APPENDIX F
Preliminary Foundation Report

Crawford & Associates, Inc.
Geotechnical Engineering, Design and Construction Services
Sacramento | Modesto | Pleasanton | Rocklin | Ukiah

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March 24, 2020
CAInc No. 14-156.2

San Joaquin County Public Works
Bridge Engineering Division
1810 East Hazelton Street
Stockton, CA 95201

Attention: Brian Newburg, EIT

Subject: **Preliminary Foundation Report**
Messick Road Bridge Replacement
Existing Bridge No. 29C-274
San Joaquin County, California

Dear Mr. Newburg,

This Preliminary Foundation Report (PFR) provides preliminary geologic, soil, seismic, and foundation information for use in preliminary bridge design. Further geotechnical analysis will be required to prepare design level recommendations for the project. Crawford & Associates, Inc. (CAInc) completed this report in accordance with our agreement dated February 5, 2020.

1 INTRODUCTION

1.1 SCOPE OF WORK

To prepare this report, CAInc:

- Discussed the project with you and Scott Buckley of Michael Baker International (MBI).
- Reviewed the 2005 Caltrans Bridge Inspection Report (BIR) for the structure.
- Reviewed the Foundation Investigation report for Messick Road Bridge #1799, dated May 1981.
- Reviewed the three alternatives in the General Plan provided by MBI on March 2, 2020.
- Performed two exploratory borings to a maximum depth of 50 feet below existing grade on July 23, 2014.
- Reviewed geologic and seismic maps pertaining to the site.
- Performed preliminary geotechnical engineering analysis.

2 PROJECT AND SITE DESCRIPTION

The project site is located just under two miles north of Linden, California in rural San Joaquin County. Messick Road is a two-lane local road that stretches approximately one mile from East 8 Mile Road at its west terminus to Clements Road at its east terminus. The bridge crosses Mosher Creek approximately ½ mile west of East 8 Mile Road. The creek channel is approximately 10 feet below the bridge deck.

According to the BIR, the existing bridge (Bridge No. 29C-274) was built in 1931, is approximately 55 feet long and 21 feet wide, and is constructed of timber planks on Douglas fir stringers and caps on redwood piles and concrete abutments; the foundation type is unknown.

The structure has been given a sufficiency rating of 49.3 and has a status of structurally deficient.

The project will replace the existing bridge in the same footprint with a new structure accommodating two 11-foot-wide travel lanes and a clear width of 26.5 feet with no shoulders or sidewalks. The new bridge is anticipated to be single-span with either a precast or cast-in-place concrete voided slab unit structure on a short seat abutment or a three-cell box culvert with a curtain wall on each end. Foundation loads were unavailable at the issuance of this report.

The site vicinity map is shown on Figure 1.

3 PROJECT DATUM

All elevations referenced within this report are based on the General Plan[1] sheets. The elevations in this report are based on an average bridge deck elevation of 106.5 feet.

4 AS-BUILT FOUNDATION DATA

Log of test borings (LOTBs) were available in the 1981 Foundation Investigation report. As-built foundation data was not available for the existing Messick Road Bridge structure. However, the 1981 foundation investigation report mentions that, based on a review of the County bridge plans, the foundation for the west abutment is 9.5 feet below the bridge deck (elev 97 feet) and the foundation for the east abutment was 11 feet below the bridge deck (elev 95.5 feet).

5 FIELD EXPLORATION

5.1 EXPLORATORY BORINGS (2014) – CAINC

CAInc retained Geo-Ex Subsurface Exploration (Geo-Ex) to drill and sample two exploratory borings to a maximum depth of 50 feet below ground surface (bgs) on July 23, 2014. Geo-Ex used a CME 55 truck-mounted drill rig to complete the borings using solid-stem auger and mud rotary drilling techniques.

Soil samples were recovered by means of a 2.0-inch O.D. “Standard Penetration” (SPT) split-spoon sampler with liners and a 3.0-inch O.D. “Modified California” split-spoon sampler with liners. Both samplers were advanced with standard 350 ft-lb striking force using an auto-hammer. A hammer energy analysis was not performed specific to this project/site. We assumed an auto-hammer efficiency (ERi) of 80%. Sampler penetration resistance was recorded to provide a field measure of relative densities and can be correlated to soils strength and bearing characteristics. The field-recorded (uncorrected) blow counts are shown on the LOTB drawing attached.

CAInc’s project engineer John Wright logged the test borings consistent with the Unified Soil Classification System (USCS) and the Caltrans 2010 Logging Manual. CAInc retained samples from the borings and made groundwater observations (where encountered) during drilling operations. At completion, the borings were grouted in accordance with the County permit.

[1] Michael Baker International, General Plan, 30% Design, Sheets 1, 2, and 3, undated

5.2 EXPLORATORY BORINGS (1980) – MOORE AND TABER

Moore and Taber drilled two exploratory borings to a maximum depth of approximately 47 feet below the bridge deck on December 12 and 15, 1980. We understand that a 140-pound safety hammer with 30-inch drop and a cathead and rope system was used to drive the 2-inch outside diameter Standard Penetration Test split spoon samplers. The LOTB showing the 1981 borings is attached.

6 LABORATORY TESTING

The following laboratory tests were completed by CAInc on representative soil samples obtained from the 2014 exploratory borings:

- Moisture Content - Dry Density (ASTM D2216 / D2937)
- Gradation (ASTM D422)
- Atterberg Limits (ASTM D4318)
- Sulfate/Chloride Content (CTM 417/422)
- pH/Minimum Resistivity (CTM 643)
- R-value (CTM 301)

The test results are included in the LOTBs. Details test results will be included in the Foundation Report.

7 SITE GEOLOGY AND SUBSURFACE CONDITIONS

7.1 SITE GEOLOGY

The project site is situated within the Great Valley geomorphic province of California, near the eastern edge of the Sacramento Valley. Based on mapping from 1979[2] the project site and vicinity are near the boundary of the Modesto and Riverbank Formations. The Modesto Formation in the site area is described as foothill-derived alluvial silt, clay and minor sand forming terraces, upper fans, and following distributaries across lower fans containing abundant volcanic detritus. The Riverbank Formation in the site area is described as foothill-derived alluvial sand and silt, containing abundant volcanic detritus.

The site geology is shown on Figure 2.

7.2 SUBSURFACE CONDITIONS

In general, the two 1980 borings (at the existing bridge) indicated that the Messick Road Bridge site is underlain by loose sand and silty sand to approximately 8 to 14 feet below the bridge deck. The loose sand extends to approximately elev 98.5 (west) to 92.5 (center and east) feet. The upper 8 to 12 feet of this loose sand was abutment backfill and channel deposits, immediately adjacent the abutments. The two 2014 borings (within 40 feet of the existing bridge) indicated the loose sands extend from the ground surface to 2 to 3 feet bgs (approximately elev 102 to 103 feet). Underlying the near-surface loose sand, we encountered medium dense to very dense silty sand, hard sandy silt, and hard clay with sand to the maximum depth explored of 50 feet bgs (elev 56 feet).

[2] D.E. Marchand and J.A. Barstow, 1979, Preliminary Geologic Map of Cenozoic Deposits of the Bellota Quadrangle, California: scale 1:62,500.

The exploration locations, more detailed soil descriptions, and legends are shown on the attached LOTBs.

7.3 GROUNDWATER

During drilling in July of 2014, groundwater was encountered at about 19 feet below existing grade (approximately elev 87 feet). In December of 1980, groundwater was encountered at approximately elev 96 feet. In general, the maximum groundwater level in the vicinity of the bridge is expected to be similar to the water level in the creek. The variation in the groundwater elevations may be due to proximity to the channel and the time of year the borings were drilled. For design and construction, we assume the groundwater level will be consistent with the creek level or the channel bottom, whichever is lower. At the time of this report we did not have information about the seasonal or historical changes in the creek water surface elevation.

8 SCOUR CONSIDERATIONS

The subsurface soil conditions along the banks and bed of Mosher Creek generally consist of loose sand to elev 98.5 (west) to 92.5 (center and east) feet with a D_{50} value of approximately 0.20 mm. Below the loose sand, the banks of the creek are underlain by dense silty sand, hard clay, and very stiff to hard sandy silt with D_{50} values ranging from 0.05 to 0.20 mm.

According to the Preliminary Design Hydraulic Study[3], the total scour for the either concrete voided slab unit structure is elev 91 feet. Total scour for the box culvert alternative is elev 95 feet.

9 SEISMIC DATA AND EVALUATION

9.1 SURFACE FAULT RUPTURE

The site does not lie within or adjacent to an Alquist–Priolo Earthquake Fault Zone and no known active faults are mapped within or through the project area. The closest fault considered in the ground motion analysis is the Great Valley Fault System, located approximately 30 miles from the site. Based on fault mapping by the US Geologic Survey, nearby Quaternary age faults include the Bear Mountain fault (16± miles to the northeast), the Melones Fault (17± miles to the northeast), and the Greenville Fault Zone (40± miles to the southwest). Based on this mapping we consider the potential for fault rupture at the site to be low. Nearby faults are shown on Figure 3.

9.2 GROUND MOTION

The Caltrans ARS Online (v3.0.1)[4] web-based tool was used to calculate the probabilistic acceleration response spectra for the site based on criteria outlined in Appendix B of the April 2019 Caltrans Seismic Design Criteria (SDC) Version 2.0.

For our evaluation, we used latitude 38.0523° N and longitude 121.0875° W for the site coordinates and an estimated shear wave velocity (V_{S30}) of 366 meters per second (about 1,200

[3] Avila and Associates Consulting Engineers, Inc., March 6, 2020
[4] https://arsonline.dot.ca.gov/output1-6.php, accessed February 12, 2020.

feet per second) that corresponds to the boundary of “stiff soil” and “dense soil” (Soil Profile Type C/D) for the upper 100 ft of the soil profile.

The V_{S30} value was determined for this site based on the test boring data and correlations with SPT blow count N-values corrected for hammer efficiency using the equations outlined by Caltrans[5].

The Design ARS Curve is shown on Figure 4.

9.3 LIQUEFACTION POTENTIAL

Liquefaction can occur when saturated, loose to medium dense, granular soils (generally within 50 ft of the surface), or specifically defined cohesive soils, are subjected to ground shaking. Based on the results of our field exploration and an assumed groundwater level of elev 96.5 feet (approximate channel bottom) our preliminary liquefaction analysis yielded factors of safety against liquefaction above 3 for the medium dense to dense sand below elev 92.5 feet. Therefore, the potential for liquefaction below elev 92.5 feet is low.

Loose sand was encountered above elev 98.5 (west) to 92.5 (center and east). The loose sand below the groundwater level, which are limited to the center and east portions of the bridge, were evaluated and could liquefy. This assumes the high groundwater level occurs during or right after high creek levels, which could be realized during less than half of an average calendar year. Therefore, although the potential for liquefaction in the loose sand is moderate to high during the wetter half year, the potential for liquefaction in the dry half of year is low.

9.4 SEISMICALLY-INDUCED SETTLEMENT

Saturated granular soil below the groundwater can be susceptible to reconsolidation volumetric strain during or after ground shaking. Similarly, dry or unsaturated granular soil above the groundwater can be susceptible to densification when subject to seismic shaking. Both mechanisms can result in settlement of the ground surface.

The loose sand below the groundwater level and above elev 92.5 at the center and east portions of the bridge is susceptible to liquefaction-related reconsolidation volumetric strain settlement. If a seismic event is realized in the wet half of the year when the groundwater level is high, seismically-induced settlement at the ground surface could be approximately ½ to 2 inches.

Due to the increased relative density of the granular soil above the groundwater level, we expect the seismically-induced dry sand settlement at the site to be negligible.

9.5 SEISMIC SLOPE INSTABILITY

Additional seismic slope instability analysis will be completed during final design when foundation type and details have been determined; however, we do not expect seismic slope instability to impact the project.

[5] Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations, Appendix A, November 2012

10 CORROSION EVALUATION

We completed corrosivity tests on one soil sample obtained from the test borings. Results of the soil corrosion tests are summarized in Table 1.

Table 1: Soil Corrosion Test Summary

Boring / Sample No.	Depth (ft)	Elevation (ft)	pH	Minimum Resistivity (ohm-cm)	Chloride (ppm)	Sulfate (ppm)
B2/4C	21	85	6.79	1,130	11.0	3.6

Note: According to Caltrans Corrosion Guidelines, a site is considered 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 1,500 ppm, or the pH is 5.5 or less (Caltrans, Memo to Designers 3-1, June 2014). Except for MSE wall design, Caltrans does not include minimum resistivity as a parameter to define a corrosive area for structures (Caltrans Corrosion Guidelines Version 3.0, March 2018).

Based on the test results and Caltrans guidelines, the soils are considered non-corrosive to structural steel/concrete foundation elements. These tests are only an indicator of soil corrosivity and the designer should consult with a corrosion engineer if these values are considered significant. Section 12 of Caltrans Corrosion Guidelines Version 3.0, March 2018 provides information regarding corrosion mitigation measures for structural elements.

11 DISCUSSIONS AND CONCLUSIONS

Based on subsurface soil and groundwater conditions encountered during our fieldwork, the foundation material below elev 98.5 (west) to 92.5 (center and east) feet consists of very dense sand which is very strong, non-liquefiable, and suitable for shallow foundations. However, total scour for the concrete voided slab and box culvert is elev 91 and 95 feet, respectively.

The new bridge structure could be supported on the very dense sand by means of either spread footings for the concrete voided slab below elev of 91 feet or the box culvert slab at elev 92.5 feet. Alternatively, deep foundations, such as cast-in-drilled-hole or cast-in-steel-shell, could be used for the new bridge.

Groundwater could be shallow while or after the creek is flowing, so construction during the later summer or fall would minimize the potential for groundwater management during construction. Construction during the wet times of year could expose shallow groundwater, in addition to flowing or standing water in the creek bed.

The loose sand above elevation 92.5 feet in the center and east portions of the bridge could liquefy and up to 2 inches of seismically-inducted settlement could be realized. The bridge approach backfill and pavement could be impacted and some maintenance in the form of pavement overlay to level the roadway surface could be necessary following the design seismic event. Bridge foundations below this level should not be impacted. Liquefaction and seismically-induced settlement are not expected on the west side of the bridge.

A general discussion of each foundation alternative is provided below.

12 PRELIMINARY FOUNDATION RECOMMENDATIONS

12.1 SHALLOW FOUNDATIONS

Spread footings or a box culvert slab are considered suitable for new bridge support at this site provided the shallow foundations bear on the dense sand below the total scour level. Spread footings for the concrete voided slab could be founded at or below elev 89 feet (2 feet below the total scour elevation of 91 feet and into the dense sand at elev 98.5 to 92.5 feet). The box culvert slab could be founded at or below elev 92.5 feet (below total scour of elev 95 feet and on the dense sand at elev 92.5 feet). At these elevations, the shallow foundations would achieve a nominal bearing capacity of 5,000 pounds per square foot. If the bottoms of shallow foundations are designed above these levels, the loose sand above these elevations should be removed and replaced with structure backfill or controlled low strength material (CLSM) to create a strong and suitable bearing surface.

Once the scour evaluation has been completed, these recommendations may be impacted.

12.2 DEEP FOUNDATIONS

Due to the very dense sands underlying the site, deep foundations, such as driven concrete piles could encounter refusal at a shallow depth and are deemed infeasible. H-piles could likely be driven into the very dense sands, but would likely be very deep to develop vertical capacity and their lateral capacity is low and therefore not recommended. Cast-in-steel-shell (CISS) piles could be used, but would likely need to be drilled out during driving to remove the soil plug developed inside the pile to reduce frictional resistance. In addition, the soil plug would need to remain in place for the lowest three pile diameters of the CISS piles to develop end bearing. Cast-in-drilled-hole (CIDH) piles can be drilled in these materials and they would provide sufficient support below the potentially liquefiable loose sand. Use of CIDH piles at this site is expected to require special installation measures, including temporary casing, slurry drilling methods (with inspection tubes) and the use of minimum 24-inch diameter CIDH piles for tremie concrete placement due to the anticipated presence of groundwater observed at the site.

For preliminary design, 24-inch CISS piles are expected to extend to about elev 45 feet to develop capacity for 400-kip nominal loads. Similarly, 24-inch CIDH piles are expected to extend to about elev 40 feet to develop capacity for 400-kip nominal loads. The pile lengths for pile foundations will depend on the actual pile diameter and defined compressive, tensile and lateral loading requirements as provided during final design. Downdrag (negative skin friction) on proposed pile foundations is not anticipated to significantly impact foundation elements during design earthquake load conditions at both abutments.

13 APPROACH FILL EARTHWORK

We expect that approach fill will be necessary behind the proposed abutments. If the loose sand is encountered at the bottom of the excavation for approach fill, it should be removed and replaced with engineered fill or CLSM; this material is not expected on the west side, but could exist to elev 92.5 feet in the east side. Site Grading and Earthwork should be performed in accordance with Section 16 and Section 19 of Caltrans Standard Specifications, respectively.

14 PAVEMENT SECTIONS

New flexible hot mix asphalt (HMA) pavement structural section alternatives calculated in accordance with Caltrans flexible pavement design methods in the Highway Design Manual. Two R-value tests were performed, resulting in values of 27 and 31. Due to the potential variations in subgrade materials, we used an R-value of 27 for design. for various Traffic Index (TI) values using a design R-value = 27 are shown in Table 2. If import fill with a higher R-value is utilized during construction, the Class 2 Aggregate Base (AB) sections below should be reduced accordingly.

Table 2: Flexible Pavement Sections

TI	Material Type/Thickness Required	
	HMA (ft)[4]	AB (ft)
6	0.25	0.75
7	0.30	0.95
8	0.40	1.00

[4]The upper 0.2 feet of HMA may be replaced with rubberized hot mix asphalt.

Design by the Caltrans method presumes materials and construction in accordance with the latest Caltrans "Standard Specifications."

15 CONSTRUCTION CONSIDERATIONS

15.1 EXISTING FOUNDATIONS

Consistent with Section 60-2.01C of the Caltrans 2018 Standard Specifications, remove existing piling, piers, abutments, and pedestals to at least one foot below ground line or 3 feet below finished grade, whichever is lower, that may conflict with any planned improvements associated with the new bridge structure.

15.2 EXCAVATION AND SHORING

We expect that excavation of onsite soils can be achieved using typical heavy-duty construction equipment. The contractor is responsible for design, construction, and safety of all excavations and shoring in accordance with CalOSHA requirements.

15.3 GROUNDWATER

The groundwater is expected to vary with the time of year and creek level. Groundwater could be shallow while or after the creek is flowing, so construction during the later summer or fall would minimize the potential for groundwater management during construction. Typical sump pump dewatering should be expected while or after the creek is flowing.

If the bridge is constructed in the wetter times of year, groundwater levels could be high; potentially as high as the creek bed. In this time of year, sump pump dewatering may be feasible, provided the creek flow dammed upstream of and diverted around the construction area.

16 ADDITIONAL ANALYSIS

This memorandum is preliminary and should not be used for final design. CAInc's current authorized scope of services includes a PFR only.

Once authorized, CAInc will complete the geotechnical engineering analyses for the selected foundation elements based on defined foundation data and loads provided by the County or MBI. CAInc will provide a Foundation Report for final bridge design, including specific foundation recommendations based on design criteria developed for this project.

17 LIMITATIONS

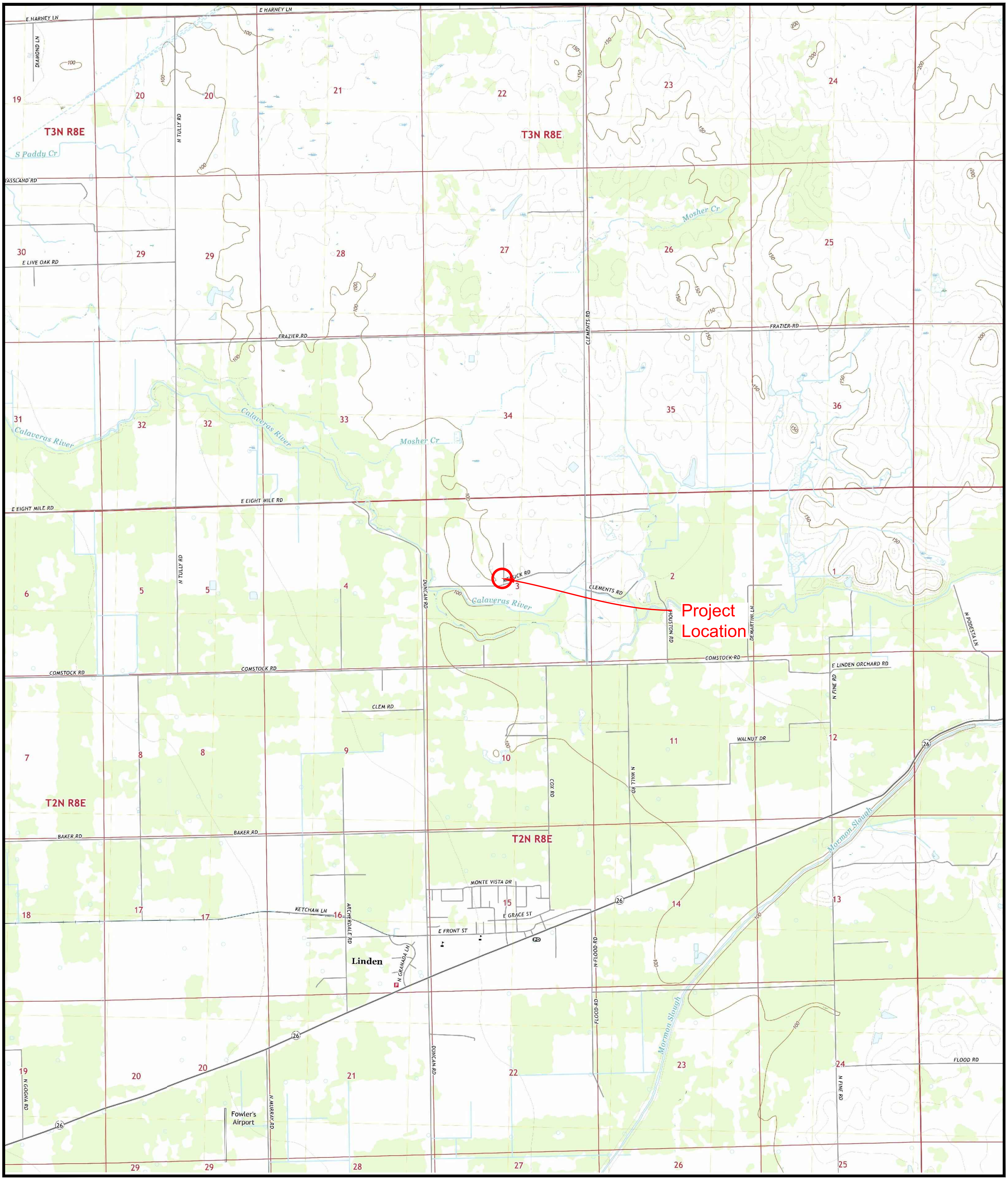
CAInc performed services in accordance with generally accepted geotechnical engineering principles and practices currently used in this area. This report applies only to the Messick Road Bridge Replacement project. Do not use or rely on this report for different locations or improvements without the written consent of CAInc. Thank you for including Crawford & Associates, Inc on your design team. Please call if you have questions or require additional information.

Sincerely,
Crawford & Associates, Inc.,

Benjamin D. Crawford, PE, GE
Principal Geotechnical Engineer

Christopher D. Trumbull, PE, GE, D.GE
Senior Project Manager

FIGURES



North

Source:
USGS 7.5' Topographic Maps, Linden, San Joaquin County, California, 2018, 1:24,000

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Taber
Since 1954

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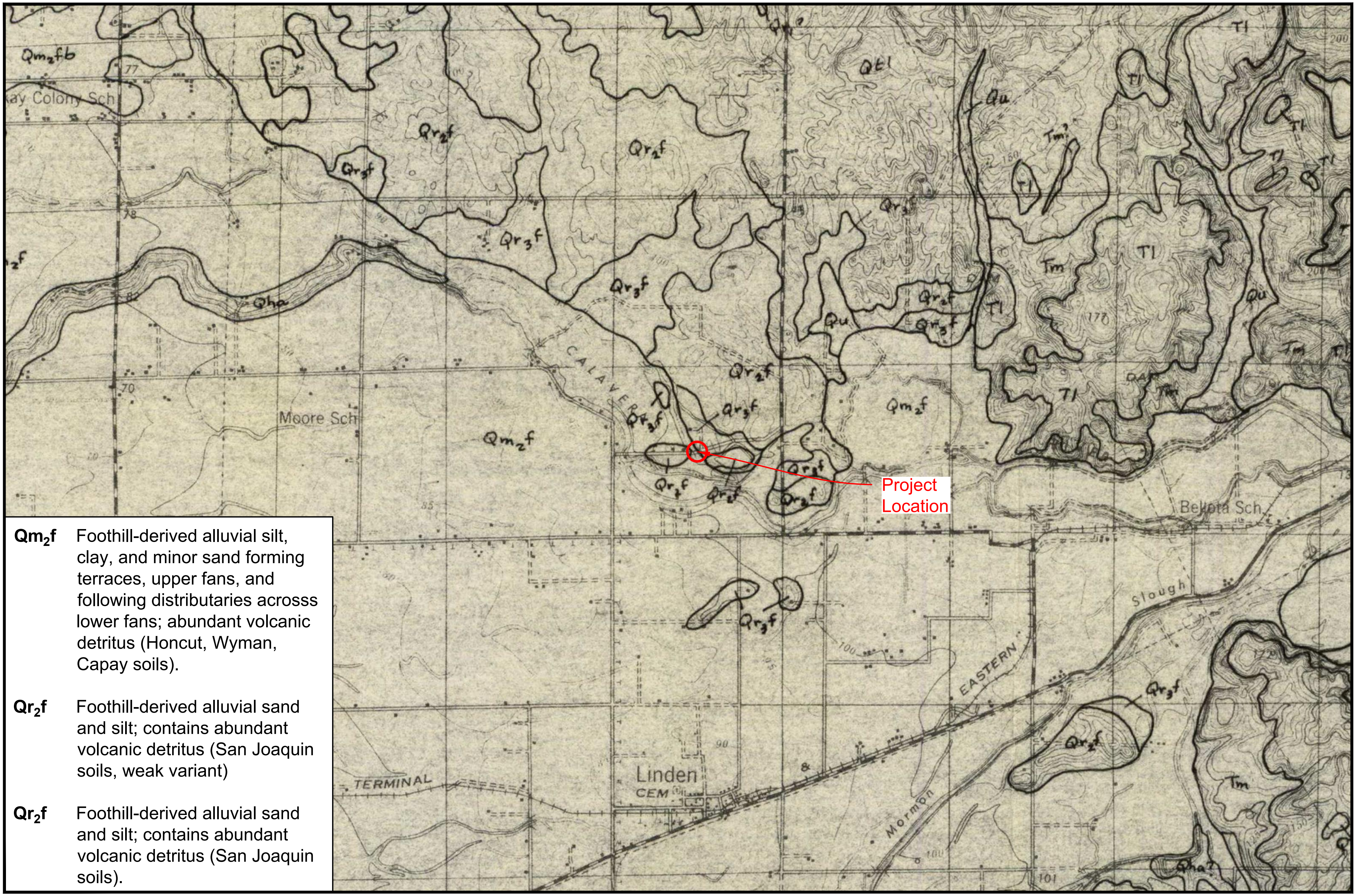
Messick Road Bridge

San Joaquin County, CA

Figure 1
Vicinity Map

Proj. No:	14-156.2
Scale:	1"=4,000'
Date:	2/21/2020



Qm_2f Foothill-derived alluvial silt, clay, and minor sand forming terraces, upper fans, and following distributaries acrosss lower fans; abundant volcanic detritus (Honcut, Wyman, Capay soils).

Qr_2f Foothill-derived alluvial sand and silt; contains abundant volcanic detritus (San Joaquin soils, weak variant)

Qr_2f Foothill-derived alluvial sand and silt; contains abundant volcanic detritus (San Joaquin soils).

North

Source: Marchand, D.E., and Bartow, J.A.. *Preliminary geologic map of Cenozoic deposits of the Bellota quadrangle, California*. Open-File Report of OF-79-664. 1:62,500. Reston, VA: United States Geologic Survey, 1979.

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Messick Road Bridge

San Joaquin County, CA

Figure 2
Geology Map

Proj. No:	14-156.2
Scale:	1"=4,000'
Date:	2/21/2020

LEGEND

Quaternary Fault (Age)	Quaternary Fault (Age)	Location
<150 years	<750,000 years	Well Constrained
<15,000 years	<1.6 million years	Moderately Constrained
<130,000 years		Inferred

North

Source:
Basemap: AutoCAD Civil3D Geolocation Tool, using Bing Maps

Fault Data: USGS GIS Data

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Messick Road Bridge

San Joaquin County, CA

Figure 3
Fault Activity Map

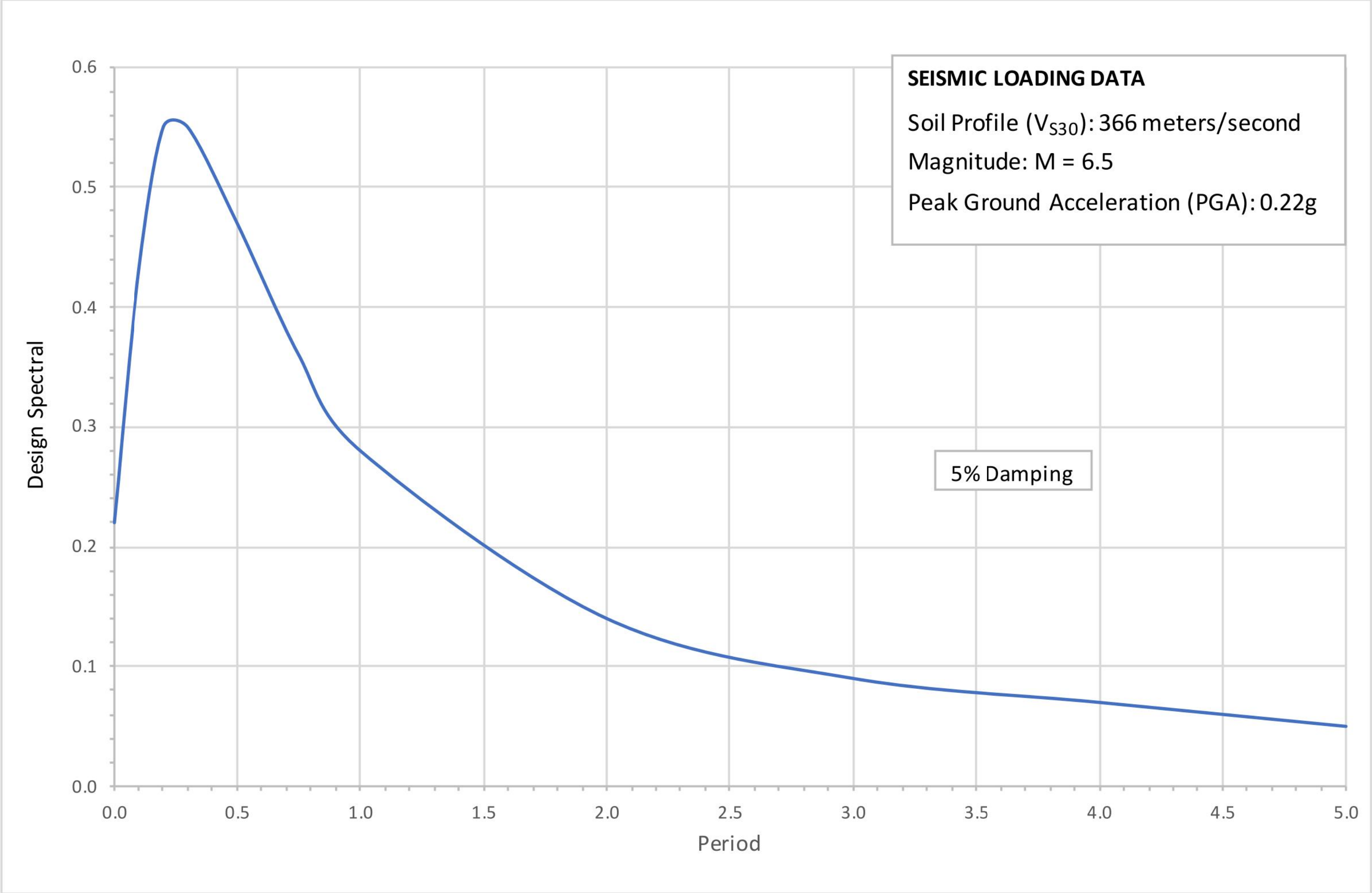
Proj. No:	14-156.2
Scale:	1"=50,000'
Date:	2/21/2020

Messick Road Bridge Replacement over Mosher Creek
San Joaquin County, California

Caltrans ARS Online Version: V3.0
Date Accessed: 2/12/2020

Period (s)	Design Spectral Acceleration, Sa (g)
0.00	0.22
0.10	0.43
0.20	0.55
0.30	0.55
0.50	0.47
0.75	0.36
1.00	0.28
2.00	0.14
3.00	0.09
4.00	0.07
5.00	0.05

The USGS 2014 hazard data for a 975-year return period is reported along with adjustment factors required by Caltrans Seismic Design Criteria (SDC) V2.0.



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Site Latitude: 38.0523
Site Longitude: -121.0875

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Messick Road Bridge

San Joaquin County, CA

Figure 4
Preliminary ARS Curve

Proj. No: 14-156.2
Scale: N/A
Date: 2/21/2020

DIST	COUNTY	ROUTE	TOTAL PROJECT	SHEET NO	TOTAL SHEETS
10	SJ	N/A		1	5

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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

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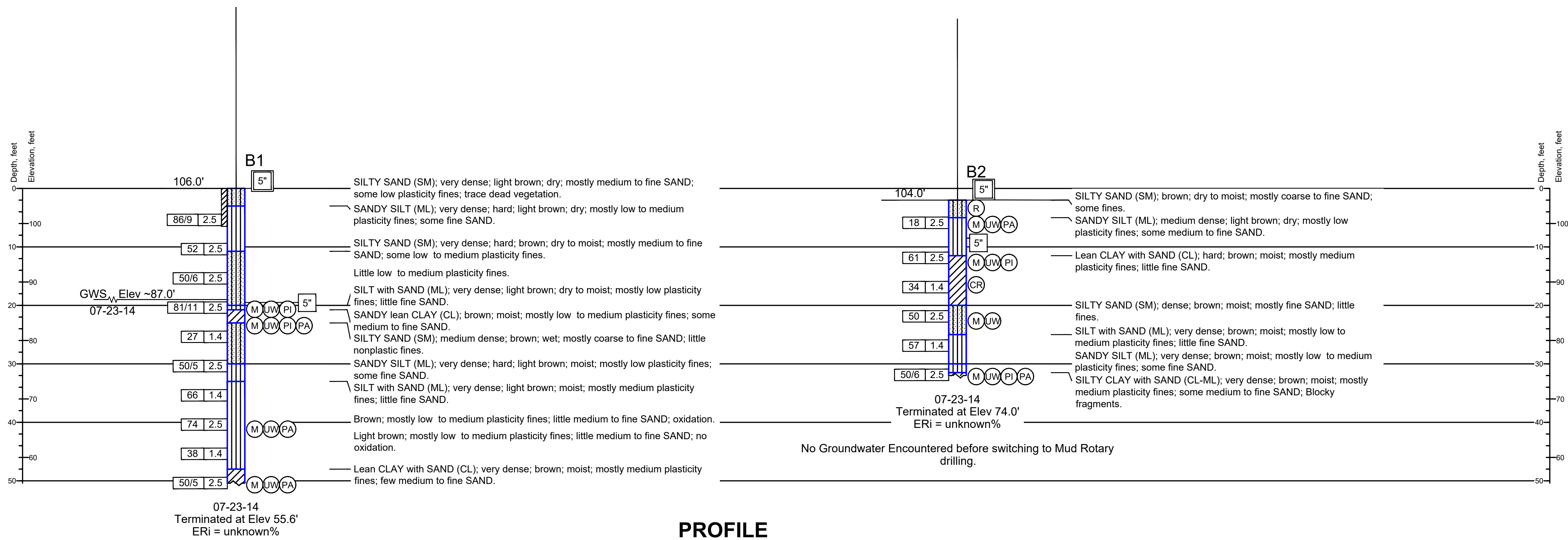
14-156.2
Project Number

PLAN
SCALE (11"x17"): 1" = 40'

NOTES:

1. Field classification of soils was in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010). See Log of Test Borings No. 2, "Soil Legend".
2. Standard Penetration tests were performed in accordance with ASTM D 1586-99 using a hammer operated with an automated drop system. Drill rods were 1 5/8-inch diameter "A"-rods; sampler was driven with brass liners.
3. "2.4 inch sampler": ID=2.4 inch, OD=2.9 inch. "2.0 inch sampler": ID=2.0 inch, OD=2.5 inch. Both driven in same manner as SPT ("1.4 inch") sampler.
4. If laboratory tests are not shown as being performed, the soil descriptions presented on the LOTB are based solely on the visual practices described in this Manual.
5. The length of each sampled interval is shown graphically on the boring log. Whole number blow counts ("N") represent the "standard penetration resistance" interval in accordance with the Caltrans Soil & Logging, Classification, and Presentation Manual (June 2010). Where less than 0.5 feet of penetration is achieved, the blow count shown is for that fraction of the "standard penetration resistance" interval actually penetrated.
6. Consistency of soils shown in ( ) where estimated.
7. Groundwater surface (GWS) elevations in the borings indicated on the Log of Test Boring Sheets reflect the fluid level in the borings on the specified date.
8. Groundwater elevations are subject to seasonal fluctuations and may occur at higher or lower elevations depending on the conditions at any particular time.
9. This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)



PROFILE
HORIZ. SCALE: NO SCALE
VERT. SCALE (11"x17"): 1" = 20'

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR:		BRIDGE NO.	MESSICK ROAD BRIDGE
FUNCTIONAL SUPERVISOR	DRAWN BY: Logan Brown	FIELD INVESTIGATION BY: Jonathan Wright/Shawn Leyva	SAN JOAQUIN COUNTY PUBLIC WORKS	X	-	
NAME: Chris Trumbull	CHECKED BY: Chris Trumbull			Project Manager (Consultant)	POST MILE -	PRELIMINARY LOG OF TEST BORINGS 1 of 5

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU XXXXX
EA XXXXXX

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET	OF
1	5

DIST	COUNTY	ROUTE	TOTAL PROJECT	SHEET NO	TOTAL SHEETS
10	SJ	N/A		2	5

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

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

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14-156.2
Project Number

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

LEGEND – SOIL (SHEET 1 OF 2)

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.

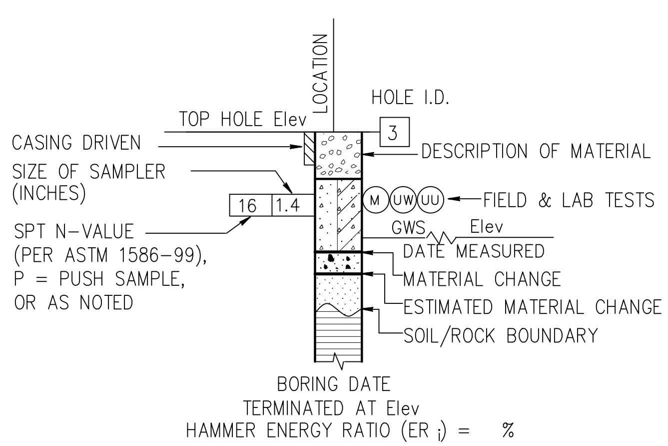
BOREHOLE IDENTIFICATION

SYMBOL	HOLE TYPE	DESCRIPTION
Size	A	AUGER BORING (HOLLOW OR SOLID STEM BUCKET)
Size	R RW P	ROTARY DRILLED BORING (CONVENTIONAL) ROTARY DRILLED WITH SELF–CASING WIRE–LINE ROTARY PERCUSSION BORING (AIR)
Size	R RC	ROTARY DRILLED DIAMOND CORE ROTARY CORE WITH CONTINUOUSLY–SAMPLED, SELF–CASING WIRE–LINE
Size	HD HA	HAND DRIVEN (1–INCH SOIL TUBE) HAND AUGER
●	D	DYNAMIC CONE PENETRATION BORING
▲	CPT	CONE PENETRATION TEST (ASTM D 5778)
□	O	OTHER (NOTE ON LOTB)

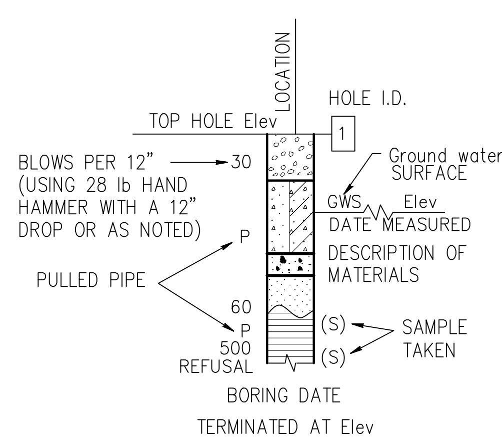
Note: Size in inches.

CONSISTENCY OF COHESIVE SOILS

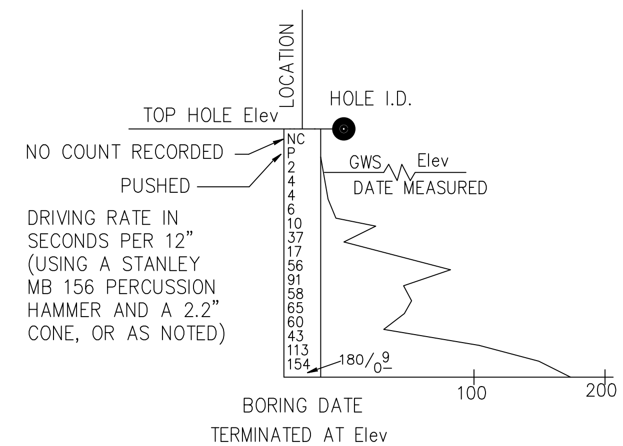
DESCRIPTION	SHEAR STRENGTH (tsf)	POCKET PENETROMETER MEASUREMENT, PP, (tsf)	TORVANE MEASUREMENT, TV, (tsf)	VANE SHEAR MEASUREMENT, VS, (tsf)
VERY SOFT	LESS THAN 0.12	LESS THAN 0.25	LESS THAN 0.12	LESS THAN 0.12
SOFT	0.12 – 0.25	0.25 – 0.5	0.12 – 0.25	0.12 – 0.25
MEDIUM STIFF	0.25 – 0.5	0.5 – 1	0.25 – 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



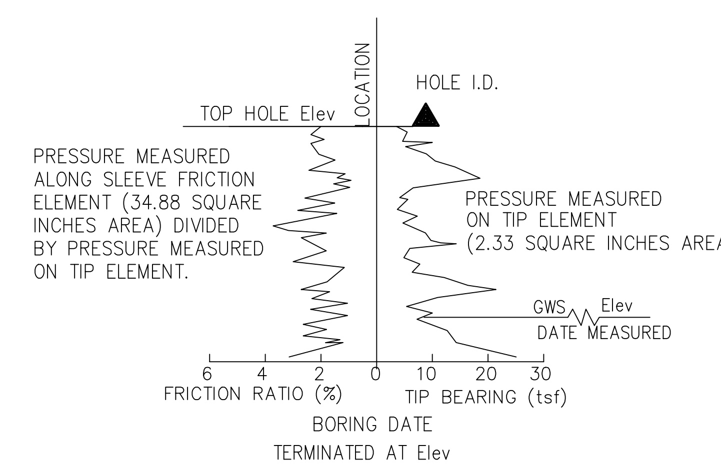
ROTARY BORING



HAND BORING



DYNAMIC CONE PENETRATION BORING



CONE PENETRATION TEST (CPT) BORING

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR: SAN JOAQUIN COUNTY PUBLIC WORKS		BRIDGE NO.	MESSICK ROAD BRIDGE
FUNCTIONAL SUPERVISOR NAME: Chris Trumbull	DRAWN BY: Logan Brown CHECKED BY: Chris Trumbull	FIELD INVESTIGATION BY: Jonathan Wright/Shawn Leyva		X Project Manager (Consultant)	- POST MILE -	PRELIMINARY LOG OF TEST BORINGS 2 of 5

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU XXXXX
EA XXXXXX

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES

SHEET 2 OF 5

Crawford & Associates, Inc.
1100 Corporate Way, Suite 230
Sacramento, CA 95831 (916) 455-4225

14-156.2
Project Number

REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

LEGEND – SOIL (SHEET 2 OF 2)

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 ORGANIC 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 4546)
- CP COMPACTION CURVE (CTM 216)
- CR CORROSIVITY TESTING (CTM 643, CTM 422, CTM 417)
- CU CONSOLIDATED UNDRAINED TRIAXIAL (ASTM D 4767)
- DR DRAINED RESIDUAL SHEAR STRENGTH (ASTM D 6467)
- 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 PLASTICITY INDEX (AASHTO T 90) LIQUID LIMIT (AASHTO T 89)
- 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)
- SW SWELL POTENTIAL (ASTM D 4546)
- UC UNCONFINED COMPRESSION-SOIL (ASTM D 2166) UNCONFINED COMPRESSION-ROCK (ASTM D 7012 METHOD C)
- UU UNCONSOLIDATED UNDRAINED TRIAXIAL (ASTM D 2850)
- UW UNIT WEIGHT (ASTM D 7263)

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
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"

REGISTERED CIVIL ENGINEER DATE

PLANS APPROVAL DATE

Crawford & Associates, Inc.
1100 Corporate Way, Suite 230
Sacramento, CA 95831 (916) 455-4225

14-156.2
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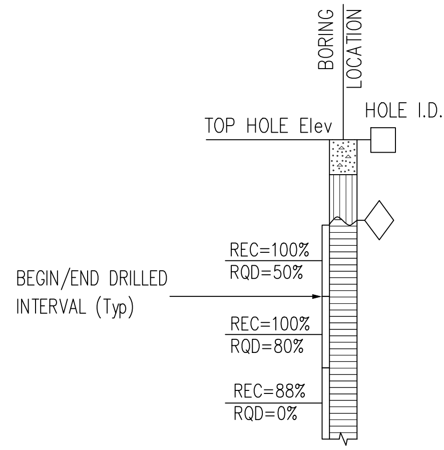
REFERENCE: CALTRANS SOIL & ROCK LOGGING, CLASSIFICATION, AND PRESENTATION MANUAL (2010)

PERCENT CORE RECOVERY (REC) & ROCK QUALITY DESIGNATION (RQD)

$$REC = \frac{\sum \text{LENGTH OF THE RECOVERED CORE PIECES (INCHES)}}{\text{TOTAL LENGTH OF CORE RUN (INCHES)}} \times 100\%$$

$$RQD = \frac{\sum \text{LENGTH OF INTACT CORE PIECES} \geq 4 \text{ INCHES}}{\text{TOTAL LENGTH OF CORE RUN (INCHES)}} \times 100\%$$



RQD* INDICATES SOUNDNESS CRITERIA NOT MET.

BEDDING SPACING

DESCRIPTION	THICKNESS / SPACING
MASSIVE	GREATER THAN 10'
VERY THICKLY BEDDED	3' – 10'
THICKLY BEDDED	1' – 3'
MODERATELY BEDDED	4" – 1'
THINLY BEDDED	1" – 4"
VERY THINLY BEDDED	1/4" – 1"
LAMINATED	LESS THAN 1/4"

LEGEND OF ROCK MATERIALS

- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND – ROCK (SHEET 1 OF 1)

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 POCKETKNIFE OR SHARP PICK WITH LIGHT OR MODERATE PRESSURE. BREAKS WITH MODERATE HAMMER BLOWS.
MODERATELY SOFT	CAN BE GROOVED ˆ INCH 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 BY 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 FROM 4 INCHES TO 1 ft.
INTENSELY FRACTURED	CORE LENGTHS MOSTLY FROM 1 TO 4 INCHES.
VERY INTENSELY FRACTURED	MOSTLY CHIPS AND FRAGMENTS.

WEATHERING DESCRIPTORS FOR INTACT ROCK

DESCRIPTION	DIAGNOSTIC FEATURES					GENERAL CHARACTERISTICS
	CHEMICAL WEATHERING–DISCOLORATION AND/OR OXIDATION		MECHANICAL WEATHERING–GRAIN BOUNDARY CONDITIONS (DISAGGREGATION) PRIMARILY FOR GRANITICS AND SOME COARSE-GRAINED SEDIMENTS	TEXTURE AND LEACHING		
	BODY OF ROCK	FRACTURE SURFACES		TEXTURE	LEACHING	
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, SEE GRAIN BOUNDARY CONDITIONS.	ALL FRACTURE SURFACES ARE DISCOLORED OR OXIDIZED, SURFACES FRIABLE.	PARTIAL SEPARATION, ROCK IS FRIABLE; IN SEMIARID 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 OR OXIDIZED THROUGHOUT, BUT RESISTANT MINERALS SUCH AS QUARTZ MAY BE UNALTERED; ALL FELDSPARS AND Fe–Mg MINERALS ARE COMPLETELY ALTERED TO CLAY.		COMPLETE SEPARATION OF GRAIN BOUNDARIES (DISAGGREGATED).	RESEMBLES A SOIL, PARTIAL OR COMPLETE REMNANT ROCK STRUCTURE MAY BE PRESERVED; LEACHING OF SOLUBLE MINERALS USUALLY COMPLETE.		CAN BE GRANULATED BY HAND. RESISTANT MINERALS SUCH AS QUARTZ MAY BE PRESENT AS "STRINGERS" OR "DIKES."

DIST	COUNTY	ROUTE	TOTAL PROJECT	SHEET NO	TOTAL SHEETS
10	SJ	N/A		5	5

REGISTERED CIVIL ENGINEER   DATE

PLANS APPROVAL DATE

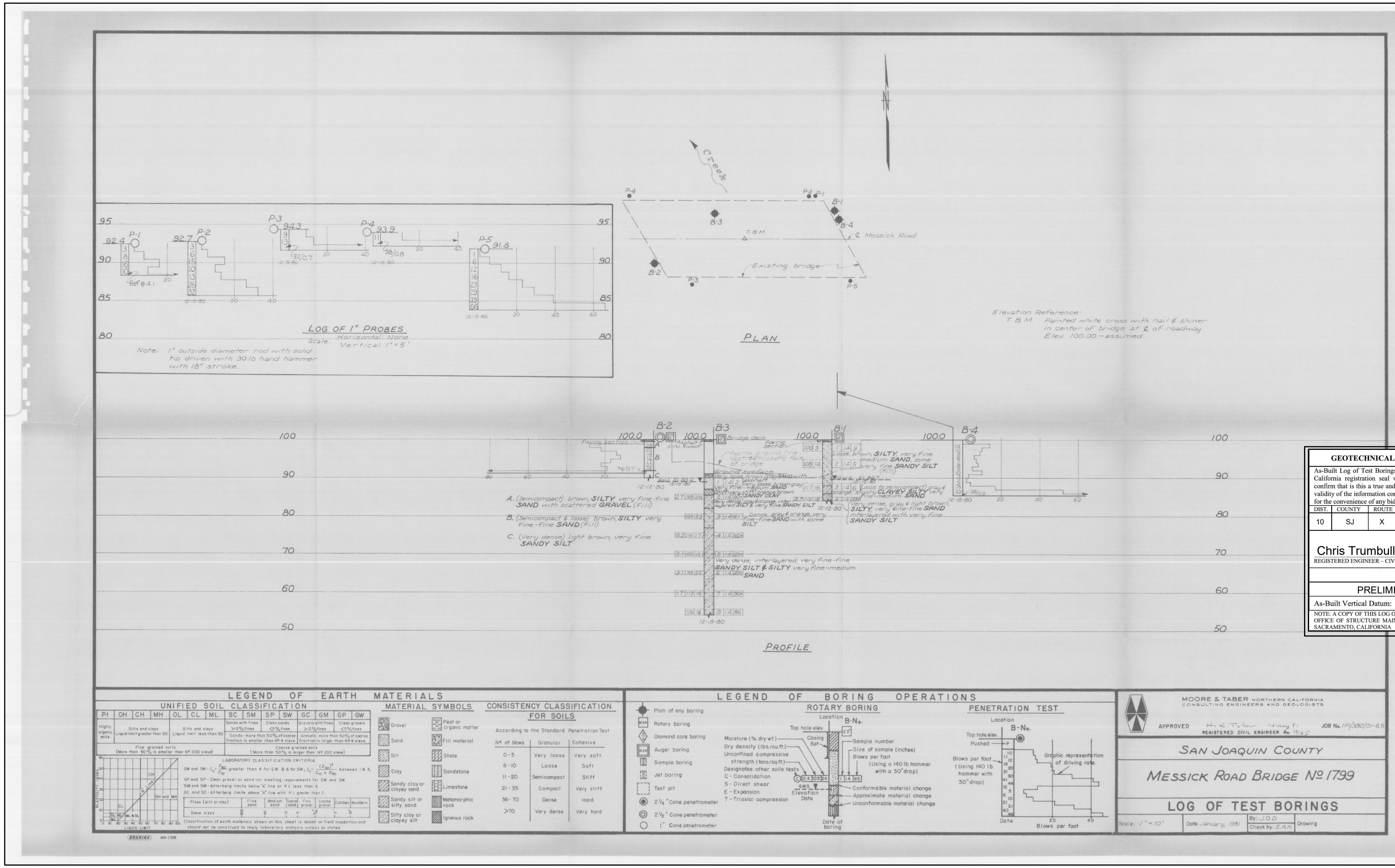
The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

Crawford & Associates, Inc.
1100 Corporate Way, Suite 230
Sacramento, CA 95831 (916) 455-4225

14-156.2
Project Number

NOTES:

1. Field classification of soils was in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010). See Log of Test Borings No. 2, "Soil Legend".
2. Standard Penetration tests were performed in accordance with ASTM D 1586-99 using a hammer operated with an automated drop system. Drill rods were 1 5/8-inch diameter "A"-rods; sampler was driven with brass liners.
3. "2.4 inch sampler": ID=2.4 inch, OD=2.9 inch. "2.0 inch sampler": ID=2.0 inch, OD=2.5 inch. Both driven in same manner as SPT ("1.4 inch") sampler.
4. If laboratory tests are not shown as being performed, the soil descriptions presented on the LOTB are based solely on the visual practices described in this Manual.
5. The length of each sampled interval is shown graphically on the boring log. Whole number blow counts ("N") represent the "standard penetration resistance" interval in accordance with the Caltrans Soil & Logging, Classification, and Presentation Manual (June 2010). Where less than 0.5 feet of penetration is achieved, the blow count shown is for that fraction of the "standard penetration resistance" interval actually penetrated.
6. Consistency of soils shown in ( ) where estimated.
7. Groundwater surface (GWS) elevations in the borings indicated on the Log of Test Boring Sheets reflect the fluid level in the borings on the specified date.
8. Groundwater elevations are subject to seasonal fluctuations and may occur at higher or lower elevations depending on the conditions at any particular time.
9. This LOTB sheet was prepared in accordance with the Caltrans Soil & Rock Logging, Classification, and Presentation Manual (2010)



GEOTECHNICAL SERVICES – DIVISION OF ENGINEERING SERVICES

As-Built Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that is this a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	POST MILES – TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
10	SJ	X	XX	2	5

Chris Trumbull — REGISTERED ENGINEER – CIVIL
2/20/2020 — DATE

MESSICK ROAD BRIDGE

PRELIMINARY LOG OF TEST BORINGS No. 5

As-Built Vertical Datum: Datum Conversion:

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — CU XX EA: XX — BRIDGE NO. XX

PROFILE

HORIZ. SCALE: NO SCALE
VERT. SCALE (11"x17"): 1" = 30'

ENGINEERING SERVICES		GEOTECHNICAL SERVICES	PREPARED FOR: SAN JOAQUIN COUNTY PUBLIC WORKS		BRIDGE NO. -	MESSICK ROAD BRIDGE
FUNCTIONAL SUPERVISOR	DRAWN BY: Logan Brown	FIELD INVESTIGATION BY: Jonathan Wright/Shawn Leyva		X Project Manager (Consultant)	POST MILE -	PRELIMINARY LOG OF TEST BORINGS 5 of 5
NAME: Chris Trumbull	CHECKED BY: Chris Trumbull					

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU XXXXX
EA XXXXXX

DISREGARD PRINTS BEARING EARLIER REVISION DATES

REVISION DATES | SHEET 2 | OF 5