PRELIMINARY GEOTECHNICAL REPORT
SANTA CRUZ ROUTE 1 HOV - TIER I CORRIDOR ANALYSIS OF HOV LANES AND TSM ALTERNATIVES (05 SCR-1, PM 7.24–16.13) AND TIER II BUILD PROJECT ANALYSIS – 41ST AVE TO SOQUEL AVE DR AUX LANES AND CHANTICLEER AVE POC (05 SCR-1, PM 13.5 – 14.9), EA 0C7300
SANTA CRUZ COUNTY, CALIFORNIA

For

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Job No: 203132.PGR
Date: July 16, 2015

Attn: Parag Mehta

Sub: PRELIMINARY GEOTECHNICAL REPORT
Highway 1 HOV Lane Widening Project, 0.4 miles S. of San Andreas Road/Larkin Valley Road to 0.4 miles N. of Morrissey Blvd OC (PM 7.24–16.13), Santa Cruz County, CA,

Dear Mr. Mehta:

Transmitted herewith is the Preliminary Geotechnical Report for the subject project. The report was prepared in accordance with the scope of work outlined in our proposal. This report defines the geotechnical conditions as evaluated from the as-built field data. No new investigations were undertaken for this phase of our work. We appreciate the opportunity to be of service to you on this project. If you have any questions concerning our findings or conclusions, please feel free to contact this office.

Very truly yours,
PARIKH CONSULTANTS, INC.

Gary Parikh

Gary Parikh, P.E., G.E., 666
President

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PRELIMINARY GEOTECHNICAL REPORT
HIGHWAY 1 HOV LANE WIDENING PROJECT
0.4 MILES S. OF SAN ANDREAS RD / LARKIN VALLEY RD UC
TO 0.4 MILES N. OF MORRISSEY BLVD OC
(PM 7.24 - 16.13)
SANTA CRUZ COUNTY, CALIFORNIA

1. SUMMARY OF FINDINGS

The proposed Highway 1 project is located within Santa Cruz County and passes through the communities of Santa Cruz, Live Oak, Soquel, Capitola, and Aptos. The general Vicinity Map and Project Location Maps are shown in Plate 1, and Plates 1A to 1C, respectively. The Highway 1 High Occupancy Vehicle (HOV) Lane Widening Project proposes to widen Highway 1 (designated State Route 1) for a distance of approximately 8.9 miles, from approximately 0.4 miles south of the San Andreas Road / Larkin Valley Road Interchange to 0.4 miles north of the Morrissey Boulevard Interchange to reduce congestion, encourage carpooling and use of alternative transportation modes as a means to increase transportation system capacity, and improve safety.

Based on readily available subsurface data and as-built plans, the subsoil conditions generally consist of loose to very dense silty/clayey/gravelly sand with some sandy/silty clay binder at San Andreas Road/Larkin Valley Road Undercrossing (UC). The subsoil conditions at Freedom Boulevard/Rob Roy Junction Overcrossing (OC), Rio Del Mar Boulevard OC, State Park Drive OC, Park Avenue UC, 41st Avenue OC and Morrissey Avenue OC consist of loose to very dense silty/clayey/gravelly sand. At Bay Avenue UC and Soquel Creek Bridge, the subsoils consist of stiff to very stiff silty/sandy/gravelly clay and dense to very dense gravelly/silty/clayey sand; respectively.

General geologic features pertaining to the site were evaluated by reference to the Geologic Map of Santa Cruz County, California, and by Google Earth Geologic Map 2007 (Plates 2A to 2C). Marine Terrace deposits (Qt; Pleistocene) are mapped along most of the corridor from State Park Drive OC to Morrissey Boulevard OC except in creeks and gulches. Alluvium (Qpa; Pleistocene) and Alluvium (Qha; Holocene) are mapped from San Andreas Road UC to State Park Drive OC and in the valley formed by creeks and gulches. Sedimentary rock (Tmps, Pliocene) is mapped along most of the banks of the creeks and gulches.

Considering the granular soil conditions, generally any short-term and long-term settlement should not be a concern for embankments. Caltrans construction standards for roadway embankments and cuts should be followed.

Groundwater varies along the corridor and is dependent on the local geology, influence from local streams and creeks and the topography. Based on the as-built Log of Test Boring (LOTB) data, groundwater was encountered at Elev. 129.0' to 134.0' at Freedom Boulevard OC, at Elev. 64.0' to 76.0' at Park Avenue UC, Elev. 13.0' at Bay Ave UC, at Elev. 8.5' to 16.0' at Soquel Creek Bridge, Elev. 64.0' at 41st Avenue OC and, Elev. 95.0' at Morrissey Avenue OC. All the groundwater data were obtained from Caltrans as built LOTBs (Appendix A). Groundwater conditions can be mitigated by using Caltrans design and construction techniques.

Foundation conditions are generally reasonable for the project corridor. Caltrans design and construction methods can accommodate geotechnical and geological considerations at the site. Depending upon the site specific soil/rock conditions typical foundation system for bridges may include spread concrete driven piles, Cast-In-Drilled-Hole (CIDH) piles, or steel H piles where hard driving conditions would preclude the use of concrete driven piles. Temporary casing might be required during construction for CIDH piles. For retaining walls and sound walls, depending on the specific site conditions and the design requirements, the foundation system may include spread footings, trench footings, CIDH piles or driven piles. Caltrans standard sign pole design plans maybe used for most of the conventional sign foundations.

Drainage structures and minor culverts may be designed in accordance with Caltrans standard plans.

The basement soil along the project corridor will vary. In general the basement soil is anticipated to be of reasonable quality and a preliminary R-value estimate of 15 has been used to develop typical structural pavement sections. New pavement section should meet the current Caltrans Design Standards in accordance with the Highway Design Manual.

Embankments/fills slopes constructed in accordance with Caltrans standards are expected to be stable at 1V: 2H. Slopes protected by asphalt or concrete pavement should be stable at 1V:1.5H. However, Caltrans guidelines generally require new embankments that are not protected from potential erosion and scour to be constructed at 1V:4H. Cut slopes are expected to be relatively stable at 1V:2H slope. These slopes should be planted with erosion control landscaping. Slopes protected by asphalt or concrete pavement should be stable at 1V:1.5H.

Based on the Soil Survey Map (Plates 4A to 4F), soils at the project site mainly consist of Loam to Sandy loam. These types of soil have moderately high to high permeability or hydraulic conductivity, and very slow to high surface runoff. Drainage characteristic of the soils is classified as 'somewhat poorly drained to somewhat excessively drained', and erosion hazard is moderately low to high. The improved areas within the corridor that are protected by erosion control measures should have low erosion potential. Normal maintenance of surface drainage and slope maintenance is important and should be incorporated in the project plans. Landscaping should be planned to protect any new slopes.

Based on the Fault Map (Plate 3), the Zayante-Vergales (ZVS) Fault and San Andreas/N (SAN) Fault are controlling seismicity within the project area. The existing and proposed bridge structures and retaining structures may experience strong ground shaking during a major earthquake generated on these or other faults nearby in the region. The project elements should be designed and built in accordance with the applicable Caltrans seismic design criteria (SDC 1.4). The ARS Design Curves for individual bridge structures are presented on Plates 7A to 7O.

Based on the Liquefaction Susceptibility Map (Plate 5), liquefaction potential, in general, along the corridor is relatively low. However, liquefaction potential is considered very high close to the Park Avenue UC and its vicinity. Further investigation will be required during the design phase to evaluate liquefaction potential at specific site locations for the proposed structures and large embankments.

The project area has relatively low potential for landslide and/or other movement. Slopes along the creeks may pose local slump or landslide risk. Generally, these localized slopes along the creek banks are mitigated by use of appropriate slope protection such as rock rip rap or revetment.

2. INTRODUCTION

This report presents the results of our preliminary geotechnical investigation for the proposed Highway 1 (SR-1) HOV lane-widening project, hereinafter referred to as "PROJECT" in the County of Santa Cruz, California. The work was performed in general accordance with the scope of work outlined in our scope and proposal. The general location of the project vicinity and project site plan is shown on the Vicinity Map and Project Location Map, Plate 1, and Plates 1A to 1C, respectively.

3. PURPOSE AND SCOPE

The purpose of this report is to provide a preliminary evaluation of potential geotechnical and seismic impacts on the project and reasonable mitigation measures. This information should assist in the preparation of various documents including the Environmental Report and Project Study Report.

The scope of work for this investigation included research and review of readily available geological/geotechnical data pertaining to the project site including available as-built Log of Test Borings (LOTBs) and site reconnaissance, evaluating the data from the key geotechnical and seismic aspects and providing a report.

4. EXISTING FACILITIES

Highway 1 (SR-1) is a major arterial highway running in the north south direction through Santa Cruz County. It generally runs close to the Pacific Coast. The project traverses across hilly terrain, city streets, railroad tracks, streams and creeks. The total length of the project is about 8.9 miles and extends along SR-1 from San Andreas Road-Larkin Valley Road Interchange at the southern limit to Morrissey Boulevard at the northern limit. Major interchanges, including bridges and ramps, exist along the corridor that provide access to the local communities of Santa Cruz, Live Oak, Soquel, Capitola, and Aptos.

5. PROJECT DESCRIPTION

The Highway 1 High Occupancy Vehicle (HOV) Lane Widening Project proposes to widen Highway 1 (designated State Route 1) for a distance of approximately 8.9 miles, from approximately 0.4 miles south of the San Andreas Road / Larkin Valley Road Interchange to 0.4 miles north of the Morrissey Boulevard Interchange to reduce congestion, encourage carpooling and ridersharing, and promote use of alternative transportation modes as a means to increase transportation system capacity. Meeting these project purposes would also address the following related needs:

- Several bottlenecks along Route 1 in the southbound and northbound directions cause recurrent congestion during peak hours.
- Travel time delays due to congestion are experienced by commuters, commerce, and emergency vehicles.
- “Cut-through” traffic, or traffic on local streets, occurs and is increasing because drivers seek to avoid congestion on the highway.
- Limited opportunities exist for pedestrians and bicyclists to safely get across Route 1 within the project corridor.
- Insufficient incentives to increase transit service in the Route 1 corridor because congestion threatens reliability and cost-effective transit service delivery.
- Inadequate facilities to support carpool and rideshare vehicles over single-occupant vehicles, reducing travel time savings and reliability.

5.1 No-Build Alternative

The No-Build Alternative offers a basis for comparison with the TSM and HOV Lane Alternatives in the future analysis year of 2035. It assumes no major construction on Highway 1 through the project limits other than planned and programmed improvements and continued routine maintenance. Planned and programmed improvements included in the No-Build Alternative incorporate the following improvements:

- Construction of auxiliary lanes between the Soquel Drive and Morrissey Boulevard interchanges for the Soquel to Morrissey Auxiliary Lanes Project; construction completed in December 2013.

- Replacement of the La Fonda Avenue overcrossing of Route 1, included as part of the Soquel to Morrissey Auxiliary Lanes project; construction completed in 2013.
- Reconstruction of bridges and addition of a merge lane in each direction between Highway 17 and the Morrissey/La Fonda area for the Highway 1/17 Merge Lanes Project; construction completed in 2008.
- Installation of median barrier on Route 1 from Freedom Boulevard to Rio Del Mar Boulevard.

Also included in the No-Build Alternative are a number of locally sponsored projects for improving the local arterial network and constructing and improving bicycle lanes.

5.2 Transportation System Management (TSM) Alternative

The TSM Alternative proposes ramp metering on existing interchange ramps with auxiliary lanes constructed between the following interchanges:

- Freedom Boulevard and Rio Del Mar Boulevard
- Rio Del Mar Boulevard and State Park Drive
- State Park Drive and Park Avenue
- Park Avenue and Bay Avenue–Porter Street.
- 41st Avenue and Soquel Avenue–Soquel Drive

Auxiliary lanes are designed to reduce conflicts between traffic entering and exiting the highway by connecting from the on-ramp of one interchange to the off-ramp of the next; auxiliary lanes are not designed to serve through traffic. The TSM Alternative also would include transit enhancements such as park and ride lots and Transportation Operations System (TOS), electronic equipment such as changeable message signs and vehicle detection systems.

The TSM Alternative would include reconstruction of the Santa Cruz Branch Rail Line bridges over Route 1 and the State Park Drive, Capitola Avenue, 41st Avenue, and Soquel Avenue overcrossings. The Santa Cruz Branch Line railroad underpass structures are proposed to be modified or replaced to accommodate highway widening to match the ultimate six-through-lane concept, including shoulder and sidewalk facilities to accommodate pedestrians and bicycles. These modifications will lower the highway profile to provide standard clearances. In addition the Aptos Creek Bridge would be widened.

5.3 HOV Lane Alternative

The HOV Lane Alternative would widen the existing four-lane highway to a six-lane facility by adding an HOV lane in the median in both the northbound and southbound directions. Along the southern portion of the project, the median generally is wide enough to incorporate the new HOV lanes within the existing right-of-way. Along the northern reach of the project, where the median is narrower, widening would occur. In some locations, this widening would extend outside the existing right-of-way.

This HOV Lane Alternative would modify or reconstruct all nine interchanges within project limits to improve merging operations and ramp geometrics, lengthen acceleration and deceleration lanes, and improve sight distances. Bridge structures, including the two existing railroad underpass structures and the Capitola Avenue Overcrossing, would be modified or replaced to accommodate highway widening. Roadway crossing structures would include shoulder and/or sidewalk facilities to accommodate pedestrians and bicycles.

The HOV Lane Alternative would include pedestrian/bicycle overcrossings of the highway at Trevethan Avenue, Chanticleer Avenue, and Mar Vista Drive, as described under the TSM Alternative. It also would include ramp metering and auxiliary lanes between interchange ramps and TOS electronic equipment, as described under the TSM Alternative with the exception that an auxiliary lane would not be constructed northbound between State Park Drive and Park Avenue. Transit improvements would include park and ride lots. Bus pads with pedestrian access to local streets would be constructed at some highway ramps to facilitate faster and easier highway access for buses.

Retaining walls would be constructed at the most effective and visually appropriate locations to minimize right-of-way acquisition, reduce or avoid environmental impacts, and separate frontage roads from the highway. The project also would include demolition and disposal, excavation, borrow and fill, sound walls, right-of-way acquisition, and temporary easements.

6. SITE CONDITIONS

Existing SR-1 highway, within the project limits, is a four-lane facility with two mixed flow lanes in each direction. Concrete median barrier or Metal Beam Guard Rail (MBGR) exists in the median of the highway. Along the southern portion of the project, the median generally is wide and gets narrower towards the northern reach of the project. An auxiliary lane exists in the southbound direction between 41st Avenue and Soquel Drive. Cross drainage structures such as bridges and culverts exist within the project limits. There are a many sign structures along the project corridor.

Based on the as-built plans and our site observations, the alignment profile generally follows the existing terrain. The roadway approaches at creeks and gulches are generally built on embankments. Some of the existing roadway profile traverses across hilly terrain resulting in cut slopes and retaining walls.

The SR-1 corridor, outside of the improved facility, is covered with trees and vegetation.

7. SUBSURFACE CONDITIONS

As-built Logs of Test Boring (LOTB) were available for nine of the structures along the project corridor. The as-built LOTBs for North Aptos Under Pass (UP), Aptos Creek Bridge, North Aptos UP, Capitola Avenue Under Pass (UP), Soquel Drive OC, and La Fonda Avenue OC are not available. Based on our review of available data, the subsurface soil and groundwater conditions are summarized in Table 1 below.

Table 1 – Subsurface Soil & Groundwater Conditions

Bridge / Structure	Subsoil Conditions*	Groundwater Conditions*
San Andreas Rd / Larkin Valley Rd UC	10 to 30 ft thick surficial deposits, overlying with very dense clayey/silty sand	Not encountered to the Elev. of 190 ft
Freedom Blvd / Rob Roy Junction OC	20 ft of loose to dense silty/clayey sand overlying with dense gravelly sand	Encountered at Elev. of 129 to 134 ft

Rio Del Mar Blvd OC	27 ft of dense to very dense silty sand overlying with dense gravelly sand	Not encountered to the Elev. of 100 ft
State Park Dr. OC	25 to 40 ft of loose to dense silty/clayey sand	
Park Avenue UC	50 ft of dense to very dense clayey sand overlying with very dense silty sand with cemented layer	Encountered at Elev. of 64 to 76 ft
Bay Avenue UC	15 ft of stiff to very stiff silty/sandy clay overlying with loose to very dense silty/clayey/gravelly sand	Encountered at Elev. of 13 ft
Soquel Creek Bridge	Stiff to very stiff sandy/silty clay imbedded with dense to very dense silty/gravelly sand	Encountered at Elev. of 8.5 ft to 16 ft
41st Avenue OC	25 ft of medium dense to dense silty sand overlying with very dense sand	Encountered at Elev. of 64 ft
Morrissey Avenue OC	Dense to very dense silty sand	Encountered at Elev. of 95 ft

* All as-built data is only available in English units.

It should be recognized that most of the as-built LOTBs are from the 1950s to 1990s when the original structures were constructed. Therefore groundwater data may vary with the passage of time due to seasonal groundwater fluctuation, surface and subsurface flows, ground surface run-off, water level in adjacent creeks, and other factors that may not be present at the time of the reference investigations. Site specific subsurface soil conditions and groundwater conditions within the project limits should be verified during the PS&E phase.

8. CLIMATE AND DRAINAGE

The climate in the project area is characterized by moderate climatic conditions. This consists of mild winters, mild summers, small daily and seasonal temperature ranges, and high relative humidity. Based on the statistical data from "National Oceanic & Atmospheric Administration", average total annual precipitation is around 30.7 inches in the project area. Extreme temperature ranges from average minimum temperature of 39.3°F in January to average maximum temperature of 75.8°F in September. Most of the rainfall is recorded in January with the average total precipitation of 6.56 inches. July is the month with the least average rainfall precipitation of 0.08 inches.

The project is located along the northern coast of Monterey Bay. The overall regional terrain trends towards south. The terrain starts sloping downward from crest of the Santa Cruz

Mountains to the northern coast of Monterey Bay. The densely vegetated terrain is cut by southward draining arroyos, gulches, canyon, and creeks within the project limit. Aptos Creek, Soquel Creek, Arana Gulch, Rodeo Gulch, Noble Gulch, Borregas Creek, and Valencia Creek are the major creeks that generally drain surface runoff from the area. It appears that the site drainage in general, flows towards the Monterey Bay.

9. GEOLOGY OF THE PROJECT AREA

9.1 Regional geology

The proposed project is located within the Santa Cruz County (Plates 1A to 1C), which is located along California's Pacific Coast situated at the north end of Monterey Bay. The county limits extend from Pacific Ocean to the crest of Santa Cruz Mountain and from Watsonville to north of Boulder Creek.

Based on available geologic maps, Monterey Bay is underlain by water-bearing unconsolidated alluvial, stream channels, and basin sediments, which were deposited beginning in the late Pleistocene, Pliocene and upper Miocene era. Early in the period of alluvial deposition, large streams draining from Santa Cruz Mountains and urban City of Santa Cruz, Soquel, Capitola, and Aptos; Bonny Doon, and San Lorenzo River Valley Area converged into the Monterey Bay and sheets of fertile deposits formed over it.

The county can be divided roughly into four geologic regions: (1) the rugged "north coast"; (2) the urban cities of Santa Cruz, Soquel, Capitola, and Aptos; (3) mountainous Bonny Doon, San Lorenzo River Valley; and (4) fertile "south county", including Watsonville. These valleys have been filled with Pleistocene to Holocene alluvium, derived from the surrounding ridges. The region consists of marine and non-marine sedimentary strata. The age of these strata ranges from Tertiary Oligocene –Holocene (younger and older flood-plain deposits) to Holocene (Basin deposits). These groups have been complexly folded into a series of synclines and anticlines that trend upward. The area has also been cut by a complex series of high angle thrust and strike slip northwest-trending faults. This folding and the faulting have produced the northwest trending ridge and valley systems.

9.2 Geologic Units

General geologic features pertaining to the site were evaluated by reference to the Geologic Map of Santa Cruz County, California, by Google Earth Geologic Map, 2007. Based on the map, different geologic units are present along the alignment. The project site subsoils mainly consist of Marine Terrace deposits (Qt; Pleistocene) in most of the location from State Park Drive OC to Morrissey Boulevard OC except in creeks and gulches. The subsoil consists of Alluvium (Qpa; Pleistocene) and Alluvium (Qha; Holocene) from San Andreas Road UC to State Park Drive OC and in the valley formed by creeks and gulches. Sedimentary rock (Tmps, Pliocene) is observed along most of the exposed banks of the creeks and gulches. SR-1 grade generally follows the existing terrain except where it crosses gulches, creeks, and ridge area. Therefore, it appears that the existing highway grade was constructed within the native upper soil strata. Considering this the project area is not expected to have any significant amount of expansive soils.

The geologic map of the general project area is shown on Plates 2A, 2B & 2C. Descriptions of the main geologic units are as follows:

Qt: Marine terrace deposits (Pleistocene) – Weakly consolidated to semi consolidated, moderately to poorly sorted silt, silty clay, sand, and gravel mostly deposited in a fluvial environment

Qpa: Alluvium (Pleistocene) – Sand, fine sand, silt, and one or more buried soils capping mesas, broad interfluves, and adjacent low- angle slopes

Qha: Alluvium (Holocene) – Poorly to moderately sorted clay, silt, sand, and minor gravel in the active, incised channel of larger tributary arroyos

Qs: Beach and dune sand (Quaternary) – Unconsolidated alluvial clay, silt, sand, and gravel along rivers and streams, includes beach, bar, and dune sands, marine terraces, and estuarine mud and sands in coastal areas

Tmps: Sedimentary rock (Pliocene) – Mostly soft, tan, gray, yellow, brown, pink, and green, thin- to medium- bedded, mostly planar-bedded, fine to coarse-grained sandstone, siltstone, and conglomerate

10. POTENTIAL GEOTECHNICAL, GEOLOGIC AND SEISMIC IMPACTS WITH PROPOSED MITIGATION MEASURES

10.1 Foundation Conditions

Foundation conditions are generally reasonable for the project corridor. Caltrans design and construction methods can accommodate geotechnical and geological considerations at the site. Based on the as-built plans, foundation design at the existing bridge structures is summarized in Table 2 below.

Table 2 – Existing Foundation Design

Bridge / Structure	No of spans /yr. built, widened	Type of Foundation Support
San Andreas Rd / Larkin Valley Rd UC	Single-span /	Spread footing
North Aptos UP	Two-span /1947, 1997	
Capitola Avenue OC	Four-span / 1947	
La Fonda Avenue OC	Four-span /	
Morrissey Avenue OC	Four-span /	
Freedom Blvd / Rob Roy Junction OC	Two-span /1969	Class II concrete piles
Park Avenue UC	Three-span / 1962	
Rio Del Mar Blvd OC	Two-span /1967	16” dia. CIDH piles Bents-spread footing
State Park Dr. OC	Five-span /1963, 1991	
41st Avenue OC	Four-span / 1961, 1987	
South Aptos UP	Two-span /1947, 1997	Treated timber piles
Aptos Creek Bridge	Two-span /1947	Steel H piles (10 BP 42) Bents- spread footing
Bay Avenue UC	Two-span /1947, 1993	
Soquel Creek Bridge	Seventeen-span/1947, 1970, 1993	
Soquel Drive OC	Four-span / 1961, 1987	

As per the Caltrans Guidelines for Foundation Investigations and Report (Version 2.0, March 2006), pile foundations shall be used at abutments when Peak Bedrock Acceleration (PBA) is 0.6g or greater, and the embankment height is 3 m (10 feet) or higher. Therefore, for the proposed bridge widening at San Andreas Road/Larkin Valley Road UC, North Aptos UP, Capitola Avenue OC, La Fonda Avenue OC, and Morrissey Blvd OC, it is recommended to use steel H piles for foundation support. Cast-In-Drilled-Hole (CIDH) piles may also be considered for design if hard pile-driving conditions are anticipated. Considering the granular soil conditions, temporary casing might be required during construction. At Rio Del Mar Blvd OC, State Park Drive OC and 41st Avenue OC, tiebacks may be required underneath the abutments depending on the alignment and the location of the abutments. At South Aptos UP, Caltrans standard driven piles may be used for foundation support of the proposed replacement structure.

For the proposed bridge widening at Aptos Creek Bridge, Bay Avenue UC, and Soquel Drive OC, driven pile or Cast-In-Drilled-Hole (CIDH) foundation system may be used for foundation support. Construction dewatering will be required for shallow foundations at the bents. To meet tension demand of the new bent support/new foundation support and considering the hard pile-driving conditions, Cast-In-Drilled-Hole (CIDH) piles may be used. Temporary casing might be required during construction. According to the readily available boring data and geologic information at Park Avenue Undercrossing, Caltrans standard driven piles may be feasible for foundation support of the proposed replacement. Due to the presence of loose sand formation and ground water condition, Cast-In-Drilled-Hole (CIDH) piles might not be feasible.

Our evaluation is based on the as-built data and our understanding of the site conditions, and is for preliminary design discussions only. Additional field explorations will be required to verify the subsoil conditions and groundwater conditions and to develop site specific foundation recommendations. The foundation design criteria should also consider structural design requirements, seismic demands, corrosion and liquefaction potential of on-site soils.

10.2 Embankments/Cuts

Embankments/cuts are generally required for the bridge approaches at or near creeks, gulches, canyons. Also some of the roadway widening work for the HOV lanes, auxiliary lanes, and ramp modifications will require embankment and grading work. Based on the available boring logs, the subsurface conditions of the project site consist of loose to very dense silty/clayey/gravelly sand with some sandy/silty clay binders. These granular soils are subject to erosion and scour. This is further discussed in subsequent section.

Cuts are expected to be generally nominal for the proposed widening work since most of the alignment is already established. Based on the regional geology and the as-built LOTBs conventional construction methods are expected to be used for excavations and cuts. Blasting is not expected.

Slope stability discussions of the embankments and cuts are provided under 'Slopes' in the subsequent section.

Settlement resulting from placement of embankment fill should occur during a reasonably short period. Therefore, Caltrans standard embankment settlement waiting period (30 days) should be adequate for the expected roadway construction. If further site specific investigation shows that consolidation settlement may require more time and schedule becomes critical, mitigation measures such as phased construction, implementing waiting period, surcharge loading and installation of wick drains may be required. The roadway embankment shall be placed in accordance with the guidelines provided in the Caltrans Highway Design Manual. These guidelines require structure approached embankment material to be compacted to minimum 95% of relative compaction. This also reduces the potential for earthquake-induced settlement or slippage to occur.

10.3 Retaining Walls

Retaining walls exist at various locations along the northbound SR-1 corridor between San Andreas Boulevard UC and Rio Del Mar OC. These walls may have to be replaced with construction of new HOV lane and auxiliary lanes. New retaining walls may be required at the most effective and visually appropriate locations to minimize right-of-way acquisition, reduce or avoid environmental impacts, and separate frontage roads from the highway.

Based on the as-built plans, many of the retaining walls are supported on spread footings. Based on the available as-built LOTBs, retaining wall foundations are expected to be in competent soil/rock. Caltrans standard retaining wall plans maybe used for most of the conventional wall sections. Special design will be required where the wall heights (and allowable bearing pressures) are not in conformance with the standard design. Special design may also be required for combined retaining walls and soundwalls or where special load applications are required.

Tiebacks may be required if the wall is within the load influence of the foundation system. Specific type of retaining structures should be determined when the design is finalized. Several Caltrans standard and non-standard wall systems are available for the project including but not limited to cantilever concrete walls, soldier pile and lagging wall (with and without tiebacks), soil nail wall, Mechanically Stabilized Embankments (MSE) etc.

10.4 Soundwalls

Based on preliminary information the two existing soundwalls along the southbound project corridor and one sound wall along the northbound project corridor between Soquel Drive OC to Morrissey Blvd OC may be replaced with the construction of new HOV lane and auxiliary lanes. New soundwalls may also be required at some other locations to be determined by the technical studies.

The existing soundwalls are supported on Cast-in-drilled-holes (CIDH) pile foundations. Based on available as-built LOTBs, the soundwall foundations along the corridor are expected to be in competent soil/rock. The wall foundations can be designed in accordance with Caltrans standard soundwall plans. These foundations include, spread footings, trench footings, drilled and driven piles. The specific foundation design will depend on the local soil conditions, the ground line and the wall height and should be determined during the PS&E phase.

10.5 Sign Structures

The existing sign structures appear to be functioning well and may not require replacement. However, with the construction of HOV lanes and widening or replacement of bridge structures, numerous overhead sign structures may have to be replaced, upgraded and/or added. Based on the available as-built LOTBs along the corridor, the sign foundations are expected to be in competent soil/rock. Caltrans standard sign pole design plans maybe used for most of the conventional sign foundations. These foundations will have to be confirmed through a design process as per Caltrans current guidelines. Special design will be required where the sign structures and their foundations cannot adapt the standard design.

10.6 Drainage Structures/Minor Culverts

Existing drainage structures and minor culverts are expected to be rehabilitated or upgraded with the construction of HOV lanes and auxiliary lanes. Some of these culverts may need to be extended or replaced as required during the design phase. Preliminary indications are that the predominantly granular soils are non-corrosive. Drainage structures and minor culverts may be designed in accordance with Caltrans standard plans. Design of these structures should be finalized during the PS & E phase.

10.7 Preliminary Pavement Design Recommendations

The HOV Lane Alternative would widen the existing four-lane highway to a six-lane facility by adding an HOV lane in the median in both the northbound and southbound directions. Along the southern portion of the project, the median generally is wide enough to incorporate the new HOV lanes within the existing right-of-way. Along the northern reach of the project, where the median is narrower, widening would occur. In some locations, this widening would extend outside the existing right-of-way. Therefore the new pavement design will be based on existing subgrade soil conditions and import fill material.

Based on the available as-built pavement sections, the existing traveled way pavement was originally constructed with 1.05 feet (320 mm) Full Depth Asphalt Concrete (FDAC) section. It has been overlaid with Asphalt Concrete (AC) and also widened with 0.33 feet (100 mm) of AC on 0.67 foot (200 mm) of Aggregate Base (AB) and 1.00 foot (300 mm) of Aggregate Subbase (AS). These have been constructed at different times to match the existing grades (Appendix A typical cross sections).

New pavement section should meet the current Caltrans Design Standards in accordance with the Highway Design Manual. The basement soil along the site is anticipated to vary. However based on the as-built LOTBs, loose to very dense clayey/silty/gravelly sand is anticipated. According to Caltrans requirement, fill material placed within 1.5 m (4 feet) of finish pavement subgrade should have a minimum R-value of 15. Traffic Index (TI) is not available for the proposed improvements. However, we have assumed TI of 15.5 for truck lanes / auxiliary lanes and 13.5 for HOV lanes. Using these assumptions in the design criteria we have provided some typical pavement sections for preliminary concepts and estimates.

HOV lanes (TI= 13.5, R=15)

Asphalt Concrete (AC)	= 210 mm (0.70 ft)
Aggregate Base Class 2 or 3 (AB)	= 345 mm (1.15 ft)
Aggregate Subbase Class 4 (AS)	= 390 mm (1.30 ft)

Truck lanes / auxiliary lanes (TI= 15.5, R=15)

Asphalt Concrete (AC)	= 240 mm (0.80ft)
Aggregate Base Class 2 or 3 (AB)	= 390 mm (1.30 ft)
Aggregate Subbase Class 4 (AS)	= 465 mm (1.55ft)

Final pavement design will depend on the site-specific R-values and the design Traffic Index values that are developed during the PS & E phase. Higher TI values and long life pavement design criteria may also necessitate a Portland Cement Concrete (PCC) pavement section. Recent design updates (June, 2006) in the Caltrans Highway Design Manual provides for standard PCC concrete design sections based on the basement soil R-values and the climate region.

10.8 Slopes

Embankments and cut slopes exist along the project corridor. However the HOV work is primarily within the median with some outside widening in the northern reach. Based on this the project is expected to have limited new embankments and cuts. Generally, bridge approaches, outside roadway widening, and auxiliary lane construction work may require new embankments. For the alignment segments going through the ridge locations or where the roadway profile changes, new cuts may be required.

Embankments/fills slopes constructed in accordance with Caltrans standards are expected to be stable at 1V: 2H. Slopes protected by asphalt or concrete pavement should be stable at 1V:1.5H. However, Caltrans guidelines generally require new embankments that are not protected from potential erosion and scour to be constructed at 1V:4H.

Cut slopes are expected to be relatively stable at 1V:2H slope. These slopes should be planted with erosion control landscaping. Slopes protected by asphalt or concrete pavement should be stable at 1V:1.5H.

Drainage provisions and erosion control measures should be implemented to reduce localized failures during the initial years after the construction. Groundcover and other appropriate measures may require more time to establish in sandy soils therefore alternative measures may be required to protect the surface.

10.9 Erosion & Sedimentation

The project corridor was evaluated based on Soil Survey Map of Santa Cruz County, California, by National Cooperative Soil Survey, Natural Resources Conservation Service, USDA and Web Soil Survey 1.1 URL: http://websoilsurvey.nrcs.usda.gov. These maps are shown on Plates 4A through 4F. The underlying native soil units and their impact from drainage and permeability standpoint are stated in Table 3 below.

Table 3 - Erosion & Sedimentation

<table>
<tr><th>Soil Unit</th><th>Map Unit Name</th><th>Surface texture</th><th>Permeability</th><th>Slope (%)</th><th>Drainage</th><th>Runoff</th><th>Erosion Hazard</th></tr>
<tr><td>105
106</td><td>Baywood loamy sand</td><td rowspan="2">Loamy sand</td><td rowspan="3">High</td><td>2-15
15–30</td><td>Excessively drained</td><td>High</td><td>High</td></tr>
<tr><td>114</td><td>Ben Lomond Felton</td><td rowspan="2">30-50</td><td rowspan="2">Well drained</td><td rowspan="2">Moderately slow</td><td rowspan="2">Moderately low</td></tr>
<tr><td>143</td><td>Lompico-Felton complex</td><td rowspan="3">Loam</td></tr>
<tr><td>116</td><td>Bonny Doon loam</td><td>Moderately high</td><td>5–30</td><td>Excessively drained</td><td rowspan="2">Slow</td><td rowspan="2">Low</td></tr>
<tr><td>124</td><td>Danville loam</td><td>High</td><td>0-2</td><td rowspan="4">Well drained</td></tr>
<tr><td>129
130</td><td>Elder sandy loam</td><td rowspan="3">Sandy loam</td><td>Moderately high</td><td>0-2
2-9</td><td rowspan="3">Moderately slow</td><td rowspan="3">Moderately low</td></tr>
<tr><td>133
134
135</td><td>Elkhorn sandy loam</td><td rowspan="2">High</td><td>2-9
9-15
15-30</td></tr>
<tr><td>136</td><td>Elkhorn-Pfeiffer complex</td><td>30-50</td></tr>
<tr><td>161
162</td><td>Pinto loam</td><td>Loam</td><td>Moderately high</td><td>0-2
2-9</td><td>Moderately well drained</td><td>Slow</td><td>Low</td></tr>
</table>

170 171	Soquel loam			0-2 2-9		Moderately slow	Moderately low
174	Tierra Watsonville Complex	Sandy loam		15-30		Very slow	
176 177 178 179	Watsonville loam	Loam		2-9 9-15 15-30 30-50	Poorly drained		
182	Zayante coarse sand	Coarse sand	High	9-15	Excessively drained	High	Low

The upper soil zone within the corridor appears to have been prepared (reworked) during construction operation. The existing conditions suggest that there is a high possibility that the highway was constructed in the native upper soil. Generally, the upper structural pavement section consists of import material (AC, Base & Subbase).

Based on the above table and Soil Survey Map (Plates 4A through 4F), the soils in the project are mainly Loam to Sandy loam. Permeability or hydraulic conductivity of the area is moderately high-to-high and runoff is very slow to high. Drainage characteristic of the soils of the area is classified as poorly drained to excessively drained and erosion hazard is moderately low to high.

The improved areas within the corridor that are protected by erosion control measures should have low erosion potential. Normal maintenance of surface drainage and slope maintenance is important and should be incorporated in the project plans. Landscaping should be planned to protect any new slopes.

10.10 Seismic Considerations:

The project is located in a seismically active area of California. Many faults existing in this area are capable of producing earthquakes that may cause strong ground shaking within the project limits. The attached Fault Map (Plate 3) presents the locations of the fault systems relative to the project site. Maximum Credible Earthquake (MCE) magnitudes for some of the major faults in the area determined by Mualchin (California Seismic Hazard Map 1996) are summarized in Table 4 below. 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.

Table 4 - Seismic Data

Fault	Estimated Closest Distance to the Middle* of the Project Area km (miles)	Maximum Credible Earthquake	PBA (Sadigh 1997)
Zayante - Vergales (ZVS)	3.5 (2.2)	7.25	0.60
San Andreas /N (SAN)	10 (6.25)	8.00	0.50
Sargent (SRT)	13 (8.15)	6.75	0.30
Monterey Bay Zone (MBY)	13 (8.15)	6.50	0.25
Calaveras-Pacines-San Benito (CPS)	31 (19.4)	7.50	0.20

* Nearest perpendicular distance to the possible bridge, location is taken to calculate peak bedrock acceleration.

The values of Peak Bedrock Acceleration (PBA) presented in the table are derived from Sadigh (1997). Mualchin's Map (1996) indicates the fault magnitudes, locations, and contours of PBA. For a specific project site, the distances to different faults are scaled and a PGA value read from the map directly. Mualchin (1996) already considered the influence of different faults in preparing the PGA contours. The general procedure follows Caltrans Guidelines for Structures Foundation Reports (March 2006). For the project corridor the PGA is interpreted as 0.20g to 0.60g (Plate 3) per Mualchin's map. Caltrans has established the Seismic Design Criteria (SDC 1.4) for incorporating the seismic loads in the design of the structures. Specific value of PGA should be established and used in the design of each of the bridge structure. Structures design should incorporate these design guidelines.

Based on the Fault Map (Plate 3), the Zayante-Vergales (ZVS) Fault and San Andreas/N (SAN) Fault are controlling seismicity within the project area. The existing and proposed bridge structures and retaining structures may experience strong ground shaking during a major earthquake generated on these or other faults nearby in the region. The project elements should be designed and built in accordance with the applicable Caltrans seismic design criteria (SDC 1.4). The ARS Design Curves for individual bridge structures are presented on Plates 7A to 7O.

10.11 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, cyclic shear stresses associated with earthquake shaking. Submerged cohesionless sands and silts of low relative density are the type of soils that usually are susceptible to liquefaction. Clays are generally not susceptible to liquefaction. A liquefaction susceptibility map using the database prepared from Preliminary Maps of Quaternary Deposits and Liquefaction Susceptibility, Nine-County San Francisco Bay Region, California by Keith L. Knudsen, Janet M. Sowers, Robert C. Witter, Carl M. Wentworth, and Edward J. Helley, 2000 (USGS Open-File Report 00-444) is presented on Plate 5.

Based on the available data (Log of Test Borings), majority of the submerged cohesionless subsoils are primarily medium dense to very dense. However, there are some locations such as Park Avenue UC and Bay Avenue UC where loose sands were encountered. Therefore, liquefaction potential varies along the corridor from relatively low to potentially high. Detail studies should be conducted during design phase to verify the conditions. Impacts of liquefaction on improvements may vary and will depend on the type of structure. However, these impacts can be mitigated using appropriate Caltrans design methods. For foundation design of structures having concentrated loads (such as bridges), the design can accommodate the additional loads generated by the liquefaction conditions. Liquefaction should not be a significant impact for pavement surfaces since the resulting settlements are generally aerial type.

10.12 Landslide Susceptibility

The project area has relatively low potential for landslide and/or other movement. Based on the Preliminary Map of Landslide Deposits in Santa Cruz County, California, a Digital Map Database, by Cooper-Clark & Associates, 1975; we have provided a Landslide Susceptibility Map, Plate 8. The hillside slopes to the east and west of the corridor that are several hundred feet away have mapped some slide potential. The general terrain along the corridor consists of gentle slopes presenting little or no potential for the formation of slumps, translational slides, or earth flows except along the stream banks and terrace margins; defined by the distribution of surficial deposits. Slopes along the creeks may pose local slump or landslide risk. Generally, these localized slopes along the creek banks are mitigated by use of appropriate slope protection such as rock rip rap or revetment. Structures such as retaining walls may be required to mitigate specific conditions.

10.13 Material Sources

There are several commercial sources of asphalt, concrete and aggregate products in the area. Some of the materials suppliers in the area are listed in Table 5 below:

Table 5 – Material Sources and Approximate Haul Distances

Source	Location	Approx. One Way Haul Distance - km (miles)
Santa Cruz Concrete	303 Coral Street, Santa Cruz, Ca	2.8 (1.75)
Graniterock	1800 Coast Road, Santa Cruz, Ca	8.3 (5.2)
Johnson Paving Inc.	1020 El Dorado Ave., Santa Cruz, Ca	2.4 (1.5)
ABC Supply Co. Inc.	5960 Soquel Avenue, Santa Cruz, Ca	2.6 (1.6)
Coast Drywall Supply	1045 17th Avenue, Santa Cruz, Ca	1.7 (2.7)
Olive Springs Quarry Inc	1399 Olive Springs Road, Soquel, Ca	6.2 (9.9)

11. STUDY LIMITATIONS

Our services consist of professional opinions based on our site reconnaissance, researched data, and the assumption that the subsurface information does not deviate from observed/researched conditions. All work done is 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 or by the furnishing of oral or written reports or findings.

The geotechnical evaluation provided in this report is intended for project design planning documents such as Environmental Document and Project Study Report. The contents of this report are not intended for design input, nor directly form the basis in preparation of construction cost estimates for bidding purposes. The scope of our services did not include any detail geotechnical investigations (such as bridge foundation report or geotechnical design and materials report), or any environmental assessment/investigation for the presence or absence of hazardous or toxic materials in structures, soil, surface water, groundwater, or air, below or around this site. Unanticipated subsurface conditions are commonly encountered and cannot be fully determined without taking soil samples and drilling/excavating test borings. Additional expenditures should be allowed during the design phase for investigation services so that a properly designed project can be attained.

The findings in this report are valid as of the present date. However, changes in environmental conditions in the project area can occur with the passage of time, whether they are due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or from the broadening of knowledge. Accordingly, the findings in this report might be invalidated, wholly or partially, by changes outside of our control.

Very truly yours,
PARIKH CONSULTANTS, INC.

Y. David Wang

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Senior Engineer

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Gary Parikh, P.E., G.E. 666
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REGISTERED PROFESSIONAL ENGINEER
GARY PARIKH
GE 666
EXP. 12/31/15
GEOTECHNICAL
STATE OF CALIFORNIA

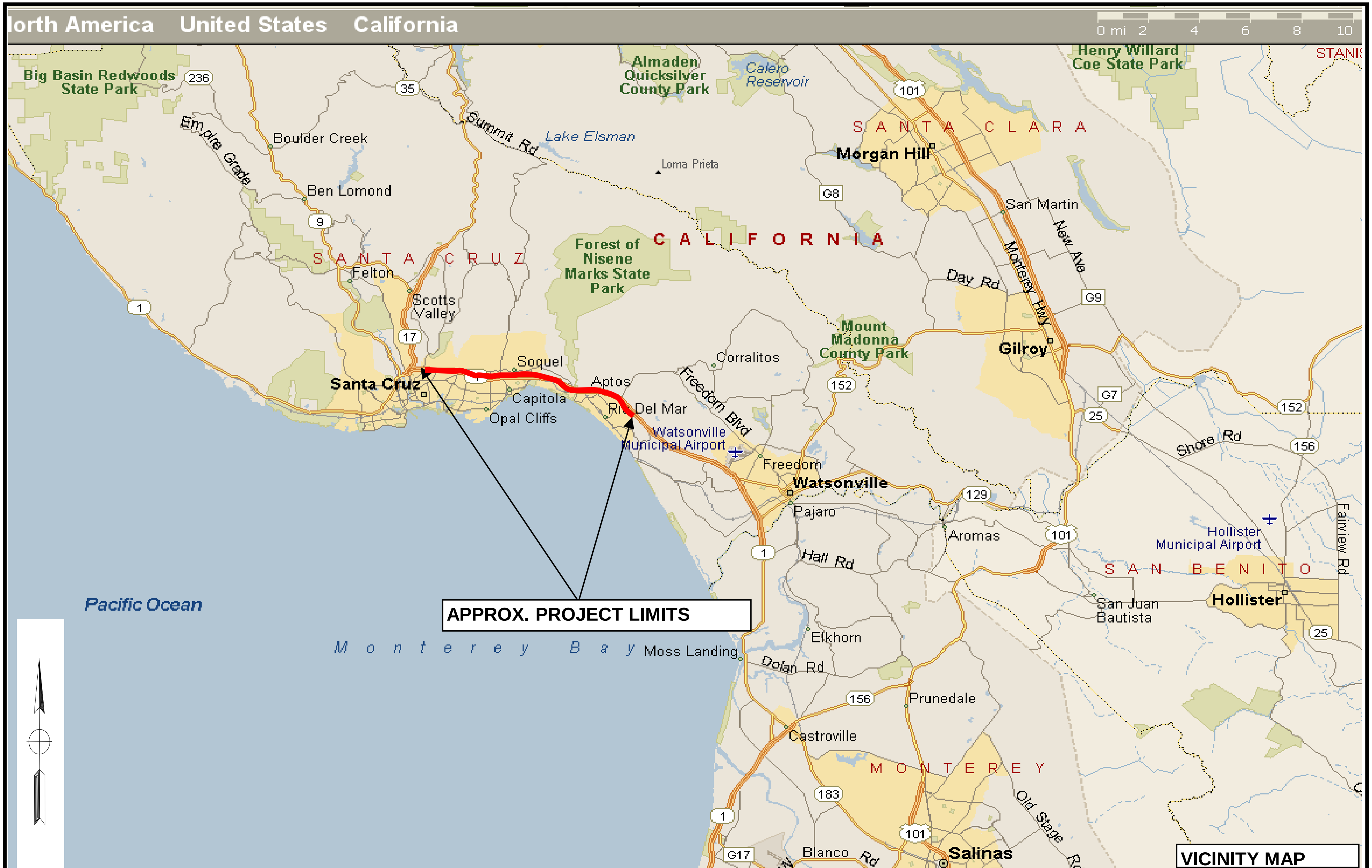
REFERENCES

GEOLOGIC REFERENCES

1. Earthquake Probabilities in the San Francisco Bay Region: 2000 to 2030 – A summary of findings, by Working Group on California Earthquake Probabilities, 1999, USGS Open-File Report 99-517
2. Geologic Map and Sections of the Quaternary Geology of Santa Cruz County and Surrounding Areas, California by Earl E. Brabb, S. Graham, C. Wentworth, D. Knifong, R. Gramer and J. Blissebach; 1997
3. Preliminary Maps of Quaternary Deposits and Liquefaction Susceptibility, Nine-County San Francisco Bay Region, California by Keith L. Knudsen, Janet M. Sowers, Robert C. Witter, Carl M. Wentworth and Edward J. Helley, 2000 (USGS Open-File Report 00-444)
4. Soil Survey Map of Santa Cruz County, California, by National Cooperative Soil Survey, Natural Resources Conservation Service, USDA and Web Soil Survey 1.1 URL: http://websoilsurvey.nrcs.usda.gov

GEOTECHNICAL REFERENCES

5. California Seismic Hazard 1996, by L. Mualchin, California Department of Transportation, 1996, Scale 1:500,000, Revision 1
6. As-Built Log of Test Borings for Larkin Valley Road / san Andreas Road Undercrossing (Bridge No. 36-94 R/L) by Caltrans, 1969
7. As-Built Log of Test Borings for Rob Roy Road / Freedom Boulevard Overcrossing (Bridge No. 36-22) by Caltrans, dated 1963
8. As-Built Log of Test Borings for Rio del Mar Boulevard Overcrossing (Bridge No. 36-23) by Caltrans dated 1963
9. As-Built Log of Test Borings for State Park Drive Overcrossing (Bridge No. 36-28) by Caltrans, dated 1961
10. As-Built Log of Test Borings for Park Avenue Undercrossing (Bridge No. 36-29 R/L) by Caltrans, dated 1961
11. As-Built Log of Test Borings for Bay Avenue Undercrossing (Bridge No. 36-36) by Caltrans, dated 1991
12. As-Built Log of Test Borings for Soquel Creek Bridge (Bridge No. 36-13) by Caltrans, dated 1969, and 1991
13. As-Built Log of Test Borings for 41st Avenue Overcrossing (Bridge No. 36-86) by Caltrans, dated 1960 and 1985
14. As-Built Log of Test Borings for Morrissey Avenue Overcrossing (Bridge No. 36-36) by Caltrans, dated 1954
15. As-Built Typical Cross Sections between 0.4 Mile North of Rob Roy Junction (PM 8.8) and North Aptos Underpass (PM 10.2) by Caltrans, dated 1966
16. As-Built Typical Cross Sections between M 8+00 to M 10+22 and M 10+22 to 13.71 by Caltrans, dated 1953
17. As-Built Typical Cross Sections, 0.2 Mile South/East of Rob Roy Overcrossing (PM 8.8) to 0.6 Mile North/West of Rio Del Mar Boulevard Overcrossing (PM 9.15) by Caltrans, dated 1979
18. As-Built Typical Cross Sections between 0.3 Mile East of Morrissey Avenue and 0.6 Mile North of Junction of Routes 5 and 56 by Caltrans, dated 1957



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HIGHWAY 1 HOV LANE WIDENING PROJECT
0.4 MILES S. OF SAN ANDREAS/LARKIN VALLEY RD IC TO 0.3 MILES N. OF MORRISSEY BLVD IC
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132 .PGR	**PLATE NO: 1**

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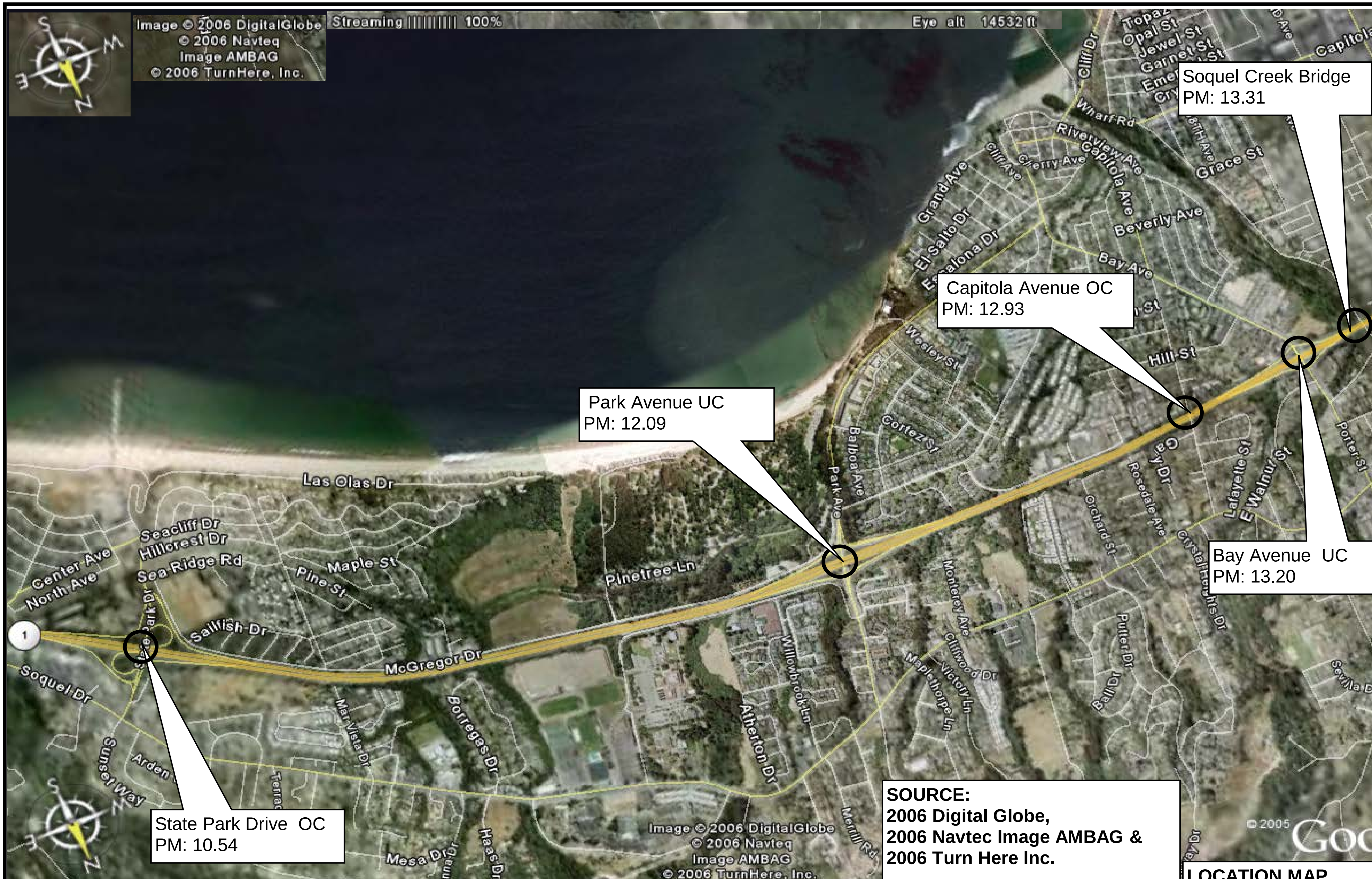
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	PLATE NO.: 1A



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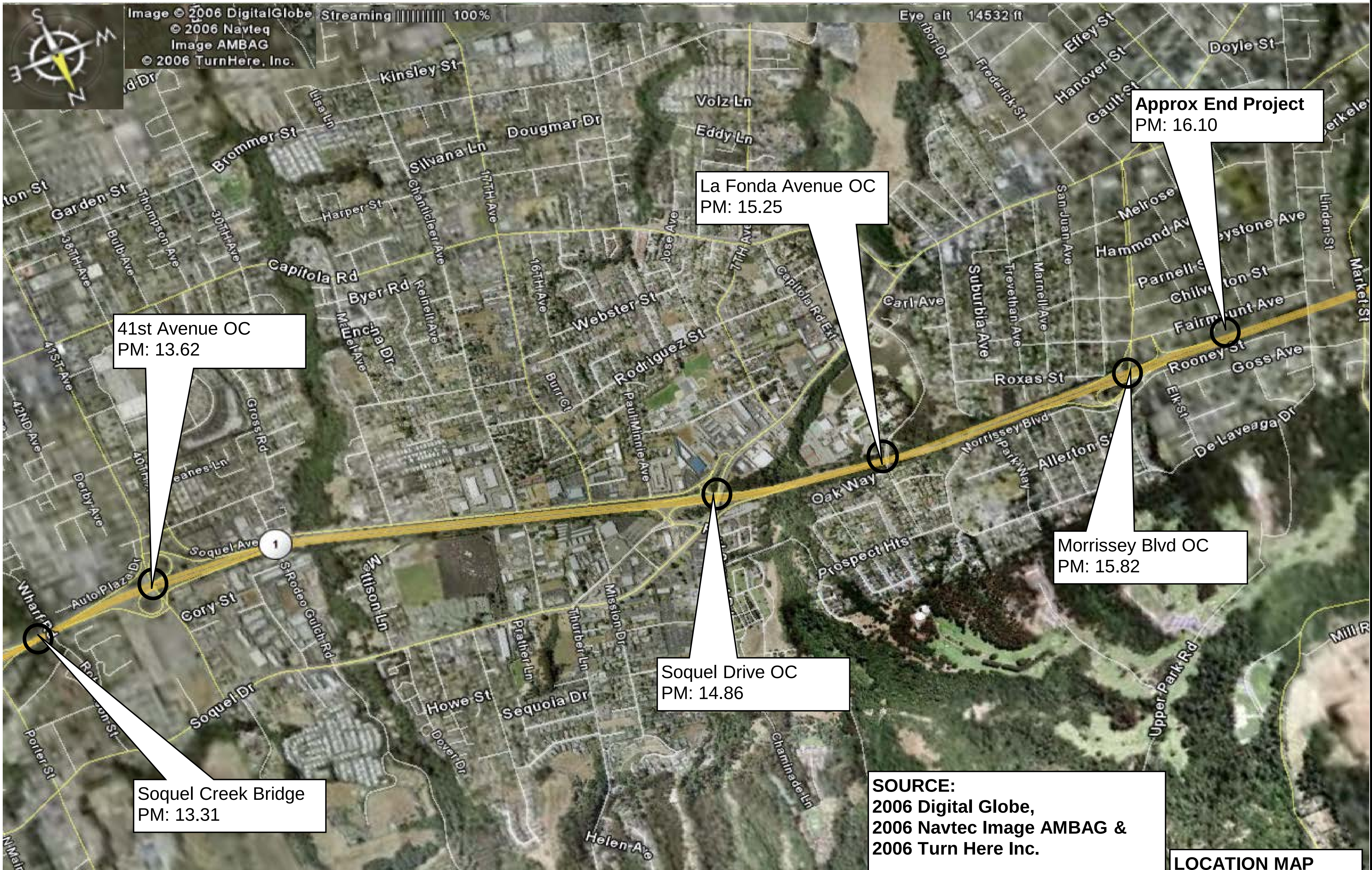
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	**PLATE NO.: 1B**



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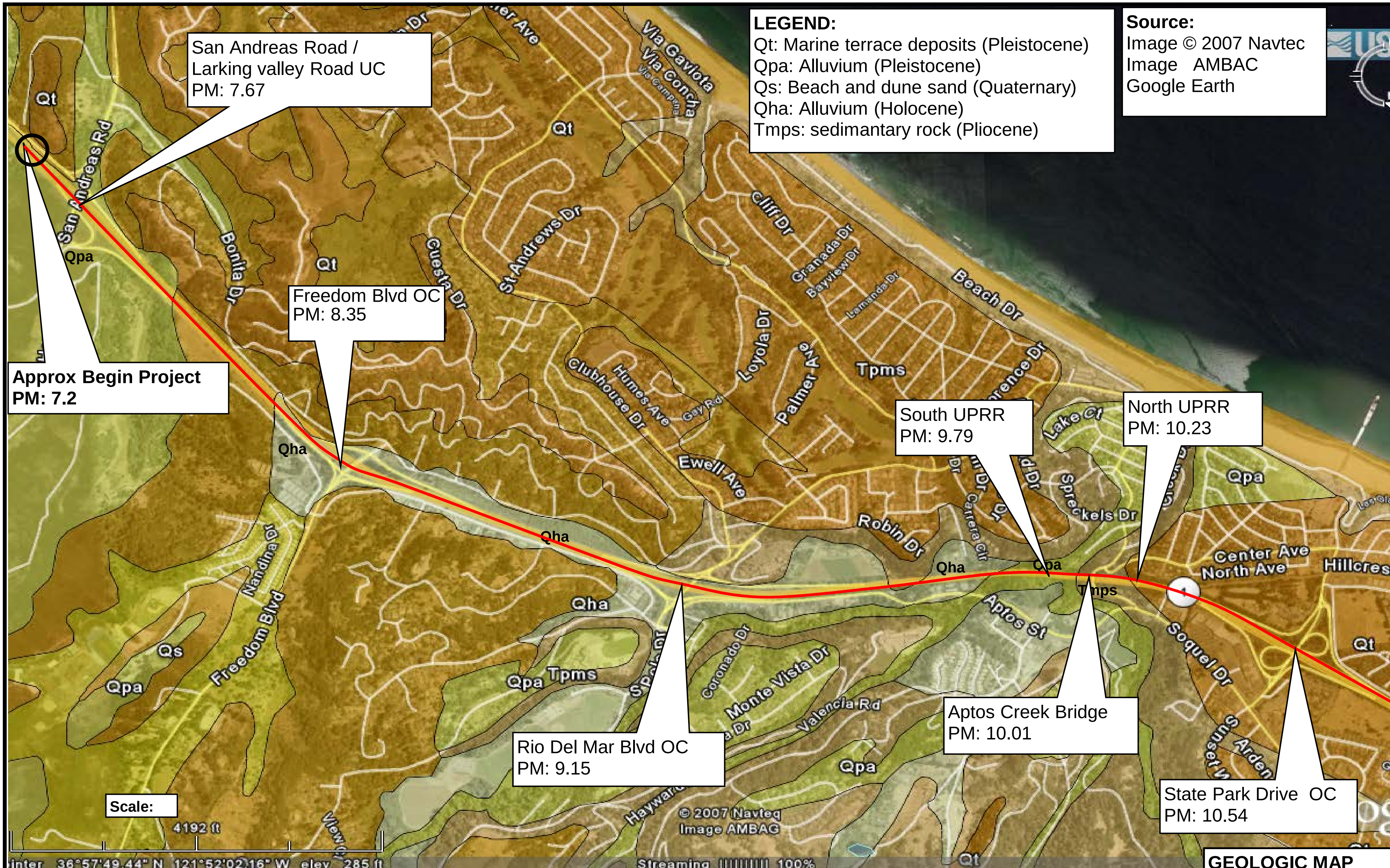
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	**PLATE NO.: 1C**



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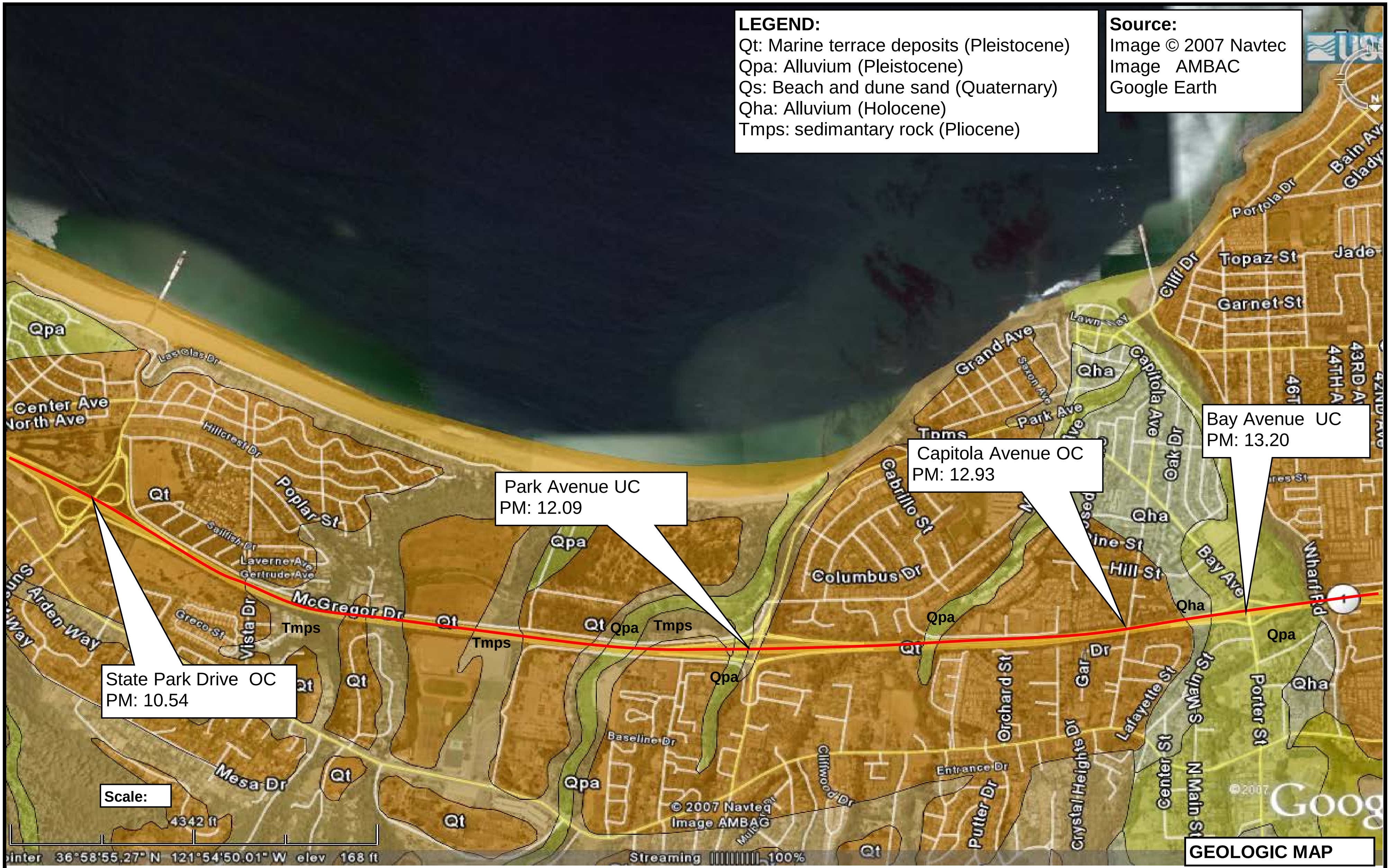
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	**PLATE NO.: 2A**



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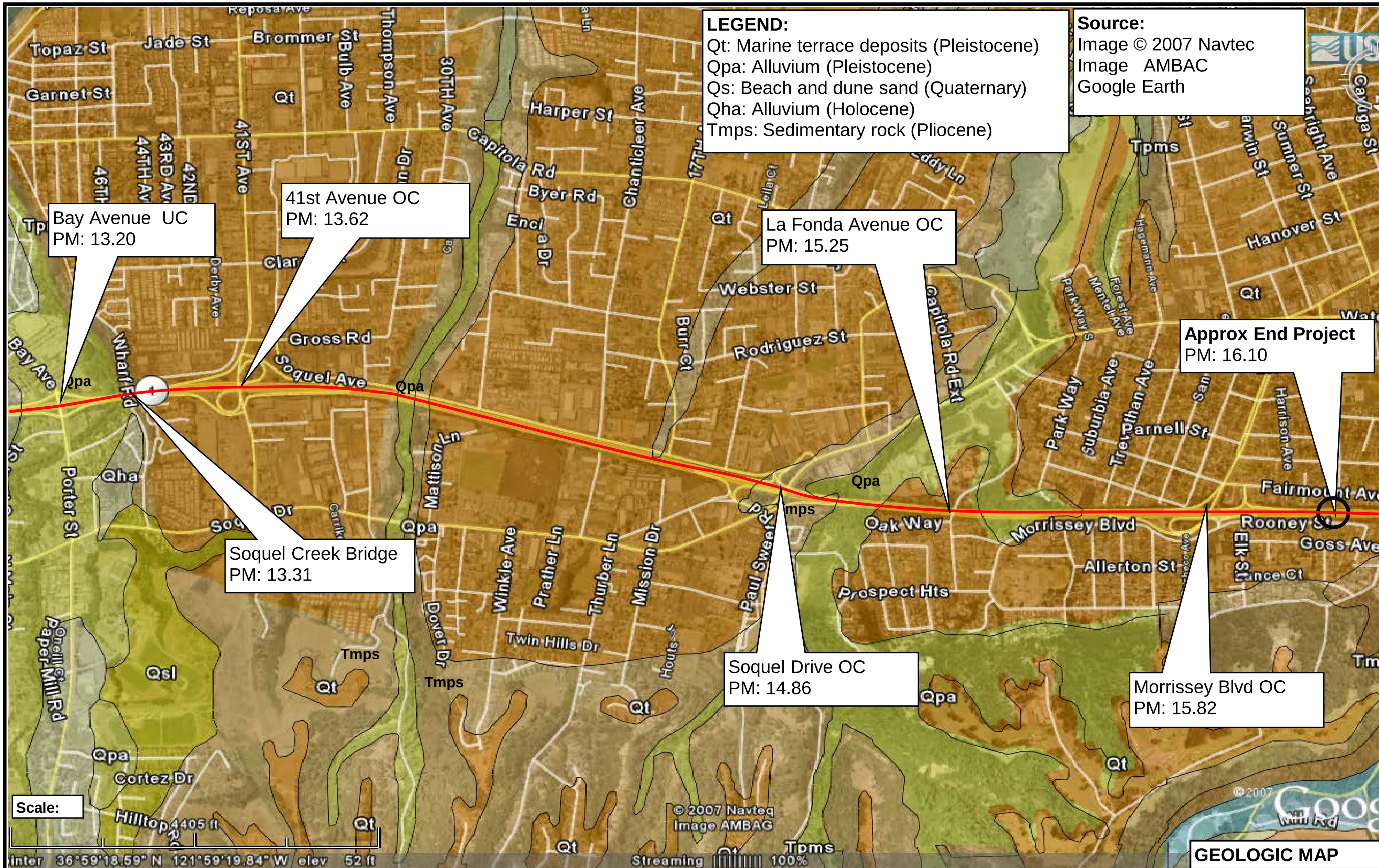
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR

PLATE NO.: 2B



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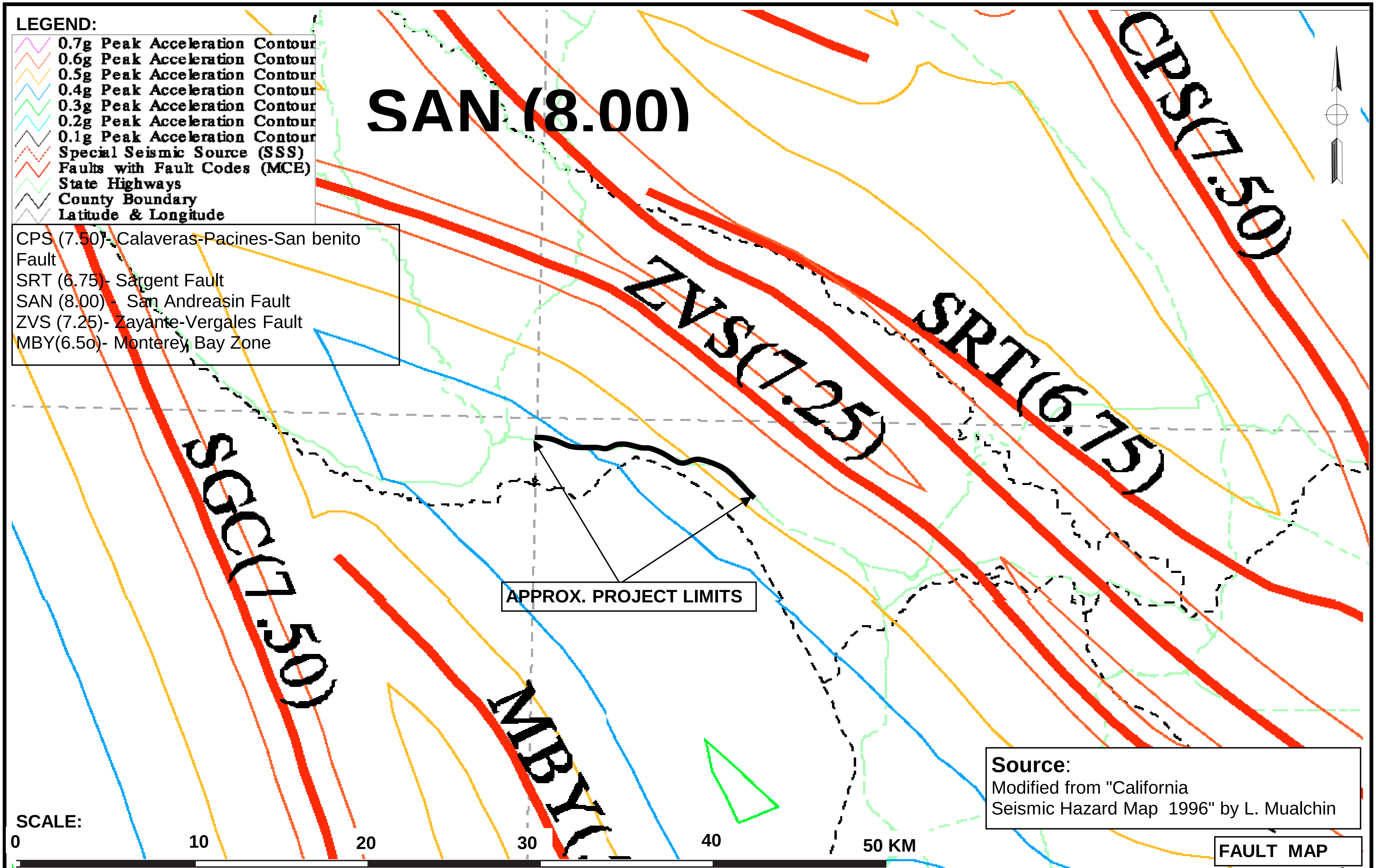
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	PLATE NO.: 2C



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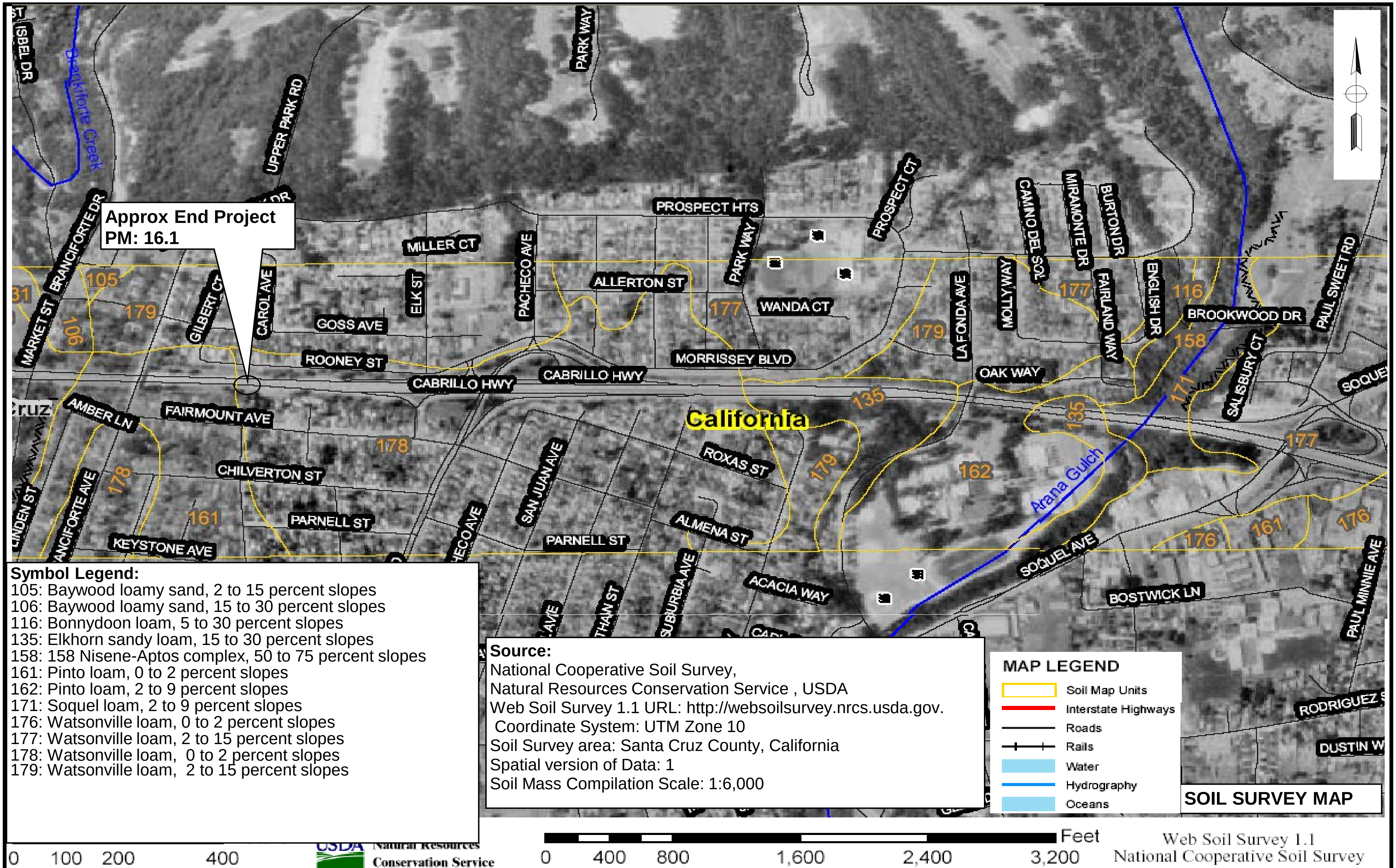
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	PLATE NO.: 3



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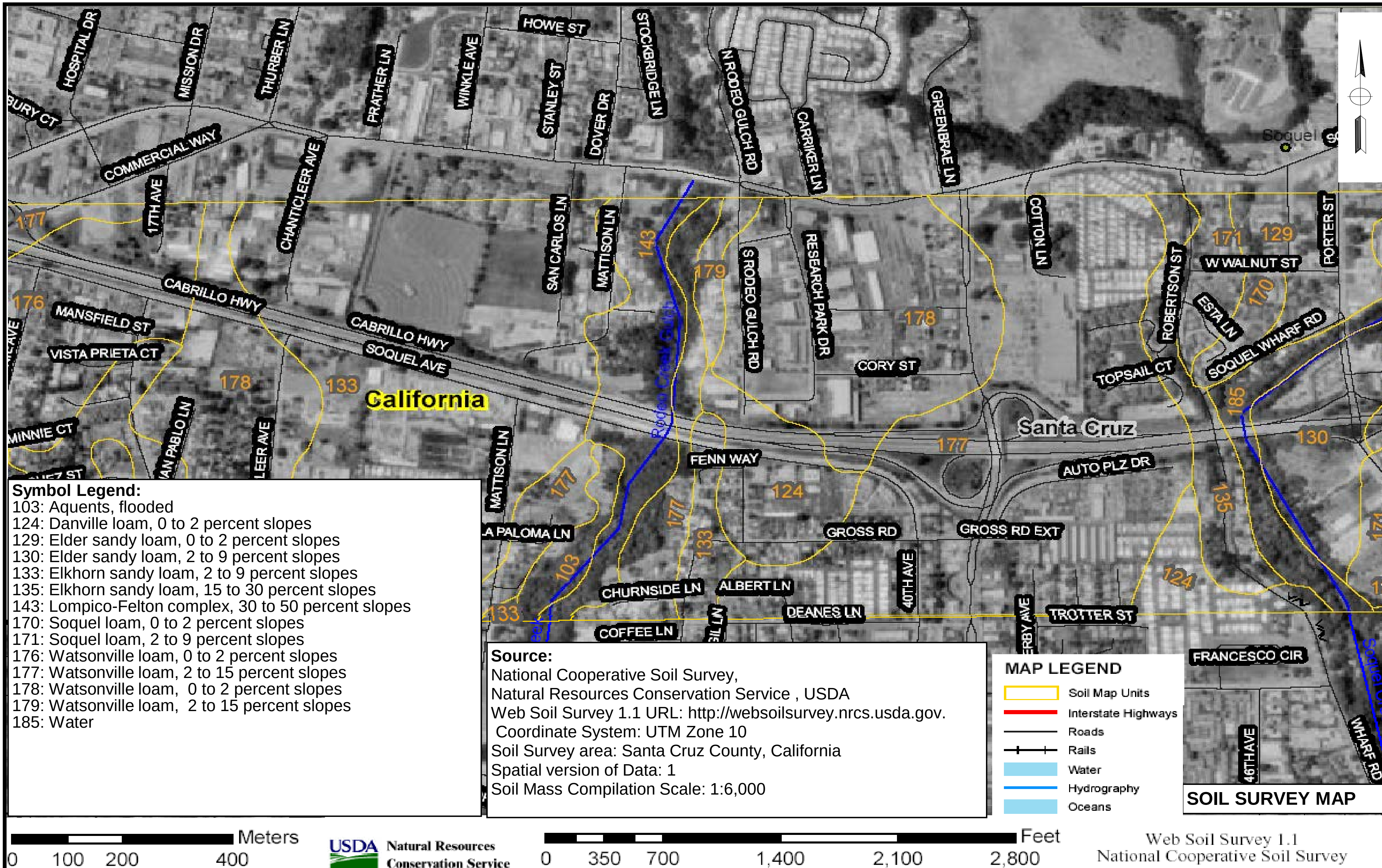
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	PLATE NO.: 4A



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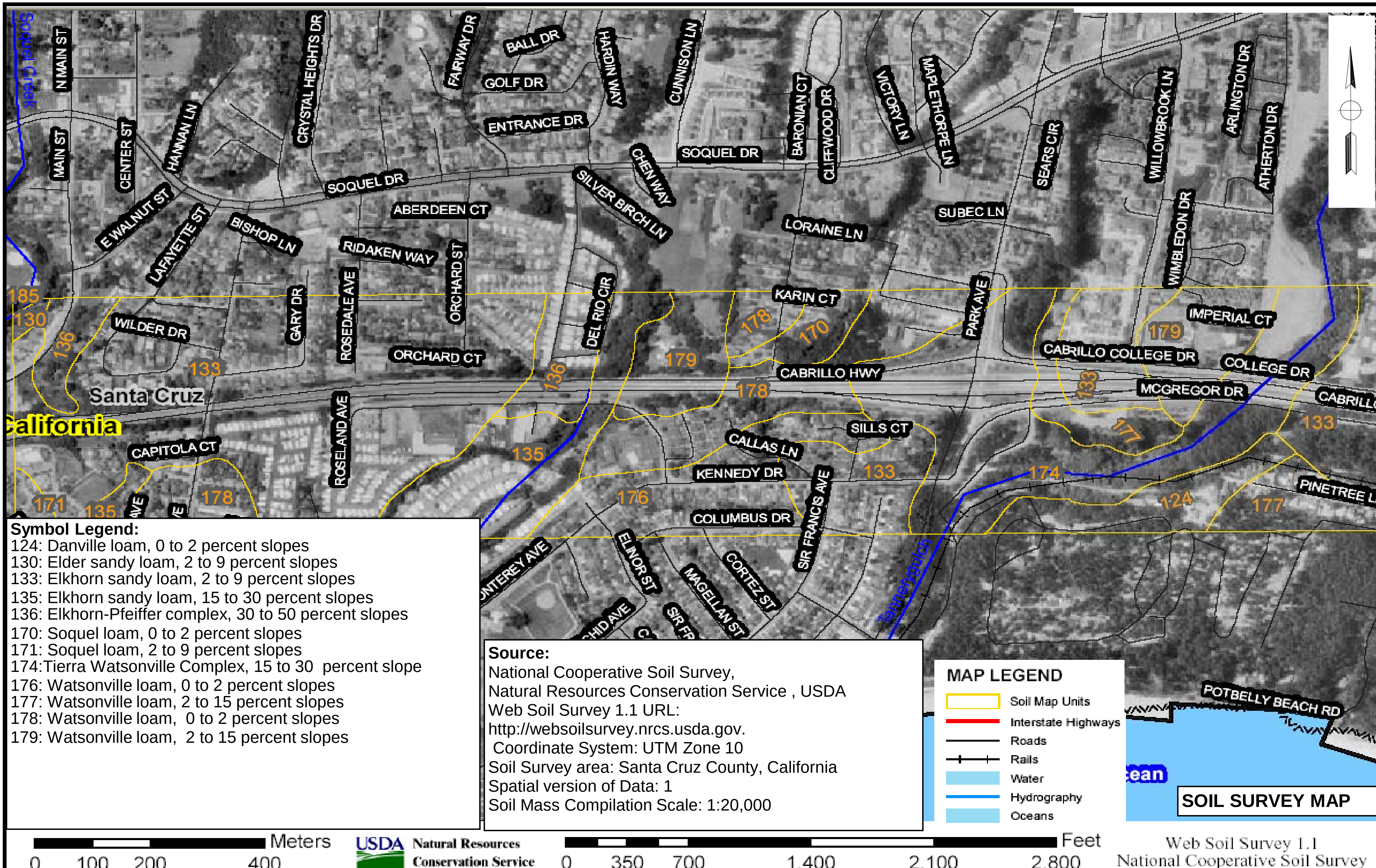
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	PLATE NO.: 4B



Symbol Legend:

124: Danville loam, 0 to 2 percent slopes
130: Elder sandy loam, 2 to 9 percent slopes
133: Elkhorn sandy loam, 2 to 9 percent slopes
135: Elkhorn sandy loam, 15 to 30 percent slopes
136: Elkhorn-Pfeiffer complex, 30 to 50 percent slopes
170: Soquel loam, 0 to 2 percent slopes
171: Soquel loam, 2 to 9 percent slopes
174: Tierra Watsonville Complex, 15 to 30 percent slope
176: Watsonville loam, 0 to 2 percent slopes
177: Watsonville loam, 2 to 15 percent slopes
178: Watsonville loam, 0 to 2 percent slopes
179: Watsonville loam, 2 to 15 percent slopes

Source:

National Cooperative Soil Survey,
Natural Resources Conservation Service, USDA
Web Soil Survey 1.1 URL:
http://websoilsurvey.nrcs.usda.gov.
Coordinate System: UTM Zone 10
Soil Survey area: Santa Cruz County, California
Spatial version of Data: 1
Soil Mass Compilation Scale: 1:20,000

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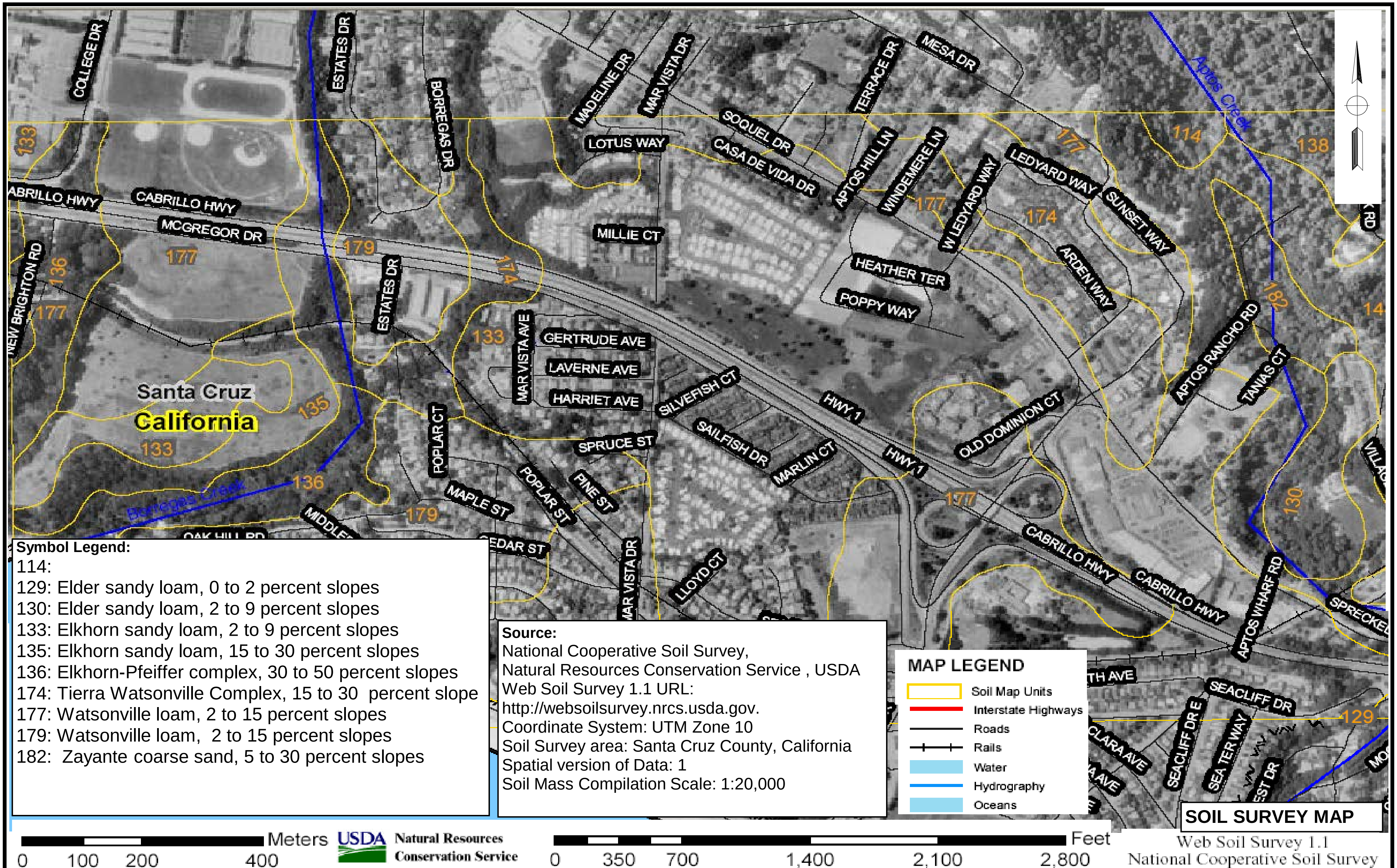
0.4 MILES S. OF SAN ANDREAS/LARKIN VALLEY RD IC TO 0.3 MILES N. OF MORRISSEY BLVD IC
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	PLATE NO.: 4C



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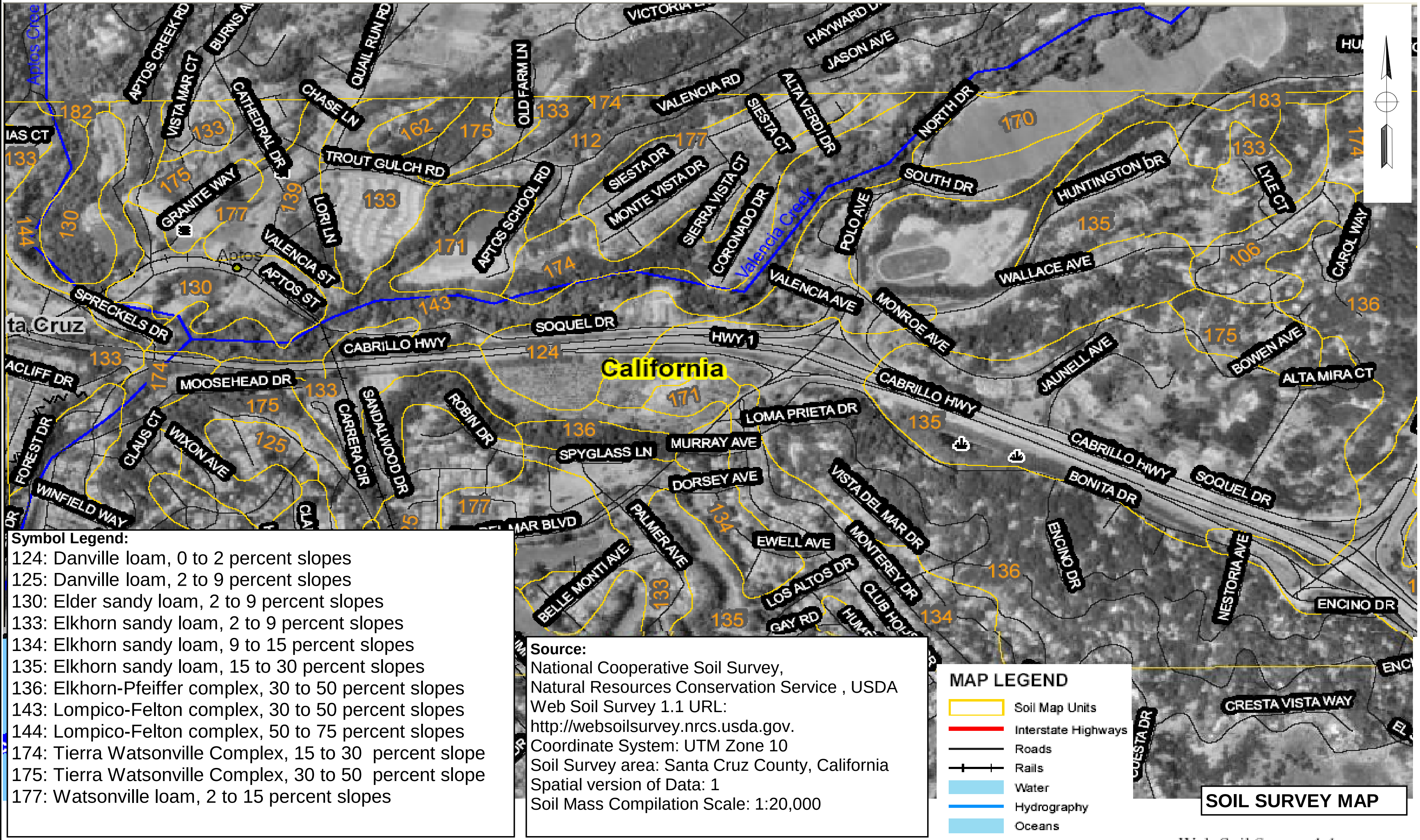
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	**PLATE NO.: 4D**



Symbol Legend:

124: Danville loam, 0 to 2 percent slopes
125: Danville loam, 2 to 9 percent slopes
130: Elder sandy loam, 2 to 9 percent slopes
133: Elkhorn sandy loam, 2 to 9 percent slopes
134: Elkhorn sandy loam, 9 to 15 percent slopes
135: Elkhorn sandy loam, 15 to 30 percent slopes
136: Elkhorn-Pfeiffer complex, 30 to 50 percent slopes
143: Lompico-Felton complex, 30 to 50 percent slopes
144: Lompico-Felton complex, 50 to 75 percent slopes
174: Tierra Watsonville Complex, 15 to 30 percent slope
175: Tierra Watsonville Complex, 30 to 50 percent slope
177: Watsonville loam, 2 to 15 percent slopes

Source:
National Cooperative Soil Survey,
Natural Resources Conservation Service , USDA
Web Soil Survey 1.1 URL:
http://websoilsurvey.nrcs.usda.gov.
Coordinate System: UTM Zone 10
Soil Survey area: Santa Cruz County, California
Spatial version of Data: 1
Soil Mass Compilation Scale: 1:20,000

MAP LEGEND

- Soil Map Units
- Interstate Highways
- Roads
- Rails
- Water
- Hydrography
- Oceans

SOIL SURVEY MAP

Meters: 0 150 300 600

USDA Natural Resources Conservation Service

Feet: 0 450 900 1,800 2,700 3,600

Web Soil Survey 1.1
National Cooperative Soil Survey

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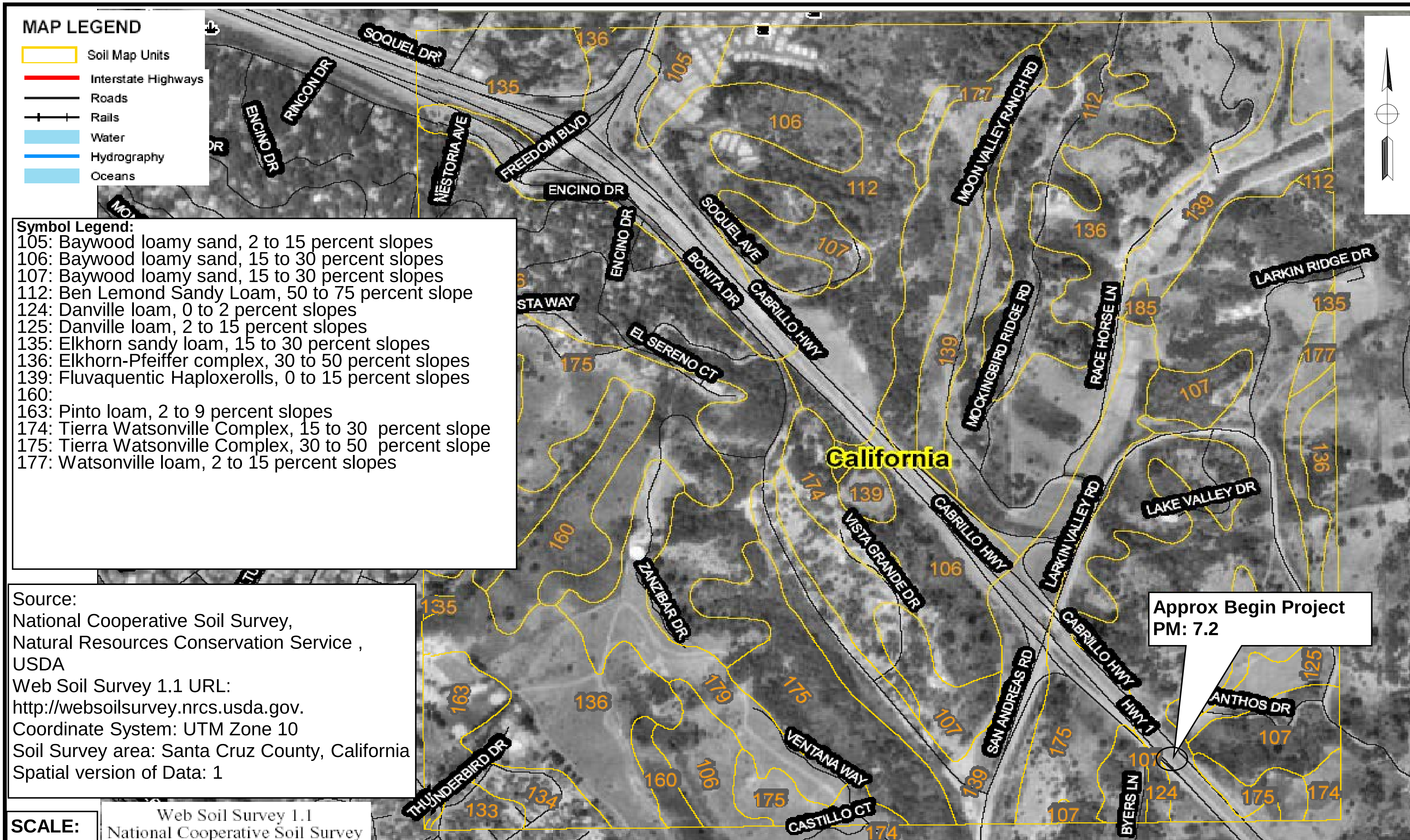
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	**PLATE NO.: 4E**



Symbol Legend:

105: Baywood loamy sand, 2 to 15 percent slopes
106: Baywood loamy sand, 15 to 30 percent slopes
107: Baywood loamy sand, 15 to 30 percent slopes
112: Ben Lemond Sandy Loam, 50 to 75 percent slope
124: Danville loam, 0 to 2 percent slopes
125: Danville loam, 2 to 15 percent slopes
135: Elkhorn sandy loam, 15 to 30 percent slopes
136: Elkhorn-Pfeiffer complex, 30 to 50 percent slopes
139: Fluvaquentic Haploxerolls, 0 to 15 percent slopes
160:
163: Pinto loam, 2 to 9 percent slopes
174: Tierra Watsonville Complex, 15 to 30 percent slope
175: Tierra Watsonville Complex, 30 to 50 percent slope
177: Watsonville loam, 2 to 15 percent slopes

Source:
National Cooperative Soil Survey,
Natural Resources Conservation Service ,
USDA
Web Soil Survey 1.1 URL:
http://websoilsurvey.nrcs.usda.gov.
Coordinate System: UTM Zone 10
Soil Survey area: Santa Cruz County, California
Spatial version of Data: 1

SCALE: Web Soil Survey 1.1 National Cooperative Soil Survey

Meters: 0 100 200 400

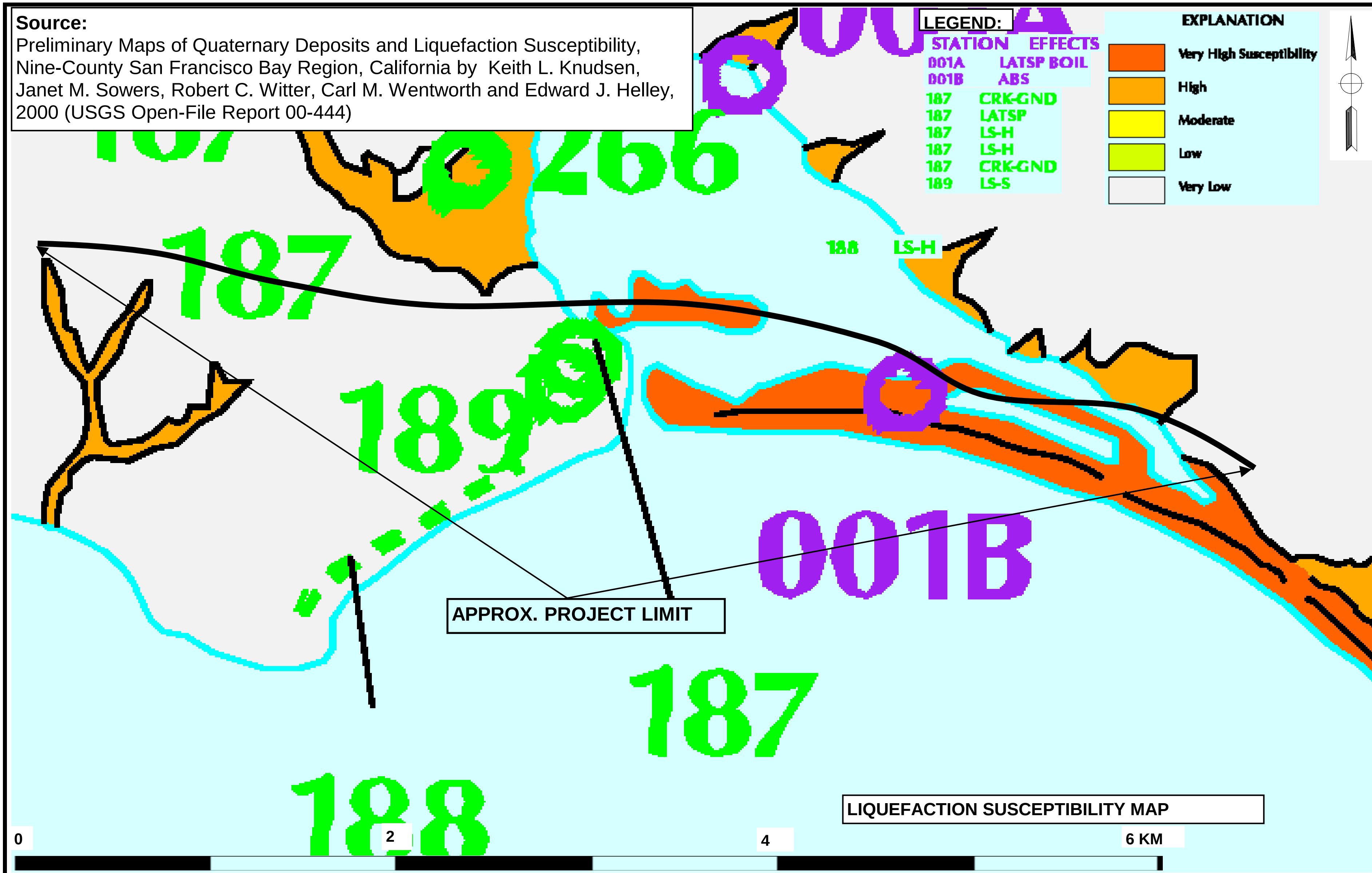
USDA Natural Resources Conservation Service

Feet: 0 400 800 1,600 2,400 3,200

SOIL SURVEY MAP

PARIKH CONSULTANTS, INC. **GEOTECHNICAL CONSULTANTS** **MATERIALS TESTING**	**HIGHWAY 1 HOV LANE WIDENING PROJECT** **0.4 MILES S. OF SAN ANDREAS/LARKIN VALLEY RD IC TO 0.3 MILES N. OF MORRISSEY BLVD IC** **SANTA CRUZ COUNTY, CALIFORNIA**
JOB NO.: 203132.PGR	**PLATE NO.: 4F**

Source:
Preliminary Maps of Quaternary Deposits and Liquefaction Susceptibility, Nine-County San Francisco Bay Region, California by Keith L. Knudsen, Janet M. Sowers, Robert C. Witter, Carl M. Wentworth and Edward J. Helley, 2000 (USGS Open-File Report 00-444)



PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

HIGHWAY 1 HOV LANE WIDENING PROJECT
0.4 MILES S. OF SAN ANDREAS/LARKIN VALLEY RD IC TO 0.3 MILES N. OF MORRISSEY BLVD IC
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	PLATE NO.: 5

Attenuation Relationships for Shallow Crustal Earthquakes (Sadigh, et al, 1997)

Fault = Zayante-Vergales Fault (ZVS)- Strike Slip

Mw = 7.25 Rrup = 3.5 km (San Andreas Road UC)

M>=6.5 *ROCK SITE:*

C1 = -1.274	C2 = 1.1	C3 = 0	C4 = -2.1
C5 = -0.48451	C6 = 0.524	C7 = 0	

A=C1+C2M+C3(8.5M)^2.5=	6.701
B=C4*Ln(Rrup+exp(C5+C6M))=	-7.212
C=C7*Ln(Rrup+2)=	0
Ln(y) = A+B+C =	-0.511
y = Exp(Ln(y)) =	0.60

Peak Bed Rock Acceleration PBA = 0.6g

Mw = 7.25 Rrup = 4.75 km (Freedom BLVD OC, South Aptos UP, Aptos Creek Bridge, ...)

A= 6.701
B= -7.295
C= 0
Ln(y) = -0.594
y = 0.55 **Peak Bed Rock Acceleration PBA = 0.55g**

Mw = 7.25 Rrup = 6.25 km (Rio Del Mar BLVD OC)

A= 6.701
B= -7.390
C= 0
Ln(y) = -0.689
y = 0.50 **Peak Bed Rock Acceleration PBA = 0.5g**

Fault = Monterey Bay Zone (MBY)- Reverse Oblique

Mw = 6.5 Rrup = 13 km

A= 5.876
B= -7.250
C= 0
Ln(y) = -1.374
y = 0.25 **Peak Bed Rock Acceleration PBA = 0.25x1.2 = 0.30g (assuming 20 % increase in reverse fault)**

Fault = San Gregorio - Palo Colorado Fault (SGC) - Strike Slip

Mw = 7.5 Rrup = 19.5 km

A= 6.976
B= -8.251
C= 0
Ln(y) = -1.275
y = 0.28 **Peak Bed Rock Acceleration PBA = 0.3g**

Attenuation Relationships for Shallow Crustal Earthquakes (Sadigh, et al, 1997)

Fault = San AndreasN Fault (SAN) - Strike Slip

Mw = 8 **Rrup = 10** **km (Freedom BLVD OC, South Aptos UP,**

M>=6.5 *ROCK SITE:*

C1 = -1.274	C2 = 1.1	C3 = 0	C4 = -2.1
C5 = -0.48451	C6 = 0.524	C7 = 0	

A=C1+C2M+C3(8.5M)^2.5= 7.526

B=C4*Ln(Rrup+exp(C5+C6M))= -8.247

C=C7*Ln(Rrup+2)= 0

Ln(y) = A+B+C = -0.721

y = Exp(Ln(y)) = 0.49 **Peak Bed Rock Acceleration (PBA = 0.5g)**

Mw = 8 **Rrup = 12.5** **km (Rio Del Mar BLVD OC, Park Avenue UC, Capitola Ave,. OC, …)**

A= 7.526

B= -8.348

C= 0

Ln(y) = -0.822

y = 0.44 g (Peak Bed Rock Acceleration)

PBA = 0.45g

Mw = 8 **Rrup = 15** **km (Soquel Drive OC, La Fonda Avenue OC, Morrissey Blvd OC)**

A= 7.526

B= -8.444

C= 0

Ln(y) = -0.918

y = 0.40 **Peak Bed Rock Acceleration PBA = 0.4g**

Fault = Sargent Fault (SRT) - Strike Slip

Mw = 6.75 **Rrup = 13** **km**

A= 6.151

B= -7.416

C= 0

Ln(y) = -1.265

y = 0.28 **Peak Bed Rock Acceleration PBA = 0.3g**

Fault = Calaveras-Pacines-San benito Fault (CPS) - Strike Slip

Mw = 7.5 **Rrup = 31** **km**

A= 6.976

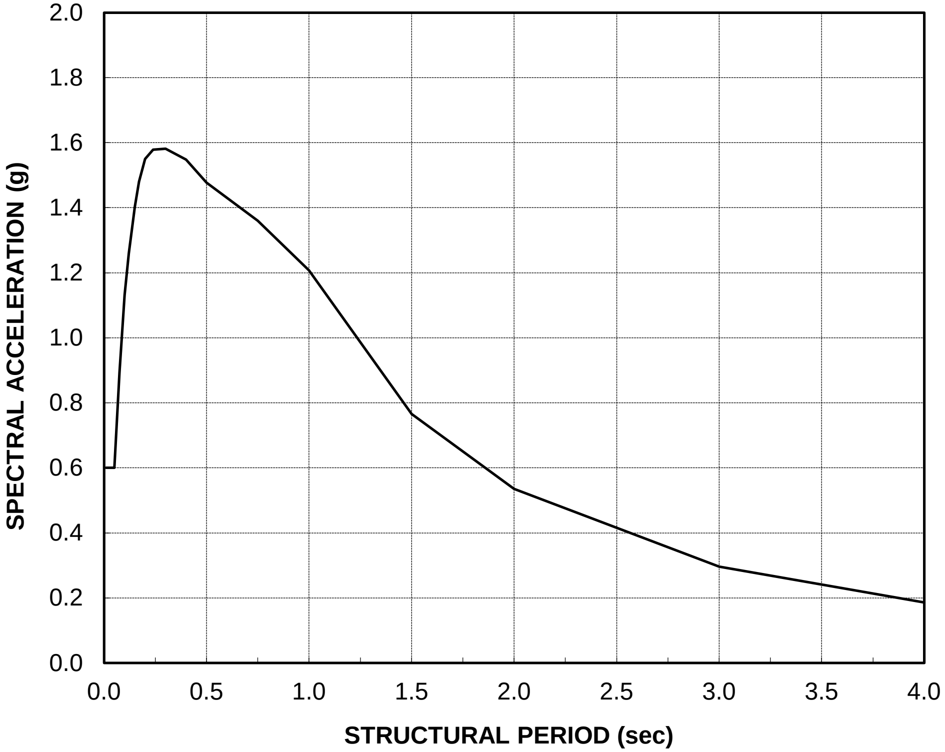
B= -8.679

C= 0

Ln(y) = -1.703

y = 0.18 **Peak Bed Rock Acceleration PBA = 0.2g**

ARS DESIGN CURVE
ROUTE 1 HOV LANE WIDENING - SAN ANDREAS ROAD UC
SANTA CRUZ COUNTY, CALIFORNIA



Spectral Data

Period (sec)	Spectral Accel. (g)
0.010	0.600
0.020	0.600
0.030	0.600
0.050	0.600
0.075	0.893
0.100	1.132
0.120	1.259
0.150	1.403
0.170	1.480
0.200	1.550
0.240	1.578
0.300	1.581
0.400	1.548
0.500	1.477
0.750	1.360
1.000	1.207
1.500	0.765
2.000	0.536
3.000	0.296
4.000	0.186

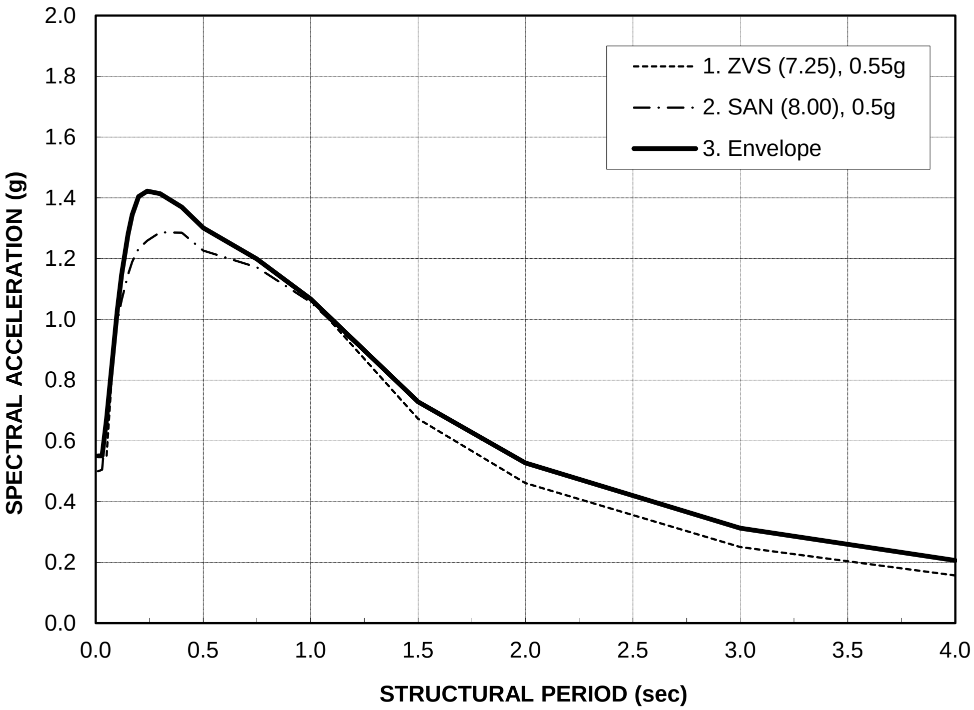
Caltrans SDC (v 1.4, June 2006), Figure B.8,
Governing Fault: Zayante - Vergales Fault (Strike-Slip)
(Mw = 7.25, Soil Profile Type D, PBA = 0.6 g)
with the following modifications:
(1) No change of Sa for structural periods < 0.5 sec
(2) 20% increase of Sa for structural periods $\geq$ 1 sec
(3) Linear interpolation for structural periods between 0.5 and 1 sec

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

HIGHWAY 1 HOV LANE WIDENING PROJECT
SAN ANDREAS ROAD UC (BR. NO. 36-0094R/L)
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	PLATE NO.: 7A

ARS DESIGN CURVE
ROUTE 1 HOV LANE WIDENING - FREEDOM BLVD OC
SANTA CRUZ COUNTY, CALIFORNIA



Spectral Data

Period (sec)	ZVS (7.25) Spectral Accel. (g)	SAN (8.00) Spectral Accel. (g)
0.010	0.550	0.500
0.020	0.550	0.502
0.030	0.550	0.505
0.050	0.550	0.672
0.075	0.806	0.843
0.100	1.025	0.990
0.120	1.148	1.063
0.150	1.280	1.147
0.170	1.345	1.189
0.200	1.404	1.232
0.240	1.422	1.259
0.300	1.414	1.286
0.400	1.369	1.285
0.500	1.301	1.227
0.750	1.199	1.171
1.000	1.067	1.057
1.500	0.673	0.729
2.000	0.461	0.528
3.000	0.250	0.313
4.000	0.157	0.207

1. Caltrans SDC (v 1.4, June 2006), Figure B.8,
   Governing Fault: Zayante-Vergales Fault (Strike-Slip)
   (Mw = 7.25, Soil Profile Type D, PBA = 0.55 g)
   with the following modifications:
   (1) No change of Sa for structural periods < 0.5 sec
   (2) 20% increase of Sa for structural periods ≥ 1 sec
   (3) Linear interpolation for structural periods between 0.5 and 1 sec

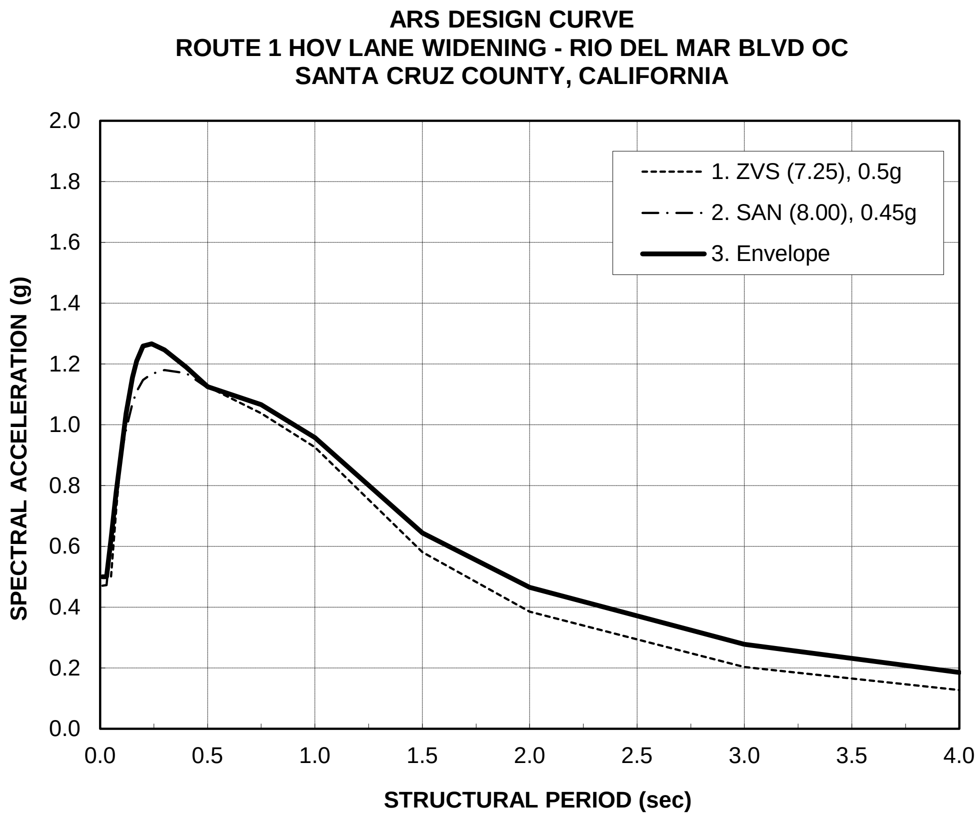
2. Caltrans SDC (v 1.4, June 2006), Figure B.9,
   Governing Fault: San Andreas/North Fault (Strike-Slip)
   (Mw = 8.00, Soil Profile Type D, PBA = 0.5 g)
   with the following modifications:
   (1) No change of Sa for structural periods < 0.5 sec
   (2) 20% increase of Sa for structural periods ≥ 1 sec
   (3) Linear interpolation for structural periods between 0.5 and 1 sec

3. Recommended Design Curve = Envelope of above two curves

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

HIGHWAY 1 HOV LANE WIDENING PROJECT
FREEDOM BLVD OC (BR. NO. 36-0022)
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR | **PLATE NO.: 7B**



Spectral Data

Period (sec)	ZVS (7.25) Spectral Accel. (g)	SAN (8.00) Spectral Accel. (g)
0.010	0.500	0.470
0.020	0.500	0.471
0.030	0.500	0.473
0.050	0.500	0.624
0.075	0.719	0.778
0.100	0.919	0.910
0.120	1.037	0.985
0.150	1.156	1.071
0.170	1.209	1.110
0.200	1.259	1.147
0.240	1.266	1.168
0.300	1.247	1.180
0.400	1.190	1.170
0.500	1.125	1.121
0.750	1.038	1.066
1.000	0.927	0.958
1.500	0.581	0.644
2.000	0.386	0.466
3.000	0.204	0.278
4.000	0.128	0.185

1. Caltrans SDC (v 1.4, June 2006), Figure B.8,
   Governing Fault: Zayante-Vergales Fault (Strike-Slip)
   (Mw = 7.25, Soil Profile Type D, PBA = 0.5 g)
   with the following modifications:
   (1) No change of Sa for structural periods < 0.5 sec
   (2) 20% increase of Sa for structural periods $\geq$ 1 sec
   (3) Linear interpolation for structural periods between 0.5 and 1 sec

2. Caltrans SDC (v 1.4, June 2006), Figure B.9,
   Governing Fault: San Andreas/North Fault (Strike-Slip)
   (Mw = 8.00, Soil Profile Type D, PBA = 0.45 g)
   with the following modifications:
   (1) No change of Sa for structural periods < 0.5 sec
   (2) 20% increase of Sa for structural periods $\geq$ 1 sec
   (3) Linear interpolation for structural periods between 0.5 and 1 sec

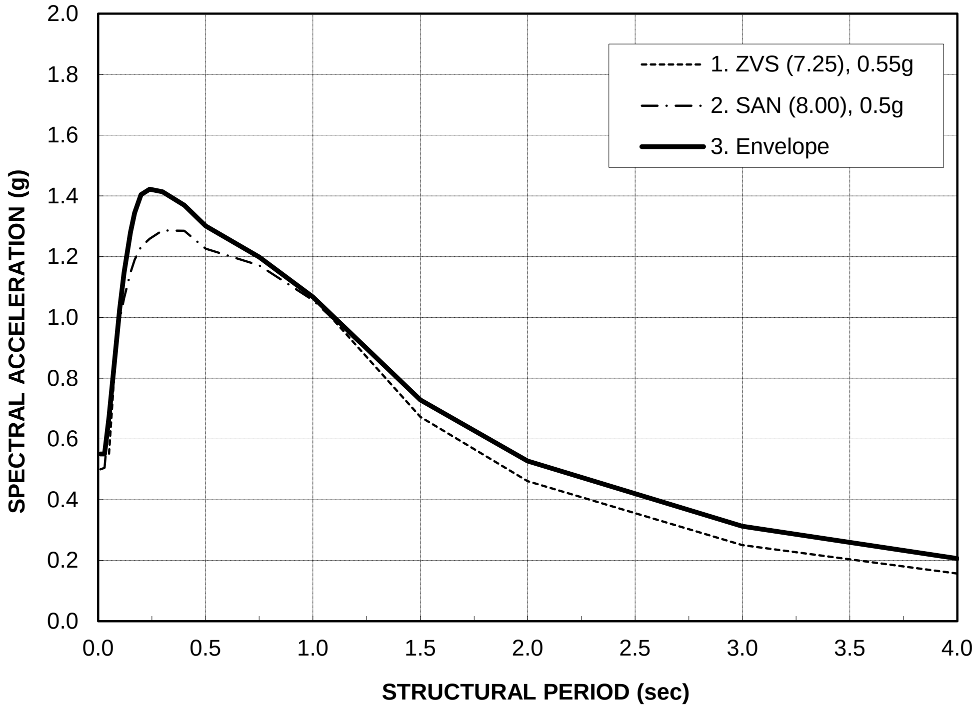
3. Recommended Design Curve = Envelope of above two curves

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

HIGHWAY 1 HOV LANE WIDENING PROJECT
RIO DEL MAR BOULEVARD OC (BR. NO. 36-0023)
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR | **PLATE NO.: 7C**

ARS DESIGN CURVE
ROUTE 1 HOV LANE WIDENING - SOUTH APTOS UP
SANTA CRUZ COUNTY, CALIFORNIA



Spectral Data

Period (sec)	ZVS (7.25) Spectral Accel. (g)	SAN (8.00) Spectral Accel. (g)
0.010	0.550	0.500
0.020	0.550	0.502
0.030	0.550	0.505
0.050	0.550	0.672
0.075	0.806	0.843
0.100	1.025	0.990
0.120	1.148	1.063
0.150	1.280	1.147
0.170	1.345	1.189
0.200	1.404	1.232
0.240	1.422	1.259
0.300	1.414	1.286
0.400	1.369	1.285
0.500	1.301	1.227
0.750	1.199	1.171
1.000	1.067	1.057
1.500	0.673	0.729
2.000	0.461	0.528
3.000	0.250	0.313
4.000	0.157	0.207

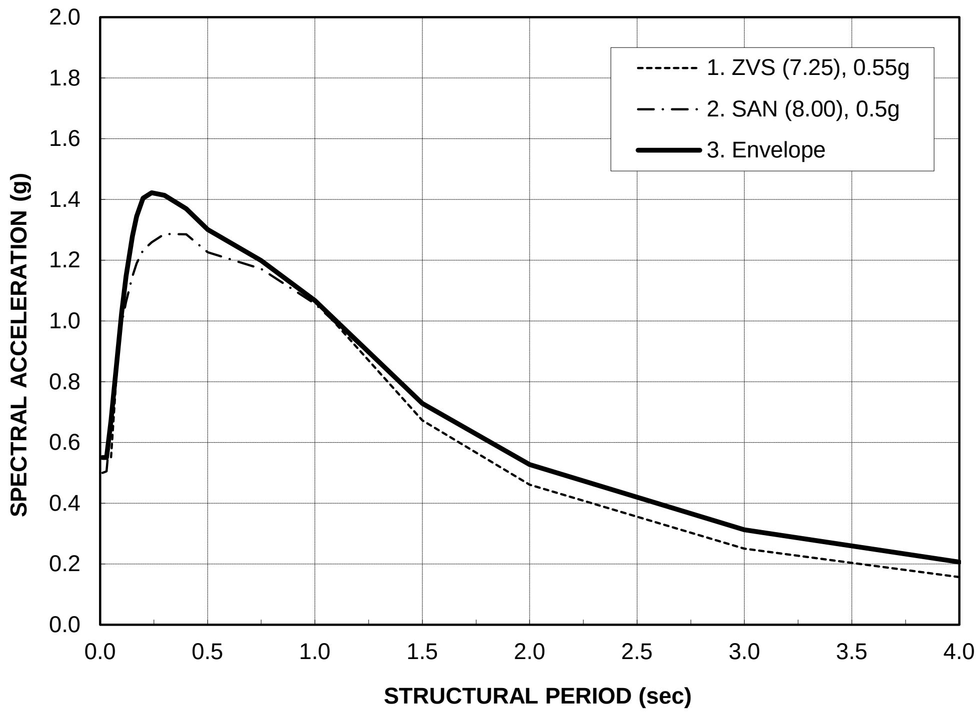
1. Caltrans SDC (v 1.4, June 2006), Figure B.8,
   Governing Fault: Zayante-Vergales Fault (Strike-Slip)
   (Mw = 7.25, Soil Profile Type D, PBA = 0.55 g)
   with the following modifications:
   (1) No change of Sa for structural periods < 0.5 sec
   (2) 20% increase of Sa for structural periods ≥ 1 sec
   (3) Linear interpolation for structural periods between 0.5 and 1 sec

2. Caltrans SDC (v 1.4, June 2006), Figure B.9,
   Governing Fault: San Andreas/North Fault (Strike-Slip)
   (Mw = 8.00, Soil Profile Type D, PBA = 0.5 g)
   with the following modifications:
   (1) No change of Sa for structural periods < 0.5 sec
   (2) 20% increase of Sa for structural periods ≥ 1 sec
   (3) Linear interpolation for structural periods between 0.5 and 1 sec

3. Recommended Design Curve = Envelope of above two curves

PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS TESTING	**HIGHWAY 1 HOV LANE WIDENING PROJECT SOUTH APTOS UP (BR. NO. 36-0003) SANTA CRUZ COUNTY, CALIFORNIA**
	JOB NO.: 203132.PGR / PLATE NO.:7D

ARS DESIGN CURVE
ROUTE 1 HOV LANE WIDENING - APTOS CREEK BRIDGE
SANTA CRUZ COUNTY, CALIFORNIA



Spectral Data

Period (sec)	ZVS (7.25) Spectral Accel. (g)	SAN (8.00) Spectral Accel. (g)
0.010	0.550	0.500
0.020	0.550	0.502
0.030	0.550	0.505
0.050	0.550	0.672
0.075	0.806	0.843
0.100	1.025	0.990
0.120	1.148	1.063
0.150	1.280	1.147
0.170	1.345	1.189
0.200	1.404	1.232
0.240	1.422	1.259
0.300	1.414	1.286
0.400	1.369	1.285
0.500	1.301	1.227
0.750	1.199	1.171
1.000	1.067	1.057
1.500	0.673	0.729
2.000	0.461	0.528
3.000	0.250	0.313
4.000	0.157	0.207

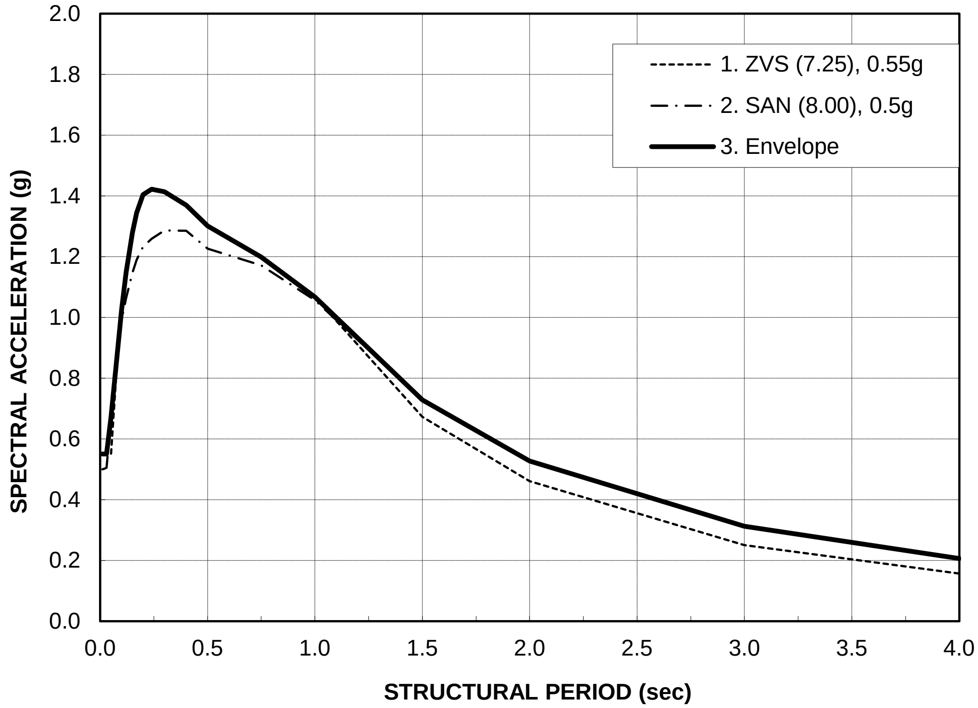
1. Caltrans SDC (v 1.4, June 2006), Figure B.8,
   Governing Fault: Zayante-Vergales Fault (Strike-Slip)
   (Mw = 7.25, Soil Profile Type D, PBA = 0.55 g)
   with the following modifications:
   (1) No change of Sa for structural periods < 0.5 sec
   (2) 20% increase of Sa for structural periods $\geq$ 1 sec
   (3) Linear interpolation for structural periods between 0.5 and 1 sec

2. Caltrans SDC (v 1.4, June 2006), Figure B.9,
   Governing Fault: San Andreas/North Fault (Strike-Slip)
   (Mw = 8.00, Soil Profile Type D, PBA = 0.5 g)
   with the following modifications:
   (1) No change of Sa for structural periods < 0.5 sec
   (2) 20% increase of Sa for structural periods $\geq$ 1 sec
   (3) Linear interpolation for structural periods between 0.5 and 1 sec

3. Recommended Design Curve = Envelope of above two curves

PARIKH CONSULTANTS, INC. **GEOTECHNICAL CONSULTANTS** **MATERIALS TESTING**	**HIGHWAY 1 HOV LANE WIDENING PROJECT** **APTOS CREEK BRIDGE (BR. NO. 36-0011)** **SANTA CRUZ COUNTY, CALIFORNIA**
JOB NO.: 203132.PGR	**PLATE NO.: 7E**

ARS DESIGN CURVE
ROUTE 1 HOV LANE WIDENING - NORTH APTOS UP
SANTA CRUZ COUNTY, CALIFORNIA



Spectral Data

Period (sec)	ZVS (7.25) Spectral Accel. (g)	SAN (8.00) Spectral Accel. (g)
0.010	0.550	0.500
0.020	0.550	0.502
0.030	0.550	0.505
0.050	0.550	0.672
0.075	0.806	0.843
0.100	1.025	0.990
0.120	1.148	1.063
0.150	1.280	1.147
0.170	1.345	1.189
0.200	1.404	1.232
0.240	1.422	1.259
0.300	1.414	1.286
0.400	1.369	1.285
0.500	1.301	1.227
0.750	1.199	1.171
1.000	1.067	1.057
1.500	0.673	0.729
2.000	0.461	0.528
3.000	0.250	0.313
4.000	0.157	0.207

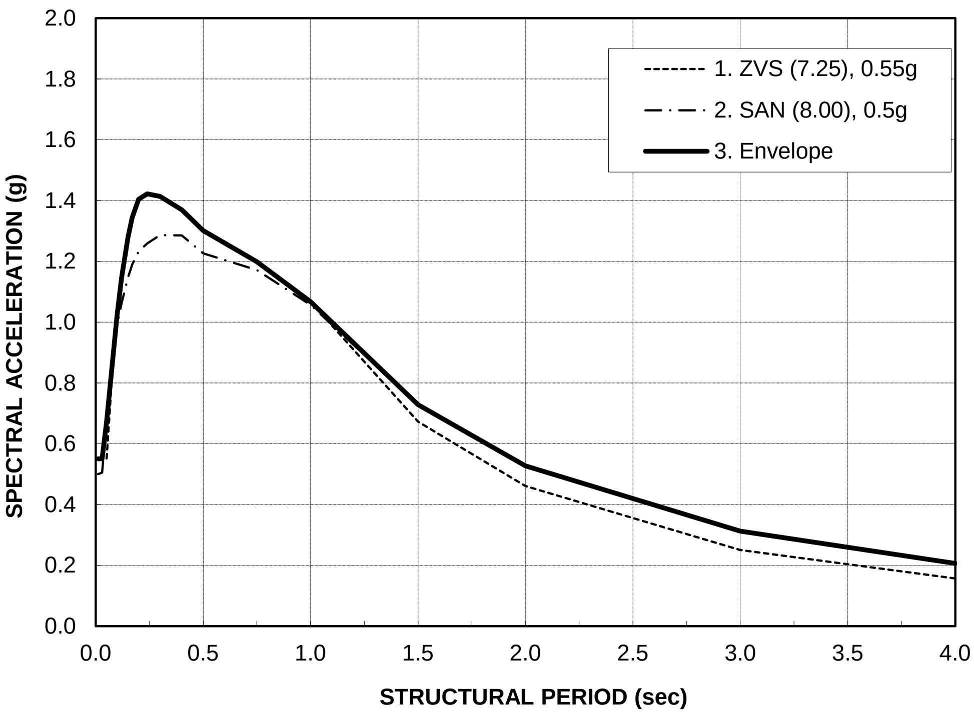
1. Caltrans SDC (v 1.4, June 2006), Figure B.8,
   Governing Fault: Zayante-Vergales Fault (Strike-Slip)
   (Mw = 7.25, Soil Profile Type D, PBA = 0.55 g)
   with the following modifications:
   (1) No change of Sa for structural periods < 0.5 sec
   (2) 20% increase of Sa for structural periods ≥ 1 sec
   (3) Linear interpolation for structural periods between 0.5 and 1 sec

2. Caltrans SDC (v 1.4, June 2006), Figure B.9,
   Governing Fault: San Andreas/North Fault (Strike-Slip)
   (Mw = 8.00, Soil Profile Type D, PBA = 0.5 g)
   with the following modifications:
   (1) No change of Sa for structural periods < 0.5 sec
   (2) 20% increase of Sa for structural periods ≥ 1 sec
   (3) Linear interpolation for structural periods between 0.5 and 1 sec

3. Recommended Design Curve = Envelope of above two curves

PARIKH CONSULTANTS, INC. **GEOTECHNICAL CONSULTANTS** **MATERIALS TESTING**	**HIGHWAY 1 HOV LANE WIDENING PROJECT** **NORTH APTOS UNDERPASS (BR. NO. 36-0012)** **SANTA CRUZ COUNTY, CALIFORNIA**
JOB NO.: 203132.PGR	**PLATE NO.:7F**

ARS DESIGN CURVE
ROUTE 1 HOV LANE WIDENING - STATE PARK DRIVE OC
SANTA CRUZ COUNTY, CALIFORNIA



Spectral Data

Period (sec)	ZVS (7.25) Spectral Accel. (g)	SAN (8.00) Spectral Accel. (g)
0.010	0.550	0.500
0.020	0.550	0.502
0.030	0.550	0.505
0.050	0.550	0.672
0.075	0.806	0.843
0.100	1.025	0.990
0.120	1.148	1.063
0.150	1.280	1.147
0.170	1.345	1.189
0.200	1.404	1.232
0.240	1.422	1.259
0.300	1.414	1.286
0.400	1.369	1.285
0.500	1.301	1.227
0.750	1.199	1.171
1.000	1.067	1.057
1.500	0.673	0.729
2.000	0.461	0.528
3.000	0.250	0.313
4.000	0.157	0.207

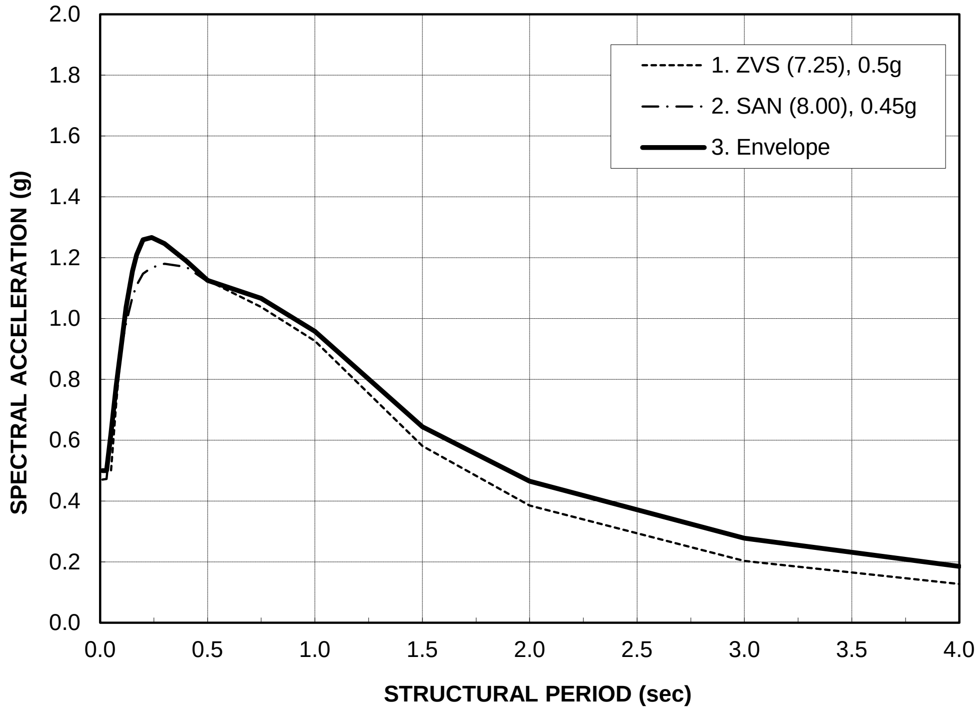
1. Caltrans SDC (v 1.4, June 2006), Figure B.8,
   Governing Fault: Zayante-Vergales Fault (Strike-Slip)
   (Mw = 7.50, Soil Profile Type D, PBA = 0.55 g)
   with the following modifications:
   (1) No change of Sa for structural periods < 0.5 sec
   (2) 20% increase of Sa for structural periods ≥ 1 sec
   (3) Linear interpolation for structural periods between 0.5 and 1 sec

2. Caltrans SDC (v 1.4, June 2006), Figure B.9,
   Governing Fault: San Andreas/North Fault (Strike-Slip)
   (Mw = 8.00, Soil Profile Type D, PBA = 0.5 g)
   with the following modifications:
   (1) No change of Sa for structural periods < 0.5 sec
   (2) 20% increase of Sa for structural periods ≥ 1 sec
   (3) Linear interpolation for structural periods between 0.5 and 1 sec

3. Recommended Design Curve = Envelope of above two curves

PARIKH CONSULTANTS, INC. GEOTECHNICAL CONSULTANTS MATERIALS TESTING	HIGHWAY 1 HOV LANE WIDENING PROJECT STATE PARK DRIVE OC (BR. NO. 36-0028) SANTA CRUZ COUNTY, CALIFORNIA	
	JOB NO.: 203132.PGR	PLATE NO.: 7G

ARS DESIGN CURVE
ROUTE 1 HOV LANE WIDENING - PARK AVENUE UC
SANTA CRUZ COUNTY, CALIFORNIA



Spectral Data

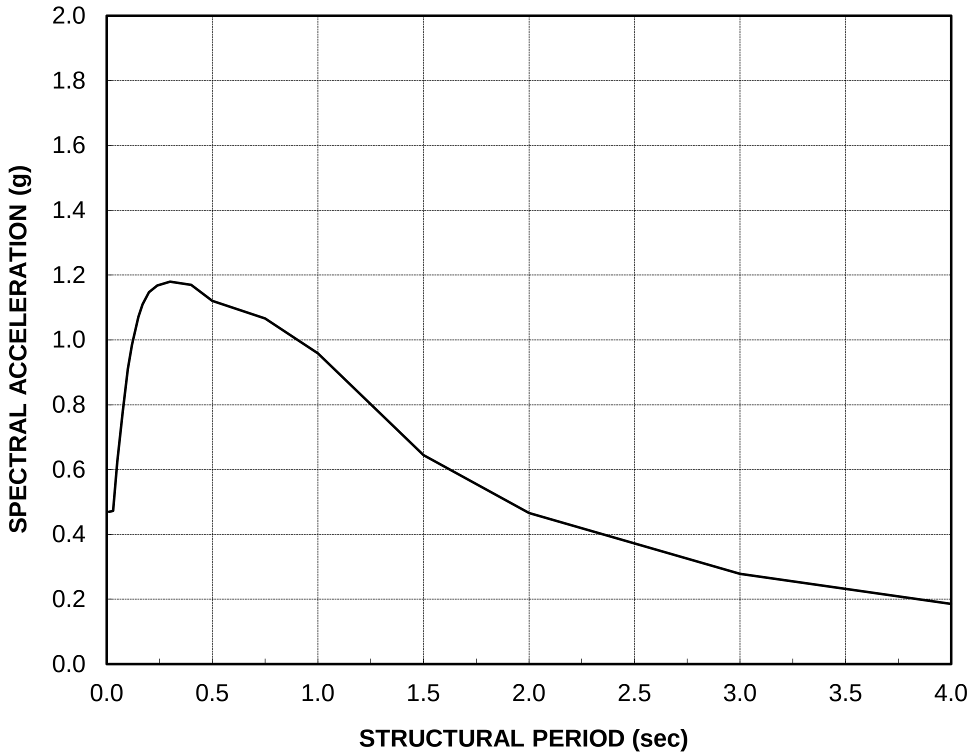
Period (sec)	ZVS (7.25) Spectral Accel. (g)	SAN (8.00) Spectral Accel. (g)
0.010	0.500	0.470
0.020	0.500	0.471
0.030	0.500	0.473
0.050	0.500	0.624
0.075	0.719	0.778
0.100	0.919	0.910
0.120	1.037	0.985
0.150	1.156	1.071
0.170	1.209	1.110
0.200	1.259	1.147
0.240	1.266	1.168
0.300	1.247	1.180
0.400	1.190	1.170
0.500	1.125	1.121
0.750	1.038	1.066
1.000	0.927	0.958
1.500	0.581	0.644
2.000	0.386	0.466
3.000	0.204	0.278
4.000	0.128	0.185

1. Caltrans SDC (v 1.4, June 2006), Figure B.8,
   Governing Fault: Zayante-Vergales Fault (Strike-Slip)
   (Mw = 7.25, Soil Profile Type D, PBA = 0.5 g)
   with the following modifications:
   (1) No change of Sa for structural periods < 0.5 sec
   (2) 20% increase of Sa for structural periods $\geq$ 1 sec
   (3) Linear interpolation for structural periods between 0.5 and 1 sec

2. Caltrans SDC (v 1.4, June 2006), Figure B.9,
   Governing Fault: San Andreas/North Fault (Strike-Slip)
   (Mw = 8.00, Soil Profile Type D, PBA = 0.45 g)
   with the following modifications:
   (1) No change of Sa for structural periods < 0.5 sec
   (2) 20% increase of Sa for structural periods $\geq$ 1 sec
   (3) Linear interpolation for structural periods between 0.5 and 1 sec

3. Recommended Design Curve = Envelope of above two curves

ARS DESIGN CURVE
ROUTE 1 HOV LANE WIDENING - CAPITOLA AVENUE OC
SANTA CRUZ COUNTY, CALIFORNIA



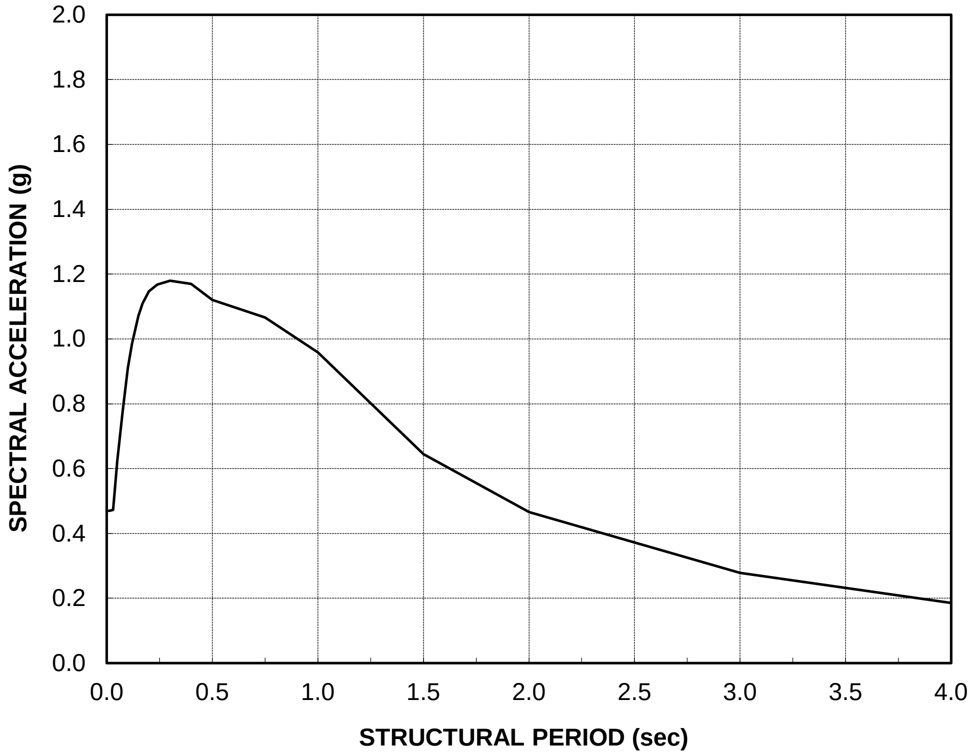
Spectral Data

Period (sec)	Spectral Accel. (g)
0.010	0.470
0.020	0.471
0.030	0.473
0.050	0.624
0.075	0.778
0.100	0.910
0.120	0.985
0.150	1.071
0.170	1.110
0.200	1.147
0.240	1.168
0.300	1.180
0.400	1.170
0.500	1.121
0.750	1.066
1.000	0.958
1.500	0.644
2.000	0.466
3.000	0.278
4.000	0.185

Caltrans SDC (v 1.4, June 2006), Figure B.9,
Governing Fault: San Andreas/North Fault (Strike-Slip)
(Mw = 8.00, Soil Profile Type D, PBA = 0.45 g)
with the following modifications:
(1) No change of Sa for structural periods < 0.5 sec
(2) 20% increase of Sa for structural periods ≥ 1 sec
(3) Linear interpolation for structural periods between 0.5 and 1 sec

PARIKH CONSULTANTS, INC. **GEOTECHNICAL CONSULTANTS** **MATERIALS TESTING**	**HIGHWAY 1 HOV LANE WIDENING PROJECT** **CAPITOLA AVENUE OC (BR. NO. 36-0024)** **SANTA CRUZ COUNTY, CALIFORNIA**
	JOB NO.: 203132.PGR **PLATE NO.: 7I**

ARS DESIGN CURVE
ROUTE 1 HOV LANE WIDENING - BAY AVENUE UC
SANTA CRUZ COUNTY, CALIFORNIA



Spectral Data

Period (sec)	Spectral Accel. (g)
0.010	0.470
0.020	0.471
0.030	0.473
0.050	0.624
0.075	0.778
0.100	0.910
0.120	0.985
0.150	1.071
0.170	1.110
0.200	1.147
0.240	1.168
0.300	1.180
0.400	1.170
0.500	1.121
0.750	1.066
1.000	0.958
1.500	0.644
2.000	0.466
3.000	0.278
4.000	0.185

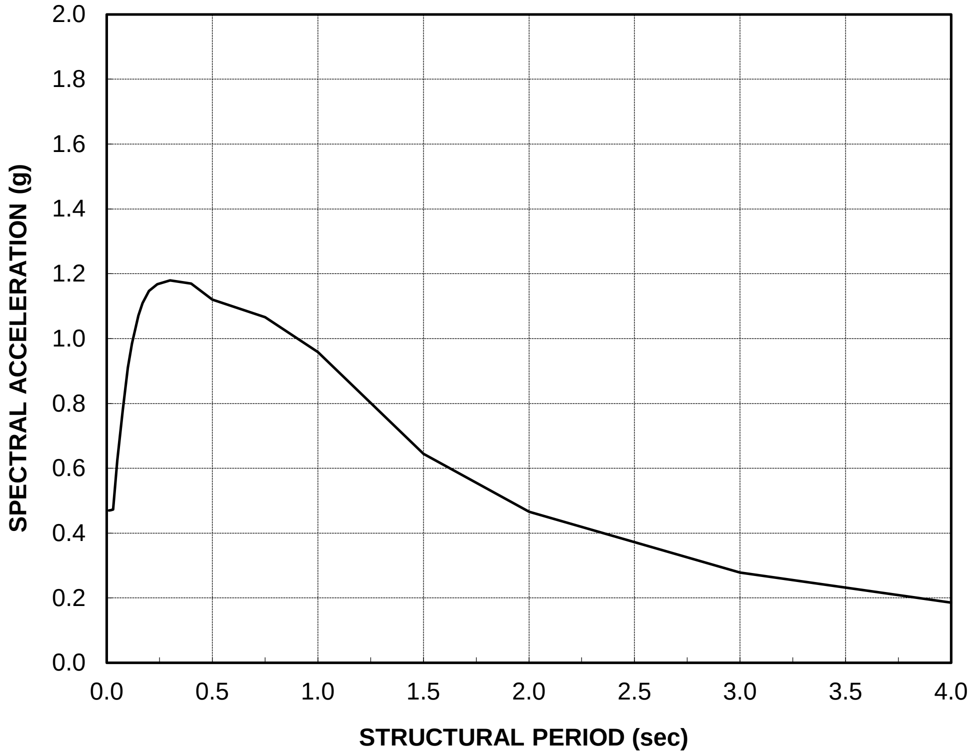
Caltrans SDC (v 1.4, June 2006), Figure B.9,
Governing Fault: San Andreas/North Fault (Strike-Slip)
(Mw = 8.00, Soil Profile Type D, PBA = 0.45 g)
with the following modifications:
(1) No change of Sa for structural periods < 0.5 sec
(2) 20% increase of Sa for structural periods ≥ 1 sec
(3) Linear interpolation for structural periods between 0.5 and 1 sec

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

HIGHWAY 1 HOV LANE WIDENING PROJECT
BAY AVENUE UC (BR. NO. 36-0036)
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR | PLATE NO.:7J

ARS DESIGN CURVE
ROUTE 1 HOV LANE WIDENING - SOQUEL CREEK BRIDGE
SANTA CRUZ COUNTY, CALIFORNIA



Spectral Data

Period (sec)	Spectral Accel. (g)
0.010	0.470
0.020	0.471
0.030	0.473
0.050	0.624
0.075	0.778
0.100	0.910
0.120	0.985
0.150	1.071
0.170	1.110
0.200	1.147
0.240	1.168
0.300	1.180
0.400	1.170
0.500	1.121
0.750	1.066
1.000	0.958
1.500	0.644
2.000	0.466
3.000	0.278
4.000	0.185

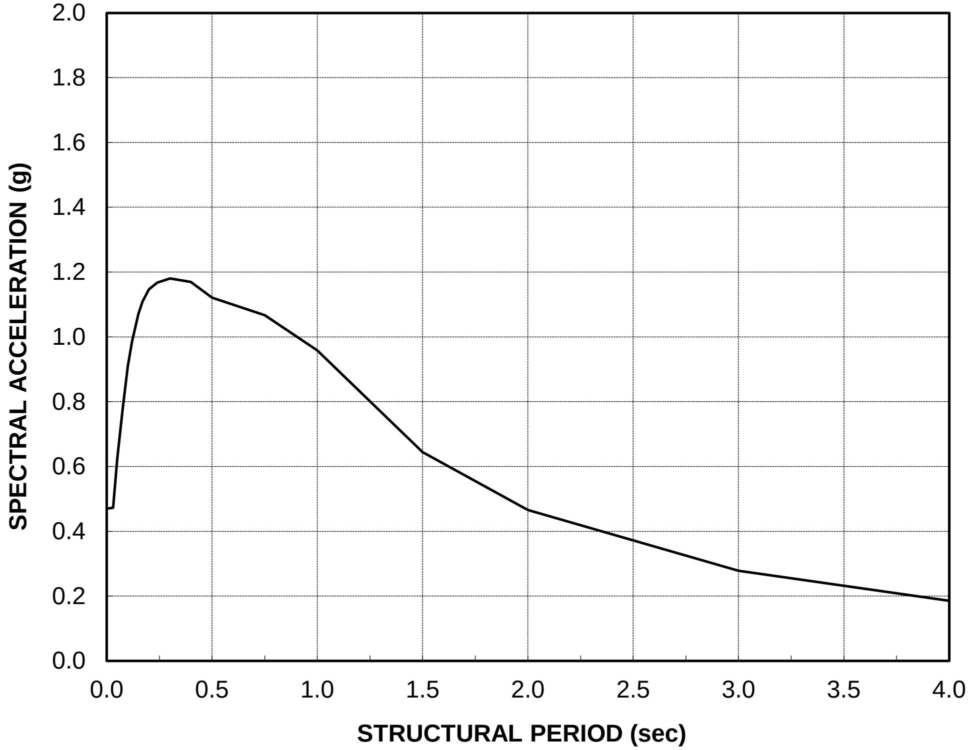
Caltrans SDC (v 1.4, June 2006), Figure B.9,
Governing Fault: San Andreas/North Fault (Strike-Slip)
(Mw = 8.00, Soil Profile Type D, PBA = 0.45 g)
with the following modifications:
(1) No change of Sa for structural periods < 0.5 sec
(2) 20% increase of Sa for structural periods ≥ 1 sec
(3) Linear interpolation for structural periods between 0.5 and 1 sec

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

HIGHWAY 1 HOV LANE WIDENING PROJECT
SOQUEL CREEK BRIDGE (BR. NO. 36-0013)
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	PLATE NO.: 7K

ARS DESIGN CURVE
ROUTE 1 HOV LANE WIDENING - 41ST AVENUE OC
SANTA CRUZ COUNTY, CALIFORNIA



Spectral Data

Period (sec)	Spectral Accel. (g)
0.010	0.470
0.020	0.471
0.030	0.473
0.050	0.624
0.075	0.778
0.100	0.910
0.120	0.985
0.150	1.071
0.170	1.110
0.200	1.147
0.240	1.168
0.300	1.180
0.400	1.170
0.500	1.121
0.750	1.066
1.000	0.958
1.500	0.644
2.000	0.466
3.000	0.278
4.000	0.185

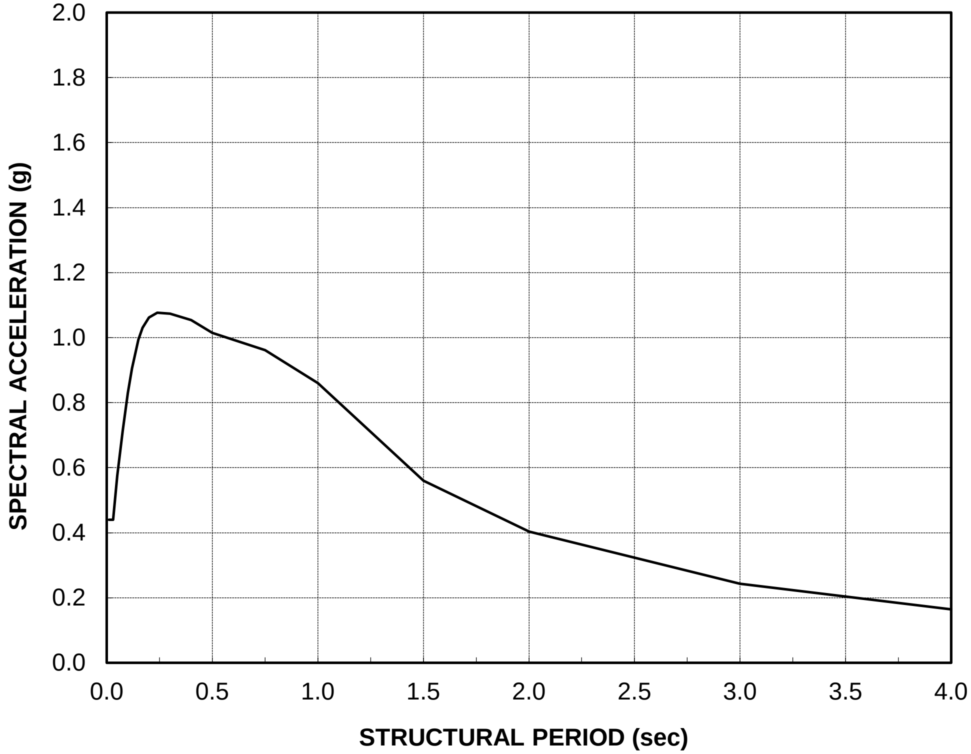
Caltrans SDC (v 1.4, June 2006), Figure B.9,
Governing Fault: San Andreas/North Fault (Strike-Slip)
(Mw = 8.00, Soil Profile Type D, PBA = 0.45 g)
with the following modifications:
(1) No change of Sa for structural periods < 0.5 sec
(2) 20% increase of Sa for structural periods $\geq$ 1 sec
(3) Linear interpolation for structural periods between 0.5 and 1 sec

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

HIGHWAY 1 HOV LANE WIDENING PROJECT
41ST AVENUE OC (BR. NO. 36-0086)
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	PLATE NO.:7L

ARS DESIGN CURVE
ROUTE 1 HOV LANE WIDENING - SOQUEL DRIVE OC
SANTA CRUZ COUNTY, CALIFORNIA



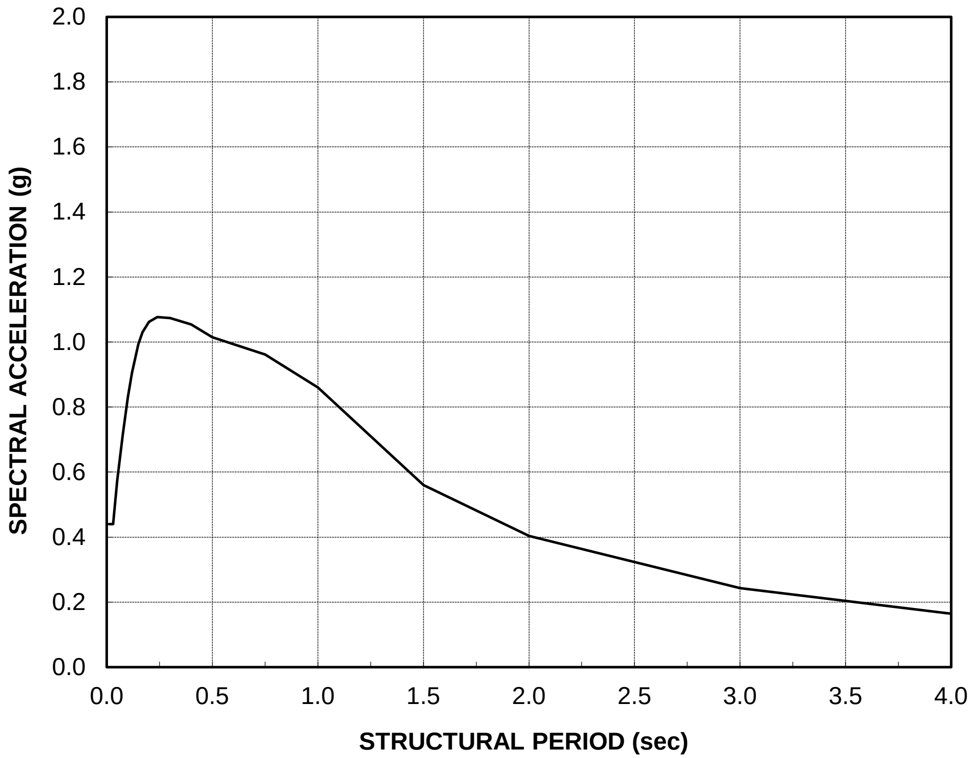
Spectral Data

Period (sec)	Spectral Accel. (g)
0.010	0.440
0.020	0.440
0.030	0.440
0.050	0.576
0.075	0.713
0.100	0.830
0.120	0.906
0.150	0.994
0.170	1.030
0.200	1.062
0.240	1.076
0.300	1.074
0.400	1.054
0.500	1.015
0.750	0.961
1.000	0.860
1.500	0.560
2.000	0.403
3.000	0.243
4.000	0.164

Caltrans SDC (v 1.4, June 2006), Figure B.9,
Governing Fault: San Andreas/North Fault (Strike-Slip)
(Mw = 8.00, Soil Profile Type D, PBA = 0.4 g)
with the following modifications:
(1) No change of Sa for structural periods < 0.5 sec
(2) 20% increase of Sa for structural periods $\geq$ 1 sec
(3) Linear interpolation for structural periods between 0.5 and 1 sec

PARIKH CONSULTANTS, INC. **GEOTECHNICAL CONSULTANTS** **MATERIALS TESTING**	**HIGHWAY 1 HOV LANE WIDENING PROJECT** **SOQUEL DRIVE OC (BR. NO. 36-0064)** **SANTA CRUZ COUNTY, CALIFORNIA**
JOB NO.: 203132.PGR	**PLATE NO.: 7M**

ARS DESIGN CURVE
ROUTE 1 HOV LANE WIDENING - LA FONDA AVENUE OC
SANTA CRUZ COUNTY, CALIFORNIA



Spectral Data

Period (sec)	Spectral Accel. (g)
0.010	0.440
0.020	0.440
0.030	0.440
0.050	0.576
0.075	0.713
0.100	0.830
0.120	0.906
0.150	0.994
0.170	1.030
0.200	1.062
0.240	1.076
0.300	1.074
0.400	1.054
0.500	1.015
0.750	0.961
1.000	0.860
1.500	0.560
2.000	0.403
3.000	0.243
4.000	0.164

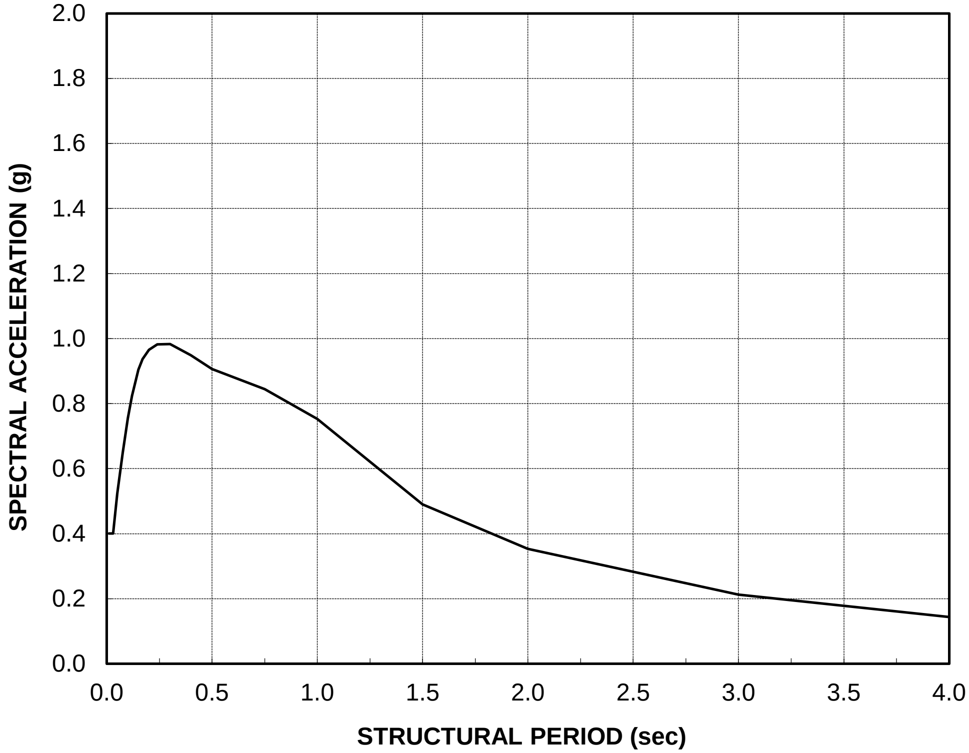
Caltrans SDC (v 1.4, June 2006), Figure B.9,
Governing Fault: San Andreas/North Fault (Strike-Slip)
(Mw = 8.00, Soil Profile Type D, PBA = 0.4 g)
with the following modifications:
(1) No change of Sa for structural periods < 0.5 sec
(2) 20% increase of Sa for structural periods ≥ 1 sec
(3) Linear interpolation for structural periods between 0.5 and 1 sec

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

HIGHWAY 1 HOV LANE WIDENING PROJECT
LA FONDA AVENUE OC (BR. NO. 36-0066)
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR | **PLATE NO.: 7N**

ARS DESIGN CURVE
ROUTE 1 HOV LANE WIDENING - MORRISSEY BLVD OC
SANTA CRUZ COUNTY, CALIFORNIA

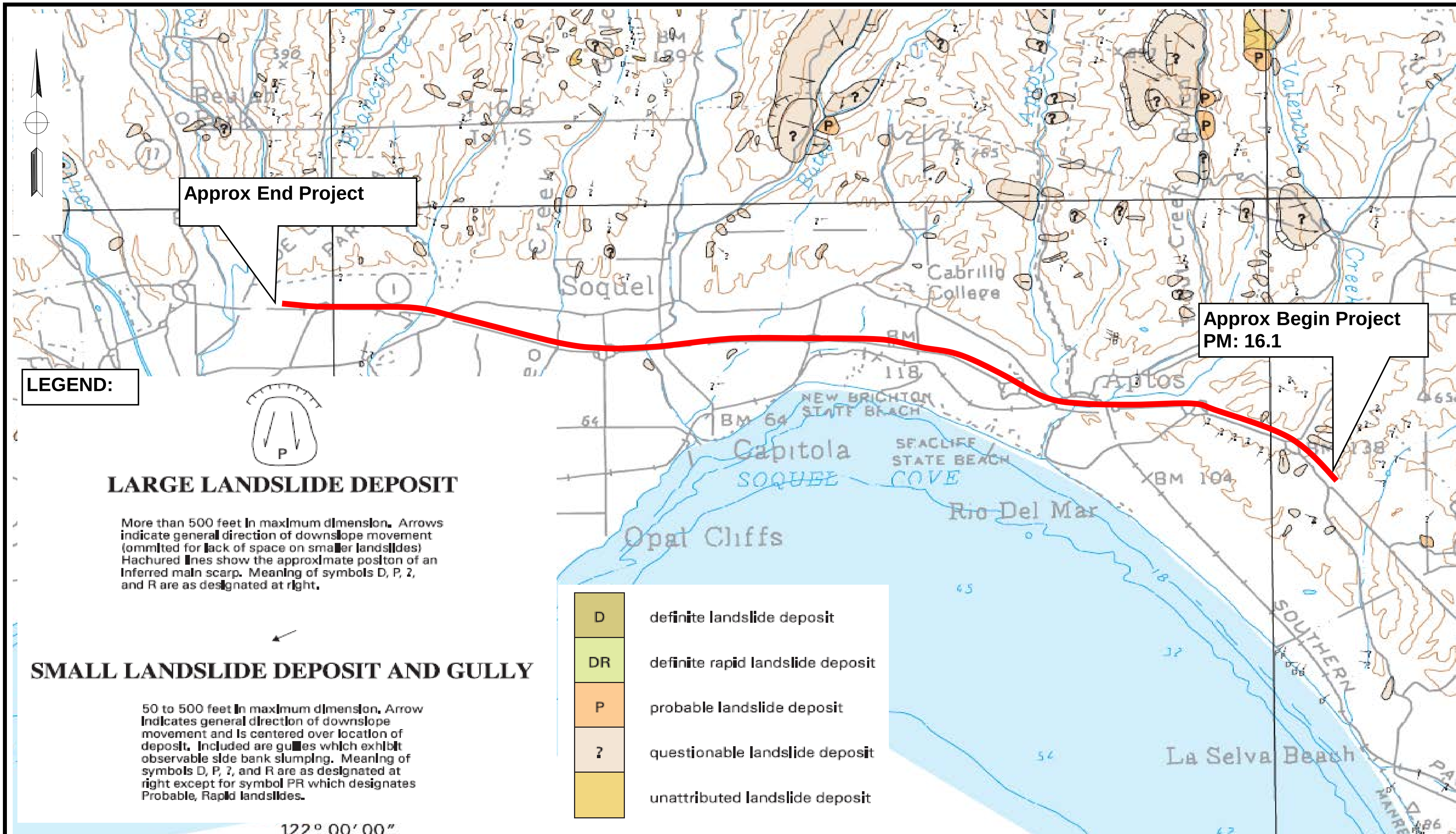


Spectral Data

Period (sec)	Spectral Accel. (g)
0.010	0.400
0.020	0.400
0.030	0.400
0.050	0.524
0.075	0.648
0.100	0.754
0.120	0.824
0.150	0.904
0.170	0.937
0.200	0.966
0.240	0.982
0.300	0.983
0.400	0.949
0.500	0.906
0.750	0.844
1.000	0.753
1.500	0.490
2.000	0.353
3.000	0.213
4.000	0.144

Caltrans SDC (v 1.4, June 2006), Figure B.6,
Governing Fault: San Andreas/North Fault (Strike-Slip)
(Mw = 8.00, Soil Profile Type C, PBA = 0.4 g)
with the following modifications:
(1) No change of Sa for structural periods < 0.5 sec
(2) 20% increase of Sa for structural periods $\geq$ 1 sec
(3) Linear interpolation for structural periods between 0.5 and 1 sec

PARIKH CONSULTANTS, INC. **GEOTECHNICAL CONSULTANTS** **MATERIALS TESTING**	**HIGHWAY 1 HOV LANE WIDENING PROJECT** **MORRISSEY BLVD OC (BR. NO. 36-0066)** **SANTA CRUZ COUNTY, CALIFORNIA**
JOB NO.: 203132.PGR	**PLATE NO.: 7O**



Source:
Preliminary map of Landslide deposits in Santa Cruz County, California, A digital map database, mapped by Cooper-Clark & Associates 1975

LAND SLIDE MAP

PARIKH CONSULTANTS, INC.
GEOTECHNICAL CONSULTANTS
MATERIALS TESTING

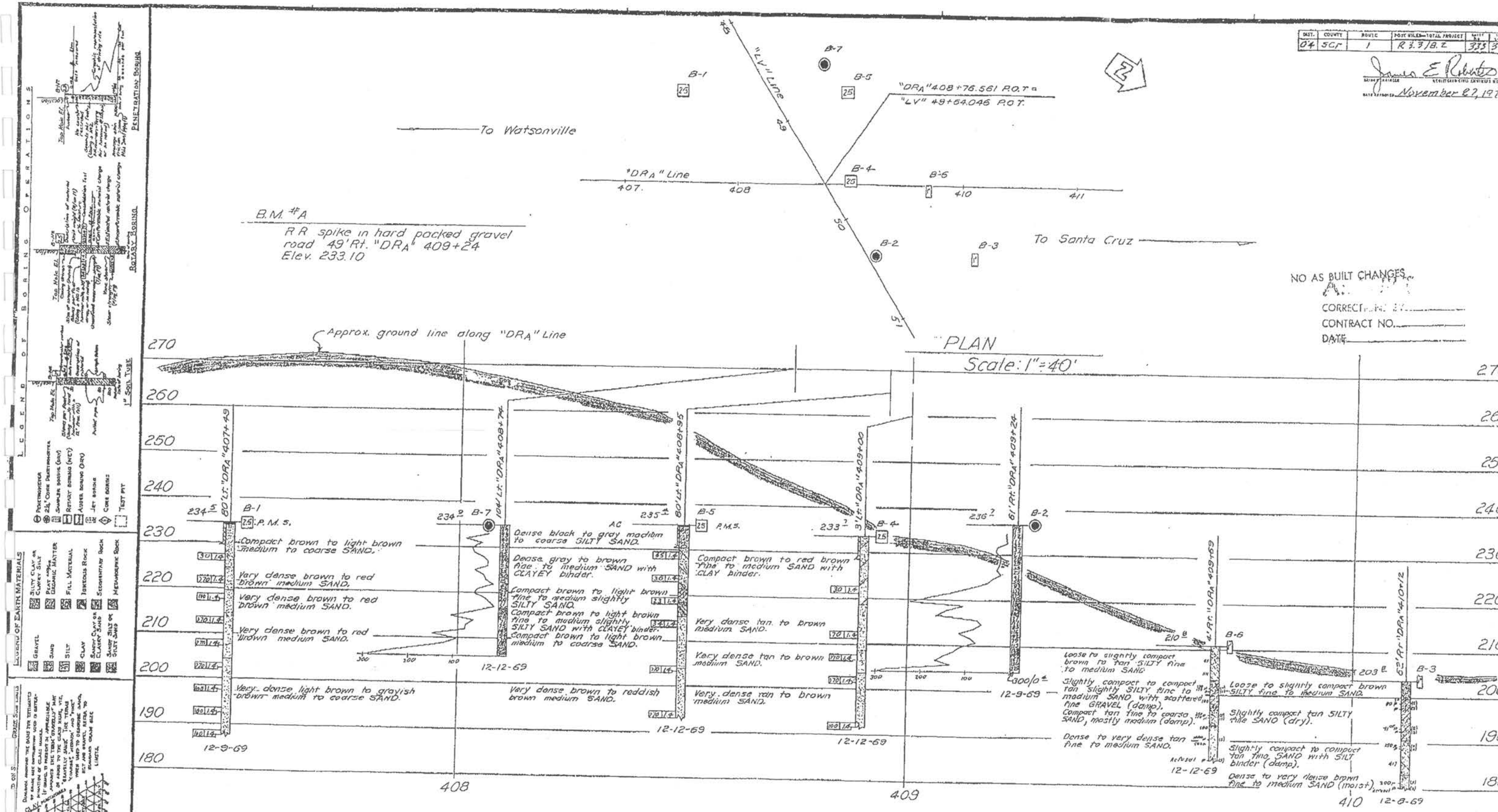
HIGHWAY 1 HOV LANE WIDENING PROJECT
0.4 MILES S. OF SAN ANDREAS/LARKIN VALLEY RD IC TO 0.3 MILES N. OF MORRISSEY BLVD IC
SANTA CRUZ COUNTY, CALIFORNIA

JOB NO.: 203132.PGR	PLATE NO.: 8

APPENDIX A

DIST.	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET	TOTAL SHEETS
04	SCr	1	R 3.3/8.2	333	335

James E. Roberts
November 27, 1972



NO AS BUILT CHANGES
CORRECTIONS BY
CONTRACT NO.
DATE

NO GROUND WATER ENCOUNTERED DURING THIS INVESTIGATION BY BRIDGE DEPT. GEOLOGY SECTION DATE Dec 1969

AS BUILT PLANS
Contract No. 04-165204
Date Completed 12-27-74
Document No. 40007726

NOTE: Classification of earth materials as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

LARKIN VALLEY ROAD UNDERCROSSING

LOG OF TEST BORINGS

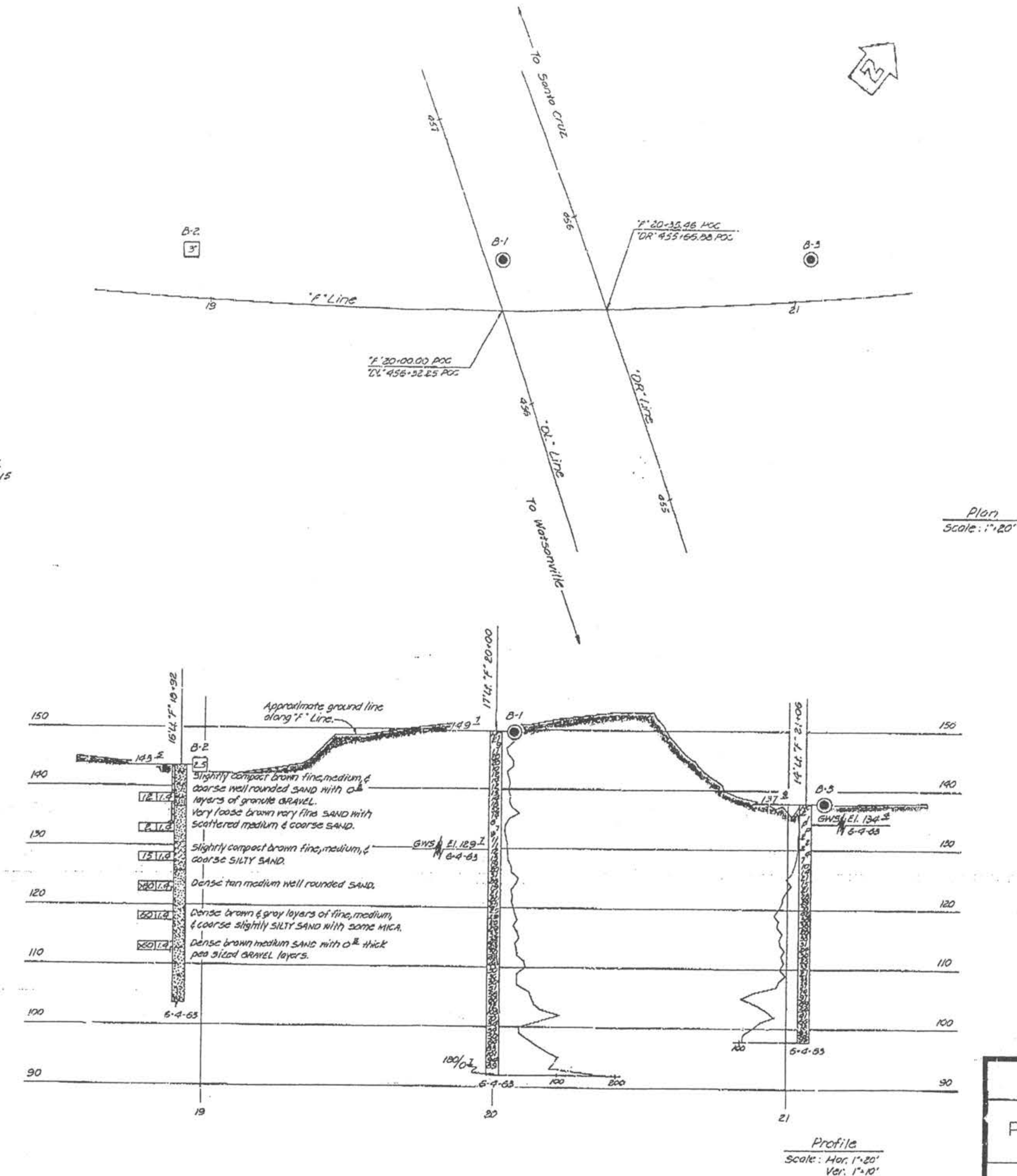
BRIDGE NO.	POST MILE	DRAWING NO.	SHEET	OF
36-94 R/L	7.7		13	13

WO 165201

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SCr	1	7.8/9.1	31	91

DESIGN SECTION SUPERVISOR — REGISTERED CIVIL ENGINEER NO.

DATE APPROVED February 3, 1969



AS BUILT PLANS
Contract No. 04-133854
Date Completed
Document No. 40001910

AS BUILT
CORRECTIONS BY
CONTRACT NO.
DATE

LEGEND OF BORINGS

LEGEND OF EARTH MATERIALS

CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

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.

STATE OF CALIFORNIA
TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

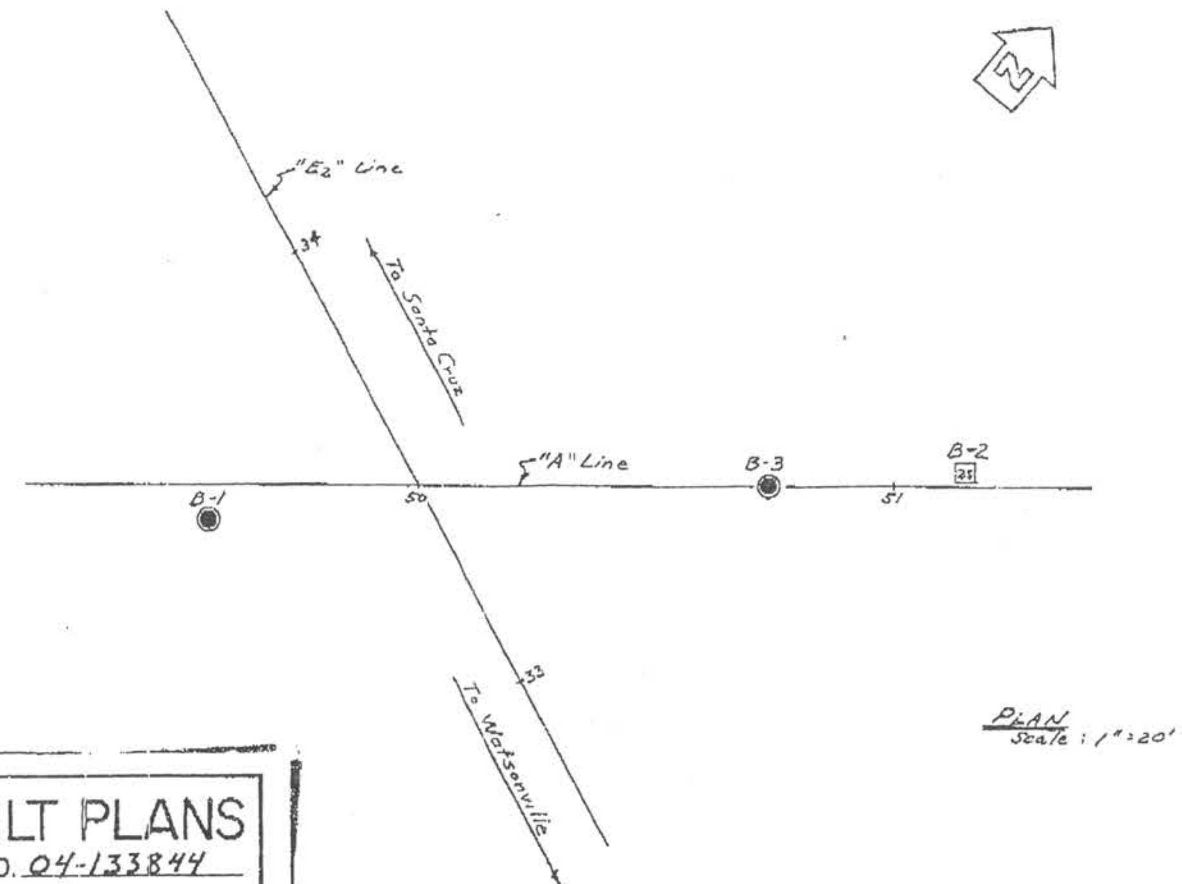
ROB ROY JUNCTION OVERCROSSING

LOG OF TEST BORINGS

BRIDGE NO.	POST MILE	DRAWING NO.	SHEET	OF
36-22	8.3	3622-70	13	13

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	SCr	1	98/102	95	86

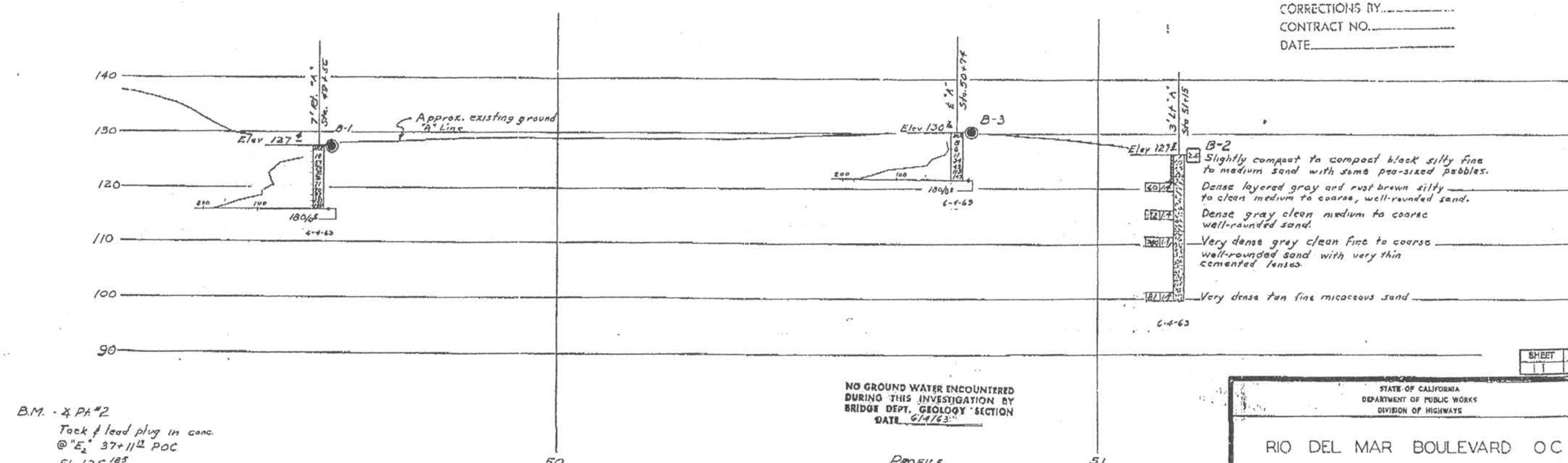
September 12, 1966



PLAN
Scale: 1" = 20'

AS BUILT PLANS
Contract No. 04-133844
Date Completed 2-8-68
Document No. 40000159

AS BUILT
CORRECTIONS BY
CONTRACT NO.
DATE



B.M. - ⊕ Pt. #2
Tack & lead plug in conc.
@ "E2" 37+11± POC
EL 125.185

PROFILE
Scale: 1" = 10'

NO GROUND WATER ENCOUNTERED DURING THIS INVESTIGATION BY BRIDGE DEPT. GEOLOGY SECTION
DATE 6/4/63

LEGEND OF BORINGS

PENETRATION BORING — ROTARY BORING — 1" SOIL TUBE

Penetrometer; 2½" Cone Penetrometer; Sampler Boring (Dry); Rotary Boring (Wet); Auger Boring (Dry); Jet Boring; Core Boring; Test Pit

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 Matter; Fill Material; Igneous Rock; Sedimentary Rock; Metamorphic Rock

CLASSIFICATION OF MATERIAL BASED ON STANDARD SIEVE

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.

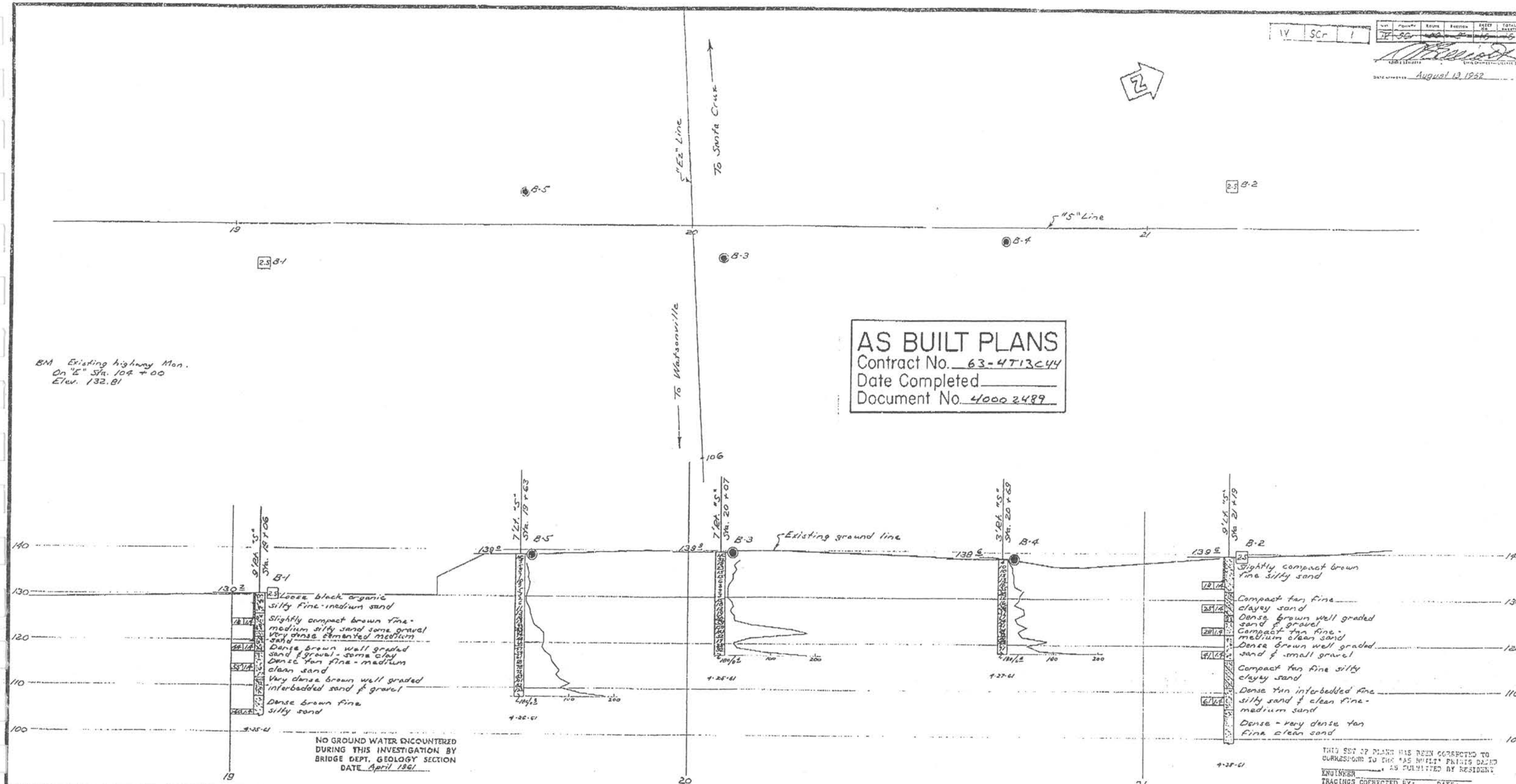
SHEET	OF
11	11

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

RIO DEL MAR BOULEVARD OC

LOG OF TEST BORINGS

SCALE As shown | BRIDGE 36-23 | FILE | DRAWING 3623-B



AS BUILT PLANS
Contract No. 63-4T13C44
Date Completed
Document No. 40002489

THIS SET OF PLANS HAS BEEN CORRECTED TO CORRESPOND TO THE "AS BUILT" PRINTS DATED ____ AS SUBMITTED BY RESIDENT ENGINEER ____
TRACINGS CORRECTED BY: ____ DATE: ____

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 SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

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 MATTER · FILL MATERIAL · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

PENETROMETER · 2¼" CONE PENETROMETER · SAMPLER BORING (DRY) · ROTARY BORING (WET) · AUGER BORING (DRY) · JET BORING · CORE BORING · TEST PIT

1" SOIL TUBE · ROTARY BORING · PENETRATION BORING

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.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

STATE PARK DRIVE O.C.

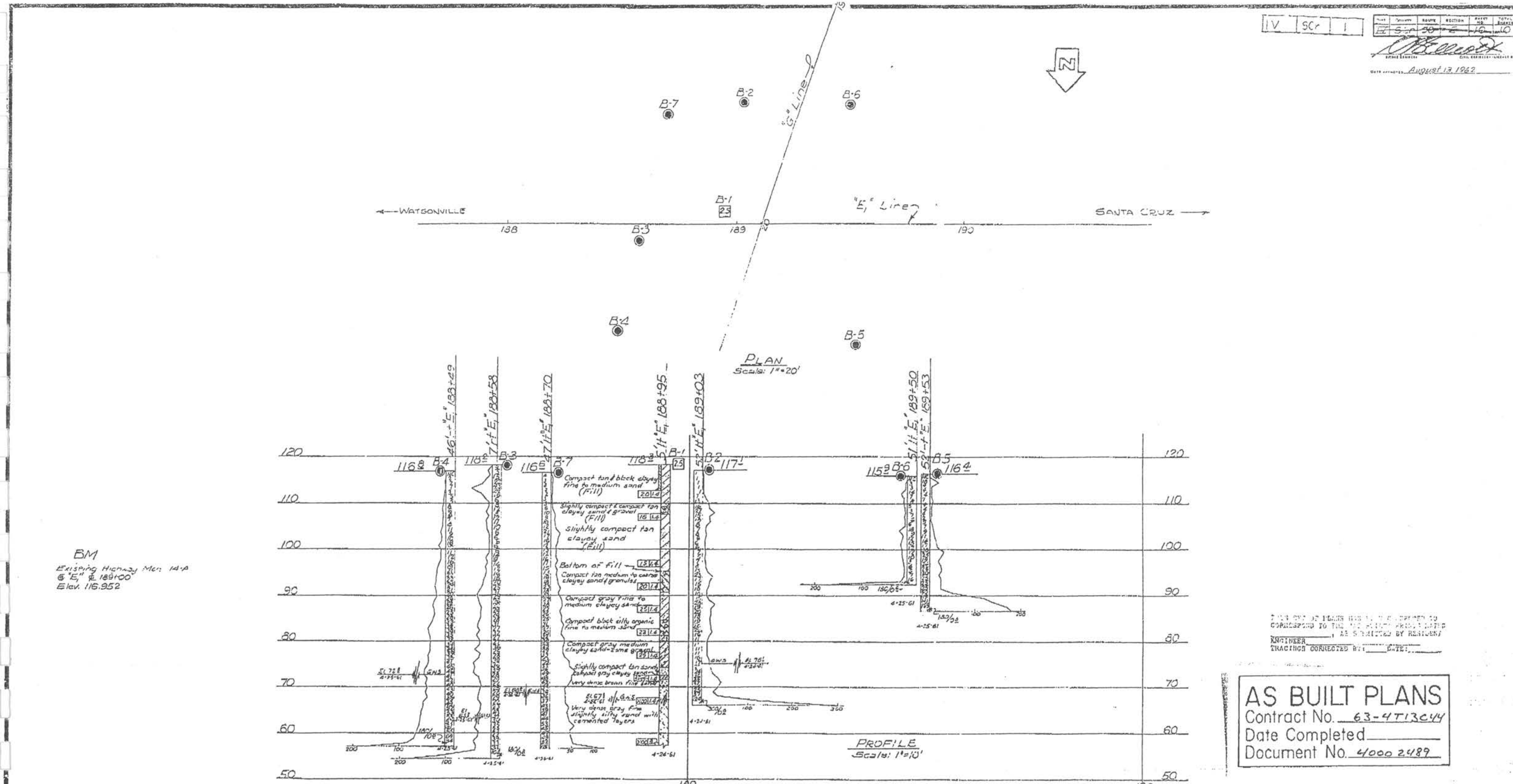
LOG OF TEST BORINGS

SCALE 1" = 10' | BRIDGE 36-28 | FILE | DRAWING 3628-16

PR-3628-5

PREL. DRAWING NO. P-3628-16

BRIDGE DEPARTMENT



Classification of Material Based on Standard Grade Size Limits

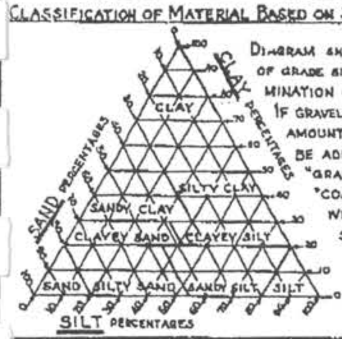


Diagram showing the basis for estimates of grade size distribution used in determination of class names.

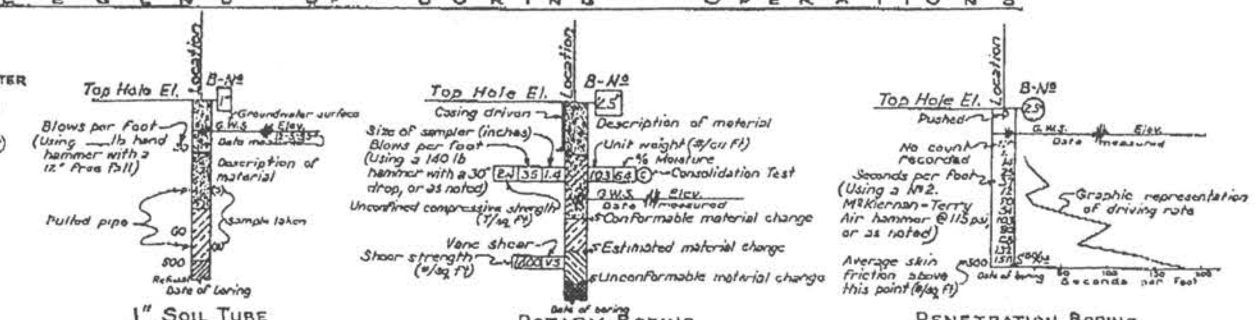
If gravel is present in appreciable amounts the term "gravelly" may be added to the class name, viz. "gravelly sand". The terms "coarse", "medium" and "fine" when used to describe sand, silt and gravel refer to standard grade size limits.

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 Matter
- Fill Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

Legend of Boring Operations

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



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.

THIS SET OF PLANS HAS BEEN CORRECTED TO CORRESPOND TO THE ... AS SUBMITTED BY RESIDENT ENGINEER ______
TRACINGS CORRECTED BY: ______ DATE: ______

AS BUILT PLANS
Contract No. 63-4T13C44
Date Completed ______
Document No. 4000 2489

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

PARK AVENUE UNDERCROSSING

LOG OF TEST BORINGS

SCALE As shown	BRIDGE 35-29 R/L	FILE	DRAWING C-3529-10

PREL. DRAWING NO. P3529-10

PR-3529-6 34

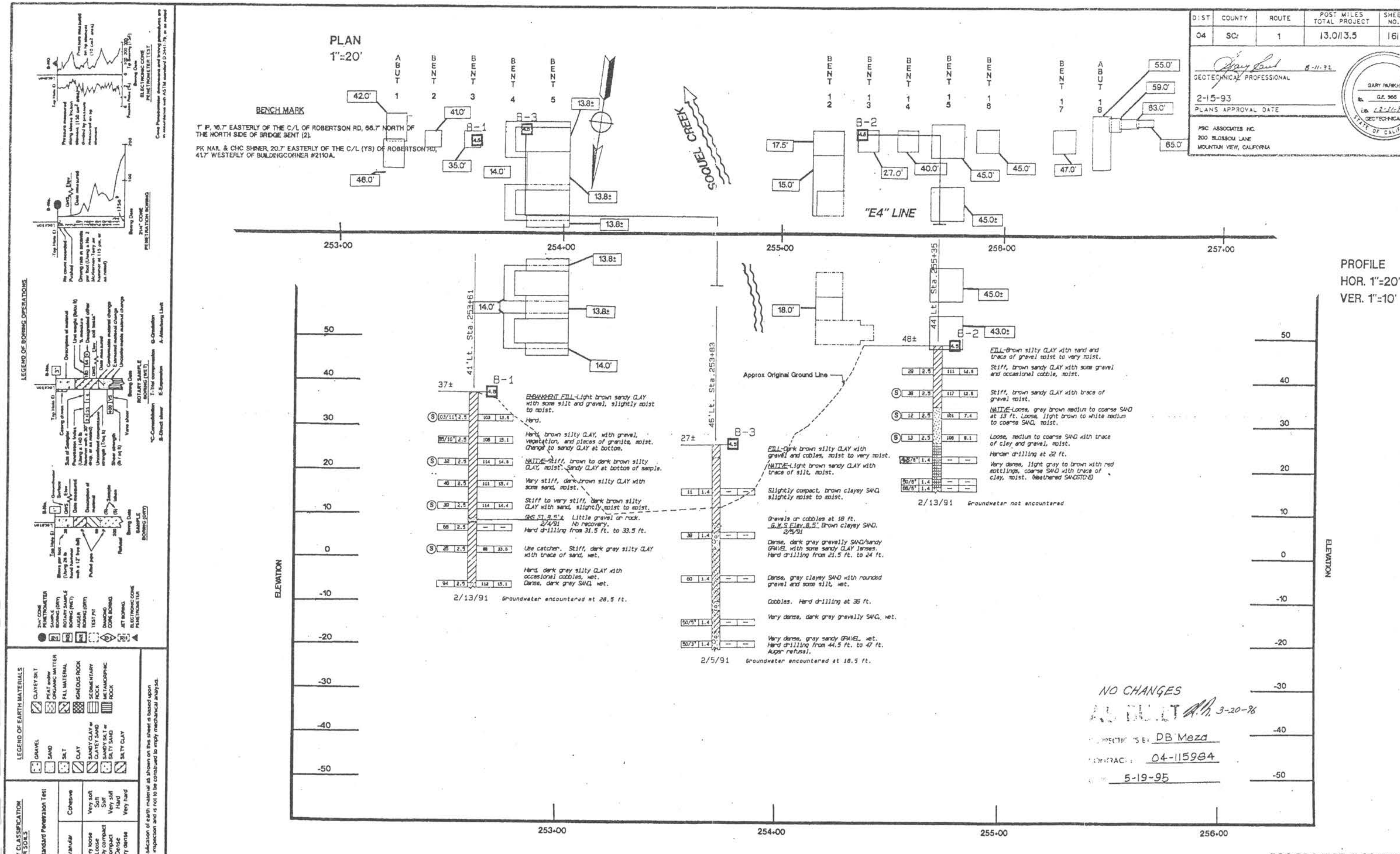
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SCr	1	13.0/13.5	161	168

GEOTECHNICAL PROFESSIONAL 8-11-92

2-15-93
PLANS APPROVAL DATE

PSC ASSOCIATES INC.
200 BLOSSOM LANE
MOUNTAIN VIEW, CALIFORNIA

GARY PARIKH
GE 566
12-31-93
GEOTECHNICAL
STATE OF CALIFORNIA



NO CHANGES
AS BUILT 3-20-96
CORRECTIONS BY DB Meza
CONTRACT 04-115984
5-19-95

PSC PROJECT # 89157.36

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.

DESIGN OVERSIGHT 8-20-92
DRAWN BY
CHECKED BY
FIELD INVESTIGATOR
DATE 7-29-91

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PROJECT ENGINEER

BRIDGE NO. 36-13
POST MILE 13.3

SOQUEL CREEK BRIDGE (WIDENING)

LOG OF TEST BORINGS

ORIGINAL SCALE IN INCHES FOR REDUCED PLANS
CU 04274
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES (PRELIMINARY STAGE ONLY)
SHEET OF

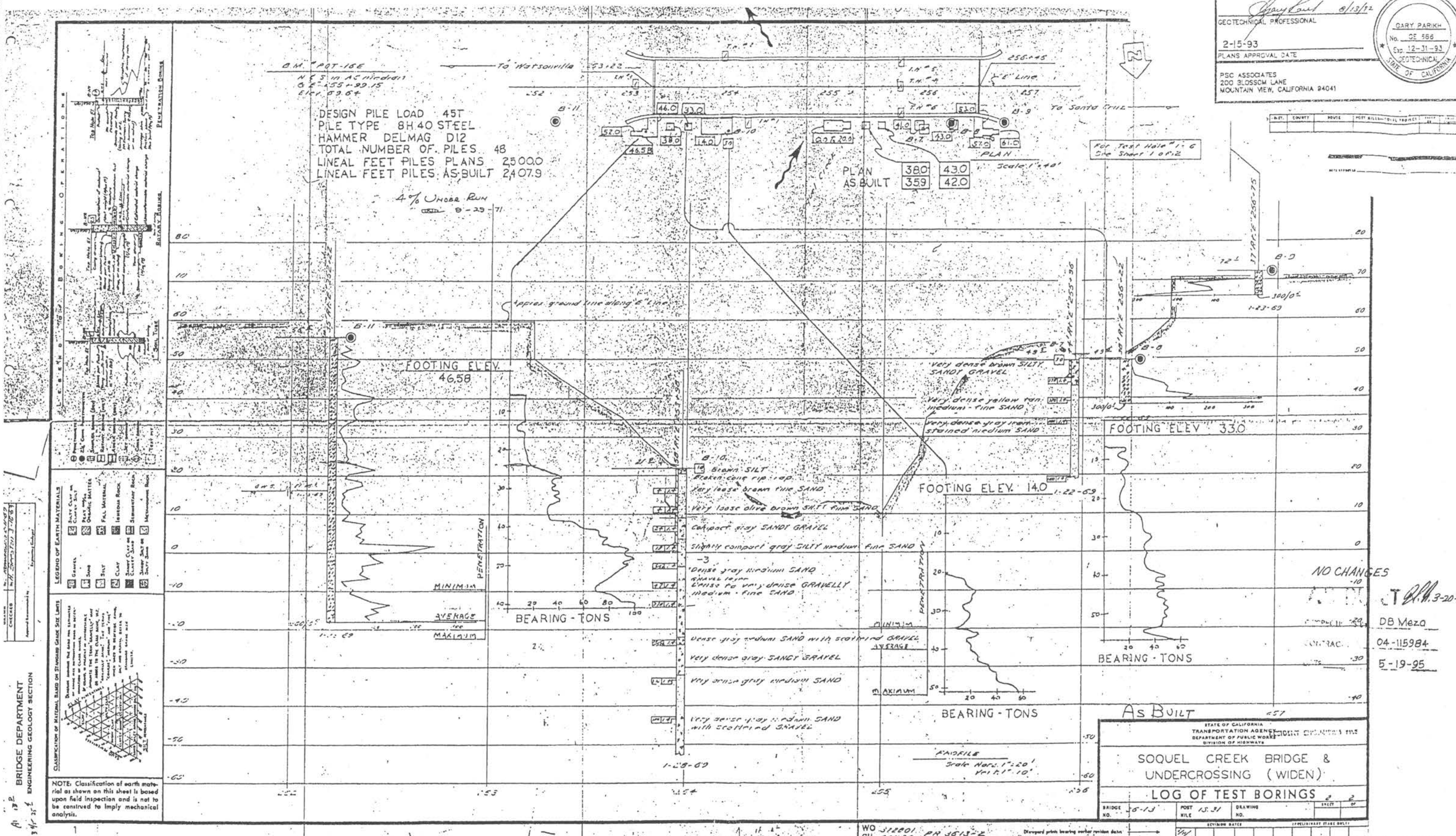
DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SCr	1	13.0/13.5	163	168

Gary Parikh 8/13/92
GEOTECHNICAL PROFESSIONAL

2-15-93
PLANS APPROVAL DATE

PSC ASSOCIATES
200 BLOSSOM LANE
MOUNTAIN VIEW, CALIFORNIA 94041

GARY PARIKH
No. GE 566
Exp. 12-31-93
GEOTECHNICAL
STATE OF CALIFORNIA



NOTE:
ADDITIONAL AS-BUILT FOUNDATION DATA MAY BE AVAILIABLE AT THE OFFICE OF TRANSPORTATION MATERIALS AND RESEARCH 5900 FOLSOM BOULEVARD SACRAMENTO, CALIFORNIA 95819.

DESIGN OVERSIGHT: 8-20-92

DESIGN	BY	CHECKED
DETAILS	BY	CHECKED
QUANTITIES	BY	CHECKED

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PROJECT ENGINEER

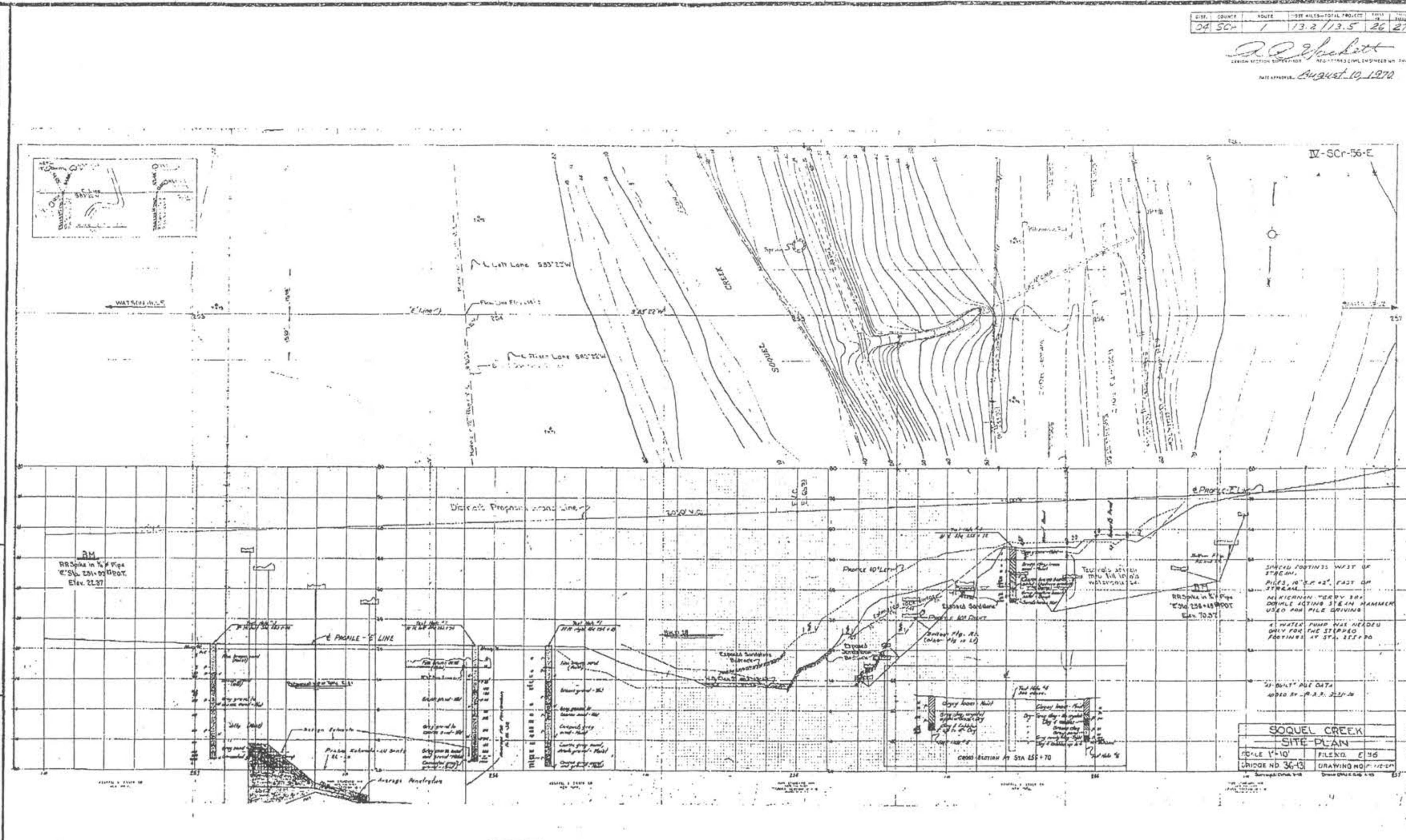
BRIDGE NO. 36-13
POST MILE 13.3

SOQUEL CREEK BRIDGE (WIDENING)
AS-BUILT LOG OF TEST BORINGS NO. 2

CU 04274
ORIGINAL SCALE IN INCHES
DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES (PRELIMINARY STAGE ONLY)
SHEET 22 OF 22

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET	TOTAL SHEETS
04	SCr	1	13.2/13.5	26	27

August 10, 1970



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.

BRIDGE DEPARTMENT
ENGINEERING GEOLOGY SECTION

26

CONTRACT PLANS
Contract No. 04-372804
Document No. 40001919

STATE OF CALIFORNIA
TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

SOQUEL CREEK BRIDGE (WIDENING)

LOG OF TEST BORINGS NO. 1

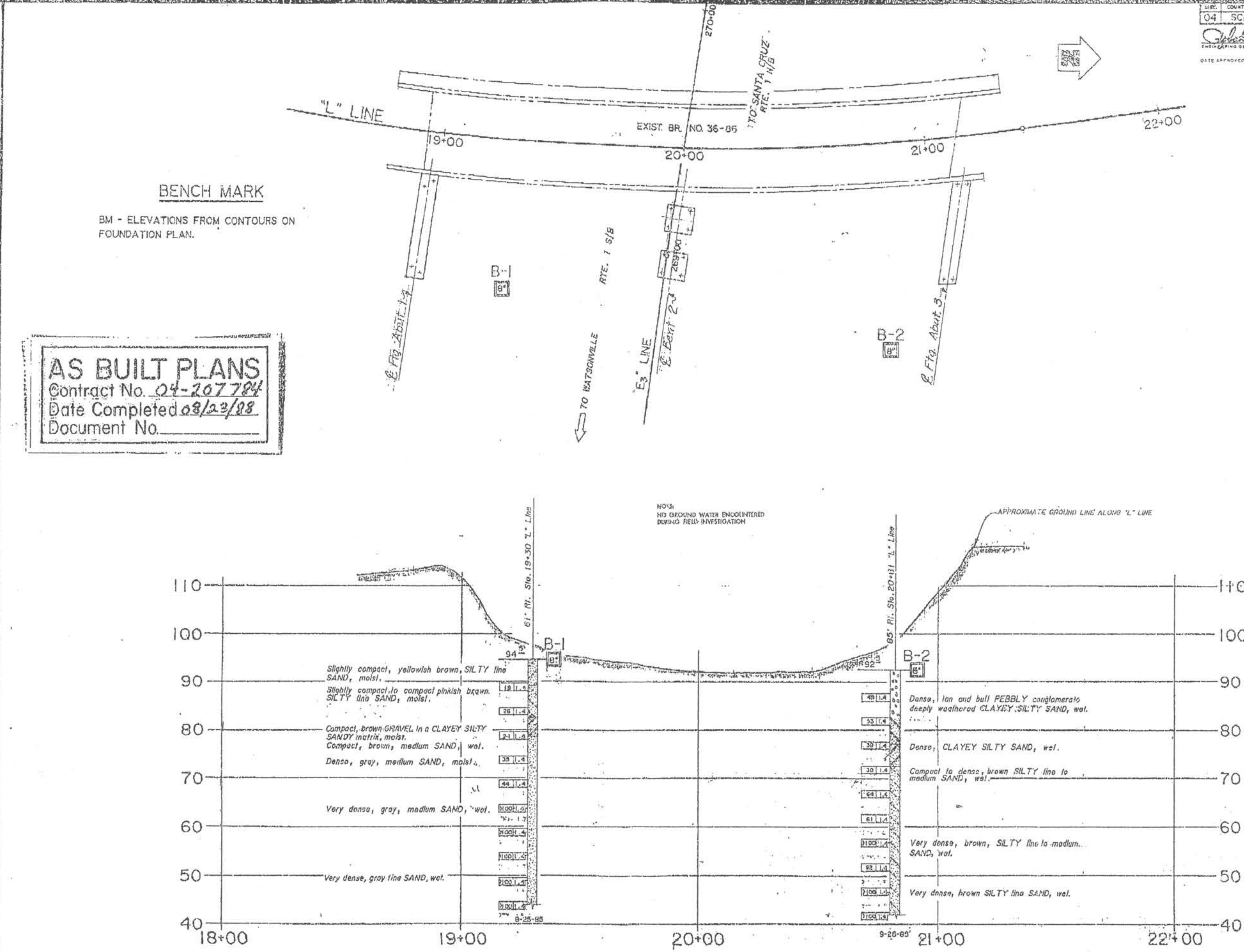
BRIDGE NO. 36-13 DRAWING NO. 3613-19

WO 372801
CU 04220

DIST.	COUNTY	ROUTE	POST MILES—TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SCr	1	13.3/13.8	61	62

ENGINEERING GEOLOGIST — CERTIFIED ENGINEERING GEOLOGIST NUMBER #165

DATE APPROVED May 26, 1987



AS BUILT PLANS
Contract No. 04-207784
Date Completed 08/23/88
Document No. ______

NO AS BUILT CHANGES
AS BUILT M.L. 9-9-88
CORRECTIONS BY M. Chapman
CONTRACT NO. 04-207784
DATE 8-23-88

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.

GEOTECHNICAL BRANCH - TRANSPORTATION LABORATORY		
DRAWN BY	Laony L. Lopez	10/85
CHECKED BY		

State of CALIFORNIA DEPARTMENT OF TRANSPORTATION

STRUCTURES - DESIGN

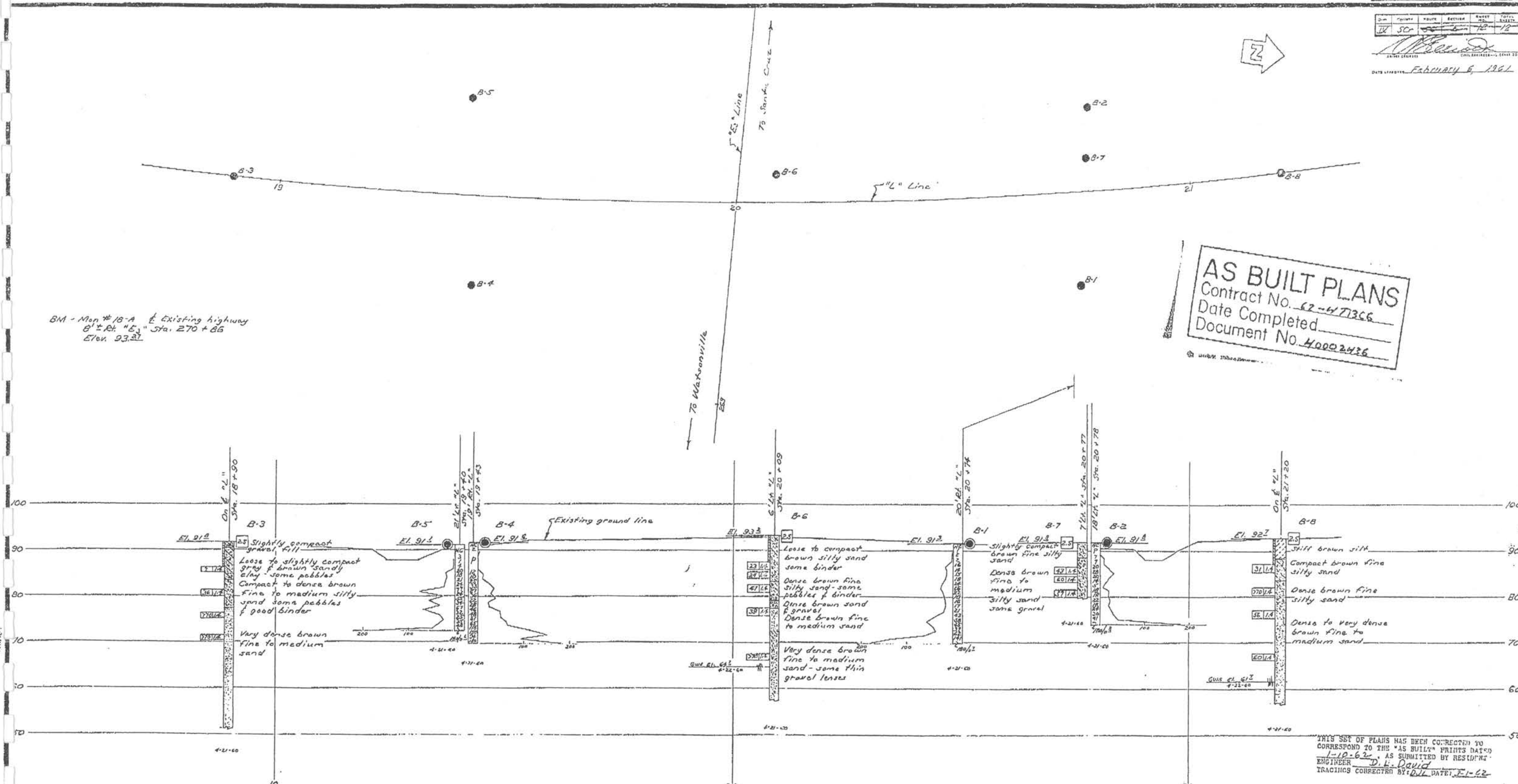
BRIDGE NO. 36-86
POST MILE 13.6

41st AVENUE OVERCROSSING (WIDEN)

LOG OF TEST BORINGS 1 OF 2

DIST	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	SCr	5		12	12

DATE APPROVED February 6, 1961



CLASSIFICATION OF MATERIAL BASED ON STANDARD GRADE SIZE LIMITS

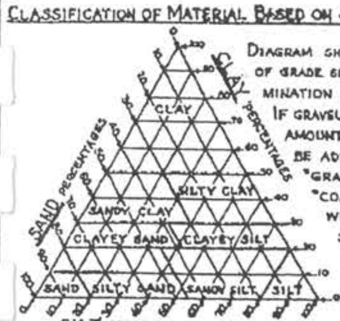


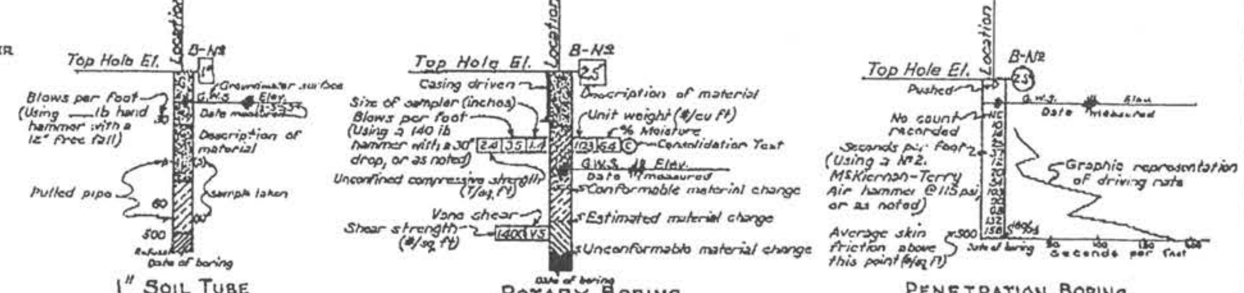
DIAGRAM SHOWING THE BASIS FOR ESTIMATES OF GRADE SIZE DISTRIBUTION USED IN DETERMINATION OF CLASS NAMES.
IF GRAVEL IS PRESENT IN APPRECIABLE AMOUNTS THE TERM "GRAVELLY" MAY BE ADDED TO THE CLASS NAME, VIZ. "GRAVELLY SAND." THE TERMS "COARSE", "MEDIUM" AND "FINE" WHEN USED TO DESCRIBE SAND, SILT AND GRAVEL REFER TO STANDARD GRADE SIZE LIMITS.

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 MATTER
- FILL MATERIAL
- IGNEOUS ROCK
- SEDIMENTARY ROCK
- METAMORPHIC ROCK

LEGEND OF BORING OPERATIONS

- PLAN OF ANY BORING
- PENETROMETER
- 2½" CONE PENETROMETER
- SAMPLER BORING (DRY)
- ROTARY BORING (WET)
- AUGER BORING (DRY)
- JET BORING
- CORE BORING
- TEST PIT



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.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

41ST AVENUE OVERCROSSING

LOG OF TEST BORINGS

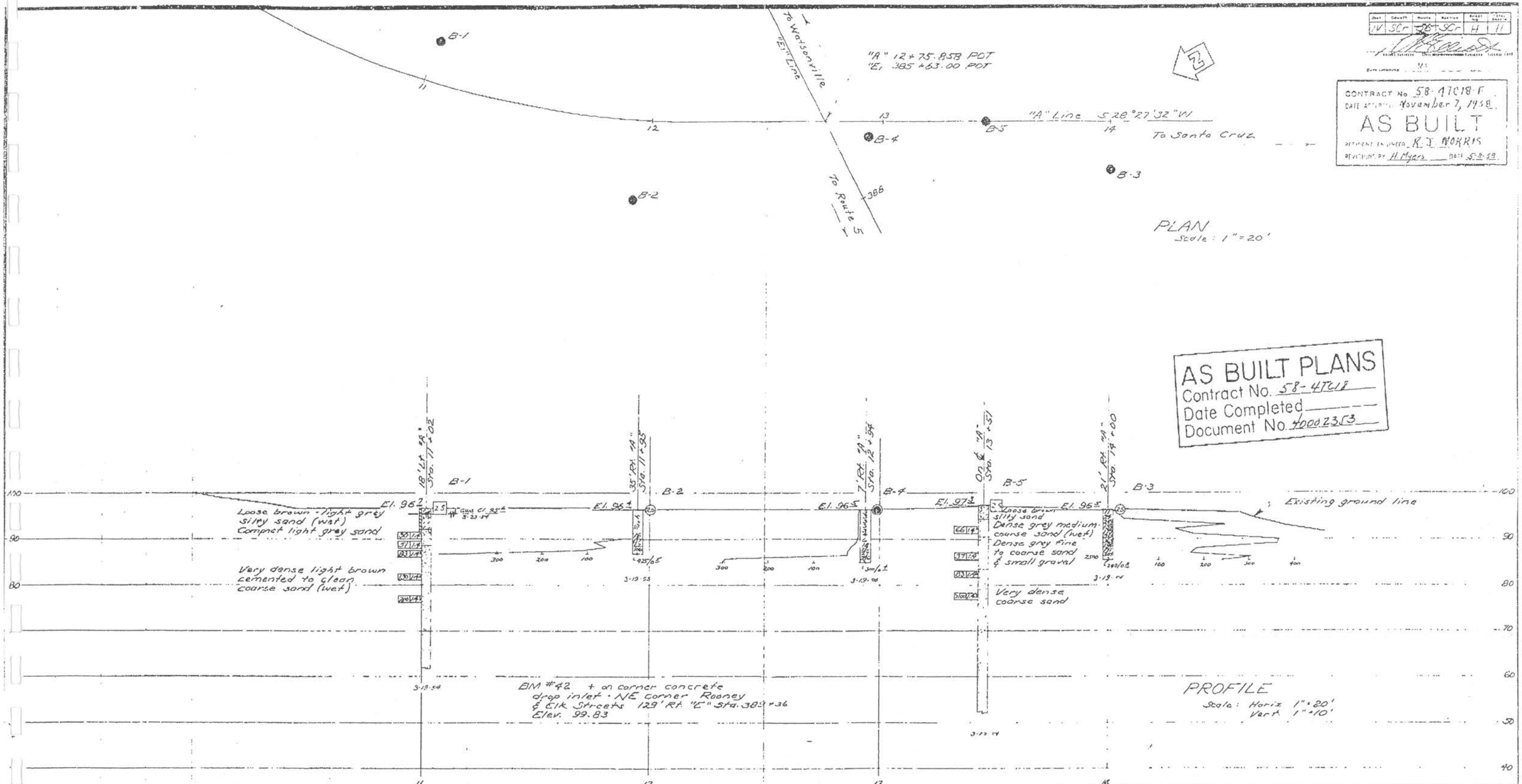
SCALE 1" = 10' | BRIDGE 36-86 | FILE | DRAWING C-6947-12

U-0401(2)

7	CAL.		116 157

IV	SCr	56 SCr	H	11	

CONTRACT No. 58-4TC18-F
DATE ACCEPTED November 7, 1958
AS BUILT
RESIDENT ENGINEER R. I. NORRIS
REVISIONS BY H. Myers DATE 5-8-59



AS BUILT PLANS
Contract No. 58-4TC18
Date Completed
Document No. 40002353

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 sand, silt and gravel refer to standard grade size limits.

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 Matter
- Fill Material
- Igneous Rock
- Sedimentary Rock
- Metamorphic Rock

LEGEND OF BORING OPERATIONS

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

1" Soil Tube

Rotary Boring

Penetration Boring

NOTES

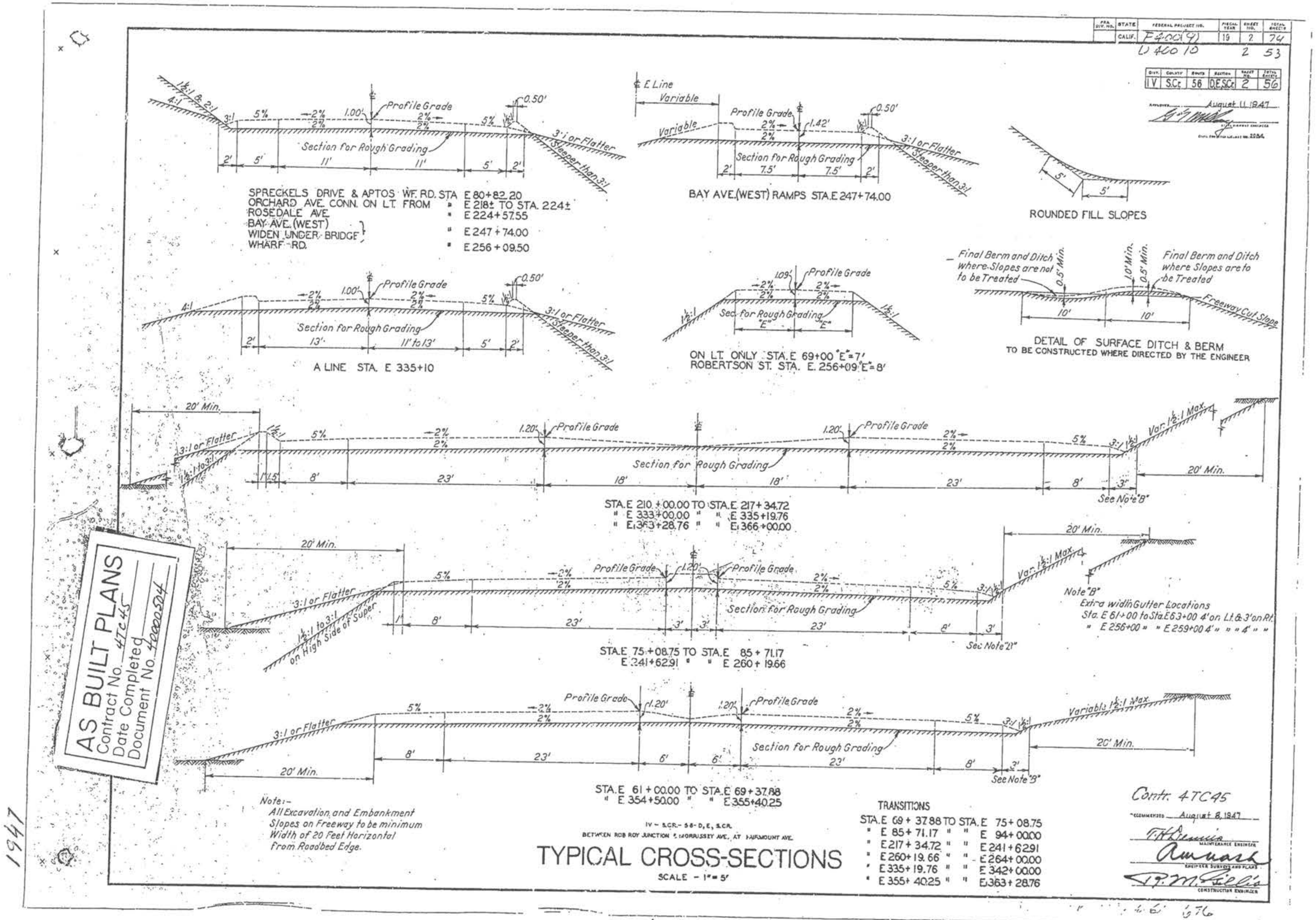
The contractor's attention is directed to Section 2, Article (c) of the Standard Specifications and to the Special Provisions accompanying this set of plans.
Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

MORRISSEY AVE. O.C.

LOG OF TEST BORINGS

SCALE As Noted | BRIDGE 36-66 | FILE | DRAWING


CALIF. F400(4) 19 2 74
U 400 10 2 53
IV SCr 56 DESCr 2 56
August 11 1947
Profile Grade
Section for Rough Grading
3:1 or Flatter
Steeper than 3:1
SPRECKELS DRIVE & APTOS WF. RD. STA E 80+82.20
ORCHARD AVE. CONN. ON LT. FROM " E 218± TO STA. 224±
ROSEDALE AVE " E 224+57.55
BAY AVE. (WEST) " E 247+74.00
WIDEN UNDER BRIDGE
WHARF RD. " E 256+09.50
E Line
Variable
BAY AVE.(WEST) RAMPS STA.E 247+74.00
ROUNDED FILL SLOPES
A LINE STA. E 335+10
ON LT. ONLY STA. E 69+00 "E"=7'
ROBERTSON ST. STA. E. 256+09 "E"=8'
Final Berm and Ditch where Slopes are not to be Treated
Final Berm and Ditch where Slopes are to be Treated
Freeway Cut Slope
DETAIL OF SURFACE DITCH & BERM
TO BE CONSTRUCTED WHERE DIRECTED BY THE ENGINEER
20' Min.
Var. 1½:1 Max.
See Note "B"
STA.E 210+00.00 TO STA.E 217+34.72
" E 333+00.00 " " E 335+19.76
" E 363+28.76 " " E 366+00.00
1½:1 to 3:1 on High Side of Super
Note "B"
Extra width Gutter Locations
Sta. E 61+00 to Sta. E 63+00 4' on Lt. & 3' on Rt.
" E 256+00 " " E 259+00 4' " " " 4' " "
STA.E 75+08.75 TO STA.E 85+71.17
E 241+62.91 " " E 260+19.66
Variable 1½:1 Max.
STA.E 61+00.00 TO STA.E 69+37.88
" E 354+50.00 " " E 355+40.25
Note:-
All Excavation and Embankment Slopes on Freeway to be minimum Width of 20 Feet Horizontal From Roadbed Edge.
IV - S.CR. - 56 - D, E, S.CR.
BETWEEN ROB ROY JUNCTION & MORRISSEY AVE. AT FAIRMOUNT AVE.
TYPICAL CROSS-SECTIONS
SCALE - 1" = 5'
TRANSITIONS
STA.E 69+37.88 TO STA.E 75+08.75
" E 85+71.17 " " E 94+00.00
" E 217+34.72 " " E 241+62.91
" E 260+19.66 " " E 264+00.00
" E 335+19.76 " " E 342+00.00
" E 355+40.25 " " E 363+28.76
Contr. 4TC45
August 8, 1947
MAINTENANCE ENGINEER
ENGINEER SURVEYS AND PLANS
CONSTRUCTION ENGINEER
AS BUILT PLANS
Contract No. 4TC45
Date Completed
Document No. 40000504
1947

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SCr	1	13.0/13.5	129	168

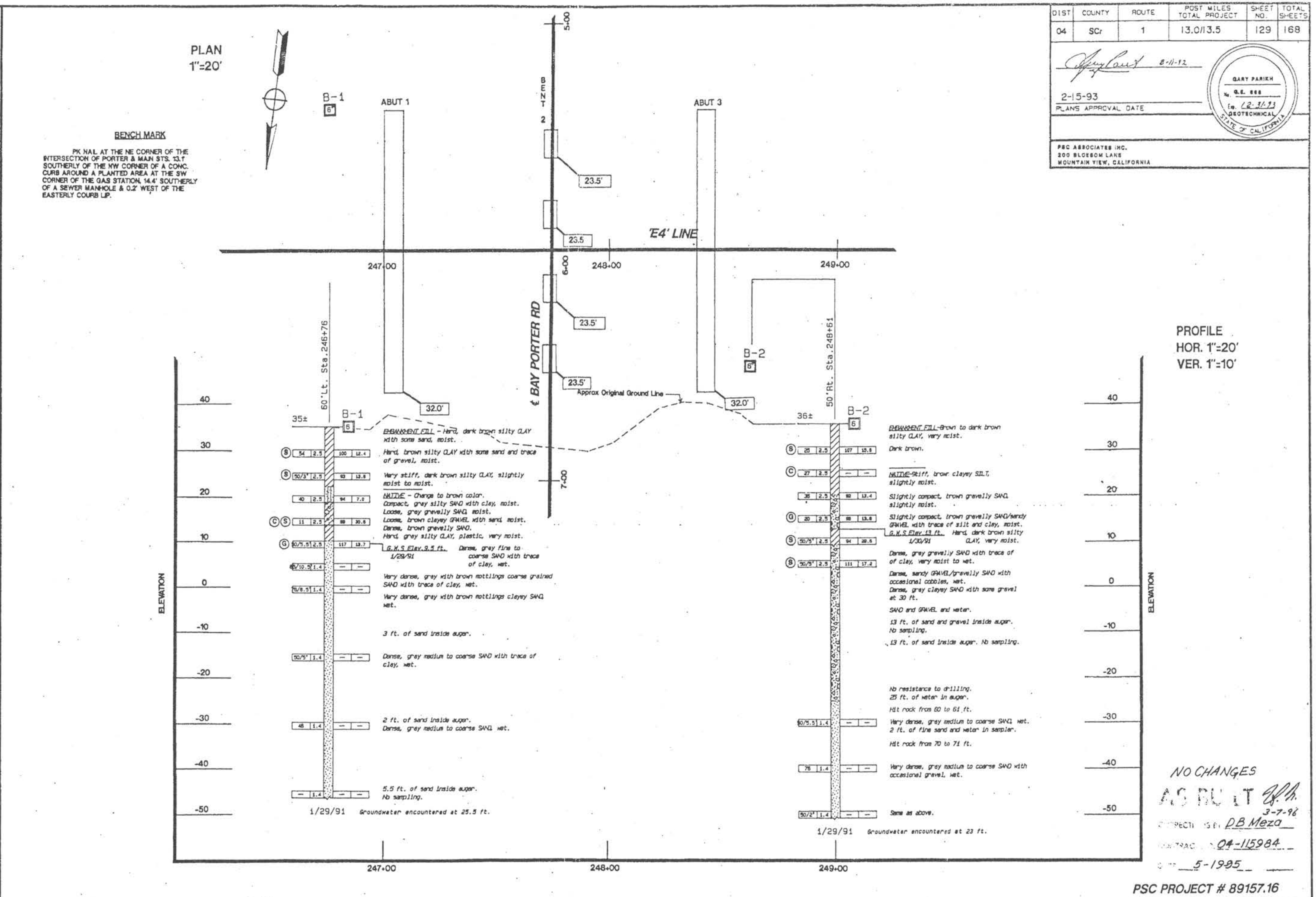
8-11-92

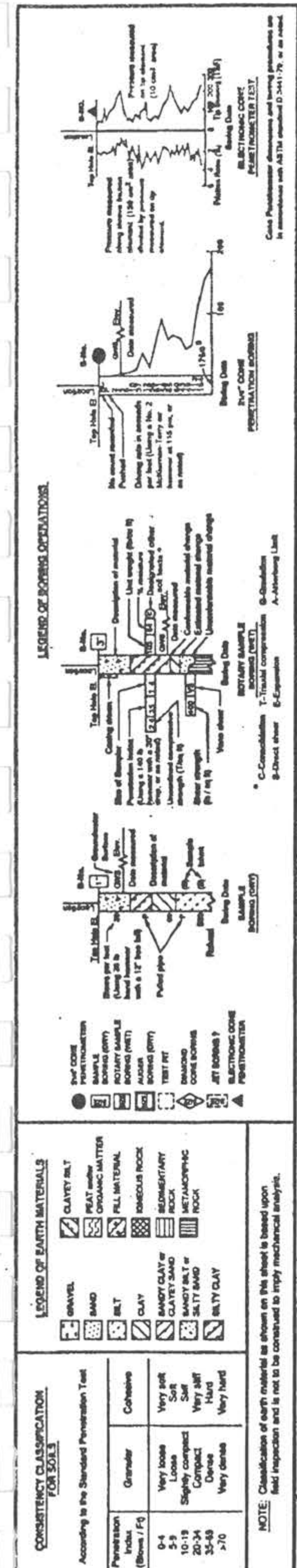
2-15-93

PLANS APPROVAL DATE

GARY PARIKH G.E. 666 Exp. 12-31-93 GEOTECHNICAL STATE OF CALIFORNIA

PSC ASSOCIATES INC.
200 BLOSSOM LANE
MOUNTAIN VIEW, CALIFORNIA





NO CHANGES

AS BUILT

3-7-96

CORRECTIONS BY DB Meza

CONTRACT NO. 04-115984

DATE 5-1995

PSC PROJECT # 89157.16

CALTRANS STRUCTURES PROJECT REVIEWER 8-20-92	DRAWN BY / CHECKED BY	FIELD INVESTIGATOR Date 7-29-91	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	PROJECT ENGINEER

BRIDGE NO. 36-36

POST MILE 13.20

BAY AVENUE UNDERCROSSING (REPLACE)

LOG OF TEST BORINGS

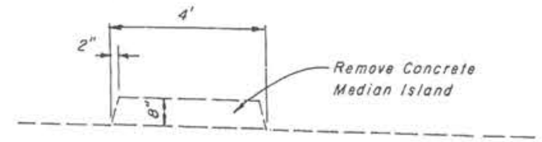
ORIGINAL SCALE IN INCHES

CU 04274

DISREGARD PRINTS BEARING

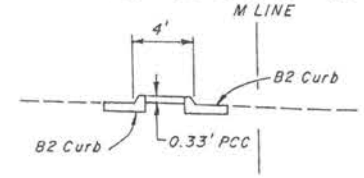
REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

04 | SCr | 1 | 15.8 | 2 | 12
12/3/90
2-11-91
U.P. PEREZ
29589
3/31/91



TYPICAL PCC MEDIAN ISLAND ON STRUCTURE

M 13 + 60 to M 15 + 35



PCC MEDIAN ISLAND SURFACING

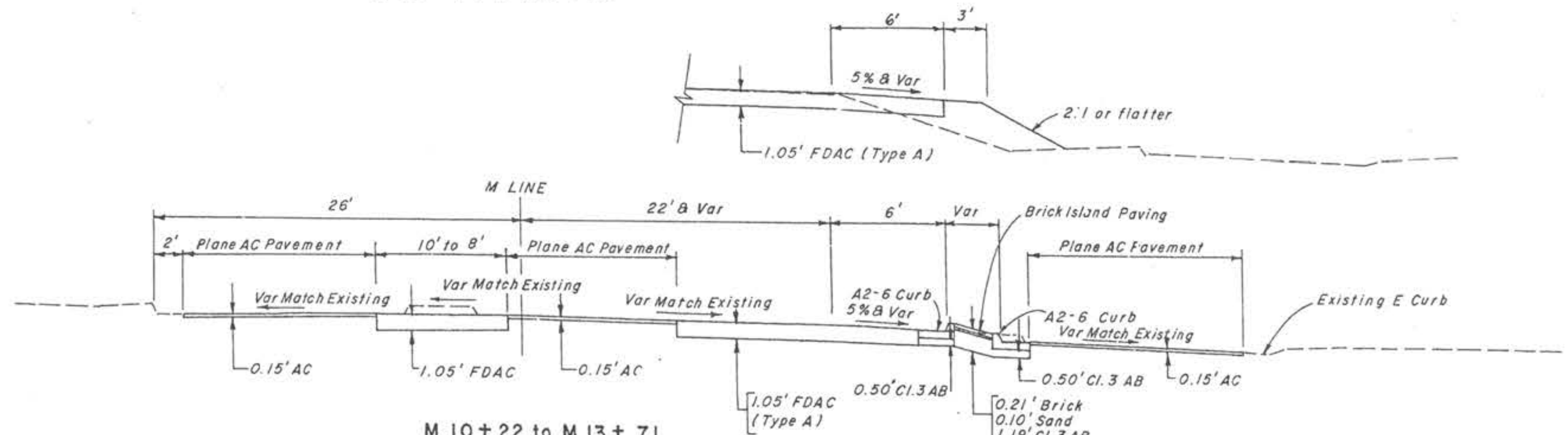
M 15 + 44 to M 15 + 53

ABBREVIATIONS

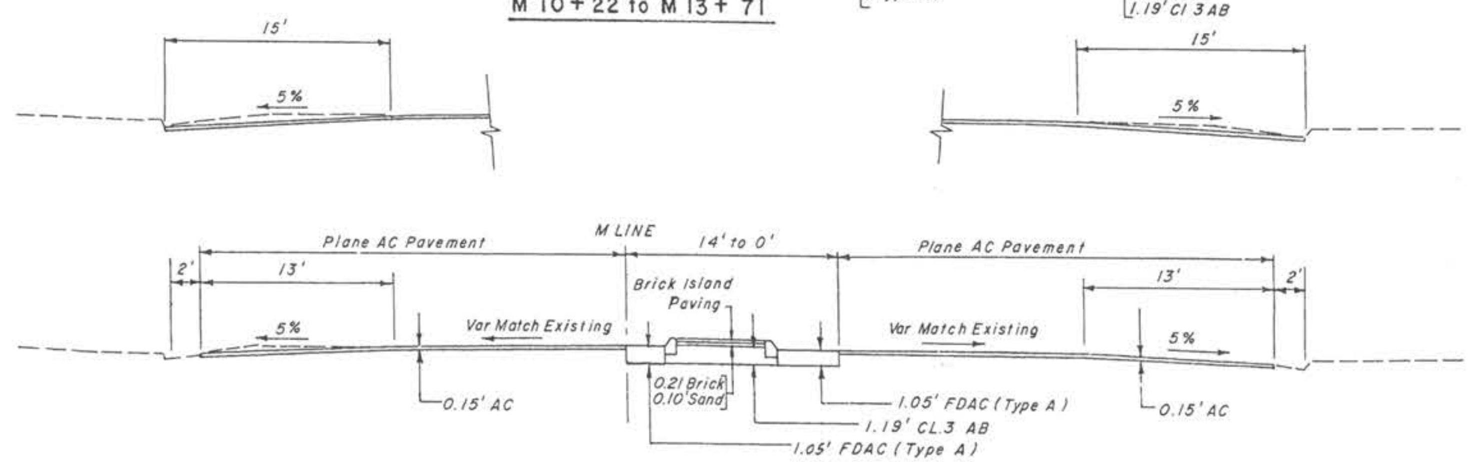
FDAC = Full Depth Asphalt Concrete

NOTES:

1. Dimensions of the Structural Sections are subject to tolerances specified in the Standard Specifications.
2. Cross Slope as shown or as directed by the Engineer.



M 10 + 22 to M 13 + 71



M 8 + 00 to M 10 + 22

NO CONSTRUCTION CHANGES
CONTRACT No.
DATE ACCEPTED
AS BUILT
RESIDENT ENGINEER

Note: 1953 Plans

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
Caltrans PROJECT DEVELOPMENT
PROJECT ENGINEER
JIM LEM

TYPICAL CROSS SECTIONS

NO SCALE

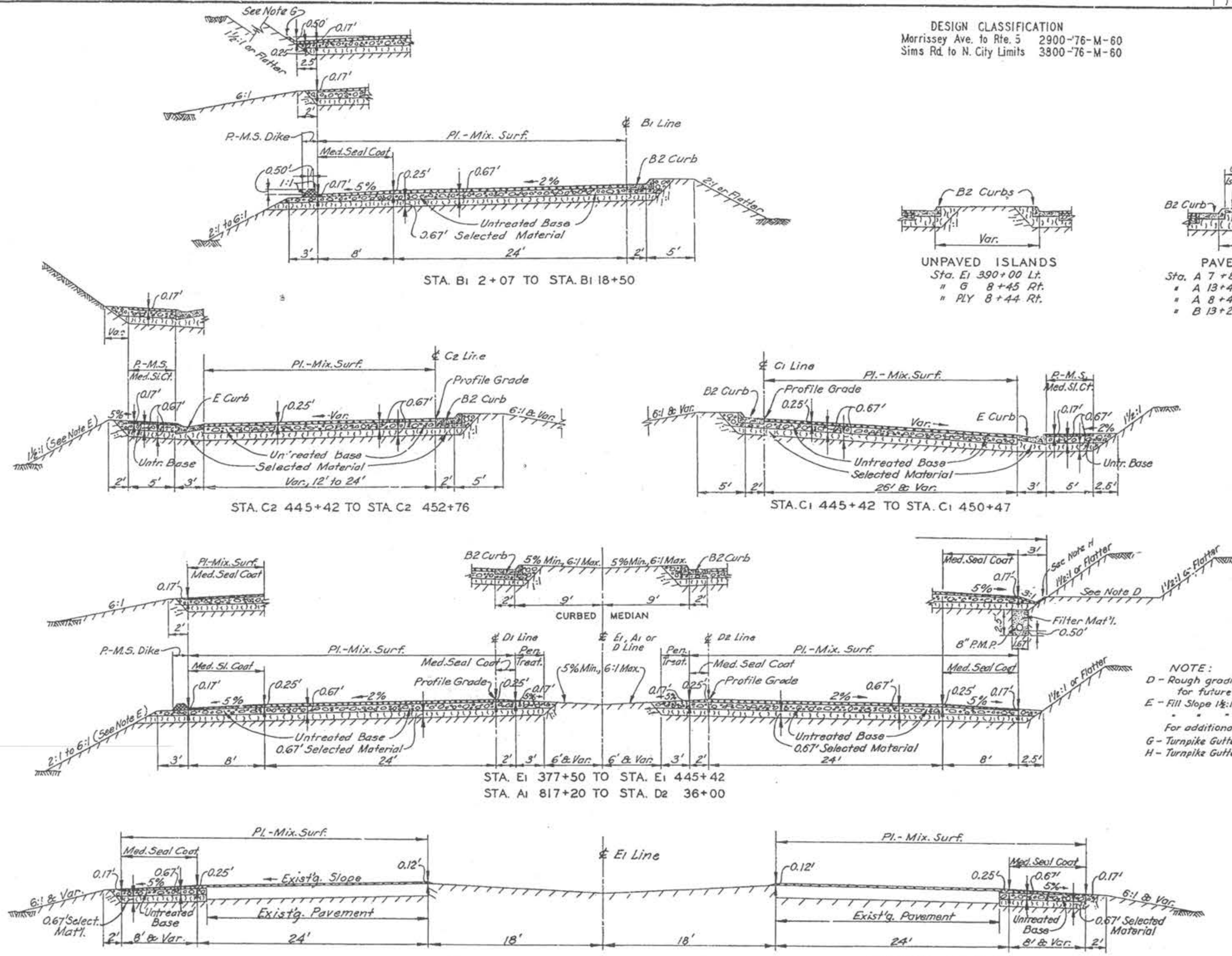
X-1

DIST.	STATE	FEDERAL PROJECT NO.	SHEET NO.	TOTAL SHEETS
7	CALIF.	U-0401(2)	X	157

DESIGN CLASSIFICATION
Morrissey Ave. to Rte. 5 2900-'76-M-60
Sims Rd. to N. City Limits 3800-'76-M-60

DIST.	COUNTY	ROUTE	SECTION	SHEET NO.	TOTAL SHEETS
IV	SCr	56	SCr,A	2	105

MARCH 11 1957



NOTE:
D - Rough grading at North Branciforte Ave. for future widening to six lanes.
E - Fill Slope 1½:1 - Sta. E1 441+35 to G2 447+25
" " " - " A2 811+50 to D 21+00
For additional Freeway Sections, See Sheet B
G - Turnpike Gutter - 34' Lt Sta. B1 2+75 to B1 9+20
H - Turnpike Gutter Details - See Drwg. 1222-5

STA. E1 373+00 TO STA. E1 377+50 ON RT.
STA. E1 374+90 TO STA. E1 377+50 ON LT.

IV-SCr-56-SCr.A
BETWEEN
0.3 MI. E. OF MORRISSEY AVE. & 0.6 MI. N. OF JCTS. OF RTES. 5 & 56

TYPICAL CROSS-SECTIONS Ⓐ

Scale: 1" = 5'

AS BUILT PLANS
Contract No. 58-4TC18-F
Date Completed
Document No. 40001754

58-4TC18-F

4QT1074

Date: 1957 Plans

DIST.	COUNTY	ROUTE	POST MILES	SHEET NO.	TOTAL SHEETS
04	S Cr	1	8.8/10.2	3	96

September 12, 1966

ASSISTANT STATE HIGHWAY ENGINEER - PLANNING
REGISTERED CIVIL ENGINEER NO. 6568

ENGINEER OF DESIGN

for ASSISTANT STATE HIGHWAY ENGINEER - OPERATIONS
REGISTERED CIVIL ENGINEER NO. 6652

NOTE:

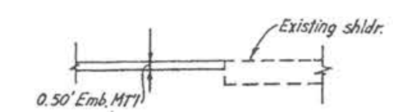
A. Dimensions are subject to tolerances specified in the Standard Specifications

ABBREVIATIONS

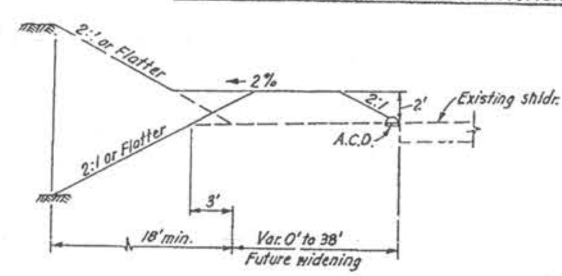
A.C.	Asphalt Concrete (Type A)
A.B.	Aggregate base, (Class 2)
A.S.	Aggregate subbase, (Class 4)
A.C.D.	Asphalt Concrete Dike (Type A)
P.T.	Penetration Treatment

DESIGN DESIGNATION

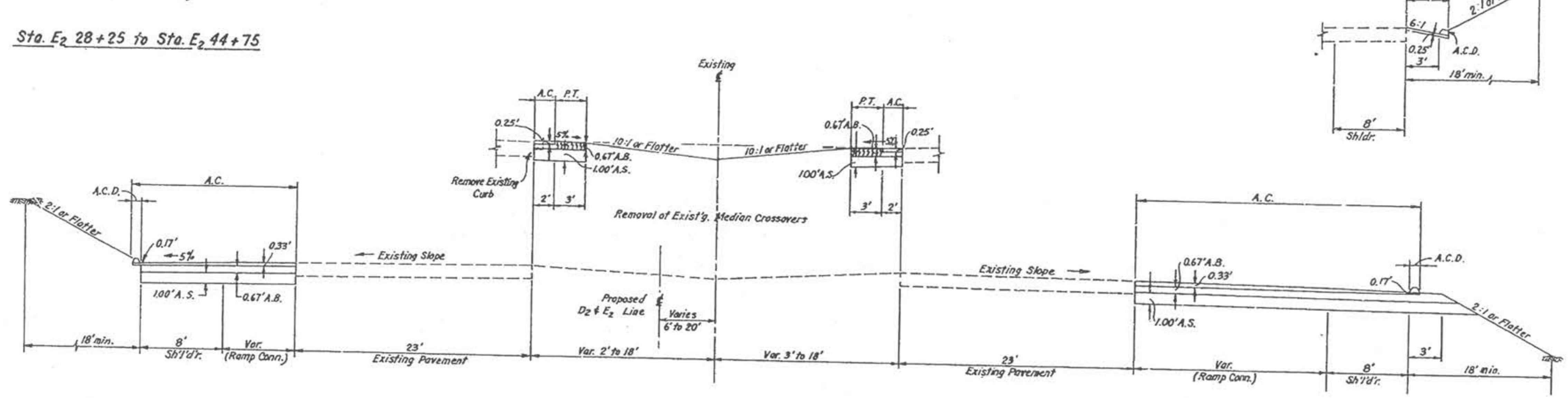
ADT 59 = 12,000 D = 55%
ADT 80 = 33,000 T = 5.5%
DHV = 5,000 V = 60 MPH



REMOVAL OF EXIST. ROAD APPROACHES



Sta. E_2 28+25 to Sta. E_2 44+75



FREEWAY - ROUTE 1

AS BUILT PLANS
Contract No. 04-133844
Date Completed 2-8-68
Document No. 40000159

Note: 1966 plans

3

Ⓐ

04-SCr-1-8.8/10.2

BETWEEN
0.4 MILE NORTH OF ROB ROY JUNCTION (P.M. 8.8)
AND NORTH APTOS UNDERPASS (P.M. 10.2)

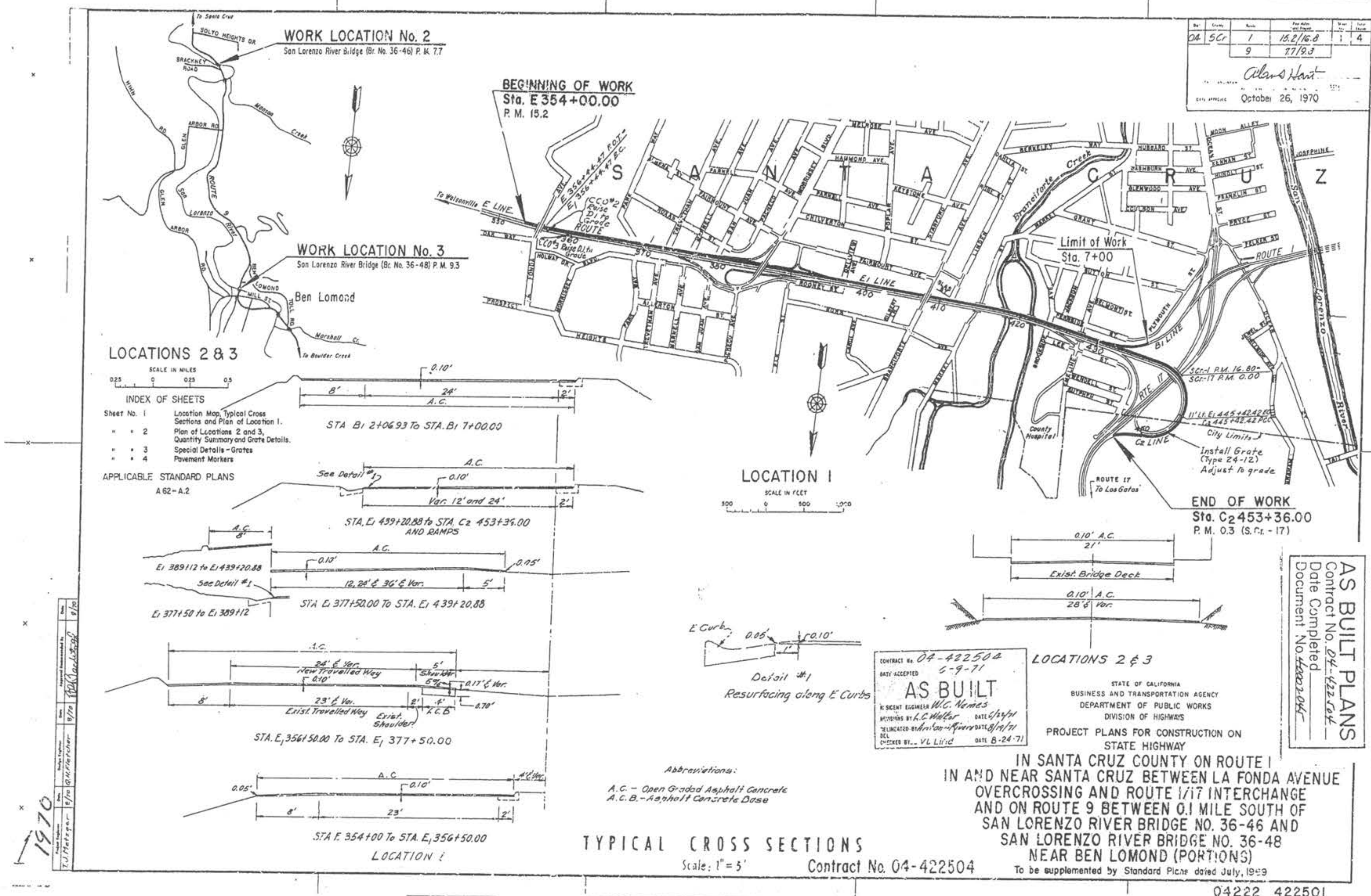
TYPICAL CROSS SECTIONS
SCALE: 1" = 5'

RECOMMENDED

PROJECT ENGINEER	DATE	DESIGN ENGINEER	DATE	APPROVAL RECOMMENDED BY	DATE
	9/66	C.D. Nord	9/66		9/66

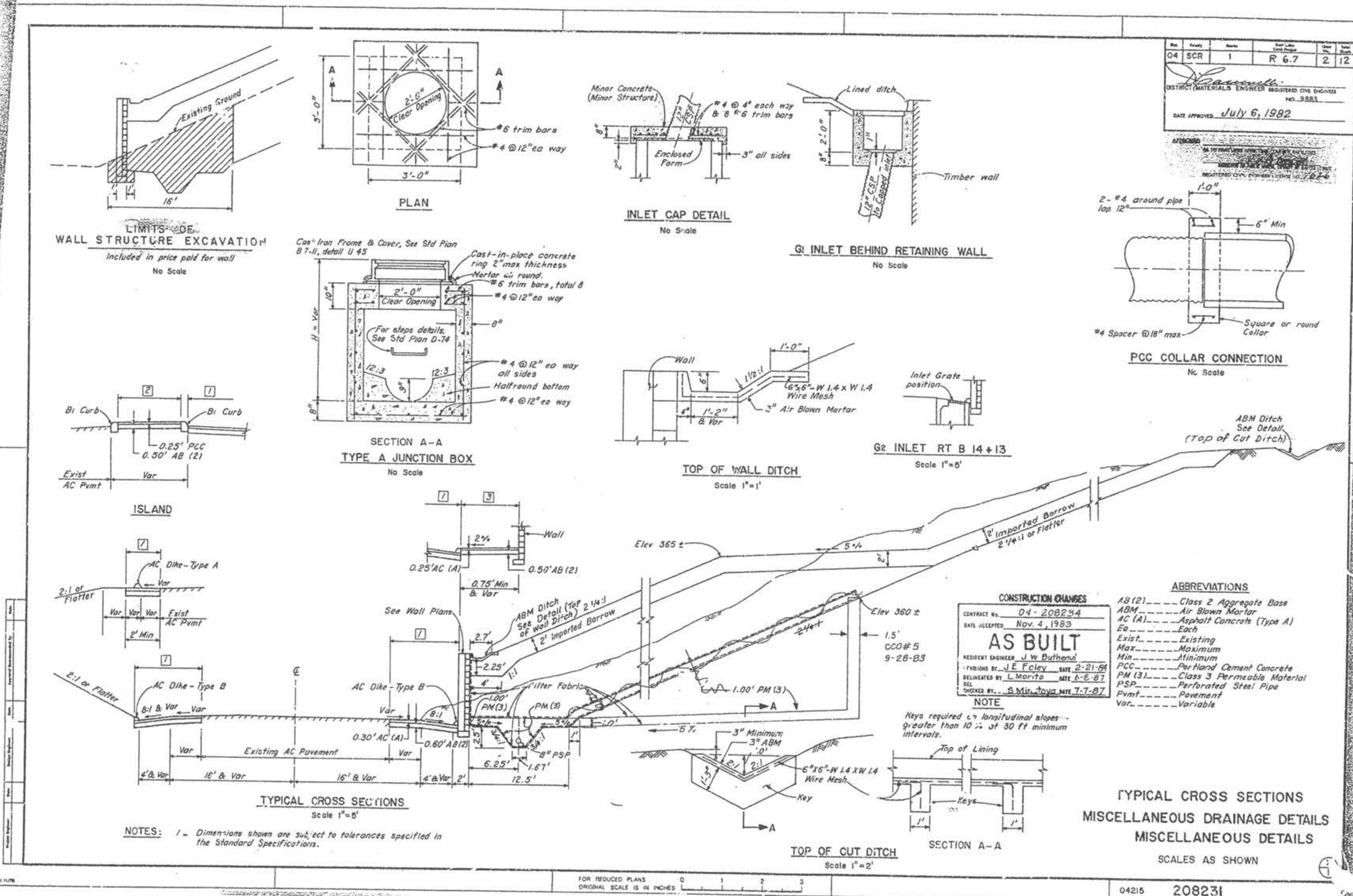
04220

133841



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.

MICROFILM - STATE OF CALIFORNIA - DEPARTMENT OF PUBLIC WORKS - MICROFILM



AS BUILT PLANS
Contract No. 04-208234
Date Completed 9-4-83
Document No.

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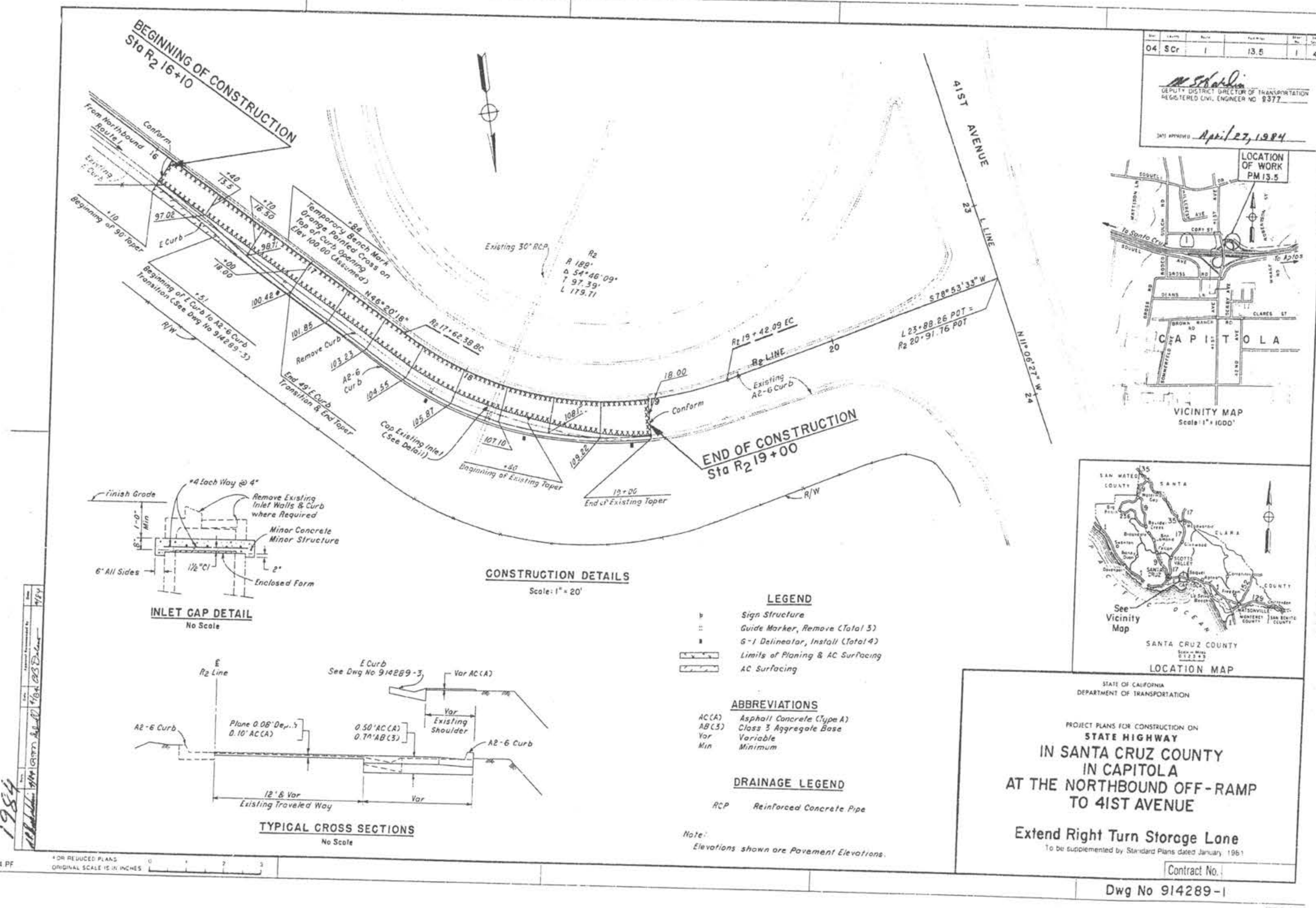
8-31-87 Donald Blackford



AS BUILT PLANS
Contract No. 04-914289
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.
10-16-84 Donald Blackford
SUPERVISOR OF MICROFILM SERVICES