FOR CONTRACT NO.: 03-0F3004

INFORMATION HANDOUT

MATERIALS INFORMATION

FOUNDATION REPORT

ROUTE: 03-ED-50-PM 17.79

Memorandum

Flex your power!
Be energy efficient!

To: JEFF SIMS
Chief, Branch 1
Division of Engineering Services
Structural Design
Office of Bridge Design North

Attention: Mr. Greg Jones

Date: May 29, 2012

File: 03-ED-50-PM 17.79
EA 03-0F3001
Coloma Street POC
(Seismic Retrofit)
Bridge No. 25-0050

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES – MS 5

Subject: Foundation Report

Per your request, the Office of Geotechnical Design North (OGD-N) has prepared this Foundation Report for the proposed Coloma Street Pedestrian Overcrossing (POC) (Bridge Number 25-0050) Seismic Retrofit in the city of Placerville in El Dorado County. This report includes a review and evaluation of the existing Coloma Street POC As-Built bridge files and a field investigation that includes two test borings completed on December 14, 2011.

PROJECT DESCRIPTION

Coloma Street POC is located in the city of the Placerville, El Dorado County, and crosses Highway 50 and Hangtown Creek. The POC is an approximately 167 feet long two-span structure that was built in 1955. Abutment 1 of the POC is connected to Conrad Street and Abutment 3 is adjacent to a Placerville City four–story parking garage structure and the Placerville City Hall. The Abutment 3 ramp is elevated from street level to a height of approximately 25 feet. Bent 2 is located in the median of Highway 50.

The proposed project is to retrofit the existing structure to meet current seismic design standards. To achieve this goal, the existing Bent 2 foundation will be replaced. No foundation retrofit is proposed for Abutment 1 and 3 at this time. Cast-In-Drilled-Hole (CIDH) piles are proposed for the project based on the geology of the project site and the structure design loading conditions.

All elevations used in this report are based on the As-Built Plans. The vertical datum used for As-Built Plans was NGVD29.

FIELD INVESTIGATION AND TESTING PROGRAM

The field investigation that includes two test borings was completed on December 14, 2011. The two borings were located near Bent 2 and drilled to a maximum depth of 27.5 feet. Table 1 below presents the summary of these borings.

Table 1. Summary of the Test Borings

Date of drilling	Boring N0.	Station	Reference Line	Offset	Top of Boring Elevation (feet)	Depth to Bedrock (feet)	Depth to Bottom of Boring (feet)
12/14/11	RC-11-001	635+58.0	"L2"	6.5 RT	1845.15	5.5	27.5
12/14/11	RC-11-002	635+40.0	"L2"	6.5 RT	1845.15	8.0	8.5

A field investigation including four 1-inch diameter sampler borings was performed in 1952 and the results of 1952 field investigation were summarized in the "As-Built" Log of Test Borings (LOTBs) dated May 23, 1955. The As-Built LOTBs indicate that those four 1-inch diameter sampler borings were drilled to a maximum depth of 5.0 feet.

No intact bedrock core samples were available for rock strength tests because the bedrock is very thinly foliated and intensely fractured slate. One soil sample was selected and tested for corrosion potential. The corrosion test results are present in the "CORROSION EVALUATION" section in this report.

SITE GEOLOGY AND SUBSURFACE CONDITIONS

The recent field investigation indicates that the earth materials beneath the project site consist of fill, native soil, and bedrock. Approximately 4 feet of manmade fill material was encountered in both borings and was described as hard gravelly lean clay. Underlying the fill material was a layer of hard lean clay ranging from 2 to 4 feet in thickness according to the 2011 borings. Bedrock was encountered at a depth of 5.5 feet in Boring RC-11-001 and 8.0 feet in Boring RC-11-002. The bedrock was classified as slate and was intensely fractured. Most fractures were along foliation planes and the foliation planes were vertical and near vertical. The slate was very thinly foliated and the hardness of the slate ranged from moderately soft to moderately hard. The upper section of the slate, approximately 5 feet, was intensely weathered, then the slate gradually grades to fresh at a depth of approximately 17 feet. The slate parts easily along the foliation planes by hand pressure.

Based on the "As-Built" LOTBs dated May 23, 1955 for the existing Coloma Street POC (Br. No. 25-0050), the soils under the site consist mainly of silty sandy clay and gravel underlain by slate bedrock. The soils apparent density and consistency were not provided in the As-Built LOTBs. Slate bedrock was encountered in all borings at varied depths of approximately 1.0 to 5 feet from the original ground surface (see Table 2). The As-Built LOTBs did not provide detailed descriptions of the soil and rock encountered in the borings.

Table 2, Depth to the Top of the Bedrock from As-Built LOTBs

Boring No.	Top of boring elevation* (feet)	Top of bedrock elevation* (feet)	Depth to top of the bedrock (feet)
BH#2	1835.0	1833.5	1.5
BH#3A	1855.9	1850.9	5
BH#4	1848.6	1845.6	3
BH#4A	1834.5	1833.5	1.0

* The elevation is based on the As-Built LOTBs.

Based on "Areas More Likely to Contain Natural Occurrences of Asbestos in Western El Dorado County, California", California Geological Survey Open-File Report 2000-002 dated 2000, the project site is approximately 2500 feet from the Melones Fault Zone which may contain naturally occurring asbestos. The LOTBs for the nearby Bedford Avenue POC (Br. No. 25-0051), which is approximately 0.3 mile east of the site, indicates the presence of some ultramafic minerals (serpentine) in Boring 00-4 below approximately elevation 1811 feet.

No ultramafic minerals (serpentine) were identified from the recent field investigation from this project site.

GROUNDWATER

Groundwater was not encountered during 1952 field investigation. Groundwater was not measured during 2011 field investigation because the drilling was within the active traffic lane and the borings were backfilled immediately when drilling was completed.

SCOUR EVALUATION

Scour is not an issue for this project because the proposed Bent 2 foundations are not in a watercourse.

CORROSION EVALUATION

A representative sample taken during the recent foundation investigation was tested for corrosion potential. The results of the laboratory tests indicate this site is not corrosive to foundation elements. Table 3 presents a summary of the results.

Table 3. Soil Corrosion Test Summary

Location	SIC Number	Sample Depth (ft)	Minimum Resistivity (ohm-cm)	pH	Sulfate Content (ppm)	Chloride Content (ppm)
RC-11-001	C4698511	0-3.5	5484	7.5	N/A	N/A

Note: Caltrans currently considers a site to be corrosive to foundation elements if one or more of the following conditions exist: Chloride concentration is greater than or equal to 500 ppm, sulfate concentration is greater than or equal to 2000 ppm, or the pH is 5.5 or less.

SEISMIC RECOMMENDATIONS

In accordance with the Caltrans Seismic Design Criteria Version 1.6, and the 2011 Fault Database, the nearest active fault to the site is Foothills Fault System north central reach section (Rescue fault, Fault ID No. 107), with Mmax of 6.5, and is referred to as a normal fault. The distance from the fault rupture plane to the bridge site is estimated to be 7.1 miles (11.4 km).

The design Acceleration Response Spectrum (ARS) curve is an envelope of the minimum statewide spectrum acceleration (SA), the SA generated from the nearest active fault, and the SA obtained from the probabilistic method which is based on a 5% probability of exceedance in 50 years (return period of 975 years). Please note that an average shear wave velocity of 1640 feet per second was used to generate the ground motion. The final design ARS curve with an estimated peak ground acceleration of 0.22g is attached.

Liquefaction Potential

Based on liquefaction analysis, the liquefaction potential is considered to be insignificant.

Surface Fault Rupture Hazard

Surface fault rupture is defined as displacement that occurs along the surface trace of a fault. There are no known active faults crossing beneath or extending directly toward the site. Therefore, the potential hazard due to ground rupture is considered to be very low.

AS-BUILT FOUNDATION DATA

Based on the As-Built Plans available, all the POC foundations were founded on spread footings, but no bearing capacity information was provided. The spread footing dimensions and the bottom of the spread footing elevations are present in Table 4 below.

Table 4. As – Built Foundations for Spread Footings, Bridge No. 25-0050

Support location	Minimum Footing Width (feet)	Footing Length (feet)	Bottom of Footing Elevation[1] (Feet)	Allowable Bearing Capacity ksf
Abut 1	3.67	11.0	1858.0	No information
Bent 2	6.0	13.0	1843.0	No information
Abut 3	5.0 and 7.5	11.0 and 17.5	1830.67 – 1830.75 and 1828.33	No information

Notes: 1. The elevation is based on As-Built Foundation Plan dated 5-23-1955.

FOUNDATION RECOMMENDATIONS

According to the "Foundation Design Data Sheet (FDDS) for Deep Foundations" dated 5-23-2012, this project is using Load and Resistance Factor Design methodology. 36-inch diameter CIDH piles are proposed for the proposed seismic retrofit.

The CIDH pile lengths or pile tip elevations recommended in Table 5 were estimated based on the FDDS dated 5-23-2012 and current FHWA design manual. The soil and rock parameters used for estimating the pile lengths were based on the LOTBs for the project.

Table 5. Foundation Design Recommendations for the CIDH piles

Bent Foundation Design Recommendations												
Support Location	Pile Type	Cut-off Elevation (ft)	Service-I Limit State Load per Support (kips)	Total Permissible Support Settlement (inches)	Required Factored Nominal Resistance per pile (kips)				Permanent Steel Casing Specified Tip Elevations (ft)	Pile tip Elevation (ft)	Specified Tip Elevation (ft)	Minimum Pile Length Socket into the Bedrock (Feet)
					Strength Limit		Extreme Event					
					Comp. (φ=0.7)	Tension (φ=0.7)	Comp. (φ=1)	Tension (φ=1)				
Bent 2	36" CIDH	1839.4	360	1	240	N/A	300	35	N/A	1827.0 (a-I) 1828.0 (a-II) 1832.0 (b-II)	1827.0	10

Notes:

1) *Design tip elevations are controlled by: (a-I) Compression (Strength Limit State), (a-II) Compression (Extreme Event), (b-II) Tension (Extreme Event), and (c) lateral load respectively.*
2) *The specified tip elevation shall not be raised above the design tip elevations for Lateral Load.*

Pile Data Table					
Location	Pile Type	Nominal Resistance (kips)		Design Tip Elevations (ft)	Specified Tip Elevation (ft)
		Compression	Tension		
Bent 2	36" diameter CIDH	350	35	1827.0 (a) 1832.0 (b)	1827.0

Notes:

1) *Design tip elevations are controlled by: (a) Compression, (b) Tension, and (c) Lateral Load, respectively.*
2) *Lateral Load controlled tip elevation will be provided by Structure Design.*

Construction Considerations

1. Groundwater may not be encountered during CIDH piles installation. But seepage water from Hantown Creek and fractured rock may flow into the drilled holes and the Contractor should be prepared to dewater during the pile installation so that the CIDH piles can be constructed using the "dry" method.

2. The bedrock under the site is thinly to very thinly foliated, intensely fractured, and weathered slate. The foliation of the slate was vertical and near vertical and easily

parts under hand pressure. Precautions should be taken to avoid fractured rock collapsing during CIDH pile installation.

3. Caving conditions may be anticipated during CIDH pile installation due to uncemented soils above bedrock and seepage water flow into the drilled holes.

4. Hard drilling conditions may be anticipated since the CIDH piles will be embedded into bedrock.

5. This Office should be notified prior to drilling for the CIDH piles and a site inspection is required by this Office during CIDH pile installation.

6. Precaution should be taken in case any serpentine or asbestos containing material is encountered during construction.

7. We recommend that the Contractor inspect the rock core samples retrieved from the recent field investigation before construction.

PROJECT INFORMATION

Standard Special Provisions S5-280, "Project Information," discloses to bidders and contractors a list of pertinent information available for their inspection prior to bid opening. The following is an excerpt from SSP S5-280 disclosing information originating from Geotechnical Services. Items listed to be included in the Information Handout will be provided in Acrobat (.pdf) format to the addressee(s) of this report via electronic mail.

Data and information attached with the project plans are:

A. Log of Test Borings for Coloma Street POC, Bridge Number 25-0050.

Data and information included in the Information Handout provided to the bidders and contractors are:

A. Foundation Report for Coloma Street POC, Bridge Number 25-0050, dated May 29, 2012.

Data and information available for inspection at the District Office:

None.

Data and information available for inspection at the Transportation Laboratory:
Rock Core Samples.

If you have any questions regarding this report, please contact Xing Zheng at 916-227-1036 or Reza Mahallati at 916-227-1033.

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Attachment: ARS curve
C: Reid Buell
Shira Rajendra
DPM (E-Copy)
OGS (E-Copy)
Structure Construction R.E. pending (E-Copy)
DES OE OPS&E (E-Copy)
DME-D03 (E-Copy)
GEODog ARCHIVE

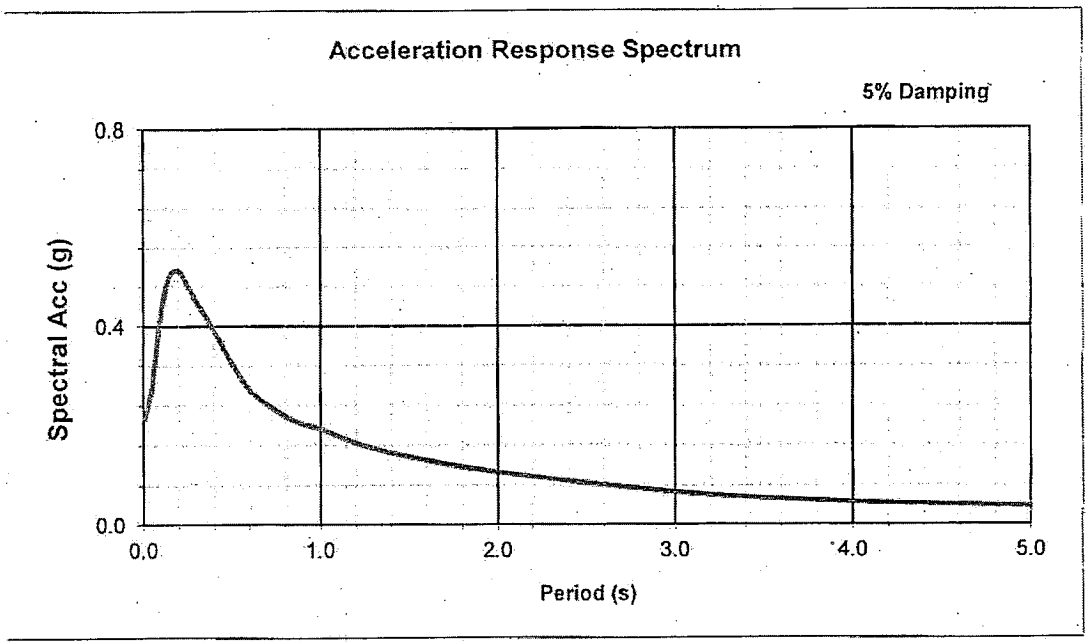
Coloma St. POC

Bridge No. 25-0050
EA No. 03-3F3001

Latitude 38.7297
Longitude -120.8014

Control **Envelope**

Period (s)	Sa(g)
0.010	0.215
0.050	0.281
0.100	0.428
0.150	0.505
0.200	0.514
0.250	0.483
0.300	0.451
0.400	0.391
0.500	0.327
0.600	0.273
0.700	0.243
0.850	0.211
1.000	0.194
1.200	0.166
1.500	0.138
2.000	0.108
3.000	0.067
4.000	0.046
5.000	0.037



Deterministic Procedure Data

Fault	Foothills Fault System north central reach section (Rescue fault)		R_{rup}	11.4	km
Fault ID	107		R_{jb}	11.4	km
Style	N		R_x	10.7	km
Mmax	6.5		V_{S30}	500	m/s
Dip	90	deg	$Z_{1.0}$	111	m
Z_{TOR}	0	km	$Z_{2.5}$	2.00	km

Notes

Please note the Design ARS curve is an envelope of all three methods of generating spectral accelerations.
1) Statewide Minimum Spectral Acceleration (SA), 2) SA by the Bear Mountain fault zone, and 3) USGS 5% Probability of Exceedance in 50 years.

Final

Design Response Spectrum