

## Memorandum

*Flex your power!  
Be energy efficient!*

**To:** GARRETT DAMRATH, Senior Planner  
D07 Office of Environmental

**Date:** May 11, 2010

**File:** 07-LA-710  
EA 07-2159F0  
P.M. 22.47/24.22

**From:** DEPARTMENT OF TRANSPORTATION  
DIVISION OF ENGINEERING SERVICES  
Geotechnical Services  
Office of Geotechnical Design – South - 1

**Subject:** REQUEST FOR TECHNICAL STUDY – LA-710

The information contained within this report is intended for use in compiling an Environmental Document. As requested, this memorandum addresses and summarizes the geotechnical elements that may interact with the I-5/SR-710 Interchange and any modification that would affect State Route 710 from Washington Boulevard to SR-60. According to the information provided by your office there are two alternatives proposed for the project along the same alignment.

### SITE GEOLOGY

The area within the project limits have been mapped as surficial sediments (Qa) consisting mainly of alluvial gravel, sand and clay deposits with some cobbles. The northern portion of the project will encounter Older Surficial Sediments (Qoa) consisting of remnants of older weakly consolidated alluvial deposits of gravel, sand and silt (Dibblee, 1991). Figure 1.

### 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 Puente Hills Blind Thrust Fault System and/or a large event on a distant earthquake fault.

An earthquake 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.

### Seismic Phenomena

#### **Ground Shaking**

Ground shaking is the primary cause of structural damage during an earthquake; the magnitude, duration and vibration frequency characteristics will vary greatly, depending upon the particular causative fault and its distance from the project.

Using the 2009 ARS on-line tool prepared by Caltrans, the Puente Hills Blind Thrust System is the closest (1.54 miles) to the southern portion of the project site (Washington Boulevard) with a Maximum Magnitude ( $M_{max}$ ) of 7.3 along this fault system.

Using the same 2009 ARS on-line tool prepared by Caltrans, the Upper Elysian Park Blind Thrust is the closest (1.99 miles) to the northern portion of the project site (SR-60 Pomona Freeway) with a Maximum Magnitude ( $M_{max}$ ) of 6.4 along this fault system.

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 Maximum Earthquake Magnitude ( $M_w$ ) expected at the site could be of 6.8 and the largest maximum-earthquake site acceleration according with this program is 0.37g.

### **Ground Rupture**

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

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 East Montebello Fault Zone and is located 4.85 miles northeast of the project.

Based on the review of several geologic/seismologic reports, it is our opinion that the potential for ground rupture is non-existing to very low at the site.

### **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  $\pm 15$  m. (50 feet) deep, during prolonged periods of ground shaking.

A 1999 Seismic Hazard Map – Los Angeles Quadrangle issued by the Department of Conservation – California Geological Survey shows that there is not a potential for liquefaction within the project limits. We concur with these findings. Figure 2

During the last two major earthquakes in the Southern California area (1971 San Fernando –  $M_m = 6.62$  and 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 these project limits is considered to be low to very low.

There is an entire array of engineering methods to mitigate this earthquake phenomenon. Pending upon reviewing the results of the proposed final subsurface exploration the appropriate engineering solution will be determined (if necessary).

## **GROUNDWATER**

Groundwater was not encountered during the 1954 boring explorations for the existing overcrossing structure at Washington Undercrossing to a depth of approximately 45 feet below ground surface and for the 1956 boring exploration at Whittier Structure to a depth of approximately 50 feet below ground surface. Groundwater levels observed in water wells within the limits of the project maintained by Los Angeles County Public Works indicate the depth to the groundwater table varies through the project limits.

Additional boring exploration will be required to evaluate the groundwater conditions through the limits of the project. However, it is anticipated that the construction of this project will not have an impacted on groundwater.

## **SLOPE STABILITY**

It is anticipated 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 final project plans. We anticipate the proposed project will be designed and constructed in conformance with Section 19 of the latest Caltrans Standard Specifications.

## **EROSION**

There will be no change in the existing rate of erosion as a result of the project. Construction activities that could expose soils to temporary erosion, however, this temporary erosion could be reduced by implementing NPDES and BMPs during project construction.

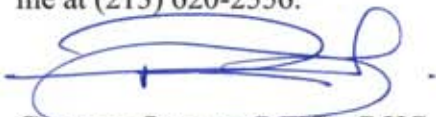
## **ECONOMIC RESOURCES**

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

## **CONCLUSIONS**

Once an alternative is selected we highly recommend that a detailed geological/geotechnical investigation be conducted to determine the design parameters for this proposed project.

There are no geological or geotechnical conditions that would preclude the construction of the proposed project. If you have any questions and/or further assistance is required please contact me at (213) 620-2556.

  
**Gustavo Ortega, C.E.G., C.HG.**  
Special Geological Studies  
Office of Geotechnical Design South-1  
Attachments/cc. JEhsan – OGDS-1 Sacramento



## References

- Alfors, T. J., and etal., **Urban Geology, Master plan for California**, Bulletin # 198, California Division of Mines and Geology, 1973.
- Blake, T., **Deterministic Estimation of Peak Acceleration from Digitized Faults**, EQFAULT Version 3.00, 2004
- Brown D.R., **Foundation Recommendations – Bridge No. 53-1150**, Division of Highways (now Department of Transportation, 1956.
- California Department of Conservation, **Fault-Rupture Hazard Zones in California**, California Geological Survey, Special Publication 42, Interim Revision 2007  
<ftp://ftp.consrv.ca.gov/pub/dmg/pubs/sp/Sp42.pdf>
- California Department of Conservation, **Seismic Hazard Zones, Los Angeles Quadrangle** California Geological Survey, Official Map, March 1999.  
[http://gmw.consrv.ca.gov/shmp/download/pdf/ozn\\_sfer.pdf](http://gmw.consrv.ca.gov/shmp/download/pdf/ozn_sfer.pdf)
- California Department of Conservation, **Special Studies Zones, El Monte Quadrangle** California Geological Survey, Official Map, November 1, 1991.
- California Geological Survey, **California Fault Parameters–Transverse Ranges and Los Angeles Basin, 2000**.  
[http://www.conservation.ca.gov/cgs/rghm/psha/fault\\_parameters/htm/Pages/CAflt\\_parameters\\_tr\\_la1.aspx](http://www.conservation.ca.gov/cgs/rghm/psha/fault_parameters/htm/Pages/CAflt_parameters_tr_la1.aspx)
- Department of Transportation, **ARS on-line tool**, 2009;  
[http://10.160.173.178/shake2/shake\\_index2.php](http://10.160.173.178/shake2/shake_index2.php)
- Department of Transportation, **Boring Log Plan Sheet – Bridge No. 53-841**, 1954.
- Department of Transportation, **2007 Fault Database**, Preliminary Draft January 2, 2008
- Dibblee, T.W., **Geologic Map of the Los Angeles Quadrangle**, Dibblee Geological Foundation Map # DF-22, May 1989.
- Dolan, J.F., and etal., **Active Faults in the Los Angeles Metropolitan Region**, Southern California Earthquake Center, 2004  
<http://www.scec.org/research/special/SCEC001activefaultsLA.pdf>
- Karimi, S. and etal., **Preliminary Foundation Recommendations for Washington Boulevard Undercrossing Bridge, Interstate 710**, Department of Transportation – OGDS-1, 2009
- Los Angeles County Department of Public Works, **Well Information**.  
<http://gis.dpw.lacounty.gov/wells/viewer.asp>
- Marek, C.E., **Foundation Recommendations – Bridge No. 53-389**, Division of Highways (now Department of Transportation, 1962.

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](http://www.dot.ca.gov/hq/esc/earthquake_engineering/Seismology/seismicmap.html)

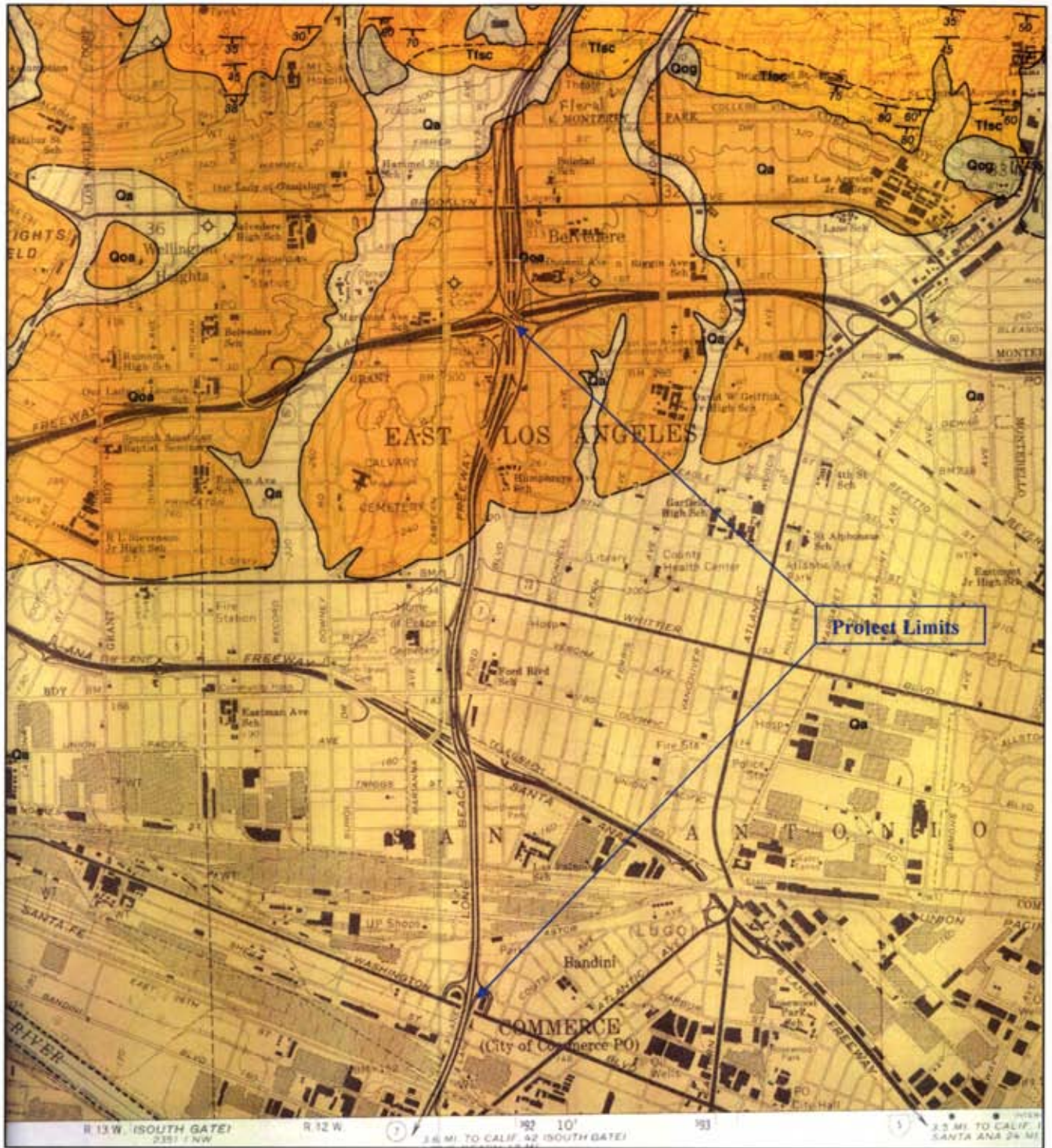
Pratt, J. and et al., **Preliminary Foundation and Seismic Recommendations for Rte 710 SB/5 Separation Widening, Bridge No. 53-0788L**, Department of Transportation – OGDS-1, 2009.

Southern California Earthquake Center., **Southern California Alphabetical Fault Index**, [http://www.data.scec.org/fault\\_index/alphadex.html](http://www.data.scec.org/fault_index/alphadex.html) , 2008

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

Yerkes, R.F., and Campbell, R.H., **Preliminary Geologic Map of Los Angeles 30' x 60' Quadrangle, Southern California, Version 1.0**, United states Geological Survey, 2005.  
[http://pubs.usgs.gov/of/2005/1019/la1\\_map.pdf](http://pubs.usgs.gov/of/2005/1019/la1_map.pdf)

# FIGURES



# GEOLOGIC MAP

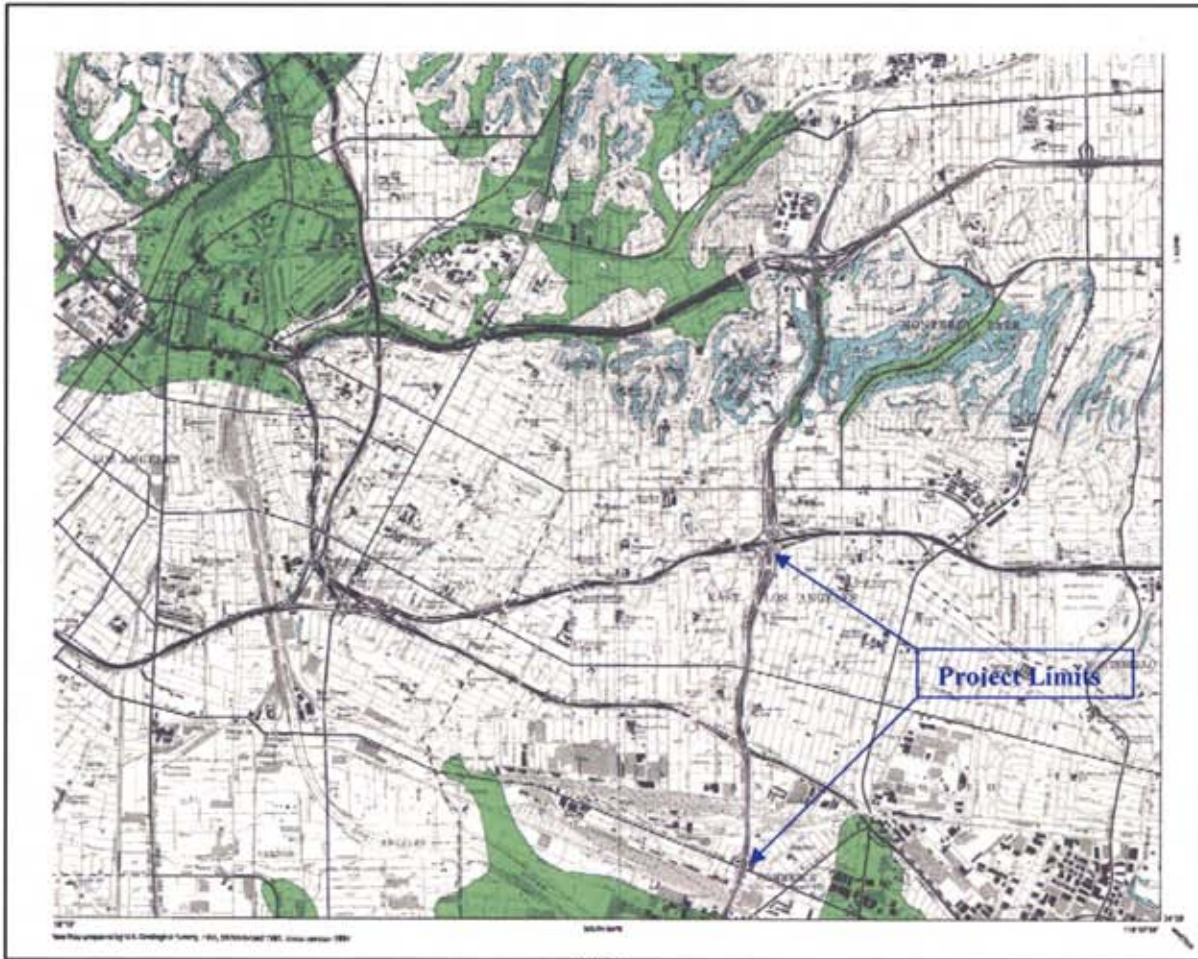
(Taken from T.W. Dibblee, Jr., 1989)

- Qa Alluvium; unconsolidated floodplain deposits of silt, sand and gravel.
- Qoa Older Surficial Sediments; remnants of older weakly consolidated alluvial deposits of gravel, sand and Silt.



**Figure 1**

Scale 1:24 000



**PURPOSE OF MAP**  
 This map was prepared by the California Department of Conservation, Division of Mines and Geology, in cooperation with the California Department of Public Works, Division of Highways, and the California Department of Transportation, in order to provide information regarding the seismic hazard zones in the Los Angeles area. The map is intended to be used as a guide in the planning and design of public works projects and other activities in the area. It is not intended to be used as a basis for engineering or other professional services.

**FOR A GENERAL DESCRIPTION OF THE Seismic Hazard Mapping Program, the Seismic Hazard Mapping Act and Regulations, and other information, please refer to the Public Works Division of Highways, Division of Highways, and the California Department of Transportation, in order to obtain a copy of the relevant documents.**

**IMPORTANT - PLEASE NOTE**  
 This map is not a guarantee of accuracy. It is intended for informational purposes only and should not be used as a basis for engineering or other professional services. The map is not intended to be used as a basis for engineering or other professional services. The map is not intended to be used as a basis for engineering or other professional services. The map is not intended to be used as a basis for engineering or other professional services.

**STATE OF CALIFORNIA  
 SEISMIC HAZARD ZONES**  
 In compliance with  
 Chapter 14, Section 17000 of the California Government Code  
 Division of Highways  
**LOS ANGELES QUADRANGLE**  
 OFFICIAL MAP  
 Released: March 25, 1999

*Janet A. Davis*  
 STATE GEOLOGIST

**MAP EXPLANATION**  
**Zones of Required Investigation**

**Classification**  
 Areas subject to high potential of liquefaction or loss of strength, settlement and ground failure. Conditions include a potential for permanent ground displacements such that investigation as defined in Public Resources Code Section 25157(a) would be required.

**Low Potential Areas/Low Risk**  
 Areas where permanent settlement of liquefaction potential, as well as settlement, expansion, contraction and subsidence water conditions include a potential for permanent ground displacements such that investigation as defined in Public Resources Code Section 25157(a) would be required.

**DATA AND INFORMATION SOURCES**  
 STATE OF CALIFORNIA, DIVISION OF HIGHWAYS  
 STATE OF CALIFORNIA, DIVISION OF HIGHWAYS, LOS ANGELES QUADRANGLE  
 California Department of Mines and Geology, Division of Highways  
 California Department of Public Works, Division of Highways

**For additional information on seismic hazards in this map area, the following should be consulted:**  
 California Department of Mines and Geology, Division of Highways  
 California Department of Public Works, Division of Highways

**Figure 2**