INFORMATION HANDOUT

For Contract No. 03-3F4104
At Pla 49,80,193

Identified by
Project ID 0312000283

MATERIALS INFORMATION

Revised Foundation Report for Dutch Ravine Canal (Widening)

M e m o r a n d u m

Flex your power!
Be energy efficient!

To: MR. GUDMUND SETBERG
BRANCH CHIEF
Division of Engineering Services
Structural Design-Mail Station #9-4/8I
Office of Bridge Design North and Central-Branch 2

Date: August 1, 2013

File: 03-PLA-193-PM 9.4
Dutch Ravine Canal
(Widening)
Br. No. 19-0069
E.A. 03-3F4101
EFIS 0312000283

Attn: Henry Fang

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services – MS 5
Office of Geotechnical Design – North

Subject: **Revised Foundation Report for Dutch Ravine Canal (Widening)**
THIS MEMO SUPERSEDES AND REPLACES THE MEMO DATED April 16, 2013 and July 8, 2013

Project Description

The Office of Geotechnical Design-North (OGD-N) has prepared the Foundation Report for the proposed widening of the Dutch Ravine Canal (Br. No. 19-0069) located on State Route 193 at PM 9.4, in Placer County, California, approximately 0.5 mile west of the town of Newcastle.

The proposed widening of Dutch Ravine Canal (Br. No. 19-0069) will widen the structure 10 feet on the south side. Dutch Ravine Canal (Br. No. 19-0069) is a single span structure supported on spread footings at all support locations. The length of the structure is 16 feet 2 3/8 inch long and is currently approximately 30 feet wide and is proposed to be widened to 40 feet wide.

The following foundation recommendations are based on the subsurface information gathered during a subsurface investigation in July 2013 and As-Built LOTBs dated December 1962. With regards to the foundation recommendations provided in this report, elevations are based on the NAVD88 vertical datum, unless otherwise noted. The correction for the vertical datum conversion from the As-Builts from 1962 and NAVD88 is -224.43 feet.

Field Investigation and Testing Program

The Office of Geotechnical Design-North conducted a site visit in January 2013 and subsurface investigation in July 2013.

The 2013 subsurface investigation consisted of two mud rotary borings (Nos. RC-10-001 and RC-10-002). The mud rotary borings were advanced using a self-casing wireline drilling method. The maximum depth reached by the 2013 subsurface investigation was approximately elevation 863.6 feet. Sampling was achieved in all borings by utilizing the Standard Penetration Test (SPT) sampler. A summary of the borings drilled during the subsurface investigation is included below in Table 1.

Table 1. The 2013 Subsurface Exploration Summary for Dutch Ravine Canal Bridge (Br. No. 19-0069)

Boring No.	Completion Date	Drill Rig Type	Hammer Type	Hammer Efficiency (%)	Approx. Ground Surface Elevation (ft)	Boring Depth (ft)
RC-10-001	7/19/2013	CME 75	Auto	79	885.2	21.6
RC-10-002	7/19/2013	CME 75	Auto	79	883.2	16.75

An As-Built LOTB consisted of two 1-inch soil tube borings (Nos. TH #1 and TH #2) in December 1962. The maximum depth reached was 12 feet.

A sample was taken from the surface for laboratory testing during the site visit on January 30, 2013.

For subsurface data and boring locations, please refer to the Log of Test Borings and the As-Built Log of Test Borings for detailed observations, information and conditions. These sheets will be forwarded once completed.

Laboratory Testing

Laboratory testing was performed on a selected sample at the surface during the January 30, 2013 site visit. Tests were performed to determine the corrosion and engineering properties of the subsurface materials for use in the foundation analyses. Refer to the Corrosion Evaluation section of this report for information concerning corrosion test results. All tests were performed in general accordance with American Society for Testing and Materials (ASTM) standards or California Test Methods (CTM). Laboratory test results are available upon request.

Site Geology and Subsurface Conditions

Regional Setting and Area Geology

Based on the Preliminary Geologic Map of Cenozoic deposits of the Auburn Quadrangle, California (Bartow, Helley, 1979), the site consists of Pre-Tertiary metamorphic and plutonic igneous rocks (pTu).

The soil encountered during the 2013 subsurface investigation generally consists of granite that is intensely weathered and partially decomposed, very soft, and friable. Large, fresh, granite boulders were observed at the site. Although not present in the borings, these boulders may be encountered during footing excavation.

The material encountered during the 1962 subsurface investigation generally consists of very loose, medium dense, dense, and very dense decomposed granite.

For subsurface data and boring locations, please refer to the Log of Test Borings for detailed observations, information and conditions. These sheets will be forwarded once completed.

Groundwater

During the subsurface investigation on July 19, 2013, after completion of RC-13-001, the boring was pumped dry (drilling fluids removed). Subsequently, two groundwater readings were made. The first reading was made approximately one hour after the boring was pumped and the second reading taken one hour after the first reading. The first measurement was 9.45 feet from the top of boring (875.75 ft). The second measurement was 9.8 feet from the top of boring (875.4 ft).

Groundwater was not reported on the As-Built LOTBs. Groundwater can resonablely be expected to be encountered during the excavation at or above the water level in the canal.

Groundwater elevations are subject to seasonal fluctuations and may occur at higher or lower elevations than those observed. Groundwater elevations respond to rainfall patterns, ground water usage patterns and upstream stream flow regulation and diversions. For more details, please refer to the LOTB and As-Built LOTB sheets.

Scour Evaluation

No Hydraulic Report is available for this structure. The Foundation Recommendations made in this report are made assuming that scour is not an issue at this site. It is our understanding that no scour assessment has been performed. For more information, contact Structure Hydraulics and Hydrology.

Corrosion Evaluation

A composite soil sample was collected from the surface at Abutment 1 during the January 30, 2013 site visit. The Office of Testing and Technology Services, Corrosive Technology Branch tested the composite sample for corrosive potential. The Corrosion Technology Branch considers a site to be corrosive if one or more of the following conditions exist for the representative soil or water samples collected at the site: chloride concentration is 550 ppm or greater, sulfate concentration is 2000 ppm or greater, or the pH is 5.5 or less. The minimum resistivity serves only as an indicator parameter for the possible presence of soluble salts and is not used to define a site as being corrosive. It is the practice of the Corrosion Technology Branch that if the minimum resistivity of the sample is greater than 1000 ohm-cm, the sample is considered to be non-corrosive and testing to determine the sulfate and chloride content is not performed.

The results of the laboratory tests determined that the composite sample was considered to be non-corrosive at this site. Refer to Table 2 for specific test results.

Table 2. Corrosion Test Summary of the Composite Samples for Dutch Ravine (Widening). (Br. No. 19-0069)

SIC Corrosion Number	Nearby Support Location	Boring Number	Sample Depth (ft)	pH	Minimum Resistivity (Ohm-Cm)	Chloride Content (ppm)	Sulfate Content (ppm)
C837035	Abutment 1	N/A	0-1	6.4	6960	N/A	N/A

Seismic Recommendations

Based on the Caltrans ARS Online Tool (Version 2.2.06), the nearest active fault for the site is the Foothills Fault System north central reach section (Dewitt Fault) (Fault ID No. 423) with MMax of 6.3. The fault is located northeast of the bridge site, and the distance to the fault rupture plane from the bridge site is approximately 2.8 miles.

Based on the As-Built Log of Test Borings, a V_{S30} (the weighted shear wave velocity for the top 100 feet of foundation materials) of 1837 feet per second is considered to be applicable to the foundation materials.

Based on the "Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations, November 2012," the design ground motion is the highest spectral acceleration as obtained by any or a combination of the following three methods for the Dutch Ravine Canal:

1) Statewide minimum deterministic spectrum requirements with MMax of 6.5, vertical strike-slip event with a rupture distance of 7.5 miles.
2) The nearest active fault as shown on the ARS Online Tool (Version 2.2.06).
3) The USGS 5% Probability of Exceedance in 50 years (975 year return period).

Based on the V_{S30}, the preliminary Acceleration Response Spectrum (ARS) is determined by a combination of methods 2 and 3 as stated above. The peak ground acceleration is estimated to be 0.45g as shown on the ARS curve.

The potential for surface rupture at the site due to fault movement is considered insignificant since there are no known faults projecting towards or passing directly through the project site.

Based on the data from the As-Built LOTB the potential for soil liquefaction is considered low.

As-Built Foundation Data

According to the As-Built Plans, the existing structure is supported on spread footings at all support locations.

Table 3. As-Built Spread Footing Data Table for Dutch Ravine Canal (Br. No. 19-0069).

Support Location	Footing Width (ft)	Maximum Footing Elevation (ft)	Allowable Load (ksf)	Design Load (ksf)
Abutment 1	3.0	879.6	2.4	2.4
Abutment 2	3.0	879.6	2.4	2.4

Foundation Recommendations

The following foundation recommendations are based on the General Plan, conversations with Mr. Henry Fang from the Office of Structure Design and the As-Built LOTB. Spread footing foundations are recommended at all support locations. Working Stress Design was used to calculate the loads for the proposed abutments for the widening.

Table 4. Foundation Design Recommendations for Spread Footings for Bridge No. 19-0069[1,2].

Support Location	Minimum Footing Width (feet)	Maximum Footing Elevation (feet)	Recommended Bearing Limits	
			WSD [1]	LFD [2]
			Allowable Bearing Capacity q_{all} (ksf)	Norminal Bearing Resistance (q_n) (ksf)
Abut 1	4.0	878.5	3.0	N/A
Abut 2	4.0	880.5	2.7	N/A

Notes: 1. Working Stress Design (WSD): The Maximum Contact Pressure (q_{max}) is not to exceed the recommended Gross Allowable Soil Bearing Capacity, (q_{all}).
2. Load Factor Design (LFD): The Maximum Contact Pressure (q_{max}), divide by the Strength Reduction Factor (ϕ), is not to exceed the Nominal Bearing Resistance (q_n).

Table 5. Spread Footing Data Table, Dutch Ravine Bridge (Br. No. 19-0069).

Support Location	Allowable Bearing Capacity q_{all} (ksf)	Nominal Bearing Resistance (q_n) (ksf)
Abut. 1	3.0	N/A
Abut 2	2.7	N/A

Construction Considerations

1. Groundwater should be expected to be encountered. The Contractor shall take measures to deal with the groundwater along with the water in the Dutch Ravine Canal.

2. Spread footings shall be placed neat against competent materials. All loose materials shall be removed prior to placement of concrete.

3. All footing excavations are to be inspected and approved by this Office or a representative of the Office of Structure Construction, when excavations are completed to the bottom of footing and prior to placement of concrete.

4. Large, fresh, granite boulders were observed at the site. Although not present in the borings, these boulders may be encountered during footing excavation.

Project Information

"Project Information," discloses to bidders and contractors a list of pertinent information available for their inspection prior to bid opening. The following is information originating from Geotechnical Services.

Data and information attached with the project plans are:

A. Log of Test Borings (Dutch Ravine Canal (Widening), Br. No. 19-0069).

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

A. Revised Foundation Report for Dutch Ravine Canal (Widening), (Br. No. 19-0069) dated August 1, 2013.

Data and information available for inspection at the Transportation Laboratory:

A. Soil Laboratory Data.

The recommendations contained in this report are based on specific project information regarding design loads and structure locations that has been provided by the Office of Bridge Design North. If any conceptual changes are made during final project design, the Office of Geotechnical Design-North, should review those changes to determine if the foundation recommendations provided in this report are still applicable. Any questions regarding the above recommendations should be directed to Joseph Kaump (916) 227-1044, of the Office of Geotechnical Design-North.

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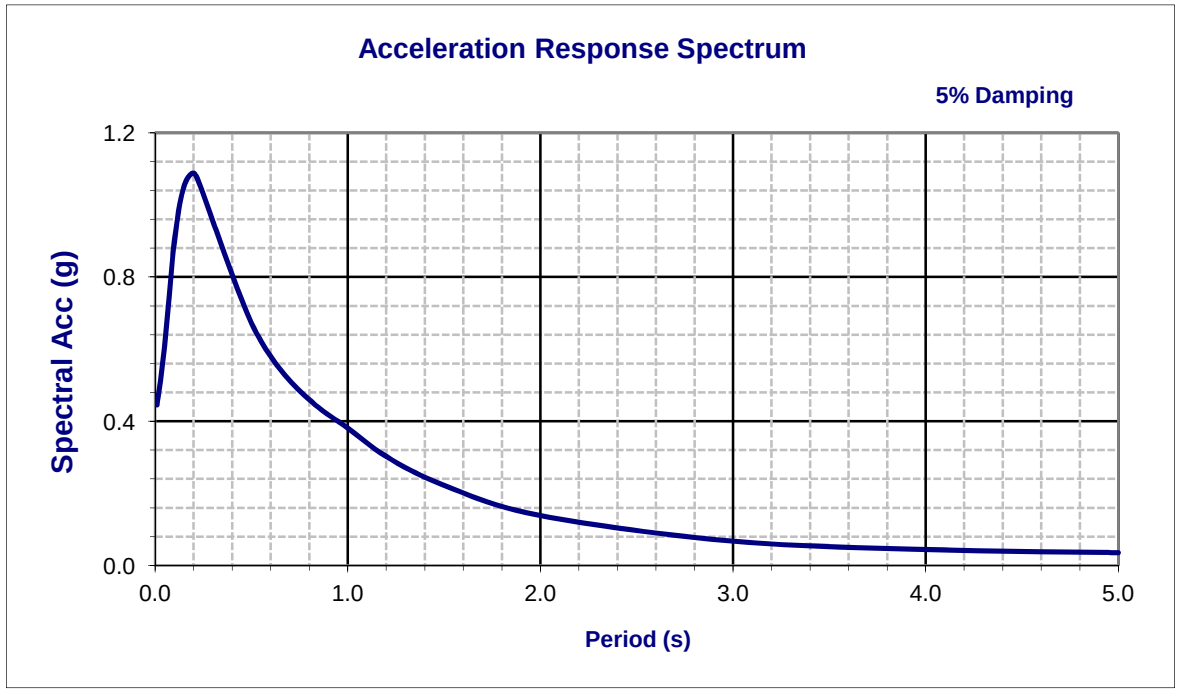
Dutch Ravine Canal (Widen)

Bridge No. 19-0069
EFIS 0312000283

Latitude 38.8788
Longitude -121.1365

Control **Envelope**

Period (s)	Sa(g)
0.010	0.445
0.050	0.611
0.100	0.899
0.150	1.053
0.200	1.088
0.250	1.030
0.300	0.954
0.400	0.807
0.500	0.672
0.600	0.580
0.700	0.512
0.850	0.437
1.000	0.381
1.200	0.302
1.500	0.222
2.000	0.138
3.000	0.067
4.000	0.044
5.000	0.035



Nearest Active Deterministic Fault Data

Fault	Foothills Fault System - north central reach section (DeWitt Fault)		R_{rup}	4.6	km
Fault ID	423		R_{jb}	0.9	km
Style	N		R_x	5.9	km
Mmax	6.3		V_{S30}	560	m/s
Dip	50	deg	$Z_{1.0}$	N/A	m
Z_{TOR}	0	km	$Z_{2.5}$	N/A	km

Notes

Please note the Design ARS curve is based on Deterministic and Probabalistic methods.

Design Response Spectrum