

# **GEOTECHNICAL DESIGN REPORT**

## **INTERSTATE 15, MANAGED LANES PROJECT, UNIT 3: PROPOSED RETAINING WALLS FOUNDATION RECOMMENDATIONS**

**11-SD-15  
M38.7 / 42.7  
EA: 080921**

**JUNE 30, 2004**

**Prepared for:**

**DISTRICT 11  
Office of Design**

**By:**

**DIVISION OF ENGINEERING SERVICES  
Geotechnical Services  
Office of Geotechnical Design – South 2**

## Memorandum

*Flex Your Power!  
Be energy efficient!*

**To:** Mr. Chris Thomas  
District 11  
Office of Design, MS# 35  
Attention: Mr. Luis Medina

**Date:** June 30, 2004

**File:** 11-SD-15  
M38.7/42.7  
EA 11 – 080921

**From:** **DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF ENGINEERING SERVICES**  
**Geotechnical Services**  
**Office of Geotechnical Design – South 2**

**Subject:** Interstate 15 (I-15) Managed Lanes Project, Unit 3: Foundation Recommendations for the Retaining Walls RW403M, RW413M, RW416M, RW423M, RW435R, RW435L, RWHV9L, and RWHV11L.

### INTRODUCTION

Following your request, a geotechnical investigation was performed for the purpose of providing foundation recommendations for the retaining structures that are required for construction of the I-15 Managed Lanes project, Unit 3. The investigation consisted of a site reconnaissance, a review of the existing as built plans and geologic maps, limited geologic mapping, subsurface investigation that included drilling, sampling, and laboratory soils testing, engineering analysis, and the writing of this report. The project information provided by the Project Engineer included the proposed retaining walls layout sheets in a scale of 1:1000 and pertinent cross sections that were used in the fieldwork, engineering analyses, and in the writing of this report.

### PROJECT LOCATION

For the project location and its limits, reference is directed to Figure 1, Project Location. The project site is located in the City of San Diego, California. It generally involves the north south trending Interstate 15 from Station 397+60 to about Station 437+50 "SD15 M" Line.

### GENERAL

Table 1 on the following page lists the proposed walls and indicates their station limits, types, and maximum heights. It was provided by the Project Engineer on June 29, 2004. For detailed locations of the proposed walls, reference is directed to attached Logs of Test Borings.

**Table 1**

WALL No.	BEGIN STATION	END STATION	ALIGNMENT	LENGTH	TYPE AND MAXIMUM HEIGHT (m)	MAXIMUM HEIGHT AT STATION/S
RW403M	11.575 Rt 397+60	13.975 Rt 402+74	SD15M	514	TYPE 1 6.7	401+10 401+40
	13.975 Rt 402+74	13.975 Rt 402+94	SD15M	20	TYPE 5 6.1	402+74 402+94
	13.975 Rt 402+94	11.575 Rt 409+04	SD15M	610	TYPE 1 6.1	402+94 403+45
RW413M	3.435 Rt 412+00	3.435 Rt 413+50	SD15L	150	TYPE 1 4.8	413+25 413+50
RW416M	3.435 Rt 414+83	3.435 Rt 417+23	SD15L	240	TYPE 1 4.8	414+83 416+60
RW423M	11.835 Lt 418+60	11.835 Lt 429+10	SD15M	1050	TYPE 1 6.1	421+53 422+70
	11.835 Lt 429+10	11.835 429+30	SD15M	20	TYPE 5 4.2	429+10 429+30
	11.835 429+30	11.835 Lt 429+80	SD15M	50	TYPE 1 3.6	429+30 429+65
RW435R	21.525 Rt 434+10	21.525 Rt 436+65	SD15R	255	TYPE 1 5.5	434+10 434+40
RW435L	21.525 Lt 434+02	21.525 Lt 435+65	SD15L	260	TYPE 1 5.5	434+02 434+29
RWHV11L	12.323 Lt 10+66	15.00 Lt 11+10	HV LINE	44	TYPE 5 3	10+95 11+10
	15.00 Lt 11+10	16.00 Lt 11+60	HV LINE	50	TYPE 1 4.2	11+10 11+60
	16.00 Lt 11+60	17.172 Lt 11+72	HV LINE	12	TYPE 5 2.4	11+60 11+73
RWHV9L	14.002 Lt 8+18	12.107 Lt 9+42	HV LINE	124	TYPE 5 2.4	most of wall

## GEOLOGY

The project site lies within the Peninsular Ranges Geomorphic Province of California. The project area is generally underlain by artificial fill, topsoil, alluvium, and a relatively thin mantle of residual soils. These stratigraphic units are underlain by a Mesozoic igneous rocks basement. The basement, the upper layer of which is weathered, is composed of upper mid Cretaceous granitic rocks of the Southern California Batholith (Kennedy and Peterson, 1975).

Plutonic rocks of the Southern California Batholith within the project area are quartz diorite and gabbro. These granitic rocks are strongly weathered often with spheroidal boulders as a result of weathering (Kennedy and Peterson, 1975). The residual soil developed on the granitic basement consists of sands, locally slightly silty, often with preserved remnant texture of the

parent rock.

Alluvium consists primarily of stream deposits of silt (often clayey), sand, and gravel derived from bedrock and residual sources that lie within or near the project area. Artificial fill consists of compacted earth materials derived from local sources, predominately the decomposed granitic soils.

## **SEISMICITY**

No known Holocene fault exists within the project area. The nearest known active fault is the Rose Canyon Fault Zone believed to be capable of producing an earthquake with a Maximum Credible Magnitude of 7.0 on the Richter scale. It is located about 23 km southwest and west from the project site. The La Nacion Fault is located about 27 kilometers south from the project limits, and it is capable of producing an earthquake with a Maximum Credible Magnitude of 6.75 on the Richter scale. In addition, the Elsinore Fault lies about 31 km northeast from the project limits; it is capable of producing an earthquake with a Maximum Credible Magnitude of 7.5 on the Richter scale. All three aforementioned faults are believed to be capable of generating a Peak Ground Acceleration of about 0.22 g at the project site (Mulchin and Jones, 1996).

## **GROUNDWATER**

With the exception of borings drilled for Walls RW435R and WalRW435L, groundwater was not encountered during the subsurface investigations for the subject retaining structures. However, groundwater conditions, mainly perched water could potentially occur at isolated locations during the construction phase of the project. In general, the occurrence of perched water is not likely to have a significant impact on the construction of walls. In the event that groundwater is encountered during construction, groundwater mitigation recommendations will be provided by this office.

### **Retaining Wall RW435L**

In Boring RW435L-B2, seepage water was encountered at an elevation of 95.9 m, and in Boring RW435L-B3, seepage water was encountered at an elevation of 92.9 m. However, the footings of the Wall RW435L are planned to be located at much higher elevation. Therefore, this seepage water will have no impact on the Retaining Wall RW435L construction. In addition, it should be noted that during the drilling program conducted in November – December of 2003, the water level at the Lake Hodges was relatively low. Thus, the variations (raise) of the groundwater level at the location of Wall RW435L could potentially occur.

### Retaining Wall RW435R

In Boring RW435R-B1, groundwater water was encountered at an elevation of 91.7 m, and in Boring RW435R-B4, groundwater was encountered at an elevation of 91.5 m. However, the footings of the Wall RW435R are planned to be located at much higher elevation. Therefore, groundwater will have no impact on the Retaining Wall RW435R construction. In addition, it should be noted that during the drilling program conducted in November – December of 2003, the water level at the Lake Hodges was relatively low. Thus, the variations (raise) of the groundwater level at the location of Wall RW435R could potentially occur.

### CORROSION

Several soil samples were collected from various locations of the subject retaining structures. These samples were tested for corrosive potential by our Caltrans District 11 Transportation Laboratory and found to be non corrosive. The results of the corrosivity tests are presented in Table 2 below.

**Table 2. Results of Corrosivity Tests.**

BORING NO.	SAMPLE DEPTH (m)	pH	MINIMUM RESISTIVITY (ohm-cm)	SULFATE CONTENT (ppm)	CHLORIDE CONTENT (ppm)
RW403M-B1	1.5-3.0	N/A	6,250	N/A	N/A
RW403M-B7	1.5-3.0	N/A	5,800	N/A	N/A
RW413M-B1	1.5-2.1	N/A	6,000	N/A	N/A
RW416M-B2	1.5-3.0	N/A	10,500	N/A	N/A
RW423M-B3	1.5-3.0	N/A	12,000	N/A	N/A
RW423M-B5	1.5-3.0	N/A	11,000	N/A	N/A
RW435L-B2	1.5-3.0	N/A	8,000	N/A	N/A
RW435R-B1	1.5-3.0	N/A	6,000	N/A	N/A
RWHV9L-B1	1.5-3.0	N/A	4,300	N/A	N/A
RWHV11L-B1	1.5-3.0	N/A	10,000	N/A	N/A

Note: Caltrans defines a corrosive area as an area where the soil and/or water contains more than 500 ppm of chlorides, more than 2000 ppm sulfates, has a minimum resistivity of less than 1000 ohm-cm, or a pH of 5.5 or less.

## **FOUNDATION RECOMMENDATIONS**

### **Retaining Wall RW403M**

#### Subsurface Soil Conditions

Based on the results of the subsurface investigation of 2003 and a review of geologic references, the alignment of the proposed Retaining Wall RW403M, is predominantly underlain by residual soils of the granitic origin consisting of sands that locally are silty, clayey, and gravelly. These residual soils are in turn underlain by weathered granitic bedrock. Both aforementioned stratigraphic units, from the geotechnical engineering standpoint are deemed to be competent.

Locally, limited sections of Wall RW403M alignment could be found to be underlain by a shallow layer/s or wedge/s of fill materials consisting of granular soils derived from granitic or/and residual soils sources. However, in Boring RW403M-B6 fill materials consisting of residual granitic sands, with medium dense relative density, were logged from about the ground surface to an elevation of 146.8 m. Prior the construction of I-15, a tributary to the Lake Hodges crossed the freeway alignment at the approximate location of Boring RW403M-B6 (Kennedy and Peterson, 1975). Therefore, it is expected that from about Station 404+40 to 405+20, a relatively thicker wedge of fill materials built of granitic soils underlies the alignment of Wall RW403M.

For the Retaining Wall RW403M, nine Logs of Test Borings (RW403M-B1 through RW403M-B9) were developed and submitted to the Project Engineer. They are attached to this report in Attachment 1: Logs of Test Borings.

#### Foundation Recommendations

With the exception of the 20 m-long section, the entire alignment of Retaining Wall RW403M was designed to be a standard Type 1 wall.

Based on subsurface soil conditions, review of geologic references, and engineering analyses, it is recommended that Wall RW403M, 6.7 m in maximum height, may be designed as standard Type 1 wall, supported on a spread footing foundation as shown on sheet B3-1 in the "Standard Plans July 1999". With Loading Case I, the 220 kPa Gross Allowable Soil Bearing Pressure may be used for the design of the Wall RW403M.

From Station 402+74 to 402+94, under the Duenda Road Overcrossing, the 20 m-long section of the Wall RW403M alignment was designed to be a standard Type 5 wall. It is my understanding that the foundation recommendations for this wall will be provided by the Office of Structural Design.

### Construction Considerations

Based on the results of the subsurface investigation, local experience, and the review of geologic references, it is anticipated that excavations for Wall RW403M foundations will mostly be accomplished with the use of standard (heavy) earth-moving equipment. However, limited sections of the proposed wall alignment that are underlain by very hard granitic bedrock will potentially need to be blasted.

### **Retaining Wall RW413M**

#### Subsurface Soil Conditions

Based on the results of the subsurface investigation of 2003 and a review of geologic references, from Station 411+80 to approximately Station 412+65, the alignment of the proposed Retaining Wall RW413M is expected to be underlain by either residual soils of the granitic origin that in turn are underlain by weathered granitic bedrock or the granitic bedrock itself. Residual soils consist of sands that locally are silty, clayey, and gravelly. Both aforementioned stratigraphic units, from the geotechnical engineering standpoint are deemed to be competent.

From about Station 412+65 to 413+50, the alignment of the proposed Retaining Wall RW413M is underlain by a wedge of fill materials consisting of soils derived from granitic or/and residual soils sources. The interface between the fill and native granitic soils is expected to daylight at about Station 412+65 and from that location it is expected to dip at about an inclination of 1:3.5 (V:H) in the northern direction. In Boring RW413-B1, this interface was logged at an elevation of 120.20 m. In addition, in Boring RW413-B1, from the ground surface to an elevation of about 123.00 m, fill materials were logged to consist of sands with cobbly and gravelly zones (layers). Based on SPT blow counts, the relative density of this fill layer was found to be medium dense. However, from an elevation of about 123.00 m to 120.20 m, based on SPT blow counts, sandy fill materials were found to be loose.

For the Retaining Wall RW413M, a Log of Test Boring RW413M-B1 was developed and submitted to the Project Engineer. It is attached to this report in Attachment 1: Logs of Test Borings.

#### Foundation Recommendations

Based on the subsurface soil conditions, review of geologic references, and engineering analyses, it is recommended that Wall RW413M, 4.8 m in maximum height, may be designed as standard Type 1 wall, supported on a spread footing foundation as shown on sheet B3-1 in the "Standard Plans July 1999". With Loading Case I, the 170 kPa Gross Allowable Soil Bearing Pressure may be used for the design of the Wall RW413M. In addition, at Station 412+65 a vertical

construction joint should be incorporated in the wall design.

### Construction Considerations

Based on the results of the subsurface investigation, local experience, and the review of geologic references, it is anticipated that excavations for Wall RW413M foundations will mostly be accomplished with the use of standard (heavy) earth-moving equipment. However, along the interval from Station 411+80 to 412+65, limited sections of the proposed wall alignment that are underlain by very hard granitic bedrock will potentially need to be blasted (this potential is minimal).

### **Retaining Wall RW416M**

#### Subsurface Soil Conditions

Based on the results of the subsurface investigation of 2003 and a review of geologic references, from Station 414+83 to approximately Station 416+40, the alignment of the proposed Retaining Wall RW416M is underlain by fill materials consisting of soils derived from granitic or/and residual soils sources. The interface between the fill and native granitic soils is expected to daylight at about Station 416+40 and from that location it is expected to dip at about an inclination of 1:3 to 1:4 (V:H) in the southern direction. Fill materials consist of sands with cobbly/rocky and gravelly zones (layers). Based on SPT blow counts, the relative density of this fill was found to be medium dense.

From about Station 416+40 to 417+23, the alignment of the proposed Retaining Wall RW416M is expected to be underlain by either residual soils of the granitic origin that in turn are underlain by weathered granitic bedrock or the granitic bedrock itself. Residual soils consist of sands that locally are silty, clayey, and gravelly. Both aforementioned stratigraphic units, from the geotechnical engineering standpoint are deemed to be competent.

For the Retaining Wall RW416M, two Logs of Test Borings (RW416M-B1 and RW416M-B2) were developed and submitted to the Project Engineer. They are attached to this report in Attachment 1: Logs of Test Borings.

#### Foundation Recommendations

Based on the subsurface soil conditions, review of geologic references, and engineering analyses, it is recommended that Wall RW416M, 4.8 m in maximum height, may be designed as standard Type 1 wall, supported on a spread footing foundation as shown on sheet B3-1 in the "Standard Plans July 1999". With Loading Case I, the 170 kPa Gross Allowable Soil Bearing Pressure may be used for the design of the Wall RW416M. In addition, at Station 416+40 a vertical construction joint should be incorporated in the wall design

### Construction Considerations

Based on the results of the subsurface investigation, local experience, and the review of geologic references, it is anticipated that excavations for Wall RW416M foundations will mostly be accomplished with the use of standard (heavy) earth-moving equipment. However, along the interval from Station 416+40 to 417+23, limited sections of the proposed wall alignment that are underlain by very hard granitic bedrock will potentially need to be blasted (this potential is minimal).

### **Retaining Wall RW423M**

#### Subsurface Soil Conditions

Based on the results of the subsurface investigation of 2003 and a review of geologic references, from Station 418+60 to approximately Station 422+55, the alignment of the proposed Retaining Wall RW423M is underlain by fill materials. The fill consists of residual granitic sands often silty, gravelly, and locally clayey. Based on SPT blow counts, the relative density of this fill was found to be medium dense. This fill layer is underlain by alluvium that in turn is underlain by weathered granitic bedrock. The alluvium consists of silty and sandy clays. Based on SPT blow counts, the relative consistency of alluvium was found to vary from firm to very stiff.

From approximately Station 422+55 to about Station 426+20, the alignment of the Retaining Wall RW423M is underlain by residual soils of the granitic origin consisting of sands that locally are silty, and gravelly. These residual soils are underlain by weathered granitic bedrock. Both aforementioned stratigraphic units, from the geotechnical engineering standpoint are deemed to be competent. Within this interval, limited sections of the Wall RW423M alignment could be found to be underlain by a shallow layer/s or wedge/s of fill materials consisting of granular soils derived from cuts into the soils of the granitic origin (residual soils and/or weathered granitic rocks).

From approximate Station 426+20 to 429+80, the alignment of the proposed Retaining Wall RW423M is underlain by relatively shallow layer of fill materials. This fill consists of residual granitic sands often silty, gravelly, and locally clayey. Based on SPT blow counts, the relative density of these fill materials was found to be dense. This fill layer is underlain by geotechnically competent weathered granitic bedrock.

For the Retaining Wall RW423M, six Logs of Test Borings (RW423M-B1 through RW423M-B6) were developed and submitted to the Project Engineer. They are attached to this report in Attachment 1: Logs of Test Borings.

### Foundation Recommendations

With the exception of the 20 m-long section, the entire alignment of Retaining Wall RW423M was designed to be a standard Type 1 wall.

Based on subsurface soil conditions, review of geologic references, and engineering analyses, it is recommended that Wall RW423M, 6.1 m in maximum height, may be designed as standard Type 1 wall, supported on a spread footing foundation as shown on sheet B3-1 in the "Standard Plans July 1999". With Loading Case I, the 210 kPa Gross Allowable Soil Bearing Pressure may be used for the design of the Wall RW423M.

From Station 429+10 to 429+30, under the Pomerado Road Overcrossing, the 20 m-long section of the Wall RW423M alignment was designed to be a standard Type 5 wall. It is my understanding that the foundation recommendation for this wall will be provided by the Office of Structural Design.

### Construction Considerations

Based on the results of the subsurface investigation, local experience, and the review of geologic references, it is anticipated that excavations for Wall RW423M foundations will mostly be accomplished with the use of standard (heavy) earth-moving equipment. However, limited sections of the proposed wall alignment that are underlain by very hard granitic bedrock will potentially need to be blasted (this potential is minimal).

## **Retaining Wall RW435R**

### Subsurface Soil Conditions

Based on the results of the subsurface investigation of 2003 and a review of geologic references, the alignment of the proposed Retaining Wall RW435R is underlain by fill materials consisting of soils derived mostly from granitic or/and residual soils sources. This fill is underlain by alluvium that in turn is underlain by residual soils of the granitic origin. Fill materials consist of sands, locally clayey and silty with cobbly/rocky and gravelly zones (layers). Based on SPT blow counts, the relative density of this fill was found to be medium dense.

In Boring RW435R-B1, at an elevation of about 91.90 m, fill materials were logged to be underlain by loose (based on SPT blow counts) alluvial sands.

In Boring RW435R-B4, at an elevation of about 97.80 m, fill materials were logged to be underlain by alluvial clays and sands. Based on SPT blow counts, the relative consistency of clays was found to be firm and the relative density of sands was found to be loose. At an elevation of about 93.40 m, alluvial soils were found to be underlain by geotechnically competent residual soils of the granitic origin.

For the Retaining Wall RW435R, four Logs of Test Borings (RW435R-B1 through RW435R-B4) were developed and submitted to the Project Engineer. They are attached to this report in Attachment 1: Logs of Test Borings.

### Foundation Recommendations

Based on the subsurface soil conditions, review of geologic references, and engineering analyses, it is recommended that Wall RW435R, 5.5 m in maximum height, may be designed as standard Type 1 wall, supported on a spread footing foundation as shown on sheet B3-1 in the "Standard Plans July 1999". With Loading Case I, the 190 kPa Gross Allowable Soil Bearing Pressure may be used for the design of the Wall RW435R.

### Construction Considerations

Based on the results of the subsurface investigation, local experience, and the review of geologic references, it is anticipated that excavations for Wall RW435R foundations will be accomplished with the use of standard earth-moving equipment.

## **Retaining Wall RW435L**

### Subsurface Soil Conditions

Based on the results of the subsurface investigation of 2003 and a review of geologic references, the alignment of the proposed Retaining Wall RW435L is underlain by fill materials consisting of soils derived mostly from granitic or/and residual soils sources. This fill is underlain by alluvium that in turn was underlain by residual soils of the granitic origin. Fill materials consist of sands, locally clayey and silty with cobbly/rocky and gravelly zones (layers). Based on SPT blow counts, the relative density of this fill was found to be medium dense.

In Boring RW435L-B1, at an elevation of about 91.40 m, fill materials were logged to be underlain by alluvium consisting of clays and sands. Based on SPT blow counts, the relative consistency of clays was found to be soft, and the relative density of sands was found to be loose to medium dense.

In Boring RW435L-B3, at an elevation of about 95.20 m, fill materials were logged to be underlain by alluvial clayey sands. Based on SPT blow counts, the relative density of these sands was found to be medium dense. At an elevation of about 93.10 m, these alluvial soils were logged to be underlain by geotechnically competent residual soils of the granitic origin. In addition, in Boring RW435L-B3, at an elevation of about 91.00 m a weathered granitic bedrock was encountered.

For the Retaining Wall RW435L, three Logs of Test Borings (RW435L-B1, RW435L-B2, and RW435L-B3) were developed and submitted to the Project Engineer. They are attached to this

report in Attachment 1: Logs of Test Borings.

### Foundation Recommendations

Based on the subsurface soil conditions, review of geologic references, and engineering analyses, it is recommended that Wall RW435L, 5.5 m in maximum height, may be designed as standard Type 1 wall, supported on a spread footing foundation as shown on sheet B3-1 in the "Standard Plans July 1999". With Loading Case I, the 190 kPa Gross Allowable Soil Bearing Pressure may be used for the design of the Wall RW435L.

### Construction Considerations

Based on the results of the subsurface investigation, local experience, and the review of geologic references, it is anticipated that excavations for Wall RW435L foundations will be accomplished with the use of standard earth-moving equipment.

## **Retaining Wall RWHV9L**

### Subsurface Soil Conditions

Based on the results of the subsurface investigation of 2003 and a review of geologic references, the alignment of the proposed Retaining Wall RWHV9L is underlain by fill materials consisting of soils derived from granitic or/and residual soils sources. This fill is underlain by residual soils of the granitic origin that in turn are underlain by weathered granitic bedrock. Fill materials consist of sands with cobbly/rocky and gravelly zones (layers). Based on SPT blow counts, the relative density of this fill was found to be medium dense. In Boring RWHV9-B1, the interface between the fill and residual granitic soils was logged to be at an elevation of about 110.80 m. Residual soils consist of sands that locally are silty, and gravelly. From the geotechnical engineering standpoint, residual soils and weathered granitic bedrock are deemed to be competent.

For the Retaining Wall RWHV9, one Log of Test Boring, RWHV9-B1, was developed and submitted to the Project Engineer. It is attached to this report in Attachment 1: Logs of Test Borings.

### Foundation Recommendations

Based on the subsurface soil conditions, review of geologic references, and engineering analyses, it is recommended that Wall RWHV9, 4.2 m in maximum height, may be designed as standard Type 1 wall, supported on a spread footing foundation as shown on sheet B3-1 in the "Standard Plans July 1999". With Loading Case I, the 160 kPa Gross Allowable Soil Bearing Pressure may be used for the design of the Wall RW4HV9.

### Construction Considerations

Based on the results of the subsurface investigation, local experience, and the review of geologic references, it is anticipated that excavations for Wall RWHV9 foundations will mostly be accomplished with the use of standard earth-moving equipment.

### **Retaining Wall RWHV11L**

#### Subsurface Soil Conditions

Based on the results of the subsurface investigation of 2003 and a review of geologic references, the alignment of the proposed Retaining Wall RWHV11L is underlain by fill materials consisting of soils derived from granitic or/and residual soils sources. Fill materials consist of sands with cobbly/rocky and gravelly zones (layers). Based on SPT blow counts, the relative density of this fill was found to be medium dense.

For the Retaining Wall RWHV11L, one Log of Test Boring, RWHV11L-B1, was developed and submitted to the Project Engineer. It is attached to this report in Attachment 1: Logs of Test Borings.

#### Foundation Recommendations

Based on the subsurface soil conditions, review of geologic references, and engineering analyses, it is recommended that Wall RWHV11, 2.4 m in maximum height, may be designed as standard Type 1 wall, supported on a spread footing foundation as shown on sheet B3-1 in the "Standard Plans July 1999". With Loading Case I, the 105 kPa Gross Allowable Soil Bearing Pressure may be used for the design of the Wall RWHV11L.

#### Construction Considerations

Based on the results of the subsurface investigation, local experience, and the review of geologic references, it is anticipated that excavations for Wall RWHV11 foundations will mostly be accomplished with the use of standard earth-moving equipment.

Chris Thomas

Interstate 15 Managed Lanes Project, Unit 3: Foundation Recommendations  
for the Retaining Walls RW403M, RW413M, RW416M, RW423M, RW435R  
RW435L, RWHV9L, and RWHV11L  
EA 11-080921

06/30/04

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If you have any question regarding this report, please call Jeff Tesar at (858) 467-2716 (Calnet 734-2716).



Jeff Tesar,  
Engineering Geologist,  
Office of Geotechnical Design-South 2  
Branch D



### Figures

1. Figure 1, Project Location

### Attachments

1. Logs of Test Borings

### References:

1. L. Mualchin, California Seismic Hazard Map, 1996.
2. Michael P. Kennedy and Gary L. Peterson, Geology of the San Diego Metropolitan Area, California, Poway Quadrangle, California Division of Mines and Geology, Bulletin 200, 1975.

JT

Cc:

Abbas Abghari  
Brian Hinman

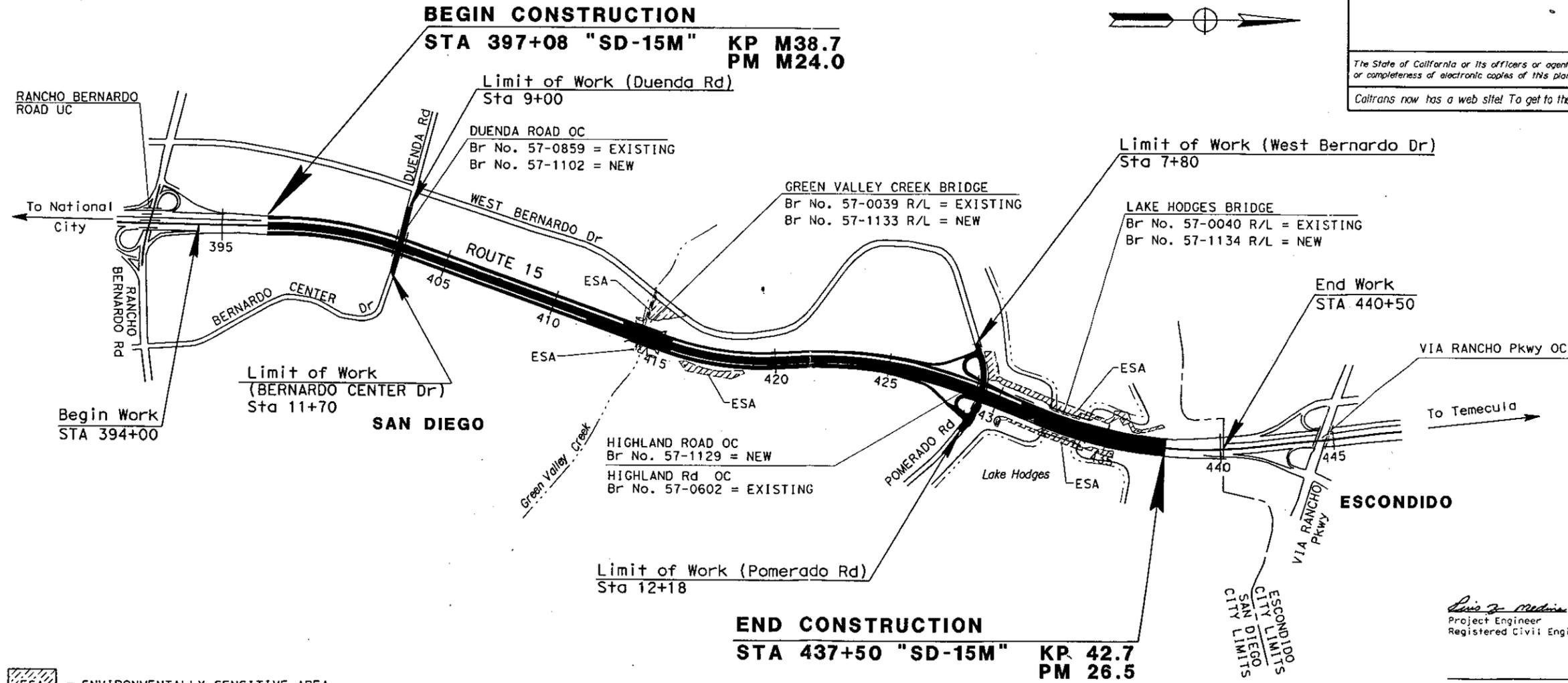
**STATE OF CALIFORNIA**  
**DEPARTMENT OF TRANSPORTATION**  
**PROJECT PLANS FOR CONSTRUCTION ON**  
**STATE HIGHWAY**  
**IN SAN DIEGO COUNTY IN SAN DIEGO FROM**  
**0.5 KM NORTH OF RANCHO BERNARDO ROAD UNDERCROSSING**  
**TO 0.7 KM SOUTH OF VIA RANCHO PARKWAY OVERCROSSING**

To be supplemented by Standard Plans dated July, 1999

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
11	SD	15	M38.7/M42.7	1	



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PROJECT ENGINEER	DATE
L. MEDINA	
PROJECT MANAGER	DATE
L. CARR	

= ENVIRONMENTALLY SENSITIVE AREA

The Contractor shall possess the Class (or classes) of license as specified in the "Notice to Contractors".

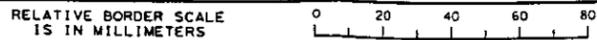
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**STA 437+50 "SD-15M" KP 42.7**  
**PM 26.5**

*Luis Z. Medina* 09-16-03  
 Project Engineer Date  
 Registered Civil Engineer



### PROJECT LOCATON

Contract No. **11-080924**





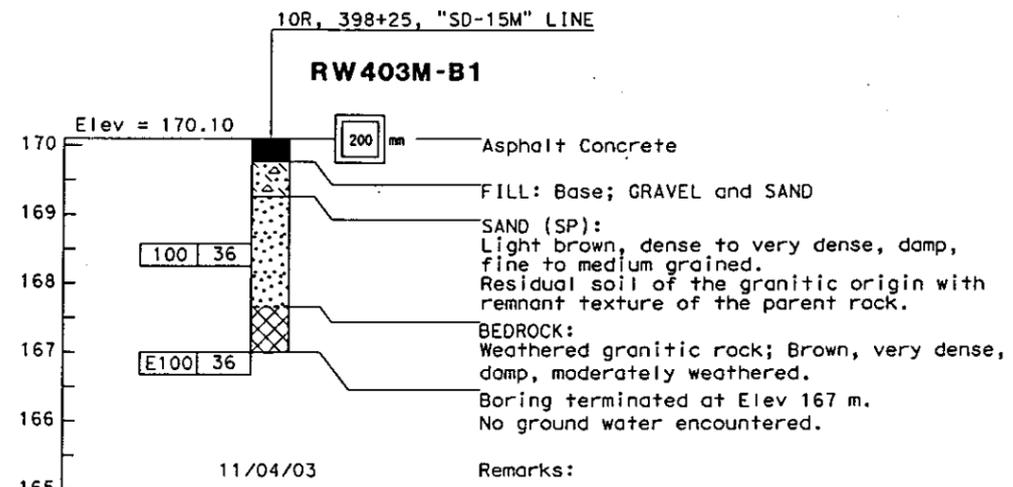
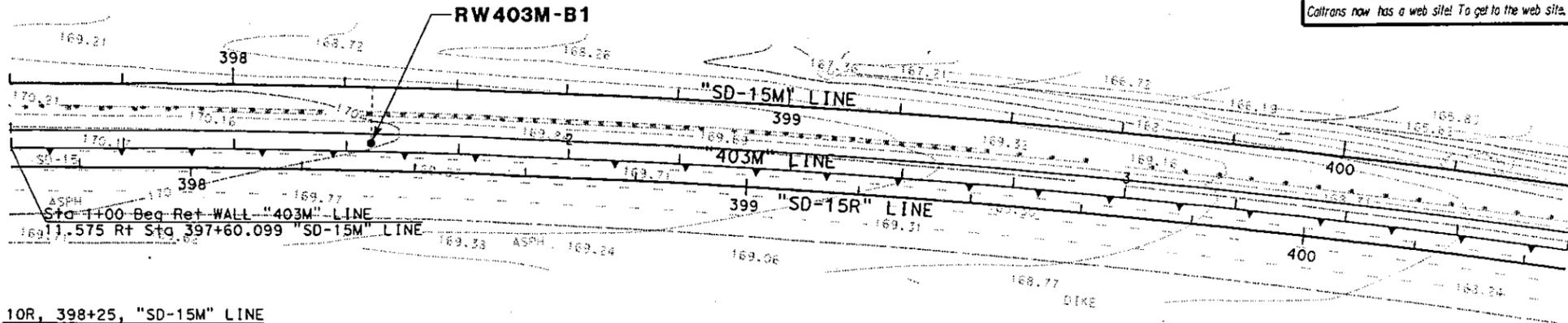
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST  
 JEFF J. TESAR  
 No. 2137  
 REGISTERED GEOLOGIST  
 CERTIFIED ENGINEERING GEOLOGIST  
 STATE OF CALIFORNIA

PLANS APPROVAL DATE \_\_\_\_\_  
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**BORING No.: RW403M-B1**  
 Date Drilled: 11/04/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 10R, 398+25, "SD-15M" Line  
 Top of hole elevation: 170.10 m

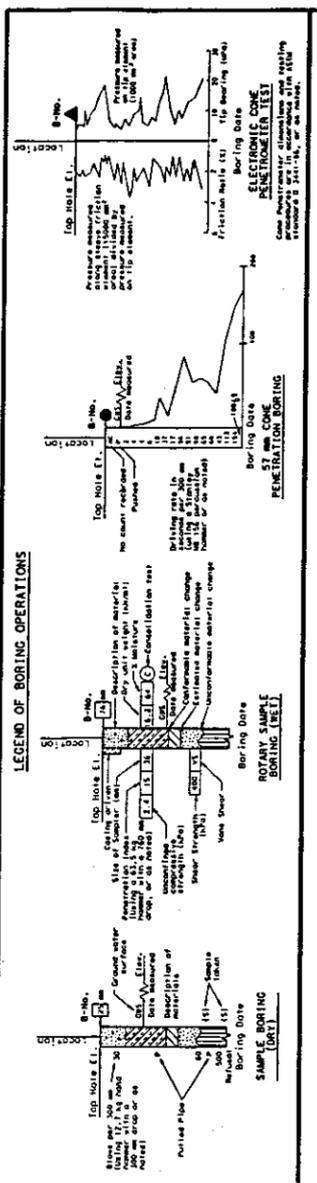
Drilling Method: CMA Auger  
 Logged By: J. Tesar



**NOTES:**

1. THE DESCRIPTIONS AND CLASSIFICATIONS OF ROCK AND/OR SOIL, INCLUDING CONSISTENCY AND RELATIVE DENSITY DEcriptors, USED BY THE FIELD PERSONNEL FOR THE EXPLORATION TEST HOLES SHOWN ON THIS SHEET ARE BASED ON THE "SOIL AND ROCK LOGGING CLASSIFICATION MANUAL", OFFICE OF MATERIAL AND FOUNDATIONS (FORMERLY OFFICE OF STRUCTURAL FOUNDATIONS), AUGUST 1996. COPIES OF THIS MANUAL ARE AVAILABLE FOR INSPECTION AND/OR REPRODUCTION SUBJECT TO APPLICABLE OFFICE POLICIES, BY ANY BIDDER OR CONTRACTOR UPON WRITTEN REQUEST.
2. E-BLOW COUNT FOR 0.3 m PENETRATION EXTRAPOLATED FROM BLOW COUNT FOR THE INTERVAL LESS THAN 0.3 m (DUE TO CHANGE IN MATERIAL AND HARD DRIVING).
3. PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF BORING OPERATIONS**



**LEGEND OF EARTH MATERIALS**

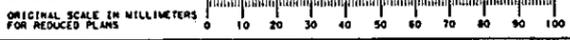
GRAVEL	CLAYEY SILT
SAND	PEAT
SILT	ORGANIC MUD
CLAY	FILL MATERIAL
SHADY CLAY or CLAYEY SAND	COBBLE
CLAYEY SILT or SILTY SAND	INDURATED ROCK
SILT	SEDIMENTARY ROCK
SILT CLAY	METAMORPHIC

**CONSISTENCY CLASSIFICATION FOR SOILS**

N-Value (Blows/30cm)	Consistency	
	Very Soft	Soft
0-4	Very Loose	Loose
5-10	Medium Dense	Dense
11-30	Very Dense	Hard
31-50		
50		

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.

<b>ENGINEERING SERVICES</b>		<b>GEOTECHNICAL SERVICES</b>		FIELD INVESTIGATION BY:	STATE OF CALIFORNIA	GEOTECHNICAL DESIGN	BRIDGE NO.	<b>RETAINING WALL RW403M R-23</b>	
DRAWN BY:	JOHN FRASIER			J. Tesar	DEPARTMENT OF TRANSPORTATION	- SOUTH 2	KILOMETER POST	<b>LOG OF TEST BORINGS RW403M-B1</b>	
CHECKED BY:	JEFF TESAR							REVISION DATES (PRELIMINARY STAGE ONLY)	
					CU 11230	EA 080921	DISREGARD PRINTS BEARING EARLIER REVISION DATES		SHEET 1 OF 1





DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
CERTIFIED ENGINEERING GEOLOGIST

JEFF J. TESAR  
No. 2137  
REGISTERED GEOLOGIST  
STATE OF CALIFORNIA

PLANS APPROVAL DATE

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**BORING No.: RW403M-B2**

Date Drilled: 11/04/03

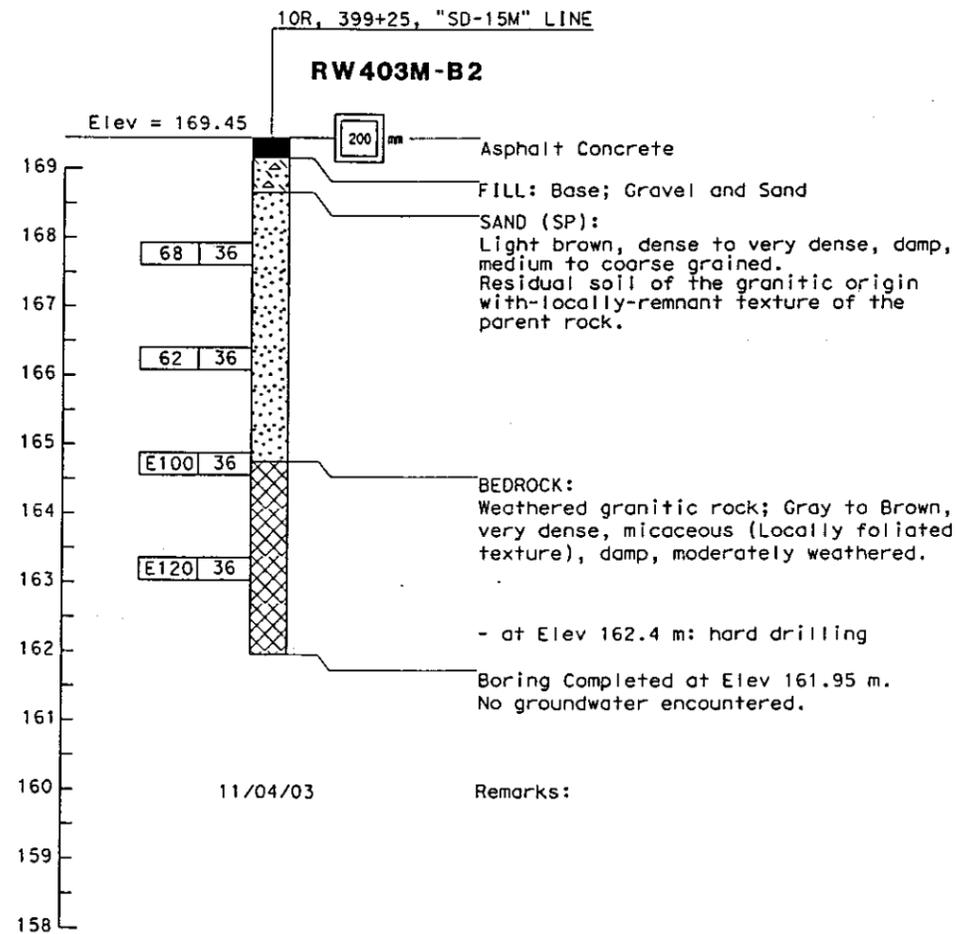
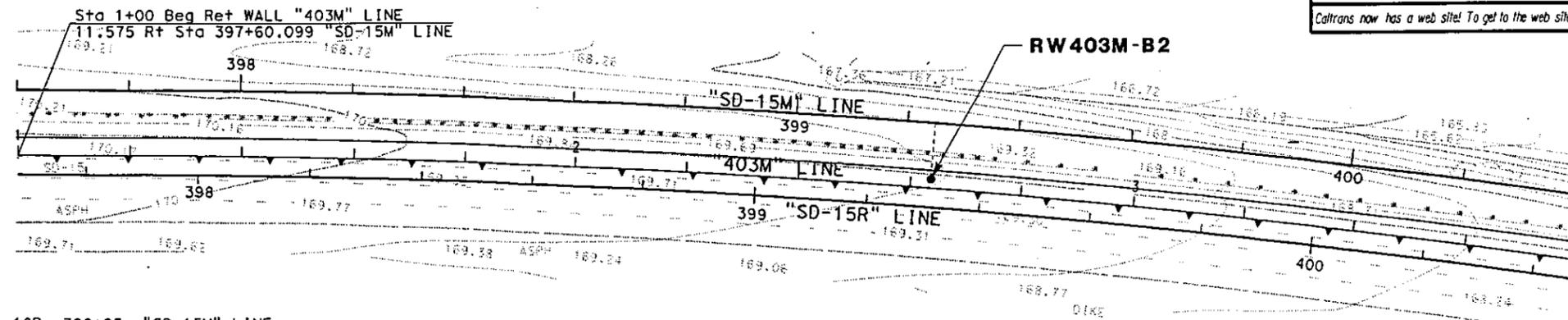
Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls

Location: 10R, 399+25, "SD-15M" Line

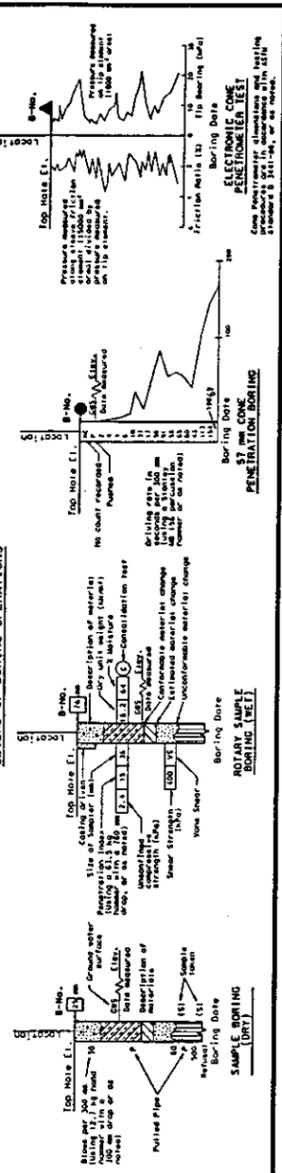
Top of hole elevation: 169.45 m

Drilling Method: CMA Auger

Logged By: J. Tesar

**NOTES:**

1. THE DESCRIPTIONS AND CLASSIFICATIONS OF ROCK AND/OR SOIL, INCLUDING CONSISTENCY AND RELATIVE DENSITY DESCRIPTORS, USED BY THE FIELD PERSONNEL FOR THE EXPLORATION TEST HOLES SHOWN ON THIS SHEET ARE BASED ON THE "SOIL AND ROCK LOGGING CLASSIFICATION MANUAL", OFFICE OF MATERIAL AND FOUNDATIONS (FORMERLY OFFICE OF STRUCTURAL FOUNDATIONS), AUGUST 1996. COPIES OF THIS MANUAL ARE AVAILABLE FOR INSPECTION AND/OR REPRODUCTION SUBJECT TO APPLICABLE OFFICE POLICIES, BY ANY BIDDER OR CONTRACTOR UPON WRITTEN REQUEST.
2. E-BLOW COUNT FOR 0.3 m PENETRATION EXTRAPOLATED FROM BLOW COUNT FOR THE INTERVAL LESS THAN 0.3 m (DUE TO CHANGE IN MATERIAL AND HARD DRIVING).
3. PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF BORING OPERATIONS**

**LEGEND OF EARTH MATERIALS**

CLAYEY SILT	PEAT AND/OR ORGANIC MATTIX
FILL MATERIAL	COBBLE
OPULES ROCK	SEDIMENTARY ROCK
METAMORPHIC	

**CONSISTENCY CLASSIFICATION FOR SOILS**

According to the Standard Penetration Test	
SPN (Blows/30 cm)	Consistency
0-4	Very Loose
5-10	Loose
11-20	Medium Dense
21-30	Dense
31-50	Very Dense
50	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.

<b>ENGINEERING SERVICES</b>		<b>GEOTECHNICAL SERVICES</b>		FIELD INVESTIGATION BY:	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	GEOTECHNICAL DESIGN - SOUTH 2	BRIDGE NO. RETAINING WALL RW403M R-24	KILOMETER POST LOG OF TEST BORINGS RW403M-B2
DRAWN BY	JOHN FRASIER	CHECKED BY	JEFF TESAR	J. Tesar	CU 11230 EA 080921	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY)	SHEET OF





DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST  
 JEFF J. TESAR  
 No. 2137  
 REGISTERED GEOLOGIST  
 CERTIFIED ENGINEERING GEOLOGIST  
 STATE OF CALIFORNIA

PLANS APPROVAL DATE  
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**BORING No.: RW403M-B4**

Date Drilled: 11/05/03

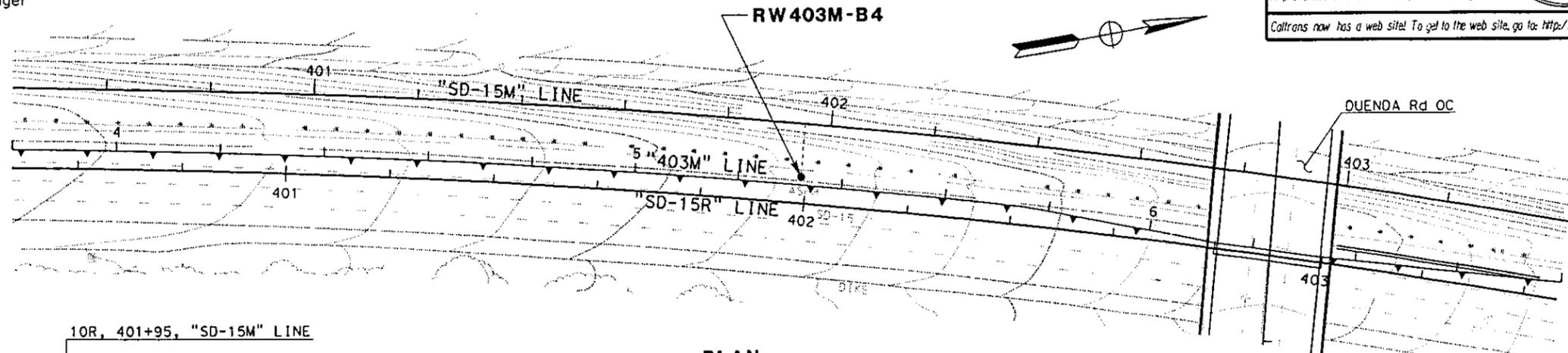
Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls

Location: 10R, 401+95, "SD-15M" Line

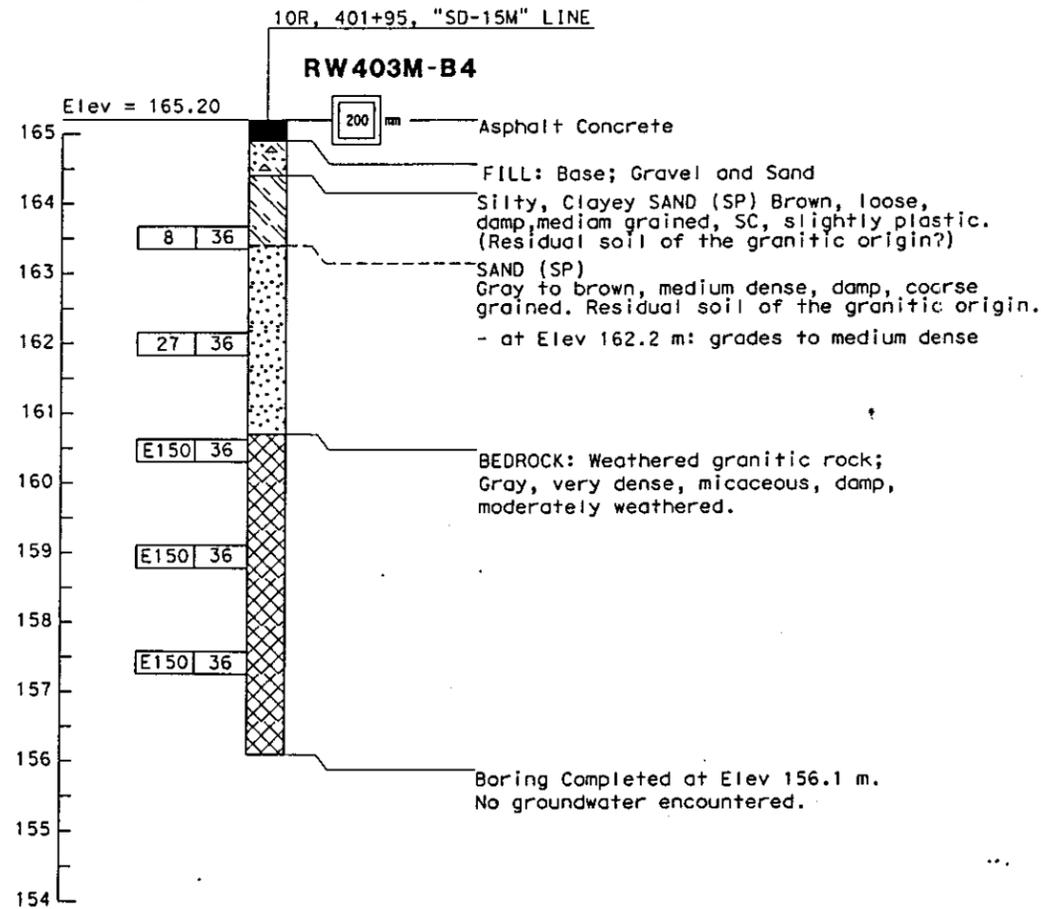
Top of hole elevation: 165.20 m

Drilling Method: CMA Auger

Logged By: J. Tesar



**PLAN**  
SCALE 1:500



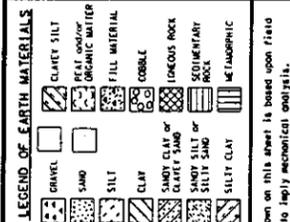
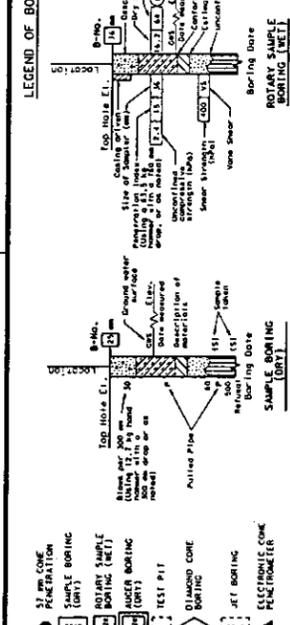
11/05/03

Remarks:

**NOTES:**

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3. PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF BORING OPERATIONS**



**CONSISTENCY CLASSIFICATION FOR SOILS**

According to the Standard Penetration Test

SPN	Consistency
0-4	Very Loose
5-10	Loose
11-20	Medium Dense
21-30	Dense
31-50	Very Dense
50	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.

<b>ENGINEERING SERVICES</b>	<b>GEOTECHNICAL SERVICES</b>	FIELD INVESTIGATION BY:	<b>STATE OF CALIFORNIA</b>	GEOTECHNICAL DESIGN	BRIDGE NO.	<b>RETAINING WALL RW403M</b>	<b>R-26</b>
DRAWN BY: JOHN FRASIER		J. Tesar	<b>CALIFORNIA</b>	- SOUTH 2	KILOMETER POST	<b>LOG OF TEST BORINGS RW403M-B4</b>	
CHECKED BY: JEFF TESAR			DEPARTMENT OF TRANSPORTATION				

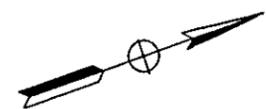


DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

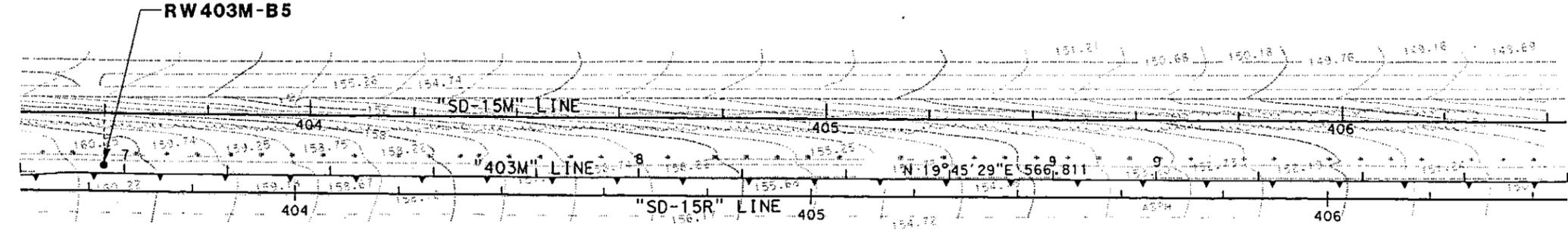
12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST  
 JEFF J. TESAR  
 No. 2137  
 REGISTERED GEOLOGIST  
 CERTIFIED ENGINEERING GEOLOGIST  
 STATE OF CALIFORNIA

PLANS APPROVAL DATE  
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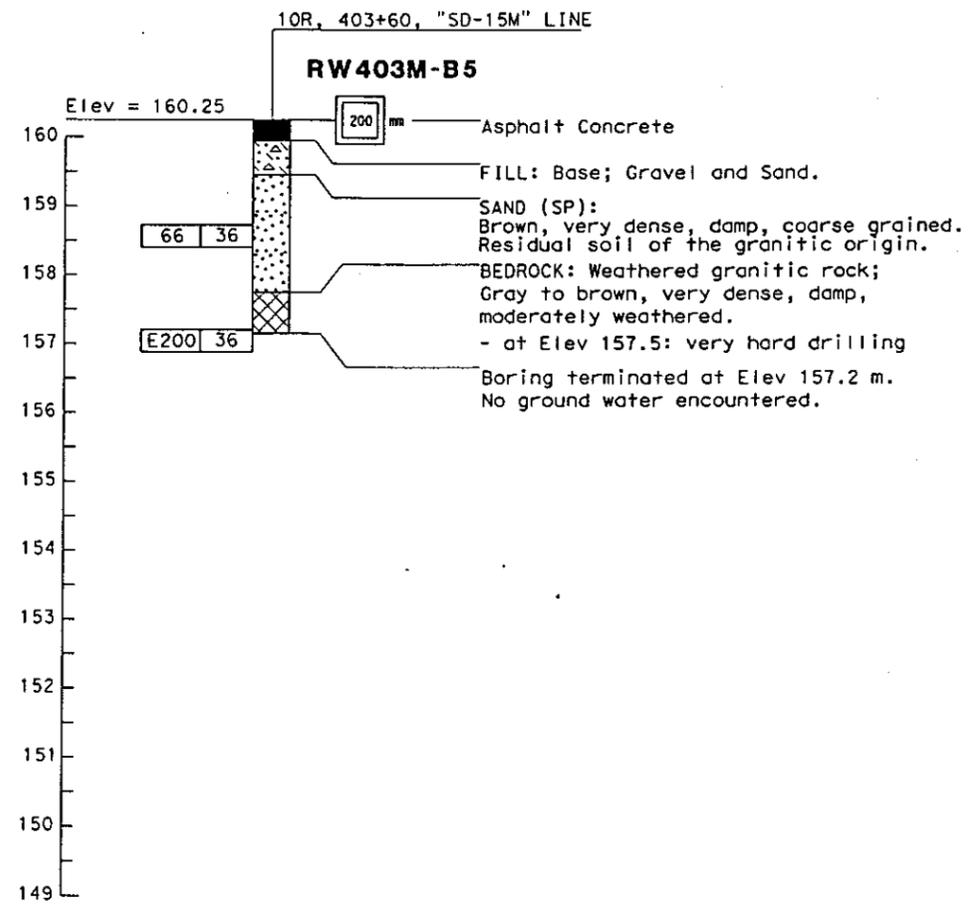
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**BORING No.: RW403M-B5**  
 Date Drilled: 11/05/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 10R, 403+60, "SD-15M" Line  
 Top of hole elevation: 160.25 m  
 Drilling Method: CMA Auger  
 Logged By: J. Tesar



**PLAN**  
 SCALE 1:500



11/05/03      Remarks:

**NOTES:**

- THE DESCRIPTIONS AND CLASSIFICATIONS OF ROCK AND/OR SOIL, INCLUDING CONSISTENCY AND RELATIVE DENSITY DESCRIPTORS, USED BY THE FIELD PERSONNEL FOR THE EXPLORATION TEST HOLES SHOWN ON THIS SHEET ARE BASED ON THE "SOIL AND ROCK LOGGING CLASSIFICATION MANUAL", OFFICE OF MATERIAL AND FOUNDATIONS (FORMERLY OFFICE OF STRUCTURAL FOUNDATIONS), AUGUST 1996. COPIES OF THIS MANUAL ARE AVAILABLE FOR INSPECTION AND/OR REPRODUCTION SUBJECT TO APPLICABLE OFFICE POLICIES, BY ANY BIDDER OR CONTRACTOR UPON WRITTEN REQUEST.
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- PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF BORING OPERATIONS**  
 ELECTRONIC CORE PENETRATION TEST  
 ROTARY SAMPLE BORING (DRY)  
 SAMPLE BORING (DRY)  
 TEST PIT  
 DIAMOND CORE BORING  
 JET BORING

**LEGEND OF BORING OPERATIONS**  
 27 mm CONE PENETRATION (DRY) BORING  
 BORING SAMPLE BORING (WET)  
 AUGER BORING (DRY)  
 TEST PIT  
 DIAMOND CORE BORING  
 JET BORING

**LEGEND OF BORING OPERATIONS**  
 27 mm CONE PENETRATION (DRY) BORING  
 BORING SAMPLE BORING (WET)  
 AUGER BORING (DRY)  
 TEST PIT  
 DIAMOND CORE BORING  
 JET BORING

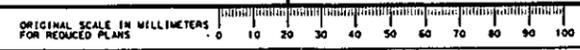
**LEGEND OF EARTH MATERIALS**  
 GRAVEL  
 SAND  
 SILT  
 CLAY  
 SILTY CLAY  
 CLAYEY SILT  
 PEAT AND/OR ORGANIC MATERIAL  
 FILL MATERIAL  
 COBBLE  
 IGNEOUS ROCK  
 SEDIMENTARY ROCK  
 METAMORPHIC

**CONSISTENCY CLASSIFICATION FOR SOILS**  
 According to the Standard Penetration Test

SPN Interval (0.30)	Consistency
0-4	Very Loose
5-10	Loose
11-20	Medium Dense
21-30	Dense
31-50	Very Dense
>50	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.

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	FIELD INVESTIGATION BY: J. Tesar	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	GEOTECHNICAL DESIGN - SOUTH 2	BRIDGE NO. RETAINING WALL RW403M R-27	KILOMETER POST LOG OF TEST BORINGS RW403M-B5
DRAWN BY JOHN FRASIER	CHECKED BY JEFF TESAR					



CU 11230  
 EA 080921  
 USERNAME => jfrasier  
 DGN FILE => b08092q027.dgn

DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY)	SHEET	OF



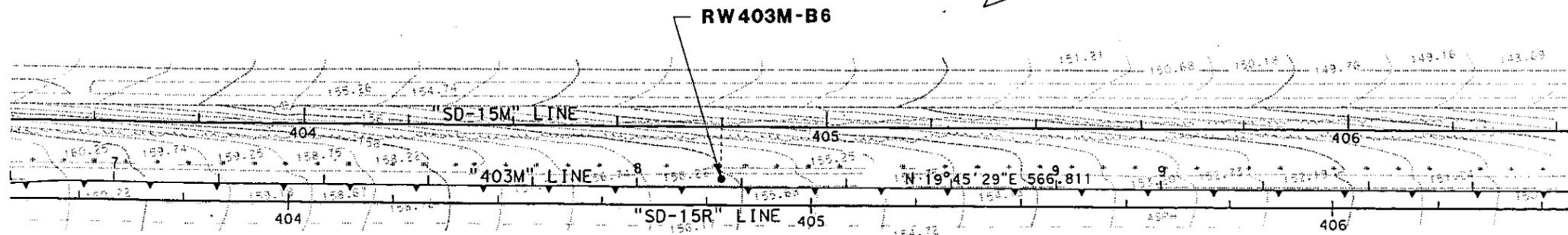
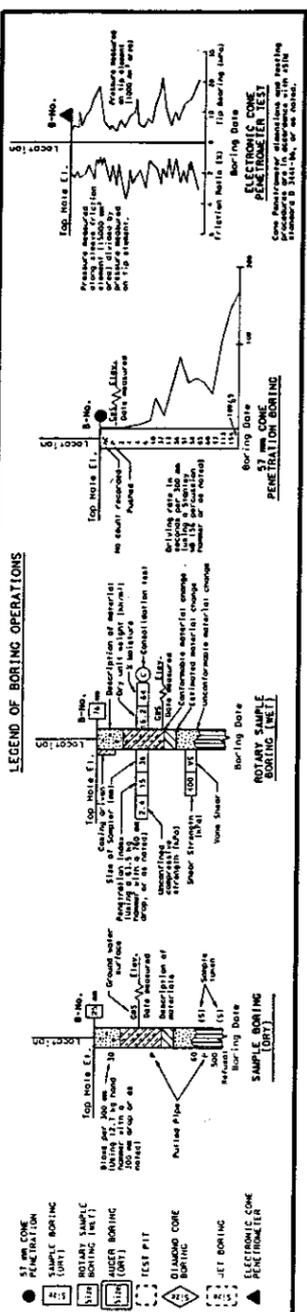
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		
			12-01-03		
			CERTIFIED ENGINEERING GEOLOGIST JEFF J. TESAR No. 2137 REGISTERED GEOLOGIST STATE OF CALIFORNIA		
PLANS APPROVAL DATE					
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**BORING No.: RW403M-B6**

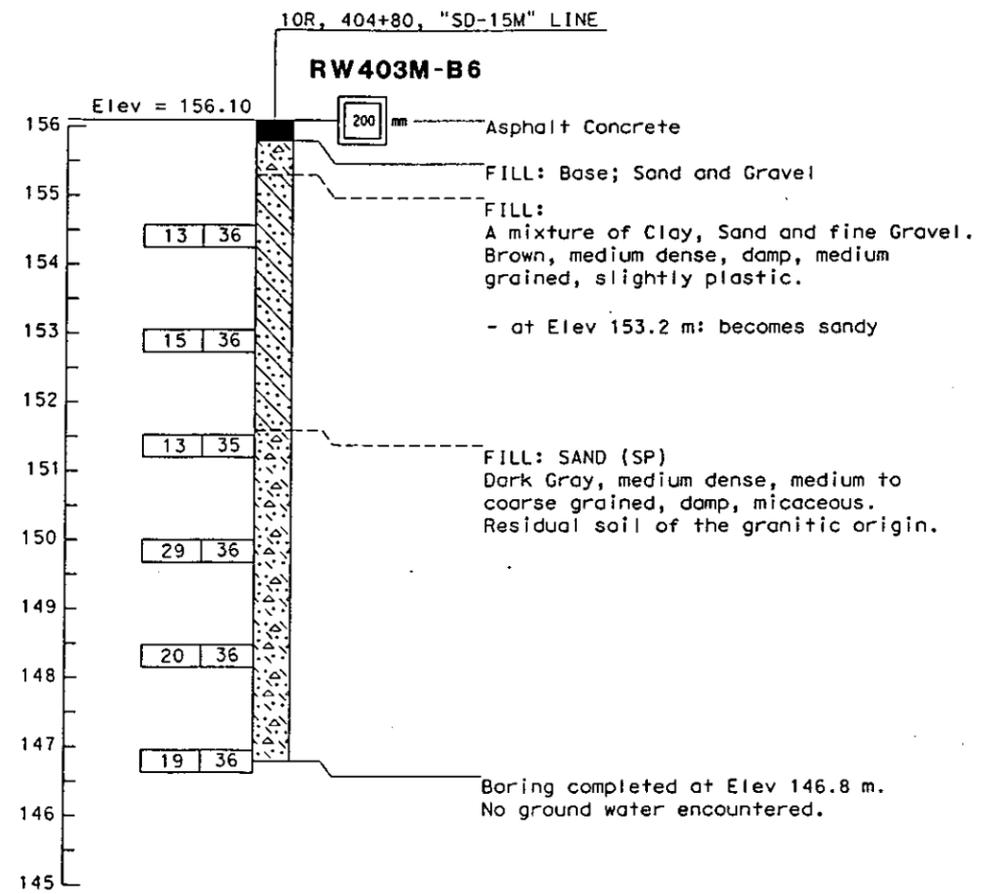
Date Drilled: 11/05/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 10R, 404+80, "SD-15M" Line  
 Top of hole elevation: 156.10 m

Drilling Method: CMA Auger

Logged By: J. Tesar



**PLAN**  
SCALE 1:500



11/05/03 Remarks:

- NOTES:**
- THE DESCRIPTIONS AND CLASSIFICATIONS OF ROCK AND/OR SOIL, INCLUDING CONSISTENCY AND RELATIVE DENSITY DESCRIPTORS, USED BY THE FIELD PERSONNEL FOR THE EXPLORATION TEST HOLES SHOWN ON THIS SHEET ARE BASED ON THE "SOIL AND ROCK LOGGING CLASSIFICATION MANUAL", OFFICE OF MATERIAL AND FOUNDATIONS (FORMERLY OFFICE OF STRUCTURAL FOUNDATIONS), AUGUST 1996. COPIES OF THIS MANUAL ARE AVAILABLE FOR INSPECTION AND/OR REPRODUCTION SUBJECT TO APPLICABLE OFFICE POLICIES, BY ANY BIDDER OR CONTRACTOR UPON WRITTEN REQUEST.
  - E-BLOW COUNT FOR 0.3 m PENETRATION EXTRAPOLATED FROM BLOW COUNT FOR THE INTERVAL LESS THAN 0.3 m (DUE TO CHANGE IN MATERIAL AND HARD DRIVING).
  - PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**CONSISTENCY CLASSIFICATION FOR SOILS**

CPT (Blows/30cm)	Consistency	
	Very Loose	Very Stiff
0-4	Loose	Stiff
5-10	Medium Dense	Very Stiff
11-30	Dense	Hard
31-50	Very Dense	
50-75		

**LEGEND OF EARTH MATERIALS**

GRAVEL	CLAYEY SILT	CLAYEY SAND	CLAYEY SILT
SAND	CLAYEY SAND	CLAYEY SILT	CLAYEY SILT
SILT	CLAY	CLAYEY SILT	CLAYEY SILT
COBBLE	CLAYEY SILT	CLAYEY SILT	CLAYEY SILT
LOOSE ROCK	CLAYEY SILT	CLAYEY SILT	CLAYEY SILT
SOFT ROCK	CLAYEY SILT	CLAYEY SILT	CLAYEY SILT
MEDIUM ROCK	CLAYEY SILT	CLAYEY SILT	CLAYEY SILT
HARD ROCK	CLAYEY SILT	CLAYEY SILT	CLAYEY SILT
METAMORPHIC	CLAYEY SILT	CLAYEY SILT	CLAYEY SILT

<b>ENGINEERING SERVICES</b>		<b>GEOTECHNICAL SERVICES</b>		FIELD INVESTIGATION BY:		STATE OF CALIFORNIA		GEOTECHNICAL DESIGN		BRIDGE NO.		<b>RETAINING WALL RW403M</b>		<b>R-28</b>	
DRAWN BY: JOHN FRASIER		CHECKED BY: JEFF TESAR		J. Tesar		DEPARTMENT OF TRANSPORTATION		- SOUTH 2		KILOMETER POST		<b>LOG OF TEST BORINGS RW403M-B6</b>			
CU 11230		EA 080921		DISREGARD PRINTS BEARING EARLIER REVISION DATES		72-38-31		SHEET		OF					











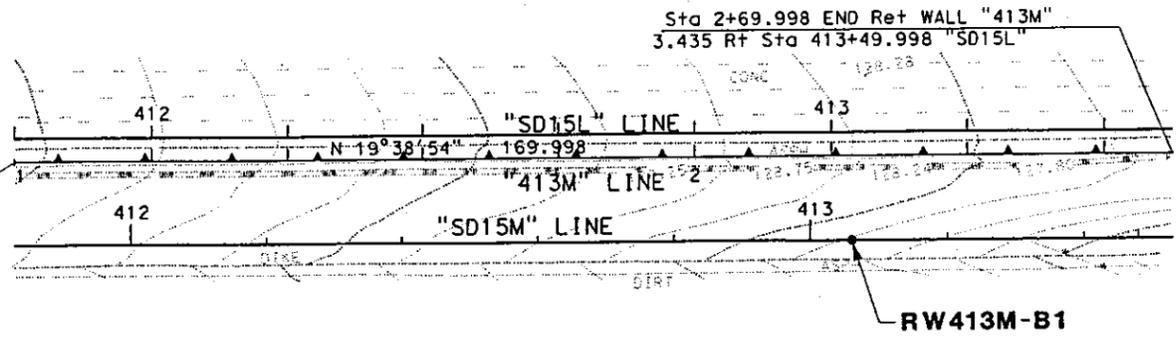
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST  
 REGISTERED GEOLOGIST  
 JEFF J. TESAR  
 No. 2137  
 CERTIFIED ENGINEERING GEOLOGIST  
 STATE OF CALIFORNIA

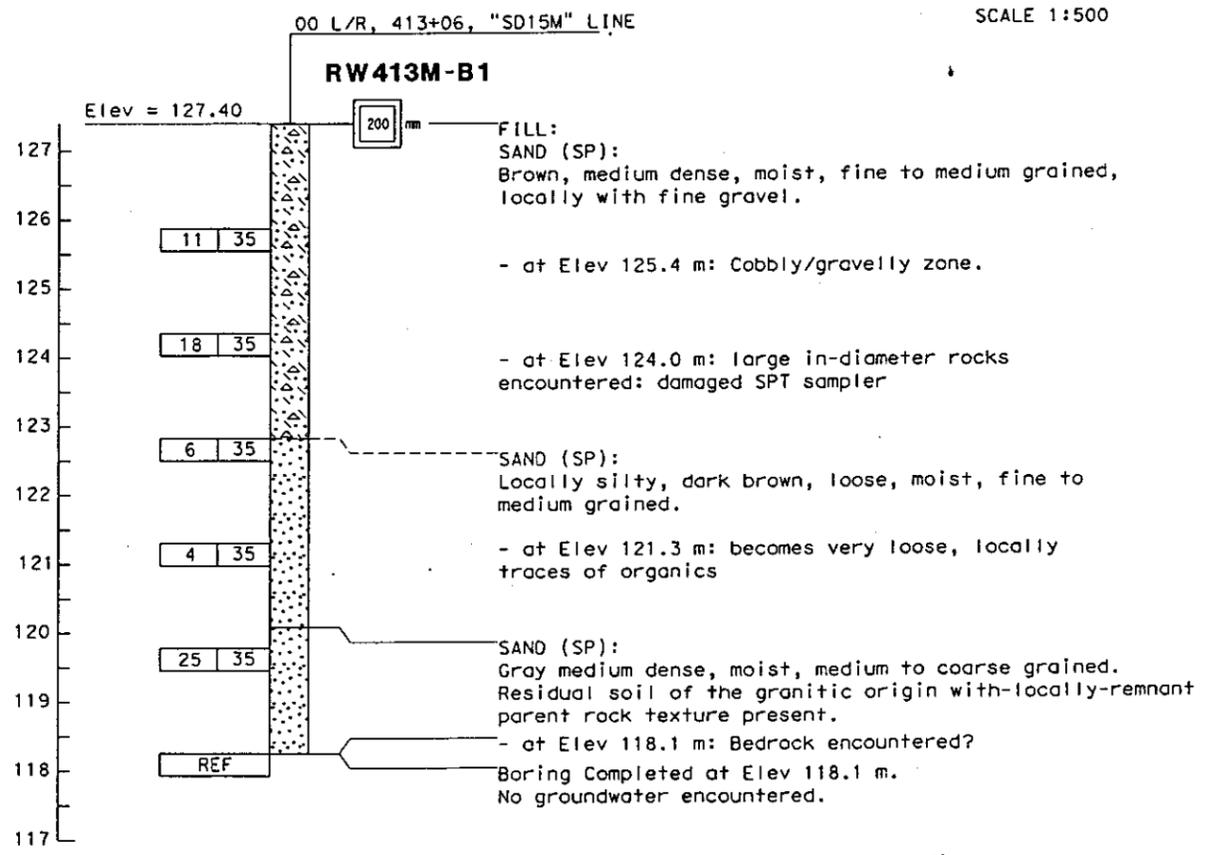
PLANS APPROVAL DATE \_\_\_\_\_  
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**BORING No.: RW413M-B1**  
 Date Drilled: 11/17/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 00 L/R, 413+06, "SD15M" Line  
 Top of hole elevation: 127.40 m

Drilling Method: Auger  
 (X) = Sample Number  
 Logged By: J. Tesar



**PLAN**  
 SCALE 1:500



**NOTES:**

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- PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF BORING OPERATIONS**

51 mm CONE PENETRATION SAMPLE BORING (OBT)  
 ROTARY SAMPLE BORING (OBT)  
 AUGER BORING (OBT)  
 TEST PIT  
 DIAMOND CORE BORING  
 JET BORING  
 ELECTRONIC CONE PENETROMETER

Borehole diameter: 150 mm, 100 mm, 75 mm, 50 mm  
 Borehole length: 10 m, 5 m, 3 m, 1.5 m  
 Borehole type: Open, Cased, Jetted

**LEGEND OF EARTH MATERIALS**

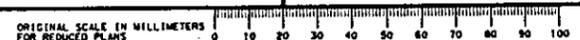
GRAVEL  
 SAND  
 SILT  
 CLAY  
 SANDY CLAY or CLAYEY SAND  
 SILTY SAND  
 SILTY CLAY  
 CLAYEY SILT or SILTY CLAY  
 ORGANIC MATERIAL  
 FILL MATERIAL  
 COBBLE  
 IGNEOUS ROCK  
 SEDIMENTARY ROCK  
 METAMORPHIC

**CONSISTENCY CLASSIFICATION FOR SOILS**  
 According to the Standard Penetration Test

SPT Blows/30cm	Consistency
0-4	Very Loose
5-10	Loose
11-20	Medium Dense
21-30	Dense
31-50	Very Dense
50	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.

<b>ENGINEERING SERVICES</b>		<b>GEOTECHNICAL SERVICES</b>		FIELD INVESTIGATION BY:	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	GEOTECHNICAL DESIGN - SOUTH 2	BRIDGE NO.	<b>RETAINING WALL RW413M R-32</b>	
DRAWN BY:	JOHN FRASIER			J. Tesar			KILOMETER POST	<b>LOG OF TEST BORINGS RW413M-B1</b>	
CHECKED BY:	JEFF TESAR				CU 11230 EA 080921		REVISION DATES (PRELIMINARY STAGE ONLY)		





DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST  
 JEFF J. TESAR  
 No. 2137  
 REGISTERED GEOLOGIST  
 STATE OF CALIFORNIA

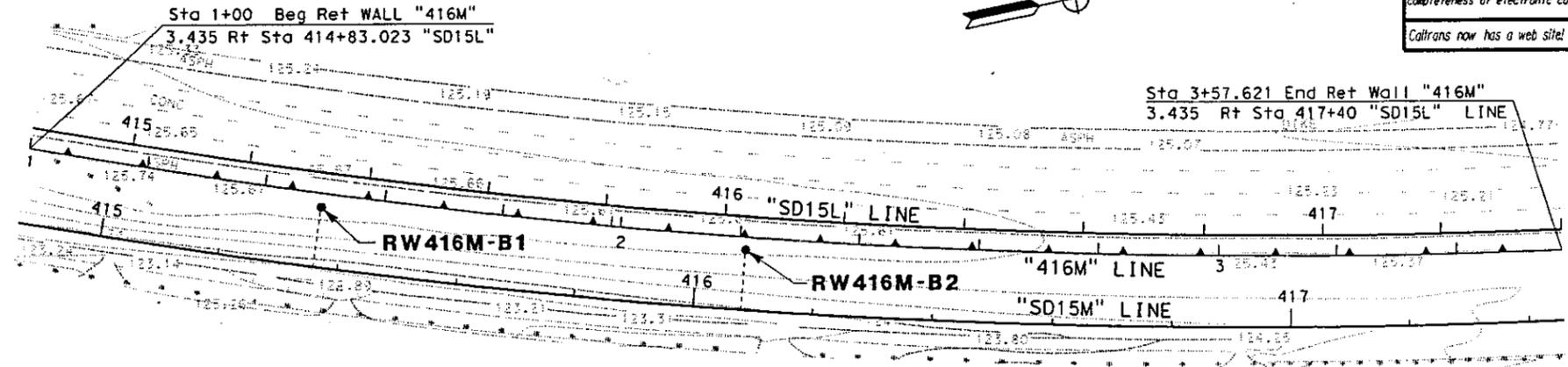
PLANS APPROVAL DATE

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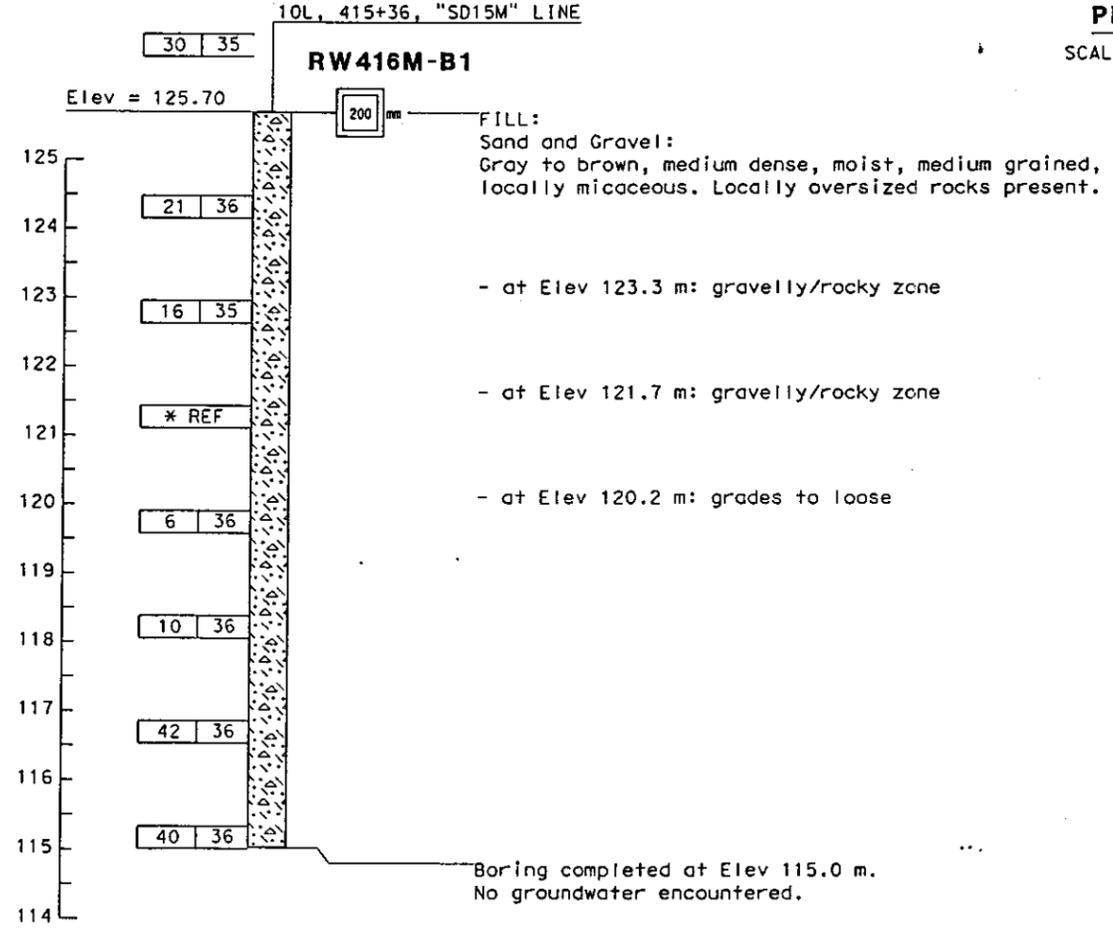
Caltrans now has a web site! To get to the web site, go to: <http://www.dot.ca.gov>

**BORING No.: RW416M-B1**  
 Date Drilled: 12/03/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 10L, 415+36, "SD15M" Line  
 Top of hole elevation: 125.70 m

Drilling Method: Auger  
 Logged By: J. Tesar



**PLAN**  
 SCALE 1:500



Remarks: \* - affected by gravel or rock

**NOTES:**

1. THE DESCRIPTIONS AND CLASSIFICATIONS OF ROCK AND/OR SOIL, INCLUDING CONSISTENCY AND RELATIVE DENSITY DESCRIPTORS, USED BY THE FIELD PERSONNEL FOR THE EXPLORATION TEST HOLES SHOWN ON THIS SHEET ARE BASED ON THE "SOIL AND ROCK LOGGING CLASSIFICATION MANUAL", OFFICE OF MATERIAL AND FOUNDATIONS (FORMERLY OFFICE OF STRUCTURAL FOUNDATIONS), AUGUST 1996. COPIES OF THIS MANUAL ARE AVAILABLE FOR INSPECTION AND/OR REPRODUCTION SUBJECT TO APPLICABLE OFFICE POLICIES, BY ANY BIDDER OR CONTRACTOR UPON WRITTEN REQUEST.
2. E-BLOW COUNT FOR 0.3 m PENETRATION EXTRAPOLATED FROM BLOW COUNT FOR THE INTERVAL LESS THAN 0.3 m (DUE TO CHANGE IN MATERIAL AND HARD DRIVING).
3. PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF BORING OPERATIONS**

PLANTING  
 SAMPLE BORING  
 ROTARY BORING  
 AUGER BORING  
 TEST PIT  
 DIAMOND CORE BORING  
 TEST BORING  
 ELECTRIC CORE BORING  
 PENETRATION BORING

CLAYEY SILT  
 SILT  
 CLAY  
 SANDY CLAY  
 CLAYEY SAND  
 SANDY SILT  
 SILTY SAND  
 SILTY CLAY

GRAVEL  
 SAND  
 SILT  
 CLAY  
 SANDY CLAY  
 CLAYEY SAND  
 SANDY SILT  
 SILTY SAND  
 SILTY CLAY

CLAYEY SILT  
 SILT  
 CLAY  
 SANDY CLAY  
 CLAYEY SAND  
 SANDY SILT  
 SILTY SAND  
 SILTY CLAY

FILL MATERIAL  
 COBBLE  
 TORCIOUS ROCK  
 SEDIMENTARY ROCK  
 METAMORPHIC

VERY LOOSE  
 LOOSE  
 MEDIUM DENSE  
 DENSE  
 VERY DENSE  
 HARD

VERY SOFT  
 SOFT  
 FIRM  
 STIFF  
 VERY STIFF  
 HARD

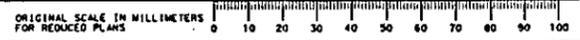
**CONSISTENCY CLASSIFICATION FOR SOILS**

According to the Standard Penetration Test

SPN (Blows/0.30 m)	Consistency
0-4	Very Loose
5-10	Loose
11-20	Medium Dense
21-30	Dense
31-50	Very Dense
50	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.

<b>ENGINEERING SERVICES</b>		<b>GEOTECHNICAL SERVICES</b>		FIELD INVESTIGATION BY:		STATE OF CALIFORNIA		BRIDGE NO.		<b>RETAINING WALL RW416M R-33</b>	
DRAWN BY: JOHN FRASIER				J. TESAR		DEPARTMENT OF TRANSPORTATION		KILOMETER POST		<b>LOG OF TEST BORINGS RW416M-B1</b>	
CHECKED BY: JEFF TESAR										REVISION DATES (PRELIMINARY STAGE ONLY)	
						CU 11230 EA 080921		DISREGARD PRINTS BEARING EARLIER REVISION DATES		SHEET 1 OF 1	

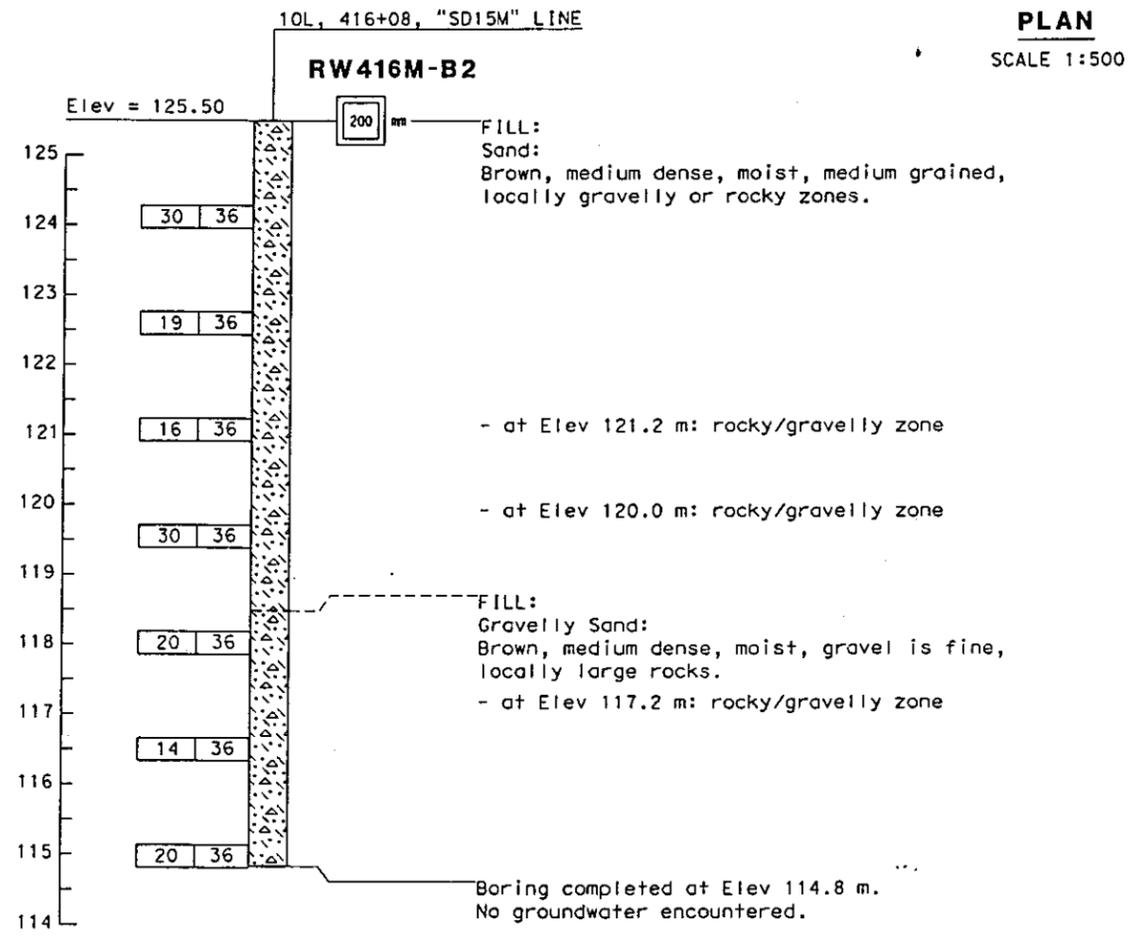
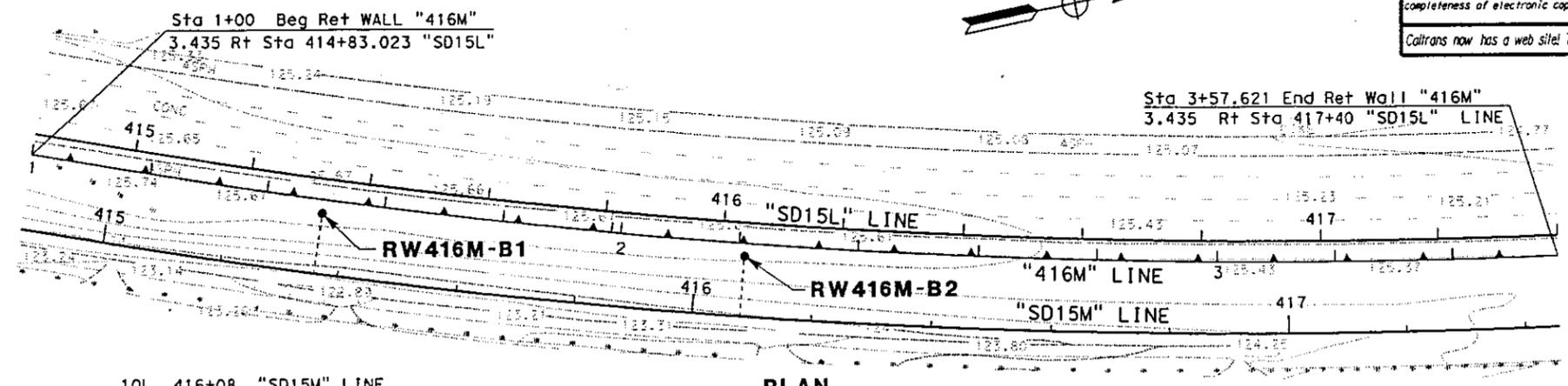




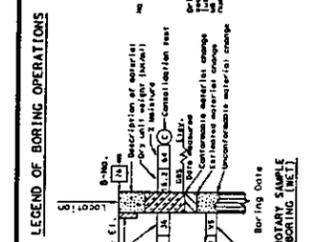
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST  
 J. Tesar  
 REGISTERED GEOLOGIST  
 JEFF J. TESAR  
 No. 2137  
 CERTIFIED ENGINEERING GEOLOGIST  
 STATE OF CALIFORNIA  
 PLANS APPROVAL DATE  
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**BORING No.: RW416M-B2**  
 Date Drilled: 12/03/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 10L, 416+08, "SD15M" Line  
 Top of hole elevation: 125.50 m  
 Drilling Method: Auger  
 Logged By: J. Tesar



- NOTES:**
1. THE DESCRIPTIONS AND CLASSIFICATIONS OF ROCK AND/OR SOIL, INCLUDING CONSISTENCY AND RELATIVE DENSITY DESCRIPTORS, USED BY THE FIELD PERSONNEL FOR THE EXPLORATION TEST HOLES SHOWN ON THIS SHEET ARE BASED ON THE "SOIL AND ROCK LOGGING CLASSIFICATION MANUAL", OFFICE OF MATERIAL AND FOUNDATIONS (FORMERLY OFFICE OF STRUCTURAL FOUNDATIONS), AUGUST 1996. COPIES OF THIS MANUAL ARE AVAILABLE FOR INSPECTION AND/OR REPRODUCTION SUBJECT TO APPLICABLE OFFICE POLICIES, BY ANY BIDDER OR CONTRACTOR UPON WRITTEN REQUEST.
  2. E-BLOW COUNT FOR 0.3 m PENETRATION EXTRAPOLATED FROM BLOW COUNT FOR THE INTERVAL LESS THAN 0.3 m (DUE TO CHANGE IN MATERIAL AND HARD DRIVING).
  3. PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.



**LEGEND OF EARTH MATERIALS**

GRAVEL	CLAYEY SILT
SAND	PEAT
SILT	ORGANIC MUD
CLAY	FILL MATERIAL
SANDY CLAY	COBBLE
CLAYEY SAND	LAGGERS
SILT CLAY	LOOSE ROCK
CLAYEY SILT	SEDIMENTARY ROCK
SILT CLAY	IGNEOUS METAMORPHIC

**CONSISTENCY CLASSIFICATION FOR SOILS**

Penetration (kN/m²)	Consistency
0-4	Very Loose
5-10	Loose
11-30	Medium Dense
31-50	Dense
50	Very Dense

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.

<b>ENGINEERING SERVICES</b>		<b>GEOTECHNICAL SERVICES</b>		FIELD INVESTIGATION BY: J. TESAR	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO. RETAINING WALL RW416M R-34
DRAWN BY JOHN FRASIER	CHECKED BY JEFF TESAR			GEOTECHNICAL DESIGN - SOUTH 2	KILOMETER POST LOG OF TEST BORINGS RW416M-B2	SHEET OF
OSF CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/20/00)				ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS	CU 11230 EA 080921	REVISION DATES (PRELIMINARY STAGE ONLY): 12-09-03

DATE PLOTTED => 16-DEC-2003  
 TIME PLOTTED => 15:12

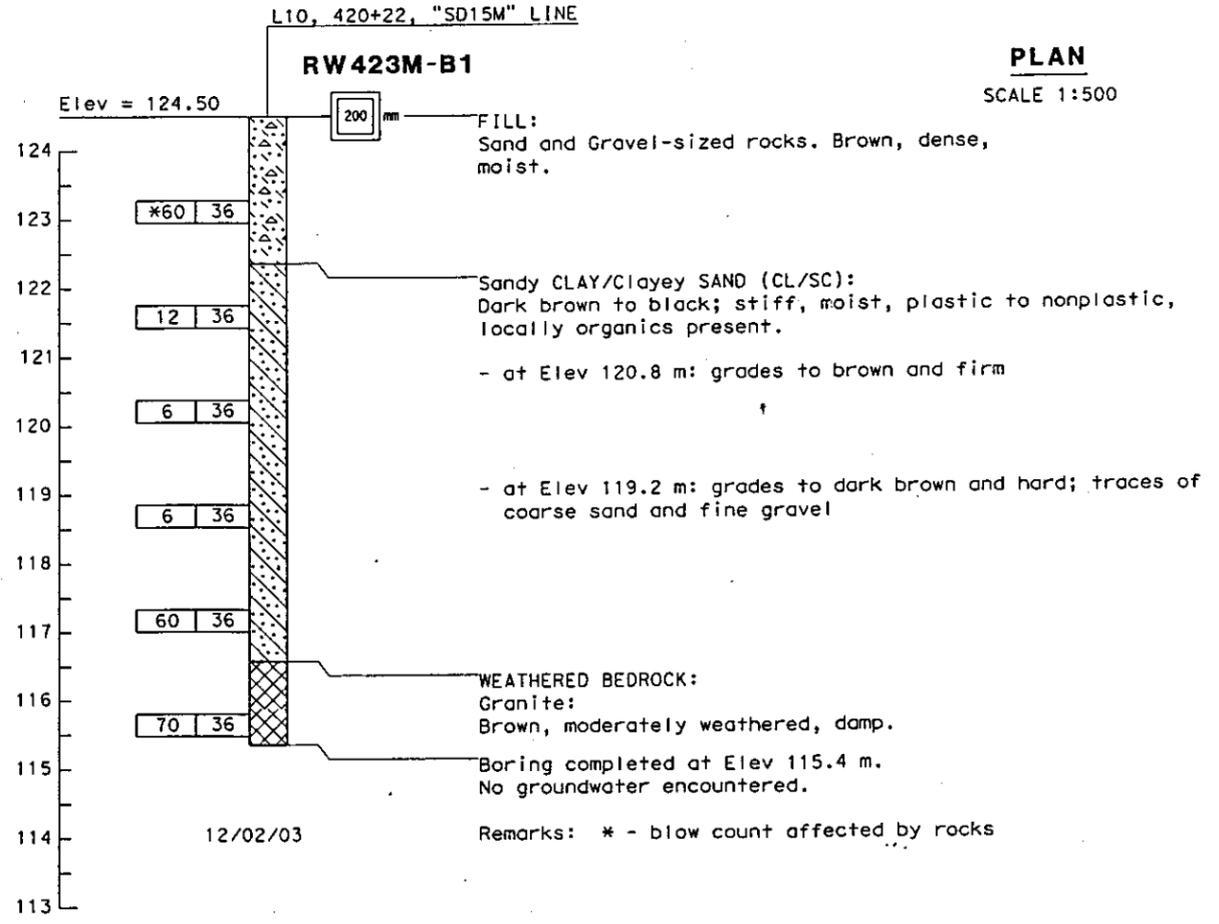
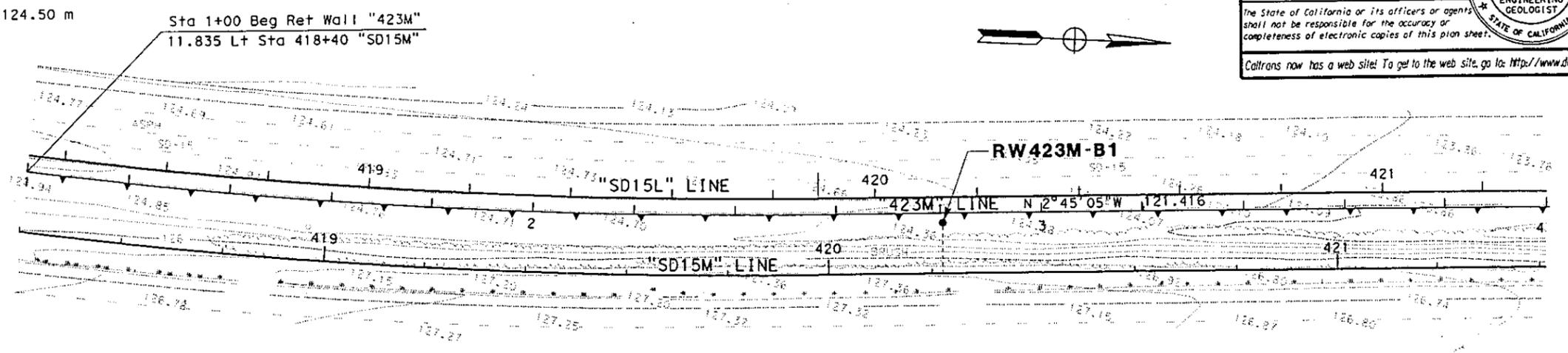


DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST  
 J. Tesar  
 REGISTERED GEOLOGIST  
 No. 2137  
 CERTIFIED ENGINEERING GEOLOGIST  
 STATE OF CALIFORNIA  
 PLANS APPROVAL DATE  
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**BORING No.: RW423M-B1**  
 Date Drilled: 12/02/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 10L, 420+22, "SD15M" Line  
 Top of hole elevation: 124.50 m

Drilling Method: Auger  
 Logged By: J. Tesar



- NOTES:**
- THE DESCRIPTIONS AND CLASSIFICATIONS OF ROCK AND/OR SOIL, INCLUDING CONSISTENCY AND RELATIVE DENSITY DESCRIPTORS, USED BY THE FIELD PERSONNEL FOR THE EXPLORATION TEST HOLES SHOWN ON THIS SHEET ARE BASED ON THE "SOIL AND ROCK LOGGING CLASSIFICATION MANUAL", OFFICE OF MATERIAL AND FOUNDATIONS (FORMERLY OFFICE OF STRUCTURAL FOUNDATIONS), AUGUST 1996. COPIES OF THIS MANUAL ARE AVAILABLE FOR INSPECTION AND/OR REPRODUCTION SUBJECT TO APPLICABLE OFFICE POLICIES, BY ANY BIDDER OR CONTRACTOR UPON WRITTEN REQUEST.
  - E-BLOW COUNT FOR 0.3 m PENETRATION EXTRAPOLATED FROM BLOW COUNT FOR THE INTERVAL LESS THAN 0.3 m (DUE TO CHANGE IN MATERIAL AND HARD DRIVING).
  - PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF BORING OPERATIONS**

ELECTRONIC CORE PENETROMETER TEST  
 ROTARY SAMPLE BORING  
 AUGER BORING  
 TEST PIT  
 STANDARD CORE BORING  
 JET BORING  
 ELECTRONIC CORE PENETROMETER

Boring Date  
 Boring No.  
 Location  
 Top Hole Elevation  
 Boring Method  
 Penetration Index (PI)  
 Blow Count (N)  
 Sample Depth (m)  
 Sample No.

**LEGEND OF EARTH MATERIALS**

GRAVEL	CLAYEY SILT	PEAT AND/OR ORGANIC MATTER
SAND	SILT	FILL MATERIAL
CLAY	CLAYEY SAND	COBBLE
SHALY CLAY	CLAYEY SILT	TOXICUS ROCK
SHALY SAND	SANDY SILT	SEDIMENTARY ROCK
SANDY SILT	SANDY SAND	METAMORPHIC
SILT CLAY		

**CONSISTENCY CLASSIFICATION FOR SOILS**

SPT Blows (60 mm)	Consistency
0-4	Very Loose
5-10	Loose
11-20	Medium Dense
21-30	Dense
31-50	Very Dense
>50	Hard

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

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	FIELD INVESTIGATION BY: J. TESAR	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	GEOTECHNICAL DESIGN - SOUTH 2	BRIDGE NO. KILOMETER POST	RETAINING WALL RW423M R-35 LOG OF TEST BORINGS RW23M-B1
DRAWN BY JOHN FRASIER	CHECKED BY JEFF TESAR					REVISION DATES (PRELIMINARY STAGE ONLY) 12-01-03

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS: 0 10 20 30 40 50 60 70 80 90 100  
 USERNAME => tbfriasie  
 DGN FILE => b08092q035.dgn

DATE PLOTTED => 15-DEC-2003  
 TIME PLOTTED => 15:13





DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST  
 REGISTERED GEOLOGIST  
 JEFF J. TESAR  
 No. 2137  
 CERTIFIED ENGINEERING GEOLOGIST  
 STATE OF CALIFORNIA

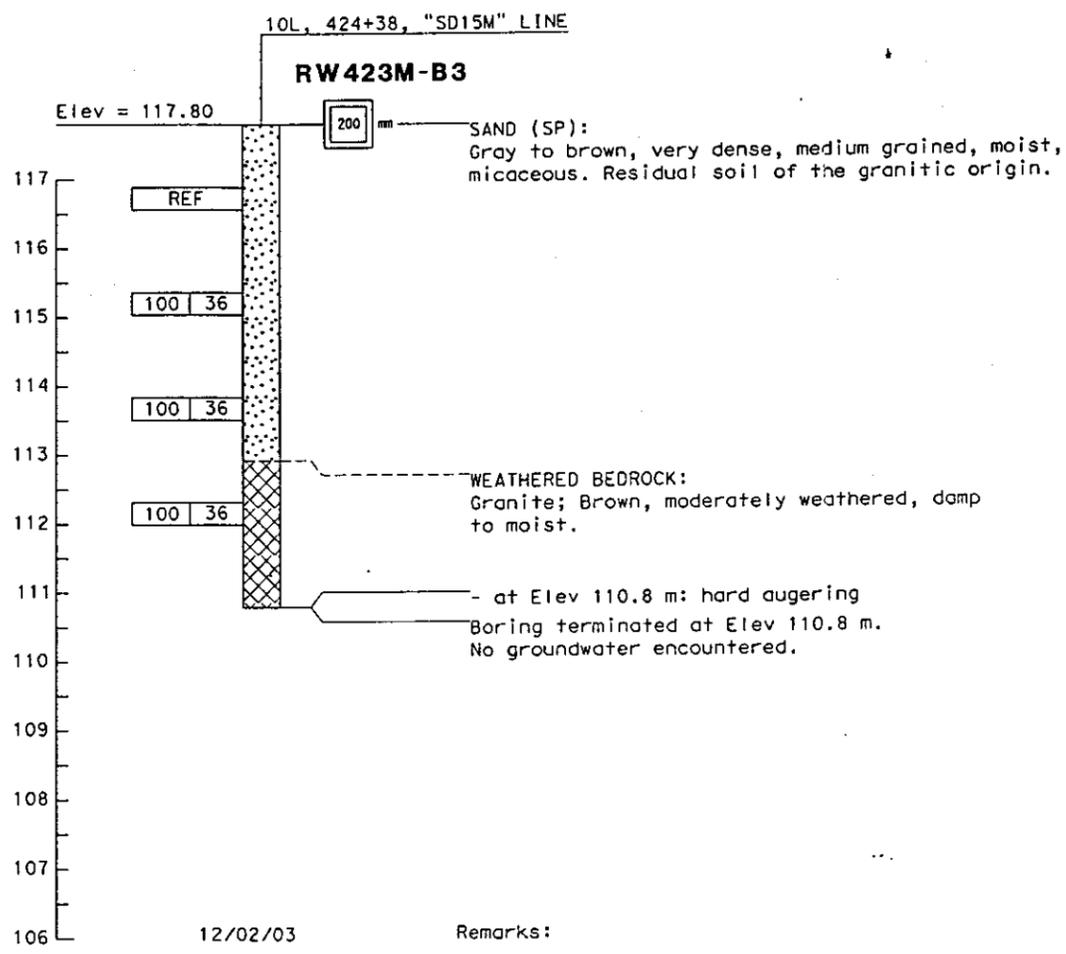
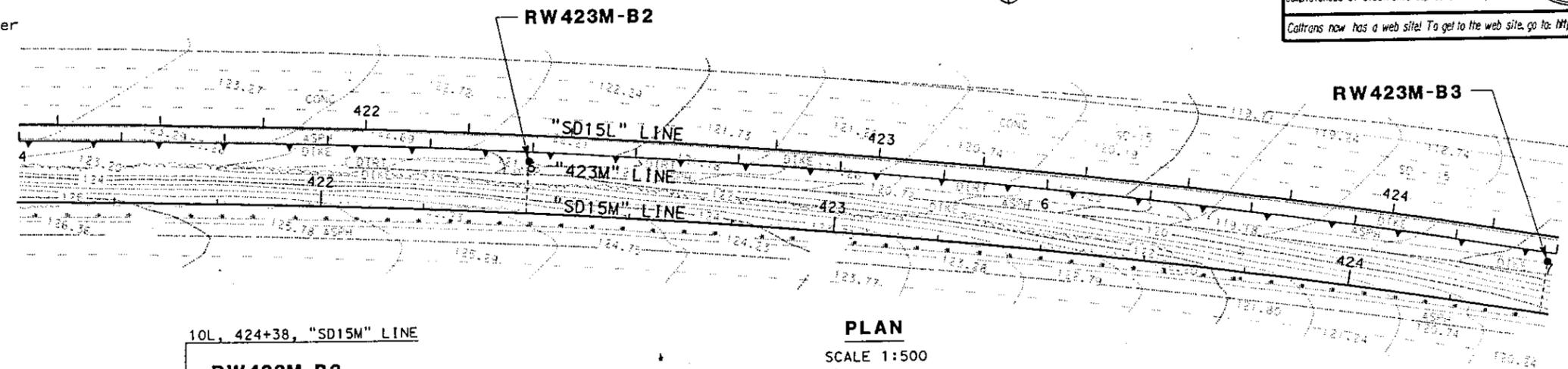
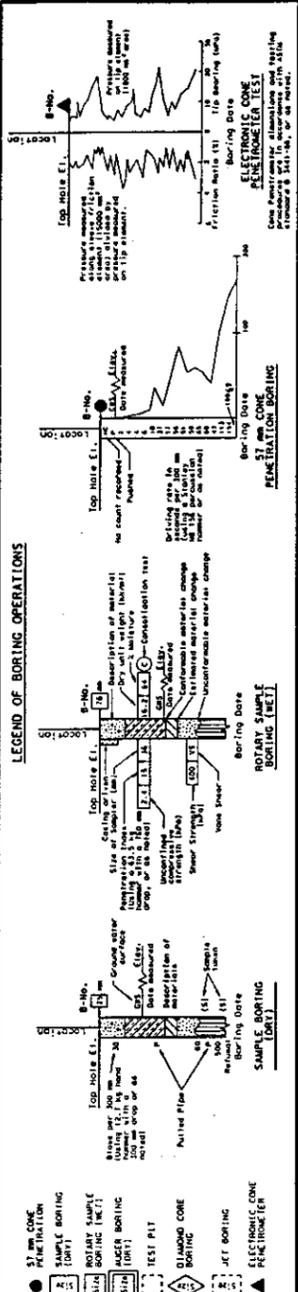
PLANS APPROVAL DATE \_\_\_\_\_

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**BORING No.: RW423M-B3**  
 Date Drilled: 12/02/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 10L, 424+38, "SD15M" Line  
 Top of hole elevation: 117.80 m

Drilling Method: Auger  
 Logged By: J. Tesar



- NOTES:**
1. THE DESCRIPTIONS AND CLASSIFICATIONS OF ROCK AND/OR SOIL, INCLUDING CONSISTENCY AND RELATIVE DENSITY DESCRIPTORS, USED BY THE FIELD PERSONNEL FOR THE EXPLORATION TEST HOLES SHOWN ON THIS SHEET ARE BASED ON THE "SOIL AND ROCK LOGGING CLASSIFICATION MANUAL", OFFICE OF MATERIAL AND FOUNDATIONS (FORMERLY OFFICE OF STRUCTURAL FOUNDATIONS), AUGUST 1996. COPIES OF THIS MANUAL ARE AVAILABLE FOR INSPECTION AND/OR REPRODUCTION SUBJECT TO APPLICABLE OFFICE POLICIES, BY ANY BIDDER OR CONTRACTOR UPON WRITTEN REQUEST.
  2. E-BLOW COUNT FOR 0.3 m PENETRATION EXTRAPOLATED FROM BLOW COUNT FOR THE INTERVAL LESS THAN 0.3 m (DUE TO CHANGE IN MATERIAL AND HARD DRIVING).
  3. PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF EARTH MATERIALS**

GRAVEL	SAND	SILT	CLAY	SANDY CLAY or CLAYEY SAND	SANDY SILT or SILTY SAND	SILTY CLAY	METAMORPHIC
CLAYEY SILT	CLAYEY SAND	CLAYEY SILT	CLAYEY SAND	CLAYEY SILT	CLAYEY SAND	CLAYEY SILT	CLAYEY SAND

**CONSISTENCY CLASSIFICATION FOR SOILS**

SP Penetration (Blow/30cm)	Consistency
0-4	Very Loose
5-10	Loose
11-20	Medium Dense
21-30	Dense
31-50	Very Dense
51	Hard

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

<b>ENGINEERING SERVICES</b>	<b>GEOTECHNICAL SERVICES</b>	FIELD INVESTIGATION BY: J. TESAR	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	GEOTECHNICAL DESIGN - SOUTH 2	BRIDGE NO. RETAINING WALL RW423M R-37
DRAWN BY JOHN FRASIER	CHECKED BY JEFF TESAR				KILOMETER POST LOG OF TEST BORINGS RW423M-B3
ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS			CU 11230 EA 080921	DISCARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY)

DATE PLOTTED => 16-DEC-2003  
 TIME PLOTTED => 15:14



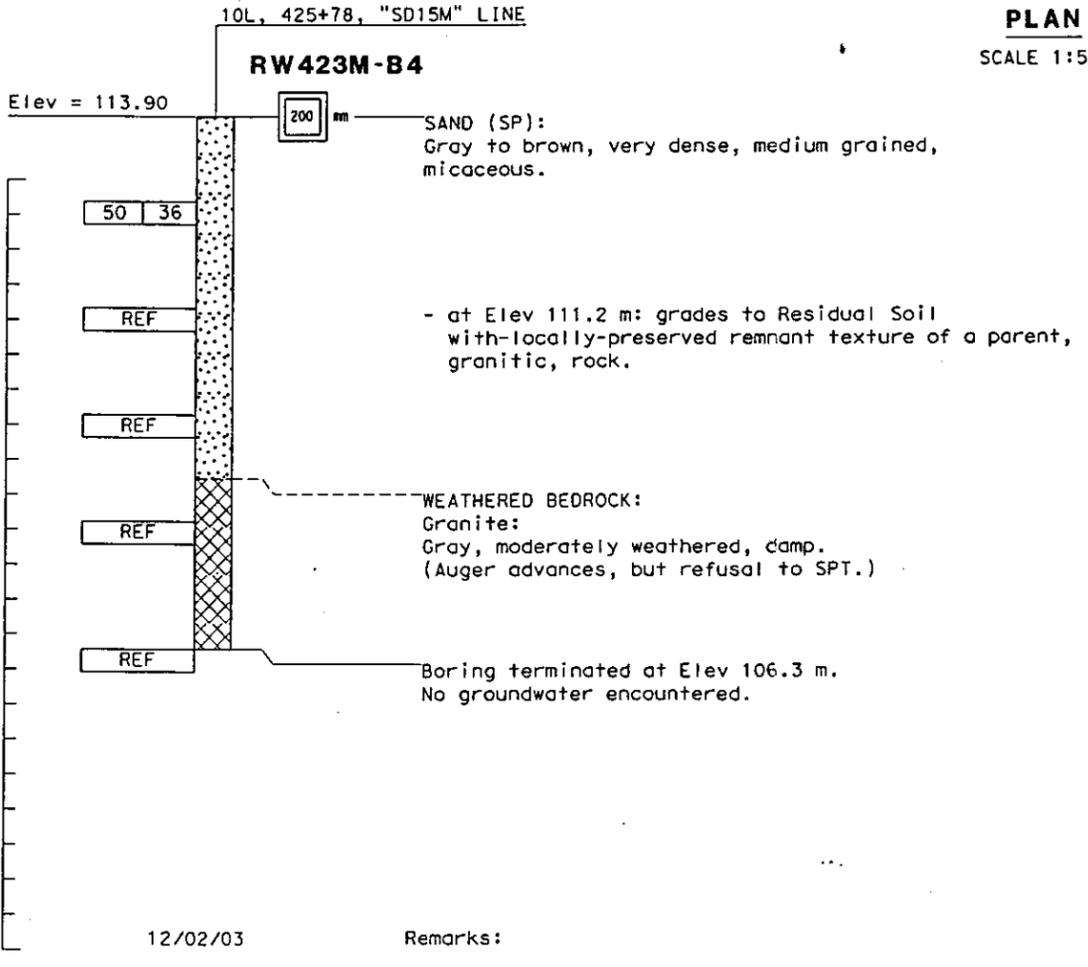
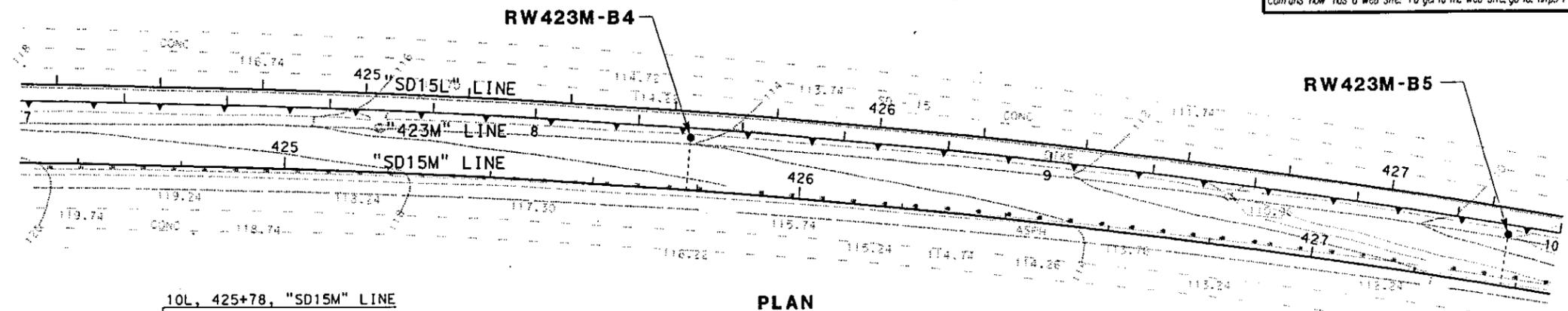
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST  
 JEFF J. TESAR  
 No. 2137  
 REGISTERED GEOLOGIST  
 CERTIFIED ENGINEERING GEOLOGIST  
 STATE OF CALIFORNIA

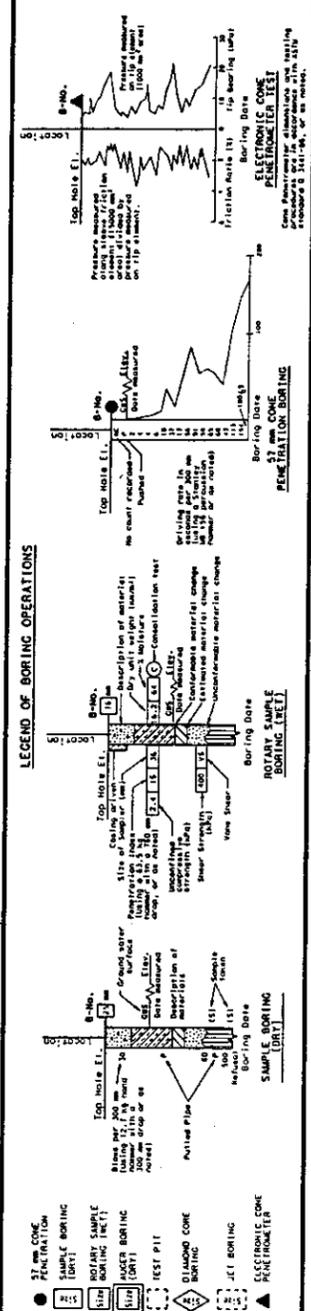
PLANS APPROVAL DATE  
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**BORING No.: RW423M-B4**  
 Date Drilled: 12/02/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 10L, 425+78, "SD15M" Line  
 Top of hole elevation: 113.90 m

Drilling Method: Auger  
 Logged By: J. Tesar



- NOTES:**
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  - PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.



**LEGEND OF EARTH MATERIALS**

GRAVEL	CLAYEY SILT	PEAT OR/OR ORGANIC MATERIAL
SAND	FILL MATERIAL	COBBLE
SILT	CLAY	SHALY CLAY OR SANDY CLAY
CLAY	CLAYEY SAND	SANDY SILT OR SILTY SAND
SHALY CLAY OR SANDY CLAY	SANDY SILT OR SILTY SAND	SILT CLAY
SEDIMENTARY ROCK	SEDIMENTARY ROCK	METAMORPHIC

**CONSISTENCY CLASSIFICATION FOR SOILS**

SP (Blows/30cm)	Consistency
0-4	Very Loose
5-10	Loose
11-30	Medium Dense
31-50	Dense
50	Very Dense
2-4	Very Soft
5-8	Soft
9-15	Stiff
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.

<b>ENGINEERING SERVICES</b>		<b>GEOTECHNICAL SERVICES</b>		FIELD INVESTIGATION BY:	STATE OF CALIFORNIA	GEOTECHNICAL DESIGN	BRIDGE NO.	<b>RETAINING WALL RW423M</b>	<b>R-38</b>
DRAWN BY:	JOHN FRASIER			J. TESAR	DEPARTMENT OF TRANSPORTATION	- SOUTH 2	KILOMETER POST	<b>LOG OF TEST BORINGS RW423M-B4</b>	
CHECKED BY:	JEFF TESAR							DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY)



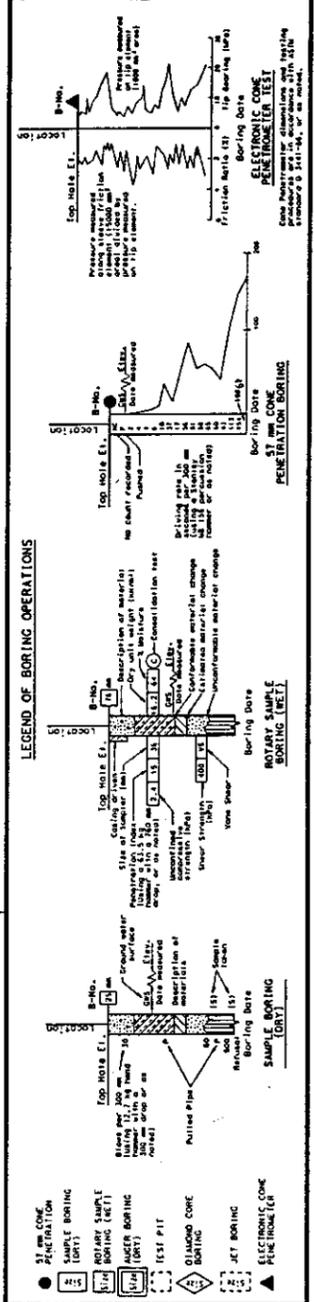
ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS  
 USERNAME => jfrasier  
 DGN FILE => b08092q038.dgn



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST  
 REGISTERED GEOLOGIST  
 JEFF J. TESAR  
 No. 2137  
 CERTIFIED ENGINEERING GEOLOGIST  
 STATE OF CALIFORNIA  
 PLANS APPROVAL DATE  
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**BORING No.: RW423M-B5**  
 Date Drilled: 12/02/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 10L, 427+37, "SD15M" Line  
 Top of hole elevation: 109.8 m  
 Drilling Method: Auger  
 Logged By: J. Tesar

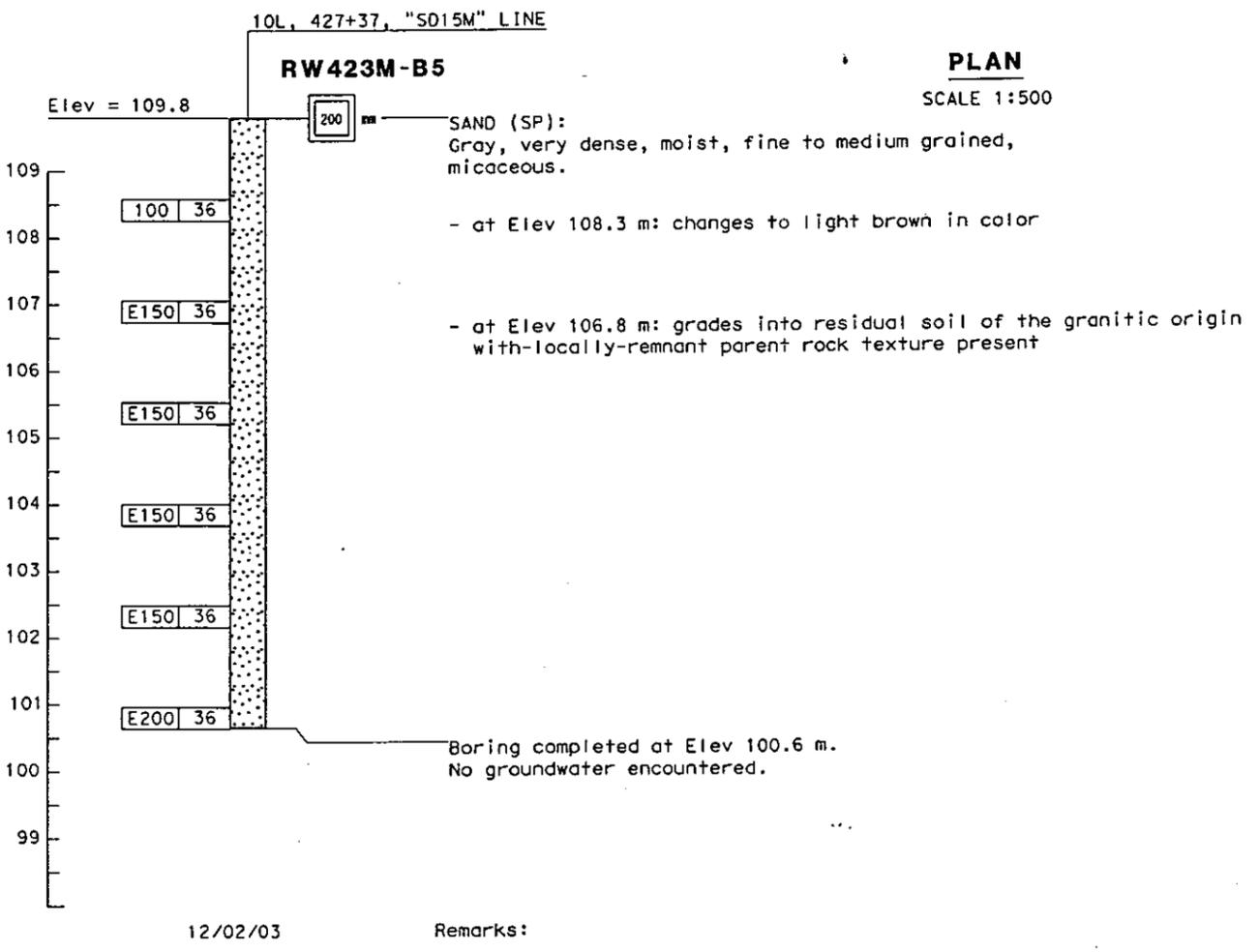
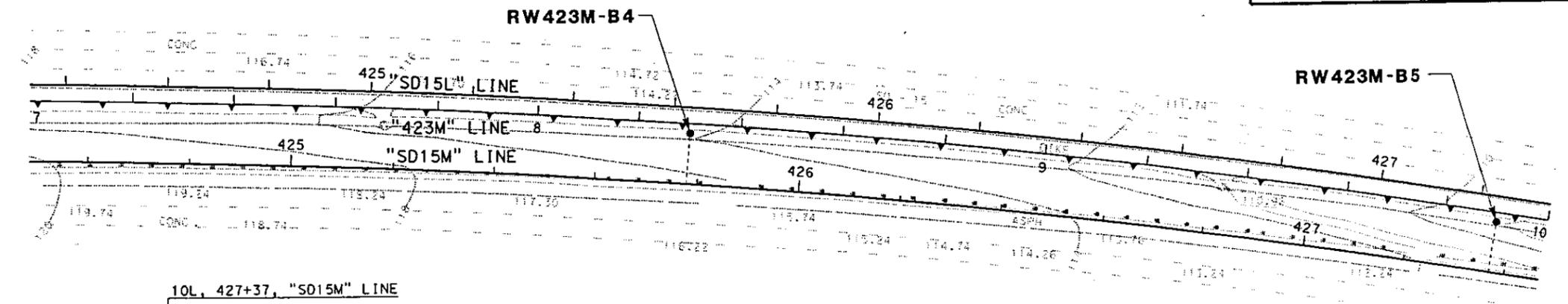


**LEGEND OF BORING OPERATIONS**

**LEGEND OF EARTH MATERIALS**

**CONSISTENCY CLASSIFICATION FOR SOILS**

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. THE DESCRIPTIONS AND CLASSIFICATIONS OF ROCK AND/OR SOIL, INCLUDING CONSISTENCY AND RELATIVE DENSITY DESCRIPTORS, USED BY THE FIELD PERSONNEL FOR THE EXPLORATION TEST HOLES SHOWN ON THIS SHEET ARE BASED ON THE "SOIL AND ROCK LOGGING CLASSIFICATION MANUAL", OFFICE OF MATERIAL AND FOUNDATIONS (FORMERLY OFFICE OF STRUCTURAL FOUNDATIONS), AUGUST 1996. COPIES OF THIS MANUAL ARE AVAILABLE FOR INSPECTION AND/OR REPRODUCTION SUBJECT TO APPLICABLE OFFICE POLICIES, BY ANY BIDDER OR CONTRACTOR UPON WRITTEN REQUEST.
  2. E-BLOW COUNT FOR 0.3 m PENETRATION EXTRAPOLATED FROM BLOW COUNT FOR THE INTERVAL LESS THAN 0.3 m (DUE TO CHANGE IN MATERIAL AND HARD DRIVING).
  3. PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

ENGINEERING SERVICES		GEOTECHNICAL SERVICES		FIELD INVESTIGATION BY:	STATE OF CALIFORNIA	GEOTECHNICAL DESIGN	BRIDGE NO.	RETAINING WALL RW423M	R-39
DRAWN BY: JOHN FRASIER				J. TESAR	DEPARTMENT OF TRANSPORTATION	- SOUTH 2	KILOMETER POST	LOG OF TEST BORINGS RW423M-B5	
CHECKED BY: JEFF TESAR								REVISION DATES (PRELIMINARY STAGE ONLY)	
								SHEET OF	

OSF CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/20/00)  
 ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS  
 USERNAME => jfrasier  
 DGN FILE => b08092q039.dgn

DATE PLOTTED => 16-DEC-2003  
 TIME PLOTTED => 15:14



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST

JEFF J. TESAR  
 No. 2137  
 CERTIFIED ENGINEERING GEOLOGIST  
 STATE OF CALIFORNIA

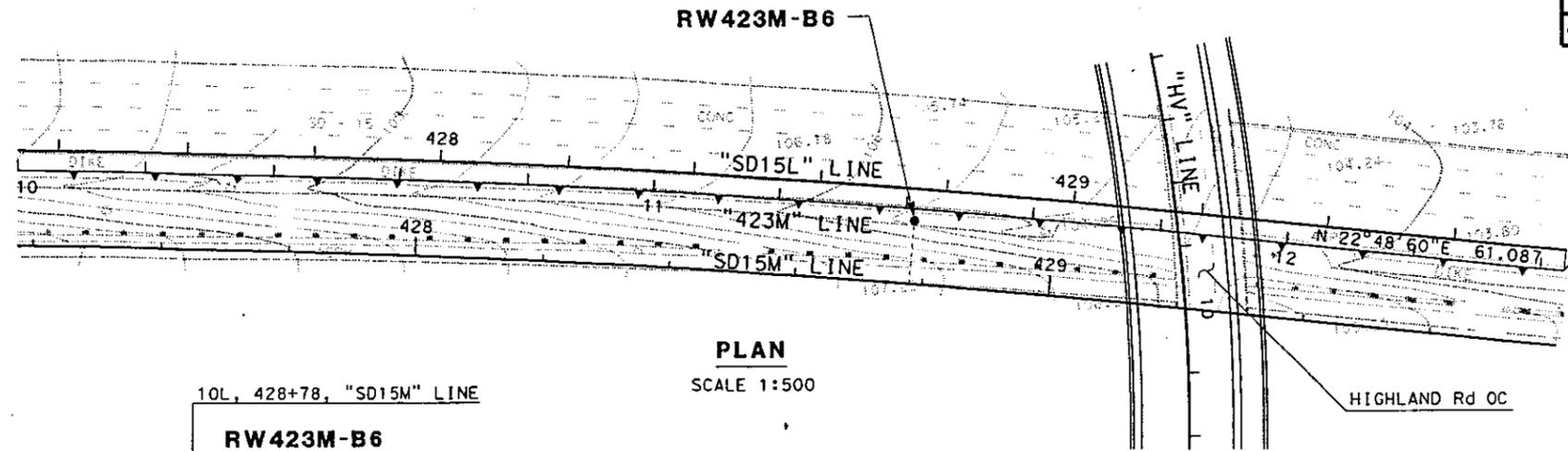
PLANS APPROVAL DATE

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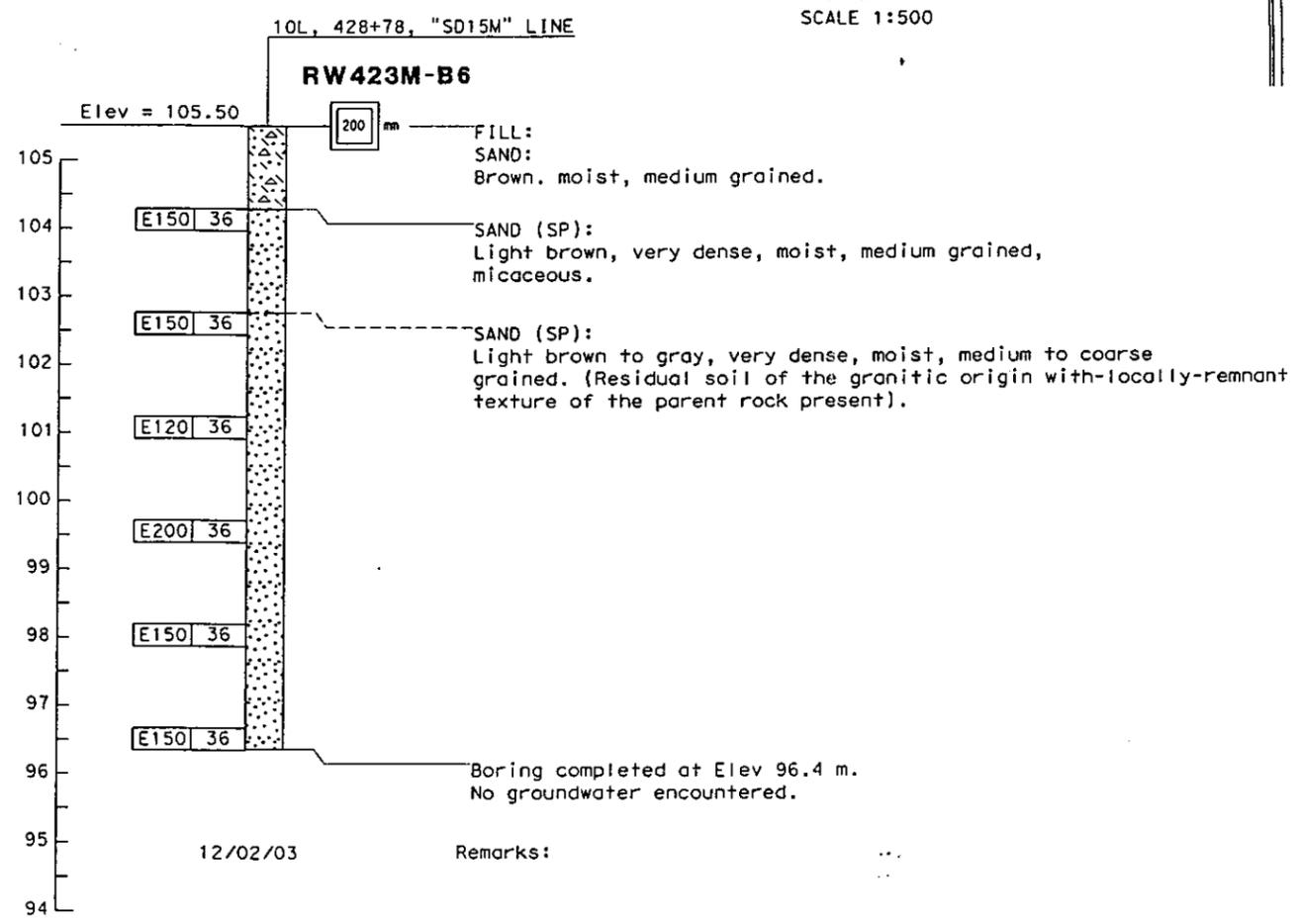
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**BORING No.: RW423M-B6**  
 Date Drilled: 12/02/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 10L, 428+78, "SD15M" Line  
 Top of hole elevation: 105.50 m

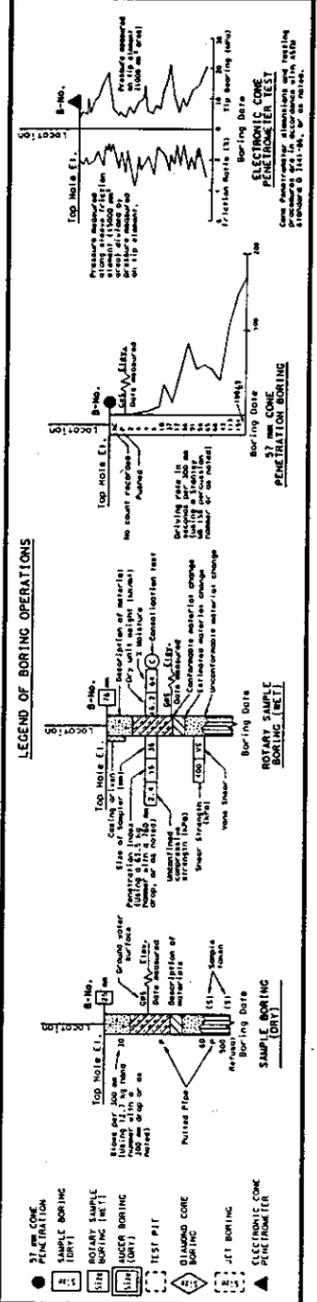
Drilling Method: Auger  
 Logged By: J. Tesar



Sta 12+43.770 End Ret Wall "423M"  
 11.835 Lt Sta 429+80 "SD15M"



- NOTES:**
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  2. E-BLOW COUNT FOR 0.3 m PENETRATION EXTRAPOLATED FROM BLOW COUNT FOR THE INTERVAL LESS THAN 0.3 m (DUE TO CHANGE IN MATERIAL AND HARD DRIVING).
  3. PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.



**LEGEND OF BORING OPERATIONS**

31 m CONE PENETRATION SAMPLE BORING (CBP)

ROTARY SAMPLE BORING (RSB)

AUGER BORING (AB)

TEST PIT

DIAMOND CORE BORING (DCB)

JET BORING

ELECTRONIC CONE PENETROMETER

**LEGEND OF EARTH MATERIALS**

GRAVEL

SAND

SILT

CLAY

SANDY CLAY

CLAYEY SAND

SILT SAND

SILT CLAY

CLAYEY SILT

SILT AND/OR ORGANIC MUD

FILL MATERIAL

COBBLE

ODDUS ROCK

SEDIMENTARY ROCK

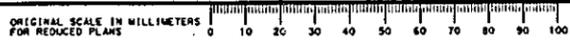
METAMORPHIC

**CONSISTENCY CLASSIFICATION FOR SOILS**

Group	Moisture Ratio (w)	Plasticity Index (PI)	Consistency
0-4	0-10	0-4	VERY LOOSE
5-10	10-20	5-10	LOOSE
11-20	20-30	11-20	MEDIUM DENSE
21-30	30-40	21-30	DENSE
31-40	40-50	31-40	VERY DENSE
41-50	50-60	41-50	VERY STIFF
51-60	60-70	51-60	STIFF
61-70	70-80	61-70	VERY STIFF
71-80	80-90	71-80	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.

<b>ENGINEERING SERVICES</b>		<b>GEOTECHNICAL SERVICES</b>		FIELD INVESTIGATION BY:	<b>STATE OF CALIFORNIA</b>		<b>GEOTECHNICAL DESIGN</b>		BRIDGE NO.	<b>RETAINING WALL RW423M R-40</b>	
DRAWN BY: JOHN FRASIER				J. TESAR	DEPARTMENT OF TRANSPORTATION		- SOUTH 2		KILOMETER POST	<b>LOG OF TEST BORINGS RW423M-B6</b>	
CHECKED BY: JEFF TESAR										REVISION DATES (PRELIMINARY STAGE ONLY)	
					CU 11230 EA 080921					SHEET OF	



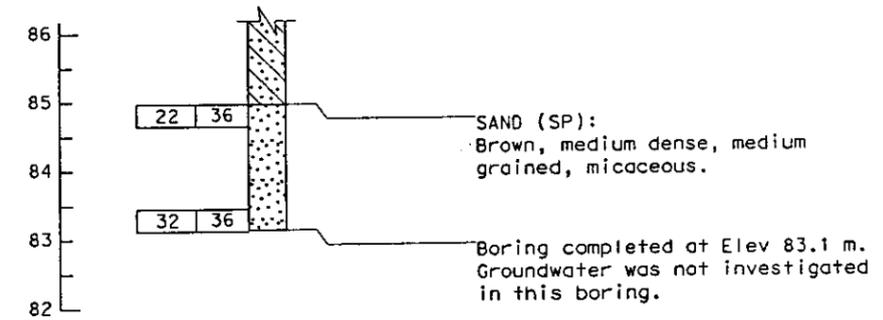
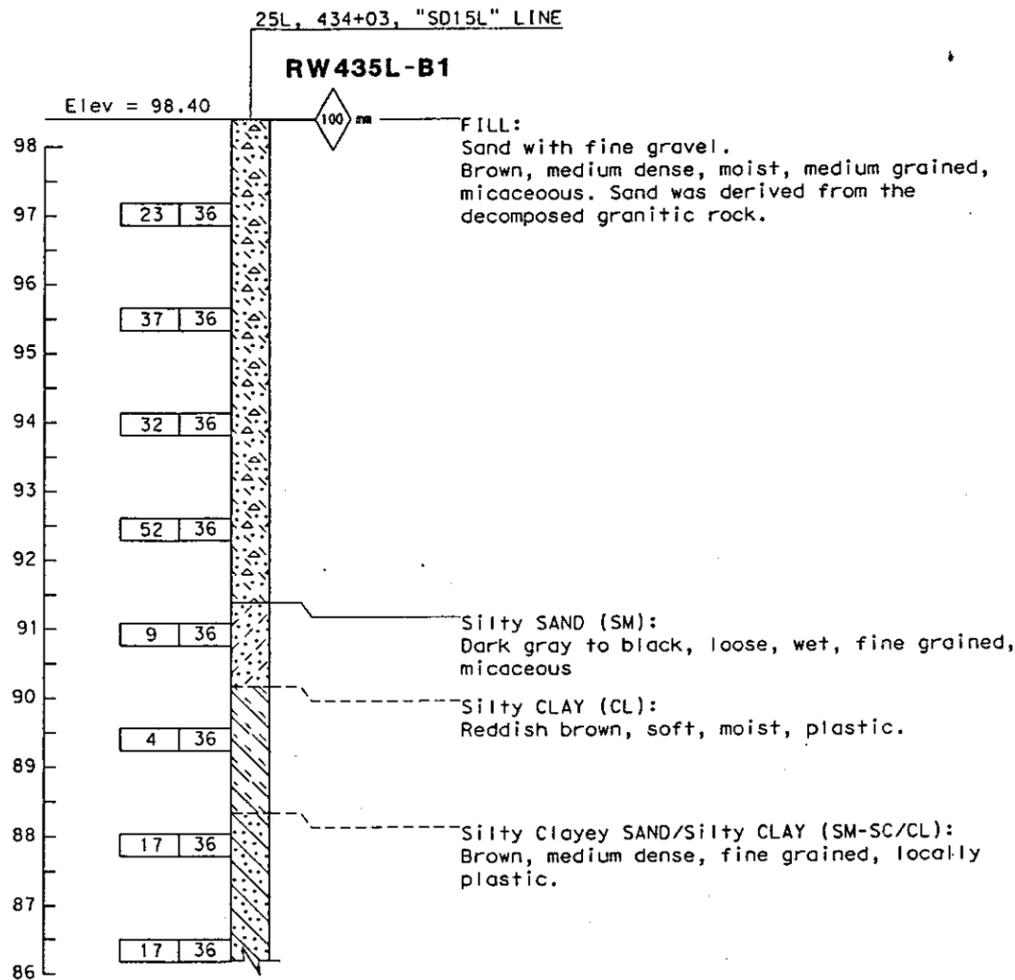
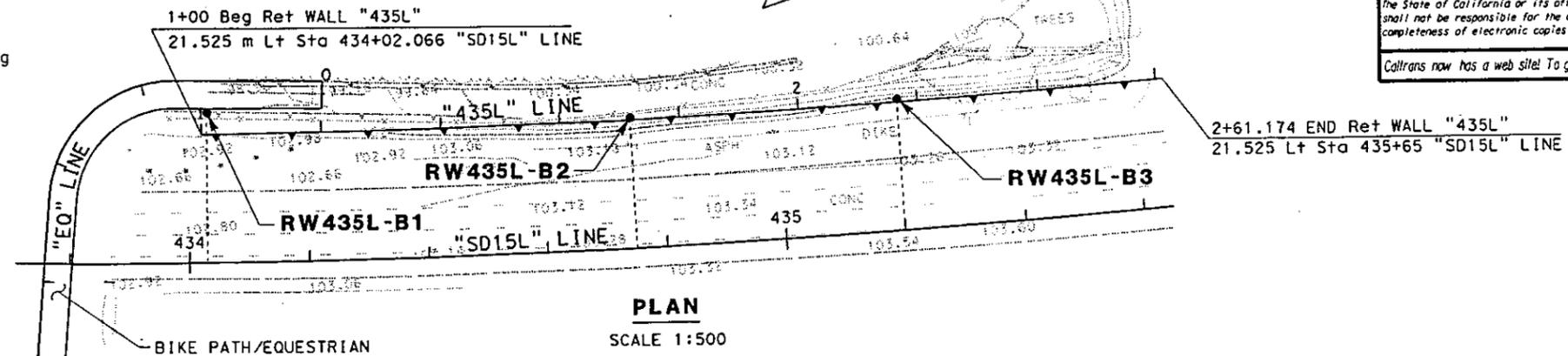


DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
**JEFF J. TESAR**  
 CERTIFIED ENGINEERING GEOLOGIST  
 No. 2137  
 REGISTERED GEOLOGIST  
 STATE OF CALIFORNIA

PLANS APPROVAL DATE \_\_\_\_\_  
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**BORING No.: RW435L-B1**  
 Date Drilled: 12/05/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 25L, 434+03, "SD15L" LINE  
 Top of hole elevation: 98.40 m  
 Drilling Method: Diamond Boring  
 Logged By: J. Tesar



**NOTES:**

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3. PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF BORING OPERATIONS**

ALTERNATE BORING  
 SAMPLE BORING (DRY)  
 ROTARY BORING (DRY)  
 DIAMOND CORE BORING (DRY)  
 JET BORING  
 PENETRATION BORING

TOP HOLE ELEV. (m)  
 BORING DATE (DRY)  
 BORING METHOD (DRY)  
 BORING TYPE (DRY)  
 BORING NO. (DRY)  
 BORING LOCATION (DRY)

**LEGEND OF EARTH MATERIALS**

GRAVEL  
 SAND  
 SILT  
 CLAY  
 SILTY SAND  
 SILTY CLAY  
 SILTY CLAYEY SAND/SILTY CLAY (SM-SC/CL)  
 SILTY SAND  
 SILTY CLAY  
 SILTY CLAYEY SAND/SILTY CLAY (SM-SC/CL)  
 SILTY SAND  
 SILTY CLAY  
 SILTY CLAYEY SAND/SILTY CLAY (SM-SC/CL)

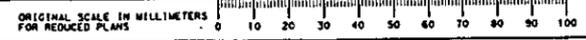
**CONSISTENCY CLASSIFICATION FOR SOILS**

According to the Standard Penetration Test

SPN	Consistency
0-4	Very Loose
5-10	Loose
11-20	Medium Dense
21-30	Dense
31-50	Very Dense
51-100	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.

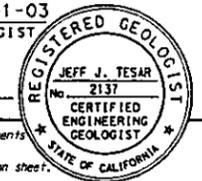
<b>ENGINEERING SERVICES</b>	<b>GEOTECHNICAL SERVICES</b>	FIELD INVESTIGATION BY: J. TESAR	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	GEOTECHNICAL DESIGN - SOUTH 2	BRIDGE NO. KILOMETER POST	<b>RETAINING WALL RW435L R-41</b>	<b>LOG OF TEST BORINGS RW435L-B1</b>
DRAWN BY JOHN FRASIER	CHECKED BY JEFF TESAR						
CU 11230 EA 080921			DISREGARD PRINTS BEARING EARLIER REVISION DATES		REVISION DATES (PRELIMINARY STAGE ONLY)		





DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST



PLANS APPROVAL DATE  
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**BORING No.: RW435L-B2**

Date Drilled: 12/04/03

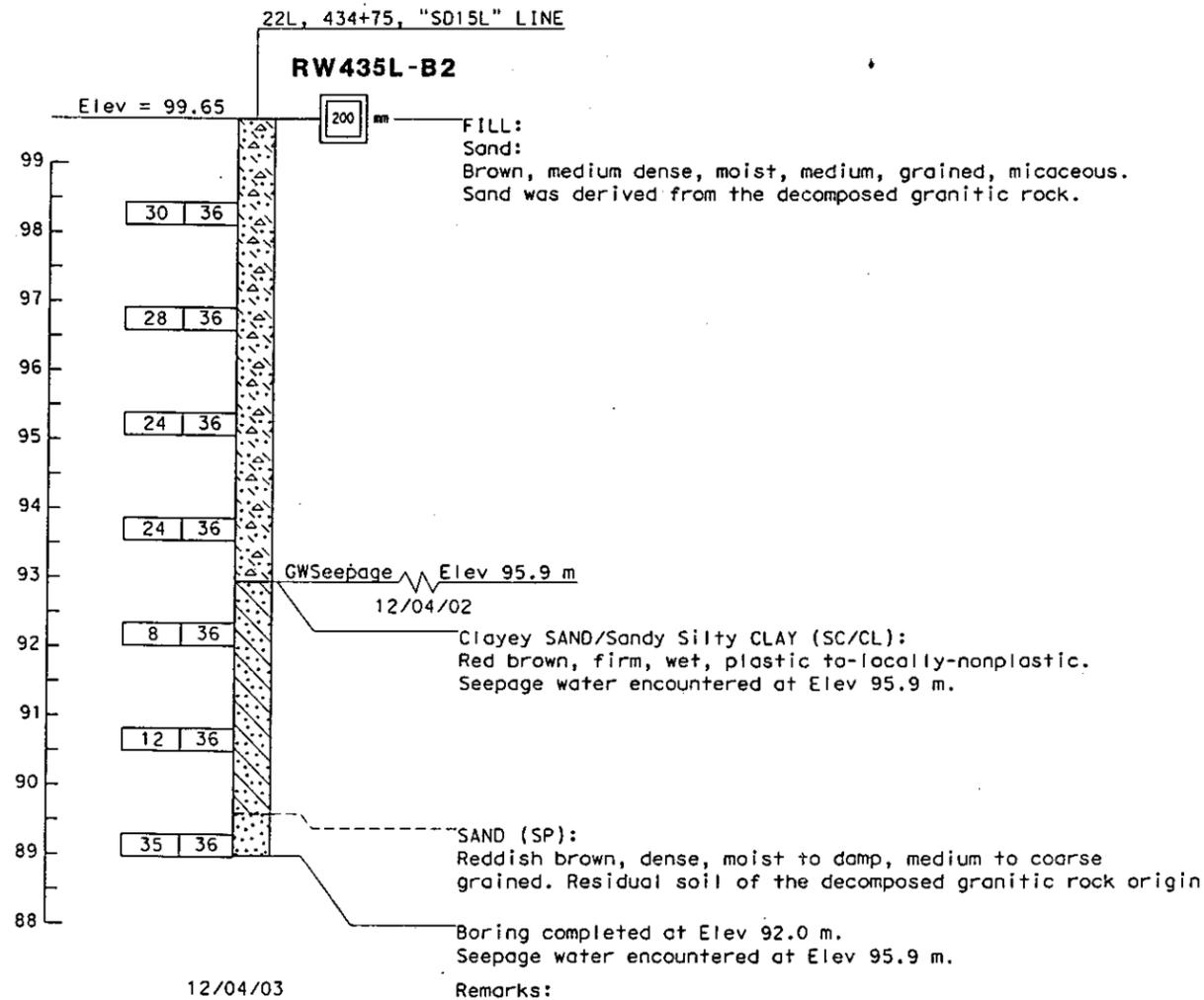
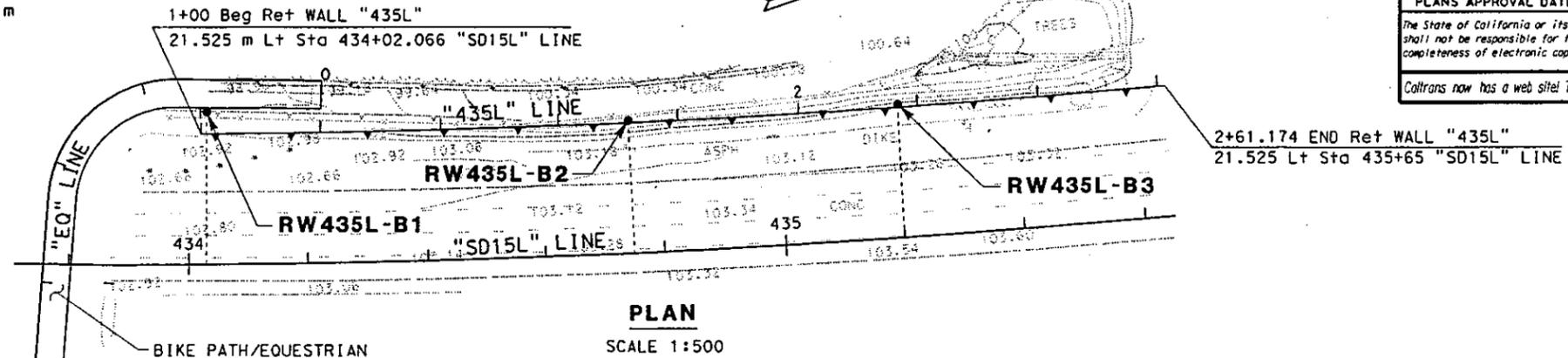
Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls

Location: 22L, 434+75, "SD15L" Line

Top of hole elevation: 99.65 m

Drilling Method: Auger

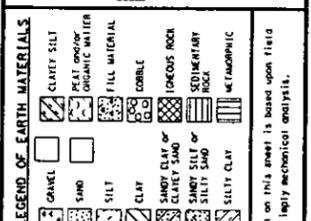
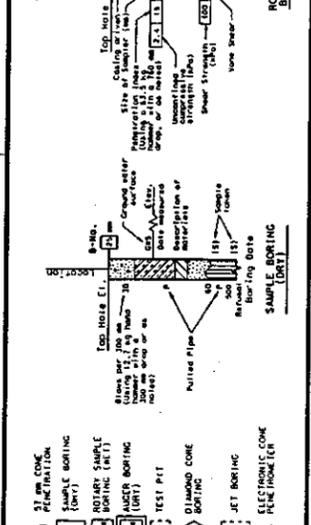
Logged By: J. Tesar



**NOTES:**

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3. PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF BORING OPERATIONS**



**CONSISTENCY CLASSIFICATION FOR SOILS**

SPIT	Penetration (mm)	Consistency
0-4	0-4	Very Loose
5-10	5-10	Loose
11-20	11-20	Medium Dense
31-50	31-50	Dense
50	50	Very Dense

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

<b>ENGINEERING SERVICES</b>		<b>GEOTECHNICAL SERVICES</b>		FIELD INVESTIGATION BY: J. TESAR		STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		GEOTECHNICAL DESIGN - SOUTH 2		BRIDGE NO. RETAINING WALL RW435L R-42	
DRAWN BY JOHN FRASIER		CHECKED BY JEFF TESAR		CU 11230 EA 080921		KILOMETER POST		DISREGARD PRINTS BEARING EARLIER REVISION DATES		LOG OF TEST BORINGS RW435L-B2	



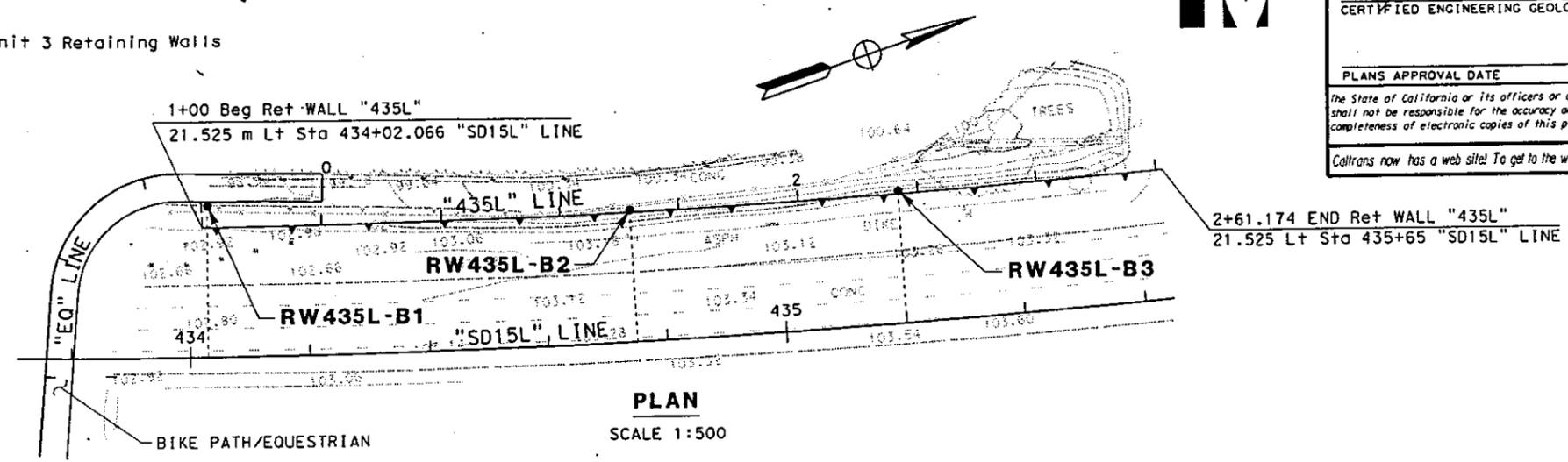


DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

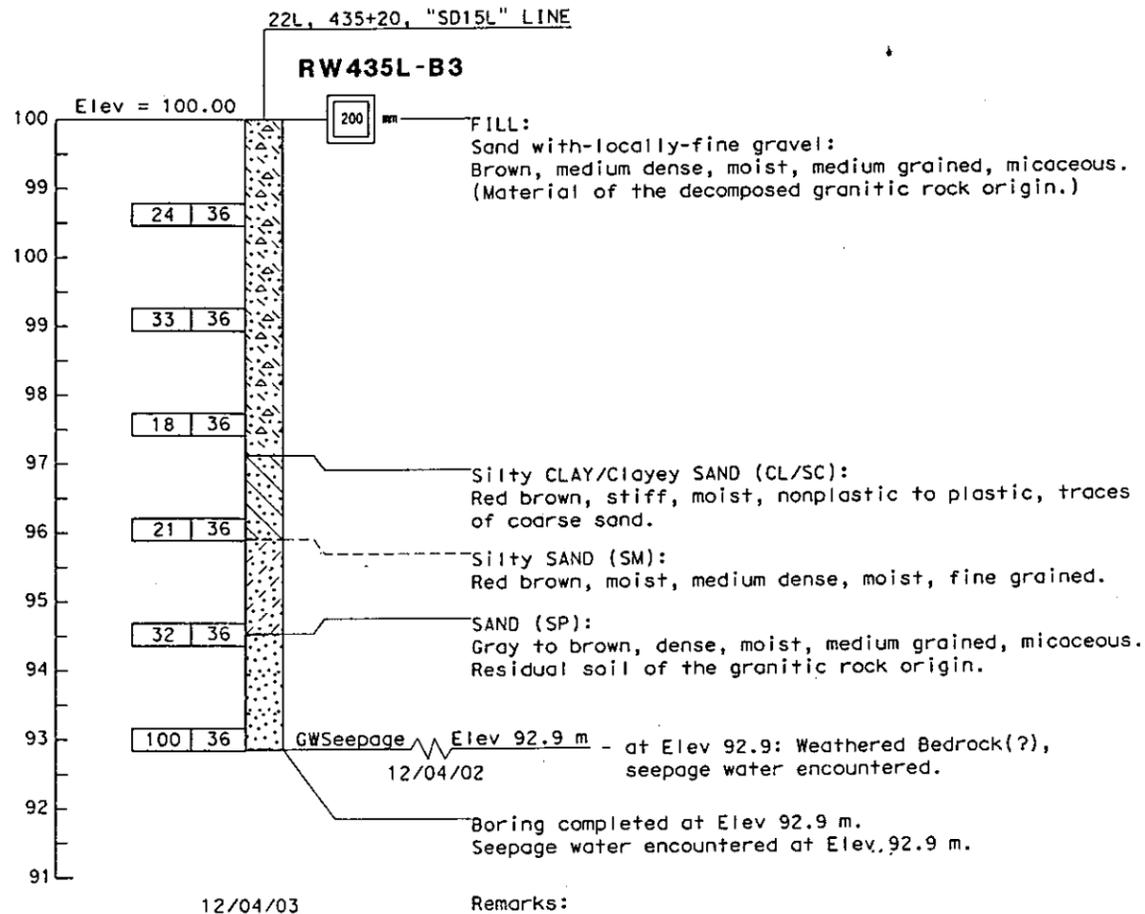
12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST  
 J. Tesar  
 REGISTERED GEOLOGIST  
 No. 2137  
 CERTIFIED ENGINEERING GEOLOGIST  
 STATE OF CALIFORNIA

PLANS APPROVAL DATE \_\_\_\_\_  
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**BORING No.: RW435L-B3**  
 Date Drilled: 12/04/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 22L, 435+20 "SD15L" Line  
 Top of hole elevation: 100.00 m  
 Drilling Method: Auger  
 Logged By: J. Tesar



**PLAN**  
 SCALE 1:500



- NOTES:**
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  3. PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF BORING OPERATIONS**

15 mm cone penetration  
 Sample boring  
 Rotary sample boring (SRT)  
 Auger boring  
 Test pit  
 Diamond core  
 Jet boring  
 Electronic cone penetrometer test

15 mm cone penetration  
 Sample boring  
 Rotary sample boring (SRT)  
 Auger boring  
 Test pit  
 Diamond core  
 Jet boring  
 Electronic cone penetrometer test

**LEGEND OF EARTH MATERIALS**

Gravel  
 Sand  
 Silt  
 Clay  
 Silty 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

SPPT (Blow Count)	Consistency
0-4	Very soft
5-10	Soft
11-20	Medium dense
21-30	Dense
31-50	Very dense
51-70	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.

<b>ENGINEERING SERVICES</b>		<b>GEOTECHNICAL SERVICES</b>		FIELD INVESTIGATION BY: J. TESAR	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	GEOTECHNICAL DESIGN - SOUTH 2	BRIDGE NO. RETAINING WALL RW435L R-43
DRAWN BY JOHN FRASIER	CHECKED BY JEFF TESAR				CU 11230 EA 080921	DISREGARD PRINTS BEARING EARLIER REVISION DATES	LOG OF TEST BORINGS RW435L-B3



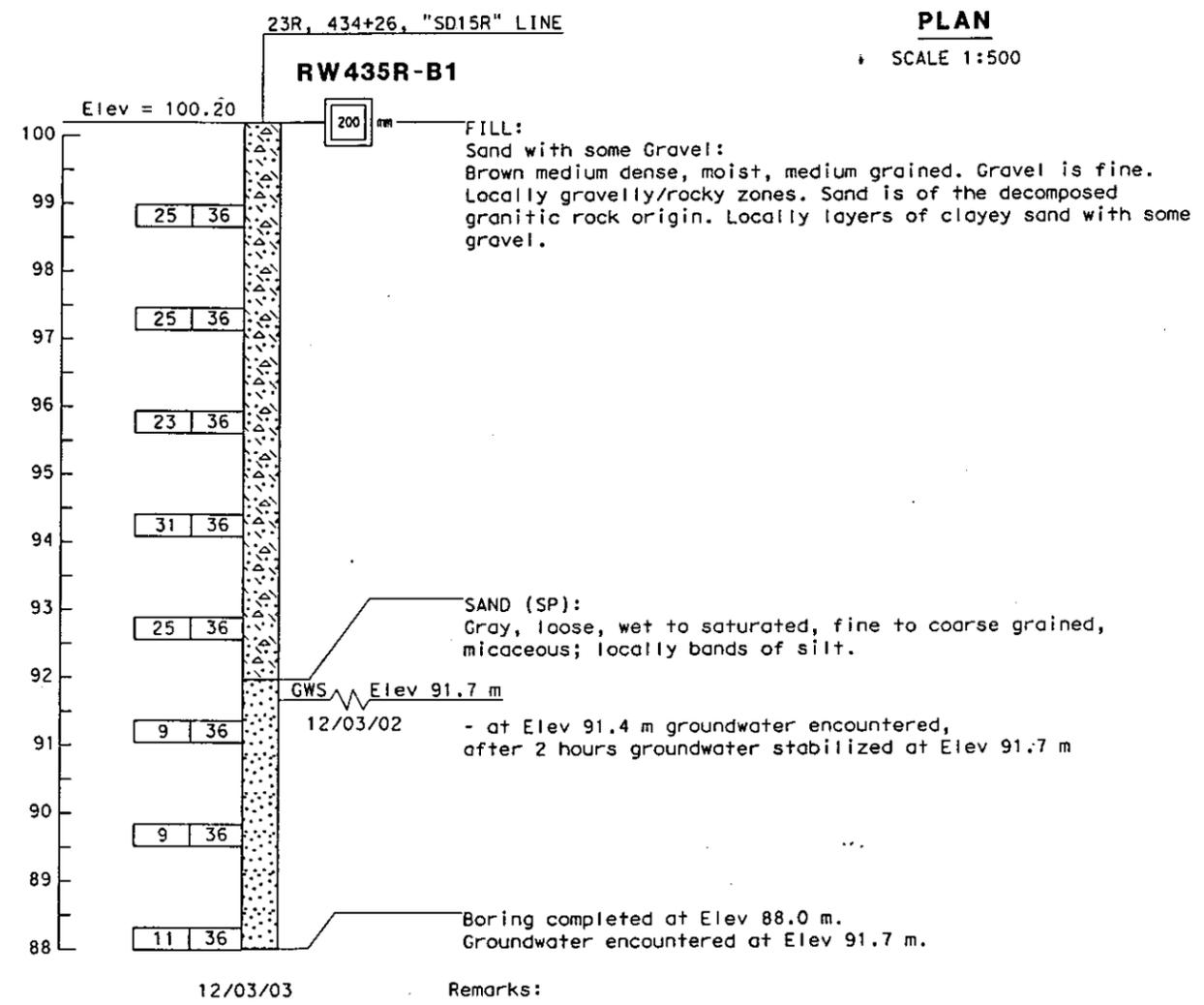
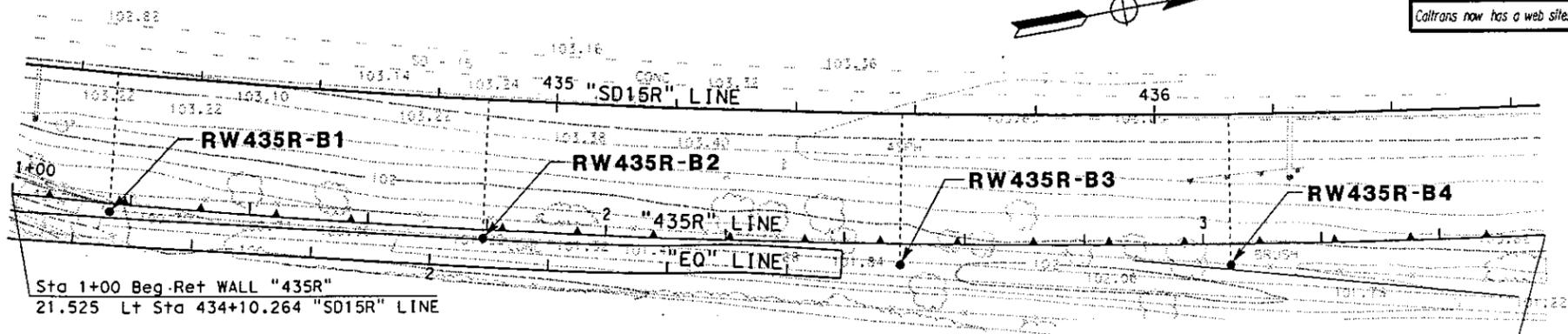


DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST  
 JEFF J. TESAR  
 No. 2137  
 REGISTERED GEOLOGIST  
 STATE OF CALIFORNIA

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**BORING No.: RW435R-B1**  
 Date Drilled: 12/03/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 23R, 434+26, "SD15R" Line  
 Top of hole elevation: 100.20 m  
 Drilling Method: Auger  
 Logged By: J. Tesar



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**LEGEND OF BORING OPERATIONS**

31 mm CORE  
 PENETRATION  
 100 mm CORE  
 150 mm CORE  
 200 mm CORE  
 250 mm CORE  
 300 mm CORE  
 350 mm CORE  
 400 mm CORE  
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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST  
 JEFF J. TESAR  
 No. 2137  
 REGISTERED GEOLOGIST  
 CERTIFIED ENGINEERING GEOLOGIST  
 STATE OF CALIFORNIA

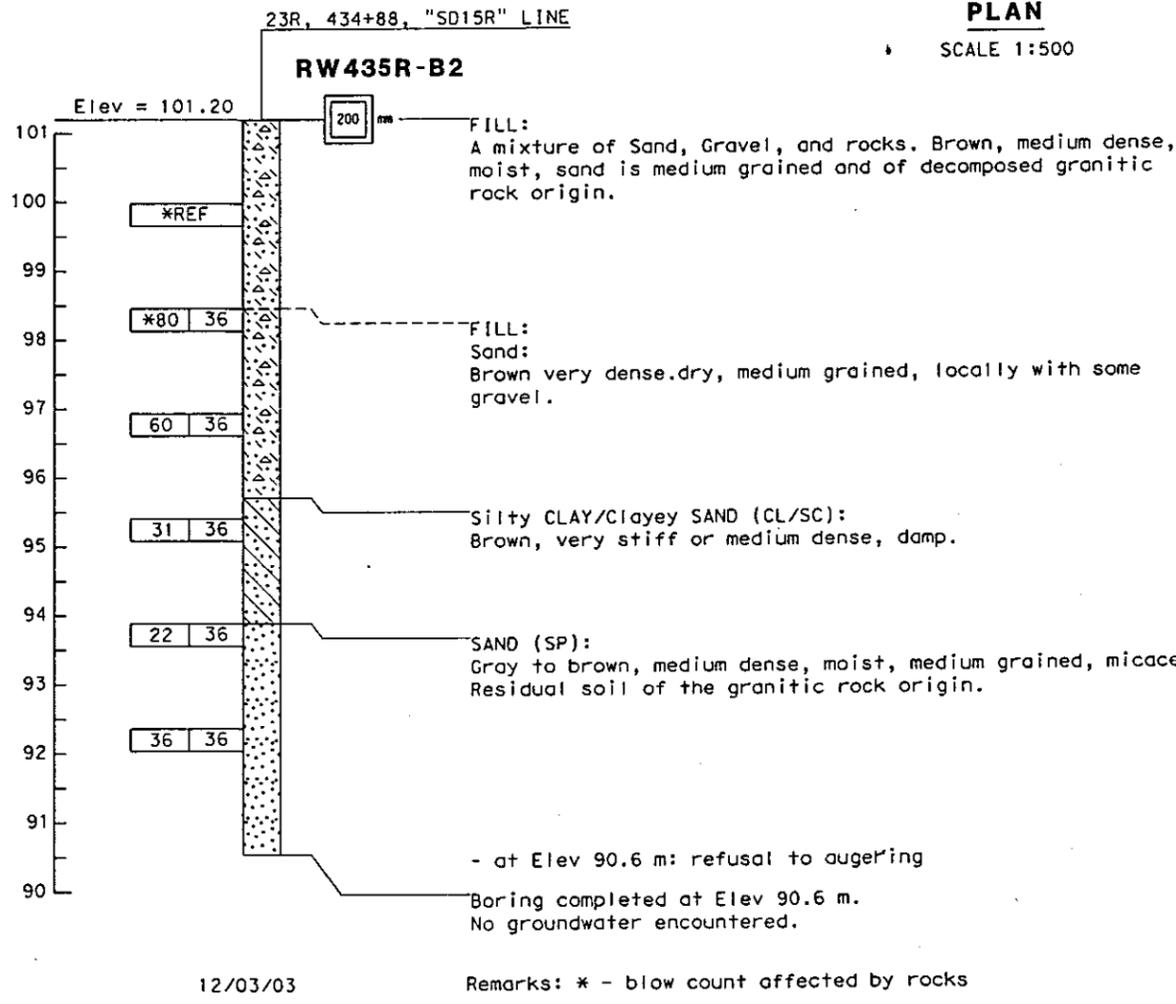
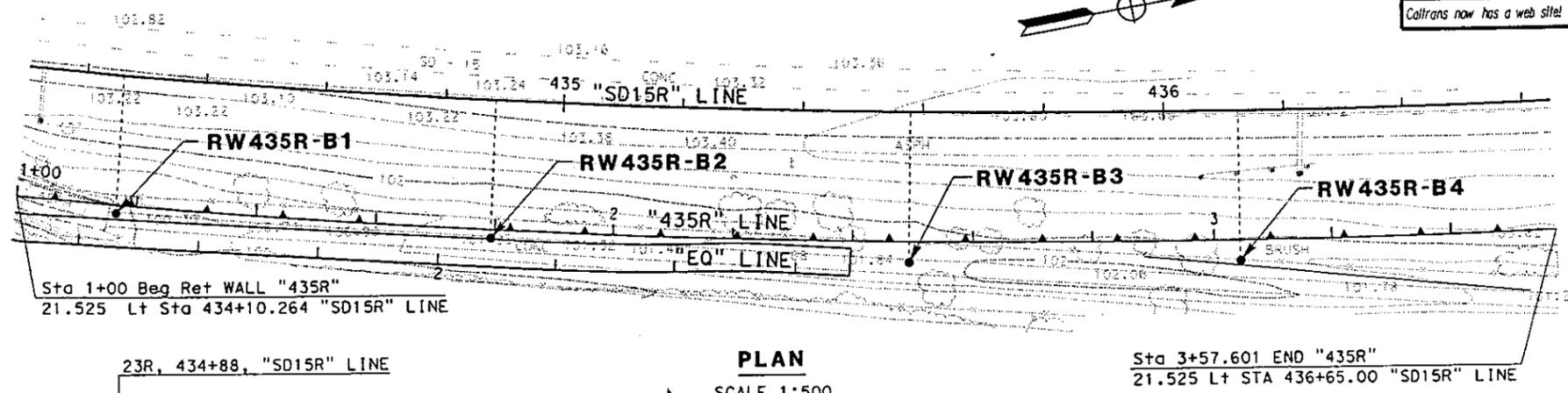
PLANS APPROVAL DATE

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**BORING No.: RW435R-B2**  
 Date Drilled: 12/03/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 23R, 434+88, "SD15R" Line  
 Top of hole elevation: 101.20 m

Drilling Method: Auger  
 Logged By: J. Tesar



- NOTES:**
1. THE DESCRIPTIONS AND CLASSIFICATIONS OF ROCK AND/OR SOIL, INCLUDING CONSISTENCY AND RELATIVE DENSITY DESCRIPTORS, USED BY THE FIELD PERSONNEL FOR THE EXPLORATION TEST HOLES SHOWN ON THIS SHEET ARE BASED ON THE "SOIL AND ROCK LOGGING CLASSIFICATION MANUAL", OFFICE OF MATERIAL AND FOUNDATIONS (FORMERLY OFFICE OF STRUCTURAL FOUNDATIONS), AUGUST 1996. COPIES OF THIS MANUAL ARE AVAILABLE FOR INSPECTION AND/OR REPRODUCTION SUBJECT TO APPLICABLE OFFICE POLICIES, BY ANY BIDDER OR CONTRACTOR UPON WRITTEN REQUEST.
  2. E-BLOW COUNT FOR 0.3 m PENETRATION EXTRAPOLATED FROM BLOW COUNT FOR THE INTERVAL LESS THAN 0.3 m (DUE TO CHANGE IN MATERIAL AND HARD DRIVING).
  3. PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF BORING OPERATIONS**

**ELECTRONIC CONE PENETROMETER TEST**  
 Cone Penetration Test (CPT) is performed using a cone penetrometer (CP) and a cone penetrometer tip (CPT). The test results are recorded on a CPT log sheet. The test results are used to determine the cone resistance (qc) and sleeve friction (fs) of the soil. The test results are used to determine the soil strength and stiffness. The test results are used to determine the soil type and consistency.

**ROTARY SAMPLE BORING (RSB)**  
 The rotary sample boring (RSB) is performed using a rotary drill bit and a sample bucket. The test results are recorded on a RSB log sheet. The test results are used to determine the soil type and consistency. The test results are used to determine the soil strength and stiffness. The test results are used to determine the soil type and consistency.

**TEST PIT**  
 The test pit is performed using a test pit and a test pit. The test results are recorded on a test pit log sheet. The test results are used to determine the soil type and consistency. The test results are used to determine the soil strength and stiffness. The test results are used to determine the soil type and consistency.

**LEGEND OF EARTH MATERIALS**

GRAVEL, SAND, SILT, CLAY, CLAYEY SILT, SILTY CLAY, CLAYEY SAND, SILTY SAND, SILTY CLAY, METAMORPHIC, CLAYEY SILT, SILTY CLAY, CLAYEY SAND, SILTY SAND, SILTY CLAY, METAMORPHIC, CLAYEY SILT, SILTY CLAY, CLAYEY SAND, SILTY SAND, SILTY CLAY, METAMORPHIC.

**CONSISTENCY CLASSIFICATION FOR SOILS**

SP Index (0-3)	Consistency	
	Very Soft	Very Stiff
0-4	Very Loose	Very Dense
5-10	Loose	Dense
11-20	Medium Dense	Very Dense
31-50	Dense	Very Dense
70	Very Dense	Very Dense

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.

<b>ENGINEERING SERVICES</b>	<b>GEOTECHNICAL SERVICES</b>	FIELD INVESTIGATION BY:	<b>STATE OF CALIFORNIA</b>	GEOTECHNICAL DESIGN	BRIDGE NO.	<b>RETAINING WALL RW435R</b>	<b>R-45</b>
DRAWN BY: JOHN FRASIER		J. TESAR	DEPARTMENT OF TRANSPORTATION	- SOUTH 2	KILOMETER POST	<b>LOG OF TEST BORINGS RW435R-B2</b>	
CHECKED BY: JEFF TESAR							



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST

JEFF J. TESAR  
 No. 2137  
 CERTIFIED ENGINEERING GEOLOGIST  
 STATE OF CALIFORNIA

PLANS APPROVAL DATE

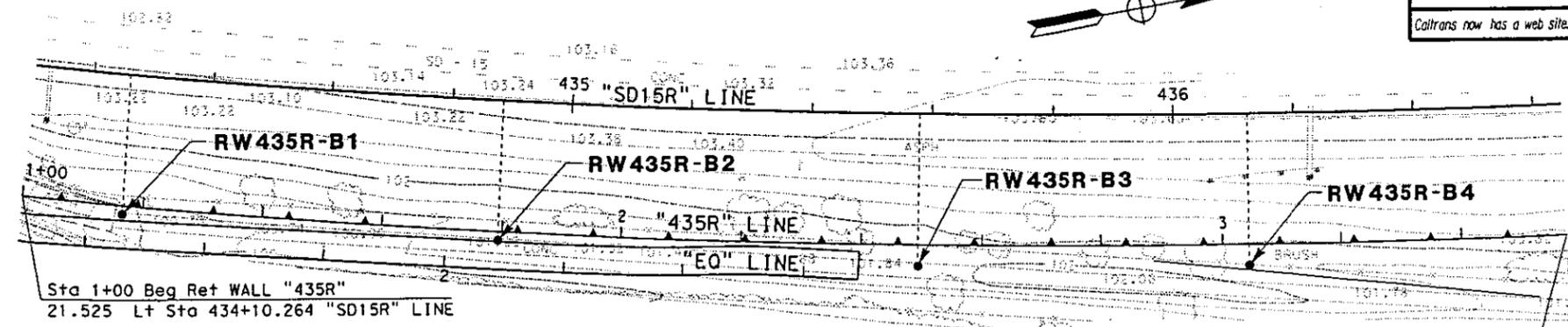
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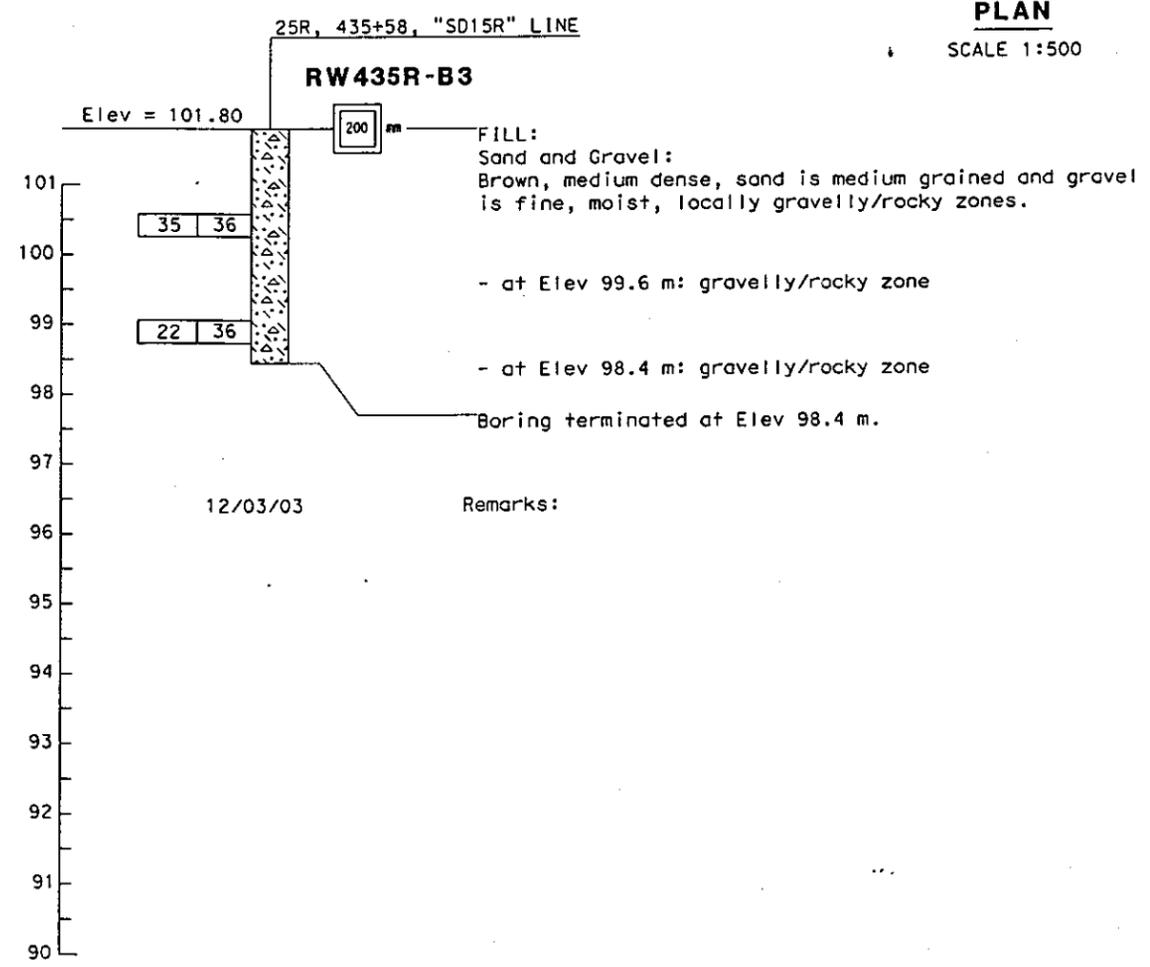
**BORING No.: RW435R-B3**  
 Date Drilled: 12/03/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 25R, 435+58, "SD15R" Line  
 Top of hole elevation: 101.80 m

Drilling Method: Auger

Logged By: J. Tesar



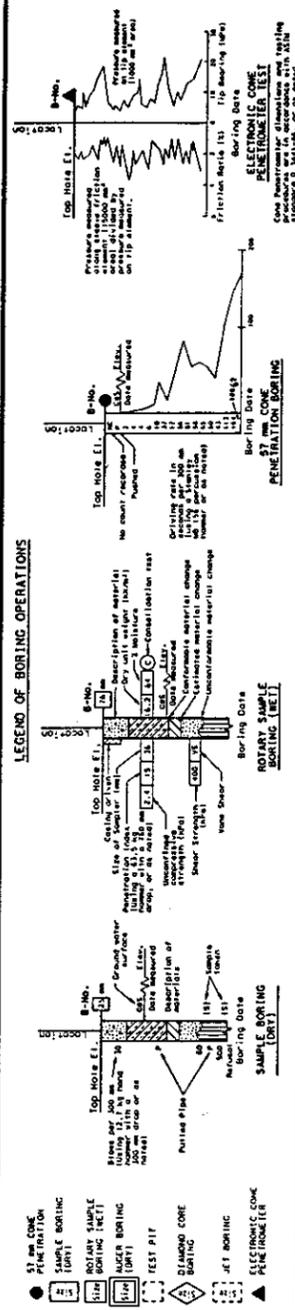
**PLAN**  
 SCALE 1:500



**NOTES:**

1. THE DESCRIPTIONS AND CLASSIFICATIONS OF ROCK AND/OR SOIL, INCLUDING CONSISTENCY AND RELATIVE DENSITY DEcriptors, USED BY THE FIELD PERSONNEL FOR THE EXPLORATION TEST HOLES SHOWN ON THIS SHEET ARE BASED ON THE "SOIL AND ROCK LOGGING CLASSIFICATION MANUAL", OFFICE OF MATERIAL AND FOUNDATIONS (FORMERLY OFFICE OF STRUCTURAL FOUNDATIONS), AUGUST 1996. COPIES OF THIS MANUAL ARE AVAILABLE FOR INSPECTION AND/OR REPRODUCTION SUBJECT TO APPLICABLE OFFICE POLICIES, BY ANY BIDDER OR CONTRACTOR UPON WRITTEN REQUEST.
2. E-BLOW COUNT FOR 0.3 m PENETRATION EXTRAPOLATED FROM BLOW COUNT FOR THE INTERVAL LESS THAN 0.3 m (DUE TO CHANGE IN MATERIAL AND HARD DRIVING).
3. PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF BORING OPERATIONS**



**LEGEND OF EARTH MATERIALS**

Consistency Classification for Soils	Symbol
Very Loose	(Symbol)
Loose	(Symbol)
Medium Dense	(Symbol)
Dense	(Symbol)
Very Dense	(Symbol)

**LEGEND OF EARTH MATERIALS**

Gravel	(Symbol)
Sand	(Symbol)
Silt	(Symbol)
Clay	(Symbol)
Sandy Clay	(Symbol)
Clayey Sand	(Symbol)
Sandy Silt	(Symbol)
Silty Sand	(Symbol)
Silty Clay	(Symbol)
Clayey Silt	(Symbol)
Silt with organic material	(Symbol)
Fill material	(Symbol)
Cobble	(Symbol)
Concretion	(Symbol)
Organic Rock	(Symbol)
Sedimentary Rock	(Symbol)
Metamorphic Rock	(Symbol)

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.

<b>ENGINEERING SERVICES</b>		<b>GEOTECHNICAL SERVICES</b>		FIELD INVESTIGATION BY:		BRIDGE NO.		<b>RETAINING WALL RW435R R-46</b>	
DRAWN BY: JOHN FRASIER						KILOMETER POST		<b>LOG OF TEST BORINGS RW435R-B3</b>	
CHECKED BY: JEFF TESAR								REVISION DATES (PRELIMINARY STAGE ONLY)	
						DISCARD PRINTS BEARING EARLIER REVISION DATES		SHEET OF	



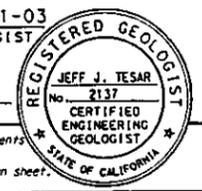
CU 11230  
 EA 080921

DATE PLOTTED => 16-DEC-2003  
 TIME PLOTTED => 15:18



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST

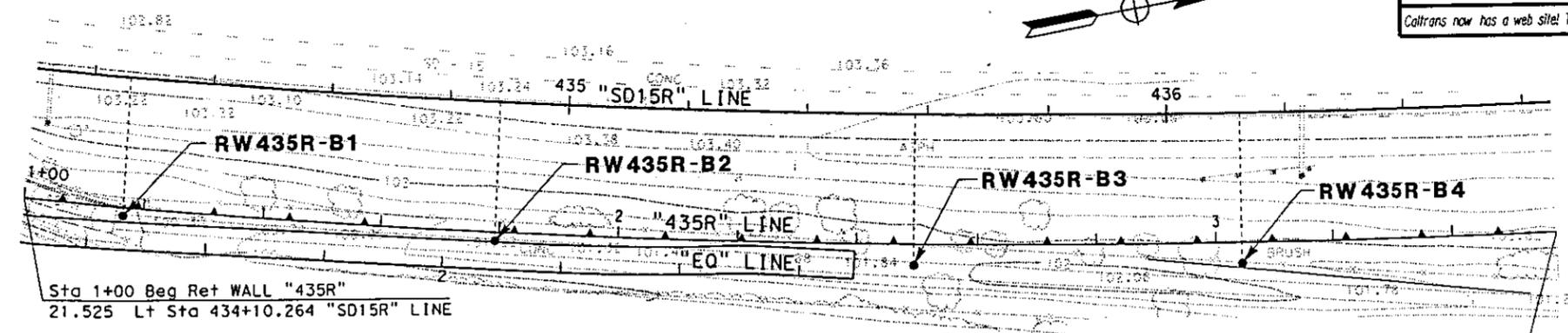


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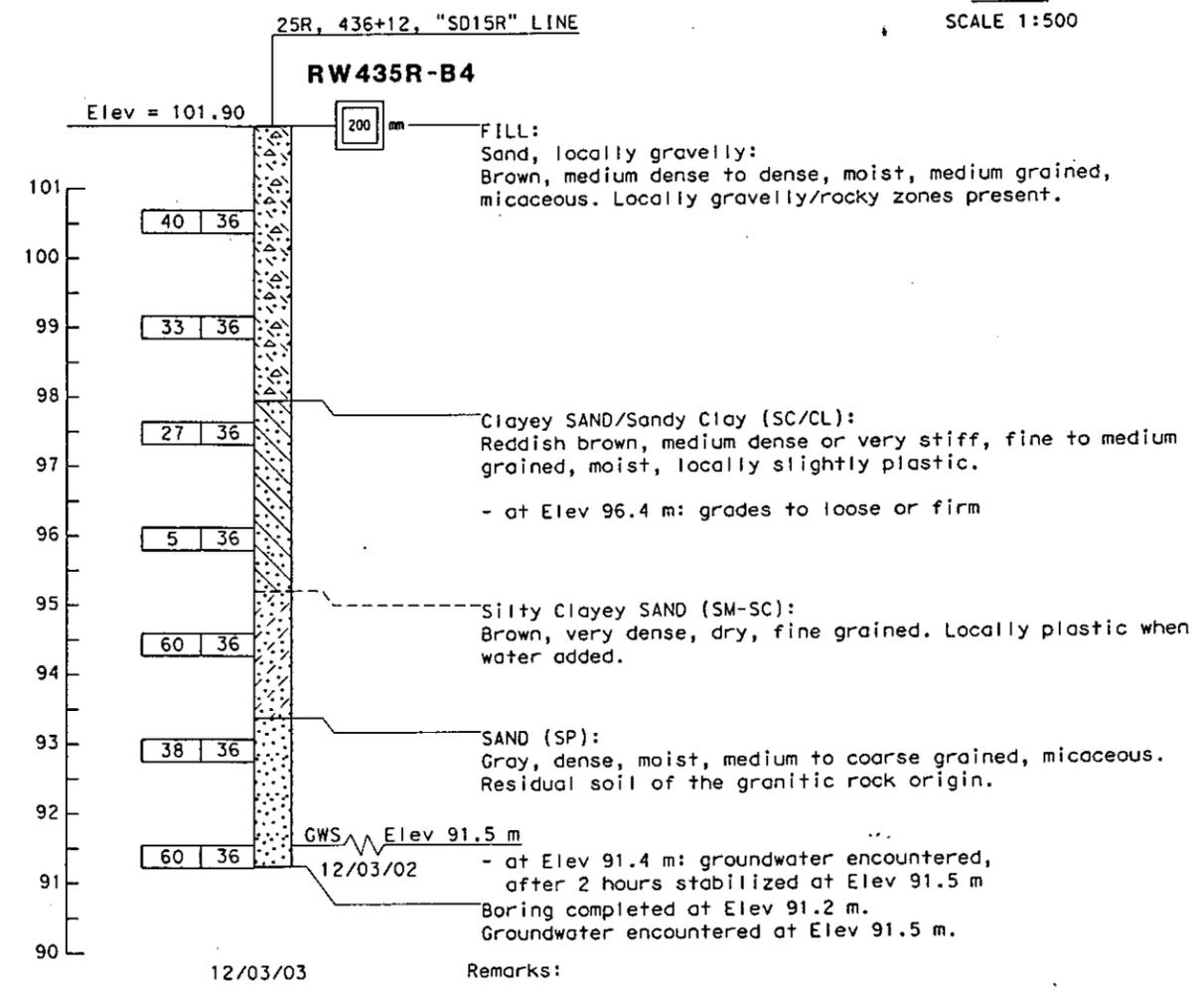
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**BORING No.: RW435R-B4**  
 Date Drilled: 12/03/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 25R, 436+12, "SD15R" Line  
 Top of hole elevation: 101.90 m

Drilling Method: Auger  
 Logged By: J. Tesar



**PLAN**  
 SCALE 1:500



- NOTES:**
- THE DESCRIPTIONS AND CLASSIFICATIONS OF ROCK AND/OR SOIL, INCLUDING CONSISTENCY AND RELATIVE DENSITY DEcriptors, USED BY THE FIELD PERSONNEL FOR THE EXPLORATION TEST HOLES SHOWN ON THIS SHEET ARE BASED ON THE "SOIL AND ROCK LOGGING CLASSIFICATION MANUAL", OFFICE OF MATERIAL AND FOUNDATIONS (FORMERLY OFFICE OF STRUCTURAL FOUNDATIONS), AUGUST 1996. COPIES OF THIS MANUAL ARE AVAILABLE FOR INSPECTION AND/OR REPRODUCTION SUBJECT TO APPLICABLE OFFICE POLICIES, BY ANY BIDDER OR CONTRACTOR UPON WRITTEN REQUEST.
  - E-BLOW COUNT FOR 0.3 m PENETRATION EXTRAPOLATED FROM BLOW COUNT FOR THE INTERVAL LESS THAN 0.3 m (DUE TO CHANGE IN MATERIAL AND HARD DRIVING).
  - PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF BORING OPERATIONS**

52 mm CONE PENETRATION (CPT)  
 SAMPLE BORING (SB)  
 ROTARY SAMPLE BORING (RSB)  
 AUGER BORING (AB)  
 TEST PIT (TP)  
 DIAMOND CORE BORING (DCB)  
 TEST BORING (TB)  
 ELECTRONIC CONE PENETROMETER (ECP)

**LEGEND OF EARTH MATERIALS**

CLAYEY SILT  
 RED AND/OR IRONIC MATT  
 FULL MATERIAL  
 CORBLE  
 OCEANIC ROCK  
 SEDIMENTARY ROCK  
 METAMORPHIC

**CONSISTENCY CLASSIFICATION FOR SOILS**

SPT Blows (0.3m)	Consistency	
	Very Loose	Very Stiff
0-4	Very Loose	Very Stiff
5-10	Loose	Stiff
11-30	Medium Dense	Very Stiff
31-50	Dense	Hard
50	Very Dense	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.

<b>ENGINEERING SERVICES</b>		<b>GEOTECHNICAL SERVICES</b>		FIELD INVESTIGATION BY: J. TESAR		STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION		GEOTECHNICAL DESIGN - SOUTH 2		BRIDGE NO. RETAINING WALL RW435R R-47	
DRAWN BY JOHN FRASIER		CHECKED BY JEFF TESAR		ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS		CU 11230 EA 080921		USERNAME => jdfcasie DGN FILE => b08092q047.dgn		REVISION DATES (PRELIMINARY STAGE ONLY)	

DATE PLOTTED => 16-DEC-2003  
 TIME PLOTTED => 15:18

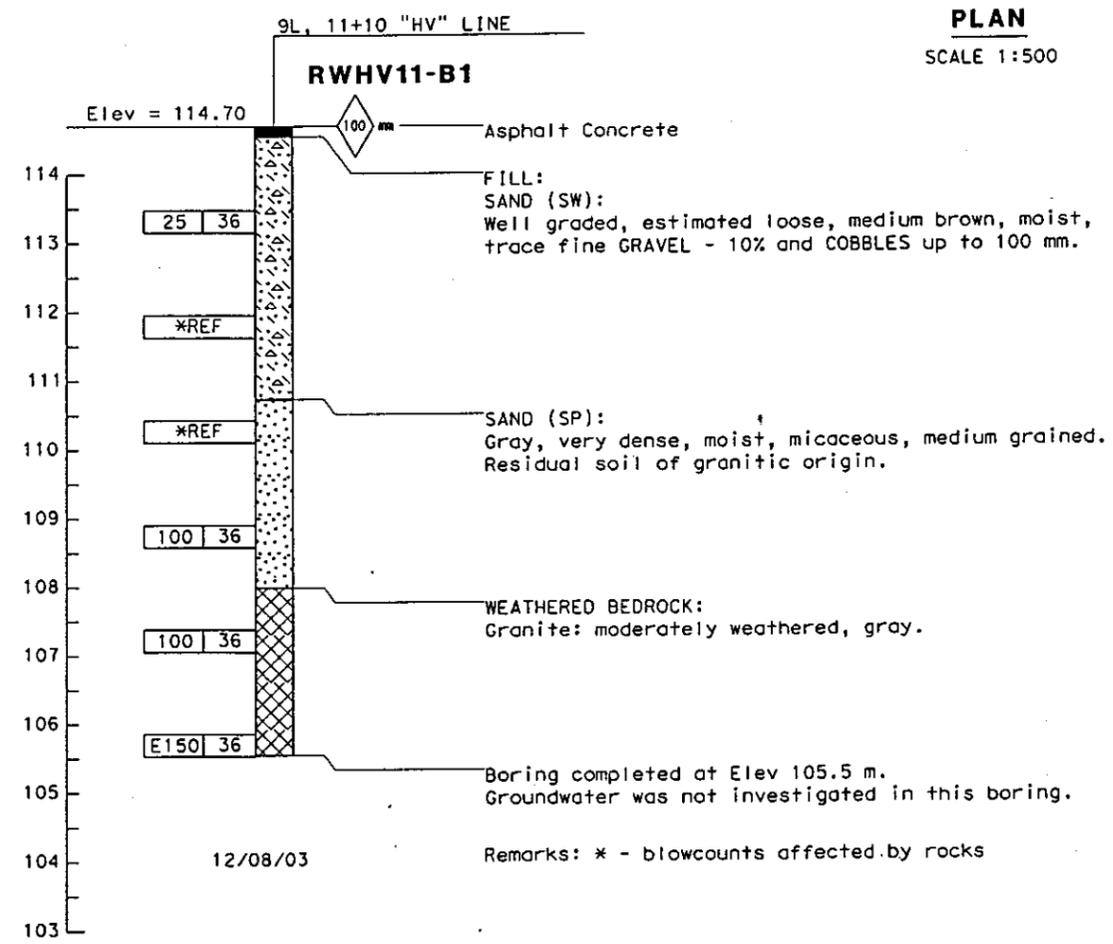
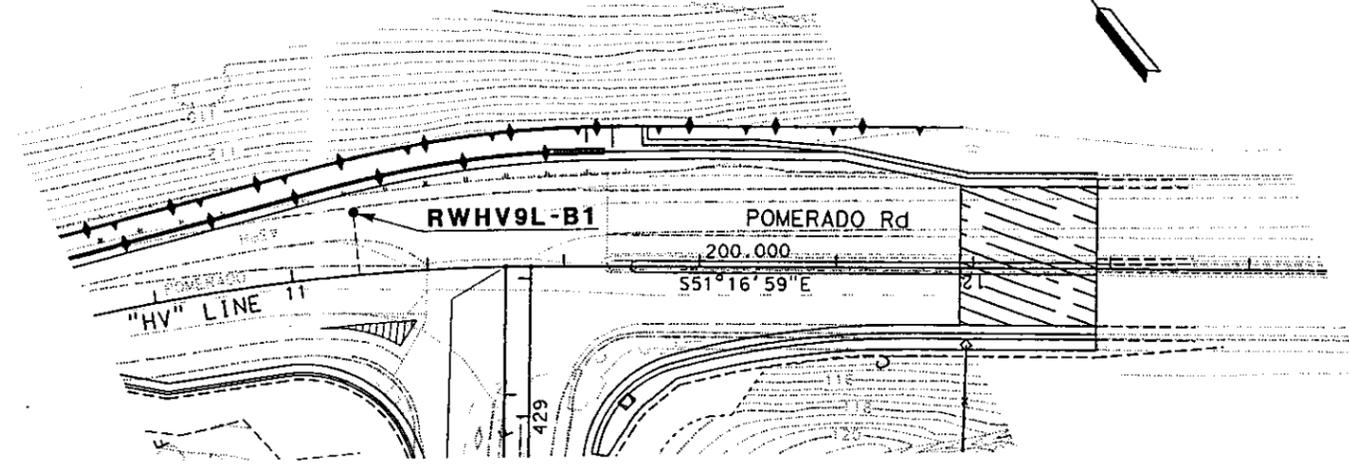


DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
 CERTIFIED ENGINEERING GEOLOGIST  
 JEFF J. TESAR  
 No. 2137  
 REGISTERED GEOLOGIST  
 CERTIFIED ENGINEERING GEOLOGIST  
 STATE OF CALIFORNIA

PLANS APPROVAL DATE  
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**BORING No.: RWHV11-B1**  
 Date Drilled: 12/08/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 19L, 11+10, "HV" Line  
 Top of hole elevation: 114.70 m  
 Drilling Method: Diamond Boring  
 Logged By: J. Tesar



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  - PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

**LEGEND OF BORING OPERATIONS**

27 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 50 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 75 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 100 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 150 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 200 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 250 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 300 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 350 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 400 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 450 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 500 mm CONE PENETRATION SAMPLE BORING (METRIC)

27 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 50 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 75 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 100 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 150 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 200 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 250 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 300 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 350 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 400 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 450 mm CONE PENETRATION SAMPLE BORING (METRIC)  
 500 mm CONE PENETRATION SAMPLE BORING (METRIC)

**LEGEND OF EARTH MATERIALS**

GRAVEL	CLAYEY SILT
SAND	PEAT AND/OR ORGANIC MATTER
SILT	FILL MATERIAL
CLAY	COBBLE
SMART CLAY or CLAYEY SAND	LAGOONIC ROCK
SMART SILT or SILTY SAND	SEDIMENTARY ROCK
SILTY CLAY	METAMORPHIC

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**

SP/PT (Blow/0.3m)	Standard Penetration Test	
	Consistive	Consistive
0-4	Very Loose	Very Soft
5-10	Loose	Soft
11-20	Medium Dense	Firm
21-30	Dense	Stiff
31-50	Very Dense	Very Stiff
50		Hard

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	FIELD INVESTIGATION BY: J. TESAR	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	GEOTECHNICAL DESIGN - SOUTH 2	BRIDGE NO. KILOMETER POST	RETAINING WALL RWHV9L LOG OF TEST BORINGS RW11-B1	R-48
DRAWN BY JOHN FRASIER	CHECKED BY JEFF TESAR						
ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100			USERNAME => tbfrasier DGN FILE => b08092q048.dgn	DISCARD PRINTS BEARING EARLIER REVISION DATES 12-16-03	REVISION DATES (Preliminary Stage Only) SHEET OF	DATE PLOTTED => 16-DEC-2003 TIME PLOTTED => 15:19	



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	15	M38.7/M42.7		

12-01-03  
CERTIFIED ENGINEERING GEOLOGIST

JEFF J. TESAR  
No. 2137  
CERTIFIED ENGINEERING GEOLOGIST  
STATE OF CALIFORNIA

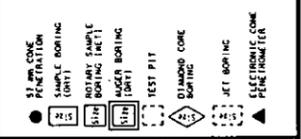
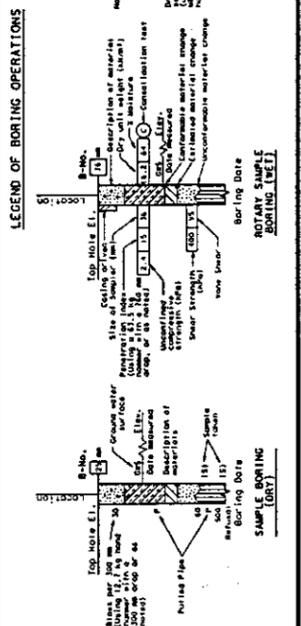
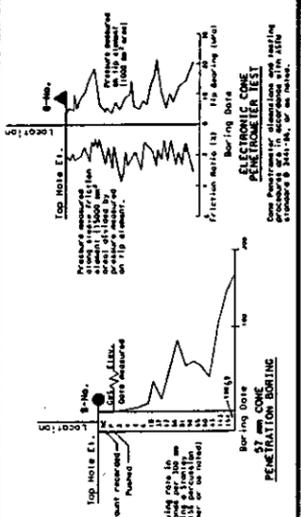
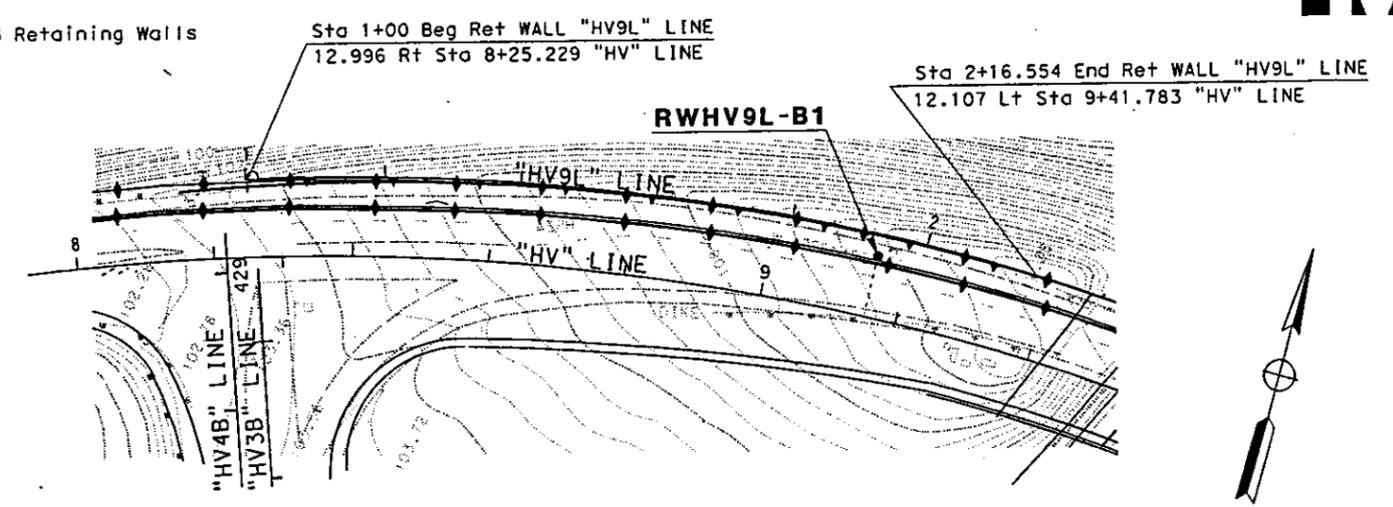
PLANS APPROVAL DATE

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**BORING No.: RWHV11L-B1**  
 Date Drilled: 12/04/03  
 Project Name: I-15 Managed Lanes, Unit 3 Retaining Walls  
 Location: 9L, 9+15, "HV" Line  
 Top of hole elevation: 110.00 m

Drilling Method: Auger  
 = Sample Number  
 (X) Logged By: J. Tesar



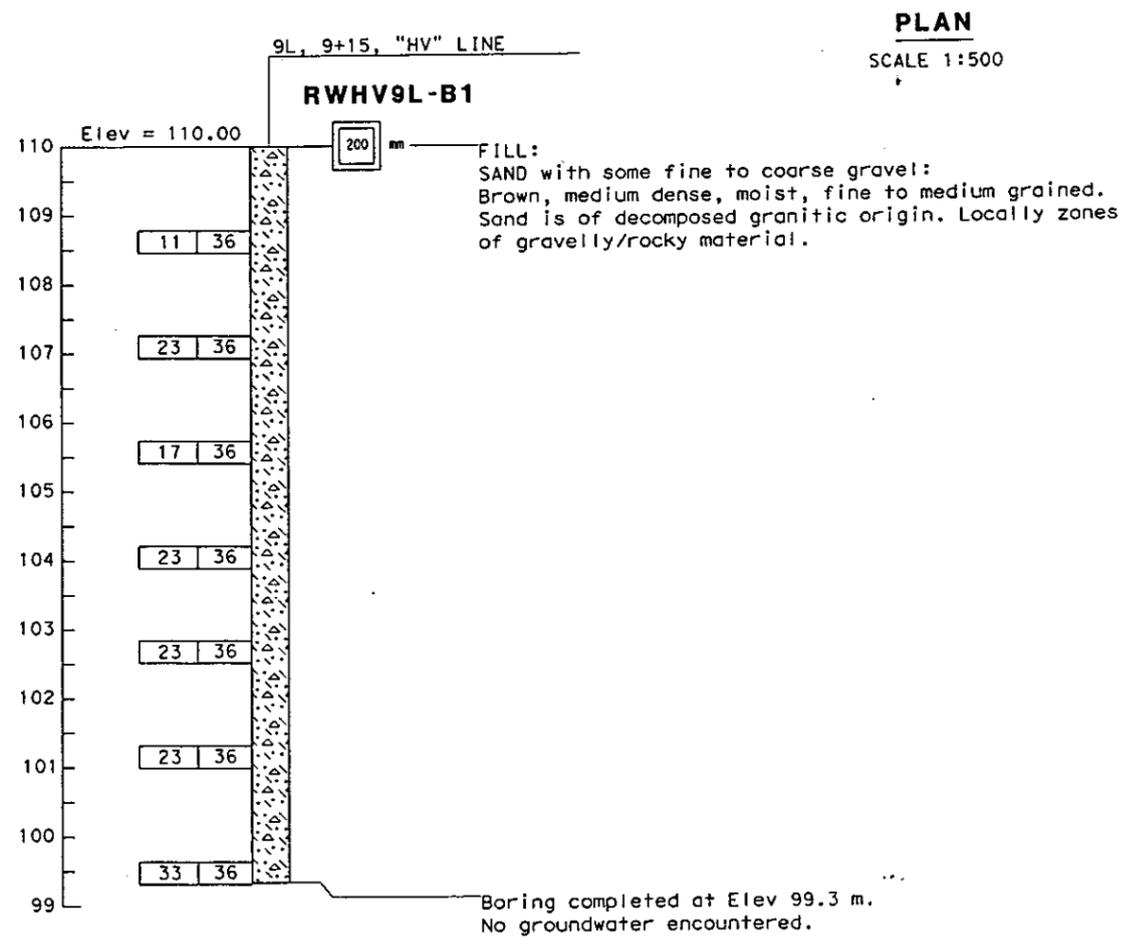
**LEGEND OF EARTH MATERIALS**

Gravel	Clayey silt
Sand	Very soft
Silt	Soft
Clay	Stiff
Fill material	Very stiff
Cobble	Hard
Loose rock	Very hard
Medium dense	
Dense	
Very dense	
Metamorphic	

**CONSISTENCY CLASSIFICATION FOR SOILS**

Liquid Limit (LL) (%)	Plasticity Index (PI) (%)	
	0-7	7-17
0-4	Very loose	Very soft
5-10	Loose	Soft
11-20	Medium dense	Stiff
21-30	Dense	Very stiff
31-50	Very dense	Hard

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.



- NOTES:**
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  3. PENETRATION INDEX VALUE DESIGNATED "REF" MEANS SAMPLER REFUSAL.

ENGINEERING SERVICES		GEOTECHNICAL SERVICES		FIELD INVESTIGATION BY: J. TESAR	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	BRIDGE NO. RETAINING WALL RWHV11L R-49
DRAWN BY JOHN FRASIER	CHECKED BY JEFF TESAR				GEOTECHNICAL DESIGN - SOUTH 2	KILOMETER POST LOG OF TEST BORINGS RWHV9L-B1
				CU 11230 EA 080921	DISREGARD PRINTS BEARING EARLIER REVISION DATES	REVISION DATES (PRELIMINARY STAGE ONLY) SHEET 1 OF 1

