INFORMATION HANDOUT

For Contract No. 03-2F6004
At 03-ED-49-15.0

Identified by
Project ID 0300020632

MATERIALS INFORMATION

Preliminary Geotechnical Report

M e m o r a n d u m

Flex your power!
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To: NESAR FORMOLI
NR Design, Branch S7

Date: September 23, 2013

File: 03-ED-49-PM 14.9/15.1
03-2F6000, 0300020632
Placerville ADA Curb Ramps

Attention: Justin Unck

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

Subject: District Preliminary Geotechnical Report

INTRODUCTION

As requested, the Office of Geotechnical Design North (OGDN) is providing this District Preliminary Geotechnical Report (DPGR) for the modification of curb ramps at two intersections to be ADA complaint. The project is located in the city of Placerville, El Dorado County, along Route 49 between post miles 14.9 and 15.1 (See Plate 1).

Project Description

The project proposes to modify curb ramps at the intersection of Routes 49 and 50. The work performed at this intersection will involve realigning SB 49 right turn pocket from a "free" right turn into a controlled right turn. Our Office will be involved only in the work that requires geotechnical expertise including the removal of existing roadway, sidewalks and curb, grading the hill side, and relocation of the existing signal pole and traffic island to behind the proposed sidewalk.

The purpose of this report is to provide preliminary geotechnical recommendations for the design and construction of the proposed project work. The conclusions and opinions in this DPGR are intended to assist in the design process and are based solely on field reconnaissance and a review of published data. No subsurface exploration, laboratory testing, or other analyses were performed for this report. At the time of this report several layouts dated 6/6/2011 and cross sections dated 7/23/13 for the proposed modifications were available from District 3.

This report included performing a literature review in an effort to obtain geological and geotechnical data pertaining to the subject site that could provide insight into the design and construction of the proposed realignment.

Existing Facilities and Proposed Improvements

The project site is located in a highly populated area of the city of Placerville, at the intersection of the routes 49 and 50 characterized by slope cut in the north side of the route 50 and narrow valley on the south with a stream running parallel to the highway. The commercial section of the town Placerville is settled within a narrow valley that trends to the northeast and most of the residential area is scattered along both sides of the routes.

According to the web-based Caltrans Post-mile Query Tool (Reference No. 6), the beginning and end of the project (PM 14.9 and 15.1) are located at latitude and longitude coordinates of 38.728284^{o} North and -120.805502^{o} West, and 38.730828^{o} North and -120.805405^{o} West, respectively; these coordinates are the basis for obtaining data in this report available through GIS related information sources. Within the project limits, State Route 49 is a two-lane highway paved with asphalt concrete (AC). The roadway within the urban area has two 12-foot wide traveled ways with no shoulders, an extra turn lane is added in the section immediately south of route 50 between Main Street and the highway.

While performing our site visit, we observed indications of underground utilities by ground surface posting, or other features. Overhead utilities were observed along both routes.

<u>Man-Made and Natural Features of Engineering and Construction Significance</u>

Based on the preliminary cross sections provided by the District and our observations during our site visit, the project site is built mostly on rock slope cut (Route 50) and rock cut through (Route 49). The height of the rock slope that will be affected is 40 feet approximately with slope ratio ranging from 1:1(H:V) to 0.5:1(H:V). The rock slope appears to be performing well, no significant rock fall debris was observed at the toe of the slope. Residential and commercial structures straddled both highways. Hangtown Creek is channelled in a concrete-lined canal that runs parallel to Route 50 and crosses under Route 49 south of the intersection.

The traffic at the highway intersection is controlled by traffic lights at all the venues.

Physical Setting

The physical setting of the project site and the surrounding area was reviewed to provide climate, topography and drainage, geology and seismicity characteristics to aid in the project design and construction. The following is a discussion of our review.

Climate

The project area and its surrounding have an abundant sunshine in summer and frequent cloudiness in winter; moderate to heavy precipitation, generally in the form of rain and snowfall; and a wide range of temperature. Temperature readings can reach down to subzero level and highs in the upper 80's during the summer.

According to the National Weather Service (Reference No. 8), the average annual precipitation at Placerville Station (046960) is 40.56 inches, from which 2.5 inches are snowfall, based on record from 1/1/1900 to 12/31/2010. Over 80 percent of the precipitation falls between November and April. The highest average daily temperature is 92.7°F during the month of July and the lowest average daily temperature of 32.6°F during the month of January. A moderately hot and dry season extends from June through September. Most of the snowfall occurs during the months of December and January. The climate historical data indicates that significant periods of daily temperature above 50°F, required for paving operations, are not likely from December through March. Work efforts can be hampered by the low temperatures during the months of December and January.

Table 2: Average Monthly Climate Summary, Boca Station, California
Period of Record: 7/1/1948 to 12/31/2005

Description	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Ave. Max. Temp °F	53.4	56.9	60.5	66.3	74.8	83.9	92.7	91.4	85.7	74.8	61.3	53.8	71.3
Ave. Min. Temp °F	32.6	35.0	37.6	40.5	46.3	51.9	57.2	56.2	52.1	45.0	37.4	33.1	43.8
Ave. Total Precipitation (in.)	6.92	6.65	5.76	3.19	1.51	0.44	0.07	0.09	0.54	2.13	4.40	6.47	38.16
Average Total Snow Fall (in.)	1.20	0.30	0.40	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.40	2.50

Source: Western Regional Climate Center, "http://www.wrcc.dri.edu"

Topography and Drainage

The project is located in the western central section of El Dorado County bordering with Sacramento County. In general, the area is made up of relatively low and flat hills mountains dissected by narrow and deep valleys carved by streams that flow westward. The project area and its surroundings are drained by the Weber Creek which is a west-trending tributary of the south fork of the American River.

The project site is located in the west-trending and narrow valley carved by the Hangtown Creek. The project area is relatively flat and elevations vary from 1800 to 1880 toward the north end of the project. (See Plate No. 2).

Soil Survey Mapping

According to the National Resource Conservation Soil Survey, U. S. Department of Agriculture, Website, Http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx (Reference No. 7), the project site is underlain by three soil types. The United States Department of Agriculture (USDA) maps the following soils within the project limits (See Plate No. 3):

Boomer very rocky loam, 30 to 50 percent slopes (BkE) These soils are well drained and consist of gravelly loam and gravelly sandy clay loam and found on the mountain flanks and backslopes.

Mariposa gravelly silt loam, 3 to 30 percent slopes (MaD). These soils are well drained. These soils consist of gravelly silt loam and are located in the backslopes and mountain flanks.

Placer diggings (PrD). These soils consist of fine sandy loam and cobbles derived from mixed sources and generally found in channels.

Regional Geology

The project site is located within the Sierra Nevada geomorphic province of California. The Sierra Nevada stretches for about 375 miles along much of the California's eastern border and its width ranges from 40 to 80 miles. It trends from south-southeast to north-northwest. The mountain range was formed by the uplift and tilting that has taken place in the past 5 million years. However, the majority of rocks that formed the Sierra Nevada are much older, roughly 120 to 130 million years. These rocks are best described as plutonic rocks or igneous rocks and constitute the Sierra Batholith. Most of the rocks in

the batholith are granitic in their composition. The most common granitic rocks of the Sierra Nevada are classified as granite, granodiorite, or tonalite; granodiorite is the most abundant. Other plutonic rocks such as diorite are much less abundant than granitic rocks.

Site Geologic Conditions

According to Lindgren, W., and Turner, H. W. (1893), and Clark L.D. (1976) (Reference Nos. 1 and 2), the rocks that underlay the project site belong to the Late Jurassic-Early Cretaceous Mariposa Formation which consist of dark gray slates with some interbedded conglomerate. Outcrops exposed along the existing cut slope compare favorably with those described above. (See Plates Nos. 4 and 5 Geologic Map, and Geologic Map Legend).

Project Site Seismicity

Based on the Caltrans ARS Online Tool (Version 2.2.06), the nearest active fault for the site is the Foothills Fault System - northern central reach section (DeWitt Fault) (Fault ID No. 423) with MMax of 6.3. The fault is located north east of the bridge site. The rupture distance to the fault plan from the bridge site is estimated to be 20 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 4590 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 site:

1) State wide 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 years return period).

Based on the V_{S30}, the peak ground acceleration of 0.17g is based on method 1 as stated above.

The potential for soil liquefaction based on the foundation materials is considered to be insignificant.

Please note that we will re-evaluate the seismic recommendations if and when additional subsurface data become available.

Surface Fault Rupture

The project site does not lie within the Foothills Fault System – north central reach section (DeWitt Fault) fault zone and no splay from same fault crosses the study area. Therefore, the potential for surface fault rupture or ground displacement at the site to adversely affect the proposed structures is very low.

Naturally Occurring Asbestos (NOA)

The Caltrans Map "Areas Likely to Contain Naturally Occurring Asbestos – District 3" (Reference No. 3) states:

> *Natural occurrences of asbestos are more likely to be encountered in, and immediately adjacent to, areas of ultramafic rocks including landslide deposits or soils originating from ultramafic rock sources.*

The referenced Caltrans map does not depict an area likely to contain Naturally Occurring Asbestos (NOA) within or immediately adjacent to the project limits. Based on the geologic conditions observed during site visits and on the Caltrans maps mentioned above, the potential for the presence of ultramafic rocks within the project limits is considered very low.

Preliminary Geotechnical Conditions

Water

Surface water

The project area and its surroundings are drained by the Weber Creek which is a west-trending tributary of the south fork of the American River.

One perennial creek, Hangtown Creek, tributary of the Weber Creek, parallels Route 50 and crosses under Route 49 at the intersection of both routes. The general direction of Hangtown Creek is to the west.

Erosion

Evidence of slight erosion was observed during our visit to the site mainly on the cut slope above the roadway formed by dark gray slates and sandstones. Effects of erosion in this material are shown as loose rocks in the cut slope and rock fall of no significance. The existing rock slope is vegetated with dry grass and scattered incipient trees, and residences and grown trees occupy the top the slope. Based on our observation, the setback distances between the residences structures and the edge of the slope is considered sufficient so that they are protected from erosion and shallow slope failures.

Ground Water

According to the State Water Resources Control Board's wells in Placerville, the median depth to ground water ranges from 4.6 feet to 6.2 feet.

Naturally Occurring Asbestos (NOA)

As discussed in the "Physical Setting" section of this report, OGDN concludes that the project site has a very low potential for the presence of ultramafic rocks and NOA. In consideration for the potential presence of NOA materials, the North Region Hazardous Material Officer should be contacted to determine if the project has the need for Airborne Toxic Control Measures (ATCMs) during project construction.

Preliminary Geotechnical Recommendations

Based on our visual inspection of the rock condition on the surface of the existing slope, the slope is made up of a hard dark gray slate and moderately to thickly bedded (0.5 to 3 feet) very hard sandstone. Foliation and bedding are dipping in random directions due to their intense folding and fracturing. The existing rocks are estimated to consist of the following geotechnical engineering properties: unit weight (γ) of 165 lbs/ft^3, and friction angle (ϕ) of 30^o. The boulders on the surface of the existing slope are flat and rectangular with an average length of 4 feet and a width of 2 to 3 feet. These boulders and cobbles are considered to be very hard. Precautionary measures may be necessary to make sure the surface boulders and cobbles do not come down into the work zone during construction.

The proposed cuts are adequate and most likely not pose any stability problems for the existing slope. Expect difficult excavation because of the presence of the rock at the site. The residential structures located at the top of the driveway located at the northwest corner of the intersection of Route 50 and Route 49 are not likely to be affected by the small cut shown in Typical Cross Sections X-1.

The recommended foundation for the proposed signal pole is Cast-In-Drilled-Hole (CIDH) pile. The site is underlain by hard rock and therefore, difficult pile installation is anticipated. Since groundwater is shallow, we recommend the hole be pumped dry before the placement of concrete or the wet method may be required for the installation of the CIDH pile.

Rippability

Rippability is the ease with which soil or rock can be excavated. The cuts for this project are considered rock cuts, where shallow rock and rock outcrop are anticipated. It is recommended that non-blasting methods using special equipments such as hydraulic splitters, hoe-rams, and chemical expanders be utilized for hard rock excavation and boulder size reduction. Blasting methods are not recommended because of the proximity of structures, slope cuts and the highway.

Future Investigations

No future subsurface investigation is anticipated based on the current scope of the project and the availability of As-Built Log-Of-Test-Borings near the project site.

Estimated Geotechnical Services Time and Duration Required

A request for a Geotechnical Design Report should include a General Plan, Foundation Standard Plan information, and any additional plans.

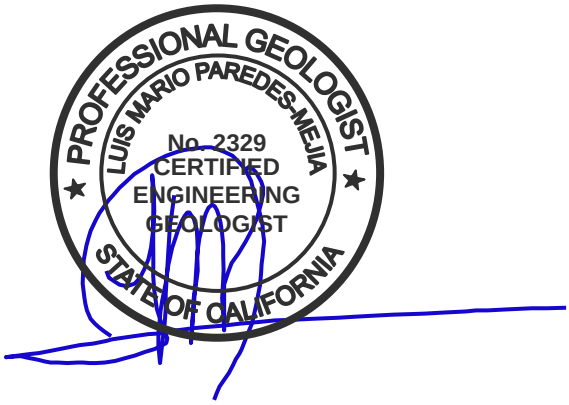
The table below presents the resource estimate for the time to complete the work for the Geotechnical Design Report.

Table 4: Resource Estimate

Office Name	Unit #	Hours						
		100	160	230	270	285	290	Totals
Drafting Services	296	-	-	0	-	-	-	0
Geotech Support	316	-	-	0	-	-	-	0
Drilling Services	322	-	-	0	-	-	-	0
GDN	323	30	-	300	40	-	-	370
Totals		30	-	300	40	-	-	370

Our Office estimates that a total of 370 hours, including construction support, will be needed in order to complete the Geotechnical Design Report.

If you have any questions or comments, please call Luis Paredes-Mejia at (916) 227-1047, or Luke Leong at (916) 227-1081 or Reza Mahallati at (916) 227-1033.



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Transportation Engineer
Office of Geotechnical Design North
Branch C

C: Reza Mahallati
GS Corporate
GDN File
RE Pending File
GS File

ATTACHMENTS

REFERENCES
Plate No. 1. Vicinity Map
Plate No. 2. Topography of Project Area
Plate No. 3. Soils Map
Plate No. 4. Geologic Map
Plate No. 5. Geologic Map Legend
Plate No. 6. Fault Map

REFERENCES

1. Lindgren, Waldemar, and Turner, H. W. (1894), Placerville Folio, California: US. Geological Survey, Geologic Atlas of the United States Folio GF-3, Scale 1:125,000
2. Clark, L. D. (1976), Stratigraphy of the North Half of the Western Sierra Nevada Metamorphic Belt, California, US. Geological Survey Professional Paper, 823, Scale 1:316,800.
3. Caltrans (2005) "Areas Likely to contain Naturally Occurring Asbestos – Caltrans District 3", mapping prepared by the Division of Maintenance GIS in coordination with the Division of Environmental Analysis, 2005 at: http://onramp.dot.ca.gov/hq/maint/roadway/gis/noa.shtml
4. Caltrans (2009) "Development of the Caltrans Deterministic PGA Map and Caltrans ARS Online", prepared by Tom Shantz, Caltrans Division of Research and Innovation, and Martha Merriam, Caltrans Geotechnical Services, July 2009.
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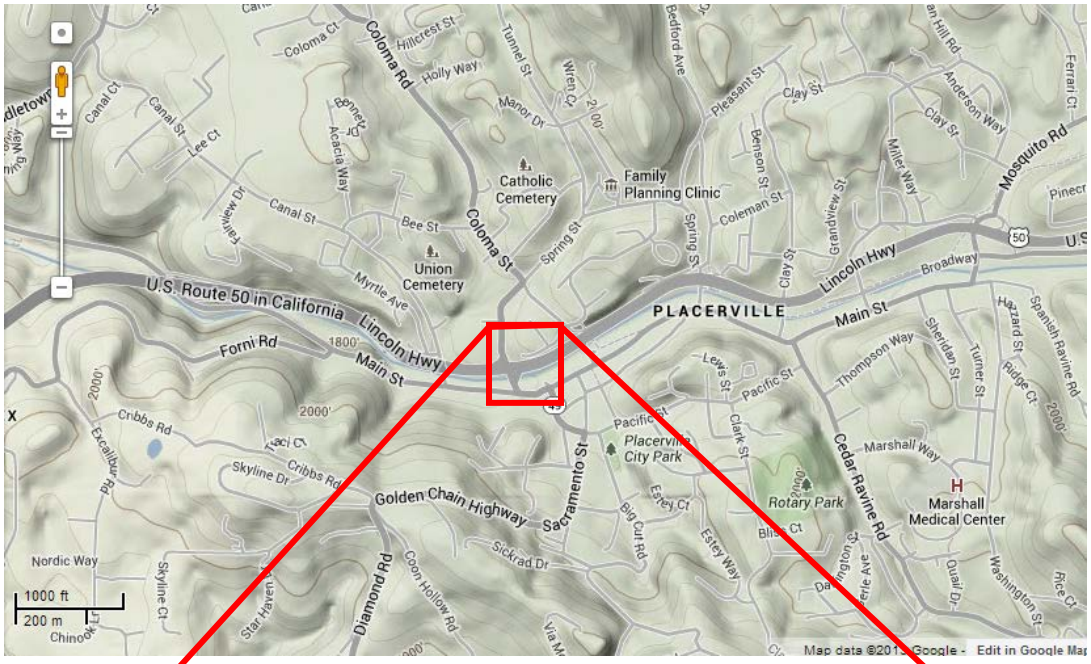
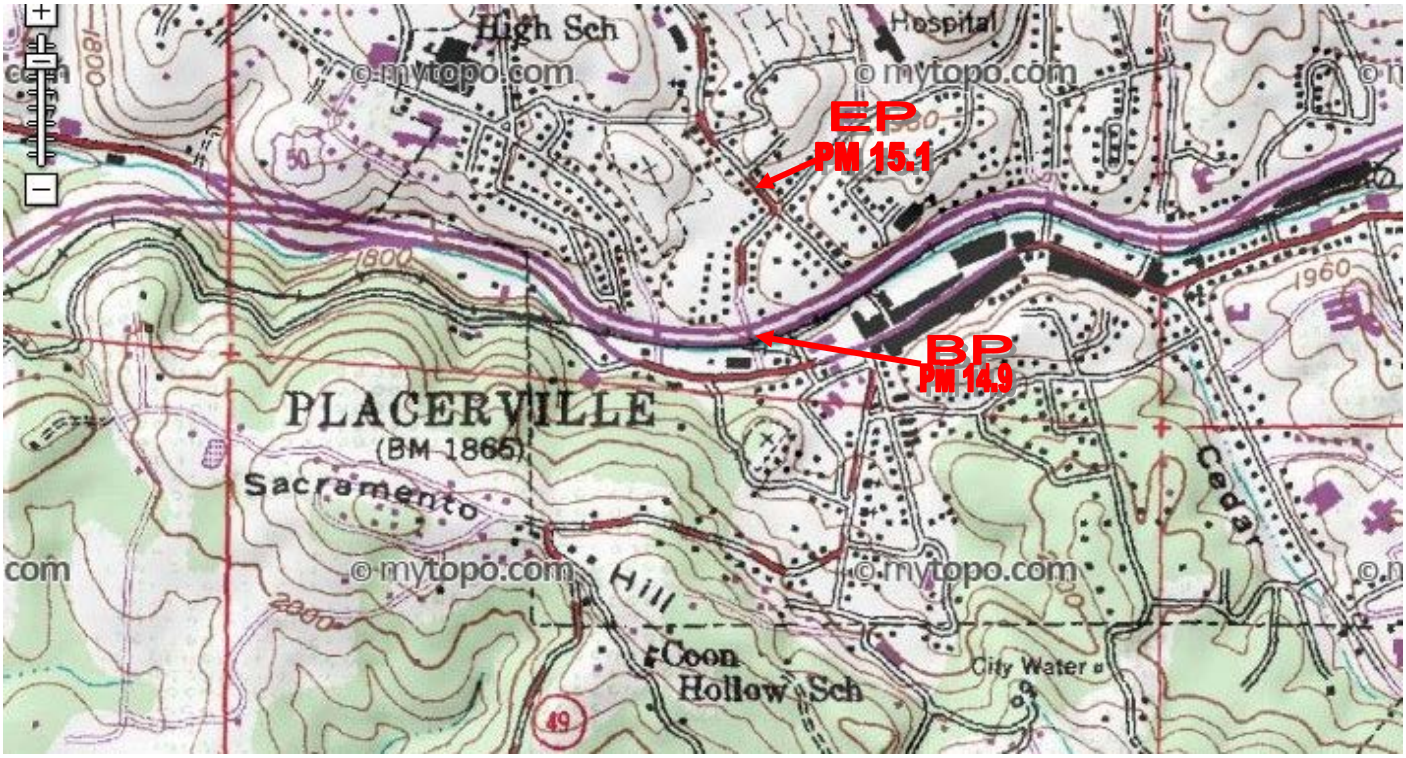
6. Caltrans (2012) "Postmile Query Tool", based on Google Maps, provided by the Caltrans GIS Services Branch at: http://svhqgisapp1.dot.ca.gov/postmilewebclient/PostmileQueryTool.html
7. National Resource Conservation Soil Survey, U. S. Department of Agriculture (2012), "Web Soil Survey", at: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx
8. Western Regional Climate Center (2012) "Climate Summaries, Western U.S. Climate Summaries – NOAA coop stations", at: http://www.wrcc.dri.edu/summary/Climsmsca.html



Caltrans	CALTRANS Division of Engineering Services Geotechnical Services Geotechnical Design – North	**EA: 03-2F6000** **Date: September 2013**	**VICINITY MAP**
		03-ED-49-PM 14.9 TO 15.1 **PLACERVILLE ADA**	Plate No. 1



Caltrans	CALTRANS Division of Engineering Services Geotechnical Services Geotechnical Design – North	**EA: 03-2F6000** **Date: September 2013**	**Topography of Project Area**
		03-ED-49-PM 14.9TO 15.1 **PLACERVILLE ADA**	Plate No. 2

LEGEND

Map Unit Symbol	Map Unit Name
BkE	Boomer very rocky loam, 30 to 50 percent slopes
MaD	Mariposa gravelly silt loam, 3 to 30 percent slopes
PrD	Placer diggings

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

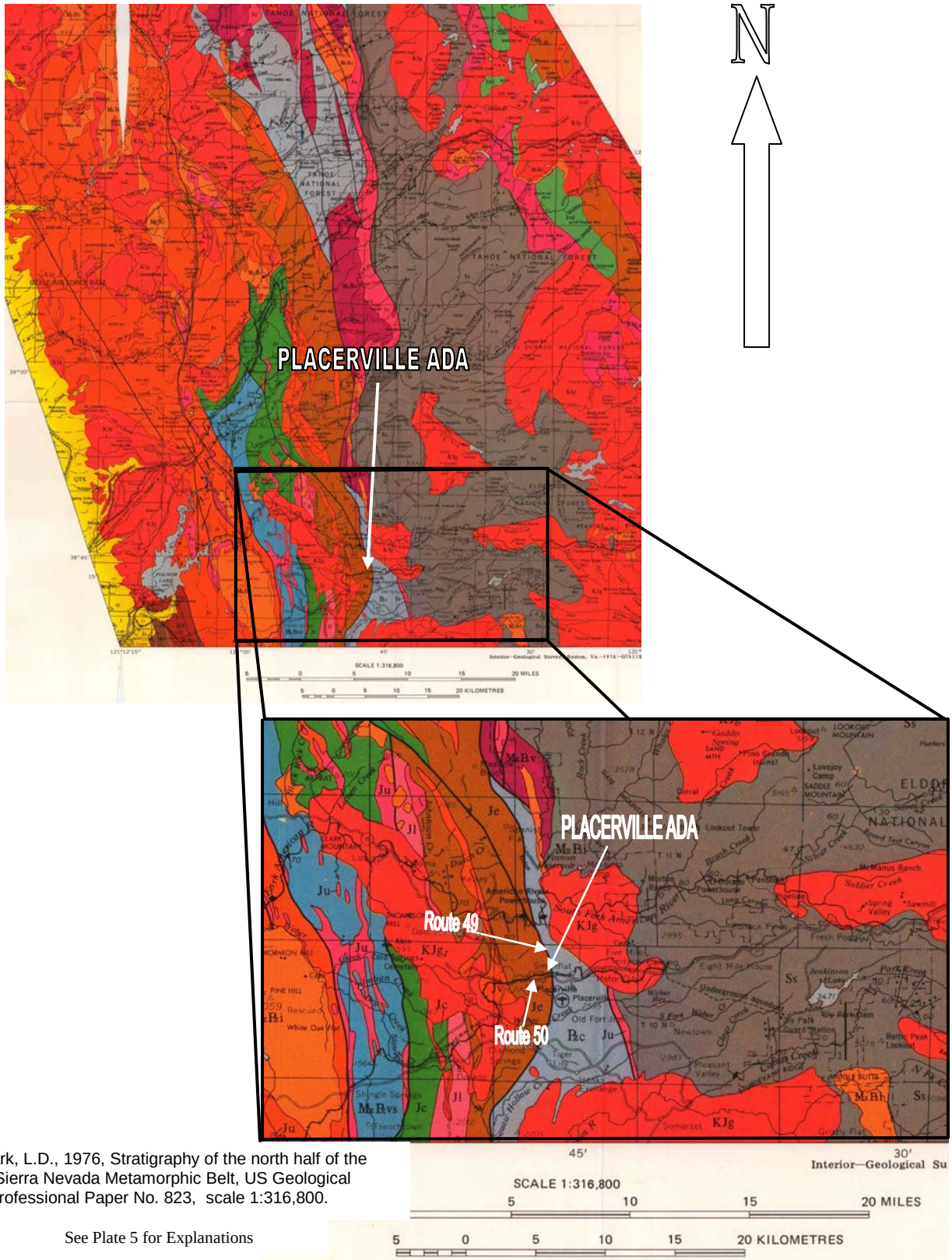
EA: 03-2F6000

Date: September 2013

SOILS MAP

03-ED-49-PM 14.9 TO 15.1
PLACERVILLE ADA

Plate 3



From Clark, L.D., 1976, Stratigraphy of the north half of the western Sierra Nevada Metamorphic Belt, US Geological Survey Professional Paper No. 823, scale 1:316,800.

See Plate 5 for Explanations

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		03-ED-49-PM 14.8TO 15.1 **PLACERVILLE ADA**	Plate No. 4

DESCRIPTION OF MAP UNITS

QTK SEDIMENTARY AND VOLCANIC ROCKS – Gently dipping and nonmetamorphosed. Differentiated only along western border of map

KJg GRANITIC ROCKS – Mostly quartz diorite to granodiorite in composition

Ju ULTRAMAFIC ROCKS – Mostly serpentine. Includes some peridotite and dunite

Jch COPPER HILL VOLCANICS (Upper Jurassic) – Mafic pyroclastic rocks and lava. Locally includes lava with pillow structure

Jmo MONTE DE ORO FORMATION (Upper Jurassic) – Slate, graywacke, tuff(?), and conglomerate. Contains plant fossils. Recognized only northeast of Oroville

Js SALT SPRING SLATE (Upper Jurassic) – Dark-gray slate with subordinate tuff and graywacke. Recognized only in southwest corner of map area

Je EPICLASTIC ROCKS – Dark-gray slate with some interbedded conglomerate, thin-bedded chert. Probably includes mafic tuff in eastern part of map area

Jv VOLCANIC ROCKS – Chiefly mafic volcanic breccia and tuff. Includes pillow lava near Yuba and Bear Rivers

Jl LOGTOWN RIDGE FORMATION (Upper Jurassic) – Volcanic breccia. Locally porphyritic with pyroxene phenocrysts, tuff, and subordinate pillow lava. Mafic to intermediate composition

Jg GOPHER RIDGE VOLCANICS (Upper(?) Jurassic) – Mafic pyroclastic rocks. Mapped only in southwest corner of map area. Approximate correlative of Logtown Ridge Formation

Jc COSUMNES-TYPE ROCKS – Slate, conglomerate, graywacke, and tuff or tuffaceous graywacke. Includes porphyritic ellipsoidal lava along Interstate Highway 80

Jml MILTON FORMATION (Middle or Upper Jurassic) – Mostly mafic volcanic breccia and tuff. Includes dark-gray slate east of Sierra City. Includes sparse chert, conglomerate, and calcarenite near Milton Reservoir

Jsc SAILOR CANYON FORMATION (Lower and Middle Jurassic) – Chiefly slate and tuff with subordinate graywacke, sparse conglomerate, and calcarenite

El CHERT BRECCIA AND LIMESTONE – Poorly sorted breccia consisting of chert fragments overlain by limestone that is in part argillaceous. Mapped only near North Fork of American River south of Cisco

MzBe EPICLASTIC ROCKS – Chiefly dark-gray slate, but contains graywacke, conglomerate, and tuff. Near State Highway 49, possibly consists of flaser rocks derived from volcanic rocks

MzBvs VOLCANIC AND SEDIMENTARY ROCKS – Chiefly mafic pyroclastic rocks. Northern part contains some thin-bedded chert. Southern part includes subordinate slate. ls, fossilferous limestone east of Auburn

MzBv METAVOLCANIC ROCKS – Mostly mafic, schistose. Local amphibolite. Bedded near North Yuba River. Locally massive

MzBi MAFIC INTRUSIVE AND METAMORPHIC ROCKS – Gabbroic and dioritic rocks and amphibolite. In part intrusive and in part the products of regional and of contact metamorphism

Bc CALAVERAS FORMATION (Paleozoic) – Dark-gray phyllite and schist derived from shale with interbedded thin-bedded metachert. Includes subordinate volcanic rocks of probable andesitic composition. Locally includes:

Bcl Limestone. Two distinct lenses: one, near Middle Fork of the Feather River, is coarsely crystalline; the other, near Bear River west of Colfax, is fossiliferous

Bcv Bedded pyroclastic rocks of probable andesitic composition, thin-bedded metachert, and subordinate limestone

Bv VOLCANIC ROCKS – Mostly mafic pyroclastic rocks and some pillow lavas. Includes rhyolite along southwestern margin of unit

Ss SHOO FLY FORMATION (Silurian) – Chiefly feldspathic quartz-rich sandstone and tuffaceous sandstone having graywacke texture and slate or very fine tuff. Subordinate thin-bedded chert, mafic volcanic rocks, and calcarenite. Locally includes:

Ssl Dolomitic limestone. In part oolitic. Mapped only near Middle Fork of the Feather River

Sss Dark-gray slate with subordinate chert, conglomerate, and sandstone

Contact

Fault – Dotted where concealed. Most faults are probably steeply east dipping reverse faults

Strike and dip of beds and lava flows

80 Inclined

Vertical

60 Overturned

50 Crumpled. Dip and strike generalized

Strike and dip of planar structures. Symbols may be combined with bedding symbols

70 Inclined schistosity

Vertical schistosity

60 Inclined phyllitic or slaty cleavage

Vertical phyllitic or slaty cleavage

Direction of tops of beds and flows. Plotted along strike with point of observation

Graded beds

Pillow lava

From Clark, L. D. (1976), Stratigraphy of the north half of the western Sierra Nevada Metamorphic Belt, California, US Geological Survey, Professional Paper 823, scale 1:316800.

Caltrans	CALTRANS Division of Engineering Services Geotechnical Services Geotechnical Design – North	**EA: 03-2F6000** **Date: September 2013**	**GEOLOGIC MAP LEGEND**
		03-ED-49-PM 14.9 & 15.1 **PLACERVILLE ADA**	Plate No. 5

Caltrans	CALTRANS Division of Engineering Services Geotechnical Services Geotechnical Design – North	**EA: 03-SF6000** **Date: September 2013**	**FAULT MAP**
		03-ED-49-PM 14.9TO 15.1 **PLACERVILLE ADA**	Plate No. 6