PRELIMIRARY GEOTECHNICAL INVESTIGATION OF THE
PROPOSED IMPROVEMENTS OF
STATE ROUTES 118/34 INTERSECTION
VENTURA COUNTY, CALIFORNIA
07-105960

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INTRODUCTION

The information contained in this report is intended for use in compiling an Environmental Document. A more detailed investigation is required for specific design details.

The purpose of this report is to review and evaluate the geotechnical elements that may interact with the proposed project which consists of improving the existing SR-118/34 Intersection and realigning Donlon Road. Five alternatives have been explored to achieve this project.

The scope of this report was limited to a literature search and review of the previous field investigations for this State Routes intersection. In addition a field review of the site was also made.

SUMMARY

The project is located in a seismically active area. The activity level is considered to be normal for the Southern California Region. There are no known earthquake faults crossing the project. The closest earthquake fault zone under the auspices of the Alquist-Priolo Earthquake Fault Zoning Act is the Springville Fault Zone and is located 1.13 miles to the southwest of the proposed project.

Ground shaking from a moderate earthquake along the Simi-Santa Rosa-Northridge Hills Fault System or other close-by earthquake fault would have the greatest potential impact to this project. The potential for liquefaction should be evaluated in detail during the subsurface exploration phase for any of the selected alternatives.

There are no geological or geotechnical conditions that would preclude the construction of this project.

PROJECT DESCRIPTION

The proposed project consists of improve the existing SR-118/34 Intersection. Five alternatives have been proposed:

- Intersection Improvement Alternative
- Bridge Alternative
- Roundabout Alternative
- Somis Bypass Alternative
- Save Our Somis Alternative (SOS)

Due to the fact that all of these alternatives are within and/or in the vicinity of each other and the geotechnical elements that may interact are basically the same for the entire area,

this preliminary report will address and encompass them in this preliminary report. Once an alternative is selected a complete (detailed) geotechnical investigation will be required.

GEOLOGIC SETTING

Regionally, the project site is located within the east portion of the Ventura Basin. This basin is an elongate, east-trending trough in which a thick section of sedimentary rocks has accumulated throughout most of the Tertiary time. Like most of the other units in the province, this basin lies athwart the characteristic northwest structural trend of the Coast Ranges, California Geomorphic Province (Bulletin 170, 1954).
Locally, the subject site is within the Las Posas sub-basin and the existing intersection has been mapped as Quaternary Alluvium deposited by flood plains consisting of clay, silt, sand and gravel (Dibblee, 1992). Figure1.

SEISMICITY

The project is located in a seismically active area. The geologic processes, which have caused earthquakes in the past, can be expected to continue. Seismic events, which are likely to produce the greatest bedrock accelerations, could be a moderate event on the Simi-Santa Rosa-Northridge Hills fault zone and/or a large event on a distant earthquake fault.

A fault is considered by the State of California to be active if geologic evidence indicates that movement on the fault has occurred in the last 11,000 years, and potentially active if movement is demonstrated to have occurred in the last 2 million years.

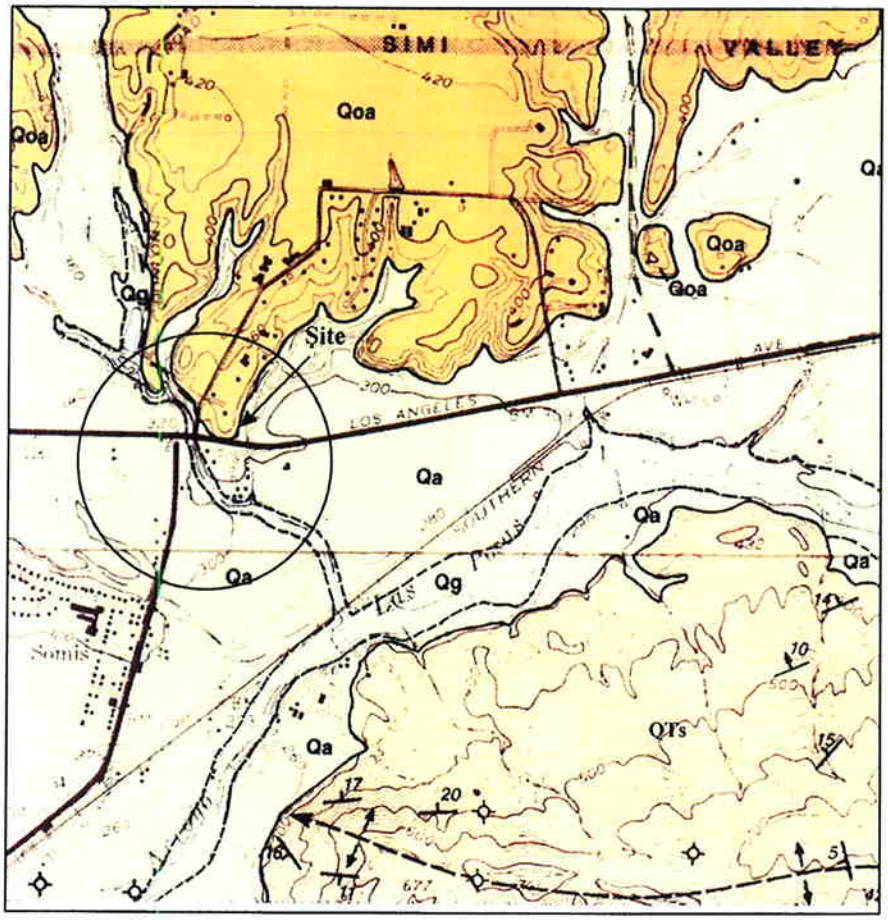
There is no geological information that indicates an active fault in the project area. The nearest known active fault (under Alquist-Priolo Earthquake Fault Zoning Act) is the Springville Fault Zone and is located 1.13 miles to the southwest of the project.

Seismic Phenomena

Ground Shaking

Ground shaking is the primary cause of structural damage during an earthquake; it is to be considered the most likely damage-producing earthquake phenomenon for this project. The magnitude, duration and vibration frequency characteristics will vary greatly, depending upon the particular causative fault and its distance from the project.

Using the 2007 draft Los Angeles Area Seismic Hazard Map prepared by Caltrans, the Simi-Santa Rosa-Northridge Hills Fault System located approximately 1.32 miles south of the project could produce a Maximum Credible Earthquakes (MCE) of 7.5-M_m along this fault system. The site lies within the 0.6g contours on the Caltrans Seismic Hazard Map. Figure 2.



GEOLOGIC MAP

(Taken from T.W. Dibblee, Jr. 1992)

LEGEND

Scale 1:24 000

Qg	Quaternary Alluvial Deposits (gravel and sand of major stream channels)
Qa	Quaternary Alluvium: silt, sand and gravel (of valley and flood plains)
Qoa	Quaternary Older Surficial Sediments (older alluvial gravel, silt and clay)
QTs	Saugus Formation; gravel weakly consolidated and reddish sandstone, crudely bedded

SYMBOLS

(not all symbols present on each map)

FORMATION CONTACT *dashed where inferred or indefinite*

MEMBER CONTACT *between units of a formation*

CONTACT BETWEEN SURFICIAL SEDIMENTS *located only approximately in places*

FAULT: *Dashed where indefinite or inferred, dotted where concealed, queried where existence is doubtful. Parallel arrows indicate inferred relative lateral movement. Relative vertical movement is shown by U-D (U=upthrown side, D=downthrown side). Short arrow indicates dip of fault plane. Sawteeth on upper plate of low angle thrust fault.*

FOLDS: ANTICLINE SYNCLINE

arrow on axial trace of fold indicates direction of plunge; dotted where concealed by surficial sediments

STRIKE AND DIP OF STRATIFIED ROCKS: inclined; inclined (approximate); overturned; inclined; approximate; vertical; horizontal; vertical

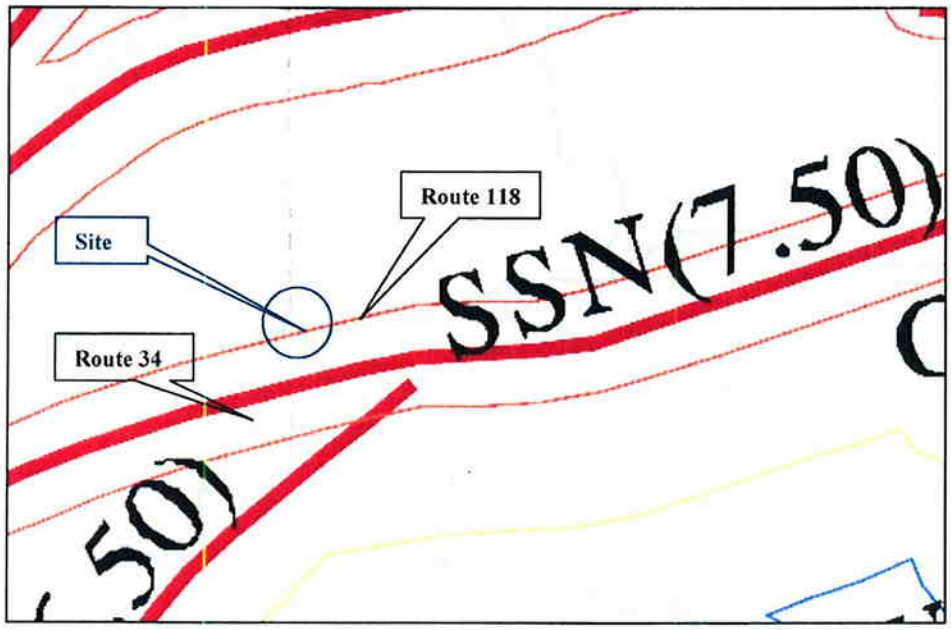
metamorphic or igneous rock foliation or flow banding

FOSSIL LOCALITY; DIRECTION OF LANDSLIDE MOVEMENT; SANDSTONE MARKER BED; CONGLOMERATE MARKER BED; ABANDONED EXPLORATORY OIL (OR GAS) WELL; OIL WELLS (ON TOPOGRAPHIC BASE MAP)

Figure 1

CALIFORNIA SEISMIC HAZARD MAP 1996

BASED ON MAXIMUM CREDIBLE EARTHQUAKES (MCE)



LEGEND:

- 0.7g Peak Acceleration Contour
- 0.6g Peak Acceleration Contour
- 0.5g Peak Acceleration Contour
- 0.4g Peak Acceleration Contour
- 0.3g Peak Acceleration Contour
- 0.2g Peak Acceleration Contour
- 0.1g Peak Acceleration Contour
- Special Seismic Source (SSS)
- Faults with Fault Codes (MCE)
- State Highways
- County Boundary
- Latitude & Longitude

No Scale

SSN = Simi-Santa Rosa-Northridge Fault Zone

Figure 2

Deterministic site parameters obtained using the EQFAULT-Version 3.0 (T. Blake, 2004) computer program for the deterministic prediction of peak acceleration from digitized California Fault System indicates that the Simi-Santa Rosa is the closest to the site, having an estimated maximum-earthquake event peak-site acceleration of 0.545g for a ME-Magnitude (M_w) of 6.7. The largest maximum-earthquake site acceleration according with this program is 0.5447g.

The proposed project will be designed and constructed with all applicable/current seismic safety standards and guidelines.

Ground Rupture

An analysis of fault rupture hazard for a particular fault requires that the fault be located exactly, and its potential for rupture to be known, if only approximately.

The proposed project is not located within the confines of the Alquist-Priolo Earthquake Fault Zoning Act. The closest well-defined fault trace zoned under the auspices of the Alquist –Priolo Act is the Springville Fault Zone and is located 1.13 miles southwest of the project. Figure3.

Based on the review of several geologic/seismologic reports, it is our opinion that the potential for ground rupture is very low and is not to be considered to be significant hazard for this project.

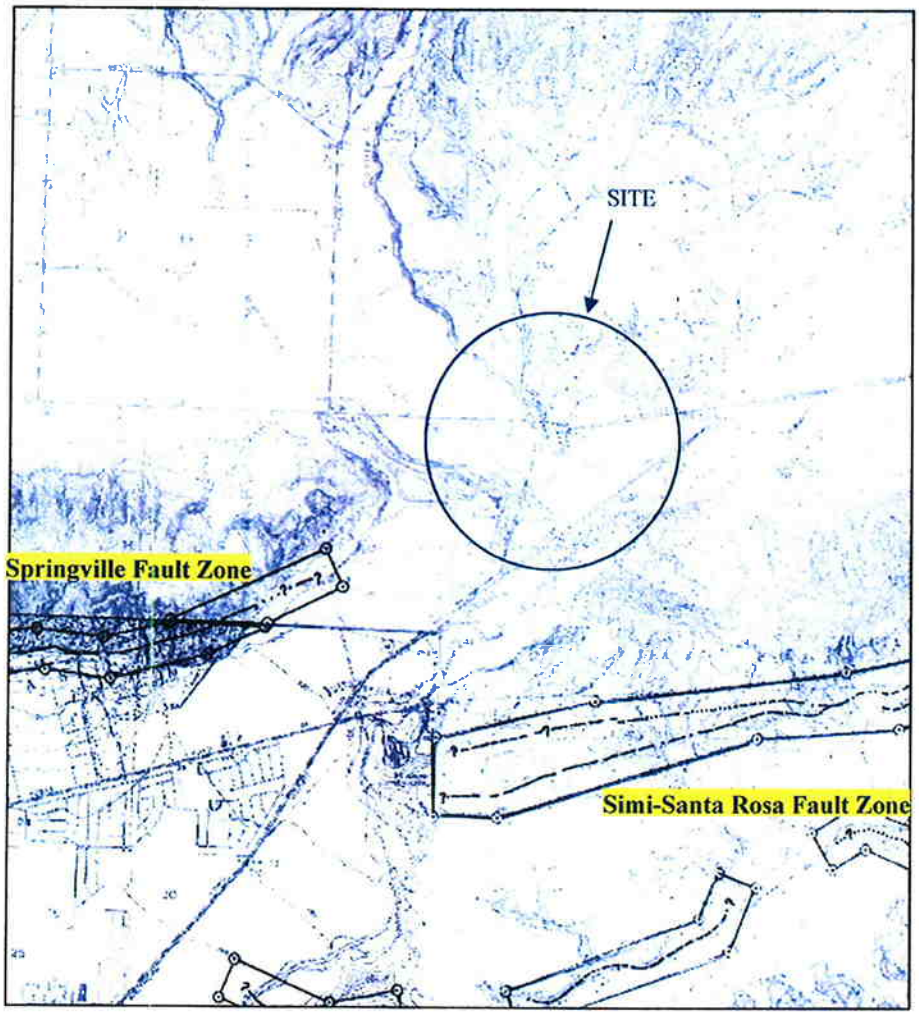
Liquefaction

Liquefaction exists when fine silts and sands are located below the water table. The water can also be perched ground water. Liquefaction has been documented to affect soils to ± 15 m. (50 feet) deep, during prolonged periods of ground shaking.

A 2000 Seismic Hazard Map – Moorpark Quadrangle issued by the Department of Conservation – California Geological Survey (Figure 4) shows a potential for liquefaction within the project limits, however, during the last two major earthquakes in the Southern California area (1971 San Fernando – M_m = 6.62 and the 1994 Northridge – M_m = 6.7) liquefaction did not occur within the limits of this project.

In addition, based on a regional study conducted by the U.S. Geological Survey (1985), the relative liquefaction susceptibility along this project is considered to be low to very low.

Final design for this proposed Intersection will require subsurface exploration that would permit assessment of this seismic phenomenon in detail. There is an entire array of engineering methods to mitigate this earthquake phenomenon. Pending upon reviewing the results of the proposed exploration the appropriate engineering solution will be applied (if necessary).



EARTHQUAKE FAULT ZONES

(Taken from CGS – Official Maps 1998/1999)

MAP EXPLANATION

Potentially Active Faults

1906 C

Faults considered to have been active during Quaternary time; solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed; query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by creep or possible creep.

Aerial photo lineaments (not field checked); based on youthful geomorphic and other features believed to be the results of Quaternary faulting.

Special Studies Zone Boundaries

These are delineated as straight-line segments that connect encircled turning points so as to define special studies zone segments.

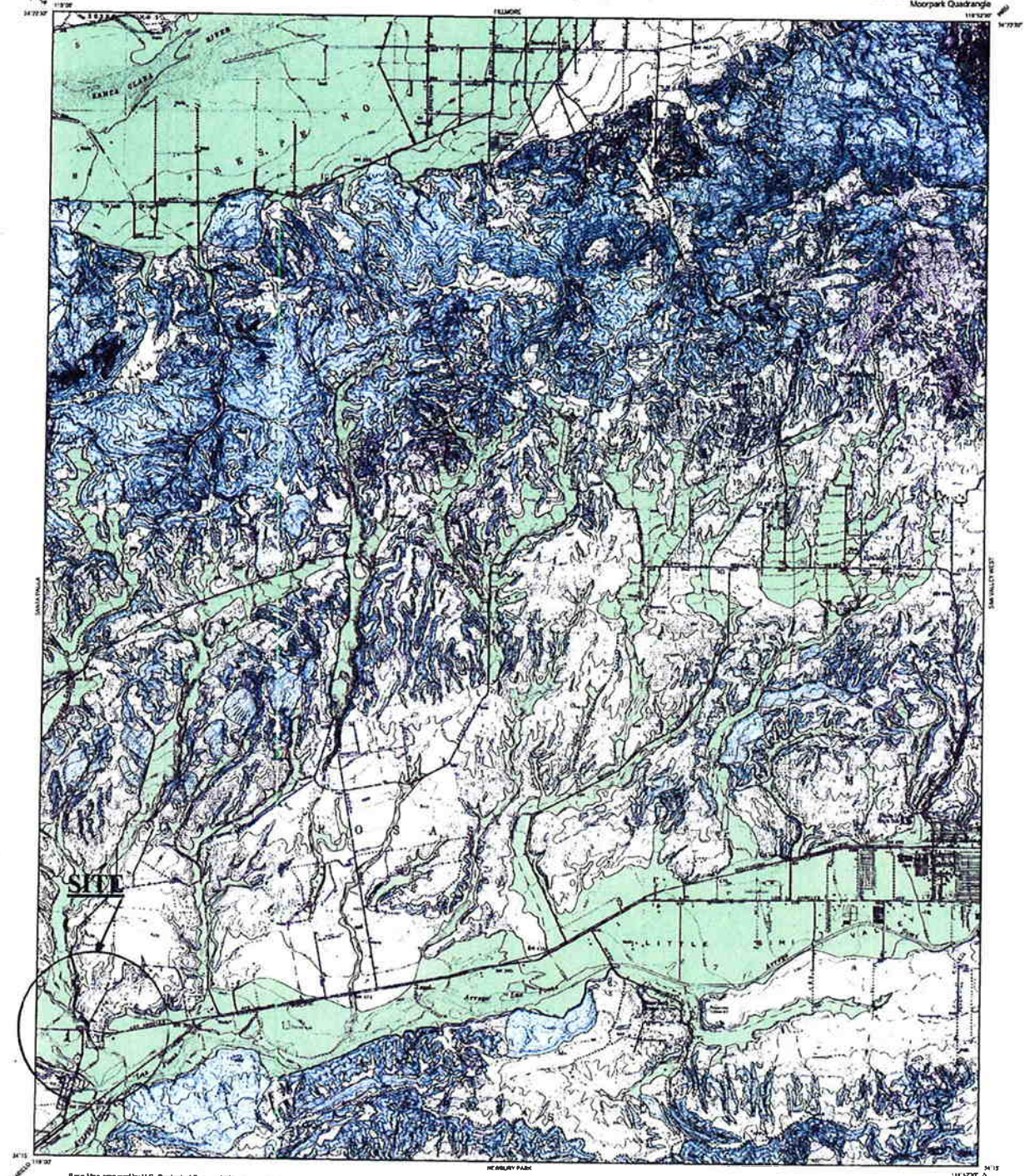
Seaward projection of zone boundary.

Figure 3

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA-GRAY DAVIS, GOVERNOR
THE RESOURCES AGENCY-MARY D. NICHOLS, SECRETARY
DEPARTMENT OF CONSERVATION-DARRYL W. YOUNG, DIRECTOR

SEISMIC HAZARD ZONES MAP
Moorpark Quadrangle



Base Map prepared by U.S. Geological Survey, 1951, photorevised

PURPOSE OF MAP

This map will assist cities and counties in fulfilling their responsibilities for protecting the public safety from the effects of earthquake-triggered ground failure as required by the Seismic Hazards Mapping Act (Public Resources Code Sections 2690-2699.6).

For information regarding the scope and recommended methods to be used in conducting site-specific investigations, see DMG Special Publication 117, *Guidelines for Evaluating and Mitigating Seismic Hazards in California*.

For a general description of the Seismic Hazards Mapping Program, the Seismic Hazards Mapping Act and regulations, and related information, please refer to the draft User's Guide (see http://www.consrv.ca.gov/dmg/shezp/userguide/).

Procedures of this map was funded by the Federal Emergency Management Agency's Hazard Mitigation Program and the Department of Conservation in cooperation with the Governor's Office of Emergency Services.

IMPORTANT - PLEASE NOTE

1) This map may not show all areas that have the potential for liquefaction, landsliding, strong earthquake ground shaking or other earthquake and geologic hazards. Also, single earthquakes capable of causing liquefaction or triggering landslide failure will not uniformly affect the entire area zoned.

2) Liquefaction zones may also contain areas susceptible to the effects of earthquake-induced landslides. This situation typically exists at or near the toe of existing landslides, downslope from a cliff or debris flow source areas, or adjacent to steep stream banks.

3) This map does not show Alquist-Priolo earthquake fault zones, if any, that may exist in this area. Please refer to the latest official map of earthquake fault zones for disclosures and other actions that are required by the Alquist-Priolo Earthquake Fault Zoning Act. For more information on this subject and an index to available maps, see DMG Special Publication 42.

4) Landslide zones on this map were determined, in part, by adapting methods originally developed by the U.S. Geological Survey (USGS). Landslide hazard maps prepared by the USGS typically use experimental approaches to assess earthquake-induced and other types of landslide hazards. Although aspects of these new methodologies may be incorporated in future CDMG seismic hazard zone maps, USGS maps should not be used as substitutes Official SEISMIC HAZARD ZONE maps.

5) U.S. Geological Survey base map standards provide that 90 percent of cultural features be located within 40 feet (horizontal accuracy) at the scale of this map. The identification and location of liquefaction and earthquake-induced landslide zones are based on available data. However, the quality of data used is varied. The zone boundaries depicted have been drawn as accurately as possible at this scale.

6) Information on this map is not sufficient to serve as a substitute for the geologic and geotechnical site investigations required under Chapters 7.5 and 7.8 of Division 2 of the Public Resources Code.

7) DISCLAIMER: The State of California and the Department of Conservation make no representations or warranties regarding the accuracy of the data from which these maps were derived. Neither the State nor the Department shall be liable under any circumstances for any direct, indirect, special, incidental or consequential damages with respect to any with these by any user or any third party on account of or arising from the use of this map.

SCALE 1:24,000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 0 1 KILOMETER

STATE OF CALIFORNIA

SEISMIC HAZARD ZONES

Delineated in compliance with
Chapter 7.8, Division 2 of the California Public Resources
(Seismic Hazards Mapping Act)

MOORPARK QUADRANGLE

OFFICIAL MAP

Released: November 17, 2000

STATE GEOLOGIST

MAP EXPLANATION

Zones of Required Investigation:

Liquefaction

Areas where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslides

Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

DATA AND METHODOLOGY USED TO DEVELOP THIS MAP ARE PRESENTED IN THE FOLLOWING:

Seismic Hazard Evaluation of the Moorpark 7.5 minute quadrangle, Ventura County, California: California Division of Mines and Geology, Open File Report 2000-007.

For additional information on seismic hazards in this map area, the rationale used for zoning, and additional references consulted, refer to DMG's World Wide Web site (http://www.consrv.ca.gov/dmg/).

Figure 4

SLOPE STABILITY

We are anticipating that some of the alternatives for this project will involve the construction of some fill slope embankments and/or placement of additional fills in some areas. However, final recommendations will be presented after this office reviews the project plans. We anticipate that the proposed project will be designed and constructed in conformance with Section 19 of the latest Caltrans Standard Specifications.

LANDSLIDES

This project will not involve any work that increases or decreases landslide potential.

GROUNDWATER

Groundwater levels in 2003 were approximately 30 feet below grade (O'Tousa, J., pers. comm., 2009) on the southwestern corner of 118/34 intersection in a private property parcel. Additional boring exploration will be required to evaluate the ground water conditions at the site. However, it is anticipated that the construction of this project will not have an impact on ground water.

EROSION

Construction activities could expose soils to temporary erosion. In order to reduce this temporary erosion NPDES and BMPs would be implemented during project construction. There will no be no change in the existing rate of erosion as a result of the project.

ECONOMIC RESOURCES

There are no known natural resources that will be affected by the project.

Dibblee, T.W., **Geologic Map of the Moorpark Quadrangle**, Dibblee Geological Foundation Map # DF-40, 1992.

Hart, E.W., **Fault-Rupture Hazard Zones in California**, Special Publication # 42, California Division of Mines and Geology, 1997.
http://www.consrv.ca.gov/cgs/rghm/ap/Pages/Index.aspx

Mualchin, L., **A technical report to accompany the Caltrans California Seismic Hazard Map 1996** (based on maximum credible earthquakes): 66 pp. 1996.
http://www.dot.ca.gov/hq/esc/earthquake_engineering/Seismology/seismicmap.html

O'Tousa, J. **Groundwater levels - Somis,** pers. comm., County of Ventura – Public Works Agency – Engineering Services Department, March 2009.

Southern California Earthquake Center., **Southern California Alphabetical Fault Index**, http://www.data.scec.org/fault_index/alphadex.html , 2008.

Tinsley, J.C., and etal., **Evaluating Liquefaction Potential**, in **Evaluating Earthquake Hazards in the Los Angeles Region, California**.; Professional Paper 1360, pp. 263-315, U.S. Geological Survey, 1985.