REQUEST FOR QUALIFICATIONS/PROPOSALS LEASE-LEASEBACK SERVICES FOR PACIFIC HIGH SCHOOL-CAREER TECHNICAL EDUCATION TRANSPORTATION TECHNOLOGIES BUILDING AND CAMPUS MODERNIZATION PHASE I - RFQ/P NO. 231– Addendum #1

1. Please note the following correction to page 6 of the RFQ/P text:

   V. CONTRACT DOCUMENTS

   Contract documents may be viewed and ordered through the Crisp Imaging PlanWell Service online by clicking on 'PUBLIC PLANROOM' at www.crispimg.com after Thursday, ~~May 16~~ May 30, 2019. There is a refundable deposit of one hundred dollars ($100.00) for each set of proposal documents and specifications, upon payment by cashier's or company check made payable to San Bernardino City Unified School District. Prospective Proposers may secure up to two sets of documents. Eligible deposits will be refunded upon return of said documents to Crisp Imaging in good acceptable condition within five (5) business days after proposals are evaluated. Proposers in need of more than two sets of proposal documents may purchase at their own cost based on Crisp Imaging's current rates at that time. Crips Imaging contact information is as follows:

   Crisp Imaging
   3180 Pullman Street
   Costa Mesa, CA 92626
   Phone: (866) 632-8329
   Public Plan Room: www.crispimg.com

2. Please note the following correction to page 7 of the RFQ/P text:

   VII. QUESTIONS AND CLARIFICATION OF THE RFP

   A. All questions, requests for explanation or clarifications of any kind in regard to this RFP shall be made in written form submitted via email to Juan Cantoran, at jcantoran@ruhnauclarke.com and a cc to sherri.lien@sbcusd.k12.ca.us; by no later than 3:00 p.m., ~~June 7~~ June 18, 2019. Email header line must contain the text, "**Question re: RFP No.231**".

3. The following Geotechnical and Hazardous Materials Survey Reports are provided as additional background information:

   Geotechnical Reports:

   A. GEOTECHNICAL INVESTIGATION REPORT - DIESEL TECHNOLOGY CENTER HARDSCAPE AREA DESIGN, Converse Consultants, March 5, 2019

   B. REVISED GEOTECHNICAL INVESTIGATION REPORT - GYMNASIUM EXPANSION, Converse Consultants, May 6, 2019

   C. REVISED GEOTECHNICAL INVESTIGATION REPORT - NEW DIESEL TECHNOLOGY CENTER BUILDING, Northwest Corner of the Existing Pacific High School, Converse Consultants, September 26, 2018

   D. RESPONSE TO REVIEW COMMENTS - CGS APPLICATION NO. 04-CGS3835, GYMNASIUM EXPANSION at Pacific High School, Converse Consultants, May 6, 2019

E. REVISED GEOTECHNICAL INVESTIGATION REPORT - GYMNASIUM EXPANSION at Pacific High School, Converse Consultants, May 6, 2019

F. GEOTECHNICAL INVESTIGATION REPORT - Diesel Technology Center Hardscape Area Design at Pacific High School, Converse Consultants, March 5, 2019

Hazardous Materials Survey Reports

A. Hazardous Materials Survey Report - Pacific High School Buildings A, B, C, D Rooms 5-10, I, M, K, Y, Z, Auditorium, Cafeteria, and Metal Storage Building, Pacific High School, Converse Consultants, July 27, 2018

B. Hazardous Materials Survey Report - Pacific High School Buildings D Rooms 1-4, E, F, G Rooms 4-8, H Rooms 5-9, Boys Locker Room, & Gymnasium, Pacific High School, Converse Consultants, August 8, 2018

Converse Consultants
Geotechnical Engineering
Environmental & Groundwater Science
Inspection & Testing Services

GEOTECHNICAL INVESTIGATION REPORT

DIESEL TECHNOLOGY CENTER HARDSCAPE AREA DESIGN

1020 PACIFIC STREET
CITY OF SAN BERNARDINO, SAN BERNARDINO COUNTY, CALIFORNIA

CONVERSE PROJECT NO. 18-81-134-04

Prepared For:

SAN BERNARDINO CITY UNIFIED SCHOOL DISTRICT
Mr. Thomas Pace
Director of Facilities
956 West 9th Street
San Bernardino, CA 92411

Presented By:

CONVERSE CONSULTANTS
2021 Rancho Drive, Suite 1
Redlands, CA 92373
909-796-0544

March 5, 2019

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

March 5, 2019

Mr. Thomas Pace
Director of Facilities
San Bernardino City Unified School District
956 West 9th Street
San Bernardino, CA 92411

Subject: **GEOTECHNICAL INVESTIGATION REPORT**
Diesel Technology Center Hardscape Area Design
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Converse Project No. 18-81-134-04

Dear Mr. Pace:

Converse Consultants (Converse) is pleased to submit this geotechnical investigation report to assist with the design of the hardscape areas around the Diesel Technology Center within the Pacific High School, located in the City of San Bernardino, San Bernardino County, California. This report was prepared in accordance with our proposal dated September 13, 2018, and your Purchase Order Number 894107.

Based upon our field investigation, laboratory data, and analyses, the proposed hardscape design is considered feasible from a geotechnical standpoint, provided the recommendations presented in this report are incorporated into the design and construction of the project.

We appreciate the opportunity to be of service to the San Bernardino City Unified School District. Should you 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

Dist.: 3/Addressee
ZA/JB/HSQ/KVG

PROFESSIONAL CERTIFICATION

This report has been prepared by the individuals whose seals and signatures appear herein.

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

Zahangir Alam, PhD, EIT
Senior Staff Engineer

James Burnham, PG
Project Geologist

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

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1.0 INTRODUCTION

This report contains the findings of our geotechnical investigation performed for the design of the hardscape area around the proposed Diesel Technology Center (DTC) at Pacific High School in the City of San Bernardino, San Bernardino County, California. The approximate site location is shown in Figure No. 1, *Approximate Site Location Map.*

The purposes of this investigation were to evaluate the nature and pertinent engineering properties of the subsurface materials at the project site and to provide pavement design, construction, and rehabilitation recommendations.

This report is prepared for the project site described herein and is intended for use solely by San Bernardino City Unified School District and their designated project team. If provided to other parties, this report be used for information on factual data only. Other parties should be responsible for making their own interpretations of the data contained in this report.

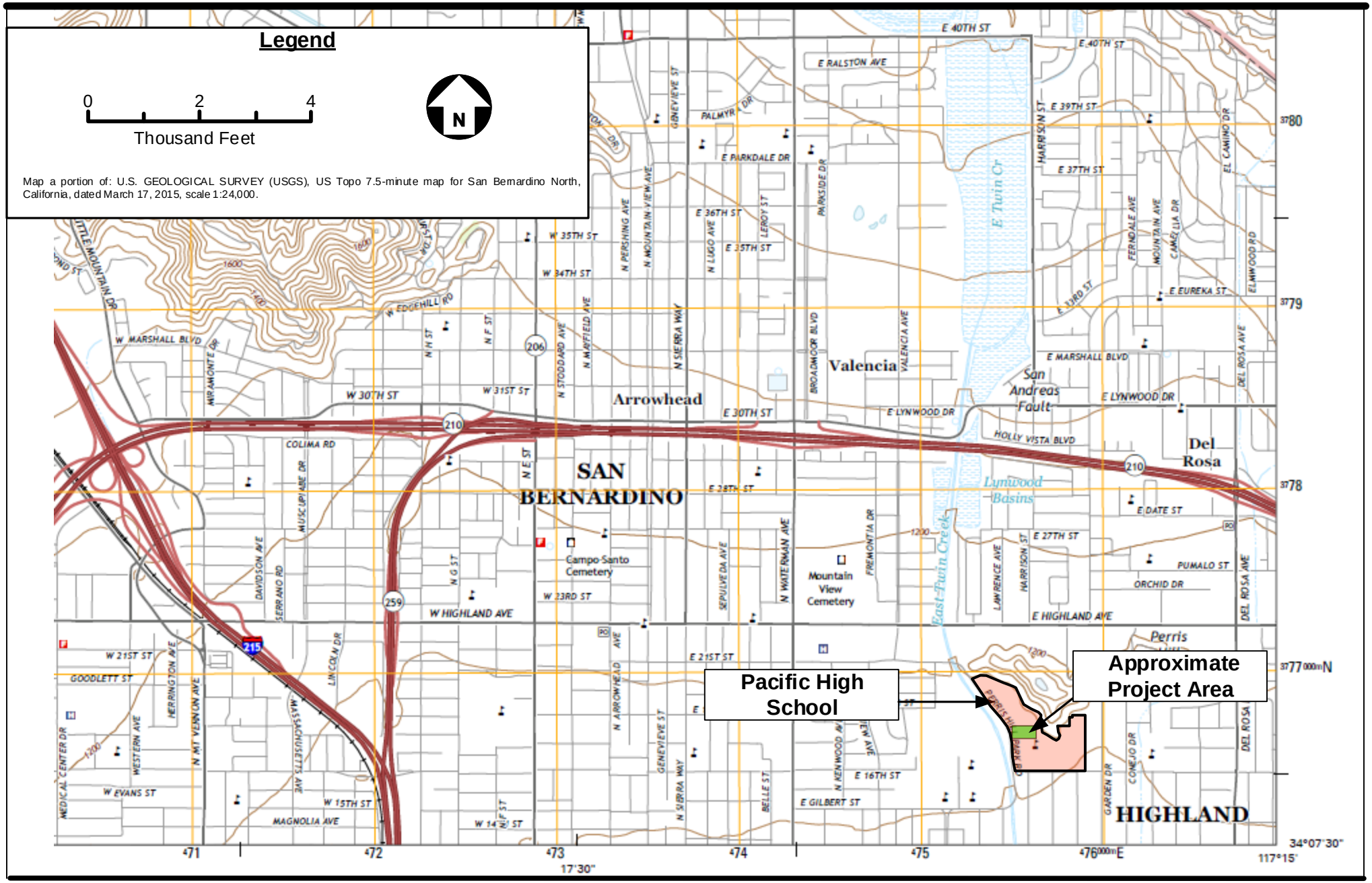
2.0 PROJECT DESCRIPTION

The project consists of the design and construction of hardscaped areas around the DTC at Pacific High School, San Bernardino, CA. The hardscaped area will consist of the following.

- Asphalt Concrete Pavement Rated up to 80,000# load.
- Cement Concrete Pavement Rated up to 80,000# load.
- Interior Concrete Slab Rated up to 64,000# load.
- Concrete Paving (Pedestrian).
- Decomposed Granite Paving (Pedestrian).

3.0 EXISTING PAVEMENT DESCRIPTION

The following Photographs No. 1 through 3 summarize the general pavement conditions observed during the field exploration.



Project: Diesel Technology Center Hardscape Area Design
Location: 1020 Pacific Street
City of Moreno Valley, Riverside County, California

Client: San Bernardino City Unified School District

Approximate Site Location Map

Project No
18-81-134-04

FIGURE
1

Converse Consultants

Photograph 1 – Some longitudinal and transverse cracking on the south side of the project area.

Photograph 2 – Some longitudinal and transverse cracking along the west side of the project area.

Photograph 3 – Some longitudinal and transverse cracking on the north side of the project area.

4.0 SCOPE OF WORK

The scope of our 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 to verify site access and marked the boring locations.
- Notified Underground Service Alert (USA) at least 48 hours prior to drilling to clear the boring locations of conflict with underground utilities.
- Engaged a California-licensed driller to drill exploratory borings.

4.2 Subsurface Exploration

Five exploratory borings (BH-01 through BH-05) were drilled to investigate the subsurface conditions within the proposed hardscape areas on December 8, 2018. The borings were drilled to the planned maximum depths of 6.5 feet below the existing ground surface (bgs).

The approximate locations of the borings are shown on Figure No. 2, *Approximate Boring 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 soils classification, and to evaluate relevant engineering properties of the site soils. These tests included the following.

- *In-situ* moisture content and dry densities (ASTM D2216/D7263)
- R-value (CT 301)
- Maximum dry density and optimum-moisture content (ASTM D1557)

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

4.4 Analyses and Report

Data obtained from the exploratory fieldwork and the laboratory-testing program were evaluated. The geotechnical analyses were compiled, and this report was prepared to present our findings and recommendations.

5.0 SUBSURFACE CONDITIONS

The various elements of the subsurface condition are presented below.

5.1 Subsurface Profile

The general subsurface conditions are summarized on the following table.

Table No. 1, Summary of Subsurface Conditions

Boring No.	Drilled Depth (feet)	Asphalt (inches)	Aggregate Base (inches)	Subgrade Soil Description
BH-01	6.5	2.0	0.0	Silty Sand (SM), fine to medium-grained, dark brown
BH-02	6.5	3.0	0.0	Silty Sand (SM), fine to coarse-grained, brown
BH-03	6.5	6.0	0.0	Silty Sand (SM), fine to coarse-grained, dark brown

Approximate Boring Locations Map

Project: Diesel Technology Center Hardscape Area Design
Location: 1020 Pacific Street
City of San Bernardino, San Bernardino County, California
For: San Bernardino City Unified School District

Project No.
18-81-134-04

Converse Consultants

Figure No.
2

Boring No.	Drilled Depth (feet)	Asphalt (inches)	Aggregate Base (inches)	Subgrade Soil Description
BH-04	6.5	5.0	0.0	Silty Sand (SM), fine to coarse-grained, dark brown
BH-05	6.5	3.0	0.0	Silty Sand (SM), fine to coarse-grained, dark brown

For a detailed description of the subsurface materials encountered, see Drawings No. A-2 through A-6, *Logs of Borings,* in Appendix A, *Field Exploration.* The measured *in-situ* dry densities and moisture-contents of the subsurface materials at selected depths are also shown on the logs of borings.

5.2 Subsurface Variations

Based on the results of our subsurface exploration, variations in the continuity and nature of subsurface conditions should be anticipated. Due to the variations in the nature and depositional characteristics of earth materials, care should be exercised in extrapolating or interpolating subsurface soil conditions between or beyond the exploration locations.

6.0 LABORATORY TEST RESULTS

Laboratory testing was performed to determine the physical and engineering properties of the subsurface soils. Tests results are included in Appendix A, *Field Exploration* and Appendix B, *Laboratory Testing Program*. Discussions of the various test results are presented below.

6.1 Physical Test Results

- In-situ Moisture and Dry Density – *In-situ* dry density and moisture content of the site soils were determined in accordance to ASTM Standard D2216 and D7263. Dry densities of soils of the project ranged from 105 to 118 pcf with moisture contents of 3 to 14 percent. Results are presented in the log of borings in Appendix A, *Field Exploration*.
- R-Value – Two representative bulk samples were tested in accordance with California Test Method 301. The results of the R-value tests were 29 and 38.
- Maximum Dry Density and Optimum Moisture Content – Typical moisture-density relationship of a representative soil sample was tested in accordance with ASTM Standard D1557. The test result is presented in Drawing No. B-1, *Moisture-Density Relationship Result*, in Appendix B, *Laboratory Testing Program.* The laboratory maximum dry density was 126.0 pounds per cubic feet (pcf), with an optimum moisture content of 10.5 percent.

7.0 PAVEMENT RECOMMENDATIONS

This section contains our recommendations for the pavement design. 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 construction.

7.1 New Pavement Section

This section contains our recommendations regarding new pavement sections.

7.1.1 Use of Existing Asphalt Concrete

Existing asphalt concrete can be pulverized onsite and used as base material. The pulverizing depth should be at least 1 inch deeper than the thickness of the existing flexible surface layer to prevent excessive wear on the pulverizing machines. The pulverized materials should conform to Section 200-2.8 of the Greenbook (2015) and should be placed in accordance with Section 301-2 of the Greenbook (2015).

7.1.2 Asphalt Concrete Pavement

Two representative soil samples were tested to determine the R-value of the subgrade soils. The tested R-values were 29 and 38. For pavement design, we have utilized an R-value of 29 and design Traffic Indices (TIs) were 6 through 9.

Based on the above information, asphalt concrete and aggregate base thickness are determined 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. Asphalt concrete pavement sections are presented in the following table.

Table No. 2, Recommended Asphalt Concrete Pavement Sections

	Traffic Index (TI)	Weight Capacity (LB)	Pavement Section		
			Option 1		Option 2
			Asphalt Concrete (inches)	Aggregate Base (inches)	Full AC Section (inches)
R-value 29	6	-	4.0	7.0	8.0
	7	-	4.5	9.0	10.0
	8	64,000#	5.0	11.5	12.0
	9	80,000#	6.0	13.0	14.0

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

Asphalt concrete materials should conform to Section 203 of the Greenbook (2015) and should be placed in accordance with Section 302.5 of the Greenbook (2015).

Base materials should conform to Section 200-2 of the Greenbook (2015) and should be placed in accordance with Section 301-2 of the Greenbook (2015).

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

7.1.3 Concrete (Rigid) Pavement

The rigid pavement sections presented in Table No. 3, *Recommended Rigid Pavement Sections*, are based on the PCC Pavement Design Chart for City and County Roads. Pavement sections are provided for the Traffic Indices (TIs) ranging from 6 to 9. An R-value of 29 was used for pavement design based on laboratory test performed on the two representative soil samples.

Table No. 3, Recommended Rigid Pavement Sections

R-Value	Design Traffic Index (TI)	Weight Capacity (LB)	PCCP Pavement Section (inches)
29	6.0	-	6.5
	7.0	-	7.0
	8.0	64,000#	8.0
	9.0	80,000#	9.0

The pavement section presented in Table No. 3, *Recommended Rigid Pavement Sections* is based on a minimum 28-day Modulus of Rupture (M-R) of 550 psi and a compressive strength of 3,000 psi. The third point method of testing beams should be used to evaluate modulus of rupture. The concrete mix design should contain a minimum cement content of 5.5 sacks per cubic yard. Recommended maximum and minimum values of slump for pavement concrete are 3 inches and 1 inch, respectively.

Transverse contraction joints should not be spaced more than 15 feet and should be cut to a depth of ¼ the thickness of the slab. Longitudinal joints should not be spaced more than 12 feet apart. A longitudinal joint is not necessary in the pavement adjacent to the curb and gutter section.

All outside edges should conform to Section 201 of the 2009 Standard Specifications for Public Works Construction (SSPWC), and PCC pavement should be constructed in accordance with Section 302-6, “Portland Cement Concrete Pavement” of the SSPWC.

Positive drainage should be provided away from all pavement areas to prevent seepage of surface and/or subsurface water into the pavement base and/or subgrade. The pavement structures and sidewalks should be provided with adequate surface and subsurface drainage.

7.1.4 Subgrade Preparation

All areas to receive asphalt or concrete pavement should be overexcavated to a depth of 12 inches below finish grade. The overexcavation should extend at least 2-foot beyond the edge of pavement. If isolated pockets of very soft, loose, or pumping subgrade are encountered, the overexcavation should be locally deepened, as needed, to expose undisturbed, firm, and unyielding soils.

Excavated on-site soils are generally considered suitable for re-use as compacted fill. Prior to re-use, excavated soils should be cleared of all debris, vegetation. Rocks larger than 1 inch in the largest dimension should not be placed within the upper 12 inches of the subgrade section.

Fill soils should be evenly spread in horizontal, 8-inch-maximum, loose lifts. The fill materials should be thoroughly mixed and moisture conditioned to within ± 3 percent of optimum moisture content for coarse grained soils and between optimum and 2 percent above optimum for fine grained soils.

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.

7.2 Pavement Rehabilitation (Mill and Overlay)

The existing pavement sections should be milled at least 2 inches to prepare the surface. Generally milling operations result in an irregular surface to which the tack coat and the paving fabric can readily conform. Paving fabrics are appropriate and will give extended life with generally accepted milled surfaces. Then use tack coat over the milled surface and place paving fabric on top of tack coat. Finally, replace the top of the existing grade with a new asphalt concrete (AC) layer. The paving fabric should meet requirements of Caltrans Standard Specifications, 2015 (Section 96-1.02).

In order to lengthen the life span of the pavement rehabilitation, the top portion of HMA surface layer may be replaced with equivalent gap-graded Rubberized Hot Mix Asphalt (RHMA-G) and/or a rubberized stress absorbing membrane interlayer (SAMI-R). The RHMA-G thickness should have a minimum of 0.1 feet and a maximum of 0.2 feet. (Caltrans HDM, Topic 631). The RHMA-G and SAMI-R will reduce the occurrence of reflective cracking of the pavement surface.

Asphalt concrete materials should conform to Section 203 of the Greenbook and should be placed in accordance with Section 302.5 of the Greenbook, or as required by the City of San Bernardino.

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

7.3 Concrete Paving (Pedestrian)

Except as modified herein, concrete walks 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).

Prior to placement of concrete, the upper 12 inches of subgrade soils should be moisture conditioned to within $\pm$ 3 percent of optimum moisture content for coarse-grained soils and 0 and 2 percent above optimum for fine-grained soils, and compacted to at least 95 percent of the laboratory maximum dry density.

The subgrade should be prepared 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.

7.4 Decomposed Granite Paving (Pedestrian)

For walkways and paths, decomposed granite can be used in two layers of 2 inches. Using decomposed granite with the addition of stabilizers or resins can extend the life of the paving. This however requires the use of proper mixing equipment or can be bought premixed from certain suppliers.

Prior to placement of concrete, the upper 12 inches of subgrade soils should be moisture conditioned to within ± 3 percent of optimum moisture content for coarse-grained soils and 0 and 2 percent above optimum for fine-grained soils, and compacted to at least 95 percent of the laboratory maximum dry density.

8.0 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. Testing should be performed to determine density and moisture of the compacted soils 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.

9.0 CLOSURE

This report is prepared for the project described herein and is intended for use solely by San Bernardino City Unified School District 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.

10.0 REFERENCES

ASTM INTERNATIONAL, Annual Book of ASTM Standards, Current.

CALIFORNIA DEPARTMENT OF TRANSPORTATION (2017), *"Highway Design Manual"*, Department of Transportation, State of California.

CALIFORNIA DEPARTMENT OF TRANSPORTATION (2015), Standard Specifications, dated 2015.

"GREENBOOK" STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, 2015 Edition, Public Works Standards, Inc.

Appendix A

Field Exploration

APPENDIX A

FIELD EXPLORATION

Our field investigation included site reconnaissance and a subsurface exploration program consisting of drilling soil borings. During the site reconnaissance, the surface conditions were noted and the borings were marked using nearby buildings and landmarks as a guide. The boring locations should be considered accurate only to the degree implied by the method used to mark them in the field.

Five exploratory borings (BH-01 through BH-05) were drilled on December 8, 2018 to their planned maximum depths of 6.5 feet below existing ground surface (bgs).

The borings were advanced using a truck-mounted drill rig equipped with 8-inch diameter hollow-stem augers for soil sampling. Encountered earth materials were continuously logged by a Converse geologist and visually classified in the field in accordance with the Unified Soil Classification System. Where appropriate, 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 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 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.

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 driven samples are indicated in the log at the top of the next drive sample.

Following the completion of logging and sampling, all borings were backfilled with soil cuttings and surface patched with cold asphalt concrete. The surface may settle over time. If construction is delayed, 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*. Logs of the exploratory borings are presented in Drawings No. A-2 through A-6, *Logs of Borings.*

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	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

LABORATORY TESTING ABBREVIATIONS

TEST TYPE
(Results shown in Appendix B)

CLASSIFICATION

Plasticity	pi
Grain Size Analysis	ma
Passing No. 200 Sieve	wa
Sand Equivalent	se
Expansion Index	ei
Compaction Curve	max
Hydrometer	h
Disturb	Dist.

STRENGTH

Pocket Penetrometer	p
Direct Shear	ds
Direct Shear (single point)	ds*
Unconfined Compression	uc
Triaxial Compression	tx
Vane Shear	vs
Consolidation	c
Collapse Test	col
Resistance (R) Value	r
Chemical Analysis	ca
Electrical Resistivity	er
Permeability	perm
Soil Cement	sc

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

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

Diesel Technology Center Hardscape Area Design
1020 Pacific Street
City of San Bernardino, San Bernardino County, CA
For: San Bernardino City Unified School District

Project No. 18-81-134-04

Drawing No. A-1

Project ID: 18-81-134-04.GPJ; Template: KEY

Log of Boring No. BH-01

Dates Drilled: 12/8/2018 Logged by: Michael Maldonado Checked By: James Burnham

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

Ground Surface Elevation (ft): 1140 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 DRIVE	SAMPLES BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		2" ASPHALT CONCRETE/NO AGGREGATE BASE						
		ALLUVIUM **SILTY SAND (SM):** fine to medium-grained, dark brown.						
			■		3/4/6	13	115	
5								
			■		5/6/9	13	117	
		End of boring at 6.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings, tamped and surface patched with cold asphalt concrete on 12/8/2018.						

Converse Consultants

Diesel Technology Center Hardscape Area Design
1020 Pacific Street
City of San Bernardino, San Bernardino County, CA
For: San Bernardino City Unified School District

Project No. 18-81-134-04

Drawing No. A-2

Log of Boring No. BH-02

Dates Drilled: 12/8/2018 Logged by: Michael Maldonado Checked By: James Burnham

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

Ground Surface Elevation (ft): 1137 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 DRIVE	SAMPLES BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		3" ASPHALT CONCRETE/NO AGGREGATE BASE						
		ALLUVIUM						
		SILTY SAND (SM): fine to coarse-grained, brown.						
			■	▨	10/14/13	4	118	r
5			■		12/13/20	3	114	
		End of boring at 6.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings, tamped and surface patched with cold asphalt concrete on 12/8/2018.						

Converse Consultants

Diesel Technology Center Hardscape Area Design
1020 Pacific Street
City of San Bernardino, San Bernardino County, CA
For: San Bernardino City Unified School District

Project No. 18-81-134-04

Drawing No. A-3

Log of Boring No. BH-03

Dates Drilled: 12/8/2018 Logged by: Michael Maldonado Checked By: James Burnham

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

Ground Surface Elevation (ft): 1138 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 DRIVE	SAMPLES BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		6" ASPHALT CONCRETE/NO AGGREGATE BASE						
		ALLUVIUM **SILTY SAND (SM):** fine to coarse-grained, dark brown.						
			■		4/5/8	8	108	
5								
			■		6/8/9	14	118	
		End of boring at 6.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings, tamped and surface patched with cold asphalt concrete on 12/8/2018.						

Converse Consultants

Diesel Technology Center Hardscape Area Design
1020 Pacific Street
City of San Bernardino, San Bernardino County, CA
For: San Bernardino City Unified School District

Project No. 18-81-134-04

Drawing No. A-4

Log of Boring No. BH-04

Dates Drilled: 12/8/2018 Logged by: Michael Maldonado Checked By: James Burnham

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

Ground Surface Elevation (ft): 1138 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 DRIVE	SAMPLES BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		5" ASPHALT CONCRETE/NO AGGREGATE BASE						
		ALLUVIUM **SILTY SAND (SM):** fine to coarse-grained, dark brown.						
			■		2/4/5	13	105	max
5								
			■		4/7/10	11	112	
		End of boring at 6.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings, tamped and surface patched with cold asphalt concrete on 12/8/2018.						

Converse Consultants

Diesel Technology Center Hardscape Area Design
1020 Pacific Street
City of San Bernardino, San Bernardino County, CA
For: San Bernardino City Unified School District

Project No. 18-81-134-04

Drawing No. A-5

Log of Boring No. BH-05

Dates Drilled: 12/8/2018 Logged by: Michael Maldonado Checked By: James Burnham

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

Ground Surface Elevation (ft): 1136 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 DRIVE	SAMPLES BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		3" ASPHALT CONCRETE/NO AGGREGATE BASE						
		ALLUVIUM **SILTY SAND (SM):** fine to coarse-grained, dark brown.						
			■		7/8/10	12	115	r
5								
			■		9/10/8	9	106	
		End of boring at 6.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings, tamped and surface patched with cold asphalt concrete on 12/8/2018.						

Converse Consultants

Diesel Technology Center Hardscape Area Design
1020 Pacific Street
City of San Bernardino, San Bernardino County, CA
For: San Bernardino City Unified School District

Project No. 18-81-134-04

Drawing No. A-6

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 physical properties and engineering characteristics. The amount and selection of tests were based on the geotechnical parameters required for this project. Test results are presented herein and on the Logs of Borings in Appendix A, *Field Exploration*. The following is a summary of the various laboratory tests conducted for this project.

Moisture Content and Dry Density

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

R-value

Two representative bulk soil samples were tested for resistance value (R-value) in accordance with California Test Method CT301. The test provides a relative measure of soil strength for use in pavement design. The test results are presented in the following table.

Table No. B-1, R-Value Test Results

Boring No.	Depth (feet)	Soil Classification	Measured R-value
BH-02	1-5	Silty Sand (SM)	38
BH-05	1-5	Silty Sand (SM)	29

Maximum Dry Density and Optimum Moisture Content Tests

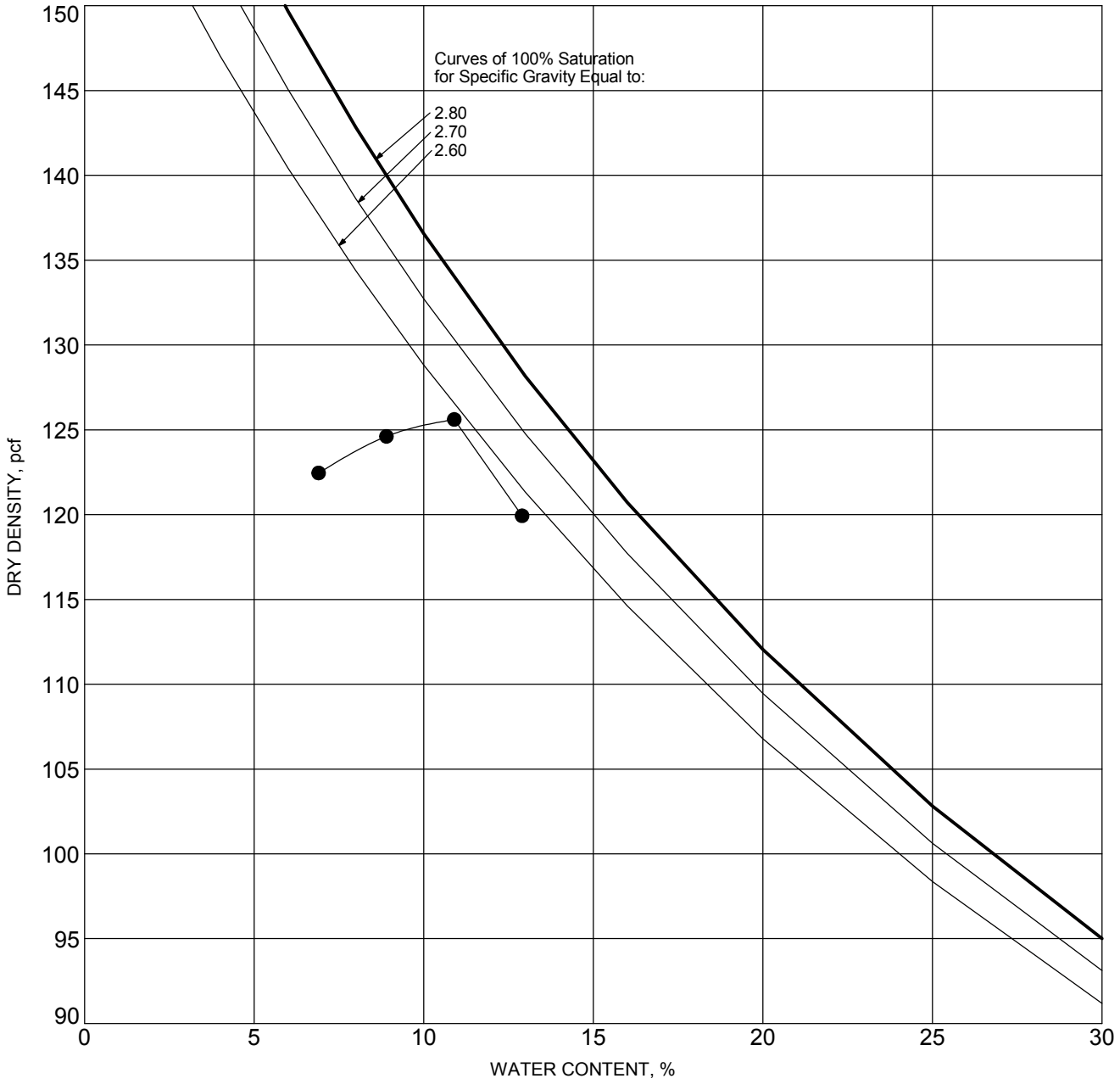
Laboratory maximum dry density and optimum moisture content relationship test was performed on a representative bulk sample. The test was conducted in accordance with the ASTM Standard D1557 method. Test result is presented on Drawing No. B-1, *Moisture-Density Relationship Results,* and summarized in the following table.

Table No. B-2, Summary of Moisture-Density Relationship Results

Boring No.	Depth (feet)	Soil Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
BH-04	1-5	Silty Sand (SM)	126.0	10.5

Sample Storage

Soil samples presently 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.



SYMBOL	BORING NO.	DEPTH (ft)	DESCRIPTION	ASTM TEST METHOD	OPTIMUM WATER, %	MAXIMUM DRY DENSITY, pcf
●	**BH-04**	**1-5**	**SILTY SAND (SM), Dark Brown**	**D1557 A**	**10.5**	**126.0**

MOISTURE-DENSITY RELATIONSHIP RESULTS

Converse Consultants

Diesel Technology Center Hardscape Area Design
1020 Pacific Street
City of San Bernardino, San Bernardino County, CA
For: San Bernardino City Unified School District

Project No.
18-81-134-04

Drawing No.
B-1

Project ID: 18-81-134-04.GPJ; Template: COMPACTION

Converse Consultants
Geotechnical Engineering
Environmental & Groundwater Science
Inspection & Testing Services

REVISED GEOTECHNICAL INVESTIGATION REPORT

GYMNASIUM EXPANSION

PACIFIC HIGH SCHOOL

CITY OF SAN BERNARDINO, SAN BERNARDINO COUNTY, CALIFORNIA

CONVERSE PROJECT NO. 18-81-134-03

Prepared For:

SAN BERNARDINO CITY UNIFIED SCHOOL DISTRICT
Mr. Thomas Pace
Director of Facilities
956 West 9th Street
San Bernardino, CA 92411

Presented By:

CONVERSE CONSULTANTS
2021 Rancho Drive, Suite 1
Redlands, CA 92373
909-796-0544

May 6, 2019

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

May 6, 2019

Mr. Thomas Pace
Director of Facilities
San Bernardino City Unified School District
956 West 9th Street
San Bernardino, CA 92411

Subject: **REVISED GEOTECHNICAL INVESTIGATION REPORT**
GYMNASIUM EXPANSION
Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Converse Project No. 18-81-134-03

Dear Mr. Pace:

Converse Consultants (Converse) has prepared this report to present the results of our geotechnical investigation conducted for the gymnasium expansion located at 1020 Pacific Street, northern side of the existing Pacific High School in the City of San Bernardino, San Bernardino County, California. This report was prepared in accordance with our Proposal dated August 28, 2018 and your Assignment of Project dated September 18, 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 San Bernardino City Unified School District (SBCUSD). 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/Regional Manager

Dist.: 4/Addressee
ZA/JB/SM/HSQ/KVG

2021 Rancho Drive, Suite 1, Redlands CA 92373
Telephone: (909) 796-0544 ♦ Facsimile: (909) 796-7675 ♦ www.converseconsultants.com

PROFESSIONAL CERTIFICATION

This report has been prepared by the following professionals whose seals and signatures appear hereon.

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

Zahangir Alam, PhD, EIT
Senior Staff Engineer

Jay Burnham, PG
Senior Staff Geologist

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

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.

- It is planned to demolish approximately 2,200 square feet front entry and construct a new 6,920 square feet lobby with supporting amenities as a part of existing gymnasium expansion. The addition of building will likely be a combination of steel, concrete and masonry with shallow foundation and slab-on-grade. The structural loads are not known at this time but are anticipated to be moderate.

- The project site is located at the northern side of the Pacific High School, which has a street address of 1020 Pacific Street in the City of San Bernardino, San Bernardino County, California. We anticipate the existing building is serviced by underground water and sewer pipeline. The high school is bounded by Pacific Street to the south, Perris Hill Park Road to the west, open land to the north, and residential property to the east. The high school consists of multiple one- and two-story structures, tennis, baseball and basketball courts, a football field, and parking lots. The project site is relatively flat, with an elevation of approximately 1,132 feet above mean sea level (amsl). Perris Hill, with an approximate peak elevation of 1,300 feet amsl, is located approximately 650 feet northeast of the site. The coordinates for the project site are approximately 34.1298° north latitude and 117.2635° west longitude. The area surrounding the buildings is covered with landscaping and paved with asphalt/cement concrete.

- Our scope of work was developed based on CGS – Note 48 and included project set-up, subsurface exploration, laboratory testing, engineering analysis, and preparation of this report.

- Two exploratory borings (BH-01 and BH-02) were drilled on October 2, 2018 to investigate the subsurface conditions at the site. The borings were advanced to maximum planned depths of 21.5 and 51.5 feet bgs.

- The subsurface soil at the project site consisted primarily of unconsolidated alluvial soils as a mixture of sand and silt. A sand layer was observed at depths between 30.0 to 35.0 and 20.0 to 21.5 feet bgs in borings BH-01 and BH-02, respectively. A gravelly sand layer was observed at depth between 35.0 to 51.5 feet bgs in boring BH-01. Based on hammer blow counts, the upper 10 feet soils are loose to medium dense. Relative compaction of the upper 10 feet soils varies from 78 to 86 percent.

- Groundwater was not encountered in our exploratory borings to a maximum explored depth of 51.5 feet bgs. Several of the referenced groundwater wells have been monitored for many decades and display a trend of long-term decline in local groundwater levels, likely due to groundwater pumping and development of the area. Considering regional development and sustained groundwater usage, groundwater levels are unlikely to return to the historically shallow levels. Current groundwater is generally expected to be deeper than 50 feet bgs and the historical high groundwater is approximately 38 feet bgs. Based on the current groundwater condition, dewatering is not expected to be required during construction of the building. It should be noted that the groundwater level could vary depending upon the seasonal precipitation and possible groundwater pumping activity in the site vicinity. Shallow perched groundwater may be present locally, particularly following precipitation.

- The site is not located within a San Bernardino 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.

- Based on a site-specific dynamic settlement analysis, the site has a liquefaction induced settlement potential of up to 1.85 inches.

- Based on the flat nature of the proposed site configuration, lateral spreading is not considered a risk. Lateral spreading, Landsliding, seiches, tsunamis, and earthquake-induced flooding is considered to be low.

- The expansion index (EI) of the upper 5 feet sample was 5, corresponding to very low expansion 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 resistivities of the sample when saturated were 1,213 to 6,548 Ohm-cm for the site. This indicates that the soils tested are corrosive to moderately 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 site of the proposed gymnasium expansion should be cleared of all vegetation (if any) and debris. The existing front entry of the building will need to be demolished. All materials resulting from clearing, grubbing, and demolition operations should be removed from the site. All existing underground utilities and appurtenances should be located at the site. Such utilities should either be protected in-place or removed and replaced during construction as required by the project specifications. All excavations should be conducted in such a manner as not to cause loss of bearing and/or lateral support of existing structures or utilities.

- 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.

- Footings and slab should be placed on at least 24 inches of compacted fill or 5 feet below ground surface, whichever is deeper. The change in depth of the overexcavation below the footings and slabs-on-grade should be transitioned by a gradual slope (maximum 3:1). The overexcavation should extend to at least 2 feet beyond the footprint of the footings and slab.

- 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.

- The existing gymnasium building is supported on conventional continuous shallow foundation systems. The new gymnasium lobby expansion will also be supported on conventional continuous shllow foundation systems. New footings abutting existing footings should have adhesive dowel connections to mitigate differential settlement. New footings should be conservatively sized to carry all new construction loads, without reliance on existing footings. The structural engineer should provide appropriate measures that are compatible to the existing and new foundations systems.

- 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 1 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 5.1 inches of dry seismic settlement with up to 1.85 inches of liquefaction induced settlement during a large earthquake. The soil profile at the site is almost similar. So, we anticipate that the total settlement will be uniform. We recommend that the planned structure be designed conservatively in anticipation of dynamic differential settlement of 0.7 inches in 40 horizontal feet. Generally, the static and dynamic settlement does not occur at the same time. For design purpose, the structural engineer should decide whether static and dynamic settlement will be combined or not.

- 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 proposed location is suitable for construction of the proposed gymnasium expansion provided the recommendations presented in this geotechnical investigation report are considered 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 improvements to the gymnasium located at 1020 Pacific Street, northeast corner of the existing Pacific High School in the City of San Bernardino, San Bernardino County, California. The approximate location of the site is shown on Figure No. 1, *Approximate Site 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 site earthwork, and design and construction of foundations for the proposed building addition.

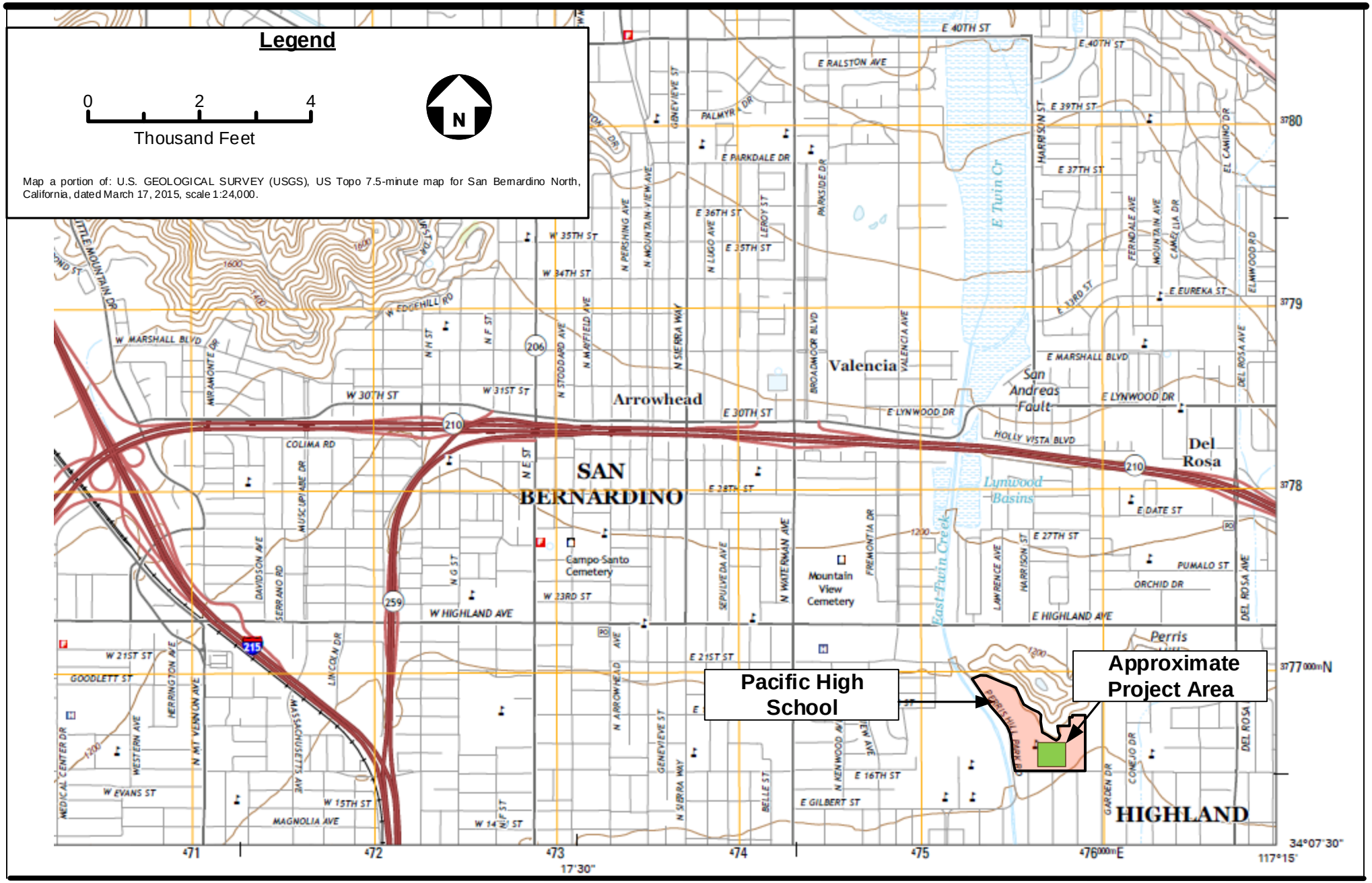
This report is prepared for the project described herein and is intended for use solely by San Bernardino City Unified School District (SBCUSD) and their authorized agents for design purposes. It should not be used as a bidding document but may be made available to the potential contractors for information 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

It is planned to demolish approximately 2,200 square feet front entry and construct a new 6,920 square feet lobby with supporting amenities as a part of existing gymnasium expansion. The addition of building will likely be a combination of steel, concrete and masonry with shallow foundation and slab-on-grade. The structural loads are not known at this time but are anticipated to be moderate.

3.0 SITE DESCRIPTION

The project site is located at the northern side of the Pacific High School, which has a street address of 1020 Pacific Street in the City of San Bernardino, San Bernardino County, California. The existing gymnasium building covers 19,500 square feet. The area surrounding the buildings is covered with landscaping and paved with asphalt/cement concrete. We anticipate the existing building is serviced by underground utility pipeline including water and sewer. Photograph No 1 depicts the present site conditions.



Project: Gymnasium Expansion
Location: Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Client: San Bernardino City Unified School District

Approximate Site Location Map

Project No
18-81-134-03

Converse Consultants

FIGURE
1

Photograph No 1: Present front side conditions of the gymnasium

The high school is bounded by Pacific Street to the south, Perris Hill Park Road to the west, open land to the north, and residential property to the east. The high school consists of multiple one- and two-story structures, tennis, baseball and basketball courts, a football field, and parking lots.

The project site is relatively flat, with an elevation of approximately 1,132 feet above mean sea level (amsl). Perris Hill, with an approximate peak elevation of 1,300 feet amsl, is located approximately 650 feet northeast of the site. The coordinates for the project site are approximately 34.1298° north latitude and 117.2635° west longitude.

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.
- 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.

- Requested clearance of exploration locations for active underground utilities by a representative from the SBCUSD.
- Engaged California licensed driller to drill exploratory borings.

4.2 Subsurface Exploration

Two exploratory borings (BH-01 and BH-02) were drilled on October 2, 2018 to investigate the subsurface conditions at the site. The borings were advanced to maximum planned depths of 21.5 and 51.5 feet bgs.

Approximate boring locations are indicated in Figure No. 2, *Approximate Boring Locations Map*. For a description of the field exploration and sampling program see 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)
- Expansion Index (ASTM D4829)
- Soil Corrosivity (California Tests 643, 422, and 417)
- 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)

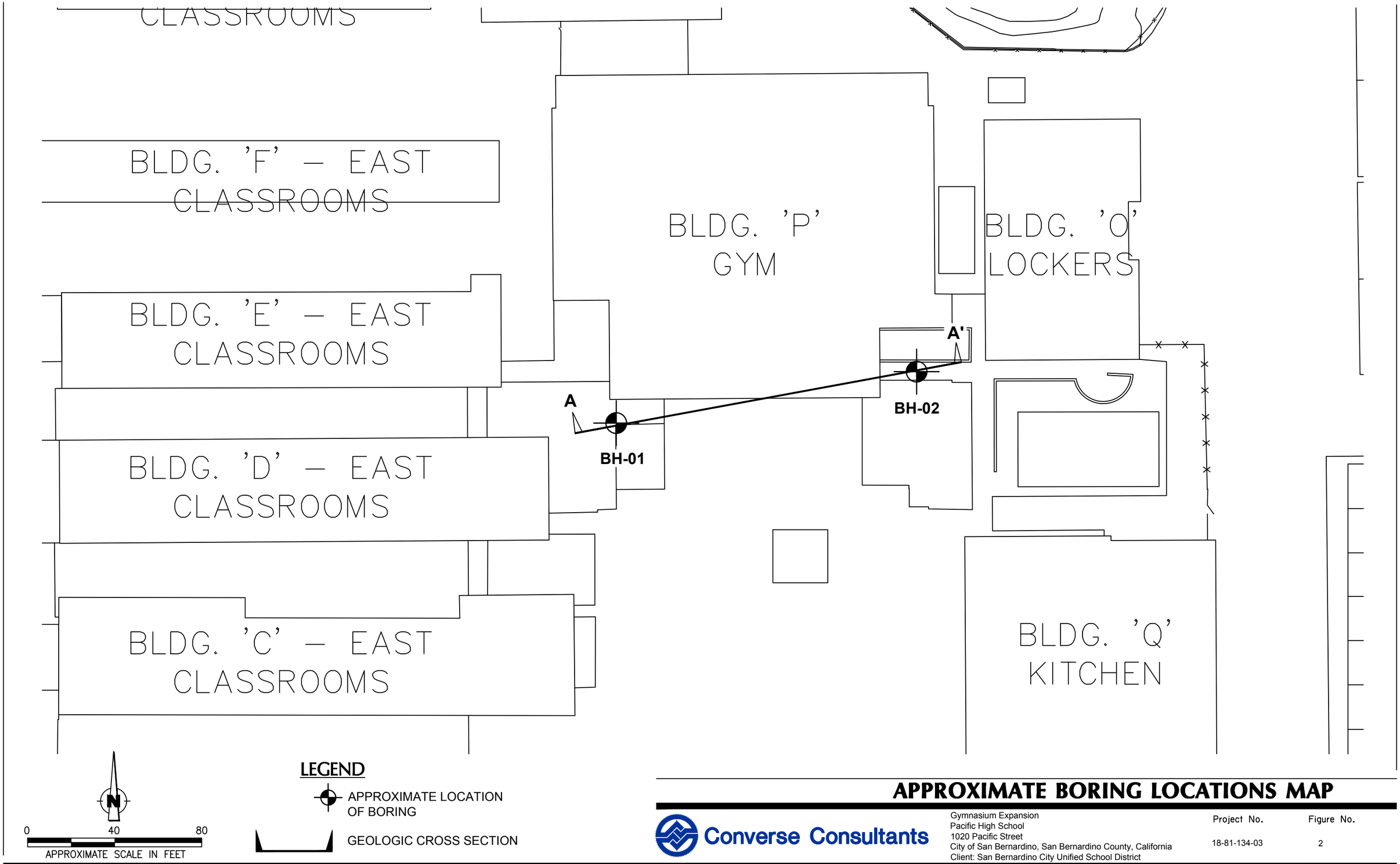
For *in situ* moisture and density data, see the Logs of Borings in Appendix A, *Field Exploration*. For a description of the other laboratory test methods and test results, see Appendix B, *Laboratory Testing Program*.

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 was performed and this report was prepared to present our findings, conclusions and recommendations for the proposed project.

5.0 SITE CONDITIONS

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



APPROXIMATE BORING LOCATIONS MAP

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Gymnasium Expansion
Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Client: San Bernardino City Unified School District

Project No.	Figure No.
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5.1 Surface Profile

The surface around the existing building was paved with asphalt concrete. The measured thicknesses of asphalt concrete are presented in the following table.

Table No. 1, Existing Pavement Sections

Boring No.	Depth (ft)	Asphalt Concrete Thickness (in.)	Aggregate Base Thickness (in.)
BH-01	51.5	4.0	0.0
BH-02	21.5	3.0	0.0

5.2 Subsurface Profile

Based on the exploratory borings and laboratory test results, the subsurface soil at the project site consisted primarily of unconsolidated alluvial soils as a mixture of sand and silt. A sand layer was observed at depths between 30.0 to 35.0 and 20.0 to 21.5 feet bgs in borings BH-01 and BH-02, respectively. A gravelly sand layer was observed at depth between 35.0 to 51.5 feet bgs in boring BH-01. Based on hammer blow counts, the upper 10 feet soils are loose to medium dense. Relative compaction of the upper 10 feet soils varies from 78 to 86 percent.

For a detailed description of the subsurface materials encountered in the exploratory borings, see Drawings No. A-2 and A-3, Logs of Borings, in Appendix A, Field Exploration.

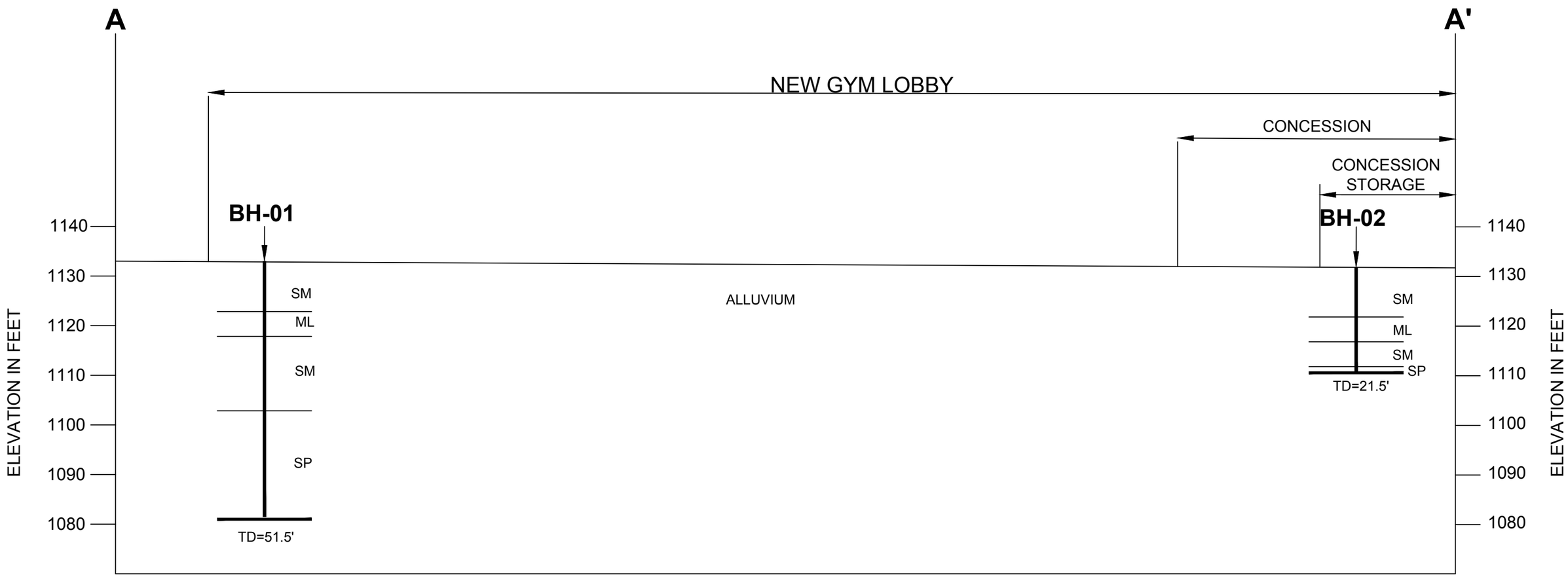
Fill soils were not identified in our subsurface exploration; however, the site has been previously graded for the existing building and fill soil may be present. If present, the fill soils were likely derived from on-site sources and are similar to the native alluvial soils in composition and density.

Figure No. 3, *Geologic Cross Sections A-A'*, 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.*

5.3 Groundwater

Groundwater was not encountered during the field investigation at depths of up to approximately 51.5 feet bgs. Regional databases were reviewed to estimate expected groundwater conditions in the vicinity of the proposed gymnasium expansion. The following data was found on the GeoTracker website (SWRCB, 2018).

- SAN BERNARDINO COUNTY MEDICAL CENTER (Site No. T0607100621), located approximately 2,300 feet southwest of the project site, reported groundwater at depths ranging from 170 to 195 feet bgs in 2001.



PROFILE
HORIZONTAL: 1"=20'
VERTICAL: 1"=20'

0 20 40
GRAPHIC SCALE

GEOLOGIC CROSS SECTION A-A'

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Gymnasium Expansion
Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, CA
For: San Bernardino City Unified School District

Project No.	Drawing No.
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- MOBIL #18-ELG (Site No. T0607100426), located approximately 1.05 miles southwest of the project site reported groundwater at a depth of 150.5 feet bgs in 2006.
- SHELL SERVICE STATION (Site No. T0607101303), located approximately 1.2 miles northeast of the project site, reported groundwater at depths ranging from 200 to 250 feet bgs in 2004.

Data in the following table was found on the National Water Information System (USGS, 2018a). Due to the number of sites with available data in the project area, sites closest to the proposed alignment were selected.

Table No. 2, Summary of USGS Groundwater Depth Data

Site No.	Location	Groundwater Depth Range (ft. bgs)	Date Range
340743117162001	400 feet east of 16th St and Crestview Ave.	(5*)-253.72	1904-2008
340801117162101	Northeast of E. 20th St. and Crestview Ave.	198	1971
340815117154301	North of E. 23rd St. and N. Newport Ave.	38-81	1915-1949
340811117151601	Northeast of E. Highland Ave. and Mountain Ave.	59	1947
340807117162401	Southwest of E. Highland Ave. and Valencia Ave.	218	1970
340737117163801	East of E. Gilbert St. and N. Waterman Ave.	226	1970
340820117164001	North of N. Waterman Ave. and E. 23rd St.	110.3-265	1949-1967
340823117154301	100 feet east of 26th St. and Alameda Ave.	98	1950
340825117155601	Southwest of E. 27th St. and Lawrence Ave.	72-120	1927-1943
340810117162301	300 feet west of E Highland Ave. and Valencia Ave.	42-59	1910-1916

*Based on review of historical groundwater data in the wells listed above, it has been determined that the high groundwater level of -5 feet BGS is doubtful, and therefore, Site No. 340743117162001 has been removed from consideration of the highest historical groundwater level.

<u>Several of the referenced groundwater wells have been monitored for many decades and display a trend of long-term decline in local groundwater levels, likely due to groundwater pumping and development of the area. Considering regional development and sustained groundwater usage, groundwater levels are unlikely to return to the historically shallow levels.</u>

Current groundwater is generally expected to be deeper than 50 feet BGS. The historical high groundwater level was approximately 38 feet bgs. Based on the current and historical groundwater conditions, dewatering is not expected to be required during construction of the building. It should be noted that the groundwater level could vary

depending upon the seasonal precipitation and possible groundwater pumping activity in the site vicinity. Shallow perched groundwater may be present locally, particularly following precipitation.

5.4 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.

5.5 Excavatability

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

5.6 Flooding

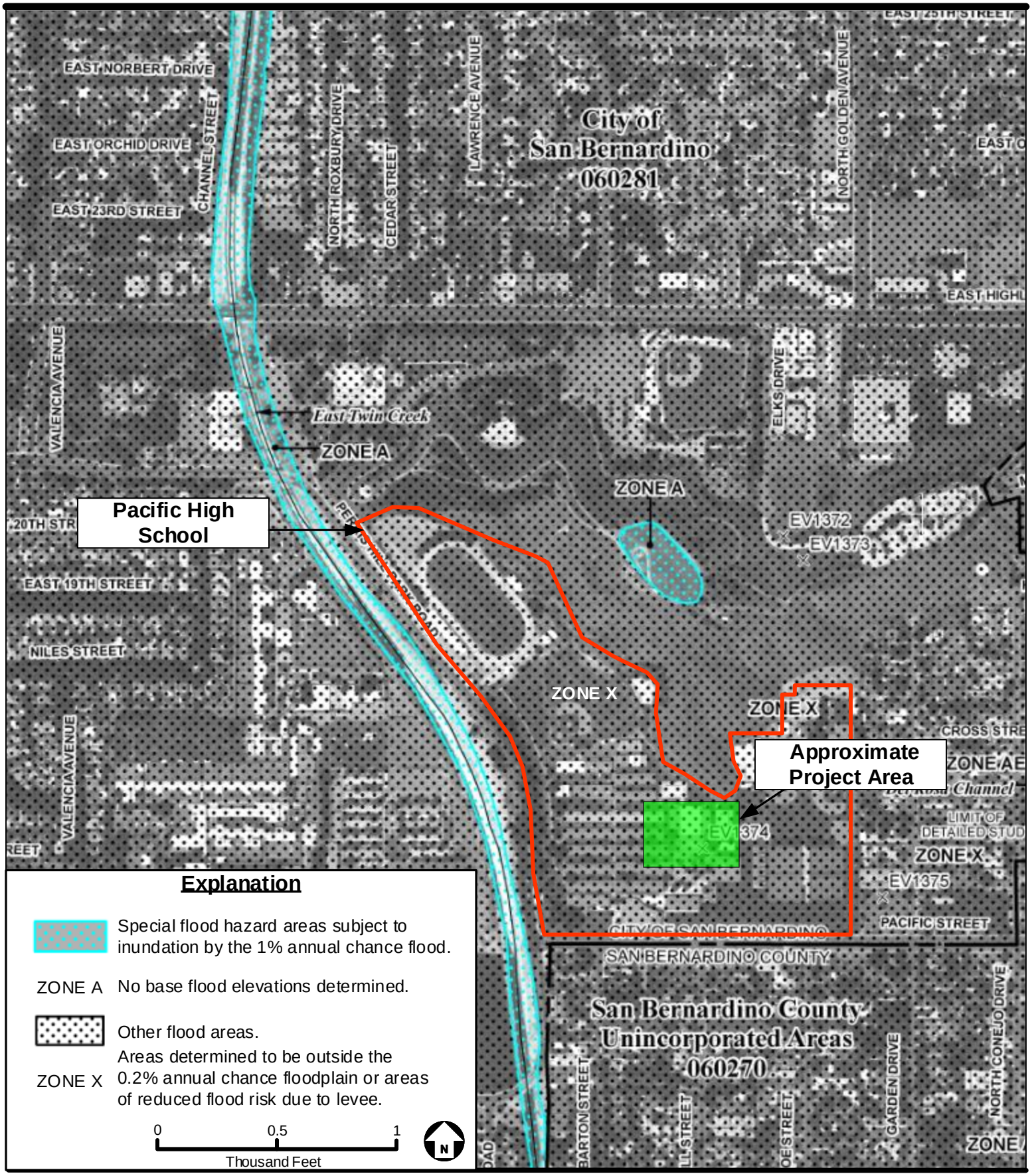
The site is located in an area with reduced flood risk due to levee (FEMA, 2008). The levee is located along the channel west of the campus that runs north-south. The site is located within flood Zone X (500-year flood plain) identified by San Bernardino County (San Bernardino County, 2010a). Figure 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.



Project: Gymnasium Expansion
Location: Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Client: San Bernardino City Unified School District

FEMA Flood Hazard Map

Project No
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Converse Consultants

FIGURE
4

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.

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

6.2 Site Geology

The project site is situated at the foot of Perris Hill near the central portion of the San Bernardino Valley, which is bounded by the San Bernardino Mountains and the San Andreas fault to the north, and the San Timoteo Badlands and the San Jacinto fault to the south.

Perris Hill, which bounds the school to the north and is located roughly 650 feet east-northeast of the project area is comprised of the Pelona Schist. The Pelona Schist is a mica schist metamorphosed from petroliths of sedimentary and pyroclastic rocks (Dibblee and Minch, 2004). Based on the proximity of Perris Hill to the project site, the Pelona Schist is likely located below the site at an unknown depth. The maximum elevation of Perris Hill is approximately 1,300 feet, nearly 170 feet higher than the project site.

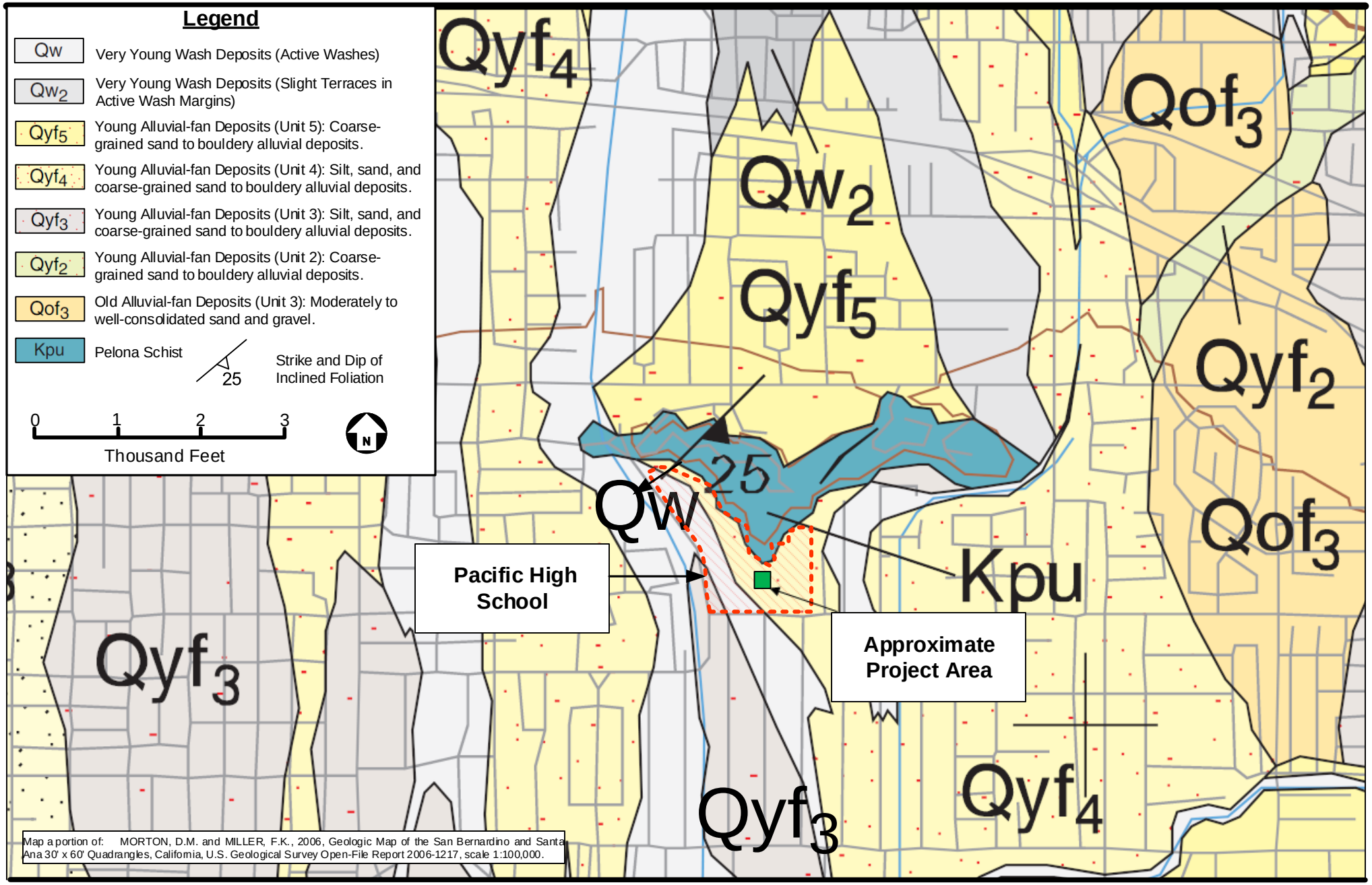
The project site is underlain by alluvial fan deposits primarily consisting of unconsolidated to slightly consolidated silt, sand and gravel. Cretaceous-aged schist bedrock outcrops approximately 150 feet north-northeast of the project site and likely underlies the site at depth. (Dibblee and Minch, 2004; Morton and Miller, 2006).

7.0 FAULTING AND SEISMICITY

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

7.1 Faulting

The site is not located within a San Bernardino County or State of California Earthquake Fault Zone (San Bernardino, 2010b; CGS, 1974). There are no known active faults projecting toward or extending across the project site. See Figure No. 6, *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.



Project: Gymnasium Expansion
Location: Pacific High School
1020 Pacific Street
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Client: San Bernardino City Unified School District

Regional Geologic Map

Project No
18-81-134-03

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FIGURE
5

MAP EXPLANATION

Potentially Active Faults

1906 C

Faults considered to have been active during Quaternary time, solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed, query (?) indicates additional uncertainty Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by creep or possible creep

Aerial photo lineaments (not field checked), based on youthful geomorphic and other features believed to be the results of Quaternary faulting

Special Studies Zone Boundaries

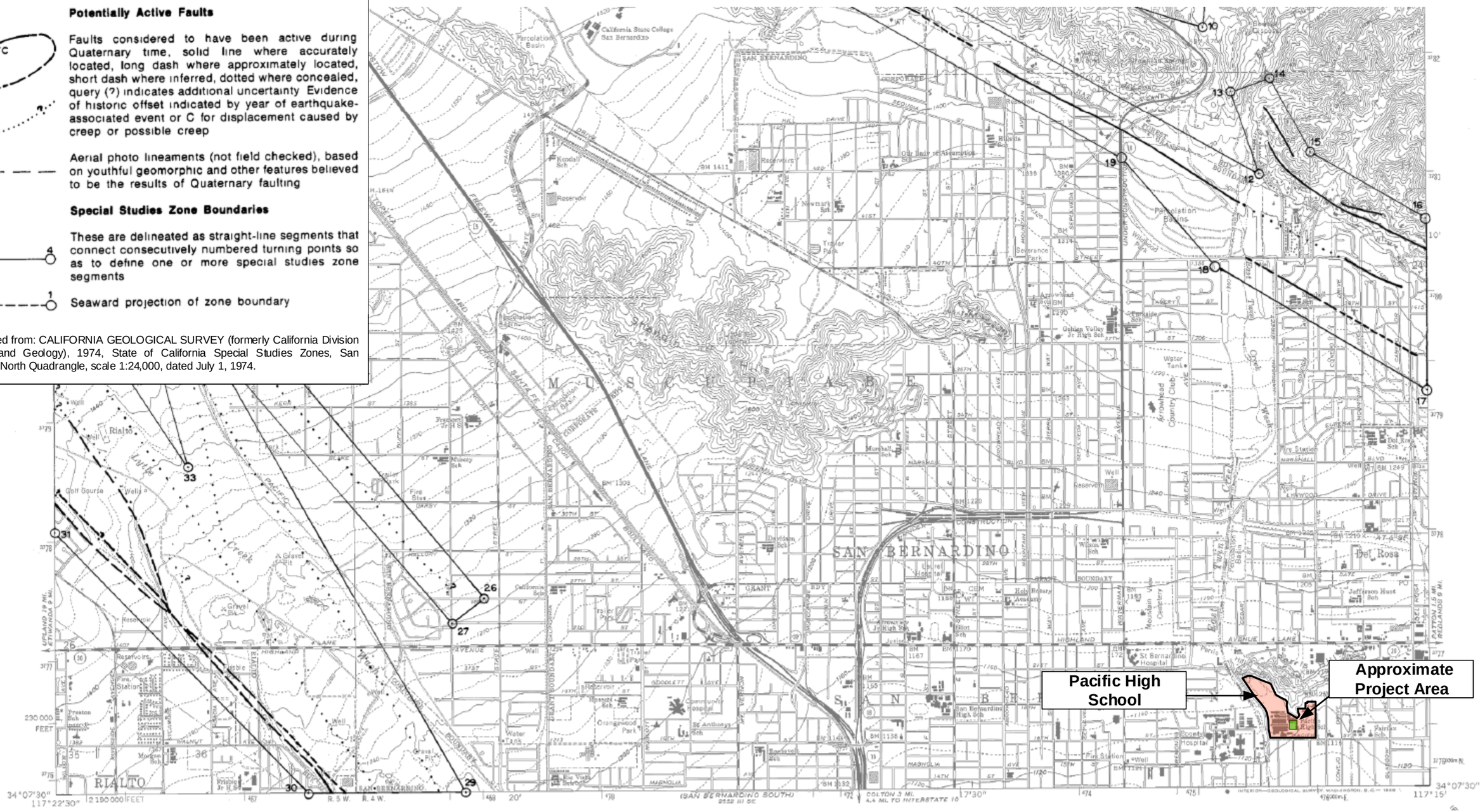
3 — 4

These are delineated as straight-line segments that connect consecutively numbered turning points so as to define one or more special studies zone segments

1

Seaward projection of zone boundary

Map adapted from: CALIFORNIA GEOLOGICAL SURVEY (formerly California Division of Mines and Geology), 1974, State of California Special Studies Zones, San Bernardino North Quadrangle, scale 1:24,000, dated July 1, 1974.



Project: Gymnasium Expansion
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1020 Pacific Street
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Client: San Bernardino City Unified School District

Fault Hazard Map

Project No
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Converse Consultants

FIGURE
6

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. 3, Seismic Characteristics of Nearby Active Faults

Fault Name	Approximate Distance miles (km)	Moment Magnitude (Mw)
San Andreas - Southern	3.9 (6.3)	7.4
San Andreas - San Bernardino	3.9 (6.3)	7.5
San Jacinto-San Bernardino	5.2 (8.3)	6.7
San Jacinto-San Jacinto Valley	8.1 (13.1)	6.9
Cleghorn	10.2 (16.4)	6.5
North Frontal Fault Zone (West)	10.8 (17.4)	7.2
Cucamonga	11.7 (18.8)	6.9
San Andreas – Mojave	19.8 (31.8)	7.4
San Andreas - 1857 Rupture	19.8 (31.8)	7.8
San Jose	24.8 (39.9)	6.4
Sierra Madre	26.4 (42.5)	7.2
Chino-Central Ave. (Elsinore)	27.3 (43.9)	6.7
North Frontal Fault Zone (East)	27.8 (44.8)	6.7
Helendale - S. Lockhardt	28.0 (45.0)	7.3
Elsinore-Glen Ivy	28.5 (45.8)	6.8
Whittier	28.7 (46.2)	6.8
Pinto Mountain	31.4 (50.5)	7.2
San Jacinto-Anza	33.5 (53.9)	7.2
Elsinore-Temecula	34.1 (54.8)	6.8
Clamshell-Sawpit	35.5 (57.1)	6.5
Elysian Park Thrust	36.0 (58.0)	6.7
Lenwood-Lockhart-Old Woman Sprgs	39.0 (62.8)	7.5
Raymond	42.8 (68.9)	6.5
Johnson Valley (Northern)	43.2 (69.5)	6.7
Compton Thrust	47.1 (75.8)	6.8
San Andreas - Coachella	47.7 (76.7)	7.2
Verdugo	47.7 (76.7)	6.9
Landers	48.0 (77.3)	7.3
Burnt Mtn.	49.2 (79.2)	6.5
Eureka Peak	49.8 (80.2)	6.4
Emerson So. - Copper Mtn.	50.0 (80.5)	7.0
Newport-Inglewood (L.A.Basin)	52.4 (84.3)	7.1
Newport-Inglewood (Offshore)	52.6 (84.6)	7.1

Fault Name	Approximate Distance miles (km)	Moment Magnitude (Mw)
Elsinore-Julian	54.0 (86.9)	7.1
Gravel Hills - Harper Lake	55.0 (88.5)	7.1
Hollywood	55.4 (89.2)	6.4
Calico - Hidalgo	56.0 (90.1)	7.3
San Gabriel	59.6 (95.9)	7.2
Sierra Madre (San Fernando)	60.2 (96.9)	6.7
Pisgah-Bullion Mtn.-Mesquite Lk	61.0 (98.2)	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 91 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. Three earthquakes producing estimated ground accelerations at the site ranging from 0.233 g to 0.269 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 14 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 USGS 2008 California Gridded Source, with an MCE of Mw 7.0 and a deterministic peak ground acceleration (PGA) of 0.99g.

In accordance with ASCE 7-10, Section 21.2 the site-specific response spectra can be taken as the lesser of the probabilistic maximum rotated component of MCE ground motion and the 84th percentile of deterministic maximum rotated component of 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. 4, 2016 CBC Mapped Acceleration Parameters

Parameter	Value	Parameter	Value
Site Class	D	**Seismic Design Category**	E
S_s	2.108	**C_{RS}**	1.008
S_1	1.026	**C_{R1}**	0.965
F_a	1	**0.08 F_v/F_a**	0.120
F_v	1.5	**0.4 F_v/F_a**	0.600
S_{MS}	2.108	**T_0**	0.146
S_{M1}	1.539	**T_S**	0.730
S_{DS}	1.405	**T_L**	8
S_{D1}	1.026		

A site-specific response analysis, using faults within 100 kilometers of the site, was developed using the computer program EZ-FRISK v. 7.65 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 3,000 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. 5, Probabilistic Response Spectrum Data

Attenuation Relationship	Probabilistic Mean	Boore-Atkinson (2008)	Campbell-Bozorgnia (2008)	Chiou-Youngs (2007)
Peak Ground Acceleration (g)	1.303	1.236	1.173	1.467
Spectral Period (sec)	**2% in 50yr Probabilistic Spectral Acceleration (g)**			
0.03	1.390	1.335	1.224	1.575
0.05	1.548	1.469	1.367	1.767
0.10	2.144	2.165	1.825	2.351
0.20	2.721	2.737	2.325	3.040
0.30	2.847	2.927	2.391	3.158
0.40	2.823	2.953	2.410	3.055

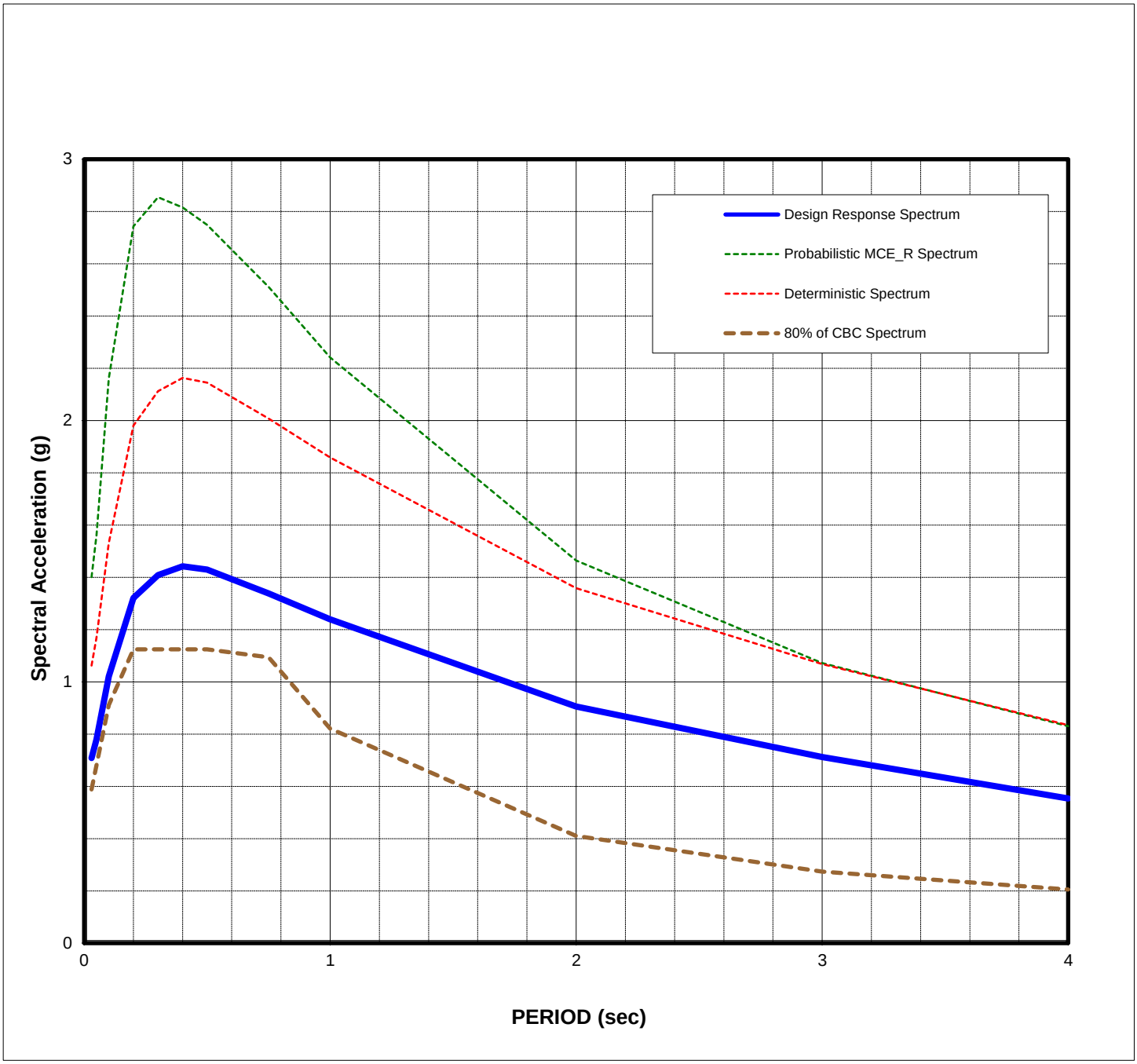
Spectral Period (sec)	2% in 50yr Probabilistic Spectral Acceleration (g)			
0.50	2.771	2.923	2.493	2.877
0.75	2.567	2.687	2.429	2.583
1.00	2.322	2.182	2.334	2.433
2.00	1.517	1.353	1.707	1.472
3.00	1.111	1.064	1.204	1.053
4.00	0.860	0.817	0.965	0.786

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. 6, 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 CBC Lower Level, (g)	Site Specific MCE_R Spectral Acceleration (g)	80% CBC Design Response Spectrum	Site Specific Design Spectral Acceleration (g)
0.03	1.390	1.008	1.401	1.062	0.225	1.062	0.588	**0.71**
0.05	1.548	1.008	1.560	1.169	0.375	1.169	0.681	**0.78**
0.10	2.144	1.008	2.161	1.531	0.750	1.531	0.912	**1.02**
0.20	2.721	1.008	2.743	1.981	1.500	1.981	1.124	**1.32**
0.30	2.847	1.003	2.854	2.112	1.500	2.112	1.124	**1.41**
0.40	2.823	0.997	2.815	2.163	1.500	2.163	1.124	**1.44**
0.50	2.771	0.992	2.748	2.145	1.500	2.145	1.124	**1.43**
0.75	2.567	0.978	2.512	2.007	1.200	2.007	1.094	**1.34**
1.00	2.322	0.965	2.241	1.858	0.900	1.858	0.821	**1.24**
2.00	1.517	0.965	1.464	1.358	0.450	1.358	0.410	**0.91**
3.00	1.111	0.965	1.072	1.068	0.300	1.068	0.274	**0.71**
4.00	0.860	0.965	0.830	0.834	0.225	0.830	0.205	**0.55**

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 7.65
and USGS 2008 fault model database.

SITE SPECIFIC DESIGN RESPONSE SPECTRUM

Project: Gymnasium Expansion
Location: Pacific High School
1020 Pacific Street
City of Moreno Valley, Riverside County, California
Client: San Bernardino City Unified School District

Project Number:

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Converse Consultants

Figure No.

7

Table No. 7, 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}	1.981	1.688
Site-Specific1-second period Spectral Response Acceleration, S_{M1}	2.716	1.231
Site-Specific Design Spectral Response Acceleration for short period S_{DS}	1.321	1.124
Site-Specific Design Spectral Response Acceleration for 1-second period, S_{D1}	1.811	0.821

The EZ-FRISK output files have been included in Appendix D*, EZ-FRISK Output Files* at the end of this report.

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 San Bernardino County or State of California Earthquake Fault Zone (San Bernardino, 2010b; CGS, 1974). Based on review of available geologic information, no major surface fault crosses through or extends towards the site (Morton and Miller, 2006). 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 not located in an area designated by San Bernardino County as susceptible to liquefaction (San Bernardino County, 2010b). See Figure 8, *San Bernardino County Liquefaction Hazard Map* for more details.

The current groundwater depth is greater than 50 feet bgs and historical groundwater depth was at 38 feet bgs. Based on a site-specific liquefaction analysis presented in Appendix C, *Dynamic Settlement Analysis*, liquefaction potential at the project site is up to 1.85 inches.

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, *Dynamic Settlement Analysis*, we estimate that the site will have the potential for up to 5.1 inches of total dry seismic settlement.

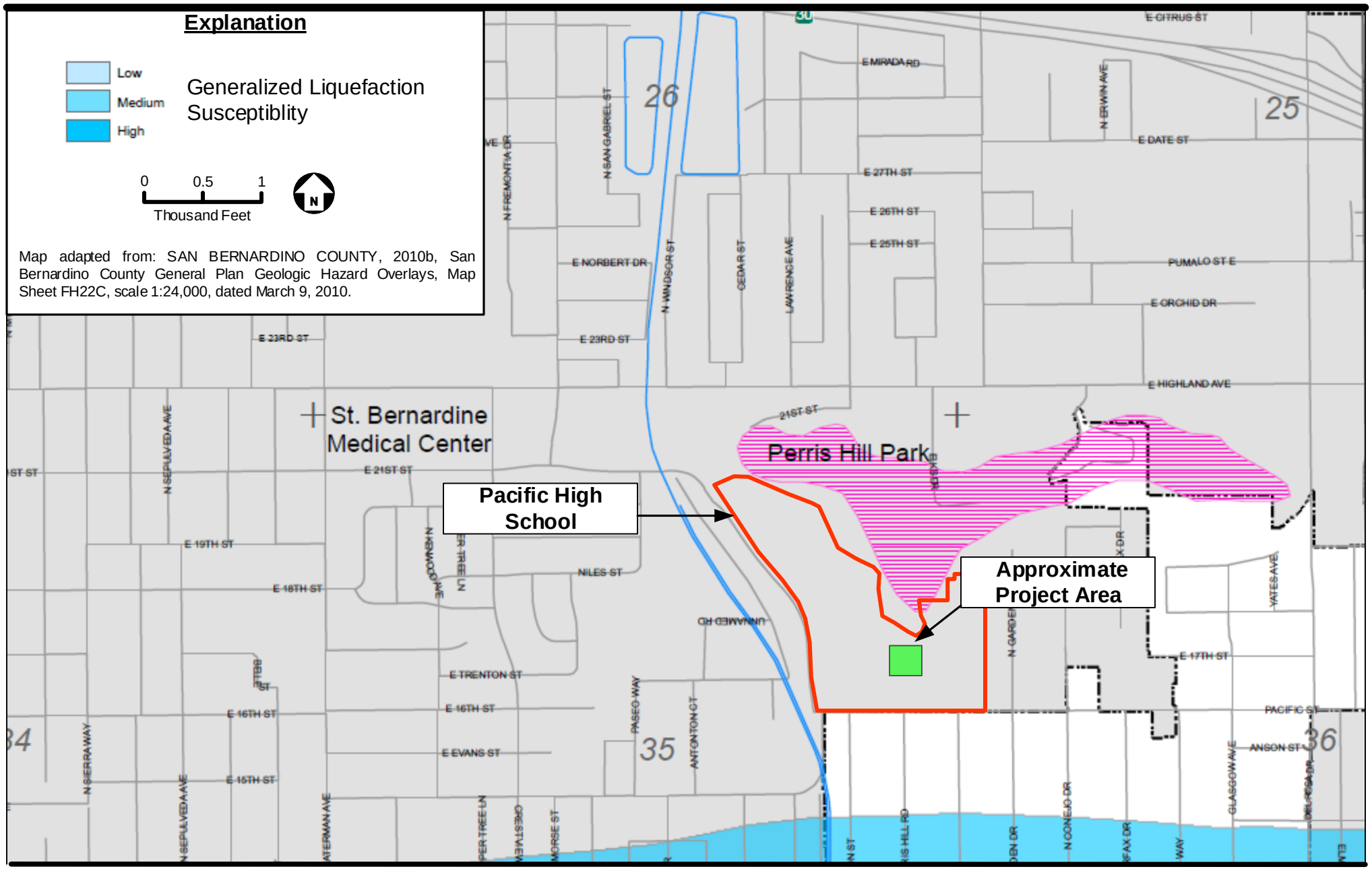
Lateral Spreading: Seismically induced lateral spreading involves primarily lateral movement of earth materials over underlying materials which are liquefied due to ground shaking. It differs from the slope failure in that complete ground failure involving large movement does not occur due to the relatively 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. Perris Hill, which is adjacent to Pacific High School, is designated by San Bernardino County as moderately to highly susceptible to landsliding.

The toe of the closest flank of Perris Hill is located approximately 180 feet north-northeast of the proposed gymnasium expansion. The average slope ratio of the closest flank is approximately 4H:1V (horizontal:vertical). The height of the closest slope is approximately 40 feet. The hill ascends further to the north approximately 120 feet in height with an average slope ratio of 5H:1V.

Based on review of geologic mapping (Dibblee and Minch, 2004), foliation within the Pelona Schist that comprises Perris Hill dips between 12 and 35 degrees south to southeast, away from the proposed new building. Since the building is west to southwest of the hill, it is lateral to the predominant failure direction. Furthermore, a failure surface dipping 15 to 30 degrees out of slope on a 4:1 slope will not daylight and is unlikely to produce a major slope failure.

Due to the distance from Perris Hill, height of Perris Hill in the vicinity of the site, strike and dip of foliation in the Pelona Schist, overall relief, landsliding on Perris Hill is not expected to affect the proposed building. Due to the relatively flat nature of the site, the potential for on-site landsliding is considered to be low.



Project: Gymnasium Expansion
Location: Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Client: San Bernardino City Unified School District

San Bernardino County Liquefaction Hazard Map

Project No
18-81-134-03

Converse Consultants

FIGURE
8

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. Seiching could potentially occur in the channel located west of the campus or in bodies of water located on the campus.

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 (San Bernardino County, 2010a). 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.

8.0 LABORATORY TEST RESULTS

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.

8.1 Physical Testing

The results of laboratory tests on samples obtained from the site is presented below.

The results of laboratory tests on samples obtained from the site is presented below.

- *In-situ* Moisture and Dry Density – Results of *in-situ* moisture and dry density tests performed in accordance with ASTM Standard D2216 and ASTM Standard 7263 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 100 to 110 pcf with moisture contents ranging from 6 to 8 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 soils was tested to evaluate the expansion potential in accordance with ASTM Standard D4829. The test result showed an EI of 5, indicating very low expansion potential.
- Grain Size Analysis – Two 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.* The results suggest the soils are typically silty sand.
- Maximum Dry Density and Optimum Moisture Content – Typical moisture-density relationship test of two representative bulk samples were conducted in accordance with ASTM D1557. The results presented are in Drawing No. B-2, *Moisture-Density Relationship Results*, in Appendix B, *Laboratory Testing Program*. The laboratory maximum dry densities were 127.5 and 128.0 pounds per cubic foot (pcf) and the optimum moisture contents were 9.0 and 9.5 percent.

- Direct Shear – Two direct shear tests were performed in accordance with ASTM Standard D3080 on relatively undisturbed ring samples. The results of the direct shear tests are presented in Drawings No. B-3 and B-4, *Direct Shear Test Results* in Appendix B, *Laboratory Testing Program*.
- Consolidation Test – Two consolidation tests were performed on relatively undisturbed samples of the site soil, in accordance to ASTM Standard D2435. The test results are shown on Drawings No. B-5 and B-6, *Consolidation Test Results,* 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

Two representative soil samples were 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 Test Methods 643, 422, and 417. The test results are summarized below and are presented in Appendix B, *Laboratory Testing Program.*

- The pH measurements of the samples were 7.3 and 9.1.
- The sulfate contents of the samples were 0.003 and 0.03 percent by weight.
- The chloride concentrations of the samples were 32 and 200 ppm.
- The minimum electrical resistivities when saturated were 1,213 and 6,548 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 proposed development. 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 structure will be constructed at or near grade. The earthwork for the structure based on the anticipated shallow foundations will consist of remedial grading, fill placement, and facility utility connection backfill.

Prior to the start of any earthwork, the site of the proposed gymnasium expansion should be cleared of all vegetation (if any) and debris. The existing front entry of the building will need to be demolished. All materials resulting from clearing, grubbing, and demolition operations should be removed from the site. All existing underground utilities and appurtenances should be located at the site. Such utilities should either be protected in-place or removed and replaced during construction as required by the project specifications. All excavations should be conducted in such a manner as not to cause loss of bearing and/or lateral support of existing structures or utilities.

All debris, deleterious material, and surficial soils containing roots and perishable materials (if any) should be stripped and removed from the site. Deleterious material, including organics, concrete, and debris generated during excavation, should not be placed as fill.

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 and slabs-on-grade 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. 8, Overexcavation Depths

Structure/Pavement	Minimum Excavation Depth
Building Footings	24 inches below footings or 5 feet below ground surface, whichever is deeper
Slab-on-grade	24 inches below slab

The change in depth of the overexcavation below the footings and slabs-on-grade should be transitioned by a gradual slope. The overexcavation should extend to at least 2 feet beyond the footprint of the building and at least 1 foot beyond the edge of pavement. The overexcavation bottom should be scarified and compacted as described in Section 9.4, *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 Engineered Fill

No fill 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 cleaning 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 1 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 representative prior to delivery to the site.

9.4 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 ±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 ±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.

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.

9.5 Shrinkage and Subsidence

The volume of excavated and recompacted soils may be expected to increase or 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 6 to 16 percent. An average value of 11 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. For estimation purposes, ground subsidence may be taken as 0.1 feet.

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.

9.6 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 1 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.

10.0 DESIGN RECOMMENDATIONS

The existing gymnasium building is supported on conventional continuous shallow foundation systems. The new gymnasium lobby expansion will also be supported on conventional continuous shallow foundation systems. New footings abutting existing footings should have adhesive dowel connections to mitigate differential settlement. New footings should be conservatively sized to carry all new construction loads, without reliance on existing footings. The structural engineer should provide appropriate measures to compatible the existing and new foundations systems.

Recommendations for the design and construction of the proposed building 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 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. 9, Recommended Foundation 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 2,500 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), this assumes that soils, similar to the on-site soils will be utilized for import.

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 for the site are presented in the following table.

Table No. 10, 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 200 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 2,000 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.

10.4 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 9.4 *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 slab curling. Prior to the slab 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-slab 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 slab 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 1 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, *Dynamic Settlement Analysis*. We estimate that the project site has the potential for up to 5.1 inches of dry seismic settlement with up to 1.85 inches of liquefaction induced settlement during a large earthquake. The soil profile across the site is relatively similar. So, we anticipate that the total settlement will be uniform. We recommend that the planned structure be designed conservatively in anticipation of dynamic differential settlement of 0.7 inches in 40 horizontal feet.

Generally, the static and dynamic settlement does not occur at the same time. For design purpose, the structural engineer should decide whether static and dynamic settlement will be combined or not.

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 5, 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

Two representative samples of the site soils were 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 contents of the sampled soils correspond 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 locations 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 resistivities of the samples when saturated were 1,213 to 6,548 Ohm-cm for the site. This indicates that the soils tested of the site are corrosive to moderately 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 and site soils.

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. Recommendations pertaining to temporary excavations are presented in this section.

Depending on the sequence of construction, excavations may be required near existing streets or 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 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	OSHA Soil Type	Depth of Excavation (ft)	Recommended Maximum Slope (Horizontal:Vertical)[1]
Silty Sand (SM)	C	0-10	1.5:1

[1] 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 excavation 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 San Bernardino City Unified School District 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.

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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. 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.

Two exploratory borings (BH-01 and BH-02) were drilled on October 2, 2018 to investigate the subsurface conditions at the site. The borings were drilled to their planned maximum depths of 21.5 and 51.5 feet bgs.

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 boring BH-02 at depth of 20 feet bgs and in boring BH-01 at depths of 20, 30, 40, and 50 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. So, 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 and A-3, *Logs of Borings*.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	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

LABORATORY TESTING ABBREVIATIONS

TEST TYPE
(Results shown in Appendix B)

CLASSIFICATION

Plasticity	pi
Grain Size Analysis	ma
Passing No. 200 Sieve	wa
Sand Equivalent	se
Expansion Index	ei
Compaction Curve	max
Hydrometer	h
Disturb	Dist.

STRENGTH

Pocket Penetrometer	p
Direct Shear	ds
Direct Shear (single point)	ds*
Unconfined Compression	uc
Triaxial Compression	tx
Vane Shear	vs
Consolidation	c
Collapse Test	col
Resistance (R) Value	r
Chemical Analysis	ca
Electrical Resistivity	er
Permeability	perm
Soil Cement	sc

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

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

Gymnasium Expansion
Northern Edge of the Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
For: San Bernardino City Unified School District

Project No.
18-81-134-03

Drawing No.
A-1

Project ID: 18-81-134-03.GPJ; Template: KEY

Log of Boring No. BH-01

Dates Drilled: 10/2/2018 Logged by: Mike Maldonado Checked By: Scot Mathis

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

Ground Surface Elevation (ft): 1132 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 DRIVE	SAMPLES BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		4" ASPHALT CONCRETE/NO AGGREGATE BASE						
		ALLUVIUM **SILTY SAND (SM):** fine to coarse-grained, dark brown.						ei, ca, er ma, max
5			■		7/9/11	7	110	ds
			■		5/7/5	7	106	c
10		**SANDY SILT (ML):** fine to coarse-grained sand, trace clay, dark brown.	■		3/5/8	17	112	
15		**SILTY SAND (SM):** fine to medium-grained, brown.	■		9/10/12	13	108	
20			☒		4/6/7			
25			■		12/32/38	8	120	
30		**SAND (SP):** fine to coarse-grained, trace silt, brown.	☒		10/15/21			

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City of San Bernardino, San Bernardino County, California
For: San Bernardino City Unified School District

Project No. 18-81-134-03

Drawing No. A-2a

Log of Boring No. BH-01

Dates Drilled: 10/2/2018 Logged by: Mike Maldonado Checked By: Scot Mathis

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

Ground Surface Elevation (ft): 1132 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 DRIVE	SAMPLES BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		ALLUVIUM **SAND (SP):** fine to coarse-grained, few gravel up to 1.5" in largest dimension, trace silt., brown.	■		12/33/43	2	107	
40			☒		15/18/20			
45			■		25/50-5"	2	108	
50			☒		30/33/32			
		End of boring at 51.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings, tamped, and surface patched with asphalt concrete on 10/2/18.						

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Project No. 18-81-134-03

Drawing No. A-2b

Log of Boring No. BH-02

Dates Drilled: 10/2/2018 Logged by: Mike Maldonado Checked By: Scot Mathis

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

Ground Surface Elevation (ft): 1131 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 DRIVE	SAMPLES BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		3" ASPHALT CONCRETE/NO AGGREGATE BASE						
		ALLUVIUM **SILTY SAND (SM):** fine to medium-grained, brown.						ca, er, ma, max
5					10/13/12	8	109	ds
					4/9/11	6	100	c
10		**SANDY SILT (ML):** fine-grained sand, brown.			5/8/13	13	106	
15		**SILTY SAND (SM):** fine to coarse-grained, yellowish brown.			5/11/14	7	109	
20		**SAND (SP):** fine to medium-grained, light brown.			9/12/13			
		End of boring at 21.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings, tamped, and surface patched with asphalt concrete on 10/2/18.						

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City of San Bernardino, San Bernardino County, California
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Project No. 18-81-134-03

Drawing No. A-3

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 to ASTM Standard D2216 and ASTM D7263 to aid soils classification and to provide qualitative information on strength and compressibility characteristics of the site soils. For test results, see the Logs of Borings in Appendix A, Field Exploration.

Expansion Index Test

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

Table No. B-1, Expansion Index Test Result

Boring No.	Depth (feet)	Soil Description	Expansion Index	Expansion Potential
BH-01	1-5	Silty Sand (SM)	5	Very Low

Soil Corrosivity Tests

Two representative soil samples were 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 Test Methods 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	9.1	32	0.003	6,548
BH-02	1-5	7.3	200	0.03	1,213

Grain-Size Analyses

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

Maximum Density and Optimum Moisture Content Tests

Laboratory maximum dry density-optimum moisture content relationship tests were 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-3, 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), Dark Brown	9.0	128.0
BH-02	1-5	Silty Sand (SM), Brown	9.5	127.5

Direct Shear Test

Two direct shear tests were performed on relatively undisturbed representative soil samples at soaked moisture conditions, in accordance with the ASTM D3080 method. For each test, three samples contained in a brass sampler ring were placed, one at a time, directly into the test apparatus and subjected to a range of normal loads appropriate for the anticipated conditions. The samples were 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 deformation data and plotted to determine the shear strength parameters. For test results, including sample density and moisture content, see Drawings No. B-3 and B-4*, Direct Shear Test Results,* and in the following table.

Table No. B-4, Summary of Direct Shear Test Results

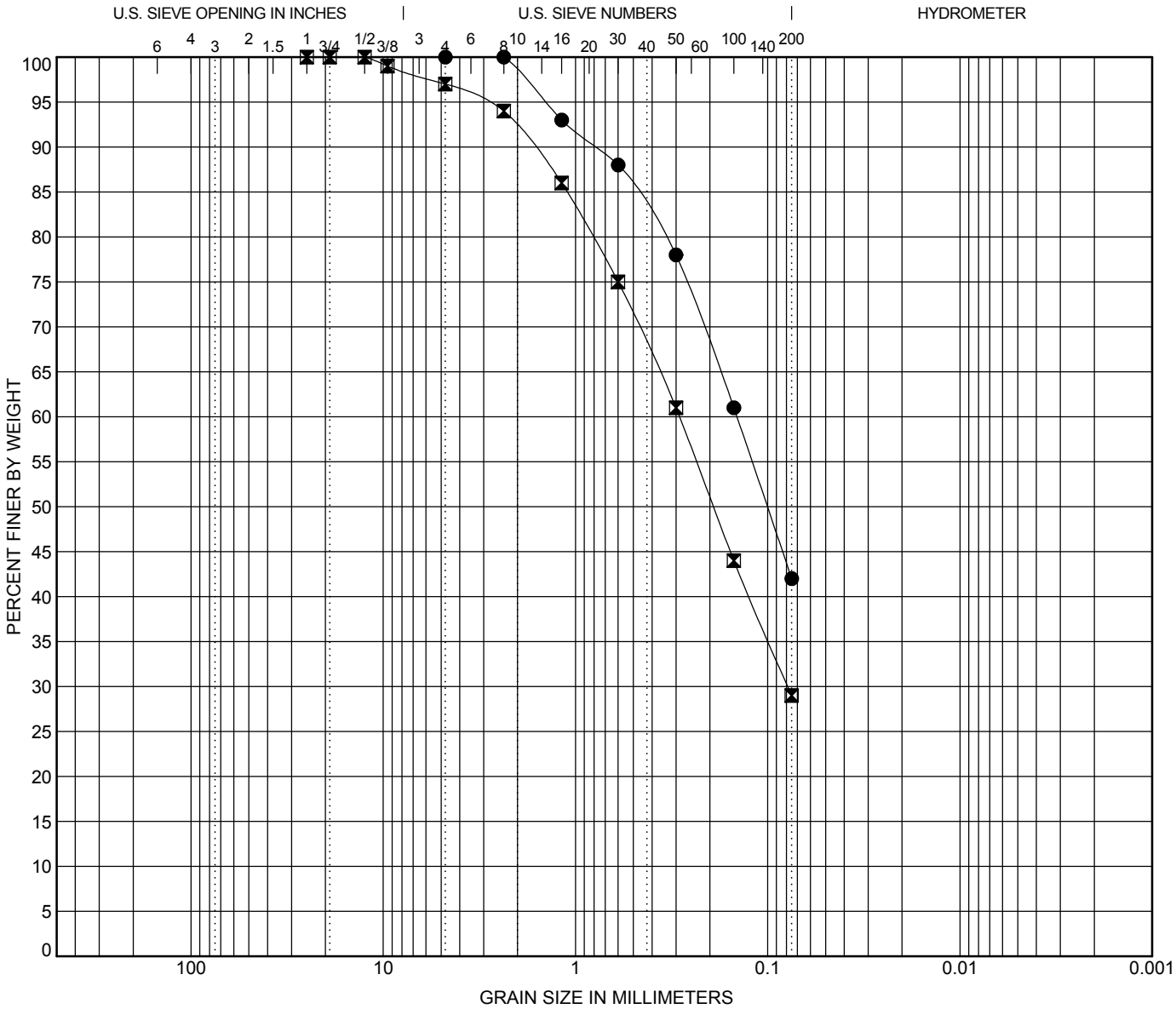
Boring No.	Depth (feet)	Soil Description	Peak Strength Parameters	
			Friction Angle (degrees)	Cohesion (psf)
BH-01	5.0-6.5	Silty Sand (SM)	33	100
BH-02	5.0-6.5	Silty Sand (SM)	32	150

Consolidation Tests

Two consolidation tests were conducted in accordance with ASTM Standard D2435 method. Data obtained from this test performed on two relatively undisturbed ring samples were 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 Drawings No. B-5 and B-6, *Consolidation Test Results*.

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**	**1-5**	**SILTY SAND (SM)**					

	Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BH-01**	**1-5**	**4.75**	**0.145**			**0.0**	**58.0**	**42.0**	
⊠	**BH-02**	**1-5**	**25**	**0.288**	**0.079**		**3.0**	**68.0**	**29.0**	

GRAIN SIZE DISTRIBUTION RESULTS

Converse Consultants

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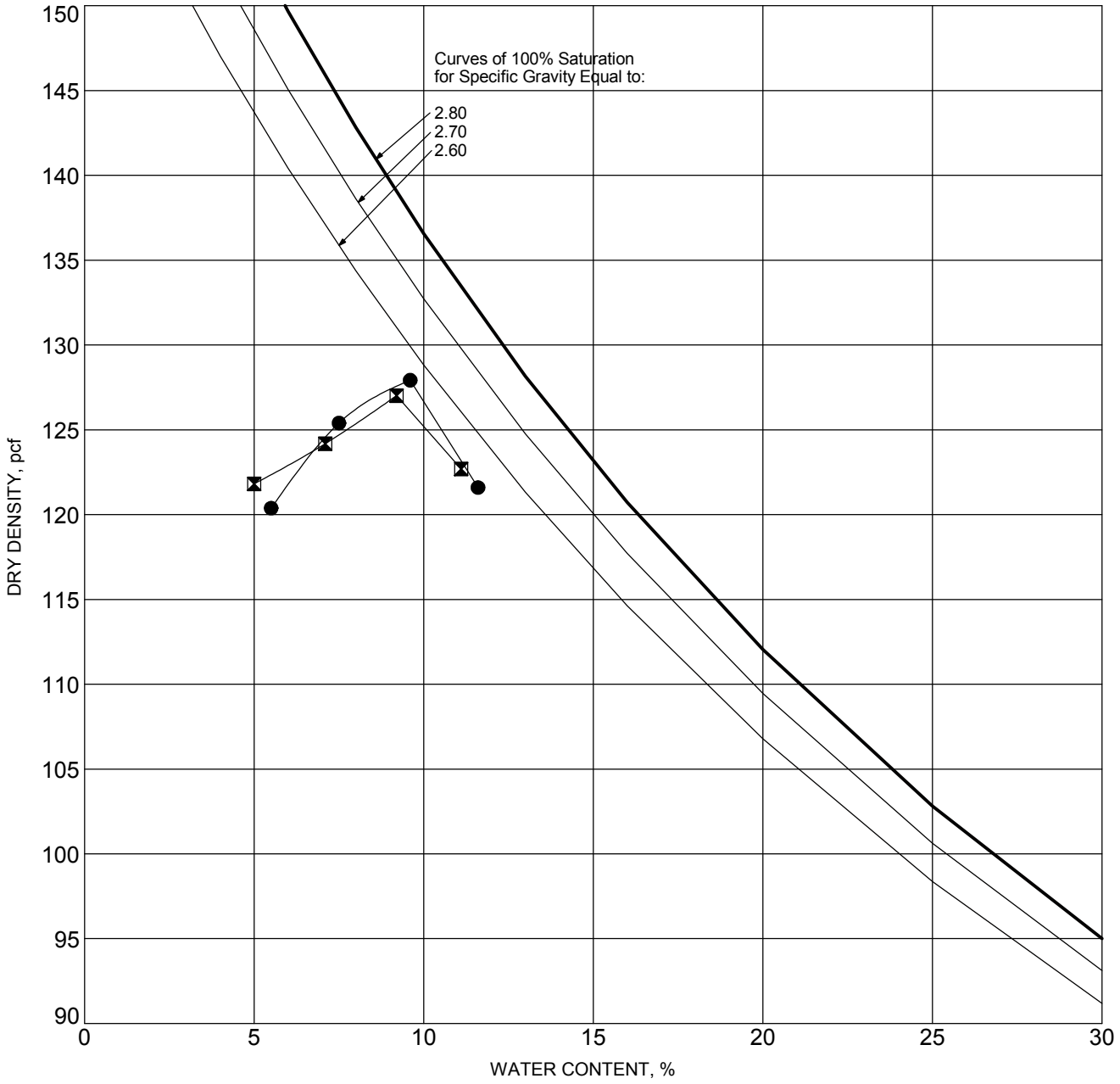
Northern Edge of the Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
For: San Bernardino City Unified School District

Project No. **18-81-134-03**

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), Dark Brown**	**D1557- A**	**9.0**	**128.0**
⊠	**BH-02**	**1-5**	**SILTY SAND (SM), Brown**	**D1557- A**	**9.5**	**127.5**

MOISTURE-DENSITY RELATIONSHIP RESULTS

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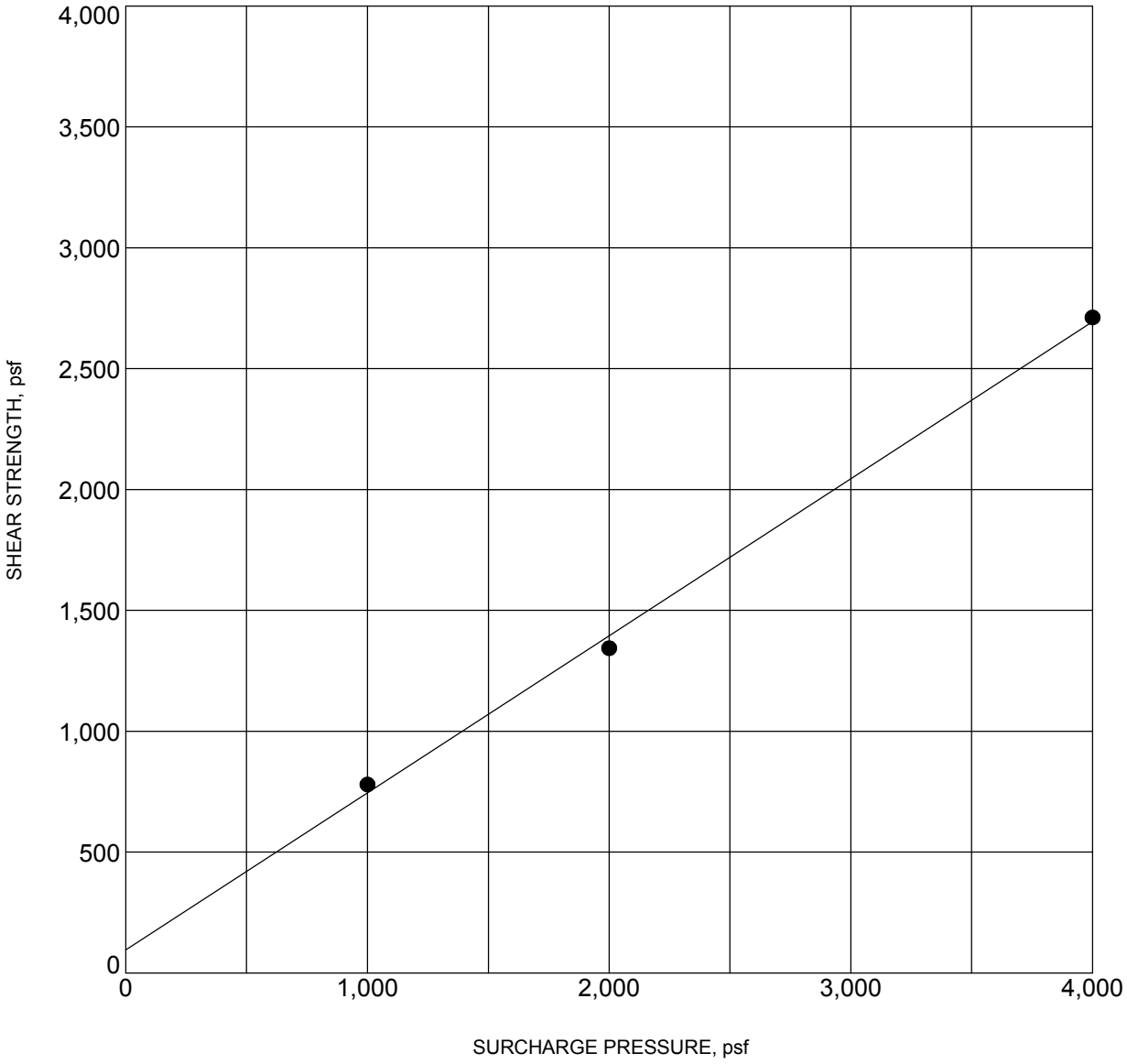
For: San Bernardino City Unified School District

Project No.
18-81-134-03

Drawing No.
B-2

Project ID: 18-81-134-03.GPJ; Template: COMPACTION



BORING NO. :	**BH-01**	DEPTH (ft) :	**5.0-6.5**
DESCRIPTION :	**SILTY SAND (SM)**		
COHESION (psf) :	**100**	FRICTION ANGLE (degrees):	**33**
MOISTURE CONTENT (%) :	**6.9**	DRY DENSITY (pcf) :	**115.7**

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

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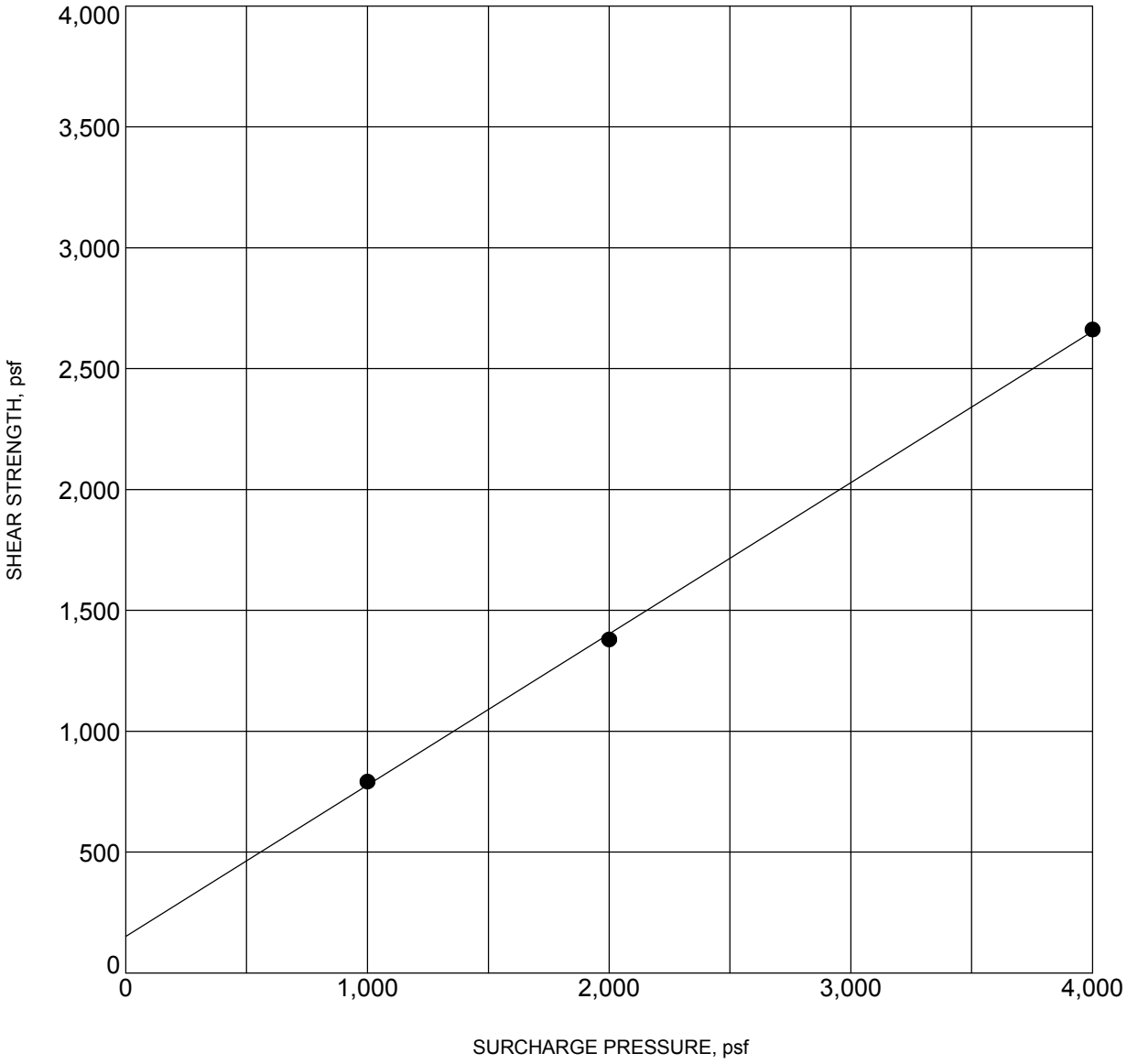
For: San Bernardino City Unified School District

Project No. **18-81-134-03**

Drawing No. **B-3**



BORING NO. :	**BH-02**	DEPTH (ft) :	**5.0-6.5**
DESCRIPTION :	**SILTY SAND (SM)**		
COHESION (psf) :	**150**	FRICTION ANGLE (degrees):	**32**
MOISTURE CONTENT (%) :	**7.5**	DRY DENSITY (pcf) :	**108.7**

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

Converse Consultants

Gymnasium Expansion
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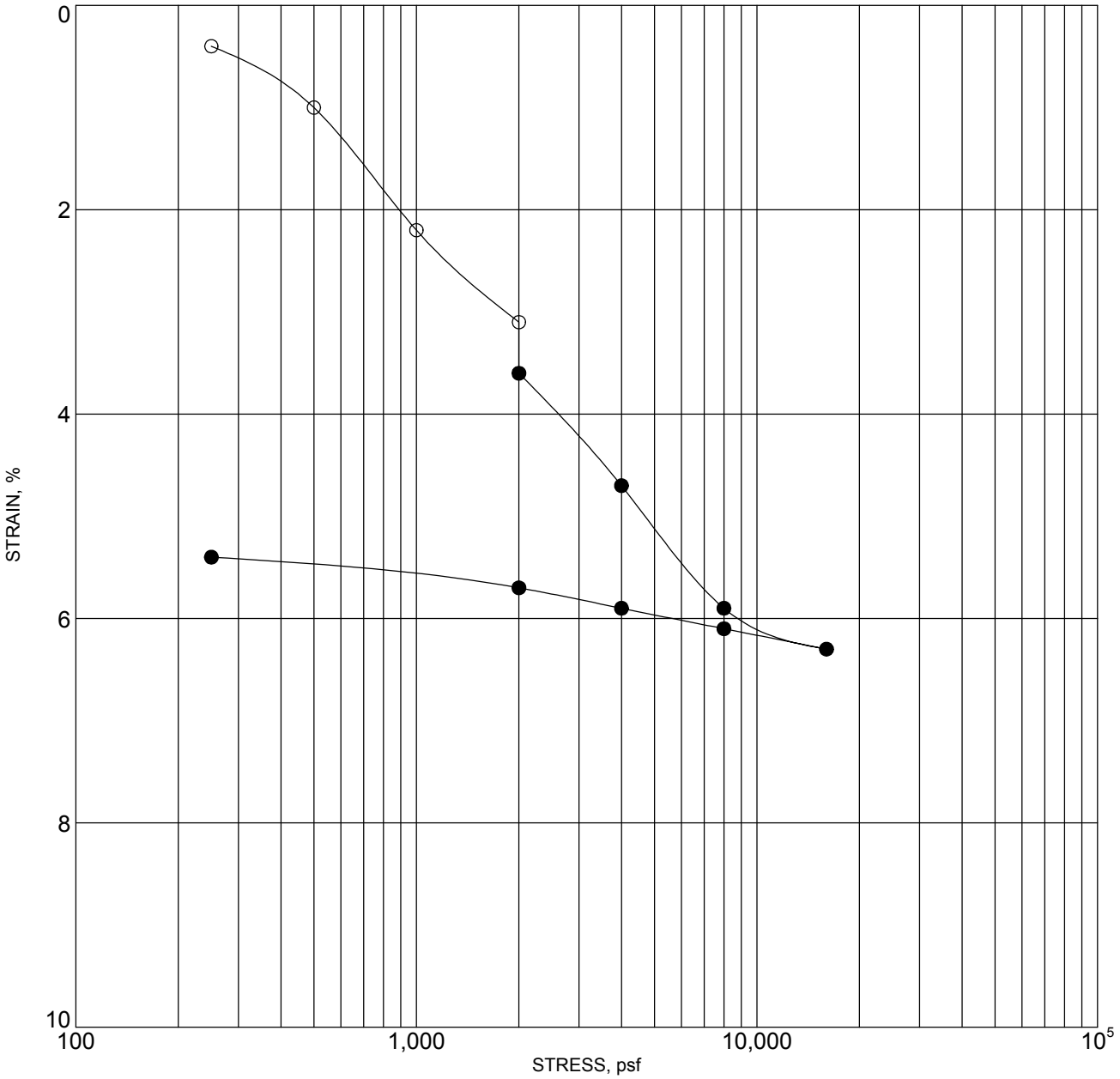
City of San Bernardino, San Bernardino County, California
For: San Bernardino City Unified School District

Project No. **18-81-134-03**

Drawing No. **B-4**



BORING NO. :	BH-01	DEPTH (ft) :	7.5-9.0
DESCRIPTION :	SILTY SAND (SM)		

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	7	106	33	0.560)
FINAL	17	112	100	0.474

NOTE: SOLID CIRCLES INDICATE READINGS AFTER ADDITION OF WATER

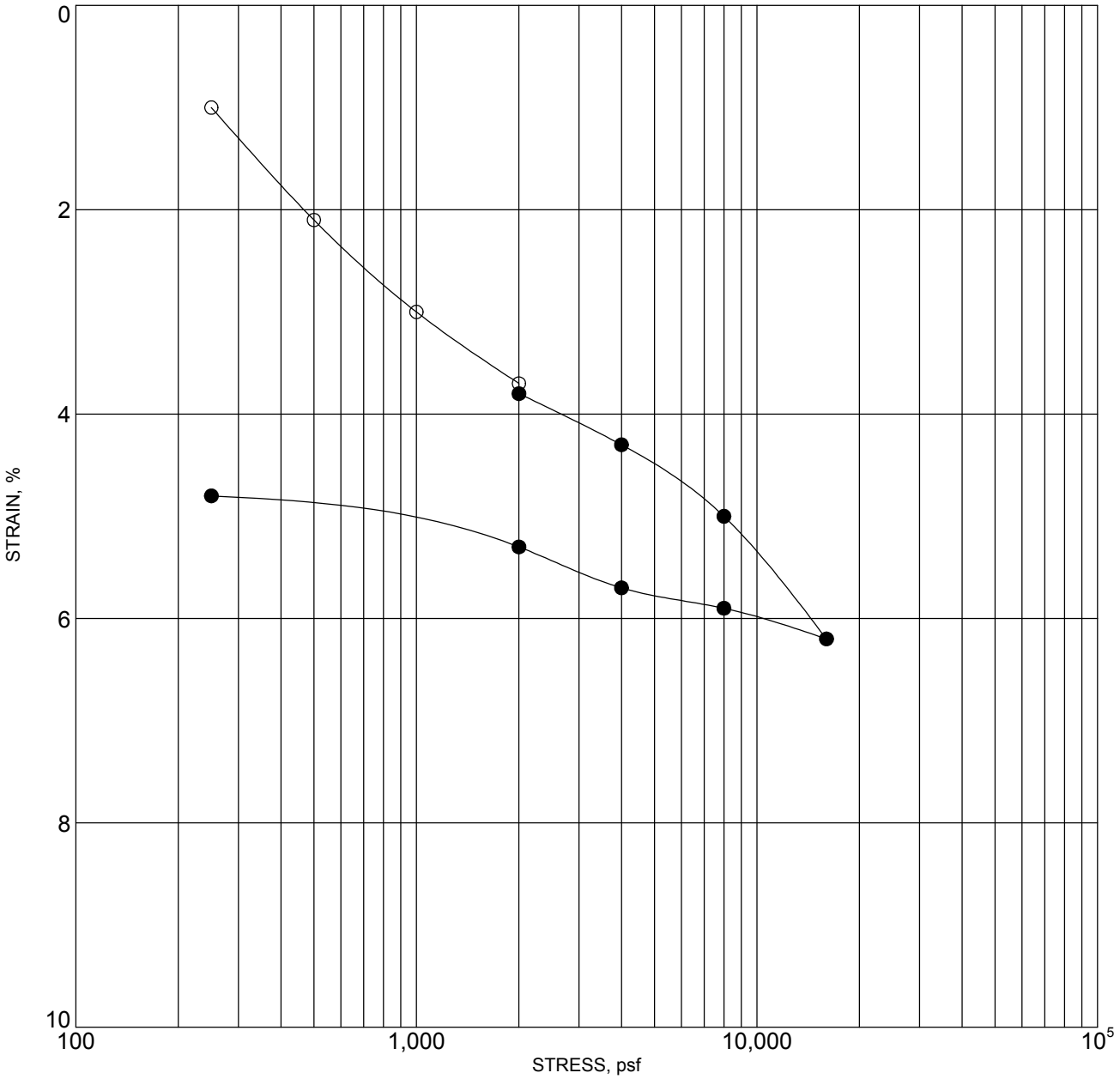
CONSOLIDATION TEST RESULTS

Converse Consultants

Gymnasium Expansion
Northern Edge of the Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
For: San Bernardino City Unified School District

Project No. **18-81-134-03**

Drawing No. **B-5**



BORING NO. :	BH-02	DEPTH (ft) :	7.5-9.0
DESCRIPTION :	SILTY SAND (SM)		

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	6	100	24	0.654
FINAL	16	114	100	0.446

NOTE: SOLID CIRCLES INDICATE READINGS AFTER ADDITION OF WATER

CONSOLIDATION TEST RESULTS

Converse Consultants

Gymnasium Expansion
Northern Edge of the Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
For: San Bernardino City Unified School District

Project No. **18-81-134-03**

Drawing No. **B-6**

Appendix C

Dynamic Settlement Analysis

APPENDIX C

DYNAMIC SETTLEMENT ANALYSIS

The subsurface data obtained from the boring (BH-01) drilled during the field investigation was used to evaluate 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 M7.0 and peak ground acceleration (PGA) of 0.99g, 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 a factor of safety of 1.3. The result of our analysis is presented on Plate C-1 and summarized in the following table.

Table C-1, Estimated Dynamic Settlements

Location	Groundwater Conditions	Groundwater Depth (feet bgs)	Dry Seismic Settlement (inches)	Liquefaction Induced Settlement (inches)
BH-01	In-situ (current)	52	5.05	1.82
	During Earthquake (historical)	38		

Based on our analysis, the project site has the potential for up to 5.1 inches of dry seismic settlement with up to 1.85 inches of liquefaction induced settlement.

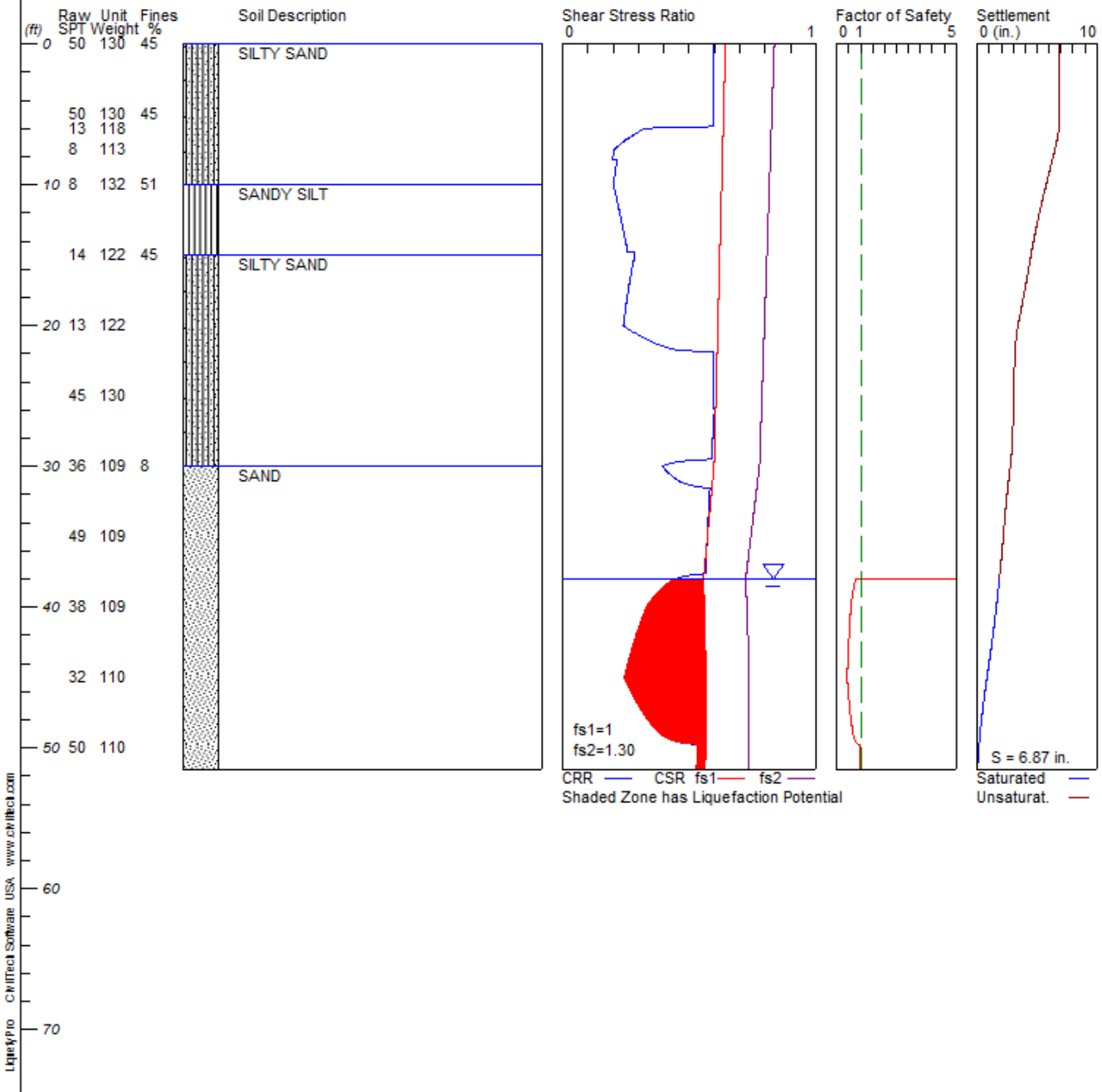
The soil profile across the site is relatively similar. So, we anticipate that the total settlement will be uniform. We recommend that the planned structure be designed in anticipation of dynamic differential settlement of 0.7 inches in 40 horizontal feet.

DYNAMIC SETTLEMENT

Gymnasium Expansion - Pacific High School

Hole No.=BH-01 Water Depth=38 ft Surface Elev.=1132

Magnitude=7
Acceleration=0.99g



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                                        LIQUEFACTION ANALYSIS SUMMARY

                                       Copyright by CivilTech Software
                                             www.civiltech.com

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        Licensed to ,   5/1/2019        11:45:06 AM

        Input File Name: N:\2018\18-81-134 SBCUSD, New Diesel Technology
Center\-03\Settlement\BH-01 his.liq
        Title:  Gymnasium Expansion - Pacific High School
        Subtitle:  Dynamic Settlement

        Surface Elev.=1132
        Hole No.=BH-01
        Depth of Hole= 51.50 ft
        Water Table during Earthquake= 38.00 ft
        Water Table during In-Situ Testing= 52.00 ft
        Max. Acceleration= 0.99 g
        Earthquake Magnitude= 7.00

 Input Data:
        Surface Elev.=1132
        Hole No.=BH-01
        Depth of Hole=51.50 ft
        Water Table during Earthquake= 38.00 ft
        Water Table during In-Situ Testing= 52.00 ft
        Max. Acceleration=0.99 g
        Earthquake Magnitude=7.00
        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 two CSR (fs1=1, fs2=User)
        10. Use Curve Smoothing: Yes*
        * Recommended Options
```

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	50.00	130.00	45.00
5.00	50.00	130.00	45.00
6.00	13.00	118.00	45.00
7.50	8.00	113.00	45.00
10.00	8.00	132.00	51.00
15.00	14.00	122.00	45.00
20.00	13.00	122.00	45.00
25.00	45.00	130.00	45.00
30.00	36.00	109.00	8.00
35.00	49.00	109.00	8.00
40.00	38.00	109.00	8.00
45.00	32.00	110.00	8.00
50.00	50.00	110.00	8.00

Output Results:

Settlement of Saturated Sands=1.82 in.
Settlement of Unsaturated Sands=5.05 in.
Total Settlement of Saturated and Unsaturated Sands=6.87 in.
Differential Settlement=3.434 to 4.532 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.60	0.64	5.00	1.82	5.05	6.87
0.05	0.60	0.64	5.00	1.82	5.05	6.87
0.10	0.60	0.64	5.00	1.82	5.05	6.87
0.15	0.60	0.64	5.00	1.82	5.05	6.87
0.20	0.60	0.64	5.00	1.82	5.05	6.87
0.25	0.60	0.64	5.00	1.82	5.05	6.87
0.30	0.60	0.64	5.00	1.82	5.05	6.87
0.35	0.60	0.64	5.00	1.82	5.05	6.87
0.40	0.60	0.64	5.00	1.82	5.05	6.87
0.45	0.60	0.64	5.00	1.82	5.05	6.87
0.50	0.60	0.64	5.00	1.82	5.05	6.87
0.55	0.60	0.64	5.00	1.82	5.05	6.87
0.60	0.60	0.64	5.00	1.82	5.05	6.87
0.65	0.60	0.64	5.00	1.82	5.05	6.87
0.70	0.60	0.64	5.00	1.82	5.05	6.87
0.75	0.60	0.64	5.00	1.82	5.05	6.87
0.80	0.60	0.64	5.00	1.82	5.05	6.87
0.85	0.60	0.64	5.00	1.82	5.05	6.87
0.90	0.60	0.64	5.00	1.82	5.05	6.87

0.95	0.60	0.64	5.00	1.82	5.05	6.87
1.00	0.60	0.64	5.00	1.82	5.05	6.87
1.05	0.60	0.64	5.00	1.82	5.05	6.87
1.10	0.60	0.64	5.00	1.82	5.05	6.87
1.15	0.60	0.64	5.00	1.82	5.05	6.87
1.20	0.60	0.64	5.00	1.82	5.05	6.87
1.25	0.60	0.64	5.00	1.82	5.05	6.87
1.30	0.60	0.64	5.00	1.82	5.05	6.87
1.35	0.60	0.64	5.00	1.82	5.05	6.87
1.40	0.60	0.64	5.00	1.82	5.05	6.87
1.45	0.60	0.64	5.00	1.82	5.05	6.87
1.50	0.60	0.64	5.00	1.82	5.05	6.87
1.55	0.60	0.64	5.00	1.82	5.04	6.87
1.60	0.60	0.64	5.00	1.82	5.04	6.87
1.65	0.60	0.64	5.00	1.82	5.04	6.87
1.70	0.60	0.64	5.00	1.82	5.04	6.87
1.75	0.60	0.64	5.00	1.82	5.04	6.87
1.80	0.60	0.64	5.00	1.82	5.04	6.87
1.85	0.60	0.64	5.00	1.82	5.04	6.86
1.90	0.60	0.64	5.00	1.82	5.04	6.86
1.95	0.60	0.64	5.00	1.82	5.04	6.86
2.00	0.60	0.64	5.00	1.82	5.04	6.86
2.05	0.60	0.64	5.00	1.82	5.04	6.86
2.10	0.60	0.64	5.00	1.82	5.04	6.86
2.15	0.60	0.64	5.00	1.82	5.04	6.86
2.20	0.60	0.64	5.00	1.82	5.04	6.86
2.25	0.60	0.64	5.00	1.82	5.04	6.86
2.30	0.60	0.64	5.00	1.82	5.04	6.86
2.35	0.60	0.64	5.00	1.82	5.04	6.86
2.40	0.60	0.64	5.00	1.82	5.04	6.86
2.45	0.60	0.64	5.00	1.82	5.04	6.86
2.50	0.60	0.64	5.00	1.82	5.04	6.86
2.55	0.60	0.64	5.00	1.82	5.04	6.86
2.60	0.60	0.64	5.00	1.82	5.04	6.86
2.65	0.60	0.64	5.00	1.82	5.04	6.86
2.70	0.60	0.64	5.00	1.82	5.04	6.86
2.75	0.60	0.64	5.00	1.82	5.04	6.86
2.80	0.60	0.64	5.00	1.82	5.04	6.86
2.85	0.60	0.64	5.00	1.82	5.04	6.86
2.90	0.60	0.64	5.00	1.82	5.04	6.86
2.95	0.60	0.64	5.00	1.82	5.04	6.86
3.00	0.60	0.64	5.00	1.82	5.04	6.86
3.05	0.60	0.64	5.00	1.82	5.04	6.86
3.10	0.60	0.64	5.00	1.82	5.04	6.86
3.15	0.60	0.64	5.00	1.82	5.04	6.86
3.20	0.60	0.64	5.00	1.82	5.04	6.86
3.25	0.60	0.64	5.00	1.82	5.04	6.86
3.30	0.60	0.64	5.00	1.82	5.04	6.86

3.35	0.60	0.64	5.00	1.82	5.04	6.86
3.40	0.60	0.64	5.00	1.82	5.04	6.86
3.45	0.60	0.64	5.00	1.82	5.04	6.86
3.50	0.60	0.64	5.00	1.82	5.04	6.86
3.55	0.60	0.64	5.00	1.82	5.04	6.86
3.60	0.60	0.64	5.00	1.82	5.04	6.86
3.65	0.60	0.64	5.00	1.82	5.04	6.86
3.70	0.60	0.64	5.00	1.82	5.04	6.86
3.75	0.60	0.64	5.00	1.82	5.04	6.86
3.80	0.60	0.64	5.00	1.82	5.04	6.86
3.85	0.60	0.64	5.00	1.82	5.04	6.86
3.90	0.60	0.64	5.00	1.82	5.04	6.86
3.95	0.60	0.64	5.00	1.82	5.04	6.86
4.00	0.60	0.64	5.00	1.82	5.04	6.86
4.05	0.60	0.64	5.00	1.82	5.04	6.86
4.10	0.60	0.64	5.00	1.82	5.04	6.86
4.15	0.60	0.64	5.00	1.82	5.04	6.86
4.20	0.60	0.64	5.00	1.82	5.04	6.86
4.25	0.60	0.64	5.00	1.82	5.04	6.86
4.30	0.60	0.64	5.00	1.82	5.04	6.86
4.35	0.60	0.64	5.00	1.82	5.04	6.86
4.40	0.60	0.64	5.00	1.82	5.04	6.86
4.45	0.60	0.64	5.00	1.82	5.04	6.86
4.50	0.60	0.64	5.00	1.82	5.04	6.86
4.55	0.60	0.64	5.00	1.82	5.04	6.86
4.60	0.60	0.64	5.00	1.82	5.04	6.86
4.65	0.60	0.64	5.00	1.82	5.04	6.86
4.70	0.60	0.64	5.00	1.82	5.04	6.86
4.75	0.60	0.64	5.00	1.82	5.04	6.86
4.80	0.60	0.64	5.00	1.82	5.04	6.86
4.85	0.60	0.64	5.00	1.82	5.04	6.86
4.90	0.60	0.64	5.00	1.82	5.04	6.86
4.95	0.60	0.64	5.00	1.82	5.04	6.86
5.00	0.60	0.64	5.00	1.82	5.04	6.86
5.05	0.60	0.64	5.00	1.82	5.04	6.86
5.10	0.60	0.64	5.00	1.82	5.04	6.86
5.15	0.60	0.64	5.00	1.82	5.03	6.86
5.20	0.60	0.64	5.00	1.82	5.03	6.86
5.25	0.60	0.64	5.00	1.82	5.03	6.86
5.30	0.60	0.64	5.00	1.82	5.03	6.85
5.35	0.60	0.64	5.00	1.82	5.03	6.85
5.40	0.60	0.64	5.00	1.82	5.03	6.85
5.45	0.60	0.64	5.00	1.82	5.03	6.85
5.50	0.60	0.64	5.00	1.82	5.03	6.85
5.55	0.60	0.64	5.00	1.82	5.03	6.85
5.60	0.60	0.64	5.00	1.82	5.03	6.85
5.65	0.60	0.64	5.00	1.82	5.03	6.85
5.70	0.60	0.63	5.00	1.82	5.03	6.85

5.75	0.60	0.63	5.00	1.82	5.03	6.85
5.80	0.60	0.63	5.00	1.82	5.03	6.85
5.85	0.60	0.63	5.00	1.82	5.02	6.84
5.90	0.56	0.63	5.00	1.82	5.02	6.84
5.95	0.39	0.63	5.00	1.82	5.01	6.83
6.00	0.32	0.63	5.00	1.82	5.00	6.82
6.05	0.32	0.63	5.00	1.82	5.00	6.82
6.10	0.31	0.63	5.00	1.82	4.99	6.81
6.15	0.31	0.63	5.00	1.82	4.98	6.80
6.20	0.30	0.63	5.00	1.82	4.97	6.79
6.25	0.30	0.63	5.00	1.82	4.96	6.78
6.30	0.29	0.63	5.00	1.82	4.95	6.77
6.35	0.29	0.63	5.00	1.82	4.94	6.76
6.40	0.28	0.63	5.00	1.82	4.93	6.75
6.45	0.28	0.63	5.00	1.82	4.92	6.74
6.50	0.28	0.63	5.00	1.82	4.91	6.73
6.55	0.27	0.63	5.00	1.82	4.90	6.72
6.60	0.27	0.63	5.00	1.82	4.89	6.71
6.65	0.26	0.63	5.00	1.82	4.88	6.70
6.70	0.26	0.63	5.00	1.82	4.87	6.69
6.75	0.26	0.63	5.00	1.82	4.86	6.68
6.80	0.25	0.63	5.00	1.82	4.85	6.67
6.85	0.25	0.63	5.00	1.82	4.84	6.66
6.90	0.24	0.63	5.00	1.82	4.83	6.65
6.95	0.24	0.63	5.00	1.82	4.81	6.63
7.00	0.24	0.63	5.00	1.82	4.80	6.62
7.05	0.23	0.63	5.00	1.82	4.79	6.61
7.10	0.23	0.63	5.00	1.82	4.78	6.60
7.15	0.23	0.63	5.00	1.82	4.76	6.58
7.20	0.22	0.63	5.00	1.82	4.75	6.57
7.25	0.22	0.63	5.00	1.82	4.74	6.56
7.30	0.22	0.63	5.00	1.82	4.72	6.55
7.35	0.21	0.63	5.00	1.82	4.71	6.53
7.40	0.21	0.63	5.00	1.82	4.70	6.52
7.45	0.21	0.63	5.00	1.82	4.68	6.50
7.50	0.20	0.63	5.00	1.82	4.67	6.49
7.55	0.20	0.63	5.00	1.82	4.65	6.47
7.60	0.20	0.63	5.00	1.82	4.64	6.46
7.65	0.20	0.63	5.00	1.82	4.62	6.44
7.70	0.20	0.63	5.00	1.82	4.61	6.43
7.75	0.20	0.63	5.00	1.82	4.59	6.41
7.80	0.20	0.63	5.00	1.82	4.58	6.40
7.85	0.20	0.63	5.00	1.82	4.56	6.38
7.90	0.20	0.63	5.00	1.82	4.55	6.37
7.95	0.20	0.63	5.00	1.82	4.53	6.35
8.00	0.20	0.63	5.00	1.82	4.52	6.34
8.05	0.20	0.63	5.00	1.82	4.50	6.32
8.10	0.20	0.63	5.00	1.82	4.49	6.31

8.15	0.20	0.63	5.00	1.82	4.47	6.29
8.20	0.20	0.63	5.00	1.82	4.45	6.28
8.25	0.21	0.63	5.00	1.82	4.44	6.26
8.30	0.21	0.63	5.00	1.82	4.43	6.25
8.35	0.21	0.63	5.00	1.82	4.41	6.23
8.40	0.21	0.63	5.00	1.82	4.40	6.22
8.45	0.21	0.63	5.00	1.82	4.38	6.20
8.50	0.21	0.63	5.00	1.82	4.37	6.19
8.55	0.21	0.63	5.00	1.82	4.36	6.18
8.60	0.21	0.63	5.00	1.82	4.34	6.16
8.65	0.21	0.63	5.00	1.82	4.33	6.15
8.70	0.21	0.63	5.00	1.82	4.31	6.13
8.75	0.21	0.63	5.00	1.82	4.30	6.12
8.80	0.21	0.63	5.00	1.82	4.28	6.11
8.85	0.21	0.63	5.00	1.82	4.27	6.09
8.90	0.21	0.63	5.00	1.82	4.26	6.08
8.95	0.21	0.63	5.00	1.82	4.24	6.06
9.00	0.21	0.63	5.00	1.82	4.23	6.05
9.05	0.21	0.63	5.00	1.82	4.21	6.03
9.10	0.21	0.63	5.00	1.82	4.20	6.02
9.15	0.21	0.63	5.00	1.82	4.18	6.00
9.20	0.21	0.63	5.00	1.82	4.17	5.99
9.25	0.21	0.63	5.00	1.82	4.15	5.98
9.30	0.21	0.63	5.00	1.82	4.14	5.96
9.35	0.21	0.63	5.00	1.82	4.13	5.95
9.40	0.21	0.63	5.00	1.82	4.11	5.93
9.45	0.21	0.63	5.00	1.82	4.10	5.92
9.50	0.20	0.63	5.00	1.82	4.08	5.90
9.55	0.20	0.63	5.00	1.82	4.07	5.89
9.60	0.20	0.63	5.00	1.82	4.05	5.87
9.65	0.20	0.63	5.00	1.82	4.04	5.86
9.70	0.20	0.63	5.00	1.82	4.02	5.84
9.75	0.20	0.63	5.00	1.82	4.01	5.83
9.80	0.20	0.63	5.00	1.82	3.99	5.81
9.85	0.20	0.63	5.00	1.82	3.98	5.80
9.90	0.20	0.63	5.00	1.82	3.96	5.78
9.95	0.20	0.63	5.00	1.82	3.95	5.77
10.00	0.20	0.63	5.00	1.82	3.93	5.75
10.05	0.20	0.63	5.00	1.82	3.92	5.74
10.10	0.20	0.63	5.00	1.82	3.90	5.72
10.15	0.20	0.63	5.00	1.82	3.89	5.71
10.20	0.20	0.63	5.00	1.82	3.87	5.69
10.25	0.20	0.63	5.00	1.82	3.86	5.68
10.30	0.21	0.63	5.00	1.82	3.84	5.66
10.35	0.21	0.63	5.00	1.82	3.83	5.65
10.40	0.21	0.63	5.00	1.82	3.81	5.63
10.45	0.21	0.63	5.00	1.82	3.80	5.62
10.50	0.21	0.63	5.00	1.82	3.78	5.60

10.55	0.21	0.63	5.00	1.82	3.77	5.59
10.60	0.21	0.63	5.00	1.82	3.75	5.57
10.65	0.21	0.63	5.00	1.82	3.74	5.56
10.70	0.21	0.63	5.00	1.82	3.73	5.55
10.75	0.21	0.63	5.00	1.82	3.71	5.53
10.80	0.21	0.63	5.00	1.82	3.70	5.52
10.85	0.21	0.63	5.00	1.82	3.68	5.50
10.90	0.21	0.63	5.00	1.82	3.67	5.49
10.95	0.21	0.63	5.00	1.82	3.65	5.47
11.00	0.21	0.63	5.00	1.82	3.64	5.46
11.05	0.21	0.63	5.00	1.82	3.63	5.45
11.10	0.22	0.63	5.00	1.82	3.61	5.43
11.15	0.22	0.63	5.00	1.82	3.60	5.42
11.20	0.22	0.63	5.00	1.82	3.58	5.41
11.25	0.22	0.63	5.00	1.82	3.57	5.39
11.30	0.22	0.63	5.00	1.82	3.56	5.38
11.35	0.22	0.63	5.00	1.82	3.54	5.36
11.40	0.22	0.63	5.00	1.82	3.53	5.35
11.45	0.22	0.63	5.00	1.82	3.52	5.34
11.50	0.22	0.63	5.00	1.82	3.50	5.32
11.55	0.22	0.63	5.00	1.82	3.49	5.31
11.60	0.22	0.63	5.00	1.82	3.48	5.30
11.65	0.22	0.63	5.00	1.82	3.46	5.28
11.70	0.22	0.63	5.00	1.82	3.45	5.27
11.75	0.22	0.63	5.00	1.82	3.44	5.26
11.80	0.22	0.63	5.00	1.82	3.42	5.24
11.85	0.22	0.63	5.00	1.82	3.41	5.23
11.90	0.22	0.63	5.00	1.82	3.40	5.22
11.95	0.23	0.63	5.00	1.82	3.38	5.20
12.00	0.23	0.63	5.00	1.82	3.37	5.19
12.05	0.23	0.63	5.00	1.82	3.36	5.18
12.10	0.23	0.63	5.00	1.82	3.34	5.16
12.15	0.23	0.63	5.00	1.82	3.33	5.15
12.20	0.23	0.63	5.00	1.82	3.32	5.14
12.25	0.23	0.63	5.00	1.82	3.31	5.13
12.30	0.23	0.63	5.00	1.82	3.29	5.11
12.35	0.23	0.62	5.00	1.82	3.28	5.10
12.40	0.23	0.62	5.00	1.82	3.27	5.09
12.45	0.23	0.62	5.00	1.82	3.25	5.08
12.50	0.23	0.62	5.00	1.82	3.24	5.06
12.55	0.23	0.62	5.00	1.82	3.23	5.05
12.60	0.23	0.62	5.00	1.82	3.22	5.04
12.65	0.23	0.62	5.00	1.82	3.20	5.02
12.70	0.23	0.62	5.00	1.82	3.19	5.01
12.75	0.23	0.62	5.00	1.82	3.18	5.00
12.80	0.23	0.62	5.00	1.82	3.17	4.99
12.85	0.24	0.62	5.00	1.82	3.15	4.98
12.90	0.24	0.62	5.00	1.82	3.14	4.96

12.95	0.24	0.62	5.00	1.82	3.13	4.95
13.00	0.24	0.62	5.00	1.82	3.12	4.94
13.05	0.24	0.62	5.00	1.82	3.11	4.93
13.10	0.24	0.62	5.00	1.82	3.09	4.91
13.15	0.24	0.62	5.00	1.82	3.08	4.90
13.20	0.24	0.62	5.00	1.82	3.07	4.89
13.25	0.24	0.62	5.00	1.82	3.06	4.88
13.30	0.24	0.62	5.00	1.82	3.05	4.87
13.35	0.24	0.62	5.00	1.82	3.03	4.85
13.40	0.24	0.62	5.00	1.82	3.02	4.84
13.45	0.24	0.62	5.00	1.82	3.01	4.83
13.50	0.24	0.62	5.00	1.82	3.00	4.82
13.55	0.24	0.62	5.00	1.82	2.99	4.81
13.60	0.24	0.62	5.00	1.82	2.97	4.79
13.65	0.24	0.62	5.00	1.82	2.96	4.78
13.70	0.25	0.62	5.00	1.82	2.95	4.77
13.75	0.25	0.62	5.00	1.82	2.94	4.76
13.80	0.25	0.62	5.00	1.82	2.93	4.75
13.85	0.25	0.62	5.00	1.82	2.92	4.74
13.90	0.25	0.62	5.00	1.82	2.90	4.72
13.95	0.25	0.62	5.00	1.82	2.89	4.71
14.00	0.25	0.62	5.00	1.82	2.88	4.70
14.05	0.25	0.62	5.00	1.82	2.87	4.69
14.10	0.25	0.62	5.00	1.82	2.86	4.68
14.15	0.25	0.62	5.00	1.82	2.85	4.67
14.20	0.25	0.62	5.00	1.82	2.83	4.66
14.25	0.25	0.62	5.00	1.82	2.82	4.64
14.30	0.25	0.62	5.00	1.82	2.81	4.63
14.35	0.25	0.62	5.00	1.82	2.80	4.62
14.40	0.25	0.62	5.00	1.82	2.79	4.61
14.45	0.25	0.62	5.00	1.82	2.78	4.60
14.50	0.25	0.62	5.00	1.82	2.77	4.59
14.55	0.25	0.62	5.00	1.82	2.76	4.58
14.60	0.26	0.62	5.00	1.82	2.74	4.57
14.65	0.26	0.62	5.00	1.82	2.73	4.55
14.70	0.26	0.62	5.00	1.82	2.72	4.54
14.75	0.26	0.62	5.00	1.82	2.71	4.53
14.80	0.28	0.62	5.00	1.82	2.70	4.52
14.85	0.28	0.62	5.00	1.82	2.69	4.51
14.90	0.28	0.62	5.00	1.82	2.68	4.50
14.95	0.28	0.62	5.00	1.82	2.67	4.49
15.00	0.28	0.62	5.00	1.82	2.66	4.48
15.05	0.28	0.62	5.00	1.82	2.65	4.47
15.10	0.28	0.62	5.00	1.82	2.64	4.46
15.15	0.28	0.62	5.00	1.82	2.63	4.45
15.20	0.28	0.62	5.00	1.82	2.62	4.44
15.25	0.28	0.62	5.00	1.82	2.61	4.43
15.30	0.28	0.62	5.00	1.82	2.60	4.42

15.35	0.28	0.62	5.00	1.82	2.59	4.41
15.40	0.28	0.62	5.00	1.82	2.58	4.40
15.45	0.28	0.62	5.00	1.82	2.57	4.39
15.50	0.28	0.62	5.00	1.82	2.56	4.38
15.55	0.28	0.62	5.00	1.82	2.55	4.37
15.60	0.28	0.62	5.00	1.82	2.54	4.36
15.65	0.28	0.62	5.00	1.82	2.53	4.35
15.70	0.28	0.62	5.00	1.82	2.52	4.34
15.75	0.28	0.62	5.00	1.82	2.51	4.33
15.80	0.28	0.62	5.00	1.82	2.50	4.32
15.85	0.28	0.62	5.00	1.82	2.49	4.31
15.90	0.27	0.62	5.00	1.82	2.48	4.30
15.95	0.27	0.62	5.00	1.82	2.47	4.29
16.00	0.27	0.62	5.00	1.82	2.46	4.28
16.05	0.27	0.62	5.00	1.82	2.45	4.27
16.10	0.27	0.62	5.00	1.82	2.44	4.26
16.15	0.27	0.62	5.00	1.82	2.43	4.25
16.20	0.27	0.62	5.00	1.82	2.42	4.24
16.25	0.27	0.62	5.00	1.82	2.41	4.23
16.30	0.27	0.62	5.00	1.82	2.40	4.22
16.35	0.27	0.62	5.00	1.82	2.39	4.21
16.40	0.27	0.62	5.00	1.82	2.38	4.20
16.45	0.27	0.62	5.00	1.82	2.37	4.19
16.50	0.27	0.62	5.00	1.82	2.36	4.18
16.55	0.27	0.62	5.00	1.82	2.35	4.17
16.60	0.27	0.62	5.00	1.82	2.34	4.16
16.65	0.27	0.62	5.00	1.82	2.33	4.15
16.70	0.27	0.62	5.00	1.82	2.32	4.14
16.75	0.27	0.62	5.00	1.82	2.31	4.13
16.80	0.27	0.62	5.00	1.82	2.30	4.12
16.85	0.27	0.62	5.00	1.82	2.29	4.11
16.90	0.26	0.62	5.00	1.82	2.27	4.10
16.95	0.26	0.62	5.00	1.82	2.26	4.08
17.00	0.26	0.62	5.00	1.82	2.25	4.07
17.05	0.26	0.62	5.00	1.82	2.24	4.06
17.10	0.26	0.62	5.00	1.82	2.23	4.05
17.15	0.26	0.62	5.00	1.82	2.22	4.04
17.20	0.26	0.62	5.00	1.82	2.21	4.03
17.25	0.26	0.62	5.00	1.82	2.20	4.02
17.30	0.26	0.62	5.00	1.82	2.19	4.01
17.35	0.26	0.62	5.00	1.82	2.18	4.00
17.40	0.26	0.62	5.00	1.82	2.17	3.99
17.45	0.26	0.62	5.00	1.82	2.16	3.98
17.50	0.26	0.62	5.00	1.82	2.15	3.97
17.55	0.26	0.62	5.00	1.82	2.13	3.96
17.60	0.26	0.62	5.00	1.82	2.12	3.94
17.65	0.26	0.62	5.00	1.82	2.11	3.93
17.70	0.26	0.62	5.00	1.82	2.10	3.92

17.75	0.26	0.62	5.00	1.82	2.09	3.91
17.80	0.26	0.62	5.00	1.82	2.08	3.90
17.85	0.26	0.62	5.00	1.82	2.07	3.89
17.90	0.26	0.62	5.00	1.82	2.06	3.88
17.95	0.26	0.62	5.00	1.82	2.05	3.87
18.00	0.26	0.62	5.00	1.82	2.04	3.86
18.05	0.25	0.62	5.00	1.82	2.02	3.85
18.10	0.25	0.62	5.00	1.82	2.01	3.83
18.15	0.25	0.62	5.00	1.82	2.00	3.82
18.20	0.25	0.62	5.00	1.82	1.99	3.81
18.25	0.25	0.62	5.00	1.82	1.98	3.80
18.30	0.25	0.62	5.00	1.82	1.97	3.79
18.35	0.25	0.62	5.00	1.82	1.96	3.78
18.40	0.25	0.62	5.00	1.82	1.95	3.77
18.45	0.25	0.62	5.00	1.82	1.93	3.76
18.50	0.25	0.62	5.00	1.82	1.92	3.74
18.55	0.25	0.62	5.00	1.82	1.91	3.73
18.60	0.25	0.62	5.00	1.82	1.90	3.72
18.65	0.25	0.62	5.00	1.82	1.89	3.71
18.70	0.25	0.62	5.00	1.82	1.88	3.70
18.75	0.25	0.62	5.00	1.82	1.87	3.69
18.80	0.25	0.62	5.00	1.82	1.85	3.68
18.85	0.25	0.62	5.00	1.82	1.84	3.66
18.90	0.25	0.62	5.00	1.82	1.83	3.65
18.95	0.25	0.62	5.00	1.82	1.82	3.64
19.00	0.25	0.61	5.00	1.82	1.81	3.63
19.05	0.25	0.61	5.00	1.82	1.80	3.62
19.10	0.25	0.61	5.00	1.82	1.79	3.61
19.15	0.25	0.61	5.00	1.82	1.77	3.59
19.20	0.25	0.61	5.00	1.82	1.76	3.58
19.25	0.25	0.61	5.00	1.82	1.75	3.57
19.30	0.24	0.61	5.00	1.82	1.74	3.56
19.35	0.24	0.61	5.00	1.82	1.73	3.55
19.40	0.24	0.61	5.00	1.82	1.72	3.54
19.45	0.24	0.61	5.00	1.82	1.70	3.52
19.50	0.24	0.61	5.00	1.82	1.69	3.51
19.55	0.24	0.61	5.00	1.82	1.68	3.50
19.60	0.24	0.61	5.00	1.82	1.67	3.49
19.65	0.24	0.61	5.00	1.82	1.66	3.48
19.70	0.24	0.61	5.00	1.82	1.65	3.47
19.75	0.24	0.61	5.00	1.82	1.64	3.46
19.80	0.24	0.61	5.00	1.82	1.62	3.44
19.85	0.24	0.61	5.00	1.82	1.61	3.43
19.90	0.24	0.61	5.00	1.82	1.60	3.42
19.95	0.24	0.61	5.00	1.82	1.59	3.41
20.00	0.24	0.61	5.00	1.82	1.58	3.40
20.05	0.24	0.61	5.00	1.82	1.56	3.39
20.10	0.25	0.61	5.00	1.82	1.55	3.37

20.15	0.25	0.61	5.00	1.82	1.54	3.36
20.20	0.26	0.61	5.00	1.82	1.53	3.35
20.25	0.26	0.61	5.00	1.82	1.52	3.34
20.30	0.27	0.61	5.00	1.82	1.51	3.33
20.35	0.27	0.61	5.00	1.82	1.50	3.32
20.40	0.27	0.61	5.00	1.82	1.49	3.31
20.45	0.28	0.61	5.00	1.82	1.49	3.31
20.50	0.28	0.61	5.00	1.82	1.48	3.30
20.55	0.29	0.61	5.00	1.82	1.47	3.29
20.60	0.29	0.61	5.00	1.82	1.46	3.28
20.65	0.30	0.61	5.00	1.82	1.45	3.28
20.70	0.30	0.61	5.00	1.82	1.45	3.27
20.75	0.31	0.61	5.00	1.82	1.44	3.26
20.80	0.31	0.61	5.00	1.82	1.43	3.26
20.85	0.32	0.61	5.00	1.82	1.43	3.25
20.90	0.32	0.61	5.00	1.82	1.42	3.24
20.95	0.33	0.61	5.00	1.82	1.42	3.24
21.00	0.33	0.61	5.00	1.82	1.41	3.23
21.05	0.34	0.61	5.00	1.82	1.41	3.23
21.10	0.35	0.61	5.00	1.82	1.40	3.22
21.15	0.35	0.61	5.00	1.82	1.39	3.22
21.20	0.36	0.61	5.00	1.82	1.39	3.21
21.25	0.37	0.61	5.00	1.82	1.39	3.21
21.30	0.37	0.61	5.00	1.82	1.38	3.20
21.35	0.38	0.61	5.00	1.82	1.38	3.20
21.40	0.39	0.61	5.00	1.82	1.37	3.19
21.45	0.40	0.61	5.00	1.82	1.37	3.19
21.50	0.41	0.61	5.00	1.82	1.36	3.18
21.55	0.41	0.61	5.00	1.82	1.36	3.18
21.60	0.43	0.61	5.00	1.82	1.36	3.18
21.65	0.44	0.61	5.00	1.82	1.35	3.17
21.70	0.45	0.61	5.00	1.82	1.35	3.17
21.75	0.47	0.61	5.00	1.82	1.34	3.16
21.80	0.49	0.61	5.00	1.82	1.34	3.16
21.85	0.53	0.61	5.00	1.82	1.34	3.16
21.90	0.60	0.61	5.00	1.82	1.33	3.15
21.95	0.60	0.61	5.00	1.82	1.33	3.15
22.00	0.60	0.61	5.00	1.82	1.33	3.15
22.05	0.60	0.61	5.00	1.82	1.32	3.14
22.10	0.60	0.61	5.00	1.82	1.32	3.14
22.15	0.60	0.61	5.00	1.82	1.32	3.14
22.20	0.60	0.61	5.00	1.82	1.32	3.14
22.25	0.60	0.61	5.00	1.82	1.31	3.13
22.30	0.60	0.61	5.00	1.82	1.31	3.13
22.35	0.60	0.61	5.00	1.82	1.31	3.13
22.40	0.60	0.61	5.00	1.82	1.30	3.12
22.45	0.60	0.61	5.00	1.82	1.30	3.12
22.50	0.60	0.61	5.00	1.82	1.30	3.12

22.55	0.60	0.61	5.00	1.82	1.30	3.12
22.60	0.60	0.61	5.00	1.82	1.29	3.11
22.65	0.60	0.61	5.00	1.82	1.29	3.11
22.70	0.60	0.61	5.00	1.82	1.29	3.11
22.75	0.60	0.61	5.00	1.82	1.29	3.11
22.80	0.60	0.61	5.00	1.82	1.29	3.11
22.85	0.60	0.61	5.00	1.82	1.28	3.10
22.90	0.60	0.61	5.00	1.82	1.28	3.10
22.95	0.60	0.61	5.00	1.82	1.28	3.10
23.00	0.60	0.61	5.00	1.82	1.28	3.10
23.05	0.60	0.61	5.00	1.82	1.28	3.10
23.10	0.60	0.61	5.00	1.82	1.27	3.09
23.15	0.60	0.61	5.00	1.82	1.27	3.09
23.20	0.60	0.61	5.00	1.82	1.27	3.09
23.25	0.60	0.61	5.00	1.82	1.27	3.09
23.30	0.60	0.61	5.00	1.82	1.27	3.09
23.35	0.60	0.61	5.00	1.82	1.26	3.09
23.40	0.60	0.61	5.00	1.82	1.26	3.08
23.45	0.60	0.61	5.00	1.82	1.26	3.08
23.50	0.60	0.61	5.00	1.82	1.26	3.08
23.55	0.60	0.61	5.00	1.82	1.26	3.08
23.60	0.60	0.61	5.00	1.82	1.26	3.08
23.65	0.60	0.61	5.00	1.82	1.26	3.08
23.70	0.60	0.61	5.00	1.82	1.25	3.07
23.75	0.60	0.61	5.00	1.82	1.25	3.07
23.80	0.60	0.61	5.00	1.82	1.25	3.07
23.85	0.60	0.61	5.00	1.82	1.25	3.07
23.90	0.60	0.61	5.00	1.82	1.25	3.07
23.95	0.60	0.61	5.00	1.82	1.25	3.07
24.00	0.60	0.61	5.00	1.82	1.25	3.07
24.05	0.60	0.61	5.00	1.82	1.24	3.07
24.10	0.60	0.61	5.00	1.82	1.24	3.06
24.15	0.60	0.61	5.00	1.82	1.24	3.06
24.20	0.60	0.61	5.00	1.82	1.24	3.06
24.25	0.60	0.61	5.00	1.82	1.24	3.06
24.30	0.60	0.61	5.00	1.82	1.24	3.06
24.35	0.60	0.61	5.00	1.82	1.24	3.06
24.40	0.60	0.61	5.00	1.82	1.24	3.06
24.45	0.60	0.61	5.00	1.82	1.23	3.05
24.50	0.60	0.61	5.00	1.82	1.23	3.05
24.55	0.60	0.61	5.00	1.82	1.23	3.05
24.60	0.60	0.61	5.00	1.82	1.23	3.05
24.65	0.60	0.61	5.00	1.82	1.23	3.05
24.70	0.60	0.61	5.00	1.82	1.23	3.05
24.75	0.60	0.61	5.00	1.82	1.23	3.05
24.80	0.60	0.61	5.00	1.82	1.23	3.05
24.85	0.60	0.61	5.00	1.82	1.22	3.04
24.90	0.60	0.61	5.00	1.82	1.22	3.04

24.95	0.60	0.61	5.00	1.82	1.22	3.04
25.00	0.60	0.61	5.00	1.82	1.22	3.04
25.05	0.60	0.61	5.00	1.82	1.22	3.04
25.10	0.60	0.61	5.00	1.82	1.22	3.04
25.15	0.60	0.61	5.00	1.82	1.22	3.04
25.20	0.60	0.61	5.00	1.82	1.22	3.04
25.25	0.60	0.61	5.00	1.82	1.21	3.03
25.30	0.60	0.61	5.00	1.82	1.21	3.03
25.35	0.60	0.61	5.00	1.82	1.21	3.03
25.40	0.60	0.61	5.00	1.82	1.21	3.03
25.45	0.60	0.61	5.00	1.82	1.21	3.03
25.50	0.60	0.61	5.00	1.82	1.21	3.03
25.55	0.60	0.61	5.00	1.82	1.21	3.03
25.60	0.60	0.61	5.00	1.82	1.20	3.03
25.65	0.60	0.61	5.00	1.82	1.20	3.02
25.70	0.60	0.60	5.00	1.82	1.20	3.02
25.75	0.60	0.60	5.00	1.82	1.20	3.02
25.80	0.60	0.60	5.00	1.82	1.20	3.02
25.85	0.60	0.60	5.00	1.82	1.20	3.02
25.90	0.60	0.60	5.00	1.82	1.20	3.02
25.95	0.60	0.60	5.00	1.82	1.19	3.02
26.00	0.60	0.60	5.00	1.82	1.19	3.01
26.05	0.60	0.60	5.00	1.82	1.19	3.01
26.10	0.60	0.60	5.00	1.82	1.19	3.01
26.15	0.60	0.60	5.00	1.82	1.19	3.01
26.20	0.60	0.60	5.00	1.82	1.19	3.01
26.25	0.60	0.60	5.00	1.82	1.19	3.01
26.30	0.60	0.60	5.00	1.82	1.18	3.01
26.35	0.60	0.60	5.00	1.82	1.18	3.00
26.40	0.60	0.60	5.00	1.82	1.18	3.00
26.45	0.60	0.60	5.00	1.82	1.18	3.00
26.50	0.60	0.60	5.00	1.82	1.18	3.00
26.55	0.60	0.60	5.00	1.82	1.18	3.00
26.60	0.60	0.60	5.00	1.82	1.18	3.00
26.65	0.60	0.60	5.00	1.82	1.17	2.99
26.70	0.60	0.60	5.00	1.82	1.17	2.99
26.75	0.60	0.60	5.00	1.82	1.17	2.99
26.80	0.60	0.60	5.00	1.82	1.17	2.99
26.85	0.60	0.60	5.00	1.82	1.17	2.99
26.90	0.60	0.60	5.00	1.82	1.17	2.99
26.95	0.60	0.60	5.00	1.82	1.16	2.98
27.00	0.60	0.60	5.00	1.82	1.16	2.98
27.05	0.60	0.60	5.00	1.82	1.16	2.98
27.10	0.60	0.60	5.00	1.82	1.16	2.98
27.15	0.60	0.60	5.00	1.82	1.16	2.98
27.20	0.60	0.60	5.00	1.82	1.15	2.97
27.25	0.60	0.60	5.00	1.82	1.15	2.97
27.30	0.60	0.60	5.00	1.82	1.15	2.97

27.35	0.60	0.60	5.00	1.82	1.15	2.97
27.40	0.60	0.60	5.00	1.82	1.15	2.97
27.45	0.59	0.60	5.00	1.82	1.14	2.96
27.50	0.59	0.60	5.00	1.82	1.14	2.96
27.55	0.59	0.60	5.00	1.82	1.14	2.96
27.60	0.59	0.60	5.00	1.82	1.14	2.96
27.65	0.59	0.60	5.00	1.82	1.13	2.96
27.70	0.59	0.60	5.00	1.82	1.13	2.95
27.75	0.59	0.60	5.00	1.82	1.13	2.95
27.80	0.59	0.60	5.00	1.82	1.13	2.95
27.85	0.59	0.60	5.00	1.82	1.12	2.95
27.90	0.59	0.60	5.00	1.82	1.12	2.94
27.95	0.59	0.60	5.00	1.82	1.12	2.94
28.00	0.59	0.60	5.00	1.82	1.12	2.94
28.05	0.59	0.60	5.00	1.82	1.11	2.93
28.10	0.59	0.60	5.00	1.82	1.11	2.93
28.15	0.59	0.60	5.00	1.82	1.11	2.93
28.20	0.59	0.60	5.00	1.82	1.11	2.93
28.25	0.59	0.60	5.00	1.82	1.10	2.92
28.30	0.59	0.60	5.00	1.82	1.10	2.92
28.35	0.59	0.60	5.00	1.82	1.10	2.92
28.40	0.59	0.60	5.00	1.82	1.09	2.92
28.45	0.59	0.60	5.00	1.82	1.09	2.91
28.50	0.59	0.60	5.00	1.82	1.09	2.91
28.55	0.59	0.60	5.00	1.82	1.08	2.91
28.60	0.59	0.60	5.00	1.82	1.08	2.90
28.65	0.59	0.60	5.00	1.82	1.08	2.90
28.70	0.59	0.60	5.00	1.82	1.07	2.89
28.75	0.59	0.60	5.00	1.82	1.07	2.89
28.80	0.59	0.60	5.00	1.82	1.07	2.89
28.85	0.59	0.60	5.00	1.82	1.06	2.88
28.90	0.59	0.60	5.00	1.82	1.06	2.88
28.95	0.59	0.60	5.00	1.82	1.05	2.87
29.00	0.59	0.60	5.00	1.82	1.05	2.87
29.05	0.59	0.60	5.00	1.82	1.04	2.86
29.10	0.59	0.60	5.00	1.82	1.04	2.86
29.15	0.59	0.60	5.00	1.82	1.03	2.85
29.20	0.59	0.60	5.00	1.82	1.03	2.85
29.25	0.59	0.60	5.00	1.82	1.02	2.84
29.30	0.59	0.60	5.00	1.82	1.02	2.84
29.35	0.59	0.60	5.00	1.82	1.01	2.83
29.40	0.59	0.60	5.00	1.82	1.01	2.83
29.45	0.59	0.60	5.00	1.82	1.00	2.82
29.50	0.59	0.60	5.00	1.82	0.99	2.81
29.55	0.55	0.60	5.00	1.82	0.99	2.81
29.60	0.50	0.60	5.00	1.82	0.98	2.80
29.65	0.47	0.60	5.00	1.82	0.98	2.80
29.70	0.45	0.60	5.00	1.82	0.97	2.79

29.75	0.44	0.60	5.00	1.82	0.96	2.78
29.80	0.43	0.60	5.00	1.82	0.96	2.78
29.85	0.42	0.60	5.00	1.82	0.95	2.77
29.90	0.41	0.60	5.00	1.82	0.94	2.76
29.95	0.40	0.60	5.00	1.82	0.93	2.76
30.00	0.40	0.60	5.00	1.82	0.93	2.75
30.05	0.40	0.60	5.00	1.82	0.92	2.74
30.10	0.40	0.60	5.00	1.82	0.91	2.73
30.15	0.40	0.60	5.00	1.82	0.91	2.73
30.20	0.40	0.60	5.00	1.82	0.90	2.72
30.25	0.41	0.60	5.00	1.82	0.89	2.71
30.30	0.41	0.60	5.00	1.82	0.89	2.71
30.35	0.41	0.60	5.00	1.82	0.88	2.70
30.40	0.41	0.60	5.00	1.82	0.87	2.69
30.45	0.42	0.60	5.00	1.82	0.86	2.69
30.50	0.42	0.60	5.00	1.82	0.86	2.68
30.55	0.42	0.60	5.00	1.82	0.85	2.67
30.60	0.43	0.60	5.00	1.82	0.84	2.67
30.65	0.43	0.59	5.00	1.82	0.84	2.66
30.70	0.43	0.59	5.00	1.82	0.83	2.65
30.75	0.44	0.59	5.00	1.82	0.82	2.64
30.80	0.44	0.59	5.00	1.82	0.82	2.64
30.85	0.44	0.59	5.00	1.82	0.81	2.63
30.90	0.45	0.59	5.00	1.82	0.80	2.62
30.95	0.45	0.59	5.00	1.82	0.80	2.62
31.00	0.46	0.59	5.00	1.82	0.79	2.61
31.05	0.46	0.59	5.00	1.82	0.78	2.61
31.10	0.47	0.59	5.00	1.82	0.78	2.60
31.15	0.47	0.59	5.00	1.82	0.77	2.59
31.20	0.48	0.59	5.00	1.82	0.77	2.59
31.25	0.49	0.59	5.00	1.82	0.76	2.58
31.30	0.50	0.59	5.00	1.82	0.75	2.57
31.35	0.51	0.59	5.00	1.82	0.75	2.57
31.40	0.52	0.59	5.00	1.82	0.74	2.56
31.45	0.54	0.59	5.00	1.82	0.73	2.55
31.50	0.57	0.59	5.00	1.82	0.73	2.55
31.55	0.58	0.59	5.00	1.82	0.72	2.54
31.60	0.58	0.59	5.00	1.82	0.71	2.53
31.65	0.58	0.59	5.00	1.82	0.71	2.53
31.70	0.58	0.59	5.00	1.82	0.70	2.52
31.75	0.58	0.59	5.00	1.82	0.70	2.52
31.80	0.58	0.59	5.00	1.82	0.69	2.51
31.85	0.58	0.59	5.00	1.82	0.68	2.50
31.90	0.58	0.59	5.00	1.82	0.68	2.50
31.95	0.58	0.59	5.00	1.82	0.67	2.49
32.00	0.58	0.59	5.00	1.82	0.66	2.49
32.05	0.58	0.59	5.00	1.82	0.66	2.48
32.10	0.58	0.59	5.00	1.82	0.65	2.47

32.15	0.58	0.59	5.00	1.82	0.65	2.47
32.20	0.58	0.59	5.00	1.82	0.64	2.46
32.25	0.58	0.59	5.00	1.82	0.63	2.46
32.30	0.58	0.59	5.00	1.82	0.63	2.45
32.35	0.58	0.59	5.00	1.82	0.62	2.44
32.40	0.58	0.59	5.00	1.82	0.62	2.44
32.45	0.58	0.59	5.00	1.82	0.61	2.43
32.50	0.58	0.59	5.00	1.82	0.60	2.43
32.55	0.58	0.59	5.00	1.82	0.60	2.42
32.60	0.58	0.58	5.00	1.82	0.59	2.41
32.65	0.58	0.58	5.00	1.82	0.59	2.41
32.70	0.58	0.58	5.00	1.82	0.58	2.40
32.75	0.58	0.58	5.00	1.82	0.58	2.40
32.80	0.58	0.58	5.00	1.82	0.57	2.39
32.85	0.58	0.58	5.00	1.82	0.56	2.39
32.90	0.58	0.58	5.00	1.82	0.56	2.38
32.95	0.58	0.58	5.00	1.82	0.55	2.37
33.00	0.58	0.58	5.00	1.82	0.55	2.37
33.05	0.58	0.58	5.00	1.82	0.54	2.36
33.10	0.58	0.58	5.00	1.82	0.54	2.36
33.15	0.58	0.58	5.00	1.82	0.53	2.35
33.20	0.58	0.58	5.00	1.82	0.53	2.35
33.25	0.58	0.58	5.00	1.82	0.52	2.34
33.30	0.58	0.58	5.00	1.82	0.51	2.33
33.35	0.58	0.58	5.00	1.82	0.51	2.33
33.40	0.58	0.58	5.00	1.82	0.50	2.32
33.45	0.58	0.58	5.00	1.82	0.50	2.32
33.50	0.58	0.58	5.00	1.82	0.49	2.31
33.55	0.58	0.58	5.00	1.82	0.49	2.31
33.60	0.58	0.58	5.00	1.82	0.48	2.30
33.65	0.58	0.58	5.00	1.82	0.48	2.30
33.70	0.58	0.58	5.00	1.82	0.47	2.29
33.75	0.58	0.58	5.00	1.82	0.47	2.29
33.80	0.58	0.58	5.00	1.82	0.46	2.28
33.85	0.58	0.58	5.00	1.82	0.45	2.28
33.90	0.58	0.58	5.00	1.82	0.45	2.27
33.95	0.57	0.58	5.00	1.82	0.44	2.27
34.00	0.57	0.58	5.00	1.82	0.44	2.26
34.05	0.57	0.58	5.00	1.82	0.43	2.25
34.10	0.57	0.58	5.00	1.82	0.43	2.25
34.15	0.57	0.58	5.00	1.82	0.42	2.24
34.20	0.57	0.58	5.00	1.82	0.42	2.24
34.25	0.57	0.58	5.00	1.82	0.41	2.23
34.30	0.57	0.58	5.00	1.82	0.41	2.23
34.35	0.57	0.58	5.00	1.82	0.40	2.22
34.40	0.57	0.58	5.00	1.82	0.40	2.22
34.45	0.57	0.58	5.00	1.82	0.39	2.21
34.50	0.57	0.57	5.00	1.82	0.39	2.21

34.55	0.57	0.57	5.00	1.82	0.38	2.21
34.60	0.57	0.57	5.00	1.82	0.38	2.20
34.65	0.57	0.57	5.00	1.82	0.38	2.20
34.70	0.57	0.57	5.00	1.82	0.37	2.19
34.75	0.57	0.57	5.00	1.82	0.37	2.19
34.80	0.57	0.57	5.00	1.82	0.36	2.18
34.85	0.57	0.57	5.00	1.82	0.36	2.18
34.90	0.57	0.57	5.00	1.82	0.35	2.17
34.95	0.57	0.57	5.00	1.82	0.35	2.17
35.00	0.57	0.57	5.00	1.82	0.34	2.16
35.05	0.57	0.57	5.00	1.82	0.34	2.16
35.10	0.57	0.57	5.00	1.82	0.33	2.15
35.15	0.57	0.57	5.00	1.82	0.33	2.15
35.20	0.57	0.57	5.00	1.82	0.32	2.15
35.25	0.57	0.57	5.00	1.82	0.32	2.14
35.30	0.57	0.57	5.00	1.82	0.32	2.14
35.35	0.57	0.57	5.00	1.82	0.31	2.13
35.40	0.57	0.57	5.00	1.82	0.31	2.13
35.45	0.57	0.57	5.00	1.82	0.30	2.12
35.50	0.57	0.57	5.00	1.82	0.30	2.12
35.55	0.57	0.57	5.00	1.82	0.29	2.11
35.60	0.57	0.57	5.00	1.82	0.29	2.11
35.65	0.57	0.57	5.00	1.82	0.28	2.10
35.70	0.57	0.57	5.00	1.82	0.27	2.10
35.75	0.57	0.57	5.00	1.82	0.27	2.09
35.80	0.57	0.57	5.00	1.82	0.26	2.09
35.85	0.57	0.57	5.00	1.82	0.26	2.08
35.90	0.57	0.57	5.00	1.82	0.25	2.07
35.95	0.57	0.57	5.00	1.82	0.25	2.07
36.00	0.57	0.57	5.00	1.82	0.24	2.06
36.05	0.57	0.57	5.00	1.82	0.24	2.06
36.10	0.57	0.57	5.00	1.82	0.23	2.05
36.15	0.57	0.57	5.00	1.82	0.23	2.05
36.20	0.57	0.57	5.00	1.82	0.22	2.04
36.25	0.57	0.57	5.00	1.82	0.22	2.04
36.30	0.57	0.57	5.00	1.82	0.21	2.03
36.35	0.57	0.57	5.00	1.82	0.21	2.03
36.40	0.57	0.56	5.00	1.82	0.20	2.02
36.45	0.57	0.56	5.00	1.82	0.19	2.01
36.50	0.57	0.56	5.00	1.82	0.19	2.01
36.55	0.57	0.56	5.00	1.82	0.18	2.00
36.60	0.57	0.56	5.00	1.82	0.18	2.00
36.65	0.57	0.56	5.00	1.82	0.17	1.99
36.70	0.57	0.56	5.00	1.82	0.17	1.99
36.75	0.57	0.56	5.00	1.82	0.16	1.98
36.80	0.57	0.56	5.00	1.82	0.15	1.97
36.85	0.57	0.56	5.00	1.82	0.15	1.97
36.90	0.57	0.56	5.00	1.82	0.14	1.96

36.95	0.57	0.56	5.00	1.82	0.14	1.96
37.00	0.57	0.56	5.00	1.82	0.13	1.95
37.05	0.57	0.56	5.00	1.82	0.12	1.95
37.10	0.57	0.56	5.00	1.82	0.12	1.94
37.15	0.57	0.56	5.00	1.82	0.11	1.93
37.20	0.57	0.56	5.00	1.82	0.11	1.93
37.25	0.57	0.56	5.00	1.82	0.10	1.92
37.30	0.57	0.56	5.00	1.82	0.09	1.92
37.35	0.57	0.56	5.00	1.82	0.09	1.91
37.40	0.57	0.56	5.00	1.82	0.08	1.90
37.45	0.56	0.56	5.00	1.82	0.08	1.90
37.50	0.56	0.56	5.00	1.82	0.07	1.89
37.55	0.56	0.56	5.00	1.82	0.06	1.88
37.60	0.56	0.56	5.00	1.82	0.06	1.88
37.65	0.54	0.56	5.00	1.82	0.05	1.87
37.70	0.51	0.56	5.00	1.82	0.05	1.87
37.75	0.49	0.56	5.00	1.82	0.04	1.86
37.80	0.48	0.56	5.00	1.82	0.03	1.85
37.85	0.47	0.56	5.00	1.82	0.03	1.85
37.90	0.46	0.56	5.00	1.82	0.02	1.84
37.95	0.45	0.56	5.00	1.82	0.01	1.83
38.00	0.45	0.56	5.00	1.82	0.01	1.83
38.05	0.44	0.56	0.79*	1.82	0.00	1.82
38.10	0.43	0.56	0.78*	1.82	0.00	1.82
38.15	0.43	0.56	0.77*	1.81	0.00	1.81
38.20	0.42	0.56	0.76*	1.81	0.00	1.81
38.25	0.42	0.56	0.75*	1.80	0.00	1.80
38.30	0.42	0.56	0.75*	1.79	0.00	1.79
38.35	0.41	0.56	0.74*	1.79	0.00	1.79
38.40	0.41	0.56	0.73*	1.78	0.00	1.78
38.45	0.41	0.56	0.73*	1.78	0.00	1.78
38.50	0.40	0.56	0.72*	1.77	0.00	1.77
38.55	0.40	0.56	0.71*	1.77	0.00	1.77
38.60	0.40	0.56	0.71*	1.76	0.00	1.76
38.65	0.39	0.56	0.70*	1.76	0.00	1.76
38.70	0.39	0.56	0.70*	1.75	0.00	1.75
38.75	0.39	0.56	0.69*	1.74	0.00	1.74
38.80	0.38	0.56	0.69*	1.74	0.00	1.74
38.85	0.38	0.56	0.68*	1.73	0.00	1.73
38.90	0.38	0.56	0.68*	1.73	0.00	1.73
38.95	0.38	0.56	0.67*	1.72	0.00	1.72
39.00	0.37	0.56	0.67*	1.71	0.00	1.71
39.05	0.37	0.56	0.66*	1.71	0.00	1.71
39.10	0.37	0.56	0.66*	1.70	0.00	1.70
39.15	0.37	0.56	0.65*	1.70	0.00	1.70
39.20	0.36	0.56	0.65*	1.69	0.00	1.69
39.25	0.36	0.56	0.65*	1.68	0.00	1.68
39.30	0.36	0.56	0.64*	1.68	0.00	1.68

39.35	0.36	0.56	0.64*	1.67	0.00	1.67
39.40	0.35	0.56	0.63*	1.66	0.00	1.66
39.45	0.35	0.56	0.63*	1.66	0.00	1.66
39.50	0.35	0.56	0.63*	1.65	0.00	1.65
39.55	0.35	0.56	0.62*	1.64	0.00	1.64
39.60	0.35	0.56	0.62*	1.64	0.00	1.64
39.65	0.34	0.56	0.61*	1.63	0.00	1.63
39.70	0.34	0.56	0.61*	1.62	0.00	1.62
39.75	0.34	0.56	0.61*	1.62	0.00	1.62
39.80	0.34	0.56	0.60*	1.61	0.00	1.61
39.85	0.34	0.56	0.60*	1.60	0.00	1.60
39.90	0.33	0.56	0.60*	1.60	0.00	1.60
39.95	0.33	0.56	0.59*	1.59	0.00	1.59
40.00	0.33	0.56	0.59*	1.58	0.00	1.58
40.05	0.33	0.56	0.59*	1.58	0.00	1.58
40.10	0.33	0.56	0.59*	1.57	0.00	1.57
40.15	0.33	0.56	0.58*	1.56	0.00	1.56
40.20	0.33	0.56	0.58*	1.56	0.00	1.56
40.25	0.32	0.56	0.58*	1.55	0.00	1.55
40.30	0.32	0.56	0.58*	1.54	0.00	1.54
40.35	0.32	0.56	0.58*	1.54	0.00	1.54
40.40	0.32	0.56	0.57*	1.53	0.00	1.53
40.45	0.32	0.56	0.57*	1.52	0.00	1.52
40.50	0.32	0.56	0.57*	1.51	0.00	1.51
40.55	0.32	0.56	0.57*	1.51	0.00	1.51
40.60	0.32	0.56	0.57*	1.50	0.00	1.50
40.65	0.32	0.56	0.56*	1.49	0.00	1.49
40.70	0.32	0.56	0.56*	1.49	0.00	1.49
40.75	0.31	0.56	0.56*	1.48	0.00	1.48
40.80	0.31	0.56	0.56*	1.47	0.00	1.47
40.85	0.31	0.56	0.56*	1.47	0.00	1.47
40.90	0.31	0.56	0.55*	1.46	0.00	1.46
40.95	0.31	0.56	0.55*	1.45	0.00	1.45
41.00	0.31	0.56	0.55*	1.44	0.00	1.44
41.05	0.31	0.56	0.55*	1.44	0.00	1.44
41.10	0.31	0.56	0.55*	1.43	0.00	1.43
41.15	0.31	0.56	0.54*	1.42	0.00	1.42
41.20	0.31	0.56	0.54*	1.41	0.00	1.41
41.25	0.30	0.56	0.54*	1.41	0.00	1.41
41.30	0.30	0.56	0.54*	1.40	0.00	1.40
41.35	0.30	0.56	0.54*	1.39	0.00	1.39
41.40	0.30	0.56	0.54*	1.38	0.00	1.38
41.45	0.30	0.56	0.53*	1.38	0.00	1.38
41.50	0.30	0.56	0.53*	1.37	0.00	1.37
41.55	0.30	0.56	0.53*	1.36	0.00	1.36
41.60	0.30	0.56	0.53*	1.36	0.00	1.36
41.65	0.30	0.56	0.53*	1.35	0.00	1.35
41.70	0.30	0.56	0.53*	1.34	0.00	1.34

41.75	0.29	0.56	0.52*	1.33	0.00	1.33
41.80	0.29	0.56	0.52*	1.33	0.00	1.33
41.85	0.29	0.56	0.52*	1.32	0.00	1.32
41.90	0.29	0.56	0.52*	1.31	0.00	1.31
41.95	0.29	0.56	0.52*	1.30	0.00	1.30
42.00	0.29	0.56	0.52*	1.29	0.00	1.29
42.05	0.29	0.56	0.51*	1.29	0.00	1.29
42.10	0.29	0.56	0.51*	1.28	0.00	1.28
42.15	0.29	0.56	0.51*	1.27	0.00	1.27
42.20	0.29	0.56	0.51*	1.26	0.00	1.26
42.25	0.29	0.56	0.51*	1.26	0.00	1.26
42.30	0.28	0.56	0.51*	1.25	0.00	1.25
42.35	0.28	0.56	0.50*	1.24	0.00	1.24
42.40	0.28	0.56	0.50*	1.23	0.00	1.23
42.45	0.28	0.56	0.50*	1.23	0.00	1.23
42.50	0.28	0.56	0.50*	1.22	0.00	1.22
42.55	0.28	0.56	0.50*	1.21	0.00	1.21
42.60	0.28	0.56	0.50*	1.20	0.00	1.20
42.65	0.28	0.56	0.49*	1.19	0.00	1.19
42.70	0.28	0.56	0.49*	1.19	0.00	1.19
42.75	0.28	0.56	0.49*	1.18	0.00	1.18
42.80	0.28	0.56	0.49*	1.17	0.00	1.17
42.85	0.28	0.56	0.49*	1.16	0.00	1.16
42.90	0.27	0.56	0.49*	1.15	0.00	1.15
42.95	0.27	0.56	0.49*	1.15	0.00	1.15
43.00	0.27	0.56	0.48*	1.14	0.00	1.14
43.05	0.27	0.56	0.48*	1.13	0.00	1.13
43.10	0.27	0.56	0.48*	1.12	0.00	1.12
43.15	0.27	0.56	0.48*	1.11	0.00	1.11
43.20	0.27	0.56	0.48*	1.11	0.00	1.11
43.25	0.27	0.56	0.48*	1.10	0.00	1.10
43.30	0.27	0.56	0.48*	1.09	0.00	1.09
43.35	0.27	0.56	0.47*	1.08	0.00	1.08
43.40	0.27	0.56	0.47*	1.07	0.00	1.07
43.45	0.27	0.56	0.47*	1.07	0.00	1.07
43.50	0.27	0.56	0.47*	1.06	0.00	1.06
43.55	0.26	0.56	0.47*	1.05	0.00	1.05
43.60	0.26	0.56	0.47*	1.04	0.00	1.04
43.65	0.26	0.56	0.47*	1.03	0.00	1.03
43.70	0.26	0.56	0.46*	1.02	0.00	1.02
43.75	0.26	0.56	0.46*	1.02	0.00	1.02
43.80	0.26	0.56	0.46*	1.01	0.00	1.01
43.85	0.26	0.56	0.46*	1.00	0.00	1.00
43.90	0.26	0.56	0.46*	0.99	0.00	0.99
43.95	0.26	0.56	0.46*	0.98	0.00	0.98
44.00	0.26	0.56	0.46*	0.97	0.00	0.97
44.05	0.26	0.57	0.46*	0.97	0.00	0.97
44.10	0.26	0.57	0.45*	0.96	0.00	0.96

44.15	0.26	0.57	0.45*	0.95	0.00	0.95
44.20	0.25	0.57	0.45*	0.94	0.00	0.94
44.25	0.25	0.57	0.45*	0.93	0.00	0.93
44.30	0.25	0.57	0.45*	0.92	0.00	0.92
44.35	0.25	0.57	0.45*	0.92	0.00	0.92
44.40	0.25	0.57	0.45*	0.91	0.00	0.91
44.45	0.25	0.57	0.44*	0.90	0.00	0.90
44.50	0.25	0.57	0.44*	0.89	0.00	0.89
44.55	0.25	0.57	0.44*	0.88	0.00	0.88
44.60	0.25	0.57	0.44*	0.87	0.00	0.87
44.65	0.25	0.57	0.44*	0.86	0.00	0.86
44.70	0.25	0.57	0.44*	0.86	0.00	0.86
44.75	0.25	0.57	0.44*	0.85	0.00	0.85
44.80	0.25	0.57	0.44*	0.84	0.00	0.84
44.85	0.25	0.57	0.43*	0.83	0.00	0.83
44.90	0.25	0.57	0.43*	0.82	0.00	0.82
44.95	0.24	0.57	0.43*	0.81	0.00	0.81
45.00	0.24	0.57	0.43*	0.80	0.00	0.80
45.05	0.25	0.57	0.43*	0.79	0.00	0.79
45.10	0.25	0.57	0.44*	0.79	0.00	0.79
45.15	0.25	0.57	0.44*	0.78	0.00	0.78
45.20	0.25	0.57	0.44*	0.77	0.00	0.77
45.25	0.25	0.57	0.44*	0.76	0.00	0.76
45.30	0.25	0.57	0.44*	0.75	0.00	0.75
45.35	0.25	0.57	0.45*	0.74	0.00	0.74
45.40	0.25	0.57	0.45*	0.73	0.00	0.73
45.45	0.26	0.57	0.45*	0.73	0.00	0.73
45.50	0.26	0.57	0.45*	0.72	0.00	0.72
45.55	0.26	0.57	0.46*	0.71	0.00	0.71
45.60	0.26	0.57	0.46*	0.70	0.00	0.70
45.65	0.26	0.57	0.46*	0.69	0.00	0.69
45.70	0.26	0.57	0.46*	0.68	0.00	0.68
45.75	0.26	0.57	0.47*	0.68	0.00	0.68
45.80	0.26	0.57	0.47*	0.67	0.00	0.67
45.85	0.27	0.57	0.47*	0.66	0.00	0.66
45.90	0.27	0.57	0.47*	0.65	0.00	0.65
45.95	0.27	0.57	0.48*	0.64	0.00	0.64
46.00	0.27	0.57	0.48*	0.63	0.00	0.63
46.05	0.27	0.57	0.48*	0.63	0.00	0.63
46.10	0.27	0.57	0.48*	0.62	0.00	0.62
46.15	0.27	0.57	0.49*	0.61	0.00	0.61
46.20	0.28	0.57	0.49*	0.60	0.00	0.60
46.25	0.28	0.57	0.49*	0.60	0.00	0.60
46.30	0.28	0.57	0.49*	0.59	0.00	0.59
46.35	0.28	0.57	0.50*	0.58	0.00	0.58
46.40	0.28	0.57	0.50*	0.57	0.00	0.57
46.45	0.28	0.57	0.50*	0.56	0.00	0.56
46.50	0.28	0.57	0.50*	0.56	0.00	0.56

46.55	0.29	0.57	0.51*	0.55	0.00	0.55
46.60	0.29	0.57	0.51*	0.54	0.00	0.54
46.65	0.29	0.57	0.51*	0.53	0.00	0.53
46.70	0.29	0.57	0.51*	0.53	0.00	0.53
46.75	0.29	0.57	0.52*	0.52	0.00	0.52
46.80	0.29	0.57	0.52*	0.51	0.00	0.51
46.85	0.30	0.57	0.52*	0.50	0.00	0.50
46.90	0.30	0.57	0.53*	0.50	0.00	0.50
46.95	0.30	0.57	0.53*	0.49	0.00	0.49
47.00	0.30	0.57	0.53*	0.48	0.00	0.48
47.05	0.30	0.57	0.53*	0.48	0.00	0.48
47.10	0.30	0.57	0.54*	0.47	0.00	0.47
47.15	0.31	0.57	0.54*	0.46	0.00	0.46
47.20	0.31	0.57	0.54*	0.45	0.00	0.45
47.25	0.31	0.57	0.55*	0.45	0.00	0.45
47.30	0.31	0.57	0.55*	0.44	0.00	0.44
47.35	0.31	0.57	0.55*	0.43	0.00	0.43
47.40	0.31	0.57	0.56*	0.43	0.00	0.43
47.45	0.32	0.57	0.56*	0.42	0.00	0.42
47.50	0.32	0.57	0.56*	0.41	0.00	0.41
47.55	0.32	0.57	0.56*	0.40	0.00	0.40
47.60	0.32	0.57	0.57*	0.40	0.00	0.40
47.65	0.32	0.57	0.57*	0.39	0.00	0.39
47.70	0.33	0.57	0.57*	0.38	0.00	0.38
47.75	0.33	0.57	0.58*	0.38	0.00	0.38
47.80	0.33	0.57	0.58*	0.37	0.00	0.37
47.85	0.33	0.57	0.58*	0.36	0.00	0.36
47.90	0.33	0.57	0.59*	0.36	0.00	0.36
47.95	0.34	0.57	0.59*	0.35	0.00	0.35
48.00	0.34	0.57	0.60*	0.34	0.00	0.34
48.05	0.34	0.57	0.60*	0.34	0.00	0.34
48.10	0.34	0.57	0.60*	0.33	0.00	0.33
48.15	0.34	0.57	0.61*	0.33	0.00	0.33
48.20	0.35	0.57	0.61*	0.32	0.00	0.32
48.25	0.35	0.57	0.61*	0.31	0.00	0.31
48.30	0.35	0.57	0.62*	0.31	0.00	0.31
48.35	0.35	0.57	0.62*	0.30	0.00	0.30
48.40	0.35	0.57	0.63*	0.29	0.00	0.29
48.45	0.36	0.57	0.63*	0.29	0.00	0.29
48.50	0.36	0.57	0.64*	0.28	0.00	0.28
48.55	0.36	0.57	0.64*	0.28	0.00	0.28
48.60	0.36	0.57	0.64*	0.27	0.00	0.27
48.65	0.37	0.57	0.65*	0.26	0.00	0.26
48.70	0.37	0.57	0.65*	0.26	0.00	0.26
48.75	0.37	0.57	0.66*	0.25	0.00	0.25
48.80	0.38	0.57	0.66*	0.25	0.00	0.25
48.85	0.38	0.57	0.67*	0.24	0.00	0.24
48.90	0.38	0.57	0.67*	0.23	0.00	0.23

48.95	0.38	0.57	0.68*	0.23	0.00	0.23
49.00	0.39	0.57	0.69*	0.22	0.00	0.22
49.05	0.39	0.57	0.69*	0.22	0.00	0.22
49.10	0.40	0.57	0.70*	0.21	0.00	0.21
49.15	0.40	0.57	0.71*	0.21	0.00	0.21
49.20	0.40	0.57	0.71*	0.20	0.00	0.20
49.25	0.41	0.57	0.72*	0.20	0.00	0.20
49.30	0.41	0.57	0.73*	0.19	0.00	0.19
49.35	0.42	0.57	0.74*	0.19	0.00	0.19
49.40	0.42	0.57	0.75*	0.18	0.00	0.18
49.45	0.43	0.57	0.76*	0.18	0.00	0.18
49.50	0.44	0.57	0.77*	0.17	0.00	0.17
49.55	0.45	0.57	0.79*	0.17	0.00	0.17
49.60	0.46	0.57	0.81*	0.16	0.00	0.16
49.65	0.47	0.57	0.84*	0.16	0.00	0.16
49.70	0.49	0.57	0.87*	0.15	0.00	0.15
49.75	0.52	0.57	0.93*	0.15	0.00	0.15
49.80	0.53	0.56	0.94*	0.14	0.00	0.14
49.85	0.53	0.56	0.94*	0.14	0.00	0.14
49.90	0.53	0.56	0.94*	0.13	0.00	0.13
49.95	0.53	0.56	0.94*	0.13	0.00	0.13
50.00	0.53	0.56	0.94*	0.13	0.00	0.13
50.05	0.53	0.56	0.94*	0.12	0.00	0.12
50.10	0.53	0.56	0.94*	0.12	0.00	0.12
50.15	0.53	0.56	0.94*	0.11	0.00	0.11
50.20	0.53	0.56	0.94*	0.11	0.00	0.11
50.25	0.53	0.56	0.94*	0.11	0.00	0.11
50.30	0.53	0.56	0.94*	0.10	0.00	0.10
50.35	0.53	0.56	0.94*	0.10	0.00	0.10
50.40	0.53	0.56	0.94*	0.09	0.00	0.09
50.45	0.53	0.56	0.94*	0.09	0.00	0.09
50.50	0.53	0.56	0.94*	0.09	0.00	0.09
50.55	0.53	0.56	0.94*	0.08	0.00	0.08
50.60	0.53	0.56	0.94*	0.08	0.00	0.08
50.65	0.53	0.56	0.94*	0.07	0.00	0.07
50.70	0.53	0.56	0.94*	0.07	0.00	0.07
50.75	0.53	0.56	0.94*	0.06	0.00	0.06
50.80	0.53	0.56	0.94*	0.06	0.00	0.06
50.85	0.53	0.56	0.94*	0.06	0.00	0.06
50.90	0.53	0.56	0.94*	0.05	0.00	0.05
50.95	0.53	0.56	0.94*	0.05	0.00	0.05
51.00	0.53	0.56	0.94*	0.04	0.00	0.04
51.05	0.53	0.56	0.94*	0.04	0.00	0.04
51.10	0.53	0.56	0.94*	0.03	0.00	0.03
51.15	0.53	0.56	0.94*	0.03	0.00	0.03
51.20	0.53	0.56	0.94*	0.03	0.00	0.03
51.25	0.53	0.56	0.94*	0.02	0.00	0.02
51.30	0.53	0.56	0.94*	0.02	0.00	0.02

51.35	0.53	0.56	0.94*	0.01	0.00	0.01
51.40	0.53	0.56	0.94*	0.01	0.00	0.01
51.45	0.53	0.56	0.94*	0.00	0.00	0.00
51.50	0.53	0.56	0.94*	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/ft2)

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

EZ-Frisk Output Files

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	9.905e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.03	1.062e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.05	1.169e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.1	1.531e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.2	1.981e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	2.112e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	2.163e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	2.145e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.75	2.007e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
1	1.858e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
2	1.358e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
3	1.067e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
4	8.342e-001	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas

Fractile: Mean

Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
PGA	6.535e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.03	7.005e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.05	7.712e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded

0.1	1.009e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.2	1.307e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	1.391e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	1.433e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	1.425e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.75	1.326e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
1	1.219e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
2	8.733e-001	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
3	6.841e-001	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
4	5.334e-001	8.20 Mw	3.79	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	1.052e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.03	1.164e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.05	1.305e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.1	1.831e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.2	2.357e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	2.564e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	2.649e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	2.622e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.75	2.320e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
1	1.849e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded

2	1.146e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
3	1.082e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
4	8.583e-001	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas

Fractile: Mean

Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
PGA	6.943e-001	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.03	7.680e-001	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.05	8.613e-001	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.1	1.204e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.2	1.555e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	1.685e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	1.745e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	1.718e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.75	1.504e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
1	1.198e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
2	7.297e-001	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
3	6.903e-001	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
4	5.470e-001	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas

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	8.404e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.03	8.698e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.05	9.546e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.1	1.202e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.2	1.541e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	1.652e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	1.743e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	1.838e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
0.75	1.993e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
1	2.045e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
2	1.729e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
3	1.281e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
4	1.024e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas

Fractile: Mean

Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
PGA	5.545e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.03	5.739e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.05	6.298e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.1	7.930e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.2	1.017e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	1.090e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	1.159e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	1.232e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
0.75	1.325e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
1	1.347e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
2	1.117e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
3	8.277e-001	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas

4	6.612e-001	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas

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	1.131e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.03	1.209e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.05	1.318e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.1	1.670e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.2	2.123e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.3	2.231e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.4	2.262e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
0.5	2.222e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
0.75	2.055e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
1	1.939e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
2	1.204e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
3	8.384e-001	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
4	6.202e-001	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas

Fractile: Mean

Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
PGA	7.465e-001	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.03	7.974e-001	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.05	8.693e-001	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded

0.1	1.102e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.2	1.400e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.3	1.472e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.4	1.505e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
0.5	1.490e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
0.75	1.374e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
1	1.279e+000	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
2	7.763e-001	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
3	5.342e-001	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas
4	3.920e-001	8.20 Mw	3.79	USGS 2008 California	Southern San Andreas

Largest Amplitudes of Ground Motions for Each Source

Source: Burnt Mtn
Region: USGS 2008 California
Closest Distance: 73.45 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.243e-001	1.665e-001	1.123e-001	9.417e-002

0.03	1.269e-001	1.664e-001	1.166e-001	9.780e-002
0.05	1.388e-001	1.744e-001	1.312e-001	1.107e-001
0.1	1.935e-001	2.342e-001	1.831e-001	1.633e-001
0.2	2.792e-001	3.582e-001	2.559e-001	2.234e-001
0.3	2.848e-001	3.663e-001	2.676e-001	2.206e-001
0.4	2.736e-001	3.612e-001	2.501e-001	2.094e-001
0.5	2.611e-001	3.470e-001	2.411e-001	1.953e-001
0.75	2.099e-001	2.768e-001	1.950e-001	1.578e-001
1	1.727e-001	2.264e-001	1.585e-001	1.332e-001
2	8.653e-002	1.155e-001	7.768e-002	6.643e-002
3	5.286e-002	6.742e-002	4.966e-002	4.149e-002
4	3.902e-002	5.083e-002	3.727e-002	2.895e-002

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

1	2	3	4	5
PGA	8.203e-002	1.098e-001	7.413e-002	6.214e-002
0.03	8.375e-002	1.098e-001	7.692e-002	6.453e-002
0.05	9.156e-002	1.151e-001	8.655e-002	7.306e-002
0.1	1.275e-001	1.539e-001	1.208e-001	1.077e-001
0.2	1.842e-001	2.363e-001	1.688e-001	1.474e-001
0.3	1.876e-001	2.407e-001	1.765e-001	1.456e-001
0.4	1.808e-001	2.378e-001	1.663e-001	1.381e-001
0.5	1.720e-001	2.274e-001	1.601e-001	1.284e-001

0.75	1.369e-001	1.794e-001	1.282e-001	1.030e-001
1	1.123e-001	1.467e-001	1.037e-001	8.644e-002
2	5.545e-002	7.355e-002	5.021e-002	4.260e-002
3	3.383e-002	4.301e-002	3.208e-002	2.639e-002
4	2.491e-002	3.239e-002	2.407e-002	1.828e-002

Source: Calico-Hidalgo
Region: USGS 2008 California
Closest Distance: 89.59 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.386e-001	1.715e-001	1.213e-001	1.230e-001
0.03	1.425e-001	1.751e-001	1.251e-001	1.272e-001
0.05	1.551e-001	1.845e-001	1.386e-001	1.421e-001
0.1	2.074e-001	2.327e-001	1.826e-001	2.067e-001
0.2	2.856e-001	3.040e-001	2.621e-001	2.906e-001
0.3	3.013e-001	3.209e-001	2.878e-001	2.952e-001
0.4	2.943e-001	3.263e-001	2.753e-001	2.814e-001
0.5	2.928e-001	3.281e-001	2.822e-001	2.680e-001

0.75	2.588e-001	2.953e-001	2.555e-001	2.256e-001
1	2.252e-001	2.553e-001	2.235e-001	1.969e-001
2	1.287e-001	1.496e-001	1.299e-001	1.067e-001
3	8.719e-002	1.036e-001	8.785e-002	7.009e-002
4	6.504e-002	7.667e-002	6.790e-002	5.054e-002

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

1	2	3	4	5
PGA	9.145e-002	1.132e-001	8.004e-002	8.117e-002
0.03	9.400e-002	1.156e-001	8.254e-002	8.390e-002
0.05	1.023e-001	1.217e-001	9.144e-002	9.378e-002
0.1	1.366e-001	1.529e-001	1.205e-001	1.364e-001
0.2	1.884e-001	2.006e-001	1.729e-001	1.917e-001
0.3	1.985e-001	2.109e-001	1.899e-001	1.948e-001
0.4	1.950e-001	2.148e-001	1.831e-001	1.871e-001
0.5	1.933e-001	2.150e-001	1.875e-001	1.774e-001
0.75	1.691e-001	1.915e-001	1.680e-001	1.479e-001
1	1.466e-001	1.654e-001	1.463e-001	1.282e-001
2	8.259e-002	9.527e-002	8.396e-002	6.855e-002
3	5.582e-002	6.610e-002	5.675e-002	4.462e-002
4	4.155e-002	4.886e-002	4.384e-002	3.194e-002

Source: California Gridded
Region: USGS 2008 California
Closest Distance: 5.00 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	9.905e-001	1.037e+000	8.404e-001	1.099e+000
0.03	1.062e+000	1.145e+000	8.698e-001	1.173e+000
0.05	1.169e+000	1.283e+000	9.546e-001	1.281e+000
0.1	1.531e+000	1.780e+000	1.202e+000	1.626e+000
0.2	1.981e+000	2.357e+000	1.541e+000	2.046e+000
0.3	2.112e+000	2.564e+000	1.652e+000	2.121e+000
0.4	2.163e+000	2.649e+000	1.743e+000	2.097e+000
0.5	2.145e+000	2.622e+000	1.802e+000	2.010e+000
0.75	1.889e+000	2.293e+000	1.616e+000	1.759e+000
1	1.579e+000	1.767e+000	1.408e+000	1.561e+000
2	7.887e-001	9.069e-001	7.428e-001	7.788e-001
3	5.030e-001	5.658e-001	4.546e-001	4.887e-001
4	3.644e-001	4.096e-001	3.454e-001	3.383e-001

Fractile: Mean

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

1	2	3	4	5
PGA	6.535e-001	6.842e-001	5.545e-001	7.250e-001
0.03	7.005e-001	7.553e-001	5.739e-001	7.743e-001
0.05	7.712e-001	8.467e-001	6.298e-001	8.450e-001
0.1	1.009e+000	1.170e+000	7.930e-001	1.073e+000
0.2	1.307e+000	1.555e+000	1.017e+000	1.350e+000
0.3	1.391e+000	1.685e+000	1.090e+000	1.399e+000
0.4	1.433e+000	1.745e+000	1.159e+000	1.395e+000
0.5	1.425e+000	1.718e+000	1.208e+000	1.347e+000
0.75	1.246e+000	1.486e+000	1.075e+000	1.175e+000
1	1.034e+000	1.145e+000	9.280e-001	1.029e+000
2	5.064e-001	5.777e-001	4.801e-001	5.019e-001
3	3.220e-001	3.609e-001	2.937e-001	3.114e-001
4	2.326e-001	2.610e-001	2.230e-001	2.138e-001

Source: Chino
Region: USGS 2008 California
Closest Distance: 43.18 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.006e-001	2.605e-001	1.770e-001	1.643e-001
0.03	2.073e-001	2.640e-001	1.852e-001	1.726e-001
0.05	2.296e-001	2.791e-001	2.114e-001	1.983e-001
0.1	3.278e-001	3.809e-001	3.091e-001	2.934e-001
0.2	4.507e-001	5.544e-001	4.155e-001	3.822e-001
0.3	4.431e-001	5.486e-001	4.142e-001	3.665e-001
0.4	4.197e-001	5.368e-001	3.856e-001	3.366e-001
0.5	3.965e-001	5.106e-001	3.678e-001	3.112e-001
0.75	3.151e-001	4.023e-001	2.947e-001	2.484e-001
1	2.580e-001	3.251e-001	2.408e-001	2.083e-001
2	1.287e-001	1.633e-001	1.200e-001	1.029e-001
3	7.895e-002	9.516e-002	7.723e-002	6.446e-002
4	5.814e-002	7.123e-002	5.817e-002	4.503e-002

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

1	2	3	4	5

PGA	1.324e-001	1.719e-001	1.168e-001	1.084e-001
0.03	1.368e-001	1.742e-001	1.222e-001	1.139e-001
0.05	1.515e-001	1.841e-001	1.395e-001	1.308e-001
0.1	2.159e-001	2.503e-001	2.039e-001	1.936e-001
0.2	2.974e-001	3.658e-001	2.741e-001	2.522e-001
0.3	2.919e-001	3.605e-001	2.733e-001	2.418e-001
0.4	2.778e-001	3.535e-001	2.565e-001	2.234e-001
0.5	2.617e-001	3.346e-001	2.448e-001	2.055e-001
0.75	2.058e-001	2.608e-001	1.940e-001	1.626e-001
1	1.679e-001	2.106e-001	1.577e-001	1.354e-001
2	8.254e-002	1.040e-001	7.754e-002	6.604e-002
3	5.053e-002	6.070e-002	4.989e-002	4.101e-002
4	3.713e-002	4.539e-002	3.756e-002	2.844e-002

```
Source: Clamshell-Sawpit
Region: USGS 2008 California
  Closest Distance: 54.95 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
  Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
  Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

      1          2              3              4              5
```

PGA	1.574e-001	2.043e-001	1.387e-001	1.293e-001
0.03	1.620e-001	2.061e-001	1.447e-001	1.351e-001
0.05	1.785e-001	2.166e-001	1.645e-001	1.544e-001
0.1	2.541e-001	2.965e-001	2.375e-001	2.282e-001
0.2	3.611e-001	4.569e-001	3.240e-001	3.024e-001
0.3	3.668e-001	4.801e-001	3.279e-001	2.924e-001
0.4	3.440e-001	4.543e-001	3.045e-001	2.730e-001
0.5	3.253e-001	4.346e-001	2.890e-001	2.524e-001
0.75	2.582e-001	3.465e-001	2.282e-001	2.000e-001
1	2.052e-001	2.672e-001	1.836e-001	1.646e-001
2	9.056e-002	1.130e-001	8.828e-002	7.043e-002
3	5.349e-002	6.197e-002	5.628e-002	4.222e-002
4	3.829e-002	4.353e-002	4.221e-002	2.914e-002

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

1	2	3	4	5
PGA	1.039e-001	1.348e-001	9.153e-002	8.529e-002
0.03	1.069e-001	1.360e-001	9.550e-002	8.916e-002
0.05	1.178e-001	1.429e-001	1.086e-001	1.018e-001
0.1	1.674e-001	1.949e-001	1.567e-001	1.506e-001
0.2	2.383e-001	3.015e-001	2.138e-001	1.996e-001
0.3	2.416e-001	3.155e-001	2.164e-001	1.930e-001
0.4	2.273e-001	2.992e-001	2.026e-001	1.803e-001

0.5	2.144e-001	2.849e-001	1.922e-001	1.660e-001
0.75	1.685e-001	2.246e-001	1.501e-001	1.306e-001
1	1.334e-001	1.731e-001	1.202e-001	1.068e-001
2	5.805e-002	7.195e-002	5.706e-002	4.515e-002
3	3.424e-002	3.953e-002	3.636e-002	2.685e-002
4	2.446e-002	2.774e-002	2.726e-002	1.840e-002

Source: Cleghorn
Region: USGS 2008 California
Closest Distance: 16.10 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	4.123e-001	4.397e-001	3.837e-001	4.134e-001
0.03	4.342e-001	4.587e-001	4.040e-001	4.400e-001
0.05	4.865e-001	4.926e-001	4.644e-001	5.023e-001
0.1	7.020e-001	6.930e-001	6.980e-001	7.150e-001
0.2	9.223e-001	9.658e-001	8.938e-001	9.073e-001
0.3	8.963e-001	9.522e-001	8.553e-001	8.814e-001
0.4	8.608e-001	9.530e-001	8.102e-001	8.194e-001

0.5	8.097e-001	9.136e-001	7.657e-001	7.499e-001
0.75	6.569e-001	7.322e-001	6.173e-001	6.212e-001
1	5.452e-001	5.902e-001	5.140e-001	5.315e-001
2	2.791e-001	2.980e-001	2.682e-001	2.712e-001
3	1.734e-001	1.742e-001	1.740e-001	1.720e-001
4	1.268e-001	1.286e-001	1.310e-001	1.206e-001

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

1	2	3	4	5
PGA	2.720e-001	2.901e-001	2.532e-001	2.728e-001
0.03	2.865e-001	3.027e-001	2.666e-001	2.903e-001
0.05	3.210e-001	3.250e-001	3.064e-001	3.314e-001
0.1	4.626e-001	4.554e-001	4.606e-001	4.718e-001
0.2	6.085e-001	6.372e-001	5.897e-001	5.986e-001
0.3	5.905e-001	6.258e-001	5.643e-001	5.815e-001
0.4	5.705e-001	6.275e-001	5.389e-001	5.450e-001
0.5	5.379e-001	5.988e-001	5.131e-001	5.019e-001
0.75	4.309e-001	4.747e-001	4.079e-001	4.102e-001
1	3.558e-001	3.823e-001	3.374e-001	3.477e-001
2	1.792e-001	1.898e-001	1.734e-001	1.744e-001
3	1.110e-001	1.111e-001	1.124e-001	1.095e-001
4	8.092e-002	8.196e-002	8.461e-002	7.620e-002

Source: Cucamonga
Region: USGS 2008 California
Closest Distance: 17.31 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	3.909e-001	4.086e-001	3.590e-001	4.050e-001
0.03	4.120e-001	4.270e-001	3.782e-001	4.308e-001
0.05	4.615e-001	4.572e-001	4.356e-001	4.917e-001
0.1	6.691e-001	6.473e-001	6.601e-001	6.999e-001
0.2	8.873e-001	9.296e-001	8.458e-001	8.865e-001
0.3	8.741e-001	9.586e-001	8.054e-001	8.581e-001
0.4	8.269e-001	9.276e-001	7.582e-001	7.950e-001
0.5	7.772e-001	8.929e-001	7.096e-001	7.290e-001
0.75	6.264e-001	7.221e-001	5.607e-001	5.965e-001
1	5.048e-001	5.546e-001	4.602e-001	4.995e-001
2	2.286e-001	2.340e-001	2.322e-001	2.197e-001
3	1.368e-001	1.284e-001	1.491e-001	1.330e-001
4	9.741e-002	8.839e-002	1.118e-001	9.201e-002

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

1	2	3	4	5
PGA	2.579e-001	2.696e-001	2.368e-001	2.672e-001
0.03	2.718e-001	2.817e-001	2.495e-001	2.842e-001
0.05	3.045e-001	3.017e-001	2.874e-001	3.244e-001
0.1	4.409e-001	4.254e-001	4.355e-001	4.618e-001
0.2	5.855e-001	6.134e-001	5.581e-001	5.849e-001
0.3	5.759e-001	6.300e-001	5.314e-001	5.662e-001
0.4	5.480e-001	6.108e-001	5.043e-001	5.288e-001
0.5	5.157e-001	5.853e-001	4.752e-001	4.867e-001
0.75	4.106e-001	4.681e-001	3.704e-001	3.932e-001
1	3.292e-001	3.593e-001	3.020e-001	3.263e-001
2	1.467e-001	1.490e-001	1.501e-001	1.411e-001
3	8.761e-002	8.188e-002	9.634e-002	8.461e-002
4	6.221e-002	5.633e-002	7.220e-002	5.810e-002

Source: Elsinore
Region: USGS 2008 California
Closest Distance: 43.43 km
Amplitude Units: Acceleration (g)
Magnitude: 7.85 Mw

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

1	2	3	4	5
PGA	3.142e-001	3.783e-001	2.445e-001	3.197e-001
0.03	3.312e-001	4.021e-001	2.542e-001	3.373e-001
0.05	3.657e-001	4.301e-001	2.846e-001	3.825e-001
0.1	4.928e-001	5.411e-001	3.879e-001	5.493e-001
0.2	6.156e-001	5.916e-001	5.328e-001	7.224e-001
0.3	6.279e-001	6.075e-001	5.615e-001	7.147e-001
0.4	6.085e-001	6.091e-001	5.435e-001	6.727e-001
0.5	6.029e-001	6.142e-001	5.732e-001	6.214e-001
0.75	5.563e-001	5.851e-001	5.566e-001	5.273e-001
1	4.950e-001	5.016e-001	5.201e-001	4.635e-001
2	3.081e-001	3.171e-001	3.507e-001	2.565e-001
3	2.236e-001	2.528e-001	2.468e-001	1.711e-001
4	1.687e-001	1.875e-001	1.941e-001	1.246e-001

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

1	2	3	4	5
PGA	2.073e-001	2.496e-001	1.613e-001	2.109e-001
0.03	2.185e-001	2.653e-001	1.677e-001	2.226e-001
0.05	2.413e-001	2.838e-001	1.878e-001	2.524e-001
0.1	3.247e-001	3.556e-001	2.559e-001	3.625e-001
0.2	4.062e-001	3.903e-001	3.515e-001	4.767e-001
0.3	4.138e-001	3.993e-001	3.705e-001	4.715e-001
0.4	4.034e-001	4.011e-001	3.615e-001	4.475e-001
0.5	4.003e-001	4.025e-001	3.824e-001	4.161e-001
0.75	3.649e-001	3.793e-001	3.669e-001	3.484e-001
1	3.231e-001	3.250e-001	3.408e-001	3.034e-001
2	1.979e-001	2.020e-001	2.267e-001	1.650e-001
3	1.432e-001	1.613e-001	1.594e-001	1.090e-001
4	1.079e-001	1.195e-001	1.254e-001	7.875e-002

Source: Elysian Park (Upper)
Region: USGS 2008 California
  Closest Distance: 77.36 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
  Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
  Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.253e-001	1.424e-001	1.322e-001	1.014e-001
0.03	1.281e-001	1.426e-001	1.367e-001	1.050e-001
0.05	1.399e-001	1.489e-001	1.529e-001	1.179e-001
0.1	1.955e-001	2.017e-001	2.127e-001	1.720e-001
0.2	2.863e-001	3.234e-001	2.994e-001	2.359e-001
0.3	3.000e-001	3.509e-001	3.152e-001	2.338e-001
0.4	2.846e-001	3.358e-001	2.951e-001	2.230e-001
0.5	2.716e-001	3.249e-001	2.823e-001	2.076e-001
0.75	2.181e-001	2.633e-001	2.257e-001	1.654e-001
1	1.727e-001	2.051e-001	1.770e-001	1.360e-001
2	7.239e-002	8.800e-002	7.235e-002	5.682e-002
3	4.119e-002	4.845e-002	4.197e-002	3.315e-002
4	2.940e-002	3.425e-002	3.148e-002	2.247e-002

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

1	2	3	4	5
PGA	8.269e-002	9.395e-002	8.722e-002	6.689e-002
0.03	8.453e-002	9.411e-002	9.022e-002	6.926e-002
0.05	9.231e-002	9.827e-002	1.009e-001	7.781e-002
0.1	1.288e-001	1.326e-001	1.403e-001	1.135e-001
0.2	1.889e-001	2.134e-001	1.976e-001	1.557e-001
0.3	1.976e-001	2.306e-001	2.080e-001	1.543e-001

0.4	1.881e-001	2.211e-001	1.963e-001	1.469e-001
0.5	1.790e-001	2.130e-001	1.877e-001	1.363e-001
0.75	1.423e-001	1.707e-001	1.485e-001	1.078e-001
1	1.123e-001	1.329e-001	1.159e-001	8.815e-002
2	4.641e-002	5.605e-002	4.676e-002	3.642e-002
3	2.636e-002	3.090e-002	2.711e-002	2.108e-002
4	1.878e-002	2.183e-002	2.032e-002	1.419e-002

Source: Eureka Peak
Region: USGS 2008 California
Closest Distance: 79.99 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.042e-001	1.372e-001	9.865e-002	7.659e-002
0.03	1.062e-001	1.371e-001	1.023e-001	7.919e-002
0.05	1.160e-001	1.440e-001	1.149e-001	8.918e-002
0.1	1.619e-001	1.946e-001	1.602e-001	1.311e-001
0.2	2.368e-001	3.037e-001	2.249e-001	1.819e-001
0.3	2.440e-001	3.141e-001	2.359e-001	1.821e-001

0.4	2.339e-001	3.071e-001	2.200e-001	1.747e-001
0.5	2.229e-001	2.948e-001	2.104e-001	1.633e-001
0.75	1.779e-001	2.342e-001	1.675e-001	1.319e-001
1	1.456e-001	1.913e-001	1.343e-001	1.112e-001
2	7.199e-002	9.677e-002	6.405e-002	5.515e-002
3	4.373e-002	5.602e-002	4.078e-002	3.438e-002
4	3.207e-002	4.172e-002	3.059e-002	2.389e-002

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

1	2	3	4	5
PGA	6.873e-002	9.056e-002	6.509e-002	5.054e-002
0.03	7.006e-002	9.046e-002	6.747e-002	5.225e-002
0.05	7.657e-002	9.504e-002	7.583e-002	5.884e-002
0.1	1.067e-001	1.279e-001	1.057e-001	8.652e-002
0.2	1.563e-001	2.004e-001	1.484e-001	1.200e-001
0.3	1.607e-001	2.064e-001	1.557e-001	1.200e-001
0.4	1.545e-001	2.022e-001	1.463e-001	1.148e-001
0.5	1.467e-001	1.932e-001	1.397e-001	1.070e-001
0.75	1.160e-001	1.518e-001	1.101e-001	8.591e-002
1	9.462e-002	1.239e-001	8.789e-002	7.205e-002
2	4.613e-002	6.164e-002	4.140e-002	3.534e-002
3	2.798e-002	3.574e-002	2.635e-002	2.186e-002
4	2.048e-002	2.659e-002	1.975e-002	1.509e-002

Source: Gravel Hills-Harper Lk
Region: USGS 2008 California
Closest Distance: 88.42 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.181e-001	1.499e-001	1.074e-001	9.703e-002
0.03	1.208e-001	1.512e-001	1.110e-001	1.002e-001
0.05	1.314e-001	1.586e-001	1.236e-001	1.122e-001
0.1	1.786e-001	2.058e-001	1.662e-001	1.638e-001
0.2	2.540e-001	2.948e-001	2.369e-001	2.302e-001
0.3	2.662e-001	3.100e-001	2.560e-001	2.327e-001
0.4	2.589e-001	3.120e-001	2.423e-001	2.223e-001
0.5	2.533e-001	3.080e-001	2.413e-001	2.106e-001
0.75	2.149e-001	2.628e-001	2.069e-001	1.750e-001
1	1.824e-001	2.219e-001	1.743e-001	1.511e-001
2	9.816e-002	1.220e-001	9.299e-002	7.949e-002
3	6.342e-002	7.770e-002	6.128e-002	5.128e-002
4	4.714e-002	5.813e-002	4.675e-002	3.653e-002

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

1	2	3	4	5
PGA	7.794e-002	9.894e-002	7.088e-002	6.402e-002
0.03	7.970e-002	9.977e-002	7.322e-002	6.610e-002
0.05	8.673e-002	1.046e-001	8.153e-002	7.401e-002
0.1	1.177e-001	1.352e-001	1.097e-001	1.081e-001
0.2	1.676e-001	1.945e-001	1.563e-001	1.519e-001
0.3	1.754e-001	2.037e-001	1.689e-001	1.535e-001
0.4	1.713e-001	2.054e-001	1.612e-001	1.473e-001
0.5	1.670e-001	2.019e-001	1.603e-001	1.390e-001
0.75	1.403e-001	1.704e-001	1.360e-001	1.145e-001
1	1.187e-001	1.438e-001	1.141e-001	9.822e-002
2	6.295e-002	7.771e-002	6.010e-002	5.103e-002
3	4.060e-002	4.956e-002	3.958e-002	3.264e-002
4	3.011e-002	3.704e-002	3.019e-002	2.308e-002

Source: Helendale-So Lockhart
Region: USGS 2008 California
Closest Distance: 45.30 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.508e-001	3.106e-001	2.061e-001	2.357e-001
0.03	2.619e-001	3.230e-001	2.148e-001	2.480e-001
0.05	2.896e-001	3.434e-001	2.424e-001	2.829e-001
0.1	3.994e-001	4.462e-001	3.396e-001	4.126e-001
0.2	5.191e-001	5.523e-001	4.633e-001	5.418e-001
0.3	5.219e-001	5.589e-001	4.780e-001	5.288e-001
0.4	5.004e-001	5.549e-001	4.549e-001	4.914e-001
0.5	4.866e-001	5.461e-001	4.598e-001	4.540e-001
0.75	4.223e-001	4.799e-001	4.111e-001	3.759e-001
1	3.631e-001	4.020e-001	3.624e-001	3.248e-001
2	2.059e-001	2.304e-001	2.144e-001	1.729e-001
3	1.397e-001	1.605e-001	1.454e-001	1.131e-001
4	1.044e-001	1.194e-001	1.124e-001	8.143e-002

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

1	2	3	4	5
PGA	1.655e-001	2.050e-001	1.360e-001	1.555e-001
0.03	1.728e-001	2.131e-001	1.417e-001	1.637e-001
0.05	1.911e-001	2.266e-001	1.599e-001	1.867e-001
0.1	2.632e-001	2.932e-001	2.241e-001	2.722e-001
0.2	3.425e-001	3.644e-001	3.057e-001	3.575e-001
0.3	3.439e-001	3.673e-001	3.154e-001	3.489e-001
0.4	3.316e-001	3.654e-001	3.025e-001	3.268e-001
0.5	3.223e-001	3.580e-001	3.064e-001	3.025e-001
0.75	2.765e-001	3.111e-001	2.708e-001	2.476e-001
1	2.366e-001	2.604e-001	2.374e-001	2.121e-001
2	1.322e-001	1.468e-001	1.386e-001	1.112e-001
3	8.944e-002	1.024e-001	9.392e-002	7.204e-002
4	6.670e-002	7.608e-002	7.256e-002	5.146e-002

Source: Hollywood
Region: USGS 2008 California
  Closest Distance: 88.99 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
  Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
  Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	9.185e-002	1.190e-001	8.940e-002	6.714e-002
0.03	9.345e-002	1.187e-001	9.249e-002	6.915e-002
0.05	1.018e-001	1.245e-001	1.036e-001	7.739e-002
0.1	1.412e-001	1.675e-001	1.428e-001	1.133e-001
0.2	2.094e-001	2.656e-001	2.022e-001	1.603e-001
0.3	2.187e-001	2.789e-001	2.145e-001	1.627e-001
0.4	2.108e-001	2.746e-001	2.003e-001	1.574e-001
0.5	2.017e-001	2.652e-001	1.920e-001	1.480e-001
0.75	1.621e-001	2.126e-001	1.533e-001	1.205e-001
1	1.331e-001	1.745e-001	1.228e-001	1.020e-001
2	6.611e-002	8.892e-002	5.846e-002	5.096e-002
3	4.021e-002	5.158e-002	3.721e-002	3.183e-002
4	2.952e-002	3.850e-002	2.791e-002	2.214e-002

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

1	2	3	4	5
PGA	6.061e-002	7.853e-002	5.899e-002	4.430e-002
0.03	6.166e-002	7.833e-002	6.103e-002	4.562e-002
0.05	6.717e-002	8.213e-002	6.832e-002	5.106e-002
0.1	9.302e-002	1.101e-001	9.421e-002	7.475e-002
0.2	1.381e-001	1.752e-001	1.334e-001	1.057e-001

0.3	1.439e-001	1.833e-001	1.415e-001	1.071e-001
0.4	1.391e-001	1.808e-001	1.332e-001	1.034e-001
0.5	1.327e-001	1.738e-001	1.275e-001	9.687e-002
0.75	1.057e-001	1.378e-001	1.008e-001	7.840e-002
1	8.649e-002	1.131e-001	8.036e-002	6.606e-002
2	4.236e-002	5.664e-002	3.778e-002	3.265e-002
3	2.573e-002	3.290e-002	2.404e-002	2.024e-002
4	1.884e-002	2.453e-002	1.802e-002	1.398e-002

Source: Imp Extensional Gridded, Char, Normal
Region: USGS 2008 California
  Closest Distance: 5.00 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
  Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
  Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	7.760e-001	8.574e-001	6.404e-001	8.301e-001
0.03	8.343e-001	9.421e-001	6.740e-001	8.870e-001
0.05	9.402e-001	1.073e+000	7.635e-001	9.846e-001
0.1	1.287e+000	1.542e+000	1.014e+000	1.304e+000
0.2	1.703e+000	2.043e+000	1.407e+000	1.658e+000

0.3	1.750e+000	2.073e+000	1.472e+000	1.705e+000
0.4	1.783e+000	2.166e+000	1.505e+000	1.679e+000
0.5	1.747e+000	2.111e+000	1.520e+000	1.610e+000
0.75	1.451e+000	1.600e+000	1.326e+000	1.428e+000
1	1.225e+000	1.222e+000	1.160e+000	1.293e+000
2	6.632e-001	6.066e-001	6.821e-001	7.008e-001
3	4.174e-001	3.567e-001	4.546e-001	4.410e-001
4	3.078e-001	2.726e-001	3.454e-001	3.055e-001

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

1	2	3	4	5
PGA	5.120e-001	5.658e-001	4.226e-001	5.477e-001
0.03	5.505e-001	6.216e-001	4.447e-001	5.853e-001
0.05	6.204e-001	7.077e-001	5.038e-001	6.496e-001
0.1	8.476e-001	1.013e+000	6.691e-001	8.603e-001
0.2	1.123e+000	1.348e+000	9.281e-001	1.094e+000
0.3	1.153e+000	1.362e+000	9.713e-001	1.125e+000
0.4	1.181e+000	1.426e+000	1.001e+000	1.117e+000
0.5	1.160e+000	1.383e+000	1.019e+000	1.079e+000
0.75	9.564e-001	1.037e+000	8.797e-001	9.525e-001
1	8.023e-001	7.914e-001	7.634e-001	8.520e-001
2	4.263e-001	3.864e-001	4.408e-001	4.516e-001
3	2.674e-001	2.275e-001	2.937e-001	2.809e-001

4	1.966e-001	1.737e-001	2.230e-001	1.931e-001

Source: Imp Extensional Gridded, Char, Strike Slip
Region: USGS 2008 California
  Closest Distance: 5.00 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
  Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
  Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	9.164e-001	1.037e+000	6.964e-001	1.016e+000
0.03	9.864e-001	1.145e+000	7.293e-001	1.085e+000
0.05	1.097e+000	1.283e+000	8.186e-001	1.190e+000
0.1	1.455e+000	1.780e+000	1.055e+000	1.529e+000
0.2	1.858e+000	2.301e+000	1.346e+000	1.927e+000
0.3	1.923e+000	2.376e+000	1.406e+000	1.988e+000
0.4	1.970e+000	2.505e+000	1.450e+000	1.955e+000
0.5	1.932e+000	2.455e+000	1.474e+000	1.867e+000
0.75	1.676e+000	2.101e+000	1.296e+000	1.630e+000
1	1.432e+000	1.695e+000	1.141e+000	1.461e+000
2	7.887e-001	9.069e-001	6.804e-001	7.788e-001
3	5.030e-001	5.658e-001	4.546e-001	4.887e-001

4	3.644e-001	4.096e-001	3.454e-001	3.383e-001

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

1	2	3	4	5
PGA	6.047e-001	6.842e-001	4.595e-001	6.703e-001
0.03	6.508e-001	7.553e-001	4.812e-001	7.160e-001
0.05	7.240e-001	8.467e-001	5.401e-001	7.852e-001
0.1	9.582e-001	1.170e+000	6.960e-001	1.009e+000
0.2	1.226e+000	1.519e+000	8.879e-001	1.272e+000
0.3	1.267e+000	1.562e+000	9.277e-001	1.311e+000
0.4	1.305e+000	1.650e+000	9.646e-001	1.301e+000
0.5	1.283e+000	1.609e+000	9.884e-001	1.252e+000
0.75	1.104e+000	1.362e+000	8.606e-001	1.088e+000
1	9.373e-001	1.098e+000	7.509e-001	9.629e-001
2	5.064e-001	5.776e-001	4.398e-001	5.019e-001
3	3.220e-001	3.609e-001	2.937e-001	3.114e-001
4	2.326e-001	2.610e-001	2.230e-001	2.138e-001

Source: Imp Extensional Gridded, GR, Normal
Region: USGS 2008 California
Closest Distance: 5.01 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	7.724e-001	8.480e-001	6.399e-001	8.293e-001
0.03	8.302e-001	9.310e-001	6.734e-001	8.861e-001
0.05	9.353e-001	1.059e+000	7.629e-001	9.837e-001
0.1	1.282e+000	1.530e+000	1.014e+000	1.303e+000
0.2	1.698e+000	2.032e+000	1.406e+000	1.657e+000
0.3	1.746e+000	2.062e+000	1.471e+000	1.704e+000
0.4	1.778e+000	2.154e+000	1.503e+000	1.678e+000
0.5	1.742e+000	2.100e+000	1.518e+000	1.608e+000
0.75	1.447e+000	1.591e+000	1.324e+000	1.426e+000
1	1.222e+000	1.215e+000	1.159e+000	1.292e+000
2	6.616e-001	6.038e-001	6.811e-001	6.999e-001
3	4.165e-001	3.551e-001	4.539e-001	4.403e-001
4	3.071e-001	2.714e-001	3.449e-001	3.051e-001

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

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

1	2	3	4	5
PGA	5.096e-001	5.595e-001	4.222e-001	5.472e-001
0.03	5.478e-001	6.143e-001	4.443e-001	5.847e-001
0.05	6.171e-001	6.990e-001	5.034e-001	6.490e-001
0.1	8.446e-001	1.005e+000	6.689e-001	8.596e-001
0.2	1.121e+000	1.341e+000	9.278e-001	1.093e+000
0.3	1.150e+000	1.355e+000	9.707e-001	1.124e+000
0.4	1.178e+000	1.419e+000	9.999e-001	1.116e+000
0.5	1.157e+000	1.376e+000	1.018e+000	1.078e+000
0.75	9.538e-001	1.032e+000	8.786e-001	9.513e-001
1	8.003e-001	7.874e-001	7.624e-001	8.510e-001
2	4.253e-001	3.846e-001	4.402e-001	4.510e-001
3	2.668e-001	2.265e-001	2.932e-001	2.805e-001
4	1.962e-001	1.730e-001	2.227e-001	1.928e-001

Source: Imp Extensional Gridded, GR, Strike Slip
Region: USGS 2008 California
Closest Distance: 5.01 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

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

1	2	3	4	5
PGA	9.121e-001	1.026e+000	6.958e-001	1.015e+000
0.03	9.814e-001	1.131e+000	7.287e-001	1.084e+000
0.05	1.091e+000	1.267e+000	8.179e-001	1.189e+000
0.1	1.449e+000	1.766e+000	1.055e+000	1.528e+000
0.2	1.853e+000	2.289e+000	1.345e+000	1.926e+000
0.3	1.918e+000	2.364e+000	1.405e+000	1.986e+000
0.4	1.965e+000	2.492e+000	1.449e+000	1.954e+000
0.5	1.927e+000	2.443e+000	1.473e+000	1.865e+000
0.75	1.671e+000	2.090e+000	1.294e+000	1.628e+000
1	1.428e+000	1.686e+000	1.139e+000	1.459e+000
2	7.866e-001	9.027e-001	6.795e-001	7.777e-001
3	5.017e-001	5.632e-001	4.539e-001	4.880e-001
4	3.635e-001	4.078e-001	3.449e-001	3.378e-001

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

1	2	3	4	5
PGA	6.018e-001	6.767e-001	4.591e-001	6.697e-001
0.03	6.475e-001	7.464e-001	4.808e-001	7.153e-001
0.05	7.201e-001	8.362e-001	5.397e-001	7.845e-001
0.1	9.547e-001	1.160e+000	6.958e-001	1.008e+000

0.2	1.223e+000	1.510e+000	8.876e-001	1.271e+000
0.3	1.264e+000	1.554e+000	9.272e-001	1.310e+000
0.4	1.301e+000	1.641e+000	9.638e-001	1.299e+000
0.5	1.279e+000	1.601e+000	9.874e-001	1.250e+000
0.75	1.100e+000	1.355e+000	8.596e-001	1.087e+000
1	9.347e-001	1.092e+000	7.500e-001	9.617e-001
2	5.051e-001	5.749e-001	4.392e-001	5.012e-001
3	3.212e-001	3.593e-001	2.932e-001	3.110e-001
4	2.320e-001	2.599e-001	2.227e-001	2.135e-001

Source: Johnson Valley (No)
Region: USGS 2008 California
Closest Distance: 68.98 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.375e-001	1.821e-001	1.224e-001	1.082e-001
0.03	1.408e-001	1.829e-001	1.271e-001	1.125e-001
0.05	1.542e-001	1.921e-001	1.431e-001	1.275e-001
0.1	2.146e-001	2.561e-001	1.997e-001	1.879e-001

0.2	3.040e-001	3.785e-001	2.782e-001	2.552e-001
0.3	3.092e-001	3.861e-001	2.905e-001	2.512e-001
0.4	2.965e-001	3.811e-001	2.722e-001	2.362e-001
0.5	2.842e-001	3.675e-001	2.645e-001	2.206e-001
0.75	2.314e-001	2.977e-001	2.175e-001	1.790e-001
1	1.919e-001	2.448e-001	1.791e-001	1.519e-001
2	9.830e-002	1.273e-001	9.067e-002	7.695e-002
3	6.132e-002	7.645e-002	5.877e-002	4.874e-002
4	4.540e-002	5.744e-002	4.446e-002	3.430e-002

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

1	2	3	4	5
PGA	9.075e-002	1.201e-001	8.075e-002	7.136e-002
0.03	9.292e-002	1.207e-001	8.386e-002	7.420e-002
0.05	1.018e-001	1.268e-001	9.442e-002	8.413e-002
0.1	1.414e-001	1.683e-001	1.318e-001	1.240e-001
0.2	2.006e-001	2.497e-001	1.836e-001	1.684e-001
0.3	2.037e-001	2.537e-001	1.917e-001	1.657e-001
0.4	1.961e-001	2.509e-001	1.810e-001	1.563e-001
0.5	1.874e-001	2.409e-001	1.758e-001	1.454e-001
0.75	1.510e-001	1.930e-001	1.430e-001	1.170e-001
1	1.248e-001	1.586e-001	1.172e-001	9.868e-002
2	6.302e-002	8.107e-002	5.860e-002	4.938e-002

3	3.925e-002	4.877e-002	3.796e-002	3.101e-002
4	2.899e-002	3.661e-002	2.871e-002	2.167e-002

Source: Landers
Region: USGS 2008 California
  Closest Distance: 76.41 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
  Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
  Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.627e-001	2.054e-001	1.376e-001	1.452e-001
0.03	1.679e-001	2.104e-001	1.423e-001	1.509e-001
0.05	1.835e-001	2.221e-001	1.585e-001	1.699e-001
0.1	2.475e-001	2.823e-001	2.121e-001	2.480e-001
0.2	3.347e-001	3.626e-001	3.006e-001	3.408e-001
0.3	3.474e-001	3.762e-001	3.250e-001	3.409e-001
0.4	3.367e-001	3.786e-001	3.102e-001	3.213e-001
0.5	3.326e-001	3.773e-001	3.169e-001	3.035e-001
0.75	2.917e-001	3.359e-001	2.859e-001	2.533e-001
1	2.527e-001	2.875e-001	2.505e-001	2.200e-001
2	1.438e-001	1.670e-001	1.461e-001	1.183e-001

3	9.735e-002	1.157e-001	9.883e-002	7.751e-002
4	7.264e-002	8.569e-002	7.639e-002	5.584e-002

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

1	2	3	4	5
PGA	1.074e-001	1.355e-001	9.082e-002	9.579e-002
0.03	1.108e-001	1.388e-001	9.392e-002	9.954e-002
0.05	1.211e-001	1.466e-001	1.046e-001	1.121e-001
0.1	1.630e-001	1.855e-001	1.400e-001	1.636e-001
0.2	2.208e-001	2.392e-001	1.984e-001	2.249e-001
0.3	2.289e-001	2.472e-001	2.145e-001	2.250e-001
0.4	2.231e-001	2.493e-001	2.064e-001	2.137e-001
0.5	2.197e-001	2.473e-001	2.107e-001	2.011e-001
0.75	1.907e-001	2.177e-001	1.881e-001	1.662e-001
1	1.645e-001	1.863e-001	1.640e-001	1.433e-001
2	9.225e-002	1.063e-001	9.441e-002	7.598e-002
3	6.233e-002	7.380e-002	6.384e-002	4.935e-002
4	4.641e-002	5.461e-002	4.932e-002	3.529e-002

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

Closest Distance: 62.06 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.057e-001	2.585e-001	1.681e-001	1.905e-001
0.03	2.137e-001	2.676e-001	1.744e-001	1.992e-001
0.05	2.348e-001	2.836e-001	1.950e-001	2.256e-001
0.1	3.180e-001	3.606e-001	2.643e-001	3.292e-001
0.2	4.179e-001	4.415e-001	3.694e-001	4.426e-001
0.3	4.280e-001	4.526e-001	3.937e-001	4.377e-001
0.4	4.132e-001	4.532e-001	3.765e-001	4.099e-001
0.5	4.069e-001	4.512e-001	3.865e-001	3.829e-001
0.75	3.595e-001	4.056e-001	3.537e-001	3.191e-001
1	3.126e-001	3.460e-001	3.145e-001	2.771e-001
2	1.809e-001	2.038e-001	1.897e-001	1.493e-001
3	1.244e-001	1.456e-001	1.296e-001	9.818e-002
4	9.309e-002	1.077e-001	1.006e-001	7.092e-002

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

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

1	2	3	4	5
PGA	1.357e-001	1.706e-001	1.109e-001	1.257e-001
0.03	1.410e-001	1.765e-001	1.151e-001	1.314e-001
0.05	1.549e-001	1.872e-001	1.287e-001	1.489e-001
0.1	2.095e-001	2.370e-001	1.744e-001	2.172e-001
0.2	2.757e-001	2.913e-001	2.438e-001	2.921e-001
0.3	2.820e-001	2.975e-001	2.598e-001	2.888e-001
0.4	2.738e-001	2.984e-001	2.504e-001	2.726e-001
0.5	2.692e-001	2.957e-001	2.572e-001	2.545e-001
0.75	2.352e-001	2.630e-001	2.328e-001	2.098e-001
1	2.036e-001	2.242e-001	2.060e-001	1.808e-001
2	1.161e-001	1.298e-001	1.226e-001	9.596e-002
3	7.970e-002	9.285e-002	8.372e-002	6.252e-002
4	5.948e-002	6.866e-002	6.496e-002	4.482e-002

Source: Mojave Shear Gridded
Region: USGS 2008 California
Closest Distance: 41.35 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: Boore-Atkinson (2008) NGA USGS 2008 MRC

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

1	2	3	4	5
PGA	3.153e-001	3.530e-001	2.343e-001	3.586e-001
0.03	3.312e-001	3.713e-001	2.441e-001	3.783e-001
0.05	3.658e-001	3.961e-001	2.750e-001	4.263e-001
0.1	4.983e-001	5.089e-001	3.827e-001	6.032e-001
0.2	6.329e-001	5.948e-001	5.211e-001	7.830e-001
0.3	6.380e-001	6.052e-001	5.395e-001	7.692e-001
0.4	6.134e-001	6.032e-001	5.173e-001	7.197e-001
0.5	5.968e-001	5.996e-001	5.321e-001	6.586e-001
0.75	5.292e-001	5.459e-001	4.932e-001	5.486e-001
1	4.603e-001	4.610e-001	4.466e-001	4.733e-001
2	2.667e-001	2.760e-001	2.809e-001	2.432e-001
3	1.837e-001	2.043e-001	1.939e-001	1.529e-001
4	1.368e-001	1.519e-001	1.512e-001	1.073e-001

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

1	2	3	4	5
PGA	2.080e-001	2.329e-001	1.546e-001	2.366e-001
0.03	2.186e-001	2.450e-001	1.611e-001	2.496e-001
0.05	2.414e-001	2.614e-001	1.814e-001	2.813e-001

0.1	3.283e-001	3.344e-001	2.525e-001	3.980e-001
0.2	4.176e-001	3.925e-001	3.438e-001	5.166e-001
0.3	4.204e-001	3.978e-001	3.560e-001	5.075e-001
0.4	4.066e-001	3.972e-001	3.440e-001	4.787e-001
0.5	3.964e-001	3.930e-001	3.549e-001	4.414e-001
0.75	3.472e-001	3.539e-001	3.250e-001	3.627e-001
1	3.004e-001	2.987e-001	2.926e-001	3.099e-001
2	1.713e-001	1.758e-001	1.816e-001	1.565e-001
3	1.177e-001	1.303e-001	1.253e-001	9.737e-002
4	8.740e-002	9.680e-002	9.763e-002	6.779e-002

Source: Newport-Inglewood
Region: USGS 2008 California
Closest Distance: 84.08 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.565e-001	1.941e-001	1.332e-001	1.425e-001
0.03	1.614e-001	1.993e-001	1.374e-001	1.477e-001
0.05	1.760e-001	2.104e-001	1.523e-001	1.654e-001

0.1	2.350e-001	2.639e-001	2.006e-001	2.406e-001
0.2	3.179e-001	3.317e-001	2.870e-001	3.350e-001
0.3	3.337e-001	3.479e-001	3.149e-001	3.386e-001
0.4	3.255e-001	3.532e-001	3.020e-001	3.214e-001
0.5	3.243e-001	3.560e-001	3.120e-001	3.051e-001
0.75	2.895e-001	3.246e-001	2.872e-001	2.569e-001
1	2.535e-001	2.815e-001	2.547e-001	2.245e-001
2	1.475e-001	1.678e-001	1.525e-001	1.223e-001
3	1.014e-001	1.196e-001	1.041e-001	8.065e-002
4	7.576e-002	8.820e-002	8.078e-002	5.832e-002

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

1	2	3	4	5
PGA	1.033e-001	1.281e-001	8.787e-002	9.399e-002
0.03	1.065e-001	1.315e-001	9.068e-002	9.742e-002
0.05	1.161e-001	1.388e-001	1.005e-001	1.092e-001
0.1	1.548e-001	1.734e-001	1.324e-001	1.588e-001
0.2	2.097e-001	2.189e-001	1.894e-001	2.210e-001
0.3	2.199e-001	2.286e-001	2.077e-001	2.234e-001
0.4	2.157e-001	2.326e-001	2.008e-001	2.138e-001
0.5	2.143e-001	2.333e-001	2.074e-001	2.022e-001
0.75	1.893e-001	2.104e-001	1.890e-001	1.686e-001
1	1.651e-001	1.824e-001	1.667e-001	1.463e-001

2	9.466e-002	1.069e-001	9.858e-002	7.857e-002
3	6.494e-002	7.627e-002	6.723e-002	5.135e-002
4	4.840e-002	5.621e-002	5.216e-002	3.686e-002

Source: North Frontal (East)
Region: USGS 2008 California
Closest Distance: 44.27 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.289e-001	2.852e-001	1.900e-001	2.115e-001
0.03	2.381e-001	2.926e-001	1.985e-001	2.231e-001
0.05	2.631e-001	3.081e-001	2.255e-001	2.558e-001
0.1	3.718e-001	4.152e-001	3.245e-001	3.756e-001
0.2	5.058e-001	5.890e-001	4.390e-001	4.893e-001
0.3	5.109e-001	6.180e-001	4.434e-001	4.713e-001
0.4	4.815e-001	5.955e-001	4.161e-001	4.329e-001
0.5	4.602e-001	5.782e-001	4.047e-001	3.977e-001
0.75	3.802e-001	4.829e-001	3.367e-001	3.209e-001
1	3.091e-001	3.768e-001	2.823e-001	2.681e-001

2	1.448e-001	1.681e-001	1.479e-001	1.185e-001
3	8.875e-002	9.891e-002	9.556e-002	7.178e-002
4	6.406e-002	7.017e-002	7.190e-002	5.011e-002

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

1	2	3	4	5
PGA	1.511e-001	1.882e-001	1.254e-001	1.396e-001
0.03	1.571e-001	1.931e-001	1.310e-001	1.472e-001
0.05	1.736e-001	2.033e-001	1.488e-001	1.688e-001
0.1	2.449e-001	2.729e-001	2.141e-001	2.478e-001
0.2	3.337e-001	3.886e-001	2.896e-001	3.229e-001
0.3	3.366e-001	4.061e-001	2.926e-001	3.110e-001
0.4	3.189e-001	3.921e-001	2.768e-001	2.879e-001
0.5	3.043e-001	3.790e-001	2.696e-001	2.645e-001
0.75	2.486e-001	3.131e-001	2.217e-001	2.111e-001
1	2.013e-001	2.441e-001	1.849e-001	1.749e-001
2	9.293e-002	1.070e-001	9.559e-002	7.616e-002
3	5.684e-002	6.309e-002	6.173e-002	4.570e-002
4	4.094e-002	4.472e-002	4.642e-002	3.166e-002

Source: North Frontal (West)

Region: USGS 2008 California
Closest Distance: 17.78 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	5.140e-001	5.253e-001	4.249e-001	5.918e-001
0.03	5.470e-001	5.589e-001	4.447e-001	6.374e-001
0.05	6.094e-001	6.002e-001	5.040e-001	7.240e-001
0.1	8.579e-001	8.333e-001	7.367e-001	1.004e+000
0.2	1.112e+000	1.109e+000	9.569e-001	1.269e+000
0.3	1.124e+000	1.183e+000	9.412e-001	1.247e+000
0.4	1.081e+000	1.164e+000	9.070e-001	1.173e+000
0.5	1.040e+000	1.144e+000	8.937e-001	1.081e+000
0.75	8.938e-001	1.003e+000	7.771e-001	9.016e-001
1	7.456e-001	7.806e-001	6.822e-001	7.741e-001
2	3.692e-001	3.680e-001	3.888e-001	3.507e-001
3	2.288e-001	2.331e-001	2.464e-001	2.068e-001
4	1.630e-001	1.650e-001	1.811e-001	1.429e-001

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

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

1	2	3	4	5
PGA	3.392e-001	3.466e-001	2.804e-001	3.905e-001
0.03	3.609e-001	3.688e-001	2.934e-001	4.206e-001
0.05	4.021e-001	3.960e-001	3.326e-001	4.777e-001
0.1	5.653e-001	5.476e-001	4.861e-001	6.622e-001
0.2	7.335e-001	7.316e-001	6.314e-001	8.375e-001
0.3	7.403e-001	7.772e-001	6.210e-001	8.228e-001
0.4	7.166e-001	7.662e-001	6.033e-001	7.805e-001
0.5	6.912e-001	7.496e-001	5.992e-001	7.250e-001
0.75	5.877e-001	6.502e-001	5.139e-001	5.989e-001
1	4.874e-001	5.057e-001	4.479e-001	5.085e-001
2	2.372e-001	2.344e-001	2.513e-001	2.258e-001
3	1.465e-001	1.487e-001	1.592e-001	1.317e-001
4	1.041e-001	1.052e-001	1.169e-001	9.029e-002

Source: Pinto Mtn
Region: USGS 2008 California
Closest Distance: 50.70 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.203e-001	2.785e-001	1.830e-001	1.995e-001
0.03	2.291e-001	2.873e-001	1.905e-001	2.094e-001
0.05	2.527e-001	3.046e-001	2.149e-001	2.387e-001
0.1	3.490e-001	3.971e-001	3.003e-001	3.497e-001
0.2	4.609e-001	5.085e-001	4.121e-001	4.620e-001
0.3	4.640e-001	5.143e-001	4.269e-001	4.509e-001
0.4	4.443e-001	5.098e-001	4.048e-001	4.182e-001
0.5	4.312e-001	4.996e-001	4.061e-001	3.878e-001
0.75	3.692e-001	4.314e-001	3.571e-001	3.192e-001
1	3.152e-001	3.604e-001	3.104e-001	2.747e-001
2	1.750e-001	2.024e-001	1.777e-001	1.448e-001
3	1.167e-001	1.367e-001	1.194e-001	9.415e-002
4	8.705e-002	1.017e-001	9.190e-002	6.751e-002

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

1	2	3	4	5
PGA	1.454e-001	1.837e-001	1.207e-001	1.316e-001
0.03	1.511e-001	1.895e-001	1.257e-001	1.382e-001

0.05	1.668e-001	2.010e-001	1.418e-001	1.575e-001
0.1	2.300e-001	2.610e-001	1.981e-001	2.307e-001
0.2	3.041e-001	3.355e-001	2.719e-001	3.049e-001
0.3	3.057e-001	3.380e-001	2.817e-001	2.975e-001
0.4	2.944e-001	3.357e-001	2.693e-001	2.782e-001
0.5	2.852e-001	3.274e-001	2.704e-001	2.578e-001
0.75	2.416e-001	2.797e-001	2.351e-001	2.099e-001
1	2.053e-001	2.335e-001	2.033e-001	1.792e-001
2	1.123e-001	1.289e-001	1.149e-001	9.305e-002
3	7.475e-002	8.717e-002	7.714e-002	5.995e-002
4	5.561e-002	6.483e-002	5.934e-002	4.267e-002

Source: Pisgah-Bullion Mtn-Mesquite Lk
Region: USGS 2008 California
Closest Distance: 97.99 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.183e-001	1.449e-001	1.078e-001	1.023e-001
0.03	1.212e-001	1.471e-001	1.111e-001	1.053e-001

0.05	1.315e-001	1.545e-001	1.229e-001	1.172e-001
0.1	1.759e-001	1.959e-001	1.615e-001	1.701e-001
0.2	2.477e-001	2.672e-001	2.330e-001	2.429e-001
0.3	2.638e-001	2.853e-001	2.570e-001	2.491e-001
0.4	2.589e-001	2.914e-001	2.452e-001	2.401e-001
0.5	2.573e-001	2.931e-001	2.495e-001	2.293e-001
0.75	2.258e-001	2.615e-001	2.223e-001	1.934e-001
1	1.955e-001	2.257e-001	1.920e-001	1.689e-001
2	1.099e-001	1.304e-001	1.082e-001	9.126e-002
3	7.337e-002	8.785e-002	7.254e-002	5.972e-002
4	5.466e-002	6.523e-002	5.583e-002	4.293e-002

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

1	2	3	4	5
PGA	7.808e-002	9.558e-002	7.116e-002	6.750e-002
0.03	7.995e-002	9.706e-002	7.330e-002	6.950e-002
0.05	8.678e-002	1.019e-001	8.109e-002	7.731e-002
0.1	1.159e-001	1.288e-001	1.066e-001	1.123e-001
0.2	1.634e-001	1.763e-001	1.538e-001	1.603e-001
0.3	1.738e-001	1.875e-001	1.696e-001	1.644e-001
0.4	1.714e-001	1.919e-001	1.631e-001	1.593e-001
0.5	1.698e-001	1.921e-001	1.657e-001	1.515e-001
0.75	1.475e-001	1.695e-001	1.462e-001	1.267e-001

1	1.272e-001	1.462e-001	1.256e-001	1.099e-001
2	7.053e-002	8.302e-002	6.995e-002	5.861e-002
3	4.697e-002	5.604e-002	4.686e-002	3.802e-002
4	3.492e-002	4.157e-002	3.605e-002	2.713e-002

Source: Puente Hills
Region: USGS 2008 California
Closest Distance: 56.80 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (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	2.417e-001	2.023e-001	2.178e-001
0.03	2.282e-001	2.468e-001	2.096e-001	2.283e-001
0.05	2.504e-001	2.591e-001	2.343e-001	2.579e-001
0.1	3.470e-001	3.428e-001	3.261e-001	3.722e-001
0.2	4.752e-001	4.827e-001	4.528e-001	4.900e-001
0.3	4.880e-001	5.130e-001	4.737e-001	4.772e-001
0.4	4.623e-001	4.960e-001	4.495e-001	4.412e-001
0.5	4.452e-001	4.856e-001	4.440e-001	4.061e-001
0.75	3.736e-001	4.135e-001	3.802e-001	3.271e-001

1	3.046e-001	3.268e-001	3.150e-001	2.718e-001
2	1.370e-001	1.496e-001	1.456e-001	1.159e-001
3	8.187e-002	9.055e-002	8.720e-002	6.786e-002
4	5.896e-002	6.423e-002	6.633e-002	4.633e-002

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

1	2	3	4	5
PGA	1.455e-001	1.594e-001	1.335e-001	1.437e-001
0.03	1.506e-001	1.629e-001	1.383e-001	1.506e-001
0.05	1.652e-001	1.709e-001	1.546e-001	1.702e-001
0.1	2.287e-001	2.253e-001	2.152e-001	2.456e-001
0.2	3.135e-001	3.185e-001	2.988e-001	3.233e-001
0.3	3.215e-001	3.371e-001	3.126e-001	3.148e-001
0.4	3.064e-001	3.266e-001	2.990e-001	2.935e-001
0.5	2.947e-001	3.183e-001	2.958e-001	2.701e-001
0.75	2.445e-001	2.681e-001	2.504e-001	2.151e-001
1	1.985e-001	2.117e-001	2.063e-001	1.773e-001
2	8.793e-002	9.528e-002	9.408e-002	7.443e-002
3	5.243e-002	5.776e-002	5.633e-002	4.320e-002
4	3.768e-002	4.093e-002	4.283e-002	2.928e-002

Source: Puente Hills (Coyote Hills)
Region: USGS 2008 California
Closest Distance: 61.41 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.774e-001	2.035e-001	1.750e-001	1.536e-001
0.03	1.824e-001	2.055e-001	1.814e-001	1.603e-001
0.05	1.999e-001	2.148e-001	2.033e-001	1.816e-001
0.1	2.794e-001	2.880e-001	2.850e-001	2.652e-001
0.2	3.944e-001	4.337e-001	3.961e-001	3.534e-001
0.3	4.063e-001	4.617e-001	4.126e-001	3.446e-001
0.4	3.842e-001	4.450e-001	3.886e-001	3.192e-001
0.5	3.686e-001	4.317e-001	3.771e-001	2.969e-001
0.75	3.016e-001	3.557e-001	3.114e-001	2.377e-001
1	2.421e-001	2.784e-001	2.512e-001	1.969e-001
2	1.054e-001	1.224e-001	1.095e-001	8.429e-002
3	6.155e-002	6.991e-002	6.468e-002	5.004e-002
4	4.438e-002	4.983e-002	4.892e-002	3.438e-002

Fractile: Mean
Column 1: Spectral Period

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

1	2	3	4	5
PGA	1.170e-001	1.343e-001	1.155e-001	1.014e-001
0.03	1.204e-001	1.356e-001	1.197e-001	1.058e-001
0.05	1.319e-001	1.417e-001	1.341e-001	1.198e-001
0.1	1.841e-001	1.892e-001	1.881e-001	1.750e-001
0.2	2.602e-001	2.862e-001	2.614e-001	2.332e-001
0.3	2.677e-001	3.034e-001	2.722e-001	2.274e-001
0.4	2.545e-001	2.930e-001	2.584e-001	2.121e-001
0.5	2.434e-001	2.829e-001	2.510e-001	1.964e-001
0.75	1.971e-001	2.306e-001	2.050e-001	1.557e-001
1	1.576e-001	1.803e-001	1.645e-001	1.281e-001
2	6.761e-002	7.797e-002	7.075e-002	5.410e-002
3	3.941e-002	4.460e-002	4.178e-002	3.184e-002
4	2.836e-002	3.176e-002	3.159e-002	2.172e-002

Source: Puente Hills (LA)
Region: USGS 2008 California
Closest Distance: 81.43 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.399e-001	1.575e-001	1.433e-001	1.189e-001
0.03	1.432e-001	1.587e-001	1.478e-001	1.231e-001
0.05	1.558e-001	1.653e-001	1.642e-001	1.380e-001
0.1	2.137e-001	2.175e-001	2.229e-001	2.008e-001
0.2	3.074e-001	3.281e-001	3.169e-001	2.773e-001
0.3	3.257e-001	3.594e-001	3.404e-001	2.772e-001
0.4	3.118e-001	3.516e-001	3.223e-001	2.614e-001
0.5	3.035e-001	3.469e-001	3.176e-001	2.460e-001
0.75	2.549e-001	2.953e-001	2.684e-001	2.008e-001
1	2.076e-001	2.354e-001	2.186e-001	1.686e-001
2	9.303e-002	1.071e-001	9.727e-002	7.468e-002
3	5.538e-002	6.308e-002	5.790e-002	4.515e-002
4	4.011e-002	4.496e-002	4.399e-002	3.137e-002

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

1	2	3	4	5
PGA	9.229e-002	1.039e-001	9.453e-002	7.846e-002

0.03	9.449e-002	1.047e-001	9.754e-002	8.124e-002
0.05	1.028e-001	1.091e-001	1.083e-001	9.106e-002
0.1	1.408e-001	1.429e-001	1.471e-001	1.325e-001
0.2	2.028e-001	2.165e-001	2.091e-001	1.829e-001
0.3	2.146e-001	2.362e-001	2.246e-001	1.829e-001
0.4	2.065e-001	2.315e-001	2.144e-001	1.736e-001
0.5	2.004e-001	2.273e-001	2.112e-001	1.626e-001
0.75	1.665e-001	1.915e-001	1.766e-001	1.315e-001
1	1.351e-001	1.525e-001	1.431e-001	1.097e-001
2	5.968e-002	6.824e-002	6.287e-002	4.794e-002
3	3.546e-002	4.024e-002	3.740e-002	2.874e-002
4	2.563e-002	2.865e-002	2.840e-002	1.983e-002

Source: Puente Hills (Santa Fe Springs)
Region: USGS 2008 California
Closest Distance: 72.99 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.357e-001	1.527e-001	1.393e-001	1.152e-001

0.03	1.389e-001	1.531e-001	1.442e-001	1.195e-001
0.05	1.519e-001	1.601e-001	1.615e-001	1.344e-001
0.1	2.129e-001	2.172e-001	2.259e-001	1.957e-001
0.2	3.092e-001	3.456e-001	3.167e-001	2.656e-001
0.3	3.217e-001	3.725e-001	3.315e-001	2.614e-001
0.4	3.043e-001	3.553e-001	3.102e-001	2.474e-001
0.5	2.896e-001	3.429e-001	2.964e-001	2.296e-001
0.75	2.317e-001	2.768e-001	2.367e-001	1.817e-001
1	1.831e-001	2.152e-001	1.858e-001	1.486e-001
2	7.632e-002	9.200e-002	7.604e-002	6.097e-002
3	4.325e-002	5.061e-002	4.412e-002	3.507e-002
4	3.079e-002	3.574e-002	3.309e-002	2.357e-002

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

1	2	3	4	5
PGA	8.953e-002	1.008e-001	9.191e-002	7.599e-002
0.03	9.165e-002	1.010e-001	9.516e-002	7.884e-002
0.05	1.003e-001	1.056e-001	1.065e-001	8.868e-002
0.1	1.403e-001	1.428e-001	1.491e-001	1.291e-001
0.2	2.040e-001	2.280e-001	2.089e-001	1.753e-001
0.3	2.119e-001	2.448e-001	2.187e-001	1.725e-001
0.4	2.011e-001	2.340e-001	2.064e-001	1.632e-001
0.5	1.909e-001	2.248e-001	1.971e-001	1.509e-001

0.75	1.512e-001	1.794e-001	1.557e-001	1.186e-001
1	1.191e-001	1.394e-001	1.216e-001	9.639e-002
2	4.893e-002	5.860e-002	4.914e-002	3.908e-002
3	2.769e-002	3.228e-002	2.850e-002	2.230e-002
4	1.967e-002	2.278e-002	2.136e-002	1.488e-002

Source: Raymond
Region: USGS 2008 California
Closest Distance: 66.96 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.374e-001	1.784e-001	1.207e-001	1.129e-001
0.03	1.407e-001	1.790e-001	1.255e-001	1.175e-001
0.05	1.538e-001	1.866e-001	1.417e-001	1.332e-001
0.1	2.158e-001	2.516e-001	1.995e-001	1.962e-001
0.2	3.120e-001	3.938e-001	2.768e-001	2.654e-001
0.3	3.229e-001	4.215e-001	2.868e-001	2.605e-001
0.4	3.064e-001	4.063e-001	2.677e-001	2.453e-001
0.5	2.930e-001	3.931e-001	2.575e-001	2.285e-001

0.75	2.369e-001	3.194e-001	2.079e-001	1.835e-001
1	1.902e-001	2.490e-001	1.690e-001	1.525e-001
2	8.585e-002	1.076e-001	8.323e-002	6.673e-002
3	5.122e-002	5.973e-002	5.349e-002	4.046e-002
4	3.705e-002	4.272e-002	4.029e-002	2.813e-002

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

1	2	3	4	5
PGA	9.063e-002	1.177e-001	7.967e-002	7.448e-002
0.03	9.281e-002	1.181e-001	8.281e-002	7.750e-002
0.05	1.015e-001	1.231e-001	9.347e-002	8.790e-002
0.1	1.422e-001	1.653e-001	1.317e-001	1.295e-001
0.2	2.059e-001	2.598e-001	1.826e-001	1.751e-001
0.3	2.127e-001	2.770e-001	1.892e-001	1.719e-001
0.4	2.026e-001	2.676e-001	1.780e-001	1.621e-001
0.5	1.931e-001	2.576e-001	1.711e-001	1.504e-001
0.75	1.545e-001	2.071e-001	1.367e-001	1.199e-001
1	1.237e-001	1.613e-001	1.106e-001	9.899e-002
2	5.504e-002	6.852e-002	5.379e-002	4.280e-002
3	3.279e-002	3.810e-002	3.455e-002	2.573e-002
4	2.367e-002	2.723e-002	2.601e-002	1.777e-002

Source: Southern San Andreas
Region: USGS 2008 California
Closest Distance: 3.79 km
Amplitude Units: Acceleration (g)
Magnitude: 8.20 Mw
Fractile: 0.84
Column 1: Spectral Period
Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations
Column 3: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	9.017e-001	8.746e-001	7.659e-001	1.065e+000
0.03	9.678e-001	9.648e-001	7.997e-001	1.139e+000
0.05	1.069e+000	1.067e+000	8.876e-001	1.252e+000
0.1	1.396e+000	1.496e+000	1.083e+000	1.615e+000
0.2	1.752e+000	1.785e+000	1.387e+000	2.088e+000
0.3	1.916e+000	2.017e+000	1.503e+000	2.229e+000
0.4	1.956e+000	1.996e+000	1.609e+000	2.262e+000
0.5	2.011e+000	1.973e+000	1.838e+000	2.222e+000
0.75	2.007e+000	1.973e+000	1.993e+000	2.055e+000
1	1.858e+000	1.591e+000	2.045e+000	1.939e+000
2	1.358e+000	1.140e+000	1.729e+000	1.204e+000
3	1.067e+000	1.082e+000	1.281e+000	8.384e-001
4	8.342e-001	8.583e-001	1.024e+000	6.202e-001

Fractile: Mean

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

1	2	3	4	5
PGA	5.950e-001	5.771e-001	5.053e-001	7.025e-001
0.03	6.386e-001	6.366e-001	5.277e-001	7.515e-001
0.05	7.052e-001	7.040e-001	5.857e-001	8.258e-001
0.1	9.201e-001	9.832e-001	7.147e-001	1.065e+000
0.2	1.156e+000	1.178e+000	9.150e-001	1.378e+000
0.3	1.263e+000	1.325e+000	9.917e-001	1.471e+000
0.4	1.296e+000	1.314e+000	1.070e+000	1.505e+000
0.5	1.338e+000	1.293e+000	1.232e+000	1.490e+000
0.75	1.326e+000	1.279e+000	1.325e+000	1.374e+000
1	1.219e+000	1.031e+000	1.347e+000	1.279e+000
2	8.733e-001	7.260e-001	1.117e+000	7.763e-001
3	6.841e-001	6.903e-001	8.277e-001	5.342e-001
4	5.334e-001	5.470e-001	6.612e-001	3.920e-001

Source: San Gabriel
Region: USGS 2008 California
Closest Distance: 93.75 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.259e-001	1.564e-001	1.125e-001	1.087e-001
0.03	1.290e-001	1.590e-001	1.160e-001	1.122e-001
0.05	1.402e-001	1.671e-001	1.285e-001	1.252e-001
0.1	1.881e-001	2.125e-001	1.696e-001	1.821e-001
0.2	2.631e-001	2.876e-001	2.438e-001	2.579e-001
0.3	2.784e-001	3.046e-001	2.677e-001	2.628e-001
0.4	2.722e-001	3.096e-001	2.553e-001	2.518e-001
0.5	2.698e-001	3.101e-001	2.595e-001	2.399e-001
0.75	2.359e-001	2.751e-001	2.310e-001	2.016e-001
1	2.039e-001	2.365e-001	1.995e-001	1.756e-001
2	1.143e-001	1.360e-001	1.124e-001	9.434e-002
3	7.609e-002	9.164e-002	7.516e-002	6.148e-002
4	5.663e-002	6.805e-002	5.773e-002	4.412e-002

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

1	2	3	4	5

PGA	8.304e-002	1.032e-001	7.422e-002	7.170e-002
0.03	8.514e-002	1.049e-001	7.651e-002	7.400e-002
0.05	9.253e-002	1.103e-001	8.476e-002	8.258e-002
0.1	1.239e-001	1.396e-001	1.119e-001	1.202e-001
0.2	1.736e-001	1.898e-001	1.609e-001	1.702e-001
0.3	1.834e-001	2.002e-001	1.766e-001	1.734e-001
0.4	1.803e-001	2.038e-001	1.698e-001	1.671e-001
0.5	1.781e-001	2.033e-001	1.724e-001	1.585e-001
0.75	1.541e-001	1.784e-001	1.519e-001	1.321e-001
1	1.327e-001	1.532e-001	1.306e-001	1.142e-001
2	7.330e-002	8.664e-002	7.267e-002	6.059e-002
3	4.872e-002	5.846e-002	4.855e-002	3.914e-002
4	3.618e-002	4.337e-002	3.728e-002	2.788e-002

Source: San Gorgornio Shear Gridded
Region: USGS 2008 California
  Closest Distance: 5.00 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
  Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
  Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5

PGA	9.649e-001	1.052e+000	7.110e-001	1.131e+000
0.03	1.039e+000	1.164e+000	7.437e-001	1.209e+000
0.05	1.151e+000	1.305e+000	8.314e-001	1.318e+000
0.1	1.519e+000	1.831e+000	1.056e+000	1.670e+000
0.2	1.934e+000	2.328e+000	1.351e+000	2.123e+000
0.3	2.066e+000	2.540e+000	1.427e+000	2.231e+000
0.4	2.101e+000	2.581e+000	1.488e+000	2.235e+000
0.5	2.094e+000	2.521e+000	1.594e+000	2.167e+000
0.75	1.937e+000	2.320e+000	1.545e+000	1.946e+000
1	1.701e+000	1.849e+000	1.466e+000	1.788e+000
2	1.065e+000	1.146e+000	1.036e+000	1.013e+000
3	7.573e-001	8.855e-001	7.286e-001	6.578e-001
4	5.695e-001	6.744e-001	5.680e-001	4.660e-001

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

1	2	3	4	5
PGA	6.366e-001	6.943e-001	4.691e-001	7.465e-001
0.03	6.854e-001	7.680e-001	4.907e-001	7.974e-001
0.05	7.597e-001	8.613e-001	5.486e-001	8.693e-001
0.1	1.001e+000	1.204e+000	6.970e-001	1.102e+000
0.2	1.276e+000	1.536e+000	8.914e-001	1.400e+000
0.3	1.361e+000	1.670e+000	9.416e-001	1.472e+000
0.4	1.392e+000	1.700e+000	9.899e-001	1.486e+000

0.5	1.391e+000	1.652e+000	1.069e+000	1.452e+000
0.75	1.277e+000	1.504e+000	1.026e+000	1.301e+000
1	1.114e+000	1.198e+000	9.650e-001	1.179e+000
2	6.840e-001	7.297e-001	6.694e-001	6.528e-001
3	4.849e-001	5.648e-001	4.707e-001	4.191e-001
4	3.637e-001	4.298e-001	3.668e-001	2.945e-001

Source: San Jacinto
Region: USGS 2008 California
Closest Distance: 6.36 km
Amplitude Units: Acceleration (g)
Magnitude: 7.88 Mw
Fractile: 0.84
Column 1: Spectral Period
Column 2: Acceleration (g) for: Weighted Mean of Attenuation Equations
Column 3: Acceleration (g) for: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	7.771e-001	7.485e-001	6.728e-001	9.101e-001
0.03	8.313e-001	8.174e-001	7.037e-001	9.728e-001
0.05	9.206e-001	8.968e-001	7.880e-001	1.077e+000
0.1	1.228e+000	1.242e+000	1.026e+000	1.417e+000
0.2	1.541e+000	1.484e+000	1.314e+000	1.824e+000
0.3	1.628e+000	1.605e+000	1.370e+000	1.907e+000
0.4	1.640e+000	1.607e+000	1.415e+000	1.900e+000

0.5	1.654e+000	1.590e+000	1.534e+000	1.837e+000
0.75	1.571e+000	1.521e+000	1.536e+000	1.657e+000
1	1.425e+000	1.241e+000	1.501e+000	1.535e+000
2	9.572e-001	8.164e-001	1.133e+000	9.225e-001
3	7.117e-001	6.872e-001	8.143e-001	6.336e-001
4	5.460e-001	5.299e-001	6.424e-001	4.656e-001

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

1	2	3	4	5
PGA	5.127e-001	4.938e-001	4.439e-001	6.005e-001
0.03	5.485e-001	5.394e-001	4.643e-001	6.419e-001
0.05	6.074e-001	5.917e-001	5.199e-001	7.106e-001
0.1	8.094e-001	8.165e-001	6.770e-001	9.348e-001
0.2	1.017e+000	9.790e-001	8.668e-001	1.204e+000
0.3	1.073e+000	1.055e+000	9.042e-001	1.259e+000
0.4	1.088e+000	1.058e+000	9.410e-001	1.264e+000
0.5	1.101e+000	1.042e+000	1.029e+000	1.231e+000
0.75	1.037e+000	9.860e-001	1.020e+000	1.106e+000
1	9.345e-001	8.038e-001	9.877e-001	1.012e+000
2	6.155e-001	5.200e-001	7.320e-001	5.946e-001
3	4.560e-001	4.384e-001	5.260e-001	4.037e-001
4	3.489e-001	3.377e-001	4.148e-001	2.943e-001

Source: San Joaquin Hills
Region: USGS 2008 California
Closest Distance: 69.20 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.738e-001	1.977e-001	1.708e-001	1.530e-001
0.03	1.789e-001	2.007e-001	1.766e-001	1.593e-001
0.05	1.954e-001	2.100e-001	1.966e-001	1.797e-001
0.1	2.688e-001	2.755e-001	2.692e-001	2.618e-001
0.2	3.762e-001	3.959e-001	3.789e-001	3.538e-001
0.3	3.931e-001	4.270e-001	4.031e-001	3.493e-001
0.4	3.746e-001	4.155e-001	3.826e-001	3.258e-001
0.5	3.644e-001	4.092e-001	3.793e-001	3.047e-001
0.75	3.083e-001	3.510e-001	3.256e-001	2.482e-001
1	2.524e-001	2.797e-001	2.690e-001	2.085e-001
2	1.152e-001	1.289e-001	1.238e-001	9.290e-002
3	6.965e-002	7.803e-002	7.439e-002	5.652e-002
4	5.054e-002	5.539e-002	5.676e-002	3.947e-002

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

1	2	3	4	5
PGA	1.147e-001	1.304e-001	1.127e-001	1.010e-001
0.03	1.180e-001	1.324e-001	1.165e-001	1.051e-001
0.05	1.289e-001	1.385e-001	1.297e-001	1.186e-001
0.1	1.771e-001	1.811e-001	1.776e-001	1.727e-001
0.2	2.482e-001	2.612e-001	2.500e-001	2.335e-001
0.3	2.590e-001	2.806e-001	2.659e-001	2.305e-001
0.4	2.482e-001	2.736e-001	2.545e-001	2.167e-001
0.5	2.409e-001	2.682e-001	2.525e-001	2.019e-001
0.75	2.016e-001	2.276e-001	2.143e-001	1.628e-001
1	1.644e-001	1.812e-001	1.762e-001	1.358e-001
2	7.393e-002	8.212e-002	8.000e-002	5.966e-002
3	4.460e-002	4.978e-002	4.806e-002	3.598e-002
4	3.230e-002	3.530e-002	3.665e-002	2.494e-002

Source: San Jose
Region: USGS 2008 California
Closest Distance: 39.30 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.068e-001	2.652e-001	1.862e-001	1.689e-001
0.03	2.142e-001	2.697e-001	1.952e-001	1.777e-001
0.05	2.383e-001	2.869e-001	2.236e-001	2.046e-001
0.1	3.434e-001	3.961e-001	3.312e-001	3.030e-001
0.2	4.694e-001	5.741e-001	4.417e-001	3.923e-001
0.3	4.578e-001	5.640e-001	4.350e-001	3.743e-001
0.4	4.308e-001	5.450e-001	4.036e-001	3.440e-001
0.5	4.042e-001	5.152e-001	3.806e-001	3.169e-001
0.75	3.171e-001	4.010e-001	2.992e-001	2.510e-001
1	2.577e-001	3.223e-001	2.417e-001	2.091e-001
2	1.261e-001	1.594e-001	1.174e-001	1.016e-001
3	7.659e-002	9.177e-002	7.494e-002	6.306e-002
4	5.580e-002	6.747e-002	5.620e-002	4.374e-002

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

1	2	3	4	5
PGA	1.364e-001	1.750e-001	1.229e-001	1.114e-001
0.03	1.413e-001	1.780e-001	1.288e-001	1.173e-001
0.05	1.573e-001	1.893e-001	1.475e-001	1.350e-001
0.1	2.262e-001	2.603e-001	2.185e-001	1.999e-001
0.2	3.097e-001	3.788e-001	2.914e-001	2.588e-001
0.3	3.015e-001	3.707e-001	2.870e-001	2.470e-001
0.4	2.851e-001	3.588e-001	2.684e-001	2.279e-001
0.5	2.667e-001	3.377e-001	2.535e-001	2.090e-001
0.75	2.070e-001	2.600e-001	1.970e-001	1.641e-001
1	1.676e-001	2.088e-001	1.583e-001	1.359e-001
2	8.085e-002	1.015e-001	7.586e-002	6.519e-002
3	4.902e-002	5.854e-002	4.841e-002	4.010e-002
4	3.563e-002	4.300e-002	3.629e-002	2.762e-002

Source: Santa Monica
Region: USGS 2008 California
Closest Distance: 93.97 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.458e-001	1.605e-001	1.437e-001	1.331e-001
0.03	1.497e-001	1.641e-001	1.477e-001	1.374e-001
0.05	1.623e-001	1.716e-001	1.625e-001	1.528e-001
0.1	2.165e-001	2.163e-001	2.122e-001	2.210e-001
0.2	3.041e-001	2.933e-001	3.070e-001	3.121e-001
0.3	3.293e-001	3.283e-001	3.409e-001	3.187e-001
0.4	3.202e-001	3.284e-001	3.276e-001	3.045e-001
0.5	3.205e-001	3.345e-001	3.363e-001	2.905e-001
0.75	2.866e-001	3.092e-001	3.063e-001	2.442e-001
1	2.432e-001	2.562e-001	2.632e-001	2.101e-001
2	1.208e-001	1.280e-001	1.351e-001	9.938e-002
3	7.725e-002	8.438e-002	8.479e-002	6.258e-002
4	5.649e-002	5.929e-002	6.554e-002	4.466e-002

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

1	2	3	4	5
PGA	9.617e-002	1.059e-001	9.483e-002	8.782e-002
0.03	9.880e-002	1.083e-001	9.747e-002	9.066e-002
0.05	1.071e-001	1.132e-001	1.072e-001	1.009e-001
0.1	1.426e-001	1.422e-001	1.400e-001	1.458e-001
0.2	2.007e-001	1.935e-001	2.026e-001	2.059e-001
0.3	2.170e-001	2.157e-001	2.249e-001	2.103e-001

0.4	2.122e-001	2.163e-001	2.179e-001	2.026e-001
0.5	2.118e-001	2.193e-001	2.237e-001	1.924e-001
0.75	1.874e-001	2.005e-001	2.015e-001	1.602e-001
1	1.584e-001	1.660e-001	1.723e-001	1.368e-001
2	7.755e-002	8.152e-002	8.731e-002	6.383e-002
3	4.948e-002	5.382e-002	5.478e-002	3.984e-002
4	3.611e-002	3.778e-002	4.232e-002	2.822e-002

Source: Sierra Madre
Region: USGS 2008 California
Closest Distance: 43.87 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.420e-001	2.946e-001	1.983e-001	2.332e-001
0.03	2.523e-001	3.044e-001	2.070e-001	2.455e-001
0.05	2.786e-001	3.209e-001	2.347e-001	2.801e-001
0.1	3.891e-001	4.249e-001	3.339e-001	4.086e-001
0.2	5.198e-001	5.727e-001	4.527e-001	5.341e-001
0.3	5.286e-001	6.059e-001	4.612e-001	5.189e-001

0.4	5.008e-001	5.865e-001	4.356e-001	4.803e-001
0.5	4.834e-001	5.761e-001	4.317e-001	4.425e-001
0.75	4.111e-001	4.988e-001	3.720e-001	3.623e-001
1	3.401e-001	3.942e-001	3.198e-001	3.064e-001
2	1.677e-001	1.837e-001	1.788e-001	1.406e-001
3	1.072e-001	1.148e-001	1.191e-001	8.775e-002
4	7.829e-002	8.127e-002	9.129e-002	6.231e-002

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

1	2	3	4	5
PGA	1.597e-001	1.943e-001	1.309e-001	1.539e-001
0.03	1.665e-001	2.008e-001	1.366e-001	1.620e-001
0.05	1.838e-001	2.118e-001	1.548e-001	1.848e-001
0.1	2.564e-001	2.792e-001	2.203e-001	2.696e-001
0.2	3.430e-001	3.778e-001	2.987e-001	3.524e-001
0.3	3.483e-001	3.982e-001	3.043e-001	3.424e-001
0.4	3.318e-001	3.862e-001	2.897e-001	3.194e-001
0.5	3.200e-001	3.776e-001	2.876e-001	2.947e-001
0.75	2.690e-001	3.234e-001	2.450e-001	2.385e-001
1	2.216e-001	2.554e-001	2.095e-001	2.000e-001
2	1.076e-001	1.170e-001	1.155e-001	9.033e-002
3	6.868e-002	7.320e-002	7.696e-002	5.587e-002
4	5.004e-002	5.180e-002	5.895e-002	3.938e-002

Source: Sierra Madre (San Fernando)
Region: USGS 2008 California
Closest Distance: 96.29 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	8.513e-002	1.055e-001	8.309e-002	6.677e-002
0.03	8.659e-002	1.054e-001	8.583e-002	6.858e-002
0.05	9.390e-002	1.096e-001	9.582e-002	7.630e-002
0.1	1.298e-001	1.473e-001	1.311e-001	1.111e-001
0.2	1.968e-001	2.440e-001	1.868e-001	1.595e-001
0.3	2.123e-001	2.735e-001	1.998e-001	1.636e-001
0.4	2.040e-001	2.656e-001	1.868e-001	1.596e-001
0.5	1.969e-001	2.604e-001	1.794e-001	1.507e-001
0.75	1.606e-001	2.152e-001	1.435e-001	1.231e-001
1	1.292e-001	1.694e-001	1.150e-001	1.031e-001
2	5.796e-002	7.383e-002	5.464e-002	4.540e-002
3	3.435e-002	4.081e-002	3.477e-002	2.745e-002
4	2.469e-002	2.899e-002	2.608e-002	1.900e-002

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

1	2	3	4	5
PGA	5.617e-002	6.962e-002	5.483e-002	4.406e-002
0.03	5.714e-002	6.953e-002	5.663e-002	4.525e-002
0.05	6.196e-002	7.230e-002	6.322e-002	5.034e-002
0.1	8.554e-002	9.681e-002	8.648e-002	7.332e-002
0.2	1.298e-001	1.610e-001	1.233e-001	1.051e-001
0.3	1.398e-001	1.798e-001	1.318e-001	1.077e-001
0.4	1.346e-001	1.749e-001	1.242e-001	1.048e-001
0.5	1.295e-001	1.707e-001	1.191e-001	9.868e-002
0.75	1.047e-001	1.395e-001	9.433e-002	8.013e-002
1	8.390e-002	1.098e-001	7.520e-002	6.674e-002
2	3.714e-002	4.703e-002	3.531e-002	2.909e-002
3	2.198e-002	2.603e-002	2.246e-002	1.745e-002
4	1.577e-002	1.847e-002	1.684e-002	1.200e-002

Source: Sierra Madre Connected
Region: USGS 2008 California
Closest Distance: 43.87 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.527e-001	3.048e-001	2.046e-001	2.487e-001
0.03	2.639e-001	3.164e-001	2.135e-001	2.619e-001
0.05	2.913e-001	3.340e-001	2.415e-001	2.985e-001
0.1	4.047e-001	4.387e-001	3.414e-001	4.340e-001
0.2	5.357e-001	5.753e-001	4.639e-001	5.679e-001
0.3	5.464e-001	6.108e-001	4.750e-001	5.534e-001
0.4	5.189e-001	5.927e-001	4.503e-001	5.137e-001
0.5	5.032e-001	5.855e-001	4.505e-001	4.735e-001
0.75	4.339e-001	5.163e-001	3.955e-001	3.899e-001
1	3.620e-001	4.103e-001	3.443e-001	3.312e-001
2	1.824e-001	1.955e-001	1.981e-001	1.537e-001
3	1.185e-001	1.258e-001	1.332e-001	9.653e-002
4	8.677e-002	8.900e-002	1.025e-001	6.882e-002

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

1	2	3	4	5
PGA	1.668e-001	2.011e-001	1.350e-001	1.641e-001
0.03	1.742e-001	2.088e-001	1.409e-001	1.728e-001
0.05	1.922e-001	2.204e-001	1.594e-001	1.969e-001
0.1	2.667e-001	2.883e-001	2.253e-001	2.864e-001
0.2	3.535e-001	3.796e-001	3.061e-001	3.747e-001
0.3	3.600e-001	4.014e-001	3.134e-001	3.652e-001
0.4	3.438e-001	3.903e-001	2.995e-001	3.417e-001
0.5	3.332e-001	3.837e-001	3.002e-001	3.157e-001
0.75	2.840e-001	3.347e-001	2.605e-001	2.569e-001
1	2.359e-001	2.658e-001	2.256e-001	2.164e-001
2	1.171e-001	1.245e-001	1.280e-001	9.876e-002
3	7.591e-002	8.024e-002	8.603e-002	6.146e-002
4	5.546e-002	5.672e-002	6.618e-002	4.349e-002

Source: So Emerson-Copper Mtn
Region: USGS 2008 California
Closest Distance: 79.94 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.319e-001	1.698e-001	1.170e-001	1.087e-001
0.03	1.351e-001	1.716e-001	1.211e-001	1.126e-001
0.05	1.474e-001	1.802e-001	1.353e-001	1.268e-001
0.1	2.015e-001	2.348e-001	1.839e-001	1.857e-001
0.2	2.830e-001	3.322e-001	2.600e-001	2.570e-001
0.3	2.933e-001	3.449e-001	2.781e-001	2.570e-001
0.4	2.836e-001	3.448e-001	2.628e-001	2.431e-001
0.5	2.763e-001	3.385e-001	2.612e-001	2.293e-001
0.75	2.331e-001	2.865e-001	2.234e-001	1.893e-001
1	1.973e-001	2.406e-001	1.884e-001	1.629e-001
2	1.058e-001	1.314e-001	1.007e-001	8.519e-002
3	6.829e-002	8.365e-002	6.637e-002	5.487e-002
4	5.075e-002	6.254e-002	5.064e-002	3.906e-002

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

1	2	3	4	5
PGA	8.700e-002	1.121e-001	7.722e-002	7.173e-002
0.03	8.914e-002	1.132e-001	7.992e-002	7.432e-002
0.05	9.729e-002	1.189e-001	8.929e-002	8.365e-002
0.1	1.327e-001	1.543e-001	1.213e-001	1.226e-001
0.2	1.868e-001	2.192e-001	1.715e-001	1.696e-001

0.3	1.933e-001	2.267e-001	1.835e-001	1.696e-001
0.4	1.877e-001	2.271e-001	1.748e-001	1.613e-001
0.5	1.823e-001	2.219e-001	1.735e-001	1.515e-001
0.75	1.522e-001	1.857e-001	1.469e-001	1.240e-001
1	1.284e-001	1.559e-001	1.233e-001	1.059e-001
2	6.783e-002	8.372e-002	6.508e-002	5.470e-002
3	4.372e-002	5.336e-002	4.287e-002	3.493e-002
4	3.241e-002	3.986e-002	3.270e-002	2.468e-002

Source: Verdugo
Region: USGS 2008 California
Closest Distance: 78.03 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.256e-001	1.610e-001	1.107e-001	1.049e-001
0.03	1.284e-001	1.618e-001	1.147e-001	1.088e-001
0.05	1.399e-001	1.685e-001	1.287e-001	1.226e-001
0.1	1.938e-001	2.241e-001	1.774e-001	1.800e-001
0.2	2.812e-001	3.460e-001	2.496e-001	2.480e-001

0.3	2.955e-001	3.760e-001	2.638e-001	2.468e-001
0.4	2.823e-001	3.655e-001	2.475e-001	2.339e-001
0.5	2.727e-001	3.576e-001	2.412e-001	2.194e-001
0.75	2.251e-001	2.979e-001	1.989e-001	1.785e-001
1	1.828e-001	2.351e-001	1.636e-001	1.497e-001
2	8.453e-002	1.044e-001	8.248e-002	6.669e-002
3	5.121e-002	5.973e-002	5.323e-002	4.068e-002
4	3.709e-002	4.268e-002	4.016e-002	2.843e-002

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

1	2	3	4	5
PGA	8.284e-002	1.063e-001	7.306e-002	6.921e-002
0.03	8.475e-002	1.068e-001	7.570e-002	7.178e-002
0.05	9.233e-002	1.112e-001	8.489e-002	8.092e-002
0.1	1.277e-001	1.473e-001	1.171e-001	1.187e-001
0.2	1.855e-001	2.283e-001	1.647e-001	1.636e-001
0.3	1.947e-001	2.471e-001	1.740e-001	1.628e-001
0.4	1.867e-001	2.407e-001	1.646e-001	1.548e-001
0.5	1.797e-001	2.344e-001	1.602e-001	1.446e-001
0.75	1.469e-001	1.932e-001	1.308e-001	1.167e-001
1	1.189e-001	1.523e-001	1.071e-001	9.723e-002
2	5.420e-002	6.651e-002	5.331e-002	4.279e-002
3	3.279e-002	3.810e-002	3.439e-002	2.588e-002

4	2.370e-002	2.720e-002	2.593e-002	1.796e-002

Source: Extensional Gridded
Region: USGS 2008 Western US
  Closest Distance: 12.46 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
  Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
  Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	5.520e-001	5.286e-001	4.645e-001	6.631e-001
0.03	5.848e-001	5.593e-001	4.885e-001	7.067e-001
0.05	6.510e-001	6.050e-001	5.582e-001	7.897e-001
0.1	9.119e-001	8.512e-001	8.169e-001	1.068e+000
0.2	1.176e+000	1.140e+000	1.073e+000	1.346e+000
0.3	1.165e+000	1.143e+000	1.046e+000	1.338e+000
0.4	1.135e+000	1.154e+000	1.003e+000	1.272e+000
0.5	1.082e+000	1.118e+000	9.684e-001	1.179e+000
0.75	9.056e-001	9.323e-001	8.087e-001	9.882e-001
1	7.664e-001	7.561e-001	6.927e-001	8.584e-001
2	4.075e-001	4.018e-001	3.856e-001	4.357e-001
3	2.583e-001	2.510e-001	2.548e-001	2.691e-001

4	1.882e-001	1.857e-001	1.936e-001	1.853e-001

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

1	2	3	4	5
PGA	3.642e-001	3.487e-001	3.065e-001	4.375e-001
0.03	3.859e-001	3.691e-001	3.223e-001	4.663e-001
0.05	4.295e-001	3.992e-001	3.683e-001	5.211e-001
0.1	6.010e-001	5.594e-001	5.390e-001	7.045e-001
0.2	7.761e-001	7.519e-001	7.082e-001	8.881e-001
0.3	7.676e-001	7.515e-001	6.901e-001	8.831e-001
0.4	7.522e-001	7.601e-001	6.671e-001	8.460e-001
0.5	7.198e-001	7.329e-001	6.492e-001	7.906e-001
0.75	5.961e-001	6.044e-001	5.348e-001	6.571e-001
1	5.013e-001	4.898e-001	4.548e-001	5.643e-001
2	2.618e-001	2.559e-001	2.492e-001	2.806e-001
3	1.654e-001	1.601e-001	1.646e-001	1.714e-001
4	1.202e-001	1.184e-001	1.250e-001	1.171e-001

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

1	2	3	4	5
PGA	1.303e+000	1.236e+000	1.173e+000	1.467e+000
0.03	1.390e+000	1.335e+000	1.224e+000	1.575e+000
0.05	1.548e+000	1.469e+000	1.367e+000	1.767e+000
0.1	2.144e+000	2.165e+000	1.825e+000	2.351e+000
0.2	2.721e+000	2.737e+000	2.325e+000	* 3.040e+000
0.3	2.847e+000	2.927e+000	2.391e+000	* 3.158e+000
0.4	2.823e+000	2.953e+000	2.410e+000	* 3.055e+000
0.5	2.771e+000	2.923e+000	2.493e+000	2.877e+000
0.75	2.567e+000	2.687e+000	2.429e+000	2.583e+000
1	2.322e+000	2.182e+000	2.334e+000	2.433e+000
2	1.517e+000	1.353e+000	1.707e+000	1.472e+000
3	1.111e+000	1.064e+000	1.204e+000	1.053e+000
4	8.604e-001	8.174e-001	9.649e-001	7.860e-001

Converse Consultants
Geotechnical Engineering
Environmental & Groundwater Science
Inspection & Testing Services

REVISED GEOTECHNICAL INVESTIGATION REPORT

NEW DIESEL TECHNOLOGY CENTER BUILDING

CITY OF SAN BERNARDINO, SAN BERNARDINO COUNTY, CALIFORNIA

CONVERSE PROJECT NO. 18-81-134-01

Prepared For:

SAN BERNARDINO CITY UNIFIED SCHOOL DISTRICT
Mr. Thomas Pace
Director of Facilities
956 West 9th Street
San Bernardino, CA 92411

Presented By:

CONVERSE CONSULTANTS
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September 26, 2018

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

September 26, 2018

Mr. Thomas Pace
Director of Facilities
San Bernardino City Unified School District
956 West 9th Street
San Bernardino, CA 92411

Subject: **REVISED GEOTECHNICAL INVESTIGATION REPORT**
NEW DIESEL TECHNOLOGY CENTER BUILDING
Northwest Corner of the Existing Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Converse Project No. 18-81-134-01

Dear Mr. Pace:

Converse Consultants (Converse) has prepared this revised report to present the results of our geotechnical investigation for the new diesel technology center building located at 1020 Pacific Street, northwest corner of the existing Pacific High School, City of San Bernardino, San Bernardino County, California. This revised report was prepared to address review comments presented in a letter dated August 23, 2018 by Dr. Erik K. Frost of the California Geological Survey (CGS). This report was prepared in accordance with our revised proposal dated March 12, 2018 and your Assignment of Project dated March 14, 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 San Bernardino City Unified School District (SBCUSD). 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/Regional Manager

Dist.: 4/Addressee
ZA/JB/SM/HSQ/kvg

PROFESSIONAL CERTIFICATION

This report has been prepared by the following professionals whose seals and signatures appear hereon.

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

Zahangir Alam, PhD, EIT
Senior Staff Engineer

Jay Burnham, GIT
Senior Staff Geologist

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

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 project site is located at the northwest corner of the Pacific High School, which has a street address of 1020 Pacific Street in the City of San Bernardino, San Bernardino County, California. The high school is bounded by Pacific Street to the south, Perris Hill Park Road to the west, open land to the north, and residential property to the east. Presently, a building exists within the footprint of the proposed new diesel technology center. The area surrounding the existing building is paved with asphalt concrete. The high school consists of multiple one- and two-story structures, tennis, baseball and basketball courts, a football field, and parking lots. The project site is relatively flat, with an elevation of approximately 1,138 feet above mean sea level (amsl). Perris Hill with as approximate elevation of 1,241 feet amsl is located approximately 200 feet east of the site. The coordinates for the project site are approximately 34.1306° north latitude and 117.2649° west longitude.

- An existing building will be demolished and a new building will be constructed to serve as a diesel technology center. The building will be roughly 100’ x 215’ (21,500 square feet), one-story, and will likely be constructed of masonry block with slab-on-grade. The structural loads are known at this time but are anticipated to be moderate. We anticipate that the project will include underground utilities, paved driveways and parking areas, and landscape areas.

- Our scope of work was developed based on CGS – Note 48 and included project set-up, subsurface exploration, laboratory testing, engineering analysis, and preparation of this report.

- Five exploratory borings (BH-01 through BH-05) were drilled on April 5 and 6, 2018 to investigate the subsurface conditions at the site. The borings were drilled to their planned maximum depths of 16.5 and 51.5 feet bgs.

- The subsurface soil at the project site consisted primarily of unconsolidated alluvial soils of sand, silty sand, and sandy silt layers. Based on hammer blow counts, the upper 10 feet soils are loose to medium dense. Relative compaction of the upper 10 feet of soils varies from 76 to 86 percent.

- Groundwater was not encountered in our exploratory borings to a maximum explored depth of 51.5 feet bgs. <u>Several of the referenced groundwater wells have</u>

been monitored for many decades and display a trend of long-term decline in local groundwater levels, likely due to groundwater pumping and development of the area. Considering regional development and sustained groundwater usage, groundwater levels are unlikely to return to the historically shallow levels. Current groundwater is generally expected to be deeper than 50 feet bgs and the historical high groundwater is approximately 38 feet bgs. Based on the current groundwater condition, dewatering is not expected to be required during construction of the building. It should be noted that the groundwater level could vary depending upon the seasonal precipitation and possible groundwater pumping activity in the site vicinity. Shallow perched groundwater may be present locally, particularly following precipitation.

- The site is not located within a San Bernardino 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 groundwater condition (deeper than 50 feet bgs). For the historical groundwater condition, the site has a liquefaction induced settlement potential of up to 0.93 inches.

- Based on the flat nature of the proposed site configuration and low potential for liquefaction, lateral spreading is not considered a risk. The risk for lateral spreading, landsliding, seiches, tsunamis, and earthquake-induced flooding is considered to be low.

- The expansion index (EI) of sample tested was 1, corresponding to very low expansion potential. The collapse potential of the tested soils from the site is 0.6 percent, indicating slight collapse potential.

- The sulfate and chloride contents of soil samples tested correspond to American Concrete Institute (ACI) exposure category S0 and C1, respectively. Design recommendations for these categories are provided in the text of this report.

- The measured value of the minimum electrical resistivity when saturated was 6,400 Ohm-cm for the site. This indicates that the tested site soils are moderately 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 site should be cleared of all vegetation (if any) and debris. The existing building located at the site of the proposed new diesel technology center building will need to be demolished. All materials resulting from

clearing, grubbing, and demolition operations including foundation should be removed from the site.

- Based on our subsurface exploration, we anticipate that the site soils will be excavatable with conventional heavy-duty earth moving equipment.

- Excavated onsite earth materials cleared of deleterious matter can be moisture conditioned and re-used as compacted fill.

- Footings and slab should be placed on at least 24 inches of compacted fill. The change in depth of the overexcavation below the footings and slabs-on-grade should be transitioned by a gradual slope. The overexcavation should extend to at least 2 feet beyond the footprint of the footings and slab.

- 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 1 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 1,800 psf.

- The total settlement of shallow footings from static structural loads and short-term settlement of properly compacted fill is anticipated to be 1 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 6.6 inches of dry seismic settlement with up to 0.93 inches of liquefaction induced settlement during a large earthquake. The soil profile for borings BH-02 and BH-04 is almost similar. So, we anticipate that the total settlement will be uniform. We recommend that the planned structure be designed conservatively in anticipation of dynamic differential settlement of 0.7 inches in 40 horizontal feet. The static and dynamic settlement estimates should <u>not</u> be combined for design purposes.

- 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 new diesel technology center provided the recommendations presented in this geotechnical investigation report are considered 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 diesel technology center project located at 1020 Pacific Street, northwest corner of the existing Pacific High School in the City of San Bernardino, San Bernardino County, California. The approximate location of the site is shown on Figure No. 1, Approximate Site 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 site earthwork, and design and construction of foundations for the proposed building.

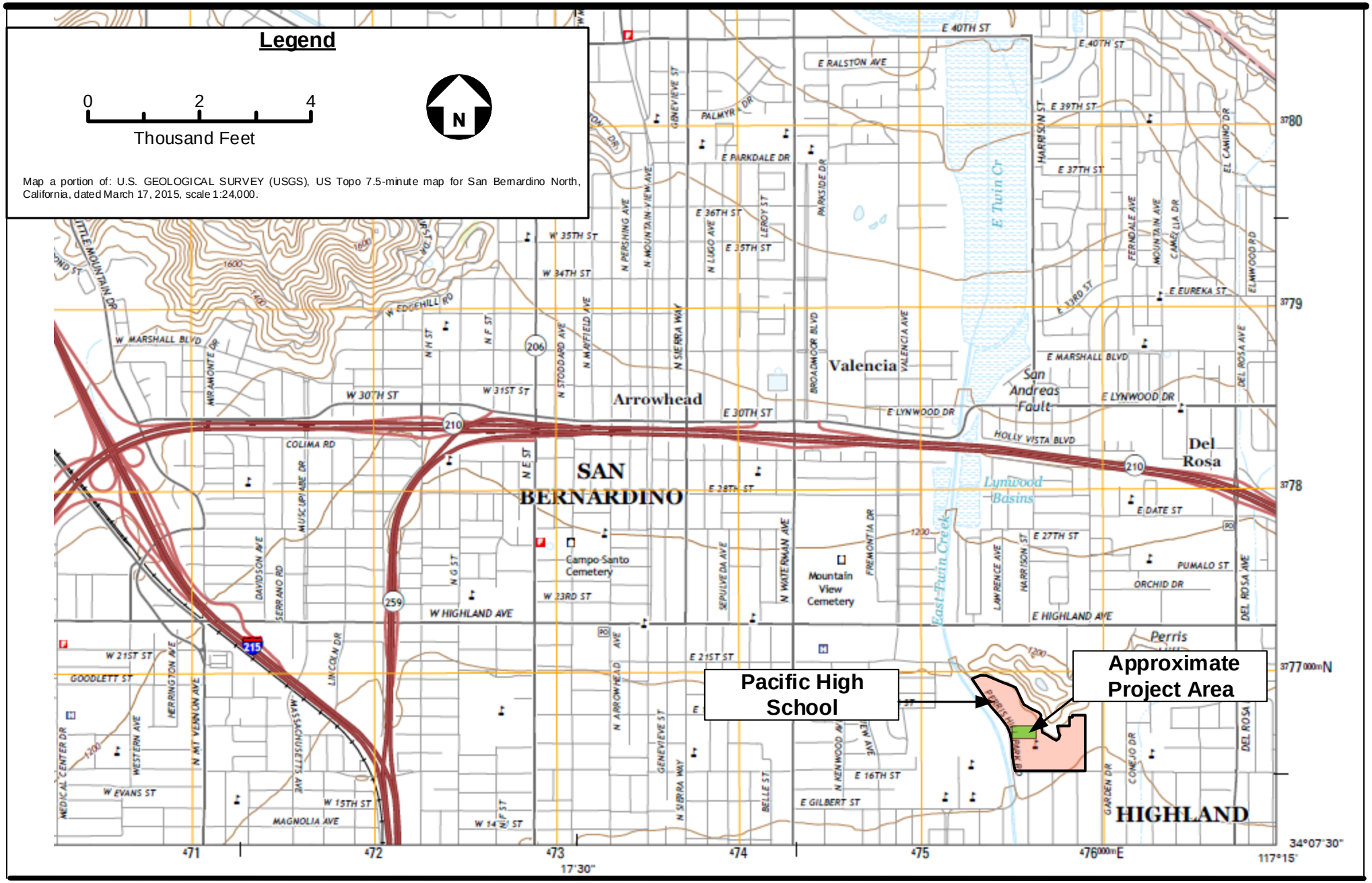
This report is prepared for the project described herein and is intended for use solely by San Bernardino City Unified School District (SBCUSD) and their authorized agents for design purposes. It should not be used as a bidding document but may be made available to the potential contractors for information 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

An existing building will be demolished and a new building will be constructed to serve as a diesel technology center. The building will be roughly 100’ x 215’ (21,500 square feet), one-story, and will likely be constructed of masonry block with slab-on-grade. The structural loads are known at this time but are anticipated to be moderate. We anticipate that the project will include underground utilities, paved driveways and parking areas, and landscape areas.

3.0 SITE DESCRIPTION

The project site is located at the northwest corner of the Pacific High School, which has a street address of 1020 Pacific Street in the City of San Bernardino, San Bernardino County, California. There is a one-story existing building in the area of the proposed new building. The approximately 50’ x 236’ existing building is currently used as workshop. The area surrounding the existing building is paved with asphalt concrete. Photographs 1 and 2 depict the present site conditions.



Project: New Diesel Technology Center Building
Location: Northwest Corner of the Existing Pacific High School
1020 Pacific Street
City of Moreno Valley, Riverside County, California
Client: San Bernardino City Unified School District

Approximate Site Location Map

Project No
18-81-134-01

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FIGURE
1

Photograph 1: Site conditions at the existing building facing northeast.

Photograph 2: Site conditions at the existing building facing east.

The Pacific high school is bounded by Pacific Street to the south, Perris Hill Park Road to the west, open land to the north, and residential property to the east. The high school consists of multiple one- and two-story structures, tennis, baseball and basketball courts, a football field, and parking lots.

The project site is relatively flat, with an elevation of approximately 1,138 feet above mean sea level (amsl). Perris Hill, with as approximate elevation of 1,241 feet amsl, is located approximately 200 feet east of the site. The coordinates for the project site are approximately 34.1306° north latitude and 117.2649° west longitude.

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.
- 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.
- Met with representative from SBCUSD to clear boring locations from known underground utilities.
- Engaged California licensed driller to drill exploratory borings.

4.2 Subsurface Exploration

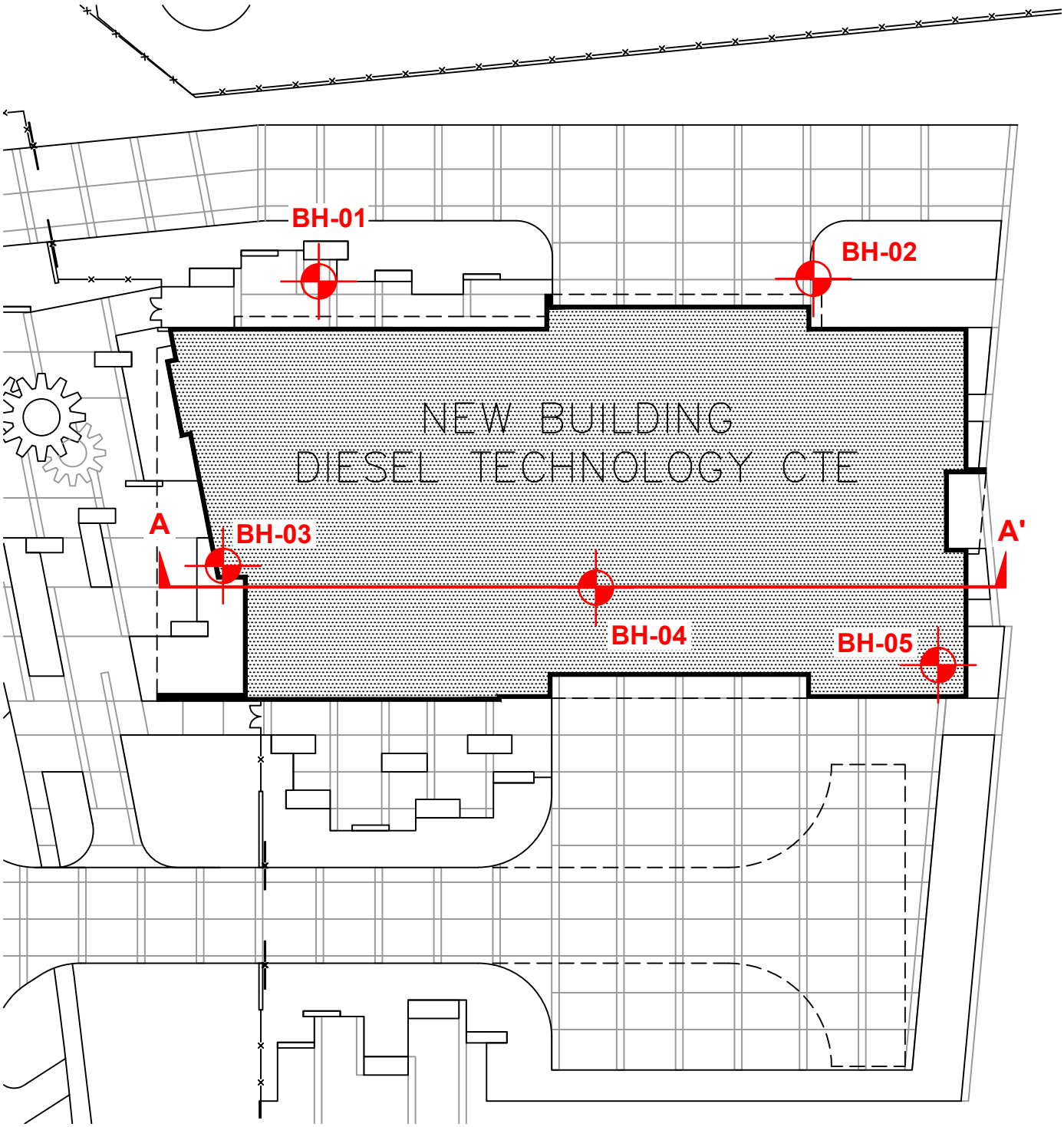
Five exploratory borings (BH-01 through BH-05) were drilled on April 5 and 6, 2018 to investigate the subsurface conditions at the site. The borings were drilled to their planned maximum depths of 16.5 and 51.5 feet bgs.

The approximate locations of the borings are shown on Figure No. 2, *Site Plan and Approximate Boring 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)
- Expansion index (ASTM Standard D4829)
- Soil Corrosivity (California Test 643, 422, and 417)
- Collapse Potential (ASTM Standard D5333)
- Grain Size Distribution (ASTM Standard C136)
- Maximum Dry Density and Optimum Moisture Content Relationship (ASTM Standard D1557)



LEGEND

APPROXIMATE LOCATION OF BORING

GEOLOGIC CROSS SECTION

N

0 40 80

APPROXIMATE SCALE IN FEET

SITE PLAN AND APPROXIMATE BORING LOCATIONS MAP

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New Diesel Technology Center Building
Northwest Corner of the Existing Pacific High School
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Project No.	Figure No.
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- 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 project.

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

The surface around the existing building was paved with asphalt concrete. The measured thicknesses of asphalt concrete are presented in the following table.

Table No. 1, Existing Pavement Sections

Boring No.	Depth (ft)	Asphalt Concrete Thickness (in.)	Aggregate Base Thickness (in.)
BH-01	16.5	4.0	0.0
BH-02	51.5	4.0	0.0
BH-03	16.5	4.0	0.0
BH-04	51.5	4.0	0.0
BH-05	16.5	5.0	0.0

5.2 Subsurface Profile

Based on the exploratory borings and laboratory test results, the upper 50 feet of subsurface soil at the project site consisted primarily of unconsolidated alluvial soils including layers of sand, silty sand, and sandy silt. Based on hammer blow counts, the upper 10 feet of soils are loose to medium dense. Relative compaction of the upper 10 feet of soils varies from 76 to 86 percent.

For a detailed description of the subsurface materials encountered in the exploratory borings, see Drawings No. A-2 through A-6, Logs of Borings, in Appendix A, Field Exploration.

Fill soils were not identified in our subsurface exploration; however, the site has been previously graded for the existing building and fill soil may be 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.

Figures No. 3a and 3b, *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.*

5.3 Groundwater

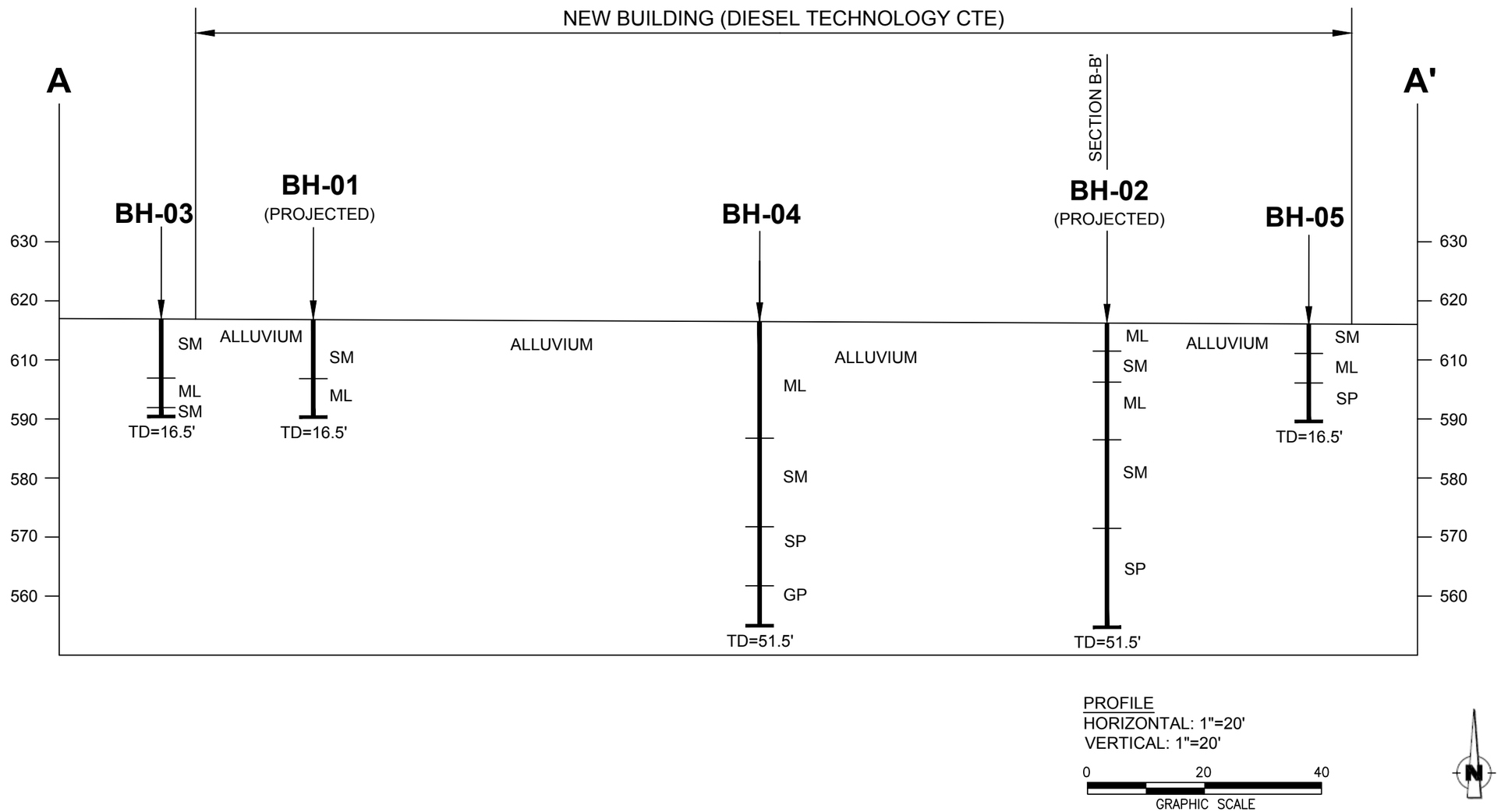
Groundwater was not encountered during the field at depths of up to approximately 51.5 feet bgs. Regional databases were reviewed to estimate expected groundwater conditions at the project site. The following data was found on the GeoTracker website (SWRCB, 2018).

- SAN BERNARDINO COUNTY MEDICAL CENTER (Site No. T0607100621), located approximately 2,000 feet southwest of the project site, reported groundwater at depths ranging from 170 to 195 feet bgs in 2001.
- MOBIL #18-ELG (Site No. T0607100426), located approximately 1 mile southwest of the project site reported groundwater at a depth of 150.5 feet bgs in 2006.
- SHELL SERVICE STATION (Site No. T0607101303), located approximately 1.2 miles northeast of the project site, reported groundwater at depths ranging from 200 to 250 feet bgs in 2004.

Data in the following table was found on the National Water Information System (USGS, 2018a). Due to the number of site with available data in the project area, site closest to the proposed site were selected.

Table No. 2, Summary of USGS Groundwater Depth Data

Site No.	Location	Groundwater Depth Range(ft. bgs)	Date Range
340743117162001	400 feet east of 16th St and Crestview Ave.	(5*)-253.72	1904-2008
340801117162101	Northeast of E. 20th St. and Crestview Ave.	198	1971
340815117154301	North of E. 23rd St. and N Newport Ave.	38-81	1915-1949
340811117151601	Northeast of E. Highland Ave. and Mountain Ave.	59	1947



GEOLOGIC CROSS SECTION A-A'

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New Diesel Technology Center Building
Northwest Corner of the Existing Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
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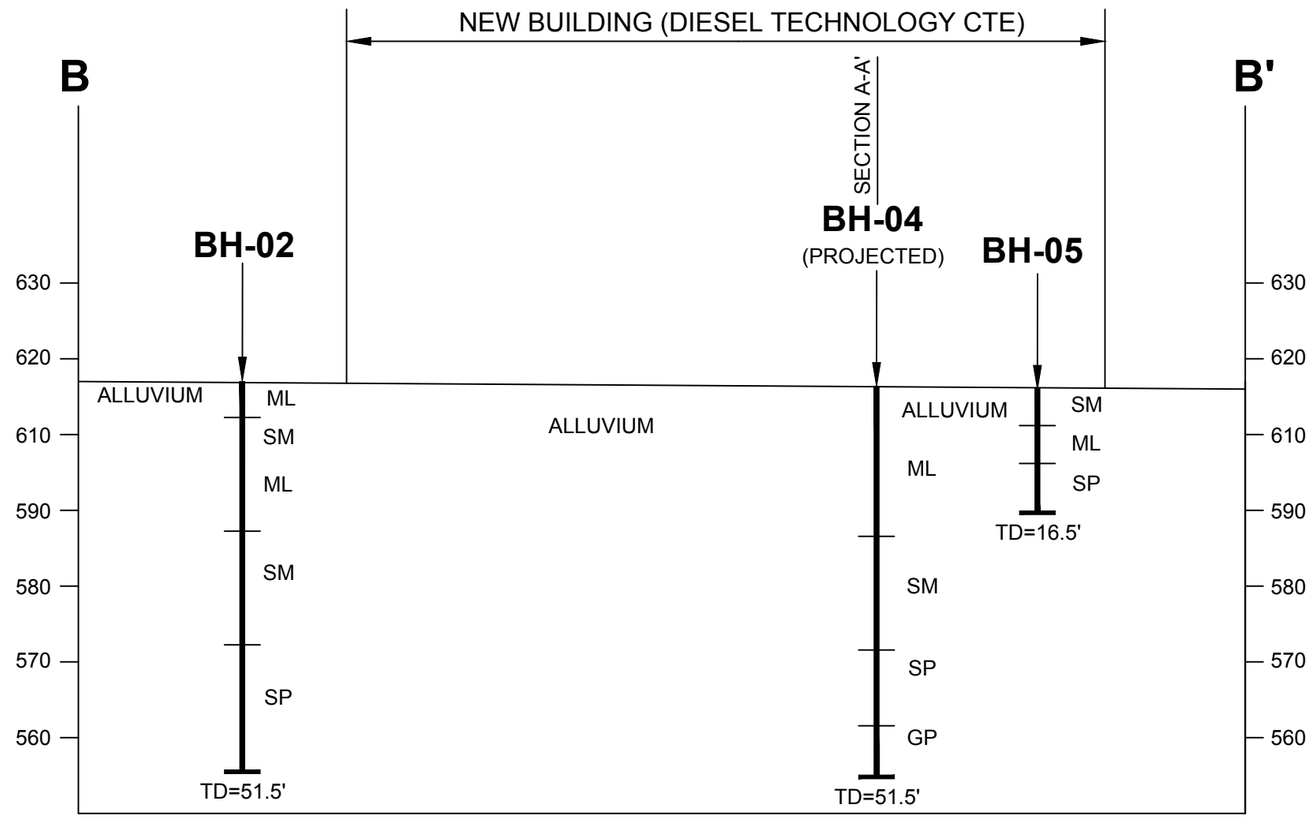
Project No.	Figure No.
18-81-134-01	3a



PROFILE
HORIZONTAL: 1"=20'
VERTICAL: 1"=20'

0 20 40
GRAPHIC SCALE

N

GEOLOGIC CROSS SECTION B-B'

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New Diesel Technology Center Building
Northwest Corner of the Existing Pacific High School
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Figure No. 3b

Site No.	Location	Groundwater Depth Range(ft. bgs)	Date Range
340807117162401	Southwest of E. Highland Ave. and Valencia Ave.	218	1970
340737117163801	East of E. Gilbert St. and N. Waterman Ave.	226	1970
340820117164001	North of N. Waterman Ave. and E. 23rd St.	110.3-265	1949-1967
340823117154301	100 feet east of 26th St. and Alameda Ave.	98	1950
340825117155601	Southwest of E. 27th St. and Lawrence Ave.	72-120	1927-1943
340810117162301	300 feet west of E Highland Ave. and Valencia Ave.	42-59	1910-1916

*Based on review of historical groundwater data in the wells listed above, it has been determined that the high groundwater level of -5 feet BGS is doubtful, and therefore, Site No. 340743117162001 has been removed from consideration of the highest historical groundwater level.

Several of the referenced groundwater wells have been monitored for many decades and display a trend of long-term decline in local groundwater levels, likely due to groundwater pumping and development of the area. Considering regional development and sustained groundwater usage, groundwater levels are unlikely to return to the historically shallow levels.

Current groundwater is generally expected to be deeper than 50 feet BGS. The historical high groundwater level was approximately 38 feet bgs. Based on the current and historical groundwater conditions, dewatering is not expected to be required during construction of the building. It should be noted that the groundwater level could vary depending upon the seasonal precipitation and possible groundwater pumping activity in the site vicinity. Shallow perched groundwater may be present locally, particularly following precipitation.

5.4 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.

5.5 Excavatability

The surface and subsurface soil materials for the proposed development 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.

5.6 Flooding

The site is located in an area with reduced flood risk due to levee (FEMA, 2008). The levee is located along the channel west of the campus that runs north-south. The site is located within flood Zone X (500-year flood plain) identified by San Bernardino County (San Bernardino County, 2010a). 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.

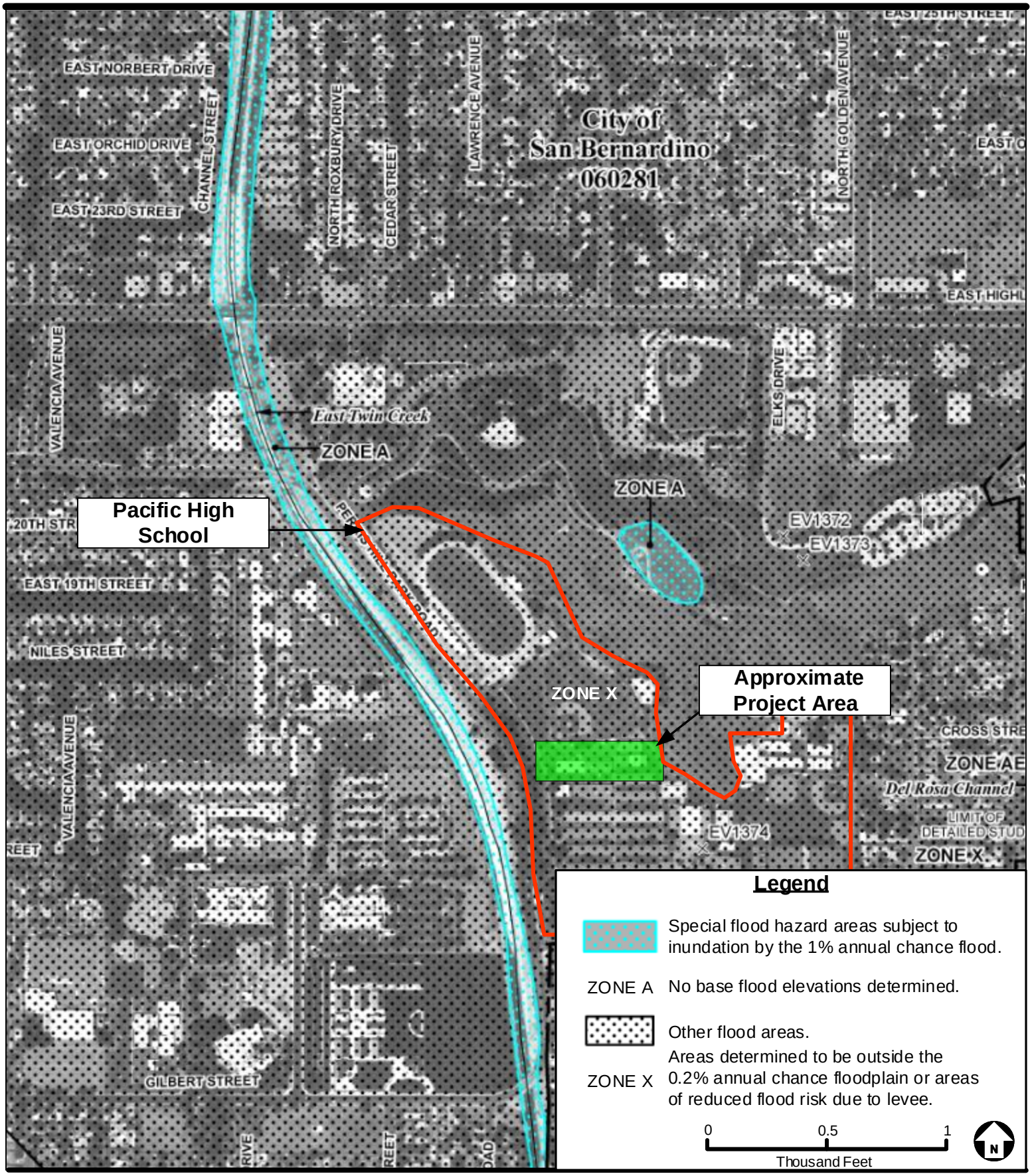
The province is a seismically active region characterized by a series of northwest-trending strike-slip faults. The most prominent of the nearby fault zones include the San Jacinto, San Andreas, and Cucamonga Fault Zones, all of which have been known to be active during Quaternary time.

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.

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

6.2 Site Geology

The project site is situated at the foot of Perris Hill near the central portion of the San Bernardino Valley, which is bounded by the San Bernardino Mountains and the San Andreas fault to the north, and the San Timoteo Badlands and the San Jacinto fault to the south.



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1020 Pacific Street
City of Moreno Valley, Riverside County, California
Client: San Bernardino City Unified School District

FEMA Flood Hazard Map

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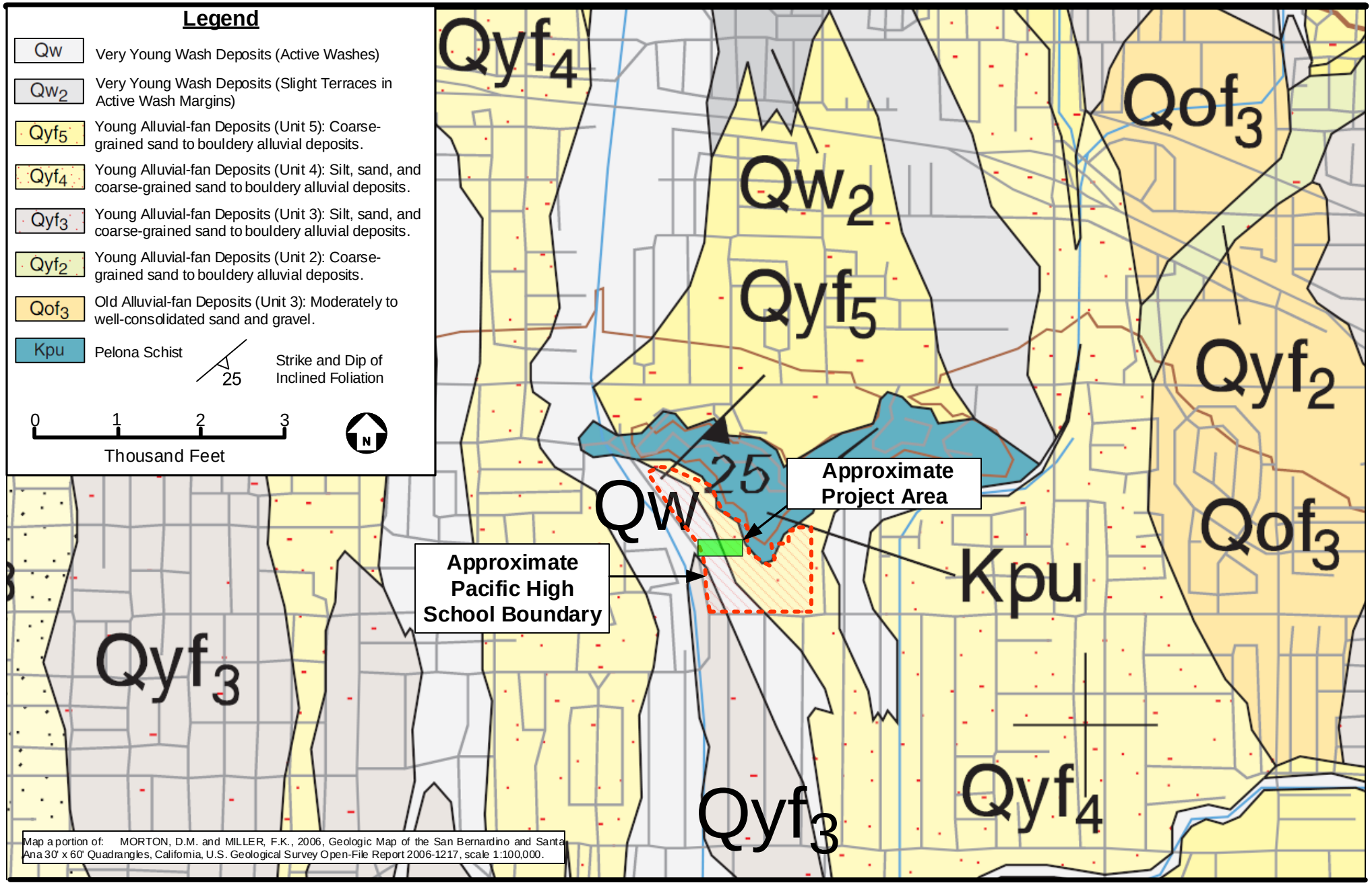
FIGURE
4



Project: New Diesel Technology Center Building
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1020 Pacific Street
City of Moreno Valley, Riverside County, California
Client: San Bernardino City Unified School District

Regional Geologic Map

Project No
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FIGURE
5

Perris Hill, which bounds the school to the north and is located roughly 200 feet east-northeast of the project area is comprised of the Pelona Schist. The Pelona Schist is a mica schist metamorphosed from petroliths of sedimentary and pyroclastic rocks (Dibblee and Minch, 2004). Foliation in the Pelona Schist generally dips 15 to 30 degrees to the south to southeast.Based on the proximity of Perris Hill to the project site, the Pelona Schist is likely located below the site at an unknown depth. The maximum elevation of Perris Hill is approximately 1,300 feet, nearly 170 feet higher than the project site.

The project site is underlain by active stream channel and alluvial fan deposits primarily consisting of unconsolidated sand and gravel. Cretaceous-aged schist bedrock outcrops approximately 500 feet north of the project site and likely underlies the site at depth. (Dibblee and Minch, 2004; Morton and Miller, 2006).

7.0 FAULTING AND SEISMICITY

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

7.1 Faulting

The site is not located within a San Bernardino County or State of California Earthquake Fault Zone (San Bernardino, 2010b; CGS, 1974). There are no known active faults projecting toward or extending across the project site. See Figure No. 6, *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. 3, Seismic Characteristics of Nearby Active Faults

Fault Name	Approximate Distance miles (km)	Moment Magnitude (Mw)
San Andreas - Southern	2.1 (3.4)	7.4
San Andreas - San Bernardino	2.1 (3.4)	7.5
San Jacinto-San Bernardino	5.1 (8.2)	6.7
San Jacinto-San Jacinto Valley	8.2 (13.2)	6.9
Cleghorn	10.1 (16.3)	6.5

MAP EXPLANATION

Potentially Active Faults

Faults considered to have been active during Quaternary time, solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed, query (?) indicates additional uncertainty Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by creep or possible creep

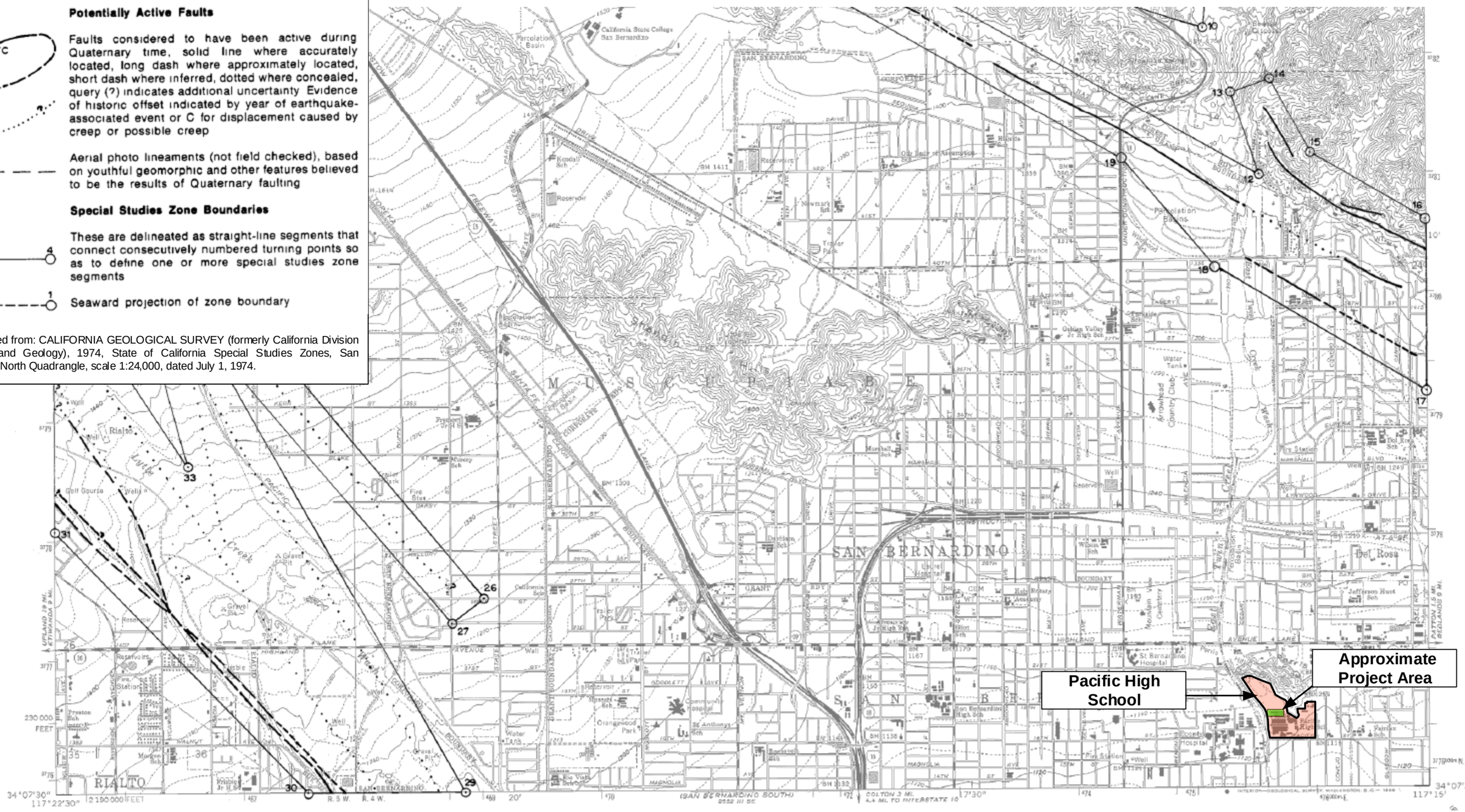
Aerial photo lineaments (not field checked), based on youthful geomorphic and other features believed to be the results of Quaternary faulting

Special Studies Zone Boundaries

These are delineated as straight-line segments that connect consecutively numbered turning points so as to define one or more special studies zone segments

Seaward projection of zone boundary

Map adapted from: CALIFORNIA GEOLOGICAL SURVEY (formerly California Division of Mines and Geology), 1974, State of California Special Studies Zones, San Bernardino North Quadrangle, scale 1:24,000, dated July 1, 1974.



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1020 Pacific Street
City of Moreno Valley, Riverside County, California
Client: San Bernardino City Unified School District

Fault Hazard Map

Project No
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Converse Consultants

FIGURE
6

Fault Name	Approximate Distance miles (km)	Moment Magnitude (Mw)
North Frontal Fault Zone (West)	10.7 (17.3)	7.2
Cucamonga	11.6 (18.6)	6.9
San Andreas – Mojave	19.7 (31.7)	7.4
San Andreas - 1857 Rupture	19.7 (31.7)	7.8
San Jose	24.7 (39.8)	6.4
Sierra Madre	26.3 (42.3)	7.2
Chino-Central Ave. (Elsinore)	27.2 (43.8)	6.7
North Frontal Fault Zone (East)	27.9 (44.9)	6.7
Helendale - S. Lockhardt	28.0 (45.0)	7.3
Elsinore-Glen Ivy	28.5 (45.8)	6.8
Whittier	28.6 (46.1)	6.8
Pinto Mountain	31.5 (50.7)	7.2
San Jacinto-Anza	33.6 (54.1)	7.2
Elsinore-Temecula	34.1 (54.8)	6.8
Clamshell-Sawpit	35.4 (57.0)	6.5
Elysian Park Thrust	36.0 (57.9)	6.7
Lenwood-Lockhart-Old Woman Sprgs	39.1 (62.9)	7.5
Raymond	42.7 (68.7)	6.5
Johnson Valley (Northern)	43.2 (69.5)	6.7
Compton Thrust	47.0 (75.7)	6.8
Verdugo	47.5 (76.5)	6.9
San Andreas - Coachella	47.8 (76.9)	7.2
Landers	48.1 (77.4)	7.3
Burnt Mtn.	49.2 (79.2)	6.5
Eureka Peak	49.8 (80.2)	6.4
Emerson So. - Copper Mtn.	50.0 (80.5)	7.0
Newport-Inglewood (L.A.Basin)	52.3 (84.2)	7.1
Newport-Inglewood (Offshore)	52.6 (84.6)	7.1
Elsinore-Julian	54.1 (87.0)	7.1
Gravel Hills - Harper Lake	55.0 (88.5)	7.1
Hollywood	55.3 (89.0)	6.4
Calico - Hidalgo	56.0 (90.2)	7.3
San Gabriel	59.5 (95.8)	7.2
Sierra Madre (San Fernando)	60.1 (96.7)	6.7
Pisgah-Bullion Mtn.-Mesquite Lk	61.1 (98.3)	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 91 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. Three earthquakes producing estimated ground accelerations at the site ranging from 0.233 g

to 0.269 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 14 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 USGS 2008 California Gridded Source, with an MCE of Mw 7.0 and a deterministic peak ground acceleration (PGA) of 0.99g.

In accordance with ASCE 7-10, Section 21.2 the site-specific response spectra can be taken as the lesser of the probabilistic maximum rotated component of MCE ground motion and the 84th percentile of deterministic maximum rotated component of 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. 4, 2016 CBC Mapped Acceleration Parameters

Parameter	Value	Parameter	Value
Site Class	D	**Seismic Design Category**	IV
S_s	2.110	**C_{RS}**	1.007
S_1	1.027	**C_{R1}**	0.965
F_a	1	**0.08 F_v/F_a**	0.120
F_v	1.5	**0.4 F_v/F_a**	0.600
S_{MS}	2.110	**T_0**	0.146
S_{M1}	1.541	**T_S**	0.730
S_{DS}	1.407	**T_L**	8
S_{D1}	1.027		

A site-specific response analysis, using faults within 100 kilometers of the site, was developed using the computer program EZ-FRISK v. 7.65 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)

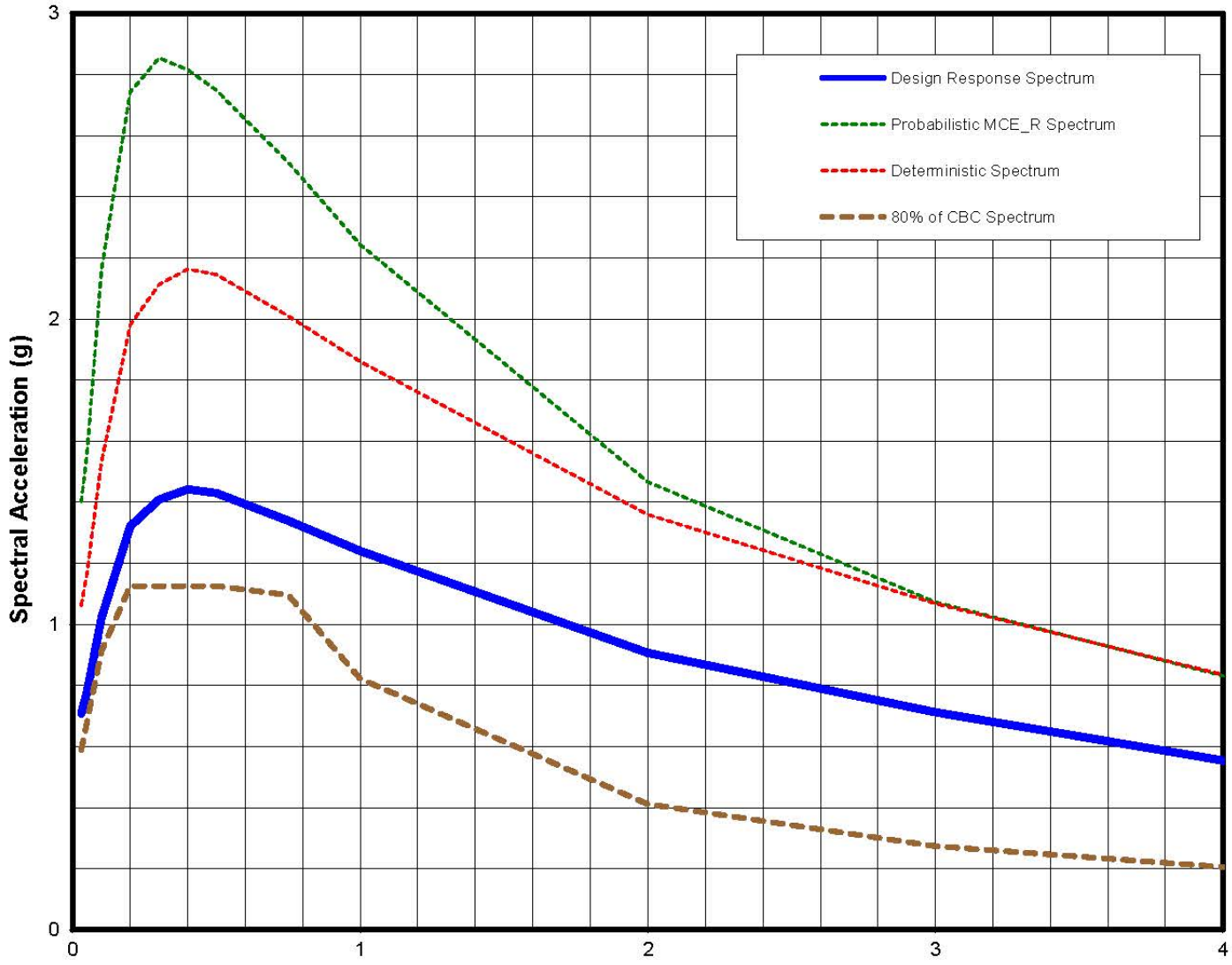
were used in the analysis. These attenuation relationships are based on Next Generation Attenuation (NGA) project model. Maximum rotated components were determined using Huang (2008) method. An average shear wave velocity at upper 30 meters of soil profile (V_{s30}) of 270 meters per second, depth to 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 3,000 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. 5, Probabilistic Response Spectrum Data

Attenuation Relationship	Probabilistic Mean	Boore-Atkinson (2008)	Campbell-Bozorgnia (2008)	Chiou-Youngs (2007)
Peak Ground Acceleration (g)	1.303	1.237	1.173	1.468
Spectral Period (sec)	**2% in 50yr Probabilistic Spectral Acceleration (g)**			
0.03	1.391	1.336	1.224	1.576
0.05	1.549	1.470	1.368	1.768
0.10	2.145	2.166	1.826	2.352
0.20	2.723	2.739	2.326	3.042
0.30	2.849	2.929	2.392	3.160
0.40	2.825	2.956	2.411	3.057
0.50	2.773	2.926	2.495	2.879
0.75	2.569	2.690	2.431	2.585
1.00	2.324	2.184	2.336	2.435
2.00	1.519	1.355	1.709	1.474
3.00	1.112	1.065	1.205	1.054
4.00	0.861	0.818	0.966	0.787

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.



SITE SPECIFIC DESIGN RESPONSE SPECTRUM

Project: New Diesel Technology Center Building
Location: Northwest Corner of Existing Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Client: For: San Bernardino City Unified School District

Project Number:

18-81-134-01

Converse Consultants

Figure No.

7

Table No. 6, 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 CBC Lower Level, (g)	Site Specific MCE_R Spectral Acceleration (g)	80% CBC Design Response Spectrum	Site Specific Design Spectral Acceleration (g)
0.03	1.391	1.007	1.401	1.062	0.225	1.062	0.589	0.71
0.05	1.549	1.007	1.560	1.169	0.375	1.169	0.681	0.78
0.10	2.145	1.007	2.160	1.531	0.750	1.531	0.913	1.02
0.20	2.723	1.007	2.742	1.981	1.500	1.981	1.125	1.32
0.30	2.849	1.002	2.854	2.112	1.500	2.112	1.125	1.41
0.40	2.825	0.997	2.815	2.163	1.500	2.163	1.125	1.44
0.50	2.773	0.991	2.749	2.145	1.500	2.145	1.125	1.43
0.75	2.569	0.978	2.513	2.009	1.200	2.009	1.095	1.34
1.00	2.324	0.965	2.243	1.860	0.900	1.860	0.822	1.24
2.00	1.519	0.965	1.466	1.359	0.450	1.359	0.411	0.91
3.00	1.112	0.965	1.073	1.068	0.300	1.068	0.274	0.71
4.00	0.861	0.965	0.831	0.835	0.225	0.831	0.205	0.55

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.

Table No. 7, 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}	1.981	1.688
Site-Specific1-second period Spectral Response Acceleration, S_{M1}	2.718	1.232
Site-Specific Design Spectral Response Acceleration for short period S_{DS}	1.321	1.125
Site-Specific Design Spectral Response Acceleration for 1-second period, S_{D1}	1.812	0.822

The EZ-FRISK output files have been included in Appendix D*, EZ-FRISK Output Files* at the end of this report.

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 San Bernardino County or State of California Earthquake Fault Zone (San Bernardino, 2010b; CGS, 1974). Based on review of available geologic information, no major surface fault crosses through or extends towards the site (Morton and Miller, 2006). 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.

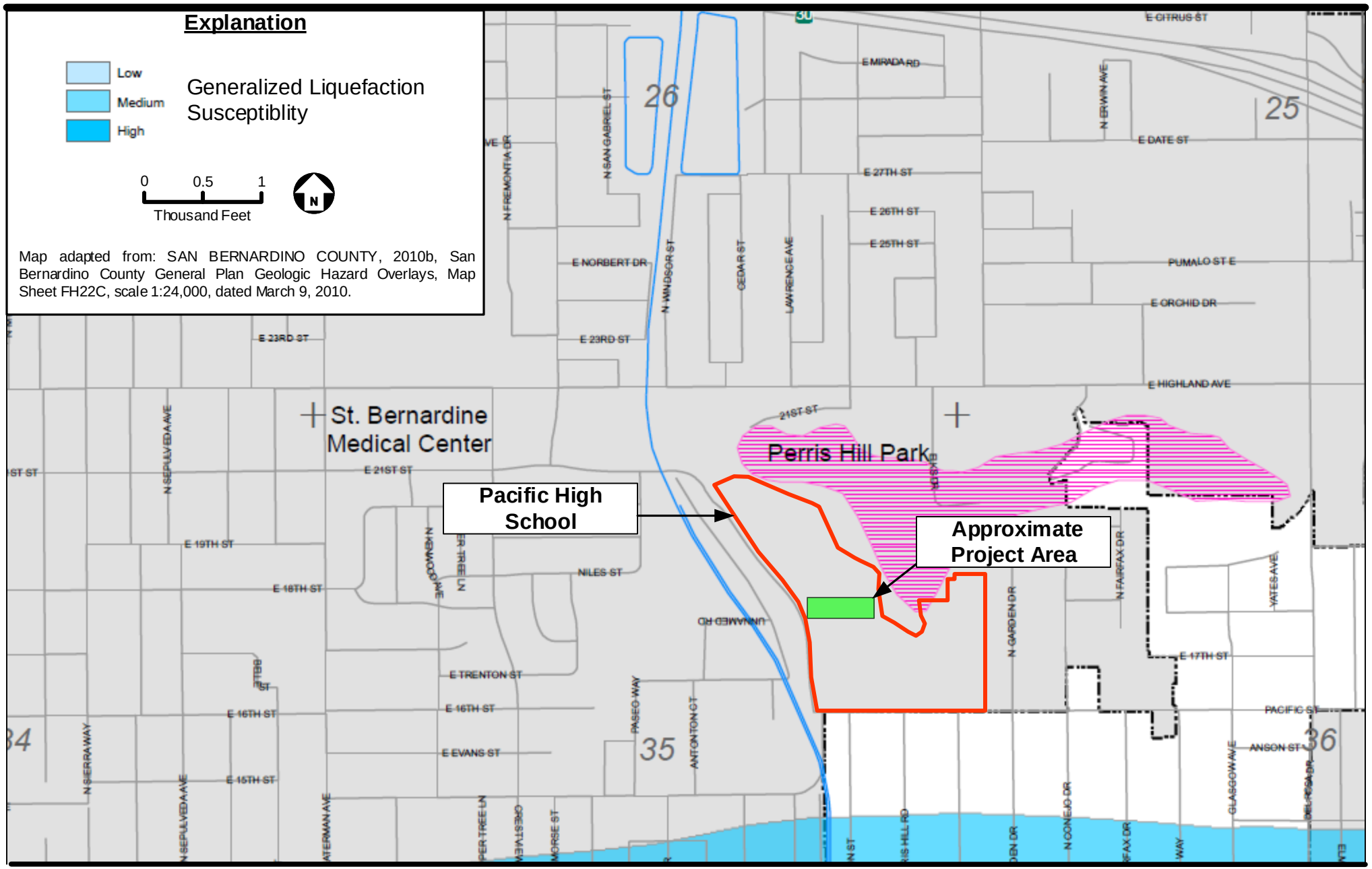
Soil liquefaction generally occurs in submerged granular soils and non-plastic silts during or after strong ground shaking. There are several general requirements for liquefaction to occur. They are as follows.

- 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 not located in an area designated by San Bernardino County as susceptible to liquefaction (San Bernardino County, 2010b). See Figure 8, *San Bernardino County Liquefaction Hazard Map* for more details.

The current groundwater depth is greater than 50 feet bgs and historical groundwater depth was at 38 feet bgs. According to CBC Section 1803A.7, historical high groundwater level should be considered for liquefaction evaluation. Based on a site-specific liquefaction analysis presented in Appendix C, *Dynamic Settlement Analyses*, liquefaction potential at the project site is up to 0.93 inches under the historical groundwater condition, whereas liquefaction potential for the current groundwater condition is negligible.

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, *Dynamic Settlement Analyses*, we estimate that the site will have the



Project: New Diesel Technology Center Building
Location: Northwest Corner of the Existing Pacific High School
1020 Pacific Street
City of Moreno Valley, Riverside County, California
Client: San Bernardino City Unified School District

San Bernardino County Liquefaction Hazard Map

Project No
18-81-134-01

Converse Consultants

FIGURE
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potential for up to approximately 6.6 and 6.0 inches of total dry seismic settlement under current and historic groundwater condition, respectively.

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 low potential for liquefaction, the potential for lateral spreading is also considered low.

Landslides: Seismically induced landslides and other slope failures are common occurrences during or soon after earthquakes. Perris Hill, which is adjacent to Pacific High School, is designated by San Bernardino County as moderately to highly susceptible to landsliding.

The toe of the closest flank of Perris Hill is located approximately 225 feet east of the proposed building. The average slope ratio of the closest flank is approximately 4H:1V (horizontal:vertical). The height of the closest slope is approximately 40 feet. The hill ascends further to the north approximately 120 feet in height with an average slope ratio of 5H:1V.

Based on review of geologic mapping (Dibblee and Minch, 2004), foliation within the Pelona Schist that comprises Perris Hill dips between 12 and 35 degrees south to southeast, away from the proposed new building. Since the building is west to southwest of the hill, it is lateral to the predominant failure direction. Furthermore, a failure surface dipping 15 to 30 degrees out of slope on a 4:1 slope will not daylight and is unlikely to produce a major slope failure.

Due to the distance from Perris Hill, height of Perris Hill in the vicinity of the site, strike and dip of foliation in the Pelona Schist, overall relief, landsliding on Perris Hill is not expected to affect the proposed building. Due to the relatively flat nature of the site, the potential for on-site 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. Seiching could potentially occur in the channel located west of the campus or in swimming pools.

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 (San Bernardino County, 2010a). 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.

8.0 LABORATORY TEST RESULTS

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.

8.1 Physical Testing

The results of laboratory tests on samples obtained from the site is presented below.

- *In-situ* Moisture and Dry Density – Results of *in-situ* moisture and dry density tests performed in accordance with ASTM Standard D2216 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 97 to 109 pcf with moisture contents ranging from 6 to 15 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 soils was tested to evaluate the expansion potential in accordance with ASTM Standard D4829. The test result showed an EI of 1, indicating very low expansion potential.
- Collapse Potential – One relatively undisturbed representative sample collected from the upper 5 feet soil was 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 result showed collapse potential of 0.6 percent, indicating slight collapse potential.
- Grain Size Analysis – Three representative samples were tested to determine the relative grain size distribution in accordance with the ASTM Standard D422. The test results are graphically presented in Drawing No. B-1, *Grain Size Distribution Results.* Based on the results, the predominating soil types are silty sand and sandy silt.
- Maximum Dry Density and Optimum Moisture Content – Results of one typical moisture-density relationship tested in accordance with ASTM D1557 is presented in Drawing No. B-2, *Moisture-Density Relationship Result*, in Appendix B, *Laboratory Testing Program*. The laboratory maximum dry density was 127.0 pounds per cubic foot (pcf) and the optimum moisture content was 10.5 percent.
- Direct Shear – Two direct shear tests were performed in accordance with ASTM Standard D3080 on relatively undisturbed ring samples. The results of the direct shear tests are presented in Drawings No. B-3 and B-4, *Direct Shear Test Results* in Appendix B, *Laboratory Testing Program*.
- Consolidation Test – Two consolidation tests were performed on relatively undisturbed samples of the site soil, in accordance to ASTM Standard D2435. The test results are shown on Drawings No. B-5 and B-6, *Consolidation Test Results,* 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 HDR, Inc. (Claremont, CA) in accordance with California Test Methods 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 8.3.
- The sulfate content of the sample was 0.001 percent by weight.
- The chloride concentration of the samples was 2.3 ppm.
- The minimum electrical resistivity when saturated was 6,400 ohm-cm.

9.0 EARTHWORK RECOMMENDATIONS

Recommendations for ground improvement, site preparation, 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 proposed development. 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 structures will be constructed at or near grade. The earthwork for the structures based on the anticipated shallow foundations will consist of remedial grading, fill placement, and facility utility connection backfill.

Prior to the start of any earthwork, the site of the proposed building should be cleared of all vegetation (if any) and debris. The existing building will need to be demolished. All materials resulting from clearing, grubbing, and demolition operations 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 Ground Improvement

The Seismic Hazards Mapping Act and related regulations establish a statewide minimum public safety standard for mitigation of earthquake hazards. The minimum level of mitigations for a project should reduce the risk of failure during an earthquake to a level that does not cause the collapse of buildings for human occupancy, but in most cases, not to a level of no ground failure at all. However, nothing in the Act, the regulations, or available (design) guidelines precludes the authority having jurisdiction over the project from enacting more stringent requirements, requiring a higher level of performance (State of California, 2008). The ultimate decision to approve the project is the responsibility of the authority having jurisdiction over the project.

The site is potentially subject to 7.0 inches of dry seismic settlement with 0.95 inches of liquefaction-induced ground settlement, as discussed in Section 10.6, *Settlement* and Appendix C, *Dynamic Settlement Analysis*. Ground improvement may be performed to reduce the ground settlement at the project site in order to facilitate the support of the proposed building on shallow regular and stiffened foundation systems. Several options are summarized in the following subsections.

9.2.1 Stone Columns

Stone columns are generally utilized for improving soft silts and clays and loose silty sands. Stone columns increase soil's bearing capacity and shear resistance, reduce settlements and liquefaction potential, and increase the time-rate of consolidation. The stone column ground improvement technique creates dense aggregate columns using a crane-suspended downhole vibrator in order to reinforce subsurface soils and densify granular soils. The stone columns are constructed with either the wet top feed process, or the dry bottom feed process. Generally, the spacing of stone columns is between 6 and 10 feet, with centers arranged on a triangular or square pattern.

9.2.2 Micropiles

Micropiles are often utilized to stabilize soft ground to transfer structural load to competent bearing strata. Micropiles are usually 3 to 10 inches in diameter that can extend up to a depth of 200 feet. Micropiles can be used in nearly any subsurface as it can be installed with drilling equipment and can be combined with different grouting techniques to create the bearing element.

9.2.3 Post-tensioned Slab

Post-tensioned slabs are used to reduce the impact of differential settlement and to mitigate seismic effects. Design recommendations for post tensioned slab are presented in Section 10.5 *Post-tensioned Slabs*.

9.2.4 Recommended Ground Improvement

Converse consulted with Mr. Thang Nguyen of Hayward-Baker Geotechnical Construction regarding feasible alternatives for ground improvement based on the known site conditions. According to Hayward-Baker, all above methods are suitable to improve ground for the subject site.

9.2.5 Preliminary Specifications

Ground improvement (stone columns and micropiles) should extend at least 5 feet beyond the proposed building footprint on all four sides. The depth ground improvement should be at least 30 feet below existing ground surface (bgs).

Specialty contractor (i.e. hayward baker) should be selected to perform ground improvement for the site.

9.2.6 Quality Control and Quality Assurance

Comprehensive quality control and quality assurance plans are an essential part of the successful ground improvement (stone columns and micropiles). During the work, real-time monitoring of essential parameters should be performed. The QA/QC program is the best way to assure that the work will provide a foundation system that will meet the client's need. All ground improvement related works should be observed by the project geotechnical consultant. As a part of post construction monitoring, <u>we recommend to perform a minimum of two cone penetration testings (CPT) per 5,000 to square feet of improvement for further evaluating liquefaction potential and settlement.</u> The first location of CPT (CPT-1) should be at the middle of the grid; the second location of CPT (CPT-2) should be mid-way between the first location and the stone column. Total post-improvement liquefaction potential and seismic settlement should be less than or equal to 2 inches to achieve stabilized ground.

9.3 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. 8, Overexcavation Depths

Structure/Pavement	Minimum Excavation Depth
Building Footings	24 inches below footings or 5 feet below ground surface, whichever is deeper
Slab-on-grade	24 inches below slab
Pavement	12 inches below finished grade

The change in depth of the overexcavation below the footings and slabs-on-grade should be transitioned by a gradual slope. The overexcavation should extend to at least 2 feet beyond the footprint of the building 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.

9.4 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 cleaning 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 1 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 representative 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 ±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 ±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 may be expected to increase or decrease as a result of grading. The shrinkage and/or bulkage would depend on, among other factors, the depth of cut and/or fill, and the grading method and equipment utilized. For preliminary estimation, bulking and 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 11 to 17 percent. An average value of 14 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. For estimation purposes, ground subsidence may be taken as 0.1 feet.

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 structures 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 1 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.

10.0 DESIGN RECOMMENDATIONS

Recommendations for the design and construction of the proposed building 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 structures 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. 9, Recommended Foundation 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	1,800 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 2,500 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 structures 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 and without surcharge for the site are presented in the following table.

Table No. 10, 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)	50
At-rest (wall is restrained)	70

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

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 0.35 between mass concrete and soil, 0.30 between formed concrete and soil, and 0.25 between steel and soil may be used. A passive earth pressure of 180 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 1,800 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.

10.4 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*.

Structural design elements of slabs-on-grade, including but not limited to thickness, reinforcement, joint spacing, should be selected based on the analysis performed by the project structural engineer considering anticipated loading conditions and the modulus of subgrade reaction of the supporting materials.

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 slab curling. Prior to the slab pour, all utility trenches should be properly backfilled and compacted.

The upper 12 inches of soil subgrade under slabs-on-grade should be moisture conditioned to 0 to 3 percent above optimum moisture content within 12 hours prior to placement of concrete.

Subgrade for slabs-on-grade should be firm and uniform. All loose or disturbed soils including under-slab 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 slab 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 Post-tensioned Slabs

Post-tensioned slabs should be designed in accordance with the current California Building Code (CBSC, 2016) and Post-Tensioning Institute (PTI) guidelines (PTI, 2008). PTI design parameters are not required for post-tensioned slabs for very low expansive soils. If low expansive soils are encountered, PTI design parameters should be provided based on testing of the soils present in the shallow subgrade at the completion of grading.

10.6 Settlement

The total settlement of shallow footings from static structural loads and short-term settlement of properly compacted fill is anticipated to be 1 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, *Dynamic Settlement Analysis*. We estimate that the project site has the potential for up to 6.6 inches of dry seismic settlement with up to 0.93 inches of liquefaction induced settlement during a large earthquake. The soil profile for borings BH-02 and BH-04 is almost similar. So, we anticipate that the total settlement will be uniform. We recommend that the planned structure be designed conservatively in anticipation of dynamic differential settlement of 0.7 inches in 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.

10.7 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 1, 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.

10.8 Soil Corrosivity

One representative sample of site soil 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 contents of the sampled soils correspond 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 locations 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 6,400 Ohm-cm for the site. This indicates that the soils tested of the proposed site are moderately corrosive to ferrous metals in contact with the soil (Romanoff, 1957). <u>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 and site soils.</u>

11.0 CONSTRUCTION RECOMMENDATIONS

Temporary sloped excavation is 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. Recommendations pertaining to temporary excavations are presented in this section.

Depending on the sequence of construction, excavations may be required near existing streets or 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 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)[1]
Silty Sand (SM), and Sandy Silt (ML)	0-4	Vertical
	4-10	1:1

[1] 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 excavation 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 San Bernardino City Unified School District 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. 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.

Five exploratory borings (BH-01 through BH-05) were drilled on April 5 and 6, 2018 to investigate the subsurface conditions at the site. The borings were drilled to their planned maximum depths of 16.5 and 51.5 feet bgs.

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-02 and BH-04 at depths of 20, 30, 40, and 50 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. The surface may settle over time, so if construction is delayed, 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-6, *Logs of Borings*.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	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

LABORATORY TESTING ABBREVIATIONS

TEST TYPE
(Results shown in Appendix B)

CLASSIFICATION

Plasticity	pi
Grain Size Analysis	ma
Passing No. 200 Sieve	wa
Sand Equivalent	se
Expansion Index	ei
Compaction Curve	max
Hydrometer	h
Disturb	Dist.

STRENGTH

Pocket Penetrometer	p
Direct Shear	ds
Direct Shear (single point)	ds*
Unconfined Compression	uc
Triaxial Compression	tx
Vane Shear	vs
Consolidation	c
Collapse Test	col
Resistance (R) Value	r
Chemical Analysis	ca
Electrical Resistivity	er
Permeability	perm
Soil Cement	sc

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

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

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New Diesel Technology Center Building
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Project No.
18-81-134-01

Drawing No.
A-1

Project ID: 18-81-134-01.GPJ; Template: KEY

Log of Boring No. BH-01

Dates Drilled: 4/6/2018 Logged by: Mike Maldonado Checked By: Scot Mathis

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

Ground Surface Elevation (ft): 618 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 DRIVE	SAMPLES BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		4" ASPHALT CONCRETE/NO AGGREGATE BASE						ei, max
		ALLUVIUM **SILTY SAND (SM):** fine to coarse-grained, dark brown.						
5			■		4/5/6	10	104	
10		**SANDY SILT (ML):** fine to coarse-grained sand, brown.	■		5/5/6	18	103	
15			■		5/7/8	13	112	
		End of boring at 16.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings, tamped, and surface patched with asphalt concrete on 4/6/18						

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Project No. 18-81-134-01

Drawing No. A-2

Log of Boring No. BH-02

Dates Drilled: 4/5/2018 Logged by: Mike Maldonado Checked By: Scot Mathis

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

Ground Surface Elevation (ft): 617 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 DRIVE	SAMPLES BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		4" ASPHALT CONCRETE/NO AGGREGATE BASE						
		ALLUVIUM **SANDY SILT (ML):** fine to coarse-grained sand, brown.	■	▨	2/3/4	12	104	col
5		**SILTY SAND (SM):** fine to coarse-grained, brown.	■		2/3/5	10	100	ds
10		**SANDY SILT (ML):** fine to coarse-grained sand, brown.	■	▨	4/4/5	17	100	ma
15			■		6/12/15	14	114	
20		**SILTY SAND (SM):** fine to coarse-grained, brown.	☒		4/4/5			
25			■		10/18/26	10	120	
30		- few gravel up to 1" in largest dimension	☒		12/25/31			

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Project No. **18-81-134-01**

Drawing No. **A-3a**

Log of Boring No. BH-02

Dates Drilled: 4/5/2018 Logged by: Mike Maldonado Checked By: Scot Mathis

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

Ground Surface Elevation (ft): 617 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 DRIVE	SAMPLES BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		ALLUVIUM **SAND (SP):** fine to coarse-grained, scattered gravel up to 1" in largest dimension, brown.			18/25/40	2	111	
40			X		15/26/23			
45		- scattered gravel up to 2" in largest dimension	■		31/50-5"	2	123	
50			X		12/35/36			
		End of boring at 51.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings, tamped, and surface patched with asphalt concrete on 4/5/18.						

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Project No. 18-81-134-01

Drawing No. A-3b

Log of Boring No. BH-03

Dates Drilled: 4/6/2018 Logged by: Mike Maldonado Checked By: Scot Mathis

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

Ground Surface Elevation (ft): 618 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 DRIVE	SAMPLES BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		4" ASPHALT CONCRETE/NO AGGREGATE BASE						
		ALLUVIUM **SILTY SAND (SM):** fine to coarse-grained, dark brown.						ma
5			■		6/8/9	6	105	c
10		**SANDY SILT (ML):** fine to coarse-grained sand, brown.	■		4/6/9	15	108	
15		**SILTY SAND (SM):** fine to coarse-grained, brown.	■		6/7/9	5	115	
		End of boring at 16.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings, tamped, and surface patched with asphalt concrete on 4/6/18.						

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Project No. 18-81-134-01

Drawing No. A-4

Log of Boring No. BH-04

Dates Drilled: 4/5/2018 Logged by: Mike Maldonado Checked By: Scot Mathis

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

Ground Surface Elevation (ft): 616 Depth to Water (ft): NOT ENCOUNTERED

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.

Depth (ft)	Graphic Log	Summary of Subsurface Conditions	Samples: Drive	Samples: Bulk	Blows	Moisture	Dry Unit Wt. (pcf)	Other
		4" ASPHALT CONCRETE/NO AGGREGATE BASE						ca, er
		ALLUVIUM **SANDY SILT (ML):** fine to coarse-grained sand, dark brown.	■	▨	1/3/3	15	97	
5			■		2/2/4	11	109	ds
10			■	▨	5/6/7	15	106	
15			■		9/10/11	16	110	
20		**SILTY SAND (SM):** fine to coarse-grained, brown.	☒		5/5/7			
25			■		8/10/16	13	116	
30		- scattered gravel up to 1" in largest dimension	☒		14/19/20			

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Drawing No. A-5a

Log of Boring No. BH-04

Dates Drilled: 4/5/2018 Logged by: Mike Maldonado Checked By: Scot Mathis

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

Ground Surface Elevation (ft): 616 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 DRIVE	SAMPLES BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		ALLUVIUM **SAND (SP):** fine to coarse-grained, few gravel up to 1" in largest dimension, brown.	■		18/36/50-5"	3	120	
40			☒		14/25/30			
45		**GRAVELLY SAND (GP):** fine to coarse-grained, some gravel up to 2" in largest dimension, brown.	■		25/50-5"	2	124	
50			☒		25/50-4"			
		End of boring at 51.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings, tamped, and surface patched with asphalt concrete on 4/5/18.						

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Drawing No. A-5b

Log of Boring No. BH-05

Dates Drilled: 4/6/2018 Logged by: Mike Maldonado Checked By: Scot Mathis

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

Ground Surface Elevation (ft): 616 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 DRIVE	SAMPLES BULK	BLOWS	MOISTURE	DRY UNIT WT. (pcf)	OTHER
		5" ASPHALT CONCRETE/NO AGGREGATE BASE						
		ALLUVIUM **SILTY SAND (SM):** fine to coarse-grained, dark brown.						ma
5		**SANDY SILT (ML):** fine to coarse-grained sand, brown.			2/4/6	13	106	c
10		**SAND (SP):** fine to coarse-grained, brown.			4/6/8	3	104	
15					4/5/7	2	111	
		End of boring at 16.5 feet bgs. No groundwater encountered. Borehole backfilled with soil cuttings, tamped, and surgace patched with asphalt concrete on 4/6/18.						

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Project No. 18-81-134-01

Drawing No. A-6

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

Results of moisture content and dry density tests performed on relatively undisturbed ring samples in accordance to ASTM Standard D2216 were used to aid in the classification of the soils and to provide quantitative measurement of the in situ dry density. Data obtained from this test 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 soil sample was tested to evaluate the expansion potential. The test was conducted in accordance with ASTM Standard D4829. The test result is presented in the following table.

Table No. B-1, Expansion Index Test Result

Boring No.	Depth (feet)	Soil Description	Expansion Index	Expansion Potential
BH-01	0-5	Silty Sand (SM)	1	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 the test was to determine the corrosion potential of site soils when placed in contact with common construction materials. The tests were performed by HDR Inc. (Claremont, CA) in accordance to Caltrans Tests 643, 422 and 417. Test results are presented in the following table.

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

Boring No.	Depth (feet)	pH	Soluble Sulfates (CA 417) (% by weight)	Soluble Chlorides (CA 422) (ppm)	Min. Resistivity (CA 643) (Ohm-cm)
BH-04	0-5	8.3	0.001	2.3	6,400

Collapse Tests

To evaluate the moisture sensitivity (collapse/swell potential) of the encountered soils, one collapse test was 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	Sandy Silt (ML)	-0.6	Slight
*BH-03	5.0-6.5	Silty Sand (SM)	-0.6	Slight
*BH-05	5.0-6.5	Sandy Silt (ML)	-1.5	Slight

(*Consolidation test)

Grain-Size Analyses

To aid in classification of the soils, mechanical grain-size analyses was performed on three representative soil samples. Testing was performed in accordance with the ASTM Standard D422 test method. Grain-size curves are shown in 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 a representative bulk sample. The test was conducted in accordance with the ASTM Standard D1557 test method. The test result is presented in Drawing No. B-2, *Moisture-Density Relationship Result,* and is also summarized in the following table.

Table No B-4, Summary of Moisture-Density Relationship Result

Boring No.	Depth (feet)	Soil Description	Optimum Moisture (%)	Maximum Density (lb/cft)
BH-01	0-5	Silty Sand (SM), Dark Brown	10.5	127.0

Direct Shear Test

Two direct shear tests were performed on relatively undisturbed samples in soaked moisture condition in accordance with ASTM D3080. For each test, 3 samples contained in brass sampler rings were placed, one at a time, directly into the test apparatus and subjected to a range of normal loads appropriate for the anticipated conditions. The samples were then sheared at a constant strain rate of 0.01 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 deformation data and plotted to determine the shear strength parameters. For test data, including sample density and moisture content, see Drawings No. B-3 and B-4*, Direct Shear Test Results,* and the following table.

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

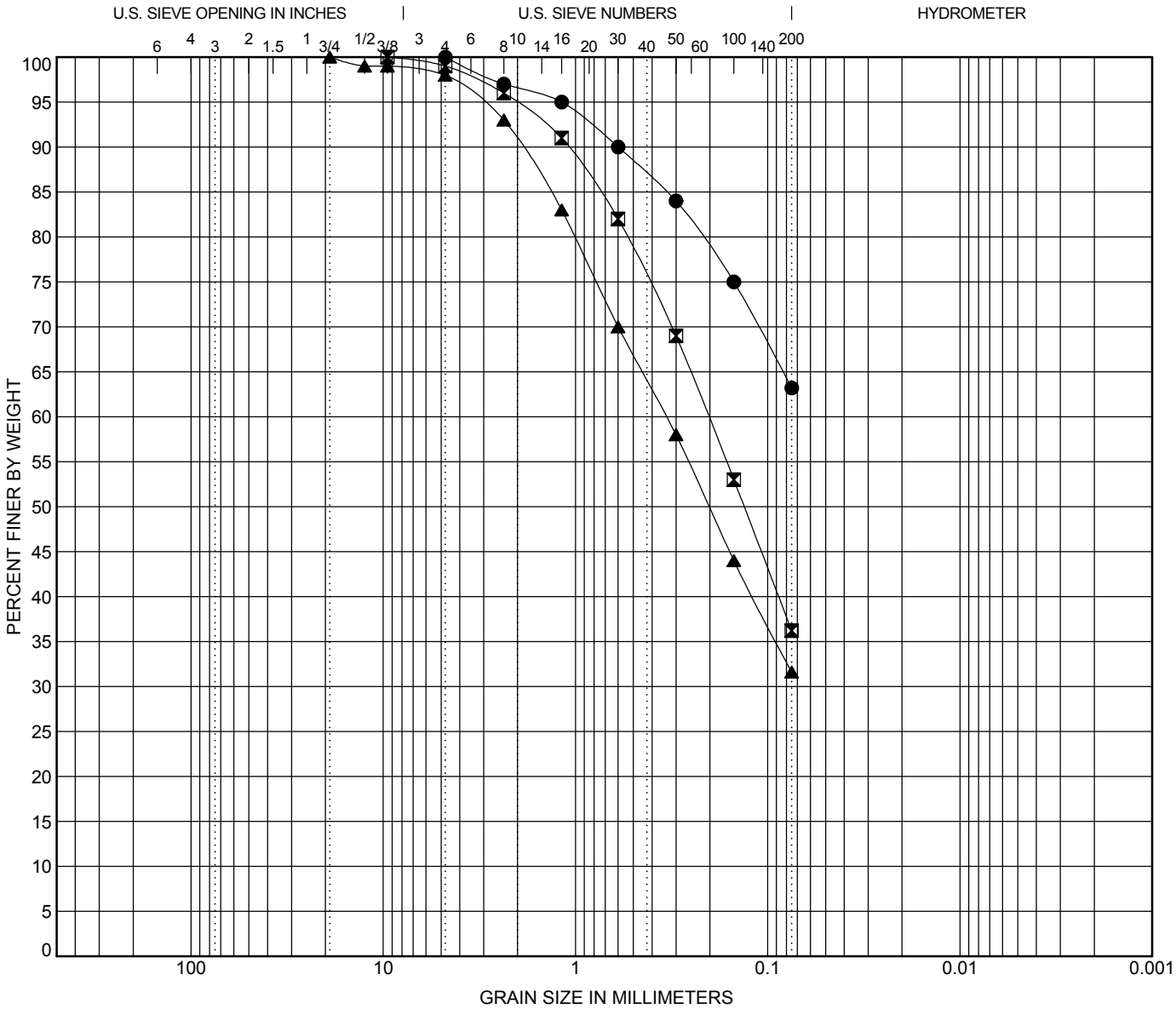
Boring No.	Depth (feet)	Soil Description	Peak Strength Parameters	
			Friction Angle (degrees)	Cohesion (psf)
BH-02	5.0-6.5	Silty Sand (SM)	29	10
BH-04	5.0-6.5	Sandy Silt (ML)	23	120

Consolidation Tests

This test was conducted in accordance with ASTM Standard D2435 method. Data obtained from this test performed on two relatively undisturbed ring samples were 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 results, including sample density and moisture content, see Drawings No. B-5 and B-6, *Consolidation Test Results*.

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-02**	**10-15**	**SANDY SILT (ML)**					
⊠	**BH-03**	**0-5**	**SILTY SAND (SM)**					
▲	**BH-05**	**0-5**	**SILTY SAND (SM)**					

	Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**BH-02**	**10-15**	**4.75**				**0.0**	**36.8**	**63.2**	
⊠	**BH-03**	**0-5**	**9.5**	**0.203**			**1.0**	**62.8**	**36.2**	
▲	**BH-05**	**0-5**	**19**	**0.337**			**2.0**	**66.4**	**31.6**	

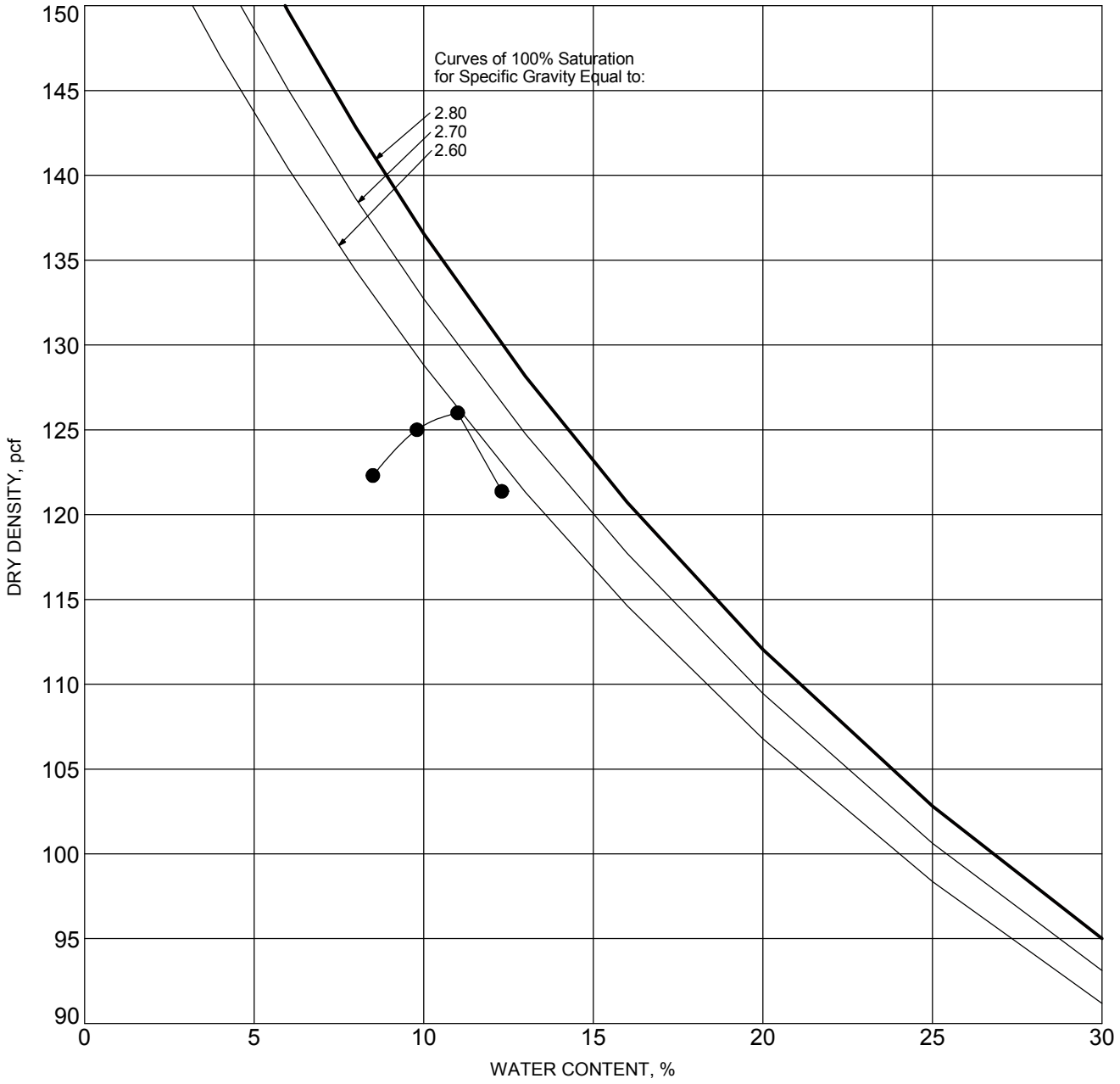
GRAIN SIZE DISTRIBUTION RESULTS

Converse Consultants

New Diesel Technology Center Building
Northwest Corner of the Existing Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
For: San Bernardino City Unified School District

Project No. **18-81-134-01**

Drawing No. **B-1**



SYMBOL	BORING NO.	DEPTH (ft)	DESCRIPTION	ASTM TEST METHOD	OPTIMUM WATER, %	MAXIMUM DRY DENSITY, pcf
●	**BH-01**	**0-5**	**SILTY SAND (SM), DARK BROWN**	**D1557- A**	**10.5**	**127.0**

MOISTURE-DENSITY RELATIONSHIP RESULTS

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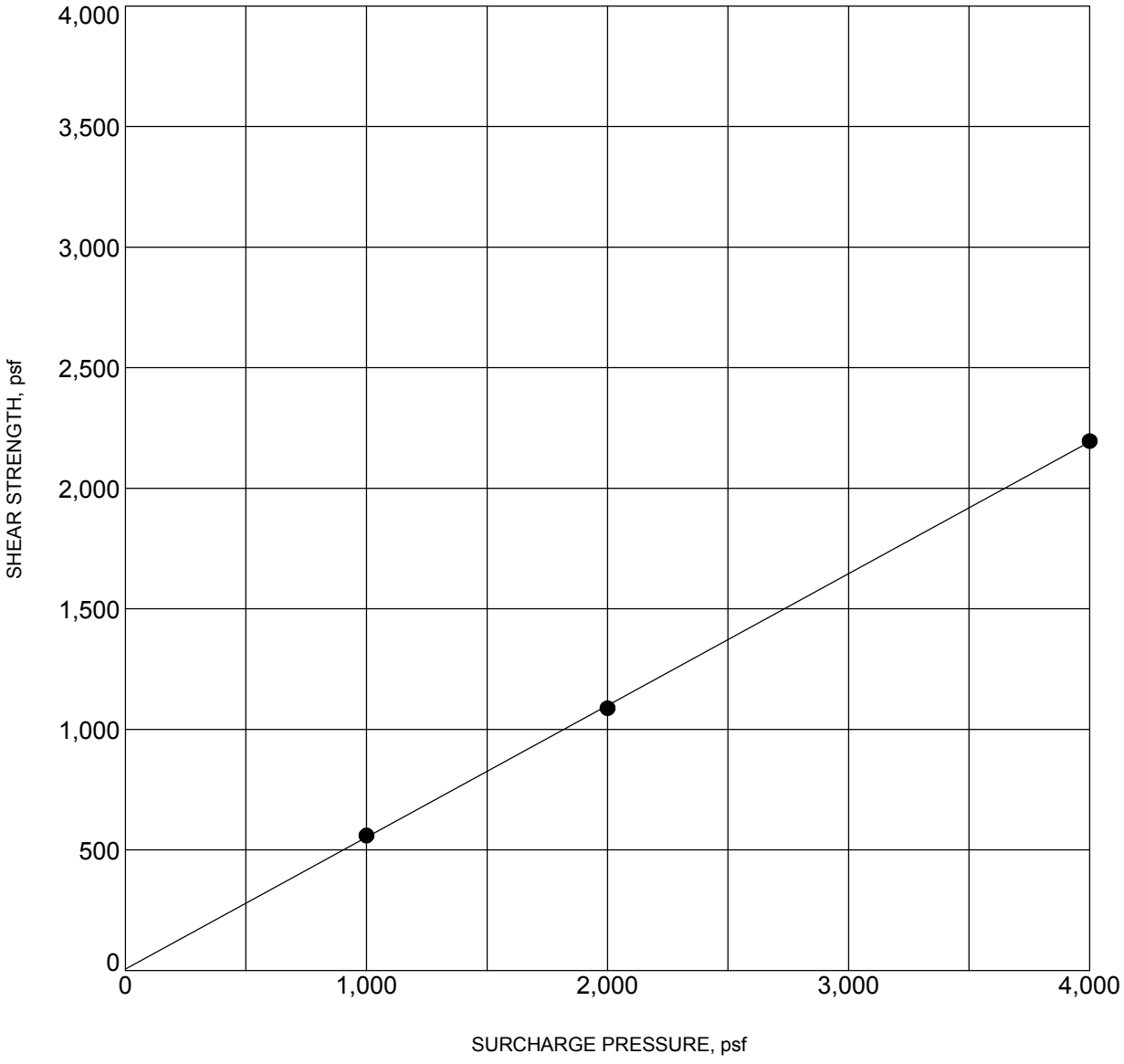
For: San Bernardino City Unified School District

Project No.
18-81-134-01

Drawing No.
B-2

Project ID: 18-81-134-01.GPJ; Template: COMPACTION



BORING NO. :	**BH-02**	DEPTH (ft) :	**5.0-6.5**
DESCRIPTION :	**SILTY SAND (SM)**		
COHESION (psf) :	**10**	FRICTION ANGLE (degrees):	**29**
MOISTURE CONTENT (%) :	**10.3**	DRY DENSITY (pcf) :	**99.6**

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

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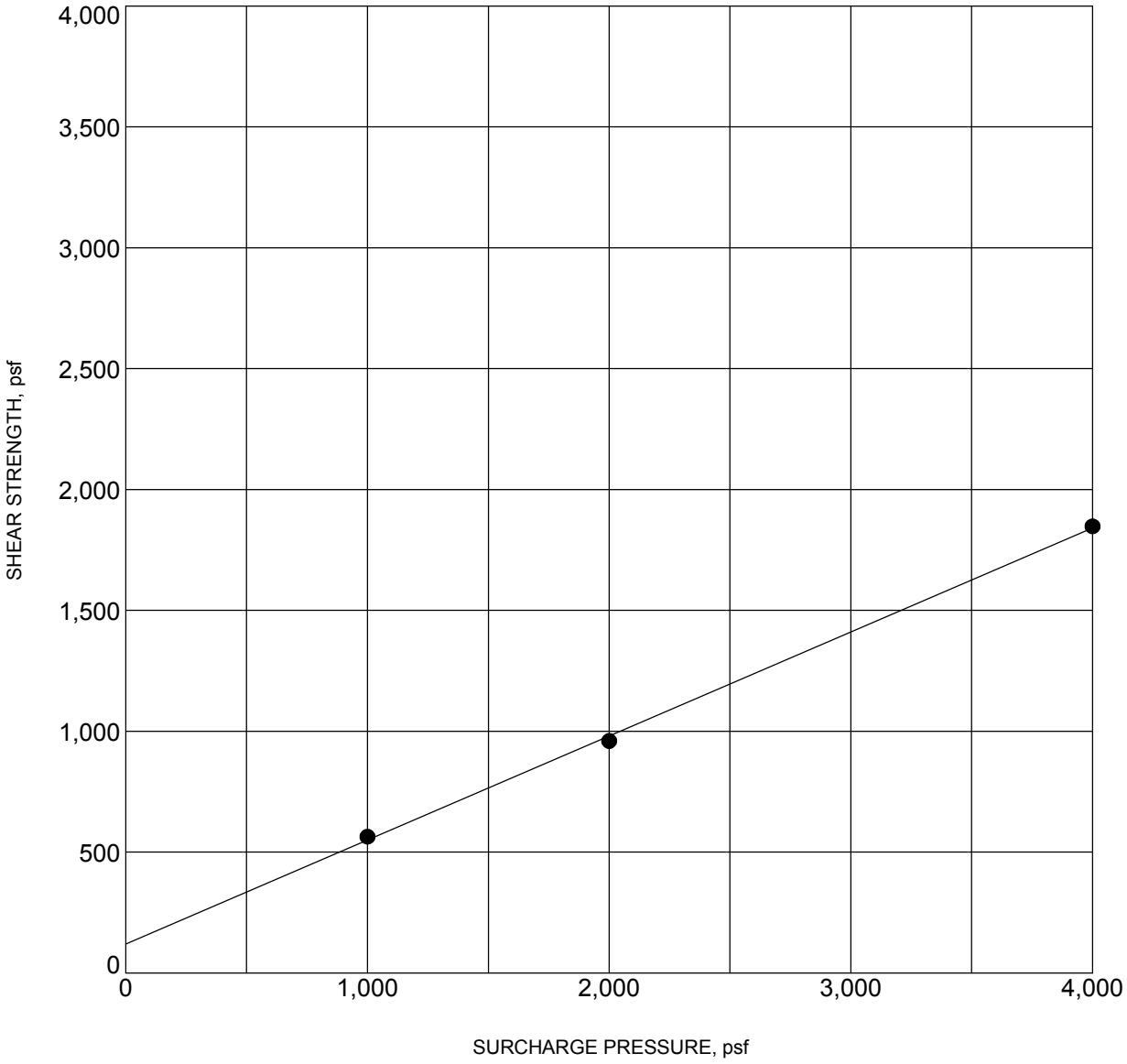
Project No. **18-81-134-01**

Drawing No. **B-3**



BORING NO. :	**BH-04**	DEPTH (ft) :	**5.0-6.5**
DESCRIPTION :	**SANDY SILT (ML)**		
COHESION (psf) :	**120**	FRICTION ANGLE (degrees):	**23**
MOISTURE CONTENT (%) :	**11.0**	DRY DENSITY (pcf) :	**108.8**

NOTE: Ultimate Strength.

DIRECT SHEAR TEST RESULTS

Converse Consultants

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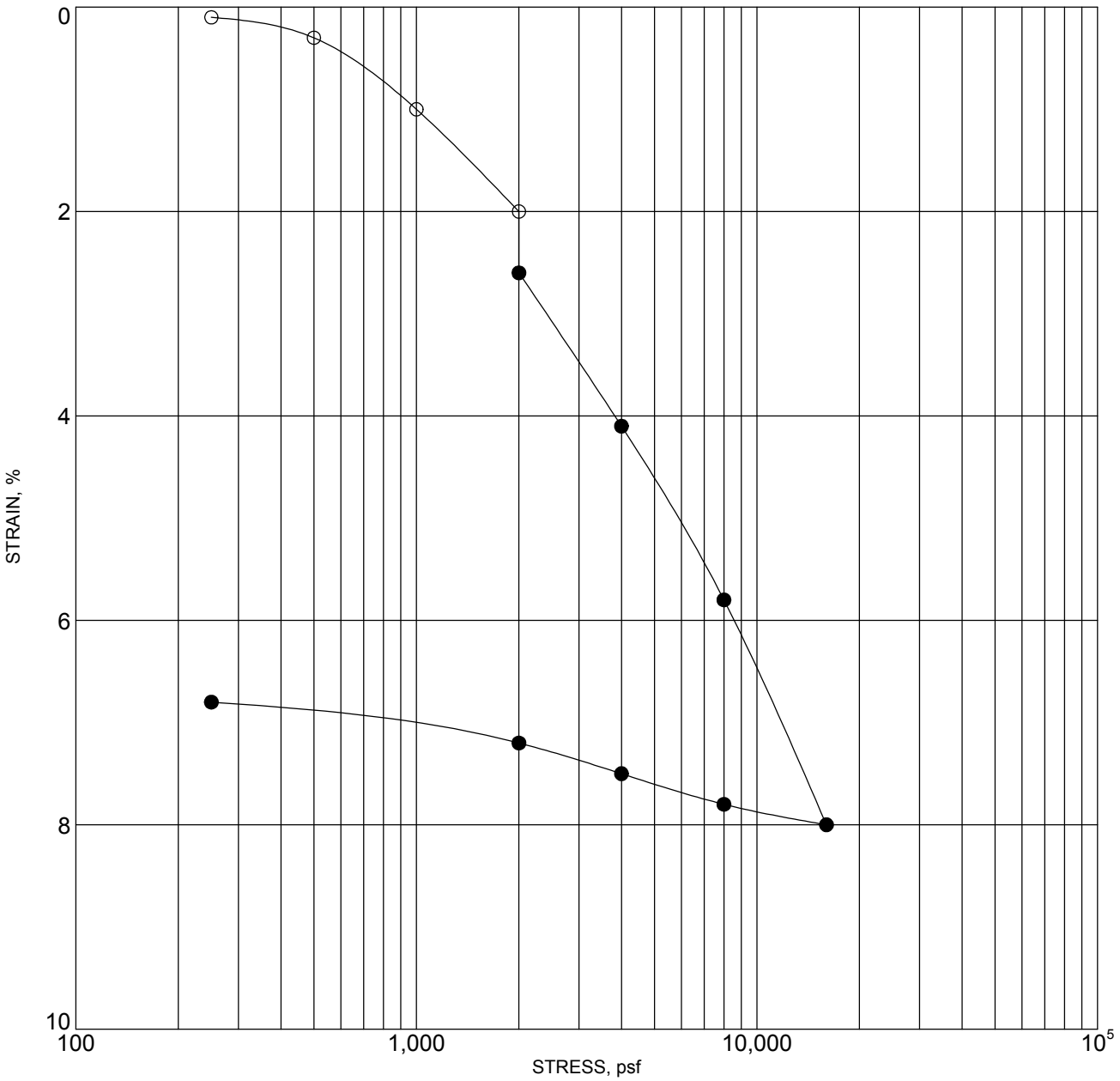
For: San Bernardino City Unified School District

Project No. **18-81-134-01**

Drawing No. **B-4**



BORING NO. :	BH-03	DEPTH (ft) :	5.0-6.5
DESCRIPTION :	SILTY SAND (SM)		

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	8	110	42	0.503
FINAL	14	118	100	0.391

NOTE: SOLID CIRCLES INDICATE READINGS AFTER ADDITION OF WATER

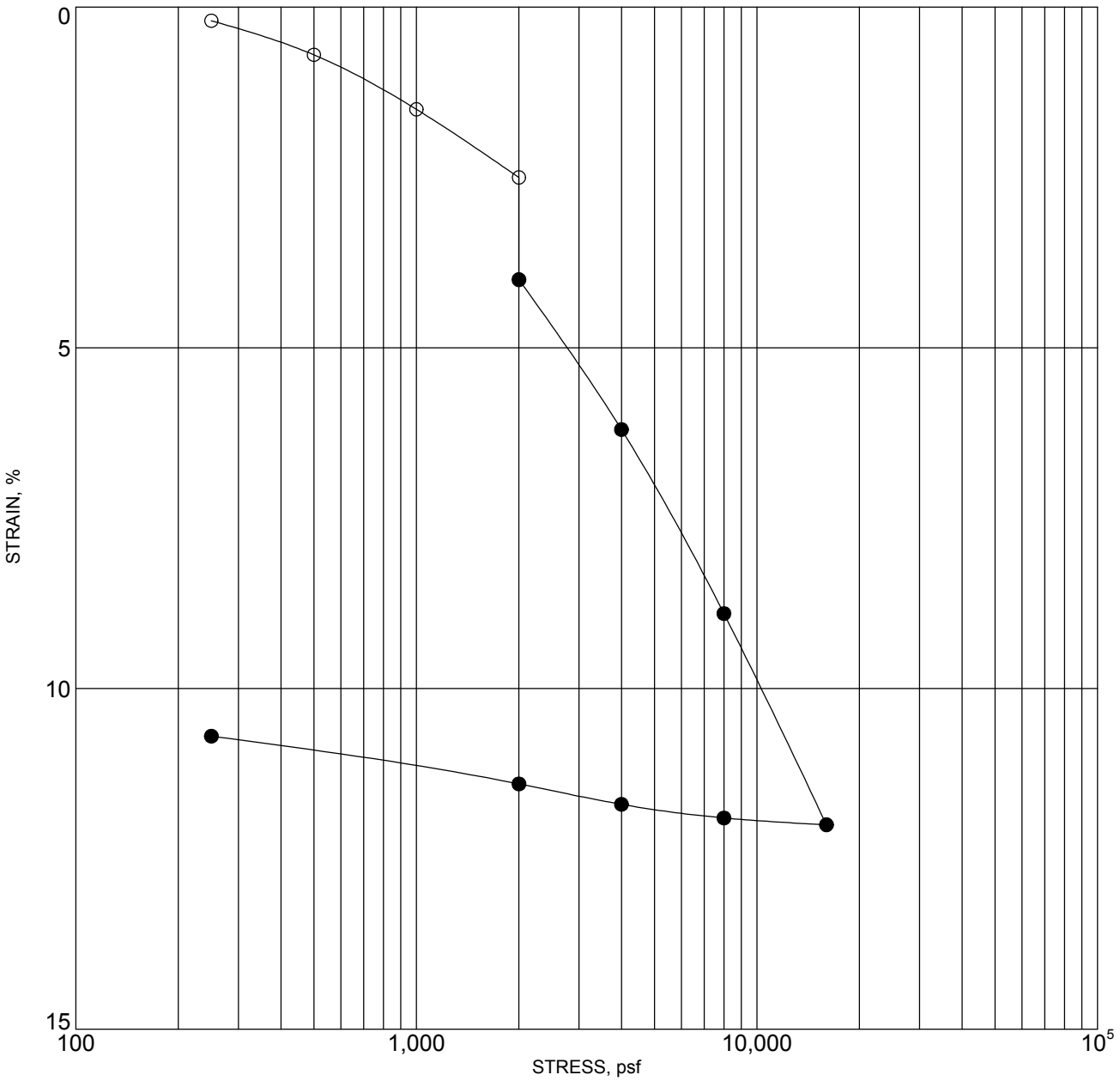
CONSOLIDATION TEST RESULTS

Converse Consultants

New Diesel Technology Center Building
Northwest Corner of the Existing Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
For: San Bernardino City Unified School District

Project No. **18-81-134-01**

Drawing No. **B-5**



BORING NO. :	BH-05	DEPTH (ft) :	5.0-6.5
DESCRIPTION :	SANDY SILT (ML)		

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	13	106	61	0.560
FINAL	16	114	100	0.446

NOTE: SOLID CIRCLES INDICATE READINGS AFTER ADDITION OF WATER

CONSOLIDATION TEST RESULTS

Converse Consultants

New Diesel Technology Center Building
Northwest Corner of the Existing Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
For: San Bernardino City Unified School District

Project No. **18-81-134-01**

Drawing No. **B-6**

Project ID: 18-81-134-01.GPJ; Template: CONSOLIDATION

Appendix C

Dynamic Settlement Analyses

APPENDIX C

DYNAMIC SETTLEMENT ANALYSES

The subsurface data obtained from the 2 borings (BH-02 and BH-04) drilled during the field investigation were used to evaluate the dynamic settlement due to potential liquefaction and 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 M7.0 and peak ground acceleration (PGA) of 0.99g, 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. Analyses were conducted for design groundwater conditions with a factor of safety of 1.3.

The results of our analyses are presented on Plates C-1 through C-4 and summarized in the following table.

Table C-1, Estimated Dynamic Settlements

Location	Groundwater Conditions	Groundwater Depth (feet bgs)	Dry Seismic Settlement (inches)	Liquefaction Induced Settlement (inches)
BH-02	Current	>50	6.50	0.04
	Historical	38	5.66	0.93
BH-04	Current	>50	6.60	0.05
	Historical	38	6.01	0.18

Based on our analysis, the project site has the potential for up to 6.6 inches of dry seismic settlement with up to 0.93 inches of liquefaction induced settlement.

BH-02 and BH-04 are approximately 100 feet apart. The estimated maximum total dynamic settlements in the borings are 6.59 and 6.65 inches. The difference between these estimated settlements is 0.06 inches. Based on these values, the estimated dynamic differential settlement is less than 0.5 inches over a horizontal distance of 40 feet.

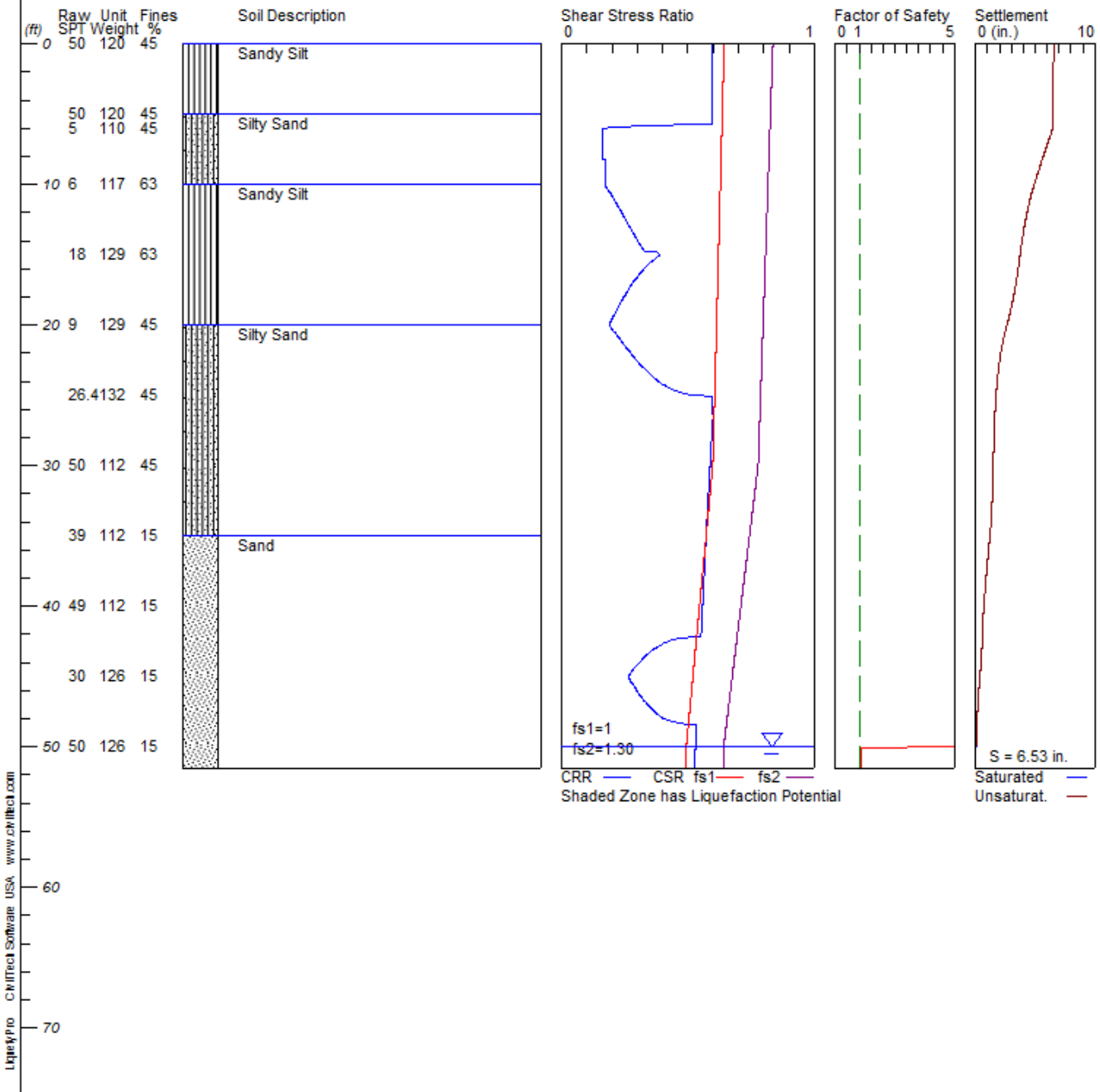
The soil profile across the site is relatively similar. So, we anticipate that the total settlement will be uniform. We recommend that the planned structure be designed conservatively in anticipation of dynamic differential settlement of 0.7 inches in 40 horizontal feet.

DYNAMIC SETTLEMENT

New Diesel Technology Center Building

Hole No.=BH-02 Water Depth=50 ft Surface Elev.=617

Magnitude=7.0
Acceleration=0.99g

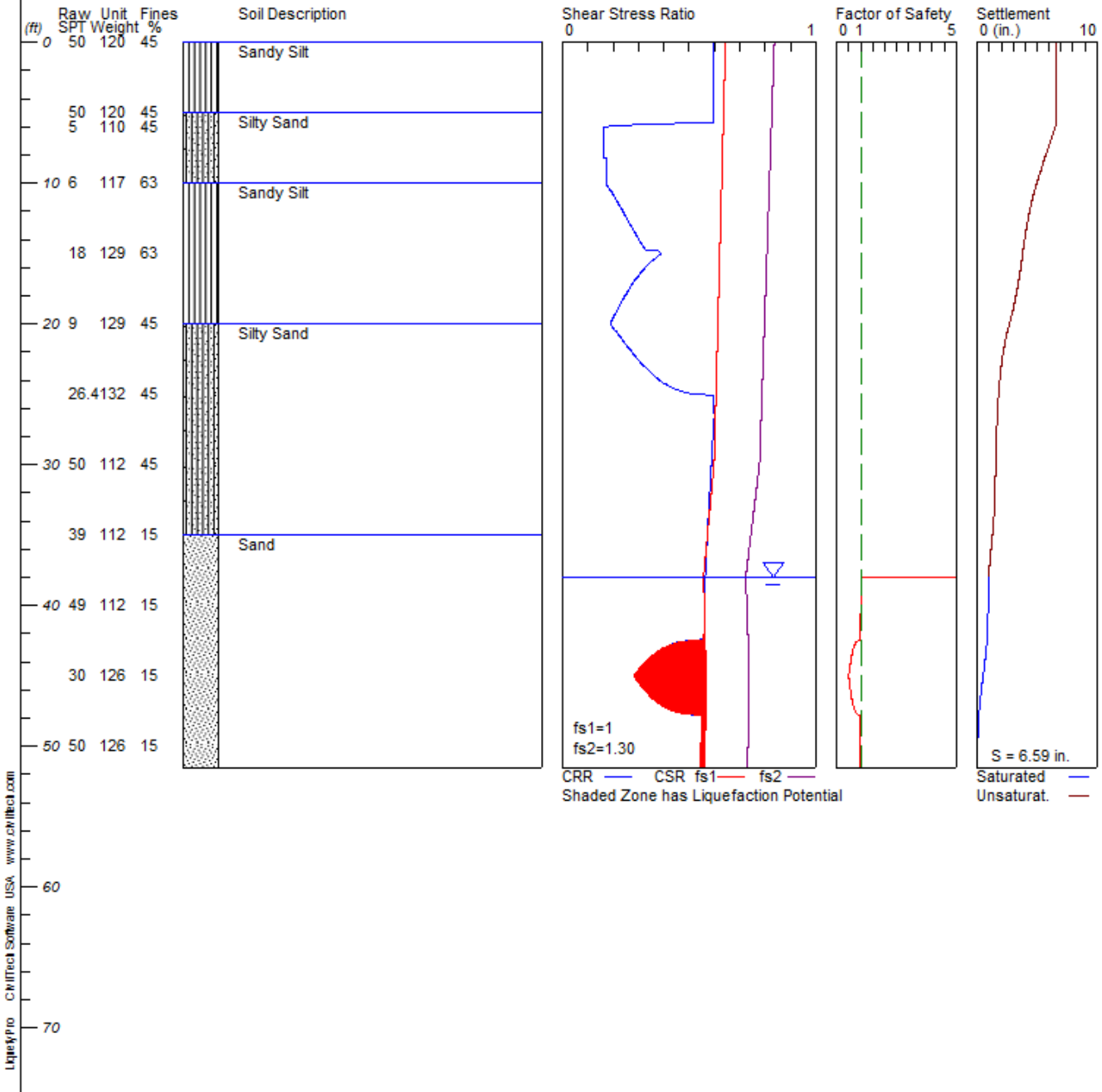


DYNAMIC SETTLEMENT

New Diesel Technology Center Building

Hole No.=BH-02 Water Depth=38 ft Surface Elev.=617

Magnitude=7.0
Acceleration=0.99g

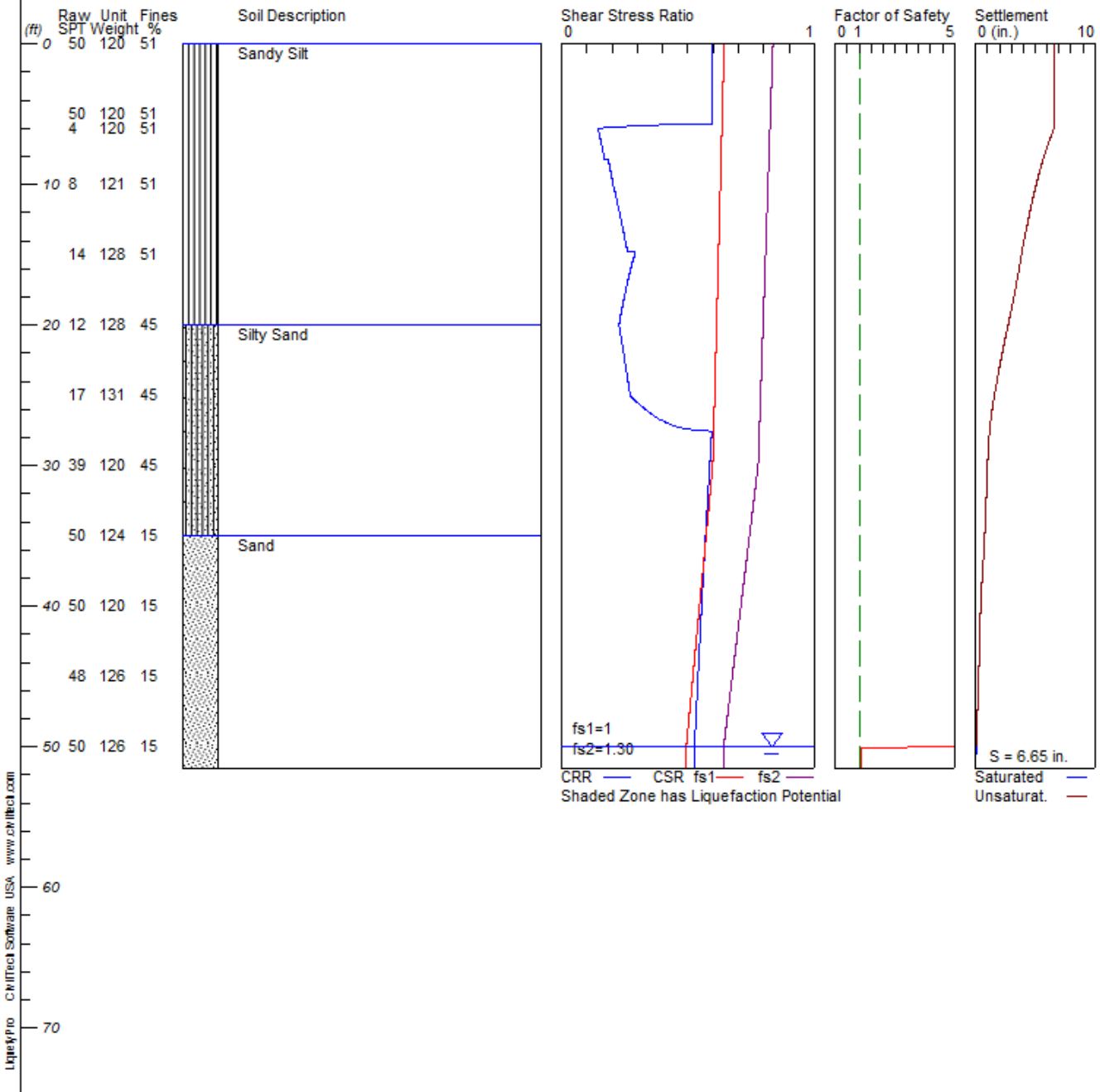


DYNAMIC SETTLEMENT

New Diesel Technology Center Building

Hole No.=BH-04 Water Depth=50 ft Surface Elev.=616

Magnitude=7.0
Acceleration=0.99g

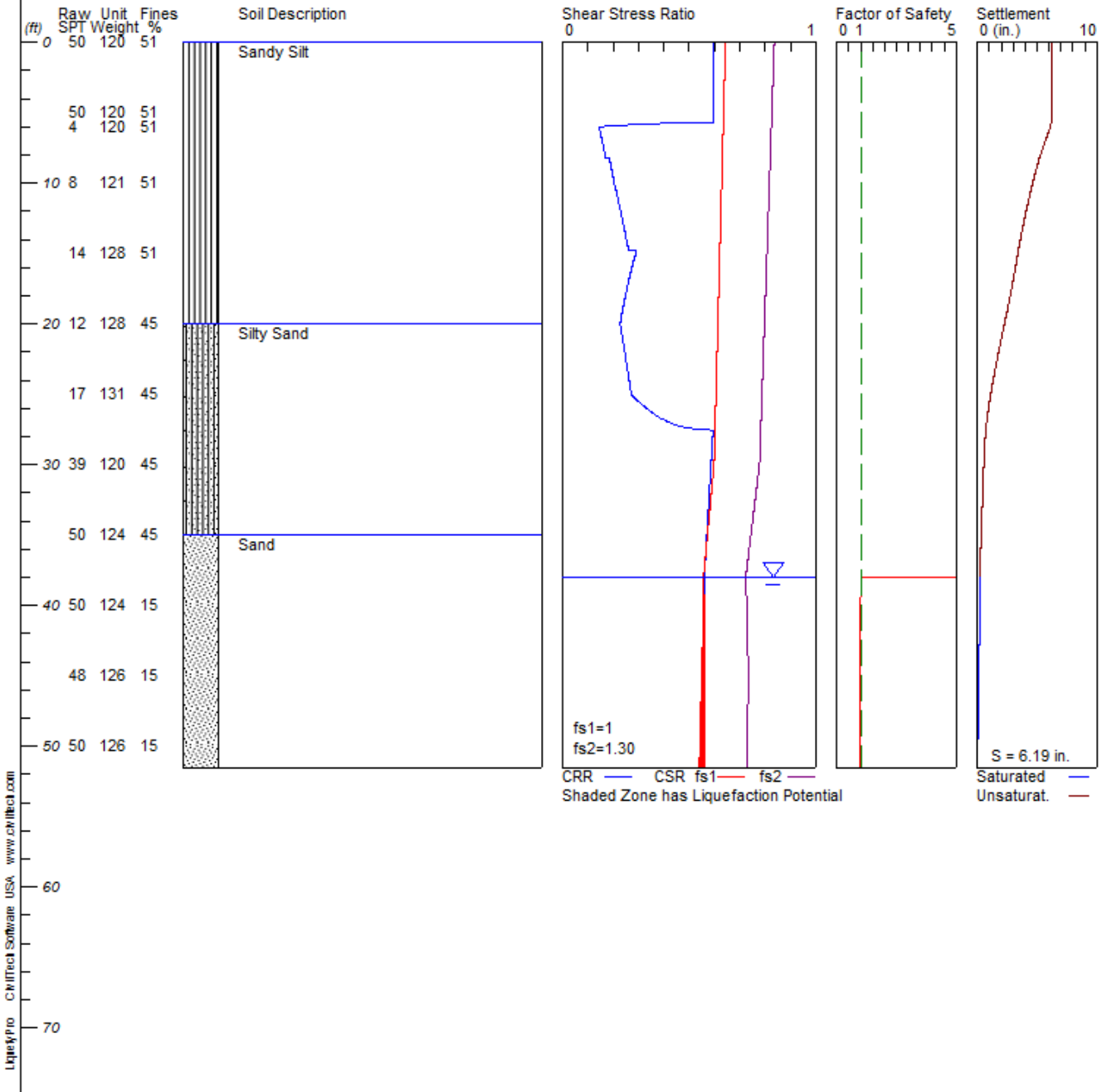


DYNAMIC SETTLEMENT

New Diesel Technology Center Building

Hole No.=BH-04 Water Depth=38 ft Surface Elev.=616

Magnitude=7.0
Acceleration=0.99g



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                                        LIQUEFACTION ANALYSIS SUMMARY

                                       Copyright by CivilTech Software
                                            www.civiltech.com

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Center\-01\Settlement -Final\BH-02.liq
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        Subtitle:  Dynamic Settlement

        Surface Elev.=617
        Hole No.=BH-02
        Depth of Hole= 51.50 ft
        Water Table during Earthquake= 50.00 ft
        Water Table during In-Situ Testing= 50.00 ft
        Max. Acceleration= 0.99 g
        Earthquake Magnitude= 7.00

 Input Data:
        Surface Elev.=617
        Hole No.=BH-02
        Depth of Hole=51.50 ft
        Water Table during Earthquake= 50.00 ft
        Water Table during In-Situ Testing= 50.00 ft
        Max. Acceleration=0.99 g
        Earthquake Magnitude=7.00
        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 two CSR (fs1=1, fs2=User)
        10. Use Curve Smoothing: Yes*
        * Recommended Options
```

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	50.00	120.00	45.00
5.00	50.00	120.00	45.00
6.00	5.00	110.00	45.00
10.00	6.00	117.00	63.00
15.00	18.00	129.00	63.00
20.00	9.00	129.00	45.00
25.00	26.40	132.00	45.00
30.00	50.00	112.00	45.00
35.00	39.00	112.00	15.00
40.00	49.00	112.00	15.00
45.00	30.00	126.00	15.00
50.00	50.00	126.00	15.00

Output Results:

Settlement of Saturated Sands=0.04 in.
Settlement of Unsaturated Sands=6.50 in.
Total Settlement of Saturated and Unsaturated Sands=6.53 in.
Differential Settlement=3.267 to 4.312 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.60	0.64	5.00	0.04	6.50	6.53
0.05	0.60	0.64	5.00	0.04	6.50	6.53
0.10	0.60	0.64	5.00	0.04	6.50	6.53
0.15	0.60	0.64	5.00	0.04	6.50	6.53
0.20	0.60	0.64	5.00	0.04	6.50	6.53
0.25	0.60	0.64	5.00	0.04	6.50	6.53
0.30	0.60	0.64	5.00	0.04	6.50	6.53
0.35	0.60	0.64	5.00	0.04	6.50	6.53
0.40	0.60	0.64	5.00	0.04	6.50	6.53
0.45	0.60	0.64	5.00	0.04	6.50	6.53
0.50	0.60	0.64	5.00	0.04	6.50	6.53
0.55	0.60	0.64	5.00	0.04	6.50	6.53
0.60	0.60	0.64	5.00	0.04	6.50	6.53
0.65	0.60	0.64	5.00	0.04	6.50	6.53
0.70	0.60	0.64	5.00	0.04	6.50	6.53
0.75	0.60	0.64	5.00	0.04	6.50	6.53
0.80	0.60	0.64	5.00	0.04	6.50	6.53
0.85	0.60	0.64	5.00	0.04	6.50	6.53
0.90	0.60	0.64	5.00	0.04	6.50	6.53
0.95	0.60	0.64	5.00	0.04	6.50	6.53

1.00	0.60	0.64	5.00	0.04	6.50	6.53
1.05	0.60	0.64	5.00	0.04	6.50	6.53
1.10	0.60	0.64	5.00	0.04	6.50	6.53
1.15	0.60	0.64	5.00	0.04	6.50	6.53
1.20	0.60	0.64	5.00	0.04	6.50	6.53
1.25	0.60	0.64	5.00	0.04	6.50	6.53
1.30	0.60	0.64	5.00	0.04	6.50	6.53
1.35	0.60	0.64	5.00	0.04	6.50	6.53
1.40	0.60	0.64	5.00	0.04	6.50	6.53
1.45	0.60	0.64	5.00	0.04	6.49	6.53
1.50	0.60	0.64	5.00	0.04	6.49	6.53
1.55	0.60	0.64	5.00	0.04	6.49	6.53
1.60	0.60	0.64	5.00	0.04	6.49	6.53
1.65	0.60	0.64	5.00	0.04	6.49	6.53
1.70	0.60	0.64	5.00	0.04	6.49	6.53
1.75	0.60	0.64	5.00	0.04	6.49	6.53
1.80	0.60	0.64	5.00	0.04	6.49	6.53
1.85	0.60	0.64	5.00	0.04	6.49	6.53
1.90	0.60	0.64	5.00	0.04	6.49	6.53
1.95	0.60	0.64	5.00	0.04	6.49	6.53
2.00	0.60	0.64	5.00	0.04	6.49	6.53
2.05	0.60	0.64	5.00	0.04	6.49	6.53
2.10	0.60	0.64	5.00	0.04	6.49	6.53
2.15	0.60	0.64	5.00	0.04	6.49	6.53
2.20	0.60	0.64	5.00	0.04	6.49	6.53
2.25	0.60	0.64	5.00	0.04	6.49	6.53
2.30	0.60	0.64	5.00	0.04	6.49	6.53
2.35	0.60	0.64	5.00	0.04	6.49	6.53
2.40	0.60	0.64	5.00	0.04	6.49	6.53
2.45	0.60	0.64	5.00	0.04	6.49	6.53
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2.60	0.60	0.64	5.00	0.04	6.49	6.53
2.65	0.60	0.64	5.00	0.04	6.49	6.53
2.70	0.60	0.64	5.00	0.04	6.49	6.53
2.75	0.60	0.64	5.00	0.04	6.49	6.53
2.80	0.60	0.64	5.00	0.04	6.49	6.53
2.85	0.60	0.64	5.00	0.04	6.49	6.53
2.90	0.60	0.64	5.00	0.04	6.49	6.53
2.95	0.60	0.64	5.00	0.04	6.49	6.53
3.00	0.60	0.64	5.00	0.04	6.49	6.53
3.05	0.60	0.64	5.00	0.04	6.49	6.53
3.10	0.60	0.64	5.00	0.04	6.49	6.53
3.15	0.60	0.64	5.00	0.04	6.49	6.53
3.20	0.60	0.64	5.00	0.04	6.49	6.53
3.25	0.60	0.64	5.00	0.04	6.49	6.53
3.30	0.60	0.64	5.00	0.04	6.49	6.53
3.35	0.60	0.64	5.00	0.04	6.49	6.53

3.40	0.60	0.64	5.00	0.04	6.49	6.53
3.45	0.60	0.64	5.00	0.04	6.49	6.53
3.50	0.60	0.64	5.00	0.04	6.49	6.53
3.55	0.60	0.64	5.00	0.04	6.49	6.53
3.60	0.60	0.64	5.00	0.04	6.49	6.53
3.65	0.60	0.64	5.00	0.04	6.49	6.53
3.70	0.60	0.64	5.00	0.04	6.49	6.53
3.75	0.60	0.64	5.00	0.04	6.49	6.53
3.80	0.60	0.64	5.00	0.04	6.49	6.53
3.85	0.60	0.64	5.00	0.04	6.49	6.53
3.90	0.60	0.64	5.00	0.04	6.49	6.53
3.95	0.60	0.64	5.00	0.04	6.49	6.53
4.00	0.60	0.64	5.00	0.04	6.49	6.53
4.05	0.60	0.64	5.00	0.04	6.49	6.53
4.10	0.60	0.64	5.00	0.04	6.49	6.52
4.15	0.60	0.64	5.00	0.04	6.49	6.52
4.20	0.60	0.64	5.00	0.04	6.49	6.52
4.25	0.60	0.64	5.00	0.04	6.49	6.52
4.30	0.60	0.64	5.00	0.04	6.49	6.52
4.35	0.60	0.64	5.00	0.04	6.49	6.52
4.40	0.60	0.64	5.00	0.04	6.49	6.52
4.45	0.60	0.64	5.00	0.04	6.49	6.52
4.50	0.60	0.64	5.00	0.04	6.49	6.52
4.55	0.60	0.64	5.00	0.04	6.49	6.52
4.60	0.60	0.64	5.00	0.04	6.49	6.52
4.65	0.60	0.64	5.00	0.04	6.49	6.52
4.70	0.60	0.64	5.00	0.04	6.49	6.52
4.75	0.60	0.64	5.00	0.04	6.49	6.52
4.80	0.60	0.64	5.00	0.04	6.49	6.52
4.85	0.60	0.64	5.00	0.04	6.49	6.52
4.90	0.60	0.64	5.00	0.04	6.49	6.52
4.95	0.60	0.64	5.00	0.04	6.49	6.52
5.00	0.60	0.64	5.00	0.04	6.49	6.52
5.05	0.60	0.64	5.00	0.04	6.49	6.52
5.10	0.60	0.64	5.00	0.04	6.49	6.52
5.15	0.60	0.64	5.00	0.04	6.49	6.52
5.20	0.60	0.64	5.00	0.04	6.49	6.52
5.25	0.60	0.64	5.00	0.04	6.48	6.52
5.30	0.60	0.64	5.00	0.04	6.48	6.52
5.35	0.60	0.64	5.00	0.04	6.48	6.52
5.40	0.60	0.64	5.00	0.04	6.48	6.52
5.45	0.60	0.64	5.00	0.04	6.48	6.52
5.50	0.60	0.64	5.00	0.04	6.48	6.52
5.55	0.60	0.64	5.00	0.04	6.48	6.52
5.60	0.60	0.64	5.00	0.04	6.48	6.52
5.65	0.60	0.64	5.00	0.04	6.48	6.52
5.70	0.60	0.63	5.00	0.04	6.48	6.52
5.75	0.52	0.63	5.00	0.04	6.48	6.51

5.80	0.37	0.63	5.00	0.04	6.47	6.51
5.85	0.30	0.63	5.00	0.04	6.46	6.50
5.90	0.25	0.63	5.00	0.04	6.45	6.49
5.95	0.21	0.63	5.00	0.04	6.44	6.48
6.00	0.16	0.63	5.00	0.04	6.43	6.46
6.05	0.16	0.63	5.00	0.04	6.41	6.44
6.10	0.16	0.63	5.00	0.04	6.39	6.42
6.15	0.16	0.63	5.00	0.04	6.37	6.41
6.20	0.16	0.63	5.00	0.04	6.35	6.39
6.25	0.16	0.63	5.00	0.04	6.33	6.37
6.30	0.16	0.63	5.00	0.04	6.31	6.35
6.35	0.16	0.63	5.00	0.04	6.29	6.33
6.40	0.16	0.63	5.00	0.04	6.27	6.31
6.45	0.16	0.63	5.00	0.04	6.25	6.29
6.50	0.16	0.63	5.00	0.04	6.23	6.27
6.55	0.16	0.63	5.00	0.04	6.21	6.25
6.60	0.16	0.63	5.00	0.04	6.19	6.23
6.65	0.16	0.63	5.00	0.04	6.17	6.21
6.70	0.16	0.63	5.00	0.04	6.15	6.19
6.75	0.16	0.63	5.00	0.04	6.13	6.17
6.80	0.16	0.63	5.00	0.04	6.11	6.15
6.85	0.16	0.63	5.00	0.04	6.09	6.13
6.90	0.16	0.63	5.00	0.04	6.07	6.11
6.95	0.16	0.63	5.00	0.04	6.05	6.09
7.00	0.16	0.63	5.00	0.04	6.03	6.07
7.05	0.16	0.63	5.00	0.04	6.01	6.05
7.10	0.16	0.63	5.00	0.04	5.99	6.03
7.15	0.16	0.63	5.00	0.04	5.97	6.01
7.20	0.16	0.63	5.00	0.04	5.95	5.99
7.25	0.16	0.63	5.00	0.04	5.93	5.97
7.30	0.16	0.63	5.00	0.04	5.91	5.95
7.35	0.16	0.63	5.00	0.04	5.89	5.93
7.40	0.16	0.63	5.00	0.04	5.87	5.91
7.45	0.16	0.63	5.00	0.04	5.85	5.89
7.50	0.16	0.63	5.00	0.04	5.83	5.87
7.55	0.16	0.63	5.00	0.04	5.81	5.85
7.60	0.16	0.63	5.00	0.04	5.79	5.83
7.65	0.16	0.63	5.00	0.04	5.77	5.81
7.70	0.16	0.63	5.00	0.04	5.75	5.79
7.75	0.16	0.63	5.00	0.04	5.73	5.77
7.80	0.16	0.63	5.00	0.04	5.71	5.75
7.85	0.16	0.63	5.00	0.04	5.69	5.73
7.90	0.16	0.63	5.00	0.04	5.67	5.71
7.95	0.16	0.63	5.00	0.04	5.65	5.69
8.00	0.16	0.63	5.00	0.04	5.63	5.67
8.05	0.16	0.63	5.00	0.04	5.61	5.65
8.10	0.16	0.63	5.00	0.04	5.59	5.63
8.15	0.16	0.63	5.00	0.04	5.57	5.61

8.20	0.16	0.63	5.00	0.04	5.55	5.59
8.25	0.17	0.63	5.00	0.04	5.53	5.57
8.30	0.17	0.63	5.00	0.04	5.51	5.55
8.35	0.17	0.63	5.00	0.04	5.49	5.53
8.40	0.17	0.63	5.00	0.04	5.47	5.51
8.45	0.17	0.63	5.00	0.04	5.46	5.49
8.50	0.17	0.63	5.00	0.04	5.44	5.47
8.55	0.17	0.63	5.00	0.04	5.42	5.45
8.60	0.17	0.63	5.00	0.04	5.40	5.44
8.65	0.17	0.63	5.00	0.04	5.38	5.42
8.70	0.17	0.63	5.00	0.04	5.36	5.40
8.75	0.17	0.63	5.00	0.04	5.34	5.38
8.80	0.17	0.63	5.00	0.04	5.33	5.36
8.85	0.17	0.63	5.00	0.04	5.31	5.34
8.90	0.17	0.63	5.00	0.04	5.29	5.33
8.95	0.17	0.63	5.00	0.04	5.27	5.31
9.00	0.17	0.63	5.00	0.04	5.25	5.29
9.05	0.17	0.63	5.00	0.04	5.23	5.27
9.10	0.17	0.63	5.00	0.04	5.21	5.25
9.15	0.17	0.63	5.00	0.04	5.20	5.23
9.20	0.17	0.63	5.00	0.04	5.18	5.21
9.25	0.17	0.63	5.00	0.04	5.16	5.20
9.30	0.17	0.63	5.00	0.04	5.14	5.18
9.35	0.17	0.63	5.00	0.04	5.12	5.16
9.40	0.17	0.63	5.00	0.04	5.10	5.14
9.45	0.17	0.63	5.00	0.04	5.08	5.12
9.50	0.17	0.63	5.00	0.04	5.07	5.10
9.55	0.17	0.63	5.00	0.04	5.05	5.08
9.60	0.17	0.63	5.00	0.04	5.03	5.07
9.65	0.17	0.63	5.00	0.04	5.01	5.05
9.70	0.17	0.63	5.00	0.04	4.99	5.03
9.75	0.17	0.63	5.00	0.04	4.97	5.01
9.80	0.17	0.63	5.00	0.04	4.95	4.99
9.85	0.17	0.63	5.00	0.04	4.94	4.97
9.90	0.17	0.63	5.00	0.04	4.92	4.95
9.95	0.17	0.63	5.00	0.04	4.90	4.93
10.00	0.17	0.63	5.00	0.04	4.88	4.92
10.05	0.17	0.63	5.00	0.04	4.86	4.90
10.10	0.17	0.63	5.00	0.04	4.84	4.88
10.15	0.18	0.63	5.00	0.04	4.82	4.86
10.20	0.18	0.63	5.00	0.04	4.81	4.84
10.25	0.18	0.63	5.00	0.04	4.79	4.82
10.30	0.18	0.63	5.00	0.04	4.77	4.81
10.35	0.18	0.63	5.00	0.04	4.75	4.79
10.40	0.19	0.63	5.00	0.04	4.74	4.77
10.45	0.19	0.63	5.00	0.04	4.72	4.76
10.50	0.19	0.63	5.00	0.04	4.70	4.74
10.55	0.19	0.63	5.00	0.04	4.69	4.72

10.60	0.19	0.63	5.00	0.04	4.67	4.71
10.65	0.19	0.63	5.00	0.04	4.65	4.69
10.70	0.20	0.63	5.00	0.04	4.64	4.67
10.75	0.20	0.63	5.00	0.04	4.62	4.66
10.80	0.20	0.63	5.00	0.04	4.61	4.64
10.85	0.20	0.63	5.00	0.04	4.59	4.63
10.90	0.20	0.63	5.00	0.04	4.58	4.61
10.95	0.20	0.63	5.00	0.04	4.56	4.60
11.00	0.21	0.63	5.00	0.04	4.55	4.58
11.05	0.21	0.63	5.00	0.04	4.53	4.57
11.10	0.21	0.63	5.00	0.04	4.52	4.55
11.15	0.21	0.63	5.00	0.04	4.50	4.54
11.20	0.21	0.63	5.00	0.04	4.49	4.53
11.25	0.21	0.63	5.00	0.04	4.47	4.51
11.30	0.22	0.63	5.00	0.04	4.46	4.50
11.35	0.22	0.63	5.00	0.04	4.45	4.48
11.40	0.22	0.63	5.00	0.04	4.43	4.47
11.45	0.22	0.63	5.00	0.04	4.42	4.46
11.50	0.22	0.63	5.00	0.04	4.41	4.44
11.55	0.22	0.63	5.00	0.04	4.39	4.43
11.60	0.23	0.63	5.00	0.04	4.38	4.42
11.65	0.23	0.63	5.00	0.04	4.37	4.40
11.70	0.23	0.63	5.00	0.04	4.35	4.39
11.75	0.23	0.63	5.00	0.04	4.34	4.38
11.80	0.23	0.63	5.00	0.04	4.33	4.37
11.85	0.23	0.63	5.00	0.04	4.32	4.35
11.90	0.23	0.63	5.00	0.04	4.30	4.34
11.95	0.24	0.63	5.00	0.04	4.29	4.33
12.00	0.24	0.63	5.00	0.04	4.28	4.32
12.05	0.24	0.63	5.00	0.04	4.27	4.30
12.10	0.24	0.63	5.00	0.04	4.25	4.29
12.15	0.24	0.63	5.00	0.04	4.24	4.28
12.20	0.24	0.63	5.00	0.04	4.23	4.27
12.25	0.25	0.63	5.00	0.04	4.22	4.26
12.30	0.25	0.63	5.00	0.04	4.21	4.24
12.35	0.25	0.62	5.00	0.04	4.20	4.23
12.40	0.25	0.62	5.00	0.04	4.18	4.22
12.45	0.25	0.62	5.00	0.04	4.17	4.21
12.50	0.25	0.62	5.00	0.04	4.16	4.20
12.55	0.26	0.62	5.00	0.04	4.15	4.19
12.60	0.26	0.62	5.00	0.04	4.14	4.18
12.65	0.26	0.62	5.00	0.04	4.13	4.17
12.70	0.26	0.62	5.00	0.04	4.12	4.15
12.75	0.26	0.62	5.00	0.04	4.11	4.14
12.80	0.26	0.62	5.00	0.04	4.10	4.13
12.85	0.26	0.62	5.00	0.04	4.09	4.12
12.90	0.27	0.62	5.00	0.04	4.07	4.11
12.95	0.27	0.62	5.00	0.04	4.06	4.10

13.00	0.27	0.62	5.00	0.04	4.05	4.09
13.05	0.27	0.62	5.00	0.04	4.04	4.08
13.10	0.27	0.62	5.00	0.04	4.03	4.07
13.15	0.27	0.62	5.00	0.04	4.02	4.06
13.20	0.28	0.62	5.00	0.04	4.01	4.05
13.25	0.28	0.62	5.00	0.04	4.00	4.04
13.30	0.28	0.62	5.00	0.04	3.99	4.03
13.35	0.28	0.62	5.00	0.04	3.98	4.02
13.40	0.28	0.62	5.00	0.04	3.97	4.01
13.45	0.28	0.62	5.00	0.04	3.96	4.00
13.50	0.29	0.62	5.00	0.04	3.95	3.99
13.55	0.29	0.62	5.00	0.04	3.94	3.98
13.60	0.29	0.62	5.00	0.04	3.93	3.97
13.65	0.29	0.62	5.00	0.04	3.92	3.96
13.70	0.29	0.62	5.00	0.04	3.91	3.95
13.75	0.29	0.62	5.00	0.04	3.90	3.94
13.80	0.30	0.62	5.00	0.04	3.90	3.93
13.85	0.30	0.62	5.00	0.04	3.89	3.92
13.90	0.30	0.62	5.00	0.04	3.88	3.91
13.95	0.30	0.62	5.00	0.04	3.87	3.90
14.00	0.30	0.62	5.00	0.04	3.86	3.89
14.05	0.30	0.62	5.00	0.04	3.85	3.89
14.10	0.31	0.62	5.00	0.04	3.84	3.88
14.15	0.31	0.62	5.00	0.04	3.83	3.87
14.20	0.31	0.62	5.00	0.04	3.82	3.86
14.25	0.31	0.62	5.00	0.04	3.81	3.85
14.30	0.31	0.62	5.00	0.04	3.80	3.84
14.35	0.31	0.62	5.00	0.04	3.79	3.83
14.40	0.32	0.62	5.00	0.04	3.79	3.82
14.45	0.32	0.62	5.00	0.04	3.78	3.81
14.50	0.32	0.62	5.00	0.04	3.77	3.81
14.55	0.32	0.62	5.00	0.04	3.76	3.80
14.60	0.32	0.62	5.00	0.04	3.75	3.79
14.65	0.32	0.62	5.00	0.04	3.74	3.78
14.70	0.33	0.62	5.00	0.04	3.73	3.77
14.75	0.33	0.62	5.00	0.04	3.73	3.76
14.80	0.38	0.62	5.00	0.04	3.72	3.75
14.85	0.38	0.62	5.00	0.04	3.71	3.75
14.90	0.38	0.62	5.00	0.04	3.70	3.74
14.95	0.39	0.62	5.00	0.04	3.70	3.73
15.00	0.39	0.62	5.00	0.04	3.69	3.72
15.05	0.39	0.62	5.00	0.04	3.68	3.72
15.10	0.38	0.62	5.00	0.04	3.67	3.71
15.15	0.38	0.62	5.00	0.04	3.67	3.70
15.20	0.37	0.62	5.00	0.04	3.66	3.70
15.25	0.37	0.62	5.00	0.04	3.65	3.69
15.30	0.37	0.62	5.00	0.04	3.64	3.68
15.35	0.36	0.62	5.00	0.04	3.64	3.67

15.40	0.36	0.62	5.00	0.04	3.63	3.67
15.45	0.36	0.62	5.00	0.04	3.62	3.66
15.50	0.35	0.62	5.00	0.04	3.61	3.65
15.55	0.35	0.62	5.00	0.04	3.61	3.64
15.60	0.35	0.62	5.00	0.04	3.60	3.63
15.65	0.35	0.62	5.00	0.04	3.59	3.63
15.70	0.34	0.62	5.00	0.04	3.58	3.62
15.75	0.34	0.62	5.00	0.04	3.57	3.61
15.80	0.34	0.62	5.00	0.04	3.56	3.60
15.85	0.33	0.62	5.00	0.04	3.56	3.59
15.90	0.33	0.62	5.00	0.04	3.55	3.59
15.95	0.33	0.62	5.00	0.04	3.54	3.58
16.00	0.33	0.62	5.00	0.04	3.53	3.57
16.05	0.32	0.62	5.00	0.04	3.52	3.56
16.10	0.32	0.62	5.00	0.04	3.51	3.55
16.15	0.32	0.62	5.00	0.04	3.51	3.54
16.20	0.32	0.62	5.00	0.04	3.50	3.53
16.25	0.31	0.62	5.00	0.04	3.49	3.53
16.30	0.31	0.62	5.00	0.04	3.48	3.52
16.35	0.31	0.62	5.00	0.04	3.47	3.51
16.40	0.31	0.62	5.00	0.04	3.46	3.50
16.45	0.30	0.62	5.00	0.04	3.45	3.49
16.50	0.30	0.62	5.00	0.04	3.44	3.48
16.55	0.30	0.62	5.00	0.04	3.44	3.47
16.60	0.30	0.62	5.00	0.04	3.43	3.46
16.65	0.30	0.62	5.00	0.04	3.42	3.45
16.70	0.29	0.62	5.00	0.04	3.41	3.44
16.75	0.29	0.62	5.00	0.04	3.40	3.43
16.80	0.29	0.62	5.00	0.04	3.39	3.43
16.85	0.29	0.62	5.00	0.04	3.38	3.42
16.90	0.29	0.62	5.00	0.04	3.37	3.41
16.95	0.28	0.62	5.00	0.04	3.36	3.40
17.00	0.28	0.62	5.00	0.04	3.35	3.39
17.05	0.28	0.62	5.00	0.04	3.34	3.38
17.10	0.28	0.62	5.00	0.04	3.33	3.37
17.15	0.28	0.62	5.00	0.04	3.32	3.36
17.20	0.27	0.62	5.00	0.04	3.31	3.35
17.25	0.27	0.62	5.00	0.04	3.30	3.34
17.30	0.27	0.62	5.00	0.04	3.29	3.33
17.35	0.27	0.62	5.00	0.04	3.28	3.32
17.40	0.27	0.62	5.00	0.04	3.27	3.31
17.45	0.27	0.62	5.00	0.04	3.26	3.29
17.50	0.26	0.62	5.00	0.04	3.25	3.28
17.55	0.26	0.62	5.00	0.04	3.24	3.27
17.60	0.26	0.62	5.00	0.04	3.23	3.26
17.65	0.26	0.62	5.00	0.04	3.22	3.25
17.70	0.26	0.62	5.00	0.04	3.20	3.24
17.75	0.26	0.62	5.00	0.04	3.19	3.23

17.80	0.25	0.62	5.00	0.04	3.18	3.22
17.85	0.25	0.62	5.00	0.04	3.17	3.21
17.90	0.25	0.62	5.00	0.04	3.16	3.20
17.95	0.25	0.62	5.00	0.04	3.15	3.18
18.00	0.25	0.62	5.00	0.04	3.14	3.17
18.05	0.25	0.62	5.00	0.04	3.13	3.16
18.10	0.24	0.62	5.00	0.04	3.11	3.15
18.15	0.24	0.62	5.00	0.04	3.10	3.14
18.20	0.24	0.62	5.00	0.04	3.09	3.13
18.25	0.24	0.62	5.00	0.04	3.08	3.11
18.30	0.24	0.62	5.00	0.04	3.07	3.10
18.35	0.24	0.62	5.00	0.04	3.05	3.09
18.40	0.23	0.62	5.00	0.04	3.04	3.08
18.45	0.23	0.62	5.00	0.04	3.03	3.07
18.50	0.23	0.62	5.00	0.04	3.02	3.05
18.55	0.23	0.62	5.00	0.04	3.00	3.04
18.60	0.23	0.62	5.00	0.04	2.99	3.03
18.65	0.23	0.62	5.00	0.04	2.98	3.01
18.70	0.23	0.62	5.00	0.04	2.97	3.00
18.75	0.22	0.62	5.00	0.04	2.95	2.99
18.80	0.22	0.62	5.00	0.04	2.94	2.98
18.85	0.22	0.62	5.00	0.04	2.93	2.96
18.90	0.22	0.62	5.00	0.04	2.91	2.95
18.95	0.22	0.62	5.00	0.04	2.90	2.94
19.00	0.22	0.61	5.00	0.04	2.89	2.92
19.05	0.21	0.61	5.00	0.04	2.87	2.91
19.10	0.21	0.61	5.00	0.04	2.86	2.89
19.15	0.21	0.61	5.00	0.04	2.84	2.88
19.20	0.21	0.61	5.00	0.04	2.83	2.87
19.25	0.21	0.61	5.00	0.04	2.82	2.85
19.30	0.21	0.61	5.00	0.04	2.80	2.84
19.35	0.21	0.61	5.00	0.04	2.79	2.82
19.40	0.20	0.61	5.00	0.04	2.77	2.81
19.45	0.20	0.61	5.00	0.04	2.76	2.79
19.50	0.20	0.61	5.00	0.04	2.74	2.78
19.55	0.20	0.61	5.00	0.04	2.73	2.76
19.60	0.20	0.61	5.00	0.04	2.71	2.75
19.65	0.20	0.61	5.00	0.04	2.70	2.73
19.70	0.20	0.61	5.00	0.04	2.68	2.72
19.75	0.20	0.61	5.00	0.04	2.67	2.70
19.80	0.19	0.61	5.00	0.04	2.65	2.69
19.85	0.19	0.61	5.00	0.04	2.63	2.67
19.90	0.19	0.61	5.00	0.04	2.62	2.65
19.95	0.19	0.61	5.00	0.04	2.60	2.64
20.00	0.19	0.61	5.00	0.04	2.59	2.62
20.05	0.19	0.61	5.00	0.04	2.57	2.61
20.10	0.19	0.61	5.00	0.04	2.55	2.59
20.15	0.19	0.61	5.00	0.04	2.54	2.57

20.20	0.20	0.61	5.00	0.04	2.52	2.56
20.25	0.20	0.61	5.00	0.04	2.50	2.54
20.30	0.20	0.61	5.00	0.04	2.49	2.53
20.35	0.20	0.61	5.00	0.04	2.47	2.51
20.40	0.21	0.61	5.00	0.04	2.46	2.50
20.45	0.21	0.61	5.00	0.04	2.44	2.48
20.50	0.21	0.61	5.00	0.04	2.43	2.47
20.55	0.21	0.61	5.00	0.04	2.42	2.45
20.60	0.21	0.61	5.00	0.04	2.40	2.44
20.65	0.22	0.61	5.00	0.04	2.39	2.42
20.70	0.22	0.61	5.00	0.04	2.37	2.41
20.75	0.22	0.61	5.00	0.04	2.36	2.40
20.80	0.22	0.61	5.00	0.04	2.35	2.38
20.85	0.22	0.61	5.00	0.04	2.33	2.37
20.90	0.23	0.61	5.00	0.04	2.32	2.36
20.95	0.23	0.61	5.00	0.04	2.31	2.34
21.00	0.23	0.61	5.00	0.04	2.29	2.33
21.05	0.23	0.61	5.00	0.04	2.28	2.32
21.10	0.24	0.61	5.00	0.04	2.27	2.31
21.15	0.24	0.61	5.00	0.04	2.26	2.29
21.20	0.24	0.61	5.00	0.04	2.25	2.28
21.25	0.24	0.61	5.00	0.04	2.23	2.27
21.30	0.24	0.61	5.00	0.04	2.22	2.26
21.35	0.25	0.61	5.00	0.04	2.21	2.25
21.40	0.25	0.61	5.00	0.04	2.20	2.23
21.45	0.25	0.61	5.00	0.04	2.19	2.22
21.50	0.25	0.61	5.00	0.04	2.17	2.21
21.55	0.25	0.61	5.00	0.04	2.16	2.20
21.60	0.26	0.61	5.00	0.04	2.15	2.19
21.65	0.26	0.61	5.00	0.04	2.14	2.18
21.70	0.26	0.61	5.00	0.04	2.13	2.17
21.75	0.26	0.61	5.00	0.04	2.12	2.16
21.80	0.26	0.61	5.00	0.04	2.11	2.15
21.85	0.27	0.61	5.00	0.04	2.10	2.13
21.90	0.27	0.61	5.00	0.04	2.09	2.12
21.95	0.27	0.61	5.00	0.04	2.08	2.11
22.00	0.27	0.61	5.00	0.04	2.07	2.10
22.05	0.28	0.61	5.00	0.04	2.06	2.09
22.10	0.28	0.61	5.00	0.04	2.05	2.09
22.15	0.28	0.61	5.00	0.04	2.04	2.08
22.20	0.28	0.61	5.00	0.04	2.03	2.07
22.25	0.29	0.61	5.00	0.04	2.02	2.06
22.30	0.29	0.61	5.00	0.04	2.01	2.05
22.35	0.29	0.61	5.00	0.04	2.00	2.04
22.40	0.29	0.61	5.00	0.04	1.99	2.03
22.45	0.29	0.61	5.00	0.04	1.99	2.02
22.50	0.30	0.61	5.00	0.04	1.98	2.01
22.55	0.30	0.61	5.00	0.04	1.97	2.01

22.60	0.30	0.61	5.00	0.04	1.96	2.00
22.65	0.30	0.61	5.00	0.04	1.95	1.99
22.70	0.31	0.61	5.00	0.04	1.95	1.98
22.75	0.31	0.61	5.00	0.04	1.94	1.97
22.80	0.31	0.61	5.00	0.04	1.93	1.97
22.85	0.31	0.61	5.00	0.04	1.92	1.96
22.90	0.32	0.61	5.00	0.04	1.92	1.95
22.95	0.32	0.61	5.00	0.04	1.91	1.94
23.00	0.32	0.61	5.00	0.04	1.90	1.94
23.05	0.33	0.61	5.00	0.04	1.89	1.93
23.10	0.33	0.61	5.00	0.04	1.89	1.92
23.15	0.33	0.61	5.00	0.04	1.88	1.92
23.20	0.33	0.61	5.00	0.04	1.87	1.91
23.25	0.34	0.61	5.00	0.04	1.87	1.90
23.30	0.34	0.61	5.00	0.04	1.86	1.90
23.35	0.34	0.61	5.00	0.04	1.85	1.89
23.40	0.34	0.61	5.00	0.04	1.85	1.88
23.45	0.35	0.61	5.00	0.04	1.84	1.88
23.50	0.35	0.61	5.00	0.04	1.83	1.87
23.55	0.35	0.61	5.00	0.04	1.83	1.86
23.60	0.36	0.61	5.00	0.04	1.82	1.86
23.65	0.36	0.61	5.00	0.04	1.82	1.85
23.70	0.36	0.61	5.00	0.04	1.81	1.85
23.75	0.37	0.61	5.00	0.04	1.80	1.84
23.80	0.37	0.61	5.00	0.04	1.80	1.84
23.85	0.37	0.61	5.00	0.04	1.79	1.83
23.90	0.38	0.61	5.00	0.04	1.79	1.82
23.95	0.38	0.61	5.00	0.04	1.78	1.82
24.00	0.38	0.61	5.00	0.04	1.78	1.81
24.05	0.39	0.61	5.00	0.04	1.77	1.81
24.10	0.39	0.61	5.00	0.04	1.76	1.80
24.15	0.40	0.61	5.00	0.04	1.76	1.80
24.20	0.40	0.61	5.00	0.04	1.75	1.79
24.25	0.40	0.61	5.00	0.04	1.75	1.79
24.30	0.41	0.61	5.00	0.04	1.74	1.78
24.35	0.41	0.61	5.00	0.04	1.74	1.78
24.40	0.42	0.61	5.00	0.04	1.73	1.77
24.45	0.42	0.61	5.00	0.04	1.73	1.77
24.50	0.43	0.61	5.00	0.04	1.72	1.76
24.55	0.43	0.61	5.00	0.04	1.72	1.76
24.60	0.44	0.61	5.00	0.04	1.71	1.75
24.65	0.45	0.61	5.00	0.04	1.71	1.75
24.70	0.45	0.61	5.00	0.04	1.70	1.74
24.75	0.46	0.61	5.00	0.04	1.70	1.74
24.80	0.47	0.61	5.00	0.04	1.69	1.73
24.85	0.48	0.61	5.00	0.04	1.69	1.73
24.90	0.49	0.61	5.00	0.04	1.69	1.72
24.95	0.51	0.61	5.00	0.04	1.68	1.72

25.00	0.53	0.61	5.00	0.04	1.68	1.71
25.05	0.60	0.61	5.00	0.04	1.67	1.71
25.10	0.60	0.61	5.00	0.04	1.67	1.70
25.15	0.60	0.61	5.00	0.04	1.66	1.70
25.20	0.60	0.61	5.00	0.04	1.66	1.70
25.25	0.60	0.61	5.00	0.04	1.66	1.69
25.30	0.60	0.61	5.00	0.04	1.65	1.69
25.35	0.60	0.61	5.00	0.04	1.65	1.68
25.40	0.60	0.61	5.00	0.04	1.64	1.68
25.45	0.60	0.61	5.00	0.04	1.64	1.68
25.50	0.60	0.61	5.00	0.04	1.64	1.67
25.55	0.60	0.61	5.00	0.04	1.63	1.67
25.60	0.60	0.61	5.00	0.04	1.63	1.66
25.65	0.60	0.61	5.00	0.04	1.62	1.66
25.70	0.60	0.60	5.00	0.04	1.62	1.66
25.75	0.60	0.60	5.00	0.04	1.62	1.65
25.80	0.60	0.60	5.00	0.04	1.61	1.65
25.85	0.60	0.60	5.00	0.04	1.61	1.65
25.90	0.60	0.60	5.00	0.04	1.61	1.64
25.95	0.60	0.60	5.00	0.04	1.60	1.64
26.00	0.60	0.60	5.00	0.04	1.60	1.64
26.05	0.60	0.60	5.00	0.04	1.60	1.63
26.10	0.60	0.60	5.00	0.04	1.59	1.63
26.15	0.60	0.60	5.00	0.04	1.59	1.63
26.20	0.60	0.60	5.00	0.04	1.59	1.62
26.25	0.60	0.60	5.00	0.04	1.58	1.62
26.30	0.60	0.60	5.00	0.04	1.58	1.62
26.35	0.60	0.60	5.00	0.04	1.58	1.62
26.40	0.60	0.60	5.00	0.04	1.58	1.61
26.45	0.60	0.60	5.00	0.04	1.57	1.61
26.50	0.60	0.60	5.00	0.04	1.57	1.61
26.55	0.60	0.60	5.00	0.04	1.57	1.60
26.60	0.60	0.60	5.00	0.04	1.57	1.60
26.65	0.60	0.60	5.00	0.04	1.56	1.60
26.70	0.60	0.60	5.00	0.04	1.56	1.60
26.75	0.60	0.60	5.00	0.04	1.56	1.59
26.80	0.60	0.60	5.00	0.04	1.55	1.59
26.85	0.60	0.60	5.00	0.04	1.55	1.59
26.90	0.60	0.60	5.00	0.04	1.55	1.59
26.95	0.60	0.60	5.00	0.04	1.55	1.58
27.00	0.60	0.60	5.00	0.04	1.54	1.58
27.05	0.60	0.60	5.00	0.04	1.54	1.58
27.10	0.60	0.60	5.00	0.04	1.54	1.58
27.15	0.60	0.60	5.00	0.04	1.54	1.57
27.20	0.60	0.60	5.00	0.04	1.54	1.57
27.25	0.60	0.60	5.00	0.04	1.53	1.57
27.30	0.60	0.60	5.00	0.04	1.53	1.57
27.35	0.60	0.60	5.00	0.04	1.53	1.57

27.40	0.60	0.60	5.00	0.04	1.53	1.56
27.45	0.60	0.60	5.00	0.04	1.53	1.56
27.50	0.60	0.60	5.00	0.04	1.52	1.56
27.55	0.60	0.60	5.00	0.04	1.52	1.56
27.60	0.60	0.60	5.00	0.04	1.52	1.56
27.65	0.60	0.60	5.00	0.04	1.52	1.55
27.70	0.60	0.60	5.00	0.04	1.52	1.55
27.75	0.60	0.60	5.00	0.04	1.51	1.55
27.80	0.59	0.60	5.00	0.04	1.51	1.55
27.85	0.59	0.60	5.00	0.04	1.51	1.55
27.90	0.59	0.60	5.00	0.04	1.51	1.54
27.95	0.59	0.60	5.00	0.04	1.51	1.54
28.00	0.59	0.60	5.00	0.04	1.50	1.54
28.05	0.59	0.60	5.00	0.04	1.50	1.54
28.10	0.59	0.60	5.00	0.04	1.50	1.54
28.15	0.59	0.60	5.00	0.04	1.50	1.54
28.20	0.59	0.60	5.00	0.04	1.50	1.53
28.25	0.59	0.60	5.00	0.04	1.50	1.53
28.30	0.59	0.60	5.00	0.04	1.49	1.53
28.35	0.59	0.60	5.00	0.04	1.49	1.53
28.40	0.59	0.60	5.00	0.04	1.49	1.53
28.45	0.59	0.60	5.00	0.04	1.49	1.53
28.50	0.59	0.60	5.00	0.04	1.49	1.52
28.55	0.59	0.60	5.00	0.04	1.49	1.52
28.60	0.59	0.60	5.00	0.04	1.48	1.52
28.65	0.59	0.60	5.00	0.04	1.48	1.52
28.70	0.59	0.60	5.00	0.04	1.48	1.52
28.75	0.59	0.60	5.00	0.04	1.48	1.52
28.80	0.59	0.60	5.00	0.04	1.48	1.51
28.85	0.59	0.60	5.00	0.04	1.48	1.51
28.90	0.59	0.60	5.00	0.04	1.47	1.51
28.95	0.59	0.60	5.00	0.04	1.47	1.51
29.00	0.59	0.60	5.00	0.04	1.47	1.51
29.05	0.59	0.60	5.00	0.04	1.47	1.51
29.10	0.59	0.60	5.00	0.04	1.47	1.50
29.15	0.59	0.60	5.00	0.04	1.47	1.50
29.20	0.59	0.60	5.00	0.04	1.46	1.50
29.25	0.59	0.60	5.00	0.04	1.46	1.50
29.30	0.59	0.60	5.00	0.04	1.46	1.50
29.35	0.59	0.60	5.00	0.04	1.46	1.50
29.40	0.59	0.60	5.00	0.04	1.46	1.50
29.45	0.59	0.60	5.00	0.04	1.46	1.49
29.50	0.59	0.60	5.00	0.04	1.46	1.49
29.55	0.59	0.60	5.00	0.04	1.45	1.49
29.60	0.59	0.60	5.00	0.04	1.45	1.49
29.65	0.59	0.60	5.00	0.04	1.45	1.49
29.70	0.59	0.60	5.00	0.04	1.45	1.49
29.75	0.59	0.60	5.00	0.04	1.45	1.48

29.80	0.59	0.60	5.00	0.04	1.45	1.48
29.85	0.59	0.60	5.00	0.04	1.44	1.48
29.90	0.59	0.60	5.00	0.04	1.44	1.48
29.95	0.59	0.60	5.00	0.04	1.44	1.48
30.00	0.59	0.60	5.00	0.04	1.44	1.48
30.05	0.59	0.60	5.00	0.04	1.44	1.47
30.10	0.59	0.60	5.00	0.04	1.44	1.47
30.15	0.59	0.60	5.00	0.04	1.44	1.47
30.20	0.59	0.60	5.00	0.04	1.43	1.47
30.25	0.59	0.60	5.00	0.04	1.43	1.47
30.30	0.59	0.60	5.00	0.04	1.43	1.47
30.35	0.59	0.60	5.00	0.04	1.43	1.47
30.40	0.59	0.60	5.00	0.04	1.43	1.46
30.45	0.59	0.60	5.00	0.04	1.43	1.46
30.50	0.59	0.60	5.00	0.04	1.42	1.46
30.55	0.59	0.60	5.00	0.04	1.42	1.46
30.60	0.59	0.60	5.00	0.04	1.42	1.46
30.65	0.59	0.59	5.00	0.04	1.42	1.46
30.70	0.59	0.59	5.00	0.04	1.42	1.45
30.75	0.59	0.59	5.00	0.04	1.42	1.45
30.80	0.59	0.59	5.00	0.04	1.41	1.45
30.85	0.58	0.59	5.00	0.04	1.41	1.45
30.90	0.58	0.59	5.00	0.04	1.41	1.45
30.95	0.58	0.59	5.00	0.04	1.41	1.45
31.00	0.58	0.59	5.00	0.04	1.41	1.44
31.05	0.58	0.59	5.00	0.04	1.41	1.44
31.10	0.58	0.59	5.00	0.04	1.40	1.44
31.15	0.58	0.59	5.00	0.04	1.40	1.44
31.20	0.58	0.59	5.00	0.04	1.40	1.44
31.25	0.58	0.59	5.00	0.04	1.40	1.44
31.30	0.58	0.59	5.00	0.04	1.40	1.43
31.35	0.58	0.59	5.00	0.04	1.40	1.43
31.40	0.58	0.59	5.00	0.04	1.39	1.43
31.45	0.58	0.59	5.00	0.04	1.39	1.43
31.50	0.58	0.59	5.00	0.04	1.39	1.43
31.55	0.58	0.59	5.00	0.04	1.39	1.42
31.60	0.58	0.59	5.00	0.04	1.39	1.42
31.65	0.58	0.59	5.00	0.04	1.38	1.42
31.70	0.58	0.59	5.00	0.04	1.38	1.42
31.75	0.58	0.59	5.00	0.04	1.38	1.42
31.80	0.58	0.59	5.00	0.04	1.38	1.42
31.85	0.58	0.59	5.00	0.04	1.38	1.41
31.90	0.58	0.59	5.00	0.04	1.38	1.41
31.95	0.58	0.59	5.00	0.04	1.37	1.41
32.00	0.58	0.59	5.00	0.04	1.37	1.41
32.05	0.58	0.59	5.00	0.04	1.37	1.41
32.10	0.58	0.59	5.00	0.04	1.37	1.40
32.15	0.58	0.59	5.00	0.04	1.37	1.40

32.20	0.58	0.59	5.00	0.04	1.36	1.40
32.25	0.58	0.59	5.00	0.04	1.36	1.40
32.30	0.58	0.59	5.00	0.04	1.36	1.40
32.35	0.58	0.59	5.00	0.04	1.36	1.39
32.40	0.58	0.59	5.00	0.04	1.36	1.39
32.45	0.58	0.59	5.00	0.04	1.35	1.39
32.50	0.58	0.59	5.00	0.04	1.35	1.39
32.55	0.58	0.59	5.00	0.04	1.35	1.39
32.60	0.58	0.58	5.00	0.04	1.35	1.38
32.65	0.58	0.58	5.00	0.04	1.34	1.38
32.70	0.58	0.58	5.00	0.04	1.34	1.38
32.75	0.58	0.58	5.00	0.04	1.34	1.38
32.80	0.58	0.58	5.00	0.04	1.34	1.37
32.85	0.58	0.58	5.00	0.04	1.34	1.37
32.90	0.58	0.58	5.00	0.04	1.33	1.37
32.95	0.58	0.58	5.00	0.04	1.33	1.37
33.00	0.58	0.58	5.00	0.04	1.33	1.36
33.05	0.58	0.58	5.00	0.04	1.33	1.36
33.10	0.58	0.58	5.00	0.04	1.32	1.36
33.15	0.58	0.58	5.00	0.04	1.32	1.36
33.20	0.58	0.58	5.00	0.04	1.32	1.35
33.25	0.58	0.58	5.00	0.04	1.32	1.35
33.30	0.58	0.58	5.00	0.04	1.31	1.35
33.35	0.58	0.58	5.00	0.04	1.31	1.35
33.40	0.58	0.58	5.00	0.04	1.31	1.34
33.45	0.58	0.58	5.00	0.04	1.30	1.34
33.50	0.58	0.58	5.00	0.04	1.30	1.34
33.55	0.58	0.58	5.00	0.04	1.30	1.33
33.60	0.58	0.58	5.00	0.04	1.29	1.33
33.65	0.58	0.58	5.00	0.04	1.29	1.33
33.70	0.58	0.58	5.00	0.04	1.29	1.32
33.75	0.58	0.58	5.00	0.04	1.28	1.32
33.80	0.58	0.58	5.00	0.04	1.28	1.32
33.85	0.58	0.58	5.00	0.04	1.28	1.31
33.90	0.58	0.58	5.00	0.04	1.27	1.31
33.95	0.58	0.58	5.00	0.04	1.27	1.31
34.00	0.58	0.58	5.00	0.04	1.27	1.30
34.05	0.58	0.58	5.00	0.04	1.26	1.30
34.10	0.58	0.58	5.00	0.04	1.26	1.29
34.15	0.57	0.58	5.00	0.04	1.25	1.29
34.20	0.57	0.58	5.00	0.04	1.25	1.29
34.25	0.57	0.58	5.00	0.04	1.24	1.28
34.30	0.57	0.58	5.00	0.04	1.24	1.28
34.35	0.57	0.58	5.00	0.04	1.23	1.27
34.40	0.57	0.58	5.00	0.04	1.23	1.27
34.45	0.57	0.58	5.00	0.04	1.23	1.26
34.50	0.57	0.57	5.00	0.04	1.22	1.26
34.55	0.57	0.57	5.00	0.04	1.21	1.25

34.60	0.57	0.57	5.00	0.04	1.21	1.25
34.65	0.57	0.57	5.00	0.04	1.20	1.24
34.70	0.57	0.57	5.00	0.04	1.20	1.24
34.75	0.57	0.57	5.00	0.04	1.19	1.23
34.80	0.57	0.57	5.00	0.04	1.19	1.22
34.85	0.57	0.57	5.00	0.04	1.18	1.22
34.90	0.57	0.57	5.00	0.04	1.18	1.21
34.95	0.57	0.57	5.00	0.04	1.17	1.21
35.00	0.57	0.57	5.00	0.04	1.16	1.20
35.05	0.57	0.57	5.00	0.04	1.16	1.20
35.10	0.57	0.57	5.00	0.04	1.15	1.19
35.15	0.57	0.57	5.00	0.04	1.15	1.18
35.20	0.57	0.57	5.00	0.04	1.14	1.18
35.25	0.57	0.57	5.00	0.04	1.13	1.17
35.30	0.57	0.57	5.00	0.04	1.13	1.17
35.35	0.57	0.57	5.00	0.04	1.12	1.16
35.40	0.57	0.57	5.00	0.04	1.12	1.15
35.45	0.57	0.57	5.00	0.04	1.11	1.15
35.50	0.57	0.57	5.00	0.04	1.11	1.14
35.55	0.57	0.57	5.00	0.04	1.10	1.14
35.60	0.57	0.57	5.00	0.04	1.09	1.13
35.65	0.57	0.57	5.00	0.04	1.09	1.13
35.70	0.57	0.57	5.00	0.04	1.08	1.12
35.75	0.57	0.57	5.00	0.04	1.08	1.11
35.80	0.57	0.57	5.00	0.04	1.07	1.11
35.85	0.57	0.57	5.00	0.04	1.07	1.10
35.90	0.57	0.57	5.00	0.04	1.06	1.10
35.95	0.57	0.57	5.00	0.04	1.05	1.09
36.00	0.57	0.57	5.00	0.04	1.05	1.09
36.05	0.57	0.57	5.00	0.04	1.04	1.08
36.10	0.57	0.57	5.00	0.04	1.04	1.07
36.15	0.57	0.57	5.00	0.04	1.03	1.07
36.20	0.57	0.57	5.00	0.04	1.03	1.06
36.25	0.57	0.57	5.00	0.04	1.02	1.06
36.30	0.57	0.57	5.00	0.04	1.02	1.05
36.35	0.57	0.57	5.00	0.04	1.01	1.05
36.40	0.57	0.56	5.00	0.04	1.00	1.04
36.45	0.57	0.56	5.00	0.04	1.00	1.04
36.50	0.57	0.56	5.00	0.04	0.99	1.03
36.55	0.57	0.56	5.00	0.04	0.99	1.03
36.60	0.57	0.56	5.00	0.04	0.98	1.02
36.65	0.57	0.56	5.00	0.04	0.98	1.01
36.70	0.57	0.56	5.00	0.04	0.97	1.01
36.75	0.57	0.56	5.00	0.04	0.97	1.00
36.80	0.57	0.56	5.00	0.04	0.96	1.00
36.85	0.57	0.56	5.00	0.04	0.96	0.99
36.90	0.57	0.56	5.00	0.04	0.95	0.99
36.95	0.57	0.56	5.00	0.04	0.95	0.98

37.00	0.57	0.56	5.00	0.04	0.94	0.98
37.05	0.57	0.56	5.00	0.04	0.93	0.97
37.10	0.57	0.56	5.00	0.04	0.93	0.97
37.15	0.57	0.56	5.00	0.04	0.92	0.96
37.20	0.57	0.56	5.00	0.04	0.92	0.96
37.25	0.57	0.56	5.00	0.04	0.91	0.95
37.30	0.57	0.56	5.00	0.04	0.91	0.95
37.35	0.57	0.56	5.00	0.04	0.90	0.94
37.40	0.57	0.56	5.00	0.04	0.90	0.93
37.45	0.57	0.56	5.00	0.04	0.89	0.93
37.50	0.57	0.56	5.00	0.04	0.89	0.92
37.55	0.56	0.56	5.00	0.04	0.88	0.92
37.60	0.56	0.56	5.00	0.04	0.88	0.91
37.65	0.56	0.56	5.00	0.04	0.87	0.91
37.70	0.56	0.56	5.00	0.04	0.87	0.90
37.75	0.56	0.56	5.00	0.04	0.86	0.90
37.80	0.56	0.56	5.00	0.04	0.86	0.89
37.85	0.56	0.56	5.00	0.04	0.85	0.89
37.90	0.56	0.56	5.00	0.04	0.85	0.88
37.95	0.56	0.56	5.00	0.04	0.84	0.88
38.00	0.56	0.56	5.00	0.04	0.84	0.87
38.05	0.56	0.56	5.00	0.04	0.83	0.87
38.10	0.56	0.56	5.00	0.04	0.83	0.86
38.15	0.56	0.56	5.00	0.04	0.82	0.86
38.20	0.56	0.56	5.00	0.04	0.82	0.85
38.25	0.56	0.56	5.00	0.04	0.81	0.85
38.30	0.56	0.55	5.00	0.04	0.81	0.84
38.35	0.56	0.55	5.00	0.04	0.80	0.84
38.40	0.56	0.55	5.00	0.04	0.80	0.83
38.45	0.56	0.55	5.00	0.04	0.79	0.83
38.50	0.56	0.55	5.00	0.04	0.79	0.82
38.55	0.56	0.55	5.00	0.04	0.78	0.82
38.60	0.56	0.55	5.00	0.04	0.78	0.82
38.65	0.56	0.55	5.00	0.04	0.77	0.81
38.70	0.56	0.55	5.00	0.04	0.77	0.81
38.75	0.56	0.55	5.00	0.04	0.76	0.80
38.80	0.56	0.55	5.00	0.04	0.76	0.80
38.85	0.56	0.55	5.00	0.04	0.75	0.79
38.90	0.56	0.55	5.00	0.04	0.75	0.79
38.95	0.56	0.55	5.00	0.04	0.75	0.78
39.00	0.56	0.55	5.00	0.04	0.74	0.78
39.05	0.56	0.55	5.00	0.04	0.74	0.77
39.10	0.56	0.55	5.00	0.04	0.73	0.77
39.15	0.56	0.55	5.00	0.04	0.73	0.76
39.20	0.56	0.55	5.00	0.04	0.72	0.76
39.25	0.56	0.55	5.00	0.04	0.72	0.75
39.30	0.56	0.55	5.00	0.04	0.71	0.75
39.35	0.56	0.55	5.00	0.04	0.71	0.75

39.40	0.56	0.55	5.00	0.04	0.70	0.74
39.45	0.56	0.55	5.00	0.04	0.70	0.74
39.50	0.56	0.55	5.00	0.04	0.70	0.73
39.55	0.56	0.55	5.00	0.04	0.69	0.73
39.60	0.56	0.55	5.00	0.04	0.69	0.72
39.65	0.56	0.55	5.00	0.04	0.68	0.72
39.70	0.56	0.55	5.00	0.04	0.68	0.72
39.75	0.56	0.55	5.00	0.04	0.67	0.71
39.80	0.56	0.55	5.00	0.04	0.67	0.71
39.85	0.56	0.55	5.00	0.04	0.67	0.70
39.90	0.56	0.55	5.00	0.04	0.66	0.70
39.95	0.56	0.55	5.00	0.04	0.66	0.69
40.00	0.56	0.55	5.00	0.04	0.65	0.69
40.05	0.56	0.55	5.00	0.04	0.65	0.69
40.10	0.56	0.55	5.00	0.04	0.65	0.68
40.15	0.56	0.55	5.00	0.04	0.64	0.68
40.20	0.56	0.54	5.00	0.04	0.64	0.67
40.25	0.56	0.54	5.00	0.04	0.63	0.67
40.30	0.56	0.54	5.00	0.04	0.63	0.66
40.35	0.56	0.54	5.00	0.04	0.62	0.66
40.40	0.56	0.54	5.00	0.04	0.62	0.65
40.45	0.56	0.54	5.00	0.04	0.61	0.65
40.50	0.56	0.54	5.00	0.04	0.61	0.65
40.55	0.56	0.54	5.00	0.04	0.60	0.64
40.60	0.56	0.54	5.00	0.04	0.60	0.64
40.65	0.56	0.54	5.00	0.04	0.59	0.63
40.70	0.56	0.54	5.00	0.04	0.59	0.63
40.75	0.56	0.54	5.00	0.04	0.59	0.63
40.80	0.56	0.54	5.00	0.04	0.59	0.63
40.85	0.56	0.54	5.00	0.04	0.59	0.62
40.90	0.56	0.54	5.00	0.04	0.59	0.62
40.95	0.56	0.54	5.00	0.04	0.58	0.62
41.00	0.56	0.54	5.00	0.04	0.58	0.62
41.05	0.56	0.54	5.00	0.04	0.58	0.62
41.10	0.56	0.54	5.00	0.04	0.58	0.61
41.15	0.55	0.54	5.00	0.04	0.58	0.61
41.20	0.55	0.54	5.00	0.04	0.57	0.61
41.25	0.55	0.54	5.00	0.04	0.57	0.61
41.30	0.55	0.54	5.00	0.04	0.57	0.61
41.35	0.55	0.54	5.00	0.04	0.57	0.61
41.40	0.55	0.54	5.00	0.04	0.57	0.60
41.45	0.55	0.54	5.00	0.04	0.56	0.60
41.50	0.55	0.54	5.00	0.04	0.56	0.60
41.55	0.55	0.54	5.00	0.04	0.56	0.60
41.60	0.55	0.54	5.00	0.04	0.56	0.60
41.65	0.55	0.54	5.00	0.04	0.56	0.59
41.70	0.55	0.54	5.00	0.04	0.55	0.59
41.75	0.55	0.54	5.00	0.04	0.55	0.59

41.80	0.55	0.54	5.00	0.04	0.55	0.59
41.85	0.55	0.54	5.00	0.04	0.55	0.58
41.90	0.55	0.54	5.00	0.04	0.55	0.58
41.95	0.55	0.54	5.00	0.04	0.54	0.58
42.00	0.55	0.54	5.00	0.04	0.54	0.58
42.05	0.55	0.54	5.00	0.04	0.54	0.58
42.10	0.55	0.54	5.00	0.04	0.54	0.57
42.15	0.55	0.53	5.00	0.04	0.53	0.57
42.20	0.52	0.53	5.00	0.04	0.53	0.57
42.25	0.48	0.53	5.00	0.04	0.53	0.57
42.30	0.46	0.53	5.00	0.04	0.53	0.56
42.35	0.45	0.53	5.00	0.04	0.52	0.56
42.40	0.44	0.53	5.00	0.04	0.52	0.56
42.45	0.43	0.53	5.00	0.04	0.52	0.56
42.50	0.42	0.53	5.00	0.04	0.52	0.55
42.55	0.41	0.53	5.00	0.04	0.51	0.55
42.60	0.41	0.53	5.00	0.04	0.51	0.55
42.65	0.40	0.53	5.00	0.04	0.51	0.54
42.70	0.40	0.53	5.00	0.04	0.51	0.54
42.75	0.39	0.53	5.00	0.04	0.50	0.54
42.80	0.39	0.53	5.00	0.04	0.50	0.54
42.85	0.38	0.53	5.00	0.04	0.50	0.53
42.90	0.38	0.53	5.00	0.04	0.49	0.53
42.95	0.37	0.53	5.00	0.04	0.49	0.53
43.00	0.37	0.53	5.00	0.04	0.49	0.52
43.05	0.37	0.53	5.00	0.04	0.48	0.52
43.10	0.36	0.53	5.00	0.04	0.48	0.52
43.15	0.36	0.53	5.00	0.04	0.48	0.52
43.20	0.35	0.53	5.00	0.04	0.48	0.51
43.25	0.35	0.53	5.00	0.04	0.47	0.51
43.30	0.35	0.53	5.00	0.04	0.47	0.51
43.35	0.34	0.53	5.00	0.04	0.47	0.50
43.40	0.34	0.53	5.00	0.04	0.46	0.50
43.45	0.34	0.53	5.00	0.04	0.46	0.50
43.50	0.34	0.53	5.00	0.04	0.46	0.49
43.55	0.33	0.53	5.00	0.04	0.45	0.49
43.60	0.33	0.53	5.00	0.04	0.45	0.49
43.65	0.33	0.53	5.00	0.04	0.44	0.48
43.70	0.32	0.53	5.00	0.04	0.44	0.48
43.75	0.32	0.53	5.00	0.04	0.44	0.47
43.80	0.32	0.53	5.00	0.04	0.43	0.47
43.85	0.32	0.53	5.00	0.04	0.43	0.47
43.90	0.31	0.53	5.00	0.04	0.43	0.46
43.95	0.31	0.53	5.00	0.04	0.42	0.46
44.00	0.31	0.53	5.00	0.04	0.42	0.46
44.05	0.31	0.52	5.00	0.04	0.41	0.45
44.10	0.30	0.52	5.00	0.04	0.41	0.45
44.15	0.30	0.52	5.00	0.04	0.41	0.44

44.20	0.30	0.52	5.00	0.04	0.40	0.44
44.25	0.30	0.52	5.00	0.04	0.40	0.43
44.30	0.29	0.52	5.00	0.04	0.39	0.43
44.35	0.29	0.52	5.00	0.04	0.39	0.43
44.40	0.29	0.52	5.00	0.04	0.38	0.42
44.45	0.29	0.52	5.00	0.04	0.38	0.42
44.50	0.28	0.52	5.00	0.04	0.38	0.41
44.55	0.28	0.52	5.00	0.04	0.37	0.41
44.60	0.28	0.52	5.00	0.04	0.37	0.40
44.65	0.28	0.52	5.00	0.04	0.36	0.40
44.70	0.28	0.52	5.00	0.04	0.36	0.39
44.75	0.27	0.52	5.00	0.04	0.35	0.39
44.80	0.27	0.52	5.00	0.04	0.35	0.38
44.85	0.27	0.52	5.00	0.04	0.34	0.38
44.90	0.27	0.52	5.00	0.04	0.34	0.37
44.95	0.27	0.52	5.00	0.04	0.33	0.37
45.00	0.26	0.52	5.00	0.04	0.33	0.36
45.05	0.27	0.52	5.00	0.04	0.32	0.36
45.10	0.27	0.52	5.00	0.04	0.32	0.35
45.15	0.27	0.52	5.00	0.04	0.31	0.35
45.20	0.27	0.52	5.00	0.04	0.30	0.34
45.25	0.27	0.52	5.00	0.04	0.30	0.34
45.30	0.27	0.52	5.00	0.04	0.29	0.33
45.35	0.27	0.52	5.00	0.04	0.29	0.33
45.40	0.28	0.52	5.00	0.04	0.28	0.32
45.45	0.28	0.52	5.00	0.04	0.28	0.32
45.50	0.28	0.52	5.00	0.04	0.28	0.31
45.55	0.28	0.52	5.00	0.04	0.27	0.31
45.60	0.28	0.52	5.00	0.04	0.27	0.30
45.65	0.29	0.52	5.00	0.04	0.26	0.30
45.70	0.29	0.52	5.00	0.04	0.26	0.29
45.75	0.29	0.52	5.00	0.04	0.25	0.29
45.80	0.29	0.52	5.00	0.04	0.25	0.28
45.85	0.29	0.52	5.00	0.04	0.24	0.28
45.90	0.29	0.52	5.00	0.04	0.24	0.28
45.95	0.30	0.51	5.00	0.04	0.23	0.27
46.00	0.30	0.51	5.00	0.04	0.23	0.27
46.05	0.30	0.51	5.00	0.04	0.23	0.26
46.10	0.30	0.51	5.00	0.04	0.22	0.26
46.15	0.30	0.51	5.00	0.04	0.22	0.25
46.20	0.31	0.51	5.00	0.04	0.21	0.25
46.25	0.31	0.51	5.00	0.04	0.21	0.25
46.30	0.31	0.51	5.00	0.04	0.21	0.24
46.35	0.31	0.51	5.00	0.04	0.20	0.24
46.40	0.31	0.51	5.00	0.04	0.20	0.23
46.45	0.32	0.51	5.00	0.04	0.19	0.23
46.50	0.32	0.51	5.00	0.04	0.19	0.23
46.55	0.32	0.51	5.00	0.04	0.19	0.22

46.60	0.32	0.51	5.00	0.04	0.18	0.22
46.65	0.32	0.51	5.00	0.04	0.18	0.22
46.70	0.33	0.51	5.00	0.04	0.18	0.21
46.75	0.33	0.51	5.00	0.04	0.17	0.21
46.80	0.33	0.51	5.00	0.04	0.17	0.20
46.85	0.33	0.51	5.00	0.04	0.16	0.20
46.90	0.34	0.51	5.00	0.04	0.16	0.20
46.95	0.34	0.51	5.00	0.04	0.16	0.19
47.00	0.34	0.51	5.00	0.04	0.15	0.19
47.05	0.34	0.51	5.00	0.04	0.15	0.19
47.10	0.35	0.51	5.00	0.04	0.15	0.18
47.15	0.35	0.51	5.00	0.04	0.14	0.18
47.20	0.35	0.51	5.00	0.04	0.14	0.18
47.25	0.35	0.51	5.00	0.04	0.14	0.17
47.30	0.36	0.51	5.00	0.04	0.13	0.17
47.35	0.36	0.51	5.00	0.04	0.13	0.17
47.40	0.36	0.51	5.00	0.04	0.13	0.17
47.45	0.36	0.51	5.00	0.04	0.13	0.16
47.50	0.37	0.51	5.00	0.04	0.12	0.16
47.55	0.37	0.51	5.00	0.04	0.12	0.16
47.60	0.37	0.51	5.00	0.04	0.12	0.15
47.65	0.38	0.51	5.00	0.04	0.11	0.15
47.70	0.38	0.51	5.00	0.04	0.11	0.15
47.75	0.39	0.51	5.00	0.04	0.11	0.14
47.80	0.39	0.51	5.00	0.04	0.10	0.14
47.85	0.39	0.50	5.00	0.04	0.10	0.14
47.90	0.40	0.50	5.00	0.04	0.10	0.14
47.95	0.40	0.50	5.00	0.04	0.10	0.13
48.00	0.41	0.50	5.00	0.04	0.09	0.13
48.05	0.41	0.50	5.00	0.04	0.09	0.13
48.10	0.42	0.50	5.00	0.04	0.09	0.12
48.15	0.43	0.50	5.00	0.04	0.09	0.12
48.20	0.43	0.50	5.00	0.04	0.08	0.12
48.25	0.44	0.50	5.00	0.04	0.08	0.12
48.30	0.46	0.50	5.00	0.04	0.08	0.11
48.35	0.47	0.50	5.00	0.04	0.07	0.11
48.40	0.49	0.50	5.00	0.04	0.07	0.11
48.45	0.53	0.50	5.00	0.04	0.07	0.11
48.50	0.53	0.50	5.00	0.04	0.07	0.10
48.55	0.53	0.50	5.00	0.04	0.06	0.10
48.60	0.53	0.50	5.00	0.04	0.06	0.10
48.65	0.53	0.50	5.00	0.04	0.06	0.10
48.70	0.53	0.50	5.00	0.04	0.06	0.09
48.75	0.53	0.50	5.00	0.04	0.05	0.09
48.80	0.53	0.50	5.00	0.04	0.05	0.09
48.85	0.53	0.50	5.00	0.04	0.05	0.09
48.90	0.53	0.50	5.00	0.04	0.05	0.08
48.95	0.53	0.50	5.00	0.04	0.05	0.08

49.00	0.53	0.50	5.00	0.04	0.04	0.08
49.05	0.53	0.50	5.00	0.04	0.04	0.08
49.10	0.53	0.50	5.00	0.04	0.04	0.08
49.15	0.53	0.50	5.00	0.04	0.04	0.07
49.20	0.53	0.50	5.00	0.04	0.03	0.07
49.25	0.53	0.50	5.00	0.04	0.03	0.07
49.30	0.53	0.50	5.00	0.04	0.03	0.07
49.35	0.53	0.50	5.00	0.04	0.03	0.06
49.40	0.53	0.50	5.00	0.04	0.03	0.06
49.45	0.53	0.50	5.00	0.04	0.02	0.06
49.50	0.53	0.50	5.00	0.04	0.02	0.06
49.55	0.53	0.50	5.00	0.04	0.02	0.06
49.60	0.53	0.50	5.00	0.04	0.02	0.05
49.65	0.53	0.50	5.00	0.04	0.02	0.05
49.70	0.53	0.50	5.00	0.04	0.01	0.05
49.75	0.53	0.49	5.00	0.04	0.01	0.05
49.80	0.53	0.49	5.00	0.04	0.01	0.05
49.85	0.53	0.49	5.00	0.04	0.01	0.04
49.90	0.53	0.49	5.00	0.04	0.01	0.04
49.95	0.53	0.49	5.00	0.04	0.00	0.04
50.00	0.53	0.49	5.00	0.04	0.00	0.04
50.05	0.53	0.49	1.07	0.04	0.00	0.04
50.10	0.53	0.49	1.07	0.04	0.00	0.04
50.15	0.53	0.49	1.07	0.03	0.00	0.03
50.20	0.53	0.49	1.07	0.03	0.00	0.03
50.25	0.53	0.49	1.07	0.03	0.00	0.03
50.30	0.53	0.49	1.07	0.03	0.00	0.03
50.35	0.53	0.49	1.07	0.03	0.00	0.03
50.40	0.53	0.49	1.07	0.03	0.00	0.03
50.45	0.53	0.49	1.07	0.03	0.00	0.03
50.50	0.53	0.49	1.07	0.03	0.00	0.03
50.55	0.53	0.49	1.07	0.02	0.00	0.02
50.60	0.53	0.49	1.07	0.02	0.00	0.02
50.65	0.53	0.49	1.07	0.02	0.00	0.02
50.70	0.53	0.49	1.07	0.02	0.00	0.02
50.75	0.53	0.49	1.07	0.02	0.00	0.02
50.80	0.53	0.49	1.07	0.02	0.00	0.02
50.85	0.53	0.49	1.07	0.02	0.00	0.02
50.90	0.53	0.49	1.07	0.02	0.00	0.02
50.95	0.53	0.49	1.07	0.01	0.00	0.01
51.00	0.53	0.49	1.07	0.01	0.00	0.01
51.05	0.53	0.49	1.07	0.01	0.00	0.01
51.10	0.53	0.49	1.07	0.01	0.00	0.01
51.15	0.53	0.49	1.07	0.01	0.00	0.01
51.20	0.53	0.49	1.07	0.01	0.00	0.01
51.25	0.53	0.49	1.07	0.01	0.00	0.01
51.30	0.53	0.49	1.07	0.01	0.00	0.01
51.35	0.53	0.49	1.07	0.00	0.00	0.00

51.40	0.53	0.49	1.07	0.00	0.00	0.00
51.45	0.53	0.49	1.07	0.00	0.00	0.00
51.50	0.53	0.49	1.07	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/ft2)

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

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                                        LIQUEFACTION ANALYSIS SUMMARY

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        Font: Courier New, Regular, Size 8 is recommended for this report.
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        Input File Name: N:\2018\18-81-134 SBCUSD, New Diesel Technology
Center\-01\Settlement -Final\BH-02 his.liq
        Title:  New Diesel Technology Center Building
        Subtitle:  Dynamic Settlement

        Surface Elev.=617
        Hole No.=BH-02
        Depth of Hole= 51.50 ft
        Water Table during Earthquake= 38.00 ft
        Water Table during In-Situ Testing= 38.00 ft
        Max. Acceleration= 0.99 g
        Earthquake Magnitude= 7.00

 Input Data:
        Surface Elev.=617
        Hole No.=BH-02
        Depth of Hole=51.50 ft
        Water Table during Earthquake= 38.00 ft
        Water Table during In-Situ Testing= 38.00 ft
        Max. Acceleration=0.99 g
        Earthquake Magnitude=7.00
        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 two CSR (fs1=1, fs2=User)
        10. Use Curve Smoothing: Yes*
        * Recommended Options
```

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	50.00	120.00	45.00
5.00	50.00	120.00	45.00
6.00	5.00	110.00	45.00
10.00	6.00	117.00	63.00
15.00	18.00	129.00	63.00
20.00	9.00	129.00	45.00
25.00	26.40	132.00	45.00
30.00	50.00	112.00	45.00
35.00	39.00	112.00	15.00
40.00	49.00	112.00	15.00
45.00	30.00	126.00	15.00
50.00	50.00	126.00	15.00

Output Results:

Settlement of Saturated Sands=0.93 in.
Settlement of Unsaturated Sands=5.66 in.
Total Settlement of Saturated and Unsaturated Sands=6.59 in.
Differential Settlement=3.295 to 4.350 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.60	0.64	5.00	0.93	5.66	6.59
0.05	0.60	0.64	5.00	0.93	5.66	6.59
0.10	0.60	0.64	5.00	0.93	5.66	6.59
0.15	0.60	0.64	5.00	0.93	5.66	6.59
0.20	0.60	0.64	5.00	0.93	5.66	6.59
0.25	0.60	0.64	5.00	0.93	5.66	6.59
0.30	0.60	0.64	5.00	0.93	5.66	6.59
0.35	0.60	0.64	5.00	0.93	5.66	6.59
0.40	0.60	0.64	5.00	0.93	5.66	6.59
0.45	0.60	0.64	5.00	0.93	5.66	6.59
0.50	0.60	0.64	5.00	0.93	5.66	6.59
0.55	0.60	0.64	5.00	0.93	5.66	6.59
0.60	0.60	0.64	5.00	0.93	5.66	6.59
0.65	0.60	0.64	5.00	0.93	5.66	6.59
0.70	0.60	0.64	5.00	0.93	5.66	6.59
0.75	0.60	0.64	5.00	0.93	5.66	6.59
0.80	0.60	0.64	5.00	0.93	5.66	6.59
0.85	0.60	0.64	5.00	0.93	5.66	6.59
0.90	0.60	0.64	5.00	0.93	5.66	6.59
0.95	0.60	0.64	5.00	0.93	5.66	6.59

1.00	0.60	0.64	5.00	0.93	5.66	6.59
1.05	0.60	0.64	5.00	0.93	5.66	6.59
1.10	0.60	0.64	5.00	0.93	5.66	6.59
1.15	0.60	0.64	5.00	0.93	5.66	6.59
1.20	0.60	0.64	5.00	0.93	5.66	6.59
1.25	0.60	0.64	5.00	0.93	5.66	6.59
1.30	0.60	0.64	5.00	0.93	5.66	6.59
1.35	0.60	0.64	5.00	0.93	5.66	6.59
1.40	0.60	0.64	5.00	0.93	5.66	6.59
1.45	0.60	0.64	5.00	0.93	5.66	6.59
1.50	0.60	0.64	5.00	0.93	5.66	6.59
1.55	0.60	0.64	5.00	0.93	5.66	6.59
1.60	0.60	0.64	5.00	0.93	5.66	6.59
1.65	0.60	0.64	5.00	0.93	5.66	6.59
1.70	0.60	0.64	5.00	0.93	5.66	6.59
1.75	0.60	0.64	5.00	0.93	5.66	6.59
1.80	0.60	0.64	5.00	0.93	5.66	6.59
1.85	0.60	0.64	5.00	0.93	5.66	6.59
1.90	0.60	0.64	5.00	0.93	5.66	6.59
1.95	0.60	0.64	5.00	0.93	5.66	6.59
2.00	0.60	0.64	5.00	0.93	5.66	6.59
2.05	0.60	0.64	5.00	0.93	5.66	6.59
2.10	0.60	0.64	5.00	0.93	5.66	6.59
2.15	0.60	0.64	5.00	0.93	5.66	6.59
2.20	0.60	0.64	5.00	0.93	5.66	6.59
2.25	0.60	0.64	5.00	0.93	5.66	6.59
2.30	0.60	0.64	5.00	0.93	5.66	6.59
2.35	0.60	0.64	5.00	0.93	5.66	6.59
2.40	0.60	0.64	5.00	0.93	5.66	6.59
2.45	0.60	0.64	5.00	0.93	5.66	6.59
2.50	0.60	0.64	5.00	0.93	5.66	6.59
2.55	0.60	0.64	5.00	0.93	5.66	6.59
2.60	0.60	0.64	5.00	0.93	5.66	6.59
2.65	0.60	0.64	5.00	0.93	5.66	6.59
2.70	0.60	0.64	5.00	0.93	5.66	6.59
2.75	0.60	0.64	5.00	0.93	5.66	6.59
2.80	0.60	0.64	5.00	0.93	5.66	6.59
2.85	0.60	0.64	5.00	0.93	5.66	6.59
2.90	0.60	0.64	5.00	0.93	5.66	6.59
2.95	0.60	0.64	5.00	0.93	5.66	6.59
3.00	0.60	0.64	5.00	0.93	5.66	6.59
3.05	0.60	0.64	5.00	0.93	5.66	6.59
3.10	0.60	0.64	5.00	0.93	5.66	6.59
3.15	0.60	0.64	5.00	0.93	5.66	6.59
3.20	0.60	0.64	5.00	0.93	5.66	6.59
3.25	0.60	0.64	5.00	0.93	5.66	6.59
3.30	0.60	0.64	5.00	0.93	5.66	6.59
3.35	0.60	0.64	5.00	0.93	5.66	6.59

3.40	0.60	0.64	5.00	0.93	5.66	6.59
3.45	0.60	0.64	5.00	0.93	5.66	6.59
3.50	0.60	0.64	5.00	0.93	5.66	6.59
3.55	0.60	0.64	5.00	0.93	5.66	6.58
3.60	0.60	0.64	5.00	0.93	5.66	6.58
3.65	0.60	0.64	5.00	0.93	5.66	6.58
3.70	0.60	0.64	5.00	0.93	5.66	6.58
3.75	0.60	0.64	5.00	0.93	5.66	6.58
3.80	0.60	0.64	5.00	0.93	5.66	6.58
3.85	0.60	0.64	5.00	0.93	5.66	6.58
3.90	0.60	0.64	5.00	0.93	5.66	6.58
3.95	0.60	0.64	5.00	0.93	5.66	6.58
4.00	0.60	0.64	5.00	0.93	5.66	6.58
4.05	0.60	0.64	5.00	0.93	5.66	6.58
4.10	0.60	0.64	5.00	0.93	5.66	6.58
4.15	0.60	0.64	5.00	0.93	5.66	6.58
4.20	0.60	0.64	5.00	0.93	5.66	6.58
4.25	0.60	0.64	5.00	0.93	5.66	6.58
4.30	0.60	0.64	5.00	0.93	5.66	6.58
4.35	0.60	0.64	5.00	0.93	5.66	6.58
4.40	0.60	0.64	5.00	0.93	5.66	6.58
4.45	0.60	0.64	5.00	0.93	5.66	6.58
4.50	0.60	0.64	5.00	0.93	5.65	6.58
4.55	0.60	0.64	5.00	0.93	5.65	6.58
4.60	0.60	0.64	5.00	0.93	5.65	6.58
4.65	0.60	0.64	5.00	0.93	5.65	6.58
4.70	0.60	0.64	5.00	0.93	5.65	6.58
4.75	0.60	0.64	5.00	0.93	5.65	6.58
4.80	0.60	0.64	5.00	0.93	5.65	6.58
4.85	0.60	0.64	5.00	0.93	5.65	6.58
4.90	0.60	0.64	5.00	0.93	5.65	6.58
4.95	0.60	0.64	5.00	0.93	5.65	6.58
5.00	0.60	0.64	5.00	0.93	5.65	6.58
5.05	0.60	0.64	5.00	0.93	5.65	6.58
5.10	0.60	0.64	5.00	0.93	5.65	6.58
5.15	0.60	0.64	5.00	0.93	5.65	6.58
5.20	0.60	0.64	5.00	0.93	5.65	6.58
5.25	0.60	0.64	5.00	0.93	5.65	6.58
5.30	0.60	0.64	5.00	0.93	5.65	6.58
5.35	0.60	0.64	5.00	0.93	5.65	6.58
5.40	0.60	0.64	5.00	0.93	5.65	6.58
5.45	0.60	0.64	5.00	0.93	5.65	6.58
5.50	0.60	0.64	5.00	0.93	5.65	6.58
5.55	0.60	0.64	5.00	0.93	5.65	6.58
5.60	0.60	0.64	5.00	0.93	5.65	6.58
5.65	0.60	0.64	5.00	0.93	5.65	6.58
5.70	0.60	0.63	5.00	0.93	5.65	6.57
5.75	0.52	0.63	5.00	0.93	5.64	6.57

5.80	0.37	0.63	5.00	0.93	5.64	6.57
5.85	0.30	0.63	5.00	0.93	5.63	6.56
5.90	0.25	0.63	5.00	0.93	5.62	6.55
5.95	0.21	0.63	5.00	0.93	5.61	6.54
6.00	0.16	0.63	5.00	0.93	5.60	6.52
6.05	0.16	0.63	5.00	0.93	5.58	6.50
6.10	0.16	0.63	5.00	0.93	5.56	6.48
6.15	0.16	0.63	5.00	0.93	5.54	6.46
6.20	0.16	0.63	5.00	0.93	5.52	6.44
6.25	0.16	0.63	5.00	0.93	5.50	6.42
6.30	0.16	0.63	5.00	0.93	5.48	6.40
6.35	0.16	0.63	5.00	0.93	5.46	6.38
6.40	0.16	0.63	5.00	0.93	5.44	6.36
6.45	0.16	0.63	5.00	0.93	5.42	6.34
6.50	0.16	0.63	5.00	0.93	5.40	6.33
6.55	0.16	0.63	5.00	0.93	5.38	6.31
6.60	0.16	0.63	5.00	0.93	5.36	6.29
6.65	0.16	0.63	5.00	0.93	5.34	6.27
6.70	0.16	0.63	5.00	0.93	5.32	6.25
6.75	0.16	0.63	5.00	0.93	5.30	6.23
6.80	0.16	0.63	5.00	0.93	5.28	6.21
6.85	0.16	0.63	5.00	0.93	5.26	6.19
6.90	0.16	0.63	5.00	0.93	5.24	6.17
6.95	0.16	0.63	5.00	0.93	5.22	6.15
7.00	0.16	0.63	5.00	0.93	5.20	6.13
7.05	0.16	0.63	5.00	0.93	5.18	6.11
7.10	0.16	0.63	5.00	0.93	5.16	6.09
7.15	0.16	0.63	5.00	0.93	5.14	6.07
7.20	0.16	0.63	5.00	0.93	5.12	6.05
7.25	0.16	0.63	5.00	0.93	5.10	6.03
7.30	0.16	0.63	5.00	0.93	5.08	6.01
7.35	0.16	0.63	5.00	0.93	5.06	5.99
7.40	0.16	0.63	5.00	0.93	5.04	5.97
7.45	0.16	0.63	5.00	0.93	5.02	5.95
7.50	0.16	0.63	5.00	0.93	5.00	5.93
7.55	0.16	0.63	5.00	0.93	4.98	5.91
7.60	0.16	0.63	5.00	0.93	4.96	5.89
7.65	0.16	0.63	5.00	0.93	4.94	5.87
7.70	0.16	0.63	5.00	0.93	4.92	5.85
7.75	0.16	0.63	5.00	0.93	4.90	5.83
7.80	0.16	0.63	5.00	0.93	4.88	5.81
7.85	0.16	0.63	5.00	0.93	4.86	5.79
7.90	0.16	0.63	5.00	0.93	4.84	5.76
7.95	0.16	0.63	5.00	0.93	4.82	5.74
8.00	0.16	0.63	5.00	0.93	4.80	5.72
8.05	0.16	0.63	5.00	0.93	4.78	5.70
8.10	0.16	0.63	5.00	0.93	4.76	5.68
8.15	0.16	0.63	5.00	0.93	4.74	5.66

8.20	0.16	0.63	5.00	0.93	4.72	5.64
8.25	0.17	0.63	5.00	0.93	4.70	5.62
8.30	0.17	0.63	5.00	0.93	4.68	5.60
8.35	0.17	0.63	5.00	0.93	4.66	5.59
8.40	0.17	0.63	5.00	0.93	4.64	5.57
8.45	0.17	0.63	5.00	0.93	4.62	5.55
8.50	0.17	0.63	5.00	0.93	4.60	5.53
8.55	0.17	0.63	5.00	0.93	4.59	5.51
8.60	0.17	0.63	5.00	0.93	4.57	5.49
8.65	0.17	0.63	5.00	0.93	4.55	5.48
8.70	0.17	0.63	5.00	0.93	4.53	5.46
8.75	0.17	0.63	5.00	0.93	4.51	5.44
8.80	0.17	0.63	5.00	0.93	4.49	5.42
8.85	0.17	0.63	5.00	0.93	4.47	5.40
8.90	0.17	0.63	5.00	0.93	4.46	5.38
8.95	0.17	0.63	5.00	0.93	4.44	5.36
9.00	0.17	0.63	5.00	0.93	4.42	5.35
9.05	0.17	0.63	5.00	0.93	4.40	5.33
9.10	0.17	0.63	5.00	0.93	4.38	5.31
9.15	0.17	0.63	5.00	0.93	4.36	5.29
9.20	0.17	0.63	5.00	0.93	4.34	5.27
9.25	0.17	0.63	5.00	0.93	4.33	5.25
9.30	0.17	0.63	5.00	0.93	4.31	5.23
9.35	0.17	0.63	5.00	0.93	4.29	5.22
9.40	0.17	0.63	5.00	0.93	4.27	5.20
9.45	0.17	0.63	5.00	0.93	4.25	5.18
9.50	0.17	0.63	5.00	0.93	4.23	5.16
9.55	0.17	0.63	5.00	0.93	4.21	5.14
9.60	0.17	0.63	5.00	0.93	4.20	5.12
9.65	0.17	0.63	5.00	0.93	4.18	5.10
9.70	0.17	0.63	5.00	0.93	4.16	5.09
9.75	0.17	0.63	5.00	0.93	4.14	5.07
9.80	0.17	0.63	5.00	0.93	4.12	5.05
9.85	0.17	0.63	5.00	0.93	4.10	5.03
9.90	0.17	0.63	5.00	0.93	4.08	5.01
9.95	0.17	0.63	5.00	0.93	4.07	4.99
10.00	0.17	0.63	5.00	0.93	4.05	4.97
10.05	0.17	0.63	5.00	0.93	4.03	4.95
10.10	0.17	0.63	5.00	0.93	4.01	4.94
10.15	0.18	0.63	5.00	0.93	3.99	4.92
10.20	0.18	0.63	5.00	0.93	3.97	4.90
10.25	0.18	0.63	5.00	0.93	3.96	4.88
10.30	0.18	0.63	5.00	0.93	3.94	4.87
10.35	0.18	0.63	5.00	0.93	3.92	4.85
10.40	0.19	0.63	5.00	0.93	3.90	4.83
10.45	0.19	0.63	5.00	0.93	3.89	4.81
10.50	0.19	0.63	5.00	0.93	3.87	4.80
10.55	0.19	0.63	5.00	0.93	3.85	4.78

10.60	0.19	0.63	5.00	0.93	3.84	4.76
10.65	0.19	0.63	5.00	0.93	3.82	4.75
10.70	0.20	0.63	5.00	0.93	3.81	4.73
10.75	0.20	0.63	5.00	0.93	3.79	4.72
10.80	0.20	0.63	5.00	0.93	3.77	4.70
10.85	0.20	0.63	5.00	0.93	3.76	4.69
10.90	0.20	0.63	5.00	0.93	3.74	4.67
10.95	0.20	0.63	5.00	0.93	3.73	4.66
11.00	0.21	0.63	5.00	0.93	3.71	4.64
11.05	0.21	0.63	5.00	0.93	3.70	4.63
11.10	0.21	0.63	5.00	0.93	3.68	4.61
11.15	0.21	0.63	5.00	0.93	3.67	4.60
11.20	0.21	0.63	5.00	0.93	3.66	4.58
11.25	0.21	0.63	5.00	0.93	3.64	4.57
11.30	0.22	0.63	5.00	0.93	3.63	4.56
11.35	0.22	0.63	5.00	0.93	3.61	4.54
11.40	0.22	0.63	5.00	0.93	3.60	4.53
11.45	0.22	0.63	5.00	0.93	3.59	4.51
11.50	0.22	0.63	5.00	0.93	3.57	4.50
11.55	0.22	0.63	5.00	0.93	3.56	4.49
11.60	0.23	0.63	5.00	0.93	3.55	4.47
11.65	0.23	0.63	5.00	0.93	3.53	4.46
11.70	0.23	0.63	5.00	0.93	3.52	4.45
11.75	0.23	0.63	5.00	0.93	3.51	4.44
11.80	0.23	0.63	5.00	0.93	3.50	4.42
11.85	0.23	0.63	5.00	0.93	3.48	4.41
11.90	0.23	0.63	5.00	0.93	3.47	4.40
11.95	0.24	0.63	5.00	0.93	3.46	4.39
12.00	0.24	0.63	5.00	0.93	3.45	4.37
12.05	0.24	0.63	5.00	0.93	3.43	4.36
12.10	0.24	0.63	5.00	0.93	3.42	4.35
12.15	0.24	0.63	5.00	0.93	3.41	4.34
12.20	0.24	0.63	5.00	0.93	3.40	4.33
12.25	0.25	0.63	5.00	0.93	3.39	4.31
12.30	0.25	0.63	5.00	0.93	3.38	4.30
12.35	0.25	0.62	5.00	0.93	3.36	4.29
12.40	0.25	0.62	5.00	0.93	3.35	4.28
12.45	0.25	0.62	5.00	0.93	3.34	4.27
12.50	0.25	0.62	5.00	0.93	3.33	4.26
12.55	0.26	0.62	5.00	0.93	3.32	4.25
12.60	0.26	0.62	5.00	0.93	3.31	4.23
12.65	0.26	0.62	5.00	0.93	3.30	4.22
12.70	0.26	0.62	5.00	0.93	3.29	4.21
12.75	0.26	0.62	5.00	0.93	3.27	4.20
12.80	0.26	0.62	5.00	0.93	3.26	4.19
12.85	0.26	0.62	5.00	0.93	3.25	4.18
12.90	0.27	0.62	5.00	0.93	3.24	4.17
12.95	0.27	0.62	5.00	0.93	3.23	4.16

13.00	0.27	0.62	5.00	0.93	3.22	4.15
13.05	0.27	0.62	5.00	0.93	3.21	4.14
13.10	0.27	0.62	5.00	0.93	3.20	4.13
13.15	0.27	0.62	5.00	0.93	3.19	4.12
13.20	0.28	0.62	5.00	0.93	3.18	4.11
13.25	0.28	0.62	5.00	0.93	3.17	4.10
13.30	0.28	0.62	5.00	0.93	3.16	4.09
13.35	0.28	0.62	5.00	0.93	3.15	4.08
13.40	0.28	0.62	5.00	0.93	3.14	4.07
13.45	0.28	0.62	5.00	0.93	3.13	4.06
13.50	0.29	0.62	5.00	0.93	3.12	4.05
13.55	0.29	0.62	5.00	0.93	3.11	4.04
13.60	0.29	0.62	5.00	0.93	3.10	4.03
13.65	0.29	0.62	5.00	0.93	3.09	4.02
13.70	0.29	0.62	5.00	0.93	3.08	4.01
13.75	0.29	0.62	5.00	0.93	3.07	4.00
13.80	0.30	0.62	5.00	0.93	3.06	3.99
13.85	0.30	0.62	5.00	0.93	3.05	3.98
13.90	0.30	0.62	5.00	0.93	3.04	3.97
13.95	0.30	0.62	5.00	0.93	3.03	3.96
14.00	0.30	0.62	5.00	0.93	3.03	3.95
14.05	0.30	0.62	5.00	0.93	3.02	3.94
14.10	0.31	0.62	5.00	0.93	3.01	3.93
14.15	0.31	0.62	5.00	0.93	3.00	3.93
14.20	0.31	0.62	5.00	0.93	2.99	3.92
14.25	0.31	0.62	5.00	0.93	2.98	3.91
14.30	0.31	0.62	5.00	0.93	2.97	3.90
14.35	0.31	0.62	5.00	0.93	2.96	3.89
14.40	0.32	0.62	5.00	0.93	2.95	3.88
14.45	0.32	0.62	5.00	0.93	2.94	3.87
14.50	0.32	0.62	5.00	0.93	2.94	3.86
14.55	0.32	0.62	5.00	0.93	2.93	3.85
14.60	0.32	0.62	5.00	0.93	2.92	3.85
14.65	0.32	0.62	5.00	0.93	2.91	3.84
14.70	0.33	0.62	5.00	0.93	2.90	3.83
14.75	0.33	0.62	5.00	0.93	2.89	3.82
14.80	0.38	0.62	5.00	0.93	2.89	3.81
14.85	0.38	0.62	5.00	0.93	2.88	3.80
14.90	0.38	0.62	5.00	0.93	2.87	3.80
14.95	0.39	0.62	5.00	0.93	2.86	3.79
15.00	0.39	0.62	5.00	0.93	2.86	3.78
15.05	0.39	0.62	5.00	0.93	2.85	3.78
15.10	0.38	0.62	5.00	0.93	2.84	3.77
15.15	0.38	0.62	5.00	0.93	2.83	3.76
15.20	0.37	0.62	5.00	0.93	2.83	3.75
15.25	0.37	0.62	5.00	0.93	2.82	3.75
15.30	0.37	0.62	5.00	0.93	2.81	3.74
15.35	0.36	0.62	5.00	0.93	2.80	3.73

15.40	0.36	0.62	5.00	0.93	2.80	3.72
15.45	0.36	0.62	5.00	0.93	2.79	3.72
15.50	0.35	0.62	5.00	0.93	2.78	3.71
15.55	0.35	0.62	5.00	0.93	2.77	3.70
15.60	0.35	0.62	5.00	0.93	2.76	3.69
15.65	0.35	0.62	5.00	0.93	2.76	3.68
15.70	0.34	0.62	5.00	0.93	2.75	3.68
15.75	0.34	0.62	5.00	0.93	2.74	3.67
15.80	0.34	0.62	5.00	0.93	2.73	3.66
15.85	0.33	0.62	5.00	0.93	2.72	3.65
15.90	0.33	0.62	5.00	0.93	2.72	3.64
15.95	0.33	0.62	5.00	0.93	2.71	3.63
16.00	0.33	0.62	5.00	0.93	2.70	3.63
16.05	0.32	0.62	5.00	0.93	2.69	3.62
16.10	0.32	0.62	5.00	0.93	2.68	3.61
16.15	0.32	0.62	5.00	0.93	2.67	3.60
16.20	0.32	0.62	5.00	0.93	2.67	3.59
16.25	0.31	0.62	5.00	0.93	2.66	3.58
16.30	0.31	0.62	5.00	0.93	2.65	3.57
16.35	0.31	0.62	5.00	0.93	2.64	3.57
16.40	0.31	0.62	5.00	0.93	2.63	3.56
16.45	0.30	0.62	5.00	0.93	2.62	3.55
16.50	0.30	0.62	5.00	0.93	2.61	3.54
16.55	0.30	0.62	5.00	0.93	2.60	3.53
16.60	0.30	0.62	5.00	0.93	2.59	3.52
16.65	0.30	0.62	5.00	0.93	2.58	3.51
16.70	0.29	0.62	5.00	0.93	2.58	3.50
16.75	0.29	0.62	5.00	0.93	2.57	3.49
16.80	0.29	0.62	5.00	0.93	2.56	3.48
16.85	0.29	0.62	5.00	0.93	2.55	3.47
16.90	0.29	0.62	5.00	0.93	2.54	3.46
16.95	0.28	0.62	5.00	0.93	2.53	3.45
17.00	0.28	0.62	5.00	0.93	2.52	3.44
17.05	0.28	0.62	5.00	0.93	2.51	3.43
17.10	0.28	0.62	5.00	0.93	2.50	3.42
17.15	0.28	0.62	5.00	0.93	2.49	3.41
17.20	0.27	0.62	5.00	0.93	2.48	3.40
17.25	0.27	0.62	5.00	0.93	2.47	3.39
17.30	0.27	0.62	5.00	0.93	2.46	3.38
17.35	0.27	0.62	5.00	0.93	2.45	3.37
17.40	0.27	0.62	5.00	0.93	2.44	3.36
17.45	0.27	0.62	5.00	0.93	2.43	3.35
17.50	0.26	0.62	5.00	0.93	2.42	3.34
17.55	0.26	0.62	5.00	0.93	2.40	3.33
17.60	0.26	0.62	5.00	0.93	2.39	3.32
17.65	0.26	0.62	5.00	0.93	2.38	3.31
17.70	0.26	0.62	5.00	0.93	2.37	3.30
17.75	0.26	0.62	5.00	0.93	2.36	3.29

17.80	0.25	0.62	5.00	0.93	2.35	3.28
17.85	0.25	0.62	5.00	0.93	2.34	3.27
17.90	0.25	0.62	5.00	0.93	2.33	3.25
17.95	0.25	0.62	5.00	0.93	2.32	3.24
18.00	0.25	0.62	5.00	0.93	2.30	3.23
18.05	0.25	0.62	5.00	0.93	2.29	3.22
18.10	0.24	0.62	5.00	0.93	2.28	3.21
18.15	0.24	0.62	5.00	0.93	2.27	3.20
18.20	0.24	0.62	5.00	0.93	2.26	3.18
18.25	0.24	0.62	5.00	0.93	2.25	3.17
18.30	0.24	0.62	5.00	0.93	2.23	3.16
18.35	0.24	0.62	5.00	0.93	2.22	3.15
18.40	0.23	0.62	5.00	0.93	2.21	3.14
18.45	0.23	0.62	5.00	0.93	2.20	3.12
18.50	0.23	0.62	5.00	0.93	2.18	3.11
18.55	0.23	0.62	5.00	0.93	2.17	3.10
18.60	0.23	0.62	5.00	0.93	2.16	3.09
18.65	0.23	0.62	5.00	0.93	2.15	3.07
18.70	0.23	0.62	5.00	0.93	2.13	3.06
18.75	0.22	0.62	5.00	0.93	2.12	3.05
18.80	0.22	0.62	5.00	0.93	2.11	3.03
18.85	0.22	0.62	5.00	0.93	2.09	3.02
18.90	0.22	0.62	5.00	0.93	2.08	3.01
18.95	0.22	0.62	5.00	0.93	2.07	2.99
19.00	0.22	0.61	5.00	0.93	2.05	2.98
19.05	0.21	0.61	5.00	0.93	2.04	2.97
19.10	0.21	0.61	5.00	0.93	2.03	2.95
19.15	0.21	0.61	5.00	0.93	2.01	2.94
19.20	0.21	0.61	5.00	0.93	2.00	2.92
19.25	0.21	0.61	5.00	0.93	1.98	2.91
19.30	0.21	0.61	5.00	0.93	1.97	2.90
19.35	0.21	0.61	5.00	0.93	1.95	2.88
19.40	0.20	0.61	5.00	0.93	1.94	2.87
19.45	0.20	0.61	5.00	0.93	1.92	2.85
19.50	0.20	0.61	5.00	0.93	1.91	2.84
19.55	0.20	0.61	5.00	0.93	1.89	2.82
19.60	0.20	0.61	5.00	0.93	1.88	2.81
19.65	0.20	0.61	5.00	0.93	1.86	2.79
19.70	0.20	0.61	5.00	0.93	1.85	2.78
19.75	0.20	0.61	5.00	0.93	1.83	2.76
19.80	0.19	0.61	5.00	0.93	1.82	2.74
19.85	0.19	0.61	5.00	0.93	1.80	2.73
19.90	0.19	0.61	5.00	0.93	1.79	2.71
19.95	0.19	0.61	5.00	0.93	1.77	2.70
20.00	0.19	0.61	5.00	0.93	1.75	2.68
20.05	0.19	0.61	5.00	0.93	1.74	2.66
20.10	0.19	0.61	5.00	0.93	1.72	2.65
20.15	0.19	0.61	5.00	0.93	1.70	2.63

20.20	0.20	0.61	5.00	0.93	1.69	2.61
20.25	0.20	0.61	5.00	0.93	1.67	2.60
20.30	0.20	0.61	5.00	0.93	1.66	2.58
20.35	0.20	0.61	5.00	0.93	1.64	2.57
20.40	0.21	0.61	5.00	0.93	1.63	2.55
20.45	0.21	0.61	5.00	0.93	1.61	2.54
20.50	0.21	0.61	5.00	0.93	1.60	2.52
20.55	0.21	0.61	5.00	0.93	1.58	2.51
20.60	0.21	0.61	5.00	0.93	1.57	2.50
20.65	0.22	0.61	5.00	0.93	1.56	2.48
20.70	0.22	0.61	5.00	0.93	1.54	2.47
20.75	0.22	0.61	5.00	0.93	1.53	2.45
20.80	0.22	0.61	5.00	0.93	1.51	2.44
20.85	0.22	0.61	5.00	0.93	1.50	2.43
20.90	0.23	0.61	5.00	0.93	1.49	2.42
20.95	0.23	0.61	5.00	0.93	1.48	2.40
21.00	0.23	0.61	5.00	0.93	1.46	2.39
21.05	0.23	0.61	5.00	0.93	1.45	2.38
21.10	0.24	0.61	5.00	0.93	1.44	2.36
21.15	0.24	0.61	5.00	0.93	1.42	2.35
21.20	0.24	0.61	5.00	0.93	1.41	2.34
21.25	0.24	0.61	5.00	0.93	1.40	2.33
21.30	0.24	0.61	5.00	0.93	1.39	2.32
21.35	0.25	0.61	5.00	0.93	1.38	2.30
21.40	0.25	0.61	5.00	0.93	1.37	2.29
21.45	0.25	0.61	5.00	0.93	1.35	2.28
21.50	0.25	0.61	5.00	0.93	1.34	2.27
21.55	0.25	0.61	5.00	0.93	1.33	2.26
21.60	0.26	0.61	5.00	0.93	1.32	2.25
21.65	0.26	0.61	5.00	0.93	1.31	2.24
21.70	0.26	0.61	5.00	0.93	1.30	2.22
21.75	0.26	0.61	5.00	0.93	1.29	2.21
21.80	0.26	0.61	5.00	0.93	1.28	2.20
21.85	0.27	0.61	5.00	0.93	1.27	2.19
21.90	0.27	0.61	5.00	0.93	1.26	2.18
21.95	0.27	0.61	5.00	0.93	1.25	2.17
22.00	0.27	0.61	5.00	0.93	1.24	2.16
22.05	0.28	0.61	5.00	0.93	1.23	2.15
22.10	0.28	0.61	5.00	0.93	1.22	2.14
22.15	0.28	0.61	5.00	0.93	1.21	2.13
22.20	0.28	0.61	5.00	0.93	1.20	2.12
22.25	0.29	0.61	5.00	0.93	1.19	2.12
22.30	0.29	0.61	5.00	0.93	1.18	2.11
22.35	0.29	0.61	5.00	0.93	1.17	2.10
22.40	0.29	0.61	5.00	0.93	1.16	2.09
22.45	0.29	0.61	5.00	0.93	1.15	2.08
22.50	0.30	0.61	5.00	0.93	1.15	2.07
22.55	0.30	0.61	5.00	0.93	1.14	2.06

22.60	0.30	0.61	5.00	0.93	1.13	2.06
22.65	0.30	0.61	5.00	0.93	1.12	2.05
22.70	0.31	0.61	5.00	0.93	1.11	2.04
22.75	0.31	0.61	5.00	0.93	1.11	2.03
22.80	0.31	0.61	5.00	0.93	1.10	2.03
22.85	0.31	0.61	5.00	0.93	1.09	2.02
22.90	0.32	0.61	5.00	0.93	1.08	2.01
22.95	0.32	0.61	5.00	0.93	1.08	2.00
23.00	0.32	0.61	5.00	0.93	1.07	2.00
23.05	0.33	0.61	5.00	0.93	1.06	1.99
23.10	0.33	0.61	5.00	0.93	1.05	1.98
23.15	0.33	0.61	5.00	0.93	1.05	1.97
23.20	0.33	0.61	5.00	0.93	1.04	1.97
23.25	0.34	0.61	5.00	0.93	1.03	1.96
23.30	0.34	0.61	5.00	0.93	1.03	1.95
23.35	0.34	0.61	5.00	0.93	1.02	1.95
23.40	0.34	0.61	5.00	0.93	1.01	1.94
23.45	0.35	0.61	5.00	0.93	1.01	1.94
23.50	0.35	0.61	5.00	0.93	1.00	1.93
23.55	0.35	0.61	5.00	0.93	1.00	1.92
23.60	0.36	0.61	5.00	0.93	0.99	1.92
23.65	0.36	0.61	5.00	0.93	0.98	1.91
23.70	0.36	0.61	5.00	0.93	0.98	1.90
23.75	0.37	0.61	5.00	0.93	0.97	1.90
23.80	0.37	0.61	5.00	0.93	0.97	1.89
23.85	0.37	0.61	5.00	0.93	0.96	1.89
23.90	0.38	0.61	5.00	0.93	0.95	1.88
23.95	0.38	0.61	5.00	0.93	0.95	1.88
24.00	0.38	0.61	5.00	0.93	0.94	1.87
24.05	0.39	0.61	5.00	0.93	0.94	1.86
24.10	0.39	0.61	5.00	0.93	0.93	1.86
24.15	0.40	0.61	5.00	0.93	0.93	1.85
24.20	0.40	0.61	5.00	0.93	0.92	1.85
24.25	0.40	0.61	5.00	0.93	0.92	1.84
24.30	0.41	0.61	5.00	0.93	0.91	1.84
24.35	0.41	0.61	5.00	0.93	0.91	1.83
24.40	0.42	0.61	5.00	0.93	0.90	1.83
24.45	0.42	0.61	5.00	0.93	0.90	1.82
24.50	0.43	0.61	5.00	0.93	0.89	1.82
24.55	0.43	0.61	5.00	0.93	0.89	1.81
24.60	0.44	0.61	5.00	0.93	0.88	1.81
24.65	0.45	0.61	5.00	0.93	0.88	1.80
24.70	0.45	0.61	5.00	0.93	0.87	1.80
24.75	0.46	0.61	5.00	0.93	0.87	1.79
24.80	0.47	0.61	5.00	0.93	0.86	1.79
24.85	0.48	0.61	5.00	0.93	0.86	1.78
24.90	0.49	0.61	5.00	0.93	0.85	1.78
24.95	0.51	0.61	5.00	0.93	0.85	1.78

25.00	0.53	0.61	5.00	0.93	0.84	1.77
25.05	0.60	0.61	5.00	0.93	0.84	1.77
25.10	0.60	0.61	5.00	0.93	0.84	1.76
25.15	0.60	0.61	5.00	0.93	0.83	1.76
25.20	0.60	0.61	5.00	0.93	0.83	1.75
25.25	0.60	0.61	5.00	0.93	0.82	1.75
25.30	0.60	0.61	5.00	0.93	0.82	1.75
25.35	0.60	0.61	5.00	0.93	0.81	1.74
25.40	0.60	0.61	5.00	0.93	0.81	1.74
25.45	0.60	0.61	5.00	0.93	0.81	1.73
25.50	0.60	0.61	5.00	0.93	0.80	1.73
25.55	0.60	0.61	5.00	0.93	0.80	1.73
25.60	0.60	0.61	5.00	0.93	0.80	1.72
25.65	0.60	0.61	5.00	0.93	0.79	1.72
25.70	0.60	0.60	5.00	0.93	0.79	1.72
25.75	0.60	0.60	5.00	0.93	0.79	1.71
25.80	0.60	0.60	5.00	0.93	0.78	1.71
25.85	0.60	0.60	5.00	0.93	0.78	1.71
25.90	0.60	0.60	5.00	0.93	0.77	1.70
25.95	0.60	0.60	5.00	0.93	0.77	1.70
26.00	0.60	0.60	5.00	0.93	0.77	1.70
26.05	0.60	0.60	5.00	0.93	0.77	1.69
26.10	0.60	0.60	5.00	0.93	0.76	1.69
26.15	0.60	0.60	5.00	0.93	0.76	1.69
26.20	0.60	0.60	5.00	0.93	0.76	1.68
26.25	0.60	0.60	5.00	0.93	0.75	1.68
26.30	0.60	0.60	5.00	0.93	0.75	1.68
26.35	0.60	0.60	5.00	0.93	0.75	1.67
26.40	0.60	0.60	5.00	0.93	0.74	1.67
26.45	0.60	0.60	5.00	0.93	0.74	1.67
26.50	0.60	0.60	5.00	0.93	0.74	1.67
26.55	0.60	0.60	5.00	0.93	0.74	1.66
26.60	0.60	0.60	5.00	0.93	0.73	1.66
26.65	0.60	0.60	5.00	0.93	0.73	1.66
26.70	0.60	0.60	5.00	0.93	0.73	1.65
26.75	0.60	0.60	5.00	0.93	0.72	1.65
26.80	0.60	0.60	5.00	0.93	0.72	1.65
26.85	0.60	0.60	5.00	0.93	0.72	1.65
26.90	0.60	0.60	5.00	0.93	0.72	1.64
26.95	0.60	0.60	5.00	0.93	0.71	1.64
27.00	0.60	0.60	5.00	0.93	0.71	1.64
27.05	0.60	0.60	5.00	0.93	0.71	1.64
27.10	0.60	0.60	5.00	0.93	0.71	1.63
27.15	0.60	0.60	5.00	0.93	0.71	1.63
27.20	0.60	0.60	5.00	0.93	0.70	1.63
27.25	0.60	0.60	5.00	0.93	0.70	1.63
27.30	0.60	0.60	5.00	0.93	0.70	1.63
27.35	0.60	0.60	5.00	0.93	0.70	1.62

27.40	0.60	0.60	5.00	0.93	0.69	1.62
27.45	0.60	0.60	5.00	0.93	0.69	1.62
27.50	0.60	0.60	5.00	0.93	0.69	1.62
27.55	0.60	0.60	5.00	0.93	0.69	1.62
27.60	0.60	0.60	5.00	0.93	0.69	1.61
27.65	0.60	0.60	5.00	0.93	0.68	1.61
27.70	0.60	0.60	5.00	0.93	0.68	1.61
27.75	0.60	0.60	5.00	0.93	0.68	1.61
27.80	0.59	0.60	5.00	0.93	0.68	1.61
27.85	0.59	0.60	5.00	0.93	0.68	1.60
27.90	0.59	0.60	5.00	0.93	0.68	1.60
27.95	0.59	0.60	5.00	0.93	0.67	1.60
28.00	0.59	0.60	5.00	0.93	0.67	1.60
28.05	0.59	0.60	5.00	0.93	0.67	1.60
28.10	0.59	0.60	5.00	0.93	0.67	1.60
28.15	0.59	0.60	5.00	0.93	0.67	1.59
28.20	0.59	0.60	5.00	0.93	0.67	1.59
28.25	0.59	0.60	5.00	0.93	0.66	1.59
28.30	0.59	0.60	5.00	0.93	0.66	1.59
28.35	0.59	0.60	5.00	0.93	0.66	1.59
28.40	0.59	0.60	5.00	0.93	0.66	1.59
28.45	0.59	0.60	5.00	0.93	0.66	1.58
28.50	0.59	0.60	5.00	0.93	0.66	1.58
28.55	0.59	0.60	5.00	0.93	0.65	1.58
28.60	0.59	0.60	5.00	0.93	0.65	1.58
28.65	0.59	0.60	5.00	0.93	0.65	1.58
28.70	0.59	0.60	5.00	0.93	0.65	1.58
28.75	0.59	0.60	5.00	0.93	0.65	1.57
28.80	0.59	0.60	5.00	0.93	0.65	1.57
28.85	0.59	0.60	5.00	0.93	0.64	1.57
28.90	0.59	0.60	5.00	0.93	0.64	1.57
28.95	0.59	0.60	5.00	0.93	0.64	1.57
29.00	0.59	0.60	5.00	0.93	0.64	1.57
29.05	0.59	0.60	5.00	0.93	0.64	1.56
29.10	0.59	0.60	5.00	0.93	0.64	1.56
29.15	0.59	0.60	5.00	0.93	0.63	1.56
29.20	0.59	0.60	5.00	0.93	0.63	1.56
29.25	0.59	0.60	5.00	0.93	0.63	1.56
29.30	0.59	0.60	5.00	0.93	0.63	1.56
29.35	0.59	0.60	5.00	0.93	0.63	1.55
29.40	0.59	0.60	5.00	0.93	0.63	1.55
29.45	0.59	0.60	5.00	0.93	0.62	1.55
29.50	0.59	0.60	5.00	0.93	0.62	1.55
29.55	0.59	0.60	5.00	0.93	0.62	1.55
29.60	0.59	0.60	5.00	0.93	0.62	1.55
29.65	0.59	0.60	5.00	0.93	0.62	1.55
29.70	0.59	0.60	5.00	0.93	0.62	1.54
29.75	0.59	0.60	5.00	0.93	0.62	1.54

29.80	0.59	0.60	5.00	0.93	0.61	1.54
29.85	0.59	0.60	5.00	0.93	0.61	1.54
29.90	0.59	0.60	5.00	0.93	0.61	1.54
29.95	0.59	0.60	5.00	0.93	0.61	1.54
30.00	0.59	0.60	5.00	0.93	0.61	1.53
30.05	0.59	0.60	5.00	0.93	0.61	1.53
30.10	0.59	0.60	5.00	0.93	0.60	1.53
30.15	0.59	0.60	5.00	0.93	0.60	1.53
30.20	0.59	0.60	5.00	0.93	0.60	1.53
30.25	0.59	0.60	5.00	0.93	0.60	1.53
30.30	0.59	0.60	5.00	0.93	0.60	1.53
30.35	0.59	0.60	5.00	0.93	0.60	1.52
30.40	0.59	0.60	5.00	0.93	0.59	1.52
30.45	0.59	0.60	5.00	0.93	0.59	1.52
30.50	0.59	0.60	5.00	0.93	0.59	1.52
30.55	0.59	0.60	5.00	0.93	0.59	1.52
30.60	0.59	0.60	5.00	0.93	0.59	1.52
30.65	0.59	0.59	5.00	0.93	0.59	1.51
30.70	0.59	0.59	5.00	0.93	0.59	1.51
30.75	0.59	0.59	5.00	0.93	0.58	1.51
30.80	0.59	0.59	5.00	0.93	0.58	1.51
30.85	0.58	0.59	5.00	0.93	0.58	1.51
30.90	0.58	0.59	5.00	0.93	0.58	1.51
30.95	0.58	0.59	5.00	0.93	0.58	1.50
31.00	0.58	0.59	5.00	0.93	0.58	1.50
31.05	0.58	0.59	5.00	0.93	0.57	1.50
31.10	0.58	0.59	5.00	0.93	0.57	1.50
31.15	0.58	0.59	5.00	0.93	0.57	1.50
31.20	0.58	0.59	5.00	0.93	0.57	1.50
31.25	0.58	0.59	5.00	0.93	0.57	1.49
31.30	0.58	0.59	5.00	0.93	0.56	1.49
31.35	0.58	0.59	5.00	0.93	0.56	1.49
31.40	0.58	0.59	5.00	0.93	0.56	1.49
31.45	0.58	0.59	5.00	0.93	0.56	1.49
31.50	0.58	0.59	5.00	0.93	0.56	1.48
31.55	0.58	0.59	5.00	0.93	0.56	1.48
31.60	0.58	0.59	5.00	0.93	0.55	1.48
31.65	0.58	0.59	5.00	0.93	0.55	1.48
31.70	0.58	0.59	5.00	0.93	0.55	1.48
31.75	0.58	0.59	5.00	0.93	0.55	1.48
31.80	0.58	0.59	5.00	0.93	0.55	1.47
31.85	0.58	0.59	5.00	0.93	0.54	1.47
31.90	0.58	0.59	5.00	0.93	0.54	1.47
31.95	0.58	0.59	5.00	0.93	0.54	1.47
32.00	0.58	0.59	5.00	0.93	0.54	1.47
32.05	0.58	0.59	5.00	0.93	0.54	1.46
32.10	0.58	0.59	5.00	0.93	0.54	1.46
32.15	0.58	0.59	5.00	0.93	0.53	1.46

32.20	0.58	0.59	5.00	0.93	0.53	1.46
32.25	0.58	0.59	5.00	0.93	0.53	1.46
32.30	0.58	0.59	5.00	0.93	0.53	1.45
32.35	0.58	0.59	5.00	0.93	0.52	1.45
32.40	0.58	0.59	5.00	0.93	0.52	1.45
32.45	0.58	0.59	5.00	0.93	0.52	1.45
32.50	0.58	0.59	5.00	0.93	0.52	1.45
32.55	0.58	0.59	5.00	0.93	0.52	1.44
32.60	0.58	0.58	5.00	0.93	0.51	1.44
32.65	0.58	0.58	5.00	0.93	0.51	1.44
32.70	0.58	0.58	5.00	0.93	0.51	1.44
32.75	0.58	0.58	5.00	0.93	0.51	1.43
32.80	0.58	0.58	5.00	0.93	0.50	1.43
32.85	0.58	0.58	5.00	0.93	0.50	1.43
32.90	0.58	0.58	5.00	0.93	0.50	1.43
32.95	0.58	0.58	5.00	0.93	0.50	1.42
33.00	0.58	0.58	5.00	0.93	0.50	1.42
33.05	0.58	0.58	5.00	0.93	0.49	1.42
33.10	0.58	0.58	5.00	0.93	0.49	1.42
33.15	0.58	0.58	5.00	0.93	0.49	1.42
33.20	0.58	0.58	5.00	0.93	0.49	1.41
33.25	0.58	0.58	5.00	0.93	0.48	1.41
33.30	0.58	0.58	5.00	0.93	0.48	1.41
33.35	0.58	0.58	5.00	0.93	0.48	1.40
33.40	0.58	0.58	5.00	0.93	0.47	1.40
33.45	0.58	0.58	5.00	0.93	0.47	1.40
33.50	0.58	0.58	5.00	0.93	0.47	1.40
33.55	0.58	0.58	5.00	0.93	0.47	1.39
33.60	0.58	0.58	5.00	0.93	0.46	1.39
33.65	0.58	0.58	5.00	0.93	0.46	1.39
33.70	0.58	0.58	5.00	0.93	0.46	1.38
33.75	0.58	0.58	5.00	0.93	0.45	1.38
33.80	0.58	0.58	5.00	0.93	0.45	1.38
33.85	0.58	0.58	5.00	0.93	0.44	1.37
33.90	0.58	0.58	5.00	0.93	0.44	1.37
33.95	0.58	0.58	5.00	0.93	0.44	1.36
34.00	0.58	0.58	5.00	0.93	0.43	1.36
34.05	0.58	0.58	5.00	0.93	0.43	1.36
34.10	0.58	0.58	5.00	0.93	0.42	1.35
34.15	0.57	0.58	5.00	0.93	0.42	1.35
34.20	0.57	0.58	5.00	0.93	0.42	1.34
34.25	0.57	0.58	5.00	0.93	0.41	1.34
34.30	0.57	0.58	5.00	0.93	0.41	1.33
34.35	0.57	0.58	5.00	0.93	0.40	1.33
34.40	0.57	0.58	5.00	0.93	0.40	1.32
34.45	0.57	0.58	5.00	0.93	0.39	1.32
34.50	0.57	0.57	5.00	0.93	0.39	1.31
34.55	0.57	0.57	5.00	0.93	0.38	1.31

34.60	0.57	0.57	5.00	0.93	0.38	1.30
34.65	0.57	0.57	5.00	0.93	0.37	1.30
34.70	0.57	0.57	5.00	0.93	0.37	1.29
34.75	0.57	0.57	5.00	0.93	0.36	1.29
34.80	0.57	0.57	5.00	0.93	0.36	1.28
34.85	0.57	0.57	5.00	0.93	0.35	1.28
34.90	0.57	0.57	5.00	0.93	0.34	1.27
34.95	0.57	0.57	5.00	0.93	0.34	1.26
35.00	0.57	0.57	5.00	0.93	0.33	1.26
35.05	0.57	0.57	5.00	0.93	0.33	1.25
35.10	0.57	0.57	5.00	0.93	0.32	1.25
35.15	0.57	0.57	5.00	0.93	0.31	1.24
35.20	0.57	0.57	5.00	0.93	0.31	1.24
35.25	0.57	0.57	5.00	0.93	0.30	1.23
35.30	0.57	0.57	5.00	0.93	0.30	1.22
35.35	0.57	0.57	5.00	0.93	0.29	1.22
35.40	0.57	0.57	5.00	0.93	0.29	1.21
35.45	0.57	0.57	5.00	0.93	0.28	1.21
35.50	0.57	0.57	5.00	0.93	0.27	1.20
35.55	0.57	0.57	5.00	0.93	0.27	1.19
35.60	0.57	0.57	5.00	0.93	0.26	1.19
35.65	0.57	0.57	5.00	0.93	0.26	1.18
35.70	0.57	0.57	5.00	0.93	0.25	1.18
35.75	0.57	0.57	5.00	0.93	0.25	1.17
35.80	0.57	0.57	5.00	0.93	0.24	1.17
35.85	0.57	0.57	5.00	0.93	0.23	1.16
35.90	0.57	0.57	5.00	0.93	0.23	1.15
35.95	0.57	0.57	5.00	0.93	0.22	1.15
36.00	0.57	0.57	5.00	0.93	0.22	1.14
36.05	0.57	0.57	5.00	0.93	0.21	1.14
36.10	0.57	0.57	5.00	0.93	0.21	1.13
36.15	0.57	0.57	5.00	0.93	0.20	1.13
36.20	0.57	0.57	5.00	0.93	0.19	1.12
36.25	0.57	0.57	5.00	0.93	0.19	1.12
36.30	0.57	0.57	5.00	0.93	0.18	1.11
36.35	0.57	0.57	5.00	0.93	0.18	1.10
36.40	0.57	0.56	5.00	0.93	0.17	1.10
36.45	0.57	0.56	5.00	0.93	0.17	1.09
36.50	0.57	0.56	5.00	0.93	0.16	1.09
36.55	0.57	0.56	5.00	0.93	0.16	1.08
36.60	0.57	0.56	5.00	0.93	0.15	1.08
36.65	0.57	0.56	5.00	0.93	0.15	1.07
36.70	0.57	0.56	5.00	0.93	0.14	1.07
36.75	0.57	0.56	5.00	0.93	0.13	1.06
36.80	0.57	0.56	5.00	0.93	0.13	1.06
36.85	0.57	0.56	5.00	0.93	0.12	1.05
36.90	0.57	0.56	5.00	0.93	0.12	1.05
36.95	0.57	0.56	5.00	0.93	0.11	1.04

37.00	0.57	0.56	5.00	0.93	0.11	1.03
37.05	0.57	0.56	5.00	0.93	0.10	1.03
37.10	0.57	0.56	5.00	0.93	0.10	1.02
37.15	0.57	0.56	5.00	0.93	0.09	1.02
37.20	0.57	0.56	5.00	0.93	0.09	1.01
37.25	0.57	0.56	5.00	0.93	0.08	1.01
37.30	0.57	0.56	5.00	0.93	0.08	1.00
37.35	0.57	0.56	5.00	0.93	0.07	1.00
37.40	0.57	0.56	5.00	0.93	0.07	0.99
37.45	0.57	0.56	5.00	0.93	0.06	0.99
37.50	0.57	0.56	5.00	0.93	0.06	0.98
37.55	0.56	0.56	5.00	0.93	0.05	0.98
37.60	0.56	0.56	5.00	0.93	0.05	0.97
37.65	0.56	0.56	5.00	0.93	0.04	0.97
37.70	0.56	0.56	5.00	0.93	0.04	0.96
37.75	0.56	0.56	5.00	0.93	0.03	0.96
37.80	0.56	0.56	5.00	0.93	0.03	0.95
37.85	0.56	0.56	5.00	0.93	0.02	0.95
37.90	0.56	0.56	5.00	0.93	0.02	0.94
37.95	0.56	0.56	5.00	0.93	0.01	0.94
38.00	0.56	0.56	5.00	0.93	0.00	0.93
38.05	0.56	0.56	1.01	0.93	0.00	0.93
38.10	0.56	0.56	1.01	0.93	0.00	0.93
38.15	0.56	0.56	1.01	0.92	0.00	0.92
38.20	0.56	0.56	1.01	0.92	0.00	0.92
38.25	0.56	0.56	1.01	0.92	0.00	0.92
38.30	0.56	0.56	1.01	0.92	0.00	0.92
38.35	0.56	0.56	1.01	0.92	0.00	0.92
38.40	0.56	0.56	1.01	0.92	0.00	0.92
38.45	0.56	0.56	1.01	0.92	0.00	0.92
38.50	0.56	0.56	1.01	0.92	0.00	0.92
38.55	0.56	0.56	1.01	0.92	0.00	0.92
38.60	0.56	0.56	1.01	0.92	0.00	0.92
38.65	0.56	0.56	1.01	0.92	0.00	0.92
38.70	0.56	0.56	1.01	0.91	0.00	0.91
38.75	0.56	0.56	1.01	0.91	0.00	0.91
38.80	0.56	0.56	1.01	0.91	0.00	0.91
38.85	0.56	0.56	1.01	0.91	0.00	0.91
38.90	0.56	0.56	1.01	0.91	0.00	0.91
38.95	0.56	0.56	1.01	0.91	0.00	0.91
39.00	0.56	0.56	1.01	0.91	0.00	0.91
39.05	0.56	0.56	1.01	0.91	0.00	0.91
39.10	0.56	0.56	1.01	0.91	0.00	0.91
39.15	0.56	0.56	1.01	0.91	0.00	0.91
39.20	0.56	0.56	1.01	0.91	0.00	0.91
39.25	0.56	0.56	1.01	0.91	0.00	0.91
39.30	0.56	0.56	1.01	0.91	0.00	0.91
39.35	0.56	0.56	1.01	0.91	0.00	0.91

39.40	0.56	0.56	1.00	0.90	0.00	0.90
39.45	0.56	0.56	1.00	0.90	0.00	0.90
39.50	0.56	0.56	1.00	0.90	0.00	0.90
39.55	0.56	0.56	1.00	0.90	0.00	0.90
39.60	0.56	0.56	1.00	0.90	0.00	0.90
39.65	0.56	0.56	1.00	0.90	0.00	0.90
39.70	0.56	0.56	1.00	0.90	0.00	0.90
39.75	0.56	0.56	1.00	0.90	0.00	0.90
39.80	0.56	0.56	1.00	0.90	0.00	0.90
39.85	0.56	0.56	1.00	0.90	0.00	0.90
39.90	0.56	0.56	1.00	0.90	0.00	0.90
39.95	0.56	0.56	1.00	0.90	0.00	0.90
40.00	0.56	0.56	1.00	0.90	0.00	0.90
40.05	0.56	0.56	1.00	0.90	0.00	0.90
40.10	0.56	0.56	1.00	0.90	0.00	0.90
40.15	0.56	0.56	1.00	0.90	0.00	0.90
40.20	0.56	0.56	1.00	0.90	0.00	0.90
40.25	0.56	0.56	1.00	0.90	0.00	0.90
40.30	0.56	0.56	1.00	0.90	0.00	0.90
40.35	0.56	0.56	1.00*	0.90	0.00	0.90
40.40	0.56	0.56	1.00*	0.90	0.00	0.90
40.45	0.56	0.56	1.00*	0.90	0.00	0.90
40.50	0.56	0.56	1.00*	0.90	0.00	0.90
40.55	0.56	0.56	1.00*	0.89	0.00	0.89
40.60	0.56	0.56	1.00*	0.89	0.00	0.89
40.65	0.56	0.56	1.00*	0.89	0.00	0.89
40.70	0.56	0.56	1.00*	0.89	0.00	0.89
40.75	0.56	0.56	1.00*	0.89	0.00	0.89
40.80	0.56	0.56	1.00*	0.89	0.00	0.89
40.85	0.56	0.56	1.00*	0.89	0.00	0.89
40.90	0.56	0.56	1.00*	0.89	0.00	0.89
40.95	0.56	0.56	1.00*	0.89	0.00	0.89
41.00	0.56	0.56	1.00*	0.89	0.00	0.89
41.05	0.56	0.56	1.00*	0.89	0.00	0.89
41.10	0.56	0.56	1.00*	0.88	0.00	0.88
41.15	0.56	0.56	1.00*	0.88	0.00	0.88
41.20	0.56	0.56	1.00*	0.88	0.00	0.88
41.25	0.56	0.56	1.00*	0.88	0.00	0.88
41.30	0.56	0.56	1.00*	0.88	0.00	0.88
41.35	0.56	0.56	0.99*	0.88	0.00	0.88
41.40	0.56	0.56	0.99*	0.88	0.00	0.88
41.45	0.56	0.56	0.99*	0.87	0.00	0.87
41.50	0.56	0.56	0.99*	0.87	0.00	0.87
41.55	0.56	0.56	0.99*	0.87	0.00	0.87
41.60	0.56	0.56	0.99*	0.87	0.00	0.87
41.65	0.56	0.56	0.99*	0.87	0.00	0.87
41.70	0.56	0.56	0.99*	0.86	0.00	0.86
41.75	0.56	0.56	0.99*	0.86	0.00	0.86

41.80	0.56	0.56	0.99*	0.86	0.00	0.86
41.85	0.56	0.56	0.99*	0.85	0.00	0.85
41.90	0.56	0.56	0.99*	0.85	0.00	0.85
41.95	0.56	0.56	0.99*	0.85	0.00	0.85
42.00	0.56	0.56	0.99*	0.85	0.00	0.85
42.05	0.56	0.56	0.99*	0.84	0.00	0.84
42.10	0.56	0.56	0.99*	0.84	0.00	0.84
42.15	0.56	0.56	0.99*	0.83	0.00	0.83
42.20	0.56	0.56	0.99*	0.83	0.00	0.83
42.25	0.56	0.56	0.99*	0.83	0.00	0.83
42.30	0.56	0.56	0.99*	0.82	0.00	0.82
42.35	0.56	0.56	0.99*	0.82	0.00	0.82
42.40	0.56	0.56	0.99*	0.81	0.00	0.81
42.45	0.53	0.56	0.94*	0.81	0.00	0.81
42.50	0.50	0.56	0.88*	0.81	0.00	0.81
42.55	0.47	0.56	0.84*	0.80	0.00	0.80
42.60	0.46	0.56	0.81*	0.80	0.00	0.80
42.65	0.45	0.56	0.79*	0.79	0.00	0.79
42.70	0.44	0.56	0.78*	0.79	0.00	0.79
42.75	0.43	0.56	0.76*	0.78	0.00	0.78
42.80	0.42	0.56	0.75*	0.78	0.00	0.78
42.85	0.42	0.56	0.74*	0.77	0.00	0.77
42.90	0.41	0.56	0.73*	0.77	0.00	0.77
42.95	0.40	0.56	0.72*	0.76	0.00	0.76
43.00	0.40	0.56	0.71*	0.75	0.00	0.75
43.05	0.39	0.56	0.70*	0.75	0.00	0.75
43.10	0.39	0.56	0.69*	0.74	0.00	0.74
43.15	0.39	0.56	0.68*	0.74	0.00	0.74
43.20	0.38	0.56	0.68*	0.73	0.00	0.73
43.25	0.38	0.56	0.67*	0.73	0.00	0.73
43.30	0.37	0.56	0.66*	0.72	0.00	0.72
43.35	0.37	0.56	0.65*	0.71	0.00	0.71
43.40	0.37	0.56	0.65*	0.71	0.00	0.71
43.45	0.36	0.56	0.64*	0.70	0.00	0.70
43.50	0.36	0.56	0.64*	0.69	0.00	0.69
43.55	0.36	0.56	0.63*	0.69	0.00	0.69
43.60	0.35	0.56	0.62*	0.68	0.00	0.68
43.65	0.35	0.56	0.62*	0.68	0.00	0.68
43.70	0.35	0.56	0.61*	0.67	0.00	0.67
43.75	0.34	0.56	0.61*	0.66	0.00	0.66
43.80	0.34	0.56	0.60*	0.66	0.00	0.66
43.85	0.34	0.56	0.60*	0.65	0.00	0.65
43.90	0.33	0.56	0.59*	0.64	0.00	0.64
43.95	0.33	0.56	0.59*	0.64	0.00	0.64
44.00	0.33	0.56	0.58*	0.63	0.00	0.63
44.05	0.33	0.56	0.58*	0.62	0.00	0.62
44.10	0.32	0.56	0.57*	0.62	0.00	0.62
44.15	0.32	0.56	0.57*	0.61	0.00	0.61

44.20	0.32	0.56	0.56*	0.60	0.00	0.60
44.25	0.32	0.56	0.56*	0.59	0.00	0.59
44.30	0.31	0.56	0.55*	0.59	0.00	0.59
44.35	0.31	0.56	0.55*	0.58	0.00	0.58
44.40	0.31	0.56	0.54*	0.57	0.00	0.57
44.45	0.31	0.56	0.54*	0.57	0.00	0.57
44.50	0.30	0.56	0.54*	0.56	0.00	0.56
44.55	0.30	0.57	0.53*	0.55	0.00	0.55
44.60	0.30	0.57	0.53*	0.54	0.00	0.54
44.65	0.30	0.57	0.52*	0.54	0.00	0.54
44.70	0.29	0.57	0.52*	0.53	0.00	0.53
44.75	0.29	0.57	0.52*	0.52	0.00	0.52
44.80	0.29	0.57	0.51*	0.51	0.00	0.51
44.85	0.29	0.57	0.51*	0.51	0.00	0.51
44.90	0.28	0.57	0.50*	0.50	0.00	0.50
44.95	0.28	0.57	0.50*	0.49	0.00	0.49
45.00	0.28	0.57	0.50*	0.48	0.00	0.48
45.05	0.28	0.57	0.50*	0.47	0.00	0.47
45.10	0.28	0.57	0.50*	0.47	0.00	0.47
45.15	0.29	0.57	0.51*	0.46	0.00	0.46
45.20	0.29	0.57	0.51*	0.45	0.00	0.45
45.25	0.29	0.57	0.51*	0.44	0.00	0.44
45.30	0.29	0.57	0.52*	0.44	0.00	0.44
45.35	0.29	0.57	0.52*	0.43	0.00	0.43
45.40	0.30	0.57	0.52*	0.42	0.00	0.42
45.45	0.30	0.57	0.53*	0.41	0.00	0.41
45.50	0.30	0.57	0.53*	0.41	0.00	0.41
45.55	0.30	0.57	0.54*	0.40	0.00	0.40
45.60	0.31	0.57	0.54*	0.39	0.00	0.39
45.65	0.31	0.57	0.54*	0.38	0.00	0.38
45.70	0.31	0.57	0.55*	0.38	0.00	0.38
45.75	0.31	0.57	0.55*	0.37	0.00	0.37
45.80	0.31	0.57	0.56*	0.36	0.00	0.36
45.85	0.32	0.57	0.56*	0.35	0.00	0.35
45.90	0.32	0.57	0.56*	0.35	0.00	0.35
45.95	0.32	0.57	0.57*	0.34	0.00	0.34
46.00	0.32	0.57	0.57*	0.33	0.00	0.33
46.05	0.33	0.57	0.58*	0.33	0.00	0.33
46.10	0.33	0.57	0.58*	0.32	0.00	0.32
46.15	0.33	0.57	0.59*	0.31	0.00	0.31
46.20	0.33	0.57	0.59*	0.31	0.00	0.31
46.25	0.34	0.57	0.59*	0.30	0.00	0.30
46.30	0.34	0.57	0.60*	0.29	0.00	0.29
46.35	0.34	0.57	0.60*	0.29	0.00	0.29
46.40	0.34	0.57	0.61*	0.28	0.00	0.28
46.45	0.35	0.57	0.61*	0.27	0.00	0.27
46.50	0.35	0.57	0.62*	0.27	0.00	0.27
46.55	0.35	0.57	0.62*	0.26	0.00	0.26

46.60	0.36	0.57	0.63*	0.25	0.00	0.25
46.65	0.36	0.57	0.63*	0.25	0.00	0.25
46.70	0.36	0.57	0.64*	0.24	0.00	0.24
46.75	0.37	0.57	0.65*	0.24	0.00	0.24
46.80	0.37	0.57	0.65*	0.23	0.00	0.23
46.85	0.37	0.57	0.66*	0.22	0.00	0.22
46.90	0.38	0.57	0.66*	0.22	0.00	0.22
46.95	0.38	0.57	0.67*	0.21	0.00	0.21
47.00	0.38	0.57	0.68*	0.20	0.00	0.20
47.05	0.39	0.57	0.68*	0.20	0.00	0.20
47.10	0.39	0.57	0.69*	0.19	0.00	0.19
47.15	0.39	0.57	0.70*	0.19	0.00	0.19
47.20	0.40	0.57	0.71*	0.18	0.00	0.18
47.25	0.40	0.57	0.71*	0.18	0.00	0.18
47.30	0.41	0.57	0.72*	0.17	0.00	0.17
47.35	0.41	0.57	0.73*	0.17	0.00	0.17
47.40	0.42	0.56	0.74*	0.16	0.00	0.16
47.45	0.43	0.56	0.76*	0.16	0.00	0.16
47.50	0.43	0.56	0.77*	0.15	0.00	0.15
47.55	0.44	0.56	0.79*	0.15	0.00	0.15
47.60	0.45	0.56	0.81*	0.14	0.00	0.14
47.65	0.47	0.56	0.83*	0.14	0.00	0.14
47.70	0.49	0.56	0.86*	0.13	0.00	0.13
47.75	0.52	0.56	0.92*	0.13	0.00	0.13
47.80	0.55	0.56	0.97*	0.12	0.00	0.12
47.85	0.55	0.56	0.97*	0.12	0.00	0.12
47.90	0.55	0.56	0.97*	0.11	0.00	0.11
47.95	0.55	0.56	0.97*	0.11	0.00	0.11
48.00	0.55	0.56	0.97*	0.10	0.00	0.10
48.05	0.55	0.56	0.97*	0.10	0.00	0.10
48.10	0.55	0.56	0.97*	0.10	0.00	0.10
48.15	0.55	0.56	0.97*	0.09	0.00	0.09
48.20	0.55	0.56	0.97*	0.09	0.00	0.09
48.25	0.55	0.56	0.97*	0.09	0.00	0.09
48.30	0.55	0.56	0.97*	0.08	0.00	0.08
48.35	0.55	0.56	0.97*	0.08	0.00	0.08
48.40	0.55	0.56	0.97*	0.08	0.00	0.08
48.45	0.55	0.56	0.97*	0.07	0.00	0.07
48.50	0.55	0.56	0.97*	0.07	0.00	0.07
48.55	0.55	0.56	0.97*	0.07	0.00	0.07
48.60	0.55	0.56	0.97*	0.06	0.00	0.06
48.65	0.55	0.56	0.97*	0.06	0.00	0.06
48.70	0.55	0.56	0.97*	0.06	0.00	0.06
48.75	0.55	0.56	0.97*	0.06	0.00	0.06
48.80	0.55	0.56	0.97*	0.05	0.00	0.05
48.85	0.55	0.56	0.97*	0.05	0.00	0.05
48.90	0.55	0.56	0.97*	0.05	0.00	0.05
48.95	0.55	0.56	0.97*	0.05	0.00	0.05

49.00	0.55	0.56	0.97*	0.05	0.00	0.05
49.05	0.55	0.56	0.97*	0.04	0.00	0.04
49.10	0.55	0.56	0.97*	0.04	0.00	0.04
49.15	0.55	0.56	0.97*	0.04	0.00	0.04
49.20	0.55	0.56	0.97*	0.04	0.00	0.04
49.25	0.55	0.56	0.97*	0.04	0.00	0.04
49.30	0.55	0.56	0.97*	0.04	0.00	0.04
49.35	0.55	0.56	0.97*	0.04	0.00	0.04
49.40	0.55	0.56	0.97*	0.04	0.00	0.04
49.45	0.55	0.56	0.97*	0.03	0.00	0.03
49.50	0.55	0.56	0.97*	0.03	0.00	0.03
49.55	0.55	0.56	0.97*	0.03	0.00	0.03
49.60	0.55	0.56	0.97*	0.03	0.00	0.03
49.65	0.55	0.56	0.97*	0.03	0.00	0.03
49.70	0.55	0.56	0.97*	0.03	0.00	0.03
49.75	0.55	0.56	0.97*	0.03	0.00	0.03
49.80	0.55	0.56	0.97*	0.03	0.00	0.03
49.85	0.55	0.56	0.97*	0.03	0.00	0.03
49.90	0.55	0.56	0.97*	0.03	0.00	0.03
49.95	0.55	0.56	0.97*	0.03	0.00	0.03
50.00	0.55	0.56	0.97*	0.02	0.00	0.02
50.05	0.55	0.56	0.97*	0.02	0.00	0.02
50.10	0.55	0.56	0.97*	0.02	0.00	0.02
50.15	0.55	0.56	0.97*	0.02	0.00	0.02
50.20	0.55	0.56	0.97*	0.02	0.00	0.02
50.25	0.55	0.56	0.97*	0.02	0.00	0.02
50.30	0.55	0.56	0.97*	0.02	0.00	0.02
50.35	0.55	0.56	0.97*	0.02	0.00	0.02
50.40	0.55	0.56	0.97*	0.02	0.00	0.02
50.45	0.55	0.56	0.97*	0.02	0.00	0.02
50.50	0.55	0.56	0.97*	0.02	0.00	0.02
50.55	0.55	0.56	0.97*	0.02	0.00	0.02
50.60	0.55	0.56	0.97*	0.01	0.00	0.01
50.65	0.55	0.56	0.97*	0.01	0.00	0.01
50.70	0.55	0.56	0.97*	0.01	0.00	0.01
50.75	0.55	0.56	0.97*	0.01	0.00	0.01
50.80	0.55	0.56	0.97*	0.01	0.00	0.01
50.85	0.55	0.56	0.97*	0.01	0.00	0.01
50.90	0.55	0.56	0.97*	0.01	0.00	0.01
50.95	0.55	0.56	0.97*	0.01	0.00	0.01
51.00	0.55	0.56	0.97*	0.01	0.00	0.01
51.05	0.54	0.56	0.97*	0.01	0.00	0.01
51.10	0.54	0.56	0.97*	0.01	0.00	0.01
51.15	0.54	0.56	0.97*	0.01	0.00	0.01
51.20	0.54	0.56	0.97*	0.01	0.00	0.01
51.25	0.54	0.56	0.97*	0.00	0.00	0.00
51.30	0.54	0.56	0.97*	0.00	0.00	0.00
51.35	0.54	0.56	0.97*	0.00	0.00	0.00

51.40	0.54	0.56	0.97*	0.00	0.00	0.00
51.45	0.54	0.56	0.97*	0.00	0.00	0.00
51.50	0.54	0.56	0.97*	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/ft2)

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

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*******************************************************************************
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                                        LIQUEFACTION ANALYSIS SUMMARY

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        Font: Courier New, Regular, Size 8 is recommended for this report.
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        Input File Name: N:\2018\18-81-134 SBCUSD, New Diesel Technology
Center\-01\Settlement -Final\BH-04.liq
        Title:  New Diesel Technology Center Building
        Subtitle:  Dynamic Settlement

        Surface Elev.=616
        Hole No.=BH-04
        Depth of Hole= 51.50 ft
        Water Table during Earthquake= 50.00 ft
        Water Table during In-Situ Testing= 50.00 ft
        Max. Acceleration= 0.99 g
        Earthquake Magnitude= 7.00

 Input Data:
        Surface Elev.=616
        Hole No.=BH-04
        Depth of Hole=51.50 ft
        Water Table during Earthquake= 50.00 ft
        Water Table during In-Situ Testing= 50.00 ft
        Max. Acceleration=0.99 g
        Earthquake Magnitude=7.00
        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 two CSR (fs1=1, fs2=User)
        10. Use Curve Smoothing: Yes*
        * Recommended Options
```

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	50.00	120.00	51.00
5.00	50.00	120.00	51.00
6.00	4.00	120.00	51.00
10.00	8.00	121.00	51.00
15.00	14.00	128.00	51.00
20.00	12.00	128.00	45.00
25.00	17.00	131.00	45.00
30.00	39.00	120.00	45.00
35.00	50.00	124.00	15.00
40.00	50.00	120.00	15.00
45.00	48.00	126.00	15.00
50.00	50.00	126.00	15.00

Output Results:

Settlement of Saturated Sands=0.05 in.
Settlement of Unsaturated Sands=6.60 in.
Total Settlement of Saturated and Unsaturated Sands=6.65 in.
Differential Settlement=3.325 to 4.389 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.60	0.64	5.00	0.05	6.60	6.65
0.05	0.60	0.64	5.00	0.05	6.60	6.65
0.10	0.60	0.64	5.00	0.05	6.60	6.65
0.15	0.60	0.64	5.00	0.05	6.60	6.65
0.20	0.60	0.64	5.00	0.05	6.60	6.65
0.25	0.60	0.64	5.00	0.05	6.60	6.65
0.30	0.60	0.64	5.00	0.05	6.60	6.65
0.35	0.60	0.64	5.00	0.05	6.60	6.65
0.40	0.60	0.64	5.00	0.05	6.60	6.65
0.45	0.60	0.64	5.00	0.05	6.60	6.65
0.50	0.60	0.64	5.00	0.05	6.60	6.65
0.55	0.60	0.64	5.00	0.05	6.60	6.65
0.60	0.60	0.64	5.00	0.05	6.60	6.65
0.65	0.60	0.64	5.00	0.05	6.60	6.65
0.70	0.60	0.64	5.00	0.05	6.60	6.65
0.75	0.60	0.64	5.00	0.05	6.60	6.65
0.80	0.60	0.64	5.00	0.05	6.60	6.65
0.85	0.60	0.64	5.00	0.05	6.60	6.65
0.90	0.60	0.64	5.00	0.05	6.60	6.65
0.95	0.60	0.64	5.00	0.05	6.60	6.65

1.00	0.60	0.64	5.00	0.05	6.60	6.65
1.05	0.60	0.64	5.00	0.05	6.60	6.65
1.10	0.60	0.64	5.00	0.05	6.60	6.65
1.15	0.60	0.64	5.00	0.05	6.60	6.65
1.20	0.60	0.64	5.00	0.05	6.60	6.65
1.25	0.60	0.64	5.00	0.05	6.60	6.65
1.30	0.60	0.64	5.00	0.05	6.60	6.65
1.35	0.60	0.64	5.00	0.05	6.60	6.65
1.40	0.60	0.64	5.00	0.05	6.60	6.65
1.45	0.60	0.64	5.00	0.05	6.60	6.65
1.50	0.60	0.64	5.00	0.05	6.60	6.65
1.55	0.60	0.64	5.00	0.05	6.60	6.65
1.60	0.60	0.64	5.00	0.05	6.60	6.65
1.65	0.60	0.64	5.00	0.05	6.60	6.65
1.70	0.60	0.64	5.00	0.05	6.60	6.65
1.75	0.60	0.64	5.00	0.05	6.60	6.65
1.80	0.60	0.64	5.00	0.05	6.60	6.65
1.85	0.60	0.64	5.00	0.05	6.60	6.65
1.90	0.60	0.64	5.00	0.05	6.60	6.65
1.95	0.60	0.64	5.00	0.05	6.60	6.65
2.00	0.60	0.64	5.00	0.05	6.60	6.65
2.05	0.60	0.64	5.00	0.05	6.60	6.65
2.10	0.60	0.64	5.00	0.05	6.60	6.65
2.15	0.60	0.64	5.00	0.05	6.60	6.65
2.20	0.60	0.64	5.00	0.05	6.60	6.65
2.25	0.60	0.64	5.00	0.05	6.60	6.65
2.30	0.60	0.64	5.00	0.05	6.60	6.65
2.35	0.60	0.64	5.00	0.05	6.60	6.65
2.40	0.60	0.64	5.00	0.05	6.60	6.65
2.45	0.60	0.64	5.00	0.05	6.60	6.65
2.50	0.60	0.64	5.00	0.05	6.60	6.65
2.55	0.60	0.64	5.00	0.05	6.60	6.65
2.60	0.60	0.64	5.00	0.05	6.60	6.65
2.65	0.60	0.64	5.00	0.05	6.60	6.65
2.70	0.60	0.64	5.00	0.05	6.60	6.65
2.75	0.60	0.64	5.00	0.05	6.60	6.65
2.80	0.60	0.64	5.00	0.05	6.60	6.65
2.85	0.60	0.64	5.00	0.05	6.60	6.65
2.90	0.60	0.64	5.00	0.05	6.60	6.65
2.95	0.60	0.64	5.00	0.05	6.59	6.65
3.00	0.60	0.64	5.00	0.05	6.59	6.65
3.05	0.60	0.64	5.00	0.05	6.59	6.65
3.10	0.60	0.64	5.00	0.05	6.59	6.65
3.15	0.60	0.64	5.00	0.05	6.59	6.65
3.20	0.60	0.64	5.00	0.05	6.59	6.65
3.25	0.60	0.64	5.00	0.05	6.59	6.65
3.30	0.60	0.64	5.00	0.05	6.59	6.64
3.35	0.60	0.64	5.00	0.05	6.59	6.64

3.40	0.60	0.64	5.00	0.05	6.59	6.64
3.45	0.60	0.64	5.00	0.05	6.59	6.64
3.50	0.60	0.64	5.00	0.05	6.59	6.64
3.55	0.60	0.64	5.00	0.05	6.59	6.64
3.60	0.60	0.64	5.00	0.05	6.59	6.64
3.65	0.60	0.64	5.00	0.05	6.59	6.64
3.70	0.60	0.64	5.00	0.05	6.59	6.64
3.75	0.60	0.64	5.00	0.05	6.59	6.64
3.80	0.60	0.64	5.00	0.05	6.59	6.64
3.85	0.60	0.64	5.00	0.05	6.59	6.64
3.90	0.60	0.64	5.00	0.05	6.59	6.64
3.95	0.60	0.64	5.00	0.05	6.59	6.64
4.00	0.60	0.64	5.00	0.05	6.59	6.64
4.05	0.60	0.64	5.00	0.05	6.59	6.64
4.10	0.60	0.64	5.00	0.05	6.59	6.64
4.15	0.60	0.64	5.00	0.05	6.59	6.64
4.20	0.60	0.64	5.00	0.05	6.59	6.64
4.25	0.60	0.64	5.00	0.05	6.59	6.64
4.30	0.60	0.64	5.00	0.05	6.59	6.64
4.35	0.60	0.64	5.00	0.05	6.59	6.64
4.40	0.60	0.64	5.00	0.05	6.59	6.64
4.45	0.60	0.64	5.00	0.05	6.59	6.64
4.50	0.60	0.64	5.00	0.05	6.59	6.64
4.55	0.60	0.64	5.00	0.05	6.59	6.64
4.60	0.60	0.64	5.00	0.05	6.59	6.64
4.65	0.60	0.64	5.00	0.05	6.59	6.64
4.70	0.60	0.64	5.00	0.05	6.59	6.64
4.75	0.60	0.64	5.00	0.05	6.59	6.64
4.80	0.60	0.64	5.00	0.05	6.59	6.64
4.85	0.60	0.64	5.00	0.05	6.59	6.64
4.90	0.60	0.64	5.00	0.05	6.59	6.64
4.95	0.60	0.64	5.00	0.05	6.59	6.64
5.00	0.60	0.64	5.00	0.05	6.59	6.64
5.05	0.60	0.64	5.00	0.05	6.59	6.64
5.10	0.60	0.64	5.00	0.05	6.59	6.64
5.15	0.60	0.64	5.00	0.05	6.59	6.64
5.20	0.60	0.64	5.00	0.05	6.59	6.64
5.25	0.60	0.64	5.00	0.05	6.59	6.64
5.30	0.60	0.64	5.00	0.05	6.59	6.64
5.35	0.60	0.64	5.00	0.05	6.59	6.64
5.40	0.60	0.64	5.00	0.05	6.59	6.64
5.45	0.60	0.64	5.00	0.05	6.59	6.64
5.50	0.60	0.64	5.00	0.05	6.59	6.64
5.55	0.60	0.64	5.00	0.05	6.59	6.64
5.60	0.60	0.64	5.00	0.05	6.59	6.64
5.65	0.60	0.64	5.00	0.05	6.58	6.64
5.70	0.60	0.63	5.00	0.05	6.58	6.63
5.75	0.43	0.63	5.00	0.05	6.58	6.63

5.80	0.34	0.63	5.00	0.05	6.57	6.62
5.85	0.28	0.63	5.00	0.05	6.56	6.61
5.90	0.23	0.63	5.00	0.05	6.55	6.60
5.95	0.19	0.63	5.00	0.05	6.54	6.59
6.00	0.14	0.63	5.00	0.05	6.52	6.58
6.05	0.14	0.63	5.00	0.05	6.50	6.55
6.10	0.15	0.63	5.00	0.05	6.48	6.53
6.15	0.15	0.63	5.00	0.05	6.46	6.51
6.20	0.15	0.63	5.00	0.05	6.43	6.48
6.25	0.15	0.63	5.00	0.05	6.41	6.46
6.30	0.15	0.63	5.00	0.05	6.39	6.44
6.35	0.15	0.63	5.00	0.05	6.37	6.42
6.40	0.15	0.63	5.00	0.05	6.34	6.39
6.45	0.15	0.63	5.00	0.05	6.32	6.37
6.50	0.15	0.63	5.00	0.05	6.30	6.35
6.55	0.15	0.63	5.00	0.05	6.28	6.33
6.60	0.15	0.63	5.00	0.05	6.26	6.31
6.65	0.15	0.63	5.00	0.05	6.23	6.29
6.70	0.15	0.63	5.00	0.05	6.21	6.26
6.75	0.15	0.63	5.00	0.05	6.19	6.24
6.80	0.15	0.63	5.00	0.05	6.17	6.22
6.85	0.15	0.63	5.00	0.05	6.15	6.20
6.90	0.16	0.63	5.00	0.05	6.13	6.18
6.95	0.16	0.63	5.00	0.05	6.11	6.16
7.00	0.16	0.63	5.00	0.05	6.09	6.14
7.05	0.16	0.63	5.00	0.05	6.06	6.12
7.10	0.16	0.63	5.00	0.05	6.04	6.10
7.15	0.16	0.63	5.00	0.05	6.02	6.07
7.20	0.16	0.63	5.00	0.05	6.00	6.05
7.25	0.16	0.63	5.00	0.05	5.98	6.03
7.30	0.16	0.63	5.00	0.05	5.96	6.01
7.35	0.16	0.63	5.00	0.05	5.94	5.99
7.40	0.16	0.63	5.00	0.05	5.92	5.97
7.45	0.16	0.63	5.00	0.05	5.90	5.95
7.50	0.16	0.63	5.00	0.05	5.88	5.93
7.55	0.16	0.63	5.00	0.05	5.86	5.91
7.60	0.16	0.63	5.00	0.05	5.84	5.89
7.65	0.16	0.63	5.00	0.05	5.82	5.87
7.70	0.16	0.63	5.00	0.05	5.80	5.85
7.75	0.17	0.63	5.00	0.05	5.78	5.83
7.80	0.17	0.63	5.00	0.05	5.76	5.81
7.85	0.17	0.63	5.00	0.05	5.74	5.80
7.90	0.17	0.63	5.00	0.05	5.72	5.78
7.95	0.17	0.63	5.00	0.05	5.71	5.76
8.00	0.17	0.63	5.00	0.05	5.69	5.74
8.05	0.17	0.63	5.00	0.05	5.67	5.72
8.10	0.17	0.63	5.00	0.05	5.65	5.70
8.15	0.17	0.63	5.00	0.05	5.63	5.68

8.20	0.17	0.63	5.00	0.05	5.61	5.66
8.25	0.18	0.63	5.00	0.05	5.59	5.64
8.30	0.19	0.63	5.00	0.05	5.57	5.63
8.35	0.19	0.63	5.00	0.05	5.56	5.61
8.40	0.19	0.63	5.00	0.05	5.54	5.59
8.45	0.19	0.63	5.00	0.05	5.52	5.58
8.50	0.19	0.63	5.00	0.05	5.51	5.56
8.55	0.19	0.63	5.00	0.05	5.49	5.54
8.60	0.19	0.63	5.00	0.05	5.47	5.53
8.65	0.19	0.63	5.00	0.05	5.46	5.51
8.70	0.19	0.63	5.00	0.05	5.44	5.49
8.75	0.19	0.63	5.00	0.05	5.43	5.48
8.80	0.19	0.63	5.00	0.05	5.41	5.46
8.85	0.19	0.63	5.00	0.05	5.39	5.44
8.90	0.19	0.63	5.00	0.05	5.38	5.43
8.95	0.19	0.63	5.00	0.05	5.36	5.41
9.00	0.19	0.63	5.00	0.05	5.34	5.40
9.05	0.19	0.63	5.00	0.05	5.33	5.38
9.10	0.19	0.63	5.00	0.05	5.31	5.36
9.15	0.19	0.63	5.00	0.05	5.30	5.35
9.20	0.20	0.63	5.00	0.05	5.28	5.33
9.25	0.20	0.63	5.00	0.05	5.27	5.32
9.30	0.20	0.63	5.00	0.05	5.25	5.30
9.35	0.20	0.63	5.00	0.05	5.23	5.29
9.40	0.20	0.63	5.00	0.05	5.22	5.27
9.45	0.20	0.63	5.00	0.05	5.20	5.25
9.50	0.20	0.63	5.00	0.05	5.19	5.24
9.55	0.20	0.63	5.00	0.05	5.17	5.22
9.60	0.20	0.63	5.00	0.05	5.16	5.21
9.65	0.20	0.63	5.00	0.05	5.14	5.19
9.70	0.20	0.63	5.00	0.05	5.13	5.18
9.75	0.20	0.63	5.00	0.05	5.11	5.16
9.80	0.20	0.63	5.00	0.05	5.10	5.15
9.85	0.20	0.63	5.00	0.05	5.08	5.13
9.90	0.20	0.63	5.00	0.05	5.07	5.12
9.95	0.20	0.63	5.00	0.05	5.05	5.10
10.00	0.20	0.63	5.00	0.05	5.04	5.09
10.05	0.20	0.63	5.00	0.05	5.02	5.07
10.10	0.21	0.63	5.00	0.05	5.01	5.06
10.15	0.21	0.63	5.00	0.05	4.99	5.04
10.20	0.21	0.63	5.00	0.05	4.98	5.03
10.25	0.21	0.63	5.00	0.05	4.96	5.01
10.30	0.21	0.63	5.00	0.05	4.95	5.00
10.35	0.21	0.63	5.00	0.05	4.93	4.98
10.40	0.21	0.63	5.00	0.05	4.92	4.97
10.45	0.21	0.63	5.00	0.05	4.90	4.96
10.50	0.21	0.63	5.00	0.05	4.89	4.94
10.55	0.21	0.63	5.00	0.05	4.88	4.93

10.60	0.21	0.63	5.00	0.05	4.86	4.91
10.65	0.21	0.63	5.00	0.05	4.85	4.90
10.70	0.21	0.63	5.00	0.05	4.83	4.88
10.75	0.21	0.63	5.00	0.05	4.82	4.87
10.80	0.21	0.63	5.00	0.05	4.81	4.86
10.85	0.22	0.63	5.00	0.05	4.79	4.84
10.90	0.22	0.63	5.00	0.05	4.78	4.83
10.95	0.22	0.63	5.00	0.05	4.76	4.82
11.00	0.22	0.63	5.00	0.05	4.75	4.80
11.05	0.22	0.63	5.00	0.05	4.74	4.79
11.10	0.22	0.63	5.00	0.05	4.72	4.77
11.15	0.22	0.63	5.00	0.05	4.71	4.76
11.20	0.22	0.63	5.00	0.05	4.70	4.75
11.25	0.22	0.63	5.00	0.05	4.68	4.73
11.30	0.22	0.63	5.00	0.05	4.67	4.72
11.35	0.22	0.63	5.00	0.05	4.66	4.71
11.40	0.22	0.63	5.00	0.05	4.64	4.69
11.45	0.22	0.63	5.00	0.05	4.63	4.68
11.50	0.22	0.63	5.00	0.05	4.62	4.67
11.55	0.22	0.63	5.00	0.05	4.60	4.65
11.60	0.22	0.63	5.00	0.05	4.59	4.64
11.65	0.23	0.63	5.00	0.05	4.58	4.63
11.70	0.23	0.63	5.00	0.05	4.56	4.61
11.75	0.23	0.63	5.00	0.05	4.55	4.60
11.80	0.23	0.63	5.00	0.05	4.54	4.59
11.85	0.23	0.63	5.00	0.05	4.52	4.58
11.90	0.23	0.63	5.00	0.05	4.51	4.56
11.95	0.23	0.63	5.00	0.05	4.50	4.55
12.00	0.23	0.63	5.00	0.05	4.49	4.54
12.05	0.23	0.63	5.00	0.05	4.47	4.52
12.10	0.23	0.63	5.00	0.05	4.46	4.51
12.15	0.23	0.63	5.00	0.05	4.45	4.50
12.20	0.23	0.63	5.00	0.05	4.44	4.49
12.25	0.23	0.63	5.00	0.05	4.42	4.47
12.30	0.23	0.63	5.00	0.05	4.41	4.46
12.35	0.23	0.62	5.00	0.05	4.40	4.45
12.40	0.23	0.62	5.00	0.05	4.39	4.44
12.45	0.23	0.62	5.00	0.05	4.37	4.42
12.50	0.24	0.62	5.00	0.05	4.36	4.41
12.55	0.24	0.62	5.00	0.05	4.35	4.40
12.60	0.24	0.62	5.00	0.05	4.34	4.39
12.65	0.24	0.62	5.00	0.05	4.32	4.37
12.70	0.24	0.62	5.00	0.05	4.31	4.36
12.75	0.24	0.62	5.00	0.05	4.30	4.35
12.80	0.24	0.62	5.00	0.05	4.29	4.34
12.85	0.24	0.62	5.00	0.05	4.28	4.33
12.90	0.24	0.62	5.00	0.05	4.26	4.31
12.95	0.24	0.62	5.00	0.05	4.25	4.30

13.00	0.24	0.62	5.00	0.05	4.24	4.29
13.05	0.24	0.62	5.00	0.05	4.23	4.28
13.10	0.24	0.62	5.00	0.05	4.22	4.27
13.15	0.24	0.62	5.00	0.05	4.20	4.25
13.20	0.24	0.62	5.00	0.05	4.19	4.24
13.25	0.24	0.62	5.00	0.05	4.18	4.23
13.30	0.24	0.62	5.00	0.05	4.17	4.22
13.35	0.25	0.62	5.00	0.05	4.16	4.21
13.40	0.25	0.62	5.00	0.05	4.14	4.20
13.45	0.25	0.62	5.00	0.05	4.13	4.18
13.50	0.25	0.62	5.00	0.05	4.12	4.17
13.55	0.25	0.62	5.00	0.05	4.11	4.16
13.60	0.25	0.62	5.00	0.05	4.10	4.15
13.65	0.25	0.62	5.00	0.05	4.09	4.14
13.70	0.25	0.62	5.00	0.05	4.07	4.13
13.75	0.25	0.62	5.00	0.05	4.06	4.11
13.80	0.25	0.62	5.00	0.05	4.05	4.10
13.85	0.25	0.62	5.00	0.05	4.04	4.09
13.90	0.25	0.62	5.00	0.05	4.03	4.08
13.95	0.25	0.62	5.00	0.05	4.02	4.07
14.00	0.25	0.62	5.00	0.05	4.01	4.06
14.05	0.25	0.62	5.00	0.05	4.00	4.05
14.10	0.25	0.62	5.00	0.05	3.98	4.04
14.15	0.25	0.62	5.00	0.05	3.97	4.02
14.20	0.25	0.62	5.00	0.05	3.96	4.01
14.25	0.25	0.62	5.00	0.05	3.95	4.00
14.30	0.26	0.62	5.00	0.05	3.94	3.99
14.35	0.26	0.62	5.00	0.05	3.93	3.98
14.40	0.26	0.62	5.00	0.05	3.92	3.97
14.45	0.26	0.62	5.00	0.05	3.91	3.96
14.50	0.26	0.62	5.00	0.05	3.90	3.95
14.55	0.26	0.62	5.00	0.05	3.88	3.94
14.60	0.26	0.62	5.00	0.05	3.87	3.92
14.65	0.26	0.62	5.00	0.05	3.86	3.91
14.70	0.26	0.62	5.00	0.05	3.85	3.90
14.75	0.26	0.62	5.00	0.05	3.84	3.89
14.80	0.29	0.62	5.00	0.05	3.83	3.88
14.85	0.29	0.62	5.00	0.05	3.82	3.87
14.90	0.29	0.62	5.00	0.05	3.81	3.86
14.95	0.29	0.62	5.00	0.05	3.80	3.85
15.00	0.29	0.62	5.00	0.05	3.79	3.84
15.05	0.29	0.62	5.00	0.05	3.78	3.83
15.10	0.29	0.62	5.00	0.05	3.77	3.82
15.15	0.29	0.62	5.00	0.05	3.76	3.81
15.20	0.29	0.62	5.00	0.05	3.75	3.80
15.25	0.29	0.62	5.00	0.05	3.74	3.79
15.30	0.28	0.62	5.00	0.05	3.73	3.78
15.35	0.28	0.62	5.00	0.05	3.72	3.77

15.40	0.28	0.62	5.00	0.05	3.71	3.76
15.45	0.28	0.62	5.00	0.05	3.70	3.75
15.50	0.28	0.62	5.00	0.05	3.69	3.74
15.55	0.28	0.62	5.00	0.05	3.68	3.73
15.60	0.28	0.62	5.00	0.05	3.67	3.73
15.65	0.28	0.62	5.00	0.05	3.66	3.72
15.70	0.28	0.62	5.00	0.05	3.65	3.71
15.75	0.28	0.62	5.00	0.05	3.64	3.70
15.80	0.28	0.62	5.00	0.05	3.63	3.68
15.85	0.28	0.62	5.00	0.05	3.62	3.67
15.90	0.28	0.62	5.00	0.05	3.61	3.66
15.95	0.27	0.62	5.00	0.05	3.60	3.65
16.00	0.27	0.62	5.00	0.05	3.59	3.64
16.05	0.27	0.62	5.00	0.05	3.58	3.63
16.10	0.27	0.62	5.00	0.05	3.57	3.62
16.15	0.27	0.62	5.00	0.05	3.56	3.61
16.20	0.27	0.62	5.00	0.05	3.55	3.60
16.25	0.27	0.62	5.00	0.05	3.54	3.59
16.30	0.27	0.62	5.00	0.05	3.53	3.58
16.35	0.27	0.62	5.00	0.05	3.52	3.57
16.40	0.27	0.62	5.00	0.05	3.51	3.56
16.45	0.27	0.62	5.00	0.05	3.50	3.55
16.50	0.27	0.62	5.00	0.05	3.49	3.54
16.55	0.27	0.62	5.00	0.05	3.48	3.53
16.60	0.27	0.62	5.00	0.05	3.47	3.52
16.65	0.26	0.62	5.00	0.05	3.46	3.51
16.70	0.26	0.62	5.00	0.05	3.45	3.50
16.75	0.26	0.62	5.00	0.05	3.44	3.49
16.80	0.26	0.62	5.00	0.05	3.43	3.48
16.85	0.26	0.62	5.00	0.05	3.42	3.47
16.90	0.26	0.62	5.00	0.05	3.40	3.46
16.95	0.26	0.62	5.00	0.05	3.39	3.45
17.00	0.26	0.62	5.00	0.05	3.38	3.43
17.05	0.26	0.62	5.00	0.05	3.37	3.42
17.10	0.26	0.62	5.00	0.05	3.36	3.41
17.15	0.26	0.62	5.00	0.05	3.35	3.40
17.20	0.26	0.62	5.00	0.05	3.34	3.39
17.25	0.26	0.62	5.00	0.05	3.33	3.38
17.30	0.26	0.62	5.00	0.05	3.32	3.37
17.35	0.26	0.62	5.00	0.05	3.31	3.36
17.40	0.26	0.62	5.00	0.05	3.30	3.35
17.45	0.25	0.62	5.00	0.05	3.28	3.34
17.50	0.25	0.62	5.00	0.05	3.27	3.32
17.55	0.25	0.62	5.00	0.05	3.26	3.31
17.60	0.25	0.62	5.00	0.05	3.25	3.30
17.65	0.25	0.62	5.00	0.05	3.24	3.29
17.70	0.25	0.62	5.00	0.05	3.23	3.28
17.75	0.25	0.62	5.00	0.05	3.22	3.27

17.80	0.25	0.62	5.00	0.05	3.21	3.26
17.85	0.25	0.62	5.00	0.05	3.19	3.25
17.90	0.25	0.62	5.00	0.05	3.18	3.23
17.95	0.25	0.62	5.00	0.05	3.17	3.22
18.00	0.25	0.62	5.00	0.05	3.16	3.21
18.05	0.25	0.62	5.00	0.05	3.15	3.20
18.10	0.25	0.62	5.00	0.05	3.14	3.19
18.15	0.25	0.62	5.00	0.05	3.13	3.18
18.20	0.25	0.62	5.00	0.05	3.11	3.16
18.25	0.25	0.62	5.00	0.05	3.10	3.15
18.30	0.24	0.62	5.00	0.05	3.09	3.14
18.35	0.24	0.62	5.00	0.05	3.08	3.13
18.40	0.24	0.62	5.00	0.05	3.07	3.12
18.45	0.24	0.62	5.00	0.05	3.06	3.11
18.50	0.24	0.62	5.00	0.05	3.04	3.09
18.55	0.24	0.62	5.00	0.05	3.03	3.08
18.60	0.24	0.62	5.00	0.05	3.02	3.07
18.65	0.24	0.62	5.00	0.05	3.01	3.06
18.70	0.24	0.62	5.00	0.05	3.00	3.05
18.75	0.24	0.62	5.00	0.05	2.98	3.03
18.80	0.24	0.62	5.00	0.05	2.97	3.02
18.85	0.24	0.62	5.00	0.05	2.96	3.01
18.90	0.24	0.62	5.00	0.05	2.95	3.00
18.95	0.24	0.62	5.00	0.05	2.94	2.99
19.00	0.24	0.61	5.00	0.05	2.92	2.97
19.05	0.24	0.61	5.00	0.05	2.91	2.96
19.10	0.24	0.61	5.00	0.05	2.90	2.95
19.15	0.24	0.61	5.00	0.05	2.89	2.94
19.20	0.24	0.61	5.00	0.05	2.87	2.93
19.25	0.23	0.61	5.00	0.05	2.86	2.91
19.30	0.23	0.61	5.00	0.05	2.85	2.90
19.35	0.23	0.61	5.00	0.05	2.84	2.89
19.40	0.23	0.61	5.00	0.05	2.83	2.88
19.45	0.23	0.61	5.00	0.05	2.81	2.86
19.50	0.23	0.61	5.00	0.05	2.80	2.85
19.55	0.23	0.61	5.00	0.05	2.79	2.84
19.60	0.23	0.61	5.00	0.05	2.77	2.83
19.65	0.23	0.61	5.00	0.05	2.76	2.81
19.70	0.23	0.61	5.00	0.05	2.75	2.80
19.75	0.23	0.61	5.00	0.05	2.74	2.79
19.80	0.23	0.61	5.00	0.05	2.72	2.78
19.85	0.23	0.61	5.00	0.05	2.71	2.76
19.90	0.23	0.61	5.00	0.05	2.70	2.75
19.95	0.23	0.61	5.00	0.05	2.69	2.74
20.00	0.23	0.61	5.00	0.05	2.67	2.72
20.05	0.23	0.61	5.00	0.05	2.66	2.71
20.10	0.23	0.61	5.00	0.05	2.65	2.70
20.15	0.23	0.61	5.00	0.05	2.63	2.69

20.20	0.23	0.61	5.00	0.05	2.62	2.67
20.25	0.23	0.61	5.00	0.05	2.61	2.66
20.30	0.23	0.61	5.00	0.05	2.60	2.65
20.35	0.23	0.61	5.00	0.05	2.58	2.63
20.40	0.23	0.61	5.00	0.05	2.57	2.62
20.45	0.23	0.61	5.00	0.05	2.56	2.61
20.50	0.23	0.61	5.00	0.05	2.55	2.60
20.55	0.23	0.61	5.00	0.05	2.53	2.58
20.60	0.23	0.61	5.00	0.05	2.52	2.57
20.65	0.23	0.61	5.00	0.05	2.51	2.56
20.70	0.23	0.61	5.00	0.05	2.50	2.55
20.75	0.23	0.61	5.00	0.05	2.48	2.53
20.80	0.23	0.61	5.00	0.05	2.47	2.52
20.85	0.24	0.61	5.00	0.05	2.46	2.51
20.90	0.24	0.61	5.00	0.05	2.45	2.50
20.95	0.24	0.61	5.00	0.05	2.43	2.49
21.00	0.24	0.61	5.00	0.05	2.42	2.47
21.05	0.24	0.61	5.00	0.05	2.41	2.46
21.10	0.24	0.61	5.00	0.05	2.40	2.45
21.15	0.24	0.61	5.00	0.05	2.39	2.44
21.20	0.24	0.61	5.00	0.05	2.37	2.42
21.25	0.24	0.61	5.00	0.05	2.36	2.41
21.30	0.24	0.61	5.00	0.05	2.35	2.40
21.35	0.24	0.61	5.00	0.05	2.34	2.39
21.40	0.24	0.61	5.00	0.05	2.32	2.38
21.45	0.24	0.61	5.00	0.05	2.31	2.36
21.50	0.24	0.61	5.00	0.05	2.30	2.35
21.55	0.24	0.61	5.00	0.05	2.29	2.34
21.60	0.24	0.61	5.00	0.05	2.28	2.33
21.65	0.24	0.61	5.00	0.05	2.26	2.32
21.70	0.24	0.61	5.00	0.05	2.25	2.30
21.75	0.24	0.61	5.00	0.05	2.24	2.29
21.80	0.24	0.61	5.00	0.05	2.23	2.28
21.85	0.24	0.61	5.00	0.05	2.22	2.27
21.90	0.24	0.61	5.00	0.05	2.21	2.26
21.95	0.25	0.61	5.00	0.05	2.19	2.25
22.00	0.25	0.61	5.00	0.05	2.18	2.23
22.05	0.25	0.61	5.00	0.05	2.17	2.22
22.10	0.25	0.61	5.00	0.05	2.16	2.21
22.15	0.25	0.61	5.00	0.05	2.15	2.20
22.20	0.25	0.61	5.00	0.05	2.14	2.19
22.25	0.25	0.61	5.00	0.05	2.12	2.18
22.30	0.25	0.61	5.00	0.05	2.11	2.16
22.35	0.25	0.61	5.00	0.05	2.10	2.15
22.40	0.25	0.61	5.00	0.05	2.09	2.14
22.45	0.25	0.61	5.00	0.05	2.08	2.13
22.50	0.25	0.61	5.00	0.05	2.07	2.12
22.55	0.25	0.61	5.00	0.05	2.06	2.11

22.60	0.25	0.61	5.00	0.05	2.04	2.10
22.65	0.25	0.61	5.00	0.05	2.03	2.08
22.70	0.25	0.61	5.00	0.05	2.02	2.07
22.75	0.25	0.61	5.00	0.05	2.01	2.06
22.80	0.25	0.61	5.00	0.05	2.00	2.05
22.85	0.25	0.61	5.00	0.05	1.99	2.04
22.90	0.25	0.61	5.00	0.05	1.98	2.03
22.95	0.25	0.61	5.00	0.05	1.97	2.02
23.00	0.25	0.61	5.00	0.05	1.95	2.00
23.05	0.25	0.61	5.00	0.05	1.94	1.99
23.10	0.26	0.61	5.00	0.05	1.93	1.98
23.15	0.26	0.61	5.00	0.05	1.92	1.97
23.20	0.26	0.61	5.00	0.05	1.91	1.96
23.25	0.26	0.61	5.00	0.05	1.90	1.95
23.30	0.26	0.61	5.00	0.05	1.89	1.94
23.35	0.26	0.61	5.00	0.05	1.88	1.93
23.40	0.26	0.61	5.00	0.05	1.87	1.92
23.45	0.26	0.61	5.00	0.05	1.85	1.91
23.50	0.26	0.61	5.00	0.05	1.84	1.89
23.55	0.26	0.61	5.00	0.05	1.83	1.88
23.60	0.26	0.61	5.00	0.05	1.82	1.87
23.65	0.26	0.61	5.00	0.05	1.81	1.86
23.70	0.26	0.61	5.00	0.05	1.80	1.85
23.75	0.26	0.61	5.00	0.05	1.79	1.84
23.80	0.26	0.61	5.00	0.05	1.78	1.83
23.85	0.26	0.61	5.00	0.05	1.77	1.82
23.90	0.26	0.61	5.00	0.05	1.76	1.81
23.95	0.26	0.61	5.00	0.05	1.75	1.80
24.00	0.26	0.61	5.00	0.05	1.73	1.79
24.05	0.26	0.61	5.00	0.05	1.72	1.78
24.10	0.26	0.61	5.00	0.05	1.71	1.76
24.15	0.26	0.61	5.00	0.05	1.70	1.75
24.20	0.26	0.61	5.00	0.05	1.69	1.74
24.25	0.27	0.61	5.00	0.05	1.68	1.73
24.30	0.27	0.61	5.00	0.05	1.67	1.72
24.35	0.27	0.61	5.00	0.05	1.66	1.71
24.40	0.27	0.61	5.00	0.05	1.65	1.70
24.45	0.27	0.61	5.00	0.05	1.64	1.69
24.50	0.27	0.61	5.00	0.05	1.63	1.68
24.55	0.27	0.61	5.00	0.05	1.62	1.67
24.60	0.27	0.61	5.00	0.05	1.61	1.66
24.65	0.27	0.61	5.00	0.05	1.60	1.65
24.70	0.27	0.61	5.00	0.05	1.59	1.64
24.75	0.27	0.61	5.00	0.05	1.58	1.63
24.80	0.27	0.61	5.00	0.05	1.57	1.62
24.85	0.27	0.61	5.00	0.05	1.56	1.61
24.90	0.27	0.61	5.00	0.05	1.55	1.60
24.95	0.27	0.61	5.00	0.05	1.53	1.59

25.00	0.27	0.61	5.00	0.05	1.52	1.58
25.05	0.27	0.61	5.00	0.05	1.51	1.57
25.10	0.28	0.61	5.00	0.05	1.50	1.56
25.15	0.28	0.61	5.00	0.05	1.49	1.54
25.20	0.28	0.61	5.00	0.05	1.48	1.54
25.25	0.29	0.61	5.00	0.05	1.47	1.53
25.30	0.29	0.61	5.00	0.05	1.46	1.52
25.35	0.29	0.61	5.00	0.05	1.45	1.51
25.40	0.29	0.61	5.00	0.05	1.45	1.50
25.45	0.30	0.61	5.00	0.05	1.44	1.49
25.50	0.30	0.61	5.00	0.05	1.43	1.48
25.55	0.30	0.61	5.00	0.05	1.42	1.47
25.60	0.31	0.61	5.00	0.05	1.41	1.46
25.65	0.31	0.61	5.00	0.05	1.40	1.45
25.70	0.31	0.60	5.00	0.05	1.39	1.44
25.75	0.32	0.60	5.00	0.05	1.38	1.43
25.80	0.32	0.60	5.00	0.05	1.37	1.42
25.85	0.32	0.60	5.00	0.05	1.36	1.41
25.90	0.32	0.60	5.00	0.05	1.36	1.41
25.95	0.33	0.60	5.00	0.05	1.35	1.40
26.00	0.33	0.60	5.00	0.05	1.34	1.39
26.05	0.34	0.60	5.00	0.05	1.33	1.38
26.10	0.34	0.60	5.00	0.05	1.32	1.37
26.15	0.34	0.60	5.00	0.05	1.31	1.36
26.20	0.35	0.60	5.00	0.05	1.31	1.36
26.25	0.35	0.60	5.00	0.05	1.30	1.35
26.30	0.36	0.60	5.00	0.05	1.29	1.34
26.35	0.36	0.60	5.00	0.05	1.28	1.33
26.40	0.36	0.60	5.00	0.05	1.27	1.33
26.45	0.37	0.60	5.00	0.05	1.27	1.32
26.50	0.37	0.60	5.00	0.05	1.26	1.31
26.55	0.38	0.60	5.00	0.05	1.25	1.30
26.60	0.38	0.60	5.00	0.05	1.24	1.29
26.65	0.38	0.60	5.00	0.05	1.24	1.29
26.70	0.39	0.60	5.00	0.05	1.23	1.28
26.75	0.39	0.60	5.00	0.05	1.22	1.27
26.80	0.40	0.60	5.00	0.05	1.21	1.27
26.85	0.40	0.60	5.00	0.05	1.21	1.26
26.90	0.41	0.60	5.00	0.05	1.20	1.25
26.95	0.41	0.60	5.00	0.05	1.19	1.24
27.00	0.42	0.60	5.00	0.05	1.19	1.24
27.05	0.43	0.60	5.00	0.05	1.18	1.23
27.10	0.43	0.60	5.00	0.05	1.17	1.22
27.15	0.44	0.60	5.00	0.05	1.17	1.22
27.20	0.45	0.60	5.00	0.05	1.16	1.21
27.25	0.46	0.60	5.00	0.05	1.15	1.20
27.30	0.47	0.60	5.00	0.05	1.15	1.20
27.35	0.48	0.60	5.00	0.05	1.14	1.19

27.40	0.50	0.60	5.00	0.05	1.14	1.19
27.45	0.52	0.60	5.00	0.05	1.13	1.18
27.50	0.57	0.60	5.00	0.05	1.12	1.17
27.55	0.59	0.60	5.00	0.05	1.12	1.17
27.60	0.59	0.60	5.00	0.05	1.11	1.16
27.65	0.59	0.60	5.00	0.05	1.11	1.16
27.70	0.59	0.60	5.00	0.05	1.10	1.15
27.75	0.59	0.60	5.00	0.05	1.10	1.15
27.80	0.59	0.60	5.00	0.05	1.09	1.14
27.85	0.59	0.60	5.00	0.05	1.09	1.14
27.90	0.59	0.60	5.00	0.05	1.08	1.13
27.95	0.59	0.60	5.00	0.05	1.08	1.13
28.00	0.59	0.60	5.00	0.05	1.07	1.12
28.05	0.59	0.60	5.00	0.05	1.07	1.12
28.10	0.59	0.60	5.00	0.05	1.06	1.11
28.15	0.59	0.60	5.00	0.05	1.06	1.11
28.20	0.59	0.60	5.00	0.05	1.06	1.11
28.25	0.59	0.60	5.00	0.05	1.05	1.10
28.30	0.59	0.60	5.00	0.05	1.05	1.10
28.35	0.59	0.60	5.00	0.05	1.04	1.09
28.40	0.59	0.60	5.00	0.05	1.04	1.09
28.45	0.59	0.60	5.00	0.05	1.04	1.09
28.50	0.59	0.60	5.00	0.05	1.03	1.08
28.55	0.59	0.60	5.00	0.05	1.03	1.08
28.60	0.59	0.60	5.00	0.05	1.03	1.08
28.65	0.59	0.60	5.00	0.05	1.02	1.07
28.70	0.59	0.60	5.00	0.05	1.02	1.07
28.75	0.59	0.60	5.00	0.05	1.02	1.07
28.80	0.59	0.60	5.00	0.05	1.01	1.06
28.85	0.59	0.60	5.00	0.05	1.01	1.06
28.90	0.59	0.60	5.00	0.05	1.01	1.06
28.95	0.59	0.60	5.00	0.05	1.00	1.05
29.00	0.59	0.60	5.00	0.05	1.00	1.05
29.05	0.59	0.60	5.00	0.05	1.00	1.05
29.10	0.59	0.60	5.00	0.05	0.99	1.04
29.15	0.59	0.60	5.00	0.05	0.99	1.04
29.20	0.59	0.60	5.00	0.05	0.99	1.04
29.25	0.59	0.60	5.00	0.05	0.98	1.04
29.30	0.59	0.60	5.00	0.05	0.98	1.03
29.35	0.59	0.60	5.00	0.05	0.98	1.03
29.40	0.59	0.60	5.00	0.05	0.98	1.03
29.45	0.59	0.60	5.00	0.05	0.97	1.02
29.50	0.59	0.60	5.00	0.05	0.97	1.02
29.55	0.59	0.60	5.00	0.05	0.97	1.02
29.60	0.59	0.60	5.00	0.05	0.97	1.02
29.65	0.59	0.60	5.00	0.05	0.96	1.01
29.70	0.59	0.60	5.00	0.05	0.96	1.01
29.75	0.59	0.60	5.00	0.05	0.96	1.01

29.80	0.59	0.60	5.00	0.05	0.96	1.01
29.85	0.59	0.60	5.00	0.05	0.95	1.00
29.90	0.59	0.60	5.00	0.05	0.95	1.00
29.95	0.59	0.60	5.00	0.05	0.95	1.00
30.00	0.59	0.60	5.00	0.05	0.95	1.00
30.05	0.59	0.60	5.00	0.05	0.94	0.99
30.10	0.59	0.60	5.00	0.05	0.94	0.99
30.15	0.59	0.60	5.00	0.05	0.94	0.99
30.20	0.59	0.60	5.00	0.05	0.94	0.99
30.25	0.59	0.60	5.00	0.05	0.93	0.99
30.30	0.59	0.60	5.00	0.05	0.93	0.98
30.35	0.59	0.60	5.00	0.05	0.93	0.98
30.40	0.58	0.60	5.00	0.05	0.93	0.98
30.45	0.58	0.60	5.00	0.05	0.93	0.98
30.50	0.58	0.60	5.00	0.05	0.92	0.97
30.55	0.58	0.60	5.00	0.05	0.92	0.97
30.60	0.58	0.60	5.00	0.05	0.92	0.97
30.65	0.58	0.59	5.00	0.05	0.92	0.97
30.70	0.58	0.59	5.00	0.05	0.91	0.97
30.75	0.58	0.59	5.00	0.05	0.91	0.96
30.80	0.58	0.59	5.00	0.05	0.91	0.96
30.85	0.58	0.59	5.00	0.05	0.91	0.96
30.90	0.58	0.59	5.00	0.05	0.91	0.96
30.95	0.58	0.59	5.00	0.05	0.90	0.95
31.00	0.58	0.59	5.00	0.05	0.90	0.95
31.05	0.58	0.59	5.00	0.05	0.90	0.95
31.10	0.58	0.59	5.00	0.05	0.90	0.95
31.15	0.58	0.59	5.00	0.05	0.89	0.95
31.20	0.58	0.59	5.00	0.05	0.89	0.94
31.25	0.58	0.59	5.00	0.05	0.89	0.94
31.30	0.58	0.59	5.00	0.05	0.89	0.94
31.35	0.58	0.59	5.00	0.05	0.89	0.94
31.40	0.58	0.59	5.00	0.05	0.88	0.93
31.45	0.58	0.59	5.00	0.05	0.88	0.93
31.50	0.58	0.59	5.00	0.05	0.88	0.93
31.55	0.58	0.59	5.00	0.05	0.88	0.93
31.60	0.58	0.59	5.00	0.05	0.87	0.93
31.65	0.58	0.59	5.00	0.05	0.87	0.92
31.70	0.58	0.59	5.00	0.05	0.87	0.92
31.75	0.58	0.59	5.00	0.05	0.87	0.92
31.80	0.58	0.59	5.00	0.05	0.87	0.92
31.85	0.58	0.59	5.00	0.05	0.86	0.91
31.90	0.58	0.59	5.00	0.05	0.86	0.91
31.95	0.58	0.59	5.00	0.05	0.86	0.91
32.00	0.58	0.59	5.00	0.05	0.86	0.91
32.05	0.58	0.59	5.00	0.05	0.85	0.91
32.10	0.58	0.59	5.00	0.05	0.85	0.90
32.15	0.58	0.59	5.00	0.05	0.85	0.90

32.20	0.58	0.59	5.00	0.05	0.85	0.90
32.25	0.58	0.59	5.00	0.05	0.85	0.90
32.30	0.58	0.59	5.00	0.05	0.84	0.89
32.35	0.58	0.59	5.00	0.05	0.84	0.89
32.40	0.58	0.59	5.00	0.05	0.84	0.89
32.45	0.58	0.59	5.00	0.05	0.84	0.89
32.50	0.58	0.59	5.00	0.05	0.83	0.89
32.55	0.58	0.59	5.00	0.05	0.83	0.88
32.60	0.58	0.58	5.00	0.05	0.83	0.88
32.65	0.58	0.58	5.00	0.05	0.83	0.88
32.70	0.58	0.58	5.00	0.05	0.82	0.88
32.75	0.58	0.58	5.00	0.05	0.82	0.87
32.80	0.58	0.58	5.00	0.05	0.82	0.87
32.85	0.58	0.58	5.00	0.05	0.82	0.87
32.90	0.58	0.58	5.00	0.05	0.82	0.87
32.95	0.58	0.58	5.00	0.05	0.81	0.86
33.00	0.58	0.58	5.00	0.05	0.81	0.86
33.05	0.58	0.58	5.00	0.05	0.81	0.86
33.10	0.58	0.58	5.00	0.05	0.81	0.86
33.15	0.58	0.58	5.00	0.05	0.80	0.85
33.20	0.58	0.58	5.00	0.05	0.80	0.85
33.25	0.58	0.58	5.00	0.05	0.80	0.85
33.30	0.58	0.58	5.00	0.05	0.80	0.85
33.35	0.58	0.58	5.00	0.05	0.79	0.84
33.40	0.58	0.58	5.00	0.05	0.79	0.84
33.45	0.57	0.58	5.00	0.05	0.79	0.84
33.50	0.57	0.58	5.00	0.05	0.79	0.84
33.55	0.57	0.58	5.00	0.05	0.78	0.83
33.60	0.57	0.58	5.00	0.05	0.78	0.83
33.65	0.57	0.58	5.00	0.05	0.78	0.83
33.70	0.57	0.58	5.00	0.05	0.78	0.83
33.75	0.57	0.58	5.00	0.05	0.77	0.82
33.80	0.57	0.58	5.00	0.05	0.77	0.82
33.85	0.57	0.58	5.00	0.05	0.77	0.82
33.90	0.57	0.58	5.00	0.05	0.77	0.82
33.95	0.57	0.58	5.00	0.05	0.76	0.81
34.00	0.57	0.58	5.00	0.05	0.76	0.81
34.05	0.57	0.58	5.00	0.05	0.76	0.81
34.10	0.57	0.58	5.00	0.05	0.76	0.81
34.15	0.57	0.58	5.00	0.05	0.75	0.80
34.20	0.57	0.58	5.00	0.05	0.75	0.80
34.25	0.57	0.58	5.00	0.05	0.75	0.80
34.30	0.57	0.58	5.00	0.05	0.75	0.80
34.35	0.57	0.58	5.00	0.05	0.74	0.79
34.40	0.57	0.58	5.00	0.05	0.74	0.79
34.45	0.57	0.58	5.00	0.05	0.74	0.79
34.50	0.57	0.57	5.00	0.05	0.73	0.79
34.55	0.57	0.57	5.00	0.05	0.73	0.78

34.60	0.57	0.57	5.00	0.05	0.73	0.78
34.65	0.57	0.57	5.00	0.05	0.73	0.78
34.70	0.57	0.57	5.00	0.05	0.72	0.77
34.75	0.57	0.57	5.00	0.05	0.72	0.77
34.80	0.57	0.57	5.00	0.05	0.72	0.77
34.85	0.57	0.57	5.00	0.05	0.72	0.77
34.90	0.57	0.57	5.00	0.05	0.71	0.76
34.95	0.57	0.57	5.00	0.05	0.71	0.76
35.00	0.57	0.57	5.00	0.05	0.71	0.76
35.05	0.57	0.57	5.00	0.05	0.70	0.75
35.10	0.57	0.57	5.00	0.05	0.70	0.75
35.15	0.57	0.57	5.00	0.05	0.70	0.75
35.20	0.57	0.57	5.00	0.05	0.69	0.75
35.25	0.57	0.57	5.00	0.05	0.69	0.74
35.30	0.57	0.57	5.00	0.05	0.69	0.74
35.35	0.57	0.57	5.00	0.05	0.69	0.74
35.40	0.57	0.57	5.00	0.05	0.68	0.73
35.45	0.57	0.57	5.00	0.05	0.68	0.73
35.50	0.57	0.57	5.00	0.05	0.68	0.73
35.55	0.57	0.57	5.00	0.05	0.67	0.72
35.60	0.57	0.57	5.00	0.05	0.67	0.72
35.65	0.57	0.57	5.00	0.05	0.67	0.72
35.70	0.57	0.57	5.00	0.05	0.66	0.71
35.75	0.57	0.57	5.00	0.05	0.66	0.71
35.80	0.57	0.57	5.00	0.05	0.66	0.71
35.85	0.57	0.57	5.00	0.05	0.65	0.70
35.90	0.57	0.57	5.00	0.05	0.65	0.70
35.95	0.57	0.57	5.00	0.05	0.65	0.70
36.00	0.57	0.57	5.00	0.05	0.64	0.69
36.05	0.57	0.57	5.00	0.05	0.64	0.69
36.10	0.57	0.57	5.00	0.05	0.64	0.69
36.15	0.57	0.57	5.00	0.05	0.63	0.68
36.20	0.57	0.57	5.00	0.05	0.63	0.68
36.25	0.57	0.57	5.00	0.05	0.63	0.68
36.30	0.57	0.57	5.00	0.05	0.62	0.67
36.35	0.57	0.57	5.00	0.05	0.62	0.67
36.40	0.57	0.56	5.00	0.05	0.62	0.67
36.45	0.57	0.56	5.00	0.05	0.61	0.66
36.50	0.57	0.56	5.00	0.05	0.61	0.66
36.55	0.56	0.56	5.00	0.05	0.61	0.66
36.60	0.56	0.56	5.00	0.05	0.60	0.65
36.65	0.56	0.56	5.00	0.05	0.60	0.65
36.70	0.56	0.56	5.00	0.05	0.60	0.65
36.75	0.56	0.56	5.00	0.05	0.59	0.64
36.80	0.56	0.56	5.00	0.05	0.59	0.64
36.85	0.56	0.56	5.00	0.05	0.59	0.64
36.90	0.56	0.56	5.00	0.05	0.58	0.63
36.95	0.56	0.56	5.00	0.05	0.58	0.63

37.00	0.56	0.56	5.00	0.05	0.57	0.63
37.05	0.56	0.56	5.00	0.05	0.57	0.62
37.10	0.56	0.56	5.00	0.05	0.57	0.62
37.15	0.56	0.56	5.00	0.05	0.56	0.61
37.20	0.56	0.56	5.00	0.05	0.56	0.61
37.25	0.56	0.56	5.00	0.05	0.56	0.61
37.30	0.56	0.56	5.00	0.05	0.55	0.60
37.35	0.56	0.56	5.00	0.05	0.55	0.60
37.40	0.56	0.56	5.00	0.05	0.55	0.60
37.45	0.56	0.56	5.00	0.05	0.54	0.59
37.50	0.56	0.56	5.00	0.05	0.54	0.59
37.55	0.56	0.56	5.00	0.05	0.53	0.59
37.60	0.56	0.56	5.00	0.05	0.53	0.58
37.65	0.56	0.56	5.00	0.05	0.53	0.58
37.70	0.56	0.56	5.00	0.05	0.52	0.57
37.75	0.56	0.56	5.00	0.05	0.52	0.57
37.80	0.56	0.56	5.00	0.05	0.52	0.57
37.85	0.56	0.56	5.00	0.05	0.51	0.56
37.90	0.56	0.56	5.00	0.05	0.51	0.56
37.95	0.56	0.56	5.00	0.05	0.50	0.55
38.00	0.56	0.56	5.00	0.05	0.50	0.55
38.05	0.56	0.56	5.00	0.05	0.50	0.55
38.10	0.56	0.56	5.00	0.05	0.49	0.54
38.15	0.56	0.56	5.00	0.05	0.49	0.54
38.20	0.56	0.56	5.00	0.05	0.48	0.54
38.25	0.56	0.56	5.00	0.05	0.48	0.53
38.30	0.56	0.55	5.00	0.05	0.48	0.53
38.35	0.56	0.55	5.00	0.05	0.47	0.52
38.40	0.56	0.55	5.00	0.05	0.47	0.52
38.45	0.56	0.55	5.00	0.05	0.46	0.52
38.50	0.56	0.55	5.00	0.05	0.46	0.51
38.55	0.56	0.55	5.00	0.05	0.46	0.51
38.60	0.56	0.55	5.00	0.05	0.45	0.50
38.65	0.56	0.55	5.00	0.05	0.45	0.50
38.70	0.56	0.55	5.00	0.05	0.44	0.50
38.75	0.56	0.55	5.00	0.05	0.44	0.49
38.80	0.56	0.55	5.00	0.05	0.44	0.49
38.85	0.56	0.55	5.00	0.05	0.43	0.48
38.90	0.56	0.55	5.00	0.05	0.43	0.48
38.95	0.56	0.55	5.00	0.05	0.42	0.47
39.00	0.56	0.55	5.00	0.05	0.42	0.47
39.05	0.56	0.55	5.00	0.05	0.42	0.47
39.10	0.56	0.55	5.00	0.05	0.41	0.46
39.15	0.56	0.55	5.00	0.05	0.41	0.46
39.20	0.56	0.55	5.00	0.05	0.40	0.45
39.25	0.56	0.55	5.00	0.05	0.40	0.45
39.30	0.56	0.55	5.00	0.05	0.39	0.45
39.35	0.56	0.55	5.00	0.05	0.39	0.44

39.40	0.56	0.55	5.00	0.05	0.39	0.44
39.45	0.56	0.55	5.00	0.05	0.38	0.44
39.50	0.56	0.55	5.00	0.05	0.38	0.43
39.55	0.56	0.55	5.00	0.05	0.38	0.43
39.60	0.56	0.55	5.00	0.05	0.38	0.43
39.65	0.56	0.55	5.00	0.05	0.38	0.43
39.70	0.56	0.55	5.00	0.05	0.38	0.43
39.75	0.56	0.55	5.00	0.05	0.38	0.43
39.80	0.56	0.55	5.00	0.05	0.37	0.43
39.85	0.55	0.55	5.00	0.05	0.37	0.42
39.90	0.55	0.55	5.00	0.05	0.37	0.42
39.95	0.55	0.55	5.00	0.05	0.37	0.42
40.00	0.55	0.55	5.00	0.05	0.37	0.42
40.05	0.55	0.55	5.00	0.05	0.37	0.42
40.10	0.55	0.55	5.00	0.05	0.37	0.42
40.15	0.55	0.55	5.00	0.05	0.36	0.42
40.20	0.55	0.54	5.00	0.05	0.36	0.41
40.25	0.55	0.54	5.00	0.05	0.36	0.41
40.30	0.55	0.54	5.00	0.05	0.36	0.41
40.35	0.55	0.54	5.00	0.05	0.36	0.41
40.40	0.55	0.54	5.00	0.05	0.36	0.41
40.45	0.55	0.54	5.00	0.05	0.36	0.41
40.50	0.55	0.54	5.00	0.05	0.35	0.41
40.55	0.55	0.54	5.00	0.05	0.35	0.40
40.60	0.55	0.54	5.00	0.05	0.35	0.40
40.65	0.55	0.54	5.00	0.05	0.35	0.40
40.70	0.55	0.54	5.00	0.05	0.35	0.40
40.75	0.55	0.54	5.00	0.05	0.35	0.40
40.80	0.55	0.54	5.00	0.05	0.35	0.40
40.85	0.55	0.54	5.00	0.05	0.34	0.40
40.90	0.55	0.54	5.00	0.05	0.34	0.39
40.95	0.55	0.54	5.00	0.05	0.34	0.39
41.00	0.55	0.54	5.00	0.05	0.34	0.39
41.05	0.55	0.54	5.00	0.05	0.34	0.39
41.10	0.55	0.54	5.00	0.05	0.34	0.39
41.15	0.55	0.54	5.00	0.05	0.34	0.39
41.20	0.55	0.54	5.00	0.05	0.33	0.38
41.25	0.55	0.54	5.00	0.05	0.33	0.38
41.30	0.55	0.54	5.00	0.05	0.33	0.38
41.35	0.55	0.54	5.00	0.05	0.33	0.38
41.40	0.55	0.54	5.00	0.05	0.33	0.38
41.45	0.55	0.54	5.00	0.05	0.33	0.38
41.50	0.55	0.54	5.00	0.05	0.32	0.38
41.55	0.55	0.54	5.00	0.05	0.32	0.37
41.60	0.55	0.54	5.00	0.05	0.32	0.37
41.65	0.55	0.54	5.00	0.05	0.32	0.37
41.70	0.55	0.54	5.00	0.05	0.32	0.37
41.75	0.55	0.54	5.00	0.05	0.32	0.37

41.80	0.55	0.54	5.00	0.05	0.31	0.37
41.85	0.55	0.54	5.00	0.05	0.31	0.36
41.90	0.55	0.54	5.00	0.05	0.31	0.36
41.95	0.55	0.54	5.00	0.05	0.31	0.36
42.00	0.55	0.54	5.00	0.05	0.31	0.36
42.05	0.55	0.54	5.00	0.05	0.31	0.36
42.10	0.55	0.54	5.00	0.05	0.31	0.36
42.15	0.55	0.53	5.00	0.05	0.30	0.35
42.20	0.55	0.53	5.00	0.05	0.30	0.35
42.25	0.55	0.53	5.00	0.05	0.30	0.35
42.30	0.55	0.53	5.00	0.05	0.30	0.35
42.35	0.55	0.53	5.00	0.05	0.30	0.35
42.40	0.55	0.53	5.00	0.05	0.30	0.35
42.45	0.55	0.53	5.00	0.05	0.29	0.34
42.50	0.55	0.53	5.00	0.05	0.29	0.34
42.55	0.55	0.53	5.00	0.05	0.29	0.34
42.60	0.55	0.53	5.00	0.05	0.29	0.34
42.65	0.55	0.53	5.00	0.05	0.29	0.34
42.70	0.55	0.53	5.00	0.05	0.29	0.34
42.75	0.55	0.53	5.00	0.05	0.28	0.33
42.80	0.55	0.53	5.00	0.05	0.28	0.33
42.85	0.55	0.53	5.00	0.05	0.28	0.33
42.90	0.55	0.53	5.00	0.05	0.28	0.33
42.95	0.55	0.53	5.00	0.05	0.28	0.33
43.00	0.55	0.53	5.00	0.05	0.27	0.33
43.05	0.55	0.53	5.00	0.05	0.27	0.32
43.10	0.55	0.53	5.00	0.05	0.27	0.32
43.15	0.55	0.53	5.00	0.05	0.27	0.32
43.20	0.55	0.53	5.00	0.05	0.27	0.32
43.25	0.55	0.53	5.00	0.05	0.27	0.32
43.30	0.54	0.53	5.00	0.05	0.26	0.32
43.35	0.54	0.53	5.00	0.05	0.26	0.31
43.40	0.54	0.53	5.00	0.05	0.26	0.31
43.45	0.54	0.53	5.00	0.05	0.26	0.31
43.50	0.54	0.53	5.00	0.05	0.26	0.31
43.55	0.54	0.53	5.00	0.05	0.26	0.31
43.60	0.54	0.53	5.00	0.05	0.25	0.30
43.65	0.54	0.53	5.00	0.05	0.25	0.30
43.70	0.54	0.53	5.00	0.05	0.25	0.30
43.75	0.54	0.53	5.00	0.05	0.25	0.30
43.80	0.54	0.53	5.00	0.05	0.25	0.30
43.85	0.54	0.53	5.00	0.05	0.24	0.30
43.90	0.54	0.53	5.00	0.05	0.24	0.29
43.95	0.54	0.53	5.00	0.05	0.24	0.29
44.00	0.54	0.53	5.00	0.05	0.24	0.29
44.05	0.54	0.52	5.00	0.05	0.24	0.29
44.10	0.54	0.52	5.00	0.05	0.24	0.29
44.15	0.54	0.52	5.00	0.05	0.23	0.28

44.20	0.54	0.52	5.00	0.05	0.23	0.28
44.25	0.54	0.52	5.00	0.05	0.23	0.28
44.30	0.54	0.52	5.00	0.05	0.23	0.28
44.35	0.54	0.52	5.00	0.05	0.23	0.28
44.40	0.54	0.52	5.00	0.05	0.22	0.28
44.45	0.54	0.52	5.00	0.05	0.22	0.27
44.50	0.54	0.52	5.00	0.05	0.22	0.27
44.55	0.54	0.52	5.00	0.05	0.22	0.27
44.60	0.54	0.52	5.00	0.05	0.22	0.27
44.65	0.54	0.52	5.00	0.05	0.22	0.27
44.70	0.54	0.52	5.00	0.05	0.21	0.26
44.75	0.54	0.52	5.00	0.05	0.21	0.26
44.80	0.54	0.52	5.00	0.05	0.21	0.26
44.85	0.54	0.52	5.00	0.05	0.21	0.26
44.90	0.54	0.52	5.00	0.05	0.21	0.26
44.95	0.54	0.52	5.00	0.05	0.20	0.25
45.00	0.54	0.52	5.00	0.05	0.20	0.25
45.05	0.54	0.52	5.00	0.05	0.20	0.25
45.10	0.54	0.52	5.00	0.05	0.20	0.25
45.15	0.54	0.52	5.00	0.05	0.20	0.25
45.20	0.54	0.52	5.00	0.05	0.19	0.24
45.25	0.54	0.52	5.00	0.05	0.19	0.24
45.30	0.54	0.52	5.00	0.05	0.19	0.24
45.35	0.54	0.52	5.00	0.05	0.19	0.24
45.40	0.54	0.52	5.00	0.05	0.19	0.24
45.45	0.54	0.52	5.00	0.05	0.18	0.23
45.50	0.54	0.52	5.00	0.05	0.18	0.23
45.55	0.54	0.52	5.00	0.05	0.18	0.23
45.60	0.54	0.52	5.00	0.05	0.18	0.23
45.65	0.54	0.52	5.00	0.05	0.18	0.23
45.70	0.54	0.52	5.00	0.05	0.17	0.23
45.75	0.54	0.52	5.00	0.05	0.17	0.22
45.80	0.54	0.52	5.00	0.05	0.17	0.22
45.85	0.54	0.52	5.00	0.05	0.17	0.22
45.90	0.54	0.52	5.00	0.05	0.17	0.22
45.95	0.54	0.51	5.00	0.05	0.16	0.22
46.00	0.54	0.51	5.00	0.05	0.16	0.21
46.05	0.54	0.51	5.00	0.05	0.16	0.21
46.10	0.54	0.51	5.00	0.05	0.16	0.21
46.15	0.54	0.51	5.00	0.05	0.16	0.21
46.20	0.54	0.51	5.00	0.05	0.15	0.21
46.25	0.54	0.51	5.00	0.05	0.15	0.20
46.30	0.54	0.51	5.00	0.05	0.15	0.20
46.35	0.54	0.51	5.00	0.05	0.15	0.20
46.40	0.54	0.51	5.00	0.05	0.15	0.20
46.45	0.54	0.51	5.00	0.05	0.14	0.20
46.50	0.54	0.51	5.00	0.05	0.14	0.19
46.55	0.54	0.51	5.00	0.05	0.14	0.19

46.60	0.54	0.51	5.00	0.05	0.14	0.19
46.65	0.54	0.51	5.00	0.05	0.14	0.19
46.70	0.54	0.51	5.00	0.05	0.13	0.19
46.75	0.54	0.51	5.00	0.05	0.13	0.18
46.80	0.53	0.51	5.00	0.05	0.13	0.18
46.85	0.53	0.51	5.00	0.05	0.13	0.18
46.90	0.53	0.51	5.00	0.05	0.13	0.18
46.95	0.53	0.51	5.00	0.05	0.12	0.18
47.00	0.53	0.51	5.00	0.05	0.12	0.17
47.05	0.53	0.51	5.00	0.05	0.12	0.17
47.10	0.53	0.51	5.00	0.05	0.12	0.17
47.15	0.53	0.51	5.00	0.05	0.12	0.17
47.20	0.53	0.51	5.00	0.05	0.11	0.17
47.25	0.53	0.51	5.00	0.05	0.11	0.16
47.30	0.53	0.51	5.00	0.05	0.11	0.16
47.35	0.53	0.51	5.00	0.05	0.11	0.16
47.40	0.53	0.51	5.00	0.05	0.11	0.16
47.45	0.53	0.51	5.00	0.05	0.10	0.16
47.50	0.53	0.51	5.00	0.05	0.10	0.15
47.55	0.53	0.51	5.00	0.05	0.10	0.15
47.60	0.53	0.51	5.00	0.05	0.10	0.15
47.65	0.53	0.51	5.00	0.05	0.10	0.15
47.70	0.53	0.51	5.00	0.05	0.09	0.15
47.75	0.53	0.51	5.00	0.05	0.09	0.14
47.80	0.53	0.51	5.00	0.05	0.09	0.14
47.85	0.53	0.50	5.00	0.05	0.09	0.14
47.90	0.53	0.50	5.00	0.05	0.09	0.14
47.95	0.53	0.50	5.00	0.05	0.08	0.14
48.00	0.53	0.50	5.00	0.05	0.08	0.13
48.05	0.53	0.50	5.00	0.05	0.08	0.13
48.10	0.53	0.50	5.00	0.05	0.08	0.13
48.15	0.53	0.50	5.00	0.05	0.08	0.13
48.20	0.53	0.50	5.00	0.05	0.07	0.13
48.25	0.53	0.50	5.00	0.05	0.07	0.12
48.30	0.53	0.50	5.00	0.05	0.07	0.12
48.35	0.53	0.50	5.00	0.05	0.07	0.12
48.40	0.53	0.50	5.00	0.05	0.07	0.12
48.45	0.53	0.50	5.00	0.05	0.06	0.12
48.50	0.53	0.50	5.00	0.05	0.06	0.11
48.55	0.53	0.50	5.00	0.05	0.06	0.11
48.60	0.53	0.50	5.00	0.05	0.06	0.11
48.65	0.53	0.50	5.00	0.05	0.06	0.11
48.70	0.53	0.50	5.00	0.05	0.05	0.11
48.75	0.53	0.50	5.00	0.05	0.05	0.10
48.80	0.53	0.50	5.00	0.05	0.05	0.10
48.85	0.53	0.50	5.00	0.05	0.05	0.10
48.90	0.53	0.50	5.00	0.05	0.05	0.10
48.95	0.53	0.50	5.00	0.05	0.04	0.10

49.00	0.53	0.50	5.00	0.05	0.04	0.09
49.05	0.53	0.50	5.00	0.05	0.04	0.09
49.10	0.53	0.50	5.00	0.05	0.04	0.09
49.15	0.53	0.50	5.00	0.05	0.04	0.09
49.20	0.53	0.50	5.00	0.05	0.03	0.09
49.25	0.53	0.50	5.00	0.05	0.03	0.08
49.30	0.53	0.50	5.00	0.05	0.03	0.08
49.35	0.53	0.50	5.00	0.05	0.03	0.08
49.40	0.53	0.50	5.00	0.05	0.03	0.08
49.45	0.53	0.50	5.00	0.05	0.02	0.08
49.50	0.53	0.50	5.00	0.05	0.02	0.07
49.55	0.53	0.50	5.00	0.05	0.02	0.07
49.60	0.53	0.50	5.00	0.05	0.02	0.07
49.65	0.53	0.50	5.00	0.05	0.02	0.07
49.70	0.53	0.50	5.00	0.05	0.01	0.07
49.75	0.53	0.49	5.00	0.05	0.01	0.06
49.80	0.53	0.49	5.00	0.05	0.01	0.06
49.85	0.53	0.49	5.00	0.05	0.01	0.06
49.90	0.53	0.49	5.00	0.05	0.01	0.06
49.95	0.53	0.49	5.00	0.05	0.00	0.06
50.00	0.53	0.49	5.00	0.05	0.00	0.05
50.05	0.53	0.49	1.07	0.05	0.00	0.05
50.10	0.53	0.49	1.07	0.05	0.00	0.05
50.15	0.53	0.49	1.07	0.05	0.00	0.05
50.20	0.53	0.49	1.07	0.05	0.00	0.05
50.25	0.53	0.49	1.07	0.04	0.00	0.04
50.30	0.53	0.49	1.07	0.04	0.00	0.04
50.35	0.53	0.49	1.07	0.04	0.00	0.04
50.40	0.53	0.49	1.07	0.04	0.00	0.04
50.45	0.53	0.49	1.07	0.04	0.00	0.04
50.50	0.53	0.49	1.07	0.04	0.00	0.04
50.55	0.53	0.49	1.07	0.03	0.00	0.03
50.60	0.53	0.49	1.07	0.03	0.00	0.03
50.65	0.53	0.49	1.07	0.03	0.00	0.03
50.70	0.53	0.49	1.07	0.03	0.00	0.03
50.75	0.53	0.49	1.06	0.03	0.00	0.03
50.80	0.53	0.49	1.06	0.03	0.00	0.03
50.85	0.53	0.49	1.06	0.02	0.00	0.02
50.90	0.52	0.49	1.06	0.02	0.00	0.02
50.95	0.52	0.49	1.06	0.02	0.00	0.02
51.00	0.52	0.49	1.06	0.02	0.00	0.02
51.05	0.52	0.49	1.06	0.02	0.00	0.02
51.10	0.52	0.49	1.06	0.01	0.00	0.01
51.15	0.52	0.49	1.06	0.01	0.00	0.01
51.20	0.52	0.49	1.06	0.01	0.00	0.01
51.25	0.52	0.49	1.06	0.01	0.00	0.01
51.30	0.52	0.49	1.06	0.01	0.00	0.01
51.35	0.52	0.49	1.06	0.01	0.00	0.01

51.40	0.52	0.49	1.06	0.00	0.00	0.00
51.45	0.52	0.49	1.06	0.00	0.00	0.00
51.50	0.52	0.49	1.06	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.

---

1 atm (atmosphere) = 1 tsf (ton/ft2)

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

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                                        LIQUEFACTION ANALYSIS SUMMARY

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        Input File Name: N:\2018\18-81-134 SBCUSD, New Diesel Technology
Center\-01\Settlement -Final\BH-04 His.liq
        Title:  New Diesel Technology Center Building
        Subtitle:  Dynamic Settlement

        Surface Elev.=616
        Hole No.=BH-04
        Depth of Hole= 51.50 ft
        Water Table during Earthquake= 38.00 ft
        Water Table during In-Situ Testing= 38.00 ft
        Max. Acceleration= 0.99 g
        Earthquake Magnitude= 7.00

 Input Data:
        Surface Elev.=616
        Hole No.=BH-04
        Depth of Hole=51.50 ft
        Water Table during Earthquake= 38.00 ft
        Water Table during In-Situ Testing= 38.00 ft
        Max. Acceleration=0.99 g
        Earthquake Magnitude=7.00
        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 two CSR (fs1=1, fs2=User)
        10. Use Curve Smoothing: Yes*
        * Recommended Options
```

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	50.00	120.00	51.00
5.00	50.00	120.00	51.00
6.00	4.00	120.00	51.00
10.00	8.00	121.00	51.00
15.00	14.00	128.00	51.00
20.00	12.00	128.00	45.00
25.00	17.00	131.00	45.00
30.00	39.00	120.00	45.00
35.00	50.00	124.00	45.00
40.00	50.00	124.00	15.00
45.00	48.00	126.00	15.00
50.00	50.00	126.00	15.00

Output Results:

Settlement of Saturated Sands=0.18 in.
Settlement of Unsaturated Sands=6.01 in.
Total Settlement of Saturated and Unsaturated Sands=6.19 in.
Differential Settlement=3.094 to 4.085 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.60	0.64	5.00	0.18	6.01	6.19
0.05	0.60	0.64	5.00	0.18	6.01	6.19
0.10	0.60	0.64	5.00	0.18	6.01	6.19
0.15	0.60	0.64	5.00	0.18	6.01	6.19
0.20	0.60	0.64	5.00	0.18	6.01	6.19
0.25	0.60	0.64	5.00	0.18	6.01	6.19
0.30	0.60	0.64	5.00	0.18	6.01	6.19
0.35	0.60	0.64	5.00	0.18	6.01	6.19
0.40	0.60	0.64	5.00	0.18	6.01	6.19
0.45	0.60	0.64	5.00	0.18	6.01	6.19
0.50	0.60	0.64	5.00	0.18	6.01	6.19
0.55	0.60	0.64	5.00	0.18	6.01	6.19
0.60	0.60	0.64	5.00	0.18	6.01	6.19
0.65	0.60	0.64	5.00	0.18	6.01	6.19
0.70	0.60	0.64	5.00	0.18	6.01	6.19
0.75	0.60	0.64	5.00	0.18	6.01	6.19
0.80	0.60	0.64	5.00	0.18	6.01	6.19
0.85	0.60	0.64	5.00	0.18	6.01	6.19
0.90	0.60	0.64	5.00	0.18	6.01	6.19
0.95	0.60	0.64	5.00	0.18	6.01	6.19

1.00	0.60	0.64	5.00	0.18	6.01	6.19
1.05	0.60	0.64	5.00	0.18	6.01	6.19
1.10	0.60	0.64	5.00	0.18	6.01	6.19
1.15	0.60	0.64	5.00	0.18	6.01	6.19
1.20	0.60	0.64	5.00	0.18	6.01	6.19
1.25	0.60	0.64	5.00	0.18	6.01	6.19
1.30	0.60	0.64	5.00	0.18	6.01	6.19
1.35	0.60	0.64	5.00	0.18	6.01	6.19
1.40	0.60	0.64	5.00	0.18	6.01	6.19
1.45	0.60	0.64	5.00	0.18	6.01	6.19
1.50	0.60	0.64	5.00	0.18	6.01	6.19
1.55	0.60	0.64	5.00	0.18	6.01	6.19
1.60	0.60	0.64	5.00	0.18	6.01	6.19
1.65	0.60	0.64	5.00	0.18	6.00	6.19
1.70	0.60	0.64	5.00	0.18	6.00	6.19
1.75	0.60	0.64	5.00	0.18	6.00	6.19
1.80	0.60	0.64	5.00	0.18	6.00	6.19
1.85	0.60	0.64	5.00	0.18	6.00	6.19
1.90	0.60	0.64	5.00	0.18	6.00	6.19
1.95	0.60	0.64	5.00	0.18	6.00	6.19
2.00	0.60	0.64	5.00	0.18	6.00	6.19
2.05	0.60	0.64	5.00	0.18	6.00	6.19
2.10	0.60	0.64	5.00	0.18	6.00	6.19
2.15	0.60	0.64	5.00	0.18	6.00	6.19
2.20	0.60	0.64	5.00	0.18	6.00	6.19
2.25	0.60	0.64	5.00	0.18	6.00	6.19
2.30	0.60	0.64	5.00	0.18	6.00	6.19
2.35	0.60	0.64	5.00	0.18	6.00	6.19
2.40	0.60	0.64	5.00	0.18	6.00	6.19
2.45	0.60	0.64	5.00	0.18	6.00	6.19
2.50	0.60	0.64	5.00	0.18	6.00	6.19
2.55	0.60	0.64	5.00	0.18	6.00	6.19
2.60	0.60	0.64	5.00	0.18	6.00	6.19
2.65	0.60	0.64	5.00	0.18	6.00	6.19
2.70	0.60	0.64	5.00	0.18	6.00	6.18
2.75	0.60	0.64	5.00	0.18	6.00	6.18
2.80	0.60	0.64	5.00	0.18	6.00	6.18
2.85	0.60	0.64	5.00	0.18	6.00	6.18
2.90	0.60	0.64	5.00	0.18	6.00	6.18
2.95	0.60	0.64	5.00	0.18	6.00	6.18
3.00	0.60	0.64	5.00	0.18	6.00	6.18
3.05	0.60	0.64	5.00	0.18	6.00	6.18
3.10	0.60	0.64	5.00	0.18	6.00	6.18
3.15	0.60	0.64	5.00	0.18	6.00	6.18
3.20	0.60	0.64	5.00	0.18	6.00	6.18
3.25	0.60	0.64	5.00	0.18	6.00	6.18
3.30	0.60	0.64	5.00	0.18	6.00	6.18
3.35	0.60	0.64	5.00	0.18	6.00	6.18

3.40	0.60	0.64	5.00	0.18	6.00	6.18
3.45	0.60	0.64	5.00	0.18	6.00	6.18
3.50	0.60	0.64	5.00	0.18	6.00	6.18
3.55	0.60	0.64	5.00	0.18	6.00	6.18
3.60	0.60	0.64	5.00	0.18	6.00	6.18
3.65	0.60	0.64	5.00	0.18	6.00	6.18
3.70	0.60	0.64	5.00	0.18	6.00	6.18
3.75	0.60	0.64	5.00	0.18	6.00	6.18
3.80	0.60	0.64	5.00	0.18	6.00	6.18
3.85	0.60	0.64	5.00	0.18	6.00	6.18
3.90	0.60	0.64	5.00	0.18	6.00	6.18
3.95	0.60	0.64	5.00	0.18	6.00	6.18
4.00	0.60	0.64	5.00	0.18	6.00	6.18
4.05	0.60	0.64	5.00	0.18	6.00	6.18
4.10	0.60	0.64	5.00	0.18	6.00	6.18
4.15	0.60	0.64	5.00	0.18	6.00	6.18
4.20	0.60	0.64	5.00	0.18	6.00	6.18
4.25	0.60	0.64	5.00	0.18	6.00	6.18
4.30	0.60	0.64	5.00	0.18	6.00	6.18
4.35	0.60	0.64	5.00	0.18	6.00	6.18
4.40	0.60	0.64	5.00	0.18	6.00	6.18
4.45	0.60	0.64	5.00	0.18	6.00	6.18
4.50	0.60	0.64	5.00	0.18	6.00	6.18
4.55	0.60	0.64	5.00	0.18	6.00	6.18
4.60	0.60	0.64	5.00	0.18	6.00	6.18
4.65	0.60	0.64	5.00	0.18	6.00	6.18
4.70	0.60	0.64	5.00	0.18	6.00	6.18
4.75	0.60	0.64	5.00	0.18	6.00	6.18
4.80	0.60	0.64	5.00	0.18	6.00	6.18
4.85	0.60	0.64	5.00	0.18	6.00	6.18
4.90	0.60	0.64	5.00	0.18	6.00	6.18
4.95	0.60	0.64	5.00	0.18	6.00	6.18
5.00	0.60	0.64	5.00	0.18	6.00	6.18
5.05	0.60	0.64	5.00	0.18	6.00	6.18
5.10	0.60	0.64	5.00	0.18	6.00	6.18
5.15	0.60	0.64	5.00	0.18	6.00	6.18
5.20	0.60	0.64	5.00	0.18	6.00	6.18
5.25	0.60	0.64	5.00	0.18	6.00	6.18
5.30	0.60	0.64	5.00	0.18	5.99	6.18
5.35	0.60	0.64	5.00	0.18	5.99	6.18
5.40	0.60	0.64	5.00	0.18	5.99	6.18
5.45	0.60	0.64	5.00	0.18	5.99	6.18
5.50	0.60	0.64	5.00	0.18	5.99	6.18
5.55	0.60	0.64	5.00	0.18	5.99	6.18
5.60	0.60	0.64	5.00	0.18	5.99	6.17
5.65	0.60	0.64	5.00	0.18	5.99	6.17
5.70	0.60	0.63	5.00	0.18	5.99	6.17
5.75	0.43	0.63	5.00	0.18	5.99	6.17

5.80	0.34	0.63	5.00	0.18	5.98	6.16
5.85	0.28	0.63	5.00	0.18	5.97	6.15
5.90	0.23	0.63	5.00	0.18	5.96	6.14
5.95	0.19	0.63	5.00	0.18	5.95	6.13
6.00	0.14	0.63	5.00	0.18	5.93	6.11
6.05	0.14	0.63	5.00	0.18	5.91	6.09
6.10	0.15	0.63	5.00	0.18	5.89	6.07
6.15	0.15	0.63	5.00	0.18	5.86	6.05
6.20	0.15	0.63	5.00	0.18	5.84	6.02
6.25	0.15	0.63	5.00	0.18	5.82	6.00
6.30	0.15	0.63	5.00	0.18	5.80	5.98
6.35	0.15	0.63	5.00	0.18	5.77	5.96
6.40	0.15	0.63	5.00	0.18	5.75	5.93
6.45	0.15	0.63	5.00	0.18	5.73	5.91
6.50	0.15	0.63	5.00	0.18	5.71	5.89
6.55	0.15	0.63	5.00	0.18	5.69	5.87
6.60	0.15	0.63	5.00	0.18	5.66	5.85
6.65	0.15	0.63	5.00	0.18	5.64	5.82
6.70	0.15	0.63	5.00	0.18	5.62	5.80
6.75	0.15	0.63	5.00	0.18	5.60	5.78
6.80	0.15	0.63	5.00	0.18	5.58	5.76
6.85	0.15	0.63	5.00	0.18	5.56	5.74
6.90	0.16	0.63	5.00	0.18	5.54	5.72
6.95	0.16	0.63	5.00	0.18	5.51	5.70
7.00	0.16	0.63	5.00	0.18	5.49	5.68
7.05	0.16	0.63	5.00	0.18	5.47	5.65
7.10	0.16	0.63	5.00	0.18	5.45	5.63
7.15	0.16	0.63	5.00	0.18	5.43	5.61
7.20	0.16	0.63	5.00	0.18	5.41	5.59
7.25	0.16	0.63	5.00	0.18	5.39	5.57
7.30	0.16	0.63	5.00	0.18	5.37	5.55
7.35	0.16	0.63	5.00	0.18	5.35	5.53
7.40	0.16	0.63	5.00	0.18	5.33	5.51
7.45	0.16	0.63	5.00	0.18	5.31	5.49
7.50	0.16	0.63	5.00	0.18	5.29	5.47
7.55	0.16	0.63	5.00	0.18	5.27	5.45
7.60	0.16	0.63	5.00	0.18	5.25	5.43
7.65	0.16	0.63	5.00	0.18	5.23	5.41
7.70	0.16	0.63	5.00	0.18	5.21	5.39
7.75	0.17	0.63	5.00	0.18	5.19	5.37
7.80	0.17	0.63	5.00	0.18	5.17	5.35
7.85	0.17	0.63	5.00	0.18	5.15	5.33
7.90	0.17	0.63	5.00	0.18	5.13	5.31
7.95	0.17	0.63	5.00	0.18	5.11	5.29
8.00	0.17	0.63	5.00	0.18	5.09	5.28
8.05	0.17	0.63	5.00	0.18	5.07	5.26
8.10	0.17	0.63	5.00	0.18	5.06	5.24
8.15	0.17	0.63	5.00	0.18	5.04	5.22

8.20	0.17	0.63	5.00	0.18	5.02	5.20
8.25	0.18	0.63	5.00	0.18	5.00	5.18
8.30	0.19	0.63	5.00	0.18	4.98	5.16
8.35	0.19	0.63	5.00	0.18	4.97	5.15
8.40	0.19	0.63	5.00	0.18	4.95	5.13
8.45	0.19	0.63	5.00	0.18	4.93	5.11
8.50	0.19	0.63	5.00	0.18	4.92	5.10
8.55	0.19	0.63	5.00	0.18	4.90	5.08
8.60	0.19	0.63	5.00	0.18	4.88	5.06
8.65	0.19	0.63	5.00	0.18	4.87	5.05
8.70	0.19	0.63	5.00	0.18	4.85	5.03
8.75	0.19	0.63	5.00	0.18	4.83	5.01
8.80	0.19	0.63	5.00	0.18	4.82	5.00
8.85	0.19	0.63	5.00	0.18	4.80	4.98
8.90	0.19	0.63	5.00	0.18	4.78	4.97
8.95	0.19	0.63	5.00	0.18	4.77	4.95
9.00	0.19	0.63	5.00	0.18	4.75	4.93
9.05	0.19	0.63	5.00	0.18	4.74	4.92
9.10	0.19	0.63	5.00	0.18	4.72	4.90
9.15	0.19	0.63	5.00	0.18	4.70	4.89
9.20	0.20	0.63	5.00	0.18	4.69	4.87
9.25	0.20	0.63	5.00	0.18	4.67	4.86
9.30	0.20	0.63	5.00	0.18	4.66	4.84
9.35	0.20	0.63	5.00	0.18	4.64	4.82
9.40	0.20	0.63	5.00	0.18	4.63	4.81
9.45	0.20	0.63	5.00	0.18	4.61	4.79
9.50	0.20	0.63	5.00	0.18	4.60	4.78
9.55	0.20	0.63	5.00	0.18	4.58	4.76
9.60	0.20	0.63	5.00	0.18	4.56	4.75
9.65	0.20	0.63	5.00	0.18	4.55	4.73
9.70	0.20	0.63	5.00	0.18	4.53	4.72
9.75	0.20	0.63	5.00	0.18	4.52	4.70
9.80	0.20	0.63	5.00	0.18	4.50	4.69
9.85	0.20	0.63	5.00	0.18	4.49	4.67
9.90	0.20	0.63	5.00	0.18	4.47	4.66
9.95	0.20	0.63	5.00	0.18	4.46	4.64
10.00	0.20	0.63	5.00	0.18	4.44	4.63
10.05	0.20	0.63	5.00	0.18	4.43	4.61
10.10	0.21	0.63	5.00	0.18	4.41	4.60
10.15	0.21	0.63	5.00	0.18	4.40	4.58
10.20	0.21	0.63	5.00	0.18	4.38	4.57
10.25	0.21	0.63	5.00	0.18	4.37	4.55
10.30	0.21	0.63	5.00	0.18	4.36	4.54
10.35	0.21	0.63	5.00	0.18	4.34	4.52
10.40	0.21	0.63	5.00	0.18	4.33	4.51
10.45	0.21	0.63	5.00	0.18	4.31	4.49
10.50	0.21	0.63	5.00	0.18	4.30	4.48
10.55	0.21	0.63	5.00	0.18	4.28	4.47

10.60	0.21	0.63	5.00	0.18	4.27	4.45
10.65	0.21	0.63	5.00	0.18	4.26	4.44
10.70	0.21	0.63	5.00	0.18	4.24	4.42
10.75	0.21	0.63	5.00	0.18	4.23	4.41
10.80	0.21	0.63	5.00	0.18	4.21	4.40
10.85	0.22	0.63	5.00	0.18	4.20	4.38
10.90	0.22	0.63	5.00	0.18	4.19	4.37
10.95	0.22	0.63	5.00	0.18	4.17	4.35
11.00	0.22	0.63	5.00	0.18	4.16	4.34
11.05	0.22	0.63	5.00	0.18	4.14	4.33
11.10	0.22	0.63	5.00	0.18	4.13	4.31
11.15	0.22	0.63	5.00	0.18	4.12	4.30
11.20	0.22	0.63	5.00	0.18	4.10	4.29
11.25	0.22	0.63	5.00	0.18	4.09	4.27
11.30	0.22	0.63	5.00	0.18	4.08	4.26
11.35	0.22	0.63	5.00	0.18	4.06	4.25
11.40	0.22	0.63	5.00	0.18	4.05	4.23
11.45	0.22	0.63	5.00	0.18	4.04	4.22
11.50	0.22	0.63	5.00	0.18	4.02	4.21
11.55	0.22	0.63	5.00	0.18	4.01	4.19
11.60	0.22	0.63	5.00	0.18	4.00	4.18
11.65	0.23	0.63	5.00	0.18	3.98	4.17
11.70	0.23	0.63	5.00	0.18	3.97	4.15
11.75	0.23	0.63	5.00	0.18	3.96	4.14
11.80	0.23	0.63	5.00	0.18	3.94	4.13
11.85	0.23	0.63	5.00	0.18	3.93	4.11
11.90	0.23	0.63	5.00	0.18	3.92	4.10
11.95	0.23	0.63	5.00	0.18	3.91	4.09
12.00	0.23	0.63	5.00	0.18	3.89	4.08
12.05	0.23	0.63	5.00	0.18	3.88	4.06
12.10	0.23	0.63	5.00	0.18	3.87	4.05
12.15	0.23	0.63	5.00	0.18	3.86	4.04
12.20	0.23	0.63	5.00	0.18	3.84	4.02
12.25	0.23	0.63	5.00	0.18	3.83	4.01
12.30	0.23	0.63	5.00	0.18	3.82	4.00
12.35	0.23	0.62	5.00	0.18	3.81	3.99
12.40	0.23	0.62	5.00	0.18	3.79	3.97
12.45	0.23	0.62	5.00	0.18	3.78	3.96
12.50	0.24	0.62	5.00	0.18	3.77	3.95
12.55	0.24	0.62	5.00	0.18	3.76	3.94
12.60	0.24	0.62	5.00	0.18	3.74	3.93
12.65	0.24	0.62	5.00	0.18	3.73	3.91
12.70	0.24	0.62	5.00	0.18	3.72	3.90
12.75	0.24	0.62	5.00	0.18	3.71	3.89
12.80	0.24	0.62	5.00	0.18	3.69	3.88
12.85	0.24	0.62	5.00	0.18	3.68	3.86
12.90	0.24	0.62	5.00	0.18	3.67	3.85
12.95	0.24	0.62	5.00	0.18	3.66	3.84

13.00	0.24	0.62	5.00	0.18	3.65	3.83
13.05	0.24	0.62	5.00	0.18	3.63	3.82
13.10	0.24	0.62	5.00	0.18	3.62	3.80
13.15	0.24	0.62	5.00	0.18	3.61	3.79
13.20	0.24	0.62	5.00	0.18	3.60	3.78
13.25	0.24	0.62	5.00	0.18	3.59	3.77
13.30	0.24	0.62	5.00	0.18	3.58	3.76
13.35	0.25	0.62	5.00	0.18	3.56	3.75
13.40	0.25	0.62	5.00	0.18	3.55	3.73
13.45	0.25	0.62	5.00	0.18	3.54	3.72
13.50	0.25	0.62	5.00	0.18	3.53	3.71
13.55	0.25	0.62	5.00	0.18	3.52	3.70
13.60	0.25	0.62	5.00	0.18	3.51	3.69
13.65	0.25	0.62	5.00	0.18	3.49	3.68
13.70	0.25	0.62	5.00	0.18	3.48	3.66
13.75	0.25	0.62	5.00	0.18	3.47	3.65
13.80	0.25	0.62	5.00	0.18	3.46	3.64
13.85	0.25	0.62	5.00	0.18	3.45	3.63
13.90	0.25	0.62	5.00	0.18	3.44	3.62
13.95	0.25	0.62	5.00	0.18	3.43	3.61
14.00	0.25	0.62	5.00	0.18	3.41	3.60
14.05	0.25	0.62	5.00	0.18	3.40	3.58
14.10	0.25	0.62	5.00	0.18	3.39	3.57
14.15	0.25	0.62	5.00	0.18	3.38	3.56
14.20	0.25	0.62	5.00	0.18	3.37	3.55
14.25	0.25	0.62	5.00	0.18	3.36	3.54
14.30	0.26	0.62	5.00	0.18	3.35	3.53
14.35	0.26	0.62	5.00	0.18	3.34	3.52
14.40	0.26	0.62	5.00	0.18	3.32	3.51
14.45	0.26	0.62	5.00	0.18	3.31	3.50
14.50	0.26	0.62	5.00	0.18	3.30	3.48
14.55	0.26	0.62	5.00	0.18	3.29	3.47
14.60	0.26	0.62	5.00	0.18	3.28	3.46
14.65	0.26	0.62	5.00	0.18	3.27	3.45
14.70	0.26	0.62	5.00	0.18	3.26	3.44
14.75	0.26	0.62	5.00	0.18	3.25	3.43
14.80	0.29	0.62	5.00	0.18	3.24	3.42
14.85	0.29	0.62	5.00	0.18	3.23	3.41
14.90	0.29	0.62	5.00	0.18	3.22	3.40
14.95	0.29	0.62	5.00	0.18	3.21	3.39
15.00	0.29	0.62	5.00	0.18	3.20	3.38
15.05	0.29	0.62	5.00	0.18	3.19	3.37
15.10	0.29	0.62	5.00	0.18	3.18	3.36
15.15	0.29	0.62	5.00	0.18	3.17	3.35
15.20	0.29	0.62	5.00	0.18	3.16	3.34
15.25	0.29	0.62	5.00	0.18	3.15	3.33
15.30	0.28	0.62	5.00	0.18	3.14	3.32
15.35	0.28	0.62	5.00	0.18	3.13	3.31

15.40	0.28	0.62	5.00	0.18	3.12	3.30
15.45	0.28	0.62	5.00	0.18	3.11	3.29
15.50	0.28	0.62	5.00	0.18	3.10	3.28
15.55	0.28	0.62	5.00	0.18	3.09	3.27
15.60	0.28	0.62	5.00	0.18	3.08	3.26
15.65	0.28	0.62	5.00	0.18	3.07	3.25
15.70	0.28	0.62	5.00	0.18	3.06	3.24
15.75	0.28	0.62	5.00	0.18	3.05	3.23
15.80	0.28	0.62	5.00	0.18	3.04	3.22
15.85	0.28	0.62	5.00	0.18	3.03	3.21
15.90	0.28	0.62	5.00	0.18	3.02	3.20
15.95	0.27	0.62	5.00	0.18	3.01	3.19
16.00	0.27	0.62	5.00	0.18	3.00	3.18
16.05	0.27	0.62	5.00	0.18	2.99	3.17
16.10	0.27	0.62	5.00	0.18	2.98	3.16
16.15	0.27	0.62	5.00	0.18	2.97	3.15
16.20	0.27	0.62	5.00	0.18	2.96	3.14
16.25	0.27	0.62	5.00	0.18	2.95	3.13
16.30	0.27	0.62	5.00	0.18	2.94	3.12
16.35	0.27	0.62	5.00	0.18	2.93	3.11
16.40	0.27	0.62	5.00	0.18	2.92	3.10
16.45	0.27	0.62	5.00	0.18	2.91	3.09
16.50	0.27	0.62	5.00	0.18	2.90	3.08
16.55	0.27	0.62	5.00	0.18	2.89	3.07
16.60	0.27	0.62	5.00	0.18	2.88	3.06
16.65	0.26	0.62	5.00	0.18	2.87	3.05
16.70	0.26	0.62	5.00	0.18	2.86	3.04
16.75	0.26	0.62	5.00	0.18	2.84	3.03
16.80	0.26	0.62	5.00	0.18	2.83	3.02
16.85	0.26	0.62	5.00	0.18	2.82	3.00
16.90	0.26	0.62	5.00	0.18	2.81	2.99
16.95	0.26	0.62	5.00	0.18	2.80	2.98
17.00	0.26	0.62	5.00	0.18	2.79	2.97
17.05	0.26	0.62	5.00	0.18	2.78	2.96
17.10	0.26	0.62	5.00	0.18	2.77	2.95
17.15	0.26	0.62	5.00	0.18	2.76	2.94
17.20	0.26	0.62	5.00	0.18	2.75	2.93
17.25	0.26	0.62	5.00	0.18	2.74	2.92
17.30	0.26	0.62	5.00	0.18	2.73	2.91
17.35	0.26	0.62	5.00	0.18	2.71	2.90
17.40	0.26	0.62	5.00	0.18	2.70	2.88
17.45	0.25	0.62	5.00	0.18	2.69	2.87
17.50	0.25	0.62	5.00	0.18	2.68	2.86
17.55	0.25	0.62	5.00	0.18	2.67	2.85
17.60	0.25	0.62	5.00	0.18	2.66	2.84
17.65	0.25	0.62	5.00	0.18	2.65	2.83
17.70	0.25	0.62	5.00	0.18	2.64	2.82
17.75	0.25	0.62	5.00	0.18	2.62	2.81

17.80	0.25	0.62	5.00	0.18	2.61	2.80
17.85	0.25	0.62	5.00	0.18	2.60	2.78
17.90	0.25	0.62	5.00	0.18	2.59	2.77
17.95	0.25	0.62	5.00	0.18	2.58	2.76
18.00	0.25	0.62	5.00	0.18	2.57	2.75
18.05	0.25	0.62	5.00	0.18	2.56	2.74
18.10	0.25	0.62	5.00	0.18	2.54	2.73
18.15	0.25	0.62	5.00	0.18	2.53	2.71
18.20	0.25	0.62	5.00	0.18	2.52	2.70
18.25	0.25	0.62	5.00	0.18	2.51	2.69
18.30	0.24	0.62	5.00	0.18	2.50	2.68
18.35	0.24	0.62	5.00	0.18	2.49	2.67
18.40	0.24	0.62	5.00	0.18	2.47	2.66
18.45	0.24	0.62	5.00	0.18	2.46	2.64
18.50	0.24	0.62	5.00	0.18	2.45	2.63
18.55	0.24	0.62	5.00	0.18	2.44	2.62
18.60	0.24	0.62	5.00	0.18	2.43	2.61
18.65	0.24	0.62	5.00	0.18	2.42	2.60
18.70	0.24	0.62	5.00	0.18	2.40	2.59
18.75	0.24	0.62	5.00	0.18	2.39	2.57
18.80	0.24	0.62	5.00	0.18	2.38	2.56
18.85	0.24	0.62	5.00	0.18	2.37	2.55
18.90	0.24	0.62	5.00	0.18	2.36	2.54
18.95	0.24	0.62	5.00	0.18	2.34	2.53
19.00	0.24	0.61	5.00	0.18	2.33	2.51
19.05	0.24	0.61	5.00	0.18	2.32	2.50
19.10	0.24	0.61	5.00	0.18	2.31	2.49
19.15	0.24	0.61	5.00	0.18	2.29	2.48
19.20	0.24	0.61	5.00	0.18	2.28	2.46
19.25	0.23	0.61	5.00	0.18	2.27	2.45
19.30	0.23	0.61	5.00	0.18	2.26	2.44
19.35	0.23	0.61	5.00	0.18	2.24	2.43
19.40	0.23	0.61	5.00	0.18	2.23	2.41
19.45	0.23	0.61	5.00	0.18	2.22	2.40
19.50	0.23	0.61	5.00	0.18	2.21	2.39
19.55	0.23	0.61	5.00	0.18	2.19	2.38
19.60	0.23	0.61	5.00	0.18	2.18	2.36
19.65	0.23	0.61	5.00	0.18	2.17	2.35
19.70	0.23	0.61	5.00	0.18	2.16	2.34
19.75	0.23	0.61	5.00	0.18	2.14	2.33
19.80	0.23	0.61	5.00	0.18	2.13	2.31
19.85	0.23	0.61	5.00	0.18	2.12	2.30
19.90	0.23	0.61	5.00	0.18	2.11	2.29
19.95	0.23	0.61	5.00	0.18	2.09	2.28
20.00	0.23	0.61	5.00	0.18	2.08	2.26
20.05	0.23	0.61	5.00	0.18	2.07	2.25
20.10	0.23	0.61	5.00	0.18	2.05	2.24
20.15	0.23	0.61	5.00	0.18	2.04	2.22

20.20	0.23	0.61	5.00	0.18	2.03	2.21
20.25	0.23	0.61	5.00	0.18	2.02	2.20
20.30	0.23	0.61	5.00	0.18	2.00	2.19
20.35	0.23	0.61	5.00	0.18	1.99	2.17
20.40	0.23	0.61	5.00	0.18	1.98	2.16
20.45	0.23	0.61	5.00	0.18	1.97	2.15
20.50	0.23	0.61	5.00	0.18	1.95	2.14
20.55	0.23	0.61	5.00	0.18	1.94	2.12
20.60	0.23	0.61	5.00	0.18	1.93	2.11
20.65	0.23	0.61	5.00	0.18	1.92	2.10
20.70	0.23	0.61	5.00	0.18	1.90	2.09
20.75	0.23	0.61	5.00	0.18	1.89	2.07
20.80	0.23	0.61	5.00	0.18	1.88	2.06
20.85	0.24	0.61	5.00	0.18	1.87	2.05
20.90	0.24	0.61	5.00	0.18	1.85	2.04
20.95	0.24	0.61	5.00	0.18	1.84	2.02
21.00	0.24	0.61	5.00	0.18	1.83	2.01
21.05	0.24	0.61	5.00	0.18	1.82	2.00
21.10	0.24	0.61	5.00	0.18	1.80	1.99
21.15	0.24	0.61	5.00	0.18	1.79	1.97
21.20	0.24	0.61	5.00	0.18	1.78	1.96
21.25	0.24	0.61	5.00	0.18	1.77	1.95
21.30	0.24	0.61	5.00	0.18	1.76	1.94
21.35	0.24	0.61	5.00	0.18	1.74	1.93
21.40	0.24	0.61	5.00	0.18	1.73	1.91
21.45	0.24	0.61	5.00	0.18	1.72	1.90
21.50	0.24	0.61	5.00	0.18	1.71	1.89
21.55	0.24	0.61	5.00	0.18	1.70	1.88
21.60	0.24	0.61	5.00	0.18	1.68	1.87
21.65	0.24	0.61	5.00	0.18	1.67	1.85
21.70	0.24	0.61	5.00	0.18	1.66	1.84
21.75	0.24	0.61	5.00	0.18	1.65	1.83
21.80	0.24	0.61	5.00	0.18	1.64	1.82
21.85	0.24	0.61	5.00	0.18	1.63	1.81
21.90	0.24	0.61	5.00	0.18	1.61	1.80
21.95	0.25	0.61	5.00	0.18	1.60	1.78
22.00	0.25	0.61	5.00	0.18	1.59	1.77
22.05	0.25	0.61	5.00	0.18	1.58	1.76
22.10	0.25	0.61	5.00	0.18	1.57	1.75
22.15	0.25	0.61	5.00	0.18	1.55	1.74
22.20	0.25	0.61	5.00	0.18	1.54	1.73
22.25	0.25	0.61	5.00	0.18	1.53	1.71
22.30	0.25	0.61	5.00	0.18	1.52	1.70
22.35	0.25	0.61	5.00	0.18	1.51	1.69
22.40	0.25	0.61	5.00	0.18	1.50	1.68
22.45	0.25	0.61	5.00	0.18	1.49	1.67
22.50	0.25	0.61	5.00	0.18	1.47	1.66
22.55	0.25	0.61	5.00	0.18	1.46	1.64

22.60	0.25	0.61	5.00	0.18	1.45	1.63
22.65	0.25	0.61	5.00	0.18	1.44	1.62
22.70	0.25	0.61	5.00	0.18	1.43	1.61
22.75	0.25	0.61	5.00	0.18	1.42	1.60
22.80	0.25	0.61	5.00	0.18	1.41	1.59
22.85	0.25	0.61	5.00	0.18	1.40	1.58
22.90	0.25	0.61	5.00	0.18	1.38	1.57
22.95	0.25	0.61	5.00	0.18	1.37	1.55
23.00	0.25	0.61	5.00	0.18	1.36	1.54
23.05	0.25	0.61	5.00	0.18	1.35	1.53
23.10	0.26	0.61	5.00	0.18	1.34	1.52
23.15	0.26	0.61	5.00	0.18	1.33	1.51
23.20	0.26	0.61	5.00	0.18	1.32	1.50
23.25	0.26	0.61	5.00	0.18	1.31	1.49
23.30	0.26	0.61	5.00	0.18	1.29	1.48
23.35	0.26	0.61	5.00	0.18	1.28	1.47
23.40	0.26	0.61	5.00	0.18	1.27	1.45
23.45	0.26	0.61	5.00	0.18	1.26	1.44
23.50	0.26	0.61	5.00	0.18	1.25	1.43
23.55	0.26	0.61	5.00	0.18	1.24	1.42
23.60	0.26	0.61	5.00	0.18	1.23	1.41
23.65	0.26	0.61	5.00	0.18	1.22	1.40
23.70	0.26	0.61	5.00	0.18	1.21	1.39
23.75	0.26	0.61	5.00	0.18	1.20	1.38
23.80	0.26	0.61	5.00	0.18	1.19	1.37
23.85	0.26	0.61	5.00	0.18	1.17	1.36
23.90	0.26	0.61	5.00	0.18	1.16	1.35
23.95	0.26	0.61	5.00	0.18	1.15	1.34
24.00	0.26	0.61	5.00	0.18	1.14	1.32
24.05	0.26	0.61	5.00	0.18	1.13	1.31
24.10	0.26	0.61	5.00	0.18	1.12	1.30
24.15	0.26	0.61	5.00	0.18	1.11	1.29
24.20	0.26	0.61	5.00	0.18	1.10	1.28
24.25	0.27	0.61	5.00	0.18	1.09	1.27
24.30	0.27	0.61	5.00	0.18	1.08	1.26
24.35	0.27	0.61	5.00	0.18	1.07	1.25
24.40	0.27	0.61	5.00	0.18	1.06	1.24
24.45	0.27	0.61	5.00	0.18	1.05	1.23
24.50	0.27	0.61	5.00	0.18	1.04	1.22
24.55	0.27	0.61	5.00	0.18	1.03	1.21
24.60	0.27	0.61	5.00	0.18	1.02	1.20
24.65	0.27	0.61	5.00	0.18	1.00	1.19
24.70	0.27	0.61	5.00	0.18	0.99	1.18
24.75	0.27	0.61	5.00	0.18	0.98	1.17
24.80	0.27	0.61	5.00	0.18	0.97	1.16
24.85	0.27	0.61	5.00	0.18	0.96	1.14
24.90	0.27	0.61	5.00	0.18	0.95	1.13
24.95	0.27	0.61	5.00	0.18	0.94	1.12

25.00	0.27	0.61	5.00	0.18	0.93	1.11
25.05	0.27	0.61	5.00	0.18	0.92	1.10
25.10	0.28	0.61	5.00	0.18	0.91	1.09
25.15	0.28	0.61	5.00	0.18	0.90	1.08
25.20	0.28	0.61	5.00	0.18	0.89	1.07
25.25	0.29	0.61	5.00	0.18	0.88	1.06
25.30	0.29	0.61	5.00	0.18	0.87	1.05
25.35	0.29	0.61	5.00	0.18	0.86	1.04
25.40	0.29	0.61	5.00	0.18	0.85	1.03
25.45	0.30	0.61	5.00	0.18	0.84	1.03
25.50	0.30	0.61	5.00	0.18	0.83	1.02
25.55	0.30	0.61	5.00	0.18	0.82	1.01
25.60	0.31	0.61	5.00	0.18	0.82	1.00
25.65	0.31	0.61	5.00	0.18	0.81	0.99
25.70	0.31	0.60	5.00	0.18	0.80	0.98
25.75	0.32	0.60	5.00	0.18	0.79	0.97
25.80	0.32	0.60	5.00	0.18	0.78	0.96
25.85	0.32	0.60	5.00	0.18	0.77	0.95
25.90	0.32	0.60	5.00	0.18	0.76	0.94
25.95	0.33	0.60	5.00	0.18	0.75	0.94
26.00	0.33	0.60	5.00	0.18	0.75	0.93
26.05	0.34	0.60	5.00	0.18	0.74	0.92
26.10	0.34	0.60	5.00	0.18	0.73	0.91
26.15	0.34	0.60	5.00	0.18	0.72	0.90
26.20	0.35	0.60	5.00	0.18	0.71	0.90
26.25	0.35	0.60	5.00	0.18	0.71	0.89
26.30	0.36	0.60	5.00	0.18	0.70	0.88
26.35	0.36	0.60	5.00	0.18	0.69	0.87
26.40	0.36	0.60	5.00	0.18	0.68	0.86
26.45	0.37	0.60	5.00	0.18	0.67	0.86
26.50	0.37	0.60	5.00	0.18	0.67	0.85
26.55	0.38	0.60	5.00	0.18	0.66	0.84
26.60	0.38	0.60	5.00	0.18	0.65	0.83
26.65	0.38	0.60	5.00	0.18	0.64	0.83
26.70	0.39	0.60	5.00	0.18	0.64	0.82
26.75	0.39	0.60	5.00	0.18	0.63	0.81
26.80	0.40	0.60	5.00	0.18	0.62	0.80
26.85	0.40	0.60	5.00	0.18	0.61	0.80
26.90	0.41	0.60	5.00	0.18	0.61	0.79
26.95	0.41	0.60	5.00	0.18	0.60	0.78
27.00	0.42	0.60	5.00	0.18	0.59	0.78
27.05	0.43	0.60	5.00	0.18	0.59	0.77
27.10	0.43	0.60	5.00	0.18	0.58	0.76
27.15	0.44	0.60	5.00	0.18	0.57	0.76
27.20	0.45	0.60	5.00	0.18	0.57	0.75
27.25	0.46	0.60	5.00	0.18	0.56	0.74
27.30	0.47	0.60	5.00	0.18	0.56	0.74
27.35	0.48	0.60	5.00	0.18	0.55	0.73

27.40	0.50	0.60	5.00	0.18	0.54	0.72
27.45	0.52	0.60	5.00	0.18	0.54	0.72
27.50	0.57	0.60	5.00	0.18	0.53	0.71
27.55	0.59	0.60	5.00	0.18	0.53	0.71
27.60	0.59	0.60	5.00	0.18	0.52	0.70
27.65	0.59	0.60	5.00	0.18	0.51	0.70
27.70	0.59	0.60	5.00	0.18	0.51	0.69
27.75	0.59	0.60	5.00	0.18	0.50	0.69
27.80	0.59	0.60	5.00	0.18	0.50	0.68
27.85	0.59	0.60	5.00	0.18	0.49	0.68
27.90	0.59	0.60	5.00	0.18	0.49	0.67
27.95	0.59	0.60	5.00	0.18	0.48	0.67
28.00	0.59	0.60	5.00	0.18	0.48	0.66
28.05	0.59	0.60	5.00	0.18	0.48	0.66
28.10	0.59	0.60	5.00	0.18	0.47	0.65
28.15	0.59	0.60	5.00	0.18	0.47	0.65
28.20	0.59	0.60	5.00	0.18	0.46	0.64
28.25	0.59	0.60	5.00	0.18	0.46	0.64
28.30	0.59	0.60	5.00	0.18	0.46	0.64
28.35	0.59	0.60	5.00	0.18	0.45	0.63
28.40	0.59	0.60	5.00	0.18	0.45	0.63
28.45	0.59	0.60	5.00	0.18	0.44	0.63
28.50	0.59	0.60	5.00	0.18	0.44	0.62
28.55	0.59	0.60	5.00	0.18	0.44	0.62
28.60	0.59	0.60	5.00	0.18	0.43	0.62
28.65	0.59	0.60	5.00	0.18	0.43	0.61
28.70	0.59	0.60	5.00	0.18	0.43	0.61
28.75	0.59	0.60	5.00	0.18	0.42	0.60
28.80	0.59	0.60	5.00	0.18	0.42	0.60
28.85	0.59	0.60	5.00	0.18	0.42	0.60
28.90	0.59	0.60	5.00	0.18	0.41	0.59
28.95	0.59	0.60	5.00	0.18	0.41	0.59
29.00	0.59	0.60	5.00	0.18	0.41	0.59
29.05	0.59	0.60	5.00	0.18	0.40	0.59
29.10	0.59	0.60	5.00	0.18	0.40	0.58
29.15	0.59	0.60	5.00	0.18	0.40	0.58
29.20	0.59	0.60	5.00	0.18	0.39	0.58
29.25	0.59	0.60	5.00	0.18	0.39	0.57
29.30	0.59	0.60	5.00	0.18	0.39	0.57
29.35	0.59	0.60	5.00	0.18	0.39	0.57
29.40	0.59	0.60	5.00	0.18	0.38	0.57
29.45	0.59	0.60	5.00	0.18	0.38	0.56
29.50	0.59	0.60	5.00	0.18	0.38	0.56
29.55	0.59	0.60	5.00	0.18	0.38	0.56
29.60	0.59	0.60	5.00	0.18	0.37	0.55
29.65	0.59	0.60	5.00	0.18	0.37	0.55
29.70	0.59	0.60	5.00	0.18	0.37	0.55
29.75	0.59	0.60	5.00	0.18	0.37	0.55

29.80	0.59	0.60	5.00	0.18	0.36	0.54
29.85	0.59	0.60	5.00	0.18	0.36	0.54
29.90	0.59	0.60	5.00	0.18	0.36	0.54
29.95	0.59	0.60	5.00	0.18	0.36	0.54
30.00	0.59	0.60	5.00	0.18	0.35	0.54
30.05	0.59	0.60	5.00	0.18	0.35	0.53
30.10	0.59	0.60	5.00	0.18	0.35	0.53
30.15	0.59	0.60	5.00	0.18	0.35	0.53
30.20	0.59	0.60	5.00	0.18	0.34	0.53
30.25	0.59	0.60	5.00	0.18	0.34	0.52
30.30	0.59	0.60	5.00	0.18	0.34	0.52
30.35	0.59	0.60	5.00	0.18	0.34	0.52
30.40	0.58	0.60	5.00	0.18	0.34	0.52
30.45	0.58	0.60	5.00	0.18	0.33	0.52
30.50	0.58	0.60	5.00	0.18	0.33	0.51
30.55	0.58	0.60	5.00	0.18	0.33	0.51
30.60	0.58	0.60	5.00	0.18	0.33	0.51
30.65	0.58	0.59	5.00	0.18	0.32	0.51
30.70	0.58	0.59	5.00	0.18	0.32	0.50
30.75	0.58	0.59	5.00	0.18	0.32	0.50
30.80	0.58	0.59	5.00	0.18	0.32	0.50
30.85	0.58	0.59	5.00	0.18	0.32	0.50
30.90	0.58	0.59	5.00	0.18	0.31	0.49
30.95	0.58	0.59	5.00	0.18	0.31	0.49
31.00	0.58	0.59	5.00	0.18	0.31	0.49
31.05	0.58	0.59	5.00	0.18	0.31	0.49
31.10	0.58	0.59	5.00	0.18	0.30	0.49
31.15	0.58	0.59	5.00	0.18	0.30	0.48
31.20	0.58	0.59	5.00	0.18	0.30	0.48
31.25	0.58	0.59	5.00	0.18	0.30	0.48
31.30	0.58	0.59	5.00	0.18	0.30	0.48
31.35	0.58	0.59	5.00	0.18	0.29	0.47
31.40	0.58	0.59	5.00	0.18	0.29	0.47
31.45	0.58	0.59	5.00	0.18	0.29	0.47
31.50	0.58	0.59	5.00	0.18	0.29	0.47
31.55	0.58	0.59	5.00	0.18	0.28	0.47
31.60	0.58	0.59	5.00	0.18	0.28	0.46
31.65	0.58	0.59	5.00	0.18	0.28	0.46
31.70	0.58	0.59	5.00	0.18	0.28	0.46
31.75	0.58	0.59	5.00	0.18	0.28	0.46
31.80	0.58	0.59	5.00	0.18	0.27	0.46
31.85	0.58	0.59	5.00	0.18	0.27	0.45
31.90	0.58	0.59	5.00	0.18	0.27	0.45
31.95	0.58	0.59	5.00	0.18	0.27	0.45
32.00	0.58	0.59	5.00	0.18	0.26	0.45
32.05	0.58	0.59	5.00	0.18	0.26	0.44
32.10	0.58	0.59	5.00	0.18	0.26	0.44
32.15	0.58	0.59	5.00	0.18	0.26	0.44

32.20	0.58	0.59	5.00	0.18	0.26	0.44
32.25	0.58	0.59	5.00	0.18	0.25	0.44
32.30	0.58	0.59	5.00	0.18	0.25	0.43
32.35	0.58	0.59	5.00	0.18	0.25	0.43
32.40	0.58	0.59	5.00	0.18	0.25	0.43
32.45	0.58	0.59	5.00	0.18	0.24	0.43
32.50	0.58	0.59	5.00	0.18	0.24	0.42
32.55	0.58	0.59	5.00	0.18	0.24	0.42
32.60	0.58	0.58	5.00	0.18	0.24	0.42
32.65	0.58	0.58	5.00	0.18	0.24	0.42
32.70	0.58	0.58	5.00	0.18	0.23	0.42
32.75	0.58	0.58	5.00	0.18	0.23	0.41
32.80	0.58	0.58	5.00	0.18	0.23	0.41
32.85	0.58	0.58	5.00	0.18	0.23	0.41
32.90	0.58	0.58	5.00	0.18	0.23	0.41
32.95	0.58	0.58	5.00	0.18	0.22	0.41
33.00	0.58	0.58	5.00	0.18	0.22	0.40
33.05	0.58	0.58	5.00	0.18	0.22	0.40
33.10	0.58	0.58	5.00	0.18	0.22	0.40
33.15	0.58	0.58	5.00	0.18	0.22	0.40
33.20	0.58	0.58	5.00	0.18	0.21	0.39
33.25	0.58	0.58	5.00	0.18	0.21	0.39
33.30	0.58	0.58	5.00	0.18	0.21	0.39
33.35	0.58	0.58	5.00	0.18	0.21	0.39
33.40	0.58	0.58	5.00	0.18	0.20	0.39
33.45	0.57	0.58	5.00	0.18	0.20	0.38
33.50	0.57	0.58	5.00	0.18	0.20	0.38
33.55	0.57	0.58	5.00	0.18	0.20	0.38
33.60	0.57	0.58	5.00	0.18	0.20	0.38
33.65	0.57	0.58	5.00	0.18	0.19	0.38
33.70	0.57	0.58	5.00	0.18	0.19	0.37
33.75	0.57	0.58	5.00	0.18	0.19	0.37
33.80	0.57	0.58	5.00	0.18	0.19	0.37
33.85	0.57	0.58	5.00	0.18	0.19	0.37
33.90	0.57	0.58	5.00	0.18	0.18	0.37
33.95	0.57	0.58	5.00	0.18	0.18	0.36
34.00	0.57	0.58	5.00	0.18	0.18	0.36
34.05	0.57	0.58	5.00	0.18	0.18	0.36
34.10	0.57	0.58	5.00	0.18	0.18	0.36
34.15	0.57	0.58	5.00	0.18	0.17	0.35
34.20	0.57	0.58	5.00	0.18	0.17	0.35
34.25	0.57	0.58	5.00	0.18	0.17	0.35
34.30	0.57	0.58	5.00	0.18	0.17	0.35
34.35	0.57	0.58	5.00	0.18	0.16	0.35
34.40	0.57	0.58	5.00	0.18	0.16	0.34
34.45	0.57	0.58	5.00	0.18	0.16	0.34
34.50	0.57	0.57	5.00	0.18	0.16	0.34
34.55	0.57	0.57	5.00	0.18	0.16	0.34

34.60	0.57	0.57	5.00	0.18	0.15	0.34
34.65	0.57	0.57	5.00	0.18	0.15	0.33
34.70	0.57	0.57	5.00	0.18	0.15	0.33
34.75	0.57	0.57	5.00	0.18	0.15	0.33
34.80	0.57	0.57	5.00	0.18	0.15	0.33
34.85	0.57	0.57	5.00	0.18	0.14	0.33
34.90	0.57	0.57	5.00	0.18	0.14	0.32
34.95	0.57	0.57	5.00	0.18	0.14	0.32
35.00	0.57	0.57	5.00	0.18	0.14	0.32
35.05	0.57	0.57	5.00	0.18	0.14	0.32
35.10	0.57	0.57	5.00	0.18	0.13	0.32
35.15	0.57	0.57	5.00	0.18	0.13	0.31
35.20	0.57	0.57	5.00	0.18	0.13	0.31
35.25	0.57	0.57	5.00	0.18	0.13	0.31
35.30	0.57	0.57	5.00	0.18	0.13	0.31
35.35	0.57	0.57	5.00	0.18	0.12	0.31
35.40	0.57	0.57	5.00	0.18	0.12	0.30
35.45	0.57	0.57	5.00	0.18	0.12	0.30
35.50	0.57	0.57	5.00	0.18	0.12	0.30
35.55	0.57	0.57	5.00	0.18	0.11	0.30
35.60	0.57	0.57	5.00	0.18	0.11	0.29
35.65	0.57	0.57	5.00	0.18	0.11	0.29
35.70	0.57	0.57	5.00	0.18	0.11	0.29
35.75	0.57	0.57	5.00	0.18	0.11	0.29
35.80	0.57	0.57	5.00	0.18	0.10	0.29
35.85	0.57	0.57	5.00	0.18	0.10	0.28
35.90	0.57	0.57	5.00	0.18	0.10	0.28
35.95	0.57	0.57	5.00	0.18	0.10	0.28
36.00	0.57	0.57	5.00	0.18	0.10	0.28
36.05	0.57	0.57	5.00	0.18	0.09	0.28
36.10	0.57	0.57	5.00	0.18	0.09	0.27
36.15	0.57	0.57	5.00	0.18	0.09	0.27
36.20	0.57	0.57	5.00	0.18	0.09	0.27
36.25	0.57	0.57	5.00	0.18	0.09	0.27
36.30	0.57	0.57	5.00	0.18	0.08	0.26
36.35	0.57	0.57	5.00	0.18	0.08	0.26
36.40	0.57	0.56	5.00	0.18	0.08	0.26
36.45	0.57	0.56	5.00	0.18	0.08	0.26
36.50	0.57	0.56	5.00	0.18	0.07	0.26
36.55	0.56	0.56	5.00	0.18	0.07	0.25
36.60	0.56	0.56	5.00	0.18	0.07	0.25
36.65	0.56	0.56	5.00	0.18	0.07	0.25
36.70	0.56	0.56	5.00	0.18	0.07	0.25
36.75	0.56	0.56	5.00	0.18	0.06	0.25
36.80	0.56	0.56	5.00	0.18	0.06	0.24
36.85	0.56	0.56	5.00	0.18	0.06	0.24
36.90	0.56	0.56	5.00	0.18	0.06	0.24
36.95	0.56	0.56	5.00	0.18	0.05	0.24

37.00	0.56	0.56	5.00	0.18	0.05	0.23
37.05	0.56	0.56	5.00	0.18	0.05	0.23
37.10	0.56	0.56	5.00	0.18	0.05	0.23
37.15	0.56	0.56	5.00	0.18	0.04	0.23
37.20	0.56	0.56	5.00	0.18	0.04	0.22
37.25	0.56	0.56	5.00	0.18	0.04	0.22
37.30	0.56	0.56	5.00	0.18	0.04	0.22
37.35	0.56	0.56	5.00	0.18	0.04	0.22
37.40	0.56	0.56	5.00	0.18	0.03	0.21
37.45	0.56	0.56	5.00	0.18	0.03	0.21
37.50	0.56	0.56	5.00	0.18	0.03	0.21
37.55	0.56	0.56	5.00	0.18	0.03	0.21
37.60	0.56	0.56	5.00	0.18	0.02	0.21
37.65	0.56	0.56	5.00	0.18	0.02	0.20
37.70	0.56	0.56	5.00	0.18	0.02	0.20
37.75	0.56	0.56	5.00	0.18	0.02	0.20
37.80	0.56	0.56	5.00	0.18	0.01	0.19
37.85	0.56	0.56	5.00	0.18	0.01	0.19
37.90	0.56	0.56	5.00	0.18	0.01	0.19
37.95	0.56	0.56	5.00	0.18	0.01	0.19
38.00	0.56	0.56	5.00	0.18	0.00	0.18
38.05	0.56	0.56	1.01	0.18	0.00	0.18
38.10	0.56	0.56	1.01	0.18	0.00	0.18
38.15	0.56	0.56	1.01	0.18	0.00	0.18
38.20	0.56	0.56	1.01	0.18	0.00	0.18
38.25	0.56	0.56	1.01	0.18	0.00	0.18
38.30	0.56	0.56	1.01	0.18	0.00	0.18
38.35	0.56	0.56	1.01	0.18	0.00	0.18
38.40	0.56	0.56	1.00	0.18	0.00	0.18
38.45	0.56	0.56	1.00	0.18	0.00	0.18
38.50	0.56	0.56	1.00	0.18	0.00	0.18
38.55	0.56	0.56	1.00	0.18	0.00	0.18
38.60	0.56	0.56	1.00	0.18	0.00	0.18
38.65	0.56	0.56	1.00	0.18	0.00	0.18
38.70	0.56	0.56	1.00	0.18	0.00	0.18
38.75	0.56	0.56	1.00	0.18	0.00	0.18
38.80	0.56	0.56	1.00	0.18	0.00	0.18
38.85	0.56	0.56	1.00	0.18	0.00	0.18
38.90	0.56	0.56	1.00	0.18	0.00	0.18
38.95	0.56	0.56	1.00	0.18	0.00	0.18
39.00	0.56	0.56	1.00	0.18	0.00	0.18
39.05	0.56	0.56	1.00	0.18	0.00	0.18
39.10	0.56	0.56	1.00	0.18	0.00	0.18
39.15	0.56	0.56	1.00	0.18	0.00	0.18
39.20	0.56	0.56	1.00*	0.18	0.00	0.18
39.25	0.56	0.56	1.00*	0.18	0.00	0.18
39.30	0.56	0.56	1.00*	0.18	0.00	0.18
39.35	0.56	0.56	1.00*	0.18	0.00	0.18

39.40	0.56	0.56	1.00*	0.18	0.00	0.18
39.45	0.56	0.56	1.00*	0.18	0.00	0.18
39.50	0.56	0.56	1.00*	0.18	0.00	0.18
39.55	0.56	0.56	1.00*	0.18	0.00	0.18
39.60	0.56	0.56	1.00*	0.18	0.00	0.18
39.65	0.56	0.56	1.00*	0.18	0.00	0.18
39.70	0.56	0.56	1.00*	0.18	0.00	0.18
39.75	0.56	0.56	1.00*	0.18	0.00	0.18
39.80	0.56	0.56	1.00*	0.18	0.00	0.18
39.85	0.56	0.56	1.00*	0.18	0.00	0.18
39.90	0.56	0.56	1.00*	0.18	0.00	0.18
39.95	0.56	0.56	1.00*	0.18	0.00	0.18
40.00	0.56	0.56	1.00*	0.18	0.00	0.18
40.05	0.56	0.56	1.00*	0.18	0.00	0.18
40.10	0.56	0.56	0.99*	0.18	0.00	0.18
40.15	0.56	0.56	0.99*	0.18	0.00	0.18
40.20	0.56	0.56	0.99*	0.18	0.00	0.18
40.25	0.56	0.56	0.99*	0.18	0.00	0.18
40.30	0.56	0.56	0.99*	0.18	0.00	0.18
40.35	0.56	0.56	0.99*	0.18	0.00	0.18
40.40	0.56	0.56	0.99*	0.18	0.00	0.18
40.45	0.56	0.56	0.99*	0.18	0.00	0.18
40.50	0.56	0.56	0.99*	0.18	0.00	0.18
40.55	0.56	0.56	0.99*	0.18	0.00	0.18
40.60	0.56	0.56	0.99*	0.18	0.00	0.18
40.65	0.56	0.56	0.99*	0.18	0.00	0.18
40.70	0.56	0.56	0.99*	0.18	0.00	0.18
40.75	0.56	0.56	0.99*	0.18	0.00	0.18
40.80	0.56	0.56	0.99*	0.18	0.00	0.18
40.85	0.56	0.56	0.99*	0.18	0.00	0.18
40.90	0.56	0.56	0.99*	0.18	0.00	0.18
40.95	0.56	0.56	0.99*	0.18	0.00	0.18
41.00	0.56	0.56	0.99*	0.18	0.00	0.18
41.05	0.56	0.56	0.99*	0.18	0.00	0.18
41.10	0.56	0.56	0.99*	0.18	0.00	0.18
41.15	0.56	0.56	0.99*	0.18	0.00	0.18
41.20	0.56	0.56	0.99*	0.18	0.00	0.18
41.25	0.56	0.56	0.99*	0.18	0.00	0.18
41.30	0.56	0.56	0.99*	0.18	0.00	0.18
41.35	0.56	0.56	0.99*	0.18	0.00	0.18
41.40	0.56	0.56	0.99*	0.18	0.00	0.18
41.45	0.55	0.56	0.99*	0.18	0.00	0.18
41.50	0.55	0.56	0.99*	0.18	0.00	0.18
41.55	0.55	0.56	0.99*	0.18	0.00	0.18
41.60	0.55	0.56	0.99*	0.18	0.00	0.18
41.65	0.55	0.56	0.99*	0.18	0.00	0.18
41.70	0.55	0.56	0.99*	0.17	0.00	0.17
41.75	0.55	0.56	0.99*	0.17	0.00	0.17

41.80	0.55	0.56	0.99*	0.17	0.00	0.17
41.85	0.55	0.56	0.99*	0.17	0.00	0.17
41.90	0.55	0.56	0.99*	0.17	0.00	0.17
41.95	0.55	0.56	0.99*	0.17	0.00	0.17
42.00	0.55	0.56	0.99*	0.17	0.00	0.17
42.05	0.55	0.56	0.99*	0.17	0.00	0.17
42.10	0.55	0.56	0.99*	0.17	0.00	0.17
42.15	0.55	0.56	0.99*	0.17	0.00	0.17
42.20	0.55	0.56	0.99*	0.17	0.00	0.17
42.25	0.55	0.56	0.98*	0.17	0.00	0.17
42.30	0.55	0.56	0.98*	0.17	0.00	0.17
42.35	0.55	0.56	0.98*	0.17	0.00	0.17
42.40	0.55	0.56	0.98*	0.16	0.00	0.16
42.45	0.55	0.56	0.98*	0.16	0.00	0.16
42.50	0.55	0.56	0.98*	0.16	0.00	0.16
42.55	0.55	0.56	0.98*	0.16	0.00	0.16
42.60	0.55	0.56	0.98*	0.16	0.00	0.16
42.65	0.55	0.56	0.98*	0.16	0.00	0.16
42.70	0.55	0.56	0.98*	0.16	0.00	0.16
42.75	0.55	0.56	0.98*	0.16	0.00	0.16
42.80	0.55	0.56	0.98*	0.16	0.00	0.16
42.85	0.55	0.56	0.98*	0.16	0.00	0.16
42.90	0.55	0.56	0.98*	0.16	0.00	0.16
42.95	0.55	0.56	0.98*	0.16	0.00	0.16
43.00	0.55	0.56	0.98*	0.16	0.00	0.16
43.05	0.55	0.56	0.98*	0.15	0.00	0.15
43.10	0.55	0.56	0.98*	0.15	0.00	0.15
43.15	0.55	0.56	0.98*	0.15	0.00	0.15
43.20	0.55	0.56	0.98*	0.15	0.00	0.15
43.25	0.55	0.56	0.98*	0.15	0.00	0.15
43.30	0.55	0.56	0.98*	0.15	0.00	0.15
43.35	0.55	0.56	0.98*	0.15	0.00	0.15
43.40	0.55	0.56	0.98*	0.15	0.00	0.15
43.45	0.55	0.56	0.98*	0.15	0.00	0.15
43.50	0.55	0.56	0.98*	0.15	0.00	0.15
43.55	0.55	0.56	0.98*	0.15	0.00	0.15
43.60	0.55	0.56	0.98*	0.15	0.00	0.15
43.65	0.55	0.56	0.98*	0.15	0.00	0.15
43.70	0.55	0.56	0.98*	0.14	0.00	0.14
43.75	0.55	0.56	0.98*	0.14	0.00	0.14
43.80	0.55	0.56	0.98*	0.14	0.00	0.14
43.85	0.55	0.56	0.98*	0.14	0.00	0.14
43.90	0.55	0.56	0.98*	0.14	0.00	0.14
43.95	0.55	0.56	0.98*	0.14	0.00	0.14
44.00	0.55	0.56	0.98*	0.14	0.00	0.14
44.05	0.55	0.56	0.98*	0.14	0.00	0.14
44.10	0.55	0.56	0.98*	0.14	0.00	0.14
44.15	0.55	0.56	0.98*	0.14	0.00	0.14

44.20	0.55	0.56	0.98*	0.14	0.00	0.14
44.25	0.55	0.56	0.98*	0.13	0.00	0.13
44.30	0.55	0.56	0.98*	0.13	0.00	0.13
44.35	0.55	0.56	0.98*	0.13	0.00	0.13
44.40	0.55	0.56	0.98*	0.13	0.00	0.13
44.45	0.55	0.56	0.98*	0.13	0.00	0.13
44.50	0.55	0.56	0.98*	0.13	0.00	0.13
44.55	0.55	0.56	0.98*	0.13	0.00	0.13
44.60	0.55	0.56	0.98*	0.13	0.00	0.13
44.65	0.55	0.56	0.98*	0.13	0.00	0.13
44.70	0.55	0.56	0.98*	0.13	0.00	0.13
44.75	0.55	0.56	0.98*	0.13	0.00	0.13
44.80	0.55	0.56	0.98*	0.12	0.00	0.12
44.85	0.55	0.56	0.98*	0.12	0.00	0.12
44.90	0.55	0.56	0.98*	0.12	0.00	0.12
44.95	0.55	0.56	0.98*	0.12	0.00	0.12
45.00	0.55	0.56	0.98*	0.12	0.00	0.12
45.05	0.55	0.56	0.98*	0.12	0.00	0.12
45.10	0.55	0.56	0.98*	0.12	0.00	0.12
45.15	0.55	0.56	0.97*	0.12	0.00	0.12
45.20	0.55	0.56	0.97*	0.12	0.00	0.12
45.25	0.55	0.56	0.97*	0.12	0.00	0.12
45.30	0.55	0.56	0.97*	0.12	0.00	0.12
45.35	0.55	0.56	0.97*	0.11	0.00	0.11
45.40	0.55	0.56	0.97*	0.11	0.00	0.11
45.45	0.55	0.56	0.97*	0.11	0.00	0.11
45.50	0.55	0.56	0.97*	0.11	0.00	0.11
45.55	0.55	0.56	0.97*	0.11	0.00	0.11
45.60	0.55	0.56	0.97*	0.11	0.00	0.11
45.65	0.55	0.56	0.97*	0.11	0.00	0.11
45.70	0.55	0.56	0.97*	0.11	0.00	0.11
45.75	0.55	0.56	0.97*	0.11	0.00	0.11
45.80	0.55	0.56	0.97*	0.11	0.00	0.11
45.85	0.55	0.56	0.97*	0.10	0.00	0.10
45.90	0.55	0.56	0.97*	0.10	0.00	0.10
45.95	0.55	0.56	0.97*	0.10	0.00	0.10
46.00	0.55	0.56	0.97*	0.10	0.00	0.10
46.05	0.55	0.56	0.97*	0.10	0.00	0.10
46.10	0.55	0.56	0.97*	0.10	0.00	0.10
46.15	0.55	0.56	0.97*	0.10	0.00	0.10
46.20	0.55	0.56	0.97*	0.10	0.00	0.10
46.25	0.55	0.56	0.97*	0.10	0.00	0.10
46.30	0.55	0.56	0.97*	0.10	0.00	0.10
46.35	0.55	0.56	0.97*	0.10	0.00	0.10
46.40	0.55	0.56	0.97*	0.09	0.00	0.09
46.45	0.55	0.56	0.97*	0.09	0.00	0.09
46.50	0.55	0.56	0.97*	0.09	0.00	0.09
46.55	0.55	0.56	0.97*	0.09	0.00	0.09

46.60	0.55	0.56	0.97*	0.09	0.00	0.09
46.65	0.55	0.56	0.97*	0.09	0.00	0.09
46.70	0.55	0.56	0.97*	0.09	0.00	0.09
46.75	0.55	0.56	0.97*	0.09	0.00	0.09
46.80	0.55	0.56	0.97*	0.09	0.00	0.09
46.85	0.55	0.56	0.97*	0.09	0.00	0.09
46.90	0.55	0.56	0.97*	0.08	0.00	0.08
46.95	0.55	0.56	0.97*	0.08	0.00	0.08
47.00	0.55	0.56	0.97*	0.08	0.00	0.08
47.05	0.55	0.56	0.97*	0.08	0.00	0.08
47.10	0.55	0.56	0.97*	0.08	0.00	0.08
47.15	0.55	0.56	0.97*	0.08	0.00	0.08
47.20	0.55	0.56	0.97*	0.08	0.00	0.08
47.25	0.55	0.56	0.97*	0.08	0.00	0.08
47.30	0.55	0.56	0.97*	0.08	0.00	0.08
47.35	0.55	0.56	0.97*	0.08	0.00	0.08
47.40	0.55	0.56	0.97*	0.08	0.00	0.08
47.45	0.55	0.56	0.97*	0.07	0.00	0.07
47.50	0.55	0.56	0.97*	0.07	0.00	0.07
47.55	0.55	0.56	0.97*	0.07	0.00	0.07
47.60	0.55	0.56	0.97*	0.07	0.00	0.07
47.65	0.55	0.56	0.97*	0.07	0.00	0.07
47.70	0.55	0.56	0.97*	0.07	0.00	0.07
47.75	0.55	0.56	0.97*	0.07	0.00	0.07
47.80	0.55	0.56	0.97*	0.07	0.00	0.07
47.85	0.55	0.56	0.97*	0.07	0.00	0.07
47.90	0.55	0.56	0.97*	0.07	0.00	0.07
47.95	0.55	0.56	0.97*	0.07	0.00	0.07
48.00	0.55	0.56	0.97*	0.06	0.00	0.06
48.05	0.55	0.56	0.97*	0.06	0.00	0.06
48.10	0.54	0.56	0.97*	0.06	0.00	0.06
48.15	0.54	0.56	0.97*	0.06	0.00	0.06
48.20	0.54	0.56	0.97*	0.06	0.00	0.06
48.25	0.54	0.56	0.97*	0.06	0.00	0.06
48.30	0.54	0.56	0.97*	0.06	0.00	0.06
48.35	0.54	0.56	0.97*	0.06	0.00	0.06
48.40	0.54	0.56	0.97*	0.06	0.00	0.06
48.45	0.54	0.56	0.97*	0.06	0.00	0.06
48.50	0.54	0.56	0.97*	0.05	0.00	0.05
48.55	0.54	0.56	0.97*	0.05	0.00	0.05
48.60	0.54	0.56	0.97*	0.05	0.00	0.05
48.65	0.54	0.56	0.97*	0.05	0.00	0.05
48.70	0.54	0.56	0.97*	0.05	0.00	0.05
48.75	0.54	0.56	0.97*	0.05	0.00	0.05
48.80	0.54	0.56	0.97*	0.05	0.00	0.05
48.85	0.54	0.56	0.97*	0.05	0.00	0.05
48.90	0.54	0.56	0.97*	0.05	0.00	0.05
48.95	0.54	0.56	0.97*	0.05	0.00	0.05

49.00	0.54	0.56	0.97*	0.05	0.00	0.05
49.05	0.54	0.56	0.97*	0.04	0.00	0.04
49.10	0.54	0.56	0.97*	0.04	0.00	0.04
49.15	0.54	0.56	0.97*	0.04	0.00	0.04
49.20	0.54	0.56	0.97*	0.04	0.00	0.04
49.25	0.54	0.56	0.97*	0.04	0.00	0.04
49.30	0.54	0.56	0.97*	0.04	0.00	0.04
49.35	0.54	0.56	0.97*	0.04	0.00	0.04
49.40	0.54	0.56	0.97*	0.04	0.00	0.04
49.45	0.54	0.56	0.97*	0.04	0.00	0.04
49.50	0.54	0.56	0.97*	0.04	0.00	0.04
49.55	0.54	0.56	0.97*	0.04	0.00	0.04
49.60	0.54	0.56	0.97*	0.03	0.00	0.03
49.65	0.54	0.56	0.97*	0.03	0.00	0.03
49.70	0.54	0.56	0.97*	0.03	0.00	0.03
49.75	0.54	0.56	0.97*	0.03	0.00	0.03
49.80	0.54	0.56	0.97*	0.03	0.00	0.03
49.85	0.54	0.56	0.97*	0.03	0.00	0.03
49.90	0.54	0.56	0.97*	0.03	0.00	0.03
49.95	0.54	0.56	0.97*	0.03	0.00	0.03
50.00	0.54	0.56	0.97*	0.03	0.00	0.03
50.05	0.54	0.56	0.97*	0.03	0.00	0.03
50.10	0.54	0.56	0.97*	0.03	0.00	0.03
50.15	0.54	0.56	0.97*	0.02	0.00	0.02
50.20	0.54	0.56	0.97*	0.02	0.00	0.02
50.25	0.54	0.56	0.97*	0.02	0.00	0.02
50.30	0.54	0.56	0.97*	0.02	0.00	0.02
50.35	0.54	0.56	0.97*	0.02	0.00	0.02
50.40	0.54	0.56	0.97*	0.02	0.00	0.02
50.45	0.54	0.56	0.97*	0.02	0.00	0.02
50.50	0.54	0.56	0.97*	0.02	0.00	0.02
50.55	0.54	0.56	0.97*	0.02	0.00	0.02
50.60	0.54	0.56	0.97*	0.02	0.00	0.02
50.65	0.54	0.56	0.97*	0.02	0.00	0.02
50.70	0.54	0.56	0.97*	0.01	0.00	0.01
50.75	0.54	0.56	0.97*	0.01	0.00	0.01
50.80	0.54	0.56	0.97*	0.01	0.00	0.01
50.85	0.54	0.56	0.97*	0.01	0.00	0.01
50.90	0.54	0.56	0.97*	0.01	0.00	0.01
50.95	0.54	0.56	0.97*	0.01	0.00	0.01
51.00	0.54	0.56	0.97*	0.01	0.00	0.01
51.05	0.54	0.56	0.97*	0.01	0.00	0.01
51.10	0.54	0.56	0.97*	0.01	0.00	0.01
51.15	0.54	0.56	0.97*	0.01	0.00	0.01
51.20	0.54	0.56	0.97*	0.01	0.00	0.01
51.25	0.54	0.56	0.97*	0.00	0.00	0.00
51.30	0.54	0.56	0.97*	0.00	0.00	0.00
51.35	0.54	0.56	0.97*	0.00	0.00	0.00

51.40	0.54	0.56	0.97*	0.00	0.00	0.00
51.45	0.54	0.56	0.97*	0.00	0.00	0.00
51.50	0.54	0.56	0.97*	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/ft2)

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

EZ-FRISK Output Files

Probabilistic Hazard Results for EZ-FRISK 7.65 Build 004

SPECTRAL PERIOD: PGA
Column 1: Acceleration (g)
Column 2: Mean
Column 3: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
1.0e-004	7.063e-001	7.063e-001	7.063e-001	7.063e-001
1.0e-003	6.972e-001	7.031e-001	7.062e-001	6.824e-001
0.010	4.287e-001	4.210e-001	5.262e-001	3.389e-001
0.020	2.817e-001	2.802e-001	3.444e-001	2.206e-001
0.050	1.332e-001	1.396e-001	1.501e-001	1.100e-001
0.070	9.668e-002	1.030e-001	1.047e-001	8.237e-002
0.100	6.713e-002	7.216e-002	6.959e-002	5.963e-002
0.200	3.013e-002	3.184e-002	2.884e-002	2.972e-002
0.300	1.708e-002	1.749e-002	1.558e-002	1.816e-002
0.400	1.057e-002	1.049e-002	9.258e-003	1.196e-002
0.500	6.865e-003	6.618e-003	5.780e-003	8.196e-003
0.700	3.161e-003	2.890e-003	2.468e-003	4.123e-003
1.000	1.137e-003	9.725e-004	8.016e-004	1.637e-003
2.000	7.586e-005	5.528e-005	4.120e-005	1.311e-004
3.000	9.455e-006	6.157e-006	4.263e-006	1.794e-005

SPECTRAL PERIOD: 0.03
Column 1: Acceleration (g)
Column 2: Mean
Column 3: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
1.0e-004	7.063e-001	7.063e-001	7.063e-001	7.063e-001
1.0e-003	6.968e-001	7.033e-001	7.062e-001	6.808e-001
0.010	4.343e-001	4.273e-001	5.330e-001	3.427e-001
0.020	2.885e-001	2.866e-001	3.529e-001	2.259e-001
0.050	1.385e-001	1.444e-001	1.565e-001	1.147e-001
0.070	1.011e-001	1.070e-001	1.098e-001	8.640e-002
0.100	7.062e-002	7.542e-002	7.350e-002	6.293e-002
0.200	3.229e-002	3.403e-002	3.092e-002	3.190e-002
0.300	1.865e-002	1.920e-002	1.694e-002	1.981e-002
0.400	1.177e-002	1.184e-002	1.020e-002	1.326e-002
0.500	7.785e-003	7.668e-003	6.447e-003	9.239e-003

0.700	3.710e-003	3.518e-003	2.817e-003	4.794e-003
1.000	1.395e-003	1.261e-003	9.422e-004	1.984e-003
2.000	1.033e-004	8.267e-005	5.182e-005	1.755e-004
3.000	1.378e-005	1.009e-005	5.602e-006	2.564e-005

SPECTRAL PERIOD: 0.05
Column 1: Acceleration (g)
Column 2: Mean
Column 3: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
1.0e-004	7.063e-001	7.063e-001	7.063e-001	7.063e-001
1.0e-003	6.966e-001	7.044e-001	7.063e-001	6.793e-001
0.010	4.543e-001	4.506e-001	5.568e-001	3.556e-001
0.020	3.103e-001	3.079e-001	3.821e-001	2.410e-001
0.050	1.544e-001	1.587e-001	1.773e-001	1.273e-001
0.070	1.140e-001	1.185e-001	1.263e-001	9.706e-002
0.100	8.047e-002	8.414e-002	8.584e-002	7.143e-002
0.200	3.762e-002	3.861e-002	3.727e-002	3.697e-002
0.300	2.220e-002	2.220e-002	2.101e-002	2.341e-002
0.400	1.433e-002	1.399e-002	1.302e-002	1.597e-002
0.500	9.689e-003	9.267e-003	8.470e-003	1.133e-002
0.700	4.816e-003	4.447e-003	3.901e-003	6.100e-003
1.000	1.916e-003	1.693e-003	1.396e-003	2.658e-003
2.000	1.625e-004	1.288e-004	8.999e-005	2.689e-004
3.000	2.373e-005	1.733e-005	1.080e-005	4.306e-005

SPECTRAL PERIOD: 0.1
Column 1: Acceleration (g)
Column 2: Mean
Column 3: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
1.0e-004	7.063e-001	7.063e-001	7.063e-001	7.063e-001
1.0e-003	7.009e-001	7.060e-001	7.063e-001	6.905e-001
0.010	5.212e-001	5.365e-001	6.126e-001	4.145e-001
0.020	3.828e-001	3.913e-001	4.608e-001	2.962e-001
0.050	2.089e-001	2.173e-001	2.410e-001	1.685e-001
0.070	1.593e-001	1.668e-001	1.789e-001	1.320e-001
0.100	1.162e-001	1.220e-001	1.269e-001	9.959e-002
0.200	5.786e-002	5.969e-002	6.005e-002	5.382e-002

0.300	3.603e-002	3.637e-002	3.618e-002	3.554e-002
0.400	2.454e-002	2.441e-002	2.385e-002	2.534e-002
0.500	1.751e-002	1.729e-002	1.643e-002	1.879e-002
0.700	9.635e-003	9.501e-003	8.377e-003	1.103e-002
1.000	4.409e-003	4.394e-003	3.399e-003	5.433e-003
2.000	5.387e-004	5.584e-004	2.927e-004	7.650e-004
3.000	1.019e-004	1.082e-004	4.255e-005	1.551e-004

SPECTRAL PERIOD: 0.2
Column 1: Acceleration (g)
Column 2: Mean
Column 3: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
1.0e-004	7.063e-001	7.063e-001	7.063e-001	7.063e-001
1.0e-003	7.053e-001	7.063e-001	7.063e-001	7.034e-001
0.010	5.942e-001	6.229e-001	6.566e-001	5.032e-001
0.020	4.644e-001	4.878e-001	5.344e-001	3.710e-001
0.050	2.656e-001	2.800e-001	3.036e-001	2.132e-001
0.070	2.042e-001	2.157e-001	2.295e-001	1.673e-001
0.100	1.501e-001	1.588e-001	1.651e-001	1.265e-001
0.200	7.606e-002	7.953e-002	7.992e-002	6.873e-002
0.300	4.836e-002	4.964e-002	4.936e-002	4.607e-002
0.400	3.390e-002	3.427e-002	3.372e-002	3.370e-002
0.500	2.503e-002	2.505e-002	2.424e-002	2.578e-002
0.700	1.484e-002	1.475e-002	1.356e-002	1.621e-002
1.000	7.571e-003	7.562e-003	6.286e-003	8.863e-003
2.000	1.232e-003	1.257e-003	7.606e-004	1.679e-003
3.000	2.847e-004	2.911e-004	1.394e-004	4.236e-004

SPECTRAL PERIOD: 0.3
Column 1: Acceleration (g)
Column 2: Mean
Column 3: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
1.0e-004	7.063e-001	7.063e-001	7.063e-001	7.063e-001
1.0e-003	7.059e-001	7.063e-001	7.063e-001	7.049e-001
0.010	6.057e-001	6.405e-001	6.514e-001	5.251e-001
0.020	4.723e-001	5.101e-001	5.221e-001	3.845e-001
0.050	2.633e-001	2.879e-001	2.886e-001	2.134e-001

0.070	1.997e-001	2.182e-001	2.160e-001	1.649e-001
0.100	1.448e-001	1.577e-001	1.539e-001	1.228e-001
0.200	7.187e-002	7.710e-002	7.327e-002	6.524e-002
0.300	4.551e-002	4.802e-002	4.499e-002	4.353e-002
0.400	3.199e-002	3.332e-002	3.077e-002	3.189e-002
0.500	2.378e-002	2.457e-002	2.225e-002	2.451e-002
0.700	1.437e-002	1.478e-002	1.269e-002	1.563e-002
1.000	7.584e-003	7.862e-003	6.107e-003	8.783e-003
2.000	1.363e-003	1.466e-003	8.255e-004	1.799e-003
3.000	3.384e-004	3.728e-004	1.635e-004	4.787e-004

SPECTRAL PERIOD: 0.4
Column 1: Acceleration (g)
Column 2: Mean
Column 3: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
1.0e-004	7.063e-001	7.063e-001	7.063e-001	7.063e-001
1.0e-003	7.060e-001	7.063e-001	7.063e-001	7.053e-001
0.010	5.919e-001	6.182e-001	6.320e-001	5.255e-001
0.020	4.449e-001	4.711e-001	4.849e-001	3.786e-001
0.050	2.367e-001	2.518e-001	2.551e-001	2.031e-001
0.070	1.777e-001	1.887e-001	1.893e-001	1.549e-001
0.100	1.281e-001	1.360e-001	1.344e-001	1.141e-001
0.200	6.399e-002	6.778e-002	6.428e-002	5.992e-002
0.300	4.102e-002	4.316e-002	3.996e-002	3.994e-002
0.400	2.917e-002	3.050e-002	2.773e-002	2.929e-002
0.500	2.192e-002	2.284e-002	2.035e-002	2.256e-002
0.700	1.351e-002	1.408e-002	1.195e-002	1.448e-002
1.000	7.288e-003	7.683e-003	5.964e-003	8.215e-003
2.000	1.340e-003	1.492e-003	8.514e-004	1.676e-003
3.000	3.280e-004	3.844e-004	1.692e-004	4.305e-004

SPECTRAL PERIOD: 0.5
Column 1: Acceleration (g)
Column 2: Mean
Column 3: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
1.0e-004	7.063e-001	7.063e-001	7.063e-001	7.063e-001
1.0e-003	7.059e-001	7.063e-001	7.063e-001	7.052e-001

0.010	5.721e-001	5.973e-001	6.081e-001	5.108e-001
0.020	4.175e-001	4.421e-001	4.512e-001	3.591e-001
0.050	2.160e-001	2.296e-001	2.319e-001	1.864e-001
0.070	1.614e-001	1.715e-001	1.718e-001	1.409e-001
0.100	1.162e-001	1.236e-001	1.221e-001	1.030e-001
0.200	5.845e-002	6.227e-002	5.914e-002	5.394e-002
0.300	3.777e-002	4.001e-002	3.725e-002	3.606e-002
0.400	2.704e-002	2.845e-002	2.618e-002	2.651e-002
0.500	2.044e-002	2.138e-002	1.948e-002	2.047e-002
0.700	1.274e-002	1.323e-002	1.180e-002	1.320e-002
1.000	6.962e-003	7.239e-003	6.157e-003	7.492e-003
2.000	1.280e-003	1.420e-003	9.603e-004	1.459e-003
3.000	3.061e-004	3.721e-004	1.965e-004	3.497e-004

SPECTRAL PERIOD: 0.75
Column 1: Acceleration (g)
Column 2: Mean
Column 3: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
1.0e-004	7.063e-001	7.063e-001	7.063e-001	7.063e-001
1.0e-003	7.052e-001	7.060e-001	7.061e-001	7.035e-001
0.010	4.960e-001	5.196e-001	5.251e-001	4.434e-001
0.020	3.337e-001	3.531e-001	3.570e-001	2.910e-001
0.050	1.620e-001	1.720e-001	1.720e-001	1.421e-001
0.070	1.201e-001	1.278e-001	1.263e-001	1.062e-001
0.100	8.630e-002	9.234e-002	8.941e-002	7.715e-002
0.200	4.384e-002	4.714e-002	4.372e-002	4.065e-002
0.300	2.858e-002	3.051e-002	2.789e-002	2.735e-002
0.400	2.061e-002	2.175e-002	1.984e-002	2.022e-002
0.500	1.567e-002	1.636e-002	1.495e-002	1.570e-002
0.700	9.841e-003	1.009e-002	9.263e-003	1.017e-002
1.000	5.386e-003	5.471e-003	4.969e-003	5.719e-003
2.000	9.779e-004	1.062e-003	8.361e-004	1.035e-003
3.000	2.339e-004	2.831e-004	1.846e-004	2.340e-004

SPECTRAL PERIOD: 1
Column 1: Acceleration (g)
Column 2: Mean
Column 3: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
1.0e-004	7.063e-001	7.063e-001	7.063e-001	7.063e-001
1.0e-003	7.029e-001	7.044e-001	7.049e-001	6.994e-001
0.010	4.180e-001	4.345e-001	4.424e-001	3.771e-001
0.020	2.651e-001	2.769e-001	2.824e-001	2.362e-001
0.050	1.254e-001	1.322e-001	1.314e-001	1.127e-001
0.070	9.320e-002	9.896e-002	9.642e-002	8.420e-002
0.100	6.739e-002	7.208e-002	6.861e-002	6.147e-002
0.200	3.462e-002	3.681e-002	3.425e-002	3.282e-002
0.300	2.261e-002	2.347e-002	2.218e-002	2.220e-002
0.400	1.627e-002	1.641e-002	1.595e-002	1.645e-002
0.500	1.232e-002	1.207e-002	1.211e-002	1.278e-002
0.700	7.628e-003	7.087e-003	7.564e-003	8.232e-003
1.000	4.069e-003	3.560e-003	4.079e-003	4.568e-003
2.000	6.943e-004	5.570e-004	7.067e-004	8.190e-004
3.000	1.607e-004	1.271e-004	1.641e-004	1.909e-004

SPECTRAL PERIOD: 2
- Column 1: Acceleration (g)
- Column 2: Mean
- Column 3: Boore-Atkinson (2008) NGA USGS 2008 MRC
- Column 4: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
- Column 5: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
1.0e-004	7.063e-001	7.063e-001	7.063e-001	7.063e-001
1.0e-003	6.374e-001	6.513e-001	6.447e-001	6.162e-001
0.010	2.018e-001	2.186e-001	2.071e-001	1.798e-001
0.020	1.186e-001	1.297e-001	1.203e-001	1.058e-001
0.050	5.699e-002	6.292e-002	5.698e-002	5.107e-002
0.070	4.305e-002	4.728e-002	4.302e-002	3.885e-002
0.100	3.158e-002	3.415e-002	3.170e-002	2.888e-002
0.200	1.637e-002	1.661e-002	1.691e-002	1.560e-002
0.300	1.054e-002	1.006e-002	1.125e-002	1.032e-002
0.400	7.346e-003	6.648e-003	8.096e-003	7.294e-003
0.500	5.323e-003	4.607e-003	6.048e-003	5.314e-003
0.700	2.982e-003	2.408e-003	3.575e-003	2.964e-003
1.000	1.385e-003	1.041e-003	1.770e-003	1.344e-003
2.000	1.796e-004	1.199e-004	2.619e-004	1.569e-004
3.000	3.712e-005	2.354e-005	5.831e-005	2.951e-005

SPECTRAL PERIOD: 3
- Column 1: Acceleration (g)
- Column 2: Mean
- Column 3: Boore-Atkinson (2008) NGA USGS 2008 MRC

Column 4: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
1.0e-004	7.051e-001	7.056e-001	7.055e-001	7.043e-001
1.0e-003	5.028e-001	5.332e-001	5.018e-001	4.734e-001
0.010	1.218e-001	1.353e-001	1.200e-001	1.100e-001
0.020	7.364e-002	8.166e-002	7.320e-002	6.606e-002
0.050	3.664e-002	3.976e-002	3.719e-002	3.295e-002
0.070	2.779e-002	2.964e-002	2.854e-002	2.520e-002
0.100	2.041e-002	2.127e-002	2.125e-002	1.873e-002
0.200	1.041e-002	1.022e-002	1.127e-002	9.755e-003
0.300	6.393e-003	6.022e-003	7.176e-003	5.980e-003
0.400	4.193e-003	3.842e-003	4.860e-003	3.877e-003
0.500	2.855e-003	2.566e-003	3.399e-003	2.599e-003
0.700	1.428e-003	1.254e-003	1.771e-003	1.258e-003
1.000	5.773e-004	4.999e-004	7.459e-004	4.859e-004
2.000	5.589e-005	4.866e-005	7.673e-005	4.229e-005
3.000	9.708e-006	8.670e-006	1.358e-005	6.877e-006

SPECTRAL PERIOD: 4
Column 1: Acceleration (g)
Column 2: Mean
Column 3: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
1.0e-004	6.974e-001	7.019e-001	6.983e-001	6.921e-001
1.0e-003	3.850e-001	4.230e-001	3.755e-001	3.566e-001
0.010	8.818e-002	9.680e-002	8.891e-002	7.883e-002
0.020	5.496e-002	6.009e-002	5.659e-002	4.820e-002
0.050	2.761e-002	2.926e-002	2.936e-002	2.421e-002
0.070	2.087e-002	2.167e-002	2.249e-002	1.843e-002
0.100	1.519e-002	1.539e-002	1.666e-002	1.352e-002
0.200	7.320e-003	6.996e-003	8.489e-003	6.476e-003
0.300	4.174e-003	3.847e-003	5.077e-003	3.597e-003
0.400	2.550e-003	2.295e-003	3.219e-003	2.137e-003
0.500	1.630e-003	1.443e-003	2.116e-003	1.331e-003
0.700	7.337e-004	6.368e-004	9.903e-004	5.739e-004
1.000	2.630e-004	2.252e-004	3.671e-004	1.966e-004
2.000	1.987e-005	1.706e-005	2.869e-005	1.386e-005
3.000	2.975e-006	2.609e-006	4.281e-006	2.036e-006

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

1	2	3	4	5
PGA	1.303e+000	1.237e+000	1.173e+000	1.468e+000
0.03	1.391e+000	1.336e+000	1.224e+000	1.576e+000
0.05	1.549e+000	1.470e+000	1.368e+000	1.768e+000
0.1	2.145e+000	2.166e+000	1.826e+000	2.352e+000
0.2	2.723e+000	2.739e+000	2.326e+000	* 3.042e+000
0.3	2.849e+000	2.929e+000	2.392e+000	* 3.160e+000
0.4	2.825e+000	2.956e+000	2.411e+000	* 3.057e+000
0.5	2.773e+000	2.926e+000	2.495e+000	2.879e+000
0.75	2.569e+000	2.690e+000	2.431e+000	2.585e+000
1	2.324e+000	2.184e+000	2.336e+000	2.435e+000
2	1.519e+000	1.355e+000	1.709e+000	1.474e+000
3	1.112e+000	1.065e+000	1.205e+000	1.054e+000
4	8.613e-001	8.183e-001	9.661e-001	7.867e-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	9.905e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.03	1.062e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.05	1.169e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.1	1.531e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.2	1.981e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	2.112e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	2.163e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	2.145e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.75	2.009e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
1	1.860e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
2	1.359e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
3	1.068e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
4	8.350e-001	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas

Fractile: Mean

Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
PGA	6.535e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.03	7.005e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.05	7.712e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded

0.1	1.009e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.2	1.307e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	1.391e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	1.433e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	1.425e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.75	1.327e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
1	1.220e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
2	8.741e-001	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
3	6.848e-001	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
4	5.339e-001	8.20 Mw	3.77	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	1.052e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.03	1.163e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.05	1.304e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.1	1.831e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.2	2.357e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	2.564e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	2.649e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	2.622e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.75	2.319e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
1	1.848e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded

2	1.145e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
3	1.083e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
4	8.593e-001	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas

Fractile: Mean

Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
PGA	6.938e-001	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.03	7.675e-001	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.05	8.606e-001	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.1	1.203e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.2	1.555e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	1.685e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	1.745e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	1.718e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.75	1.504e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
1	1.197e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
2	7.295e-001	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
3	6.911e-001	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
4	5.476e-001	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas

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	8.404e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.03	8.698e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.05	9.546e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.1	1.202e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.2	1.541e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	1.652e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	1.743e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	1.839e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
0.75	1.994e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
1	2.047e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
2	1.731e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
3	1.283e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
4	1.025e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas

Fractile: Mean

Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
PGA	5.545e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.03	5.739e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.05	6.298e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.1	7.930e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.2	1.017e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	1.090e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	1.159e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	1.233e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
0.75	1.326e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
1	1.348e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
2	1.119e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
3	8.285e-001	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas

4	6.618e-001	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas

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	1.131e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.03	1.209e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.05	1.317e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.1	1.670e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.2	2.122e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.3	2.231e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.4	2.263e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
0.5	2.224e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
0.75	2.057e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
1	1.940e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
2	1.205e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
3	8.391e-001	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
4	6.207e-001	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas

Fractile: Mean

Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
PGA	7.464e-001	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.03	7.974e-001	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.05	8.693e-001	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded

0.1	1.102e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.2	1.400e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.3	1.472e+000	7.60 Mw	5.00	USGS 2008 California	San Gorgornio Shear Gridded
0.4	1.506e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
0.5	1.491e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
0.75	1.375e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
1	1.280e+000	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
2	7.770e-001	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
3	5.347e-001	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas
4	3.923e-001	8.20 Mw	3.77	USGS 2008 California	Southern San Andreas

Largest Amplitudes of Ground Motions for Each Source

Source: Burnt Mtn
Region: USGS 2008 California
Closest Distance: 73.58 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.241e-001	1.661e-001	1.122e-001	9.397e-002

0.03	1.267e-001	1.660e-001	1.164e-001	9.758e-002
0.05	1.385e-001	1.740e-001	1.309e-001	1.105e-001
0.1	1.931e-001	2.336e-001	1.828e-001	1.629e-001
0.2	2.786e-001	3.574e-001	2.554e-001	2.230e-001
0.3	2.843e-001	3.656e-001	2.671e-001	2.202e-001
0.4	2.731e-001	3.606e-001	2.497e-001	2.090e-001
0.5	2.607e-001	3.464e-001	2.407e-001	1.950e-001
0.75	2.095e-001	2.763e-001	1.947e-001	1.575e-001
1	1.725e-001	2.261e-001	1.582e-001	1.330e-001
2	8.640e-002	1.153e-001	7.756e-002	6.633e-002
3	5.278e-002	6.733e-002	4.958e-002	4.143e-002
4	3.896e-002	5.076e-002	3.722e-002	2.891e-002

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

1	2	3	4	5
PGA	8.186e-002	1.096e-001	7.400e-002	6.200e-002
0.03	8.357e-002	1.095e-001	7.679e-002	6.439e-002
0.05	9.137e-002	1.148e-001	8.639e-002	7.289e-002
0.1	1.272e-001	1.535e-001	1.206e-001	1.075e-001
0.2	1.838e-001	2.358e-001	1.685e-001	1.471e-001
0.3	1.873e-001	2.403e-001	1.762e-001	1.453e-001
0.4	1.804e-001	2.374e-001	1.661e-001	1.379e-001
0.5	1.717e-001	2.270e-001	1.599e-001	1.282e-001

0.75	1.367e-001	1.792e-001	1.280e-001	1.028e-001
1	1.121e-001	1.465e-001	1.035e-001	8.631e-002
2	5.537e-002	7.344e-002	5.013e-002	4.254e-002
3	3.378e-002	4.295e-002	3.203e-002	2.636e-002
4	2.488e-002	3.235e-002	2.403e-002	1.826e-002

Source: Calico-Hidalgo
Region: USGS 2008 California
Closest Distance: 89.65 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.385e-001	1.713e-001	1.212e-001	1.229e-001
0.03	1.424e-001	1.750e-001	1.250e-001	1.271e-001
0.05	1.549e-001	1.843e-001	1.385e-001	1.420e-001
0.1	2.072e-001	2.325e-001	1.825e-001	2.065e-001
0.2	2.853e-001	3.038e-001	2.619e-001	2.904e-001
0.3	3.011e-001	3.206e-001	2.877e-001	2.950e-001
0.4	2.941e-001	3.260e-001	2.751e-001	2.813e-001
0.5	2.926e-001	3.279e-001	2.820e-001	2.679e-001

0.75	2.586e-001	2.952e-001	2.553e-001	2.255e-001
1	2.251e-001	2.552e-001	2.234e-001	1.968e-001
2	1.287e-001	1.495e-001	1.298e-001	1.067e-001
3	8.715e-002	1.036e-001	8.780e-002	7.006e-002
4	6.501e-002	7.663e-002	6.787e-002	5.052e-002

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

1	2	3	4	5
PGA	9.138e-002	1.131e-001	7.999e-002	8.111e-002
0.03	9.393e-002	1.154e-001	8.250e-002	8.384e-002
0.05	1.022e-001	1.216e-001	9.139e-002	9.370e-002
0.1	1.365e-001	1.528e-001	1.204e-001	1.363e-001
0.2	1.883e-001	2.004e-001	1.728e-001	1.916e-001
0.3	1.984e-001	2.107e-001	1.898e-001	1.946e-001
0.4	1.949e-001	2.147e-001	1.830e-001	1.869e-001
0.5	1.932e-001	2.149e-001	1.874e-001	1.773e-001
0.75	1.690e-001	1.914e-001	1.679e-001	1.478e-001
1	1.466e-001	1.653e-001	1.462e-001	1.281e-001
2	8.255e-002	9.522e-002	8.392e-002	6.852e-002
3	5.580e-002	6.607e-002	5.672e-002	4.460e-002
4	4.153e-002	4.884e-002	4.382e-002	3.193e-002

Source: California Gridded
Region: USGS 2008 California
Closest Distance: 5.00 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	9.905e-001	1.037e+000	8.404e-001	1.099e+000
0.03	1.062e+000	1.145e+000	8.698e-001	1.173e+000
0.05	1.169e+000	1.283e+000	9.546e-001	1.281e+000
0.1	1.531e+000	1.780e+000	1.202e+000	1.626e+000
0.2	1.981e+000	2.357e+000	1.541e+000	2.046e+000
0.3	2.112e+000	2.564e+000	1.652e+000	2.121e+000
0.4	2.163e+000	2.649e+000	1.743e+000	2.097e+000
0.5	2.145e+000	2.622e+000	1.802e+000	2.010e+000
0.75	1.889e+000	2.293e+000	1.616e+000	1.759e+000
1	1.579e+000	1.767e+000	1.408e+000	1.561e+000
2	7.887e-001	9.069e-001	7.428e-001	7.788e-001
3	5.030e-001	5.658e-001	4.546e-001	4.887e-001
4	3.644e-001	4.096e-001	3.454e-001	3.383e-001

Fractile: Mean

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

1	2	3	4	5
PGA	6.535e-001	6.842e-001	5.545e-001	7.250e-001
0.03	7.005e-001	7.553e-001	5.739e-001	7.743e-001
0.05	7.712e-001	8.467e-001	6.298e-001	8.450e-001
0.1	1.009e+000	1.170e+000	7.930e-001	1.073e+000
0.2	1.307e+000	1.555e+000	1.017e+000	1.350e+000
0.3	1.391e+000	1.685e+000	1.090e+000	1.399e+000
0.4	1.433e+000	1.745e+000	1.159e+000	1.395e+000
0.5	1.425e+000	1.718e+000	1.208e+000	1.347e+000
0.75	1.246e+000	1.486e+000	1.075e+000	1.175e+000
1	1.034e+000	1.145e+000	9.280e-001	1.029e+000
2	5.064e-001	5.777e-001	4.801e-001	5.019e-001
3	3.220e-001	3.609e-001	2.937e-001	3.114e-001
4	2.326e-001	2.610e-001	2.230e-001	2.138e-001

Source: Chino
Region: USGS 2008 California
Closest Distance: 43.13 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.008e-001	2.607e-001	1.772e-001	1.645e-001
0.03	2.075e-001	2.643e-001	1.854e-001	1.728e-001
0.05	2.298e-001	2.793e-001	2.116e-001	1.985e-001
0.1	3.281e-001	3.812e-001	3.094e-001	2.938e-001
0.2	4.511e-001	5.548e-001	4.159e-001	3.827e-001
0.3	4.435e-001	5.490e-001	4.146e-001	3.669e-001
0.4	4.201e-001	5.372e-001	3.860e-001	3.370e-001
0.5	3.969e-001	5.109e-001	3.681e-001	3.115e-001
0.75	3.154e-001	4.026e-001	2.949e-001	2.486e-001
1	2.583e-001	3.253e-001	2.410e-001	2.085e-001
2	1.288e-001	1.635e-001	1.201e-001	1.030e-001
3	7.902e-002	9.523e-002	7.730e-002	6.453e-002
4	5.819e-002	7.128e-002	5.823e-002	4.508e-002

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

1	2	3	4	5

PGA	1.325e-001	1.720e-001	1.169e-001	1.085e-001
0.03	1.369e-001	1.744e-001	1.223e-001	1.140e-001
0.05	1.516e-001	1.843e-001	1.396e-001	1.310e-001
0.1	2.162e-001	2.505e-001	2.041e-001	1.938e-001
0.2	2.976e-001	3.661e-001	2.744e-001	2.525e-001
0.3	2.921e-001	3.608e-001	2.736e-001	2.421e-001
0.4	2.780e-001	3.537e-001	2.567e-001	2.236e-001
0.5	2.619e-001	3.349e-001	2.451e-001	2.058e-001
0.75	2.060e-001	2.610e-001	1.942e-001	1.628e-001
1	1.680e-001	2.107e-001	1.578e-001	1.356e-001
2	8.261e-002	1.041e-001	7.761e-002	6.610e-002
3	5.058e-002	6.074e-002	4.994e-002	4.105e-002
4	3.716e-002	4.542e-002	3.760e-002	2.847e-002

Source: Clamshell-Sawpit
Region: USGS 2008 California
  Closest Distance: 54.79 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
  Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
  Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5

PGA	1.578e-001	2.048e-001	1.391e-001	1.297e-001
0.03	1.624e-001	2.067e-001	1.451e-001	1.356e-001
0.05	1.790e-001	2.171e-001	1.650e-001	1.549e-001
0.1	2.548e-001	2.973e-001	2.381e-001	2.290e-001
0.2	3.621e-001	4.580e-001	3.248e-001	3.034e-001
0.3	3.677e-001	4.811e-001	3.287e-001	2.933e-001
0.4	3.448e-001	4.553e-001	3.053e-001	2.738e-001
0.5	3.261e-001	4.356e-001	2.897e-001	2.530e-001
0.75	2.588e-001	3.472e-001	2.287e-001	2.005e-001
1	2.056e-001	2.678e-001	1.841e-001	1.650e-001
2	9.076e-002	1.132e-001	8.850e-002	7.060e-002
3	5.361e-002	6.209e-002	5.642e-002	4.233e-002
4	3.838e-002	4.361e-002	4.231e-002	2.921e-002

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

1	2	3	4	5
PGA	1.041e-001	1.351e-001	9.177e-002	8.556e-002
0.03	1.072e-001	1.364e-001	9.574e-002	8.944e-002
0.05	1.181e-001	1.433e-001	1.089e-001	1.022e-001
0.1	1.679e-001	1.954e-001	1.571e-001	1.511e-001
0.2	2.389e-001	3.022e-001	2.143e-001	2.002e-001
0.3	2.422e-001	3.162e-001	2.169e-001	1.935e-001
0.4	2.279e-001	2.998e-001	2.030e-001	1.808e-001

0.5	2.149e-001	2.855e-001	1.926e-001	1.665e-001
0.75	1.688e-001	2.251e-001	1.505e-001	1.309e-001
1	1.337e-001	1.735e-001	1.205e-001	1.071e-001
2	5.818e-002	7.209e-002	5.720e-002	4.526e-002
3	3.432e-002	3.960e-002	3.645e-002	2.691e-002
4	2.452e-002	2.779e-002	2.732e-002	1.844e-002

Source: Cleghorn
Region: USGS 2008 California
Closest Distance: 16.01 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	4.136e-001	4.407e-001	3.851e-001	4.151e-001
0.03	4.357e-001	4.598e-001	4.055e-001	4.418e-001
0.05	4.881e-001	4.938e-001	4.661e-001	5.044e-001
0.1	7.043e-001	6.948e-001	7.003e-001	7.177e-001
0.2	9.252e-001	9.682e-001	8.967e-001	9.106e-001
0.3	8.992e-001	9.547e-001	8.581e-001	8.848e-001
0.4	8.638e-001	9.556e-001	8.130e-001	8.227e-001

0.5	8.125e-001	9.162e-001	7.683e-001	7.530e-001
0.75	6.593e-001	7.343e-001	6.195e-001	6.240e-001
1	5.473e-001	5.919e-001	5.160e-001	5.340e-001
2	2.803e-001	2.989e-001	2.694e-001	2.725e-001
3	1.741e-001	1.747e-001	1.747e-001	1.729e-001
4	1.273e-001	1.290e-001	1.316e-001	1.213e-001

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

1	2	3	4	5
PGA	2.729e-001	2.908e-001	2.541e-001	2.739e-001
0.03	2.875e-001	3.034e-001	2.676e-001	2.915e-001
0.05	3.221e-001	3.258e-001	3.075e-001	3.328e-001
0.1	4.641e-001	4.566e-001	4.621e-001	4.735e-001
0.2	6.104e-001	6.388e-001	5.916e-001	6.008e-001
0.3	5.925e-001	6.274e-001	5.662e-001	5.838e-001
0.4	5.724e-001	6.292e-001	5.408e-001	5.472e-001
0.5	5.398e-001	6.005e-001	5.150e-001	5.040e-001
0.75	4.325e-001	4.761e-001	4.094e-001	4.120e-001
1	3.571e-001	3.835e-001	3.386e-001	3.493e-001
2	1.799e-001	1.904e-001	1.741e-001	1.752e-001
3	1.114e-001	1.114e-001	1.128e-001	1.101e-001
4	8.125e-002	8.221e-002	8.496e-002	7.658e-002

Source: Cucamonga
Region: USGS 2008 California
Closest Distance: 17.15 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	3.933e-001	4.103e-001	3.614e-001	4.081e-001
0.03	4.146e-001	4.289e-001	3.807e-001	4.341e-001
0.05	4.644e-001	4.593e-001	4.385e-001	4.954e-001
0.1	6.732e-001	6.504e-001	6.643e-001	7.048e-001
0.2	8.925e-001	9.339e-001	8.509e-001	8.927e-001
0.3	8.793e-001	9.631e-001	8.103e-001	8.644e-001
0.4	8.321e-001	9.322e-001	7.631e-001	8.011e-001
0.5	7.821e-001	8.975e-001	7.142e-001	7.345e-001
0.75	6.306e-001	7.259e-001	5.645e-001	6.014e-001
1	5.082e-001	5.576e-001	4.634e-001	5.037e-001
2	2.303e-001	2.353e-001	2.340e-001	2.217e-001
3	1.379e-001	1.291e-001	1.503e-001	1.342e-001
4	9.813e-002	8.886e-002	1.127e-001	9.287e-002

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

1	2	3	4	5
PGA	2.595e-001	2.707e-001	2.384e-001	2.693e-001
0.03	2.735e-001	2.830e-001	2.512e-001	2.864e-001
0.05	3.064e-001	3.030e-001	2.893e-001	3.269e-001
0.1	4.436e-001	4.274e-001	4.383e-001	4.650e-001
0.2	5.889e-001	6.162e-001	5.615e-001	5.890e-001
0.3	5.793e-001	6.329e-001	5.347e-001	5.703e-001
0.4	5.514e-001	6.138e-001	5.075e-001	5.328e-001
0.5	5.190e-001	5.883e-001	4.783e-001	4.905e-001
0.75	4.133e-001	4.706e-001	3.729e-001	3.965e-001
1	3.315e-001	3.613e-001	3.041e-001	3.291e-001
2	1.478e-001	1.499e-001	1.512e-001	1.424e-001
3	8.826e-002	8.233e-002	9.707e-002	8.540e-002
4	6.267e-002	5.663e-002	7.275e-002	5.864e-002

Source: Elsinore
Region: USGS 2008 California
Closest Distance: 43.42 km
Amplitude Units: Acceleration (g)
Magnitude: 7.85 Mw

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

1	2	3	4	5
PGA	3.142e-001	3.784e-001	2.445e-001	3.198e-001
0.03	3.313e-001	4.022e-001	2.542e-001	3.374e-001
0.05	3.658e-001	4.301e-001	2.846e-001	3.826e-001
0.1	4.929e-001	5.412e-001	3.879e-001	5.494e-001
0.2	6.157e-001	5.917e-001	5.328e-001	7.226e-001
0.3	6.280e-001	6.076e-001	5.616e-001	7.148e-001
0.4	6.086e-001	6.092e-001	5.436e-001	6.728e-001
0.5	6.030e-001	6.143e-001	5.733e-001	6.215e-001
0.75	5.564e-001	5.852e-001	5.567e-001	5.273e-001
1	4.951e-001	5.017e-001	5.202e-001	4.635e-001
2	3.082e-001	3.172e-001	3.508e-001	2.566e-001
3	2.236e-001	2.529e-001	2.468e-001	1.711e-001
4	1.688e-001	1.875e-001	1.942e-001	1.246e-001

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

1	2	3	4	5
PGA	2.073e-001	2.496e-001	1.614e-001	2.110e-001
0.03	2.186e-001	2.654e-001	1.677e-001	2.226e-001
0.05	2.413e-001	2.838e-001	1.878e-001	2.524e-001
0.1	3.247e-001	3.557e-001	2.560e-001	3.625e-001
0.2	4.062e-001	3.904e-001	3.516e-001	4.768e-001
0.3	4.138e-001	3.993e-001	3.706e-001	4.716e-001
0.4	4.034e-001	4.012e-001	3.616e-001	4.475e-001
0.5	4.004e-001	4.026e-001	3.825e-001	4.161e-001
0.75	3.649e-001	3.794e-001	3.670e-001	3.485e-001
1	3.231e-001	3.250e-001	3.409e-001	3.035e-001
2	1.979e-001	2.020e-001	2.267e-001	1.651e-001
3	1.432e-001	1.613e-001	1.595e-001	1.090e-001
4	1.079e-001	1.195e-001	1.254e-001	7.876e-002

Source: Elysian Park (Upper)
Region: USGS 2008 California
  Closest Distance: 77.23 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
  Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
  Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.255e-001	1.427e-001	1.324e-001	1.016e-001
0.03	1.284e-001	1.429e-001	1.369e-001	1.052e-001
0.05	1.402e-001	1.493e-001	1.531e-001	1.182e-001
0.1	1.959e-001	2.022e-001	2.131e-001	1.724e-001
0.2	2.868e-001	3.240e-001	2.999e-001	2.364e-001
0.3	3.005e-001	3.516e-001	3.157e-001	2.342e-001
0.4	2.851e-001	3.363e-001	2.955e-001	2.233e-001
0.5	2.720e-001	3.254e-001	2.827e-001	2.079e-001
0.75	2.184e-001	2.636e-001	2.260e-001	1.656e-001
1	1.729e-001	2.054e-001	1.773e-001	1.362e-001
2	7.249e-002	8.811e-002	7.245e-002	5.690e-002
3	4.124e-002	4.851e-002	4.203e-002	3.319e-002
4	2.944e-002	3.429e-002	3.152e-002	2.250e-002

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

1	2	3	4	5
PGA	8.284e-002	9.415e-002	8.735e-002	6.702e-002
0.03	8.469e-002	9.431e-002	9.036e-002	6.940e-002
0.05	9.249e-002	9.848e-002	1.010e-001	7.798e-002
0.1	1.291e-001	1.329e-001	1.406e-001	1.138e-001
0.2	1.892e-001	2.138e-001	1.979e-001	1.560e-001
0.3	1.980e-001	2.310e-001	2.083e-001	1.545e-001

0.4	1.884e-001	2.215e-001	1.966e-001	1.471e-001
0.5	1.792e-001	2.133e-001	1.879e-001	1.365e-001
0.75	1.425e-001	1.709e-001	1.487e-001	1.080e-001
1	1.125e-001	1.331e-001	1.160e-001	8.827e-002
2	4.647e-002	5.612e-002	4.683e-002	3.647e-002
3	2.640e-002	3.094e-002	2.715e-002	2.110e-002
4	1.880e-002	2.186e-002	2.035e-002	1.420e-002

Source: Eureka Peak
Region: USGS 2008 California
Closest Distance: 80.12 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.040e-001	1.369e-001	9.849e-002	7.643e-002
0.03	1.060e-001	1.368e-001	1.021e-001	7.902e-002
0.05	1.158e-001	1.437e-001	1.147e-001	8.898e-002
0.1	1.616e-001	1.941e-001	1.599e-001	1.308e-001
0.2	2.364e-001	3.030e-001	2.245e-001	1.816e-001
0.3	2.436e-001	3.135e-001	2.356e-001	1.818e-001

0.4	2.336e-001	3.066e-001	2.196e-001	1.745e-001
0.5	2.225e-001	2.943e-001	2.101e-001	1.631e-001
0.75	1.776e-001	2.339e-001	1.673e-001	1.318e-001
1	1.454e-001	1.910e-001	1.341e-001	1.111e-001
2	7.189e-002	9.664e-002	6.396e-002	5.508e-002
3	4.367e-002	5.595e-002	4.072e-002	3.433e-002
4	3.202e-002	4.167e-002	3.054e-002	2.386e-002

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

1	2	3	4	5
PGA	6.859e-002	9.036e-002	6.499e-002	5.043e-002
0.03	6.992e-002	9.026e-002	6.736e-002	5.214e-002
0.05	7.641e-002	9.483e-002	7.570e-002	5.871e-002
0.1	1.065e-001	1.276e-001	1.055e-001	8.632e-002
0.2	1.560e-001	2.000e-001	1.481e-001	1.198e-001
0.3	1.604e-001	2.060e-001	1.554e-001	1.197e-001
0.4	1.542e-001	2.019e-001	1.461e-001	1.147e-001
0.5	1.464e-001	1.929e-001	1.395e-001	1.068e-001
0.75	1.158e-001	1.516e-001	1.100e-001	8.578e-002
1	9.449e-002	1.237e-001	8.776e-002	7.195e-002
2	4.606e-002	6.155e-002	4.134e-002	3.530e-002
3	2.794e-002	3.569e-002	2.631e-002	2.183e-002
4	2.045e-002	2.656e-002	1.972e-002	1.507e-002

Source: Gravel Hills-Harper Lk
Region: USGS 2008 California
Closest Distance: 88.39 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.182e-001	1.500e-001	1.075e-001	9.707e-002
0.03	1.208e-001	1.513e-001	1.110e-001	1.002e-001
0.05	1.315e-001	1.587e-001	1.236e-001	1.122e-001
0.1	1.787e-001	2.059e-001	1.663e-001	1.639e-001
0.2	2.541e-001	2.949e-001	2.370e-001	2.303e-001
0.3	2.663e-001	3.101e-001	2.561e-001	2.328e-001
0.4	2.589e-001	3.121e-001	2.424e-001	2.224e-001
0.5	2.534e-001	3.081e-001	2.414e-001	2.106e-001
0.75	2.150e-001	2.629e-001	2.069e-001	1.750e-001
1	1.825e-001	2.220e-001	1.744e-001	1.511e-001
2	9.819e-002	1.220e-001	9.302e-002	7.951e-002
3	6.344e-002	7.772e-002	6.129e-002	5.129e-002
4	4.715e-002	5.814e-002	4.677e-002	3.653e-002

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

1	2	3	4	5
PGA	7.798e-002	9.899e-002	7.090e-002	6.405e-002
0.03	7.973e-002	9.982e-002	7.324e-002	6.613e-002
0.05	8.677e-002	1.047e-001	8.155e-002	7.405e-002
0.1	1.177e-001	1.353e-001	1.097e-001	1.081e-001
0.2	1.676e-001	1.946e-001	1.564e-001	1.519e-001
0.3	1.755e-001	2.038e-001	1.690e-001	1.536e-001
0.4	1.714e-001	2.055e-001	1.612e-001	1.474e-001
0.5	1.671e-001	2.020e-001	1.603e-001	1.390e-001
0.75	1.404e-001	1.704e-001	1.361e-001	1.146e-001
1	1.187e-001	1.438e-001	1.141e-001	9.825e-002
2	6.297e-002	7.773e-002	6.012e-002	5.105e-002
3	4.061e-002	4.958e-002	3.960e-002	3.265e-002
4	3.011e-002	3.706e-002	3.020e-002	2.309e-002

Source: Helendale-So Lockhart
Region: USGS 2008 California
Closest Distance: 45.32 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.507e-001	3.105e-001	2.060e-001	2.356e-001
0.03	2.618e-001	3.229e-001	2.147e-001	2.479e-001
0.05	2.894e-001	3.433e-001	2.423e-001	2.827e-001
0.1	3.992e-001	4.460e-001	3.394e-001	4.124e-001
0.2	5.189e-001	5.521e-001	4.631e-001	5.415e-001
0.3	5.217e-001	5.587e-001	4.779e-001	5.286e-001
0.4	5.002e-001	5.547e-001	4.547e-001	4.911e-001
0.5	4.864e-001	5.459e-001	4.596e-001	4.538e-001
0.75	4.221e-001	4.797e-001	4.110e-001	3.757e-001
1	3.629e-001	4.018e-001	3.623e-001	3.246e-001
2	2.058e-001	2.303e-001	2.143e-001	1.729e-001
3	1.396e-001	1.604e-001	1.453e-001	1.131e-001
4	1.044e-001	1.193e-001	1.123e-001	8.139e-002

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

1	2	3	4	5
PGA	1.654e-001	2.049e-001	1.359e-001	1.554e-001
0.03	1.728e-001	2.130e-001	1.417e-001	1.636e-001
0.05	1.910e-001	2.265e-001	1.599e-001	1.866e-001
0.1	2.630e-001	2.931e-001	2.239e-001	2.721e-001
0.2	3.424e-001	3.643e-001	3.055e-001	3.573e-001
0.3	3.437e-001	3.671e-001	3.153e-001	3.488e-001
0.4	3.314e-001	3.652e-001	3.024e-001	3.267e-001
0.5	3.221e-001	3.578e-001	3.062e-001	3.023e-001
0.75	2.764e-001	3.110e-001	2.707e-001	2.475e-001
1	2.366e-001	2.603e-001	2.373e-001	2.120e-001
2	1.321e-001	1.467e-001	1.385e-001	1.111e-001
3	8.940e-002	1.023e-001	9.389e-002	7.200e-002
4	6.667e-002	7.605e-002	7.253e-002	5.143e-002

Source: Hollywood
Region: USGS 2008 California
  Closest Distance: 88.85 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
  Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
  Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	9.202e-002	1.193e-001	8.953e-002	6.727e-002
0.03	9.363e-002	1.190e-001	9.262e-002	6.929e-002
0.05	1.020e-001	1.247e-001	1.037e-001	7.755e-002
0.1	1.415e-001	1.679e-001	1.430e-001	1.135e-001
0.2	2.097e-001	2.661e-001	2.025e-001	1.606e-001
0.3	2.190e-001	2.794e-001	2.148e-001	1.630e-001
0.4	2.111e-001	2.750e-001	2.005e-001	1.577e-001
0.5	2.020e-001	2.656e-001	1.923e-001	1.482e-001
0.75	1.623e-001	2.129e-001	1.535e-001	1.206e-001
1	1.333e-001	1.747e-001	1.230e-001	1.022e-001
2	6.619e-002	8.903e-002	5.854e-002	5.101e-002
3	4.025e-002	5.164e-002	3.726e-002	3.186e-002
4	2.955e-002	3.854e-002	2.795e-002	2.216e-002

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

1	2	3	4	5
PGA	6.072e-002	7.870e-002	5.907e-002	4.438e-002
0.03	6.178e-002	7.850e-002	6.111e-002	4.572e-002
0.05	6.730e-002	8.231e-002	6.843e-002	5.117e-002
0.1	9.321e-002	1.103e-001	9.437e-002	7.491e-002
0.2	1.384e-001	1.756e-001	1.336e-001	1.059e-001

0.3	1.442e-001	1.836e-001	1.417e-001	1.072e-001
0.4	1.393e-001	1.811e-001	1.334e-001	1.035e-001
0.5	1.329e-001	1.741e-001	1.276e-001	9.701e-002
0.75	1.058e-001	1.380e-001	1.009e-001	7.850e-002
1	8.660e-002	1.132e-001	8.046e-002	6.614e-002
2	4.241e-002	5.671e-002	3.783e-002	3.269e-002
3	2.576e-002	3.294e-002	2.407e-002	2.026e-002
4	1.887e-002	2.456e-002	1.804e-002	1.399e-002

Source: Imp Extensional Gridded, Char, Normal
Region: USGS 2008 California
  Closest Distance: 5.00 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
  Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
  Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	7.760e-001	8.575e-001	6.404e-001	8.301e-001
0.03	8.344e-001	9.421e-001	6.740e-001	8.870e-001
0.05	9.402e-001	1.073e+000	7.635e-001	9.846e-001
0.1	1.287e+000	1.542e+000	1.014e+000	1.304e+000
0.2	1.703e+000	2.043e+000	1.407e+000	1.658e+000

0.3	1.750e+000	2.073e+000	1.472e+000	1.705e+000
0.4	1.783e+000	2.166e+000	1.505e+000	1.679e+000
0.5	1.747e+000	2.111e+000	1.520e+000	1.610e+000
0.75	1.451e+000	1.600e+000	1.326e+000	1.428e+000
1	1.225e+000	1.222e+000	1.160e+000	1.293e+000
2	6.632e-001	6.066e-001	6.821e-001	7.008e-001
3	4.174e-001	3.567e-001	4.546e-001	4.410e-001
4	3.078e-001	2.726e-001	3.454e-001	3.055e-001

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

1	2	3	4	5
PGA	5.120e-001	5.658e-001	4.226e-001	5.477e-001
0.03	5.505e-001	6.216e-001	4.447e-001	5.853e-001
0.05	6.204e-001	7.077e-001	5.038e-001	6.496e-001
0.1	8.476e-001	1.013e+000	6.691e-001	8.603e-001
0.2	1.123e+000	1.348e+000	9.281e-001	1.094e+000
0.3	1.153e+000	1.362e+000	9.713e-001	1.125e+000
0.4	1.181e+000	1.426e+000	1.001e+000	1.117e+000
0.5	1.160e+000	1.383e+000	1.019e+000	1.079e+000
0.75	9.564e-001	1.037e+000	8.797e-001	9.525e-001
1	8.023e-001	7.914e-001	7.634e-001	8.520e-001
2	4.263e-001	3.864e-001	4.408e-001	4.516e-001
3	2.674e-001	2.275e-001	2.937e-001	2.809e-001

4	1.966e-001	1.737e-001	2.230e-001	1.931e-001

Source: Imp Extensional Gridded, Char, Strike Slip
Region: USGS 2008 California
  Closest Distance: 5.00 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
  Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
  Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	9.164e-001	1.037e+000	6.964e-001	1.016e+000
0.03	9.864e-001	1.145e+000	7.293e-001	1.085e+000
0.05	1.097e+000	1.283e+000	8.186e-001	1.190e+000
0.1	1.455e+000	1.780e+000	1.055e+000	1.529e+000
0.2	1.858e+000	2.301e+000	1.346e+000	1.927e+000
0.3	1.923e+000	2.376e+000	1.406e+000	1.988e+000
0.4	1.970e+000	2.505e+000	1.450e+000	1.955e+000
0.5	1.932e+000	2.455e+000	1.474e+000	1.867e+000
0.75	1.676e+000	2.101e+000	1.296e+000	1.630e+000
1	1.432e+000	1.695e+000	1.141e+000	1.461e+000
2	7.887e-001	9.069e-001	6.804e-001	7.788e-001
3	5.030e-001	5.658e-001	4.546e-001	4.887e-001

4	3.644e-001	4.096e-001	3.454e-001	3.383e-001

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

1	2	3	4	5
PGA	6.047e-001	6.842e-001	4.595e-001	6.703e-001
0.03	6.509e-001	7.553e-001	4.812e-001	7.160e-001
0.05	7.240e-001	8.467e-001	5.401e-001	7.852e-001
0.1	9.582e-001	1.170e+000	6.960e-001	1.009e+000
0.2	1.226e+000	1.519e+000	8.879e-001	1.272e+000
0.3	1.267e+000	1.562e+000	9.277e-001	1.311e+000
0.4	1.305e+000	1.650e+000	9.646e-001	1.301e+000
0.5	1.283e+000	1.609e+000	9.884e-001	1.252e+000
0.75	1.104e+000	1.362e+000	8.606e-001	1.088e+000
1	9.373e-001	1.098e+000	7.509e-001	9.630e-001
2	5.064e-001	5.777e-001	4.398e-001	5.019e-001
3	3.220e-001	3.609e-001	2.937e-001	3.114e-001
4	2.326e-001	2.610e-001	2.230e-001	2.138e-001

Source: Imp Extensional Gridded, GR, Normal
Region: USGS 2008 California
Closest Distance: 5.02 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	7.707e-001	8.436e-001	6.396e-001	8.289e-001
0.03	8.282e-001	9.258e-001	6.731e-001	8.857e-001
0.05	9.330e-001	1.053e+000	7.626e-001	9.832e-001
0.1	1.280e+000	1.524e+000	1.014e+000	1.302e+000
0.2	1.696e+000	2.027e+000	1.406e+000	1.656e+000
0.3	1.744e+000	2.057e+000	1.471e+000	1.703e+000
0.4	1.776e+000	2.149e+000	1.503e+000	1.677e+000
0.5	1.740e+000	2.094e+000	1.517e+000	1.607e+000
0.75	1.445e+000	1.587e+000	1.323e+000	1.425e+000
1	1.220e+000	1.212e+000	1.158e+000	1.291e+000
2	6.608e-001	6.024e-001	6.806e-001	6.994e-001
3	4.160e-001	3.543e-001	4.536e-001	4.400e-001
4	3.068e-001	2.708e-001	3.446e-001	3.049e-001

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

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

1	2	3	4	5
PGA	5.085e-001	5.566e-001	4.220e-001	5.469e-001
0.03	5.465e-001	6.109e-001	4.441e-001	5.844e-001
0.05	6.156e-001	6.948e-001	5.032e-001	6.487e-001
0.1	8.431e-001	1.001e+000	6.688e-001	8.593e-001
0.2	1.119e+000	1.337e+000	9.276e-001	1.093e+000
0.3	1.149e+000	1.352e+000	9.704e-001	1.124e+000
0.4	1.177e+000	1.415e+000	9.995e-001	1.115e+000
0.5	1.156e+000	1.373e+000	1.017e+000	1.077e+000
0.75	9.526e-001	1.029e+000	8.780e-001	9.508e-001
1	7.993e-001	7.854e-001	7.620e-001	8.504e-001
2	4.247e-001	3.837e-001	4.399e-001	4.507e-001
3	2.665e-001	2.260e-001	2.930e-001	2.804e-001
4	1.959e-001	1.726e-001	2.225e-001	1.927e-001

Source: Imp Extensional Gridded, GR, Strike Slip
Region: USGS 2008 California
Closest Distance: 5.02 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC

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

1	2	3	4	5
PGA	9.101e-001	1.020e+000	6.955e-001	1.014e+000
0.03	9.790e-001	1.125e+000	7.284e-001	1.084e+000
0.05	1.089e+000	1.260e+000	8.176e-001	1.188e+000
0.1	1.447e+000	1.759e+000	1.054e+000	1.527e+000
0.2	1.851e+000	2.283e+000	1.345e+000	1.925e+000
0.3	1.916e+000	2.358e+000	1.405e+000	1.985e+000
0.4	1.962e+000	2.486e+000	1.448e+000	1.953e+000
0.5	1.924e+000	2.436e+000	1.472e+000	1.864e+000
0.75	1.668e+000	2.084e+000	1.293e+000	1.627e+000
1	1.426e+000	1.682e+000	1.138e+000	1.458e+000
2	7.856e-001	9.006e-001	6.790e-001	7.772e-001
3	5.011e-001	5.620e-001	4.536e-001	4.877e-001
4	3.631e-001	4.069e-001	3.446e-001	3.376e-001

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

1	2	3	4	5
PGA	6.005e-001	6.732e-001	4.589e-001	6.694e-001
0.03	6.460e-001	7.423e-001	4.806e-001	7.150e-001
0.05	7.183e-001	8.313e-001	5.395e-001	7.841e-001
0.1	9.530e-001	1.156e+000	6.957e-001	1.008e+000

0.2	1.221e+000	1.506e+000	8.874e-001	1.270e+000
0.3	1.262e+000	1.550e+000	9.269e-001	1.310e+000
0.4	1.300e+000	1.637e+000	9.634e-001	1.299e+000
0.5	1.278e+000	1.597e+000	9.869e-001	1.250e+000
0.75	1.099e+000	1.351e+000	8.590e-001	1.086e+000
1	9.334e-001	1.090e+000	7.495e-001	9.611e-001
2	5.044e-001	5.736e-001	4.388e-001	5.009e-001
3	3.207e-001	3.585e-001	2.930e-001	3.107e-001
4	2.317e-001	2.593e-001	2.225e-001	2.133e-001

Source: Johnson Valley (No)
Region: USGS 2008 California
Closest Distance: 69.04 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.374e-001	1.819e-001	1.223e-001	1.081e-001
0.03	1.407e-001	1.828e-001	1.270e-001	1.123e-001
0.05	1.541e-001	1.920e-001	1.430e-001	1.274e-001
0.1	2.144e-001	2.559e-001	1.996e-001	1.877e-001

0.2	3.037e-001	3.781e-001	2.780e-001	2.550e-001
0.3	3.090e-001	3.858e-001	2.902e-001	2.510e-001
0.4	2.963e-001	3.808e-001	2.720e-001	2.360e-001
0.5	2.840e-001	3.672e-001	2.643e-001	2.205e-001
0.75	2.312e-001	2.975e-001	2.173e-001	1.789e-001
1	1.918e-001	2.447e-001	1.790e-001	1.518e-001
2	9.824e-002	1.272e-001	9.061e-002	7.690e-002
3	6.128e-002	7.640e-002	5.873e-002	4.870e-002
4	4.537e-002	5.740e-002	4.443e-002	3.427e-002

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

1	2	3	4	5
PGA	9.067e-002	1.200e-001	8.069e-002	7.130e-002
0.03	9.284e-002	1.206e-001	8.380e-002	7.413e-002
0.05	1.017e-001	1.267e-001	9.435e-002	8.404e-002
0.1	1.412e-001	1.682e-001	1.317e-001	1.239e-001
0.2	2.004e-001	2.495e-001	1.834e-001	1.682e-001
0.3	2.035e-001	2.535e-001	1.915e-001	1.656e-001
0.4	1.960e-001	2.507e-001	1.809e-001	1.562e-001
0.5	1.872e-001	2.407e-001	1.756e-001	1.453e-001
0.75	1.509e-001	1.928e-001	1.429e-001	1.169e-001
1	1.247e-001	1.585e-001	1.171e-001	9.861e-002
2	6.298e-002	8.102e-002	5.856e-002	4.935e-002

3	3.922e-002	4.874e-002	3.794e-002	3.099e-002
4	2.897e-002	3.658e-002	2.869e-002	2.165e-002

Source: Landers
Region: USGS 2008 California
  Closest Distance: 76.54 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
  Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
  Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.625e-001	2.050e-001	1.375e-001	1.449e-001
0.03	1.676e-001	2.100e-001	1.422e-001	1.506e-001
0.05	1.832e-001	2.217e-001	1.583e-001	1.696e-001
0.1	2.470e-001	2.818e-001	2.118e-001	2.475e-001
0.2	3.341e-001	3.619e-001	3.002e-001	3.403e-001
0.3	3.469e-001	3.756e-001	3.246e-001	3.404e-001
0.4	3.362e-001	3.780e-001	3.099e-001	3.209e-001
0.5	3.321e-001	3.768e-001	3.165e-001	3.031e-001
0.75	2.913e-001	3.354e-001	2.855e-001	2.530e-001
1	2.524e-001	2.872e-001	2.502e-001	2.197e-001
2	1.436e-001	1.668e-001	1.459e-001	1.181e-001

3	9.723e-002	1.156e-001	9.871e-002	7.742e-002
4	7.256e-002	8.559e-002	7.630e-002	5.578e-002

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

1	2	3	4	5
PGA	1.072e-001	1.353e-001	9.070e-002	9.562e-002
0.03	1.106e-001	1.386e-001	9.380e-002	9.936e-002
0.05	1.209e-001	1.463e-001	1.044e-001	1.119e-001
0.1	1.627e-001	1.852e-001	1.397e-001	1.633e-001
0.2	2.205e-001	2.388e-001	1.981e-001	2.245e-001
0.3	2.285e-001	2.468e-001	2.142e-001	2.246e-001
0.4	2.228e-001	2.489e-001	2.061e-001	2.134e-001
0.5	2.194e-001	2.470e-001	2.104e-001	2.008e-001
0.75	1.904e-001	2.175e-001	1.879e-001	1.660e-001
1	1.643e-001	1.860e-001	1.638e-001	1.432e-001
2	9.214e-002	1.062e-001	9.429e-002	7.590e-002
3	6.226e-002	7.372e-002	6.377e-002	4.929e-002
4	4.635e-002	5.455e-002	4.926e-002	3.525e-002

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

Closest Distance: 62.15 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.055e-001	2.582e-001	1.680e-001	1.902e-001
0.03	2.134e-001	2.672e-001	1.742e-001	1.989e-001
0.05	2.345e-001	2.833e-001	1.948e-001	2.253e-001
0.1	3.176e-001	3.601e-001	2.639e-001	3.288e-001
0.2	4.173e-001	4.410e-001	3.690e-001	4.421e-001
0.3	4.275e-001	4.521e-001	3.933e-001	4.372e-001
0.4	4.127e-001	4.527e-001	3.761e-001	4.094e-001
0.5	4.065e-001	4.507e-001	3.861e-001	3.825e-001
0.75	3.591e-001	4.052e-001	3.533e-001	3.187e-001
1	3.122e-001	3.457e-001	3.142e-001	2.768e-001
2	1.808e-001	2.036e-001	1.895e-001	1.491e-001
3	1.243e-001	1.454e-001	1.295e-001	9.808e-002
4	9.300e-002	1.076e-001	1.005e-001	7.085e-002

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

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

1	2	3	4	5
PGA	1.356e-001	1.704e-001	1.108e-001	1.255e-001
0.03	1.408e-001	1.763e-001	1.149e-001	1.313e-001
0.05	1.547e-001	1.869e-001	1.285e-001	1.487e-001
0.1	2.092e-001	2.367e-001	1.742e-001	2.169e-001
0.2	2.754e-001	2.910e-001	2.435e-001	2.917e-001
0.3	2.817e-001	2.971e-001	2.595e-001	2.885e-001
0.4	2.735e-001	2.981e-001	2.501e-001	2.723e-001
0.5	2.689e-001	2.954e-001	2.570e-001	2.542e-001
0.75	2.350e-001	2.627e-001	2.326e-001	2.096e-001
1	2.034e-001	2.240e-001	2.057e-001	1.806e-001
2	1.160e-001	1.297e-001	1.225e-001	9.586e-002
3	7.962e-002	9.276e-002	8.363e-002	6.245e-002
4	5.942e-002	6.860e-002	6.489e-002	4.477e-002

Source: Mojave Shear Gridded
Region: USGS 2008 California
Closest Distance: 41.37 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: Boore-Atkinson (2008) NGA USGS 2008 MRC

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

1	2	3	4	5
PGA	3.151e-001	3.528e-001	2.342e-001	3.584e-001
0.03	3.311e-001	3.711e-001	2.440e-001	3.781e-001
0.05	3.656e-001	3.960e-001	2.748e-001	4.260e-001
0.1	4.980e-001	5.086e-001	3.825e-001	6.029e-001
0.2	6.326e-001	5.945e-001	5.208e-001	7.826e-001
0.3	6.377e-001	6.050e-001	5.393e-001	7.688e-001
0.4	6.131e-001	6.029e-001	5.170e-001	7.194e-001
0.5	5.965e-001	5.993e-001	5.318e-001	6.583e-001
0.75	5.290e-001	5.457e-001	4.929e-001	5.484e-001
1	4.601e-001	4.609e-001	4.464e-001	4.731e-001
2	2.666e-001	2.759e-001	2.808e-001	2.431e-001
3	1.836e-001	2.043e-001	1.938e-001	1.528e-001
4	1.367e-001	1.518e-001	1.511e-001	1.072e-001

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

1	2	3	4	5
PGA	2.079e-001	2.328e-001	1.545e-001	2.365e-001
0.03	2.184e-001	2.449e-001	1.610e-001	2.495e-001
0.05	2.412e-001	2.613e-001	1.813e-001	2.811e-001

0.1	3.282e-001	3.343e-001	2.524e-001	3.978e-001
0.2	4.174e-001	3.923e-001	3.436e-001	5.164e-001
0.3	4.202e-001	3.976e-001	3.558e-001	5.073e-001
0.4	4.065e-001	3.970e-001	3.439e-001	4.785e-001
0.5	3.962e-001	3.928e-001	3.547e-001	4.412e-001
0.75	3.470e-001	3.538e-001	3.249e-001	3.625e-001
1	3.003e-001	2.986e-001	2.925e-001	3.098e-001
2	1.712e-001	1.757e-001	1.815e-001	1.564e-001
3	1.176e-001	1.303e-001	1.252e-001	9.731e-002
4	8.736e-002	9.676e-002	9.758e-002	6.775e-002

Source: Newport-Inglewood
Region: USGS 2008 California
Closest Distance: 84.03 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.566e-001	1.942e-001	1.332e-001	1.425e-001
0.03	1.615e-001	1.994e-001	1.375e-001	1.477e-001
0.05	1.761e-001	2.106e-001	1.524e-001	1.656e-001

0.1	2.352e-001	2.641e-001	2.008e-001	2.408e-001
0.2	3.181e-001	3.319e-001	2.872e-001	3.352e-001
0.3	3.339e-001	3.481e-001	3.150e-001	3.387e-001
0.4	3.257e-001	3.534e-001	3.021e-001	3.216e-001
0.5	3.245e-001	3.562e-001	3.122e-001	3.053e-001
0.75	2.897e-001	3.247e-001	2.874e-001	2.570e-001
1	2.536e-001	2.816e-001	2.548e-001	2.246e-001
2	1.476e-001	1.679e-001	1.526e-001	1.223e-001
3	1.015e-001	1.196e-001	1.041e-001	8.068e-002
4	7.579e-002	8.824e-002	8.082e-002	5.834e-002

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

1	2	3	4	5
PGA	1.033e-001	1.281e-001	8.791e-002	9.405e-002
0.03	1.066e-001	1.316e-001	9.072e-002	9.749e-002
0.05	1.162e-001	1.389e-001	1.005e-001	1.092e-001
0.1	1.549e-001	1.735e-001	1.325e-001	1.589e-001
0.2	2.099e-001	2.190e-001	1.895e-001	2.212e-001
0.3	2.200e-001	2.288e-001	2.078e-001	2.235e-001
0.4	2.158e-001	2.327e-001	2.009e-001	2.139e-001
0.5	2.144e-001	2.334e-001	2.075e-001	2.023e-001
0.75	1.894e-001	2.105e-001	1.890e-001	1.687e-001
1	1.652e-001	1.825e-001	1.668e-001	1.463e-001

2	9.470e-002	1.069e-001	9.863e-002	7.860e-002
3	6.497e-002	7.630e-002	6.726e-002	5.137e-002
4	4.842e-002	5.623e-002	5.219e-002	3.687e-002

Source: North Frontal (East)
Region: USGS 2008 California
Closest Distance: 44.38 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.284e-001	2.847e-001	1.896e-001	2.109e-001
0.03	2.375e-001	2.920e-001	1.980e-001	2.225e-001
0.05	2.625e-001	3.075e-001	2.249e-001	2.550e-001
0.1	3.708e-001	4.143e-001	3.237e-001	3.745e-001
0.2	5.046e-001	5.878e-001	4.379e-001	4.880e-001
0.3	5.098e-001	6.168e-001	4.424e-001	4.701e-001
0.4	4.804e-001	5.943e-001	4.152e-001	4.318e-001
0.5	4.592e-001	5.771e-001	4.039e-001	3.967e-001
0.75	3.794e-001	4.820e-001	3.360e-001	3.201e-001
1	3.084e-001	3.761e-001	2.816e-001	2.674e-001

2	1.445e-001	1.677e-001	1.476e-001	1.183e-001
3	8.856e-002	9.872e-002	9.536e-002	7.161e-002
4	6.393e-002	7.004e-002	7.175e-002	4.999e-002

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

1	2	3	4	5
PGA	1.507e-001	1.878e-001	1.251e-001	1.392e-001
0.03	1.567e-001	1.927e-001	1.307e-001	1.468e-001
0.05	1.732e-001	2.029e-001	1.484e-001	1.683e-001
0.1	2.443e-001	2.723e-001	2.136e-001	2.471e-001
0.2	3.329e-001	3.878e-001	2.889e-001	3.220e-001
0.3	3.358e-001	4.053e-001	2.919e-001	3.102e-001
0.4	3.182e-001	3.914e-001	2.762e-001	2.872e-001
0.5	3.037e-001	3.783e-001	2.690e-001	2.638e-001
0.75	2.481e-001	3.125e-001	2.212e-001	2.105e-001
1	2.009e-001	2.437e-001	1.845e-001	1.745e-001
2	9.273e-002	1.068e-001	9.537e-002	7.597e-002
3	5.672e-002	6.297e-002	6.160e-002	4.559e-002
4	4.085e-002	4.463e-002	4.633e-002	3.159e-002

Source: North Frontal (West)

Region: USGS 2008 California
Closest Distance: 17.73 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	5.140e-001	5.251e-001	4.251e-001	5.917e-001
0.03	5.470e-001	5.586e-001	4.450e-001	6.373e-001
0.05	6.093e-001	5.999e-001	5.044e-001	7.238e-001
0.1	8.577e-001	8.327e-001	7.372e-001	1.003e+000
0.2	1.112e+000	1.108e+000	9.574e-001	1.269e+000
0.3	1.123e+000	1.182e+000	9.416e-001	1.247e+000
0.4	1.081e+000	1.163e+000	9.074e-001	1.173e+000
0.5	1.039e+000	1.143e+000	8.941e-001	1.082e+000
0.75	8.938e-001	1.002e+000	7.774e-001	9.018e-001
1	7.456e-001	7.800e-001	6.825e-001	7.744e-001
2	3.693e-001	3.678e-001	3.891e-001	3.511e-001
3	2.290e-001	2.330e-001	2.467e-001	2.072e-001
4	1.632e-001	1.649e-001	1.814e-001	1.432e-001

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

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

1	2	3	4	5
PGA	3.391e-001	3.464e-001	2.805e-001	3.904e-001
0.03	3.609e-001	3.686e-001	2.936e-001	4.205e-001
0.05	4.020e-001	3.958e-001	3.328e-001	4.776e-001
0.1	5.652e-001	5.473e-001	4.864e-001	6.619e-001
0.2	7.334e-001	7.312e-001	6.317e-001	8.373e-001
0.3	7.402e-001	7.767e-001	6.213e-001	8.227e-001
0.4	7.165e-001	7.656e-001	6.035e-001	7.805e-001
0.5	6.912e-001	7.491e-001	5.994e-001	7.250e-001
0.75	5.876e-001	6.497e-001	5.141e-001	5.991e-001
1	4.874e-001	5.053e-001	4.481e-001	5.087e-001
2	2.372e-001	2.342e-001	2.515e-001	2.260e-001
3	1.467e-001	1.486e-001	1.594e-001	1.320e-001
4	1.043e-001	1.051e-001	1.172e-001	9.049e-002

Source: Pinto Mtn
Region: USGS 2008 California
Closest Distance: 50.85 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.198e-001	2.779e-001	1.825e-001	1.989e-001
0.03	2.285e-001	2.866e-001	1.901e-001	2.088e-001
0.05	2.521e-001	3.039e-001	2.144e-001	2.381e-001
0.1	3.481e-001	3.962e-001	2.995e-001	3.487e-001
0.2	4.598e-001	5.075e-001	4.110e-001	4.608e-001
0.3	4.630e-001	5.132e-001	4.260e-001	4.497e-001
0.4	4.433e-001	5.088e-001	4.039e-001	4.172e-001
0.5	4.302e-001	4.986e-001	4.053e-001	3.869e-001
0.75	3.685e-001	4.305e-001	3.564e-001	3.185e-001
1	3.145e-001	3.598e-001	3.097e-001	2.740e-001
2	1.746e-001	2.020e-001	1.773e-001	1.444e-001
3	1.165e-001	1.364e-001	1.191e-001	9.393e-002
4	8.686e-002	1.015e-001	9.170e-002	6.736e-002

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

1	2	3	4	5
PGA	1.450e-001	1.834e-001	1.204e-001	1.313e-001
0.03	1.508e-001	1.891e-001	1.254e-001	1.378e-001

0.05	1.664e-001	2.005e-001	1.414e-001	1.571e-001
0.1	2.294e-001	2.604e-001	1.976e-001	2.301e-001
0.2	3.034e-001	3.348e-001	2.712e-001	3.041e-001
0.3	3.050e-001	3.373e-001	2.811e-001	2.967e-001
0.4	2.937e-001	3.350e-001	2.687e-001	2.775e-001
0.5	2.846e-001	3.268e-001	2.699e-001	2.572e-001
0.75	2.411e-001	2.791e-001	2.347e-001	2.094e-001
1	2.049e-001	2.331e-001	2.028e-001	1.788e-001
2	1.120e-001	1.287e-001	1.146e-001	9.284e-002
3	7.460e-002	8.702e-002	7.697e-002	5.981e-002
4	5.549e-002	6.471e-002	5.921e-002	4.257e-002

Source: Pisgah-Bullion Mtn-Mesquite Lk
Region: USGS 2008 California
Closest Distance: 98.07 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.182e-001	1.447e-001	1.078e-001	1.022e-001
0.03	1.211e-001	1.469e-001	1.110e-001	1.052e-001

0.05	1.314e-001	1.543e-001	1.228e-001	1.171e-001
0.1	1.757e-001	1.957e-001	1.614e-001	1.700e-001
0.2	2.475e-001	2.669e-001	2.329e-001	2.427e-001
0.3	2.636e-001	2.851e-001	2.568e-001	2.490e-001
0.4	2.587e-001	2.911e-001	2.451e-001	2.399e-001
0.5	2.571e-001	2.929e-001	2.493e-001	2.291e-001
0.75	2.256e-001	2.613e-001	2.222e-001	1.933e-001
1	1.954e-001	2.256e-001	1.919e-001	1.688e-001
2	1.099e-001	1.303e-001	1.082e-001	9.122e-002
3	7.333e-002	8.780e-002	7.250e-002	5.969e-002
4	5.463e-002	6.519e-002	5.580e-002	4.291e-002

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

1	2	3	4	5
PGA	7.801e-002	9.547e-002	7.111e-002	6.744e-002
0.03	7.988e-002	9.695e-002	7.326e-002	6.944e-002
0.05	8.670e-002	1.018e-001	8.103e-002	7.724e-002
0.1	1.157e-001	1.286e-001	1.065e-001	1.121e-001
0.2	1.633e-001	1.761e-001	1.536e-001	1.601e-001
0.3	1.737e-001	1.873e-001	1.695e-001	1.643e-001
0.4	1.713e-001	1.917e-001	1.630e-001	1.591e-001
0.5	1.696e-001	1.920e-001	1.656e-001	1.514e-001
0.75	1.474e-001	1.694e-001	1.461e-001	1.266e-001

1	1.272e-001	1.461e-001	1.256e-001	1.098e-001
2	7.049e-002	8.298e-002	6.991e-002	5.858e-002
3	4.695e-002	5.601e-002	4.683e-002	3.800e-002
4	3.490e-002	4.155e-002	3.603e-002	2.712e-002

Source: Puente Hills
Region: USGS 2008 California
Closest Distance: 56.68 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	2.210e-001	2.421e-001	2.026e-001	2.183e-001
0.03	2.287e-001	2.473e-001	2.100e-001	2.288e-001
0.05	2.509e-001	2.596e-001	2.347e-001	2.585e-001
0.1	3.478e-001	3.435e-001	3.268e-001	3.730e-001
0.2	4.761e-001	4.836e-001	4.537e-001	4.910e-001
0.3	4.888e-001	5.139e-001	4.746e-001	4.781e-001
0.4	4.631e-001	4.969e-001	4.503e-001	4.421e-001
0.5	4.460e-001	4.864e-001	4.448e-001	4.069e-001
0.75	3.742e-001	4.142e-001	3.808e-001	3.277e-001

1	3.051e-001	3.273e-001	3.155e-001	2.723e-001
2	1.372e-001	1.498e-001	1.458e-001	1.161e-001
3	8.201e-002	9.069e-002	8.736e-002	6.798e-002
4	5.906e-002	6.433e-002	6.645e-002	4.641e-002

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

1	2	3	4	5
PGA	1.458e-001	1.597e-001	1.337e-001	1.440e-001
0.03	1.509e-001	1.632e-001	1.386e-001	1.509e-001
0.05	1.656e-001	1.713e-001	1.549e-001	1.705e-001
0.1	2.292e-001	2.257e-001	2.156e-001	2.461e-001
0.2	3.141e-001	3.191e-001	2.993e-001	3.240e-001
0.3	3.221e-001	3.377e-001	3.131e-001	3.155e-001
0.4	3.069e-001	3.272e-001	2.995e-001	2.941e-001
0.5	2.953e-001	3.188e-001	2.963e-001	2.706e-001
0.75	2.450e-001	2.685e-001	2.508e-001	2.155e-001
1	1.988e-001	2.121e-001	2.067e-001	1.777e-001
2	8.808e-002	9.542e-002	9.425e-002	7.457e-002
3	5.252e-002	5.785e-002	5.643e-002	4.328e-002
4	3.774e-002	4.100e-002	4.291e-002	2.933e-002

Source: Puente Hills (Coyote Hills)
Region: USGS 2008 California
Closest Distance: 61.32 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.776e-001	2.038e-001	1.752e-001	1.539e-001
0.03	1.827e-001	2.058e-001	1.816e-001	1.606e-001
0.05	2.002e-001	2.151e-001	2.035e-001	1.819e-001
0.1	2.798e-001	2.884e-001	2.854e-001	2.657e-001
0.2	3.949e-001	4.343e-001	3.966e-001	3.539e-001
0.3	4.068e-001	4.622e-001	4.131e-001	3.451e-001
0.4	3.847e-001	4.455e-001	3.890e-001	3.196e-001
0.5	3.690e-001	4.322e-001	3.775e-001	2.973e-001
0.75	3.019e-001	3.561e-001	3.118e-001	2.380e-001
1	2.424e-001	2.787e-001	2.515e-001	1.971e-001
2	1.055e-001	1.225e-001	1.096e-001	8.439e-002
3	6.161e-002	6.998e-002	6.476e-002	5.010e-002
4	4.443e-002	4.988e-002	4.898e-002	3.442e-002

Fractile: Mean
Column 1: Spectral Period

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

1	2	3	4	5
PGA	1.172e-001	1.345e-001	1.156e-001	1.015e-001
0.03	1.205e-001	1.358e-001	1.199e-001	1.059e-001
0.05	1.321e-001	1.419e-001	1.343e-001	1.200e-001
0.1	1.844e-001	1.895e-001	1.883e-001	1.753e-001
0.2	2.606e-001	2.865e-001	2.617e-001	2.335e-001
0.3	2.680e-001	3.038e-001	2.726e-001	2.277e-001
0.4	2.548e-001	2.933e-001	2.587e-001	2.123e-001
0.5	2.437e-001	2.833e-001	2.513e-001	1.966e-001
0.75	1.973e-001	2.308e-001	2.053e-001	1.559e-001
1	1.578e-001	1.805e-001	1.647e-001	1.282e-001
2	6.768e-002	7.805e-002	7.083e-002	5.416e-002
3	3.945e-002	4.464e-002	4.183e-002	3.188e-002
4	2.839e-002	3.179e-002	3.163e-002	2.174e-002

Source: Puente Hills (LA)
Region: USGS 2008 California
Closest Distance: 81.31 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: Boore-Atkinson (2008) NGA USGS 2008 MRC
Column 4: Acceleration (g) for: Campbell-Bozorgnia (2008) NGA USGS 2008 MRC
Column 5: Acceleration (g) for: Chiou-Youngs (2007) NGA USGS 2008 MRC

1	2	3	4	5
PGA	1.401e-001	1.577e-001	1.434e-001	1.191e-001
0.03	1.434e-001	1.590e-001	1.480e-001	1.233e-001
0.05	1.561e-001	1.656e-001	1.644e-001	1.383e-001
0.1	2.141e-001	2.179e-001	2.233e-001	2.012e-001
0.2	3.079e-001	3.286e-001	3.174e-001	2.777e-001
0.3	3.261e-001	3.600e-001	3.408e-001	2.776e-001
0.4	3.122e-001	3.521e-001	3.227e-001	2.618e-001
0.5	3.039e-001	3.473e-001	3.180e-001	2.463e-001
0.75	2.552e-001	2.957e-001	2.687e-001	2.010e-001
1	2.078e-001	2.357e-001	2.189e-001	1.688e-001
2	9.313e-002	1.073e-001	9.738e-002	7.476e-002
3	5.544e-002	6.315e-002	5.797e-002	4.520e-002
4	4.015e-002	4.500e-002	4.404e-002	3.141e-002

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

1	2	3	4	5
PGA	9.244e-002	1.041e-001	9.465e-002	7.859e-002

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

September 11, 2018

Mr. Thomas Pace
Director of Facilities
San Bernardino City Unified School District
956 West 9th Street
San Bernardino, CA 92411

Subject: **RESPONSE TO REVIEW COMMENTS**
CGS APPLICATION NO. 04-CGS3508
NEW DIESEL TECHNOLOGY CENTER BUILDING
Northwest Corner of the Existing Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Converse Project No. 18-81-134-01

Dear Mr. Pace:

Converse Consultants (Converse) has prepared this letter in response to the letter dated August 23, 2018 by Dr. Erik K. Frost of the California Geological Survey (CGS). In the letter, the CGS provided review comments regarding our Geotechnical Investigation Report dated May 24, 2018.

We have prepared a revised geotechnical investigation report dated September 11, 2018. The revised geotechnical investigation report incorporates our responses to the CGS comments. The following sections in the report have been revised. The responses presented below refer to these revised and new sections.

- Executive Summary
- Section 5.3, *Groundwater*
- Section 6.2, *Site Geology*
- Section 7.3, *Site-Specific Seismic Analysis*
- Section 7.4, *Secondary Effects of Seismicity, Liquefaction, Seismic Settlement and Landsliding*
- Section 9.2, *Ground Improvement*
- Section 10.6, *Settlement*
- Appendix C, *Dynamic Settlement Analysis*
- Appendix D, *EZ-FRISK Output Files*

The following comments provided by CGS refer to items included in the Note 48 Checklist Review Comments. Items not addressed here did not include comments requiring additional information.

Engineering Geology/Site Characterization

Comment on Item No. 10
"If the consultants treat the sandy silts as non-liquefiable (Item 20), they should provide the results of relevant laboratory tests (e.g., Atterberg Limits) to support this assessment.

Response to Comment on Item No. 10
We have revised dynamic settlement analysis to consider the sandy silt soils as potentially liquefiable. Therefore, no additional tests are required.

Comment on Item No. 11
"The consultant should revise their grading and foundation plans as necessary and appropriate (Item 20, Item 21, Item 22, Item 23)."

Response to Comment on Item No. 11
Converse did not prepare the grading and foundation plans. A copy of our revised geotechnical investigation report dated September 11, 2018 has been provided to District for use in preparation of the grading and foundation plans.

Seismology & Calculation of Earthquake Ground Motion

Comment on Item No. 13
"The consultants classify the site soil profile as Site Class C, Very Dense Soil and Soft Rock. However, the CGS notes the consultants' reported map-based seismic parameters appear to be based on Site Class D. The Consultants should clarify the appropriate site class, and provide a rationale and supporting calculations for their selection."

Response to Comment on Item No. 13
Based on the average blows per foot for borings BH-02 and BH-04 of 32 and 35 respectively, the site has been classified as Site Class D.

Comment on Item No. 14
"The consultants should revise their reported map-based seismic parameters as necessary and appropriate (Item 13)."

Response to Comment on Item No. 14
The reported map-based seismic parameters were based on Site Class D and as such, have not been changed.

Comment on Item No. 16
"The consultants should provide relevant output files for EZ-FRISK to document all boundary conditions and results of their site-specific ground motion analysis. The consultants should also revise their V_{s30} value and site-specific ground motion analysis as necessary and appropriate (Item 13)."

Response to Comment on Item No. 16

The EZ-FRISK output files have been included in Appendix D, *EZ-FRISK Output Files*. The V_{s30} value used in the analysis was 360 meters per second, which is appropriate for Site Class D, and has not been updated.

Comment on Item No. 17

"The consultants base their controlling earthquake magnitude on the results of their site-specific ground motion analysis (via EZ-FRISK), however, supporting calculations were not provided. The consultant should provide relevant output files from EZ-FRISK to document the controlling earthquake magnitude. They should revise this earthquake magnitude as necessary and appropriate (Item 16)."

Response to Comment on Item No. 17

The EZ-FRISK output files have been included in Appendix D, *EZ-FRISK Output Files*.

Liquefaction/Seismic Settlement Analysis

Comment on Item No. 19

"The consultants' assessment of liquefaction susceptibility is supported by the available data, although the CGS notes the historically highest groundwater depth used by the consultants is marked as "questionable" by DWR (indicating a deeper value of historical groundwater may be more appropriate). The consultants may wish to revise the historically highest groundwater level used in their analysis."

Response to Comment on Item No. 19

Based on review of additional well sites in the vicinity of the project site, including sites with data from earlier years, it has been determined that the surficial historical groundwater value for Site No. 340743117162001 is suspect, and as such, the site has been removed from consideration. The new historical high ground water level reported in the report and used in the liquefaction analysis is 38 feet BGS.

Comment on Item No. 20

"The consultants' liquefaction triggering and seismic settlement analysis reflect input values that may need to be revised (Item 16, Item 19). In addition, the CGS notes the consultants treat the sandy silts at the site as non-liquefiable. The consultants should provide a rationale for this assessment, supported by relevant laboratory data and calculations (e.g., Bray and Sancio, 2006). Barring such a rationale, the consultants should revise their analyses to allow for potential liquefaction in the sandy silts at the site. When resubmitting, the consultants should provide all output files from LiquefyPro for review."

Response to Comment on Item No. 20

There is no need to revise the input values for dynamic settlement analysis due to the response on Item No. 16. For Item No. 19, the input value for historical high groundwater has been revised to 38 feet BGS. In addition, we have revised the dynamic settlement

analysis to consider sandy silt layers as potentially liquefiable. Therefore, no additional laboratory testing on sandy silt soils is required. The LiquefyPro output files have been included in Appendix C, *Dynamic Settlement Analysis*.

Comment on Item No. 21
"The consultants should assess the potential for bearing capacity failure if they identify shallow potentially liquefiable soils (Item 20). They should also assess the potential for lateral spreading associated with the concrete-lined drainage to the west of the site."

Response to Comment on Item No. 21
The liquefaction potential has been determined to be negligible with the updated historical high groundwater level. Based on the negligible potential for liquefaction, the potential for lateral spreading is also considered negligible.

Comment on Item No. 22
"The consultants should provide mitigation options for liquefaction as necessary and appropriate (Item 20, Item 21)."

Response to Comment on Item No. 22
Mitigation options for liquefaction have been included in the Section 9.2 Ground Improvement of the report.

Slope Stability Analysis

Comment on Item No. 23
"The consultants' report a County of San Bernardino zone of landslide susceptibility 500 feet north of the site. The CGS notes this does not appear to represent the closest distance from the zone to the site. The consultants should report the closest distance from the zone to the site, as well as any relevant structural data bearing on the issue of landslide susceptibility and revise their assessment of landslide hazard at the site as necessary and appropriate."

Response to Comment on Item No. 23
The Landslide sections has been revised to the following.

Seismically induced landslides and other slope failures are common occurrences during or soon after earthquakes. Perris Hill, which is adjacent to Pacific High School, is designated by San Bernardino County as moderately to highly susceptible to landsliding.

The toe of the closest flank of Perris Hill is located approximately 225 feet east of the proposed building. The average slope ratio of the closest flank is approximately 4H:1V (horizontal:vertical). The height of the closest slope is approximately 40 feet. The hill ascends further to the north approximately 120 feet in height with an average slope ratio of 5H:1V.

Based on review of geologic mapping (Dibblee and Minch, 2004), foliation within the Pelona Schist that comprises Perris Hill dips between 12 and 35 degrees south to southeast, away from the proposed new building. Since the building is west to southwest of the hill, it is lateral to the predominant failure direction. Furthermore, a failure surface dipping 15 to 30 degrees out of slope on a 4:1 slope will not daylight and is unlikely to produce a major slope failure.

Due to distance from Perris Hill, the height of Perris Hill in the vicinity of the site, strike and dip of foliation in the Pelona Schist, and overall relief, landsliding on Perris Hill is not expected to affect the proposed building. Due to the relatively flat nature of the site, the potential for on-site landsliding is considered to be low.

Comment on Item No. 24
"The consultants should report static and deterministic strength parameters as necessary."

Response to Comment on Item No. 24
Based on the low potential for landsliding to affect the project site, the slope stability of Perris Hill has not been analyzed.

Comment on Item No. 25
"The consultants should report a pseudo-static coefficient as necessary and appropriate."

Response to Comment on Item No. 25
Based on the low potential for landsliding to affect the project site, the slope stability of Perris Hill has not been analyzed.

Comment on Item No. 26
"The consultants should identify critical surface as necessary and appropriate."

Response to Comment on Item No. 26
Based on the low potential for landsliding to affect the project site, the slope stability of Perris Hill has not been analyzed.

Comment on Item No. 27
"The consultants should consider dynamic site conditions as necessary and appropriate."

Response to Comment on Item No. 27
Based on the low potential for landsliding to affect the project site, the slope stability of Perris Hill has not been analyzed.

Comment on Item No. 28
"The consultants should provide mitigation options as necessary and appropriate."

Response to Comment on Item No. 28

Based on the low potential for landsliding to affect the project site, the slope stability of Perris Hill has not been analyzed.

Report Documentation

Comment on Item No. 32

"The consultants should refer to Bray and Sancio (2006) regarding the potential for liquefaction in silts and clays.

Response to Comment on Item No. 32

The liquefaction analysis has been repeated with sandy silt layers considered as potentially liquefiable. Therefore, no reference to Bray and Sancio (2006) is necessary.

We appreciate the opportunity to be of continued service to San Bernardino City Unified School District. If you have any questions, please feel free to contact us at 909-796-0544.

CONVERSE CONSULTANTS

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Principal Engineer/Regional Manager

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

September 26, 2018

Mr. Thomas Pace
Director of Facilities
San Bernardino City Unified School District
956 West 9th Street
San Bernardino, CA 92411

Subject: **RESPONSE TO SECOND REVIEW COMMENTS**
CGS APPLICATION NO. 04-CGS3508
NEW DIESEL TECHNOLOGY CENTER BUILDING
Northwest Corner of the Existing Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Converse Project No. 18-81-134-01

Dear Mr. Pace:

Converse Consultants (Converse) has prepared this letter in response to the letter dated September 24, 2018 by Dr. Erik K. Frost of the California Geological Survey (CGS). In the letter, the CGS provided review comments regarding our Revised Geotechnical Investigation Report dated September 11, 2018.

We have prepared a revised geotechnical investigation report dated September 26, 2018. The revised geotechnical investigation report incorporates our responses to the CGS comments. The following sections in the report have been revised. The responses presented below refer to these revised and new sections.

- Executive Summary
- Section 7.3, *Site-Specific Seismic Analysis*
- Section 7.4, *Secondary Effects of Seismicity*
- Section 10.6, *Settlement*
- Appendix C, *Dynamic Settlement Analysis*
- Appendix D, *EZ-FRISK Output Files*

The following comments provided by CGS refer to items included in the Note 48 Checklist Review Comments. Items not addressed here did not include comments requiring additional information.

Discussion of Site Class

"The CGS notes Site Class D appears to be appropriate for the site, and in the absence of supporting calculations, a default shear wave velocity for Site Class D soils should be used in subsequent hazard analyses."

Response

An updated site-specific ground motion analysis was conducted using a Vs30 shear wave velocity of 270 meters per second for Site Class D soils.

Discussion of Site-Specific Ground Motion Analysis

"The consultants should revise their site-specific ground motion analysis using either a default shear wave velocity for Site Class D soils, or a shear wave velocity consistent with the weighted harmonic mean blow count for the site soils (ASCE 7 Section 20.4)."

Response

The site-specific ground motion analysis has been revised using a default VS30 shear wave velocity of 270 meters per second. Relevant EZ-FRISK output files have been included in Appendix D.

Discussion of Liquefaction Triggering and Seismic Settlement Analyses

"The consultants now present revised analyses using a historically highest groundwater of 38 feet bgs and sandy silts that are susceptible to liquefaction, which appears to be appropriate for the site. However, the consultants should revise their analyses based on the results of their revised site-specific ground motion analyses."

Response

The dynamic settlement analysis was revised based on the results of the revised site-specific ground motion analysis.

We appreciate the opportunity to be of continued service to San Bernardino City Unified School District. If you have any questions, please feel free to contact us at 909-796-0544.

CONVERSE CONSULTANTS

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May 6, 2019

Mr. Thomas Pace
Director of Facilities
San Bernardino City Unified School District
956 West 9th Street
San Bernardino, CA 92411

Subject: **RESPONSE TO REVIEW COMMENTS**
CGS APPLICATION NO. 04-CGS3835
GYMNASIUM EXPANSION
Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Converse Project No. 18-81-134-03

Dear Mr. Pace:

Converse Consultants (Converse) has prepared this letter in response to the letter dated April 17, 2019 by Dr. Erik K. Frost and Chase White of the California Geological Survey (CGS). In the letter, the CGS provided review comments regarding our Geotechnical Investigation Report dated December 6, 2018.

We have prepared a revised geotechnical investigation report dated May 6, 2019. The revised geotechnical investigation report incorporates our responses to the CGS comments. The following sections in the report have been revised. The responses presented below refer to these revised and new sections.

- Executive Summary
- Section 7.4, *Secondary Effects of Seismicity, Liquefaction and Seismic Settlement*
- Section 10.0, *Design Recommendations*
- Section 10.5, *Settlement*
- Appendix C, *Dynamic Settlement Analysis*

The following comments provided by CGS refer to items included in the Note 48 Checklist Review Comments. Items not addressed here do not include comments requiring additional information.

Engineering Geology/Site Characterization

<u>Comment on Item No. 11</u>
"The consultants provide no discussion or assessment of the foundations supporting the existing structure and do not address the compatibility between existing and proposed new foundations. Additionally, the CGS does not agree with the consultants' recommendation

that 'static and dynamic settlement estimates should not be combined for design purposes'. These mechanisms of settlement are different and therefore both could occur, though at different times. The consultants should provide further explanation and justification for their conclusion regarding maximum anticipated static and dynamic settlements not being combined. The consultants should also review their grading and foundation plans with respect to updated results of their seismic settlement analysis and consider revisions as may be warranted and appropriate."

Response to Comment on Item No. 11
The existing gymnasium building is supported on conventional continuous shallow foundation systems. The new gymnasium lobby expansion will also be supported on conventional continuous shallow foundation systems. New footings abutting existing footings should have adhesive dowel connections to mitigate differential settlement. New footings should be conservatively sized to carry all new construction loads, without reliance on existing footings. The structural engineer should provide appropriate measures to ensure the existing and new foundations systems are compatible.

Generally, static and dynamic settlement does not occur at the same time. For design purposes, the structural engineer should decide whether static and dynamic settlement will be combined or not.

Converse does not prepare the grading and foundation plans. However, we will review the grading and foundation plans prepared by Civil/Structural engineers. A copy of the revised geotechnical report has been provided to the Civil/Structural Engineers to update their plans.

Liquefaction/Seismic Settlement Analysis

Comment on Item No. 20
"The consultants conduct liquefaction triggering and seismic settlement analyses using an earthquake magnitude of 7.0, a PGA_M of 0.99g, and a groundwater elevation of 38 feet bgs. However, the CGS notes the consultants did not use an appropriate in-situ groundwater depth, which will tend to depress the calculated value of liquefaction-induced settlement. In addition, the assumed input fines content (15%) of the poorly-graded sands below 30 feet bgs does not agree with the logged soil description (trace silt). The consultants should revise their analyses to reflect the site conditions as noted above."

Response to Comment on Item No. 20
We have revised the dynamic settlement analysis considering a combination of in-situ groundwater depth at 52 feet bgs and groundwater depth during earthquake at 38 bgs. Also, we have utilized fines content of 8% below 30 feet bgs to reflect the site soil conditions.

We appreciate the opportunity to be of continued service to San Bernardino City Unified School District. If you have any questions, please feel free to contact us at 909-796-0544.

st

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REVISED GEOTECHNICAL INVESTIGATION REPORT

GYMNASIUM EXPANSION

PACIFIC HIGH SCHOOL

CITY OF SAN BERNARDINO, SAN BERNARDINO COUNTY, CALIFORNIA

CONVERSE PROJECT NO. 18-81-134-03

Prepared For:

SAN BERNARDINO CITY UNIFIED SCHOOL DISTRICT
Mr. Thomas Pace
Director of Facilities
956 West 9th Street
San Bernardino, CA 92411

Presented By:

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May 6, 2019

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

May 6, 2019

Mr. Thomas Pace
Director of Facilities
San Bernardino City Unified School District
956 West 9th Street
San Bernardino, CA 92411

Subject: **REVISED GEOTECHNICAL INVESTIGATION REPORT**
GYMNASIUM EXPANSION
Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Converse Project No. 18-81-134-03

Dear Mr. Pace:

Converse Consultants (Converse) has prepared this report to present the results of our geotechnical investigation conducted for the gymnasium expansion located at 1020 Pacific Street, northern side of the existing Pacific High School in the City of San Bernardino, San Bernardino County, California. This report was prepared in accordance with our Proposal dated August 28, 2018 and your Assignment of Project dated September 18, 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 San Bernardino City Unified School District (SBCUSD). Should have any questions, please do not hesitate to contact us at 909-796-0544.

CONVERSE CONSULTANTS

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PROFESSIONAL CERTIFICATION

This report has been prepared by the following professionals whose seals and signatures appear hereon.

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

Zahangir Alam, PhD, EIT
Senior Staff Engineer

Jay Burnham, PG
Senior Staff Geologist

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

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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.

- It is planned to demolish approximately 2,200 square feet front entry and construct a new 6,920 square feet lobby with supporting amenities as a part of existing gymnasium expansion. The addition of building will likely be a combination of steel, concrete and masonry with shallow foundation and slab-on-grade. The structural loads are not known at this time but are anticipated to be moderate.

- The project site is located at the northern side of the Pacific High School, which has a street address of 1020 Pacific Street in the City of San Bernardino, San Bernardino County, California. We anticipate the existing building is serviced by underground water and sewer pipeline. The high school is bounded by Pacific Street to the south, Perris Hill Park Road to the west, open land to the north, and residential property to the east. The high school consists of multiple one- and two-story structures, tennis, baseball and basketball courts, a football field, and parking lots. The project site is relatively flat, with an elevation of approximately 1,132 feet above mean sea level (amsl). Perris Hill, with an approximate peak elevation of 1,300 feet amsl, is located approximately 650 feet northeast of the site. The coordinates for the project site are approximately 34.1298° north latitude and 117.2635° west longitude. The area surrounding the buildings is covered with landscaping and paved with asphalt/cement concrete.

- Our scope of work was developed based on CGS – Note 48 and included project set-up, subsurface exploration, laboratory testing, engineering analysis, and preparation of this report.

- Two exploratory borings (BH-01 and BH-02) were drilled on October 2, 2018 to investigate the subsurface conditions at the site. The borings were advanced to maximum planned depths of 21.5 and 51.5 feet bgs.

- The subsurface soil at the project site consisted primarily of unconsolidated alluvial soils as a mixture of sand and silt. A sand layer was observed at depths between 30.0 to 35.0 and 20.0 to 21.5 feet bgs in borings BH-01 and BH-02, respectively. A gravelly sand layer was observed at depth between 35.0 to 51.5 feet bgs in boring BH-01. Based on hammer blow counts, the upper 10 feet soils are loose to medium dense. Relative compaction of the upper 10 feet soils varies from 78 to 86 percent.

- Groundwater was not encountered in our exploratory borings to a maximum explored depth of 51.5 feet bgs. Several of the referenced groundwater wells have been monitored for many decades and display a trend of long-term decline in local groundwater levels, likely due to groundwater pumping and development of the area. Considering regional development and sustained groundwater usage, groundwater levels are unlikely to return to the historically shallow levels. Current groundwater is generally expected to be deeper than 50 feet bgs and the historical high groundwater is approximately 38 feet bgs. Based on the current groundwater condition, dewatering is not expected to be required during construction of the building. It should be noted that the groundwater level could vary depending upon the seasonal precipitation and possible groundwater pumping activity in the site vicinity. Shallow perched groundwater may be present locally, particularly following precipitation.

- The site is not located within a San Bernardino 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.

- Based on a site-specific dynamic settlement analysis, the site has a liquefaction induced settlement potential of up to 1.85 inches.

- Based on the flat nature of the proposed site configuration, lateral spreading is not considered a risk. Lateral spreading, Landsliding, seiches, tsunamis, and earthquake-induced flooding is considered to be low.

- The expansion index (EI) of the upper 5 feet sample was 5, corresponding to very low expansion 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 resistivities of the sample when saturated were 1,213 to 6,548 Ohm-cm for the site. This indicates that the soils tested are corrosive to moderately 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 site of the proposed gymnasium expansion should be cleared of all vegetation (if any) and debris. The existing front entry of the building will need to be demolished. All materials resulting from clearing, grubbing, and demolition operations should be removed from the site. All existing underground utilities and appurtenances should be located at the site. Such utilities should either be protected in-place or removed and replaced during construction as required by the project specifications. All excavations should be conducted in such a manner as not to cause loss of bearing and/or lateral support of existing structures or utilities.

- 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.

- Footings and slab should be placed on at least 24 inches of compacted fill or 5 feet below ground surface, whichever is deeper. The change in depth of the overexcavation below the footings and slabs-on-grade should be transitioned by a gradual slope (maximum 3:1). The overexcavation should extend to at least 2 feet beyond the footprint of the footings and slab.

- 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.

- The existing gymnasium building is supported on conventional continuous shallow foundation systems. The new gymnasium lobby expansion will also be supported on conventional continuous shllow foundation systems. New footings abutting existing footings should have adhesive dowel connections to mitigate differential settlement. New footings should be conservatively sized to carry all new construction loads, without reliance on existing footings. The structural engineer should provide appropriate measures that are compatible to the existing and new foundations systems.

- 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 1 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 5.1 inches of dry seismic settlement with up to 1.85 inches of liquefaction induced settlement during a large earthquake. The soil profile at the site is almost similar. So, we anticipate that the total settlement will be uniform. We recommend that the planned structure be designed conservatively in anticipation of dynamic differential settlement of 0.7 inches in 40 horizontal feet. Generally, the static and dynamic settlement does not occur at the same time. For design purpose, the structural engineer should decide whether static and dynamic settlement will be combined or not.

- 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 proposed location is suitable for construction of the proposed gymnasium expansion provided the recommendations presented in this geotechnical investigation report are considered in the planning, design and construction of the project.

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Appendix A ..... *Field Exploration*
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1.0 INTRODUCTION

This report presents the results of our geotechnical investigation performed for improvements to the gymnasium located at 1020 Pacific Street, northeast corner of the existing Pacific High School in the City of San Bernardino, San Bernardino County, California. The approximate location of the site is shown on Figure No. 1, *Approximate Site 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 site earthwork, and design and construction of foundations for the proposed building addition.

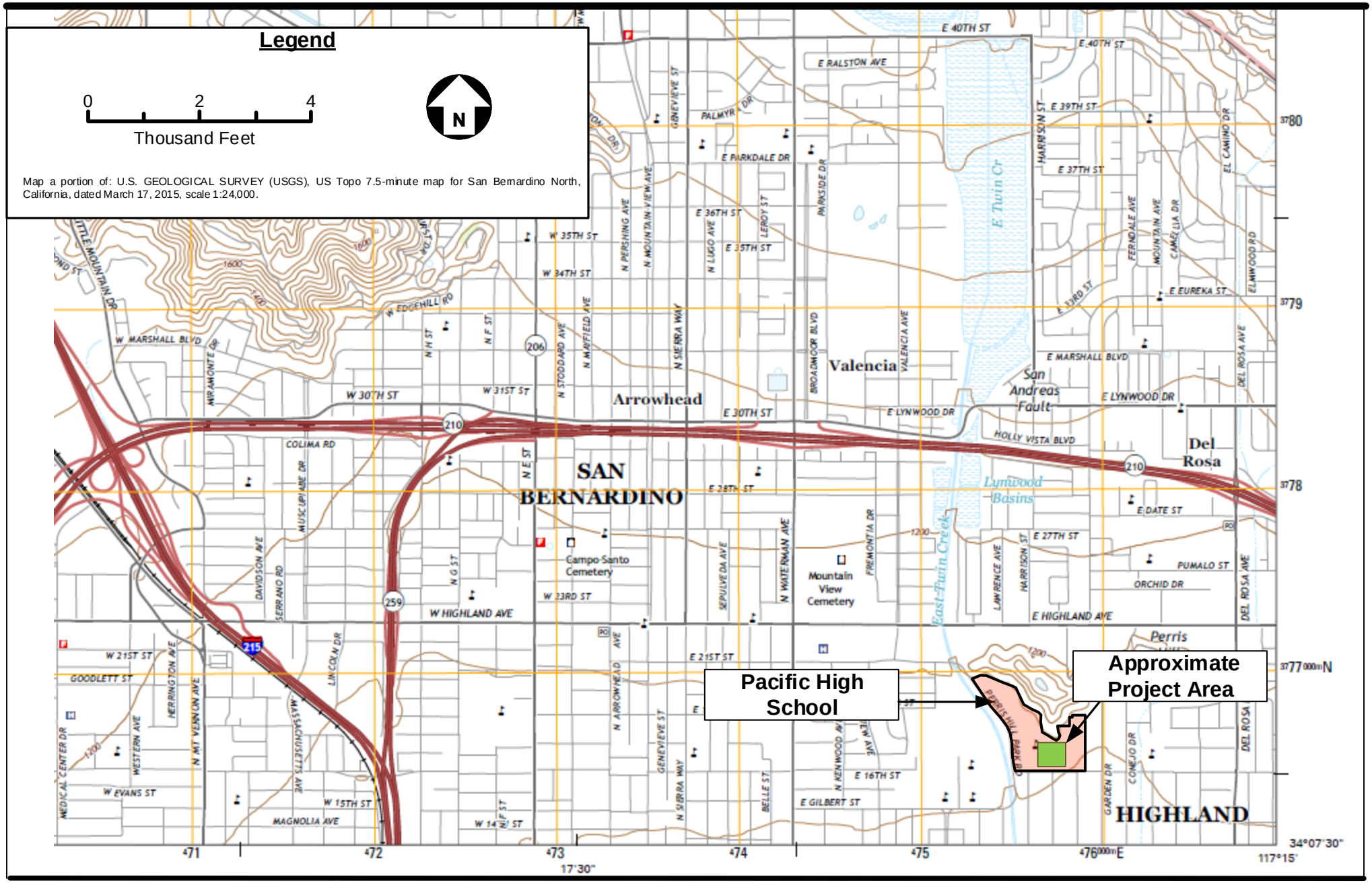
This report is prepared for the project described herein and is intended for use solely by San Bernardino City Unified School District (SBCUSD) and their authorized agents for design purposes. It should not be used as a bidding document but may be made available to the potential contractors for information 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

It is planned to demolish approximately 2,200 square feet front entry and construct a new 6,920 square feet lobby with supporting amenities as a part of existing gymnasium expansion. The addition of building will likely be a combination of steel, concrete and masonry with shallow foundation and slab-on-grade. The structural loads are not known at this time but are anticipated to be moderate.

3.0 SITE DESCRIPTION

The project site is located at the northern side of the Pacific High School, which has a street address of 1020 Pacific Street in the City of San Bernardino, San Bernardino County, California. The existing gymnasium building covers 19,500 square feet. The area surrounding the buildings is covered with landscaping and paved with asphalt/cement concrete. We anticipate the existing building is serviced by underground utility pipeline including water and sewer. Photograph No 1 depicts the present site conditions.



Project: Gymnasium Expansion
Location: Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Client: San Bernardino City Unified School District

Approximate Site Location Map

Project No
18-81-134-03

Converse Consultants

FIGURE
1

Photograph No 1: Present front side conditions of the gymnasium

The high school is bounded by Pacific Street to the south, Perris Hill Park Road to the west, open land to the north, and residential property to the east. The high school consists of multiple one- and two-story structures, tennis, baseball and basketball courts, a football field, and parking lots.

The project site is relatively flat, with an elevation of approximately 1,132 feet above mean sea level (amsl). Perris Hill, with an approximate peak elevation of 1,300 feet amsl, is located approximately 650 feet northeast of the site. The coordinates for the project site are approximately 34.1298° north latitude and 117.2635° west longitude.

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.
- 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.

- Requested clearance of exploration locations for active underground utilities by a representative from the SBCUSD.
- Engaged California licensed driller to drill exploratory borings.

4.2 Subsurface Exploration

Two exploratory borings (BH-01 and BH-02) were drilled on October 2, 2018 to investigate the subsurface conditions at the site. The borings were advanced to maximum planned depths of 21.5 and 51.5 feet bgs.

Approximate boring locations are indicated in Figure No. 2, *Approximate Boring Locations Map*. For a description of the field exploration and sampling program see 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)
- Expansion Index (ASTM D4829)
- Soil Corrosivity (California Tests 643, 422, and 417)
- 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)

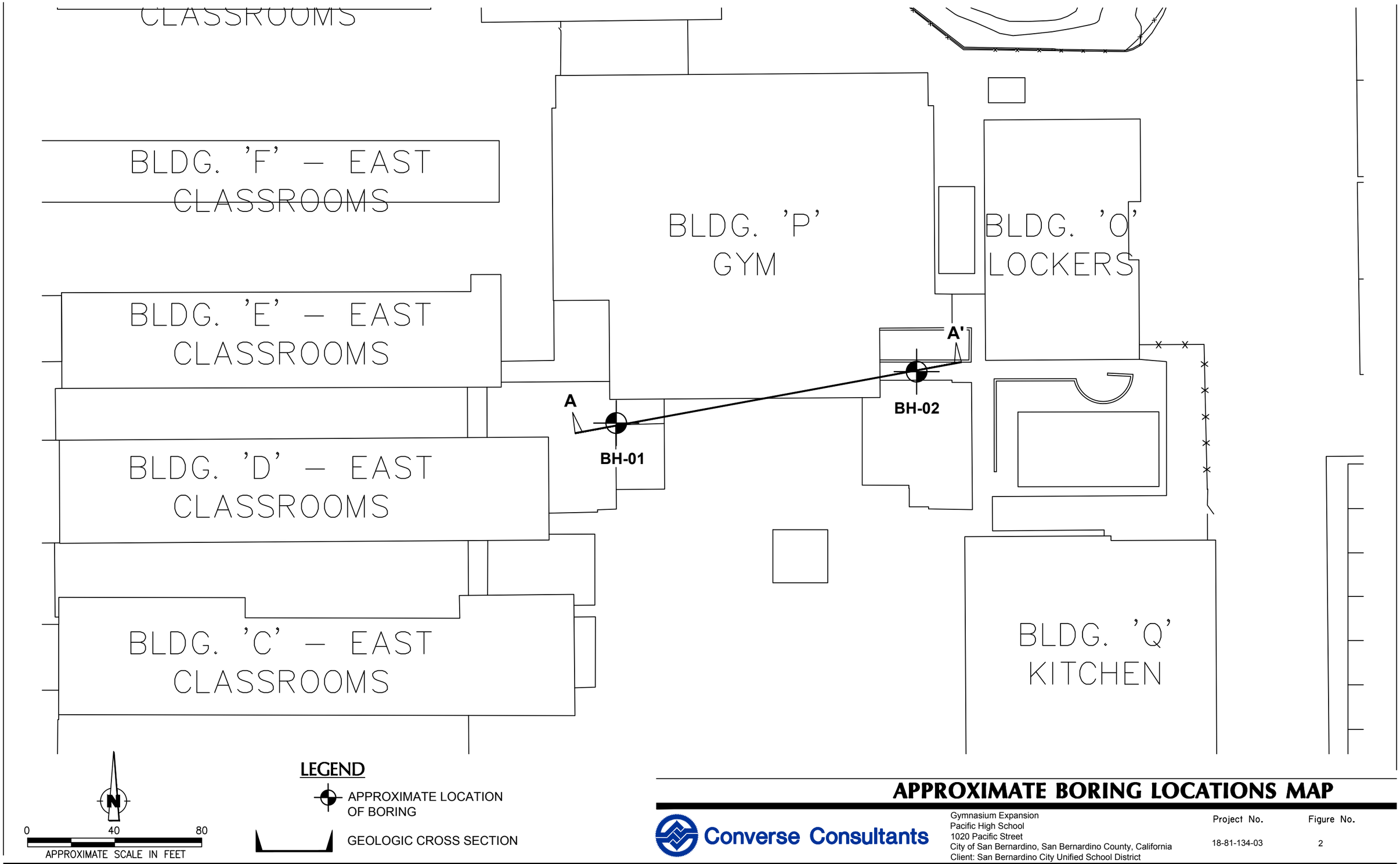
For *in situ* moisture and density data, see the Logs of Borings in Appendix A, *Field Exploration*. For a description of the other laboratory test methods and test results, see Appendix B, *Laboratory Testing Program*.

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 was performed and this report was prepared to present our findings, conclusions and recommendations for the proposed project.

5.0 SITE CONDITIONS

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



APPROXIMATE BORING LOCATIONS MAP

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Gymnasium Expansion
Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Client: San Bernardino City Unified School District

Project No.	Figure No.
18-81-134-03	2

5.1 Surface Profile

The surface around the existing building was paved with asphalt concrete. The measured thicknesses of asphalt concrete are presented in the following table.

Table No. 1, Existing Pavement Sections

Boring No.	Depth (ft)	Asphalt Concrete Thickness (in.)	Aggregate Base Thickness (in.)
BH-01	51.5	4.0	0.0
BH-02	21.5	3.0	0.0

5.2 Subsurface Profile

Based on the exploratory borings and laboratory test results, the subsurface soil at the project site consisted primarily of unconsolidated alluvial soils as a mixture of sand and silt. A sand layer was observed at depths between 30.0 to 35.0 and 20.0 to 21.5 feet bgs in borings BH-01 and BH-02, respectively. A gravelly sand layer was observed at depth between 35.0 to 51.5 feet bgs in boring BH-01. Based on hammer blow counts, the upper 10 feet soils are loose to medium dense. Relative compaction of the upper 10 feet soils varies from 78 to 86 percent.

For a detailed description of the subsurface materials encountered in the exploratory borings, see Drawings No. A-2 and A-3, Logs of Borings, in Appendix A, Field Exploration.

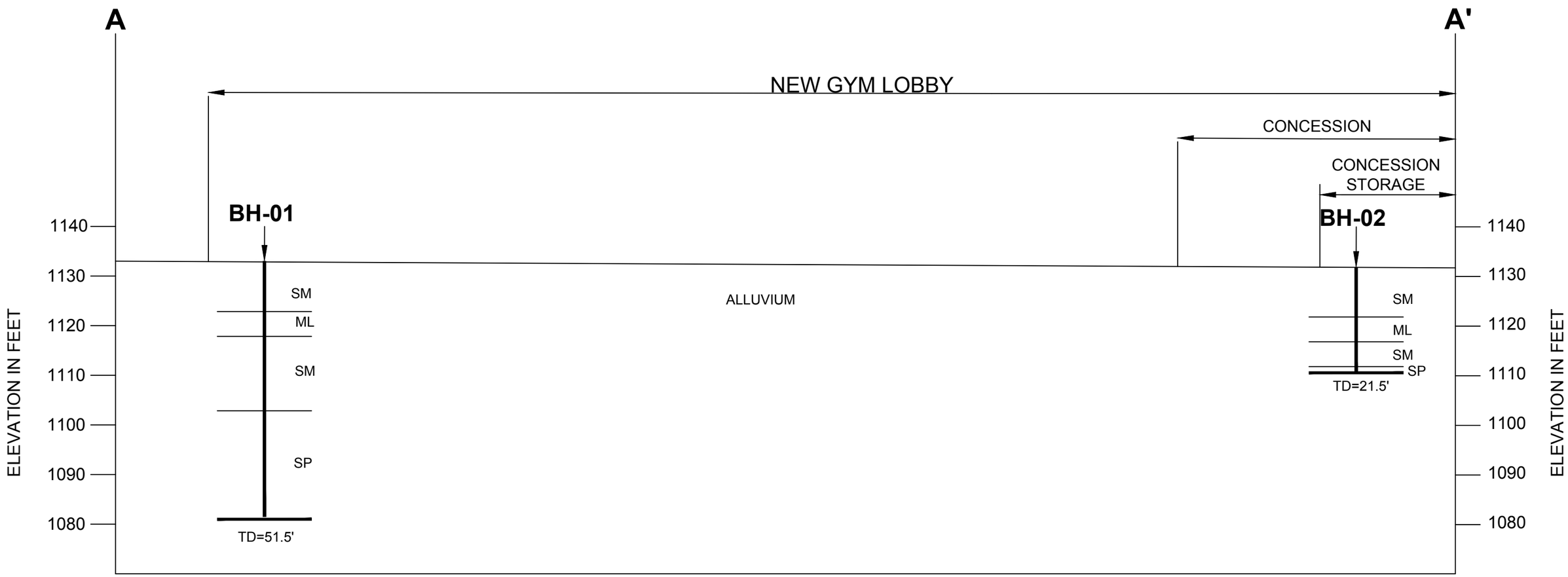
Fill soils were not identified in our subsurface exploration; however, the site has been previously graded for the existing building and fill soil may be present. If present, the fill soils were likely derived from on-site sources and are similar to the native alluvial soils in composition and density.

Figure No. 3, *Geologic Cross Sections A-A'*, 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.*

5.3 Groundwater

Groundwater was not encountered during the field investigation at depths of up to approximately 51.5 feet bgs. Regional databases were reviewed to estimate expected groundwater conditions in the vicinity of the proposed gymnasium expansion. The following data was found on the GeoTracker website (SWRCB, 2018).

- SAN BERNARDINO COUNTY MEDICAL CENTER (Site No. T0607100621), located approximately 2,300 feet southwest of the project site, reported groundwater at depths ranging from 170 to 195 feet bgs in 2001.



PROFILE
HORIZONTAL: 1"=20'
VERTICAL: 1"=20'

0 20 40
GRAPHIC SCALE

GEOLOGIC CROSS SECTION A-A'

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Gymnasium Expansion
Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, CA
For: San Bernardino City Unified School District

Project No.	Drawing No.
18-81-134-03	3

- MOBIL #18-ELG (Site No. T0607100426), located approximately 1.05 miles southwest of the project site reported groundwater at a depth of 150.5 feet bgs in 2006.
- SHELL SERVICE STATION (Site No. T0607101303), located approximately 1.2 miles northeast of the project site, reported groundwater at depths ranging from 200 to 250 feet bgs in 2004.

Data in the following table was found on the National Water Information System (USGS, 2018a). Due to the number of sites with available data in the project area, sites closest to the proposed alignment were selected.

Table No. 2, Summary of USGS Groundwater Depth Data

Site No.	Location	Groundwater Depth Range (ft. bgs)	Date Range
340743117162001	400 feet east of 16th St and Crestview Ave.	(5*)-253.72	1904-2008
340801117162101	Northeast of E. 20th St. and Crestview Ave.	198	1971
340815117154301	North of E. 23rd St. and N. Newport Ave.	38-81	1915-1949
340811117151601	Northeast of E. Highland Ave. and Mountain Ave.	59	1947
340807117162401	Southwest of E. Highland Ave. and Valencia Ave.	218	1970
340737117163801	East of E. Gilbert St. and N. Waterman Ave.	226	1970
340820117164001	North of N. Waterman Ave. and E. 23rd St.	110.3-265	1949-1967
340823117154301	100 feet east of 26th St. and Alameda Ave.	98	1950
340825117155601	Southwest of E. 27th St. and Lawrence Ave.	72-120	1927-1943
340810117162301	300 feet west of E Highland Ave. and Valencia Ave.	42-59	1910-1916

*Based on review of historical groundwater data in the wells listed above, it has been determined that the high groundwater level of -5 feet BGS is doubtful, and therefore, Site No. 340743117162001 has been removed from consideration of the highest historical groundwater level.

<u>Several of the referenced groundwater wells have been monitored for many decades and display a trend of long-term decline in local groundwater levels, likely due to groundwater pumping and development of the area. Considering regional development and sustained groundwater usage, groundwater levels are unlikely to return to the historically shallow levels.</u>

Current groundwater is generally expected to be deeper than 50 feet BGS. The historical high groundwater level was approximately 38 feet bgs. Based on the current and historical groundwater conditions, dewatering is not expected to be required during construction of the building. It should be noted that the groundwater level could vary

depending upon the seasonal precipitation and possible groundwater pumping activity in the site vicinity. Shallow perched groundwater may be present locally, particularly following precipitation.

5.4 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.

5.5 Excavatability

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

5.6 Flooding

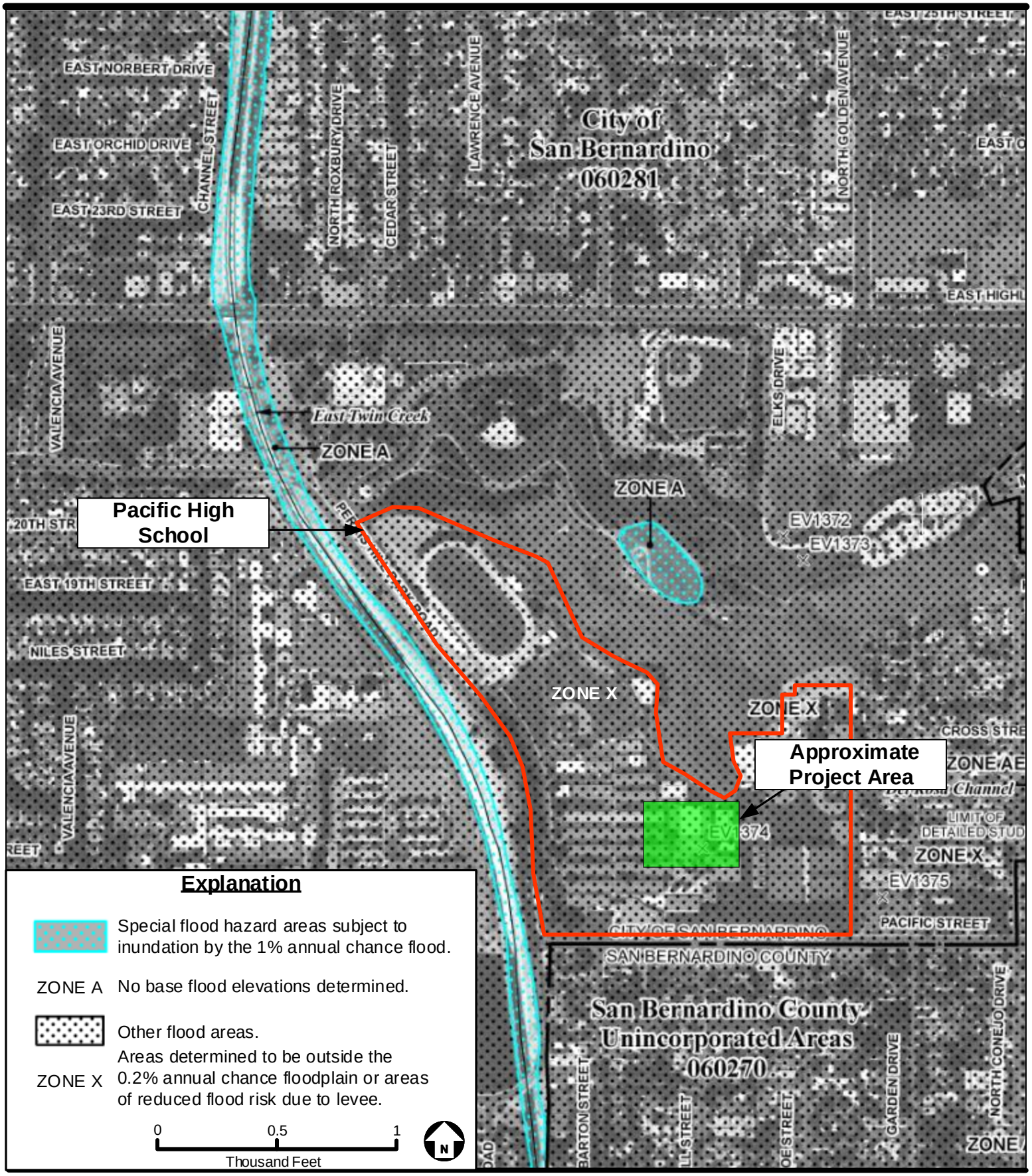
The site is located in an area with reduced flood risk due to levee (FEMA, 2008). The levee is located along the channel west of the campus that runs north-south. The site is located within flood Zone X (500-year flood plain) identified by San Bernardino County (San Bernardino County, 2010a). Figure 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.



Project: Gymnasium Expansion
Location: Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Client: San Bernardino City Unified School District

FEMA Flood Hazard Map

Project No
18-81-134-03

Converse Consultants

FIGURE
4

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.

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

6.2 Site Geology

The project site is situated at the foot of Perris Hill near the central portion of the San Bernardino Valley, which is bounded by the San Bernardino Mountains and the San Andreas fault to the north, and the San Timoteo Badlands and the San Jacinto fault to the south.

Perris Hill, which bounds the school to the north and is located roughly 650 feet east-northeast of the project area is comprised of the Pelona Schist. The Pelona Schist is a mica schist metamorphosed from petroliths of sedimentary and pyroclastic rocks (Dibblee and Minch, 2004). Based on the proximity of Perris Hill to the project site, the Pelona Schist is likely located below the site at an unknown depth. The maximum elevation of Perris Hill is approximately 1,300 feet, nearly 170 feet higher than the project site.

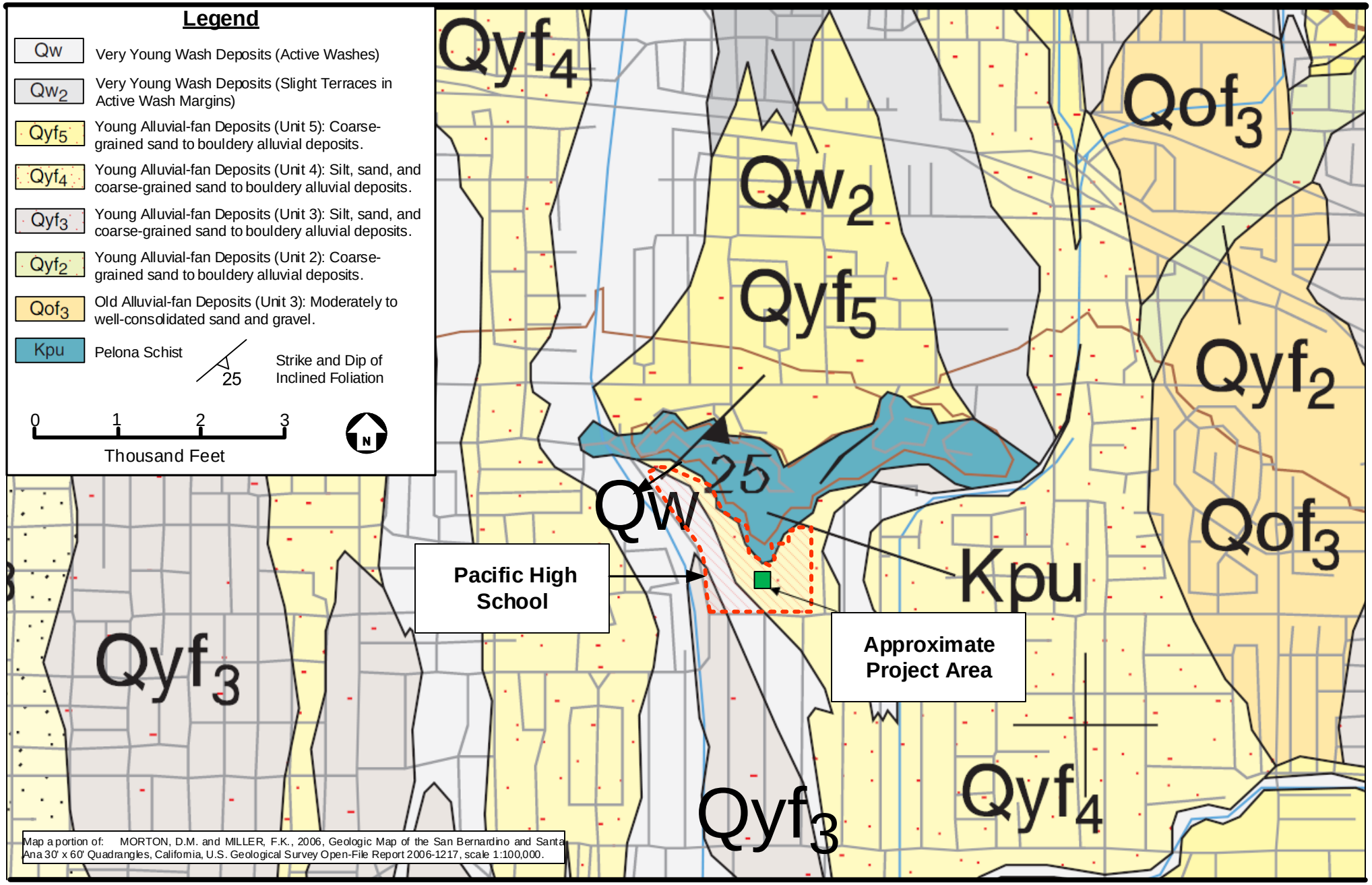
The project site is underlain by alluvial fan deposits primarily consisting of unconsolidated to slightly consolidated silt, sand and gravel. Cretaceous-aged schist bedrock outcrops approximately 150 feet north-northeast of the project site and likely underlies the site at depth. (Dibblee and Minch, 2004; Morton and Miller, 2006).

7.0 FAULTING AND SEISMICITY

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

7.1 Faulting

The site is not located within a San Bernardino County or State of California Earthquake Fault Zone (San Bernardino, 2010b; CGS, 1974). There are no known active faults projecting toward or extending across the project site. See Figure No. 6, *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.



Project: Gymnasium Expansion
Location: Pacific High School
1020 Pacific Street
City of San Bernardino, San Bernardino County, California
Client: San Bernardino City Unified School District

Regional Geologic Map

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FIGURE
5

MAP EXPLANATION

Potentially Active Faults

1906 C

Faults considered to have been active during Quaternary time, solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed, query (?) indicates additional uncertainty Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by creep or possible creep

Aerial photo lineaments (not field checked), based on youthful geomorphic and other features believed to be the results of Quaternary faulting

Special Studies Zone Boundaries

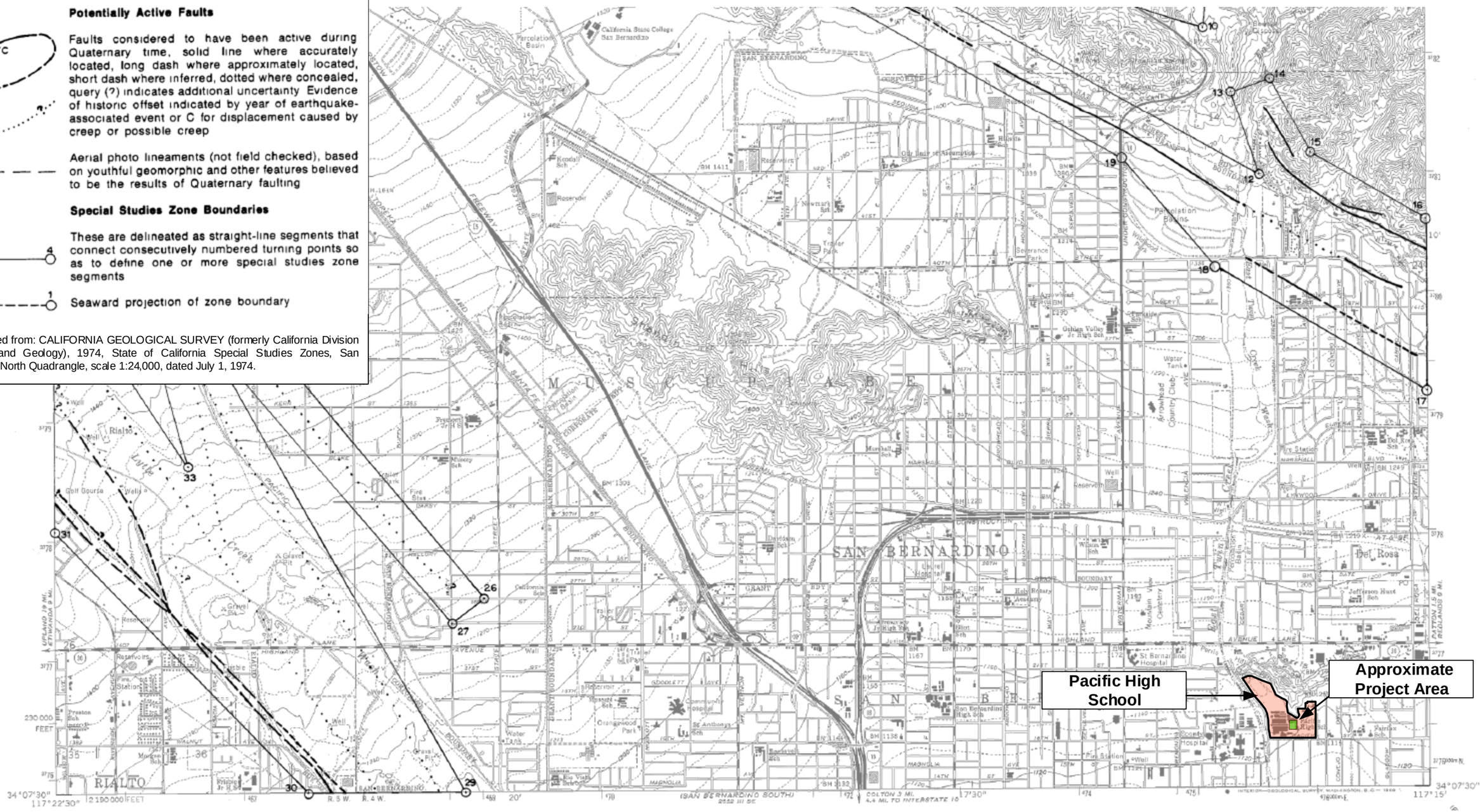
3 — 4

These are delineated as straight-line segments that connect consecutively numbered turning points so as to define one or more special studies zone segments

1

Seaward projection of zone boundary

Map adapted from: CALIFORNIA GEOLOGICAL SURVEY (formerly California Division of Mines and Geology), 1974, State of California Special Studies Zones, San Bernardino North Quadrangle, scale 1:24,000, dated July 1, 1974.



Project: Gymnasium Expansion
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Fault Hazard Map

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FIGURE
6

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. 3, Seismic Characteristics of Nearby Active Faults

Fault Name	Approximate Distance miles (km)	Moment Magnitude (Mw)
San Andreas - Southern	3.9 (6.3)	7.4
San Andreas - San Bernardino	3.9 (6.3)	7.5
San Jacinto-San Bernardino	5.2 (8.3)	6.7
San Jacinto-San Jacinto Valley	8.1 (13.1)	6.9
Cleghorn	10.2 (16.4)	6.5
North Frontal Fault Zone (West)	10.8 (17.4)	7.2
Cucamonga	11.7 (18.8)	6.9
San Andreas – Mojave	19.8 (31.8)	7.4
San Andreas - 1857 Rupture	19.8 (31.8)	7.8
San Jose	24.8 (39.9)	6.4
Sierra Madre	26.4 (42.5)	7.2
Chino-Central Ave. (Elsinore)	27.3 (43.9)	6.7
North Frontal Fault Zone (East)	27.8 (44.8)	6.7
Helendale - S. Lockhardt	28.0 (45.0)	7.3
Elsinore-Glen Ivy	28.5 (45.8)	6.8
Whittier	28.7 (46.2)	6.8
Pinto Mountain	31.4 (50.5)	7.2
San Jacinto-Anza	33.5 (53.9)	7.2
Elsinore-Temecula	34.1 (54.8)	6.8
Clamshell-Sawpit	35.5 (57.1)	6.5
Elysian Park Thrust	36.0 (58.0)	6.7
Lenwood-Lockhart-Old Woman Sprgs	39.0 (62.8)	7.5
Raymond	42.8 (68.9)	6.5
Johnson Valley (Northern)	43.2 (69.5)	6.7
Compton Thrust	47.1 (75.8)	6.8
San Andreas - Coachella	47.7 (76.7)	7.2
Verdugo	47.7 (76.7)	6.9
Landers	48.0 (77.3)	7.3
Burnt Mtn.	49.2 (79.2)	6.5
Eureka Peak	49.8 (80.2)	6.4
Emerson So. - Copper Mtn.	50.0 (80.5)	7.0
Newport-Inglewood (L.A.Basin)	52.4 (84.3)	7.1
Newport-Inglewood (Offshore)	52.6 (84.6)	7.1

Fault Name	Approximate Distance miles (km)	Moment Magnitude (Mw)
Elsinore-Julian	54.0 (86.9)	7.1
Gravel Hills - Harper Lake	55.0 (88.5)	7.1
Hollywood	55.4 (89.2)	6.4
Calico - Hidalgo	56.0 (90.1)	7.3
San Gabriel	59.6 (95.9)	7.2
Sierra Madre (San Fernando)	60.2 (96.9)	6.7
Pisgah-Bullion Mtn.-Mesquite Lk	61.0 (98.2)	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 91 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. Three earthquakes producing estimated ground accelerations at the site ranging from 0.233 g to 0.269 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 14 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 USGS 2008 California Gridded Source, with an MCE of Mw 7.0 and a deterministic peak ground acceleration (PGA) of 0.99g.

In accordance with ASCE 7-10, Section 21.2 the site-specific response spectra can be taken as the lesser of the probabilistic maximum rotated component of MCE ground motion and the 84th percentile of deterministic maximum rotated component of 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. 4, 2016 CBC Mapped Acceleration Parameters

Parameter	Value	Parameter	Value
Site Class	D	**Seismic Design Category**	E
S_s	2.108	**C_{RS}**	1.008
S_1	1.026	**C_{R1}**	0.965
F_a	1	**0.08 F_v/F_a**	0.120
F_v	1.5	**0.4 F_v/F_a**	0.600
S_{MS}	2.108	**T_0**	0.146
S_{M1}	1.539	**T_S**	0.730
S_{DS}	1.405	**T_L**	8
S_{D1}	1.026		

A site-specific response analysis, using faults within 100 kilometers of the site, was developed using the computer program EZ-FRISK v. 7.65 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 3,000 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. 5, Probabilistic Response Spectrum Data

Attenuation Relationship	Probabilistic Mean	Boore-Atkinson (2008)	Campbell-Bozorgnia (2008)	Chiou-Youngs (2007)
Peak Ground Acceleration (g)	1.303	1.236	1.173	1.467
Spectral Period (sec)	**2% in 50yr Probabilistic Spectral Acceleration (g)**			
0.03	1.390	1.335	1.224	1.575
0.05	1.548	1.469	1.367	1.767
0.10	2.144	2.165	1.825	2.351
0.20	2.721	2.737	2.325	3.040
0.30	2.847	2.927	2.391	3.158
0.40	2.823	2.953	2.410	3.055

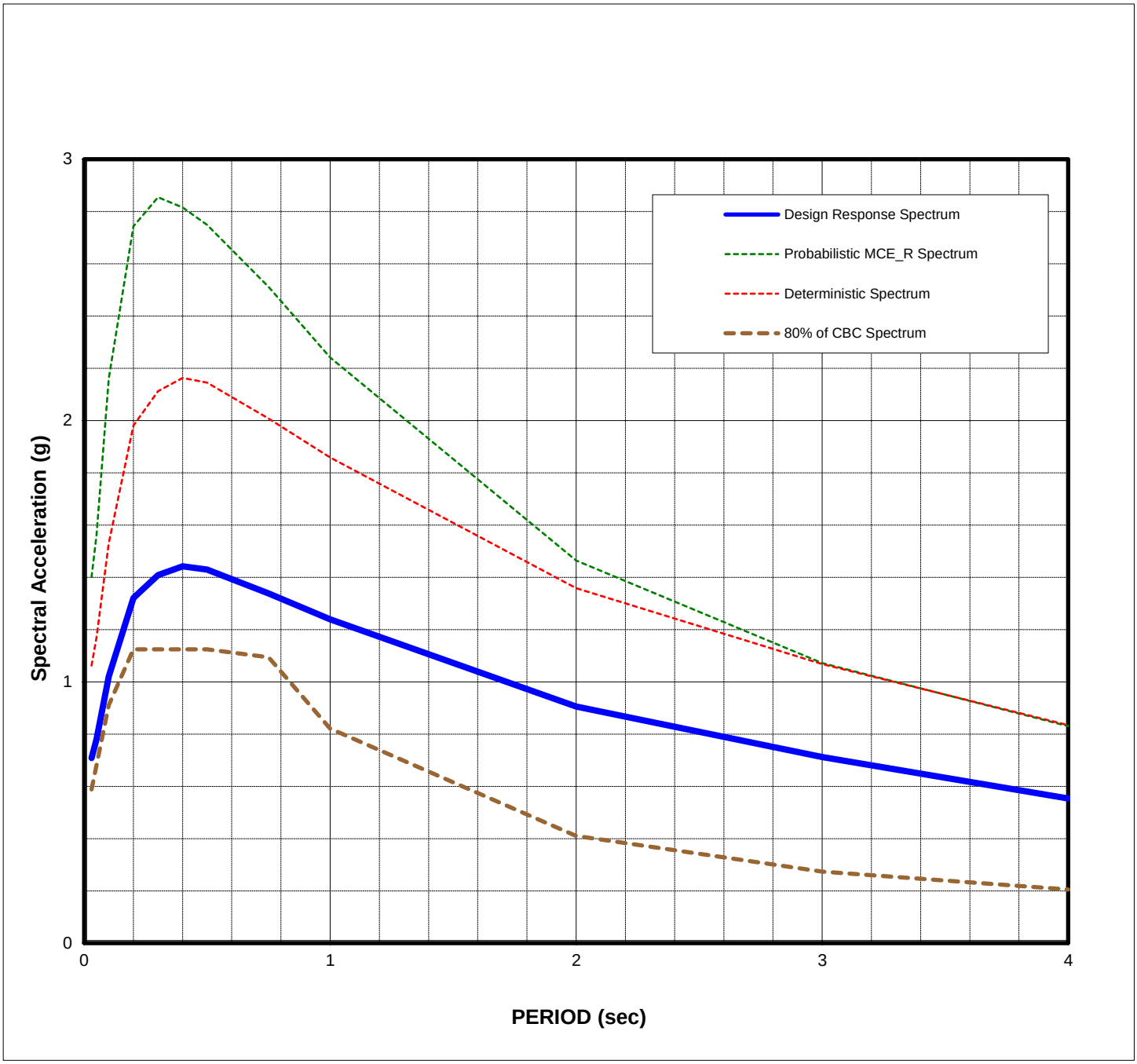
Spectral Period (sec)	2% in 50yr Probabilistic Spectral Acceleration (g)			
0.50	2.771	2.923	2.493	2.877
0.75	2.567	2.687	2.429	2.583
1.00	2.322	2.182	2.334	2.433
2.00	1.517	1.353	1.707	1.472
3.00	1.111	1.064	1.204	1.053
4.00	0.860	0.817	0.965	0.786

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. 6, 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 CBC Lower Level, (g)	Site Specific MCE_R Spectral Acceleration (g)	80% CBC Design Response Spectrum	Site Specific Design Spectral Acceleration (g)
0.03	1.390	1.008	1.401	1.062	0.225	1.062	0.588	**0.71**
0.05	1.548	1.008	1.560	1.169	0.375	1.169	0.681	**0.78**
0.10	2.144	1.008	2.161	1.531	0.750	1.531	0.912	**1.02**
0.20	2.721	1.008	2.743	1.981	1.500	1.981	1.124	**1.32**
0.30	2.847	1.003	2.854	2.112	1.500	2.112	1.124	**1.41**
0.40	2.823	0.997	2.815	2.163	1.500	2.163	1.124	**1.44**
0.50	2.771	0.992	2.748	2.145	1.500	2.145	1.124	**1.43**
0.75	2.567	0.978	2.512	2.007	1.200	2.007	1.094	**1.34**
1.00	2.322	0.965	2.241	1.858	0.900	1.858	0.821	**1.24**
2.00	1.517	0.965	1.464	1.358	0.450	1.358	0.410	**0.91**
3.00	1.111	0.965	1.072	1.068	0.300	1.068	0.274	**0.71**
4.00	0.860	0.965	0.830	0.834	0.225	0.830	0.205	**0.55**

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 7.65
and USGS 2008 fault model database.

SITE SPECIFIC DESIGN RESPONSE SPECTRUM

Project: Gymnasium Expansion
Location: Pacific High School
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City of Moreno Valley, Riverside County, California
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Figure No.

7

Table No. 7, 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}	1.981	1.688
Site-Specific1-second period Spectral Response Acceleration, S_{M1}	2.716	1.231
Site-Specific Design Spectral Response Acceleration for short period S_{DS}	1.321	1.124
Site-Specific Design Spectral Response Acceleration for 1-second period, S_{D1}	1.811	0.821

The EZ-FRISK output files have been included in Appendix D*, EZ-FRISK Output Files* at the end of this report.

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 San Bernardino County or State of California Earthquake Fault Zone (San Bernardino, 2010b; CGS, 1974). Based on review of available geologic information, no major surface fault crosses through or extends towards the site (Morton and Miller, 2006). 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 not located in an area designated by San Bernardino County as susceptible to liquefaction (San Bernardino County, 2010b). See Figure 8, *San Bernardino County Liquefaction Hazard Map* for more details.

The current groundwater depth is greater than 50 feet bgs and historical groundwater depth was at 38 feet bgs. Based on a site-specific liquefaction analysis presented in Appendix C, *Dynamic Settlement Analysis*, liquefaction potential at the project site is up to 1.85 inches.

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, *Dynamic Settlement Analysis*, we estimate that the site will have the potential for up to 5.1 inches of total dry seismic settlement.

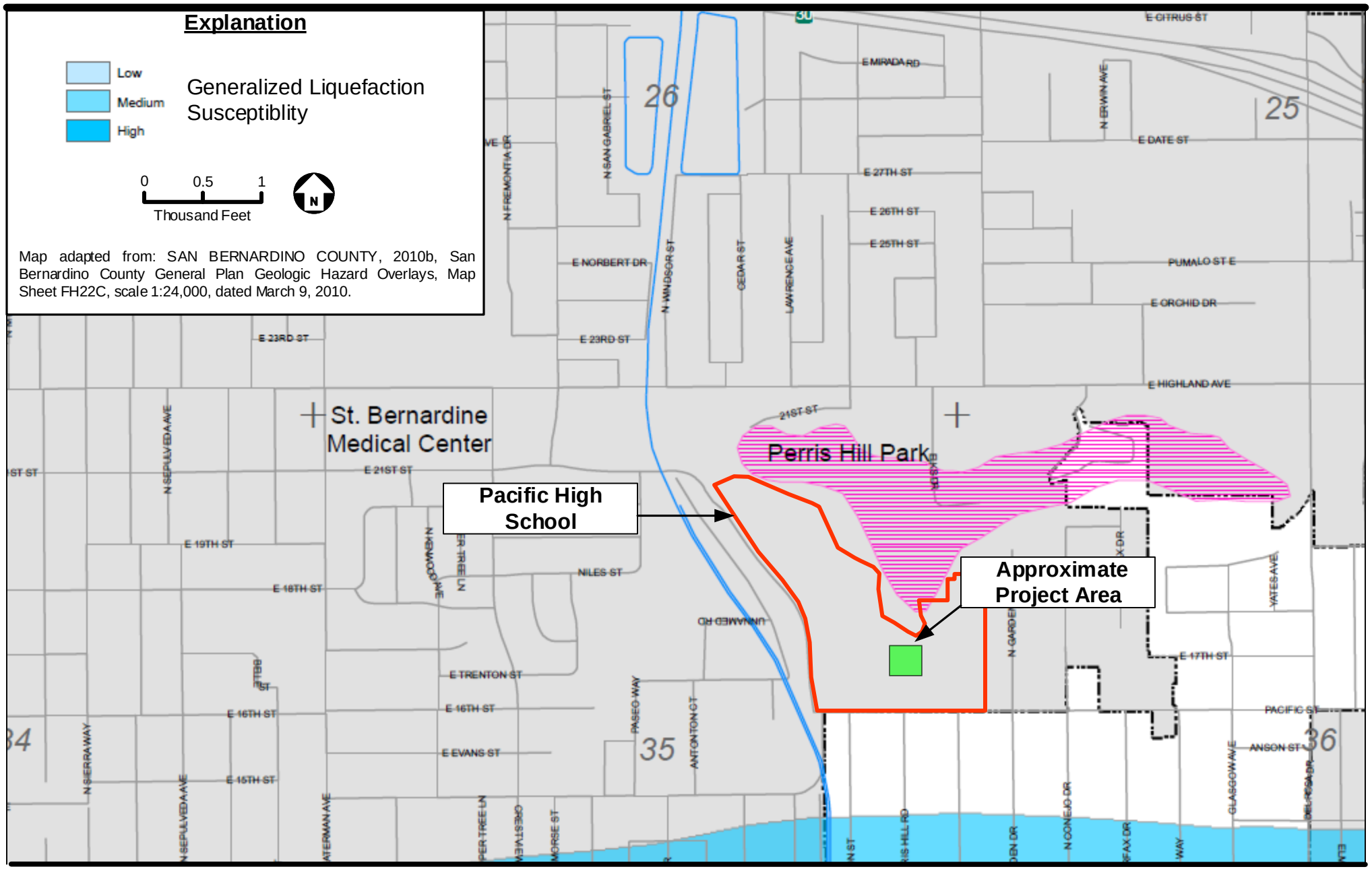
Lateral Spreading: Seismically induced lateral spreading involves primarily lateral movement of earth materials over underlying materials which are liquefied due to ground shaking. It differs from the slope failure in that complete ground failure involving large movement does not occur due to the relatively 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. Perris Hill, which is adjacent to Pacific High School, is designated by San Bernardino County as moderately to highly susceptible to landsliding.

The toe of the closest flank of Perris Hill is located approximately 180 feet north-northeast of the proposed gymnasium expansion. The average slope ratio of the closest flank is approximately 4H:1V (horizontal:vertical). The height of the closest slope is approximately 40 feet. The hill ascends further to the north approximately 120 feet in height with an average slope ratio of 5H:1V.

Based on review of geologic mapping (Dibblee and Minch, 2004), foliation within the Pelona Schist that comprises Perris Hill dips between 12 and 35 degrees south to southeast, away from the proposed new building. Since the building is west to southwest of the hill, it is lateral to the predominant failure direction. Furthermore, a failure surface dipping 15 to 30 degrees out of slope on a 4:1 slope will not daylight and is unlikely to produce a major slope failure.

Due to the distance from Perris Hill, height of Perris Hill in the vicinity of the site, strike and dip of foliation in the Pelona Schist, overall relief, landsliding on Perris Hill is not expected to affect the proposed building. Due to the relatively flat nature of the site, the potential for on-site landsliding is considered to be low.



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Client: San Bernardino City Unified School District

San Bernardino County Liquefaction Hazard Map

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FIGURE
8

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. Seiching could potentially occur in the channel located west of the campus or in bodies of water located on the campus.

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 (San Bernardino County, 2010a). 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.

8.0 LABORATORY TEST RESULTS

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.

8.1 Physical Testing

The results of laboratory tests on samples obtained from the site is presented below.

The results of laboratory tests on samples obtained from the site is presented below.

- *In-situ* Moisture and Dry Density – Results of *in-situ* moisture and dry density tests performed in accordance with ASTM Standard D2216 and ASTM Standard 7263 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 100 to 110 pcf with moisture contents ranging from 6 to 8 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 soils was tested to evaluate the expansion potential in accordance with ASTM Standard D4829. The test result showed an EI of 5, indicating very low expansion potential.
- Grain Size Analysis – Two 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.* The results suggest the soils are typically silty sand.
- Maximum Dry Density and Optimum Moisture Content – Typical moisture-density relationship test of two representative bulk samples were conducted in accordance with ASTM D1557. The results presented are in Drawing No. B-2, *Moisture-Density Relationship Results*, in Appendix B, *Laboratory Testing Program*. The laboratory maximum dry densities were 127.5 and 128.0 pounds per cubic foot (pcf) and the optimum moisture contents were 9.0 and 9.5 percent.

- Direct Shear – Two direct shear tests were performed in accordance with ASTM Standard D3080 on relatively undisturbed ring samples. The results of the direct shear tests are presented in Drawings No. B-3 and B-4, *Direct Shear Test Results* in Appendix B, *Laboratory Testing Program*.
- Consolidation Test – Two consolidation tests were performed on relatively undisturbed samples of the site soil, in accordance to ASTM Standard D2435. The test results are shown on Drawings No. B-5 and B-6, *Consolidation Test Results,* 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

Two representative soil samples were 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 Test Methods 643, 422, and 417. The test results are summarized below and are presented in Appendix B, *Laboratory Testing Program.*

- The pH measurements of the samples were 7.3 and 9.1.
- The sulfate contents of the samples were 0.003 and 0.03 percent by weight.
- The chloride concentrations of the samples were 32 and 200 ppm.
- The minimum electrical resistivities when saturated were 1,213 and 6,548 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 proposed development. 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 structure will be constructed at or near grade. The earthwork for the structure based on the anticipated shallow foundations will consist of remedial grading, fill placement, and facility utility connection backfill.

Prior to the start of any earthwork, the site of the proposed gymnasium expansion should be cleared of all vegetation (if any) and debris. The existing front entry of the building will need to be demolished. All materials resulting from clearing, grubbing, and demolition operations should be removed from the site. All existing underground utilities and appurtenances should be located at the site. Such utilities should either be protected in-place or removed and replaced during construction as required by the project specifications. All excavations should be conducted in such a manner as not to cause loss of bearing and/or lateral support of existing structures or utilities.

All debris, deleterious material, and surficial soils containing roots and perishable materials (if any) should be stripped and removed from the site. Deleterious material, including organics, concrete, and debris generated during excavation, should not be placed as fill.

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 and slabs-on-grade 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. 8, Overexcavation Depths

Structure/Pavement	Minimum Excavation Depth
Building Footings	24 inches below footings or 5 feet below ground surface, whichever is deeper
Slab-on-grade	24 inches below slab

The change in depth of the overexcavation below the footings and slabs-on-grade should be transitioned by a gradual slope. The overexcavation should extend to at least 2 feet beyond the footprint of the building and at least 1 foot beyond the edge of pavement. The overexcavation bottom should be scarified and compacted as described in Section 9.4, *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 Engineered Fill

No fill 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 cleaning 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 1 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 representative prior to delivery to the site.

9.4 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 ±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 ±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.

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.

9.5 Shrinkage and Subsidence

The volume of excavated and recompacted soils may be expected to increase or 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 6 to 16 percent. An average value of 11 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. For estimation purposes, ground subsidence may be taken as 0.1 feet.

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.

9.6 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 1 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.

10.0 DESIGN RECOMMENDATIONS

The existing gymnasium building is supported on conventional continuous shallow foundation systems. The new gymnasium lobby expansion will also be supported on conventional continuous shallow foundation systems. New footings abutting existing footings should have adhesive dowel connections to mitigate differential settlement. New footings should be conservatively sized to carry all new construction loads, without reliance on existing footings. The structural engineer should provide appropriate measures to compatible the existing and new foundations systems.

Recommendations for the design and construction of the proposed building 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 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. 9, Recommended Foundation 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 2,500 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), this assumes that soils, similar to the on-site soils will be utilized for import.

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 for the site are presented in the following table.

Table No. 10, 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 200 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 2,000 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.

10.4 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 9.4 *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 slab curling. Prior to the slab 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-slab 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 slab 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 1 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, *Dynamic Settlement Analysis*. We estimate that the project site has the potential for up to 5.1 inches of dry seismic settlement with up to 1.85 inches of liquefaction induced settlement during a large earthquake. The soil profile across the site is relatively similar. So, we anticipate that the total settlement will be uniform. We recommend that the planned structure be designed conservatively in anticipation of dynamic differential settlement of 0.7 inches in 40 horizontal feet.

Generally, the static and dynamic settlement does not occur at the same time. For design purpose, the structural engineer should decide whether static and dynamic settlement will be combined or not.

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 5, 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

Two representative samples of the site soils were 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 contents of the sampled soils correspond 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 locations 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 resistivities of the samples when saturated were 1,213 to 6,548 Ohm-cm for the site. This indicates that the soils tested of the site are corrosive to moderately 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 and site soils.

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. Recommendations pertaining to temporary excavations are presented in this section.

Depending on the sequence of construction, excavations may be required near existing streets or 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 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	OSHA Soil Type	Depth of Excavation (ft)	Recommended Maximum Slope (Horizontal:Vertical)[1]
Silty Sand (SM)	C	0-10	1.5:1

[1] 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 excavation 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 San Bernardino City Unified School District 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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