GEOTECHNICAL INVESTIGATION REPORT
PHASE I AND PHASE II
SANTA MONICA HIGH SCHOOL
NORTH CAMPUS IMPROVEMENTS
601 PICO BOULEVARD
SANTA MONICA, LOS ANGELES COUNTY
CALIFORNIA

Prepared for:

Santa Monica-Malibu Unified School District

2828 Fourth Street
Santa Monica, California 90405-4308

Project No. 11428.007

August 29, 2017

Revised October 27, 2017

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Attention: Mr. Kevin Klaus, Deputy Bond Program Manager

Subject: Geotechnical Investigation Report, Phase I and Phase II
Santa Monica High School North Campus Improvements
601 Pico Boulevard
Santa Monica, Los Angeles County, California

In accordance with our March 29, 2017 proposal authorized on May 16, 2017, and supplemental exploration Leighton Consulting, Inc. (Leighton) is pleased to present this revised geotechnical exploration report for the proposed *Phase I and II Campus Plan North Campus Improvements* for the Santa Monica High School (Samohi) campus located at 601 Pico Boulevard, Santa Monica, California. Leighton Consulting, Inc. (Leighton) has completed this geotechnical exploration report for (1) the approval by the California Geological Survey (CGS) and (2) provide design parameters to the design team for design approval of the subject project by the California Division of the State Architect (DSA). This report is intended to meet requirements of Section 1803A.2 of the 2016 California Building Code (CBC) and the CGS's Note 48 check list for review of engineering geology and seismology reports for California public schools. The main focus of revision is inclusion of a second level subterranean (B2) and reconfiguration of the pool design including excavation along the Olympic Boulevard retaining wall foundation in two locations. We understand it is the intent to leave a portion of the existing retaining wall along Olympic Boulevard in place to serve as a free-standing wall once design grade is lowered to support the pool and semi-subterranean construction.

This site is **not** located within a currently designated Alquist-Priolo Special Studies Zone for surface fault rupture. This site is also **not** within a currently designated liquefaction hazard zone. However, as is the case for most of Southern California, strong ground shaking has and will occur at this site.

Specific recommendations for site grading, foundations, and other geotechnical aspects of the project are presented in this report.

We appreciate this opportunity to be of service. If you have any questions regarding this report or if we can be of further service, please call us at your convenience at **(866) *LEIGHTON***, directly at the phone extensions or e-mail addresses listed below.

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1.0 INTRODUCTION

1.1 Site Description and Proposed Development

The Santa Monica High School (Samohi) campus, located at 601 Pico Boulevard in the City of Santa Monica, is situated within a densely developed residential and commercial neighborhood on a topographic high overlooking the Pacific Ocean to the south and west. The location of the proposed Phase I and Phase II North Campus improvements (Site) is located in the northwest region of the Campus spanning a large area occupied by the 3-story Technology Building, 2-Story Science Building, Edison transformer (Electrical Utility Building) and restroom buildings.

According to the Psomas (2008), various utilities, including 4- to 15-inch-diameter storm drains, a 6-inch-diameter sanitary sewer, and electrical/telecommunications lines are present within the Site footprint. The northern portion of the Site is bordered by a cast-in-place concrete retaining wall to the northwest (fronting Olympic Boulevard) and southwest (fronting 6th Street) retaining approximately 10 feet to 15 feet, respectively. *The foundation (depth and type) of the existing retaining wall along Olympic Boulevard has been generally measured locally at two locations as shown on Plate 1.*

The Site is paved with asphalt concrete with the ground surface ranging from approximately Elevation (El.) +94 feet mean sea level (msl) to El. +99 feet msl. The ground surface of the 6th Street access road ranges from El. +80 feet msl to El. +86 feet msl. The site location (latitude 34.01272°, longitude -118.48679°) and immediate vicinity are shown on Figure 1, *Site Location Map.*

The existing campus improvements constructed over the last 100 years, which include the historical Greek Theatre and Barnum Hall, were built on topographic high points overlooking Santa Monica Bay, see figure 1a, Site Topography Map. This early 1923-1925 topography (Hoots, 1931) provided from the United States Geological Survey (USGS) indicate the campus is constructed on marine terrace deposits that have been incised by Ballona Creek Drainage on the northern and southern edges. These marine terraces form relatively flat surfaces elevated above the surrounding topography dipping gently towards the Pacific Ocean (approximately 1°-2°). Construction of the school campus appears to have required minor cut and fill grading and retaining walls to achieve current elevations as the original topography is evident throughout the school campus.

Review of HED (July 14, 2017), indicates the *Samohi North Campus* building improvements are proposed as follows:

- Aquatic Center with enclosed, 9-foot deep, 50-meter swimming pool fronting Olympic Boulevard with a finish pool deck at elevation (El.) 88 feet mean sea level (msl);
- Three level North Building 44 plus feet in height;
- Relocated 6th Street and surface parking ranging west to east from El. 84 feet msl to El. 87 feet msl;
- 2 level semi-subterranean parking with B1 level at El. 85 feet msl, and B2 level at and El. 74 feet msl, respectively; and
- Fire engine turnabout and hammerhead, lower plaza and loading dock, elevators connecting all levels with associated utility infrastructure.

The approximate building layout provided by HED is shown on Plate 1, *Exploration Location Map.* Existing buildings (3-story Technology Building, 2-story Science Building), 6th street retaining wall and first 100-feet of the Olympic Boulevard Wall east of 6th street, paved parking, and utility infrastructure will be demolished to make way for new construction.

The existing Utility-Edison Transformer Building located north of the proposed project site will remain. This building is understood to have its first floor at about El. +98 feet msl with a basement level anticipated at about El. +85 feet msl and level (B2) anticipated at El. +74 feet msl. The Utility Building will border the northeast limit of the Pool Deck construction.

We understand that maximum column loads will not exceed 1,000 kips. Once the development plans are finalized, they should be provided to Leighton Consulting, Inc. (Leighton) to ensure our recommendations remain appropriate.

1.2 Previous Investigations

Several previous geotechnical explorations have been performed on the Samohi campus since 2008. Applicable findings and geotechnical data from previous explorations listed below have been incorporated into this report. Full report references can be found in *References* section at the end of this report.

Relevant borings are presented on Plate 1, *Exploration Location Map.* The boring logs are included in Appendix A, *Field Exploration Logs.*

MACTEC (2008): MACTEC performed geotechnical exploration in 2008 for a proposed science and technology building located within the northeast corner of the project site. A total of eight hollow-stem auger borings were drilled and sampled during this exploration (Borings B-1 through B-8). Additionally, four hollow-stem auger borings performed by LeRoy Crandall & Associates in 1954 (Borings B-1 through B-4) were presented. A field infiltration test (T-1, Plate 1-current) was performed within the northeast portion of the project site in the former softball fields as part of the investigation. See Section 2.6 for infiltration data.

Leighton (2011): Leighton performed a field exploration program in December 2010 and January 2011 for the conceptually proposed Civic Center Joint Use Project (CCJUP) as presented in our previous report (Leighton, 2011). A total of 10 hollow-stem auger borings were drilled and sampled during this exploration, and the locations of the borings performed as a part of the study (Borings EIR-B1 through EIR-B10) were limited to open areas around existing campus structures and athletic facilities. Five hollow stem auger borings were drilled to approximately 75 feet below the existing ground surface (bgs) and five hollow stem borings were drilled to approximately 40 feet depth bgs.

Leighton (2012a): Leighton performed additional subsurface explorations at the project site as an addendum to our 2011 study for Siting Study II for the CCJUP, which consisted of a new gymnasium and new paved parking areas, generally located at the southeastern portion of the school campus between the Greek Theater and Pico Boulevard. A total of four hollow-stem auger borings were drilled and sampled to depths ranging from approximately 50 to 101 feet bgs in the southeastern portion of the site during this exploration (Borings LB-1 through LB-4).

Leighton (2012b): Leighton performed an additional subsurface exploration at the project site for a proposed electrical transformer enclosure. One boring was hand-augered to a depth of 11½ feet bgs to characterize subsurface materials and to obtain bulk samples for laboratory testing.

Leighton (2016b): Leighton prepared an updated geotechnical exploration report for the proposed CCJUP based on previous explorations (Leighton, 2011, 2012a and 2012b; MACTEC, 2008). The report presented our findings, conclusions, and updated recommendations for the design and construction of the project in general conformance with the 2013 California Building Code (CBC). Improvements that were the primary focus of the updated report include a softball field, basketball courts, portable restroom, concrete flatwork, 10- to 25-foot-high perimeter fencing, and associated utility improvements, Americans with Disabilities (ADA) improvements to existing concrete stairways adjacent to 7th Street, new concrete stairs, asphalt paved parking, modifications to existing retaining walls and paver construction.

1.3 Purpose and Scope of Exploration

The purpose of our geotechnical explorations was to evaluate the soil, groundwater and Olympic Boulevard retaining wall conditions at the Phase I and Phase II North Campus improvements site through review of available data and subsurface explorations in order to provide geotechnical recommendations to aid in design and construction for the project as currently proposed (see Section 1.1). The scope of this geotechnical exploration included the following tasks:

- *Background Review* – A background review was performed of readily available, relevant geotechnical, civil and geological literature pertinent to the project site. References reviewed in preparation of this report are listed at the end of this text.

- *Field Exploration* – Our field exploration was performed on June 13, 2017, and consisted of five (5) hollow-stem auger borings (designated LB-1 through LB-5) drilled to approximate depths ranging from of 31½ feet to 51 ½ feet bgs.

  Five (5) cone penetrometer test (CPT) soundings (designated CPT-1 through CPT-5) were each advanced to an approximate depth ranging from 24.5 feet to 51.3 feet bgs.

  Two (2) backhoe test pit excavations (TP-1 and TP-2) were excavated on September 29 and October 2, 2017, adjacent to the Olympic Boulevard retaining wall to expose and measure the foundations dimensions.

  Prior to the field exploration, the borings, CPT's and test pits were marked and Underground Service Alert (USA) was notified for utility clearance. In addition, a private utility locator was utilized to locate any unknown or unmarked utilities in the areas of the proposed boring locations prior to drilling.

During drilling of the hollow-stem auger borings (LB-1 through LB-5), both bulk and relatively undisturbed drive samples were obtained from the borings for geotechnical laboratory testing. Relatively undisturbed samples were collected from the borings using a Modified California Ring sampler conducted in accordance with ASTM Test Method D3550. Standard Penetration Tests (SPT) were also performed within the hollow-stem auger borings in accordance with ASTM Test Method D1586. The samplers were driven for a total penetration of 18 inches, unless practical refusal was encountered, using a 140-pound automatic hammer falling freely for 30 inches. The number of blows per 6 inches of penetration was recorded on the boring logs.

The borings and test pit were logged in the field by a professional geologist. Each soil sample collected was reviewed and described in accordance with the Unified Soil Classification System (USCS). The samples were sealed and packaged for transportation to our laboratory. After completion of drilling, all of the borings and test pits were backfilled with excess soils generated during the explorations. The boring logs are presented in Appendix A, *Field Exploration Logs*. The approximate locations of the explorations including test pit logs (TP-1 and TP-2) are shown on Plate 1, *Exploration Location Map* (in pocket).

- *Laboratory Testing* – Geotechnical laboratory tests were conducted on selected bulk and undisturbed soil samples obtained from our borings. This laboratory testing program was designed to evaluate geotechnical (physical) characteristics of site soil. A description of geotechnical laboratory test-procedures and results are presented in Appendix B, *Laboratory Test Results*. The following laboratory tests were performed:
    - In-situ Moisture Content and Dry Density (ASTM D2216 and ASTM D2937);
    - Expansion Index (ASTM D4829);
    - Modified Proctor Compaction Test (ASTM D1557);
    - Direct Shear (ASTM D 3080);
    - R Value (DOT CA Test 301);
    - Consolidation (ASTM D2435); and

  - Corrosivity (Soluble Sulfate ASTM C1580, Soluble Chloride ASTM C1411-09, pH ASTM D4972, and Resistivity ASTM G187-12a).

  The in-situ moisture and density of soil samples at depths are shown on the borings logs included in Appendix A. The results of the remaining laboratory tests are presented in Appendix B – *Laboratory Test Results.*

- *Engineering Analysis* – Data obtained from field explorations and geotechnical laboratory testing was evaluated and analyzed to develop geotechnical conclusions and provide recommendations in accordance with the California Geological Survey (CGS) Note 48 (October 2013 version). Geologic cross sections prepared for this campus and revised to accommodate current concept and profile presented on Plate 2, *Geotechnical Cross Sections AA' and BB'* (in pocket).

- *Report Preparation* - Results of our geologic hazards review and geotechnical exploration have been summarized in this report, presenting our findings, conclusions and preliminary geotechnical design recommendations for design and construction of the new North Campus Phase I and Phase II improvements as currently proposed.

It should be noted that the recommendations in this report are subject to the limitations presented in Section 7.0 of the report.

2.0 GEOTECHNICAL FINDINGS

2.1 Geologic Setting

The site is located in the Ocean Park Plain, a subdivision of the greater Santa Monica Plain, an alluvial surface within the southwestern block of the Los Angeles Basin (Poland and Piper, 1956). The Los Angeles Basin, a structural trough, is a northwest-trending alluviated lowland plain approximately 50 miles long and 20 miles wide. Mountains and hills that generally expose Late Cretaceous to Late Pleistocene-age sedimentary and igneous rocks bound the Basin along the north, northeast, east and southeast (Yerkes, 1965). The Basin is part of the Peninsular Ranges geomorphic province of California characterized by sub parallel blocks sliced longitudinally by young, steeply dipping northwest-trending fault zones. The Basin, located at the northerly terminus of the Peninsular Ranges, is the site of active sedimentation and the strata are interpreted to be as much as 31,000 feet thick in the center of the synclinal trough of the Central Block of the Los Angeles Basin.

The Santa Monica and Ocean Park Plains consist of an alluvial aggradation of dissected sediments composed largely of gravel, sands and silts laid down by the ancestral Los Angeles River and by streams flowing south from the Santa Monica Mountains (Figure 2, *Regional Geology Map*). The Ocean Park Plain lies mostly at a southwest angle to Pico Boulevard and Bundy Drive, extends inland from the coast approximately 3 miles, is between 1 to 2 miles wide of which its surface is composed mostly of marine deposits of late-Pleistocene age (Poland and Piper, 1956). The plain has been dissected by the Ballona Creek Drainage along its northern and southern borders, uplifted and locally infilled with Holocene age alluvial deposits.

2.2 Local Geologic Units and Subsurface Conditions

Presented below are brief descriptions of the geologic units encountered in the exploratory borings completed at the site by Leighton and others. Detailed descriptions of the geologic units encountered are presented on the boring logs in Appendix A. Geotechnical conditions described on the logs represent the conditions at the actual exploratory excavation locations. Other variations may occur beyond and/or between the excavations. Lines of demarcation between the geologic units and the various earth materials on the logs represent approximated boundaries, and (unless otherwise noted) actual transitions may be gradual. The locations of the subsurface explorations are shown on Plate 1, *Exploration Location Map* and a subsurface profile based on data obtained and interpreted from the borings and available as-built maps including conceptual planned basement levels is shown on Plate 2,*Geologic Cross-Sections A-A' and B-B'*.

Campus site development (buildings and retaining walls) mask over some surface exposures of natural geologic units, topography and structure. Artificial fill (Af) materials were encountered underlying existing pavements within exploratory borings. Local geology was interpreted from published regional geologic maps of the area (Yerkes and Campbell, 2005; Dibblee, 1991). Figure 2, *Regional Geology Map*, illustrates the approximate distribution of geologic units at the site. Native geologic units underlying the artificial fill materials consist of a formation of successive Quaternary age marine terrace deposits (map symbol: Qom) laid down on marine abrasion platforms. These deposits, derived locally from erosion of the Santa Monica mountains are characterized as slightly to moderately consolidated silt, sand, and gravels, abraded by wave action during the Pleistocene epoch, and incised by the Ballona Creek drainage.

Undocumented Artificial Fill: (Map Symbol: Afu)

Artificial fill materials were encountered at depths ranging from 5 to 7½ feet bgs. One boring (LB-2, Plate 1) encountered up to approximately 4 feet of angular gravel reported to be part of an onsite infiltration system. Fill, as encountered consists of medium dense, yellowish brown to brown silty sand with gravel and man-made debris (concrete, asphalt) to stiff, dark brown, clayey sandy silt with miscellaneous concrete debris. No documentation or records related to fill placement was available at the time of this report preparation, therefore, for purposes of this report all fill encountered onsite and anticipated in future explorations is considered undocumented and unsuitable for support of new improvements in its current condition. The exact location and footprint of the reported infiltration trench is unknown.

Quaternary Old Marine Deposits (Map Symbol: Qom)

The Quaternary age old marine deposits beneath the artificial fill materials as encountered in our exploratory borings generally consists mostly of tan, brown to orange brown, moist, medium dense to dense silty sand and sand with varying proportions of gravel, clay and small cobbles to maximum depths explored.

The stratigraphy of the subsurface soils encountered in each soil boring is presented in the boring logs (Appendix A). The general subsurface conditions across the site, interpreted from the boring and CPT data are depicted on Plate 2, *Geologic Cross-Sections A-A' and B-B'*.

2.3 Corrosion

Corrosion: In general, soil resistivity, which is a measure of how easily electrical current flows through soils, is the most influential factor for ferrous corrosivity. Based on findings of studies presented in the American Society for Testing and Materials (ASTM) STP 1013 titled "Effects of Soil Characteristics on Corrosion" (February, 1989), an approximate relationship between soil resistivity and soil corrosiveness was developed as shown in Table 1 below.

Table 1 - Soil Corrosivity as a Function of Resistivity

Soil Resistivity (ohm-cm)	Classification of Soil Corrosiveness
0 to 900	Very severe corrosion
900 to 2,300	Severely corrosive
2,300 to 5,000	Moderately corrosive
5,000 to 10,000	Mildly corrosive
10,000 to >100,000	Very mildly corrosive

Sulfate Exposure: Sulfate ions in the soil can lower the soil resistivity and can be highly aggressive to Portland cement concrete by combining chemically with certain constituents of the concrete, principally tricalcium aluminate. This reaction is accompanied by expansion and eventual disruption of the concrete matrix. A potentially high sulfate content could also cause corrosion of reinforcing steel in concrete. Section 1904A of the 2016 California Building Code (CBC) defers to the American Concrete Institute's (ACI's) ACI 318-14 for concrete durability requirements. Table 19.3.1.1 of ACI 318-14 lists "*Exposure categories and classes*," including sulfate exposure as follows:

Table 1A - Sulfate Concentration and Exposure

Soluble Sulfate in Water (parts-per-million)	Water-Soluble Sulfate (SO_4) in soil (percentage by weight)	ACI 318-14 Sulfate Class
0-150	0.00 - 0.10	S0 (negligible)
150-1,500	0.10 - 0.20	S1 (moderate*)
1,500-10,000	0.20 - 2.00	S2 (severe)
>10,000	>2.00	S3 (very severe)

*or seawater

Representative composite, near surface (0-5 feet) bulk soil samples were tested to evaluate corrosion potential. The chemical analysis test results for the onsite soil from our geotechnical exploration are included in Appendix B, *Laboratory Test Results* of this report and are summarized below.

Table 2 - Corrosivity Test Results

Test Parameter	Test Results			General Classification of Hazard
	EIR-1	LB-1	LB-5	
Water-Soluble Sulfate-SO_4 in Soil (ppm)	93	255	237	Negligible to Moderate sulfate exposure to buried concrete
Percent by Weight SO_4	0.0093	.0255	.0237	
Water-Soluble Chloride in Soil (ppm)	41	41	101	Non-corrosive to buried concrete (per Caltrans Specifications)
Percent by Weight (Chl$^-$)	.0041	.0041	.0101	
pH	6.97	8.06	7.83	Mildly alkaline
Minimum Resistivity (saturated, ohm-cm)	4450	5100	1080	Severely to Moderately Corrosive to buried ferrous pipes

Additional corrosion testing should be performed upon completion of grading to confirm the preliminary findings and conclusions presented above.

2.4 Expansive Soils

Expansion Index (EI) testing of two representative bulk samples from the upper 5 feet at the site indicated that the site soils tested are not expansive with EI values of zero. Prior testing of three representative bulk samples from the upper 9 to

23 feet at the campus indicated site soils have EI values ranging from 7 to 98 (Leighton, 2011, 2012a and 2012b). These combined test results indicate a very low to high expansion potential for onsite materials. For purposes of this report the expansion properties of the soil below the North Campus improvement footprint can be considered as low. Additional testing of soils upon completion of grading should be performed to confirm the results of the initial testing.

Based on geotechnical laboratory testing performed on selected soil samples collected from the site and review of previous laboratory test results, a synopsis of geotechnical properties of the site soils is provided in Table 3 below. Geotechnical laboratory testing results are presented in Appendix B, *Laboratory Test Results.*

Table 3 – Soil Geotechnical Properties Synopsis

Parameters	Soil Properties
In-situ Moisture:	Dry to moist
In-situ Density:	Medium dense to dense
Swell/Expansion Potential:	Mostly granular, swell/expansion potential is **low.**
Collapse Potential:	Not susceptible to collapse when wetted
Strength:	Adequate to provide structural support
Corrosivity:	No sulfate attack of concrete but **corrosive to ferrous metals**.

2.5 Groundwater

Groundwater was not encountered during the current exploration. Groundwater was encountered in prior explorations (Leighton, 2011 and 2012a) performed at the Campus at about 75 and 79.5 feet bgs in Borings LB-1 and LB-2, corresponding to elevations El. 25 feet and El. 25.5 feet, respectively. Groundwater was encountered during our 2011 exploration at depths ranging from 50, 55 and 59 feet bgs in borings EIR-B1, EIR-B2 and EIR-B4, corresponding to elevations of El. 24 feet, El. 26 feet and El. 21 feet, respectively.

Review of groundwater level data reported through the State Water Resources Control Board (see http://geotracker.waterboards.ca.gov/) in a boring drilled in support of underground storage tank cleanup activities indicate groundwater levels recorded at 1866 Lincoln Boulevard on February 9, 2005 were reported at approximately El. 22 feet.

Historic groundwater levels, as interpreted from the Beverly Hills 7.5 Minute Quadrangle, Los Angeles County, California (CGS, 1998) indicate historic high groundwater at levels of approximately 40 feet below ground surface. Landscaping irrigation at the site, infiltration of stormwater runoff, fluctuations in rainfall, seasonal and/or otherwise may cause temporary perched water zones to exist below the site.

During the investigation, boring LB-2 (Plate 1) encountered approximately 4 feet of crushed free draining aggregate reported to Leighton as an infiltration pit/trench. The details of the construction, i.e. lateral extent, depth, width is unknown. Therefore, during construction excavation very moist, wet or saturated soils may be encountered either requiring drying out or stabilization prior to placement of structural fill should this reported infiltration device be receiving onsite runoff.

2.6 Infiltration Rate

In-situ percolation testing was performed at the site in general accordance with the County of Los Angeles Department of Public Works (LADPW) *Guidelines for Design, Investigation, and Reporting Low Impact Development Stormwater Infiltration* (LADPW, 2014).

Boring PB-1 located (See Plate 1) was converted to temporary percolation test well upon completion of drilling and sampling. A 2-inch-diameter perforated PVC pipe was placed in the borehole within the zone to be tested (See table 4 below) and solid PVC pipe was placed above the perforated section. The annulus of the borehole was filled with clean sand (#3 Monterey Sand) to approximately 1-foot above the screen zone. The percolation test well was pre-soaked prior to the testing in an attempt to model the behavior of the stormwater quality control measure during a design storm event. After the conclusion of the percolation testing, the PVC pipe was removed and the test holes backfilled with excess soil cuttings.

Boring PB-1: The falling head procedure was conducted, which records the drop of water levels inside the well over the testing period. The measured and un-factored infiltration rate for PB-1 was calculated by dividing the rate of discharge (cubic inches per hour) by the infiltration surface area, or flow area (square inches). Discharge volume was calculated by adding the total volume of water that dropped within the PVC pipe and annulus incorporating a porosity reduction factor to account for the filter pack material. The flow area was based on the average water height within the slotted pipe section of the test well only. The results of the infiltration testing are included in Table 4 below.

MACTEC T-1: Field infiltration testing was performed at one location near a proposed drywell to estimate the infiltration rate of the subgrade soils. A pit was manually excavated to approximately 2.5 feet below existing ground surface. Testing was performed using the double ring infiltrometer method (ASTM D3385). The results of the infiltration testing are included in Table 4 below. The location of the test performed (Mactec, 2008) is shown on Plate 1, *Exploration Location Map.*

Table 4 – Measured Infiltration Rate

Percolation Test Boring/Well Designation	Approximate Depth of Test Zone Below Ground Surface (feet)	Unfactored* Infiltration Rate (inches per hour)
PB-1	5-10	18.4
MACTEC T-1	2.5	1.0

Note: Invert of any stormwater infiltration shall be set back at least 15 feet, and outside a 1:1 plane drawn down and out from the bottom of adjacent foundations.

Based on our current subsurface exploration, the site is generally underlain by sand, sand with silt and silty sand. The material is favorable for infiltration purposes.

The test at the location of PB-1 was performed in the screened interval (test zone) within predominantly sandy granular soils; however, infiltration rates can and will vary across the site as indicated by the variance in site soils (Appendix A) and infiltration rates presented above. Therefore, care must be used in the selection of infiltration rate for use in design and the potential for variances in soil conditions that could significantly affect field performance. Additional testing is warranted once the final design and invert depth have been established by the design team. *Testing should be performed at the specific location and invert depth.*

3.0 GEOLOGIC/SEISMIC HAZARDS

Geologic and seismic hazards include surface fault rupture, seismic shaking, liquefaction, seismically-induced settlement, lateral spreading, seismically-induced landslides, flooding, seismically-induced flooding, seiches and tsunamis. The following sections discuss these hazards and their potential impact at the project site.

3.1 Faulting

There are no active or potentially active faults known to cross the project site and the site is not located within an Alquist-Priolo Earthquake Fault Zone (CGS, 1986; Bryant and Hart, 2007) and as such, the potential for surface fault rupture at the site is considered low. However, several active and potentially active faults are mapped within 10 km (6.2 miles) of the site. Figure 3, *Regional Fault and Historical Seismicity Map*, shows the proximity of known active and potentially active faults within the region.

Santa Monica Fault: Although not yet recognized or well defined by the State of California as a Special Studies Zone, the SMFZ is the closest known fault to the site, at a distance of approximately 3.0 miles (4.9 km) northerly of the site. The SMFZ is considered, but **not** proven to be active, mapped as being located primarily along Santa Monica Boulevard. This fault zone trends east-west along the southern boundary of the Santa Monica Mountains for more than 24.8 miles (40 km) and is included as part of the Transverse Ranges Southern Boundary fault system, which consists of east-west trending, left-lateral and oblique-reverse movements along several active faults. The SMFZ consists of one or more strands, is about 40 km (24.8 miles) in length, and is one of a series of east-southeast trending reverse, left-lateral oblique-slip structures that extend more than 200 km (125 miles) across southern California and accommodate westward motion of the Transverse Ranges (Dolan *et al*., 1997). It has been delineated locally at depths of several-thousand feet through exploratory oil well drilling and oil field development (Wills *et al*., 2008).

High resolution seismic reflection profiles across the SMFZ were acquired (Pratt, *et al.,* 1998) as part of an integrated hazard assessment of this fault, which showed a series of near vertical strike-slip faults beneath topographic scarps inferred to be caused by thrust faulting. Pleistocene or Holocene movement had been postulated, but **not** directly proven along some upper plate secondary fault segments related to the SMFZ (Dolan *et al.*, 2000). Recurrence interval and recency of movement along many fault segments are neither well documented nor understood, mainly because intense urbanization has modified or destroyed any surface traces of the fault (Hill *et al*., 1979). Southern California Earthquake Center (SCEC) identifies the most recent rupture as Late Quaternary with intervals between events unknown.

North-dip, west-slip rate across the SMFZ is estimated to vary with location along en-echelon faults to be minimally on the order of 0.6 mm/year (Dolan et. al., 2000) and as high as 3.9 to 5.9 mm/year (Davis and Namson, 1994). A deterministic estimated maximum magnitude earthquake is generally modeled between Magnitude (M_w) 6.0 and 7.0 if the entire SMFZ ruptured at once.

The City of Santa Monica Geologic Hazards map (City of Santa Monica, 2014) indicates two branches of the Santa Monica Fault zone are located within a “Fault Hazard Management Zone” that is less than a mile to the north of the project site. Sites located within the FHMZ require fault studies be conducted prior to approval of building permits.

The State of California Geological Survey (CGS) has recommended to establish an Earthquake fault Zone based on the criteria of “sufficiently active” and “well defined” (Bryant and Hart, 2007) in their Fault Evaluation Report (FER 259) dated June 28, 2017.

Palos Verdes Fault: The Palos Verdes fault is considered active and is located approximately 5.2 miles (8.3 km) southwest of the project site forming the western boundary of the Los Angeles basin. The Palos Verdes fault is made up of a system of three segments which collectively form a complex right-lateral reverse displacement (Brankman and Shaw, 2009). The modeled right-lateral slip rate along the zone is between 2.5 and 3.8 mm/yr, and reverse slip rate is between 0.26 and 0.38 mm/yr (Cooke and Marshall, 2006). Calculated slip rates within the northern portion of the Palos Verdes fault zone are estimated to be 0.35 mm/yr reverse slip rate and 1.1 mm/yr right-lateral slip rate (Shaw, 2007). Estimated maximum moment magnitude along this fault complex is on the order of 7.3.

Newport Inglewood Fault: The Newport-Inglewood fault, located approximately 7.0 miles (11.2 km) east of the project site is an active, zoned, northwest-trending, approximately 2- to 4-mile-wide belt of anticlinal folds and faults disrupting early Holocene to Late Pleistocene-age and older deposits (Barrows, 1974). The NIFZ is characterized by trends related to right-lateral shearing at depth (Moody and Hill, 1956). The zone defines the boundary between the western basement complex of Catalina type schist and related rocks to the southwest, and the eastern basement complex of metasedimentary, metavolcanic and plutonic rocks to the northeast (Yerkes, et al., 1965). Right-lateral, strike-slip displacement of 3,000 to 5,000 feet has been measured in Lower Pliocene strata along the NIFZ (Dudley, 1954; Hill, 1954; Poland, et al., 1959). Apparent vertical offset across faults of the NIFZ ranges from 4,000 feet at the basement interface, to 1,000 feet in the Pliocene strata, and 200 feet at the Plio-Pleistocene boundary (Yerkes, et al., 1965). Movement along this structural zone is inferred to have been initiated during middle Miocene time (circa 15 million years ago), with seismic activity continuing to the present time. There is abundant seismic evidence that the zone is tectonically active; thus, the surrounding metropolitan area is subject to certain seismic risks. At least five earthquakes of magnitude 4.9 or larger have been associated with the NIFZ since 1920 (Barrows, 1974). Estimated maximum deterministic magnitude earthquake is generally modeled between Magnitude (M_w) 6.5 and 7.2.

Hollywood Fault: Located approximately 7.1 miles (11.5 km) northeast of the site, the Hollywood Fault begins near the Los Angeles River and eastern edge of the Santa Monica Mountains and extends westward for approximately 9½ miles where it is thought to shift its locus of active deformation to the area of the West Beverly Hills Lineament (WBHL), where faulting takes a left step to the Santa Monica Fault. The Hollywood Fault is capable of producing a M_w 6.4 to 6.6 earthquake (Dolan et al., 1997). Investigators have estimated the lateral slip rate to be about 1.0 ±0.5 mm/year, with a vertical slip rate to be 0.25 mm/year (Dolan et al., 1997). Conversely, a lower slip rate of 0.04 - 0.4 mm/year (Ziony and Yerkes, 1985) leads to a long return period.

Recent detailed geologic and geotechnical studies have provided cumulative physical evidence for Holocene displacements resulting in an Alquist-Priolo Special Study Zone being established for the Hollywood Fault (CGS, 2014). Exposures identified in prior explorations (Crook and Proctor, 1992), coupled with bulk-soil radiocarbon ages provide scant evidence for an early to mid-Holocene age for the most recent surface rupture approximately 6,000 years to 11,000 years ago; suggesting a long period of quiescence between surface rupturing on the Hollywood Fault (Dolan, 1997, 2000) (Ziony and Yerkes, 1985).

3.2 Historical Seismicity

An evaluation of historical seismicity from significant past earthquakes related to the site was performed (see Figure 3, *Regional Fault and Historical Seismicity Map*). Peak ground accelerations (PGA) at the site resulting from significant past earthquakes between 1800 to 2016, with magnitudes M4.0 or greater, were estimated using the EQSEARCH computer program (Blake, 2000) with 2016 updates. This historical seismicity search was performed for a 100-kilometer (62-mile) radius from the project site, and is included in Appendix C, *Seismicity Data*. The largest earthquake magnitude found in the search was the M7.earthquake, known as the Arvin-Tehachapi quake that occurred on July 21, 1952 approximately 74.5 miles (120.0 kilometers) from the site producing an estimated site acceleration of approximately 0.046g. The largest estimated PGA found in the search was approximately 0.246g from an earthquake approximately 1.2 miles (1.9 kilometers) from the site.

Review of additional data publicly available from the Center for Engineering Strong Motion Data (CESMD) website (http://strongmotioncenter.org/) was reviewed for stations in the vicinity of the project site. The data reviewed indicates that a site (Santa Monica City Hall) less than ½ mile to the southwest of the project site experienced a peak ground acceleration of 0.901g from the M6.7 Northridge earthquake that occurred on January 17, 1994. This earthquake occurred less than 15 miles (24.1 km) north of the project site along a blind thrust fault damaging structures throughout Los Angeles, Ventura, Orange, and San Bernardino Counties.

3.3 Liquefaction and Lateral Spreading

Liquefaction is the loss of soil strength due to a buildup of excess pore-water pressure during strong and long-duration ground shaking. Liquefaction is associated primarily with loose (low density), saturated, relatively uniform fine- to medium-grained, clean cohesionless soils. As shaking action of an earthquake progresses, soil granules are rearranged and the soil densifies within a short period. This rapid densification of soil results in a buildup of pore-water pressure. When the pore-water pressure approaches the total overburden pressure, soil shear strength reduces abruptly and temporarily behaves similar to a fluid. For liquefaction to occur there must be:

(1) loose, clean granular soils,

(2) shallow groundwater, **and**

(3) strong, long-duration ground shaking.

Review of both the Beverly Hills Quadrangle Seismic Hazard Zone Map (CGS, 1999) and the City of Santa Monica Geologic Hazards map (City of Santa Monica, 2014) indicates that the site is not within an area potentially susceptible to liquefaction (Figure 4, *Seismic Hazard Map*).

SEE: http://gmw.consrv.ca.gov/shmp/download/pdf/ozn_bevh.pdf

With groundwater at a depth greater than 50 feet below grade and relatively medium dense to dense sands below the site the potential for liquefaction to affect the site is considered low. Since the potential for liquefaction is considered low and the relatively flat nature of the site with no free faces, the potential for lateral spreading to occur at the site is also considered low.

3.4 Seismically-Induced Settlement

Seismically-induced settlement consists of dry dynamic settlement (above groundwater) and liquefaction-induced settlement (below groundwater). These settlements occur primarily within loose to moderately dense sandy soil due to reduction in volume during and shortly after an earthquake event.

Based on our analysis, the total seismically-induced settlement is expected to be on the order of ½ inch or less. Accordingly, seismically-induced differential settlement is expected to be on the order of ¼ inch over 30 feet.

3.5 Seismically-Induced Landslides

The proposed project site is not located in an area mapped as potentially susceptible to seismically-induced landslides (Figure 4, *Seismic Hazard Map*). No landslides are mapped or known to exist at the project site or vicinity. The topography of the site is relatively flat, and generally slopes to the west. Previous grading and construction at the site has created stepped level pads for activities fields, buildings, and parking lots. The potential for seismically induced landslides to affect the site is low.

3.6 Flooding

As shown on Figure 5, *Flood Hazard Zone Map*, the site is located outside of areas recognized by the Federal Emergency Management Agency (FEMA) to within 0.2% annual flood potential (FEMA, 2008). Earthquake-induced flooding can be caused by failure of dams or other water-retaining structures as a result of an earthquake. As shown on Figure 6, *Dam inundation Map*, the site is located outside of a dam inundation area due to the absence of such structures near the site, therefore the potential for earthquake-induced flooding at the site is considered low.

3.7 Seiches and Tsunamis

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. Tsunamis are sea waves generated by large-scale disturbance of the ocean floor that induces a rapid displacement of the water column above. The most frequent causes of tsunamis are shallow underwater earthquakes and submarine landslides.

The site is not located within the tsunami run up area as mapped on the Los Angeles Tsunami Hazard: Maximum Runup map (CalEMA, 2010). The run up area indicates zones along the Pacific Coast below an elevation of 42 feet (msl) are susceptible to tsunami inundation. The project site is topographically at least 40 feet above the areas identified to have a potential for Tsunamis impact. In addition, the site is not located within a tsunami inundation area as mapped by the State of California (CGS, 2009).

Based on the site’s elevation of 85 to 99 feet above sea level and the lack of nearby enclosed water bodies, the risks associated with tsunamis and seiches are considered negligible.

4.0 FINDINGS AND CONCLUSIONS

Presented below is a summary of findings and conclusions based upon the results of our evaluation of the project site:

- This site is **not** located within a currently designated Alquist-Priolo Special Studies Zone for surface fault rupture. However, as is the case for most of Southern California, strong ground shaking has and will occur at this site. This site is also **not** within a currently designated (March 25, 1999) liquefaction hazard zone. Due to primarily dense sands and deep groundwater, damaging liquefaction is unlikely to occur at this site. The site is not located in any geologic or seismic hazard zone that could preclude the development of the proposed project.

- The site is underlain by undocumented artificial fill ranging in thickness from 5 to 7 feet overlying native old marine terrace deposits generally consisting of dense to very dense sands to sands with gravel and varying proportions of silt and clay.

- Groundwater was not encountered during the current exploration. Groundwater is not expected to pose a constraint to construction. The historic high groundwater level at the site was reported to be on the order of 40 feet bgs.

- An infiltration pit/trench was encountered at the location of boring LB-2 during drilling. Dimensional details and depth are unknown. Very moist, wet or saturated soils could be encountered during excavation requiring either drying out or stabilization prior to placement of structural fill.

- The potential for liquefaction and liquefaction-induced ground failure to occur at the site is considered low.

- The potential seismically-induced settlement at the site is estimated to be on the order of 1 inch or less.

- Based on our observations and testing, the onsite soils that will be in contact with the planned structures are expected to have a very low expansion potential. Additional testing is recommended during design stage or at completion of grading.

- Concrete in contact with the onsite soil is expected to have negligible exposure to water-soluble sulfates and low exposure to chloride in the soil. The onsite soil, however, is considered corrosive to ferrous metal.

- The subsurface materials are anticipated to be readily excavated using conventional earthmoving equipment in good working condition.
- The proposed improvements may be supported on conventional shallow footing foundation systems established on engineered fill or undisturbed natural soils.

Based upon the results of our geotechnical evaluation of the site, the proposed improvements are considered feasible from a geotechnical standpoint.

5.0 RECOMMENDATIONS

The following recommendations have been developed based on the exhibited engineering properties of the onsite soils and their anticipated behavior during and after construction. Recommendations are specifically provided for design of foundations, seismic design considerations, floor slabs, paving, and grading. The proposed structures may be supported on spread-type shallow footing foundation systems established on engineered fill or undisturbed natural soils. Leighton should review the grading plan, foundation plans, shoring plans and specifications and pool plans when they are available to verify that the recommendations presented in this report have been properly interpreted and incorporated.

5.1 Grading

Project earthwork is expected to include complete demolition/removal of existing surface pavements (e.g. parking, concrete flatwork, structures, retaining walls along 6th Street , utilities) and complete overexcavation and recompaction of any remaining undocumented fill soils below new improvement footprints as described in the following subsections. A portion of an existing retaining wall along Olympic Boulevard is to remain and repurposed as a free standing to partial retaining wall. The existing Utility Building will also remain and border the northeastern limit of the pool construction.

5.1.1 Site Preparation

After the site is cleared, the soils should be carefully observed for the removal of all unsuitable deposits. We recommend that after removal of pavements and hardscape, and complete demolition of existing structures and utilities (Psomas, 2008) within the proposed improvement footprint, all undocumented fill soils should be excavated from these proposed improvement footprints. Undocumented fill was encountered as deep as 7½ feet bgs in our borings. Deeper fill may be encountered between boring locations.

This overexcavation bottom should extend horizontally either the thickness of fill below spread footings or at least 5 feet horizontally beyond the outside edges of proposed footings, whichever is deeper. Overexcavation is not required for footings established directly on undisturbed natural soils. Any underground obstructions encountered should be removed. Efforts should be made to locate any and all existing utility lines (Psomas, 2008). Those lines should be removed or rerouted where interfering with proposed construction. *It is essential that excavation not undermine foundations of the existing Utility Building. The As-Built details of any retaining walls to remain should be provided to Leighton and the structural engineer prior to incorporation into the new design.*

Areas outside Phase I Phase II North Campus footprint limits, planned for new asphalt and/or concrete pavement, should be over-excavated to a minimum depth of 24 inches below existing or finish grade, or 18 inches below proposed pavement sections; whichever is deeper.

Resulting removal excavation bottom-surfaces should be observed by Leighton Consulting, Inc., prior to placement of any backfill or new construction. After these over-excavations are completed, and prior to fill placement, exposed surfaces should be scarified to a minimum depth of 6 inches, moisture-conditioned to or slightly above optimum moisture content, and recompacted (proof rolled) to a minimum 90 percent relative compaction as determined by ASTM D 1557 standard test method (modified Proctor compaction curve).

5.1.2 Earthwork Observation and Testing

Leighton Consulting, Inc. should observe and test all grading and earthwork, to check that the site is properly prepared, the selected fill materials are satisfactory, and that placement and compaction of fills has been performed in accordance with our recommendations and the project specifications. Sufficient notification to us prior to earthwork is essential. Project plans and specifications should incorporate recommendations contained in the text of this report.

Variations in site conditions are possible and may be encountered during construction. To confirm correlation between soil data obtained during our field and laboratory testing and actual subsurface conditions encountered during construction, and to observe conformance with approved plans and specifications, it is essential that we be retained to perform continuous or intermittent review during earthwork, excavation and foundation construction phases. Therefore, conclusions and recommendations presented in this report are contingent upon us performing construction observation services.

5.1.3 Fill Placement and Compaction

Onsite soils free of organics, debris and oversized material (greater-than 6 inches in largest dimension) are suitable for use as compacted structural fill. However, any soil to be placed as fill, whether onsite or imported material, should be first viewed by Leighton and then tested if and as necessary, prior to approval for use as compacted fill. All structural fill must be free of hazardous materials.

All fill soil should be placed in thin, loose lifts, moisture-conditioned, as necessary, to within 2 percent of optimum moisture content, and compacted to a minimum 95% relative compaction as determined by ASTM D 1557 standard test method (modified Proctor compaction curve) within building footprints. Aggregate base for pavement sections should be compacted to a minimum of 95% relative compaction. At least the upper 12 inches of the exposed soils in roadways and access drives, parking lots and (concrete –paver) flatwork areas, should be compacted to at least 95 percent relative compaction based on ASTM Test Method D 1557.

Fill Materials: The onsite soils, less any deleterious material or organic matter, can be used in required fills. Cobbles larger than 6 inches in largest diameter should not be used in the fill. Any required import material should consist of relatively non-expansive soils with an Expansion Index (EI) less than 20 (EI<20). The imported materials should contain sufficient fines (binder material) so as to be relatively impermeable and result in a stable subgrade when compacted. All proposed import materials should be approved by the geotechnical engineer of record prior to being placed at the site.

Surface Drainage: Water should not be allowed to pond or accumulate anywhere except in detention basins. Pad drainage should be designed to collect and direct surface water away from structures to approved drainage facilities. Hardscape drains should be installed and drain to storm water disposal systems. Drainage patterns approved at the time of fine grading should be maintained throughout the life of proposed structures. Irrigation and/or percolation should not be allowed for at least 10 feet horizontally around buildings.

5.1.4 Reuse of Concrete and Asphalt In Fill Pulverized demolition concrete free of rebar and other materials and demolished asphalt pavement can be pulverized to particles no-larger-than (≤) 3-inches, and mixed with site soils for use in compacted fill. Blended pulverized concrete and asphalt should be mixed with at least 25% soils by weight. Such materials must be free of and segregated from any hazardous materials and/or organic material of any kind.

5.1.5 Temporary Excavations

All temporary excavations, including utility trenches, retaining wall excavations, and other excavations should be performed in accordance with project plans, specifications and all State of California Occupational Safety and Health Administration (CalOSHA) requirements.

No surcharge loads should be permitted within a horizontal distance equal to the height of cut or 5 feet, whichever is greater from the top of the slope, unless the cut is shored appropriately. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any adjacent existing site foundations should be properly shored to maintain support of these structures.

Temporary excavations should be treated in accordance with CalOSHA excavation regulations. The sides of excavations should be shored or sloped accordingly. CalOSHA allows the sides of unbraced excavations, up to a maximum height of 20 feet, to be cut to a ¾:1 (horizontal:vertical) slope for Type A soils, 1:1 for Type B soils, and 1½:1 for Type C soils.

The onsite soils within the proposed structural depths generally conform to CalOSHA Type C soils. CalOSHA regulations are applicable in areas with no restriction of surrounding ground deformations. Shoring should be designed for areas with deformation restrictions. The soil type should be verified or revised based on geotechnical observation and testing during construction, as soil classifications may vary over short horizontal distances. Heavy construction loads, such as those resulting from stockpiles and heavy machinery, should be kept a minimum distance equivalent to the excavation height or 5 feet, whichever is greater, from the excavation unless the excavation is shored and these surcharges are considered in the design of the shoring system.

5.1.6 Trench Backfill

Pipeline trenches should be backfilled with compacted fill in accordance with this report, and applicable *Standard Specifications For Public Works Construction* (Greenbook), current edition standards. Backfill in and above the pipe zone should be as follows:

- **Pipe Zone**: Any proposed pipe should be placed on properly placed bedding materials. Pipe bedding should extend to a depth in accordance to the pipe manufacturer's specification. The pipe bedding should extend to least 1 foot over the top of the conduit. The bedding material may consist of compacted free-draining sand, gravel, or crushed rock. If sand is used, the sand should have a sand equivalent greater than 30. As an alternate the pipe bedding zone can be backfilled with Controlled Low Strength Material (CLSM) consisting of at least one sack of Portland cement per cubic-yard of sand, conforming to Section 201-6 of the 2015 Edition of the Standard Specifications for Public Works Construction (Greenbook). CLSM bedding should be placed to 1 foot over the top of the conduit, and vibrated. CLSM should not be jetted.

- **Over Pipe Zone**: Above the pipe zone, trenches can be backfilled with excavated on-site soils free of debris, organic and oversized material larger than 3 inches in largest dimension. As an option, the whole trench can be backfilled with one-sack CLSM same as presented above for the pipe bedding zone. Oversized rock (cobbles and/or boulders) should either be removed from any backfill, or pulverized for use in backfill only above the pipe zone. Gravel larger than ¾-inch in diameter should be mixed with at least 80 percent soil by weight passing the No. 4 sieve. Native soil backfill over the pipe-bedding zone should be placed in thin lifts, moisture conditioned, as necessary, and mechanically compacted using a minimum standard of 95% relative compaction (relative to the laboratory modified Proctor maximum **dry** density), relative to the ASTM D 1557 laboratory maximum dry density within building footprints, or 90% under hardscape areas to within 12-inches of the surface. The upper 12-inches under hardscape, parking, paver etc. should be compacted to 95% relative compaction. Backfill above the pipe zone should **not** be jetted. In any case, backfill above the pipe zone (bedding) should be observed and tested by Leighton.

5.1.7 Corrosion Protection Measures

Water-soluble sulfates in soil can react adversely with concrete. As referenced in the 2016 California Building Code (CBC), Section 1904A, concrete subject to exposure to sulfates shall comply with requirements set forth in ACI 318. Based on laboratory testing results of the onsite soils from recent and prior investigations, concrete structures in contact with the onsite soil will likely have **“negligible to moderate”** exposure to water-soluble sulfates in the soil. Therefore, common Type II Portland cement may be used for concrete construction in contact with site soils. Subgrade soil should be tested for water-soluble sulfate content prior to final design of the concrete structures. Import fill soil should be tested for corrosivity and sulfate attack before import to the site. Further testing of the subgrade soils near finish grade should be performed to verify these results.

Based on corrosivity test results of the onsite soils from recent and prior investigations, the onsite soil is considered severely corrosive to ferrous metals. Therefore, based on these results, ferrous pipe buried in moist to wet site earth materials should be avoided by using high-density polyethylene (HDPE), polyvinyl chloride (PVC) and/or other non-ferrous pipe when possible. Ferrous pipe can also be protected by polyethylene bags, tap or coatings, di-electric fittings or other means to separate the pipe from on-site soils. A qualified corrosion engineer should be consulted for necessary mitigations for corrosive soil.

5.2 Foundations

Based on our preliminary investigation and our experience in the region, the proposed new structures may be supported on a shallow spread footing foundation system established on engineered fill or undisturbed natural soils. Any proposed light pole foundations should be designed in accordance with Section 1807A.3 of the 2016 California Building Code.

5.2.1 Shallow Spread Footings

Based on our preliminary investigation, footings for proposed permanent structures should have a minimum embedment of 12 inches and have a minimum width of 12 inches. Footings for proposed temporary structures may be supported directly on grade.

***Bearing Value**:* Footings or post-tensioned concrete slabs with thickened edges established on engineered fill may be designed to impose an allowable bearing pressure of 3,000 pounds per square foot (psf). A one third increase in the bearing value for short duration loading, such as wind or seismic forces may be used.

Foundations established deeper than 10 and 20 feet below the lowest existing adjacent grade may be designed to impose allowable bearing pressures of 4,000 psf and 5,000 psf, respectively.

The excavations should be deepened as necessary to extend into satisfactory soils.

The ultimate bearing capacity can be taken as 9,000 psf (12,000 psf and 15,000 psf for foundations deeper than 10 feet and 20 feet below the lowest adjacent grade, respectively). This value does not incorporate a factor of safety and may only be used for an ultimate bearing capacity check with appropriate factored loads.

A one-third increase in the allowable bearing may be used for wind or seismic loading. The recommended bearing value is a net value, and the weight of concrete in the footings can be taken as 50 pounds per cubic foot (pcf); the weight of soil backfill can be neglected when determining the downward loads.

***Settlement*:** The above recommended allowable bearing capacities are generally based on a total post-construction settlement of about 1 inch for column loads not exceeding 675 kips for dead plus sustained live loads when bearing at or below 10 feet bgs, or for 1,000 kips when bearing at or below 20 feet bgs.

Differential settlement due to static loading is generally estimated at ½ inch over a horizontal distance of 40 feet. Once developed by the structural engineer, we should review total dead and sustained live loads for each column including plan location and span distance, to evaluate if differential settlements between dissimilarly loaded columns will be tolerable. Excessive differential settlement can be mitigated with the use of reduced bearing pressures, deeper footing embedment, possibly changing overexcavation schemes and using imported base material under spread footings, or possibly other methods.

Lateral Resistance: Soil resistance available to withstand lateral loads on a shallow foundation is a function of the frictional resistance along the base of the footing and the passive resistance that may develop as the face of the structure tends to move into the soil. The frictional resistance between the base of the foundation and the subgrade soil may be computed using a coefficient of friction of 0.35. The passive resistance may be computed using an equivalent fluid pressure of 300 pounds-per-cubic-foot (pcf), assuming there is constant contact between the footing and undisturbed soil. The passive resistance can be increased by one-third when considering short-duration wind or seismic loads. The friction resistance and the passive resistance of the soils can be combined without reduction in determining the total lateral resistance.

Uplift Resistance: To evaluate uplift resistance provided by the dead weight of soils above the footing, the frustum of soil above the footing may be estimated by a 30 degree outward projection from vertical. A unit weight of 120 pcf may be used for the soil volume within the frustum.

To evaluate uplift resistance provided by the shear resistance soils above the footing, a shear value of 50 psf may be used along vertical shear planes from the bottom of the footing to the ground surface along the perimeter the footings.

5.2.2 Modulus of Subgrade Reaction

For design of combined foundations, we recommend that a lower bound and upper bound values of K (modulus of subgrade reaction) be considered to optimize foundation performance. For combined foundations established in undisturbed natural soil or engineered fill, an initial K value of 45 pounds per cubic inch (pci) may be used. The K values presented herein incorporate consolidation settlement and foundation size effects.

5.2.3 Deep Foundations

Cast-In-Drilled Hole (CIDH) concrete piles may also be used to support proposed flagpole type columns, such as shade canopy structures, signs, and fencing.

Axial Capacity of CIDH Pile

The capacities below may be used for design of drilled, cast-in-place concrete piles (CIDH).

Downward Capacity of CIDH Piles (kips)

Depth of Pile Tip (feet)	18-inch-diameter	36-inch-diameter
30	100	160
40	150	230
50	200	300

The values above may be interpolated for other pile diameters. Dead-plus-live load capacities are shown. A one-third increase may be used for wind or seismic loads. A factor of safety of 2 was used for shaft friction and end bearing was neglected in determining the pile capacities.

Uplift capacities may be taken as equal to 50 percent of the downward capacities. The capacities presented are based on the strength of the soils; the strength of the pile section should be checked to verify the structural capacity of the piles.

Piles in groups may be spaced at 2½ pile diameters on-centers. If the piles are so spaced, no reduction in axial capacity due to group action need be considered in the design.

Lateral Capacity of CIDH Pile

Lateral loads may be resisted by the piles and by the passive resistance of the soils. The lateral capacity of the piles will depend on the pile type and size, the permissible deflection, and on the degree of fixity at the top of the pile.

We have calculated lateral load, maximum moments, and depths to maximum moment for CIDH concrete piles using the computer program LPILE by ENSOFT, Inc. We have assumed a concrete compressive strength value (f'_c) of 5,000 pounds per square inch (psi).

Lateral Capacities of 18-Inch-Diameter CIDH Pile

Pile Head Deflection (inches)	Fixity	Shear Force at Pile Top (kips)	Maximum Bending Moment (kips-in)	Depth to Maximum Moment (feet)
¼	Free Head	6	500	10
½	Free Head	9	770	12
¼	Fixed Head	13	1,300	0
½	Fixed Head	20	2,200	0

Lateral Capacities of 24-Inch-Diameter-CIDH Pile

Pile Head Deflection (inches)	Fixity	Shear Force at Pile Top (kips)	Maximum Bending Moment (kips-in)	Depth to Maximum Moment (feet)
¼	Free Head	8	600	12
½	Free Head	12	1,000	14
¼	Fixed Head	17	1,700	0
½	Fixed Head	26	2,800	0

Lateral Capacities of 36-Inch-Diameter-CIDH Pile

Pile Head Deflection (inches)	Fixity	Shear Force at Pile Top (kips)	Maximum Bending Moment (kips-in)	Depth to Maximum Moment (feet)
¼	Free Head	13	1,150	14
½	Free Head	19	1,900	15
¼	Fixed Head	27	3,000	0
½	Fixed Head	42	5,200	0

The analyses performed uses the flexural stiffness of the piles computed from the modulus of elasticity (*E*) and moment of inertia (*I*). The modulus of elasticity (*E*) is derived based on the concrete compressive strength and the moment of inertia (*I*) is derived based on the pile cross-section geometry. The values of *E* and *I* are assumed constant along the entire length of the piles.

Lateral pile capacities considering a reduced moment of inertia due to cracked concrete pile sections should be evaluated after reinforcing details become available.

A resistance factor of 1 should be used for lateral capacity evaluation with factored loads.

The capacities presented in the table above are for pile lengths equal to or greater than 15 feet. This length is measured below the pile cap. The lateral capacity and reduction in the bending moment are based in part on the assumption that any required backfill adjacent to the pile caps and grade beams are properly compacted.

For piles in groups spaced at least 2½ pile diameters on-center, no reduction in the lateral capacity need be considered for the first row of piles. For subsequent rows in the direction parallel to loading, piles in groups spaced closer than 7 pile diameters on-center will have a reduction in lateral capacity due to group effects. The lateral capacity of piles in groups spaced at 2½ pile diameters on-center may be assumed to be reduced by half. The reduction for other pile spacings may be interpolated between no reduction for piles spaced at 7 pile diameters on-center and the reduction for piles spaced at 2½ pile diameters on-center.

The passive resistance of engineered fill against pile caps and grade beams will depend on the method of installation. The passive resistance of engineered fill may be assumed to be equal to the pressure developed by a fluid with a density of 300 pounds per cubic foot (pcf), up to a maximum pressure of 3,000 pounds per square foot. A one-third increase in the passive value may be used for wind or seismic loads. The lateral resistance of the piles and the passive resistance of the soils may be combined without reduction in determining the total lateral resistance.

5.2.4 Settlement

The settlement of the proposed improvements founded on piles in the manner recommended, will be approximately ½ inch or less. Differential settlement will be approximately ¼ inch or less. The differential settlement is anticipated to occur over a minimum span of 40 feet.

Settlement of piles, generally resulting from settlement of the supporting soils and elastic compression of piles, is expected to be on the order of ¼ inch. The settlement analysis should be evaluated when the actual structural load and pile cap configuration become available.

5.2.5 Construction

The drilling of the pile shafts and placement of the steel reinforcement and concrete should be done under the continuous observation of the project geotechnical engineer. Localized caving within unsupported excavations should be anticipated. Casing may be required where/if sands layers occur. Excavations for piles that are spaced at less than five diameters (center to center) should not be open simultaneously. Concrete for closely spaced piles should be placed and allowed to set for at least 24 hours before initiating the excavation for any adjacent piles. Steel reinforcement and concrete should be placed as soon as possible after approval of the drill hole by the engineering geologist. Pile excavations should not be left open overnight. Tremie pipes should be utilized when placing the concrete to prevent the concrete from falling and/or striking the walls of the borehole.

5.3 Seismic Design Parameters

To accommodate effects of ground shaking produced by regional seismic events, seismic design can be performed by the project structural engineer in accordance with the 2016 Edition of the California Building Code (CBC 2016). Table 5, *2016 CBC Seismic Parameters* (below), lists seismic design parameters based on the 2016 CBC, Section 1613A.3 (ASCE 07-10) methodology:

Table 5 - 2016 CBC Site-Specific Seismic Parameters

Categorization/Coefficients	Code-Based (1) (2)
Site Longitude (decimal degrees) West	-118.48679
Site Latitude (decimal degrees) North	34.01272
Site Class	D
Mapped Spectral Response Acceleration at 0.2s Period, S_s	1.980
Mapped Spectral Response Acceleration at 1s Period, S_1	0.735
Short Period Site Coefficient at 0.2s Period, F_a	1.0
Long Period Site Coefficient at 1s Period, F_v	1.5
Adjusted Spectral Response Acceleration at 0.2s Period, S_{MS}	1.980
Adjusted Spectral Response Acceleration at 1s Period, S_{M1}	1.103
Design Spectral Response Acceleration at 0.2s Period, S_{DS}	1.320
Design Spectral Response Acceleration at 1s Period, S_{D1}	0.735

1. All were derived from the USGS web page: http://earthquake.usgs.gov/designmaps/us/application.php
   All coefficients in units of g (spectral acceleration)
2. See Appendix D for details of the seismic evaluation.

5.4 Slabs-on-Grade

Concrete slabs-on-grade should be designed by the structural engineer in accordance with 2016 CBC requirements for soils with a low expansion potential. More stringent requirements may be required by the structural engineer and/or architect; however, slabs-on-grade should have the following minimum recommended components:

- **Subgrade:** The near-surface soils can be expansive and will shrink and swell with changes in the moisture content. Therefore, floor slabs-on-grade and adjacent concrete flatwork should be underlain by at least 18 inches of relatively non-expansive fill (EI<20). Existing soils at planned basement levels are anticipated to be relatively non-expansive. Accordingly, removal and replacement with non-expansive fill will likely not be required at basement levels.

  Slab-on-grade subgrade soil should be moisture conditioned to or within 3% over optimum moisture content, to a minimum depth of 18 inches within building footprints, and compacted to 90% of the modified proctor (ASTM D 1557) laboratory maximum density prior to placing either a moisture barrier, steel and/or concrete. Onsite soil may be suitable for this use, however additional expansion testing should be performed upon completion of grading to verify expansive properties of onsite soil.

- **Moisture Barrier:** A moisture barrier consisting of at least 15-mil-thick Stego-wrap vapor barriers (see: http://www.stegoindustries.com/products/stego_wrap_vapor_barrier.php), or equivalent, should then be placed below slabs where moisture-sensitive floor coverings or equipment will be placed.

- **Reinforced Concrete**: A conventionally reinforced concrete slab-on-grade with a thickness of at least 5 inches should within the building footprint and 6-inches for exterior SOG be placed in pedestrian areas without heavy loads. Reinforcing steel should be designed by the structural engineer, but as a minimum should be No. 3 rebar placed at 18 inches on-center, each direction (perpendicularly), mid-depth in the slab. A modulus of subgrade reaction (k) as a linear spring constant, of 75 pounds-per-square-inch per inch deflection (pci) can be used for design of heavily loaded slabs-on-grade, assuming a linear response up to deflections on the order of ¾ inch.

  Minor cracking of concrete after curing due to expansion, drying and shrinkage is normal and will occur. However, cracking is often aggravated by a high water-to-cement ratio, high concrete temperature at the time of placement, small nominal aggregate size, and rapid moisture loss due to hot, dry, and/or windy weather conditions during placement and curing. Cracking due to temperature and moisture fluctuations can also be expected. The use of low-slump concrete or low water/cement ratios can reduce the potential for shrinkage cracking

- **Pool Considerations:** the following design considerations are intended to reduce the impact of differential settlement and expansive soil related forces, but will not eliminate movement. The following items should be considered in the design and construction of the swimming pool. Once the plans are available they should be reviewed by the geotechnical engineer to ensure our recommendations remain appropriate, or, so additional recommendations can be provided based on the final design.

  Heavy duty pipes and couplings should be used for the pool plumbing system to minimize leakage, which may cause the soil to expand and produce local high pressures to the pool shell.

Installation of a pressure-relief valve system below the pool bottom should be considered for potential hydrostatic pressures below the pool shell when the pool is empty.

Subdrains below the pool decking should be considered to capture seepage through construction joints or deck pool drains to minimize distortion to pool decking from potential expansive soil pressure.

The pool designer should assume moderately expansive soils and include adequate reinforcement to minimize potential for cracks to develop in the pool shell and decking.

5.4.1 Utilities and Trenches

Open or backfilled trenches paralleling any new or existing footings to remain shall not be below a 1:1 projection from outer lowest edge of footings or slab on grade. Where pipes cross under footings the footings shall be specifically designed by the engineer in charge. Pipe sleeves shall be provided where pipes cross through footings or footing walls and sleeve clearances shall be designed to account for potential settlement of not less than 1 inch around the pipe. Alternate and approved clearances can be provided by the design professional in charge of the utility.

5.5 Lateral Earth Pressures

Recommended lateral earth pressures are provided as equivalent fluid unit weights, in psf/ft. or pcf. These values do not contain an appreciable factor of safety, so the structural engineer should apply the applicable factors of safety and/or load factors during design.

On-site soils are likely suitable to be used as retaining wall backfill due to its low expansion potential, field and laboratory verification recommended before use. However, site soils can be variable in composition and expansive characteristics, See Section 2.4. Should site soil be desired for reuse behind retaining walls the material should be tested to ensure Expansion potential is less than 20 (EI<20). Recommended lateral earth pressures for retaining walls backfilled with sandy soils with drained conditions as shown on Figure 7 are as follows:

Table 6 - Retaining Wall Design Earth Pressures

Retaining Wall Condition (Level Backfill)	Equivalent Fluid Pressure (pounds-per-cubic-foot)*
Active (cantilever)	35
At-Rest (braced)	55
Passive Resistance (compacted fill)	300
Seismic Increment (add to active pressure)	30

*Only for level and drained properly compacted backfill

Walls that are free to rotate or deflect may be designed using active earth pressure. For the basement walls or walls that are fixed against rotation, the at-rest pressure should be used. For seismic condition, the pressure should be distributed as an inverted triangular distribution and the dynamic thrust should be applied at a height of 0.6H above the base of the wall.

Retaining Wall Surcharges: In addition to the above lateral forces due to retained earth, surcharge due to above grade loads on the wall backfill, such as existing building foundations, should be considered in design of retaining walls. *The existing Utility Electrical Building is reported with finish floor elevation of El. 98.7 feet and subterranean transformer vault finish floor elevation of El. 88.8 feet. According to the as-built plans reviewed by Leighton and provided by the District, conventional foundations bearing at approximately 24 inches below grade were constructed*.

Vertical surcharge loads behind a retaining wall on or in backfill within a 1:1 (horizontal:vertical) plane projection up and out from the retaining wall toe, should be considered as lateral and vertical surcharge. Unrestrained (cantilever) retaining walls should be designed to resist one-third of these surcharge loads applied as a uniform horizontal pressure on the wall. Braced walls should also be designed to resist an additional uniform horizontal-pressure equivalent to one-half of uniform vertical surcharge loads. Consideration should be given to underpinning existing structures to remain in this zone, to reduce surcharge loads on the wall and to reduce the potential for inducing damaging settlement within these existing buildings, due to soil movement within the wall influence zone.

In areas where autos and pickup trucks will drive we suggest assuming a uniform vertical surcharge of 300 psf, which would result in active and at-rest horizontal surcharges of 100 psf and 150 psf, respectively. This should be doubled in areas of heavy construction traffic (such as concrete trucks, heavy equipment delivery-trucks, etc.). If crane outrigger loads or other point load sources are applied as wall surcharge, this will require additional analyses based on load source and location relative to the wall.

5.5.1 **Sliding and Overturning** Total depth of retained earth for design of walls and for uplift resistance, should be measured as the vertical height of the stem below the ground surface at the wall face for stem design, or measured at the heel of the footing for overturning and sliding. A soil unit weight of 120 pcf may be assumed for calculating the actual weight of the soil over the wall footing, if drained, or 60 pcf if submerged, for properly compacted backfill.

5.5.2 **Drainage** Adequate drainage may be provided by a subdrain system positioned behind the walls. Typically, this system consists of a 4-inch minimum diameter perforated pipe placed near the base of the wall (perforations placed downward). The pipe should be bedded and backfilled with pervious backfill material described in Section 300-3.5.2 of the Standard Specifications for Public Works Construction (Green Book), 2015 Edition. This pervious backfill should extend at least 2 feet out from the wall and to within 2 feet of the outside finished grade. This pervious backfill and pipe should be wrapped in filter fabric, such as Mirafi 140N or equivalent, placed as described in Section 300-8.1 of the Standard Specifications for Public Works Construction (Green Book), 2015 Edition. The subdrain outlet should be connected to a free-draining outlet or sump.

Miradrain, Geotech Drainage Panels, or Enkadrain drainage geocomposites, or similar, may be used for wall drainage as an alternative to the Class 2 Permeable Material or drain rock backfill, particularly where horizontal space is limited adjacent to shoring (where walls are cast against shoring). These drainage panels should be connected to the perforated drainpipe at the base of the wall.

5.6 Pavement Design

To provide support for paving, the subgrade soils should be prepared as recommended in Section 5.1, Grading. Compaction of the subgrade, including trench backfills, to at least 90 to 95 percent as recommended relative compaction based on ASTM Test Method D 1557 and achieving a firm, hard and unyielding surface will be important for paving support. The upper 12-inches of subgrade should be compacted to 95% relative compaction. The preparation of the paving area subgrade should be performed immediately prior to placement of the base course. Proper drainage of the paved areas should be provided since this will reduce moisture infiltration into the subgrade and increase the life of the paving.

5.6.1 Base Course

The base course for both asphalt concrete and Portland Cement Concrete paving should meet the specifications for Class 2 Aggregate Base as defined in Section 26 of the latest edition of the State of California, Department of Transportation, and Standard Specifications. Alternatively, the base course could meet the specifications for untreated base as defined in Section 200-2 of the latest edition of *Standard Specifications for Public Works Construction* (Greenbook). Crushed Miscellaneous Base (CMB) may be used for the base course provided the geotechnical consultant evaluates and tests it before delivery to the site.

5.6.2 Asphalt Concrete

The required asphalt paving and base thicknesses will depend on the expected wheel loads and volume of traffic (Traffic Index or TI). Assuming that the paving subgrade will consist of the sandy onsite or comparable soils with an R-value of at least 25 (Appendix B) compacted to at least 90 percent relative compaction based on ASTM Test Method D 1557 below 12-inches and 95% relative compaction in the upper 12-inches, the minimum recommended paving thicknesses are presented in the following table:

Area	Traffic Index	Asphalt Concrete (inches)	Base Course (inches)
Light Truck	5	3	8
Heavy Truck	6	4	10
Main Drives	7	4	12

The asphalt paving sections were determined using the Caltrans design method. We can determine the recommended paving and base course thicknesses for other Traffic Indices if required. Careful inspection is recommended to verify that the recommended thicknesses or greater are achieved, and that proper construction procedures are followed.

5.6.3 Portland Cement Concrete Paving

Portland Cement Concrete (PCC) paving and walks may be supported directly on sandy onsite soils or compacted fill. PCC paving and walks supported on clayey onsite soils should be underlain by at least 18 inches of engineered fill consisting of relatively non-expansive (EI < 20) soils. We have assumed that such a subgrade will have an R-value of at least 40, which will need to be verified during grading.

PCC paving sections were determined in accordance with procedures developed by the Portland Cement Association. Concrete paving sections for a range of Traffic Indices are presented in the table below. We have assumed that the PCC will have a compressive strength $\left(f_c^{'}\right)$ of at least 3,000 pounds per square inch (psi).

Area	Traffic Index	Portland Cement Concrete (inches)	Base Course (inches)
Light Truck	5	6½	4
Heavy Truck	6	7	4
Main Drives	7	7½	4

The paving should be provided with expansion joints at regular intervals no more than 15 feet in each direction. Load transfer devices, such as dowels or keys, are recommended at joints in the paving to reduce possible offsets. The paving sections in the above table have been developed based on the strength of unreinforced concrete. Steel reinforcing may be added to the paving to reduce cracking and to prolong the life of the paving.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Excavations

Based on our field observations, caving of cohesionless strata and loose fill soils will likely be encountered in unshored excavations. To protect workers entering excavations, excavations should be performed in accordance with OSHA and Cal-OSHA requirements, and the current edition of the California Construction Safety Orders, see:

http://www.dir.ca.gov/title8/sb4a6.html

Contractors should be advised that fill soils should be considered Type C soils as defined in the California Construction Safety Orders. As indicated in Table B-1 of Article 6, Section 1541.1, Appendix B, of the California Construction Safety Orders, excavations less-than (<) 20 feet deep within Type C soils should be sloped back no steeper than 1½:1 (horizontal:vertical), where workers are to enter the excavation. This may be impractical near adjacent existing utilities and structures; so shoring may be required depending on trench locations. Stiff undisturbed native clays will stand steeper.

During construction, soil conditions should be regularly evaluated to verify that conditions are as anticipated. The contractor is responsible for providing the "competent person" required by OSHA standards to evaluate soil conditions. Close coordination between the competent person and Leighton Consulting, Inc. should be maintained to facilitate construction while providing safe excavations.

Basement (and all) excavation must not undermine existing foundations for existing Utility building and/or any retaining walls to remain. Excavations must not encroach within a 1:1 (horizontal:vertical) wedge extending down and out from existing shallow footings to remain. Shoring or underpinning of existing building foundations will likely be required to facilitate basement and/or pool excavation. Specifically, depending on excavation proximity to the existing adjacent Utility Building, shallow foundations for the southern edge of this building may have to be underpinned.

6.2 Temporary Shoring

Vertical cuts may be supported by several methods including cross-braced hydraulic shoring or conventional shields in utility trenches, or sheet piles, soldier piles and wood lagging, and/or soil nailing for basement excavations. These choices should be left to the contractor's judgment since economic considerations and/or the individual contractor's construction experience may determine which method is more economical and/or appropriate. However, shoring systems should be designed by a California licensed civil or structural engineer. The contractor and shoring designer should also perform additional geotechnical studies as necessary to refine means and methods of shoring construction. The contractor should forward temporary excavation support system plans to us for pre-construction review.

Hollow-stem-auger borings were drilled, which avoid empirical observation of caving soils in drilled shafts. Therefore, this report does not have any empirical information regarding the potential for caving in drilled holes (e.g. shear wall piles, soldier piles and/or tie-backs), which should be considered by the contractor. The contractor may therefore choose to evaluate the potential for difficult drilling conditions and caving of piles, soldier pile and tie-back shafts by drilling pilot holes with the intended production drilling equipment. We expect some clean sand layers at this site are prone to caving.

Support of all adjacent existing structures and infrastructure without distress is the contractor's responsibility. Excavations that extend below an imaginary plane inclined at 45 degrees below the edge of any adjacent existing site foundation should be properly shored to maintain support of the adjacent structure. In addition, it should be the contractor's responsibility to undertake a pre-construction survey including (1) establishing surface survey monuments adjacent to existing sensitive structures and infrastructure to measure ground movement adjacent to excavations, and (2) photographing and otherwise documenting adjacent property conditions prior to excavation. Surface monuments should be established and read by a California licensed Professional Land Surveyor (PLS), with an accuracy on the order of 1/10th. of an inch.

As preliminary guidelines, the following geotechnical parameters can be used for shoring design:

- **Supported Earth Pressures**: For site undocumented fill, an active equivalent fluid earth pressure of 35 pounds-per-cubic-foot (pcf) should be used for **temporary** deflecting cantilever shoring, or 50 pcf as an at-rest pressure for **temporary** braced shoring, only for drained shoring above groundwater with level backfill. Braced shoring can also be designed using a uniform rectangular soil pressure of 25H psf, where H is equal to the depth of the excavation being shored, in feet. Braces, tie-backs or soil nails should be installed and pre-loaded as the excavation progresses to reduce shoring deflections. Determination of appropriate design conditions (active or at-rest) depends on shoring flexibility. If a rotation of more than 0.001 radian (0.06 degrees) at the base or at the top is allowed, active pressure conditions apply; otherwise, at-rest condition governs.

- **Surcharge Loads**: Surcharge loads (dead or live) should be added to the indicated lateral earth pressures and should be applied uniformly, if such loads are within a horizontal distance that is less-than the exposed shoring height. The corresponding lateral earth pressure will approximately be 33-percent of the vertical surcharge for active conditions, and 50-percent for at-rest conditions. Surcharge pressures from concentrated loads should be evaluated after geometric constraints and loading conditions are determined on individual basis.

- **Soldier Piles:** Soldier piles typically consist of steel H-beams set in predrilled holes and backfilled with structural concrete below the proposed excavation level and then with lean-mix concrete to the ground surface. Lagging between the soldier piles is expected to be required. Soldier piles may be assumed to have a passive resistance below the lowest adjacent excavation (bottom of pile caps) of 600 pounds-per-square-foot (psf), per foot of embedment of the soldier pile encased in concrete in firm contact with the sands and silts. This passive pressure should not exceed 6,000 psf, and is based on the assumption that soldier piles will be spaced at least three diameters on center. Soldier piles can be problematic in some zones of the sand material that may make drilling and lagging installation difficult. Due to the potential for sand caving, drilled shafts should be poured the same day as drilled, and under no circumstances should be left open overnight. If water is encountered (*assumed temporary due to former infiltration trench/pit*), then it should be pumped out, and the “tremmie” method used in pouring concrete, which should be designed for an additional compressive strength of 1,000 psi above the dry shaft design strength. Casing should be made available during drilling.

- **Tie-Back Design**: At least one row of tie-back anchors or other bracing will be required for excavations exceeding approximately 15 feet in height. Unbonded portions of tie-back anchors should extend to the assumed failure plane. The failure plane is an imaginary line extending up from the bottom of the excavation at a minimum inclination of 30^{o} from the vertical. The anchors should be installed starting at no more than 8 feet below the surface of the adjacent retained soils and should be at inclinations between 15^{o} and 45^{o} from the horizontal. The locations and angles of these anchors may need to be adjusted to clear existing foundations and utilities (Psomas, 2008). Cement bond resistance on tie-back anchors may be assumed to be 40H pounds-per-square-foot (psf), where H is the average depth of the tie-back anchor portion (beyond the failure plane) in feet, but not to exceed 500 psf. Bond resistance values can be increased for pressure-injected (grouted) anchors.

- **Tie-Back Testing**: Tie-back capacities must be verified by testing before the next level of excavation can proceed. Actual anchor capacity of the tie-back anchor should be verified by testing all anchors to 150 percent of the design load (proof-testing). At least one anchor on each wall, but not more than 150 feet apart along the perimeter of the shoring (in plan view), should be tested up to 200 percent of the design load for 24 hours (as performance-testing). Anchor deflection after slack is removed from the strands or anchor rod, should not exceed 0.1 and 0.25 inches for the two types of tests, respectively. Testing jack calibration must be provided by the contractor to Leighton Consulting, Inc., and should not be more than one month old.

- **Monitoring:** Soldier piles should be monitored weekly for line and grade, surveyed by a California licensed Professional Land Surveyor (PLS). Survey results must be sent to Leighton Consulting, Inc., weekly, preferably by e-mail. If total horizontal deflection inward (towards the excavation) exceeds one-inch, then excavation adjacent to excessively-deflecting soldier/sheet pile(s) should be halted immediately, and the shoring design at that location should reevaluated by the shoring designer, owner and Leighton Consulting, Inc. Any movement more than one inch will require remedial shoring at the location of excessive deflection, to prevent additional movement prior to further construction in that area.

6.3 Cast-In-Place Concrete Piles Construction

Bottoms of drilled cast-in-place pile excavations should be reasonably free of loose soil before reinforcing steel is installed and concrete is placed. We recommend that Leighton Consulting, Inc. observe pile drilling, in accordance with Section 1705A.8 of the 2016 California Building Code, to establish that piles are founded in suitable undisturbed native materials and constructed in accordance with the recommendations presented in this report. The approved geotechnical report and the construction documents prepared by the registered design professionals shall be used to determine compliance. Cast-in-place piles should be constructed in accordance with Section 205-3.3.2 of the 2015 *Standard Specifications for Public Works Construction* (Green Book).

Due to the loose nature of fill and cohesionless alluvium, casing of each shaft may be necessary. If perched water is encountered and cannot be removed from excavations prior to concrete placement, then concrete will need to be placed by tremie pipe or concrete pump hose. The concrete should be tremied or pumped to the bottom of the hole keeping the tremie or pipe below the surface of the concrete to avoid entrapment of water in placed concrete. As concrete is poured, water is displaced out of the hole.

Care should be taken to avoid “blow-outs” into open drilled shafts when placing fresh concrete in adjacent closely spaced drilled shafts. Fluid pressure of uncured concrete under on-the-order-of (≈) 40-feet of head can deform or displace soils into an adjacent closely spaced shaft. For new piles placed closer-than (<) 2½ diameters on center, construction sequencing should require curing concrete in one shaft before drilling the adjacent closely spaced shaft. Or, multiple (two or more) temporary steel casings can be used to stabilize multiple (two or more) adjacent closely-spaced shafts simultaneously. Other options can be considered as the means-and-methods of the foundation contractor.

6.4 Geotechnical Services During Construction

Our geotechnical recommendations are contingent upon Leighton Consulting, Inc., providing geotechnical observation and testing services during earthwork and foundation construction. There is a potential for encountering deeper undocumented fill or otherwise unacceptable existing soils between or beyond our boring locations. We are unaware of any existing fill placement documentation for this site. Therefore, inconsistent existing fill materials may be encountered during construction, possibly requiring revised geotechnical recommendations.

Our geotechnical recommendations provided in this report are based on information available at the time the report was prepared and may change as plans are developed. Additional geotechnical exploration, testing and/or analysis may be required based on final plans. Leighton Consulting, Inc. should review site grading, foundation, pool design and shoring plans when available, to comment further on geotechnical aspects of this project and check to see general conformance of final project plans to recommendations presented in this report.

Leighton Consulting, Inc. should be retained to provide geotechnical observation and testing during excavation and all phases of earthwork. Our conclusions and recommendations should be reviewed and verified by us during construction and revised accordingly if geotechnical conditions encountered vary from our findings and interpretations. Geotechnical observation and testing should be provided:

- During all excavation,
- During compaction of all fill materials,
- After excavation of all footings and prior to placement of concrete,
- During deep foundation installation if required,
- During utility trench backfilling and compaction,
- During pavement subgrade and base preparation, and/or
- If and when any unusual geotechnical conditions are encountered.

7.0 LIMITATIONS

Leighton's work was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, express or implied, is made as to the conclusions and professional opinions included in this report. As in many projects, conditions revealed in excavations may be at variance with preliminary findings. If this occurs, the changed conditions must be evaluated by the geotechnical consultant and additional recommendations be obtained, as warranted.

The identification and testing of hazardous, toxic or contaminated materials were outside the scope of Leighton's work. Should such materials be encountered at any time, or their existence is suspected, all measures stipulated in local, county, state and federal regulations, as applicable, should be implemented.

This report is issued with the understanding that it is the responsibility of the owner or a duly authorized agent acting on behalf of the owner, to ensure that the information and recommendations contained herein are brought to the attention of the necessary design consultants for the project and incorporated into the plans; and that the necessary steps are taken to see that the contracts carry out such recommendations in the field.

The findings of this report are considered valid as of the present date. However, changes in the condition of a property can occur with the passage of time, whether due to natural processes or the work of man on the subject or adjacent properties. In addition, changes in standards of practice may occur from legislation or the broadening of knowledge. Accordingly, the findings of this report may at some future time be invalidated wholly or partially by changes outside Leighton's control.

The conclusions and recommendations in this report are based in part upon data that were obtained from a necessarily limited number of observations, site visits, excavations, samples and testes. Such information can be obtained only with respect to the specific locations explored, and therefore may not completely define all subsurface conditions throughout the site. The nature of many sites is that differing geotechnical and/or geological conditions can occur within small distances and under varying climatic conditions. Furthermore, changes in subsurface conditions can and do occur over time. Therefore, the findings, conclusions, and recommendations presented in this report should be considered preliminary if unanticipated conditions are encountered and additional explorations, testing and analyses may be necessary to develop alternative recommendations.

This report has been prepared for the express use of Santa Monica - Malibu Unified School District and its design consultants, and only as related expressly to the assessment of the geotechnical constraints of developing the subject site and for construction purposes. This report may not be used by others or for other projects without the express written consent of Santa Monica - Malibu Unified School District and our firm.

If parties other than Leighton are engaged to provide construction geotechnical services, they must be notified that they will be required to assume complete responsibility for the geotechnical phase of the project by concurring with the findings and recommendations in this report or by providing alternative recommendations. Any persons using this report for bidding or construction purposes should perform such independent investigations as they deem necessary to satisfy themselves as to the surface and/or subsurface conditions to be encountered and the procedures to be used in the performance of work on the subject site.

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Project: 11428.007	Eng/Geol: CCK/JAR
Scale:1 " = 1,000 '	Date: August 2017

Base Map: ESRI ArcGIS Online 2017
Thematic Information: Leighton
Author: Leighton Geomatics (btran)

SITE LOCATION MAP

Santa Monica High School
601 Pico Boulevard
Santa Monica, California

Figure 1

Leighton

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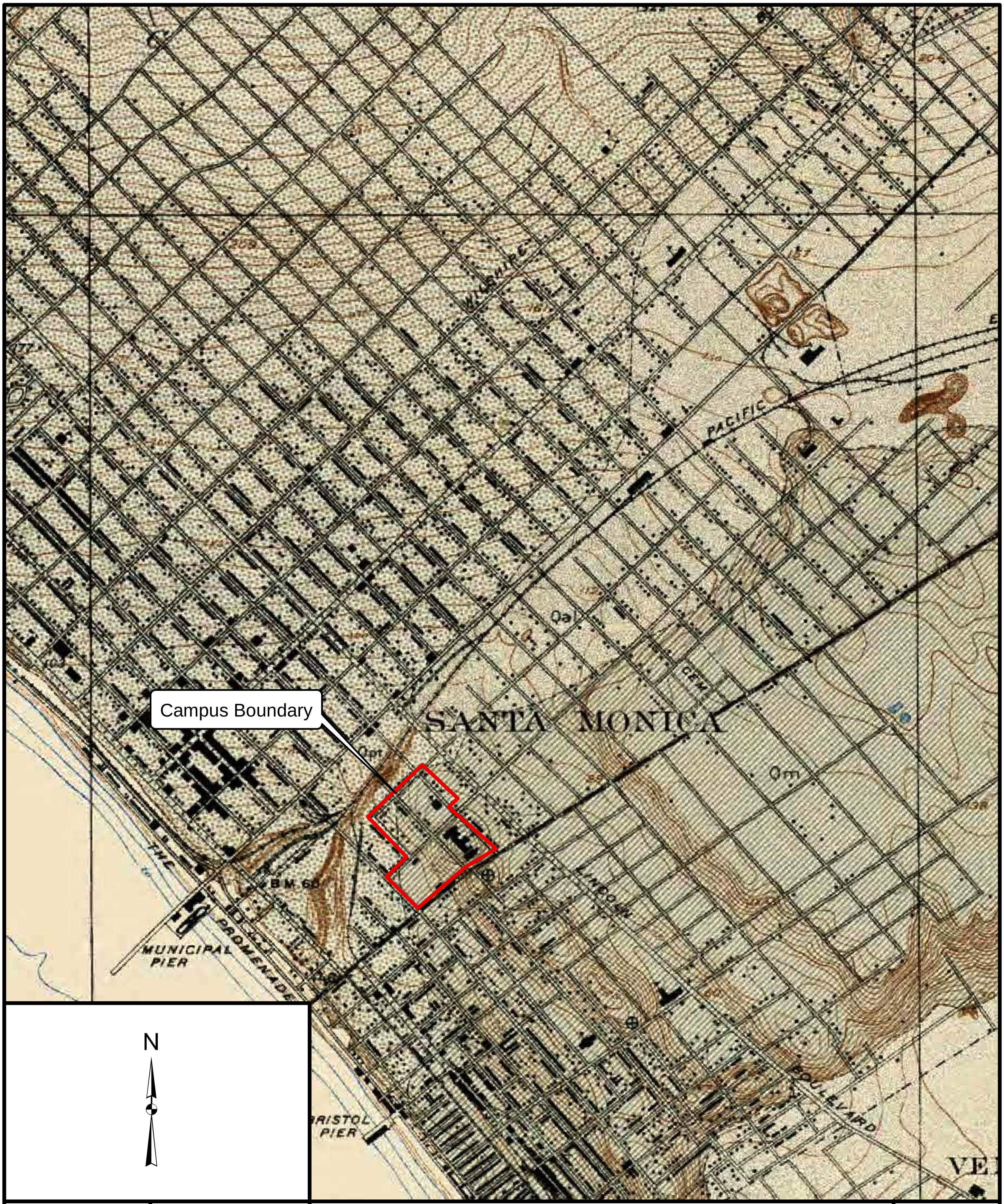

Project: 11428.007	Eng/Geol: CCK/JAR
Scale: NTS	Date: August 2017

Base Map: ESRI ArcGIS Online 2017
Thematic Information: Leighton
Author: Leighton Geomatics (btran)

SITE TOPOGRAPHY MAP

Santa Monica High School
601 Pico Boulevard
Santa Monica, California

Figure 1a

Leighton

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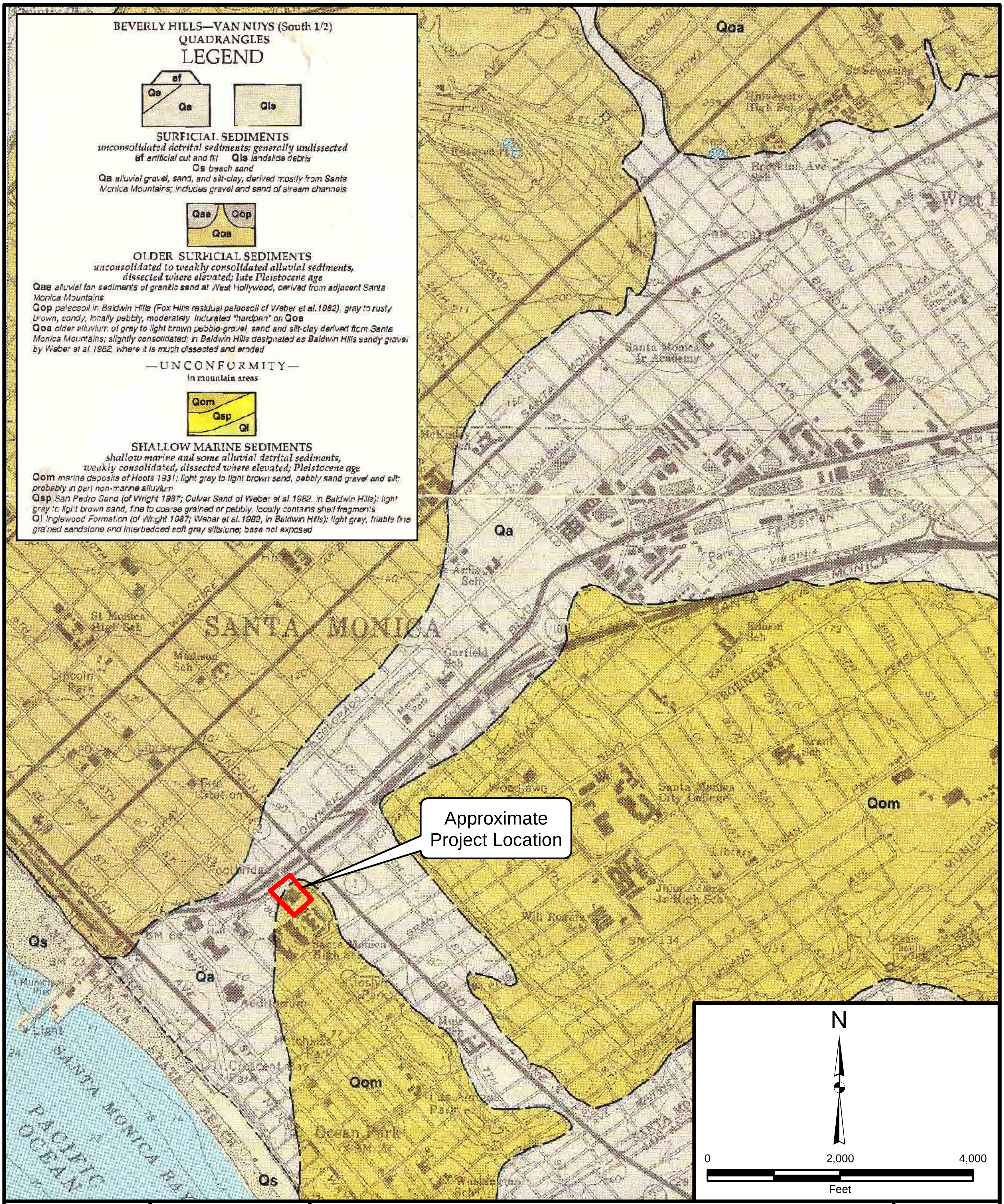

BEVERLY HILLS—VAN NUYS (South 1/2) QUADRANGLES

LEGEND

SURFICIAL SEDIMENTS

unconsolidated detrital sediments; generally undissected

af *artificial cut and fill* **Qls** *landslide debris*

Qs *beach sand*

Qa *alluvial gravel, sand, and silt-clay, derived mostly from Santa Monica Mountains; includes gravel and sand of stream channels*

OLDER SURFICIAL SEDIMENTS

unconsolidated to weakly consolidated alluvial sediments, dissected where elevated; late Pleistocene age

Qae *alluvial fan sediments of granitic sand at West Hollywood, derived from adjacent Santa Monica Mountains*

Qop *paleosoil in Baldwin Hills (Fox Hills residual paleosoil of Weber et al. 1982); gray to rusty brown, sandy, locally pebbly, moderately indurated "hardpan" on* **Qoa**

Qoa *older alluvium of gray to light brown pebble-gravel, sand and silt-clay derived from Santa Monica Mountains; slightly consolidated; in Baldwin Hills designated as Baldwin Hills sandy gravel by Weber et al. 1982, where it is much dissected and eroded*

—UNCONFORMITY—

in mountain areas

SHALLOW MARINE SEDIMENTS

shallow marine and some alluvial detrital sediments, weakly consolidated, dissected where elevated; Pleistocene age

Qom *marine deposits of Hoots 1931; light gray to light brown sand, pebbly sand gravel and silt; probably in part non-marine alluvium*

Qsp *San Pedro Sand (of Wright 1987; Culver Sand of Weber et al 1982, in Baldwin Hills); light gray to light brown sand, fine to coarse grained or pebbly, locally contains shell fragments*

Ql *Inglewood Formation (of Wright 1987; Weber et al. 1982, in Baldwin Hills); light gray, friable fine grained sandstone and interbedded soft gray siltstone; base not exposed*

Project: 11428.007	Eng/Geol: CCK/JAR
Scale:1 " = 2,000 '	Date: August 2017

Base Map: By Thomas W. Dibblee, JR., 1991
Geologic Map of The Beverly Hills and Van Nuys
Thematic Information: Leighton, USGS
Author: Leighton Geomatics (btran)

REGIONAL GEOLOGY MAP

Santa Monica High School
601 Pico Boulevard
Santa Monica, California

Figure 2

Leighton

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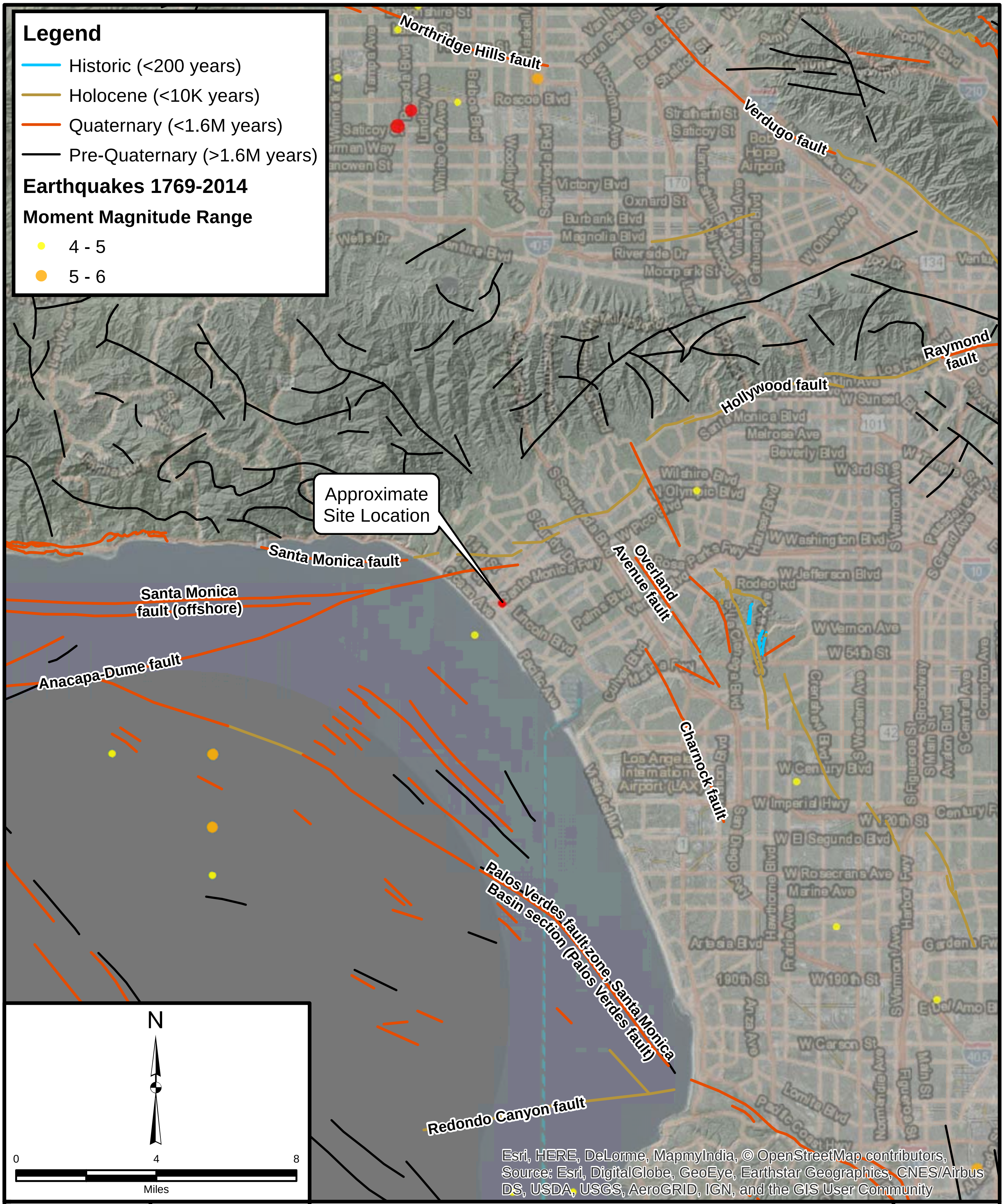

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Project: 11428.007

Eng/Geol: CCK/JAR

Scale:1 " = 4 miles

Date: August 2017

Base Map: ESRI ArcGIS Online 2017
Thematic Information: Leighton, CGS, Bryant 2010
Author: Leighton Geomatics (btran)

REGIONAL FAULT AND HISTORIC SEISMICITY MAP

Santa Monica High School
601 Pico Boulevard
Santa Monica, California

Figure 3

Leighton

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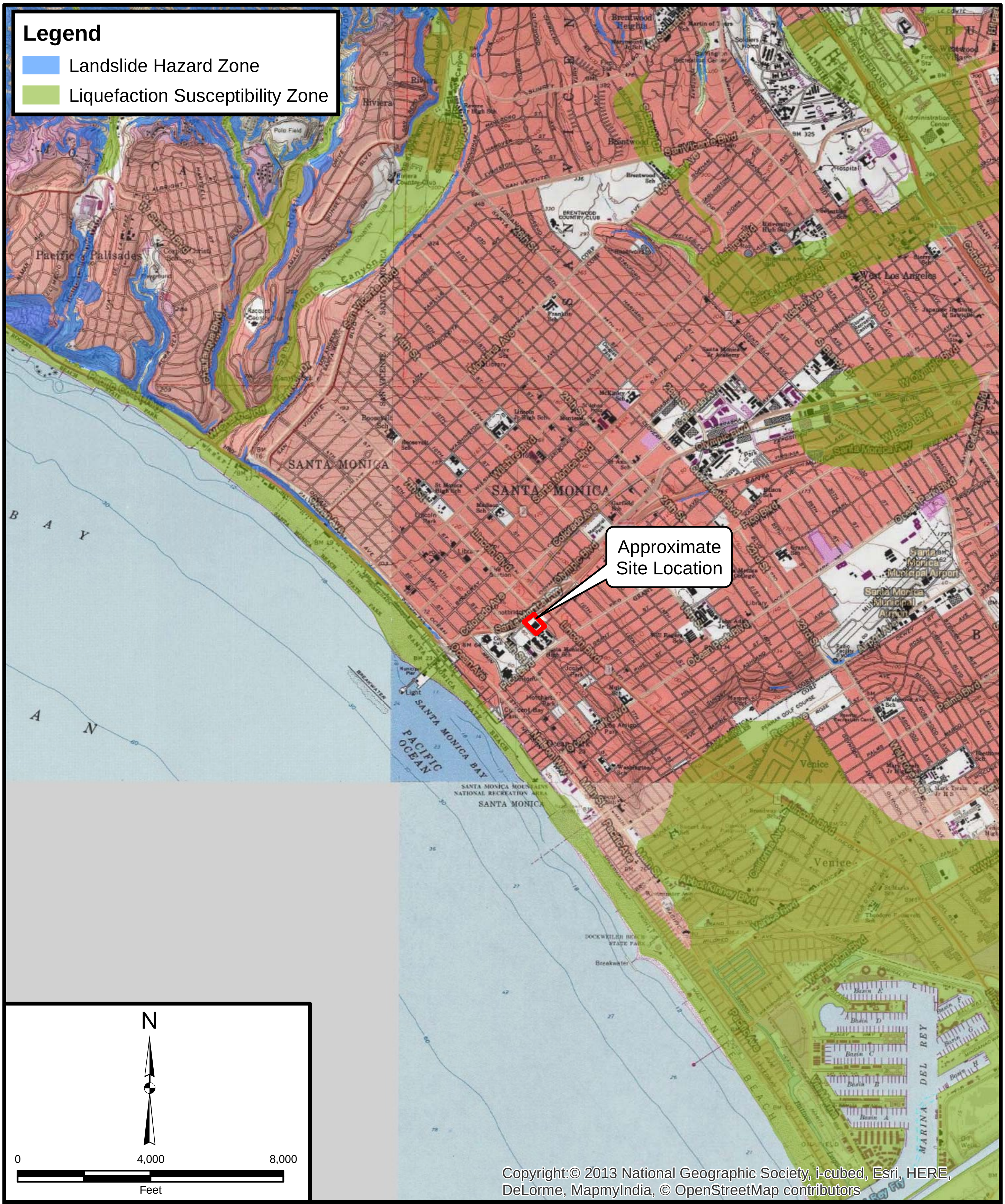

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Project: 11428.007
Eng/Geol: CCK/JAR
Scale:1 " = 4,000 '
Date: August 2017

Base Map: ESRI ArcGIS Online 2017
Thematic Information: Leighton, CGS
Author: Leighton Geomatics (btran)

SEISMIC HAZARD MAP

Santa Monica High School
601 Pico Boulevard
Santa Monica, California

Figure 4

Leighton

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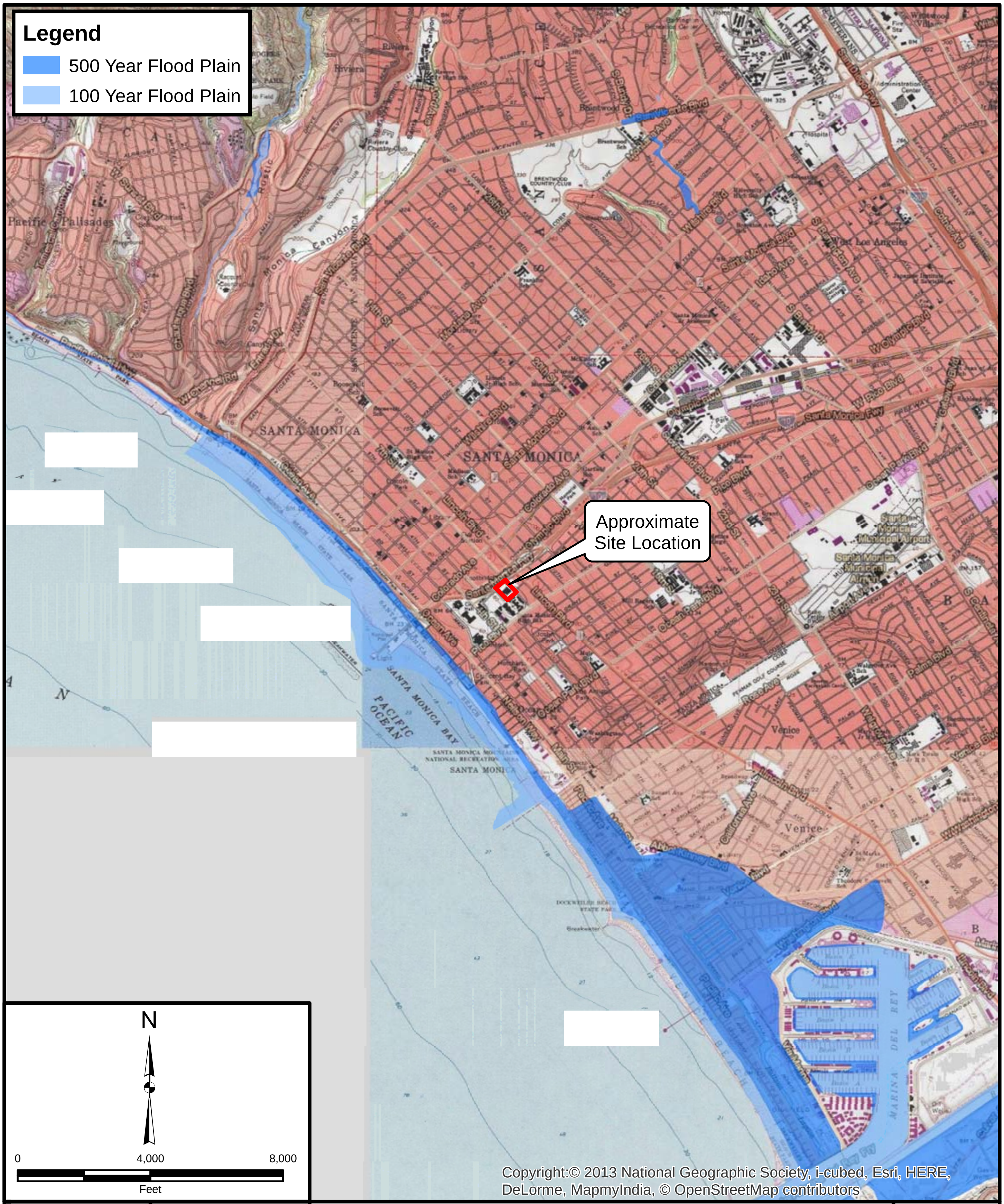

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Project: 11428.007	Eng/Geol: CCK/JAR
Scale:1 " = 4,000 '	Date: August 2017

Base Map: ESRI ArcGIS Online 2017
Thematic Information: Leighton, CA DWR, FEMA
Author: Leighton Geomatics (btran)

FLOOD HAZARD ZONE MAP

Santa Monica High School
601 Pico Boulevard
Santa Monica, California

Figure 5

Leighton

Map Saved as V:\Drafting\11428\007\Maps\11428-007_F05_FHM_2017-08-24.mxd on 8/22/2017 4:41:05 PM

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Project: 11428.007

Eng/Geol: CCK/JAR

Scale:1 " = 4,000 '

Date: August 2017

Base Map: ESRI ArcGIS Online 2017
Thematic Information: Leighton
Author: Leighton Geomatics (btran)

DAM INUNDATION MAP

Santa Monica High School
601 Pico Boulevard
Santa Monica, California

Figure 6

Leighton

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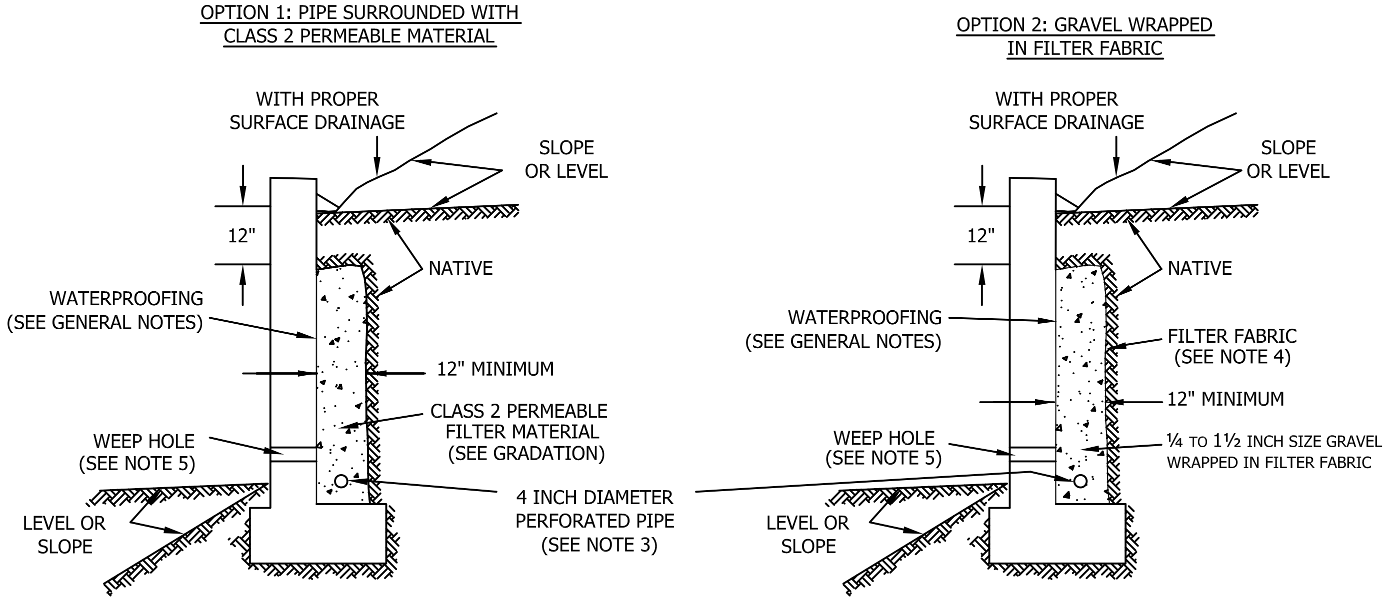
SUBDRAIN OPTIONS AND BACKFILL WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF ≤50


OPTION 1: PIPE SURROUNDED WITH CLASS 2 PERMEABLE MATERIAL

OPTION 2: GRAVEL WRAPPED IN FILTER FABRIC

Class 2 Filter Permeable Material Gradation
Per Caltrans Specifications

Sieve Size	Percent Passing
1"	100
3/4"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

GENERAL NOTES:

* Waterproofing should be provided where moisture nuisance problem through the wall is undesirable.
* Water proofing of the walls is not under purview of the geotechnical engineer
* All drains should have a gradient of 1 percent minimum
*Outlet portion of the subdrain should have a 4-inch diameter solid pipe discharged into a suitable disposal area designed by the project engineer. The subdrain pipe should be accessible for maintenance (rodding)
*Other subdrain backfill options are subject to the review by the geotechnical engineer and modification of design parameters.

Notes:
1) Sand should have a sand equivalent of 30 or greater and may be densified by water jetting.
2) 1 Cu. ft. per ft. of 1/4- to 1 1/2-inch size gravel wrapped in filter fabric
3) Pipe type should be ASTM D1527 Acrylonitrile Butadiene Styrene (ABS) SDR35 or ASTM D1785 Polyvinyl Chloride plastic (PVC), Schedule 40, Armco A2000 PVC, or approved equivalent. Pipe should be installed with perforations down. Perforations should be 3/8 inch in diameter placed at the ends of a 120-degree arc in two rows at 3-inch on center (staggered)
4) Filter fabric should be Mirafi 140NC or approved equivalent.
5) Weephole should be 3-inch minimum diameter and provided at 10-foot maximum intervals. If exposure is permitted, weepholes should be located 12 inches above finished grade. If exposure is not permitted such as for a wall adjacent to a sidewalk/curb, a pipe under the sidewalk to be discharged through the curb face or equivalent should be provided. For a basement-type wall, a proper subdrain outlet system should be provided.
6) Retaining wall plans should be reviewed and approved by the geotechnical engineer.
7) Walls over six feet in height are subject to a special review by the geotechnical engineer and modifications to the above requirements.

RETAINING WALL BACKFILL AND SUBDRAIN DETAIL
FOR WALLS 6 FEET OR LESS IN HEIGHT

WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF ≤50

Leighton
Figure 7

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APPENDIX A

Field Exploration Logs

GEOTECHNICAL BORING LOG LB-1

Project No.	11428.007	**Date Drilled**	6-13-17
Project	Samohi Phase 1 and 2	**Logged By**	EMH
Drilling Co.	Martini Drilling Co.	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	95'
Location	See Plate 1, Exploration Location Map	**Sampled By**	EMH

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log N S	Attitudes	Sample No.	Bulk Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
95	0			BB-1					SM	@0': **Artificial Fill, undocumented (Afu):** Silty SAND (SM), yellowish brown, dry to slightly moist, fine to coarse grained sand, miscellaneous debris	CN CR DS EI MX RV
90	5			R1		13 50/5	128	8	ML	@5': Sandy SILT (ML), dark brown, hard, slightly moist, fine to medium sand, some clay, miscellaneous debris, sampler bouncing on a cobble	
										@7.5': **Quaternary Old Marine Deposits (Qom):**	
85	10			S1		3 6 8		10	SM	@10': Silty SAND (SM), light brown, medium dense, moist, fine to medium sand, trace clay	
80	15			R2		10 15 21	117	13		@15': Moist, increase in fines content, slightly cohesive	
75	20			S2		6 9 13		12		@20': Silty SAND (SM), medium brown to reddish brown, medium dense, moist, fine to medium sand, trace clay, slightly oxidized	
70	25			R3		15 27 38	104	7		@25': Decrease in fines content, slightly moist, noncohesive	
65	30										

SAMPLE TYPES:

B	**BULK SAMPLE**
C	**CORE SAMPLE**
G	**GRAB SAMPLE**
R	**RING SAMPLE**
S	**SPLIT SPOON SAMPLE**
T	**TUBE SAMPLE**

TYPE OF TESTS:

-200	**% FINES PASSING**
AL	**ATTERBERG LIMITS**
CN	**CONSOLIDATION**
CO	**COLLAPSE**
CR	**CORROSION**
CU	**UNDRAINED TRIAXIAL**
DS	**DIRECT SHEAR**
EI	**EXPANSION INDEX**
H	**HYDROMETER**
MD	**MAXIMUM DENSITY**
PP	**POCKET PENETROMETER**
RV	**R VALUE**
SA	**SIEVE ANALYSIS**
SE	**SAND EQUIVALENT**
SG	**SPECIFIC GRAVITY**
UC	**UNCONFINED COMPRESSIVE STRENGTH**

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-1

Project No. 11428.007
Project Samohi Phase 1 and 2
Drilling Co. Martini Drilling Co.
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location See Plate 1, Exploration Location Map
Date Drilled 6-13-17
Logged By EMH
Hole Diameter 8"
Ground Elevation 95'
Sampled By EMH

Elevation Feet	Depth Feet	Graphic Log N S	Attitudes	Sample No.	Bulk Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	**SOIL DESCRIPTION** *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
65	30			S3		10 23 29		7	SP-SM	@30': Sand with Silt (SP-SM), tan to light brown, hard, slightly moist, fine sand, slightly micaceous	
60	35			R4		15 32 50/4	112	10		@35': Becomes oxidized, slightly moist, reddish brown, fine to medium sand	
55	40			S4		12 16 20		8	SM	@40': Silty SAND (SM), reddish to orangish brown, medium dense, slightly moist, fine to medium sand, oxidized laminations, trace clay	
50	45			R5		17 40 50/5	109	5	SP	@45': SAND (SP), tan, very dense, slightly moist, fine to medium sand, slightly micaceous, trace silt and clay	
45	50			S5		13 27 39		6		@50': Grades coarser, oxidized laminations	
										Total Depth of Boring: 51.5 feet bgs No groundwater encountered during drilling Boring backfilled with soil cuttings on 6/13/17 upon completion of drilling	
40	55										
35	60										

SAMPLE TYPES:

B	**BULK SAMPLE**
C	**CORE SAMPLE**
G	**GRAB SAMPLE**
R	**RING SAMPLE**
S	**SPLIT SPOON SAMPLE**
T	**TUBE SAMPLE**

TYPE OF TESTS:

-200	**% FINES PASSING**
AL	**ATTERBERG LIMITS**
CN	**CONSOLIDATION**
CO	**COLLAPSE**
CR	**CORROSION**
CU	**UNDRAINED TRIAXIAL**
DS	**DIRECT SHEAR**
EI	**EXPANSION INDEX**
H	**HYDROMETER**
MD	**MAXIMUM DENSITY**
PP	**POCKET PENETROMETER**
RV	**R VALUE**
SA	**SIEVE ANALYSIS**
SE	**SAND EQUIVALENT**
SG	**SPECIFIC GRAVITY**
UC	**UNCONFINED COMPRESSIVE STRENGTH**

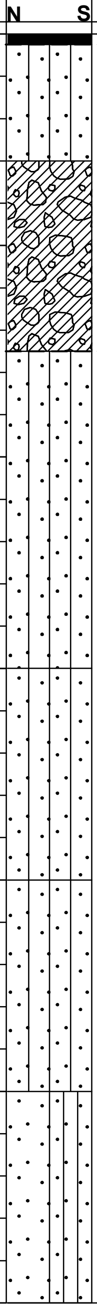
*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-2

Project No.	11428.007	**Date Drilled**	6-13-17
Project	Samohi Phase 1 and 2	**Logged By**	EMH
Drilling Co.	Martini Drilling Co.	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	96'
Location	See Plate 1, Exploration Location Map	**Sampled By**	EMH

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.



Elevation Feet	Depth Feet	Attitudes	Sample No.	Bulk / Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
95	0		BB-1	Bulk				SM	@0': 3.5 inches of Asphalt Concrete over 0 inches of Aggregate Base @0.25': **Artificial Fill, undocumented (Afu):** Silty SAND (SM), brown, slightly moist, fine to medium sand	
90	5							GP	@3': 3-inch angular gravels. Infiltration system extends approximently to 7.5 feet bgs	
			S1	Driven	8 13 9		11	SM	@7.5': **Quaternary Old Marine Deposits (Qom):** Silty SAND (SM), brown, medium dense, moist, predominantly fine sand, some medium sand, slightly cohesive, trace clay	CN DS
85	10		R1	Driven	9 16 23				@10': Dark brown, slight increase in clay content	
80	15		S2	Driven	6 11 15		13	SM	@15': Silty SAND (SM), brown, medium dense, moist, fine to medium sand, trace clay	
75	20		R2	Driven	12 23 32				@20': Silty SAND (SM), reddish brown, dense, slightly moist, fine to medium sand, trace clay, trace micas	DS
70	25		S3	Driven	7 16 22		8	SP-SM	@25': Sand with Silt (SP-SM), tan, medium dense, slightly moist, fine sand, with oxidized laminations, slightly micaceous	
	30									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

GEOTECHNICAL BORING LOG LB-2

Project No. 11428.007
Project Samohi Phase 1 and 2
Drilling Co. Martini Drilling Co.
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location See Plate 1, Exploration Location Map

Date Drilled 6-13-17
Logged By EMH
Hole Diameter 8"
Ground Elevation 96'
Sampled By EMH

Elevation Feet	Depth Feet	Graphic Log N S	Attitudes	Sample No.	Bulk	Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	30			R3		■	24 39 44	106	4	SP	@30': SAND (SP), orange brown, very dense, slightly moist, fine to medium sand, grades coarser in sample, laminated, trace silt, oxidized	
65											Total Depth of Boring: 31.5 feet bgs No groundwater encountered during drilling Boring backfilled with soil cuttings on 6/13/17 upon completion of drilling	
	35											
60												
	40											
55												
	45											
50												
	50											
45												
	55											
40												
	60											

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

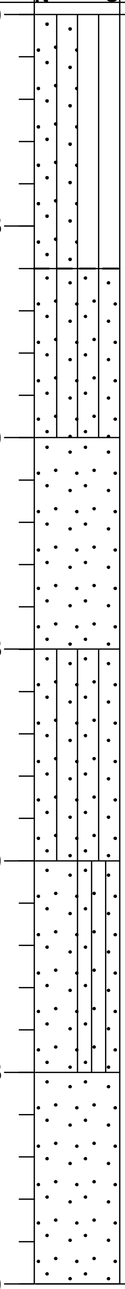
TYPE OF TESTS:

-200	% FINES PASSING
AL	ATTERBERG LIMITS
CN	CONSOLIDATION
CO	COLLAPSE
CR	CORROSION
CU	UNDRAINED TRIAXIAL
DS	DIRECT SHEAR
EI	EXPANSION INDEX
H	HYDROMETER
MD	MAXIMUM DENSITY
PP	POCKET PENETROMETER
RV	R VALUE
SA	SIEVE ANALYSIS
SE	SAND EQUIVALENT
SG	SPECIFIC GRAVITY
UC	UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG LB-3

Project No.	11428.007	**Date Drilled**	6-13-17
Project	Samohi Phase 1 and 2	**Logged By**	EMH
Drilling Co.	Martini Drilling Co.	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	102'
Location	See Plate 1, Exploration Location Map	**Sampled By**	EMH



Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Bulk / Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	**SOIL DESCRIPTION** *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0			BB-1	Bulk				SM-ML	@0': **Artificial Fill, undocumented (Afu):** Silty SAND to Sandy Silt (SM/ML), dark brown, slightly moist, fine to medium sand	
100											
	5			R1	Driven	4 12 20	104	4			
									SM	@6': **Quaternary Old Marine Deposits (Qom):** Silty SAND (SM), reddish brown, medium dense, slightly moist, fine to medium sand, oxidized	
95											
	10			S1	Driven	4 8 12		4	SP	@10': SAND (SP), medium brown, medium dense, dry, fine to medium sand with clayey laminations	
90											
	15			R2	Driven	18 30 42	111	7	SM	@15': Silty SAND (SM), reddish brown, slightly moist, fine to medium sand, oxidized, trace clay	
85											
	20			S2	Driven	5 13 15		5	SP-SM	@20': Sand with Silt (SP-SM), brown, medium dense, fine to medium sand, slightly oxidized	
80											
	25			R3	Driven	21 43 50/3	103	5	SP	@25': SAND (SP), tan to light brown, very dense, slightly moist, fine sand, micaceous, trace silt	
75											
	30										

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING
AL	ATTERBERG LIMITS
CN	CONSOLIDATION
CO	COLLAPSE
CR	CORROSION
CU	UNDRAINED TRIAXIAL
DS	DIRECT SHEAR
EI	EXPANSION INDEX
H	HYDROMETER
MD	MAXIMUM DENSITY
PP	POCKET PENETROMETER
RV	R VALUE
SA	SIEVE ANALYSIS
SE	SAND EQUIVALENT
SG	SPECIFIC GRAVITY
UC	UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG LB-3

Project No. 11428.007
Project Samohi Phase 1 and 2
Drilling Co. Martini Drilling Co.
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location See Plate 1, Exploration Location Map
Date Drilled 6-13-17
Logged By EMH
Hole Diameter 8"
Ground Elevation 102'
Sampled By EMH

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log N S	Attitudes	Sample No.	Bulk	Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30			S3		☒	10 16 28		5	SP	@30': SAND (SP), brown to orange brown, medium dense, slightly moist, predominantly fine sand, some medium sand with oxidized laminations	
70												
	35			R4		■	12 50/6	106	6		@35': Grades coarser, fine to medium sand, slightly moist, heavily oxidized pockets of sand with oxidized laminations	
65												
	40			S4		☒	13 25 28		4	SP	@40': SAND (SP), brown to orange brown, slightly moist, with oxidized laminations, fine to medium sand, trace silt, trace coarse sand	
60												
	45			R5		■	15 39 50/4	104	4		@45': SAND (SP), tan, very dense, slightly moist, mostly fine sand, trace medium sand, trace silt quartz grained sand, very minor oxidized pockets of sand, micaceous	
55												
	50			S5		☒	18 30 50/5		4		@50': Grades slightly coarser	
											Total Depth of Boring: 51.5 feet bgs No groundwater encountered during drilling Boring backfilled with soil cuttings on 6/13/17 upon completion of drilling	
50												
	55											
45												
	60											

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

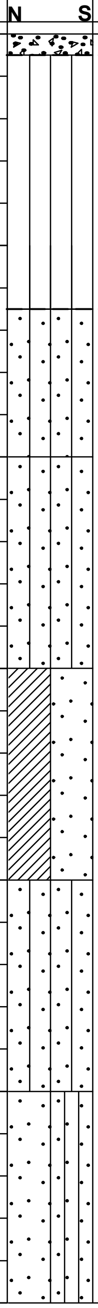
TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-4

Project No. 11428.007
Project Samohi Phase 1 and 2
Drilling Co. Martini Drilling Co.
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location See Plate 1, Exploration Location Map

Date Drilled 6-13-17
Logged By EMH
Hole Diameter 8"
Ground Elevation 99'
Sampled By EMH



SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0							@0': 6 inches of Concrete	
			BB-1				ML	@0.5': **Artificial Fill, undocumented (Afu):** Sandy SILT (ML), dark brown, slightly moist, fine to medium sand	
95									
	5		S1	2 3 5		5		@5': Sandy SILT (ML), dark brown, firm, slightly moist, fine to medium sand	
								@6.5': **Quaternary Old Marine Deposits (Qom):**	
90									
	10		R1	11 17 25	111	3	SM	@10': Silty SAND (SM), light brown, medium dense, slightly moist, predominantly fine sand, some medium sand, slightly micaceous	
85									
	15		S2	10 25 37		9	SM-SC	@15': Silty SAND with Clay (SM-SC), light brown to orange brown, dense, fine to medium sand, oxidized on parting surface with clayey laminations	
80									
	20		R2	27 50/5	101	7		@20': Silty SAND (SM), reddish brown, fine to medium sand, oxidized, trace clay	
75									
	25		S3	9 18 25		5	SP-SM	@25': Sand with Silt (SP-SM), tan to light brown, medium dense, slightly moist, fine sand, unoxidized	
70									
	30								

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

GEOTECHNICAL BORING LOG LB-4

Project No. 11428.007
Project Samohi Phase 1 and 2
Drilling Co. Martini Drilling Co.
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location See Plate 1, Exploration Location Map

Date Drilled 6-13-17
Logged By EMH
Hole Diameter 8"
Ground Elevation 99'
Sampled By EMH

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Bulk / Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	**SOIL DESCRIPTION** *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	30			R3	■	15 41 50/5	107	3	SP-SM	@30': Grades to fine to medium sand	
65											
	35			S4	☒	15 29 40		4	SP	@35': SAND (SP), tan to orange, very dense, slightly moist, fine to medium sand, heavily oxidized in top of sample, becomes less oxidized with depth, trace silt, micaceous	
60											
	40			R4	■	18 50/6	100	2	SP	@40': SAND (SP), tan, very dense, slightly moist, fine to medium rounded sand	
55											
	45			S5	☒	15 32 50/6		5		@45': With oxidized laminations	
50											
	50			R5	■	25 50/6	105	3		@50': SAND (SP), tan, very dense, slightly moist, fine to medium, rounded sand grains, spotty oxidation, trace coarse sand	
										Total Depth of Boring: 51.5 feet bgs No groundwater encountered during drilling Boring backfilled with soil cuttings on 6/13/17 upon completion of drilling	
45											
	55										
40											
	60										

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-5

Project No. 11428.007
Project Samohi Phase 1 and 2
Drilling Co. Martini Drilling Co.
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location See Plate 1, Exploration Location Map

Date Drilled 6-13-17
Logged By EMH
Hole Diameter 8"
Ground Elevation 98'
Sampled By EMH

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Bulk / Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0			BB-1					SM	@0': 3 inches of Asphalt Concrete over 0 inches of Aggregate Base @0.25': **Artificial Fill, undocumented (Afu):** Silty SAND (SM), brown to dark brown, slightly moist, fine sand, with brick debris	CN CR DS EI MX RV
95											
	5			R1		4 7 11	114	8		@5': With asphalt debris	
									SM	@6': **Quaternary Old Marine Deposits (Qom):** Silty SAND (SM), medium brown, medium dense, slightly moist, fine to medium sand	
90											
	10			S1		5 8 11		11	SM-SC	@10': Silty Sand with Clay (SM-SC), dark yellowish brown, moist, fine to medium sand, some cohesion, black oxide spotting	
85											
	15			R2		7 14 18			SP-SM	@15': Sand with Silt (SP-SM), yellowish brown, medium dense, slightly moist, fine to medium sand, slightly oxidized	CN DS
80											
	20			S2		4 8 12		6		@20': Grades to fine sand	
75											
	25			R3		14 34 50/5	105	4	SP	@25': SAND (SP), tan to light yellowish brown, very dense, slightly moist, fine to medium sand, trace silt	
70											
	30										

SAMPLE TYPES:

B	**BULK SAMPLE**
C	**CORE SAMPLE**
G	**GRAB SAMPLE**
R	**RING SAMPLE**
S	**SPLIT SPOON SAMPLE**
T	**TUBE SAMPLE**

TYPE OF TESTS:

-200	**% FINES PASSING**
AL	**ATTERBERG LIMITS**
CN	**CONSOLIDATION**
CO	**COLLAPSE**
CR	**CORROSION**
CU	**UNDRAINED TRIAXIAL**
DS	**DIRECT SHEAR**
EI	**EXPANSION INDEX**
H	**HYDROMETER**
MD	**MAXIMUM DENSITY**
PP	**POCKET PENETROMETER**
RV	**R VALUE**
SA	**SIEVE ANALYSIS**
SE	**SAND EQUIVALENT**
SG	**SPECIFIC GRAVITY**
UC	**UNCONFINED COMPRESSIVE STRENGTH**

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-5

Project No.	11428.007	**Date Drilled**	6-13-17
Project	Samohi Phase 1 and 2	**Logged By**	EMH
Drilling Co.	Martini Drilling Co.	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	98'
Location	See Plate 1, Exploration Location Map	**Sampled By**	EMH

Elevation Feet	Depth Feet	Graphic Log N S	Attitudes	Sample No.	Bulk	Driven	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	**SOIL DESCRIPTION** *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	30			S3			13 26 30		4	SP	@30': Becomes oxidized, orange brown, fine to medium sand, trace coarse sand, trace silt	
											Total Depth of Boring: 31.5 feet bgs No groundwater encountered during drilling Boring backfilled with soil cuttings on 6/13/17 upon completion of drilling	
65												
	35											
60												
	40											
55												
	45											
50												
	50											
45												
	55											
40												
	60											

SAMPLE TYPES:

B	BULK SAMPLE
C	CORE SAMPLE
G	GRAB SAMPLE
R	RING SAMPLE
S	SPLIT SPOON SAMPLE
T	TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG EIR B-1

Date 12-27-10 **Sheet** 1 **of** 3
Project 603086-001 SMMUSD/Parsons/Santa Monica High School **Logged / Sampled By** MAW
Drilling Co. ABC Liovin Drilling, Inc. **Type of Rig** CME-75
Hole Diameter 8" **Drive Weight** 140 lbs Down Hole Hammer **Drop** 30"
Elevation Top of Hole 79' **Location** See Plates 1A and 1B

SOIL DESCRIPTION

The Soil Description applies only to a location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log N S	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0								8.5-inches of asphalt concrete over 4-inches of base coarse	
									UNDOCUMENTED ARTIFICIAL FILL (Afu) SILTY SAND, brown to dark brown, moist, fine to medium grained, some silt	
75										
	5			R-1	6 10 12	107	5	SP	SAND, medium dense, brown to dark brown, moist, fine to medium grained, mottled with some silt sand	CR
				B-1						
70										
	10			S-1	7 10 12		10		SAND, medium dense, orange brown to dark brown, moist, fine to medium grained, trace clay.	
									@ 12': **OLD ALLUVIAL FAN DEPOSITS (Qof)** Poorly Graded SAND with Gravel, dense, brown to orange, moist, some clay, fine to coarse grained.	
65										
	15			R-2	19 28 29	109	11	SPg	Poorly Graded SAND with Gravel, dense, brown to orange brown, moist to very moist, some clay, fine to coarse grained.	
60										
	20			S-2	12 18 23				Poorly Graded SAND with Gravel, dense, light brown, moist, trace silt, GR:13%, SA:79%, FI:8%	SA
55										
	25			R-3	22 25 32	97	22	SM	Silty SAND, light orange brown, fine grained	DS
50										
	30									

SAMPLE TYPES:

S	**SPLIT SPOON**	**G**	**GRAB SAMPLE**
R	**RING SAMPLE**	**C**	**CORE SAMPLE**
B	**BULK SAMPLE**		
T	**TUBE SAMPLE**		

TYPE OF TESTS:

DS	**DIRECT SHEAR**	**SA**	**SIEVE ANALYSIS**	**-200**	**% FINES PASSING**
MD	**MAXIMUM DENSITY**	**SE**	**SAND EQUIVALENT**	**AL**	**ATTERBERG LIMITS**
CN	**CONSOLIDATION**	**EI**	**EXPANSION INDEX**	**CO**	**COLLAPSE**
CR	**CORROSION**	**RV**	**R VALUE**	**PP**	**POCKET PENETROMETER**
UC	**UNCONFINED COMPRESSIVE STRENGTH**				

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG EIR B-1

Date 12-27-10 **Sheet** 2 **of** 3
Project 603086-001 SMMUSD/Parsons/Santa Monica High School **Logged / Sampled By** MAW
Drilling Co. ABC Liovin Drilling, Inc. **Type of Rig** CME-75
Hole Diameter 8" **Drive Weight** 140 lbs Down Hole Hammer **Drop** 30"
Elevation Top of Hole 79' **Location** See Plates 1A and 1B

Elevation Feet	Depth Feet	Graphic Log N S	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION The Soil Description applies only to a location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	Type of Tests
	30			S-3	12 15 19		21	SP	SAND, dense, light gray to orange brown, wet, perched groundwater over a 1-2-inch thick clayey bed GR: 0%, SA:67%, FI:33%. (percentage of fines related to clay bed)	SA
45										
	35			R-4	36 50/5"	103	5		Poorly Graded SAND, dense, orange brown, moist, fine to medium grained with some coarse.	
40										
	40			S-4	19 22 27		5	SPg	Poorly Graded SAND with Gravel, dense, brown, moist, trace silt, broken cobble in sampler tip, GR:17%, SA:76%, FI:7%	SA
35										
	45			R-5	35 38 42			SM	Silty SAND, fine grained, light brown	DS
30										
	50			S-5	19 21 24		22		Silty SAND, medium brown, fine grained, transition to clayey SILT with some medium grained sand at tip, GR:1%, SA:55%, FI:44%	SA
								ML		
25										
∇	55			R-6	13 32 39	104	20	CL	CLAY with SILT and some fine sand, hard, gray, oxidized orange brown pockets, moist Groundwater encountered @ 55' during drilling	
20										
	60									

SAMPLE TYPES:
S SPLIT SPOON
R RING SAMPLE
B BULK SAMPLE
T TUBE SAMPLE
G GRAB SAMPLE
C CORE SAMPLE

TYPE OF TESTS:
DS DIRECT SHEAR
MD MAXIMUM DENSITY
CN CONSOLIDATION
CR CORROSION
UC UNCONFINED COMPRESSIVE STRENGTH
SA SIEVE ANALYSIS
SE SAND EQUIVALENT
EI EXPANSION INDEX
RV R VALUE
-200 % FINES PASSING
AL ATTERBERG LIMITS
CO COLLAPSE
PP POCKET PENETROMETER

GEOTECHNICAL BORING LOG EIR B-1

Date 12-27-10
Sheet 3 **of** 3
Project 603086-001 SMMUSD/Parsons/Santa Monica High School
Logged / Sampled By MAW
Drilling Co. ABC Liovin Drilling, Inc.
Type of Rig CME-75
Hole Diameter 8"
Drive Weight 140 lbs Down Hole Hammer
Drop 30"
Elevation Top of Hole 79'
Location See Plates 1A and 1B

Elevation Feet	Depth Feet	Graphic Log N S	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	**SOIL DESCRIPTION** The Soil Description applies only to a location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	Type of Tests
	60			S-6	15 18 22		16	SMg	Silty SAND with Gravel, trace silt, poor sample recovery GR:31%, SA:56%, FI:13%	SA
15										
	65			R-7	14 17 22	128	9	SPg	Poorly Graded SAND with Gravel, medium dense, gray to orange borwn, wet,trace silt, fine to coarse grained at tip, grades to SAND.	
10										
	70			S-7	12 16 17		15		Poorly Graded SAND with Gravel, dense, dark brown, trace silt GR:24%, SA:66%, FI:10%.	SA
5										
	75			R-8	18 22 28				Gray, wet, fine to coarse grained. Fine grained sand at tip of sampler.	
									Total depth of boring: 76.5' Groundwater encountered @ 55' during drilling Backfill boring with cuttings and capped asphalt with cold patch	
0										
	80									
-5										
	85									
-10										
	90									

SAMPLE TYPES:

S	SPLIT SPOON	G	GRAB SAMPLE
R	RING SAMPLE	C	CORE SAMPLE
B	BULK SAMPLE		
T	TUBE SAMPLE		

TYPE OF TESTS:

DS	DIRECT SHEAR	SA	SIEVE ANALYSIS	-200	% FINES PASSING
MD	MAXIMUM DENSITY	SE	SAND EQUIVALENT	AL	ATTERBERG LIMITS
CN	CONSOLIDATION	EI	EXPANSION INDEX	CO	COLLAPSE
CR	CORROSION	RV	R VALUE	PP	POCKET PENETROMETER
UC	UNCONFINED COMPRESSIVE STRENGTH				

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG EIR B-7

Date 12-30-10
Sheet 1 **of** 2
Project 603086-001 SMMUSD/Parsons/Santa Monica High School
Logged / Sampled By MAW
Drilling Co. ABC Liovin Drilling, Inc.
Type of Rig CME-75
Hole Diameter 8"
Drive Weight 140 lbs Down Hole Hammer
Drop 30"
Elevation Top of Hole 90'
Location See Plates 1A and 1B

Elevation Feet	Depth Feet	Graphic Log N S	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	**SOIL DESCRIPTION** **The Soil Description applies only to a location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.**	Type of Tests
90	0								6.5-inches of Asphalt concrete over 4-inches of base **UNDOCUMENTED ARTIFICIAL FILL (Afu)** SAND, orange brown, fine to medium grained, some coarse, trace gravel	
85	5			B-1 R-1	10 16 31	111	11	SP	Medium dense	
									@ 7': **OLD ALLUVIAL FAN DEPOSITS (Qof)** SAND, light brown, moist, fine to medium grained	
80	10			S-1	9 16 21		5	SM	Silty SAND, dense, light brown, slightly moist, fine to medium grained	
75	15			R-2	16 41 50/2"	106	6	SM		
70	20			S-2	19 38 27		4	SMg	Small cobble in center of sample, mechanically broken	
65	25			R-3	13 26 50	100	12	SP	SAND, very dense, gray, fine grained, trace clay, oxidized thin beds	
60	30									

SAMPLE TYPES:

S	SPLIT SPOON	G	GRAB SAMPLE
R	RING SAMPLE	C	CORE SAMPLE
B	BULK SAMPLE		
T	TUBE SAMPLE		

TYPE OF TESTS:

DS	DIRECT SHEAR	SA	SIEVE ANALYSIS	-200	% FINES PASSING
MD	MAXIMUM DENSITY	SE	SAND EQUIVALENT	AL	ATTERBERG LIMITS
CN	CONSOLIDATION	EI	EXPANSION INDEX	CO	COLLAPSE
CR	CORROSION	RV	R VALUE	PP	POCKET PENETROMETER
UC	UNCONFINED COMPRESSIVE STRENGTH				

GEOTECHNICAL BORING LOG EIR B-7

Date 12-30-10 **Sheet** 2 **of** 2
Project 603086-001 SMMUSD/Parsons/Santa Monica High School **Logged / Sampled By** MAW
Drilling Co. ABC Liovin Drilling, Inc. **Type of Rig** CME-75
Hole Diameter 8" **Drive Weight** 140 lbs Down Hole Hammer **Drop** 30"
Elevation Top of Hole 90' **Location** See Plates 1A and 1B

Elevation Feet	Depth Feet	Graphic Log N S	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION The Soil Description applies only to a location of the exploration at the time of drilling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	Type of Tests
60	30			S-3	16 21 28		5		SAND, very dense, gray, fine grained, trace clay, oxidized thin beds	
55	35			R-4	21 50/4"	99	5	SP	Very dense, medium to coarse grained sand	
50	40			S-4	15 30 32		5	SPg	Some gravel	
									Total depth of boring 41.5' No groundwater encountered during drilling Boring backfill with soil cuttings and capped asphalt with cold patch	
45	45									
40	50									
35	55									
30	60									

SAMPLE TYPES:

S	SPLIT SPOON	G	GRAB SAMPLE
R	RING SAMPLE	C	CORE SAMPLE
B	BULK SAMPLE		
T	TUBE SAMPLE		

TYPE OF TESTS:

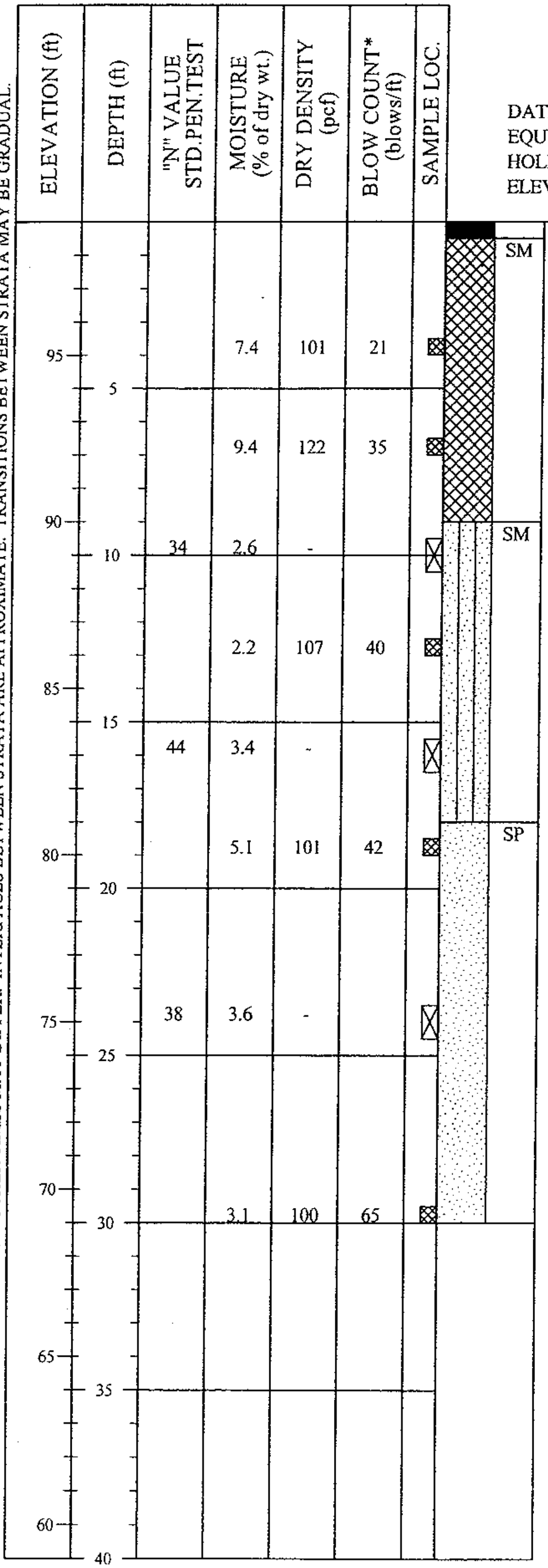
DS	DIRECT SHEAR	SA	SIEVE ANALYSIS	-200	% FINES PASSING
MD	MAXIMUM DENSITY	SE	SAND EQUIVALENT	AL	ATTERBERG LIMITS
CN	CONSOLIDATION	EI	EXPANSION INDEX	CO	COLLAPSE
CR	CORROSION	RV	R VALUE	PP	POCKET PENETROMETER
UC	UNCONFINED COMPRESSIVE STRENGTH				

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

BORING 1

DATE DRILLED: October 11, 2008
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION: 99.0**

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.



6-inch thick Asphalt Concrete, No Base

FILL- SILTY SAND- dry, light brown, some gravel

Few gravel and some roots

Trace asphalt concrete fragements

SILTY SAND- dense, dry, brown, fine grained

POORLY GRADED SAND- dense, damp, light yellowish brown, fine grained

12-inch thick layer of coarse sand, some gravel

Some gravel below 26 feet

END OF BORING AT 30 FEET.

NOTES:

Water not encountered.
Boring backfilled with soil cuttings, tamped and patched.

* Number of blows required to drive Crandall sampler 12 inches using a 140 pound hammer falling 12 inches.

** Elevations based on topographic survey prepared by PSOMAS dated July 29, 2008.

Field Tech: GMC
Prepared By: MKT
Checked By: HP

B12SOIL_CRANDALL(DECIMAL_ELE) 81741.GPJ LAW_CRAN.GDT 12/19/08

Proposed Science and Technology Building
Santa Monica High School
Santa Monica, California

MACTEC

LOG OF BORING

Project: 4953-08-1741 Figure: A-1.1

BORING 2

DATE DRILLED: October 11, 2008
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION: 96.0**

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.
95						
			7.3	113	23	☒
	5					
90						
			7.6	113	26	☒
	10		9.5	109	31	☒
85						
			10.4	109	46	☒
	15					
			11.4	105	45	☒
80						
	20		6.7	105	37	☒
75						
	25		5.2	100	57	☒
70						
	30		3.9	99	38	☒
65						
	35					
60						
	40					

7-inch thick Asphalt Concrete, No Base

SM FILL- SILTY SAND- damp, light brown, fine grained

SM SILTY SAND- medium dense, damp, light brown, fine grained

Some corase sand layers between 10 to 13 feet

SP POORLY GRADED SAND- medium dense to dense, damp, light brown, fine grained

END OF BORING AT 30 FEET.

NOTES:

Water not encountered.
Boring backfilled with soil cuttings, tamped and patched.

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Field Tech: GMC
Prepared By: MKT
Checked By: HP

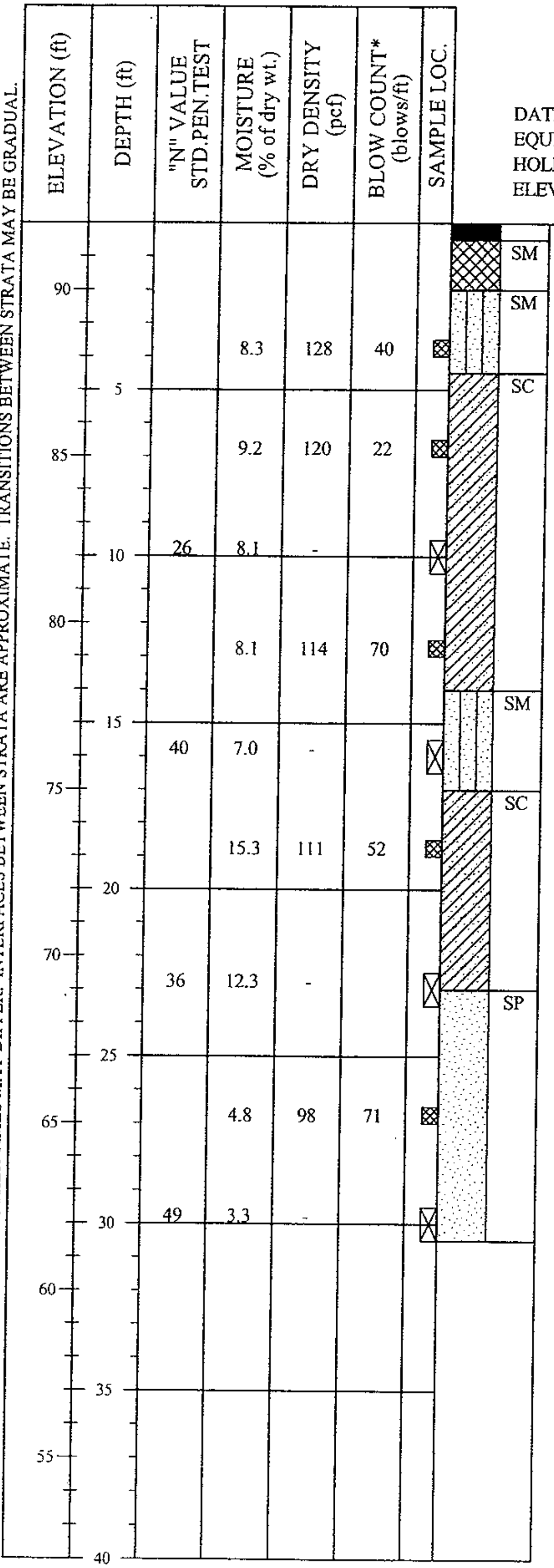
Proposed Science and Technology Building
Santa Monica High School
Santa Monica, California

MACTEC

LOG OF BORING
Project: 4953-08-1741
Figure: A-1.2

BORING 3

DATE DRILLED: October 11, 2008
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION: 92.0**



"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.
	8.3	128	40	▩
	9.2	120	22	▩
26	8.1	-		☒
	8.1	114	70	▩
40	7.0	-		☒
	15.3	111	52	▩
36	12.3	-		☒
	4.8	98	71	▩
49	3.3	-		☒

6-inch thick Asphalt Concrete, No Base

SM FILL- SITLY SAND- damp, brown, fine grained, some brick fragments

SM SILTY SAND- medium dense to dense, damp, brown, fine grained, slightly porous

SC CLAYEY SAND- medium dense, damp, light brown

SM SILTY SAND- dense, damp, light brown, some clay

SC CLAYEY SAND - dense, moist, light brown and gray, alternating with layers of Sandy Clay

SP POORLY GRADED SAND- dense, damp, light brown, fine grained

END OF BORING AT 30.5 FEET.

NOTES:

No water encountered.
Boring backfilled with soil cuttings, tamped and patched.

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B12SOIL_CRANDALL(DECIMAL_ELE) 81741.GPJ LAW_CRAN.GDT 12/19/08

Field Tech: GMC
Prepared By: MKT
Checked By: HP

Proposed Science and Technology Building
Santa Monica High School
Santa Monica, California

MACTEC

LOG OF BORING
Project: 4953-08-1741
Figure: A-1.3

BORING 4

DATE DRILLED: October 11, 2008
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION: 96.0**

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.
95			10.2	125	21	▩
90	5		12.7	121	18	▩
			14.1	113	33	▩
85	10		11.4	111	27	▩
			10.0	109	32	▩
80	15		8.3	110	30	▩
75	20		10.7	108	36	▩
70	25		10.9	104	28	▩
65	30		6.8	113	50	▩
60	35					
	40					

SM	FILL- SILTY SAND- moist, dark grayish brown, fine to medium grained, some gravel, some asphalt concrete fragments, some clay
ML	CLAYEY SILT- stiff, moist, reddish brown
CL-ML	SILTY CLAY- very stiff, moist, light brown
SC	CLAYEY SAND- medium dense, moist, reddish brown, fine grained
SM	SILTY SAND- medium dense, moist, light brown, fine to medium grained
SP	POORLY GRADED SAND- dense, moist, light brown, fine to medium grained, some silt

END OF BORING AT 31 FEET.

NOTES:

Water not encountered.
Boring backfilled with soil cuttings, tamped.

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

B12SOIL_CRANDALL(DECIMAL ELE) 81741.GPJ LAW_CRAN.GDT 12/19/08

Field Tech: GMC
Prepared By: MKT
Checked By: HP

Proposed Science and Technology Building
Santa Monica High School
Santa Monica, California

MACTEC

LOG OF BORING
Project: 4953-08-1741
Figure: A-1.4

BORING 5

DATE DRILLED: October 11, 2008
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION: 99.0**

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.
95	5		2.9	109	31	▩
			6.4	114	27	▩
90	10		8.6	110	30	▩
85			7.7	109	58	▩
	15		6.6	104	46	▩
80	20		3.3	101	41	▩
75	25		4.1	100	43	▩
70	30		3.8	98	29	▩
65	35					
60	40					

SM FILL- SILTY SAND- moist, light brown, fine to medium grained

SP POORLY GRADED SAND- medium dense, moist, light brown, fine to medium grained

SC CLAYEY SAND- medium dense to dense, moist, reddish brown, fine to medium grained, some clay

SP POORLY GRADED SAND- medium dense, moist, light brown, fine to medium grained

END OF BORING AT 31 FEET.

NOTES:

Hand Auger used in upper 5 feet due to utilites.
Water not encountered.
Boring backfilled with soil cuttings, tamped

Field Tech: GMC
Prepared By: MKT
Checked By: HP

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Santa Monica High School
Santa Monica, California

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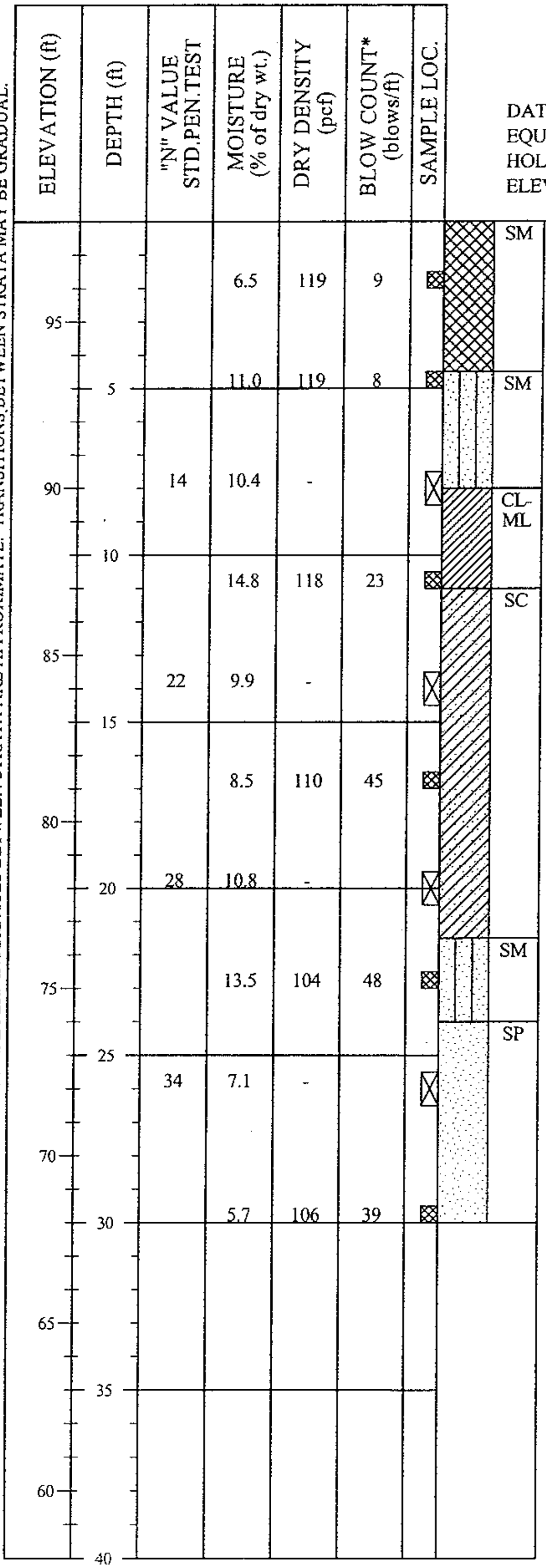
LOG OF BORING
Project: 4953-08-1741 Figure: A-1.5

BORING 6

DATE DRILLED: October 11, 2008
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION: 98.0**



"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.
	6.5	119	9	▩
	11.0	119	8	▩
14	10.4	-		☒
	14.8	118	23	▩
22	9.9	-		☒
	8.5	110	45	▩
28	10.8	-		☒
	13.5	104	48	▩
34	7.1	-		☒
	5.7	106	39	▩

SM	FILL- SILTY SAND- moist, dark brown, fine to medium grained, some gravel and asphalt concrete fragments
SM	SILTY SAND- medium dense, moist, dark reddish brown, fine to medium grained, some clay
CL-ML	SILTY CLAY- stiff, moist, light brown
SC	CLAYEY SAND- medium dense, moist, reddish brown, fine to medium grained
SM	SILTY SAND- dense, moist, light brown, fine grained
SP	POORLY GRADED SAND- dense, moist, light brown, fine to medium grained, some silt

END OF BORING AT 30 FEET.

NOTES:

Water not encountered.
Boring backfilled with soil cuttings, tamped and patched.

Field Tech: GMC
Prepared By: MKT
Checked By: HP

Proposed Science and Technology Building
Santa Monica High School
Santa Monica, California

MACTEC

LOG OF BORING
Project: 4953-08-1741
Figure: A-1.6

BORING 7

DATE DRILLED: October 11, 2008
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION: 102.0**

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.
100			10.0	97	11	▨
	5		1.8	110	27	▨
95			7.2	109	48	▨
	10		6.4	104	60	▨
90						
	15					
85						
	20					
80						
	25					
75						
	30					
70						
	35					
65						
	40					

▩	SM	FILL- SILTY SAND- moist, brown, fine to medium grained
▤	SM	SILTY SAND- medium dense, moist, light brown, fine to medium grained
▨	SC	CLAYEY SAND- dense, moist, reddish brown, fine grained

END OF BORING AT 11 FEET.

NOTES:

Water not encountered.
Boring backfilled with soil cuttings, tamped an patched.

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Field Tech: GMC
Prepared By: MKT
Checked By: HP

Proposed Science and Technology Building
Santa Monica High School
Santa Monica, California

MACTEC

LOG OF BORING
Project: 4953-08-1741
Figure: A-1.7

BORING 8

DATE DRILLED: October 11, 2008
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION: 100.0**

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.		
							SM	SILTY SAND- loose, damp, dark brown, fine grained, some roots
			5.6	97	4	▩		
95	5							Becomes light brown, medium dense below 5 feet
			4.3	114	41	▩		
90	10		6.5	111	28	▩		
							SC	CLAYEY SAND- very dense, moist, light brown, fine to medium grained
			8.3	114	68	▩		
85	15							
			7.8	110	76	▩		
							SM	SILTY SAND- very dense, moist, light brown, fine grained
80	20		6.3	100	74	▩		
							SP	POORLY GRADED SAND- dense, moist, light brown, fine grained
75	25		5.6	99	41	▩		
								12-inch thick layer of gravel and cobbles
70	30		5.8	107	62	▩		
65	35							
	40							

END OF BORING AT 31 FEET.

NOTES:

Water not encountered.
Boring backfilled with soil cuttings, tamped and patched.

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Field Tech: GMC
Prepared By: MKT
Checked By: HP

Proposed Science and Technology Building
Santa Monica High School
Santa Monica, California

MACTEC

LOG OF BORING
Project: 4953-08-1741
Figure: A-1.8

MAJOR DIVISIONS			GROUP SYMBOLS		TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	▨	GW	Well graded gravels, gravel - sand mixtures, little or no fines.
			▨	GP	Poorly graded gravels or grave - sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amount of fines)	▨	GM	Silty gravels, gravel - sand - silt mixtures.
			▨	GC	Clayey gravels, gravel - sand - clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 Sieve Size)	CLEAN SANDS (Little or no fines)	▨	SW	Well graded sands, gravelly sands, little or no fines.
			▨	SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	▨	SM	Silty sands, sand - silt mixtures
			▨	SC	Clayey sands, sand - clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		▥	ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts and with slight plasticity.
			▨	CL	Inorganic lays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			▤	OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		▥	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			▨	CH	Inorganic clays of high plasticity, fat clays
			▨	OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			▨	PT	Peat and other highly organic soils.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

SILT OR CLAY	SAND			GRAVEL		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		
No.200	No.40	No.10	No.4	3/4"	3"	12"	

U.S. STANDARD SIEVE SIZE

Reference: The Unified Soil Classification System, Corps of Engineers, U.S. Army Technical Memorandum No. 3-357, Vol. 1, March, 1953 (Revised April, 1960)

■	Undisturbed Sample	▮	Auger Cuttings
☒	Split Spoon Sample	≋	Bulk Sample
▥	Rock Core	▩	Crandall Sampler
▩	Dilatometer	▨	Pressure Meter
□	Packer	○	No Recovery
▽	Water Table at time of drilling	▼	Water Table after drilling

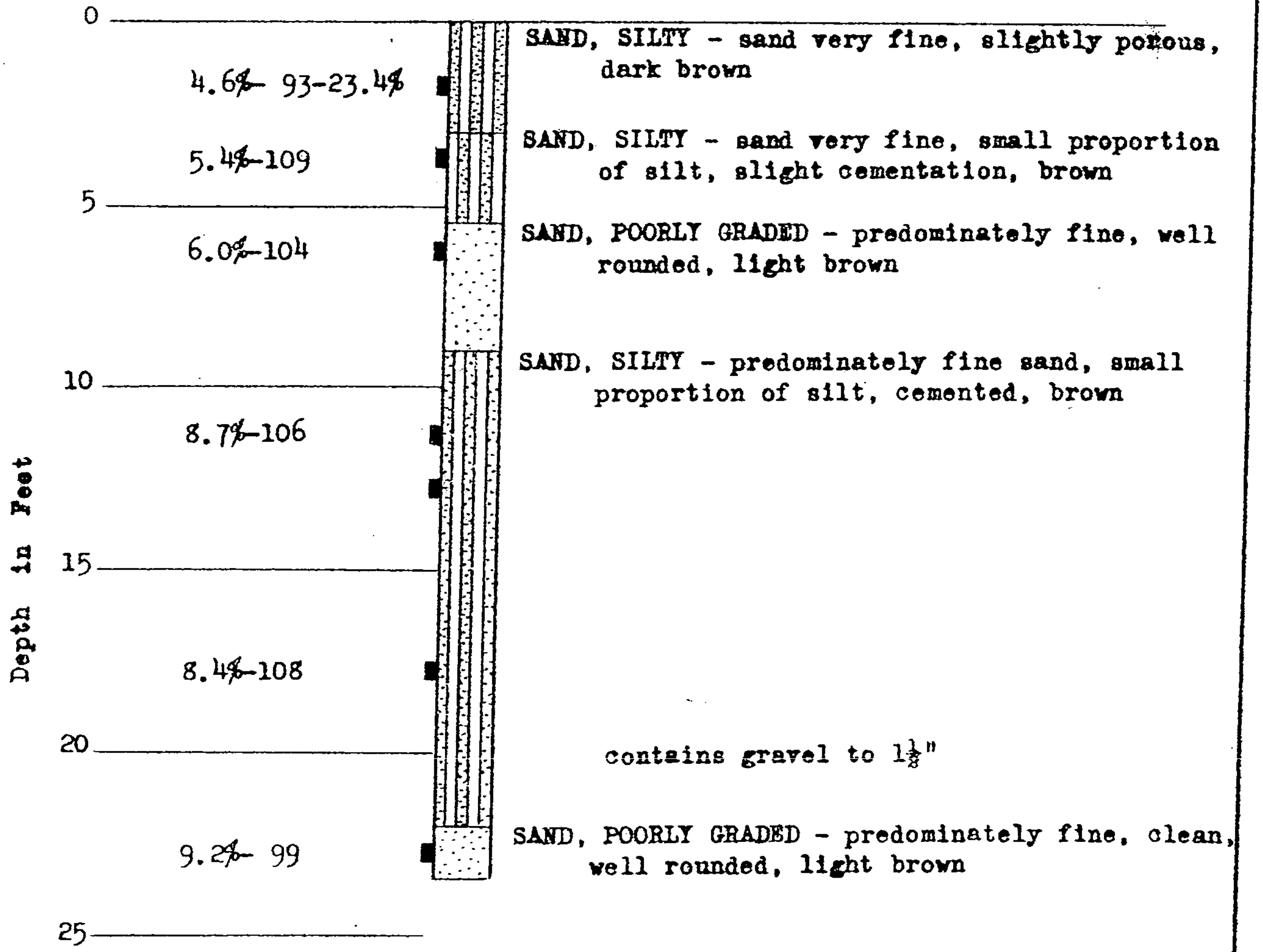
Correlation of Penetration Resistance with Relative Density and Consistency

SAND & GRAVEL		SILT & CLAY	
No. of Blows	Relative Density	No. of Blows	Consistency
0 - 4	Very Loose	0 - 1	Very Soft
5 - 10	Loose	2 - 4	Soft
11 - 30	Medium Dense	5 - 8	Medium Stiff
31 - 50	Dense	9 - 15	Stiff
Over 50	Very Dense	16 - 30	Very Stiff
		Over 30	Hard

KEY TO SYMBOLS AND DESCRIPTIONS

MACTEC

LOG OF BORING 1



SAND, SILTY - sand very fine, slightly porous, dark brown

SAND, SILTY - sand very fine, small proportion of silt, slight cementation, brown

SAND, POORLY GRADED - predominately fine, well rounded, light brown

SAND, SILTY - predominately fine sand, small proportion of silt, cemented, brown

contains gravel to 1½"

SAND, POORLY GRADED - predominately fine, clean, well rounded, light brown

K E Y

■ —Indicates depth at which undisturbed sample obtained

4.6%- 93-23.4%

Increased moisture content in % of dry weight

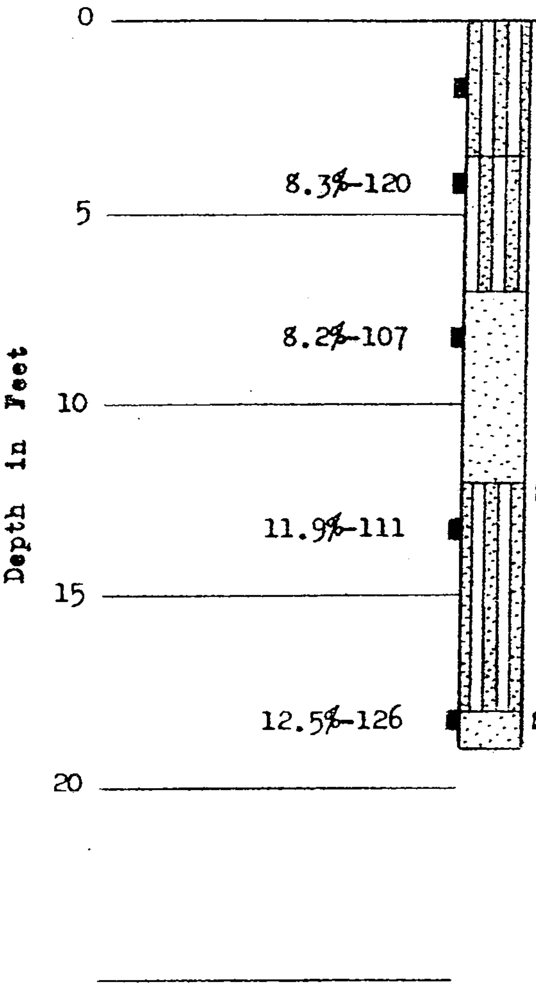
Dry density in lbs/cu.ft.

Field moisture content

Soils classified in accordance with the U.S. Bureau of Reclamation system.

LeROY CRANDALL & ASSOCIATES

LOG OF BORING 2



SAND, SILTY - sand very fine, slightly porous, dark brown

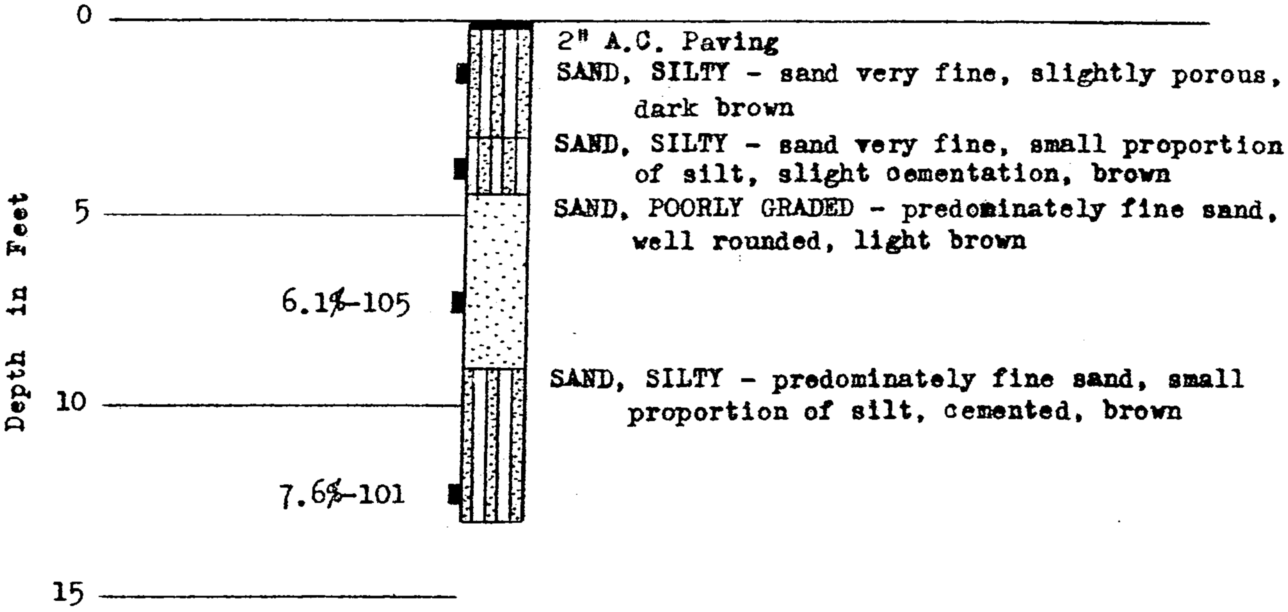
SAND, SILTY - sand very fine, small proportion of silt, brown
slight cementation

SAND, POORLY GRADED - predominately fine sand, well rounded, light brown

SAND, SILTY - predominately fine, small proportion of silt, brown

SAND, POORLY GRADED - predominately fine sand, well rounded, highly cemented, black

LOG OF BORING 3



2" A.C. Paving

SAND, SILTY - sand very fine, slightly porous, dark brown

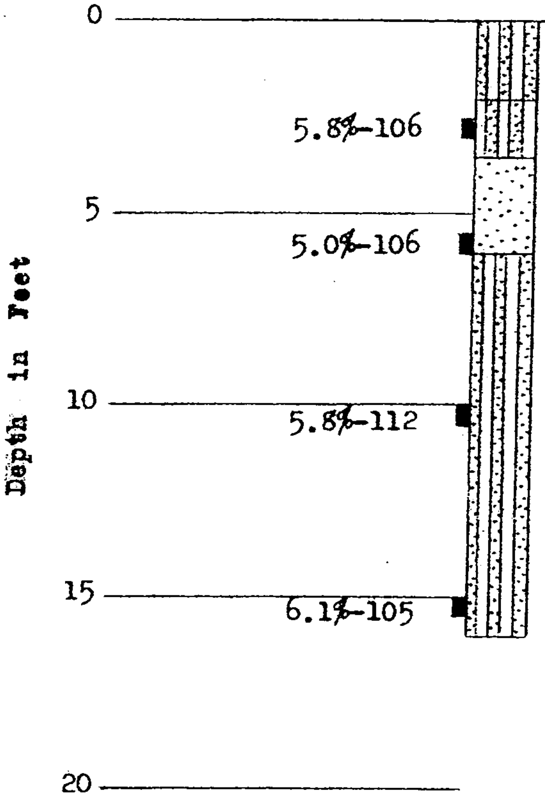
SAND, SILTY - sand very fine, small proportion of silt, slight cementation, brown

SAND, POORLY GRADED - predominately fine sand, well rounded, light brown

SAND, SILTY - predominately fine sand, small proportion of silt, cemented, brown

LeROY CRANDALL & ASSOCIATES

LOG OF BORING 4



SAND, SILTY - sand very fine, slightly porous dark brown

SAND, SILTY - sand very fine, small proportion of silt, brown

SAND, POORLY GRADED - predominately fine sand, well rounded, light brown

SAND, SILTY - predominately fine sand, small proportion of silt, cemented, brown

LeROY CRANDALL & ASSOCIATES

SUMMARY

OF

CONE PENETRATION TEST DATA

Project:

Samohi Phase 1 & 2
601 Pico Blvd.
Santa Monica, CA
June 13, 2017

Prepared for:

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Leighton Consulting
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Prepared by:

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SUMMARY

OF

CONE PENETRATION TEST DATA

1. INTRODUCTION

This report presents the results of a Cone Penetration Test (CPT) program carried out for the Samohi Phase 1 & 2 project located at 601 Pico Blvd. in Santa Monica, California. The work was performed by Kehoe Testing & Engineering (KTE) on June 13, 2017. The scope of work was performed as directed by Leighton Consulting personnel.

2. SUMMARY OF FIELD WORK

The fieldwork consisted of performing CPT soundings at five locations to determine the soil lithology. Groundwater measurements and hole collapse depths provided in **TABLE 2.1** are for information only. The readings indicate the apparent depth to which the hole is open and the apparent water level (if encountered) in the CPT probe hole at the time of measurement upon completion of the CPT. KTE does not warranty the accuracy of the measurements and the reported water levels may not represent the true or stabilized groundwater levels.

LOCATION	DEPTH OF CPT (ft)	COMMENTS/NOTES:
CPT-1	47	Refusal, hole open to 47.0 ft (dry)
CPT-2	49	Refusal, hole open to 47.0 ft (dry)
CPT-3	51	Refusal, hole open to 51.0 ft (dry)
CPT-4	39	Refusal, hole open to 39.0 ft (dry)
CPT-5	24	Refusal, hole open to 24.0 ft (dry)

TABLE 2.1 - Summary of CPT Soundings

3. FIELD EQUIPMENT & PROCEDURES

The CPT soundings were carried out by **KTE** using an integrated electronic cone system manufactured by Vertek. The CPT soundings were performed in accordance with ASTM standards (D5778). The cone penetrometers were pushed using a 30-ton CPT rig. The cone used during the program was a 15 cm^2 cone and recorded the following parameters at approximately 2.5 cm depth intervals:

- Cone Resistance (qc)
- Sleeve Friction (fs)
- Dynamic Pore Pressure (u)
- Inclination
- Penetration Speed

The above parameters were recorded and viewed in real time using a laptop computer. Data is stored at the KTE office for future analysis and reference. A complete set of baseline readings was taken prior to each sounding to determine temperature shifts and any zero load offsets. Monitoring base line readings ensures that the cone electronics are operating properly.

4. CONE PENETRATION TEST DATA & INTERPRETATION

The Cone Penetration Test data is presented in graphical form in the attached Appendix. These plots were generated using the CPeT-IT program. Penetration depths are referenced to ground surface. The soil classification on the CPT plots is derived from the attached CPT Classification Chart (Robertson) and presents major soil lithologic changes. The stratigraphic interpretation is based on relationships between cone resistance (qc), sleeve friction (fs), and penetration pore pressure (u). The friction ratio (Rf), which is sleeve friction divided by cone resistance, is a calculated parameter that is used along with cone resistance to infer soil behavior type. Generally, cohesive soils (clays) have high friction ratios, low cone resistance and generate excess pore water pressures. Cohesionless soils (sands) have lower friction ratios, high cone bearing and generate little (or negative) excess pore water pressures.

Tables of basic CPT output from the interpretation program CPeT-IT are provided for CPT data averaged over one foot intervals in the Appendix. We recommend a geotechnical engineer review the assumed input parameters and the calculated output from the CPeT-IT program. A summary of the equations used for the tabulated parameters is provided in the Appendix.

It should be noted that it is not always possible to clearly identify a soil type based on qc, fs and u. In these situations, experience, judgement and an assessment of the pore pressure data should be used to infer the soil behavior type.

If you have any questions regarding this information, please do not hesitate to call our office at (714) 901-7270.

Sincerely,

KEHOE TESTING & ENGINEERING

Richard W. Koester, Jr.
General Manager

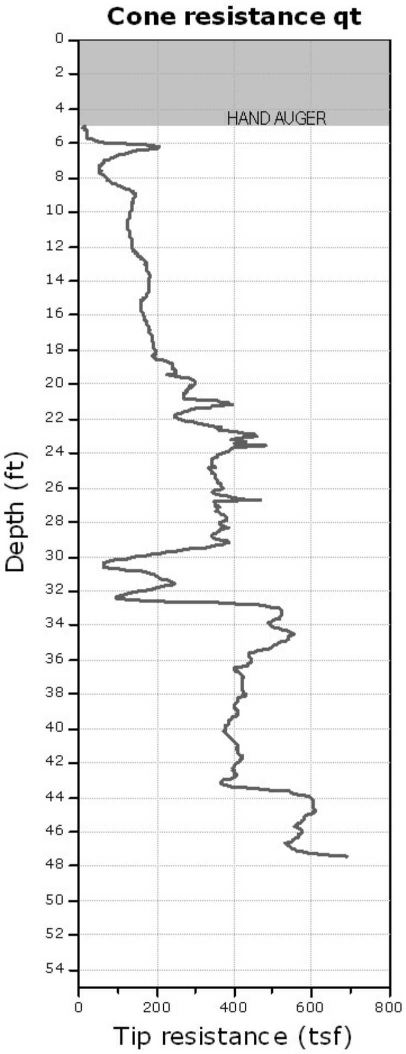
06/14/17-mm-8190

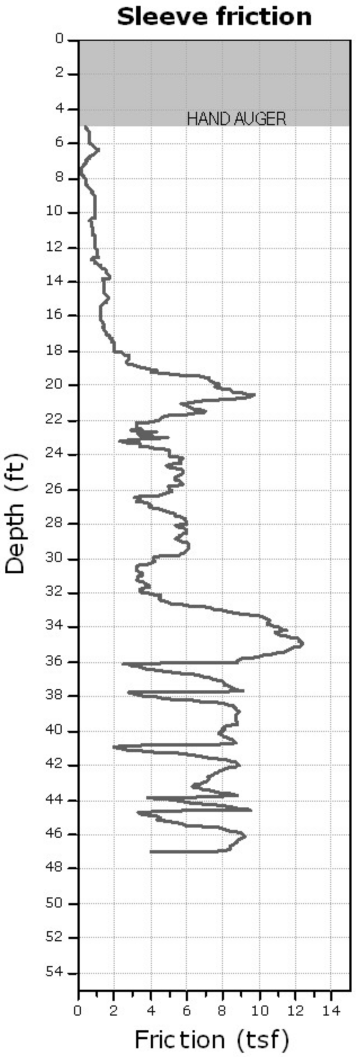
APPENDIX

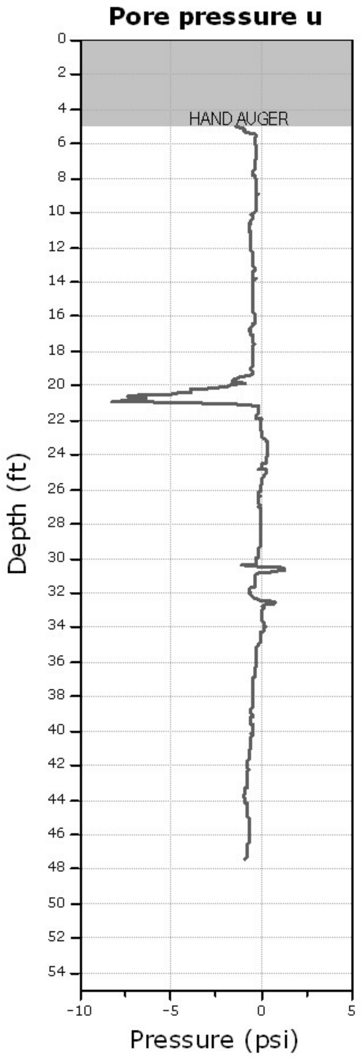
Kehoe Testing and Engineering
714-901-7270
rich@kehoetesting.com
www.kehoetesting.com

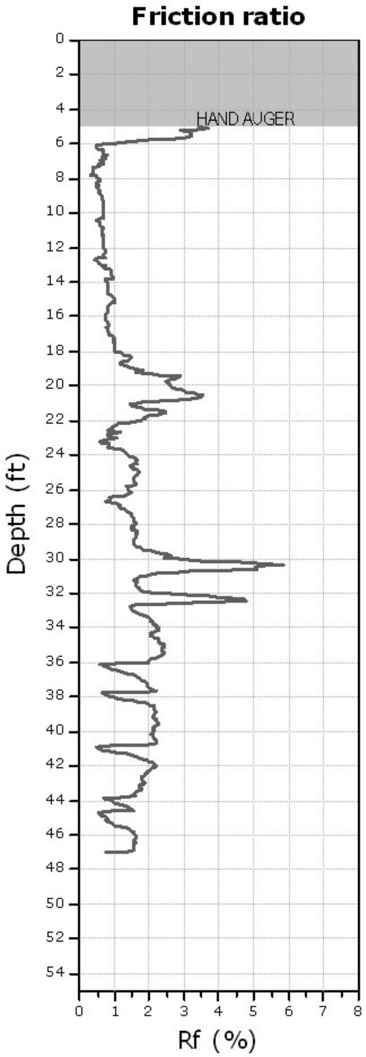
Project: Leighton Consulting/Samohi Phase 1 & 2
Location: 601 Pico Blvd Santa Monica, CA

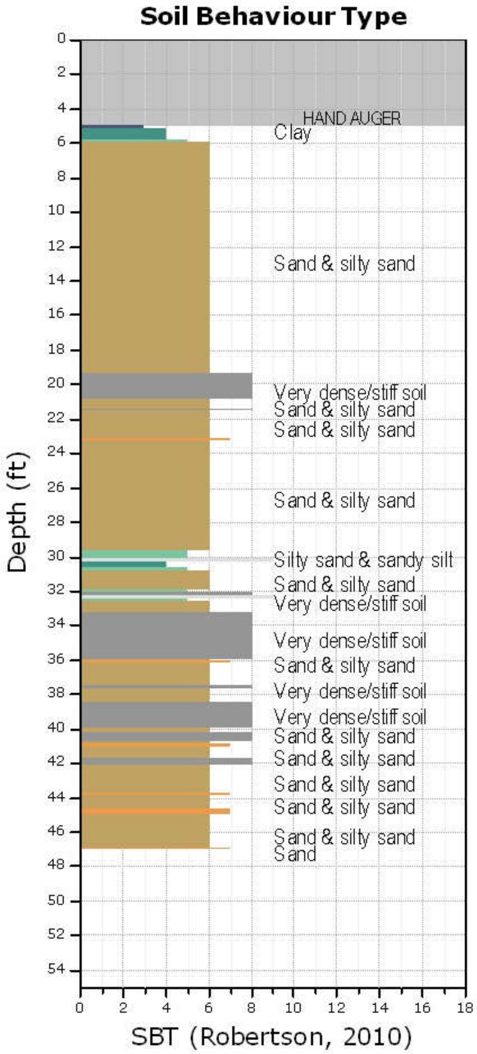
CPT-1
Total depth: 47.38 ft, Date: 6/13/2017
Cone Type: Vertek











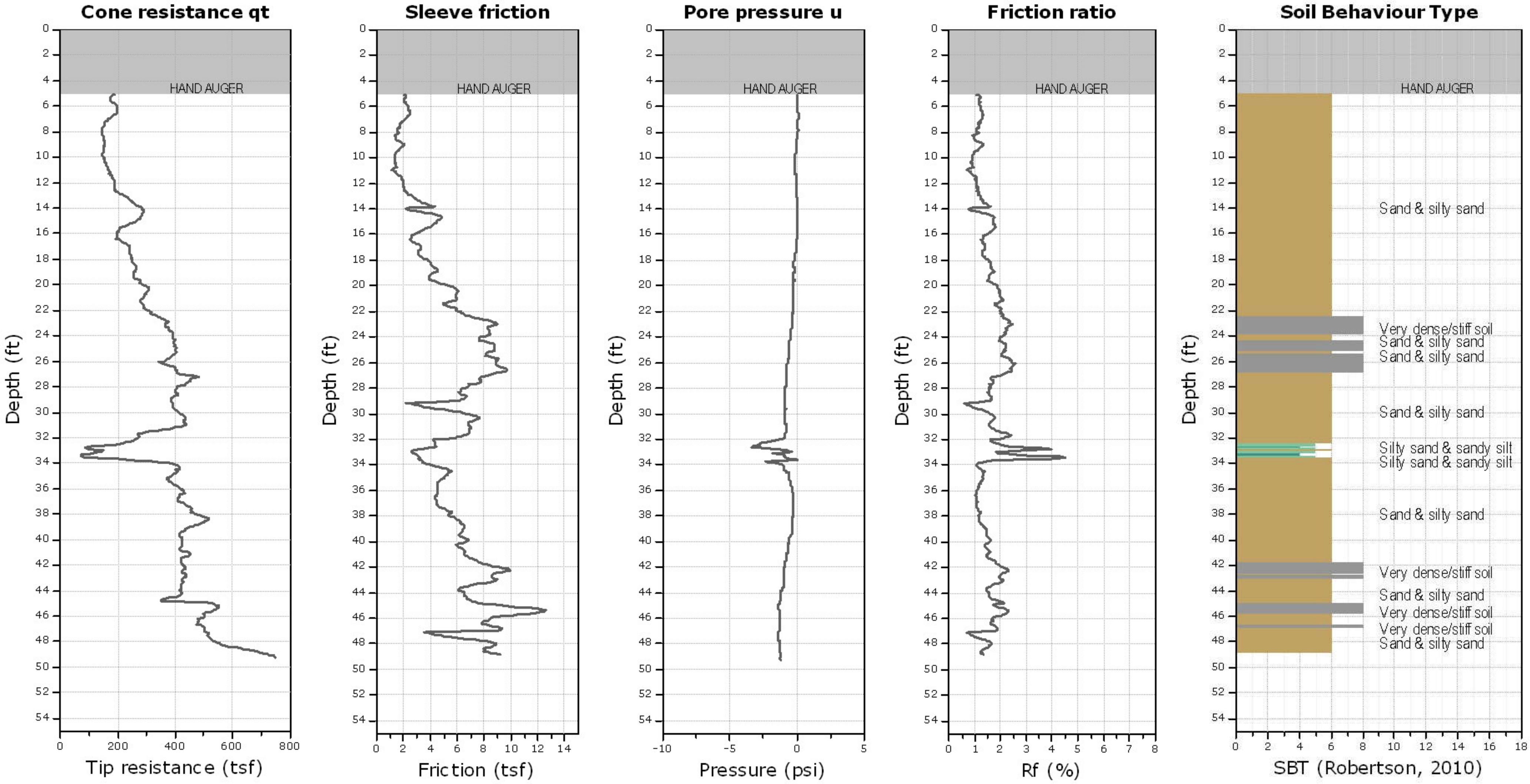
CPeT-IT v.2.0.1.55 - CPTU data presentation & interpretation software - Report created on: 6/14/2017, 11:22:33 AM
Project file: C:\LeightonSantaMonica6-17\Plot Data\Plots w-ha.cpt

Kehoe Testing and Engineering
714-901-7270
rich@kehoetesting.com
www.kehoetesting.com

CPT-2

Project: **Leighton Consulting/Samohi Phase 1 & 2**
Location: **601 Pico Blvd Santa Monica, CA**

Total depth: 49.23 ft, Date: 6/13/2017
Cone Type: Vertek



Kehoe Testing and Engineering
714-901-7270
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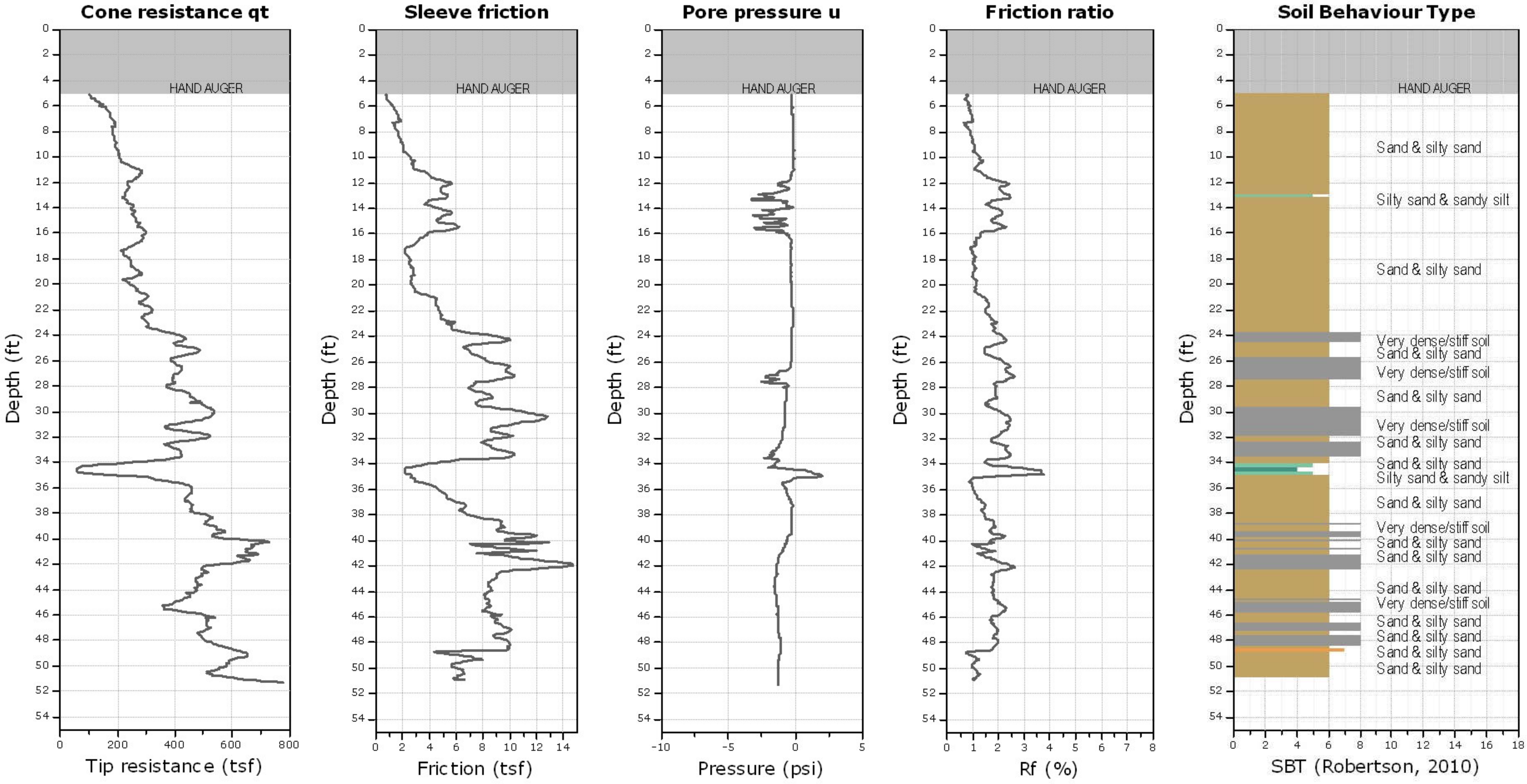
www.kehoetesting.com

CPT-3

Project: **Leighton Consulting/Samohi Phase 1 & 2**
Location: **601 Pico Blvd Santa Monica, CA**

Total depth: 51.32 ft, Date: 6/13/2017
Cone Type: Vertek



Kehoe Testing and Engineering
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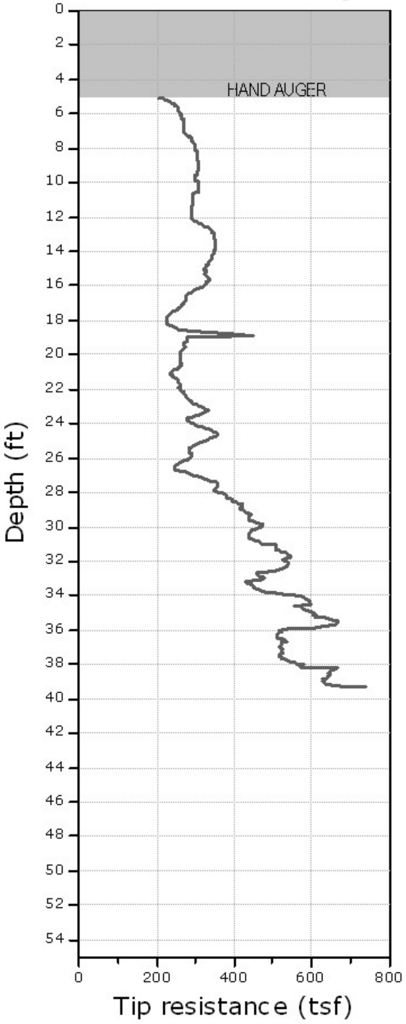
www.kehoetesting.com

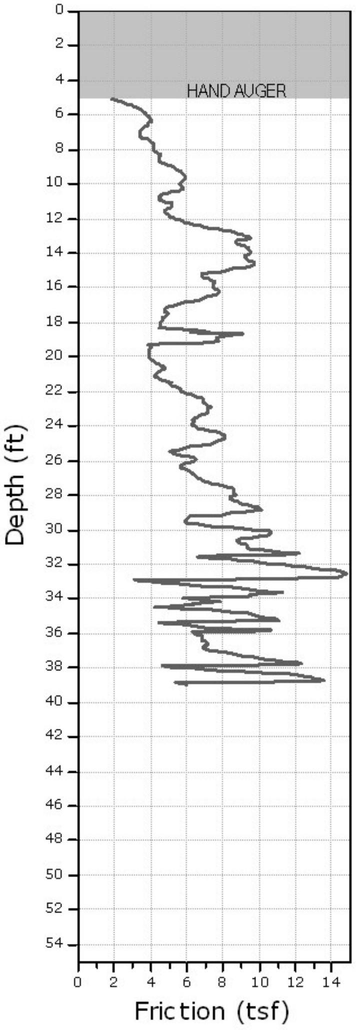
Project: **Leighton Consulting/Samohi Phase 1 & 2**
Location: **601 Pico Blvd Santa Monica, CA**

CPT-4
Total depth: 39.32 ft, Date: 6/13/2017
Cone Type: Vertek

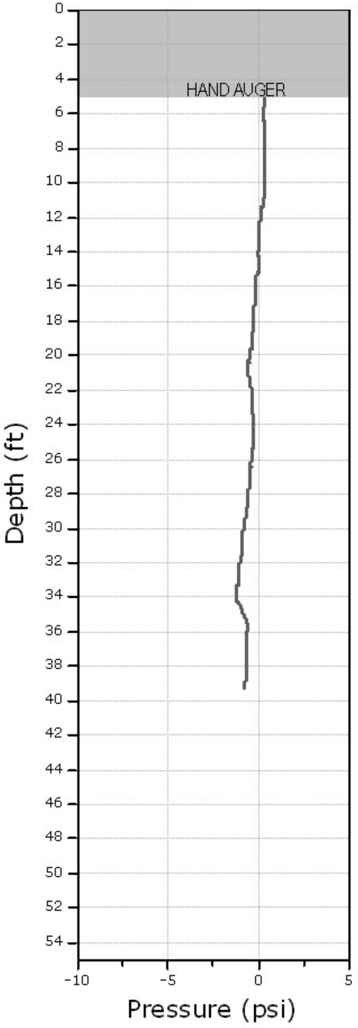
Cone resistance qt



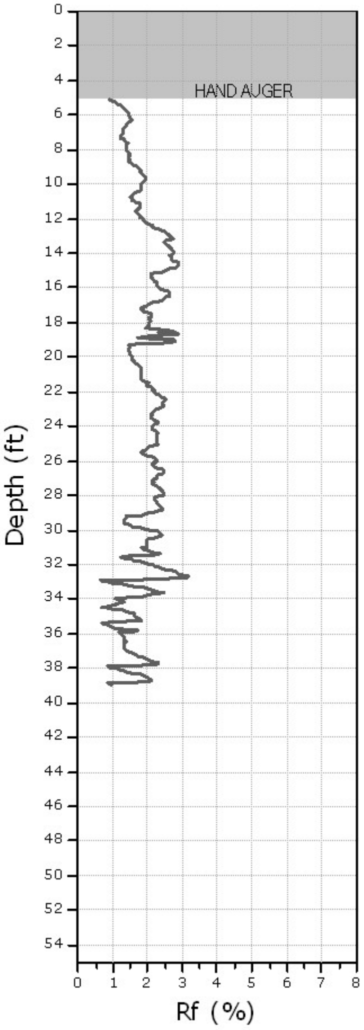
Sleeve friction



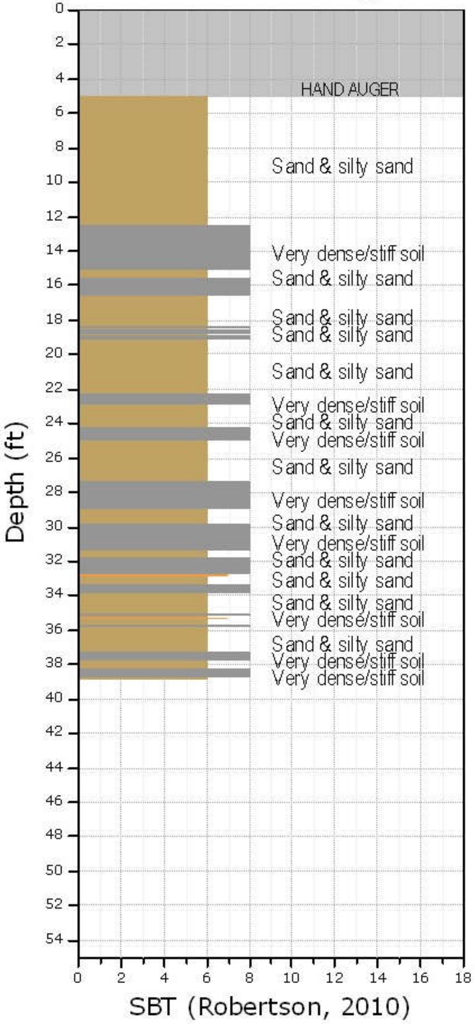
Pore pressure u



Friction ratio



Soil Behaviour Type



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Kehoe Testing and Engineering
714-901-7270
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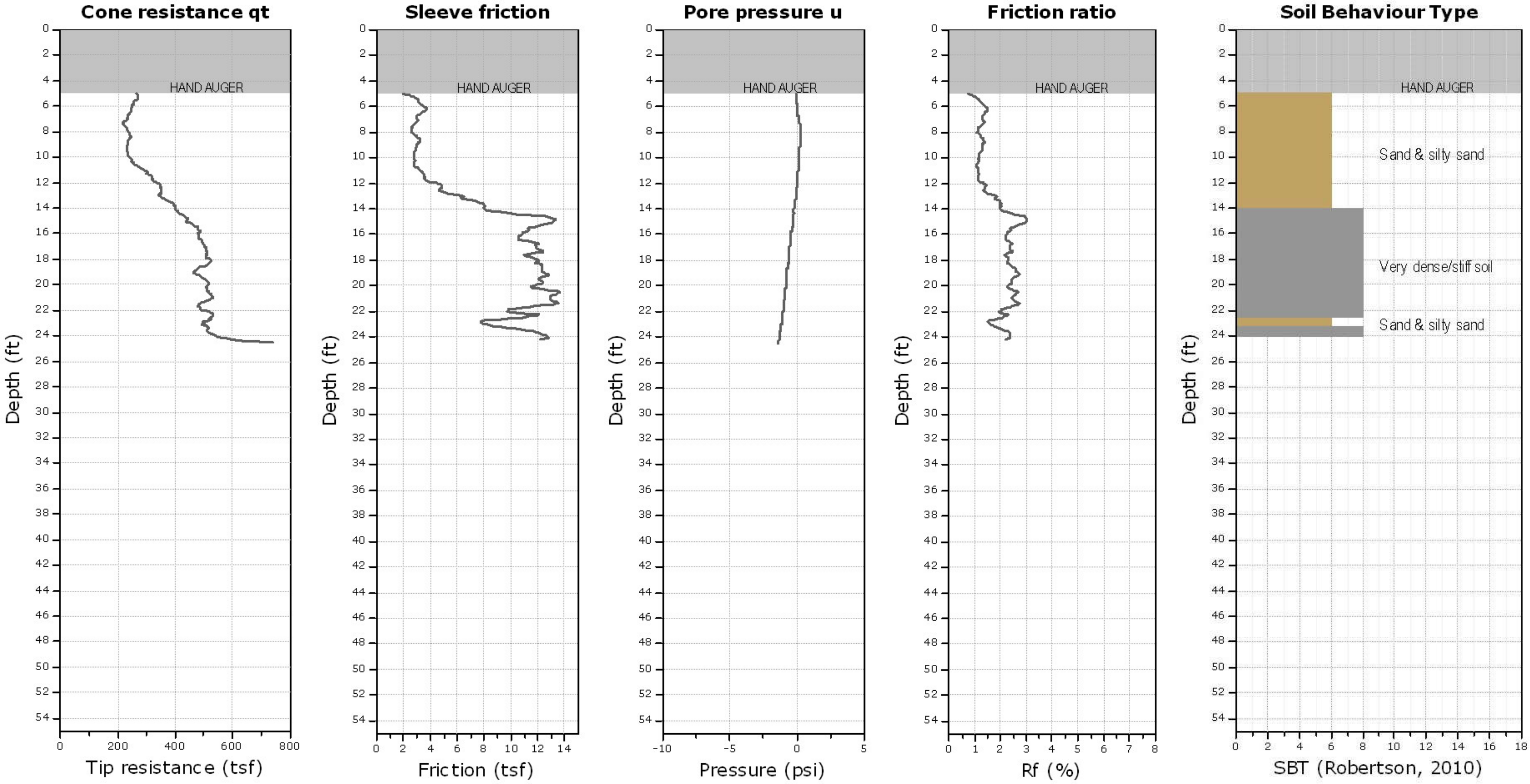
www.kehoetesting.com

Project: **Leighton Consulting/Samohi Phase 1 & 2**
Location: **601 Pico Blvd Santa Monica, CA**

CPT-5
Total depth: 24.54 ft, Date: 6/13/2017
Cone Type: Vertek



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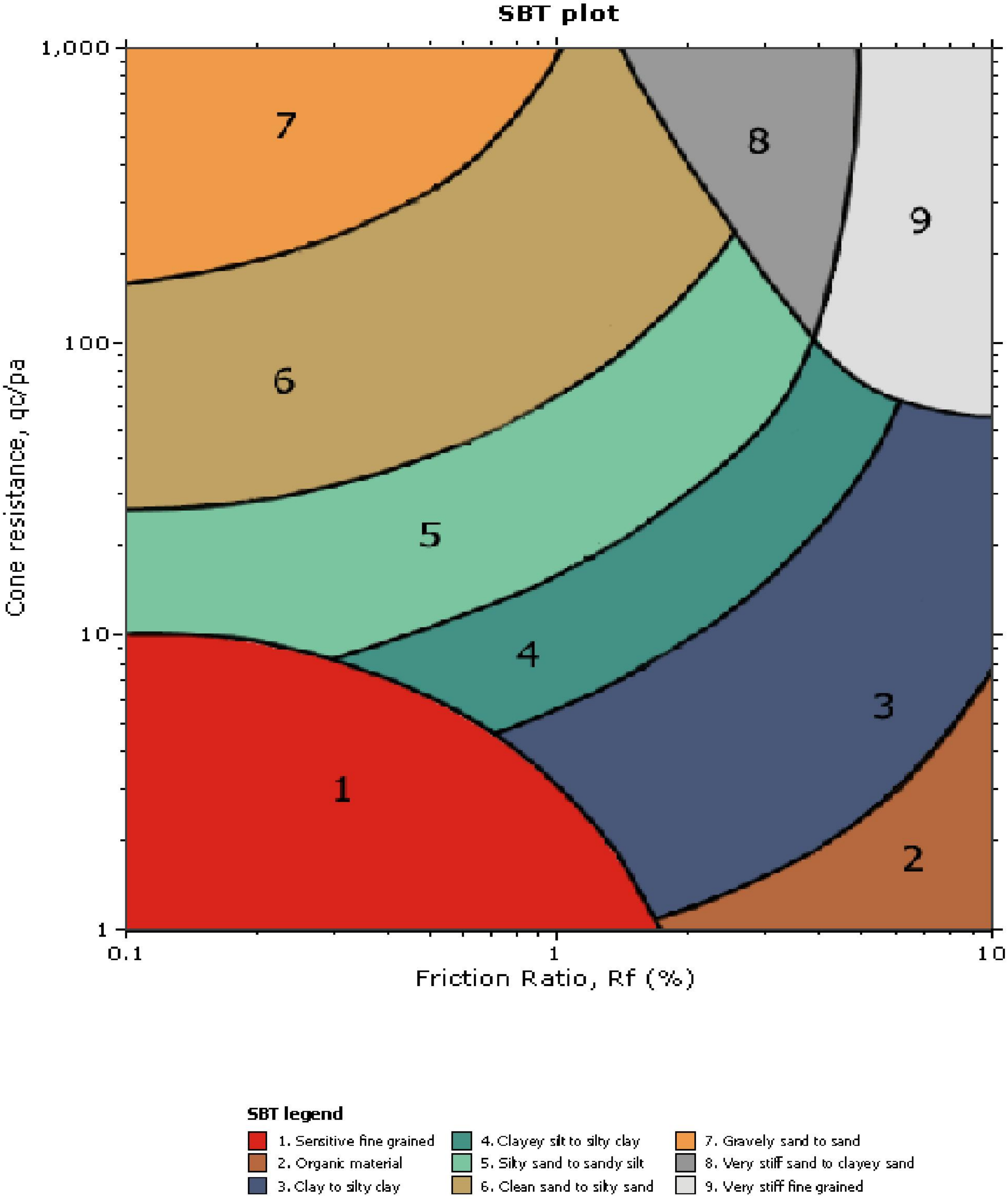
SBT plot
1,000
100
10
1
Cone resistance, qc/pa
0.1
1
10
Friction Ratio, Rf (%)
1
2
3
4
5
6
7
8
9
SBT legend
1. Sensitive fine grained
2. Organic material
3. Clay to silty clay
4. Clayey silt to silty clay
5. Silty sand to sandy silt
6. Clean sand to silty sand
7. Gravely sand to sand
8. Very stiff sand to clayey sand
9. Very stiff fine grained

	CPT-1	In situ data										Basic output data											
Depth (ft)	qc (tsf)	fs (tsf)	u (psi)	Other	qt (tsf)	Rf(%)	SBT	Ic SBT	ã (pcf)	ó,v (tsf)	u0 (tsf)	ó',vo (tsf)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn
1	41.88	0.94	0.1	0.58	41.88	2.24	5	2.44	118.93	0.06	0	0.06	702.78	2.25	0	6	0.59	5.52	1.94	218.02	0.12	40.72	7
2	32.69	1.04	-1.14	0.73	32.67	3.2	4	2.63	119.09	0.12	0	0.12	273.35	3.21	0	5	0.69	4.48	2.18	137.92	-0.69	28.87	5
3	12.32	0.31	-0.58	0.75	12.32	2.54	3	2.9	107.9	0.17	0	0.17	70.23	2.58	0	5	0.78	4.13	2.43	47.39	-0.24	29.85	5
4	5.01	0.21	-0.1	0.73	5.01	4.17	3	3.35	102.74	0.22	0	0.22	21.34	4.36	0	3	0.95	4.37	2.86	19.76	-0.03	19.05	3
5	12.11	0.52	-1.27	0.73	12.1	4.32	3	3.04	111.6	0.28	0	0.28	42.19	4.42	-0.01	4	0.88	3.22	2.67	36.01	-0.33	20.08	3
6	102.34	0.73	-0.39	0.88	102.33	0.71	6	1.83	119.27	0.34	0	0.34	300.15	0.72	0	6	0.49	1.75	1.64	168.65	-0.08	93.6	7
7	67.67	0.63	-0.39	0.98	67.66	0.93	6	2.04	117.13	0.4	0	0.4	168.83	0.93	0	6	0.57	1.75	1.85	111.42	-0.07	69.87	7
8	69.97	0.42	-0.32	1.04	69.96	0.6	6	1.93	114.24	0.46	0	0.46	152.63	0.6	0	6	0.54	1.58	1.76	103.81	-0.05	85.97	7
9	144.32	0.84	-0.29	1.16	144.31	0.58	6	1.66	121.08	0.52	0	0.52	278.7	0.58	0	6	0.46	1.39	1.55	189.51	-0.04	110.78	7
10	132.2	0.94	-0.44	1.24	132.2	0.71	6	1.74	121.73	0.58	0	0.58	228.17	0.71	0	6	0.5	1.36	1.64	168.75	-0.05	93.84	7
11	127.4	0.84	-0.69	1.27	127.39	0.66	6	1.73	120.78	0.64	0	0.64	198.89	0.66	0	6	0.51	1.29	1.65	154.98	-0.08	95.84	7
12	134.71	0.84	-0.59	1.29	134.7	0.62	6	1.7	120.91	0.7	0	0.7	192.04	0.62	0	6	0.5	1.23	1.63	156.22	-0.06	99.3	7
13	171.47	1.04	-0.44	1.35	171.46	0.61	6	1.61	123.14	0.76	0	0.76	224.85	0.61	0	6	0.48	1.17	1.56	189.23	-0.04	107.25	7
14	179.61	1.67	-0.49	1.35	179.61	0.93	6	1.72	126.69	0.82	0	0.82	217.35	0.93	0	6	0.53	1.14	1.68	193.03	-0.04	81.08	7
15	163.95	1.36	-0.49	1.45	163.94	0.83	6	1.71	124.95	0.89	0	0.89	184.23	0.83	0	6	0.53	1.1	1.69	169.52	-0.04	85.03	7
16	166.98	1.25	-0.39	1.47	166.97	0.75	6	1.68	124.4	0.95	0	0.95	175.25	0.75	0	6	0.53	1.06	1.66	166.35	-0.03	90.18	7
17	182.23	1.57	-0.59	1.49	182.22	0.86	6	1.69	126.25	1.01	0	1.01	179.32	0.86	0	6	0.54	1.03	1.69	175.56	-0.04	83.68	7
18	198.52	2.19	-0.49	1.49	198.51	1.1	6	1.74	128.92	1.07	0	1.07	183.69	1.11	0	6	0.57	0.99	1.75	184.95	-0.03	70.78	7
19	241.75	4.28	-0.59	1.48	241.74	1.77	6	1.84	134.3	1.14	0	1.14	210.68	1.78	0	6	0.61	0.95	1.86	217.02	-0.04	49.76	7
20	296.99	7.94	-1.89	1.61	296.97	2.67	8	1.94	137.28	1.21	0	1.21	244.29	2.68	0	8	0.65	0.92	1.96	255.93	-0.11	35.14	7
21	361.11	8.15	-3.25	1.76	361.07	2.26	8	1.83	137.28	1.28	0	1.28	281.23	2.26	0	8	0.62	0.89	1.86	302.31	-0.18	41.4	7
22	256.06	5.01	-0.1	1.94	256.05	1.96	6	1.86	135.59	1.35	0	1.35	189.06	1.97	0	6	0.64	0.86	1.9	206.26	-0.01	45.44	7
23	452.38	3.76	0.04	1.89	452.38	0.83	6	1.42	134.87	1.41	0	1.41	318.82	0.83	0	6	0.47	0.87	1.45	371.8	0	100.49	7
24	360.8	4.59	0.39	2	360.8	1.27	6	1.62	135.79	1.48	0	1.48	242.39	1.28	0	6	0.56	0.83	1.67	281.36	0.02	67.79	7
25	339.7	5.22	0.2	2.18	339.7	1.54	6	1.7	136.58	1.55	0	1.55	218.06	1.54	0	6	0.6	0.8	1.77	254.48	0.01	57.13	7
26	368.73	4.8	-0.1	2.24	368.73	1.3	6	1.63	136.17	1.62	0	1.62	226.77	1.31	0	6	0.57	0.78	1.69	272.19	0	66.22	7
27	355.05	4.07	-0.12	2.28	355.05	1.15	6	1.59	134.87	1.69	0	1.69	209.54	1.15	0	6	0.56	0.77	1.66	256.82	-0.01	72.9	7
28	363.93	5.64	-0.1	2.38	363.93	1.55	6	1.69	137.28	1.75	0	1.75	206.39	1.56	0	6	0.61	0.74	1.77	251.68	0	56.66	7
29	363.82	5.64	-0.1	2.43	363.82	1.55	6	1.69	137.28	1.82	0	1.82	198.52	1.56	0	6	0.61	0.72	1.78	244.95	0	56.46	7
30	155.7	4.91	-0.3	2.47	155.7	3.15	5	2.16	134.22	1.89	0	1.89	81.35	3.19	0	5	0.81	0.62	2.29	90.67	-0.01	28.02	5
31	188.28	3.55	-0.39	2.47	188.28	1.89	6	1.93	132.32	1.96	0	1.96	95.21	1.91	0	5	0.73	0.64	2.06	112.46	-0.01	43.07	7
32	162.38	4.49	-0.63	2.47	162.38	2.77	5	2.1	133.68	2.02	0	2.02	79.24	2.8	0	5	0.8	0.59	2.25	89.96	-0.02	31.05	5
33	511.8	7.21	0.06	2.38	511.8	1.41	6	1.58	137.28	2.09	0	2.09	243.62	1.41	0	6	0.59	0.67	1.67	322.93	0	63.23	7
34	490.91	11.17	0.19	2.29	490.91	2.28	8	1.77	137.28	2.16	0	2.16	226.18	2.29	0	6	0.67	0.62	1.88	286.93	0.01	40.9	7
35	516.91	11.38	-0.2	2.35	516.91	2.2	8	1.75	137.28	2.23	0	2.23	230.84	2.21	0	6	0.66	0.61	1.86	296.89	-0.01	42.24	7
36	441.94	8.67	-0.3	2.37	441.93	1.96	8	1.73	137.28	2.3	0	2.3	191.29	1.97	0	6	0.67	0.6	1.86	247.73	-0.01	46.15	7
37	421.68	7	-0.47	2.43	421.67	1.66	6	1.68	137.28	2.37	0	2.37	177.15	1.67	0	6	0.65	0.59	1.81	234.2	-0.01	53	7
38	426.9	8.88	-0.49	2.51	426.89	2.08	8	1.76	137.28	2.44	0	2.44	174.29	2.09	0	6	0.69	0.56	1.9	225.67	-0.01	43.49	7
39	407.68	8.67	-0.58	2.61	407.68	2.13	8	1.78	137.28	2.5	0	2.5	161.81	2.14	0	6	0.7	0.55	1.93	208.8	-0.02	42.35	7
40	376.15	8.67	-0.52	2.67	376.14	2.3	8	1.83	137.28	2.57	0	2.57	145.2	2.32	0	5	0.73	0.52	1.99	184.53	-0.01	39.05	7
41	409.88	8.35	-0.59	2.71	409.87	2.04	8	1.77	137.28	2.64	0	2.64	154.17	2.05	0	6	0.71	0.52	1.93	201.26	-0.02	43.75	7
42	404.34	7.52	-0.79	2.77	404.33	1.86	6	1.73	137.28	2.71	0	2.71	148.19	1.87	0	6	0.7	0.52	1.9	196.02	-0.02	47.15	7
43	369.88	7.41	-0.79	2.87	369.87	2	6	1.78	137.28	2.78	0	2.78	132.11	2.02	0	6	0.73	0.49	1.96	171.55	-0.02	43.59	7
44	597.01	7.1	-0.88	3.01	597	1.19	6	1.48	137.28	2.85	0	2.85	208.67	1.2	0	6	0.6	0.55	1.63	308.66	-0.02	72.6	7
45	589.7	5.95	-0.74	3.19	589.69	1.01	6	1.42	137.28	2.92	0	2.92	201.23	1.01	0	6	0.59	0.55	1.57	305.72	-0.02	83.06	7
46	571.84	8.04	-0.69	3.33	571.83	1.41	6	1.55	137.28	2.98	0	2.98	190.59	1.41	0	6	0.64	0.51	1.71	275.56	-0.02	62.14	7
47	553.78	0	-0.79	3.44	553.77	0	0	0	87.36	3.03	0	3.03	181.86	0	0	0	1	0.35	4.06	181.86	-0.02	274.09	0

	CPT-2	In situ data									Basic output data												
Depth (ft)	qc (tsf)	fs (tsf)	u (psi)	Other	qt (tsf)	Rf(%)	SBT	Ic SBT	ã (pcf)	ó,v (tsf)	u0 (tsf)	ó',vo (tsf)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn
1	91.06	1.36	0	-0.23	91.06	1.49	5	2.07	123.51	0.06	0	0.06	1472.6	1.49	0	6	0.49	4.06	1.67	348.8	0	60.78	7
2	89.91	0.84	0	-0.41	89.91	0.93	6	1.95	119.93	0.12	0	0.12	737.19	0.93	0	6	0.47	2.79	1.62	236.37	0	84.98	7
3	75.19	0.63	0	-0.47	75.19	0.83	6	1.98	117.39	0.18	0	0.18	415.92	0.84	0	6	0.5	2.42	1.68	171.86	0	85.16	7
4	86.88	1.04	0	-0.76	86.88	1.2	6	2.03	121.48	0.24	0	0.24	359.34	1.21	0	6	0.54	2.22	1.78	181.69	0	66.33	7
5	194.03	1.67	0	-1.02	194.03	0.86	6	1.67	126.88	0.3	0	0.3	635.99	0.86	0	6	0.44	1.73	1.51	316.42	0	95.19	7
6	195.91	2.3	0	-1	195.91	1.17	6	1.76	129.23	0.37	0	0.37	529.54	1.17	0	6	0.48	1.67	1.62	307.75	0	73.62	7
7	167.81	2.19	0.06	-0.97	167.82	1.31	6	1.84	128.51	0.43	0	0.43	386.07	1.31	0	6	0.52	1.59	1.71	252.09	0.01	65.48	7
8	144.21	1.67	0	-0.98	144.21	1.16	6	1.85	126.15	0.5	0	0.5	289.48	1.16	0	6	0.53	1.5	1.73	203.35	0	69.63	7
9	153.19	1.46	-0.1	-0.96	153.19	0.95	6	1.78	125.32	0.56	0	0.56	272.97	0.96	0	6	0.51	1.39	1.68	200.3	-0.01	80.31	7
10	149.75	1.46	-0.2	-0.92	149.75	0.98	6	1.79	125.27	0.62	0	0.62	239.81	0.98	0	6	0.53	1.32	1.7	186.66	-0.02	77.73	7
11	167.81	1.67	-0.2	-0.96	167.81	1	6	1.76	126.52	0.69	0	0.69	243.93	1	0	6	0.53	1.26	1.69	198.59	-0.02	77.68	7
12	187.24	1.98	-0.1	-0.96	187.24	1.06	6	1.74	128.05	0.75	0	0.75	248.91	1.06	0	6	0.53	1.2	1.69	211.65	-0.01	75.09	7
13	223.37	2.72	-0.09	-0.98	223.37	1.22	6	1.74	130.77	0.81	0	0.81	273.27	1.22	0	6	0.54	1.15	1.7	242	-0.01	69	7
14	282.89	4.18	0	-0.96	282.89	1.48	6	1.74	134.5	0.88	0	0.88	319.84	1.48	0	6	0.54	1.1	1.71	294.36	0	60.15	7
15	261.17	4.39	0	-0.96	261.17	1.68	6	1.8	134.66	0.95	0	0.95	274.18	1.69	0	6	0.58	1.06	1.79	261.84	0	53.16	7
16	197.37	3.24	0	-0.98	197.37	1.64	6	1.87	131.76	1.02	0	1.02	193.45	1.65	0	6	0.61	1.03	1.87	190.33	0	52.2	7
17	241.33	3.03	-0.1	-0.96	241.33	1.25	6	1.72	131.76	1.08	0	1.08	222.26	1.26	0	6	0.56	0.99	1.73	224.35	-0.01	66.43	7
18	250.73	3.65	-0.2	-0.98	250.73	1.46	6	1.76	133.23	1.15	0	1.15	217.52	1.46	0	6	0.58	0.95	1.78	225	-0.01	58.82	7
19	257.41	4.39	-0.25	-1.02	257.41	1.7	6	1.81	134.63	1.21	0	1.21	210.91	1.71	0	6	0.61	0.92	1.84	222.66	-0.01	51.57	7
20	288.53	4.8	-0.29	-1	288.53	1.66	6	1.77	135.57	1.28	0	1.28	223.96	1.67	0	6	0.6	0.89	1.81	241.92	-0.02	53.08	7
21	289.68	5.74	-0.29	-0.98	289.68	1.98	6	1.84	136.89	1.35	0	1.35	213.41	1.99	0	6	0.63	0.86	1.88	233.66	-0.02	45.51	7
22	301.79	6.37	-0.29	-0.96	301.79	2.11	6	1.85	137.28	1.42	0	1.42	211.57	2.12	0	6	0.64	0.83	1.9	235.18	-0.01	43.11	7
23	369.57	8.15	-0.39	-0.9	369.56	2.2	8	1.82	137.28	1.49	0	1.49	247.33	2.21	0	6	0.63	0.81	1.87	280.36	-0.02	42.06	7
24	389.93	8.46	-0.49	-0.85	389.93	2.17	8	1.8	137.28	1.56	0	1.56	249.45	2.18	0	6	0.63	0.78	1.86	287.63	-0.02	42.74	7
25	402.57	8.88	-0.58	-0.84	402.56	2.2	8	1.8	137.28	1.63	0	1.63	246.64	2.21	0	6	0.64	0.76	1.86	288.3	-0.03	42.12	7
26	363.09	9.19	-0.72	-0.82	363.08	2.53	8	1.87	137.28	1.69	0	1.69	213.3	2.54	0	8	0.67	0.73	1.95	248.88	-0.03	36.83	7
27	418.54	8.77	-0.79	-0.78	418.53	2.1	8	1.77	137.28	1.76	0	1.76	236.41	2.1	0	6	0.64	0.72	1.85	284.5	-0.03	44.03	7
28	404.86	7	-0.85	-0.82	404.85	1.73	6	1.71	137.28	1.83	0	1.83	220.06	1.74	0	6	0.62	0.71	1.79	271.27	-0.03	52	7
29	384.81	6.06	-0.88	-0.81	384.8	1.57	6	1.68	137.28	1.9	0	1.9	201.52	1.58	0	6	0.62	0.7	1.78	252.23	-0.03	55.92	7
30	412.59	5.53	-0.88	-0.82	412.58	1.34	6	1.61	137.28	1.97	0	1.97	208.56	1.35	0	6	0.59	0.69	1.7	268.61	-0.03	64.48	7
31	433.69	6.68	-0.79	-0.88	433.68	1.54	6	1.65	137.28	2.04	0	2.04	211.85	1.55	0	6	0.61	0.67	1.75	273.1	-0.03	57.44	7
32	270.15	5.74	-1.21	-0.88	270.14	2.13	6	1.88	136.72	2.11	0	2.11	127.28	2.14	0	5	0.72	0.61	2.01	154.77	-0.04	41.02	7
33	145.57	3.86	-0.42	-0.82	145.57	2.65	5	2.12	132.31	2.17	0	2.17	66.02	2.69	0	5	0.83	0.55	2.3	74.74	-0.01	31.22	5
34	373.01	4.07	-1.09	-0.73	373	1.09	6	1.56	134.99	2.24	0	2.24	165.56	1.1	0	6	0.6	0.64	1.69	223.69	-0.04	74.02	7
35	383.46	5.12	-0.59	-0.67	383.45	1.33	6	1.62	136.73	2.31	0	2.31	165.15	1.34	0	6	0.63	0.61	1.76	220.65	-0.02	62.98	7
36	421.36	4.49	-0.39	-0.67	421.36	1.07	6	1.52	136	2.38	0	2.38	176.35	1.07	0	6	0.59	0.62	1.65	245.3	-0.01	76.69	7
37	412.38	4.8	-0.29	-0.67	412.38	1.16	6	1.56	136.44	2.44	0	2.44	167.72	1.17	0	6	0.61	0.6	1.7	232.01	-0.01	70.79	7
38	474.1	5.85	-0.29	-0.69	474.1	1.23	6	1.55	137.28	2.51	0	2.51	187.69	1.24	0	6	0.61	0.59	1.68	263.06	-0.01	68.92	7
39	449.45	6.37	-0.39	-0.69	449.45	1.42	6	1.61	137.28	2.58	0	2.58	173.12	1.43	0	6	0.64	0.56	1.76	238.43	-0.01	60.61	7
40	423.77	6.37	-0.59	-0.73	423.76	1.5	6	1.64	137.28	2.65	0	2.65	158.91	1.51	0	6	0.66	0.54	1.8	216.76	-0.02	56.99	7
41	444.34	6.89	-0.79	-0.69	444.33	1.55	6	1.65	137.28	2.72	0	2.72	162.44	1.56	0	6	0.67	0.53	1.8	222.53	-0.02	55.72	7
42	428.67	7.94	-0.98	-0.65	428.66	1.85	6	1.72	137.28	2.79	0	2.79	152.79	1.86	0	6	0.7	0.51	1.89	203.99	-0.03	47.54	7
43	429.61	7.73	-0.98	-0.62	429.6	1.8	6	1.71	137.28	2.86	0	2.86	149.43	1.81	0	6	0.7	0.5	1.88	200.73	-0.02	48.61	7
44	418.34	6.47	-1.18	-0.57	418.32	1.55	6	1.66	137.28	2.92	0	2.92	142.04	1.56	0	6	0.69	0.5	1.84	194.66	-0.03	54.81	7
45	525.48	8.46	-1.38	-0.57	525.46	1.61	6	1.62	137.28	2.99	0	2.99	174.56	1.62	0	6	0.67	0.5	1.79	244.85	-0.03	54.64	7
46	500.42	10.23	-1.28	-0.61	500.4	2.05	8	1.72	137.28	3.06	0	3.06	162.43	2.06	0	6	0.72	0.46	1.91	218.53	-0.03	43.98	7
47	500.31	8.25	-1.36	-0.52	500.29	1.65	6	1.64	137.28	3.13	0	3.13	158.81	1.66	0	6	0.69	0.47	1.83	221.19	-0.03	52.9	7
48	538.95	7.52	-1.33	-0.51	538.93	1.4	6	1.56	137.28	3.2	0	3.2	167.47	1.4	0	6	0.67	0.48	1.75	242.11	-0.03	61.52	7
49	720.76	0	-1.23	-0.49	720.74	0	0	0	87.36	3.24	0	3.24	221.27	0	0	0	1	0.33	4.06	221.27	-0.03	330.38	0

	CPT-3	In situ data										Basic output data											
Depth (ft)	qc (tsf)	fs (tsf)	u (psi)	Other	qt (tsf)	Rf(%)	SBT	Ic SBT	ã (pcf)	ó,v (tsf)	u0 (tsf)	ó',vo (tsf)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn
1	72.16	0.73	-0.1	-0.32	72.16	1.01	6	2.04	118.41	0.06	0	0.06	1216.9	1.01	0	6	0.47	3.84	1.62	261.67	-0.12	81.02	7
2	94.82	0.84	-0.2	-0.49	94.82	0.88	6	1.91	120.06	0.12	0	0.12	793.69	0.88	0	6	0.46	2.75	1.59	245.83	-0.12	89.18	7
3	72.37	0.73	-0.2	-0.53	72.37	1.01	6	2.04	118.42	0.18	0	0.18	404.71	1.01	0	6	0.52	2.53	1.74	172.71	-0.08	74.61	7
4	60.57	0.52	-0.2	-0.55	60.57	0.86	5	2.07	115.53	0.24	0	0.24	255.45	0.87	0	6	0.54	2.26	1.79	128.61	-0.06	76.45	7
5	96.6	0.73	-0.29	-0.55	96.59	0.76	6	1.87	119.13	0.3	0	0.3	325.57	0.76	0	6	0.5	1.88	1.66	171.05	-0.07	90.59	7
6	142.75	1.25	-0.27	-0.59	142.75	0.88	6	1.77	124.02	0.36	0	0.36	397.93	0.88	0	6	0.48	1.68	1.61	226.48	-0.05	87.81	7
7	181.29	1.57	-0.2	-0.59	181.28	0.86	6	1.69	126.24	0.42	0	0.42	429.62	0.87	0	6	0.47	1.54	1.56	262.39	-0.03	91.64	7
8	183.37	1.57	-0.2	-0.57	183.37	0.85	6	1.69	126.27	0.48	0	0.48	377.9	0.86	0	6	0.47	1.45	1.57	250.08	-0.03	91.52	7
9	194.55	1.98	-0.2	-0.55	194.55	1.02	6	1.72	128.14	0.55	0	0.55	353.97	1.02	0	6	0.5	1.39	1.63	254.01	-0.03	80.05	7
10	206.03	2.51	-0.2	-0.51	206.03	1.22	6	1.76	129.99	0.61	0	0.61	335.05	1.22	0	6	0.52	1.33	1.68	257.78	-0.02	69.64	7
11	277.78	3.34	-0.15	-0.41	277.77	1.2	6	1.67	132.82	0.68	0	0.68	407.76	1.21	0	6	0.5	1.25	1.61	326.39	-0.02	72.56	7
12	237.05	4.59	-1.18	-0.36	237.04	1.94	6	1.88	134.77	0.75	0	0.75	316.32	1.94	0	6	0.58	1.22	1.83	273.48	-0.11	47.11	7
13	225.25	4.49	-2.34	-0.35	225.22	1.99	6	1.9	134.47	0.81	0	0.81	275.67	2	0	6	0.6	1.17	1.86	248.11	-0.21	45.56	7
14	247.91	4.18	-0.96	-0.31	247.9	1.69	6	1.82	134.18	0.88	0	0.88	280.33	1.69	0	6	0.57	1.11	1.79	259.34	-0.08	52.96	7
15	263.37	5.22	-1.25	-0.22	263.35	1.98	6	1.86	135.96	0.95	0	0.95	276.44	1.99	0	6	0.6	1.07	1.84	264.63	-0.09	46.03	7
16	296.36	4.7	-0.66	-0.18	296.36	1.59	6	1.75	135.48	1.02	0	1.02	290.41	1.59	0	6	0.56	1.02	1.75	285.43	-0.05	56.36	7
17	248.22	2.82	-0.39	-0.1	248.22	1.14	6	1.68	131.31	1.08	0	1.08	228.26	1.14	0	6	0.55	0.99	1.69	230.66	-0.03	72.24	7
18	243.52	2.51	-0.39	-0.04	243.52	1.03	6	1.66	130.4	1.15	0	1.15	211.18	1.03	0	6	0.54	0.96	1.67	219.19	-0.02	77.26	7
19	274.85	2.72	-0.34	-0.02	274.85	0.99	6	1.61	131.28	1.21	0	1.21	225.51	0.99	0	6	0.53	0.93	1.63	240.52	-0.02	81.17	7
20	245.72	2.92	-0.29	0.02	245.71	1.19	6	1.7	131.55	1.28	0	1.28	191.08	1.2	0	6	0.57	0.9	1.74	207.24	-0.02	68.34	7
21	303.47	3.76	-0.29	0.06	303.46	1.24	6	1.66	133.9	1.35	0	1.35	224.42	1.24	0	6	0.56	0.87	1.7	249.49	-0.02	68.21	7
22	319.76	4.8	-0.2	0.08	319.75	1.5	6	1.71	135.82	1.41	0	1.41	225.11	1.51	0	6	0.59	0.84	1.76	253.77	-0.01	58.24	7
23	303.88	5.53	-0.2	0.12	303.88	1.82	6	1.79	136.73	1.48	0	1.48	204	1.83	0	6	0.62	0.81	1.85	231.52	-0.01	48.92	7
24	411.55	6.89	-0.29	0.16	411.54	1.67	6	1.69	137.28	1.55	0	1.55	264.34	1.68	0	6	0.59	0.8	1.75	309.38	-0.01	54.12	7
25	462.82	7.62	-0.29	0.18	462.82	1.65	6	1.66	137.28	1.62	0	1.62	284.74	1.65	0	6	0.58	0.78	1.72	340.38	-0.01	55.39	7
26	386.69	8.56	-0.39	0.2	386.69	2.21	8	1.81	137.28	1.69	0	1.69	228.03	2.22	0	6	0.65	0.74	1.88	268.99	-0.02	41.75	7
27	405.18	8.88	-1.46	0.24	405.16	2.19	8	1.8	137.28	1.76	0	1.76	229.59	2.2	0	6	0.65	0.72	1.87	274.69	-0.06	42.21	7
28	371.87	7.83	-0.69	0.33	371.86	2.11	6	1.8	137.28	1.83	0	1.83	202.7	2.12	0	6	0.66	0.7	1.89	244.66	-0.03	43.32	7
29	468.67	8.88	-0.69	0.39	468.66	1.89	6	1.71	137.28	1.89	0	1.89	246.42	1.9	0	6	0.62	0.7	1.79	306.99	-0.03	48.48	7
30	534.46	10.23	-0.78	0.51	534.45	1.91	8	1.69	137.28	1.96	0	1.96	271.27	1.92	0	6	0.62	0.68	1.77	343.66	-0.03	48.41	7
31	394.42	10.96	-0.83	0.61	394.41	2.78	8	1.89	137.28	2.03	0	2.03	193.14	2.79	0	8	0.71	0.63	2	233.82	-0.03	33.7	7
32	515.66	9.19	-0.98	0.55	515.65	1.78	6	1.67	137.28	2.1	0	2.1	244.51	1.79	0	6	0.62	0.65	1.76	317.07	-0.03	51.32	7
33	412.49	7.73	-1.72	0.51	412.47	1.87	6	1.73	137.28	2.17	0	2.17	189.19	1.88	0	6	0.66	0.62	1.85	242.06	-0.06	47.93	7
34	257.73	4.91	-1.55	0.51	257.71	1.9	6	1.85	135.45	2.24	0	2.24	114.23	1.92	0	5	0.72	0.58	2	141.04	-0.05	44.3	7
35	220.76	2.82	1.35	0.49	220.78	1.28	6	1.76	131.02	2.3	0	2.3	94.9	1.29	0	6	0.69	0.58	1.92	120.59	0.04	57.88	7
36	455.62	4.49	-0.69	0.51	455.61	0.99	6	1.47	136.19	2.37	0	2.37	191.22	0.99	0	6	0.57	0.63	1.6	270.17	-0.02	82.97	7
37	440.58	5.64	-0.33	0.57	440.57	1.28	6	1.58	137.28	2.44	0	2.44	179.65	1.29	0	6	0.62	0.6	1.71	247.28	-0.01	66.26	7
38	481.1	7.31	-0.29	0.61	481.09	1.52	6	1.62	137.28	2.51	0	2.51	190.87	1.53	0	6	0.64	0.58	1.76	260.97	-0.01	57.82	7
39	535.5	10.23	-0.29	0.67	535.5	1.91	8	1.69	137.28	2.58	0	2.58	206.88	1.92	0	6	0.67	0.55	1.82	278.68	-0.01	47.7	7
40	594.92	11.17	-0.61	0.69	594.91	1.88	8	1.66	137.28	2.64	0	2.64	223.94	1.89	0	6	0.66	0.55	1.79	306.57	-0.02	48.83	7
41	646.3	10.96	-1.08	0.69	646.29	1.7	8	1.6	137.28	2.71	0	2.71	237.18	1.7	0	6	0.64	0.55	1.73	333.29	-0.03	53.82	7
42	560.57	11.7	-1.37	0.71	560.55	2.09	8	1.71	137.28	2.78	0	2.78	200.48	2.1	0	6	0.69	0.51	1.86	270.63	-0.04	44.02	7
43	482.45	8.88	-1.52	0.72	482.44	1.84	6	1.69	137.28	2.85	0	2.85	168.24	1.85	0	6	0.69	0.5	1.86	228.19	-0.04	48.38	7
44	473.37	8.46	-1.53	0.73	473.35	1.79	6	1.68	137.28	2.92	0	2.92	161.15	1.8	0	6	0.7	0.49	1.86	219.43	-0.04	49.39	7
45	400.58	8.35	-1.37	0.71	400.57	2.09	8	1.78	137.28	2.99	0	2.99	133.06	2.1	0	6	0.74	0.46	1.97	173.72	-0.03	42.23	7
46	499.58	8.77	-1.31	0.73	499.56	1.76	6	1.67	137.28	3.06	0	3.06	162.44	1.77	0	6	0.7	0.48	1.85	223.76	-0.03	50.24	7
47	526.31	9.29	-1.28	0.78	526.3	1.77	6	1.66	137.28	3.13	0	3.13	167.4	1.78	0	6	0.7	0.47	1.84	232.06	-0.03	50.19	7
48	505.11	8.15	-1.1	0.73	505.1	1.61	6	1.63	137.28	3.19	0	3.19	157.15	1.62	0	6	0.7	0.46	1.82	220.06	-0.02	53.86	7
49	647.55	5.95	-1.18	0.59	647.54	0.92	6	1.37	137.28	3.26	0	3.26	197.48	0.92	0	6	0.59	0.52	1.53	313.59	-0.03	89.96	7
50	577.9	5.85	-1.35	0.57	577.88	1.01	6	1.43	137.28	3.33	0	3.33	172.48	1.02	0	6	0.62	0.49	1.61	265.97	-0.03	81	7
51	621.97	0	-1.29	0.47	621.95	0	0	0	87.36	3.37	0	3.37	183.29	0	0	0	1	0.31	4.06	183.29	-0.03	276.13	0

	CPT-4	In situ data									Basic output data												
Depth (ft)	qc (tsf)	fs (tsf)	u (psi)	Other	qt (tsf)	Rf(%)	SBT	Ic SBT	ã (pcf)	ó,v (tsf)	u0 (tsf)	ó',vo (tsf)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn
1	58.37	0.52	0	0.16	58.37	0.89	5	2.09	115.44	0.06	0	0.06	1009.7	0.9	0	6	0.47	3.94	1.63	217.13	0	85.9	7
2	60.36	0.31	0.1	0.16	60.36	0.52	6	1.95	111.78	0.11	0	0.11	529.96	0.52	0	6	0.46	2.76	1.58	157.42	0.06	110.25	7
3	49.92	1.25	0.1	0.14	49.92	2.51	5	2.42	121.46	0.17	0	0.17	285.47	2.52	0	5	0.65	3.22	2.07	151.32	0.04	35.75	7
4	196.22	2.19	0.1	0.06	196.22	1.12	6	1.75	128.89	0.24	0	0.24	820.89	1.12	0	6	0.46	1.97	1.56	365.13	0.03	78.39	7
5	199.35	1.88	0.3	-0.14	199.36	0.94	6	1.69	127.8	0.3	0	0.3	657.62	0.94	0	6	0.45	1.75	1.53	328.56	0.07	89.03	7
6	259.4	3.55	0.2	-0.14	259.4	1.37	6	1.73	133.1	0.37	0	0.37	701.45	1.37	0	6	0.48	1.66	1.61	405.55	0.04	66.39	7
7	270.57	3.86	0.3	-0.14	270.57	1.43	6	1.74	133.82	0.44	0	0.44	619.25	1.43	0	6	0.49	1.55	1.63	394.54	0.05	63.78	7
8	297.3	4.28	0.39	-0.16	297.31	1.44	6	1.72	134.8	0.5	0	0.5	589.53	1.44	0	6	0.49	1.44	1.63	404.69	0.06	63.43	7
9	309.73	4.91	0.39	-0.14	309.74	1.58	6	1.74	135.9	0.57	0	0.57	541.02	1.59	0	6	0.51	1.37	1.66	400.33	0.05	58.16	7
10	306.7	5.33	0.3	-0.1	306.71	1.74	6	1.77	136.47	0.64	0	0.64	478.43	1.74	0	6	0.53	1.31	1.71	378.11	0.03	53.32	7
11	292.5	4.7	0.2	-0.1	292.5	1.61	6	1.76	135.44	0.71	0	0.71	412.43	1.61	0	6	0.53	1.24	1.71	341.85	0.02	56.7	7
12	289.68	5.95	0.1	-0.1	289.68	2.05	6	1.85	137.15	0.78	0	0.78	372.24	2.06	0	6	0.58	1.2	1.81	326.34	0.01	45.31	7
13	347.43	8.35	0	-0.1	347.43	2.4	8	1.86	137.28	0.84	0	0.84	410.36	2.41	0	8	0.59	1.14	1.84	374.11	0	39.53	7
14	347.01	9.4	-0.1	-0.1	347.01	2.71	8	1.91	137.28	0.91	0	0.91	378.97	2.72	0	8	0.61	1.09	1.89	358.01	-0.01	35.31	7
15	324.66	8.88	0	-0.14	324.66	2.73	8	1.93	137.28	0.98	0	0.98	329.63	2.74	0	8	0.63	1.05	1.92	320.58	0	34.83	7
16	318.71	7.21	-0.2	-0.16	318.71	2.26	6	1.86	137.28	1.05	0	1.05	302.35	2.27	0	8	0.61	1	1.86	301.51	-0.01	41.32	7
17	269	6.06	-0.2	-0.2	269	2.25	6	1.9	137.1	1.12	0	1.12	239.35	2.26	0	6	0.63	0.97	1.91	244.36	-0.01	40.86	7
18	224.94	5.74	-0.29	-0.18	224.93	2.55	5	1.99	136.27	1.19	0	1.19	188.47	2.57	0	5	0.67	0.93	2.01	195.71	-0.02	35.94	7
19	289.68	6.16	-0.41	-1.56	289.68	2.13	6	1.86	137.28	1.26	0	1.26	229.66	2.14	0	6	0.63	0.9	1.89	244.71	-0.02	42.97	7
20	258.46	4.28	-0.5	-2.84	258.45	1.66	6	1.8	134.46	1.32	0	1.32	194.33	1.67	0	6	0.61	0.87	1.84	211.85	-0.03	52.48	7
21	237.05	4.91	-0.59	-2.9	237.04	2.07	6	1.9	135.25	1.39	0	1.39	169.43	2.08	0	6	0.66	0.83	1.95	185.96	-0.03	42.85	7
22	258.67	5.85	-0.42	-2.83	258.66	2.26	6	1.91	136.74	1.46	0	1.46	176.26	2.27	0	6	0.67	0.81	1.97	196.06	-0.02	39.95	7
23	310.98	6.68	-0.39	-2.79	310.98	2.15	6	1.85	137.28	1.53	0	1.53	202.56	2.16	0	6	0.65	0.79	1.91	230.4	-0.02	42.35	7
24	293.65	6.89	-0.29	-2.79	293.65	2.35	0	1.89	137.28	1.6	0	1.6	182.95	2.36	0	6	0.67	0.76	1.96	209.2	-0.01	38.89	7
25	321.64	7.1	-0.29	-2.79	321.63	2.21	6	1.85	137.28	1.67	0	1.67	192.17	2.22	0	6	0.66	0.74	1.93	223.96	-0.01	41.26	7
26	285.09	5.74	-0.39	-2.86	285.08	2.01	6	1.84	136.85	1.73	0	1.73	163.45	2.03	0	6	0.67	0.72	1.93	192.52	-0.02	44	7
27	298.87	7	-0.49	-2.93	298.86	2.34	8	1.89	137.28	1.8	0	1.8	164.83	2.36	0	5	0.69	0.69	1.98	194.36	-0.02	38.72	7
28	359.23	8.98	-0.59	-3.05	359.22	2.5	8	1.87	137.28	1.87	0	1.87	191.03	2.51	0	5	0.69	0.68	1.96	228.32	-0.02	37.02	7
29	417.08	8.46	-0.69	-3.12	417.07	2.03	8	1.76	137.28	1.94	0	1.94	214.06	2.04	0	6	0.65	0.68	1.85	264.99	-0.03	45.09	7
30	467.31	7.1	-0.79	-3.22	467.3	1.52	6	1.63	137.28	2.01	0	2.01	231.72	1.53	0	6	0.6	0.68	1.72	299.36	-0.03	58.72	7
31	481.83	8.46	-0.88	-3.34	481.82	1.76	6	1.67	137.28	2.08	0	2.08	231.01	1.76	0	6	0.62	0.66	1.77	297.75	-0.03	51.72	7
32	531.33	10.23	-1.04	-3.42	531.31	1.93	8	1.69	137.28	2.15	0	2.15	246.65	1.93	0	6	0.63	0.64	1.79	319.67	-0.04	47.9	7
33	476.61	13.37	-1.1	-3.49	476.59	2.8	8	1.86	137.28	2.21	0	2.21	214.28	2.82	0	8	0.71	0.59	1.97	266.39	-0.04	33.68	7
34	553.88	9.71	-1.24	-3.55	553.87	1.75	6	1.65	137.28	2.28	0	2.28	241.65	1.76	0	6	0.63	0.62	1.75	322.17	-0.04	52.13	7
35	602.34	7.1	-0.84	-3.6	602.33	1.18	6	1.48	137.28	2.35	0	2.35	255.17	1.18	0	6	0.56	0.64	1.58	361.37	-0.03	74.62	7
36	527.15	7	-0.64	-3.65	527.14	1.33	6	1.55	137.28	2.42	0	2.42	216.83	1.33	0	6	0.6	0.61	1.67	301.64	-0.02	66	7
37	520.36	8.77	-0.69	-3.76	520.35	1.69	6	1.64	137.28	2.49	0	2.49	208.09	1.69	0	6	0.64	0.58	1.77	282.48	-0.02	53.33	7
38	576.23	12.32	-0.68	-3.84	576.22	2.14	8	1.72	137.28	2.56	0	2.56	224.34	2.15	0	6	0.67	0.55	1.84	299.34	-0.02	43.39	7
39	626.88	0	-0.76	-3.95	626.87	0	0	0	87.36	2.6	0	2.6	240.03	0	0	0	1	0.41	4.06	240.03	-0.02	357.19	0

	CPT-5	In situ data										Basic output data											
Depth (ft)	qc (tsf)	fs (tsf)	u (psi)	Other	qt (tsf)	Rf(%)	SBT	Ic SBT	ã (pcf)	ó,v (tsf)	u0 (tsf)	ó',vo (tsf)	Qt1	Fr (%)	Bq	SBTn	n	Cn	Ic	Qtn	U2	I(B)	Mod. SBTn
1	97.95	0.42	0	0.27	97.95	0.43	6	1.73	115.07	0.06	0	0.06	1700.4	0.43	0	6	0.37	2.91	1.34	268.86	0	150.96	7
2	43.23	0.21	0	0.2	43.23	0.48	6	2.07	108	0.11	0	0.11	386.37	0.48	0	6	0.48	2.97	1.66	121.14	0	101.92	7
3	36.65	0.21	-0.03	0.2	36.65	0.57	5	2.16	107.6	0.17	0	0.17	220.79	0.57	0	6	0.54	2.73	1.79	94.19	-0.01	84.08	7
4	62.66	0.42	0	0.22	62.66	0.67	6	1.99	113.98	0.22	0	0.22	280.87	0.67	0	6	0.51	2.22	1.71	131.28	0	89.51	7
5	263.78	1.78	-0.1	0.14	263.78	0.67	6	1.5	128.07	0.29	0	0.29	920.14	0.67	0	6	0.38	1.64	1.35	409.17	-0.02	121.26	7
6	252.09	3.13	0	0.1	252.09	1.24	6	1.71	132.11	0.35	0	0.35	714.21	1.24	0	6	0.47	1.67	1.58	397.52	0	72.16	7
7	231.31	3.03	0.1	0.15	231.31	1.31	6	1.75	131.66	0.42	0	0.42	551.92	1.31	0	6	0.49	1.58	1.63	344.12	0.02	67.92	7
8	237.36	2.82	0.2	0.14	237.37	1.19	6	1.71	131.2	0.48	0	0.48	489.67	1.19	0	6	0.49	1.46	1.61	327.44	0.03	73.4	7
9	233.92	3.13	0.2	0.16	233.92	1.34	6	1.76	131.93	0.55	0	0.55	424.49	1.34	0	6	0.51	1.4	1.67	308.2	0.03	65.78	7
10	242.79	2.82	0.1	0.16	242.79	1.16	6	1.7	131.25	0.62	0	0.62	393.51	1.16	0	6	0.5	1.31	1.62	299.8	0.01	73.93	7
11	293.54	3.13	0.05	0.16	293.55	1.07	6	1.62	132.49	0.68	0	0.68	429.59	1.07	0	6	0.48	1.23	1.56	341.37	0.01	80.74	7
12	335.52	4.07	0	0.18	335.52	1.21	6	1.62	134.73	0.75	0	0.75	446.88	1.22	0	6	0.49	1.18	1.58	374.55	0	73.16	7
13	342.52	5.95	-0.1	0.2	342.52	1.74	6	1.75	137.28	0.82	0	0.82	417.94	1.74	0	6	0.54	1.15	1.72	371.42	-0.01	53.2	7
14	401.31	9.71	-0.29	0.12	401.31	2.42	8	1.83	137.28	0.89	0	0.89	451.8	2.43	0	8	0.58	1.11	1.81	419.65	-0.02	39.5	7
15	440.16	12.32	-0.29	0.08	440.16	2.8	8	1.87	137.28	0.95	0	0.95	459.91	2.81	0	8	0.6	1.06	1.86	441.62	-0.02	34.5	7
16	482.66	11.7	-0.47	0.13	482.66	2.42	8	1.8	137.28	1.02	0	1.02	470.51	2.43	0	8	0.58	1.02	1.8	464.04	-0.03	39.61	7
17	499.16	11.9	-0.55	0.18	499.16	2.38	8	1.78	137.28	1.09	0	1.09	455.96	2.39	0	8	0.58	0.98	1.79	462.05	-0.04	40.2	7
18	520.15	11.59	-0.59	0.25	520.14	2.23	8	1.75	137.28	1.16	0	1.16	447.09	2.23	0	8	0.58	0.95	1.76	464.99	-0.04	42.85	7
19	463.34	12.32	-0.77	0.34	463.33	2.66	8	1.84	137.28	1.23	0	1.23	375.85	2.67	0	8	0.62	0.91	1.86	398.07	-0.05	36.06	7
20	510.54	12.74	-0.8	0.45	510.53	2.5	8	1.8	137.28	1.3	0	1.3	392.27	2.5	0	8	0.61	0.88	1.82	425.15	-0.04	38.39	7
21	527.78	12.64	-0.88	0.53	527.76	2.39	8	1.78	137.28	1.37	0	1.37	385.12	2.4	0	8	0.6	0.86	1.81	426.28	-0.05	39.91	7
22	494.67	10.44	-1.05	0.59	494.66	2.11	8	1.74	137.28	1.44	0	1.44	343.58	2.12	0	8	0.6	0.83	1.78	388.69	-0.05	44.65	7
23	497.7	9.92	-1.16	0.59	497.69	1.99	8	1.72	137.28	1.5	0	1.5	329.91	2	0	6	0.59	0.81	1.76	380.76	-0.06	47.01	7
24	542.6	10.55	-1.27	0.55	542.59	1.94	8	1.69	137.28	1.57	0	1.57	344.01	1.95	0	6	0.59	0.79	1.74	405.21	-0.06	48.28	7
25	302.42	0	-0.2	-2.47	302.42	0	0	0	87.36	1.62	0	1.62	186.1	0	0	0	1	0.65	4.06	186.1	-0.01	280.14	0

Presented below is a list of formulas used for the estimation of various soil properties. The formulas are presented in SI unit system and assume that all components are expressed in the same units.

:: Unit Weight, g (kN/m^3) ::

$$g = g_w \cdot \left(0.27 \cdot \log(R_f) + 0.36 \cdot \log(\frac{q_t}{p_a}) + 1.236 \right)$$

where g_w = water unit weight

:: Permeability, k (m/s) ::

$I_c < 3.27$ and $I_c > 1.00$ then $k = 10^{0.952-3.04 \cdot I_c}$

$I_c \leq 4.00$ and $I_c > 3.27$ then $k = 10^{-4.52-1.37 \cdot I_c}$

:: N$_{SPT}$ (blows per 30 cm) ::

$$N_{60} = \left(\frac{q_c}{P_a}\right) \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

$$N_{1(60)} = Q_{tn} \cdot \frac{1}{10^{1.1268-0.2817 \cdot I_c}}$$

:: Young's Modulus, Es (MPa) ::

$$(q_t - \sigma_v) \cdot 0.015 \cdot 10^{0.55 \cdot I_c + 1.68}$$

(applicable only to $I_c < I_{c\_cutoff}$)

:: Relative Density, Dr (%) ::

$$100 \cdot \sqrt{\frac{Q_{tn}}{k_{DR}}}$$

(applicable only to SBT$_n$: 5, 6, 7 and 8 or $I_c < I_{c\_cutoff}$)

:: State Parameter, ψ ::

$$\psi = 0.56 - 0.33 \cdot \log(Q_{tn,cs})$$

:: Peak drained friction angle, φ (°) ::

$$\varphi = 17.60 + 11 \cdot \log(Q_{tn})$$

(applicable only to SBT$_n$: 5, 6, 7 and 8)

:: 1-D constrained modulus, M (MPa) ::

If $I_c > 2.20$

$a = 14$ for $Q_{tn} > 14$

$a = Q_{tn}$ for $Q_{tn} \leq 14$

$M_{CPT} = a \cdot (q_t - \sigma_v)$

If $I_c \leq 2.20$

$M_{CPT} = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$

:: Small strain shear Modulus, Go (MPa) ::

$$G_0 = (q_t - \sigma_v) \cdot 0.0188 \cdot 10^{0.55 \cdot I_c + 1.68}$$

:: Shear Wave Velocity, Vs (m/s) ::

$$V_s = \left(\frac{G_0}{\rho}\right)^{0.50}$$

:: Undrained peak shear strength, Su (kPa) ::

$N_{kt} = 10.50 + 7 \cdot \log(F_r)$ or user defined

$$S_u = \frac{(q_t - \sigma_v)}{N_{kt}}$$

(applicable only to SBT$_n$: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Remolded undrained shear strength, Su(rem) (kPa) ::

$S_{u(rem)} = f_s$ (applicable only to SBT$_n$: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Overconsolidation Ratio, OCR ::

$$k_{OCR} = \left[\frac{Q_{tn}^{0.20}}{0.25 \cdot (10.50 \cdot + 7 \cdot \log(F_r))} \right]^{1.25}$$ or user defined

$$OCR = k_{OCR} \cdot Q_{tn}$$

(applicable only to SBT$_n$: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: In situ Stress Ratio, Ko ::

$$K_O = (1 - \sin\varphi') \cdot OCR^{\sin\varphi'}$$

(applicable only to SBT$_n$: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Soil Sensitivity, S$_t$ ::

$$S_t = \frac{N_S}{F_r}$$

(applicable only to SBT$_n$: 1, 2, 3, 4 and 9 or $I_c > I_{c\_cutoff}$)

:: Effective Stress Friction Angle, φ' (°) ::

$$\varphi' = 29.5° \cdot B_q^{0.121} \cdot (0.256 + 0.336 \cdot B_q + \log Q_t)$$

(applicable for $0.10 < B_q < 1.00$)

References

- Robertson, P.K., Cabal K.L., Guide to Cone Penetration Testing for Geotechnical Engineering, Gregg Drilling & Testing, Inc., 5th Edition, November 2012
- Robertson, P.K., Interpretation of Cone Penetration Tests - a unified approach., Can. Geotech. J. 46(11): 1337–1355 (2009)

APPENDIX B

Laboratory Test Results

APPENDIX B - GEOTECHNICAL LABORATORY TESTING

Our geotechnical laboratory testing program was directed toward a quantitative and qualitative evaluation of physical and mechanical properties of soils underlying this campus at proposed improvements, and to aid in verifying soil classification. This geotechnical testing was performed at our Irvine laboratory (DSA LEA 63).

Percent Fines (Percentage Passing Sieve No. 200 Sieve): Selected soil samples were wet-wash sieved through a No. 200 U.S. Standard brass sieve in accordance with ASTM Test Methods D 1140 to measure percent fines (silts and clays). This data was used to refine the Unified Soil Classification for tested soil samples. Test results are presented in this appendix and on logs in Appendix A.

Modified Proctor Compaction Curve: Laboratory modified Proctor compaction curves (ASTM D 1557) were established for bulk soil-samples to determine sample-specific modified Proctor laboratory maximum dry density and optimum moisture content. Results of these tests are presented on the following "*Modified Proctor Compaction Test*" sheets in this appendix.

Sieve Analysis (SA): Selected composite soil samples were tested for grain size distribution in accordance with ASTM Test Methods D 6913 to measure grain size. This data was used to refine the Unified Soil Classification for tested soil samples. Test results are presented in this appendix and on logs in Appendix A.

Direct Shear Tests: Direct shear tests were performed, in general accordance with ASTM Test Method D 3080, on remolded soil samples remolded to 90% of the ASTM D 1557 laboratory maximum density. Remolded specimens were soaked for a minimum of 24 hours under a surcharge equal to the applied normal force during testing. After transfer of the sample to the shear box, and reloading the sample, pore pressures set up in the sample due to the transfer were allowed to dissipate for a period of approximately 1 hour prior to application of shearing force. These specimens were tested under various normal loads with a motor-driven, strain-controlled, direct-shear testing apparatus at a strain rate of 0.05 inches per minute (depending upon the soil type). Test results are presented on the *Direct Shear Test Results* sheets which follow in this appendix.

Swell Potential or Settlement (CN): Selected composite soil samples were tested for wetting-induced swell/collapse strains to develop estimates of heave or settlement of a confined soil profile in accordance with ASTM D 4546. The load-induced strains after wetting are used to estimate stress-induced settlement following wetting-induced heave or settlement. Test results are presented in this appendix and on logs in Appendix A.

Consolidation: Consolidation tests on relatively undisturbed drive samples from our borings were performed in accordance with ASTM D 2435. Results are included in this appendix on the *One-Dimensional Consolidation Properties of Soils* sheets.

Corrosivity Tests: To evaluate corrosion potential of subsurface soils at the site, we tested a bulk sample collected during our subsurface exploration for pH, electrical resistivity (CTM 532/643), soluble sulfate content (CTM 417 Part II) and soluble chloride content (CTM 422) testing. Results of these tests are enclosed at the end of this appendix.

R-Value Tests: Selected samples were tested in accordance with DOT CA Test 301. The R-Value test measures the response of a compacted sample of soil or aggregate to a vertically applied pressure under specific conditions. This test is used by Caltrans for pavement design, replacing the California bearing ratio test. The R-value of a material is determined when the material is in a state of saturation such that water will be exuded from the compacted test specimen when a 16.8 kN load (2.07 MPa) is applied to test a series of specimens prepared at different moisture contents. R-Value is used in pavement design, with the thickness of each layer dependent on the R-value of the layer below and the expected level of traffic loading, expressed as a Traffic Index. Results of these tests are enclosed at the end of this appendix.

Expansion Tests: In accordance with ASTM D 4829 the specimen is compacted into a metal ring so that the degree of saturation is between 40 and 60 % and the specimen and the ring are placed in a consolidometer. A vertical confining pressure of 1 psi is applied to the specimen and then the specimen is inundated with distilled water. The deformation of the specimen is recorded for 24 hours or until the rate of deformation becomes less than 0.005 mm/hour. The Expansion Index, EI, is used to measure a basic index property of soil and therefore, the EI is comparable to other indices such as the liquid limit, plastic limit, and plasticity index of soils. Results of these tests are enclosed at the end of this appendix.

Boring No.	PB-1							
Sample No.	R2							
Depth (ft.)	7.0							
Sample Type	Ring							
Soil Identification	Reddish brown poorly-graded sand with silt (SP-SM)							
Moisture Correction								
Wet Weight of Soil + Container (g)	0.0							
Dry Weight of Soil + Container (g)	0.0							
Weight of Container (g)	1.0							
Moisture Content (%)	0.0							
Sample Dry Weight Determination								
Weight of Sample + Container (g)	841.3							
Weight of Container (g)	206.4							
Weight of Dry Sample (g)	634.9							
Container No.:								
After Wash								
Method (A or B)	B							
Dry Weight of Sample + Cont. (g)	801.6							
Weight of Container (g)	206.4							
Dry Weight of Sample (g)	595.2							
% Passing No. 200 Sieve	**6.3**							
% Retained No. 200 Sieve	93.7							

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PERCENT PASSING
No. 200 SIEVE
ASTM D 1140

Project Name: Santa Monica High School/Tennis Court

Project No.: 11428.008

Client Name: Santa Monica-Malibu Unified School District

Tested By: S. Felter Date: 08/07/17

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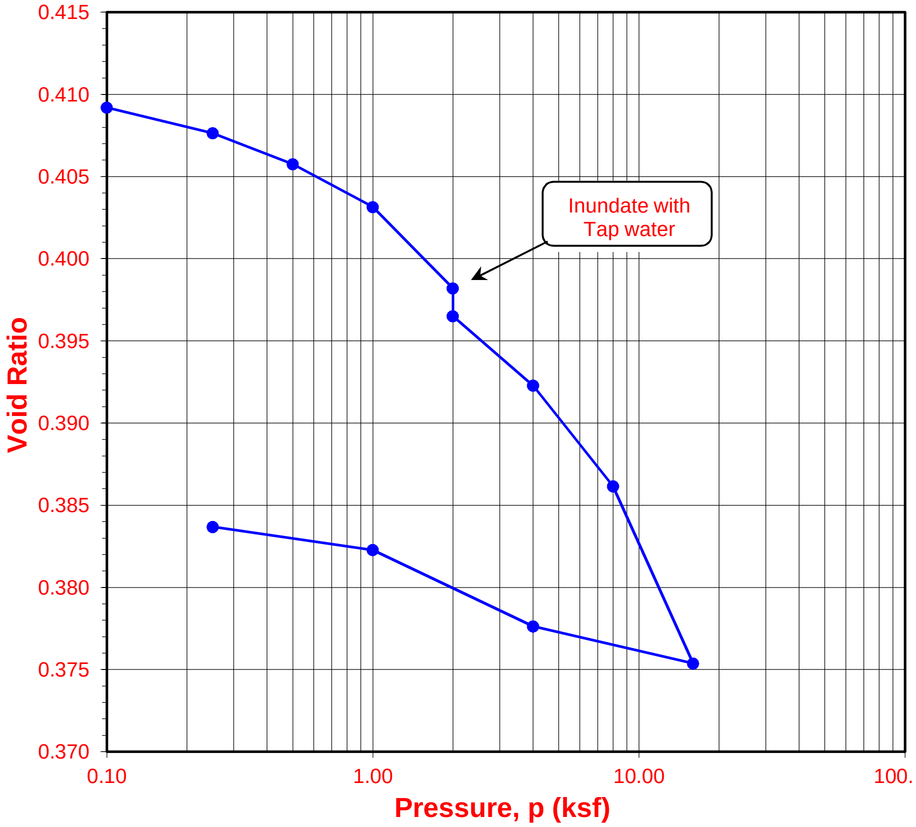
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name: Santa Monica High School
Project No.: 11428.007
Boring No.: LB-1
Sample No.: BB-1
Soil Identification: Brown silty sand (SM)

Tested By: G. Bathala Date: 07/07/17
Checked By: J. Ward Date: 07/26/17
Depth (ft.): 0-5
Sample Type: 90% Remold

Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	198.52
Weight of Ring (g)	43.26
Height after consol. (in.)	0.9818
Before Test	
Wt.Wet Sample+Cont. (g)	154.83
Wt.of Dry Sample+Cont. (g)	147.54
Weight of Container (g)	56.02
Initial Moisture Content (%)	8.0
Initial Dry Density (pcf)	119.6
Initial Saturation (%)	53
Initial Vertical Reading (in.)	0.3047
After Test	
Wt.of Wet Sample+Cont. (g)	261.80
Wt. of Dry Sample+Cont. (g)	245.50
Weight of Container (g)	58.50
Final Moisture Content (%)	11.34
Final Dry Density (pcf)	121.8
Final Saturation (%)	80
Final Vertical Reading (in.)	0.2832
Specific Gravity (assumed)	2.70
Water Density (pcf)	62.43

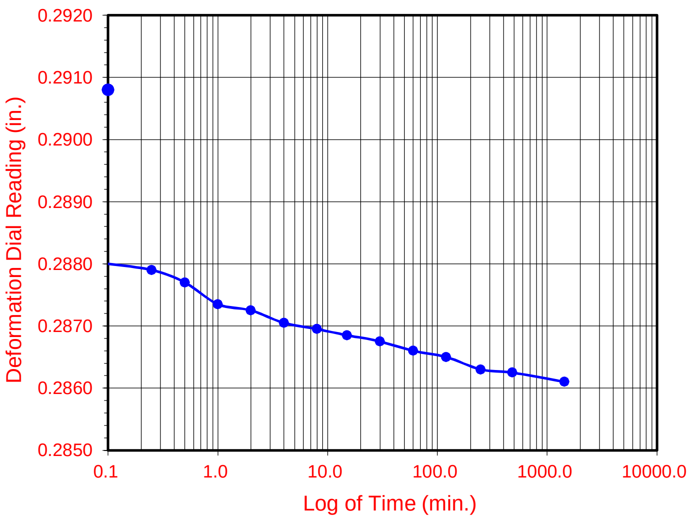


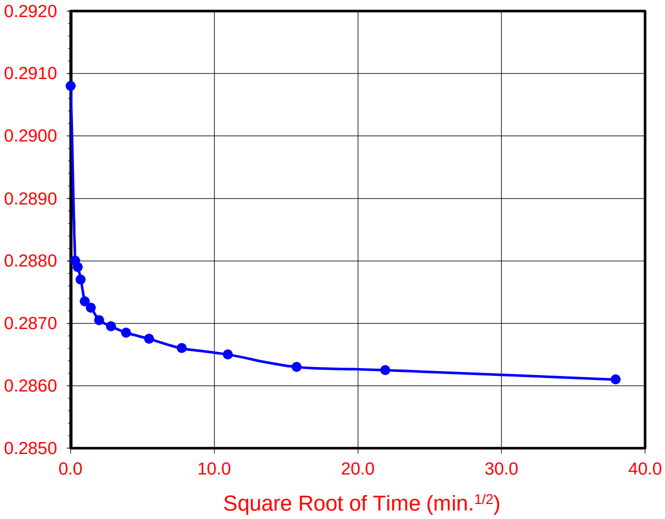
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deforma-tion (%)
0.10	0.3045	0.9999	0.00	0.01	0.409	0.01
0.25	0.3028	0.9982	0.06	0.18	0.408	0.12
0.50	0.3005	0.9958	0.16	0.42	0.406	0.26
1.00	0.2971	0.9925	0.31	0.75	0.403	0.44
2.00	0.2920	0.9874	0.47	1.27	0.398	0.80
2.00	0.2908	0.9862	0.47	1.38	0.397	0.91
4.00	0.2861	0.9815	0.64	1.86	0.392	1.22
8.00	0.2801	0.9754	0.81	2.46	0.386	1.65
16.00	0.2705	0.9659	1.00	3.41	0.375	2.41
4.00	0.2742	0.9696	0.79	3.05	0.378	2.26
1.00	0.2799	0.9753	0.55	2.48	0.382	1.93
0.25	0.2832	0.9786	0.32	2.15	0.384	1.83

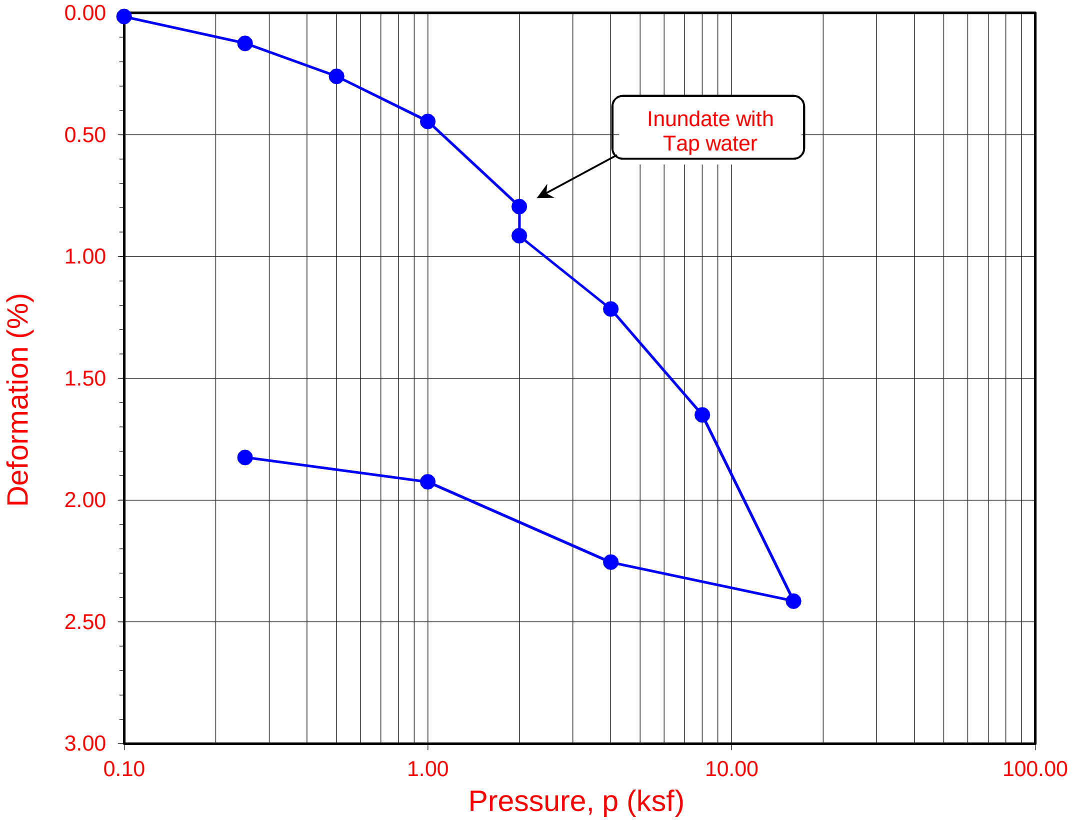
Time Readings @ 4.0 ksf

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)
7/11/17	7:30:00	0.0	0.0	0.2908
7/11/17	7:30:06	0.1	0.3	0.2880
7/11/17	7:30:15	0.2	0.5	0.2879
7/11/17	7:30:30	0.5	0.7	0.2877
7/11/17	7:31:00	1.0	1.0	0.2874
7/11/17	7:32:00	2.0	1.4	0.2873
7/11/17	7:34:00	4.0	2.0	0.2871
7/11/17	7:38:00	8.0	2.8	0.2870
7/11/17	7:45:00	15.0	3.9	0.2869
7/11/17	8:00:00	30.0	5.5	0.2868
7/11/17	8:30:00	60.0	7.7	0.2866
7/11/17	9:30:00	120.0	11.0	0.2865
7/11/17	11:38:00	248.0	15.7	0.2863
7/11/17	15:30:00	480.0	21.9	0.2863
7/12/17	7:30:00	1440.0	37.9	0.2861

Time Readings @ 4.0 ksf







Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
LB-1	**BB-1**	**0-5**	**8.0**	**11.3**	**119.6**	**121.8**	**0.409**	**0.384**	**53**	**80**

Soil Identification: Brown silty sand (SM)

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ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 11428.007

Santa Monica High School

07-17

Leighton

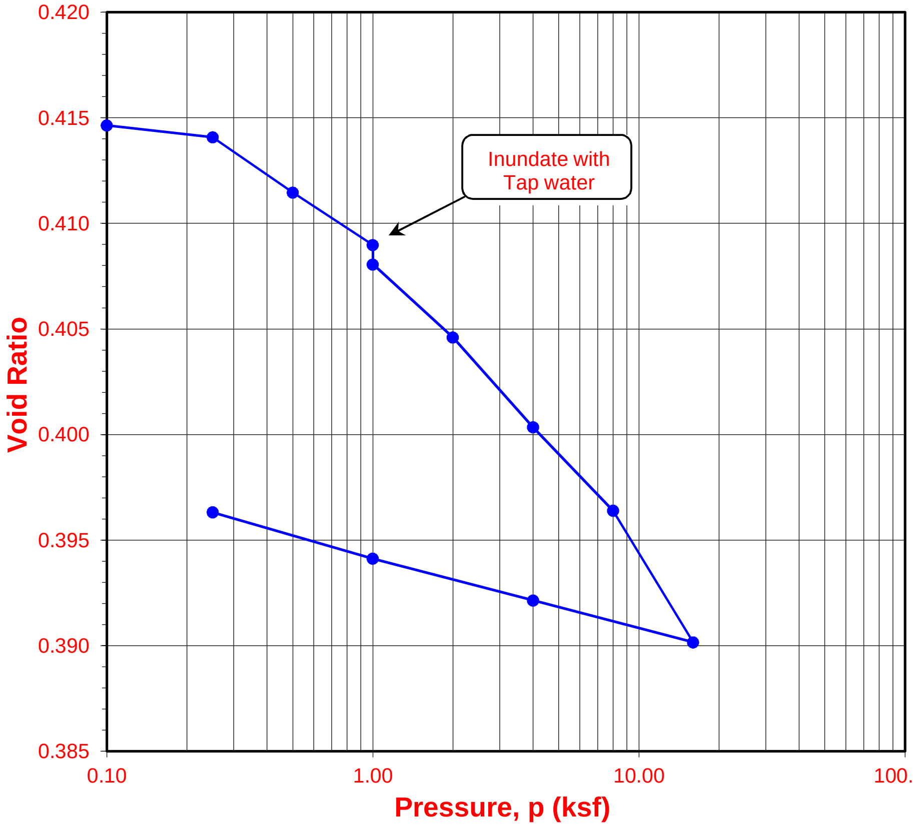
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name: Santa Monica High School
Project No.: 11428.007
Boring No.: LB-2
Sample No.: R1
Soil Identification: Brown silty sand (SM)

Tested By: G. Bathala Date: 07/06/17
Checked By: J. Ward Date: 07/26/17
Depth (ft.): 10.0
Sample Type: Ring

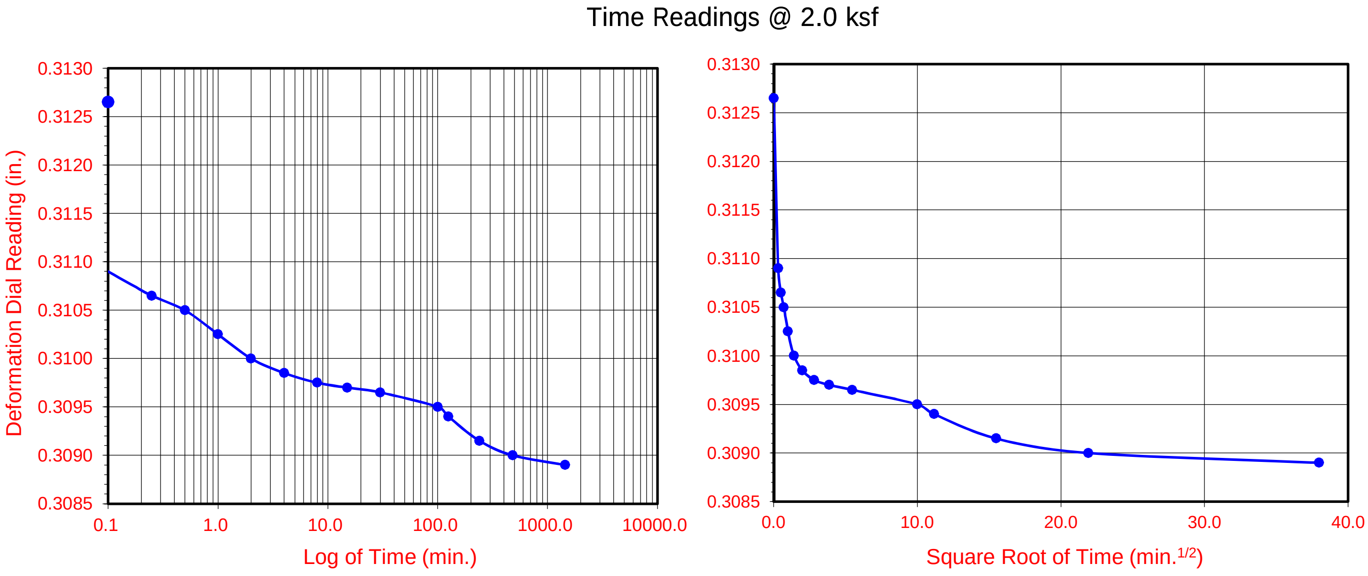
Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	200.98
Weight of Ring (g)	41.42
Height after consol. (in.)	0.9870
Before Test	
Wt.Wet Sample+Cont. (g)	191.63
Wt.of Dry Sample+Cont. (g)	175.80
Weight of Container (g)	36.68
Initial Moisture Content (%)	11.4
Initial Dry Density (pcf)	119.1
Initial Saturation (%)	74
Initial Vertical Reading (in.)	0.3198
After Test	
Wt.of Wet Sample+Cont. (g)	276.03
Wt. of Dry Sample+Cont. (g)	258.63
Weight of Container (g)	74.67
Final Moisture Content (%)	12.21
Final Dry Density (pcf)	120.1
Final Saturation (%)	82
Final Vertical Reading (in.)	0.3038
Specific Gravity (assumed)	2.70
Water Density (pcf)	62.43

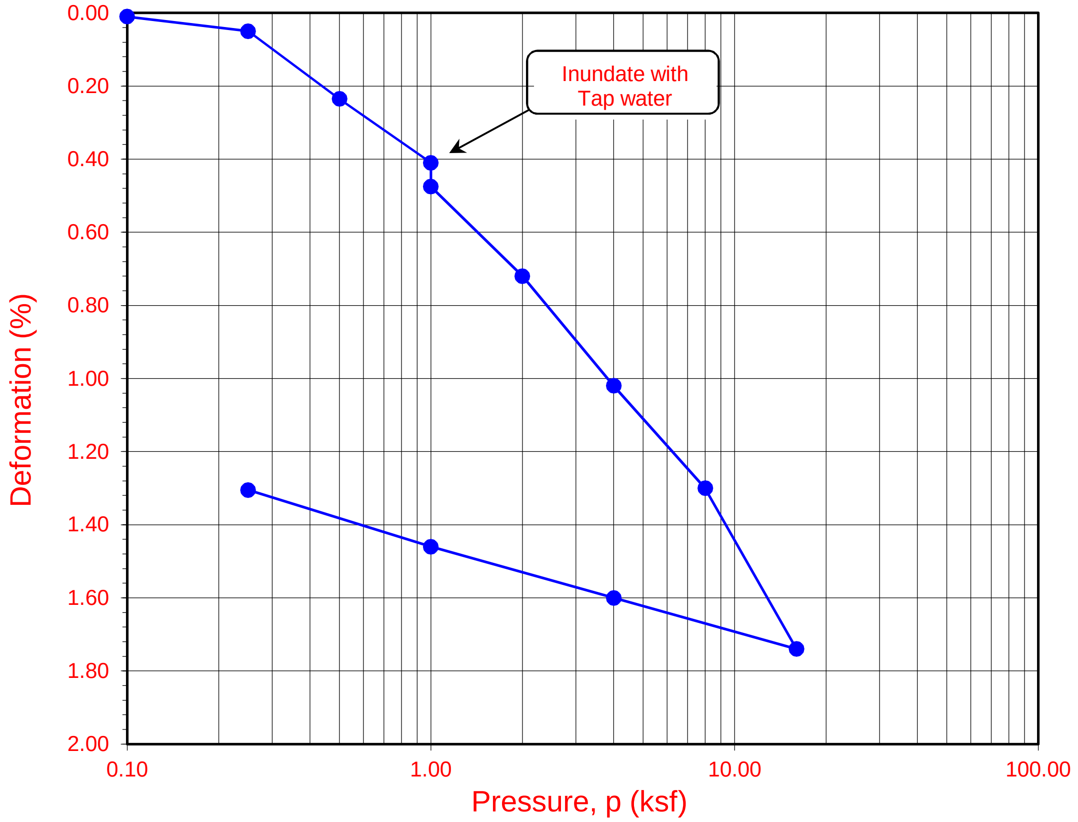


Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.3197	0.9999	0.00	0.01	0.415	0.01
0.25	0.3190	0.9992	0.03	0.08	0.414	0.05
0.50	0.3163	0.9965	0.12	0.35	0.411	0.23
1.00	0.3133	0.9935	0.24	0.65	0.409	0.41
1.00	0.3127	0.9929	0.24	0.71	0.408	0.47
2.00	0.3089	0.9891	0.37	1.09	0.405	0.72
4.00	0.3043	0.9845	0.53	1.55	0.400	1.02
8.00	0.2995	0.9797	0.73	2.03	0.396	1.30
16.00	0.2932	0.9734	0.92	2.66	0.390	1.74
4.00	0.2969	0.9771	0.69	2.29	0.392	1.60
1.00	0.3005	0.9807	0.47	1.93	0.394	1.46
0.25	0.3038	0.9840	0.30	1.60	0.396	1.30

Time Readings @ 2.0 ksf

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)
7/8/17	6:30:00	0.0	0.0	0.3127
7/8/17	6:30:06	0.1	0.3	0.3109
7/8/17	6:30:15	0.2	0.5	0.3107
7/8/17	6:30:30	0.5	0.7	0.3105
7/8/17	6:31:00	1.0	1.0	0.3103
7/8/17	6:32:00	2.0	1.4	0.3100
7/8/17	6:34:00	4.0	2.0	0.3099
7/8/17	6:38:00	8.0	2.8	0.3098
7/8/17	6:45:00	15.0	3.9	0.3097
7/8/17	7:00:00	30.0	5.5	0.3097
7/8/17	8:10:00	100.0	10.0	0.3095
7/8/17	8:35:00	125.0	11.2	0.3094
7/8/17	10:30:00	240.0	15.5	0.3092
7/8/17	14:30:00	480.0	21.9	0.3090
7/9/17	6:32:00	1442.0	38.0	0.3089





Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
LB-2	**R1**	**10.0**	**11.4**	**12.2**	**119.1**	**120.1**	**0.415**	**0.396**	**74**	**82**

Soil Identification: Brown silty sand (SM)

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ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 11428.007

Santa Monica High School

07-17

Leighton

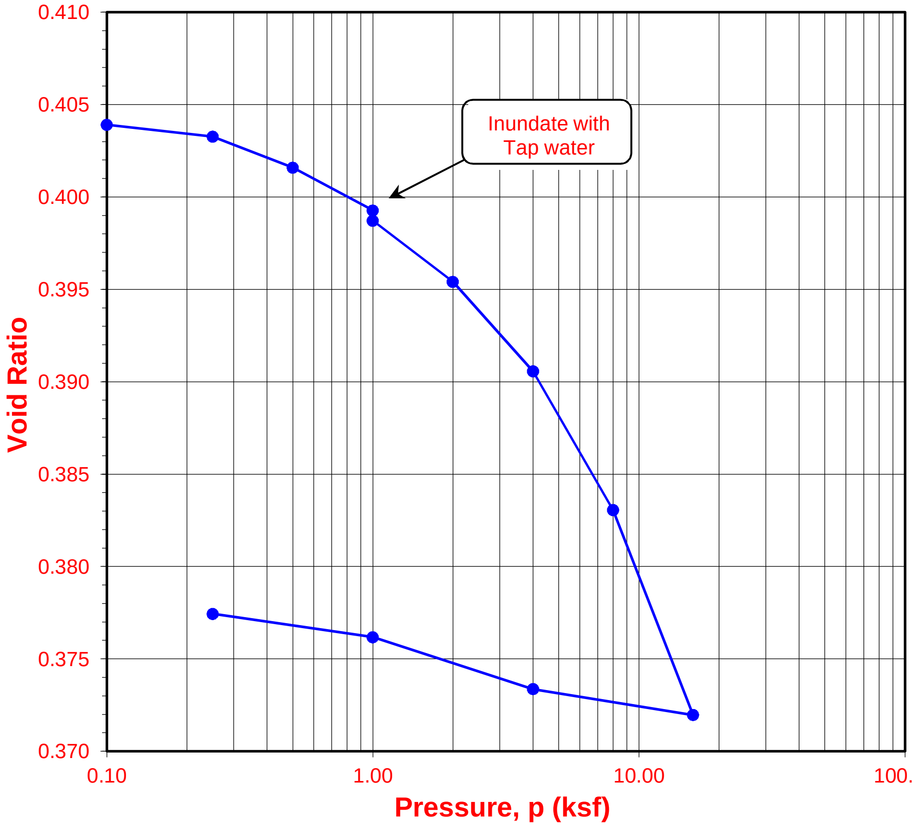
ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name: Santa Monica High School
Project No.: 11428.007
Boring No.: LB-5
Sample No.: BB-1
Soil Identification: Dark brown silty sand (SM)

Tested By: G. Bathala Date: 07/07/17
Checked By: J. Ward Date: 07/26/17
Depth (ft.): 0-5
Sample Type: 90% Remold

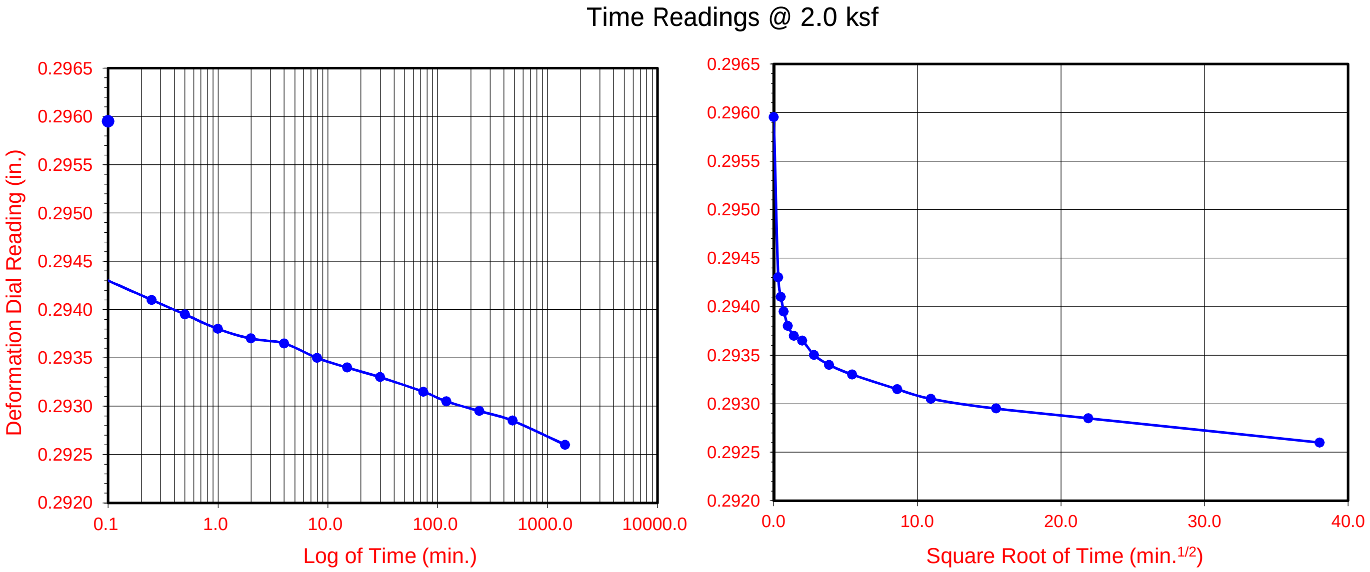
Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	199.16
Weight of Ring (g)	43.46
Height after consol. (in.)	0.9810
Before Test	
Wt.Wet Sample+Cont. (g)	149.54
Wt.of Dry Sample+Cont. (g)	141.31
Weight of Container (g)	36.67
Initial Moisture Content (%)	7.9
Initial Dry Density (pcf)	120.0
Initial Saturation (%)	53
Initial Vertical Reading (in.)	0.3019
After Test	
Wt.of Wet Sample+Cont. (g)	270.90
Wt. of Dry Sample+Cont. (g)	254.34
Weight of Container (g)	66.80
Final Moisture Content (%)	11.49
Final Dry Density (pcf)	122.1
Final Saturation (%)	82
Final Vertical Reading (in.)	0.2809
Specific Gravity (assumed)	2.70
Water Density (pcf)	62.43

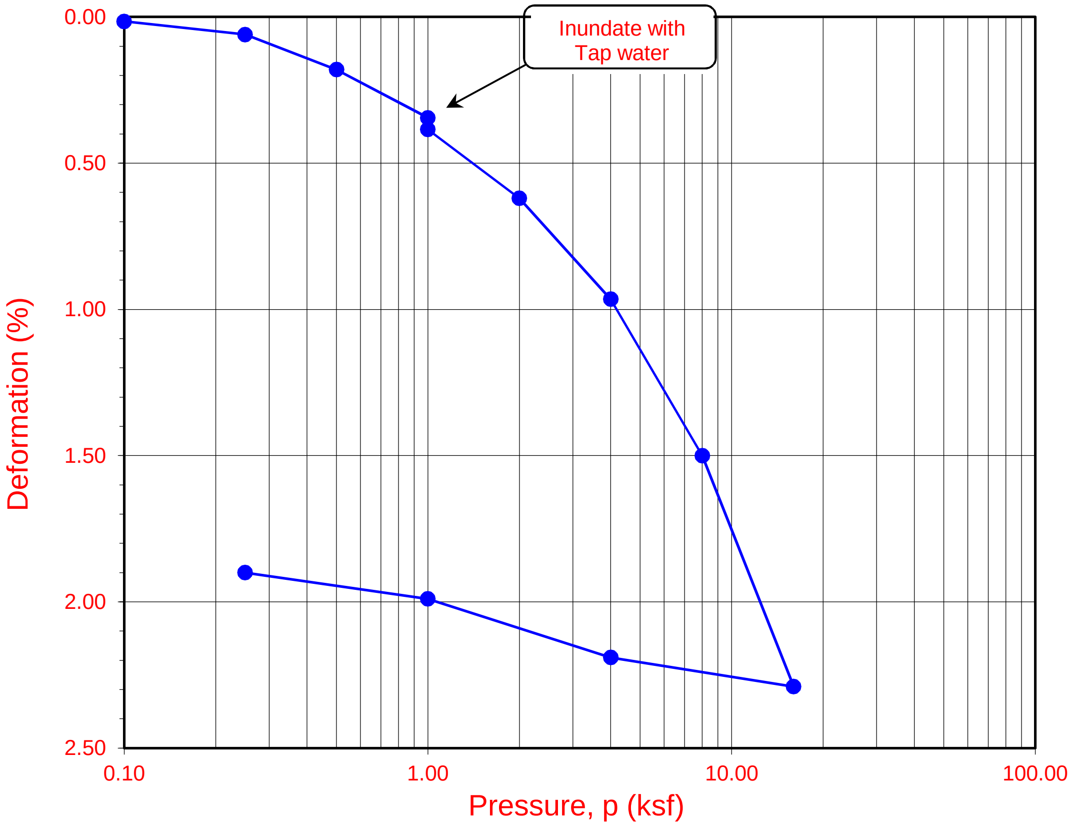


Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deformation (%)
0.10	0.3018	0.9999	0.00	0.01	0.404	0.01
0.25	0.3006	0.9987	0.07	0.13	0.403	0.06
0.50	0.2988	0.9969	0.13	0.31	0.402	0.18
1.00	0.2964	0.9945	0.21	0.55	0.399	0.34
1.00	0.2960	0.9941	0.21	0.60	0.399	0.39
2.00	0.2926	0.9907	0.31	0.93	0.395	0.62
4.00	0.2880	0.9861	0.43	1.40	0.391	0.97
8.00	0.2809	0.9790	0.60	2.10	0.383	1.50
16.00	0.2704	0.9685	0.86	3.15	0.372	2.29
4.00	0.2747	0.9728	0.53	2.72	0.373	2.19
1.00	0.2784	0.9765	0.36	2.35	0.376	1.99
0.25	0.2809	0.9790	0.20	2.10	0.377	1.90

Time Readings @ 2.0 ksf

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)
7/10/17	7:15:00	0.0	0.0	0.2960
7/10/17	7:15:06	0.1	0.3	0.2943
7/10/17	7:15:15	0.2	0.5	0.2941
7/10/17	7:15:30	0.5	0.7	0.2940
7/10/17	7:16:00	1.0	1.0	0.2938
7/10/17	7:17:00	2.0	1.4	0.2937
7/10/17	7:19:00	4.0	2.0	0.2937
7/10/17	7:23:00	8.0	2.8	0.2935
7/10/17	7:30:00	15.0	3.9	0.2934
7/10/17	7:45:00	30.0	5.5	0.2933
7/10/17	8:29:00	74.0	8.6	0.2932
7/10/17	9:15:00	120.0	11.0	0.2931
7/10/17	11:15:00	240.0	15.5	0.2930
7/10/17	15:15:00	480.0	21.9	0.2929
7/11/17	7:20:00	1445.0	38.0	0.2926





Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
LB-5	**BB-1**	**0-5**	**7.9**	**11.5**	**120.0**	**122.1**	**0.404**	**0.377**	**53**	**82**

Soil Identification: Dark brown silty sand (SM)

Leighton

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 11428.007

Santa Monica High School

07-17

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS

ASTM D 2435

Project Name: Santa Monica High School

Project No.: 11428.007

Boring No.: LB-5

Sample No.: R2

Soil Identification: Brown silty sand (SM)

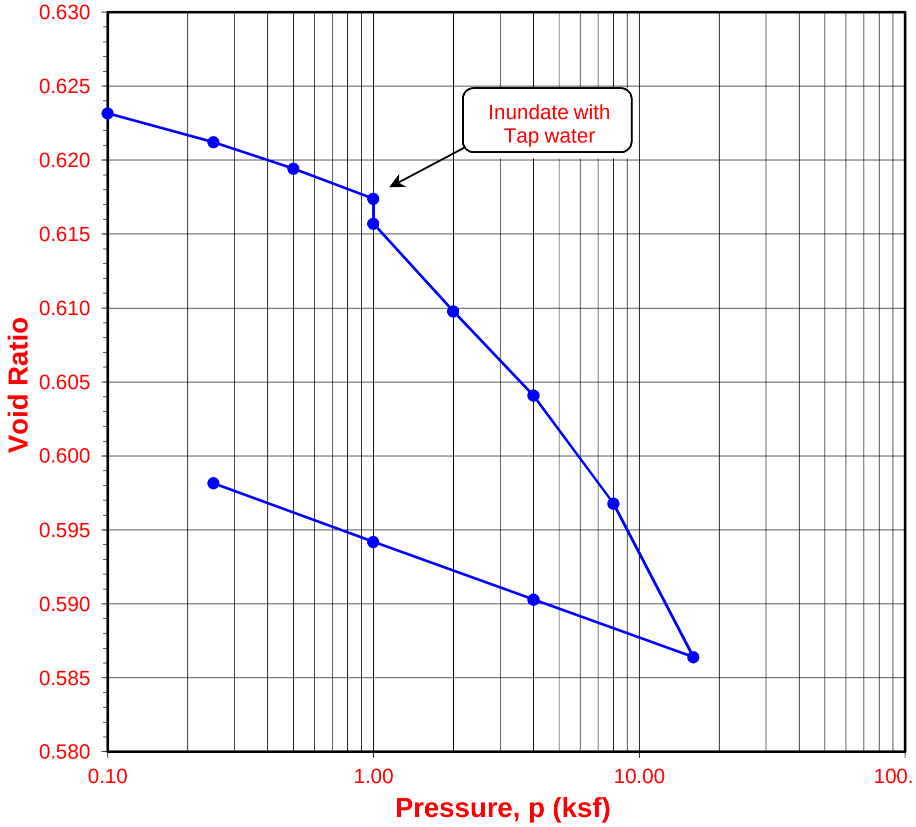
Tested By: G. Bathala Date: 07/06/17

Checked By: J. Ward Date: 07/26/17

Depth (ft.): 15.0

Sample Type: Ring

Sample Diameter (in.)	2.415
Sample Thickness (in.)	1.000
Wt. of Sample + Ring (g)	173.90
Weight of Ring (g)	41.82
Height after consol. (in.)	0.9847
Before Test	
Wt.Wet Sample+Cont. (g)	199.35
Wt.of Dry Sample+Cont. (g)	192.09
Weight of Container (g)	66.28
Initial Moisture Content (%)	5.8
Initial Dry Density (pcf)	103.9
Initial Saturation (%)	25
Initial Vertical Reading (in.)	0.2601
After Test	
Wt.of Wet Sample+Cont. (g)	226.09
Wt. of Dry Sample+Cont. (g)	203.59
Weight of Container (g)	38.14
Final Moisture Content (%)	18.20
Final Dry Density (pcf)	104.4
Final Saturation (%)	80
Final Vertical Reading (in.)	0.2418
Specific Gravity (assumed)	2.70
Water Density (pcf)	62.43

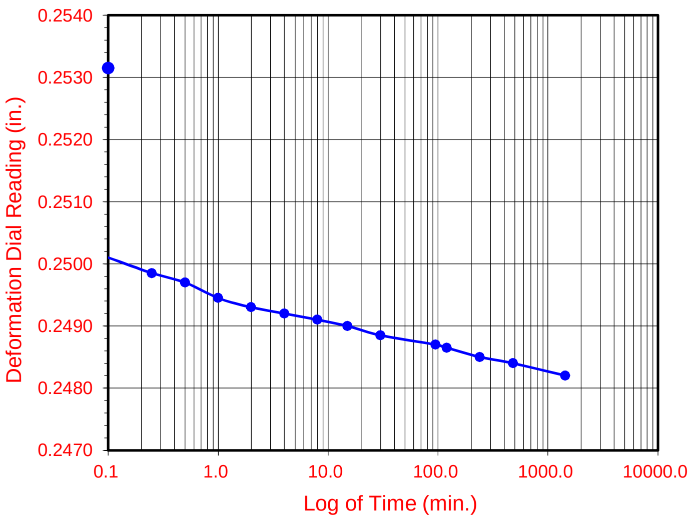


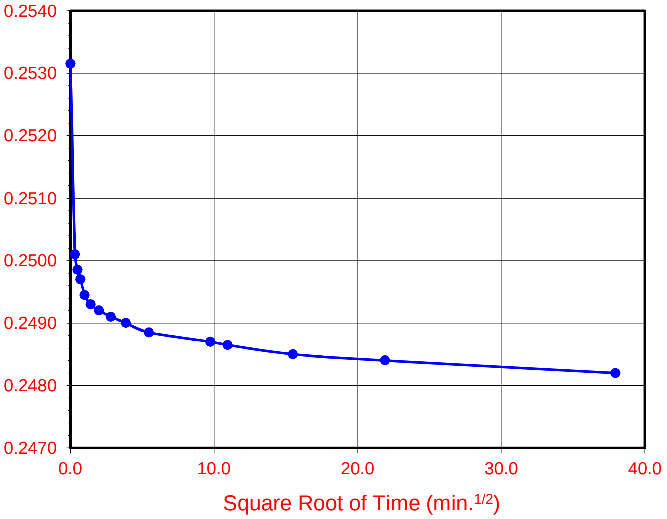
Pressure (p) (ksf)	Final Reading (in.)	Apparent Thickness (in.)	Load Compliance (%)	Deformation % of Sample Thickness	Void Ratio	Corrected Deforma-tion (%)
0.10	0.2602	1.0001	0.00	0.00	0.623	0.00
0.25	0.2587	0.9986	0.03	0.14	0.621	0.11
0.50	0.2567	0.9966	0.12	0.34	0.619	0.22
1.00	0.2542	0.9941	0.24	0.59	0.617	0.35
1.00	0.2532	0.9931	0.24	0.70	0.616	0.46
2.00	0.2482	0.9881	0.37	1.19	0.610	0.82
4.00	0.2431	0.9830	0.53	1.70	0.604	1.17
8.00	0.2366	0.9765	0.73	2.35	0.597	1.62
16.00	0.2283	0.9682	0.92	3.18	0.586	2.26
4.00	0.2330	0.9729	0.69	2.71	0.590	2.02
1.00	0.2376	0.9775	0.47	2.25	0.594	1.78
0.25	0.2418	0.9817	0.30	1.84	0.598	1.54

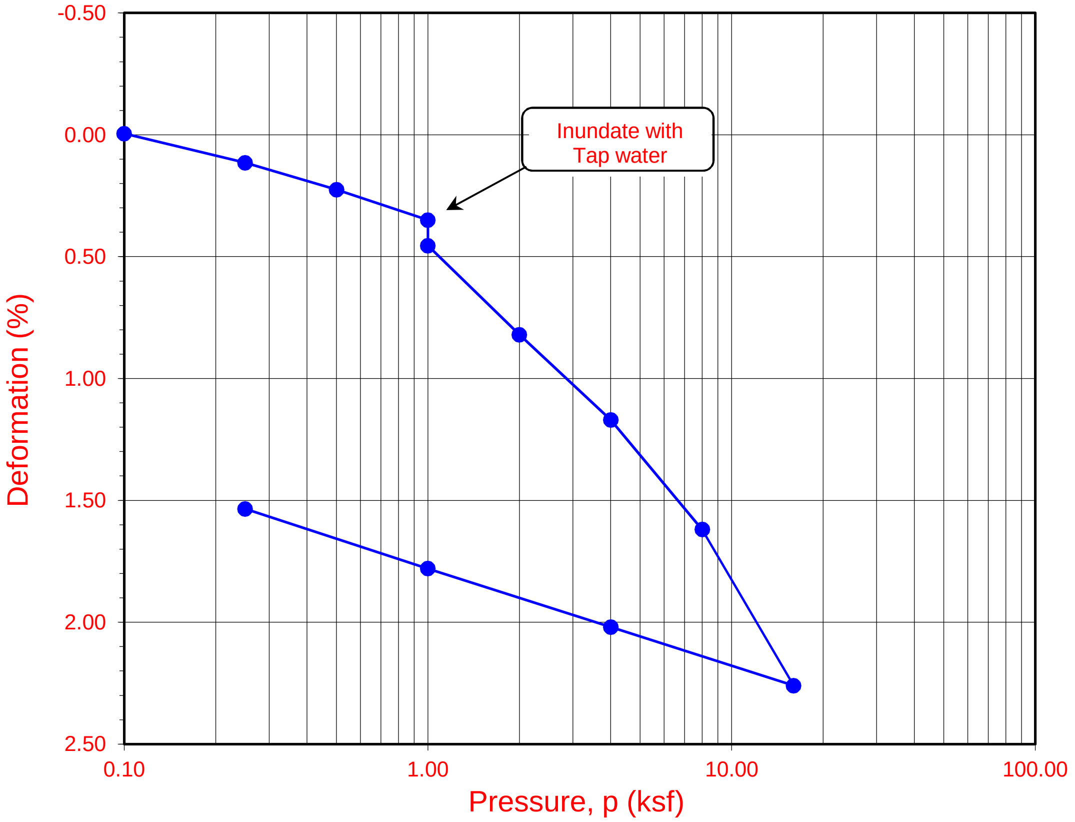
Time Readings @ 2.0 ksf

Date	Time	Elapsed Time (min)	Square Root of Time	Dial Rdgs. (in.)
7/8/17	6:35:00	0.0	0.0	0.2532
7/8/17	6:35:06	0.1	0.3	0.2501
7/8/17	6:35:15	0.2	0.5	0.2499
7/8/17	6:35:30	0.5	0.7	0.2497
7/8/17	6:36:00	1.0	1.0	0.2495
7/8/17	6:37:00	2.0	1.4	0.2493
7/8/17	6:39:00	4.0	2.0	0.2492
7/8/17	6:43:00	8.0	2.8	0.2491
7/8/17	6:50:00	15.0	3.9	0.2490
7/8/17	7:05:00	30.0	5.5	0.2489
7/8/17	8:10:00	95.0	9.7	0.2487
7/8/17	8:35:00	120.0	11.0	0.2487
7/8/17	10:35:00	240.0	15.5	0.2485
7/8/17	14:35:00	480.0	21.9	0.2484
7/9/17	6:35:00	1440.0	37.9	0.2482

Time Readings @ 2.0 ksf







Boring No.	Sample No.	Depth (ft.)	Moisture Content (%)		Dry Density (pcf)		Void Ratio		Degree of Saturation (%)	
			Initial	Final	Initial	Final	Initial	Final	Initial	Final
LB-5	**R2**	**15.0**	**5.8**	**18.2**	**103.9**	**104.4**	**0.623**	**0.598**	**25**	**80**

Soil Identification: Brown silty sand (SM)

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ONE-DIMENSIONAL CONSOLIDATION PROPERTIES of SOILS
ASTM D 2435

Project No.: 11428.007

Santa Monica High School

07-17

Leighton

TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: Santa Monica High School

Project No. : 11428.007

Tested By : G. Berdy Date: 07/11/17

Data Input By: J. Ward Date: 07/26/17

Boring No.	LB-1	LB-5		
Sample No.	BB-1	BB-1		
Sample Depth (ft)	0-5	0-5		
Soil Identification:	Brown SM	Dark brown SM		
Wet Weight of Soil + Container (g)	203.40	259.06		
Dry Weight of Soil + Container (g)	201.34	256.91		
Weight of Container (g)	54.33	72.02		
Moisture Content (%)	1.40	1.16		
Weight of Soaked Soil (g)	100.29	100.75		

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	301	300		
Crucible No.	22	14		
Furnace Temperature (°C)	860	860		
Time In / Time Out	7:15/8:00	7:15/8:00		
Duration of Combustion (min)	45	45		
Wt. of Crucible + Residue (g)	24.6221	24.1515		
Wt. of Crucible (g)	24.6160	24.1458		
Wt. of Residue (g) (A)	0.0061	0.0057		
PPM of Sulfate (A) x 41150	251.02	234.55		
PPM of Sulfate, Dry Weight Basis	**255**	**237**		

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	15	15		
ml of AgNO3 Soln. Used in Titration (C)	0.4	0.7		
PPM of Chloride (C -0.2) * 100 * 30 / B	40	100		
PPM of Chloride, Dry Wt. Basis	**41**	**101**		

pH TEST, DOT California Test 643

pH Value	**8.06**	**7.83**		
Temperature °C	20.5	20.6		

SOIL RESISTIVITY TEST

DOT CA TEST 643

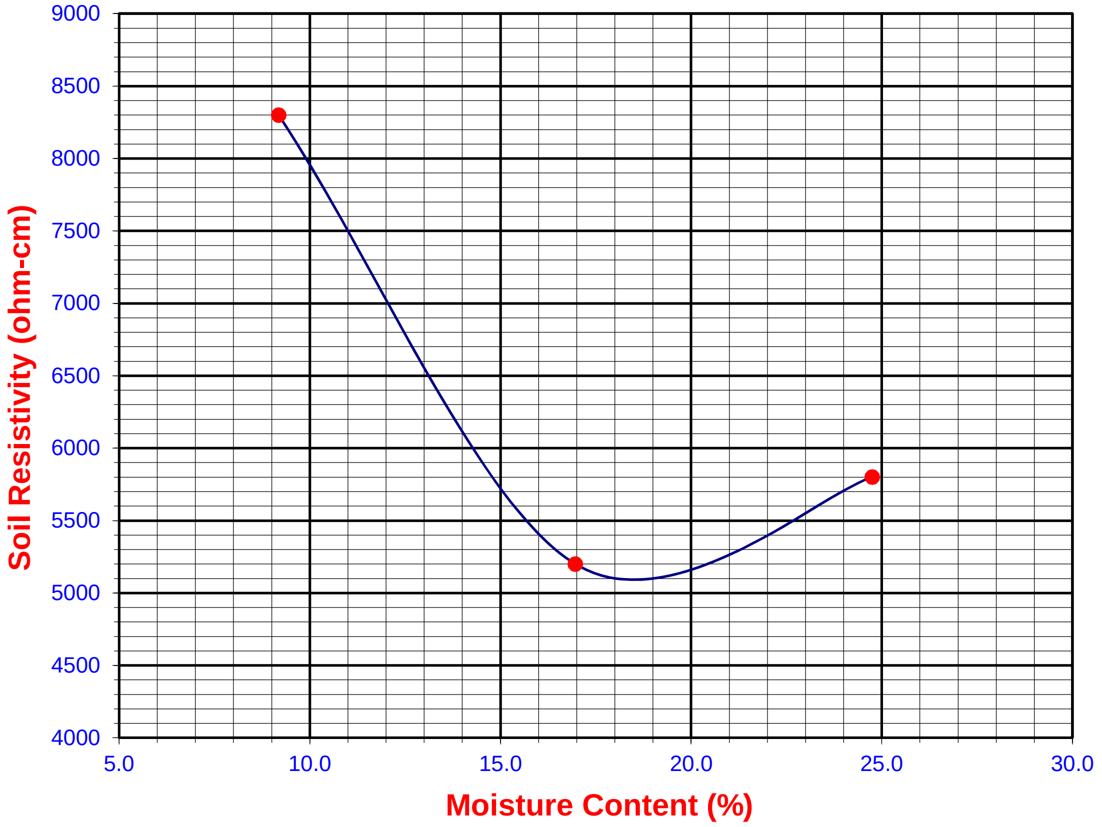
Project Name:	Santa Monica High School	Tested By :	GEB/JY Date: 07/24/17
Project No. :	11428.007	Data Input By:	J. Ward Date: 07/26/17
Boring No.:	LB-1	Depth (ft.) :	0-5
Sample No. :	BB-1		
Soil Identification:*	Brown SM		

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	10	9.18	8300	8300
2	20	16.97	5200	5200
3	30	24.75	5800	5800
4				
5				

Moisture Content (%) (MCi)	1.40
Wet Wt. of Soil + Cont. (g)	203.40
Dry Wt. of Soil + Cont. (g)	201.34
Wt. of Container (g)	54.33
Container No.	
Initial Soil Wt. (g) (Wt)	130.29
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
5100	**18.5**	**255**	**41**	**8.06**	**20.5**



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SOIL RESISTIVITY TEST

DOT CA TEST 643

Project Name: Santa Monica High School
Project No. : 11428.007
Boring No.: LB-5
Sample No. : BB-1
Soil Identification:* Dark brown SM

Tested By : GEB/JY Date: 07/24/17
Data Input By: J. Ward Date: 07/26/17
Depth (ft.) : 0-5

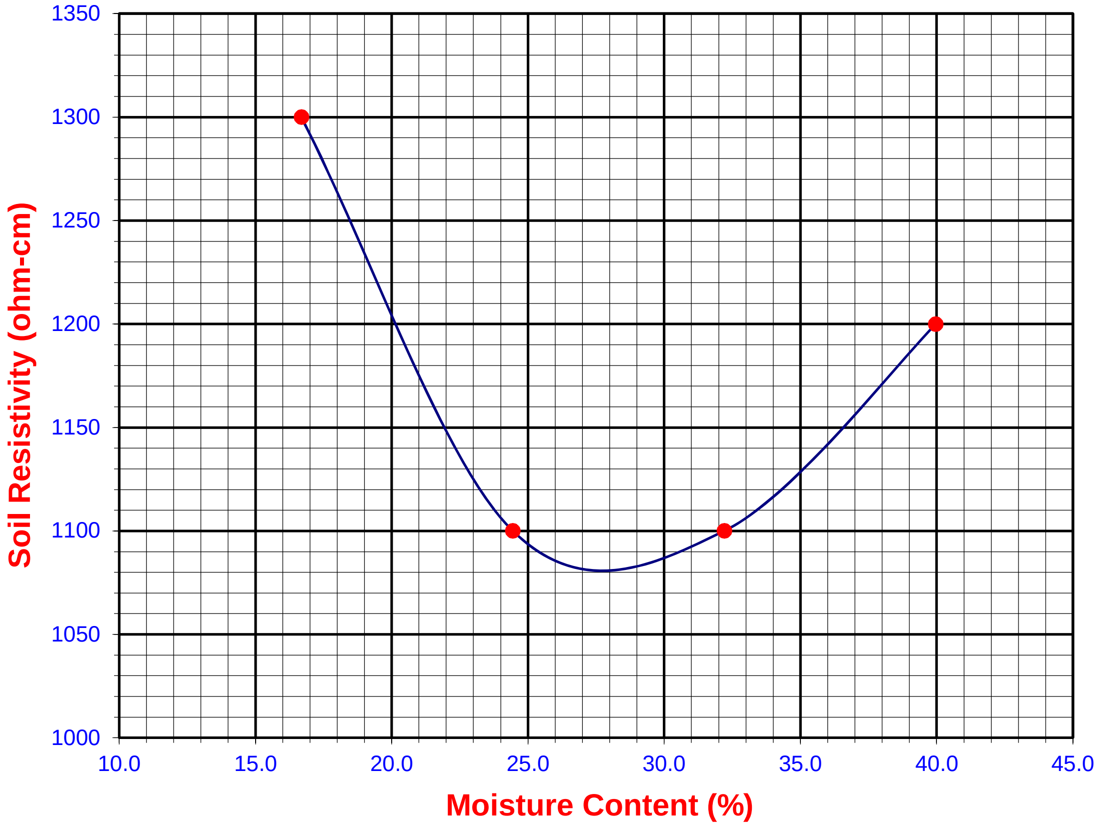
*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	20	16.69	1300	1300
2	30	24.45	1100	1100
3	40	32.21	1100	1100
4	50	39.97	1200	1200
5				

Moisture Content (%) (MCi)	1.16
Wet Wt. of Soil + Cont. (g)	259.06
Dry Wt. of Soil + Cont. (g)	256.91
Wt. of Container (g)	72.02
Container No.	
Initial Soil Wt. (g) (Wt)	130.34
Box Constant	1.000

MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
1080	**27.7**	**237**	**101**	**7.83**	**20.6**



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DIRECT SHEAR TEST

Consolidated Drained - ASTM D 3080

Project Name: Santa Monica High School
Project No.: 11428.007
Boring No.: LB-1
Sample No.: BB-1
Soil Identification: Brown silty sand (SM)

Tested By: G. Bathala
Checked By: J. Ward
Sample Type: 90% Remold
Depth (ft.): 0-5

Date: 07/10/17
Date: 07/25/17

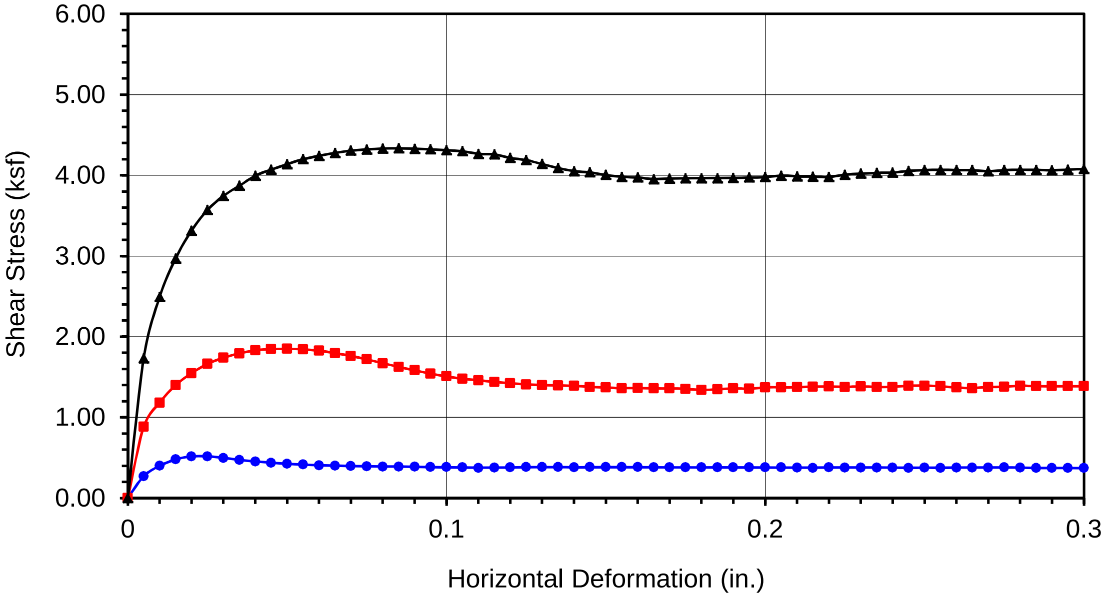
Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	199.43	198.45	198.14
Weight of Ring(gm):	45.79	43.45	42.85

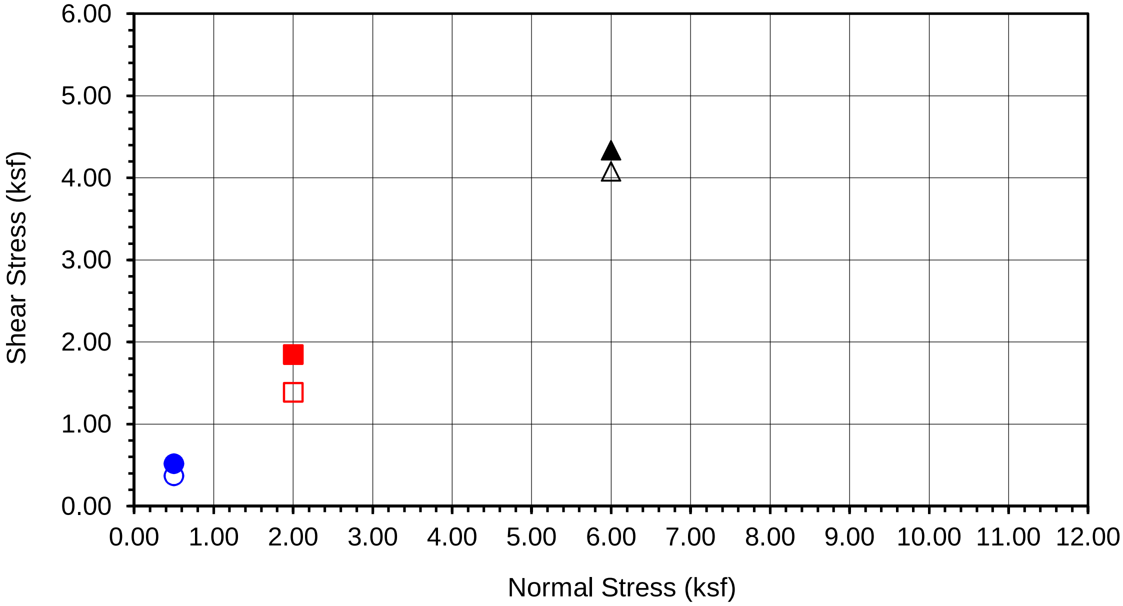
Before Shearing

Weight of Wet Sample+Cont.(gm):	161.50	161.50	161.50
Weight of Dry Sample+Cont.(gm):	154.05	154.05	154.05
Weight of Container(gm):	58.55	58.55	58.55
Vertical Rdg.(in): Initial	0.0000	0.2640	0.2887
Vertical Rdg.(in): Final	-0.0053	0.2743	0.3092

After Shearing

Weight of Wet Sample+Cont.(gm):	223.53	217.91	197.49
Weight of Dry Sample+Cont.(gm):	207.23	201.24	181.78
Weight of Container(gm):	66.26	57.97	39.50
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**LB-1**
Sample No.	**BB-1**
Depth (ft)	**0-5**

Sample Type:

90% Remold

Soil Identification:
Brown silty sand (SM)

Normal Stress (kip/ft²)	0.500	2.000	6.000
Peak Shear Stress (kip/ft²)	● 0.516	■ 1.849	▲ 4.335
Shear Stress @ End of Test (ksf)	○ 0.371	□ 1.386	△ 4.077
Deformation Rate (in./min.)	0.0033	0.0033	0.0033
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	7.80	7.80	7.80
Dry Density (pcf)	118.5	119.6	119.8
Saturation (%)	49.9	51.4	51.8
Soil Height Before Shearing (in.)	0.9947	0.9897	0.9795
Final Moisture Content (%)	11.6	11.6	11.0

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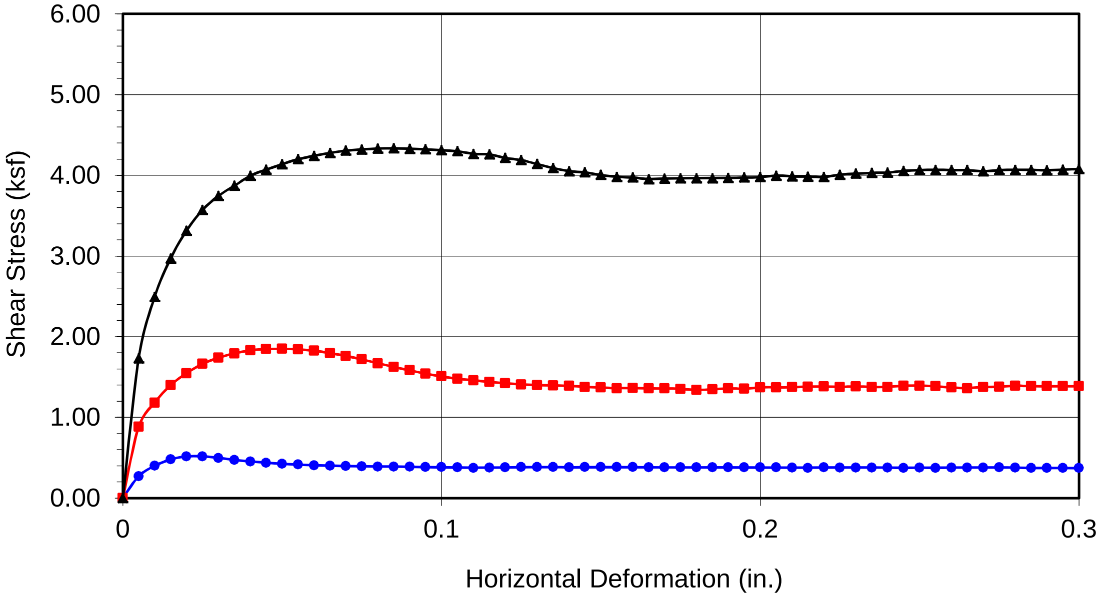
DIRECT SHEAR TEST RESULTS

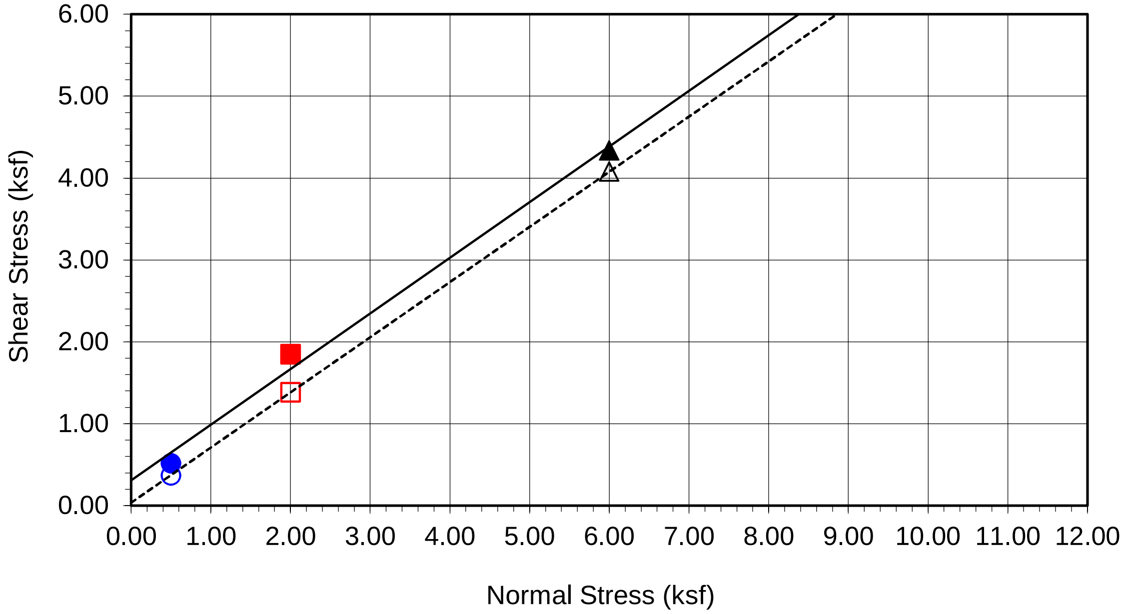
Consolidated Drained - ASTM D 3080

Project No.: 11428.007

Santa Monica High School

07-17





Boring No.	**LB-1**
Sample No.	**BB-1**
Depth (ft)	**0-5**

<u>Sample Type:</u> 90% Remold

<u>Soil Identification:</u>
Brown silty sand (SM)

<u>Strength Parameters</u>

	C (psf)	ϕ (^{o})
Peak	309	34
Ultimate	36	34

Normal Stress (kip/ft²)	0.500	2.000	6.000
Peak Shear Stress (kip/ft²)	● 0.516	■ 1.849	▲ 4.335
Shear Stress @ End of Test (ksf)	○ 0.371	□ 1.386	△ 4.077
Deformation Rate (in./min.)	0.0033	0.0033	0.0033
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	7.80	7.80	7.80
Dry Density (pcf)	118.5	119.6	119.8
Saturation (%)	49.9	51.4	51.8
Soil Height Before Shearing (in.)	0.9947	0.9897	0.9795
Final Moisture Content (%)	11.6	11.6	11.0

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DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 11428.007

Santa Monica High School

07-17

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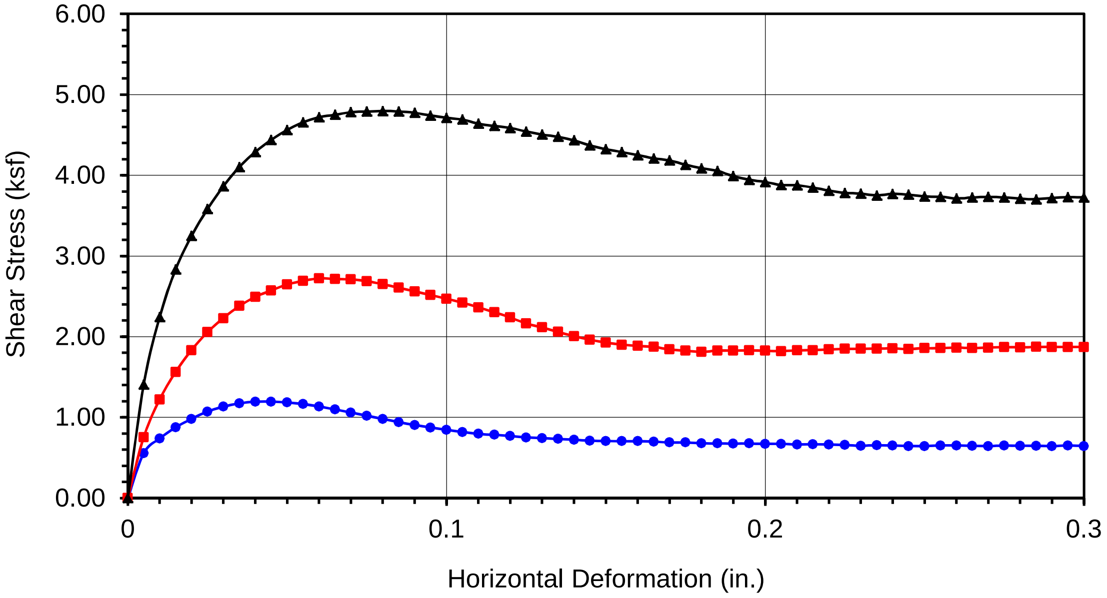
DIRECT SHEAR TEST

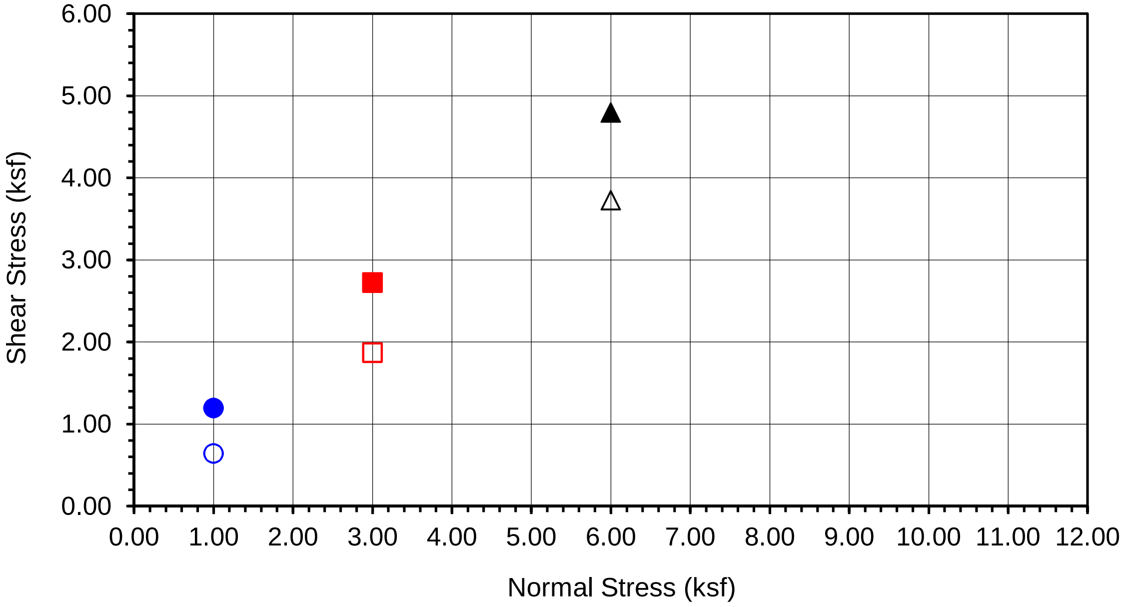
Consolidated Drained - ASTM D 3080

Project Name:	Santa Monica High School	Tested By:	G. Bathala	Date:	07/09/17
Project No.:	11428.007	Checked By:	J. Ward	Date:	07/26/17
Boring No.:	LB-2	Sample Type:	Ring		
Sample No.:	R1	Depth (ft.):	10.0		

Soil Identification: Brown silty sand (SM)

Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	198.33	200.73	202.48
Weight of Ring(gm):	42.42	44.07	45.32
Before Shearing			
Weight of Wet Sample+Cont.(gm):	191.63	191.63	191.63
Weight of Dry Sample+Cont.(gm):	175.80	175.80	175.80
Weight of Container(gm):	36.68	36.68	36.68
Vertical Rdg.(in): Initial	0.0000	0.3002	0.2784
Vertical Rdg.(in): Final	-0.0085	0.3115	0.2935
After Shearing			
Weight of Wet Sample+Cont.(gm):	214.56	212.10	222.92
Weight of Dry Sample+Cont.(gm):	195.30	193.66	204.43
Weight of Container(gm):	57.12	54.25	64.79
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**LB-2**
Sample No.	**R1**
Depth (ft)	**10**

Sample Type:

Ring

Soil Identification:

Brown silty sand (SM)

Normal Stress (kip/ft²)	1.000	3.000	6.000
Peak Shear Stress (kip/ft²)	● 1.195	■ 2.723	▲ 4.797
Shear Stress @ End of Test (ksf)	○ 0.644	□ 1.871	△ 3.725
Deformation Rate (in./min.)	0.0033	0.0033	0.0033
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	11.38	11.38	11.38
Dry Density (pcf)	116.4	117.0	117.4
Saturation (%)	68.6	69.7	70.4
Soil Height Before Shearing (in.)	0.9915	0.9887	0.9849
Final Moisture Content (%)	13.9	13.2	13.2

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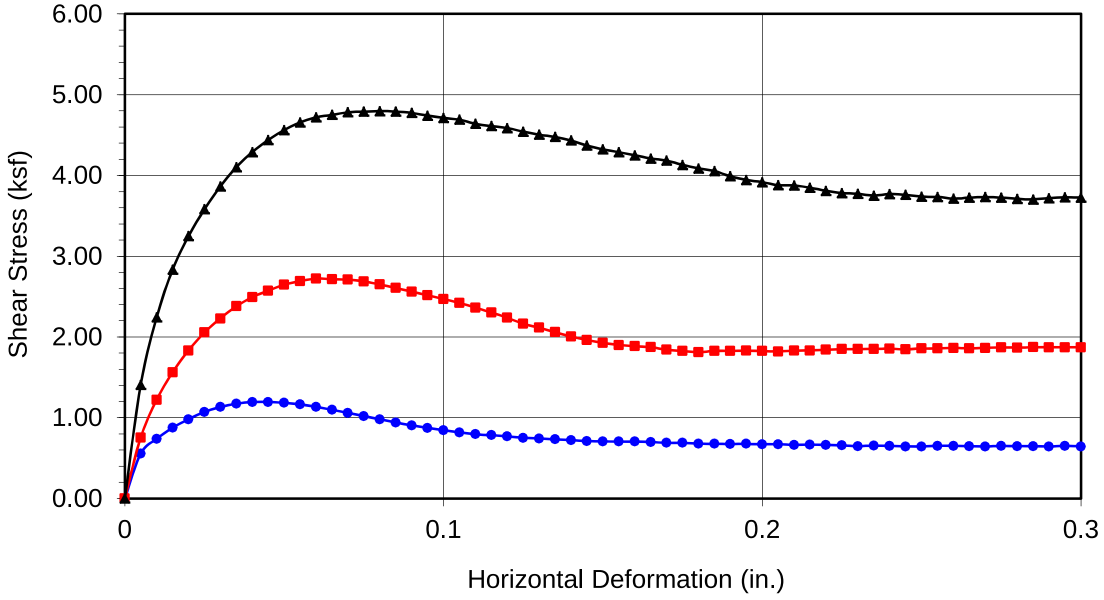
DIRECT SHEAR TEST RESULTS

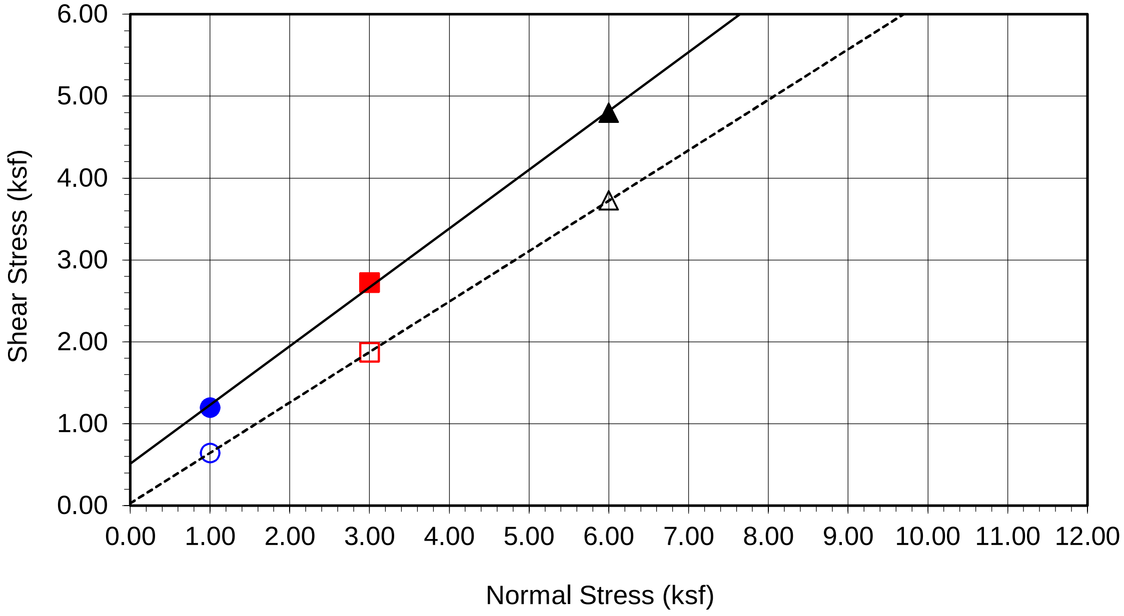
Consolidated Drained - ASTM D 3080

Project No.: 11428.007

Santa Monica High School

07-17





Boring No.	**LB-2**
Sample No.	**R1**
Depth (ft)	**10**
Sample Type:	Ring

Soil Identification:

Brown silty sand (SM)

Strength Parameters

	C (psf)	ϕ (°)
Peak	511	36
Ultimate	26	32

Normal Stress (kip/ft²)	1.000	3.000	6.000
Peak Shear Stress (kip/ft²)	● 1.195	■ 2.723	▲ 4.797
Shear Stress @ End of Test (ksf)	○ 0.644	□ 1.871	△ 3.725
Deformation Rate (in./min.)	0.0033	0.0033	0.0033
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	11.38	11.38	11.38
Dry Density (pcf)	116.4	117.0	117.4
Saturation (%)	68.6	69.7	70.4
Soil Height Before Shearing (in.)	0.9915	0.9887	0.9849
Final Moisture Content (%)	13.9	13.2	13.2

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DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 11428.007

Santa Monica High School

07-17

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DIRECT SHEAR TEST

Consolidated Drained - ASTM D 3080

Project Name: Santa Monica High School
Tested By: G. Bathala
Date: 07/18/17
Project No.: 11428.007
Checked By: J. Ward
Date: 07/26/17
Boring No.: LB-2
Sample Type: Ring
Sample No.: R2
Depth (ft.): 20.0
Soil Identification: Dark yellowish brown silty sand (SM)

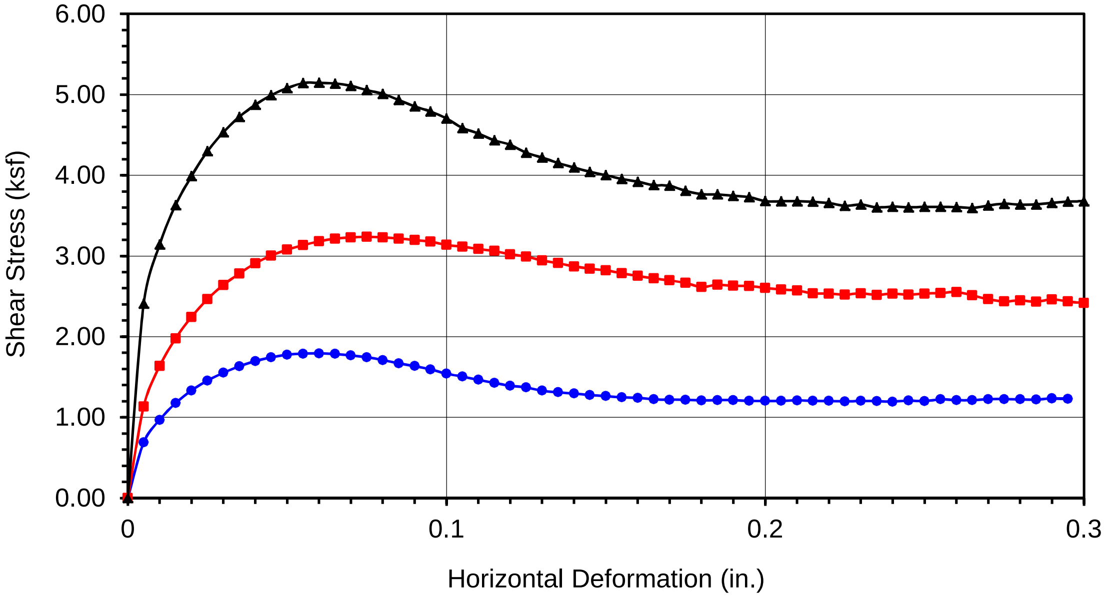
Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	182.37	184.34	182.52
Weight of Ring(gm):	43.20	43.87	41.00

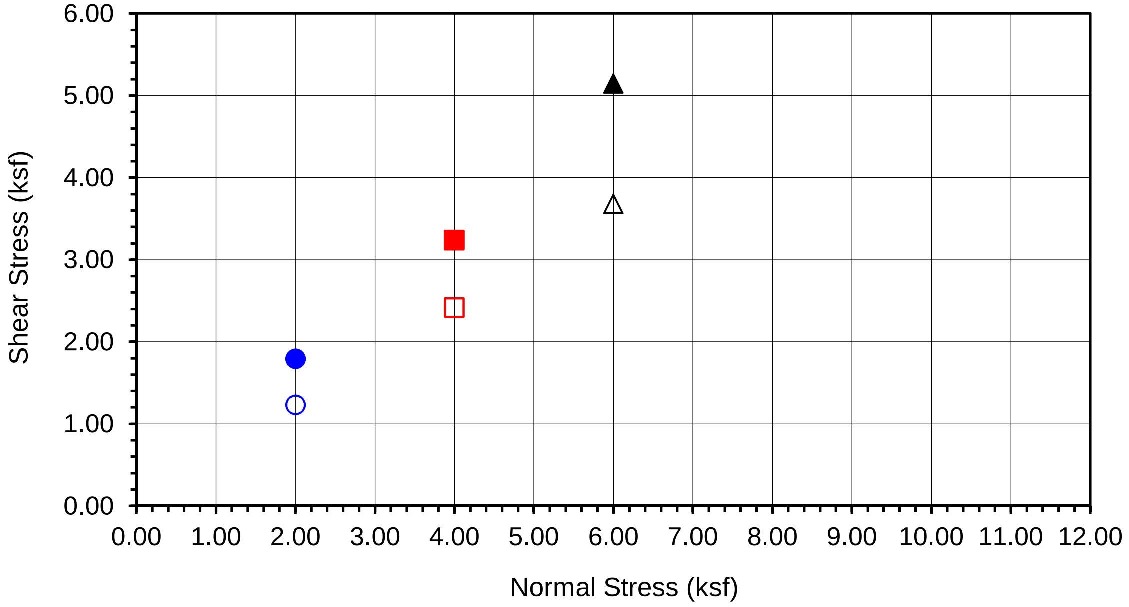
Before Shearing

Weight of Wet Sample+Cont.(gm):	192.78	192.78	192.78
Weight of Dry Sample+Cont.(gm):	181.56	181.56	181.56
Weight of Container(gm):	57.50	57.50	57.50
Vertical Rdg.(in): Initial	0.2988	0.2964	0.0000
Vertical Rdg.(in): Final	0.3117	0.3138	-0.0172

After Shearing

Weight of Wet Sample+Cont.(gm):	186.35	186.01	206.50
Weight of Dry Sample+Cont.(gm):	164.75	164.17	185.07
Weight of Container(gm):	39.72	37.72	57.98
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**LB-2**
Sample No.	**R2**
Depth (ft)	**20**

Sample Type:

Ring

Soil Identification:
Dark yellowish brown silty sand (SM)

Normal Stress (kip/ft^2)	2.000	4.000	6.000
Peak Shear Stress (kip/ft^2)	● 1.792	■ 3.238	▲ 5.146
Shear Stress @ End of Test (ksf)	○ 1.232	□ 2.418	△ 3.678
Deformation Rate (in./min.)	0.0033	0.0033	0.0033
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	9.04	9.04	9.04
Dry Density (pcf)	106.1	107.1	107.9
Saturation (%)	41.5	42.6	43.5
Soil Height Before Shearing (in.)	0.9871	0.9826	0.9828
Final Moisture Content (%)	17.3	17.3	16.9

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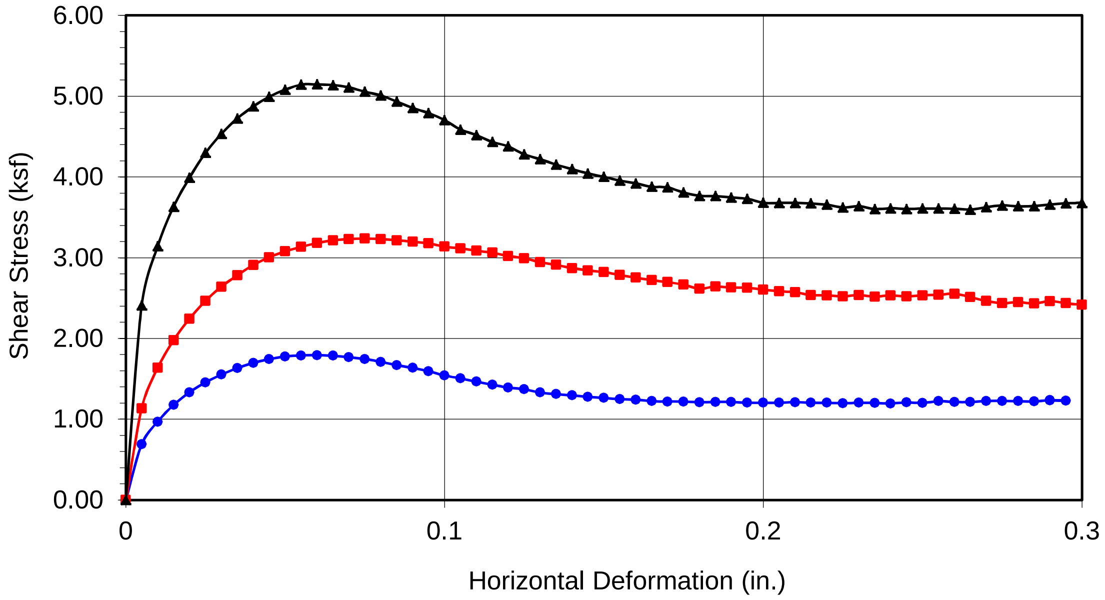
DIRECT SHEAR TEST RESULTS

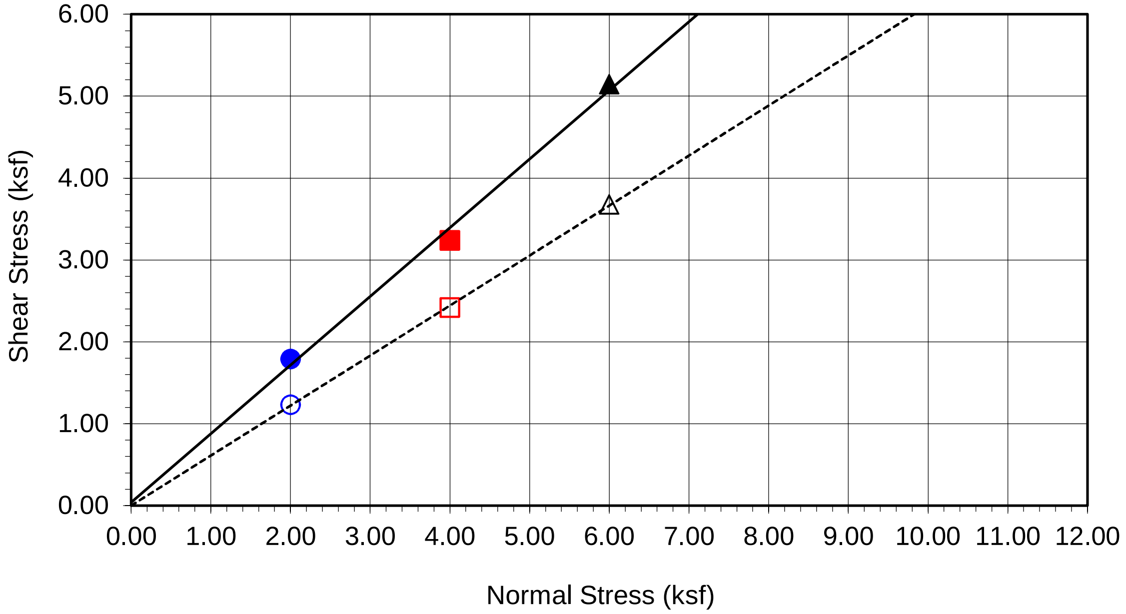
Consolidated Drained - ASTM D 3080

Project No.: 11428.007

Santa Monica High School

07-17





Boring No.	**LB-2**
Sample No.	**R2**
Depth (ft)	**20**
Sample Type:	Ring

Soil Identification:
Dark yellowish brown silty sand (SM)

Strength Parameters

	C (psf)	ϕ (^{o})
Peak	38	40
Ultimate	0	31

Normal Stress (kip/ft²)	2.000	4.000	6.000
Peak Shear Stress (kip/ft²)	● 1.792	■ 3.238	▲ 5.146
Shear Stress @ End of Test (ksf)	○ 1.232	□ 2.418	△ 3.678
Deformation Rate (in./min.)	0.0033	0.0033	0.0033
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	9.04	9.04	9.04
Dry Density (pcf)	106.1	107.1	107.9
Saturation (%)	41.5	42.6	43.5
Soil Height Before Shearing (in.)	0.9871	0.9826	0.9828
Final Moisture Content (%)	17.3	17.3	16.9

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DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 11428.007

Santa Monica High School

07-17

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DIRECT SHEAR TEST

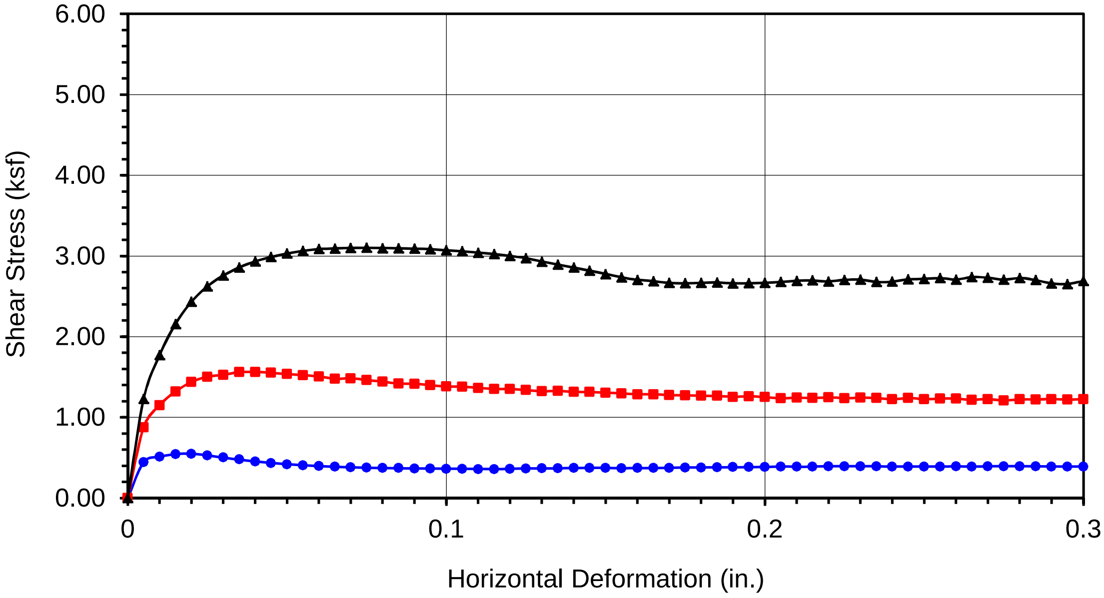
Consolidated Drained - ASTM D 3080

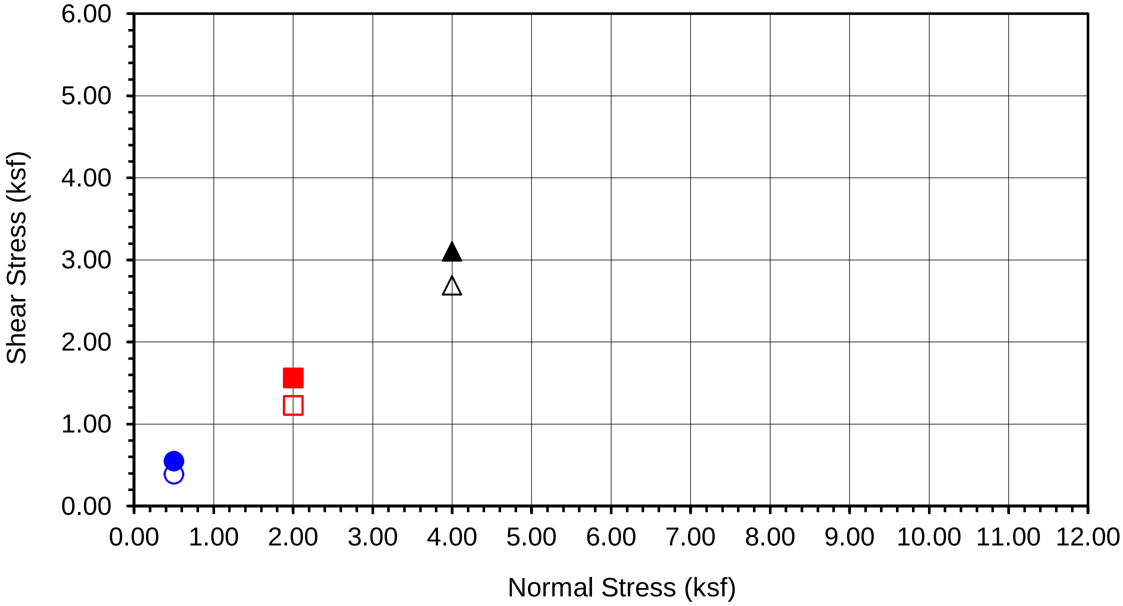
Project Name: Santa Monica High School
Project No.: 11428.007
Boring No.: LB-5
Sample No.: BB-1
Soil Identification: Dark brown silty sand (SM)

Tested By: G. Bathala
Checked By: J. Ward
Sample Type: 90% Remold
Depth (ft.): 0-5

Date: 07/13/17
Date: 07/25/17

Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	199.09	198.67	198.98
Weight of Ring(gm):	43.31	42.94	43.26
Before Shearing			
Weight of Wet Sample+Cont.(gm):	187.72	187.72	187.72
Weight of Dry Sample+Cont.(gm):	178.97	178.97	178.97
Weight of Container(gm):	68.52	68.52	68.52
Vertical Rdg.(in): Initial	0.0000	0.2744	0.2887
Vertical Rdg.(in): Final	-0.0036	0.2856	0.3085
After Shearing			
Weight of Wet Sample+Cont.(gm):	225.33	226.02	195.62
Weight of Dry Sample+Cont.(gm):	208.17	209.37	179.26
Weight of Container(gm):	65.49	67.37	35.78
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**LB-5**
Sample No.	**BB-1**
Depth (ft)	**0-5**

Sample Type:

90% Remold

Soil Identification:
Dark brown silty sand (SM)

Normal Stress (kip/ft²)	0.500	2.000	4.000
Peak Shear Stress (kip/ft²)	● 0.547	■ 1.562	▲ 3.103
Shear Stress @ End of Test (ksf)	○ 0.390	□ 1.226	△ 2.691
Deformation Rate (in./min.)	0.0033	0.0033	0.0033
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	7.92	7.92	7.92
Dry Density (pcf)	120.0	120.0	120.0
Saturation (%)	52.9	52.9	52.9
Soil Height Before Shearing (in.)	0.9964	0.9888	0.9802
Final Moisture Content (%)	12.0	11.7	11.4

Leighton

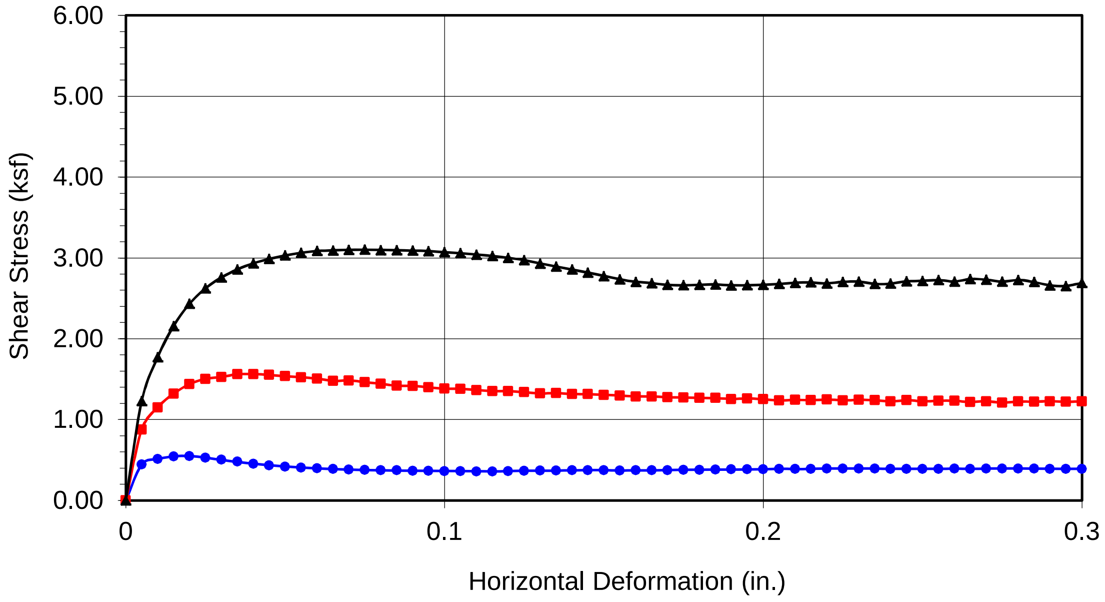
DIRECT SHEAR TEST RESULTS

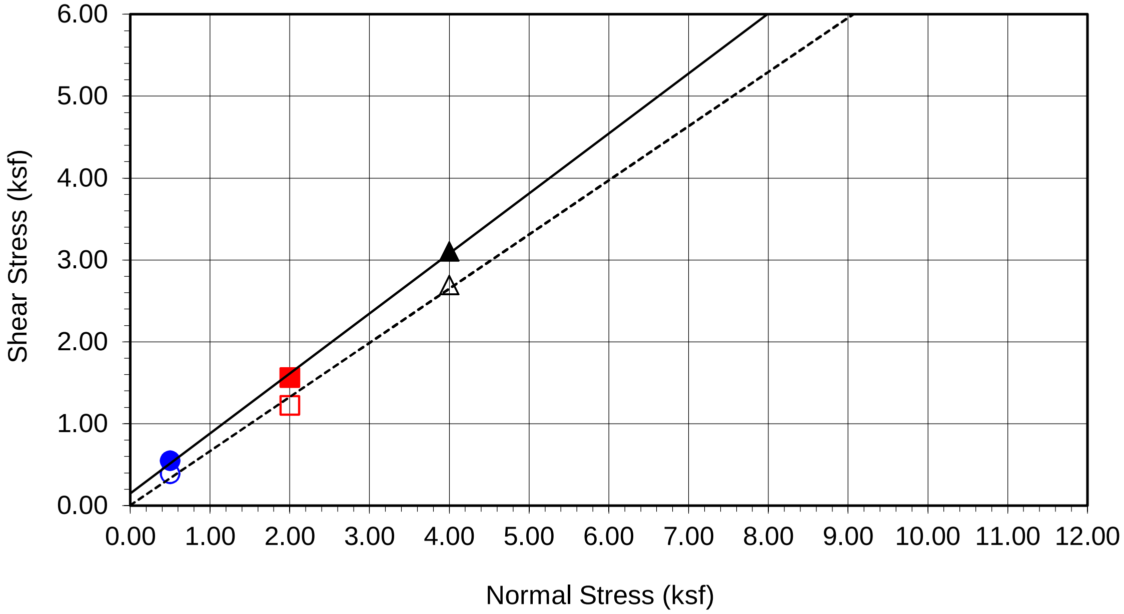
Consolidated Drained - ASTM D 3080

Project No.: 11428.007

Santa Monica High School

07-17





Boring No.	**LB-5**
Sample No.	**BB-1**
Depth (ft)	**0-5**
Sample Type:	90% Remold

Soil Identification:

Dark brown silty sand (SM)

Strength Parameters

	C (psf)	ϕ (^{o})
Peak	150	36
Ultimate	2	33

Normal Stress (kip/ft^2)	0.500	2.000	4.000
Peak Shear Stress (kip/ft^2)	● 0.547	■ 1.562	▲ 3.103
Shear Stress @ End of Test (ksf)	○ 0.390	□ 1.226	△ 2.691
Deformation Rate (in./min.)	0.0033	0.0033	0.0033
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	7.92	7.92	7.92
Dry Density (pcf)	120.0	120.0	120.0
Saturation (%)	52.9	52.9	52.9
Soil Height Before Shearing (in.)	0.9964	0.9888	0.9802
Final Moisture Content (%)	12.0	11.7	11.4

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DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 11428.007

Santa Monica High School

07-17

Leighton

DIRECT SHEAR TEST

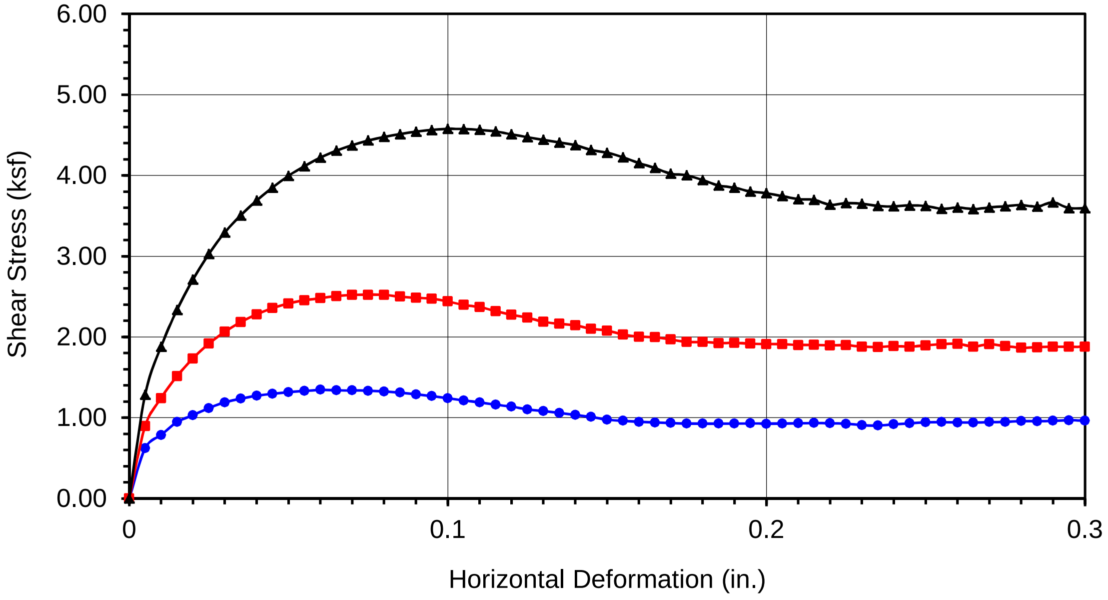
Consolidated Drained - ASTM D 3080

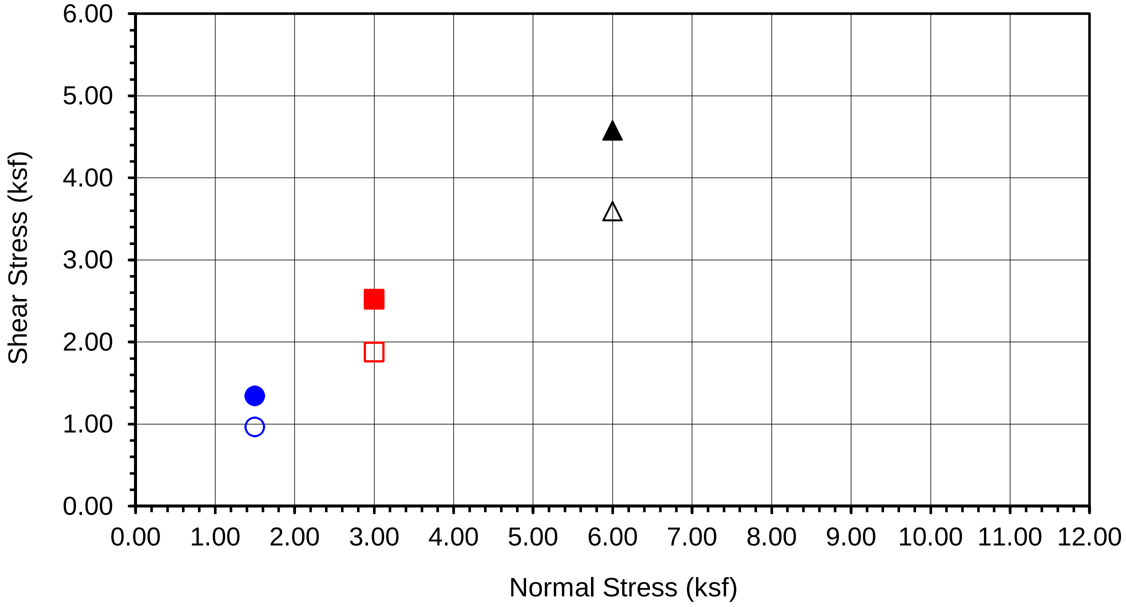
Project Name: Santa Monica High School
Project No.: 11428.007
Boring No.: LB-5
Sample No.: R2
Soil Identification: Brown silty sand (SM)

Tested By: G. Bathala
Checked By: J. Ward
Sample Type: Ring
Depth (ft.): 15.0

Date: 07/09/17
Date: 07/26/17

Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	168.57	172.74	175.04
Weight of Ring(gm):	40.53	42.24	43.34
Before Shearing			
Weight of Wet Sample+Cont.(gm):	199.35	199.35	199.35
Weight of Dry Sample+Cont.(gm):	192.09	192.09	192.09
Weight of Container(gm):	66.28	66.28	66.28
Vertical Rdg.(in): Initial	0.2707	0.0000	0.2844
Vertical Rdg.(in): Final	0.2788	-0.0192	0.3049
After Shearing			
Weight of Wet Sample+Cont.(gm):	200.00	209.70	211.78
Weight of Dry Sample+Cont.(gm):	177.73	187.74	190.68
Weight of Container(gm):	60.64	66.14	69.43
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**LB-5**
Sample No.	**R2**
Depth (ft)	**15**

Sample Type:

Ring

Soil Identification:
Brown silty sand (SM)

Normal Stress (kip/ft²)	1.500	3.000	6.000
Peak Shear Stress (kip/ft²)	● 1.346	■ 2.521	▲ 4.577
Shear Stress @ End of Test (ksf)	○ 0.965	□ 1.880	△ 3.596
Deformation Rate (in./min.)	0.0033	0.0033	0.0033
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	5.77	5.77	5.77
Dry Density (pcf)	100.7	102.6	103.6
Saturation (%)	23.1	24.2	24.8
Soil Height Before Shearing (in.)	0.9919	0.9808	0.9795
Final Moisture Content (%)	19.0	18.1	17.4

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DIRECT SHEAR TEST RESULTS

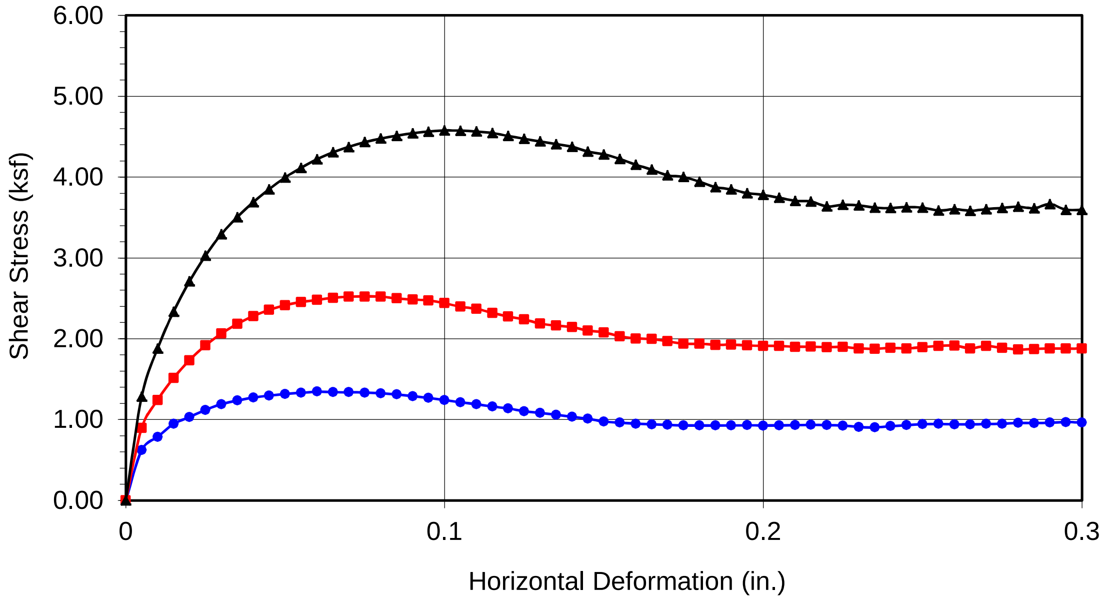
Consolidated Drained - ASTM D 3080

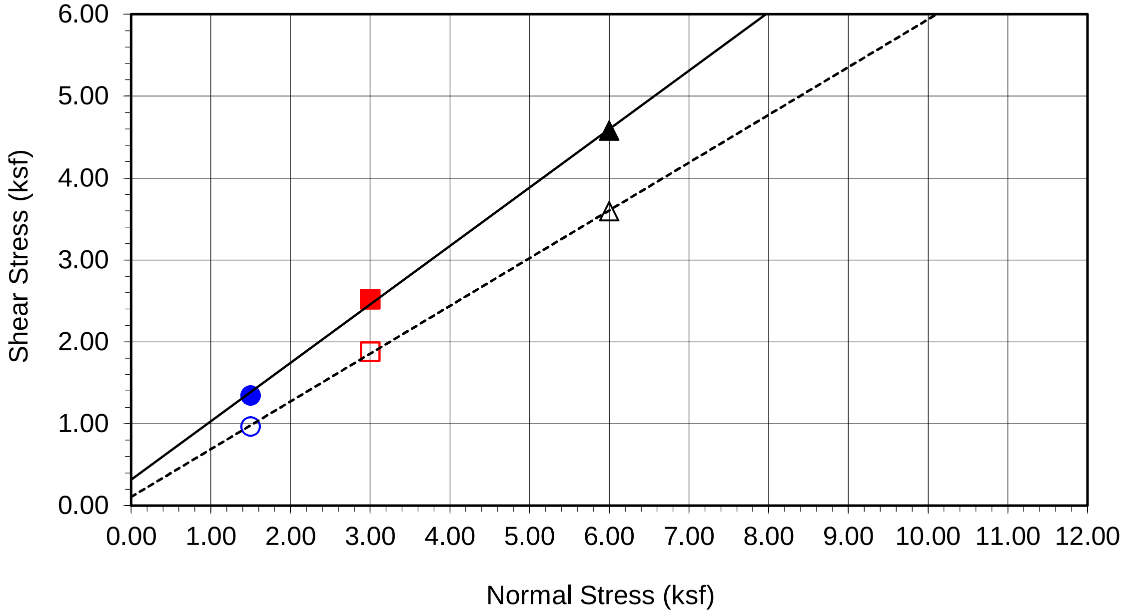
Project No.: 11428.007

Santa Monica High School

07-17

DS LB-5, R2 @ 15





Boring No.	**LB-5**
Sample No.	**R2**
Depth (ft)	**15**
Sample Type:	Ring

Soil Identification:
Brown silty sand (SM)

Strength Parameters

	C (psf)	ϕ (^{o})
Peak	318	36
Ultimate	107	30

Normal Stress (kip/ft²)	1.500	3.000	6.000
Peak Shear Stress (kip/ft²)	● 1.346	■ 2.521	▲ 4.577
Shear Stress @ End of Test (ksf)	○ 0.965	□ 1.880	△ 3.596
Deformation Rate (in./min.)	0.0033	0.0033	0.0033
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	5.77	5.77	5.77
Dry Density (pcf)	100.7	102.6	103.6
Saturation (%)	23.1	24.2	24.8
Soil Height Before Shearing (in.)	0.9919	0.9808	0.9795
Final Moisture Content (%)	19.0	18.1	17.4

Leighton

DIRECT SHEAR TEST RESULTS

Consolidated Drained - ASTM D 3080

Project No.: 11428.007

Santa Monica High School

07-17

Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name: Santa Monica High School
Tested By: M. Vinet
Date: 7/20/17
Project No. : 11428.007
Checked By: J. Ward
Date: 7/26/17
Boring No.: LB-1
Depth: 0-5
Sample No. : BB-1
Location: N/A
Sample Description: Brown silty sand (SM)

Dry Wt. of Soil + Cont. (gm.)	2512.2
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	2512.2
Weight Soil Retained on #4 Sieve	47.2
Percent Passing # 4	98.1

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	0.9910
Wt. Comp. Soil + Mold (gm.)	624.0	636.4
Wt. of Mold (gm.)	200.5	200.5
Specific Gravity (Assumed)	2.70	2.70
Container No.	4	4
Wet Wt. of Soil + Cont. (gm.)	466.6	636.4
Dry Wt. of Soil + Cont. (gm.)	444.4	392.1
Wt. of Container (gm.)	166.6	200.5
Moisture Content (%)	8.0	11.2
Wet Density (pcf)	127.7	132.7
Dry Density (pcf)	118.3	119.4
Void Ratio	0.425	0.412
Total Porosity	0.298	0.292
Pore Volume (cc)	61.8	59.9
Degree of Saturation (%) [S meas]	**50.8**	**73.1**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
7/20/17	11:00	1.0	0	0.5000
7/20/17	11:10	1.0	10	0.5000
	Add Distilled Water to the Specimen			
7/21/17	8:30	1.0	1280	0.4910
7/21/17	9:30	1.0	1340	0.4910

Expansion Index (EI meas) =	((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	-9.0
Expansion Index (Report) =	Nearest Whole Number or Zero (0) if Initial Height is > than Final Height	**0**

Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	Santa Monica High School	Tested By:	M. Vinet	Date:	7/20/17
Project No. :	11428.007	Checked By:	J. Ward	Date:	7/26/17
Boring No.:	LB-5	Depth:	0-5		
Sample No. :	BB-1	Location:	N/A		
Sample Description:	Dark brown silty sand (SM)				

Dry Wt. of Soil + Cont. (gm.)	1982.4
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	1982.4
Weight Soil Retained on #4 Sieve	42.2
Percent Passing # 4	97.9

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	0.9955
Wt. Comp. Soil + Mold (gm.)	635.8	649.5
Wt. of Mold (gm.)	209.4	209.4
Specific Gravity (Assumed)	2.70	2.70
Container No.	5	5
Wet Wt. of Soil + Cont. (gm.)	459.8	649.5
Dry Wt. of Soil + Cont. (gm.)	437.6	394.8
Wt. of Container (gm.)	159.8	209.4
Moisture Content (%)	8.0	11.5
Wet Density (pcf)	128.6	133.4
Dry Density (pcf)	119.1	119.6
Void Ratio	0.416	0.409
Total Porosity	0.294	0.290
Pore Volume (cc)	60.8	59.8
Degree of Saturation (%) [S meas]	**52.0**	**75.7**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
7/20/17	11:45	1.0	0	0.5000
7/20/17	11:55	1.0	10	0.5000
	Add Distilled Water to the Specimen			
7/21/17	8:30	1.0	1235	0.4955
7/21/17	9:30	1.0	1295	0.4955

Expansion Index (EI meas)	=	((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	-4.5
Expansion Index (Report)	=	Nearest Whole Number or Zero (0) if Initial Height is > than Final Height	**0**

Rev. 03-08

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name: Santa Monica High School
Tested By: O. Figueroa
Date: 07/06/17
Project No.: 11428.007
Input By: J. Ward
Date: 07/07/17
Boring No.: LB-1
Depth (ft.): 0-5
Sample No.: BB-1
Soil Identification: Brown silty sand (SM)

Note: Corrected dry density calculation assumes specific gravity of 2.70 and moisture content of 1.0% for oversize particles

Preparation Method:	X	Moist
		Dry
Compaction Method	X	Mechanical Ram
		Manual Ram

Scalp Fraction (%)	
#3/4	
#3/8	
#4	4.6

Rammer Weight (lb.) = 10.0
Height of Drop (in.) = 18.0
Mold Volume (ft³) 0.03330

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3780	4002	3990			
Weight of Mold (g)	1864	1864	1864			
Net Weight of Soil (g)	1916	2138	2126			
Wet Weight of Soil + Cont. (g)	324.6	441.0	466.4			
Dry Weight of Soil + Cont. (g)	311.6	414.3	428.6			
Weight of Container (g)	38.7	39.7	39.1			
Moisture Content (%)	4.76	7.13	9.70			
Wet Density (pcf)	126.8	141.5	140.7			
Dry Density (pcf)	121.1	132.1	128.3			

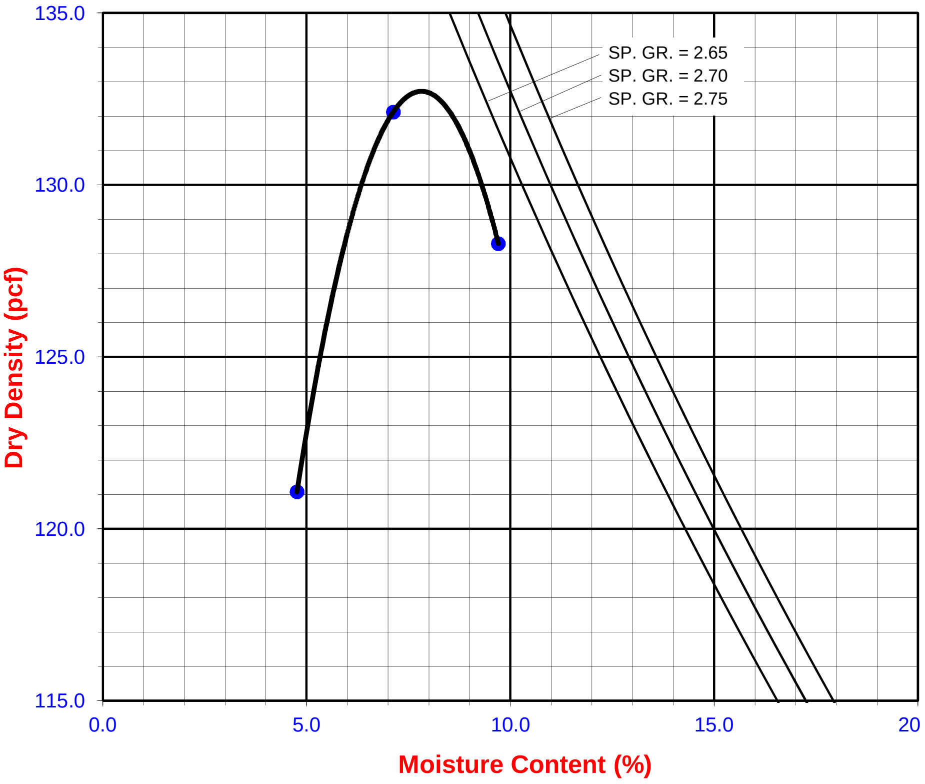
Maximum Dry Density (pcf) 132.5
Optimum Moisture Content (%) 8.0
Corrected Dry Density (pcf) 134.0
Corrected Moisture Content (%) 7.5

☒ **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

☐ **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

☐ **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:
GR:SA:FI
Atterberg Limits:
LL,PL,PI



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MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name: Santa Monica High School
Tested By: O. Figueroa
Date: 07/06/17
Project No.: 11428.007
Input By: J. Ward
Date: 07/07/17
Boring No.: LB-5
Depth (ft.): 0-5
Sample No.: BB-1
Soil Identification: Dark brown silty sand (SM)

Preparation Method: ☒ Moist ☐ Dry

☒ Mechanical Ram
☐ Manual Ram

Mold Volume (ft³) 0.03330

Ram Weight = 10 lb.; Drop = 18 in.

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3915	4036	3964			
Weight of Mold (g)	1864	1864	1864			
Net Weight of Soil (g)	2051	2172	2100			
Wet Weight of Soil + Cont. (g)	449.7	456.2	473.8			
Dry Weight of Soil + Cont. (g)	427.0	424.0	431.0			
Weight of Container (g)	39.5	39.1	39.3			
Moisture Content (%)	5.86	8.37	10.93			
Wet Density (pcf)	135.8	143.8	139.0			
Dry Density (pcf)	128.3	132.7	125.3			

Maximum Dry Density (pcf) 133.0

Optimum Moisture Content (%) 8.0

PROCEDURE USED

☒ **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

☐ **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

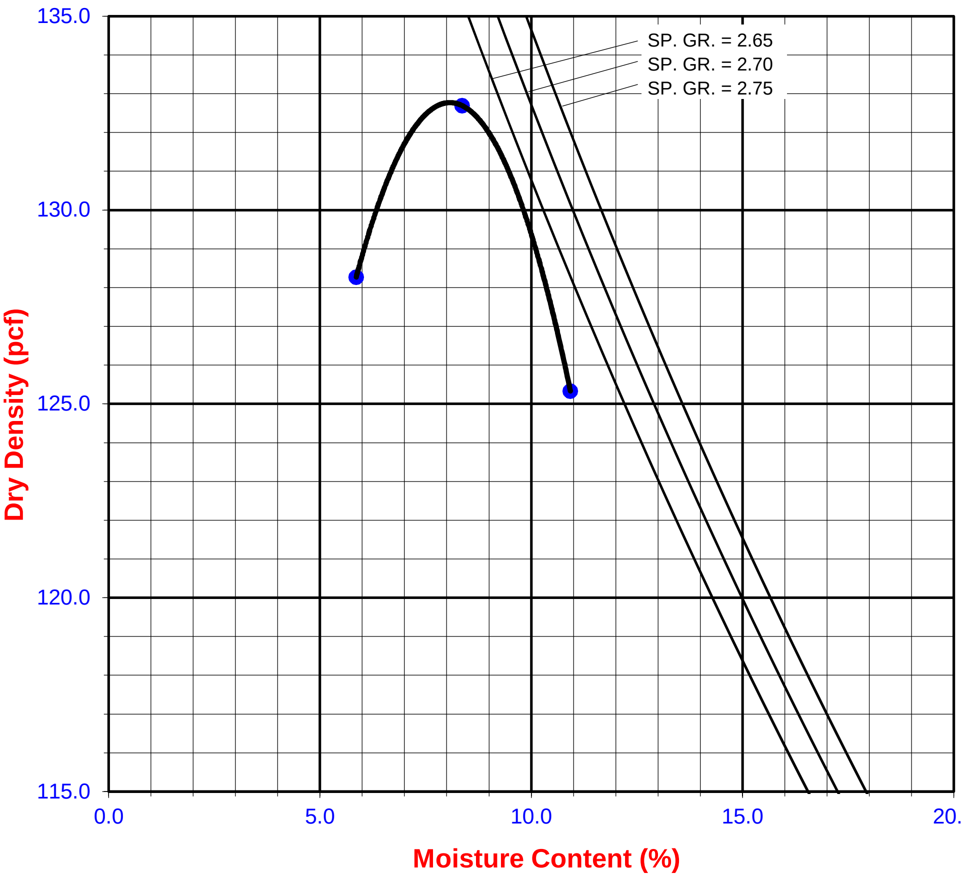
☐ **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



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R-VALUE TEST RESULTS

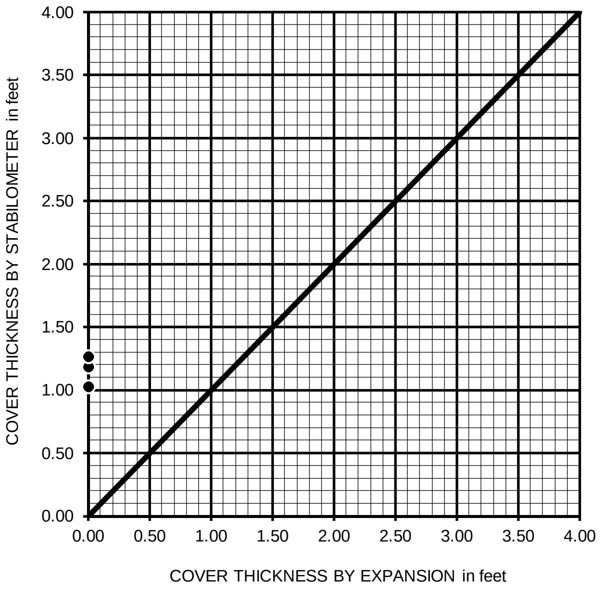
DOT CA Test 301

PROJECT NAME: Santa Monica High School
PROJECT NUMBER: 11428.007
BORING NUMBER: LB-1
DEPTH (FT.): 0-5
SAMPLE NUMBER: BB-1
TECHNICIAN: M. Vinet
SAMPLE DESCRIPTION: Brown silty sand (SM)
DATE COMPLETED: 7/20/2017

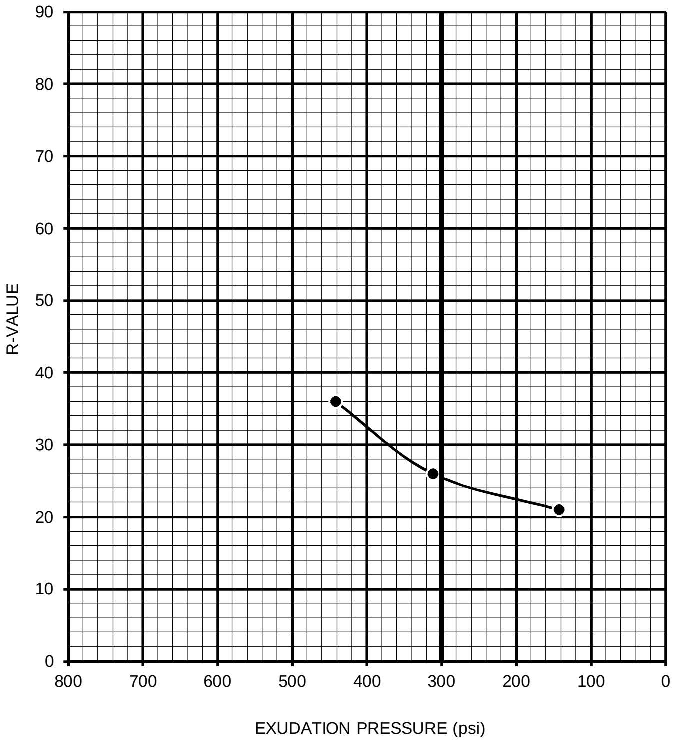
TEST SPECIMEN	**a**	**b**	**c**
MOISTURE AT COMPACTION %	9.3	10.3	11.3
HEIGHT OF SAMPLE, Inches	2.48	2.65	2.58
DRY DENSITY, pcf	129.0	126.5	123.7
COMPACTOR PRESSURE, psi	250	125	75
EXUDATION PRESSURE, psi	442	312	143
EXPANSION, Inches x 10exp-4	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	79	99	107
TURNS DISPLACEMENT	4.47	4.75	4.92
R-VALUE UNCORRECTED	36	24	20
R-VALUE CORRECTED	36	26	21

DESIGN CALCULATION DATA	**a**	**b**	**c**
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	1.02	1.18	1.26
EXPANSION PRESSURE THICKNESS, ft.	0.00	0.00	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION: N/A
R-VALUE BY EXUDATION: 25
EQUILIBRIUM R-VALUE: 25

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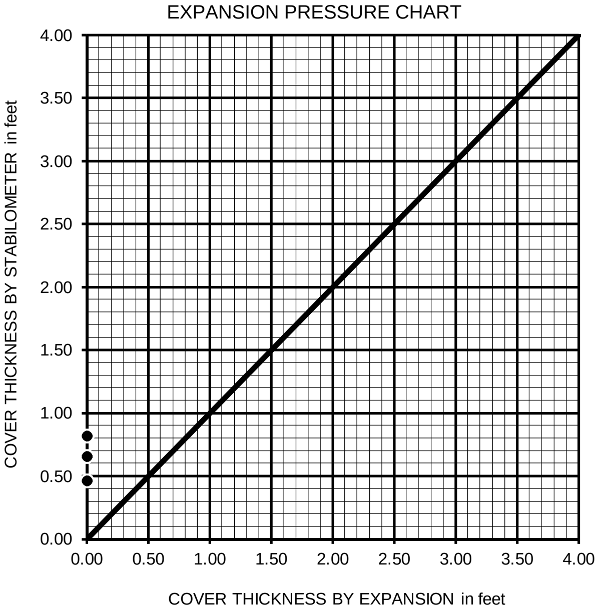
R-VALUE TEST RESULTS

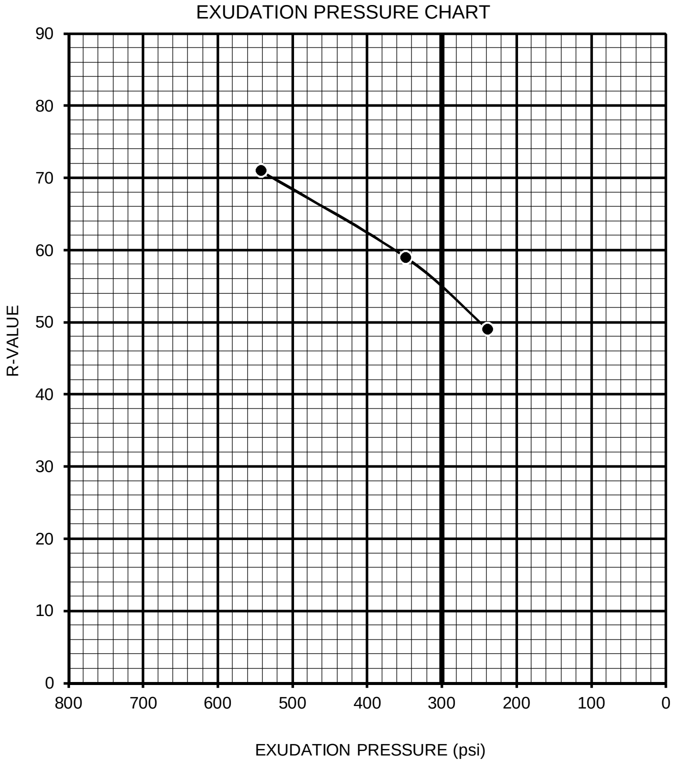
DOT CA Test 301

PROJECT NAME:	Santa Monica High School	PROJECT NUMBER:	11428.007
BORING NUMBER:	LB-5	DEPTH (FT.):	0-5
SAMPLE NUMBER:	BB-1	TECHNICIAN:	M. Vinet
SAMPLE DESCRIPTION:	Dark brown silty sand (SM)	DATE COMPLETED:	7/20/2017

TEST SPECIMEN	**a**	**b**	**c**
MOISTURE AT COMPACTION %	8.0	8.5	9.0
HEIGHT OF SAMPLE, Inches	2.45	2.49	2.51
DRY DENSITY, pcf	131.2	128.2	129.0
COMPACTOR PRESSURE, psi	350	350	250
EXUDATION PRESSURE, psi	543	348	239
EXPANSION, Inches x 10exp-4	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	32	45	56
TURNS DISPLACEMENT	4.18	4.45	4.75
R-VALUE UNCORRECTED	71	59	49
R-VALUE CORRECTED	71	59	49

DESIGN CALCULATION DATA	**a**	**b**	**c**
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.46	0.66	0.82
EXPANSION PRESSURE THICKNESS, ft.	0.00	0.00	0.00





R-VALUE BY EXPANSION: N/A

R-VALUE BY EXUDATION: 55

EQUILIBRIUM R-VALUE: 55

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PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name: Santa Monica High School/Tennis Court
Project No.: 11428.008
Boring No.: PB-1
Sample No.: R1
Soil Identification: Reddish brown poorly-graded sand (SP)

Tested By: S. Felter Date: 08/07/17
Checked By: J. Ward Date: 08/23/17
Depth (feet): 5.0

		Moisture Content of Total Air - Dry Soil	
Container No.:	PH	Wt. of Air-Dry Soil + Cont. (g)	0.0
Wt. of Air-Dried Soil + Cont.(g)	860.3	Wt. of Dry Soil + Cont. (g)	0.0
Wt. of Container (g)	202.7	Wt. of Container No.______ (g)	1.0
Dry Wt. of Soil (g)	657.6	Moisture Content (%)	0.0

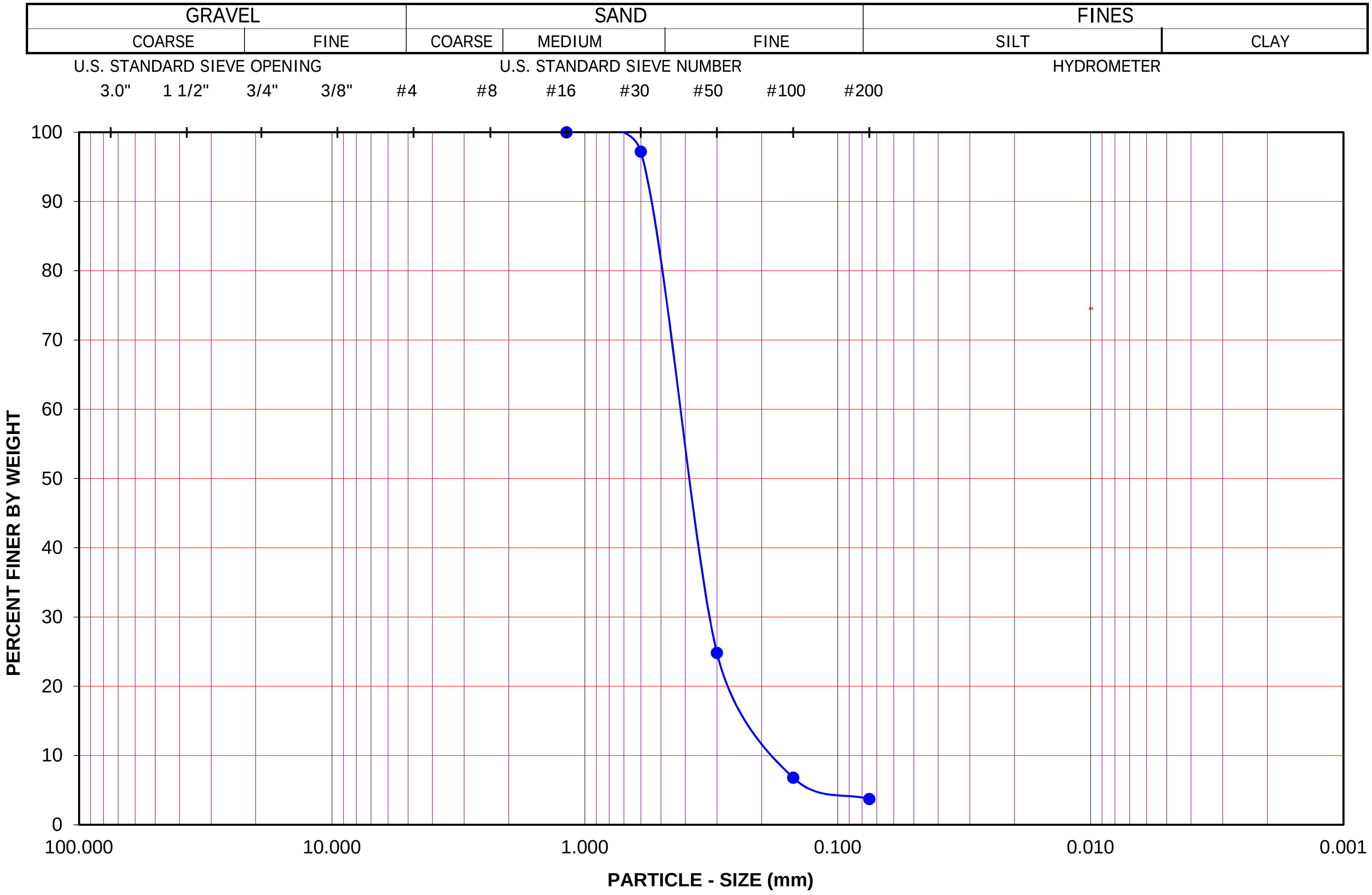
After Wet Sieve	Container No.	PH
	Wt. of Dry Soil + Container (g)	837.6
	Wt. of Container (g)	202.7
	Dry Wt. of Soil Retained on # 200 Sieve (g)	634.9

U. S. Sieve Size		Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
(in.)	(mm.)		
3"	75.0		
1 1/2"	37.5		
3/4"	19.0		
3/8"	9.5		
#4	4.75		
#8	2.36		
#16	1.18	0.0	100.0
#30	0.600	18.2	97.2
#50	0.300	494.4	24.8
#100	0.150	613.1	6.8
#200	0.075	633.1	3.7
PAN			

GRAVEL: **0 %**
SAND: **96 %**
FINES: **4 %**
GROUP SYMBOL: **SP**

Cu = D60/D10 = 2.33
Cc = $(D30)^2/(D60*D10)$ = 1.35

Remarks:



Project Name: Santa Monica High School/Tennis Court

Project No.: 11428.008

Boring No.: PB-1

Sample No.: R1

Depth (feet): 5.0

Soil Type : SP

Soil Identification: Reddish brown poorly-graded sand (SP)

GR:SA:FI : (%) **0 : 96 : 4**

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PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Aug-17

SA PB-1, R1 @ 5

Leighton

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name: Santa Monica High School/Tennis Court
Tested By: S. Felter Date: 08/07/17
Project No.: 11428.008
Checked By: J. Ward Date: 08/23/17
Boring No.: PB-1
Depth (feet): 8.5
Sample No.: R3
Soil Identification: Olive brown poorly-graded sand with silt (SP-SM)

		Moisture Content of Total Air - Dry Soil	
Container No.:	DR	Wt. of Air-Dry Soil + Cont. (g)	0.0
Wt. of Air-Dried Soil + Cont.(g)	843.9	Wt. of Dry Soil + Cont. (g)	0.0
Wt. of Container (g)	218.3	Wt. of Container No.______ (g)	1.0
Dry Wt. of Soil (g)	625.6	Moisture Content (%)	0.0

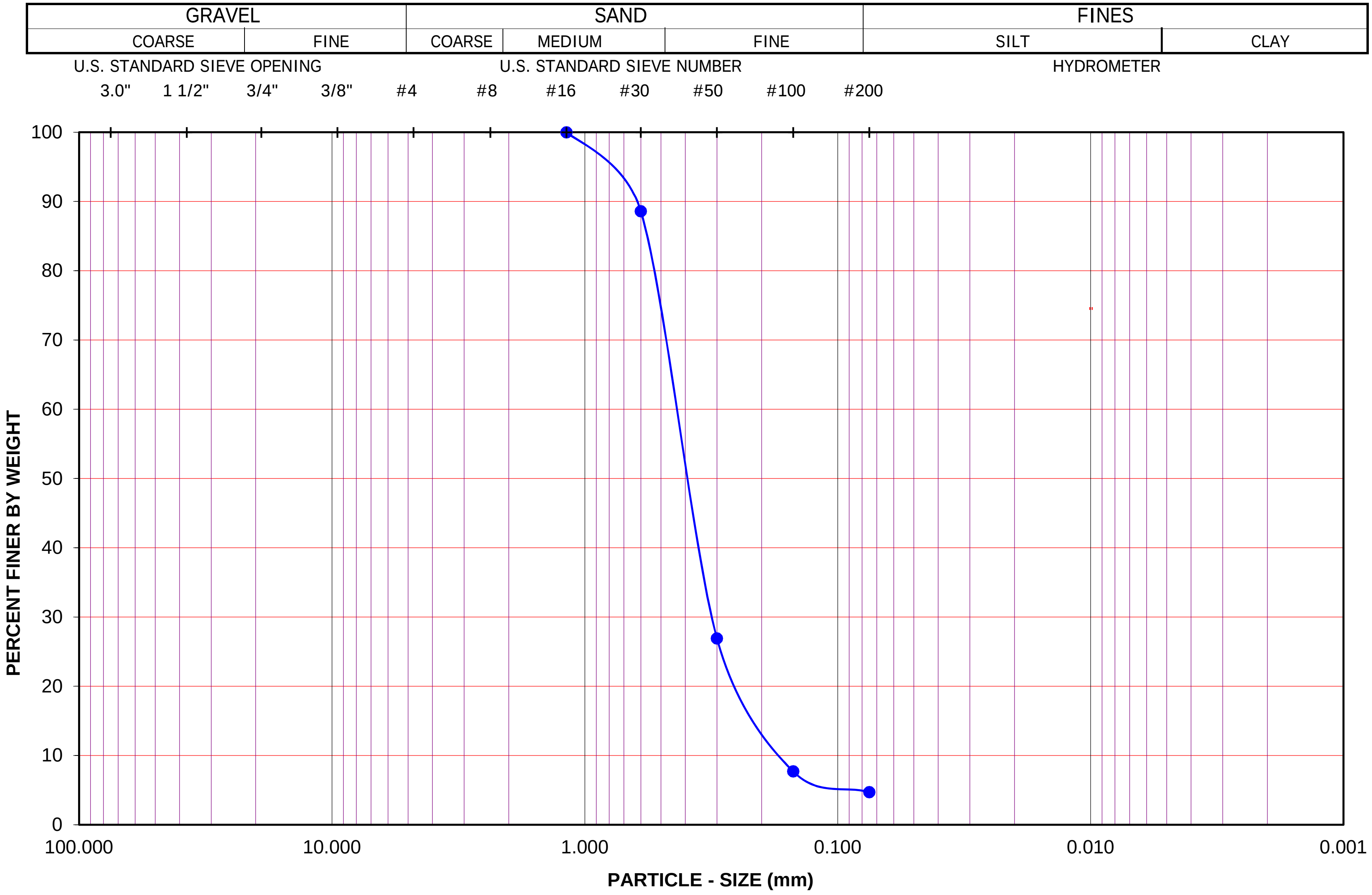
After Wet Sieve	Container No.	DR
	Wt. of Dry Soil + Container (g)	816.3
	Wt. of Container (g)	218.3
	Dry Wt. of Soil Retained on # 200 Sieve (g)	598.0

U. S. Sieve Size		Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
(in.)	(mm.)		
3"	75.0		
1 1/2"	37.5		
3/4"	19.0		
3/8"	9.5		
#4	4.75		
#8	2.36		
#16	1.18	0.0	100.0
#30	0.600	71.5	88.6
#50	0.300	457.5	26.9
#100	0.150	577.5	7.7
#200	0.075	595.9	4.7
PAN			

GRAVEL: **0 %**
SAND: **95 %**
FINES: **5 %**
GROUP SYMBOL: **SP-SM**

Cu = D60/D10 = 2.53
Cc = $(D30)^2/(D60*D10)$ = 1.31

Remarks:



Project Name: Santa Monica High School/Tennis Court

Project No.: 11428.008

Boring No.: PB-1

Sample No.: R3

Depth (feet): 8.5

Soil Type : SP-SM

Soil Identification: Olive brown poorly-graded sand with silt (SP-SM)

GR:SA:FI : (%) **0 : 95 : 5**

Leighton

PARTICLE - SIZE DISTRIBUTION

ASTM D 6913

Aug-17

APPENDIX C

Seismicity Data

Leighton

USGS Design Maps Detailed Report

ASCE 7-10 Standard (34.01272°N, 118.48679°W)

Site Class D – "Stiff Soil", Risk Category IV (e.g. essential facilities)

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1]	$S_S = 1.980$ g
From Figure 22-2 [2]	$S_1 = 0.735$ g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index $PI > 20$, • Moisture content $w \geq 40\%$, and • Undrained shear strength $\bar{s}_u < 500$ psf		
F. Soils requiring site response analysis in accordance with Section 21.1		See Section 20.3.1	

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk-Targeted Maximum Considered Earthquake (MCE$_R$) Spectral Response Acceleration Parameters

Table 11.4-1: Site Coefficient F_a

Site Class	Mapped MCE $_R$ Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_S

For Site Class = D and S_S = 1.980 g, F_a = 1.000

Table 11.4-2: Site Coefficient F_v

Site Class	Mapped MCE $_R$ Spectral Response Acceleration Parameter at 1-s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.735 g, F_v = 1.500

Equation (11.4–1): $S_{MS} = F_aS_S = 1.000 \times 1.980 = 1.980$ g

Equation (11.4–2): $S_{M1} = F_vS_1 = 1.500 \times 0.735 = 1.103$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

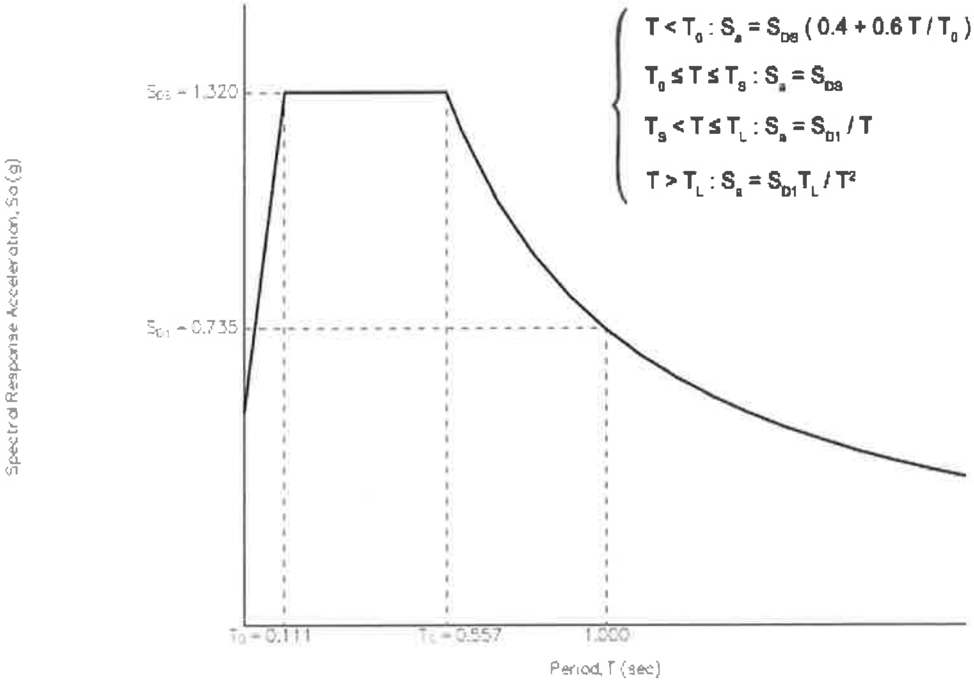
Equation (11.4–3): $S_{DS} = ⅔\, S_{MS} = ⅔ \times 1.980 = 1.320$ g

Equation (11.4–4): $S_{D1} = ⅔\, S_{M1} = ⅔ \times 1.103 = 0.735$ g

Section 11.4.5 — Design Response Spectrum

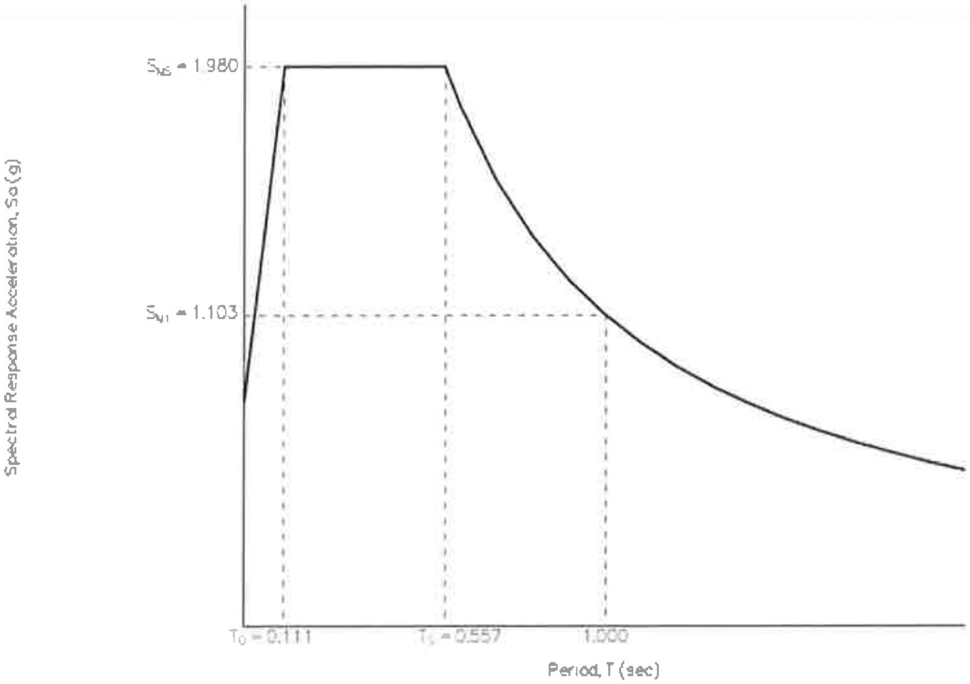
From Figure 22-12 [3] $T_L = 8$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4] PGA = 0.751

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.751 = 0.751$ g

Table 11.8–1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	$\boxed{1.0}$
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight–line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.751 g, F_{PGA} = 1.000

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5] C_{RS} = 0.960

From Figure 22-18 [6] C_{R1} = 0.957

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	**RISK CATEGORY**		
	I or II	**III**	**IV**
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = IV and S_{DS} = 1.320 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	**RISK CATEGORY**		
	I or II	**III**	**IV**
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = IV and S_{D1} = 0.735 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

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                   *                       *
                   *    E Q S E A R C H    *
                   *                       *
                   *     Version 3.00      *
                   *                       *
                   *************************

                       ESTIMATION OF
                    PEAK ACCELERATION FROM
                 CALIFORNIA EARTHQUAKE CATALOGS


JOB NUMBER: 11428.007
                                     DATE: 07-27-2017

JOB NAME: Phase I and Phase II

EARTHQUAKE-CATALOG-FILE NAME: ALLQUAKE.DAT

MAGNITUDE RANGE:
  MINIMUM MAGNITUDE:  4.00
  MAXIMUM MAGNITUDE:  9.00

SITE COORDINATES:
  SITE LATITUDE:  34.0127
  SITE LONGITUDE:  118.4868

SEARCH DATES:
        START DATE:   1800
        END DATE:   2016

SEARCH RADIUS:
        100.0 mi
        160.9 km

ATTENUATION RELATION:  14) Campbell & Bozorgnia (1997 Rev.) - Alluvium
  UNCERTAINTY (M=Median, S=Sigma): M      Number of Sigmas:  0.0
  ASSUMED SOURCE TYPE:  DS [SS=Strike-slip, DS=Reverse-slip, BT=Blind-thrust]
  SCOND:   0  Depth Source:  A
  Basement Depth:  5.00 km     Campbell SSR:  0     Campbell SHR:  0
  COMPUTE PEAK HORIZONTAL ACCELERATION

MINIMUM DEPTH VALUE (km):  3.0
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                         EARTHQUAKE SEARCH RESULTS
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-------------------------------------------------------------------------------
    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |34.0000|118.5000|11/08/1914|1140 0.0|  0.0| 4.50| 0.176 |VIII|  1.2(  1.9)
MGI |34.0000|118.5000|03/08/1918|1230 0.0|  0.0| 4.00| 0.122 | VII|  1.2(  1.9)
DMG |34.0000|118.5000|06/22/1920| 248 0.0|  0.0| 4.90| 0.231 | IX |  1.2(  1.9)
MGI |34.0000|118.5000|06/23/1920|1220 0.0|  0.0| 4.00| 0.122 | VII|  1.2(  1.9)
DMG |34.0000|118.5000|08/04/1927|1224 0.0|  0.0| 5.00| 0.246 | IX |  1.2(  1.9)
MGI |34.0000|118.5000|11/19/1918|2018 0.0|  0.0| 5.00| 0.246 | IX |  1.2(  1.9)
DMG |34.0000|118.5000|03/06/1918|1820 0.0|  0.0| 4.00| 0.122 | VII|  1.2(  1.9)
DMG |34.0000|118.4170|12/07/1938| 338 0.0|  0.0| 4.00| 0.085 | VII|  4.1(  6.6)
MGI |34.0000|118.4000|02/07/1927| 429 0.0|  0.0| 4.60| 0.116 | VII|  5.0(  8.1)
MGI |34.0000|118.4000|01/29/1927|2324 0.0|  0.0| 4.00| 0.073 | VII|  5.0(  8.1)
MGI |34.0000|118.4000|10/01/1930| 040 0.0|  0.0| 4.60| 0.116 | VII|  5.0(  8.1)
MGI |34.0000|118.4000|02/22/1920|1610 0.0|  0.0| 4.60| 0.116 | VII|  5.0(  8.1)
GSG |34.0958|118.4912|06/02/2014|023643.9|  4.4| 4.16| 0.074 | VII|  5.7(  9.2)
GSP |34.0590|118.3870|09/09/2001|235918.0|  4.0| 4.20| 0.068 | VI |  6.5( 10.5)
DMG |33.9030|118.4310|11/29/1938|192115.8| 10.0| 4.00| 0.046 | VI |  8.2( 13.2)
GSG |34.1347|118.4858|03/17/2014|132536.9|  9.9| 4.39| 0.061 | VI |  8.4( 13.5)
DMG |33.9500|118.6320|08/31/1930| 04036.0|  0.0| 5.20| 0.104 | VII|  9.4( 15.1)
GSP |33.9380|118.3360|05/18/2009|033936.3| 13.0| 4.70| 0.064 | VI | 10.1( 16.2)
PAS |33.9190|118.6270|01/19/1989| 65328.8| 11.9| 5.00| 0.078 | VII| 10.3( 16.6)
MGI |34.0000|118.3000|06/30/1920| 350 0.0|  0.0| 4.00| 0.034 |  V | 10.7( 17.3)
MGI |34.0000|118.3000|06/22/1920|2035 0.0|  0.0| 4.00| 0.034 |  V | 10.7( 17.3)
MGI |34.0000|118.3000|09/03/1905| 540 0.0|  0.0| 5.30| 0.096 | VII| 10.7( 17.3)
DMG |33.9830|118.3000|02/11/1940|192410.0|  0.0| 4.00| 0.033 |  V | 10.9( 17.5)
PAS |33.9330|118.6690|10/17/1979|205237.3|  5.5| 4.20| 0.036 |  V | 11.8( 19.0)
PAS |33.9440|118.6810|01/01/1979|231438.9| 11.3| 5.00| 0.065 | VI | 12.1( 19.4)
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MGI |34.1000|118.3000|07/16/1920|2022 0.0|  0.0| 4.60| 0.046 | VI | 12.3( 19.7)
MGI |34.1000|118.3000|07/16/1920|2130 0.0|  0.0| 4.60| 0.046 | VI | 12.3( 19.7)
MGI |34.1000|118.3000|07/26/1920|1215 0.0|  0.0| 4.00| 0.029 |  V | 12.3( 19.7)
MGI |34.1000|118.3000|07/16/1920|2127 0.0|  0.0| 4.60| 0.046 | VI | 12.3( 19.7)
DMG |33.8830|118.3170|03/11/1933|1457 0.0|  0.0| 4.90| 0.054 | VI | 13.2( 21.3)
T-A |34.0000|118.2500|09/23/1827| 0 0 0.0|  0.0| 5.00| 0.056 | VI | 13.6( 21.8)
T-A |34.0000|118.2500|03/26/1860| 0 0 0.0|  0.0| 5.00| 0.056 | VI | 13.6( 21.8)
T-A |34.0000|118.2500|05/02/1856| 810 0.0|  0.0| 4.30| 0.032 |  V | 13.6( 21.8)
T-A |34.0000|118.2500|01/17/1857| 1 0 0.0|  0.0| 4.30| 0.032 |  V | 13.6( 21.8)
T-A |34.0000|118.2500|05/04/1857| 6 0 0.0|  0.0| 4.30| 0.032 |  V | 13.6( 21.8)
T-A |34.0000|118.2500|03/21/1880|1425 0.0|  0.0| 4.30| 0.032 |  V | 13.6( 21.8)
T-A |34.0000|118.2500|01/10/1856| 0 0 0.0|  0.0| 5.00| 0.056 | VI | 13.6( 21.8)
MGI |34.0800|118.2600|07/16/1920|18 8 0.0|  0.0| 5.00| 0.055 | VI | 13.8( 22.2)
GSP |33.9220|118.2700|10/28/2001|162745.6| 21.0| 4.00| 0.025 |  V | 13.9( 22.4)
GSP |34.2150|118.5100|01/19/1994|140914.8| 17.0| 4.50| 0.036 |  V | 14.0( 22.6)
GSP |34.2130|118.5370|01/17/1994|123055.4| 18.0| 6.70| 0.196 |VIII| 14.1( 22.7)
MGI |33.8000|118.5000|06/18/1915|15 5 0.0|  0.0| 4.00| 0.023 | IV | 14.7( 23.7)
GSP |34.2310|118.4750|03/20/1994|212012.3| 13.0| 5.30| 0.063 | VI | 15.1( 24.3)
GSP |34.2280|118.5730|01/17/1994|175608.2| 19.0| 4.60| 0.034 |  V | 15.7( 25.2)
GSP |34.2180|118.6070|01/18/1994|113509.9| 12.0| 4.20| 0.024 |  V | 15.7( 25.3)
GSP |34.2450|118.4710|01/18/1994|155144.9| 12.0| 4.00| 0.020 | IV | 16.1( 25.8)
DMG |33.7830|118.4170|10/14/1940|205111.0|  0.0| 4.00| 0.020 | IV | 16.4( 26.3)
DMG |33.7830|118.4170|11/01/1940| 725 3.0|  0.0| 4.00| 0.020 | IV | 16.4( 26.3)
DMG |33.7830|118.4170|10/12/1940| 024 0.0|  0.0| 4.00| 0.020 | IV | 16.4( 26.3)
DMG |33.7830|118.4170|11/02/1940| 25826.0|  0.0| 4.00| 0.020 | IV | 16.4( 26.3)
MGI |34.0000|118.2000|06/26/1917|2115 0.0|  0.0| 4.60| 0.032 |  V | 16.4( 26.4)
MGI |34.0000|118.2000|02/13/1917|13 5 0.0|  0.0| 4.60| 0.032 |  V | 16.4( 26.4)
MGI |34.0000|118.2000|06/26/1917|2130 0.0|  0.0| 4.60| 0.032 |  V | 16.4( 26.4)




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                    EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
MGI |34.0000|118.2000|06/26/1917|2120 0.0|  0.0| 4.60| 0.032 |  V | 16.4( 26.4)
MGI |34.0000|118.2000|06/26/1917| 424 0.0|  0.0| 4.00| 0.020 | IV | 16.4( 26.4)
DMG |33.7700|118.4800|04/24/1931|182754.8|  0.0| 4.40| 0.026 |  V | 16.8( 27.0)
DMG |33.8500|118.2670|03/11/1933| 629 0.0|  0.0| 4.40| 0.026 |  V | 16.9( 27.1)
DMG |33.8500|118.2670|03/11/1933|1425 0.0|  0.0| 5.00| 0.042 | VI | 16.9( 27.1)
DMG |33.9390|118.2050|01/11/1950|214135.0|  0.4| 4.10| 0.021 | IV | 16.9( 27.2)
GSP |34.2540|118.5450|01/17/1994|130627.9|  0.0| 4.60| 0.031 |  V | 17.0( 27.3)
DMG |33.7670|118.4500|10/11/1940| 55712.3|  0.0| 4.70| 0.033 |  V | 17.1( 27.5)
GSP |34.2610|118.5340|01/17/1994|123939.8| 14.0| 4.50| 0.027 |  V | 17.3( 27.9)
MGI |34.1000|118.2000|05/02/1916|1432 0.0|  0.0| 4.00| 0.018 | IV | 17.5( 28.1)
MGI |34.1000|118.2000|01/27/1860| 830 0.0|  0.0| 4.30| 0.023 | IV | 17.5( 28.1)
MGI |34.1000|118.2000|04/21/1921|1538 0.0|  0.0| 4.00| 0.018 | IV | 17.5( 28.1)
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GSP |34.0200|118.1800|06/12/1989|172225.5| 16.0| 4.10| 0.020 | IV | 17.6( 28.3)
GSP |34.0300|118.1800|06/12/1989|165718.4| 16.0| 4.40| 0.025 |  V | 17.6( 28.3)
DMG |34.2680|118.4450|08/30/1964|225737.1| 15.4| 4.00| 0.018 | IV | 17.8( 28.6)
DMG |34.2730|118.5320|06/21/1971|16 1 8.5|  4.1| 4.00| 0.017 | IV | 18.2( 29.2)
DMG |34.2650|118.5770|04/15/1971|111432.0|  4.2| 4.20| 0.020 | IV | 18.2( 29.2)
DMG |33.8000|118.3000|11/03/1931|16 5 0.0|  0.0| 4.00| 0.017 | IV | 18.2( 29.2)
MGI |33.8000|118.3000|12/31/1928|1045 0.0|  0.0| 4.00| 0.017 | IV | 18.2( 29.2)
MGI |33.9000|118.2000|10/08/1927|1914 0.0|  0.0| 4.60| 0.028 |  V | 18.2( 29.2)
GSP |34.2690|118.5760|01/17/1994|125546.8| 16.0| 4.10| 0.018 | IV | 18.4( 29.6)
DMG |33.8670|118.2170|06/19/1944| 3 6 7.0|  0.0| 4.40| 0.023 | IV | 18.4( 29.7)
DMG |33.8670|118.2170|06/19/1944| 0 333.0|  0.0| 4.50| 0.025 |  V | 18.4( 29.7)
GSP |34.2740|118.5630|01/27/1994|171958.8| 14.0| 4.60| 0.027 |  V | 18.6( 29.9)
DMG |34.2840|118.5280|04/02/1971| 54025.0|  3.0| 4.00| 0.016 | IV | 18.9( 30.4)
DMG |34.1000|118.8000|05/10/1911|1340 0.0|  0.0| 4.00| 0.016 | IV | 18.9( 30.4)
DMG |34.2860|118.5150|03/31/1971|145222.5|  2.1| 4.60| 0.026 |  V | 18.9( 30.5)
GSP |34.2870|118.4660|01/19/1994|071406.2| 11.0| 4.00| 0.016 | IV | 19.0( 30.5)
GSP |34.2910|118.4760|02/06/1994|131926.9| 11.0| 4.10| 0.017 | IV | 19.2( 30.9)
DMG |33.8670|118.2000|11/13/1933|2128 0.0|  0.0| 4.00| 0.016 | IV | 19.3( 31.0)
GSP |34.2840|118.4040|01/14/2001|022614.1|  8.0| 4.30| 0.020 | IV | 19.3( 31.1)
GSP |34.2920|118.4660|01/19/1994|144635.2|  6.0| 4.00| 0.016 | IV | 19.3( 31.1)
DMG |34.2960|118.4640|03/30/1971| 85443.3|  2.6| 4.10| 0.017 | IV | 19.6( 31.5)
GSP |34.2780|118.6110|01/29/1994|121656.4|  2.0| 4.30| 0.020 | IV | 19.6( 31.6)
GSP |34.2890|118.4030|01/14/2001|025053.7|  8.0| 4.00| 0.015 | IV | 19.7( 31.6)
GSP |34.2970|118.4580|01/21/1994|185344.6|  7.0| 4.30| 0.020 | IV | 19.7( 31.7)
GSB |34.3000|118.4660|01/21/1994|183915.3| 10.0| 4.70| 0.027 |  V | 19.9( 32.0)
GSP |34.2990|118.4390|02/03/1994|162335.4|  8.0| 4.20| 0.018 | IV | 20.0( 32.1)
GSP |34.3010|118.4520|01/21/1994|185244.2|  7.0| 4.30| 0.019 | IV | 20.0( 32.2)
GSB |34.2990|118.4280|01/23/1994|085508.7|  6.0| 4.20| 0.018 | IV | 20.0( 32.3)
GSP |34.3040|118.4730|01/17/1994|150703.2|  2.0| 4.20| 0.018 | IV | 20.1( 32.4)
GSP |34.2930|118.3890|12/06/1994|034834.5|  9.0| 4.50| 0.022 | IV | 20.1( 32.4)
GSB |34.2850|118.6240|01/17/1994|135602.4| 19.0| 4.70| 0.026 |  V | 20.4( 32.8)
GSB |34.3010|118.5650|01/17/1994|204602.4|  9.0| 5.20| 0.039 |  V | 20.4( 32.8)
DMG |34.3080|118.4540|02/09/1971|144346.7|  6.2| 5.20| 0.038 |  V | 20.5( 32.9)
DMG |33.8170|118.2170|10/22/1941| 65718.5|  0.0| 4.90| 0.030 |  V | 20.5( 33.0)
GSB |34.3100|118.4740|01/21/1994|184228.8|  7.0| 4.20| 0.017 | IV | 20.5( 33.0)
GSP |34.3110|118.4560|01/17/1994|193534.3|  2.0| 4.00| 0.014 | IV | 20.7( 33.3)
DMG |33.9500|118.1330|10/25/1933| 7 046.0|  0.0| 4.30| 0.018 | IV | 20.7( 33.3)
GSP |34.3050|118.5790|01/29/1994|112036.0|  1.0| 5.10| 0.035 |  V | 20.9( 33.6)
DMG |34.3000|118.6000|04/04/1893|1940 0.0|  0.0| 6.00| 0.072 | VI | 20.9( 33.6)
DMG |33.7830|118.2500|11/14/1941| 84136.3|  0.0| 5.40| 0.044 | VI | 20.9( 33.6)
GSP |34.3170|118.4550|01/17/1994|132644.7|  2.0| 4.70| 0.025 |  V | 21.1( 33.9)




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                    EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |    DATE    |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
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----+-------+--------+----------+--------+-----+-----+-------+----+------------
T-A |34.1700|118.1700|03/07/1888|1554 0.0|  0.0| 4.30| 0.018 | IV | 21.1( 34.0)
GSP |34.3110|118.3980|06/15/1994|055948.6|  7.0| 4.20| 0.016 | IV | 21.2( 34.1)
GSP |34.3000|118.6200|08/09/2007|075849.0|  4.0| 4.40| 0.019 | IV | 21.2( 34.2)
GSP |34.3120|118.3930|05/25/1994|125657.1|  7.0| 4.40| 0.019 | IV | 21.3( 34.3)
GSB |34.3190|118.5580|01/18/1994|132444.1|  1.0| 4.50| 0.020 | IV | 21.5( 34.6)
DMG |33.7590|118.2530|08/31/1938| 31814.2| 10.0| 4.50| 0.020 | IV | 22.1( 35.5)
GSP |34.3310|118.4420|01/17/1994|141430.3|  1.0| 4.50| 0.020 | IV | 22.1( 35.6)
GSG |34.3340|118.4840|01/17/1994|223152.1| 10.0| 4.20| 0.015 | IV | 22.2( 35.7)
PAS |34.1490|118.1350|12/03/1988|113826.4| 13.3| 4.90| 0.027 |  V | 22.2( 35.7)
PAS |34.0490|118.1010|10/01/1987|144541.5| 13.6| 4.70| 0.023 | IV | 22.2( 35.7)
PAS |34.0600|118.1000|10/01/1987|1449 5.9| 11.7| 4.70| 0.023 | IV | 22.4( 36.0)
GSP |34.3390|118.4750|09/01/2011|204708.0|  7.0| 4.20| 0.015 | IV | 22.5( 36.3)
PAS |34.0730|118.0980|10/04/1987|105938.2|  8.2| 5.30| 0.036 |  V | 22.6( 36.4)
DMG |33.7830|118.2000|12/27/1939|192849.0|  0.0| 4.70| 0.022 | IV | 22.8( 36.7)
PAS |34.0520|118.0900|10/01/1987|151231.8| 10.8| 4.70| 0.022 | IV | 22.9( 36.8)
MGI |34.1000|118.1000|07/11/1855| 415 0.0|  0.0| 6.30| 0.080 | VII| 22.9( 36.9)
GSP |34.0690|118.8820|05/02/2009|011113.7| 14.0| 4.40| 0.017 | IV | 22.9( 36.9)
PAS |34.0500|118.0870|10/01/1987|155953.5| 10.4| 4.00| 0.012 | III| 23.0( 37.0)
PAS |34.0760|118.0900|10/01/1987|1448 3.1| 11.7| 4.10| 0.013 | III| 23.1( 37.2)
GSP |33.9920|118.0820|03/16/2010|110400.2| 18.0| 4.40| 0.017 | IV | 23.2( 37.4)
GSB |34.3450|118.5520|01/24/1994|041518.8|  6.0| 4.80| 0.023 | IV | 23.2( 37.4)
GSB |34.3330|118.6230|01/18/1994|072356.0| 14.0| 4.30| 0.015 | IV | 23.4( 37.7)
DMG |33.9000|118.1000|07/08/1929|1646 6.7| 13.0| 4.70| 0.021 | IV | 23.5( 37.8)
DMG |34.3530|118.4560|03/07/1971| 13340.5|  3.3| 4.50| 0.018 | IV | 23.6( 37.9)
PAS |34.0610|118.0790|10/01/1987|144220.0|  9.5| 5.90| 0.056 | VI | 23.6( 37.9)
DMG |34.3560|118.4740|03/25/1971|2254 9.9|  4.6| 4.20| 0.014 | IV | 23.7( 38.2)
GSP |34.3570|118.4800|02/25/1994|125912.6|  1.0| 4.10| 0.013 | III| 23.8( 38.3)
DMG |34.3350|118.3310|02/09/1971|155820.7| 14.2| 4.80| 0.022 | IV | 24.0( 38.6)
DMG |34.3610|118.4870|02/10/1971|143526.7|  4.4| 4.20| 0.014 | IV | 24.0( 38.7)
GSG |34.3040|118.7220|01/17/1994|221922.3| 10.0| 4.00| 0.012 | III| 24.2( 38.9)
DMG |34.3390|118.3320|02/09/1971|141612.9| 11.1| 4.10| 0.013 | III| 24.2( 38.9)
DMG |34.3570|118.4060|02/09/1971|141950.2| 11.8| 4.00| 0.012 | III| 24.2( 39.0)
DMG |34.3440|118.6360|02/09/1971|143436.1| -2.0| 4.90| 0.024 | IV | 24.4( 39.3)
GSB |34.3600|118.5710|01/19/1994|044048.0|  2.0| 4.50| 0.017 | IV | 24.5( 39.4)
DMG |33.6630|118.4130|01/08/1967| 738 5.3| 17.7| 4.00| 0.011 | III| 24.5( 39.4)
GSP |34.0490|118.9150|02/19/1995|212418.1| 15.0| 4.30| 0.014 | IV | 24.6( 39.6)
GSP |34.3040|118.7370|01/19/1994|091310.9| 13.0| 4.10| 0.012 | III| 24.7( 39.7)
GSP |34.3260|118.6980|01/17/1994|233330.7|  9.0| 5.60| 0.041 |  V | 24.8( 39.9)
GSP |34.3740|118.4950|01/28/1994|200953.4|  0.0| 4.20| 0.013 | III| 24.9( 40.1)
GSB |34.3430|118.6660|01/17/1994|234925.4|  8.0| 4.30| 0.014 | IV | 25.0( 40.2)
PAS |34.3470|118.6560|04/08/1976|152138.1| 14.5| 4.60| 0.018 | IV | 25.0( 40.3)
GSB |34.3580|118.6220|01/18/1994|040126.8|  1.0| 4.50| 0.017 | IV | 25.1( 40.3)
DMG |33.7500|118.1830|08/04/1933| 41748.0|  0.0| 4.00| 0.011 | III| 25.1( 40.5)
DMG |33.9670|118.0500|01/30/1941| 13446.9|  0.0| 4.10| 0.012 | III| 25.2( 40.6)
GSP |34.3620|118.6150|03/20/1996|073759.8| 13.0| 4.10| 0.012 | III| 25.2( 40.6)
GSP |34.3590|118.6290|01/24/1994|055024.3| 12.0| 4.30| 0.014 | IV | 25.2( 40.6)
GSG |33.6583|118.3722|05/15/2013|200006.2|  1.2| 4.00| 0.011 | III| 25.3( 40.8)
GSG |33.6580|118.3720|05/15/2013|200006.2|  1.2| 4.00| 0.011 | III| 25.4( 40.8)
PAS |34.3800|118.4590|08/12/1977| 21926.1|  9.5| 4.50| 0.016 | IV | 25.4( 40.9)
GSP |34.3630|118.6270|01/24/1994|055421.1| 10.0| 4.20| 0.013 | III| 25.5( 41.0)
PAS |34.0770|118.0470|02/11/1988|152555.7| 12.5| 4.70| 0.019 | IV | 25.5( 41.1)
GSP |34.3790|118.5610|01/18/1994|152346.9|  7.0| 4.80| 0.020 | IV | 25.6( 41.3)
GSP |34.3790|118.5630|01/18/1994|003935.0|  7.0| 4.40| 0.015 | IV | 25.7( 41.3)
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                         EARTHQUAKE SEARCH RESULTS
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    |      |       |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |34.3840|118.4550|02/10/1971|113134.6|  6.0| 4.20| 0.013 | III| 25.7( 41.4)
DMG |33.7830|118.1330|10/02/1933| 91017.6|  0.0| 5.40| 0.033 |  V | 25.7( 41.4)
DMG |33.7830|118.1330|11/20/1933|1032 0.0|  0.0| 4.00| 0.011 | III| 25.7( 41.4)
DMG |33.7830|118.1330|01/13/1940| 749 7.0|  0.0| 4.00| 0.011 | III| 25.7( 41.4)
DMG |33.7500|118.1670|05/16/1933|205855.0|  0.0| 4.00| 0.011 | III| 25.8( 41.5)
GSP |34.3610|118.6570|01/29/2002|055328.9| 14.0| 4.20| 0.012 | III| 25.9( 41.7)
GSP |34.3680|118.6370|01/17/1994|194353.4| 13.0| 4.10| 0.011 | III| 26.0( 41.8)
GSP |34.3740|118.6220|01/17/1994|155410.8| 12.0| 4.80| 0.020 | IV | 26.1( 42.0)
DMG |34.3610|118.3060|02/09/1971|141021.5|  5.0| 4.70| 0.018 | IV | 26.2( 42.1)
DMG |33.6320|118.4670|01/08/1967| 73730.4| 11.4| 4.00| 0.010 | III| 26.3( 42.3)
GSP |34.3780|118.6180|01/19/1994|211144.9| 11.0| 5.10| 0.025 |  V | 26.3( 42.3)
DMG |34.3920|118.4270|02/21/1971| 71511.7|  7.2| 4.50| 0.015 | IV | 26.4( 42.5)
DMG |34.3680|118.3140|04/25/1971|1448 6.5| -2.0| 4.00| 0.010 | III| 26.4( 42.5)
DMG |34.3800|118.6230|10/29/1936|223536.1| 10.0| 4.00| 0.010 | III| 26.5( 42.7)
GSP |34.3540|118.7040|05/01/1996|194956.4| 14.0| 4.10| 0.011 | III| 26.6( 42.8)
DMG |34.3970|118.4390|02/21/1971| 55052.6|  6.9| 4.70| 0.018 | IV | 26.7( 42.9)
DMG |34.3990|118.4730|03/09/1974| 05431.9| 24.4| 4.70| 0.018 | IV | 26.7( 42.9)
DMG |33.6330|118.4000|10/17/1934| 938 0.0|  0.0| 4.00| 0.010 | III| 26.7( 42.9)
DMG |34.3870|118.3640|02/09/1971|143917.8| -1.6| 4.00| 0.010 | III| 26.8( 43.1)
GSP |34.3690|118.6720|04/26/1997|103730.7| 16.0| 5.10| 0.025 |  V | 26.8( 43.1)
GSP |34.3770|118.6490|04/27/1997|110928.4| 15.0| 4.80| 0.019 | IV | 26.8( 43.1)
DMG |34.3700|118.3020|02/10/1971| 31212.0|  0.8| 4.00| 0.010 | III| 26.8( 43.2)
DMG |34.3990|118.4190|02/10/1971|134953.7|  9.7| 4.30| 0.013 | III| 26.9( 43.4)
DMG |33.7670|118.1170|11/04/1939|2141 0.0|  0.0| 4.00| 0.010 | III| 27.1( 43.7)
DMG |33.7500|118.1330|03/11/1933|11 4 0.0|  0.0| 4.60| 0.016 | IV | 27.2( 43.8)
DMG |34.3960|118.3660|02/10/1971|173855.1|  6.2| 4.20| 0.012 | III| 27.3( 44.0)
GSP |34.3650|118.7080|01/19/1994|044314.5| 12.0| 4.10| 0.011 | III| 27.4( 44.1)
GSP |34.3970|118.6090|07/22/1999|095724.0| 11.0| 4.00| 0.010 | III| 27.4( 44.1)
PAS |34.0540|118.9640|04/13/1982|11 212.2| 16.6| 4.00| 0.010 | III| 27.4( 44.2)
DMG |34.0170|118.9670|04/16/1948|222624.0|  0.0| 4.70| 0.017 | IV | 27.5( 44.2)
GSG |34.4080|118.5590|01/17/1994|200205.4|  0.0| 4.00| 0.010 | III| 27.6( 44.4)
MGI |34.0000|118.0000|05/05/1929| 735 0.0|  0.0| 4.00| 0.010 | III| 27.9( 44.9)
MGI |34.0000|118.0000|12/25/1903|1745 0.0|  0.0| 5.00| 0.021 | IV | 27.9( 44.9)
MGI |34.0000|118.0000|05/05/1929| 1 7 0.0|  0.0| 4.60| 0.015 | IV | 27.9( 44.9)
GSP |34.3770|118.6980|01/18/1994|004308.9| 11.0| 5.20| 0.025 |  V | 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 346.0|  8.0| 4.10| 0.010 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 434.0|  8.0| 4.20| 0.011 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|141028.0|  8.0| 5.30| 0.027 |  V | 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 1 8.0|  8.0| 5.80| 0.041 |  V | 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 325.0|  8.0| 4.40| 0.013 | III| 27.9( 44.9)
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DMG |34.4110|118.4010|02/09/1971|14 231.0|  8.0| 4.70| 0.017 | IV | 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 446.0|  8.0| 4.20| 0.011 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 550.0|  8.0| 4.10| 0.010 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 150.0|  8.0| 4.50| 0.014 | IV | 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 8 4.0|  8.0| 4.00| 0.010 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 444.0|  8.0| 4.10| 0.010 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 710.0|  8.0| 4.00| 0.010 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 154.0|  8.0| 4.20| 0.011 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 244.0|  8.0| 5.80| 0.041 |  V | 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 730.0|  8.0| 4.00| 0.010 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 2 3.0|  8.0| 4.10| 0.010 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 745.0|  8.0| 4.50| 0.014 | IV | 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 4 7.0|  8.0| 4.10| 0.010 | III| 27.9( 44.9)




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                        EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |34.4110|118.4010|02/09/1971|14 439.0|  8.0| 4.10| 0.010 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 041.8|  8.4| 6.40| 0.066 | VI | 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 541.0|  8.0| 4.10| 0.010 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 853.0|  8.0| 4.60| 0.015 | IV | 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 230.0|  8.0| 4.30| 0.012 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 8 7.0|  8.0| 4.20| 0.011 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 133.0|  8.0| 4.20| 0.011 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 159.0|  8.0| 4.10| 0.010 | III| 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 838.0|  8.0| 4.50| 0.014 | IV | 27.9( 44.9)
DMG |34.4110|118.4010|02/09/1971|14 140.0|  8.0| 4.10| 0.010 | III| 27.9( 44.9)
GSP |34.3940|118.6690|06/26/1995|084028.9| 13.0| 5.00| 0.021 | IV | 28.3( 45.5)
GSB |34.3790|118.7110|01/19/1994|210928.6| 14.0| 5.50| 0.031 |  V | 28.3( 45.6)
MGI |34.1000|118.0000|01/27/1930|2026 0.0|  0.0| 4.60| 0.015 | IV | 28.5( 45.8)
PAS |34.0160|118.9880|10/26/1984|172043.5| 13.3| 4.60| 0.015 | IV | 28.7( 46.2)
DMG |34.4260|118.4140|02/10/1971| 518 7.2|  5.8| 4.50| 0.014 | III| 28.8( 46.4)
DMG |34.4110|118.3290|02/10/1971| 5 636.0|  4.7| 4.30| 0.012 | III| 28.9( 46.6)
DMG |34.4280|118.4130|04/01/1971|15 3 3.6|  8.0| 4.10| 0.010 | III| 29.0( 46.6)
DMG |33.9960|117.9750|06/15/1967| 458 5.5| 10.0| 4.10| 0.010 | III| 29.3( 47.2)
DMG |34.0000|119.0000|09/24/1827| 4 0 0.0|  0.0| 7.00| 0.096 | VII| 29.4( 47.3)
MGI |34.0000|119.0000|12/14/1912| 0 0 0.0|  0.0| 5.70| 0.035 |  V | 29.4( 47.3)
DMG |33.7330|118.1000|03/11/1933|1350 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7330|118.1000|03/11/1933|15 9 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7330|118.1000|03/11/1933|1447 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|1653 0.0|  0.0| 4.80| 0.017 | IV | 29.4( 47.3)
DMG |33.7500|118.0830|03/23/1933|1831 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 210 0.0|  0.0| 4.60| 0.014 | IV | 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 258 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
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DMG |33.7500|118.0830|03/11/1933| 2 5 0.0|  0.0| 4.30| 0.011 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 2 9 0.0|  0.0| 5.00| 0.020 | IV | 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 311 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 618 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 3 9 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|1547 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 553 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 323 0.0|  0.0| 5.00| 0.020 | IV | 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|1944 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|22 0 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 926 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 211 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/19/1933|2123 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 252 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/12/1933| 448 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|1956 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/12/1933| 835 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/12/1933|1651 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|2231 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|23 5 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 524 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/15/1933| 432 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/15/1933| 540 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/12/1933|1738 0.0|  0.0| 4.50| 0.013 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 911 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 555 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)




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                   EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |33.7500|118.0830|03/12/1933|1825 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 635 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 2 4 0.0|  0.0| 4.90| 0.018 | IV | 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|2240 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/23/1933| 840 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 3 5 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 227 0.0|  0.0| 4.60| 0.014 | IV | 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 513 0.0|  0.0| 4.70| 0.016 | IV | 29.4( 47.3)
DMG |33.7500|118.0830|03/16/1933|1530 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 230 0.0|  0.0| 5.10| 0.022 | IV | 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 259 0.0|  0.0| 4.60| 0.014 | IV | 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 837 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|04/02/1933|1536 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/12/1933| 616 0.0|  0.0| 4.60| 0.014 | IV | 29.4( 47.3)
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DMG |33.7500|118.0830|03/12/1933| 740 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|1025 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|1045 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|11 0 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 339 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 611 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|1129 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/21/1933| 326 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 439 0.0|  0.0| 4.90| 0.018 | IV | 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 222 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|1147 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 515 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/15/1933| 2 8 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 521 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/13/1933|1532 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|1357 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/31/1933|1049 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 257 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/12/1933|15 2 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/16/1933|1529 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/16/1933|1456 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/12/1933| 6 1 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 347 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/18/1933|2052 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/17/1933|1651 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 216 0.0|  0.0| 4.80| 0.017 | IV | 29.4( 47.3)
DMG |33.7500|118.0830|03/12/1933| 027 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/12/1933| 034 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/30/1933|1225 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/14/1933|2242 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 832 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 751 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/12/1933|2354 0.0|  0.0| 4.50| 0.013 | III| 29.4( 47.3)
DMG |33.7500|118.0830|04/02/1933| 8 0 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 910 0.0|  0.0| 5.10| 0.022 | IV | 29.4( 47.3)
DMG |33.7500|118.0830|04/01/1933| 642 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/14/1933|1219 0.0|  0.0| 4.50| 0.013 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/13/1933| 432 0.0|  0.0| 4.70| 0.016 | IV | 29.4( 47.3)
DMG |33.7500|118.0830|03/14/1933| 036 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)




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                         EARTHQUAKE SEARCH RESULTS
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    |       |        |          | TIME   |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+--------+---------+----------+--------+-----+-----+-------+----+------------
DMG |33.7500|118.0830|03/12/1933|2128 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
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DMG |33.7500|118.0830|03/11/1933|1141 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 436 0.0|  0.0| 4.60| 0.014 | IV | 29.4( 47.3)
DMG |33.7500|118.0830|03/13/1933| 617 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/13/1933|131828.0|  0.0| 5.30| 0.025 |  V | 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|2232 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/25/1933|1346 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/12/1933| 546 0.0|  0.0| 4.40| 0.012 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 759 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 8 8 0.0|  0.0| 4.50| 0.013 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/20/1933|1358 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/13/1933|1929 0.0|  0.0| 4.20| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 336 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933|1138 0.0|  0.0| 4.00| 0.009 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/13/1933| 343 0.0|  0.0| 4.10| 0.010 | III| 29.4( 47.3)
DMG |33.7500|118.0830|03/11/1933| 440 0.0|  0.0| 4.70| 0.016 | IV | 29.4( 47.3)
DMG |34.4330|118.3980|02/09/1971|144017.4| -2.0| 4.10| 0.010 | III| 29.5( 47.4)
DMG |34.4310|118.3690|08/14/1974|144555.2|  8.2| 4.20| 0.010 | III| 29.6( 47.7)
DMG |34.4460|118.4360|02/10/1971|185441.7|  8.1| 4.20| 0.010 | III| 30.1( 48.4)
MGI |34.2000|118.0000|01/09/1921| 530 0.0|  0.0| 4.60| 0.014 | III| 30.7( 49.4)
DMG |34.4570|118.4270|02/09/1971|161926.5| -1.0| 4.20| 0.010 | III| 30.9( 49.7)
DMG |33.6330|118.2000|11/01/1940|20 046.0|  0.0| 4.00| 0.008 | III| 30.9( 49.8)
DMG |33.6300|118.2000|09/13/1929|132338.2|  0.0| 4.00| 0.008 | III| 31.1( 50.1)
PAS |34.4630|118.4090|09/24/1977|212824.3|  5.0| 4.20| 0.009 | III| 31.4( 50.5)
DMG |33.8000|118.0000|10/21/1913| 938 0.0|  0.0| 4.00| 0.008 | III| 31.5( 50.7)
DMG |34.0650|119.0350|02/21/1973|144557.3|  8.0| 5.90| 0.037 |  V | 31.6( 50.8)
DMG |33.7000|118.0670|07/20/1940| 4 113.0|  0.0| 4.00| 0.008 | II | 32.3( 52.0)
DMG |33.7000|118.0670|03/11/1933| 85457.0|  0.0| 5.10| 0.019 | IV | 32.3( 52.0)
DMG |33.7000|118.0670|03/11/1933| 51022.0|  0.0| 5.10| 0.019 | IV | 32.3( 52.0)
DMG |33.7000|118.0670|02/08/1940|165617.0|  0.0| 4.00| 0.008 | II | 32.3( 52.0)
GSP |34.2620|118.0020|06/28/1991|144354.5| 11.0| 5.40| 0.024 | IV | 32.6( 52.5)
DMG |34.4850|118.5210|07/16/1965| 74622.4| 15.1| 4.00| 0.008 | II | 32.7( 52.6)
DMG |33.9900|119.0580|05/29/1955|164335.4| 17.4| 4.10| 0.008 | III| 32.7( 52.7)
GSP |34.2500|117.9900|06/28/1991|170055.5|  9.0| 4.30| 0.010 | III| 32.8( 52.7)
GSG |33.9325|117.9172|03/29/2014|040942.3|  4.8| 5.10| 0.018 | IV | 33.1( 53.2)
DMG |33.7500|118.0000|11/16/1934|2126 0.0|  0.0| 4.00| 0.007 | II | 33.3( 53.6)
DMG |33.5430|118.3400|09/14/1963| 35116.2|  2.2| 4.20| 0.009 | III| 33.5( 53.9)
DMG |33.6830|118.0500|03/11/1933|1250 0.0|  0.0| 4.40| 0.010 | III| 33.8( 54.5)
DMG |33.6830|118.0500|03/11/1933| 658 3.0|  0.0| 5.50| 0.024 |  V | 33.8( 54.5)
GSP |34.5000|118.5600|07/05/1991|174157.1| 11.0| 4.10| 0.008 | II | 33.9( 54.6)
DMG |34.4170|118.8330|06/01/1946|11 631.0|  0.0| 4.10| 0.008 | II | 34.2( 55.0)
GSG |33.9613|117.8923|03/29/2014|213245.9|  9.4| 4.14| 0.008 | III| 34.2( 55.1)
PAS |33.9650|117.8860|01/01/1976|172012.9|  6.2| 4.20| 0.008 | III| 34.5( 55.6)
DMG |33.6170|118.1170|01/20/1934|2117 0.0|  0.0| 4.50| 0.011 | III| 34.6( 55.7)
DMG |34.2000|117.9000|08/28/1889| 215 0.0|  0.0| 5.50| 0.022 | IV | 35.9( 57.9)
DMG |34.2000|117.9000|07/13/1935|105416.5|  0.0| 4.70| 0.012 | III| 35.9( 57.9)
DMG |33.6710|118.0120|10/20/1961|223534.2|  5.6| 4.10| 0.007 | II | 36.0( 58.0)
DMG |33.6800|117.9930|11/20/1961| 85334.7|  4.4| 4.00| 0.007 | II | 36.5( 58.7)
PAS |33.5380|118.2070|05/25/1982|134430.3| 13.7| 4.10| 0.007 | II | 36.5( 58.7)
MGI |33.8000|117.9000|05/22/1902| 740 0.0|  0.0| 4.30| 0.008 | III| 36.7( 59.0)
DMG |34.5290|118.6440|02/07/1956| 21656.5| 16.0| 4.20| 0.008 | II | 36.8( 59.1)
T-A |34.4200|118.9200|03/29/1917| 8 6 0.0|  0.0| 4.30| 0.008 | III| 37.4( 60.3)
DMG |33.6540|117.9940|10/20/1961|194950.5|  4.6| 4.30| 0.008 | III| 37.6( 60.5)
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                    EARTHQUAKE SEARCH RESULTS
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    |      |       |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |33.6170|118.0330|05/21/1938| 944 0.0|  0.0| 4.00| 0.006 | II | 37.7( 60.7)
DMG |33.6650|117.9790|10/20/1961|214240.7|  7.2| 4.00| 0.006 | II | 37.7( 60.7)
DMG |33.6590|117.9810|10/20/1961|20 714.5|  6.1| 4.00| 0.006 | II | 37.9( 61.0)
DMG |33.5000|118.2500|06/18/1920|10 8 0.0|  0.0| 4.50| 0.009 | III| 37.9( 61.0)
DMG |33.6170|118.0170|03/14/1933|19 150.0|  0.0| 5.10| 0.015 | IV | 38.4( 61.8)
DMG |33.6170|118.0170|03/15/1933|111332.0|  0.0| 4.90| 0.013 | III| 38.4( 61.8)
DMG |33.6170|118.0170|10/02/1933|1326 1.0|  0.0| 4.00| 0.006 | II | 38.4( 61.8)
DMG |34.5190|118.1980|08/23/1952|10 9 7.1| 13.1| 5.00| 0.013 | III| 38.6( 62.2)
DMG |33.6000|118.0170|12/25/1935|1715 0.0|  0.0| 4.50| 0.009 | III| 39.2( 63.1)
GSP |33.6920|119.0580|05/30/2012|051400.8| 16.0| 4.00| 0.006 | II | 39.5( 63.6)
PAS |33.9060|119.1660|05/23/1978| 91650.8|  6.0| 4.00| 0.006 | II | 39.6( 63.7)
DMG |33.5610|118.0580|01/15/1937|183547.0| 10.0| 4.00| 0.006 | II | 39.7( 63.9)
DMG |34.1000|117.8000|03/31/1931|2033 0.0|  0.0| 4.00| 0.006 | II | 39.7( 64.0)
DMG |33.6000|118.0000|03/11/1933| 217 0.0|  0.0| 4.50| 0.009 | III| 39.9( 64.2)
DMG |33.6000|118.0000|03/11/1933| 231 0.0|  0.0| 4.40| 0.008 | III| 39.9( 64.2)
MGI |33.7000|117.9000|07/08/1902| 945 0.0|  0.0| 4.00| 0.006 | II | 40.0( 64.3)
PAS |34.3780|119.0350|04/03/1985| 4 449.8| 27.9| 4.00| 0.006 | II | 40.2( 64.7)
DMG |34.5860|118.6130|02/07/1956| 31638.6|  2.6| 4.60| 0.009 | III| 40.2( 64.7)
PAS |33.6300|119.0200|10/23/1981|172816.9| 12.0| 4.60| 0.009 | III| 40.4( 65.0)
GSP |33.9090|117.7920|06/14/2012|031715.7|  9.0| 4.00| 0.006 | II | 40.4( 65.1)
DMG |33.6170|117.9670|03/11/1933| 154 7.8|  0.0| 6.30| 0.036 |  V | 40.4( 65.1)
GSP |33.9050|117.7920|08/08/2012|062334.1| 10.0| 4.50| 0.008 | III| 40.5( 65.1)
GSP |33.9040|117.7910|08/08/2012|163322.1| 10.0| 4.50| 0.008 | III| 40.5( 65.2)
GSP |33.9070|117.7880|08/29/2012|203100.3|  9.0| 4.10| 0.006 | II | 40.7( 65.5)
DMG |33.5170|118.1000|03/22/1941| 82240.0|  0.0| 4.00| 0.006 | II | 40.8( 65.6)
GSP |33.9170|117.7760|09/03/2002|070851.9| 12.0| 4.80| 0.010 | III| 41.2( 66.4)
PAS |33.6370|119.0560|10/23/1981|191552.5|  6.3| 4.60| 0.009 | III| 41.7( 67.1)
GSG |33.9530|117.7610|07/29/2008|184215.7| 14.0| 5.30| 0.015 | IV | 41.8( 67.2)
DMG |33.5750|117.9830|03/11/1933| 518 4.0|  0.0| 5.20| 0.014 | IV | 41.8( 67.3)
DMG |33.7670|117.8170|08/22/1936| 521 0.0|  0.0| 4.00| 0.005 | II | 42.0( 67.5)
MGI |33.8000|117.8000|11/10/1926|1723 0.0|  0.0| 4.60| 0.009 | III| 42.0( 67.6)
MGI |33.8000|117.8000|11/09/1926|1535 0.0|  0.0| 4.60| 0.009 | III| 42.0( 67.6)
MGI |33.8000|117.8000|05/19/1917| 719 0.0|  0.0| 4.00| 0.005 | II | 42.0( 67.6)
MGI |33.8000|117.8000|05/20/1917| 945 0.0|  0.0| 4.00| 0.005 | II | 42.0( 67.6)
MGI |33.8000|117.8000|05/19/1917| 635 0.0|  0.0| 4.00| 0.005 | II | 42.0( 67.6)
MGI |33.8000|117.8000|11/07/1926|1948 0.0|  0.0| 4.60| 0.009 | III| 42.0( 67.6)
MGI |33.8000|117.8000|11/04/1926|2238 0.0|  0.0| 4.60| 0.009 | III| 42.0( 67.6)
DMG |33.5670|117.9830|07/07/1937|1112 0.0|  0.0| 4.00| 0.005 | II | 42.2( 67.9)
DMG |33.5670|117.9830|04/17/1934|1833 0.0|  0.0| 4.00| 0.005 | II | 42.2( 67.9)
PAS |33.5080|118.0710|11/20/1988| 53928.7|  6.0| 4.50| 0.008 | III| 42.2( 68.0)
GSG |34.6173|118.6302|01/04/2015|031809.5|  8.8| 4.25| 0.006 | II | 42.5( 68.4)
DMG |34.1180|119.2200|03/18/1957|185628.0| 13.8| 4.70| 0.009 | III| 42.6( 68.5)
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GSP |33.9550|117.7460|12/14/2001|120135.5| 13.0| 4.00| 0.005 | II | 42.6( 68.5)
MGI |34.2000|119.2000|06/16/1914|1052 0.0|  0.0| 4.60| 0.008 | III| 42.8( 68.8)
PAS |34.0060|117.7390|02/18/1989| 717 4.8|  3.3| 4.30| 0.007 | II | 42.8( 68.9)
PAS |33.6710|119.1110|09/04/1981|155050.3|  5.0| 5.30| 0.015 | IV | 42.9( 69.0)
DMG |34.4830|118.9830|09/04/1942| 63433.0|  0.0| 4.50| 0.008 | II | 43.1( 69.3)
DMG |34.4830|118.9830|09/03/1942|14 6 1.0|  0.0| 4.50| 0.008 | II | 43.1( 69.3)
GSP |33.6200|117.9000|04/07/1989|200730.2| 13.0| 4.50| 0.008 | II | 43.2( 69.6)
DMG |33.8540|117.7520|10/04/1961| 22131.6|  4.3| 4.10| 0.006 | II | 43.5( 70.0)
DMG |34.5650|118.1130|02/28/1969| 45612.4|  5.3| 4.30| 0.006 | II | 43.7( 70.3)
GSP |34.1100|117.7200|04/17/1990|223227.2|  4.0| 4.60| 0.008 | III| 44.4( 71.4)
PAS |33.4710|118.0610|02/27/1984|101815.0|  6.0| 4.00| 0.005 | II | 44.7( 71.9)




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                    EARTHQUAKE SEARCH RESULTS
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   |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
GSP |33.9510|117.7090|01/05/1998|181406.5| 11.0| 4.30| 0.006 | II | 44.7( 72.0)
GSP |34.1500|117.7200|03/01/1990|032303.0| 11.0| 4.70| 0.009 | III| 44.9( 72.2)
MGI |34.0000|117.7000|12/03/1929| 9 5 0.0|  0.0| 4.00| 0.005 | II | 45.0( 72.5)
PAS |34.1360|117.7090|06/26/1988|15 458.5|  7.9| 4.60| 0.008 | II | 45.3( 72.9)
DMG |33.6040|119.1050|03/25/1956| 332 2.3|  8.2| 4.20| 0.006 | II | 45.3( 72.9)
GSP |34.1300|117.7000|03/01/1990|003457.1|  4.0| 4.00| 0.005 | II | 45.7( 73.6)
GSP |34.1400|117.7000|02/28/1990|234336.6|  5.0| 5.20| 0.012 | III| 45.8( 73.8)
DMG |34.1000|117.6830|01/09/1934|1410 0.0|  0.0| 4.50| 0.007 | II | 46.4( 74.6)
DMG |34.1000|117.6830|01/18/1934| 214 0.0|  0.0| 4.00| 0.005 | II | 46.4( 74.6)
PAS |34.5410|118.9890|06/12/1984| 02752.4| 11.7| 4.10| 0.005 | II | 46.4( 74.6)
GSP |34.1400|117.6900|03/02/1990|172625.4|  6.0| 4.60| 0.008 | II | 46.4( 74.7)
GSP |33.8060|117.7150|03/07/2000|002028.2| 11.0| 4.00| 0.005 | II | 46.5( 74.8)
GSP |33.5150|119.0330|08/24/2010|054216.9| 16.0| 4.00| 0.005 | II | 46.5( 74.9)
DMG |34.6000|118.9000|05/18/1940| 91512.0|  0.0| 4.00| 0.005 | II | 46.9( 75.5)
DMG |34.4000|117.8000|02/24/1946| 6 752.0|  0.0| 4.10| 0.005 | II | 47.5( 76.4)
DMG |33.3670|118.1500|04/16/1942| 72833.0|  0.0| 4.00| 0.004 |  I | 48.6( 78.2)
DMG |34.5000|119.1170|11/17/1954|23 351.0|  0.0| 4.40| 0.006 | II | 49.2( 79.2)
DMG |34.6670|118.8330|01/24/1950|215659.0|  0.0| 4.00| 0.004 |  I | 49.3( 79.3)
GSP |34.4400|119.1830|05/08/2009|202714.0|  7.0| 4.10| 0.005 | II | 49.5( 79.6)
DMG |33.5830|119.1830|02/10/1952|135055.0|  0.0| 4.00| 0.004 |  I | 49.8( 80.1)
DMG |34.1500|119.3500|08/22/1950|224758.0|  0.0| 4.20| 0.005 | II | 50.3( 80.9)
MGI |34.3000|119.3000|05/01/1904|1830 0.0|  0.0| 4.60| 0.007 | II | 50.5( 81.3)
MGI |34.3000|119.3000|09/28/1926|1749 0.0|  0.0| 4.00| 0.004 |  I | 50.5( 81.3)
MGI |34.3000|119.3000|05/15/1927|1120 0.0|  0.0| 4.00| 0.004 |  I | 50.5( 81.3)
DMG |33.5450|117.8070|10/27/1969|1316 2.3|  6.5| 4.50| 0.006 | II | 50.6( 81.5)
DMG |33.9500|117.5830|04/11/1941| 12024.0|  0.0| 4.00| 0.004 |  I | 51.9( 83.6)
DMG |34.1000|119.4000|05/19/1893| 035 0.0|  0.0| 5.50| 0.013 | III| 52.6( 84.6)
MGI |33.8000|117.6000|04/22/1918|2115 0.0|  0.0| 5.00| 0.009 | III| 52.9( 85.1)
DMG |33.8000|117.6000|09/16/1903|1210 0.0|  0.0| 4.00| 0.004 |  I | 52.9( 85.1)
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DMG |34.1830|117.5830|10/03/1948| 24628.0|  0.0| 4.00| 0.004 |  I | 53.0( 85.3)
DMG |33.4300|119.0960|10/31/1969|103929.0|  7.3| 4.80| 0.007 | II | 53.3( 85.8)
MGI |34.4000|119.3000|08/12/1925|1845 0.0|  0.0| 4.00| 0.004 |  I | 53.6( 86.2)
DMG |34.3700|117.6500|12/08/1812|15 0 0.0|  0.0| 7.00| 0.042 | VI | 53.8( 86.5)
DMG |34.6170|119.0830|02/26/1950| 0 622.0|  0.0| 4.70| 0.007 | II | 53.8( 86.6)
GSP |33.6660|119.3300|03/16/2002|213323.8|  7.0| 4.60| 0.006 | II | 54.0( 86.8)
GSP |34.3740|117.6490|08/20/1998|234958.4|  9.0| 4.40| 0.005 | II | 54.0( 86.8)
DMG |34.3000|117.6000|07/30/1894| 512 0.0|  0.0| 6.00| 0.019 | IV | 54.4( 87.6)
DMG |34.6830|119.0000|04/06/1943|223624.0|  0.0| 4.00| 0.004 |  I | 54.7( 88.1)
DMG |34.1830|117.5480|09/01/1937|163533.5| 10.0| 4.50| 0.005 | II | 54.9( 88.4)
GSP |34.3850|117.6350|10/16/2007|085344.1|  8.0| 4.20| 0.004 |  I | 55.0( 88.5)
DMG |34.1670|117.5330|03/01/1948| 81213.0|  0.0| 4.70| 0.006 | II | 55.6( 89.4)
DMG |34.7000|119.0000|10/23/1916| 254 0.0|  0.0| 5.50| 0.012 | III| 55.7( 89.7)
DMG |34.1270|117.5210|12/27/1938|10 928.6| 10.0| 4.00| 0.004 |  I | 55.8( 89.8)
DMG |34.7170|118.9670|06/11/1935|1810 0.0|  0.0| 4.00| 0.004 |  I | 55.8( 89.8)
DMG |34.3040|117.5700|05/05/1969|16 2 9.6|  8.8| 4.40| 0.005 | II | 56.1( 90.3)
DMG |34.1400|117.5150|01/01/1965| 8 418.0|  5.9| 4.40| 0.005 | II | 56.3( 90.5)
DMG |34.2110|117.5300|09/01/1937|1348 8.2| 10.0| 4.50| 0.005 | II | 56.4( 90.7)
PAS |34.2110|117.5300|10/19/1979|122237.8|  4.9| 4.10| 0.004 |  I | 56.4( 90.7)
MGI |34.0000|117.5000|12/16/1858|10 0 0.0|  0.0| 7.00| 0.039 |  V | 56.5( 90.9)
DMG |34.0000|117.5000|07/03/1908|1255 0.0|  0.0| 4.00| 0.004 |  I | 56.5( 90.9)
DMG |34.2810|117.5520|09/13/1970| 44748.6|  8.0| 4.40| 0.005 | II | 56.5( 91.0)
DMG |33.9860|119.4750|08/06/1973|232917.0| 16.9| 5.00| 0.008 | II | 56.6( 91.1)
DMG |34.2700|117.5400|09/12/1970|143053.0|  8.0| 5.40| 0.011 | III| 56.9( 91.6)




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                         EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |34.2000|117.5000|06/14/1892|1325 0.0|  0.0| 4.90| 0.007 | II | 57.9( 93.1)
DMG |34.0000|119.5000|03/19/1905| 440 0.0|  0.0| 4.00| 0.003 |  I | 58.0( 93.3)
MGI |34.0000|119.5000|05/03/1926|1353 0.0|  0.0| 4.30| 0.004 |  I | 58.0( 93.3)
DMG |34.0000|119.5000|02/18/1926|1818 0.0|  0.0| 5.00| 0.008 | II | 58.0( 93.3)
DMG |34.2670|117.5180|09/12/1970|141011.2|  8.0| 4.10| 0.004 |  I | 58.1( 93.5)
DMG |34.1240|117.4800|05/15/1955|17 326.0|  7.6| 4.00| 0.003 |  I | 58.1( 93.5)
DMG |33.6820|117.5530|07/05/1938|18 655.7| 10.0| 4.50| 0.005 | II | 58.2( 93.7)
DMG |34.7840|118.9020|07/27/1972| 03117.4|  8.0| 4.40| 0.005 | II | 58.3( 93.8)
DMG |34.1160|117.4750|06/28/1960|20 048.0| 12.0| 4.10| 0.004 |  I | 58.3( 93.8)
T-A |34.8300|118.7500|11/27/1852| 0 0 0.0|  0.0| 7.00| 0.037 |  V | 58.4( 94.0)
DMG |33.9170|119.5000|08/26/1954|1348 3.0|  0.0| 4.80| 0.006 | II | 58.4( 94.0)
DMG |33.3390|119.1040|10/24/1969|202642.5| -1.8| 4.70| 0.006 | II | 58.5( 94.1)
GSP |34.4810|119.3530|10/23/1996|220929.4| 14.0| 4.20| 0.004 |  I | 59.1( 95.1)
GSP |34.1390|117.4650|03/09/2008|092232.1|  3.0| 4.00| 0.003 |  I | 59.1( 95.1)
DMG |33.7170|117.5170|06/19/1935|1117 0.0|  0.0| 4.00| 0.003 |  I | 59.2( 95.3)
DMG |33.7170|117.5070|08/06/1938|22 056.0| 10.0| 4.00| 0.003 |  I | 59.8( 96.2)
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DMG |34.3000|117.5000|07/22/1899|2032 0.0|  0.0| 6.50| 0.024 |  V | 59.8( 96.2)
GSP |34.3810|119.4350|07/24/2004|125519.9|  3.0| 4.30| 0.004 |  I | 59.8( 96.3)
DMG |34.2170|117.4670|03/25/1941|234341.0|  0.0| 4.00| 0.003 |  I | 60.0( 96.5)
DMG |33.6990|117.5110|05/31/1938| 83455.4| 10.0| 5.50| 0.011 | III| 60.0( 96.5)
PAS |34.1350|117.4480|01/08/1983| 71930.4|  4.6| 4.10| 0.003 |  I | 60.0( 96.6)
DMG |33.7250|117.4980|01/03/1956| 02548.9| 13.7| 4.70| 0.006 | II | 60.1( 96.7)
DMG |34.2500|119.5000|04/13/1917| 359 0.0|  0.0| 4.50| 0.005 | II | 60.2( 96.8)
DMG |34.2500|119.5000|04/21/1917| 659 0.0|  0.0| 4.00| 0.003 |  I | 60.2( 96.8)
GSG |34.1430|117.4425|01/15/2014|093518.9|  3.6| 4.43| 0.005 |  I | 60.4( 97.2)
GSP |34.1250|117.4380|01/06/2005|143527.7|  4.0| 4.40| 0.004 |  I | 60.5( 97.3)
DMG |33.7480|117.4790|06/22/1971|104119.0|  8.0| 4.20| 0.004 |  I | 60.6( 97.5)
DMG |34.1120|117.4260|03/19/1937| 12338.4| 10.0| 4.00| 0.003 |  I | 61.1( 98.3)
T-A |34.0000|117.4200|04/12/1888|1315 0.0|  0.0| 4.30| 0.004 |  I | 61.1( 98.3)
T-A |34.0000|117.4200|09/10/1920|1415 0.0|  0.0| 4.30| 0.004 |  I | 61.1( 98.3)
DMG |34.1320|117.4260|04/15/1965|20 833.3|  5.5| 4.50| 0.005 | II | 61.2( 98.5)
DMG |34.2670|119.5170|04/12/1944|153310.0|  0.0| 4.00| 0.003 |  I | 61.4( 98.9)
DMG |33.7330|117.4670|10/26/1954|162226.0|  0.0| 4.10| 0.003 |  I | 61.6( 99.1)
GSP |33.7330|117.4660|09/02/2007|172914.0|  2.0| 4.70| 0.005 | II | 61.6( 99.2)
DMG |34.3490|119.4920|07/14/1958| 52555.3| 16.0| 4.70| 0.005 | II | 61.9( 99.7)
MGI |34.0000|117.4000|05/22/1907| 652 0.0|  0.0| 4.60| 0.005 | II | 62.2(100.1)
USG |34.4180|119.4680|09/07/1984|11 345.2|  9.5| 4.00| 0.003 |  I | 62.6(100.8)
DMG |33.6670|119.5000|11/30/1939| 64251.0|  0.0| 4.00| 0.003 |  I | 62.8(101.1)
DMG |34.8670|118.8670|07/22/1952| 74455.0|  0.0| 4.10| 0.003 |  I | 62.8(101.1)
DMG |34.2000|117.4000|07/22/1899| 046 0.0|  0.0| 5.50| 0.010 | III| 63.5(102.1)
DMG |33.8330|117.4000|06/05/1940| 82727.0|  0.0| 4.00| 0.003 |  I | 63.5(102.2)
DMG |34.8350|118.9880|11/29/1936| 55445.3| 10.0| 4.00| 0.003 |  I | 63.5(102.3)
USG |34.1390|117.3860|02/21/1987|231530.1|  2.6| 4.07| 0.003 |  I | 63.6(102.3)
GSP |34.1900|117.3900|12/28/1989|094108.1| 15.0| 4.50| 0.004 |  I | 63.9(102.8)
DMG |34.2670|119.5670|06/29/1968|191357.0| 10.0| 4.40| 0.004 |  I | 64.2(103.3)
DMG |34.8670|118.9330|09/21/1941|1953 7.2|  0.0| 5.20| 0.008 | II | 64.2(103.3)
DMG |33.2910|119.1930|10/24/1969| 82912.1| 10.0| 5.10| 0.007 | II | 64.3(103.4)
DMG |33.9330|117.3670|10/24/1943| 02921.0|  0.0| 4.00| 0.003 |  I | 64.4(103.6)
DMG |34.8000|119.1000|09/05/1883|1230 0.0|  0.0| 6.00| 0.015 | IV | 64.6(104.0)
DMG |34.2450|119.5880|06/29/1968|203633.6|  1.8| 4.00| 0.003 |  I | 64.9(104.5)
DMG |34.8430|119.0260|03/07/1939|195331.8| 10.0| 4.00| 0.003 |  I | 65.0(104.7)
DMG |34.0330|117.3500|04/18/1940|184343.9|  0.0| 4.40| 0.004 |  I | 65.1(104.7)
DMG |34.9000|118.9000|10/23/1916| 244 0.0|  0.0| 6.00| 0.014 | IV | 65.6(105.6)




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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
PAS |34.9430|118.7430|06/10/1988|23 643.0|  6.8| 5.40| 0.009 | III| 65.9(106.0)
DMG |34.1180|117.3410|09/22/1951| 82239.1| 11.9| 4.30| 0.004 |  I | 65.9(106.1)
DMG |33.7000|117.4000|05/13/1910| 620 0.0|  0.0| 5.00| 0.006 | II | 65.9(106.1)
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DMG |33.7000|117.4000|05/15/1910|1547 0.0|  0.0| 6.00| 0.014 | IV | 65.9(106.1)
DMG |33.7000|117.4000|04/11/1910| 757 0.0|  0.0| 5.00| 0.006 | II | 65.9(106.1)
DMG |34.1270|117.3380|02/23/1936|222042.7| 10.0| 4.50| 0.004 |  I | 66.2(106.5)
DMG |34.1400|117.3390|02/26/1936| 93327.6| 10.0| 4.00| 0.003 |  I | 66.2(106.6)
DMG |34.8670|119.0170|07/21/1952|2153 9.0|  0.0| 4.30| 0.004 |  I | 66.3(106.6)
DMG |34.3330|119.5830|07/01/1941| 819 0.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|10/02/1938|1845 0.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|09/25/1941| 51256.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|09/08/1941| 31423.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|07/01/1941| 848 0.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|07/01/1941| 858 0.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|07/03/1941|1926 0.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|09/08/1941| 31245.0|  0.0| 4.50| 0.004 |  I | 66.4(106.9)
DMG |34.3330|119.5830|07/12/1941|1618 0.0|  0.0| 4.50| 0.004 |  I | 66.4(106.9)
DMG |34.3330|119.5830|09/14/1941| 14518.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|07/01/1941|1025 0.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|09/15/1941| 137 2.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|07/01/1941| 9 5 0.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|07/01/1941| 945 0.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|07/02/1941|2219 0.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|11/21/1941|1656 3.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|07/01/1941|2354 0.0|  0.0| 4.50| 0.004 |  I | 66.4(106.9)
DMG |34.3330|119.5830|07/01/1941| 830 0.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|07/01/1941| 821 0.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|07/01/1941|1820 0.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.3330|119.5830|11/18/1941|18 810.0|  0.0| 4.00| 0.003 |  I | 66.4(106.9)
DMG |34.2550|119.6140|07/31/1968|224445.3| 15.0| 4.00| 0.003 |  I | 66.6(107.1)
GSP |34.1680|117.3370|06/28/1997|214525.1|  9.0| 4.20| 0.003 |  I | 66.6(107.2)
DMG |34.9000|118.9500|08/01/1952|13 430.0|  0.0| 5.10| 0.007 | II | 66.7(107.3)
DMG |34.5000|119.5000|08/05/1930|1125 0.0|  0.0| 5.00| 0.006 | II | 66.9(107.6)
DMG |34.5000|119.5000|12/05/1920|1158 0.0|  0.0| 4.50| 0.004 |  I | 66.9(107.6)
DMG |34.5000|119.5000|06/29/1926|2321 0.0|  0.0| 5.50| 0.009 | III| 66.9(107.6)
PAS |34.2510|119.6220|03/23/1988| 84247.0| 16.4| 4.00| 0.003 |  I | 66.9(107.7)
DMG |34.0330|117.3170|09/03/1935| 647 0.0|  0.0| 4.50| 0.004 |  I | 67.0(107.7)
DMG |34.8850|119.0020|02/23/1939| 91846.7| 10.0| 4.50| 0.004 |  I | 67.0(107.8)
DMG |34.3670|119.5830|07/01/1941| 75054.8|  0.0| 5.90| 0.013 | III| 67.2(108.2)
DMG |34.1830|119.6460|06/29/1968| 63320.9|  8.4| 4.00| 0.003 |  I | 67.3(108.3)
DMG |34.2540|119.6280|07/08/1968| 91837.2| 15.7| 4.00| 0.003 |  I | 67.3(108.3)
T-A |34.9200|118.9200|08/29/1857| 0 0 0.0|  0.0| 4.30| 0.003 |  I | 67.3(108.3)
T-A |34.9200|118.9200|01/20/1857| 0 0 0.0|  0.0| 5.00| 0.006 | II | 67.3(108.3)
T-A |34.9200|118.9200|05/23/1857| 0 0 0.0|  0.0| 5.00| 0.006 | II | 67.3(108.3)
DMG |33.4000|119.4000|07/24/1947|1654 2.0|  0.0| 4.30| 0.003 |  I | 67.4(108.4)
T-A |34.1700|117.3200|12/02/1859|2210 0.0|  0.0| 4.30| 0.003 |  I | 67.6(108.8)
DMG |34.8830|119.0330|08/20/1952| 84747.0|  0.0| 4.20| 0.003 |  I | 67.7(108.9)
DMG |34.9110|118.9730|02/23/1939| 84551.7| 10.0| 4.50| 0.004 |  I | 67.9(109.3)
GSP |34.1070|117.3040|01/09/2009|034946.3| 14.0| 4.50| 0.004 |  I | 68.0(109.4)
MGI |34.1000|117.3000|07/15/1905|2041 0.0|  0.0| 5.30| 0.008 | II | 68.2(109.7)
MGI |34.1000|117.3000|12/27/1901|11 0 0.0|  0.0| 4.60| 0.004 |  I | 68.2(109.7)
DMG |34.1000|117.3000|02/16/1931|1327 0.0|  0.0| 4.00| 0.003 |  I | 68.2(109.7)
MGI |34.1000|117.3000|11/22/1911| 257 0.0|  0.0| 4.00| 0.003 |  I | 68.2(109.7)
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                    EARTHQUAKE SEARCH RESULTS
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    |      |       |         | TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |34.9500|118.8670|07/21/1952|121936.0|  0.0| 5.30| 0.008 | II | 68.2(109.8)
DMG |34.2500|119.6540|06/29/1968|153242.8| 14.6| 4.10| 0.003 |  I | 68.7(110.5)
DMG |33.0380|118.7340|09/13/1937|221439.5| 10.0| 4.00| 0.003 |  I | 68.8(110.7)
DMG |34.0000|117.2830|11/07/1939|1852 8.4|  0.0| 4.70| 0.005 | II | 68.9(110.9)
DMG |34.9280|118.9700|01/15/1955| 1 3 6.7|  9.1| 4.30| 0.003 |  I | 68.9(110.9)
DMG |34.9030|119.0380|05/08/1939| 248 5.3| 10.0| 4.50| 0.004 |  I | 69.0(111.1)
MGI |34.2000|117.3000|04/13/1913|1045 0.0|  0.0| 4.00| 0.003 |  I | 69.1(111.1)
DMG |34.9000|119.0500|07/22/1952|143018.0|  0.0| 4.30| 0.003 |  I | 69.1(111.3)
DMG |34.9320|118.9760|03/01/1963| 02557.9| 13.9| 5.00| 0.006 | II | 69.3(111.5)
GSP |34.9180|119.0200|12/24/2000|010421.9| 14.0| 4.40| 0.004 |  I | 69.5(111.8)
DMG |35.0000|118.7330|04/29/1953|124745.0|  0.0| 4.70| 0.005 | II | 69.6(112.0)
DMG |35.0000|118.7330|08/23/1952| 6 3 3.0|  0.0| 4.30| 0.003 |  I | 69.6(112.0)
DMG |33.9960|117.2700|02/17/1952|123658.3| 16.0| 4.50| 0.004 |  I | 69.7(112.1)
DMG |34.9500|118.9500|10/16/1952|1222 7.0|  0.0| 4.30| 0.003 |  I | 69.9(112.4)
DMG |34.1180|119.7020|07/05/1968| 04517.2|  5.9| 5.20| 0.007 | II | 69.9(112.5)
DMG |34.9450|118.9680|03/04/1963|201042.3|  8.5| 4.00| 0.003 |  - | 70.0(112.6)
DMG |34.9410|118.9870|11/15/1961| 53855.5| 10.7| 5.00| 0.006 | II | 70.1(112.9)
DMG |34.2120|119.6910|06/26/1968|181111.2| 13.9| 4.00| 0.003 |  - | 70.2(113.0)
GSP |34.0470|117.2550|02/21/2000|134943.1| 15.0| 4.50| 0.004 |  I | 70.5(113.5)
DMG |34.0000|117.2500|07/23/1923| 73026.0|  0.0| 6.25| 0.016 | IV | 70.8(113.9)
DMG |34.0000|117.2500|11/01/1932| 445 0.0|  0.0| 4.00| 0.003 |  - | 70.8(113.9)
DMG |34.0720|119.7230|07/05/1968| 23614.1|  4.3| 4.00| 0.003 |  - | 70.8(114.0)
T-A |34.0800|117.2500|10/07/1869| 0 0 0.0|  0.0| 4.30| 0.003 |  I | 70.9(114.1)
DMG |35.0000|118.8330|07/23/1952| 75319.0|  0.0| 5.40| 0.008 | II | 71.0(114.2)
DMG |35.0000|118.8330|12/01/1952| 52610.0|  0.0| 4.40| 0.003 |  I | 71.0(114.2)
DMG |35.0000|118.8330|07/23/1952|181351.0|  0.0| 5.20| 0.007 | II | 71.0(114.2)
DMG |34.9670|118.9500|11/27/1952|153641.0|  0.0| 4.00| 0.003 |  - | 71.0(114.2)
DMG |34.9670|118.9500|07/30/1952|11 255.0|  0.0| 4.10| 0.003 |  I | 71.0(114.2)
DMG |34.9830|118.9000|07/24/1952| 95032.0|  0.0| 4.30| 0.003 |  I | 71.0(114.3)
DMG |34.9830|118.9000|03/23/1953|17 637.0|  0.0| 4.00| 0.003 |  - | 71.0(114.3)
PAS |34.0230|117.2450|10/02/1985|234412.4| 15.2| 4.80| 0.005 | II | 71.1(114.4)
DMG |34.2530|119.6980|06/29/1968|191221.3|  9.5| 4.20| 0.003 |  I | 71.2(114.5)
DMG |34.9500|119.0170|11/11/1952|181225.0|  0.0| 4.10| 0.003 |  I | 71.4(114.9)
DMG |34.8410|119.2400|01/11/1958|23 847.4| 10.8| 4.00| 0.003 |  - | 71.5(115.0)
DMG |34.9330|119.0670|02/10/1954|235838.0|  0.0| 4.50| 0.004 |  I | 71.6(115.2)
DMG |34.9220|119.1030|01/09/1963| 6 4 3.8|  8.7| 4.00| 0.002 |  - | 71.9(115.7)
GSP |34.0240|117.2300|03/11/1998|121851.8| 14.0| 4.50| 0.004 |  I | 71.9(115.7)
DMG |34.0430|117.2280|04/03/1939| 25044.7| 10.0| 4.00| 0.002 |  - | 72.1(116.0)
DMG |34.9670|119.0000|09/02/1952|204556.0|  0.0| 4.70| 0.004 |  I | 72.1(116.0)
DMG |34.1920|119.7330|07/05/1968| 036 6.4| 15.6| 4.00| 0.002 |  - | 72.3(116.4)
DMG |34.3170|119.7000|10/21/1953|16 238.0|  0.0| 4.00| 0.002 |  - | 72.4(116.5)
DMG |35.0630|118.4230|08/26/1952|205640.6| -0.8| 4.40| 0.003 |  I | 72.6(116.8)
DMG |34.9830|118.9830|05/23/1954|235243.0|  0.0| 5.10| 0.006 | II | 72.7(117.0)
PAS |34.3470|119.6960|08/13/1978|225453.4| 12.8| 5.10| 0.006 | II | 72.8(117.2)
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DMG |35.0670|118.6170|07/23/1952|235136.0|  0.0| 4.00| 0.002 |  - | 73.2(117.7)
DMG |34.1760|119.7540|07/07/1968|143330.8| 12.8| 4.50| 0.004 |  I | 73.3(118.0)
DMG |35.0330|118.8500|10/07/1953|145921.0|  0.0| 4.90| 0.005 | II | 73.4(118.1)
GSP |32.9750|118.7910|03/04/1992|190627.0|  6.0| 4.20| 0.003 |  I | 73.8(118.7)
DMG |34.9830|119.0330|07/21/1952|235328.0|  0.0| 4.50| 0.004 |  I | 73.8(118.8)
MGI |34.1000|117.2000|04/23/1923|2113 0.0|  0.0| 4.00| 0.002 |  - | 73.9(118.8)
DMG |35.0830|118.5830|08/04/1952| 535 0.0|  0.0| 4.00| 0.002 |  - | 74.1(119.2)
DMG |35.0830|118.5830|07/22/1952| 81624.0|  0.0| 4.40| 0.003 |  I | 74.1(119.2)
DMG |33.9000|117.2000|12/19/1880| 0 0 0.0|  0.0| 6.00| 0.012 | III| 74.1(119.2)




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                         EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |35.0000|119.0000|07/21/1952|1218 0.0|  0.0| 4.40| 0.003 |  I | 74.2(119.3)
DMG |35.0000|119.0000|08/10/1952|194424.0|  0.0| 4.10| 0.003 |  - | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1210 0.0|  0.0| 4.50| 0.004 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|18 0 0.0|  0.0| 4.50| 0.004 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1313 0.0|  0.0| 4.50| 0.004 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1317 0.0|  0.0| 4.00| 0.002 |  - | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1542 0.0|  0.0| 4.20| 0.003 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|12 6 0.0|  0.0| 4.80| 0.005 |  I | 74.2(119.3)
DMG |35.0000|119.0000|03/13/1929| 228 0.0|  0.0| 4.50| 0.004 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1212 0.0|  0.0| 4.60| 0.004 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|12 531.0|  0.0| 6.40| 0.016 | IV | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1240 0.0|  0.0| 4.90| 0.005 | II | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1638 0.0|  0.0| 4.50| 0.004 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|12 7 0.0|  0.0| 4.70| 0.004 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1239 0.0|  0.0| 4.20| 0.003 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1536 0.0|  0.0| 4.20| 0.003 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/22/1952| 82122.0|  0.0| 4.10| 0.003 |  - | 74.2(119.3)
DMG |35.0000|119.0000|07/25/1952| 0 3 0.0|  0.0| 4.00| 0.002 |  - | 74.2(119.3)
DMG |35.0000|119.0000|07/22/1952|191024.0|  0.0| 4.10| 0.003 |  - | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1222 0.0|  0.0| 4.90| 0.005 | II | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1259 0.0|  0.0| 4.20| 0.003 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1336 0.0|  0.0| 4.10| 0.003 |  - | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|14 6 0.0|  0.0| 4.20| 0.003 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1442 0.0|  0.0| 4.20| 0.003 |  I | 74.2(119.3)
DMG |35.0000|119.0000|01/25/1919|2229 0.0|  0.0| 4.00| 0.002 |  - | 74.2(119.3)
DMG |35.0000|119.0000|02/16/1919|1557 0.0|  0.0| 5.00| 0.005 | II | 74.2(119.3)
DMG |35.0000|119.0000|07/22/1952|175236.0|  0.0| 4.10| 0.003 |  - | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1553 0.0|  0.0| 4.50| 0.004 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1225 0.0|  0.0| 4.70| 0.004 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1417 0.0|  0.0| 4.10| 0.003 |  - | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1617 0.0|  0.0| 4.10| 0.003 |  - | 74.2(119.3)
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DMG |35.0000|119.0000|07/21/1952|1415 0.0|  0.0| 4.40| 0.003 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1451 0.0|  0.0| 4.20| 0.003 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1311 0.0|  0.0| 4.10| 0.003 |  - | 74.2(119.3)
DMG |35.0000|119.0000|07/22/1952|133143.0|  0.0| 4.80| 0.005 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1359 0.0|  0.0| 4.60| 0.004 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/23/1952| 043 8.0|  0.0| 4.40| 0.003 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|1228 0.0|  0.0| 4.20| 0.003 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|13 8 0.0|  0.0| 4.50| 0.004 |  I | 74.2(119.3)
DMG |35.0000|119.0000|07/21/1952|132512.0|  0.0| 4.50| 0.004 |  I | 74.2(119.3)
MGI |34.4000|119.7000|03/25/1806| 8 0 0.0|  0.0| 5.00| 0.005 | II | 74.3(119.5)
MGI |34.4000|119.7000|07/06/1926|1745 0.0|  0.0| 4.00| 0.002 |  - | 74.3(119.5)
MGI |34.4000|119.7000|06/24/1926|1530 0.0|  0.0| 4.00| 0.002 |  - | 74.3(119.5)
MGI |34.4000|119.7000|08/09/1926| 412 0.0|  0.0| 4.00| 0.002 |  - | 74.3(119.5)
MGI |34.4000|119.7000|08/26/1927|1240 0.0|  0.0| 4.00| 0.002 |  - | 74.3(119.5)
PAS |33.0330|117.9440|02/22/1983| 21830.4| 10.0| 4.30| 0.003 |  I | 74.5(119.9)
DMG |35.0670|118.7670|07/22/1952|21 211.0|  0.0| 4.20| 0.003 |  I | 74.5(119.9)
DMG |35.0000|119.0170|01/12/1954|233349.0|  0.0| 5.90| 0.011 | III| 74.5(120.0)
DMG |35.0000|119.0170|05/25/1953| 324 1.0|  0.0| 4.80| 0.004 |  I | 74.5(120.0)
DMG |35.0000|119.0170|07/21/1952|115214.0|  0.0| 7.70| 0.046 | VI | 74.5(120.0)
DMG |35.0330|118.9170|07/23/1952|211658.0|  0.0| 4.10| 0.003 |  - | 74.6(120.0)
PAS |35.0950|118.5190|06/22/1981| 45747.3|  5.0| 4.00| 0.002 |  - | 74.7(120.3)
GSP |34.0050|117.1800|02/13/2010|213906.6|  8.0| 4.10| 0.003 |  - | 74.8(120.4)




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                        EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |35.0170|118.9830|08/17/1952| 9 9 7.0|  0.0| 4.10| 0.003 |  - | 74.9(120.5)
DMG |35.0330|118.9330|07/22/1952|223133.0|  0.0| 4.70| 0.004 |  I | 74.9(120.5)
DMG |35.0000|119.0330|07/21/1952|12 2 0.0|  0.0| 5.60| 0.009 | III| 74.9(120.6)
DMG |35.0000|119.0330|07/21/1952|1157 0.0|  0.0| 4.50| 0.004 |  I | 74.9(120.6)
DMG |35.0000|119.0330|07/21/1952|1158 0.0|  0.0| 4.60| 0.004 |  I | 74.9(120.6)
DMG |35.0000|119.0330|07/21/1952|1154 0.0|  0.0| 4.50| 0.004 |  I | 74.9(120.6)
DMG |35.0000|119.0330|07/21/1952|1155 0.0|  0.0| 4.50| 0.004 |  I | 74.9(120.6)
DMG |35.0000|119.0330|07/21/1952|1159 0.0|  0.0| 4.50| 0.004 |  I | 74.9(120.6)
GSP |33.1660|119.3020|11/15/2009|224527.1|  6.0| 4.30| 0.003 |  I | 74.9(120.6)
DMG |35.0000|119.0500|09/12/1952|103525.0|  0.0| 4.50| 0.003 |  I | 75.3(121.2)
DMG |35.0500|118.9000|09/25/1952|162136.0|  0.0| 4.10| 0.003 |  - | 75.4(121.3)
DMG |35.0830|118.7500|07/26/1952|15 831.0|  0.0| 4.40| 0.003 |  I | 75.4(121.3)
DMG |35.0830|118.7500|07/26/1952|18 244.0|  0.0| 4.00| 0.002 |  - | 75.4(121.3)
DMG |35.0830|118.7500|07/22/1952| 84734.0|  0.0| 4.70| 0.004 |  I | 75.4(121.3)
DMG |35.1000|118.6170|09/26/1952|202120.0|  0.0| 4.00| 0.002 |  - | 75.4(121.4)
T-A |34.5000|119.6700|03/14/1857|23 0 0.0|  0.0| 4.30| 0.003 |  I | 75.4(121.4)
T-A |34.5000|119.6700|05/31/1854|1250 0.0|  0.0| 4.30| 0.003 |  I | 75.4(121.4)
T-A |34.5000|119.6700|02/09/1902|15 0 0.0|  0.0| 4.30| 0.003 |  I | 75.4(121.4)
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T-A |34.5000|119.6700|06/25/1855|22 0 0.0|  0.0| 4.30| 0.003 |  I | 75.4(121.4)
T-A |34.5000|119.6700|07/09/1885| 0 0 0.0|  0.0| 4.30| 0.003 |  I | 75.4(121.4)
T-A |34.5000|119.6700|06/01/1893|12 0 0.0|  0.0| 5.00| 0.005 | II | 75.4(121.4)
DMG |33.2670|119.4500|11/18/1947|2159 3.0|  0.0| 5.00| 0.005 | II | 75.6(121.7)
GSP |35.0980|118.3060|12/31/1995|214823.1|  7.0| 4.00| 0.002 |  - | 75.6(121.7)
DMG |34.3250|119.7610|08/09/1956| 0 849.2|  4.0| 4.00| 0.002 |  - | 75.9(122.2)
DMG |35.0000|119.0830|11/07/1952| 85535.0|  0.0| 4.60| 0.004 |  I | 76.1(122.5)
DMG |34.2000|119.8000|12/21/1812|19 0 0.0|  0.0| 7.00| 0.026 |  V | 76.2(122.6)
DMG |35.0670|118.8830|08/14/1952|114146.0|  0.0| 4.20| 0.003 |  I | 76.2(122.6)
DMG |35.0670|118.8830|08/17/1952|21 442.0|  0.0| 4.30| 0.003 |  I | 76.2(122.6)
DMG |34.4900|119.6910|09/16/1962|181235.2| 13.3| 4.00| 0.002 |  - | 76.2(122.6)
DMG |35.1170|118.4810|05/01/1953| 64820.9|  2.4| 4.10| 0.002 |  - | 76.2(122.7)
DMG |35.0330|119.0000|07/22/1952|101939.0|  0.0| 4.10| 0.002 |  - | 76.3(122.7)
DMG |35.0500|118.9500|08/17/1952| 614 4.0|  0.0| 4.00| 0.002 |  - | 76.3(122.8)
DMG |35.0500|118.9500|11/14/1952|2334 1.4|  0.0| 4.00| 0.002 |  - | 76.3(122.8)
DMG |35.0170|119.0500|08/05/1953|122059.0|  0.0| 4.30| 0.003 |  I | 76.4(122.9)
PAS |35.0000|119.1030|05/13/1975| 02135.6| 19.1| 4.50| 0.003 |  I | 76.7(123.4)
GSP |33.6740|119.7600|07/24/2005|125942.9|  6.0| 4.10| 0.002 |  - | 76.7(123.4)
DMG |34.3500|119.7670|11/10/1940|102510.0|  0.0| 4.00| 0.002 |  - | 76.7(123.5)
DMG |33.7380|117.1870|04/27/1962| 91232.1|  5.7| 4.10| 0.002 |  - | 76.9(123.7)
MGI |34.5000|119.7000|07/29/1925|14 0 0.0|  0.0| 4.00| 0.002 |  - | 77.0(123.9)
MGI |34.5000|119.7000|08/26/1919|1212 0.0|  0.0| 4.00| 0.002 |  - | 77.0(123.9)
MGI |34.5000|119.7000|08/26/1919|1457 0.0|  0.0| 4.00| 0.002 |  - | 77.0(123.9)
DMG |35.0670|118.9330|07/23/1952|223220.0|  0.0| 4.10| 0.002 |  - | 77.1(124.1)
PAS |35.0460|119.0010|06/05/1975|144645.3|  9.0| 4.10| 0.002 |  - | 77.1(124.1)
DMG |35.0450|119.0040|03/23/1956|212327.1| 12.1| 4.30| 0.003 |  I | 77.1(124.1)
GSP |35.0430|119.0130|09/22/2005|202448.6| 11.0| 4.70| 0.004 |  I | 77.2(124.2)
DMG |35.1330|118.5170|07/22/1952| 141 2.0|  0.0| 4.50| 0.003 |  I | 77.4(124.5)
DMG |35.1330|118.5170|08/14/1952| 72822.0|  0.0| 4.10| 0.002 |  - | 77.4(124.5)
DMG |35.1330|118.5170|07/23/1952|152524.0|  0.0| 4.00| 0.002 |  - | 77.4(124.5)
DMG |35.1330|118.5170|07/28/1952| 54554.0|  0.0| 4.20| 0.003 |  I | 77.4(124.5)
DMG |35.0330|119.0500|08/18/1952| 44010.0|  0.0| 4.70| 0.004 |  I | 77.4(124.5)
DMG |35.0330|119.0500|07/27/1952| 71611.0|  0.0| 4.10| 0.002 |  - | 77.4(124.5)
DMG |35.0330|119.0500|08/07/1952|163151.0|  0.0| 4.90| 0.005 | II | 77.4(124.5)
MGI |34.3000|119.8000|07/03/1925|1638 0.0|  0.0| 5.30| 0.006 | II | 77.6(124.9)




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                 EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
MGI |34.3000|119.8000|07/03/1925|1821 0.0|  0.0| 5.30| 0.006 | II | 77.6(124.9)
DMG |34.3000|119.8000|06/29/1925|144216.0|  0.0| 6.25| 0.014 | III| 77.6(124.9)
DMG |35.0670|118.9830|08/04/1952|194750.0|  0.0| 4.00| 0.002 |  - | 78.1(125.6)
DMG |35.1330|118.7000|09/02/1952|124132.0|  0.0| 4.60| 0.004 |  I | 78.3(126.0)
DMG |35.0330|119.1000|01/13/1954| 14531.0|  0.0| 4.40| 0.003 |  I | 78.6(126.5)
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DMG |35.0330|119.1000|02/07/1954| 0 953.0|  0.0| 4.40| 0.003 |  I | 78.6(126.5)
DMG |35.0330|119.1000|09/02/1953|152756.0|  0.0| 4.00| 0.002 |  - | 78.6(126.5)
DMG |35.0330|119.1000|01/12/1954|234037.0|  0.0| 4.10| 0.002 |  - | 78.6(126.5)
PAS |35.0180|119.1410|11/10/1981|223435.5|  3.1| 4.50| 0.003 |  I | 78.8(126.7)
USG |33.0170|117.8170|07/14/1986| 11112.6| 10.0| 4.12| 0.002 |  - | 78.8(126.8)
USG |33.0170|117.8170|07/16/1986|1247 3.7| 10.0| 4.11| 0.002 |  - | 78.8(126.8)
DMG |35.1500|118.6330|01/27/1954|141948.0|  0.0| 5.00| 0.005 | II | 79.0(127.1)
DMG |35.1330|118.7670|07/25/1952|143442.0|  0.0| 4.40| 0.003 |  I | 79.0(127.1)
DMG |35.1330|118.7670|07/21/1952|194122.0|  0.0| 5.50| 0.007 | II | 79.0(127.1)
GSP |33.1950|119.4490|01/03/2012|141856.1| 18.0| 4.10| 0.002 |  - | 79.0(127.2)
DMG |34.4710|119.7570|11/16/1958| 934 6.1| 15.2| 4.00| 0.002 |  - | 79.1(127.3)
DMG |35.0670|119.0330|07/23/1952|175329.0|  0.0| 4.10| 0.002 |  - | 79.1(127.4)
DMG |35.0670|119.0330|07/27/1952|113438.0|  0.0| 4.10| 0.002 |  - | 79.1(127.4)
DMG |35.1500|118.6830|08/13/1952|173925.0|  0.0| 4.70| 0.004 |  I | 79.3(127.6)
DMG |35.0660|119.0490|01/24/1974| 5 2 0.8|  6.4| 4.30| 0.003 |  I | 79.4(127.8)
PAS |35.0120|119.1790|11/10/1981|2237 5.0|  9.4| 4.20| 0.003 |  - | 79.4(127.8)
PAS |32.9900|117.8490|07/13/1986|14 133.0| 12.0| 4.60| 0.003 |  I | 79.6(128.1)
MGI |34.4000|119.8000|09/09/1929| 515 0.0|  0.0| 4.60| 0.003 |  I | 79.6(128.1)
GSB |35.0380|119.1300|02/14/2004|124311.4| 12.0| 4.60| 0.003 |  I | 79.7(128.2)
PAS |35.0350|119.1370|06/16/1978| 42131.6|  1.8| 4.30| 0.003 |  I | 79.7(128.2)
GSG |32.8667|118.6535|11/10/2014|084242.9|  5.4| 4.11| 0.002 |  - | 79.7(128.3)
PAS |34.4020|119.8020|03/10/1986|153316.3| 18.0| 4.10| 0.002 |  - | 79.8(128.4)
DMG |35.1000|118.9670|08/25/1952| 62026.0|  0.0| 4.70| 0.004 |  I | 79.9(128.5)
DMG |35.0670|119.0670|02/24/1954|223022.0|  0.0| 4.50| 0.003 |  I | 79.9(128.6)
PAS |32.9860|117.8440|10/01/1986|201218.6|  6.0| 4.00| 0.002 |  - | 80.0(128.7)
DMG |34.3330|119.8330|06/26/1933| 62752.0|  0.0| 4.30| 0.003 |  I | 80.0(128.8)
DMG |34.3330|119.8330|06/26/1933| 62542.0|  0.0| 4.30| 0.003 |  I | 80.0(128.8)
PAS |32.9710|117.8700|07/13/1986|1347 8.2|  6.0| 5.30| 0.006 | II | 80.2(129.1)
DMG |32.8670|118.2500|02/13/1952|151337.0|  0.0| 4.70| 0.004 |  I | 80.3(129.2)
GSB |35.0270|119.1780|04/16/2005|191813.0| 10.0| 4.60| 0.003 |  I | 80.3(129.2)
DMG |34.2000|117.1000|09/20/1907| 154 0.0|  0.0| 6.00| 0.011 | III| 80.3(129.3)
DMG |35.0500|119.1330|08/06/1953|1120 4.0|  0.0| 4.40| 0.003 |  I | 80.5(129.5)
DMG |35.0500|119.1330|05/23/1953| 75255.0|  0.0| 4.20| 0.002 |  - | 80.5(129.5)
GSP |34.1920|117.0950|04/06/1994|190104.1|  7.0| 4.80| 0.004 |  I | 80.5(129.6)
DMG |35.1000|119.0000|07/22/1952|14 511.0|  0.0| 4.30| 0.003 |  I | 80.5(129.6)
DMG |35.1000|119.0000|07/24/1952| 311 7.0|  0.0| 4.10| 0.002 |  - | 80.5(129.6)
GSP |35.0310|119.1800|05/06/2005|022909.5| 11.0| 4.10| 0.002 |  - | 80.6(129.7)
GSP |32.9850|117.8180|06/21/1995|211736.2|  6.0| 4.30| 0.003 |  I | 80.7(129.9)
GSP |33.9530|117.0760|09/14/2011|144451.0| 16.0| 4.10| 0.002 |  - | 80.9(130.1)
DMG |35.1830|118.6000|07/26/1952| 63850.0|  0.0| 4.00| 0.002 |  - | 81.1(130.4)
DMG |35.1830|118.6000|07/26/1952|2241 3.0|  0.0| 4.60| 0.003 |  I | 81.1(130.4)
DMG |35.1830|118.6000|07/29/1952|154950.0|  0.0| 4.90| 0.004 |  I | 81.1(130.4)
T-A |34.4200|119.8200|00/00/1862| 0 0 0.0|  0.0| 5.70| 0.008 | III| 81.1(130.6)
DMG |35.1830|118.6500|07/21/1952|151358.0|  0.0| 5.10| 0.005 | II | 81.3(130.9)
DMG |33.1500|119.4500|06/17/1934| 243 0.0|  0.0| 4.00| 0.002 |  - | 81.3(130.9)
DMG |33.1500|119.4500|01/05/1940| 62052.0|  0.0| 4.00| 0.002 |  - | 81.3(130.9)
DMG |35.0500|119.1670|12/14/1950|135623.0|  0.0| 4.40| 0.003 |  I | 81.4(131.0)
DMG |35.1940|118.4650|07/22/1952|19 858.2|  3.7| 4.30| 0.003 |  I | 81.6(131.3)




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                    EARTHQUAKE SEARCH RESULTS
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    |      |       |         | TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |         | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
GSP |32.9000|118.0070|06/20/2009|010030.6| 14.0| 4.10| 0.002 |  - | 81.6(131.4)
GSP |32.9700|117.8100|04/04/1990|085439.3|  6.0| 4.00| 0.002 |  - | 81.9(131.7)
DMG |35.1990|118.5310|09/01/1961|165148.9|  4.5| 4.00| 0.002 |  - | 81.9(131.9)
PAS |32.9700|117.8030|07/14/1986| 03246.2| 10.0| 4.00| 0.002 |  - | 82.1(132.0)
GSP |35.0220|119.2530|05/08/2010|192306.6| 15.0| 4.30| 0.003 |  - | 82.2(132.3)
DMG |34.0170|117.0500|02/19/1940|12 655.7|  0.0| 4.60| 0.003 |  I | 82.2(132.3)
DMG |35.1000|119.0830|07/24/1946| 019 8.0|  0.0| 4.00| 0.002 |  - | 82.4(132.6)
DMG |35.1000|119.0830|12/06/1934| 743 0.0|  0.0| 4.00| 0.002 |  - | 82.4(132.6)
DMG |33.7000|117.1000|06/11/1902| 245 0.0|  0.0| 4.50| 0.003 |  I | 82.4(132.6)
DMG |35.2000|118.6330|07/22/1952| 321 5.0|  0.0| 4.40| 0.003 |  I | 82.4(132.6)
PAS |32.9450|117.8310|07/29/1986| 81741.8| 10.0| 4.10| 0.002 |  - | 82.8(133.3)
DMG |32.8170|118.3500|12/26/1951| 04654.0|  0.0| 5.90| 0.009 | III| 82.9(133.5)
DMG |35.0500|119.2330|08/19/1952|191226.0|  0.0| 4.50| 0.003 |  I | 83.2(134.0)
PAS |32.9330|117.8410|07/29/1986| 81741.6| 10.0| 4.30| 0.003 |  - | 83.3(134.1)
GSP |34.0540|117.0300|06/27/2005|221733.6| 12.0| 4.00| 0.002 |  - | 83.4(134.2)
PAS |32.9450|117.8060|09/07/1984|11 313.4|  6.0| 4.30| 0.003 |  - | 83.5(134.4)
DMG |35.2170|118.6670|09/14/1952|204324.0|  0.0| 4.10| 0.002 |  - | 83.8(134.8)
DMG |35.2290|118.5130|06/28/1957|1132 0.8|  1.6| 4.10| 0.002 |  - | 84.0(135.2)
GSP |33.9320|117.0230|01/16/2010|120325.7| 13.0| 4.30| 0.003 |  - | 84.0(135.2)
DMG |35.2330|118.5330|07/22/1952|15 314.0|  0.0| 4.20| 0.002 |  - | 84.3(135.7)
DMG |35.2330|118.5330|03/17/1953|161517.0|  0.0| 4.00| 0.002 |  - | 84.3(135.7)
DMG |35.2330|118.5330|07/30/1952|144650.0|  0.0| 4.10| 0.002 |  - | 84.3(135.7)
DMG |35.2330|118.5330|07/29/1952|173643.0|  0.0| 4.40| 0.003 |  I | 84.3(135.7)
DMG |35.2330|118.5330|07/24/1952|1735 6.0|  0.0| 4.20| 0.002 |  - | 84.3(135.7)
DMG |35.2330|118.5330|07/21/1952|174244.0|  0.0| 5.10| 0.005 | II | 84.3(135.7)
DMG |35.2350|118.5480|03/03/1973|181449.5|  8.0| 4.00| 0.002 |  - | 84.5(135.9)
DMG |35.2330|118.6000|07/22/1952| 91025.0|  0.0| 4.50| 0.003 |  I | 84.5(136.0)
DMG |35.2330|118.6000|01/10/1953|221738.0|  0.0| 4.00| 0.002 |  - | 84.5(136.0)
GSP |34.0580|117.0100|06/16/2005|205326.0| 11.0| 4.90| 0.004 |  I | 84.6(136.1)
GSP |34.1800|117.0200|12/04/1991|081703.5| 11.0| 4.00| 0.002 |  - | 84.7(136.2)
DMG |35.2390|118.5180|07/21/1952|2021 5.1| -2.0| 4.20| 0.002 |  - | 84.7(136.3)
DMG |35.1500|119.0500|11/11/1952|1722 8.0|  0.0| 4.20| 0.002 |  - | 84.8(136.5)
DMG |35.2410|118.5600|07/21/1952|1912 7.4|  5.8| 4.30| 0.002 |  - | 84.9(136.6)
DMG |34.0000|117.0000|06/30/1923| 022 0.0|  0.0| 4.50| 0.003 |  I | 85.1(136.9)
DMG |35.0830|119.2330|03/03/1956| 62412.0|  0.0| 4.20| 0.002 |  - | 85.2(137.1)
DMG |35.2170|118.8170|07/23/1952|1317 5.0|  0.0| 5.70| 0.008 | II | 85.2(137.2)
DMG |35.2170|118.8170|12/15/1953|124436.0|  0.0| 4.60| 0.003 |  I | 85.2(137.2)
PAS |32.9470|117.7360|01/15/1989|153955.2|  6.0| 4.20| 0.002 |  - | 85.3(137.3)
GSG |34.2800|117.0278|07/05/2014|165934.1|  8.7| 4.58| 0.003 |  I | 85.4(137.4)
DMG |35.2500|118.4830|07/23/1952| 93842.0|  0.0| 4.20| 0.002 |  - | 85.4(137.5)
DMG |35.2500|118.4830|07/23/1952|1330 4.0|  0.0| 4.40| 0.003 |  I | 85.4(137.5)
GSP |34.1200|116.9980|06/29/1992|144126.0|  4.0| 4.40| 0.003 |  I | 85.5(137.5)
GSP |34.0970|116.9960|12/05/1997|170438.9|  4.0| 4.10| 0.002 |  - | 85.5(137.6)
GSP |34.0850|116.9890|06/30/1992|214900.3|  3.0| 4.40| 0.003 |  I | 85.8(138.1)
GSP |35.1490|119.1040|05/28/1993|044740.6| 21.0| 5.20| 0.005 | II | 85.9(138.3)
GSP |35.2100|118.0660|07/11/1992|181416.2| 10.0| 5.70| 0.008 | II | 86.1(138.5)
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USG |32.7700|118.3340|06/16/1985|1027 0.7|  5.0| 4.14| 0.002 |  - | 86.3(138.8)
DMG |33.8000|117.0000|12/25/1899|1225 0.0|  0.0| 6.40| 0.013 | III| 86.5(139.1)
DMG |35.2670|118.4500|07/21/1952|191619.0|  0.0| 4.30| 0.002 |  - | 86.6(139.4)
DMG |34.1670|116.9830|10/16/1951|1241 5.0|  0.0| 4.00| 0.002 |  - | 86.6(139.4)
GSG |34.4125|119.9260|05/29/2013|143803.2|  8.0| 4.80| 0.004 |  I | 86.7(139.5)
GSP |34.1570|116.9760|12/19/2007|121409.0|  7.0| 4.00| 0.002 |  - | 87.0(139.9)
GSP |34.0840|116.9680|10/02/2008|094149.3| 12.0| 4.10| 0.002 |  - | 87.0(140.0)




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                    EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |33.7500|117.0000|06/06/1918|2232 0.0|  0.0| 5.00| 0.004 |  I | 87.1(140.2)
DMG |33.7500|117.0000|04/21/1918|223225.0|  0.0| 6.80| 0.018 | IV | 87.1(140.2)
PAS |34.1510|116.9720|11/20/1978| 655 9.5|  6.1| 4.30| 0.002 |  - | 87.1(140.2)
GSP |32.7600|118.2880|08/16/2001|180433.8|  6.0| 4.40| 0.003 |  - | 87.2(140.4)
DMG |34.0000|120.0170|04/01/1945|234342.0|  0.0| 5.40| 0.006 | II | 87.6(140.9)
DMG |34.3330|117.0000|02/27/1942| 1 853.0|  0.0| 4.00| 0.002 |  - | 87.8(141.2)
DMG |35.2830|118.5500|07/22/1952| 15151.0|  0.0| 4.40| 0.003 |  - | 87.8(141.3)
DMG |35.2830|118.5500|07/23/1952| 737 0.0|  0.0| 4.80| 0.004 |  I | 87.8(141.3)
DMG |35.2830|118.5500|07/23/1952| 34928.0|  0.0| 4.70| 0.003 |  I | 87.8(141.3)
DMG |35.2830|118.5500|07/26/1952| 922 6.0|  0.0| 4.30| 0.002 |  - | 87.8(141.3)
DMG |35.2830|118.5500|07/31/1952| 41022.0|  0.0| 4.20| 0.002 |  - | 87.8(141.3)
DMG |35.2830|118.5500|08/01/1952| 31611.6|  0.0| 4.50| 0.003 |  I | 87.8(141.3)
DMG |35.2830|118.5830|07/31/1952|1719 8.0|  0.0| 4.50| 0.003 |  I | 87.9(141.4)
DMG |35.1840|119.0990|07/01/1959|234923.4|  9.0| 4.70| 0.003 |  I | 88.0(141.7)
DMG |35.2890|118.4600|07/26/1952| 1 221.3| 10.8| 4.20| 0.002 |  - | 88.1(141.8)
DMG |35.2900|118.4700|07/24/1952|12 757.6| 14.1| 4.10| 0.002 |  - | 88.2(141.9)
DMG |35.2890|118.4110|08/10/1952|122318.0|  4.0| 4.60| 0.003 |  I | 88.2(142.0)
PAS |34.1980|116.9590|04/01/1978|105227.4|  8.0| 4.00| 0.002 |  - | 88.3(142.1)
DMG |34.1330|116.9500|06/10/1938|1440 0.0|  0.0| 4.00| 0.002 |  - | 88.3(142.1)
DMG |35.2940|118.4010|08/13/1952| 42940.6| 14.5| 4.60| 0.003 |  I | 88.6(142.6)
DMG |34.2670|116.9670|08/29/1943| 51630.0|  0.0| 4.00| 0.002 |  - | 88.6(142.6)
DMG |34.2670|116.9670|08/29/1943| 35754.0|  0.0| 4.00| 0.002 |  - | 88.6(142.6)
DMG |34.2670|116.9670|08/29/1943| 34513.0|  0.0| 5.50| 0.006 | II | 88.6(142.6)
T-A |33.5000|117.0700|12/29/1880| 7 0 0.0|  0.0| 4.30| 0.002 |  - | 88.7(142.7)
GSP |32.7340|118.3340|08/16/2001|220628.1| 25.0| 4.20| 0.002 |  - | 88.7(142.8)
DMG |32.7500|118.2000|06/25/1939| 149 0.0|  0.0| 4.50| 0.003 |  I | 88.7(142.8)
DMG |35.2990|118.4350|07/25/1952|20 6 6.1| -1.4| 4.80| 0.003 |  I | 88.9(143.0)
DMG |35.3000|118.5000|02/19/1953| 812 6.0|  0.0| 4.40| 0.003 |  - | 88.9(143.0)
DMG |35.3000|118.5330|07/30/1952| 95929.0|  0.0| 4.00| 0.002 |  - | 88.9(143.1)
DMG |35.3000|118.5330|07/21/1952|182628.0|  0.0| 4.10| 0.002 |  - | 88.9(143.1)
DMG |35.3000|118.5330|07/21/1952|182338.0|  0.0| 4.50| 0.003 |  I | 88.9(143.1)
DMG |35.3000|118.5330|09/02/1952|1638 9.0|  0.0| 4.00| 0.002 |  - | 88.9(143.1)
DMG |35.3000|118.4320|07/23/1952| 61045.9| 14.5| 4.20| 0.002 |  - | 88.9(143.1)
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DMG |35.3030|118.4810|09/04/1952|18 649.1|  5.8| 4.40| 0.003 |  - | 89.1(143.4)
DMG |35.3030|118.4730|08/01/1952|213522.4|  4.2| 4.00| 0.002 |  - | 89.1(143.4)
DMG |35.3050|118.5070|08/09/1952|10 732.1| -2.0| 4.20| 0.002 |  - | 89.2(143.6)
DMG |35.3080|118.5160|07/31/1952|19 515.4|  7.3| 4.00| 0.002 |  - | 89.4(143.9)
DMG |35.3000|118.6670|08/13/1952|212548.0|  0.0| 4.10| 0.002 |  - | 89.5(144.0)
GSP |34.1210|116.9280|08/16/1998|133440.2|  6.0| 4.70| 0.003 |  I | 89.5(144.0)
DMG |35.3110|118.4990|07/25/1952|1313 8.2|  2.8| 5.00| 0.004 |  I | 89.6(144.3)
DMG |35.1830|119.1740|06/04/1956| 83319.3| 14.3| 4.00| 0.002 |  - | 89.7(144.4)
DMG |35.3130|118.4890|10/20/1952|181443.6| 14.0| 4.30| 0.002 |  - | 89.8(144.5)
DMG |35.3140|118.4820|08/30/1952| 45559.8|  5.5| 4.70| 0.003 |  I | 89.8(144.6)
GSP |34.1120|116.9200|10/01/1998|181816.0|  4.0| 4.70| 0.003 |  I | 89.9(144.6)
DMG |35.3140|118.5300|07/26/1952|225856.1|  6.8| 4.30| 0.002 |  - | 89.9(144.6)
DMG |35.3150|118.5160|07/25/1952|194323.7| 11.2| 5.70| 0.007 | II | 89.9(144.7)
DMG |35.3160|118.4870|09/15/1952| 44013.2|  4.2| 4.90| 0.004 |  I | 90.0(144.8)
GSP |32.7280|118.2230|01/29/2009|084159.0|  0.0| 4.20| 0.002 |  - | 90.0(144.8)
DMG |35.3160|118.5140|07/24/1952|14 525.9|  5.4| 4.30| 0.002 |  - | 90.0(144.8)
DMG |35.3170|118.4940|07/25/1952|19 944.6|  5.5| 5.70| 0.007 | II | 90.1(144.9)
GSP |34.2900|116.9460|02/10/2001|210505.8|  9.0| 5.10| 0.004 |  I | 90.1(145.0)
GSP |34.1780|116.9220|06/28/1992|170131.9| 13.0| 4.70| 0.003 |  I | 90.2(145.1)
GSP |34.2870|116.9420|02/11/2001|003916.0|  8.0| 4.20| 0.002 |  - | 90.3(145.3)




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   |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |35.3200|118.5180|07/27/1952| 0 915.6|  6.5| 4.20| 0.002 |  - | 90.3(145.3)
DMG |34.1800|116.9200|01/16/1930| 034 3.6|  0.0| 5.10| 0.004 |  I | 90.3(145.4)
DMG |34.1800|116.9200|01/16/1930| 02433.9|  0.0| 5.20| 0.005 | II | 90.3(145.4)
DMG |35.3210|118.4940|02/11/1955|194431.5| 14.7| 4.50| 0.003 |  I | 90.3(145.4)
DMG |35.3210|118.5400|07/24/1952|141012.2|  9.5| 4.00| 0.002 |  - | 90.4(145.4)
DMG |35.3240|118.4860|01/20/1953| 81322.8|  7.2| 4.00| 0.002 |  - | 90.5(145.7)
DMG |34.4330|116.9830|04/18/1945| 458 2.0|  0.0| 4.30| 0.002 |  - | 90.6(145.8)
GSP |35.3180|118.6540|01/25/2003|091610.2|  5.0| 4.50| 0.003 |  I | 90.6(145.8)
DMG |35.3000|118.8000|12/23/1905|2223 0.0|  0.0| 5.00| 0.004 |  I | 90.6(145.9)
DMG |35.3300|118.5070|05/29/1968| 22938.7|  3.1| 4.00| 0.002 |  - | 91.0(146.4)
DMG |35.3330|118.5330|08/01/1952|103556.0|  0.0| 4.00| 0.002 |  - | 91.2(146.8)
DMG |32.7180|118.1720|04/28/1938| 6 728.0| 10.0| 4.50| 0.003 |  I | 91.2(146.8)
DMG |35.3330|118.5670|08/08/1952| 51718.0|  0.0| 4.00| 0.002 |  - | 91.3(146.9)
DMG |35.3350|118.4740|07/23/1952|172224.0|  6.6| 4.50| 0.003 |  I | 91.3(146.9)
DMG |35.3360|118.4720|07/23/1952|105413.5| 19.7| 4.10| 0.002 |  - | 91.4(147.0)
DMG |35.3330|118.6000|08/10/1952| 6 118.0|  0.0| 4.00| 0.002 |  - | 91.4(147.1)
DMG |35.3330|118.6000|09/16/1952|142454.0|  0.0| 4.00| 0.002 |  - | 91.4(147.1)
DMG |35.3330|118.6000|07/23/1952|164853.0|  0.0| 4.50| 0.003 |  I | 91.4(147.1)
DMG |35.3330|118.6000|07/31/1952|12 9 9.0|  0.0| 5.80| 0.008 | II | 91.4(147.1)
DMG |35.3330|118.6000|07/23/1952|161838.0|  0.0| 4.50| 0.003 |  I | 91.4(147.1)
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PAS |32.7560|117.9880|01/12/1975|212214.8| 15.3| 4.80| 0.003 |  I | 91.4(147.1)
DMG |35.3370|118.5370|08/30/1952| 45954.8|  3.5| 4.00| 0.002 |  - | 91.5(147.2)
DMG |35.3380|118.5230|08/06/1952| 34624.2| 12.6| 4.30| 0.002 |  - | 91.5(147.3)
GSP |34.3950|120.0220|05/09/2004|085717.3|  4.0| 4.40| 0.002 |  - | 91.5(147.3)
GSP |34.2560|116.9120|06/28/1992|170557.5|  8.0| 4.60| 0.003 |  I | 91.6(147.3)
MGI |34.2000|116.9000|10/10/1915| 5 6 0.0|  0.0| 4.00| 0.002 |  - | 91.6(147.5)
DMG |35.3400|118.4730|07/24/1952| 5 249.6|  2.1| 4.50| 0.003 |  I | 91.6(147.5)
DMG |34.3200|116.9250|04/18/1968|174213.4|  4.7| 4.00| 0.002 |  - | 91.7(147.6)
DMG |32.8000|117.8330|01/24/1942|214148.0|  0.0| 4.00| 0.002 |  - | 91.8(147.8)
DMG |33.9680|116.8820|06/27/1959|162211.1| 13.8| 4.00| 0.002 |  - | 91.9(147.9)
DMG |34.1000|116.8830|10/24/1935|1451 0.0|  0.0| 4.50| 0.003 |  - | 91.9(147.9)
DMG |34.1000|116.8830|10/24/1935|1527 0.0|  0.0| 4.00| 0.002 |  - | 91.9(147.9)
DMG |34.1000|116.8830|10/24/1935|1452 0.0|  0.0| 4.50| 0.003 |  - | 91.9(147.9)
DMG |33.7100|116.9250|09/23/1963|144152.6| 16.5| 5.00| 0.004 |  I | 91.9(148.0)
DMG |35.3450|118.5070|07/23/1952|18 328.3| 10.4| 4.00| 0.002 |  - | 92.0(148.0)
GSP |33.6570|120.0330|04/21/2005|063619.0|  6.0| 4.00| 0.002 |  - | 92.0(148.1)
PAS |34.2460|116.9010|06/29/1979| 55320.5|  5.7| 4.60| 0.003 |  I | 92.1(148.1)
GSP |32.7260|118.0680|12/27/2000|002714.1|  6.0| 4.10| 0.002 |  - | 92.1(148.2)
DMG |35.3460|118.4650|12/25/1952| 55633.0|  4.6| 4.10| 0.002 |  - | 92.1(148.2)
MGI |33.8000|116.9000|04/29/1918| 2 0 0.0|  0.0| 4.00| 0.002 |  - | 92.1(148.2)
MGI |33.8000|116.9000|12/18/1920|1726 0.0|  0.0| 4.00| 0.002 |  - | 92.1(148.2)
MGI |33.8000|116.9000|04/23/1918|1415 0.0|  0.0| 4.00| 0.002 |  - | 92.1(148.2)
MGI |33.8000|116.9000|06/14/1918|1024 0.0|  0.0| 4.00| 0.002 |  - | 92.1(148.2)
PAS |34.2490|116.9000|06/30/1979| 7 353.0|  5.6| 4.50| 0.003 |  - | 92.1(148.3)
DMG |35.3330|118.7330|08/05/1952| 65010.0|  0.0| 4.40| 0.002 |  - | 92.2(148.4)
GSP |33.9660|116.8760|01/12/2010|023608.4| 10.0| 4.30| 0.002 |  - | 92.3(148.5)
PAS |34.2430|116.8960|06/30/1979| 03411.6|  5.8| 4.90| 0.004 |  I | 92.3(148.5)
DMG |33.5000|117.0000|08/08/1925|1013 0.0|  0.0| 4.50| 0.003 |  - | 92.4(148.7)
DMG |35.3510|118.5270|08/11/1952|132149.2| -2.0| 4.40| 0.002 |  - | 92.4(148.7)
GSP |34.3620|116.9230|12/07/1992|033331.5|  1.0| 4.00| 0.002 |  - | 92.5(148.9)
DMG |35.3560|118.5380|07/19/1955| 2 425.5|  6.4| 4.10| 0.002 |  - | 92.8(149.3)
MGI |34.3000|116.9000|12/01/1915|14 5 0.0|  0.0| 4.00| 0.002 |  - | 92.8(149.3)
PAS |32.7590|117.9060|10/18/1976|172753.1| 13.8| 4.20| 0.002 |  - | 92.8(149.4)




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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |34.3370|116.9090|11/30/1962|2351 5.5|  7.0| 4.30| 0.002 |  - | 92.9(149.4)
GSP |34.3610|116.9130|12/04/1992|125942.1|  0.0| 4.20| 0.002 |  - | 93.0(149.7)
GSP |34.3770|116.9180|12/04/1992|052511.2|  2.0| 4.80| 0.003 |  I | 93.1(149.7)
DMG |35.3600|118.4380|08/03/1952| 15156.1|  7.0| 4.10| 0.002 |  - | 93.1(149.8)
DMG |35.3580|118.6160|08/24/1955|17 540.9|  7.2| 4.00| 0.002 |  - | 93.2(149.9)
GSP |34.3400|116.9000|11/27/1992|160057.5|  1.0| 5.30| 0.005 | II | 93.4(150.3)
DMG |35.3670|118.5000|06/20/1953|231852.0|  0.0| 4.40| 0.002 |  - | 93.5(150.5)
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MGI |35.3000|119.0000|09/04/1908| 0 0 0.0|  0.0| 4.60| 0.003 |  I | 93.5(150.5)
MGI |35.3000|119.0000|01/08/1903| 030 0.0|  0.0| 4.60| 0.003 |  I | 93.5(150.5)
DMG |34.4000|116.9170|02/01/1942|151828.0|  0.0| 4.50| 0.003 |  - | 93.5(150.5)
DMG |34.4000|116.9170|02/01/1942|16 334.0|  0.0| 4.50| 0.003 |  - | 93.5(150.5)
DMG |34.4000|116.9170|02/01/1942|151555.0|  0.0| 4.00| 0.002 |  - | 93.5(150.5)
DMG |34.4000|116.9170|01/25/1942|215133.0|  0.0| 4.00| 0.002 |  - | 93.5(150.5)
DMG |35.3670|118.5330|07/23/1952|195134.0|  0.0| 4.20| 0.002 |  - | 93.5(150.5)
GSP |34.3640|116.9040|11/27/1992|183225.0|  1.0| 4.10| 0.002 |  - | 93.6(150.6)
GSP |34.1410|116.8570|09/19/1997|223714.5| 10.0| 4.10| 0.002 |  - | 93.6(150.7)
DMG |35.3670|118.5830|07/23/1952| 65342.0|  0.0| 4.20| 0.002 |  - | 93.7(150.7)
DMG |35.3670|118.5830|07/23/1952| 62628.0|  0.0| 4.00| 0.002 |  - | 93.7(150.7)
DMG |35.3670|118.5830|07/23/1952| 04738.0|  0.0| 4.60| 0.003 |  I | 93.7(150.7)
DMG |35.3670|118.5830|07/27/1952| 73539.0|  0.0| 4.20| 0.002 |  - | 93.7(150.7)
DMG |35.3670|118.5830|07/23/1952| 03832.0|  0.0| 6.10| 0.009 | III| 93.7(150.7)
DMG |35.3670|118.5830|07/23/1952| 31923.0|  0.0| 5.00| 0.004 |  I | 93.7(150.7)
DMG |35.3670|118.5830|07/23/1952| 4 140.0|  0.0| 4.70| 0.003 |  I | 93.7(150.7)
DMG |35.3670|118.5830|07/28/1952|154120.0|  0.0| 4.00| 0.002 |  - | 93.7(150.7)
DMG |35.3670|118.5830|09/16/1952|1521 8.0|  0.0| 4.30| 0.002 |  - | 93.7(150.7)
GSP |34.1950|116.8620|08/17/1992|204152.1| 11.0| 5.30| 0.005 | II | 93.7(150.8)
GSP |34.1980|116.8620|08/18/1992|094640.7| 12.0| 4.20| 0.002 |  - | 93.8(150.9)
DMG |33.9500|116.8500|09/28/1946| 719 9.0|  0.0| 5.00| 0.004 |  I | 93.8(151.0)
DMG |35.3170|118.9500|09/01/1952|1039 0.0|  0.0| 4.10| 0.002 |  - | 93.8(151.0)
GSP |32.6850|118.1380|06/20/1997|053855.0|  6.0| 4.20| 0.002 |  - | 93.8(151.0)
GSP |34.1630|116.8550|06/28/1992|144321.0|  6.0| 5.30| 0.005 | II | 93.9(151.1)
DMG |34.3240|116.8850|12/01/1962| 03548.8|  9.6| 4.30| 0.002 |  - | 94.0(151.3)
GSP |34.3690|116.8970|12/04/1992|020857.5|  3.0| 5.30| 0.005 | II | 94.1(151.4)
DMG |34.3120|116.8790|01/31/1972| 155 4.2|  8.0| 4.00| 0.002 |  - | 94.1(151.5)
DMG |34.3330|116.8830|10/14/1943|142844.0|  0.0| 4.50| 0.003 |  - | 94.2(151.7)
DMG |35.3330|118.9170|07/31/1952|195314.0|  0.0| 4.50| 0.003 |  - | 94.4(151.9)
DMG |35.3330|118.9170|07/29/1952|195132.0|  0.0| 4.50| 0.003 |  - | 94.4(151.9)
DMG |35.3330|118.9170|08/07/1952|1919 7.0|  0.0| 4.20| 0.002 |  - | 94.4(151.9)
DMG |35.3330|118.9170|08/22/1952|224124.0|  0.0| 5.80| 0.007 | II | 94.4(151.9)
GSP |32.6810|118.1090|06/20/1997|043540.5|  6.0| 4.70| 0.003 |  I | 94.5(152.1)
DMG |34.3250|116.8750|12/02/1962| 04138.4|  6.7| 4.40| 0.002 |  - | 94.6(152.2)
DMG |35.3830|118.5670|07/23/1952| 546 3.0|  0.0| 4.70| 0.003 |  I | 94.7(152.4)
DMG |35.3830|118.6000|09/05/1953|192436.0|  0.0| 4.10| 0.002 |  - | 94.8(152.6)
DMG |35.3790|118.6680|11/21/1955|205527.6|  5.3| 4.30| 0.002 |  - | 94.9(152.7)
GSP |34.2320|116.8460|07/10/1992|012940.0|  0.0| 4.20| 0.002 |  - | 95.0(152.9)
DMG |32.6800|118.0770|10/28/1973|22 0 2.7|  8.0| 4.50| 0.002 |  - | 95.0(152.9)
GSP |34.3700|116.8800|11/29/1992|142120.5|  3.0| 4.00| 0.002 |  - | 95.0(152.9)
GSP |34.2250|116.8440|07/09/1992|023435.0|  0.0| 4.10| 0.002 |  - | 95.0(152.9)
DMG |34.3250|116.8650|10/29/1962| 24253.9|  8.6| 4.80| 0.003 |  I | 95.1(153.1)
PAS |35.3720|118.7740|12/15/1987|182346.1|  3.2| 4.10| 0.002 |  - | 95.3(153.3)
DMG |34.3500|116.8670|10/15/1943|1650 1.0|  0.0| 4.50| 0.002 |  - | 95.4(153.5)
GSP |35.3900|118.6230|09/29/2004|225454.2|  3.0| 5.00| 0.004 |  I | 95.4(153.5)
GSP |34.1630|116.8270|06/28/1992|150451.5| 12.0| 4.40| 0.002 |  - | 95.5(153.6)




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                    EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
GSP |34.3240|116.8580|02/22/2003|141608.4|  4.0| 4.10| 0.002 |  - | 95.5(153.7)
T-A |35.3300|119.0000|01/04/1870| 7 0 0.0|  0.0| 4.30| 0.002 |  - | 95.5(153.7)
PAS |33.5350|120.0490|01/12/1983|1719 0.6|  5.0| 4.20| 0.002 |  - | 95.5(153.7)
DMG |35.3670|118.8330|03/17/1935|2026 0.0|  0.0| 4.00| 0.002 |  - | 95.5(153.8)
GSP |34.2390|116.8370|07/09/1992|014357.6|  0.0| 5.30| 0.005 | II | 95.6(153.8)
GSP |34.3260|116.8570|02/22/2003|122513.6|  9.0| 4.00| 0.002 |  - | 95.6(153.8)
PAS |32.7140|117.9100|10/18/1976|172652.6| 15.1| 4.20| 0.002 |  - | 95.6(153.9)
GSP |34.3110|116.8510|02/22/2003|122133.1|  4.0| 4.30| 0.002 |  - | 95.7(154.0)
GSP |34.3100|116.8500|02/22/2003|193345.8|  3.0| 4.50| 0.002 |  - | 95.7(154.1)
DMG |35.3950|118.6200|08/08/1955| 32150.5|  4.1| 4.70| 0.003 |  I | 95.7(154.1)
GSN |34.2030|116.8270|06/28/1992|150530.7|  5.0| 6.70| 0.015 | IV | 95.8(154.1)
PAS |34.6610|119.9730|05/07/1984|193232.8|  9.9| 4.20| 0.002 |  - | 95.8(154.2)
GSG |34.3100|116.8480|02/22/2003|121910.6|  1.0| 5.20| 0.004 |  I | 95.8(154.2)
GSP |34.3200|116.8500|10/27/1998|154017.1|  4.0| 4.10| 0.002 |  - | 95.9(154.3)
GSP |34.3110|116.8470|02/22/2003|122015.6|  4.0| 4.00| 0.002 |  - | 95.9(154.4)
DMG |35.4000|118.5830|07/24/1952|114756.0|  0.0| 4.40| 0.002 |  - | 95.9(154.4)
DMG |35.4000|118.5830|07/25/1952| 7 351.0|  0.0| 4.10| 0.002 |  - | 95.9(154.4)
GSP |35.3700|118.8500|12/18/1990|165643.0|  6.0| 4.20| 0.002 |  - | 96.0(154.4)
GSP |34.3040|116.8430|02/27/2003|050021.7|  4.0| 4.00| 0.002 |  - | 96.0(154.6)
GSP |34.3220|116.8460|09/20/1999|070249.2|  2.0| 4.20| 0.002 |  - | 96.1(154.7)
DMG |35.4000|118.6330|10/02/1952|231021.0|  0.0| 4.20| 0.002 |  - | 96.1(154.7)
GSP |34.3150|116.8440|02/25/2003|040304.8|  2.0| 4.60| 0.003 |  I | 96.1(154.7)
DMG |35.3670|118.8830|09/12/1953| 64116.0|  0.0| 4.10| 0.002 |  - | 96.2(154.8)
GSP |34.3230|116.8440|10/27/1998|010840.7|  5.0| 4.90| 0.003 |  I | 96.3(154.9)
DMG |35.3500|118.9670|02/04/1954|204841.0|  0.0| 4.00| 0.002 |  - | 96.3(154.9)
DMG |34.3070|116.8350|08/28/1950|194526.4| 11.7| 4.20| 0.002 |  - | 96.5(155.3)
DMG |33.9670|116.8000|09/07/1945|153424.0|  0.0| 4.30| 0.002 |  - | 96.6(155.5)
DMG |34.1000|116.8000|10/24/1935|1448 7.6|  0.0| 5.10| 0.004 |  I | 96.7(155.6)
GSP |34.3540|116.8430|11/13/2004|173916.9|  9.0| 4.20| 0.002 |  - | 96.8(155.8)
DMG |33.5000|116.9170|11/04/1935| 355 0.0|  0.0| 4.50| 0.002 |  - | 96.8(155.8)
DMG |35.3830|118.8500|10/13/1952|222035.0|  0.0| 4.00| 0.002 |  - | 96.8(155.8)
DMG |35.3830|118.8500|07/29/1952| 7 347.0|  0.0| 6.10| 0.009 | III| 96.8(155.8)
PAS |35.2250|117.6290|05/02/1975|18 323.1| 10.0| 4.20| 0.002 |  - | 96.9(155.9)
PAS |33.7010|116.8370|08/22/1979| 2 136.3|  5.0| 4.10| 0.002 |  - | 97.0(156.1)
GSP |34.3290|116.8320|12/03/2005|074934.6|  5.0| 4.10| 0.002 |  - | 97.0(156.1)
GSP |34.2370|116.8110|06/28/1992|125730.8| 10.0| 4.00| 0.002 |  - | 97.0(156.1)
GSP |34.1830|116.8020|06/28/1992|192637.6|  1.0| 4.00| 0.002 |  - | 97.0(156.2)
DMG |32.7170|117.8330|11/06/1950|205546.0|  0.0| 4.40| 0.002 |  - | 97.1(156.2)
DMG |34.7000|117.0000|07/16/1916|1150 0.0|  0.0| 4.50| 0.002 |  - | 97.1(156.3)
DMG |34.7000|117.0000|07/16/1916|1230 0.0|  0.0| 4.00| 0.002 |  - | 97.1(156.3)
DMG |34.0290|116.7870|04/30/1954| 03623.9| 11.1| 4.20| 0.002 |  - | 97.3(156.5)
DMG |34.4170|116.8500|02/11/1932|231120.0|  0.0| 4.00| 0.002 |  - | 97.5(157.0)
DMG |35.4000|118.8170|07/29/1952| 8 146.0|  0.0| 5.10| 0.004 |  I | 97.6(157.1)
GSP |32.6260|118.1510|06/20/1997|080413.6|  6.0| 4.60| 0.003 |  - | 97.7(157.2)
DMG |33.0000|117.3000|11/22/1800|2130 0.0|  0.0| 6.50| 0.012 | III| 97.8(157.3)
DMG |34.2290|116.7950|05/11/1956|163050.5| 13.3| 4.70| 0.003 |  I | 97.8(157.5)
PAS |34.3220|116.8150|08/29/1985| 759 8.7|  6.1| 4.10| 0.002 |  - | 97.9(157.5)
GSP |34.0140|116.7750|10/18/2005|040841.5| 16.0| 4.10| 0.002 |  - | 98.0(157.7)
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GSP |34.0120|116.7750|10/18/2005|073103.5| 18.0| 4.40| 0.002 |  - | 98.0(157.7)
DMG |33.9760|116.7750|10/17/1965| 94519.0| 17.0| 4.90| 0.003 |  I | 98.0(157.7)
GSP |34.2980|116.8040|07/05/1992|200303.1|  3.0| 4.00| 0.002 |  - | 98.1(157.9)
DMG |34.0140|116.7710|06/10/1944|111150.5| 10.0| 4.50| 0.002 |  - | 98.2(158.0)
DMG |33.9730|116.7690|06/10/1944|111531.9| 10.0| 4.00| 0.002 |  - | 98.4(158.3)




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                    EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |35.4320|118.6640|09/30/1964|175125.8|  7.4| 4.00| 0.002 |  - | 98.5(158.5)
DMG |34.3170|116.8000|08/12/1950| 21717.0|  0.0| 4.30| 0.002 |  - | 98.6(158.7)
DMG |34.4360|116.8340|07/14/1973| 8 020.1|  8.0| 4.80| 0.003 |  I | 98.8(159.0)
DMG |35.4330|118.7000|05/01/1954|22 439.0|  0.0| 4.20| 0.002 |  - | 98.8(159.0)
DMG |35.4400|118.3470|01/02/1964|194841.0|  6.3| 4.20| 0.002 |  - | 98.9(159.1)
DMG |33.2670|117.0170|06/07/1935|1633 0.0|  0.0| 4.00| 0.002 |  - | 98.9(159.2)
DMG |32.8500|117.4830|02/23/1943| 92112.0|  0.0| 4.00| 0.002 |  - | 98.9(159.2)
DMG |33.4540|116.8980|07/29/1936|142252.8| 10.0| 4.00| 0.002 |  - | 99.0(159.4)
DMG |33.4560|116.8960|06/16/1938| 55916.9| 10.0| 4.00| 0.002 |  - | 99.1(159.5)
GSP |34.2190|116.7710|07/21/1992|211029.0|  1.0| 4.10| 0.002 |  - | 99.1(159.5)
DMG |34.2990|116.7840|03/18/1956| 24217.3|  6.3| 4.40| 0.002 |  - | 99.3(159.8)
GSP |34.2670|116.7750|12/02/2000|082807.4|  3.0| 4.10| 0.002 |  - | 99.4(159.9)
DMG |34.2500|116.7700|03/16/1956|203344.3|  0.8| 4.00| 0.002 |  - | 99.5(160.1)
GSP |35.4530|118.4310|05/06/1997|191253.8|  6.0| 4.50| 0.002 |  - | 99.5(160.1)
GSP |34.2730|116.7740|08/24/1992|135146.0|  1.0| 4.30| 0.002 |  - | 99.5(160.1)
DMG |35.4540|118.4760|11/23/1953|2039 0.9|  5.9| 4.40| 0.002 |  - | 99.5(160.1)
DMG |35.1060|117.3460|10/11/1966|165912.9|  6.5| 4.40| 0.002 |  - | 99.5(160.2)
DMG |33.9330|116.7500|08/06/1938| 228 0.0|  0.0| 4.00| 0.002 |  - | 99.6(160.3)
DMG |33.9330|116.7500|10/28/1944|183016.0|  0.0| 4.40| 0.002 |  - | 99.6(160.3)
DMG |34.1170|116.7500|08/22/1942|125913.0|  0.0| 4.00| 0.002 |  - | 99.6(160.3)
GSP |34.2110|116.7600|06/28/1992|152429.3|  6.0| 4.50| 0.002 |  - | 99.7(160.4)
DMG |33.9170|116.7500|01/25/1933|1444 0.0|  0.0| 4.00| 0.002 |  - | 99.7(160.4)
PAS |32.6250|118.0090|07/11/1981|215029.4|  5.0| 4.30| 0.002 |  - | 99.7(160.4)
DMG |35.4540|118.6050|02/07/1964|22 750.3| -2.0| 4.40| 0.002 |  - | 99.7(160.5)
GSP |33.5000|116.8620|11/17/2008|123542.0| 12.0| 4.10| 0.002 |  - | 99.8(160.5)
GSP |34.2070|116.7570|06/28/1992|161719.2|  3.0| 4.20| 0.002 |  - | 99.8(160.6)
DMG |35.3530|117.8260|07/03/1944| 53823.5| -2.0| 4.70| 0.003 |  I | 99.9(160.7)

*******************************************************************************
-END OF SEARCH-   1087 EARTHQUAKES FOUND WITHIN THE SPECIFIED SEARCH AREA.

TIME PERIOD OF SEARCH:   1800  TO  2016

LENGTH OF SEARCH TIME:   217  years
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THE EARTHQUAKE CLOSEST TO THE SITE IS ABOUT 1.2 MILES (1.9 km) AWAY.

LARGEST EARTHQUAKE MAGNITUDE FOUND IN THE SEARCH RADIUS: 7.7

LARGEST EARTHQUAKE SITE ACCELERATION FROM THIS SEARCH: 0.246 g

COEFFICIENTS FOR GUTENBERG & RICHTER RECURRENCE RELATION:
  a-value=  3.943
  b-value=  0.817
  beta-value=  1.882


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TABLE OF MAGNITUDES AND EXCEEDANCES:
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  Earthquake | Number of Times | Cumulative
   Magnitude |    Exceeded     | No. / Year
  -----------+-----------------+------------
     4.0     |     1087        |   5.03241
     4.5     |      406        |   1.87963
     5.0     |      145        |   0.67130
     5.5     |       54        |   0.25000
     6.0     |       27        |   0.12500
     6.5     |       11        |   0.05093
     7.0     |        6        |   0.02778
     7.5     |        1        |   0.00463
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APPENDIX D

General Earthwork and Grading Recommendations

APPENDIX D

LEIGHTON CONSULTING, INC.
EARTHWORK AND GRADING GUIDE SPECIFICATIONS

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D-1.0 GENERAL

D-1.1 Intent

These Earthwork and Grading Guide Specifications are for grading and earthwork shown on the current, approved grading plan(s) and/or indicated in the Leighton Consulting, Inc. geotechnical report(s). These Guide Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the project-specific recommendations in the geotechnical report shall supersede these Guide Specifications. Leighton Consulting, Inc. shall provide geotechnical observation and testing during earthwork and grading. Based on these observations and tests, Leighton Consulting, Inc. may provide new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

D-1.2 Role of Leighton Consulting, Inc.

Prior to commencement of earthwork and grading, Leighton Consulting, Inc. shall meet with the earthwork contractor to review the earthwork contractor’s work plan, to schedule sufficient personnel to perform the appropriate level of observation, mapping and compaction testing. During earthwork and grading, Leighton Consulting, Inc. shall observe, map, and document subsurface exposures to verify geotechnical design assumptions. If observed conditions are found to be significantly different than the interpreted assumptions during the design phase, Leighton Consulting, Inc. shall inform the owner, recommend appropriate changes in design to accommodate these observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include (1) natural ground after clearing to receiving fill but before fill is placed, (2) bottoms of all "remedial removal" areas, (3) all key bottoms, and (4) benches made on sloping ground to receive fill.

Leighton Consulting, Inc. shall observe moisture-conditioning and processing of the subgrade and fill materials, and perform relative compaction testing of fill to determine the attained relative compaction. Leighton Consulting, Inc. shall provide *Daily Field Reports* to the owner and the Contractor on a routine and frequent basis.

D-1.3 The Earthwork Contractor

The earthwork contractor (Contractor) shall be qualified, experienced and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Guide

Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing grading and backfilling in accordance with the current, approved plans and specifications.

The Contractor shall inform the owner and Leighton Consulting, Inc. of changes in work schedules at least one working day in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that Leighton Consulting, Inc. is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish earthwork and grading in accordance with the applicable grading codes and agency ordinances, these Guide Specifications, and recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of Leighton Consulting, Inc., unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, adverse weather, etc., are resulting in a quality of work less than required in these specifications, Leighton Consulting, Inc. shall reject the work and may recommend to the owner that earthwork and grading be stopped until unsatisfactory condition(s) are rectified.

D-2.0 PREPARATION OF AREAS TO BE FILLED

D-2.1 Clearing and Grubbing

Vegetation, such as brush, grass, roots and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies and Leighton Consulting, Inc.. Care should be taken not to encroach upon or otherwise damage native and/or historic trees designated by the Owner or appropriate agencies to remain. Pavements, flatwork or other construction should not extend under the “drip line” of designated trees to remain.

Leighton Consulting, Inc. shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 3 percent of organic materials (by dry weight: ASTM D 2974). Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area. As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

D-2.2 Processing

Existing ground that has been declared satisfactory for support of fill, by Leighton Consulting, Inc., shall be scarified to a minimum depth of 6 inches (15 cm). Existing ground that is not satisfactory shall be over-excavated as specified in the following Section D-2.3. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

D-2.3 Overexcavation

In addition to removals and over-excavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be over-excavated to competent ground as evaluated by Leighton Consulting, Inc. during grading. All undocumented fill soils under proposed structure footprints should be excavated

D-2.4 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), (>20 percent grade) the ground shall be stepped or benched. The lowest bench or key shall be a minimum of 15 feet (4.5 m) wide and at least 2 feet (0.6 m) deep, into competent material as evaluated by Leighton Consulting, Inc.. Other benches shall be excavated a minimum height of 4 feet (1.2 m) into competent material or as otherwise recommended by Leighton Consulting, Inc.. Fill placed on ground sloping flatter than 5:1 (horizontal to vertical units), (<20 percent grade) shall also be benched or otherwise over-excavated to provide a flat subgrade for the fill.

D-2.5 Evaluation/Acceptance of Fill Areas

All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by Leighton Consulting, Inc. as suitable to receive fill. The Contractor shall obtain a written acceptance (*Daily Field Report*) from Leighton Consulting, Inc. prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys and benches.

D-3.0 FILL MATERIAL

D-3.1 Fill Quality

Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by Leighton Consulting, Inc. prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to Leighton Consulting, Inc. or mixed with other soils to achieve satisfactory fill material.

D-3.2 Oversize

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 6 inches (15 cm), shall not be buried or placed in fill unless location, materials and placement methods are specifically accepted by Leighton Consulting, Inc.. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 feet (3 m) measured vertically from finish grade, or within 2 feet (0.61 m) of future utilities or underground construction.

D-3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of Section D-3.1, and be free of hazardous materials (“contaminants”) and rock larger than 3-inches (8 cm) in largest dimension. All import soils shall have an Expansion Index (EI) of 20 or less and a sulfate content no greater than (≤) 500 parts-per-million (ppm). A representative sample of a potential import source shall be given to Leighton Consulting, Inc. at least four full working days before importing begins, so that suitability of this import material can be determined and appropriate tests performed.

D-4.0 FILL PLACEMENT AND COMPACTION

D-4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill, as described in Section D-2.0, above, in near-horizontal layers not exceeding 8 inches (20 cm) in loose thickness. Leighton Consulting, Inc. may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers, and only if the building officials with the appropriate jurisdiction approve. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

D-4.2 Fill Moisture Conditioning

Fill soils shall be watered, dried back, blended and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM) Test Method D 1557.

D-4.3 Compaction of Fill

After each layer has been moisture-conditioned, mixed, and evenly spread, each layer shall be uniformly compacted to not-less-than (≥) 90 percent of the maximum dry density as determined by ASTM Test Method D 1557. In some cases, structural fill may be specified (see project-specific geotechnical report) to be uniformly compacted to at-least (≥) 95 percent of the ASTM D 1557 modified Proctor laboratory maximum dry density. For fills thicker than (>) 15 feet (4.5 m), the portion of fill deeper than 15 feet below proposed finish grade shall be compacted to 95 percent of the ASTM D 1557 laboratory maximum density. Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

D-4.4 Compaction of Fill Slopes

In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by back rolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet (1 to 1.2 m) in fill elevation, or by other methods producing satisfactory results acceptable to Leighton Consulting, Inc.. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of the ASTM D 1557 laboratory maximum density.

D-4.5 Compaction Testing

Field-tests for moisture content and relative compaction of the fill soils shall be performed by Leighton Consulting, Inc.. Location and frequency of tests shall be at our field representative(s) discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

D-4.6 Compaction Test Locations

Leighton Consulting, Inc. shall document the approximate elevation and horizontal coordinates of each density test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that Leighton

Consulting, Inc. can determine the test locations with sufficient accuracy. Adequate grade stakes shall be provided.

D-5.0 EXCAVATION

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by Leighton Consulting, Inc. during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by Leighton Consulting, Inc. based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, then observed and reviewed by Leighton Consulting, Inc. prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by Leighton Consulting, Inc..

D-6.0 TRENCH BACKFILLS

D-6.1 Safety

The Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations. Work should be performed in accordance with Article 6 of the *California Construction Safety Orders*, 2009 Edition or more current (see also: http://www.dir.ca.gov/title8/sb4a6.html).

D-6.2 Bedding and Backfill

All utility trench bedding and backfill shall be performed in accordance with applicable provisions of the 2015 Edition of the *Standard Specifications for Public Works Construction* (Green Book). Bedding material shall have a Sand Equivalent greater than 30 (SE>30). Bedding shall be placed to 1-foot (0.3 m) over the top of the conduit, and densified by jetting in areas of granular soils, if allowed by the permitting agency. Otherwise, the pipe-bedding zone should be backfilled with Controlled Low Strength Material (CLSM) consisting of at least one sack of Portland cement per cubic-yard of sand, and conforming to Section 201-6 of the 2015 Edition of the *Standard Specifications for Public Works Construction* (Green Book). Backfill over the bedding zone shall be placed and densified mechanically to a minimum of 90 percent of relative compaction (ASTM D 1557) from 1 foot (0.3 m) above the top of the conduit to the surface. Backfill above the pipe zone shall **not** be jetted. Jetting of the bedding around the conduits shall be observed by Leighton Consulting, Inc. and backfill above the pipe zone (bedding) shall be observed and tested by Leighton Consulting, Inc..

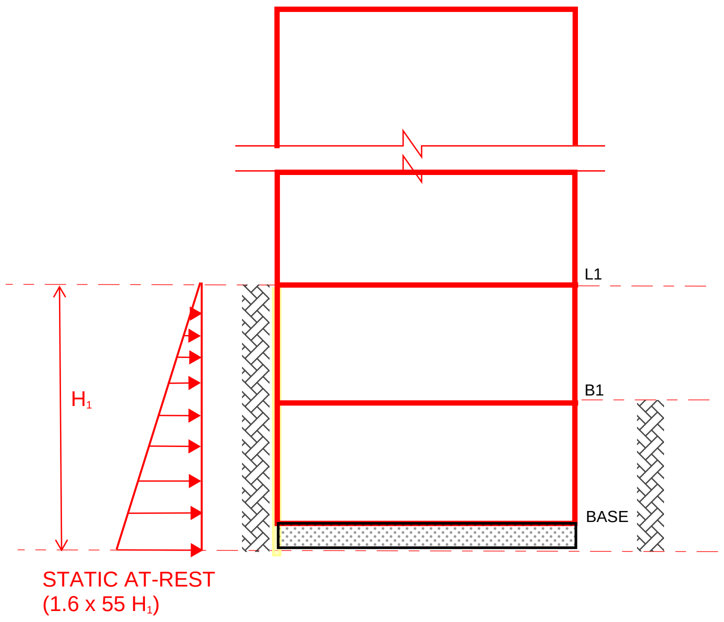
D-6.3 Lift Thickness

Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to Leighton Consulting, Inc. that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method, and only if the building officials with the appropriate jurisdiction approve.

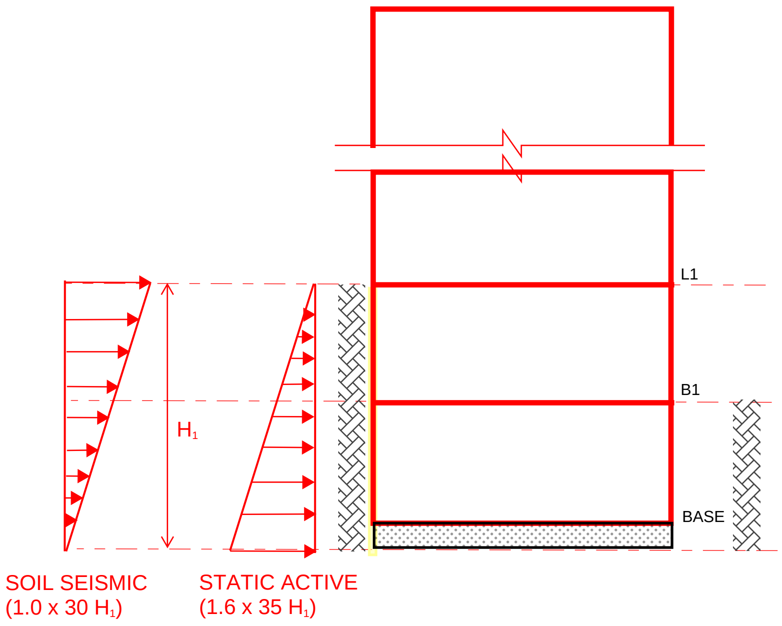
APPENDIX E

Soil Loading Basement Wall Evaluation

Leighton

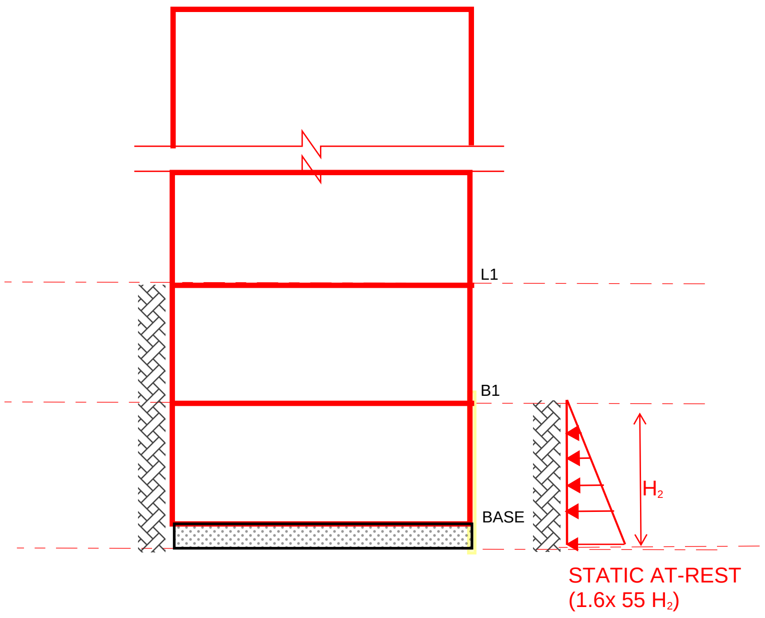


STATIC CONDITION



SEISMIC CONDITION

BASEMENT WALL DESIGN - EAST & SOUTH



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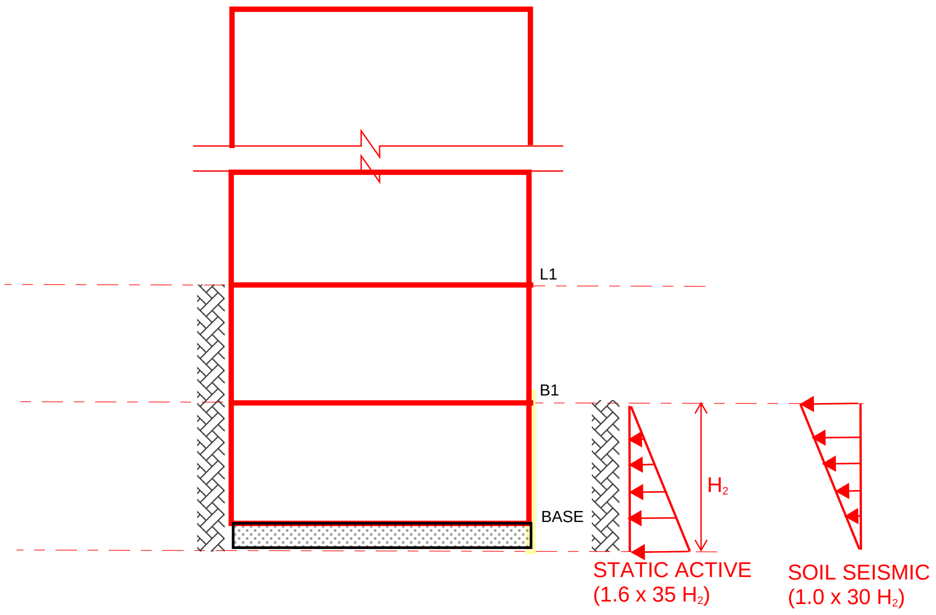
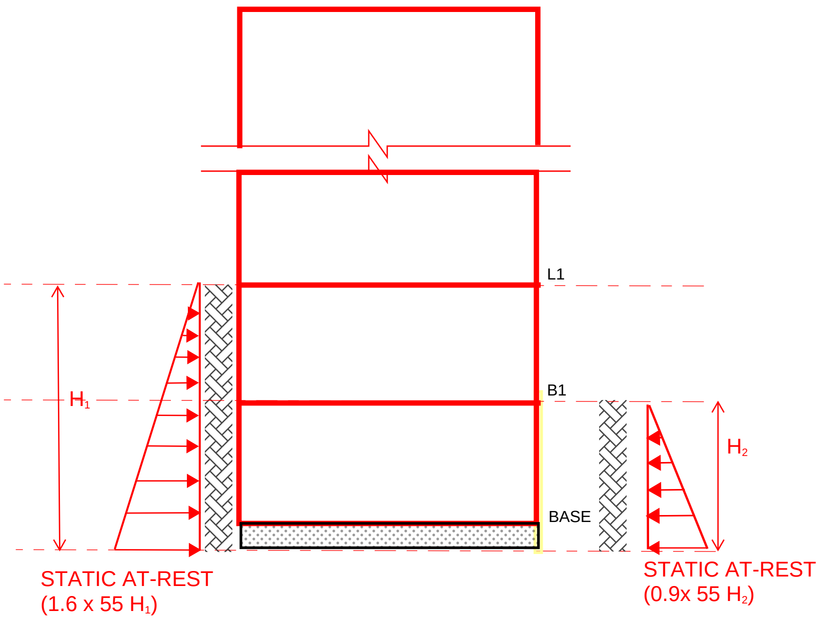


SEISMIC CONDITION

BASEMENT WALL DESIGN - WEST & NORTH

SOIL LOAD COMBINATIONS - BASEMENT WALL EVALUATION

SANTA MONICA HIGH SCHOOL



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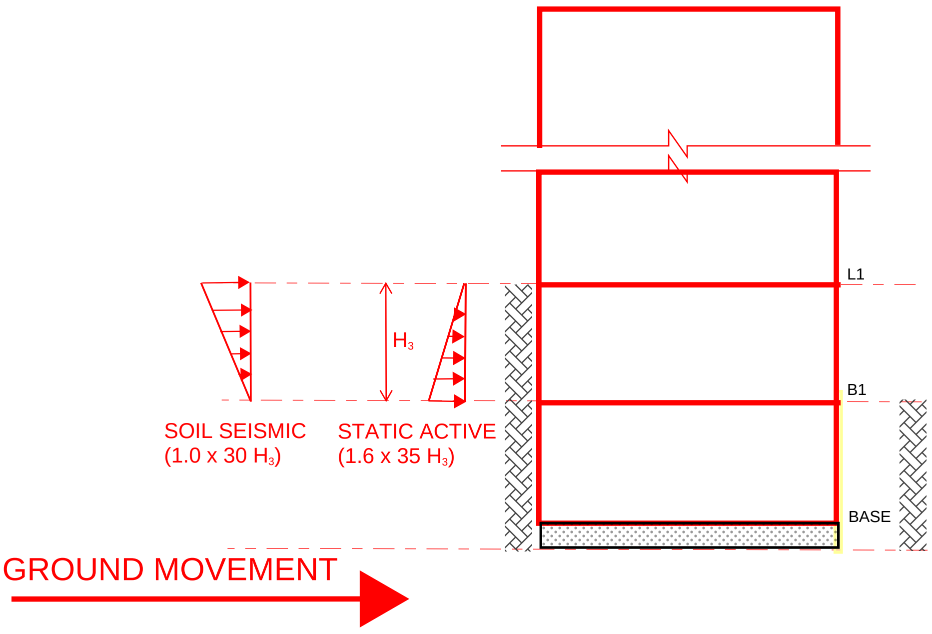
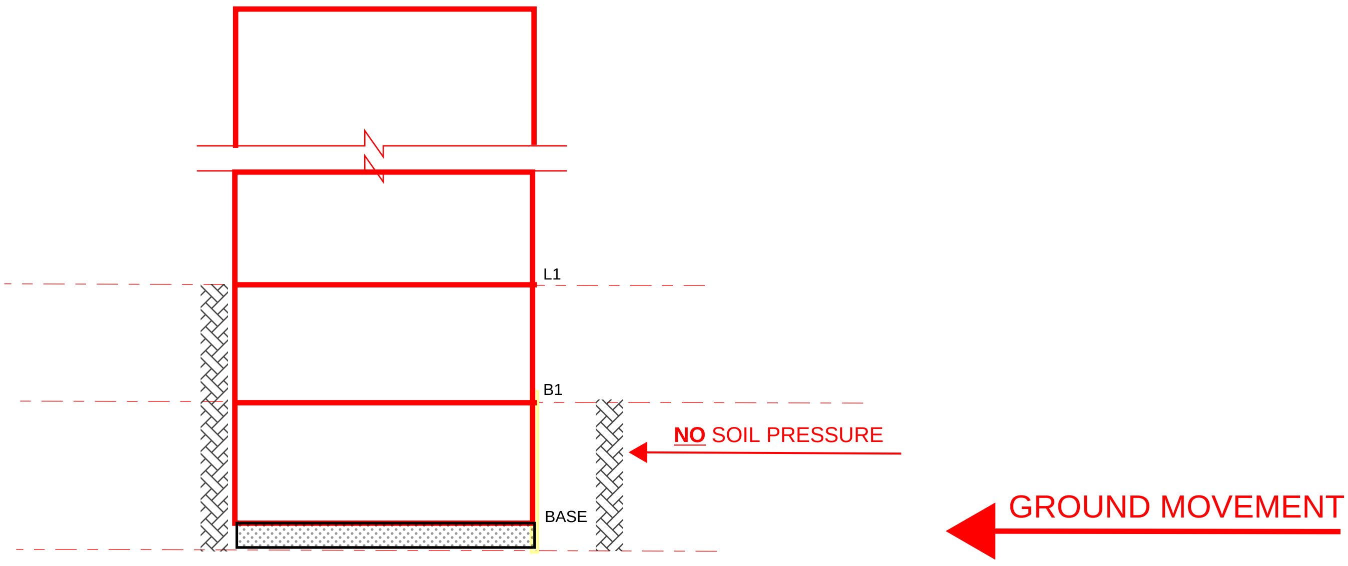


SEISMIC CONDITION - EQ PUSHING WEST & NORTH



SEISMIC CONDITION - EQ PUSHING EAST & SOUTH

SOIL LOAD COMBINATIONS - OVERALL BUILDING EVALUATION

SANTA MONICA HIGH SCHOOL

EXPLORATION LOCATION MAP

Santa Monica High School
601 Pico Boulevard
Santa Monica, California

Proj: 11428.007	Eng/Geol: CCK/JAR
Scale: 1"=40'	Date: October 2017

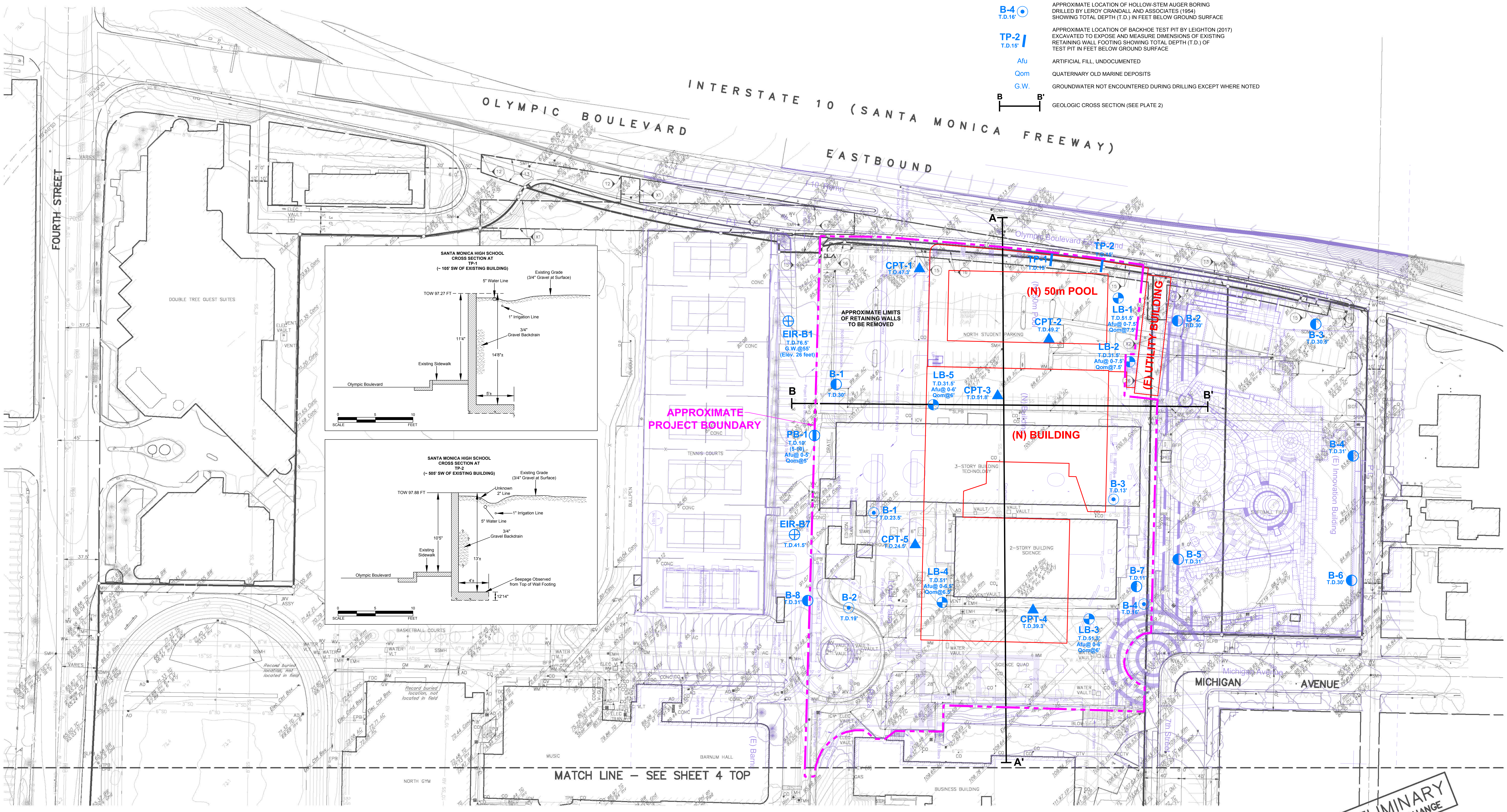
Drafted By: BQT | Checked By: BQT | V:\DRAFTING\11428\007\CAD\2017-07-27\11428-007_P01_GM_2017-10-09.DWG (10-09-17 3:31:39PM) Plotted by: btran

PLATE 1

Leighton

LEGEND

PB-1 T.D.10' (5-10) Afu@ 0-5' Qom@5' ◐	APPROXIMATE LOCATION OF HOLLOW STEM AUGER BORING DRILLED BY LEIGHTON (2017) CONVERTED INTO TEMPORARY PERCOLATION TEST WELL HOWING TOTAL DEPTH (T.D.) TESTED INTERVAL IN PARANTHESES (5-10'), AND DEPTH TO EARTH UNITS IN FEET BELOW GROUND SURFACE
LB-5 T.D.31.5' Afu@ 0-6' Qom@6' ◕	APPROXIMATE LOCATION OF HOLLOW STEM AUGER BORINGS DRILLED BY LEIGHTON (2017) SHOWING TOTAL DEPTH (T.D.) AND DEPTH TO EARTH UNITS IN FEET BELOW GROUND SURFACE
CPT-5 T.D.24.5' ▲	APPROXIMATE LOCATION OF CONE PENETROMETER TEST BY LEIGHTON (2017) SHOWING TOTAL DEPTH (T.D.) IN FEET BELOW GROUND SURFACE
EIR-B7 T.D.41.5' ⊕	APPROXIMATE LOCATION OF HOLLOW-STEM AUGER BORINGS DRILLED BY LEIGHTON (2011) SHOWING TOTAL DEPTH (T.D.) IN FEET BELOW GROUND SURFACE. DEPTH AND ELEVATION TO GROUNDWATER SHOWN
B-8 T.D.31' ◐	APPROXIMATE LOCATION OF HOLLOW-STEM AUGER BORING DRILLED BY MACTEC (2008) SHOWING TOTAL DEPTH (T.D.) IN FEET BELOW GROUND SURFACE
B-4 T.D.16' ⊙	APPROXIMATE LOCATION OF HOLLOW-STEM AUGER BORING DRILLED BY LEROY CRANDALL AND ASSOCIATES (1954) SHOWING TOTAL DEPTH (T.D.) IN FEET BELOW GROUND SURFACE
TP-2 T.D.15' /	APPROXIMATE LOCATION OF BACKHOE TEST PIT BY LEIGHTON (2017) EXCAVATED TO EXPOSE AND MEASURE DIMENSIONS OF EXISTING RETAINING WALL FOOTING SHOWING TOTAL DEPTH (T.D.) OF TEST PIT IN FEET BELOW GROUND SURFACE
Afu	ARTIFICIAL FILL, UNDOCUMENTED
Qom	QUATERNARY OLD MARINE DEPOSITS
G.W.	GROUNDWATER NOT ENCOUNTERED DURING DRILLING EXCEPT WHERE NOTED
B ├──┤ B'	GEOLOGIC CROSS SECTION (SEE PLATE 2)



PSOMAS

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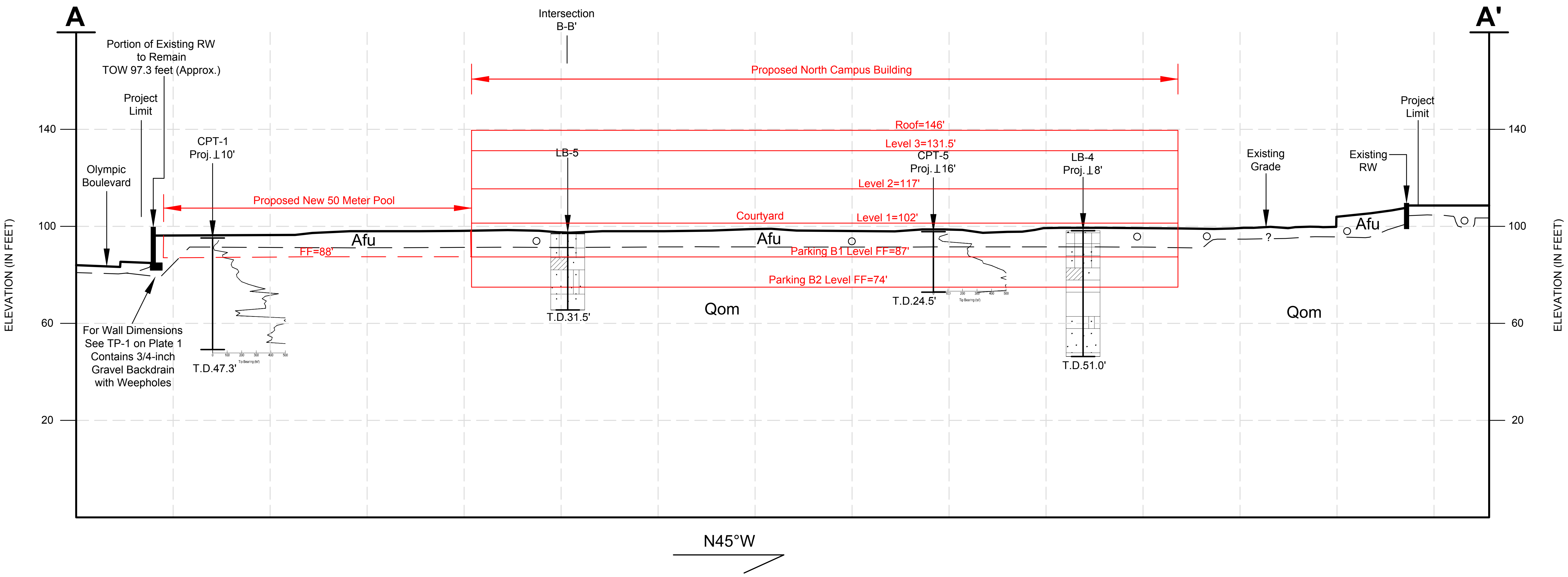
AERIAL TOPOGRAPHIC SURVEY AND UTILITY LOCATIONS FOR:

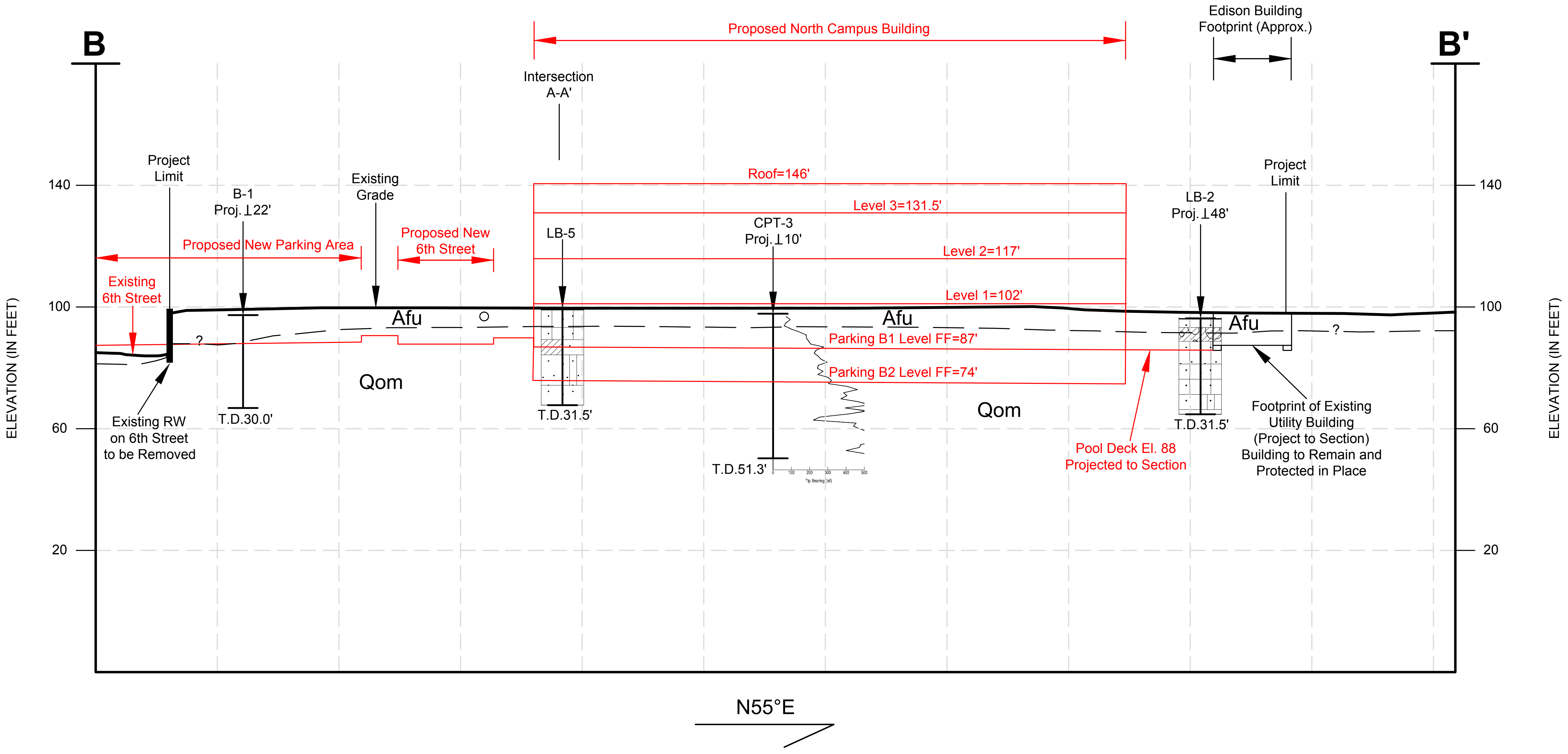
SANTA MONICA – MALIBU UNIFIED SCHOOL DISTRICT

SANTA MONICA HIGH SCHOOL

IN THE CITY OF SANTA MONICA COUNTY OF LOS ANGELES STATE OF CALIFORNIA

DATE: JANUARY 2, 2008
SCALE: 1" = 40'
PROJECT NUMBER: 1SAN080101 TASK 100
SHEET 3 OF 4





LEGEND

USCS Boring Graphics

▨	SAND (SP), fine to medium grained
▨	Silty SAND (SM), fine to medium grained
▨	SAND with Silt (SP-SM), fine to medium grained
▨	Sandy SILT (ML); very fine sand
▨	SAND with clay
Afu	Artificial fill, undocumented. Silty SAND to Sandy SILT with man made debris
Qom	Quaternary Old Marine Deposits SAND, Silty SAND, SAND with Silt, and Silty SAND with Clay
LB-5	Hollow stem auger borings projected perpendicular (⊥) to section at approximate elevation of ground surface where boring was drilled.
Tsf	Tons per square foot - see Appendix A
RW	Retaining wall

Elevation Reference:

Aerial Topographic Survey and Utility Locations for Santa Monica
Malibu Unified School District Santa Monica High School
In the City of Santa Monica County of Los Angeles State of California January 2, 2008

Design Reference:

HED Design Samohi North Campus Schematic Design 100%
601 Pico Boulevard, Santa Monica, CA 90405
Sheets: A301, A302

TOW-Top of Wall Elevation from
Plan: Santa Monica HS Record Locations
of Improvements per Caltrans Plans,
By PSOMAS, June 22, 2009

GEOTECHNICAL CROSS SECTIONS A-A' AND B-B'

Santa Monica High School
601 Pico Boulevard
Santa Monica, California

PLATE 2

Proj: 11428.007	Eng/Geol: CCK/JAR
Scale: 1"=40'	Date: October 2017

Drafted By: BQT | Checked By: BQT | V:\DRAFTING\11428\007\CAD\2017-07-27\11428-007_P02_CS_2017-10-11.DWG (10-11-17 2:57:33PM) Plotted by: btran

Leighton