REPORT OF
GEOLOGIC-SEISMIC HAZARDS EVALUATION
PROPOSED PARKING STRUCTURE

LOMA LINDA UNIVERSITY MEDICAL CENTER
NORTHEAST CORNER OF CAMPUS STREET AND BARTON ROAD
LOMA LINDA, CALIFORNIA

Prepared for:

LOMA LINDA UNIVERSITY MEDICAL CENTER

Loma Linda, California

June 28, 2013

AMEC Project 4953-10-0913

amec

June 28, 2013

Mr. Eric Schilt
Director of Construction Management
Loma Linda University
11234 Anderson Street, Admin Trailer C
Loma Linda, California 92354

Subject: **LETTER OF TRANSMITTAL**
Report of Geologic-Seismic Hazards Evaluation
Proposed Parking Structure
Loma Linda University Medical Center
Northeast Corner of Campus Street and Barton Road
Loma Linda, California
AMEC Project 4953-10-0913

Dear Mr. Schilt:

We are pleased to submit the results of our geologic-seismic hazards evaluation for the proposed parking structure to be constructed at the northeast corner of Campus Street and Barton Road on the campus of Loma Linda University Medical Center in the city of Loma Linda, California. Our services were performed in general accordance with our proposal dated June 14, 2013 and the agreement between Loma Linda Construction Management and AMEC Environment & Infrastructure, Inc., dated April 12, 2012.

You have furnished us with a site plan for the project, and we are familiar with the soil and groundwater conditions in the vicinity of the site, having previous performed geotechnical investigations at the adjacent medical center and the parking structures to the northwest of the project site. You have informed us that the Environmental Impact Report (EIR) for the project is being prepared by others and input on the geotechnical, geological, and seismic issues are required for the EIR.

The results of our evaluation are presented in this report. Please note that you or your representative should submit copies of this report to the appropriate governmental agencies for their review.

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It has been a pleasure to be of professional service to you. Please call if you have any questions or if we can be of further assistance.

Sincerely,

AMEC Environment & Infrastructure, Inc.

Reviewed by:

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PAUL ELLIOTT
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LOMA LINDA UNIVERSITY MEDICAL CENTER

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AMEC Environment & Infrastructure, Inc.

Los Angeles, California

June 28, 2013

Project 4953-10-0913

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1.0 SITE CONDITIONS

The site is located within the Loma Linda University campus at the northeast corner of Campus Street and Barton Road. The site is currently used as an asphalt-paved parking lot. The site slopes from about Elevation 1142 northeast to about Elevation 1151 southwest.

2.0 GEOLOGIC SETTING

Regionally, the site is located in a zone of large-scale neo-tectonism that straddles the Peninsular and Transverse geomorphic provinces. The Peninsular Range province is characterized by northwest/southeast trending alignments of mountains, hills and intervening basins (known as badlands), reflecting the influence of northwest trending major faults and folds, such as the nearby San Jacinto and Elsinore fault zones. These faults control the general geologic structural fabric of the region. This province extends northwesterly from Baja California into the Los Angeles basin and Western San Bernardino County. Its western and eastern extents are the Southern California offshore islands and Mojave Desert, respectively. The northern boundary of the province is the Transverse Ranges. The Transverse Ranges geomorphic province is characterized by east-west trending mountain ranges that include the San Gabriel and San Bernardino Mountains. The San Andreas Fault is located at the base of the San Bernardino Mountains. The eastern boundary of the province is the Colorado Desert geomorphic province along the San Jacinto fault system. The site is located in the San Bernardino Valley, a structural depression between the San Jacinto Fault on the west and the San Bernardino Mountains on the north and northeast.

Locally, the proposed site is located on a broad alluvial fan bordering the San Timoteo Badlands to the south. The San Bernardino Mountains border the north side of the valley. Unconsolidated alluvium is the predominant surficial material (California Geological Survey, 2010). Consolidated Tertiary age sedimentary rocks underlie the alluvial deposits (USGS, 1963; USGS, 1991).

A site map is with topographic features is Figure 1, Vicinity Map. The relationship of the site to the regional geologic conditions is depicted on Figure 2, Regional Geology; the location of major faults and earthquake epicenters in Southern California are shown on the Regional Faults and Seismicity Map, Figure 3.

3.0 GEOLOGIC MATERIALS

The proposed site is primarily underlain by unconsolidated alluvial deposits overlain by shallow artificial fill associated with previous grading at the site. The alluvial deposits are Holocene detrital material shed from the San Bernardino Mountains to the north.

This specific site does not have any borings that demonstrate deep fill other than for parking lot grading; but there may be localized zones of deeper fill emplaced for utilities. Furthermore, for reference, fill soils up to 8 feet thick were encountered in our prior geotechnical borings for the proposed parking structures and Hospital Tower. The fill soils consisted predominantly of silty sand. Holocene age alluvial deposits below the fill consist of loose to medium dense silty sand and sand with varying amounts of gravel. Beneath the younger alluvial deposits are older alluvial deposits consisting primarily of indurated clay-bearing deposits with gravelly, pebbly, and cobbly zones (USGS, 1963; USGS, 1991).

4.0 GROUNDWATER

The site is in the southern boundary of the Bunker Hill Groundwater Subbasin of the Upper Santa Ana Valley Groundwater Basin. The alluvial materials beneath the site are part of the water-bearing deposits of the basin. Historical high groundwater levels in the area occurred in 1945 when groundwater levels were roughly between Elevations 1050 to 1075 north of the University campus corresponding to a depth of approximately 96 to 71 feet, respectively, below the site's existing ground surface. (USGS, 1963)

According to our prior borings drilled in the vicinity of the site, groundwater was encountered as seepage in borings drilled in 1963 at an Elevation of 1076 corresponding to a depth of 70 feet at the proposed site (LeRoy Crandall & Associates, 1963). Groundwater was not encountered in the borings drilled in 1984 to a maximum depth of 61 feet, corresponding to about Elevation 1080 (LeRoy Crandall & Associates, 1984). Water was not encountered in the borings drilled in 1987 to a maximum depth of 80 feet, corresponding to about Elevation 1057 (LeRoy Crandall & Associates, 1987). Borings drilled in 2010 for the proposed Hospital Tower also did not encounter groundwater to maximum depths of 81 feet below the existing ground surface.

Groundwater level data for Well No. 01S04W25E007S, located approximately 0.5 miles northeast of the site, indicated a maximum high groundwater level at a depth of 39.7 feet in August 27, 2005 (2013, California Department of Water Resources). This measurement corresponds to an Elevation of 1040.2 feet above mean sea level, corresponding approximately to 106 feet below ground surface at the proposed site.

Based on the data discussed above, the historical maximum high groundwater level for the site is conservatively estimated to be deeper than 60 feet below the existing ground surface.

5.0 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 (previously the California Division of Mines and Geology) for the Alquist-Priolo Earthquake Fault Zoning Program (Bryant and Hart, 2007). 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 (last 1.6 million years). Inactive faults have not moved in the last 1.6 million years.

Active Faults

San Jacinto Fault Zone

The active San Jacinto fault zone, considered one of the most seismically active faults in Southern California, is located approximately 0.5 miles southwest of the site. This fault zone includes several en echelon branches or segments and displays many features characteristic of recent activity such as fault line scarps, sag ponds, and groundwater barriers. Historically, the San Jacinto fault zone has triggered a number of small to moderate-sized earthquakes and at least four large tremors of local magnitudes greater than 6.0. These four tremors were the Imperial Valley earthquake of May 18, 1940 (local magnitude of 7.1), the Borrego Mountain earthquake of April 9, 1968 (local magnitude of 6.5), and the November 23 and 24, 1987 Westmorland earthquakes (respective local magnitudes of 6.0 and 6.3). The Imperial Valley and the Borrego Mountain earthquakes occurred on the Imperial fault and the Coyote Creek fault, respectively, which are both considered to be part of the San Jacinto fault zone. The Westmorland earthquakes resulted from movement on the Superstition Hills fault, which is considered to be part of the San Jacinto fault zone. The California Geological Survey (2003) has assigned a maximum moment magnitude of 6.6 to 7.2 to the several segments of the San Jacinto fault zone. A maximum moment magnitude of 7.2 has been assigned to the Anza segment.

San Andreas Fault Zone

The active San Andreas fault zone is located about 7.5 miles northeast of the site. This fault zone, California's most prominent geological feature, trends generally northwest for almost the entire length of the state. The 1857 Fort Tejon earthquake was the last major earthquake along the San

Andreas fault zone in Southern California. According to the California Geological Survey, the San Bernardino North Section of the San Andreas fault has a slip rate of 22 mm/yr and a maximum moment magnitude of 7.5.

Cucamonga Fault

The active Cucamonga fault is located approximately 14 miles northwest of the site. This fault zone borders the southern front of the San Gabriel Mountains and consists of an approximately ½ mile wide east-striking thrust fault complex. Although the east and west terminations of the Cucamonga fault are not well defined, the fault is generally considered to extend from San Antonio Canyon eastward to Lytle Creek. Along its 15½ mile extent, movement on the Cucamonga fault zone has created prominent fault scarps that disrupt Quaternary alluvial fans flanking the southern margin of the San Gabriel Mountains (Morton and Matti, 1987). Recent studies indicate alluvial deposits as young as 1,750 to 1,000 years old have been offset by the fault. Also, fault scarp morphology and relations with alluvial units suggest that the eastern 9 miles of the Cucamonga fault zone may have been more seismically active than the western portion over the last 4,000 years.

Blind Thrust Fault Zones

Several buried thrust faults, commonly referred to as blind thrusts, underlie the Los Angeles Basin at depth. These faults are not exposed at the ground surface and are typically identified at depths greater than 1.86 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.

Puente Hills Blind Thrust

The Puente Hills Blind Thrust fault (PHBT) 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) and overlies the Elysian Park Thrust. The PHBT 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 Santa Fe Springs segment of the PHBT is believed to be the causative fault of the October 1, 1987 Whittier Narrows Earthquake (Shaw et al., 2002). The PHBT underlies the site at depth. Postulated earthquake scenarios for the PHBT include single segment fault ruptures capable of producing an earthquake of magnitude 6.5 to 6.6 (M_w) and a multiple segment fault rupture capable of producing an earthquake of magnitude 7.1 (M_w). The PHBT 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 PHBT is considered an active fault capable of generating future earthquakes beneath the Los Angeles Basin. An average slip rate of 0.03 inches per year and a maximum magnitude of 7.1 are estimated by the California Geological Survey (2003) for the Puente Hills Blind Thrust. The vertical surface projection of the postulated Puente Hills Blind Thrust is about 35 miles west of the site at the closest point.

San Joaquin Hills Thrust

Until recently, the southern Los Angeles Basin has been estimated to have a low seismic hazard relative to the greater Los Angeles region (Working Group on California Earthquake Probabilities, 1995; Dolan et al., 1995). This estimation is generally based on the fewer number of known active faults and the lower rates of historic seismicity for this area. However, several recent studies by Grant et al. (2000, 2002) suggest that an active blind thrust fault system underlies the San Joaquin Hills. This postulated blind thrust fault is believed to be a faulted anticlinal fold, parallel to the Newport-Inglewood fault zone (NIFZ) but considered a distinctly separate seismic source (Grant et al., 2002). The recency of movement and Holocene slip rate of this fault are not known. However, the fault, if it exists, has been estimated to be capable of producing a Magnitude 6.8 to 7.3 earthquake (Grant et al., 2002). This estimation is based primarily on coastal geomorphology and age-dating of marsh deposits that are elevated above the current coastline.

The vertical surface projection of the postulated San Joaquin Hills Thrust is about 39 miles southwest of the site at the closest point. This thrust fault is not exposed at the surface and does not present a potential surface fault rupture hazard. The California Geological Survey (2003) considers this postulated fault to be active and estimates an average slip rate of 0.02 inches per year and a maximum moment magnitude of 6.6 for the San Joaquin Hills Thrust.

Potentially Active Faults

Arrowhead Fault

The closest potentially active fault to the site is the Arrowhead fault located about 10 miles to the northeast. The Arrowhead is a reverse fault approximately 9.3 miles in length.

Santa Ana Fault

The potentially active Santa Ana fault is located about 11 miles northeast of the site. This north-dipping reverse fault trends west to east from Running Springs to Pipes Wash, a distance of about 25 miles. The Santa Ana fault, Waterman Canyon fault, and Pipes Canyon fault form a north-dipping thrust zone along the southern flank of the San Bernardino Mountains. The latest offset in portions of this thrust zone are Pleistocene age (Meisling, 1984). The Santa Ana fault is considered potentially active (Jennings and Bryant, 2010).

6.0 GEOLOGIC-SEISMIC HAZARDS

Fault Rupture

The site is not within a currently established Alquist-Priolo Earthquake Fault (AP) Zone for surface fault rupture hazards. The closest active fault to the site with the potential for surface fault rupture is the San Jacinto fault zone located approximately 1,200 feet to the west-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 site. Therefore, the potential for surface rupture due to fault plane displacement propagating to the surface at the site during the design life of the project is considered low.

Seismicity

Earthquake Catalog Data

The seismicity of the region surrounding the site was determined from research of an electronic database of seismic data (Southern California Seismic Network, 2012). This database includes earthquake data compiled by the California Institute of Technology from 1932 through 2012 and data for 1812 to 1931 compiled by Richter and the U.S. National Oceanic Atmospheric Administration (NOAA). The search for earthquakes that occurred within 100 kilometers of the site indicates that 662 earthquakes of Richter magnitude 4.0 and greater occurred from 1932 through 2012; four earthquakes of magnitude 6.0 or greater occurred between 1906 and 1931; and two earthquake of magnitude 7.0 or greater occurred between 1812 and 1905. A list of these earthquakes is presented as Table 3. Epicenters of moderate and major earthquakes (greater than magnitude 6.0) are shown in Figure 3.

The information for each earthquake 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 the table.

<u>Historic Earthquakes</u>

A number of earthquakes of moderate to major magnitude have occurred in the Southern California area within the last 105 years. A partial list of these earthquakes is included in the table on the following page.

List of Historic Earthquakes

Earthquake (Oldest to Youngest)	Date of Earthquake	Magnitude	Distance to Epicenter (Miles)	Direction to Epicenter
San Bernardino Mtns.	September 20, 1907	6.0	14	NE
Lake Elsinore	May 15, 1910	6.0	25	SSW
San Jacinto-Hemet area	April 21, 1918	6.8	25	SSE
Loma Linda area	July 23, 1923	6.3	4	S
Long Beach	March 11, 1933	6.4	50	SW
San Clemente Island	December 26, 1951	5.9	106	SW
Tehachapi	July 21, 1952	7.5	123	NW
San Fernando	February 9, 1971	6.6	70	NW
Whittier Narrows	October 1, 1987	5.9	47	W
Sierra Madre	June 28, 1991	5.8	45	NW
Landers	June 28, 1992	7.3	48	ENE
Big Bear	June 28, 1992	6.4	27	ENE
Northridge	January 17, 1994	6.7	74	WNW
Hector Mine	October 16, 1999	7.1	68	NE

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Checked by MAE 6/28/13

The site could be subjected to strong ground shaking in the event of an earthquake. However, 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.

Slope Stability

According to the County of San Bernardino (2010) and the City of Loma Linda General Plan (2009), the site is not located within an area of steep slopes and slope instability. The site of the proposed parking structure is located on gently sloping ground with no slope stability problems. There is no potential for lurching (movement at right angles to a steep slope during strong ground shaking). The slopes on Loma Linda Hill appear to be stable. Additionally, the property is not known to be on or in the path of any existing or potential landslide.

Liquefaction and Seismically-Induced Settlement

Liquefaction potential is greatest where the groundwater level is shallow, and submerged loose, fine sands occur within a depth of about 50 feet or less. Liquefaction potential decreases as grain size and clay and gravel content increase. As ground acceleration and shaking duration increase during an earthquake, liquefaction potential increases.

According to the County of San Bernardino (2010) and the City of Loma Linda Seismic Safety Element (2009), the site is not located within an area that has a potential for liquefaction. In addition, as previously stated, the historic-high groundwater level is conservatively estimated to be deeper than 60 feet beneath the site. Accordingly, due to the dense nature of geologic materials encountered below a depth of 60 feet in our nearby borings, the potential for liquefaction adversely impacting the proposed project is considered to be low.

Seismically-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. Dry and partially saturated soils as well as saturated granular soils are subject to seismically-induced settlement. Generally, differential settlements induced by ground failures such as liquefaction, flow slides, and surface ruptures would be much more severe than those caused by densification alone. Based on our prior nearby borings, there is a potential for significant seismically-induced settlement beneath the site.

A site-specific liquefaction and seismically-induced settlement evaluation should be performed at the site as part of the geotechnical investigation for the project. Based on our experience in the immediate vicinity of the site and with similar project sites, it is our opinion that the anticipated potential for seismically-induced settlement can be mitigated if appropriate geotechnical recommendations are provided and implemented. Potential mitigation measures could include the use of structural methods, such as a mat foundation or pile foundations, or ground improvement methods, such as removal and recompaction or aggregate piers.

Hydroconsolidation

Based on our prior nearby borings, the upper soils are susceptible to hydroconsolidation and may become weaker and more compressible when wet. This condition can be effectively mitigated by implementing remedial grading recommendations, such as removal and recompaction of the upper soils beneath foundations and slabs. Recommendations to mitigate this condition should be provided in the geotechnical report for the project.

Expansive Soils

Based on our prior nearby explorations and the available geologic information, the upper natural soils beneath the site are anticipated to consist of silty sand and sand deposits. These soil types are anticipated to have a low potential for expansion. Therefore, the potential for expansive soils impacting the proposed project is considered to be low.

Subsidence

Extensive subsidence has occurred in the western portion of the Bunker Hill Groundwater Basin as a result of extraction of groundwater and reduction in artesian head. This subsidence extends to the University as determined by the United States Geological Survey (Lofgren, 1971). Total subsidence in the vicinity of Loma Linda was measured at 1.3 feet from 1943 to 1968-1969 (Lofgren, 1971). Large scale subsidence is not expected to cause extensive damage to individual structures. Recent measures by water authorizes have mitigated the over-extraction of groundwater to minimize broad areal subsidence. The potential for significant additional subsidence occurring beneath the site is considered low.

Tsunamis, Inundation, Seiches, and Flooding

The site is not within a potential tsunami inundation hazard zone and the risk of tsunami affecting the site is low. The site is not located downslope of any large bodies of water that could adversely affect the site in the event of earthquake-induced seiches (wave oscillations in an enclosed or semi-enclosed body of water). The site is not in an area of flooding potential as defined by the County of San Bernardino (2010).

Mineral Resources

According to the California Geological Survey (Miller et al., 1984), the site is located in mineral resource zone MRZ-3. This designation states the zone is undetermined in its mineral resource significance (CSMGB, 2008).

Soil Erosion and Loss of Topsoil

The site is currently an asphalt concrete parking lot with landscaped islands. The topsoil was removed by prior grading. The proposed parking structure, if constructed in accordance with appropriate geotechnical recommendations and the applicable code requirements and if properly maintained, is not anticipated to result in substantial erosion or the loss of topsoil.

7.0 CONCLUSIONS

Based on the available geologic data, active or potentially active faults with the potential for surface fault rupture are not known to be located beneath or projecting toward the site. In our opinion, the potential for surface rupture at the site due to fault plane displacement propagating to the ground surface during the design life of the project is considered low. Although the site could be subjected to strong ground shaking in the event of an earthquake, 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.

Based on the historic-high groundwater level and the measurements from our current and prior explorations, the potential for liquefaction and liquefaction-induced settlement is considered low; however, based on our prior nearby borings, there is a potential for significant seismically-induced settlement beneath the site. The upper soils beneath the site are susceptible to hydroconsolidation and may become weaker and more compressible when wet. The site is relatively level and the absence of nearby slopes precludes slope stability hazards. The potential for other geologic hazards such as tsunamis, seiches, flooding, and subsidence affecting the site is considered low. The site could be susceptible to subsidence due to nearby groundwater withdrawal based on USGS data. Such subsidence would be expected to be distributed over a wide region. The thickness of the sediments beneath the site which could be subject to subsidence is anticipated to be relatively thin so the potential for subsidence to impact structures at the site is considered relatively low. The potential for inundation at the site as a result of an earthquake-induced dam failure is considered low.

8.0 REFERENCES

Bryant, W. A., Hart, E.W., 2007, "Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act with Index to Earthquake Fault Zones Maps," Interim Revision 2007.

California Department of Conservation Stat Mining and Geology Board (CSMGB), 2008, "A Report of Mineral Land Classification and Designation Under the Surface Mining and Reclamation Act of 1975," SMGB Information Report 2008-05, July 2008.

California Department of Water Resources, 2013, "Water Data Library" <http://www.water.ca.gov/waterdatalibrary/>

California Geological Survey, 2010, Geological Compilation of Quaternary Surficial Deposits in Southern California, San Bernardino 30'x60' Quadrangle, July 2010

California Geological Survey, 2008, "Appendix A: California Fault Parameters for the National Seismic Hazard Maps and Working Group on California Earthquake Probabilities 2007," Special Report 203A.

California Geological Survey, 2003, "The Revised 2002 California Probabilistic Seismic Hazard Maps, June 2003," Appendix A – 2002 California Fault Parameters.

Campbell, K.W., and Bozorgnia, Y., 2008, Ground Motion Model for the Geometric Mean Horizontal Component of PGA, PGV, PGD and 5% Damped Linear Elastic Response Spectra for Periods Ranging from 0.01s to 10.0s, Earthquake Spectra, v.24, no.1

Dolan, J. F. et al., 1995, "Prospects for Larger or More Frequent Earthquakes in the Los Angeles Metropolitan Region, California," *Science 267*, 199-205 pp.

Grant, L. B., Ballenger, L. J., and Runnerstrom, E. E., 2002, "Coastal Uplift of the San Joaquin Hills, Southern Los Angeles Basin, California, by a Large Earthquake Since A. D. 1635," *Bulletin of the Seismological Society of America*, Vol. 92, No. 2, pp. 590-599.

Grant, L. B., Mueller, K. J., Gath, E. M., and Munro, R., 2000, "Late Quaternary Uplift and Earthquake Potential of the San Joaquin Hills, Southern Los Angeles Basin, California," *Geology*, Vol. 28, No. 4, p. 384.

Hummon, C., Schneider, C. L., Yeats, R. S., and Huftile, G. J., 1992, "Active Tectonics of the Northern Los Angeles Basin: An Analysis of Subsurface Data", in Proceedings of the 35th Annual Meeting of the Association of Engineering Geologists".

Jennings, C.W. and Bryant, W.A., 2010, "Fault Activity Map of California," California Geological Survey, Geologic Data Map Series No. 6, map scale 1:750,000.

LeRoy Crandall & Associates, 1963, "Report of Foundation Investigation, Proposed Medical Center, San Fernando County, California for the Loma Linda University," Project No. A-63628.

LeRoy Crandall & Associates, 1983, "Report of Geotechnical Investigation, Proposed Northeast Wing, Loma Linda University Medical Center, Loma Linda, California for Loma Linda University," Project No. AE-83226.

LeRoy Crandall & Associates, 1984, "Report of Geotechnical Investigation, Proposed South Wing, Loma Linda University Medical Center, Loma Linda, California for Loma Linda University," Project No. AD-84048.

LeRoy Crandall & Associates, 1987, "Report of Foundation Investigation, Proposed South Wing, Phase 2, Loma Linda University Medical Center, Loma Linda, California for Loma Linda University," Project No. A-87027.

Lofgren, Ben E., 1971, "Estimated Subsidence in the Chino-Riverside and Bunker Hill-Yucaipa Areas in Southern California for a Postulated Water-Level Lowering, 1965-2015", US Geological Survey Open File Report. 20 p.

Loma Linda General Plan, City of, 2009, "Public Health and Safety Element of the Loma Linda General Plan", adapted May 26, 2009

Mark, R. K., 1977, "Application of Linear Statistical Models of Earthquake Magnitude Versus Fault Length in Estimating Maximum Expectable Earthquakes," Geology, Vol. 5, pp. 464-466.

Meisling, K.E., 1984. Neotectonics of the north frontal fault system of the San Bernardino Mountains, southern California: Cajon Pass to Lucerne Valley: Pasadena, California, California Institute of Technology, Ph.D. dissertation, 394 p.

Miller, R.V., 1984, "Mineral Land Classification of the Greater Los Angeles Area, Part VII Classification of Sand and Gravel Resource Areas, San Bernardino Production-Consumption Region," California Department of Conservation Division of Mines and Geology, Special Report 143.

Morton, D.M., and Matti, J.C., 1987, "The Cucamonga fault zone: Geologic setting and Quaternary history," in Morton, D.M., and Yerkes R.F., eds., Recent reverse faulting in the Transverse Ranges, California: U.S. Geological Survey Professional Paper 1339, p. 179-203.

Morton, D.M., 1978, "Geologic Map of the San Bernardino South Quadrangle, San Bernardino and Riverside Counties, California, U.S. Geological Survey Open File Report 78-20

San Bernardino, County of, 2010a, "San Bernardino County Land Use Plan, Geologic Hazard Overlays," Map FH30C.

San Bernardino, County of, 2010b, "San Bernardino County Land Use Plan, Geologic Hazard Overlays," Map FH30B.

San Bernardino, County of, 2007, "San Bernardino County 2007 General Plan," Adopted March 13, 2007, Amended June 18, 2013.

Shaw, J. H., Plesch, A., Dolan, J. F., Pratt, T. L., and Fiore, P., 2002, "Puente Hills Blind-Thrust System Los Angeles, California," *Bulletin of the Seismological Society of America*, Vol. 92, No. 8, pp. 2946-2960.

Slemmons, D. B., 1979, "Evaluation of Geomorphic Features of Active Faults For Engineering Design and Siting Studies," Association of Engineering Geologists Short Course.

Southern California Seismographic Network, 2012, "Southern California Earthquake Catalog," http://www.scecdc.scec.org/ftp/catalogs/SCSN/.

USGS, 1963, "Geologic and Hydrologic Features of the San Bernardino Area California, With Special Reference to Underflow Across the San Jacinto Fault", Geologic Survey Water Supply Paper 1419

USGS, 1991, "Liquefaction Susceptibility in the San Bernardino Valley, Southern California-A Regional Evaluation", U.S. Geologic Survey Bulletin 1898

Wells, D. L., and Coppersmith, K. J., 1994, "New Empirical Relationships Among Magnitude, Rupture Length, Rupture Width, Rupture Area, and Surface Displacement," *Bulletin of the Seismological Society of America,* Vol. 84, No. 4, pp. 974-1002.

Wesnousky, S. G., 1986, "Earthquakes, Quaternary Faults and Seismic Hazard in California," *Journal of Geophysical Research*, Vol. 91, No. B12, pp. 12,587-12,631.

Working Group on California Earthquake Probabilities, 1995, "Seismic Hazards in Southern California: Probable Earthquakes, 1994 to 2024," *Bulletin of the Seismological Society of America*, Vol. 85, No. 2.

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
San Jacinto (SB Section)	6.7	(a)	SS	6.0	0.5	SW
San Andreas (SB N.Section)	7.5	(a)	SS	22.0	7.5	NNE
Cucamonga	6.9	(a)	RO	5.0	14	NW
San Andreas (Mojave S.Section)	7.4	(a)	SS	29.0	21	NNW
Elsinore (Glen Ivy Section)	6.8	(a)	SS	5.0	22	SW
Chino-Central Avenue	6.7	(a)	RO	1.0	23	WSW
San Jose	6.4	(a)	RO	0.5	24	WNW
San Gabriel	7.2	(a)	SS	1.0	26	NW
Sierra Madre	7.2	(a)	RO	2.0	26	WNW
Whittier	6.8	(a)	RO	2.5	26	WSW
Puente Hills Blind Thrust	7.1	(a)	BT	0.7	35	W
San Joaquin Thrust	6.6	(a)	BT	0.5	39	SW
Clamshell-Sawpit	6.5	(a)	RO	0.5	39	WNW
Raymond	6.5	(a)	RO	1.5	43	WNW
Upper Elysian Park Thrust	6.4	(a)	BT	1.3	47	W
Newport-Inglewood Zone	7.1	(a)	SS	1.0	47	SW
Verdugo	6.9	(a)	RO	0.5	52	WNW
Hollywood	6.4	(a)	RO	1.0	59	W
Palos Verdes Hills	7.3	(a)	SS	3.0	59	WSW
Sierra Madre (San Fernando)	6.7	(a)	RO	2.0	62	WNW
Santa Monica	6.6	(a)	RO	1.0	66	W
Northridge Thrust	7.0	(a)	BT	1.5	67	WNW
Malibu Coast	6.7	(a)	RO	0.3	73	W
Santa Susana	6.7	(a)	RO	5.0	73	WNW
Holser	6.5	(a)	RO	0.4	78	WNW
Anacapa-Dume	7.5	(a)	RO	3.0	82	W
Simi-Santa Rosa	7.0	(a)	RO	1.0	83	WNW

(a) California Geological Survey, 2003, 2008
(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

Revised by PER 6/27/13
Checked by MAE 6/28/13

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
Arrowhead	6.9	(f)	RO	1.0	10	NE
Santa Ana	6.9	(f)	RO	1.0	11	NE
Waterman Canyon	6.9	(f)	RO	1.0	11	N
Indian Hill	6.6	(b)	RO	0.1	25	WNW
Garnet Hill	7.0	(f)	SS	0.1	34	ESE
Peralta Hills	6.5	(b)	RO	0.1	34	SW
El Modeno	6.5	(b)	NO	0.1	34	SW
Duarte	6.7	(c)	RO	0.1	36	WNW
Pipes Canyon	6.4	(c)	SS	0.6	37	ENE
Norwalk	6.7	(c)	RO	0.1	41	WSW
Pelican Hill	6.3	(b)	SS	0.1	45	SW
Los Alamitos	6.2	(b)	SS	0.1	50	SW

(a) California Geological Survey, 2003, 2008
(b) Mark, 1977
(c) Slemmons, 1979
(d) Wesnousky, 1986
(e) Hummon et al., 1994
(f) Wells and Coppersmith, 1994
SS Strike Slip
NO Normal Oblique
RO Reverse Oblique
BT Blind Thrust

Revised by PER 6/27/13
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Table 3
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 Km of the Site
(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
02-11-1932	23:11:20	34.42 N	116.85 W	B	56	.0	4.0
11-01-1932	04:45:00	34.00 N	117.25 W	E	6	.0	4.0
01-25-1933	14:44:00	33.92 N	116.75 W	E	50	.0	4.0
03-11-1933	01:54:07	33.62 N	117.97 W	A	81	.0	6.4
03-11-1933	02:04:00	33.75 N	118.08 W	C	83	.0	4.9
03-11-1933	02:05:00	33.75 N	118.08 W	C	83	.0	4.3
03-11-1933	02:09:00	33.75 N	118.08 W	C	83	.0	5.0
03-11-1933	02:10:00	33.75 N	118.08 W	C	83	.0	4.6
03-11-1933	02:11:00	33.75 N	118.08 W	C	83	.0	4.4
03-11-1933	02:16:00	33.75 N	118.08 W	C	83	.0	4.8
03-11-1933	02:17:00	33.60 N	118.00 W	E	84	.0	4.5
03-11-1933	02:22:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	02:27:00	33.75 N	118.08 W	C	83	.0	4.6
03-11-1933	02:30:00	33.75 N	118.08 W	C	83	.0	5.1
03-11-1933	02:31:00	33.60 N	118.00 W	E	84	.0	4.4
03-11-1933	02:52:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	02:57:00	33.75 N	118.08 W	C	83	.0	4.2
03-11-1933	02:58:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	02:59:00	33.75 N	118.08 W	C	83	.0	4.6
03-11-1933	03:05:00	33.75 N	118.08 W	C	83	.0	4.2
03-11-1933	03:09:00	33.75 N	118.08 W	C	83	.0	4.4
03-11-1933	03:11:00	33.75 N	118.08 W	C	83	.0	4.2
03-11-1933	03:23:00	33.75 N	118.08 W	C	83	.0	5.0
03-11-1933	03:36:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	03:39:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	03:47:00	33.75 N	118.08 W	C	83	.0	4.1
03-11-1933	04:36:00	33.75 N	118.08 W	C	83	.0	4.6
03-11-1933	04:39:00	33.75 N	118.08 W	C	83	.0	4.9
03-11-1933	04:40:00	33.75 N	118.08 W	C	83	.0	4.7
03-11-1933	05:10:22	33.70 N	118.07 W	C	84	.0	5.1
03-11-1933	05:13:00	33.75 N	118.08 W	C	83	.0	4.7
03-11-1933	05:15:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	05:18:04	33.58 N	117.98 W	C	85	.0	5.2
03-11-1933	05:21:00	33.75 N	118.08 W	C	83	.0	4.4
03-11-1933	05:24:00	33.75 N	118.08 W	C	83	.0	4.2

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Table 3 - continued
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(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
03-11-1933	05:53:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	05:55:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	06:11:00	33.75 N	118.08 W	C	83	.0	4.4
03-11-1933	06:18:00	33.75 N	118.08 W	C	83	.0	4.2
03-11-1933	06:29:00	33.85 N	118.27 W	C	95	.0	4.4
03-11-1933	06:35:00	33.75 N	118.08 W	C	83	.0	4.2
03-11-1933	06:58:03	33.68 N	118.05 W	C	83	.0	5.5
03-11-1933	07:51:00	33.75 N	118.08 W	C	83	.0	4.2
03-11-1933	07:59:00	33.75 N	118.08 W	C	83	.0	4.1
03-11-1933	08:08:00	33.75 N	118.08 W	C	83	.0	4.5
03-11-1933	08:32:00	33.75 N	118.08 W	C	83	.0	4.2
03-11-1933	08:37:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	08:54:57	33.70 N	118.07 W	C	84	.0	5.1
03-11-1933	09:10:00	33.75 N	118.08 W	C	83	.0	5.1
03-11-1933	09:11:00	33.75 N	118.08 W	C	83	.0	4.4
03-11-1933	09:26:00	33.75 N	118.08 W	C	83	.0	4.1
03-11-1933	10:25:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	10:45:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	11:00:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	11:04:00	33.75 N	118.13 W	C	87	.0	4.6
03-11-1933	11:29:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	11:38:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	11:41:00	33.75 N	118.08 W	C	83	.0	4.2
03-11-1933	11:47:00	33.75 N	118.08 W	C	83	.0	4.4
03-11-1933	12:50:00	33.68 N	118.05 W	C	83	.0	4.4
03-11-1933	13:50:00	33.73 N	118.10 W	C	85	.0	4.4
03-11-1933	13:57:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	14:25:00	33.85 N	118.27 W	C	95	.0	5.0
03-11-1933	14:47:00	33.73 N	118.10 W	C	85	.0	4.4
03-11-1933	14:57:00	33.88 N	118.32 W	C	99	.0	4.9
03-11-1933	15:09:00	33.73 N	118.10 W	C	85	.0	4.4
03-11-1933	15:47:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	16:53:00	33.75 N	118.08 W	C	83	.0	4.8
03-11-1933	19:44:00	33.75 N	118.08 W	C	83	.0	4.0
03-11-1933	19:56:00	33.75 N	118.08 W	C	83	.0	4.2

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(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
03-11-1933	22:00:00	33.75 N	118.08 W	C	83	.0	4.4
03-11-1933	22:31:00	33.75 N	118.08 W	C	83	.0	4.4
03-11-1933	22:32:00	33.75 N	118.08 W	C	83	.0	4.1
03-11-1933	22:40:00	33.75 N	118.08 W	C	83	.0	4.4
03-11-1933	23:05:00	33.75 N	118.08 W	C	83	.0	4.2
03-12-1933	00:27:00	33.75 N	118.08 W	C	83	.0	4.4
03-12-1933	00:34:00	33.75 N	118.08 W	C	83	.0	4.0
03-12-1933	04:48:00	33.75 N	118.08 W	C	83	.0	4.0
03-12-1933	05:46:00	33.75 N	118.08 W	C	83	.0	4.4
03-12-1933	06:01:00	33.75 N	118.08 W	C	83	.0	4.2
03-12-1933	06:16:00	33.75 N	118.08 W	C	83	.0	4.6
03-12-1933	07:40:00	33.75 N	118.08 W	C	83	.0	4.2
03-12-1933	08:35:00	33.75 N	118.08 W	C	83	.0	4.2
03-12-1933	15:02:00	33.75 N	118.08 W	C	83	.0	4.2
03-12-1933	16:51:00	33.75 N	118.08 W	C	83	.0	4.0
03-12-1933	17:38:00	33.75 N	118.08 W	C	83	.0	4.5
03-12-1933	18:25:00	33.75 N	118.08 W	C	83	.0	4.1
03-12-1933	21:28:00	33.75 N	118.08 W	C	83	.0	4.1
03-12-1933	23:54:00	33.75 N	118.08 W	C	83	.0	4.5
03-13-1933	03:43:00	33.75 N	118.08 W	C	83	.0	4.1
03-13-1933	04:32:00	33.75 N	118.08 W	C	83	.0	4.7
03-13-1933	06:17:00	33.75 N	118.08 W	C	83	.0	4.0
03-13-1933	13:18:28	33.75 N	118.08 W	C	83	.0	5.3
03-13-1933	15:32:00	33.75 N	118.08 W	C	83	.0	4.1
03-13-1933	19:29:00	33.75 N	118.08 W	C	83	.0	4.2
03-14-1933	00:36:00	33.75 N	118.08 W	C	83	.0	4.2
03-14-1933	12:19:00	33.75 N	118.08 W	C	83	.0	4.5
03-14-1933	19:01:50	33.62 N	118.02 W	C	84	.0	5.1
03-14-1933	22:42:00	33.75 N	118.08 W	C	83	.0	4.1
03-15-1933	02:08:00	33.75 N	118.08 W	C	83	.0	4.1
03-15-1933	04:32:00	33.75 N	118.08 W	C	83	.0	4.1
03-15-1933	05:40:00	33.75 N	118.08 W	C	83	.0	4.2
03-15-1933	11:13:32	33.62 N	118.02 W	C	84	.0	4.9
03-16-1933	14:56:00	33.75 N	118.08 W	C	83	.0	4.0
03-16-1933	15:29:00	33.75 N	118.08 W	C	83	.0	4.2

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DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
03-16-1933	15:30:00	33.75 N	118.08 W	C	83	.0	4.1
03-17-1933	16:51:00	33.75 N	118.08 W	C	83	.0	4.1
03-18-1933	20:52:00	33.75 N	118.08 W	C	83	.0	4.2
03-19-1933	21:23:00	33.75 N	118.08 W	C	83	.0	4.2
03-20-1933	13:58:00	33.75 N	118.08 W	C	83	.0	4.1
03-21-1933	03:26:00	33.75 N	118.08 W	C	83	.0	4.1
03-23-1933	08:40:00	33.75 N	118.08 W	C	83	.0	4.1
03-23-1933	18:31:00	33.75 N	118.08 W	C	83	.0	4.1
03-25-1933	13:46:00	33.75 N	118.08 W	C	83	.0	4.1
03-30-1933	12:25:00	33.75 N	118.08 W	C	83	.0	4.4
03-31-1933	10:49:00	33.75 N	118.08 W	C	83	.0	4.1
04-01-1933	06:42:00	33.75 N	118.08 W	C	83	.0	4.2
04-02-1933	08:00:00	33.75 N	118.08 W	C	83	.0	4.0
04-02-1933	15:36:00	33.75 N	118.08 W	C	83	.0	4.0
05-16-1933	20:58:55	33.75 N	118.17 W	C	90	.0	4.0
08-04-1933	04:17:48	33.75 N	118.18 W	C	91	.0	4.0
10-02-1933	09:10:17	33.78 N	118.13 W	A	85	.0	5.4
10-02-1933	13:26:01	33.62 N	118.02 W	C	84	.0	4.0
10-25-1933	07:00:46	33.95 N	118.13 W	C	81	.0	4.3
11-13-1933	21:28:00	33.87 N	118.20 W	C	89	.0	4.0
11-20-1933	10:32:00	33.78 N	118.13 W	B	85	.0	4.0
01-09-1934	14:10:00	34.10 N	117.68 W	A	39	.0	4.5
01-18-1934	02:14:00	34.10 N	117.68 W	A	39	.0	4.0
01-20-1934	21:17:00	33.62 N	118.12 W	B	92	.0	4.5
01-26-1934	18:44:00	34.08 N	116.47 W	C	74	.0	4.0
02-20-1934	10:35:00	33.47 N	116.63 W	B	87	.0	4.0
04-17-1934	18:33:00	33.57 N	117.98 W	C	85	.0	4.0
11-16-1934	21:26:00	33.75 N	118.00 W	B	76	.0	4.0
06-07-1935	16:33:00	33.27 N	117.02 W	B	90	.0	4.0
06-19-1935	11:17:00	33.72 N	117.52 W	B	44	.0	4.0
07-13-1935	10:54:16	34.20 N	117.90 W	A	61	.0	4.7
09-03-1935	06:47:00	34.03 N	117.32 W	B	5	.0	4.5
10-24-1935	14:48:07	34.10 N	116.80 W	A	43	.0	5.1
10-24-1935	14:51:00	34.10 N	116.88 W	C	36	.0	4.5
10-24-1935	14:52:00	34.10 N	116.88 W	C	36	.0	4.5

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DATE	TIME	LATITUDE		LONGITUDE		Q	DIST	DEPTH	MAGNITUDE
10-24-1935	15:27:00	34.10	N	116.88	W	C	36	.0	4.0
11-04-1935	03:55:00	33.50	N	116.92	W	B	69	.0	4.5
12-25-1935	17:15:00	33.60	N	118.02	W	B	85	.0	4.5
02-23-1936	22:20:42	34.13	N	117.34	W	A	11	10.0	4.5
02-26-1936	09:33:27	34.14	N	117.34	W	A	12	10.0	4.0
07-29-1936	14:22:52	33.45	N	116.90	W	C	74	10.0	4.0
08-22-1936	05:21:00	33.77	N	117.82	W	B	60	.0	4.0
01-15-1937	18:35:47	33.56	N	118.06	W	B	91	10.0	4.0
03-04-1937	16:04:00	33.78	N	116.28	W	B	95	.0	4.0
03-19-1937	01:23:38	34.11	N	117.43	W	A	16	10.0	4.0
03-26-1937	21:24:00	33.47	N	116.58	W	C	90	.0	4.0
03-27-1937	05:28:00	33.47	N	116.58	W	C	90	.0	4.0
03-27-1937	07:42:00	33.47	N	116.58	W	C	90	.0	4.5
03-29-1937	17:03:16	33.42	N	116.49	W	C	100	10.0	4.0
06-01-1937	15:41:44	34.58	N	116.60	W	B	85	10.0	4.0
07-07-1937	11:12:00	33.57	N	117.98	W	B	85	.0	4.0
09-01-1937	13:48:08	34.21	N	117.53	W	A	30	10.0	4.5
09-01-1937	16:35:33	34.18	N	117.55	W	A	30	10.0	4.5
01-04-1938	00:29:00	33.47	N	116.58	W	C	90	.0	4.5
02-08-1938	07:39:00	34.05	N	116.43	W	B	77	.0	4.0
02-15-1938	07:45:39	34.17	N	116.26	W	C	94	10.0	4.5
05-21-1938	09:44:00	33.62	N	118.03	W	B	86	.0	4.0
05-31-1938	08:34:55	33.70	N	117.51	W	B	45	10.0	5.2
06-10-1938	14:40:00	34.13	N	116.95	W	B	31	.0	4.0
06-16-1938	05:59:16	33.46	N	116.90	W	B	74	10.0	4.0
07-05-1938	18:06:55	33.68	N	117.55	W	A	49	10.0	4.5
08-06-1938	02:28:00	33.93	N	116.75	W	B	49	.0	4.0
08-06-1938	22:00:55	33.72	N	117.51	W	B	43	10.0	4.0
08-31-1938	03:18:14	33.76	N	118.25	W	A	97	10.0	4.5
12-27-1938	10:09:28	34.13	N	117.52	W	B	25	10.0	4.0
04-03-1939	02:50:44	34.04	N	117.23	W	A	3	10.0	4.0
11-04-1939	21:41:00	33.77	N	118.12	W	B	85	.0	4.0
11-07-1939	18:52:08	34.00	N	117.28	W	A	6	.0	4.7
12-27-1939	19:28:49	33.78	N	118.20	W	A	91	.0	4.7
01-13-1940	07:49:07	33.78	N	118.13	W	B	85	.0	4.0

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(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
02-08-1940	16:56:17	33.70 N	118.07 W	B	84	.0	4.0
02-11-1940	19:24:10	33.98 N	118.30 W	B	96	.0	4.0
02-19-1940	12:06:55	34.02 N	117.05 W	A	20	.0	4.6
04-18-1940	18:43:43	34.03 N	117.35 W	A	8	.0	4.4
05-18-1940	05:03:58	34.08 N	116.30 W	A	89	.0	5.3
05-18-1940	05:51:20	34.07 N	116.33 W	A	86	.0	5.2
05-18-1940	06:04:30	34.07 N	116.32 W	A	88	.0	4.6
05-18-1940	07:21:32	34.07 N	116.33 W	A	86	.0	5.0
05-18-1940	13:47:19	34.05 N	116.28 W	C	91	.0	4.5
05-19-1940	02:26:02	34.05 N	116.28 W	C	91	.0	4.5
05-19-1940	02:27:30	34.05 N	116.28 W	C	91	.0	4.5
05-19-1940	03:51:45	34.05 N	116.28 W	C	91	.0	4.0
05-19-1940	19:39:41	34.05 N	116.28 W	C	91	.0	4.0
05-22-1940	06:31:37	34.05 N	116.28 W	C	91	.0	4.0
05-22-1940	14:10:05	34.05 N	116.28 W	C	91	.0	4.0
05-27-1940	03:27:27	34.05 N	116.28 W	C	91	.0	4.0
06-01-1940	05:27:01	34.08 N	116.33 W	A	86	.0	4.7
06-01-1940	05:56:46	34.05 N	116.28 W	C	91	.0	4.0
06-01-1940	06:54:28	34.10 N	116.33 W	A	86	.0	4.3
06-02-1940	06:13:10	34.08 N	116.33 W	A	86	.0	4.5
06-05-1940	08:27:27	33.83 N	117.40 W	B	27	.0	4.0
06-06-1940	22:21:15	34.00 N	116.32 W	A	88	.0	4.3
06-06-1940	23:48:49	34.05 N	116.28 W	C	91	.0	4.0
06-06-1940	23:56:37	34.02 N	116.37 W	A	83	.0	4.4
06-08-1940	17:10:32	34.05 N	116.28 W	C	91	.0	4.0
06-11-1940	19:51:18	34.03 N	116.32 W	A	88	.0	4.4
06-14-1940	21:58:50	34.05 N	116.28 W	C	91	.0	4.0
06-24-1940	16:39:36	34.05 N	116.28 W	C	91	.0	4.0
07-20-1940	04:01:13	33.70 N	118.07 W	B	84	.0	4.0
08-01-1940	19:31:40	34.05 N	116.28 W	C	91	.0	4.0
08-04-1940	18:15:20	34.05 N	116.28 W	B	91	.0	4.0
11-01-1940	20:00:46	33.63 N	118.20 W	B	98	.0	4.0
01-30-1941	01:34:46	33.97 N	118.05 W	A	73	.0	4.1
02-23-1941	18:36:14	33.50 N	116.48 W	C	94	.0	4.5
03-22-1941	08:22:40	33.52 N	118.10 W	B	97	.0	4.0

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A = +- 1 km horizontal distance; +- 2 km depth
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Table 3 - continued
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 Km of the Site
(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE		LONGITUDE		Q	DIST	DEPTH	MAGNITUDE
03-25-1941	23:43:41	34.22	N	117.47	W	B	26	.0	4.0
04-11-1941	01:20:24	33.95	N	117.58	W	B	31	.0	4.0
10-22-1941	06:57:18	33.82	N	118.22	W	A	92	.0	4.8
11-14-1941	08:41:36	33.78	N	118.25	W	A	96	.0	4.8
01-25-1942	21:51:33	34.40	N	116.92	W	B	51	.0	4.0
02-01-1942	15:15:55	34.40	N	116.92	W	B	51	.0	4.0
02-01-1942	15:18:28	34.40	N	116.92	W	B	51	.0	4.5
02-01-1942	16:03:34	34.40	N	116.92	W	B	51	.0	4.5
02-27-1942	01:08:53	34.33	N	117.00	W	B	40	.0	4.0
03-01-1942	10:46:31	34.08	N	116.47	W	C	74	.0	4.0
04-26-1942	15:10:23	33.95	N	116.73	W	C	50	.0	4.0
05-22-1942	15:18:29	34.45	N	116.78	W	C	63	.0	4.0
08-07-1942	01:15:33	34.30	N	116.42	W	C	83	.0	4.5
08-07-1942	01:23:58	34.30	N	116.42	W	C	83	.0	4.0
08-07-1942	01:53:14	34.30	N	116.42	W	C	83	.0	4.0
08-22-1942	12:59:13	34.12	N	116.75	W	C	48	.0	4.0
09-20-1942	16:14:14	34.35	N	116.28	W	C	97	.0	4.0
09-21-1942	07:07:54	33.53	N	116.63	W	C	82	.0	4.0
08-29-1943	03:45:13	34.27	N	116.97	W	C	37	.0	5.3
08-29-1943	03:57:54	34.27	N	116.97	W	C	37	.0	4.0
08-29-1943	05:16:30	34.27	N	116.97	W	C	37	.0	4.0
10-14-1943	14:28:44	34.33	N	116.88	W	C	47	.0	4.5
10-15-1943	16:50:01	34.35	N	116.87	W	C	50	.0	4.5
10-24-1943	00:29:21	33.93	N	117.37	W	C	16	.0	4.0
11-17-1943	11:28:41	33.92	N	116.70	W	C	54	.0	4.5
05-05-1944	13:47:15	34.00	N	116.38	W	C	82	.0	4.0
06-10-1944	11:11:50	34.01	N	116.77	W	A	46	10.0	4.5
06-10-1944	11:15:31	33.97	N	116.77	W	B	47	10.0	4.0
06-12-1944	10:45:34	33.98	N	116.72	W	A	51	10.0	5.0
06-12-1944	11:16:35	33.99	N	116.71	W	A	51	10.0	5.2
06-12-1944	22:21:19	33.98	N	116.70	W	A	53	10.0	4.2
06-19-1944	00:03:33	33.87	N	118.22	W	B	90	.0	4.5
06-19-1944	03:06:07	33.87	N	118.22	W	C	90	.0	4.4
08-25-1944	07:30:25	34.00	N	116.70	W	C	52	.0	4.2
10-28-1944	18:30:16	33.93	N	116.75	W	B	49	.0	4.4

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Table 3 - continued
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 Km of the Site
(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
04-18-1945	04:58:02	34.43 N	116.98 W	B	50	.0	4.3
09-07-1945	15:34:24	33.97 N	116.80 W	B	44	.0	4.3
02-24-1946	06:07:52	34.40 N	117.80 W	C	63	.0	4.1
08-15-1946	19:01:08	33.92 N	116.25 W	C	95	.0	4.0
09-28-1946	07:19:09	33.95 N	116.85 W	B	40	.0	4.8
05-11-1947	05:06:20	34.23 N	116.33 W	B	88	.0	4.6
07-24-1947	22:10:46	34.02 N	116.50 W	A	71	.0	5.3
07-24-1947	22:53:41	34.02 N	116.50 W	C	71	.0	4.3
07-24-1947	22:54:26	34.02 N	116.50 W	C	71	.0	4.7
07-25-1947	00:46:31	34.02 N	116.50 W	C	71	.0	4.8
07-25-1947	01:56:47	34.02 N	116.50 W	C	71	.0	4.6
07-25-1947	05:17:52	34.02 N	116.50 W	C	71	.0	4.3
07-25-1947	06:19:49	34.02 N	116.50 W	C	71	.0	5.2
07-25-1947	07:57:30	34.02 N	116.50 W	C	71	.0	4.2
07-25-1947	16:14:53	34.02 N	116.50 W	C	71	.0	4.5
07-26-1947	01:24:15	34.02 N	116.50 W	C	71	.0	4.2
07-26-1947	02:49:41	34.02 N	116.50 W	C	71	.0	4.9
07-26-1947	23:04:25	34.02 N	116.50 W	C	71	.0	4.5
07-26-1947	23:13:51	34.02 N	116.50 W	C	71	.0	4.1
07-29-1947	16:36:15	34.02 N	116.50 W	C	71	.0	4.2
07-30-1947	05:22:17	34.02 N	116.50 W	C	71	.0	4.2
08-01-1947	17:01:37	34.02 N	116.50 W	C	71	.0	4.1
08-08-1947	06:47:45	34.02 N	116.50 W	C	71	.0	4.0
11-10-1947	02:22:55	34.40 N	116.42 W	B	87	.0	4.5
03-01-1948	08:12:13	34.17 N	117.53 W	B	28	.0	4.7
10-03-1948	02:46:28	34.18 N	117.58 W	A	33	.0	4.0
12-04-1948	23:43:17	33.93 N	116.38 W	A	82	.0	6.0
12-05-1948	00:07:21	33.93 N	116.37 W	A	84	.0	4.9
12-05-1948	00:40:32	33.93 N	116.35 W	A	85	.0	4.4
12-05-1948	00:42:35	33.97 N	116.43 W	A	77	.0	4.6
12-05-1948	00:50:57	34.00 N	116.47 W	A	74	.0	4.4
12-06-1948	02:46:08	34.00 N	116.47 W	A	74	.0	4.3
12-10-1948	20:42:57	33.93 N	116.40 W	A	81	.0	4.4
12-11-1948	16:12:20	33.97 N	116.45 W	A	76	.0	4.5
12-28-1948	12:53:41	33.48 N	116.70 W	B	82	.0	4.0

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Table 3 - continued
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 Km of the Site
(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
09-23-1949	21:44:40	33.96 N	116.65 W	A	58	12.2	4.0
01-11-1950	21:41:35	33.94 N	118.20 W	A	88	.4	4.1
01-13-1950	05:07:19	33.96 N	116.43 W	A	78	5.9	4.1
08-12-1950	02:17:17	34.32 N	116.80 W	B	52	.0	4.3
08-28-1950	19:45:26	34.31 N	116.84 W	A	49	11.7	4.2
09-05-1950	19:19:56	33.65 N	116.75 W	B	65	.0	4.7
12-22-1950	02:05:36	33.42 N	116.57 W	B	95	.0	4.0
02-15-1951	10:47:59	33.48 N	116.50 W	B	94	.0	4.8
02-15-1951	10:49:57	33.48 N	116.50 W	B	94	.0	4.6
09-22-1951	08:22:39	34.12 N	117.34 W	A	10	11.9	4.3
10-16-1951	12:41:05	34.17 N	116.98 W	B	29	.0	4.0
01-08-1952	06:34:27	33.96 N	116.35 W	B	85	11.4	4.4
02-17-1952	12:36:58	34.00 N	117.27 W	A	6	16.0	4.5
02-04-1953	04:36:16	33.40 N	116.57 W	C	97	.0	4.3
04-30-1954	00:36:23	34.03 N	116.79 W	A	44	11.1	4.2
10-26-1954	16:22:26	33.73 N	117.47 W	B	40	.0	4.1
04-25-1955	02:55:15	33.45 N	116.68 W	B	85	.0	4.0
05-15-1955	17:03:25	34.12 N	117.48 W	A	22	7.6	4.0
07-02-1955	16:29:38	34.41 N	116.67 W	A	68	10.0	4.2
01-03-1956	00:25:48	33.72 N	117.50 W	B	42	13.7	4.7
03-16-1956	20:29:33	34.31 N	116.76 W	A	55	1.3	4.8
03-16-1956	20:33:44	34.25 N	116.77 W	A	51	.8	4.0
03-16-1956	20:36:13	34.26 N	116.76 W	A	53	3.3	4.0
03-16-1956	23:34:56	34.34 N	116.74 W	A	58	1.7	4.4
03-18-1956	02:42:17	34.30 N	116.78 W	A	52	6.3	4.0
05-11-1956	16:30:50	34.23 N	116.80 W	B	48	13.3	4.7
09-23-1956	11:24:41	33.53 N	116.56 W	A	86	12.2	4.3
02-01-1957	07:52:15	33.98 N	116.34 W	B	86	11.0	4.6
12-04-1957	02:51:44	34.07 N	116.43 W	B	77	3.7	4.3
04-17-1959	16:19:00	33.88 N	116.44 W	A	79	22.2	4.2
06-12-1959	11:03:12	33.49 N	116.78 W	A	77	5.7	4.0
06-27-1959	16:22:11	33.97 N	116.88 W	A	36	13.8	4.0
08-26-1959	05:32:50	34.07 N	116.57 W	A	64	16.7	4.3
06-28-1960	20:00:48	34.12 N	117.47 W	A	21	12.0	4.1
10-04-1961	02:21:31	33.85 N	117.75 W	B	50	4.3	4.1

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Table 3 - continued
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 Km of the Site
(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE		LONGITUDE		Q	DIST	DEPTH	MAGNITUDE
10-20-1961	19:49:50	33.65	N	117.99	W	B	80	4.6	4.3
10-20-1961	20:07:14	33.66	N	117.98	W	B	79	6.1	4.0
10-20-1961	21:42:40	33.67	N	117.98	W	B	78	7.2	4.0
10-20-1961	22:35:34	33.67	N	118.01	W	B	81	5.6	4.1
11-20-1961	08:53:34	33.68	N	117.99	W	B	79	4.4	4.0
04-27-1962	09:12:32	33.74	N	117.19	W	B	35	5.7	4.1
10-29-1962	02:42:53	34.33	N	116.86	W	B	48	8.6	5.0
11-30-1962	23:51:05	34.34	N	116.91	W	B	46	7.0	4.3
12-01-1962	00:35:48	34.32	N	116.88	W	B	47	9.6	4.3
12-02-1962	00:41:38	34.33	N	116.88	W	B	47	6.7	4.4
07-30-1963	06:34:57	34.15	N	116.21	W	B	98	12.9	4.7
08-22-1963	04:33:55	34.16	N	116.19	W	B	100	5.8	4.4
09-23-1963	14:41:52	33.71	N	116.93	W	B	49	16.5	5.1
01-06-1964	23:47:12	34.38	N	116.47	W	B	82	12.3	4.5
11-17-1964	14:52:28	33.90	N	116.57	W	B	66	10.3	4.0
01-01-1965	08:04:18	34.14	N	117.52	W	B	25	5.9	4.4
04-15-1965	20:08:33	34.13	N	117.43	W	B	18	5.5	4.5
10-17-1965	09:45:18	33.98	N	116.77	W	B	46	17.0	4.9
05-21-1967	14:42:34	33.51	N	116.58	W	B	87	19.4	4.7
06-15-1967	04:58:05	34.00	N	117.97	W	B	66	10.0	4.1
08-11-1967	00:57:11	33.51	N	116.63	W	B	84	10.7	4.1
04-18-1968	17:42:13	34.32	N	116.93	W	B	43	4.7	4.0
02-28-1969	04:56:12	34.57	N	118.11	W	A	97	5.3	4.3
05-05-1969	16:02:09	34.30	N	117.57	W	B	40	8.8	4.4
10-27-1969	13:16:02	33.55	N	117.81	W	B	75	6.5	4.5
09-12-1970	14:10:11	34.27	N	117.52	W	A	34	8.0	4.1
09-12-1970	14:30:52	34.27	N	117.54	W	A	35	8.0	5.2
09-13-1970	04:47:48	34.28	N	117.55	W	A	37	8.0	4.4
02-23-1971	00:07:39	33.50	N	116.43	W	B	98	8.0	4.2
06-22-1971	10:41:19	33.75	N	117.48	W	B	39	8.0	4.2
01-31-1972	01:55:04	34.31	N	116.88	W	B	46	8.0	4.0
07-14-1973	08:00:20	34.44	N	116.83	W	A	59	8.0	4.6
04-05-1974	10:42:50	34.52	N	116.45	W	B	91	4.8	4.1
02-10-1975	12:51:17	34.40	N	116.64	W	A	70	8.0	4.4
06-01-1975	01:38:49	34.52	N	116.50	W	A	88	4.5	5.0

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Table 3 - continued
List of Historic Earthquakes of Magnitude 4.0 or
Greater Within 100 Km of the Site
(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
08-02-1975	00:14:07	33.52 N	116.56 W	A	88	13.4	4.7
08-14-1975	08:08:49	34.02 N	116.43 W	B	78	10.9	4.0
11-15-1975	06:13:27	34.30 N	116.34 W	B	90	5.8	4.6
12-14-1975	18:16:20	34.29 N	116.32 W	A	91	1.8	4.7
01-01-1976	17:20:12	33.97 N	117.89 W	A	58	6.2	4.2
08-11-1976	15:24:55	33.48 N	116.51 W	P	94	15.4	4.3
04-01-1978	10:52:27	34.20 N	116.96 W	A	33	8.0	4.0
06-05-1978	16:03:03	33.42 N	116.70 W	A	87	11.9	4.4
11-20-1978	06:55:09	34.15 N	116.97 W	A	29	6.1	4.3
03-15-1979	20:17:49	34.31 N	116.44 W	A	81	2.0	4.9
03-15-1979	21:07:16	34.33 N	116.44 W	A	82	2.5	5.3
03-15-1979	21:34:25	34.35 N	116.45 W	A	82	1.5	4.5
03-15-1979	23:07:58	34.33 N	116.44 W	A	82	2.8	4.8
03-16-1979	17:36:59	34.33 N	116.40 W	C	86	5.0	4.0
03-18-1979	22:53:02	34.23 N	116.36 W	A	86	3.4	4.2
03-31-1979	00:16:08	34.30 N	116.50 W	B	76	.1	4.2
06-29-1979	05:53:20	34.25 N	116.90 W	B	40	5.7	4.6
06-30-1979	00:34:11	34.24 N	116.90 W	B	40	5.8	4.7
06-30-1979	07:03:52	34.25 N	116.90 W	B	40	5.6	4.5
07-13-1979	02:26:03	34.26 N	116.44 W	C	80	5.0	4.0
08-22-1979	02:01:36	33.70 N	116.84 W	B	55	5.0	4.1
10-19-1979	12:22:37	34.21 N	117.53 W	B	30	4.9	4.1
02-25-1980	10:47:38	33.50 N	116.51 W	A	92	13.6	5.5
02-09-1982	23:41:17	33.85 N	116.96 W	D	35	6.0	4.1
06-15-1982	23:49:21	33.55 N	116.68 W	A	78	13.1	4.8
06-16-1982	00:03:01	33.57 N	116.66 W	C	77	9.0	4.2
11-10-1982	11:21:25	34.06 N	116.67 W	A	55	11.4	4.1
01-08-1983	07:19:30	34.13 N	117.45 W	A	20	7.8	4.1
02-27-1984	10:18:15	33.47 N	118.06 W	C	98	6.0	4.0
06-11-1984	22:21:10	34.38 N	116.61 W	A	71	1.8	4.0
08-06-1984	08:14:36	33.98 N	116.71 W	A	52	14.2	4.3
02-15-1985	23:26:26	33.98 N	116.40 W	A	80	2.3	4.0
07-18-1985	14:05:25	34.42 N	116.54 W	C	79	6.0	4.2
08-29-1985	07:59:08	34.32 N	116.82 W	A	51	6.1	4.1
10-02-1985	23:44:12	34.02 N	117.25 W	A	3	15.2	4.8

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A = +- 1 km horizontal distance; +- 2 km depth
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Table 3 - continued
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 Km of the Site
(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
07-08-1986	09:20:44	34.00 N	116.61 W	A	61	10.4	5.6
07-08-1986	09:24:12	34.03 N	116.65 W	C	56	9.1	4.4
07-08-1986	09:28:13	33.95 N	116.53 W	C	69	17.8	4.0
07-08-1986	10:09:02	33.98 N	116.58 W	A	64	8.1	4.4
07-08-1986	10:11:00	34.02 N	116.67 W	A	55	3.9	4.1
07-08-1986	10:22:39	34.03 N	116.63 W	A	59	10.9	4.4
07-08-1986	19:36:20	34.02 N	116.61 W	A	60	11.7	4.0
07-09-1986	00:12:32	33.98 N	116.57 W	A	65	8.7	4.2
07-12-1986	05:45:27	33.99 N	116.65 W	A	57	6.6	4.0
07-17-1986	20:35:14	33.99 N	116.65 W	A	57	6.7	4.6
07-17-1986	21:54:45	33.99 N	116.65 W	A	57	7.3	4.4
08-29-1986	07:46:54	33.95 N	116.60 W	A	62	5.3	4.0
10-15-1986	02:28:47	33.95 N	116.58 W	A	65	6.6	4.1
02-21-1987	23:15:29	34.13 N	117.45 W	A	19	8.5	4.0
05-11-1987	15:10:10	34.31 N	116.92 W	A	43	5.3	4.1
10-01-1987	14:42:20	34.06 N	118.08 W	A	75	9.5	5.9
10-01-1987	14:45:41	34.05 N	118.10 W	A	77	13.6	4.7
10-01-1987	14:48:03	34.08 N	118.09 W	A	76	11.7	4.1
10-01-1987	14:49:05	34.06 N	118.10 W	A	77	11.7	4.7
10-01-1987	15:12:31	34.05 N	118.09 W	A	76	10.8	4.7
10-01-1987	15:59:53	34.05 N	118.09 W	A	76	10.4	4.0
10-04-1987	10:59:38	34.07 N	118.10 W	A	77	8.3	5.3
02-11-1988	15:25:55	34.08 N	118.05 W	A	72	12.5	4.7
06-26-1988	15:04:58	34.14 N	117.71 W	A	42	7.9	4.7
07-02-1988	00:26:58	33.48 N	116.44 W	A	99	12.6	4.3
11-20-1988	05:39:28	33.51 N	118.07 W	C	96	6.0	4.9
12-03-1988	11:38:26	34.15 N	118.13 W	A	81	14.3	5.0
12-16-1988	05:53:05	33.98 N	116.68 W	A	54	8.1	4.9
02-18-1989	07:17:04	34.01 N	117.74 W	A	44	3.3	4.1
04-07-1989	20:07:30	33.62 N	117.90 W	A	76	12.9	4.7
06-04-1989	21:33:59	34.60 N	116.84 W	A	72	1.9	4.3
06-12-1989	16:57:18	34.03 N	118.18 W	A	84	15.6	4.6
06-12-1989	17:22:25	34.02 N	118.18 W	A	84	15.5	4.4
12-02-1989	23:16:47	33.65 N	116.74 W	A	66	14.5	4.2
12-28-1989	09:41:08	34.19 N	117.39 W	A	19	14.6	4.3

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Table 3 - continued
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 Km of the Site
(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
02-18-1990	15:52:59	33.51 N	116.45 W	A	96	9.2	4.2
02-28-1990	23:43:36	34.14 N	117.70 W	A	41	4.5	5.4
03-01-1990	00:34:57	34.13 N	117.70 W	A	41	4.4	4.0
03-01-1990	03:23:03	34.15 N	117.72 W	A	44	11.4	4.7
03-02-1990	17:26:25	34.15 N	117.69 W	A	41	5.6	4.7
04-17-1990	22:32:27	34.11 N	117.72 W	A	43	3.6	4.8
06-28-1991	14:43:54	34.27 N	117.99 W	A	72	9.1	5.8
06-28-1991	17:00:55	34.25 N	117.99 W	A	71	9.5	4.3
12-04-1991	08:17:03	34.18 N	117.02 W	A	27	10.7	4.0
04-23-1992	02:25:29	33.96 N	116.32 W	A	88	11.5	4.6
04-23-1992	04:50:23	33.96 N	116.32 W	A	88	12.4	6.1
04-23-1992	05:10:10	34.01 N	116.32 W	A	87	3.0	4.3
04-23-1992	05:10:28	33.96 N	116.33 W	A	87	3.2	4.4
04-23-1992	11:32:33	33.97 N	116.32 W	B	88	.8	4.0
05-02-1992	12:46:41	33.99 N	116.29 W	A	91	4.0	4.1
05-04-1992	01:16:02	33.94 N	116.34 W	A	86	5.8	4.1
05-04-1992	16:19:49	33.94 N	116.30 W	A	90	12.4	4.8
05-06-1992	02:38:43	33.94 N	116.31 W	A	89	6.8	4.7
05-12-1992	02:31:11	33.98 N	116.26 W	A	93	6.7	4.5
05-12-1992	02:31:27	33.98 N	116.26 W	A	93	.2	4.4
05-12-1992	02:32:52	33.98 N	116.26 W	A	93	4.9	4.0
05-18-1992	15:44:17	33.95 N	116.34 W	A	86	6.6	5.0
06-11-1992	00:24:19	34.17 N	116.35 W	A	86	.8	4.4
06-28-1992	11:57:34	34.20 N	116.44 W	A	78	1.0	7.3
06-28-1992	12:00:45	34.13 N	116.41 W	B	80	.0	5.6
06-28-1992	12:01:16	34.12 N	116.32 W	C	87	6.0	5.4
06-28-1992	12:17:49	34.51 N	116.63 W	C	78	5.5	4.6
06-28-1992	12:18:51	34.17 N	116.79 W	A	46	.0	4.3
06-28-1992	12:36:40	34.13 N	116.43 W	C	77	7.4	5.3
06-28-1992	12:40:53	34.33 N	116.55 W	D	73	6.0	5.4
06-28-1992	12:43:58	34.11 N	116.43 W	A	78	3.0	4.4
06-28-1992	12:56:09	34.48 N	116.52 W	D	83	6.0	4.3
06-28-1992	13:10:50	34.42 N	116.45 W	C	85	6.0	4.7
06-28-1992	13:17:47	34.14 N	116.41 W	C	80	6.0	4.1
06-28-1992	13:18:15	34.09 N	116.39 W	A	81	.0	4.4

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Table 3 - continued
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 Km of the Site
(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
06-28-1992	13:26:05	34.16 N	116.41 W	C	80	6.0	4.8
06-28-1992	13:35:38	33.97 N	116.51 W	D	70	6.0	4.0
06-28-1992	13:40:55	34.19 N	116.43 W	C	79	6.0	4.2
06-28-1992	13:50:16	34.07 N	116.39 W	C	81	6.0	4.1
06-28-1992	13:50:46	34.11 N	116.40 W	C	80	6.0	4.9
06-28-1992	14:09:28	34.11 N	116.65 W	C	58	6.0	4.1
06-28-1992	14:39:06	34.09 N	116.43 W	A	78	.2	4.3
06-28-1992	14:43:21	34.16 N	116.85 W	B	40	11.1	5.5
06-28-1992	15:04:51	34.16 N	116.83 W	A	42	12.2	4.4
06-28-1992	15:05:30	34.20 N	116.83 W	C	44	5.2	6.4
06-28-1992	15:17:00	34.13 N	116.86 W	B	38	17.9	4.0
06-28-1992	15:17:13	34.10 N	116.87 W	B	37	2.9	4.6
06-28-1992	15:18:33	34.20 N	116.76 W	B	49	2.2	4.6
06-28-1992	15:24:29	34.21 N	116.76 W	C	50	6.0	4.7
06-28-1992	15:25:20	34.21 N	116.80 W	C	46	6.0	4.2
06-28-1992	15:45:54	34.08 N	116.40 W	A	80	2.6	4.2
06-28-1992	15:53:14	34.22 N	116.73 W	B	53	.8	4.1
06-28-1992	15:56:11	34.22 N	116.75 W	A	51	1.4	4.0
06-28-1992	16:01:15	34.03 N	116.38 W	C	82	1.7	4.3
06-28-1992	16:08:37	34.22 N	116.75 W	A	51	4.9	4.1
06-28-1992	16:09:53	34.06 N	116.37 W	A	83	3.8	4.1
06-28-1992	16:17:19	34.21 N	116.76 W	C	50	6.0	4.2
06-28-1992	16:32:10	34.60 N	116.62 W	C	85	6.0	4.4
06-28-1992	16:33:08	34.59 N	116.64 W	C	83	6.0	4.1
06-28-1992	17:01:31	34.18 N	116.92 W	A	35	13.7	5.1
06-28-1992	17:05:57	34.26 N	116.91 W	A	40	7.7	5.0
06-28-1992	17:18:29	34.19 N	116.81 W	A	45	9.1	4.1
06-28-1992	17:18:42	34.25 N	116.78 W	C	50	.0	4.0
06-28-1992	17:21:27	34.22 N	116.86 W	A	42	1.4	4.2
06-28-1992	17:31:21	34.29 N	116.45 W	B	80	6.8	4.1
06-28-1992	17:32:30	34.20 N	116.82 W	A	44	2.2	4.0
06-28-1992	17:39:51	34.38 N	116.47 W	C	82	6.0	4.0
06-28-1992	17:42:32	34.24 N	116.90 W	B	40	6.5	4.0
06-28-1992	17:44:30	34.16 N	116.85 W	A	40	5.3	4.1
06-28-1992	17:48:32	34.22 N	116.75 W	A	51	1.2	4.4

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Table 3 - continued
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(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
06-28-1992	19:26:37	34.18 N	116.80 W	A	45	1.0	4.2
06-28-1992	20:51:31	34.21 N	116.78 W	A	48	11.1	4.1
06-28-1992	21:13:16	34.10 N	116.43 W	A	78	3.8	4.6
06-28-1992	22:13:12	34.06 N	116.36 W	B	84	7.0	4.0
06-28-1992	22:48:22	34.15 N	116.47 W	A	75	11.0	4.1
06-29-1992	03:01:56	34.24 N	116.44 W	A	79	7.5	4.4
06-29-1992	11:07:06	34.50 N	116.53 W	C	84	6.0	4.2
06-29-1992	11:13:18	34.24 N	116.74 W	A	53	3.0	4.1
06-29-1992	11:44:47	34.20 N	116.79 W	A	47	.8	4.3
06-29-1992	11:44:56	34.60 N	116.62 W	C	86	6.0	4.4
06-29-1992	13:20:03	34.64 N	116.49 W	C	97	6.0	4.1
06-29-1992	14:08:37	34.10 N	116.40 W	A	80	10.4	5.5
06-29-1992	14:12:06	34.10 N	116.40 W	B	80	7.1	4.0
06-29-1992	14:13:38	34.11 N	116.40 W	A	80	9.9	5.0
06-29-1992	14:31:30	34.08 N	116.39 W	A	81	4.9	4.6
06-29-1992	14:41:26	34.12 N	117.00 W	A	26	4.7	4.6
06-29-1992	14:54:06	34.10 N	116.42 W	A	78	3.7	4.2
06-29-1992	16:01:42	33.88 N	116.27 W	A	94	1.8	4.8
06-29-1992	16:25:29	34.09 N	116.42 W	A	78	3.0	4.2
06-29-1992	16:41:41	34.25 N	116.72 W	A	55	1.6	4.5
06-29-1992	19:23:20	34.17 N	116.77 W	A	47	8.0	4.0
06-29-1992	20:07:35	33.89 N	116.29 W	A	92	2.5	4.1
06-29-1992	20:44:25	34.66 N	116.70 W	C	85	6.0	4.4
06-30-1992	00:06:08	34.13 N	116.40 W	A	80	3.2	4.4
06-30-1992	11:30:29	34.09 N	116.42 W	A	78	11.6	4.4
06-30-1992	12:14:49	34.09 N	116.42 W	A	78	11.9	4.2
06-30-1992	12:34:54	34.32 N	116.45 W	A	81	4.6	4.2
06-30-1992	14:38:11	34.00 N	116.36 W	A	84	.9	4.9
06-30-1992	15:19:05	34.17 N	116.41 W	A	80	.4	4.1
06-30-1992	15:20:08	34.26 N	116.74 W	C	54	6.0	4.2
06-30-1992	17:14:21	34.06 N	116.37 W	A	82	.0	4.1
06-30-1992	17:26:30	34.64 N	116.66 W	C	87	6.0	4.4
06-30-1992	20:00:25	34.64 N	116.65 W	C	87	6.0	4.3
06-30-1992	20:05:06	33.99 N	116.36 W	A	84	.6	4.1
06-30-1992	21:22:37	34.00 N	116.35 W	A	84	1.4	4.7

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(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
06-30-1992	21:22:54	34.13 N	116.73 W	A	50	11.9	4.8
06-30-1992	21:49:00	34.08 N	116.99 W	A	26	3.6	4.4
07-01-1992	07:01:49	34.10 N	116.38 W	A	82	.0	4.4
07-01-1992	07:40:29	34.33 N	116.46 W	C	80	6.0	5.3
07-01-1992	17:07:15	34.27 N	116.69 W	A	59	4.7	4.2
07-01-1992	17:45:46	34.28 N	116.69 W	B	59	5.9	4.4
07-01-1992	20:46:17	34.28 N	116.73 W	A	56	.7	4.2
07-01-1992	20:53:56	34.28 N	116.73 W	A	56	1.3	4.0
07-02-1992	00:16:22	34.31 N	116.44 W	A	81	6.0	4.0
07-03-1992	04:15:50	34.21 N	116.77 W	A	49	10.6	4.1
07-03-1992	17:17:06	34.26 N	116.90 W	A	42	7.6	4.1
07-05-1992	05:49:38	33.95 N	116.40 W	A	81	3.2	4.1
07-05-1992	20:03:03	34.30 N	116.80 W	A	51	3.1	4.1
07-06-1992	12:00:59	34.09 N	116.37 W	A	83	1.7	4.4
07-06-1992	18:06:36	34.46 N	116.48 W	A	86	.4	4.3
07-06-1992	19:41:37	34.08 N	116.38 W	A	82	3.2	4.4
07-07-1992	08:21:03	34.07 N	116.38 W	A	82	3.2	4.1
07-07-1992	22:09:28	34.34 N	116.47 W	A	80	2.5	4.4
07-09-1992	01:43:57	34.24 N	116.84 W	A	45	.0	4.9
07-09-1992	02:34:35	34.22 N	116.84 W	A	43	.5	4.2
07-09-1992	12:23:17	34.22 N	116.81 W	A	46	1.2	4.2
07-10-1992	01:29:40	34.23 N	116.85 W	A	44	.4	4.2
07-10-1992	02:41:14	34.12 N	116.39 W	A	81	3.4	4.0
07-15-1992	00:18:56	34.33 N	116.46 W	A	81	.0	4.0
07-18-1992	00:06:11	34.10 N	116.42 W	A	78	2.6	4.0
07-20-1992	04:08:23	34.20 N	116.43 W	C	79	6.0	4.1
07-21-1992	21:10:29	34.22 N	116.77 W	A	49	1.7	4.0
07-21-1992	23:22:10	34.13 N	116.60 W	A	62	1.6	4.1
07-24-1992	07:23:56	34.49 N	116.48 W	A	87	8.5	4.0
07-24-1992	18:14:36	33.90 N	116.28 W	A	92	8.2	5.0
07-24-1992	18:15:27	33.89 N	116.29 W	A	92	3.3	4.0
07-25-1992	04:31:59	33.94 N	116.31 W	A	89	4.7	4.8
07-28-1992	18:27:03	34.11 N	116.42 W	A	79	.0	4.6
07-31-1992	18:03:52	34.10 N	116.42 W	A	78	.0	4.0
08-04-1992	19:06:12	34.10 N	116.38 W	A	82	.0	4.0

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Table 3 - continued
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(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
08-05-1992	15:41:54	34.65 N	116.53 W	A	95	4.2	4.0
08-07-1992	00:43:28	34.27 N	116.77 W	A	51	1.7	4.0
08-08-1992	15:37:43	34.38 N	116.46 W	A	83	2.8	4.5
08-11-1992	06:11:17	34.06 N	116.37 W	A	82	.7	4.2
08-15-1992	08:24:14	34.09 N	116.40 W	A	80	.4	4.8
08-17-1992	20:41:52	34.19 N	116.86 W	A	41	11.3	5.0
08-18-1992	09:46:40	34.20 N	116.86 W	A	41	12.2	4.2
08-24-1992	13:51:46	34.27 N	116.77 W	A	52	1.8	4.3
08-31-1992	09:25:40	34.45 N	116.47 W	A	86	11.0	4.3
09-09-1992	12:50:45	33.95 N	116.33 W	A	87	5.3	4.3
09-15-1992	08:47:11	34.06 N	116.36 W	A	83	8.3	5.1
09-16-1992	19:23:54	34.33 N	116.39 W	B	87	10.9	4.0
09-18-1992	16:59:51	34.56 N	116.55 W	A	87	3.7	4.0
10-02-1992	07:19:57	34.60 N	116.64 W	A	84	3.4	4.6
10-05-1992	11:18:40	34.29 N	116.45 W	B	80	10.3	4.6
11-27-1992	16:00:57	34.34 N	116.90 W	A	47	1.4	5.4
11-27-1992	18:32:24	34.36 N	116.90 W	A	48	1.1	4.1
11-29-1992	14:21:20	34.37 N	116.88 W	A	50	3.4	4.0
12-04-1992	02:08:57	34.37 N	116.90 W	A	49	3.0	5.2
12-04-1992	05:25:11	34.38 N	116.92 W	A	48	2.7	4.7
12-04-1992	12:59:42	34.36 N	116.91 W	A	47	.7	4.3
12-07-1992	03:33:31	34.36 N	116.92 W	A	47	1.1	4.0
12-11-1992	01:38:34	34.27 N	116.40 W	A	83	2.7	4.1
12-21-1992	11:44:02	34.09 N	116.41 W	A	79	3.6	4.0
02-15-1993	07:59:33	34.40 N	116.46 W	C	84	6.0	4.2
05-31-1993	08:55:29	34.12 N	117.00 W	A	26	5.7	4.1
07-08-1993	22:57:44	34.25 N	116.43 W	A	80	2.4	4.0
08-21-1993	01:46:38	34.03 N	116.32 W	A	87	9.1	5.0
04-06-1994	19:01:04	34.19 N	117.10 W	A	22	7.3	4.8
06-16-1994	16:24:27	34.27 N	116.40 W	A	83	3.4	5.0
08-01-1994	21:34:31	34.64 N	116.52 W	A	95	9.1	4.9
08-07-1994	15:10:25	33.99 N	116.27 W	A	92	7.0	4.0
11-20-1994	04:31:43	34.01 N	116.32 W	A	87	6.3	4.2
05-07-1995	11:03:33	33.90 N	116.29 W	A	92	10.7	4.8
09-05-1995	20:27:18	34.20 N	116.44 W	A	78	.0	4.4

NOTE: 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

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

Table 3 - continued
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 Km of the Site
(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE		LONGITUDE		Q	DIST	DEPTH	MAGNITUDE
11-27-1996	01:42:43	33.95	N	116.31	W	A	89	6.0	4.1
06-28-1997	21:45:25	34.17	N	117.34	W	A	15	10.0	4.2
09-19-1997	22:37:14	34.14	N	116.86	W	A	39	10.3	4.1
09-28-1997	15:57:22	34.30	N	116.45	W	A	80	7.7	4.4
12-05-1997	17:04:38	34.10	N	117.00	W	A	25	4.5	4.1
12-21-1997	00:20:58	33.67	N	117.01	W	A	48	.0	4.0
01-05-1998	18:14:06	33.95	N	117.71	W	A	42	11.5	4.3
03-11-1998	12:18:51	34.02	N	117.23	W	A	4	14.9	4.5
08-16-1998	13:34:40	34.12	N	116.93	W	A	32	6.2	4.7
08-20-1998	23:49:58	34.37	N	117.65	W	A	51	9.0	4.4
10-01-1998	18:18:15	34.11	N	116.92	W	A	33	4.4	4.7
10-27-1998	01:08:40	34.32	N	116.84	W	A	49	5.9	4.9
10-27-1998	15:40:17	34.32	N	116.85	W	A	49	4.3	4.1
05-14-1999	07:54:03	34.06	N	116.37	W	A	83	1.9	4.9
05-14-1999	10:52:35	34.03	N	116.36	W	A	84	1.7	4.2
07-19-1999	22:09:27	33.63	N	116.72	W	A	68	14.0	4.2
09-20-1999	07:02:49	34.32	N	116.85	W	A	49	2.8	4.2
02-21-2000	13:49:43	34.05	N	117.26	W	A	1	15.0	4.5
03-07-2000	00:20:28	33.81	N	117.72	W	A	50	11.3	4.0
12-02-2000	08:28:07	34.27	N	116.77	W	A	51	3.3	4.1
02-10-2001	21:05:05	34.29	N	116.95	W	A	40	9.1	5.1
02-11-2001	00:39:15	34.29	N	116.94	W	A	40	8.1	4.2
10-28-2001	16:27:45	33.92	N	118.27	W	A	94	21.1	4.0
10-31-2001	07:56:16	33.51	N	116.51	W	A	92	15.2	5.1
12-14-2001	12:01:35	33.95	N	117.75	W	A	46	13.8	4.0
09-03-2002	07:08:51	33.92	N	117.78	W	A	49	12.9	4.8
02-22-2003	12:19:10	34.31	N	116.85	W	A	48	1.2	5.4
02-22-2003	12:20:15	34.31	N	116.85	W	A	48	4.4	4.0
02-22-2003	12:21:33	34.31	N	116.85	W	A	48	4.4	4.3
02-22-2003	12:25:13	34.33	N	116.86	W	C	49	9.3	4.0
02-22-2003	14:16:08	34.32	N	116.86	W	A	48	4.2	4.1
02-22-2003	19:33:45	34.31	N	116.85	W	A	48	3.0	4.5
02-25-2003	04:03:04	34.32	N	116.84	W	A	49	2.7	4.6
02-27-2003	05:00:21	34.30	N	116.84	W	A	48	4.6	4.0
07-15-2003	06:15:50	34.62	N	116.67	W	A	84	7.6	4.2

NOTE: 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

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

Table 3 - continued
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 Km of the Site
(CAL TECH DATA 1932-2012)

DATE	TIME	LATITUDE		LONGITUDE		Q	DIST	DEPTH	MAGNITUDE
11-13-2004	17:39:16	34.35	N	116.84	W	A	51	9.6	4.2
01-06-2005	14:35:27	34.13	N	117.44	W	A	18	4.2	4.4
01-12-2005	08:10:46	33.95	N	116.40	W	A	81	7.6	4.3
06-12-2005	15:41:46	33.53	N	116.57	W	A	86	14.2	5.2
06-16-2005	20:53:26	34.06	N	117.01	W	A	23	11.6	4.9
06-27-2005	22:17:33	34.05	N	117.03	W	A	22	12.1	4.0
10-18-2005	04:08:41	34.01	N	116.78	W	A	45	16.7	4.1
10-18-2005	07:31:03	34.01	N	116.78	W	A	45	18.6	4.4
12-03-2005	07:49:34	34.33	N	116.83	W	A	51	5.1	4.1
06-02-2007	05:11:26	33.87	N	116.21	W	A	99	4.8	4.3
08-09-2007	07:58:49	34.30	N	118.06	W	A	79	7.6	4.7
09-02-2007	17:29:14	33.73	N	117.48	W	A	40	12.6	4.7
10-16-2007	08:53:44	34.38	N	117.64	W	A	51	8.1	4.2
12-19-2007	12:14:09	34.16	N	116.98	W	A	29	9.3	4.1
03-09-2008	09:22:32	34.14	N	117.46	W	A	21	3.7	4.0
06-23-2008	14:14:57	34.05	N	117.25	W	A	2	14.4	4.0
07-29-2008	18:42:15	33.95	N	117.76	W	A	47	14.7	5.4
10-02-2008	09:41:49	34.08	N	116.97	W	A	28	12.5	4.1
01-09-2009	03:49:46	34.11	N	117.30	W	A	7	14.2	4.5
04-24-2009	03:27:50	33.89	N	117.79	W	A	51	4.2	4.0
05-18-2009	03:39:36	33.94	N	118.34	W	A	100	13.9	4.7
05-19-2009	22:49:11	33.93	N	118.33	W	A	99	12.8	4.0
01-12-2010	02:36:00	33.97	N	116.88	W	A	37	10.1	4.3
01-16-2010	12:03:26	33.93	N	117.02	W	A	26	13.9	4.3
02-13-2010	21:39:00	34.01	N	117.02	W	A	23	8.5	4.1
03-16-2010	11:04:00	33.99	N	118.08	W	A	76	18.9	4.4
08-06-2010	17:39:32	33.98	N	116.44	W	A	76	7.7	4.1
09-14-2011	14:44:51	33.95	N	117.08	W	A	20	16.9	4.1
06-14-2012	03:17:15	33.91	N	117.79	W	A	51	9.8	4.0
08-08-2012	06:23:34	33.90	N	117.79	W	A	51	10.1	4.5
08-08-2012	16:33:22	33.90	N	117.79	W	A	51	10.4	4.5
08-29-2012	20:31:00	33.91	N	117.79	W	A	51	9.2	4.1

NOTE: Q IS A FACTOR RELATING THE QUALITY OF EPICENTRAL DETERMINATION

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B = +- 2 km horizontal distance; +- 5 km depth
C = +- 5 km horizontal distance; no depth restriction
D = >+- 5 km horizontal distance

Event qualities are highly suspect prior to 1990. Many of these event qualities are based on incomplete information according to Caltech.

Table 3 - continued
List of Historic Earthquakes of Magnitude 4.0 or
Greater Within 100 Km of the Site
(CAL TECH DATA 1932-2012)

S E A R C H   O F   E A R T H Q U A K E   D A T A   F I L E 1

SITE: Loma Linda Parking Structure

COORDINATES OF SITE ...... 34.0489 N 117.2652 W

DISTANCE PER DEGREE ..... 110.9 KM-N 92.3 KM-W

MAGNITUDE LIMITS .... 4.0 - 8.5

TEMPORAL LIMITS .... 1932 - 2012

SEARCH RADIUS (KM) 100

NUMBER OF YEARS OF DATA 81.00

NUMBER OF EARTHQUAKES IN FILE 4574

NUMBER OF EARTHQUAKES IN AREA 662

AMEC Environment & Infrastructure, Inc.

Table 3 - continued
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 Km of the Site
(RICHTER DATA 1906-1931)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
09-20-1907	01:54:00	34.20 N	117.10 W	D	23	.0	6.0
05-15-1910	15:47:00	33.70 N	117.40 W	D	41	.0	6.0
04-21-1918	22:32:25	33.75 N	117.00 W	D	41	.0	6.8
07-23-1923	07:30:26	34.00 N	117.25 W	D	6	.0	6.3

S E A R C H   O F   E A R T H Q U A K E   D A T A   F I L E 2

SITE: Loma Linda Parking Structure

COORDINATES OF SITE ...... 34.0489 N 117.2652 W

DISTANCE PER DEGREE ..... 110.9 KM-N 92.3 KM-W

MAGNITUDE LIMITS .... 6.0 - 8.5

TEMPORAL LIMITS .... 1906 - 1931

SEARCH RADIUS (KM) 100

NUMBER OF YEARS OF DATA 26.00

NUMBER OF EARTHQUAKES IN FILE 35

NUMBER OF EARTHQUAKES IN AREA 4

AMEC Environment & Infrastructure, Inc.

Table 3 - continued
List of Historic Earthquakes of Magnitude 4.0 or Greater Within 100 Km of the Site
(NOAA/CDMG DATA 1812-1905)

DATE	TIME	LATITUDE	LONGITUDE	Q	DIST	DEPTH	MAGNITUDE
02-09-1890	04:06:00	34.00 N	117.50 W	D	22	.0	7.0
12-25-1899	04:25:00	33.50 N	116.50 W	D	93	.0	7.0

S E A R C H O F E A R T H Q U A K E D A T A F I L E 3

SITE: Loma Linda Parking Structure

COORDINATES OF SITE ...... 34.0489 N 117.2652 W

DISTANCE PER DEGREE ..... 110.9 KM-N 92.3 KM-W

MAGNITUDE LIMITS .... 7.0 - 8.5

TEMPORAL LIMITS .... 1812 - 1905

SEARCH RADIUS (KM) 100

NUMBER OF YEARS OF DATA 94.00

NUMBER OF EARTHQUAKES IN FILE 9

NUMBER OF EARTHQUAKES IN AREA 2

AMEC Environment & Infrastructure, Inc.

Table 3 - continued
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	446
4.5 - 5.0	154
5.0 - 5.5	49
5.5 - 6.0	8
6.0 - 6.5	7
6.5 - 7.0	1
7.0 - 7.5	3
7.5 - 8.0	0
8.0 - 8.5	0

* * *

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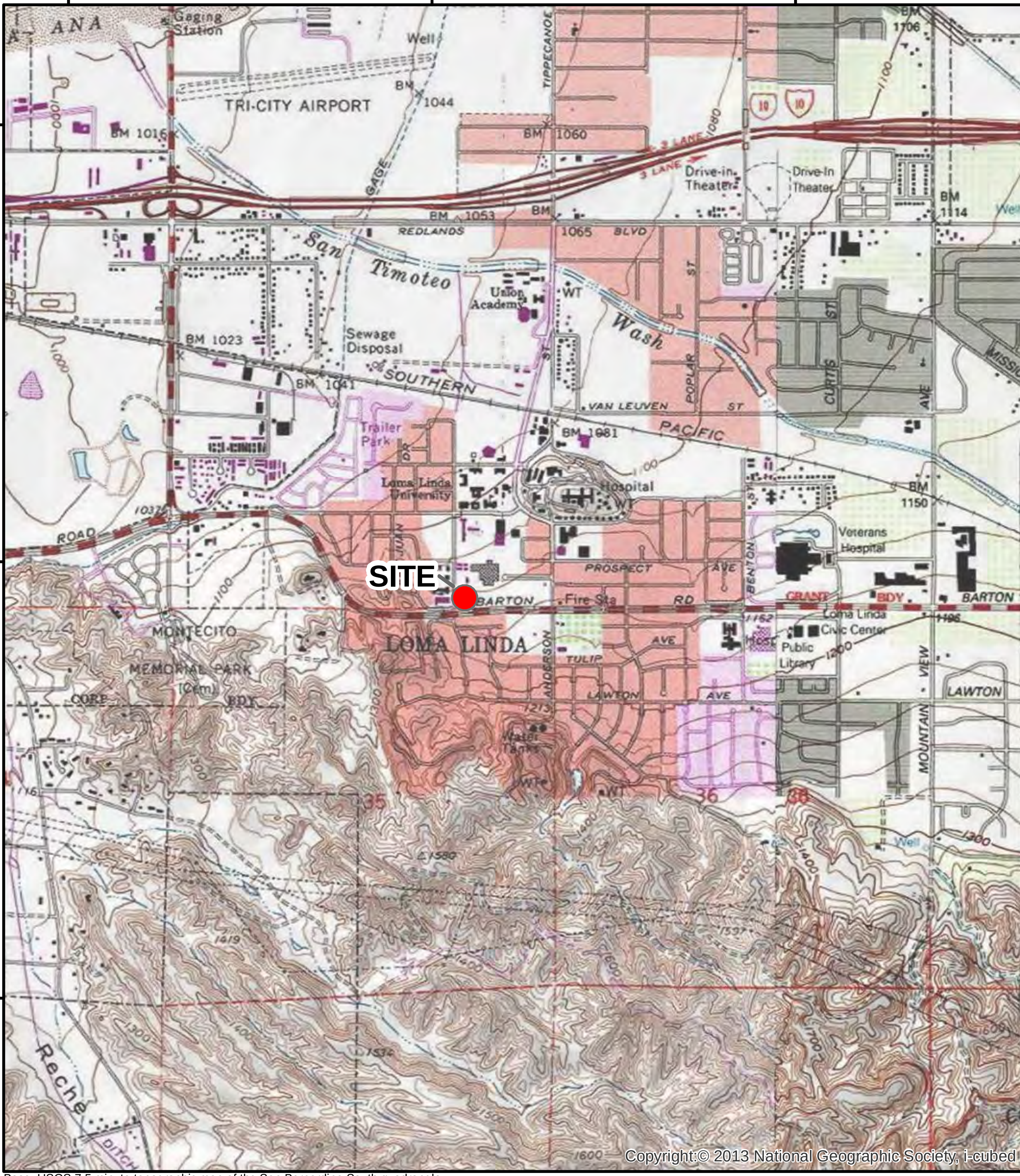
FIGURES

117°17'0"W 117°16'0"W 117°15'0"W



34°4'0"N 34°3'0"N 34°2'0"N

Base: USGS 7.5 minute topographic map of the San Bernardino South quadrangle

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0 500 1,000 2,000 3,000 Feet

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Proposed Parking Structure
Loma Linda University Medical Center
Los Angeles, California

LAT:	34.0489
LON:	-117.2652
SCALE:	1:24,000
DRAWN:	PER
CHECK:	PJE
DATE:	6-28-13

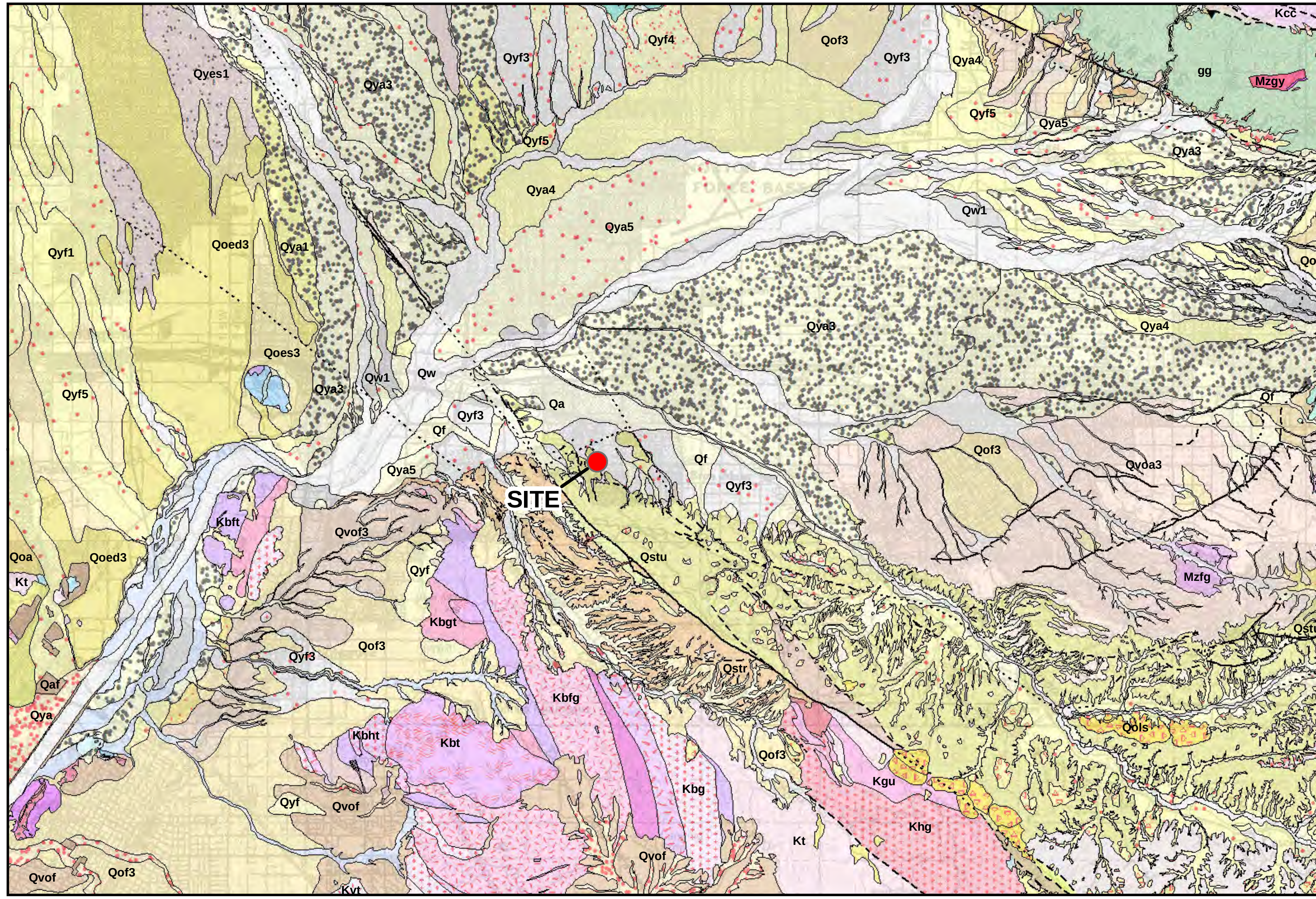
VICINITY MAP

FIGURE: **1**

PROJECT: 4953-10-0913

Geologic Units

Qaf - Artificial fill
Qc - Very young colluvial deposits
Qa - Very young axial-channel deposits
Qls - Very young landslide deposits
Qf - Very young alluvial-fan deposits
Qw - Very young wash deposits
Qyw - Young wash deposits
Qyls - Young landslide deposits
Qya - Young axial-channel deposits
Qyf - Young alluvial-fan deposits
Qyed - Young eolian deposits (dune sand)
Qyes - Young eolian deposits (sheet sand)
Qoa - Old axial-channel deposits
Qoed - Old eolian deposits (dune sand)
Qof - Old alluvial-fan deposits
Qols - Old landslide deposits
Qvoa - Very old axial-channel deposits
Qvof - Very old alluvial-fan deposits
Qvols - Very old landslide deposits
Qvor - Very old regolith
Qvos - Very old surficial deposits
Qstcq - San Timoteo Beds
Qstr - San Timoteo Beds
Qsts - San Timoteo Beds
Qstu - San Timoteo Beds
Tgh - Hypabyssal granitic rocks
Tsg - Conglomerate, sandstone, and arkose
Tstd - San Timoteo Beds
Tstl - San Timoteo Beds
Tstm - San Timoteo Beds
gg - Gneissic granitoid rocks and gneiss
Kba - Box Springs plutonic complex
Kcc - Monzogranite of City Creek
Kg - Granitic dikes
Khg - Heterogeneous granitic rocks
Kmgt - Monzogranite and tonalite, undifferentiated
Kps - Pelona Schist
Krg - Granite of Riverside area
Kt - Tonalite, undifferentiated
Kvt - Val Verde Pluton
Mzfg - Foliated granitoid rocks
Pzmp - Marble, Peninsular Ranges
Pzmp - Marble, Peninsular Ranges
Pzmp - Marble, Peninsular Ranges
Pzms - Marble and schist, undifferentiated
Pzsgp - Biotite schist and gneiss
Pzsgp - Biotite schist and gneiss
Pzsgp - Biotite schist and gneiss

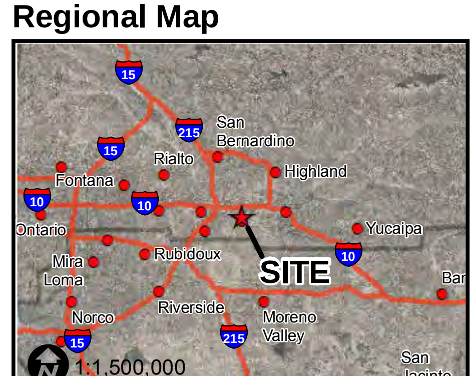


Morton, D.M., Miller, F.K., 2006, "Geologic Map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California", U.S. Geological Survey Open-File Report 2006-1217 Version 1.0.

Geologic Contacts

contact, identity and existence certain, location accurate
contact, identity and existence certain, location approximate
contact, identity and existence certain, location concealed
contact, identity and existence certain, location inferred
fault, identity and existence certain, location accurate
fault, identity and existence certain, location approximate
fault, identity and existence certain, location concealed
fault, identity and existence certain, location inferred
fault, identity or existence questionable, location accurate
fault, identity or existence questionable, location concealed
(Queried where contacts are questionable)

Regional Map



0 0.5 1 2 3 4 Miles

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Proposed Parking Structure
Loma Linda University Medical Center
Loma Linda, California

LAT:	34.05099
LON:	-117.25057
SCALE:	1:100,000
DRAWN:	PER
CHECK:	PJE
DATE:	12-13-12

REGIONAL GEOLOGIC MAP

FIGURE: 2

PROJECT: 4953-10-0913

Path: C:\Users\pierre.romo\Desktop\temp\lomalinda100913_Figure_2_Regional_Geologic_Map.mxd

Explanation

Earthquakes

Approximate Epicentral Area of Earthquake

Events ≥ 7.0

Events 6.0 - 6.9

Events 5.0 - 5.9

Faults

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.

REFERENCES:

Jennings, C.W. and Bryant, W.A., 2010, "Fault Activity Map of California," California Geological Survey, GDM-006, May 2010

Earthquake Catalogs: California Geological Survey, 1769-1932; Southern California Earthquake Center, 1932-2011.

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LON:	-117.2652
SCALE:	1:750,000
DRAWN:	PER
CHECK:	PJE
DATE:	6-28-13

Proposed Parking Structure
Loma Linda University Medical Center
Loma Linda, California

REGIONAL FAULTS AND SEISMICITY MAP

FIGURE: 3

PROJECT: 4953-10-0913

Path: C:\Users\pierre.romo\Desktop\temp\lomalinda100913_Figure_3_Faults_Seismicity_Map.mxd