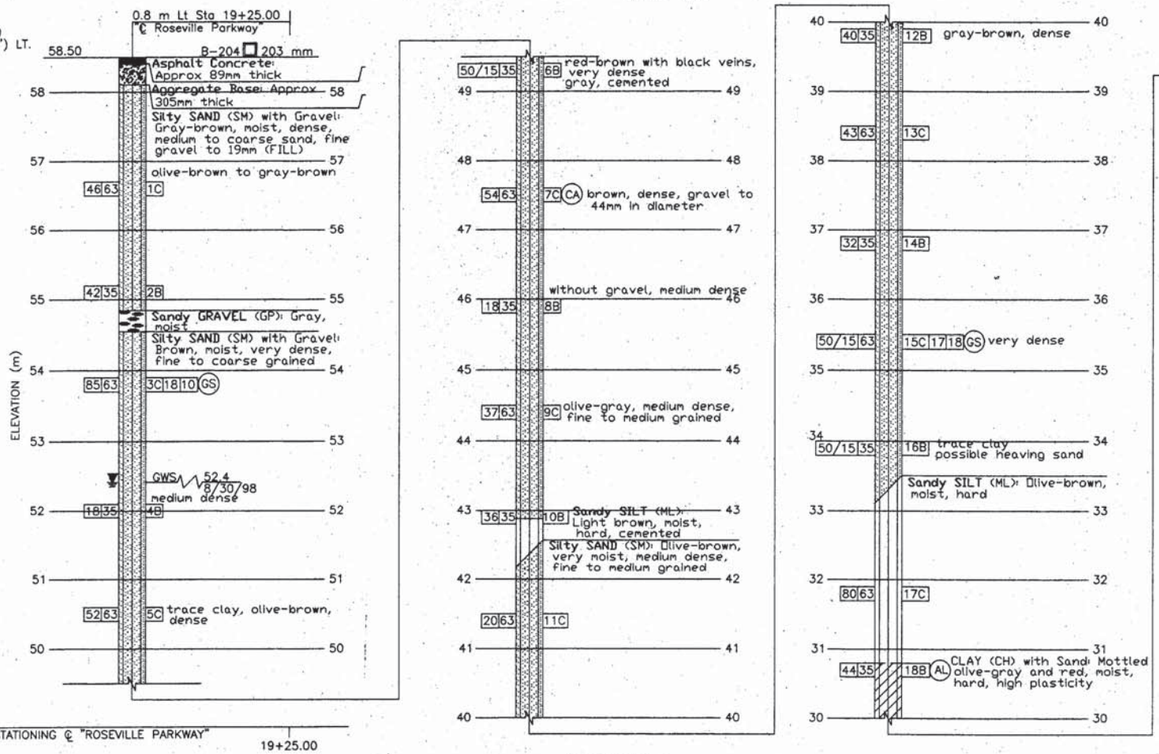
AS BUILT
CORRECTION BY: Frank Cullen
CONTRACT NO.: 03-2A480F
DATE: 11-10-00
No changes



PLAN
SCALE: 1:500



PROFILE
HORIZONTAL SCALE: 1:40
VERTICAL SCALE: 1:40

Caltrans Metric
CONFORMED JULY 1, 1999

DIST	COUNTY	ROUTE	POST KILOMETERS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	Pla	80		122	152

Elizabeth M. Smith
GEOTECHNICAL PROFESSIONAL

PLANS APPROVAL DATE

Elizabeth M. Smith No. GE2373 Exp. 6/30/99 GEOTECHNICAL REGISTERED PROFESSIONAL ENGINEER STATE OF CALIFORNIA

KLEINFELDER INC.
3077 FITE CIRCLE
SACRAMENTO, CA 95827

CITY OF ROSEVILLE
ENGINEERING DEPARTMENT
316 VERNON ST. ROOM 106
ROSEVILLE, CA 95678

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

JOEL ESCABAR, DESIGN OVERSIGHT, SIGN OFF DATE 6-18-99	DRAWN BY	D. CLENDENEN	L. REAGAN, ENG. FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	Walt LaFranchi, PROJECT ENGINEER
	CHECKED BY	E.M. SMITH	DATE: 8/30/98		

BRIDGE NO. 19-0177
POST KM 5.62

ROSEVILLE PARKWAY OVERCROSSING
LOG OF TEST BORINGS NO. 4

FILE PATH: 23-483459

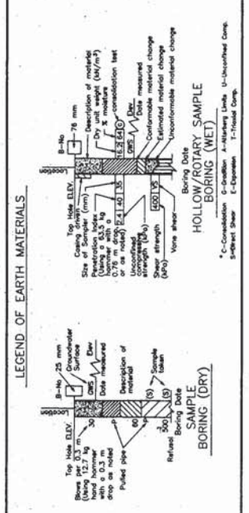
ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 2 4 6 8

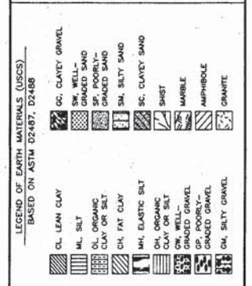
CU 03
EA 2A4801

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY): ~~1/12/99~~ ~~3/12/99~~ 5/5/99

SHEET 50 OF 51

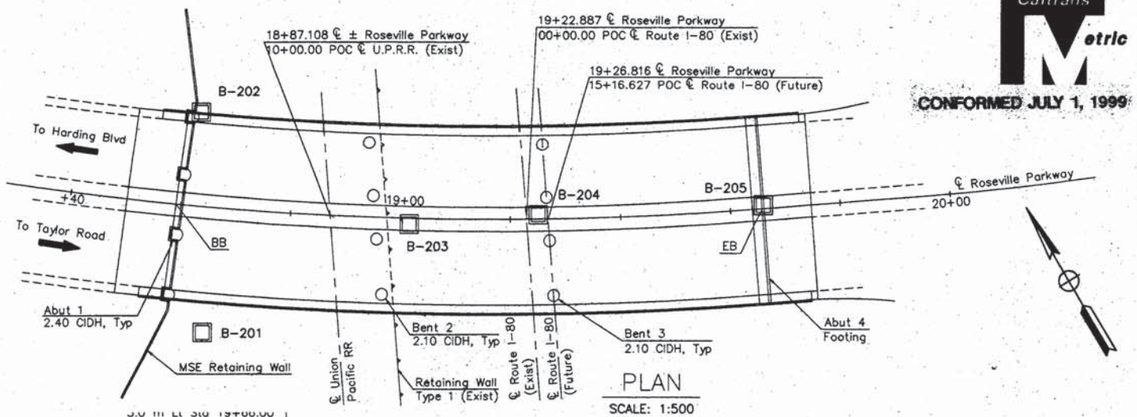
LEGEND OF EARTH MATERIALS

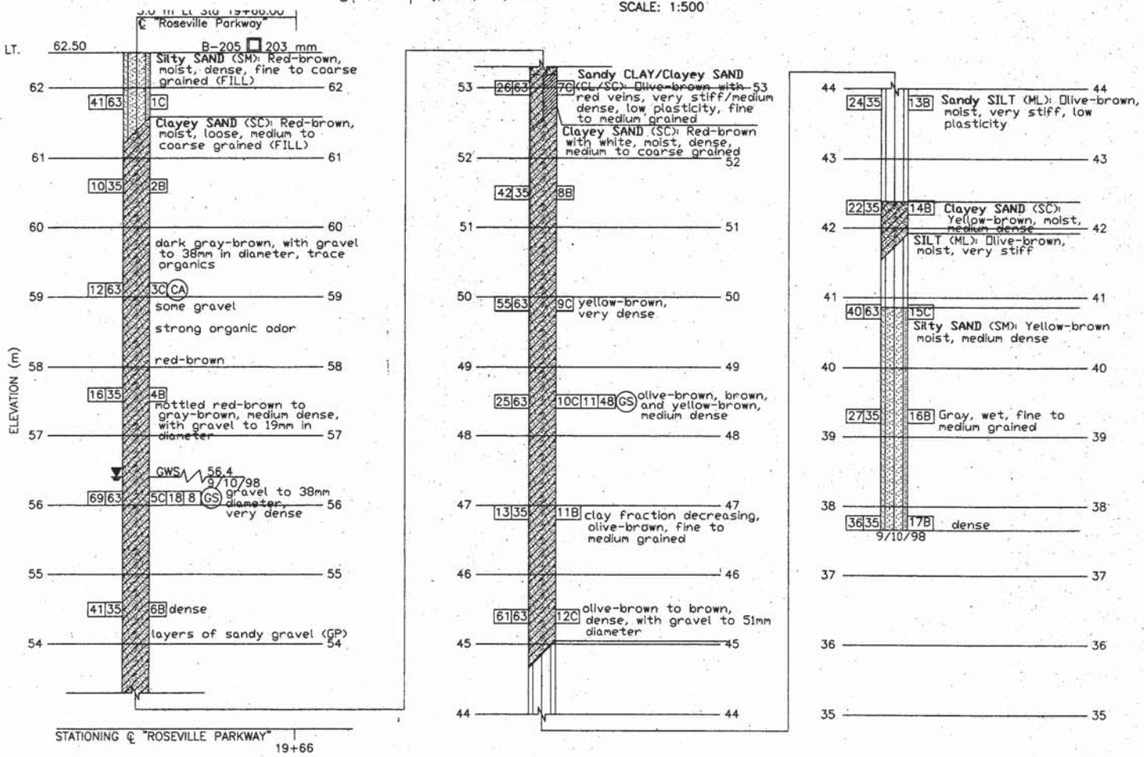




Note:

1. 63 mm samples were taken using a modified California split-barrel sampler with an inside diameter of 49 mm and an outside diameter of 63 mm.
2. The boring logs and related information represent the opinion of the geotechnical engineer as to the character of the materials at the locations shown. Soil and groundwater conditions between adjacent test holes and at other locations may differ from those shown. Groundwater conditions may change with passage of time.
3. Test boring elevations are approximate and are interpolated based on topographic base sheet mapping prepared for this project.
4. Test boring locations were determined in the field based on taping and pacing from mapped site features. The locations of the explorations should be considered accurate only to the degree implied by the measuring methods used.
5. An automatic hammer was used to drive sampler.
6. Visual classification of earth materials was based on field inspection and was confirmed or revised with laboratory test results.
7. Benchmark: Mark 19-147-3 (CALTRANS Designation) 1/2" rebar with metal cap in well 240.402 (788.72') LT. B 47+92.10 POT (Interstate 80) "U.S.G.S." Elevation 51.039 (167.45')





PROFILE
HORIZONTAL SCALE: 1:40
VERTICAL SCALE: 1:40

Caltrans Metric
CONFORMED JULY 1, 1999

DIST	COUNTY	ROUTE	POST KILOMETERS TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	Pla	80		123	152

Elizabeth M. Smith
GEOTECHNICAL PROFESSIONAL

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Elizabeth M. Smith — No. GE2373 — Exp. 6/30/99 — GEOTECHNICAL — STATE OF CALIFORNIA

KLEINFELDER INC.
3077 FITE CIRCLE
SACRAMENTO, CA 95827

CITY OF ROSEVILLE
ENGINEERING DEPARTMENT
316 VERNON ST. ROOM 106
ROSEVILLE, CA 95678

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AS BUILT
CORRECTION BY: Frank Vell
CONTRACT NO.: 03-2A4804
DATE: 11-10-00
No Changes

JOEL ESCABAR — DESIGN OVERSIGHT — SIGN OFF DATE 6-18-99	DRAWN BY	D. CLENDENEN	L. REAGAN, ENG. — FIELD INVESTIGATION BY: — DATE: 9/10/98
	CHECKED BY	E.M. SMITH	

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

Walt LaFranchi — PROJECT ENGINEER

CU 03
EA 2A4801

BRIDGE NO. 19-0177
POST KM 5.62

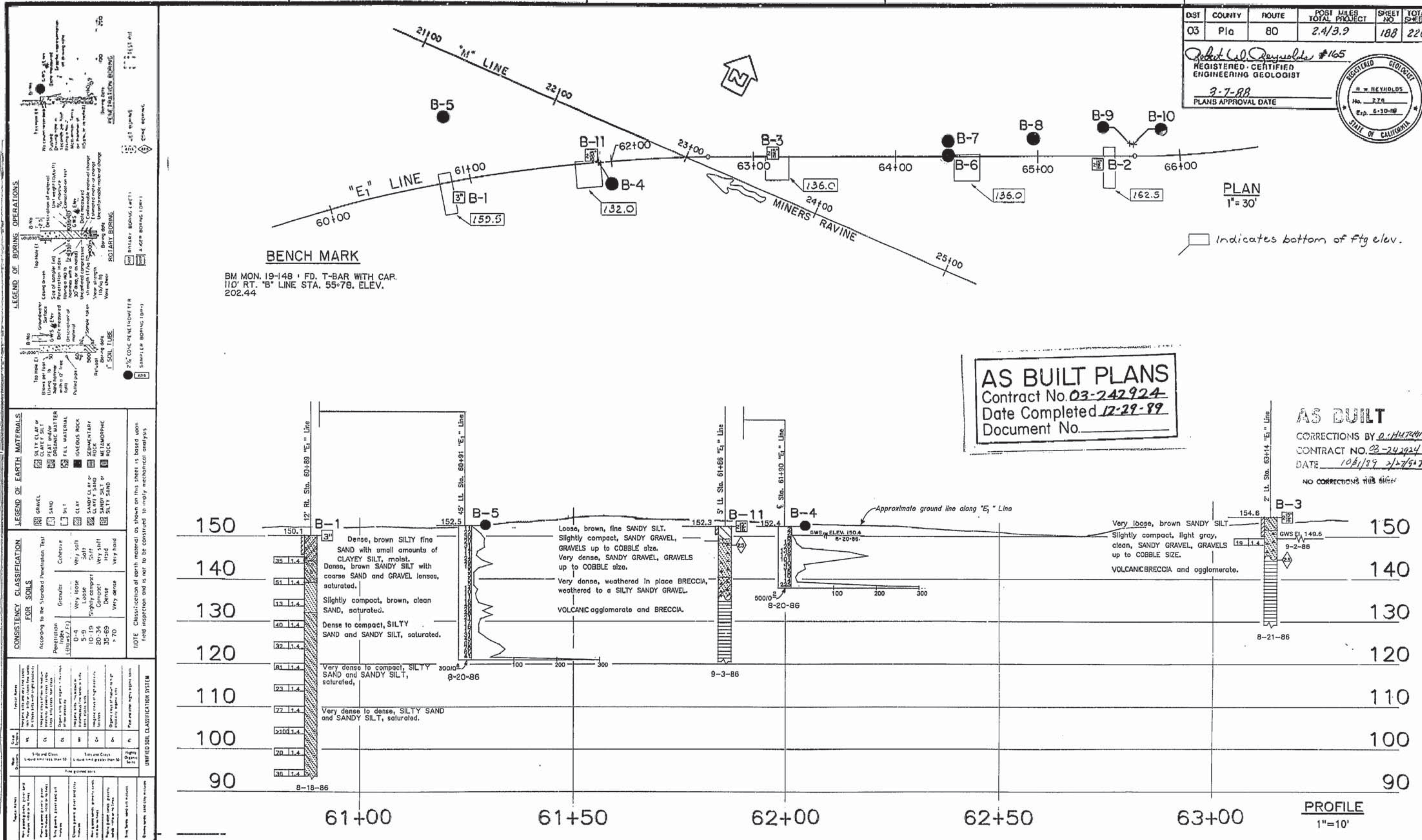
ROSEVILLE PARKWAY OVERCROSSING
LOG OF TEST BORINGS NO. 5

FILE PATH: 23-483459

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 2 4 6 8

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY)										SHEET	OF
1/12/99	3/12/99	5/5/99								51	51



GEOTECHNICAL BRANCH - TRANSPORTATION LABORATORY	State of CALIFORNIA DEPARTMENT OF TRANSPORTATION	STRUCTURES - DESIGN 11	BRIDGE NO. 19-569 POST MILE 2.9	MINERS RAVINE BRIDGE LOG OF TEST BORINGS 1 OF 2
DRAWN BY Leony L.Lopez 11/86				

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

CU 03 EA 242921

SHEET 13 OF 14

188

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

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
03	Pla	80	2.4/3.9	189	226

Robert L. Reynolds, #165
REGISTERED · CERTIFIED
ENGINEERING GEOLOGIST

3-7-88
PLANS APPROVAL DATE

REGISTERED GEOLOGIST
R W REYNOLDS
No. 278
Exp. 6-30-89
STATE OF CALIFORNIA

AS BUILT PLANS
Contract No. 03-242924
Date Completed 12-29-89
Document No.

(FOR PLAN VIEW SEE LOG OF TEST BORINGS 1 OF 2)

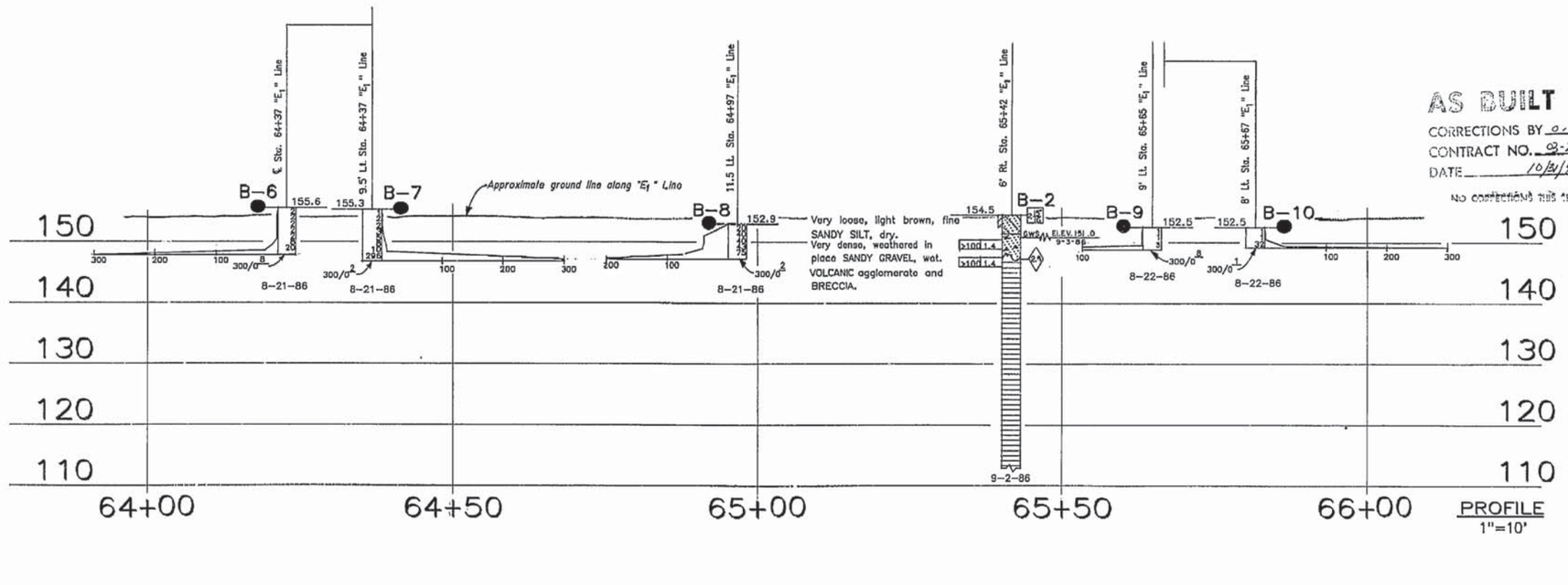
LEGEND OF BORING OPERATIONS

LEGEND OF EARTH MATERIALS

CONSISTENCY CLASSIFICATION FOR SOILS
According to the Standard Penetration Test

UNIFIED SOIL CLASSIFICATION SYSTEM

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



AS BUILT
CORRECTIONS BY O. HUTCHINSON
CONTRACT NO. 03-242924
DATE 10/31/89 2-22-90 JP
NO CORRECTIONS THIS SHEET

189

GEOTECHNICAL BRANCH - TRANSPORTATION LABORATORY

DRAWN BY	CHECKED BY	Prepared Recommendations By	CHANGE ORDER	EXPENDITURE AUTHORIZATION	SPEC. DESIGN
Lacey L. Lopez 11/86		R.C. Wilkelman 560			

State of CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STRUCTURES - DESIGN 11

BRIDGE NO.	POST MILE
19-568	2.9

MINERS RAVINE BRIDGE
LOG OF TEST BORINGS 2 OF 2

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 03
EA 242921

Disregard prints bearing earlier revision dates

REVISION DATES (PRELIMINARY STAGE ONLY)	SHEET	OF
12/19/87	14	14

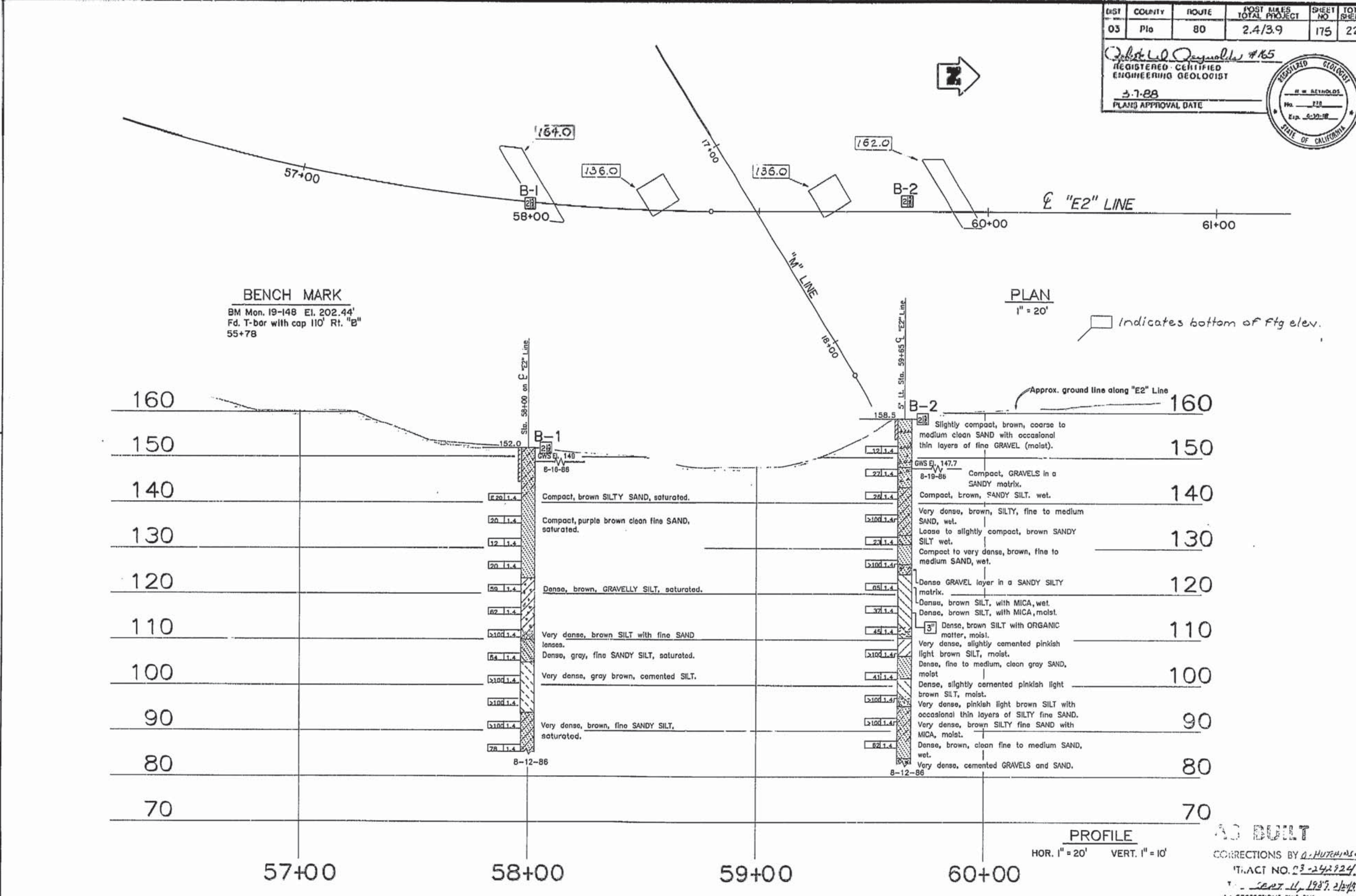
I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENTS TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION

DATE 10-15-96 SIGNATURE Ronald E. Blackford

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO	TOTAL SHEETS
03	Pla	80	2.4/3.9	175	226

REGISTERED CERTIFIED ENGINEERING GEOLOGIST #165

3-7-88
PLANS APPROVAL DATE



AS BUILT
CORRECTIONS BY D. HUTCHINSON
CONTRACT NO. 03-242924
DATE Sept. 11, 1989

175

GEOTECHNICAL BRANCH - TRANSPORTATION LABORATORY

DRAWN BY Bruce Carlson 11/86

Approved: R.C. Wilhelms 560

State of CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STRUCTURES - DESIGN 11

BRIDGE NO	19-56K
POST MILE	2.9

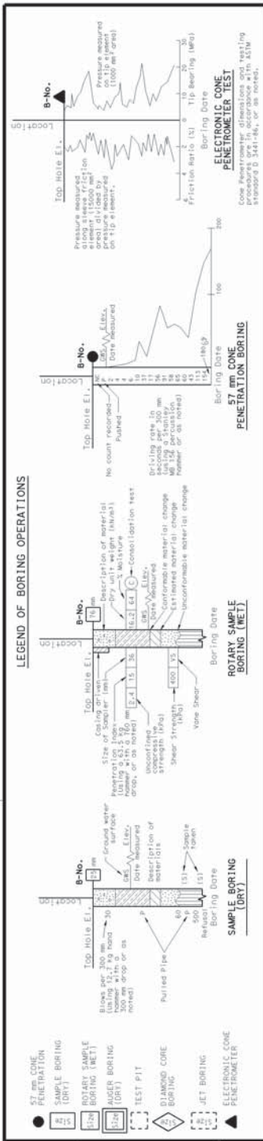
MINERS RAVINE BRIDGE
LOG OF TEST BORINGS

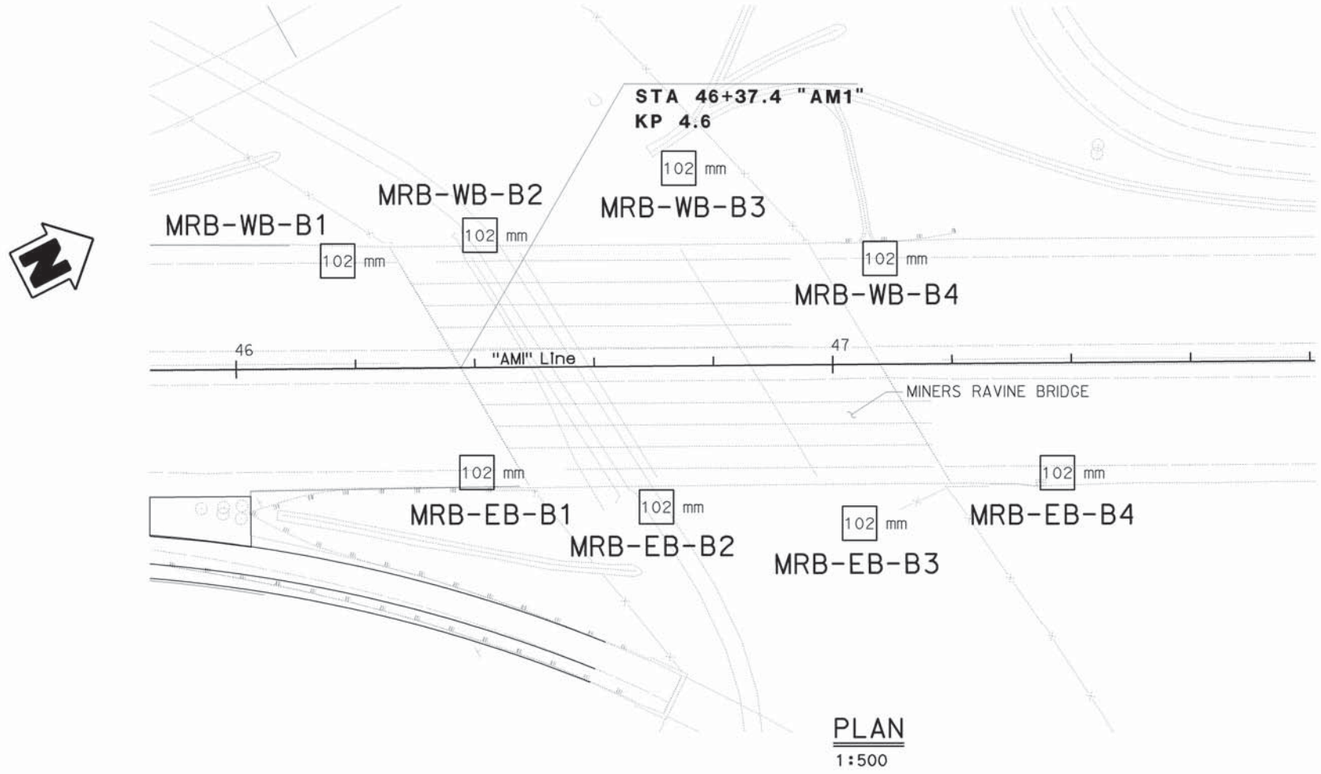
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

CU 03
EA 242921

SHEET 12 OF 12

AS BUILT PLANS
Contract No 03-242924
Date Completed 12-29-89
Document No ____





PLAN
1:500

Notes:

1. 51 mm samples were taken using a California split-barrel sampler with an inside diameter (I.D.) of 51 mm and an outside diameter (O.D.) of 64 mm.
2. A CME automatic hammer (63.5 kg) with a 760 mm drop was used to advance the sampler.
3. Blowcounts noted for boring are field blowcounts and have not been corrected.
4. 35 mm samples were taken using a SPT split-barrel sampler with an inside diameter (I.D.) of 35 mm and an outside diameter (O.D.) of 51 mm.
5. 63.5 mm core samples were taken using an HQ core sampler with a 63.5 mm inside diameter (I.D.) and 94 mm outside diameter (O.D.) core barrel.
6. Blowcounts 50/125 means 50 blows per 125 mm penetration.
7. Efficiency factor for CME automatic hammer is 1.1.
8. Borings were drilled with Rotary wash method. Groundwater not measured in bolehole.
9. The descriptions and classifications of soil, including consistency and relative density descriptions, used by the field personnel for the exploration bole holes on "Soil and Rock Logging Classification Manual (Field Guide)", Engineering Service Center, Office of Structural Foundations, August 1996.

BENCHMARKS

STATION	OFFSET	N	E	ELEV	DESCRIPTION
15+79.190	4.62 Rt	618564.792	2062442.621	44.552	

SURVEY CONTROL
1. Coordinates bearing and distances are based on the California coordinate system of Nad 1983 HPGN, zone 6. (EPOCH 1991.35). Elevations are based on NGVD 29.

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Plc	80	4.5/8.3	477	539

5-14-08
REGISTERED CIVIL ENGINEER

11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MARK H. STANLEY — No. GE 2397 — Exp. 9-30-08 — GEOTECHNICAL — STATE OF CALIFORNIA

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KLEINFELDER INC.
3077 FITE CIR.
SACRAMENTO, CA 95826

Mark Stanley DESIGN OVERSIGHT 05/14/08 SIGN OFF DATE	DRAWN BY	A. Sanchez	FIELD INVESTIGATION BY: DATE:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER	BRIDGE NO. 19-0056 / KILOMETER POST 4.6	MINERS RAVINE BRIDGE (WIDEN) LOG OF TEST BORINGS 1 OF 5
	CHECKED BY	B. Anderson/ M. Stanley					

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 5/2008 6/1/08

SHEET 24 OF 28

FILE => 19-0056-x-lotb1of5.dgn

USERNAME => s135318 DATE PLOTTED => 21-NOV-2008 TIME PLOTTED => 15:31

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	478	539

REGISTERED CIVIL ENGINEER 5-14-08

PLANS APPROVAL DATE 11-17-08

REGISTERED PROFESSIONAL ENGINEER — MARK H. STANLEY — No. GE 2397 — Exp. 9-30-08 — GEOTECHNICAL — STATE OF CALIFORNIA

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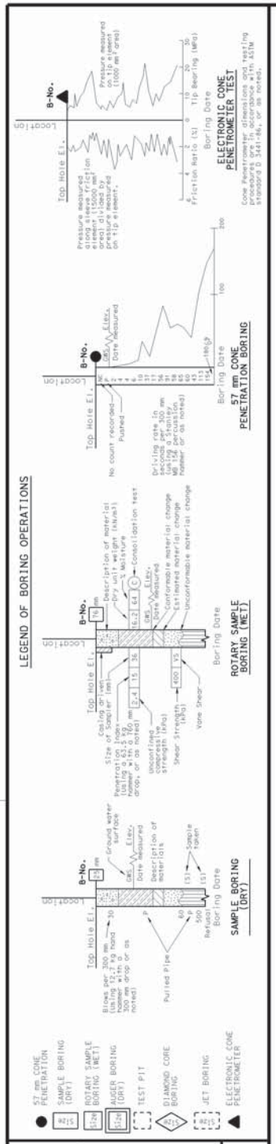
KLEINFELDER INC.
3077 FITE CIR.
SACRAMENTO, CA 95826

FOR PLAN VIEW AND ADDITIONAL NOTES, SEE "LOG OF TEST BORINGS" SHEET 1 OF 5



PROFILE
HOR. 1:400
VER. 1:100

Mark Stanley DESIGN OVERSIGHT 05/14/08 SIGN OFF DATE	DRAWN BY	A. Sanchez	FIELD INVESTIGATION BY: DATE:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER	BRIDGE NO. 19-0056 / KILOMETER POST 4.6	MINERS RAVINE BRIDGE (WIDEN)
	CHECKED BY	B. Anderson/ M. Stanley					LOG OF TEST BORINGS 2 OF 5

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY)										SHEET	OF
5/28/08										25	28

FILE => 19-0056-x-lotb2of5.dgn

USERNAME => s1355318 DATE PLOTTED => 21-NOV-2008 TIME PLOTTED => 15:31

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	PLA	80	4.5/8.3	479	539

Caltrans Metric

REGISTERED CIVIL ENGINEER 5-14-08

11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MARK H. STANLEY — No. GE 2397 — Exp. 9-30-08 — GEOTECHNICAL — STATE OF CALIFORNIA

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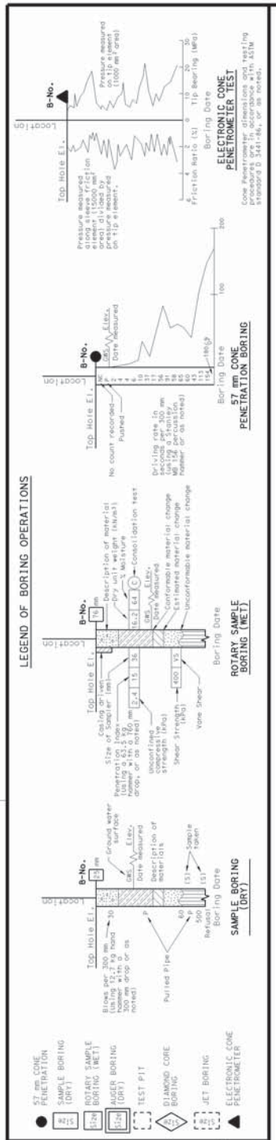
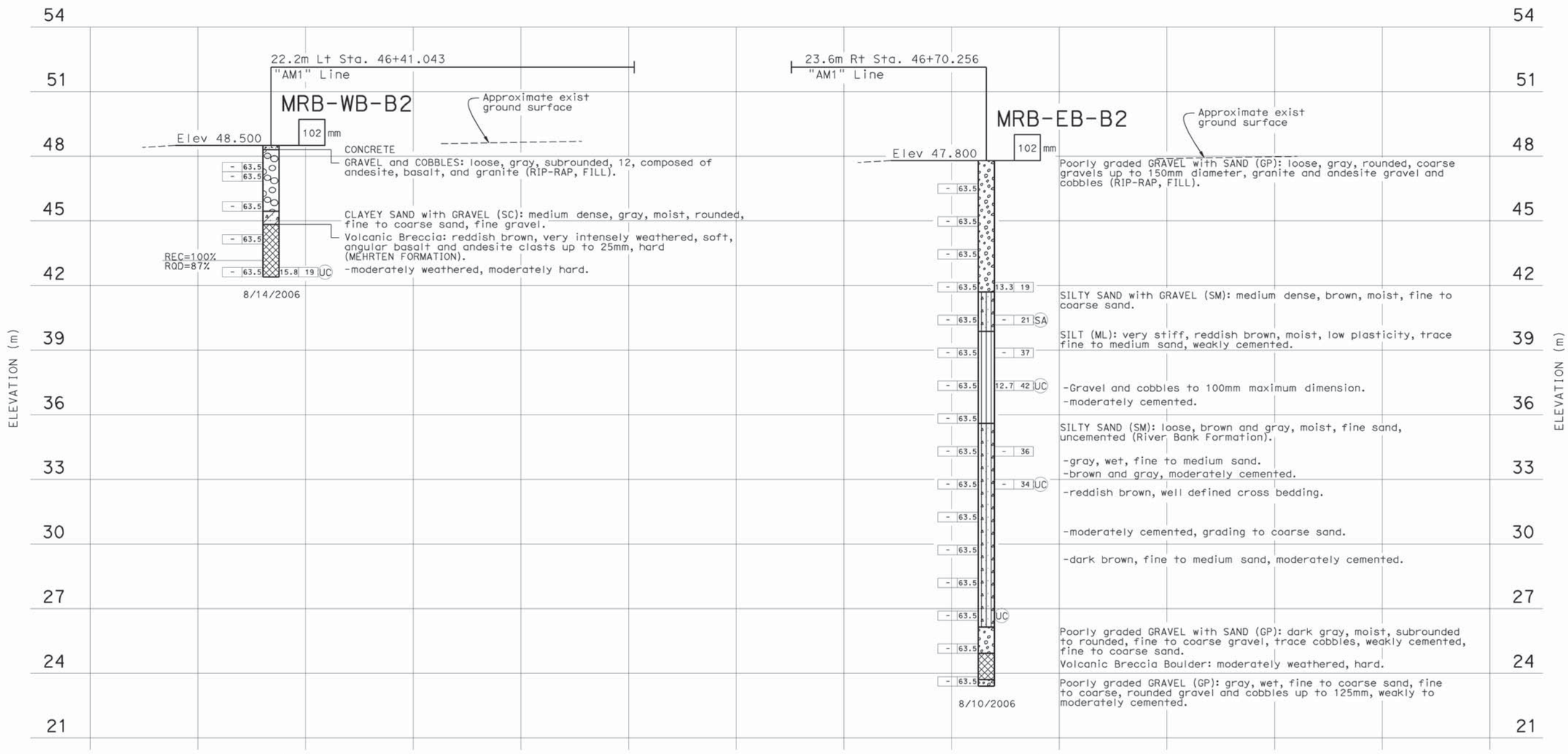
KLEINFELDER INC.
3077 FITE CIR.
SACRAMENTO, CA 95826

FOR PLAN VIEW AND ADDITIONAL NOTES, SEE
"LOG OF TEST BORINGS" SHEET 1 OF 5





PROFILE
HOR. 1:400
VER. 1:100

Mark Stanley DESIGN OVERSIGHT 05/14/08 SIGN OFF DATE	DRAWN BY CHECKED BY	A. Sanchez B. Anderson/ M. Stanley	FIELD INVESTIGATION BY: DATE:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER	BRIDGE NO. 19-0056 KILOMETER POST 4.6	MINERS RAVINE BRIDGE (WIDEN) **LOG OF TEST BORINGS 3 OF 5**

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY)										SHEET	OF
5/28/08										26	28

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FOR PLAN VIEW AND ADDITIONAL NOTES, SEE
"LOG OF TEST BORINGS" SHEET 1 OF 5

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	480	539

5-14-08
REGISTERED CIVIL ENGINEER

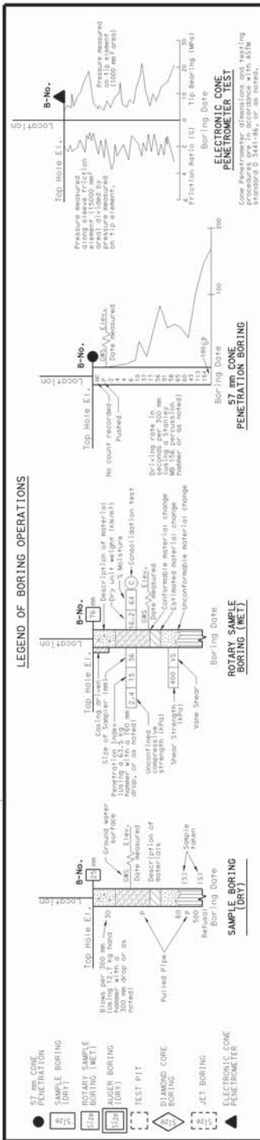
11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
MARK H. STANLEY
No. GE 2397
Exp. 9-30-08
GEOTECHNICAL
STATE OF CALIFORNIA

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

KLEINFELDER INC.
3077 FITE CIR.
SACRAMENTO, CA 95826

LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

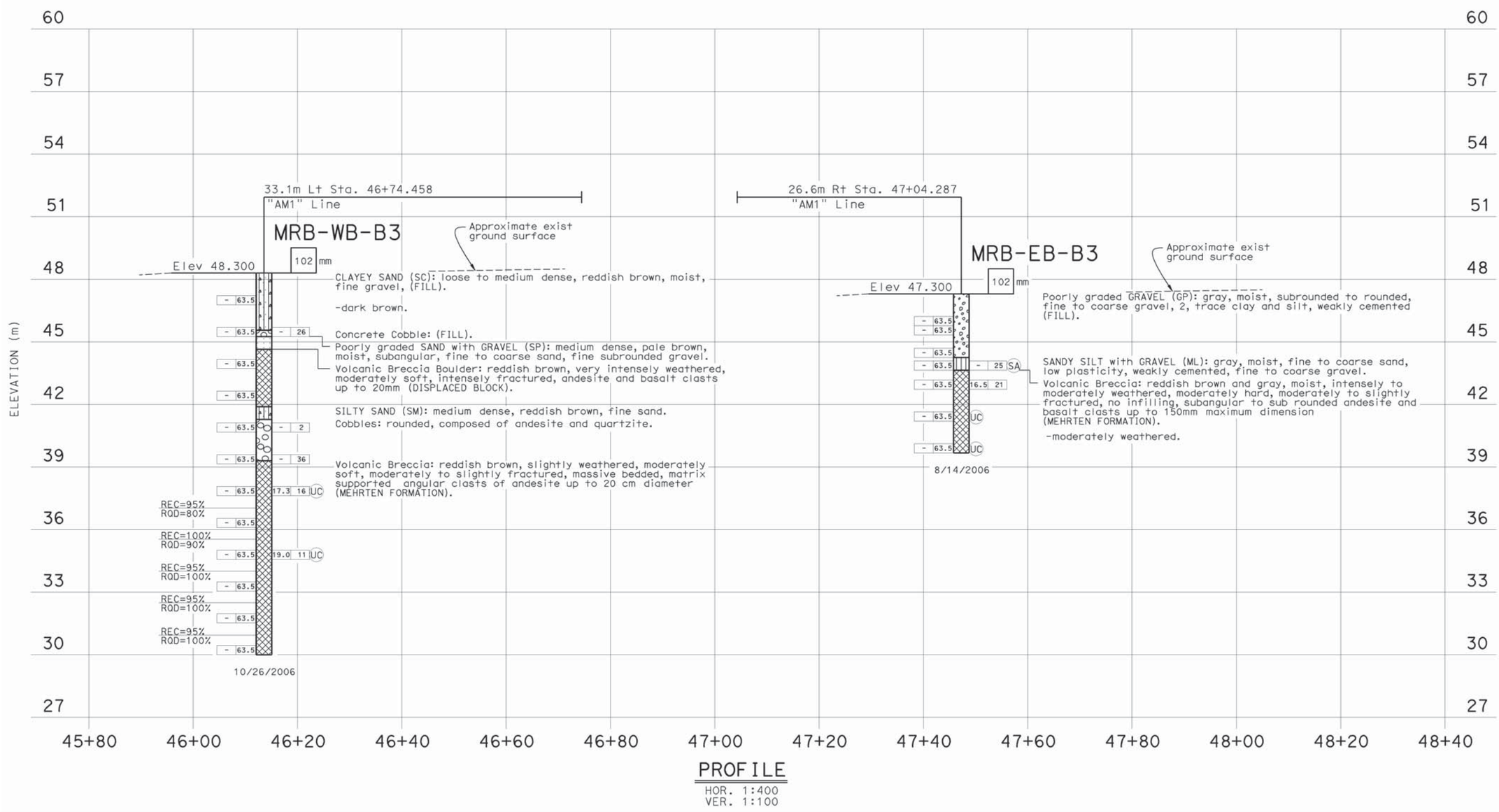
GRAVEL · SAND · SILT · CLAY · SANDY CLAY or CLAYEY SAND · SANDY SILT or SILTY SAND · SILTY CLAY · CLAYEY SILT · PEAT and/or ORGANIC MATTER · FILL MATERIAL · COBBLE · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

SPT N-Value (Blows/0.30m)	Granular	SPT N-Value (Blows/0.30m)	Cohesive
0-4	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very stiff
		>31	Hard

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.



PROFILE
HOR. 1:400
VER. 1:100

Mark Stanley DESIGN OVERSIGHT 05/14/08 SIGN OFF DATE	DRAWN BY A. Sanchez CHECKED BY B. Anderson/ M. Stanley	FIELD INVESTIGATION BY: DATE:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER	BRIDGE NO. 19-0056 KILOMETER POST 4.6	MINERS RAVINE BRIDGE (WIDEN) **LOG OF TEST BORINGS 4 OF 5**	

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY)										SHEET	OF
5/28/08										27	28

FILE => 19-0056-x-1otb4of5.dgn

USERNAME => s1355318 DATE PLOTTED => 21-NOV-2008 TIME PLOTTED => 15:31

FOR PLAN VIEW AND ADDITIONAL NOTES, SEE
"LOG OF TEST BORINGS" SHEET 1 OF 5

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	481	539

5-14-08
REGISTERED CIVIL ENGINEER

11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
MARK H. STANLEY
No. GE 2397
Exp. 9-30-08
GEOTECHNICAL
STATE OF CALIFORNIA

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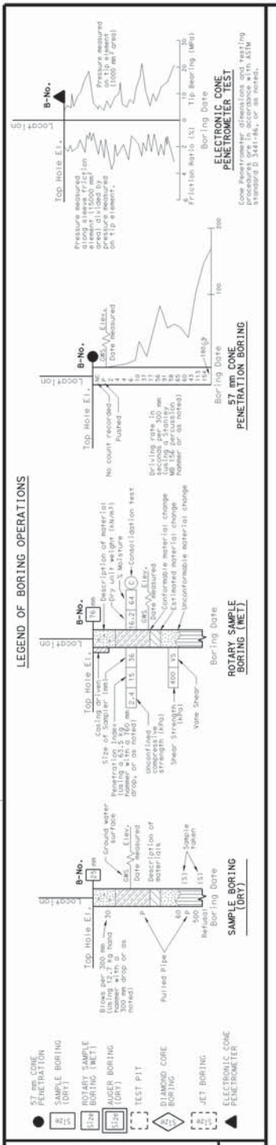
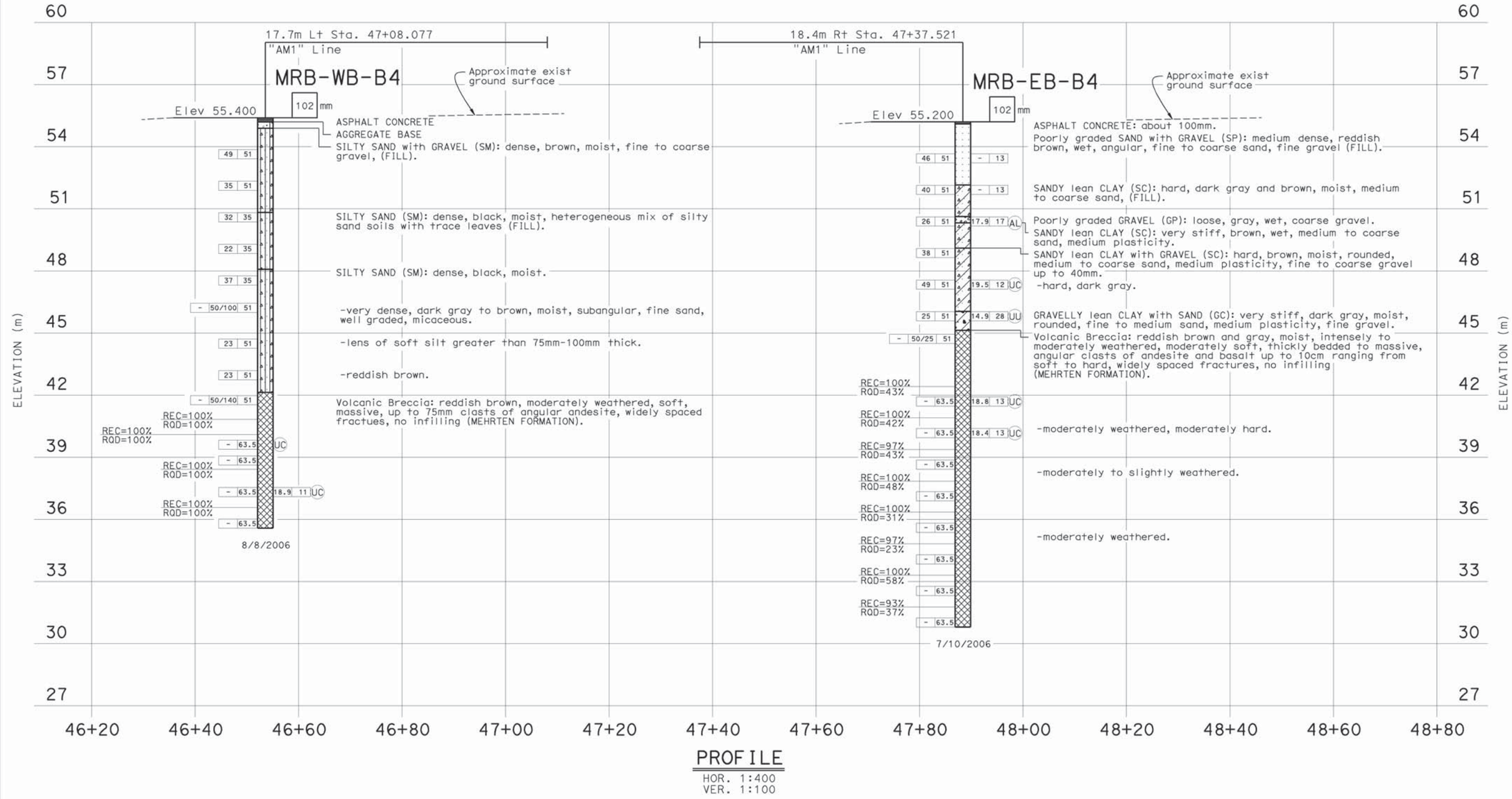
KLEINFELDER INC.
3077 FITE CIR.
SACRAMENTO, CA 95826





PROFILE
HOR. 1:400
VER. 1:100

Mark Stanley DESIGN OVERSIGHT 05/14/08 SIGN OFF DATE	DRAWN BY	A. Sanchez	FIELD INVESTIGATION BY: DATE:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER	BRIDGE NO. 19-0056 KILOMETER POST 4.6	MINERS RAVINE BRIDGE (WIDEN) LOG OF TEST BORINGS 5 OF 5
	CHECKED BY	B. Anderson/ M. Stanley					

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 5/28/08

SHEET 28 OF 28

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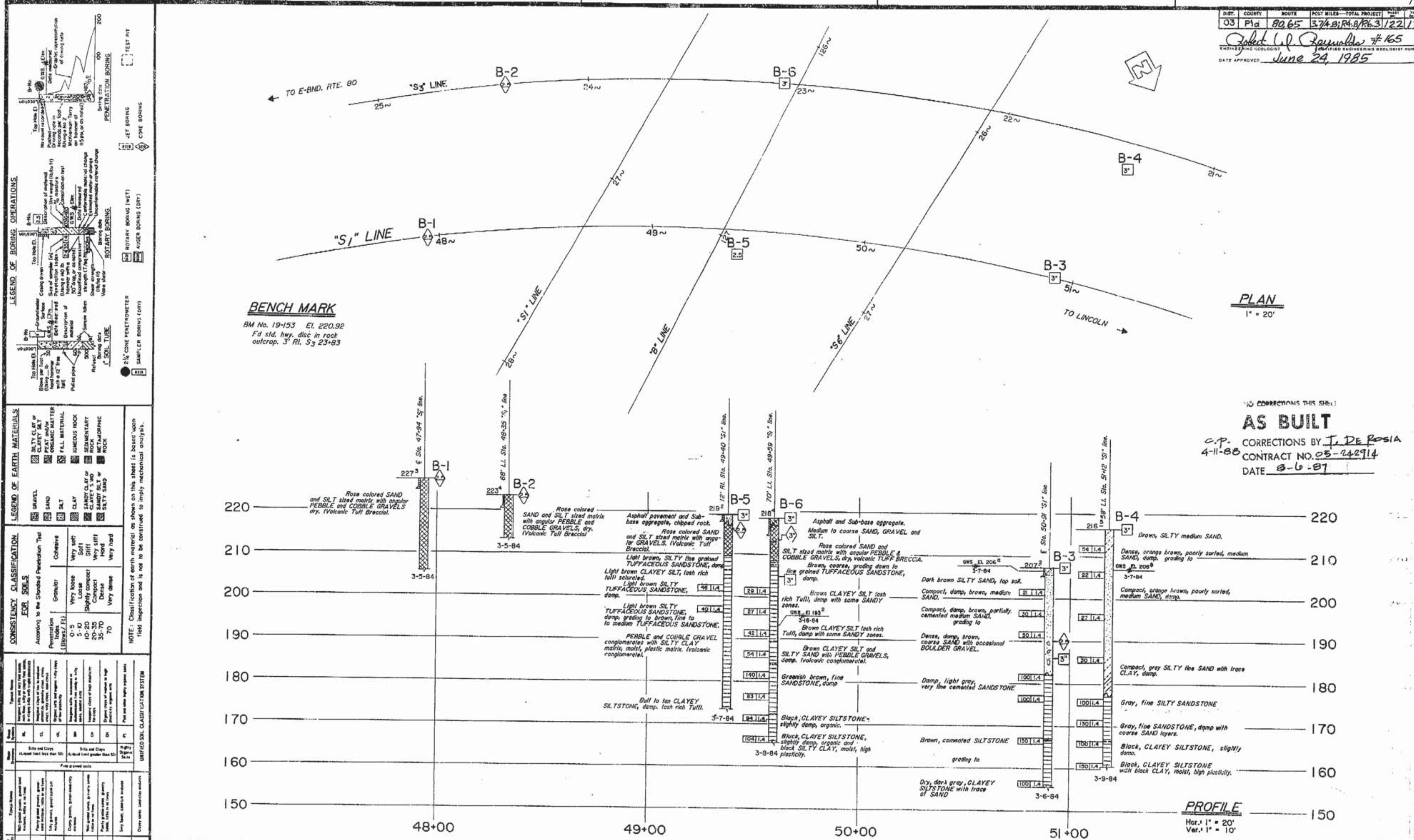


DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	Pla	80, 65	3.7/4.8; R4.8/R6.3	122	175

Robert W. Reynolds #165
ENGINEERING GEOLOGIST — CERTIFIED ENGINEERING GEOLOGIST NUMBER
DATE APPROVED June 24, 1985

ENGINEERING GEOLOGY AND TECHNICAL SERVICES BRANCH – TRANSPORTATION LABORATORY

DRAWN BY IRMA HOWELL 4/84
CHECKED BY
Wilfred S. Yee CE 11049 — PROJECT GEOLOGIST
ENGINEERING GEOLOGIST

State of CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STRUCTURES - DESIGN
PROJECT ENGINEER — REGISTERED CIVIL ENGINEER NO. 14436

BRIDGE NO. 19-151 R/L
POST MILE 4.8

ROUTE 65/80 SEPARATION
LOG OF TEST BORINGS

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

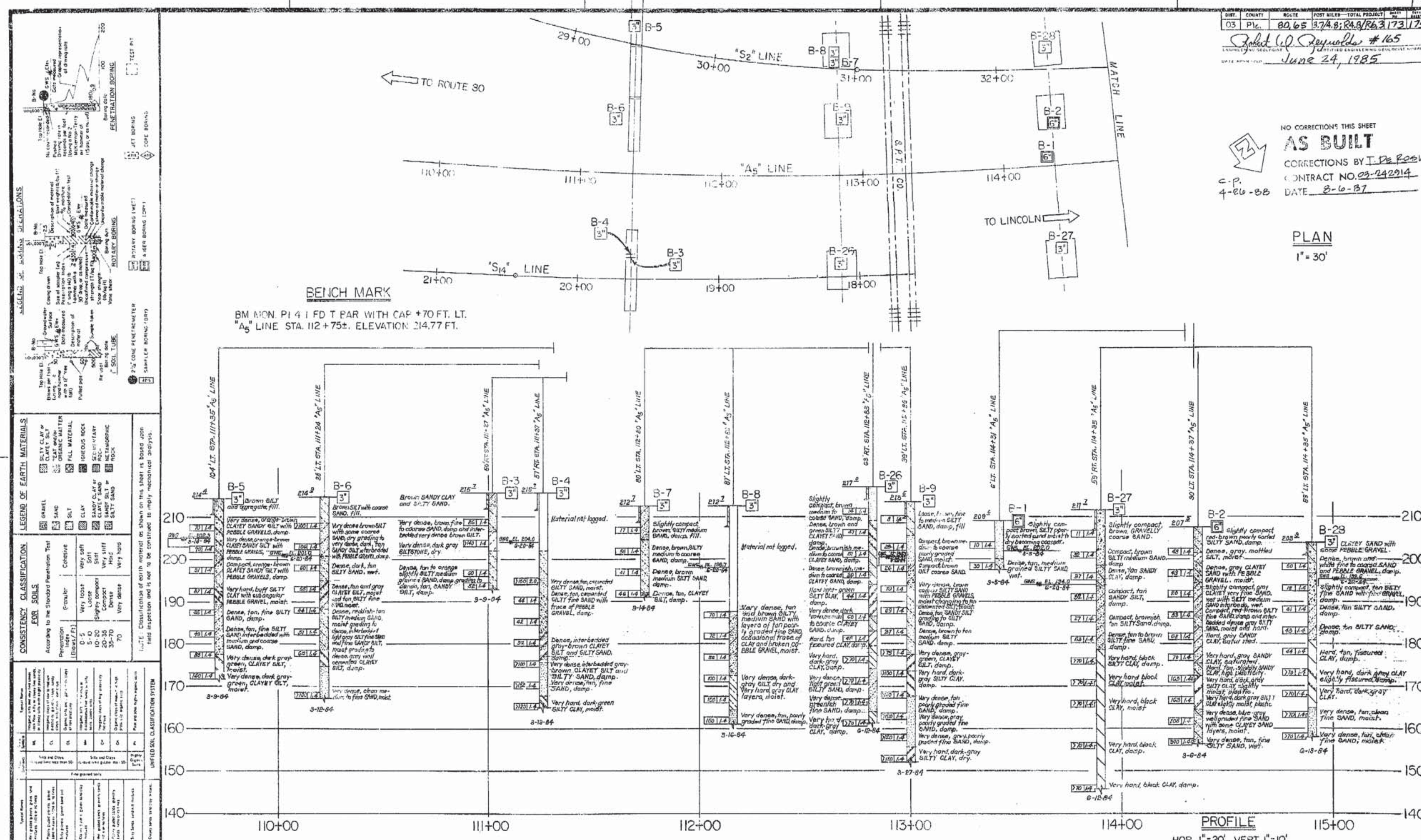
CU 03
WO 242911

Disregard prints bearing earlier revision dates

SHEET 14 OF 14

122

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 5-4-88 SIGNATURE Donald Blackford SUPERVISOR OF MICROFILM SERVICES



GEOTECHNICAL BRANCH - TRANSPORTATION LABORATORY	State of CALIFORNIA DEPARTMENT OF TRANSPORTATION	STRUCTURES - DESIGN 11	BRIDGE NO. 19-152 R/L	EAST ROSEVILLE VIADUCT
DRAWN BY LEONY L. LOPEZ 9/84; CHECKED BY Ronald [illegible] 9/84; PROJECT ENGINEER 11049; ENGINEERING GEOLOGIST Wilfred S. Yee 11049		PROJECT ENGINEER 10-17-84; REGISTERED CIVIL ENGINEER NO. 14636	POST MILE R 5.1	LOG OF TEST BORINGS 1 OF 3
ORIGINAL SCALE IN INCHES FOR REDUCED PLANS		CU 03210 WO 242911	Disregard prints bearing earlier revision dates	SHEET 51 OF 53

173

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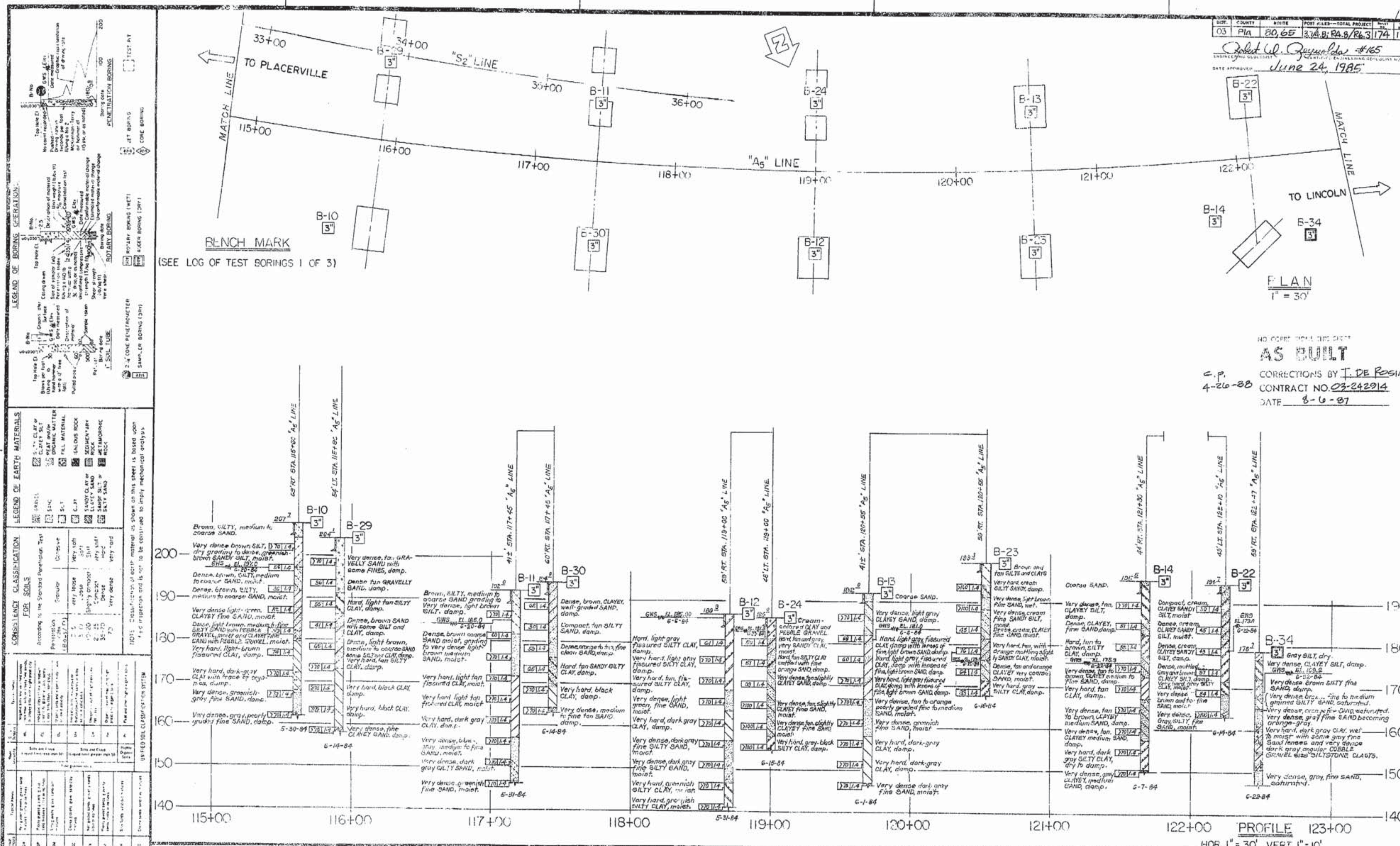
5-4-88 — Donald Blackford — SUPERVISOR OF MICROFILM SERVICES



DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	Pla	80, 65	3.7/4.8; R4.8/R6.3	174	175

ENGINEERING GEOLOGIST: Robert A. Reynolds #165

DATE APPROVED: June 24, 1985

GEOTECHNICAL BRANCH - TRANSPORTATION LABORATORY

DRAWN BY: LEONY L. LOPEZ

CHECKED BY: Ronald J. Richm.

State of CALIFORNIA DEPARTMENT OF TRANSPORTATION

STRUCTURES - DESIGN 11

BRIDGE NO. 19-152 R/L

POST MILE R 5.1

EAST ROSEVILLE VIADUCT

LOG OF TEST BORINGS 2 OF 3

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

CU 03210
WO 242911

SHEET 52 OF 53

174

AS BUILT PLANS

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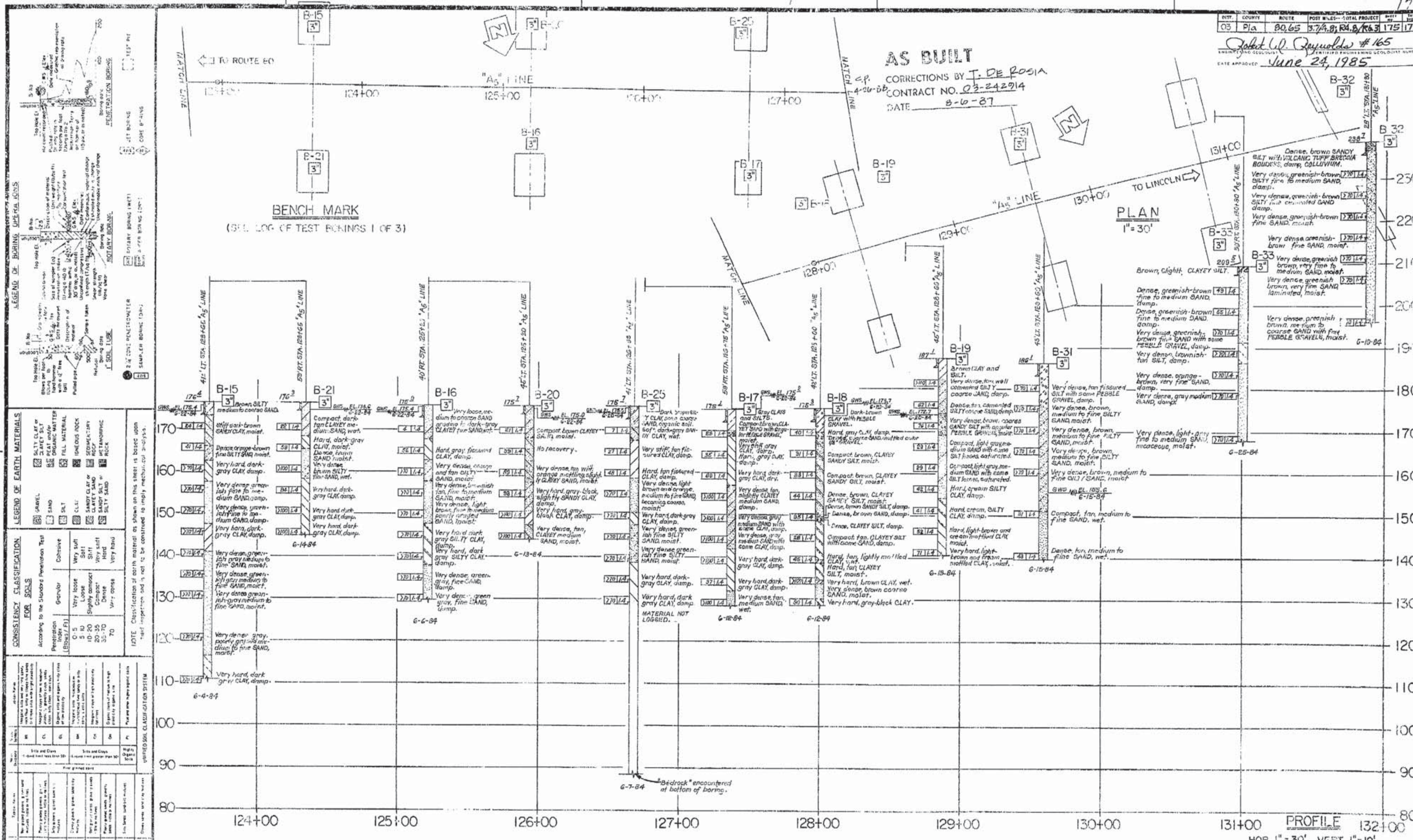

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
03	Pla	80,65	3.7/4.8; R4.8/R6.3	175	175

June 24, 1985

GEOTECHNICAL BRANCH - TRANSPORTATION LABORATORY

DRAWN BY LEONY L. LOPEZ

CHECKED BY

State of CALIFORNIA
DEPARTMENT OF TRANSPORTATION

STRUCTURES - DESIGN 11

BRIDGE NO. 19-152 R/L

POST MILE R 5.1

EAST ROSEVILLE VIADUCT

LOG OF TEST BORINGS 3 OF 3

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS

CU 03210
WO 242911

53 | 53

175

AS BUILT PLANS
Contract No. 03-242914
Date Completed 8-6-87
Document No.

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DATE 5-4-88 SUPERVISOR OF MICROFILM SERVICES

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Sac,Pla	80	28.1/29.0, 0.0/4.7	493	528

Khaled H. Chowdhury 6-27-07
REGISTERED CIVIL ENGINEER

11-26-07
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Khaled H. Chowdhury No. C67823 Exp. 6-30-09 CIVIL STATE OF CALIFORNIA

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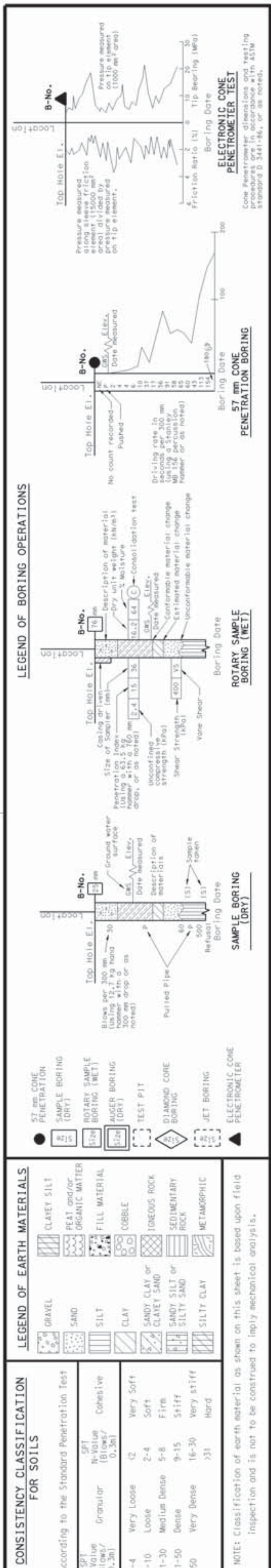
KLEINFELDER INC.
3077 FITE CIR.
SACRAMENTO, CA 95826



WEATHERING DESCRIPTORS

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

Descriptors		Diagnostic features					
		Chemical weathering-Discoloration and/or oxidation		Mechanical weathering-Grain boundary conditions (disaggregation) primarily for granitics and some coarse-grained sediments	Texture and solutioning		General characteristics (strength, excavation, etc.)§
Alphanumeric descriptor	Descriptive term	Body of rock	Fracture surfaces †		Texture	Solutioning	
W1	Fresh	No discoloration, not oxidized.	No discoloration or oxidation.	No separation, intact (tight).	No change.	No solutioning.	Hammer rings when crystalline rocks are struck. Almost always rock excavation except for naturaly weak or weakly cemented rocks such as siltstones or shales.
W2	Slightly weathered to fresh °						
W3	Slightly weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull.	Minor to complete discoloration or oxidation of most surfaces.	No visible separation, intact (tight).	Preserved.	Minor leaching of some soluble minerals may be noted.	Hammer rings when crystalline rocks are struck. Body of rock not weakened. With few exceptions, such as siltstones or shales, classified as rock excavation.
W4	Moderately to slightly weathered °						
W5	Moderately weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty," feldspar crystals are "cloudy."	All fracture surfaces are discolored or oxidized.	Partial separation of boundaries visible.	Generally preserved.	Soluble minerals may be mostly leached.	Hammer does not ring when rock is struck. Body of rock is slightly weakened. Depending on fracturing, usually is rock excavation except in naturally weak rocks such as siltstones or shales.
W6	Intensely to moderately weathered °						
W7	Intensely weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in-situ disaggregation, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semi-arid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, argillation).	Leaching of soluble minerals may be complete.	Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened. Usually common excavation.
W8	Very intensely weathered						
W9	Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay.		Complete separation of grain boundaries (disaggregated).	Resembles a soil, partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete.		Can be granulated by hand. Always common excavation. Resistant minerals such as quartz may be present as "stringers" or "dikes."

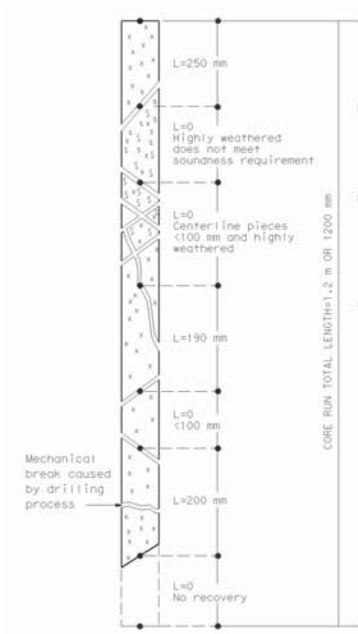
Note: This chart and its horizontal categories are more readily applied to rocks with feldspars and mafic minerals. Weathering in various sedimentary rocks, particularly limestones and poorly indurated sediments, will not always fit the categories established. This chart and weathering categories may have to be modified for particular site conditions or alteration such as hydrothermal effects; however, the basic framework and similar descriptors are to be used.

° Combination descriptors are permissible where equal distribution of both weathering characteristics are present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, dual descriptors should not be used where significant, identifiable zones can be delineated. When given as a range, only two adjacent terms may be combined. "Decomposed to slightly weathered," or "moderately weathered to fresh" are not acceptable.

† Does not include directional weathering along shears or faults and their associated features. For example, a shear zone that carried weathering to great depths into a fresh rock mass would not require the rock mass to be classified as weathered.

§ These are generalizations and should not be used as diagnostic features for weathering or excavation classification. These characteristics vary to a large extent based on naturally weak materials or cementation and type of excavation.

RQD LOGGING



$$RQD = \frac{\sum \text{Length of sound core pieces} > 100 \text{ mm}}{\text{Total core run length}}$$

$$RQD = \frac{250+190+200}{1200} \times 100\%$$

RQD = 53% (fair)

RQD (ROCK QUALITY DESIGNATION)	DESCRIPTION OF ROCK QUALITY
0 - 25%	VERY POOR
25 - 50%	POOR
50 - 75%	FAIR
75 - 90%	GOOD
90 - 100%	EXCELLENT

After Deere & Deere, 1989

BEDDING, FOLIATION, OR FLOW TEXTURE DESCRIPTORS

Descriptors	Thickness / Spacing
Massive	Greater than 3 m
Very thickly (bedded, foliated, or banded)	1 to 3 m
Thickly	300 mm to 1 m
Moderately	100 to 300 mm
Thinly	30 to 100 mm
Very thinly	10 to 30 mm
Laminated (intensely foliated or banded)	Less than 10 mm

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

FRACTURE DENSITY

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

FRACTURE DENSITY- Based on the spacing of all natural fractures in an exposure or core recovery lengths in boreholes; excludes mechanical breaks, shears, and shear zones; however, shear-distributed zones (fracturing outside the shear) are included. Descriptors for fracture density apply to all rock exposures such as tunnel walls, dozer trenches, outcrops, or foundation cut slopes and inverts, as well as boreholes. Descriptive criteria presented below are based on borehole cores where lengths are measured along the core axis, for other exposures the criteria is distance measured between fractures (size of blocks).

UNFRACTURED (FD0): No fractures.

VERY SLIGHTLY FRACTURED (FD1): Core recovered mostly in lengths greater than 1 m.

SLIGHTLY TO VERY SLIGHTLY FRACTURED (FD2)*

SLIGHTLY FRACTURED (FD3): Core recovered mostly in lengths from 300 to 1000 mm, with few scattered lengths less than 300 mm or greater than 1000 mm.

MODERATELY TO SLIGHTLY FRACTURED (FD4)*

MODERATELY FRACTURED (FD5): Core recovered mostly in 100 to 300 mm lenghts with most lengths about 200 mm.

INTENSELY TO MODERATELY FRACTURED (FD6)*

INTENSELY FRACTURED (FD7): Lengths average from 30 to 100 mm with scattered fragmented intervals. Core recovered mostly in lengths less than 100 mm.

VERY INTENSELY TO INTENSELY FRACTURED (FD8)*

VERY INTENSELY FRACTURED (FD9): Core recovered mostly as chips and fragments with a few scattered short core lengths.

* Combinations of fracture densities (e.g. Very intensely to intensely fractured, or Moderately to slightly fractured) are used where equal distribution of both fracture density characteristics are presently over a significant interval or exposure, or where characteristics are "in between" the descriptor definitions.

ROCK HARDNESS/STRENGTH DESCRIPTORS

Alphanumeric Descriptor	Descriptor	Criteria
H1	Extremely hard	Core, fragment, or exposure cannot be scratched with knife or sharp pick; can only be chipped with repeated heavy hammer blows.
H2	Very hard	Cannot be scratched with knife of sharp pick. Core or fragment breaks with repeated heavy hammer blows.
H3	Hard	Can be scratched with knife or sharp pick with difficulty (heavy pressure). Heavy hammer blow required to break specimen.
H4	Moderately hard	Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.
H5	Moderately soft	Can be grooved 2 mm deep by knife or sharp pick with moderate or heavy pressure. Core or fragment breaks with light hammer blow or heavy manual pressure.
H6	Soft	Can be grooved or gouged easily by knife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
H7	Very soft	Can be readily indented, grooved or gouged with fingernail, or carved with a knife. Breaks with light manual pressure.

Any bedrock unit softer than H7, very soft, is to be described using ASTM D-2488 consistency descriptors.

Note: Although "sharp pick" is included in these definitions, descriptions of ability to be scratched, grooved or gouged by a knife is the preferred criteria.

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

IN-SITU, LAB & FIELD TEST DESIGNATIONS

- (AL) ATTERBERG LIMITS
- (CA) CHEMICAL ANALYSIS
- (CN) CONSOLIDATION
- (CU) CONSOLIDATED UNDRAINED TRIAXIAL
- (DS) DIRECT SHEAR
- (MD) MAX. DRY DENSITY
- (PP) POCKET PENETROMETER
- (SA) SIEVE ANALYSIS
- (TV) TORVANE
- (UC) UNCONFINED COMPRESSION
- (UU) UNCONSOLIDATED UNDRAINED TRIAXIAL
- (VS) VANE SHEAR

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.

D Brittsan	DRAWN BY	A. Sanchez	GZhang/BVonDessoneck	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	K Chowdhury	BRIDGE NO. 19E0005	RETAINING WALL 39E-41E
DESIGN OVERSIGHT			FIELD INVESTIGATION BY:		PROJECT ENGINEER		
June 29, 2007	CHECKED BY	M. Briseno	DATE: August 2006			KILOMETER POST 4.14	ROCK LEGENDS AND LABORATORY AND FIELD TEST SYMBOLS
SIGN OFF DATE							

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367821

DISREGARD PRINTS BEARING EARLIER REVISION DATES 6/27/07

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 23 OF 29

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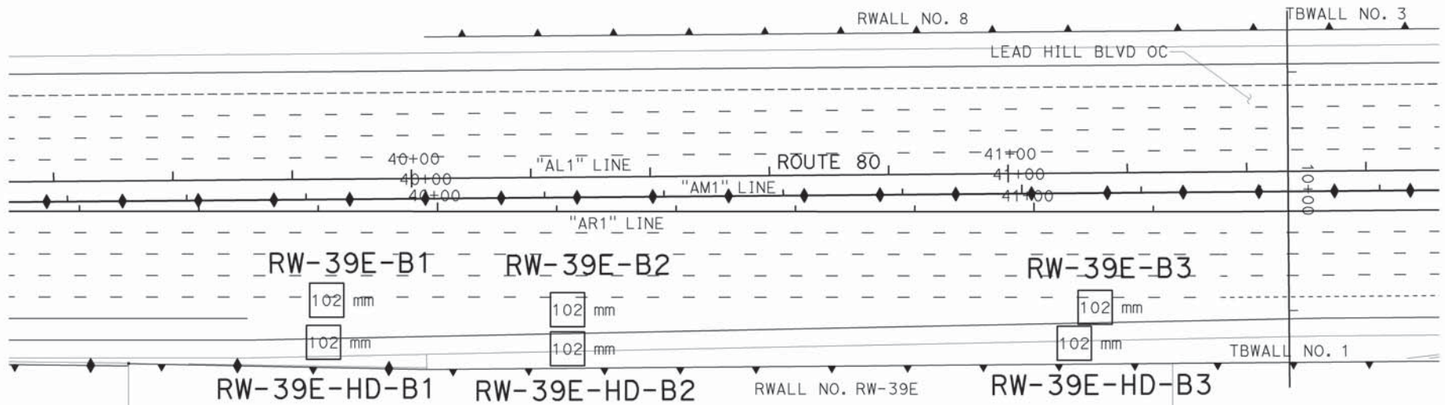

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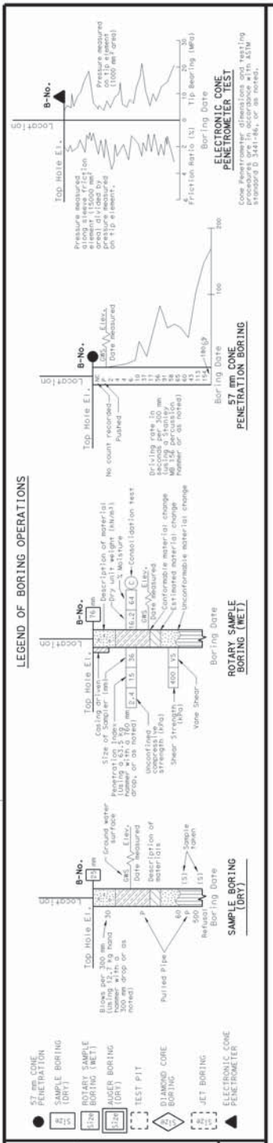

BENCHMARKS

STATION	OFFSET	N	E	ELEV	DESCRIPTION
15+79.190	4.62 Rt	618564.792	2062442.621	44.552	

SURVEY CONTROL
1. Coordinates bearing and distances are based on the California coordinate system of Nad 1983 HPGN, zone 6. (EPOCH 1991.35). Elevations are based on NGVD 29.

Notes:

1. 51 mm samples were taken using a California split-barrel sampler with an inside diameter (I.D.) of 51 mm and an outside diameter (O.D.) of 64 mm.
2. A safety semi-automatic hammer (63.5 kg) with a 760 mm drop was used to advance the sampler.
3. Blowcounts noted for boring are field blowcounts and have not been corrected.
4. 35 mm samples were taken using a SPT split-barrel sampler with an inside diameter (I.D.) of 35 mm and an outside diameter (O.D.) of 51 mm.
5. 63.5 mm core samples were taken using an HQ core sampler with a 63.5 mm inside diameter (I.D.) and 94 mm outside diameter (O.D.) core barrel.
6. Blowcounts 50/125 means 50 blows per 125 mm penetration.
7. Horizontal Borings were started approximately 1.5m above adjacent shoulder grade and inclined downward at a 10 degree angle. Horizontal borings intersect shoulder grade at a depth of approximately 8.8 meters.

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Sac,Pla	80	28.1/29.0, 0.0/4.7	494	528

Khaled H Chowdhury 6-27-07
REGISTERED CIVIL ENGINEER

11-26-07
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Khaled H. Chowdhury — No. C67823 — Exp. 6-30-09 — CIVIL — STATE OF CALIFORNIA

KLEINFELDER INC.
3077 FITE CIR.
SACRAMENTO, CA 95826

D Brittsan DESIGN OVERSIGHT	DRAWN BY	A. Sanchez	Kleinfelder, Inc. FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	K Chowdhury PROJECT ENGINEER
June 29, 2007 SIGN OFF DATE	CHECKED BY	B. Anderson, C.E.G.	DATE: December 2006		

BRIDGE NO.	RETAINING WALL 39E-41E
19E0005	
KILOMETER POST 4.14	LOG OF TEST BORINGS 1 OF 6

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367821

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES (PRELIMINARY STAGE ONLY): 6/27/07

SHEET 24 OF 29

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Sac,Pla	80	28.1/29.0, 0.0/4.7	495	528

Khaled Khowdhury 6-27-07
REGISTERED CIVIL ENGINEER

11-26-07
PLANS APPROVAL DATE

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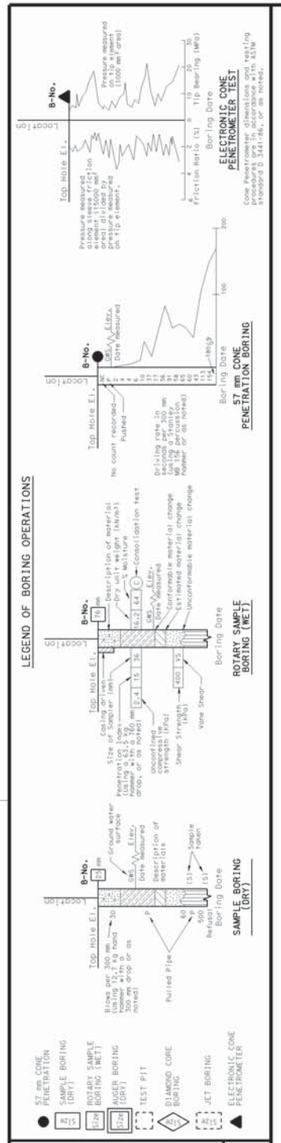
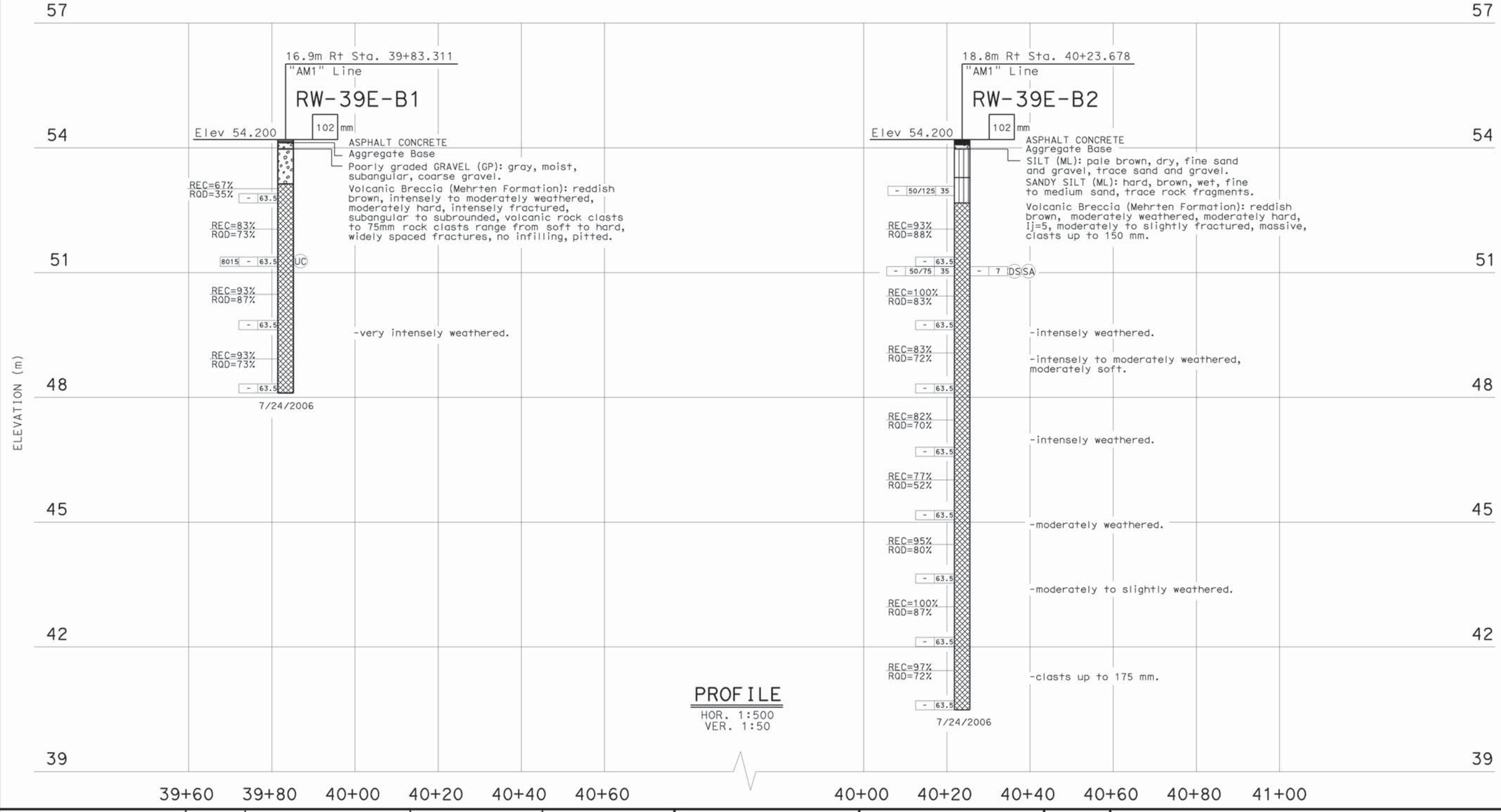
FOR PLAN VIEW AND ADDITIONAL NOTES, SEE
"LOG OF TEST BORINGS" SHEET 1 OF 4





PROFILE
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VER. 1:50

D Brittsan DESIGN OVERSIGHT	DRAWN BY	A. Sanchez	Kleinfelder, Inc. FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	K Chowdhury PROJECT ENGINEER
June 29, 2007 SIGN OFF DATE	CHECKED BY	B. Anderson, C.E.G.	DATE: December 2006		

BRIDGE NO.	RETAINING WALL 39E-41E
19E0005	
KILOMETER POST 4.14	LOG OF TEST BORINGS 2 OF 6

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367821

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) 6/27/07

SHEET 25 OF 29

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03	Sac,Pla	80	28.1/29.0, 0.0/4.7	496	528

Khaled A Chowdhury 6-27-07
REGISTERED CIVIL ENGINEER

11-26-07
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Khaled H. Chowdhury — No. C67823 — Exp. 6-30-09 — CIVIL — STATE OF CALIFORNIA

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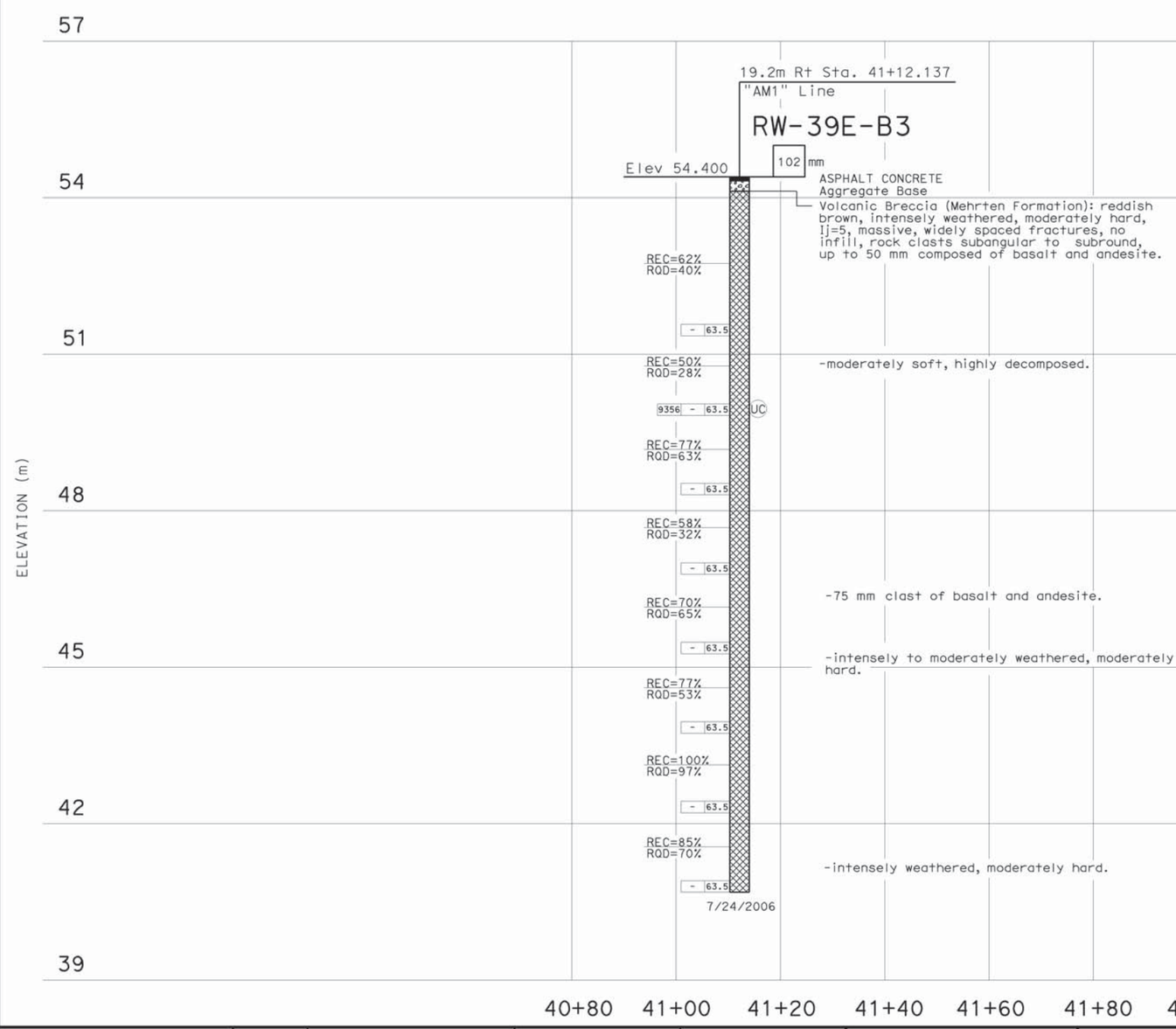
FOR PLAN VIEW AND ADDITIONAL NOTES, SEE
"LOG OF TEST BORINGS" SHEET 1 OF 4



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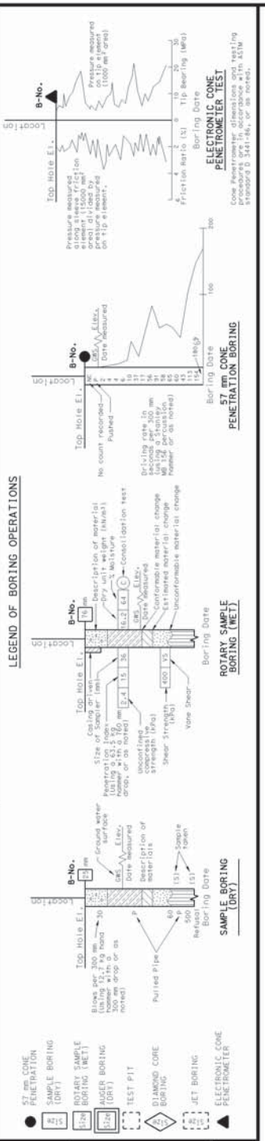
LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test			
SPT N-Value (Blows/0.3m)	Granular	SPT N-Value (Blows/0.3m)	Cohesive
0-4	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very stiff
		>31	Hard

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.

D Brittsan DESIGN OVERSIGHT June 29, 2007 SIGN OFF DATE	DRAWN BY CHECKED BY	A. Sanchez B. Anderson, C.E.G.	Kleinfelder, Inc. FIELD INVESTIGATION BY: DATE: December 2006	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	K Chowdhury PROJECT ENGINEER	BRIDGE NO. 19E0005 KILOMETER POST 4.14	RETAINING WALL 39E-41E LOG OF TEST BORINGS 3 OF 6

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367821

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY)										SHEET	OF
6/27/07										26	29

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Sac,Pla	80	28.1/29.0, 0.0/4.7	497	528

Khaled H. Chowdhury 6-27-07
REGISTERED CIVIL ENGINEER

11-26-07
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER Khaled H. Chowdhury No. C67823 Exp. 6-30-09 CIVIL STATE OF CALIFORNIA

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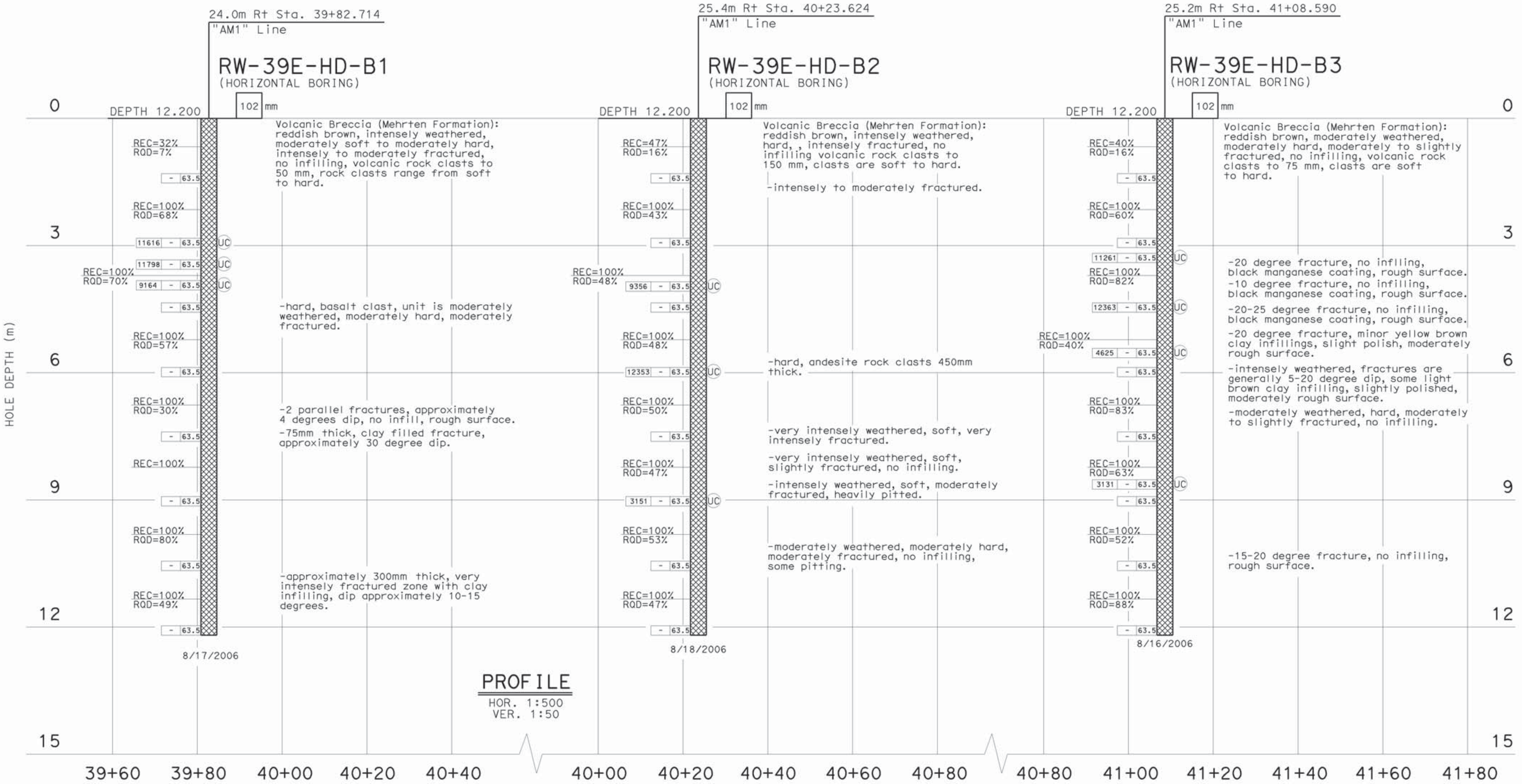
FOR PLAN VIEW AND ADDITIONAL NOTES, SEE "LOG OF TEST BORINGS" SHEET 1 OF 4



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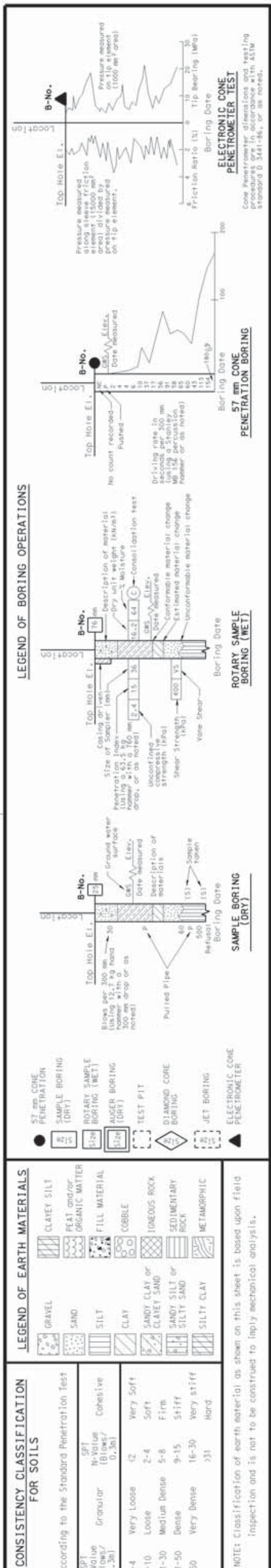

D Brittsan DESIGN OVERSIGHT	DRAWN BY	A. Sanchez	Kleinfelder, Inc. FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
June 29, 2007 SIGN OFF DATE	CHECKED BY	B. Anderson, C.E.G.	DATE: December 2006	

K Chowdhury
PROJECT ENGINEER

BRIDGE NO. 19E0005
KILOMETER POST 4.14

RETAINING WALL 39E-41E
LOG OF TEST BORINGS 4 OF 6

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367821

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 6/27/07

REVISION DATES (PRELIMINARY STAGE ONLY)

FILE => 19e0005-z-log-05.dgn

USERNAME => trrichf DATE PLOTTED => 28-NOV-2007 TIME PLOTTED => 14:48

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Sac,Pla	80	28.1/29.0, 0.0/4.7	498	528

Caltrans Metric

Khaled H Chowdhury 6-27-07
REGISTERED CIVIL ENGINEER

11-26-07
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Khaled H. Chowdhury — No. C67823 — Exp. 6-30-09 — CIVIL — STATE OF CALIFORNIA

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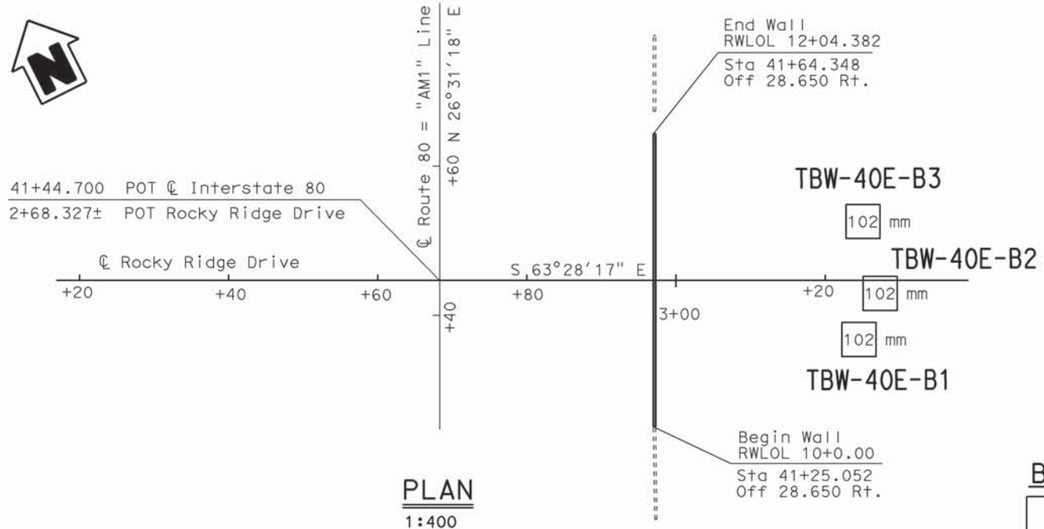
KLEINFELDER INC.
3077 FITE CIR.
SACRAMENTO, CA 95826



PLAN
1:400

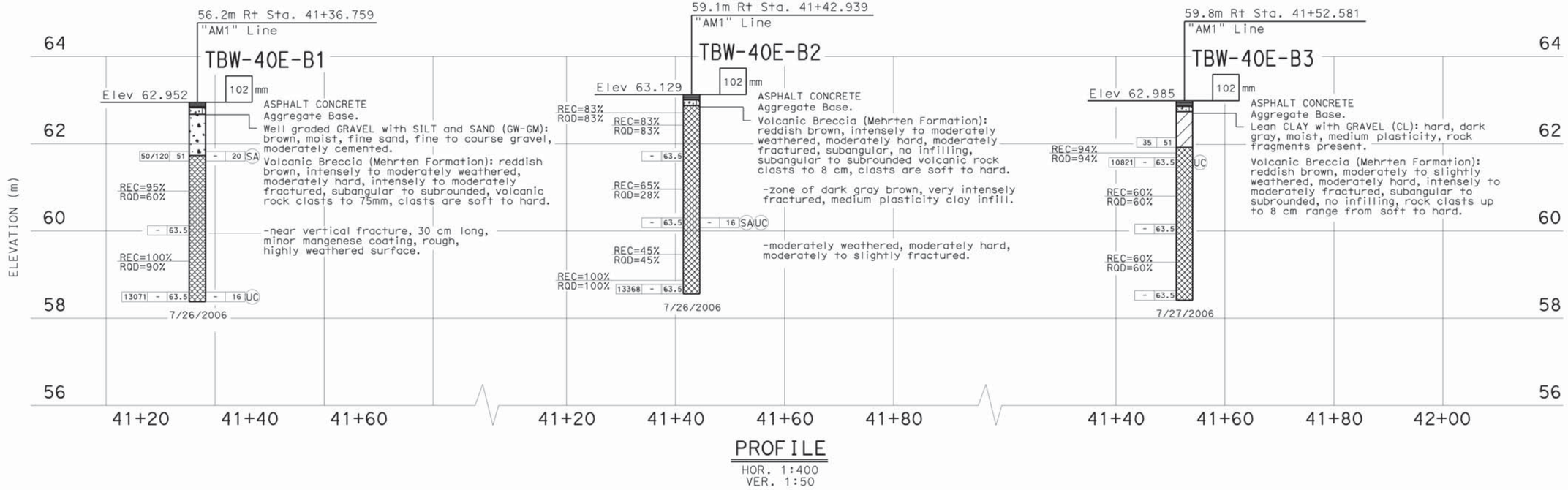
Notes:

1. 51 mm samples were taken using a California split-barrel sampler with an inside diameter (I.D.) of 51 mm and an outside diameter (O.D.) of 64 mm.
2. A safety semi-automatic hammer (63.5 kg) with a 760 mm drop was used to advance the sampler.
3. Blowcounts noted for boring are field blowcounts and have not been corrected.
4. 35 mm samples were taken using a SPT split-barrel sampler with an inside diameter (I.D.) of 35 mm and an outside diameter (O.D.) of 51 mm.
5. 63.5 mm core samples were taken using an HQ core sampler with a 63.5 mm inside diameter (I.D.) and 94 mm outside diameter (O.D.) core barrel.
6. Blowcounts 50/125 means 50 blows per 125 mm penetration.

BENCHMARKS

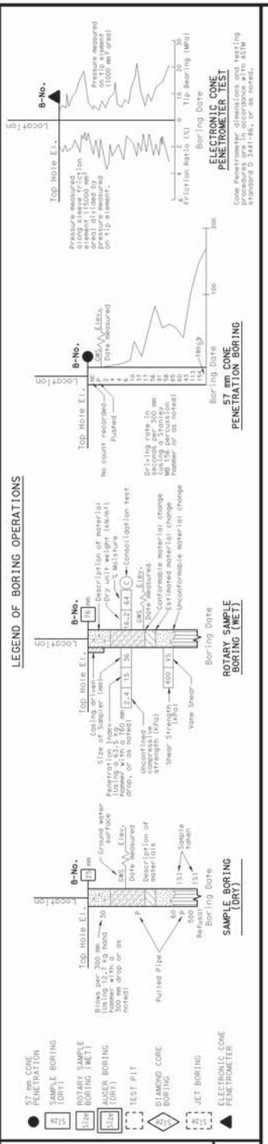
STATION	OFFSET	N	E	ELEV	DESCRIPTION
15+79.190	4.62 Rt	618564.792	2062442.621	44.552	

SURVEY CONTROL
1. Coordinates bearing and distances are based on the California coordinate system of Nad 1983 HPGN, zone 6. (EPOCH 1991.35). Elevations are based on NGVD 29.



PROFILE
HOR. 1:400
VER. 1:50

LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

GRAVEL · SAND · SILT · CLAY · SANDY CLAY or CLAYEY SAND · SANDY SILT or SILTY SAND · SILTY CLAY · CLAYEY SILT · PEAT and/or ORGANIC MATTER · FILL MATERIAL · COBBLE · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

SPT N-Value (Blows/0.3m)	Granular	SPT N-Value (Blows/0.3m)	Cohesive
0-4	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very Stiff
		>31	Hard

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.

D Brittsan DESIGN OVERSIGHT	DRAWN BY	A. Sanchez	Kleinfelder, Inc. FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	K Chowdhury PROJECT ENGINEER	BRIDGE NO. 19E0005 KILOMETER POST 4.14	RETAINING WALL 39E-41E LOG OF TEST BORINGS 5 OF 6
June 29, 2007 SIGN OFF DATE	CHECKED BY	B. Anderson, C.E.G.	DATE: December 2006				

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367821

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 6/27/07

SHEET 28 OF 29

FILE => 19e0005-z-log-06.dgn

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Sac,Pla	80	28.1/29.0, 0.0/4.7	499	528

Khaled H Chowdhury 6-27-07
REGISTERED CIVIL ENGINEER

11-26-07
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Khaled H. Chowdhury — No. C67823 — Exp. 6-30-09 — CIVIL — STATE OF CALIFORNIA

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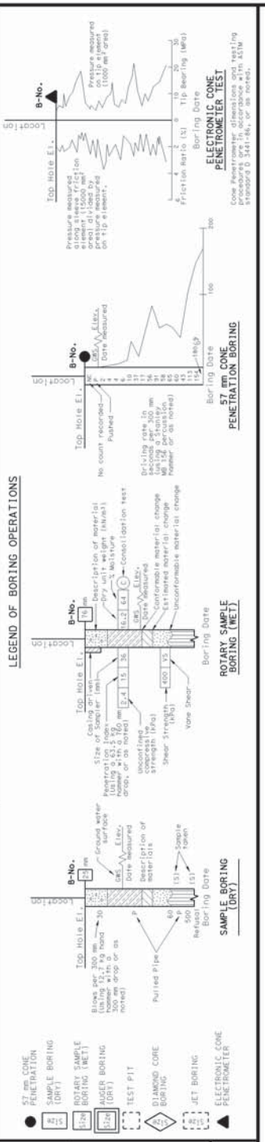

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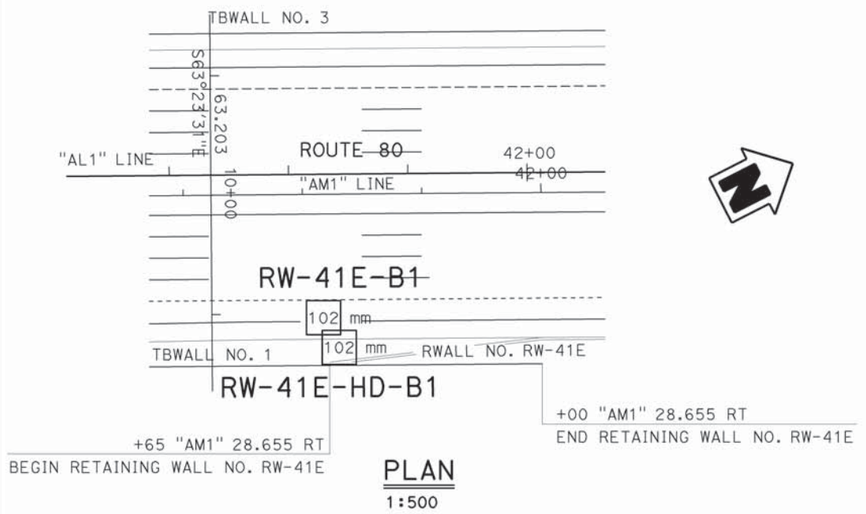

PLAN
1:500

BENCHMARKS

STATION	OFFSET	N	E	ELEV	DESCRIPTION
15+79.190	4.62 Rt	618564.792	2062442.621	44.552	

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1. Coordinates bearing and distances are based on the California coordinate system of Nad 1983 HPGN, zone 6. (EPOCH 1991.35). Elevations are based on NGVD 29.

Notes:

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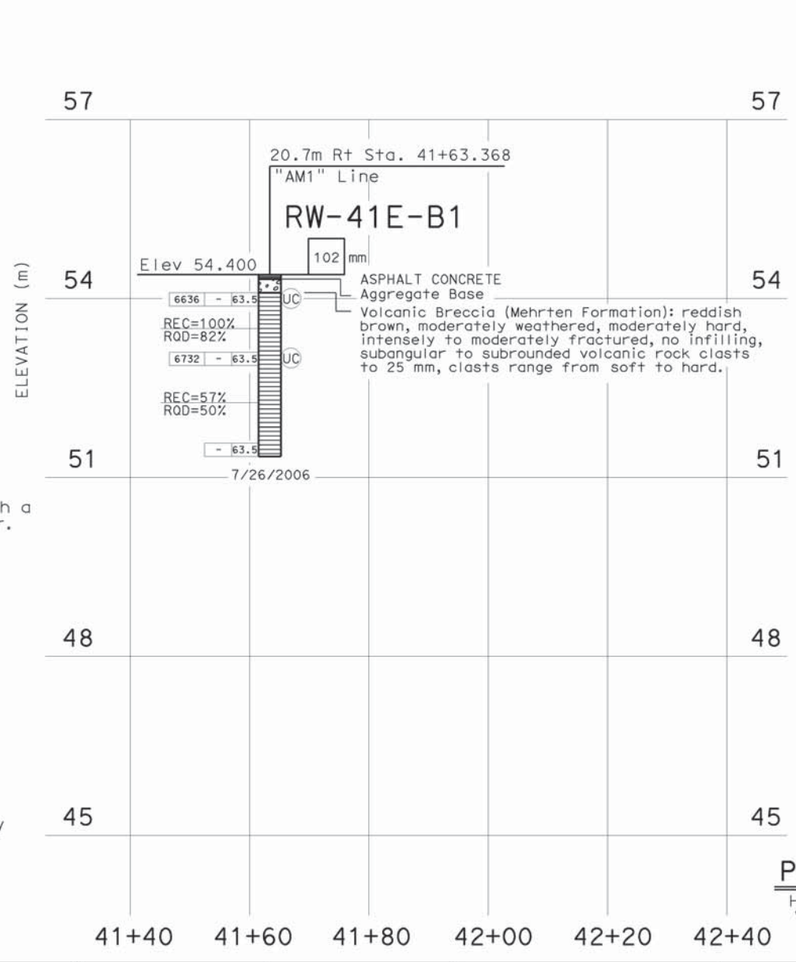

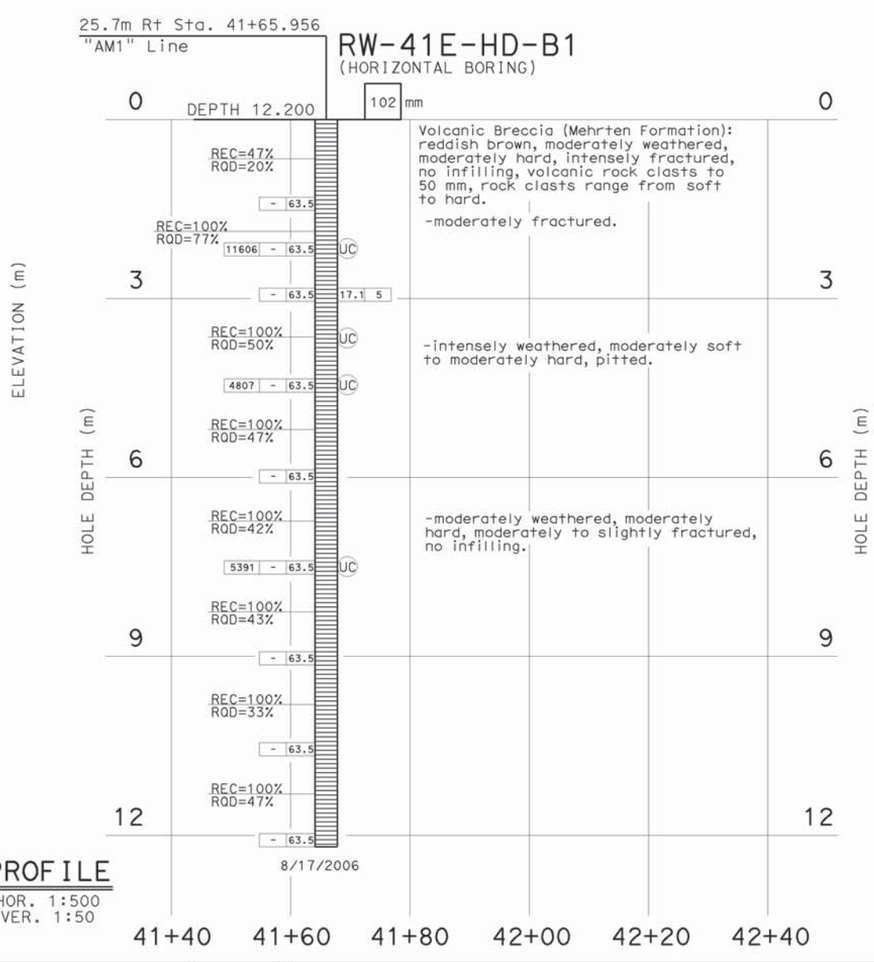

PROFILE
HOR. 1:500
VER. 1:50

D Brittsan DESIGN OVERSIGHT June 29, 2007 SIGN OFF DATE	DRAWN BY CHECKED BY	A. Sanchez B. Anderson, C.E.G.	Kleinfelder, Inc. FIELD INVESTIGATION BY: DATE: December 2006	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	K Chowdhury PROJECT ENGINEER	BRIDGE NO. 19E0005 KILOMETER POST 4.14	RETAINING WALL 39E-41E LOG OF TEST BORING 6 OF 6	

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367821

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY)										SHEET	OF
6/27/07										29	29

FILE => 19e0005-z-log-07.dgn

USERNAME => ttrichf DATE PLOTTED => 28-NOV-2007 TIME PLOTTED => 14:48

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Sac,Pla	80	28.1/29.0, 0.0/4.7	521	528

Caltrans Metric

Khaled H Chowdhury 6-27-07
REGISTERED CIVIL ENGINEER

11-26-07
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Khaled H. Chowdhury — No. C67823 — Exp. 6-30-09 — CIVIL — STATE OF CALIFORNIA

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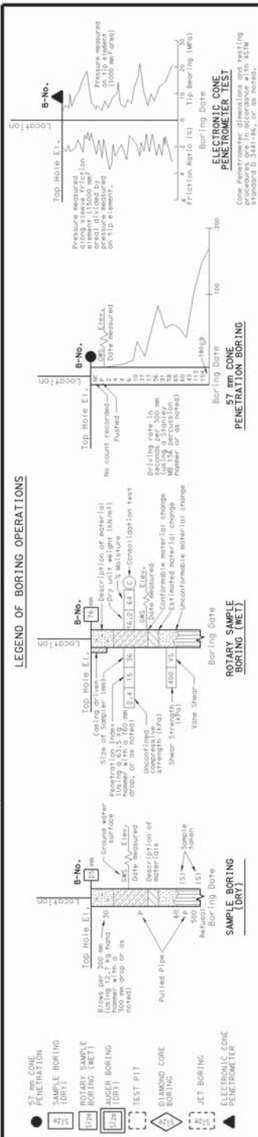
LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

GRAVEL · SAND · SILT · CLAY · SANDY CLAY or CLAYEY SAND · SANDY SILT or SILTY SAND · SILTY CLAY · CLAYEY SILT · PEAT and/or ORGANIC MATTER · FILL MATERIAL · COBBLE · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC ROCK

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.

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

SPT N-Value (Blows/0.305m)	Granular	SPT N-Value (Blows/0.305m)	Cohesive
0-4	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very stiff
		>31	Hard

WEATHERING DESCRIPTORS

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

Descriptors		Diagnostic features: Chemical weathering-Discoloration and/or oxidation		Mechanical weathering-Grain boundary conditions (disaggregation) primarily for granitics and some coarse-grained sediments	Texture and solutioning		General characteristics (strength, excavation, etc.)§
Alphanumeric descriptor	Descriptive term	Body of rock	Fracture surfaces †		Texture	Solutioning	
W1	Fresh	No discoloration, not oxidized.	No discoloration or oxidation.	No separation, intact (tight).	No change.	No solutioning.	Hammer rings when crystalline rocks are struck. Almost always rock excavation except for naturally weak or weakly cemented rocks such as siltstones or shales.
W2	Slightly weathered to fresh °						
W3	Slightly weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull.	Minor to complete discoloration or oxidation of most surfaces.	No visible separation, intact (tight).	Preserved.	Minor leaching of some soluble minerals may be noted.	Hammer rings when crystalline rocks are struck. Body of rock not weakened. With few exceptions, such as siltstones or shales, classified as rock excavation.
W4	Moderately to slightly weathered °						
W5	Moderately weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty," feldspar crystals are "cloudy."	All fracture surfaces are discolored or oxidized.	Partial separation of boundaries visible.	Generally preserved.	Soluble minerals may be mostly leached.	Hammer does not ring when rock is struck. Body of rock is slightly weakened. Depending on fracturing, usually is rock excavation except in naturally weak rocks such as siltstones or shales.
W6	Intensely to moderately weathered °						
W7	Intensely weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in-situ disaggregation, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semi-arid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, argillation).	Leaching of soluble minerals may be complete.	Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened. Usually common excavation.
W8	Very intensely weathered						
W9	Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay.		Complete separation of grain boundaries (disaggregated).	Resembles a soil, partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete.		Can be granulated by hand. Always common excavation. Resistant minerals such as quartz may be present as "stringers" or "dikes."

Note: This chart and its horizontal categories are more readily applied to rocks with feldspars and mafic minerals. Weathering in various sedimentary rocks, particularly limestones and poorly indurated sediments, will not always fit the categories established. This chart and weathering categories may have to be modified for particular site conditions or alteration such as hydrothermal effects; however, the basic framework and similar descriptors are to be used.

° Combination descriptors are permissible where equal distribution of both weathering characteristics are present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, dual descriptors should not be used where significant, identifiable zones can be delineated. When given as a range, only two adjacent terms may be combined. "Decomposed to slightly weathered," or "moderately weathered to fresh" are not acceptable.

† Does not include directional weathering along shears or faults and their associated features. For example, a shear zone that carried weathering to great depths into a fresh rock mass would not require the rock mass to be classified as weathered.

§ These are generalizations and should not be used as diagnostic features for weathering or excavation classification. These characteristics vary to a large extent based on naturally weak materials or cementation and type of excavation.

FRACTURE DENSITY

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

FRACTURE DENSITY- Based on the spacing of all natural fractures in an exposure or core recovery lengths in boreholes; excludes mechanical breaks, shears, and shear zones; however, shear-distributed zones (fracturing outside the shear) are included. Descriptors for fracture density apply to all rock exposures such as tunnel walls, dozer trenches, outcrops, or foundation cut slopes and inverts, as well as boreholes. Descriptive criteria presented below are based on borehole cores where lengths are measured along the core axis, for other exposures the criteria is distance measured between fractures (size of blocks).

UNFRACTURED (FD0): No fractures.

VERY SLIGHTLY FRACTURED (FD1): Core recovered mostly in lengths greater than 1 m.

SLIGHTLY TO VERY SLIGHTLY FRACTURED (FD2)*

SLIGHTLY FRACTURED (FD3): Core recovered mostly in lengths from 300 to 1000 mm, with few scattered lengths less than 300 mm or greater than 1000 mm.

MODERATELY TO SLIGHTLY FRACTURED (FD4)*

MODERATELY FRACTURED (FD5): Core recovered mostly in 100 to 300 mm lenghts with most lengths about 200 mm.

INTENSELY TO MODERATELY FRACTURED (FD6)*

INTENSELY FRACTURED (FD7): Lengths average from 30 to 100 mm with scattered fragmented intervals. Core recovered mostly in lengths less than 100 mm.

VERY INTENSELY TO INTENSELY FRACTURED (FD8)*

VERY INTENSELY FRACTURED (FD9): Core recovered mostly as chips and fragments with a few scattered short core lengths.

* Combinations of fracture densities (e.g. Very intensely to intensely fractured, or Moderately to slightly fractured) are used where equal distribution of both fracture density characteristics are presently over a significant interval or exposure, or where characteristics are "in between" the descriptor definitions.

ROCK HARDNESS/STRENGTH DESCRIPTORS

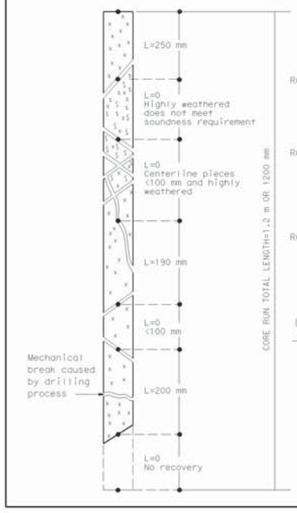
Alphanumeric Descriptor	Descriptor	Criteria
H1	Extremely hard	Core, fragment, or exposure cannot be scratched with knife or sharp pick; can only be chipped with repeated heavy hammer blows.
H2	Very hard	Cannot be scratched with knife of sharp pick. Core or fragment breaks with repeated heavy hammer blows.
H3	Hard	Can be scratched with knife or sharp pick with difficulty (heavy pressure). Heavy hammer blow required to break specimen.
H4	Moderately hard	Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.
H5	Moderately soft	Can be grooved 2 mm deep by knife or sharp pick with moderate or heavy pressure. Core or fragment breaks with light hammer blow or heavy manual pressure.
H6	Soft	Can be grooved or gouged easily by knife or sharp pick with light pressure, can be scratched with fingernail). Breaks with light to moderate manual pressure.
H7	Very soft	Can be readily indented, grooved or gouged with fingernail, or carved with a knife. Breaks with light manual pressure.

Any bedrock unit softer than H7, very soft, is to be described using ASTM D-2488 consistency descriptors.

Note: Although "sharp pick" is included in these definitions, descriptions of ability to be scratched, grooved or gouged by a knife is the preferred criteria.

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

RQD LOGGING



$$RQD = \frac{\sum \text{Length of sound core pieces} > 100\text{ mm}}{\text{Total core run length}}$$

$$RQD = \frac{250+190+200}{1200} \times 100\%$$

RQD = 53% (fair)

RQD (ROCK QUALITY DESIGNATION)	DESCRIPTION OF ROCK QUALITY
0 - 25%	VERY POOR
25 - 50%	POOR
50 - 75%	FAIR
75 - 90%	GOOD
90 - 100%	EXCELLENT

After Deere & Deere, 1989

BEDDING, FOLIATION, OR FLOW TEXTURE DESCRIPTORS

Descriptors	Thickness / Spacing
Massive	Greater than 3 m
Very thickly (bedded, foliated, or banded)	1 to 3 m
Thickly	300 mm to 1 m
Moderately	100 to 300 mm
Thinly	30 to 100 mm
Very thinly	10 to 30 mm
Laminated (intensely foliated or banded)	Less than 10 mm

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

IN-SITU, LAB & FIELD TEST DESIGNATIONS

- (AL) ATTERBERG LIMITS
- (CA) CHEMICAL ANALYSIS
- (CN) CONSOLIDATION
- (CU) CONSOLIDATED UNDRAINED TRIAXIAL
- (DS) DIRECT SHEAR
- (MD) MAX. DRY DENSITY
- (PP) POCKET PENETROMETER
- (SA) SIEVE ANALYSIS
- (TV) TORVANE
- (UC) UNCONFINED COMPRESSION
- (UU) UNCONSOLIDATED UNDRAINED TRIAXIAL
- (VS) VANE SHEAR

D Brittsan
DESIGN OVERSIGHT
June 29, 2007
SIGN OFF DATE

DRAWN BY: A. Sanchez
CHECKED BY: M. Briseno

GZhang/BVonDessoneck
FIELD INVESTIGATION BY:
DATE: August 2006

PREPARED FOR THE STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

K Chowdhury
PROJECT ENGINEER

BRIDGE NO. 19E0006
KILOMETER POST 4.14

RETAINING WALL 40W-42W

ROCK LEGENDS AND LABORATORY AND FIELD TEST SYMBOLS

CU 03262
EA 367821

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 6/27/07

SHEET 22 OF 29

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

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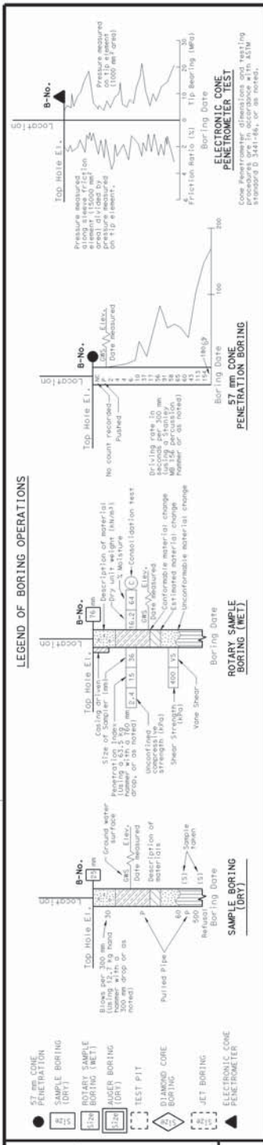

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REGISTERED CIVIL ENGINEER

11-26-07
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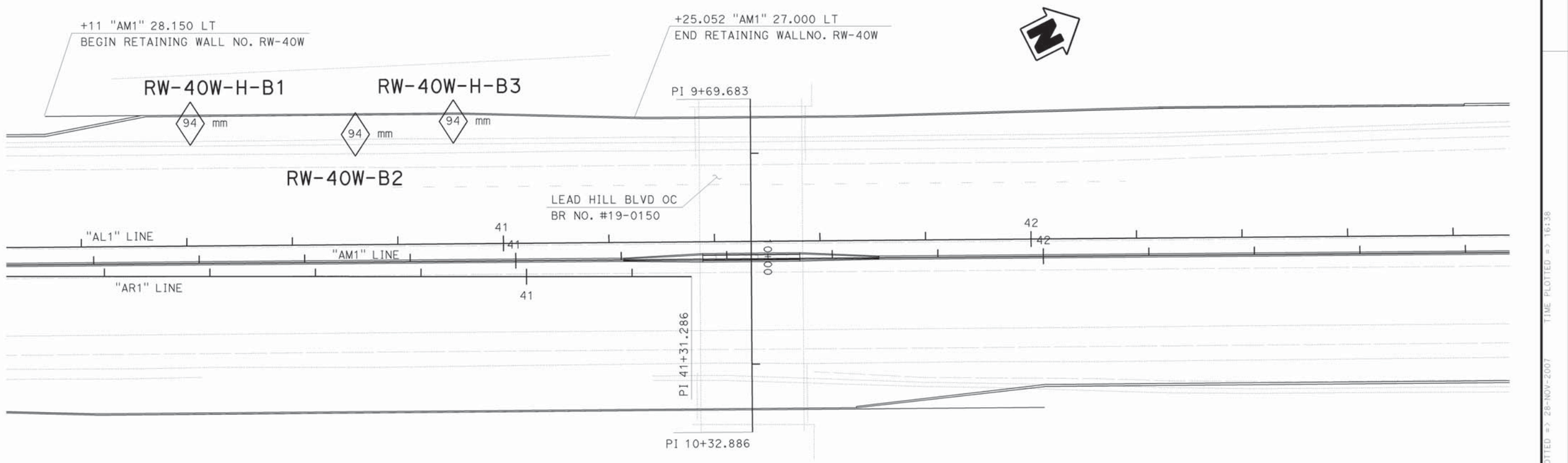

PLAN
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D Brittsan DESIGN OVERSIGHT	DRAWN BY	A. Sanchez	Kleinfelder, Inc. FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	K Chowdhury PROJECT ENGINEER	BRIDGE NO. 19E0006	RETAINING WALL 40W-42W
June 29, 2007 SIGN OFF DATE	CHECKED BY	B. Anderson, C.E.G.	DATE: December 2006			KILOMETER POST 4.14	LOG OF TEST BORINGS 1 OF 7

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367821

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REVISION DATES (PRELIMINARY STAGE ONLY): 6/27/07

SHEET 23 OF 29

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Caltrans Metric

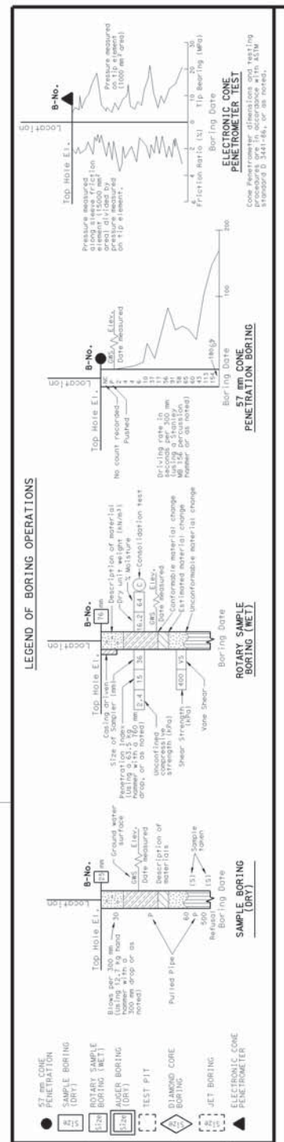
Khaled H. Chowdhury 6-27-07
REGISTERED CIVIL ENGINEER

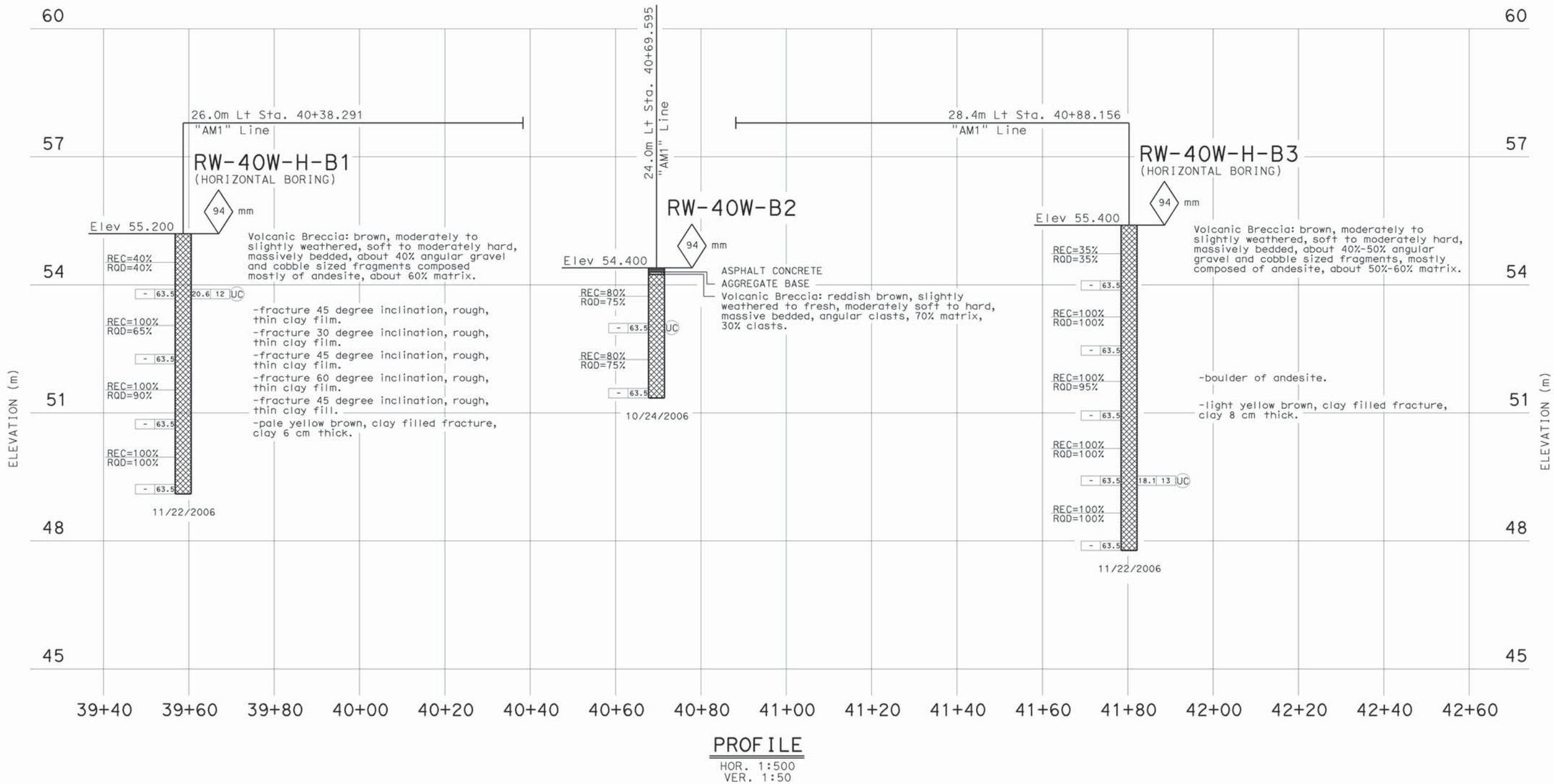
11-26-07
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Khaled H. Chowdhury — No. C67823 — Exp. 6-30-09 — CIVIL — STATE OF CALIFORNIA

KLEINFELDER INC.
3077 FITE CIR.
SACRAMENTO, CA 95826

FOR PLAN VIEW AND ADDITIONAL NOTES, SEE
"LOG OF TEST BORINGS" SHEET 1 OF 2





PROFILE
HOR. 1:500
VER. 1:50

D Brittsan DESIGN OVERSIGHT June 29, 2007 SIGN OFF DATE	DRAWN BY CHECKED BY	A. Sanchez B. Anderson, C.E.G.	Kleinfelder, Inc. FIELD INVESTIGATION BY: DATE: December 2006	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	K Chowdhury PROJECT ENGINEER	BRIDGE NO. 19E0006 KILOMETER POST 4.14	RETAINING WALL 40W-42W LOG OF TEST BORINGS 2 OF 7	

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367821

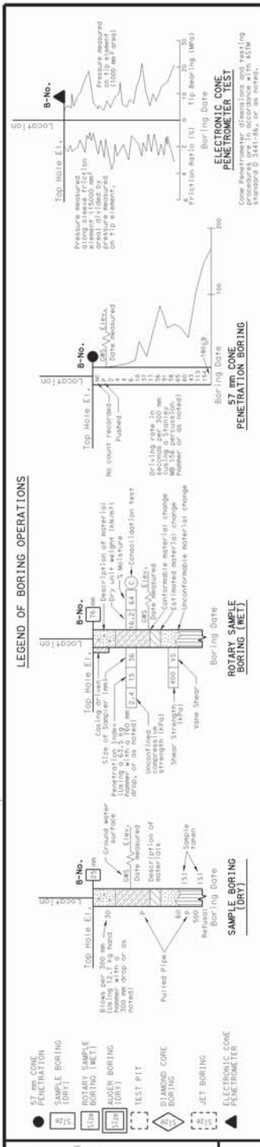
DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 6/27/07

SHEET 24 OF 29

FILE => 19e0006-z-log-03.dgn

USERNAME => p71133 DATE PLOTTED => 28-NOV-2007 TIME PLOTTED => 16:38



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.

Notes:

1. 51 mm samples were taken using a California split-barrel sampler with an inside diameter (I.D.) of 51 mm and an outside diameter (O.D.) of 64 mm.
2. A safety semi-automatic hammer (63.5 kg) with a 760 mm drop was used to advance the sampler.
3. Blowcounts noted for boring are field blowcounts and have not been corrected.
4. 35 mm samples were taken using a SPT split-barrel sampler with an inside diameter (I.D.) of 35 mm and an outside diameter (O.D.) of 51 mm.
5. 63.5 mm core samples were taken using an HQ core sampler with a 63.5 mm inside diameter (I.D.) and 94 mm outside diameter (O.D.) core barrel.
6. Blowcounts 50/125 means 50 blows per 125 mm penetration.
7. Horizontal borings were started approximately 1.5 m above adjacent shoulder grade and inclined downward at a 10 degree angle. Horizontal borings intersect shoulder grade at a depth of approximately 8.8 meters.

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Sac,Pla	80	28.1/29.0, 0.0/4.7	524	528

Khaled H Chowdhury 6-27-07
REGISTERED CIVIL ENGINEER

11-26-07
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Khaled H. Chowdhury — No. C67823 — Exp. 6-30-09 — CIVIL — STATE OF CALIFORNIA

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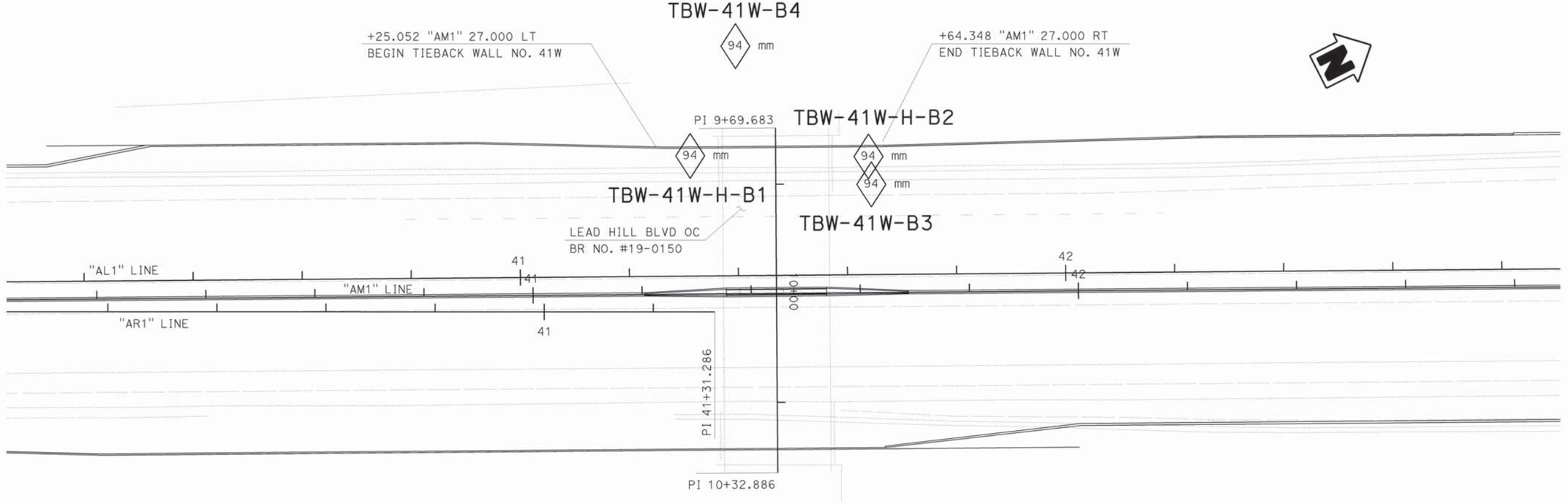
KLEINFELDER INC.
3077 FITE CIR.
SACRAMENTO, CA 95826

BENCHMARKS

STATION	OFFSET	N	E	ELEV	DESCRIPTION
15+79.190	4.62 Rt	618564.792	2062442.621	44.552	

SURVEY CONTROL
1. Coordinates bearing and distances are based on the California coordinate system of Nad 1983 HPGN, zone 6. (EPOCH 1991.35). Elevations are based on NGVD 29.



PLAN
1:400

D Brittsan DESIGN OVERSIGHT June 29, 2007 SIGN OFF DATE	DRAWN BY CHECKED BY	A. Sanchez B. Anderson, C.E.G.	Kleinfelder, Inc. FIELD INVESTIGATION BY: DATE: December 2006	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	K Chowdhury PROJECT ENGINEER	BRIDGE NO. 19E0006 KILOMETER POST 4.14	RETAINING WALL 40W-42W LOG OF TEST BORINGS 3 OF 7	

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367821

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 6/27/07

SHEET 25 OF 29

FILE => 19e0006-z-log-04.dgn

USERNAME => p71839 DATE PLOTTED => 28-NOV-2007 TIME PLOTTED => 16:39

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Sac,Pla	80	28.1/29.0, 0.0/4.7	525	528

Khaled Khowdhury 6-27-07
REGISTERED CIVIL ENGINEER

11-26-07
PLANS APPROVAL DATE

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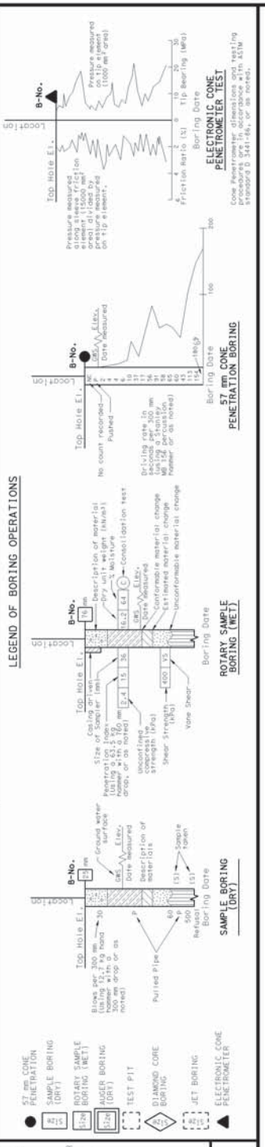
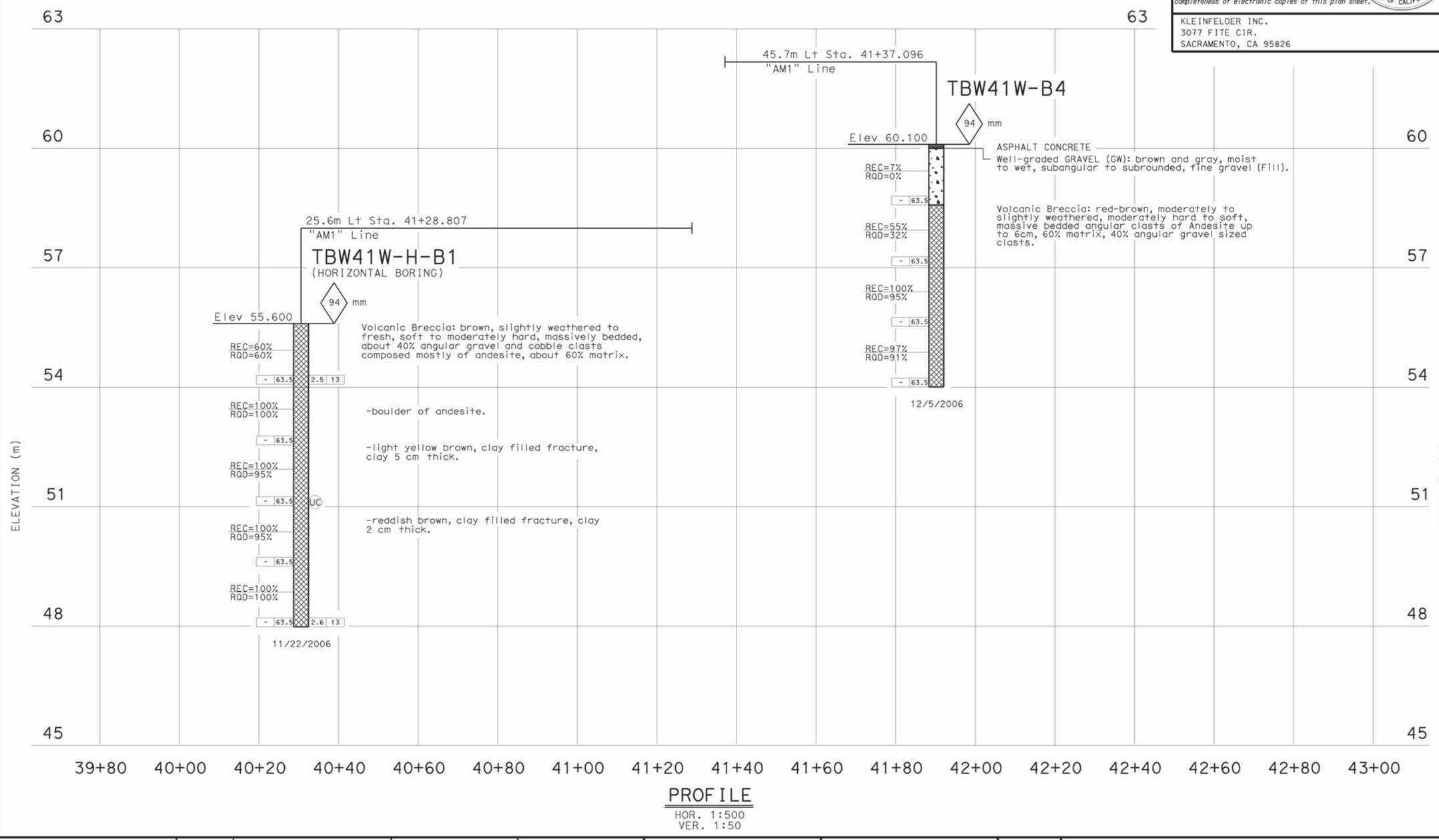
REGISTERED PROFESSIONAL ENGINEER — Khaled H. Chowdhury — No. C67823 — Exp. 6-30-09 — CIVIL — STATE OF CALIFORNIA

KLEINFELDER INC.
3077 FITE CIR.
SACRAMENTO, CA 95826

FOR PLAN VIEW AND ADDITIONAL NOTES, SEE "LOG OF TEST BORINGS" SHEET 1 OF 3





PROFILE
HOR. 1:500
VER. 1:50

D Brittsan DESIGN OVERSIGHT	DRAWN BY	A. Sanchez	Kleinfelder, Inc. FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	K Chowdhury PROJECT ENGINEER	BRIDGE NO. 19E0006	RETAINING WALL 40W-42W
June 29, 2007 SIGN OFF DATE	CHECKED BY	B. Anderson, C.E.G.	DATE: December 2006			KILOMETER POST 4.14	LOG OF TEST BORINGS 4 OF 7

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367821

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 6/27/07

SHEET 26 OF 29

FILE => 19e0006-z-log-05.dgn

USERNAME => pitts3 DATE PLOTTED => 28-NOV-2007 TIME PLOTTED => 16:39

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Sac,Pla	80	28.1/29.0, 0.0/4.7	526	528

Khaled Khowdhury 6-27-07
REGISTERED CIVIL ENGINEER

11-26-07
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Khaled H. Chowdhury — No. C67823 — Exp. 6-30-09 — CIVIL — STATE OF CALIFORNIA

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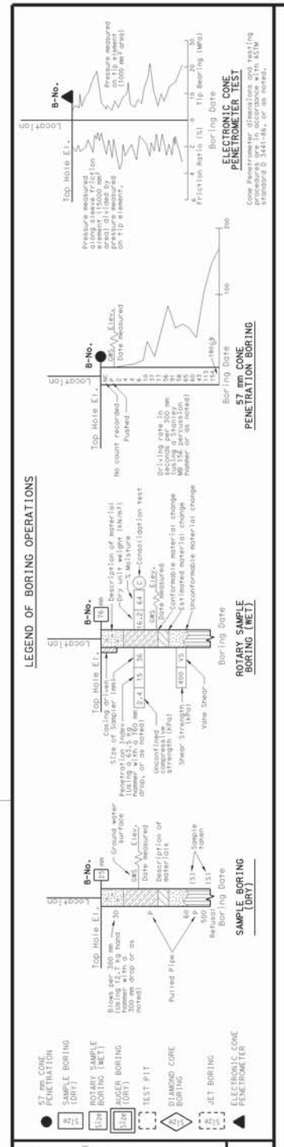
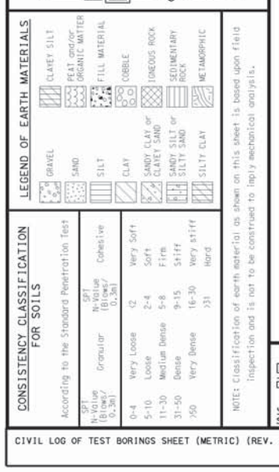
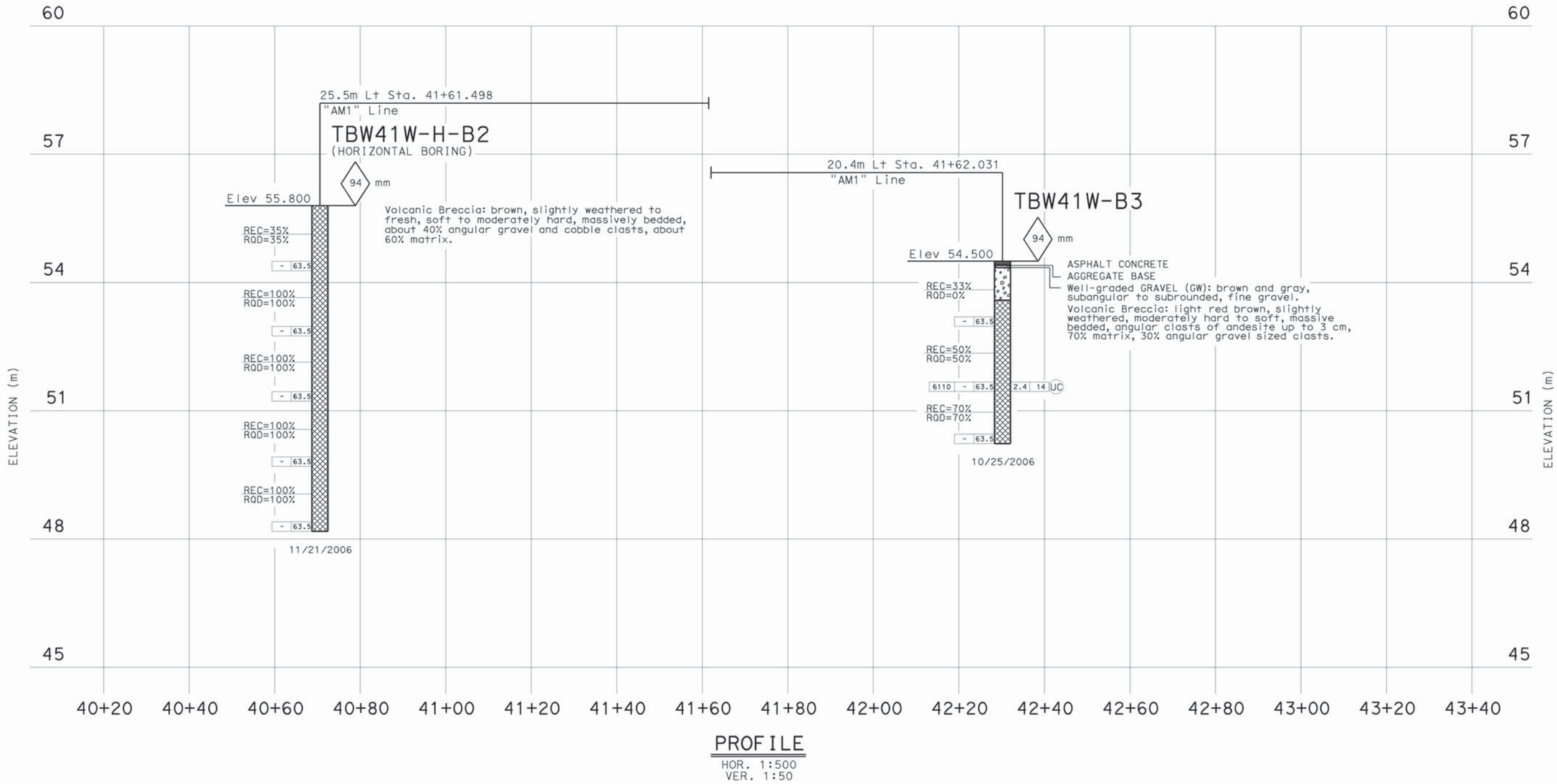
3077 FITE CIR.
SACRAMENTO, CA 95826

FOR PLAN VIEW AND ADDITIONAL NOTES, SEE
"LOG OF TEST BORINGS" SHEET 1 OF 3





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.



PROFILE
HOR. 1:500
VER. 1:50

D Brittsan	DRAWN BY	A. Sanchez	Kleinfelder, Inc.	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	K Chowdhury	BRIDGE NO. 19E0006	RETAINING WALL 40W-42W	
DESIGN OVERSIGHT	CHECKED BY	B. Anderson, C.E.G.	FIELD INVESTIGATION BY:		PROJECT ENGINEER	KILOMETER POST 4.14	LOG OF TEST BORINGS 5 OF 7	
June 29, 2007 SIGN OFF DATE			DATE: December 2006					

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367821

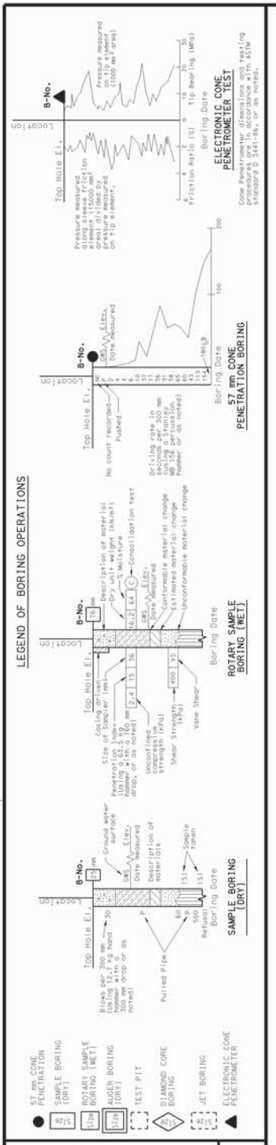
DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) 6/27/07

SHEET 27 OF 29

FILE => 19e0006-z-log-06.dgn

USERNAME => pt183 DATE PLOTTED => 28-NOV-2007 TIME PLOTTED => 16:39



Notes:

1. 51 mm samples were taken using a California split-barrel sampler with an inside diameter (I.D.) of 51 mm and an outside diameter (O.D.) of 64 mm.
2. A safety semi-automatic hammer (63.5 kg) with a 760 mm drop was used to advance the sampler.
3. Blowcounts noted for boring are field blowcounts and have not been corrected.
4. 35 mm samples were taken using a SPT split-barrel sampler with an inside diameter (I.D.) of 35 mm and an outside diameter (O.D.) of 51 mm.
5. 63.5 mm core samples were taken using an HQ core sampler with a 63.5 mm inside diameter (I.D.) and 94 mm outside diameter (O.D.) core barrel.
6. Blowcounts 50/125 means 50 blows per 125 mm penetration.
7. Horizontal borings were started approximately 1.5 m above adjacent shoulder grade and inclined downward at a 10 degree angle. Horizontal borings intersect shoulder grade at a depth of approximately 8.8 meters.

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Sac,Pla	80	28.1/29.0, 0.0/4.7	527	528

Khaled H Chowdhury 6-27-07
REGISTERED CIVIL ENGINEER

11-26-07
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Khaled H. Chowdhury — No. C67823 — Exp. 6-30-09 — CIVIL — STATE OF CALIFORNIA

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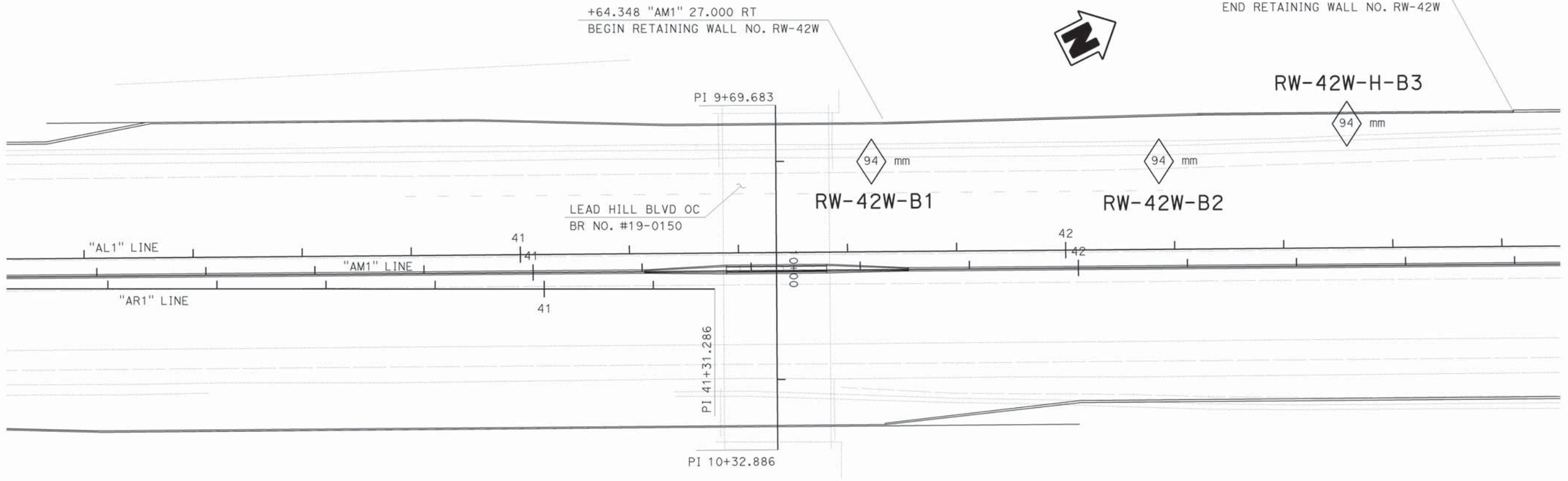
KLEINFELDER INC.
3077 FITE CIR.
SACRAMENTO, CA 95826

BENCHMARKS

STATION	OFFSET	N	E	ELEV	DESCRIPTION
15+79.190	4.62 Rt	618564.792	2062442.621	44.552	

SURVEY CONTROL
1. Coordinates bearing and distances are based on the California coordinate system of Nad 1983 HPGN, zone 6. (EPOCH 1991.35). Elevations are based on NGVD 29.



PLAN
1:400

D Brittsan DESIGN OVERSIGHT June 29, 2007 SIGN OFF DATE	DRAWN BY CHECKED BY	A. Sanchez B. Anderson, C.E.G.	Kleinfelder, Inc. FIELD INVESTIGATION BY: DATE: December 2006	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	K Chowdhury PROJECT ENGINEER	BRIDGE NO. 19E0006 KILOMETER POST 4.14	RETAINING WALL 40W-42W LOG OF TEST BORINGS 6 OF 7

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367821

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 6/27/07

SHEET 28 OF 29

FILE => 19e0006-z-log-07.dgn

DATE PLOTTED => 28-NOV-2007 TIME PLOTTED => 16:39
USERNAME => pj7133

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Sac,Pla	80	28.1729.0, 0.0/4.7	528	528

Khaled H Chowdhury 6-27-07
REGISTERED CIVIL ENGINEER

11-26-07
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Khaled H. Chowdhury — No. C67823 — Exp. 6-30-09 — CIVIL — STATE OF CALIFORNIA

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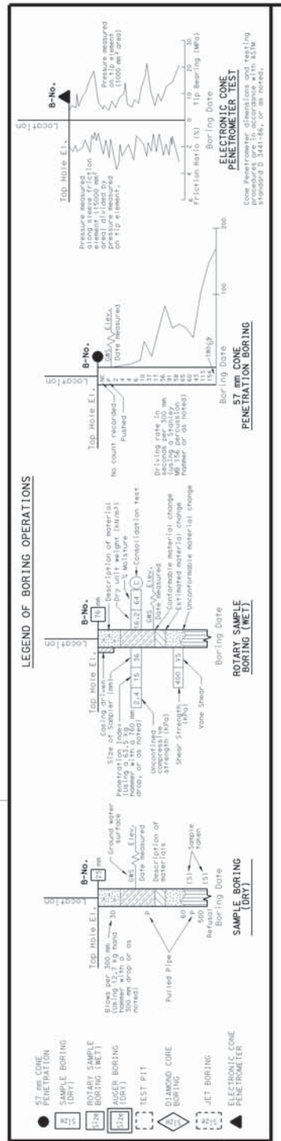
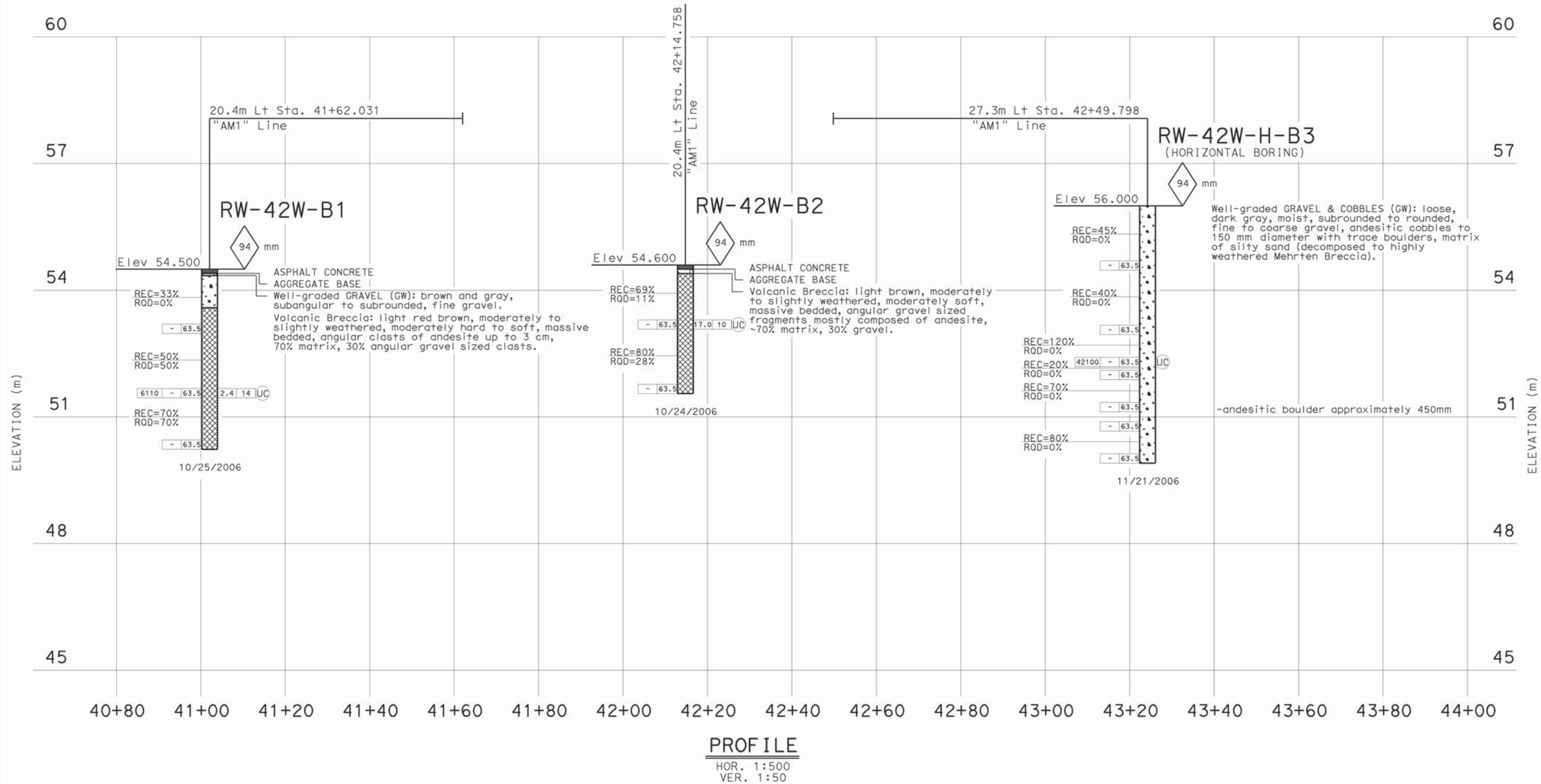
3077 FITE CIR.
SACRAMENTO, CA 95826

FOR PLAN VIEW AND ADDITIONAL NOTES, SEE
"LOG OF TEST BORINGS" SHEET 1 OF 2





PROFILE
HOR. 1:500
VER. 1:50

D Brittsan DESIGN OVERSIGHT	DRAWN BY	A. Sanchez	Kleinfelder, Inc. FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	K Chowdhury PROJECT ENGINEER	BRIDGE NO. 19E0006	RETAINING WALL 40W-42W
June 29, 2007 SIGN OFF DATE	CHECKED BY	B. Anderson, C.E.G.	DATE: December 2006			KILOMETER POST 4.14	LOG OF TEST BORINGS 7 OF 7

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367821

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY)										SHEET	OF
6/27/07										29	29

FILE => 19e0006-z-log-08.dgn

USERNAME = p7183 DATE PLOTTED => 28-NOV-2007 TIME PLOTTED => 16:39

Notes:

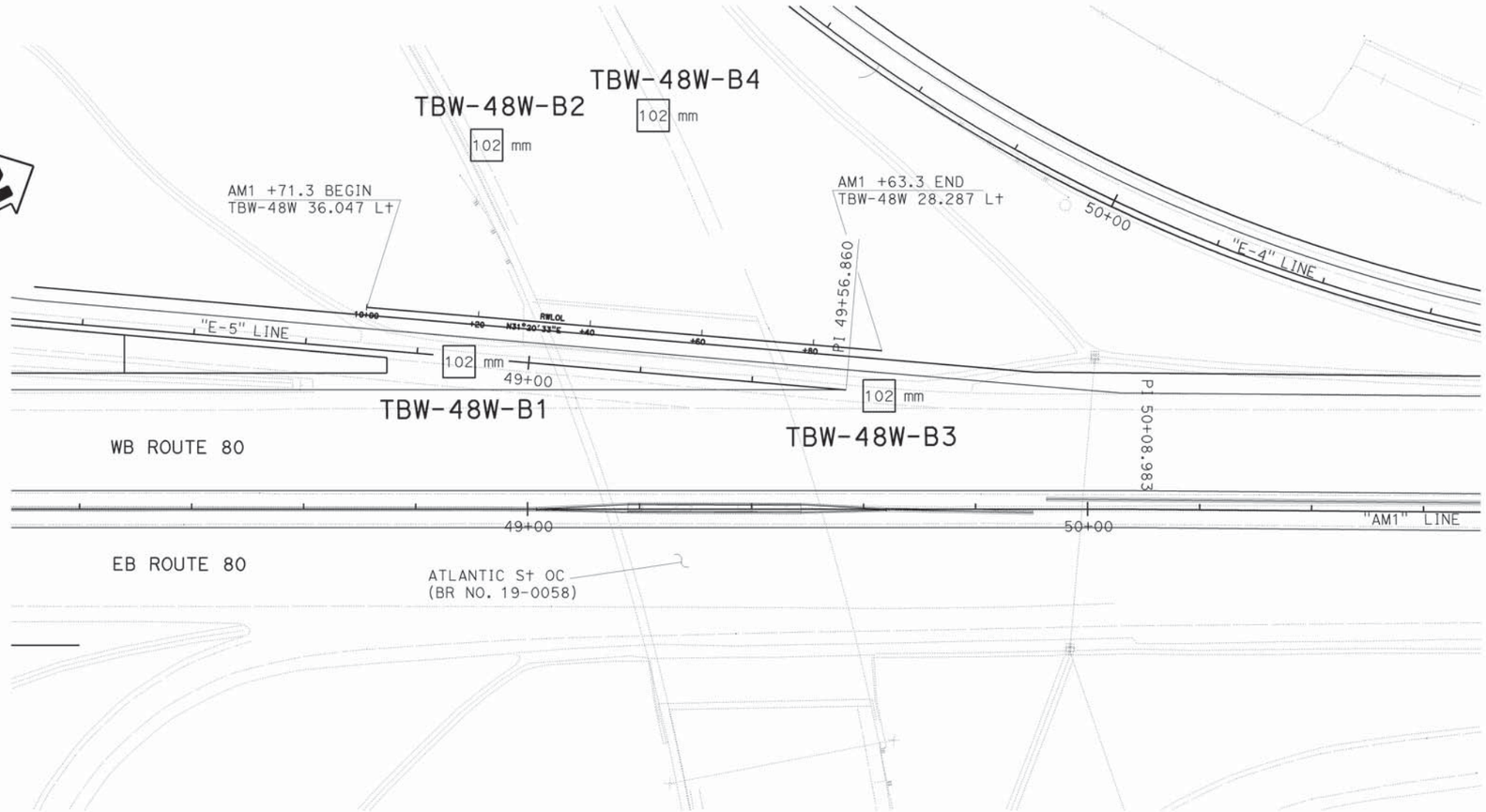
1. 51 mm samples were taken using a California split-barrel sampler with an inside diameter (I.D.) of 51 mm and an outside diameter (O.D.) of 64 mm.
2. A safety semi-automatic hammer (63.5 kg) with a 760 mm drop was used to advance the sampler.
3. Blowcounts noted for boring are field blowcounts and have not been corrected.
4. 35 mm samples were taken using a SPT split-barrel sampler with an inside diameter (I.D.) of 35 mm and an outside diameter (O.D.) of 51 mm.
5. 63.5 mm core samples were taken using an HQ core sampler with a 63.5 mm inside diameter (I.D.) and 94 mm outside diameter (O.D.) core barrel.
6. Blowcounts 50/125 means 50 blows per 125 mm penetration.
7. Groundwater was not encountered at the time of drilling.
8. The descriptions and classifications of soil, including consistency and relative density descriptions, used by the field personnel for the exploration bole holes on "Soil and Rock Logging Classification Manual (Field Guide)", Engineering Service Center, Office of Structural Foundations, August 1996.

BENCHMARKS

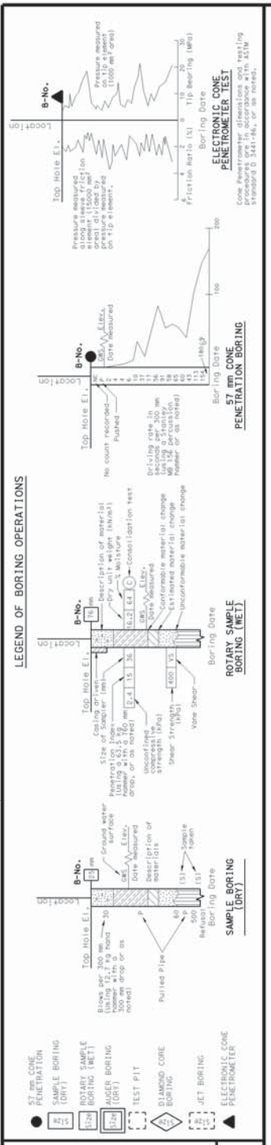
STATION	OFFSET	N	E	ELEV	DESCRIPTION
15+79.190	4.62 Rt	618564.792	2062442.621	44.552	

SURVEY CONTROL

1. Coordinates bearing and distances are based on the California coordinate system of Nad 1983 HPGN, zone 6. (EPOCH 1991.35). Elevations are based on NGVD 29.



PLAN
1:500



Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	508	539

5/28/08
REGISTERED CIVIL ENGINEER

11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KENNETH G. SORENSEN — No. GE 2520 — Exp. 9-30-08 — GEOTECHNICAL — STATE OF CALIFORNIA

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KLEINFELDER INC.
3077 FITE CIR.
SACRAMENTO, CA 95826

Kenneth Sorensen, DESIGN OVERSIGHT, 05/18/08, SIGN OFF DATE	DRAWN BY: A. Sanchez	CHECKED BY: G. Zhang	G. Zhang, FIELD INVESTIGATION BY: DATE: 01/15/07	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER

BRIDGE NO. 19E0008
KILOMETER POST 4.7

RETAINING WALL - 48W
LOG OF TEST BORINGS 1 OF 4

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 5/19/08

SHEET 11 OF 14

FILE => 19e0008-x-1of1of4.dgn

USERNAME => ttrrich DATE PLOTTED => 21-NOV-2008 TIME PLOTTED => 15:29

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	509	539

Caltrans Metric

5/28/08
REGISTERED CIVIL ENGINEER

11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KENNETH G. SORENSEN — No. GE 2520 — Exp. 9-30-08 — GEOTECHNICAL — STATE OF CALIFORNIA

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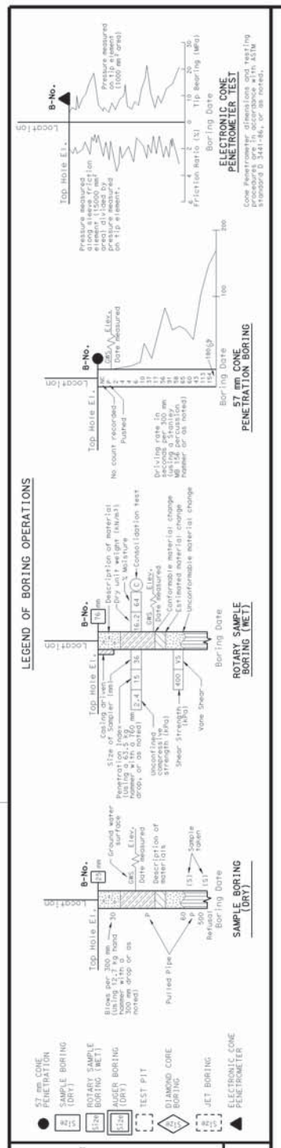
KLEINFELDER INC.
3077 FITE CIR.
SACRAMENTO, CA 95826

FOR PLAN VIEW AND ADDITIONAL NOTES, SEE "LOG OF TEST BORINGS" SHEET 1 OF 3



LEGEND OF EARTH MATERIALS

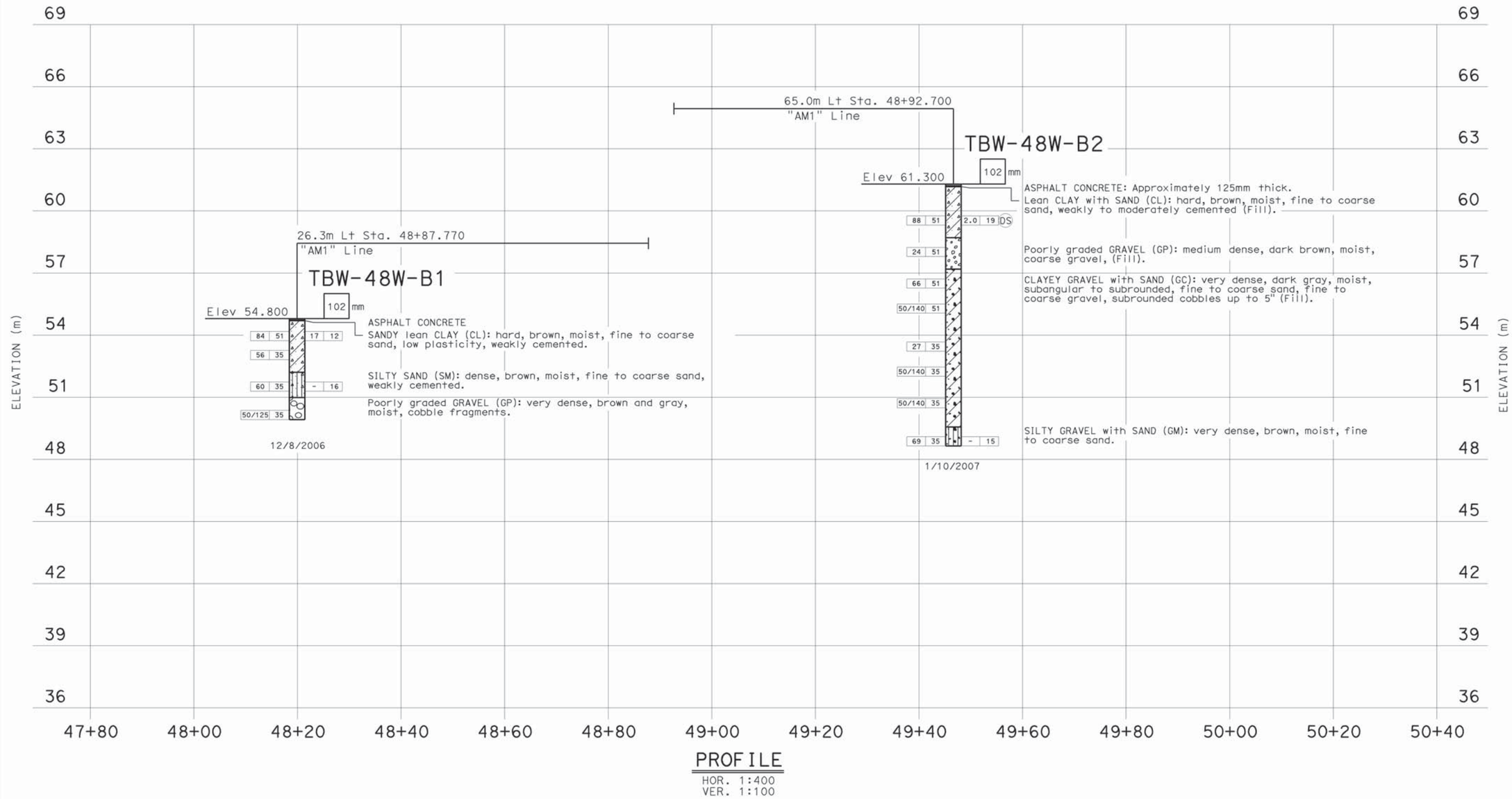
GRAVEL · SAND · SILT · CLAY · CLAYEY SILT · PEAT and/or ORGANIC MATTER · FILL MATERIAL · COBBLE · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC · SANDY CLAY or CLAYEY SAND · SANDY SILT or SILTY SAND · SILTY CLAY

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

SPT N-Value (Blows/0.3m)	Granular	SPT N-Value (Blows/0.3m)	Cohesive
0-4	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very stiff
		>31	Hard

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.



PROFILE
HOR. 1:400
VER. 1:100

Kenneth Sorensen	DRAWN BY	A. Sanchez	G. Zhang	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO. 19E0008	RETAINING WALL - 48W
DESIGN OVERSIGHT	CHECKED BY	G. Zhang	FIELD INVESTIGATION BY:		PROJECT ENGINEER	KILOMETER POST 4.7	LOG OF TEST BORINGS 2 OF 4
05/18/08 SIGN OFF DATE			DATE: 01/15/07				

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 5/19/08

SHEET 12 OF 14

FILE => 19e0008-x-lotb2of4.dgn

USERNAME => ttrrichf DATE PLOTTED => 21-NOV-2008 TIME PLOTTED => 15:29

Caltrans Metric

5/28/08
REGISTERED CIVIL ENGINEER

11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KENNETH G. SORENSEN — No. GE 2520 — Exp. 9-30-08 — GEOTECHNICAL — STATE OF CALIFORNIA

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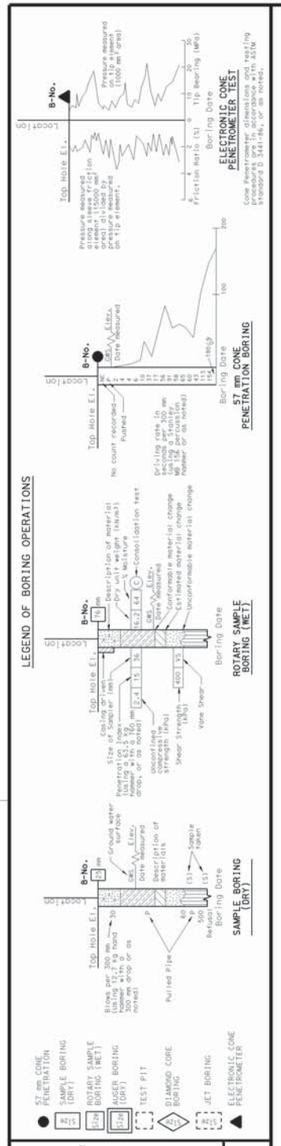
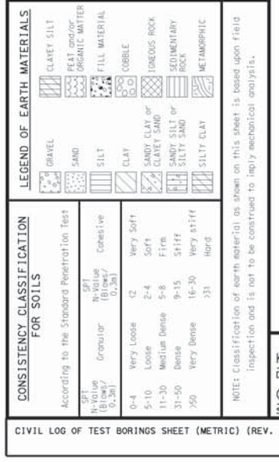
3077 FITE CIR.
SACRAMENTO, CA 95826

FOR PLAN VIEW AND ADDITIONAL NOTES, SEE
"LOG OF TEST BORINGS" SHEET 1 OF 3



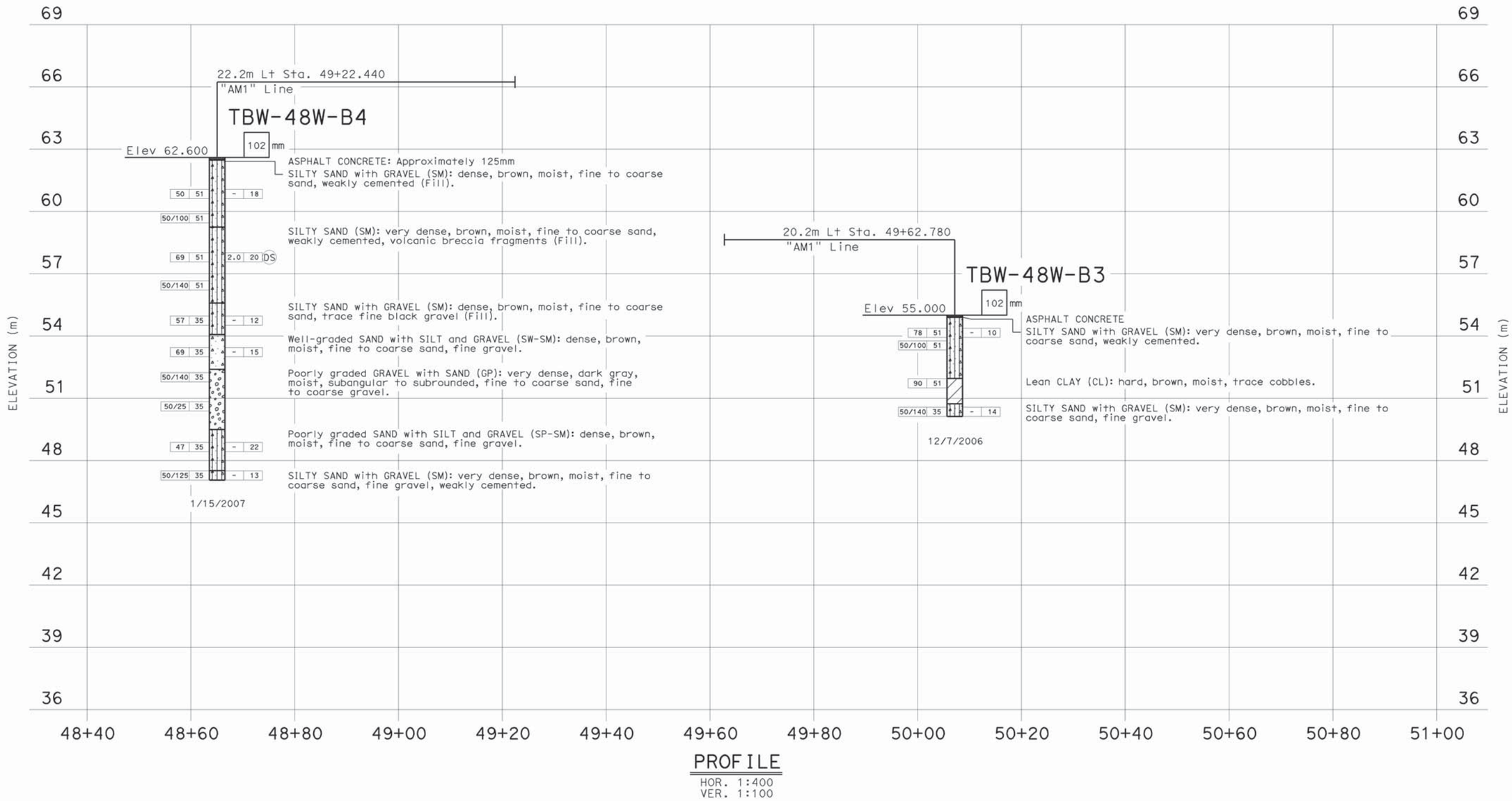


CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

SPT N-Value (Blows/0.3m)	Granular	SPT N-Value (Blows/0.3m)	Cohesive
0-4	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very stiff
		>31	Hard

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.



PROFILE
HOR. 1:400
VER. 1:100

Kenneth Sorensen DESIGN OVERSIGHT 05/18/08 SIGN OFF DATE	DRAWN BY CHECKED BY	A. Sanchez G. Zhang	G. Zhang FIELD INVESTIGATION BY: DATE: 01/15/07	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER	BRIDGE NO. 19E0008 KILOMETER POST 4.7	RETAINING WALL - 48W LOG OF TEST BORINGS 3 OF 4

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 5/19/08

SHEET 13 OF 14

FILE => 19e0008-x-lotb3of4.dgn

USERNAME => ttrrlchf DATE PLOTTED => 21-NOV-2008 TIME PLOTTED => 15:29

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	511	539

REGISTERED CIVIL ENGINEER 5/28/08

11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KENNETH G. SORENSEN — No. GE 2520 — Exp. 9-30-08 — GEOTECHNICAL — STATE OF CALIFORNIA

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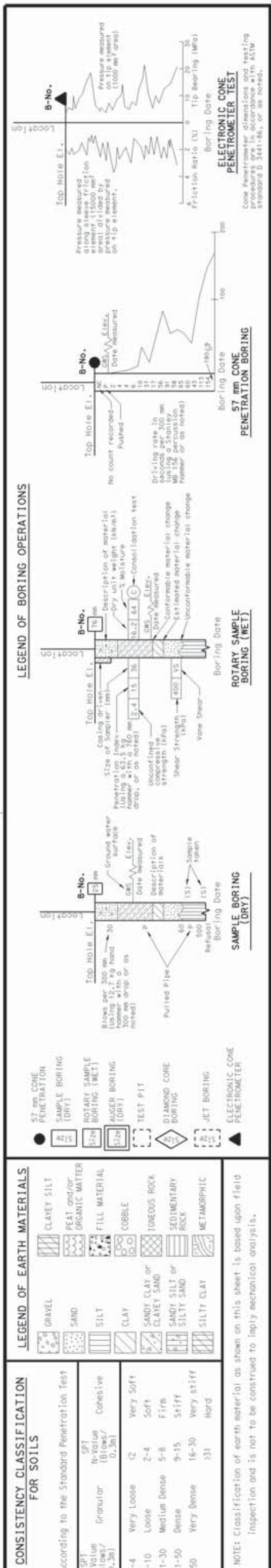
3077 FITE CIR.
SACRAMENTO, CA 95826



WEATHERING DESCRIPTORS

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

Descriptors		Diagnostic features					General characteristics (strength, excavation, etc.)§
		Chemical weathering-Discoloration and/or oxidation		Mechanical weathering-Grain boundary conditions (disaggregation) primarily for granitics and some coarse-grained sediments	Texture and solutioning		
Alphanumeric descriptor	Descriptive term	Body of rock	Fracture surfaces †		Texture	Solutioning	
W1	Fresh	No discoloration, not oxidized.	No discoloration or oxidation.	No separation, intact (tight).	No change.	No solutioning.	Hammer rings when crystalline rocks are struck. Almost always rock excavation except for naturaly weak or weakly cemented rocks such as siltstones or shales.
W2	Slightly weathered to fresh °						
W3	Slightly weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull.	Minor to complete discoloration or oxidation of most surfaces.	No visible separation, intact (tight).	Preserved.	Minor leaching of some soluble minerals may be noted.	Hammer rings when crystalline rocks are struck. Body of rock not weakened. With few exceptions, such as siltstones or shales, classified as rock excavation.
W4	Moderately to slightly weathered °						
W5	Moderately weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty," feldspar crystals are "cloudy."	All fracture surfaces are discolored or oxidized.	Partial separation of boundaries visible.	Generally preserved.	Soluble minerals may be mostly leached.	Hammer does not ring when rock is struck. Body of rock is slightly weakened. Depending on fracturing, usually is rock excavation except in naturally weak rocks such as siltstones or shales.
W6	Intensely to moderately weathered °						
W7	Intensely weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in-situ disaggregation, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semi-arid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, argillation).	Leaching of soluble minerals may be complete.	Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened. Usually common excavation.
W8	Very intensely weathered						
W9	Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay.		Complete separation of grain boundaries (disaggregated).	Resembles a soil, partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete.		Can be granulated by hand. Always common excavation. Resistant minerals such as quartz may be present as "stringers" or "dikes."

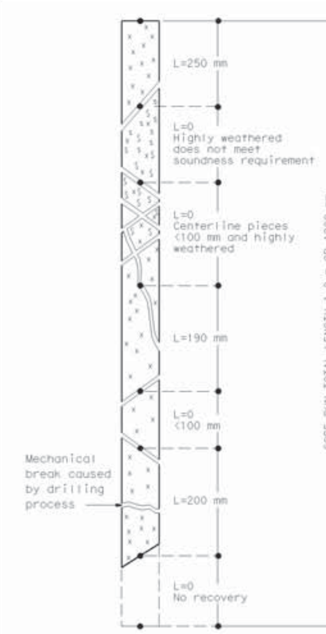
Note: This chart and its horizontal categories are more readily applied to rocks with feldspars and mafic minerals. Weathering in various sedimentary rocks, particularly limestones and poorly indurated sediments, will not always fit the categories established. This chart and weathering categories may have to be modified for particular site conditions or alteration such as hydrothermal effects; however, the basic framework and similar descriptors are to be used.

° Combination descriptors are permissible where equal distribution of both weathering characteristics are present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, dual descriptors should not be used where significant, identifiable zones can be delineated. When given as a range, only two adjacent terms may be combined. "Decomposed to slightly weathered," or "moderately weathered to fresh" are not acceptable.

† Does not include directional weathering along shears or faults and their associated features. For example, a shear zone that carried weathering to great depths into a fresh rock mass would not require the rock mass to be classified as weathered.

§ These are generalizations and should not be used as diagnostic features for weathering or excavation classification. These characteristics vary to a large extent based on naturally weak materials or cementation and type of excavation.

RQD LOGGING



$$RQD = \frac{\sum \text{Length of sound core pieces} > 100\text{ mm}}{\text{Total core run length}}$$

$$RQD = \frac{250+190+200}{1200} \times 100\%$$

RQD = 53% (fair)

RQD (ROCK QUALITY DESIGNATION)	DESCRIPTION OF ROCK QUALITY
0 - 25%	VERY POOR
25 - 50%	POOR
50 - 75%	FAIR
75 - 90%	GOOD
90 - 100%	EXCELLENT

After Deere & Deere, 1989

BEDDING, FOLIATION, OR FLOW TEXTURE DESCRIPTORS

Descriptors	Thickness / Spacing
Massive	Greater than 3 m
Very thickly (bedded, foliated, or banded)	1 to 3 m
Thickly	300 mm to 1 m
Moderately	100 to 300 mm
Thinly	30 to 100 mm
Very thinly	10 to 30 mm
Laminated (intensely foliated or banded)	Less than 10 mm

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

FRACTURE DENSITY

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

FRACTURE DENSITY- Based on the spacing of all natural fractures in an exposure or core recovery lengths in boreholes; excludes mechanical breaks, shears, and shear zones; however, shear-distributed zones (fracturing outside the shear) are included. Descriptors for fracture density apply to all rock exposures such as tunnel walls, dozer trenches, outcrops, or foundation cut slopes and inverts, as well as boreholes. Descriptive criteria presented below are based on borehole cores where lengths are measured along the core axis, for other exposures the criteria is distance measured between fractures (size of blocks).

UNFRACTURED (FDØ): No fractures.

VERY SLIGHTLY FRACTURED (FD1): Core recovered mostly in lengths greater than 1 m.

SLIGHTLY TO VERY SLIGHTLY FRACTURED (FD2)*

SLIGHTLY FRACTURED (FD3): Core recovered mostly in lengths from 300 to 1000 mm, with few scattered lengths less than 300 mm or greater than 1000 mm.

MODERATELY TO SLIGHTLY FRACTURED (FD4)*

MODERATELY FRACTURED (FD5): Core recovered mostly in 100 to 300 mm lenghts with most lengths about 200 mm.

INTENSELY TO MODERATELY FRACTURED (FD6)*

INTENSELY FRACTURED (FD7): Lengths average from 30 to 100 mm with scattered fragmented intervals. Core recovered mostly in lengths less than 100 mm.

VERY INTENSELY TO INTENSELY FRACTURED (FD8)*

VERY INTENSELY FRACTURED (FD9): Core recovered mostly as chips and fragments with a few scattered short core lengths.

* Combinations of fracture densities (e.g. Very intensely to intensely fractured, or Moderately to slightly fractured) are used where equal distribution of both fracture density characteristics are presently over a significant interval or exposure, or where characteristics are "in between" the descriptor definitions.

ROCK HARDNESS/STRENGTH DESCRIPTORS

Alphanumeric Descriptor	Descriptor	Criteria
H1	Extremely hard	Core, fragment, or exposure cannot be scratched with knife or sharp pick; can only be chipped with repeated heavy hammer blows.
H2	Very hard	Cannot be scratched with knife of sharp pick. Core or fragment breaks with repeated heavy hammer blows.
H3	Hard	Can be scratched with knife or sharp pick with difficulty (heavy pressure). Heavy hammer blow required to break specimen.
H4	Moderately hard	Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.
H5	Moderately soft	Can be grooved 2 mm deep by knife or sharp pick with moderate or heavy pressure. Core or fragment breaks with light hammer blow or heavy manual pressure.
H6	Soft	Can be grooved or gouged easily by knife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
H7	Very soft	Can be readily indented, grooved or gouged with fingernail, or carved with a knife. Breaks with light manual pressure.

Any bedrock unit softer than H7, very soft, is to be described using ASTM D-2488 consistency descriptors.

Note: Although "sharp pick" is included in these definitions, descriptions of ability to be scratched, grooved or gouged by a knife is the preferred criteria.

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

IN-SITU, LAB & FIELD TEST DESIGNATIONS

- (AL) ATTERBERG LIMITS
- (CA) CHEMICAL ANALYSIS
- (CN) CONSOLIDATION
- (CU) CONSOLIDATED UNDRAINED TRIAXIAL
- (DS) DIRECT SHEAR
- (MD) MAX. DRY DENSITY
- (PP) POCKET PENETROMETER
- (SA) SIEVE ANALYSIS
- (TV) TORVANE
- (UC) UNCONFINED COMPRESSION
- (UU) UNCONSOLIDATED UNDRAINED TRIAXIAL
- (VS) VANE SHEAR

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.

Kenneth Sorensen DESIGN OVERSIGHT 05/18/08 SIGN OFF DATE	DRAWN BY: A. Sanchez CHECKED BY: G. Zhang	G. Zhang FIELD INVESTIGATION BY: DATE: 01/15/07	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER	BRIDGE NO. 19E0008 KILOMETER POST 4.7	RETAINING WALL - 48W LOG OF TEST BORINGS 4 OF 4

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	522	539

REGISTERED CIVIL ENGINEER 9/12/08

11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KENNETH G. SORENSEN — No. GE 2520 — Exp. 9-30-08 — GEOTECHNICAL — STATE OF CALIFORNIA

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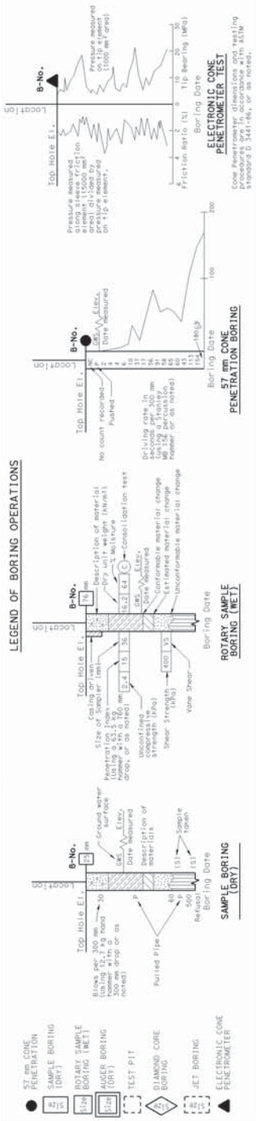
LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

GRAVEL · SAND · SILT · CLAY · CLAYEY SILT · PEAT (HIGHLY ORGANIC MATTER) · FILL MATERIAL · COBBLE · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

SPT N-Value (Blows/0.305)	Granular	SPT N-Value (Blows/0.305)	Cohesive
0-4	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very stiff
		>31	Hard

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.

WEATHERING DESCRIPTORS

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

Descriptors		Diagnostic features: Chemical weathering-Discoloration and/or oxidation		Mechanical weathering-Grain boundary conditions (disaggregation) primarily for granitics and some coarse-grained sediments	Texture and solutioning		General characteristics (strength, excavation, etc.)§
Alphanumeric descriptor	Descriptive term	Body of rock	Fracture surfaces †		Texture	Solutioning	
W1	Fresh	No discoloration, not oxidized.	No discoloration or oxidation.	No separation, intact (tight).	No change.	No solutioning.	Hammer rings when crystalline rocks are struck. Almost always rock excavation except for naturally weak or weakly cemented rocks such as siltstones or shales.
W2	Slightly weathered to fresh °						
W3	Slightly weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull.	Minor to complete discoloration or oxidation of most surfaces.	No visible separation, intact (tight).	Preserved.	Minor leaching of some soluble minerals may be noted.	Hammer rings when crystalline rocks are struck. Body of rock not weakened. With few exceptions, such as siltstones or shales, classified as rock excavation.
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W6	Intensely to moderately weathered °						
W7	Intensely weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in-situ disaggregation, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semi-arid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, argillation).	Leaching of soluble minerals may be complete.	Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened. Usually common excavation.
W8	Very intensely weathered						
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H4	Moderately hard	Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.
H5	Moderately soft	Can be grooved 2 mm deep by knife or sharp pick with moderate or heavy pressure. Core or fragment breaks with light hammer blow or heavy manual pressure.
H6	Soft	Can be grooved or gouged easily by knife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
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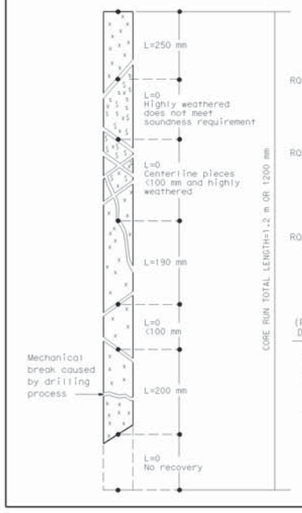
Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

RQD LOGGING



$$RQD = \frac{\sum \text{Length of sound core pieces} > 100\text{ mm}}{\text{Total core run length}}$$

$$RQD = \frac{250+190+200}{1200} \times 100\%$$

RQD = 53% (fair)

RQD (ROCK QUALITY DESIGNATION)	DESCRIPTION OF ROCK QUALITY
0 - 25%	VERY POOR
25 - 50%	POOR
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90 - 100%	EXCELLENT

After Deere & Deere, 1989

BEDDING, FOLIATION, OR FLOW TEXTURE DESCRIPTORS

Descriptors	Thickness / Spacing
Massive	Greater than 3 m
Very thickly (bedded, foliated, or banded)	1 to 3 m
Thickly	300 mm to 1 m
Moderately	100 to 300 mm
Thinly	30 to 100 mm
Very thinly	10 to 30 mm
Laminated (intensely foliated or banded)	Less than 10 mm

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

IN-SITU, LAB & FIELD TEST DESIGNATIONS

- (AL) ATTERBERG LIMITS
- (CA) CHEMICAL ANALYSIS
- (CN) CONSOLIDATION
- (CU) CONSOLIDATED UNDRAINED TRIAXIAL
- (DS) DIRECT SHEAR
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- (TV) TORVANE
- (UC) UNCONFINED COMPRESSION
- (UU) UNCONSOLIDATED UNDRAINED TRIAXIAL
- (VS) VANE SHEAR

Kenneth Sorensen DESIGN OVERSIGHT SIGN OFF DATE	DRAWN BY	A. Sanchez	G. Zhang FIELD INVESTIGATION BY: DATE: 01/15/07	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER
	CHECKED BY	E. Ortakci			

BRIDGE NO.	RETAINING WALL - 49E
19E0009	
KILOMETER POST 4.7	LOG OF TEST BORINGS 1 OF 4

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 9/12/08

SHEET 11 OF 14

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

FILE => 19e0009-f-log-01.dgn

USERNAME = frlehard DATE PLOTTED => 21-NOV-2008 TIME PLOTTED => 15:45

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	523	539

REGISTERED CIVIL ENGINEER 9/12/08

11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
KENNETH G. SORENSEN
No. GE 2520
Exp. 9-30-08
GEOTECHNICAL
STATE OF CALIFORNIA

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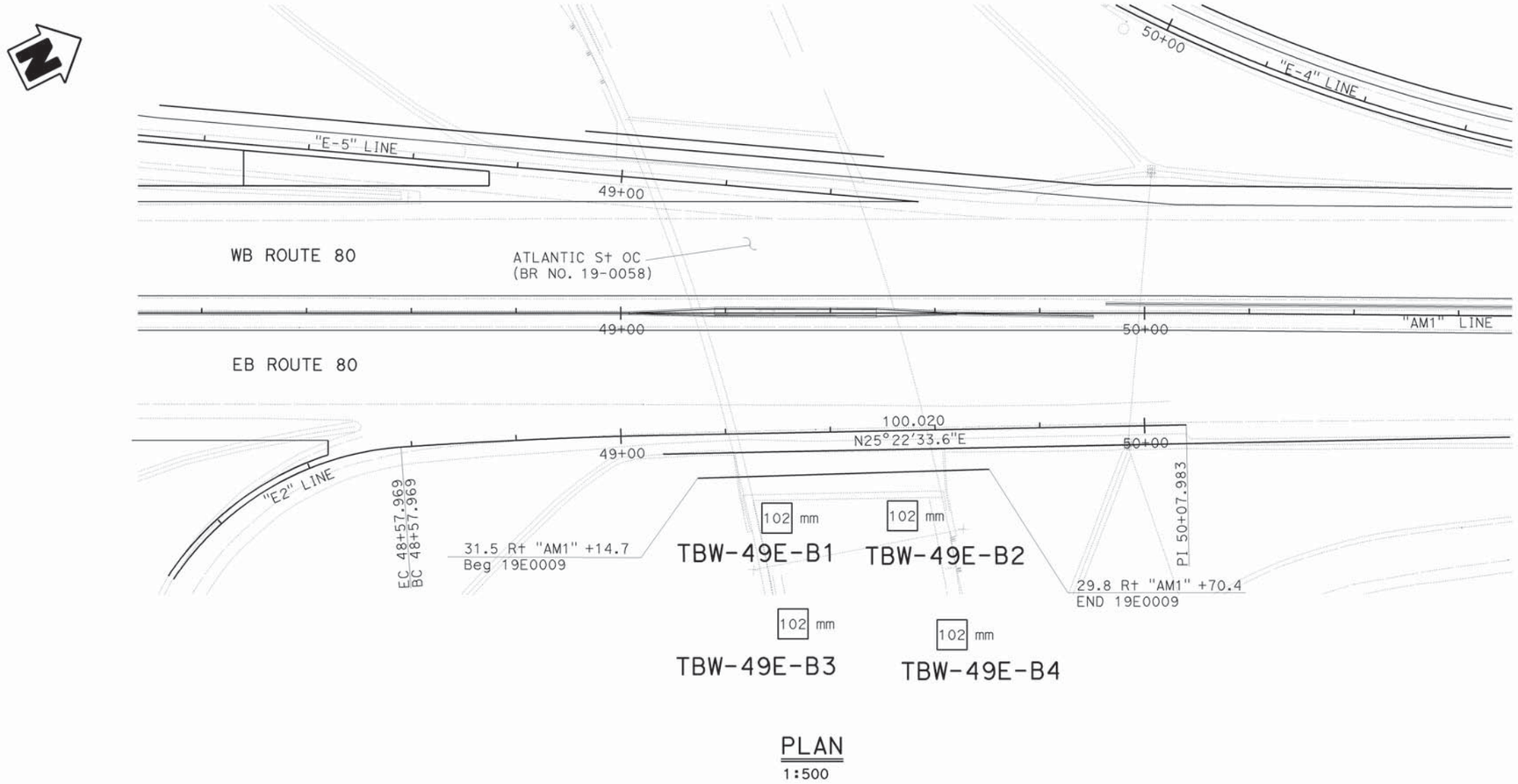
SACRAMENTO, CA 95827

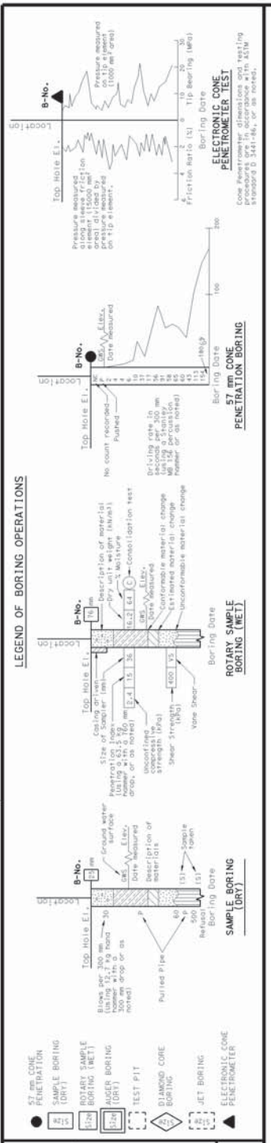
Notes:

1. 51 mm samples were taken using a California split-barrel sampler with an inside diameter (I.D.) of 51 mm and an outside diameter (O.D.) of 64 mm.
2. A safety semi-automatic hammer (63.5 kg) with a 760 mm drop was used to advance the sampler.
3. Blowcounts noted for boring are field blowcounts and have not been corrected.
4. 35 mm samples were taken using a SPT split-barrel sampler with an inside diameter (I.D.) of 35 mm and an outside diameter (O.D.) of 51 mm.
5. 63.5 mm core samples were taken using an HQ core sampler with a 63.5 mm inside diameter (I.D.) and 94 mm outside diameter (O.D.) core barrel.
6. Blowcounts 50/125 means 50 blows per 125 mm penetration.
7. The holes are backfilled immediately after completion. Borings were accomplished with rotary wash methods and utilizing water as the drill fluid. During the investigation, groundwater measurements were not attempted in the boreholes.
8. The descriptions and classifications of soil, including consistency and relative density descriptions, used by the field personnel for the exploration bole holes on "Soil and Rock Logging Classification Manual (Field Guide)", Engineering Service Center, Office of Structural Foundations, August 1996.



PLAN
1:500

LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

GRAVEL · SAND · SILT · CLAY · SANDY CLAY or CLAYEY SAND · SANDY SILT or SILTY SAND · SILTY CLAY · CLAYEY SILT · PEAT and/or ORGANIC MATTER · FILL MATERIAL · COBBLE · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC

CONSISTENCY CLASSIFICATION FOR SOILS
According to the Standard Penetration Test

SPT N-Value (Blows/0.3m)	Granular	SPT N-Value (Blows/0.3m)	Cohesive
0-4	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very stiff
		>31	Hard

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.

Kenneth Sorensen DESIGN OVERSIGHT SIGN OFF DATE	DRAWN BY	A. Sanchez	G. Zhang FIELD INVESTIGATION BY: DATE: 01/15/07		PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER	BRIDGE NO. 19E0009 KILOMETER POST 4.7
	CHECKED BY	E. Ortakci					

RETAINING WALL - 49E

LOG OF TEST BORINGS 2 OF 4

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 9/12/08

SHEET 12 OF 14

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

FILE => 19e0009-f-log-02.dgn

USERNAME => friennard DATE PLOTTED => 21-NOV-2008 TIME PLOTTED => 15:45

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	524	539

REGISTERED CIVIL ENGINEER 9/12/08

11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KENNETH G. SORENSEN — No. GE 2520 — Exp. 9-30-08 — GEOTECHNICAL — STATE OF CALIFORNIA

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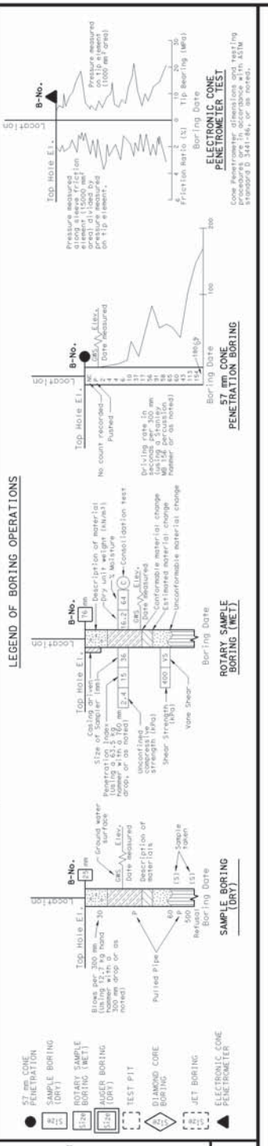
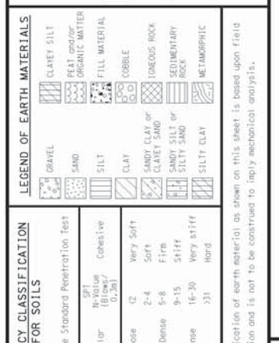
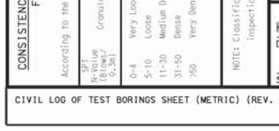
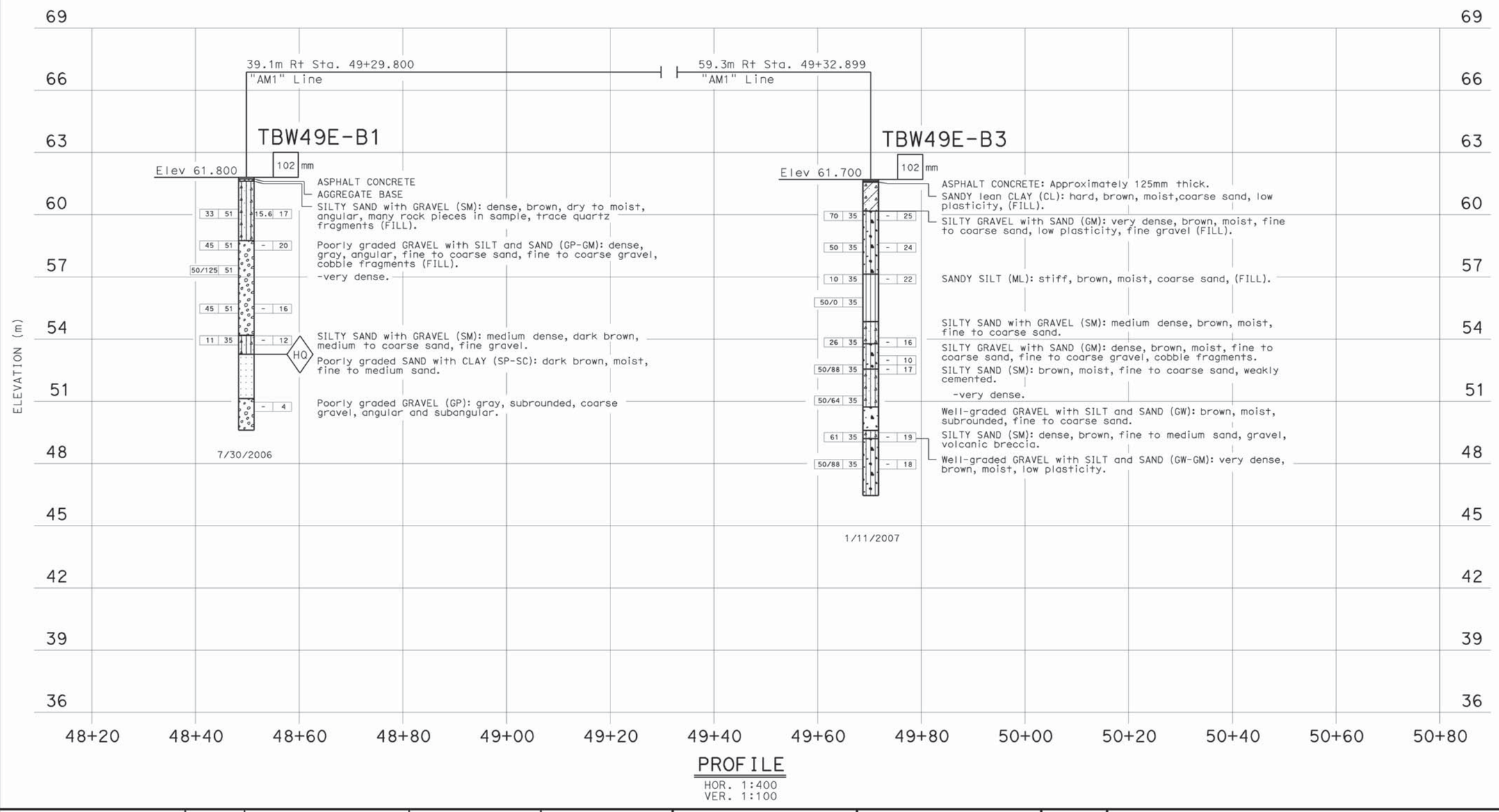
FOR PLAN VIEW AND ADDITIONAL NOTES, SEE
"LOG OF TEST BORINGS" SHEET 1 OF 3







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.



PROFILE
HOR. 1:400
VER. 1:100

Kenneth Sorensen DESIGN OVERSIGHT	DRAWN BY	A. Sanchez	G. Zhang FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO. 19E0009	RETAINING WALL - 49E
SIGN OFF DATE	CHECKED BY	E. Ortakci	DATE: 01/15/07		PROJECT ENGINEER	KILOMETER POST 4.7	LOG OF TEST BORINGS 3 OF 4

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 9/12/08

SHEET 13 OF 14

FILE => 19e0009-f-log-03.dgn

USERNAME => ttrenord DATE PLOTTED => 21-NOV-2008 TIME PLOTTED => 15:45

FOR PLAN VIEW AND ADDITIONAL NOTES, SEE
"LOG OF TEST BORINGS" SHEET 1 OF 3

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	525	539

9/12/08
REGISTERED CIVIL ENGINEER

REGISTERED PROFESSIONAL ENGINEER
KENNETH G. SORENSEN
No. GE 2520
Exp. 9-30-08
GEOTECHNICAL
STATE OF CALIFORNIA

11-17-08
PLANS APPROVAL DATE

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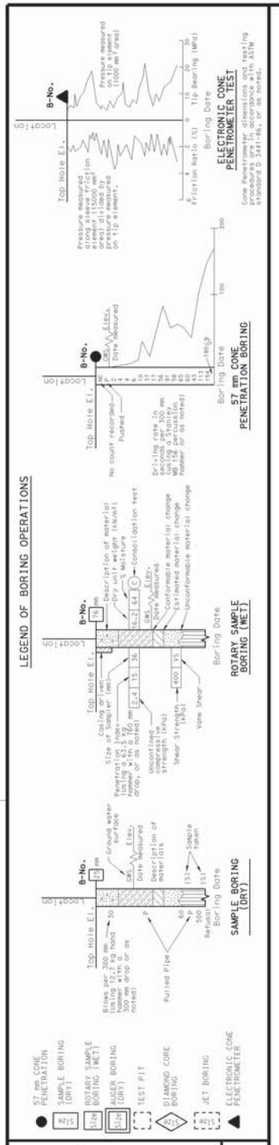
SACRAMENTO, CA 95827

LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

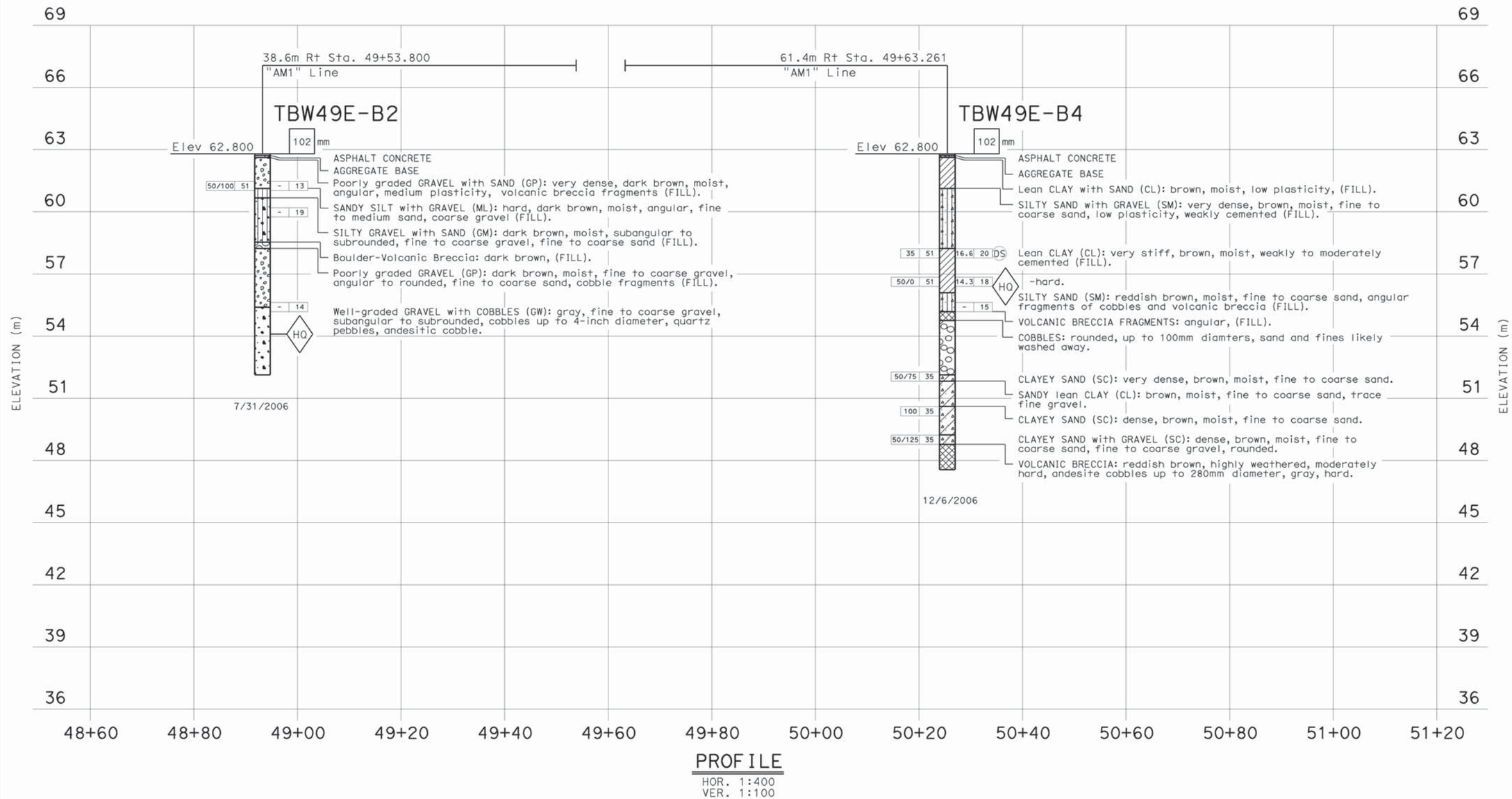
GRAVEL · SAND · SILT · CLAY · CLAYEY SILT · PEAT and/or ORGANIC MATTER · FILL MATERIAL · COBBLE · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC · SANDY CLAY or CLAYEY SAND · SANDY SILT or SILTY SAND · SILTY CLAY

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

SPT N-Value (Blows/0.3m)	Granular	SPT N-Value (Blows/0.3m)	Cohesive
0-4	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very stiff
		>31	Hard

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.



PROFILE
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VER. 1:100

Kenneth Sorensen DESIGN OVERSIGHT	DRAWN BY	A. Sanchez	G. Zhang FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER	BRIDGE NO. 19E0009 KILOMETER POST 4.7	RETAINING WALL - 49E **LOG OF TEST BORINGS 4 OF 4**
SIGN OFF DATE	CHECKED BY	E. Ortakci	DATE: 01/15/07				

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 9/12/08

SHEET 14 OF 14

FILE => 19e0009-f-log-04.dgn

USERNAME => Terrence.Ward DATE PLOTTED => 21-NOV-2008 TIME PLOTTED => 15:45

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	536	539

REGISTERED CIVIL ENGINEER 9/12/08

11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KENNETH G. SORENSEN — No. GE 2520 — Exp. 9-30-08 — GEOTECHNICAL — STATE OF CALIFORNIA

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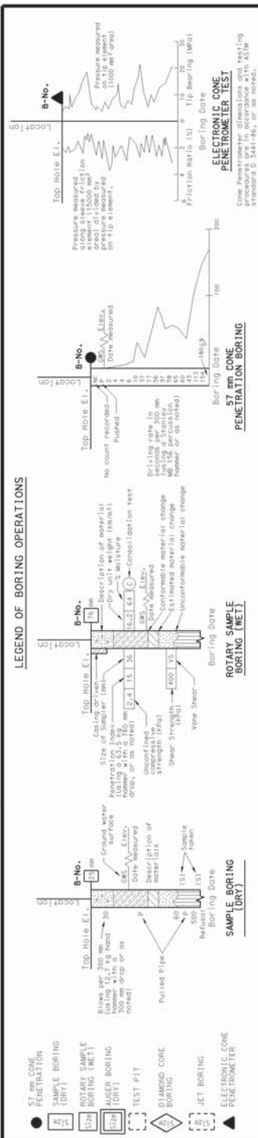
LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

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>50	Very Dense	16-30	Very stiff
		>31	Hard

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.

WEATHERING DESCRIPTORS

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

Descriptors		Diagnostic features: Chemical weathering-Discoloration and/or oxidation		Mechanical weathering-Grain boundary conditions (disaggregation) primarily for granitics and some coarse-grained sediments	Texture and solutioning		General characteristics (strength, excavation, etc.)§
Alphanumeric descriptor	Descriptive term	Body of rock	Fracture surfaces †		Texture	Solutioning	
W1	Fresh	No discoloration, not oxidized.	No discoloration or oxidation.	No separation, intact (tight).	No change.	No solutioning.	Hammer rings when crystalline rocks are struck. Almost always rock excavation except for naturally weak or weakly cemented rocks such as siltstones or shales.
W2	Slightly weathered to fresh ○						
W3	Slightly weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull.	Minor to complete discoloration or oxidation of most surfaces.	No visible separation, intact (tight).	Preserved.	Minor leaching of some soluble minerals may be noted.	Hammer rings when crystalline rocks are struck. Body of rock not weakened. With few exceptions, such as siltstones or shales, classified as rock excavation.
W4	Moderately to slightly weathered ○						
W5	Moderately weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty," feldspar crystals are "cloudy."	All fracture surfaces are discolored or oxidized.	Partial separation of boundaries visible.	Generally preserved.	Soluble minerals may be mostly leached.	Hammer does not ring when rock is struck. Body of rock is slightly weakened. Depending on fracturing, usually is rock excavation except in naturally weak rocks such as siltstones or shales.
W6	Intensely to moderately weathered ○						
W7	Intensely weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in-situ disaggregation, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semi-arid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, argillation).	Leaching of soluble minerals may be complete.	Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened. Usually common excavation.
W8	Very intensely weathered						
W9	Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay.		Complete separation of grain boundaries (disaggregated).	Resembles a soil, partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete.		Can be granulated by hand. Always common excavation. Resistant minerals such as quartz may be present as "stringers" or "dikes."

Note: This chart and its horizontal categories are more readily applied to rocks with feldspars and mafic minerals. Weathering in various sedimentary rocks, particularly limestones and poorly indurated sediments, will not always fit the categories established. This chart and weathering categories may have to be modified for particular site conditions or alteration such as hydrothermal effects; however, the basic framework and similar descriptors are to be used.

○ Combination descriptors are permissible where equal distribution of both weathering characteristics are present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, dual descriptors should not be used where significant, identifiable zones can be delineated. When given as a range, only two adjacent terms may be combined. "Decomposed to slightly weathered," or "moderately weathered to fresh" are not acceptable.

† Does not include directional weathering along shears or faults and their associated features. For example, a shear zone that carried weathering to great depths into a fresh rock mass would not require the rock mass to be classified as weathered.

§ These are generalizations and should not be used as diagnostic features for weathering or excavation classification. These characteristics vary to a large extent based on naturally weak materials or cementation and type of excavation.

FRACTURE DENSITY

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

FRACTURE DENSITY- Based on the spacing of all natural fractures in an exposure or core recovery lengths in boreholes; excludes mechanical breaks, shears, and shear zones; however, shear-distributed zones (fracturing outside the shear) are included. Descriptors for fracture density apply to all rock exposures such as tunnel walls, dozer trenches, outcrops, or foundation cut slopes and inverts, as well as boreholes. Descriptive criteria presented below are based on borehole cores where lengths are measured along the core axis, for other exposures the criteria is distance measured between fractures (size of blocks).

UNFRACTURED (FD0): No fractures.

VERY SLIGHTLY FRACTURED (FD1): Core recovered mostly in lengths greater than 1 m.

SLIGHTLY TO VERY SLIGHTLY FRACTURED (FD2)*

SLIGHTLY FRACTURED (FD3): Core recovered mostly in lengths from 300 to 1000 mm, with few scattered lengths less than 300 mm or greater than 1000 mm.

MODERATELY TO SLIGHTLY FRACTURED (FD4)*

MODERATELY FRACTURED (FD5): Core recovered mostly in 100 to 300 mm lenghts with most lengths about 200 mm.

INTENSELY TO MODERATELY FRACTURED (FD6)*

INTENSELY FRACTURED (FD7): Lengths average from 30 to 100 mm with scattered fragmented intervals. Core recovered mostly in lengths less than 100 mm.

VERY INTENSELY TO INTENSELY FRACTURED (FD8)*

VERY INTENSELY FRACTURED (FD9): Core recovered mostly as chips and fragments with a few scattered short core lengths.

* Combinations of fracture densities (e.g. Very intensely to intensely fractured, or Moderately to slightly fractured) are used where equal distribution of both fracture density characteristics are presently over a significant interval or exposure, or where characteristics are "in between" the descriptor definitions.

ROCK HARDNESS/STRENGTH DESCRIPTORS

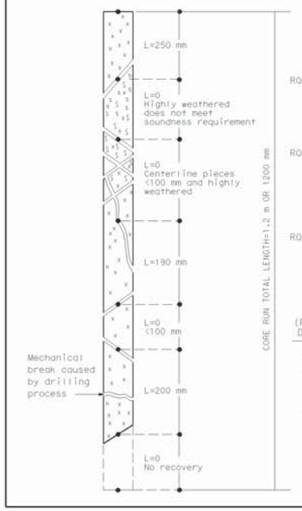
Alphanumeric Descriptor	Descriptor	Criteria
H1	Extremely hard	Core, fragment, or exposure cannot be scratched with knife or sharp pick; can only be chipped with repeated heavy hammer blows.
H2	Very hard	Cannot be scratched with knife of sharp pick. Core or fragment breaks with repeated heavy hammer blows.
H3	Hard	Can be scratched with knife or sharp pick with difficulty (heavy pressure). Heavy hammer blow required to break specimen.
H4	Moderately hard	Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.
H5	Moderately soft	Can be grooved 2 mm deep by knife or sharp pick with moderate or heavy pressure. Core or fragment breaks with light hammer blow or heavy manual pressure.
H6	Soft	Can be grooved or gouged easily by knife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
H7	Very soft	Can be readily indented, grooved or gouged with fingernail, or carved with a knife. Breaks with light manual pressure.

Any bedrock unit softer than H7, very soft, is to be described using ASTM D-2488 consistency descriptors.

Note: Although "sharp pick" is included in these definitions, descriptions of ability to be scratched, grooved or gouged by a knife is the preferred criteria.

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

RQD LOGGING



$$RQD = \frac{\sum \text{Length of sound core pieces} > 100\text{ mm}}{\text{Total core run length}}$$

$$RQD = \frac{250+190+200}{1200} \times 100\%$$

RQD = 53% (fair)

RQD (ROCK QUALITY DESIGNATION)	DESCRIPTION OF ROCK QUALITY
0 - 25%	VERY POOR
25 - 50%	POOR
50 - 75%	FAIR
75 - 90%	GOOD
90 - 100%	EXCELLENT

After Deere & Deere, 1989

BEDDING, FOLIATION, OR FLOW TEXTURE DESCRIPTORS

Descriptors	Thickness / Spacing
Massive	Greater than 3 m
Very thickly (bedded, foliated, or banded)	1 to 3 m
Thickly	300 mm to 1 m
Moderately	100 to 300 mm
Thinly	30 to 100 mm
Very thinly	10 to 30 mm
Laminated (intensely foliated or banded)	Less than 10 mm

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

IN-SITU, LAB & FIELD TEST DESIGNATIONS

- (AL) ATTERBERG LIMITS
- (CA) CHEMICAL ANALYSIS
- (CN) CONSOLIDATION
- (CU) CONSOLIDATED UNDRAINED TRIAXIAL
- (DS) DIRECT SHEAR
- (MD) MAX. DRY DENSITY
- (PP) POCKET PENETROMETER
- (SA) SIEVE ANALYSIS
- (TV) TORVANE
- (UC) UNCONFINED COMPRESSION
- (UU) UNCONSOLIDATED UNDRAINED TRIAXIAL
- (VS) VANE SHEAR

Kenneth Sorensen DESIGN OVERSIGHT SIGN OFF DATE	DRAWN BY	A. Sanchez	G. Zhang FIELD INVESTIGATION BY: DATE: 01/15/07	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER
	CHECKED BY	E. Ortakci			

BRIDGE NO.	RETAINING WALL - 58E
19E0010	
KILOMETER POST 5.9	LOG OF TEST BORINGS 1 OF 4

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 9/12/08

SHEET 11 OF 14

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	537	539

REGISTERED CIVIL ENGINEER 9/12/08

11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KENNETH G. SORENSEN — No. GE 2520 — Exp. 9-30-08 — GEOTECHNICAL — STATE OF CALIFORNIA

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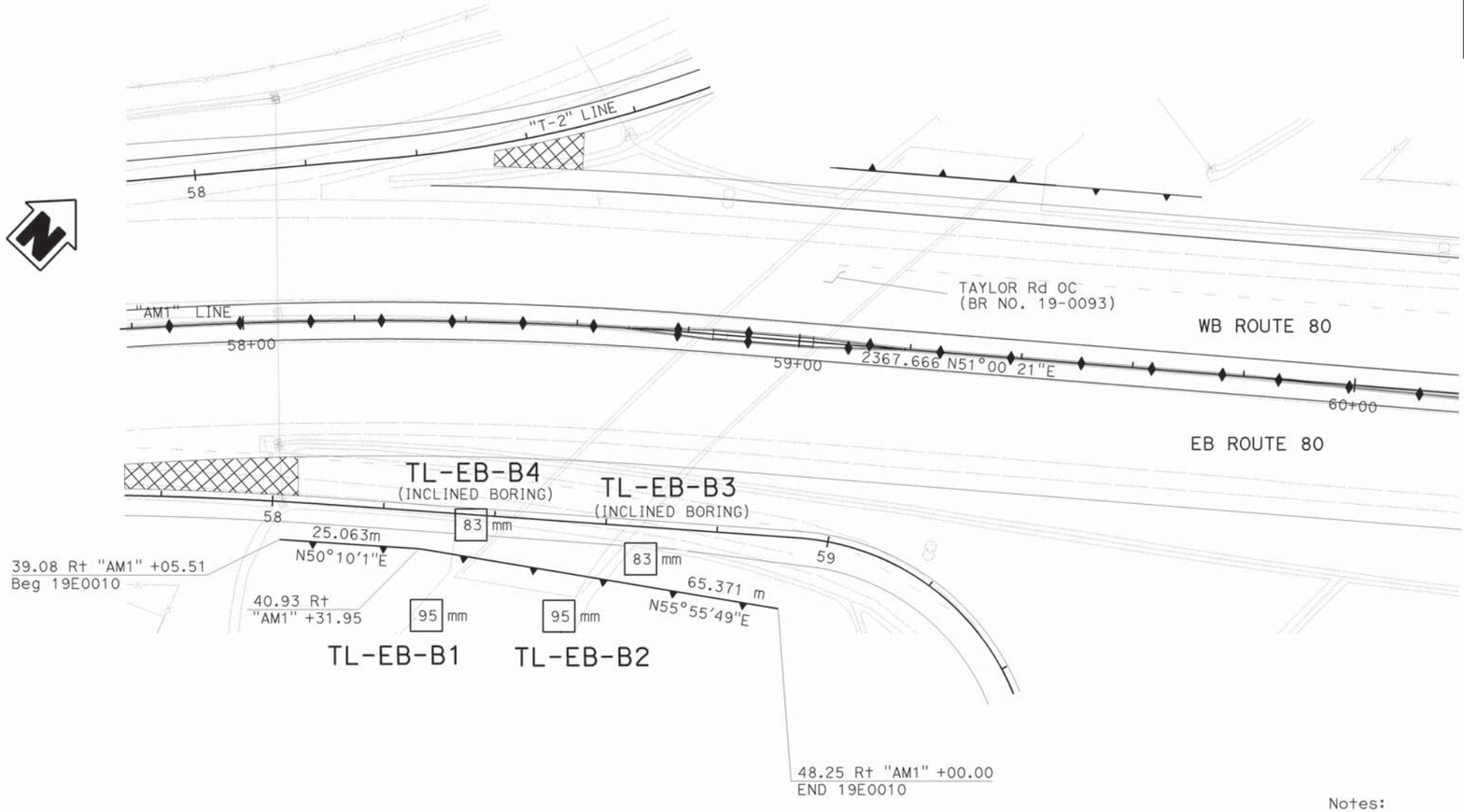

PLAN
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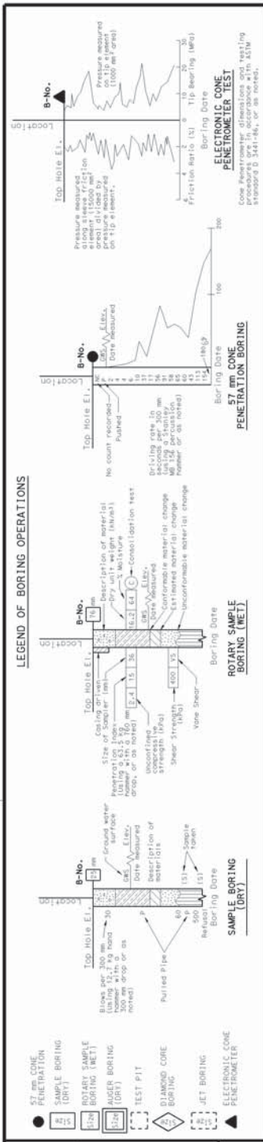
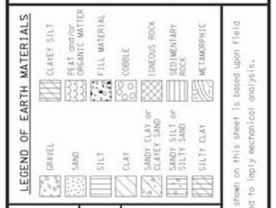
LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS



CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

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>50	Very Dense	16-30	Very stiff
		>31	Hard

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.

BENCHMARKS

STATION	OFFSET	N	E	ELEV	DESCRIPTION
STA 58+34.478 "AM1" (CL Rte 80)	23.428m Lt	622211.977	2064606.488	60.182m	PD-19-008-03.62 Fnd: #6 Rebar W/AL DOT CAP
STA 59+84.431 "AM1" (CL Rte 80)	33.533m Lt	622322.757	2064724.573	62.555m	PD-19-080-03.62 Fnd: #6 Rebar W/AL DOT CAP

SURVEY CONTROL
1. Coordinates bearing and distances are based on the California coordinate system of Nad 1983 HPGN, zone 6. (EPOCH 1991.35). Elevations are based on NGVD 29.

Notes:

1. 51 mm samples were taken using a California split-barrel sampler with an inside diameter (I.D.) of 51 mm and an outside diameter (O.D.) of 64 mm.
2. A safety semi-automatic hammer (63.5 kg) with a 760 mm drop was used to advance the sampler.
3. Blowcounts noted for boring are field blowcounts and have not been corrected.
4. 35 mm samples were taken using a SPT split-barrel sampler with an inside diameter (I.D.) of 35 mm and an outside diameter (O.D.) of 51 mm.
5. 63.5 mm core samples were taken using an HQ core sampler with a 63.5 mm inside diameter (I.D.) and 94 mm outside diameter (O.D.) core barrel.
6. Blowcounts 50/125 means 50 blows per 125 mm penetration.
7. The holes are backfilled immediately after completion. Vertical borings were accomplished with rotary wash methods and utilizing water as the drill fluid. During the investigation, groundwater measurements were not attempted in the boreholes.
8. The descriptions and classifications of soil, including consistency and relative density descriptions, used by the field personnel for the exploration bole holes on "Soil and Rock Logging Classification Manual (Field Guide)", Engineering Service Center, Office of Structural Foundations, August 1996.

Kenneth Sorensen DESIGN OVERSIGHT	DRAWN BY	A. Sanchez	G. Zhang FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO. 19E0010	RETAINING WALL - 58E
SIGN OFF DATE	CHECKED BY	E. Ortakci	DATE: 01/15/07		PROJECT ENGINEER	KILOMETER POST 5.9	LOG OF TEST BORINGS 2 OF 4

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 9/12/08

SHEET 12 OF 14

FILE => 19e0010-g-log-02.dgn

USERNAME => hfriend DATE PLOTTED => 21-NOV-2008 TIME PLOTTED => 15:53

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	538	539

REGISTERED CIVIL ENGINEER 9/12/08

11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KENNETH G. SORENSEN — No. GE 2520 — Exp. 9-30-08 — GEOTECHNICAL — STATE OF CALIFORNIA

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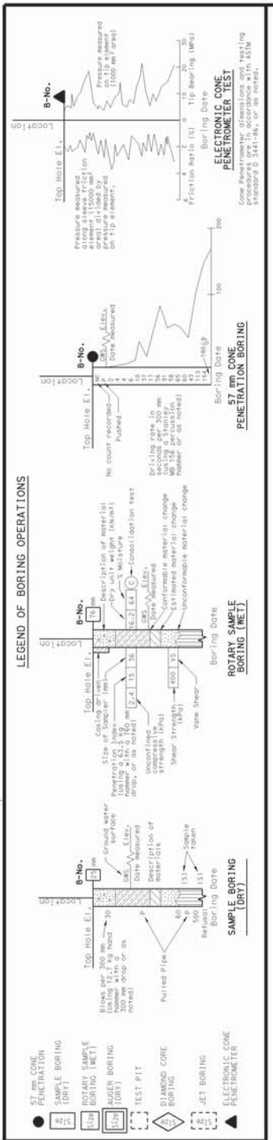
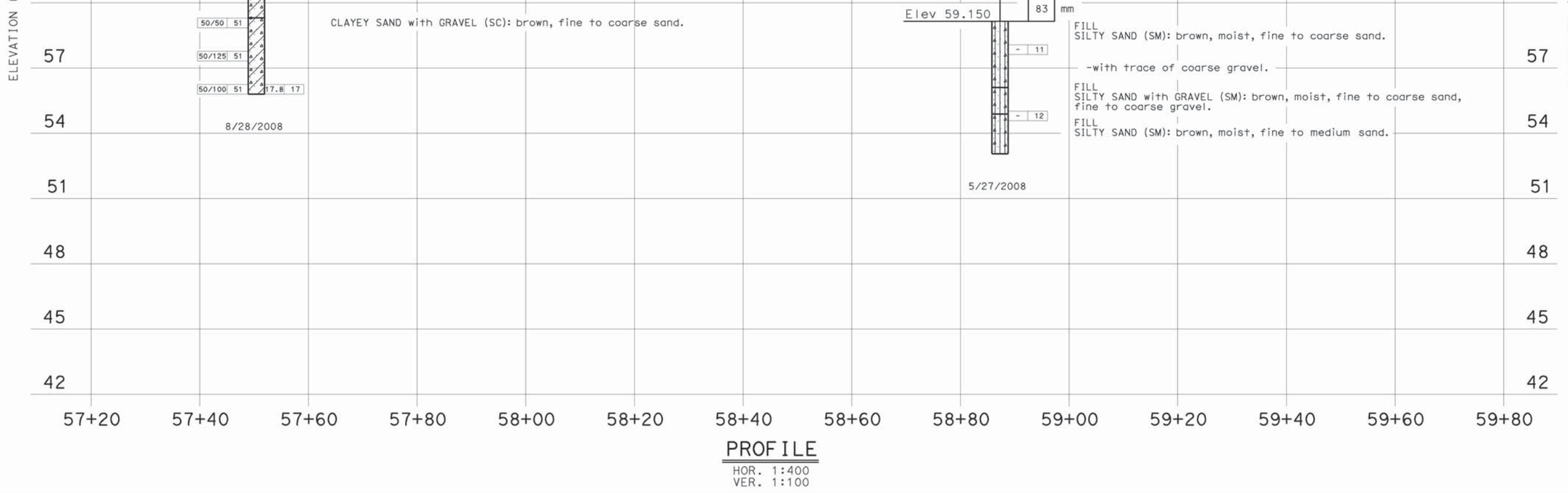
SACRAMENTO, CA 95827

FOR PLAN VIEW AND ADDITIONAL NOTES, SEE
"LOG OF TEST BORINGS" SHEET 1 OF 3





PROFILE
HOR. 1:400
VER. 1:100

LEGEND OF EARTH MATERIALS: GRAVEL, SAND, SILT, CLAYEY SILT, PEAT AND/OR ORGANIC MATTER, FILL MATERIAL, CLAY, COBBLE, SANDY CLAY OR CLAYEY SAND, IGNEOUS ROCK, SANDY SILT OR SILTY SAND, SEDIMENTARY ROCK, SILTY CLAY, METAMORPHIC

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SIGN OFF DATE	CHECKED BY	E. Ortakci	DATE: 01/15/07		PROJECT ENGINEER	KILOMETER POST 5.9	LOG OF TEST BORINGS 3 OF 4

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

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EA 367831

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REVISION DATES (PRELIMINARY STAGE ONLY)										SHEET	OF
9/12/08										13	14

FILE => 19e0010-g-log-03.dgn

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	539	539

REGISTERED CIVIL ENGINEER 9/12/08

11-17-08
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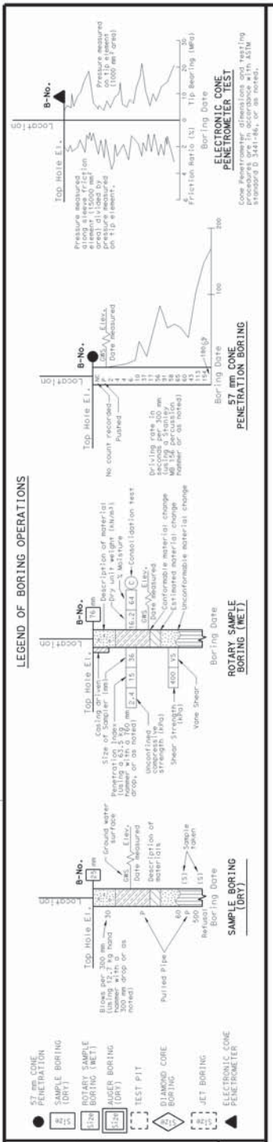
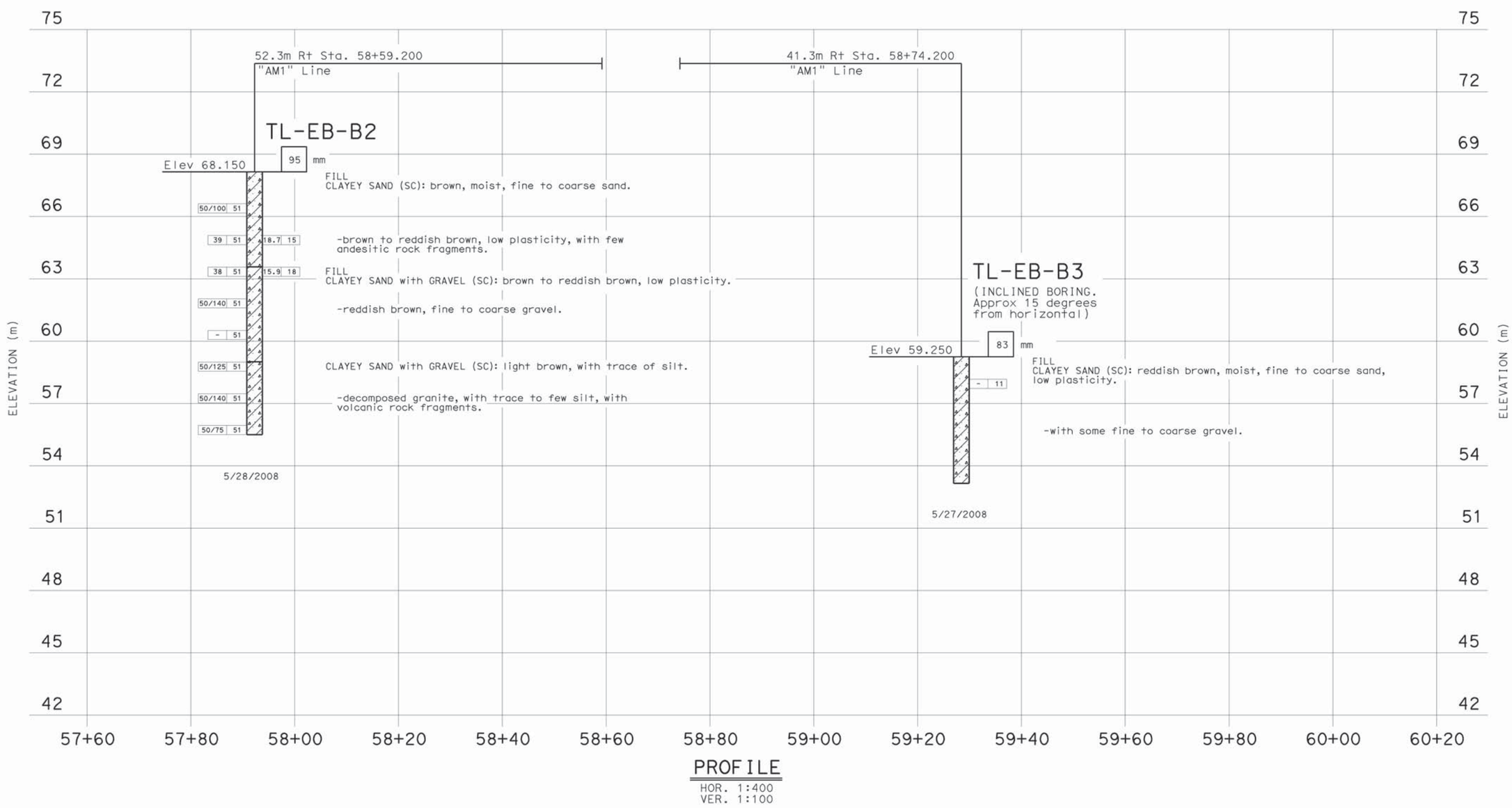
FOR PLAN VIEW AND ADDITIONAL NOTES, SEE "LOG OF TEST BORINGS" SHEET 1 OF 3





PROFILE
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Kenneth Sorensen DESIGN OVERSIGHT	DRAWN BY	A. Sanchez	G. Zhang FIELD INVESTIGATION BY:	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO. 19E0010 KILOMETER POST 5.9	RETAINING WALL - 58E **LOG OF TEST BORINGS 4 OF 4**	
SIGN OFF DATE	CHECKED BY	E. Ortakci	DATE: 01/15/07		PROJECT ENGINEER			

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 9/12/08

SHEET 14 OF 14

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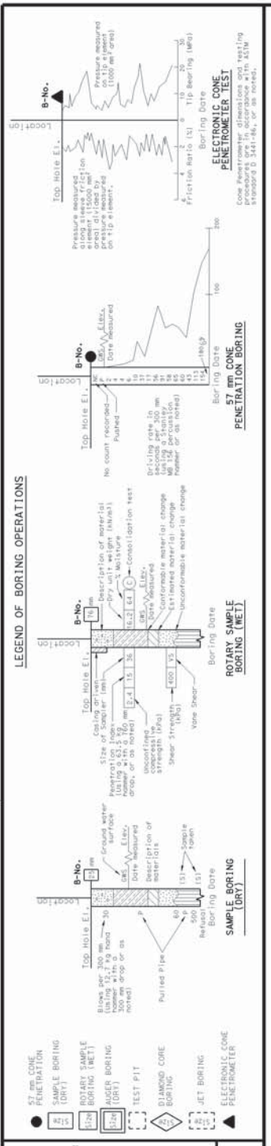


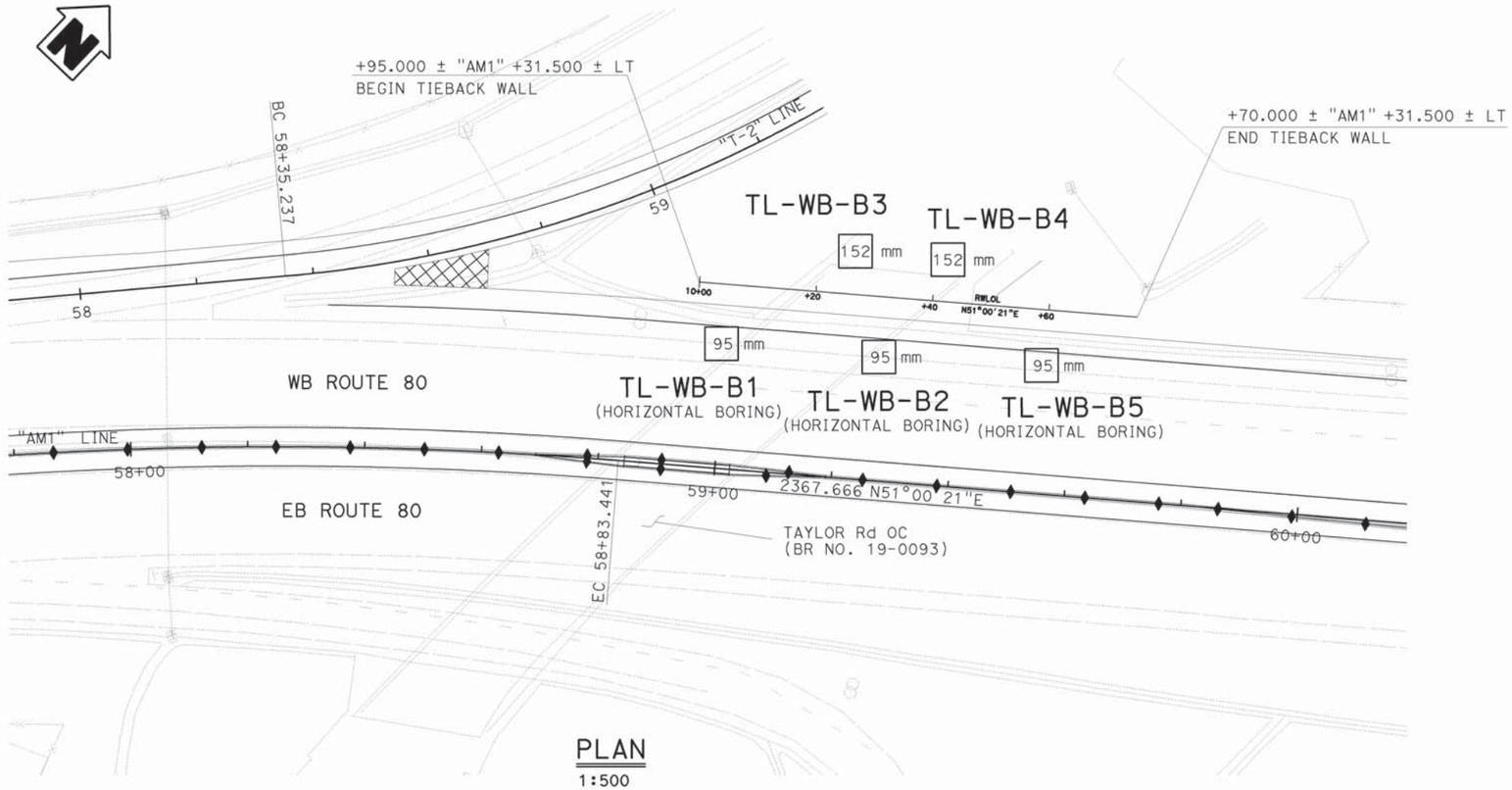
Notes:

1. 51 mm samples were taken using a California split-barrel sampler with an inside diameter (I.D.) of 51 mm and an outside diameter (O.D.) of 64 mm.
2. A safety semi-automatic hammer (63.5 kg) with a 760 mm drop was used to advance the sampler.
3. Blowcounts noted for boring are field blowcounts and have not been corrected.
4. 35 mm samples were taken using a SPT split-barrel sampler with an inside diameter (I.D.) of 35 mm and an outside diameter (O.D.) of 51 mm.
5. 63.5 mm core samples were taken using an HQ core sampler with a 63.5 mm inside diameter (I.D.) and 94 mm outside diameter (O.D.) core barrel.
6. Blowcounts 50/125 means 50 blows per 125 mm penetration.
7. Groundwater was not encountered at the time of drilling.
8. The descriptions and classifications of soil, including consistency and relative density descriptions, used by the field personnel for the exploration bole holes on "Soil and Rock Logging Classification Manual (Field Guide)", Engineering Service Center, Office of Structural Foundations, August 1996.

BENCHMARKS

STATION	OFFSET	N	E	ELEV	DESCRIPTION
15+79.190	4.62 Rt	618564.792	2062442.621	44.552	

SURVEY CONTROL
1. Coordinates bearing and distances are based on the California coordinate system of Nad 1983 HPGN, zone 6. (EPOCH 1991.35). Elevations are based on NGVD 29.



PLAN
1:500

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	494	539

REGISTERED CIVIL ENGINEER — 5/28/08

11-17-08
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — KENNETH G. SORENSEN — No. GE 2520 — Exp. 9-30-08 — GEOTECHNICAL — STATE OF CALIFORNIA

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05/14/08 SIGN OFF DATE	CHECKED BY	S. Ponapalli	DATE: 03/05/07			PROJECT ENGINEER	KILOMETER POST 5.9

RETAINING WALL - 59W
LOG OF TEST BORINGS 1 OF 4

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 5/19/08

SHEET 10 OF 13

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03	Pla	80	4.5/8.3	495	539

REGISTERED CIVIL ENGINEER 5/28/08

11-17-08
PLANS APPROVAL DATE

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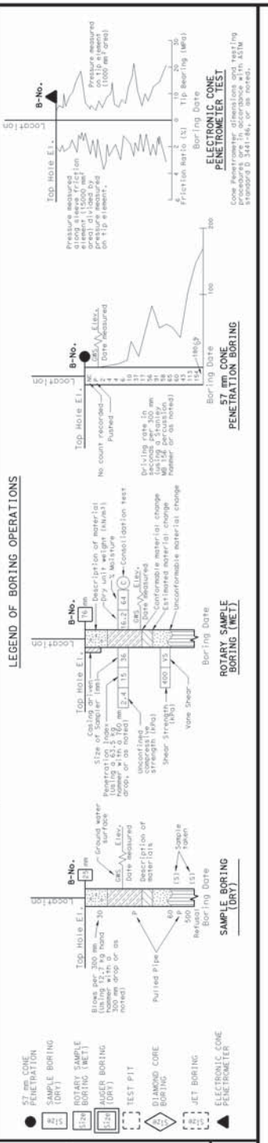

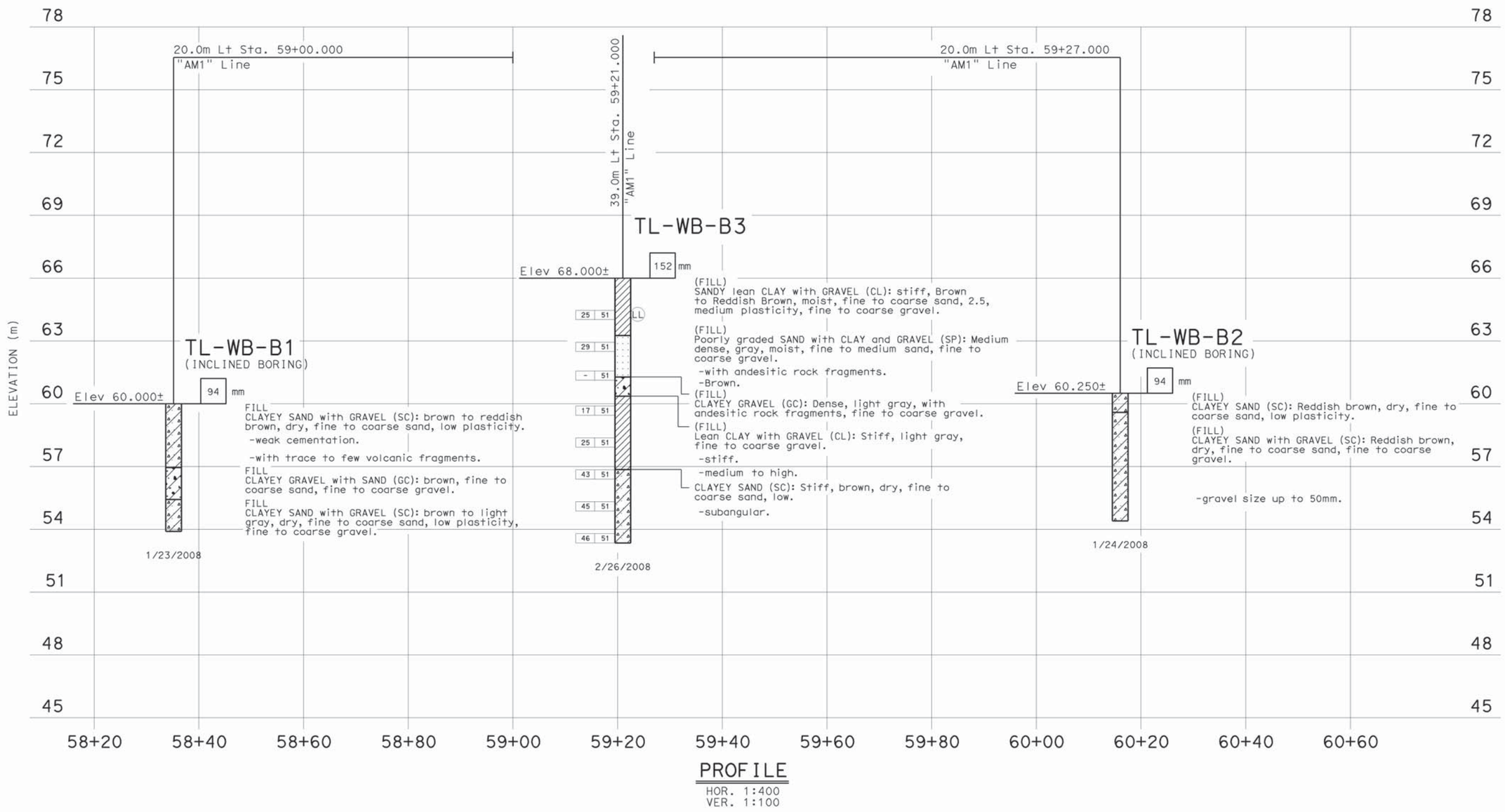

PROFILE
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VER. 1:100

Kenneth Sorensen DESIGN OVERSIGHT 05/14/08 SIGN OFF DATE	DRAWN BY	A. Sanchez	Sarat Ponapalli FIELD INVESTIGATION BY: DATE: 03/05/07	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER	BRIDGE NO. 19E0007 KILOMETER POST 5.9	RETAINING WALL - 59W LOG OF TEST BORINGS 2 OF 4	
	CHECKED BY	S. Ponapalli						

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 5/19/08

SHEET 11 OF 13

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
03	Pla	80	4.5/8.3	496	539

REGISTERED CIVIL ENGINEER 5/28/08

11-17-08
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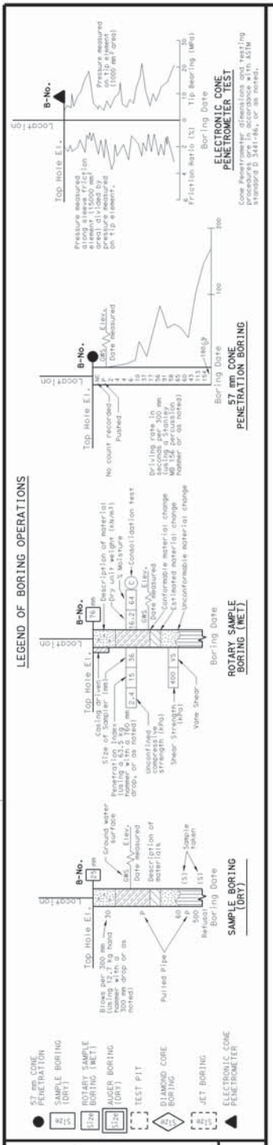
FOR PLAN VIEW AND ADDITIONAL NOTES, SEE
"LOG OF TEST BORINGS" SHEET 1 OF 3

LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

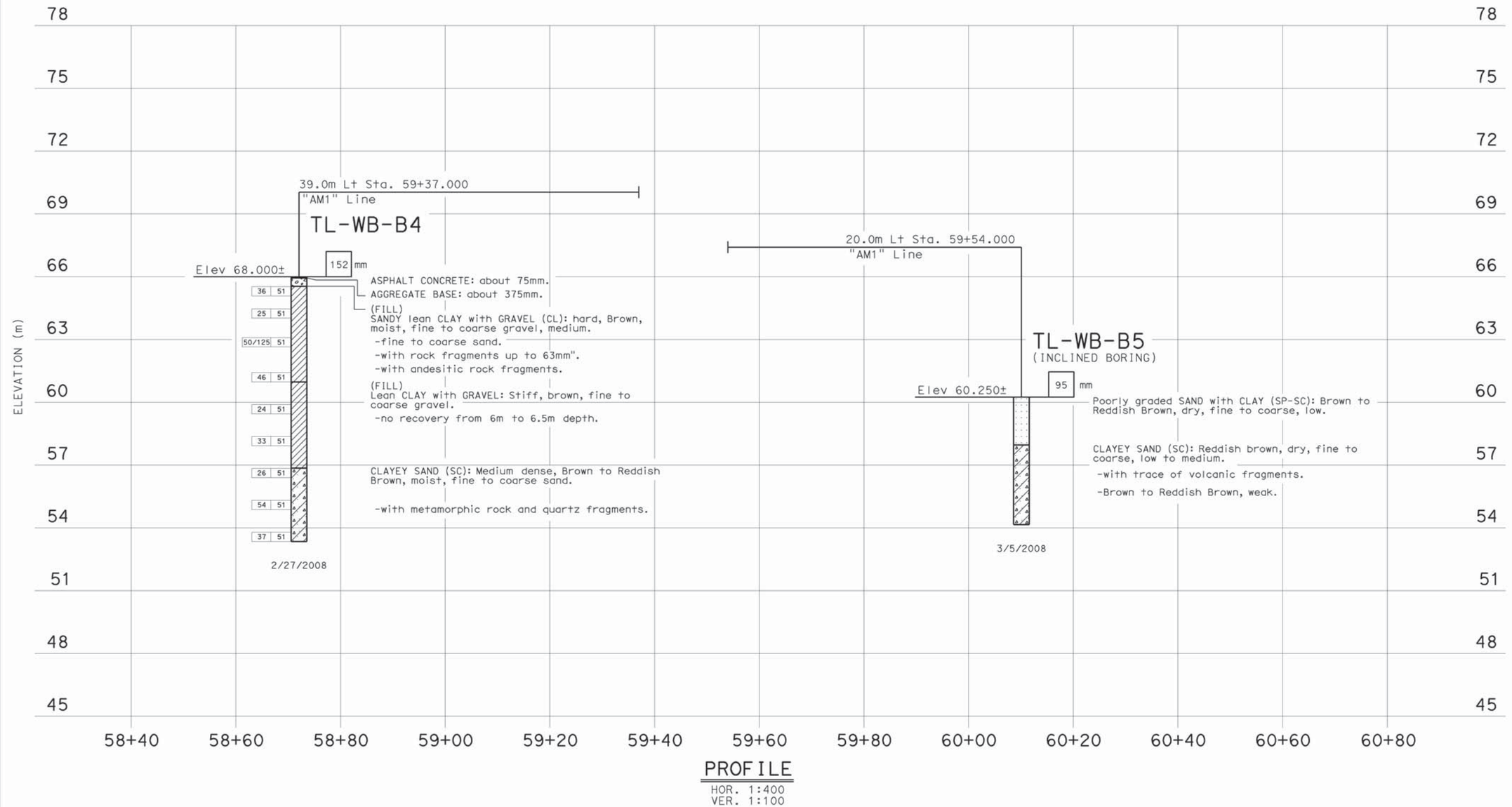
GRAVEL · SAND · SILT · CLAY · SANDY CLAY or CLAYEY SAND · SANDY SILT or SILTY SAND · SILTY CLAY · CLAYEY SILT · PEAT and/or ORGANIC MATTER · FILL MATERIAL · COBBLE · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

SPT N-Value (Blows/0.3m)	Granular	SPT N-Value (Blows/0.3m)	Cohesive
0-4	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very stiff
		>31	Hard

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.



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Kenneth Sorensen	DRAWN BY	A. Sanchez	Sarat Ponapalli	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		BRIDGE NO. 19E0007	RETAINING WALL - 59W
DESIGN OVERSIGHT	CHECKED BY	S. Ponapalli	FIELD INVESTIGATION BY:		PROJECT ENGINEER	KILOMETER POST 5.9	LOG OF TEST BORINGS 3 OF 4
05/14/08 SIGN OFF DATE			DATE: 03/05/07				

CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 2/1/00)

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

CU 03262
EA 367831

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SHEET 12 OF 13

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Caltrans Metric

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11-17-08
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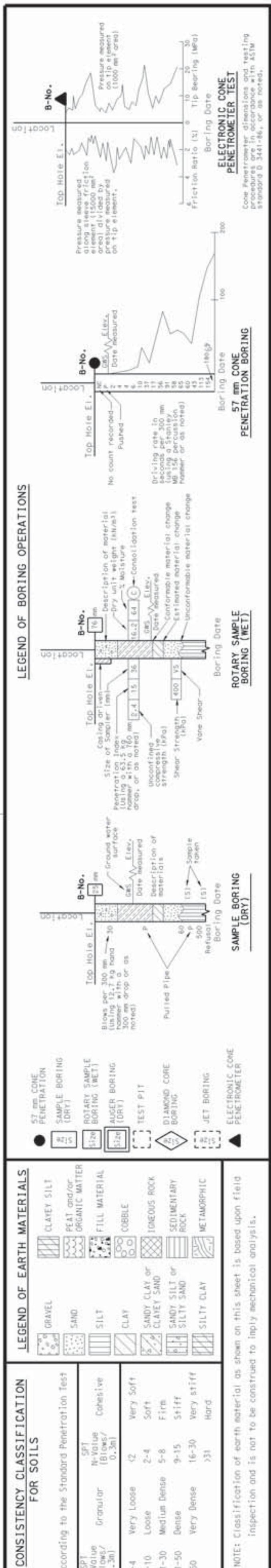


WEATHERING DESCRIPTORS

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

Descriptors		Diagnostic features					
		Chemical weathering-Discoloration and/or oxidation		Mechanical weathering-Grain boundary conditions (disaggregation) primarily for granitics and some coarse-grained sediments	Texture and solutioning		General characteristics (strength, excavation, etc.)§
Alphanumeric descriptor	Descriptive term	Body of rock	Fracture surfaces †		Texture	Solutioning	
W1	Fresh	No discoloration, not oxidized.	No discoloration or oxidation.	No separation, intact (tight).	No change.	No solutioning.	Hammer rings when crystalline rocks are struck. Almost always rock excavation except for naturaly weak or weakly cemented rocks such as siltstones or shales.
W2	Slightly weathered to fresh°						
W3	Slightly weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull.	Minor to complete discoloration or oxidation of most surfaces.	No visible separation, intact (tight).	Preserved.	Minor leaching of some soluble minerals may be noted.	Hammer rings when crystalline rocks are struck. Body of rock not weakened. With few exceptions, such as siltstones or shales, classified as rock excavation.
W4	Moderately to slightly weathered°						
W5	Moderately weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty," feldspar crystals are "cloudy."	All fracture surfaces are discolored or oxidized.	Partial separation of boundaries visible.	Generally preserved.	Soluble minerals may be mostly leached.	Hammer does not ring when rock is struck. Body of rock is slightly weakened. Depending on fracturing, usually is rock excavation except in naturally weak rocks such as siltstones or shales.
W6	Intensely to moderately weathered°						
W7	Intensely weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in-situ disaggregation, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semi-arid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, argillation).	Leaching of soluble minerals may be complete.	Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened. Usually common excavation.
W8	Very intensely weathered						
W9	Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay.		Complete separation of grain boundaries (disaggregated).	Resembles a soil, partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete.		Can be granulated by hand. Always common excavation. Resistant minerals such as quartz may be present as "stringers" or "dikes."

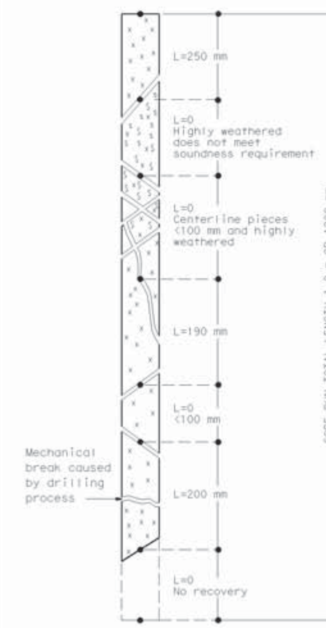
Note: This chart and its horizontal categories are more readily applied to rocks with feldspars and mafic minerals. Weathering in various sedimentary rocks, particularly limestones and poorly indurated sediments, will not always fit the categories established. This chart and weathering categories may have to be modified for particular site conditions or alteration such as hydrothermal effects; however, the basic framework and similar descriptors are to be used.

° Combination descriptors are permissible where equal distribution of both weathering characteristics are present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, dual descriptors should not be used where significant, identifiable zones can be delineated. When given as a range, only two adjacent terms may be combined. "Decomposed to slightly weathered," or "moderately weathered to fresh" are not acceptable.

† Does not include directional weathering along shears or faults and their associated features. For example, a shear zone that carried weathering to great depths into a fresh rock mass would not require the rock mass to be classified as weathered.

§ These are generalizations and should not be used as diagnostic features for weathering or excavation classification. These characteristics vary to a large extent based on naturally weak materials or cementation and type of excavation.

RQD LOGGING



$$RQD = \frac{\sum \text{Length of sound core pieces} > 100\text{ mm}}{\text{Total core run length}}$$

$$RQD = \frac{250+190+200}{1200} \times 100\%$$

RQD = 53% (fair)

RQD (ROCK QUALITY DESIGNATION)	DESCRIPTION OF ROCK QUALITY
0 - 25%	VERY POOR
25 - 50%	POOR
50 - 75%	FAIR
75 - 90%	GOOD
90 - 100%	EXCELLENT

After Deere & Deere, 1989

BEDDING, FOLIATION, OR FLOW TEXTURE DESCRIPTORS

Descriptors	Thickness / Spacing
Massive	Greater than 3 m
Very thickly (bedded, foliated, or banded)	1 to 3 m
Thickly	300 mm to 1 m
Moderately	100 to 300 mm
Thinly	30 to 100 mm
Very thinly	10 to 30 mm
Laminated (intensely foliated or banded)	Less than 10 mm

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

FRACTURE DENSITY

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

FRACTURE DENSITY- Based on the spacing of all natural fractures in an exposure or core recovery lengths in boreholes; excludes mechanical breaks, shears, and shear zones; however, shear-distributed zones (fracturing outside the shear) are included. Descriptors for fracture density apply to all rock exposures such as tunnel walls, dozer trenches, outcrops, or foundation cut slopes and inverts, as well as boreholes. Descriptive criteria presented below are based on borehole cores where lengths are measured along the core axis, for other exposures the criteria is distance measured between fractures (size of blocks).

UNFRACTURED (FD0): No fractures.

VERY SLIGHTLY FRACTURED (FD1): Core recovered mostly in lengths greater than 1 m.

SLIGHTLY TO VERY SLIGHTLY FRACTURED (FD2)*

SLIGHTLY FRACTURED (FD3): Core recovered mostly in lengths from 300 to 1000 mm, with few scattered lengths less than 300 mm or greater than 1000 mm.

MODERATELY TO SLIGHTLY FRACTURED (FD4)*

MODERATELY FRACTURED (FD5): Core recovered mostly in 100 to 300 mm lenghts with most lengths about 200 mm.

INTENSELY TO MODERATELY FRACTURED (FD6)*

INTENSELY FRACTURED (FD7): Lengths average from 30 to 100 mm with scattered fragmented intervals. Core recovered mostly in lengths less than 100 mm.

VERY INTENSELY TO INTENSELY FRACTURED (FD8)*

VERY INTENSELY FRACTURED (FD9): Core recovered mostly as chips and fragments with a few scattered short core lengths.

* Combinations of fracture densities (e.g. Very intensely to intensely fractured, or Moderately to slightly fractured) are used where equal distribution of both fracture density characteristics are presently over a significant interval or exposure, or where characteristics are "in between" the descriptor definitions.

ROCK HARDNESS/STRENGTH DESCRIPTORS

Alphanumeric Descriptor	Descriptor	Criteria
H1	Extremely hard	Core, fragment, or exposure cannot be scratched with knife or sharp pick; can only be chipped with repeated heavy hammer blows.
H2	Very hard	Cannot be scratched with knife of sharp pick. Core or fragment breaks with repeated heavy hammer blows.
H3	Hard	Can be scratched with knife or sharp pick with difficulty (heavy pressure). Heavy hammer blow required to break specimen.
H4	Moderately hard	Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.
H5	Moderately soft	Can be grooved 2 mm deep by knife or sharp pick with moderate or heavy pressure. Core or fragment breaks with light hammer blow or heavy manual pressure.
H6	Soft	Can be grooved or gouged easily by knife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
H7	Very soft	Can be readily indented, grooved or gouged with fingernail, or carved with a knife. Breaks with light manual pressure.

Any bedrock unit softer than H7, very soft, is to be described using ASTM D-2488 consistency descriptors.

Note: Although "sharp pick" is included in these definitions, descriptions of ability to be scratched, grooved or gouged by a knife is the preferred criteria.

Modified from United States Bureau of Reclamation, Engineering Geology Field manual.

IN-SITU, LAB & FIELD TEST DESIGNATIONS

- (AL) ATTERBERG LIMITS
- (CA) CHEMICAL ANALYSIS
- (CN) CONSOLIDATION
- (CU) CONSOLIDATED UNDRAINED TRIAXIAL
- (DS) DIRECT SHEAR
- (MD) MAX. DRY DENSITY
- (PP) POCKET PENETROMETER
- (SA) SIEVE ANALYSIS
- (TV) TORVANE
- (UC) UNCONFINED COMPRESSION
- (UU) UNCONSOLIDATED UNDRAINED TRIAXIAL
- (VS) VANE SHEAR

APPENDIX B

Caltrans Comments and BCI Response

Structures Preliminary Geotechnical Report

Interstate 80/State Route 65

Interchange Improvement Project

Prepared by BLACKBURN CONSULTING, Auburn, California for CH2M Hill

September 2014

Page 6 - Section 6.2 Faulting

Seismic related information including faults, distance to seismic sources, PGA, PBA, as well as ARS curves for both Probabilistic Seismic Hazard Analysis and Deterministic Seismic Hazard Analysis have been updated with the latest Caltrans On-line V2.3.06. All references to PGA (Merriam and Shantz, 2007) shall be modified and the data from the latest version shall be used and referenced in all future submittals.

Pages 6 and 7 - Section 6.3 Subsurface Soil and Rock

Several "General Soil and Rock Conditions" are outlined for each of the 6 general project areas, yet a single Acceleration Response Spectrum curve using a Vs30=560 m/s is used to represent the entire project area. The LOTBs on pages 33 through 83 of the report indicate a wide range of geological formations through the project which will yield different Vs30s. For the next phase of design, separate seismic analysis and ARS curves shall be submitted for each separate structure based on site specific Vs30s.

Page 8 - Section 7.1 Geologic Hazards

The third line indicates that "There is a potential for weak claystones to occur near the base of the Mehrten Formation... the claystone can impact slope stability and design parameters for new structures". However, Section 7.2.5 Seismic Slope Stability states that potential for seismic slope instability within the project area is very low. Please clarify whether or not this may be an issue.

Page 9 - Table 3

- Please use "Maximum Magnitude" instead of "Maximum Moment Magnitude".

-Please specify what R_{RUP} represents.

-Need to specify that the Peak Ground Acceleration (PGA) is based on the minimum Deterministic Spectrum.

Pages 11, 12, 13 I reviewed Table 4 and for the time being have not further comments.

Page 31 - Preliminary ARS

The recommended ARS curve shown is incorrect. A composite curve using the minimum deterministic spectrum for periods between 0 to about 0.7 seconds and probabilistic spectrum for periods between 0.7 and 5 seconds should have been used. Figure 6 only shows the deterministic curve.

General Comments

Please note that the current Caltrans Seismic Design Criteria (SDC) have been updated, and the foundation design procedures are currently being updated. It is the responsibility of the consultant to make sure the procedures/methods used for foundation related design are the most current.

BCI Response to Caltrans Comments

Comment on Page 6 - Section 6.2 Faulting
Seismic related information is referenced to the latest Caltrans ARS Online V2.3.06.

Comment on Pages 6 and 7 - Section 6.3 Subsurface Soil and Rock
Acknowledged and comment included in the SPGR that for the next phase of design, separate seismic analysis and ARS curves shall be submitted for each separate structure based on site specific Vs30's.

Comment on Page 8 - Section 7.1 Geologic Hazards
We provide clarification in Section 7.2.5 "Seismic Slope Stability" that possible claystones near the base of the Mehrten Formation can impact slope stability.

Comment on Page 9 - Table 3

- Changed "Maximum Moment Magnitude" to "Maximum Magnitude".
- Included definition of R_{RUP} as the closest distance to the fault rupture plane (as defined in Caltrans' "Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations," Appendix B, November 2012).
- Included a note that the Peak Ground Acceleration (PGA) is based on the Minimum Deterministic Spectrum.

Comment on Page 31 - Preliminary ARS
The recommended ARS curve shown is correct. The curve shown in Figure 6 is a composite curve (envelope) that uses the minimum deterministic spectrum for periods between 0 to about 0.75 seconds and probabilistic spectrum for periods between 0.75 and 5 seconds.

The apparent discrepancy appears to be that the probabilistic spectrum we use is based on a deaggregated event distance of 73.2 km rather than the default minimum deterministic distance (in accordance with Section 6 of Caltrans' "Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations" (November 2012). This results in less deviation of the probabilistic curve from the minimum deterministic curve. We provide tabled spectrum data in Figure 6b for clarification of values used.

General Comments
We acknowledge that the current Caltrans Seismic Design Criteria (SDC) have been updated, and the foundation design procedures are currently being updated, and that it is the responsibility of the consultant to make sure the procedures/methods used for foundation related design are the most current.