GROUP DELTA

TECHNICAL MEMORANDUM

Project No. / Name: LA1143 / Palo Comado Canyon Road / US-101 Interchange

Prepared for: Mr. Mark Firger, PE
Parsons

Prepared by: Curt Scheyhing, PE, GE

Date: 12-07-2017

Subject: Pavement Design Memorandum

Dear Mark,

Group Delta Consultants (GDC) is pleased to submit this Technical Memorandum to provide pavement design recommendations for the subject site.

1.0 PROJECT DESCRIPTION

The California Department of Transportation (Caltrans) and the City of Agoura Hills (City) propose to construct improvements at the US 101/Palo Comado Canyon Road Interchange (Post Mile [PM] 33.5/33.9) in Los Angeles County within the city of Agoura Hills. The site location is shown in Figure 1. The project includes widening Palo Comado Canyon Road between the northbound on- and off-ramp intersection and Chesebro Road to the south. Within these limits, the Palo Comado Canyon Road Overcrossing would be widened to accommodate one lane in each direction and one left-turn lane, for a total of three striped lanes. A Class II bike lane and a 6-foot-wide sidewalk would be provided on both sides of the overcrossing. The project would realign the northbound on- and off-ramps and provide a traffic signal at the intersection.

This pavement design memorandum was prepared to provide Parsons with pavement design recommendations for the Plans, Specifications and Estimate (PS&E) phase based on site specific field and laboratory investigation as well as site reconnaissance and review of existing available information. An exploration location plan is shown in Figures 2A and 2B. The results of GDC's field investigation and laboratory testing were presented in the Foundation Report for Palo Comado Canyon Road Overcrossing (OC), and are reproduced herein as Appendix A and Appendix B, respectively.

Proposed new pavements include:

- Palo Comado Canyon Road
- US-101 Ramps (Northbound [NB] on-ramp, NB off-ramp, and NB off-ramp terminus)
- Limited length of US-101 inside and outside mainline lanes

In addition, traffic from the #1 lane may be shifted onto the existing inside shoulder.

Caltrans District 7 Materials Division's review comments (dated July 27, 2017 and October 19, 2017) are included in Appendix C.

2.0 SITE AND SUBGRADE CONDITIONS

2.1 Site Conditions

The site conditions are shown on a topographic plan in Figures 2A and 2B, an overview aerial photograph in Figure 3, and more detailed aerial photographs and street view photographs in Figures 4A through 4G. The interchange includes the existing Palo Comado Canyon Road OC, and NB off- and on-ramps in a half-diamond configuration. The surrounding area has open fields and residential / commercial development.

2.2 Geology

Based on the "Preliminary Geologic Map of the Los Angeles 30'x60' Quadrangle," (Yerkes and Campbell, 2005) the natural site geology at the bridge site consists of relatively young shallow alluvial deposits originating from Palo Comado and Chesebro Canyons, overlying Tertiary-age sedimentary bedrock of the Calabasas Formation (Tcb). The site is shown on the geologic map in Figure 5, which shows Tcb exposed at the surface to the northeast and southwest of the bridge. Regionally Calabasas Formation undivided (early late Miocene and late middle Miocene) is generally interbedded clayey to silty sandstone and silty shale, containing local beds of sedimentary breccia (probable Conejo Volcanics) clasts. The formational materials encountered at the site consisted of high plasticity claystone. Approach fills have been placed at the abutments over the alluvial and bedrock materials.

2.3 Groundwater

Perched groundwater is present at depths of deeper than 20 feet below the freeway level. The permanent groundwater table is not anticipated within the zone of influence of the pavement subgrade.

2.4 Existing Subgrade Soils

Subgrade soils in the pavement areas are generally very poor and consist of Fat Clay and Sandy Fat Clay (CH). Based on laboratory test results the on-site clay has Liquid Limit (LL) of 50 to 70, Plasticity Index (PI) of 30 to 45, R-Value of 6 to 17, and borderline Medium to High expansion potential based on Expansion Index (EI) testing (tested EI=86). Boring records and laboratory test results are shown in Appendices A and B, respectively. For rigid pavement design, they are considered Subgrade Type III in accordance with Table 623.1A of the Highway Design Manual (HDM).

2.5 Existing Pavement

Pavement type is mostly Hot Mix Asphalt (HMA) [previously referred to as Asphalt Concrete (AC)] on the mainline, mainline shoulders, northbound ramps and shoulders, and Palo Comado Canyon Road (Figures 4A through 4G). The exceptions are the four northbound mainline travel lanes from about 60 feet east to 50 feet west of the existing bridge, and about the western 220 feet of the NB off-ramp ramp terminus, which are Jointed Plain Concrete Pavement (JPCP) [previously referred to as Portland Cement Concrete Pavement (PCCP)], as shown in Figures 4A, 4B, 4C, 4F, and 4G. Selected sheets of the project plans are shown in Figures 6A through 6F. The as-built pavement sections are listed on Figure 6B and shown on the typical sections in Figures 6B through 6F.

The existing JPCP appears to be in generally fair to good condition. The ramp HMA exhibits significant longitudinal, transverse, and alligator cracking, and some of the cracks have been patched with black filler material (Figures 4E and 4F). The mainline freeway and shoulder HMA appears to be in good surface condition due to a recent overlay project (Figures 4C and 4D), but older aerial photographs show significant past cracking and patching (Figures 4A and 4B).

Based on the as-built drawings, the existing inside shoulder on the freeway is as follows:

0.45’ AC overlay
0.35’ Type B AC
0.55’ Class 2 AB
<u>0.60’ Class 4 AS</u>
Total = 1.95’

If the section was new, then this section is estimated to have a Traffic Index (TI) capacity of about 9.5 for a subgrade R-value of 5, and TI capacity of about 10.5 for R-value of 15.

3.0 PAVEMENT RECOMMENDATIONS

3.1 Pavement Type

Caltrans District 7 Materials comments on an earlier version of the plans are presented in Appendix C. Flexible hot mix asphalt (HMA) pavements are recommended for Palo Comado Canyon Road and the ramps (except termini). Rigid Jointed Plain Concrete Pavement (JPCP) is recommended for the ramp termini. For new mainline pavements JPCP is proposed for outside lanes, and HMA and JPCP are considered for the inside lanes. Additionally, use of the existing inside HMA shoulder may be considered for the inside lanes. Typical sections from the plans are shown in Figures 6A through 6F.

3.2 Traffic Index

Parsons provided a TI of 10 for Palo Comado Canyon Road for 20-year design life, and provided a TI of 12 for the ramps for 40-year design life. A TI of 16 was provided for mainline outside lanes and TI of 13 was provided for inside lanes.

3.3 R-Value, Expansion Index, and Subgrade Type

R-value testing of two samples yielded R=17 and R=6. Expansion Index (EI) tests on one sample yielded EI=86 (Medium Expansion Potential, borderline High Expansion Potential).

Due to presence of expansive high plasticity clay (CH) soil with low R-value, a design R-value of 5 is recommended for flexible pavements.

The site soil classifies as Subgrade Type III, which is unsuitable for support of JPCP in accordance with HDM. Therefore, the subgrade below the JPCP should be removed to a certain depth and replaced with Type II subgrade (R-Value=10 to 40, Plasticity Index PI<12). Due to high sulfates (10,500 – 13,250 ppm) lime treatment is not recommended. Recommended depth of removal and replacement is 4 feet below the finished grade.

3.4 Pavement Structural Sections

3.4.1 Palo Comado Canyon Road

3.4.1.1 Widening

Within Caltrans right-of-way (R/W), Caltrans recommended HMA over Alternative Treated Base (ATB) over Class 3 Aggregate Base (AB). The recommended section is listed below:

TI=10 R-Value = 5

0.50' HMA (Type A)
0.50' ATB*
1.25' Class 3 AB
2.25' Total

*ATB (Alternate Treated Base) includes Lean Concrete Base (LCB), Lean Concrete Base Rapid Setting (LCBRS), and Roller Compacted Concrete Base (RCCB). For ease of bidding and contractor administration, Materials recommends LCB or LCBRS.

For consistency, the same section should also be used outside Caltrans R/W.

3.4.1.2 Cold Plane and Overlay

In accordance with Caltrans comments, the existing pavement may be cold planed 0.15' and overlaid with 0.15' of new HMA-A.

3.4.2 Ramps (except for Ramp Termini)

Caltrans recommended HMA over Alternative Treated Base (ATB) over Class 3 Aggregate Base (AB). The recommended section is listed below:

TI=12 R-Value = 5

0.60' HMA (Type A)
0.60' ATB*
1.55' Class 3 AB
2.75' Total

*ATB (Alternate Treated Base) includes Lean Concrete Base (LCB), Lean Concrete Base Rapid Setting (LCBRS), and Roller Compacted Concrete Base (RCCB). For ease of bidding and contractor administration, Materials recommends LCB or LCBRS.

3.4.3 Ramp Termini

Caltrans recommended JPCP over Alternative Treated Base (ATB) over Class 3 Aggregate Base (AB). The recommended section is listed below:

TI=12 Subgrade Type II (requires removal of Type III subgrade to 4' below finish grade)

0.95' JPCP
------ Base Bond Breaker (Geosynthetic)*
0.35' ATB**
0.60' Class 3 AB
2.10' Imported Borrow***
4.00' Total

*Whenever placing Alternate Concrete Base beneath concrete pavement, place Base Bond Breaker between the base and the pavement.

** ATB (Alternate Treated Base) includes Lean Concrete Base (LCB), Lean Concrete Base Rapid Setting (LCBRS), and Roller Compacted Concrete Base (RCCB). For ease of bidding and contractor administration, Materials recommends LCB or LCBRS.

***Remove 2.1 feet of Subgrade Type III native soil below structural section and replace with Subgrade Type II ($R \geq 15$ and $PI < 12$) imported borrow, to total depth of 4 feet below finished grade. Lime treatment not recommended due to high sulfates.

3.4.4 Mainline New Pavement

3.4.4.1 Outside Lanes

For the outside lane, the TI=16.0. Flexible pavement is not allowed by HDM since TI>15. The recommended section is listed below:

TI=16 Subgrade Type II (requires removal of Type III subgrade to 4' below finish grade)

1.20' JPCP
------ Base Bond Breaker (Geosynthetic)*
0.35' ATB**
0.70' Class 3 AB
1.75' Imported Borrow***
4.00' Total

*Whenever placing Alternate Concrete Base beneath concrete pavement, place Base Bond Breaker between the base and the pavement.

** ATB (Alternate Treated Base) includes Lean Concrete Base (LCB), Lean Concrete Base Rapid Setting (LCBRS), and Roller Compacted Concrete Base (RCCB). For ease of bidding and contractor administration, Materials recommends LCB or LCBRS.

***Remove 1.75 feet of Subgrade Type III native soil below structural section and replace with Subgrade Type II (R≥15 and PI<12) imported borrow, to total depth of 4 feet below finished grade. Lime treatment not recommended due to high sulfates.

3.4.4.2 Inside Lanes

For the inside lane, the TI=13.0. Flexible pavement or rigid pavement may be used. The recommended section is listed below:

Flexible

TI=13 R-Value = 5

0.70' HMA (Type A)
0.70' ATB*
1.50' Class 3 AB
2.90' Total

* ATB (Alternate Treated Base) includes Lean Concrete Base (LCB), Lean Concrete Base Rapid Setting (LCBRS), and Roller Compacted Concrete Base (RCCB). For ease of bidding and contractor administration, Materials recommends LCB or LCBRS.

Rigid

TI=13 Subgrade Type II (requires removal of Type III subgrade to 4' below finish grade)

1.00' JPCP
------ Base Bond Breaker (Geosynthetic)*
0.35' ATB**
0.70' AB, Class 3
1.95' Imported Borrow***
4.00' Total

*Whenever placing Alternate Concrete Base beneath concrete pavement, place Base Bond Breaker between the base and the pavement.

** ATB (Alternate Treated Base) includes Lean Concrete Base (LCB), Lean Concrete Base Rapid Setting (LCBRS), and Roller Compacted Concrete Base (RCCB). For ease of bidding and contractor administration, Materials recommends LCB or LCBRS.

***Remove 1.95 feet of Subgrade Type III native soil below structural section and replace with Subgrade Type II (R≥15 and PI<12) imported borrow, to total depth of 4 feet below finished grade. Lime treatment not recommended due to high sulfates.

3.4.5 Shift #1 Lane to Inside Shoulder

As a possible option, the #1 lane traffic may be carried on the existing inside HMA shoulder. Based on the as-built drawings, the existing inside shoulder on the freeway is as follows:

0.45’ AC overlay
0.35’ Type B AC
0.55’ Class 2 AB
0.60’ Class 4 AS
Total = 1.95’

If the section was new, then this section is estimated to have a TI capacity of about 9.5 for a subgrade R-value of 5, and TI capacity of about 10.5 for R-value of 15. Since the TI capacity is less than the design TI = 13.0 for the inside lane, it may have less than 20-year life, but with low truck traffic it will still provide useful design life and may be included in future rehabilitation projects along with the other pavements in the area.

4.0 ATTACHMENTS

The following Figures and Appendices are included and complete this technical memorandum.

FIGURES

Figure 1	Vicinity Map
Figures 2A and 2B	Exploration Location Plan
Figure 3	Aerial Photograph
Figures 4A-4G	Aerial and Street View Photos
Figure 5	Geologic Map
Figures 6A-6F	Plan Cover Sheet and Typical Sections

APPENDICES

Appendix A	Field Investigation
Appendix B	Laboratory Testing
Appendix C	Caltrans Materials Comments

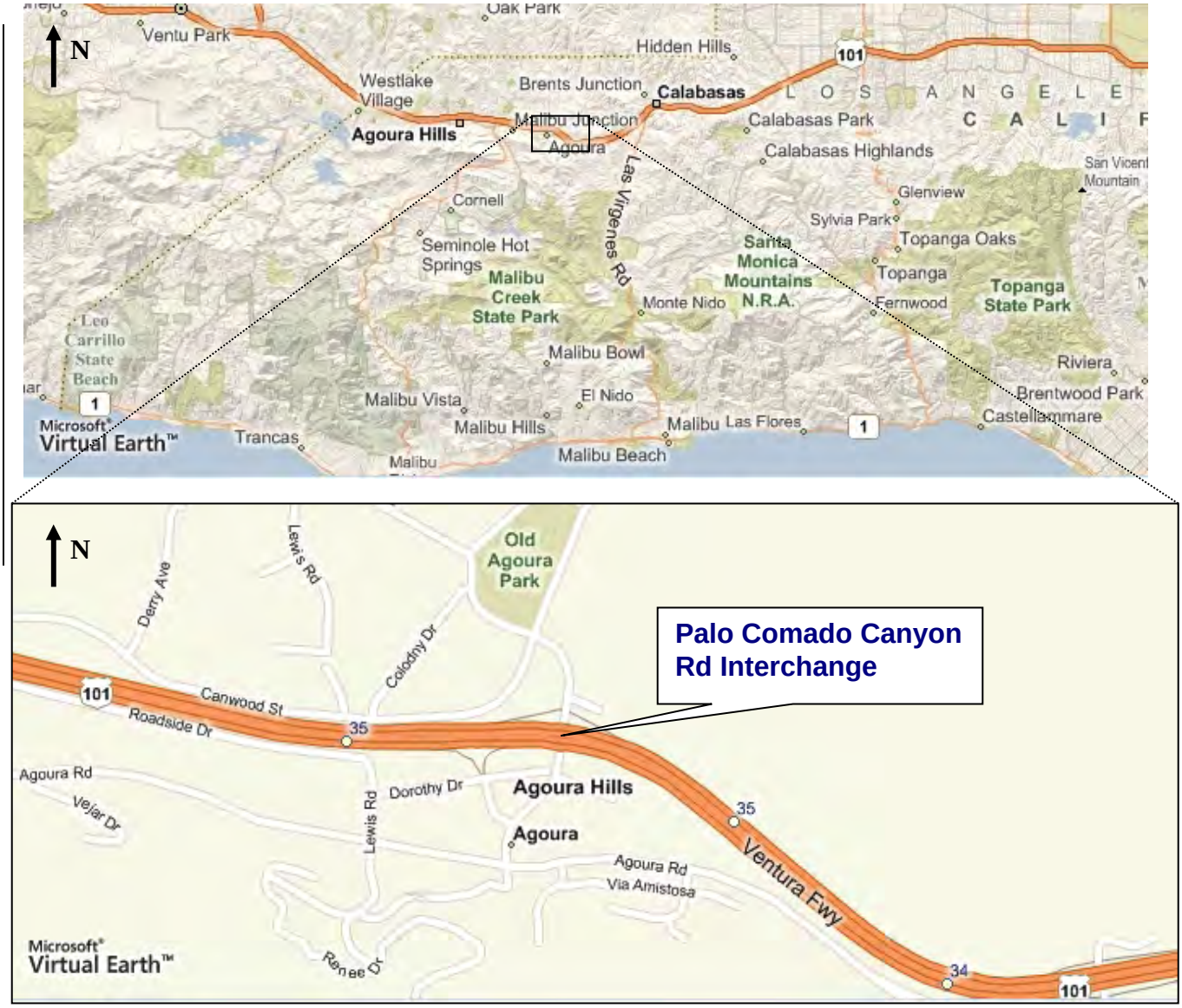
5.0 LIMITATIONS

This technical memorandum was prepared in accordance with generally accepted geotechnical engineering principles and practice. The professional engineering work and judgment meet the standard of care of our profession. No other warranty, expressed or implied, is made.

We appreciate the opportunity to assist you on this important project. Should you have any questions regarding this technical memorandum, please feel free to call us at 949-450-2100.

Sincerely,
Group Delta Consultants

Curt Scheyhing, PE, GE
Principal Geotechnical Engineer



The base maps are from Microsoft's Virtual Earth

GROUP DELTA

GDC Project No. LA-1143

Palo Comado Canyon Road OC Pavement Design Recommendations

Vicinity Map

Figure 1

NOTE:

FOR ACCURATE RIGHT OF WAY DATA, CONTACT
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

ABBREVIATIONS:

C CUT

F FILL

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	101	33.5/33.9		

REGISTERED CIVIL ENGINEER — 12-8-17 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MARK FIRGER No. C74273 Exp. 6-30-19 CIVIL — STATE OF CALIFORNIA

THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF SCANNED COPIES OF THIS PLAN SHEET.

PARSONS
2201 DUPONT DR, STE 200
IRVINE, CA 92612

CITY OF AGOURA HILLS
30001 LADYFACE COURT
AGOURA HILLS, CA 91301

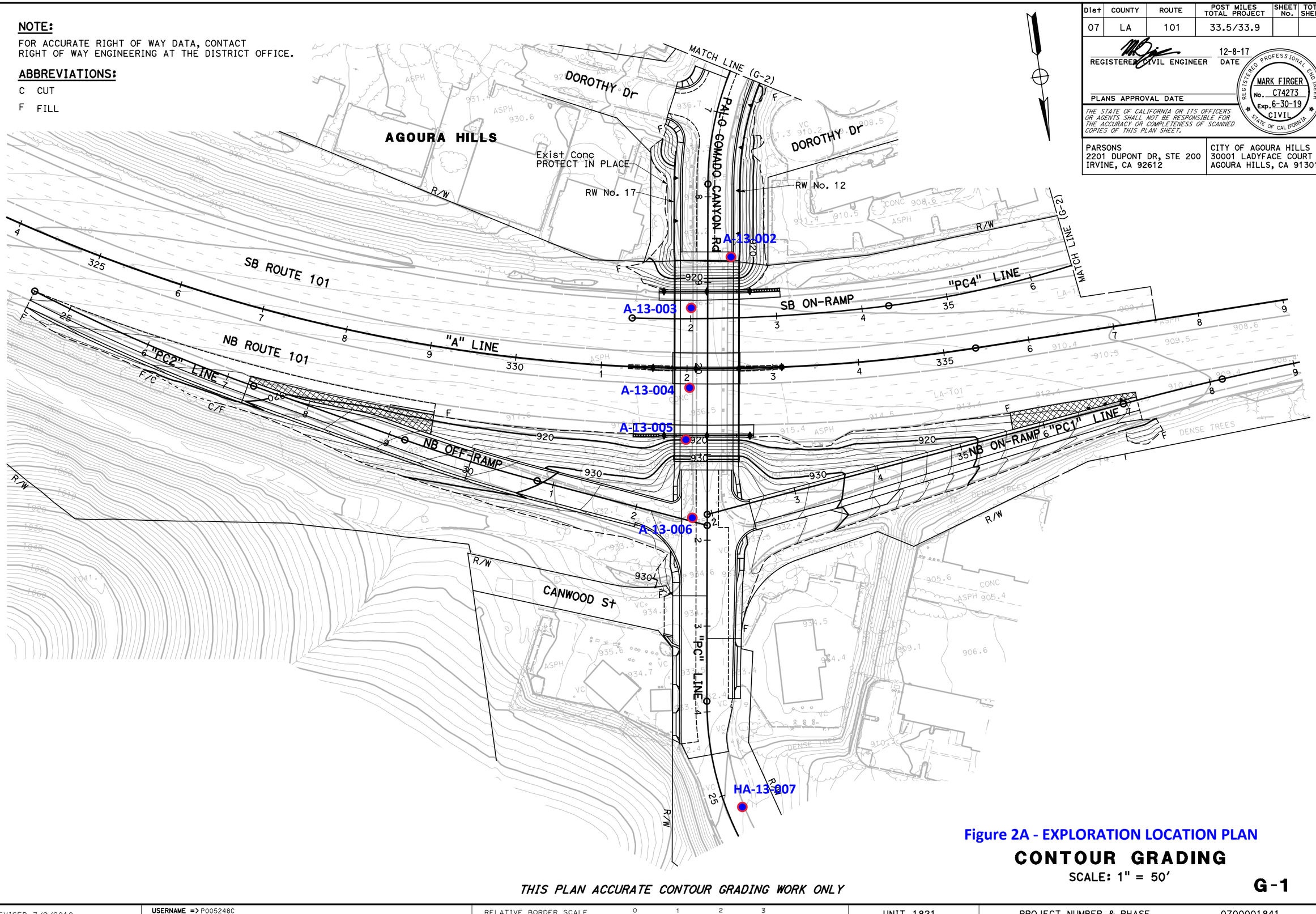


Figure 2A - EXPLORATION LOCATION PLAN

CONTOUR GRADING

SCALE: 1" = 50'

G-1

THIS PLAN ACCURATE CONTOUR GRADING WORK ONLY

REVISED BY	DATE REVISED

CALCULATED-DESIGNED BY: KEVIN CASTRO
CHECKED BY: MARK FIRGER
CONSULTANT FUNCTIONAL SUPERVISOR: MARK FIRGER

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

LAST REVISION 00-00-00
DATE PLOTTED => 12/5/2017
TIME PLOTTED => 11:52:55 PM

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NOTE:

FOR ACCURATE RIGHT OF WAY DATA, CONTACT
RIGHT OF WAY ENGINEERING AT THE DISTRICT OFFICE.

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	101	33.5/33.9		

REGISTERED CIVIL ENGINEER — 12-8-17 DATE

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PLANS APPROVAL DATE

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IRVINE, CA 92612

CITY OF AGOURA HILLS
30001 LADYFACE COURT
AGOURA HILLS, CA 91301

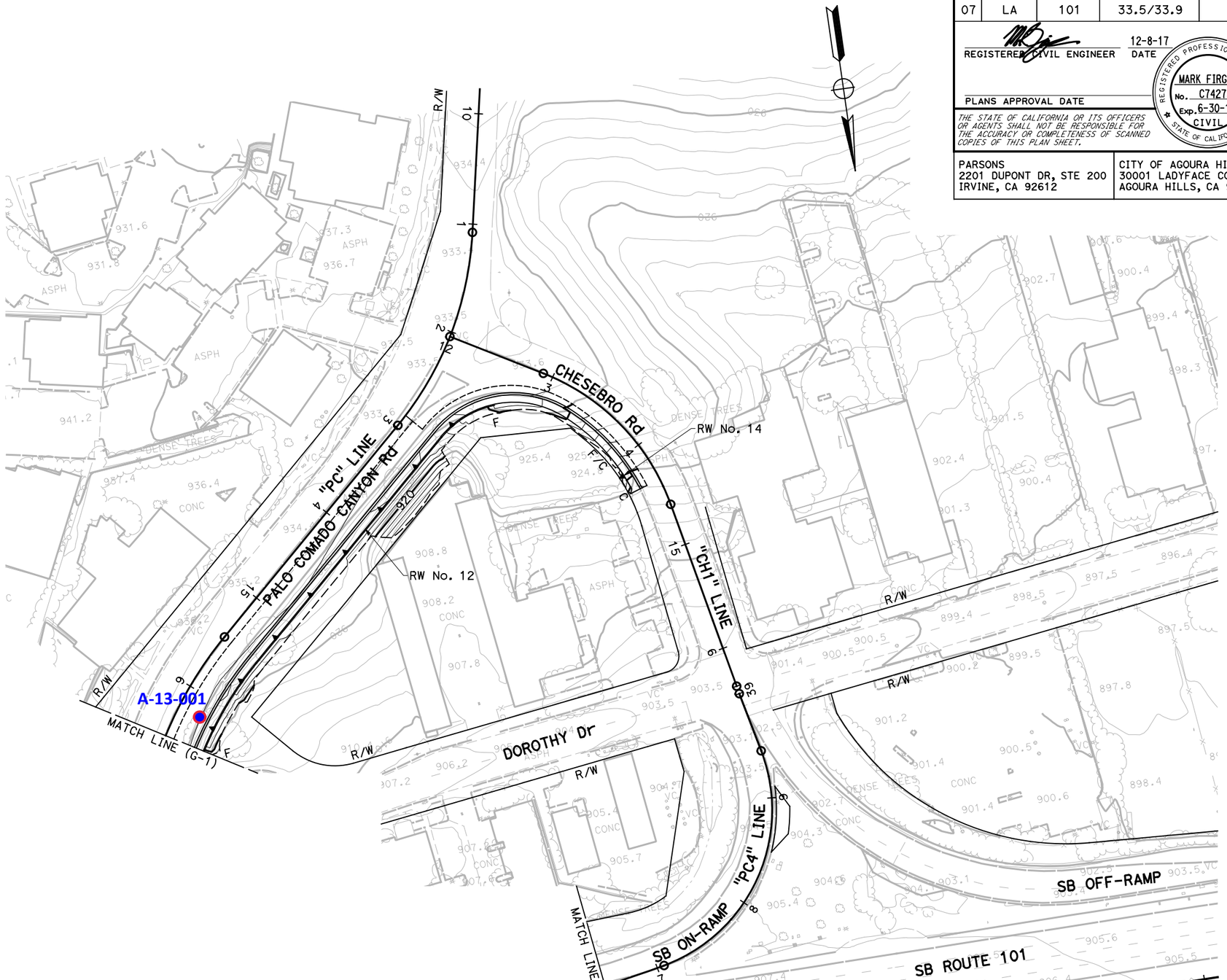


Figure 2B - EXPLORATION LOCATION PLAN

CONTOUR GRADING

SCALE: 1" = 50'

G-2

THIS PLAN ACCURATE FOR CONTOUR GRADING WORK ONLY

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION — Caltrans

CONSULTANT FUNCTIONAL SUPERVISOR: MARK FIRGER

CALCULATED-DESIGNED BY: KEVIN CASTRO

CHECKED BY: MARK FIRGER

REVISED BY | DATE REVISED

LAST REVISION: 00-00-00

DATE PLOTTED => 12/5/2017
TIME PLOTTED => 11:53:02 PM

BORDER LAST REVISED 7/2/2010

USERNAME => P005248C
DGN FILE => 070000184ha002.dgn

RELATIVE BORDER SCALE IS IN INCHES 0 1 2 3

UNIT 1821

PROJECT NUMBER & PHASE 0700001841

FIGURE 3
AERIAL PHOTOGRAPH

FIGURE 4A
AERIAL PHOTOGRAPH
NORTHBOUND ON-RAMP

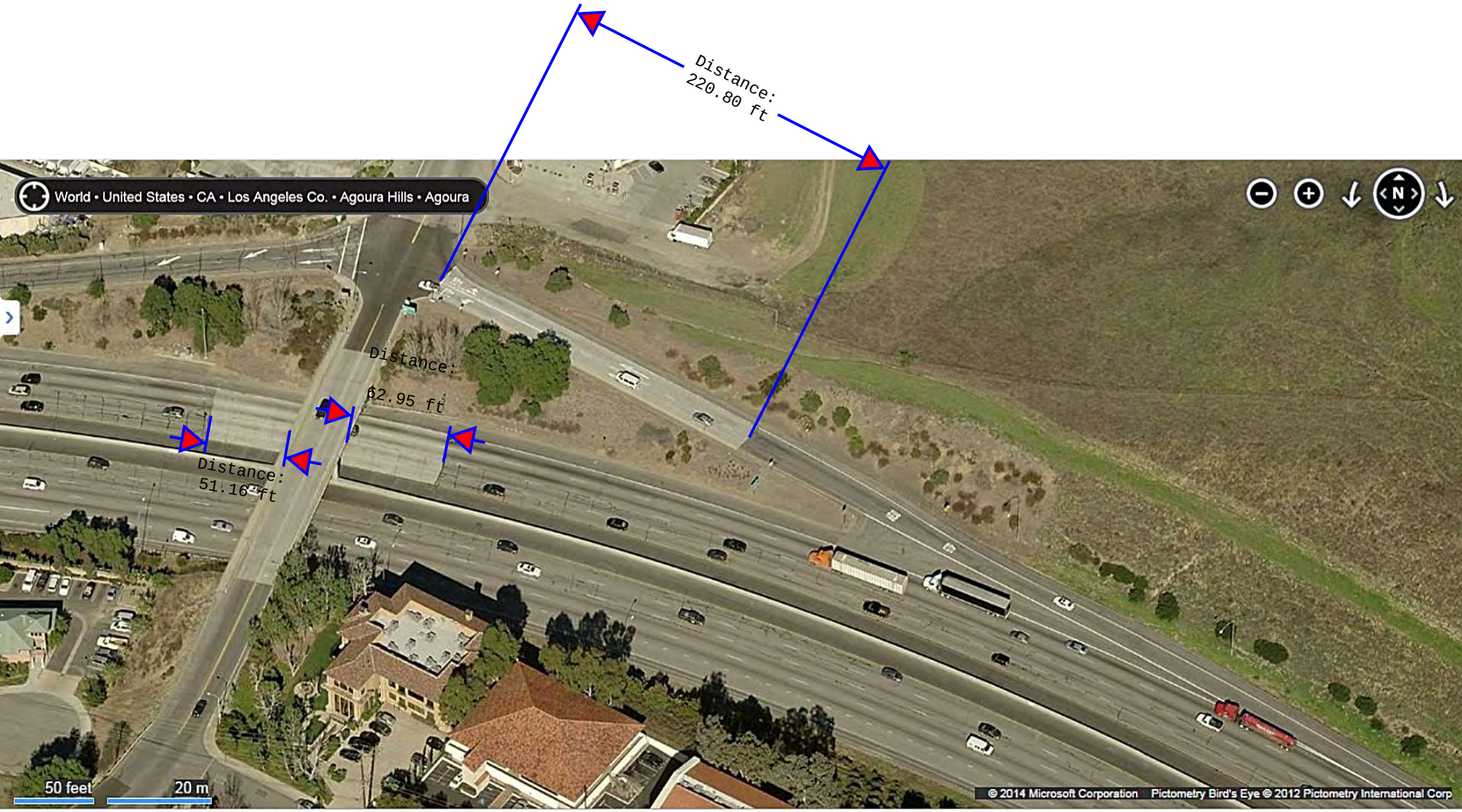


FIGURE 4B
AERIAL PHOTOGRAPH
NORTHBOUND OFF-RAMP

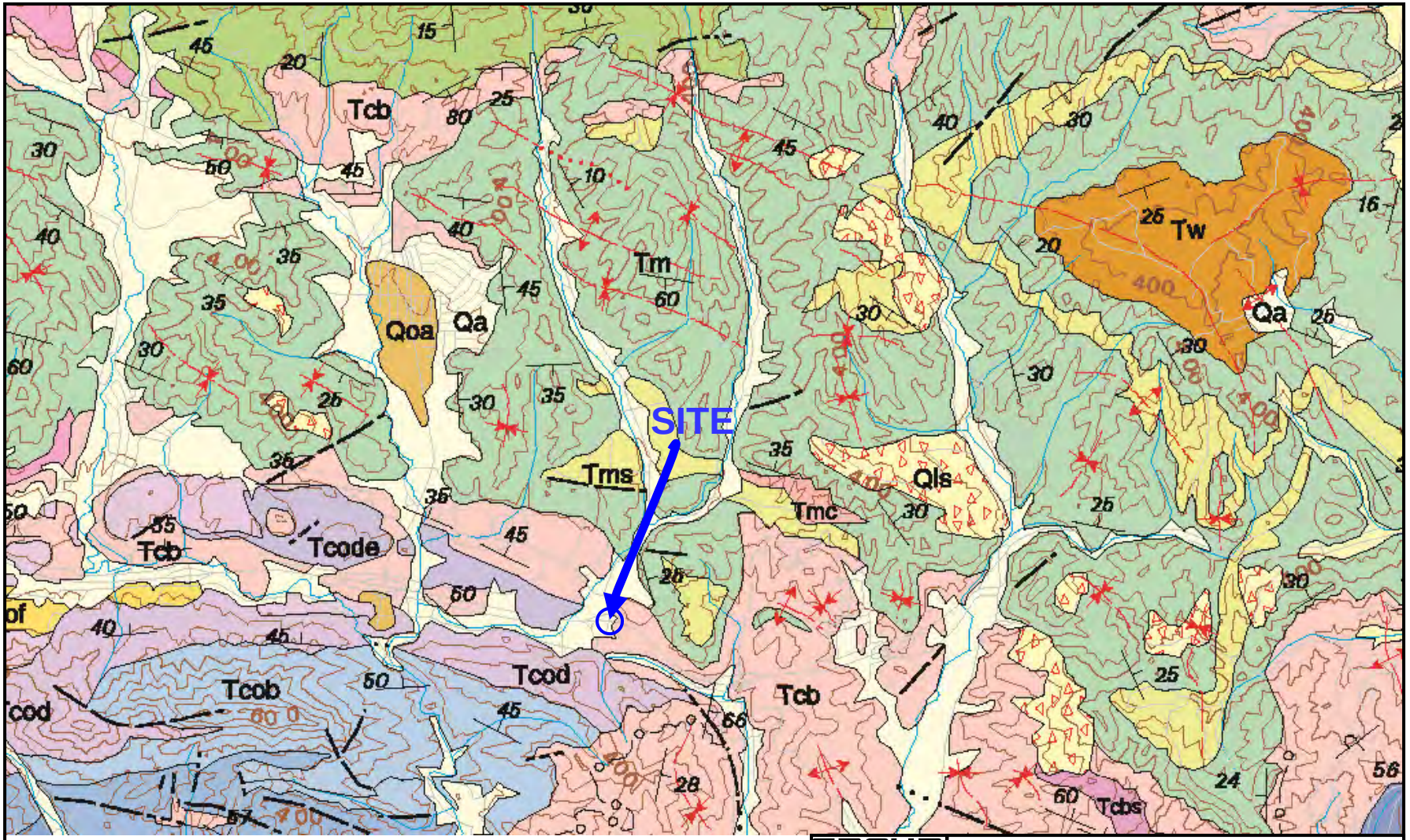
FIGURE 4C
NORTHBOUND
FREEWAY

FIGURE 4D
SOUTHBOUND
FREEWAY

FIGURE 4E
NORTHBOUND
ON-RAMP

FIGURE 4F
NORTHBOUND
OFF-RAMP

FIGURE 4G
NORTHBOUND
OFF-RAMP
TERMINUS



GROUP DELTA

GDC Project No. LA-1143

Palo Comado Canyon Rd / US-101 Interchange
Agoura Hills, CA

GEOLOGIC MAP

Figure 5

APPROVED AS TO IMPACT ON STATE FACILITIES AND CONFORMANCE WITH APPLICABLE STATE STANDARDS AND PRACTICES AND THAT TECHNICAL OVERSIGHT WAS PERFORMED.

CONSULTANT DESIGN ENGINEER: MARK FIRGER | CALTRANS DESIGN OVERSIGHT APPROVAL | REGISTRATION No. | LICENSE Exp DATE | DATE SIGNED

INDEX OF PLANS

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION ON

STATE HIGHWAY

IN LOS ANGELES COUNTY
IN AGOURA HILLS
FROM 0.2 MILE SOUTH TO 0.2 MILE NORTH
OF PALO COMADO CANYON ROAD OVERCROSSING

TO BE SUPPLEMENTED BY STANDARD PLANS DATED 2015

Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	101	33.5/33.9		

LOCATION MAP

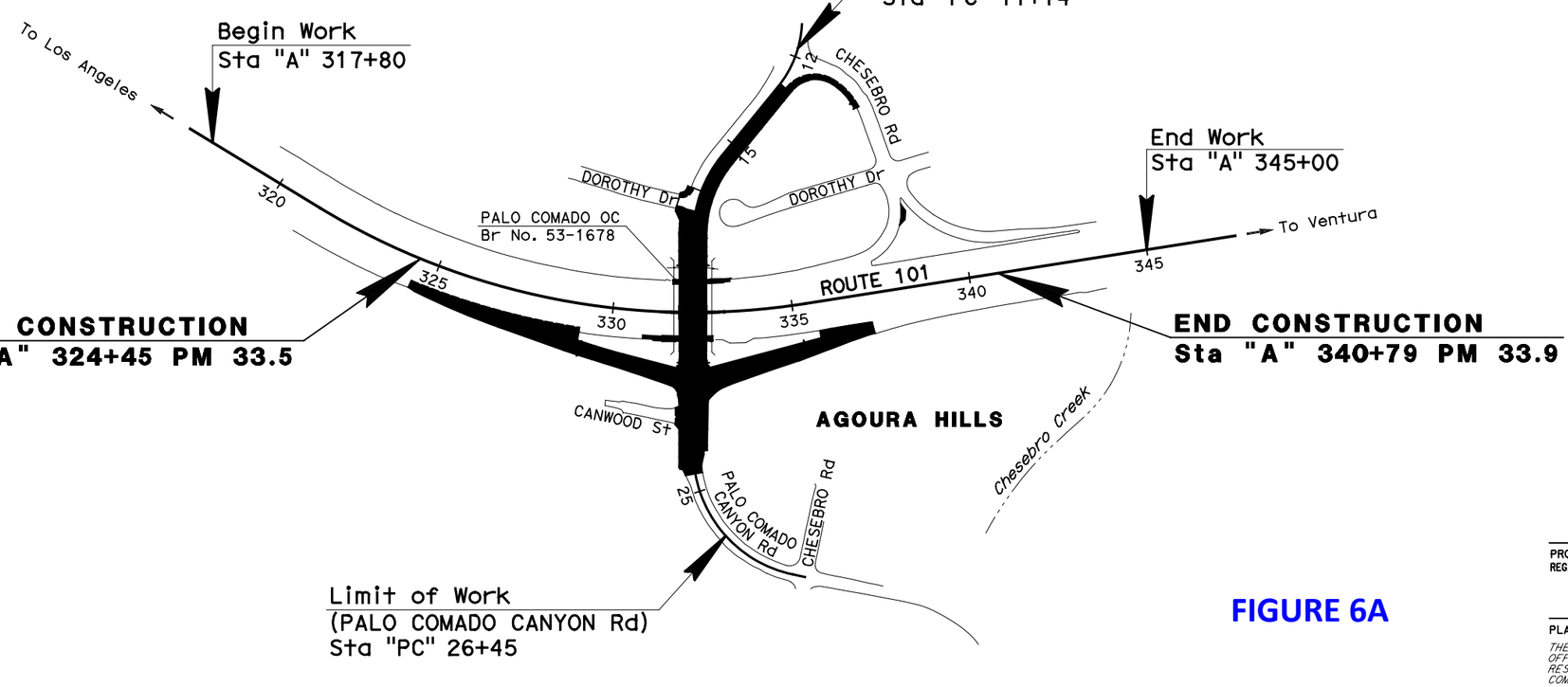


FIGURE 6A

PROJECT ENGINEER
REGISTERED CIVIL ENGINEER — DATE

REGISTERED PROFESSIONAL ENGINEER — MARK FIRGER — No. C74273 — Exp. 6/30/19 — STATE OF CALIFORNIA

PLANS APPROVAL DATE

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CITY ENGINEER
CITY OF AGOURA HILLS
REGISTERED CIVIL ENGINEER — DATE

REGISTERED PROFESSIONAL ENGINEER — RAMIRO ADEVA — No. C66865 — Exp. 9/30/18 — STATE OF CALIFORNIA

PLANS APPROVAL DATE

THE CONTRACTOR SHALL POSSESS THE CLASS (OR CLASSES) OF LICENSE AS SPECIFIED IN THE "NOTICE TO BIDDERS."

NO SCALE

PARSONS
2201 DUPONT DRIVE, STE 200
IRVINE, CA 92612

CITY OF AGOURA HILLS
30001 LADYFACE COURT
AGOURA HILLS, CA 91301

CONTRACT No.	07-257201
PROJECT ID	0700001841

LAST REVISION: DATE PLOTTED => 12/5/2017 TIME PLOTTED => 1:48:14 PM 00-00-00

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Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
07	LA	101	33.5/33.9		

REGISTERED CIVIL ENGINEER — 12-8-17 DATE

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — MARK FIRGER No. C74273 Exp. 6-30-19 CIVIL — STATE OF CALIFORNIA

PARSONS
2201 DUPONT DR, STE 200
IRVINE, CA 92612

CITY OF AGOURA HILLS
30001 LADYFACE COURT
AGOURA HILLS, CA 91301

NOTES:

1. DIMENSIONS OF THE PAVEMENT STRUCTURES (STRUCTURAL SECTIONS) ARE SUBJECT TO TOLERANCES SPECIFIED IN THE STANDARD SPECIFICATIONS.
2. SUPERELEVATIONS ARE SHOWN ON SUPERELEVATION DIAGRAMS.
3. ALL DIMENSIONS ARE TO FLOWLINE OF CURB UNLESS OTHERWISE NOTED.
4. FOR DIKES AND CURBS, SEE LAYOUT PLANS.
5. FOR RETAINING WALLS, SEE RETAINING WALL PLANS.
6. FOR "PC" Sta 18+64.16 TO 21+18.16, SEE STRUCTURE PLANS.

EXISTING PAVEMENT STRUCTURE SECTIONS

A
- 0.33' AC
- 0.67' CLASS 2 AB
- 1.00' CLASS 2 AS

B
- 0.40' HMA (TYPE B)
- 0.75' RMCTB (CLASS A)
- 0.40' CLASS 3 AB

C
- 1.15' PCC
- 0.40' CLASS 3 AB

D
- 0.75' PCCP
- 0.45' RMCTB (CLASS A)
- 0.50' CLASS 3 AB

E
- 0.65' PCCP
- 0.45' RMCTB (CLASS A)
- 0.60' CLASS 3 AB

F
- 0.20' RHMA-G
- 0.25' AC (TYPE B)
- 0.75' PCC
- 0.45' CLASS A RM CTB
- 0.50' CLASS 3 AB

G
- 0.20' RHMA-G
- 0.25' AC (TYPE B)
- 0.65' PCC
- 0.45' CLASS A RM CTB
- 0.60' CLASS 3 AB

H
- 0.20' RHMA-G
- 0.70' & Var AC (TYPE B)
- 0.65' CLASS 2 AB
- 0.60' CLASS 4 AB

I
- 0.20' RHMA-G
- 0.55' & Var HMA (TYPE B)
- 0.55' CLASS 2 AB
- 0.50' & Var CLASS 4 AB

J
- 0.20' RHMA-G
- 0.15' AC (TYPE B)
- 0.55' CLASS 2 AB
- 0.80' CLASS 4 AB

ABBREVIATIONS:

ATB	ALTERNATE TREATED BASE
PCCP	PORTLAND CEMENT CONCRETE PAVEMENT
RMCTB	ROAD MIXED CEMENT TREATED BASE
RSC	RAPID STRENGTH CONCRETE
TE	TAPERED EDGE

TYPICAL PAVEMENT STRUCTURE SECTIONS

1
- 0.50' HMA (TYPE A)
- 0.50' ATB
- 1.25' CLASS 3 AB

2
- 0.15' TO 0.65' HMA (TYPE A)
- 0.15' COLD PLANE AC Pvmt

3
- 0.60' HMA (TYPE A)
- 0.60' ATB
- 1.55' CLASS 3 AB

4
- 0.95' JPCP
- ---- BASE BOND BREAKER
- 0.35' ATB
- 0.60' CLASS 3 AB
- 2.10' IMPORTED BORROW

5
- ROCK BLANKET

6
- 0.67' RSC
- 0.50' CLASS 3 AB

7
- 0.70' HMA (TYPE A)
- 0.70' ATB
- 1.50' CLASS 3 AB

8
- 1.00' HMA (TYPE A)
- 0.60' ATB
- 1.55' CLASS 3 AB

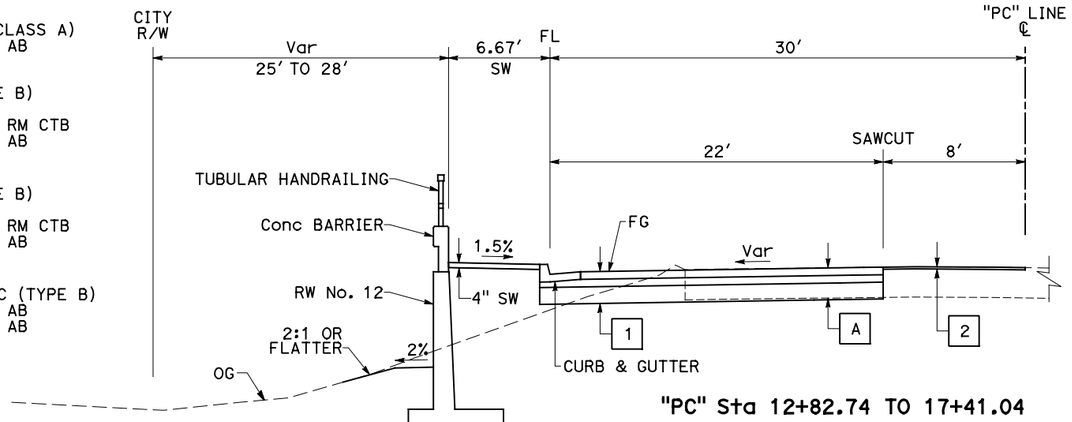
9
- 1.20' JPCP
- ---- BASE BOND BREAKER
- 0.35' ATB
- 0.70' CLASS 3 AB
- 1.70' IMPORTED BORROW

DESIGN DESIGNATION (PALO COMADO)

ADT (2010)	10,627	D	56%
ADT (2035)	14,820	T	2%
DHV	1,200	V	35 MPH
ESAL	2,000,000	TI(20)	10.0

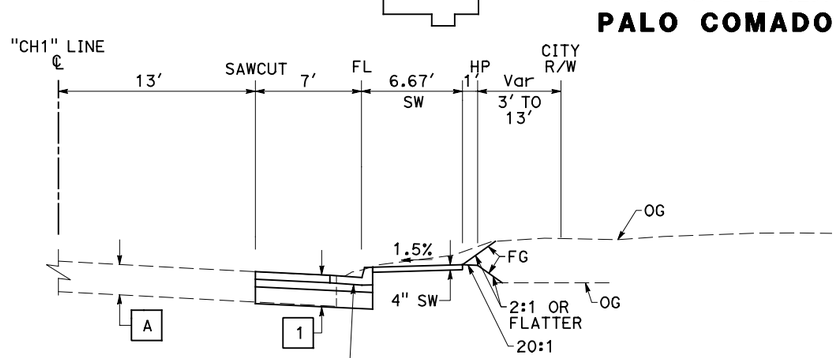
PAVEMENT CLIMATE REGION

INLAND VALLEY



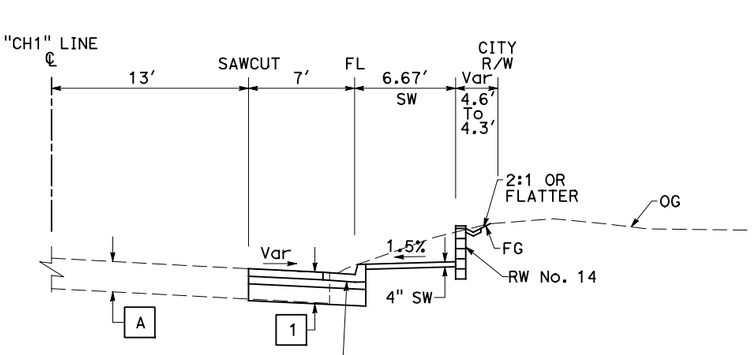
"PC" Sta 12+82.74 TO 17+41.04

PALO COMADO CANYON Rd



"CH1" Sta 13+27.08 TO 14+00.00

CHESEBRO ROAD



"CH1" Sta 14+00.00 TO 14+32.28

CHESEBRO ROAD

FIGURE 6B

TYPICAL CROSS SECTIONS

NO SCALE

X-1

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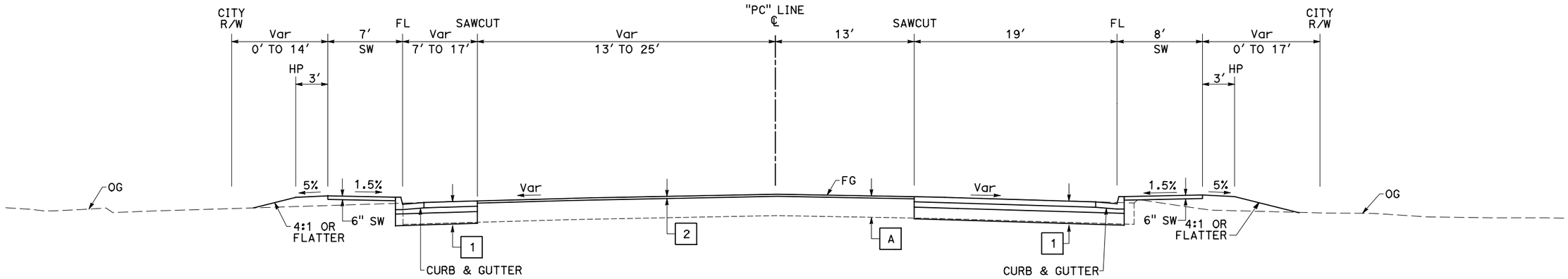
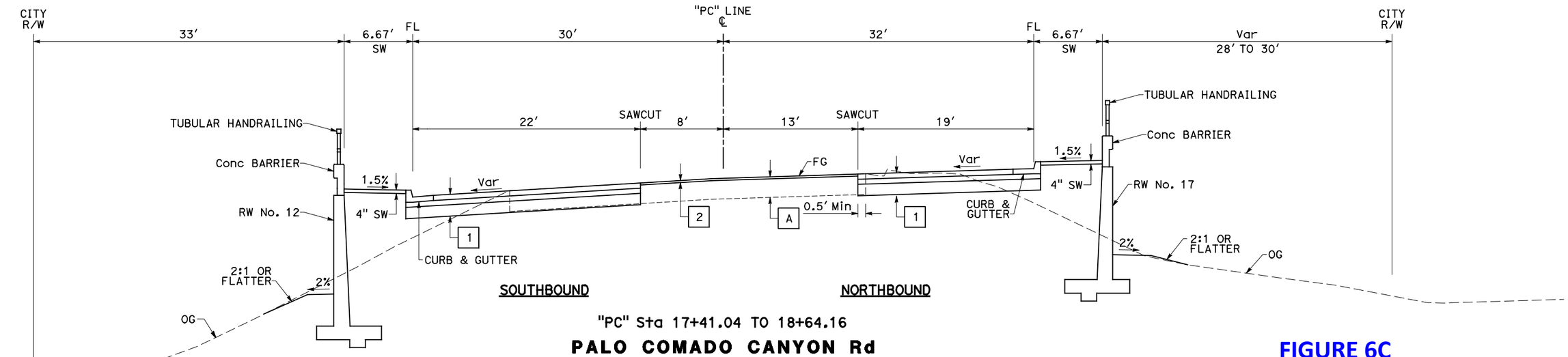


SOUTHBOUND NORTHBOUND

"PC" Sta 21+18.16 TO 24+50.00

PALO COMADO CANYON Rd



SOUTHBOUND NORTHBOUND

"PC" Sta 17+41.04 TO 18+64.16

PALO COMADO CANYON Rd

FIGURE 6C

TYPICAL CROSS SECTIONS

NO SCALE

X-2

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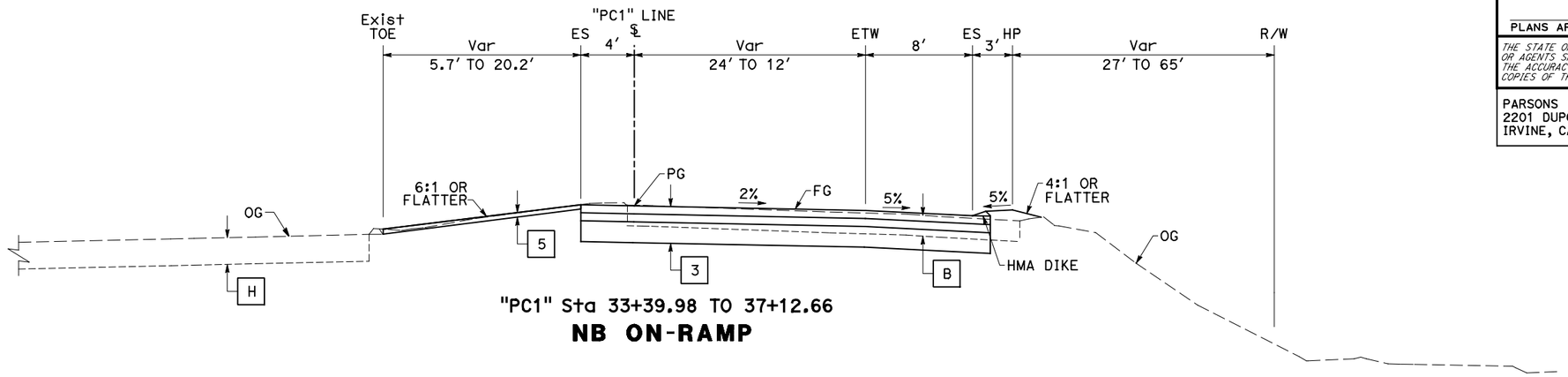
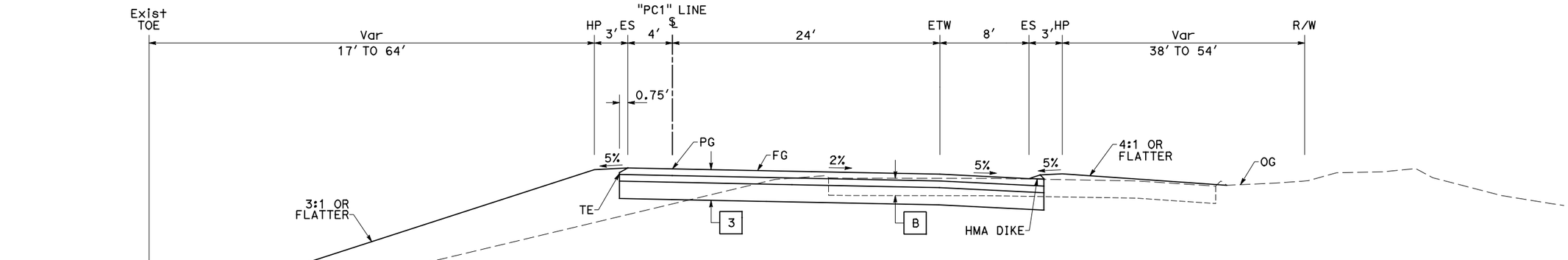


"PC1" Sta 33+39.98 TO 37+12.66

NB ON-RAMP



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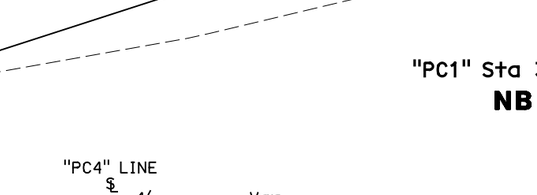

"PC4" Sta 38+51.49 TO 39+09.93

MAINTENANCE VEHICLE PULLOUT

"PC1" Sta 33+34.34 TO 34+19.76

MAINTENANCE VEHICLE PULLOUT

FIGURE 6D

TYPICAL CROSS SECTIONS

NO SCALE

X-3

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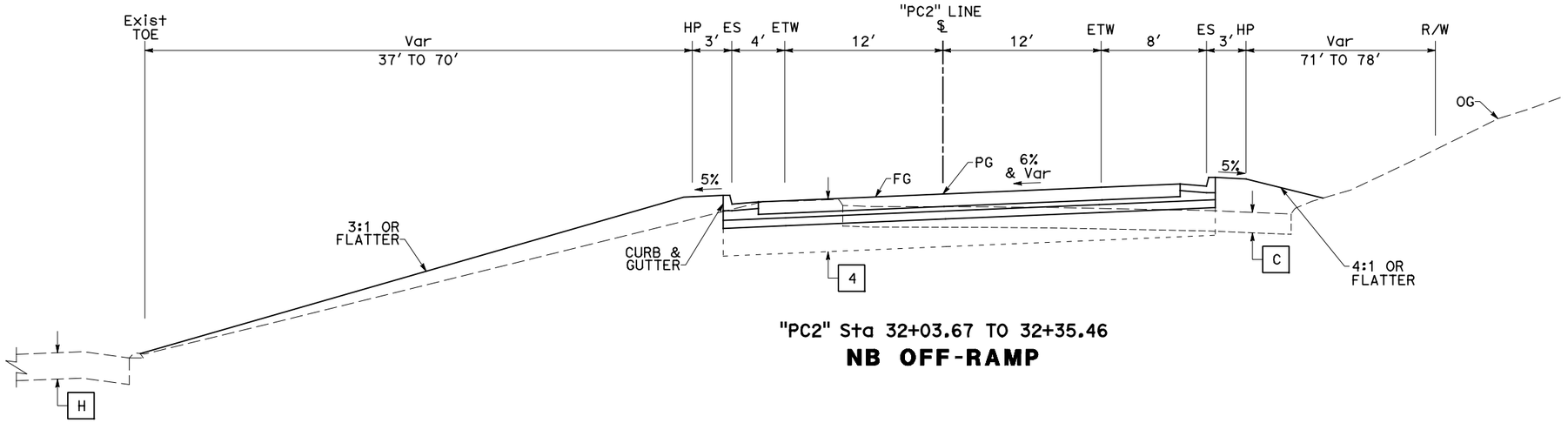

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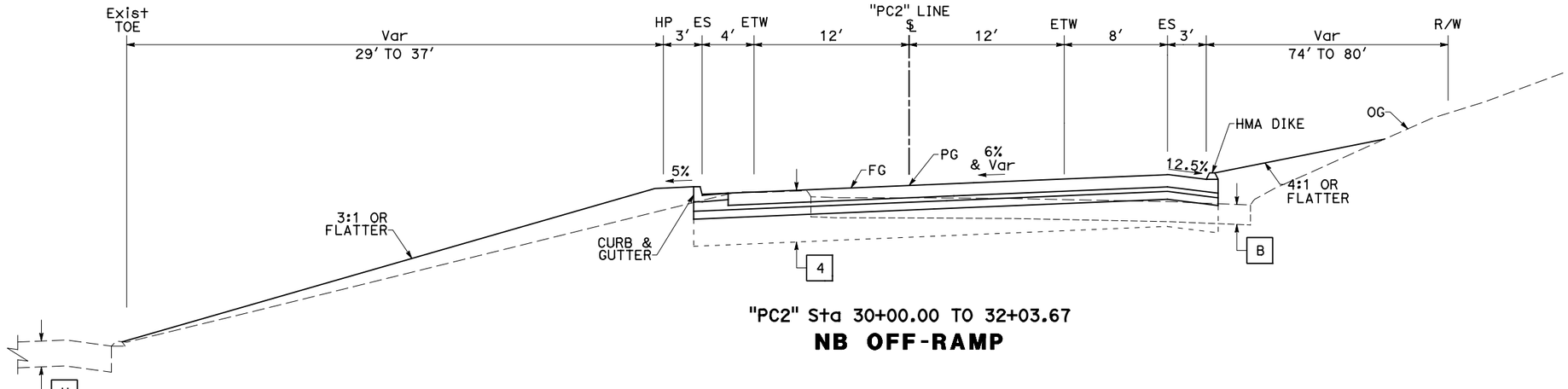
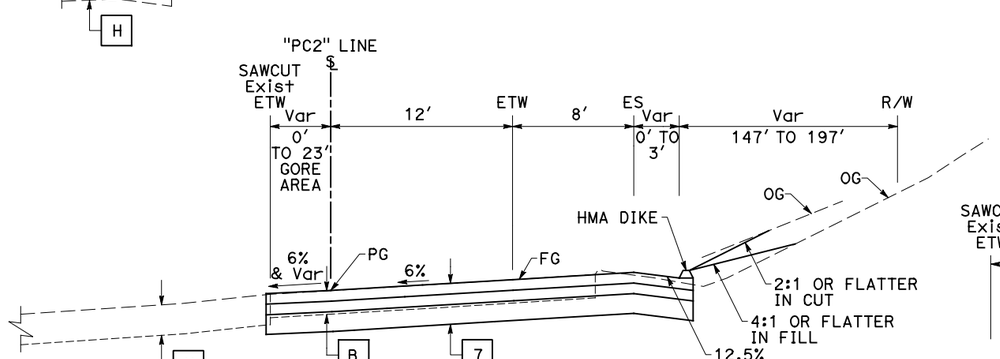
NB OFF-RAMP



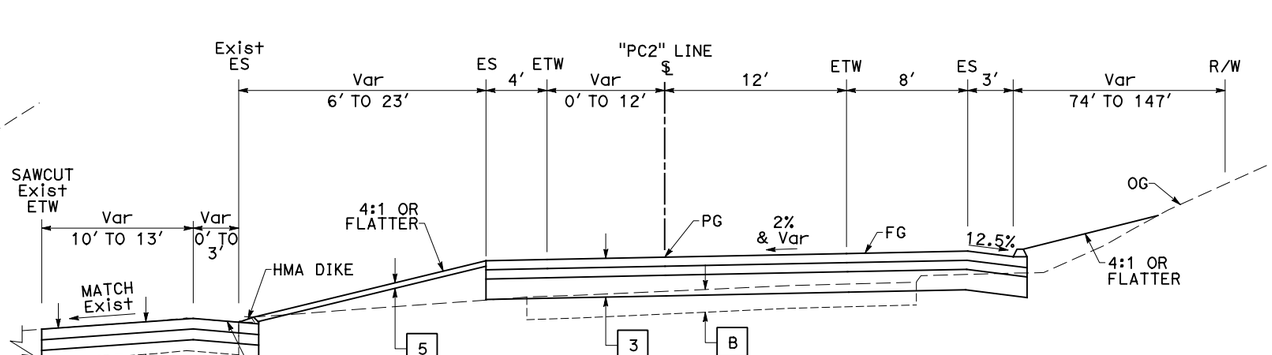
"PC2" Sta 30+00.00 TO 32+03.67

NB OFF-RAMP



"PC2" Sta 24+54.11 TO 27+25.55

NB OFF-RAMP



"PC2" Sta 27+25.55 TO 30+00.00

NB OFF-RAMP

FIGURE 6E

TYPICAL CROSS SECTIONS

NO SCALE

X-4

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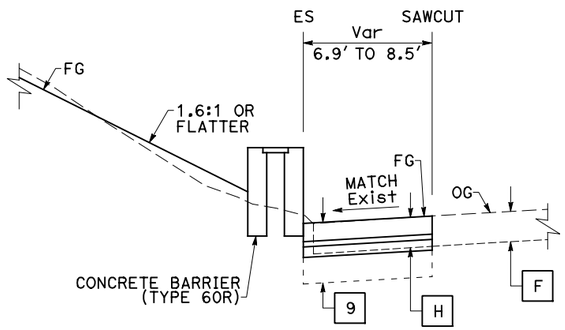

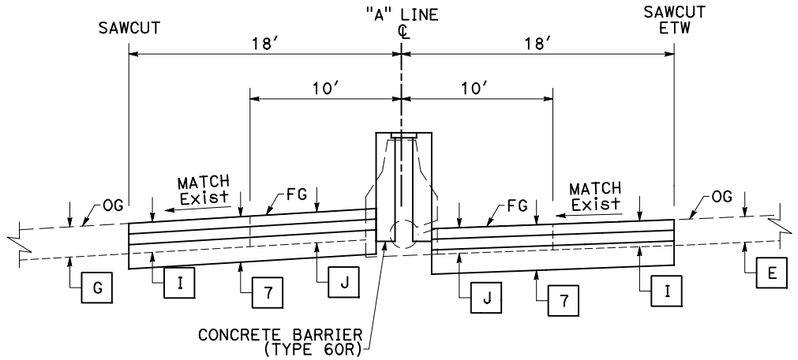

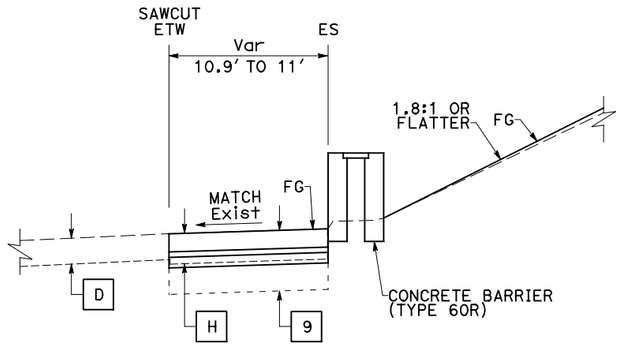

SOUTHBOUND

NORTHBOUND

"A" Sta 331+32.02 TO 333+12.73

ROUTE 101

FIGURE 6F

TYPICAL CROSS SECTIONS

NO SCALE

X-5

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Appendix A Field Investigation

APPENDIX A
FIELD INVESTIGATION

A.1 Introduction

The subsurface conditions at the PALO COMADO CANYON RD. (WIDEN) project site were investigated by performing six hollow stem auger borings and one hand auger boring on September 9, 12, and 13, 2013. The locations of the explorations are presented in the exploration plan of the main report. A summary of field explorations is presented in Table A-1.

Prior to beginning the exploration program, access permission and drilling permits were obtained as necessary. Subsurface utility maps were reviewed prior to selecting locations for subsurface investigations. Underground Service Alert (USA) was notified and each exploration location was cleared for underground utilities. Approved traffic control plans were implemented where necessary during field activities. The exploration methods are described in the following sections.

A.2 Soil Drilling and Sampling

Drilling, Logging, and Soil / Rock Classification

Borings were performed by GDC's drilling subcontractors Choice Drilling Inc. under the continuous technical supervision of a GDC field engineer geologist, who visually inspected the soil samples, measured groundwater levels, maintained detailed records of the borings, and visually / manually classified the soils in accordance with the ASTM D 2488 and the Unified Soil Classification System (USCS). Logging and classification was performed in general accordance with Caltrans "Soil and Rock Logging, Classification, and Presentation Manual (2010 Edition)". A Boring Record Legend and Key for Soil Classification are presented in Figures A-1a through A-1f. The boring records are presented in Figures A-2a through A-8a.

Sampling

Bulk samples of soil cuttings were collected at selected depths and drive samples were collected from the borings typically at 2.5 feet for the first ten feet of exploration, and at a typical interval of 5 feet from depth of ten feet to the end of the borehole. The sampling was performed using Standard Penetration Test (SPT) samplers in accordance with ASTM D 1586 and Ring-Lined "California" Split Barrel samplers in accordance with ASTM D 3550.

Bulk samples were collected from the hand auger boring and hollow-stem auger cuttings and placed in plastic bags.

SPT drive samples were obtained using a 2-inch outside diameter and 1.375-inch inside diameter split-spoon sampler without lining. The soil recovered from the SPT sampling was sealed in plastic bags to preserve the natural moisture content.

California drive samples were collected with a 3-inch outside diameter 2.5-inch inside diameter split barrel sampler with a 2.42-inch inside diameter cutting shoe. The sampler barrel is lined with 18-inches of metal rings for sample collection and has an additional length of waste barrel. Stainless steel or brass liner rings for sample collection are 1-inch high, 2.42-inch inside diameter, and 2.5-inch outside diameter. California samples were removed from the sampler, retained in the metal rings and placed in sealed plastic canisters to prevent loss of moisture.

At each sampling interval, the drive samplers were fitted onto sampling rod, lowered to the bottom of the boring, and driven 18 inches or to refusal (50 blows per 6 inches) with a 140-lb hammer free-falling a height of 30-inches using an automatic hammer. Compared to the SPT, the California sampler provides less disturbed samples.

Penetration Resistance

SPT blow counts adjusted to 60% hammer efficiency (N_{60}) are routinely used as an index of the relative density of coarse grained soils, and are sometimes used (but less reliable) to estimate consistency of cohesive soils. For samples collected using non-SPT samplers, different hammer weight and drop height, and/or efficiency different than 60%, correction factors can be applied to estimate the equivalent SPT N_{60} value following the approach of Burmister (1948) as follows:

$$N^*_{60} = N_R * C_E * C_H * C_S$$

where

N^*_{60} = equivalent SPT N_{60}

N_R = Raw Field Blowcount (blows per foot)

C_E = Hammer Efficiency Correction = Er_i / 60%

C_H = Hammer Energy Correction = (W * H) / (140 lb * 30 in)

C_S = Sampler Size Correction = $[(2.0\text{ in})^2-(1.375\text{ in})^2]/[D_o^2-D_i^2]$

Er_i = hammer efficiency, %

W= actual drive hammer weight, lbs

H = actual drive hammer drop, inch

D_o, D_i = actual sampler outside and inside diameter, respectively, inches

Burmister's correction assumes that penetration resistance (blowcount) is inversely proportional to the hammer energy. For a hammer other than a 140# hammer with 30" drop the hammer energy correction is equal to the ratio of the theoretical hammer energy (weight times drop) to the theoretical SPT hammer energy, or C_H = (W * H) / (140 lb * 30 in).

Burmister's correction assumes that penetration resistance (blowcount) is proportional to the annular end area of the drive sampler. For California drive samplers with D_o=3 inch and D_i=2.42 inch the sampler size correction factor is the ratio of the annular area of an SPT split spoon to that of the California Sampler, or $C_S = [2.0^2-1.375^2]/[3^2-2.42^2] = 0.67$.

To normalize the field SPT and California blowcounts to a hammer with 60% efficiency, an energy correction factor equal to Hammer Efficiency (%) / 60% was applied to the field blowcounts. Hammer efficiency was determined by Pile Driving Analyzer (PDA) measurement. Hammer efficiency measurements are presented in Figures A-9a through A-9e.

The correction factors applied to obtain N^*_{60} are summarized in the following table:

Hammer Type	Hammer Weight and Drop	C_H	Hammer Efficiency (%)	C_E	Cal Sampler Dimensions	C_S	Combined Correction Factor SPT Samples	Combined Correction Factor CAL Samples
CME Auto	140# 30"	1	85	1.42	D_o=3.0" D_i=2.42"	0.67	1.42	0.95

Corrected N^*_{60} are generally used, with due engineering judgment, only for qualitative assessment of in place density or consistency, and are not used for other more critical analyses such as liquefaction.

Relative Density and Consistency

Equivalent SPT N_{60} values were used as the basis for classifying relative density of granular/cohesionless soils. The correlations for consistency and relative density are shown in the Boring Record Legend, Figures A-1a through A-1d. Drive sample field blow counts, SPT

N^*_{60} values, pocket penetrometer readings, and corresponding density/consistency classifications are presented on the boring records.

Relative Density and Consistency

Equivalent SPT N_{60} values were used as the basis for classifying relative density of granular/cohesionless soils. Wherever possible consistency classification of cohesive soils was based on undrained shear strength estimated in the field with a pocket penetrometer and/or Torvane or by testing in the laboratory. The correlations for consistency and relative density are shown in the Boring Record Legend, Figures A-1a through A-1d. Drive sample field blow counts, SPT N^*_{60} values, and corresponding density/consistency classifications are presented on the boring records.

Borehole Abandonment

At the completion of the drilling groundwater was measured (where possible) and the borings were abandoned by backfilling the borehole with drill cuttings. The surface was patched with cold mix asphalt concrete or quickset concrete, as necessary.

Sample Handling and Transport

Geotechnical samples were sealed to prevent moisture loss, packed in appropriate protective containers, and transported to the geotechnical laboratory for further examination and geotechnical testing.

Laboratory Testing

The soils were further examined and tested in the laboratory and classified in accordance with the Unified Soil Classification System following ASTM D 2487 and D 2488 (see Figures A-1e and A-1f). Field classifications presented on the records were modified where necessary on the basis of the laboratory test results. Descriptions of the laboratory tests performed and a summary of the results are presented in Appendix B.

Hand Auger Boring

Choice Drilling Inc. performed one hand-auger Boring A-13-007 at depth of 5 feet. The test data is presented in Figure A-8

A.3 List of Attached Tables and Figures

The following tables and figures are attached and complete this appendix:

List of Tables

Table A-1 Summary of Field Explorations

List of Figures

Figures A-1a through A-1d Boring Record Legend
Figures A-1e and A-1f Key for Soil Classification
Figures A-2a through A-8 Boring Records
Figures A-9a through A-9e Hammer Efficiency Calibrations

TABLE A-1
SUMMARY OF FIELD EXPLORATIONS

Exploration No.	Approximate Exploration Location		Date	Exploration			Groundwater		Figure No.
	Station	Offset (ft)		Type	Surface Elevation (ft)	Total Depth (ft)	Depth (ft)	Elevation (ft)	
A-13-001	16 + 22	22L	9/09/13	HSA	934	26.5	NE	NE	A-2 (a-b)
A-13-002	18 + 72	25L	9/09/13	HSA	936	61	NE	NE	A-3 (a-c)
A-13-003	19 + 28	20R	9/12/13 – 9/13/13	HSA	910	50.4	23	887	A-4 (a-c)
A-13-004	20 + 22	20R	9/12/13	HSA	914	50.5	NE	NE	A-5 (a-c)
A-13-005	20 + 83	25R	9/12/13	HSA	917	51	45.5	871.5	A-6 (a-c)
A-13-006	21 + 75	17R	9/09/13	HSA	936	60.5	NE	NE	A-7 (a-c)
HA-13-007	25 + 43	14L	9/09/13	Hand Auger	928	5.0	NE	NE	A-8

Notes: 1) Boring locations are illustrated on the Exploration Location Plan in the main report.
2) Stations referenced to centerline of Palo Comado Road, perpendicular offset Right or Left of center line looking up station.
3) Elevations estimated to nearest 0.5 ft using tape measure and topographic map.

Other notes and abbreviations as needed
HSA = Hollow-Stem Auger MR = Mud Rotary NE = Not Encountered L = Left R = Right

SOIL IDENTIFICATION AND DESCRIPTION SEQUENCE

Sequence	Identification Components	Refer to Section: Field	Refer to Section: Lab	Required	Optional
1	Group Name	2.5.2	3.2.2	●	
2	Group Symbol	2.5.2	3.2.2	●	
	Description Components				
3	Consistency of Cohesive Soil	2.5.3	3.2.3	●	
4	Apparent Density of Cohesionless Soil	2.5.4		●	
5	Color	2.5.5		●	
6	Moisture	2.5.6		●	
7	Percent or Proportion of Soil	2.5.7	3.2.4	●	⬭
	Particle Size	2.5.8	2.5.8	●	⬭
	Particle Angularity	2.5.9			○
	Particle Shape	2.5.10			○
8	Plasticity (for fine-grained soil)	2.5.11	3.2.5		○
9	Dry Strength (for fine-grained soil)	2.5.12			○
10	Dilatency (for fine-grained soil)	2.5.13			○
11	Toughness (for fine-grained soil)	2.5.14			○
12	Structure	2.5.15			○
13	Cementation	2.5.16		●	
14	Percent of Cobbles and Boulders	2.5.17		●	
	Description of Cobbles and Boulders	2.5.18		●	
15	Consistency Field Test Result	2.5.3		●	
16	Additional Comments	2.5.19			○

Describe the soil using descriptive terms in the order shown

Minimum Required Sequence:

USCS Group Name (Group Symbol); Consistency or Density; Color; Moisture; Percent or Proportion of Soil; Particle Size; Plasticity (optional).

⬭ = optional for non-Caltrans projects

Where applicable:

Cementation; % cobbles & boulders; Description of cobbles & boulders; Consistency field test result

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

HOLE IDENTIFICATION

Holes are identified using the following convention:

H – YY – NNN

Where:

H: Hole Type Code

YY: 2-digit year

NNN: 3-digit number (001-999)

Hole Type Code and Description

Hole Type Code	Description
A	Auger boring (hollow or solid stem, bucket)
R	Rotary drilled boring (conventional)
RC	Rotary core (self-cased wire-line, continuously-sampled)
RW	Rotary core (self-cased wire-line, not continuously sampled)
P	Rotary percussion boring (Air)
HD	Hand driven (1-inch soil tube)
HA	Hand auger
D	Driven (dynamic cone penetrometer)
CPT	Cone Penetration Test
O	Other (note on LOTB)

Description Sequence Examples:

SANDY lean CLAY (CL); very stiff; yellowish brown; moist; mostly fines; some SAND, from fine to medium; few gravels; medium plasticity; PP=2.75.

Well-graded SAND with SILT and GRAVEL and COBBLES (SW-SM); dense; brown; moist; mostly SAND, from fine to coarse; some fine GRAVEL; few fines; weak cementation; 10% GRANITE COBBLES; 3 to 6 inches; hard; subrounded.

Clayey SAND (SC); medium dense, light brown; wet; mostly fine sand,; little fines; low plasticity.

GROUP DELTA

GDC Project No. LA1143

Palo Comado Bridge OC (Widen)
Agoura Hills, CA

BORING RECORD LEGEND #1

Figure A-1a

GROUP SYMBOLS AND NAMES

Graphic / Symbol	Group Names
GW	Well-graded GRAVEL Well-graded GRAVEL with SAND
GP	Poorly graded GRAVEL Poorly graded GRAVEL with SAND
GW-GM	Well-graded GRAVEL with SILT Well-graded GRAVEL with SILT and SAND
GW-GC	Well-graded GRAVEL with CLAY (or SILTY CLAY) Well-graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GP-GM	Poorly graded GRAVEL with SILT Poorly graded GRAVEL with SILT and SAND
GP-GC	Poorly graded GRAVEL with CLAY (or SILTY CLAY) Poorly graded GRAVEL with CLAY and SAND (or SILTY CLAY and SAND)
GM	SILTY GRAVEL SILTY GRAVEL with SAND
GC	CLAYEY GRAVEL CLAYEY GRAVEL with SAND
GC-GM	SILTY, CLAYEY GRAVEL SILTY, CLAYEY GRAVEL with SAND
SW	Well-graded SAND Well-graded SAND with GRAVEL
SP	Poorly graded SAND Poorly graded SAND with GRAVEL
SW-SM	Well-graded SAND with SILT Well-graded SAND with SILT and GRAVEL
SW-SC	Well-graded SAND with CLAY (or SILTY CLAY) Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SP-SM	Poorly graded SAND with SILT Poorly graded SAND with SILT and GRAVEL
SP-SC	Poorly graded SAND with CLAY (or SILTY CLAY) Poorly graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL)
SM	SILTY SAND SILTY SAND with GRAVEL
SC	CLAYEY SAND CLAYEY SAND with GRAVEL
SC-SM	SILTY, CLAYEY SAND SILTY, CLAYEY SAND with GRAVEL
PT	PEAT
	COBBLES COBBLES and BOULDERS BOULDERS

Graphic / Symbol	Group Names
CL	Lean CLAY Lean CLAY with SAND Lean CLAY with GRAVEL SANDY lean CLAY SANDY lean CLAY with GRAVEL GRAVELLY lean CLAY GRAVELLY lean CLAY with SAND
CL-ML	SILTY CLAY SILTY CLAY with SAND SILTY CLAY with GRAVEL SANDY SILTY CLAY SANDY SILTY CLAY with GRAVEL GRAVELLY SILTY CLAY GRAVELLY SILTY CLAY with SAND
ML	SILT SILT with SAND SILT with GRAVEL SANDY SILT SANDY SILT with GRAVEL GRAVELLY SILT GRAVELLY SILT with SAND
OL	ORGANIC lean CLAY ORGANIC lean CLAY with SAND ORGANIC lean CLAY with GRAVEL SANDY ORGANIC lean CLAY SANDY ORGANIC lean CLAY with GRAVEL GRAVELLY ORGANIC lean CLAY GRAVELLY ORGANIC lean CLAY with SAND
OL	ORGANIC SILT ORGANIC SILT with SAND ORGANIC SILT with GRAVEL SANDY ORGANIC SILT SANDY ORGANIC SILT with GRAVEL GRAVELLY ORGANIC SILT GRAVELLY ORGANIC SILT with SAND
CH	Fat CLAY Fat CLAY with SAND Fat CLAY with GRAVEL SANDY fat CLAY SANDY fat CLAY with GRAVEL GRAVELLY fat CLAY GRAVELLY fat CLAY with SAND
MH	Elastic SILT Elastic SILT with SAND Elastic SILT with GRAVEL SANDY elastic SILT SANDY elastic SILT with GRAVEL GRAVELLY elastic SILT GRAVELLY elastic SILT with SAND
OH	ORGANIC fat CLAY ORGANIC fat CLAY with SAND ORGANIC fat CLAY with GRAVEL SANDY ORGANIC fat CLAY SANDY ORGANIC fat CLAY with GRAVEL GRAVELLY ORGANIC fat CLAY GRAVELLY ORGANIC fat CLAY with SAND
OH	ORGANIC elastic SILT ORGANIC elastic SILT with SAND ORGANIC elastic SILT with GRAVEL SANDY elastic ELASTIC SILT SANDY ORGANIC elastic SILT with GRAVEL GRAVELLY ORGANIC elastic SILT GRAVELLY ORGANIC elastic SILT with SAND
OL/OH	ORGANIC SOIL ORGANIC SOIL with SAND ORGANIC SOIL with GRAVEL SANDY ORGANIC SOIL SANDY ORGANIC SOIL with GRAVEL GRAVELLY ORGANIC SOIL GRAVELLY ORGANIC SOIL with SAND

FIELD AND LABORATORY TESTING

C	Consolidation (ASTM D 2435)
CL	Collapse Potential (ASTM D 5333)
CP	Compaction Curve (CTM 216)
CR	Corrosion, Sulfates, Chlorides (CTM 643, CTM 417, CTM 422)
CU	Consolidated Undrained Triaxial (ASTM D 4767)
DS	Direct Shear (ASTM D 3080)
EI	Expansion Index (ASTM D 4829)
M	Moisture Content (ASTM D 2216)
OC	Organic Content (ASTM D 2974)
P	Permeability (CTM 220)
PA	Particle Size Analysis (ASTM D 422)
PI	Liquid Limit, Plastic Limit, Plasticity Index (AASHTO T 89, AASHTO T 90)
PL	Point Load Index (ASTM D 5731)
PM	Pressure Meter
R	R-Value (CTM 301)
SE	Sand Equivalent (CTM 217)
SG	Specific Gravity (AASHTO T 100)
SL	Shrinkage Limit (ASTM D 427)
SW	Swell Potential (ASTM D 4546)
UC	Unconfined Compression - Soil (ASTM D 2166) Unconfined Compression - Rock (ASTM D 2938)
UU	Unconsolidated Undrained Triaxial (ASTM D 2850)
UW	Unit Weight (ASTM D 4767)

SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT)
- Standard California Sampler
- Modified California Sampler (2.4" ID, 3" OD)
- Shelby Tube
- Piston Sampler
- NX Rock Core
- HQ Rock Core
- Bulk Sample
- Other (see remarks)

DRILLING METHOD SYMBOLS

- Auger Drilling
- Rotary Drilling
- Dynamic Cone or Hand Driven
- Diamond Core

WATER LEVEL SYMBOLS

- First Water Level Reading (during drilling)
- Static Water Level Reading (after drilling, date)

Definitions for Change in Material

Term	Definition	Symbol
Material Change	Change in material is observed in the sample or core and the location of change can be accurately located.	———
Estimated Material Change	Change in material cannot be accurately located either because the change is gradational or because of limitations of the drilling and sampling methods.	– – – – –
Soil / Rock Boundary	Material changes from soil characteristics to rock characteristics.	~ ~ ~

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

GROUP DELTA

GDC Project No. LA1143

Palo Comado Bridge OC (Widen)
Agoura Hills, CA

BORING RECORD LEGEND #2

Figure A-1b

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

APPARENT DENSITY OF COHESIONLESS SOILS	
Description	**SPT N_{60} (blows / 12 inches)**
Very Loose	0 - 5
Loose	5 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	Greater than 50

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

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

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

CEMENTATION	
Description	**Criteria**
Weak	Crumbles or breaks with handling or little finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010), with the exception of consistency of cohesive soils vs. N_{60}.

Plasticity

Description	**Criteria**
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.
Low	The thread can barely be rolled and the lump cannot be formed when drier than the plastic limit.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. The lump crumbles when drier than the plastic limit.
High	It takes considerable time rolling and kneading to reach the plastic limit. The thread can be rerolled several times after reaching the plastic limit. The lump can be formed without crumbling when drier than the plastic limit.

GROUP DELTA

GDC Project No. LA1143

Palo Comado Bridge OC (Widen)
Agoura Hills, CA

BORING RECORD LEGEND #3

Figure A-1c

LEGEND OF ROCK MATERIALS


IGNEOUS ROCK


SEDIMENTARY ROCK


METAMORPHIC ROCK

BEDDING SPACING

Description	Thickness/Spacing
Massive	Greater than 10 ft
Very Thickly Bedded	3 ft - 10 ft
Thickly Bedded	1 ft - 3 ft
Moderately Bedded	4 in - 1 ft
Thinly Bedded	1 in - 4 in
Very Thinly Bedded	1/4 in - 1 in
Laminated	Less than 1/4 in

WEATHERING DESCRIPTORS FOR INTACT ROCK

	Diagnostic Features					
	Chemical Weathering-Discoloration-Oxidation		Mechanical Weathering and Grain Boundary Conditions	Texture and Leaching		
Description	Body of Rock	Fracture Surfaces		Texture	Leaching	General Characteristics
Fresh	No discoloration, not oxidized	No discoloration or oxidation	No separation, intact (tight)	No change	No leaching	Hammer rings when crystalline rocks are struck.
Slightly Weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull	Minor to complete discoloration or oxidation of most surfaces	No visible separation, intact (tight)	Preserved	Minor leaching of some soluble minerals	Hammer rings when crystalline rocks are struck. Body of rock not weakened.
Moderately Weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty"; feldspar crystals are "cloudy"	All fracture surfaces are discolored or oxidized	Partial separation of boundaries visible	Generally preserved	Soluble minerals may be mostly leached	Hammer does not ring when rock is struck. Body of rock is slightly weakened.
Intensely Weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in situ disaggregation, grain boundary conditions	All fracture surfaces are discolored or oxidized; surfaces friable	Partial separation, rock is friable; in semi-arid conditions, granitics are disaggregated	Texture altered by chemical disintegration (hydration, argillation)	Leaching of soluble minerals may be complete	Dull sound when struck with hammer; usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures or veinlets. Rock is significantly weakened.
Decomposed	Discolored of oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay		Complete separation of grain boundaries (disaggregated)	Resembles a soil; partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete		Can be granulated by hand. Resistant minerals such as quartz may be present as "stringers" or "dikes".

PERCENT CORE RECOVERY (REC)

$$\frac{\Sigma \text{ Length of the recovered core pieces (in.)}}{\text{Total length of core run (in.)}} \times 100$$

ROCK QUALITY DESIGNATION (RQD)

$$\frac{\Sigma \text{ Length of intact core pieces} \geq 4 \text{ in.}}{\text{Total length of core run (in.)}} \times 100$$

RQD* indicates soundness criteria not met.

ROCK HARDNESS

Description	Criteria
Extremely Hard	Cannot be scratched with a pocketknife or sharp pick. Can only be chipped with repeated heavy hammer blows
Very Hard	Cannot be scratched with a pocketknife or sharp pick. Breaks with repeated heavy hammer blows.
Hard	Can be scratched with a pocketknife or sharp pick with difficulty (heavy pressure). Breaks with heavy hammer blows.
Moderately Hard	Can be scratched with a pocketknife or sharp pick with light or moderate pressure. Breaks with moderate hammer blows
Moderately Soft	Can be grooved 1/16 in. deep with a pocketknife or sharp pick with moderate or heavy pressure. Breaks with light hammer blow or heavy manual pressure.
Soft	Can be grooved or gouged easily with a pocketknife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
Very Soft	Can be readily indented, grooved or gouged with fingernail, or carved with a pocketknife. Breaks with light manual pressure.

FRACTURE DENSITY

Description	Observed Fracture Density
Unfractured	No fractures
Very Slightly Fractured	Core lengths greater than 3 ft.
Slightly Fractured	Core lengths mostly from 1 to 3 ft.
Moderately Fractured	Core lengths mostly 4 in. to 1 ft.
Intensely Fractured	Core lengths mostly from 1 to 4 in.
Very Intensely Fractured	Mostly chips and fragments.

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).

GROUP DELTA

GDC Project No. LA1143

Palo Comado Bridge OC (Widen)
Agoura Hills, CA

BORING RECORD LEGEND #3

Figure A-1d

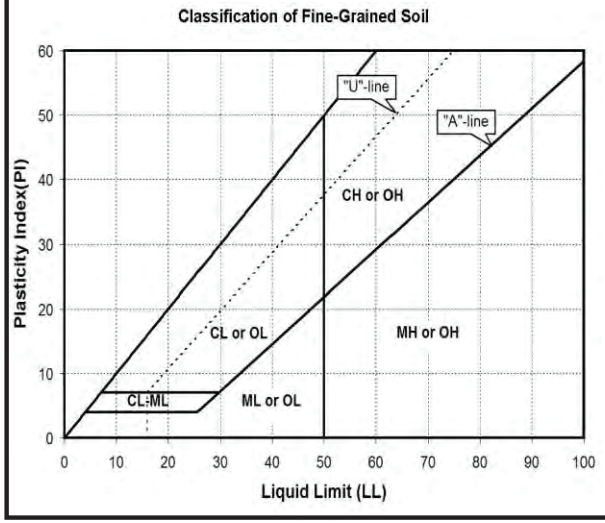
CLASSIFICATION OF INORGANIC FINE GRAINED SOILS (Soils with ≥50% finer than No. 200 Sieve)

GROUP SYMBOL				GROUP NAME
CL	<30% plus No. 200	<15% plus No. 200		Lean clay
		15-25% plus No. 200	%sand ≥%gravel	Lean clay with sand
			%sand <%gravel	Lean clay with gravel
	≥30% plus No. 200	% sand ≥ % gravel	<15% gravel	Sandy lean clay
			≥15% gravel	Sandy lean clay with gravel
		% sand < % gravel	<15% sand	Gravelly lean clay
			≥15% sand	Gravelly lean clay with sand
ML	<30% plus No. 200	<15% plus No. 200		Silt
		15-25% plus No. 200	%sand ≥%gravel	Silt with sand
			%sand <%gravel	Silt with gravel
	≥30% plus No. 200	% sand ≥ % gravel	<15% gravel	Sandy silt
			≥15% gravel	Sandy silt with gravel
		% sand < % gravel	<15% sand	Gravelly silt
			≥15% sand	Gravelly silt with sand
CH	<30% plus No. 200	<15% plus No. 200		Fat clay
		15-25% plus No. 200	%sand ≥%gravel	Fat clay with sand
			%sand <%gravel	Fat clay with gravel
	≥30% plus No. 200	% sand ≥ % gravel	<15% gravel	Sandy fat clay
			≥15% gravel	Sandy fat clay with gravel
		% sand < % gravel	<15% sand	Gravelly fat clay
			≥15% sand	Gravelly fat clay with sand
MH	<30% plus No. 200	<15% plus No. 200		Elastic silt
		15-25% plus No. 200	%sand ≥%gravel	Elastic silt with sand
			%sand <%gravel	Elastic silt with gravel
	≥30% plus No. 200	% sand ≥ % gravel	<15% gravel	Sandy elastic silt
			≥15% gravel	Sandy elastic silt with gravel
		% sand < % gravel	<15% sand	Gravelly elastic silt
			≥15% sand	Gravelly elastic silt with sand

Reference:
ASTM D 2487 and 2488

Laboratory Classification of Clay and Silt

REFERENCE: Caltrans Soil and Rock Logging, Classification, and Presentation Manual (2010).



CL: LL<50; above A-Line.

CH: LL≥50; above A-Line.

ML: LL<50; below A-Line, or PI<4, or Non-Plastic

MH: LL≥50; below A-Line.

CL-ML: above A-Line and PI=4 to 7

CL/CH, ML/MH: at or near LL=50

ML/CL, MH/CH: at or near the A-Line

Field Identification of Clays and Silts

Group Symbol	Dry Strength	Dilatancy	Toughness	Plasticity
ML	None to low	Slow to rapid	Low or thread cannot be formed	Low to nonplastic
CL	Medium to high	None to slow	Medium	Medium
MH	Low to medium	None to slow	Low to medium	Low to medium
CH	High to very high	None	High	High

GROUP DELTA

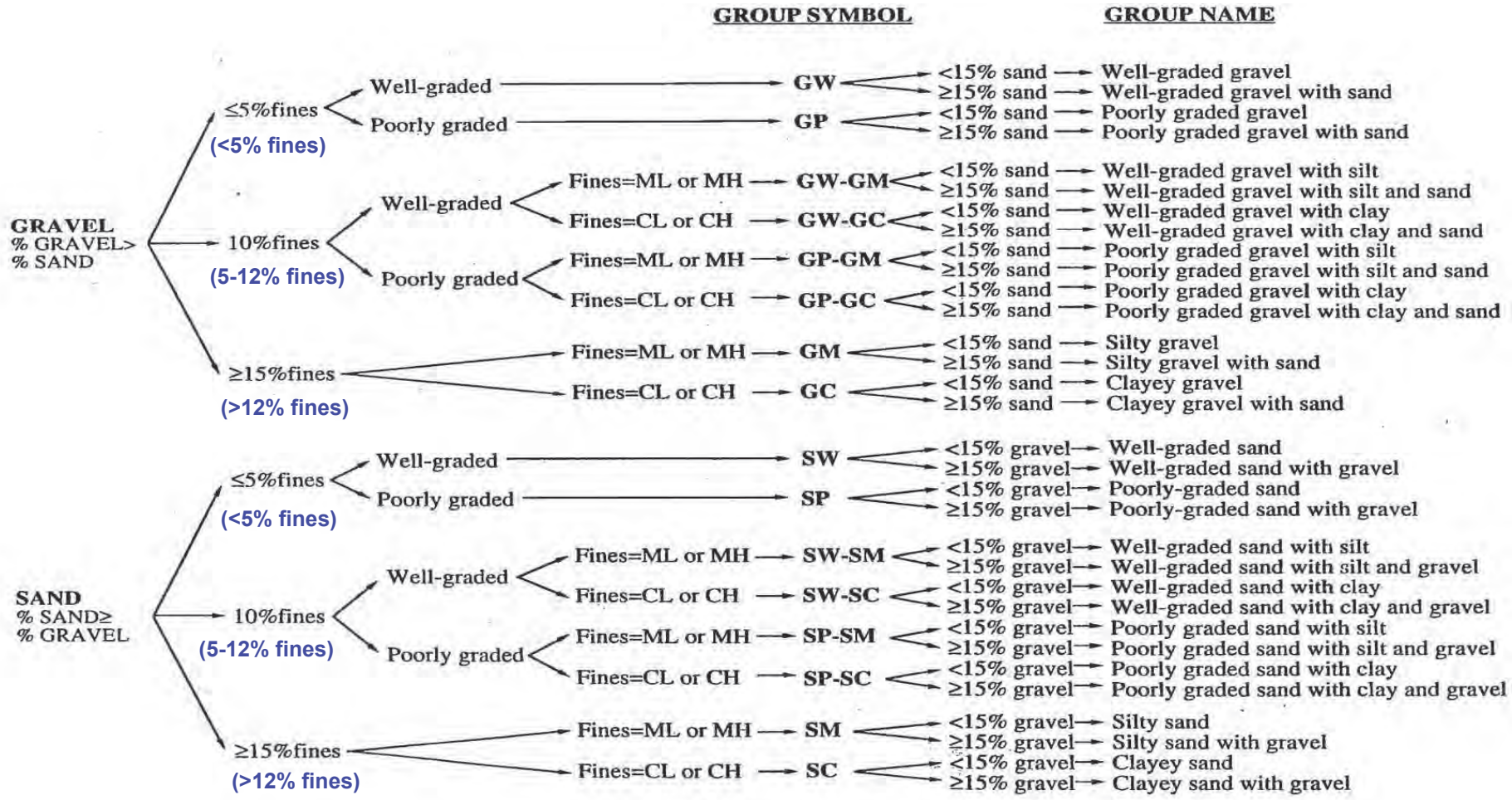
GDC Project No. LA1143

Palo Comado Bridge OC (Widen)
Agoura Hills, CA

KEY FOR SOIL CLASSIFICATION #1

Figure A-1e

CLASSIFICATION OF COARSE-GRAINED SOILS (Soils with <50% "fines" passing No. 200 Sieve)



Reference:

ASTM D 2487 and 2488

Note: Values estimated to nearest 5% to be used for visual identification, values in parentheses to be used for classification when based on laboratory grain size data.

Granular Soil Gradation Parameters

Coefficient of Uniformity: $C_u = D_{60}/D_{10}$

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

D_{10} = 10% of soil is finer than this diameter

D_{30} = 30% of soil is finer than this diameter

D_{60} = 60% of soil is finer than this diameter

Group Symbol	Gradation or Plasticity Requirement
SW	$C_u > 6$ and $1 \leq C_c \leq 3$
GW	$C_u > 4$ and $1 \leq C_c \leq 3$
GP or SP	Clean gravel or sand not meeting requirement for SW or GW
SM or GM	Non-plastic fines or below A-Line or PI<4
SC or GC	Plastic fines or above A-Line and PI>7

GROUP DELTA

GDC Project No. LA1143

Palo Comado Bridge OC (Widen)
Agoura Hills, CA

KEY FOR SOIL CLASSIFICATION #2

Figure A-1f

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-001**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/9/2013	9/9/2013	1 of 2

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	22 ft left Sta. 16 + 22

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	26.5	934 N/A	▽ N/E / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	▼ N/E / *NE* AFTER DRILLING

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															ASPHALT CONCRETE (9")
															AGGREGATE BASE (18")
	930		B-1												Fat CLAY (CH); medium brown; moist; mostly fines; trace fine SAND; oxidation; high plasticity (ALLUVIUM, Qa)
5			R-2	9 12 16	28	27			24.8	95	56:31				Very stiff; PP=3.0 tsf.
															Medium brown to gray; caliche; PP=3.0 tsf.
			S-3	3 3 4	7	10			27.4						
	925														
10			R-4	7 8 11	19	18			22.5	98					Rig chatter; hard drilling; PP=3.0 tsf.
	920														
15			S-5	3 4 5	9	13			21.3						Sandy Fat CLAY (CH); very stiff; dark gray; moist; mostly fines; some fine SAND; few GRAVEL; high plasticity; PP=3.5 tsf. #200: 7% GRAVEL; 38% SAND; 55% fines.
	915														
20			R-6	13 18 25	43	41			21.7	101					Fat CLAY (CH); very stiff; medium brown-gray; moist; mostly fines; few fine GRAVEL; high plasticity; PP=2.0 tsf.
	910														SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE); fine-grained; reddish

GDC_CT_LOG_BORING_2013 CALTRANS BORING LOGS.GPJ GDC2013.GDT 9/12/14

GROUP DELTA CONSULTANTS, INC.
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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE
A-2 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-001**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/9/2013	9/9/2013	2 of 2

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	22 ft left Sta. 16 + 22

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	26.5	934 N/A	▽ N/E / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	▼ N/E / *NE* AFTER DRILLING

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		X	S-7	15 18 30	48	68			22.8						brown-medium gray; very soft; steeply dipping; some caliche; (Fat CLAY (CH); hard; moist; high plasticity; PP=4.0 tsf); (CALABASAS FORMATION, Tcb).
															Bottom of borehole at 26.5 feet. Boring terminated at planned depth. Groundwater not encountered.
30	905														
35	900														
40	895														
45	890														
	885														

This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010).

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FIGURE
A-2 b

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-002**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/9/2013	9/9/2013	1 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	25 ft left Sta. 18 + 72

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	61	936 N/A	▽ N/E / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	AFTER DRILLING ▼ N/E / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	935														ASPHALT CONCRETE (6.5")
															AGGREGATE BASE (16")
			B-1												Fat CLAY (CH); orange-brown; moist; high plasticity; (FILL, Qaf).
5															
	930		S-2	3 4 4	8	11			23.8		53:30				Very stiff; orangish brown-gray; specks of volcanic ash; PP=3.5 tsf.
			R-3	7 10 12	22	21			19.9	102		CN			Orangish brown-gray and dark brown; PP=2.0 tsf.
10															
	925		S-4	3 3 4	7	10			23.4						Stiff; orange-gray; PP=1.0 tsf.
15															
	920		R-5	12 15 22	27	26			18.1	109		DS			Very stiff; few GRAVEL; PP=2.5 tsf.
20															
	915		S-6	5 5 6	11	16			25.7						Fat CLAY (CH); stiff; mottled orange-dark gray; moist; high plasticity; (ALLUVIUM, Qa); PP=1.5 tsf.

GDC_CT_LOG_BORING_2013 CALTRANS BORING LOGS.GPJ GDC2013.GDT 9/12/14

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Irvine, CA 92618

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE
A-3 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-002**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/9/2013	9/9/2013	2 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	25 ft left Sta. 18 + 72

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	61	936 N/A	▽ N/E / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	▼ N/E / *NE* AFTER DRILLING

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	910		R-7	12 18 25	43	41			25.7	98	68:44	DS			SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE); fine-grained; mottled orange-grown; very soft; (Fat CLAY (CH); hard; slightly moist; high plasticity; PP>4.5 tsf); (CALABASAS FORMATION, Tcb).
30	905		S-8	11 14 17	31	44			21.4						Thinly bedded; steeply dipping bedding plane; medium gray; (very stiff; weak cementation; oxidation; PP=2.5 tsf).
35	900		R-9	22 50/6"	50/6"	48/6"			24.9	104					(moist; PP=3.5 tsf).
40	895		S-10	12 20 26	46	65			22.4						Laminated; discontinuity; dark gray; friable; mineralization; (hard; dry; caliche; PP>4.5 tsf).
45	890		R-11	45 50/6"	50/6"	48/6"			17.7	112					Thickly bedded; medium gray; tuffaceous; (slightly moist; PP>4.5 tsf).

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FIGURE
A-3 b

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-002**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/9/2013	9/9/2013	3 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	25 ft left Sta. 18 + 72

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	61	936 N/A	▽ N/E / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	▼ N/E / *NE* AFTER DRILLING

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	885		S-12	16 28 36	64	91			16.4						SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE) (CALABASAS FORMATION, Tcb) (continued). (moist; PP>4.5 tsf).
55	880		R-13	50/6"	REF	REF			13.1	121					(PP>4.5 tsf).
60	875		S-14	29 50/6"	50/6"	71/6"			12.1						(slightly moist; moderate cementation; PP=4.0 tsf).
															Bottom of borehole at 61 feet. Boring terminated at planned depth.
65	870														This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)
70	865														

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FIGURE
A-3 c

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-003**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/12/2013	9/13/2013	1 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	20 ft right Sta. 19 + 28

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	T. Latimer	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	50.5	910 N/A	▽ 23.0 / *887.0* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	AFTER DRILLING
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	▼ N/M / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															ASPHALT CONCRETE (12")
															AGGREGATE BASE (9")
			B-1												Fat CLAY (CH); moderately brown; moist; mostly fines; few GRAVEL; high plasticity; (FILL, Qaf / ALLUVIUM, Qa).
5	905		R-2	12 21 25	46	44			27.9	94					SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE); fine-grained; mottled gray and orangish brown-brown; very soft; (Fat CLAY with SAND (CH); hard; moist; mostly fines; little fine SAND; high plasticity; PP>4.5 tsf). (CALABASAS FORMATION, Tcb).
			S-3	4 6 11	17	24			25.3		65:39				Mottled gray-brown; weathered; (Fat CLAY (CH); very stiff; mostly fines; few fine SAND; high plasticity; PP=3.75 tsf).
10	900		R-4	12 20 26	46	44			28.4	93					(Hard; PP=4.5 tsf).
15	895		S-5	12 18 22	40	57			15.4						(Sandy Fat CLAY (CH); hard; gray; moist; mostly fines; some fine SAND; high plasticity; PP>4.5 tsf).
20	890		R-6	31 50/6"	50/6"	48/6"			13.6	114					(Fat CLAY with SAND (CH); hard; gray; moist; mostly fines; little fine SAND; high plasticity; PP>4.5 tsf).
															▽ Perched water at 23 feet.

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FIGURE
A-4 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-003**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/12/2013	9/13/2013	2 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	20 ft right Sta. 19 + 28

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	T. Latimer	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	50.5	910 N/A	▽ 23.0 / *887.0* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	AFTER DRILLING
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	▼ N/M / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		⊠	S-7	50/6"	REF	REF			23.4			CR			SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE) (CALABASAS FORMATION, Tcb) (continued). (Trace GRAVEL).
30	880	■	R-8	50/6"	REF	REF			17.1	120					(Fat CLAY (CH); hard; dark gray; moist to wet; mostly fines; few fine SAND; high plasticity; PP>4.5 tsf).
35	875	⊠	S-9	20 50/6"	50/6"	71/6"			20.4						(Sandy Fat CLAY (CH); hard; dark grayish brown; moist; mostly fines; some fine SAND; high plasticity; PP>4.5 tsf).
40	870	■	R-10	32 50/3"	50/3"	48/3"			21.4	101					(PP>4.5 tsf).
45	865	⊠	S-11	27 50/6"	50/6"	71/6"			22.1						

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FIGURE
A-4 b

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-003**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/12/2013	9/13/2013	3 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	20 ft right Sta. 19 + 28

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	T. Latimer	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	50.5	910 N/A	▽ 23.0 / *887.0* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	AFTER DRILLING
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	▼ N/M / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		⋈	R-12	50/5"	REF	REF			20	98					SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE) (CALABASAS FORMATION, Tcb) (continued).
															Bottom of borehole at 50.5 feet.
															Boring terminated at planned depth.
															Perched water encountered at 23 feet.
55	855														
															This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)
60	850														
65	845														
70	840														

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FIGURE
A-4 c

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-004**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/12/2013	9/12/2013	1 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	20 ft right Sta. 20 + 22

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	50.5	914 N/A	▽ N/E / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	AFTER DRILLING ▼ N/E / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															ASPHALT CONCRETE (6")
															AGGREGATE BASE (15")
															Sandy Fat CLAY (CH); reddish brown; moist; mostly fines; some fine SAND; high plasticity (ALLUVIUM, Qa).
	910		B-1												
5															
			S-2	2 3 3	6	8			17.3						Very stiff; PP=3.25 tsf. #200: 33% SAND; 67% fines
			R-3	7 12 20	32	30			16.7	109					
	905														
10			S-4	4 7 8	15	21			18.5						Light reddish brown; little caliche; PP=2.75 tsf.
	900														
15			R-5	8 12 15	27	26			26.9	95					Reddish brown; PP=3.75 tsf.
	895														
20			S-6	7 10 20	30	42			23.1						SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE); fine-grained; reddish brown-light gray; weathered; very soft; (Fat CLAY (CH); hard; slightly moist; high plasticity; PP>4.5 tsf) (CALABASAS FORMATION, Tcb).
	890														

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FIGURE
A-5 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-004**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/12/2013	9/12/2013	2 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	20 ft right Sta. 20 + 22

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	50.5	914 N/A	▽ N/E / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	▼ N/E / *NE* AFTER DRILLING

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R-7	33 50/6"	50/6"	48/6"			21.5	104		CN			SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE) (CALABASAS FORMATION, Tcb) (continued). Thickly bedded; gray; (PP>4.5 tsf).
	885														
30			S-8	11 15 19	34	48			20.2						Medium to dark gray; (PP >4.5 tsf).
	880														
35			R-9	34 50/6"	50/6"	48/6"			19.5	109					(PP >4.5 tsf).
	875														
40			S-10	14 21 25	46	65			20.5						Laminated; medium gray; (dry; PP>4.5 tsf).
	870														
45			R-11	50/6"	REF	REF			20.1	107					Medium to dark gray; (PP>4.5 tsf).
	865														

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FIGURE
A-5 b

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-004**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/12/2013	9/12/2013	3 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	20 ft right Sta. 20 + 22

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	50.5	914 N/A	▽ N/E / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	AFTER DRILLING ▼ N/E / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		☒	S-12	50/6"	REF	REF			15.1						SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE) (CALABASAS FORMATION, Tcb) (continued). Steeply dipping beds; medium gray; (PP>4.5 tsf). Bottom of borehole at 50.5 feet Boring terminated at planned depth. Groundwater not encountered.
55	860														
60	855														This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)
65	850														
70	845														
	840														

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FIGURE
A-5 c

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-005**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/12/2013	9/12/2013	1 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	25 ft right Sta. 20 + 83

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	51	917 N/A	▽ 45.5 / *871.5* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	AFTER DRILLING
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	▼ NM / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
															ASPHALT CONCRETE (7")
															AGGREGATE BASE (8")
	915														Fat CLAY (CH); reddish brown; moist; mostly fines; high plasticity; (ALLUVIUM Qa).
			B-1												
5															
			R-2	18 18 24	42	40			18.9	105	58:31				Hard; dry; trace GRAVEL; PP>4.5 tsf.
	910														
			S-3	7 12 17	29	41			25.8						SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE); fine-grained; thinly bedded; steeply dipping bedding planes; olive gray; weathered; very soft; (Fat CLAY (CH); hard; slightly moist; some oxidation; high plasticity; PP>4.5 tsf) (CALABASAS FORMATION, Tcb).
10															
			R-4	13 26 34	60	57			26.0	98					Very thinly bedded to laminated; reddish brown-dark brown; (Caliche; PP>4.5 tsf).
	905														
15															
			S-5	5 9 11	20	28			25.3						Thinly bedded; medium brown; mineralized bedding planes; (PP>4.5 tsf).
	900														
20															
			R-6	35 21 36	57	54			21.4	104					Medium brown-gray (PP>4.5 tsf).
	895														

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FIGURE
A-6 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-005**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/12/2013	9/12/2013	2 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	25 ft right Sta. 20 + 83

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	51	917 N/A	▽ 45.5 / *871.5* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	AFTER DRILLING ▼ NM / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			S-7	6 12 15	27	38			19.1						SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE) (CALABASAS FORMATION, Tcb) (continued). Gray; (very stiff; dry; PP=3.5 tsf).
	890														
30			R-8	30 50/6"	50/6"	48/6"			20.8	106					Laminated; medium gray; (hard; slightly moist; PP>4.5 tsf).
	885														
35			S-9	8 10 12	22	31			20.4						(PP>4.5 tsf).
	880														
40			R-10	31 50/6"	50/6"	48/6"			18.4	110					(PP>4.5 tsf).
	875														
45			S-11	50/6"	REF	REF			15.0						▽ Very intensely fractured; (weak cementation). Perched water at 45.5 feet.
	870														

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FIGURE
A-6 b

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-005**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/12/2013	9/12/2013	3 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	25 ft right Sta. 20 + 83

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	51	917 N/A	▽ 45.5 / *871.5* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	AFTER DRILLING
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	▼ NM / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
			R-12	29 50/6"	50/6"	48/6"			19.9	109					SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE) (CALABASAS FORMATION, Tcb) (continued). Gray; (dry; PP>4.5 tsf). Bottom of borehole at 51 feet. Boring terminated at planned depth. Perched water encountered at 45 feet.
55	865														
60	860														
65	855														
70	850														
	845														

This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging. Classification, and Presentation Manual (2010).

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FIGURE
A-6 c

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-006**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/9/2013	9/9/2013	1 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	17 ft right Sta. 21 + 75

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	60.5	936 N/A	▽ N/E / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	AFTER DRILLING ▼ N/E / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	935		B-1									CR R			Fat CLAY (CH); medium reddish brown; slightly moist; mostly fines; few GRAVEL; high plasticity (FILL, Qaf).
5	930		R-2	10 12 17	29	27			22.6	103		DS			Fat CLAY with SAND (CH); hard; medium brown-gray; slightly moist; mostly fines; little fine SAND; few GRAVEL; few oxidation; high plasticity; PP=4.0 tsf.
			S-3	4 4 4	8	11			23.4						Stiff; PP=1.5 tsf. #200: 21% SAND; 79% fines
10	925		R-4	8 11 14	25	24			21.3	101		DS			Brown-gray and orange; moist; PP=1.5 tsf.
15	920		S-5	3 4 6	10	14			22.1		57:39				Fat CLAY with SAND (CH);Very stiff; dark gray; oxidation; PP=3.5 tsf (ALLUVIUM, Qa).
20	915		R-6	13 19 28	47	45			29.9	93					SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE); fine-grained; laminated; brown-orange; very soft; weathered; (Fat CLAY (CH); hard; slightly moist; some caliche; high plasticity; PP=4 tsf) (CALABASAS FORMATION, Tcb).

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FIGURE
A-7 a

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-006**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/9/2013	9/9/2013	2 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	17 ft right Sta. 21 + 75

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	60.5	936 N/A	▽ N/E / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	AFTER DRILLING ▼ N/E / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	910		S-7	3 3 4	7	10			28.5						SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE) (CALABASAS FORMATION, Tcb) (continued). Very thinly bedded; yellowish brown-orange; oxidation on bedding planes; (PP>4.5 tsf).
30	905		R-8	18 32 45	77	73			31.1	92		DS			Laminated; medium brown; (PP>4.5 tsf).
35	900		S-9	10 12 16	28	40			25.3						Thinly bedded; dark brown; caliche on some bedding planes; (slightly moist; PP>4.5 tsf).
40	895		R-10	50/6"	REF	REF			25.1	101					Tuffaceous; (PP>4.5 tsf).
45	890		S-11	43 50/6"	50/6"	71/6"			19.9						Thinly bedded; steeply dipping; gray; (PP>4.5 tsf).

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FIGURE
A-7 b

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**A-13-006**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/9/2013	9/9/2013	3 of 3

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	17 ft right Sta. 21 + 75

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	CME 75	Hollow Stem Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
Automatic, (140 lbs., 30")	85%	8"	60.5	936 N/A	▽ N/E / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	
SPT (1.4"), CAL (2.4")	(N)60 = 1.42Nspt = 0.95Ncal	Soil Cuttings	▼ N/E / *NE* AFTER DRILLING

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	885		R-12	50/6"	REF	REF			17.7	113					SEDIMENTARY ROCK (POORLY INDURATED CLAYSTONE) (CALABASAS FORMATION, Tcb) (continued). (little caliche; PP>4.5 tsf).
55	880		S-13	30 50/6"	50/6"	71/6"			15.7						Dark gray; (PP>4.5 tsf).
60			R-14	50/6"	REF	REF			18.2	103					Medium to dark gray; (PP>4.5 tsf).
	875														Bottom of borehole at 60.5 feet. Boring terminated at planned depth. Groundwater not encountered.
65	870														This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)
70	865														

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FIGURE
A-7 c

BORING RECORD

PROJECT NAME	PROJECT NUMBER	HOLE ID
Palo Comado Bridge Widening	LA-1143	**HA-13-007**

DIST.	CO.	ROUTE	POSTMILE	BRIDGE NO.	CALTRANS ENCROACHMENT PERMIT NUMBER	START	FINISH	SHEET NO.
07	LA	101	33.69	53 - 1678	0700001840	9/9/2013	9/9/2013	1 of 1

SITE LOCATION	BOREHOLE LOCATION (Lat/Long or North/East and Datum)	BOREHOLE LOCATION (Offset, Station, Line)
Agoura Hills, CA	Boring Location Plan	14 ft left Sta. 25 + 43

DRILLING COMPANY	DRILL RIG	DRILLING METHOD	LOGGED BY	CHECKED BY
Choice	Hand Auger	Hand Auger	S. Stone	M.DiNicola

HAMMER TYPE (WEIGHT/DROP)	HAMMER EFFICIENCY (ERi)	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GW (ft)
NA	NA	4"	5	928 N/A	▽ N/E / *NE* DURING DRILLING

DRIVE SAMPLER TYPE(S) & SIZE (ID)	NOTES	BOREHOLE BACKFILL & COMPLETION	
Bag Sample	N/A	Soil Cuttings	AFTER DRILLING ▼ N/E / *NE*

DEPTH (feet)	ELEVATION (feet)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS / 6 IN)	BLOWS/FT	SPT N^*_{60}	RECOVERY (%)	RQD (%)	MOISTURE (%)	DRY DENSITY (pcf)	ATTERBERG LIMITS (LL:PI)	OTHER TESTS	DRILLING METHOD	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
0	925		B-1									R EI			Fat CLAY (CH); light brown; dry; high plasticity. Slightly moist. Laminations and black oxidation nodules.
5															Bottom of hand auger at 5 feet. Hand auger terminated at palnned depth. Groundwater not encountered. This Boring Record was prepared in accordance with the Caltrans Soil & Rock Logging. Classification, and Presentation Manual (2010).
10	920														
15	915														
20	910														
	905														

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FIGURE
A-8

SPT Hammer Energy Measurements

Hammer Calibration done on:
October 27,2012
in Canoga Park, CA

Choice Drilling Rig 1
Operator: Sean Pichinson
ETR = 85.2%

Prepared for:

Choice Drilling, Inc.
PO Box 299
Canoga Park, CA 91303

Prepared by:

Brian Serl
Calibration Engineer

SPT CAL
16254 Van Gogh Ct.
Chino Hills, CA 91709
http://www.sptcal.com
909-730-2161

Figure A-9a

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Figure A-9b

Presentation of SPT Analyzer Test Data

1. Introduction

This report presents the results of SPT Hammer Energy Measurements recorded with an SPT Analyzer from Pile Dynamics carried out on October 27, 2012 in Canoga Park, CA.

2. Field Equipment and Procedures

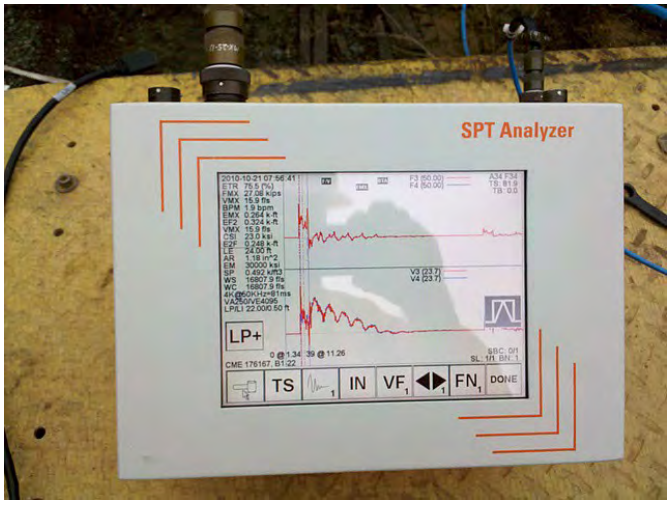
The drill used is referred to at Choice Drilling as Rig 1. The operator of this drill and attached hydraulic Landa automatic trip hammer was Sean Pichinson of Choice Drilling, Inc. The Landa auto hammer has the same specifications and dimensions as the CME automatic trip hammer.

The Landa Auto Hammer uses a 140 lb. weight dropped 30” on to an anvil above the bore hole. AWJ drill rod connects the anvil to a split spoon type soil sampler inside an 8” o.d. hollow stem auger at the designated sample depth. After a seeding blow the sampler is driven 18”. The number of blows required to penetrate the last 12" is referred to as the “N value”, which is related to soil strength.

The first recording was taken at 5' below ground surface and then every 5' to final recording at 50'.

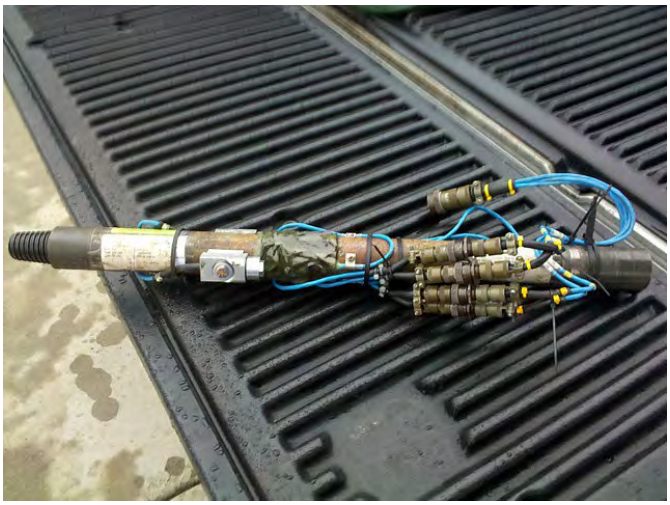
3. Instrumentation

An SPT Analyzer from Pile Dynamics was used to record and the process the data. The raw data was stored directly in the SPT Analyzer computer with subsequent analysis in the office with PDA-W and PDIPlot software. The measurements and analysis were conducted in general accordance with ASTM D4945 and ASTM D6066 test standards.



The SPT Analyzer is fully compliant with the minimum digital sampling frequency requirements of ASTM D4633-05 (50 kHz) and EN ISO 22476-3:2005 (100 kHz), as well as with the low pass filter, (cutoff frequency of 5000 Hz instead of 3000 Hz) requirements of ASTM D4633-05. All equipment and analysis also conform to ASTM D6066.

Figure A-9c



A 2' instrumented section of AWJ rod, with two sets of accelerometers and strain transducers mounted on opposite sides of the drill rod, was placed below the anvil. It measured strain and acceleration of every hammer blow. The SPT Analyzer then calculates the amount of energy transferred to the rod by force and velocity measurements.

4. Observations

The the drill rig motor is diesel fueled. The throttle control is a push pull locking type. The drill and sample equipment looked to be well operated and maintained. The operator Sean Pichinson has been drilling in the geotechnical field with similar equipment for over 13 years. His professionalism, experience and expertise were evident during the drilling process.

5. Results

Results from the SPT Hammer Energy Measurements are summarized in Table 1. It shows the Energy Transfer Ratio (ETR) at each sampling depth. ETR is the ratio of the measured maximum transferred energy to rated energy of the hammer which is the product of the weight of the hammer times the height of the fall. 140 lb x 30” = 4200 lb-in = 0.350 kip-ft.

The ETR for all of the blow counts averaged **85.2%**

Figure A-9d

Table 1 – Summary of SPT Hammer Energy Measurements

B1-05	84.9
B1-10	85.2
B1-15	84.0
B1-20	80.9
B1-25	82.5
B1-30	85.4
B1-35	86.9
B1-40	86.3
B1.45	90.3
B1-50	85.7
Average ETR%	**85.2**

References

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- Goble, G. G., Abou-matar, H., September, 1992. *Determination of wave equation soil constants from the standard penetration test*. Proceedings of the Fourth International Conference on the Application of Stress-Wave Theory to Piles: The Netherlands; 99-103.
- Morgano, C.M., Liang, R., September, 1992. *Energy transfer in SPT - Rod length effect*. Proceedings of the Fourth International Conference on the Application of Stress-Wave Theory to Piles: The Netherlands; 121-127.
- *Check out our website at http://www.sptcal.com for more information and references.*

Appendix B Laboratory Testing

APPENDIX B
LABORATORY TESTING

B.1 General

The laboratory testing was performed using appropriate American Society for Testing and Materials (ASTM) and Caltrans Test Methods (CTM).

Modified California drive samples, Standard Penetration Test (SPT) drive samples, and bulk samples collected during the field investigation were carefully sealed in the field to prevent moisture loss. The samples of earth materials were then transported to the laboratory for further examination and testing. Tests were performed on selected samples as an aid in classifying the earth materials and to evaluate their physical properties and engineering characteristics. Laboratory testing for this investigation included:

- Soil and Rock Classification: USCS (ASTM D 2487) and Visual Manual (ASTM D 2488), (ISRM) (1981) standards and the Bureau of Reclamation (2001) standards;
- Moisture content (ASTM D 2216) and Dry Unit Weight (ASTM D 2937);
- Atterberg Limits (ASTM D 4318);
- Percent Passing No. 200 Sieve (ASTM D 1140);
- Direct Shear (ASTM D 3080);
- One-Dimensional Consolidation (ASTM D 2435);
- Expansion Index (D 4829);
- Soil Corrosivity (Caltrans Methods 643, 422, and 417);
- Resistance R-Value (CTM 301).

A summary of laboratory test results is presented in Table B-1. Brief descriptions of the laboratory testing program and test results are presented below.

B.2 Soil and Rock Classification

Earth materials recovered from subsurface explorations were classified in general accordance with Caltrans' "Soil and Rock Logging Classification Manual, 2010". The subsurface soils were classified visually / manually in the field in accordance with the Unified Soil Classification System (USCS) following ASTM D 2488; soil classifications were modified as necessary based on testing in the laboratory in accordance with ASTM D 2487. Rock materials were classified using a hybrid of the International Society of Rock Mechanics (ISRM) (1981) standards and the Bureau of Reclamation (2001) standards, and modified where necessary on the basis of laboratory test results. The details of the soil and rock

classification systems and boring records presenting the classifications are presented in Appendix A.

B.3 Moisture Content and Dry Unit Weight

The in-situ moisture content of selected bulk, SPT, and ring samples was determined by oven drying in general accordance with ASTM D 2216. Selected California Ring samples were trimmed flush in the metal rings and wet weight was measured. After drying, the dry weight of each sample was measured, volume and weight of the metal containers was measured, and moisture content and dry density were calculated in general accordance with ASTM D 2216 and D 2937. Results of these tests are presented in Table B-1 and on the boring records in Appendix A.

B.4 Atterberg Limits

Characterization of the fine-grained fractions of soils was evaluated using the Atterberg Limits. This test includes Liquid Limit and Plastic Limit tests to determine the Plasticity Index in accordance with ASTM D 4318. Results of these tests are presented on the boring records in Appendix A, are summarized in Table B-1, and are plotted on a Plasticity Chart in Figure B-1 of this Appendix.

B.5 Percent Passing No. 200 Sieve

Representative samples were dried, weighed, soaked in water until individual soil particles were separated, and then washed on the No. 200 sieve. The percentage of fines (soil passing No. 200 sieve) was determined for selected samples in accordance with ASTM D 1140. For selected samples the washed fraction retained on the No. 200 sieve was then screened on a No. 4 sieve, and the fraction retained on No. 4 was weighed to determine the percentage of gravel. For selected samples, the washed material retained on No. 200 sieve was shaken through a standard stack of sieves in accordance with ASTM D 422 to determine the grain size distribution. For selected samples, the grain size distribution of the fraction finer than No. 200 sieve was determined by Hydrometer Analysis in accordance with ASTM D 422. The relative proportion (or percentage) by dry weight of gravel (retained on No. 4 sieve), sand (passing No. 4 and retained on No. 200 sieve), and fines (passing No. 200 sieve) are listed on the boring records in Appendix A and summarized in Table B-1.

B.6 Direct Shear Test

To determine the drained shear strength parameters of the on-site soils, direct shear tests were performed on selected in situ samples and compacted remolded samples in accordance with ASTM D 3080. After the initial weight and volume measurements were made, the sample was placed in the shear machine, and a selected normal load was applied. The sample was saturated or kept at field moisture (to model worst case field conditions), allowed to consolidate under the selected normal load, and then sheared to failure. Shear rate was selected to maintain drained conditions. Shear stress and vertical/horizontal sample deformations were monitored throughout the test. The process was repeated on additional samples of the same soil material at two additional normal loads. The test results are presented in Figures B-2a through B-2e of this appendix.

B.7 One-Dimensional Consolidation

The consolidation characteristics of representative soil samples under incremental loading were evaluated by performing one-dimensional consolidation in general accordance with ASTM D 2435, using a floating ring consolidometer and dead weight system. Results of the tests are presented in Figures B-3a and B-3b.

B.8 Expansion Index

The expansion potential of the site soils was estimated using the Expansion Index Test in accordance with ASTM D 4829. The results of this test are illustrated in Figure B-4.

B.9 R-Value

Resistance “R” Value tests were performed by stabilometer method on selected bulk samples of the subgrade soils. The tests were conducted in general accordance with CTM 301. The test results are presented in Figures B-5a through B-5d.

B.10 Soil Corrosivity

Tests were performed in order to determine corrosion potential of site soils on concrete and ferrous metals. Corrosivity testing included minimum resistivity and soil pH (Caltrans Method 643), water-soluble chlorides (Caltrans Method 422), water-soluble sulfates (Caltrans Method 417) and electrical resistivity (Caltrans Method 643). The test results are summarized in Table B-2.

B.11 List of Attached Table and Figures

The following tables and figures are attached and complete this appendix:

List of Table

List of Figures

Boring No.	Sample No.	Depth (ft)	Sample Type	Geologic Unit	USCS Group Symbol	SPT N*60 (blows/ft)	Undrained Shear Strength, Su (ksf)			Moisture Content (%)	Dry Unit Weight (pcf)	Total Unit Wt (pcf)	Atterberg Limits			Grain Size Distribution (%) by dry weight			Clay	Other Tests
							Pocket Pen.	Mini Vane	UU Test				LL	PL	PI	Gravel	Sand	Fines		
A-13-001	B-1	2.0	BULK		CH															
A-13-001	R-2	5.0	MC		CH	27	3			24.8	95	119	56	25	31					
A-13-001	S-3	7.5	SPT		CH	10	3			27.4										
A-13-001	R-4	10.0	MC		CH	18	3			22.5	98	120								
A-13-001	S-5	15.0	SPT		CL	13	3.5			21.3						7	38	55		
A-13-001	R-6	20.0	MC		CH	41	2			21.7	101	123								
A-13-001	S-7	25.0	SPT		ML	68	4			22.8										
A-13-002	B-1	2.0	BULK		CH															
A-13-002	S-2	5.0	SPT		CH	11	3.5			23.8			53	23	30					
A-13-002	R-3	7.5	MC		CH	21	2.0			19.9	102	122								CN
A-13-002	S-4	10.0	SPT		CH	10	1.0			23.4										
A-13-002	R-5	15.0	MC		CH	26	2.5			18.1	109	129								DS
A-13-002	S-6	20.0	SPT		CH	16	1.5			25.7										
A-13-002	R-7	25.0	MC		Tcb	41	4.5			25.7	98	123	68	24	44					DS
A-13-002	S-8	30.0	SPT		Tcb	44	2.5			21.4										
A-13-002	R-9	35.0	MC		Tcb	48/6"	3.5			24.9	104	130								
A-13-002	S-10	40.0	SPT		Tcb	65	>4.5			22.4										
A-13-002	R-11	45.0	MC		Tcb	48/6"	>4.5			17.7	112	132								
A-13-002	S-12	50.0	SPT		Tcb	91	>4.5			16.4										
A-13-002	R-13	55.0	MC		Tcb	REF	>4.5			13.1	121	137								
A-13-002	S-14	60.0	SPT		Tcb	71/6"	4.0			12.1										
A-13-003	B-1	2.0	BULK		CH															
A-13-003	R-2	5.0	MC		CH	44	4.5			27.9	94	120								
A-13-003	S-3	7.5	SPT		Tcb	24	3.75			25.3			65	26	39					
A-13-003	R-4	10.0	MC		Tcb	44	4.5			28.4	93	119								
A-13-003	S-5	15.0	SPT		Tcb	57	>4.5			15.4										
A-13-003	R-6	20.0	MC		Tcb	48/6"	>4.5			13.6	114	130								
A-13-003	S-7	25.0	SPT		Tcb	REF	1.5			23.4										Corrosivity
A-13-003	R-8	30.0	MC		Tcb	REF	4.5			17.1	120	141								
A-13-003	S-9	35.0	SPT		Tcb	71/6"	>4.5			20.4										

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TABLE B-1: Summary of Laboratory Results

Project: Palo Comado Bridge Widening

Location: Agoura Hills, CA

Number: LA-1143

Boring No.	Sample No.	Depth (ft)	Sample Type	Geologic Unit	USCS Group Symbol	SPT N*60 (blows/ft)	Undrained Shear Strength, Su (ksf)			Moisture Content (%)	Dry Unit Weight (pcf)	Total Unit Wt (pcf)	Atterberg Limits			Grain Size Distribution (%) by dry weight			Clay	Other Tests
							Pocket Pen.	Mini Vane	UU Test				LL	PL	PI	Gravel	Sand	Fines		
A-13-003	R-10	40.0	MC		Tcb	48/3"	>4.5			21.4	101	123								
A-13-003	S-11	45.0	SPT		Tcb	71/6"	>4.5			22.1										
A-13-003	R-12	50.0	MC		Tcb	REF	>4.5			20.0	98	118								
A-13-004	B-1	2.5	BULK		CH															
A-13-004	S-2	6.0	SPT		CH	8	3.25			17.3						0	33	67		
A-13-004	R-3	7.5	MC		CH	30	3.75			16.7	109	127								
A-13-004	S-4	10.0	SPT		CH	21	2.75			18.5										
A-13-004	R-5	15.0	MC		Tcb	26	3.75			26.9	95	121								
A-13-004	S-6	20.0	SPT		Tcb	42	>4.5			23.1										
A-13-004	R-7	25.0	MC		Tcb	48/6"	>4.5			21.5	104	126								CN
A-13-004	S-8	30.0	SPT		Tcb	48	>4.5			20.2										
A-13-004	R-9	35.0	MC		Tcb	48/6"	>4.5			19.5	109	130								
A-13-004	S-10	40.0	SPT		Tcb	65	>4.5			20.5										
A-13-004	R-11	45.0	MC		Tcb	REF	>4.5			20.1	107	129								
A-13-004	S-12	50.0	SPT		Tcb	REF	>4.5			15.1										
A-13-005	B-1	1.5	BULK		CH															
A-13-005	R-2	5.0	MC		CH	40	>4.5			18.9	105	125	58	27	31					
A-13-005	S-3	7.5	SPT		Tcb	41	>4.5			25.8										
A-13-005	R-4	10.0	MC		Tcb	57	>4.5			26.0	98	123								
A-13-005	S-5	15.0	SPT		Tcb	28	>4.5			25.3										
A-13-005	R-6	20.0	MC		Tcb	54	>4.5			21.4	104	126								
A-13-005	S-7	25.0	SPT		Tcb	38	3.5			19.1										
A-13-005	R-8	30.0	MC		Tcb	48/6"	>4.5			20.8	106	128								
A-13-005	S-9	35.0	SPT		Tcb	31	>4.5			20.4										
A-13-005	R-10	40.0	MC		Tcb	48/6"	>4.5			18.4	110	130								
A-13-005	S-11	45.0	SPT		Tcb	REF	>4.5			15.0										
A-13-005	R-12	50.0	MC		Tcb	48/6"	>4.5			19.9	109	131								
A-13-006	B-1	0.0	BULK		CH															Corrosivity, R
A-13-006	R-2	5.0	MC		CH	27	4.0			22.6	103	126								DS
A-13-006	S-3	7.5	SPT		CH	11	1.5			23.4						0	21	79		

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TABLE B-1: Summary of Laboratory Results

Project: Palo Comado Bridge Widening
Location: Agoura Hills, CA
Number: LA-1143

Boring No.	Sample No.	Depth (ft)	Sample Type	Geologic Unit	USCS Group Symbol	SPT N*60 (blows/ft)	Undrained Shear Strength, Su (ksf)			Moisture Content (%)	Dry Unit Weight (pcf)	Total Unit Wt (pcf)	Atterberg Limits			Grain Size Distribution (%) by dry weight			Clay	Other Tests
							Pocket Pen.	Mini Vane	UU Test				LL	PL	PI	Gravel	Sand	Fines		
A-13-006	R-4	10.0	MC		CH	24	1.5			21.3	101	123								DS
A-13-006	S-5	15.0	SPT		CH	14	3.5			22.1			57	18	39					
A-13-006	R-6	20.0	MC		Tcb	45	4.0			29.9	93	121								
A-13-006	S-7	25.0	SPT		Tcb	10	>4.5			28.5										
A-13-006	R-8	30.0	MC		Tcb	73	>4.5			31.1	92	121								DS
A-13-006	S-9	35.0	SPT		Tcb	40	>4.5			25.3										
A-13-006	R-10	40.0	MC		Tcb	REF	>4.5			25.1	101	126								
A-13-006	S-11	45.0	SPT		Tcb	71/6"	>4.5			19.9										
A-13-006	R-12	50.0	MC		Tcb	REF	>4.5			17.7	113	133								
A-13-006	S-13	55.0	SPT		Tcb	71/6"	>4.5			15.7										
A-13-006	R-14	60.0	MC		Tcb	REF	>4.5			18.2	103	122								
A-13-007	B-1	0.0	BULK		CH															R, EI

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TABLE B-1: Summary of Laboratory Results

Project: Palo Comado Bridge Widening

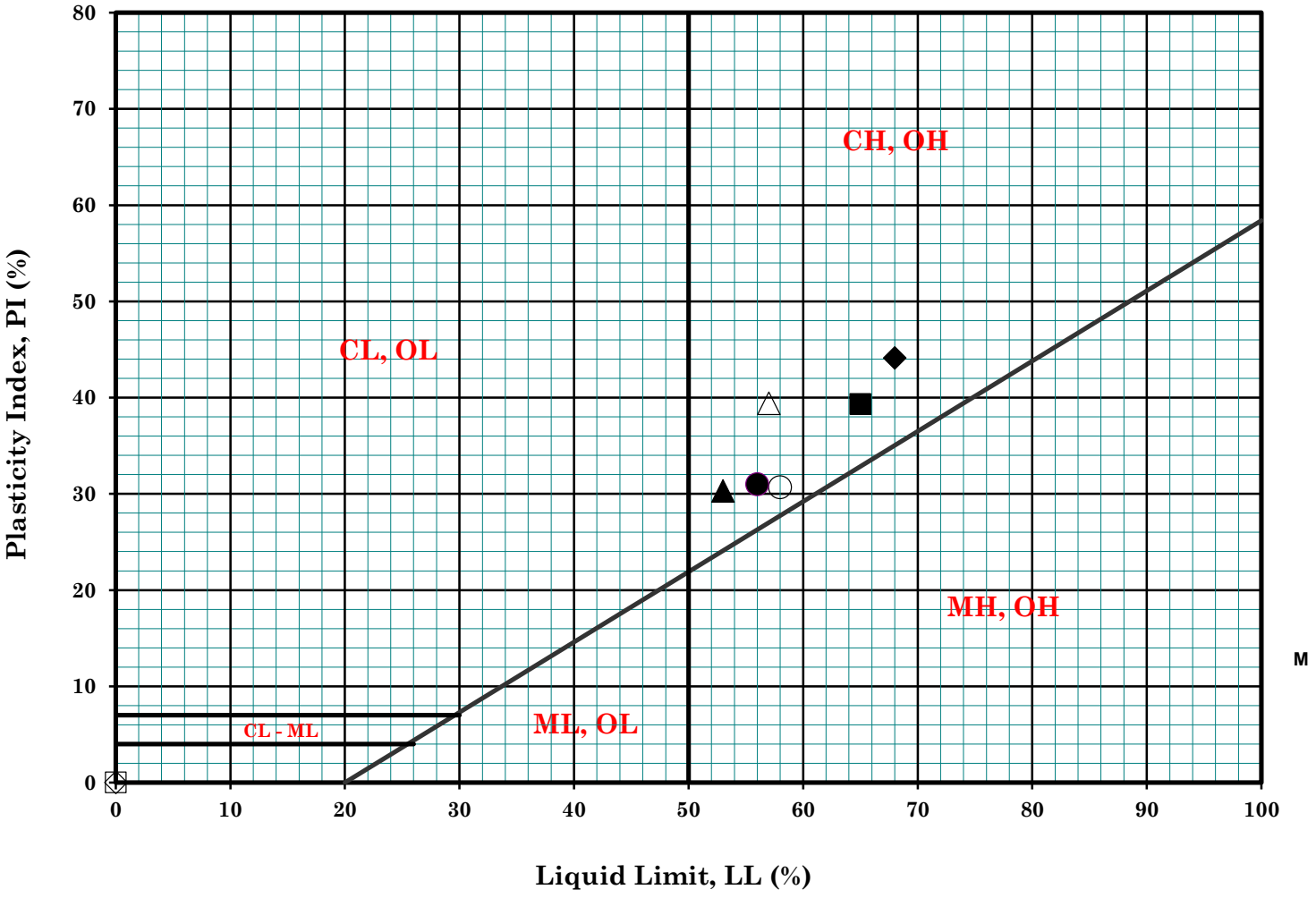
Location: Agoura Hills, CA

Number: LA-1143

TABLE B-2: SUMMARY OF CORROSION TEST RESULTS

Boring No	Sample No.	Depth (ft)	USCS Soil Type	Resistivity CTM 643 (ohm-cm)	pH CTM 643	Soluble Sulfate Content CTM 417 (ppm)	Soluble Chloride CTM 422 (ppm)
A-13-003	S-7	25	Tcb	NM	7.29	13250	< 0.01
A-13-006	B-1	0-5	CH	423	7.09	10500	< 0.01

PLASTICITY CHART



Symbol	Boring No.	Sample No.	Depth (ft)		Depth (m)		MC (%)	LL (%)	PL (%)	PI (%)	Description
●	A-13-001	R2	5.0	6.5	1.5	2.0	24.8	56	25	31	Fat Clay (CH)
▲	A-13-002	S-2	5.0	6.5	1.5	2.0	23.8	53	23	30	Fat Clay (CH)
◆	A-13-002	R-7	25.0	26.5	7.6	8.1	25.7	68	24	44	Calabasas Formation (Tcb)
■	A-13-003	S-3	7.5	9.0	2.3	2.7	25.3	65	26	39	Calabasas Formation (Tcb)
○	A-13-005	R-2	5.0	6.5	1.5	2.0	18.9	58	27	31	Fat Clay (CH)
△	A-13-006	S-5	15.0	16.5	4.6	5.0	22.1	57	18	39	Fat Clay (CH)

Remark :

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Palo Comado Bridge Widening

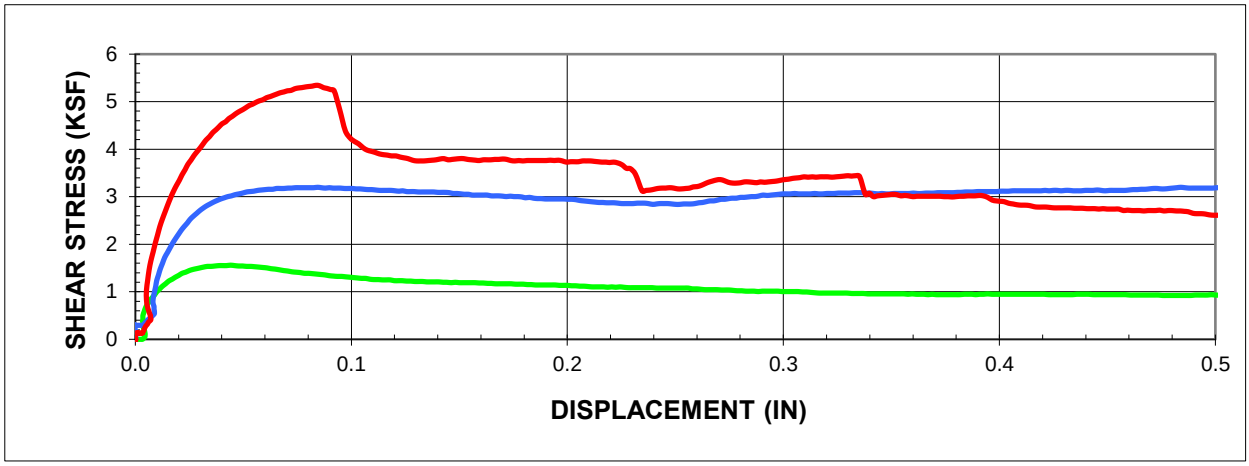
Project No. : *LA-1143*

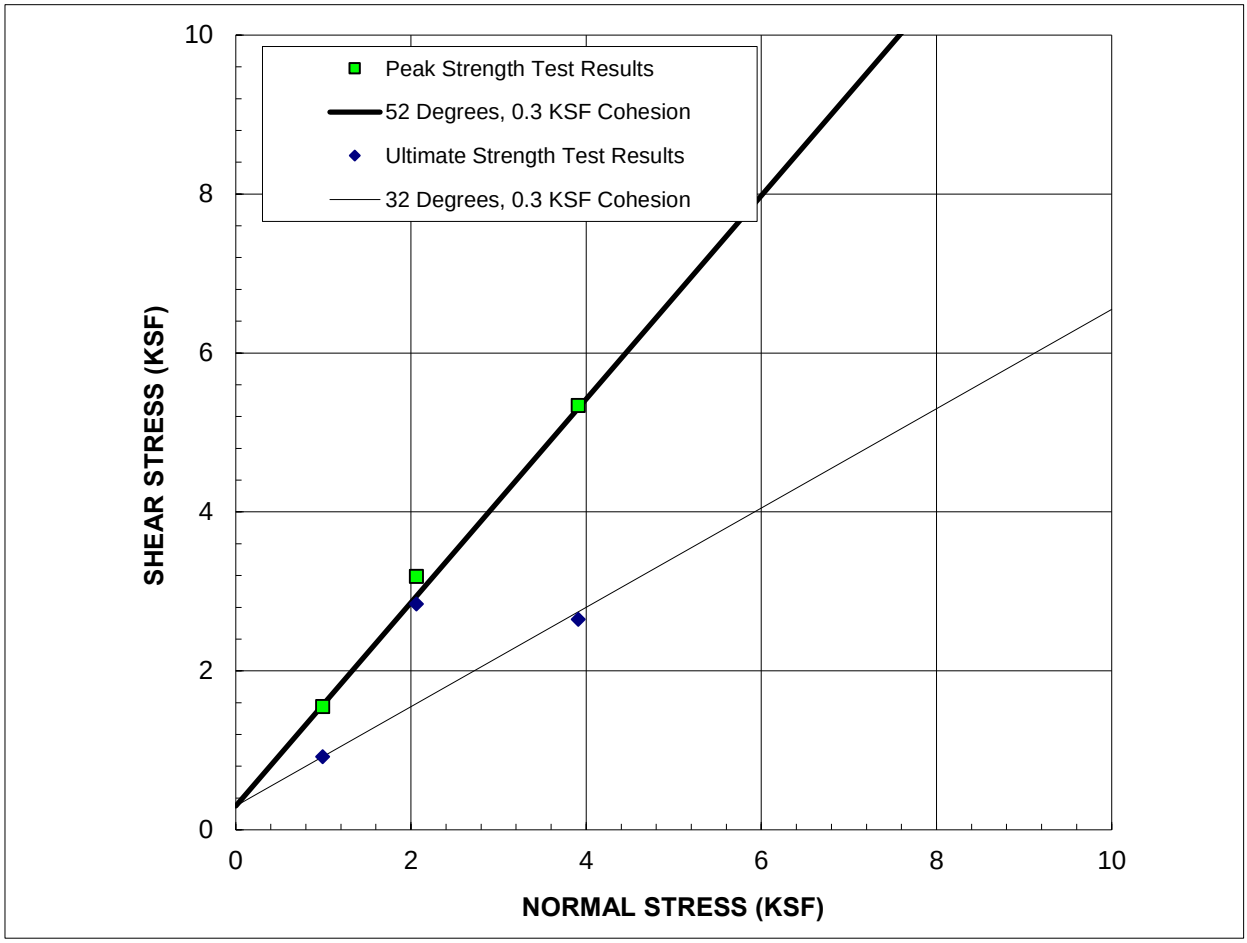
Date : *9/30/13*

ATTERBERG LIMITS

(ASTM D-4318-84)

FIGURE B-1





SAMPLE: A-13-002 R5@15'

Description: **CH**

STRAIN RATE: 0.0025 IN/MIN

(Sample was consolidated and drained)

	PEAK	ULTIMATE
ϕ'	52 ^{o}	32 ^{o}
c'	0.30 KSF	0.30 KSF

	IN-SITU	AS-TESTED
γ_d	109.0 PCF	109.0 PCF
w_c	18.1 %	28.8 %

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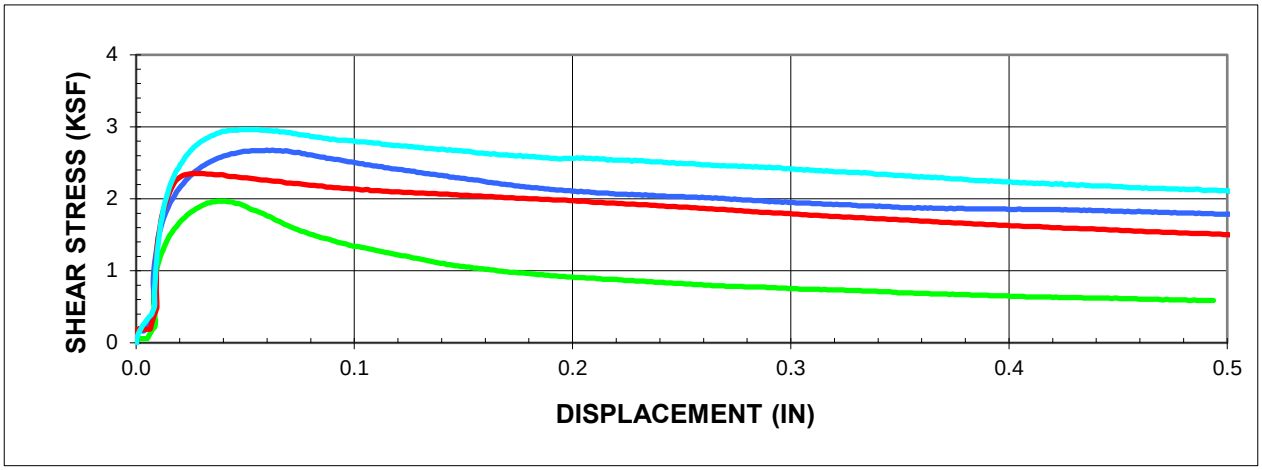
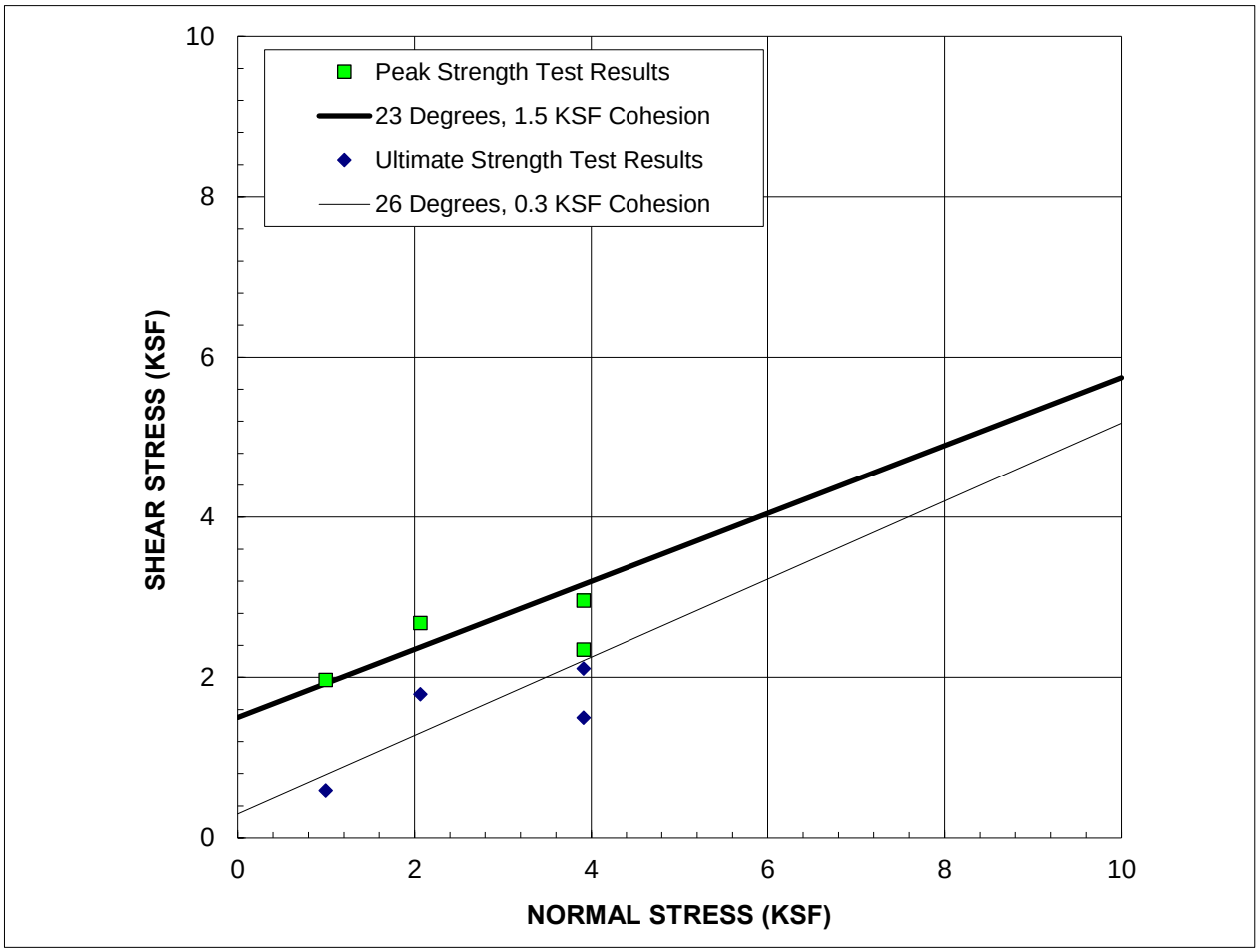
DIRECT SHEAR TEST RESULTS

Project No.: LA - 1143

FIGURE B-2a





SAMPLE: A-13-002 R7@25'

Description: **Tcb- Calabasas Formation**

STRAIN RATE: 0.0025 IN/MIN

(Sample was consolidated and drained)

	PEAK	ULTIMATE
ϕ'	23 ^{o}	26 ^{o}
c'	1.50 KSF	0.30 KSF

	IN-SITU	AS-TESTED
γ_d	98.0 PCF	98.0 PCF
w_c	25.7 %	30.9 %

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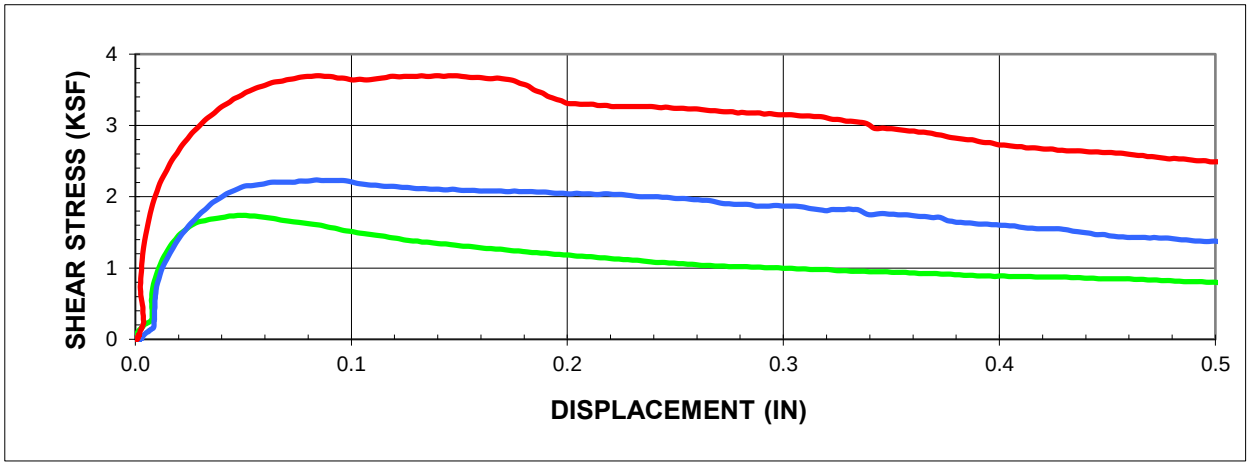
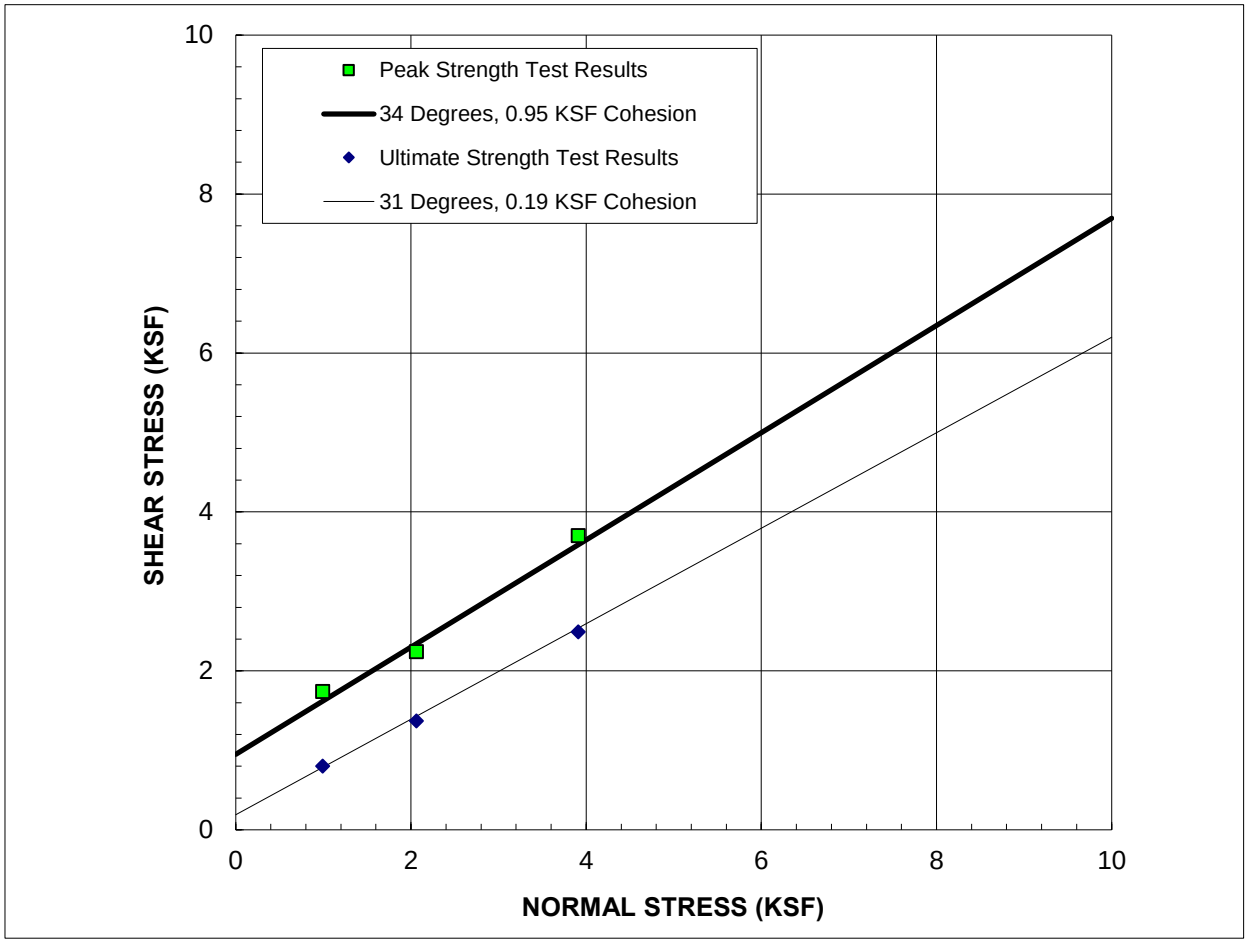
DIRECT SHEAR TEST RESULTS

Project No.: LA-1143

FIGURE B-2b





SAMPLE: A-13-006 R2@5'

Description: CH

STRAIN RATE: 0.0025 IN/MIN

(Sample was consolidated and drained)

	PEAK		ULTIMATE	
ϕ'	34	°	31	°
c'	0.95	KSF	0.19	KSF

	IN-SITU		AS-TESTED	
γ_d	103.0	PCF	104.5	PCF
w_c	22.6	%	26.3	%

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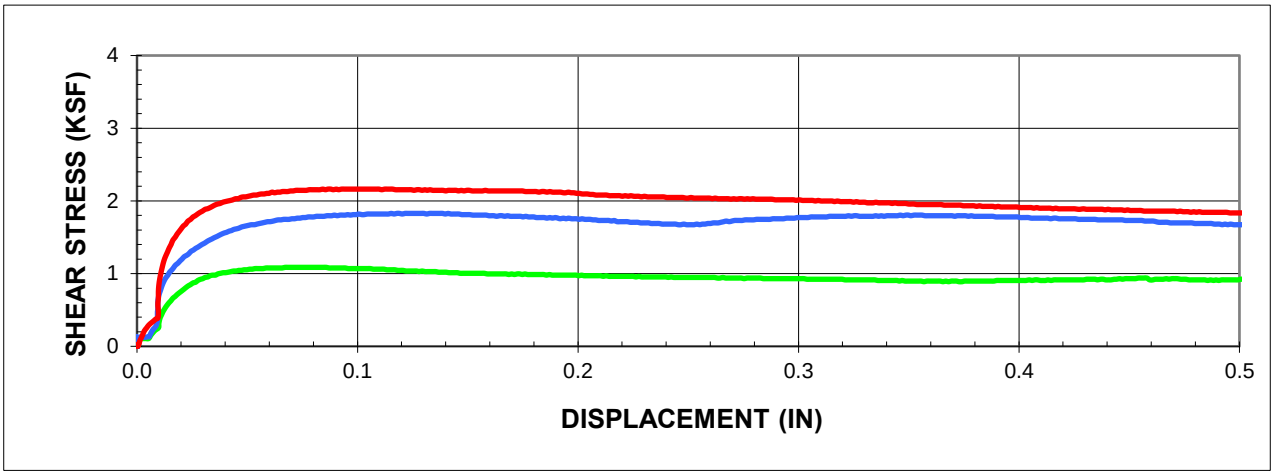
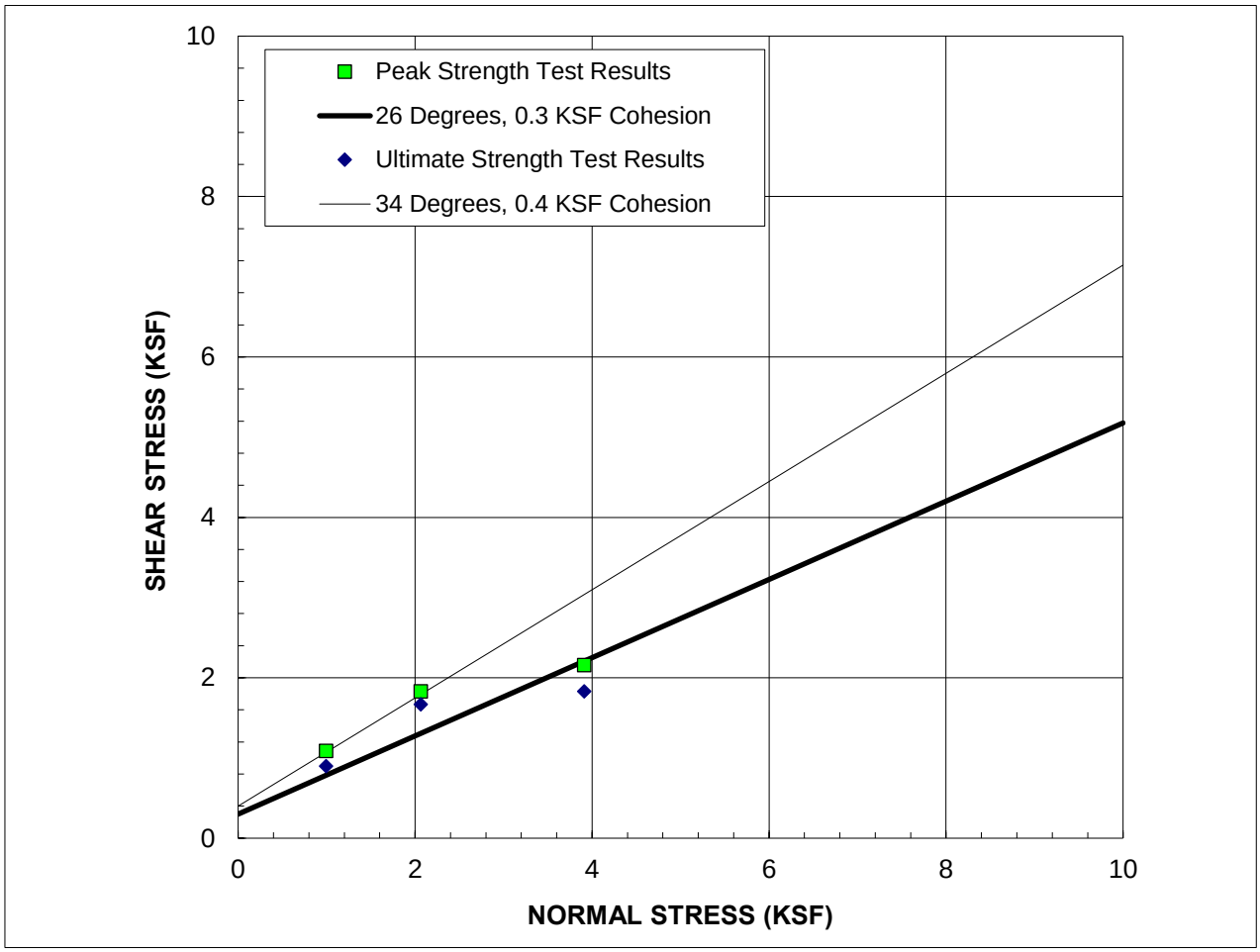
DIRECT SHEAR TEST RESULTS

Project LA- 1143

FIGURE B-2c





SAMPLE: A-13-006 R4@10'

Description: CH

STRAIN RATE: 0.0025 IN/MIN

(Sample was consolidated and drained)

	PEAK	ULTIMATE
ϕ'	26 °	34 °
c'	0.30 KSF	0.40 KSF

	IN-SITU	AS-TESTED
γ_d	101 PCF	101 PCF
w_c	21.3 %	26.2 %

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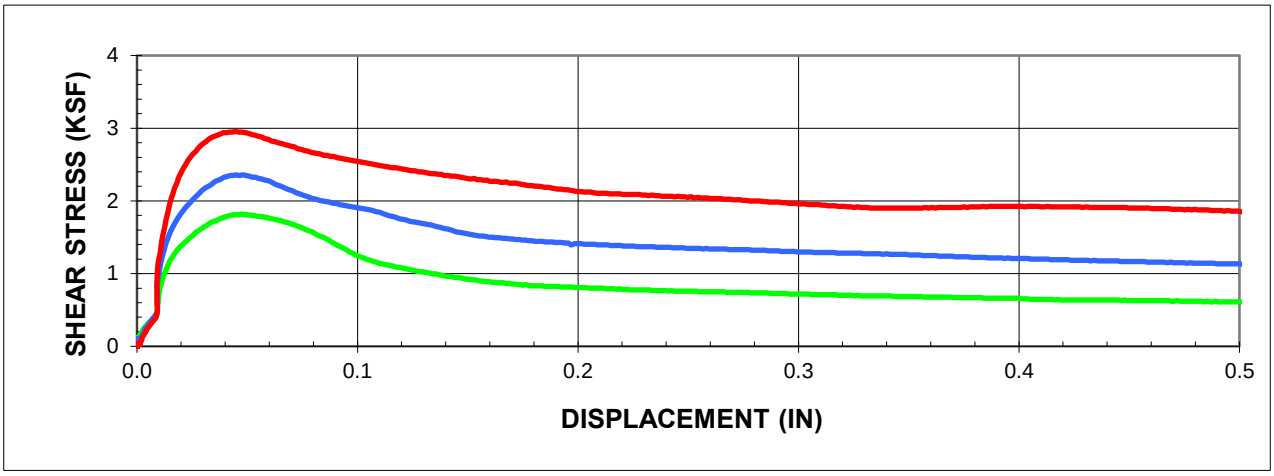
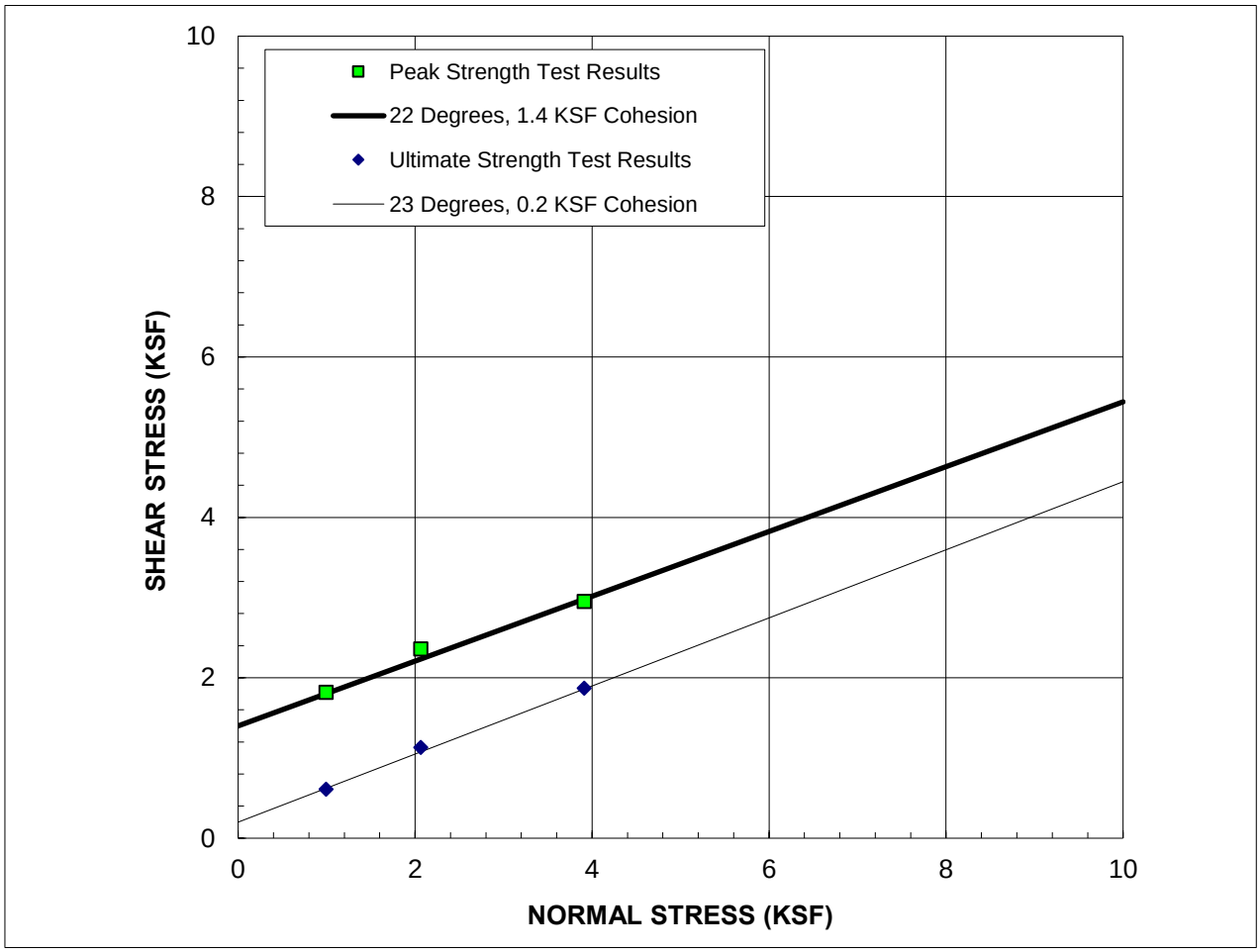
DIRECT SHEAR TEST RESULTS

Project No.: LA1143

FIGURE B-2d





SAMPLE: A-13-006 R8@30'

Description: Calabasas Formation (Tcb)

STRAIN RATE: 0.0025 IN/MIN

(Sample was consolidated and drained)

	PEAK	ULTIMATE
ϕ'	22 ^{o}	23 ^{o}
c'	1.40 KSF	0.20 KSF

	IN-SITU	AS-TESTED
γ_d	92.0 PCF	92.0 PCF
w_c	31.1 %	33.1 %

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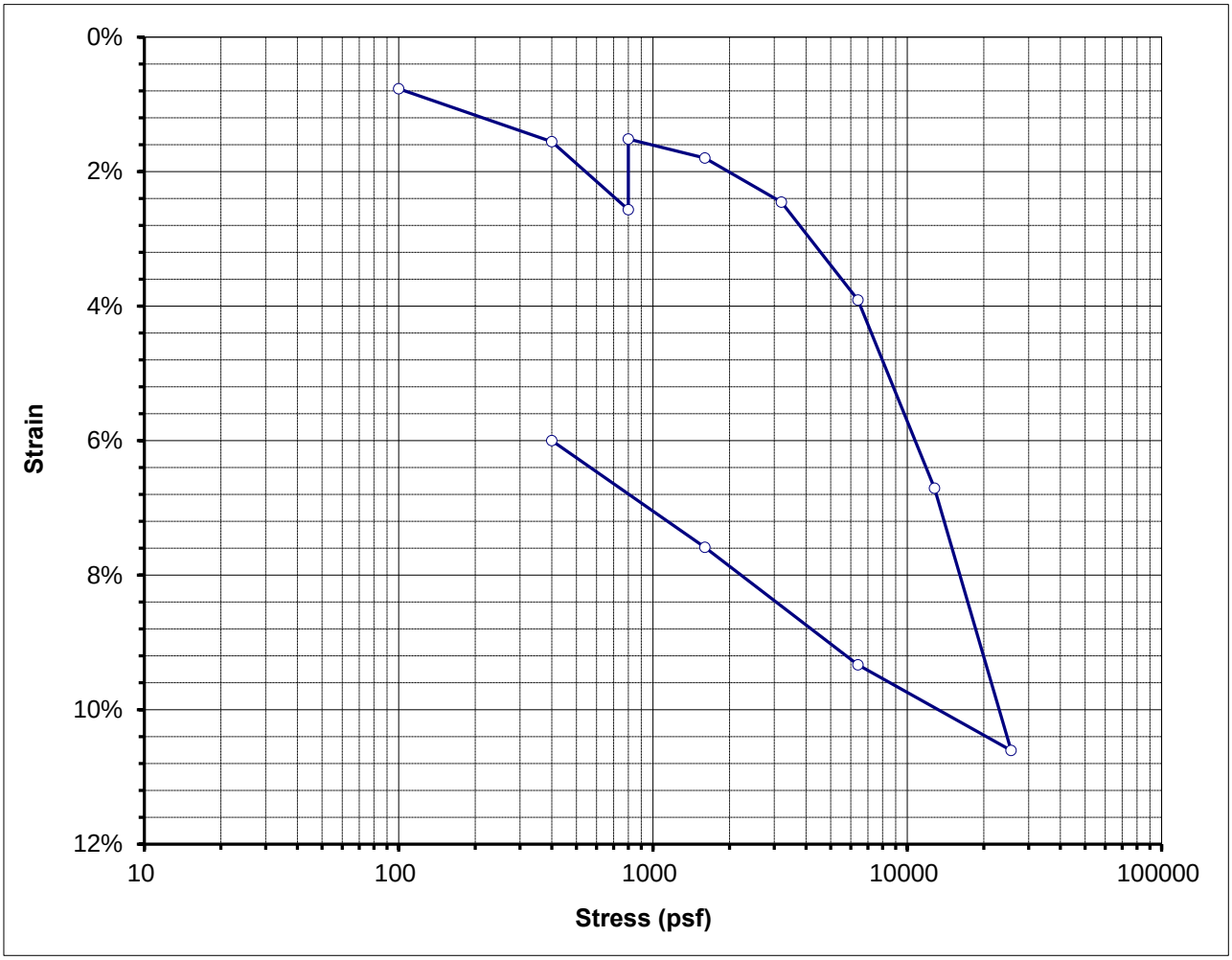
DIRECT SHEAR TEST RESULTS

Project No.: LA-1143

FIGURE B-2e

CONSOLIDATION TEST RESULTS
ASTM D-2435



Boring No.	A-13-002	Sample Depth	7.5 ft
Sample No.	R3	USCS	CH
Depth (feet)			

BEFORE TEST

Initial Moisture Content:	25.6%	
Initial Dry Unit Wt:	96.8	pcf
Initial Total Unit Wt.:	121.7	pcf
Initial Void Ratio:	0.8202	
Initial Degree of Saturation:	88.3%	

AFTER TEST

Final Moisture Content:	25.8%	
Final Dry Unit Wt:	102.0	pcf
Final Total Unit Wt.:	128.3	pcf
Final Void Ratio:	0.7282	
Final Degree of Saturation:	100.0%	

Water Added at: 800 psf

ATTERBERG LIMITS					
LL=	53	PL=	23	PI=	30

Assumed Specific Gravity of Solids, Gs: 2.83

PRESSURE (psf)	SAMPLE STRAIN	VOID RATIO
100	0.77%	0.8062
400	1.56%	0.7919
800	2.57%	0.7735
800	1.52%	0.7926
1600	1.80%	0.7874
3200	2.45%	0.7755
6400	3.91%	0.7490
12800	6.71%	0.6981
25600	10.61%	0.6271
6400	9.33%	0.6503
1600	7.59%	0.6821
400	6.00%	0.7110

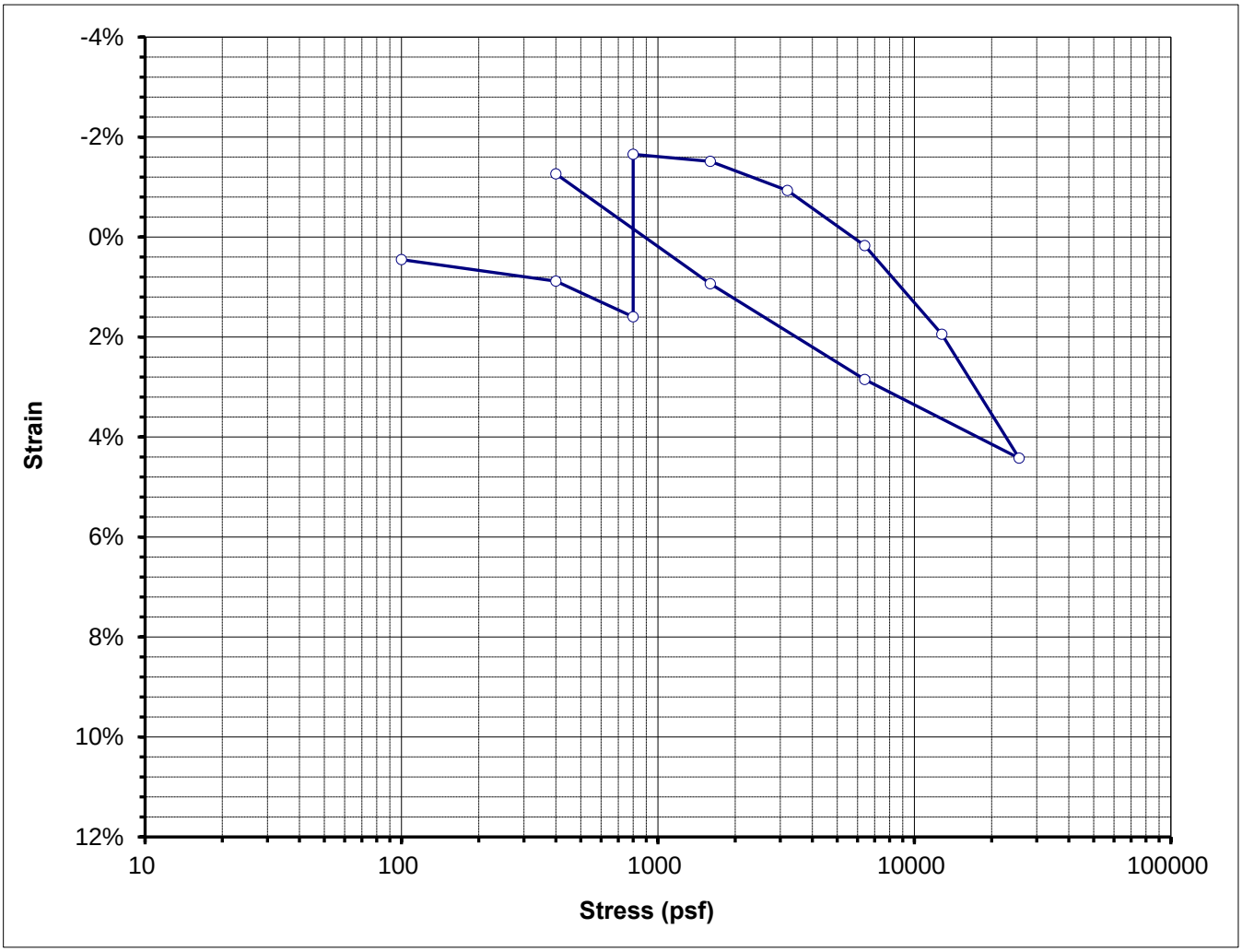
PROJECT NUMBER: LA - 1143

PROJECT NAME: Palo Comado Bridge Widening

FIGURE B-3a

GROUP DELTA

CONSOLIDATION TEST RESULTS
ASTM D-2435



Boring No.	A-13-004	Sample Depth	25 ft
Sample No.	R7	USCS	Tcb

BEFORE TEST

Initial Moisture Content:	22.7%	
Initial Dry Unit Wt:	103.4	pcf
Initial Total Unit Wt.:	126.8	pcf
Initial Void Ratio:	0.9441	
Initial Degree of Saturation:	77.3%	

AFTER TEST

Final Moisture Content:	26.9%	
Final Dry Unit Wt:	107.6	pcf
Final Total Unit Wt.:	136.6	pcf
Final Void Ratio:	0.8673	
Final Degree of Saturation:	99.9%	

Water Added at: 800 psf

ATTERBERG LIMITS					
LL=	N/M	PL=	N/M	PI=	N/M

Assumed Specific Gravity of Solids, Gs: 3.22

PRESSURE (psf)	SAMPLE STRAIN	VOID RATIO
100	0.45%	0.9353
400	0.88%	0.9269
800	1.59%	0.9131
800	-1.65%	0.9763
1600	-1.51%	0.9735
3200	-0.93%	0.9622
6400	0.17%	0.9408
12800	1.95%	0.9063
25600	4.42%	0.8581
6400	2.85%	0.8887
1600	0.93%	0.9259
400	-1.26%	0.9687

PROJECT NUMBER: LA-1143

PROJECT NAME: Palo Comado Bridge Widening

FIGURE B-3b

GROUP DELTA

EXPANSION INDEX OF SOIL

ASTM D-4829-10 / UBC 29-2

Project Name	: Palo Comado Bridge Widening				
Project No.	: LA-1143	**Sampled By :**	Steve S.	**Date :**	
Boring No.	: HA-13-007	**Prepared By :**	Eric Y.	**Date :**	09/21/13
Sample No.	: B-1	**Test By :**	Eric Y.	**Date :**	09/23/13
Depth (ft/m)	: 0-5 ###	**Calculated By :**	Eric Y.	**Date :**	09/24/13
Location	:	**Checked By :**		**Date :**	
Description	: Fat Clay (CH)				

Sample Preparation

Weight of Total Soil	3271.50	**Weight of Soil Retained on No. 4 Sieve**	50.70	**% Passing No. 4 Sieve**	98.45

Trail	**Field**	**2**	**3**	**4**	**Tested**	**M & D After Test**	
Container No.	SP3	SP3				**Container No.**	
Weight of Wet Soil + Container (gm)	577.60	411.70				**Wet Soil+Cont.+Ring**	
Weight of Dry Soil + Container (gm)	512.60	381.10				**Dry Soil+Cont.+Ring**	
Weight of Container (gm)	192.10	192.10				**Wt. of Container**	
Moisture Content (%)	20.28	16.19			16.19	**Moisture Content**	
Weight of Wet Soil + Ring (gm)	565.20	552.90					
Weight of Ring (gm) No. 1.0	202.58	202.58			202.58		
Weight of Wet Soil (gm)	362.62	350.32					
Wet Density of Soil (pcf)	109.38	105.67				**Wet Density (pcf)**	
Dry Density of Soil (pcf)	90.94	90.95				**Dry Density (pcf)**	
Precent Saturation of Soil $S_{(Meas.)}$	64.15	51.22			51.22	**(%) Saturation**	

Loading Machine No.

Date	Reading Time	Elapsed Time	Dial Reading	Expansion
09/23/13	8:50:00	0:10:00		0.0000
09/23/13				
09/23/13	9:00:00	**0:00:00**	**0.5000**	**0.0000**
Add Distilled Water to Sample				
			0.5000	0.0000
	10:00:00	1:00:00	0.5770	0.0770
	11:00:00	2:00:00	0.5800	0.0800
	12:00:00	3:00:00	0.5820	0.0820
	14:00:00	5:00:00	0.5830	0.0830
	17:00:00	8:00:00	0.5840	0.0840
09/24/13	7:30:00	22:30:00	0.5850	0.0850
09/24/13	9:00:00	0:00:00	0.5850	0.0850

Remark :

1. *Screen sample through* **No. 4** *Sieve*
2. *Sample should be compacted into a metal ring of the Degree of Saturation of* **50 +/- 2% (48 - 52).**
3. *Inundated sample in distilled water to 24 h, or until the rate of expansion > (0.0002 in./h), no less than 3 h.*

Volume of Mold (ft^3)	0.00731	**Specific Gravity**	2.70
Rammer Weight (lb.)	5.0	**Blows/Layer**	15
Vertical Confining Pressure		1.0 (lbf/in^2) / 6.9 (kPa)	

$$(\%)\ S = \frac{S.G. \times W \times Dd}{Wd \times S.G. - Dd}$$

S.G.=Specific Gravity, **W**=Water Content
Dd=Dry Soil Density, **Wd**=Unit Wt. of Water

$$E.I._{(meas)} = \frac{\text{Change in High}}{\text{Initial Thickness}} \times 1000 = \mathbf{85.00}$$

$$\text{Expansion Index}_{(50)} = EI_{(meas.)} - (50 - S_{(meas.)}) \times \frac{65 + EI_{(meas.)}}{220 - S_{(meas.)}}$$

86	**Medium**

Expansion Index	Potential Expansion
0 - 20	*Very Low*
21 - 50	*Low*
51 - 90	*Medium*
91 - 130	*High*
> 130	*Very High*

GROUP DELTA

Figure: B-4

SAMPLE NO.: HA-13-007 **SAMPLE DATE:** 9/9/13

SAMPLE LOCATION: B-1 @ 0' - 5' **TEST DATE:** 9/27/13

SAMPLE DESCRIPTION: Dark yellow brown lean clay (CL)

LABORATORY TEST DATA

	TEST SPECIMEN	1	2	3	4	5	
A	COMPACTOR PRESSURE	130	160	200			[PSI]
B	INITIAL MOISTURE	16.9	16.9	16.9			[%]
C	BATCH SOIL WEIGHT	1200	1200	1200			[G]
D	WATER ADDED	120	112	104			[ML]
E	WATER ADDED (D*(100+B)/C)	11.7	10.9	10.1			[%]
F	COMPACTION MOISTURE (B+E)	28.6	27.8	27.0			[%]
G	MOLD WEIGHT	2111.6	2114.6	2099.0			[G]
H	TOTAL BRIQUETTE WEIGHT	3151.1	3110.0	3087.2			[G]
I	NET BRIQUETTE WEIGHT (H-G)	1039.5	995.4	988.2			[G]
J	BRIQUETTE HEIGHT	2.65	2.52	2.48			[IN]
K	DRY DENSITY (30.3*I/((100+F)*J))	92.4	93.6	95.0			[PCF]
L	EXUDATION LOAD	3200	4479	5976			[LB]
M	EXUDATION PRESSURE (L/12.54)	255	357	477			[PSI]
N	STABILOMETER AT 1000 LBS	53	48	42			[PSI]
O	STABILOMETER AT 2000 LBS	123	112	103			[PSI]
P	DISPLACEMENT FOR 100 PSI	4.46	4.34	4.27			[Turns]
Q	R VALUE BY STABILOMETER	14	20	24			
R	CORRECTED R-VALUE (See Fig. 14)	16	20	24			
S	EXPANSION DIAL READING	0.0031	0.0046	0.0069			[IN]
T	EXPANSION PRESSURE (S*43,300)	134	199	299			[PSF]
U	COVER BY STABILOMETER	1.55	1.48	1.40			[FT]
V	COVER BY EXPANSION	1.03	1.53	2.30			[FT]

TRAFFIC INDEX:	7.5
GRAVEL FACTOR:	1.30
UNIT WEIGHT OF COVER [PCF]:	130
R-VALUE BY EXUDATION:	17
R-VALUE BY EXPANSION:	20
R-VALUE AT EQUILIBRIUM:	17

*Note: Gravel factor estimated from pavement section using CTM 301, Section C, Part b.

GROUP DELTA CONSULTANTS
370 Amapola Ave., Suite 212, Torrance, CA 90501
32 Mauchly, Suite B, Irvine, CA 92618
4201 Santa Ana St., Suite F, Ontario, CA 91761
9245 Activity Road, Suite 103, San Diego, CA 92126

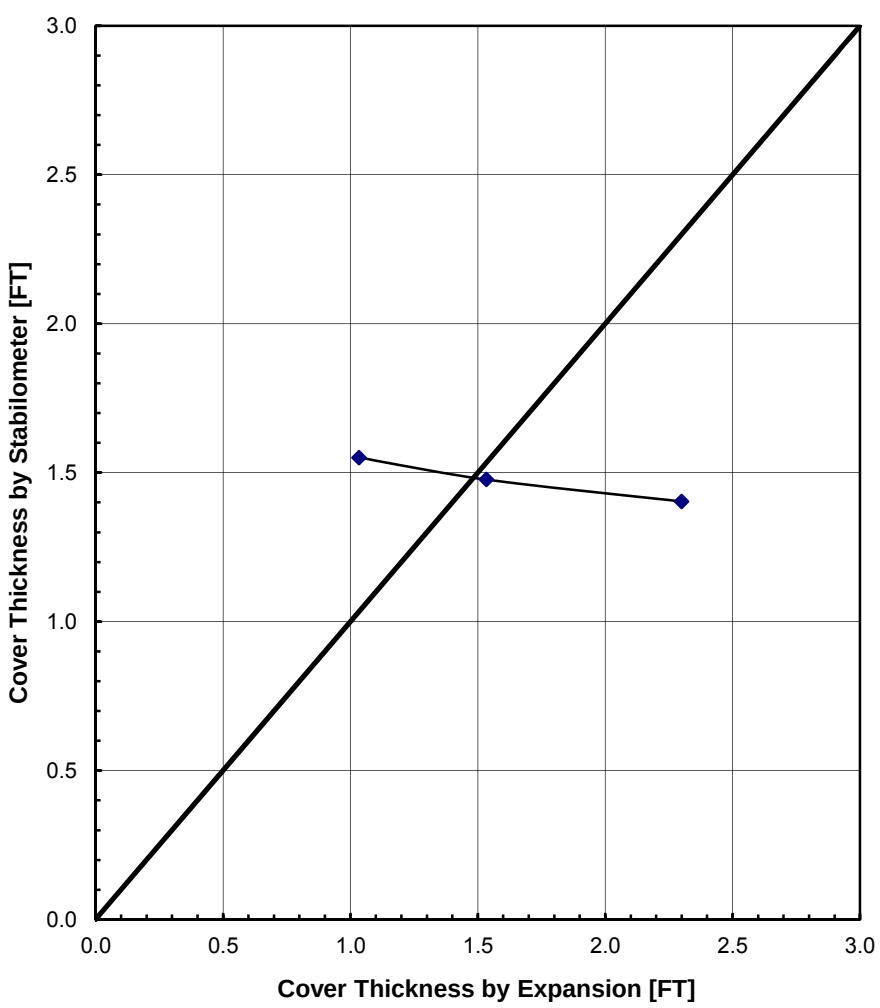
R-VALUE TEST RESULTS

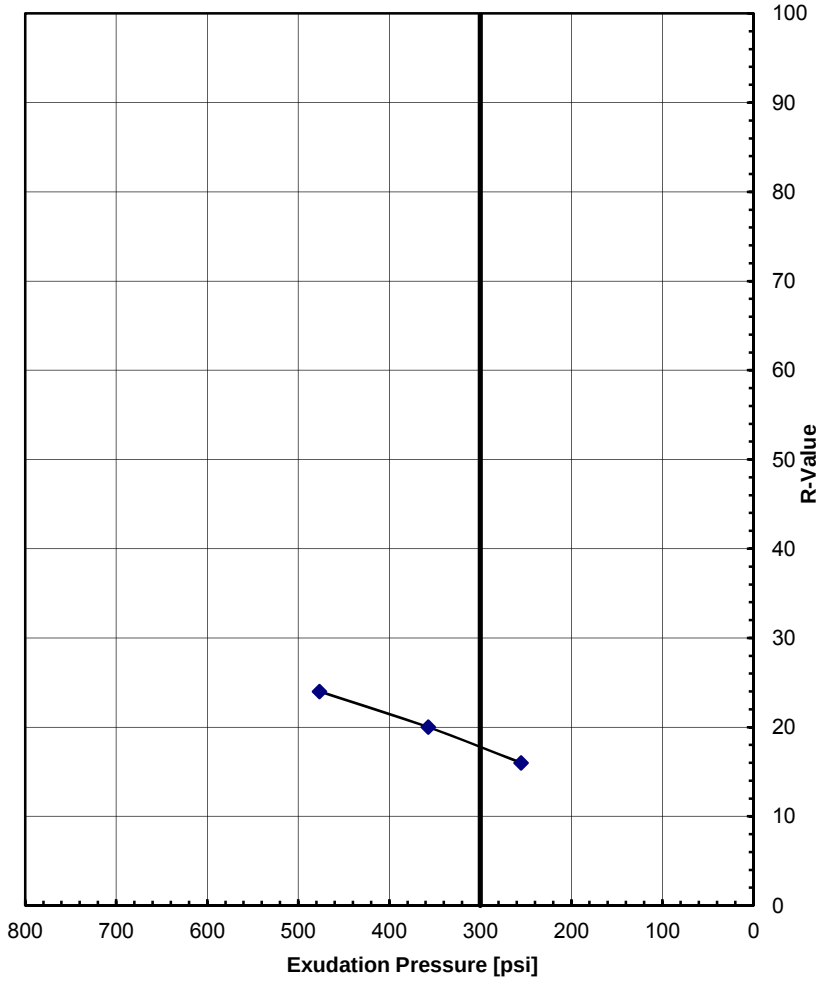
Document No. 13-0194
Project No. LA1143

FIGURE B-5a

Sample: HA-13-007, B-1 @ 0' - 5'

R-Value at Equilibrium: 17





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4201 Santa Ana St., Suite F, Ontario, CA 91761
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COVER AND EXUDATION CHARTS

Document No. 13-0194
Project No. LA1143
FIGURE B-5b

BORING NO.: A-13-006, B-1 **SAMPLE DATE:** 6/23/14

BORING LOCATION: 0-5' **TEST DATE:** 6/26/14

SAMPLE DESCRIPTION: Dark yellow brown fat clay (CH)

LABORATORY TEST DATA

	TEST SPECIMEN	1	2	3	4	5	
A	COMPACTOR PRESSURE	145	100	80			[PSI]
B	INITIAL MOISTURE	6.0	6.0	6.0			[%]
C	BATCH SOIL WEIGHT	1100	1100	1100			[G]
D	WATER ADDED	140	160	185			[ML]
E	WATER ADDED (D*(100+B)/C)	13.5	15.4	17.8			[%]
F	COMPACTION MOISTURE (B+E)	19.5	21.4	23.8			[%]
G	MOLD WEIGHT	2108.0	2113.3	2111.5			[G]
H	TOTAL BRIQUETTE WEIGHT	3162.0	3136.6	3167.3			[G]
I	NET BRIQUETTE WEIGHT (H-G)	1054.0	1023.3	1055.8			[G]
J	BRIQUETTE HEIGHT	2.53	2.51	2.64			[IN]
K	DRY DENSITY (30.3*I/((100+F)*J))	105.6	101.7	97.9			[PCF]
L	EXUDATION LOAD	7795	5567	3427			[LB]
M	EXUDATION PRESSURE (L/12.54)	622	444	273			[PSI]
N	STABILOMETER AT 1000 LBS	50	59	66			[PSI]
O	STABILOMETER AT 2000 LBS	121	135	144			[PSI]
P	DISPLACEMENT FOR 100 PSI	3.94	4.47	5.72			[Turns]
Q	R VALUE BY STABILOMETER	17	9	5			
R	CORRECTED R-VALUE (See Fig. 14)	17	9	5			
S	EXPANSION DIAL READING	0.0041	0.0022	0.0010			[IN]
T	EXPANSION PRESSURE (S*43,300)	178	95	43			[PSF]
U	COVER BY STABILOMETER	0.80	0.88	0.92			[FT]
V	COVER BY EXPANSION	1.37	0.73	0.33			[FT]

TRAFFIC INDEX:	4.5
GRAVEL FACTOR:	1.49
UNIT WEIGHT OF COVER [PCF]:	130
R-VALUE BY EXUDATION:	6
R-VALUE BY EXPANSION:	10
R-VALUE AT EQUILIBRIUM:	6

*Note: Gravel factor estimated from required AC pavement section using CT301, Part 6.B.2.

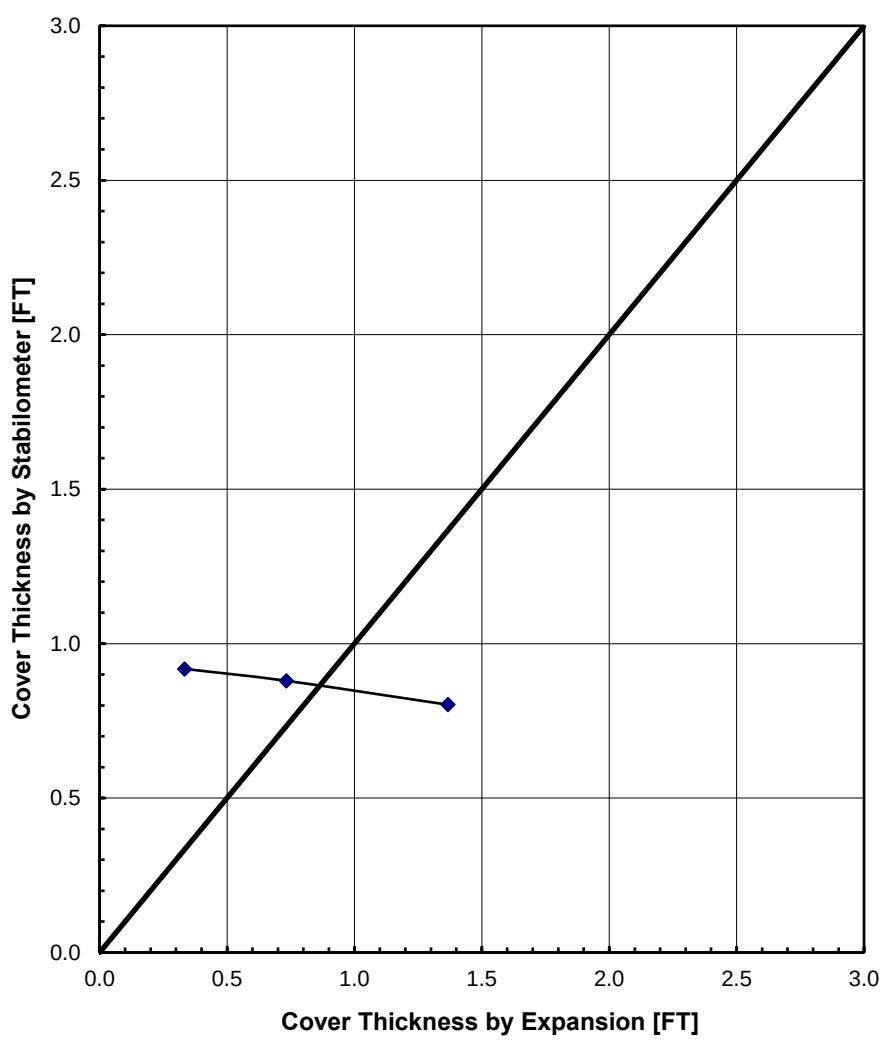
GROUP DELTA

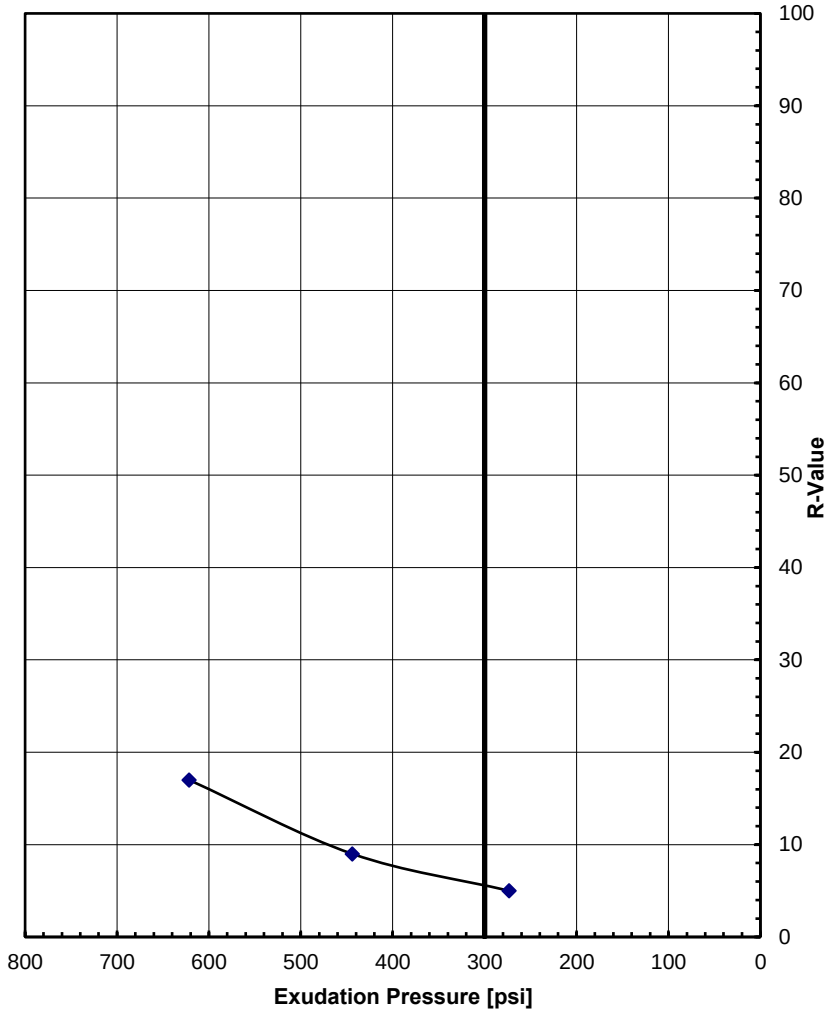
R-VALUE TEST RESULTS

Document No.
Project No. LA1143
FIGURE B-5c

Sample A-13-006, B-1

R-Value at Equilibrium: 6





GROUP DELTA

COVER AND EXUDATION CHARTS

Document No.
Project No. LA1143
FIGURE B-5d

Appendix C Caltrans Materials Comments

District 7 Quality Review Comments

Co-Rte-07-**LA 101 PM 33.5/33.9**
EA ___257201 (0700001841)
Quality Review Draft100% PS&E

Reviewer Kirsten Stahl, Hung Nguyen
Functional Unit Materials Investigations
Date 10/19/2017

Group Delta Response in blue 12/4/17

No.	Plan/SSP/ Estimates/Page No.	Comments
1	Typical Cross Sections X-1, through X-5	REVISE the Typical Pavement Structural Sections Type [1] TO READ as follows: ~~REVISE:~~ 0.50' HMA (Type A) 0.50' ATB ~~1.10' Class 3 AB~~ TO READ: 0.50' HMA (Type A) 0.50' ATB 1.25' Class 3 AB* Updated in memo For ATB (Alternate Treated Base) includes Lean Concrete Base (LCB), Lean Concrete Base Rapid Setting (LCBRS), and Roller Compacted Concrete Base (RCCB). In order to make easily for contractor bidding and contractor administrations, Materials recommends use LCB or LCBRS. *See Materials Investigations, Memorandum dated July 27, 2017.
2	Typical Cross Sections X-1, through X-5	REVISE Typical Pavement Structural Sections Type [3] TO READ as follows: ~~REVISE:~~ 0.60' HMA (Type A) 0.60' ATB ~~1.35' Class 3 AB~~ TO READ: 0.60' HMA (TYPE A) 0.60' ATB 1.55' Class 3 AB* Updated in memo *See Materials Investigations, Memorandum dated July 27, 2017.

If you have any questions, please call me at 7-0470 or Hung Nguyen of my staff at 7-8665.

District 7 Quality Review Comments

Co-Rte-07-**LA 101 PM 33.5/33.9**
EA ___257201 (0700001841)
Quality Review Draft100% PS&E

Reviewer Kirsten Stahl, Hung Nguyen
Functional Unit Materials Investigations
Date 10/19/2017

3	Typical Cross Sections X-1, through X-5	REVISE Typical Pavement Structural Sections Type 4 TO READ as follows: ~~REVISE: 0.95' JPCP~~ TO READ: 0.95' JPCP ~~0.35' ATB~~ ------ Base Bond Breaker (Geosynthetic)** ~~0.60' Class 3 AB~~ 0.35' ATB ~~2.10' Imported Borrow~~ 0.60' Class 3 AB 2.10' Imported Borrow ** Whenever placing Alternate Concrete Base beneath concrete pavement, place Base Bond Breaker between the base and pavement.
4	Typical Cross Sections X-1, through X-5	REVISE Typical Pavement Structural Sections Type 9 TO READ as follows: ~~REVISE: 1.20' JPCP~~ TO READ: 1.20' JPCP ~~0.35' ATB~~ ------ Base Bond Breaker (Geosynthetic)** ~~0.70' Class 3 AB~~ 0.35' ATB ~~1.75' Imported Borrow~~ 0.70' Class 3 AB removal needs to go to 4 feet below FG, assume 1.70' is 1.70' Imported Borrow a typo, it should be 1.75' to add up to 4.00' total
5	Typical Cross Sections X-1, through X-5	For T.I. = 13, R-Value= 5 0.70' HMA (Type A) 0.70' ATB 1.50' Class 3 AB 2.90' Total

Updated in memo

Updated in memo

Updated in memo

If you have any questions, please call me at 7-0470 or Hung Nguyen of my staff at 7-8665.

District 7 Quality Review Comments

Co-Rte-07-**LA 101 PM 33.5/33.9**
EA ___257201 (0700001841)
Quality Review Draft100% PS&E

Reviewer KRS Kirsten Stahl, Hung Nguyen
Functional Unit Materials Investigations
Date 10/19/2017

		REVISE Typical Pavement Structural Sections Type [7] TO READ as follows: ~~REVISE:~~ 0.70' HMA (Type A) TO READ: 0.70' HMA (Type A) 0.70' ATB 0.70' ATB ~~1.30' Class 3 AB~~ 1.50' Class 3 AB	Updated in memo
6	Layout L-1 through L-3	The Layout shall reflect any changes made to Plans.	Updates by Parsons
7	Construction Details C-1 through C-25	The Construction Details shall reflect any changes made to Plans.	Updates by Parsons
8	Summary of Quantities Q-1 through Q-4	The Summary of Quantities shall reflect any changes made to Plans.	Updates by Parsons
9	Specifications	The Specifications shall reflect any changes made to the plans.	Updates by Parsons

If you have any questions, please call me at 7-0470 or Hung Nguyen of my staff at 7-8665.

District 7 Quality Review Comments

KRS

Co-Rte-07-**LA 101 PM 33.5/33.9**
EA ___257201 (0700001841)
Quality Review Draft100% PS&E

Reviewer Kirsten Stahl, Hung Nguyen
Functional Unit Materials Investigations
Date 10/19/2017

10	Cost Estimates	The Cost Estimates shall reflect any changes made to Plans. Updates by Parsons
		KIRSTEN STAHL, P. E. District Materials Engineer Civil Engineering License No. C46857-Exp. 06/30/19

REGISTERED PROFESSIONAL ENGINEER
KIRSTEN R. STAHL
No. C46857
Exp. 6/30/19
CIVIL
STATE OF CALIFORNIA

If you have any questions, please call me at 7-0470 or Hung Nguyen of my staff at 7-8665.

Memorandum

Making Conservation
a California Way of Life

To: ANDRANIK ARZUMANIAN
Office of Design

From: KIRSTEN STAHL, P.E.
Office of Engineering Services
Materials Investigations

Date: July 27, 2017
File: 07-LA-101
PM 33.5/33.9
Pavement Rehabilitation

EA: 257201
EFIS: 0700001840

Subject: Pavement Rehabilitation

Materials Investigations has reviewed the submitted plans, specification and estimate, and has following recommendations:

- Materials concurs with Pavement Section [1], per consultant response dated 6/27/2017 as:

  TI=10 R=5

  0.50' HMA-A (Hot Mix Asphalt-Type A)
  0.50' Alternative Treated Base (ATB)
  1.25' Class 3, Aggregate Base (CL-3 AB)
  2.25' Total

- Materials concurs with Pavement Section [3], per consultant response dated 6/27/2017 as:

  TI=12 R=5

  0.60' HMA-A (Hot Mix Asphalt-Type A)
  0.60' Alternative Treated Base (ATB)
  1.55' Class 3, Aggregate Base (CL-3 AB)
  2.75' Total

- Materials concurs with Pavement Section [4] as:

  TI=12 R=5

  0.95' JPCP (Jointed Plain Concrete Pavement)
  0.35' Alternative Treated Base (ATB)
  0.60' Class 3, Aggregate Base (CL-3 AB)
  2.10' Imported Borrow
  4.00' Total

July 27, 2017
07-LA-101,
PM 33.5/33.9
257201/0700001840

- On Sheet X-1, please correct Pavement Section [6] to read as:

  0.67 RSC
  0.50' CL 3 AB
  1.17' Total

- Add NSSP 40-5 for RSC (Rapid Strength Concrete).

- On Sheets X-1 and L-2 in Pavement Section [1] on Chesebro road, width of HMA-A is less than 5'. In order to provide proper compaction, please correct that to a minimum of 5'.

- On Sheets X-3, L-1 and L-3, Pavement Section [8] for MVP (Maintenance Vehicle Pullout) and CHP Enforcement Area, width of HMA-A is less than 5'. In order to provide proper compaction, please correct that to a minimum of 5', or revise the Pavement Section type [8] to type [3] .

- On Sheets X-5 and L-1, Pavement Section [9] for NB and SB 101, width of JPCP is less than 6'. In order to prevent volunteer cracking, please correct that to a minimum of 6'.

- On the Sheet C-14, please show the cross section A-A.

If you have any questions, please call me at 7-0470 or Mehrdad Molaei of my staff at 7-8665.

KIRSTEN STAHL, P.E.
District Materials Engineer
Civil Engineering License No. C46857-Exp. 06/30/19