PRELIMINARY GEOTECHNICAL REPORT
STATE ROUTE 99/120 INTERCHANGE CONNECTOR PROJECT
CITY OF MANTECA, CALIFORNIA
10-SJ-99/120, PM3.1/6.2-PM R5.1/T7.2, EA: 10-1E740K

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1.0 EXECUTIVE SUMMARY

The California Department of Transportation (Caltrans) District 10 with the cooperation of the City of Manteca and the San Joaquin Council of Governments (SJCOG) proposes to reconstruct the existing State Route (SR) 99/120 interchange.

Based on our analysis according to Caltrans' procedure, the peak ground acceleration (PGA) that are expected to occur along the project corridor is about 0.37g. Project elements should be designed and built in accordance with applicable Caltrans seismic design criteria.

Based on the available as-built Logs of Test Borings (LOTBs) as listed in Section 3.0, the subsurface soils generally consist of loose to slightly compact/medium dense sand in the upper 20 to 30 feet overlying medium dense to very dense sand and clayey sand. The borings also indicated intermediate layers of compact to very compact sandy silt, silt and clayey silt layers. Groundwater was encountered between approximate elevations of +19.0 feet and +43.8 and approximate depths between 1.5 feet and 22.5 feet below the existing ground during drilling.

Based on the plans provided, 2H: 1V fill slopes are expected for the proposed improvements.

Based on the provided information, we understand that two retaining walls are expected for this project and MSE wall option is considered at this preliminary stage.

The following are some of the considerations due to various geological, geotechnical and seismic constraints at the project site:

a) The proposed project is located near seismically active area. Seismic ground shaking is expected during future earthquakes that will originate due seismically active faults in the region such as the San Andreas, Hayward/Rodgers Creek, and Calaveras Faults. The distances of the project from the nearby faults are presented in Table 3 "Earthquake Data".

b) No known active faults pass through the project alignment. Therefore, the potential for surface fault rupture that could directly affect the project improvements is considered negligible.

c) Based on the as-built log of test borings, the liquefaction potential exists in general along the project corridor. Site-specific liquefaction potential will need to be evaluated in the Plans, Specifications & Estimate (PS&E) phase of the project.

d) Since, there are no steep slopes exist within the project alignment, landslide potential does not exist at the project site.

2.0 INTRODUCTION

The California Department of Transportation (Caltrans) District 10 with the cooperation of the City of Manteca and the San Joaquin Council of Governments (SJCOG) proposes to reconstruct the existing State Route (SR) 99/120 interchange. This project will add new auxiliary lanes on SR 120, widen connector lanes to increase capacity, upgrade existing ramps, remove an existing at-grade crossing of the Union Pacific tracks and replace it with a grade separated crossing, add a connector road between Austin Road and Moffat Boulevard, signals and lighting improvements. This project will provide traffic congestion relief and improved operations of the interchange.

2.1 Purpose and Need for the Project

Purpose:
The purpose is to construct an additional ramp connector lane for the northbound SR 99 to westbound SR 120 connector and the eastbound SR 120 to southbound SR 99 connector in order to improve the traffic operations of the interchange.

Need:
The need is to increase the capacity of connector ramps and improve the weaving, merge, and diverge movements between the SR 99/120 and SR 99/Austin Road interchanges.

3.0 PERTINENT INVESTIGATIONS, REPORTS AND PUBLISHED MAPS

Previous investigations, reports and published maps that include the project corridor vary in focus and scale.

California Department of Transportation (Caltrans) Logs of Test Borings (LOTBs)

a) Caltrans, LOTBs for North Connector Overcrossing (Bridge No 29-286), dated March, 12, 1981.

b) Caltrans, LOTBs for Moffat Boulevard Overhead (Bridge No 29-278), dated March, 12, 1981.

c) Caltrans, LOTBs for Spreckles Road undercrossing (Bridge No 29-277), dated October, 1995.

d) Caltrans, LOTBs for of Austin Road Overcrossing (Bridge No 29-129), dated June, 21, 1954.

Others

Geologic Map of the San Francisco-San Jose quadrangle, California, 1991 by Wagner, D.L., Bortugno, E.J., and McJunkin, R.D.

Caltrans Department of Transportation (Caltrans), November 2012, "Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations".

4.0 EXISTING FACILITIES AND DESCRIPTION OF PROJECT ALTERNATIVES

4.1 Existing Facilities

Within the project limits there are five existing structures;

- Northbound SR 99 to westbound SR 120 and eastbound SR 120 to northbound SR 99 Connector OC (Bridge No. 29-0286E)
- Eastbound SR 120 to northbound SR 99 Connector OC (Bridge No. 29-0286)

- Austin Road Overcrossing (Bridge No. 29-0129)
- Moffat Overhead (Bridge No. 29-0278R & 29-0278L)
- Spreckles Undercrossing (Bridge No. 29-277R & 29-277L)

4.2 Project Description

The proposed project includes the following elements:

- Widen the eastbound SR 120 to southbound SR 99 connector ramp from one-lane to two-lanes;
- Widen the northbound SR 99 to westbound SR 120 connector ramp from one-lane to two-lanes;
- Construct a new structure over SR 99 to serve eastbound SR 120 to northbound SR 99 traffic and modify the existing structure over SR 99 to serve westbound SR 120 traffic;
- Add an auxiliary lane in the median in each direction of SR 120 from Main Street to SR 99;
- Add an auxiliary lane in each direction on SR 99 from SR 120 to approximately one mile south. This includes widening the Moffat Overhead and Spreckles Underpass structures;
- Remove the Austin Road overcrossing and replace with a longer and wider structure spanning SR 99 and UPRR (removal consists of removing the structure and the fill located between SR 99 and Moffat Boulevard);
- Convert the Austin Road on-ramp to northbound SR 99 and to westbound SR 120 to a loop ramp that will provide separate traffic movements to SR 99 and SR 120;
- Replace the southbound exit ramp from SR 99 to Austin Road with a grade separated (braided) ramp to eliminate the weaving with SR 120 merging traffic;
- Add a new connector road from Austin Road to Woodward Avenue to Moffat Boulevard and widen the existing UPRR Woodward Avenue gated crossing; and
- Relocate the northbound SR 99 exit ramp to Austin Road to accommodate the loop on ramp and relocate the adjacent SR 99 Frontage Road for approximately 0.8 miles.

5.0 PHYSICAL SETTING

5.1 Climate and Drainage

The project site is located in the northern part of the San Joaquin Valley of the Central Valley of northern California. The climate in this region can be characterized by Mediterranean climate that consists of mild winters, hot and dry summers, small daily and seasonal temperature ranges and mild humidity. Based on the statistical information published on the website of the Western Regional Climate Center, for an available record period from 1971 to 2000 at Manteca station (No. 045303), the average monthly temperature in the project vicinity ranges from a minimum of 35.4 °F in December to a maximum of 93.2 °F in July. The annual average total precipitation is about 10.41 inches. Most of the rainfall is recorded in January with an average total monthly precipitation of 1.65 inches. June is the month with the least rainfall precipitation of 0.09 inches. Freezing weather may occur, but it is generally not necessary to design for freeze-thaw conditions for the area.

According to the California Department of Water Resources (DWR 2006), the project site is in the west of the Eastern San Joaquin Subbasin of the San Joaquin Valley Groundwater Basin that occupies a northwest trending structural trough between the Coast Ranges to the west and the Sierra Nevada to the east. The San Joaquin River and several tributaries drain the Subbasin northward into the Sacramento and San Joaquin Delta and discharge into the San Francisco Bay. The topography within the project limits varies between elevation 40 feet and 78 feet. The site drainage is generally by sheet flow, or collected by local drainage systems.

6.0 GEOLOGY OF THE PROJECT AREA

6.1 Regional Geologic Setting

The proposed project site is located in the northern portion of the San Joaquin Basin/San Joaquin Valley and the central portion of the Great Valley Geomorphic

Province of California. The Great Valley (also referred to as the Central Valley) is a large, asymmetrical, northwestwardly trending, structural trough formed between the uplands of the California Coast Ranges to the west and the Sierra Nevada to the east. The San Joaquin Valley is a flat structural basin (with San Joaquin Basin in the north and Tulare Basin in the south) bounded by the Sierra Nevada to the east, the Coast Ranges to the west and the Sacramental-San Joaquin Delta to the north. The elevation of the land-surface of the San Joaquin Valley is approximately several feet above sea level in the north. Sediments of the San Joaquin Valley consist of interlayered gravel, sand, silt, and clay derived from the adjacent mountains and deposited in alluvial fan, floodplain, flood-basin, lacustrine, and marsh environments. Sediments derived from the Coast Ranges are finer grain than those derived from the Sierra Nevada.

6.2 Site Geology

General geologic features pertaining to the project site were evaluated by reference to Geologic Map of the San Francisco-San Jose quadrangle, California, 1991 by Wagner, D.L., Bortugno, E.J., and McJunkin, R.D.. Based on the publication, the project site and its vicinity is generally underlain by the following Quaternary geologic units:

Qs- Dune Sand (Holocene)
Qm- Modesto Formation (late Pleistocene)

A portion of the published Geologic Map covering the project site is attached as Plate No. 3.

6.3 Subsurface Soil Conditions

We have reviewed the as-built LOTBs of the relevant existing bridge structures within the project limits. The following is the general descriptions of the subsurface soil conditions as recorded in the as-built LOTBs.

TABLE 1: SUMMARY OF SUBSURFACE SOIL CONDITIONS (BASED ON AS-BUILT LOTBS)

Bridge Structure Name	Subsurface Soil Conditions (from As-built Boring Logs)
North Connector Overcrossing (Br. No 29-286)	Slightly compact/medium dense sand in the upper 20 to 25 feet overlying medium dense to very dense silty sand and clayey sand to maximum drilled depth of 72 feet below grade (up to elevation -26 feet). The borings also indicated intermediate layers of slightly compact to compact sandy silt, silt, clayey silt and clay layers.
Moffat Boulevard Overhead (Bridge No 29-278)	Slightly compact/medium dense sand in the upper 20 to 30 feet overlying medium dense to very dense silty sand and clayey sand to maximum drilled depth of 115 feet below grade (up to elevation -72 feet). The borings also indicated intermediate layers of slightly compact to compact silt, sandy silt and clayey silt layers. One boring, boring B-9, encountered compact to dense/hard silt from 73 feet to the maximum explored depth of 115 feet below grade (between elevation -30 feet and -72 feet).
Spreckles Road undercrossing (Bridge No 29-277)	Loose to compact/medium dense sand and sand with silt in the upper 20 to 30 feet overlying medium dense to very dense sand to maximum drilled depth of 81 feet below grade (up to elevation -40 feet). The borings also indicated intermediate layers of slightly compact to cemented silt, sandy silt and clayey silt layers.
Austin Road Overcrossing (Bridge No 29-129)	Loose to slightly compact/medium dense sand in the upper 20 to 25 feet overlying medium dense to very dense sand and clayey sand to maximum drilled depth of 50 feet below grade (up to elevation -6 feet). The borings also indicated intermediate layers of compact to very compact sandy silt, silt and clayey silt layers.

TABLE 2: SUMMARY OF MEASURED/ESTIMATED GROUNDWATER LEVEL

Bridge Structure Name	Groundwater Data from As-built LOTB
North Connector Overcrossing (Br. No 29-286)	Encountered between elevation 30.4 feet to 43.8 feet (depth between 7-18 feet below grade)
Moffat Boulevard Overhead (Bridge No 29-278)	Encountered between elevation 30.5 feet to 34.2 feet (depth between 8-11 feet below grade)
Spreckles Road undercrossing (Bridge No 29-277)	Encountered between elevation 19.0 feet to 29.25 feet (depth between 10-22.5 feet below grade)
Austin Road Overcrossing (Bridge No 29-129)	Encountered between elevation 40.5 feet to 42 feet (depth between 1.5-3 feet below grade)

The subsurface soil conditions within the project corridor should be verified during the PS&E phase.

6.4 Faults and Seismicity

Faults are classified by the State Geologist as “active”, “potentially active”, and “activity uncertain”. An "active" fault is one that has had some movement within Holocene time (the last 11,000 years), and has the potential for activity in the near future. A "potentially active" fault is one which is not known to have ruptured in historic time, but shows evidence that it has ruptured in the recent geological past and could do so again in the future. A fault classified as "activity uncertain" is one for which there is insufficient data concerning the level of activity or recurrence of activity.

Maximum credible earthquake magnitudes (Mmax) for some of the major faults in the area are determined by Caltrans’ developed online ARS tool (Version 2.3.09). These maximum credible earthquake magnitudes represent the largest earthquakes that could occur on the given fault based on the current understanding of the regional tectonic structure. The earthquake data of the active faults in the project vicinity are summarized below.

TABLE 3 – EARTHQUAKE DATA

Fault (Fault ID)	Maximum Magnitude, M_{Max}	Fault Type	Approx. Distance R_{rup}/R_x (km)*
Great Valley 07 (Orestimba) (138)	6.7	Reverse	25.7/24.7
San Andreas (Santa Cruz Mts) 2011 CFM (158)	8.0	Strike Slip	98.5/98.5
San Andreas (Peninsula) 2011 CFM (134)	8.0	Strike Slip	99.3/96.8

* Distances are based on Caltrans ARS online and only for ground motion estimation purpose. Not recommended to locate faults for site specific studies.
R_{rup} = Closest distance to the fault rupture plane
R_x = Horizontal distance to the fault trace or surface projection of the top of rupture plane

Seismic Considerations

The design spectrum shall be designed in accordance with the 2012 Caltrans Fault Database (Version 2b) and the Acceleration Response Spectrum (ARS) Online web tool (Version 2.3.09). The design methods incorporate both “Deterministic and Probabilistic Seismic Hazards” to produce the “Design Response Spectrum”.

Average shear wave velocities (V_s) for the top 30m (100 feet) at the various locations along the alignment are estimated by using established correlations and the procedure provided in the “Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations, (Caltrans, November 2012)”.

As discussed in section 7.3.2, liquefaction potential exists at the project site. Therefore, when estimating the V_{S30m} for liquefaction case, we have assumed the residual shear strengths and modeled those as soft clays for the potential liquefiable soils. Both “liquefied case” and “non-liquefied case” case have been considered.

The As-Built boring data were used to calculate average shear wave velocities. As Shear wave velocities were calculated at various locations along the project alignment. The average shear wave velocities ranged from 240 m/s to 250 m/s for the non-liquefaction case and 190 m/s to 220 m/s for the liquefaction case.

For developing the ARS curve, we have considered both profiles: (1) liquefaction case; and (2) non-liquefaction case. V_S30 of 190 m/s for liquefaction case and 250 m/s non-liquefaction case were considered in the analysis. The envelope of these two curves is recommended. The recommended envelope design curve is presented on Plate No.5A. ARS curves of non-liquefaction and liquefaction cases are presented on Plate Nos. 5B & 5C.

- Site Location: 37.7853ºN/121.1884ºW
- Calculated V_{S30m} = 190 m/s (liquefaction case) and 250 m/s (non-liquefaction case)
- No adjustments were required for basin effect.
- No adjustments were required for near fault effect.
- The recommended ARS curve is based on the “Caltrans Online Probabilistic” method.
- Anticipated Peak Ground Acceleration (PGA): 0.37g
- Mean earthquake magnitude: 6.7

7.0 GEOTECHNICAL CONSIDERATIONS

7.1 Groundwater

Based on the as-built Log of Test Borings, the groundwater was encountered between approximate elevations of +19.0 feet and +43.8 and approximate depths between 1.5 feet and 22.5 feet below the existing ground during drilling.

The groundwater level is anticipated to vary with the passage of time due to seasonal groundwater fluctuation, surface and subsurface flows into the bay, ground surface run-off, and other factors that may not be present at the time of the previous investigation. It is our opinion that the groundwater conditions within the project limits should be verified during the PS&E phase.

7.2 Erosion and Sedimentation

The project area was evaluated based on "Soil Survey Map" of San Joaquin County, by National Cooperative Soil Survey, Natural Resources Conservation Service, USDA and Web Soil Survey, URL:
http://websoilsurvey.nrcs.usda.gov (Plates 6). The following table summarizes data provided by the "United States Department of Agriculture, Natural Resources Conservation Service".

TABLE 4: SUMMARY OF SOIL UNITS

Map Unit Symbol	Map Unit Name	Slopes (%)	Erosion Hazard (Road, Trail)
141	Delhi fine sand	0 to 5	Slight
142	Delhi loamy sand	0 to 2	Slight
143	Delhi-Urban land complex	0 to 2	Slight
254	Timor loamy sand	0 to 2	Slight
255	Tinnin loamy coarse sand	0 to 2	Slight
265	Veritas sandy loam, partially drained	0 to 2	Slight
266	Veritas fine sandy loam (266)	0 to 2	Slight

The ratings in this interpretation indicate the hazard of soil loss from un-surfaced roads and trails. The ratings are based on soil erosion factor K, slope, and content of rock fragments. The hazard is described as "slight," "moderate," or "severe." A rating of "slight" indicates that little or no erosion is likely; "moderate" indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and "severe" indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed. Based on the Soil Survey Map, the project area only little or no erosion potential.

7.3 Seismic Hazards

Primary seismic hazards include ground shaking and surface fault rupture. Secondary seismic effects resulting from soil responses to ground shaking includes liquefaction. These hazards may cause deformation of man-made structures. These hazards are discussed in the following paragraphs.

7.3.1 Primary Seismic Hazards

Ground Shaking

Earthquake-induced ground-shaking is a seismic hazard that can result in liquefaction, lurching and lateral spreading of soils, and landsliding of soil and rock as well as dynamic oscillation of man-made structure. Differential settlement can occur at the ground surface due to subsurface liquefaction and densification caused by strong ground-shaking.

Based on the analyses, the calculated Peak Ground Acceleration (PGA) is about 0.37g. The earthquake shaking potential along the project alignment exists and the entire project corridor is subject to seismically-induced ground-shaking.

Surface Fault Rupture

Rupture of the ground surface along the trace of an active fault can be expected to occur during seismic events that originate on such faults. No active or potentially active faults have been mapped through the project site. Therefore, the potential for fault rupture to affect the project is very low.

7.3.2 Secondary Seismic Hazards

Liquefaction Susceptibility

Liquefaction is a phenomenon in which saturated cohesionless soils are subject to a temporary but essentially total loss of shear strength under the reversing, cyclical shear stresses associated with earthquake shaking. Saturated cohesionless sands and silts of low relative density are the type of soils that are usually susceptible to liquefaction. Clays are generally not susceptible to liquefaction. Gravels tend to drain well and are not usually susceptible to liquefaction.

For liquefaction analyses, we have adopted Peak Ground Acceleration (PGA) of 0.37g. The liquefaction potential was evaluated in accordance with the methods proposed by Youd, et al. (2001), primarily using the as-built boring data. As indicated in soil liquefaction engineering (Bray, 2006), for soils with sufficient fines content so as to separate the coarser particles and control behavior, liquefaction appears to occur in soils where these fines are either non-plastic or are low plasticity silts and/or silty clays (PI<12%, and LL<37%), and with high water content relative to their liquid limit (w> 0.85LL).

In general, liquefaction hazards are most severe in the upper 50 feet of the surface as mentioned in Special Publication 117A (CGS, 2008). In our opinion, the impact due to the potential liquefiable soils below 50 feet is considered insignificant, especially when the layer is relatively thin and discontinuous.

We have evaluated the liquefaction potential along the project limit based on the boring data. Based on our analysis, liquefaction potential exists at the site and post-liquefaction settlement is estimated up to 7 inches.

Site-specific investigation should be conducted in the PS&E phase to further evaluate the liquefaction potential conditions at the project corridor. If liquefaction is found to be an issue, downdrag due to post-liquefaction settlement may have to be considered in the vertical pile capacity analyses and lateral spreading may have to be considered in the lateral pile capacity analyses and embankment stability evaluation.

7.4 Existing Slopes - Landslides

Landslides occur when shear stress in a soil or rock mass exceeds their shear strength. Shear stresses can be increased by adding to the weight of soil or rock mass through saturation or loading. Shear strength can be reduced by a rise of groundwater, erosion or grading at the toe of a slide mass. Slope failure can be caused by an increase in shear stress or a decrease in shear strength. Zones of low shear strength often are associated with the presence of expansive clay soils and weak bedrock units. Earthquake-induced ground-shaking can cause activation of new or previously existing landslides and other slope instabilities, especially during periods of high groundwater. Failure of steep slopes in the vicinity of the project corridor and the collapse of stream banks could occur during a major earthquake. Areas with steep slopes would be most susceptible to landsliding.

Since, there are no steep slopes exist within the project alignment, landslide potential does not exist at the project site.

7.5 Expansive Soil

Based on as-built boring data, expansive clays were not encountered near surface at the project location. It should be verified during PS&E phase. If expansive soils encountered during PS&E phase field investigation, it is recommended to perform laboratory tests such as Plasticity Index, expansion index and R-value to investigate the expansive soil properties of the subsurface soils underlying the project site. There will be an impact on the structural pavement design and/or shallow footing if expansive soil is encountered in the pavement subgrade or footing subgrade.

8.0 HAZARDOUS WASTE POTENTIAL

Refer to Environmental Site Assessment Report for information regarding potential hazardous waste issues within the project corridor.

9.0 PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

9.1 Earthwork and Grading

The project includes widening existing roadways and widening of the roadway at the existing structures. The project requires fill on existing slope and embankment fill for abutments of bridge structure widening.

Areas to receive engineered fill or structure backfill should be excavated to remove any loose/soft soil materials. The resulting surface upon which fill is to be placed should be observed by the Geotechnical Engineer. Areas receiving fill should be scarified, moisture conditioned and compacted in accordance with Caltrans standard specifications.

In general, engineered fill or structure backfill imported to the site should be clean and free of debris and organic material and should be reviewed by the Geotechnical Engineer. Fill material within 4 feet of planned pavement subgrade should meet design R-value requirement. Engineered fill should have a minimum 90-percent relative compaction per Caltrans standard (Section 19, Caltrans Standard Specifications, 2015) except that 95-percent compaction is recommended for the upper 6-inch of the pavement subgrade and foundation subgrade of the structures. The extent of the 95-percent compaction for the pavement subgrade should be followed as specified in Caltrans 2015 Standard Specifications, Section 19-5.03B.

a) 0.5 foot below the grading plane for the width between the outer edges of shoulder.

b) 2.5 feet below the finished grade for the width of the traveled way plus 3 feet on each side.

The structure foundation subgrade excavation and fill compaction requirement should be in accordance with Caltrans 2015 Standard Specifications, Section 19-3 “Structure Excavation and Backfill”.

The on-site materials exposed after the excavation may be used for engineered fill provided that they meet the design specifications and are not contaminated.

9.2 Recommendations for Future Exploration and Investigations

Borings are proposed to provide supplemental information regarding subsurface soil conditions and groundwater conditions for the project. Geotechnical investigations should be conducted to evaluate the engineering properties of the subsurface soil materials for recommendation of geotechnical parameters and to address geotechnical hazards associated with different design elements (such as slope stability and settlement etc.) and hazards associated with strong ground motion (shaking and liquefaction, etc.).

The proposed field exploration program will depend on the type of design element such as bridge widening, connectors, earth retaining systems, overhead sign foundations, embankment, and roadways. Based on the preliminary project plans and the information available at the project site, the following scope (proposed boring depth and the frequency of borings for different design elements) of geotechnical investigation work is recommended in the PS&E phase.

a) For the proposed bridge widening and connectors, there should be one boring at each support.

b) For earth retaining systems, there should be one boring every 300 lineal feet.

c) For the roadway widening, borings should be drilled up to 5 feet deep within every 1000 lineal feet.

d) For overhead sign, the boring should be drilled at the location of the proposed overhead sign.

Field Exploration

The following outline for the field exploration program and some of the details of the proposed field exploration are suggested for different design elements of the proposed project.

a) "Encroachment Permit" has to be obtained from Caltrans for the field exploration of the proposed borings. "Work Scheduling Request Form" will be submitted to Caltrans if lane closure within the Caltrans Right of Way is required.

b) Truck-mounted drill rig using hollow-stem auger and rotary-wash drilling method can be used. Modified California Sampler or Standard Penetration Test Sampler should be used for the soil sampling. Pocket penetrometer tests (minimum of two) should be performed on each cohesive soil samples.

c) Ground investigation work should be performed and the classifications of the soil/rock materials in the field exploration should be in accordance with the guidelines in the "Caltrans Soil & Rock Logging, Classification, and Presentation Manual" (June 2010 Edition).

d) The borings should be drilled under the technical supervision of the field engineer or geologist, who will classify and continuously log the soils encountered during drilling and supervise the collection of soil samples at various depths for visual examination and laboratory testing. The soil samples will be transported to the laboratory for further evaluation and testing.

e) If groundwater is present, its depth should be measured in every hollow stem auger boring. If groundwater cannot be measured because of the rotary-wash method is used, some borings will be considered to left open for a period of minimum of 24 hours or over-night for re-measurement of groundwater level when feasible. Due to the traffic and safety concern or permit requirement, the boreholes may needed to be grouted on the same day at certain locations.

f) Upon completion of drilling and sampling, borings should be backfilled with cement grout.

Several underground utilities may exist at the site. The location of the utility lines should be verified prior to drilling.

Laboratory Testing

a) The laboratory tests anticipated to be performed on soil samples should include moisture and density, Atterberg Limits, sieve analyses, consolidation, unconfined compressive strength, corrosion test and R-Value test.

b) Depending on the findings (specifically SPT blow counts) from the field exploration, gradation analysis should be performed on cohesionless soils to investigate the percentage of fine content which is required in the evaluation of liquefaction potential for loose to medium dense saturated sands.

c) Depending on the findings from the field exploration, appropriate tests such as moisture and density, Atterberg Limits and/or consolidation, should be performed on the soft to firm cohesive soil to investigate the engineering properties, which are required to evaluate the magnitude of consolidation settlement.

d) Corrosion tests, such as resistivity, pH value, percentage of sulfate content and chloride content, should be performed on selected soil samples to appropriate depths to investigate the corrosiveness at the bottom foundations. If formation is the same within the same structure, it may not be necessary to obtain samples from all borings.

- Samples should be taken in fill material as well as native soil, if appropriate.
- One sample at near surface between 1 and 5 feet.

- One sample at the water table (if water table is within the limits of the proposed pile foundation).
- Additional sample for each significant change in subsurface material to a depth of 3 feet below the lowest anticipated groundwater level (if water table is within the limits of the proposed pile foundation).

9.3 Preliminary Foundation Recommendations

The preliminary foundation recommendations for the proposed structures will be presented in the "Preliminary Foundation Reports" that will be prepared separately.

9.4 Slope Stability (Existing Slopes and New Slopes)

The slopes within the project vicinity consist of man-made embankment slopes at the connectors, and undercrossing, overcrossing abutments. These existing slopes, typically having gradients of 2H:1V or flatter, are covered with vegetations, and generally appear to be in good condition.

For the proposed structures, new fill and embankments are anticipated. We also understand that new embankment side slopes will be 4H:1V. The slope stability should be analyzed during PS&E phase under the static condition, pseudo-static condition, and post-liquefaction case (if required).

9.5 Fill Slopes/Settlements

Based on the plans provided, we anticipate embankment fills for the proposed improvements. Since majority of sandy soils were identified in the as-built LOTBs, the long-term settlement due to fill materials should be relatively low. Site-specific ground investigation and settlement analysis is required during PS&E phase.

9.6 Excavations and Cut Slope

Based on our understanding of the project, major cuts and excavations are not anticipated for this project.

9.7 Earth Retaining Systems

Based on the preliminary plans, we understand that two (2) retaining walls are proposed for this Project. The retaining walls are proposed at the following locations.

1. Retaining Wall 1: Wall 1 is planned at the new off-ramp from eastbound SR 120 to Austin Road. Total wall length is approximately 700 feet long and up to 26 feet height. It is planned to support new embankment.

2. Retaining Wall 2: Wall 2 is planned for the widening of the eastbound SR 120 to southbound SR 99 connector ramp from one-lane to two-lanes. Total wall length is approximately 400 feet long and up to 10 feet height. It is planned to support new embankment.

It is our understanding that MSE Wall is considered as an option, because these walls are going to hold up new fill and also to work with the proposed staging. The proposed earth retaining systems are preliminary and subject to confirmation from future field exploration and specific wall footing elevations during the PS&E phase.

9.8 Pavement Design

We understand that there will be new pavement construction for widening and new connectors. Traffic Index (TI) vales were not provided at this time. Structural pavement design will be provided during PS&E phase.

10.0 INVESTIGATION LIMITATIONS

Please be advised that we are performing a professional service and that our conclusions and recommendations are professional opinions only. No investigation has been performed for this project. All work done and all recommendations made are in accordance with generally accepted geotechnical engineering principles and practices. No warranty, expressed or implied, of merchantability or fitness, is made or intended in connection with our work.

If you have any questions on the above, please do not hesitate to contact us.

Respectfully Submitted,
PARIKH CONSULTANTS, INC.

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REFERENCES

1) California Department of Transportation (Caltrans), As-built Logs of Test Borings

   a) Caltrans, LOTBs for North Connector Overcrossing (Bridge No 29-286), dated March, 12, 1981.

   b) Caltrans, LOTBs for Moffat Boulevard Overhead (Bridge No 29-278), dated March, 12, 1981.

   c) Caltrans, LOTBs for Spreckles Road undercrossing (Bridge No 29-277), dated October, 1995.

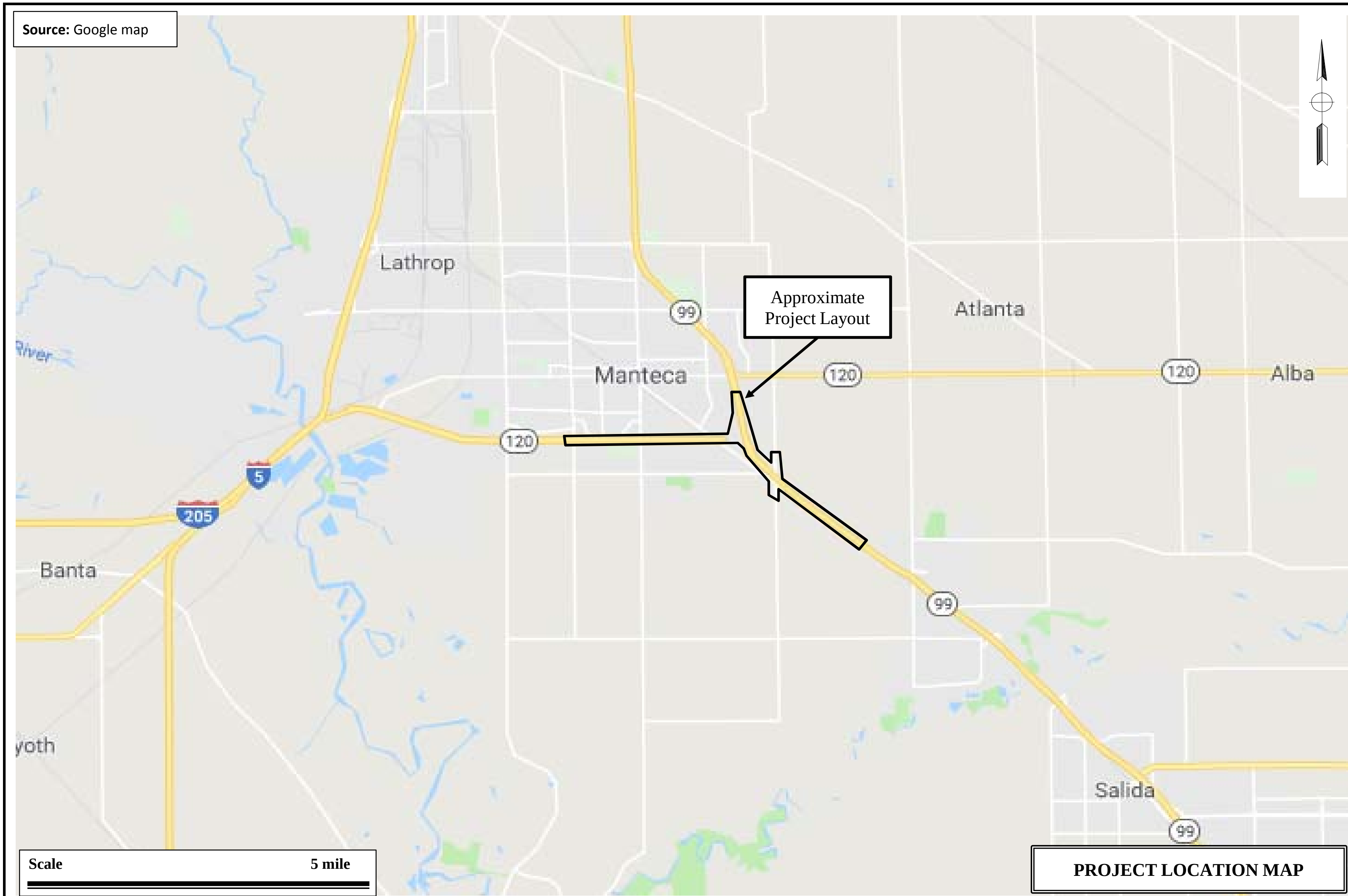
   Caltrans, LOTBs for of Austin Road Overcrossing (Bridge No 29-129), dated June, 21, 1954.

2) California Department of Transportation (Caltrans), November 2012, "Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations"; http://dap3.dot.ca.gov/ARS_Online/Tech_Docs/Methodology%20for%20Developing%20DRS_12-5-12.pdf .

3) Geologic Map of the San Francisco-San Jose quadrangle, California, 1991 by Wagner, D.L., Bortugno, E.J., and McJunkin, R.D..

4) National Cooperative Soil Survey Natural Resources Conservation Service, United States Department of Agriculture, Web Soil Survey: San Joaquin County, California; http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx .

5) Western U.S. Climate Historical Summaries (2014). Retrieved June2014, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?Ca7414.

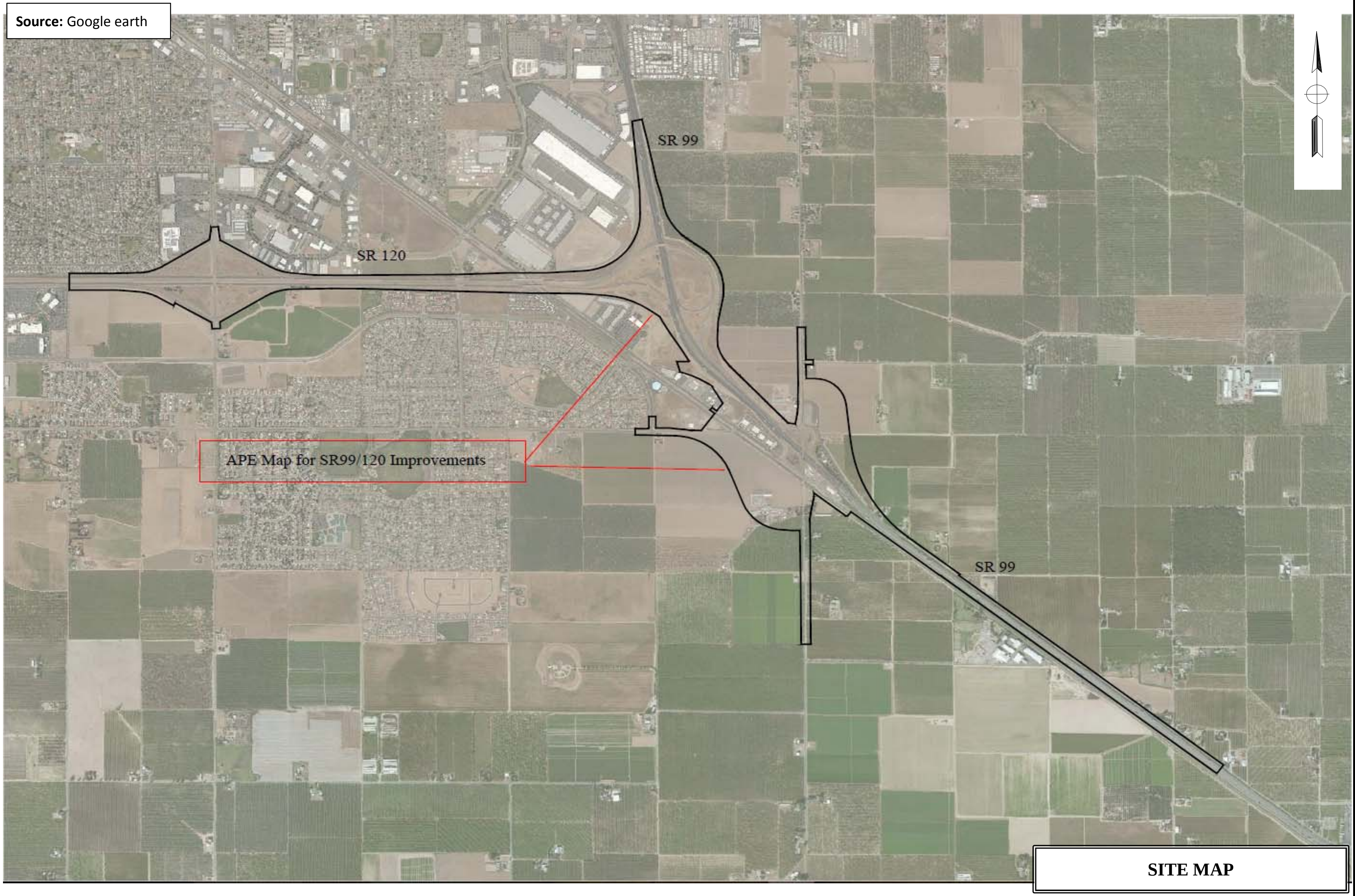


PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

STATE ROUTE 99/120 INTERCHANGE CONNECTOR PROJECT
CITY OF MANTECA, CALIFORNIA

JOB NO.: 2016-101-PGR

PLATE NO.: 1



PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

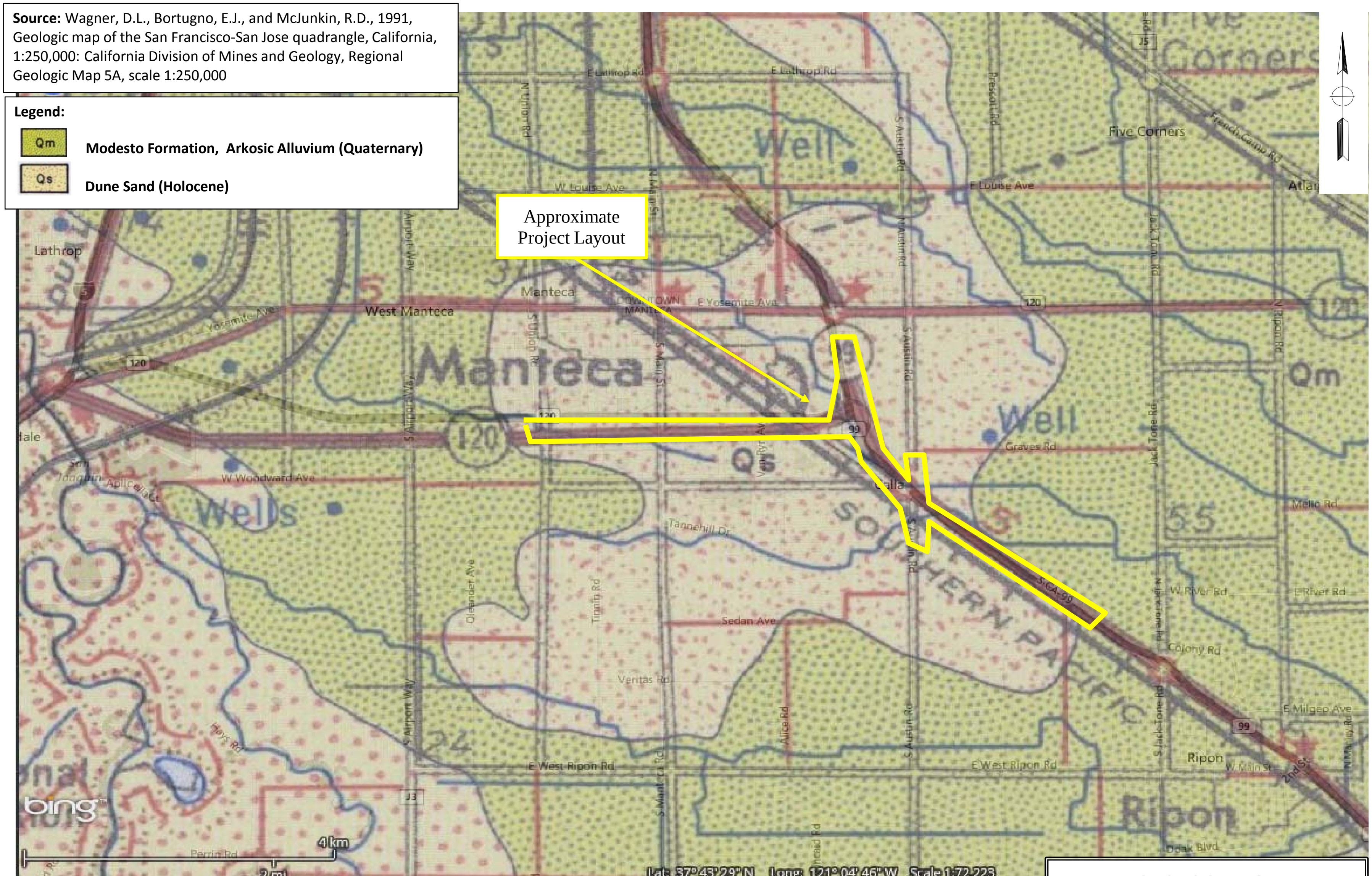
STATE ROUTE 99/120 INTERCHANGE CONNECTOR PROJECT
MANTECA, CALIFORNIA

JOB NO.: 2016-101-PGR	PLATE NO.: 2

Source: Wagner, D.L., Bortugno, E.J., and McJunkin, R.D., 1991, Geologic map of the San Francisco-San Jose quadrangle, California, 1:250,000: California Division of Mines and Geology, Regional Geologic Map 5A, scale 1:250,000

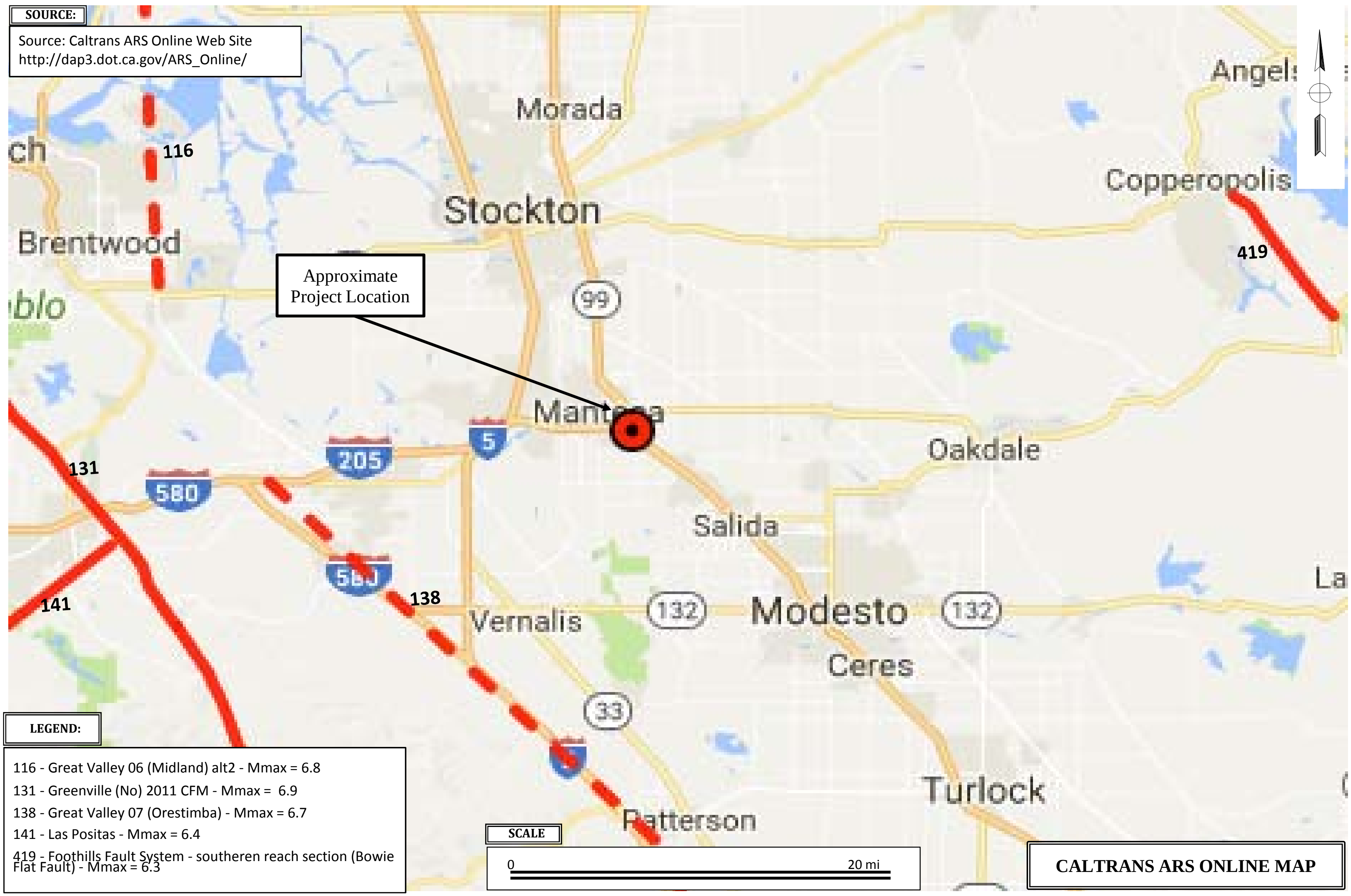
Legend:

Qm	**Modesto Formation, Arkosic Alluvium (Quaternary)**
Qs	**Dune Sand (Holocene)**



GEOLOGY MAP

PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS TESTING	**STATE ROUTE 99/120 INTERCHANGE CONNECTOR PROJECT CITY OF MANTECA, CALIFORNIA**	
	JOB NO.: 2016-101-PGR	**PLATE NO.: 3**



CALTRANS ARS ONLINE MAP

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

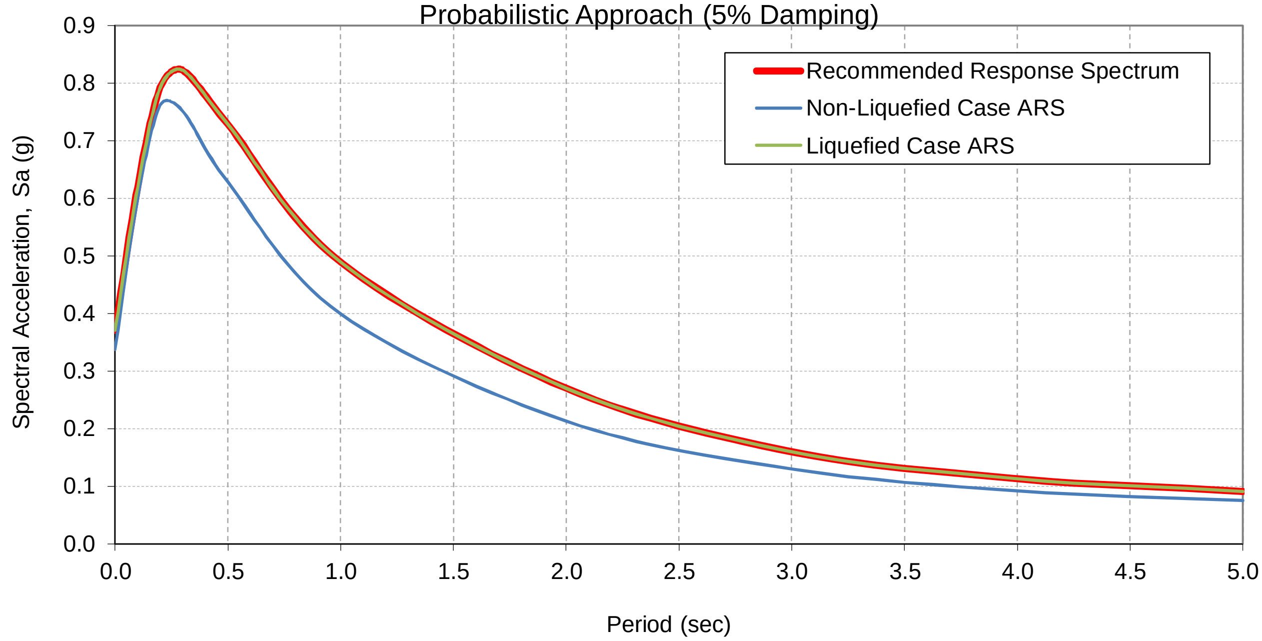
STATE ROUTE 99/120 INTERCHANGE CONNECTOR PROJECT
CITY OF MANTECA, CALIFORNIA

JOB NO.: 2016-101-PGR

PLATE NO.: 4

RECOMMENDED ACCELERATION RESPONSE SPECTRUM
(Non-Liquefied and Liquefied Case Envelope)

Probabilistic Approach (5% Damping)



Site Information

Latitude:	37.7853
Longitude	-121.1884
V_{S30} (m/s) =	250 (Non-Liq) / 190 (Liq.)

Recommended Response Spectrum			
Period (sec)	Non-Liquefied Case Acceleration (g)	Liquefied Case Acceleration (g)	Final Recommended Acceleration (g)
0.0	0.338	0.371	0.371
0.1	0.599	0.619	0.619
0.2	0.761	0.792	0.792
0.3	0.751	0.822	0.822
0.5	0.628	0.728	0.728
1.0	0.399	0.489	0.489
2.0	0.213	0.270	0.270
3.0	0.130	0.160	0.160
4.0	0.092	0.113	0.113
5.0	0.075	0.091	0.091

Source:

1. Caltrans ARS Online tool (V2.3.09, http://dap3.dot.ca.gov/shake_stable/v2/index.php)

2. Caltrans Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations, November 2012

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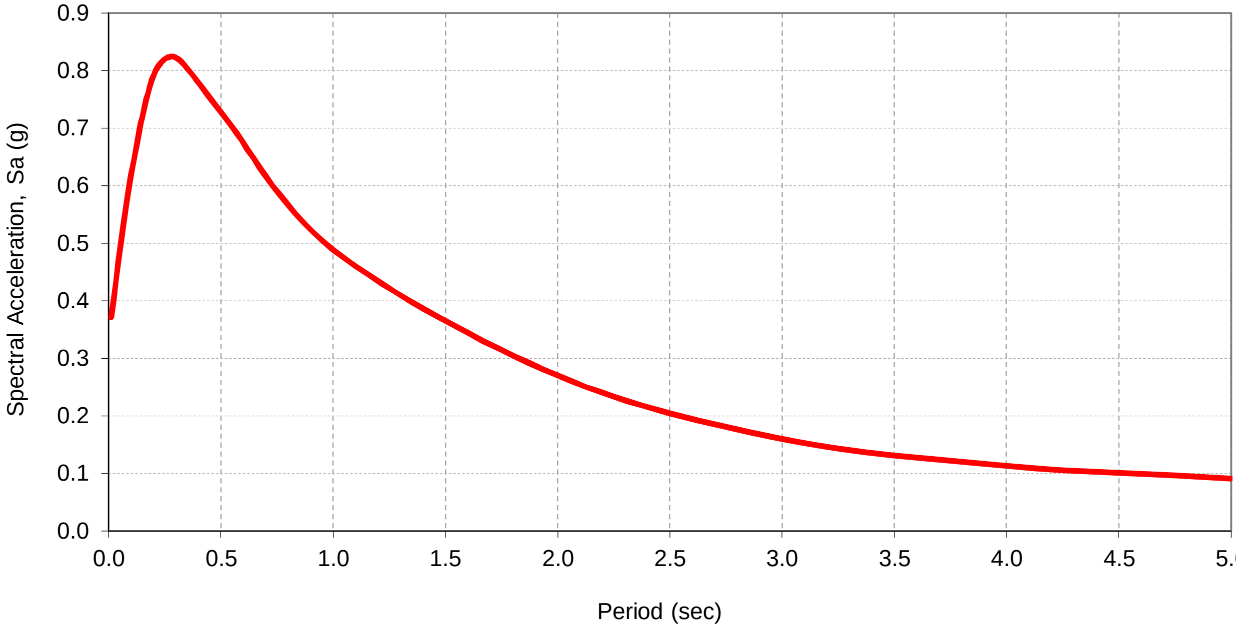
STATE ROUTE 99/120 INTERCHANGE CONNECTOR PROJECT
CITY OF MANTECA, CALIFORNIA

Project No.: 2016-101-PGR	**Plate No.: 5A**

RECOMMENDED ACCELERATION RESPONSE SPECTRUM

(5% Damping)



Site Information

Latitude:	37.7853
Longitude	-121.1884
V_{S30} (m/s) =	190
$Z_{1.0}$ (m) =	N/A
$Z_{2.5}$ (km) =	N/A
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	25.68

Governing Curve:

Caltrans Online Probabilistic ARS

Recommended Response Spectrum				
Period (sec)	Caltrans Online Probabilistic Spectral Acceleration (g)	Adjusted for Near Fault Effect	Adjusted For Basin Effect	Final Adjusted Spectral Acceleration (g)
0.0	0.371	1	1	0.371
0.1	0.619	1	1	0.619
0.2	0.792	1	1	0.792
0.3	0.822	1	1	0.822
0.5	0.728	1	1	0.728
1.0	0.489	1	1	0.489
2.0	0.27	1	1	0.270
3.0	0.16	1	1	0.160
4.0	0.113	1	1	0.113
5.0	0.091	1	1	0.091

Source:

1. Caltrans ARS Online tool (V.2.3.09, http://dap3.dot.ca.gov/ARS_Online/)

2. USGS Deaggregation 2008 beta (http://eqint.cr.usgs.gov/deaggint/2008/index.php)

3. Caltrans Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations, November 2012

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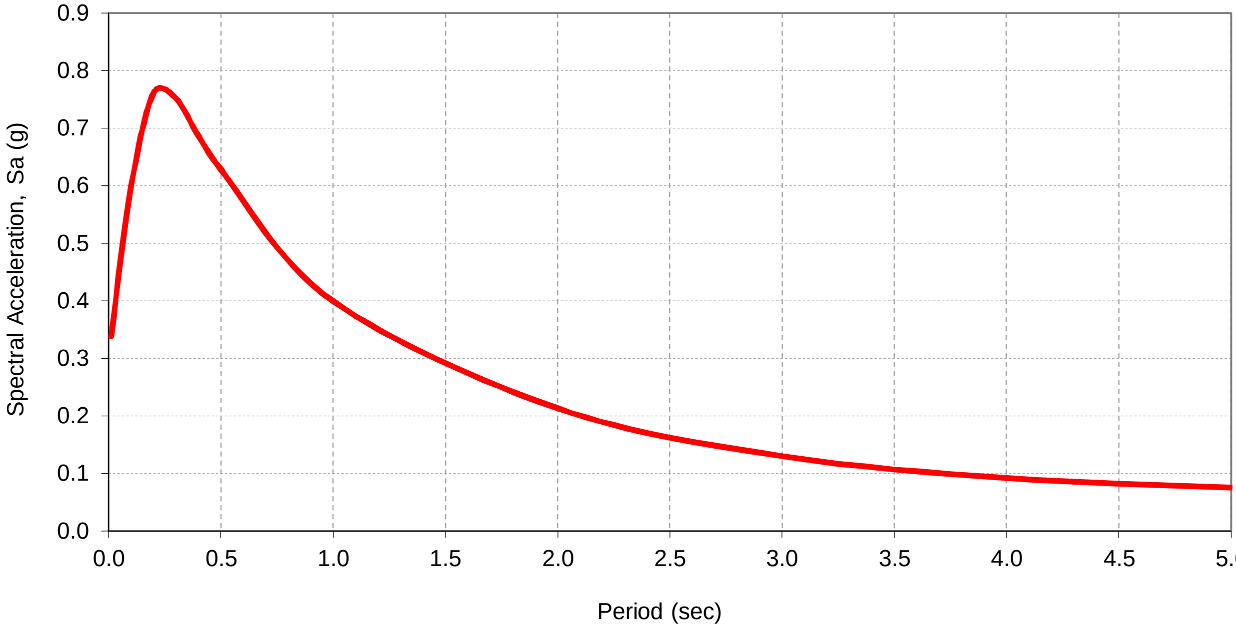
STATE ROUTE 99/120 INTERCHANGE CONNECTOR PROJECT
CITY OF MANTECA, CALIFORNIA

Project No.: 2016-101-PGR	**Plate No.: 5B**

12/11/2017 North Connector OC_Acceleration_Response_Spectrum_V2.3.09_liq case.xlsx
T:\Ongoing Projects\2016\2016-101-PGR Mark Thomas Rte 99 & 120\Report\PGR\ARS\liq case\

RECOMMENDED ACCELERATION RESPONSE SPECTRUM

(5% Damping)



Site Information

Latitude:	37.7853
Longitude	-121.1884
V_{S30} (m/s) =	250
$Z_{1.0}$ (m) =	N/A
$Z_{2.5}$ (km) =	N/A
Near Fault Factor, Derived from USGS Deagg. Dist (km) =	25.68

Governing Curve:

Caltrans Online Probabilistic ARS

Recommended Response Spectrum				
Period (sec)	Caltrans Online Probabilistic Spectral Acceleration (g)	Adjusted for Near Fault Effect	Adjusted For Basin Effect	Final Adjusted Spectral Acceleration (g)
0.0	0.338	1	1	0.338
0.1	0.599	1	1	0.599
0.2	0.761	1	1	0.761
0.3	0.751	1	1	0.751
0.5	0.628	1	1	0.628
1.0	0.399	1	1	0.399
2.0	0.213	1	1	0.213
3.0	0.13	1	1	0.130
4.0	0.092	1	1	0.092
5.0	0.075	1	1	0.075

Source:

1. Caltrans ARS Online tool (V.2.3.09, http://dap3.dot.ca.gov/ARS_Online/)

2. USGS Deaggregation 2008 beta (http://eqint.cr.usgs.gov/deaggint/2008/index.php)

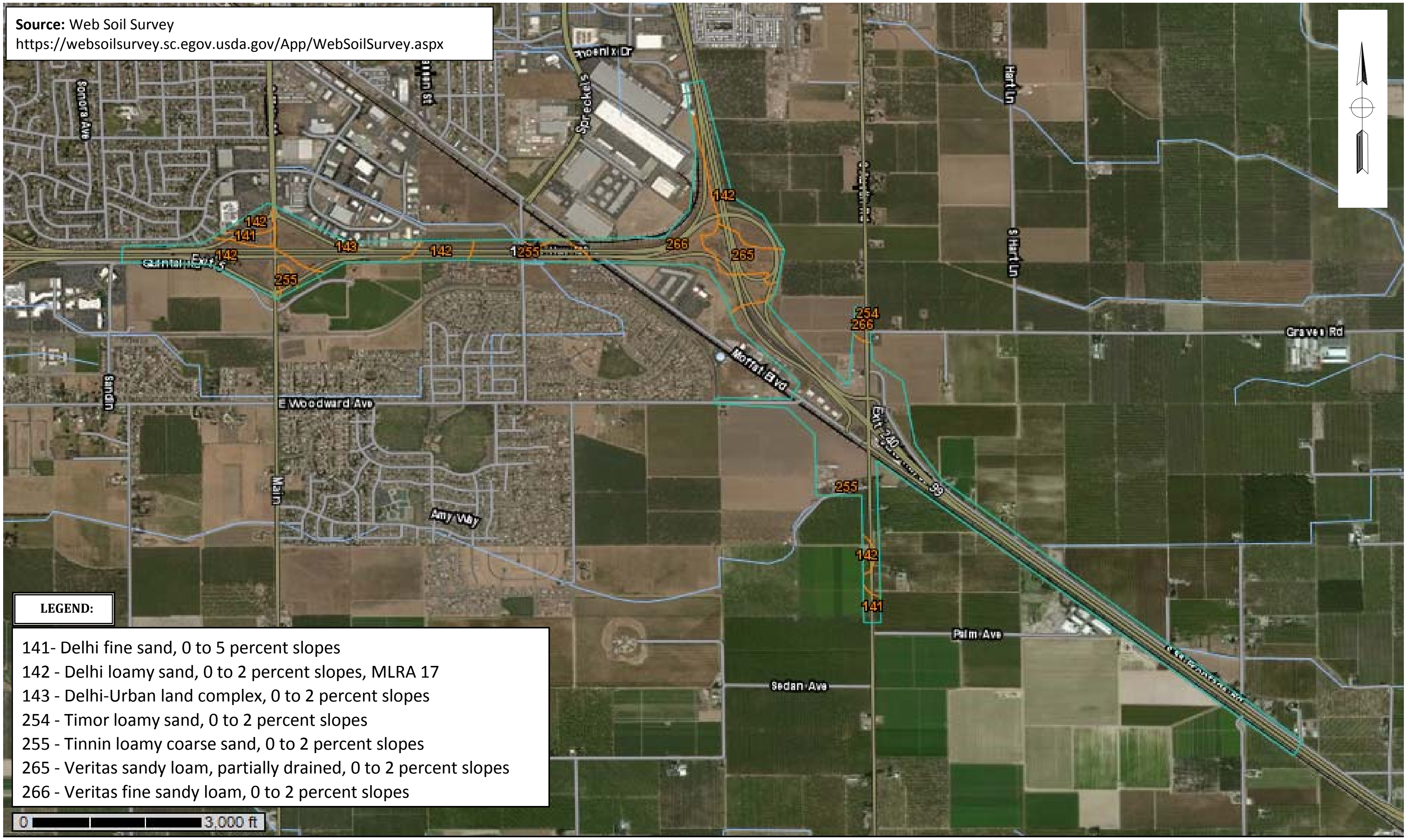
3. Caltrans Methodology for Developing Design Response Spectrum for Use in Seismic Design Recommendations, November 2012

PARIKH
Practicing in the Geosciences

STATE ROUTE 99/120 INTERCHANGE CONNECTOR PROJECT
CITY OF MANTECA, CALIFORNIA

Project No.: 2016-101-PGR	**Plate No.: 5C**

Source: Web Soil Survey
https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx



LEGEND:

141- Delhi fine sand, 0 to 5 percent slopes
142 - Delhi loamy sand, 0 to 2 percent slopes, MLRA 17
143 - Delhi-Urban land complex, 0 to 2 percent slopes
254 - Timor loamy sand, 0 to 2 percent slopes
255 - Tinnin loamy coarse sand, 0 to 2 percent slopes
265 - Veritas sandy loam, partially drained, 0 to 2 percent slopes
266 - Veritas fine sandy loam, 0 to 2 percent slopes

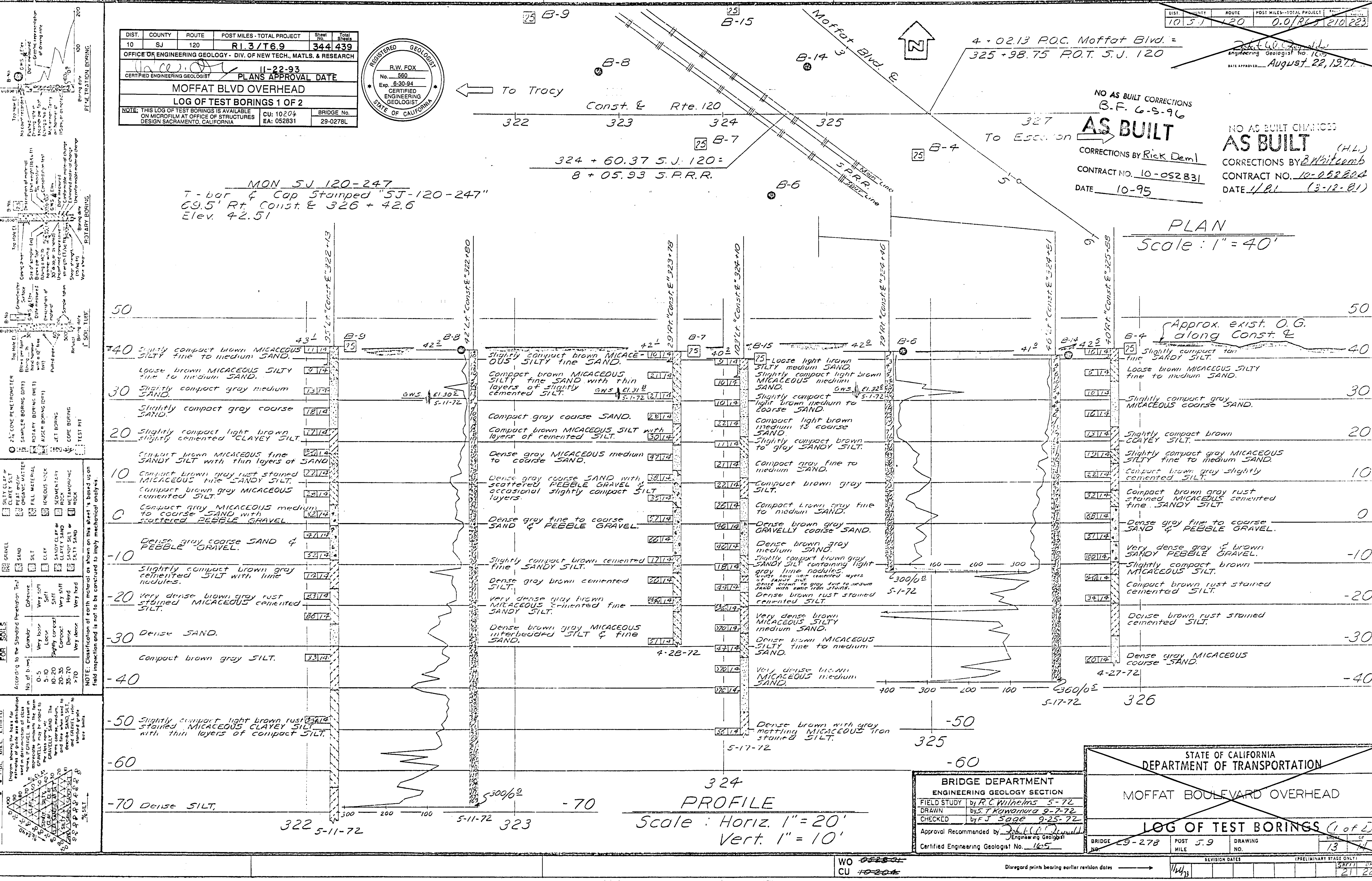
SOIL SURVEY MAP

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

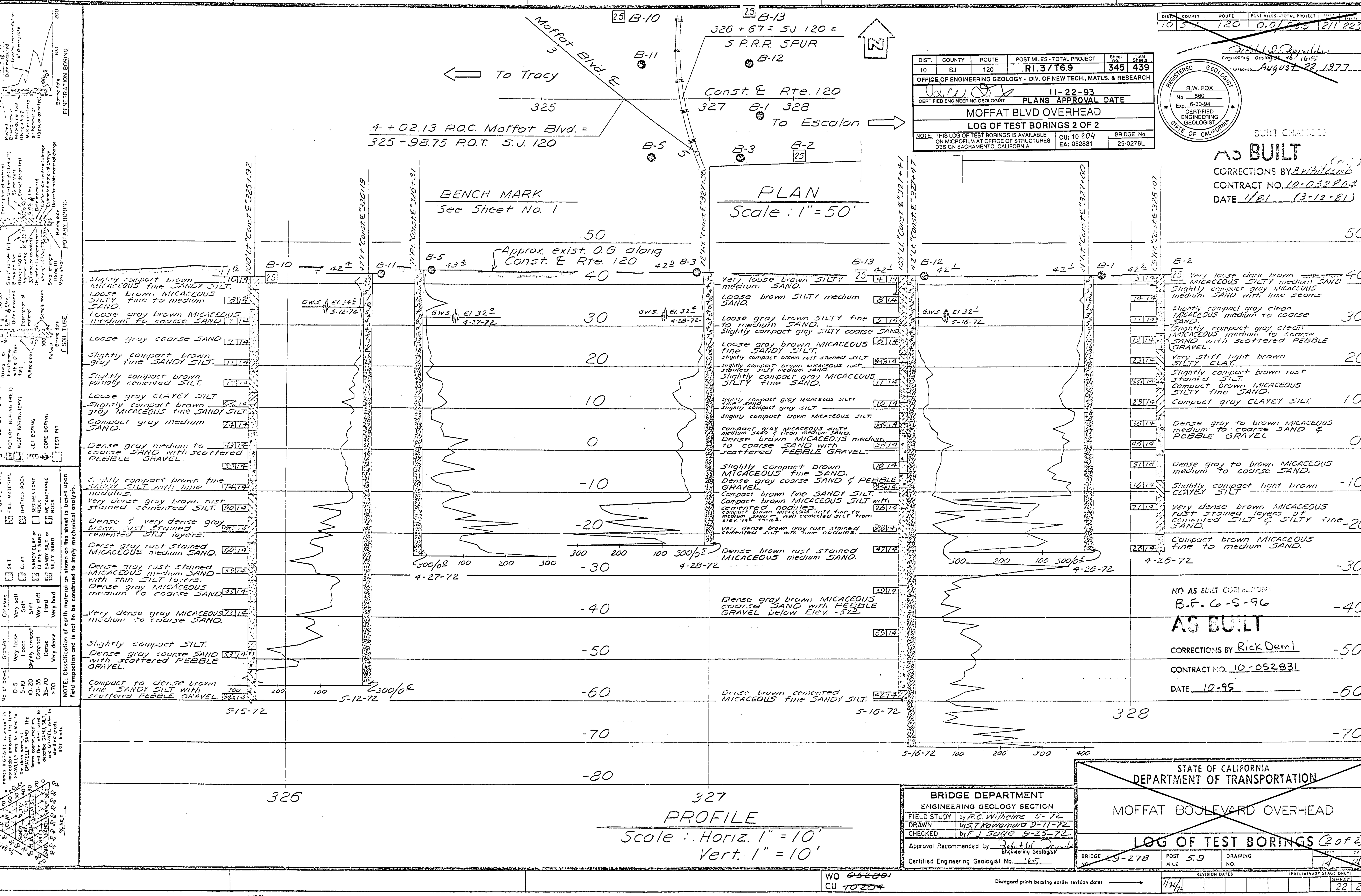
STATE ROUTE 99/120 INTERCHANGE CONNECTOR PROJECT
MANTECA, CALIFORNIA

JOB NO.: 2016-101-PGR | **PLATE NO.: 6**

APPENDIX A



DIST. 10 COUNTY SJ ROUTE 120 POST MILES - TOTAL PROJECT R1.3/T6.9 Sheet No. 344 Total Sheets 439
OFFICE OF ENGINEERING GEOLOGY - DIV. OF NEW TECH., MATLS. & RESEARCH
CERTIFIED ENGINEERING GEOLOGIST 11-22-93 PLANS APPROVAL DATE
MOFFAT BLVD OVERHEAD
LOG OF TEST BORINGS 1 OF 2
NOTE: THIS LOG OF TEST BORINGS IS AVAILABLE ON MICROFILM AT OFFICE OF STRUCTURES DESIGN SACRAMENTO, CALIFORNIA
CU: 10204 EA: 052831
BRIDGE No. 29-0278L
REGISTERED GEOLOGIST R.W. FOX No. 560 Exp. 6-30-94 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA
To Tracy
To Escalon
Const. ℄ Rte. 120
4 + 02.13 P.O.C. Moffat Blvd. = 325 + 98.75 P.O.T. S.J. 120
324 + 60.37 S.J. 120 = 8 + 05.93 S.P.R.R.
Moffat Blvd. ℄
S.P.R.R. Main Line
MON SJ 120-247
T-bar & Cap Stamped "SJ-120-247"
69.5' Rt. Const. ℄ 326 + 42.6
Elev. 42.51
NO AS BUILT CORRECTIONS B.F. 6-5-96
AS BUILT
CORRECTIONS BY Rick Deml
CONTRACT NO. 10-052831
DATE 10-95
NO AS BUILT CHANGES
AS BUILT (H.L.)
CORRECTIONS BY B.Whitcomb
CONTRACT NO. 10-052804
DATE 1/81 (3-12-81)
DIST. 10 COUNTY S.J. ROUTE 120 POST MILES 0.0/R6.5 210 223
Engineering Geologist No. 165
August 22, 1977
PLAN
Scale: 1" = 40'
B-9 B-8 B-7 B-15 B-14 B-6 B-4
Approx. exist. O.G. along Const. ℄
PROFILE
Scale: Horiz. 1" = 20'
Vert. 1" = 10'
B-9: Slightly compact brown MICACEOUS SILTY fine to medium SAND. Loose brown MICACEOUS SILTY fine to medium SAND. Slightly compact gray medium SAND. Slightly compact gray coarse SAND. Slightly compact light brown slightly cemented CLAYEY SILT. Compact brown MICACEOUS fine SANDY SILT with thin layers of SAND. Compact brown gray rust stained MICACEOUS fine SANDY SILT. Compact brown gray MICACEOUS cemented SILT. Compact gray MICACEOUS medium to coarse SAND with scattered PEBBLE GRAVEL. Dense gray coarse SAND & PEBBLE GRAVEL. Slightly compact brown gray cemented SILT with lime nodules. Very dense brown gray rust stained MICACEOUS cemented SILT. Dense SAND. Compact brown gray SILT. Slightly compact light brown rust stained MICACEOUS CLAYEY SILT with thin layers of compact SILT. Dense SILT.
B-7: Slightly compact brown MICACEOUS SILTY fine SAND. Compact brown MICACEOUS SILTY fine SAND with thin layers of slightly cemented SILT. Compact gray coarse SAND. Compact brown MICACEOUS SILT with layers of cemented SILT. Dense gray MICACEOUS medium to coarse SAND. Dense gray coarse SAND with scattered PEBBLE GRAVEL & occasional slightly compact SILT layers. Dense gray fine to coarse SAND & PEBBLE GRAVEL. Slightly compact brown cemented fine SANDY SILT. Dense gray brown cemented SILT. Very dense gray brown MICACEOUS cemented fine SANDY SILT. Dense brown gray MICACEOUS interbedded SILT & fine SAND.
B-15: Loose light brown SILTY medium SAND. Slightly compact light brown MICACEOUS medium SAND. Slightly compact light brown medium to coarse SAND. Compact light brown medium to coarse SAND. Slightly compact brown to gray SANDY SILT. Compact gray fine to medium SAND. Compact brown gray SILT. Compact brown gray fine to medium SAND. Dense brown gray GRAVELLY coarse SAND. Dense brown gray medium SAND. Slightly compact brown gray SANDY SILT containing light gray lime nodules. Dense brown rust stained cemented SILT. Very dense brown MICACEOUS SILTY medium SAND. Dense brown MICACEOUS SILTY fine to medium SAND. Very dense brown MICACEOUS medium SAND. Dense brown with gray mottling MICACEOUS iron stained SILT.
B-4: Slightly compact tan fine SANDY SILT. Loose brown MICACEOUS SILTY fine to medium SAND. Slightly compact gray MICACEOUS coarse SAND. Slightly compact brown CLAYEY SILT. Slightly compact gray MICACEOUS SILTY fine to medium SAND. Compact brown gray slightly cemented SILT. Compact brown gray rust stained MICACEOUS cemented fine SANDY SILT. Dense gray fine to coarse SAND & PEBBLE GRAVEL. Very dense gray & brown SANDY PEBBLE GRAVEL. Slightly compact brown MICACEOUS SILT. Compact brown rust stained cemented SILT. Dense brown rust stained cemented SILT. Dense gray MICACEOUS coarse SAND.
GWS El. 30.8 5-11-72
GWS El. 31.8 5-1-72
GWS El. 32.8 5-1-72
5-11-72 4-28-72 5-17-72 5-1-72 5-17-72 4-27-72
300/0 360/0
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
MOFFAT BOULEVARD OVERHEAD
LOG OF TEST BORINGS (1 of 2)
BRIDGE DEPARTMENT
ENGINEERING GEOLOGY SECTION
FIELD STUDY by R.C. Wilhelms 5-72
DRAWN by S.T. Kawamura 9-7-72
CHECKED by F.J. Sage 9-25-72
Approval Recommended by Engineering Geologist
Certified Engineering Geologist No. 165
BRIDGE 29-278 POST MILE 5.9 DRAWING NO. 13
WO 052801
CU 10204
Disregard prints bearing earlier revision dates
REVISION DATES 11/4/73
SHEET 21 OF 22



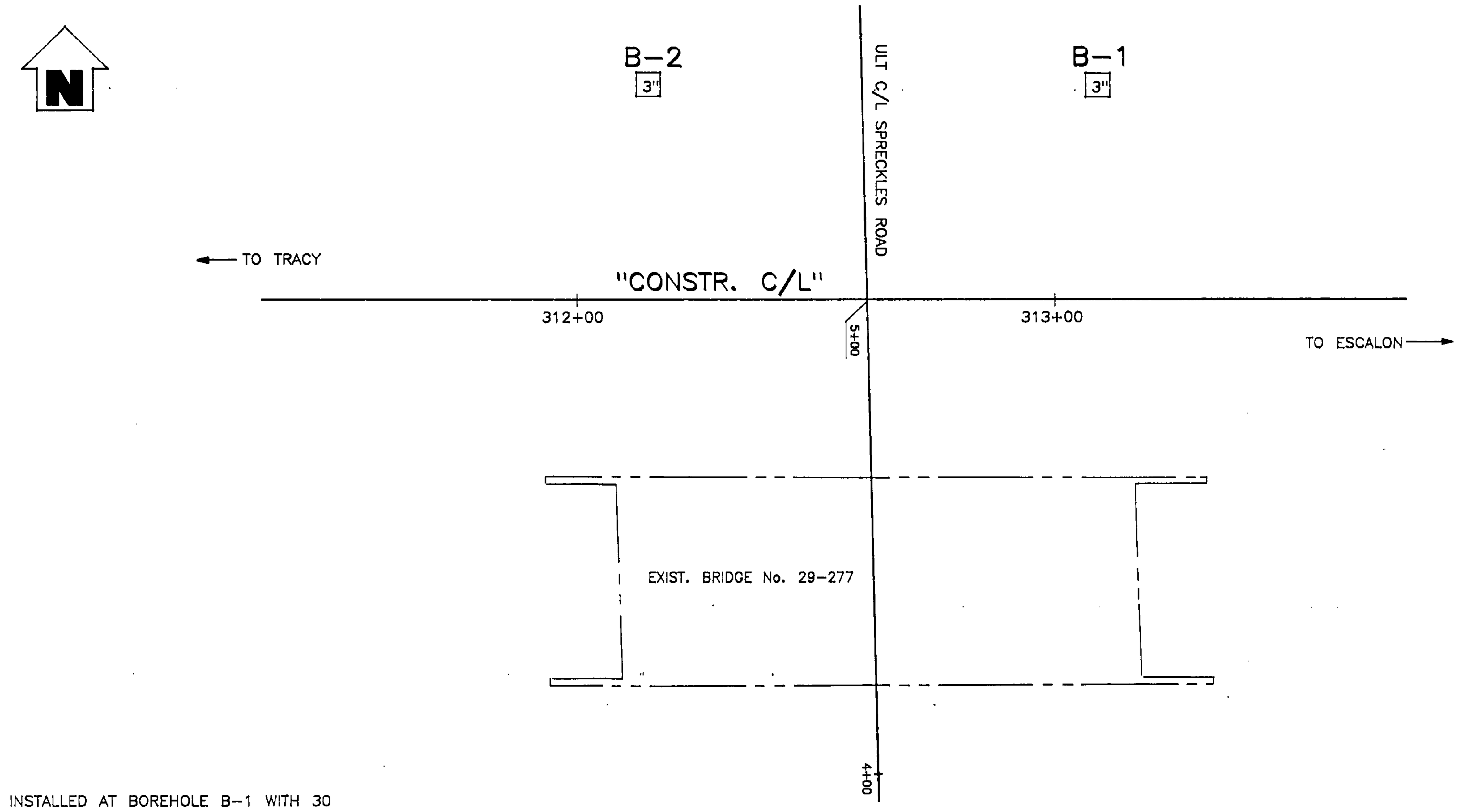
Moffat Blvd ℄
To Tracy
To Escalon
Const. ℄ Rte. 120
4+02.13 P.O.C. Moffat Blvd. = 325+98.75 P.O.T. S.J. 120
326+67 = SJ 120 = S.P.R.R. SPUR
B-10
B-11
B-12
B-13
B-1
B-2
B-3
B-5
BENCH MARK
See Sheet No. 1
PLAN
Scale: 1" = 50'
PROFILE
Scale: Horiz. 1" = 10'
Vert. 1" = 10'
Approx. exist. O.G along Const. ℄ Rte. 120
G.W.S. El 34± 5-12-72
G.W.S. El 32± 4-27-72
G.W.S. El 32± 4-28-72
G.W.S. El 32± 5-16-72
Slightly compact brown MICACEOUS fine SANDY SILT.
Loose brown MICACEOUS SILTY fine to medium SAND.
Loose gray brown MICACEOUS medium to coarse SAND.
Loose gray coarse SAND.
Slightly compact brown gray fine SANDY SILT.
Slightly compact brown partially cemented SILT.
Loose gray CLAYEY SILT.
Slightly compact brown gray MICACEOUS fine SANDY SILT.
Compact gray medium SAND.
Dense gray medium to coarse SAND with scattered PEBBLE GRAVEL.
Slightly compact brown fine SANDY SILT with lime nodules.
Very dense gray brown rust stained cemented SILT.
Dense & very dense gray brown rust stained cemented SILT layers.
Dense gray rust stained MICACEOUS medium SAND.
Dense gray rust stained MICACEOUS medium SAND with thin SILT layers.
Dense gray MICACEOUS medium to coarse SAND.
Very dense gray MICACEOUS medium to coarse SAND.
Slightly compact SILT.
Dense gray coarse SAND with scattered PEBBLE GRAVEL.
Compact to dense brown fine SANDY SILT with scattered PEBBLE GRAVEL.
Very loose brown SILTY medium SAND.
Loose brown SILTY medium SAND.
Loose gray brown SILTY fine to medium SAND.
Slightly compact gray SILTY coarse SAND.
Loose gray brown MICACEOUS fine SANDY SILT.
Slightly compact gray MICACEOUS SILTY fine SAND.
Slightly compact brown MICACEOUS SILT.
Compact gray MICACEOUS SILTY medium & clean medium SAND.
Dense brown MICACEOUS medium to coarse SAND with scattered PEBBLE GRAVEL.
Slightly compact brown MICACEOUS fine SAND.
Dense gray coarse SAND & PEBBLE GRAVEL.
Compact brown fine SANDY SILT.
Compact brown MICACEOUS SILT with cemented nodules.
Very dense brown gray rust stained cemented SILT with lime nodules.
Dense brown rust stained MICACEOUS medium SAND.
Dense gray brown MICACEOUS coarse SAND with PEBBLE GRAVEL below Elev. -52±.
Dense brown cemented MICACEOUS fine SANDY SILT.
Very loose dark brown MICACEOUS SILTY medium SAND.
Slightly compact gray MICACEOUS medium SAND with lime seams.
Slightly compact gray clean MICACEOUS medium to coarse SAND.
Slightly compact gray clean MICACEOUS medium to coarse SAND with scattered PEBBLE GRAVEL.
Very stiff light brown SILTY CLAY.
Slightly compact brown rust stained SILT.
Compact brown MICACEOUS SILTY fine SAND.
Compact gray CLAYEY SILT.
Dense gray to brown MICACEOUS medium to coarse SAND & PEBBLE GRAVEL.
Dense gray to brown MICACEOUS medium to coarse SAND.
Slightly compact light brown CLAYEY SILT.
Very dense brown MICACEOUS rust stained layers of cemented SILT & SILTY fine SAND.
Compact brown MICACEOUS fine to medium SAND.
5-15-72
5-12-72
4-27-72
4-28-72
5-16-72
4-26-72
325
326
327
328
DIST. 10 COUNTY SJ ROUTE 120 POST MILES-TOTAL PROJECT R1.3/T6.9 Sheet No. 345 Total Sheets 439
OFFICE OF ENGINEERING GEOLOGY - DIV. OF NEW TECH., MATLS. & RESEARCH
CERTIFIED ENGINEERING GEOLOGIST
11-22-93
PLANS APPROVAL DATE
MOFFAT BLVD OVERHEAD
LOG OF TEST BORINGS 2 OF 2
NOTE: THIS LOG OF TEST BORINGS IS AVAILABLE ON MICROFILM AT OFFICE OF STRUCTURES DESIGN SACRAMENTO, CALIFORNIA
CU: 10 204
EA: 052831
BRIDGE No. 29-0278L
REGISTERED GEOLOGIST R.W. FOX No. 560 Exp. 6-30-94 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA
Engineering Geologist No. 165
August 22, 1977
AS BUILT
CORRECTIONS BY
CONTRACT NO. 10-052804
DATE 1/81 (3-12-81)
NO AS BUILT CORRECTIONS
B.F. 6-5-96
AS BUILT
CORRECTIONS BY Rick Deml
CONTRACT NO. 10-052831
DATE 10-95
BRIDGE DEPARTMENT
ENGINEERING GEOLOGY SECTION
FIELD STUDY by R.C. Wilhelms 5-72
DRAWN by S.T. Kawamura 9-11-72
CHECKED by F.J. Sage 9-25-72
Approval Recommended by
Engineering Geologist
Certified Engineering Geologist No. 165
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
MOFFAT BOULEVARD OVERHEAD
LOG OF TEST BORINGS (2 of 2)
BRIDGE No. 29-278
POST MILE 5.9
DRAWING NO.
WO 052801
CU 10204
Disregard prints bearing earlier revision dates
NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.
PENETRATION BORING
ROTARY BORING
1" SOIL TUBE

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
10	SJ	120	R1.3/T6.9	380	439

R.C. Wilhelms
CERTIFIED ENGINEERING GEOLOGIST

REGISTERED GEOLOGIST — R.C. WILHELMS — No. 560 — Exp. 6-30-94 — CERTIFIED ENGINEERING GEOLOGIST — STATE OF CALIFORNIA

11-22-93
PLANS APPROVAL DATE



BENCH MARK

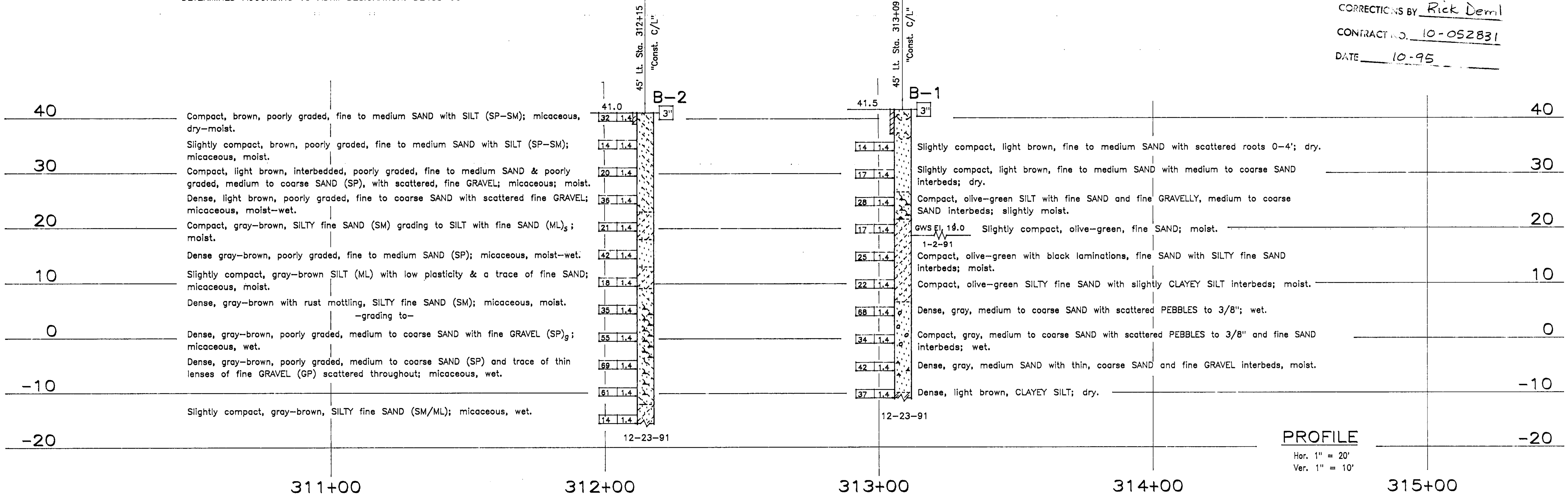
TBM "C" Elev. 41.26
"PK" NAIL IN ASPHALT, 15 FT LEFT,
STA. 4+18 "ULT. C/L SPRECKLES"

PLAN
1" = 20'

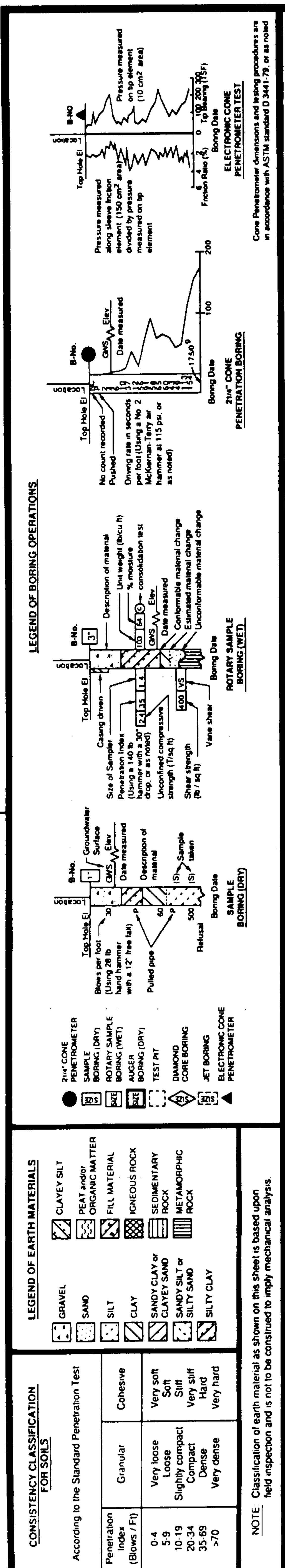
NOTES:

1. OBSERVATION WELL INSTALLED AT BOREHOLE B-1 WITH 30 FEET OF SLOTTED PIPE SET FROM ELEV. 19 TO ELEV. -11
2. ALL SOIL DESCRIPTIONS ARE "FIELD VISUAL" CLASSIFICATIONS. CLASSIFICATIONS FOUND IN B-2 WERE DETERMINED ACCORDING TO ASTM DESIGNATION: D2488-90

NO AS BUILT CORRECTIONS
B.F. 6-6-96
AS BUILT
CORRECTIONS BY Rick Deml
CONTRACT NO. 10-052831
DATE 10-95



PROFILE
Hor. 1" = 20'
Ver. 1" = 10'



DIVISION OF NEW TECHNOLOGY, MATERIALS AND RESEARCH	OFFICE OF ENGINEERING GEOLOGY	FIELD INVESTIGATION BY:	State of CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF STRUCTURES STRUCTURE DESIGN	BRIDGE NO. 29-277L	SPRECKLES ROAD UNDERCROSSING
DRAWN BY	I. GAMARRA 8/92	M. PALMER, J. BOWMAN			POST MILE 0.0/R6.5	LOG OF TEST BORINGS 1 OF 2
CHECKED BY						

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3
CU 10204
EA 052831
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES (PRELIMINARY STAGE ONLY)
SHEET 13 OF 14

TL 6051 REV 2/92

DIST.	COUNTY	ROUTE	POST MILES-TOTAL PROJECT	SHEET	TOTAL SHEETS
~~10~~	~~SJ~~	~~120~~	~~0.0/R5.5~~	~~197~~	~~223~~

Engineering Geologist No. 165
DATE APPROVED ~~August 22, 1977~~

DIST.	COUNTY	ROUTE	POST MILES - TOTAL PROJECT	Sheet No.	Total Sheets
10	SJ	120	R1.3/T6.9	381	439

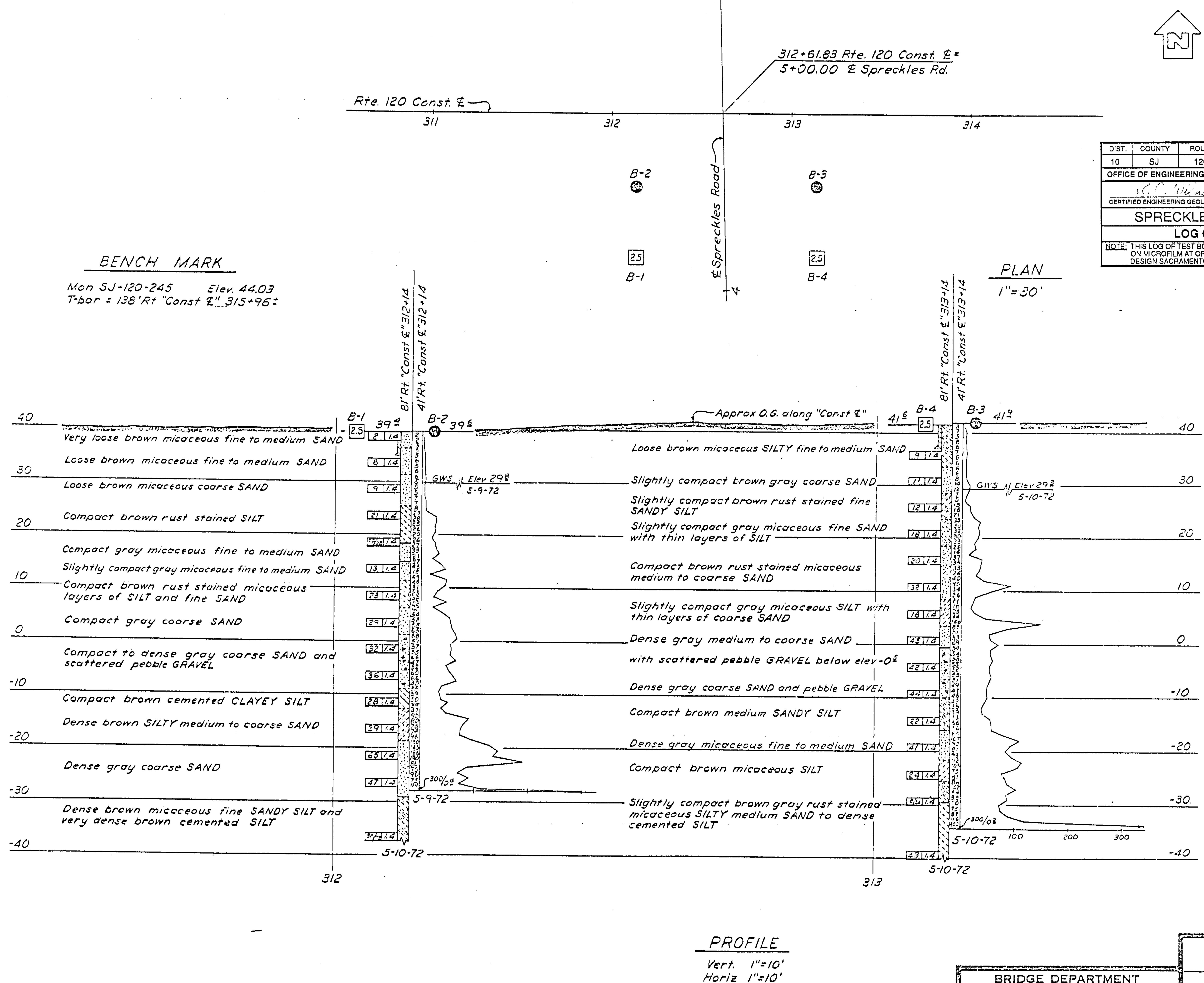
OFFICE OF ENGINEERING GEOLOGY - DIV. OF NEW TECH., MATLS. & RESEARCH

CERTIFIED ENGINEERING GEOLOGIST — 11-22-93 PLANS APPROVAL DATE

SPRECKLES ROAD UNDERCROSSING
LOG OF TEST BORINGS 2 OF 2

NOTE: THIS LOG OF TEST BORINGS IS AVAILABLE ON MICROFILM AT OFFICE OF STRUCTURES DESIGN SACRAMENTO, CALIFORNIA — CU: 10 204 EA: 052831 — BRIDGE No. 29-277 L

REGISTERED GEOLOGIST R.C. WILHELMS No. 560 Exp. 6-30-94 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA



NO AS BUILT CORRECTIONS
B.F. 6-6-96

AS BUILT
CORRECTIONS BY Rick Deml
CONTRACT NO. 10-052831
DATE 10-95

NO AS BUILT CHANGES
AS BUILT (H.L.)
CORRECTIONS BY B. Whitcomb
CONTRACT NO. 10-052804
DATE 1/81 (3-12-81)

BRIDGE DEPARTMENT
ENGINEERING GEOLOGY SECTION

FIELD STUDY	by R.C. Wilhelms 5/72
DRAWN	by T.A. Nelson 10/31/72
CHECKED	by R.C. Wilhelms 11/7/72

Approval Recommended by — Engineering Geologist
Certified Engineering Geologist No. 165

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SPRECKLES ROAD UNDERCROSSING

LOG OF TEST BORINGS

BRIDGE NO. 29-277 — POST MILE 5.6 — DRAWING NO. — SHEET 7 OF 7

~~WO 052801~~
~~CU 10204~~

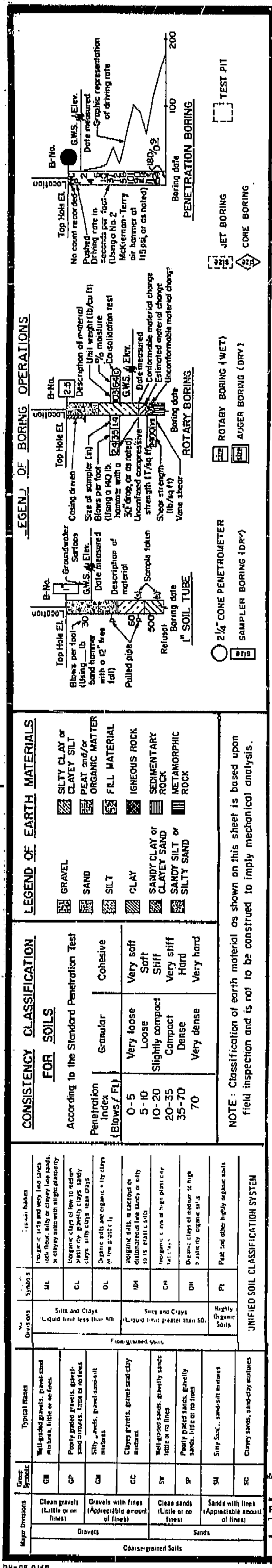
Disregard prints bearing earlier revision dates

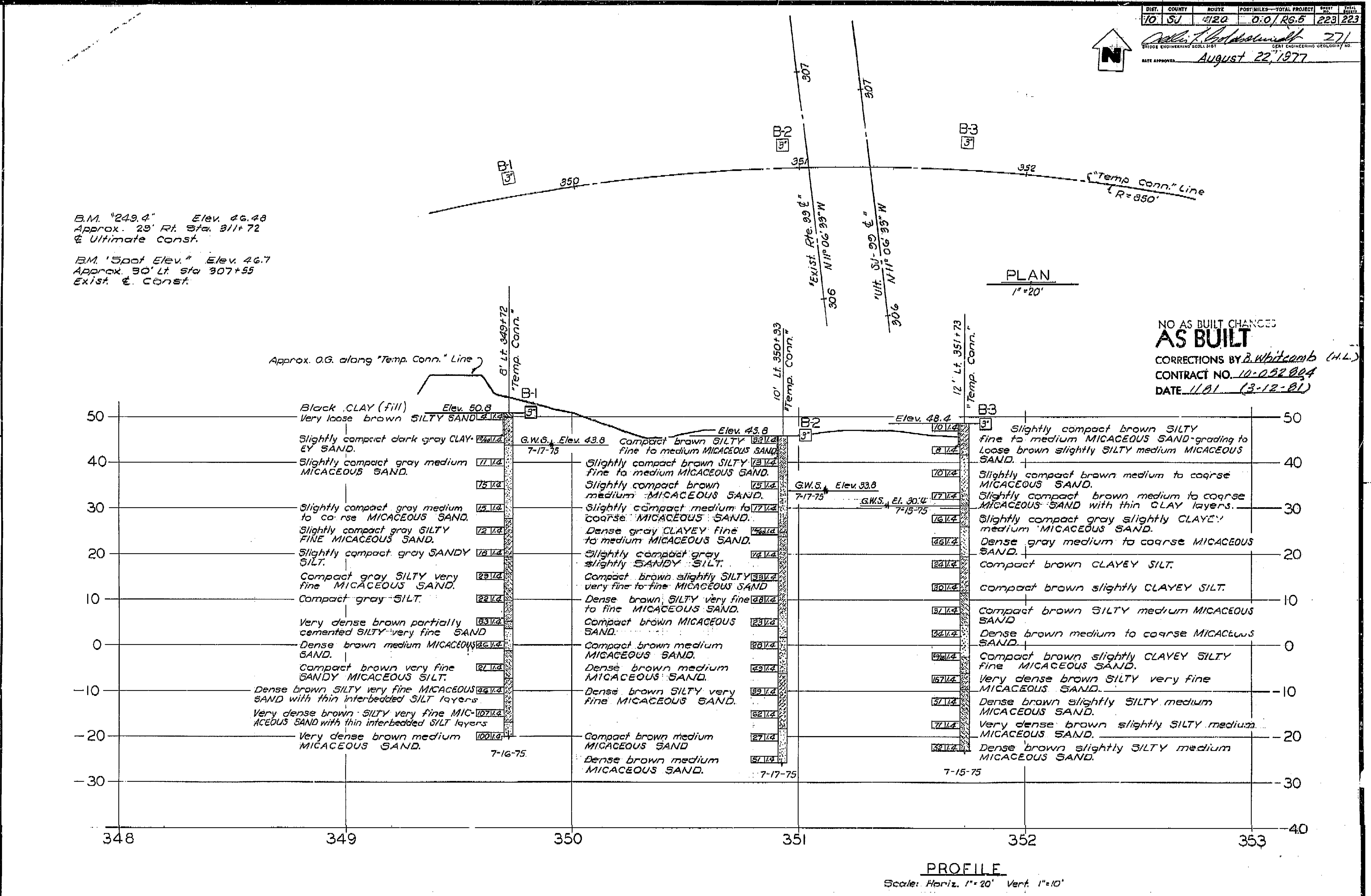
Sheet 14 of 14

AS BUILT PLANS

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
10	SJ	4/120	0.0/R6.5	223	223

August 22, 1977





NO AS BUILT CHANGES
AS BUILT
CORRECTIONS BY B. Whitcomb (H.L.)
CONTRACT NO. 10-052804
DATE 11/81 (3-12-81)

ENGINEERING GEOLOGY SECTION

FIELD STUDY: B. Fox
DRAWN: Ken Johnson
CHECKED: B. Fox 1-5-76
Approval Recommended By: B. W. Ford
CERTIFIED ENGINEERING GEOLOGIST NUMBER 78

State of CALIFORNIA
DEPARTMENT OF TRANSPORTATION

OFFICE OF STRUCTURES DESIGN GROUP I
PROJECT ENGINEER

BRIDGE NO. 29-286
POST MILE 5.8

NORTH CONNECTOR OVERCROSSING
LOG OF TEST BORINGS

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS 0 1 2 3

CU 10804
WO 052801

Disregard prints bearing earlier revision dates

SHEET 12 OF 12

223

AS BUILT PLANS
Contract No. 10-052804
Date Completed
Document No.

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF TRANSPORTATION.
DATE 4-9-81 SIGNATURE Donald Blackford TITLE Microfilm tech II

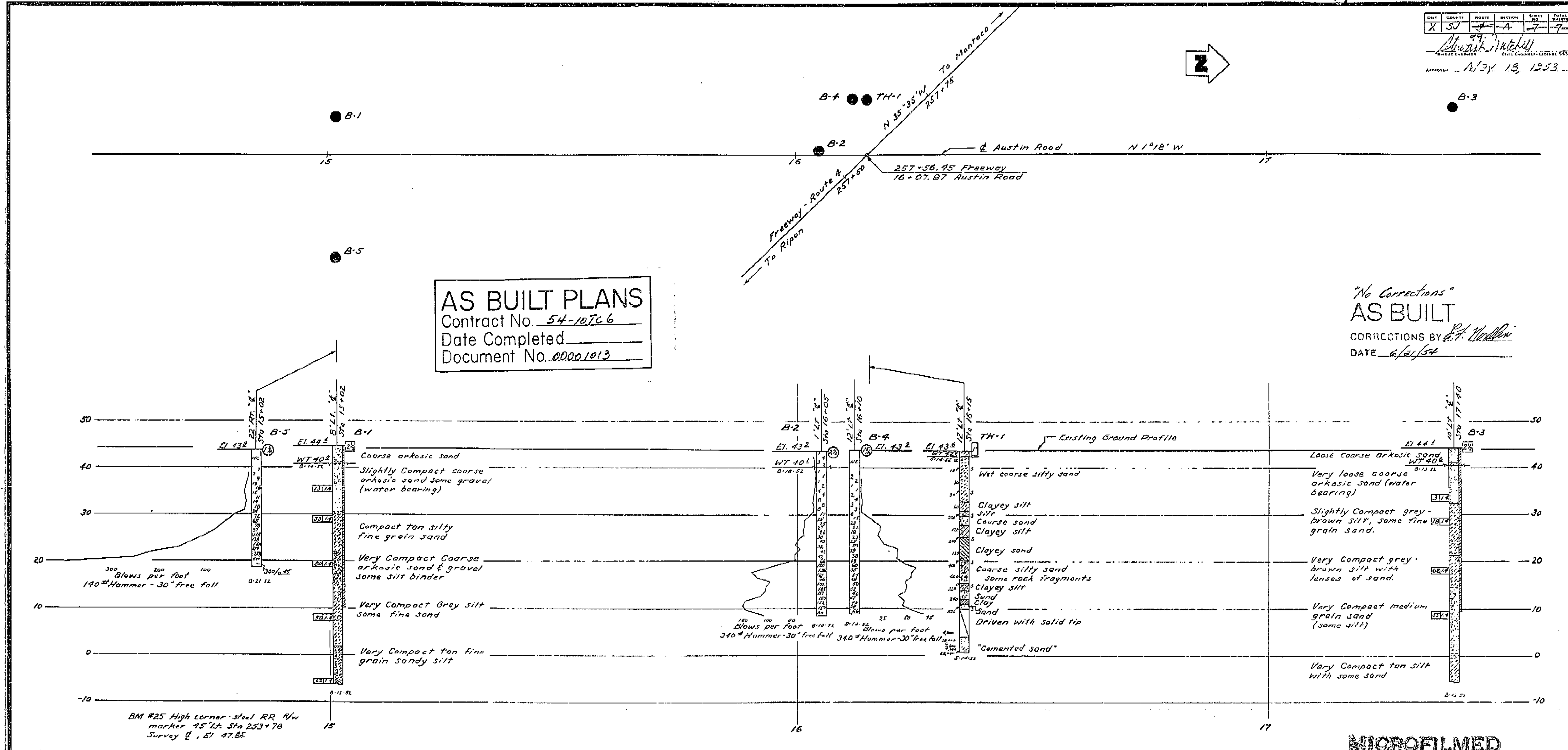
I-139 (4)

FED. ROAD DIST. No.	STATE	PROJ. No.	FISCAL YEAR	SHEET No.	TOTAL SHEETS
2	CAL.			48	54

DIST	COUNTY	ROUTE	SECTION	SHEET No.	TOTAL SHEETS
X	SJ	4	A	7	7

BRIDGE ENGINEER

APPROVED May 13, 1953



Classification of Material Based on Standard Grade Size Limits

Diagram showing the basis for estimates of grade size distribution used in determination of class names

If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, viz. "gravelly sand". The terms "coarse", "medium" and "fine" when used to describe gravel, sand and silt refer to standard grade size limits.

Read SAND percentages on this side — Read CLAY percentages on this side — Read SILT percentages on this side

Legend of Earth Materials

- Gravel
- Sand
- Silt
- Clay
- Sandy Clay or Clayey Sand
- Sandy Silt or Silty Sand
- Silty Clay or Clayey Silt
- Peat and/or Organic Clay
- Filled Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

Legend of Boring Operations

- Plan of any boring
- Penetrometer
- 2¼" Cone penetrometer
- Sampler boring (dry)
- Rotary boring (wet)
- Auger boring (dry)
- Jet boring
- Core boring
- Test pit

1" Soil Tube — Rotary Boring

Notes

The contractor's attention is directed to Section 2, Article (c) of the Standard Specifications and to the Special Provisions accompanying this set of plans. Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis. ~~Penetrometer borings having a rate of penetration measured in seconds per foot are driven with a No. 2 McKiernan Terry air hammer at 115 psi.~~

State of California
Department of Public Works
Division of Highways

AUSTIN ROAD OVERCROSSING

LOG OF TEST BORINGS

Scale: Horiz. 1" to 10', Vert. 1" to 10' — Bridge 29-129 — File — Drawing C-2820-7

I HEREBY CERTIFY THAT THIS IS A TRUE AND ACCURATE COPY OF THE ABOVE DOCUMENT TAKEN UNDER MY DIRECTION AND CONTROL ON THIS DATE IN SACRAMENTO, CALIFORNIA PURSUANT TO AUTHORIZATION BY THE DIRECTOR OF PUBLIC WORKS.

DATE ___ SIGNATURE ___ TITLE ___