Appendix N

Report of Geotechnical Investigation for Environmental Impact Report

REPORT OF GEOTECHNICAL EVALUATION FOR ENVIRONMENTAL IMPACT REPORT

**PROPOSED LOS ANGELES CONVENTION CENTER MODERNIZATION
AND FARMERS FIELD PROJECT
BOUNDED BY WEST PICO BOULEVARD,
HARBOR FREEWAY, WEST 11TH STREET AND
SOUTH FIGUEROA STREET
LOS ANGELES, CALIFORNIA**

Prepared for:

L.A. EVENT CENTER, LLC

Los Angeles, California

March 28, 2012

**AMEC
Project 4953-11-1181**

amec

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Los Angeles, California

March 28, 2012
Project 4953-11-1181

March 28, 2012

Mr. Ted Tanner
L.A. Event Center, LLC
800 West Olympic Boulevard, Suite 305
Los Angeles, California 90015

Subject: **LETTER OF TRANSMITTAL**
Report of Geotechnical Evaluation for Environmental Impact Report
Proposed Los Angeles Convention Center Modernization
And Farmers Field Project
Los Angeles, California
AMEC Project 4953-11-1181

Dear Mr. Tanner:

We are pleased to submit our report of geotechnical evaluation for use in preparing the environmental impact report for the proposed Los Angeles Convention Center Modernization and Farmers Field Project, to be located at the Los Angeles Convention Center in the City of Los Angeles, California. The scope of our work was performed in general accordance with our contract with you dated July 5, 2011.

Please call if you have any questions or require additional information.

Sincerely,

AMEC Environment & Infrastructure, Inc.

PROFESSIONAL GEOLOGIST
ROSALIND MUNRO
NO. 1269
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

Rosalind Munro
Principal Engineering Geologist

Marshall Lew, Ph. D.
Senior Principal Engineer
Vice President

REGISTERED PROFESSIONAL ENGINEER
MARSHALL LEW
No. 522
EXP. 3-31-13
GEOTECHNICAL
STATE OF CALIFORNIA

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(2 copies submitted)

Cc: Matrix Environmental
Attention: Ms. Ashley Wright

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1.0 SCOPE

This report presents the results of our geotechnical evaluation for the proposed Los Angeles Convention Center Modernization and Farmers Field project to be developed on approximately 68 acres in the downtown area of the City of Los Angeles bounded by West Pico Boulevard, the Harbor Freeway, West Eleventh Street, and South Figueroa Street. The Project Site includes properties currently occupied by the Los Angeles Convention Center West Hall, STAPLES Center, the Bond Street Parking Lot, and the Cherry Street Parking Garage. The scope of our work was performed in accordance with our contract dated July 5, 2011.

The primary purpose of this study is to provide geotechnical information for incorporation into the Environmental Impact Report (EIR) planned to be filed for the Proposed Project. The results of our study are presented in this report. Our report is based on a review of boring logs for a portion of the site, previous geotechnical reports at the site and in the immediate area, and available published and unpublished geologic and seismic literature pertinent to the Project Site. The City of Los Angeles Safety Element of the General Plan (1996) and the Seismic Safety Element of the County of Los Angeles Draft Preliminary General Plan (2007) were reviewed as part of our scope. The reports we reviewed as part of our evaluation are listed in Section 8.0, Bibliography. No site-specific field work or testing of soil samples were performed as part of this work to verify site conditions or acquire data to be used for engineering design.

Our professional services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has been prepared for L.A. Event Center, LLC to be used solely in the preparation of an Environmental Impact Report for the proposed Los Angeles Convention Center Modernization and Farmers Field project in the City of Los Angeles, California. This report has not been prepared for use by other parties, and may not contain sufficient information for purposes of other parties or other uses. Subsurface explorations were not conducted as part of this assessment. The assessment of general site environmental conditions for the presence of pollutants in the soils and ground water of the site was beyond the scope of this investigation. This report does not contain geotechnical recommendations for design of the proposed facilities; a site-specific geotechnical investigation will be required in accordance with the requirements of the City of Los

Angeles Department of Building and Safety and the Los Angeles Building Code for the proposed facilities.

2.0 SITE CONDITIONS

The proposed Los Angeles Convention Center Modernization and Farmers Field project area is located in the downtown area of the City of Los Angeles (see Figure 1). The approximately 68-acre Project Site is bounded on the south by West Pico Boulevard, on the west by the Harbor Freeway (Interstate 110), on the north by West 11th Street/Chick Hearn Court, and on the east by South Figueroa Street. The Project Site is presently occupied by the Los Angeles Convention Center West Hall, STAPLES Center, the Bond Street Parking Lot, and the Cherry Street Parking Garage.

3.0 PROPOSED DEVELOPMENT

The Convention and Event Center Project (hereafter referred to as the "Proposed Project") consists of the following three components: (1) expansion and modernization of the Los Angeles Convention Center (hereafter referred to as the "Convention Center"); (2) the construction of a new multi-use entertainment and sports facility (hereafter referred to as the "Event Center"); and (3) related parking and support facilities. The Proposed Project is located within an approximately 68-acre site that includes all of the existing Convention Center property, including the Bond Street Parking Lot and the Cherry Street Parking Garage, STAPLES Center, as well as the air space over Pico Boulevard and LA LIVE Way (hereafter referred to as the "Project Site"). The Project Site is generally bounded by the following major roadways: the I-110 Harbor Freeway to the west; Chick Hearn Court to the north; Figueroa Street to the east; and Venice Boulevard to the south. Figure 1 depicts the location of the Proposed Project.

With the implementation of the Proposed Project, the Project Site would function as a unified center for convention, sports and entertainment uses. The Proposed Project is proposed to be implemented through adoption of a new Specific Plan and Community Plan Amendment. Although the Specific Plan encompasses the entire Project Site, its primary focus would be on the regulation of the proposed buildings and related features, including signage, as well as the regulation of transportation and parking. In addition, notable elements of environmental sustainability would be comprehensively integrated into the Proposed Project and would be one of the key elements that would guide the design of the Proposed Project. Total building square footage to be constructed under the Proposed Project would be approximately 1.74 million square feet of net new gross floor area. In addition to the above improvements, the Proposed Project includes approximately 97,160 square feet of renovations to the existing Concourse Hall. Changes to the Convention Center's existing South Hall would be limited to its interface with the proposed Pico Hall. Existing parking under the South Hall and in the Convention Center's Venice Garage would not be affected by the Proposed Project.

4.0 GEOLOGIC AND SEISMIC CONDITIONS

4.1 GEOLOGIC SETTING

The Project Site is located in the northern Peninsular Ranges geomorphic province close to the boundary with the Transverse Ranges geomorphic province. The Transverse Ranges geomorphic province is characterized by east-west trending mountain ranges that include the Santa Monica Mountains. The southern boundary of the Transverse Ranges province is marked by the Malibu Coast, Santa Monica, Hollywood, Raymond, Sierra Madre, and Cucamonga faults. The Peninsular Range province is characterized by northwest/southeast trending alignments of mountains and hills and intervening basins, reflecting the influence of northwest trending major faults and folds controlling the general geologic structural fabric of the region. This province extends northwesterly from Baja California into the Los Angeles Basin and westerly into the offshore area, including Santa Catalina, Santa Barbara, San Clemente and San Nicolas islands. It is bounded by the Colorado Desert along the San Jacinto fault zone on the east. The Los Angeles Basin is the northernmost part of the Peninsular Ranges province. The Newport-Inglewood fault zone, a northwest-trending structural zone expressed at the surface by a series of discontinuous low hills, is located approximately 5.6 miles southwest of the Project Site.

The topography of the Project Site is shown on the Site Location Map, Figure 1. The geology of the region is shown in Figure 2, Geologic Map. Figure 3, Regional Faults and Seismicity Map, shows major faults and earthquake epicenters in Southern California with respect to the Project Site.

4.2 GEOLOGIC MATERIALS

The Project Site is underlain by Holocene to Pleistocene age alluvial deposits. The geotechnical foundation investigation for the Los Angeles Convention Center by our legacy company of LeRoy Crandall and Associates (1968) reported firm natural soil 2 to 10 feet below the surface (at approximate elevations 224 to 231 feet above sea level). The firm natural soil consisted primarily of sand containing varying amounts of silt/clay, gravel, cobbles, and boulders. Layers of weaker and more compressible silt, silty sand, and clay were reported within the underlying firm sand deposits. Sand typically has a low expansion potential; however, layers of silt and clay could have medium to high expansion potential. The result of a single percolation test at the Bond Street

Parking lot indicated a percolation rate of 7.5 inches per hour in firm sand deposits less than 10 feet below the ground surface (Geotechnologies, 2008).

4.3 GROUND WATER

Based on information from the California Division of Mines and Geology, now the California Geological Survey (1998), the historic high ground-water level in the vicinity of the Project Site is estimated to be on the order of 90 feet below ground surface. Information on the State Water Resources Control Board's GEOTRACKER web site indicates that in 2008, groundwater was reported between depths of 100 and 120 feet in monitoring wells located approximately 830 feet northwest of the Project Site and between depths of 31 and 49 feet in monitoring wells located approximately 0.4 miles east of the Project Site. The monitoring wells east of the Project Site likely are monitoring groundwater that is perched above the regional ground-water aquifer. Prior borings drilled to a depth of 100 feet at the Project Site did not report ground water above that depth except for occasional minor seepage between approximately 17 and 36 feet.

4.4 FAULTS

The numerous faults in Southern California include active, potentially active, and inactive faults. The criteria for these major groups are based on criteria developed by the California Geological Survey (formerly the California Division of Mines and Geology) for the Alquist-Priolo Earthquake Fault Zoning Program (Hart, 1999). By definition, an active fault is one that has had surface displacement within Holocene time (about the last 11,000 years). A potentially active fault is a fault that has demonstrated surface displacement of Quaternary age deposits (within the last 1.6 million years) but not Holocene deposits. Inactive faults have not moved in the last 1.6 million years. A list of nearby active faults (those included in CGS, 2008) and the distance in miles between the nearest point on the fault and the Project Site, the maximum magnitude, and the slip rate for the fault, is given in Table 1. A similar list for potentially active faults is presented in Table 2. The faults in the vicinity of the Project Site are shown in Figure 3. Note that blind thrust faults do not come to the surface therefore are not shown on Figure 3.

Active Faults with Surface Rupture Potential

Hollywood Fault

The active Hollywood fault, a left lateral, reverse oblique fault, is approximately 4.6 miles north-northwest of the Project Site and is the closest mapped active fault to the Project Site with the potential for surface rupture. This fault trends east-west along the base of the Santa Monica Mountains from the West Beverly Hills lineament in the West Hollywood-Beverly Hills area (Dolan and Sieh, 1992) to the Los Feliz area of Los Angeles. The fault is a ground-water barrier within Holocene sediments (Converse et al., 1981). Studies by several investigators (Dolan et al., 2000b; Dolan et al., 1997; Dolan and Sieh, 1992; and Crook and Proctor, 1992) have indicated that the fault is active, based on geomorphic evidence, stratigraphic correlation between exploratory borings, and fault trenching studies. Additionally, recent investigations performed in the Hollywood area by our legacy company of Law/Crandall (2000) have demonstrated that Holocene age alluvial sediments have been offset by several strands of the Hollywood fault.

Until recently, the approximately 9.3 mile-long Hollywood fault was considered to be expressed as a series of linear scarps and faceted south-facing ridges along the south margin of the eastern Santa Monica Mountains and the Hollywood Hills. Multiple recent fault rupture hazard investigations have shown that the Hollywood fault zone is located south of the faceted ridges and bedrock outcrops along Sunset Boulevard (Harza, 1998, William Lettis & Associates, 1998, Law/Crandall, 2001). Active deposition of numerous small alluvial fans at the mountain front and a lack of fan incision suggest late Quaternary uplift of the Santa Monica Mountains along the Hollywood fault zone (Dolan et al., 2000b, Dolan et al., 1997, Dolan and Sieh, 1992, Crook et al., 1983). The fault dips steeply to the north and has juxtaposed Tertiary and Cretaceous age (1 to 150 million years old) rocks over young sedimentary deposits of the northern Los Angeles basin. The Hollywood fault zone has not produced any damaging earthquakes during the historical period and has had relatively minor micro-seismic activity.

An Alquist-Priolo Earthquake Fault Zone has not been established for the Hollywood fault. However, the Hollywood fault is considered active by the State. The City of Los Angeles also considers the Hollywood fault active for planning purposes.

Newport-Inglewood Fault Zone

The Newport-Inglewood fault zone, a right-lateral strike-slip fault, is located about 5.6 miles west-southwest of the Project Site. This fault zone is composed of a series of discontinuous northwest-trending en echelon faults extending from Ballona Gap southeastward past the Santa Ana River in Newport Beach, where it trends off-shore. This fault zone is reflected at the surface by a line of geomorphically young anticlinal hills and mesas formed by the folding and faulting of a thick sequence of Pleistocene age sediments and Tertiary age sedimentary rocks (Barrows, 1974). Fault-plane solutions for 39 small earthquakes (between 1977 and 1985) show mostly strike-slip faulting with some reverse faulting along the north segment (north of Dominguez Hills) and some normal faulting along the south segment (south of Dominguez Hills to Newport Beach) (Hauksson, 1987). Prior fault investigations by Law/Crandall (1993) in the Huntington Beach area indicate that the on-shore North Branch segment of the Newport-Inglewood fault zone offsets Holocene age alluvial deposits in the vicinity of the Santa Ana River. Portions of the Newport Inglewood fault zone are within Alquist-Priolo Earthquake Fault Zones. The City of Los Angeles considers the Newport Inglewood fault zone active for planning purposes.

Raymond Fault

The Raymond fault is located approximately 5.9 miles north-northeast of the Project Site. The fault is primarily a left-lateral strike-slip fault with a minor component of high-angle reverse offset, placing basement rocks north of the fault over alluvial sediments south of the fault. The Raymond fault has long been recognized as a ground-water barrier in the vicinity of the cities of Pasadena and San Marino and numerous geomorphic features along its entire length (such as fault scarps, sag ponds, springs, and pressure ridges) attest to the fault's activity during the Holocene epoch (last 11,000 years). Within the last 36,000 to 41,000 years, five to eight separate earthquake events have been recognized along the Raymond fault (Crook et al., 1987, Weaver and Dolan, 2000). The most recent fault movement, based on radiocarbon ages from materials collected in an excavation exposing the fault, occurred sometime between 2,160 ± 105 and 1,630 ± 100 years before present (LeRoy Crandall and Associates, 1978; Crook et al., 1987; Weaver and Dolan, 2000). An Alquist-Priolo Earthquake Fault Zone has been established for this fault, and it is considered active by the State and the City of Los Angeles. An average slip rate of 1.5 mm/yr and a maximum moment magnitude of 6.5 are estimated by the California Geological Survey (2008) for the Raymond fault.

Verdugo Fault

The active Verdugo fault zone is composed of several faults including the Verdugo fault, the San Rafael fault, and the Eagle Rock fault. The Verdugo fault, a reverse fault, is located approximately 7.4 miles north-northwest of the Project Site. The most recent documented activity along this fault occurs in the Holocene age alluvial deposits along the western flank of the Verdugo Mountains in the Burbank area (Los Angeles County Seismic Safety Element, 1990). A State of California Special Studies Earthquake Fault Zone has not been established for the Verdugo fault by the State. However, this portion of the fault is considered active by the State (Jennings and Bryant, 2010; California Geological Survey, 2008).

Santa Monica Fault

The north strand of the Santa Monica fault, a left lateral, reverse oblique slip fault, is located approximately 8.8 miles west-northwest of the Project Site. The Santa Monica and Hollywood fault zones form a portion of the Transverse Ranges Southern Boundary fault system. The Transverse Ranges Southern Boundary fault system also includes the Malibu-Coast fault to the west of the Santa Monica fault and the Raymond and Cucamonga faults to the east of the Hollywood fault (Dolan et al., 2000). The Santa Monica fault zone is the western segment of the Santa Monica-Hollywood fault zone. The fault zone trends east - west from the Santa Monica coastline on the west to the Hollywood area on the east. Urbanization and development within the greater Los Angeles area has resulted in a poor understanding of the lateral extent, location, and rupture history of the Santa Monica fault zone. However, the surface expression of the Santa Monica fault zone includes fault-related geomorphic features, offset stratigraphy, and ground water barriers within late Quaternary deposits (Hill et al., 1979).

Research indicates that the Santa Monica fault zone is separated into an east segment and a west segment, divided by the West Beverly Hills Lineament. The east segment of the Santa Monica fault zone is not considered active (Dolan et al., 2000a; Dolan et al., 1997, Hummon et al., 1992; Ziony et al., 1985). However, the west segment of the fault is considered active (Pratt et al., 1998; Dolan et al., 2000a). The north strand of the west segment of the fault is considered active, however the south strand is not considered active (Dolan et al., 2000a) Although the north strand of the west segment of the Santa Monica fault is considered active, it has not yet been included in an Alquist-Priolo Earthquake Fault Zone due to its poorly understood surface trace.

Sierra Madre Fault Zone

The Sierra Madre fault zone consists of five recognized sections of north-dipping reverse faults that separate the Sierra Madre Mountains from the San Fernando and San Gabriel valleys (Southern California Seismographic Network, 2011). The fault zone offsets Holocene deposits, has a reported slip rate of approximately 2 millimeters per year, and is capable of producing a maximum moment magnitude earthquake of 7.2 M_w (California Geological Survey, 2008). An Alquist-Priolo Earthquake Fault Zone has not been established for this fault; however, it is considered active by the State and the City of Los Angeles. The Sierra Madre fault zone is located approximately 12 miles northeast of the Project Site.

Malibu Coast Fault Zone

The active Malibu Coast fault zone, located about 15 miles west of the Project Site, is a series of east-west trending, north-dipping reverse faults extending westward from Santa Monica to offshore of Point Mugu. Fault trenching conducted in 1985 and 1986 on south Winter Mesa in the Malibu area of Los Angeles County exposed several faults offsetting Tertiary and Pleistocene age units, and one fault offsetting colluvial deposits estimated to be 6,000 years old (Fall et al., 1987). The observed fault, named the Winter Mesa fault, is believed to be a splay of the Malibu Coast fault zone; accordingly, the Holocene faulting on the Winter Mesa fault is considered representative of active faulting along the Malibu Coast fault zone. Portions of the Malibu Coast Fault have been included as an Alquist-Priolo Earthquake Fault Zone, and it is considered active by the State and the City of Los Angeles.

Palos Verdes Fault Zone

Studies by Stephenson et al. (1995), which included geophysical studies, aerial photograph interpretation, and limited fault trenching, indicate that there are several active on-shore splays of the Palos Verdes fault zone. Geophysical data also indicate the off-shore splays of the fault are active, offsetting Holocene age deposits (Clarke et al., 1985). Based on geophysical data, the dip of the fault is interpreted to be near vertical to 55 degrees to the southwest (Stephenson et al., 1995). Vertical separations up to about 5,900 feet occur across the fault at depth. However, strike-slip movement is indicated by the configuration of the basement surface and lithologic changes in the Tertiary age rocks across the fault. No historic large magnitude earthquakes are associated with this fault. An Alquist-Priolo Earthquake Fault Zone has not been established for this fault. However, the fault is considered active by the California Geological Survey (CGS) and local reviewing agencies. The closest splay of the active Palos Verdes fault zone to the Project Site is the off-shore segment, located approximately 16 miles to the southwest.

<u>San Andreas Fault Zone</u>

The Mojave section of the active San Andreas fault zone is located about 34 miles northeast of the Project Site. This left lateral strike-slip fault zone, California's most prominent structural feature, trend generally northwest for almost the entire length of the state. The last major earthquake along the San Andreas fault zone in Southern California was the 1857 Magnitude 7.9 (M_w) Fort Tejon earthquake. An Alquist-Priolo Earthquake Fault Zone has been established for this fault, and it is considered active by the State.

Blind Thrust Faults

Several buried thrust faults, commonly referred to as blind thrusts, underlie the Los Angeles Basin. These faults are not exposed at the ground surface and are typically identified at depths greater than 1.9 miles. These faults do not present a potential surface fault rupture hazard. However, the following described blind thrust faults are considered active and potential sources for future earthquakes.

<u>Puente Hills Blind Thrust</u>

The Puente Hills Blind Thrust fault is defined based on seismic reflection profiles, petroleum well data, and precisely located seismicity (Shaw et al., 2002). This blind thrust fault system extends eastward from downtown Los Angeles to Brea (in northern Orange County). The Puente Hills Blind Thrust fault includes three north-dipping segments, named from east to west as the Coyote Hills segment, the Santa Fe Springs segment, and the Los Angeles segment. These segments are overlain by folds expressed at the surface as the Coyote Hills, Santa Fe Springs Anticline, and the Montebello Hills. The Puente Hills Blind Thrust fault lies directly beneath downtown Los Angeles and the Project Site.

The Santa Fe Springs segment of the Puente Hills Blind Thrust fault is believed to be the causative fault of the October 1, 1987 Whittier Narrows Earthquake (Shaw et al., 2002). Postulated earthquake scenarios for the Puente Hills Blind Thrust fault include single segment fault ruptures capable of producing an earthquake of maximum moment magnitude 6.5 to 6.6 (M_w) and a multiple segment fault rupture capable of producing an earthquake of maximum moment magnitude 7.1 (M_w). The Puente Hills Blind Thrust fault is not exposed at the ground surface and does not present a potential for surface fault rupture. However, based on deformation of late Quaternary age sediments above this fault system and the occurrence of the Whittier Narrows earthquake, the Puente Hills Blind Thrust fault is considered an active fault capable of generating future earthquakes beneath the Los Angeles Basin. An average slip rate of 0.7 mm/yr and a maximum moment magnitude of 7.1 are estimated by the California Geological Survey (2008) for the Puente Hills Blind Thrust.

Upper Elysian Park Thrust

The Upper Elysian Park fault is a blind thrust fault that overlies the Los Angeles and Santa Fe Springs segments of the Puente Hills Thrust (Oskin et al., 2000 and Shaw et al., 2002). The eastern edge of the Upper Elysian Park fault is defined by the northwest-trending Whittier fault zone. The closest point of the vertical surface projection of the Upper Elysian Park fault is approximately 0.8 miles northeast of the Project Site at its closest point. Like other blind thrust faults in the Los Angeles area, the Upper Elysian Park fault is not exposed at the surface and does not present a potential surface rupture hazard; however, the Upper Elysian Park fault should be considered an active feature capable of generating future earthquakes. An average slip rate of 1.3 millimeters per year and a maximum moment magnitude of 6.4 are estimated by the California Geological Survey (2008) for the Upper Elysian Park fault.

Northridge (Blind) Thrust

The Northridge Thrust is located beneath the majority of the San Fernando Valley and is the causative fault of the January 17, 1994 maximum moment magnitude 6.7 (M_w) Northridge earthquake. This thrust fault is not exposed at the surface and does not present a potential surface fault rupture hazard. However, the Northridge Thrust is an active feature that can generate future earthquakes. The vertical surface projection of the Northridge Thrust is approximately 14 miles northwest of the Project Site at the closest point. The California Geological Survey (2008) estimates an average slip rate of 1.5 mm/yr. and a maximum moment magnitude of 7.0 for the Northridge Thrust.

Potentially Active Faults

MacArthur Park Fault

The potentially active MacArthur Park fault is located about 0.8 miles northeast of the Project Site. The fault, inferred west of downtown Los Angeles, has been located based on south-facing scarps, truncated drainages, and other geomorphic features (Dolan and Sieh, 1993). The fault is approximately 5 miles long, extending northwest from the Pershing Square area in downtown Los Angeles through MacArthur Park to the Paramount Studios area in Hollywood. Current information suggests the fault is potentially active.

Overland Fault

The potentially active Overland fault is located approximately 7.4 miles west-southwest of the Project Site. The Overland fault trends northwest between the Charnock fault and the Newport-Inglewood fault zone. The fault extends from the northwest flank of the Baldwin Hills to Santa Monica Boulevard in the vicinity of Overland Avenue. Based on water level measurements, displacement along the fault is believed to be vertical, with an offset of about 9 meters (Poland, 1959). The west side of the fault has apparently moved downward, relative to the east side, forming a graben between the Charnock and Overland faults. However, there is no evidence that this fault has offset late Pleistocene or Holocene age alluvial deposits (County of Los Angeles Seismic Safety Element, 1990). Ziony and Jones (1989) indicate that the fault is potentially active (no displacement of Holocene age alluvium).

Charnock Fault

The potentially active Charnock fault is located approximately 8.7 miles west-southwest of the Project Site. The Charnock fault trends northwest-southeast subparallel to the trend of the Newport-Inglewood fault zone and the Overland fault. Differential water levels across the fault occur in the early Pleistocene age San Pedro Formation. However, there is no evidence that this fault has offset late Pleistocene or Holocene age alluvial deposits (County of Los Angeles Seismic Safety Element, 1990). Ziony and Jones (1989) indicate that the fault is potentially active (no displacement of Holocene age alluvium).

Norwalk Fault

The potentially active Norwalk fault is located about 14 miles southeast of the Project Site. The fault is a known ground-water barrier along the southern edge of the Coyote Hills, trending southeasterly toward the Santa Ana Mountains. The fault is thought to be a north-dipping reverse oblique fault along which the Coyote Hills have been uplifted. This fault offsets lower Pleistocene age and older deposits near the mouth of the Santa Ana Canyon. However, there is no evidence that this fault has offset Holocene age alluvial deposits (Ziony and Jones, 1989). Additionally, Jennings and Bryant (2010) show this fault to be potentially active.

Northridge Hills Fault

The potentially active Northridge Hills fault located approximately 17 miles to the northwest of the Project Site. The Northridge Hills fault is a high-angle fault and its location is based primarily on the numerous oil test holes that have been drilled in the Northridge Hills. Logs of these wells indicate that the Modelo Formation has been displaced between 150 to 300 meters along the dip of the fault. The apparent movement along the fault has been dip-slip with the north block moving down. The apparent surface trace of the fault can be found in the Cretaceous age Chico Formation north of Chatsworth (Weber, 1980). Geomorphic evidence, such as scarps in the Pleistocene age alluvial deposits, has been identified on aerial photographs (Weber, 1980). The fault is considered potentially active by Jennings and Bryant (2010). However, a recent publication suggests that deformation of young sediments could be related to the Northridge Hills fault (Baldwin et al., 2000).

4.5 MINERAL RESOURCES

The Project Site is underlain by Quaternary alluvium that consists of sand with varying amounts of silt/clay, gravel, cobbles, and boulders. Sand and gravel is a valued mineral resource for the construction industry in California. Current City of Los Angeles zoning laws, ordinances, and the heavily urbanized development of downtown Los Angeles make it unlikely that this resource can be exploited in the future.

4.6 GEOLOGIC-SEISMIC HAZARDS

Surface Fault Rupture

The Project Site is not within a currently established Alquist-Priolo Earthquake Fault Zone for surface fault rupture hazards. The closest active fault to the Project Site with the potential for surface fault rupture is the Hollywood fault located approximately 4.6 miles to north-northwest.

The closest Alquist-Priolo Earthquake Fault Zone is for the Newport-Inglewood fault zone, located approximately 5.6 miles to the southwest.

Based on the available geologic data, active or potentially active faults with the potential for surface fault rupture are not known to be located directly beneath or projecting toward the Project Site. Therefore, the potential for surface rupture due to fault plane displacement propagating to the surface at the Project Site during the design life of the proposed development is considered low.

Seismicity

Earthquake Catalog Data

The seismicity of the region surrounding the Project Site was determined from research of a computer catalog of seismic data (Southern California Seismographic Network, 2011). This database includes earthquake data compiled by the California Institute of Technology for 1932 to 2011. We have also utilized data from 1889 to 1931 compiled by the California Geological Survey and from 1568 to 1888 compiled by Stover and Coffman (1993). The search for earthquakes that occurred within 100 kilometers (62.1 miles) of the Project Site indicates that 302 earthquakes of Magnitude 4.0 and greater (including three earthquakes greater than Magnitude 6.0) occurred between 1932 and 2011; three earthquakes of Magnitude 6.0 or greater occurred between 1889 and 1931; and 4 earthquakes of Magnitude 6.0 or greater occurred between 1769 and 1888. A list of these earthquakes is presented as Table 3. Faults and epicenters of earthquakes greater than Magnitude 5 in the greater Los Angeles area are shown in Figure 3.

The information for each earthquake in the table includes date and time in Greenwich Civil Time (GCT), location of the epicenter in latitude and longitude, quality of epicentral determination (Q), depth in kilometers, distance from the site in kilometers, and magnitude. Where a depth of 0.0 is given, the solution was based on an assumed 16-kilometer focal depth. The explanation of the letter code for the quality factor of the data is presented on the first page of Table 3.

Historic Earthquakes

A number of earthquakes of moderate to major magnitude have occurred in the Southern California area within the last 78 years. A partial list of these earthquakes is included in the following table.

Earthquake (Oldest to Youngest)	Date of Earthquake	Magnitude	Distance to Epicenter (Miles)	Direction to Epicenter
Long Beach	March 11, 1933	6.4	41	SE
Tehachapi	July 21, 1952	7.5	70	NW
San Fernando	February 9, 1971	6.6	24	N
Whittier Narrows	October 1, 1987	5.9	20	E
Sierra Madre	June 28, 1991	5.8	29	NE
Landers	June 28, 1992	7.3	115	ENE
Big Bear	June 28, 1992	6.4	92	E
Northridge	January 17, 1994	6.7	11	NNW
Hector Mine	October 16, 1999	7.1	130	ENE
Sierra El Mayor	April 4, 2010	7.2	~170	SE

Prepared by: PWK, DEC

Seismic Design Parameters

Seismic design parameters are defined in the 2010 California Building Code (CBC) and the ASCE 7-05 Standard (ASCE, 2005) for use in the design of buildings and structures. We have determined the seismic design parameters in accordance with the provisions of the 2010 CBC and ASCE 7-05 Standard using the United States Geological Survey (USGS, 2011) program, Earthquake Ground Motion Parameters, Version 5.1.0. The site location was Latitude 34.0409° and Longitude -118.2705°; the Site Class as defined in the CBC was assumed to be Type “D”. The seismic design parameters are presented in the following table:

Seismic Design Parameters

Parameter	Value
S_S (0.2 second period, Site Class B)	2.01g
S_1 (1.0 second period, Site Class B)	0.69g
Site Class	D
F_a	1.0
F_v	1.5
$S_{MS} = F_aS_S$ (0.2 second period)	2.01g
$S_{M1} = F_vS_1$ (1.0 second period)	1.03g
$S_{DS} = 2/3 \times S_{MS}$ (0.2 second period)	1.34g
$S_{D1} = 2/3 \times S_{M1}$ (1.0 second period)	0.68g

Project Site Liquefaction

Liquefaction is the process in which loose granular soils below the ground-water table temporarily lose strength during strong ground shaking as a consequence of increased pore pressure and, thereby, reduced effective stress. The vast majority of liquefaction hazards are associated with sandy soils and silty soils of low plasticity (California Geological Survey, 2008). Potentially liquefiable soils (based on composition) must be saturated or nearly saturated to be susceptible to liquefaction (California Geological Survey, 2008).

Significant factors that affect liquefaction include water level, soil type, particle size and gradation, relative density, confining pressure, intensity of shaking, and duration of shaking. These factors must be evaluated on a site-specific basis to assess the potential for ground failure caused by liquefaction at the Project Site. Liquefaction potential has been found to be the greatest where the ground water level is shallow and submerged loose, fine sands occur within a depth of about 50 feet or less. Liquefaction potential decreases with increasing grain size and clay and gravel content, but increases as the ground acceleration and duration of shaking increase.

According to the City of Los Angeles Safety Element (1996) and the California Division of Mines and Geology (1998 and 1999), the Project Site is within an area not identified as having a potential for liquefaction. Based on information from the California Division of Mines and Geology (1998), ground water has historically been as high as approximately 90 feet below the existing ground surface. Therefore, the potential for liquefaction to occur at the Project Site is low.

Seismic-induced settlement is often caused by loose to medium-dense granular soils densified during ground shaking. Uniform settlement beneath a given structure would cause minimal damage; however, because of variations in distribution, density, and confining conditions of the soils, seismic-induced settlement is generally non-uniform and can cause serious structural damage. Dry and partially saturated soils as well as saturated granular soils are subject to seismic-induced settlement. The underlying soils at the Project Site are dense and are not considered susceptible to significant seismic induced settlement.

Slope Stability

The site is relatively level. There are no known landslides at the Project Site, nor is the Project Site in the path of any known or potential landslides. The Project Site is not within an area identified as having a potential for slope instability in the City of Los Angeles Safety Element of the General Plan (1996). The Project Site is not within a California Division of Mines and Geology (1999) Seismically Induced Landslide Hazard Zone. The Project Site soils are generally uncemented. If constructed at angles greater than approximately 1:1 (horizontal to vertical), temporary cut slopes may be susceptible to sloughing and failure. Measures to address this potential impact are set forth in Section 6.0 below.

Tsunamis, Inundation, and Seiches

The Project Site located approximately 12 miles from San Pedro Bay and at an elevation of 230 to 235 feet above mean sea level. According to the City of Los Angeles Seismic Safety Element (1996) and the state of California (2009), the Project Site is not located within a tsunami run-up zone.

According to the City of Los Angeles Seismic Safety Element (1996), the extreme southeastern corner of the Project Site is within a potential inundation hazard area, which is an area located downslope of a large body of water that could adversely affect the Project Site in the event of earthquake-induced dam failures. The Project Site is not within a hazard area for seiches (wave oscillations in an enclosed or semi-enclosed body of water).

Flooding

The Project Site is not within a flood influence area of the City of Los Angeles Seismic Safety Element (1996) or a FEMA flood hazard zone.

Expansive and Corrosive Soils

The sands at the Project Site typically have a low expansion potential; however, the silts and local clays could have medium to high expansion potential and could shrink and swell with variations in moisture content. Corrosion testing of soils within 0.5 miles of the Project Site indicated that soils are mildly to severely corrosive to ferrous metals, aggressive to copper and exposure of concrete to sulfate attack was considered negligible to moderate (MACTEC, 2004a and 2004b and Law/Crandall, 1999). The soils at the Project Site are likely to exhibit similar corrosive properties.

Oil Wells and Methane Gas

According to maps published by the California Division of Oil, Gas, and Geothermal Resources (CDOGGR, 2006), the Project Site is situated above the Los Angeles Downtown oil field, which was discovered in 1965. Oil and gas currently are produced from formations deeper than approximately 3,000 feet below the surface and producing wells are located approximately 0.5 miles southeast of the Project Site (CDOGGR, 2010).

According to CDOGGR (2006), one former oil drilling site is present within the footprint area of proposed Farmers Field. CDOGGR maps indicate that this drilling location has been plugged and abandoned. Because the Project Site is situated above an oil field, there is a potential that undocumented wells could be encountered during the proposed site development. Any wells encountered during construction will have to be abandoned in accordance with current CDOGGR standards and regulations.

The Project Site is located in a City of Los Angeles methane zone which means there is a potential for methane and other volatile gases to occur beneath the site. The City will require a subsurface methane investigation and if testing indicates that methane is present at the Project Site, then a permanent methane gas control system may be necessary beneath proposed buildings at the Project Site.

Subsidence

The Project Site is not located within an area of known subsidence associated with oil or ground water withdrawal, peat oxidation, or hydro-compaction. A potential for subsidence may be present as a result of pumping oil, water, and gas in the Los Angeles Downtown Oil Field, however, the area is not known for subsidence and oil field operations include water flooding and gas injection that tend to counteract the potential for subsidence to occur. The city of Los Angeles is responsible for monitoring oil extraction activities and administers oil drilling permits and may issue additional mitigation measures to address subsidence if deemed necessary (City of Los Angeles, 1996). Therefore the potential for subsidence is considered low.

Volcanic Hazards

Due to the distance between the Project Site and known active volcanic areas, there are no significant impacts related to volcanic hazards at the site. The proposed development will not result in or expose people to significant impacts related volcanic hazards.

Radon

The Project Site is not in a radon potential hazard zone (CGS, 2005).

Landform Alteration

There are no significant landforms at the Project Site therefore the potential impact is negligible.

5.0 SUMMARY OF POTENTIAL GEOLOGIC-SEISMIC IMPACTS

Surface Fault Rupture

Based on the available geologic data, active or potentially active faults with the potential for surface fault rupture are not known to cross or project toward the Project Site and the potential for surface fault rupture at the site is low. Therefore, the Proposed Project will not result in significant impacts related to surface fault rupture.

Seismicity and Ground Shaking

The location of the Project Site relative to known active or potentially active faults indicates the Project Site could be subjected to significant ground shaking caused by earthquakes. This hazard is common in Southern California and the effects of ground shaking can be mitigated by proper engineering design and construction in conformance with current building codes and engineering practices.

Liquefaction

The Project Site is not within an area identified as having a potential for liquefaction. It is anticipated that site soils that will not be susceptible to liquefaction because the historic high ground level is 90 feet below the surface.

Settlement

Seismic-induced settlement is often caused by loose to medium-dense granular soils densified during ground shaking. It is anticipated that Project Site soils that could be susceptible to seismic-induced will be removed from excavations, therefore, the hazard is considered low.

Slope Stability

There are no known landslides at the Project Site, nor is the site in the path of any known or potential landslides. The Project Site is not within an area identified as having a potential for slope or as having a potential for seismic slope instability (slope instability resulting from ground shaking). However, temporary excavations at the Project Site with slopes steeper than approximately 1:1 may not be stable. Measures to address this potential impact are set forth in Section 6.0 below.

Ground Water

Ground water has not been encountered in prior borings at the Project Site above a depth of 50 feet. According to the California Geological Survey (1998), the historic high ground-water depth is estimated around 90 feet.

Expansive and Corrosive Soils

The expansion potential of fine-grained soils at the Project Site is expected to range from low to medium. Project Site soils are expected to be mildly to severely corrosive to ferrous metals, aggressive to copper, and exposure of concrete to sulfate attack is expected to be negligible to moderate. Measures to address this potential impact are set forth in Section 6.0 below.

Tsunamis, Inundation, and Seiches

The Project Site is not within a tsunami or seiche hazard zone and the risk of tsunami or seiche affecting the site is low. The extreme southeastern corner of the Project Site is within a potential inundation hazard zone. Dams in California are continually monitored by various governmental agencies (such as the State of California Division of Safety of Dams and the U.S. Army Corps of Engineers) to guard against the threat of dam failure. The possibility of dam failures during an earthquake has been addressed by the California Geological Survey in the earthquake planning scenarios for a magnitude 8.3 earthquake on the San Andreas fault zone (Davis et al., 1982) and a magnitude 7.0 earthquake on the Newport-Inglewood fault zone (Toppozada et al., 1988). As stated in both reports, catastrophic failure of a major dam as a result of a scenario earthquake is regarded as unlikely. Current design and construction practices, and ongoing programs of review, modification, or total reconstruction of existing dams are intended to ensure that all dams are capable of withstanding the maximum credible earthquake (MCE) for the site. Therefore, the potential for inundation at the Project Site as a result of an earthquake-induced dam failure is considered low.

Flooding

The Project Site is not within a flood influence area of the City of Los Angeles Seismic Safety Element (1996) or a FEMA flood hazard zone.

Oil Wells and Methane Gas

The Project Site overlies the Los Angeles Downtown oil field and is located in the City of Los Angeles Methane Zone which means there is a potential for methane and other volatile gases to occur beneath the Project Site. According to California Division of Oil, Gas, and Geothermal Resources maps, there is one plugged and abandoned oil drilling location on the Project Site. There is a potential that undocumented wells could be encountered during the proposed development of the Project site. Measures to address this potential impact are set forth in Section 6.0 below.

Subsidence

The Project Site is not located within an area of known subsidence associated with oil or ground water withdrawal, peat oxidation or hydro-compaction. The potential for subsidence to affect the Proposed Project is considered to be low.

Radon

The Project Site is not in a radon potential hazard zone.

Mineral Resources

Sand and gravel deposits, a valued resource for the construction industry, underlie the Project Site; however, dense urbanization makes it highly unlikely that this resource will be exploited.

Landform Alteration

There are no unique geologic features in the vicinity of the Project Site. Therefore, no unique geologic features will be modified or destroyed as a result of the Proposed Project.

Volcanic Hazards

Due to the distance between the Proposed Site and known active volcanic areas, there are no significant impacts related to volcanic hazards at the Project Site. The Proposed Project will not result in or expose people to significant impacts related volcanic hazards.

6.0 ADDRESSING FOR POTENTIAL GEOLOGIC-SEISMIC IMPACTS

General

As part of the standard conditions of approval for the development as a whole, the Proposed Project will be designed and built in compliance with City of Los Angeles Building Code requirements. The City of Los Angeles will require that the results of a comprehensive geotechnical investigation be submitted as part of the permitting process for the project. The City of Los Angeles will require that the specific design recommendations presented in the comprehensive geotechnical report be incorporated into the design and construction of the Proposed Project.

Proper engineering design and conformance with recommendations presented in the comprehensive geotechnical report for the Proposed Project, in compliance with current Building Codes as required by the City of Los Angeles, will ensure the identified potential geotechnical impacts are less than significant.

Seismicity and Ground Shaking

The potential for significant ground shaking is common in Southern California and the effects of ground shaking can be mitigated by proper engineering design and construction in conformance with current building codes and engineering practices.

Slope Stability

If constructed at angles steeper than approximately 1:1, temporary cut slopes are susceptible to sloughing and failure. Temporary shoring will be designed to protect the temporary excavations and adjacent properties.

Ground Water

The maximum depth of proposed excavation for the Proposed Project is 50 feet. The regional ground-water aquifer is greater than 100 feet below the surface at the Project Site. Therefore, ground water is not expected to affect the Proposed Project.

Expansive and Corrosive Soils

Testing of Project Site soils will need to be performed and structures and Project Site improvements will need to be designed to resist the effects of expansive and corrosive soils.

Oil Wells and Methane Gas

One plugged and abandoned oil drilling location was mapped on the Project Site. Any undocumented wells encountered during the Proposed Project development will be abandoned in accordance with current California Division of Oil and Gas standards and regulations.

Since the Project Site is located in a city of Los Angeles Methane Zone and overlies the Los Angeles Downtown oil field, there is a potential for methane and other volatile gases to occur beneath the Project Site. If testing indicates that methane is present at the Project Site, a permanent methane gas control system may be necessary beneath the proposed building at the Project Site. If necessary, a methane gas consultant should be retained for the design of such a system.

Inundation

The extreme southeastern corner of the site is within a potential inundation hazard area of the city of Los Angeles. The potential for inundation at the Project Site can be mitigated by proper engineering design and construction in conformance with current building codes and engineering practices.

7.0 ANTICIPATED FOUNDATION CONDITIONS

Based on the geotechnical investigation for the Los Angeles Convention Center by our legacy company of LeRoy Crandall and Associates (1968), firm natural soils were encountered beneath the Project Site at approximate elevations 224 to 231 feet above sea level. As mentioned previously, the firm natural soil consisted primarily of sand containing varying amounts of silt/clay, gravel, cobbles, and boulders. Layers of weaker and more compressible silt, silty sand and clay were reported within the underlying firm sand deposits.

It is anticipated that the proposed Los Angeles Convention Center Modernization and Farmers Field project may be supported on spread footing foundations established in the firm natural soils in a manner similar to the foundations for the existing West Hall of the Convention Center, STAPLESSTAPLES Center, and LA LIVE developments. It is anticipated that spread footings established in the firm undisturbed natural soils and carried at least four feet below adjacent final grade or floor level may be designed to impose a dead plus live load pressure of about 8,000 pounds per square foot. Because of the possibility of the more compressible soils beneath footings, the soils beneath each footing should be explored prior to footing excavation with a shallow boring. The settlement for column loads up to 2,500 kips is estimated to be on the order of one inch. Heavier column loads may need to be supported on drilled cast-in-place piling to reduce settlement.

Excavations may be slope or shored depending on the space available. Where shoring is needed, conventional cantilevered or tied-back shoring may be used.

A site-specific geotechnical investigation will be required for the Proposed Project. The geotechnical investigation should include subsurface explorations and appropriate soil testing. The report should provide recommendations for foundation support, grading, excavation, shoring, and seismic design parameters needed for design and construction of the Proposed Project.

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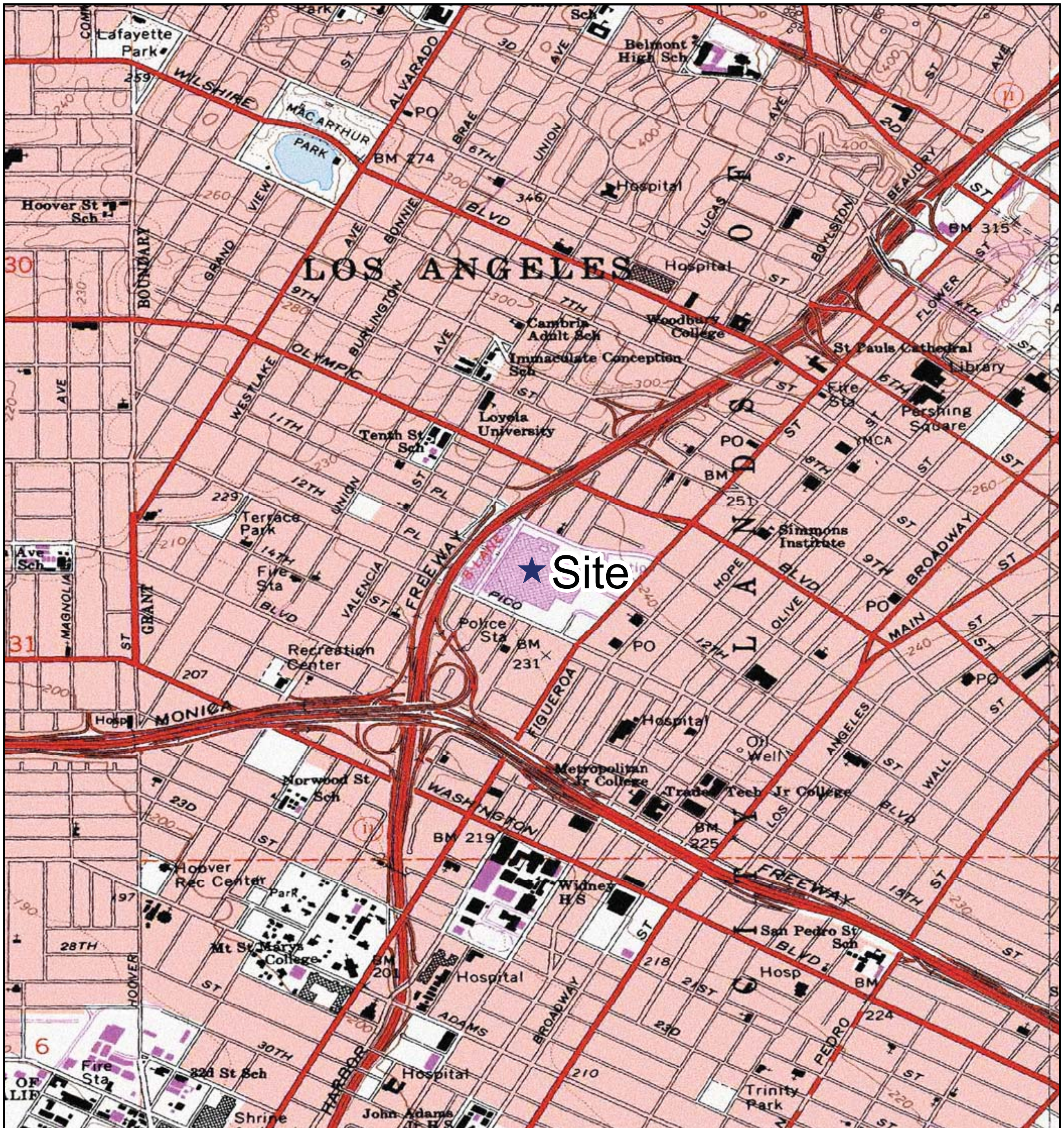
FIGURES



Basemap modified from U. S. G. S. 7.5 minute quadrangle map
Los Angeles 1966, California. Photo-revised 1981, minor revision 1994.

N

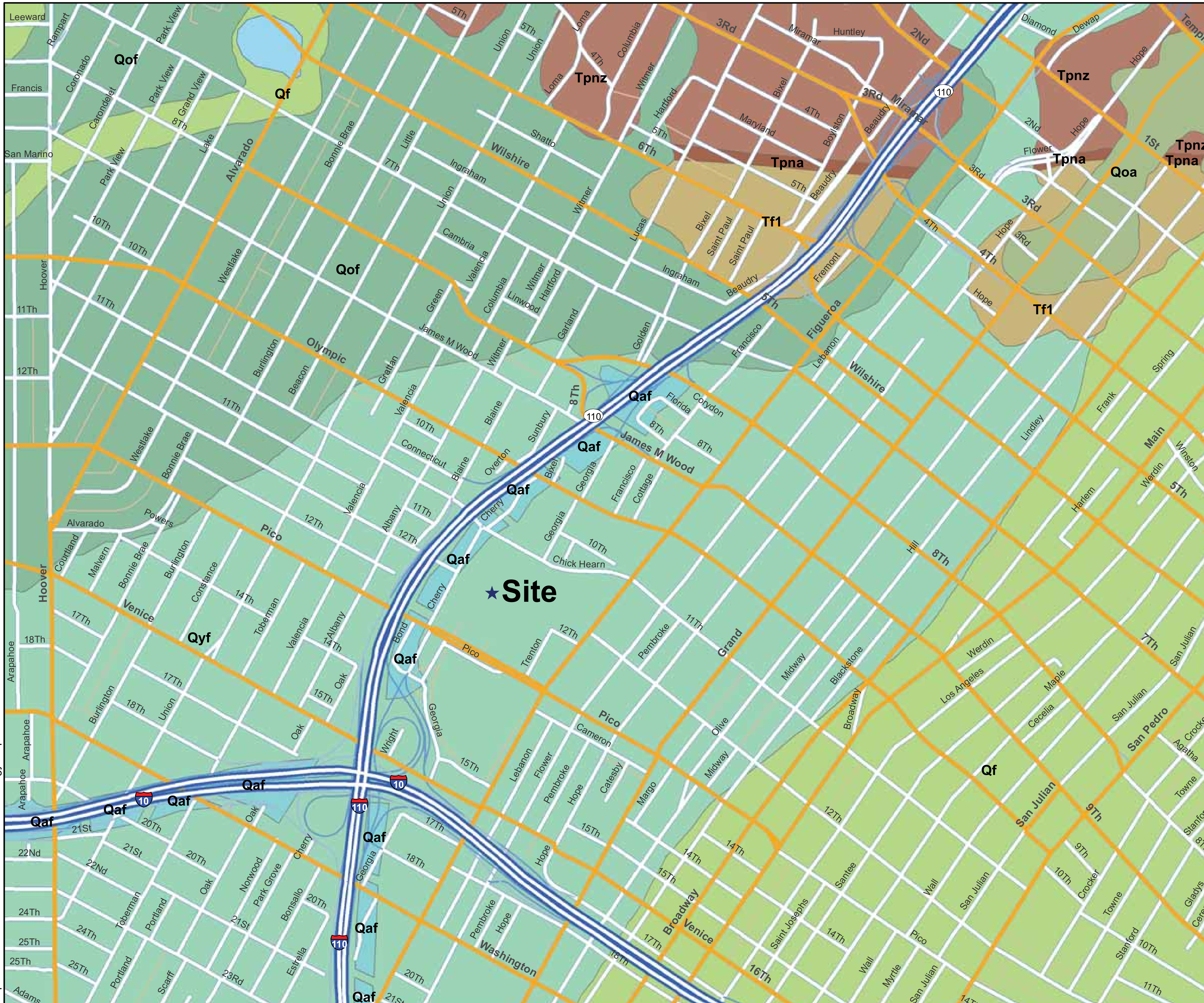
1,000 500 0 1,000

Approximate Scale in Feet

SITE LOCATION MAP
Proposed Los Angeles Convention Center
Modernization and Farmers Field Project
Los Angeles, California

By: pah	Date: 09/06/11	Project No. 4953-11-1181
	amec	Figure 1

Path: Y:\MACTEC 4953-11-1181\esri\Site Location Map.mxd



Explanation

- **Qaf** Artificial fill
- **Qf** Very young alluvial-fan deposits (late Holocene)
- **Qyf** Young alluvial-fan deposits (Holocene and late Pleistocene)
- **Qof** Old alluvial-fan deposits (late to middle Pleistocene)
- **Qoa** Old alluvial-valley deposits (late to middle Pleistocene)

Fernando Formation (Pliocene)

- **Tf1** Lower member

Puente Formation (early (Pliocene and Miocene)

- **Tpna** Sandstone
- **Tpnz** Siltstone

500 250 0 500

Approximate Scale in Feet

Source: Yerkes, R. F., and Campbell, R. H., 1997, Preliminary geologic map of the Los Angeles 7.5 minute quadrangle, Southern California: A digitial database: U. S. Geologic Survey Open-File Report; 97-432

GEOLOGIC MAP
Proposed Los.Angeles Convention Center
Modernization and Farmers Field Project
Los Angeles, California

By: pah	Date: 09/07/11	Project No. 4953-11-1181
amec		Figure 2

File path: Y:\MACTEC 4953-11-1181\esri\Geology Map.mxd

APPROXIMATE EPICENTRAL AREA OF EARTHQUAKE

M8+

M7+

M6+

M5+

Historic Fault Displacement

Holocene Fault Displacement

Evidence of Late Quaternary Fault Displacement

Undivided Quaternary Faults

Bar and ball on downthrown side (relative or apparent)

Arrows along fault indicate relative or apparent direction of lateral movement

Arrows on fault indicates direction of dip

Low angle fault identified with barbs on upper plate. Fault surface generally dips less than 45°but locally may have been subsequently steepened.

0 10 20
KM

0 12 24
Miles

REFERENCES:

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Earthquake Catalogs: Richter, 1812-1905, National Oceanic and Atmospheric Administration, 1906-1931; Southern California Earthquake Center, 1932-2010.

amec

AMEC E & I, Inc.
5628 E. SLAUSON AVE.
LOS ANGELES, CALIFORNIA 90040
(323) 889-5300 fax (323) 889-5398

FIGURE 3. Regional Faults and Seismicity Map
L.A. Convention Center and Farmers Field Project
Los Angeles, California

JOB NO.:	4953-11-1181	REVISIONS:
DATE:	09/08/11	
SCALE:	as shown	
DRAWN BY:	PWK	
CHECKED BY:	RM	

TABLES

Table 1
Major Named Faults Considered to be Active
in Southern California

Fault (in increasing distance)	Maximum Magnitude			Slip Rate (mm/yr.)	Distance From Site (miles)	Direction From Site
Puente Hills Blind Thrust	7.1	(a)	BT	0.7	-	-
Upper Elysian Park Thrust	6.4	(a)	BT	1.3	0.8	NE
Hollywood	6.4	(a)	RO	1.0	4.6	NNW
Newport-Inglewood	7.1	(a)	SS	1.0	5.6	WSW
Raymond	6.5	(a)	SS/ RO	1.5	5.9	NNE
Verdugo	6.9	(a)	R	0.5	7.4	NNW
Santa Monica	6.6	(a)	RO	1.0	8.8	WNW
Sierra Madre	7.2	(a)	R	2.0	12	NNE
Northridge Thrust	7.0	(a)	BT	1.5	14	NW
Whittier	6.8	(a)	RO	2.5	14	ESE
Malibu Coast	6.7	(a)	RO	0.3	15	W
Palos Verdes Hills	7.3	(a)	SS	3.0	16	SW
Sierra Madre-San Fernando Segment	6.7	(a)	R	2.0	16	NNW
San Gabriel	7.2	(a)	SS	1.0	17	NE
Clamshell Sawpit	6.5	(a)	R	0.5	17	ENE
San Jose	6.4	(a)	RO	0.5	22	E
Santa Susana	7.0	(a)	RO	5.0	23	NW
Anacapa	7.5	(a)	RO	3.0	24	W
Simi-Santa Rosa	7.0	(a)	RO	1.0	30	NW
Holser	6.5	(a)	RO	0.4	30	NW
Central Avenue	6.7	(a)	NO	1.0	31	E
San Joaquin Thrust	6.6	(a)	BT	0.5	31	SSE
Cucamonga	6.9	(a)	RO	5.0	33	E
San Andreas-Mojave South Section	7.4	(a)	SS	29.0	34	NE
Oak Ridge	7.0	(a)	R	4.0	36	NW
Elsinore-Glen Ivy Section	6.8	(a)	SS	5.0	37	SE
San Cayetano	7.0	(a)	R	6.0	39	NW
San Jacinto-San Bernardino Valley Section	6.7	(a)	SS	6.0	44	ENE
San Andreas-San Bernardino North Section	7.5	(a)	SS	22.0	47	ENE
Santa Ynez	7.1	(a)	SS	2.0	65	NW
Santa Cruz Island	7.0	(a)	RO	1.0	71	W

(a) California Geological Survey, 2008
SS Strike Slip
NO Normal Oblique
RO Reverse Oblique
BT Blind Thrust

Prepared by: PWK 09/02/11
Checked by: PJE 09/02/11

Table 2
Major Named Faults Considered to be Potentially Active in Southern California

Fault (in increasing distance)	Maximum Magnitude			Slip Rate (mm/yr.)	Distance From Site (miles)	Direction From Site
MacArthur Park	5.7	(e)	RO	0.1	0.8	NE
Overland	6.0	(c)	SS	0.1	7.4	WSW
Charnock	6.5	(c)	SS	0.1	8.7	WSW
Norwalk	6.7	(c)	RO	0.1	14	SE
Los Alamitos	6.2	(b)	SS	0.1	17	SSE
Northridge Hills	6.6	(d)	SS	1.2	17	NNW
Duarte	6.7	(c)	RO	0.1	17	ENE
El Modeno	6.5	(b)	NO	0.1	24	SE
Indian Hill	6.6	(b)	RO	0.1	24	E
Peralta Hills	6.5	(b)	RO	0.1	29	SE
Pelican Hill	6.3	(b)	SS	0.1	36	SSE

(b) Mark, 1977
(c) Slemmons, 1979
(d) Wesnousky, 1986
(e) Hummon et al., 1994
SS Strike Slip
NO Normal Oblique
RO Reverse Oblique
BT Blind Thrust

Prepared by: PWK 09/02/11
Checked by: PJE 09/02/11

Table 3
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 km of the Site
(Caltech Data 1932-2011)

Site Name: LA Event Center Latitude (degrees):	34.043313	Longitude (degrees):	-118.269731		6378.137

Date (mm/dd/yyyy)	Time (hh:mm:ss)	Magnitude	Magnitude Type [1]	Latitude (degrees)	Longitude (degrees)	Distance (km)	Depth (km)	Q [2]
10/21/1932	17:29:41	4.1	L	33.234	-118.579	95	6.0	C
11/01/1932	04:45:47	4.0	L	34.033	-117.304	89	18.7	B
03/11/1933	01:54:09	6.4	W	33.631	-117.999	52	6.0	C
03/11/1933	02:04:00	4.7	H	33.630	-117.970	54	6.0	C
03/11/1933	02:09:00	4.5	L	33.630	-117.970	54	6.0	C
03/11/1933	02:09:58	4.4	H	33.794	-118.059	34	6.0	C
03/11/1933	02:11:00	4.4	H	33.750	-118.083	37	0.0	Z
03/11/1933	02:16:00	4.5	H	33.750	-118.083	37	6.0	Z
03/11/1933	02:17:23	4.6	L	33.728	-117.892	50	6.0	C
03/11/1933	02:28:14	4.5	L	33.733	-117.983	44	6.0	C
03/11/1933	02:29:59	4.7	L	33.750	-118.083	37	6.0	D
03/11/1933	02:31:00	4.4	H	33.600	-118.000	55	0.0	Z
03/11/1933	02:58:18	4.2	H	33.736	-118.114	37	6.0	C
03/11/1933	03:00:23	4.4	H	33.752	-118.201	33	6.0	C
03/11/1933	03:05:57	4.2	L	33.683	-117.661	69	6.0	C
03/11/1933	03:10:21	4.0	L	33.715	-117.924	49	6.0	C
03/11/1933	03:11:00	4.0	H	33.750	-118.083	37	6.0	C
03/11/1933	03:24:01	4.8	L	33.705	-118.069	42	6.0	C
03/11/1933	04:37:31	4.4	H	33.735	-118.042	40	6.0	C
03/11/1933	04:39:00	4.9	H	33.750	-118.083	37	0.0	Z
03/11/1933	04:40:00	4.7	H	33.750	-118.083	37	0.0	Z
03/11/1933	05:11:03	4.9	H	33.756	-118.020	39	6.0	C
03/11/1933	05:13:25	4.4	L	33.638	-117.913	56	6.0	C
03/11/1933	05:18:48	5.0	H	33.767	-117.985	40	6.0	C
03/11/1933	05:21:45	4.1	L	33.722	-117.910	49	6.0	C
03/11/1933	06:12:29	4.1	L	33.794	-118.114	31	6.0	C
03/11/1933	06:18:45	4.1	L	33.681	-118.118	43	6.0	C
03/11/1933	06:58:44	5.3	H	33.624	-118.001	53	6.0	C
03/11/1933	07:50:54	4.1	L	33.785	-118.066	34	6.0	C
03/11/1933	08:09:07	4.3	L	33.655	-117.976	51	6.0	C
03/11/1933	08:55:39	4.9	H	33.701	-118.003	45	6.0	C
03/11/1933	09:10:58	4.8	H	33.757	-117.944	44	6.0	C
03/11/1933	09:11:00	4.1	L	33.750	-118.083	37	6.0	C

03/11/1933	11:04:38	4.4	L	33.764	-118.020	39	6.0	C
03/11/1933	11:42:28	4.0	L	33.770	-118.142	33	6.0	C
03/11/1933	11:47:42	4.2	L	33.744	-118.037	40	6.0	C
03/11/1933	12:50:50	4.2	L	33.679	-117.950	50	6.0	C
03/11/1933	13:51:15	4.2	L	33.737	-117.991	43	6.0	C
03/11/1933	14:26:20	4.5	L	33.820	-118.127	28	6.0	C
03/11/1933	14:47:17	4.3	L	33.752	-118.005	41	6.0	C
03/11/1933	14:57:38	4.3	L	33.885	-118.157	20	6.0	C
03/11/1933	15:10:20	4.3	L	33.745	-118.013	41	6.0	C
03/11/1933	16:54:29	4.5	L	33.728	-117.999	43	6.0	C
03/11/1933	22:32:00	4.0	L	33.799	-118.071	33	6.0	C
03/12/1933	00:28:05	4.2	L	33.712	-118.006	44	6.0	C
03/12/1933	06:16:57	4.1	L	33.814	-118.129	29	3.0	C
03/12/1933	17:38:26	4.1	L	33.505	-117.867	71	6.0	C
03/12/1933	19:30:30	4.1	L	33.752	-118.178	34	6.0	C
03/12/1933	23:24:39	4.0	H	33.678	-117.975	49	8.0	C
03/12/1933	23:54:37	4.3	L	33.712	-117.981	46	4.0	C
03/13/1933	04:33:26	4.4	L	33.817	-118.176	27	6.0	C
03/13/1933	13:18:14	4.8	L	33.741	-118.001	42	6.0	C
03/13/1933	19:30:30	4.1	L	33.750	-118.186	34	5.0	C
03/14/1933	00:36:55	4.1	L	33.688	-118.086	43	6.0	C
03/14/1933	12:19:48	4.4	L	33.706	-118.070	42	6.0	C
03/14/1933	19:02:36	4.8	L	33.688	-118.019	46	8.0	C
03/15/1933	05:41:03	4.1	L	33.783	-118.198	30	6.0	C
03/15/1933	11:13:19	4.7	L	33.714	-118.002	44	6.0	C
03/16/1933	15:29:00	4.2	L	33.535	-117.844	69	6.0	C
03/16/1933	15:30:00	4.1	H	33.750	-118.083	37	6.0	Z
03/18/1933	20:52:00	4.2	L	33.474	-117.917	71	6.0	C
03/21/1933	03:26:00	4.0	L	33.837	-118.160	25	6.0	C
03/23/1933	08:40:00	4.1	L	33.496	-118.170	62	6.0	C
03/25/1933	13:46:00	4.1	L	33.422	-117.754	84	6.0	C
03/30/1933	12:25:00	4.3	L	33.840	-118.208	23	6.0	C
04/01/1933	06:42:00	4.2	L	33.552	-118.041	59	6.0	C
04/29/1933	14:59:59	4.2	L	33.433	-118.145	69	6.0	C
10/02/1933	09:10:19	4.8	L	33.822	-118.164	27	6.0	C
10/25/1933	07:00:45	4.0	L	33.954	-118.145	15	7.7	C
01/09/1934	14:10:32	4.3	L	34.123	-117.662	57	8.6	B
11/16/1934	21:26:45	4.1	L	33.729	-117.975	44	6.0	C
06/19/1935	11:17:08	4.4	L	33.736	-117.469	82	6.0	C
07/13/1935	10:54:18	4.6	L	34.111	-117.892	36	2.7	B
09/03/1935	06:47:12	4.2	L	34.023	-117.242	95	6.0	C
12/25/1935	17:15:49	4.3	L	33.664	-117.964	51	19.7	C

02/23/1936	22:20:42	4.7	L	34.031	-117.323	87	19.7	B
09/01/1937	13:48:08	4.4	L	34.181	-117.557	67	0.3	C
09/01/1937	16:35:33	4.4	L	34.196	-117.537	70	9.2	B
05/31/1938	08:34:55	5.2	L	33.699	-117.511	80	10.2	C
07/05/1938	18:06:56	4.3	L	33.691	-117.545	78	6.0	C
08/31/1938	03:18:14	4.4	L	33.767	-118.277	31	6.0	C
11/07/1939	18:52:10	4.5	L	34.037	-117.251	94	17.4	A
12/27/1939	19:28:49	4.5	L	33.744	-118.328	34	6.0	C
04/18/1940	18:43:45	4.3	L	34.048	-117.333	86	11.7	A
10/11/1940	05:57:14	4.7	L	33.778	-118.472	35	6.0	C
11/01/1940	07:25:04	4.2	L	33.843	-118.465	29	6.0	C
03/25/1941	23:43:41	4.0	L	34.259	-117.431	81	2.5	B
10/22/1941	06:57:19	4.7	L	33.811	-118.301	26	0.2	C
11/14/1941	08:41:38	5.1	L	33.791	-118.264	28	6.0	C
09/03/1942	14:06:01	4.4	L	34.617	-118.992	92	20.0	C
09/04/1942	06:34:33	4.5	L	34.664	-118.983	95	20.0	C
06/19/1944	00:03:34	4.4	L	33.882	-118.249	18	0.0	C
06/19/1944	03:06:07	4.3	L	33.879	-118.296	18	1.0	C
03/01/1948	08:12:14	4.6	L	34.266	-117.474	77	2.5	A
04/16/1948	22:26:25	4.6	L	33.900	-118.985	68	6.0	C
09/22/1951	08:22:39	4.1	L	34.137	-117.331	87	11.1	A
02/17/1952	12:36:58	4.4	L	34.014	-117.222	97	13.8	B
08/23/1952	10:09:07	4.8	L	34.508	-118.174	52	6.0	C
10/26/1954	16:22:26	4.1	L	33.709	-117.488	81	5.0	B
01/03/1956	00:25:49	4.7	L	33.753	-117.491	79	10.8	A
02/07/1956	02:16:57	4.1	L	34.562	-118.615	66	6.0	C
02/07/1956	03:16:39	4.4	L	34.579	-118.601	67	6.0	C
03/25/1956	03:32:03	4.1	L	33.617	-119.097	90	6.0	C
03/18/1957	18:56:28	4.8	L	34.146	-119.203	87	6.0	C
06/28/1960	20:00:47	4.1	L	34.126	-117.477	74	1.3	C
10/04/1961	02:21:31	4.4	L	33.853	-117.754	52	0.6	B
10/20/1961	19:49:50	4.6	L	33.671	-117.984	49	0.6	A
10/20/1961	20:07:14	4.1	L	33.666	-117.981	50	0.0	A
10/20/1961	21:42:40	4.1	L	33.673	-117.980	49	0.3	B
10/20/1961	22:35:34	4.1	L	33.671	-118.007	48	0.0	A
11/20/1961	08:53:35	4.1	L	33.727	-117.971	45	6.0	C
09/14/1963	03:51:17	4.7	L	33.562	-118.329	54	6.0	C
01/01/1965	08:04:18	4.5	L	34.129	-117.509	71	3.3	A
04/15/1965	20:08:33	4.6	L	34.135	-117.436	78	6.0	C
07/16/1965	07:46:22	4.1	L	34.519	-118.484	57	6.0	C
06/15/1967	04:58:06	4.1	L	33.992	-117.991	26	9.0	B
02/28/1969	04:56:13	4.4	L	34.553	-118.121	58	6.0	C

05/05/1969	16:02:09	4.3	L	34.312	-117.556	72	3.2	C
10/27/1969	13:16:02	4.4	L	33.526	-117.800	72	6.0	C
09/12/1970	14:10:11	4.0	L	34.258	-117.501	75	7.5	B
09/12/1970	14:30:53	5.2	L	34.255	-117.534	72	10.8	A
09/13/1970	04:47:49	4.2	L	34.260	-117.538	72	12.2	C
02/09/1971	14:00:42	6.6	W	34.416	-118.370	43	8.9	C
02/09/1971	14:01:12	5.8	H	34.416	-118.370	43	6.0	C
02/09/1971	14:01:37	4.2	H	34.416	-118.370	43	6.0	C
02/09/1971	14:01:40	4.1	H	34.416	-118.370	43	6.0	C
02/09/1971	14:01:53	4.5	H	34.416	-118.370	43	6.0	C
02/09/1971	14:01:54	4.2	H	34.416	-118.370	43	6.0	C
02/09/1971	14:01:59	4.1	H	34.416	-118.370	43	6.0	C
02/09/1971	14:02:03	4.1	H	34.411	-118.401	43	6.0	Z
02/09/1971	14:02:30	4.7	H	34.416	-118.370	43	6.0	C
02/09/1971	14:02:30	4.3	H	34.411	-118.401	43	6.0	Z
02/09/1971	14:02:31	4.7	H	34.411	-118.401	43	6.0	Z
02/09/1971	14:02:46	5.8	H	34.416	-118.370	43	6.0	C
02/09/1971	14:03:25	4.4	H	34.416	-118.370	43	6.0	C
02/09/1971	14:03:43	4.1	H	34.416	-118.370	43	6.0	C
02/09/1971	14:04:07	4.1	H	34.416	-118.370	43	6.0	C
02/09/1971	14:04:36	4.2	H	34.416	-118.370	43	6.0	C
02/09/1971	14:04:38	4.1	H	34.416	-118.370	43	6.0	C
02/09/1971	14:04:42	4.2	H	34.416	-118.370	43	6.0	C
02/09/1971	14:04:44	4.1	H	34.416	-118.370	43	6.0	C
02/09/1971	14:04:46	4.2	H	34.411	-118.401	43	6.0	Z
02/09/1971	14:05:41	4.1	H	34.416	-118.370	43	6.0	C
02/09/1971	14:05:52	4.1	H	34.416	-118.370	43	6.0	C
02/09/1971	14:07:10	4.0	H	34.416	-118.370	43	6.0	C
02/09/1971	14:07:44	4.5	H	34.416	-118.370	43	6.0	C
02/09/1971	14:07:59	4.0	H	34.416	-118.370	43	6.0	C
02/09/1971	14:08:03	4.2	H	34.416	-118.370	43	6.0	C
02/09/1971	14:08:34	4.5	H	34.416	-118.370	43	6.0	C
02/09/1971	14:08:54	4.6	H	34.416	-118.370	43	6.0	C
02/09/1971	14:10:21	4.6	L	34.246	-118.396	25	14.6	B
02/09/1971	14:10:29	5.3	H	34.416	-118.370	43	6.0	C
02/09/1971	14:11:31	4.0	H	34.274	-118.321	26	6.0	C
02/09/1971	14:22:17	4.2	L	34.353	-118.316	35	7.6	C
02/09/1971	14:34:39	4.8	L	34.310	-118.414	33	2.8	B
02/09/1971	14:40:17	4.1	L	34.400	-118.455	43	6.1	C
02/09/1971	14:43:48	4.4	L	34.314	-118.428	33	19.0	C
02/09/1971	15:58:21	4.6	L	34.350	-118.339	35	13.9	B
02/09/1971	16:19:28	4.1	L	34.322	-118.460	36	10.4	B

02/10/1971	05:06:36	4.3	L	34.376	-118.311	37	10.9	B
02/10/1971	05:18:07	4.4	L	34.403	-118.421	42	9.8	B
02/10/1971	11:31:34	4.2	L	34.406	-118.394	42	0.3	C
02/10/1971	13:49:54	4.3	L	34.347	-118.440	37	12.6	B
02/10/1971	14:35:26	4.2	L	34.347	-118.476	39	1.8	C
02/10/1971	17:38:55	4.0	L	34.374	-118.362	38	12.2	B
02/10/1971	18:54:41	4.1	L	34.426	-118.436	45	0.0	B
02/21/1971	05:50:52	4.4	L	34.383	-118.434	41	7.9	B
02/21/1971	07:15:11	4.3	L	34.346	-118.447	37	14.2	B
03/07/1971	01:33:40	4.2	L	34.346	-118.430	37	2.4	C
03/25/1971	22:54:10	4.2	L	34.301	-118.493	35	13.0	B
03/31/1971	14:52:22	4.3	L	34.285	-118.464	32	2.2	B
04/01/1971	15:03:04	4.1	L	34.403	-118.418	42	11.7	B
04/15/1971	11:14:32	4.2	L	34.256	-118.511	32	3.2	C
06/22/1971	10:41:18	4.2	L	33.715	-117.490	81	1.6	B
02/21/1973	14:45:56	5.3	W	33.979	-119.050	72	10.0	C
03/09/1974	00:54:32	4.4	L	34.386	-118.385	40	8.6	B
01/01/1976	17:20:13	4.4	L	33.972	-117.896	35	10.2	A
04/08/1976	15:21:38	4.5	L	34.358	-118.673	51	15.1	A
11/22/1976	17:55:12	4.2	L	33.950	-118.629	35	11.8	A
08/12/1977	02:19:26	4.4	L	34.371	-118.458	40	10.8	A
09/24/1977	21:28:24	4.0	L	34.459	-118.418	48	13.3	A
01/01/1979	23:14:39	5.2	L	33.916	-118.687	41	13.3	A
10/17/1979	20:52:37	4.3	L	33.893	-118.658	40	10.7	A
10/19/1979	12:22:38	4.1	L	34.203	-117.529	71	7.1	A
09/04/1981	15:50:49	5.5	L	33.557	-119.120	95	6.0	C
10/23/1981	17:28:16	4.8	L	33.590	-119.004	85	10.0	C
10/23/1981	19:15:52	4.6	L	33.618	-119.017	84	14.8	A
04/13/1982	11:02:12	4.0	L	34.063	-118.970	65	12.1	A
05/25/1982	13:44:30	4.4	L	33.546	-118.206	56	12.6	A
01/08/1983	07:19:30	4.0	L	34.133	-117.453	76	7.8	A
06/12/1984	00:27:52	4.0	L	34.541	-118.989	86	11.7	C
10/26/1984	17:20:44	4.6	L	34.016	-118.988	66	13.3	A
04/03/1985	04:04:50	4.1	L	34.380	-119.038	80	24.9	A
10/02/1985	23:44:12	4.6	L	34.023	-117.245	95	15.2	A
10/01/1987	14:42:20	5.9	W	34.061	-118.079	18	9.5	A
10/01/1987	14:45:41	4.7	L	34.049	-118.100	16	13.6	A
10/01/1987	14:48:03	4.1	L	34.076	-118.090	17	11.7	A
10/01/1987	14:49:06	4.8	L	34.060	-118.100	16	11.7	A
10/01/1987	15:12:32	4.6	L	34.052	-118.091	17	10.8	A
10/01/1987	15:59:54	4.0	L	34.050	-118.087	17	10.4	A
10/04/1987	10:59:38	5.3	L	34.074	-118.098	16	8.3	A

10/24/1987	23:58:33	4.0	L	33.676	-119.058	84	12.2	A
02/11/1988	15:25:56	4.7	L	34.077	-118.047	21	12.5	A
06/26/1988	15:04:58	4.7	L	34.136	-117.709	53	7.9	A
09/12/1988	13:24:34	4.0	L	33.867	-118.457	26	3.4	A
11/20/1988	05:39:29	4.8	L	33.507	-118.071	62	6.0	C
12/03/1988	11:38:26	5.0	L	34.151	-118.130	18	14.3	A
01/19/1989	06:53:29	5.0	L	33.919	-118.627	36	11.9	A
02/18/1989	07:17:05	4.1	L	34.006	-117.738	49	3.3	A
04/07/1989	20:07:30	4.8	L	33.619	-117.902	58	12.8	A
06/12/1989	16:57:18	4.8	L	34.028	-118.180	8	15.6	A
06/12/1989	17:22:26	4.5	L	34.022	-118.178	9	15.5	A
12/28/1989	09:41:08	4.2	L	34.192	-117.386	83	14.6	A
02/28/1990	23:43:37	5.5	L	34.144	-117.697	54	4.5	A
03/01/1990	00:34:57	4.0	L	34.127	-117.701	53	4.4	A
03/01/1990	03:23:03	4.7	L	34.153	-117.720	52	11.4	A
03/02/1990	17:26:25	4.5	L	34.145	-117.695	54	5.6	A
04/17/1990	22:32:27	4.5	L	34.106	-117.722	51	3.6	A
06/28/1991	14:43:55	5.8	W	34.270	-117.993	36	9.2	A
06/28/1991	17:00:56	4.3	L	34.253	-117.992	35	9.5	A
07/05/1991	17:41:57	4.1	L	34.497	-118.556	57	10.9	A
01/17/1994	12:30:55	6.7	W	34.213	-118.537	31	18.4	A
01/17/1994	12:31:58	5.9	L	34.275	-118.493	33	6.0	C
01/17/1994	12:34:18	4.4	L	34.308	-118.475	35	6.0	C
01/17/1994	12:39:40	4.9	L	34.265	-118.540	35	6.0	C
01/17/1994	12:40:10	4.8	L	34.320	-118.507	38	6.0	C
01/17/1994	12:40:36	5.2	L	34.340	-118.614	46	6.0	C
01/17/1994	12:55:47	4.1	L	34.277	-118.578	39	6.0	C
01/17/1994	13:06:28	4.6	L	34.251	-118.550	35	6.0	C
01/17/1994	13:26:45	4.7	L	34.318	-118.456	35	6.0	C
01/17/1994	13:56:02	4.4	L	34.293	-118.621	43	6.0	C
01/17/1994	14:14:31	4.5	L	34.331	-118.445	36	6.0	C
01/17/1994	15:07:03	4.2	L	34.304	-118.474	35	2.6	A
01/17/1994	15:07:35	4.1	L	34.307	-118.467	35	1.6	A
01/17/1994	15:54:11	4.9	L	34.376	-118.627	50	13.0	A
01/17/1994	17:56:08	4.6	L	34.228	-118.572	35	19.2	A
01/17/1994	19:43:53	4.1	L	34.368	-118.637	49	13.9	A
01/17/1994	20:46:02	4.9	L	34.302	-118.565	40	6.0	C
01/17/1994	22:31:54	4.1	L	34.339	-118.442	37	6.0	C
01/17/1994	23:33:31	5.6	L	34.326	-118.698	50	9.8	A
01/18/1994	00:39:35	4.4	L	34.379	-118.564	46	7.2	A
01/18/1994	00:40:04	4.2	L	34.394	-118.543	46	0.0	A
01/18/1994	00:43:09	5.2	L	34.377	-118.698	54	11.3	A

01/18/1994	04:01:27	4.3	L	34.358	-118.623	48	0.9	A
01/18/1994	07:23:56	4.0	L	34.333	-118.623	46	14.8	A
01/18/1994	11:35:10	4.2	L	34.218	-118.607	37	12.1	A
01/18/1994	13:24:44	4.3	L	34.319	-118.558	41	1.7	A
01/18/1994	15:23:47	4.8	L	34.379	-118.561	46	7.7	A
01/19/1994	04:40:47	4.3	L	34.361	-118.571	45	2.6	A
01/19/1994	04:43:15	4.0	L	34.366	-118.709	54	6.0	C
01/19/1994	09:13:11	4.1	L	34.304	-118.737	52	13.0	A
01/19/1994	14:09:15	4.5	L	34.215	-118.510	29	17.5	A
01/19/1994	21:09:29	5.1	L	34.379	-118.712	55	14.4	A
01/19/1994	21:11:45	5.1	L	34.378	-118.619	49	11.3	A
01/21/1994	18:39:15	4.5	L	34.301	-118.466	34	10.6	A
01/21/1994	18:39:47	4.0	L	34.297	-118.479	34	11.9	A
01/21/1994	18:42:29	4.3	L	34.310	-118.474	35	7.9	A
01/21/1994	18:52:44	4.3	L	34.302	-118.452	33	7.6	A
01/21/1994	18:53:45	4.3	L	34.298	-118.458	33	7.7	A
01/22/1994	22:54:11	4.6	C	34.393	-118.568	48	7.6	A
01/23/1994	08:55:09	4.1	L	34.300	-118.428	32	6.0	A
01/24/1994	04:15:19	4.6	L	34.347	-118.552	43	6.5	A
01/24/1994	05:50:24	4.3	L	34.361	-118.628	48	12.1	A
01/24/1994	05:54:21	4.2	L	34.364	-118.627	49	10.9	A
01/27/1994	17:19:59	4.6	L	34.273	-118.563	37	14.9	A
01/28/1994	20:09:53	4.2	L	34.375	-118.494	42	0.7	A
01/29/1994	11:20:36	5.1	L	34.306	-118.579	41	1.1	A
01/29/1994	12:16:56	4.3	L	34.278	-118.611	41	2.6	A
02/06/1994	13:19:27	4.1	L	34.292	-118.476	34	9.3	A
02/25/1994	12:59:13	4.0	L	34.357	-118.480	40	1.2	A
03/20/1994	21:20:12	5.2	L	34.231	-118.475	28	13.1	A
05/25/1994	12:56:57	4.4	L	34.312	-118.393	32	7.0	A
06/15/1994	05:59:49	4.1	L	34.311	-118.398	32	7.4	A
12/06/1994	03:48:34	4.5	L	34.293	-118.389	30	9.0	A
02/19/1995	21:24:18	4.3	L	34.049	-118.915	60	15.6	A
06/26/1995	08:40:29	5.0	L	34.394	-118.669	54	13.3	A
12/27/1995	09:42:59	4.2	H	34.245	-118.599	38	6.0	C
03/20/1996	07:38:00	4.1	L	34.362	-118.615	48	13.0	A
05/01/1996	19:49:56	4.1	L	34.354	-118.703	53	14.4	A
04/26/1997	10:37:31	5.1	L	34.369	-118.670	52	16.4	A
04/27/1997	11:09:28	4.9	L	34.377	-118.649	51	15.2	A
06/28/1997	21:45:25	4.2	L	34.168	-117.336	87	10.0	A
01/05/1998	18:14:06	4.3	L	33.951	-117.709	53	11.5	A
03/11/1998	12:18:52	4.5	L	34.024	-117.230	96	14.9	A
08/20/1998	23:49:58	4.4	L	34.374	-117.648	68	9.0	A

02/21/2000	13:49:43	4.4	L	34.050	-117.252	94	15.4	A
01/14/2001	02:26:14	4.3	L	34.284	-118.404	30	8.8	A
01/14/2001	02:50:54	4.1	L	34.289	-118.403	30	8.4	A
09/09/2001	23:59:18	4.2	L	34.059	-118.388	11	7.9	A
01/29/2002	05:53:29	4.2	L	34.361	-118.657	50	14.2	A
09/03/2002	07:08:52	4.8	L	33.917	-117.776	48	12.9	A
01/06/2005	14:35:28	4.4	L	34.125	-117.439	77	4.2	A
08/09/2007	07:58:50	4.7	L	34.300	-118.620	43	7.6	A
09/02/2007	17:29:15	4.7	L	33.732	-117.477	81	12.6	A
10/16/2007	08:53:44	4.2	L	34.385	-117.635	70	8.1	A
07/29/2008	18:42:16	5.4	W	33.953	-117.761	48	14.7	A
01/09/2009	03:49:46	4.5	W	34.107	-117.304	89	14.2	A
05/02/2009	01:11:14	4.4	L	34.067	-118.882	57	14.2	A
05/08/2009	20:27:14	4.2	L	34.440	-119.183	95	7.6	A
05/18/2009	03:39:36	4.7	W	33.938	-118.336	13	13.9	A
05/19/2009	22:49:12	4.0	L	33.934	-118.329	13	12.8	A
03/16/2010	11:04:00	4.4	L	33.992	-118.082	18	18.9	A

Notes:

(1) Magnitude Type:
E = energy magnitude
W = moment magnitude
B = body-wave magnitude
S = surface-wave magnitude
L = local (WOOD-ANDERSON) magnitude
C = coda amplitude
H = helicorder magnitude (short-period Benioff)
D = coda duration magnitude
N = no magnitude

(2) Q is a factor relating the quality of epicentral determination
'A' = +- 1 km horizontal distance; +- 2 km depth
'B' = +- 2 km horizontal distance; +- 5 km depth
'C' = +- 5 km horizontal distance; no depth restriction
'D' = >+- 5 km horizontal distance
'Z' = no quality listed in database

Table 3
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 km of the Site
(CDMG Data 1889-1931)

Site Name: LA Event Center Latitude (degrees):	34.043313	Longitude (degrees):	-118.269731		6378.137		
Date (mm/dd/yyyy)	**Time (hh:mm:ss)**	**Magnitude**	**Magnitude Type**	**Latitude (degrees)**	**Longitude (degrees)**	**Distance (km)**	**Depth (km)**
8/28/1889	02:15:00	5.2	UN(1)	34.100	-117.900	34	UN
6/14/1892	13:25:00	4.9	UN	34.200	-117.500	72	UN
4/4/1893	19:40:00	5.4	UN	34.300	-118.600	41	UN
7/30/1894	05:12:00	5.9	UN	34.300	-117.600	67	UN
7/22/1899	00:46:00	5.5	UN	34.200	-117.400	81	UN
7/22/1899	20:32:00	6.5	UN	34.300	-117.500	76	UN
9/16/1903	12:10:00	4.0	UN	33.800	-117.600	67	UN
7/3/1908	12:55:00	4.0	UN	34.000	-117.500	71	UN
4/11/1910	07:57:00	5.0	UN	33.700	-117.400	88	UN
5/13/1910	06:20:00	5.0	UN	33.700	-117.400	88	UN
5/15/1910	15:47:00	6.0	L	33.700	-117.400	88	UN
5/10/1911	13:40:00	4.0	UN	34.100	-118.800	49	UN
10/21/1913	09:38:00	4.0	UN	33.800	-118.000	36	UN
11/8/1914	11:40:00	4.5	UN	34.000	-118.500	21	UN
10/23/1916	02:54:00	5.5	UN	34.700	-119.000	99	UN
3/6/1918	18:20:00	4.0	UN	34.000	-118.500	21	UN
6/18/1920	10:08:00	4.5	UN	33.500	-118.250	60	UN
6/22/1920	02:48:00	4.9	L	34.000	-118.500	21	UN
7/23/1923	07:30:26	6.2	L	34.000	-117.250	94	UN
8/4/1927	12:24:00	5.0	UN	34.000	-118.500	21	UN
7/8/1929	16:46:07	4.7	L	33.9	-118.1	22	13.0
9/13/1929	13:23:38	4	L	33.63	-118.2	46	UN
8/31/1930	00:40:36	5.2	L	33.95	-118.63	35	UN
2/16/1931	13:27:00	4	UN	34.1	-117.3	89	UN
3/31/1931	20:33:00	4	K	34.1	-117.8	43	UN
4/24/1931	18:27:55	4.4	L	33.77	-118.48	36	UN

Notes:
(1) UN = Unknown
(2) L = local (WOOD-ANDERSON) magnitude
(3) S = surface-wave magnitude

Table 3
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 km of the Site
(USHIS Data 1568-1888)

Site Name: LA Event Center Latitude (degrees):	34.043313	Longitude (degrees):	-118.269731		6378.137		
Date (mm/dd/yyyy)	Time (hh:mm:ss)	Magnitude	Magnitude Type	Latitude (degrees)	Longitude (degrees)	Distance (km)	Depth (km)
7/28/1769	UN(1)	6.0	L (2)	33.900	-117.800	46	UN
12/8/1812	15:0:0	6.9	L	34.370	-117.650	67	UN
9/24/1827	4:0:0	5.5	L	34.000	-119.000	67	UN
7/11/1855	4:15:0	6.0	L	34.100	-118.100	16	UN
12/16/1858	10:0:0	6.0	L	34.000	-117.500	71	UN

Notes:
(1) UN = Unknown
(2) L = Local magnitude

Table 3
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 km of the Site

S U M M A R Y O F E A R T H Q U A K E S E A R C H

* * *

NUMBER OF HISTORIC EARTHQUAKES WITHIN 100 KM RADIUS OF SITE

MAGNITUDE RANGE	NUMBER
4.0 - 4.5	208
4.5 - 5.0	78
5.0 - 5.5	26
5.5 - 6.0	11
6.0 - 6.5	7
6.5 - 7.0	4
7.0 - 7.5	0
7.5 - 8.0	0
8.0 - 8.5	0

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