

# REPORTS

**MADISON E.S. INTERIM PORTABLES**  
3635 Madison Street, Riverside, CA 92504

MARCH 2019  
Bid No. 2018/19-19

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**Converse Consultants**

Geotechnical Engineering  
Environmental & Groundwater Science  
Inspection & Testing Services

# REVISED GEOTECHNICAL INVESTIGATION REPORT

## PERMANENT CLASSROOM BUILDING MADISON ELEMENTARY SCHOOL CITY OF RIVERSIDE, RIVERSIDE COUNTY, CALIFORNIA

CONVERSE PROJECT No. 18-81-145-01



*Prepared For:*  
**RIVERSIDE UNIFIED SCHOOL DISTRICT**  
Mr. Kevin Hauser  
Associate Director, Facilities Projects  
3070 Washington Street  
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*Presented By:*  
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December 18, 2018



# Converse Consultants

Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

December 18, 2018

Mr. Kevin Hauser  
Assistant Director, Facilities Projects  
Facilities Planning and Development  
Riverside Unified School District (RUSD)  
3070 Washington Street  
Riverside, CA 92504

**Subject: REVISED GEOTECHNICAL INVESTIGATION REPORT**  
**Permanent Classroom Building**  
Madison Elementary School  
3635 Madison Street  
City of Riverside, Riverside County, California  
Converse Project No. 18-81-145-01

Dear Mr. Hauser:

Converse Consultants (Converse) has prepared this report to present the results of our geotechnical investigation for the new permanent classroom building located at 3635 Madison Street, Madison Elementary School, City of Riverside, Riverside County, California. This revised report was prepared to address review comments presented in a letter dated October 18, 2018 by Eleanor Spangler of the California Geological Survey (CGS). This report was prepared in accordance with our proposal dated March 23, 2018 and your Agreement Between Riverside Unified School District (RUSD) and Converse dated April 28, 2018.

Based on our field investigations, laboratory testing and engineering analysis, we conclude that the site is suitable for the proposed development from a geotechnical standpoint provided the recommendations presented in this report are incorporated during the design and construction of the project.

We appreciate the opportunity to be of service to Riverside Unified School District (RUSD). Should have any questions, please do not hesitate to contact us at 909-796-0544.

## CONVERSE CONSULTANTS

Hashmi S. E. Quazi, PhD, PE, GE  
Principal Engineer

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### PROFESSIONAL CERTIFICATION

This report has been prepared by the staff of Converse under the professional supervision of the individuals whose seals and signatures appear hereon.

The findings, recommendations, specifications or professional opinions contained in this report were prepared in accordance with generally accepted professional engineering and engineering geologic principles and practice in this area of Southern California. There is no warranty, either expressed or implied.

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Zahangir Alam, PhD, EIT  
Senior Staff Engineer

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Jay Burnham, PG  
Project Geologist



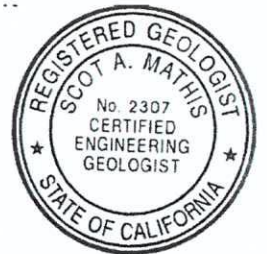
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Hashmi S. E. Quazi, PhD, PE, GE  
Principal Engineer



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Scot Mathis, PG, CEG  
Senior Geologist



## EXECUTIVE SUMMARY

The following is a summary of our geotechnical investigation, conclusions and recommendations as presented in this report. Please refer to the pertinent section of the attached report for complete conclusions and recommendations. In the event of a conflict between this summary and the report, or an omission in the summary, the report shall prevail.

- The proposed classroom building is located within the Madison Elementary School, which has a street address of 3635 Madison Street in the City of Riverside, Riverside County, California. The elementary school consists of multiple one-story permanent and temporary structures, basketball courts, an open field, a sand playground and parking lots. The location of the proposed one-story, 5 classroom building is currently partially occupied by temporary classroom buildings, blacktop/sand playground, and an open grass field. The project site is relatively flat, with an elevation of approximately 830 feet above mean sea level (amsl). The site vicinity generally slopes gradually to the west. The coordinates for the project site are approximately 33.9393° north latitude and 117.4053° west longitude.
- We understand the RUSD plans to replace the existing relocatable building with a one-story building with 5 kindergarten classrooms. The building footprint is approximately 9,500 square feet. The classroom building will be wood-frame structure with steel columns and slabs-on-grade. We understand that the project will include concrete retaining wall, parking lot, underground utilities and landscape areas.
- Our scope of work included project set-up, subsurface exploration, percolation testing, laboratory testing, engineering analysis, and preparation of this report.
- Four exploratory borings (BH-01 through BH-04) were drilled on May 27 and July 20, 2018 at the proposed site to investigate the subsurface conditions. The borings were advanced to maximum planned depths of 16.5, 26.5 and 51.5 feet bgs. One additional exploratory boring (PT-01) were drilled on July 26, 2018 to perform percolation testing. The boring was drilled to approximately 50.0 feet below the existing ground surface (bgs).
- The subsurface soils at the site consisted primarily of unconsolidated alluvial soils including layers of silty sand and sand. A sandy silt layer was observed in borings BH-03 and PT-01 at depths between 40 and 51.5 feet bgs and between 35 and 50.0 feet bgs, respectively. Based on hammer blow counts, the upper 10 feet soils are generally loose to medium with a few dense layers. Relative compaction of the upper 10 feet of soils varies from 79 to 90 percent.



- Groundwater was not encountered in our exploratory borings to a maximum explored depth of 51.5 feet bgs. The historical high groundwater level is estimated to be deeper than 50 feet bgs. Groundwater is not expected to be encountered during the construction of this project. Shallow perched groundwater may be present locally, particularly following precipitation or irrigation events.
- The site is not located within a Riverside County or State of California Earthquake Fault Zone. There are no known active faults projecting toward or extending across the project site. The potential for surface rupture resulting from the movement of nearby major faults is not known with certainty but is considered low.
- The potential impact to the project site from liquefaction is considered negligible for the current and historic groundwater conditions (deeper than 50 feet bgs).
- The risk to the site from lateral spreading, landsliding, seiches, tsunamis, and earthquake-induced flooding are considered to be low.
- The expansion index (EI) of soil sample from the upper 5 feet was 17, corresponding to very low expansion potential. The collapse potentials at a depth of 2.5 feet bgs of the site were 0.3 to 1.7 (including consolidation test) percent, indicating slight collapse potential.
- The sulfate contents of the sampled soils correspond to American Concrete Institute (ACI) exposure category S0 for these sulfate concentrations. No concrete type restrictions are specified for exposure category S0. A minimum compressive strength of 2,500 psi is recommended. The chloride contents of the sampled soils correspond to American Concrete Institute (ACI) exposure category C1 (concrete is exposed to moisture, but not to external sources of chlorides). For exposure category C1, ACI provides concrete compressive strength of at least 2,500 psi and a maximum chloride content of 0.3 percent.
- The measured value of the minimum electrical resistivity of a sample of the site soils when saturated was 1,377 ohm-cm. This indicates that the soils tested are corrosive to ferrous metals in contact with the soil. A corrosion engineer should be consulted for corrosion mitigation measures for ferrous metals in contact with the soil.
- Prior to the start of any earthwork, the proposed building site should be cleared of all vegetation, debris and trees (if any). Existing buildings, foundations (if any) asphalt concrete (paving area) and underground utilities should be removed from the site. All materials resulting from clearing and grubbing should be removed from the site.
- Based on our subsurface exploration, we anticipate that the site soils will be excavatable with conventional heavy-duty earthworking equipment.



- Excavated onsite earth materials cleared of deleterious matter can be moisture conditioned and re-used as compacted fill.
- Building footings should be placed on at least 24 inches of compacted fill or 5 feet below ground surface, whichever is deeper. Retaining walls and slab should be placed on at least 18 inches of compacted fill. The overexcavation should be uniform under entire footings and slab. The overexcavation should extend to at least 2 feet beyond the footprint of the building and at least 1.5 feet beyond retaining walls.
- All areas to receive asphalt or concrete pavement should be overexcavated to a depth of 12 inches below subgrade. The overexcavation should extend at least one foot beyond the edge of pavement.
- Fill soils should be placed on scarified and recompacted excavation bottoms, moisture conditioned, and compacted to at least 90 percent of the laboratory maximum dry density. At least the upper 12 inches of fill beneath pavement intended to support vehicle loads should be compacted to at least 95 percent of the laboratory maximum dry density.
- Footings should be at least 18 inches in width and embedded to at least 18 inches below the lowest adjacent grade. The footing dimensions and reinforcement should be based on structural design. Continuous and isolated footings can be designed based on an allowable net bearing capacity of 2,000 psf.
- The total settlement of shallow footings from static structural loads and short-term settlement of properly compacted fill is anticipated to be one inch or less. The differential settlement resulting from static loads is anticipated to be 0.5 inches or less over a horizontal distance of 40 feet.
- We estimate that the project site has the potential for up to 3.6 inches of dry seismic settlement with negligible liquefaction induced settlement. The dynamic differential settlement of the site will be up to half of the total settlement over 40 horizontal feet. The static and dynamic settlement estimates should not be combined for design purposes.
- The recommended percolation rate for the dry well design is 3.5 inches/hour.
- Lateral earth pressures design parameters are presented in the text of this report.
- Recommendations for temporary sloped excavations are provided in the text of this report.



Based on our investigation, it is our professional opinion that the site is suitable for the construction of the proposed building provided the recommendations presented in this geotechnical investigation report are implemented in the planning, design and construction of the project.





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## 1.0 INTRODUCTION

This report presents the results of our geotechnical investigation performed for the new permanent classroom building located at 3635 Madison Street, Madison Elementary School in the City of Riverside, Riverside County, California. The approximate location of the building is shown on Figure No. 1, Approximate Project Location Map.

Our scope of services was based on California Geological Survey - Note 48 (CGS, 2013). The purposes of this investigation were to determine the nature and engineering properties of the subsurface soils and to provide recommendations for seismic design, geohazard, site earthwork, and design and construction of foundations for the proposed development.

This report is prepared for the project described herein and is intended for use solely by Riverside Unified School District (RUSD) and their authorized agents for design purposes. It should not be used as a bidding document but may be made available to the potential contractors for information on factual data only. For bidding purposes, the contractors should be responsible for making their own interpretation of the data contained in this report.

## 2.0 PROJECT DESCRIPTION

We understand the RUSD plans to replace an existing relocatable building with a one-story L-shaped building with 5 kindergarten classrooms. The building footprint is approximately 9,500 square feet.

The classroom building will be wood-frame structure with steel columns and slabs-on-grade. We understand that the project will include concrete retaining wall, parking lot, underground utilities and landscape areas.

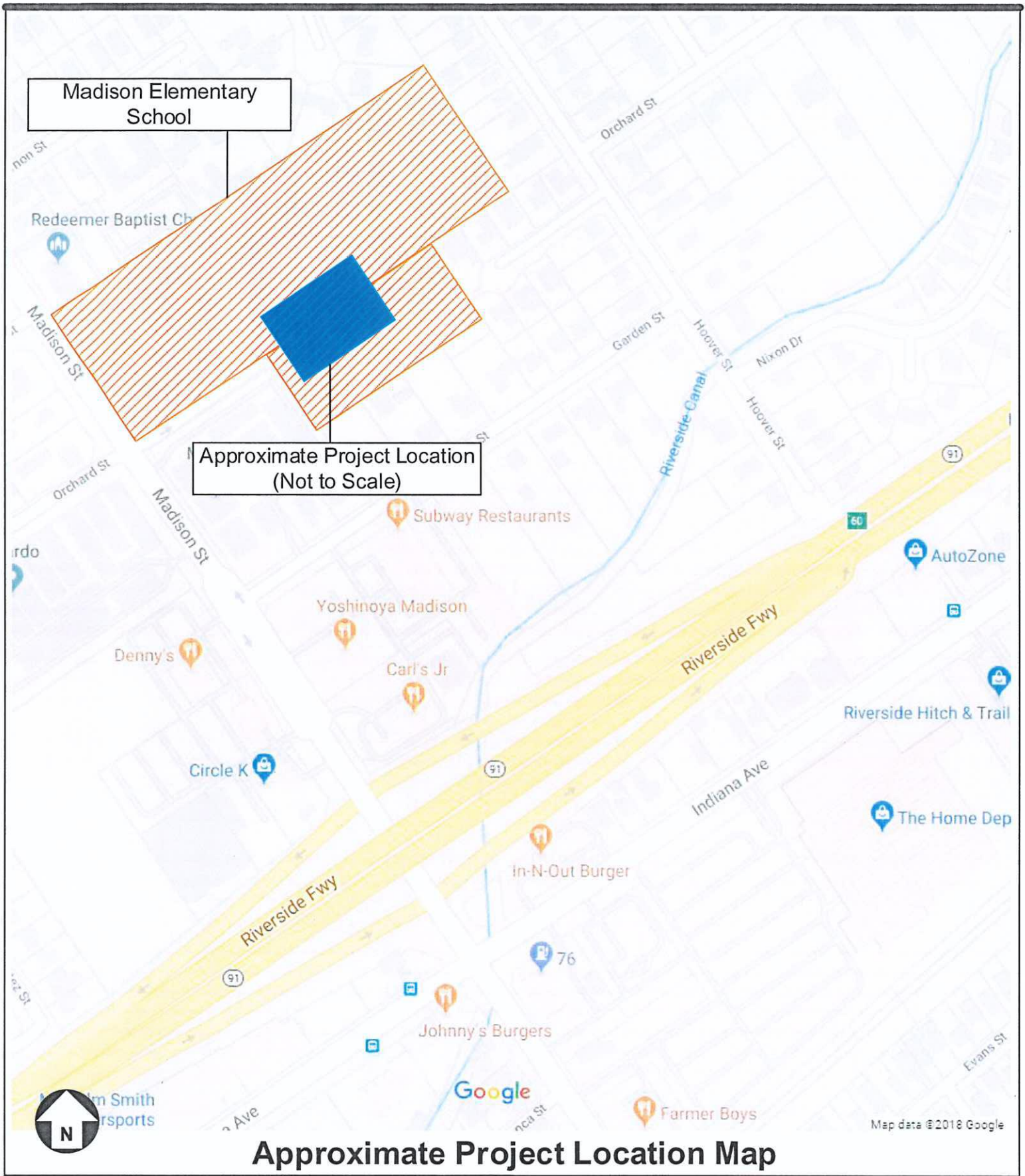
## 3.0 SITE DESCRIPTION

The proposed classroom building is located within the Madison Elementary School, which has a street address of 3635 Madison Street in the City of Riverside, Riverside County, California. The school property is bounded on the northeast by Madison Street, northwest by Colorado Avenue, southwest and southeast by residential properties.

The elementary school consists of multiple one-story permanent and temporary structures, basketball courts, an open field, a sand playground and parking lots.

The location of the proposed one-story, 5 classroom building is currently partially occupied by temporary classroom buildings, blacktop/sand playground, paved area and an open grass field. The project site is relatively flat, with an elevation of approximately 830 feet above mean sea level (amsl). The site vicinity generally slopes gradually to the





**Approximate Project Location Map**

Project: Permanent Classroom Building  
 Madison Elementary School  
 Location: 3635 Madison Street  
 City of Riverside, Riverside County, California  
 For: Riverside Unified School District

Project No.  
 18-81-145-01

west. The coordinates for the project site are approximately 33.9393° north latitude and 117.4053° west longitude. Photograph 1 depicts the present site conditions.



*Photograph No. 1: Present site conditions in the area of classroom building*

## **4.0 SCOPE OF WORK**

The scope of Converse's investigation included the tasks described in the following sections.

### **4.1 Project Set-up**

The project set-up consisted of the following tasks.

- Conducted a site reconnaissance and marked the exploration locations, such that equipment access to all the locations was available.
- Coordinated with the representative of RUSD to clear the exploration locations for active underground utilities.
- Notified Underground Service Alert (USA) at least 48 hours prior to field work to clear the exploration locations of any conflict with existing underground utilities.
- Engaged a California licensed driller to drill exploratory borings.

### **4.2 Subsurface Exploration**

Four exploratory borings (BH-01 through BH-04) were drilled on May 27 and July 20, 2018 at the proposed site to investigate the subsurface conditions. The borings were advanced to maximum planned depths of 16.5, 26.5 and 51.5 feet bgs.



One additional exploratory boring (PT-01) were drilled on July 26, 2018 to perform percolation testing. The boring was drilled to approximately 50.0 feet below the existing ground surface (bgs).

The approximate locations of the borings are shown on Figure No. 2, *Approximate Boring and Percolation Test Locations Map*. A detailed discussion of the subsurface exploration is presented in Appendix A, *Field Exploration*.

### **4.3 Laboratory Testing**

Representative samples of the site soils were tested in the laboratory to aid in the classification and to evaluate relevant engineering properties. The tests performed included the following.

- *In Situ* Moisture Content and Dry Density (ASTM Standard D2216 and D7263)
- Expansion Index (ASTM Standard D4829)
- Soil Corrosivity (California Test 643, 422, and 417)
- Collapse Potential (ASTM Standard D4546)
- Grain Size Distribution (ASTM Standard C136)
- Maximum Dry Density and Optimum Moisture Content (ASTM Standard D1557)
- Direct Shear Strength (ASTM Standard D3080)
- Consolidation (ASTM Standard D2435)

For *in situ* moisture and density data, see the Logs of Borings in Appendix A, *Field Exploration*. For a description of the other laboratory test methods and test results, see Appendix B, *Laboratory Testing Program*.

### **4.4 Engineering Analyses and Geotechnical Report Preparation**

Data obtained from the field exploration and laboratory testing program was compiled and evaluated. Geotechnical analyses of the compiled data were performed and this report was prepared to present our findings, conclusions and recommendations for the proposed building.

## **5.0 SITE CONDITIONS**

A general description of the subsurface conditions and various materials encountered during our field exploration are presented in this section.

### **5.1 Subsurface Profile**

Based on the exploratory borings and laboratory test results, the subsurface soils at the site consisted primarily of unconsolidated alluvial soils including layers of silty sand, sand. A sandy silt layer was observed in borings BH-03 and PT-01 at depth between 40 and 51.5 feet bgs and between 35 and 51.5 feet bgs, respectively. Based on hammer blow counts, the upper 10 feet soils are generally loose to medium dense with a few



dense layers. Relative compaction of the upper 10 feet of soils varies from 79 to 90 percent.

For a detailed description of the subsurface materials encountered in the exploratory borings, see Drawings No. A-2 through A-5, *Logs of Borings*, in Appendix A, Field Exploration.

Discernible fill soils were not identified in our subsurface exploration; however, the site has been previously graded for the existing buildings and fill soil is likely present. If present, the fill soils were likely derived from on-site sources and are similar to the native alluvial soils in composition and density.

Figure No. 3, *Geologic Cross Sections A-A' and B-B'*, illustrates the subsurface profile at the site. For a detailed description of the subsurface materials encountered in the exploratory borings, see Appendix A, *Field Exploration*.

## **5.2 Groundwater**

Groundwater was not encountered during the field investigation of up to approximately 51.5 feet bgs. Regional databases were reviewed to estimate expected groundwater conditions in the vicinity of the proposed building. The following data was found on the GeoTracker website (SWRCB, 2018). Due to the number of sites with available data in the project area, sites closest to the proposed building were selected.

- Mobil #18-182 (Site No. T0606500119), located approximately 1,100 feet south of the project site, reported groundwater at depths ranging from 76 to 87 feet bgs in 2006.
- Geiger Self Serv (Site No. T0606500616), located approximately 1,600 feet southeast of the project site reported groundwater at a depth of 80 feet bgs in 2000.
- Porter's Courtesy Corner (Site No. T0606500564), located approximately 2,500 feet northeast of the project site, reported groundwater at depths ranging from 74 to 84 feet bgs in 2002.
- Topham And Sons (Site No. T0606500556), located approximately 2,200 feet southeast of the project site, reported groundwater at depths ranging from 74 to 84 feet bgs in 2002.
- Dave's Auto (Site No. T0606500498), located approximately 2,800 feet southwest of the project site, reported groundwater at depths ranging from 75 to 100 feet bgs in 1997.





- Arco #1941 (Site No. T0606500395), located approximately 5,000 feet northeast of the project site, reported groundwater at depths ranging from 96 to 107 feet bgs in 2001.
- Chevron #3673 (Site No. T0606500052), located approximately 4,700 feet northwest of the project site, reported groundwater at depths ranging from 24 to 32 feet bgs in 2002.

The WMWD Cooperative Well Measuring Program (WMWD, 2016) was also reviewed for groundwater data. Sites with available data located within approximately one-mile of the project site are shown below.

- Cal Baptist #2 (Site No. 03S/05W-08B0025), located approximately 1.1 miles southwest of the project site, reported groundwater at depths ranging from 38.5 to 55.54 feet bgs in between 1993 and 2016.

The USGS National Water Information System (USGS, 2018a) was reviewed for groundwater data. No sites were located within approximately 1-mile of the project site.

Based on our current investigation and review of groundwater well data, current and historical groundwater levels are deeper than 50 feet bgs. Groundwater is not expected to be encountered during construction of the proposed addition of the building. Shallow perched groundwater may be present locally, particularly following precipitation or irrigation events.

### **5.3 Subsurface Variations**

Based on results of the subsurface exploration and our experience, some variations in the continuity and nature of subsurface conditions within the project site should be anticipated. Because of the uncertainties involved in the nature and depositional characteristics of the earth material at the site, care should be exercised in interpolating or extrapolating subsurface conditions between or beyond the boring locations.

### **5.4 Excavatability**

The subsurface soil materials for the proposed building are expected to be excavatable by conventional heavy-duty earth moving and trenching equipment.

The phrase “conventional heavy-duty excavation equipment” is intended to include commonly used equipment such as excavators, scrapers, and trenching machines. It does not include hydraulic hammers (“breakers”), jackhammers, blasting, or other specialized equipment and techniques used to excavate hard earth materials. Selection of an appropriate excavation equipment models should be done by an experienced earthwork contractor.



## **5.5 Flooding**

The site is located in an Area of Minimal Flood Hazard (FEMA, 2008). The site is not located within a flood zone identified by Riverside County (Riverside County, 2018). Figure No. 4, *FEMA Flood Hazard Map* represents the flood hazard of the project site.

## **6.0 GEOLOGIC SETTING**

The regional and local geology are discussed in the following subsections.

### **6.1 Regional Geology**

The proposed project site is located within the Northern Peninsular Ranges Geomorphic Province of Southern California. The Peninsular Ranges Geomorphic Province consists of a series of northwest-trending mountain ranges and valleys bounded on the north by the San Bernardino and San Gabriel Mountains, on the west by the Los Angeles Basin, and on the southwest by the Pacific Ocean.

The province is a seismically active region characterized by a series of northwest-trending strike-slip faults. The most prominent of the nearby fault zones include the San Jacinto, San Andreas, and Cucamonga Fault Zones, all of which have been known to be active during Quaternary time.

Topography within the province is generally characterized by broad alluvial valleys separated by linear mountain ranges. This northwest-trending linear fabric is created by the regional faulting within the granitic basement rock of the Southern California Batholith. Broad, linear, alluvial valleys have been formed by erosion of these principally granitic mountain ranges.

### **6.2 Site Geology**

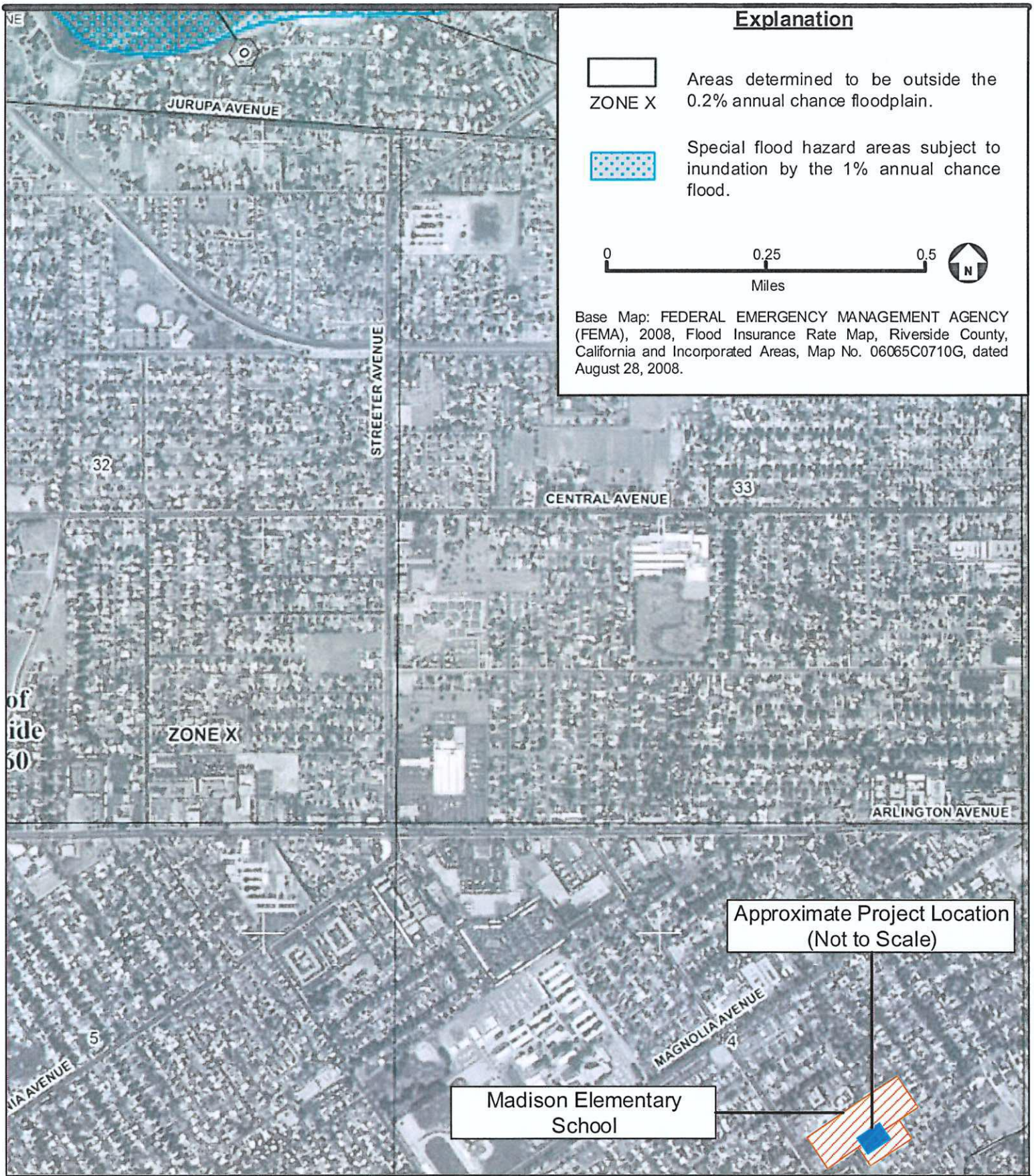
The project site is situated within a valley located between the Box Springs Mountains to the east and Mount Rubidoux and the Santa Ana River to the west. The project site is underlain by late to middle Pleistocene aged alluvial fan deposits primarily consisting of weakly indurated sand and minor gravel (Morton and Cox, 2002; Morton and Miller, 2006).

Figure No. 5, *Regional Geologic Map*, depicts the geologic setting of the project site.

## **7.0 FAULTING AND SEISMICITY**

Discussion of faulting and seismicity is presented in the following sections.





Project: Permanent Classroom Building  
 Madison Elementary School  
 Location: 3635 Madison Street  
 City of Riverside, Riverside County, California  
 For: Riverside Unified School District


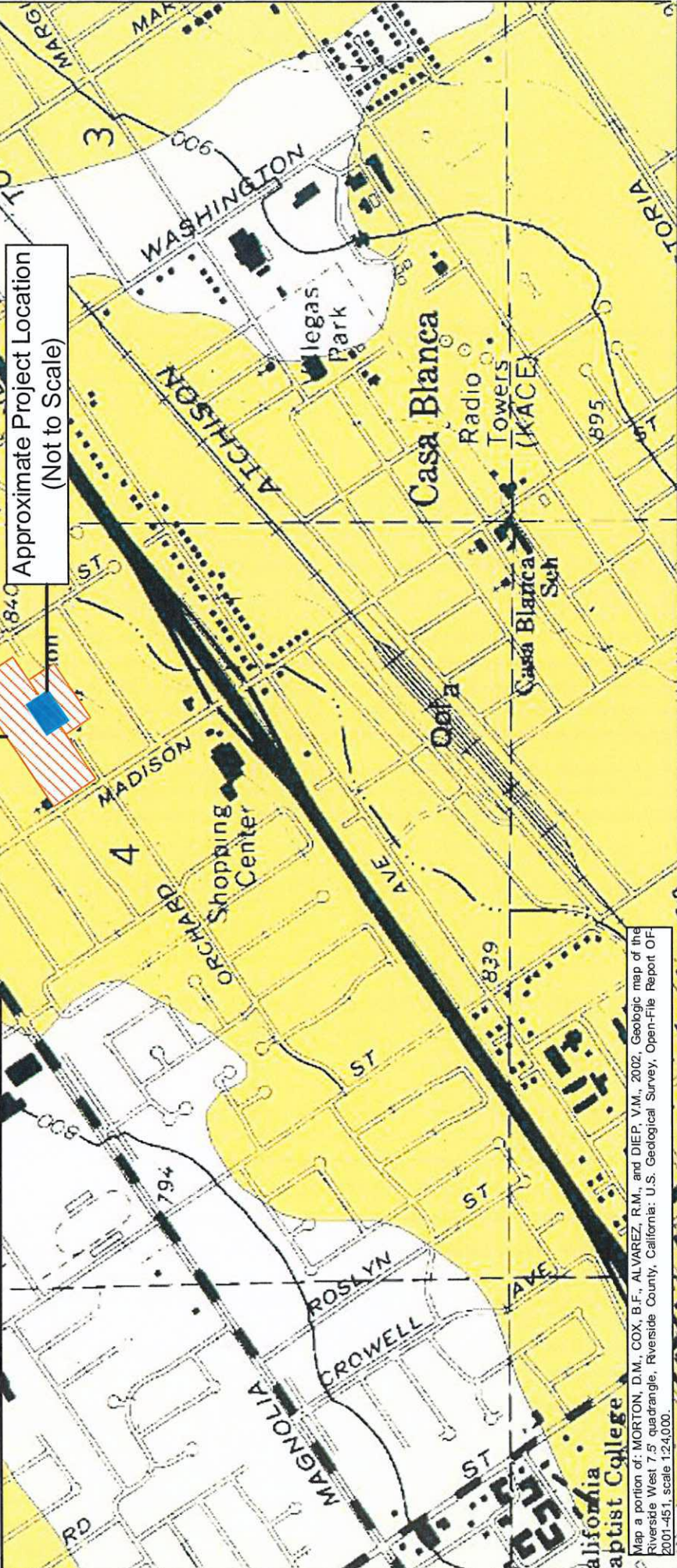
## FEMA Flood Hazard Map

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**Explanation**

**Qyfa** Young alluvial fan deposits – Unconsolidated sand and pebble- to gravel-sand

**Qofa** Very old alluvial fan deposits – well-indurated sand

Map a portion of: MORTON, D.M., COX, B.F., ALVAREZ, R.M., and DIEP, V.M., 2002. Geologic map of the Riverside West 7.5' quadrangle, Riverside County, California: U.S. Geological Survey, Open-File Report OF-2001-451, scale 1:24,000.

**Project:** Permanent Classroom Building  
 Madison Elementary School  
 3635 Madison Street  
 City of Riverside, Riverside County, California  
 Riverside Unified School District

**Location:**

**For:**

Project No  
 18-81-145-01

# Regional Geologic Map

## 7.1 Faulting

The site is not located within a Riverside County or State of California Earthquake Fault Zone (Riverside County, 2018; CGS, 2007). There are no known active faults projecting toward or extending across the project site. See Figure 6, *Riverside County Fault Hazard Map* for more details. The potential for surface rupture resulting from the movement of nearby major faults is not known with certainty but is considered low.

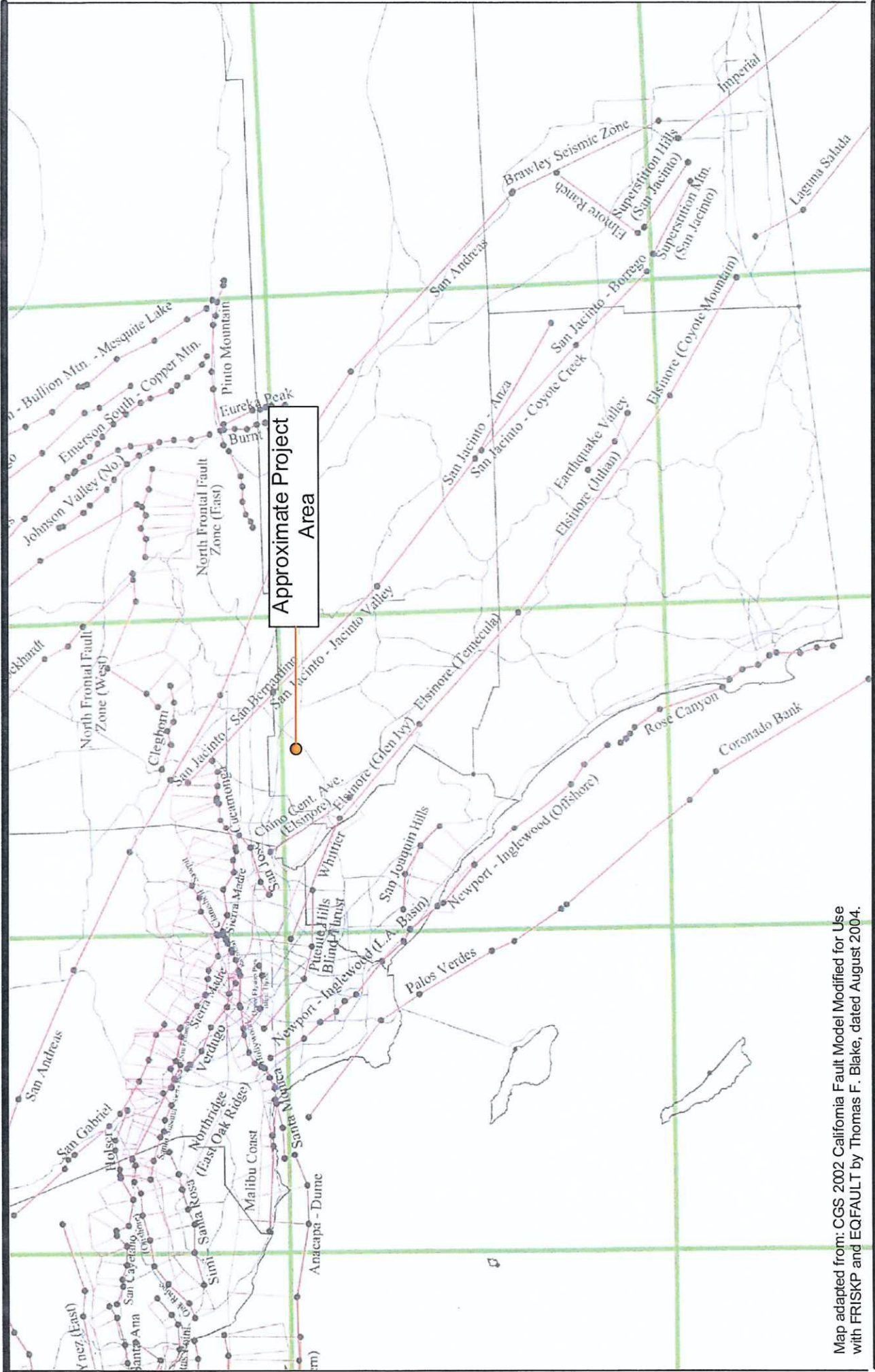
The proposed site is situated in a seismically active region. As is the case for most areas of Southern California, ground shaking resulting from earthquakes associated with nearby and more distant faults may occur at the project site. During the life of the project, seismic activity associated with active faults can be expected to generate moderate to strong ground shaking at the site.

The following table contains a list of active and potentially active faults within 100 kilometers of the subject site. The fault parameters and distances presented in the following table are based on the output from EQFAULT (Blake, 2000), revised in accordance with CGS fault parameters (Cao et. al., 2003).

**Table No. 1, Seismic Characteristics of Nearby Active Faults**

Fault Name	Approximate Distance (km)	Moment Magnitude (Mw)
San Jacinto-San Bernardino	10.3 (16.6)	6.7
San Jacinto-San Jacinto Valley	11.2 (18.0)	6.9
Chino-Central Ave. (Elsinore)	13.1 (21.1)	6.7
Elsinore-Glen Ivy	13.3 (21.4)	6.8
Whittier	14.7 (23.6)	6.8
Cucamonga	18.9 (30.4)	6.9
San Andreas-Southern	19.0 (30.6)	7.2
San Andreas-San Bernardino	19.0 (30.6)	7.5
Elsinore-Temecula	20.8 (33.5)	6.8
San Jose	20.9 (33.6)	6.4
Sierra Madre	23.6 (38.0)	7.2
Cleghorn	24.0 (38.6)	6.5
North Frontal Fault Zone (West)	25.5 (41.0)	7.2
Elysian Park Thrust	26.3 (42.3)	6.7
San Andreas-Mojave	26.7 (43.0)	7.4
San Jacinto-Anza	31.3 (50.3)	7.2
Clamshell-Sawpit	34.5 (55.5)	6.5
Compton Thrust	34.6 (55.7)	6.8
Newport-Inglewood (Offshore)	37.3 (60.1)	7.1
Newport-Inglewood (L.A.Basin)	37.7 (60.6)	7.1
Raymond	38.3 (61.6)	6.5
Pinto Mountain	40.0 (64.4)	7.2
North Frontal Fault Zone (East)	40.1 (64.6)	6.7
Helendale-S. Lockhardt	42.8 (68.9)	7.3





# Riverside County Fault Hazard Map

Map adapted from: CGS 2002 California Fault Model Modified for Use with FRISKP and EQFAULT by Thomas F. Blake, dated August 2004.

Project: Permanent Classroom Building  
 Madison Elementary School  
 Location: 3635 Madison Street  
 City of Riverside, Riverside County, California  
 For: Riverside Unified School District

Project No  
 18-81-145-01



**Converse Consultants**

Fault Name	Approximate Distance (km)	Moment Magnitude (Mw)
Verdugo	44.0 (70.8)	6.9
Elsinore-Julian	44.9 (72.3)	7.1
Hollywood	49.2 (79.1)	6.4
Palos Verdes	49.2 (79.1)	7.3
Lenwood-Lockhart-Old Woman Sprgs	52.7 (84.8)	7.5
San Andreas-Coachella	53.7 (86.4)	7.2
Coronado Bank	55.2 (88.8)	7.6
Rose Canyon	56.0 (90.1)	7.2
San Gabriel	56.6 (91.1)	7.2
Sierra Madre (San Fernando)	56.9 (91.6)	6.7
Johnson Valley (Northern)	57.9 (93.2)	6.7
Burnt Mtn.	58.1 (93.5)	6.5
Santa Monica	58.7 (94.4)	6.6
Landers	58.8 (94.6)	7.3

## 7.2 Historic Seismicity

An analysis of the seismic history of the site was conducted using the computer program EQSEARCH, (Blake, 2000), and attenuation relationships proposed by Bozorgnia et. al. (1999) for Pleistocene alluvium soil conditions. A total of 89 earthquakes and aftershocks with a moment magnitude of 5.0 or greater have been recorded within a distance of 100 kilometers from the site since the year 1800. Four earthquakes producing estimated ground accelerations at the site ranging from 0.22 g to 0.62 g were reported between the years of 1858 and 1923. These events are poorly documented but were apparently on the San Jacinto Fault within approximately 20 miles of the site and had estimated magnitudes ranging from 5.3 to 7. All other historical earthquakes have produced ground accelerations at the site of 0.2 g or less.

## 7.3 Site-Specific Seismic Analysis

A site-specific response spectrum was developed for the project for a Maximum Considered Earthquake (MCE), defined as a horizontal peak ground acceleration that has a 2 percent probability of being exceeded in 50 years (return period of approximately 2,475 years). The controlling source was determined to be the San Jacinto Fault, with an MCE of Mw 7.88 and a peak ground acceleration (PGA) of 0.530g.

In accordance with ASCE 7-10, Section 21.2 the site-specific response spectra can be taken as the lesser of the probabilistic MCE ground motion and the 84<sup>th</sup> percentile of deterministic MCE ground motion response spectra. The design response spectra can be taken as 2/3 of site-specific MCE response spectra but should not be lower than 80 percent of CBC general response spectra. The risk coefficient  $C_R$  has been incorporated at each spectral response period for which the acceleration was computed in accordance with ASCE 7-10, Section 21.2.1.1.



The 2016 CBC mapped acceleration parameters are provided in the following table. These parameters were determined using the United States Geological Survey *U.S. Seismic Design Maps* website application (USGS, 2018b), and in accordance with ASCE 7-10 Sections 11.4, 11.6, 11.8 and 21.2.

**Table No. 2, 2016 CBC Mapped Acceleration Parameters**

Parameters	Value	Parameters	Value
<b>Site Class</b>	<b>D</b>	<b>Seismic Design Category</b>	<b>D</b>
<b>S<sub>s</sub></b>	1.500	<b>C<sub>RS</sub></b>	1.107
<b>S<sub>1</sub></b>	0.600	<b>C<sub>R1</sub></b>	1.072
<b>F<sub>a</sub></b>	1	<b>0.08 F<sub>v</sub>/F<sub>a</sub></b>	0.120
<b>F<sub>v</sub></b>	1.5	<b>0.4 F<sub>v</sub>/F<sub>a</sub></b>	0.600
<b>S<sub>MS</sub></b>	1.500	<b>T<sub>0</sub></b>	0.120
<b>S<sub>M1</sub></b>	0.900	<b>T<sub>S</sub></b>	0.600
<b>S<sub>DS</sub></b>	1.000	<b>T<sub>L</sub></b>	8
<b>S<sub>D1</sub></b>	0.600		

A site-specific response analysis, using faults within 100 kilometers of the site, was developed using the computer program EZ-FRISK v7.65 by Risk Engineering (2012) and the 2008 USGS Fault Model database. Attenuation relationships proposed by Boore and Atkinson (2008), Campbell and Bozorgnia (2008), Chiou and Youngs (2008) were used in the analysis. These attenuation relationships are based on Next Generation Attenuation (NGA) project model. Maximum rotated components were determined using Huang (2008) method. An average shear wave velocity at upper 30 meters of soil profile ( $V_{s30}$ ) of 270 meters per second, depth to bedrock of with a shear wave velocity 1,000 meters per second at 150 meters below grade, and depth of bedrock where the shear wave velocity is 2,500 meters per second at 2,000 meters below grade were selected for EZ-Frisk Analysis.

The probabilistic response spectrum results and peak ground acceleration for each attenuation relationship are presented in the following table.

**Table No. 3, Probabilistic Response Spectrum Data**

Attenuation Relationship	Probabilistic Mean	Campbell-Bozorgnia (2008)	Boore-Atkinson (2008)	Chiou-Youngs (2007)
Peak Ground Acceleration (g)	0.780	0.660	0.853	0.792
Spectral Period (sec)	2% in 50yr Probabilistic Spectral Acceleration (g)			
0.05	0.914	0.787	0.973	0.960
0.10	1.256	1.139	1.289	1.323
0.20	1.607	1.469	1.621	1.717





Spectral Period (sec)	2% in 50yr Probabilistic Spectral Acceleration (g)			
0.30	1.603	1.444	1.657	1.688
0.40	1.511	1.345	1.619	1.545
0.50	1.447	1.314	1.598	1.402
0.75	1.299	1.223	1.429	1.226
1.00	1.144	1.130	1.185	1.114
2.00	0.720	0.761	0.736	0.647
3.00	0.508	0.530	0.537	0.443
4.00	0.387	0.416	0.404	0.328

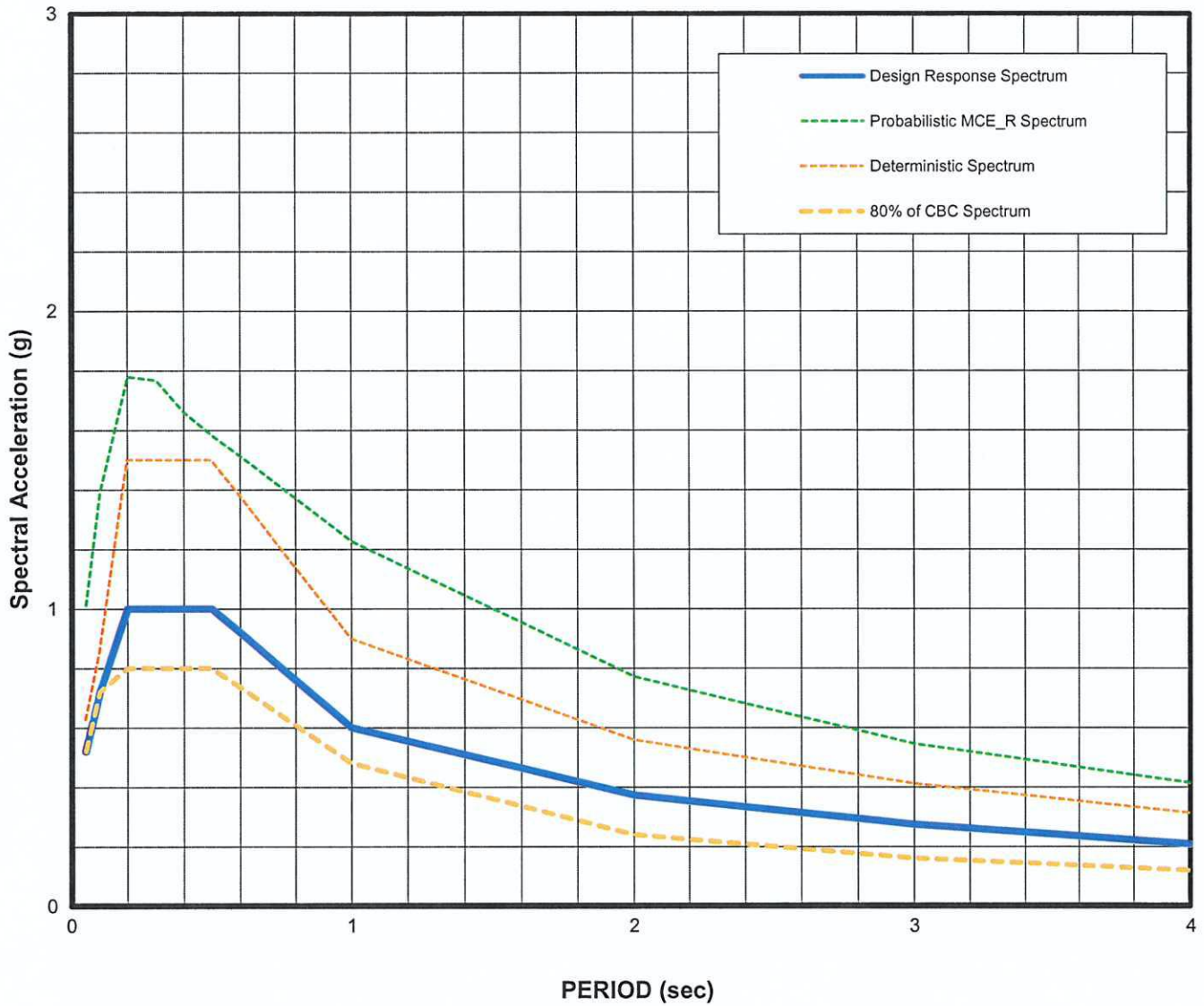
Applicable response spectra data are presented in the table below and on Figure No. 7, *Site-Specific Design Response Spectrum*. These curves correspond to response values obtained from above attenuation relations for horizontal elastic single-degree-of-freedom systems with equivalent viscous damping of 5 percent of critical damping.

**Table No. 4, Site Specific Response Spectrum Data**

Period (sec)	2% in 50yr Probabilistic Spectral Acceleration (g)	Risk Coefficient $C_R$	Probabilistic $MCE_R$ Spectral Acceleration (g)	84th Percentile Deterministic MCE Response Spectra, (g)	Deterministic Spectral Acceleration (g)	Site Specific $MCE_R$ Spectral Acceleration (g)	80% CBC Design Response Spectrum	Site Specific Design Spectral Acceleration (g)
0.05	0.914	1.107	1.012	0.628	0.628	0.628	0.520	0.52
0.10	1.256	1.107	1.390	0.857	0.857	0.857	0.720	0.72
0.20	1.607	1.107	1.779	1.060	1.500	1.500	0.800	1.00
0.30	1.603	1.103	1.768	1.080	1.500	1.500	0.800	1.00
0.40	1.511	1.098	1.659	1.058	1.500	1.500	0.800	1.00
0.50	1.447	1.094	1.583	1.047	1.500	1.500	0.800	1.00
0.75	1.299	1.083	1.407	0.972	1.200	1.200	0.640	0.80
1.00	1.144	1.072	1.226	0.871	0.900	0.900	0.480	0.60
2.00	0.720	1.072	0.771	0.559	0.559	0.559	0.240	0.37
3.00	0.508	1.072	0.545	0.411	0.411	0.411	0.160	0.27
4.00	0.387	1.072	0.414	0.313	0.313	0.313	0.120	0.21

The site-specific design response parameters are provided in the following table. These parameters were determined from design response spectra presented in table above and following guidelines of ASCE 7-10 Section 21.4.





Note: Calculated using EZFRISK program Risk Engineering, version 7.62 and USGS 2008 fault model database.

**SITE SPECIFIC DESIGN RESPONSE SPECTRUM**

New Permanent Classroom Building  
Madison Elementary School

Project Number:

18-81-145-01

For : RUSD



**Converse Consultants**

Figure No.

3

**Table No. 5, Site Specific Seismic Design Parameters**

Parameter	Value (5% Damping)	Lower Limit, 80% of CBC Design Spectra
Site-Specific 0.2-Second Period Spectral Response Acceleration, $S_{MS}$	1.500	1.200
Site-Specific 1-Second Period Spectral Response Acceleration, $S_{M1}$	1.119	0.720
Site-Specific Design Spectral Response Acceleration for short period $S_{DS}$	1.000	0.800
Site-Specific Design Spectral Response Acceleration for 1-second period, $S_{D1}$	0.746	0.480

The raw EZ-Frisk input and output data is included in Appendix E, *EZ-Frisk Files*.

#### **7.4 Secondary Effects of Seismic Activity**

In general, secondary effects of seismic activity include surface fault rupture, soil liquefaction, landslides, lateral spreading, and differential settlement due to seismic shaking, tsunamis, seiches, and earthquake-induced flooding. The site-specific potential for each of these seismic hazards is discussed in the following sections.

**Surface Fault Rupture:** The site is not located within a Riverside County or State of California Earthquake Fault Zone (Riverside County, 2018; CGS, 2007). Based on review of available geologic information, no major surface fault crosses through or extends towards the site (Morton, et al., 2002). The potential for surface rupture resulting from the movement of nearby major faults, or currently unknown faults, is not known with certainty but is considered low.

**Liquefaction:** Liquefaction is defined as the phenomenon in which a cohesionless soil mass within the upper 50 feet of the ground surface, suffers a substantial reduction in its shear strength, due the development of excess pore pressures. During earthquakes, excess pore pressures in saturated soil deposits may develop as a result of induced cyclic shear stresses, resulting in liquefaction.

Soil liquefaction generally occurs in submerged granular soils and non-plastic silts during or after strong ground shaking. There are several general requirements for liquefaction to occur. They are as follows:

- Soils must be submerged
- Soils must be primarily granular
- Soils must be loose to medium-dense
- Ground motion must be intense
- Duration of shaking must be sufficient for the soils to lose shear resistance



The site is located in an area designated by Riverside County as having a low susceptibility to liquefaction (San Bernardino County, 2018). See Figure 8, *Riverside County Liquefaction Hazard Map* for more details.

The current and historical high groundwater levels are deeper than 50 feet bgs. Based on a site-specific liquefaction analysis presented in Appendix C, *Liquefaction and Settlement Analyses*, liquefaction at the project site is unlikely, due to the lack of shallow groundwater.

**Seismic Settlement:** Dynamic dry settlement may occur in loose, granular, unsaturated soils during a large seismic event. Based on a site-specific settlement analysis presented in Appendix C, *Liquefaction and Settlement Analyses*, we estimate that the site will have the potential for up to approximately 3.6 inches of total dry seismic settlement following completion of the remedial earthwork recommended in this report.

**Lateral Spreading:** Seismically induced lateral spreading involves primarily lateral movement of earth materials over underlying materials which are liquefied due to ground shaking. It differs from the slope failure in that complete ground failure involving large movement does not occur due to the relatively smaller gradient of the initial ground surface. Lateral spreading is demonstrated by near-vertical cracks with predominantly horizontal movement of the soil mass involved. Due to the relatively flat nature of the project site and low potential for liquefaction the potential for lateral spreading is considered to be low.

**Landslides:** Seismically induced landslides and other slope failures are common occurrences during or soon after earthquakes. The site location is not located in an area designated as susceptible to landsliding by Riverside County (Riverside County, 2014). Due to the relatively flat nature of the project site, the potential for landsliding is considered to be low.

**Tsunamis:** Tsunamis are large waves generated in open bodies of water by fault displacement or major ground movement. Due to the inland location of the site, tsunamis are not considered to be a risk.

**Seiches:** Seiches are large waves generated in enclosed bodies of water in response to ground shaking. Due to the absence of enclosed bodies of water in the proximity of the project site, the risk of seiching is considered to be low.

**Earthquake-Induced Flooding:** Dams or other water-retaining structures may fail as a result of large earthquakes. The project site is not located within a designated dam inundation zone (Riverside County, 2013). Due to the distance from any large dams or other water-retaining structures, the risk for earthquake-induced flooding at the project site is considered low.

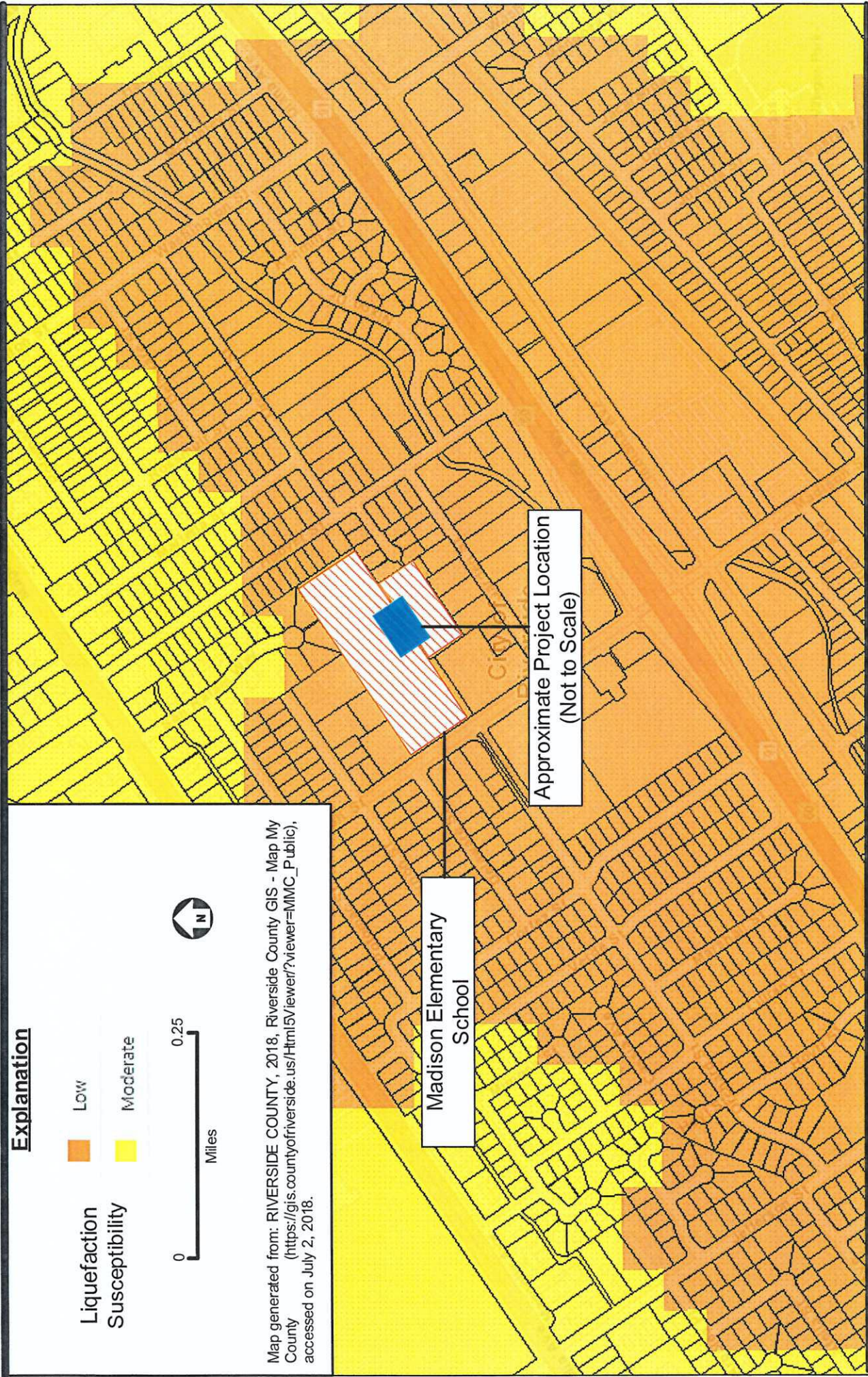


**Explanation**

- Liquefaction Susceptibility
- Low
- Moderate



Map generated from: RIVERSIDE COUNTY, 2018, Riverside County GIS - Map My County ([https://gis.countyofriverside.us/Html5Viewer/?viewer=MMC\\_Public](https://gis.countyofriverside.us/Html5Viewer/?viewer=MMC_Public)), accessed on July 2, 2018.



Madison Elementary School

Approximate Project Location (Not to Scale)

Project: Permanent Classroom Building  
Madison Elementary School  
Location: 3635 Madison Street  
City of Riverside, Riverside County, California  
For: Riverside Unified School District

Project No  
18-81-145-01

# Riverside County Liquefaction Hazard Map



**Converse Consultants**

## 8.0 LABORATORY TEST RESULTS

The physical and chemical test results are presented below.

### 8.1 *Physical Testing*

Results of the various laboratory tests are presented in Appendix B, *Laboratory Testing Program*, except for the results of *in situ* moisture and dry density tests which are presented on the Logs of Borings in Appendix A, *Field Exploration*. The results are also discussed below.

- *In-situ* Moisture and Dry Density – Results of *in-situ* moisture and dry density tests performed in accordance with ASTM Standard D2216 and D7263 are presented on the Logs of Borings in Appendix A, *Field Exploration*. Dry densities of upper 10 feet soils of the proposed site ranged from 105 to 120 pcf with moisture contents ranging from 2 to 13 percent. Results are presented in the log of borings in Appendix A, *Field Exploration*.
- Expansion Index (EI) – One representative sample from the upper 5 feet of the site materials was tested to evaluate the expansion potential in accordance with ASTM Standard D4829. The test result indicated an EI of 17, corresponding to very low expansion potential.
- Collapse Potential – Two relatively undisturbed representative samples collected from the upper 5 feet were tested in accordance with the ASTM Standard D4546 test method. The collapse potential was measured under a vertical stress of 2.0 kips per square foot (ksf). The test results showed collapse potential between 0.3 to 0.7 percent, indicating slight collapse potential. Collapse potential from consolidation test was 1.7 percent, indicating slight collapse potential.
- Grain Size Analysis – Four representative samples were tested to determine the relative grain size distribution in accordance with the ASTM Standard C136. The test results are graphically presented in Drawing No. B-1, *Grain Size Distribution Results*. Based on the results, soils are generally silty sand.
- Maximum Dry Density and Optimum Moisture Content – Typical moisture-density relationship test of two representative samples were tested in accordance with ASTM D1557 and results are presented in Drawing No. B-2, *Moisture-Density Relationship Results*, in Appendix B, *Laboratory Testing Program*. The laboratory maximum dry densities were 133.0 and 135.5 pounds per cubic foot (pcf) and the optimum moisture contents were 8.5 and 7.5 percent.
- Direct Shear – One direct shear test was performed in accordance with ASTM Standard D3080 on relatively undisturbed ring samples. The result of the direct shear test is presented in Drawing No. B-3, *Direct Shear Test Result* in Appendix B, *Laboratory Testing Program*.
- Consolidation Test – One consolidation test was performed on relatively undisturbed samples of the site soils, in accordance to ASTM Standard D2435. The test result is shown on Drawing No. B-4, *Consolidation Test Result*, in Appendix B, *Laboratory Testing Program*.



For additional information on the subsurface conditions, see the Logs of Borings in Appendix A, *Field Exploration*.

## **8.2 Chemical Testing - Corrosivity Evaluation**

One representative soil sample was tested to determine minimum electrical resistivity, pH, and chemical content, including soluble sulfate and chloride concentrations. The purpose of these tests was to determine the corrosion potential of site soils when placed in contact with common construction materials. These tests were performed by AP Engineering and Testing, Inc. (Pomona, CA) in accordance with California Tests 643, 422, and 417. The test results are summarized below and are presented in Appendix B, *Laboratory Testing Program*.

- The pH measurement of the sample was 7.6.
- The sulfate content of the sample was 0.006 percent by weight.
- The chloride concentration of the sample was 41 ppm.
- The minimum electrical resistivity when saturated was 1,377 ohm-cm.

## **9.0 SITE GRADING/EARTHWORK RECOMMENDATIONS**

Recommendations for site preparation and remedial grading and estimates of shrinkage and subsidence are provided in the following sections.

### **9.1 General**

This section contains our general recommendations regarding earthwork and grading recommendations for the site. These recommendations are based on the results of our field exploration, laboratory testing, our experience with similar projects, and data evaluation as presented in the preceding sections. These recommendations may need to be modified based on observation of the actual field conditions during grading.

It is our understanding that the proposed building will be constructed at or near grade. The earthwork for the building based on the anticipated shallow foundations will consist of remedial grading, fill placement, and utility connection trench backfill.

Prior to the start of any earthwork, the building site should be cleared of all vegetation, debris and trees (if any). Existing building, foundations (if any), asphalt concrete (paving area) and underground utilities should be removed from the site. All materials resulting from clearing and grubbing should be removed from the site.

The final bottom surfaces of all excavations should be observed and approved by the project geotechnical consultant prior to placing any fill. Based on these observations, removal of localized areas deeper than those documented may be required during grading. Therefore, some variations in the depth and lateral extent of excavation recommended in this report should be anticipated.



## 9.2 Remedial Grading

Building footings, slabs-on-grade and pavements should be uniformly supported by compacted fill. In order to provide uniform support, structural areas should be overexcavated, scarified, and recompacted as follows.

**Table No. 6, Overexcavation Depths**

Structure/Pavement	Minimum Excavation Depth
Building Footings	24 inches below footing or 5 feet below ground surface, whichever is deeper
Retaining Walls Footings	18 inches below footings
Slab-on-Grade	18 inches below slab
Pavement	12 inches below finish grade

The overexcavation should be uniform under entire footings and slabs. The overexcavation should extend to at least 2 feet beyond the footprint of the building and at least 1.5 feet beyond the edge of retaining walls and at least 1 foot beyond the edge of pavement. The overexcavation bottom should be scarified and compacted as described in Section 9.5, *Compacted Fill Placement*.

If isolated pockets of very soft, loose, eroded, or pumping soil are encountered, the unstable soil should be excavated as needed to expose undisturbed, firm, and unyielding soils.

The contractor should determine the best manner to conduct the excavations, such that there are no losses of bearing and/or lateral support to the existing structures or utilities. Consideration should be given to using slot cuts or other excavation methods which preserve lateral support during excavation operations near the existing school buildings.

## 9.3 Backfill Recommendations Behind Wall

Compaction of backfill adjacent to structural walls can produce excessive lateral pressures. Improper types and locations of compaction equipment and/or compaction techniques may damage the walls. The use of heavy compaction equipment should not be permitted within a horizontal distance of 5 feet from the wall. Backfill behind any structural walls within the recommended 5-foot zone should be compacted using lightweight construction equipment such as handheld compactors to avoid overstressing the walls. The compaction of wall backfill should be conducted procedure described in section 9.5 *Compaction Fill Placement*.





#### **9.4 Engineered Fill**

No fill soils or aggregate base should be placed until excavations and/or natural ground preparation have been observed by the geotechnical consultant. The native soils encountered within the project site are generally considered suitable for re-use as compacted fill. Excavated soils should be processed, including removal of roots and debris, removal of oversized particles, mixing, and moisture conditioning, before placing as compacted fill. On-site soils used as fill should meet the following criteria.

- No particles larger than 3 inches in largest dimension.
- Rocks larger than one inch should not be placed within the upper 12 inches of subgrade soils.
- Free of all organic matter, debris, or other deleterious material.
- Expansion index of 30 or less.
- Sand Equivalent greater than 15 (greater than 30 for pipe bedding).

Imported materials, if required, should meet the following criteria prior to being used as compacted fill.

- Predominantly granular.
- No particles larger than 3 inches in largest dimension.
- Free of organic material, loam, trash, or other deleterious material.
- Expansion index of 30 or less.
- Contain less than 30 percent by weight retained in 3/4-inch sieve.
- Contain less than 40 percent fines (passing #200 sieve).

Any imported fills should be tested and approved by geotechnical consultant prior to delivery to the site.

#### **9.5 Compacted Fill Placement**

All surfaces to receive structural fills should be scarified to a depth of 12 inches. The soil should be moisture conditioned to within  $\pm 3$  percent of optimum moisture content for coarse soils and 0 to 2 percent above optimum moisture content for fine soils. The scarified soils should be recompacted to at least 90 percent of the laboratory maximum dry density.

Fill soils should be thoroughly mixed and moisture conditioned to within  $\pm 3$  percent of optimum moisture content for coarse soils and 0 to 2 percent above optimum moisture content for fine soils. Fill soils should be evenly spread in horizontal lifts not exceeding 8 inches in uncompacted thickness.

All fill placed at the site should be compacted to at least 90 percent of the laboratory maximum dry densities as determined by ASTM Standard D1557 test method, unless a higher compaction is specified herein. At least the upper 12 inches of subgrade soils



underneath pavements intended to support vehicle loads should be scarified, moisture conditioned, and compacted to at least 95 percent of the laboratory maximum dry density.

To reduce differential settlement, variations in the soil type, degree of compaction and thickness of the engineered fill placed underneath the foundations should be minimized.

Fill materials should not be placed, spread or compacted during unfavorable weather conditions. When site grading is interrupted by heavy rain, filling operations should not resume until the geotechnical consultant approves the moisture and density conditions of the previously placed fill.

### **9.6 Shrinkage and Subsidence**

The volume of excavated and recompacted soils will decrease as a result of grading. The shrinkage would depend on, among other factors, the depth of cut and/or fill, and the grading method and equipment utilized. For preliminary estimation, shrinkage factors for various units of earth material at the site may be taken as presented below.

- The shrinkage factor (defined as a percentage of soil volume reduction when moisture conditioned and compacted to the average of 92 percent relative compaction) for the upper 5 feet of soils is estimated to range from 2 to 14 percent. An average value of 8 percent may be used for preliminary earthwork planning.
- Subsidence (defined as the settlement of native materials from the equipment load applied during grading) would depend on the construction methods including type of equipment utilized. Ground subsidence may be negligible as the site is previously graded for the existing buildings.

Although these values are only approximate, they represent our best estimates of the factors to be used to calculate lost volume that may occur during grading. If more accurate shrinkage and subsidence factors are needed, it is recommended that field-testing using the actual equipment and grading techniques be conducted.

### **9.7 Site Drainage**

Adequate positive drainage should be provided away from the structure to prevent ponding and to reduce percolation of water into structural backfill. A desirable slope for surface drainage is 2 percent in landscaped areas and one percent in paved areas. Planters and landscaped areas adjacent to the building perimeter should be designed to minimize water infiltration into the subgrade soils. Gutters and downspouts should be installed on the roofs of the structures, and runoff should be directed to the storm drain through non-erosive devices. Retaining walls should be adequately drained in order to limit hydrostatic buildup behind walls.



## 10.0 DESIGN RECOMMENDATIONS

Recommendations for the design and construction of the proposed development are presented in the following sections. The recommendations provided are based on the assumption that, in preparing the site, the above earthwork recommendations will be implemented.

### 10.1 *Shallow Foundation Design Parameters*

The proposed structure and retaining walls may be supported on continuous spread footing and/or isolated spread footings. The design of the shallow foundations should be based on the recommended parameters presented in the table below.

**Table No. 7, Recommended Foundation Design Parameters**

Parameter	Value
Minimum continuous spread footing width	18 inches
Minimum isolated footing width	18 inches
Minimum continuous or isolated footing depth of embedment below lowest adjacent grade	18 inches
Allowable net bearing capacity	2,000 psf

The allowable net bearing capacity is defined as the maximum allowable net bearing pressure on the ground. It is obtained by dividing the net ultimate bearing capacity by a safety factor. The ultimate bearing capacity is the bearing stress at which ground fails by shear or experiences a limiting amount of settlement at the foundation. The net ultimate bearing capacity is obtained by subtracting the total overburden pressure on a horizontal plane at the foundation level from the ultimate bearing capacity.

The footing dimensions and reinforcement should be based on structural design. The allowable bearing capacity can be increased by 500 psf with each foot of additional embedment and 150 psf with each foot of additional width up to a maximum of 3,000 psf.

The net allowable bearing values indicated above are for the dead load and frequently applied live loads and are obtained by applying a factor of safety of 3.0 to the net ultimate bearing capacity. If normal code requirements are applied for design, the above vertical bearing value may be increased by 33 percent for short duration loading, which will include loading induced by wind or seismic forces.

### 10.2 *Modulus of Subgrade Reaction*

For the subject project, design of the structure supported on subgrade prepared in accordance with the recommendations provided in this report may be based on a soil modulus of subgrade reaction of 150 kips per cubic feet (kcf).



### 10.3 Lateral Earth Pressures and Resistance to Lateral Loads

In the following subsections, the lateral earth pressures and resistance to lateral loads are estimated by using on-site native soils strength parameters obtained from laboratory testing.

#### 10.3.1 Active Earth Pressures

The active earth pressure behind any buried wall or foundation depends primarily on the allowable wall movement, type of backfill materials, backfill slopes, wall or foundation inclination, surcharges, and any hydrostatic pressures. The recommended lateral earth pressures for level backfill profile without surcharge for the site are presented in the following table.

**Table No. 8, Active and At-Rest Earth Pressures**

Loading Conditions	Lateral Earth Pressure (psf/ft depth)
Active earth conditions (wall is free to deflect at least 0.001 radian)	40
At-rest (wall is restrained)	60

These pressures assume a level ground surface behind the walls for a distance greater than the walls height, no surcharge and no hydrostatic pressure. If water pressure is allowed to build up behind the walls, the active pressures should be reduced by 50 percent and added to a full hydrostatic pressure to compute the design pressures against the walls.

#### 10.3.2 Passive Earth Pressure

Resistance to lateral loads can be assumed to be provided by friction acting at the base of foundations and by passive earth pressure. Coefficients of friction of 0.40 between mass concrete and soil, 0.35 between formed concrete and soil, and 0.25 between steel and soil may be used. A passive earth pressure of 290 psf per foot of depth may be used for the sides of footings poured against recompacted native soils. A factor of safety of 1.5 was applied in calculating passive earth pressure. The maximum value of the passive earth pressure should be limited to 2,500 psf. These lateral resistances may be increased by 33 percent for seismic forces. Due to the low overburden stress of the soil at shallow depth, the upper one foot of passive resistance should be neglected unless the soil is confined by pavement or slab.

Vertical and lateral bearing values indicated above are for the total dead loads and frequently applied live loads. If normal code requirements are applied for design, the above vertical bearing and lateral resistance values may be increased by 33 percent for short duration loading, which will include the effect of wind or seismic forces.



### 10.3.3 Seismic Earth Pressure

In addition to the above-mentioned static lateral earth pressures, retaining walls greater than 6 feet in height should be designed to support seismic lateral earth pressure. The equivalent fluid seismic pressure was calculated using Seed and Whitman (1970) procedure. The seismic force applied to the wall is based on a horizontal seismic acceleration coefficient equal to one-third of the peak ground acceleration in accordance with Caltrans Bridge Design Specifications (Caltrans, 2004). An equivalent fluid seismic pressure of  $23H$  pcf may be assumed under active loading conditions at the top of an inverted triangle pressure distribution where  $H$  is the height of the backfill behind the wall. Under at-rest conditions, the active equivalent fluid seismic pressure should be increased by 30 percent.

### 10.4 Slabs-on-Grade

Slabs-on-grade should be supported on properly compacted fill. Compacted fill used to support slabs-on-grade should be placed and compacted in accordance with Section 9.5 *Compacted Fill Placement*.

Slabs-on-grade should have a minimum thickness of 4 inches for support of nominal ground-floor live loads. Minimum reinforcement for slabs-on-grade should be No. 4 reinforcing bars, spaced at 18-inches on-center each way. Structural design elements of slabs-on-grade, including but not limited to thickness, reinforcement, joint spacing of more heavily-loaded slabs will be dependent upon the anticipated loading conditions and the modulus of subgrade reaction of the supporting materials and should be designed by a structural engineer.

Slabs should be designed and constructed as promulgated by the American Concrete Institute (ACI) and the Portland Cement Association (PCA). Care should be taken during concrete placement to avoid slabs curling. Prior to the slabs pour, all utility trenches should be properly backfilled and compacted.

Subgrade for slabs-on-grade should be firm and uniform. All loose or disturbed soils including under-slabs utility trench backfill should be recompacted.

In hot weather, the contractor should take appropriate curing precautions after placement of concrete to minimize cracking or curling of the slabs. The potential for slabs cracking may be lessened by the addition of fiber mesh to the concrete and/or control of the water/cement ratio.

Concrete should be cured by protecting it against loss of moisture and rapid temperature change for at least 7 days after placement. Moist curing, waterproof paper, white polyethylene sheeting, white liquid membrane compound, or a combination thereof may be used after finishing operations have been completed. The edges of



concrete slabs exposed after removal of forms should be immediately protected to provide continuous curing.

### **10.5 Settlement**

The total settlement of shallow footings from static structural loads and short-term settlement of properly compacted fill is anticipated to be one inch or less. The differential settlement resulting from static loads is anticipated to be 0.5 inches or less over a horizontal distance of 40 feet.

Our analysis of the potential dynamic settlement is presented in Appendix C, *Liquefaction and Settlement Analysis*. We estimate that the project site has the potential for up to 3.6 inches of dry seismic settlement with negligible liquefaction induced settlement under groundwater condition deeper than 50 feet bgs during a large earthquake. The dynamic differential settlement of the site will be up to half of the total settlement over 40 horizontal feet.

The static and dynamic settlement estimates should not be combined for design purposes. The maximum combined static and dynamic settlement is not anticipated to exceed the maximum anticipated dynamic settlement.

### **10.6 Expansion Potential**

Expansive soils are characterized by their ability to undergo significant volume change (shrink or swell) due to variations in moisture content. Changes in soil moisture content can result from rainfall, landscape irrigation, utility leakage, roof drainage, perched groundwater, drought, or other factors and may cause unacceptable settlement or heave of structures, concrete slabs supported-on-grade, or pavements supported over these materials.

Expansion index of the upper 5 feet of on-site soil was 17, indicating very low expansion potential. During construction, grading will mix and relocate the site soils, and additional fill soils may be added. The expansion potential of the finish-grade soils should be tested at the completion of grading. Shallow foundations should be designed to accommodate the anticipated soil expansion.

### **10.7 Soil Corrosivity**

One representative site soil sample was evaluated for corrosivity with respect to common construction materials such as concrete and steel. The test results are presented in Appendix B, *Laboratory Testing Program* and design recommendations pertaining to soil corrosivity are presented below.

The sulfate content of the sampled soils corresponds to American Concrete Institute (ACI) exposure category S0 for these sulfate concentrations (ACI 318-14, Table



19.3.1.1). No concrete type restrictions are specified for exposure category S0 (ACI 318-14, Table 19.3.2.1). A minimum compressive strength of 2,500 psi is recommended.

We anticipate that concrete structures such as footings, slabs, and flatwork will be exposed to moisture from precipitation and irrigation. Based on the site location and the results of chloride testing of the site soils, we do not anticipate that concrete structures will be exposed to external sources of chlorides, such as deicing chemicals, salt, brackish water, or seawater. ACI specifies exposure category C1 where concrete is exposed to moisture, but not to external sources of chlorides (ACI 318-14, Table 19.3.1.1). ACI provides concrete design recommendations in ACI 318-14, Table 19.3.2.1, including a compressive strength of at least 2,500 psi and a maximum chloride content of 0.3 percent.

The measured value of the minimum electrical resistivity of the sample when saturated was 1,377 ohm-cm for the site. This indicates that the soils tested of the site are corrosive to ferrous metals in contact with the soil (Romanoff, 1957). Converse does not practice in the area of corrosion consulting. A qualified corrosion consultant should provide appropriate corrosion mitigation measures for any ferrous metals in contact with the site soils.

### 10.8 Asphalt Concrete Pavement

Based on the soil type and experience on similar type of projects, an R-value of 25 was assumed for the site. For flexible pavement design, we have utilized design Traffic Indices (TIs) ranging from 5 to 8.

Based on the above information, asphalt concrete and aggregate base thickness results are presented using the CALTRANS Highway Design Manual (Caltrans, 2017), Chapter 630 with a safety factor of 0.2 for Asphalt Concrete/Aggregate Base section and 0.1 for full depth Asphalt Concrete section. Preliminary asphalt concrete pavement sections are presented in the following table below.

**Table No. 9, Recommended Preliminary Pavement Sections**

R-value	Traffic Index (TI)	Pavement Section		
		Option 1		Option 2
		Asphalt Concrete (inches)	Aggregate Base (inches)	Full AC Section (inches)
25	5	3.5	6.0	6.5
	6	4.0	8.0	8.5
	7	4.5	10.0	10.5
	8	5.0	12.0	12.5



At or near the completion of grading, subsurface samples should be tested to evaluate the actual subgrade R-value for final pavement design.

Prior to placement of aggregate base, at least the upper 12 inches of subgrade soils should be scarified, moisture-conditioned if necessary, and recompact to at least 95 percent of the laboratory maximum dry density as defined by ASTM Standard D1557 test method.

Base materials should conform with Section 200-2.2, "*Crushed Aggregate Base*," of the current Standard Specifications for Public Works Construction (SSPWC; Public Works Standards, 2015) and should be placed in accordance with Section 301.2 of the SSPWC.

Asphaltic concrete materials should conform to Section 203 of the SSPWC and should be placed in accordance with Section 302.5 of the SSPWC.

### **10.9 Concrete Flatwork**

Except as modified herein, concrete walks, driveways, access ramps, curb and gutters should be constructed in accordance with Section 303-5, *Concrete Curbs, Walks, Gutters, Cross-Gutters, Alley Intersections, Access Ramps, and Driveways*, of the Standard Specifications for Public Works Construction (Public Works Standards, 2015).

The subgrade soils under the above structures should consist of compacted fill placed as described in this report. Prior to placement of concrete, the upper 12 inches of subgrade soils should be moisture conditioned to between within 3 percent of optimum moisture content for coarse-grained soils and 0 and 2 percent above optimum for fine-grained soils.

The thickness of driveways for passenger vehicles should be at least 4 inches, or as required by the civil or structural engineer. Transverse control joints for driveways should be spaced not more than 10 feet apart. Driveways wider than 12 feet should be provided with longitudinal control joints.

Concrete walks subjected to pedestrian and bicycle loading should be at least 4 inches thick, or as required by the civil or structural engineer. Transverse joints should be spaced 15 feet or less and should be cut to a depth of one-fourth the slab thickness.

Positive drainage should be provided away from all driveways and sidewalks to prevent seepage of surface and/or subsurface water into the concrete base and/or subgrade.

### **10.10 Percolation Testing**

Percolation testing was performed at one location (PT-01) on July 28, 2018 to assist in the design of dry well. The field data of the most conservative test interval is presented





in the following table. Details of the percolation testing are presented in Appendix D *Percolation Testing*.

**Table No. 10, Field Percolation Test Data**

Percolation Test	Test Depth (feet bgs)	Raw Field Data				Corrected Percolation Rate with FOS (in/hour)**
		Time Interval (min)	Change in Water Height (inches)	Field Percolation Rate (in/hour)	Corrected* Field Percolation Rate (in/hour)	
PT-01	10-50	30	10.44	20.88	11.0	3.5

Based on the calculated percolation rate during the most conservative test interval, we recommend a percolation rate of 3.5 inches per hour.

## 11.0 CONSTRUCTION RECOMMENDATIONS

Temporary sloped excavation and shoring design recommendations are presented in the following sections.

### 11.1 General

Both sloped and vertical braced excavations can be considered for the foundations at the proposed project site and pipelines associated with it. Recommendations pertaining to temporary excavations are presented in this section.

Depending on the sequence of construction, excavations may be required near existing structures, which may require vertical side wall excavation. Where the side of the excavation is a vertical cut, it should be adequately supported by temporary shoring to protect workers and any adjacent structures.

All applicable requirements of the California Construction and General Industry Safety Orders, the Occupational Safety and Health Act, and the Construction Safety Act should be met. The soils exposed in cuts should be observed during excavation by the geotechnical consultant and the competent person designated by the contractor. If potentially unstable soil conditions are encountered, modifications of slope ratios for temporary cuts may be required.

### 11.2 Temporary Sloped Excavations

Temporary open-cut trenches may be constructed with side slopes as recommended in the following table. Temporary cuts encountering soft and wet fine-grained soils; dry loose, cohesionless soils or loose fill from trench backfill may have to be constructed at a flatter gradient than presented below.



**Table No. 11, Slope Ratios for Temporary Excavations**

Soil Type	Depth of Excavation (ft)	Recommended Maximum Slope (Horizontal:Vertical) <sup>1</sup>
Silty Sand (SM), Sand (SP) and Sand with Silt (SP-SM)	0-4	1:1
	4-10	1.5:1

<sup>1</sup> Slope ratio assumed to be uniform from top to toe of slope.

For steeper temporary construction slopes or deeper excavations, or unstable soil encountered during the excavation, shoring or trenches should be provided by the contractor to protect the workers in the excavation. Design recommendations for temporary shoring can be provided if necessary.

Surfaces exposed in slope excavations should be kept moist but not saturated to retard raveling and sloughing during construction. Adequate provisions should be made to protect the slopes from erosion during periods of rainfall. Surcharge loads, including construction materials, should not be placed within 5 feet of the unsupported slope edge. Stockpiled soils with a height higher than 6 feet will require greater distance from trench edges.

## 12.0 GEOTECHNICAL SERVICES DURING CONSTRUCTION

The project geotechnical consultant should review plans and specifications as the project design progresses. Such review is necessary to identify design elements, assumptions, or new conditions which require revisions or additions to our geotechnical recommendations.

The project geotechnical consultant should be present to observe conditions during construction. Geotechnical observation and testing should be performed as needed to verify compliance with project specifications. Additional geotechnical recommendations may be required based on subsurface conditions encountered during construction.

## 13.0 CLOSURE

This report is prepared for the project described herein and is intended for use solely by RUSD. and their authorized agents, to assist in the design and construction of the proposed project. Our findings and recommendations were obtained in accordance with generally accepted professional principles practiced in geotechnical engineering. We make no other warranty, either expressed or implied.

Converse Consultants is not responsible or liable for any claims or damages associated with interpretation of available information provided to others. Site exploration identifies actual soil conditions only at those points where samples are taken, when they are taken. Data derived through sampling and laboratory testing is extrapolated by Converse employees who render an opinion about the overall soil conditions. Actual



conditions in areas not sampled may differ. In the event that changes to the project occur, or additional, relevant information about the project is brought to our attention, the recommendations contained in this report may not be valid unless these changes and additional relevant information are reviewed and the recommendations of this report are modified or verified in writing. In addition, the recommendations can only be finalized by observing actual subsurface conditions revealed during construction. Converse cannot be held responsible for misinterpretation or changes to our recommendations made by others during construction.

As the project evolves, continued consultation and construction monitoring by a qualified geotechnical consultant should be considered an extension of geotechnical investigation services performed to date. The geotechnical consultant should review plans and specifications to verify that the recommendations presented herein have been appropriately interpreted, and that the design assumptions used in this report are valid. Where significant design changes occur, Converse may be required to augment or modify the recommendations presented herein. Subsurface conditions may differ in some locations from those encountered in the explorations, and may require additional analyses and, possibly, modified recommendations.

Design recommendations given in this report are based on the assumption that the recommendations contained in this report are implemented. Additional consultation may be prudent to interpret Converse's findings for contractors, or to possibly refine these recommendations based upon the review of the actual site conditions encountered during construction. If the scope of the project changes, if project completion is to be delayed, or if the report is to be used for another purpose, this office should be consulted.



## 14.0 REFERENCES

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# Appendix A

Field Exploration



## APPENDIX A

### FIELD EXPLORATION

Our field investigation included a site reconnaissance and a subsurface exploration program consisting of drilling soil borings and conducting percolation testing. During the site reconnaissance, the surface conditions were noted, and the approximate locations of the test borings were established by reference to existing site and boundary features. The mapped locations should be considered accurate only to the degree implied by the method used to locate the borings in the field. The soil borings are discussed in the following sections.

Four exploratory borings (BH-01 through BH-04) were drilled on May 27 and July 20, 2018 at the proposed site to investigate the subsurface conditions. The borings were advanced to maximum planned depths of 16.5, 26.5 and 51.5 feet bgs.

One additional exploratory boring (PT-01) were drilled on July 26, 2018 to perform percolation testing. The boring was drilled to approximately 50.0 feet below the existing ground surface (bgs). Details of percolation testing are presented in Appendix D *Percolation Testing*.

The borings were advanced using a truck-mounted drill rig equipped with 8-inch diameter hollow-stem augers for soils sampling. Encountered materials were continuously logged by a Converse geologist and classified in the field by visual classification in accordance with the Unified Soil Classification System. Where appropriate, the field descriptions and classifications have been modified to reflect laboratory test results.

Relatively undisturbed samples were obtained using California Modified Samplers (2.4 inches inside diameter and 3.0 inches outside diameter) lined with thin sample rings. The steel ring sampler was driven into the bottom of the borehole with successive drops of a 140-pound driving weight falling 30 inches. Blow counts at each sample interval are presented on the boring logs. Samples were retained in brass rings (2.4 inches inside diameter and 1.0 inch in height) and carefully sealed in waterproof plastic containers for shipment to the Converse laboratory. Bulk samples of typical soil types were also obtained.

Standard Penetration Testing (SPT) was also performed in accordance with the ASTM Standard D1586 test method in borings BH-01 and BH-03 at depths of 20, 30, 40, and 50 feet bgs and in boring BH-02 at 20 feet bgs using a standard (1.4 inches inside diameter and 2.0 inches outside diameter) split-barrel sampler. The mechanically driven hammer for the SPT sampler was 140 pounds, falling 30 inches for each blow. The recorded blow counts for every 6 inches for a total of 1.5 feet of sampler penetration are shown on the Logs of Borings.



The exact depths at which material changes occur cannot always be established accurately. Unless a more precise depth can be established by other means, changes in material conditions that occur between drive samples are indicated on the logs at the top of the next drive sample.

Following the completion of logging and sampling, the borings were backfilled with soil cuttings and tamped. If construction is delayed, the surface may settle over time. Therefore, we recommend the owner monitor the boring locations and backfill any depressions that might occur or provide protection around the boring locations to prevent trip and fall injuries from occurring near the area of any potential settlement.

For a key to soil symbols and terminology used in the boring logs, refer to Drawing No. A-1, *Unified Soil Classification and Key to Boring Log Symbols*. For logs of borings, see Drawings No. A-2 through A-5, *Logs of Borings*.





# SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS <small>(LITTLE OR NO FINES)</small>		<b>GW</b>	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		<b>GP</b>	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		<b>GM</b>	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
	SAND AND SANDY SOILS	CLEAN SANDS <small>(LITTLE OR NO FINES)</small>		<b>SW</b>	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		<b>SP</b>	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES <small>(APPRECIABLE AMOUNT OF FINES)</small>		<b>SM</b>	SILTY SANDS, SAND - SILT MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		<b>ML</b>	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
		LIQUID LIMIT LESS THAN 50		<b>CL</b>	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		LIQUID LIMIT LESS THAN 50		<b>OL</b>	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		<b>MH</b>	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
		LIQUID LIMIT GREATER THAN 50		<b>CH</b>	INORGANIC CLAYS OF HIGH PLASTICITY
		LIQUID LIMIT GREATER THAN 50		<b>OH</b>	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				<b>PT</b>	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

## BORING LOG SYMBOLS

### SAMPLE TYPE

- STANDARD PENETRATION TEST**  
Split barrel sampler in accordance with ASTM D-1586-84 Standard Test Method
- DRIVE SAMPLE** 2.42" I.D. sampler (CMS).
- DRIVE SAMPLE** No recovery
- BULK SAMPLE**
- GROUNDWATER WHILE DRILLING**
- GROUNDWATER AFTER DRILLING**

Apparant Density	Very Loose	Loose	Medium	Dense	Very Dense
SPT (N)	< 4	4 - 11	11 - 30	31 - 50	> 50
CA Sampler	< 5	5 - 12	13 - 35	36 - 60	> 60
Relative Density (%)	< 20	20 - 40	40 - 60	60 - 80	> 80

### LABORATORY TESTING ABBREVIATIONS

TEST TYPE	STRENGTH
(Results shown in Appendix B)	
<b>CLASSIFICATION</b>	
Plasticity	pi
Grain Size Analysis	ma
Passing No. 200 Sieve	wa
Sand Equivalent	se
Expansion Index	ei
Compaction Curve	max
Hydrometer	h
Disturb	Dist.
	Pocket Penetrometer
	Direct Shear
	Direct Shear (single point)
	Unconfined Compression
	Triaxial Compression
	Vane Shear
	Consolidation
	Collapse Test
	Resistance (R) Value
	Chemical Analysis
	Electrical Resistivity
	Permeability
	Soil Cement

Consistency	Very Soft	Soft	Medium	Stiff	Very Stiff	Hard
SPT (N)	< 2	2-4	5-8	9-15	16-30	> 30
CA Sampler	< 3	3-6	7-12	13-25	26-50	> 50

## UNIFIED SOIL CLASSIFICATION AND KEY TO BORING LOG SYMBOLS



**Converse Consultants**

Permanent Classroom Building  
Madison Elementary School  
3635 Madison Street  
City of Riverside, Riverside County, California  
For: Riverside Unified School District

Project No.  
**18-81-145-01**

Drawing No.  
**A-1**

# Log of Boring No. BH-01

Dates Drilled: 5/27/2018      Logged by: Michael Maldonado      Checked By: Scot Mathis

Equipment: 8" HOLLOW STEM AUGER      Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 828      Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES		BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
		<b>3.5" ASPHALT CONCRETE/NO AGGREGATE BASE</b>						
		<b>SILTY SAND (SM):</b> fine to coarse-grained, reddish brown.			4/4/4	5	113	ca, er, ma, max
5					6/8/11	6	113	ds
		<b>SAND (SP):</b> fine to coarse-grained, light brown.			3/5/11	2	110	
10					7/11/13	2	109	
15					3/7/11	2	103	
20		<b>SILTY SAND (SM):</b> fine to coarse-grained, reddish-brown.			3/5/9			
25					8/10/11	9	118	
30					6/9/10			



**Converse Consultants**

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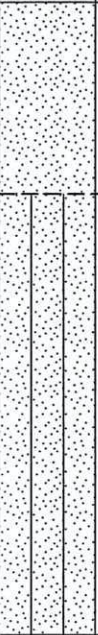
Project No. **18-81-145-01**      Drawing No. **A-2a**

# Log of Boring No. BH-01

Dates Drilled: 5/27/2018      Logged by: Michael Maldonado      Checked By: Scot Mathis

Equipment: 8" HOLLOW STEM AUGER      Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 828      Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS <small>This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.</small>	SAMPLES		BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
		<p><b>ALLUVIUM SAND (SP):</b> fine to coarse-grained, reddish-brown.</p>	■		14/24/25	2	116	
40		<p><b>SILTY SAND (SM):</b> fine to coarse-grained, reddish-brown.</p>	X		7/9/12			
45			■		19/25/26	8	109	
50			X		6/8/12			
		<p>End of boring at 51.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings, tamped, and surface patched with asphalt concrete on 5/27/2018.</p>						



**Converse Consultants**

Permanent Classroom Building  
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3635 Madison Street  
City of Riverside, Riverside County, California  
For: Riverside Unified School District

Project No. **18-81-145-01**      Drawing No. **A-2b**

# Log of Boring No. BH-02

Dates Drilled: 5/27/2018 Logged by: Michael Maldonado Checked By: Scot Mathis

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 831 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES		BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
5		<b>ALLUVIUM</b> <b>SILTY SAND (SM):</b> fine to coarse-grained, very silty, brown.			2/3/3	8	105	col
10					6/8/9	10	120	c ma
					7/8/13	3	118	
					6/8/12	11	111	
15					6/9/11	12	111	
20					4/5/10			
25					13/14/15	11	116	
		End of boring at 26.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings and tamped on 5/27/2018.						



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 Madison Elementary School  
 3635 Madison Street  
 City of Riverside, Riverside County, California  
 For: Riverside Unified School District

Project No. **18-81-145-01** Drawing No. **A-3**

# Log of Boring No. BH-03

Dates Drilled: 7/20/2018      Logged by: Michael Maldonado      Checked By: Scot Mathis

Equipment: 8" HOLLOW STEM AUGER      Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 828      Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES		BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
		<b>4" ASPHALT CONCRETE/NO AGGREGATE BASE</b>						
		<b>ALLUVIUM SILTY SAND (SM):</b> fine to medium-grained, olive brown.			19/14/19	13	119	ei, max col
5		<b>SAND with SILT (SP-SM):</b> fine to coarse-grained, brown.			6/8/14	4	116	ma
					7/12/15	2	107	
10					11/21/26	4	116	
15		<b>SILTY SAND (SM):</b> fine to coarse-grained, brown.			7/8/12	5	112	
20					6/10/16			
25					12/13/15	11	116	
30					5/7/9			



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 For: Riverside Unified School District

Project No. **18-81-145-01**      Drawing No. **A-4a**

# Log of Boring No. BH-03

Dates Drilled: 7/20/2018 Logged by: Michael Maldonado Checked By: Scot Mathis

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 828 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.	SAMPLES		BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
40	[Patterned Box]	<b>ALLUVIUM SILTY SAND (SM):</b> fine to coarse-grained, brown.	[Solid Black Box]		10/25/42	12	119	
45	[Patterned Box]	<b>SANDY SILT (ML):</b> with trace clay, fine-grained sand, brown.	[X-Mark Box]		5/9/13			
50	[Patterned Box]		[Solid Black Box]		15/50-6"	12	126	
51.5	[Patterned Box]	End of boring at 51.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings, tamped, and surface patched with asphalt concrete on 7/20/2018.	[X-Mark Box]		9/12/14			



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For: Riverside Unified School District

Project No.  
**18-81-145-01**

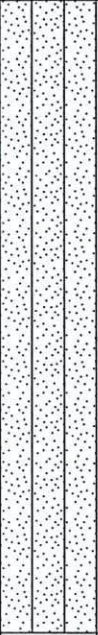







Drawing No.  
**A-4b**

# Log of Boring No. BH-04

Dates Drilled: 7/20/2018 Logged by: Michael Maldonado Checked By: Scot Mathis

Equipment: 8" HOLLOW STEM AUGER Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 832 Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	SUMMARY OF SUBSURFACE CONDITIONS <small>This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.</small>	SAMPLES		BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
5		<p><b>ALLUVIUM</b> <b>SILTY SAND (SM):</b> fine to coarse-grained, brown.</p>			10/18/19	5	114	ma
7					7/8/10	7	116	
9					5/9/14	5	112	
11					9/15/18	4	121	
13								
15					9/13/14	8	118	
		<p>End of boring at 16.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings and tamped on 7/20/2018.</p>						



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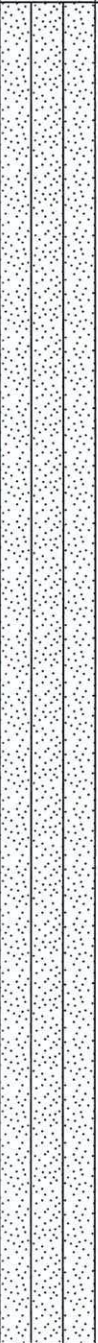
Project No. **18-81-145-01** Drawing No. **A-5**

# Log of Boring No. PT-01

Dates Drilled: 7/26/2018      Logged by: Michael Maldonado      Checked By: Scot Mathis

Equipment: 8" HOLLOW STEM AUGER      Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 832      Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	<p style="text-align: center;"><b>SUMMARY OF SUBSURFACE CONDITIONS</b></p> <p style="font-size: small;">This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.</p>	SAMPLES		BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 20px;">5</div> <div style="margin-bottom: 20px;">10</div> <div style="margin-bottom: 20px;">15</div> <div style="margin-bottom: 20px;">20</div> <div style="margin-bottom: 20px;">25</div> <div style="margin-bottom: 20px;">30</div> </div>		<p><b>ALLUVIUM</b>  <b>SILTY SAND (SM):</b> fine to coarse-grained, brown.</p>	<div style="border: 1px solid black; width: 100%; height: 100%; position: relative;"> <div style="position: absolute; top: 0; right: 0; width: 100%; height: 100%; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px); opacity: 0.5;"></div> </div>					



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Project No.  
**18-81-145-01**

Drawing No.  
**A-6a**



# Log of Boring No. PT-01

Dates Drilled: 7/26/2018      Logged by: Michael Maldonado      Checked By: Scot Mathis

Equipment: 8" HOLLOW STEM AUGER      Driving Weight and Drop: 140 lbs / 30 in

Ground Surface Elevation (ft): 832      Depth to Water (ft): NOT ENCOUNTERED

Depth (ft)	Graphic Log	<p style="text-align: center;"><b>SUMMARY OF SUBSURFACE CONDITIONS</b></p> <p style="font-size: small;">This log is part of the report prepared by Converse for this project and should be read together with the report. This summary applies only at the location of the boring and at the time of drilling. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplification of actual conditions encountered.</p>	SAMPLES		BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
			DRIVE	BULK				
40		<p><b>ALLUVIUM</b>  <b>SANDY SILT (ML):</b> fine to medium-grained sand, brown.</p>						
45								
50		<p>End of boring at 50.0 feet bgs.                      No groundwater encountered.                      Borehole was solely used for percolation testing and backfilled with soil cuttings and tamped on 7/28/2018.</p>						



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Project No. **18-81-145-01**      Drawing No. **A-6b**

# Appendix B

Laboratory Testing Program



## APPENDIX B

### LABORATORY TESTING PROGRAM

Tests were conducted in our laboratory on representative soil samples for the purpose of classification and evaluation of their relevant physical characteristics and engineering properties. The amount and selection of tests were based on the geotechnical requirements of the project. Summaries of the various laboratory tests conducted for this project and test results are presented below.

#### Moisture Content and Dry Density

In-situ dry density and moisture content tests were performed on relatively undisturbed ring samples in accordance with ASTM Standard D2216 and D7263 test method. This test is used in soil classification and provides qualitative information on strength and compressibility characteristics of site soils. For test results, see the Logs of Borings in Appendix A, *Field Exploration*.

#### Expansion Index Test

One representative bulk sample was tested in accordance with ASTM Standard D4829 to evaluate the expansion potential. The test result is presented in the following table.

**Table No. B-1, Expansion Index Test Results**

Boring No.	Depth (feet)	Soil Description	Expansion Index	Expansion Potential
BH-03	0-5	Silty Sand (SM)	17	Very Low

#### Soil Corrosivity Tests

One representative soil sample was tested to determine minimum electrical resistivity, pH, and chemical content, including soluble sulfate and chloride concentrations. The purpose of these tests was to determine the corrosion potential of site soils when placed in contact with common construction materials. These tests were performed by AP Engineering and Testing, Inc. (Pomona, CA) in accordance to California Tests CT643, 422, and 417. Test results are presented in the table below.



**Table No. B-2, Summary of Soil Corrosivity Test Results**

Boring No.	Depth (feet)	pH	Chloride (ppm)	Sulfate (% by weight)	Minimum Electrical Resistivity (ohm-cm)
BH-01	1-5	7.6	41	0.006	1,377

**Collapse Tests**

To evaluate the moisture sensitivity (collapse/swell potential) of the encountered soils, two collapse tests were performed in accordance with the ASTM Standard D4546 laboratory procedure. The sample was loaded to approximately 2 kips per square foot (ksf), allowed to stabilize under load, and then submerged. The test results including the consolidation test are presented in the following table.

**Table No. B-3, Collapse Test Results**

Boring No.	Depth (feet)	Soil Classification	Percent Swell (+) Percent Collapse (-)	Collapse Potential
BH-02	2.5-4.0	Silty Sand (SM)	-0.3	Slight
BH-02*	5.0-6.5	Silty Sand (SM)	-1.7	Slight
BH-03	2.5-4.0	Silty Sand (SM)	-0.7	Slight

(\*Consolidation test)

**Grain-Size Analyses**

To aid in classification of the soils, mechanical grain-size analyses was performed on four representative soil samples. Testing was performed in accordance with the ASTM Standard C136 test method. For test results, see Drawing No. B-1, *Grain Size Distribution Results*.

**Maximum Density and Optimum Moisture Content Tests**

Laboratory maximum dry density-optimum moisture content relationship test was performed on two representative bulk samples. The tests were conducted in accordance with the ASTM Standard D1557 test method. The test results are presented in Drawing No. B-2, *Moisture-Density Relationship Results*, and are also summarized in the following table.



**Table No B-4, Summary of Moisture-Density Relationship Results**

Boring No.	Depth (feet)	Soil Description	Optimum Moisture (%)	Maximum Density (lb/cft)
BH-01	1-5	Silty Sand (SM), Reddish Brown	7.5	135.5
BH-03	1-5	Silty Sand (SM), Olive Brown	8.5	133.0

**Direct Shear Test**

One direct shear test was performed on a representative undisturbed soil sample in accordance with ASTM D3080. For the test, three ring samples were tested at soaked moisture conditions. The samples were placed, one at a time, directly into the test apparatus and subjected to a range of normal loads appropriate for the anticipated conditions. Each sample was then sheared at a constant strain rate of 0.02 inch/minute. Shear deformation was recorded until a maximum of about 0.25-inch shear displacement was achieved. Ultimate strength was selected from the shear-stress vs. deformation data and plotted to determine the shear strength parameters. For test data, including sample density and moisture content, see Drawing No. B-3, *Direct Shear Test Result*, and the summary table below.

**Table No. B-5, Summary of Direct Shear Test Result**

Boring No.	Depth (feet)	Soil Description	Peak Strength Parameters	
			Friction Angle (degrees)	Cohesion (psf)
BH-01	5.0-6.5	Silty Sand (SM)	29	80

**Consolidation Test**

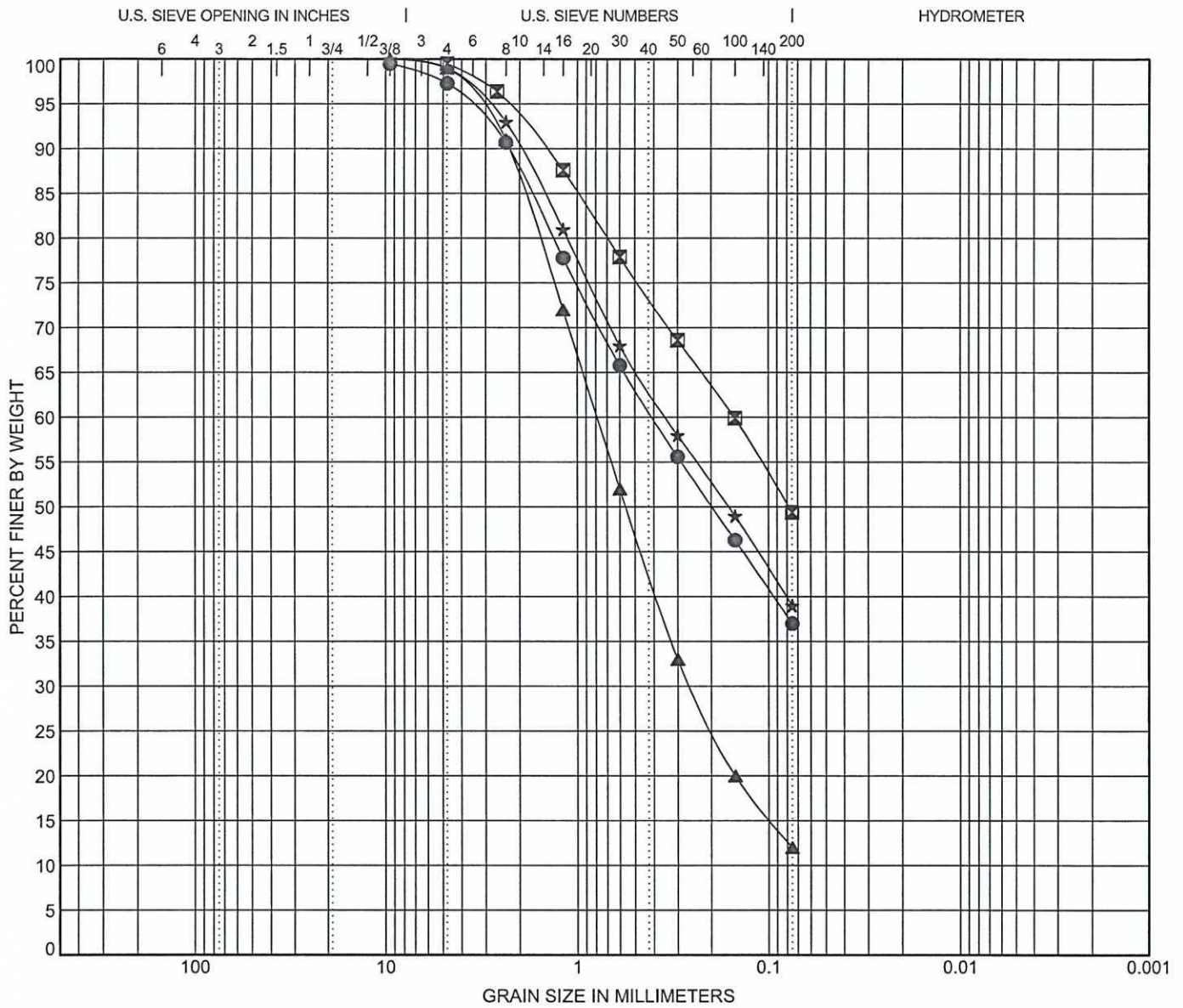
This test was conducted in accordance with ASTM Standard D2435 method. Data obtained from this test performed on one relatively undisturbed ring sample was used to evaluate the settlement characteristics of the on-site soils under load. Preparation for this test involved trimming the sample, placing it in a 1-inch-high brass ring, and loading it into the test apparatus, which contained porous stones to accommodate drainage during testing. Normal axial loads were applied to one end of the sample through the porous stones, and the resulting deflections were recorded at various time periods. The load was increased after the sample reached a reasonable state of equilibrium. Normal loads were applied at a constant load-increment ratio, successive loads being generally twice the preceding load. For test result, including sample density and moisture content, see Drawing No. B-4, *Consolidation Test Result*.



### **Sample Storage**

Soil samples stored in our laboratory will be discarded 30 days after the date of this report, unless this office receives a specific request to retain the samples for a longer period.





COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring No.	Depth (ft)	Description	LL	PL	PI	Cc	Cu
● BH-01	1-5	SILTY SAND (SM)					
☒ BH-02	5-10	SILTY SAND (SM)					
▲ BH-03	5-10	SAND with SILT (SP-SM)				1.32	12.47
★ BH-04	0-5	SILTY SAND (SM)					

Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● BH-01	1-5	9.5	0.405			2.2	60.3	37.0	
☒ BH-02	5-10	4.75	0.151			0.0	50.1	49.4	
▲ BH-03	5-10	9.5	0.786	0.256		1.0	87.0	12.0	
★ BH-04	0-5	9.5	0.345			1.0	60.0	39.0	

## GRAIN SIZE DISTRIBUTION RESULTS

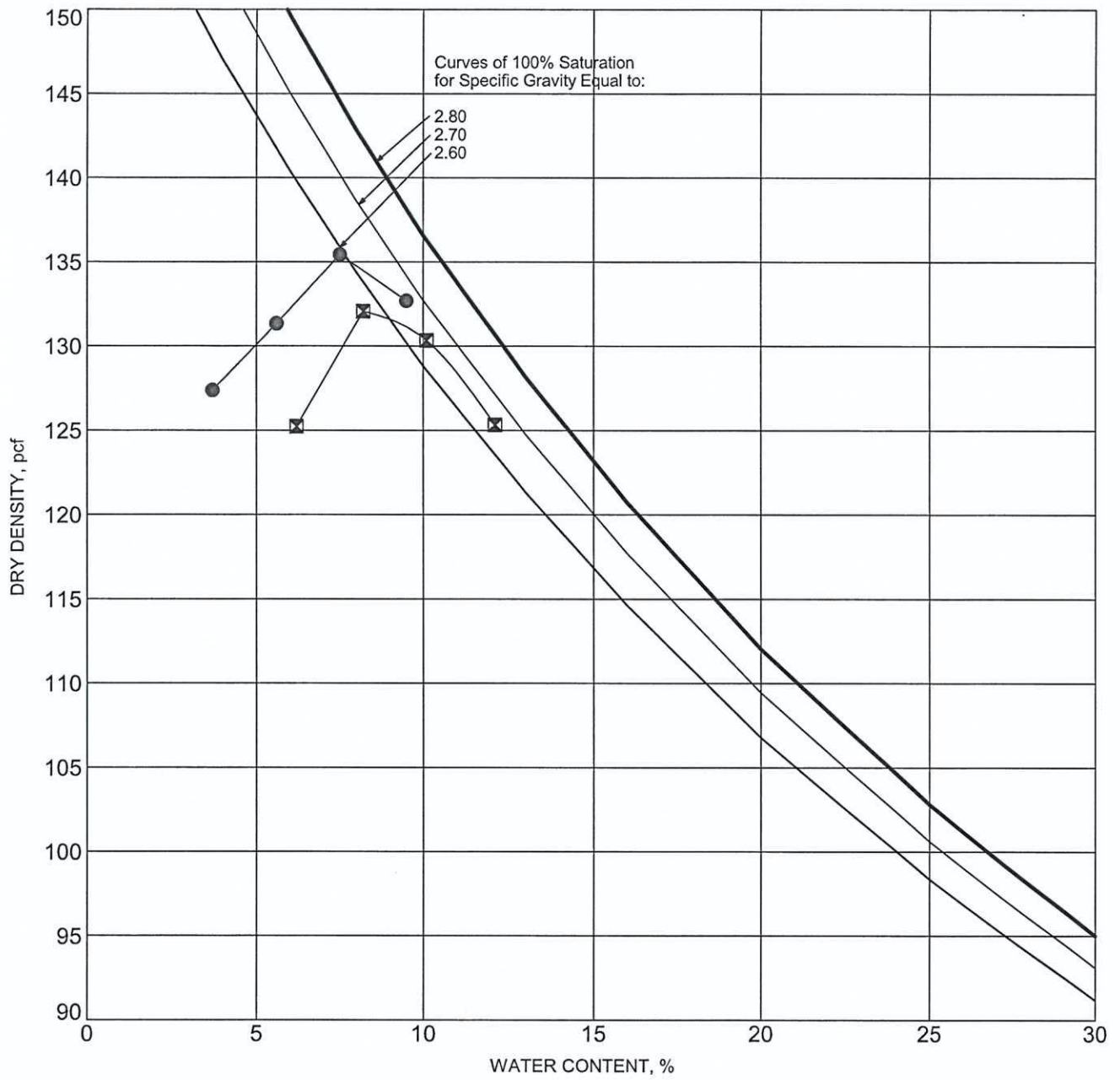


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Drawing No.  
 B-1



SYMBOL	BORING NO.	DEPTH (ft)	DESCRIPTION	ASTM TEST METHOD	OPTIMUM WATER, %	MAXIMUM DRY DENSITY, pcf
●	BH-01	1-5	SILTY SAND (SM), REDDISH BROWN	D1557-C	7.5	135.5
☒	BH-03	1-5	SILTY SAND (SM), OLIVE BROWN	D1557-A	8.5	133.0

## MOISTURE-DENSITY RELATIONSHIP RESULTS



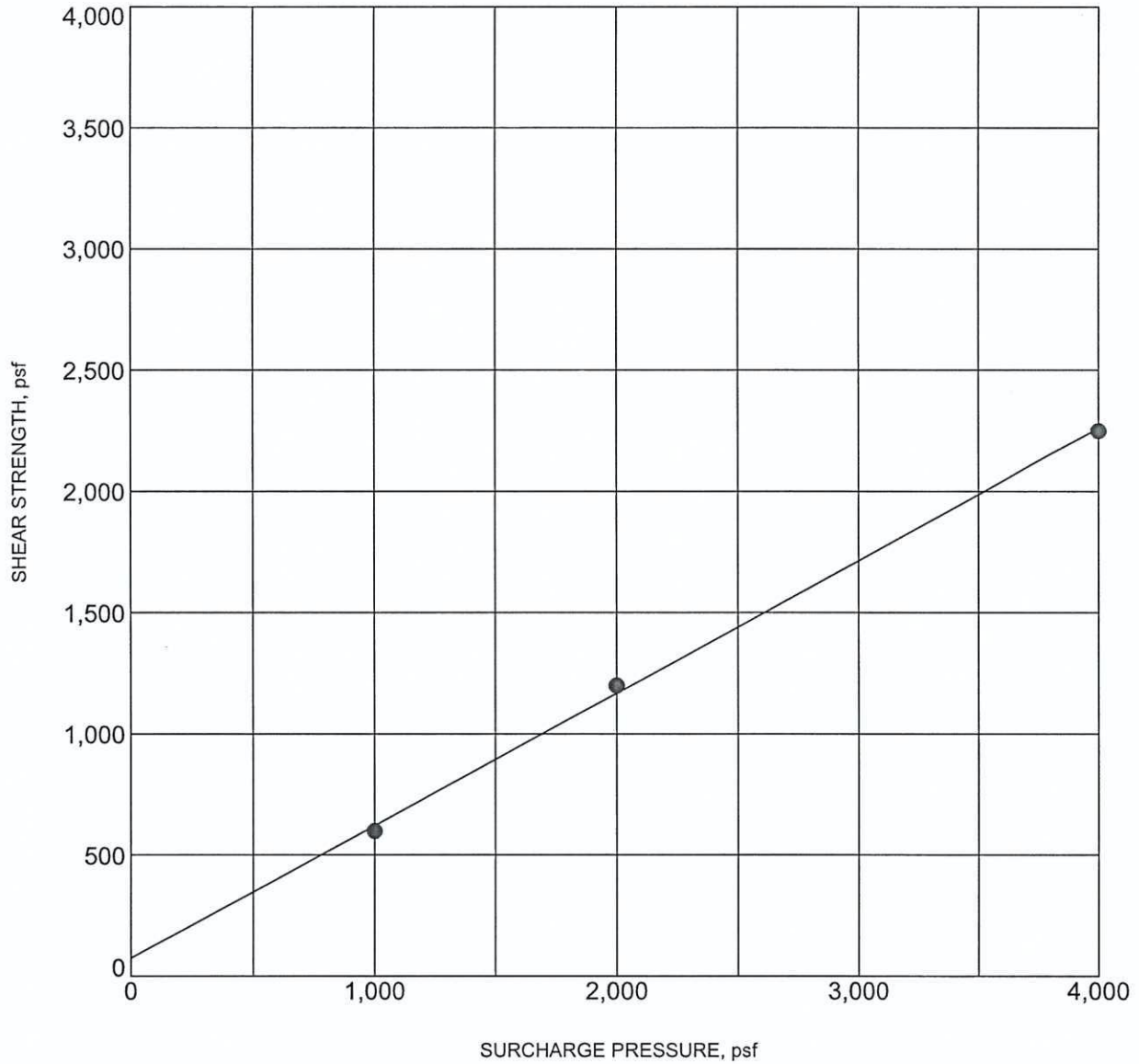
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Project No.  
 18-81-145-01

Drawing No.  
 B-2





BORING NO.	: BH-01	DEPTH (ft)	: 5.0-6.5
DESCRIPTION	: SILTY SAND (SM)		
COHESION (psf)	: 80	FRICTION ANGLE (degrees):	29
MOISTURE CONTENT (%)	: 8.0	DRY DENSITY (pcf)	: 116.0

NOTE: Ultimate Strength.

### DIRECT SHEAR TEST RESULTS



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Project No.  
 18-81-145-01

Drawing No.  
 B-3

# Appendix C

## Liquefaction and Settlement Analysis



## APPENDIX C

### LIQUEFACTION AND SETTLEMENT ANALYSIS

The subsurface data obtained from two borings (BH-01 and BH-03) were used to evaluate the liquefaction potential and dry seismic settlement due to densification of relatively loose sediments subjected to ground shaking during earthquakes.

The liquefaction analyses were performed using LiquefyPro (Civiltech, 2011). Based on our site-specific seismic analysis, presented in Section 7.3, *Site-Specific Seismic Analysis*, of this report, a mean earthquake magnitude of M7.88 and peak ground acceleration (PGA) of 0.53g, where g is the acceleration due to gravity, were selected for this analysis. This PGA is the site-specific MCE-based PGA determined in accordance with ASCE 7-10 Section 21.5.3. Analysis was conducted for groundwater condition deeper than 50 feet bgs. with a factor of safety of 1.3.

The results of our analysis are presented on Plates C-1 and C-2 and summarized in the following table. LiquefyPro output files are attached after Plates C-1 and C-2.

**Table C-1, Estimated Dynamic Settlements**

Location	Groundwater Conditions	Groundwater Depth (feet bgs)	Dry Seismic Settlement (inches)	Liquefaction Induced Settlement (inches)
BH-01	Current	> 50	3.59	Negligible
	Historical			
BH-03	Current	> 50	1.73	Negligible
	Historical			

Based on our analysis, the project site has the potential for up to 3.6 inches of dry seismic settlement with negligible liquefaction induced settlement under groundwater condition deeper than 50 feet bgs.

The dynamic differential settlement of the site will be half of the total settlement over 40 horizontal feet.

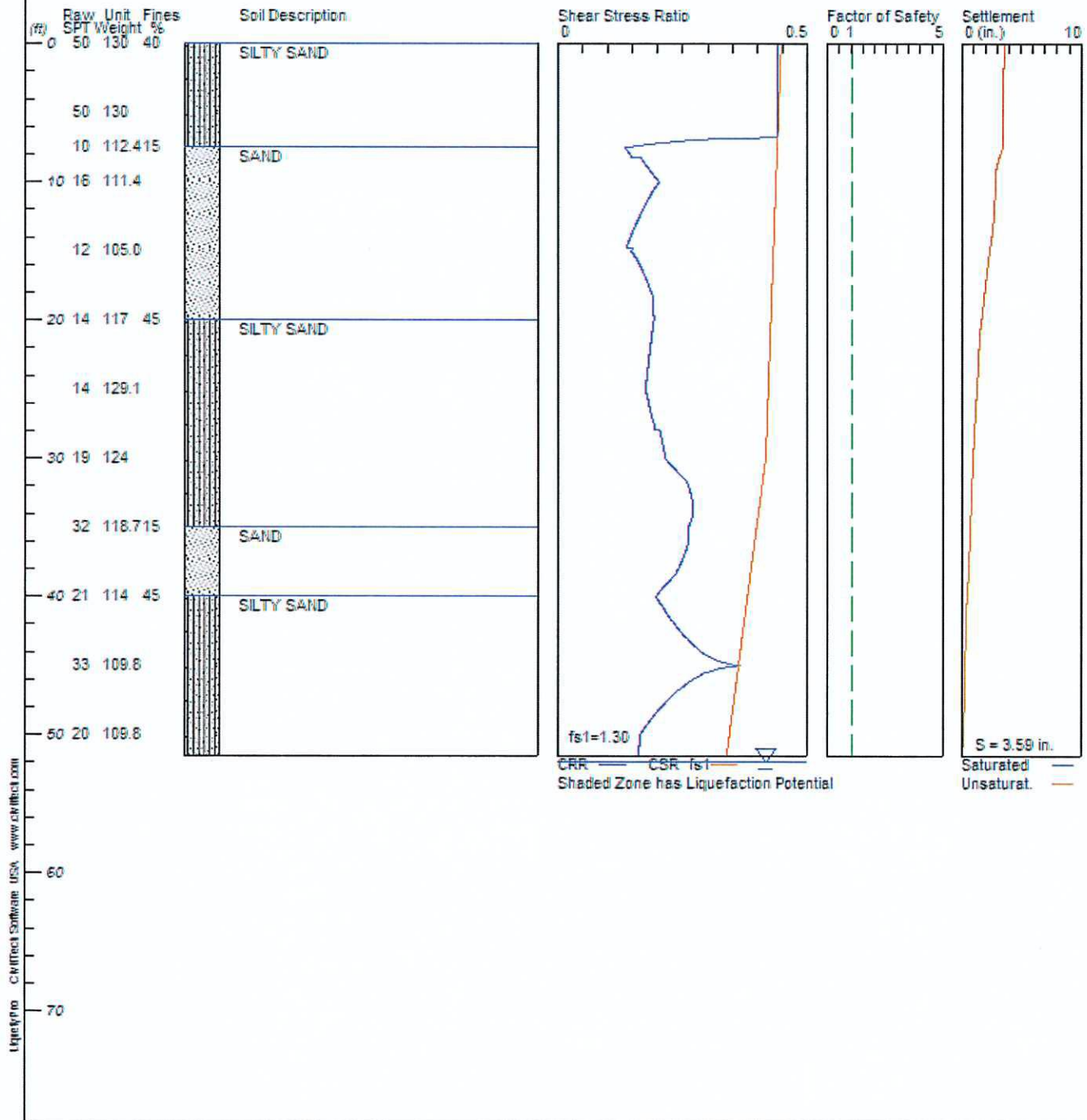


# DYNAMIC SETTLEMENT

## Permanent Classroom Building

**Hole No.=BH-01 Water Depth=52 ft Surface Elev.=828**

**Magnitude=7.88  
Acceleration=0.53g**

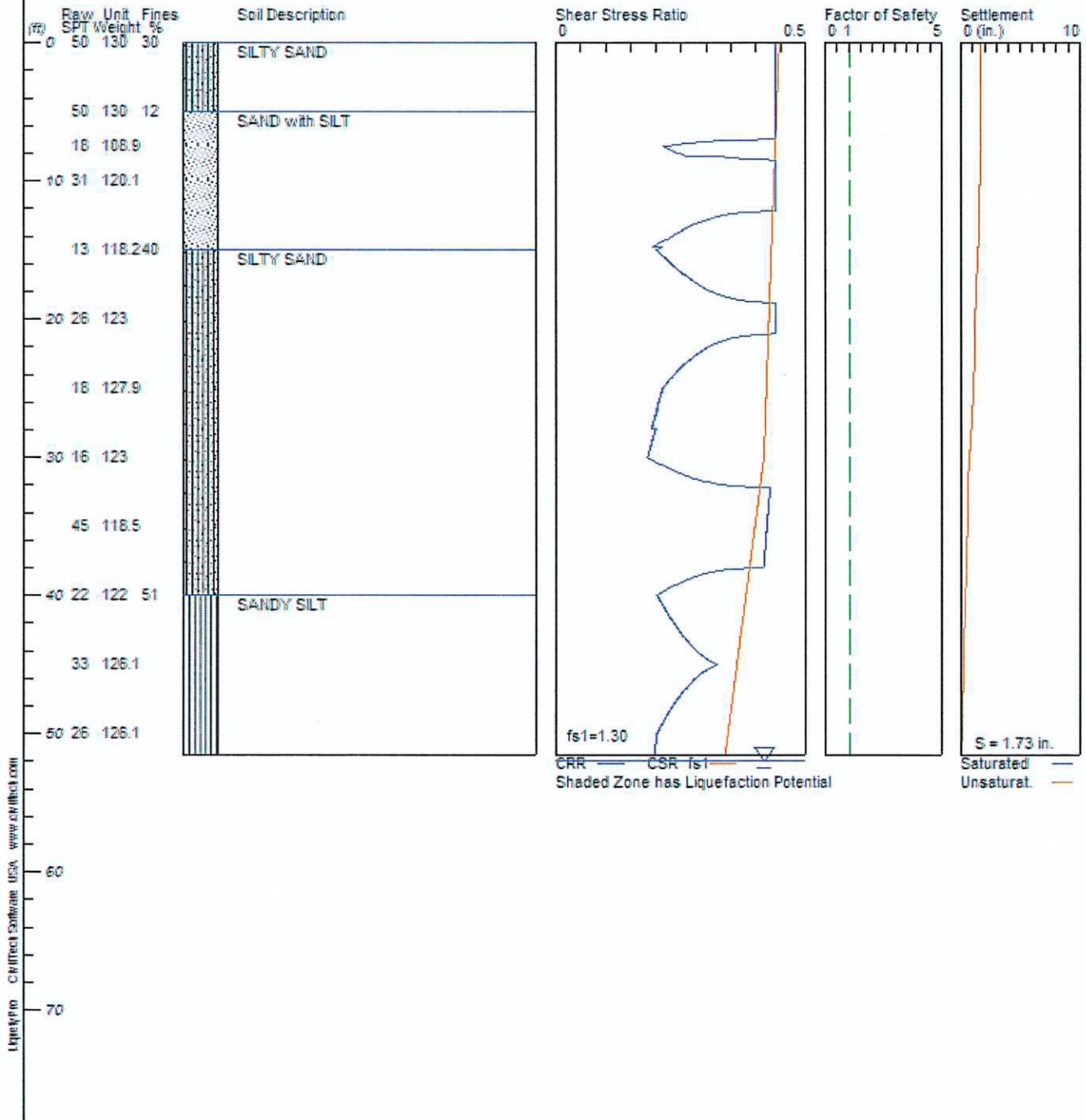


# DYNAMIC SETTLEMENT

## Permanent Classroom Building

**Hole No.=BH-03 Water Depth=52 ft Surface Elev.=828**

**Magnitude=7.88**  
**Acceleration=0.53g**



Liquefy.sum

\*\*\*\*\*  
\*\*\*\*\*

LIQUEFACTION ANALYSIS SUMMARY

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\*\*\*\*\*

Font: Courier New, Regular, Size 8 is recommended for this report.  
Licensed to , 8/24/2018 5:16:23 PM

Input File Name: N:\2018\18-81-145 RUSD, Madison E.S. Classroom  
Bldg\Settlement\BH-01.liq

Title: Permanent Classroom Building  
Subtitle: Dynamic Settlement

Surface Elev.=828  
Hole No.=BH-01  
Depth of Hole= 51.50 ft  
Water Table during Earthquake= 52.00 ft  
Water Table during In-Situ Testing= 52.00 ft  
Max. Acceleration= 0.53 g  
Earthquake Magnitude= 7.88

Input Data:

Surface Elev.=828  
Hole No.=BH-01  
Depth of Hole=51.50 ft  
Water Table during Earthquake= 52.00 ft  
Water Table during In-Situ Testing= 52.00 ft  
Max. Acceleration=0.53 g  
Earthquake Magnitude=7.88  
No-Liquefiable Soils: CL, OL are Non-Liq. Soil

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Tokimatsu/Seed
3. Fines Correction for Liquefaction: Idriss/Seed
4. Fine Correction for Settlement: During Liquefaction\*
5. Settlement Calculation in: All zones\*
6. Hammer Energy Ratio,
7. Borehole Diameter,
8. Sampling Method,
9. User request factor of safety (apply to CSR) , User= 1.3  
Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: Yes\*

Ce = 1  
Cb= 1  
Cs= 1

\* Recommended Options

Liquefy.sum

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	50.00	130.00	40.00
5.00	50.00	130.00	40.00
7.50	10.00	112.40	15.00
10.00	16.00	111.40	15.00
15.00	12.00	105.00	15.00
20.00	14.00	117.00	45.00
25.00	14.00	129.10	45.00
30.00	19.00	124.00	45.00
35.00	32.00	118.70	15.00
40.00	21.00	114.00	45.00
45.00	33.00	109.80	45.00
50.00	20.00	109.80	45.00

Output Results:

Settlement of Saturated Sands=0.00 in.  
 Settlement of Unsaturated Sands=3.59 in.  
 Total Settlement of Saturated and Unsaturated Sands=3.59 in.  
 Differential Settlement=1.796 to 2.371 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.44	0.45	5.00	0.00	3.59	3.59
0.05	0.44	0.45	5.00	0.00	3.59	3.59
0.10	0.44	0.45	5.00	0.00	3.59	3.59
0.15	0.44	0.45	5.00	0.00	3.59	3.59
0.20	0.44	0.45	5.00	0.00	3.59	3.59
0.25	0.44	0.45	5.00	0.00	3.59	3.59
0.30	0.44	0.45	5.00	0.00	3.59	3.59
0.35	0.44	0.45	5.00	0.00	3.59	3.59
0.40	0.44	0.45	5.00	0.00	3.59	3.59
0.45	0.44	0.45	5.00	0.00	3.59	3.59
0.50	0.44	0.45	5.00	0.00	3.59	3.59
0.55	0.44	0.45	5.00	0.00	3.59	3.59
0.60	0.44	0.45	5.00	0.00	3.59	3.59
0.65	0.44	0.45	5.00	0.00	3.59	3.59
0.70	0.44	0.45	5.00	0.00	3.59	3.59
0.75	0.44	0.45	5.00	0.00	3.59	3.59
0.80	0.44	0.45	5.00	0.00	3.59	3.59
0.85	0.44	0.45	5.00	0.00	3.59	3.59
0.90	0.44	0.45	5.00	0.00	3.59	3.59
0.95	0.44	0.45	5.00	0.00	3.59	3.59

Liquefy.sum

1.00	0.44	0.45	5.00	0.00	3.59	3.59
1.05	0.44	0.45	5.00	0.00	3.59	3.59
1.10	0.44	0.45	5.00	0.00	3.59	3.59
1.15	0.44	0.45	5.00	0.00	3.59	3.59
1.20	0.44	0.45	5.00	0.00	3.59	3.59
1.25	0.44	0.45	5.00	0.00	3.59	3.59
1.30	0.44	0.45	5.00	0.00	3.59	3.59
1.35	0.44	0.45	5.00	0.00	3.59	3.59
1.40	0.44	0.45	5.00	0.00	3.59	3.59
1.45	0.44	0.45	5.00	0.00	3.59	3.59
1.50	0.44	0.45	5.00	0.00	3.59	3.59
1.55	0.44	0.45	5.00	0.00	3.59	3.59
1.60	0.44	0.45	5.00	0.00	3.59	3.59
1.65	0.44	0.45	5.00	0.00	3.59	3.59
1.70	0.44	0.45	5.00	0.00	3.59	3.59
1.75	0.44	0.45	5.00	0.00	3.59	3.59
1.80	0.44	0.45	5.00	0.00	3.59	3.59
1.85	0.44	0.45	5.00	0.00	3.59	3.59
1.90	0.44	0.45	5.00	0.00	3.59	3.59
1.95	0.44	0.45	5.00	0.00	3.59	3.59
2.00	0.44	0.45	5.00	0.00	3.59	3.59
2.05	0.44	0.45	5.00	0.00	3.59	3.59
2.10	0.44	0.45	5.00	0.00	3.59	3.59
2.15	0.44	0.45	5.00	0.00	3.59	3.59
2.20	0.44	0.45	5.00	0.00	3.59	3.59
2.25	0.44	0.45	5.00	0.00	3.59	3.59
2.30	0.44	0.45	5.00	0.00	3.59	3.59
2.35	0.44	0.45	5.00	0.00	3.59	3.59
2.40	0.44	0.45	5.00	0.00	3.59	3.59
2.45	0.44	0.45	5.00	0.00	3.59	3.59
2.50	0.44	0.45	5.00	0.00	3.59	3.59
2.55	0.44	0.45	5.00	0.00	3.59	3.59
2.60	0.44	0.45	5.00	0.00	3.59	3.59
2.65	0.44	0.45	5.00	0.00	3.59	3.59
2.70	0.44	0.45	5.00	0.00	3.59	3.59
2.75	0.44	0.44	5.00	0.00	3.59	3.59
2.80	0.44	0.44	5.00	0.00	3.59	3.59
2.85	0.44	0.44	5.00	0.00	3.59	3.59
2.90	0.44	0.44	5.00	0.00	3.59	3.59
2.95	0.44	0.44	5.00	0.00	3.59	3.59
3.00	0.44	0.44	5.00	0.00	3.59	3.59
3.05	0.44	0.44	5.00	0.00	3.59	3.59
3.10	0.44	0.44	5.00	0.00	3.59	3.59
3.15	0.44	0.44	5.00	0.00	3.59	3.59
3.20	0.44	0.44	5.00	0.00	3.59	3.59
3.25	0.44	0.44	5.00	0.00	3.59	3.59
3.30	0.44	0.44	5.00	0.00	3.59	3.59
3.35	0.44	0.44	5.00	0.00	3.59	3.59



Liquefy.sum						
3.40	0.44	0.44	5.00	0.00	3.59	3.59
3.45	0.44	0.44	5.00	0.00	3.59	3.59
3.50	0.44	0.44	5.00	0.00	3.59	3.59
3.55	0.44	0.44	5.00	0.00	3.59	3.59
3.60	0.44	0.44	5.00	0.00	3.59	3.59
3.65	0.44	0.44	5.00	0.00	3.59	3.59
3.70	0.44	0.44	5.00	0.00	3.59	3.59
3.75	0.44	0.44	5.00	0.00	3.59	3.59
3.80	0.44	0.44	5.00	0.00	3.59	3.59
3.85	0.44	0.44	5.00	0.00	3.59	3.59
3.90	0.44	0.44	5.00	0.00	3.59	3.59
3.95	0.44	0.44	5.00	0.00	3.59	3.59
4.00	0.44	0.44	5.00	0.00	3.59	3.59
4.05	0.44	0.44	5.00	0.00	3.59	3.59
4.10	0.44	0.44	5.00	0.00	3.59	3.59
4.15	0.44	0.44	5.00	0.00	3.59	3.59
4.20	0.44	0.44	5.00	0.00	3.59	3.59
4.25	0.44	0.44	5.00	0.00	3.59	3.59
4.30	0.44	0.44	5.00	0.00	3.59	3.59
4.35	0.44	0.44	5.00	0.00	3.59	3.59
4.40	0.44	0.44	5.00	0.00	3.59	3.59
4.45	0.44	0.44	5.00	0.00	3.59	3.59
4.50	0.44	0.44	5.00	0.00	3.59	3.59
4.55	0.44	0.44	5.00	0.00	3.58	3.58
4.60	0.44	0.44	5.00	0.00	3.58	3.58
4.65	0.44	0.44	5.00	0.00	3.58	3.58
4.70	0.44	0.44	5.00	0.00	3.58	3.58
4.75	0.44	0.44	5.00	0.00	3.58	3.58
4.80	0.44	0.44	5.00	0.00	3.58	3.58
4.85	0.44	0.44	5.00	0.00	3.58	3.58
4.90	0.44	0.44	5.00	0.00	3.58	3.58
4.95	0.44	0.44	5.00	0.00	3.58	3.58
5.00	0.44	0.44	5.00	0.00	3.58	3.58
5.05	0.44	0.44	5.00	0.00	3.58	3.58
5.10	0.44	0.44	5.00	0.00	3.58	3.58
5.15	0.44	0.44	5.00	0.00	3.58	3.58
5.20	0.44	0.44	5.00	0.00	3.58	3.58
5.25	0.44	0.44	5.00	0.00	3.58	3.58
5.30	0.44	0.44	5.00	0.00	3.58	3.58
5.35	0.44	0.44	5.00	0.00	3.58	3.58
5.40	0.44	0.44	5.00	0.00	3.58	3.58
5.45	0.44	0.44	5.00	0.00	3.58	3.58
5.50	0.44	0.44	5.00	0.00	3.58	3.58
5.55	0.44	0.44	5.00	0.00	3.58	3.58
5.60	0.44	0.44	5.00	0.00	3.58	3.58
5.65	0.44	0.44	5.00	0.00	3.58	3.58
5.70	0.44	0.44	5.00	0.00	3.58	3.58
5.75	0.44	0.44	5.00	0.00	3.58	3.58

Liquefy.sum

5.80	0.44	0.44	5.00	0.00	3.58	3.58
5.85	0.44	0.44	5.00	0.00	3.58	3.58
5.90	0.44	0.44	5.00	0.00	3.58	3.58
5.95	0.44	0.44	5.00	0.00	3.58	3.58
6.00	0.44	0.44	5.00	0.00	3.58	3.58
6.05	0.44	0.44	5.00	0.00	3.58	3.58
6.10	0.44	0.44	5.00	0.00	3.58	3.58
6.15	0.44	0.44	5.00	0.00	3.58	3.58
6.20	0.44	0.44	5.00	0.00	3.58	3.58
6.25	0.44	0.44	5.00	0.00	3.58	3.58
6.30	0.44	0.44	5.00	0.00	3.58	3.58
6.35	0.44	0.44	5.00	0.00	3.58	3.58
6.40	0.44	0.44	5.00	0.00	3.58	3.58
6.45	0.44	0.44	5.00	0.00	3.58	3.58
6.50	0.44	0.44	5.00	0.00	3.58	3.58
6.55	0.44	0.44	5.00	0.00	3.58	3.58
6.60	0.44	0.44	5.00	0.00	3.58	3.58
6.65	0.44	0.44	5.00	0.00	3.58	3.58
6.70	0.44	0.44	5.00	0.00	3.58	3.58
6.75	0.44	0.44	5.00	0.00	3.58	3.58
6.80	0.44	0.44	5.00	0.00	3.58	3.58
6.85	0.37	0.44	5.00	0.00	3.58	3.58
6.90	0.31	0.44	5.00	0.00	3.58	3.58
6.95	0.29	0.44	5.00	0.00	3.58	3.58
7.00	0.26	0.44	5.00	0.00	3.57	3.57
7.05	0.25	0.44	5.00	0.00	3.57	3.57
7.10	0.23	0.44	5.00	0.00	3.57	3.57
7.15	0.22	0.44	5.00	0.00	3.57	3.57
7.20	0.20	0.44	5.00	0.00	3.57	3.57
7.25	0.19	0.44	5.00	0.00	3.56	3.56
7.30	0.18	0.44	5.00	0.00	3.56	3.56
7.35	0.17	0.44	5.00	0.00	3.55	3.55
7.40	0.16	0.44	5.00	0.00	3.54	3.54
7.45	0.15	0.44	5.00	0.00	3.53	3.53
7.50	0.14	0.44	5.00	0.00	3.51	3.51
7.55	0.14	0.44	5.00	0.00	3.49	3.49
7.60	0.14	0.44	5.00	0.00	3.47	3.47
7.65	0.14	0.44	5.00	0.00	3.45	3.45
7.70	0.14	0.44	5.00	0.00	3.43	3.43
7.75	0.14	0.44	5.00	0.00	3.41	3.41
7.80	0.14	0.44	5.00	0.00	3.39	3.39
7.85	0.14	0.44	5.00	0.00	3.37	3.37
7.90	0.14	0.44	5.00	0.00	3.35	3.35
7.95	0.14	0.44	5.00	0.00	3.33	3.33
8.00	0.15	0.44	5.00	0.00	3.31	3.31
8.05	0.15	0.44	5.00	0.00	3.29	3.29
8.10	0.15	0.44	5.00	0.00	3.27	3.27
8.15	0.15	0.44	5.00	0.00	3.25	3.25

Liquefy.sum						
8.20	0.15	0.44	5.00	0.00	3.24	3.24
8.25	0.17	0.44	5.00	0.00	3.22	3.22
8.30	0.17	0.44	5.00	0.00	3.20	3.20
8.35	0.17	0.44	5.00	0.00	3.18	3.18
8.40	0.17	0.44	5.00	0.00	3.17	3.17
8.45	0.17	0.44	5.00	0.00	3.15	3.15
8.50	0.17	0.44	5.00	0.00	3.14	3.14
8.55	0.17	0.44	5.00	0.00	3.12	3.12
8.60	0.17	0.44	5.00	0.00	3.11	3.11
8.65	0.17	0.44	5.00	0.00	3.09	3.09
8.70	0.18	0.44	5.00	0.00	3.08	3.08
8.75	0.18	0.44	5.00	0.00	3.06	3.06
8.80	0.18	0.44	5.00	0.00	3.05	3.05
8.85	0.18	0.44	5.00	0.00	3.03	3.03
8.90	0.18	0.44	5.00	0.00	3.02	3.02
8.95	0.18	0.44	5.00	0.00	3.00	3.00
9.00	0.18	0.44	5.00	0.00	2.99	2.99
9.05	0.18	0.44	5.00	0.00	2.98	2.98
9.10	0.18	0.44	5.00	0.00	2.96	2.96
9.15	0.19	0.44	5.00	0.00	2.95	2.95
9.20	0.19	0.44	5.00	0.00	2.93	2.93
9.25	0.19	0.44	5.00	0.00	2.93	2.93
9.30	0.19	0.44	5.00	0.00	2.93	2.93
9.35	0.19	0.44	5.00	0.00	2.93	2.93
9.40	0.19	0.44	5.00	0.00	2.93	2.93
9.45	0.19	0.44	5.00	0.00	2.93	2.93
9.50	0.19	0.44	5.00	0.00	2.92	2.92
9.55	0.19	0.44	5.00	0.00	2.92	2.92
9.60	0.19	0.44	5.00	0.00	2.92	2.92
9.65	0.20	0.44	5.00	0.00	2.92	2.92
9.70	0.20	0.44	5.00	0.00	2.92	2.92
9.75	0.20	0.44	5.00	0.00	2.92	2.92
9.80	0.20	0.44	5.00	0.00	2.91	2.91
9.85	0.20	0.44	5.00	0.00	2.91	2.91
9.90	0.20	0.44	5.00	0.00	2.91	2.91
9.95	0.20	0.44	5.00	0.00	2.91	2.91
10.00	0.20	0.44	5.00	0.00	2.91	2.91
10.05	0.20	0.44	5.00	0.00	2.91	2.91
10.10	0.20	0.44	5.00	0.00	2.90	2.90
10.15	0.20	0.44	5.00	0.00	2.90	2.90
10.20	0.20	0.44	5.00	0.00	2.90	2.90
10.25	0.20	0.44	5.00	0.00	2.90	2.90
10.30	0.20	0.44	5.00	0.00	2.90	2.90
10.35	0.20	0.44	5.00	0.00	2.90	2.90
10.40	0.20	0.44	5.00	0.00	2.89	2.89
10.45	0.19	0.44	5.00	0.00	2.89	2.89
10.50	0.19	0.44	5.00	0.00	2.89	2.89
10.55	0.19	0.44	5.00	0.00	2.89	2.89

Liquefy.sum						
10.60	0.19	0.44	5.00	0.00	2.89	2.89
10.65	0.19	0.44	5.00	0.00	2.88	2.88
10.70	0.19	0.44	5.00	0.00	2.88	2.88
10.75	0.19	0.44	5.00	0.00	2.88	2.88
10.80	0.19	0.44	5.00	0.00	2.88	2.88
10.85	0.19	0.44	5.00	0.00	2.88	2.88
10.90	0.19	0.44	5.00	0.00	2.87	2.87
10.95	0.19	0.44	5.00	0.00	2.87	2.87
11.00	0.19	0.44	5.00	0.00	2.87	2.87
11.05	0.18	0.44	5.00	0.00	2.87	2.87
11.10	0.18	0.44	5.00	0.00	2.86	2.86
11.15	0.18	0.44	5.00	0.00	2.86	2.86
11.20	0.18	0.44	5.00	0.00	2.86	2.86
11.25	0.18	0.44	5.00	0.00	2.86	2.86
11.30	0.18	0.44	5.00	0.00	2.85	2.85
11.35	0.18	0.44	5.00	0.00	2.85	2.85
11.40	0.18	0.44	5.00	0.00	2.85	2.85
11.45	0.18	0.44	5.00	0.00	2.85	2.85
11.50	0.18	0.44	5.00	0.00	2.84	2.84
11.55	0.18	0.44	5.00	0.00	2.84	2.84
11.60	0.18	0.44	5.00	0.00	2.84	2.84
11.65	0.18	0.44	5.00	0.00	2.83	2.83
11.70	0.17	0.44	5.00	0.00	2.83	2.83
11.75	0.17	0.44	5.00	0.00	2.83	2.83
11.80	0.17	0.44	5.00	0.00	2.83	2.83
11.85	0.17	0.44	5.00	0.00	2.82	2.82
11.90	0.17	0.44	5.00	0.00	2.82	2.82
11.95	0.17	0.44	5.00	0.00	2.82	2.82
12.00	0.17	0.44	5.00	0.00	2.81	2.81
12.05	0.17	0.44	5.00	0.00	2.81	2.81
12.10	0.17	0.44	5.00	0.00	2.80	2.80
12.15	0.17	0.44	5.00	0.00	2.80	2.80
12.20	0.17	0.44	5.00	0.00	2.80	2.80
12.25	0.17	0.44	5.00	0.00	2.79	2.79
12.30	0.17	0.44	5.00	0.00	2.79	2.79
12.35	0.17	0.43	5.00	0.00	2.79	2.79
12.40	0.17	0.43	5.00	0.00	2.78	2.78
12.45	0.16	0.43	5.00	0.00	2.78	2.78
12.50	0.16	0.43	5.00	0.00	2.77	2.77
12.55	0.16	0.43	5.00	0.00	2.77	2.77
12.60	0.16	0.43	5.00	0.00	2.77	2.77
12.65	0.16	0.43	5.00	0.00	2.76	2.76
12.70	0.16	0.43	5.00	0.00	2.76	2.76
12.75	0.16	0.43	5.00	0.00	2.75	2.75
12.80	0.16	0.43	5.00	0.00	2.75	2.75
12.85	0.16	0.43	5.00	0.00	2.74	2.74
12.90	0.16	0.43	5.00	0.00	2.74	2.74
12.95	0.16	0.43	5.00	0.00	2.73	2.73

Liquefy.sum						
13.00	0.16	0.43	5.00	0.00	2.73	2.73
13.05	0.16	0.43	5.00	0.00	2.72	2.72
13.10	0.16	0.43	5.00	0.00	2.72	2.72
13.15	0.16	0.43	5.00	0.00	2.71	2.71
13.20	0.16	0.43	5.00	0.00	2.71	2.71
13.25	0.15	0.43	5.00	0.00	2.70	2.70
13.30	0.15	0.43	5.00	0.00	2.69	2.69
13.35	0.15	0.43	5.00	0.00	2.69	2.69
13.40	0.15	0.43	5.00	0.00	2.68	2.68
13.45	0.15	0.43	5.00	0.00	2.68	2.68
13.50	0.15	0.43	5.00	0.00	2.67	2.67
13.55	0.15	0.43	5.00	0.00	2.66	2.66
13.60	0.15	0.43	5.00	0.00	2.66	2.66
13.65	0.15	0.43	5.00	0.00	2.65	2.65
13.70	0.15	0.43	5.00	0.00	2.64	2.64
13.75	0.15	0.43	5.00	0.00	2.64	2.64
13.80	0.15	0.43	5.00	0.00	2.63	2.63
13.85	0.15	0.43	5.00	0.00	2.62	2.62
13.90	0.15	0.43	5.00	0.00	2.62	2.62
13.95	0.15	0.43	5.00	0.00	2.61	2.61
14.00	0.15	0.43	5.00	0.00	2.60	2.60
14.05	0.15	0.43	5.00	0.00	2.59	2.59
14.10	0.14	0.43	5.00	0.00	2.59	2.59
14.15	0.14	0.43	5.00	0.00	2.58	2.58
14.20	0.14	0.43	5.00	0.00	2.57	2.57
14.25	0.14	0.43	5.00	0.00	2.56	2.56
14.30	0.14	0.43	5.00	0.00	2.55	2.55
14.35	0.14	0.43	5.00	0.00	2.54	2.54
14.40	0.14	0.43	5.00	0.00	2.53	2.53
14.45	0.14	0.43	5.00	0.00	2.53	2.53
14.50	0.14	0.43	5.00	0.00	2.52	2.52
14.55	0.14	0.43	5.00	0.00	2.51	2.51
14.60	0.14	0.43	5.00	0.00	2.50	2.50
14.65	0.14	0.43	5.00	0.00	2.49	2.49
14.70	0.14	0.43	5.00	0.00	2.48	2.48
14.75	0.14	0.43	5.00	0.00	2.47	2.47
14.80	0.15	0.43	5.00	0.00	2.46	2.46
14.85	0.15	0.43	5.00	0.00	2.45	2.45
14.90	0.15	0.43	5.00	0.00	2.44	2.44
14.95	0.15	0.43	5.00	0.00	2.43	2.43
15.00	0.15	0.43	5.00	0.00	2.42	2.42
15.05	0.15	0.43	5.00	0.00	2.41	2.41
15.10	0.15	0.43	5.00	0.00	2.41	2.41
15.15	0.15	0.43	5.00	0.00	2.40	2.40
15.20	0.15	0.43	5.00	0.00	2.39	2.39
15.25	0.15	0.43	5.00	0.00	2.38	2.38
15.30	0.15	0.43	5.00	0.00	2.37	2.37
15.35	0.15	0.43	5.00	0.00	2.36	2.36

Liquefy.sum						
15.40	0.16	0.43	5.00	0.00	2.36	2.36
15.45	0.16	0.43	5.00	0.00	2.35	2.35
15.50	0.16	0.43	5.00	0.00	2.34	2.34
15.55	0.16	0.43	5.00	0.00	2.33	2.33
15.60	0.16	0.43	5.00	0.00	2.33	2.33
15.65	0.16	0.43	5.00	0.00	2.32	2.32
15.70	0.16	0.43	5.00	0.00	2.31	2.31
15.75	0.16	0.43	5.00	0.00	2.30	2.30
15.80	0.16	0.43	5.00	0.00	2.30	2.30
15.85	0.16	0.43	5.00	0.00	2.29	2.29
15.90	0.16	0.43	5.00	0.00	2.28	2.28
15.95	0.16	0.43	5.00	0.00	2.27	2.27
16.00	0.16	0.43	5.00	0.00	2.27	2.27
16.05	0.17	0.43	5.00	0.00	2.26	2.26
16.10	0.17	0.43	5.00	0.00	2.25	2.25
16.15	0.17	0.43	5.00	0.00	2.24	2.24
16.20	0.17	0.43	5.00	0.00	2.24	2.24
16.25	0.17	0.43	5.00	0.00	2.23	2.23
16.30	0.17	0.43	5.00	0.00	2.22	2.22
16.35	0.17	0.43	5.00	0.00	2.22	2.22
16.40	0.17	0.43	5.00	0.00	2.21	2.21
16.45	0.17	0.43	5.00	0.00	2.20	2.20
16.50	0.17	0.43	5.00	0.00	2.20	2.20
16.55	0.17	0.43	5.00	0.00	2.19	2.19
16.60	0.17	0.43	5.00	0.00	2.18	2.18
16.65	0.17	0.43	5.00	0.00	2.18	2.18
16.70	0.17	0.43	5.00	0.00	2.17	2.17
16.75	0.17	0.43	5.00	0.00	2.16	2.16
16.80	0.18	0.43	5.00	0.00	2.16	2.16
16.85	0.18	0.43	5.00	0.00	2.15	2.15
16.90	0.18	0.43	5.00	0.00	2.14	2.14
16.95	0.18	0.43	5.00	0.00	2.14	2.14
17.00	0.18	0.43	5.00	0.00	2.13	2.13
17.05	0.18	0.43	5.00	0.00	2.12	2.12
17.10	0.18	0.43	5.00	0.00	2.12	2.12
17.15	0.18	0.43	5.00	0.00	2.11	2.11
17.20	0.18	0.43	5.00	0.00	2.10	2.10
17.25	0.18	0.43	5.00	0.00	2.10	2.10
17.30	0.18	0.43	5.00	0.00	2.09	2.09
17.35	0.18	0.43	5.00	0.00	2.08	2.08
17.40	0.18	0.43	5.00	0.00	2.08	2.08
17.45	0.18	0.43	5.00	0.00	2.07	2.07
17.50	0.18	0.43	5.00	0.00	2.07	2.07
17.55	0.18	0.43	5.00	0.00	2.06	2.06
17.60	0.18	0.43	5.00	0.00	2.05	2.05
17.65	0.18	0.43	5.00	0.00	2.05	2.05
17.70	0.18	0.43	5.00	0.00	2.04	2.04
17.75	0.19	0.43	5.00	0.00	2.03	2.03

Liquefy.sum

17.80	0.19	0.43	5.00	0.00	2.03	2.03
17.85	0.19	0.43	5.00	0.00	2.02	2.02
17.90	0.19	0.43	5.00	0.00	2.01	2.01
17.95	0.19	0.43	5.00	0.00	2.01	2.01
18.00	0.19	0.43	5.00	0.00	2.00	2.00
18.05	0.19	0.43	5.00	0.00	2.00	2.00
18.10	0.19	0.43	5.00	0.00	1.99	1.99
18.15	0.19	0.43	5.00	0.00	1.98	1.98
18.20	0.19	0.43	5.00	0.00	1.98	1.98
18.25	0.19	0.43	5.00	0.00	1.97	1.97
18.30	0.19	0.43	5.00	0.00	1.96	1.96
18.35	0.19	0.43	5.00	0.00	1.96	1.96
18.40	0.19	0.43	5.00	0.00	1.95	1.95
18.45	0.19	0.43	5.00	0.00	1.95	1.95
18.50	0.19	0.43	5.00	0.00	1.94	1.94
18.55	0.19	0.43	5.00	0.00	1.93	1.93
18.60	0.19	0.43	5.00	0.00	1.93	1.93
18.65	0.19	0.43	5.00	0.00	1.92	1.92
18.70	0.19	0.43	5.00	0.00	1.91	1.91
18.75	0.19	0.43	5.00	0.00	1.91	1.91
18.80	0.19	0.43	5.00	0.00	1.90	1.90
18.85	0.19	0.43	5.00	0.00	1.89	1.89
18.90	0.19	0.43	5.00	0.00	1.89	1.89
18.95	0.19	0.43	5.00	0.00	1.88	1.88
19.00	0.19	0.43	5.00	0.00	1.87	1.87
19.05	0.19	0.43	5.00	0.00	1.87	1.87
19.10	0.19	0.43	5.00	0.00	1.86	1.86
19.15	0.19	0.43	5.00	0.00	1.85	1.85
19.20	0.19	0.43	5.00	0.00	1.85	1.85
19.25	0.19	0.43	5.00	0.00	1.84	1.84
19.30	0.19	0.43	5.00	0.00	1.83	1.83
19.35	0.19	0.43	5.00	0.00	1.83	1.83
19.40	0.19	0.43	5.00	0.00	1.82	1.82
19.45	0.19	0.43	5.00	0.00	1.81	1.81
19.50	0.19	0.43	5.00	0.00	1.80	1.80
19.55	0.19	0.43	5.00	0.00	1.80	1.80
19.60	0.19	0.43	5.00	0.00	1.79	1.79
19.65	0.19	0.43	5.00	0.00	1.78	1.78
19.70	0.19	0.43	5.00	0.00	1.78	1.78
19.75	0.19	0.43	5.00	0.00	1.77	1.77
19.80	0.19	0.43	5.00	0.00	1.76	1.76
19.85	0.19	0.43	5.00	0.00	1.75	1.75
19.90	0.19	0.43	5.00	0.00	1.75	1.75
19.95	0.19	0.43	5.00	0.00	1.74	1.74
20.00	0.19	0.43	5.00	0.00	1.73	1.73
20.05	0.19	0.43	5.00	0.00	1.72	1.72
20.10	0.19	0.43	5.00	0.00	1.71	1.71
20.15	0.19	0.43	5.00	0.00	1.71	1.71

Liquefy.sum						
20.20	0.19	0.43	5.00	0.00	1.70	1.70
20.25	0.19	0.43	5.00	0.00	1.69	1.69
20.30	0.19	0.43	5.00	0.00	1.68	1.68
20.35	0.19	0.43	5.00	0.00	1.67	1.67
20.40	0.19	0.43	5.00	0.00	1.67	1.67
20.45	0.19	0.43	5.00	0.00	1.66	1.66
20.50	0.19	0.43	5.00	0.00	1.65	1.65
20.55	0.19	0.43	5.00	0.00	1.64	1.64
20.60	0.19	0.43	5.00	0.00	1.63	1.63
20.65	0.19	0.43	5.00	0.00	1.62	1.62
20.70	0.19	0.43	5.00	0.00	1.62	1.62
20.75	0.19	0.43	5.00	0.00	1.61	1.61
20.80	0.19	0.43	5.00	0.00	1.60	1.60
20.85	0.19	0.43	5.00	0.00	1.59	1.59
20.90	0.19	0.43	5.00	0.00	1.58	1.58
20.95	0.19	0.43	5.00	0.00	1.57	1.57
21.00	0.19	0.43	5.00	0.00	1.56	1.56
21.05	0.19	0.43	5.00	0.00	1.56	1.56
21.10	0.19	0.43	5.00	0.00	1.56	1.56
21.15	0.19	0.43	5.00	0.00	1.55	1.55
21.20	0.19	0.43	5.00	0.00	1.55	1.55
21.25	0.19	0.43	5.00	0.00	1.55	1.55
21.30	0.19	0.43	5.00	0.00	1.55	1.55
21.35	0.19	0.43	5.00	0.00	1.54	1.54
21.40	0.19	0.43	5.00	0.00	1.54	1.54
21.45	0.19	0.43	5.00	0.00	1.54	1.54
21.50	0.19	0.43	5.00	0.00	1.54	1.54
21.55	0.19	0.43	5.00	0.00	1.53	1.53
21.60	0.19	0.43	5.00	0.00	1.53	1.53
21.65	0.19	0.43	5.00	0.00	1.53	1.53
21.70	0.19	0.43	5.00	0.00	1.53	1.53
21.75	0.19	0.43	5.00	0.00	1.52	1.52
21.80	0.19	0.43	5.00	0.00	1.52	1.52
21.85	0.19	0.43	5.00	0.00	1.52	1.52
21.90	0.19	0.42	5.00	0.00	1.52	1.52
21.95	0.19	0.42	5.00	0.00	1.51	1.51
22.00	0.19	0.42	5.00	0.00	1.51	1.51
22.05	0.19	0.42	5.00	0.00	1.51	1.51
22.10	0.19	0.42	5.00	0.00	1.51	1.51
22.15	0.18	0.42	5.00	0.00	1.50	1.50
22.20	0.18	0.42	5.00	0.00	1.50	1.50
22.25	0.18	0.42	5.00	0.00	1.50	1.50
22.30	0.18	0.42	5.00	0.00	1.49	1.49
22.35	0.18	0.42	5.00	0.00	1.49	1.49
22.40	0.18	0.42	5.00	0.00	1.49	1.49
22.45	0.18	0.42	5.00	0.00	1.49	1.49
22.50	0.18	0.42	5.00	0.00	1.48	1.48
22.55	0.18	0.42	5.00	0.00	1.48	1.48



Liquefy.sum						
22.60	0.18	0.42	5.00	0.00	1.48	1.48
22.65	0.18	0.42	5.00	0.00	1.47	1.47
22.70	0.18	0.42	5.00	0.00	1.47	1.47
22.75	0.18	0.42	5.00	0.00	1.47	1.47
22.80	0.18	0.42	5.00	0.00	1.47	1.47
22.85	0.18	0.42	5.00	0.00	1.46	1.46
22.90	0.18	0.42	5.00	0.00	1.46	1.46
22.95	0.18	0.42	5.00	0.00	1.46	1.46
23.00	0.18	0.42	5.00	0.00	1.45	1.45
23.05	0.18	0.42	5.00	0.00	1.45	1.45
23.10	0.18	0.42	5.00	0.00	1.45	1.45
23.15	0.18	0.42	5.00	0.00	1.44	1.44
23.20	0.18	0.42	5.00	0.00	1.44	1.44
23.25	0.18	0.42	5.00	0.00	1.44	1.44
23.30	0.18	0.42	5.00	0.00	1.44	1.44
23.35	0.18	0.42	5.00	0.00	1.43	1.43
23.40	0.18	0.42	5.00	0.00	1.43	1.43
23.45	0.18	0.42	5.00	0.00	1.43	1.43
23.50	0.18	0.42	5.00	0.00	1.42	1.42
23.55	0.18	0.42	5.00	0.00	1.42	1.42
23.60	0.18	0.42	5.00	0.00	1.42	1.42
23.65	0.18	0.42	5.00	0.00	1.41	1.41
23.70	0.18	0.42	5.00	0.00	1.41	1.41
23.75	0.18	0.42	5.00	0.00	1.41	1.41
23.80	0.18	0.42	5.00	0.00	1.40	1.40
23.85	0.18	0.42	5.00	0.00	1.40	1.40
23.90	0.18	0.42	5.00	0.00	1.40	1.40
23.95	0.18	0.42	5.00	0.00	1.39	1.39
24.00	0.18	0.42	5.00	0.00	1.39	1.39
24.05	0.18	0.42	5.00	0.00	1.39	1.39
24.10	0.18	0.42	5.00	0.00	1.38	1.38
24.15	0.18	0.42	5.00	0.00	1.38	1.38
24.20	0.18	0.42	5.00	0.00	1.38	1.38
24.25	0.18	0.42	5.00	0.00	1.37	1.37
24.30	0.18	0.42	5.00	0.00	1.37	1.37
24.35	0.18	0.42	5.00	0.00	1.37	1.37
24.40	0.18	0.42	5.00	0.00	1.36	1.36
24.45	0.18	0.42	5.00	0.00	1.36	1.36
24.50	0.18	0.42	5.00	0.00	1.36	1.36
24.55	0.18	0.42	5.00	0.00	1.35	1.35
24.60	0.18	0.42	5.00	0.00	1.35	1.35
24.65	0.18	0.42	5.00	0.00	1.34	1.34
24.70	0.18	0.42	5.00	0.00	1.34	1.34
24.75	0.18	0.42	5.00	0.00	1.34	1.34
24.80	0.18	0.42	5.00	0.00	1.33	1.33
24.85	0.18	0.42	5.00	0.00	1.33	1.33
24.90	0.18	0.42	5.00	0.00	1.33	1.33
24.95	0.18	0.42	5.00	0.00	1.32	1.32

Liquefy.sum

25.00	0.18	0.42	5.00	0.00	1.32	1.32
25.05	0.18	0.42	5.00	0.00	1.31	1.31
25.10	0.18	0.42	5.00	0.00	1.31	1.31
25.15	0.18	0.42	5.00	0.00	1.31	1.31
25.20	0.18	0.42	5.00	0.00	1.30	1.30
25.25	0.18	0.42	5.00	0.00	1.30	1.30
25.30	0.18	0.42	5.00	0.00	1.30	1.30
25.35	0.18	0.42	5.00	0.00	1.29	1.29
25.40	0.18	0.42	5.00	0.00	1.29	1.29
25.45	0.18	0.42	5.00	0.00	1.28	1.28
25.50	0.18	0.42	5.00	0.00	1.28	1.28
25.55	0.18	0.42	5.00	0.00	1.28	1.28
25.60	0.18	0.42	5.00	0.00	1.27	1.27
25.65	0.18	0.42	5.00	0.00	1.27	1.27
25.70	0.18	0.42	5.00	0.00	1.27	1.27
25.75	0.18	0.42	5.00	0.00	1.26	1.26
25.80	0.18	0.42	5.00	0.00	1.26	1.26
25.85	0.18	0.42	5.00	0.00	1.25	1.25
25.90	0.18	0.42	5.00	0.00	1.25	1.25
25.95	0.18	0.42	5.00	0.00	1.25	1.25
26.00	0.18	0.42	5.00	0.00	1.24	1.24
26.05	0.18	0.42	5.00	0.00	1.24	1.24
26.10	0.18	0.42	5.00	0.00	1.24	1.24
26.15	0.18	0.42	5.00	0.00	1.23	1.23
26.20	0.18	0.42	5.00	0.00	1.23	1.23
26.25	0.18	0.42	5.00	0.00	1.23	1.23
26.30	0.18	0.42	5.00	0.00	1.22	1.22
26.35	0.18	0.42	5.00	0.00	1.22	1.22
26.40	0.19	0.42	5.00	0.00	1.21	1.21
26.45	0.19	0.42	5.00	0.00	1.21	1.21
26.50	0.19	0.42	5.00	0.00	1.21	1.21
26.55	0.19	0.42	5.00	0.00	1.20	1.20
26.60	0.19	0.42	5.00	0.00	1.20	1.20
26.65	0.19	0.42	5.00	0.00	1.20	1.20
26.70	0.19	0.42	5.00	0.00	1.19	1.19
26.75	0.19	0.42	5.00	0.00	1.19	1.19
26.80	0.19	0.42	5.00	0.00	1.18	1.18
26.85	0.19	0.42	5.00	0.00	1.18	1.18
26.90	0.19	0.42	5.00	0.00	1.18	1.18
26.95	0.19	0.42	5.00	0.00	1.17	1.17
27.00	0.19	0.42	5.00	0.00	1.17	1.17
27.05	0.19	0.42	5.00	0.00	1.17	1.17
27.10	0.19	0.42	5.00	0.00	1.16	1.16
27.15	0.19	0.42	5.00	0.00	1.16	1.16
27.20	0.19	0.42	5.00	0.00	1.16	1.16
27.25	0.19	0.42	5.00	0.00	1.15	1.15
27.30	0.19	0.42	5.00	0.00	1.15	1.15
27.35	0.19	0.42	5.00	0.00	1.14	1.14

Liquefy.sum						
27.40	0.19	0.42	5.00	0.00	1.14	1.14
27.45	0.19	0.42	5.00	0.00	1.14	1.14
27.50	0.19	0.42	5.00	0.00	1.13	1.13
27.55	0.19	0.42	5.00	0.00	1.13	1.13
27.60	0.19	0.42	5.00	0.00	1.13	1.13
27.65	0.19	0.42	5.00	0.00	1.12	1.12
27.70	0.19	0.42	5.00	0.00	1.12	1.12
27.75	0.19	0.42	5.00	0.00	1.12	1.12
27.80	0.19	0.42	5.00	0.00	1.11	1.11
27.85	0.19	0.42	5.00	0.00	1.11	1.11
27.90	0.20	0.42	5.00	0.00	1.11	1.11
27.95	0.20	0.42	5.00	0.00	1.10	1.10
28.00	0.20	0.42	5.00	0.00	1.10	1.10
28.05	0.20	0.42	5.00	0.00	1.10	1.10
28.10	0.20	0.42	5.00	0.00	1.09	1.09
28.15	0.20	0.42	5.00	0.00	1.09	1.09
28.20	0.21	0.42	5.00	0.00	1.09	1.09
28.25	0.21	0.42	5.00	0.00	1.08	1.08
28.30	0.21	0.42	5.00	0.00	1.08	1.08
28.35	0.21	0.42	5.00	0.00	1.08	1.08
28.40	0.21	0.42	5.00	0.00	1.07	1.07
28.45	0.21	0.42	5.00	0.00	1.07	1.07
28.50	0.21	0.42	5.00	0.00	1.07	1.07
28.55	0.21	0.42	5.00	0.00	1.06	1.06
28.60	0.21	0.42	5.00	0.00	1.06	1.06
28.65	0.21	0.42	5.00	0.00	1.06	1.06
28.70	0.21	0.42	5.00	0.00	1.05	1.05
28.75	0.21	0.42	5.00	0.00	1.05	1.05
28.80	0.21	0.42	5.00	0.00	1.05	1.05
28.85	0.21	0.42	5.00	0.00	1.04	1.04
28.90	0.21	0.42	5.00	0.00	1.04	1.04
28.95	0.21	0.42	5.00	0.00	1.04	1.04
29.00	0.21	0.42	5.00	0.00	1.03	1.03
29.05	0.21	0.42	5.00	0.00	1.03	1.03
29.10	0.21	0.42	5.00	0.00	1.03	1.03
29.15	0.21	0.42	5.00	0.00	1.02	1.02
29.20	0.21	0.42	5.00	0.00	1.02	1.02
29.25	0.21	0.42	5.00	0.00	1.02	1.02
29.30	0.21	0.42	5.00	0.00	1.01	1.01
29.35	0.21	0.42	5.00	0.00	1.01	1.01
29.40	0.21	0.42	5.00	0.00	1.01	1.01
29.45	0.21	0.42	5.00	0.00	1.01	1.01
29.50	0.21	0.42	5.00	0.00	1.00	1.00
29.55	0.21	0.42	5.00	0.00	1.00	1.00
29.60	0.21	0.42	5.00	0.00	1.00	1.00
29.65	0.21	0.42	5.00	0.00	0.99	0.99
29.70	0.21	0.42	5.00	0.00	0.99	0.99
29.75	0.21	0.42	5.00	0.00	0.99	0.99

Liquefy.sum

29.80	0.21	0.42	5.00	0.00	0.98	0.98
29.85	0.21	0.42	5.00	0.00	0.98	0.98
29.90	0.21	0.42	5.00	0.00	0.98	0.98
29.95	0.22	0.42	5.00	0.00	0.97	0.97
30.00	0.22	0.42	5.00	0.00	0.97	0.97
30.05	0.22	0.42	5.00	0.00	0.97	0.97
30.10	0.22	0.42	5.00	0.00	0.96	0.96
30.15	0.22	0.42	5.00	0.00	0.96	0.96
30.20	0.22	0.42	5.00	0.00	0.96	0.96
30.25	0.22	0.42	5.00	0.00	0.96	0.96
30.30	0.22	0.42	5.00	0.00	0.95	0.95
30.35	0.22	0.42	5.00	0.00	0.95	0.95
30.40	0.22	0.41	5.00	0.00	0.95	0.95
30.45	0.23	0.41	5.00	0.00	0.94	0.94
30.50	0.23	0.41	5.00	0.00	0.94	0.94
30.55	0.23	0.41	5.00	0.00	0.94	0.94
30.60	0.23	0.41	5.00	0.00	0.93	0.93
30.65	0.23	0.41	5.00	0.00	0.93	0.93
30.70	0.23	0.41	5.00	0.00	0.93	0.93
30.75	0.23	0.41	5.00	0.00	0.93	0.93
30.80	0.23	0.41	5.00	0.00	0.92	0.92
30.85	0.24	0.41	5.00	0.00	0.92	0.92
30.90	0.24	0.41	5.00	0.00	0.92	0.92
30.95	0.24	0.41	5.00	0.00	0.92	0.92
31.00	0.24	0.41	5.00	0.00	0.91	0.91
31.05	0.24	0.41	5.00	0.00	0.91	0.91
31.10	0.24	0.41	5.00	0.00	0.91	0.91
31.15	0.24	0.41	5.00	0.00	0.91	0.91
31.20	0.24	0.41	5.00	0.00	0.90	0.90
31.25	0.25	0.41	5.00	0.00	0.90	0.90
31.30	0.25	0.41	5.00	0.00	0.90	0.90
31.35	0.25	0.41	5.00	0.00	0.90	0.90
31.40	0.25	0.41	5.00	0.00	0.89	0.89
31.45	0.25	0.41	5.00	0.00	0.89	0.89
31.50	0.25	0.41	5.00	0.00	0.89	0.89
31.55	0.25	0.41	5.00	0.00	0.89	0.89
31.60	0.26	0.41	5.00	0.00	0.88	0.88
31.65	0.26	0.41	5.00	0.00	0.88	0.88
31.70	0.26	0.41	5.00	0.00	0.88	0.88
31.75	0.26	0.41	5.00	0.00	0.88	0.88
31.80	0.26	0.41	5.00	0.00	0.87	0.87
31.85	0.26	0.41	5.00	0.00	0.87	0.87
31.90	0.26	0.41	5.00	0.00	0.87	0.87
31.95	0.26	0.41	5.00	0.00	0.87	0.87
32.00	0.26	0.41	5.00	0.00	0.87	0.87
32.05	0.26	0.41	5.00	0.00	0.86	0.86
32.10	0.26	0.41	5.00	0.00	0.86	0.86
32.15	0.26	0.41	5.00	0.00	0.86	0.86

Liquefy.sum

32.20	0.26	0.41	5.00	0.00	0.86	0.86
32.25	0.26	0.41	5.00	0.00	0.85	0.85
32.30	0.26	0.41	5.00	0.00	0.85	0.85
32.35	0.26	0.41	5.00	0.00	0.85	0.85
32.40	0.26	0.41	5.00	0.00	0.85	0.85
32.45	0.26	0.41	5.00	0.00	0.84	0.84
32.50	0.26	0.41	5.00	0.00	0.84	0.84
32.55	0.27	0.41	5.00	0.00	0.84	0.84
32.60	0.27	0.41	5.00	0.00	0.84	0.84
32.65	0.27	0.41	5.00	0.00	0.84	0.84
32.70	0.27	0.41	5.00	0.00	0.83	0.83
32.75	0.27	0.41	5.00	0.00	0.83	0.83
32.80	0.27	0.41	5.00	0.00	0.83	0.83
32.85	0.27	0.41	5.00	0.00	0.83	0.83
32.90	0.27	0.41	5.00	0.00	0.82	0.82
32.95	0.27	0.41	5.00	0.00	0.82	0.82
33.00	0.27	0.41	5.00	0.00	0.82	0.82
33.05	0.27	0.41	5.00	0.00	0.82	0.82
33.10	0.27	0.41	5.00	0.00	0.82	0.82
33.15	0.27	0.40	5.00	0.00	0.81	0.81
33.20	0.27	0.40	5.00	0.00	0.81	0.81
33.25	0.27	0.40	5.00	0.00	0.81	0.81
33.30	0.27	0.40	5.00	0.00	0.81	0.81
33.35	0.27	0.40	5.00	0.00	0.80	0.80
33.40	0.27	0.40	5.00	0.00	0.80	0.80
33.45	0.27	0.40	5.00	0.00	0.80	0.80
33.50	0.27	0.40	5.00	0.00	0.80	0.80
33.55	0.27	0.40	5.00	0.00	0.80	0.80
33.60	0.27	0.40	5.00	0.00	0.79	0.79
33.65	0.27	0.40	5.00	0.00	0.79	0.79
33.70	0.27	0.40	5.00	0.00	0.79	0.79
33.75	0.27	0.40	5.00	0.00	0.79	0.79
33.80	0.27	0.40	5.00	0.00	0.78	0.78
33.85	0.27	0.40	5.00	0.00	0.78	0.78
33.90	0.27	0.40	5.00	0.00	0.78	0.78
33.95	0.27	0.40	5.00	0.00	0.78	0.78
34.00	0.27	0.40	5.00	0.00	0.78	0.78
34.05	0.27	0.40	5.00	0.00	0.77	0.77
34.10	0.27	0.40	5.00	0.00	0.77	0.77
34.15	0.27	0.40	5.00	0.00	0.77	0.77
34.20	0.27	0.40	5.00	0.00	0.77	0.77
34.25	0.27	0.40	5.00	0.00	0.76	0.76
34.30	0.27	0.40	5.00	0.00	0.76	0.76
34.35	0.27	0.40	5.00	0.00	0.76	0.76
34.40	0.27	0.40	5.00	0.00	0.76	0.76
34.45	0.27	0.40	5.00	0.00	0.76	0.76
34.50	0.27	0.40	5.00	0.00	0.75	0.75
34.55	0.27	0.40	5.00	0.00	0.75	0.75

Liquefy.sum

34.60	0.27	0.40	5.00	0.00	0.75	0.75
34.65	0.26	0.40	5.00	0.00	0.75	0.75
34.70	0.26	0.40	5.00	0.00	0.74	0.74
34.75	0.26	0.40	5.00	0.00	0.74	0.74
34.80	0.26	0.40	5.00	0.00	0.74	0.74
34.85	0.26	0.40	5.00	0.00	0.74	0.74
34.90	0.26	0.40	5.00	0.00	0.73	0.73
34.95	0.26	0.40	5.00	0.00	0.73	0.73
35.00	0.26	0.40	5.00	0.00	0.73	0.73
35.05	0.26	0.40	5.00	0.00	0.73	0.73
35.10	0.26	0.40	5.00	0.00	0.72	0.72
35.15	0.26	0.40	5.00	0.00	0.72	0.72
35.20	0.26	0.40	5.00	0.00	0.72	0.72
35.25	0.26	0.40	5.00	0.00	0.72	0.72
35.30	0.26	0.40	5.00	0.00	0.72	0.72
35.35	0.26	0.40	5.00	0.00	0.71	0.71
35.40	0.26	0.40	5.00	0.00	0.71	0.71
35.45	0.26	0.40	5.00	0.00	0.71	0.71
35.50	0.26	0.40	5.00	0.00	0.71	0.71
35.55	0.26	0.40	5.00	0.00	0.70	0.70
35.60	0.26	0.40	5.00	0.00	0.70	0.70
35.65	0.26	0.40	5.00	0.00	0.70	0.70
35.70	0.26	0.40	5.00	0.00	0.70	0.70
35.75	0.26	0.40	5.00	0.00	0.69	0.69
35.80	0.26	0.40	5.00	0.00	0.69	0.69
35.85	0.26	0.40	5.00	0.00	0.69	0.69
35.90	0.26	0.39	5.00	0.00	0.69	0.69
35.95	0.26	0.39	5.00	0.00	0.68	0.68
36.00	0.26	0.39	5.00	0.00	0.68	0.68
36.05	0.26	0.39	5.00	0.00	0.68	0.68
36.10	0.26	0.39	5.00	0.00	0.68	0.68
36.15	0.26	0.39	5.00	0.00	0.67	0.67
36.20	0.26	0.39	5.00	0.00	0.67	0.67
36.25	0.26	0.39	5.00	0.00	0.67	0.67
36.30	0.26	0.39	5.00	0.00	0.67	0.67
36.35	0.26	0.39	5.00	0.00	0.67	0.67
36.40	0.26	0.39	5.00	0.00	0.66	0.66
36.45	0.26	0.39	5.00	0.00	0.66	0.66
36.50	0.26	0.39	5.00	0.00	0.66	0.66
36.55	0.26	0.39	5.00	0.00	0.66	0.66
36.60	0.26	0.39	5.00	0.00	0.65	0.65
36.65	0.26	0.39	5.00	0.00	0.65	0.65
36.70	0.26	0.39	5.00	0.00	0.65	0.65
36.75	0.26	0.39	5.00	0.00	0.65	0.65
36.80	0.25	0.39	5.00	0.00	0.64	0.64
36.85	0.25	0.39	5.00	0.00	0.64	0.64
36.90	0.25	0.39	5.00	0.00	0.64	0.64
36.95	0.25	0.39	5.00	0.00	0.64	0.64

Liquefy.sum

37.00	0.25	0.39	5.00	0.00	0.63	0.63
37.05	0.25	0.39	5.00	0.00	0.63	0.63
37.10	0.25	0.39	5.00	0.00	0.63	0.63
37.15	0.25	0.39	5.00	0.00	0.63	0.63
37.20	0.25	0.39	5.00	0.00	0.62	0.62
37.25	0.25	0.39	5.00	0.00	0.62	0.62
37.30	0.25	0.39	5.00	0.00	0.62	0.62
37.35	0.25	0.39	5.00	0.00	0.61	0.61
37.40	0.25	0.39	5.00	0.00	0.61	0.61
37.45	0.25	0.39	5.00	0.00	0.61	0.61
37.50	0.25	0.39	5.00	0.00	0.61	0.61
37.55	0.25	0.39	5.00	0.00	0.60	0.60
37.60	0.25	0.39	5.00	0.00	0.60	0.60
37.65	0.25	0.39	5.00	0.00	0.60	0.60
37.70	0.24	0.39	5.00	0.00	0.60	0.60
37.75	0.24	0.39	5.00	0.00	0.59	0.59
37.80	0.24	0.39	5.00	0.00	0.59	0.59
37.85	0.24	0.39	5.00	0.00	0.59	0.59
37.90	0.24	0.39	5.00	0.00	0.59	0.59
37.95	0.24	0.39	5.00	0.00	0.58	0.58
38.00	0.24	0.39	5.00	0.00	0.58	0.58
38.05	0.24	0.39	5.00	0.00	0.58	0.58
38.10	0.24	0.39	5.00	0.00	0.57	0.57
38.15	0.24	0.39	5.00	0.00	0.57	0.57
38.20	0.24	0.39	5.00	0.00	0.57	0.57
38.25	0.24	0.39	5.00	0.00	0.57	0.57
38.30	0.24	0.39	5.00	0.00	0.56	0.56
38.35	0.24	0.39	5.00	0.00	0.56	0.56
38.40	0.24	0.39	5.00	0.00	0.56	0.56
38.45	0.23	0.39	5.00	0.00	0.55	0.55
38.50	0.23	0.39	5.00	0.00	0.55	0.55
38.55	0.23	0.39	5.00	0.00	0.55	0.55
38.60	0.23	0.39	5.00	0.00	0.55	0.55
38.65	0.23	0.38	5.00	0.00	0.54	0.54
38.70	0.23	0.38	5.00	0.00	0.54	0.54
38.75	0.23	0.38	5.00	0.00	0.54	0.54
38.80	0.22	0.38	5.00	0.00	0.53	0.53
38.85	0.22	0.38	5.00	0.00	0.53	0.53
38.90	0.22	0.38	5.00	0.00	0.53	0.53
38.95	0.22	0.38	5.00	0.00	0.52	0.52
39.00	0.22	0.38	5.00	0.00	0.52	0.52
39.05	0.22	0.38	5.00	0.00	0.52	0.52
39.10	0.22	0.38	5.00	0.00	0.51	0.51
39.15	0.22	0.38	5.00	0.00	0.51	0.51
39.20	0.21	0.38	5.00	0.00	0.51	0.51
39.25	0.21	0.38	5.00	0.00	0.50	0.50
39.30	0.21	0.38	5.00	0.00	0.50	0.50
39.35	0.21	0.38	5.00	0.00	0.50	0.50

Liquefy.sum

39.40	0.21	0.38	5.00	0.00	0.49	0.49
39.45	0.21	0.38	5.00	0.00	0.49	0.49
39.50	0.21	0.38	5.00	0.00	0.49	0.49
39.55	0.21	0.38	5.00	0.00	0.48	0.48
39.60	0.20	0.38	5.00	0.00	0.48	0.48
39.65	0.20	0.38	5.00	0.00	0.47	0.47
39.70	0.20	0.38	5.00	0.00	0.47	0.47
39.75	0.20	0.38	5.00	0.00	0.47	0.47
39.80	0.20	0.38	5.00	0.00	0.46	0.46
39.85	0.20	0.38	5.00	0.00	0.46	0.46
39.90	0.20	0.38	5.00	0.00	0.45	0.45
39.95	0.20	0.38	5.00	0.00	0.45	0.45
40.00	0.20	0.38	5.00	0.00	0.45	0.45
40.05	0.20	0.38	5.00	0.00	0.44	0.44
40.10	0.20	0.38	5.00	0.00	0.44	0.44
40.15	0.20	0.38	5.00	0.00	0.43	0.43
40.20	0.20	0.38	5.00	0.00	0.43	0.43
40.25	0.20	0.38	5.00	0.00	0.43	0.43
40.30	0.20	0.38	5.00	0.00	0.42	0.42
40.35	0.20	0.38	5.00	0.00	0.42	0.42
40.40	0.20	0.38	5.00	0.00	0.41	0.41
40.45	0.20	0.38	5.00	0.00	0.41	0.41
40.50	0.20	0.38	5.00	0.00	0.41	0.41
40.55	0.21	0.38	5.00	0.00	0.40	0.40
40.60	0.21	0.38	5.00	0.00	0.40	0.40
40.65	0.21	0.38	5.00	0.00	0.39	0.39
40.70	0.21	0.38	5.00	0.00	0.39	0.39
40.75	0.21	0.38	5.00	0.00	0.39	0.39
40.80	0.21	0.38	5.00	0.00	0.38	0.38
40.85	0.21	0.38	5.00	0.00	0.38	0.38
40.90	0.21	0.38	5.00	0.00	0.38	0.38
40.95	0.21	0.38	5.00	0.00	0.37	0.37
41.00	0.21	0.38	5.00	0.00	0.37	0.37
41.05	0.21	0.38	5.00	0.00	0.37	0.37
41.10	0.22	0.38	5.00	0.00	0.36	0.36
41.15	0.22	0.38	5.00	0.00	0.36	0.36
41.20	0.22	0.38	5.00	0.00	0.36	0.36
41.25	0.22	0.38	5.00	0.00	0.36	0.36
41.30	0.22	0.38	5.00	0.00	0.36	0.36
41.35	0.22	0.38	5.00	0.00	0.36	0.36
41.40	0.22	0.37	5.00	0.00	0.35	0.35
41.45	0.22	0.37	5.00	0.00	0.35	0.35
41.50	0.22	0.37	5.00	0.00	0.35	0.35
41.55	0.22	0.37	5.00	0.00	0.35	0.35
41.60	0.23	0.37	5.00	0.00	0.35	0.35
41.65	0.23	0.37	5.00	0.00	0.35	0.35
41.70	0.23	0.37	5.00	0.00	0.34	0.34
41.75	0.23	0.37	5.00	0.00	0.34	0.34



Liquefy.sum

41.80	0.23	0.37	5.00	0.00	0.34	0.34
41.85	0.23	0.37	5.00	0.00	0.34	0.34
41.90	0.23	0.37	5.00	0.00	0.34	0.34
41.95	0.23	0.37	5.00	0.00	0.34	0.34
42.00	0.23	0.37	5.00	0.00	0.33	0.33
42.05	0.23	0.37	5.00	0.00	0.33	0.33
42.10	0.24	0.37	5.00	0.00	0.33	0.33
42.15	0.24	0.37	5.00	0.00	0.33	0.33
42.20	0.24	0.37	5.00	0.00	0.33	0.33
42.25	0.24	0.37	5.00	0.00	0.33	0.33
42.30	0.24	0.37	5.00	0.00	0.32	0.32
42.35	0.24	0.37	5.00	0.00	0.32	0.32
42.40	0.24	0.37	5.00	0.00	0.32	0.32
42.45	0.24	0.37	5.00	0.00	0.32	0.32
42.50	0.24	0.37	5.00	0.00	0.32	0.32
42.55	0.25	0.37	5.00	0.00	0.32	0.32
42.60	0.25	0.37	5.00	0.00	0.32	0.32
42.65	0.25	0.37	5.00	0.00	0.31	0.31
42.70	0.25	0.37	5.00	0.00	0.31	0.31
42.75	0.25	0.37	5.00	0.00	0.31	0.31
42.80	0.25	0.37	5.00	0.00	0.31	0.31
42.85	0.25	0.37	5.00	0.00	0.31	0.31
42.90	0.25	0.37	5.00	0.00	0.31	0.31
42.95	0.26	0.37	5.00	0.00	0.31	0.31
43.00	0.26	0.37	5.00	0.00	0.30	0.30
43.05	0.26	0.37	5.00	0.00	0.30	0.30
43.10	0.26	0.37	5.00	0.00	0.30	0.30
43.15	0.26	0.37	5.00	0.00	0.30	0.30
43.20	0.26	0.37	5.00	0.00	0.30	0.30
43.25	0.26	0.37	5.00	0.00	0.30	0.30
43.30	0.26	0.37	5.00	0.00	0.30	0.30
43.35	0.27	0.37	5.00	0.00	0.30	0.30
43.40	0.27	0.37	5.00	0.00	0.29	0.29
43.45	0.27	0.37	5.00	0.00	0.29	0.29
43.50	0.27	0.37	5.00	0.00	0.29	0.29
43.55	0.27	0.37	5.00	0.00	0.29	0.29
43.60	0.27	0.37	5.00	0.00	0.29	0.29
43.65	0.27	0.37	5.00	0.00	0.29	0.29
43.70	0.28	0.37	5.00	0.00	0.29	0.29
43.75	0.28	0.37	5.00	0.00	0.29	0.29
43.80	0.28	0.37	5.00	0.00	0.28	0.28
43.85	0.28	0.37	5.00	0.00	0.28	0.28
43.90	0.28	0.37	5.00	0.00	0.28	0.28
43.95	0.28	0.37	5.00	0.00	0.28	0.28
44.00	0.29	0.37	5.00	0.00	0.28	0.28
44.05	0.29	0.37	5.00	0.00	0.28	0.28
44.10	0.29	0.37	5.00	0.00	0.28	0.28
44.15	0.29	0.36	5.00	0.00	0.28	0.28

Liquefy.sum

44.20	0.29	0.36	5.00	0.00	0.27	0.27
44.25	0.30	0.36	5.00	0.00	0.27	0.27
44.30	0.30	0.36	5.00	0.00	0.27	0.27
44.35	0.30	0.36	5.00	0.00	0.27	0.27
44.40	0.30	0.36	5.00	0.00	0.27	0.27
44.45	0.31	0.36	5.00	0.00	0.27	0.27
44.50	0.31	0.36	5.00	0.00	0.27	0.27
44.55	0.31	0.36	5.00	0.00	0.27	0.27
44.60	0.32	0.36	5.00	0.00	0.26	0.26
44.65	0.32	0.36	5.00	0.00	0.26	0.26
44.70	0.32	0.36	5.00	0.00	0.26	0.26
44.75	0.33	0.36	5.00	0.00	0.26	0.26
44.80	0.33	0.36	5.00	0.00	0.26	0.26
44.85	0.34	0.36	5.00	0.00	0.26	0.26
44.90	0.34	0.36	5.00	0.00	0.26	0.26
44.95	0.35	0.36	5.00	0.00	0.26	0.26
45.00	0.36	0.36	5.00	0.00	0.26	0.26
45.05	0.35	0.36	5.00	0.00	0.26	0.26
45.10	0.34	0.36	5.00	0.00	0.25	0.25
45.15	0.33	0.36	5.00	0.00	0.25	0.25
45.20	0.32	0.36	5.00	0.00	0.25	0.25
45.25	0.32	0.36	5.00	0.00	0.25	0.25
45.30	0.31	0.36	5.00	0.00	0.25	0.25
45.35	0.31	0.36	5.00	0.00	0.25	0.25
45.40	0.30	0.36	5.00	0.00	0.25	0.25
45.45	0.30	0.36	5.00	0.00	0.25	0.25
45.50	0.30	0.36	5.00	0.00	0.25	0.25
45.55	0.29	0.36	5.00	0.00	0.24	0.24
45.60	0.29	0.36	5.00	0.00	0.24	0.24
45.65	0.29	0.36	5.00	0.00	0.24	0.24
45.70	0.29	0.36	5.00	0.00	0.24	0.24
45.75	0.28	0.36	5.00	0.00	0.24	0.24
45.80	0.28	0.36	5.00	0.00	0.24	0.24
45.85	0.28	0.36	5.00	0.00	0.24	0.24
45.90	0.27	0.36	5.00	0.00	0.24	0.24
45.95	0.27	0.36	5.00	0.00	0.23	0.23
46.00	0.27	0.36	5.00	0.00	0.23	0.23
46.05	0.27	0.36	5.00	0.00	0.23	0.23
46.10	0.27	0.36	5.00	0.00	0.23	0.23
46.15	0.26	0.36	5.00	0.00	0.23	0.23
46.20	0.26	0.36	5.00	0.00	0.23	0.23
46.25	0.26	0.36	5.00	0.00	0.23	0.23
46.30	0.26	0.36	5.00	0.00	0.23	0.23
46.35	0.26	0.36	5.00	0.00	0.22	0.22
46.40	0.25	0.36	5.00	0.00	0.22	0.22
46.45	0.25	0.36	5.00	0.00	0.22	0.22
46.50	0.25	0.36	5.00	0.00	0.22	0.22
46.55	0.25	0.36	5.00	0.00	0.22	0.22

Liquefy.sum

46.60	0.25	0.36	5.00	0.00	0.22	0.22
46.65	0.25	0.36	5.00	0.00	0.22	0.22
46.70	0.24	0.36	5.00	0.00	0.21	0.21
46.75	0.24	0.36	5.00	0.00	0.21	0.21
46.80	0.24	0.36	5.00	0.00	0.21	0.21
46.85	0.24	0.36	5.00	0.00	0.21	0.21
46.90	0.24	0.35	5.00	0.00	0.21	0.21
46.95	0.24	0.35	5.00	0.00	0.21	0.21
47.00	0.23	0.35	5.00	0.00	0.21	0.21
47.05	0.23	0.35	5.00	0.00	0.20	0.20
47.10	0.23	0.35	5.00	0.00	0.20	0.20
47.15	0.23	0.35	5.00	0.00	0.20	0.20
47.20	0.23	0.35	5.00	0.00	0.20	0.20
47.25	0.23	0.35	5.00	0.00	0.20	0.20
47.30	0.23	0.35	5.00	0.00	0.20	0.20
47.35	0.22	0.35	5.00	0.00	0.19	0.19
47.40	0.22	0.35	5.00	0.00	0.19	0.19
47.45	0.22	0.35	5.00	0.00	0.19	0.19
47.50	0.22	0.35	5.00	0.00	0.19	0.19
47.55	0.22	0.35	5.00	0.00	0.19	0.19
47.60	0.22	0.35	5.00	0.00	0.19	0.19
47.65	0.22	0.35	5.00	0.00	0.18	0.18
47.70	0.21	0.35	5.00	0.00	0.18	0.18
47.75	0.21	0.35	5.00	0.00	0.18	0.18
47.80	0.21	0.35	5.00	0.00	0.18	0.18
47.85	0.21	0.35	5.00	0.00	0.18	0.18
47.90	0.21	0.35	5.00	0.00	0.18	0.18
47.95	0.21	0.35	5.00	0.00	0.17	0.17
48.00	0.21	0.35	5.00	0.00	0.17	0.17
48.05	0.21	0.35	5.00	0.00	0.17	0.17
48.10	0.20	0.35	5.00	0.00	0.17	0.17
48.15	0.20	0.35	5.00	0.00	0.17	0.17
48.20	0.20	0.35	5.00	0.00	0.17	0.17
48.25	0.20	0.35	5.00	0.00	0.16	0.16
48.30	0.20	0.35	5.00	0.00	0.16	0.16
48.35	0.20	0.35	5.00	0.00	0.16	0.16
48.40	0.20	0.35	5.00	0.00	0.16	0.16
48.45	0.20	0.35	5.00	0.00	0.16	0.16
48.50	0.20	0.35	5.00	0.00	0.15	0.15
48.55	0.19	0.35	5.00	0.00	0.15	0.15
48.60	0.19	0.35	5.00	0.00	0.15	0.15
48.65	0.19	0.35	5.00	0.00	0.15	0.15
48.70	0.19	0.35	5.00	0.00	0.15	0.15
48.75	0.19	0.35	5.00	0.00	0.14	0.14
48.80	0.19	0.35	5.00	0.00	0.14	0.14
48.85	0.19	0.35	5.00	0.00	0.14	0.14
48.90	0.19	0.35	5.00	0.00	0.14	0.14
48.95	0.19	0.35	5.00	0.00	0.13	0.13

Liquefy.sum

49.00	0.18	0.35	5.00	0.00	0.13	0.13
49.05	0.18	0.35	5.00	0.00	0.13	0.13
49.10	0.18	0.35	5.00	0.00	0.13	0.13
49.15	0.18	0.35	5.00	0.00	0.13	0.13
49.20	0.18	0.35	5.00	0.00	0.12	0.12
49.25	0.18	0.35	5.00	0.00	0.12	0.12
49.30	0.18	0.35	5.00	0.00	0.12	0.12
49.35	0.18	0.35	5.00	0.00	0.12	0.12
49.40	0.18	0.35	5.00	0.00	0.11	0.11
49.45	0.18	0.35	5.00	0.00	0.11	0.11
49.50	0.17	0.35	5.00	0.00	0.11	0.11
49.55	0.17	0.35	5.00	0.00	0.11	0.11
49.60	0.17	0.35	5.00	0.00	0.10	0.10
49.65	0.17	0.34	5.00	0.00	0.10	0.10
49.70	0.17	0.34	5.00	0.00	0.10	0.10
49.75	0.17	0.34	5.00	0.00	0.10	0.10
49.80	0.17	0.34	5.00	0.00	0.09	0.09
49.85	0.17	0.34	5.00	0.00	0.09	0.09
49.90	0.17	0.34	5.00	0.00	0.09	0.09
49.95	0.17	0.34	5.00	0.00	0.09	0.09
50.00	0.17	0.34	5.00	0.00	0.08	0.08
50.05	0.16	0.34	5.00	0.00	0.08	0.08
50.10	0.16	0.34	5.00	0.00	0.08	0.08
50.15	0.16	0.34	5.00	0.00	0.08	0.08
50.20	0.16	0.34	5.00	0.00	0.07	0.07
50.25	0.16	0.34	5.00	0.00	0.07	0.07
50.30	0.16	0.34	5.00	0.00	0.07	0.07
50.35	0.16	0.34	5.00	0.00	0.06	0.06
50.40	0.16	0.34	5.00	0.00	0.06	0.06
50.45	0.16	0.34	5.00	0.00	0.06	0.06
50.50	0.16	0.34	5.00	0.00	0.06	0.06
50.55	0.16	0.34	5.00	0.00	0.05	0.05
50.60	0.16	0.34	5.00	0.00	0.05	0.05
50.65	0.16	0.34	5.00	0.00	0.05	0.05
50.70	0.16	0.34	5.00	0.00	0.04	0.04
50.75	0.16	0.34	5.00	0.00	0.04	0.04
50.80	0.16	0.34	5.00	0.00	0.04	0.04
50.85	0.16	0.34	5.00	0.00	0.04	0.04
50.90	0.16	0.34	5.00	0.00	0.03	0.03
50.95	0.16	0.34	5.00	0.00	0.03	0.03
51.00	0.16	0.34	5.00	0.00	0.03	0.03
51.05	0.16	0.34	5.00	0.00	0.03	0.03
51.10	0.16	0.34	5.00	0.00	0.02	0.02
51.15	0.16	0.34	5.00	0.00	0.02	0.02
51.20	0.16	0.34	5.00	0.00	0.02	0.02
51.25	0.16	0.34	5.00	0.00	0.01	0.01
51.30	0.16	0.34	5.00	0.00	0.01	0.01
51.35	0.16	0.34	5.00	0.00	0.01	0.01

Liquefy.sum						
51.40	0.16	0.34	5.00	0.00	0.01	0.01
51.45	0.16	0.34	5.00	0.00	0.00	0.00
51.50	0.16	0.34	5.00	0.00	0.00	0.00

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\* F.S.<1, Liquefaction Potential Zone  
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

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1 atm (atmosphere) = 1 tsf (ton/ft<sup>2</sup>)  
CRRm                   Cyclic resistance ratio from soils  
CSRsf                   Cyclic stress ratio induced by a given earthquake (with  
user request factor of safety)  
F.S.                    Factor of Safety against liquefaction, F.S.=CRRm/CSRsf  
S\_sat                   Settlement from saturated sands  
S\_dry                   Settlement from Unsaturated Sands  
S\_all                   Total Settlement from Saturated and Unsaturated Sands  
NoLiq                   No-Liquefy Soils

Liquefy.sum

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LIQUEFACTION ANALYSIS SUMMARY

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Input File Name: N:\2018\18-81-145 RUSD, Madison E.S. Classroom  
Bldg\Settlement\BH-03.liq  
Title: Permanent Classroom Building  
Subtitle: Dynamic Settlement

Surface Elev.=828  
Hole No.=BH-03  
Depth of Hole= 51.50 ft  
Water Table during Earthquake= 52.00 ft  
Water Table during In-Situ Testing= 52.00 ft  
Max. Acceleration= 0.53 g  
Earthquake Magnitude= 7.88

Input Data:

Surface Elev.=828  
Hole No.=BH-03  
Depth of Hole=51.50 ft  
Water Table during Earthquake= 52.00 ft  
Water Table during In-Situ Testing= 52.00 ft  
Max. Acceleration=0.53 g  
Earthquake Magnitude=7.88  
No-Liquefiable Soils: CL, OL are Non-Liq. Soil

1. SPT or BPT Calculation.
  2. Settlement Analysis Method: Tokimatsu/Seed
  3. Fines Correction for Liquefaction: Idriss/Seed
  4. Fine Correction for Settlement: During Liquefaction\*
  5. Settlement Calculation in: All zones\*
  6. Hammer Energy Ratio, Ce = 1
  7. Borehole Diameter, Cb= 1
  8. Sampling Method, Cs= 1
  9. User request factor of safety (apply to CSR) , User= 1.3  
Plot one CSR curve (fs1=User)
  10. Use Curve Smoothing: Yes\*
- \* Recommended Options

Liquefy.sum

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	50.00	130.00	30.00
5.00	50.00	130.00	12.00
7.50	18.00	108.90	12.00
10.00	31.00	120.10	12.00
15.00	13.00	118.20	40.00
20.00	26.00	123.00	40.00
25.00	18.00	127.90	40.00
30.00	16.00	123.00	40.00
35.00	45.00	118.50	40.00
40.00	22.00	122.00	51.00
45.00	33.00	126.10	51.00
50.00	26.00	126.10	51.00

Output Results:

Settlement of Saturated Sands=0.00 in.  
 Settlement of Unsaturated Sands=1.73 in.  
 Total Settlement of Saturated and Unsaturated Sands=1.73 in.  
 Differential Settlement=0.863 to 1.139 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.44	0.45	5.00	0.00	1.73	1.73
0.05	0.44	0.45	5.00	0.00	1.73	1.73
0.10	0.44	0.45	5.00	0.00	1.73	1.73
0.15	0.44	0.45	5.00	0.00	1.73	1.73
0.20	0.44	0.45	5.00	0.00	1.73	1.73
0.25	0.44	0.45	5.00	0.00	1.73	1.73
0.30	0.44	0.45	5.00	0.00	1.73	1.73
0.35	0.44	0.45	5.00	0.00	1.73	1.73
0.40	0.44	0.45	5.00	0.00	1.73	1.73
0.45	0.44	0.45	5.00	0.00	1.73	1.73
0.50	0.44	0.45	5.00	0.00	1.73	1.73
0.55	0.44	0.45	5.00	0.00	1.73	1.73
0.60	0.44	0.45	5.00	0.00	1.73	1.73
0.65	0.44	0.45	5.00	0.00	1.73	1.73
0.70	0.44	0.45	5.00	0.00	1.73	1.73
0.75	0.44	0.45	5.00	0.00	1.73	1.73
0.80	0.44	0.45	5.00	0.00	1.73	1.73
0.85	0.44	0.45	5.00	0.00	1.72	1.72
0.90	0.44	0.45	5.00	0.00	1.72	1.72
0.95	0.44	0.45	5.00	0.00	1.72	1.72

Liquefy.sum

1.00	0.44	0.45	5.00	0.00	1.72	1.72
1.05	0.44	0.45	5.00	0.00	1.72	1.72
1.10	0.44	0.45	5.00	0.00	1.72	1.72
1.15	0.44	0.45	5.00	0.00	1.72	1.72
1.20	0.44	0.45	5.00	0.00	1.72	1.72
1.25	0.44	0.45	5.00	0.00	1.72	1.72
1.30	0.44	0.45	5.00	0.00	1.72	1.72
1.35	0.44	0.45	5.00	0.00	1.72	1.72
1.40	0.44	0.45	5.00	0.00	1.72	1.72
1.45	0.44	0.45	5.00	0.00	1.72	1.72
1.50	0.44	0.45	5.00	0.00	1.72	1.72
1.55	0.44	0.45	5.00	0.00	1.72	1.72
1.60	0.44	0.45	5.00	0.00	1.72	1.72
1.65	0.44	0.45	5.00	0.00	1.72	1.72
1.70	0.44	0.45	5.00	0.00	1.72	1.72
1.75	0.44	0.45	5.00	0.00	1.72	1.72
1.80	0.44	0.45	5.00	0.00	1.72	1.72
1.85	0.44	0.45	5.00	0.00	1.72	1.72
1.90	0.44	0.45	5.00	0.00	1.72	1.72
1.95	0.44	0.45	5.00	0.00	1.72	1.72
2.00	0.44	0.45	5.00	0.00	1.72	1.72
2.05	0.44	0.45	5.00	0.00	1.72	1.72
2.10	0.44	0.45	5.00	0.00	1.72	1.72
2.15	0.44	0.45	5.00	0.00	1.72	1.72
2.20	0.44	0.45	5.00	0.00	1.72	1.72
2.25	0.44	0.45	5.00	0.00	1.72	1.72
2.30	0.44	0.45	5.00	0.00	1.72	1.72
2.35	0.44	0.45	5.00	0.00	1.72	1.72
2.40	0.44	0.45	5.00	0.00	1.72	1.72
2.45	0.44	0.45	5.00	0.00	1.72	1.72
2.50	0.44	0.45	5.00	0.00	1.72	1.72
2.55	0.44	0.45	5.00	0.00	1.72	1.72
2.60	0.44	0.45	5.00	0.00	1.72	1.72
2.65	0.44	0.45	5.00	0.00	1.72	1.72
2.70	0.44	0.45	5.00	0.00	1.72	1.72
2.75	0.44	0.44	5.00	0.00	1.72	1.72
2.80	0.44	0.44	5.00	0.00	1.72	1.72
2.85	0.44	0.44	5.00	0.00	1.72	1.72
2.90	0.44	0.44	5.00	0.00	1.72	1.72
2.95	0.44	0.44	5.00	0.00	1.72	1.72
3.00	0.44	0.44	5.00	0.00	1.72	1.72
3.05	0.44	0.44	5.00	0.00	1.72	1.72
3.10	0.44	0.44	5.00	0.00	1.72	1.72
3.15	0.44	0.44	5.00	0.00	1.72	1.72
3.20	0.44	0.44	5.00	0.00	1.72	1.72
3.25	0.44	0.44	5.00	0.00	1.72	1.72
3.30	0.44	0.44	5.00	0.00	1.72	1.72
3.35	0.44	0.44	5.00	0.00	1.72	1.72



Liquefy.sum

3.40	0.44	0.44	5.00	0.00	1.72	1.72
3.45	0.44	0.44	5.00	0.00	1.72	1.72
3.50	0.44	0.44	5.00	0.00	1.72	1.72
3.55	0.44	0.44	5.00	0.00	1.72	1.72
3.60	0.44	0.44	5.00	0.00	1.72	1.72
3.65	0.44	0.44	5.00	0.00	1.72	1.72
3.70	0.44	0.44	5.00	0.00	1.72	1.72
3.75	0.44	0.44	5.00	0.00	1.72	1.72
3.80	0.44	0.44	5.00	0.00	1.72	1.72
3.85	0.44	0.44	5.00	0.00	1.72	1.72
3.90	0.44	0.44	5.00	0.00	1.72	1.72
3.95	0.44	0.44	5.00	0.00	1.72	1.72
4.00	0.44	0.44	5.00	0.00	1.72	1.72
4.05	0.44	0.44	5.00	0.00	1.72	1.72
4.10	0.44	0.44	5.00	0.00	1.72	1.72
4.15	0.44	0.44	5.00	0.00	1.72	1.72
4.20	0.44	0.44	5.00	0.00	1.72	1.72
4.25	0.44	0.44	5.00	0.00	1.72	1.72
4.30	0.44	0.44	5.00	0.00	1.72	1.72
4.35	0.44	0.44	5.00	0.00	1.72	1.72
4.40	0.44	0.44	5.00	0.00	1.72	1.72
4.45	0.44	0.44	5.00	0.00	1.72	1.72
4.50	0.44	0.44	5.00	0.00	1.72	1.72
4.55	0.44	0.44	5.00	0.00	1.72	1.72
4.60	0.44	0.44	5.00	0.00	1.72	1.72
4.65	0.44	0.44	5.00	0.00	1.72	1.72
4.70	0.44	0.44	5.00	0.00	1.72	1.72
4.75	0.44	0.44	5.00	0.00	1.72	1.72
4.80	0.44	0.44	5.00	0.00	1.72	1.72
4.85	0.44	0.44	5.00	0.00	1.72	1.72
4.90	0.44	0.44	5.00	0.00	1.72	1.72
4.95	0.44	0.44	5.00	0.00	1.72	1.72
5.00	0.44	0.44	5.00	0.00	1.72	1.72
5.05	0.44	0.44	5.00	0.00	1.72	1.72
5.10	0.44	0.44	5.00	0.00	1.72	1.72
5.15	0.44	0.44	5.00	0.00	1.72	1.72
5.20	0.44	0.44	5.00	0.00	1.72	1.72
5.25	0.44	0.44	5.00	0.00	1.72	1.72
5.30	0.44	0.44	5.00	0.00	1.72	1.72
5.35	0.44	0.44	5.00	0.00	1.72	1.72
5.40	0.44	0.44	5.00	0.00	1.72	1.72
5.45	0.44	0.44	5.00	0.00	1.72	1.72
5.50	0.44	0.44	5.00	0.00	1.72	1.72
5.55	0.44	0.44	5.00	0.00	1.72	1.72
5.60	0.44	0.44	5.00	0.00	1.72	1.72
5.65	0.44	0.44	5.00	0.00	1.71	1.71
5.70	0.44	0.44	5.00	0.00	1.71	1.71
5.75	0.44	0.44	5.00	0.00	1.71	1.71

Liquefy.sum

5.80	0.44	0.44	5.00	0.00	1.71	1.71
5.85	0.44	0.44	5.00	0.00	1.71	1.71
5.90	0.44	0.44	5.00	0.00	1.71	1.71
5.95	0.44	0.44	5.00	0.00	1.71	1.71
6.00	0.44	0.44	5.00	0.00	1.71	1.71
6.05	0.44	0.44	5.00	0.00	1.71	1.71
6.10	0.44	0.44	5.00	0.00	1.71	1.71
6.15	0.44	0.44	5.00	0.00	1.71	1.71
6.20	0.44	0.44	5.00	0.00	1.71	1.71
6.25	0.44	0.44	5.00	0.00	1.71	1.71
6.30	0.44	0.44	5.00	0.00	1.71	1.71
6.35	0.44	0.44	5.00	0.00	1.71	1.71
6.40	0.44	0.44	5.00	0.00	1.71	1.71
6.45	0.44	0.44	5.00	0.00	1.71	1.71
6.50	0.44	0.44	5.00	0.00	1.71	1.71
6.55	0.44	0.44	5.00	0.00	1.71	1.71
6.60	0.44	0.44	5.00	0.00	1.71	1.71
6.65	0.44	0.44	5.00	0.00	1.71	1.71
6.70	0.44	0.44	5.00	0.00	1.71	1.71
6.75	0.44	0.44	5.00	0.00	1.71	1.71
6.80	0.44	0.44	5.00	0.00	1.71	1.71
6.85	0.44	0.44	5.00	0.00	1.71	1.71
6.90	0.44	0.44	5.00	0.00	1.71	1.71
6.95	0.44	0.44	5.00	0.00	1.71	1.71
7.00	0.44	0.44	5.00	0.00	1.71	1.71
7.05	0.37	0.44	5.00	0.00	1.71	1.71
7.10	0.33	0.44	5.00	0.00	1.71	1.71
7.15	0.30	0.44	5.00	0.00	1.71	1.71
7.20	0.29	0.44	5.00	0.00	1.71	1.71
7.25	0.27	0.44	5.00	0.00	1.70	1.70
7.30	0.26	0.44	5.00	0.00	1.70	1.70
7.35	0.25	0.44	5.00	0.00	1.70	1.70
7.40	0.23	0.44	5.00	0.00	1.70	1.70
7.45	0.22	0.44	5.00	0.00	1.70	1.70
7.50	0.22	0.44	5.00	0.00	1.70	1.70
7.55	0.22	0.44	5.00	0.00	1.69	1.69
7.60	0.22	0.44	5.00	0.00	1.69	1.69
7.65	0.22	0.44	5.00	0.00	1.69	1.69
7.70	0.23	0.44	5.00	0.00	1.69	1.69
7.75	0.23	0.44	5.00	0.00	1.68	1.68
7.80	0.23	0.44	5.00	0.00	1.68	1.68
7.85	0.24	0.44	5.00	0.00	1.68	1.68
7.90	0.24	0.44	5.00	0.00	1.68	1.68
7.95	0.24	0.44	5.00	0.00	1.67	1.67
8.00	0.24	0.44	5.00	0.00	1.67	1.67
8.05	0.25	0.44	5.00	0.00	1.67	1.67
8.10	0.25	0.44	5.00	0.00	1.67	1.67
8.15	0.25	0.44	5.00	0.00	1.66	1.66

Liquefy.sum

8.20	0.26	0.44	5.00	0.00	1.66	1.66
8.25	0.33	0.44	5.00	0.00	1.66	1.66
8.30	0.34	0.44	5.00	0.00	1.66	1.66
8.35	0.36	0.44	5.00	0.00	1.66	1.66
8.40	0.38	0.44	5.00	0.00	1.66	1.66
8.45	0.41	0.44	5.00	0.00	1.65	1.65
8.50	0.44	0.44	5.00	0.00	1.65	1.65
8.55	0.44	0.44	5.00	0.00	1.65	1.65
8.60	0.44	0.44	5.00	0.00	1.65	1.65
8.65	0.44	0.44	5.00	0.00	1.65	1.65
8.70	0.44	0.44	5.00	0.00	1.65	1.65
8.75	0.44	0.44	5.00	0.00	1.65	1.65
8.80	0.44	0.44	5.00	0.00	1.65	1.65
8.85	0.44	0.44	5.00	0.00	1.65	1.65
8.90	0.44	0.44	5.00	0.00	1.64	1.64
8.95	0.44	0.44	5.00	0.00	1.64	1.64
9.00	0.44	0.44	5.00	0.00	1.64	1.64
9.05	0.44	0.44	5.00	0.00	1.64	1.64
9.10	0.44	0.44	5.00	0.00	1.64	1.64
9.15	0.44	0.44	5.00	0.00	1.64	1.64
9.20	0.44	0.44	5.00	0.00	1.64	1.64
9.25	0.44	0.44	5.00	0.00	1.64	1.64
9.30	0.44	0.44	5.00	0.00	1.64	1.64
9.35	0.44	0.44	5.00	0.00	1.64	1.64
9.40	0.44	0.44	5.00	0.00	1.64	1.64
9.45	0.44	0.44	5.00	0.00	1.64	1.64
9.50	0.44	0.44	5.00	0.00	1.64	1.64
9.55	0.44	0.44	5.00	0.00	1.64	1.64
9.60	0.44	0.44	5.00	0.00	1.63	1.63
9.65	0.44	0.44	5.00	0.00	1.63	1.63
9.70	0.44	0.44	5.00	0.00	1.63	1.63
9.75	0.44	0.44	5.00	0.00	1.63	1.63
9.80	0.44	0.44	5.00	0.00	1.63	1.63
9.85	0.44	0.44	5.00	0.00	1.63	1.63
9.90	0.44	0.44	5.00	0.00	1.63	1.63
9.95	0.44	0.44	5.00	0.00	1.63	1.63
10.00	0.44	0.44	5.00	0.00	1.63	1.63
10.05	0.44	0.44	5.00	0.00	1.63	1.63
10.10	0.44	0.44	5.00	0.00	1.63	1.63
10.15	0.44	0.44	5.00	0.00	1.63	1.63
10.20	0.44	0.44	5.00	0.00	1.63	1.63
10.25	0.44	0.44	5.00	0.00	1.63	1.63
10.30	0.44	0.44	5.00	0.00	1.63	1.63
10.35	0.44	0.44	5.00	0.00	1.63	1.63
10.40	0.44	0.44	5.00	0.00	1.63	1.63
10.45	0.44	0.44	5.00	0.00	1.63	1.63
10.50	0.44	0.44	5.00	0.00	1.63	1.63
10.55	0.44	0.44	5.00	0.00	1.63	1.63

				Liquefy.sum		
10.60	0.44	0.44	5.00	0.00	1.63	1.63
10.65	0.44	0.44	5.00	0.00	1.63	1.63
10.70	0.44	0.44	5.00	0.00	1.63	1.63
10.75	0.44	0.44	5.00	0.00	1.63	1.63
10.80	0.44	0.44	5.00	0.00	1.63	1.63
10.85	0.44	0.44	5.00	0.00	1.62	1.62
10.90	0.44	0.44	5.00	0.00	1.62	1.62
10.95	0.44	0.44	5.00	0.00	1.62	1.62
11.00	0.44	0.44	5.00	0.00	1.62	1.62
11.05	0.44	0.44	5.00	0.00	1.62	1.62
11.10	0.44	0.44	5.00	0.00	1.62	1.62
11.15	0.44	0.44	5.00	0.00	1.62	1.62
11.20	0.44	0.44	5.00	0.00	1.62	1.62
11.25	0.44	0.44	5.00	0.00	1.62	1.62
11.30	0.44	0.44	5.00	0.00	1.62	1.62
11.35	0.44	0.44	5.00	0.00	1.62	1.62
11.40	0.44	0.44	5.00	0.00	1.62	1.62
11.45	0.44	0.44	5.00	0.00	1.62	1.62
11.50	0.44	0.44	5.00	0.00	1.62	1.62
11.55	0.44	0.44	5.00	0.00	1.62	1.62
11.60	0.44	0.44	5.00	0.00	1.62	1.62
11.65	0.44	0.44	5.00	0.00	1.62	1.62
11.70	0.44	0.44	5.00	0.00	1.61	1.61
11.75	0.44	0.44	5.00	0.00	1.61	1.61
11.80	0.44	0.44	5.00	0.00	1.61	1.61
11.85	0.44	0.44	5.00	0.00	1.61	1.61
11.90	0.44	0.44	5.00	0.00	1.61	1.61
11.95	0.44	0.44	5.00	0.00	1.61	1.61
12.00	0.44	0.44	5.00	0.00	1.61	1.61
12.05	0.44	0.44	5.00	0.00	1.61	1.61
12.10	0.44	0.44	5.00	0.00	1.61	1.61
12.15	0.44	0.44	5.00	0.00	1.61	1.61
12.20	0.43	0.44	5.00	0.00	1.61	1.61
12.25	0.39	0.44	5.00	0.00	1.61	1.61
12.30	0.37	0.44	5.00	0.00	1.60	1.60
12.35	0.36	0.43	5.00	0.00	1.60	1.60
12.40	0.35	0.43	5.00	0.00	1.60	1.60
12.45	0.34	0.43	5.00	0.00	1.60	1.60
12.50	0.33	0.43	5.00	0.00	1.60	1.60
12.55	0.33	0.43	5.00	0.00	1.60	1.60
12.60	0.32	0.43	5.00	0.00	1.60	1.60
12.65	0.32	0.43	5.00	0.00	1.60	1.60
12.70	0.31	0.43	5.00	0.00	1.60	1.60
12.75	0.31	0.43	5.00	0.00	1.60	1.60
12.80	0.30	0.43	5.00	0.00	1.59	1.59
12.85	0.30	0.43	5.00	0.00	1.59	1.59
12.90	0.29	0.43	5.00	0.00	1.59	1.59
12.95	0.29	0.43	5.00	0.00	1.59	1.59

Liquefy.sum

13.00	0.29	0.43	5.00	0.00	1.59	1.59
13.05	0.28	0.43	5.00	0.00	1.59	1.59
13.10	0.28	0.43	5.00	0.00	1.59	1.59
13.15	0.28	0.43	5.00	0.00	1.58	1.58
13.20	0.27	0.43	5.00	0.00	1.58	1.58
13.25	0.27	0.43	5.00	0.00	1.58	1.58
13.30	0.27	0.43	5.00	0.00	1.58	1.58
13.35	0.26	0.43	5.00	0.00	1.58	1.58
13.40	0.26	0.43	5.00	0.00	1.58	1.58
13.45	0.26	0.43	5.00	0.00	1.58	1.58
13.50	0.26	0.43	5.00	0.00	1.57	1.57
13.55	0.25	0.43	5.00	0.00	1.57	1.57
13.60	0.25	0.43	5.00	0.00	1.57	1.57
13.65	0.25	0.43	5.00	0.00	1.57	1.57
13.70	0.25	0.43	5.00	0.00	1.57	1.57
13.75	0.24	0.43	5.00	0.00	1.56	1.56
13.80	0.24	0.43	5.00	0.00	1.56	1.56
13.85	0.24	0.43	5.00	0.00	1.56	1.56
13.90	0.24	0.43	5.00	0.00	1.56	1.56
13.95	0.23	0.43	5.00	0.00	1.56	1.56
14.00	0.23	0.43	5.00	0.00	1.55	1.55
14.05	0.23	0.43	5.00	0.00	1.55	1.55
14.10	0.23	0.43	5.00	0.00	1.55	1.55
14.15	0.22	0.43	5.00	0.00	1.55	1.55
14.20	0.22	0.43	5.00	0.00	1.54	1.54
14.25	0.22	0.43	5.00	0.00	1.54	1.54
14.30	0.22	0.43	5.00	0.00	1.54	1.54
14.35	0.21	0.43	5.00	0.00	1.54	1.54
14.40	0.21	0.43	5.00	0.00	1.53	1.53
14.45	0.21	0.43	5.00	0.00	1.53	1.53
14.50	0.21	0.43	5.00	0.00	1.53	1.53
14.55	0.20	0.43	5.00	0.00	1.52	1.52
14.60	0.20	0.43	5.00	0.00	1.52	1.52
14.65	0.20	0.43	5.00	0.00	1.52	1.52
14.70	0.20	0.43	5.00	0.00	1.51	1.51
14.75	0.19	0.43	5.00	0.00	1.51	1.51
14.80	0.21	0.43	5.00	0.00	1.51	1.51
14.85	0.21	0.43	5.00	0.00	1.50	1.50
14.90	0.21	0.43	5.00	0.00	1.50	1.50
14.95	0.20	0.43	5.00	0.00	1.50	1.50
15.00	0.20	0.43	5.00	0.00	1.49	1.49
15.05	0.20	0.43	5.00	0.00	1.49	1.49
15.10	0.20	0.43	5.00	0.00	1.49	1.49
15.15	0.20	0.43	5.00	0.00	1.48	1.48
15.20	0.21	0.43	5.00	0.00	1.48	1.48
15.25	0.21	0.43	5.00	0.00	1.47	1.47
15.30	0.21	0.43	5.00	0.00	1.47	1.47
15.35	0.21	0.43	5.00	0.00	1.47	1.47

Liquefy.sum

15.40	0.21	0.43	5.00	0.00	1.46	1.46
15.45	0.21	0.43	5.00	0.00	1.46	1.46
15.50	0.21	0.43	5.00	0.00	1.46	1.46
15.55	0.22	0.43	5.00	0.00	1.45	1.45
15.60	0.22	0.43	5.00	0.00	1.45	1.45
15.65	0.22	0.43	5.00	0.00	1.45	1.45
15.70	0.22	0.43	5.00	0.00	1.44	1.44
15.75	0.22	0.43	5.00	0.00	1.44	1.44
15.80	0.22	0.43	5.00	0.00	1.44	1.44
15.85	0.22	0.43	5.00	0.00	1.43	1.43
15.90	0.23	0.43	5.00	0.00	1.43	1.43
15.95	0.23	0.43	5.00	0.00	1.43	1.43
16.00	0.23	0.43	5.00	0.00	1.42	1.42
16.05	0.23	0.43	5.00	0.00	1.42	1.42
16.10	0.23	0.43	5.00	0.00	1.42	1.42
16.15	0.23	0.43	5.00	0.00	1.41	1.41
16.20	0.24	0.43	5.00	0.00	1.41	1.41
16.25	0.24	0.43	5.00	0.00	1.41	1.41
16.30	0.24	0.43	5.00	0.00	1.41	1.41
16.35	0.24	0.43	5.00	0.00	1.40	1.40
16.40	0.24	0.43	5.00	0.00	1.40	1.40
16.45	0.24	0.43	5.00	0.00	1.40	1.40
16.50	0.25	0.43	5.00	0.00	1.39	1.39
16.55	0.25	0.43	5.00	0.00	1.39	1.39
16.60	0.25	0.43	5.00	0.00	1.39	1.39
16.65	0.25	0.43	5.00	0.00	1.39	1.39
16.70	0.25	0.43	5.00	0.00	1.38	1.38
16.75	0.25	0.43	5.00	0.00	1.38	1.38
16.80	0.26	0.43	5.00	0.00	1.38	1.38
16.85	0.26	0.43	5.00	0.00	1.37	1.37
16.90	0.26	0.43	5.00	0.00	1.37	1.37
16.95	0.26	0.43	5.00	0.00	1.37	1.37
17.00	0.26	0.43	5.00	0.00	1.37	1.37
17.05	0.27	0.43	5.00	0.00	1.36	1.36
17.10	0.27	0.43	5.00	0.00	1.36	1.36
17.15	0.27	0.43	5.00	0.00	1.36	1.36
17.20	0.27	0.43	5.00	0.00	1.36	1.36
17.25	0.27	0.43	5.00	0.00	1.35	1.35
17.30	0.28	0.43	5.00	0.00	1.35	1.35
17.35	0.28	0.43	5.00	0.00	1.35	1.35
17.40	0.28	0.43	5.00	0.00	1.35	1.35
17.45	0.28	0.43	5.00	0.00	1.34	1.34
17.50	0.28	0.43	5.00	0.00	1.34	1.34
17.55	0.29	0.43	5.00	0.00	1.34	1.34
17.60	0.29	0.43	5.00	0.00	1.34	1.34
17.65	0.29	0.43	5.00	0.00	1.33	1.33
17.70	0.29	0.43	5.00	0.00	1.33	1.33
17.75	0.30	0.43	5.00	0.00	1.33	1.33

Liquefy.sum

17.80	0.30	0.43	5.00	0.00	1.33	1.33
17.85	0.30	0.43	5.00	0.00	1.32	1.32
17.90	0.30	0.43	5.00	0.00	1.32	1.32
17.95	0.31	0.43	5.00	0.00	1.32	1.32
18.00	0.31	0.43	5.00	0.00	1.32	1.32
18.05	0.31	0.43	5.00	0.00	1.32	1.32
18.10	0.32	0.43	5.00	0.00	1.31	1.31
18.15	0.32	0.43	5.00	0.00	1.31	1.31
18.20	0.32	0.43	5.00	0.00	1.31	1.31
18.25	0.33	0.43	5.00	0.00	1.31	1.31
18.30	0.33	0.43	5.00	0.00	1.30	1.30
18.35	0.33	0.43	5.00	0.00	1.30	1.30
18.40	0.34	0.43	5.00	0.00	1.30	1.30
18.45	0.34	0.43	5.00	0.00	1.30	1.30
18.50	0.35	0.43	5.00	0.00	1.30	1.30
18.55	0.36	0.43	5.00	0.00	1.29	1.29
18.60	0.36	0.43	5.00	0.00	1.29	1.29
18.65	0.37	0.43	5.00	0.00	1.29	1.29
18.70	0.38	0.43	5.00	0.00	1.29	1.29
18.75	0.40	0.43	5.00	0.00	1.28	1.28
18.80	0.43	0.43	5.00	0.00	1.28	1.28
18.85	0.44	0.43	5.00	0.00	1.28	1.28
18.90	0.44	0.43	5.00	0.00	1.28	1.28
18.95	0.44	0.43	5.00	0.00	1.28	1.28
19.00	0.44	0.43	5.00	0.00	1.27	1.27
19.05	0.44	0.43	5.00	0.00	1.27	1.27
19.10	0.44	0.43	5.00	0.00	1.27	1.27
19.15	0.44	0.43	5.00	0.00	1.27	1.27
19.20	0.44	0.43	5.00	0.00	1.27	1.27
19.25	0.44	0.43	5.00	0.00	1.26	1.26
19.30	0.44	0.43	5.00	0.00	1.26	1.26
19.35	0.44	0.43	5.00	0.00	1.26	1.26
19.40	0.44	0.43	5.00	0.00	1.26	1.26
19.45	0.44	0.43	5.00	0.00	1.26	1.26
19.50	0.44	0.43	5.00	0.00	1.25	1.25
19.55	0.44	0.43	5.00	0.00	1.25	1.25
19.60	0.44	0.43	5.00	0.00	1.25	1.25
19.65	0.44	0.43	5.00	0.00	1.25	1.25
19.70	0.44	0.43	5.00	0.00	1.25	1.25
19.75	0.44	0.43	5.00	0.00	1.24	1.24
19.80	0.44	0.43	5.00	0.00	1.24	1.24
19.85	0.44	0.43	5.00	0.00	1.24	1.24
19.90	0.44	0.43	5.00	0.00	1.24	1.24
19.95	0.44	0.43	5.00	0.00	1.24	1.24
20.00	0.44	0.43	5.00	0.00	1.23	1.23
20.05	0.44	0.43	5.00	0.00	1.23	1.23
20.10	0.44	0.43	5.00	0.00	1.23	1.23
20.15	0.44	0.43	5.00	0.00	1.23	1.23

Liquefy.sum

20.20	0.44	0.43	5.00	0.00	1.23	1.23
20.25	0.44	0.43	5.00	0.00	1.23	1.23
20.30	0.44	0.43	5.00	0.00	1.23	1.23
20.35	0.44	0.43	5.00	0.00	1.23	1.23
20.40	0.44	0.43	5.00	0.00	1.23	1.23
20.45	0.44	0.43	5.00	0.00	1.23	1.23
20.50	0.44	0.43	5.00	0.00	1.22	1.22
20.55	0.44	0.43	5.00	0.00	1.22	1.22
20.60	0.44	0.43	5.00	0.00	1.22	1.22
20.65	0.44	0.43	5.00	0.00	1.22	1.22
20.70	0.44	0.43	5.00	0.00	1.22	1.22
20.75	0.44	0.43	5.00	0.00	1.22	1.22
20.80	0.44	0.43	5.00	0.00	1.22	1.22
20.85	0.44	0.43	5.00	0.00	1.22	1.22
20.90	0.44	0.43	5.00	0.00	1.22	1.22
20.95	0.44	0.43	5.00	0.00	1.22	1.22
21.00	0.44	0.43	5.00	0.00	1.22	1.22
21.05	0.44	0.43	5.00	0.00	1.21	1.21
21.10	0.42	0.43	5.00	0.00	1.21	1.21
21.15	0.40	0.43	5.00	0.00	1.21	1.21
21.20	0.38	0.43	5.00	0.00	1.21	1.21
21.25	0.37	0.43	5.00	0.00	1.21	1.21
21.30	0.36	0.43	5.00	0.00	1.21	1.21
21.35	0.35	0.43	5.00	0.00	1.21	1.21
21.40	0.35	0.43	5.00	0.00	1.21	1.21
21.45	0.34	0.43	5.00	0.00	1.21	1.21
21.50	0.34	0.43	5.00	0.00	1.21	1.21
21.55	0.33	0.43	5.00	0.00	1.20	1.20
21.60	0.33	0.43	5.00	0.00	1.20	1.20
21.65	0.33	0.43	5.00	0.00	1.20	1.20
21.70	0.32	0.43	5.00	0.00	1.20	1.20
21.75	0.32	0.43	5.00	0.00	1.20	1.20
21.80	0.32	0.43	5.00	0.00	1.20	1.20
21.85	0.31	0.43	5.00	0.00	1.20	1.20
21.90	0.31	0.42	5.00	0.00	1.20	1.20
21.95	0.31	0.42	5.00	0.00	1.20	1.20
22.00	0.30	0.42	5.00	0.00	1.19	1.19
22.05	0.30	0.42	5.00	0.00	1.19	1.19
22.10	0.30	0.42	5.00	0.00	1.19	1.19
22.15	0.30	0.42	5.00	0.00	1.19	1.19
22.20	0.29	0.42	5.00	0.00	1.19	1.19
22.25	0.29	0.42	5.00	0.00	1.19	1.19
22.30	0.29	0.42	5.00	0.00	1.19	1.19
22.35	0.29	0.42	5.00	0.00	1.19	1.19
22.40	0.29	0.42	5.00	0.00	1.18	1.18
22.45	0.28	0.42	5.00	0.00	1.18	1.18
22.50	0.28	0.42	5.00	0.00	1.18	1.18
22.55	0.28	0.42	5.00	0.00	1.18	1.18



Liquefy.sum

22.60	0.28	0.42	5.00	0.00	1.18	1.18
22.65	0.28	0.42	5.00	0.00	1.18	1.18
22.70	0.27	0.42	5.00	0.00	1.18	1.18
22.75	0.27	0.42	5.00	0.00	1.17	1.17
22.80	0.27	0.42	5.00	0.00	1.17	1.17
22.85	0.27	0.42	5.00	0.00	1.17	1.17
22.90	0.27	0.42	5.00	0.00	1.17	1.17
22.95	0.27	0.42	5.00	0.00	1.17	1.17
23.00	0.26	0.42	5.00	0.00	1.17	1.17
23.05	0.26	0.42	5.00	0.00	1.17	1.17
23.10	0.26	0.42	5.00	0.00	1.16	1.16
23.15	0.26	0.42	5.00	0.00	1.16	1.16
23.20	0.26	0.42	5.00	0.00	1.16	1.16
23.25	0.26	0.42	5.00	0.00	1.16	1.16
23.30	0.25	0.42	5.00	0.00	1.16	1.16
23.35	0.25	0.42	5.00	0.00	1.16	1.16
23.40	0.25	0.42	5.00	0.00	1.15	1.15
23.45	0.25	0.42	5.00	0.00	1.15	1.15
23.50	0.25	0.42	5.00	0.00	1.15	1.15
23.55	0.25	0.42	5.00	0.00	1.15	1.15
23.60	0.25	0.42	5.00	0.00	1.15	1.15
23.65	0.24	0.42	5.00	0.00	1.14	1.14
23.70	0.24	0.42	5.00	0.00	1.14	1.14
23.75	0.24	0.42	5.00	0.00	1.14	1.14
23.80	0.24	0.42	5.00	0.00	1.14	1.14
23.85	0.24	0.42	5.00	0.00	1.14	1.14
23.90	0.24	0.42	5.00	0.00	1.14	1.14
23.95	0.24	0.42	5.00	0.00	1.13	1.13
24.00	0.24	0.42	5.00	0.00	1.13	1.13
24.05	0.23	0.42	5.00	0.00	1.13	1.13
24.10	0.23	0.42	5.00	0.00	1.13	1.13
24.15	0.23	0.42	5.00	0.00	1.13	1.13
24.20	0.23	0.42	5.00	0.00	1.12	1.12
24.25	0.23	0.42	5.00	0.00	1.12	1.12
24.30	0.23	0.42	5.00	0.00	1.12	1.12
24.35	0.23	0.42	5.00	0.00	1.12	1.12
24.40	0.23	0.42	5.00	0.00	1.11	1.11
24.45	0.22	0.42	5.00	0.00	1.11	1.11
24.50	0.22	0.42	5.00	0.00	1.11	1.11
24.55	0.22	0.42	5.00	0.00	1.11	1.11
24.60	0.22	0.42	5.00	0.00	1.11	1.11
24.65	0.22	0.42	5.00	0.00	1.10	1.10
24.70	0.22	0.42	5.00	0.00	1.10	1.10
24.75	0.22	0.42	5.00	0.00	1.10	1.10
24.80	0.22	0.42	5.00	0.00	1.10	1.10
24.85	0.22	0.42	5.00	0.00	1.09	1.09
24.90	0.21	0.42	5.00	0.00	1.09	1.09
24.95	0.21	0.42	5.00	0.00	1.09	1.09

Liquefy.sum

25.00	0.21	0.42	5.00	0.00	1.09	1.09
25.05	0.21	0.42	5.00	0.00	1.08	1.08
25.10	0.21	0.42	5.00	0.00	1.08	1.08
25.15	0.21	0.42	5.00	0.00	1.08	1.08
25.20	0.21	0.42	5.00	0.00	1.08	1.08
25.25	0.21	0.42	5.00	0.00	1.07	1.07
25.30	0.21	0.42	5.00	0.00	1.07	1.07
25.35	0.21	0.42	5.00	0.00	1.07	1.07
25.40	0.21	0.42	5.00	0.00	1.06	1.06
25.45	0.21	0.42	5.00	0.00	1.06	1.06
25.50	0.21	0.42	5.00	0.00	1.06	1.06
25.55	0.21	0.42	5.00	0.00	1.06	1.06
25.60	0.21	0.42	5.00	0.00	1.05	1.05
25.65	0.21	0.42	5.00	0.00	1.05	1.05
25.70	0.21	0.42	5.00	0.00	1.05	1.05
25.75	0.21	0.42	5.00	0.00	1.04	1.04
25.80	0.21	0.42	5.00	0.00	1.04	1.04
25.85	0.21	0.42	5.00	0.00	1.04	1.04
25.90	0.21	0.42	5.00	0.00	1.04	1.04
25.95	0.20	0.42	5.00	0.00	1.03	1.03
26.00	0.20	0.42	5.00	0.00	1.03	1.03
26.05	0.20	0.42	5.00	0.00	1.03	1.03
26.10	0.20	0.42	5.00	0.00	1.02	1.02
26.15	0.20	0.42	5.00	0.00	1.02	1.02
26.20	0.20	0.42	5.00	0.00	1.02	1.02
26.25	0.20	0.42	5.00	0.00	1.01	1.01
26.30	0.20	0.42	5.00	0.00	1.01	1.01
26.35	0.20	0.42	5.00	0.00	1.01	1.01
26.40	0.20	0.42	5.00	0.00	1.00	1.00
26.45	0.20	0.42	5.00	0.00	1.00	1.00
26.50	0.20	0.42	5.00	0.00	1.00	1.00
26.55	0.20	0.42	5.00	0.00	0.99	0.99
26.60	0.20	0.42	5.00	0.00	0.99	0.99
26.65	0.20	0.42	5.00	0.00	0.99	0.99
26.70	0.20	0.42	5.00	0.00	0.98	0.98
26.75	0.20	0.42	5.00	0.00	0.98	0.98
26.80	0.20	0.42	5.00	0.00	0.98	0.98
26.85	0.20	0.42	5.00	0.00	0.97	0.97
26.90	0.20	0.42	5.00	0.00	0.97	0.97
26.95	0.20	0.42	5.00	0.00	0.97	0.97
27.00	0.20	0.42	5.00	0.00	0.96	0.96
27.05	0.20	0.42	5.00	0.00	0.96	0.96
27.10	0.20	0.42	5.00	0.00	0.96	0.96
27.15	0.20	0.42	5.00	0.00	0.95	0.95
27.20	0.20	0.42	5.00	0.00	0.95	0.95
27.25	0.20	0.42	5.00	0.00	0.95	0.95
27.30	0.20	0.42	5.00	0.00	0.94	0.94
27.35	0.20	0.42	5.00	0.00	0.94	0.94

Liquefy.sum

27.40	0.19	0.42	5.00	0.00	0.94	0.94
27.45	0.19	0.42	5.00	0.00	0.93	0.93
27.50	0.19	0.42	5.00	0.00	0.93	0.93
27.55	0.19	0.42	5.00	0.00	0.92	0.92
27.60	0.19	0.42	5.00	0.00	0.92	0.92
27.65	0.19	0.42	5.00	0.00	0.92	0.92
27.70	0.19	0.42	5.00	0.00	0.91	0.91
27.75	0.19	0.42	5.00	0.00	0.91	0.91
27.80	0.19	0.42	5.00	0.00	0.91	0.91
27.85	0.19	0.42	5.00	0.00	0.90	0.90
27.90	0.20	0.42	5.00	0.00	0.90	0.90
27.95	0.20	0.42	5.00	0.00	0.89	0.89
28.00	0.20	0.42	5.00	0.00	0.89	0.89
28.05	0.20	0.42	5.00	0.00	0.89	0.89
28.10	0.20	0.42	5.00	0.00	0.88	0.88
28.15	0.20	0.42	5.00	0.00	0.88	0.88
28.20	0.20	0.42	5.00	0.00	0.88	0.88
28.25	0.20	0.42	5.00	0.00	0.87	0.87
28.30	0.20	0.42	5.00	0.00	0.87	0.87
28.35	0.20	0.42	5.00	0.00	0.86	0.86
28.40	0.20	0.42	5.00	0.00	0.86	0.86
28.45	0.19	0.42	5.00	0.00	0.86	0.86
28.50	0.19	0.42	5.00	0.00	0.85	0.85
28.55	0.19	0.42	5.00	0.00	0.85	0.85
28.60	0.19	0.42	5.00	0.00	0.84	0.84
28.65	0.19	0.42	5.00	0.00	0.84	0.84
28.70	0.19	0.42	5.00	0.00	0.84	0.84
28.75	0.19	0.42	5.00	0.00	0.83	0.83
28.80	0.19	0.42	5.00	0.00	0.83	0.83
28.85	0.19	0.42	5.00	0.00	0.82	0.82
28.90	0.19	0.42	5.00	0.00	0.82	0.82
28.95	0.19	0.42	5.00	0.00	0.82	0.82
29.00	0.19	0.42	5.00	0.00	0.81	0.81
29.05	0.19	0.42	5.00	0.00	0.81	0.81
29.10	0.19	0.42	5.00	0.00	0.80	0.80
29.15	0.19	0.42	5.00	0.00	0.80	0.80
29.20	0.19	0.42	5.00	0.00	0.79	0.79
29.25	0.19	0.42	5.00	0.00	0.79	0.79
29.30	0.19	0.42	5.00	0.00	0.79	0.79
29.35	0.19	0.42	5.00	0.00	0.78	0.78
29.40	0.19	0.42	5.00	0.00	0.78	0.78
29.45	0.19	0.42	5.00	0.00	0.77	0.77
29.50	0.19	0.42	5.00	0.00	0.77	0.77
29.55	0.19	0.42	5.00	0.00	0.76	0.76
29.60	0.19	0.42	5.00	0.00	0.76	0.76
29.65	0.19	0.42	5.00	0.00	0.75	0.75
29.70	0.19	0.42	5.00	0.00	0.75	0.75
29.75	0.18	0.42	5.00	0.00	0.75	0.75

Liquefy.sum

29.80	0.18	0.42	5.00	0.00	0.74	0.74
29.85	0.18	0.42	5.00	0.00	0.74	0.74
29.90	0.18	0.42	5.00	0.00	0.73	0.73
29.95	0.18	0.42	5.00	0.00	0.73	0.73
30.00	0.18	0.42	5.00	0.00	0.72	0.72
30.05	0.19	0.42	5.00	0.00	0.72	0.72
30.10	0.19	0.42	5.00	0.00	0.71	0.71
30.15	0.19	0.42	5.00	0.00	0.71	0.71
30.20	0.19	0.42	5.00	0.00	0.70	0.70
30.25	0.20	0.42	5.00	0.00	0.70	0.70
30.30	0.20	0.42	5.00	0.00	0.69	0.69
30.35	0.20	0.42	5.00	0.00	0.69	0.69
30.40	0.20	0.41	5.00	0.00	0.69	0.69
30.45	0.21	0.41	5.00	0.00	0.68	0.68
30.50	0.21	0.41	5.00	0.00	0.68	0.68
30.55	0.21	0.41	5.00	0.00	0.68	0.68
30.60	0.21	0.41	5.00	0.00	0.67	0.67
30.65	0.22	0.41	5.00	0.00	0.67	0.67
30.70	0.22	0.41	5.00	0.00	0.67	0.67
30.75	0.22	0.41	5.00	0.00	0.66	0.66
30.80	0.22	0.41	5.00	0.00	0.66	0.66
30.85	0.23	0.41	5.00	0.00	0.66	0.66
30.90	0.23	0.41	5.00	0.00	0.65	0.65
30.95	0.23	0.41	5.00	0.00	0.65	0.65
31.00	0.24	0.41	5.00	0.00	0.65	0.65
31.05	0.24	0.41	5.00	0.00	0.64	0.64
31.10	0.24	0.41	5.00	0.00	0.64	0.64
31.15	0.25	0.41	5.00	0.00	0.64	0.64
31.20	0.25	0.41	5.00	0.00	0.64	0.64
31.25	0.25	0.41	5.00	0.00	0.63	0.63
31.30	0.26	0.41	5.00	0.00	0.63	0.63
31.35	0.26	0.41	5.00	0.00	0.63	0.63
31.40	0.27	0.41	5.00	0.00	0.63	0.63
31.45	0.27	0.41	5.00	0.00	0.62	0.62
31.50	0.27	0.41	5.00	0.00	0.62	0.62
31.55	0.28	0.41	5.00	0.00	0.62	0.62
31.60	0.28	0.41	5.00	0.00	0.62	0.62
31.65	0.29	0.41	5.00	0.00	0.62	0.62
31.70	0.29	0.41	5.00	0.00	0.61	0.61
31.75	0.30	0.41	5.00	0.00	0.61	0.61
31.80	0.30	0.41	5.00	0.00	0.61	0.61
31.85	0.31	0.41	5.00	0.00	0.61	0.61
31.90	0.32	0.41	5.00	0.00	0.61	0.61
31.95	0.32	0.41	5.00	0.00	0.60	0.60
32.00	0.33	0.41	5.00	0.00	0.60	0.60
32.05	0.35	0.41	5.00	0.00	0.60	0.60
32.10	0.36	0.41	5.00	0.00	0.60	0.60
32.15	0.39	0.41	5.00	0.00	0.60	0.60

Liquefy.sum

32.20	0.43	0.41	5.00	0.00	0.59	0.59
32.25	0.43	0.41	5.00	0.00	0.59	0.59
32.30	0.43	0.41	5.00	0.00	0.59	0.59
32.35	0.43	0.41	5.00	0.00	0.59	0.59
32.40	0.43	0.41	5.00	0.00	0.59	0.59
32.45	0.43	0.41	5.00	0.00	0.59	0.59
32.50	0.43	0.41	5.00	0.00	0.59	0.59
32.55	0.43	0.41	5.00	0.00	0.58	0.58
32.60	0.43	0.41	5.00	0.00	0.58	0.58
32.65	0.43	0.41	5.00	0.00	0.58	0.58
32.70	0.43	0.41	5.00	0.00	0.58	0.58
32.75	0.43	0.41	5.00	0.00	0.58	0.58
32.80	0.43	0.41	5.00	0.00	0.58	0.58
32.85	0.43	0.41	5.00	0.00	0.58	0.58
32.90	0.43	0.41	5.00	0.00	0.57	0.57
32.95	0.43	0.41	5.00	0.00	0.57	0.57
33.00	0.43	0.41	5.00	0.00	0.57	0.57
33.05	0.43	0.41	5.00	0.00	0.57	0.57
33.10	0.43	0.41	5.00	0.00	0.57	0.57
33.15	0.43	0.40	5.00	0.00	0.57	0.57
33.20	0.43	0.40	5.00	0.00	0.57	0.57
33.25	0.43	0.40	5.00	0.00	0.57	0.57
33.30	0.43	0.40	5.00	0.00	0.57	0.57
33.35	0.43	0.40	5.00	0.00	0.56	0.56
33.40	0.43	0.40	5.00	0.00	0.56	0.56
33.45	0.43	0.40	5.00	0.00	0.56	0.56
33.50	0.43	0.40	5.00	0.00	0.56	0.56
33.55	0.43	0.40	5.00	0.00	0.56	0.56
33.60	0.43	0.40	5.00	0.00	0.56	0.56
33.65	0.43	0.40	5.00	0.00	0.56	0.56
33.70	0.42	0.40	5.00	0.00	0.56	0.56
33.75	0.42	0.40	5.00	0.00	0.56	0.56
33.80	0.42	0.40	5.00	0.00	0.56	0.56
33.85	0.42	0.40	5.00	0.00	0.55	0.55
33.90	0.42	0.40	5.00	0.00	0.55	0.55
33.95	0.42	0.40	5.00	0.00	0.55	0.55
34.00	0.42	0.40	5.00	0.00	0.55	0.55
34.05	0.42	0.40	5.00	0.00	0.55	0.55
34.10	0.42	0.40	5.00	0.00	0.55	0.55
34.15	0.42	0.40	5.00	0.00	0.55	0.55
34.20	0.42	0.40	5.00	0.00	0.55	0.55
34.25	0.42	0.40	5.00	0.00	0.55	0.55
34.30	0.42	0.40	5.00	0.00	0.55	0.55
34.35	0.42	0.40	5.00	0.00	0.55	0.55
34.40	0.42	0.40	5.00	0.00	0.55	0.55
34.45	0.42	0.40	5.00	0.00	0.54	0.54
34.50	0.42	0.40	5.00	0.00	0.54	0.54
34.55	0.42	0.40	5.00	0.00	0.54	0.54

Liquefy.sum

34.60	0.42	0.40	5.00	0.00	0.54	0.54
34.65	0.42	0.40	5.00	0.00	0.54	0.54
34.70	0.42	0.40	5.00	0.00	0.54	0.54
34.75	0.42	0.40	5.00	0.00	0.54	0.54
34.80	0.42	0.40	5.00	0.00	0.54	0.54
34.85	0.42	0.40	5.00	0.00	0.54	0.54
34.90	0.42	0.40	5.00	0.00	0.54	0.54
34.95	0.42	0.40	5.00	0.00	0.54	0.54
35.00	0.42	0.40	5.00	0.00	0.54	0.54
35.05	0.42	0.40	5.00	0.00	0.54	0.54
35.10	0.42	0.40	5.00	0.00	0.54	0.54
35.15	0.42	0.40	5.00	0.00	0.54	0.54
35.20	0.42	0.40	5.00	0.00	0.53	0.53
35.25	0.42	0.40	5.00	0.00	0.53	0.53
35.30	0.42	0.40	5.00	0.00	0.53	0.53
35.35	0.42	0.40	5.00	0.00	0.53	0.53
35.40	0.42	0.40	5.00	0.00	0.53	0.53
35.45	0.42	0.40	5.00	0.00	0.53	0.53
35.50	0.42	0.40	5.00	0.00	0.53	0.53
35.55	0.42	0.40	5.00	0.00	0.53	0.53
35.60	0.42	0.40	5.00	0.00	0.53	0.53
35.65	0.42	0.40	5.00	0.00	0.53	0.53
35.70	0.42	0.40	5.00	0.00	0.53	0.53
35.75	0.42	0.40	5.00	0.00	0.53	0.53
35.80	0.42	0.40	5.00	0.00	0.53	0.53
35.85	0.42	0.40	5.00	0.00	0.53	0.53
35.90	0.42	0.39	5.00	0.00	0.52	0.52
35.95	0.42	0.39	5.00	0.00	0.52	0.52
36.00	0.42	0.39	5.00	0.00	0.52	0.52
36.05	0.42	0.39	5.00	0.00	0.52	0.52
36.10	0.42	0.39	5.00	0.00	0.52	0.52
36.15	0.42	0.39	5.00	0.00	0.52	0.52
36.20	0.42	0.39	5.00	0.00	0.52	0.52
36.25	0.42	0.39	5.00	0.00	0.52	0.52
36.30	0.42	0.39	5.00	0.00	0.52	0.52
36.35	0.42	0.39	5.00	0.00	0.52	0.52
36.40	0.42	0.39	5.00	0.00	0.52	0.52
36.45	0.42	0.39	5.00	0.00	0.51	0.51
36.50	0.42	0.39	5.00	0.00	0.51	0.51
36.55	0.42	0.39	5.00	0.00	0.51	0.51
36.60	0.42	0.39	5.00	0.00	0.51	0.51
36.65	0.42	0.39	5.00	0.00	0.51	0.51
36.70	0.42	0.39	5.00	0.00	0.51	0.51
36.75	0.42	0.39	5.00	0.00	0.51	0.51
36.80	0.42	0.39	5.00	0.00	0.51	0.51
36.85	0.42	0.39	5.00	0.00	0.51	0.51
36.90	0.42	0.39	5.00	0.00	0.50	0.50
36.95	0.42	0.39	5.00	0.00	0.50	0.50

Liquefy.sum

37.00	0.42	0.39	5.00	0.00	0.50	0.50
37.05	0.42	0.39	5.00	0.00	0.50	0.50
37.10	0.42	0.39	5.00	0.00	0.50	0.50
37.15	0.42	0.39	5.00	0.00	0.50	0.50
37.20	0.42	0.39	5.00	0.00	0.50	0.50
37.25	0.42	0.39	5.00	0.00	0.50	0.50
37.30	0.42	0.39	5.00	0.00	0.49	0.49
37.35	0.42	0.39	5.00	0.00	0.49	0.49
37.40	0.42	0.39	5.00	0.00	0.49	0.49
37.45	0.42	0.39	5.00	0.00	0.49	0.49
37.50	0.42	0.39	5.00	0.00	0.49	0.49
37.55	0.42	0.39	5.00	0.00	0.49	0.49
37.60	0.42	0.39	5.00	0.00	0.49	0.49
37.65	0.42	0.39	5.00	0.00	0.48	0.48
37.70	0.42	0.39	5.00	0.00	0.48	0.48
37.75	0.42	0.39	5.00	0.00	0.48	0.48
37.80	0.42	0.39	5.00	0.00	0.48	0.48
37.85	0.42	0.39	5.00	0.00	0.48	0.48
37.90	0.42	0.39	5.00	0.00	0.48	0.48
37.95	0.42	0.39	5.00	0.00	0.47	0.47
38.00	0.42	0.39	5.00	0.00	0.47	0.47
38.05	0.39	0.39	5.00	0.00	0.47	0.47
38.10	0.36	0.39	5.00	0.00	0.47	0.47
38.15	0.34	0.39	5.00	0.00	0.47	0.47
38.20	0.33	0.39	5.00	0.00	0.47	0.47
38.25	0.32	0.39	5.00	0.00	0.46	0.46
38.30	0.31	0.39	5.00	0.00	0.46	0.46
38.35	0.31	0.39	5.00	0.00	0.46	0.46
38.40	0.30	0.39	5.00	0.00	0.46	0.46
38.45	0.29	0.39	5.00	0.00	0.45	0.45
38.50	0.29	0.39	5.00	0.00	0.45	0.45
38.55	0.28	0.39	5.00	0.00	0.45	0.45
38.60	0.28	0.39	5.00	0.00	0.45	0.45
38.65	0.28	0.38	5.00	0.00	0.45	0.45
38.70	0.27	0.38	5.00	0.00	0.44	0.44
38.75	0.27	0.38	5.00	0.00	0.44	0.44
38.80	0.26	0.38	5.00	0.00	0.44	0.44
38.85	0.26	0.38	5.00	0.00	0.44	0.44
38.90	0.26	0.38	5.00	0.00	0.43	0.43
38.95	0.25	0.38	5.00	0.00	0.43	0.43
39.00	0.25	0.38	5.00	0.00	0.43	0.43
39.05	0.25	0.38	5.00	0.00	0.43	0.43
39.10	0.25	0.38	5.00	0.00	0.42	0.42
39.15	0.24	0.38	5.00	0.00	0.42	0.42
39.20	0.24	0.38	5.00	0.00	0.42	0.42
39.25	0.24	0.38	5.00	0.00	0.41	0.41
39.30	0.23	0.38	5.00	0.00	0.41	0.41
39.35	0.23	0.38	5.00	0.00	0.41	0.41

Liquefy.sum

39.40	0.23	0.38	5.00	0.00	0.41	0.41
39.45	0.23	0.38	5.00	0.00	0.40	0.40
39.50	0.22	0.38	5.00	0.00	0.40	0.40
39.55	0.22	0.38	5.00	0.00	0.40	0.40
39.60	0.22	0.38	5.00	0.00	0.39	0.39
39.65	0.22	0.38	5.00	0.00	0.39	0.39
39.70	0.21	0.38	5.00	0.00	0.39	0.39
39.75	0.21	0.38	5.00	0.00	0.38	0.38
39.80	0.21	0.38	5.00	0.00	0.38	0.38
39.85	0.21	0.38	5.00	0.00	0.37	0.37
39.90	0.21	0.38	5.00	0.00	0.37	0.37
39.95	0.20	0.38	5.00	0.00	0.37	0.37
40.00	0.20	0.38	5.00	0.00	0.36	0.36
40.05	0.20	0.38	5.00	0.00	0.36	0.36
40.10	0.20	0.38	5.00	0.00	0.36	0.36
40.15	0.20	0.38	5.00	0.00	0.36	0.36
40.20	0.20	0.38	5.00	0.00	0.36	0.36
40.25	0.20	0.38	5.00	0.00	0.35	0.35
40.30	0.21	0.38	5.00	0.00	0.35	0.35
40.35	0.21	0.38	5.00	0.00	0.35	0.35
40.40	0.21	0.38	5.00	0.00	0.35	0.35
40.45	0.21	0.38	5.00	0.00	0.35	0.35
40.50	0.21	0.38	5.00	0.00	0.34	0.34
40.55	0.21	0.38	5.00	0.00	0.34	0.34
40.60	0.21	0.38	5.00	0.00	0.34	0.34
40.65	0.21	0.38	5.00	0.00	0.34	0.34
40.70	0.21	0.38	5.00	0.00	0.34	0.34
40.75	0.21	0.38	5.00	0.00	0.33	0.33
40.80	0.21	0.38	5.00	0.00	0.33	0.33
40.85	0.21	0.38	5.00	0.00	0.33	0.33
40.90	0.22	0.38	5.00	0.00	0.33	0.33
40.95	0.22	0.38	5.00	0.00	0.33	0.33
41.00	0.22	0.38	5.00	0.00	0.33	0.33
41.05	0.22	0.38	5.00	0.00	0.32	0.32
41.10	0.22	0.38	5.00	0.00	0.32	0.32
41.15	0.22	0.38	5.00	0.00	0.32	0.32
41.20	0.22	0.38	5.00	0.00	0.32	0.32
41.25	0.22	0.38	5.00	0.00	0.32	0.32
41.30	0.22	0.38	5.00	0.00	0.31	0.31
41.35	0.22	0.38	5.00	0.00	0.31	0.31
41.40	0.22	0.37	5.00	0.00	0.31	0.31
41.45	0.22	0.37	5.00	0.00	0.31	0.31
41.50	0.23	0.37	5.00	0.00	0.31	0.31
41.55	0.23	0.37	5.00	0.00	0.31	0.31
41.60	0.23	0.37	5.00	0.00	0.30	0.30
41.65	0.23	0.37	5.00	0.00	0.30	0.30
41.70	0.23	0.37	5.00	0.00	0.30	0.30
41.75	0.23	0.37	5.00	0.00	0.30	0.30



Liquefy.sum

41.80	0.23	0.37	5.00	0.00	0.30	0.30
41.85	0.23	0.37	5.00	0.00	0.30	0.30
41.90	0.23	0.37	5.00	0.00	0.29	0.29
41.95	0.23	0.37	5.00	0.00	0.29	0.29
42.00	0.23	0.37	5.00	0.00	0.29	0.29
42.05	0.24	0.37	5.00	0.00	0.29	0.29
42.10	0.24	0.37	5.00	0.00	0.29	0.29
42.15	0.24	0.37	5.00	0.00	0.29	0.29
42.20	0.24	0.37	5.00	0.00	0.29	0.29
42.25	0.24	0.37	5.00	0.00	0.28	0.28
42.30	0.24	0.37	5.00	0.00	0.28	0.28
42.35	0.24	0.37	5.00	0.00	0.28	0.28
42.40	0.24	0.37	5.00	0.00	0.28	0.28
42.45	0.24	0.37	5.00	0.00	0.28	0.28
42.50	0.24	0.37	5.00	0.00	0.28	0.28
42.55	0.24	0.37	5.00	0.00	0.27	0.27
42.60	0.25	0.37	5.00	0.00	0.27	0.27
42.65	0.25	0.37	5.00	0.00	0.27	0.27
42.70	0.25	0.37	5.00	0.00	0.27	0.27
42.75	0.25	0.37	5.00	0.00	0.27	0.27
42.80	0.25	0.37	5.00	0.00	0.27	0.27
42.85	0.25	0.37	5.00	0.00	0.27	0.27
42.90	0.25	0.37	5.00	0.00	0.26	0.26
42.95	0.25	0.37	5.00	0.00	0.26	0.26
43.00	0.25	0.37	5.00	0.00	0.26	0.26
43.05	0.26	0.37	5.00	0.00	0.26	0.26
43.10	0.26	0.37	5.00	0.00	0.26	0.26
43.15	0.26	0.37	5.00	0.00	0.26	0.26
43.20	0.26	0.37	5.00	0.00	0.26	0.26
43.25	0.26	0.37	5.00	0.00	0.25	0.25
43.30	0.26	0.37	5.00	0.00	0.25	0.25
43.35	0.26	0.37	5.00	0.00	0.25	0.25
43.40	0.26	0.37	5.00	0.00	0.25	0.25
43.45	0.26	0.37	5.00	0.00	0.25	0.25
43.50	0.27	0.37	5.00	0.00	0.25	0.25
43.55	0.27	0.37	5.00	0.00	0.25	0.25
43.60	0.27	0.37	5.00	0.00	0.24	0.24
43.65	0.27	0.37	5.00	0.00	0.24	0.24
43.70	0.27	0.37	5.00	0.00	0.24	0.24
43.75	0.27	0.37	5.00	0.00	0.24	0.24
43.80	0.27	0.37	5.00	0.00	0.24	0.24
43.85	0.27	0.37	5.00	0.00	0.24	0.24
43.90	0.28	0.37	5.00	0.00	0.24	0.24
43.95	0.28	0.37	5.00	0.00	0.24	0.24
44.00	0.28	0.37	5.00	0.00	0.23	0.23
44.05	0.28	0.37	5.00	0.00	0.23	0.23
44.10	0.28	0.37	5.00	0.00	0.23	0.23
44.15	0.28	0.36	5.00	0.00	0.23	0.23

Liquefy.sum

44.20	0.29	0.36	5.00	0.00	0.23	0.23
44.25	0.29	0.36	5.00	0.00	0.23	0.23
44.30	0.29	0.36	5.00	0.00	0.23	0.23
44.35	0.29	0.36	5.00	0.00	0.23	0.23
44.40	0.29	0.36	5.00	0.00	0.22	0.22
44.45	0.29	0.36	5.00	0.00	0.22	0.22
44.50	0.30	0.36	5.00	0.00	0.22	0.22
44.55	0.30	0.36	5.00	0.00	0.22	0.22
44.60	0.30	0.36	5.00	0.00	0.22	0.22
44.65	0.30	0.36	5.00	0.00	0.22	0.22
44.70	0.30	0.36	5.00	0.00	0.22	0.22
44.75	0.31	0.36	5.00	0.00	0.22	0.22
44.80	0.31	0.36	5.00	0.00	0.21	0.21
44.85	0.31	0.36	5.00	0.00	0.21	0.21
44.90	0.32	0.36	5.00	0.00	0.21	0.21
44.95	0.32	0.36	5.00	0.00	0.21	0.21
45.00	0.32	0.36	5.00	0.00	0.21	0.21
45.05	0.32	0.36	5.00	0.00	0.21	0.21
45.10	0.32	0.36	5.00	0.00	0.21	0.21
45.15	0.31	0.36	5.00	0.00	0.21	0.21
45.20	0.31	0.36	5.00	0.00	0.21	0.21
45.25	0.31	0.36	5.00	0.00	0.20	0.20
45.30	0.30	0.36	5.00	0.00	0.20	0.20
45.35	0.30	0.36	5.00	0.00	0.20	0.20
45.40	0.30	0.36	5.00	0.00	0.20	0.20
45.45	0.30	0.36	5.00	0.00	0.20	0.20
45.50	0.30	0.36	5.00	0.00	0.20	0.20
45.55	0.29	0.36	5.00	0.00	0.20	0.20
45.60	0.29	0.36	5.00	0.00	0.20	0.20
45.65	0.29	0.36	5.00	0.00	0.19	0.19
45.70	0.29	0.36	5.00	0.00	0.19	0.19
45.75	0.29	0.36	5.00	0.00	0.19	0.19
45.80	0.28	0.36	5.00	0.00	0.19	0.19
45.85	0.28	0.36	5.00	0.00	0.19	0.19
45.90	0.28	0.36	5.00	0.00	0.19	0.19
45.95	0.28	0.36	5.00	0.00	0.19	0.19
46.00	0.28	0.36	5.00	0.00	0.19	0.19
46.05	0.28	0.36	5.00	0.00	0.18	0.18
46.10	0.27	0.36	5.00	0.00	0.18	0.18
46.15	0.27	0.36	5.00	0.00	0.18	0.18
46.20	0.27	0.36	5.00	0.00	0.18	0.18
46.25	0.27	0.36	5.00	0.00	0.18	0.18
46.30	0.27	0.36	5.00	0.00	0.18	0.18
46.35	0.27	0.36	5.00	0.00	0.18	0.18
46.40	0.27	0.36	5.00	0.00	0.18	0.18
46.45	0.27	0.36	5.00	0.00	0.17	0.17
46.50	0.26	0.36	5.00	0.00	0.17	0.17
46.55	0.26	0.36	5.00	0.00	0.17	0.17

Liquefy.sum

46.60	0.26	0.36	5.00	0.00	0.17	0.17
46.65	0.26	0.36	5.00	0.00	0.17	0.17
46.70	0.26	0.36	5.00	0.00	0.17	0.17
46.75	0.26	0.36	5.00	0.00	0.17	0.17
46.80	0.26	0.36	5.00	0.00	0.16	0.16
46.85	0.26	0.36	5.00	0.00	0.16	0.16
46.90	0.25	0.35	5.00	0.00	0.16	0.16
46.95	0.25	0.35	5.00	0.00	0.16	0.16
47.00	0.25	0.35	5.00	0.00	0.16	0.16
47.05	0.25	0.35	5.00	0.00	0.16	0.16
47.10	0.25	0.35	5.00	0.00	0.16	0.16
47.15	0.25	0.35	5.00	0.00	0.16	0.16
47.20	0.25	0.35	5.00	0.00	0.15	0.15
47.25	0.25	0.35	5.00	0.00	0.15	0.15
47.30	0.25	0.35	5.00	0.00	0.15	0.15
47.35	0.24	0.35	5.00	0.00	0.15	0.15
47.40	0.24	0.35	5.00	0.00	0.15	0.15
47.45	0.24	0.35	5.00	0.00	0.15	0.15
47.50	0.24	0.35	5.00	0.00	0.14	0.14
47.55	0.24	0.35	5.00	0.00	0.14	0.14
47.60	0.24	0.35	5.00	0.00	0.14	0.14
47.65	0.24	0.35	5.00	0.00	0.14	0.14
47.70	0.24	0.35	5.00	0.00	0.14	0.14
47.75	0.24	0.35	5.00	0.00	0.14	0.14
47.80	0.24	0.35	5.00	0.00	0.14	0.14
47.85	0.23	0.35	5.00	0.00	0.13	0.13
47.90	0.23	0.35	5.00	0.00	0.13	0.13
47.95	0.23	0.35	5.00	0.00	0.13	0.13
48.00	0.23	0.35	5.00	0.00	0.13	0.13
48.05	0.23	0.35	5.00	0.00	0.13	0.13
48.10	0.23	0.35	5.00	0.00	0.13	0.13
48.15	0.23	0.35	5.00	0.00	0.12	0.12
48.20	0.23	0.35	5.00	0.00	0.12	0.12
48.25	0.23	0.35	5.00	0.00	0.12	0.12
48.30	0.23	0.35	5.00	0.00	0.12	0.12
48.35	0.23	0.35	5.00	0.00	0.12	0.12
48.40	0.22	0.35	5.00	0.00	0.12	0.12
48.45	0.22	0.35	5.00	0.00	0.11	0.11
48.50	0.22	0.35	5.00	0.00	0.11	0.11
48.55	0.22	0.35	5.00	0.00	0.11	0.11
48.60	0.22	0.35	5.00	0.00	0.11	0.11
48.65	0.22	0.35	5.00	0.00	0.11	0.11
48.70	0.22	0.35	5.00	0.00	0.11	0.11
48.75	0.22	0.35	5.00	0.00	0.10	0.10
48.80	0.22	0.35	5.00	0.00	0.10	0.10
48.85	0.22	0.35	5.00	0.00	0.10	0.10
48.90	0.22	0.35	5.00	0.00	0.10	0.10
48.95	0.22	0.35	5.00	0.00	0.10	0.10

Liquefy.sum

49.00	0.22	0.35	5.00	0.00	0.10	0.10
49.05	0.21	0.35	5.00	0.00	0.09	0.09
49.10	0.21	0.35	5.00	0.00	0.09	0.09
49.15	0.21	0.35	5.00	0.00	0.09	0.09
49.20	0.21	0.35	5.00	0.00	0.09	0.09
49.25	0.21	0.35	5.00	0.00	0.09	0.09
49.30	0.21	0.35	5.00	0.00	0.09	0.09
49.35	0.21	0.35	5.00	0.00	0.08	0.08
49.40	0.21	0.35	5.00	0.00	0.08	0.08
49.45	0.21	0.35	5.00	0.00	0.08	0.08
49.50	0.21	0.35	5.00	0.00	0.08	0.08
49.55	0.21	0.35	5.00	0.00	0.08	0.08
49.60	0.21	0.35	5.00	0.00	0.07	0.07
49.65	0.21	0.34	5.00	0.00	0.07	0.07
49.70	0.20	0.34	5.00	0.00	0.07	0.07
49.75	0.20	0.34	5.00	0.00	0.07	0.07
49.80	0.20	0.34	5.00	0.00	0.07	0.07
49.85	0.20	0.34	5.00	0.00	0.07	0.07
49.90	0.20	0.34	5.00	0.00	0.06	0.06
49.95	0.20	0.34	5.00	0.00	0.06	0.06
50.00	0.20	0.34	5.00	0.00	0.06	0.06
50.05	0.20	0.34	5.00	0.00	0.06	0.06
50.10	0.20	0.34	5.00	0.00	0.06	0.06
50.15	0.20	0.34	5.00	0.00	0.05	0.05
50.20	0.20	0.34	5.00	0.00	0.05	0.05
50.25	0.20	0.34	5.00	0.00	0.05	0.05
50.30	0.20	0.34	5.00	0.00	0.05	0.05
50.35	0.20	0.34	5.00	0.00	0.05	0.05
50.40	0.20	0.34	5.00	0.00	0.04	0.04
50.45	0.20	0.34	5.00	0.00	0.04	0.04
50.50	0.20	0.34	5.00	0.00	0.04	0.04
50.55	0.20	0.34	5.00	0.00	0.04	0.04
50.60	0.20	0.34	5.00	0.00	0.04	0.04
50.65	0.20	0.34	5.00	0.00	0.03	0.03
50.70	0.20	0.34	5.00	0.00	0.03	0.03
50.75	0.20	0.34	5.00	0.00	0.03	0.03
50.80	0.20	0.34	5.00	0.00	0.03	0.03
50.85	0.20	0.34	5.00	0.00	0.03	0.03
50.90	0.20	0.34	5.00	0.00	0.02	0.02
50.95	0.20	0.34	5.00	0.00	0.02	0.02
51.00	0.20	0.34	5.00	0.00	0.02	0.02
51.05	0.20	0.34	5.00	0.00	0.02	0.02
51.10	0.20	0.34	5.00	0.00	0.02	0.02
51.15	0.20	0.34	5.00	0.00	0.01	0.01
51.20	0.20	0.34	5.00	0.00	0.01	0.01
51.25	0.20	0.34	5.00	0.00	0.01	0.01
51.30	0.20	0.34	5.00	0.00	0.01	0.01
51.35	0.20	0.34	5.00	0.00	0.01	0.01

Liquefy.sum						
51.40	0.20	0.34	5.00	0.00	0.00	0.00
51.45	0.20	0.34	5.00	0.00	0.00	0.00
51.50	0.20	0.34	5.00	0.00	0.00	0.00

---

\* F.S.<1, Liquefaction Potential Zone  
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

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1 atm (atmosphere) = 1 tsf (ton/ft<sup>2</sup>)  
CRRm           Cyclic resistance ratio from soils  
CSRsf           Cyclic stress ratio induced by a given earthquake (with  
user request factor of safety)  
F.S.            Factor of Safety against liquefaction, F.S.=CRRm/CSRsf  
S\_sat           Settlement from saturated sands  
S\_dry           Settlement from Unsaturated Sands  
S\_all           Total Settlement from Saturated and Unsaturated Sands  
NoLiq           No-Liquefy Soils

# Appendix D

## Percolation Testing



## APPENDIX D

### PERCOLATION TESTING

Percolation testing was performed at one location (PT-01) on July 28, 2018 in general accordance with the Riverside County BMP Design Handbook, Appendix A, Infiltration Testing (Riverside County, 2011) which allow the use of a percolation testing method to estimate infiltration rates.

Upon completion of drilling the test hole, a 2-inch thick gravel layer was placed at the bottom of the hole and a 3.0-inch diameter perforated pipe was installed above the gravel to the ground surface. The boring annulus around the pipe was filled with gravel. The purpose of the pipe and gravel was to reduce the potential for erosion and caving due to the addition of water to the hole.

The test hole was presoaked by filling with water to a height at least 5 times the radius of the test hole. Less than 6 inches of water seeped away from the test holes within 25 minutes for 2 consecutive measurements, meeting the criteria for testing as “silty soil”. Percolation testing was conducted at least 15 hours after presoaking. During testing, the water level and total depth of the test hole were measured from the top of the pipe every 30 minutes for six hours. Water was added to the test hole after each interval to a fixed reference point from the top of the pipe. Following the completion of percolation testing, the pipe could not be removed and was cut 1 foot below the ground surface and the percolation test hole was backfilled with excavated soil.

The percolation test hole data is presented in the table below.

Percolation Test	Test Hole Diameter (inches)	Total Depth of Test Hole (feet)	Perforated Pipe Inside Diameter (inch)	Perforated Pipe Outside Diameter (inch)	Porosity of Gravel, n
PT-01	8	50	2.50	3.00	0.48

Percolation rates describe the movement of water horizontally and downward into the soil from a boring. Infiltration rates describe the downward movement of water through a horizontal surface, such as the floor of a retention basin. Percolation rates are related to infiltration rates but are generally higher and require conversion before use in design. It is our understanding that infiltration rates are not needed for the design of the drywell and have not been provided in this letter. If an infiltration rate is needed, the percolation test data can be used to estimate infiltration rates using the Porchet Inverse Borehole Method, in accordance with the Riverside County guidelines.

A conversion factor derived from California Test 750 (Caltrans, 1986) was applied to adjust for the presence of the gravel and pipe within the borehole. A factor of safety of 3 was applied to the measured infiltration rates to account for subsurface variations, uncertainty in the test method, and future siltation. The well designer should determine whether additional design related safety factors are appropriate and whether infiltration rates or percolation rates are appropriate for use in the well design.

The field data of the most conservative test interval is presented in the following table.

Percolation Test	Test Depth (feet bgs)	Raw Field Data				Corrected Percolation Rate with FOS (in/hour)**
		Time Interval (min)	Change in Water Height (inches)	Field Percolation Rate (in/hour)	Corrected* Field Percolation Rate (in/hour)	
PT-01	10-50	30	10.44	20.88	11.0	3.5

\*Percolation rate corrected for the presence of gravel and pipe within the borehole.

\*\*Percolation rate was obtained from an 8-inch diameter. The percolation rate may change with different well dimensions. The adjustment to the provided percolation rate to a well with different dimensions should be determined by the well designer.

Based on the calculated percolation rate during the most conservative test interval, we recommend a percolation rate of 3.5 inches per hour.





# Appendix E

EZ-Frisk Output Files



```
*****  
*****          EZ-FRISK          *****  
***** SEISMIC HAZARD ANALYSIS DEFINITION *****  
*****          FUGRO CONSULTANTS, INC.          *****  
*****          WALNUT CREEK, CA USA          *****  
*****
```

PROGRAM VERSION

EZ-FRISK 7.65 Build 004

ANALYSIS TITLE:

Seismic Hazard Analysis

ANALYSIS TYPE:

Single Site Analysis

SITE COORDINATES

Latitude 33.9393

Longitude -117.405

INTENSITY TYPE: Maximum Rotated Component of Spectral Response @ 5% Damping

HAZARD DEAGGREGATION

Status: OFF

SOIL AMPLIFICATION

Method: Do not use soil amplification

ATTENUATION EQUATION SITE PARAMETERS

Depth[Vs=1000m/s] (m): 150

Estimate Z1 from Vs30 for CY NGA: 1

Vs30 (m/s): 270

Vs30 Is Measured: 0

Z25 (km): 2

AMPLITUDES - Acceleration (g)

0.0001

0.001

0.01

0.02

0.05

0.07

0.1

0.2

0.3

0.4  
0.5  
0.7  
1  
2  
3

PERIODS (s)

PGA  
0.05  
0.1  
0.2  
0.3  
0.4  
0.5  
0.75  
1  
2  
3  
4

DETERMINISTIC FRACTILES

0.84  
Mean

PLOTTING PARAMETERS

Period at which to plot PGA: 0.005

CALCULATIONAL PARAMETERS

Fault Seismic Sources -

Maximum inclusion distance : 100 km  
Down dip integration increment : 1 km  
Horizontal integration increment : 1 km  
Number rupture length per earthquake : 1

Subduction Interface Seismic Sources -

Maximum inclusion distance : 1000 km  
Down dip integration increment : 5 km  
Horizontal integration increment : 20 km  
Number rupture length per earthquake : 1

Subduction Slab Seismic Sources -

Maximum inclusion distance : 1000 km  
Down dip integration increment : 5 km  
Horizontal integration increment : 20 km  
Number rupture length per earthquake : 1

Area Seismic Sources -

Maximum inclusion distance : 200 km  
Vertical integration increment : 3 km  
Number of rupture azimuths : 3  
Minimum epicentral distance step : 0.5 km  
Maximum epicentral distance step : 10 km  
Gridded Seismic Sources -  
Maximum inclusion distance : 200 km  
Default number of rupture azimuths : 20  
Maximum distance for default azimuths : 40 km  
Minimum distance for one azimuth : 150  
Use binned calculations if possible : true  
Bins per decade in distance (km) : 20  
All Seismic Sources -  
Magnitude integration step : 0.1 M  
Apply magnitude scaling : NO  
Include near-source directivity : NO

ATTENUATION EQUATIONS

Name: Boore-Atkinson (2008) NGA USGS 2008 MRC  
Database: C:\Program Files (x86)\EZ-FRISK 7.65\Files\standard.bin-attendb  
Base: FEMA P-750 Table C21.2-1  
Truncation Type: No Truncation  
Truncation Value: 0  
Magnitude Scale: Moment Magnitude  
Distance Type: Distance To Rupture

Name: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
Database: C:\Program Files (x86)\EZ-FRISK 7.65\Files\standard.bin-attendb  
Base: FEMA P-750 Table C21.2-1  
Truncation Type: No Truncation  
Truncation Value: 0  
Magnitude Scale: Moment Magnitude  
Distance Type: Distance To Rupture

Name: Chiou-Youngs (2007) NGA USGS 2008 MRC  
Database: C:\Program Files (x86)\EZ-FRISK 7.65\Files\standard.bin-attendb  
Base: FEMA P-750 Table C21.2-1  
Truncation Type: No Truncation  
Truncation Value: 0  
Magnitude Scale: Moment Magnitude  
Distance Type: Distance To Rupture

SEISMIC SOURCE SUMMARY TABLE

Closest Deterministic Fault Source	Distance	Magnitude	Mechanism	Dip Angle	Dips To Region	Site Lies
Mojave Shear	67.22	7.6000	Strike Slip	90.0000	--	USGS 2008 California SW
San Gorgonio Shear	33.34	7.6000	Strike Slip	90.0000	--	USGS 2008 California SW
Burnt Mtn	87.34	6.8000	Strike Slip	67.0000	W	USGS 2008 California W
Clamshell-Sawpit	52.57	6.7000	Reverse	50.0000	NW	USGS 2008 California SE
Cleghorn	38.42	6.8000	Strike Slip	90.0000	--	USGS 2008 California S
Coronado Bank	87.28	7.4000	Strike Slip	90.0000	--	USGS 2008 California NE
Cucamonga	26.16	6.7000	Reverse	45.0000	N	USGS 2008 California S
Elysian Park (Upper)	65.67	6.7000	Reverse	50.0000	N	USGS 2008 California E
Eureka Peak	95.26	6.7000	Strike Slip	90.0000	--	USGS 2008 California W
Helendale-So	69.15	7.4000	Strike Slip	90.0000	--	USGS 2008 California SW
Hollywood	78.59	6.7000	Strike Slip	70.0000	N	USGS 2008 California E
Johnson Valley (No)	92.41	6.9000	Strike Slip	90.0000	--	USGS 2008 California SW
Landers	93.59	7.4000	Strike Slip	90.0000	--	USGS 2008 California W
Lenwood-Lockhart-Old Woman Springs	83.63	7.5000	Strike Slip	90.0000	--	USGS 2008 California SW
North Frontal (East)	62.14	7.0000	Reverse	41.0000	S	USGS 2008 California SW
North Frontal (West)	40.67	7.2000	Reverse	49.0000	S	USGS 2008 California SW
Northridge	98.81	6.9000	Reverse	35.0000	S	USGS 2008 California SE
Palos Verdes	79.06	7.3000	Strike Slip	90.0000	--	USGS 2008 California NE
Palos Verdes Connected	79.06	7.7000	Strike Slip	90.0000	--	USGS 2008 California NE
Pinto Mtn	64.38	7.3000	Strike Slip	90.0000	--	USGS 2008 California W
Puente Hills						USGS 2008 California

42.94	7.1000 Reverse	25.0000	N	E
Puente Hills	(Coyote Hills)		USGS	2008 California
42.98	6.9000 Reverse	26.0000	N	E
Puente Hills	(LA)		USGS	2008 California
66.58	7.0000 Reverse	27.0000	N	E
Puente Hills	(Santa Fe Springs)		USGS	2008 California
56.58	6.7000 Reverse	29.0000	N	E
Raymond			USGS	2008 California
59.33	6.8000 Reverse	79.0000	N	SE
Rose Canyon			USGS	2008 California
90.79	6.9000 Strike Slip	90.0000	--	N
San Gabriel			USGS	2008 California
90.50	7.3000 Strike Slip	61.0000	NE	SE
San Joaquin Hills			USGS	2008 California
44.65	7.1000 Reverse	23.0000	SW	NE
San Jose			USGS	2008 California
32.66	6.7000 Strike Slip	74.0000	NW	SE
Sierra Madre			USGS	2008 California
37.00	7.2000 Reverse	53.0000	N	SE
Sierra Madre	(San Fernando)		USGS	2008 California
90.15	6.7000 Reverse	45.0000	N	SE
Sierra Madre	Connected		USGS	2008 California
37.00	7.3000 Reverse	51.0000	N	SE
Verdugo			USGS	2008 California
71.16	6.9000 Reverse	55.0000	NE	E
Chino			USGS	2008 California
19.58	6.8000 Strike Slip	50-65	SW	NE
Elsinore			USGS	2008 California
19.05	7.8490 Strike Slip	75-90	NE	NE
Newport-Inglewood			USGS	2008 California
60.06	7.5000 Strike Slip	88-90	NE	NE
Southern San Andreas			USGS	2008 California
28.60	8.2000 Strike Slip	58-90	N,NE	SW
San Jacinto			USGS	2008 California
17.36	7.8750 Strike Slip	90.0000	--	NW
Santa Monica			USGS	2008 California
83.14	7.4000 SS R	44-75	N	E

SEISMIC SOURCES

Name: Mojave Shear Gridded  
 Region: USGS 2008 California  
 Category: Gridded  
 Database: C:\Users\jburnham\AppData\Local\Risk Engineering\EZ-FRISK\Regions  
 \USGS2008 Lower 48 v2.00\Files\USGS 2008 Lower 48.bin-ssdb

FileType: USGS2008

General Parameters

Magnitude Scale: Moment Magnitude  
Probability of Activity: 1  
Latitude Increment, degrees: 0.1  
Longitude Increment, degrees: 0.1  
Magnitude Threshold for Weighting: 6.5

Earthquake Model Parameters

(Varies point to point?)

Cell Weight: 1  
Fault Mechanism: Strike Slip  
Depth to Top of Rupture, km: 5  
Minimum Magnitude: 6.5  
Maximum Magnitude: 7.6  
Rate at Minimum Magnitude, events per year: 0 Yes  
Beta: 1.84207  
Horizontal Rupture Length, A parameter: -3.22  
Horizontal Rupture Length, B parameter: 0.69  
Rupture Strike Azimuth Model: Fixed Strike  
Rupture Strike Angle, degrees : -47

Attenuation Equations for Source:

Raw Weight	Normalized Weight	Name
1	0.333333	Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
1	0.333333	Boore-Atkinson (2008) NGA USGS 2008 MRC
1	0.333333	Chiou-Youngs (2007) NGA USGS 2008 MRC

Probabilistic Spectra results for EZ-FRISK 7.65 Build 004

ANNUAL FREQUENCY OF EXCEEDANCE: 4.041e-004

RETURN PERIOD: 2474.9

PROBABILITY OF EXCEEDENCE: 2.0% IN 50.0 YEARS

Column 1: Spectral Period

Column 2: Acceleration (g) for: Mean

Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC

Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	7.796e-001	6.598e-001	8.529e-001	7.922e-001
0.05	9.140e-001	7.869e-001	9.732e-001	9.602e-001
0.1	1.256e+000	1.139e+000	1.289e+000	1.323e+000
0.2	1.607e+000	1.469e+000	1.621e+000	1.717e+000
0.3	1.603e+000	1.444e+000	1.657e+000	1.688e+000
0.4	1.511e+000	1.345e+000	1.619e+000	1.545e+000
0.5	1.447e+000	1.314e+000	1.598e+000	1.402e+000
0.75	1.299e+000	1.223e+000	1.429e+000	1.226e+000
1	1.144e+000	1.130e+000	1.185e+000	1.114e+000
2	7.195e-001	7.608e-001	7.360e-001	6.469e-001
3	5.080e-001	5.301e-001	5.365e-001	4.425e-001
4	3.865e-001	4.155e-001	4.036e-001	3.282e-001



Deterministic Spectra Results using EZ-FRISK 7.65 Build 004

Largest Amplitudes of Ground Motions Considering All Sources Calculated using Weighted Mean of Attenuation Equations

Amplitude Units: Acceleration (g)

Fractile: 0.84

Period	Amplitude	Magnitude	Closest Distance (km)	Region	Controlling Source
PGA	5.304e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.05	6.277e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.1	8.573e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.2	1.060e+000	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.3	1.080e+000	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.4	1.058e+000	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.5	1.047e+000	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.75	9.723e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
1	8.710e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
2	5.594e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
3	4.107e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
4	3.127e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto

Fractile: Mean

Period	Amplitude	Magnitude	Closest Distance (km)	Region	Controlling Source
PGA	3.500e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.05	4.141e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.1	5.649e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.2	6.995e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto

0.3	7.119e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
0.4	7.012e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
0.5	6.971e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
0.75	6.401e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
1	5.699e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
2	3.596e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
3	2.631e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
4	1.999e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto

Largest Amplitudes of Ground Motions Considering Sources Calculated with Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Amplitude Units: Acceleration (g)

Fractile: 0.84

Period	Amplitude	Magnitude	Closest Distance (km)	Region	Controlling Source	
PGA	4.325e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
0.05	5.112e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
0.1	7.222e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
0.2	9.427e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
0.3	9.487e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
0.4	9.308e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
0.5	9.769e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
0.75	9.532e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
1	9.093e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
2	6.459e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
3	4.689e-001	8.20 Mw	28.61	USGS 2008	California	Southern San Andreas
4	3.751e-001	8.20 Mw	28.61	USGS 2008	California	Southern San Andreas

Fractile: Mean

Period	Amplitude	Magnitude	Closest Distance (km)	Region	Controlling Source
PGA	2.853e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.05	3.373e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.1	4.765e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.2	6.220e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.3	6.260e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.4	6.191e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.5	6.549e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.75	6.304e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
1	5.971e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
2	4.175e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
3	3.029e-001	8.20 Mw	28.61	USGS 2008 California	Southern San Andreas
4	2.422e-001	8.20 Mw	28.61	USGS 2008 California	Southern San Andreas

Largest Amplitudes of Ground Motions Considering Sources Calculated with Boore-Atkinson (2008) NGA USGS 2008  
 MRC

Amplitude Units: Acceleration (g)

Fractile: 0.84

Period	Amplitude	Magnitude	Closest Distance (km)	Region	Controlling Source
PGA	5.619e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.05	6.568e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.1	8.646e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.2	9.663e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto

Period	Amplitude	Magnitude	Closest Distance (km)	Region	Controlling Source
0.3	1.007e+000	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.4	1.003e+000	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.5	1.000e+000	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.75	9.528e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
1	7.946e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
2	5.106e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
3	4.287e-001	8.20 Mw	28.61	USGS 2008 California	Southern San Andreas
4	3.212e-001	8.20 Mw	28.61	USGS 2008 California	Southern San Andreas
PGA	3.708e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.05	4.334e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.1	5.682e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.2	6.376e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.3	6.617e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.4	6.605e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.5	6.554e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.75	6.177e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
1	5.148e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
2	3.252e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
3	2.735e-001	8.20 Mw	28.61	USGS 2008 California	Southern San Andreas
4	2.047e-001	8.20 Mw	28.61	USGS 2008 California	Southern San Andreas

Fractile: Mean

Largest Amplitudes of Ground Motions Considering Sources Calculated with Chiou-Youngs (2007) NGA USGS 2008 MRC  
 Amplitude Units: Acceleration (g)

Fractile: 0.84

Period	Amplitude	Magnitude	Closest Distance (km)	Region	Controlling Source
PGA	5.969e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.05	7.150e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.1	9.852e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.2	1.272e+000	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.3	1.285e+000	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.4	1.239e+000	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.5	1.165e+000	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.75	1.011e+000	7.88 Mw	17.37	USGS 2008 California	San Jacinto
1	9.092e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
2	5.217e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
3	3.528e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
4	2.581e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto

Fractile: Mean

Period	Amplitude	Magnitude	Closest Distance (km)	Region	Controlling Source
PGA	3.939e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.05	4.718e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.1	6.500e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.2	8.390e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.3	8.481e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.4	8.240e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.5	7.809e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
0.75	6.723e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
1	5.978e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto
2	3.361e-001	7.88 Mw	17.37	USGS 2008 California	San Jacinto

3	2.248e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto
4	1.631e-001	7.88 Mw	17.37	USGS 2008	California	San Jacinto

Largest Amplitudes of Ground Motions for Each Source

Source: Mojave Shear Gridded  
 Region: USGS 2008 California  
 Closest Distance: 65.63 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 7.60 Mw  
 Fractile: 0.84

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	2.231e-001	1.674e-001	2.576e-001	2.444e-001	2.862e-001
0.05	2.544e-001	1.932e-001	2.837e-001	2.862e-001	4.093e-001
0.1	3.416e-001	2.589e-001	3.567e-001	4.093e-001	5.479e-001
0.2	4.458e-001	3.641e-001	4.254e-001	5.438e-001	5.438e-001
0.3	4.581e-001	3.920e-001	4.385e-001	5.108e-001	5.108e-001
0.4	4.428e-001	3.764e-001	4.412e-001	4.739e-001	4.739e-001
0.5	4.357e-001	3.906e-001	4.427e-001	4.061e-001	3.935e-001
0.75	3.880e-001	3.644e-001	4.061e-001	3.497e-001	3.392e-001
1	3.390e-001	3.280e-001	3.280e-001	3.497e-001	3.392e-001

2	1.961e-001	2.034e-001	2.107e-001	1.743e-001
3	1.348e-001	1.401e-001	1.548e-001	1.095e-001
4	1.001e-001	1.092e-001	1.143e-001	7.684e-002

Fractile: Mean

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.472e-001	1.105e-001	1.700e-001	1.612e-001	1.888e-001
0.05	1.678e-001	1.275e-001	1.872e-001	1.872e-001	1.888e-001
0.1	2.251e-001	1.708e-001	2.344e-001	2.700e-001	2.700e-001
0.2	2.941e-001	2.402e-001	2.807e-001	3.615e-001	3.615e-001
0.3	3.019e-001	2.587e-001	2.882e-001	3.588e-001	3.588e-001
0.4	2.935e-001	2.504e-001	2.905e-001	3.398e-001	3.398e-001
0.5	2.887e-001	2.600e-001	2.902e-001	3.159e-001	3.159e-001
0.75	2.541e-001	2.398e-001	2.633e-001	2.593e-001	2.593e-001
1	2.210e-001	2.148e-001	2.265e-001	2.216e-001	2.216e-001
2	1.259e-001	1.315e-001	1.342e-001	1.121e-001	1.121e-001
3	8.633e-002	9.051e-002	9.877e-002	6.973e-002	6.973e-002
4	6.397e-002	7.053e-002	7.282e-002	4.856e-002	4.856e-002

Source: San Gorgonio Shear Gridded  
 Region: USGS 2008 California

Closest Distance: 21.40 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 7.60 Mw  
 Fractile: 0.84  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	2	3	4	5
1				
PGA	4.788e-001	3.646e-001	4.883e-001	5.837e-001
0.05	5.628e-001	4.333e-001	5.609e-001	6.943e-001
0.1	7.722e-001	6.222e-001	7.442e-001	9.501e-001
0.2	9.679e-001	8.159e-001	8.751e-001	1.213e+000
0.3	9.726e-001	8.141e-001	8.950e-001	1.209e+000
0.4	9.424e-001	7.864e-001	8.910e-001	1.150e+000
0.5	9.164e-001	8.023e-001	8.799e-001	1.067e+000
0.75	8.154e-001	7.440e-001	8.009e-001	9.014e-001
1	7.123e-001	6.819e-001	6.643e-001	7.907e-001
2	4.195e-001	4.418e-001	3.999e-001	4.167e-001
3	2.903e-001	3.064e-001	3.000e-001	2.643e-001
4	2.166e-001	2.389e-001	2.251e-001	1.859e-001

Fractile: Mean  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC



Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	3.159e-001	2.405e-001	2.405e-001	3.222e-001	3.851e-001
0.05	3.714e-001	2.859e-001	2.859e-001	3.701e-001	4.581e-001
0.1	5.088e-001	4.106e-001	4.106e-001	4.891e-001	6.269e-001
0.2	6.386e-001	5.383e-001	5.383e-001	5.774e-001	8.001e-001
0.3	6.410e-001	5.372e-001	5.372e-001	5.882e-001	7.975e-001
0.4	6.248e-001	5.230e-001	5.230e-001	5.867e-001	7.647e-001
0.5	6.098e-001	5.373e-001	5.373e-001	5.767e-001	7.153e-001
0.75	5.365e-001	4.915e-001	4.915e-001	5.192e-001	5.988e-001
1	4.658e-001	4.474e-001	4.474e-001	4.304e-001	5.194e-001
2	2.695e-001	2.855e-001	2.855e-001	2.547e-001	2.683e-001
3	1.859e-001	1.980e-001	1.980e-001	1.914e-001	1.684e-001
4	1.384e-001	1.543e-001	1.543e-001	1.435e-001	1.175e-001

Source: Burnt Mtn

Region: USGS 2008 California

Closest Distance: 87.24 km

Amplitude Units: Acceleration (g)

Magnitude: 6.80 Mw

Fractile: 0.84

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations

Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC

Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.020e-001	9.591e-002	1.337e-001	7.644e-002	8.849e-002
0.05	1.129e-001	1.110e-001	1.392e-001	1.297e-001	1.822e-001
0.1	1.559e-001	1.524e-001	1.857e-001	1.834e-001	1.771e-001
0.2	2.296e-001	2.158e-001	2.908e-001	1.665e-001	1.360e-001
0.3	2.390e-001	2.296e-001	3.041e-001	1.156e-001	5.835e-002
0.4	2.316e-001	2.151e-001	3.028e-001	3.661e-002	2.559e-002
0.5	2.227e-001	2.081e-001	2.935e-001	4.460e-002	
0.75	1.808e-001	1.690e-001	2.372e-001		
1	1.495e-001	1.372e-001	1.955e-001		
2	7.540e-002	6.708e-002	1.008e-001		
3	4.617e-002	4.292e-002	5.898e-002		
4	3.415e-002	3.225e-002	4.460e-002		

Fractile: Mean

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	6.731e-002	6.328e-002	8.821e-002	5.044e-002	5.839e-002
0.05	7.449e-002	7.323e-002	9.184e-002	8.558e-002	1.202e-001
0.1	1.027e-001	1.005e-001	1.221e-001	1.210e-001	1.166e-001
0.2	1.515e-001	1.424e-001	1.919e-001		
0.3	1.574e-001	1.515e-001	1.998e-001		
0.4	1.530e-001	1.430e-001	1.994e-001		

0.5	1.466e-001	1.382e-001	1.924e-001	1.093e-001
0.75	1.179e-001	1.111e-001	1.538e-001	8.868e-002
1	9.714e-002	8.975e-002	1.267e-001	7.498e-002
2	4.832e-002	4.335e-002	6.419e-002	3.741e-002
3	2.955e-002	2.773e-002	3.762e-002	2.329e-002
4	2.180e-002	2.082e-002	2.842e-002	1.616e-002

Source: Clamshell-Sawpit

Region: USGS 2008 California

Closest Distance: 52.60 km

Amplitude Units: Acceleration (g)

Magnitude: 6.70 Mw

Fractile: 0.84

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations

Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC

Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	2	3	4	5
1				
PGA	1.640e-001	1.442e-001	2.122e-001	1.356e-001
0.05	1.863e-001	1.714e-001	2.254e-001	1.622e-001
0.1	2.657e-001	2.483e-001	3.091e-001	2.399e-001
0.2	3.762e-001	3.376e-001	4.742e-001	3.167e-001
0.3	3.809e-001	3.405e-001	4.969e-001	3.055e-001
0.4	3.569e-001	3.161e-001	4.700e-001	2.845e-001
0.5	3.373e-001	2.997e-001	4.493e-001	2.628e-001

0.75	2.675e-001	2.365e-001	3.579e-001	2.081e-001
1	2.124e-001	1.904e-001	2.758e-001	1.711e-001
2	9.374e-002	9.163e-002	1.164e-001	7.317e-002
3	5.538e-002	5.843e-002	6.385e-002	4.386e-002
4	3.963e-002	4.382e-002	4.481e-002	3.026e-002

Fractile: Mean

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.082e-001	9.517e-002	1.400e-001	8.945e-002
0.05	1.230e-001	1.131e-001	1.487e-001	1.070e-001
0.1	1.751e-001	1.638e-001	2.031e-001	1.583e-001
0.2	2.482e-001	2.228e-001	3.129e-001	2.090e-001
0.3	2.509e-001	2.246e-001	3.265e-001	2.016e-001
0.4	2.359e-001	2.102e-001	3.095e-001	1.880e-001
0.5	2.222e-001	1.993e-001	2.945e-001	1.729e-001
0.75	1.745e-001	1.556e-001	2.320e-001	1.359e-001
1	1.381e-001	1.246e-001	1.786e-001	1.111e-001
2	6.010e-002	5.922e-002	7.416e-002	4.691e-002
3	3.545e-002	3.774e-002	4.073e-002	2.789e-002
4	2.532e-002	2.829e-002	2.856e-002	1.910e-002

Source: Cleghorn  
 Region: USGS 2008 California  
 Closest Distance: 38.44 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 6.80 Mw  
 Fractile: 0.84

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA		2.206e-001	1.955e-001	2.811e-001	1.853e-001
0.05		2.539e-001	2.343e-001	3.028e-001	2.245e-001
0.1		3.639e-001	3.454e-001	4.148e-001	3.316e-001
0.2		4.962e-001	4.608e-001	5.985e-001	4.292e-001
0.3		4.855e-001	4.554e-001	5.906e-001	4.106e-001
0.4		4.593e-001	4.240e-001	5.786e-001	3.753e-001
0.5		4.337e-001	4.036e-001	5.505e-001	3.471e-001
0.75		3.448e-001	3.230e-001	4.341e-001	2.772e-001
1		2.824e-001	2.644e-001	3.503e-001	2.325e-001
2		1.410e-001	1.322e-001	1.759e-001	1.149e-001
3		8.656e-002	8.518e-002	1.025e-001	7.203e-002
4		6.369e-002	6.416e-002	7.659e-002	5.032e-002

Fractile: Mean  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations

Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.456e-001	1.290e-001	1.855e-001	1.223e-001
0.05	1.675e-001	1.546e-001	1.998e-001	1.481e-001
0.1	2.398e-001	2.279e-001	2.726e-001	2.188e-001
0.2	3.274e-001	3.041e-001	3.949e-001	2.832e-001
0.3	3.198e-001	3.005e-001	3.881e-001	2.709e-001
0.4	3.042e-001	2.820e-001	3.810e-001	2.495e-001
0.5	2.864e-001	2.688e-001	3.608e-001	2.295e-001
0.75	2.253e-001	2.127e-001	2.814e-001	1.816e-001
1	1.838e-001	1.732e-001	2.270e-001	1.513e-001
2	9.042e-002	8.546e-002	1.120e-001	7.377e-002
3	5.541e-002	5.502e-002	6.537e-002	4.583e-002
4	4.067e-002	4.143e-002	4.881e-002	3.178e-002

Source: Coronado Bank  
 Region: USGS 2008 California  
 Closest Distance: 87.33 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 7.40 Mw  
 Fractile: 0.84  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.424e-001	1.238e-001	1.769e-001	1.264e-001	1.464e-001
0.05	1.595e-001	1.416e-001	1.905e-001	1.464e-001	1.464e-001
0.1	2.136e-001	1.871e-001	2.406e-001	2.131e-001	2.131e-001
0.2	2.932e-001	2.679e-001	3.134e-001	2.984e-001	2.984e-001
0.3	3.085e-001	2.935e-001	3.297e-001	3.023e-001	3.023e-001
0.4	3.009e-001	2.806e-001	3.346e-001	2.875e-001	2.875e-001
0.5	2.990e-001	2.875e-001	3.359e-001	2.735e-001	2.735e-001
0.75	2.639e-001	2.601e-001	3.018e-001	2.298e-001	2.298e-001
1	2.295e-001	2.277e-001	2.604e-001	2.004e-001	2.004e-001
2	1.311e-001	1.324e-001	1.523e-001	1.085e-001	1.085e-001
3	8.875e-002	8.953e-002	1.055e-001	7.121e-002	7.121e-002
4	6.621e-002	6.920e-002	7.808e-002	5.134e-002	5.134e-002

Fractile: Mean

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	9.395e-002	8.168e-002	1.167e-001	8.343e-002	8.343e-002
0.05	1.052e-001	9.345e-002	1.257e-001	9.661e-002	9.661e-002
0.1	1.407e-001	1.234e-001	1.581e-001	1.406e-001	1.406e-001
0.2	1.935e-001	1.768e-001	2.068e-001	1.969e-001	1.969e-001

0.3	2.033e-001	1.937e-001	2.167e-001	1.994e-001
0.4	1.994e-001	1.867e-001	2.203e-001	1.911e-001
0.5	1.974e-001	1.910e-001	2.202e-001	1.810e-001
0.75	1.725e-001	1.711e-001	1.956e-001	1.507e-001
1	1.494e-001	1.490e-001	1.687e-001	1.305e-001
2	8.408e-002	8.556e-002	9.702e-002	6.967e-002
3	5.683e-002	5.783e-002	6.731e-002	4.534e-002
4	4.230e-002	4.468e-002	4.976e-002	3.244e-002

Source: Cucamonga

Region: USGS 2008 California

Closest Distance: 26.18 km

Amplitude Units: Acceleration (g)

Magnitude: 6.70 Mw

Fractile: 0.84

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations

Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC

Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	2	3	4	5
1 PGA	2.916e-001	2.615e-001	3.343e-001	2.789e-001
0.05	3.411e-001	3.168e-001	3.671e-001	3.393e-001
0.1	4.956e-001	4.793e-001	5.136e-001	4.939e-001
0.2	6.677e-001	6.244e-001	7.491e-001	6.296e-001
0.3	6.579e-001	6.003e-001	7.713e-001	6.022e-001



0.4	6.156e-001	5.589e-001	7.369e-001	5.511e-001
0.5	5.789e-001	5.241e-001	7.057e-001	5.069e-001
0.75	4.608e-001	4.116e-001	5.652e-001	4.057e-001
1	3.679e-001	3.348e-001	4.334e-001	3.354e-001
2	1.640e-001	1.652e-001	1.821e-001	1.446e-001
3	9.751e-002	1.058e-001	9.981e-002	8.696e-002
4	6.953e-002	7.931e-002	6.923e-002	6.004e-002

Fractile: Mean

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations

Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC

Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	2	3	4	5
1				
PGA	1.924e-001	1.725e-001	2.206e-001	1.840e-001
0.05	2.250e-001	2.090e-001	2.422e-001	2.239e-001
0.1	3.265e-001	3.162e-001	3.375e-001	3.259e-001
0.2	4.406e-001	4.120e-001	4.943e-001	4.154e-001
0.3	4.334e-001	3.961e-001	5.069e-001	3.974e-001
0.4	4.078e-001	3.717e-001	4.853e-001	3.665e-001
0.5	3.830e-001	3.499e-001	4.625e-001	3.365e-001
0.75	3.014e-001	2.714e-001	3.664e-001	2.664e-001
1	2.396e-001	2.194e-001	2.808e-001	2.185e-001
2	1.052e-001	1.068e-001	1.160e-001	9.283e-002
3	6.243e-002	6.832e-002	6.366e-002	5.531e-002
4	4.441e-002	5.121e-002	4.412e-002	3.791e-002

Source: Elysian Park (Upper)  
 Region: USGS 2008 California  
 Closest Distance: 65.70 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 6.70 Mw  
 Fractile: 0.84

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.490e-001	1.530e-001	1.718e-001	1.718e-001	1.223e-001
0.05	1.677e-001	1.782e-001	1.808e-001	1.808e-001	1.440e-001
0.1	2.362e-001	2.517e-001	2.461e-001	2.461e-001	2.109e-001
0.2	3.399e-001	3.500e-001	3.866e-001	3.866e-001	2.830e-001
0.3	3.505e-001	3.630e-001	4.121e-001	4.121e-001	2.764e-001
0.4	3.303e-001	3.394e-001	3.915e-001	3.915e-001	2.599e-001
0.5	3.135e-001	3.236e-001	3.763e-001	3.763e-001	2.406e-001
0.75	2.500e-001	2.580e-001	3.019e-001	3.019e-001	1.902e-001
1	1.974e-001	2.027e-001	2.339e-001	2.339e-001	1.557e-001
2	8.243e-002	8.319e-002	9.952e-002	9.952e-002	6.458e-002
3	4.685e-002	4.829e-002	5.467e-002	5.467e-002	3.759e-002
4	3.340e-002	3.621e-002	3.853e-002	3.853e-002	2.545e-002

Fractile: Mean

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	9.834e-002	1.010e-001	1.133e-001	8.072e-002
0.05	1.106e-001	1.176e-001	1.193e-001	9.504e-002
0.1	1.556e-001	1.661e-001	1.618e-001	1.391e-001
0.2	2.243e-001	2.310e-001	2.551e-001	1.868e-001
0.3	2.309e-001	2.395e-001	2.708e-001	1.824e-001
0.4	2.184e-001	2.258e-001	2.578e-001	1.715e-001
0.5	2.067e-001	2.153e-001	2.466e-001	1.582e-001
0.75	1.632e-001	1.698e-001	1.957e-001	1.241e-001
1	1.284e-001	1.327e-001	1.515e-001	1.010e-001
2	5.285e-002	5.377e-002	6.338e-002	4.140e-002
3	2.999e-002	3.120e-002	3.487e-002	2.390e-002
4	2.134e-002	2.338e-002	2.455e-002	1.607e-002

Source: Eureka Peak  
 Region: USGS 2008 California  
 Closest Distance: 95.31 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 6.70 Mw  
 Fractile: 0.84  
 Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA		8.439e-002	8.388e-002	1.078e-001	6.147e-002
0.05		9.321e-002	9.679e-002	1.125e-001	7.035e-002
0.1		1.287e-001	1.325e-001	1.510e-001	1.026e-001
0.2		1.927e-001	1.887e-001	2.421e-001	1.474e-001
0.3		2.032e-001	2.016e-001	2.570e-001	1.510e-001
0.4		1.966e-001	1.885e-001	2.544e-001	1.470e-001
0.5		1.889e-001	1.810e-001	2.468e-001	1.387e-001
0.75		1.525e-001	1.448e-001	1.993e-001	1.136e-001
1		1.255e-001	1.159e-001	1.641e-001	9.654e-002
2		6.256e-002	5.512e-002	8.408e-002	4.848e-002
3		3.808e-002	3.508e-002	4.884e-002	3.033e-002
4		2.798e-002	2.631e-002	3.651e-002	2.111e-002

Fractile: Mean

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA		5.568e-002	5.535e-002	7.113e-002	4.056e-002
0.05		6.150e-002	6.386e-002	7.423e-002	4.642e-002

0.1	8.481e-002	8.745e-002	9.926e-002	6.773e-002
0.2	1.271e-001	1.245e-001	1.597e-001	9.709e-002
0.3	1.337e-001	1.330e-001	1.689e-001	9.928e-002
0.4	1.298e-001	1.254e-001	1.675e-001	9.647e-002
0.5	1.242e-001	1.201e-001	1.618e-001	9.078e-002
0.75	9.942e-002	9.514e-002	1.292e-001	7.392e-002
1	8.156e-002	7.585e-002	1.063e-001	6.250e-002
2	4.008e-002	3.562e-002	5.355e-002	3.107e-002
3	2.437e-002	2.266e-002	3.115e-002	1.929e-002
4	1.786e-002	1.699e-002	2.327e-002	1.333e-002

Source: Helendale-So Lockhart

Region: USGS 2008 California

Closest Distance: 69.18 km

Amplitude Units: Acceleration (g)

Magnitude: 7.40 Mw

Fractile: 0.84

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations

Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC

Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	2	3	4	5
1				
PGA	1.784e-001	1.488e-001	2.264e-001	1.601e-001
0.05	2.021e-001	1.722e-001	2.458e-001	1.885e-001
0.1	2.739e-001	2.326e-001	3.136e-001	2.756e-001

0.2	3.669e-001	3.271e-001	3.991e-001	3.744e-001
0.3	3.776e-001	3.503e-001	4.108e-001	3.717e-001
0.4	3.648e-001	3.341e-001	4.115e-001	3.487e-001
0.5	3.589e-001	3.405e-001	4.086e-001	3.275e-001
0.75	3.136e-001	3.065e-001	3.619e-001	2.724e-001
1	2.710e-001	2.689e-001	3.082e-001	2.360e-001
2	1.539e-001	1.572e-001	1.782e-001	1.264e-001
3	1.042e-001	1.064e-001	1.236e-001	8.276e-002
4	7.780e-002	8.221e-002	9.158e-002	5.960e-002

Fractile: Mean

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations

Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC

Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	2	3	4	5
1				
PGA	1.177e-001	9.820e-002	1.494e-001	1.056e-001
0.05	1.334e-001	1.136e-001	1.622e-001	1.244e-001
0.1	1.805e-001	1.535e-001	2.061e-001	1.818e-001
0.2	2.421e-001	2.158e-001	2.634e-001	2.470e-001
0.3	2.488e-001	2.312e-001	2.700e-001	2.453e-001
0.4	2.417e-001	2.222e-001	2.710e-001	2.319e-001
0.5	2.372e-001	2.265e-001	2.678e-001	2.172e-001
0.75	2.051e-001	2.017e-001	2.346e-001	1.789e-001
1	1.765e-001	1.760e-001	1.997e-001	1.539e-001
2	9.877e-002	1.016e-001	1.135e-001	8.123e-002
3	6.674e-002	6.871e-002	7.881e-002	5.270e-002

4 4.970e-002 5.308e-002 5.836e-002 3.767e-002

Source: Hollywood  
 Region: USGS 2008 California  
 Closest Distance: 78.63 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 6.70 Mw  
 Fractile: 0.84  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.062e-001	1.002e-001	1.402e-001	1.402e-001	7.819e-002
0.05	1.184e-001	1.169e-001	1.473e-001	1.473e-001	9.118e-002
0.1	1.654e-001	1.631e-001	1.990e-001	1.990e-001	1.341e-001
0.2	2.414e-001	2.287e-001	3.099e-001	3.099e-001	1.856e-001
0.3	2.482e-001	2.396e-001	3.198e-001	3.198e-001	1.853e-001
0.4	2.378e-001	2.233e-001	3.125e-001	3.125e-001	1.777e-001
0.5	2.264e-001	2.135e-001	2.997e-001	2.997e-001	1.659e-001
0.75	1.805e-001	1.699e-001	2.378e-001	2.378e-001	1.339e-001
1	1.477e-001	1.363e-001	1.941e-001	1.941e-001	1.128e-001
2	7.297e-002	6.500e-002	9.806e-002	9.806e-002	5.586e-002
3	4.432e-002	4.139e-002	5.676e-002	5.676e-002	3.481e-002
4	3.250e-002	3.104e-002	4.226e-002	4.226e-002	2.419e-002

Fractile: Mean

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	7.008e-002	6.612e-002	9.253e-002	5.159e-002	
0.05	7.814e-002	7.710e-002	9.717e-002	6.016e-002	
0.1	1.090e-001	1.076e-001	1.308e-001	8.851e-002	
0.2	1.593e-001	1.509e-001	2.045e-001	1.225e-001	
0.3	1.635e-001	1.581e-001	2.102e-001	1.221e-001	
0.4	1.570e-001	1.485e-001	2.057e-001	1.168e-001	
0.5	1.490e-001	1.418e-001	1.964e-001	1.087e-001	
0.75	1.177e-001	1.117e-001	1.542e-001	8.718e-002	
1	9.598e-002	8.916e-002	1.257e-001	7.307e-002	
2	4.676e-002	4.201e-002	6.246e-002	3.580e-002	
3	2.836e-002	2.674e-002	3.620e-002	2.213e-002	
4	2.075e-002	2.004e-002	2.693e-002	1.527e-002	

Source: Johnson Valley (No)  
 Region: USGS 2008 California  
 Closest Distance: 92.46 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 6.90 Mw



Fractile: 0.84

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	9.957e-002	9.448e-002	1.272e-001	7.702e-002
0.05	1.101e-001	1.088e-001	1.329e-001	8.857e-002
0.1	1.507e-001	1.476e-001	1.752e-001	1.293e-001
0.2	2.209e-001	2.104e-001	2.689e-001	1.834e-001
0.3	2.323e-001	2.262e-001	2.844e-001	1.863e-001
0.4	2.261e-001	2.127e-001	2.855e-001	1.801e-001
0.5	2.193e-001	2.081e-001	2.796e-001	1.703e-001
0.75	1.815e-001	1.723e-001	2.314e-001	1.407e-001
1	1.517e-001	1.416e-001	1.930e-001	1.207e-001
2	7.852e-002	7.127e-002	1.021e-001	6.219e-002
3	4.908e-002	4.615e-002	6.153e-002	3.957e-002
4	3.640e-002	3.491e-002	4.640e-002	2.790e-002

Fractile: Mean

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5

PGA	6.570e-002	6.234e-002	8.394e-002	5.082e-002
0.05	7.264e-002	7.180e-002	8.768e-002	5.844e-002
0.1	9.929e-002	9.738e-002	1.152e-001	8.534e-002
0.2	1.458e-001	1.388e-001	1.774e-001	1.210e-001
0.3	1.530e-001	1.492e-001	1.869e-001	1.229e-001
0.4	1.495e-001	1.415e-001	1.880e-001	1.189e-001
0.5	1.445e-001	1.382e-001	1.832e-001	1.120e-001
0.75	1.184e-001	1.133e-001	1.500e-001	9.186e-002
1	9.865e-002	9.261e-002	1.250e-001	7.831e-002
2	5.033e-002	4.606e-002	6.504e-002	3.990e-002
3	3.141e-002	2.981e-002	3.925e-002	2.518e-002
4	2.325e-002	2.254e-002	2.957e-002	1.762e-002

Source: Landers

Region: USGS 2008 California

Closest Distance: 93.64 km

Amplitude Units: Acceleration (g)

Magnitude: 7.40 Mw

Fractile: 0.84

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations

Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC

Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.321e-001	1.171e-001	1.621e-001	1.172e-001

0.05	1.475e-001	1.335e-001	1.741e-001	1.348e-001
0.1	1.967e-001	1.751e-001	2.193e-001	1.959e-001
0.2	2.725e-001	2.521e-001	2.880e-001	2.773e-001
0.3	2.890e-001	2.782e-001	3.057e-001	2.831e-001
0.4	2.831e-001	2.662e-001	3.119e-001	2.711e-001
0.5	2.822e-001	2.731e-001	3.146e-001	2.588e-001
0.75	2.501e-001	2.475e-001	2.843e-001	2.184e-001
1	2.180e-001	2.165e-001	2.465e-001	1.909e-001
2	1.248e-001	1.257e-001	1.449e-001	1.038e-001
3	8.454e-002	8.501e-002	1.004e-001	6.821e-002
4	6.305e-002	6.571e-002	7.425e-002	4.920e-002

Fractile: Mean

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	2	3	4	5
1				
PGA	8.718e-002	7.725e-002	1.070e-001	7.732e-002
0.05	9.731e-002	8.806e-002	1.149e-001	8.897e-002
0.1	1.296e-001	1.155e-001	1.441e-001	1.292e-001
0.2	1.798e-001	1.664e-001	1.900e-001	1.830e-001
0.3	1.904e-001	1.835e-001	2.009e-001	1.868e-001
0.4	1.875e-001	1.771e-001	2.054e-001	1.801e-001
0.5	1.863e-001	1.815e-001	2.062e-001	1.711e-001
0.75	1.634e-001	1.628e-001	1.843e-001	1.432e-001
1	1.419e-001	1.417e-001	1.597e-001	1.243e-001

2	8.007e-002	8.126e-002	9.228e-002	6.666e-002
3	5.412e-002	5.492e-002	6.403e-002	4.343e-002
4	4.028e-002	4.243e-002	4.732e-002	3.109e-002

Source: Lenwood-Lockhart-Old Woman Springs  
 Region: USGS 2008 California

Closest Distance: 83.67 km

Amplitude Units: Acceleration (g)

Magnitude: 7.50 Mw

Fractile: 0.84

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations

Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC

Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.573e-001	1.337e-001	1.950e-001	1.432e-001	1.663e-001
0.05	1.769e-001	1.529e-001	2.115e-001	1.663e-001	1.663e-001
0.1	2.363e-001	2.015e-001	2.653e-001	2.420e-001	2.420e-001
0.2	3.194e-001	2.882e-001	3.333e-001	3.366e-001	3.366e-001
0.3	3.351e-001	3.160e-001	3.494e-001	3.400e-001	3.400e-001
0.4	3.268e-001	3.030e-001	3.547e-001	3.227e-001	3.227e-001
0.5	3.256e-001	3.131e-001	3.573e-001	3.063e-001	3.063e-001
0.75	2.906e-001	2.882e-001	3.257e-001	2.578e-001	2.578e-001
1	2.544e-001	2.556e-001	2.824e-001	2.252e-001	2.252e-001
2	1.480e-001	1.531e-001	1.683e-001	1.227e-001	1.227e-001

3	1.018e-001	1.044e-001	1.199e-001	8.089e-002
4	7.601e-002	8.107e-002	8.847e-002	5.850e-002

Fractile: Mean

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	2	3	4	5
1	PGA	8.820e-002	1.287e-001	9.446e-002
0.05	1.167e-001	1.009e-001	1.395e-001	1.097e-001
0.1	1.557e-001	1.330e-001	1.743e-001	1.596e-001
0.2	2.107e-001	1.902e-001	2.199e-001	2.221e-001
0.3	2.208e-001	2.085e-001	2.296e-001	2.243e-001
0.4	2.166e-001	2.016e-001	2.336e-001	2.146e-001
0.5	2.151e-001	2.081e-001	2.342e-001	2.030e-001
0.75	1.900e-001	1.896e-001	2.112e-001	1.692e-001
1	1.657e-001	1.673e-001	1.830e-001	1.468e-001
2	9.498e-002	9.893e-002	1.072e-001	7.881e-002
3	6.516e-002	6.746e-002	7.650e-002	5.150e-002
4	4.856e-002	5.235e-002	5.638e-002	3.697e-002

Source: North Frontal (East)  
 Region: USGS 2008 California  
 Closest Distance: 62.17 km

Amplitude Units: Acceleration (g)  
 Magnitude: 7.00 Mw  
 Fractile: 0.84  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.686e-001	1.414e-001	2.168e-001	1.475e-001	1.755e-001
0.05	1.905e-001	1.657e-001	2.303e-001	1.755e-001	1.755e-001
0.1	2.655e-001	2.319e-001	3.064e-001	2.581e-001	2.581e-001
0.2	3.714e-001	3.212e-001	4.472e-001	3.458e-001	3.458e-001
0.3	3.827e-001	3.339e-001	4.763e-001	3.380e-001	3.380e-001
0.4	3.623e-001	3.137e-001	4.600e-001	3.131e-001	3.131e-001
0.5	3.492e-001	3.071e-001	4.485e-001	2.919e-001	2.919e-001
0.75	2.897e-001	2.567e-001	3.759e-001	2.365e-001	2.365e-001
1	2.362e-001	2.143e-001	2.959e-001	1.982e-001	1.982e-001
2	1.109e-001	1.115e-001	1.328e-001	8.844e-002	8.844e-002
3	6.815e-002	7.238e-002	7.810e-002	5.398e-002	5.398e-002
4	4.935e-002	5.469e-002	5.553e-002	3.782e-002	3.782e-002

Fractile: Mean  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.112e-001	9.329e-002	1.430e-001	9.735e-002	
0.05	1.257e-001	1.093e-001	1.519e-001	1.158e-001	
0.1	1.749e-001	1.530e-001	2.013e-001	1.703e-001	
0.2	2.451e-001	2.119e-001	2.951e-001	2.282e-001	
0.3	2.521e-001	2.203e-001	3.130e-001	2.230e-001	
0.4	2.399e-001	2.087e-001	3.029e-001	2.082e-001	
0.5	2.305e-001	2.042e-001	2.940e-001	1.934e-001	
0.75	1.892e-001	1.689e-001	2.437e-001	1.552e-001	
1	1.537e-001	1.403e-001	1.917e-001	1.291e-001	
2	7.116e-002	7.208e-002	8.461e-002	5.679e-002	
3	4.365e-002	4.676e-002	4.982e-002	3.436e-002	
4	3.154e-002	3.531e-002	3.539e-002	2.390e-002	

Source: North Frontal (West)  
 Region: USGS 2008 California  
 Closest Distance: 40.69 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 7.20 Mw  
 Fractile: 0.84  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.674e-001	2.169e-001	3.227e-001	2.626e-001
0.05	3.095e-001	2.567e-001	3.538e-001	3.178e-001
0.1	4.337e-001	3.669e-001	4.712e-001	4.629e-001
0.2	5.759e-001	4.956e-001	6.307e-001	6.012e-001
0.3	5.834e-001	5.027e-001	6.657e-001	5.819e-001
0.4	5.524e-001	4.753e-001	6.445e-001	5.375e-001
0.5	5.319e-001	4.705e-001	6.324e-001	4.927e-001
0.75	4.521e-001	4.057e-001	5.476e-001	4.029e-001
1	3.736e-001	3.493e-001	4.313e-001	3.401e-001
2	1.831e-001	1.944e-001	2.009e-001	1.541e-001
3	1.159e-001	1.276e-001	1.256e-001	9.446e-002
4	8.408e-002	9.673e-002	8.900e-002	6.653e-002

Fractile: Mean

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.764e-001	1.431e-001	2.129e-001	1.733e-001
0.05	2.042e-001	1.694e-001	2.335e-001	2.097e-001
0.1	2.857e-001	2.421e-001	3.096e-001	3.054e-001
0.2	3.800e-001	3.270e-001	4.162e-001	3.967e-001
0.3	3.844e-001	3.317e-001	4.375e-001	3.840e-001
0.4	3.660e-001	3.161e-001	4.244e-001	3.575e-001
0.5	3.523e-001	3.136e-001	4.145e-001	3.287e-001



0.75	2.959e-001	2.673e-001	3.550e-001	2.655e-001
1	2.435e-001	2.289e-001	2.794e-001	2.222e-001
2	1.175e-001	1.256e-001	1.279e-001	9.903e-002
3	7.424e-002	8.244e-002	8.014e-002	6.015e-002
4	5.374e-002	6.245e-002	5.672e-002	4.204e-002

Source: Northridge  
 Region: USGS 2008 California  
 Closest Distance: 98.86 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 6.90 Mw  
 Fractile: 0.84  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.142e-001	1.160e-001	1.153e-001	1.115e-001
0.05	1.260e-001	1.320e-001	1.196e-001	1.263e-001
0.1	1.717e-001	1.771e-001	1.576e-001	1.805e-001
0.2	2.540e-001	2.550e-001	2.520e-001	2.549e-001
0.3	2.736e-001	2.777e-001	2.838e-001	2.595e-001
0.4	2.640e-001	2.626e-001	2.808e-001	2.488e-001
0.5	2.570e-001	2.574e-001	2.789e-001	2.347e-001
0.75	2.141e-001	2.145e-001	2.377e-001	1.902e-001

1	1.733e-001	1.721e-001	1.901e-001	1.577e-001
2	7.513e-002	7.408e-002	8.590e-002	6.541e-002
3	4.342e-002	4.368e-002	4.930e-002	3.729e-002
4	3.111e-002	3.304e-002	3.535e-002	2.494e-002

Fractile: Mean

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	2	3	4	5
1	7.537e-002	7.652e-002	7.604e-002	7.355e-002
PGA	8.312e-002	8.709e-002	7.892e-002	8.334e-002
0.05	1.132e-001	1.168e-001	1.036e-001	1.191e-001
0.1	1.676e-001	1.683e-001	1.663e-001	1.682e-001
0.2	1.803e-001	1.832e-001	1.865e-001	1.712e-001
0.3	1.748e-001	1.746e-001	1.849e-001	1.648e-001
0.4	1.695e-001	1.710e-001	1.828e-001	1.548e-001
0.5	1.398e-001	1.410e-001	1.541e-001	1.244e-001
1	1.128e-001	1.126e-001	1.231e-001	1.025e-001
2	4.819e-002	4.788e-002	5.472e-002	4.197e-002
3	2.780e-002	2.822e-002	3.145e-002	2.372e-002
4	1.987e-002	2.133e-002	2.253e-002	1.575e-002

Source: Palos Verdes

Region: USGS 2008 California  
 Closest Distance: 79.10 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 7.30 Mw  
 Fractile: 0.84  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.490e-001	1.284e-001	1.890e-001	1.295e-001	1.512e-001
0.05	1.674e-001	1.480e-001	2.030e-001	1.512e-001	1.512e-001
0.1	2.265e-001	1.987e-001	2.599e-001	2.209e-001	2.209e-001
0.2	3.107e-001	2.817e-001	3.454e-001	3.050e-001	3.050e-001
0.3	3.229e-001	3.041e-001	3.591e-001	3.055e-001	3.055e-001
0.4	3.128e-001	2.894e-001	3.609e-001	2.883e-001	2.883e-001
0.5	3.080e-001	2.930e-001	3.582e-001	2.727e-001	2.727e-001
0.75	2.669e-001	2.598e-001	3.138e-001	2.270e-001	2.270e-001
1	2.295e-001	2.247e-001	2.672e-001	1.967e-001	1.967e-001
2	1.281e-001	1.272e-001	1.522e-001	1.049e-001	1.049e-001
3	8.541e-002	8.531e-002	1.025e-001	6.841e-002	6.841e-002
4	6.364e-002	6.566e-002	7.614e-002	4.912e-002	4.912e-002

Fractile: Mean  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	9.830e-002	8.474e-002	1.247e-001	8.544e-002
0.05	1.104e-001	9.763e-002	1.339e-001	9.974e-002
0.1	1.492e-001	1.311e-001	1.708e-001	1.457e-001
0.2	2.050e-001	1.859e-001	2.279e-001	2.012e-001
0.3	2.127e-001	2.006e-001	2.360e-001	2.016e-001
0.4	2.073e-001	1.925e-001	2.376e-001	1.917e-001
0.5	2.033e-001	1.947e-001	2.348e-001	1.805e-001
0.75	1.744e-001	1.709e-001	2.035e-001	1.489e-001
1	1.494e-001	1.471e-001	1.731e-001	1.281e-001
2	8.218e-002	8.221e-002	9.694e-002	6.739e-002
3	5.468e-002	5.511e-002	6.538e-002	4.355e-002
4	4.065e-002	4.239e-002	4.853e-002	3.104e-002

Source: Palos Verdes Connected

Region: USGS 2008 California

Closest Distance: 79.10 km

Amplitude Units: Acceleration (g)

Magnitude: 7.70 Mw

Fractile: 0.84

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations

Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC

Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.847e-001	1.517e-001	2.265e-001	1.760e-001	2.052e-001
0.05	2.092e-001	1.732e-001	2.491e-001	2.052e-001	2.976e-001
0.1	2.773e-001	2.265e-001	3.077e-001	2.976e-001	4.110e-001
0.2	3.654e-001	3.238e-001	3.613e-001	4.147e-001	4.147e-001
0.3	3.831e-001	3.568e-001	3.779e-001	3.939e-001	3.939e-001
0.4	3.744e-001	3.444e-001	3.849e-001	3.721e-001	3.721e-001
0.5	3.753e-001	3.622e-001	3.914e-001	3.150e-001	3.150e-001
0.75	3.431e-001	3.454e-001	3.688e-001	3.150e-001	2.767e-001
1	3.048e-001	3.143e-001	3.233e-001	2.767e-001	1.528e-001
2	1.843e-001	1.997e-001	2.004e-001	1.528e-001	1.016e-001
3	1.305e-001	1.387e-001	1.512e-001	1.016e-001	7.385e-002
4	9.778e-002	1.086e-001	1.109e-001	7.385e-002	

Fractile: Mean

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.219e-001	1.001e-001	1.495e-001	1.161e-001	1.354e-001
0.05	1.380e-001	1.143e-001	1.644e-001	1.354e-001	1.964e-001
0.1	1.827e-001	1.495e-001	2.022e-001	1.964e-001	2.712e-001
0.2	2.411e-001	2.137e-001	2.384e-001	2.712e-001	2.736e-001
0.3	2.524e-001	2.354e-001	2.483e-001	2.736e-001	

0.4	2.482e-001	2.291e-001	2.534e-001	2.620e-001
0.5	2.482e-001	2.410e-001	2.566e-001	2.472e-001
0.75	2.245e-001	2.273e-001	2.391e-001	2.071e-001
1	1.986e-001	2.058e-001	2.095e-001	1.805e-001
2	1.183e-001	1.291e-001	1.277e-001	9.818e-002
3	8.358e-002	8.957e-002	9.647e-002	6.468e-002
4	6.249e-002	7.010e-002	7.070e-002	4.667e-002

Source: Pinto Mtn  
 Region: USGS 2008 California  
 Closest Distance: 64.41 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 7.30 Mw  
 Fractile: 0.84  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.807e-001	1.515e-001	2.316e-001	1.592e-001
0.05	2.051e-001	1.762e-001	2.507e-001	1.884e-001
0.1	2.803e-001	2.412e-001	3.237e-001	2.760e-001
0.2	3.769e-001	3.367e-001	4.218e-001	3.721e-001
0.3	3.849e-001	3.564e-001	4.312e-001	3.670e-001
0.4	3.702e-001	3.384e-001	4.294e-001	3.426e-001

0.5	3.616e-001	3.412e-001	4.228e-001	3.208e-001
0.75	3.110e-001	3.012e-001	3.667e-001	2.650e-001
1	2.662e-001	2.610e-001	3.091e-001	2.285e-001
2	1.480e-001	1.485e-001	1.746e-001	1.209e-001
3	9.867e-002	9.966e-002	1.176e-001	7.870e-002
4	7.354e-002	7.670e-002	8.745e-002	5.646e-002

Fractile: Mean

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations

Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC

Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	2	3	4	5
1				
PGA	1.193e-001	9.996e-002	1.528e-001	1.050e-001
0.05	1.353e-001	1.163e-001	1.654e-001	1.243e-001
0.1	1.847e-001	1.591e-001	2.127e-001	1.821e-001
0.2	2.487e-001	2.222e-001	2.783e-001	2.455e-001
0.3	2.536e-001	2.352e-001	2.834e-001	2.422e-001
0.4	2.452e-001	2.251e-001	2.828e-001	2.279e-001
0.5	2.389e-001	2.269e-001	2.771e-001	2.127e-001
0.75	2.033e-001	1.982e-001	2.378e-001	1.740e-001
1	1.734e-001	1.709e-001	2.003e-001	1.489e-001
2	9.495e-002	9.597e-002	1.112e-001	7.771e-002
3	6.317e-002	6.438e-002	7.503e-002	5.011e-002
4	4.698e-002	4.953e-002	5.573e-002	3.568e-002

Source: Puente Hills  
 Region: USGS 2008 California  
 Closest Distance: 42.96 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 7.10 Mw  
 Fractile: 0.84  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	2.735e-001	2.507e-001	2.901e-001	2.797e-001	2.797e-001
0.05	3.137e-001	2.927e-001	3.148e-001	3.337e-001	3.337e-001
0.1	4.384e-001	4.161e-001	4.205e-001	4.785e-001	4.785e-001
0.2	5.891e-001	5.671e-001	5.815e-001	6.186e-001	6.186e-001
0.3	5.974e-001	5.807e-001	6.126e-001	5.987e-001	5.987e-001
0.4	5.651e-001	5.513e-001	5.916e-001	5.524e-001	5.524e-001
0.5	5.413e-001	5.419e-001	5.778e-001	5.042e-001	5.042e-001
0.75	4.537e-001	4.629e-001	4.913e-001	4.070e-001	4.070e-001
1	3.699e-001	3.852e-001	3.857e-001	3.387e-001	3.387e-001
2	1.670e-001	1.802e-001	1.759e-001	1.450e-001	1.450e-001
3	1.002e-001	1.084e-001	1.066e-001	8.538e-002	8.538e-002
4	7.222e-002	8.266e-002	7.559e-002	5.842e-002	5.842e-002

Fractile: Mean  
 Column 1: Spectral Period



Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.805e-001	1.654e-001	1.914e-001	1.846e-001	1.846e-001
0.05	2.070e-001	1.931e-001	2.077e-001	2.201e-001	2.201e-001
0.1	2.889e-001	2.746e-001	2.763e-001	3.157e-001	3.157e-001
0.2	3.887e-001	3.742e-001	3.837e-001	4.082e-001	4.082e-001
0.3	3.936e-001	3.832e-001	4.026e-001	3.951e-001	3.951e-001
0.4	3.746e-001	3.667e-001	3.896e-001	3.674e-001	3.674e-001
0.5	3.589e-001	3.616e-001	3.787e-001	3.364e-001	3.364e-001
0.75	2.973e-001	3.052e-001	3.185e-001	2.682e-001	2.682e-001
1	2.412e-001	2.525e-001	2.499e-001	2.213e-001	2.213e-001
2	1.072e-001	1.165e-001	1.120e-001	9.317e-002	9.317e-002
3	6.414e-002	7.005e-002	6.802e-002	5.436e-002	5.436e-002
4	4.615e-002	5.337e-002	4.818e-002	3.692e-002	3.692e-002

Source: Puente Hills (Coyote Hills)  
 Region: USGS 2008 California  
 Closest Distance: 43.00 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 6.90 Mw  
 Fractile: 0.84  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations

Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.419e-001	2.353e-001	2.697e-001	2.209e-001
0.05	2.768e-001	2.762e-001	2.892e-001	2.649e-001
0.1	3.920e-001	3.980e-001	3.924e-001	3.856e-001
0.2	5.377e-001	5.402e-001	5.732e-001	4.997e-001
0.3	5.426e-001	5.472e-001	5.997e-001	4.808e-001
0.4	5.110e-001	5.155e-001	5.765e-001	4.409e-001
0.5	4.864e-001	4.970e-001	5.567e-001	4.054e-001
0.75	3.965e-001	4.092e-001	4.565e-001	3.238e-001
1	3.180e-001	3.318e-001	3.544e-001	2.678e-001
2	1.385e-001	1.465e-001	1.547e-001	1.143e-001
3	8.095e-002	8.671e-002	8.834e-002	6.780e-002
4	5.829e-002	6.557e-002	6.274e-002	4.656e-002

Fractile: Mean

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.596e-001	1.552e-001	1.779e-001	1.457e-001
0.05	1.826e-001	1.822e-001	1.908e-001	1.748e-001
0.1	2.583e-001	2.626e-001	2.579e-001	2.544e-001

0.2	3.548e-001	3.564e-001	3.782e-001	3.297e-001
0.3	3.575e-001	3.611e-001	3.941e-001	3.172e-001
0.4	3.386e-001	3.429e-001	3.796e-001	2.933e-001
0.5	3.219e-001	3.315e-001	3.649e-001	2.692e-001
0.75	2.595e-001	2.697e-001	2.960e-001	2.127e-001
1	2.072e-001	2.174e-001	2.296e-001	1.745e-001
2	8.886e-002	9.467e-002	9.852e-002	7.340e-002
3	5.184e-002	5.601e-002	5.635e-002	4.315e-002
4	3.725e-002	4.234e-002	3.999e-002	2.941e-002

Source: Puente Hills (LA)  
 Region: USGS 2008 California  
 Closest Distance: 66.61 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 7.00 Mw  
 Fractile: 0.84  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.713e-001	1.697e-001	1.964e-001	1.478e-001	1.478e-001
0.05	1.926e-001	1.960e-001	2.078e-001	1.740e-001	1.740e-001
0.1	2.668e-001	2.711e-001	2.754e-001	2.539e-001	2.539e-001
0.2	3.759e-001	3.797e-001	4.061e-001	3.417e-001	3.417e-001

0.3	3.907e-001	4.004e-001	4.359e-001	3.358e-001
0.4	3.710e-001	3.786e-001	4.223e-001	3.120e-001
0.5	3.586e-001	3.715e-001	4.130e-001	2.913e-001
0.75	2.987e-001	3.129e-001	3.475e-001	2.357e-001
1	2.423e-001	2.554e-001	2.745e-001	1.969e-001
2	1.081e-001	1.143e-001	1.237e-001	8.646e-002
3	6.433e-002	6.810e-002	7.274e-002	5.215e-002
4	4.657e-002	5.173e-002	5.176e-002	3.620e-002

Fractile: Mean

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	2	3	4	5
1				
PGA	1.130e-001	1.119e-001	1.296e-001	9.749e-002
0.05	1.271e-001	1.293e-001	1.371e-001	1.148e-001
0.1	1.758e-001	1.789e-001	1.810e-001	1.676e-001
0.2	2.480e-001	2.506e-001	2.680e-001	2.255e-001
0.3	2.574e-001	2.642e-001	2.865e-001	2.216e-001
0.4	2.458e-001	2.518e-001	2.781e-001	2.075e-001
0.5	2.370e-001	2.473e-001	2.707e-001	1.929e-001
0.75	1.953e-001	2.060e-001	2.253e-001	1.546e-001
1	1.578e-001	1.672e-001	1.779e-001	1.282e-001
2	6.939e-002	7.386e-002	7.880e-002	5.552e-002
3	4.120e-002	4.399e-002	4.640e-002	3.320e-002
4	2.976e-002	3.340e-002	3.299e-002	2.288e-002

Source: Puente Hills (Santa Fe Springs)  
 Region: USGS 2008 California  
 Closest Distance: 56.61 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 6.70 Mw  
 Fractile: 0.84

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.732e-001	1.746e-001	1.990e-001	1.990e-001	1.506e-001
0.05	1.960e-001	2.043e-001	2.107e-001	2.107e-001	1.784e-001
0.1	2.777e-001	2.923e-001	2.883e-001	2.883e-001	2.606e-001
0.2	3.937e-001	4.023e-001	4.455e-001	4.455e-001	3.440e-001
0.3	4.011e-001	4.118e-001	4.690e-001	4.690e-001	3.327e-001
0.4	3.762e-001	3.849e-001	4.441e-001	4.441e-001	3.091e-001
0.5	3.557e-001	3.659e-001	4.251e-001	4.251e-001	2.851e-001
0.75	2.824e-001	2.910e-001	3.391e-001	3.391e-001	2.238e-001
1	2.225e-001	2.291e-001	2.617e-001	2.617e-001	1.821e-001
2	9.265e-002	9.446e-002	1.107e-001	1.107e-001	7.408e-002
3	5.267e-002	5.487e-002	6.075e-002	6.075e-002	4.251e-002
4	3.752e-002	4.115e-002	4.269e-002	4.269e-002	2.873e-002

Fractile: Mean

Column 1: Spectral Period

Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations

Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC

Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.143e-001	1.152e-001	1.313e-001	9.939e-002	
0.05	1.293e-001	1.348e-001	1.390e-001	1.177e-001	
0.1	1.830e-001	1.929e-001	1.895e-001	1.719e-001	
0.2	2.598e-001	2.654e-001	2.940e-001	2.270e-001	
0.3	2.642e-001	2.717e-001	3.082e-001	2.195e-001	
0.4	2.489e-001	2.560e-001	2.924e-001	2.045e-001	
0.5	2.347e-001	2.435e-001	2.786e-001	1.878e-001	
0.75	1.844e-001	1.916e-001	2.199e-001	1.462e-001	
1	1.448e-001	1.500e-001	1.696e-001	1.182e-001	
2	5.941e-002	6.105e-002	7.053e-002	4.750e-002	
3	3.372e-002	3.544e-002	3.875e-002	2.703e-002	
4	2.397e-002	2.657e-002	2.721e-002	1.814e-002	

Source: Raymond  
 Region: USGS 2008 California  
 Closest Distance: 59.36 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 6.80 Mw  
 Fractile: 0.84

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.548e-001	1.344e-001	2.011e-001	1.288e-001	1.532e-001
0.05	1.743e-001	1.585e-001	2.113e-001	1.532e-001	1.532e-001
0.1	2.459e-001	2.257e-001	2.860e-001	2.259e-001	2.259e-001
0.2	3.513e-001	3.103e-001	4.420e-001	3.017e-001	3.017e-001
0.3	3.599e-001	3.179e-001	4.684e-001	2.935e-001	2.935e-001
0.4	3.401e-001	2.964e-001	4.500e-001	2.740e-001	2.740e-001
0.5	3.242e-001	2.844e-001	4.338e-001	2.545e-001	2.545e-001
0.75	2.611e-001	2.290e-001	3.508e-001	2.035e-001	2.035e-001
1	2.092e-001	1.865e-001	2.725e-001	1.687e-001	1.687e-001
2	9.425e-002	9.207e-002	1.172e-001	7.353e-002	7.353e-002
3	5.624e-002	5.919e-002	6.500e-002	4.453e-002	4.453e-002
4	4.065e-002	4.458e-002	4.641e-002	3.095e-002	3.095e-002

Fractile: Mean

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.021e-001	8.865e-002	1.327e-001	8.499e-002	8.499e-002

0.05	1.150e-001	1.046e-001	1.394e-001	1.011e-001
0.1	1.620e-001	1.489e-001	1.880e-001	1.491e-001
0.2	2.318e-001	2.048e-001	2.916e-001	1.990e-001
0.3	2.371e-001	2.097e-001	3.078e-001	1.937e-001
0.4	2.249e-001	1.971e-001	2.963e-001	1.813e-001
0.5	2.137e-001	1.891e-001	2.843e-001	1.677e-001
0.75	1.704e-001	1.506e-001	2.274e-001	1.330e-001
1	1.361e-001	1.220e-001	1.765e-001	1.096e-001
2	6.043e-002	5.950e-002	7.463e-002	4.716e-002
3	3.601e-002	3.823e-002	4.146e-002	2.833e-002
4	2.597e-002	2.879e-002	2.958e-002	1.955e-002

Source: Rose Canyon  
 Region: USGS 2008 California  
 Closest Distance: 90.84 km  
 Amplitude Units: Acceleration (g)  
 Magnitude: 6.90 Mw  
 Fractile: 0.84  
 Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	1	2	3	4	5
PGA	1.017e-001	9.598e-002	1.304e-001	7.872e-002	
0.05	1.125e-001	1.107e-001	1.363e-001	9.068e-002	



0.1	1.542e-001	1.504e-001	1.798e-001	1.325e-001
0.2	2.255e-001	2.140e-001	2.752e-001	1.873e-001
0.3	2.366e-001	2.297e-001	2.903e-001	1.898e-001
0.4	2.301e-001	2.160e-001	2.911e-001	1.832e-001
0.5	2.230e-001	2.112e-001	2.847e-001	1.731e-001
0.75	1.843e-001	1.748e-001	2.352e-001	1.428e-001
1	1.540e-001	1.436e-001	1.960e-001	1.223e-001
2	7.961e-002	7.231e-002	1.035e-001	6.297e-002
3	4.975e-002	4.683e-002	6.238e-002	4.005e-002
4	3.690e-002	3.543e-002	4.703e-002	2.823e-002

Fractile: Mean

Column 1: Spectral Period  
 Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations  
 Column 3: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC  
 Column 4: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC  
 Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

	2	3	4	5
1				
PGA	6.710e-002	6.333e-002	8.604e-002	5.194e-002
0.05	7.426e-002	7.301e-002	8.992e-002	5.983e-002
0.1	1.016e-001	9.921e-002	1.182e-001	8.744e-002
0.2	1.488e-001	1.412e-001	1.816e-001	1.236e-001
0.3	1.559e-001	1.515e-001	1.908e-001	1.253e-001
0.4	1.521e-001	1.436e-001	1.917e-001	1.209e-001
0.5	1.469e-001	1.402e-001	1.866e-001	1.138e-001
0.75	1.202e-001	1.149e-001	1.525e-001	9.321e-002
1	1.001e-001	9.394e-002	1.270e-001	7.939e-002
2	5.103e-002	4.674e-002	6.595e-002	4.040e-002