

FOR CONTRACT NO.: 1000020213

10-0Q4404

INFORMATION HANDOUT

MATERIALS INFORMATION

GEOTECHNICAL DESIGN REPORT

ROUTE: 10-MPA-140-22.1/R30.9

Memorandum

*Flex your power!
Be energy efficient!*

To: Caroline Reyes
Design Branch Senior
Central Region Design – District 10

Attn: Pat Teczon

Date: November 30, 2010

File: 10-Mpa-140 PM 22.1, R30.9
EA 10-0Q4401
(E-FIS 10 0002 0213)
Two CMS's

From: DEPARTMENT OF TRANSPORTATION
Division of Engineering Services
Geotechnical Services
Geotechnical Design - North

Subject: Geotechnical Design Report – Two CMS's, One Replace & One New

Introduction

Per District 10 Traffic Design's email request, dated September 28th, 2010, a geotechnical design report (GDR) is provided for a Route 140 project in Mariposa County. This project has two locations. Location 1 (PM 22.1) is in the town of Mariposa near the junction of Route 140 and Route 49 (Jones Street). Location 2 (PM 30.9) is located 3 miles northwest of the town called, Midpines, along Route 140. See Plate No. 1 for the Vicinity Map.

At Location 1, the project is proposed to replace the existing Model 520 Changeable Message Sign (CMS) to a standard Model 510 CMS at Sta 50+00. At Location 2, the project is proposed to construct a maintenance vehicle pullout and new Model 510 CMS at Sta 14+51.

This memo documents the geotechnical recommendations for the replacement of the CMS on Location 1 and the new construction of the CMS on Location 2.

Pertinent Reports and Investigation

In preparation of this report, the following documents were reviewed:

1. Western Regional Climate Center for 1893-2006.
2. Geologic map of California: Mariposa sheet: California Division of Mines and Geology, 1967

Existing Facilities and Proposed Improvements

Location 1 is located on Route 140 within the vicinity of the town of Mariposa. Near this location of Rte 140, the highway consists of a 2-lane undivided roadway aligned in generally

north-south direction. The roadway is built on rolling terrain on cuts and fills. There are local streets that are directly connected to the highway. There are overhead utility lines that cross the roadway. The project is proposed to replace the existing Model 520 CMS to a standard Model 510 CMS at this location.

Location 2 is located on Route 140 approximately 3 miles away along the eastbound direction of the highway from the town of Midpines. Near this location of Rte 140, the highway consists of 2-lane undivided roadway aligned with a truck climbing lane on the westbound side in a generally north-south direction. The roadway is built on rolling/mountainous terrain on mostly cuts and fills. There are local streets and private roads that are directly connected to the highway. There are no overhead utility lines that run along the roadway. The project is proposed to construct a maintenance vehicle pullout and a Model 510 CMS on this location.

Physical Setting

The physical setting of the project site and the surrounding area was reviewed to provide climate, topography and drainage, man-made and natural features, geology characteristics to aid in project design and construction planning. The following is a discussion of the review:

Climate

Information regarding the climate in the project area is provided by the Western Regional Climate Center period of record from 1893 to 2006. There are two stations located in near the town of Mariposa (#045346 & #045352). The average annual total precipitation is 31.5 in. The majority of this precipitation falls between November and April. The temperature data of these stations are unavailable. Freezing temperatures and snowfall are not common but possible at the project site. Yearly updates are available at the Western Regional Climate Center web site.

Topography & Drainage

The site is located in the Sierra geomorphic province of California on the western side of the Basin and Range province and the eastern side of the Great Valley. The rolling/mountainous terrain is typical for the Sierra region with an elevations of approximately 2000 ft near Location 1 and 2200 ft near Location 2. Most of the localized drainage is generally trending south toward downhill, and water is collected by an underdrain on Location 1 and infiltrated to the ground on Location 2.

Man-made and Natural Features of Engineering and Construction Significance

Location 1 is on top of an approximately 1:1 cut slope with a 5-foot offset from the edge of slope. This location is near a private property. Access to the proposed sign location may interfere with homeowners' access to their houses. Location 1 is also located near the Route 140

and Rte 49 (Jones St) junction. There is a tree from a private property whose branches extend out to Caltrans' right of way and may be of obstruction to construction vehicles. There are several underground utility lines that cross the proposed sign location. There are overhead power lines that cross Rte 140 near the area of Location 1 but they are not parallel to it. Mapping indicates that there is potential for Location 1 to contain naturally occurring asbestos; however, naturally occurring asbestos is not observed from surface and subsurface investigations. Location 2 is at flat grade. No private property is immediately adjacent to this location. No underground utility that is posed significance at this location.

Regional Geology

The California Department of Conservation, Division of Mines and Geology Geologic Map of California, Mariposa Sheet, 1967 was used to determine the geologic formations of the project area. A section from the map showing the project location is attached as Plate No. 2. The project locations are mapped as being in an area of Jurassic-Triassic Metavalcanic Rocks (JR_v) and Mesozoic Basic Intrusive Rocks (ub) formed during the Jurassic Period of the Mesozoic Era between 146 million and 200 million years ago.

Project Site Seismicity

In accordance with Caltrans 2009 Seismic Design Procedure (SPD), the nearest active fault to the site is the San Andreas Fault Zone (Fault ID No. 311) with a maximum magnitude, M_{max} , of 7.9. This fault is about 91.5 miles from Location 1. The fault is identified as a right-lateral strike slip fault. The spectral acceleration (SA) generated from this fault is less than both the state-wide minimum and probabilistic SA. The probabilistic SA is based on 5% probability of exceedance in 50 years (corresponding to a 1000 year return period). The design is based on a shear wave velocity of 1800 ft/s (based on As-built LOTB), the estimated peak ground acceleration is 0.21g.

Geotechnical Investigation

Subsurface investigation was done on November 23rd, 2010. One boring at each CMS location was drilled/cored. Boring R-10-001 was advanced to 20 ft and located near proposed CMS Location 1 whereas Boring R-10-002 was advanced to 25 ft and located near proposed CMS Location 2. Both borings were advanced using a 94-mm diameter rotary wash system. Standard Penetration Tests (SPT) were performed at 5-foot intervals for Location 2 where fill materials were observed. See Plate No. 3 for Boring Location.

According to the rocky and sandy nature of the sites, the sites are not anticipated be corrosive for foundation element.

Geotechnical Conditions

At Location 1, according to findings from subsurface investigation, the geotechnical characteristics within the area of the proposed CMS generally consisted of moderately hard to hard weathered rocks. Boring was advanced up to 20 ft.

At Location 2, according to findings from subsurface investigation, the geotechnical characteristics within the area of the proposed CMS generally consist of fill materials. Well-graded gravel with silt, sand, and cobbles were observed throughout the entire depth of boring. Boring was advanced up to 25 ft. No bedrock was encountered. Although boulders were not observed from boring, 3-foot to 4-foot diameter boulders were observed within the vicinity of the proposed site location.

Groundwater

The State Department of Water Resources (DWR) has no monitoring well near the project area which can provide pertinent groundwater information.

According to finding from drilling on November 23rd, 2010, Groundwater was not encountered during original subsurface investigation.

Groundwater is not expected to be encountered during construction. Groundwater conditions will vary according to variations in rainfall, well pumping, and construction activities. Liquefaction potential is considered to be minimal.

Geotechnical Analysis and Design

Since subsurface conditions at the proposed CMS Location 1 are predominately rock, the standard pile length of 18 ft for Model 510 can be shortened. The design loads were provided by the Office of Design & Technical Services. The vertical load demand is 13.7 kips, shear is 7 kips, moment is 207 kip-ft, and torsion is 55 kip-ft. Based on findings from the subsurface investigation, lateral, vertical, and torsional analyses were performed with the ground condition being weak rock and a combined ground slope and batter angle of 45 degrees. The analyses indicate that a 4-foot diameter cast-in-drilled-hole (CIDH) pile with pile length of 13 ft can provide adequate vertical and torsional capacities and results in lateral displacement of less than 1 inch.

Subsurface investigation at Location 2 indicates that the subsurface materials consist of fills which can provide equivalent or better pile capacity than those used in the Standard Plan design for Model 510 CMS. Standard design is expected to be appropriate.

Geotechnical Recommendations

Based on the review of the site investigation and the analyses, the Office of Geotechnical Design North recommends that for Location 1 (PM 22.1), a Model 510 CMS with a single CIDH pile of 13-ft in embedment length and 4 ft in diameter can be constructed. For Location 2, this office recommends that a standard design Model 510 CMS can be constructed as planned.

Construction Considerations

1. All earthworks shall follow Section 19 of Caltrans Standard Specifications.
2. Loose sand may be encountered during pile construction. Temporary casing may be needed for CIDH piles construction if caving occurs. If temporary casing is used, it must be removed after construction.
3. Groundwater is not anticipated during construction of the CIDH piles.
4. Due to the hard rock encountered during the investigation at Location 1, difficult drilling may be expected. Contractor shall prepare adequate equipments and method for the construction of the CIHD pile.
5. There is a tree from a private property whose branch extended out to Caltrans' right of way. This tree may be of obstruction to construction vehicles.
6. Boulders with sizes ranging from 3-foot to 4-foot diameters are observed within the area of Location 2. Contractors shall be prepared for cobbles and boulders when construct CIDH pile at Location 2.

Project Information

Standard Special Provision 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:

LOTB—Mpa 140 CMS's – One Replace & One New

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

Geotechnical Design Report – Two CMS's, One Replace & One New, dated November 30, 2010.

Data and information available for inspection at the District Office:

None.

Data and information available for inspection at the Transportation Laboratory are:

None.

If any changes are proposed during the final project design, the Office of Geotechnical Design – North should review those changes to determine if the foundation recommendation herein still applies.

If you have any questions or comments, please call Carolyn Zhen-Ru at (916) 227-1055 or John Huang at (916) 227-1037.

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District Construction R.E. Pending File
K. C. Liu (DES Office of Design & Technical Services)

Attachments:

- (1) Plate No. 1 Vicinity Map
- (2) Plate No. 2 Geology Map
- (3) Plate No. 3 Boring Location





No scale



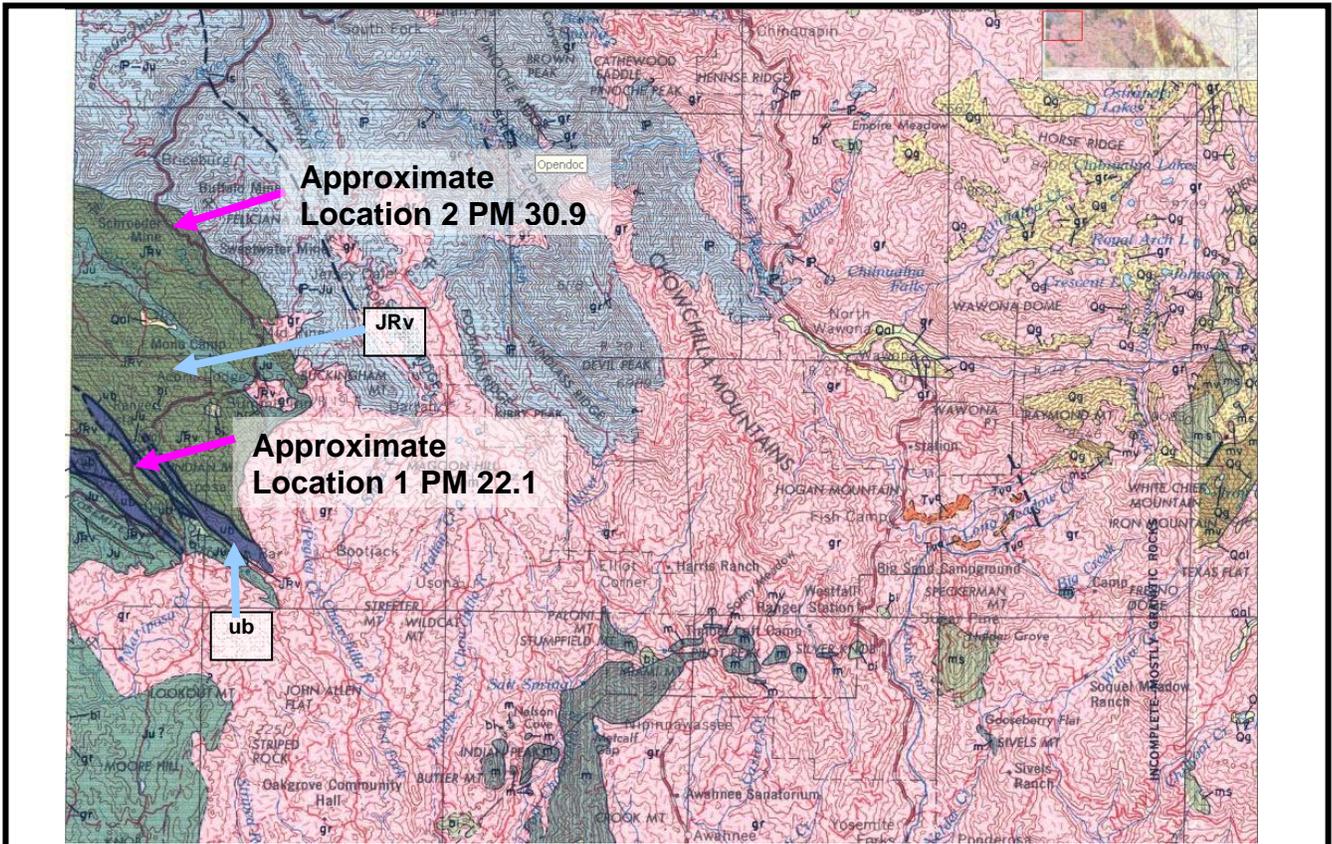
CALTRANS
 Division of Engineering Services
 Geotechnical Services
 Office of Geotechnical Design - North

EA: 10-0Q440
 Date: November 9, 2010

VICINITY MAP

**10-MPA-140 PM 22.1, R30.9
 GEOTECHNICAL DESIGN REPORT**

Plate
 No. 1



Geologic map of California: Mariposa sheet: California Division of Mines and Geology, 1967

Explanation of Relevant Formations:

JRv – Jurassic-Triassic Metavolcanic Rocks: Aphanitic rhyolite member of Mariposa Formation.
ub – Mesozoic Basic Intrusive Rocks: Pyroxenite in the Raymond quadrangle. Soapstone and talc rock in Kinsley quadrangle. Serpentine elsewhere.



	CALTRANS Division of Engineering Services Geotechnical Services Office of Geotechnical Design - North	EA 10-0Q440	GEOLOGY MAP
		Date: Nov. 9, 2010	
		10-MPA-140-PM 22.1, R30.9 GEOTECHINCAL DESIGN REPORT	Plate No. 2



No scale



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Boring Location

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Plate
 No. 3