Appendix E

Geotechnical Report

GEOTECHNICAL INVESTIGATION
PROPOSED FREEZER BUILDING
7316 GAGE AVENUE
CITY OF COMMERCE, CALIFORNIA

-Prepared By-

Sladden Engineering

6782 Stanton Avenue, Suite C
Buena Park, California 90621
(714) 523-0952

Sladden Engineering

45-090 Golf Center Parkway, Suite F, Indio, CA 92201 (760) 772-3893 Fax (760) 772-3895
6782 Stanton Avenue, Suite C, Buena Park, CA 90621 (714) 523-0952 Fax (714) 523-1369
450 Egan Avenue, Beaumont, CA 92223 (951) 845-7743 Fax (951) 845-8863
800 E. Florida Avenue, Hemet, 92543 (951) 766-8777 Fax (951) 766-8778

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Project No. 444-04194
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Comstock Gage, LLC
c/o Comstock Reality Partners
1801 Century Park East, Suite 1095
Los Angeles, California 90067

Subject: Geotechnical Investigation

Project: Proposed Freezer Building
7316 Gage Avenue
City of Commerce, California

Sladden Engineering is pleased to present the results of our geotechnical investigation performed for the proposed freezer building to be constructed on the site located at 7316 Gage Avenue in the City of Commerce, California. Our services were completed in accordance with our proposal for geotechnical engineering services dated August 29, 2016 and your authorization to proceed with the work. The purpose of our investigation was to explore the subsurface conditions at the site in order to provide recommendations for foundation design and site preparation. Evaluation of environmental issues and hazardous wastes was not included within the scope of services provided.

The opinions, recommendations and design criteria presented in this report are based on our field exploration program, laboratory testing and engineering analyses. Based on the results of our investigation, it is our professional opinion that the proposed project should be feasible from a geotechnical perspective provided that the recommendations presented in this report are implemented into design and carried out through construction.

We appreciate the opportunity to provide service to you on this project. If you have any questions regarding this report, please contact the undersigned.

Respectfully submitted,
SLADDEN ENGINEERING

Matthew J. Cohrt
Principal Geologist

PROFESSIONAL GEOLOGIST
Matthew J. Cohrt
No. 2634
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Brett L. Anderson
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER
BRETT L. ANDERSON
No. C45389
Exp. 9/30/18
CIVIL ENGINEERING
STATE OF CALIFORNIA

James W. Minor III
Staff Geologist

SER/jwm
Copies: 4/Addressee

GEOTECHNICAL INVESTIGATION
PROPOSED FREEZER BUILDING
7316 GAGE AVENUE CITY OF COMMERCE, CALIFORNIA

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INTRODUCTION

This report presents the results of the geotechnical investigation performed by Sladden Engineering (Sladden) for the proposed freezer building to be constructed on the site located at 7316 Gage Avenue in the City of Commerce, California. The site is located at approximately 33.9732 degrees North latitude and 118.1250 degrees West longitude. The approximate location of the site is indicated on the Site Location Map (Figure 1).

Our investigation was conducted in order to evaluate the engineering properties of the subsurface materials, to evaluate their *in-situ* characteristics, and to provide engineering recommendations and design criteria for site preparation, foundation design and the design of various site improvements. This study also includes a review of published and unpublished geotechnical and geological literature regarding seismicity at and near the subject site.

PROJECT DESCRIPTION

Based on our preliminary discussions, it is our understanding that the proposed project will consist of constructing a new freezer building on the project site. In addition, Sladden anticipates that the project will include paved parking areas, exterior concrete flatwork, underground utilities, landscape areas and various other improvements. For our analyses we expect that the proposed new building will be of concrete tilt-up construction supported on conventional shallow spread footings and concrete slabs on grade.

Based on the relatively level nature of the site, it appears that grading will consist of minor cuts and fill placement in order to achieve the final elevations and to provide adequate gradients for site drainage. This does not include remedial grading consisting of the removal and re-compaction of the artificial fill soil associated with the previous landfill closure project. Removals of up to 25 feet are anticipated throughout the new building areas. Sladden should be retained in order to ensure that the recommendations presented within in this report are incorporated into the design of the proposed project.

Structural foundation loads were not available at the time of this report. Based on our experience with relatively lightweight concrete tilt-up structures, we expect that isolated column loads will be less than 80 kips and continuous wall loads will be less than 6.0 kips per linear foot. If these assumed loads vary significantly from the actual loads, we should be consulted to verify the applicability of the recommendations provided.

SCOPE OF SERVICES

The purpose of our investigation was to determine specific engineering characteristics of the surface and near surface soil in order to develop foundation design criteria and recommendations for site preparation. Our supplemental exploration of the site included drilling two (2) additional exploratory boreholes to depths of approximately 51.5 feet below the existing ground surface (bgs) to address seismic settlement potential in accordance with current Los Angeles County requirements. Specifically, our site characterization consisted of the following tasks:

- Site reconnaissance to assess the existing surface conditions on and adjacent to the site.
- The excavation of two (2) additional exploratory boreholes to depths of approximately 51.5 feet bgs in order to characterize the subsurface soil conditions. Representative samples of the soil were classified in the field and retained for laboratory testing and engineering analyses.
- The performance of laboratory testing on selected samples to evaluate their engineering characteristics.
- The review of geologic literature with respect to potential geologic hazards.
- The review of Sladden Engineering's previous Geotechnical Investigation report prepared in 2004 (Appendix D).
- The performance of engineering analyses to develop recommendations for foundation design and site preparation.
- The preparation of this report summarizing our work at the site.

SITE CONDITIONS

The site of the proposed industrial building is located at 7316 Gage Avenue in the City of Commerce, California. The project site is currently vacant. At the time of our investigation, the site was covered with sparsely separated vegetation and debris. The site is bounded by the Interstate 5 Freeway corridor to the east, to the north by an existing hotel, to the south by the Rio Honda River and to the west by a baseball diamond and parking lot.

The project site is relatively level throughout with minor surface gradients related to drainage. According to the USGS 7.5' South Gate Quadrangle map (2012), the site is at an approximate elevation of 155 feet above mean sea level (MSL).

No ponding water or surface seeps were observed at or near the site during our investigation. Site drainage is controlled by surface flow, infiltration and through City or County maintained storm drains located along nearby streets.

GEOLOGIC SETTING

The project site is located in the Peninsular Ranges Physiographic Province of California. The Peninsular Ranges are mountainous areas that extend from the western edge of the continental borderland to the Salton Trough and from the Transverse Ranges Physiographic Province in the north to the tip of Baja California in the south. The province is characterized by elongated, northwest-southeast trending mountain ranges and valleys and is truncated at its northern margin by the east-west grain of the Transverse Ranges.

The site has been mapped by Jenkins (1962) to be immediately underlain by Quaternary-age alluvial materials (Qal). The geologic setting for the site and site vicinity is presented on the Regional Geologic Map (Figure 2).

SUBSURFACE CONDITIONS

The subsurface conditions at the site were investigated by drilling two (2) exploratory boreholes on the project site. The approximate locations of the boreholes are illustrated on the Borehole Location Photograph (Figure 3). The boreholes were advanced using a truck-mounted Mobile B-61 drill rig equipped with 8-inch outside diameter (O.D.) hollow stem augers. A representative of Sladden was on-site to log the materials encountered and retrieve samples for laboratory testing and engineering analyses.

During our field investigation, artificial fill soil was encountered to depths of approximately three (3) feet and twenty-one (21) bgs for BH-1 and BH-2, respectively. Previous bores indicate artificial fill depths of up to 25 feet throughout the proposed building areas (Sladden, 2004). Underlying the artificial fill soil and extending to maximum depths explored, native earth materials were encountered. Generally the native earth material consists of sandy clay (CL) clayey sand (SC) and sand (SP). The native soil appeared yellowish brown to grayish brown in in-situ color. Granular layers appeared medium dense to very dense and fine to coarse-grained. Cohesive layers appeared moist to very moist, very stiff to hard and exhibited low to medium plastic characteristics.

The final logs represent our interpretation of the contents of the field logs, and the results of the laboratory observations and tests of the field samples. The final logs are included in Appendix A of this report. The stratification lines represent the approximate boundaries between soil types although the transitions may be gradual.

Groundwater was not encountered within our bores that extended to the maximum explored depth of approximately 51.5 feet bgs. In addition, historic groundwater has been mapped at an approximate depth of 15 feet bgs (CDMG, 1998). Based upon our bores, it is our opinion that groundwater should not be a factor during construction of the proposed structures. However, following periods of heavy or prolonged rainfall, perched groundwater may be encountered, but will likely dissipate rapidly.

SEISMICITY AND FAULTING

The southwestern United States is a tectonically active and structurally complex region, dominated by northwest trending dextral faults. The faults of the region are often part of complex fault systems, composed of numerous subparallel faults that splay or step from the main fault traces. Strong seismic shaking could be produced by any of these faults during the design life of the proposed project.

We consider the most significant geologic hazard to the project to be the potential for moderate to strong seismic shaking that is likely to occur during the design life of the project. The proposed project is located in the highly seismic Southern California region within the influence of several fault systems that are considered to be active or potentially active. An active fault is defined by the State of California as a "sufficiently active and well defined fault" that has exhibited surface displacement within the Holocene epoch (about the last 11,000 years). A potentially active fault is defined by the State as a fault with a history of movement within Pleistocene time (between 11,000 and 1.6 million years ago).

Table 1 lists the closest known active faults that were generated in part using the EQFAULT computer programs (Blake, 2000), as modified using the fault parameters from The Revised 2002 California Probabilistic Seismic Hazard Maps (Cao et al, 2003). This table does not identify the probability of reactivation or the on-site effects from earthquakes occurring on any of the other faults in the region.

TABLE 1
CLOSEST KNOWN ACTIVE FAULTS

Fault Name	Distance (Km)	Maximum Event
Elysian Park Thrust	<2.0	6.4
Compton Thrust	8.6	6.8
Whittier	9.9	6.8
Newport – Inglewood (L.A. Basin)	15.1	6.9
Raymond	17.3	6.5
Verdugo	17.8	6.7
Hollywood	18.9	6.9
Sierra Madre	23.1	6.7
San Jose	23.3	6.4
Clamshell – Sawpit	25.5	6.5

2013 CBC SEISMIC DESIGN PARAMETERS

Sladden has reviewed the 2013 California Building Code (CBC) and summarized the current seismic design parameters for the proposed structures. The seismic design category for a structure may be determined in accordance with Section 1613 of the 2013 CBC or ASCE7. According to the 2013 CBC, Site Class D may be used to estimate design seismic loading for the proposed structures. The 2013 CBC Seismic Design Parameters are summarized below. The project Design Map Reports are included within Appendix C.

Risk Category (Table 1.5-1): I/II/III
Site Class (Table 1613.3.2): D
S_S (Figure 1613.3.1): 2.126g
S_1 (Figure 1613.3.1): 0.743g
F_a (Table 1613.3.3(1)): 1.0
F_v (Table 1613.5.3(2)): 1.5
S_{MS} (Equation 16-37 {F_a X S_S}): 2.126g
S_{M1} (Equation 16-38 {F_v X S_1}): 1.115g
S_{DS} (Equation 16-39 {2/3 X S_{MS}}): 1.417g
S_{D1} (Equation 16-40 {2/3 X S_{M1}}): 0.743g
Seismic Design Category: D

GEOLOGIC HAZARDS

The subject site is located in an active seismic zone and will likely experience strong seismic shaking during the design life of the proposed project. In general, the intensity of ground shaking will depend on several factors including: the distance to the earthquake focus, the earthquake magnitude, the response characteristics of the underlying materials, and the quality and type of construction. Geologic hazards and their relationship to the site are discussed below.

I. Surface Rupture. Surface rupture is expected to occur along preexisting, known active fault traces. However, surface rupture could potentially splay or step from known active faults or rupture along unidentified traces. Based on review of Jennings (1994), CDOC (2016) and Jenkins (1962), known faults are not mapped on the site. In addition, no signs of active surface faulting were observed during our review of non-stereo digitized photographs of the site and site vicinity (Google, 2016; Terra Server 2002). Finally, no signs of active surface rupture or secondary seismic effects (lateral spreading, lurching etc.) were identified on-site during our field investigation. Therefore, it is our opinion that risks associated with primary surface ground rupture should be considered "low".

II. Ground Shaking. The site has been subjected to past ground shaking by faults that traverse through the region. Strong seismic shaking from nearby active faults is expected to produce strong seismic shaking during the design life of the proposed project. A probabilistic approach was employed to the estimate the peak ground acceleration (a_{max}) that could be experienced at the site. Based on the USGS Interactive Deaggregation (USGS, 2008) and shear wave velocity (Vs30) of 240 m/s (USGS, 2016a), the site could be subjected to ground motions on the order of 0.45g. The peak ground acceleration at the site is judged to have a 475 year return period and a 10 percent chance of exceedence in 50 years.

III. Liquefaction. Liquefaction is the process in which loose, saturated granular soil loses strength as a result of cyclic loading. The strength loss is a result of a decrease in granular sand volume and a positive increase in pore pressures. Generally, liquefaction can occur if all of the following conditions apply: liquefaction-susceptible soil, groundwater within a depth of 50 feet or less, and strong seismic shaking.

The State of California has evaluated the Southgate Quadrangle for liquefaction hazards (CDMG, 1999). The site is currently on the edge of a designated zone of required investigation.

Seismic settlement is often caused when loose granular soil densifies during seismic shaking, potentially resulting in damage to overlying structures and improvements. Sladden has evaluated the potential effects of seismic settlement affecting the project site. The peak ground acceleration used in our analyses was 0.809g (PGAm) in accordance with current guidelines. Historic high groundwater levels were estimated to be approximately 15 feet bgs based on our review of groundwater data of the site vicinity (CDMG, 1998).

A review of the seismically induced settlement of the top 50 feet of the soil profile revealed total settlements of approximately 2.15 inches and 3.37 inches for BH-1 and BH-5, respectively. Differential settlements are expected to be less than 1.5 inches over a horizontal distance of 100 feet. Our seismic settlement estimates are presented on the seismic settlement data sheets within Appendix C.

IV. Tsunamis and Seiches. Because the site is situated at an elevated inland location, and is not immediately adjacent to any impounded bodies of water, risk associated with tsunamis and seiches is considered negligible.

V. Slope Failure, Landsliding, Rock Falls. The site is situated on relatively level ground and is not immediately adjacent to any slopes or hillsides that could be potentially susceptible to slope instability. According to CDMG (1999) the site is not situated within a Seismic Hazard Zone for slope instability. No signs of slope instability in the form of landslides, rock falls, earth flows or slumps were observed at or near the subject site during our investigation. As such, risks associated with slope instability should be considered "negligible".

VI. Expansive Soil. Expansion Index testing was performed in order to evaluate the expansive potential of the materials underlying the site. Based the results of our laboratory testing the materials underlying the site are considered to have a "medium" expansion potential (EI = 58). Accordingly, risk of structural damage caused by volumetric changes in the subgrade soil should be considered "in design". Slabs on grade should be designed based upon post-grading test results. The expansion potential of the surface soil should be reevaluated after grading.

VII. Settlement. Static settlement resulting from the anticipated foundation loads should be minimal provided that the recommendations included in this report are considered in foundation/slab design and construction. The ultimate static settlement is estimated to be less than one inch when using the recommended structural mat slab design criteria. As a practical matter, differential settlement between footings can be assumed as one-half of the total settlement.

VIII. Flooding and Erosion. No signs of flooding or erosion were observed during our field investigation. However, risks associated with flooding and erosion should be evaluated and mitigated by the project design Civil Engineer.

CONCLUSIONS

Based on the results of our investigation, it is our professional opinion that the project should be feasible from a geotechnical perspective provided that the recommendations provided in this report are incorporated into design and carried out through construction. The main geotechnical concern in the design and construction of the proposed project is the presence of undocumented artificial fill soil throughout the site.

Because of the presence of artificial fill soil, remedial grading including overexcavation and recompaction is recommended for the proposed new building and foundation areas. We recommend that remedial grading within the proposed new building areas include the removal and recompaction of the undocumented fill soil throughout the building areas. Specific recommendations for site preparation are presented in the Earthwork and Grading section of this report.

Groundwater was not encountered within our bores to a maximum depth of 51 feet bgs. Historic high groundwater for the site has been reported by the CDMG (1998) at depths of approximately 10 feet bgs at the site. Based on the current conditions, it is our opinion that groundwater should not be a factor during the construction of the proposed project.

Caving did occur to varying degrees within each of our exploratory bores and the surface soil may be susceptible to caving within deeper excavations. All excavations should be constructed in accordance with the normal CalOSHA excavation criteria. On the basis of our observations of the materials encountered, we anticipate that the subsoil will conform to that described by CalOSHA as Type B or C. Soil conditions should be verified in the field by a "Competent person" employed by the Contractor.

In accordance with Section 111 of the Los Angeles County Building Code, it is our opinion that the construction of the proposed building and the related site grading will not negatively impact the project site or the adjacent properties. The proposed development will not be subject to landslides, slippage or settlements provided that the recommendations included in the referenced report are incorporated into design and construction.

The following recommendations present more detailed design criteria that have been developed on the basis of our field and laboratory investigation.

EARTHWORK AND GRADING

All earthwork including excavation, backfill and preparation of the surface soil, should be performed in accordance with the geotechnical recommendations presented in this report and portions of the local regulatory requirements, as applicable. All earth work should be performed under the observation and testing of a qualified soil engineer. The following geotechnical engineering recommendations for the proposed project are based on observations from the field investigation program, laboratory testing and geotechnical engineering analyses.

a. Stripping. Areas to be graded should be cleared of the existing buildings, pavement, surface improvements, and underground utilities. All areas scheduled to receive fill should be cleared of surface improvements and any unsuitable matter. The unsuitable materials should be removed off-site. Voids left by obstructions should be properly backfilled in accordance with the compaction recommendations of this report.

b. Preparation of New Building Areas. In order to provide uniform foundation bearing conditions and to help mitigate future seismic settlements, we recommend over-excavation and re-compaction of the artificial fill soil throughout the new building areas. The artificial fill and native low density near surface soil should be removed to competent native soil expected at depths of up to 25 feet below existing grade. Remedial grading should extend laterally, a minimum of 10 feet beyond perimeter wall foundations where possible. The exposed surface soil should then be scarified, moisture conditioned to within two percent of optimum moisture content, and compacted to at least 90 percent relative compaction.

c. Slot Cuts: Special care should be exercised when excavating adjacent to the property lines. As mentioned in previous sections of this report, removals within the subject site are anticipated to depths of approximately 25 feet below the adjacent ground surface. The temporary sidewalls of the excavations for these removals are recommended to be constructed at a slope ratio not steeper than 1:1 (horizontal: vertical). To facilitate removals and protect the adjacent properties, slot cutting techniques in a repeating "ABC" sequence may be required. First, all the slots designated as "A" should be excavated, backfilled and re-compacted. The procedure should continue with the "B" slots and end with the "C" slots. The width of each slot should not exceed 10 feet. If any evidence of potential instability is observed, revised recommendations such as narrower slot cuts may be necessary. All slot excavation and backfilling procedures should be performed under the observation and testing of a qualified geotechnical engineer.

d. Compaction. Soil to be used as engineered fill should be free of organic material, debris, and other unsuitable material, and should not contain irreducible matter greater than 8 inches in maximum dimension. All fill materials should be placed in thin lifts, not exceeding six inches in a loose condition. If import fill is required, the material should be of a low to non-expansive nature and should meet the following criteria:

Plastic Index	Less than 12
Liquid Limit	Less than 35
Percent Soil Passing #200 Sieve	Between 15% and 35%
Maximum Aggregate Size	3 inches

The subgrade and all fill material should be compacted with acceptable compaction equipment, to at least 90 percent relative compaction. The bottom of the exposed subgrade should be observed by a representative of Sladden Engineering prior to fill placement. The previously removed soil may then be replaced in thin lifts at near optimum moisture content and compacted to at least 90 percent relative compaction. Compaction testing should be performed on all lifts in order to ensure proper placement of the fill materials. Table 2 provides a summary of the excavation and compaction recommendations.

TABLE 2
SUMMARY OF RECOMMENDATIONS

*Remedial Grading	Excavation and recompaction within the building envelope and extending laterally at least 10 feet beyond the building limits and to a minimum depth of 5 feet below the bottom of the footings.
Native / Import Engineered Fill	Place in thin lifts not exceeding 6 inches in a loose condition, compact to a minimum of 90 percent relative compaction.
Asphalt Concrete Sections	Compact the top 12 inches to at least 95 percent compaction within 2 percent of optimum moisture content.

*Actual depth may vary and should be determined by a representative of Sladden Engineering in the field during construction.

e. Shrinkage and Subsidence. Volumetric shrinkage of the material that is excavated and replaced as controlled compacted fill should be anticipated. We estimate that this shrinkage could be up to 40 percent. Subsidence of the surfaces that are scarified and compacted should be between 1 and 2 tenths of a foot. This will vary depending upon the type of equipment used, the moisture content of the soil at the time of grading and the actual degree of compaction attained. The losses associated with the removal of unsuitable materials cannot be calculated at this time but could be significant.

FOUNDATIONS: CONVENTIONAL SHALLOW SPREAD FOOTINGS

Conventional spread footings may be used for the support of the proposed industrial/warehouse building. Footings should extend at least 18 inches beneath lowest adjacent grade. Isolated square or rectangular footings at least 2 feet square and continuous footings at least 12 inches wide may be designed using allowable bearing pressures of 2000 and 1800 pounds per square foot, respectively. The allowable bearing pressure may be increased by approximately 250 psf for each additional 1 foot of width and 250 psf for each additional 6 inches of depth, if desired. The maximum allowable bearing pressure should be limited to 3000 psf unless confirmed by Sladden Engineering subsequent to performing specific settlement calculations. The allowable bearing pressures are for dead and frequently applied live loads and may be increased by 1/3 to resist wind, seismic or other transient loading.

The allowable bearing pressure may be increased by one-third when considering transient live loads, including seismic and wind forces. All footings should be reinforced in accordance with the project structural engineer's recommendations.

Resistance to lateral loads may be provided by a combination of friction acting at the base of foundations and passive earth pressure along the sides of the foundations. A coefficient of friction of 0.40 between soil and concrete may be used for dead load forces only. A passive earth pressure of 250 pounds per square foot, per foot of depth, may be used for the sides of footings that are placed against properly compacted native soil. Passive earth pressure should be ignored within the upper 1 foot except where confined.

All footing excavations should be observed by a representative of the project geotechnical consultant to verify adequate embedment depths prior to placement of forms, steel reinforcement or concrete. The excavations should be trimmed neat, level and square. All loose, disturbed, sloughed or moisture-softened soils and/or any construction debris should be removed prior to concrete placement. Excavated soil generated from footing and/or utility trenches should not be stockpiled within the building envelope or in areas of exterior concrete flatwork.

RETAINING WALLS

Retaining walls may be required to accomplish the proposed construction. Cantilever retaining walls may be designed using "active" pressures. Active pressures may be estimated using an equivalent fluid weight of 40 pcf for native backfill soil with level free-draining backfill conditions. "At Rest" pressures should be utilized for restrained walls. At rest pressures may be estimated using an equivalent fluid weight of 60 pcf for native backfill soil with level drained backfill conditions.

SLABS-ON-GRADE

In order to reduce the risk of heave, cracking and settlement, concrete slabs-on-grade must be placed on properly compacted fill as outlined in the previous sections. The slab subgrades should remain near optimum moisture content and should not be permitted to dry prior to concrete placement. All slab subgrades should be firm and unyielding. Disturbed soil should be removed and then replaced and compacted to a minimum of 90 percent relative compaction.

Slabs with moisture sensitive surfaces should be underlain with a moisture vapor barrier consisting of a polyvinyl chloride membrane such as 10-mil Visqueen. All laps within the membrane should be sealed and at least 2 inches of clean sand should be placed over the membrane to promote uniform curing of the concrete and to limit damage. To reduce the potential for punctures, the membrane should be placed on a pad surface that has been graded smooth without any sharp protrusions. If a smooth surface can not be achieved by grading, consideration should be given to placing a 1-inch thick leveling course of sand across the pad surface prior to placement of the membrane.

PRELIMINARY PAVEMENT DESIGN

Asphalt concrete pavements should be designed in accordance with Topic 610 of the Caltrans Highway Design Manual based on R-Value and Traffic Index. The R-Value of the near surface soil was determined to be 81. On-site soil and any imported soil should be tested for R-Value prior to establishing final pavement design sections. For preliminary pavement design, Traffic Indices (TI) of 5.0 and 6.5 were used for the light duty and heavy duty pavements, respectively. We assumed Asphalt Concrete (AC) over Class II Aggregate Base (AB). The preliminary flexible pavement layer thickness is as follows:

RECOMMENDED ASPHALT PAVEMENT SECTION LAYER THICKNESS		
Pavement Material	Recommended Thickness	
	TI=5.0	TI=6.5
Asphalt Concrete Surface Course	3.0 inches	4.0 inches
Class II Aggregate Base Course	6.0 inches	8.0 inches
Compacted Subgrade Soil	12 inches	12 inches

Asphalt concrete should conform to Sections 203 and 302 of the latest edition of the Standard Specifications for Public Works Construction (Caltrans or Greenbook). Class II aggregate base should conform to Section 26 of the Caltrans Standard Specifications or Greenbook, latest edition. The aggregate base course should be compacted to at least 95 percent of the maximum dry density as determined by ASTM Test Method D 1557.

We expect that concrete pavement will be used for loading dock areas and possibly some on-site pavement areas. A concrete pavement section of 6.0 inches of Portland Cement Concrete (PCC) on 4.0 inches of aggregate base material should be adequate for the on-site concrete pavement subject to light vehicle traffic and occasional heavy truck traffic. In areas where repeated and regular heavy truck traffic is expected, the concrete pavement section should be increased to 8.0 inches of PCC on 6.0 inches of aggregate base material. Properly spaced and constructed control joints including expansion joints and contraction joints should be incorporated into concrete pavement design to accommodate temperature and shrinkage related cracking. Joint spacing and joint patterns should be established based upon Portland Cement Association (PCA) and American Concrete Institute (ACI) guidelines.

CORROSION SERIES

The soluble sulfate concentrations of the surface soil were determined to be 200 parts per million (ppm). The soil is considered to have a "low" corrosive potential with respect to concrete. The use of Type V cement and special sulfate resistant concrete mixes should not be necessary. However, the soluble sulfate concentration should be reevaluated after the grading and compaction work is completed. Soluble sulfate content of the surface soil should be reevaluated after grading and appropriate concrete mix designs should be established based upon post-grading test results.

The pH level of the surface soil was 7.7. Based on soluble chloride concentration testing (50 ppm), the soil is considered non-corrosive with respect to normal grade steel. The minimum resistivity of the surface soil was found to be 2200 ohm-cm that suggests the site soil is considered to be "moderate" corrosive with respect to ferrous metal installations. A corrosion expert should be consulted regarding appropriate corrosion protection measures.

UTILITY TRENCH BACKFILL

All utility trench backfill should be compacted to a minimum relative compaction of 90 percent. Trench backfill materials should be placed in lifts no greater than six inches in their loose state, moisture conditioned (or air-dried) as necessary to achieve near optimum moisture conditions, and then mechanically compacted in place to a minimum relative compaction of 90 percent. A representative of the project geotechnical consultant should test the backfills to verify adequate compaction.

EXTERIOR CONCRETE FLATWORK

To minimize cracking of concrete flatwork, the subgrade soil below concrete flatwork areas should first be compacted to a minimum relative compaction of 95 percent. A representative of the project geotechnical consultant should observe and verify the density and moisture content of the soil.

DRAINAGE

All final grades should be provided with positive gradients away from foundations to provide rapid removal of surface water runoff to an adequate discharge point. No water should be allowed to be pond on or immediately adjacent to foundation elements. In order to reduce water infiltration into the subgrade soil, surface water should be directed away from building foundations to an adequate discharge point. Subgrade drainage should be evaluated upon completion of the precise grading plans and in the field during grading.

LIMITATIONS

The findings and recommendations presented in this report are based upon interpolation of the soil conditions between the exploratory bore locations and extrapolation of these conditions throughout the proposed building areas. Should conditions encountered during grading appear different than those indicated in this report, this office should be notified.

The use of this report by other parties or for other projects is not authorized. The recommendations of this report are contingent upon monitoring of the grading operation by a representative of Sladden Engineering. All recommendations are considered to be tentative pending our review of the grading operation and additional testing, if indicated. If others are employed to perform any soil testing, this office should be notified prior to such testing in order to coordinate any required site visits by our representative and to assure indemnification of Sladden Engineering.

We recommend that a pre-job conference be held on the site prior to the initiation of site grading. The purpose of this meeting will be to assure a complete understanding of the recommendations presented in this report as they apply to the actual grading performed.

ADDITIONAL SERVICES

Once completed, final project plans and specifications should be reviewed by use prior to construction to confirm that the full intent of the recommendations presented herein have been applied to design and construction. Following review of plans and specifications, observation should be performed by the Soil Engineer during construction to document that foundation elements are founded on/or penetrate into the recommended soil, and that suitable backfill soil is placed upon competent materials and properly compacted at the recommended moisture content.

Tests and observations should be performed during grading by the Soil Engineer or his representative in order to verify that the grading is being performed in accordance with the project specifications. Field density testing shall be performed in accordance with acceptable ASTM test methods. The minimum acceptable degree of compaction should be 90 percent for subgrade soils and 95 percent for Class II aggregate base as obtained by the ASTM D1557-91 test method. Where testing indicates insufficient density, additional compactive effort shall be applied until retesting indicates satisfactory compaction.

REFERENCES

Blake, T., 2000, EQFAULT and EQSEARCH, Computer Programs for Deterministic and Probabilistic Prediction of Peak Horizontal Acceleration from Digitized California Faults.

California Building Code (CBC), 2013, California Building Standards Commission.

California Department of Conservation (CDOC), 2016, Regulatory Maps; available at: http://www.quake.ca.gov/gmaps/WH/regulatorymaps.htm

California Division of Mines and Geology (CDMG), 1998, Seismic Hazard Zone Report for the Southgate 7.5-Minute Quadrangle, Los Angeles County, California; Seismic Hazard Zone Report 034.

California Division of Mines and Geology (CDMG), 1999, State of California, Seismic Hazard Zones Map, Southgate Quadrangle.

California Geological Survey, (CGS), 2011, Note 48

Cao T., Bryant, W.A., Rowshandel B., Branum D., Wills C.J., (2003), "The Revised 2002 California Probabilistic Seismic Hazard Maps".

GoogleEarth.com, 2016, Vertical Aerial Photographs for the South Gate area, California, Undated, Variable Scale; Reviewed at googlearth.com

Jennings, Charles W. (Compiler), 1994, Fault Activity Map of California and Adjacent Areas, California Division of Mines and Geology, Geologic Data Map No. 6

Jenkins, O. P., 1962, Geologic Map of California, Los Beach Sheet; 1:250,000.

Sladden Engineering, 2004, Geotechnical Investigation Report Prepared for 7316 East Gage Avenue City of Commerce, California, Project No. 444-4194, Report No. 04-10-247.

TerraServer, Inc., 2002, Aerial Photographs and Topographic Maps at Various Scales. Available at www.terraserve.com

United States Geological Survey (USGS), 2012, Southgate 7.5 Minute Quadrangle Map, 1:24000.

United States Geological Survey (USGS), 2008, Interactive Deaggregations; available at: https://geohazards.usgs.gov/deaggint/2008/

United State Geological Survey (USGS), 2016a, Custom Vs30 Mapping; available at: http://earthquake.usgs.gov/hazards/apps/vs30/custom.php

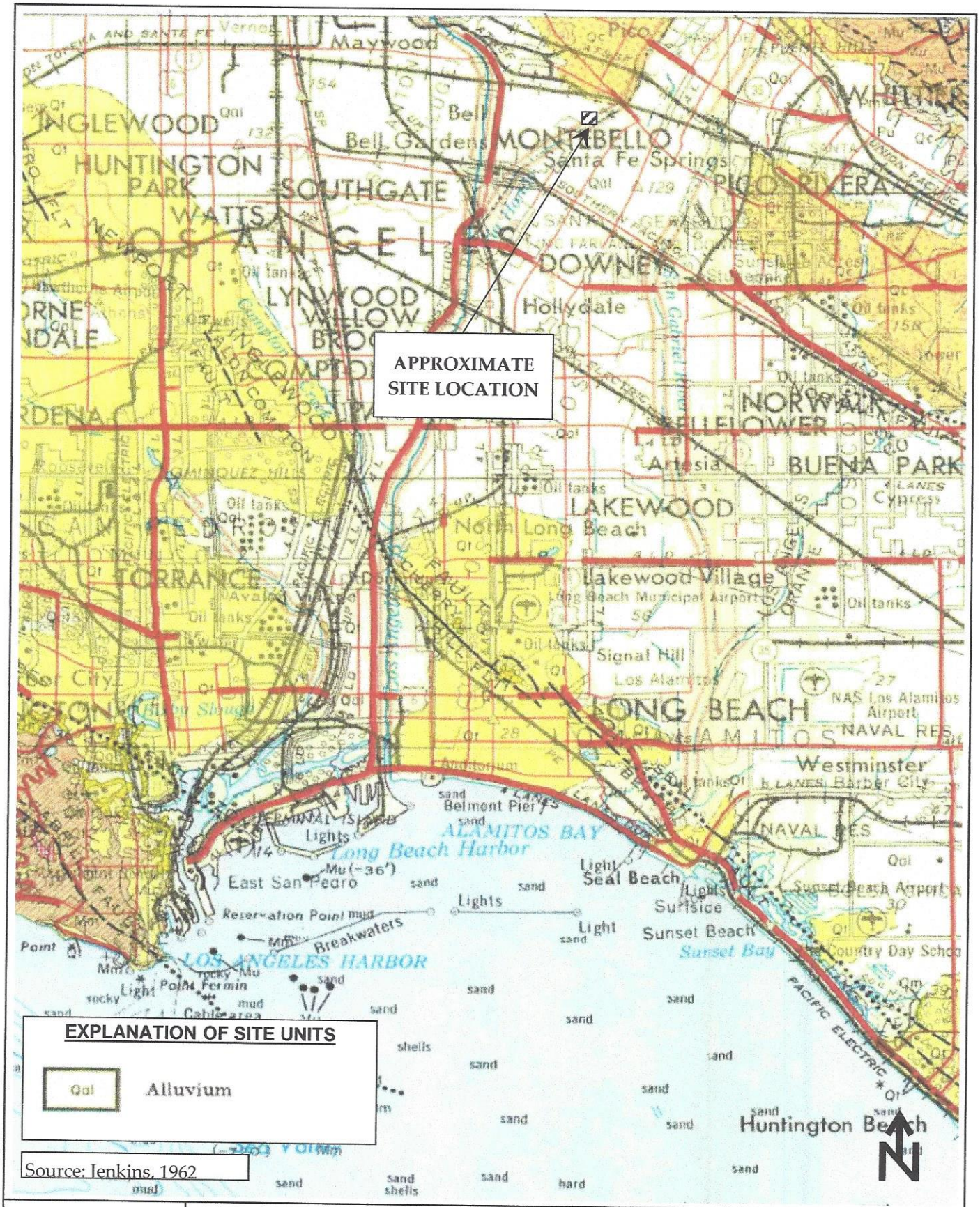
United State Geological Survey (USGS), 2016b, U.S. Seismic Design Maps; available at: http://earthquake.usgs.gov/designmaps/us/application.php

FIGURES

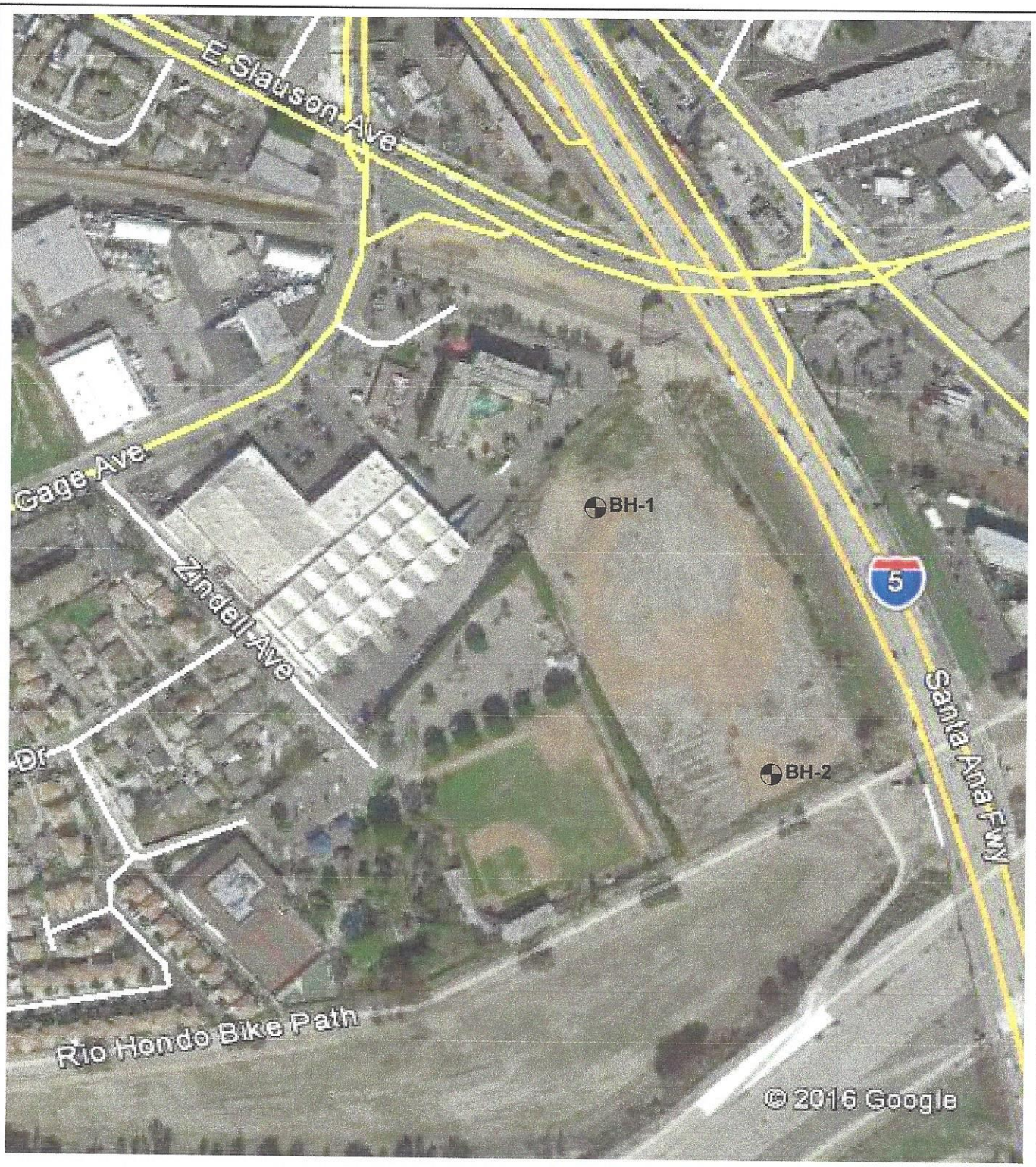
SITE LOCATION MAP
REGIONAL GEOLOGIC MAP
BOREHOLE LOCATION PHOTOGRAPH



Sladden Engineering	SITE LOCATION MAP	FIGURE 1
	Project Number: 444-04194	
	Report Number: 16-10-124	
	Date: October 17, 2016	



Sladden Engineering	REGIONAL GEOLOGIC MAP		FIGURE
	Project Number:	444-04194	2
	Report Number:	16-10-124	
	Date:	October 17, 2016	



N

Sladden Engineering

BOREHOLE LOCATION PHOTOGRAPH

FIGURE 3

Project Number:	444-04194
Report Number:	16-10-124
Date:	October 17, 2016

APPENDIX A

FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

For our field investigation two (2) additional exploratory bores were excavated August 20, 2016 utilizing a truck-mounted hollow stem auger rig (Mobile B-61). Continuous logs of the materials encountered were made by a representative of Sladden Engineering. Materials encountered in the boreholes were classified in accordance with the Unified Soil Classification System (USCS) that is presented in this appendix.

Representative undisturbed samples were obtained within our bores by driving a thin-walled steel penetration sampler (California split spoon sampler) or a Standard Penetration Test (SPT) sampler with a 140 pound automatic-trip hammer dropping approximately 30 inches (ASTM D1586). The number of blows required to drive the samplers 18 inches was recorded in 6-inch increments and blowcounts are indicated on the boring logs.

The California samplers are 3.0 inches in diameter, carrying brass sample rings having inner diameters of 2.5 inches. The standard penetration samplers are 2.0 inches in diameter with an inner diameter of 1.5 inches. Undisturbed samples were removed from the sampler and placed in moisture sealed containers in order to preserve the natural soil moisture content. Bulk samples were obtained from the excavation spoils and samples were then transported to our laboratory for further observations and testing.

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			TYPICAL NAMES	
COARSE GRAINED SOILS MORE THAN HALF IS LARGER THAN No.200 SIEVE	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN No.4 SIEVE SIZE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, POORLY-GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN No.4 SIEVE SIZE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN HALF IS SMALLER THAN No.200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS & 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, CLEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS: LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

EXPLANATION OF BORE LOG SYMBOLS


California Split-spoon Sample


Unrecovered Sample


Standard Penetration Test Sample


Groundwater depth

Note: The stratification lines on the borelogs represent the approximate boundaries between the soil types; the transitions may be gradual.

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	9/20/2016
Elevation:	153 Ft (MSL)	Boring No:	BH-1

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
	19/30/35	1	58	74.2	9.3	127.6	2		Sandy Clay (CL); yellowish brown, moist, hard, low plasticity (Fill).
	26/50-5"			75.0	10.1	123.1	6		Sandy Clay (CL); yellowish brown, moist, hard, low plasticity (Qal).
	8/9/11			77.5	21.2		10		Sandy Clay (CL); yellowish brown, moist to very moist, very stiff, low plasticity (Qal).
	9/14/14			3.7	2.8	106.5	16		Sand (SP); yellowish brown, slightly moist, medium dense, fine- to coarse-grained (Qal).
	9/13/21			5.4	4.1		20		Sand (SP); yellowish brown, slightly moist, dense, fine- to coarse-grained (Qal).
	11/17/26			3.6	3.1	103.2	26		Sand (SP); yellowish brown, slightly moist, medium dense, fine- to coarse-grained (Qal).
	6/4/9			39.6	12.5		30		Clayey Sand (SC); yellowish brown, moist, medium dense, fine- to coarse-grained (Qal).
	20/31/50-3"			51.2	12.8	106.8	36		Sandy Clay (CL); yellowish brown, moist, hard, low plasticity (Qal).
	9/12/12			90.4	32.1		40		Sandy Clay (CL); yellowish brown, moist, very stiff, low plasticity (Qal).
	21/50-6"			3.8	2.3	104.7	46		Sand (SP); yellowish brown, slightly moist, very dense, fine- to coarse-grained (Qal).
	18/30/30			7.6	4.0		50		Sand (SP); yellowish brown, slightly moist, very dense, fine- to coarse-grained (Qal).

Completion Notes:
Terminated at ~ 51.5 feet bgs.
No Bedrock Encountered.
No Groundwater or Seepage Encountered.

PROPOSED FREEZER BUILDING
7316 GAGE AVENUE, CITY OF COMMERCE

Project No: 444-04194
Report No: 16-10-124

SLADDEN ENGINEERING

BORE LOG

Drill Rig:	Mobile B-61	Date Drilled:	9/20/2016
Elevation:	152 Ft (MSL)	Boring No:	BH-2

Sample	Blow Counts	Bulk Sample	Expansion Index	% Minus #200	% Moisture	Dry Density	Depth (Feet)	Graphic Lithology	Description
							0–20		Silty Sand (SM); black, slightly moist to moist, fine- to coarse-grained with gravel and plastic, metal and wood debris (Fill).
	6/10/14			5.7	3.8		20–30		Sand (SP); yellowish brown, slightly moist, medium dense, fine- to coarse-grained (Qal).
	10/15/17			3.8	3.9	100.5	30–35		Sand (SP); yellowish brown, slightly moist, medium dense, fine- to coarse-grained (Qal).
	6/8/11			43.5	17.3		35–40		Clayey Sand (SC); yellowish brown, moist, medium dense, fine- to coarse-grained (Qal).
	14/21/26			9.7	4.6	101.8	40–45		Sand (SP); yellowish brown, slightly moist, dense, fine- to coarse-grained (Qal).
	15/19/19			7.2	4.2		45–50		Sand (SP); yellowish brown, slightly moist, dense, fine- to coarse-grained (Qal).
	24/38/38			5.1	3.6	113.0	50		Sand (SP); yellowish brown, slightly moist, very dense, fine- to coarse-grained (Qal).

Completion Notes:
Terminated at ~ 51.5 feet bgs.
No Bedrock Encountered.
No Groundwater or Seepage Encountered.

PROPOSED FREEZER BUILDING
7316 GAGE AVENUE, CITY OF COMMERCE

Project No: 444-04194
Report No: 16-10-124

APPENDIX B

LABORATORY TESTING

APPENDIX B

LABORATORY TESTING

Representative bulk and relatively undisturbed soil samples were obtained in the field and returned to our laboratory for additional observations and testing. Laboratory testing was generally performed in two phases. The first phase consisted of testing in order to determine the compaction of the existing natural soil and the general engineering classifications of the soils underlying the site. This testing was performed in order to estimate the engineering characteristics of the soil and to serve as a basis for selecting samples for the second phase of testing. The second phase consisted of soil mechanics testing. This testing including consolidation, shear strength and expansion testing was performed in order to provide a means of developing specific design recommendations based on the mechanical properties of the soil.

CLASSIFICATION AND COMPACTION TESTING

Unit Weight and Moisture Content Determinations: Each undisturbed sample was weighed and measured in order to determine its unit weight. A small portion of each sample was then subjected to testing in order to determine its moisture content. This was used in order to determine the dry density of the soil in its natural condition. The results of this testing are shown on the Bore Logs.

Maximum Density-Optimum Moisture Determinations: Representative soil types were selected for maximum density determinations. This testing was performed in accordance with the ASTM Standard D1557-91, Test Method A. The results of testing are presented graphically in this appendix. The maximum densities are compared to the field densities of the soil in order to determine the existing relative compaction to the soil.

Classification Testing: Soil samples were selected for classification testing. This testing consists of mechanical grain size analyses. This provides information for developing classifications for the soil in accordance with the Unified Soil Classification System which is presented in the preceding appendix. This classification system categorizes the soil into groups having similar engineering characteristics. The results of this testing is very useful in detecting variations in the soils and in selecting samples for further testing.

SOIL MECHANIC'S TESTING

Expansion Testing: One (1) bulk sample was selected for Expansion testing. Expansion testing was performed in accordance with the UBC Standard 18-2. This testing consists of remolding 4-inch diameter by 1-inch thick test specimens to a moisture content and dry density corresponding to approximately 50 percent saturation. The samples are subjected to a surcharge of 144 pounds per square foot and allowed to reach equilibrium. At that point the specimens are inundated with distilled water. The linear expansion is then measured until complete.

Direct Shear Testing: One (1) bulk sample was selected for Direct Shear testing. This test measures the shear strength of the soil under various normal pressures and is used to develop parameters for foundation design and lateral design. Tests were performed using a recompacted test specimen that was saturated prior to tests. Tests were performed using a strain controlled test apparatus with normal pressures ranging from 800 to 2300 pounds per square foot.

Consolidation Testing: Two (2) relatively undisturbed samples were selected for consolidation testing. For this test, a one-inch thick test specimen was subjected to vertical loads varying from 575 psf to 11520 psf applied progressively. The consolidation at each load increment was recorded prior to placement of each subsequent load. The specimens were saturated at 575 psf or 720 psf load increment.

Corrosion Series Testing: The soluble sulfate concentrations of the surface soil were determined in accordance with California Test Method Number (CA) 417. The pH and Minimum Resistivity were determined in accordance with CA 643. The soluble chloride concentrations were determined in accordance with CA 422.

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Maximum Density/Optimum Moisture

ASTM D698/D1557

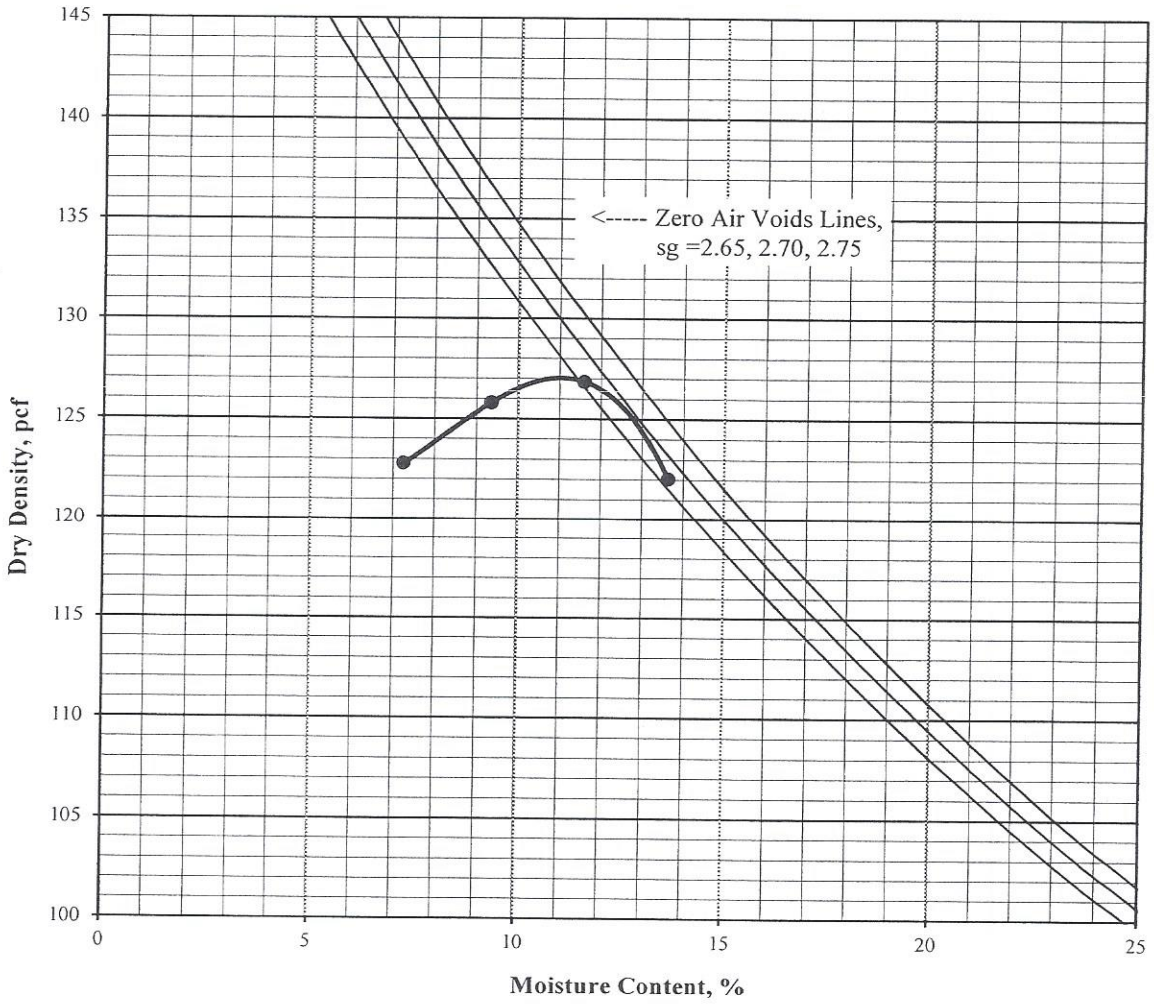
Project Number: 444-4194
Project Name: 7316 East Gage Avenue
Lab ID Number: LN6-16381
Sample Location: BH-1 Bulk 1 @ 0-5'
Description: Brown Sandy Clay (CL)

October 17, 2016

ASTM D-1557 A
Rammer Type: Machine

Maximum Density: **127 pcf**
Optimum Moisture: **11%**

Sieve Size	% Retained
3/4"	
3/8"	
#4	1.0



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Expansion Index

ASTM D 4829

Job Number: 444-4194
Job Name: 7316 East Gage Avenue
Lab ID Number: LN6-16381
Sample ID: BH-1 Bulk 1 @ 0-5'
Soil Description: Brown Sandy Clay (CL)

October 17, 2016

Wt of Soil + Ring:	573.4
Weight of Ring:	192.1
Wt of Wet Soil:	381.3
Percent Moisture:	9.2%
Sample Height, in	0.95
Wet Density, pcf:	121.6
Dry Denstiy, pcf:	111.4

% Saturation:	48.4

Expansion **Rack # 1**

Date/Time	10/12/2016	1:15 PM
Initial Reading	0.0000	
Final Reading	0.0581	

Expansion Index **58**

(Final - Initial) x 1000

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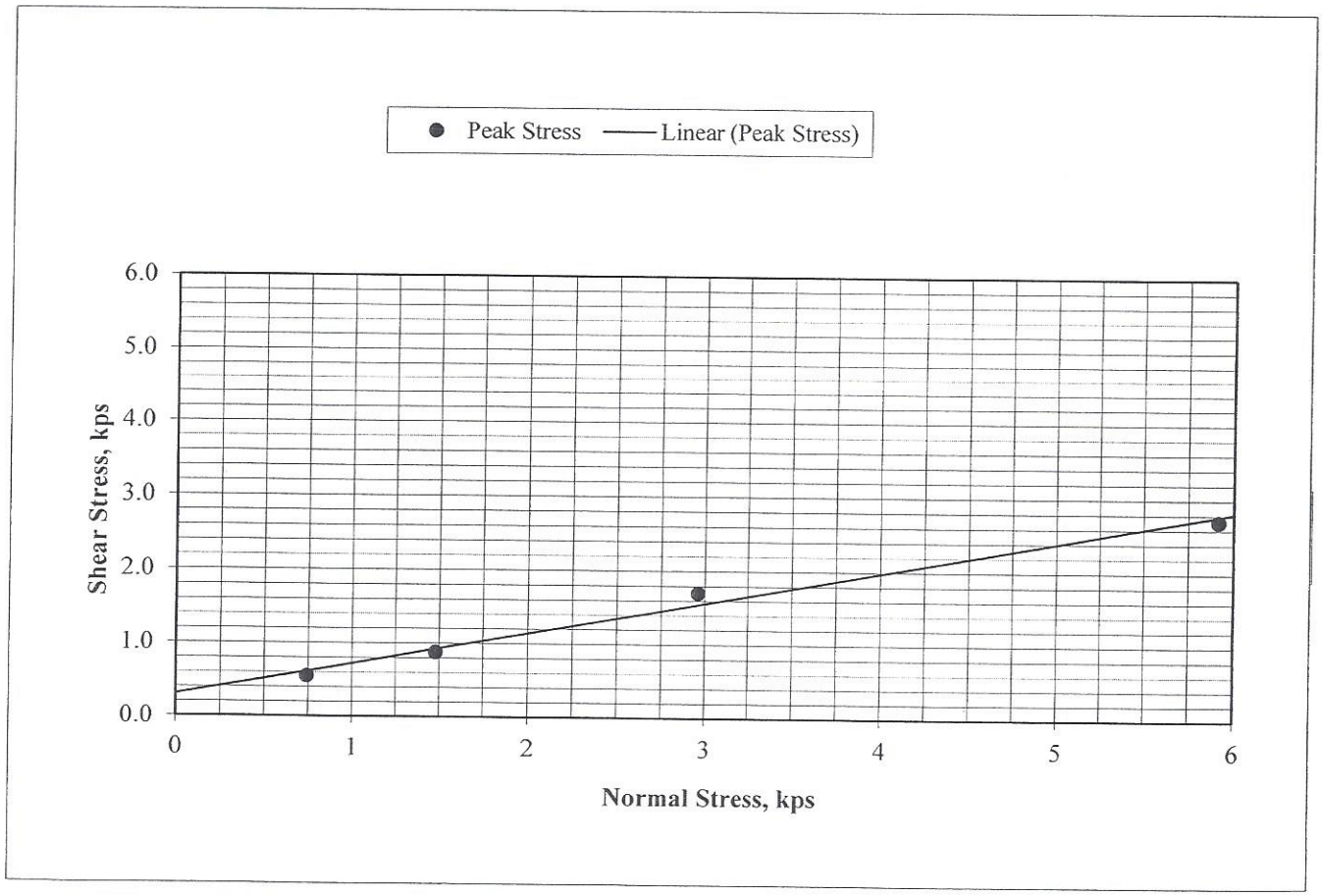
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Direct Shear ASTM D 3080-04
(modified for unconsolidated condition)

Job Number:	444-4194
Job Name	7316 East Gage Avenue
Lab ID No.	LN6-16381
Sample ID	BH-1 Bulk 1 @ 0-5'
Classification	Brown Sandy Clay (CL)
Sample Type	Remolded @ 90% of Maximum Density

October 17, 2016
Initial Dry Density: 114.3 pcf
Initial Mosture Content: 11.0 %
Peak Friction Angle (Ø): 23°
Cohesion (c): 300 psf

Test Results	1	2	3	4	Average
Moisture Content, %	18.3	18.3	18.3	18.3	18.3
Saturation, %	104.2	104.2	104.2	104.2	104.2
Normal Stress, kps	0.739	1.479	2.958	5.916	
Peak Stress, kps	0.553	0.881	1.706	2.714	



Job Number: 444-4194
Job Name: 7316 East Gage Avenue
Date: 10/17/2016

Moisture Adjustment		Remolded Shear Weight	
Wt of Soil:	1,000	Max Dry Density:	127.0
Moist As Is:	9.3	Optimum Moisture:	11.0
Moist Wanted:	11.0		
ml of Water to Add:	15.6	Wt Soil per Ring, g:	152.6

UBC

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Gradation

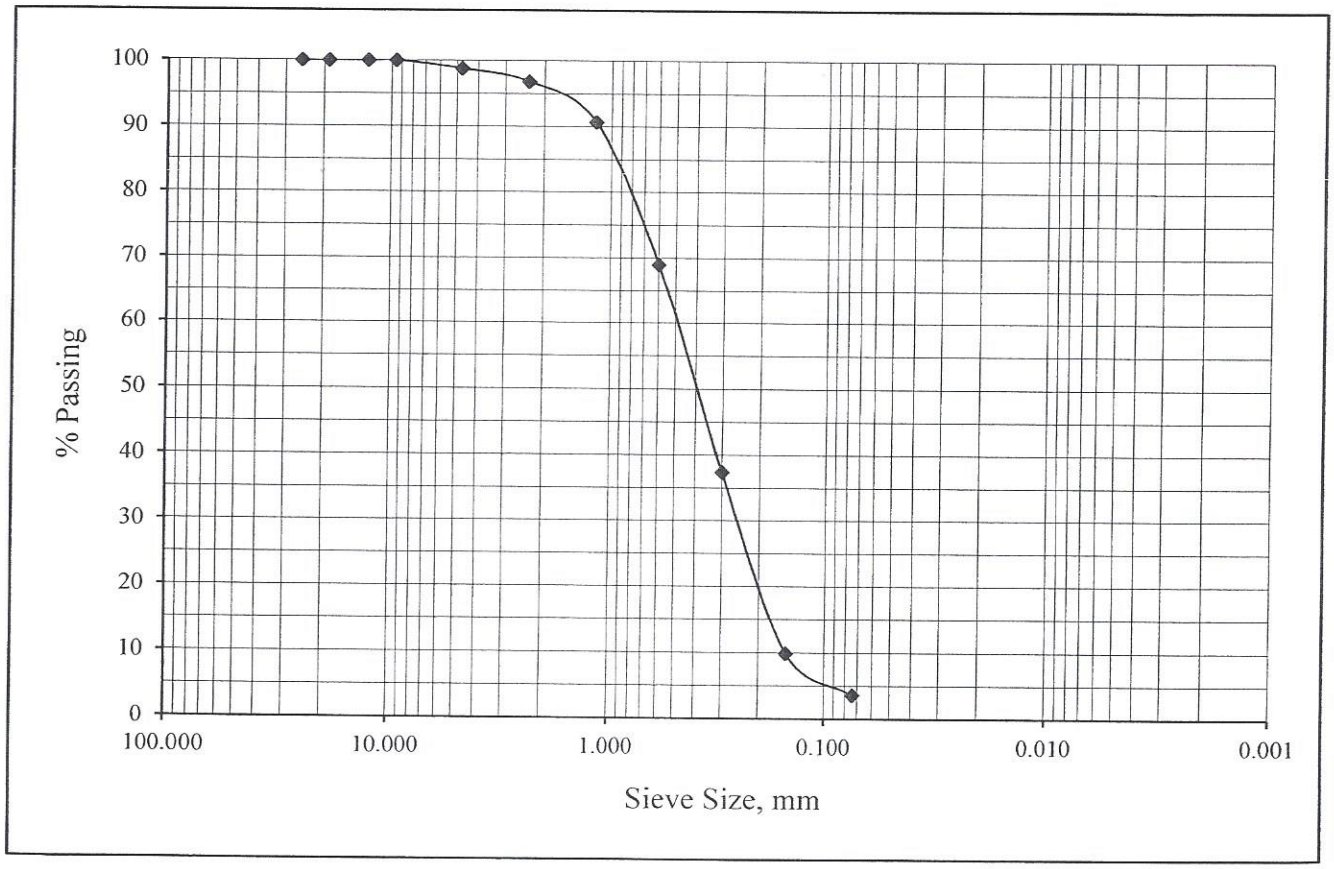
ASTM C117 & C136

Project Number: 444-4194
Project Name: 7316 East Gage Avenue
Lab ID Number: LN6-16381
Sample ID: BH-1 R-4 @ 15'

October 17, 2016

Soil Classification: SP

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	98.8
#8	2.36	96.8
#16	1.18	90.7
#30	0.60	69.0
#50	0.30	37.4
#100	0.15	9.9
#200	0.074	3.7



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Gradation

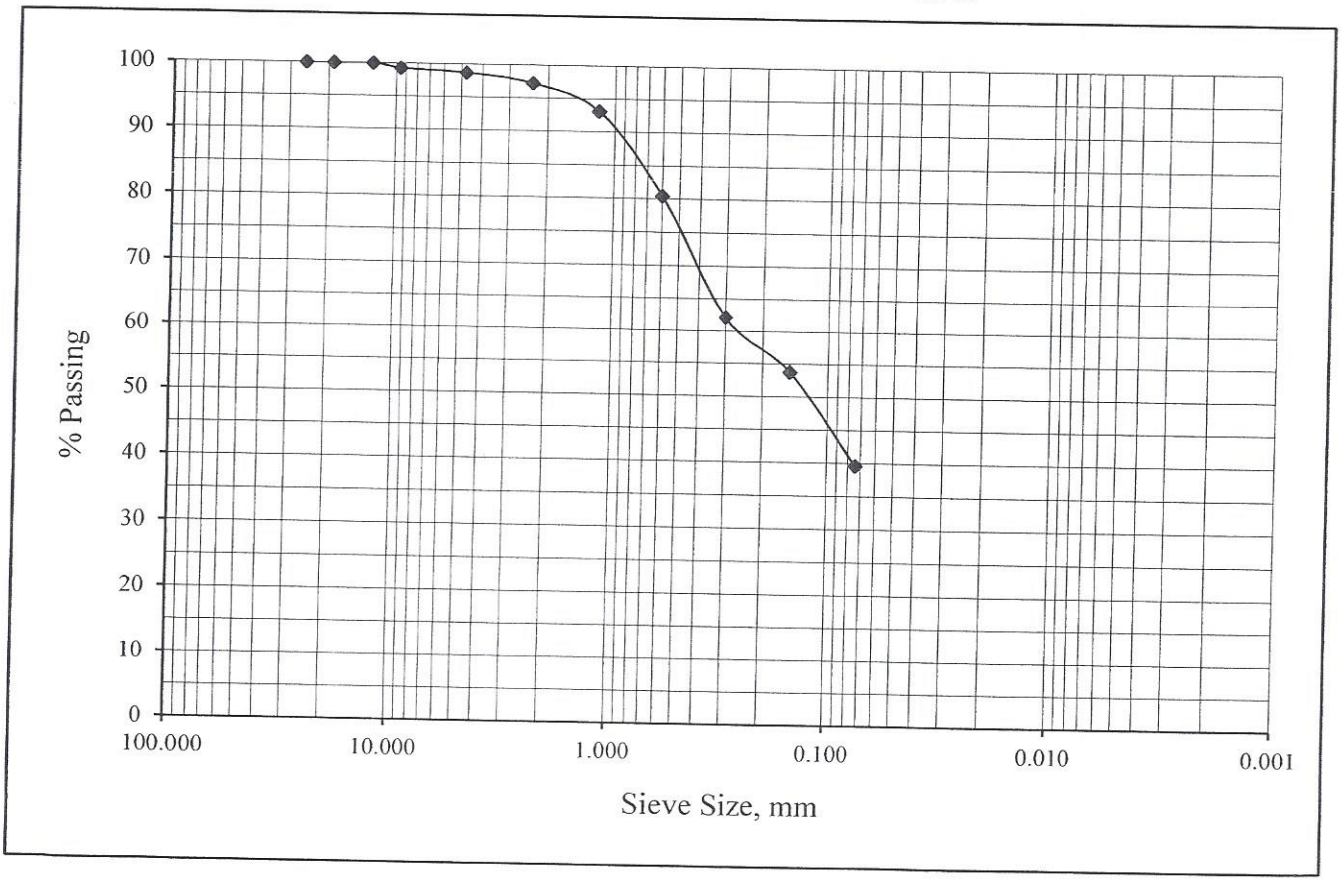
ASTM C117 & C136

Project Number: 444-4194
Project Name: 7316 East Gage Avenue
Lab ID Number: LN6-16381
Sample ID: BH-1 S-7 @ 30'

October 17, 2016

Soil Classification: SC

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	99.3
#4	4.75	98.7
#8	2.36	97.2
#16	1.18	93.1
#30	0.60	80.4
#50	0.30	62.1
#100	0.15	53.8
#200	0.074	39.6



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Gradation

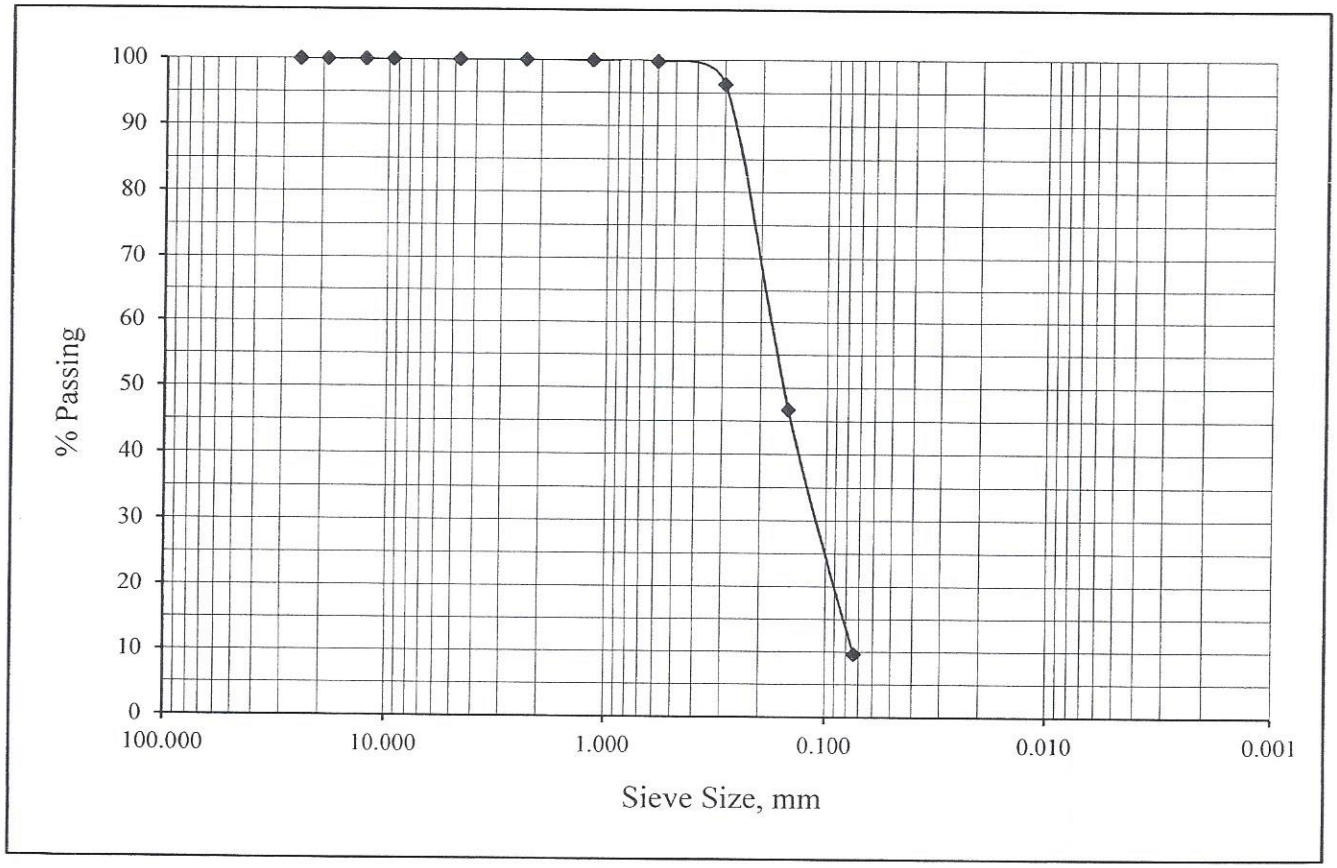
ASTM C117 & C136

Project Number: 444-4194
Project Name: 7316 East Gage Avenue
Lab ID Number: LN6-16381
Sample ID: BH-2 R-4 @ 40'

October 17, 2016

Soil Classification: SP-SM

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	100.0
#8	2.36	100.0
#16	1.18	99.9
#30	0.60	99.8
#50	0.30	96.3
#100	0.15	46.7
#200	0.074	9.7



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One Dimensional Consolidation

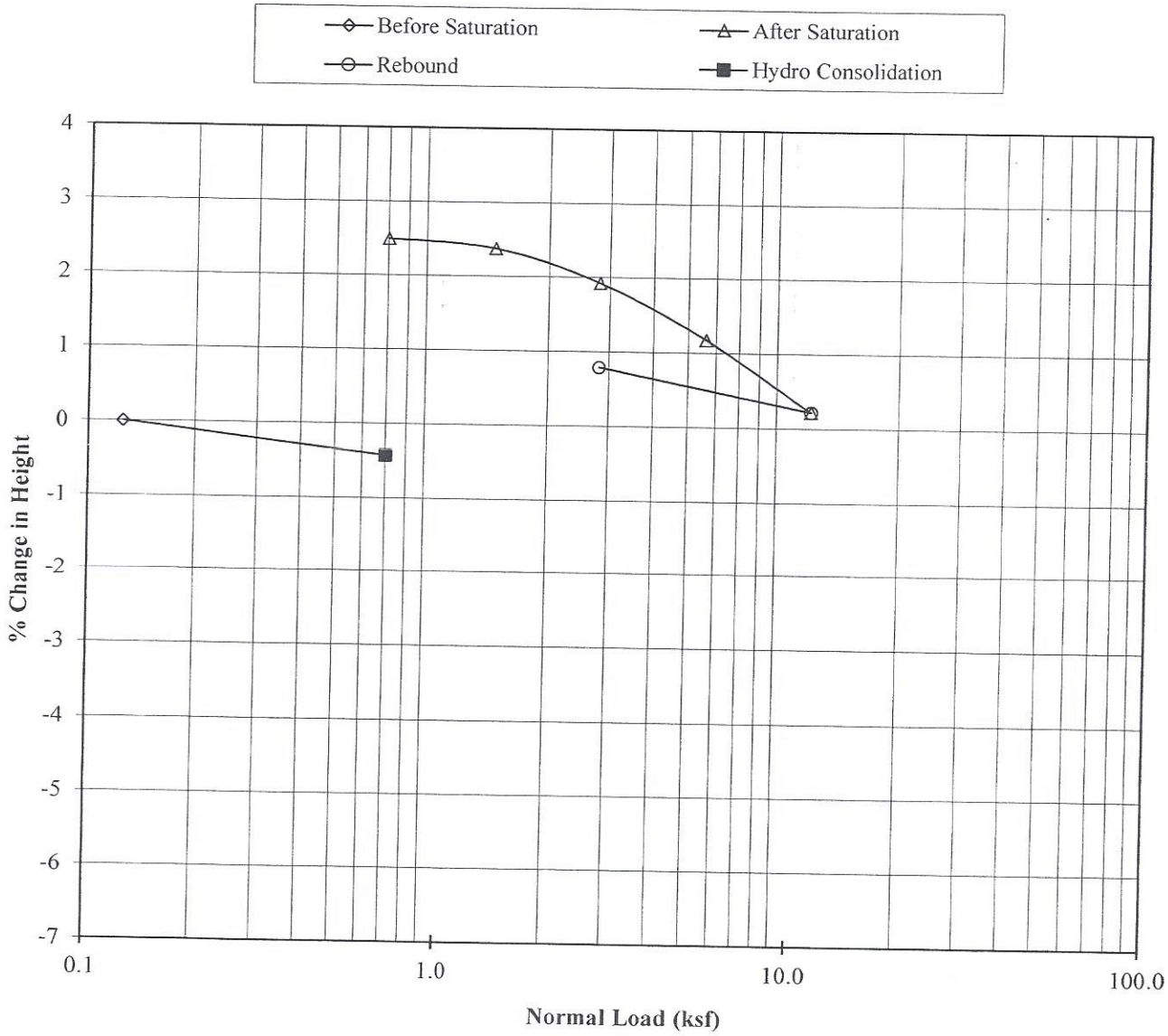
ASTM D2435 & D5333

Job Number: 444-4194
Job Name: 7316 East Gage Avenue
Lab ID Number: LN6-16381
Sample ID: BH-1 R-2 @ 5'
Soil Description: Brown Clay w/Sand (CL)

October 17, 2016

Initial Dry Density, pcf:	122.5
Initial Moisture, %:	10.1
Initial Void Ratio:	0.361
Specific Gravity:	2.67

% Change in Height vs Normal Presssure Diagram



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RESISTANCE '*R*' VALUE AND EXPANSION PRESSURE

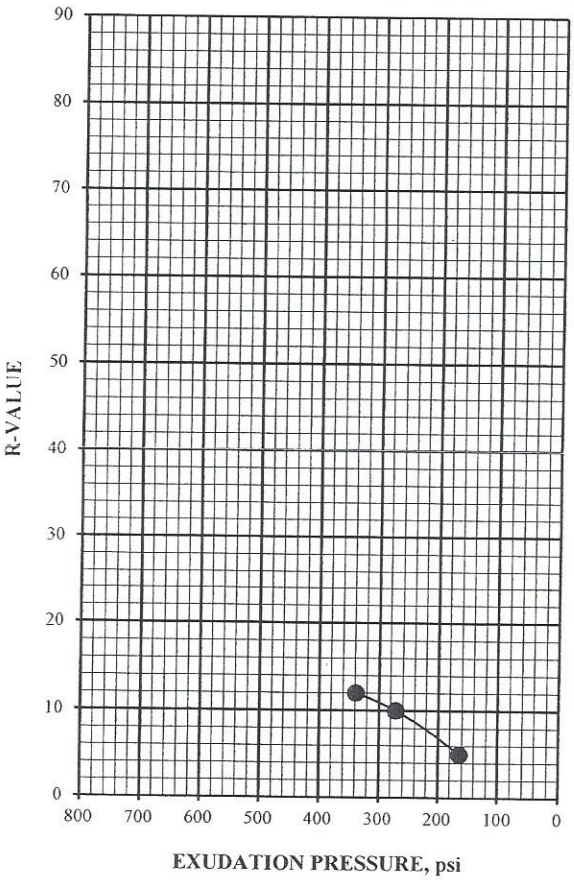
CTM 301

October 17, 2016

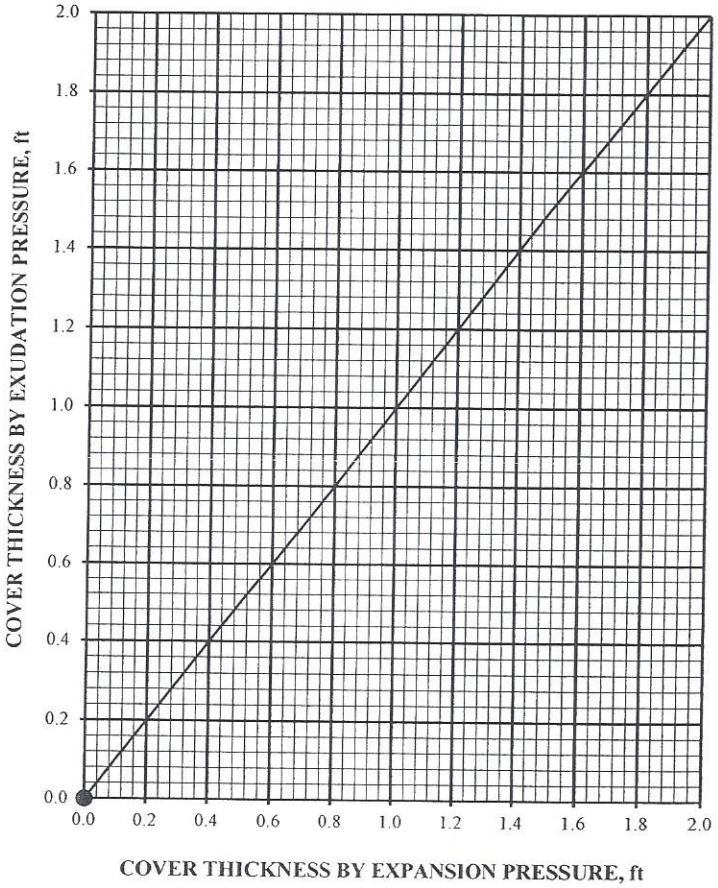
Project Number: 444-4194
Project Name: 7316 East Gage Avenue
Lab ID Number: LN6-16381
Sample ID: BH-1 Bulk 1 @ 0-5'
Sample Description: Brown Lean Clay with Sand (CL)
Specified Traffic Index: 5.0

Dry Density @ 300 psi Exudation Pressure: 115.4-pcf
%Moisture @ 300 psi Exudation Pressure: 15.5%
R-Value - Exudation Pressure: 11
R-Value - Expansion Pressure: N/A
R-Value @ Equilibrium: 11

EXUDATION PRESSURE CHART



EXPANSION PRESSURE CHART



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6782 Stanton Ave., Suite C, Buena Park, CA 90621 (714) 523-0952 Fax (714) 523-1369
45090 Golf Center Pkwy, Suite F, Indio, CA 92201 (760) 863-0713 Fax (760) 863-0847
450 Egan Avenue, Beaumont, CA 92223 (951) 845-7743 Fax (951) 845-8863

Date: October 17, 2016

Account No.: 444-4194

Customer: Comstock Gage, LLC

Location: 7316 East Gage Avenue, City of Commerce

Analytical Report

Corrosion Series

	pH per CA 643	Soluble Sulfates per CA 417 ppm	Soluble Chloride per CA 422 ppm	Min. Resistivity per CA 643 ohm-cm
BH-1 @ 0-5'	7.7	200	50	2200

APPENDIX C

2013 SEISMIC DESIGN MAP AND REPORT
VS30 GRADIENT MAP
PSH DEAGGREGATION OUTPUT
SEISMIC SETTLEMENT ANALYSIS

USGS Design Maps Summary Report

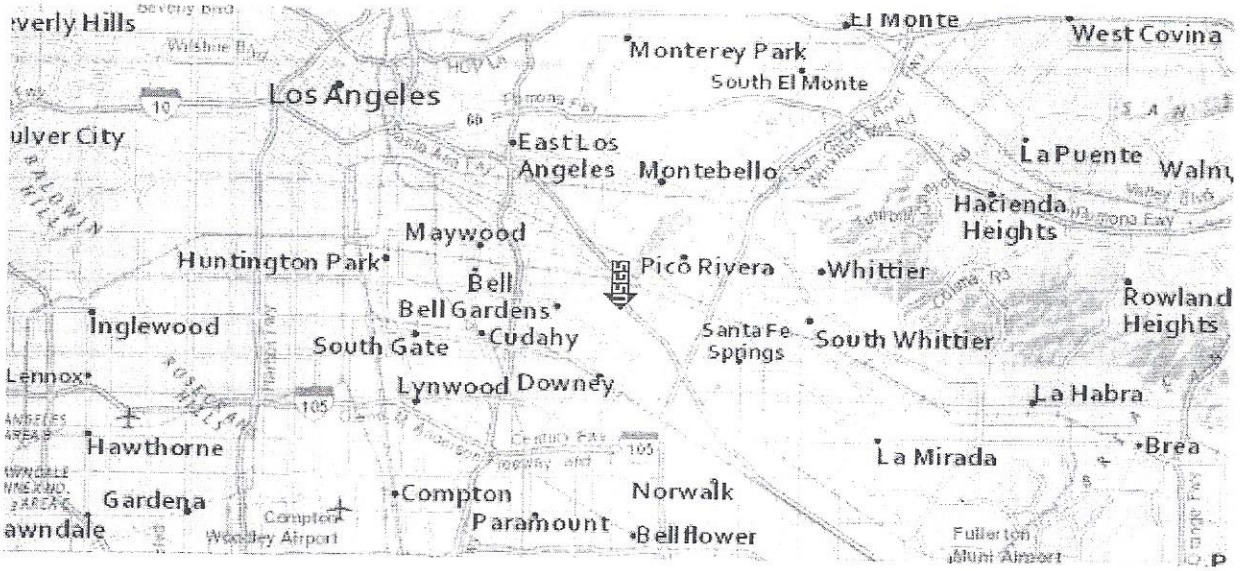
User–Specified Input

Building Code Reference Document ASCE 7-10 Standard
(which utilizes USGS hazard data available in 2008)

Site Coordinates 33.97329°N, 118.12482°W

Site Soil Classification Site Class D – "Stiff Soil"

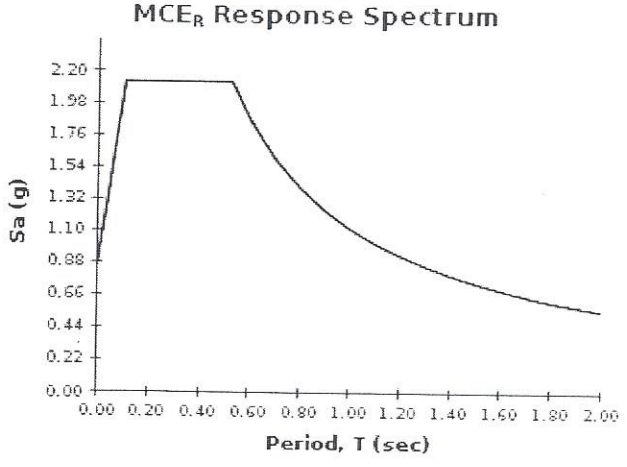
Risk Category I/II/III

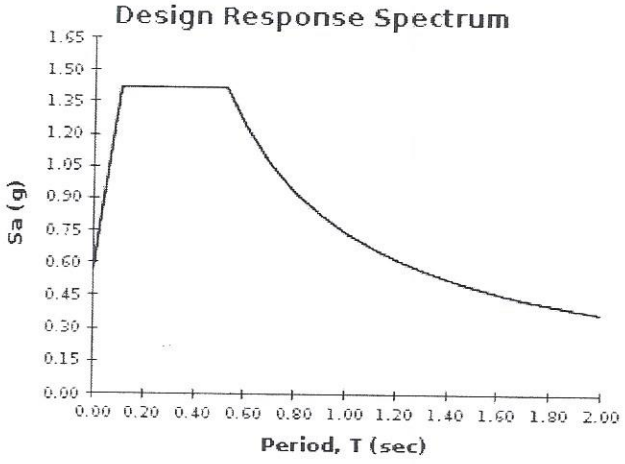


USGS–Provided Output

S_S =	2.126 g	S_{MS} =	2.126 g	S_{DS} =	1.417 g
S_1 =	0.743 g	S_{M1} =	1.115 g	S_{D1} =	0.743 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

USGS Design Maps Detailed Report

ASCE 7-10 Standard (33.97329°N, 118.12482°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

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

From Figure 22-1 [1]	S_S = 2.126 g
From Figure 22-2 [2]	S_1 = 0.743 g

Section 11.4.2 — Site Class

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

Table 20.3–1 Site Classification

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

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

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

Table 11.4-1: Site Coefficient F_a

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

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

For Site Class = D and S_S = 2.126 g, F_a = 1.000

Table 11.4-2: Site Coefficient F_v

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

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

For Site Class = D and S_1 = 0.743 g, F_v = 1.500

Equation (11.4–1): $S_{MS} = F_a S_S = 1.000 \times 2.126 = 2.126$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 1.500 \times 0.743 = 1.115$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

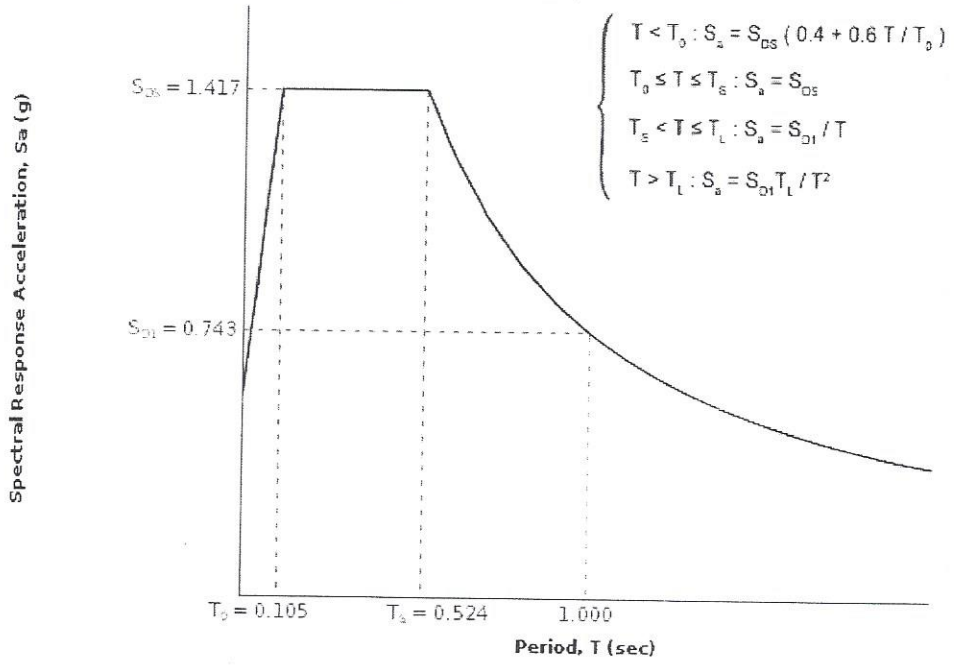
Equation (11.4–3): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 2.126 = 1.417$ g

Equation (11.4–4): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 1.115 = 0.743$ g

Section 11.4.5 — Design Response Spectrum

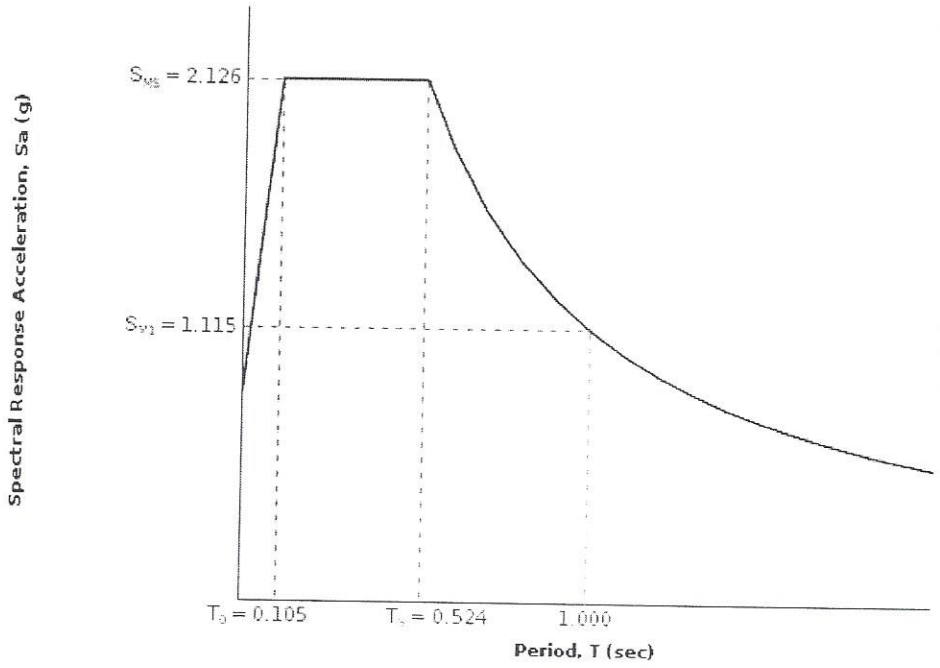
From Figure 22-12 [3] $T_L = 8$ seconds

Figure 11.4–1: Design Response Spectrum



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

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



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

From Figure 22-7 [4] PGA = 0.809

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.809 = 0.809$ g

Table 11.8–1: Site Coefficient F_{PGA}

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

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

For Site Class = D and PGA = 0.809 g, F_{PGA} = 1.000

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

From Figure 22-17 [5] C_{RS} = 0.947

From Figure 22-18 [6] C_{R1} = 0.975

Section 11.6 — Seismic Design Category

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

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

For Risk Category = I and S_{DS} = 1.417 g, Seismic Design Category = D

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

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

For Risk Category = I and S_{D1} = 0.743 g, Seismic Design Category = D

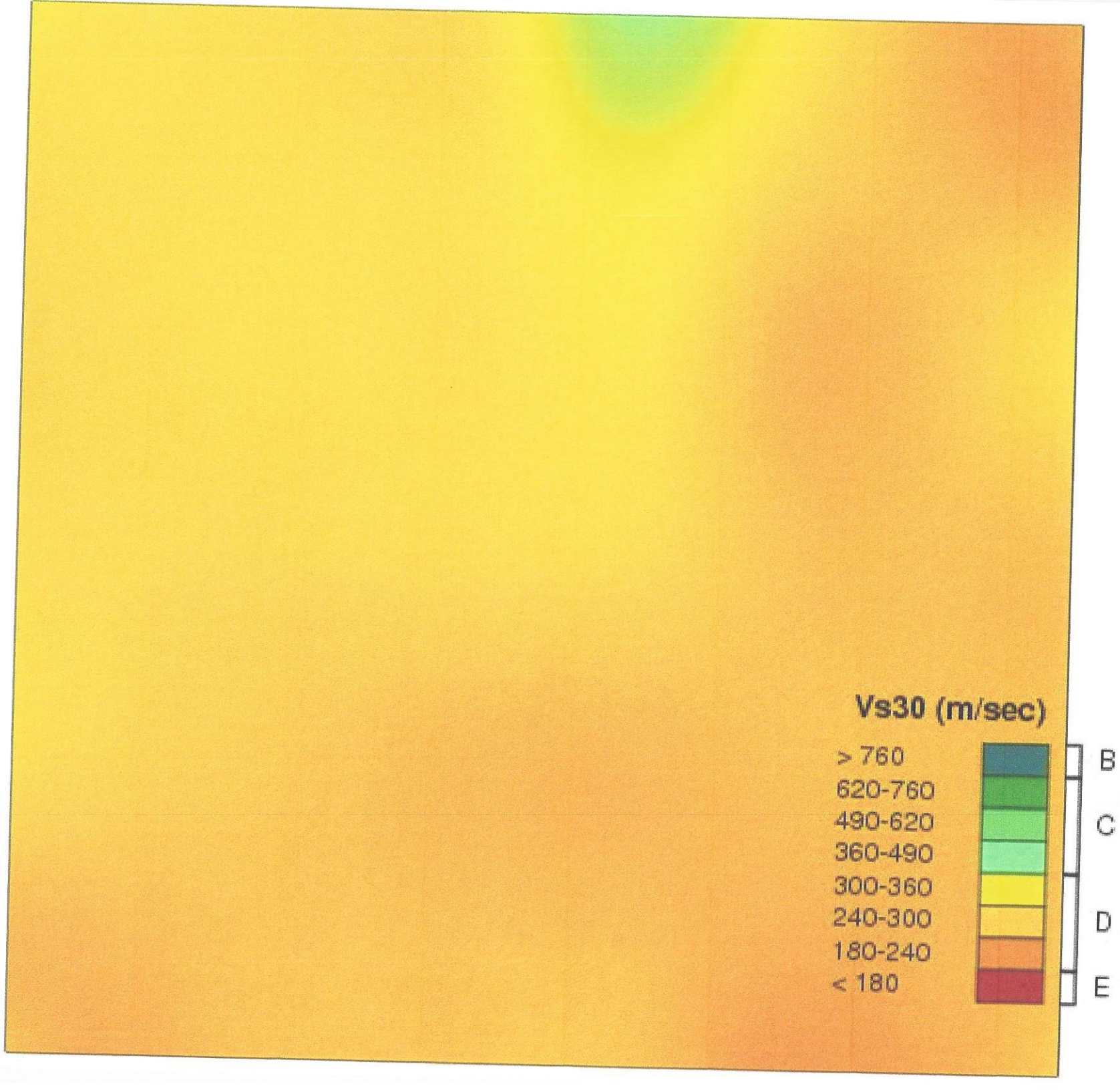
Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

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

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

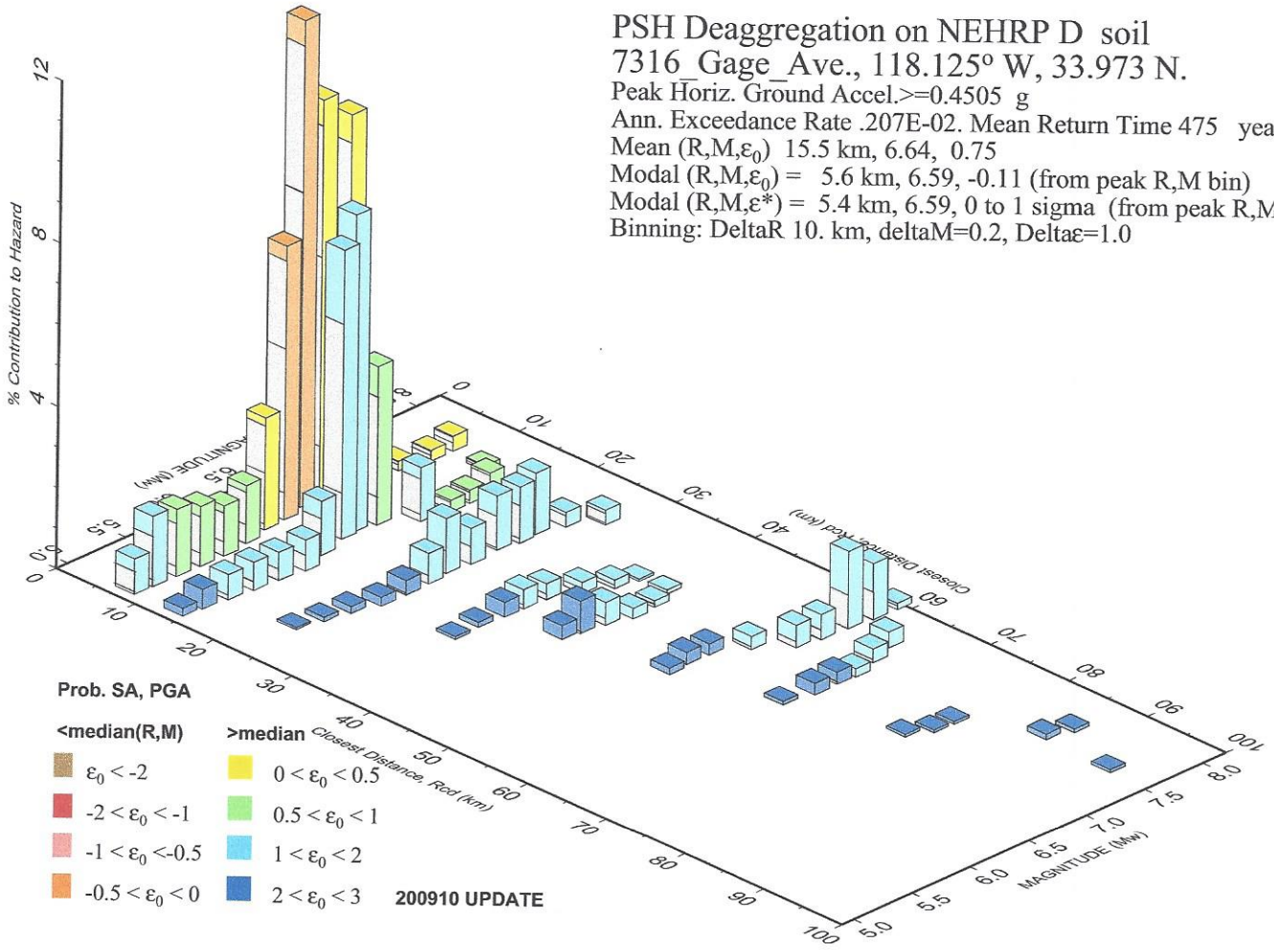
References

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


Vs30 (m/sec)
> 760
620-760
490-620
360-490
300-360
240-300
180-240
< 180
B
C
D
E

1476739092

-118.145836	33.987499	256
-118.137497	33.987499	256
-118.129166	33.987499	256
-118.120834	33.987499	308
-118.112503	33.987499	248
-118.104164	33.987499	206
-118.145836	33.979168	248
-118.137497	33.979168	259
-118.129166	33.979168	256
-118.120834	33.979168	272
-118.112503	33.979168	213
-118.104164	33.979168	241
-118.145836	33.970833	246
-118.137497	33.970833	246
-118.129166	33.970833	252
-118.120834	33.970833	254
-118.112503	33.970833	221
-118.104164	33.970833	221
-118.145836	33.962502	241
-118.137497	33.962502	228
-118.129166	33.962502	216
-118.120834	33.962502	213
-118.112503	33.962502	221
-118.104164	33.962502	221
-118.145836	33.954166	206
-118.137497	33.954166	221
-118.129166	33.954166	221
-118.120834	33.954166	221
-118.112503	33.954166	198
-118.104164	33.954166	214



GMT 2016 Oct 17 21:20:48 Distance (R), magnitude (M), epsilon (E0,E) deaggregation for a site on soil with average vs= 240. m/s top 30 m. USGS CGHT PSHA2008 UPDATE Bins with lt 0.05% contrib. omitted

7316_Gage_Ave.,_2016.10.17_21.20.44
*** Deaggregation of Seismic Hazard at One Period of Spectral Accel. ***
*** Data from U.S.G.S. National Seismic Hazards Mapping Project, 2008 version ***
PSHA Deaggregation. %contributions. site: 7316_Gage_Ave., long: 118.125 W., lat: 33.973 N.
Vs30(m/s)= 240.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08 See USGS OFR 2008-1128. dM=0.2 below
Return period: 475 yrs. Exceedance PGA =0.4505 g. Weight * Computed_Rate_Ex 0.207E-02
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.02138
#This deaggregation corresponds to Mean Hazard w/all GMPEs

DIST(KM)	MAG(MW)	ALL_EPS	EPSILON>2	1<EPS<2	0<EPS<1	-1<EPS<0	-2<EPS<-1	EPS<-2
7.5	5.05	0.882	0.322	0.492	0.068	0.000	0.000	0.000
13.6	5.05	0.191	0.185	0.005	0.000	0.000	0.000	0.000
7.5	5.20	1.749	0.509	1.063	0.177	0.000	0.000	0.000
13.8	5.20	0.483	0.440	0.043	0.000	0.000	0.000	0.000
7.6	5.40	1.667	0.361	1.067	0.240	0.000	0.000	0.000
14.2	5.40	0.614	0.501	0.113	0.000	0.000	0.000	0.000
22.6	5.41	0.053	0.053	0.000	0.000	0.000	0.000	0.000
7.7	5.60	1.487	0.257	0.912	0.317	0.000	0.000	0.000
14.4	5.60	0.690	0.477	0.213	0.000	0.000	0.000	0.000
23.3	5.61	0.107	0.107	0.000	0.000	0.000	0.000	0.000
7.7	5.80	1.250	0.183	0.713	0.353	0.000	0.000	0.000
14.7	5.80	0.697	0.417	0.280	0.000	0.000	0.000	0.000
23.8	5.80	0.164	0.163	0.001	0.000	0.000	0.000	0.000
7.4	6.01	1.438	0.167	0.802	0.469	0.000	0.000	0.000
15.0	6.01	0.774	0.380	0.393	0.000	0.000	0.000	0.000
24.8	6.00	0.212	0.203	0.009	0.000	0.000	0.000	0.000
34.1	6.01	0.065	0.065	0.000	0.000	0.000	0.000	0.000
6.6	6.23	2.760	0.204	1.153	1.266	0.137	0.000	0.000
13.8	6.23	1.343	0.436	0.837	0.071	0.000	0.000	0.000
24.8	6.21	0.363	0.313	0.050	0.000	0.000	0.000	0.000
33.9	6.22	0.128	0.124	0.003	0.000	0.000	0.000	0.000
6.4	6.40	6.714	0.369	2.153	3.525	0.666	0.000	0.000
12.8	6.47	7.099	1.825	4.133	1.142	0.000	0.000	0.000
24.7	6.41	0.754	0.551	0.203	0.000	0.000	0.000	0.000
34.1	6.43	0.362	0.328	0.035	0.000	0.000	0.000	0.000
40.9	6.46	0.338	0.317	0.021	0.000	0.000	0.000	0.000
5.6	6.59	11.943	0.621	3.600	6.028	1.679	0.016	0.000
12.6	6.58	7.799	1.602	5.036	1.162	0.000	0.000	0.000
24.3	6.59	1.368	0.805	0.563	0.000	0.000	0.000	0.000
34.2	6.59	0.465	0.370	0.096	0.000	0.000	0.000	0.000
41.3	6.60	0.799	0.747	0.052	0.000	0.000	0.000	0.000
52.5	6.60	0.153	0.153	0.000	0.000	0.000	0.000	0.000
5.3	6.79	9.714	0.635	3.247	4.621	1.193	0.017	0.000
13.1	6.75	3.900	0.749	2.447	0.704	0.000	0.000	0.000
24.6	6.78	0.898	0.458	0.440	0.000	0.000	0.000	0.000
34.4	6.77	0.390	0.258	0.133	0.000	0.000	0.000	0.000
41.7	6.79	0.563	0.411	0.152	0.000	0.000	0.000	0.000
52.2	6.77	0.295	0.282	0.013	0.000	0.000	0.000	0.000
64.0	6.81	0.090	0.090	0.000	0.000	0.000	0.000	0.000
6.1	6.98	9.186	0.705	3.368	4.171	0.911	0.031	0.000
15.4	6.97	1.336	0.292	0.860	0.183	0.000	0.000	0.000
24.2	7.03	1.355	0.511	0.791	0.052	0.000	0.000	0.000
35.8	6.98	0.283	0.162	0.122	0.000	0.000	0.000	0.000
42.6	6.96	0.261	0.212	0.049	0.000	0.000	0.000	0.000
52.4	6.95	0.267	0.228	0.039	0.000	0.000	0.000	0.000
64.6	7.04	0.286	0.262	0.024	0.000	0.000	0.000	0.000
76.3	7.03	0.068	0.068	0.000	0.000	0.000	0.000	0.000
5.7	7.16	2.727	0.158	0.805	1.319	0.419	0.025	0.000
15.9	7.20	0.294	0.055	0.181	0.058	0.000	0.000	0.000
24.7	7.20	1.389	0.463	0.820	0.106	0.000	0.000	0.000
37.2	7.17	0.220	0.132	0.088	0.000	0.000	0.000	0.000
42.2	7.17	0.159	0.091	0.068	0.000	0.000	0.000	0.000

54.3	7.18	0.316	0.242	0.075	0.000	0.000	0.000	0.000
64.6	7.23	0.301	0.241	0.060	0.000	0.000	0.000	0.000
77.5	7.19	0.068	0.068	0.000	0.000	0.000	0.000	0.000
6.7	7.37	0.233	0.018	0.077	0.110	0.026	0.001	0.000
15.9	7.36	0.330	0.054	0.203	0.072	0.000	0.000	0.000
24.5	7.35	1.523	0.409	0.942	0.172	0.000	0.000	0.000
37.7	7.35	0.061	0.030	0.031	0.000	0.000	0.000	0.000
41.2	7.35	0.093	0.045	0.048	0.000	0.000	0.000	0.000
56.9	7.40	0.546	0.403	0.143	0.000	0.000	0.000	0.000
64.8	7.38	0.205	0.158	0.046	0.000	0.000	0.000	0.000
77.6	7.36	0.065	0.065	0.001	0.000	0.000	0.000	0.000
7.5	7.60	0.268	0.023	0.104	0.125	0.017	0.000	0.000
15.7	7.55	0.497	0.072	0.306	0.119	0.001	0.000	0.000
25.4	7.55	0.366	0.088	0.230	0.048	0.000	0.000	0.000
57.4	7.58	0.616	0.381	0.235	0.000	0.000	0.000	0.000
63.9	7.59	0.336	0.260	0.076	0.000	0.000	0.000	0.000
85.6	7.61	0.134	0.127	0.008	0.000	0.000	0.000	0.000
94.3	7.57	0.076	0.076	0.000	0.000	0.000	0.000	0.000
7.5	7.79	0.373	0.031	0.137	0.177	0.027	0.000	0.000
12.4	7.73	0.136	0.014	0.066	0.052	0.003	0.000	0.000
27.6	7.74	0.376	0.088	0.236	0.052	0.000	0.000	0.000
57.6	7.80	1.899	1.074	0.825	0.000	0.000	0.000	0.000
62.8	7.79	0.386	0.243	0.143	0.000	0.000	0.000	0.000
86.5	7.79	0.097	0.085	0.012	0.000	0.000	0.000	0.000
58.0	7.99	1.390	0.712	0.678	0.000	0.000	0.000	0.000
58.0	8.19	0.152	0.066	0.086	0.000	0.000	0.000	0.000

Summary statistics for above PSHA PGA deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%): 100.0
Mean src-site R= 15.5 km; M= 6.64; eps0= 0.75. Mean calculated for all sources.
Modal src-site R= 5.6 km; M= 6.59; eps0= -0.11 from peak (R,M) bin
MODE R*= 5.4km; M*= 6.59; EPS.INTERVAL: 0 to 1 sigma % CONTRIB.= 6.028

Principal sources (faults, subduction, random seismicity having > 3% contribution)

Source Category:	% contr.	R(km)	M	epsilon0 (mean values).
California B-faults Char	37.86	13.7	6.78	0.58
California B-faults GR	26.11	11.4	6.65	0.48
California A-faults	15.89	31.2	7.30	1.12
CA Compr. crustal gridded	20.09	11.6	5.87	1.13

Individual fault hazard details if its contribution to mean hazard > 2%:

Fault ID	% contr.	Rcd(km)	M	epsilon0	Site-to-src azimuth(d)
Elysian Park (Upper) Char	7.28	10.2	6.58	0.78	-3.0
Raymond Char	2.60	16.1	6.61	1.44	-1.4
Puente Hills Char	3.23	5.6	7.04	-0.35	-164.8
Puente Hills (LA) Char	4.68	2.2	6.87	-0.49	169.9
Puente Hills (Santa Fe Springs)	6.68	5.9	6.49	-0.22	170.1
Puente Hills (Coyote Hills) Char	2.66	9.7	6.70	0.49	88.1
Elysian Park Upper, nom. GR	2.50	10.2	6.50	0.81	-3.0
Puente Hills GR D2.1 & D2.4	3.98	5.6	6.76	-0.20	-165.9
Puente Hills (LA) GR	4.54	2.2	6.68	-0.42	179.1
Puente Hills (Santa Fe Spr)NGR	2.58	5.9	6.40	-0.17	170.1
Elsinore; Whittier aPriori	2.96	7.5	6.95	0.60	71.2
Elsinore; Whittier MoBal	4.34	7.5	6.93	0.61	71.2

#**********End of deaggregation corresponding to Mean Hazard w/all GMPEs **********#

PSHA Deaggregation. %contributions. site: 7316_Gage_Ave., long: 118.125 W., lat: 33.973 N.
Vs30(m/s)= 240.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08 See USGS OFR 2008-1128. dM=0.2 below
Return period: 475 yrs. Exceedance PGA =0.4505 g. Weight * Computed_Rate_Ex 0.826E-03
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.00611

7316_Gage_Ave.,_2016.10.17_21.20.44

#This deaggregation corresponds to Boore-Atkinson 2008

DIST(KM)	MAG(MW)	ALL_EPS	EPSILON>2	1<EPS<2	0<EPS<1	-1<EPS<0	-2<EPS<-1	EPS<-2
7.2	5.05	0.161	0.133	0.028	0.000	0.000	0.000	0.000
13.2	5.05	0.021	0.021	0.000	0.000	0.000	0.000	0.000
7.4	5.20	0.328	0.263	0.065	0.000	0.000	0.000	0.000
13.8	5.21	0.076	0.076	0.000	0.000	0.000	0.000	0.000
7.5	5.40	0.319	0.223	0.096	0.000	0.000	0.000	0.000
14.5	5.40	0.123	0.123	0.000	0.000	0.000	0.000	0.000
7.6	5.60	0.298	0.179	0.118	0.000	0.000	0.000	0.000
14.9	5.60	0.162	0.162	0.000	0.000	0.000	0.000	0.000
23.8	5.61	0.045	0.045	0.000	0.000	0.000	0.000	0.000
7.6	5.80	0.268	0.146	0.122	0.000	0.000	0.000	0.000
15.2	5.80	0.185	0.182	0.003	0.000	0.000	0.000	0.000
24.3	5.81	0.081	0.081	0.000	0.000	0.000	0.000	0.000
33.8	5.81	0.023	0.023	0.000	0.000	0.000	0.000	0.000
7.2	6.01	0.338	0.155	0.183	0.000	0.000	0.000	0.000
15.5	6.01	0.223	0.211	0.011	0.000	0.000	0.000	0.000
25.2	6.00	0.114	0.114	0.000	0.000	0.000	0.000	0.000
34.3	6.01	0.053	0.053	0.000	0.000	0.000	0.000	0.000
6.4	6.23	0.715	0.164	0.349	0.192	0.010	0.000	0.000
14.5	6.23	0.389	0.278	0.109	0.002	0.000	0.000	0.000
25.2	6.22	0.205	0.197	0.009	0.000	0.000	0.000	0.000
34.0	6.22	0.106	0.103	0.003	0.000	0.000	0.000	0.000
43.6	6.23	0.036	0.036	0.000	0.000	0.000	0.000	0.000
6.4	6.40	1.777	0.205	0.721	0.799	0.052	0.000	0.000
14.3	6.46	2.090	0.745	1.286	0.059	0.000	0.000	0.000
25.0	6.42	0.476	0.376	0.100	0.000	0.000	0.000	0.000
34.2	6.43	0.320	0.287	0.033	0.000	0.000	0.000	0.000
40.9	6.46	0.323	0.303	0.021	0.000	0.000	0.000	0.000
53.9	6.43	0.024	0.024	0.000	0.000	0.000	0.000	0.000
5.5	6.60	3.183	0.229	1.218	1.615	0.121	0.000	0.000
13.7	6.58	2.694	0.675	1.889	0.129	0.000	0.000	0.000
24.6	6.59	1.002	0.521	0.480	0.000	0.000	0.000	0.000
34.2	6.59	0.431	0.337	0.094	0.000	0.000	0.000	0.000
41.2	6.60	0.730	0.678	0.052	0.000	0.000	0.000	0.000
52.5	6.60	0.153	0.153	0.000	0.000	0.000	0.000	0.000
5.4	6.80	3.014	0.233	1.282	1.399	0.099	0.000	0.000
14.5	6.76	1.477	0.331	1.062	0.084	0.000	0.000	0.000
24.7	6.78	0.645	0.269	0.376	0.000	0.000	0.000	0.000
34.4	6.77	0.346	0.217	0.130	0.000	0.000	0.000	0.000
41.8	6.78	0.466	0.325	0.141	0.000	0.000	0.000	0.000
52.2	6.77	0.295	0.282	0.013	0.000	0.000	0.000	0.000
64.0	6.81	0.090	0.090	0.000	0.000	0.000	0.000	0.000
72.4	6.80	0.023	0.023	0.000	0.000	0.000	0.000	0.000
6.6	6.99	2.890	0.249	1.365	1.208	0.069	0.000	0.000
15.9	6.98	0.635	0.131	0.437	0.067	0.000	0.000	0.000
24.5	7.03	0.873	0.261	0.561	0.051	0.000	0.000	0.000
35.8	6.99	0.245	0.127	0.118	0.000	0.000	0.000	0.000
42.9	6.98	0.222	0.163	0.058	0.000	0.000	0.000	0.000
52.4	6.95	0.264	0.225	0.039	0.000	0.000	0.000	0.000
64.6	7.04	0.286	0.262	0.024	0.000	0.000	0.000	0.000
76.3	7.03	0.068	0.068	0.000	0.000	0.000	0.000	0.000
6.0	7.17	0.859	0.056	0.310	0.444	0.049	0.000	0.000
15.9	7.20	0.157	0.025	0.101	0.030	0.000	0.000	0.000
25.1	7.19	0.861	0.216	0.557	0.087	0.000	0.000	0.000
36.9	7.18	0.154	0.078	0.076	0.000	0.000	0.000	0.000
42.4	7.18	0.121	0.072	0.050	0.000	0.000	0.000	0.000
54.4	7.18	0.309	0.235	0.075	0.000	0.000	0.000	0.000
64.5	7.23	0.291	0.231	0.060	0.000	0.000	0.000	0.000
77.5	7.19	0.068	0.068	0.000	0.000	0.000	0.000	0.000
83.8	7.19	0.032	0.032	0.000	0.000	0.000	0.000	0.000
6.9	7.37	0.081	0.006	0.032	0.040	0.003	0.000	0.000
15.9	7.36	0.171	0.025	0.111	0.035	0.000	0.000	0.000

7316_Gage_Ave.,_2016.10.17_21.20.44

25.0	7.34	0.844	0.192	0.543	0.110	0.000	0.000	0.000
37.5	7.35	0.043	0.017	0.026	0.000	0.000	0.000	0.000
41.2	7.35	0.085	0.038	0.047	0.000	0.000	0.000	0.000
57.0	7.40	0.528	0.385	0.143	0.000	0.000	0.000	0.000
64.7	7.38	0.193	0.146	0.046	0.000	0.000	0.000	0.000
77.6	7.36	0.065	0.064	0.001	0.000	0.000	0.000	0.000
84.3	7.38	0.033	0.033	0.000	0.000	0.000	0.000	0.000
94.5	7.39	0.032	0.032	0.000	0.000	0.000	0.000	0.000
7.5	7.60	0.104	0.009	0.046	0.048	0.002	0.000	0.000
15.8	7.55	0.245	0.032	0.159	0.054	0.000	0.000	0.000
26.0	7.55	0.207	0.041	0.134	0.032	0.000	0.000	0.000
57.4	7.58	0.565	0.330	0.235	0.000	0.000	0.000	0.000
63.9	7.59	0.319	0.243	0.075	0.000	0.000	0.000	0.000
76.2	7.57	0.046	0.039	0.007	0.000	0.000	0.000	0.000
85.6	7.61	0.133	0.125	0.008	0.000	0.000	0.000	0.000
94.3	7.57	0.076	0.076	0.000	0.000	0.000	0.000	0.000
7.5	7.79	0.143	0.011	0.061	0.067	0.004	0.000	0.000
12.5	7.73	0.060	0.006	0.033	0.021	0.000	0.000	0.000
27.6	7.74	0.235	0.045	0.151	0.039	0.000	0.000	0.000
57.6	7.80	1.696	0.876	0.820	0.000	0.000	0.000	0.000
62.8	7.79	0.347	0.203	0.143	0.000	0.000	0.000	0.000
76.0	7.74	0.029	0.021	0.008	0.000	0.000	0.000	0.000
86.5	7.79	0.091	0.079	0.012	0.000	0.000	0.000	0.000
27.6	7.91	0.027	0.005	0.017	0.005	0.000	0.000	0.000
58.0	7.99	1.081	0.476	0.604	0.000	0.000	0.000	0.000
62.6	7.99	0.028	0.014	0.014	0.000	0.000	0.000	0.000
58.0	8.19	0.118	0.042	0.075	0.000	0.000	0.000	0.000

Summary statistics for above PSHA PGA deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%): 40.0
Mean src-site R= 23.7 km; M= 6.82; eps0= 1.15. Mean calculated for all sources.
Modal src-site R= 5.5 km; M= 6.60; eps0= 0.22 from peak (R,M) bin
MODE R*= 13.8km; M*= 6.58; EPS.INTERVAL: 0 to 1 sigma % CONTRIB.= 1.889

Principal sources (faults, subduction, random seismicity having > 3% contribution)

Source Category:	% contr.	R(km)	M	epsilon0 (mean values).
California B-faults Char	14.88	19.6	6.83	1.01
California B-faults GR	9.71	16.4	6.68	0.94
California A-faults	9.97	41.5	7.41	1.37
CA Compr. crustal gridded	5.35	15.1	5.98	1.46

Individual fault hazard details if its contribution to mean hazard > 2%:

Fault ID	% contr.	Rcd(km)	M	epsilon0	Site-to-src azimuth(d)
Elysian Park (Upper) Char	1.73	10.2	6.59	1.04	-3.0
Raymond Char	1.20	16.1	6.62	1.33	-1.4
Puente Hills Char	0.94	5.6	7.04	-0.09	-164.8
Puente Hills (LA) Char	1.21	2.2	6.87	-0.04	169.9
Puente Hills (Santa Fe Springs)	1.83	5.9	6.49	0.09	170.1
Puente Hills (Coyote Hills) Char	0.62	9.7	6.70	0.82	88.1
Elysian Park Upper, nom. GR	0.57	10.2	6.50	1.10	-3.0
Puente Hills GR D2.1 & D2.4	1.16	5.6	6.76	0.01	-165.9
Puente Hills (LA) GR	1.16	2.2	6.68	0.02	179.1
Puente Hills (Santa Fe Spr)NGR	0.71	5.9	6.40	0.12	170.1
Elsinore; Whittier aPriori	1.20	7.5	6.95	0.69	71.2
Elsinore; Whittier MoBal	1.77	7.5	6.93	0.70	71.2

#**********End of deaggregation corresponding to Boore-Atkinson 2008 *********#

PSHA Deaggregation. %contributions. site: 7316_Gage_Ave., long: 118.125 W., lat: 33.973 N.
Vs30(m/s)= 240.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08 See USGS OFR 2008-1128. dM=0.2 below
Return period: 475 yrs. Exceedance PGA =0.4505 g. Weight * Computed_Rate_Ex 0.455E-03

7316_Gage_Ave.,_2016.10.17_21.20.44
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.02643
#This deaggregation corresponds to Campbell-Bozorgnia 2008

DIST(KM)	MAG(MW)	ALL_EPS	EPSILON>2	1<EPS<2	0<EPS<1	-1<EPS<0	-2<EPS<-1	EPS<-2
7.4	5.05	0.199	0.151	0.048	0.000	0.000	0.000	0.000
12.7	5.05	0.022	0.022	0.000	0.000	0.000	0.000	0.000
7.5	5.20	0.442	0.296	0.146	0.000	0.000	0.000	0.000
13.3	5.21	0.077	0.077	0.000	0.000	0.000	0.000	0.000
7.6	5.40	0.483	0.261	0.222	0.000	0.000	0.000	0.000
13.8	5.41	0.136	0.136	0.000	0.000	0.000	0.000	0.000
7.7	5.60	0.447	0.216	0.231	0.000	0.000	0.000	0.000
14.2	5.60	0.168	0.164	0.004	0.000	0.000	0.000	0.000
22.7	5.61	0.015	0.015	0.000	0.000	0.000	0.000	0.000
7.7	5.80	0.361	0.160	0.202	0.000	0.000	0.000	0.000
14.4	5.80	0.162	0.153	0.009	0.000	0.000	0.000	0.000
23.1	5.80	0.021	0.021	0.000	0.000	0.000	0.000	0.000
7.4	6.01	0.392	0.155	0.236	0.000	0.000	0.000	0.000
14.8	6.01	0.174	0.159	0.014	0.000	0.000	0.000	0.000
24.1	6.00	0.027	0.027	0.000	0.000	0.000	0.000	0.000
6.5	6.23	0.784	0.164	0.405	0.194	0.021	0.000	0.000
13.2	6.23	0.332	0.215	0.102	0.015	0.000	0.000	0.000
24.3	6.21	0.048	0.048	0.000	0.000	0.000	0.000	0.000
6.4	6.41	2.149	0.205	0.806	0.982	0.156	0.000	0.000
11.2	6.47	2.402	0.582	1.392	0.428	0.000	0.000	0.000
24.0	6.40	0.080	0.080	0.000	0.000	0.000	0.000	0.000
34.2	6.41	0.011	0.011	0.000	0.000	0.000	0.000	0.000
5.4	6.60	4.285	0.226	1.233	2.055	0.756	0.015	0.000
12.0	6.60	1.621	0.419	0.925	0.276	0.000	0.000	0.000
23.8	6.60	0.105	0.091	0.014	0.000	0.000	0.000	0.000
4.6	6.80	2.609	0.196	0.698	1.175	0.525	0.016	0.000
11.8	6.74	0.931	0.220	0.526	0.185	0.000	0.000	0.000
24.5	6.79	0.062	0.059	0.003	0.000	0.000	0.000	0.000
35.2	6.79	0.011	0.011	0.000	0.000	0.000	0.000	0.000
41.2	6.75	0.025	0.025	0.000	0.000	0.000	0.000	0.000
4.6	6.97	1.936	0.196	0.511	0.817	0.392	0.019	0.000
13.7	6.94	0.158	0.065	0.076	0.018	0.000	0.000	0.000
23.7	7.01	0.091	0.071	0.021	0.000	0.000	0.000	0.000
37.1	7.02	0.032	0.029	0.003	0.000	0.000	0.000	0.000
41.3	6.94	0.016	0.016	0.000	0.000	0.000	0.000	0.000
5.1	7.14	0.704	0.047	0.182	0.317	0.146	0.011	0.000
22.6	7.21	0.164	0.079	0.083	0.003	0.000	0.000	0.000
37.9	7.19	0.015	0.013	0.002	0.000	0.000	0.000	0.000
6.0	7.33	0.040	0.006	0.012	0.015	0.006	0.000	0.000
23.5	7.36	0.125	0.063	0.059	0.003	0.000	0.000	0.000
7.5	7.60	0.015	0.006	0.009	0.000	0.000	0.000	0.000
22.2	7.53	0.027	0.010	0.015	0.002	0.000	0.000	0.000
7.5	7.79	0.022	0.009	0.012	0.001	0.000	0.000	0.000

Summary statistics for above PSHA PGA deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%): 22.0
Mean src-site R= 8.4 km; M= 6.50; eps0= 0.43. Mean calculated for all sources.
Modal src-site R= 5.4 km; M= 6.60; eps0= -0.23 from peak (R,M) bin
MODE R*= 5.2km; M*= 6.60; EPS.INTERVAL: 0 to 1 sigma % CONTRIB.= 2.055

Principal sources (faults, subduction, random seismicity having > 3% contribution)

Source Category:	% contr.	R(km)	M	epsilon0 (mean values).
California B-faults Char	9.38	8.3	6.71	0.23
California B-faults GR	7.19	7.3	6.62	0.11
CA Compr. crustal gridded	4.97	10.0	5.87	1.15

Individual fault hazard details if its contribution to mean hazard > 2%:

Fault ID	% contr.	Rcd(km)	M	epsilon0	Site-to-src azimuth(d)
Elysian Park (Upper) Char	2.43	10.2	6.58	0.79	-3.0
Raymond Char	0.44	16.1	6.61	1.75	-1.4

Puente Hills Char	1.09	5.6	7.04	-0.38	-164.8
Puente Hills (LA) Char	1.82	2.2	6.87	-0.74	169.9
Puente Hills (Santa Fe Springs)	2.17	5.9	6.50	-0.17	170.1
Puente Hills (Coyote Hills) Char	0.83	9.7	6.69	0.57	88.1
Elysian Park Upper, nom. GR	0.87	10.2	6.50	0.79	-3.0
Puente Hills GR D2.1 & D2.4	1.38	5.6	6.75	-0.26	-165.9
Puente Hills (LA) GR	1.79	2.2	6.68	-0.69	179.1
Puente Hills (Santa Fe Spr)NGR	0.84	5.9	6.40	-0.12	170.1
Elsinore; Whittier aPriori	0.16	7.5	6.97	1.58	71.2
Elsinore; Whittier MoBal	0.23	7.5	6.94	1.62	71.2

#**********End of deaggregation corresponding to Campbell-Bozorgnia 2008 **********#

PSHA Deaggregation. %contributions. site: 7316_Gage_Ave., long: 118.125 W., lat: 33.973 N.
Vs30(m/s)= 240.0 (some WUS atten. models use Site Class not Vs30).
NSHMP 2007-08 See USGS OFR 2008-1128. dM=0.2 below
Return period: 475 yrs. Exceedance PGA =0.4505 g. Weight * Computed_Rate_Ex 0.786E-03
#Pr[at least one eq with median motion>=PGA in 50 yrs]=0.03358
#This deaggregation corresponds to Chiou-Youngs 2008

DIST(KM)	MAG(MW)	ALL_EPS	EPSILON>2	1<EPS<2	0<EPS<1	-1<EPS<0	-2<EPS<-1	EPS<-2
7.5	5.05	0.522	0.287	0.235	0.000	0.000	0.000	0.000
13.7	5.05	0.148	0.148	0.000	0.000	0.000	0.000	0.000
7.6	5.20	0.979	0.487	0.492	0.000	0.000	0.000	0.000
14.0	5.20	0.330	0.327	0.003	0.000	0.000	0.000	0.000
7.7	5.40	0.865	0.355	0.510	0.000	0.000	0.000	0.000
14.2	5.40	0.355	0.338	0.017	0.000	0.000	0.000	0.000
22.6	5.41	0.031	0.031	0.000	0.000	0.000	0.000	0.000
7.7	5.60	0.742	0.250	0.480	0.011	0.000	0.000	0.000
14.4	5.60	0.360	0.329	0.031	0.000	0.000	0.000	0.000
23.1	5.60	0.047	0.047	0.000	0.000	0.000	0.000	0.000
7.8	5.80	0.620	0.177	0.424	0.019	0.000	0.000	0.000
14.5	5.80	0.351	0.291	0.060	0.000	0.000	0.000	0.000
23.5	5.80	0.061	0.061	0.000	0.000	0.000	0.000	0.000
7.4	6.01	0.709	0.165	0.523	0.020	0.000	0.000	0.000
14.9	6.01	0.377	0.282	0.095	0.000	0.000	0.000	0.000
24.3	6.00	0.071	0.071	0.000	0.000	0.000	0.000	0.000
6.7	6.22	1.262	0.167	0.702	0.296	0.096	0.000	0.000
13.7	6.22	0.623	0.321	0.275	0.026	0.000	0.000	0.000
24.4	6.21	0.110	0.110	0.000	0.000	0.000	0.000	0.000
6.5	6.40	2.802	0.202	1.021	1.139	0.440	0.000	0.000
12.2	6.46	2.690	0.637	1.415	0.638	0.000	0.000	0.000
24.1	6.41	0.195	0.191	0.005	0.000	0.000	0.000	0.000
33.5	6.41	0.033	0.033	0.000	0.000	0.000	0.000	0.000
5.8	6.59	4.761	0.230	1.328	2.393	0.810	0.001	0.000
12.7	6.58	3.397	0.771	1.914	0.712	0.000	0.000	0.000
23.4	6.59	0.264	0.212	0.052	0.000	0.000	0.000	0.000
32.9	6.59	0.023	0.023	0.000	0.000	0.000	0.000	0.000
41.9	6.60	0.035	0.035	0.000	0.000	0.000	0.000	0.000
5.5	6.80	4.150	0.235	1.356	1.993	0.565	0.001	0.000
12.5	6.75	1.495	0.268	0.815	0.412	0.000	0.000	0.000
24.2	6.79	0.192	0.151	0.041	0.000	0.000	0.000	0.000
33.9	6.78	0.030	0.030	0.000	0.000	0.000	0.000	0.000
41.2	6.76	0.079	0.075	0.004	0.000	0.000	0.000	0.000
6.6	6.99	4.006	0.252	1.425	1.893	0.424	0.012	0.000
15.2	6.98	0.544	0.124	0.335	0.085	0.000	0.000	0.000
23.8	7.03	0.353	0.181	0.172	0.000	0.000	0.000	0.000
35.3	6.97	0.022	0.022	0.001	0.000	0.000	0.000	0.000
41.3	6.95	0.062	0.050	0.012	0.000	0.000	0.000	0.000
6.0	7.17	1.158	0.055	0.310	0.555	0.224	0.014	0.000
15.9	7.20	0.128	0.024	0.076	0.028	0.000	0.000	0.000
23.9	7.20	0.471	0.185	0.267	0.020	0.000	0.000	0.000
37.4	7.16	0.037	0.031	0.007	0.000	0.000	0.000	0.000

6.9	7.37	0.112	0.006	0.033	0.055	0.017	0.001	0.000
15.8	7.37	0.152	0.025	0.091	0.037	0.000	0.000	0.000
24.4	7.35	0.490	0.146	0.288	0.057	0.000	0.000	0.000
7.5	7.60	0.149	0.009	0.048	0.077	0.016	0.000	0.000
15.7	7.55	0.242	0.032	0.144	0.065	0.001	0.000	0.000
24.9	7.55	0.124	0.037	0.073	0.014	0.000	0.000	0.000
57.2	7.57	0.051	0.051	0.000	0.000	0.000	0.000	0.000
7.5	7.79	0.207	0.011	0.064	0.110	0.023	0.000	0.000
12.2	7.74	0.074	0.006	0.033	0.031	0.003	0.000	0.000
27.6	7.74	0.137	0.040	0.085	0.013	0.000	0.000	0.000
57.5	7.78	0.203	0.198	0.005	0.000	0.000	0.000	0.000
62.9	7.80	0.039	0.039	0.000	0.000	0.000	0.000	0.000
57.9	7.98	0.309	0.236	0.073	0.000	0.000	0.000	0.000
58.0	8.20	0.034	0.024	0.011	0.000	0.000	0.000	0.000

Summary statistics for above PSHA PGA deaggregation, R=distance, e=epsilon:
Contribution from this GMPE(%): 38.0
Mean src-site R= 10.9 km; M= 6.54; eps0= 0.52. Mean calculated for all sources.
Modal src-site R= 5.8 km; M= 6.59; eps0= -0.22 from peak (R,M) bin
MODE R*= 5.8km; M*= 6.59; EPS.INTERVAL: 0 to 1 sigma % CONTRIB.= 2.393

Principal sources (faults, subduction, random seismicity having > 3% contribution)

Source Category:	% contr.	R(km)	M	epsilon0 (mean values).
California B-faults Char	13.60	11.0	6.76	0.35
California B-faults GR	9.21	9.3	6.63	0.27
California A-faults	5.45	14.2	7.14	0.62
CA Compr. crustal gridded	9.77	10.6	5.80	0.94

Individual fault hazard details if its contribution to mean hazard > 2%:

Fault ID	% contr.	Rcd(km)	M	epsilon0	Site-to-src azimuth(d)
Elysian Park (Upper) Char	3.13	10.2	6.58	0.63	-3.0
Raymond Char	0.96	16.1	6.62	1.42	-1.4
Puente Hills Char	1.21	5.6	7.04	-0.52	-164.8
Puente Hills (LA) Char	1.66	2.2	6.87	-0.53	169.9
Puente Hills (Santa Fe Springs)	2.69	5.9	6.49	-0.46	170.1
Puente Hills (Coyote Hills) Char	1.21	9.7	6.70	0.27	88.1
Elysian Park Upper, nom. GR	1.06	10.2	6.50	0.68	-3.0
Puente Hills GR D2.1 & D2.4	1.45	5.6	6.76	-0.31	-165.9
Puente Hills (LA) GR	1.60	2.2	6.68	-0.45	179.1
Puente Hills (Santa Fe Spr)NGR	1.04	5.9	6.40	-0.41	170.1
Elsinore; Whittier aPriori	1.59	7.5	6.95	0.43	71.2
Elsinore; Whittier MoBal	2.34	7.5	6.93	0.45	71.2

#*********End of deaggregation corresponding to Chiou-Youngs 2008 *********#

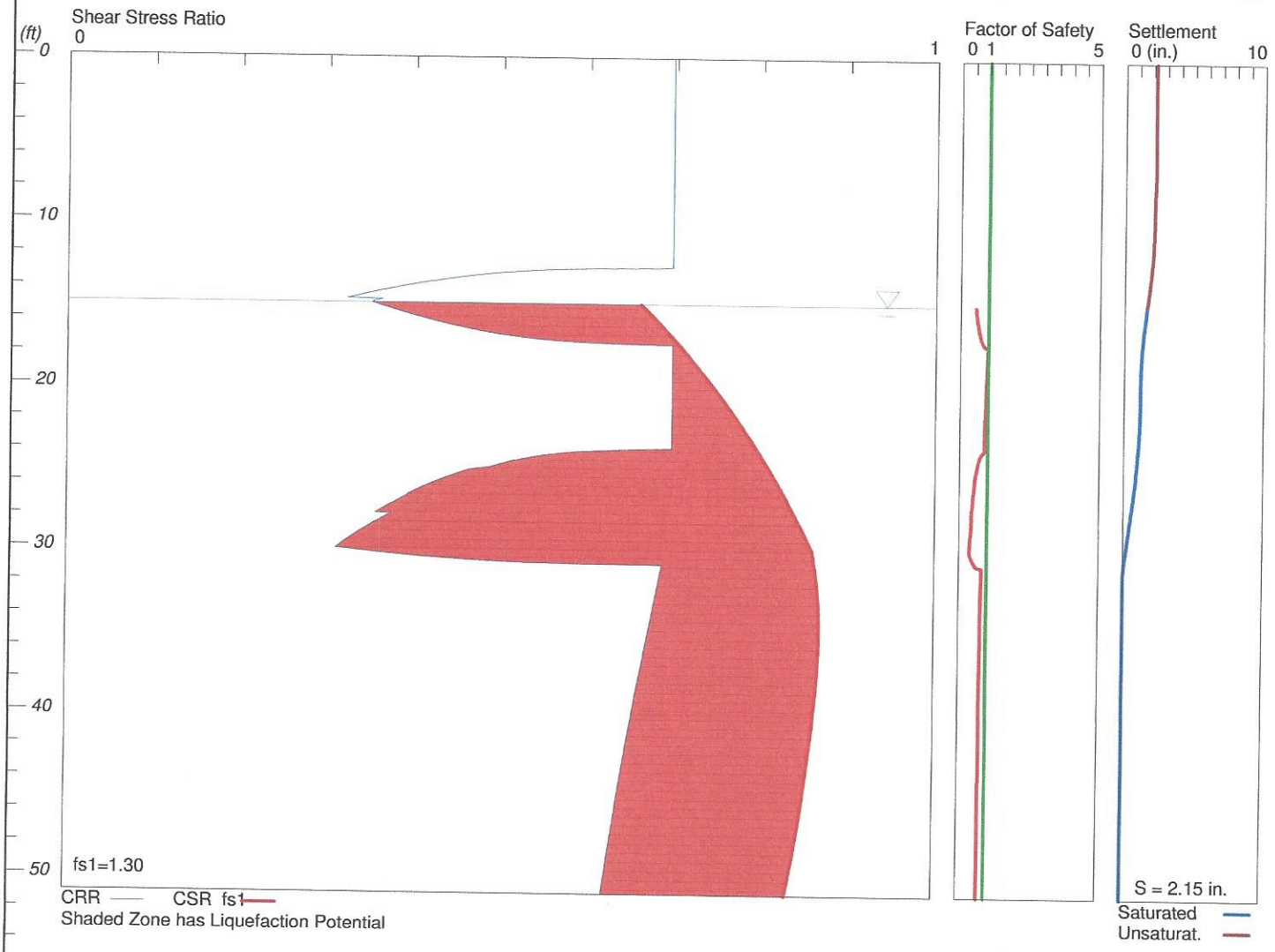
********** Southern California **********

LIQUEFACTION ANALYSIS

444-04194

Hole No.=BH-1 Water Depth=15 ft Surface Elev.=153

Magnitude=6.59
Acceleration=0.809g



LiquefyPro CivilTech Software USA www.civiltech.com

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LIQUEFACTION ANALYSIS SUMMARY

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Input File Name: E:\Liquefy5\444-04194 Sage BH-1.liq
Title: 444-04194
Subtitle: 7316 Gage Ave., Commerce

Surface Elev.=153
Hole No.=BH-1
Depth of Hole= 51.00 ft
Water Table during Earthquake= 15.00 ft
Water Table during In-Situ Testing= 52.00 ft
Max. Acceleration= 0.81 g
Earthquake Magnitude= 6.59

Input Data:
Surface Elev.=153
Hole No.=BH-1
Depth of Hole=51.00 ft
Water Table during Earthquake= 15.00 ft
Water Table during In-Situ Testing= 52.00 ft
Max. Acceleration=0.81 g
Earthquake Magnitude=6.59
No-Liquefiable Soils: Based on Analysis

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Tokimatsu, M-correction
3. Fines Correction for Liquefaction: Modify Stark/Olson
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.25
7. Borehole Diameter, Cb= 1
8. Sampling Method, Cs= 1
9. User request factor of safety (apply to CSR) , User= 1.3
   Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: Yes*

* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	43.33	139.50	74.20
2.00	43.33	139.50	74.20
5.00	66.66	135.60	75.00
10.00	20.00	135.60	77.50
15.00	18.66	109.50	3.70
20.00	34.00	109.50	5.40
25.00	28.66	106.30	3.60
30.00	13.00	106.30	39.60
35.00	66.66	120.40	51.20
40.00	24.00	120.40	90.40
45.00	66.66	107.10	3.80

50.00 60.00 107.10 7.60

Output Results:

Settlement of Saturated Sands=1.57 in.
Settlement of Unsaturated Sands=0.58 in.
Total Settlement of Saturated and Unsaturated Sands=2.15 in.
Differential Settlement=1.076 to 1.420 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.70	0.68	5.00	1.57	0.58	2.15
0.05	0.70	0.68	5.00	1.57	0.58	2.15
0.10	0.70	0.68	5.00	1.57	0.58	2.15
0.15	0.70	0.68	5.00	1.57	0.58	2.15
0.20	0.70	0.68	5.00	1.57	0.58	2.15
0.25	0.70	0.68	5.00	1.57	0.58	2.15
0.30	0.70	0.68	5.00	1.57	0.58	2.15
0.35	0.70	0.68	5.00	1.57	0.58	2.15
0.40	0.70	0.68	5.00	1.57	0.58	2.15
0.45	0.70	0.68	5.00	1.57	0.58	2.15
0.50	0.70	0.68	5.00	1.57	0.58	2.15
0.55	0.70	0.68	5.00	1.57	0.58	2.15
0.60	0.70	0.68	5.00	1.57	0.58	2.15
0.65	0.70	0.68	5.00	1.57	0.58	2.15
0.70	0.70	0.68	5.00	1.57	0.58	2.15
0.75	0.70	0.68	5.00	1.57	0.58	2.15
0.80	0.70	0.68	5.00	1.57	0.58	2.15
0.85	0.70	0.68	5.00	1.57	0.58	2.15
0.90	0.70	0.68	5.00	1.57	0.58	2.15
0.95	0.70	0.68	5.00	1.57	0.58	2.15
1.00	0.70	0.68	5.00	1.57	0.58	2.15
1.05	0.70	0.68	5.00	1.57	0.58	2.15
1.10	0.70	0.68	5.00	1.57	0.58	2.15
1.15	0.70	0.68	5.00	1.57	0.58	2.15
1.20	0.70	0.68	5.00	1.57	0.58	2.15
1.25	0.70	0.68	5.00	1.57	0.58	2.15
1.30	0.70	0.68	5.00	1.57	0.58	2.15
1.35	0.70	0.68	5.00	1.57	0.58	2.15
1.40	0.70	0.68	5.00	1.57	0.58	2.15
1.45	0.70	0.68	5.00	1.57	0.58	2.15
1.50	0.70	0.68	5.00	1.57	0.58	2.15
1.55	0.70	0.68	5.00	1.57	0.58	2.15
1.60	0.70	0.68	5.00	1.57	0.58	2.15
1.65	0.70	0.68	5.00	1.57	0.58	2.15
1.70	0.70	0.68	5.00	1.57	0.58	2.15
1.75	0.70	0.68	5.00	1.57	0.58	2.15
1.80	0.70	0.68	5.00	1.57	0.58	2.15
1.85	0.70	0.68	5.00	1.57	0.58	2.15
1.90	0.70	0.68	5.00	1.57	0.58	2.15
1.95	0.70	0.68	5.00	1.57	0.58	2.15
2.00	0.70	0.68	5.00	1.57	0.58	2.15
2.05	0.70	0.68	5.00	1.57	0.58	2.15
2.10	0.70	0.68	5.00	1.57	0.58	2.15
2.15	0.70	0.68	5.00	1.57	0.58	2.15
2.20	0.70	0.68	5.00	1.57	0.58	2.15
2.25	0.70	0.68	5.00	1.57	0.58	2.15
2.30	0.70	0.68	5.00	1.57	0.58	2.15
2.35	0.70	0.68	5.00	1.57	0.58	2.15
2.40	0.70	0.68	5.00	1.57	0.58	2.15
2.45	0.70	0.68	5.00	1.57	0.57	2.15
2.50	0.70	0.68	5.00	1.57	0.57	2.15

2.55	0.70	0.68	5.00	1.57	0.57	2.15
2.60	0.70	0.68	5.00	1.57	0.57	2.15
2.65	0.70	0.68	5.00	1.57	0.57	2.15
2.70	0.70	0.68	5.00	1.57	0.57	2.15
2.75	0.70	0.68	5.00	1.57	0.57	2.15
2.80	0.70	0.68	5.00	1.57	0.57	2.15
2.85	0.70	0.68	5.00	1.57	0.57	2.15
2.90	0.70	0.68	5.00	1.57	0.57	2.15
2.95	0.70	0.68	5.00	1.57	0.57	2.15
3.00	0.70	0.68	5.00	1.57	0.57	2.15
3.05	0.70	0.68	5.00	1.57	0.57	2.15
3.10	0.70	0.68	5.00	1.57	0.57	2.15
3.15	0.70	0.68	5.00	1.57	0.57	2.15
3.20	0.70	0.68	5.00	1.57	0.57	2.15
3.25	0.70	0.68	5.00	1.57	0.57	2.15
3.30	0.70	0.68	5.00	1.57	0.57	2.15
3.35	0.70	0.68	5.00	1.57	0.57	2.15
3.40	0.70	0.68	5.00	1.57	0.57	2.15
3.45	0.70	0.68	5.00	1.57	0.57	2.15
3.50	0.70	0.68	5.00	1.57	0.57	2.15
3.55	0.70	0.68	5.00	1.57	0.57	2.15
3.60	0.70	0.68	5.00	1.57	0.57	2.14
3.65	0.70	0.68	5.00	1.57	0.57	2.14
3.70	0.70	0.68	5.00	1.57	0.57	2.14
3.75	0.70	0.68	5.00	1.57	0.57	2.14
3.80	0.70	0.68	5.00	1.57	0.57	2.14
3.85	0.70	0.68	5.00	1.57	0.57	2.14
3.90	0.70	0.68	5.00	1.57	0.57	2.14
3.95	0.70	0.68	5.00	1.57	0.57	2.14
4.00	0.70	0.68	5.00	1.57	0.57	2.14
4.05	0.70	0.68	5.00	1.57	0.57	2.14
4.10	0.70	0.68	5.00	1.57	0.57	2.14
4.15	0.70	0.68	5.00	1.57	0.57	2.14
4.20	0.70	0.68	5.00	1.57	0.57	2.14
4.25	0.70	0.68	5.00	1.57	0.57	2.14
4.30	0.70	0.68	5.00	1.57	0.57	2.14
4.35	0.70	0.68	5.00	1.57	0.57	2.14
4.40	0.70	0.68	5.00	1.57	0.57	2.14
4.45	0.70	0.68	5.00	1.57	0.57	2.14
4.50	0.70	0.68	5.00	1.57	0.57	2.14
4.55	0.70	0.68	5.00	1.57	0.57	2.14
4.60	0.70	0.68	5.00	1.57	0.57	2.14
4.65	0.70	0.68	5.00	1.57	0.57	2.14
4.70	0.70	0.68	5.00	1.57	0.57	2.14
4.75	0.70	0.68	5.00	1.57	0.57	2.14
4.80	0.70	0.68	5.00	1.57	0.57	2.14
4.85	0.70	0.68	5.00	1.57	0.57	2.14
4.90	0.70	0.68	5.00	1.57	0.57	2.14
4.95	0.70	0.68	5.00	1.57	0.57	2.14
5.00	0.70	0.68	5.00	1.57	0.57	2.14
5.05	0.70	0.68	5.00	1.57	0.57	2.14
5.10	0.70	0.68	5.00	1.57	0.57	2.14
5.15	0.70	0.68	5.00	1.57	0.57	2.14
5.20	0.70	0.68	5.00	1.57	0.57	2.14
5.25	0.70	0.68	5.00	1.57	0.57	2.14
5.30	0.70	0.68	5.00	1.57	0.57	2.14
5.35	0.70	0.68	5.00	1.57	0.57	2.14
5.40	0.70	0.67	5.00	1.57	0.57	2.14
5.45	0.70	0.67	5.00	1.57	0.57	2.14
5.50	0.70	0.67	5.00	1.57	0.57	2.14
5.55	0.70	0.67	5.00	1.57	0.57	2.14
5.60	0.70	0.67	5.00	1.57	0.57	2.14
5.65	0.70	0.67	5.00	1.57	0.57	2.14

5.70	0.70	0.67	5.00	1.57	0.57	2.14
5.75	0.70	0.67	5.00	1.57	0.57	2.14
5.80	0.70	0.67	5.00	1.57	0.57	2.14
5.85	0.70	0.67	5.00	1.57	0.56	2.14
5.90	0.70	0.67	5.00	1.57	0.56	2.14
5.95	0.70	0.67	5.00	1.57	0.56	2.14
6.00	0.70	0.67	5.00	1.57	0.56	2.14
6.05	0.70	0.67	5.00	1.57	0.56	2.14
6.10	0.70	0.67	5.00	1.57	0.56	2.14
6.15	0.70	0.67	5.00	1.57	0.56	2.14
6.20	0.70	0.67	5.00	1.57	0.56	2.14
6.25	0.70	0.67	5.00	1.57	0.56	2.14
6.30	0.70	0.67	5.00	1.57	0.56	2.14
6.35	0.70	0.67	5.00	1.57	0.56	2.14
6.40	0.70	0.67	5.00	1.57	0.56	2.14
6.45	0.70	0.67	5.00	1.57	0.56	2.13
6.50	0.70	0.67	5.00	1.57	0.56	2.13
6.55	0.70	0.67	5.00	1.57	0.56	2.13
6.60	0.70	0.67	5.00	1.57	0.56	2.13
6.65	0.70	0.67	5.00	1.57	0.56	2.13
6.70	0.70	0.67	5.00	1.57	0.56	2.13
6.75	0.70	0.67	5.00	1.57	0.56	2.13
6.80	0.70	0.67	5.00	1.57	0.56	2.13
6.85	0.70	0.67	5.00	1.57	0.56	2.13
6.90	0.70	0.67	5.00	1.57	0.56	2.13
6.95	0.70	0.67	5.00	1.57	0.56	2.13
7.00	0.70	0.67	5.00	1.57	0.56	2.13
7.05	0.70	0.67	5.00	1.57	0.56	2.13
7.10	0.70	0.67	5.00	1.57	0.56	2.13
7.15	0.70	0.67	5.00	1.57	0.55	2.13
7.20	0.70	0.67	5.00	1.57	0.55	2.13
7.25	0.70	0.67	5.00	1.57	0.55	2.13
7.30	0.70	0.67	5.00	1.57	0.55	2.12
7.35	0.70	0.67	5.00	1.57	0.55	2.12
7.40	0.70	0.67	5.00	1.57	0.55	2.12
7.45	0.70	0.67	5.00	1.57	0.55	2.12
7.50	0.70	0.67	5.00	1.57	0.55	2.12
7.55	0.70	0.67	5.00	1.57	0.55	2.12
7.60	0.70	0.67	5.00	1.57	0.54	2.12
7.65	0.70	0.67	5.00	1.57	0.54	2.11
7.70	0.70	0.67	5.00	1.57	0.54	2.11
7.75	0.70	0.67	5.00	1.57	0.54	2.11
7.80	0.70	0.67	5.00	1.57	0.53	2.11
7.85	0.70	0.67	5.00	1.57	0.53	2.10
7.90	0.70	0.67	5.00	1.57	0.53	2.10
7.95	0.70	0.67	5.00	1.57	0.53	2.10
8.00	0.70	0.67	5.00	1.57	0.52	2.10
8.05	0.70	0.67	5.00	1.57	0.52	2.09
8.10	0.70	0.67	5.00	1.57	0.52	2.09
8.15	0.70	0.67	5.00	1.57	0.51	2.09
8.20	0.70	0.67	5.00	1.57	0.51	2.08
8.25	0.70	0.67	5.00	1.57	0.51	2.08
8.30	0.70	0.67	5.00	1.57	0.50	2.08
8.35	0.70	0.67	5.00	1.57	0.50	2.07
8.40	0.70	0.67	5.00	1.57	0.50	2.07
8.45	0.70	0.67	5.00	1.57	0.50	2.07
8.50	0.70	0.67	5.00	1.57	0.50	2.07
8.55	0.70	0.67	5.00	1.57	0.50	2.07
8.60	0.70	0.67	5.00	1.57	0.50	2.07
8.65	0.70	0.67	5.00	1.57	0.50	2.07
8.70	0.70	0.67	5.00	1.57	0.50	2.07
8.75	0.70	0.67	5.00	1.57	0.50	2.07
8.80	0.70	0.67	5.00	1.57	0.50	2.07

8.85	0.70	0.67	5.00	1.57	0.50	2.07
8.90	0.70	0.67	5.00	1.57	0.50	2.07
8.95	0.70	0.67	5.00	1.57	0.50	2.07
9.00	0.70	0.67	5.00	1.57	0.50	2.07
9.05	0.70	0.67	5.00	1.57	0.49	2.07
9.10	0.70	0.67	5.00	1.57	0.49	2.07
9.15	0.70	0.67	5.00	1.57	0.49	2.07
9.20	0.70	0.67	5.00	1.57	0.49	2.07
9.25	0.70	0.67	5.00	1.57	0.49	2.07
9.30	0.70	0.67	5.00	1.57	0.49	2.06
9.35	0.70	0.67	5.00	1.57	0.49	2.06
9.40	0.70	0.67	5.00	1.57	0.49	2.06
9.45	0.70	0.67	5.00	1.57	0.49	2.06
9.50	0.70	0.67	5.00	1.57	0.49	2.06
9.55	0.70	0.67	5.00	1.57	0.49	2.06
9.60	0.70	0.67	5.00	1.57	0.49	2.06
9.65	0.70	0.67	5.00	1.57	0.49	2.06
9.70	0.70	0.67	5.00	1.57	0.49	2.06
9.75	0.70	0.67	5.00	1.57	0.48	2.06
9.80	0.70	0.67	5.00	1.57	0.48	2.06
9.85	0.70	0.67	5.00	1.57	0.48	2.06
9.90	0.70	0.67	5.00	1.57	0.48	2.05
9.95	0.70	0.67	5.00	1.57	0.48	2.05
10.00	0.70	0.67	5.00	1.57	0.48	2.05
10.05	0.70	0.67	5.00	1.57	0.48	2.05
10.10	0.70	0.67	5.00	1.57	0.48	2.05
10.15	0.70	0.67	5.00	1.57	0.48	2.05
10.20	0.70	0.67	5.00	1.57	0.47	2.05
10.25	0.70	0.67	5.00	1.57	0.47	2.05
10.30	0.70	0.67	5.00	1.57	0.47	2.04
10.35	0.70	0.67	5.00	1.57	0.47	2.04
10.40	0.70	0.67	5.00	1.57	0.47	2.04
10.45	0.70	0.67	5.00	1.57	0.47	2.04
10.50	0.70	0.67	5.00	1.57	0.47	2.04
10.55	0.70	0.67	5.00	1.57	0.47	2.04
10.60	0.70	0.67	5.00	1.57	0.46	2.04
10.65	0.70	0.67	5.00	1.57	0.46	2.04
10.70	0.70	0.67	5.00	1.57	0.46	2.03
10.75	0.70	0.67	5.00	1.57	0.46	2.03
10.80	0.70	0.67	5.00	1.57	0.46	2.03
10.85	0.70	0.67	5.00	1.57	0.46	2.03
10.90	0.70	0.67	5.00	1.57	0.45	2.03
10.95	0.70	0.67	5.00	1.57	0.45	2.02
11.00	0.70	0.67	5.00	1.57	0.45	2.02
11.05	0.70	0.67	5.00	1.57	0.45	2.02
11.10	0.70	0.67	5.00	1.57	0.45	2.02
11.15	0.70	0.67	5.00	1.57	0.44	2.02
11.20	0.70	0.67	5.00	1.57	0.44	2.01
11.25	0.70	0.67	5.00	1.57	0.44	2.01
11.30	0.70	0.67	5.00	1.57	0.44	2.01
11.35	0.70	0.67	5.00	1.57	0.43	2.01
11.40	0.70	0.67	5.00	1.57	0.43	2.00
11.45	0.70	0.67	5.00	1.57	0.43	2.00
11.50	0.70	0.67	5.00	1.57	0.43	2.00
11.55	0.70	0.67	5.00	1.57	0.42	1.99
11.60	0.70	0.67	5.00	1.57	0.42	1.99
11.65	0.70	0.67	5.00	1.57	0.42	1.99
11.70	0.70	0.66	5.00	1.57	0.41	1.98
11.75	0.70	0.66	5.00	1.57	0.41	1.98
11.80	0.70	0.66	5.00	1.57	0.40	1.98
11.85	0.70	0.66	5.00	1.57	0.40	1.97
11.90	0.70	0.66	5.00	1.57	0.40	1.97
11.95	0.70	0.66	5.00	1.57	0.39	1.97

12.00	0.70	0.66	5.00	1.57	0.39	1.96
12.05	0.70	0.66	5.00	1.57	0.38	1.96
12.10	0.70	0.66	5.00	1.57	0.38	1.95
12.15	0.70	0.66	5.00	1.57	0.37	1.95
12.20	0.70	0.66	5.00	1.57	0.37	1.94
12.25	0.70	0.66	5.00	1.57	0.36	1.94
12.30	0.70	0.66	5.00	1.57	0.36	1.93
12.35	0.70	0.66	5.00	1.57	0.36	1.93
12.40	0.70	0.66	5.00	1.57	0.35	1.92
12.45	0.70	0.66	5.00	1.57	0.35	1.92
12.50	0.70	0.66	5.00	1.57	0.34	1.91
12.55	0.70	0.66	5.00	1.57	0.34	1.91
12.60	0.70	0.66	5.00	1.57	0.33	1.90
12.65	0.70	0.66	5.00	1.57	0.32	1.90
12.70	0.70	0.66	5.00	1.57	0.32	1.89
12.75	0.70	0.66	5.00	1.57	0.31	1.89
12.80	0.68	0.66	5.00	1.57	0.31	1.88
12.85	0.61	0.66	5.00	1.57	0.30	1.88
12.90	0.57	0.66	5.00	1.57	0.30	1.87
12.95	0.55	0.66	5.00	1.57	0.29	1.87
13.00	0.53	0.66	5.00	1.57	0.29	1.86
13.05	0.52	0.66	5.00	1.57	0.28	1.85
13.10	0.51	0.66	5.00	1.57	0.28	1.85
13.15	0.50	0.66	5.00	1.57	0.27	1.84
13.20	0.49	0.66	5.00	1.57	0.26	1.84
13.25	0.48	0.66	5.00	1.57	0.26	1.83
13.30	0.47	0.66	5.00	1.57	0.25	1.82
13.35	0.46	0.66	5.00	1.57	0.25	1.82
13.40	0.46	0.66	5.00	1.57	0.24	1.81
13.45	0.45	0.66	5.00	1.57	0.23	1.81
13.50	0.44	0.66	5.00	1.57	0.23	1.80
13.55	0.43	0.66	5.00	1.57	0.22	1.79
13.60	0.43	0.66	5.00	1.57	0.21	1.79
13.65	0.42	0.66	5.00	1.57	0.21	1.78
13.70	0.42	0.66	5.00	1.57	0.20	1.77
13.75	0.41	0.66	5.00	1.57	0.19	1.77
13.80	0.41	0.66	5.00	1.57	0.19	1.76
13.85	0.40	0.66	5.00	1.57	0.18	1.75
13.90	0.40	0.66	5.00	1.57	0.17	1.75
13.95	0.39	0.66	5.00	1.57	0.17	1.74
14.00	0.39	0.66	5.00	1.57	0.16	1.73
14.05	0.38	0.66	5.00	1.57	0.15	1.72
14.10	0.38	0.66	5.00	1.57	0.14	1.72
14.15	0.37	0.66	5.00	1.57	0.14	1.71
14.20	0.37	0.66	5.00	1.57	0.13	1.70
14.25	0.36	0.66	5.00	1.57	0.12	1.69
14.30	0.36	0.66	5.00	1.57	0.11	1.69
14.35	0.35	0.66	5.00	1.57	0.11	1.68
14.40	0.35	0.66	5.00	1.57	0.10	1.67
14.45	0.35	0.66	5.00	1.57	0.09	1.66
14.50	0.34	0.66	5.00	1.57	0.08	1.66
14.55	0.34	0.66	5.00	1.57	0.07	1.65
14.60	0.33	0.66	5.00	1.57	0.07	1.64
14.65	0.33	0.66	5.00	1.57	0.06	1.63
14.70	0.33	0.66	5.00	1.57	0.05	1.62
14.75	0.32	0.66	5.00	1.57	0.04	1.61
14.80	0.36	0.66	5.00	1.57	0.03	1.60
14.85	0.36	0.66	5.00	1.57	0.02	1.60
14.90	0.35	0.66	5.00	1.57	0.02	1.59
14.95	0.35	0.66	5.00	1.57	0.01	1.58
15.00	0.35	0.66	0.53*	1.57	0.00	1.57
15.05	0.35	0.66	0.53*	1.57	0.00	1.57
15.10	0.36	0.66	0.54*	1.56	0.00	1.56

15.15	0.36	0.66	0.54*	1.55	0.00	1.55
15.20	0.36	0.66	0.55*	1.54	0.00	1.54
15.25	0.37	0.66	0.55*	1.53	0.00	1.53
15.30	0.37	0.67	0.55*	1.53	0.00	1.53
15.35	0.37	0.67	0.56*	1.52	0.00	1.52
15.40	0.37	0.67	0.56*	1.51	0.00	1.51
15.45	0.38	0.67	0.57*	1.50	0.00	1.50
15.50	0.38	0.67	0.57*	1.50	0.00	1.50
15.55	0.38	0.67	0.57*	1.49	0.00	1.49
15.60	0.39	0.67	0.58*	1.48	0.00	1.48
15.65	0.39	0.67	0.58*	1.48	0.00	1.48
15.70	0.39	0.67	0.59*	1.47	0.00	1.47
15.75	0.40	0.67	0.59*	1.46	0.00	1.46
15.80	0.40	0.67	0.60*	1.45	0.00	1.45
15.85	0.41	0.68	0.60*	1.45	0.00	1.45
15.90	0.41	0.68	0.60*	1.44	0.00	1.44
15.95	0.41	0.68	0.61*	1.43	0.00	1.43
16.00	0.42	0.68	0.61*	1.43	0.00	1.43
16.05	0.42	0.68	0.62*	1.42	0.00	1.42
16.10	0.42	0.68	0.62*	1.41	0.00	1.41
16.15	0.43	0.68	0.63*	1.41	0.00	1.41
16.20	0.43	0.68	0.63*	1.40	0.00	1.40
16.25	0.44	0.68	0.64*	1.39	0.00	1.39
16.30	0.44	0.68	0.64*	1.39	0.00	1.39
16.35	0.44	0.68	0.65*	1.38	0.00	1.38
16.40	0.45	0.69	0.65*	1.37	0.00	1.37
16.45	0.45	0.69	0.66*	1.37	0.00	1.37
16.50	0.46	0.69	0.67*	1.36	0.00	1.36
16.55	0.46	0.69	0.67*	1.35	0.00	1.35
16.60	0.47	0.69	0.68*	1.35	0.00	1.35
16.65	0.47	0.69	0.68*	1.34	0.00	1.34
16.70	0.48	0.69	0.69*	1.34	0.00	1.34
16.75	0.48	0.69	0.70*	1.33	0.00	1.33
16.80	0.49	0.69	0.71*	1.32	0.00	1.32
16.85	0.49	0.69	0.71*	1.32	0.00	1.32
16.90	0.50	0.69	0.72*	1.31	0.00	1.31
16.95	0.51	0.70	0.73*	1.31	0.00	1.31
17.00	0.51	0.70	0.74*	1.30	0.00	1.30
17.05	0.52	0.70	0.75*	1.30	0.00	1.30
17.10	0.53	0.70	0.76*	1.29	0.00	1.29
17.15	0.54	0.70	0.77*	1.29	0.00	1.29
17.20	0.55	0.70	0.79*	1.28	0.00	1.28
17.25	0.56	0.70	0.81*	1.28	0.00	1.28
17.30	0.58	0.70	0.83*	1.27	0.00	1.27
17.35	0.60	0.70	0.86*	1.27	0.00	1.27
17.40	0.64	0.70	0.91*	1.26	0.00	1.26
17.45	0.70	0.70	0.99*	1.26	0.00	1.26
17.50	0.70	0.70	0.99*	1.25	0.00	1.25
17.55	0.70	0.71	0.99*	1.25	0.00	1.25
17.60	0.70	0.71	0.99*	1.25	0.00	1.25
17.65	0.70	0.71	0.98*	1.24	0.00	1.24
17.70	0.70	0.71	0.98*	1.24	0.00	1.24
17.75	0.70	0.71	0.98*	1.23	0.00	1.23
17.80	0.70	0.71	0.98*	1.23	0.00	1.23
17.85	0.70	0.71	0.98*	1.23	0.00	1.23
17.90	0.70	0.71	0.98*	1.22	0.00	1.22
17.95	0.70	0.71	0.98*	1.22	0.00	1.22
18.00	0.70	0.71	0.98*	1.22	0.00	1.22
18.05	0.70	0.71	0.98*	1.21	0.00	1.21
18.10	0.70	0.71	0.97*	1.21	0.00	1.21
18.15	0.70	0.72	0.97*	1.21	0.00	1.21
18.20	0.70	0.72	0.97*	1.20	0.00	1.20
18.25	0.70	0.72	0.97*	1.20	0.00	1.20

18.30	0.70	0.72	0.97*	1.20	0.00	1.20
18.35	0.70	0.72	0.97*	1.20	0.00	1.20
18.40	0.70	0.72	0.97*	1.19	0.00	1.19
18.45	0.70	0.72	0.97*	1.19	0.00	1.19
18.50	0.70	0.72	0.97*	1.19	0.00	1.19
18.55	0.70	0.72	0.96*	1.19	0.00	1.19
18.60	0.70	0.72	0.96*	1.19	0.00	1.19
18.65	0.70	0.72	0.96*	1.18	0.00	1.18
18.70	0.70	0.72	0.96*	1.18	0.00	1.18
18.75	0.70	0.72	0.96*	1.18	0.00	1.18
18.80	0.70	0.73	0.96*	1.18	0.00	1.18
18.85	0.70	0.73	0.96*	1.18	0.00	1.18
18.90	0.70	0.73	0.96*	1.18	0.00	1.18
18.95	0.70	0.73	0.96*	1.18	0.00	1.18
19.00	0.70	0.73	0.96*	1.18	0.00	1.18
19.05	0.70	0.73	0.95*	1.18	0.00	1.18
19.10	0.70	0.73	0.95*	1.17	0.00	1.17
19.15	0.70	0.73	0.95*	1.17	0.00	1.17
19.20	0.70	0.73	0.95*	1.17	0.00	1.17
19.25	0.70	0.73	0.95*	1.17	0.00	1.17
19.30	0.70	0.73	0.95*	1.17	0.00	1.17
19.35	0.70	0.73	0.95*	1.17	0.00	1.17
19.40	0.70	0.73	0.95*	1.17	0.00	1.17
19.45	0.70	0.74	0.95*	1.17	0.00	1.17
19.50	0.70	0.74	0.95*	1.17	0.00	1.17
19.55	0.70	0.74	0.94*	1.17	0.00	1.17
19.60	0.70	0.74	0.94*	1.17	0.00	1.17
19.65	0.70	0.74	0.94*	1.16	0.00	1.16
19.70	0.70	0.74	0.94*	1.16	0.00	1.16
19.75	0.70	0.74	0.94*	1.16	0.00	1.16
19.80	0.70	0.74	0.94*	1.16	0.00	1.16
19.85	0.70	0.74	0.94*	1.16	0.00	1.16
19.90	0.70	0.74	0.94*	1.16	0.00	1.16
19.95	0.70	0.74	0.94*	1.16	0.00	1.16
20.00	0.70	0.74	0.94*	1.16	0.00	1.16
20.05	0.70	0.74	0.94*	1.16	0.00	1.16
20.10	0.70	0.74	0.93*	1.16	0.00	1.16
20.15	0.70	0.75	0.93*	1.16	0.00	1.16
20.20	0.70	0.75	0.93*	1.16	0.00	1.16
20.25	0.70	0.75	0.93*	1.16	0.00	1.16
20.30	0.70	0.75	0.93*	1.16	0.00	1.16
20.35	0.70	0.75	0.93*	1.16	0.00	1.16
20.40	0.70	0.75	0.93*	1.16	0.00	1.16
20.45	0.70	0.75	0.93*	1.16	0.00	1.16
20.50	0.70	0.75	0.93*	1.16	0.00	1.16
20.55	0.70	0.75	0.93*	1.16	0.00	1.16
20.60	0.70	0.75	0.93*	1.16	0.00	1.16
20.65	0.70	0.75	0.92*	1.16	0.00	1.16
20.70	0.70	0.75	0.92*	1.16	0.00	1.16
20.75	0.70	0.75	0.92*	1.16	0.00	1.16
20.80	0.70	0.75	0.92*	1.15	0.00	1.15
20.85	0.70	0.76	0.92*	1.15	0.00	1.15
20.90	0.70	0.76	0.92*	1.15	0.00	1.15
20.95	0.70	0.76	0.92*	1.15	0.00	1.15
21.00	0.70	0.76	0.92*	1.15	0.00	1.15
21.05	0.70	0.76	0.92*	1.15	0.00	1.15
21.10	0.70	0.76	0.92*	1.15	0.00	1.15
21.15	0.70	0.76	0.92*	1.15	0.00	1.15
21.20	0.70	0.76	0.92*	1.15	0.00	1.15
21.25	0.70	0.76	0.91*	1.15	0.00	1.15
21.30	0.70	0.76	0.91*	1.15	0.00	1.15
21.35	0.70	0.76	0.91*	1.14	0.00	1.14
21.40	0.70	0.76	0.91*	1.14	0.00	1.14

21.45	0.70	0.76	0.91*	1.14	0.00	1.14
21.50	0.70	0.76	0.91*	1.14	0.00	1.14
21.55	0.70	0.77	0.91*	1.14	0.00	1.14
21.60	0.70	0.77	0.91*	1.14	0.00	1.14
21.65	0.70	0.77	0.91*	1.14	0.00	1.14
21.70	0.70	0.77	0.91*	1.14	0.00	1.14
21.75	0.70	0.77	0.91*	1.14	0.00	1.14
21.80	0.70	0.77	0.91*	1.13	0.00	1.13
21.85	0.70	0.77	0.90*	1.13	0.00	1.13
21.90	0.70	0.77	0.90*	1.13	0.00	1.13
21.95	0.70	0.77	0.90*	1.13	0.00	1.13
22.00	0.70	0.77	0.90*	1.13	0.00	1.13
22.05	0.70	0.77	0.90*	1.13	0.00	1.13
22.10	0.70	0.77	0.90*	1.13	0.00	1.13
22.15	0.70	0.77	0.90*	1.12	0.00	1.12
22.20	0.70	0.77	0.90*	1.12	0.00	1.12
22.25	0.70	0.77	0.90*	1.12	0.00	1.12
22.30	0.70	0.78	0.90*	1.12	0.00	1.12
22.35	0.70	0.78	0.90*	1.12	0.00	1.12
22.40	0.70	0.78	0.90*	1.11	0.00	1.11
22.45	0.70	0.78	0.90*	1.11	0.00	1.11
22.50	0.70	0.78	0.90*	1.11	0.00	1.11
22.55	0.70	0.78	0.89*	1.11	0.00	1.11
22.60	0.70	0.78	0.89*	1.10	0.00	1.10
22.65	0.70	0.78	0.89*	1.10	0.00	1.10
22.70	0.70	0.78	0.89*	1.10	0.00	1.10
22.75	0.70	0.78	0.89*	1.10	0.00	1.10
22.80	0.70	0.78	0.89*	1.09	0.00	1.09
22.85	0.70	0.78	0.89*	1.09	0.00	1.09
22.90	0.70	0.78	0.89*	1.09	0.00	1.09
22.95	0.70	0.78	0.89*	1.08	0.00	1.08
23.00	0.70	0.78	0.89*	1.08	0.00	1.08
23.05	0.70	0.78	0.89*	1.08	0.00	1.08
23.10	0.70	0.79	0.89*	1.07	0.00	1.07
23.15	0.70	0.79	0.89*	1.07	0.00	1.07
23.20	0.70	0.79	0.89*	1.07	0.00	1.07
23.25	0.70	0.79	0.88*	1.06	0.00	1.06
23.30	0.70	0.79	0.88*	1.06	0.00	1.06
23.35	0.70	0.79	0.88*	1.05	0.00	1.05
23.40	0.70	0.79	0.88*	1.05	0.00	1.05
23.45	0.70	0.79	0.88*	1.05	0.00	1.05
23.50	0.70	0.79	0.88*	1.04	0.00	1.04
23.55	0.70	0.79	0.88*	1.04	0.00	1.04
23.60	0.70	0.79	0.88*	1.03	0.00	1.03
23.65	0.70	0.79	0.88*	1.03	0.00	1.03
23.70	0.70	0.79	0.88*	1.03	0.00	1.03
23.75	0.70	0.79	0.88*	1.02	0.00	1.02
23.80	0.70	0.79	0.88*	1.02	0.00	1.02
23.85	0.67	0.79	0.84*	1.01	0.00	1.01
23.90	0.64	0.80	0.80*	1.01	0.00	1.01
23.95	0.61	0.80	0.77*	1.00	0.00	1.00
24.00	0.60	0.80	0.75*	1.00	0.00	1.00
24.05	0.59	0.80	0.74*	1.00	0.00	1.00
24.10	0.58	0.80	0.72*	0.99	0.00	0.99
24.15	0.57	0.80	0.71*	0.99	0.00	0.99
24.20	0.56	0.80	0.70*	0.98	0.00	0.98
24.25	0.55	0.80	0.69*	0.98	0.00	0.98
24.30	0.54	0.80	0.68*	0.97	0.00	0.97
24.35	0.54	0.80	0.67*	0.97	0.00	0.97
24.40	0.53	0.80	0.67*	0.96	0.00	0.96
24.45	0.53	0.80	0.66*	0.96	0.00	0.96
24.50	0.52	0.80	0.65*	0.95	0.00	0.95
24.55	0.52	0.80	0.65*	0.95	0.00	0.95

24.60	0.52	0.80	0.64*	0.94	0.00	0.94
24.65	0.51	0.80	0.64*	0.94	0.00	0.94
24.70	0.51	0.80	0.63*	0.93	0.00	0.93
24.75	0.50	0.81	0.63*	0.92	0.00	0.92
24.80	0.50	0.81	0.62*	0.92	0.00	0.92
24.85	0.50	0.81	0.62*	0.91	0.00	0.91
24.90	0.49	0.81	0.61*	0.91	0.00	0.91
24.95	0.49	0.81	0.61*	0.90	0.00	0.90
25.00	0.49	0.81	0.60*	0.90	0.00	0.90
25.05	0.48	0.81	0.59*	0.89	0.00	0.89
25.10	0.47	0.81	0.59*	0.88	0.00	0.88
25.15	0.47	0.81	0.58*	0.88	0.00	0.88
25.20	0.46	0.81	0.57*	0.87	0.00	0.87
25.25	0.46	0.81	0.57*	0.87	0.00	0.87
25.30	0.46	0.81	0.56*	0.86	0.00	0.86
25.35	0.45	0.81	0.56*	0.85	0.00	0.85
25.40	0.45	0.81	0.55*	0.85	0.00	0.85
25.45	0.45	0.81	0.55*	0.84	0.00	0.84
25.50	0.45	0.81	0.55*	0.83	0.00	0.83
25.55	0.44	0.81	0.54*	0.83	0.00	0.83
25.60	0.44	0.81	0.54*	0.82	0.00	0.82
25.65	0.44	0.82	0.54*	0.82	0.00	0.82
25.70	0.43	0.82	0.53*	0.81	0.00	0.81
25.75	0.43	0.82	0.53*	0.80	0.00	0.80
25.80	0.43	0.82	0.53*	0.80	0.00	0.80
25.85	0.43	0.82	0.52*	0.79	0.00	0.79
25.90	0.43	0.82	0.52*	0.78	0.00	0.78
25.95	0.42	0.82	0.52*	0.78	0.00	0.78
26.00	0.42	0.82	0.51*	0.77	0.00	0.77
26.05	0.42	0.82	0.51*	0.76	0.00	0.76
26.10	0.42	0.82	0.51*	0.76	0.00	0.76
26.15	0.41	0.82	0.50*	0.75	0.00	0.75
26.20	0.41	0.82	0.50*	0.74	0.00	0.74
26.25	0.41	0.82	0.50*	0.74	0.00	0.74
26.30	0.41	0.82	0.50*	0.73	0.00	0.73
26.35	0.41	0.82	0.49*	0.72	0.00	0.72
26.40	0.40	0.82	0.49*	0.71	0.00	0.71
26.45	0.40	0.82	0.49*	0.71	0.00	0.71
26.50	0.40	0.82	0.49*	0.70	0.00	0.70
26.55	0.40	0.83	0.48*	0.69	0.00	0.69
26.60	0.40	0.83	0.48*	0.69	0.00	0.69
26.65	0.39	0.83	0.48*	0.68	0.00	0.68
26.70	0.39	0.83	0.47*	0.67	0.00	0.67
26.75	0.39	0.83	0.48*	0.67	0.00	0.67
26.80	0.39	0.83	0.47*	0.66	0.00	0.66
26.85	0.39	0.83	0.47*	0.65	0.00	0.65
26.90	0.39	0.83	0.47*	0.64	0.00	0.64
26.95	0.39	0.83	0.46*	0.64	0.00	0.64
27.00	0.38	0.83	0.46*	0.63	0.00	0.63
27.05	0.38	0.83	0.46*	0.62	0.00	0.62
27.10	0.38	0.83	0.46*	0.61	0.00	0.61
27.15	0.38	0.83	0.46*	0.61	0.00	0.61
27.20	0.38	0.83	0.45*	0.60	0.00	0.60
27.25	0.37	0.83	0.45*	0.59	0.00	0.59
27.30	0.37	0.83	0.45*	0.58	0.00	0.58
27.35	0.37	0.83	0.45*	0.58	0.00	0.58
27.40	0.37	0.83	0.44*	0.57	0.00	0.57
27.45	0.37	0.83	0.44*	0.56	0.00	0.56
27.50	0.37	0.84	0.44*	0.55	0.00	0.55
27.55	0.36	0.84	0.44*	0.55	0.00	0.55
27.60	0.36	0.84	0.43*	0.54	0.00	0.54
27.65	0.36	0.84	0.43*	0.53	0.00	0.53
27.70	0.36	0.84	0.43*	0.52	0.00	0.52

27.75	0.36	0.84	0.43*	0.52	0.00	0.52
27.80	0.36	0.84	0.43*	0.51	0.00	0.51
27.85	0.36	0.84	0.42*	0.50	0.00	0.50
27.90	0.37	0.84	0.44*	0.49	0.00	0.49
27.95	0.37	0.84	0.44*	0.48	0.00	0.48
28.00	0.37	0.84	0.44*	0.48	0.00	0.48
28.05	0.37	0.84	0.44*	0.47	0.00	0.47
28.10	0.37	0.84	0.43*	0.46	0.00	0.46
28.15	0.36	0.84	0.43*	0.45	0.00	0.45
28.20	0.36	0.84	0.43*	0.45	0.00	0.45
28.25	0.36	0.84	0.43*	0.44	0.00	0.44
28.30	0.36	0.84	0.43*	0.43	0.00	0.43
28.35	0.36	0.84	0.42*	0.42	0.00	0.42
28.40	0.36	0.84	0.42*	0.42	0.00	0.42
28.45	0.35	0.84	0.42*	0.41	0.00	0.41
28.50	0.35	0.84	0.42*	0.40	0.00	0.40
28.55	0.35	0.85	0.41*	0.39	0.00	0.39
28.60	0.35	0.85	0.41*	0.38	0.00	0.38
28.65	0.35	0.85	0.41*	0.38	0.00	0.38
28.70	0.35	0.85	0.41*	0.37	0.00	0.37
28.75	0.34	0.85	0.41*	0.36	0.00	0.36
28.80	0.34	0.85	0.40*	0.35	0.00	0.35
28.85	0.34	0.85	0.40*	0.34	0.00	0.34
28.90	0.34	0.85	0.40*	0.34	0.00	0.34
28.95	0.34	0.85	0.40*	0.33	0.00	0.33
29.00	0.34	0.85	0.40*	0.32	0.00	0.32
29.05	0.34	0.85	0.39*	0.31	0.00	0.31
29.10	0.33	0.85	0.39*	0.30	0.00	0.30
29.15	0.33	0.85	0.39*	0.30	0.00	0.30
29.20	0.33	0.85	0.39*	0.29	0.00	0.29
29.25	0.33	0.85	0.39*	0.28	0.00	0.28
29.30	0.33	0.85	0.39*	0.27	0.00	0.27
29.35	0.33	0.85	0.38*	0.26	0.00	0.26
29.40	0.33	0.85	0.38*	0.25	0.00	0.25
29.45	0.32	0.85	0.38*	0.25	0.00	0.25
29.50	0.32	0.85	0.38*	0.24	0.00	0.24
29.55	0.32	0.85	0.38*	0.23	0.00	0.23
29.60	0.32	0.86	0.37*	0.22	0.00	0.22
29.65	0.32	0.86	0.37*	0.21	0.00	0.21
29.70	0.32	0.86	0.37*	0.20	0.00	0.20
29.75	0.32	0.86	0.37*	0.19	0.00	0.19
29.80	0.32	0.86	0.37*	0.19	0.00	0.19
29.85	0.31	0.86	0.37*	0.18	0.00	0.18
29.90	0.31	0.86	0.36*	0.17	0.00	0.17
29.95	0.31	0.86	0.36*	0.16	0.00	0.16
30.00	0.31	0.86	0.36*	0.15	0.00	0.15
30.05	0.32	0.86	0.37*	0.14	0.00	0.14
30.10	0.33	0.86	0.38*	0.13	0.00	0.13
30.15	0.34	0.86	0.39*	0.13	0.00	0.13
30.20	0.35	0.86	0.40*	0.12	0.00	0.12
30.25	0.36	0.86	0.41*	0.11	0.00	0.11
30.30	0.37	0.86	0.43*	0.10	0.00	0.10
30.35	0.38	0.86	0.44*	0.09	0.00	0.09
30.40	0.39	0.86	0.45*	0.09	0.00	0.09
30.45	0.40	0.86	0.47*	0.08	0.00	0.08
30.50	0.41	0.86	0.48*	0.07	0.00	0.07
30.55	0.43	0.86	0.50*	0.07	0.00	0.07
30.60	0.44	0.86	0.51*	0.06	0.00	0.06
30.65	0.46	0.86	0.53*	0.05	0.00	0.05
30.70	0.48	0.86	0.55*	0.05	0.00	0.05
30.75	0.50	0.86	0.58*	0.04	0.00	0.04
30.80	0.53	0.86	0.61*	0.04	0.00	0.04
30.85	0.57	0.86	0.66*	0.03	0.00	0.03

30.90	0.69	0.86	0.80*	0.03	0.00	0.03
30.95	0.69	0.86	0.80*	0.02	0.00	0.02
31.00	0.69	0.86	0.79*	0.02	0.00	0.02
31.05	0.69	0.86	0.79*	0.01	0.00	0.01
31.10	0.68	0.86	0.79*	0.01	0.00	0.01
31.15	0.68	0.86	0.79*	0.01	0.00	0.01
31.20	0.68	0.86	0.79*	0.01	0.00	0.01
31.25	0.68	0.86	0.79*	0.01	0.00	0.01
31.30	0.68	0.86	0.79*	0.00	0.00	0.00
31.35	0.68	0.86	0.79*	0.00	0.00	0.00
31.40	0.68	0.86	0.79*	0.00	0.00	0.00
31.45	0.68	0.86	0.79*	0.00	0.00	0.00
31.50	0.68	0.86	0.79*	0.00	0.00	0.00
31.55	0.68	0.86	0.79*	0.00	0.00	0.00
31.60	0.68	0.86	0.79*	0.00	0.00	0.00
31.65	0.68	0.86	0.79*	0.00	0.00	0.00
31.70	0.68	0.86	0.79*	0.00	0.00	0.00
31.75	0.68	0.86	0.79*	0.00	0.00	0.00
31.80	0.68	0.86	0.79*	0.00	0.00	0.00
31.85	0.68	0.86	0.79*	0.00	0.00	0.00
31.90	0.68	0.86	0.79*	0.00	0.00	0.00
31.95	0.68	0.86	0.79*	0.00	0.00	0.00
32.00	0.68	0.86	0.79*	0.00	0.00	0.00
32.05	0.68	0.86	0.79*	0.00	0.00	0.00
32.10	0.68	0.86	0.79*	0.00	0.00	0.00
32.15	0.68	0.86	0.79*	0.00	0.00	0.00
32.20	0.68	0.87	0.79*	0.00	0.00	0.00
32.25	0.68	0.87	0.79*	0.00	0.00	0.00
32.30	0.68	0.87	0.79*	0.00	0.00	0.00
32.35	0.68	0.87	0.79*	0.00	0.00	0.00
32.40	0.68	0.87	0.79*	0.00	0.00	0.00
32.45	0.68	0.87	0.79*	0.00	0.00	0.00
32.50	0.68	0.87	0.79*	0.00	0.00	0.00
32.55	0.68	0.87	0.79*	0.00	0.00	0.00
32.60	0.68	0.87	0.78*	0.00	0.00	0.00
32.65	0.68	0.87	0.78*	0.00	0.00	0.00
32.70	0.68	0.87	0.78*	0.00	0.00	0.00
32.75	0.68	0.87	0.78*	0.00	0.00	0.00
32.80	0.68	0.87	0.78*	0.00	0.00	0.00
32.85	0.68	0.87	0.78*	0.00	0.00	0.00
32.90	0.68	0.87	0.78*	0.00	0.00	0.00
32.95	0.68	0.87	0.78*	0.00	0.00	0.00
33.00	0.68	0.87	0.78*	0.00	0.00	0.00
33.05	0.68	0.87	0.78*	0.00	0.00	0.00
33.10	0.68	0.87	0.78*	0.00	0.00	0.00
33.15	0.68	0.87	0.78*	0.00	0.00	0.00
33.20	0.68	0.87	0.78*	0.00	0.00	0.00
33.25	0.68	0.87	0.78*	0.00	0.00	0.00
33.30	0.68	0.87	0.78*	0.00	0.00	0.00
33.35	0.68	0.87	0.78*	0.00	0.00	0.00
33.40	0.68	0.87	0.78*	0.00	0.00	0.00
33.45	0.68	0.87	0.78*	0.00	0.00	0.00
33.50	0.68	0.87	0.78*	0.00	0.00	0.00
33.55	0.68	0.87	0.78*	0.00	0.00	0.00
33.60	0.68	0.87	0.78*	0.00	0.00	0.00
33.65	0.68	0.87	0.78*	0.00	0.00	0.00
33.70	0.68	0.87	0.78*	0.00	0.00	0.00
33.75	0.68	0.87	0.78*	0.00	0.00	0.00
33.80	0.68	0.87	0.78*	0.00	0.00	0.00
33.85	0.67	0.87	0.78*	0.00	0.00	0.00
33.90	0.67	0.87	0.78*	0.00	0.00	0.00
33.95	0.67	0.87	0.78*	0.00	0.00	0.00
34.00	0.67	0.87	0.78*	0.00	0.00	0.00

34.05	0.67	0.87	0.78*	0.00	0.00	0.00
34.10	0.67	0.87	0.78*	0.00	0.00	0.00
34.15	0.67	0.87	0.78*	0.00	0.00	0.00
34.20	0.67	0.87	0.78*	0.00	0.00	0.00
34.25	0.67	0.87	0.78*	0.00	0.00	0.00
34.30	0.67	0.87	0.78*	0.00	0.00	0.00
34.35	0.67	0.87	0.78*	0.00	0.00	0.00
34.40	0.67	0.87	0.78*	0.00	0.00	0.00
34.45	0.67	0.87	0.78*	0.00	0.00	0.00
34.50	0.67	0.87	0.78*	0.00	0.00	0.00
34.55	0.67	0.87	0.77*	0.00	0.00	0.00
34.60	0.67	0.87	0.77*	0.00	0.00	0.00
34.65	0.67	0.87	0.77*	0.00	0.00	0.00
34.70	0.67	0.87	0.77*	0.00	0.00	0.00
34.75	0.67	0.87	0.77*	0.00	0.00	0.00
34.80	0.67	0.87	0.77*	0.00	0.00	0.00
34.85	0.67	0.87	0.77*	0.00	0.00	0.00
34.90	0.67	0.87	0.77*	0.00	0.00	0.00
34.95	0.67	0.87	0.77*	0.00	0.00	0.00
35.00	0.67	0.87	0.77*	0.00	0.00	0.00
35.05	0.67	0.87	0.77*	0.00	0.00	0.00
35.10	0.67	0.87	0.77*	0.00	0.00	0.00
35.15	0.67	0.87	0.77*	0.00	0.00	0.00
35.20	0.67	0.87	0.77*	0.00	0.00	0.00
35.25	0.67	0.87	0.77*	0.00	0.00	0.00
35.30	0.67	0.87	0.77*	0.00	0.00	0.00
35.35	0.67	0.87	0.77*	0.00	0.00	0.00
35.40	0.67	0.87	0.77*	0.00	0.00	0.00
35.45	0.67	0.87	0.77*	0.00	0.00	0.00
35.50	0.67	0.87	0.77*	0.00	0.00	0.00
35.55	0.67	0.87	0.77*	0.00	0.00	0.00
35.60	0.67	0.87	0.77*	0.00	0.00	0.00
35.65	0.67	0.87	0.77*	0.00	0.00	0.00
35.70	0.67	0.87	0.77*	0.00	0.00	0.00
35.75	0.67	0.87	0.77*	0.00	0.00	0.00
35.80	0.67	0.87	0.77*	0.00	0.00	0.00
35.85	0.67	0.87	0.77*	0.00	0.00	0.00
35.90	0.67	0.87	0.77*	0.00	0.00	0.00
35.95	0.67	0.87	0.77*	0.00	0.00	0.00
36.00	0.67	0.87	0.77*	0.00	0.00	0.00
36.05	0.67	0.87	0.77*	0.00	0.00	0.00
36.10	0.67	0.87	0.77*	0.00	0.00	0.00
36.15	0.67	0.87	0.77*	0.00	0.00	0.00
36.20	0.67	0.87	0.77*	0.00	0.00	0.00
36.25	0.67	0.87	0.77*	0.00	0.00	0.00
36.30	0.67	0.87	0.77*	0.00	0.00	0.00
36.35	0.67	0.87	0.77*	0.00	0.00	0.00
36.40	0.67	0.87	0.77*	0.00	0.00	0.00
36.45	0.67	0.87	0.77*	0.00	0.00	0.00
36.50	0.67	0.87	0.77*	0.00	0.00	0.00
36.55	0.66	0.87	0.77*	0.00	0.00	0.00
36.60	0.66	0.87	0.77*	0.00	0.00	0.00
36.65	0.66	0.87	0.77*	0.00	0.00	0.00
36.70	0.66	0.87	0.77*	0.00	0.00	0.00
36.75	0.66	0.87	0.77*	0.00	0.00	0.00
36.80	0.66	0.87	0.77*	0.00	0.00	0.00
36.85	0.66	0.87	0.77*	0.00	0.00	0.00
36.90	0.66	0.87	0.77*	0.00	0.00	0.00
36.95	0.66	0.87	0.77*	0.00	0.00	0.00
37.00	0.66	0.87	0.77*	0.00	0.00	0.00
37.05	0.66	0.87	0.77*	0.00	0.00	0.00
37.10	0.66	0.87	0.77*	0.00	0.00	0.00
37.15	0.66	0.87	0.76*	0.00	0.00	0.00

37.20	0.66	0.87	0.76*	0.00	0.00	0.00
37.25	0.66	0.87	0.76*	0.00	0.00	0.00
37.30	0.66	0.87	0.76*	0.00	0.00	0.00
37.35	0.66	0.87	0.76*	0.00	0.00	0.00
37.40	0.66	0.87	0.76*	0.00	0.00	0.00
37.45	0.66	0.87	0.76*	0.00	0.00	0.00
37.50	0.66	0.87	0.76*	0.00	0.00	0.00
37.55	0.66	0.87	0.76*	0.00	0.00	0.00
37.60	0.66	0.87	0.76*	0.00	0.00	0.00
37.65	0.66	0.87	0.76*	0.00	0.00	0.00
37.70	0.66	0.87	0.76*	0.00	0.00	0.00
37.75	0.66	0.87	0.76*	0.00	0.00	0.00
37.80	0.66	0.87	0.76*	0.00	0.00	0.00
37.85	0.66	0.87	0.76*	0.00	0.00	0.00
37.90	0.66	0.87	0.76*	0.00	0.00	0.00
37.95	0.66	0.87	0.76*	0.00	0.00	0.00
38.00	0.66	0.87	0.76*	0.00	0.00	0.00
38.05	0.66	0.87	0.76*	0.00	0.00	0.00
38.10	0.66	0.87	0.76*	0.00	0.00	0.00
38.15	0.66	0.87	0.76*	0.00	0.00	0.00
38.20	0.66	0.87	0.76*	0.00	0.00	0.00
38.25	0.66	0.87	0.76*	0.00	0.00	0.00
38.30	0.66	0.86	0.76*	0.00	0.00	0.00
38.35	0.66	0.86	0.76*	0.00	0.00	0.00
38.40	0.66	0.86	0.76*	0.00	0.00	0.00
38.45	0.66	0.86	0.76*	0.00	0.00	0.00
38.50	0.66	0.86	0.76*	0.00	0.00	0.00
38.55	0.66	0.86	0.76*	0.00	0.00	0.00
38.60	0.66	0.86	0.76*	0.00	0.00	0.00
38.65	0.66	0.86	0.76*	0.00	0.00	0.00
38.70	0.66	0.86	0.76*	0.00	0.00	0.00
38.75	0.66	0.86	0.76*	0.00	0.00	0.00
38.80	0.66	0.86	0.76*	0.00	0.00	0.00
38.85	0.66	0.86	0.76*	0.00	0.00	0.00
38.90	0.66	0.86	0.76*	0.00	0.00	0.00
38.95	0.66	0.86	0.76*	0.00	0.00	0.00
39.00	0.66	0.86	0.76*	0.00	0.00	0.00
39.05	0.66	0.86	0.76*	0.00	0.00	0.00
39.10	0.66	0.86	0.76*	0.00	0.00	0.00
39.15	0.66	0.86	0.76*	0.00	0.00	0.00
39.20	0.66	0.86	0.76*	0.00	0.00	0.00
39.25	0.66	0.86	0.76*	0.00	0.00	0.00
39.30	0.65	0.86	0.76*	0.00	0.00	0.00
39.35	0.65	0.86	0.76*	0.00	0.00	0.00
39.40	0.65	0.86	0.76*	0.00	0.00	0.00
39.45	0.65	0.86	0.76*	0.00	0.00	0.00
39.50	0.65	0.86	0.76*	0.00	0.00	0.00
39.55	0.65	0.86	0.76*	0.00	0.00	0.00
39.60	0.65	0.86	0.76*	0.00	0.00	0.00
39.65	0.65	0.86	0.76*	0.00	0.00	0.00
39.70	0.65	0.86	0.76*	0.00	0.00	0.00
39.75	0.65	0.86	0.76*	0.00	0.00	0.00
39.80	0.65	0.86	0.76*	0.00	0.00	0.00
39.85	0.65	0.86	0.76*	0.00	0.00	0.00
39.90	0.65	0.86	0.76*	0.00	0.00	0.00
39.95	0.65	0.86	0.76*	0.00	0.00	0.00
40.00	0.65	0.86	0.76*	0.00	0.00	0.00
40.05	0.65	0.86	0.76*	0.00	0.00	0.00
40.10	0.65	0.86	0.76*	0.00	0.00	0.00
40.15	0.65	0.86	0.76*	0.00	0.00	0.00
40.20	0.65	0.86	0.76*	0.00	0.00	0.00
40.25	0.65	0.86	0.76*	0.00	0.00	0.00
40.30	0.65	0.86	0.76*	0.00	0.00	0.00

40.35	0.65	0.86	0.76*	0.00	0.00	0.00
40.40	0.65	0.86	0.76*	0.00	0.00	0.00
40.45	0.65	0.86	0.76*	0.00	0.00	0.00
40.50	0.65	0.86	0.76*	0.00	0.00	0.00
40.55	0.65	0.86	0.76*	0.00	0.00	0.00
40.60	0.65	0.86	0.76*	0.00	0.00	0.00
40.65	0.65	0.86	0.76*	0.00	0.00	0.00
40.70	0.65	0.86	0.76*	0.00	0.00	0.00
40.75	0.65	0.86	0.76*	0.00	0.00	0.00
40.80	0.65	0.86	0.76*	0.00	0.00	0.00
40.85	0.65	0.86	0.76*	0.00	0.00	0.00
40.90	0.65	0.86	0.76*	0.00	0.00	0.00
40.95	0.65	0.86	0.76*	0.00	0.00	0.00
41.00	0.65	0.86	0.75*	0.00	0.00	0.00
41.05	0.65	0.86	0.75*	0.00	0.00	0.00
41.10	0.65	0.86	0.75*	0.00	0.00	0.00
41.15	0.65	0.86	0.75*	0.00	0.00	0.00
41.20	0.65	0.86	0.75*	0.00	0.00	0.00
41.25	0.65	0.86	0.75*	0.00	0.00	0.00
41.30	0.65	0.86	0.75*	0.00	0.00	0.00
41.35	0.65	0.86	0.75*	0.00	0.00	0.00
41.40	0.65	0.86	0.75*	0.00	0.00	0.00
41.45	0.65	0.86	0.75*	0.00	0.00	0.00
41.50	0.65	0.86	0.75*	0.00	0.00	0.00
41.55	0.65	0.86	0.75*	0.00	0.00	0.00
41.60	0.65	0.86	0.75*	0.00	0.00	0.00
41.65	0.65	0.86	0.75*	0.00	0.00	0.00
41.70	0.65	0.86	0.75*	0.00	0.00	0.00
41.75	0.65	0.86	0.75*	0.00	0.00	0.00
41.80	0.65	0.86	0.75*	0.00	0.00	0.00
41.85	0.65	0.86	0.75*	0.00	0.00	0.00
41.90	0.65	0.86	0.75*	0.00	0.00	0.00
41.95	0.65	0.86	0.75*	0.00	0.00	0.00
42.00	0.65	0.86	0.75*	0.00	0.00	0.00
42.05	0.65	0.86	0.75*	0.00	0.00	0.00
42.10	0.65	0.86	0.75*	0.00	0.00	0.00
42.15	0.65	0.86	0.75*	0.00	0.00	0.00
42.20	0.65	0.86	0.75*	0.00	0.00	0.00
42.25	0.64	0.86	0.75*	0.00	0.00	0.00
42.30	0.64	0.86	0.75*	0.00	0.00	0.00
42.35	0.64	0.86	0.75*	0.00	0.00	0.00
42.40	0.64	0.86	0.75*	0.00	0.00	0.00
42.45	0.64	0.86	0.75*	0.00	0.00	0.00
42.50	0.64	0.86	0.75*	0.00	0.00	0.00
42.55	0.64	0.86	0.75*	0.00	0.00	0.00
42.60	0.64	0.86	0.75*	0.00	0.00	0.00
42.65	0.64	0.86	0.75*	0.00	0.00	0.00
42.70	0.64	0.86	0.75*	0.00	0.00	0.00
42.75	0.64	0.86	0.75*	0.00	0.00	0.00
42.80	0.64	0.86	0.75*	0.00	0.00	0.00
42.85	0.64	0.86	0.75*	0.00	0.00	0.00
42.90	0.64	0.86	0.75*	0.00	0.00	0.00
42.95	0.64	0.86	0.75*	0.00	0.00	0.00
43.00	0.64	0.86	0.75*	0.00	0.00	0.00
43.05	0.64	0.86	0.75*	0.00	0.00	0.00
43.10	0.64	0.85	0.75*	0.00	0.00	0.00
43.15	0.64	0.85	0.75*	0.00	0.00	0.00
43.20	0.64	0.85	0.75*	0.00	0.00	0.00
43.25	0.64	0.85	0.75*	0.00	0.00	0.00
43.30	0.64	0.85	0.75*	0.00	0.00	0.00
43.35	0.64	0.85	0.75*	0.00	0.00	0.00
43.40	0.64	0.85	0.75*	0.00	0.00	0.00
43.45	0.64	0.85	0.75*	0.00	0.00	0.00

43.50	0.64	0.85	0.75*	0.00	0.00	0.00
43.55	0.64	0.85	0.75*	0.00	0.00	0.00
43.60	0.64	0.85	0.75*	0.00	0.00	0.00
43.65	0.64	0.85	0.75*	0.00	0.00	0.00
43.70	0.64	0.85	0.75*	0.00	0.00	0.00
43.75	0.64	0.85	0.75*	0.00	0.00	0.00
43.80	0.64	0.85	0.75*	0.00	0.00	0.00
43.85	0.64	0.85	0.75*	0.00	0.00	0.00
43.90	0.64	0.85	0.75*	0.00	0.00	0.00
43.95	0.64	0.85	0.75*	0.00	0.00	0.00
44.00	0.64	0.85	0.75*	0.00	0.00	0.00
44.05	0.64	0.85	0.75*	0.00	0.00	0.00
44.10	0.64	0.85	0.75*	0.00	0.00	0.00
44.15	0.64	0.85	0.75*	0.00	0.00	0.00
44.20	0.64	0.85	0.75*	0.00	0.00	0.00
44.25	0.64	0.85	0.75*	0.00	0.00	0.00
44.30	0.64	0.85	0.75*	0.00	0.00	0.00
44.35	0.64	0.85	0.75*	0.00	0.00	0.00
44.40	0.64	0.85	0.75*	0.00	0.00	0.00
44.45	0.64	0.85	0.75*	0.00	0.00	0.00
44.50	0.64	0.85	0.75*	0.00	0.00	0.00
44.55	0.64	0.85	0.75*	0.00	0.00	0.00
44.60	0.64	0.85	0.75*	0.00	0.00	0.00
44.65	0.64	0.85	0.75*	0.00	0.00	0.00
44.70	0.64	0.85	0.75*	0.00	0.00	0.00
44.75	0.64	0.85	0.75*	0.00	0.00	0.00
44.80	0.64	0.85	0.75*	0.00	0.00	0.00
44.85	0.64	0.85	0.75*	0.00	0.00	0.00
44.90	0.64	0.85	0.75*	0.00	0.00	0.00
44.95	0.64	0.85	0.75*	0.00	0.00	0.00
45.00	0.64	0.85	0.75*	0.00	0.00	0.00
45.05	0.64	0.85	0.75*	0.00	0.00	0.00
45.10	0.64	0.85	0.75*	0.00	0.00	0.00
45.15	0.64	0.85	0.75*	0.00	0.00	0.00
45.20	0.64	0.85	0.75*	0.00	0.00	0.00
45.25	0.64	0.85	0.75*	0.00	0.00	0.00
45.30	0.64	0.85	0.75*	0.00	0.00	0.00
45.35	0.64	0.85	0.75*	0.00	0.00	0.00
45.40	0.64	0.85	0.75*	0.00	0.00	0.00
45.45	0.64	0.85	0.75*	0.00	0.00	0.00
45.50	0.64	0.85	0.75*	0.00	0.00	0.00
45.55	0.63	0.85	0.75*	0.00	0.00	0.00
45.60	0.63	0.85	0.75*	0.00	0.00	0.00
45.65	0.63	0.85	0.75*	0.00	0.00	0.00
45.70	0.63	0.85	0.75*	0.00	0.00	0.00
45.75	0.63	0.85	0.75*	0.00	0.00	0.00
45.80	0.63	0.85	0.75*	0.00	0.00	0.00
45.85	0.63	0.85	0.75*	0.00	0.00	0.00
45.90	0.63	0.85	0.75*	0.00	0.00	0.00
45.95	0.63	0.85	0.75*	0.00	0.00	0.00
46.00	0.63	0.85	0.75*	0.00	0.00	0.00
46.05	0.63	0.85	0.75*	0.00	0.00	0.00
46.10	0.63	0.85	0.75*	0.00	0.00	0.00
46.15	0.63	0.85	0.75*	0.00	0.00	0.00
46.20	0.63	0.85	0.75*	0.00	0.00	0.00
46.25	0.63	0.85	0.75*	0.00	0.00	0.00
46.30	0.63	0.85	0.75*	0.00	0.00	0.00
46.35	0.63	0.85	0.75*	0.00	0.00	0.00
46.40	0.63	0.85	0.75*	0.00	0.00	0.00
46.45	0.63	0.85	0.75*	0.00	0.00	0.00
46.50	0.63	0.85	0.75*	0.00	0.00	0.00
46.55	0.63	0.85	0.75*	0.00	0.00	0.00
46.60	0.63	0.85	0.75*	0.00	0.00	0.00

46.65	0.63	0.85	0.75*	0.00	0.00	0.00
46.70	0.63	0.85	0.75*	0.00	0.00	0.00
46.75	0.63	0.85	0.75*	0.00	0.00	0.00
46.80	0.63	0.85	0.75*	0.00	0.00	0.00
46.85	0.63	0.85	0.75*	0.00	0.00	0.00
46.90	0.63	0.85	0.75*	0.00	0.00	0.00
46.95	0.63	0.85	0.75*	0.00	0.00	0.00
47.00	0.63	0.84	0.75*	0.00	0.00	0.00
47.05	0.63	0.84	0.75*	0.00	0.00	0.00
47.10	0.63	0.84	0.75*	0.00	0.00	0.00
47.15	0.63	0.84	0.75*	0.00	0.00	0.00
47.20	0.63	0.84	0.75*	0.00	0.00	0.00
47.25	0.63	0.84	0.75*	0.00	0.00	0.00
47.30	0.63	0.84	0.75*	0.00	0.00	0.00
47.35	0.63	0.84	0.75*	0.00	0.00	0.00
47.40	0.63	0.84	0.75*	0.00	0.00	0.00
47.45	0.63	0.84	0.75*	0.00	0.00	0.00
47.50	0.63	0.84	0.75*	0.00	0.00	0.00
47.55	0.63	0.84	0.75*	0.00	0.00	0.00
47.60	0.63	0.84	0.75*	0.00	0.00	0.00
47.65	0.63	0.84	0.75*	0.00	0.00	0.00
47.70	0.63	0.84	0.75*	0.00	0.00	0.00
47.75	0.63	0.84	0.75*	0.00	0.00	0.00
47.80	0.63	0.84	0.75*	0.00	0.00	0.00
47.85	0.63	0.84	0.75*	0.00	0.00	0.00
47.90	0.63	0.84	0.75*	0.00	0.00	0.00
47.95	0.63	0.84	0.75*	0.00	0.00	0.00
48.00	0.63	0.84	0.75*	0.00	0.00	0.00
48.05	0.63	0.84	0.75*	0.00	0.00	0.00
48.10	0.63	0.84	0.75*	0.00	0.00	0.00
48.15	0.63	0.84	0.75*	0.00	0.00	0.00
48.20	0.63	0.84	0.75*	0.00	0.00	0.00
48.25	0.63	0.84	0.75*	0.00	0.00	0.00
48.30	0.63	0.84	0.75*	0.00	0.00	0.00
48.35	0.63	0.84	0.75*	0.00	0.00	0.00
48.40	0.63	0.84	0.75*	0.00	0.00	0.00
48.45	0.63	0.84	0.75*	0.00	0.00	0.00
48.50	0.63	0.84	0.75*	0.00	0.00	0.00
48.55	0.63	0.84	0.75*	0.00	0.00	0.00
48.60	0.63	0.84	0.75*	0.00	0.00	0.00
48.65	0.63	0.84	0.75*	0.00	0.00	0.00
48.70	0.63	0.84	0.75*	0.00	0.00	0.00
48.75	0.63	0.84	0.75*	0.00	0.00	0.00
48.80	0.63	0.84	0.75*	0.00	0.00	0.00
48.85	0.63	0.84	0.75*	0.00	0.00	0.00
48.90	0.63	0.84	0.75*	0.00	0.00	0.00
48.95	0.63	0.84	0.75*	0.00	0.00	0.00
49.00	0.63	0.84	0.75*	0.00	0.00	0.00
49.05	0.63	0.84	0.75*	0.00	0.00	0.00
49.10	0.62	0.84	0.75*	0.00	0.00	0.00
49.15	0.62	0.84	0.75*	0.00	0.00	0.00
49.20	0.62	0.84	0.75*	0.00	0.00	0.00
49.25	0.62	0.84	0.75*	0.00	0.00	0.00
49.30	0.62	0.84	0.75*	0.00	0.00	0.00
49.35	0.62	0.84	0.75*	0.00	0.00	0.00
49.40	0.62	0.84	0.75*	0.00	0.00	0.00
49.45	0.62	0.84	0.75*	0.00	0.00	0.00
49.50	0.62	0.84	0.75*	0.00	0.00	0.00
49.55	0.62	0.84	0.75*	0.00	0.00	0.00
49.60	0.62	0.84	0.75*	0.00	0.00	0.00
49.65	0.62	0.84	0.75*	0.00	0.00	0.00
49.70	0.62	0.84	0.75*	0.00	0.00	0.00
49.75	0.62	0.84	0.75*	0.00	0.00	0.00

49.80	0.62	0.84	0.75*	0.00	0.00	0.00
49.85	0.62	0.84	0.75*	0.00	0.00	0.00
49.90	0.62	0.84	0.75*	0.00	0.00	0.00
49.95	0.62	0.83	0.75*	0.00	0.00	0.00
50.00	0.62	0.83	0.75*	0.00	0.00	0.00
50.05	0.62	0.83	0.75*	0.00	0.00	0.00
50.10	0.62	0.83	0.75*	0.00	0.00	0.00
50.15	0.62	0.83	0.75*	0.00	0.00	0.00
50.20	0.62	0.83	0.75*	0.00	0.00	0.00
50.25	0.62	0.83	0.75*	0.00	0.00	0.00
50.30	0.62	0.83	0.75*	0.00	0.00	0.00
50.35	0.62	0.83	0.75*	0.00	0.00	0.00
50.40	0.62	0.83	0.75*	0.00	0.00	0.00
50.45	0.62	0.83	0.75*	0.00	0.00	0.00
50.50	0.62	0.83	0.75*	0.00	0.00	0.00
50.55	0.62	0.83	0.75*	0.00	0.00	0.00
50.60	0.62	0.83	0.75*	0.00	0.00	0.00
50.65	0.62	0.83	0.75*	0.00	0.00	0.00
50.70	0.62	0.83	0.75*	0.00	0.00	0.00
50.75	0.62	0.83	0.75*	0.00	0.00	0.00
50.80	0.62	0.83	0.75*	0.00	0.00	0.00
50.85	0.62	0.83	0.75*	0.00	0.00	0.00
50.90	0.62	0.83	0.75*	0.00	0.00	0.00
50.95	0.62	0.83	0.75*	0.00	0.00	0.00
51.00	0.62	0.83	0.75*	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)

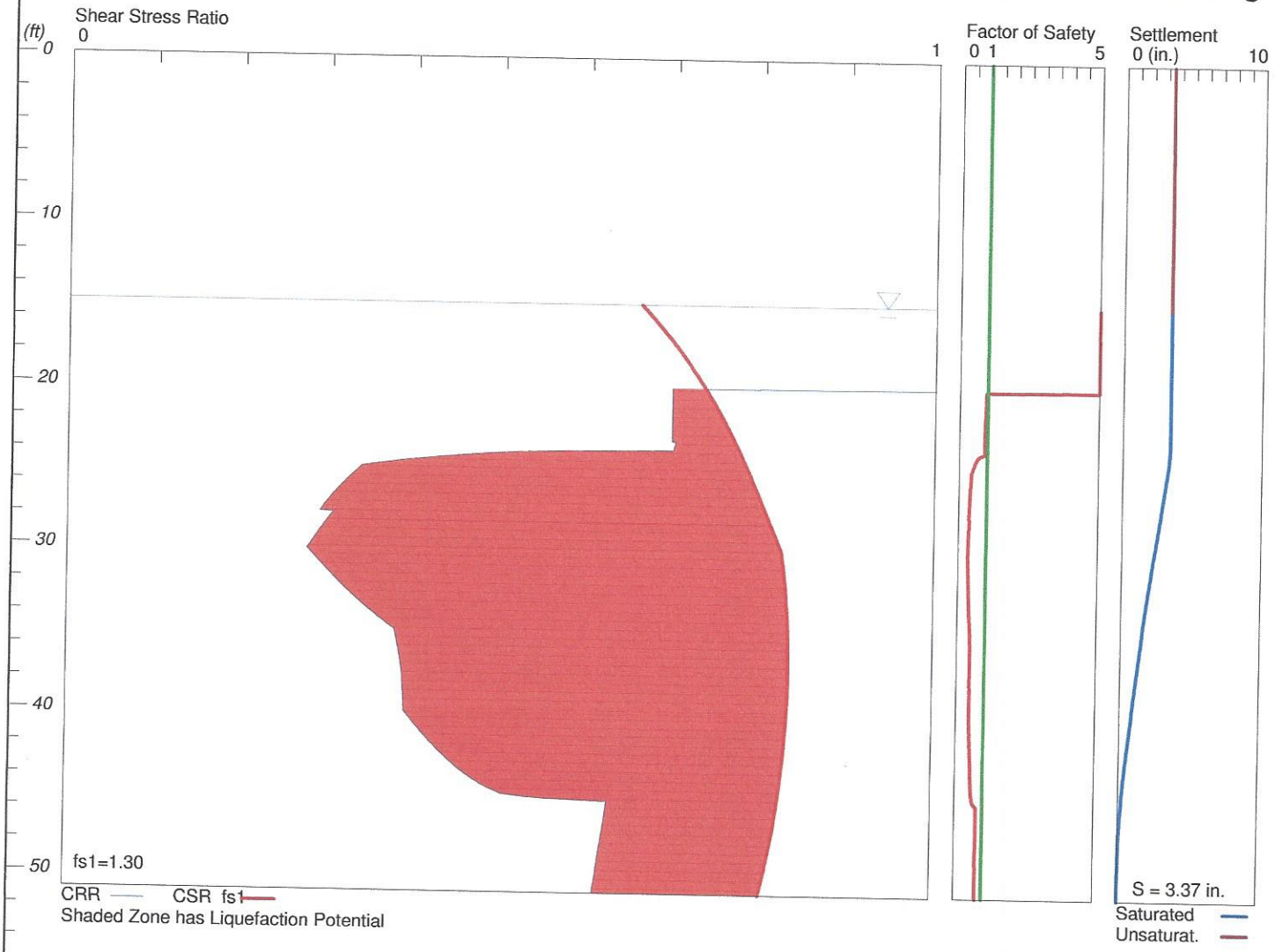
CRRm	Cyclic resistance ratio from soils
CSRsf	Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S.	Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat	Settlement from saturated sands
S_dry	Settlement from Unsaturated Sands
S_all	Total Settlement from Saturated and Unsaturated Sands
NoLiq	No-Liquefy Soils

LIQUEFACTION ANALYSIS

444-04194

Hole No.=BH-2 Water Depth=15 ft Surface Elev.=153

Magnitude=6.59
Acceleration=0.809g



LiquefyPro CivilTech Software USA www.civiltech.com

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LIQUEFACTION ANALYSIS SUMMARY

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Input File Name: E:\Liquefy5\444-04194 Sage BH-1.liq
Title: 444-04194
Subtitle: 7316 Gage Ave., Commerce

Surface Elev.=153
Hole No.=BH-2
Depth of Hole= 51.00 ft
Water Table during Earthquake= 15.00 ft
Water Table during In-Situ Testing= 52.00 ft
Max. Acceleration= 0.81 g
Earthquake Magnitude= 6.59

Input Data:
Surface Elev.=153
Hole No.=BH-2
Depth of Hole=51.00 ft
Water Table during Earthquake= 15.00 ft
Water Table during In-Situ Testing= 52.00 ft
Max. Acceleration=0.81 g
Earthquake Magnitude=6.59
No-Liquefiable Soils: Based on Analysis

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Tokimatsu, M-correction
3. Fines Correction for Liquefaction: Modify Stark/Olson
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.25
7. Borehole Diameter, Cb= 1
8. Sampling Method, Cs= 1
9. User request factor of safety (apply to CSR) , User= 1.3
   Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: Yes*

* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	43.33	139.50	NoLiq
2.00	43.33	139.50	NoLiq
5.00	66.66	139.50	NoLiq
10.00	20.00	139.50	NoLiq
15.00	18.66	139.50	NoLiq
20.00	34.00	139.50	NoLiq
25.00	24.00	139.50	5.70
30.00	21.33	104.40	3.80
35.00	19.00	104.40	43.50
40.00	31.33	106.50	9.70
45.00	38.00	106.50	7.20

50.00 50.66 117.20 5.10

Output Results:

Settlement of Saturated Sands=3.37 in.
Settlement of Unsaturated Sands=0.00 in.
Total Settlement of Saturated and Unsaturated Sands=3.37 in.
Differential Settlement=1.686 to 2.225 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	2.00	0.68	5.00	3.37	0.00	3.37
0.05	2.00	0.68	5.00	3.37	0.00	3.37
0.10	2.00	0.68	5.00	3.37	0.00	3.37
0.15	2.00	0.68	5.00	3.37	0.00	3.37
0.20	2.00	0.68	5.00	3.37	0.00	3.37
0.25	2.00	0.68	5.00	3.37	0.00	3.37
0.30	2.00	0.68	5.00	3.37	0.00	3.37
0.35	2.00	0.68	5.00	3.37	0.00	3.37
0.40	2.00	0.68	5.00	3.37	0.00	3.37
0.45	2.00	0.68	5.00	3.37	0.00	3.37
0.50	2.00	0.68	5.00	3.37	0.00	3.37
0.55	2.00	0.68	5.00	3.37	0.00	3.37
0.60	2.00	0.68	5.00	3.37	0.00	3.37
0.65	2.00	0.68	5.00	3.37	0.00	3.37
0.70	2.00	0.68	5.00	3.37	0.00	3.37
0.75	2.00	0.68	5.00	3.37	0.00	3.37
0.80	2.00	0.68	5.00	3.37	0.00	3.37
0.85	2.00	0.68	5.00	3.37	0.00	3.37
0.90	2.00	0.68	5.00	3.37	0.00	3.37
0.95	2.00	0.68	5.00	3.37	0.00	3.37
1.00	2.00	0.68	5.00	3.37	0.00	3.37
1.05	2.00	0.68	5.00	3.37	0.00	3.37
1.10	2.00	0.68	5.00	3.37	0.00	3.37
1.15	2.00	0.68	5.00	3.37	0.00	3.37
1.20	2.00	0.68	5.00	3.37	0.00	3.37
1.25	2.00	0.68	5.00	3.37	0.00	3.37
1.30	2.00	0.68	5.00	3.37	0.00	3.37
1.35	2.00	0.68	5.00	3.37	0.00	3.37
1.40	2.00	0.68	5.00	3.37	0.00	3.37
1.45	2.00	0.68	5.00	3.37	0.00	3.37
1.50	2.00	0.68	5.00	3.37	0.00	3.37
1.55	2.00	0.68	5.00	3.37	0.00	3.37
1.60	2.00	0.68	5.00	3.37	0.00	3.37
1.65	2.00	0.68	5.00	3.37	0.00	3.37
1.70	2.00	0.68	5.00	3.37	0.00	3.37
1.75	2.00	0.68	5.00	3.37	0.00	3.37
1.80	2.00	0.68	5.00	3.37	0.00	3.37
1.85	2.00	0.68	5.00	3.37	0.00	3.37
1.90	2.00	0.68	5.00	3.37	0.00	3.37
1.95	2.00	0.68	5.00	3.37	0.00	3.37
2.00	2.00	0.68	5.00	3.37	0.00	3.37
2.05	2.00	0.68	5.00	3.37	0.00	3.37
2.10	2.00	0.68	5.00	3.37	0.00	3.37
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2.30	2.00	0.68	5.00	3.37	0.00	3.37
2.35	2.00	0.68	5.00	3.37	0.00	3.37
2.40	2.00	0.68	5.00	3.37	0.00	3.37
2.45	2.00	0.68	5.00	3.37	0.00	3.37
2.50	2.00	0.68	5.00	3.37	0.00	3.37

2.55	2.00	0.68	5.00	3.37	0.00	3.37
2.60	2.00	0.68	5.00	3.37	0.00	3.37
2.65	2.00	0.68	5.00	3.37	0.00	3.37
2.70	2.00	0.68	5.00	3.37	0.00	3.37
2.75	2.00	0.68	5.00	3.37	0.00	3.37
2.80	2.00	0.68	5.00	3.37	0.00	3.37
2.85	2.00	0.68	5.00	3.37	0.00	3.37
2.90	2.00	0.68	5.00	3.37	0.00	3.37
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3.35	2.00	0.68	5.00	3.37	0.00	3.37
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3.65	2.00	0.68	5.00	3.37	0.00	3.37
3.70	2.00	0.68	5.00	3.37	0.00	3.37
3.75	2.00	0.68	5.00	3.37	0.00	3.37
3.80	2.00	0.68	5.00	3.37	0.00	3.37
3.85	2.00	0.68	5.00	3.37	0.00	3.37
3.90	2.00	0.68	5.00	3.37	0.00	3.37
3.95	2.00	0.68	5.00	3.37	0.00	3.37
4.00	2.00	0.68	5.00	3.37	0.00	3.37
4.05	2.00	0.68	5.00	3.37	0.00	3.37
4.10	2.00	0.68	5.00	3.37	0.00	3.37
4.15	2.00	0.68	5.00	3.37	0.00	3.37
4.20	2.00	0.68	5.00	3.37	0.00	3.37
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4.70	2.00	0.68	5.00	3.37	0.00	3.37
4.75	2.00	0.68	5.00	3.37	0.00	3.37
4.80	2.00	0.68	5.00	3.37	0.00	3.37
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5.85	2.00	0.67	5.00	3.37	0.00	3.37
5.90	2.00	0.67	5.00	3.37	0.00	3.37
5.95	2.00	0.67	5.00	3.37	0.00	3.37
6.00	2.00	0.67	5.00	3.37	0.00	3.37
6.05	2.00	0.67	5.00	3.37	0.00	3.37
6.10	2.00	0.67	5.00	3.37	0.00	3.37
6.15	2.00	0.67	5.00	3.37	0.00	3.37
6.20	2.00	0.67	5.00	3.37	0.00	3.37
6.25	2.00	0.67	5.00	3.37	0.00	3.37
6.30	2.00	0.67	5.00	3.37	0.00	3.37
6.35	2.00	0.67	5.00	3.37	0.00	3.37
6.40	2.00	0.67	5.00	3.37	0.00	3.37
6.45	2.00	0.67	5.00	3.37	0.00	3.37
6.50	2.00	0.67	5.00	3.37	0.00	3.37
6.55	2.00	0.67	5.00	3.37	0.00	3.37
6.60	2.00	0.67	5.00	3.37	0.00	3.37
6.65	2.00	0.67	5.00	3.37	0.00	3.37
6.70	2.00	0.67	5.00	3.37	0.00	3.37
6.75	2.00	0.67	5.00	3.37	0.00	3.37
6.80	2.00	0.67	5.00	3.37	0.00	3.37
6.85	2.00	0.67	5.00	3.37	0.00	3.37
6.90	2.00	0.67	5.00	3.37	0.00	3.37
6.95	2.00	0.67	5.00	3.37	0.00	3.37
7.00	2.00	0.67	5.00	3.37	0.00	3.37
7.05	2.00	0.67	5.00	3.37	0.00	3.37
7.10	2.00	0.67	5.00	3.37	0.00	3.37
7.15	2.00	0.67	5.00	3.37	0.00	3.37
7.20	2.00	0.67	5.00	3.37	0.00	3.37
7.25	2.00	0.67	5.00	3.37	0.00	3.37
7.30	2.00	0.67	5.00	3.37	0.00	3.37
7.35	2.00	0.67	5.00	3.37	0.00	3.37
7.40	2.00	0.67	5.00	3.37	0.00	3.37
7.45	2.00	0.67	5.00	3.37	0.00	3.37
7.50	2.00	0.67	5.00	3.37	0.00	3.37
7.55	2.00	0.67	5.00	3.37	0.00	3.37
7.60	2.00	0.67	5.00	3.37	0.00	3.37
7.65	2.00	0.67	5.00	3.37	0.00	3.37
7.70	2.00	0.67	5.00	3.37	0.00	3.37
7.75	2.00	0.67	5.00	3.37	0.00	3.37
7.80	2.00	0.67	5.00	3.37	0.00	3.37
7.85	2.00	0.67	5.00	3.37	0.00	3.37
7.90	2.00	0.67	5.00	3.37	0.00	3.37
7.95	2.00	0.67	5.00	3.37	0.00	3.37
8.00	2.00	0.67	5.00	3.37	0.00	3.37
8.05	2.00	0.67	5.00	3.37	0.00	3.37
8.10	2.00	0.67	5.00	3.37	0.00	3.37
8.15	2.00	0.67	5.00	3.37	0.00	3.37
8.20	2.00	0.67	5.00	3.37	0.00	3.37
8.25	2.00	0.67	5.00	3.37	0.00	3.37
8.30	2.00	0.67	5.00	3.37	0.00	3.37
8.35	2.00	0.67	5.00	3.37	0.00	3.37
8.40	2.00	0.67	5.00	3.37	0.00	3.37
8.45	2.00	0.67	5.00	3.37	0.00	3.37
8.50	2.00	0.67	5.00	3.37	0.00	3.37
8.55	2.00	0.67	5.00	3.37	0.00	3.37
8.60	2.00	0.67	5.00	3.37	0.00	3.37
8.65	2.00	0.67	5.00	3.37	0.00	3.37
8.70	2.00	0.67	5.00	3.37	0.00	3.37
8.75	2.00	0.67	5.00	3.37	0.00	3.37
8.80	2.00	0.67	5.00	3.37	0.00	3.37

8.85	2.00	0.67	5.00	3.37	0.00	3.37
8.90	2.00	0.67	5.00	3.37	0.00	3.37
8.95	2.00	0.67	5.00	3.37	0.00	3.37
9.00	2.00	0.67	5.00	3.37	0.00	3.37
9.05	2.00	0.67	5.00	3.37	0.00	3.37
9.10	2.00	0.67	5.00	3.37	0.00	3.37
9.15	2.00	0.67	5.00	3.37	0.00	3.37
9.20	2.00	0.67	5.00	3.37	0.00	3.37
9.25	2.00	0.67	5.00	3.37	0.00	3.37
9.30	2.00	0.67	5.00	3.37	0.00	3.37
9.35	2.00	0.67	5.00	3.37	0.00	3.37
9.40	2.00	0.67	5.00	3.37	0.00	3.37
9.45	2.00	0.67	5.00	3.37	0.00	3.37
9.50	2.00	0.67	5.00	3.37	0.00	3.37
9.55	2.00	0.67	5.00	3.37	0.00	3.37
9.60	2.00	0.67	5.00	3.37	0.00	3.37
9.65	2.00	0.67	5.00	3.37	0.00	3.37
9.70	2.00	0.67	5.00	3.37	0.00	3.37
9.75	2.00	0.67	5.00	3.37	0.00	3.37
9.80	2.00	0.67	5.00	3.37	0.00	3.37
9.85	2.00	0.67	5.00	3.37	0.00	3.37
9.90	2.00	0.67	5.00	3.37	0.00	3.37
9.95	2.00	0.67	5.00	3.37	0.00	3.37
10.00	2.00	0.67	5.00	3.37	0.00	3.37
10.05	2.00	0.67	5.00	3.37	0.00	3.37
10.10	2.00	0.67	5.00	3.37	0.00	3.37
10.15	2.00	0.67	5.00	3.37	0.00	3.37
10.20	2.00	0.67	5.00	3.37	0.00	3.37
10.25	2.00	0.67	5.00	3.37	0.00	3.37
10.30	2.00	0.67	5.00	3.37	0.00	3.37
10.35	2.00	0.67	5.00	3.37	0.00	3.37
10.40	2.00	0.67	5.00	3.37	0.00	3.37
10.45	2.00	0.67	5.00	3.37	0.00	3.37
10.50	2.00	0.67	5.00	3.37	0.00	3.37
10.55	2.00	0.67	5.00	3.37	0.00	3.37
10.60	2.00	0.67	5.00	3.37	0.00	3.37
10.65	2.00	0.67	5.00	3.37	0.00	3.37
10.70	2.00	0.67	5.00	3.37	0.00	3.37
10.75	2.00	0.67	5.00	3.37	0.00	3.37
10.80	2.00	0.67	5.00	3.37	0.00	3.37
10.85	2.00	0.67	5.00	3.37	0.00	3.37
10.90	2.00	0.67	5.00	3.37	0.00	3.37
10.95	2.00	0.67	5.00	3.37	0.00	3.37
11.00	2.00	0.67	5.00	3.37	0.00	3.37
11.05	2.00	0.67	5.00	3.37	0.00	3.37
11.10	2.00	0.67	5.00	3.37	0.00	3.37
11.15	2.00	0.67	5.00	3.37	0.00	3.37
11.20	2.00	0.67	5.00	3.37	0.00	3.37
11.25	2.00	0.67	5.00	3.37	0.00	3.37
11.30	2.00	0.67	5.00	3.37	0.00	3.37
11.35	2.00	0.67	5.00	3.37	0.00	3.37
11.40	2.00	0.67	5.00	3.37	0.00	3.37
11.45	2.00	0.67	5.00	3.37	0.00	3.37
11.50	2.00	0.67	5.00	3.37	0.00	3.37
11.55	2.00	0.67	5.00	3.37	0.00	3.37
11.60	2.00	0.67	5.00	3.37	0.00	3.37
11.65	2.00	0.67	5.00	3.37	0.00	3.37
11.70	2.00	0.66	5.00	3.37	0.00	3.37
11.75	2.00	0.66	5.00	3.37	0.00	3.37
11.80	2.00	0.66	5.00	3.37	0.00	3.37
11.85	2.00	0.66	5.00	3.37	0.00	3.37
11.90	2.00	0.66	5.00	3.37	0.00	3.37
11.95	2.00	0.66	5.00	3.37	0.00	3.37

12.00	2.00	0.66	5.00	3.37	0.00	3.37
12.05	2.00	0.66	5.00	3.37	0.00	3.37
12.10	2.00	0.66	5.00	3.37	0.00	3.37
12.15	2.00	0.66	5.00	3.37	0.00	3.37
12.20	2.00	0.66	5.00	3.37	0.00	3.37
12.25	2.00	0.66	5.00	3.37	0.00	3.37
12.30	2.00	0.66	5.00	3.37	0.00	3.37
12.35	2.00	0.66	5.00	3.37	0.00	3.37
12.40	2.00	0.66	5.00	3.37	0.00	3.37
12.45	2.00	0.66	5.00	3.37	0.00	3.37
12.50	2.00	0.66	5.00	3.37	0.00	3.37
12.55	2.00	0.66	5.00	3.37	0.00	3.37
12.60	2.00	0.66	5.00	3.37	0.00	3.37
12.65	2.00	0.66	5.00	3.37	0.00	3.37
12.70	2.00	0.66	5.00	3.37	0.00	3.37
12.75	2.00	0.66	5.00	3.37	0.00	3.37
12.80	2.00	0.66	5.00	3.37	0.00	3.37
12.85	2.00	0.66	5.00	3.37	0.00	3.37
12.90	2.00	0.66	5.00	3.37	0.00	3.37
12.95	2.00	0.66	5.00	3.37	0.00	3.37
13.00	2.00	0.66	5.00	3.37	0.00	3.37
13.05	2.00	0.66	5.00	3.37	0.00	3.37
13.10	2.00	0.66	5.00	3.37	0.00	3.37
13.15	2.00	0.66	5.00	3.37	0.00	3.37
13.20	2.00	0.66	5.00	3.37	0.00	3.37
13.25	2.00	0.66	5.00	3.37	0.00	3.37
13.30	2.00	0.66	5.00	3.37	0.00	3.37
13.35	2.00	0.66	5.00	3.37	0.00	3.37
13.40	2.00	0.66	5.00	3.37	0.00	3.37
13.45	2.00	0.66	5.00	3.37	0.00	3.37
13.50	2.00	0.66	5.00	3.37	0.00	3.37
13.55	2.00	0.66	5.00	3.37	0.00	3.37
13.60	2.00	0.66	5.00	3.37	0.00	3.37
13.65	2.00	0.66	5.00	3.37	0.00	3.37
13.70	2.00	0.66	5.00	3.37	0.00	3.37
13.75	2.00	0.66	5.00	3.37	0.00	3.37
13.80	2.00	0.66	5.00	3.37	0.00	3.37
13.85	2.00	0.66	5.00	3.37	0.00	3.37
13.90	2.00	0.66	5.00	3.37	0.00	3.37
13.95	2.00	0.66	5.00	3.37	0.00	3.37
14.00	2.00	0.66	5.00	3.37	0.00	3.37
14.05	2.00	0.66	5.00	3.37	0.00	3.37
14.10	2.00	0.66	5.00	3.37	0.00	3.37
14.15	2.00	0.66	5.00	3.37	0.00	3.37
14.20	2.00	0.66	5.00	3.37	0.00	3.37
14.25	2.00	0.66	5.00	3.37	0.00	3.37
14.30	2.00	0.66	5.00	3.37	0.00	3.37
14.35	2.00	0.66	5.00	3.37	0.00	3.37
14.40	2.00	0.66	5.00	3.37	0.00	3.37
14.45	2.00	0.66	5.00	3.37	0.00	3.37
14.50	2.00	0.66	5.00	3.37	0.00	3.37
14.55	2.00	0.66	5.00	3.37	0.00	3.37
14.60	2.00	0.66	5.00	3.37	0.00	3.37
14.65	2.00	0.66	5.00	3.37	0.00	3.37
14.70	2.00	0.66	5.00	3.37	0.00	3.37
14.75	2.00	0.66	5.00	3.37	0.00	3.37
14.80	2.00	0.66	5.00	3.37	0.00	3.37
14.85	2.00	0.66	5.00	3.37	0.00	3.37
14.90	2.00	0.66	5.00	3.37	0.00	3.37
14.95	2.00	0.66	5.00	3.37	0.00	3.37
15.00	2.00	0.66	5.00	3.37	0.00	3.37
15.05	2.00	0.66	5.00	3.37	0.00	3.37
15.10	2.00	0.66	5.00	3.37	0.00	3.37

15.15	2.00	0.66	5.00	3.37	0.00	3.37
15.20	2.00	0.66	5.00	3.37	0.00	3.37
15.25	2.00	0.66	5.00	3.37	0.00	3.37
15.30	2.00	0.67	5.00	3.37	0.00	3.37
15.35	2.00	0.67	5.00	3.37	0.00	3.37
15.40	2.00	0.67	5.00	3.37	0.00	3.37
15.45	2.00	0.67	5.00	3.37	0.00	3.37
15.50	2.00	0.67	5.00	3.37	0.00	3.37
15.55	2.00	0.67	5.00	3.37	0.00	3.37
15.60	2.00	0.67	5.00	3.37	0.00	3.37
15.65	2.00	0.67	5.00	3.37	0.00	3.37
15.70	2.00	0.67	5.00	3.37	0.00	3.37
15.75	2.00	0.67	5.00	3.37	0.00	3.37
15.80	2.00	0.67	5.00	3.37	0.00	3.37
15.85	2.00	0.67	5.00	3.37	0.00	3.37
15.90	2.00	0.68	5.00	3.37	0.00	3.37
15.95	2.00	0.68	5.00	3.37	0.00	3.37
16.00	2.00	0.68	5.00	3.37	0.00	3.37
16.05	2.00	0.68	5.00	3.37	0.00	3.37
16.10	2.00	0.68	5.00	3.37	0.00	3.37
16.15	2.00	0.68	5.00	3.37	0.00	3.37
16.20	2.00	0.68	5.00	3.37	0.00	3.37
16.25	2.00	0.68	5.00	3.37	0.00	3.37
16.30	2.00	0.68	5.00	3.37	0.00	3.37
16.35	2.00	0.68	5.00	3.37	0.00	3.37
16.40	2.00	0.68	5.00	3.37	0.00	3.37
16.45	2.00	0.68	5.00	3.37	0.00	3.37
16.50	2.00	0.69	5.00	3.37	0.00	3.37
16.55	2.00	0.69	5.00	3.37	0.00	3.37
16.60	2.00	0.69	5.00	3.37	0.00	3.37
16.65	2.00	0.69	5.00	3.37	0.00	3.37
16.70	2.00	0.69	5.00	3.37	0.00	3.37
16.75	2.00	0.69	5.00	3.37	0.00	3.37
16.80	2.00	0.69	5.00	3.37	0.00	3.37
16.85	2.00	0.69	5.00	3.37	0.00	3.37
16.90	2.00	0.69	5.00	3.37	0.00	3.37
16.95	2.00	0.69	5.00	3.37	0.00	3.37
17.00	2.00	0.69	5.00	3.37	0.00	3.37
17.05	2.00	0.69	5.00	3.37	0.00	3.37
17.10	2.00	0.69	5.00	3.37	0.00	3.37
17.15	2.00	0.70	5.00	3.37	0.00	3.37
17.20	2.00	0.70	5.00	3.37	0.00	3.37
17.25	2.00	0.70	5.00	3.37	0.00	3.37
17.30	2.00	0.70	5.00	3.37	0.00	3.37
17.35	2.00	0.70	5.00	3.37	0.00	3.37
17.40	2.00	0.70	5.00	3.37	0.00	3.37
17.45	2.00	0.70	5.00	3.37	0.00	3.37
17.50	2.00	0.70	5.00	3.37	0.00	3.37
17.55	2.00	0.70	5.00	3.37	0.00	3.37
17.60	2.00	0.70	5.00	3.37	0.00	3.37
17.65	2.00	0.70	5.00	3.37	0.00	3.37
17.70	2.00	0.70	5.00	3.37	0.00	3.37
17.75	2.00	0.70	5.00	3.37	0.00	3.37
17.80	2.00	0.70	5.00	3.37	0.00	3.37
17.85	2.00	0.71	5.00	3.37	0.00	3.37
17.90	2.00	0.71	5.00	3.37	0.00	3.37
17.95	2.00	0.71	5.00	3.37	0.00	3.37
18.00	2.00	0.71	5.00	3.37	0.00	3.37
18.05	2.00	0.71	5.00	3.37	0.00	3.37
18.10	2.00	0.71	5.00	3.37	0.00	3.37
18.15	2.00	0.71	5.00	3.37	0.00	3.37
18.20	2.00	0.71	5.00	3.37	0.00	3.37
18.25	2.00	0.71	5.00	3.37	0.00	3.37

18.30	2.00	0.71	5.00	3.37	0.00	3.37
18.35	2.00	0.71	5.00	3.37	0.00	3.37
18.40	2.00	0.71	5.00	3.37	0.00	3.37
18.45	2.00	0.71	5.00	3.37	0.00	3.37
18.50	2.00	0.71	5.00	3.37	0.00	3.37
18.55	2.00	0.72	5.00	3.37	0.00	3.37
18.60	2.00	0.72	5.00	3.37	0.00	3.37
18.65	2.00	0.72	5.00	3.37	0.00	3.37
18.70	2.00	0.72	5.00	3.37	0.00	3.37
18.75	2.00	0.72	5.00	3.37	0.00	3.37
18.80	2.00	0.72	5.00	3.37	0.00	3.37
18.85	2.00	0.72	5.00	3.37	0.00	3.37
18.90	2.00	0.72	5.00	3.37	0.00	3.37
18.95	2.00	0.72	5.00	3.37	0.00	3.37
19.00	2.00	0.72	5.00	3.37	0.00	3.37
19.05	2.00	0.72	5.00	3.37	0.00	3.37
19.10	2.00	0.72	5.00	3.37	0.00	3.37
19.15	2.00	0.72	5.00	3.37	0.00	3.37
19.20	2.00	0.72	5.00	3.37	0.00	3.37
19.25	2.00	0.72	5.00	3.37	0.00	3.37
19.30	2.00	0.73	5.00	3.37	0.00	3.37
19.35	2.00	0.73	5.00	3.37	0.00	3.37
19.40	2.00	0.73	5.00	3.37	0.00	3.37
19.45	2.00	0.73	5.00	3.37	0.00	3.37
19.50	2.00	0.73	5.00	3.37	0.00	3.37
19.55	2.00	0.73	5.00	3.37	0.00	3.37
19.60	2.00	0.73	5.00	3.37	0.00	3.37
19.65	2.00	0.73	5.00	3.37	0.00	3.37
19.70	2.00	0.73	5.00	3.37	0.00	3.37
19.75	2.00	0.73	5.00	3.37	0.00	3.37
19.80	2.00	0.73	5.00	3.37	0.00	3.37
19.85	2.00	0.73	5.00	3.37	0.00	3.37
19.90	2.00	0.73	5.00	3.37	0.00	3.37
19.95	2.00	0.73	5.00	3.37	0.00	3.37
20.00	2.00	0.73	5.00	3.37	0.00	3.37
20.05	0.70	0.73	0.95*	3.37	0.00	3.37
20.10	0.70	0.73	0.95*	3.37	0.00	3.37
20.15	0.70	0.74	0.95*	3.37	0.00	3.37
20.20	0.70	0.74	0.95*	3.37	0.00	3.37
20.25	0.70	0.74	0.94*	3.37	0.00	3.37
20.30	0.70	0.74	0.94*	3.37	0.00	3.37
20.35	0.70	0.74	0.94*	3.37	0.00	3.37
20.40	0.70	0.74	0.94*	3.37	0.00	3.37
20.45	0.70	0.74	0.94*	3.37	0.00	3.37
20.50	0.70	0.74	0.94*	3.37	0.00	3.37
20.55	0.70	0.74	0.94*	3.37	0.00	3.37
20.60	0.70	0.74	0.94*	3.37	0.00	3.37
20.65	0.70	0.74	0.94*	3.37	0.00	3.37
20.70	0.70	0.74	0.94*	3.37	0.00	3.37
20.75	0.70	0.74	0.94*	3.37	0.00	3.37
20.80	0.70	0.74	0.94*	3.37	0.00	3.37
20.85	0.70	0.74	0.94*	3.37	0.00	3.37
20.90	0.70	0.74	0.94*	3.37	0.00	3.37
20.95	0.70	0.74	0.93*	3.37	0.00	3.37
21.00	0.70	0.75	0.93*	3.37	0.00	3.37
21.05	0.70	0.75	0.93*	3.37	0.00	3.37
21.10	0.70	0.75	0.93*	3.37	0.00	3.37
21.15	0.70	0.75	0.93*	3.37	0.00	3.37
21.20	0.70	0.75	0.93*	3.37	0.00	3.37
21.25	0.70	0.75	0.93*	3.37	0.00	3.37
21.30	0.70	0.75	0.93*	3.37	0.00	3.37
21.35	0.70	0.75	0.93*	3.37	0.00	3.37
21.40	0.70	0.75	0.93*	3.37	0.00	3.37

21.45	0.70	0.75	0.93*	3.37	0.00	3.37
21.50	0.70	0.75	0.93*	3.37	0.00	3.37
21.55	0.70	0.75	0.93*	3.37	0.00	3.37
21.60	0.70	0.75	0.93*	3.37	0.00	3.37
21.65	0.70	0.75	0.92*	3.37	0.00	3.37
21.70	0.70	0.75	0.92*	3.37	0.00	3.37
21.75	0.70	0.75	0.92*	3.37	0.00	3.37
21.80	0.70	0.75	0.92*	3.37	0.00	3.37
21.85	0.70	0.75	0.92*	3.37	0.00	3.37
21.90	0.70	0.76	0.92*	3.37	0.00	3.37
21.95	0.70	0.76	0.92*	3.37	0.00	3.37
22.00	0.70	0.76	0.92*	3.37	0.00	3.37
22.05	0.70	0.76	0.92*	3.37	0.00	3.37
22.10	0.70	0.76	0.92*	3.37	0.00	3.37
22.15	0.70	0.76	0.92*	3.37	0.00	3.37
22.20	0.70	0.76	0.92*	3.37	0.00	3.37
22.25	0.70	0.76	0.92*	3.37	0.00	3.37
22.30	0.70	0.76	0.92*	3.37	0.00	3.37
22.35	0.70	0.76	0.92*	3.37	0.00	3.37
22.40	0.70	0.76	0.92*	3.37	0.00	3.37
22.45	0.70	0.76	0.91*	3.37	0.00	3.37
22.50	0.70	0.76	0.91*	3.37	0.00	3.37
22.55	0.70	0.76	0.91*	3.37	0.00	3.37
22.60	0.70	0.76	0.91*	3.37	0.00	3.37
22.65	0.70	0.76	0.91*	3.37	0.00	3.37
22.70	0.70	0.76	0.91*	3.37	0.00	3.37
22.75	0.70	0.76	0.91*	3.37	0.00	3.37
22.80	0.70	0.76	0.91*	3.37	0.00	3.37
22.85	0.70	0.76	0.91*	3.37	0.00	3.37
22.90	0.70	0.77	0.91*	3.37	0.00	3.37
22.95	0.70	0.77	0.91*	3.37	0.00	3.37
23.00	0.70	0.77	0.91*	3.37	0.00	3.37
23.05	0.70	0.77	0.91*	3.37	0.00	3.37
23.10	0.70	0.77	0.91*	3.37	0.00	3.37
23.15	0.70	0.77	0.91*	3.37	0.00	3.37
23.20	0.70	0.77	0.91*	3.37	0.00	3.37
23.25	0.70	0.77	0.91*	3.37	0.00	3.37
23.30	0.70	0.77	0.91*	3.37	0.00	3.37
23.35	0.70	0.77	0.91*	3.37	0.00	3.37
23.40	0.70	0.77	0.91*	3.36	0.00	3.36
23.45	0.70	0.77	0.91*	3.36	0.00	3.36
23.50	0.70	0.77	0.91*	3.36	0.00	3.36
23.55	0.70	0.77	0.91*	3.36	0.00	3.36
23.60	0.70	0.77	0.91*	3.36	0.00	3.36
23.65	0.70	0.77	0.90*	3.35	0.00	3.35
23.70	0.70	0.77	0.90*	3.35	0.00	3.35
23.75	0.70	0.77	0.90*	3.35	0.00	3.35
23.80	0.70	0.77	0.90*	3.34	0.00	3.34
23.85	0.70	0.77	0.90*	3.34	0.00	3.34
23.90	0.64	0.77	0.82*	3.34	0.00	3.34
23.95	0.57	0.77	0.74*	3.33	0.00	3.33
24.00	0.54	0.78	0.70*	3.33	0.00	3.33
24.05	0.52	0.78	0.67*	3.32	0.00	3.32
24.10	0.50	0.78	0.65*	3.32	0.00	3.32
24.15	0.49	0.78	0.63*	3.31	0.00	3.31
24.20	0.47	0.78	0.61*	3.30	0.00	3.30
24.25	0.46	0.78	0.59*	3.30	0.00	3.30
24.30	0.45	0.78	0.58*	3.29	0.00	3.29
24.35	0.44	0.78	0.57*	3.29	0.00	3.29
24.40	0.43	0.78	0.55*	3.28	0.00	3.28
24.45	0.42	0.78	0.54*	3.27	0.00	3.27
24.50	0.41	0.78	0.53*	3.27	0.00	3.27
24.55	0.40	0.78	0.52*	3.26	0.00	3.26

24.60	0.40	0.78	0.51*	3.25	0.00	3.25
24.65	0.39	0.78	0.50*	3.25	0.00	3.25
24.70	0.38	0.78	0.49*	3.24	0.00	3.24
24.75	0.37	0.78	0.48*	3.23	0.00	3.23
24.80	0.37	0.78	0.47*	3.22	0.00	3.22
24.85	0.36	0.78	0.46*	3.22	0.00	3.22
24.90	0.35	0.78	0.45*	3.21	0.00	3.21
24.95	0.35	0.78	0.44*	3.20	0.00	3.20
25.00	0.34	0.78	0.43*	3.19	0.00	3.19
25.05	0.34	0.78	0.43*	3.18	0.00	3.18
25.10	0.34	0.78	0.43*	3.18	0.00	3.18
25.15	0.34	0.79	0.43*	3.17	0.00	3.17
25.20	0.33	0.79	0.43*	3.16	0.00	3.16
25.25	0.33	0.79	0.42*	3.15	0.00	3.15
25.30	0.33	0.79	0.42*	3.14	0.00	3.14
25.35	0.33	0.79	0.42*	3.14	0.00	3.14
25.40	0.33	0.79	0.42*	3.13	0.00	3.13
25.45	0.33	0.79	0.42*	3.12	0.00	3.12
25.50	0.33	0.79	0.42*	3.11	0.00	3.11
25.55	0.33	0.79	0.42*	3.10	0.00	3.10
25.60	0.33	0.79	0.41*	3.09	0.00	3.09
25.65	0.33	0.79	0.41*	3.09	0.00	3.09
25.70	0.33	0.79	0.41*	3.08	0.00	3.08
25.75	0.32	0.79	0.41*	3.07	0.00	3.07
25.80	0.32	0.79	0.41*	3.06	0.00	3.06
25.85	0.32	0.79	0.41*	3.05	0.00	3.05
25.90	0.32	0.79	0.41*	3.04	0.00	3.04
25.95	0.32	0.79	0.40*	3.03	0.00	3.03
26.00	0.32	0.79	0.40*	3.03	0.00	3.03
26.05	0.32	0.79	0.40*	3.02	0.00	3.02
26.10	0.32	0.79	0.40*	3.01	0.00	3.01
26.15	0.32	0.79	0.40*	3.00	0.00	3.00
26.20	0.32	0.79	0.40*	2.99	0.00	2.99
26.25	0.32	0.79	0.40*	2.98	0.00	2.98
26.30	0.31	0.79	0.40*	2.97	0.00	2.97
26.35	0.31	0.80	0.39*	2.97	0.00	2.97
26.40	0.31	0.80	0.39*	2.96	0.00	2.96
26.45	0.31	0.80	0.39*	2.95	0.00	2.95
26.50	0.31	0.80	0.39*	2.94	0.00	2.94
26.55	0.31	0.80	0.39*	2.93	0.00	2.93
26.60	0.31	0.80	0.39*	2.92	0.00	2.92
26.65	0.31	0.80	0.39*	2.91	0.00	2.91
26.70	0.31	0.80	0.39*	2.91	0.00	2.91
26.75	0.31	0.80	0.38*	2.90	0.00	2.90
26.80	0.31	0.80	0.38*	2.89	0.00	2.89
26.85	0.30	0.80	0.38*	2.88	0.00	2.88
26.90	0.30	0.80	0.38*	2.87	0.00	2.87
26.95	0.30	0.80	0.38*	2.86	0.00	2.86
27.00	0.30	0.80	0.38*	2.85	0.00	2.85
27.05	0.30	0.80	0.38*	2.84	0.00	2.84
27.10	0.30	0.80	0.38*	2.84	0.00	2.84
27.15	0.30	0.80	0.38*	2.83	0.00	2.83
27.20	0.30	0.80	0.37*	2.82	0.00	2.82
27.25	0.30	0.80	0.37*	2.81	0.00	2.81
27.30	0.30	0.80	0.37*	2.80	0.00	2.80
27.35	0.30	0.80	0.37*	2.79	0.00	2.79
27.40	0.30	0.80	0.37*	2.78	0.00	2.78
27.45	0.30	0.80	0.37*	2.77	0.00	2.77
27.50	0.30	0.80	0.37*	2.76	0.00	2.76
27.55	0.29	0.80	0.37*	2.75	0.00	2.75
27.60	0.29	0.81	0.37*	2.75	0.00	2.75
27.65	0.29	0.81	0.36*	2.74	0.00	2.74
27.70	0.29	0.81	0.36*	2.73	0.00	2.73

27.75	0.29	0.81	0.36*	2.72	0.00	2.72
27.80	0.29	0.81	0.36*	2.71	0.00	2.71
27.85	0.29	0.81	0.36*	2.70	0.00	2.70
27.90	0.31	0.81	0.38*	2.69	0.00	2.69
27.95	0.31	0.81	0.38*	2.68	0.00	2.68
28.00	0.30	0.81	0.38*	2.67	0.00	2.67
28.05	0.30	0.81	0.38*	2.67	0.00	2.67
28.10	0.30	0.81	0.38*	2.66	0.00	2.66
28.15	0.30	0.81	0.37*	2.65	0.00	2.65
28.20	0.30	0.81	0.37*	2.64	0.00	2.64
28.25	0.30	0.81	0.37*	2.63	0.00	2.63
28.30	0.30	0.81	0.37*	2.62	0.00	2.62
28.35	0.30	0.81	0.37*	2.61	0.00	2.61
28.40	0.30	0.81	0.37*	2.60	0.00	2.60
28.45	0.30	0.81	0.37*	2.59	0.00	2.59
28.50	0.30	0.81	0.37*	2.59	0.00	2.59
28.55	0.30	0.81	0.37*	2.58	0.00	2.58
28.60	0.30	0.81	0.36*	2.57	0.00	2.57
28.65	0.30	0.81	0.36*	2.56	0.00	2.56
28.70	0.29	0.81	0.36*	2.55	0.00	2.55
28.75	0.29	0.81	0.36*	2.54	0.00	2.54
28.80	0.29	0.81	0.36*	2.53	0.00	2.53
28.85	0.29	0.81	0.36*	2.52	0.00	2.52
28.90	0.29	0.82	0.36*	2.51	0.00	2.51
28.95	0.29	0.82	0.36*	2.50	0.00	2.50
29.00	0.29	0.82	0.36*	2.50	0.00	2.50
29.05	0.29	0.82	0.36*	2.49	0.00	2.49
29.10	0.29	0.82	0.35*	2.48	0.00	2.48
29.15	0.29	0.82	0.35*	2.47	0.00	2.47
29.20	0.29	0.82	0.35*	2.46	0.00	2.46
29.25	0.29	0.82	0.35*	2.45	0.00	2.45
29.30	0.29	0.82	0.35*	2.44	0.00	2.44
29.35	0.29	0.82	0.35*	2.43	0.00	2.43
29.40	0.29	0.82	0.35*	2.42	0.00	2.42
29.45	0.29	0.82	0.35*	2.41	0.00	2.41
29.50	0.28	0.82	0.35*	2.40	0.00	2.40
29.55	0.28	0.82	0.35*	2.40	0.00	2.40
29.60	0.28	0.82	0.35*	2.39	0.00	2.39
29.65	0.28	0.82	0.34*	2.38	0.00	2.38
29.70	0.28	0.82	0.34*	2.37	0.00	2.37
29.75	0.28	0.82	0.34*	2.36	0.00	2.36
29.80	0.28	0.82	0.34*	2.35	0.00	2.35
29.85	0.28	0.82	0.34*	2.34	0.00	2.34
29.90	0.28	0.82	0.34*	2.33	0.00	2.33
29.95	0.28	0.82	0.34*	2.32	0.00	2.32
30.00	0.28	0.82	0.34*	2.31	0.00	2.31
30.05	0.28	0.82	0.34*	2.30	0.00	2.30
30.10	0.28	0.82	0.34*	2.29	0.00	2.29
30.15	0.28	0.82	0.34*	2.28	0.00	2.28
30.20	0.28	0.82	0.34*	2.27	0.00	2.27
30.25	0.28	0.82	0.34*	2.26	0.00	2.26
30.30	0.28	0.82	0.34*	2.25	0.00	2.25
30.35	0.28	0.82	0.34*	2.24	0.00	2.24
30.40	0.28	0.82	0.34*	2.24	0.00	2.24
30.45	0.28	0.83	0.34*	2.23	0.00	2.23
30.50	0.28	0.83	0.34*	2.22	0.00	2.22
30.55	0.28	0.83	0.34*	2.21	0.00	2.21
30.60	0.28	0.83	0.34*	2.20	0.00	2.20
30.65	0.29	0.83	0.35*	2.19	0.00	2.19
30.70	0.29	0.83	0.35*	2.18	0.00	2.18
30.75	0.29	0.83	0.35*	2.17	0.00	2.17
30.80	0.29	0.83	0.35*	2.16	0.00	2.16
30.85	0.29	0.83	0.35*	2.15	0.00	2.15

30.90	0.29	0.83	0.35*	2.14	0.00	2.14
30.95	0.29	0.83	0.35*	2.13	0.00	2.13
31.00	0.29	0.83	0.35*	2.13	0.00	2.13
31.05	0.29	0.83	0.35*	2.12	0.00	2.12
31.10	0.29	0.83	0.35*	2.11	0.00	2.11
31.15	0.29	0.83	0.36*	2.10	0.00	2.10
31.20	0.30	0.83	0.36*	2.09	0.00	2.09
31.25	0.30	0.83	0.36*	2.08	0.00	2.08
31.30	0.30	0.83	0.36*	2.07	0.00	2.07
31.35	0.30	0.83	0.36*	2.06	0.00	2.06
31.40	0.30	0.83	0.36*	2.05	0.00	2.05
31.45	0.30	0.83	0.36*	2.05	0.00	2.05
31.50	0.30	0.83	0.36*	2.04	0.00	2.04
31.55	0.30	0.83	0.36*	2.03	0.00	2.03
31.60	0.30	0.83	0.37*	2.02	0.00	2.02
31.65	0.30	0.83	0.37*	2.01	0.00	2.01
31.70	0.30	0.83	0.37*	2.00	0.00	2.00
31.75	0.31	0.83	0.37*	1.99	0.00	1.99
31.80	0.31	0.83	0.37*	1.99	0.00	1.99
31.85	0.31	0.83	0.37*	1.98	0.00	1.98
31.90	0.31	0.83	0.37*	1.97	0.00	1.97
31.95	0.31	0.83	0.37*	1.96	0.00	1.96
32.00	0.31	0.83	0.37*	1.95	0.00	1.95
32.05	0.31	0.83	0.38*	1.94	0.00	1.94
32.10	0.31	0.83	0.38*	1.93	0.00	1.93
32.15	0.31	0.83	0.38*	1.93	0.00	1.93
32.20	0.31	0.83	0.38*	1.92	0.00	1.92
32.25	0.31	0.83	0.38*	1.91	0.00	1.91
32.30	0.32	0.83	0.38*	1.90	0.00	1.90
32.35	0.32	0.83	0.38*	1.89	0.00	1.89
32.40	0.32	0.83	0.38*	1.88	0.00	1.88
32.45	0.32	0.83	0.38*	1.88	0.00	1.88
32.50	0.32	0.83	0.39*	1.87	0.00	1.87
32.55	0.32	0.83	0.39*	1.86	0.00	1.86
32.60	0.32	0.83	0.39*	1.85	0.00	1.85
32.65	0.32	0.83	0.39*	1.84	0.00	1.84
32.70	0.32	0.83	0.39*	1.83	0.00	1.83
32.75	0.32	0.83	0.39*	1.83	0.00	1.83
32.80	0.33	0.83	0.39*	1.82	0.00	1.82
32.85	0.33	0.83	0.39*	1.81	0.00	1.81
32.90	0.33	0.83	0.40*	1.80	0.00	1.80
32.95	0.33	0.83	0.40*	1.79	0.00	1.79
33.00	0.33	0.83	0.40*	1.79	0.00	1.79
33.05	0.33	0.83	0.40*	1.78	0.00	1.78
33.10	0.33	0.83	0.40*	1.77	0.00	1.77
33.15	0.33	0.83	0.40*	1.76	0.00	1.76
33.20	0.33	0.83	0.40*	1.75	0.00	1.75
33.25	0.34	0.83	0.40*	1.75	0.00	1.75
33.30	0.34	0.83	0.41*	1.74	0.00	1.74
33.35	0.34	0.83	0.41*	1.73	0.00	1.73
33.40	0.34	0.83	0.41*	1.72	0.00	1.72
33.45	0.34	0.83	0.41*	1.71	0.00	1.71
33.50	0.34	0.83	0.41*	1.71	0.00	1.71
33.55	0.34	0.83	0.41*	1.70	0.00	1.70
33.60	0.34	0.83	0.41*	1.69	0.00	1.69
33.65	0.34	0.83	0.41*	1.68	0.00	1.68
33.70	0.35	0.83	0.42*	1.68	0.00	1.68
33.75	0.35	0.83	0.42*	1.67	0.00	1.67
33.80	0.35	0.83	0.42*	1.66	0.00	1.66
33.85	0.35	0.83	0.42*	1.65	0.00	1.65
33.90	0.35	0.83	0.42*	1.65	0.00	1.65
33.95	0.35	0.83	0.42*	1.64	0.00	1.64
34.00	0.35	0.83	0.42*	1.63	0.00	1.63

34.05	0.35	0.83	0.43*	1.62	0.00	1.62
34.10	0.35	0.83	0.43*	1.62	0.00	1.62
34.15	0.36	0.83	0.43*	1.61	0.00	1.61
34.20	0.36	0.83	0.43*	1.60	0.00	1.60
34.25	0.36	0.83	0.43*	1.59	0.00	1.59
34.30	0.36	0.83	0.43*	1.59	0.00	1.59
34.35	0.36	0.83	0.43*	1.58	0.00	1.58
34.40	0.36	0.83	0.44*	1.57	0.00	1.57
34.45	0.36	0.83	0.44*	1.56	0.00	1.56
34.50	0.36	0.83	0.44*	1.56	0.00	1.56
34.55	0.37	0.83	0.44*	1.55	0.00	1.55
34.60	0.37	0.83	0.44*	1.54	0.00	1.54
34.65	0.37	0.83	0.44*	1.53	0.00	1.53
34.70	0.37	0.83	0.44*	1.53	0.00	1.53
34.75	0.37	0.83	0.45*	1.52	0.00	1.52
34.80	0.37	0.83	0.45*	1.51	0.00	1.51
34.85	0.37	0.83	0.45*	1.51	0.00	1.51
34.90	0.38	0.83	0.45*	1.50	0.00	1.50
34.95	0.38	0.83	0.45*	1.49	0.00	1.49
35.00	0.38	0.83	0.45*	1.48	0.00	1.48
35.05	0.38	0.83	0.45*	1.48	0.00	1.48
35.10	0.38	0.83	0.45*	1.47	0.00	1.47
35.15	0.38	0.83	0.45*	1.46	0.00	1.46
35.20	0.38	0.83	0.46*	1.46	0.00	1.46
35.25	0.38	0.83	0.46*	1.45	0.00	1.45
35.30	0.38	0.83	0.46*	1.44	0.00	1.44
35.35	0.38	0.83	0.46*	1.44	0.00	1.44
35.40	0.38	0.83	0.46*	1.43	0.00	1.43
35.45	0.38	0.83	0.46*	1.42	0.00	1.42
35.50	0.38	0.83	0.46*	1.41	0.00	1.41
35.55	0.38	0.83	0.46*	1.41	0.00	1.41
35.60	0.38	0.83	0.46*	1.40	0.00	1.40
35.65	0.38	0.83	0.46*	1.39	0.00	1.39
35.70	0.38	0.83	0.46*	1.39	0.00	1.39
35.75	0.38	0.83	0.46*	1.38	0.00	1.38
35.80	0.38	0.83	0.46*	1.37	0.00	1.37
35.85	0.38	0.83	0.46*	1.37	0.00	1.37
35.90	0.38	0.83	0.46*	1.36	0.00	1.36
35.95	0.38	0.83	0.46*	1.35	0.00	1.35
36.00	0.38	0.83	0.46*	1.35	0.00	1.35
36.05	0.38	0.83	0.46*	1.34	0.00	1.34
36.10	0.38	0.83	0.46*	1.33	0.00	1.33
36.15	0.38	0.83	0.46*	1.32	0.00	1.32
36.20	0.38	0.83	0.46*	1.32	0.00	1.32
36.25	0.38	0.83	0.46*	1.31	0.00	1.31
36.30	0.38	0.83	0.46*	1.30	0.00	1.30
36.35	0.38	0.83	0.46*	1.30	0.00	1.30
36.40	0.38	0.83	0.46*	1.29	0.00	1.29
36.45	0.38	0.83	0.46*	1.28	0.00	1.28
36.50	0.38	0.83	0.46*	1.28	0.00	1.28
36.55	0.38	0.83	0.46*	1.27	0.00	1.27
36.60	0.38	0.83	0.46*	1.26	0.00	1.26
36.65	0.38	0.83	0.46*	1.26	0.00	1.26
36.70	0.38	0.83	0.46*	1.25	0.00	1.25
36.75	0.38	0.83	0.46*	1.24	0.00	1.24
36.80	0.38	0.83	0.46*	1.23	0.00	1.23
36.85	0.39	0.83	0.46*	1.23	0.00	1.23
36.90	0.39	0.83	0.46*	1.22	0.00	1.22
36.95	0.39	0.83	0.46*	1.21	0.00	1.21
37.00	0.39	0.83	0.46*	1.21	0.00	1.21
37.05	0.39	0.83	0.46*	1.20	0.00	1.20
37.10	0.39	0.83	0.46*	1.19	0.00	1.19
37.15	0.39	0.83	0.46*	1.19	0.00	1.19

37.20	0.39	0.83	0.46*	1.18	0.00	1.18
37.25	0.39	0.83	0.46*	1.17	0.00	1.17
37.30	0.39	0.83	0.46*	1.17	0.00	1.17
37.35	0.39	0.83	0.46*	1.16	0.00	1.16
37.40	0.39	0.83	0.46*	1.15	0.00	1.15
37.45	0.39	0.83	0.46*	1.15	0.00	1.15
37.50	0.39	0.83	0.46*	1.14	0.00	1.14
37.55	0.39	0.83	0.46*	1.13	0.00	1.13
37.60	0.39	0.83	0.46*	1.13	0.00	1.13
37.65	0.39	0.83	0.46*	1.12	0.00	1.12
37.70	0.39	0.83	0.46*	1.11	0.00	1.11
37.75	0.39	0.83	0.46*	1.11	0.00	1.11
37.80	0.39	0.83	0.46*	1.10	0.00	1.10
37.85	0.39	0.83	0.47*	1.09	0.00	1.09
37.90	0.39	0.83	0.47*	1.08	0.00	1.08
37.95	0.39	0.83	0.47*	1.08	0.00	1.08
38.00	0.39	0.83	0.47*	1.07	0.00	1.07
38.05	0.39	0.83	0.47*	1.06	0.00	1.06
38.10	0.39	0.83	0.47*	1.06	0.00	1.06
38.15	0.39	0.83	0.47*	1.05	0.00	1.05
38.20	0.39	0.83	0.47*	1.04	0.00	1.04
38.25	0.39	0.83	0.47*	1.04	0.00	1.04
38.30	0.39	0.83	0.47*	1.03	0.00	1.03
38.35	0.39	0.83	0.47*	1.02	0.00	1.02
38.40	0.39	0.83	0.47*	1.02	0.00	1.02
38.45	0.39	0.83	0.47*	1.01	0.00	1.01
38.50	0.39	0.83	0.47*	1.00	0.00	1.00
38.55	0.39	0.83	0.47*	1.00	0.00	1.00
38.60	0.39	0.83	0.47*	0.99	0.00	0.99
38.65	0.39	0.83	0.47*	0.98	0.00	0.98
38.70	0.39	0.83	0.47*	0.98	0.00	0.98
38.75	0.39	0.83	0.47*	0.97	0.00	0.97
38.80	0.39	0.83	0.47*	0.96	0.00	0.96
38.85	0.39	0.83	0.47*	0.96	0.00	0.96
38.90	0.39	0.83	0.47*	0.95	0.00	0.95
38.95	0.39	0.83	0.47*	0.94	0.00	0.94
39.00	0.39	0.83	0.47*	0.94	0.00	0.94
39.05	0.39	0.83	0.47*	0.93	0.00	0.93
39.10	0.39	0.83	0.47*	0.92	0.00	0.92
39.15	0.39	0.83	0.47*	0.92	0.00	0.92
39.20	0.39	0.83	0.47*	0.91	0.00	0.91
39.25	0.39	0.83	0.47*	0.90	0.00	0.90
39.30	0.39	0.83	0.47*	0.90	0.00	0.90
39.35	0.39	0.83	0.47*	0.89	0.00	0.89
39.40	0.39	0.83	0.47*	0.88	0.00	0.88
39.45	0.39	0.83	0.47*	0.88	0.00	0.88
39.50	0.39	0.83	0.47*	0.87	0.00	0.87
39.55	0.39	0.83	0.47*	0.86	0.00	0.86
39.60	0.39	0.83	0.47*	0.86	0.00	0.86
39.65	0.39	0.83	0.47*	0.85	0.00	0.85
39.70	0.39	0.83	0.47*	0.84	0.00	0.84
39.75	0.39	0.83	0.47*	0.84	0.00	0.84
39.80	0.39	0.83	0.47*	0.83	0.00	0.83
39.85	0.39	0.83	0.47*	0.82	0.00	0.82
39.90	0.39	0.83	0.47*	0.82	0.00	0.82
39.95	0.39	0.83	0.47*	0.81	0.00	0.81
40.00	0.39	0.83	0.47*	0.80	0.00	0.80
40.05	0.39	0.83	0.47*	0.80	0.00	0.80
40.10	0.39	0.83	0.47*	0.79	0.00	0.79
40.15	0.39	0.83	0.47*	0.78	0.00	0.78
40.20	0.39	0.83	0.47*	0.78	0.00	0.78
40.25	0.39	0.83	0.47*	0.77	0.00	0.77
40.30	0.40	0.83	0.47*	0.76	0.00	0.76

40.35	0.40	0.83	0.48*	0.76	0.00	0.76
40.40	0.40	0.83	0.48*	0.75	0.00	0.75
40.45	0.40	0.83	0.48*	0.74	0.00	0.74
40.50	0.40	0.83	0.48*	0.74	0.00	0.74
40.55	0.40	0.83	0.48*	0.73	0.00	0.73
40.60	0.40	0.83	0.48*	0.72	0.00	0.72
40.65	0.40	0.83	0.48*	0.72	0.00	0.72
40.70	0.40	0.83	0.48*	0.71	0.00	0.71
40.75	0.40	0.83	0.48*	0.70	0.00	0.70
40.80	0.40	0.83	0.48*	0.70	0.00	0.70
40.85	0.40	0.83	0.49*	0.69	0.00	0.69
40.90	0.40	0.83	0.49*	0.68	0.00	0.68
40.95	0.41	0.83	0.49*	0.68	0.00	0.68
41.00	0.41	0.83	0.49*	0.67	0.00	0.67
41.05	0.41	0.83	0.49*	0.67	0.00	0.67
41.10	0.41	0.83	0.49*	0.66	0.00	0.66
41.15	0.41	0.83	0.49*	0.65	0.00	0.65
41.20	0.41	0.83	0.49*	0.65	0.00	0.65
41.25	0.41	0.83	0.49*	0.64	0.00	0.64
41.30	0.41	0.83	0.49*	0.63	0.00	0.63
41.35	0.41	0.83	0.50*	0.63	0.00	0.63
41.40	0.41	0.83	0.50*	0.62	0.00	0.62
41.45	0.41	0.83	0.50*	0.61	0.00	0.61
41.50	0.41	0.83	0.50*	0.61	0.00	0.61
41.55	0.42	0.83	0.50*	0.60	0.00	0.60
41.60	0.42	0.83	0.50*	0.60	0.00	0.60
41.65	0.42	0.83	0.50*	0.59	0.00	0.59
41.70	0.42	0.83	0.50*	0.58	0.00	0.58
41.75	0.42	0.83	0.50*	0.58	0.00	0.58
41.80	0.42	0.83	0.51*	0.57	0.00	0.57
41.85	0.42	0.83	0.51*	0.56	0.00	0.56
41.90	0.42	0.83	0.51*	0.56	0.00	0.56
41.95	0.42	0.83	0.51*	0.55	0.00	0.55
42.00	0.42	0.83	0.51*	0.55	0.00	0.55
42.05	0.42	0.83	0.51*	0.54	0.00	0.54
42.10	0.43	0.83	0.51*	0.53	0.00	0.53
42.15	0.43	0.83	0.51*	0.53	0.00	0.53
42.20	0.43	0.83	0.51*	0.52	0.00	0.52
42.25	0.43	0.83	0.52*	0.51	0.00	0.51
42.30	0.43	0.83	0.52*	0.51	0.00	0.51
42.35	0.43	0.83	0.52*	0.50	0.00	0.50
42.40	0.43	0.83	0.52*	0.50	0.00	0.50
42.45	0.43	0.83	0.52*	0.49	0.00	0.49
42.50	0.43	0.83	0.52*	0.48	0.00	0.48
42.55	0.43	0.83	0.52*	0.48	0.00	0.48
42.60	0.43	0.83	0.52*	0.47	0.00	0.47
42.65	0.44	0.83	0.53*	0.47	0.00	0.47
42.70	0.44	0.83	0.53*	0.46	0.00	0.46
42.75	0.44	0.83	0.53*	0.45	0.00	0.45
42.80	0.44	0.83	0.53*	0.45	0.00	0.45
42.85	0.44	0.83	0.53*	0.44	0.00	0.44
42.90	0.44	0.83	0.53*	0.44	0.00	0.44
42.95	0.44	0.83	0.53*	0.43	0.00	0.43
43.00	0.44	0.83	0.53*	0.42	0.00	0.42
43.05	0.44	0.83	0.54*	0.42	0.00	0.42
43.10	0.44	0.83	0.54*	0.41	0.00	0.41
43.15	0.45	0.83	0.54*	0.41	0.00	0.41
43.20	0.45	0.83	0.54*	0.40	0.00	0.40
43.25	0.45	0.83	0.54*	0.40	0.00	0.40
43.30	0.45	0.83	0.54*	0.39	0.00	0.39
43.35	0.45	0.83	0.54*	0.38	0.00	0.38
43.40	0.45	0.83	0.55*	0.38	0.00	0.38
43.45	0.45	0.83	0.55*	0.37	0.00	0.37

43.50	0.45	0.83	0.55*	0.37	0.00	0.37
43.55	0.46	0.83	0.55*	0.36	0.00	0.36
43.60	0.46	0.83	0.55*	0.36	0.00	0.36
43.65	0.46	0.83	0.55*	0.35	0.00	0.35
43.70	0.46	0.83	0.56*	0.35	0.00	0.35
43.75	0.46	0.83	0.56*	0.34	0.00	0.34
43.80	0.46	0.83	0.56*	0.33	0.00	0.33
43.85	0.46	0.83	0.56*	0.33	0.00	0.33
43.90	0.46	0.83	0.56*	0.32	0.00	0.32
43.95	0.47	0.83	0.56*	0.32	0.00	0.32
44.00	0.47	0.83	0.57*	0.31	0.00	0.31
44.05	0.47	0.83	0.57*	0.31	0.00	0.31
44.10	0.47	0.83	0.57*	0.30	0.00	0.30
44.15	0.47	0.83	0.57*	0.30	0.00	0.30
44.20	0.47	0.83	0.57*	0.29	0.00	0.29
44.25	0.47	0.83	0.57*	0.29	0.00	0.29
44.30	0.48	0.83	0.58*	0.28	0.00	0.28
44.35	0.48	0.83	0.58*	0.28	0.00	0.28
44.40	0.48	0.83	0.58*	0.27	0.00	0.27
44.45	0.48	0.82	0.58*	0.27	0.00	0.27
44.50	0.48	0.82	0.59*	0.26	0.00	0.26
44.55	0.48	0.82	0.59*	0.26	0.00	0.26
44.60	0.49	0.82	0.59*	0.25	0.00	0.25
44.65	0.49	0.82	0.59*	0.25	0.00	0.25
44.70	0.49	0.82	0.59*	0.24	0.00	0.24
44.75	0.49	0.82	0.60*	0.24	0.00	0.24
44.80	0.49	0.82	0.60*	0.23	0.00	0.23
44.85	0.50	0.82	0.60*	0.23	0.00	0.23
44.90	0.50	0.82	0.61*	0.22	0.00	0.22
44.95	0.50	0.82	0.61*	0.22	0.00	0.22
45.00	0.50	0.82	0.61*	0.21	0.00	0.21
45.05	0.51	0.82	0.62*	0.21	0.00	0.21
45.10	0.52	0.82	0.63*	0.20	0.00	0.20
45.15	0.53	0.82	0.64*	0.20	0.00	0.20
45.20	0.54	0.82	0.66*	0.19	0.00	0.19
45.25	0.55	0.82	0.67*	0.19	0.00	0.19
45.30	0.57	0.82	0.69*	0.18	0.00	0.18
45.35	0.60	0.82	0.72*	0.18	0.00	0.18
45.40	0.63	0.82	0.76*	0.17	0.00	0.17
45.45	0.63	0.82	0.76*	0.17	0.00	0.17
45.50	0.63	0.82	0.76*	0.16	0.00	0.16
45.55	0.63	0.82	0.76*	0.16	0.00	0.16
45.60	0.63	0.82	0.76*	0.16	0.00	0.16
45.65	0.63	0.82	0.76*	0.15	0.00	0.15
45.70	0.63	0.82	0.76*	0.15	0.00	0.15
45.75	0.63	0.82	0.76*	0.14	0.00	0.14
45.80	0.63	0.82	0.76*	0.14	0.00	0.14
45.85	0.63	0.82	0.76*	0.14	0.00	0.14
45.90	0.62	0.82	0.76*	0.13	0.00	0.13
45.95	0.62	0.82	0.76*	0.13	0.00	0.13
46.00	0.62	0.82	0.76*	0.12	0.00	0.12
46.05	0.62	0.82	0.76*	0.12	0.00	0.12
46.10	0.62	0.82	0.76*	0.12	0.00	0.12
46.15	0.62	0.82	0.76*	0.11	0.00	0.11
46.20	0.62	0.82	0.76*	0.11	0.00	0.11
46.25	0.62	0.82	0.76*	0.11	0.00	0.11
46.30	0.62	0.82	0.76*	0.10	0.00	0.10
46.35	0.62	0.82	0.76*	0.10	0.00	0.10
46.40	0.62	0.82	0.76*	0.10	0.00	0.10
46.45	0.62	0.82	0.76*	0.09	0.00	0.09
46.50	0.62	0.82	0.76*	0.09	0.00	0.09
46.55	0.62	0.82	0.76*	0.09	0.00	0.09
46.60	0.62	0.82	0.76*	0.08	0.00	0.08

46.65	0.62	0.82	0.76*	0.08	0.00	0.08
46.70	0.62	0.82	0.76*	0.08	0.00	0.08
46.75	0.62	0.82	0.76*	0.08	0.00	0.08
46.80	0.62	0.82	0.76*	0.07	0.00	0.07
46.85	0.62	0.82	0.76*	0.07	0.00	0.07
46.90	0.62	0.82	0.76*	0.07	0.00	0.07
46.95	0.62	0.82	0.76*	0.07	0.00	0.07
47.00	0.62	0.82	0.76*	0.06	0.00	0.06
47.05	0.62	0.82	0.76*	0.06	0.00	0.06
47.10	0.62	0.82	0.76*	0.06	0.00	0.06
47.15	0.62	0.82	0.76*	0.06	0.00	0.06
47.20	0.62	0.82	0.76*	0.05	0.00	0.05
47.25	0.62	0.82	0.76*	0.05	0.00	0.05
47.30	0.62	0.82	0.76*	0.05	0.00	0.05
47.35	0.62	0.82	0.76*	0.05	0.00	0.05
47.40	0.62	0.82	0.76*	0.05	0.00	0.05
47.45	0.62	0.82	0.76*	0.05	0.00	0.05
47.50	0.62	0.82	0.76*	0.04	0.00	0.04
47.55	0.62	0.82	0.76*	0.04	0.00	0.04
47.60	0.62	0.82	0.76*	0.04	0.00	0.04
47.65	0.62	0.82	0.76*	0.04	0.00	0.04
47.70	0.62	0.82	0.76*	0.04	0.00	0.04
47.75	0.62	0.82	0.76*	0.04	0.00	0.04
47.80	0.62	0.82	0.76*	0.04	0.00	0.04
47.85	0.62	0.82	0.76*	0.04	0.00	0.04
47.90	0.62	0.82	0.76*	0.03	0.00	0.03
47.95	0.62	0.81	0.76*	0.03	0.00	0.03
48.00	0.62	0.81	0.76*	0.03	0.00	0.03
48.05	0.62	0.81	0.76*	0.03	0.00	0.03
48.10	0.62	0.81	0.76*	0.03	0.00	0.03
48.15	0.62	0.81	0.76*	0.03	0.00	0.03
48.20	0.62	0.81	0.76*	0.03	0.00	0.03
48.25	0.62	0.81	0.76*	0.03	0.00	0.03
48.30	0.62	0.81	0.76*	0.03	0.00	0.03
48.35	0.62	0.81	0.76*	0.02	0.00	0.02
48.40	0.62	0.81	0.76*	0.02	0.00	0.02
48.45	0.62	0.81	0.76*	0.02	0.00	0.02
48.50	0.62	0.81	0.76*	0.02	0.00	0.02
48.55	0.62	0.81	0.76*	0.02	0.00	0.02
48.60	0.62	0.81	0.76*	0.02	0.00	0.02
48.65	0.62	0.81	0.76*	0.02	0.00	0.02
48.70	0.62	0.81	0.76*	0.02	0.00	0.02
48.75	0.62	0.81	0.76*	0.02	0.00	0.02
48.80	0.62	0.81	0.76*	0.02	0.00	0.02
48.85	0.62	0.81	0.76*	0.02	0.00	0.02
48.90	0.62	0.81	0.76*	0.01	0.00	0.01
48.95	0.62	0.81	0.76*	0.01	0.00	0.01
49.00	0.62	0.81	0.76*	0.01	0.00	0.01
49.05	0.62	0.81	0.76*	0.01	0.00	0.01
49.10	0.62	0.81	0.76*	0.01	0.00	0.01
49.15	0.62	0.81	0.76*	0.01	0.00	0.01
49.20	0.62	0.81	0.76*	0.01	0.00	0.01
49.25	0.62	0.81	0.76*	0.01	0.00	0.01
49.30	0.62	0.81	0.76*	0.01	0.00	0.01
49.35	0.62	0.81	0.76*	0.01	0.00	0.01
49.40	0.62	0.81	0.76*	0.01	0.00	0.01
49.45	0.61	0.81	0.76*	0.01	0.00	0.01
49.50	0.61	0.81	0.76*	0.01	0.00	0.01
49.55	0.61	0.81	0.76*	0.00	0.00	0.00
49.60	0.61	0.81	0.76*	0.00	0.00	0.00
49.65	0.61	0.81	0.76*	0.00	0.00	0.00
49.70	0.61	0.81	0.76*	0.00	0.00	0.00
49.75	0.61	0.81	0.76*	0.00	0.00	0.00

49.80	0.61	0.81	0.76*	0.00	0.00	0.00
49.85	0.61	0.81	0.76*	0.00	0.00	0.00
49.90	0.61	0.81	0.76*	0.00	0.00	0.00
49.95	0.61	0.81	0.76*	0.00	0.00	0.00
50.00	0.61	0.81	0.76*	0.00	0.00	0.00
50.05	0.61	0.81	0.76*	0.00	0.00	0.00
50.10	0.61	0.81	0.76*	0.00	0.00	0.00
50.15	0.61	0.81	0.76*	0.00	0.00	0.00
50.20	0.61	0.81	0.76*	0.00	0.00	0.00
50.25	0.61	0.81	0.76*	0.00	0.00	0.00
50.30	0.61	0.81	0.76*	0.00	0.00	0.00
50.35	0.61	0.81	0.76*	0.00	0.00	0.00
50.40	0.61	0.81	0.76*	0.00	0.00	0.00
50.45	0.61	0.80	0.76*	0.00	0.00	0.00
50.50	0.61	0.80	0.76*	0.00	0.00	0.00
50.55	0.61	0.80	0.76*	0.00	0.00	0.00
50.60	0.61	0.80	0.76*	0.00	0.00	0.00
50.65	0.61	0.80	0.76*	0.00	0.00	0.00
50.70	0.61	0.80	0.76*	0.00	0.00	0.00
50.75	0.61	0.80	0.76*	0.00	0.00	0.00
50.80	0.61	0.80	0.76*	0.00	0.00	0.00
50.85	0.61	0.80	0.76*	0.00	0.00	0.00
50.90	0.61	0.80	0.76*	0.00	0.00	0.00
50.95	0.61	0.80	0.76*	0.00	0.00	0.00
51.00	0.61	0.80	0.76*	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

Previous Geotechnical Investigation Report Prepared by Sladden Engineering, 2004

GEOTECHNICAL INVESTIGATION
PROPOSED INDUSTRIAL DEVELOPMENT
7316 EAST GAGE AVENUE
CITY OF COMMERCE, CALIFORNIA

Sladden Engineering

6782 Stanton Ave., Suite A, Buena Park, CA 90621 (714) 523-0952 Fax (714) 523-1369
114 S. California Street, Beaumont, Ca 92223 (909) 845-7743 Fax (909) 845-8863
39-725 Garand Ln., Suite G, Palm Desert, CA 92211 (760) 772-3893 Fax (760) 772-3895

October 18, 2004

Project No. 444-4194
04-10-247

Dynamic Builders
2114 South Hill Street
Los Angeles, California 90007

Attention: Mr. David Jones

Project: Proposed Industrial Development
7316 East Gage Avenue
City of Commerce, California

Subject: Geotechnical Investigation

Presented herewith is the report of our Geotechnical Investigation conducted at the site of the proposed industrial development located at 7316 East Gage Avenue in the City of Commerce, California. The investigation was performed in order to provide recommendations for site preparation and to assist in building foundation design.

This report presents the results of our field investigation and laboratory testing along with conclusions and recommendations for foundation design and site preparation. This report completes our agreed upon scope of services as understood in our proposal dated August 25, 2004.

We appreciate the opportunity to provide service to you on this project. If you have any questions regarding this report, our the recommendations provided herein, please contact the undersigned

Respectfully submitted,
SLADDEN ENGINEERING

Brett L. Anderson
Principal Engineer

SER/lb

Copies: 6/Dynamic Builders, Inc.

GEOTECHNICAL INVESTIGATION
PROPOSED INDUSTRIAL DEVELOPMENT
7316 EAST GAGE AVENUE
CITY OF COMMERCE, CALIFORNIA

October 18, 2004

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INTRODUCTION

This report presents the results of our Geotechnical Investigation performed in order to provide recommendations for remedial site grading and to assist in the design and construction of the foundations for the proposed industrial buildings and the associated site improvements. The project site is located at 7316 East Gage Avenue in the City of Los Angeles, California. The proposed project consists of one or more industrial buildings along with various related site improvements. The associated site improvements will include paved parking areas and driveways, various underground utilities, and landscape areas.

SCOPE OF WORK

The purpose of our investigation was to determine certain engineering characteristics of the near surface soils on the site in order to develop recommendations for foundation design and site preparation. Our investigation included field exploration, laboratory testing, engineering analysis and the preparation of this report. Evaluation of environmental issues or hazardous wastes was not within the scope of services provided. Our investigation was performed in accordance with contemporary geotechnical engineering principles and practice. We make no other warranty, either express or implied.

PROJECT DESCRIPTION

The project site is located at 7316 East Gage Avenue in the City of Commerce, California. The preliminary plans indicate that the proposed development will include one or more industrial buildings along with various associated site improvements. It is our assumption that the proposed buildings will be of relatively lightweight concrete tilt-up, steel-frame or reinforced masonry construction and will be supported by conventional shallow spread footings and concrete slabs on grade. The associated site improvements will include paved parking areas and driveways along with various underground utilities.

At the time of our investigation, the project site was vacant and the ground surface was either paved or covered with base material. The site is identified as the former Gage landfill in several previous reports provided for our review. A review of previous geotechnical reports confirms the existence of extensive buried debris and artificial fills consistent with the previous landfill use.

The current surface of the site is relatively level overall and the property is near the elevation of the adjacent properties and streets. The Santa Ana Freeway corridor forms the eastern edge of the property. There is an existing ballfield directly west of the site and a hotel just north of the subject site

It is our assumption that the proposed industrial buildings will be of relatively lightweight steel-frame, concrete tilt-up or reinforced masonry construction and will be supported by conventional shallow spread footings and concrete slabs on grade. Based upon our previous experience with similar structures, we assume that the column loads will be less than 80 kips and wall loading will be less than 5.0 kips per linear foot. If the actual design loads exceed these assumed loads, the recommendations included in this report should be reviewed with respect to the increased loading and the adequacy should be verified.

SOIL CONDITIONS

The site is underlain primarily by extensive amounts of buried debris and artificial fill material overlying native silty sands, sandy silts and fine to coarse-grained alluvial sands with gravel. Artificial fill depths of up to 30 feet below existing grade were encountered within the areas of our exploratory borings dependent upon location. The artificial fill soils were comprised primarily of various types of debris consistent with the previous landfill use. The artificial fill soils and debris appeared very loose and highly compressible within each of our borings. The underlying native soils also appeared somewhat loose within the upper 5 to 10 feet within several of our borings but appeared firm below a depth of 10 feet.

The deeper native soils consisted primarily of sandy silts, silty sands and fine to coarse grained alluvial sands with gravel. In general, the deeper native soils appear quite firm and sampler penetration resistance (as measured by field blowcounts) suggests that density within the native soils generally increases with depth. The near surface artificial fill soils and the underlying native soils were found to be moist throughout the depth of our exploratory borings. Laboratory testing indicated moisture content varying from 2 to 30 percent.

Laboratory classification testing indicates that the near surface artificial fills and native soils consist primarily of silty sands and sandy silts. Expansion testing indicates that the near surface soils are moderately expansive and fall within the "low" expansion category in accordance with the Uniform Building Code (UBC) classification system. Consolidation testing indicates that the deeper native soils are susceptible to only minor consolidation or compression related settlements as a result of the increased loading associated with engineered fills as well as the new building foundations.

Groundwater was not encountered within our exploratory borings that extended to a maximum depth of approximately 80 feet below the existing ground surface. Groundwater should not be a factor in foundation design or construction.

CONCLUSIONS AND RECOMMENDATIONS

Based upon our field and laboratory investigation, it is our opinion that the proposed industrial development is feasible from a soil mechanic's standpoint provided that the recommendations included in this report are considered in building foundation design and site preparation. Due to the presence of extensive amounts of artificial fill soils and debris throughout the site, extensive remedial grading is recommended for the proposed building areas. We recommend that remedial grading within the proposed building areas include complete removal and recompaction of the artificial fill soils, debris and any loose native soils encountered in order to provide uniform compacted soils beneath the building foundations. Specific recommendations for site preparation are presented in the Site Grading section of this report.

Groundwater was not encountered within our borings that extended to a maximum depth of 51 feet below the existing ground surface. Due to the depth to groundwater, specific liquefaction analyses were not performed. Based upon the depth to groundwater, the potential for liquefaction and the related surficial affects of liquefaction impacting the site are considered negligible.

The site is located within a seismically active area of Southern California and strong ground shaking resulting from seismic events on prominent faults in the region will likely impact the site during the expected lifetime of the project. As a minimum, the building addition should be designed in accordance with Uniform Building Code criteria for Seismic Zone 4. Pertinent seismic design criteria as described in the 1997 UBC are summarized in Appendix C.

Caving did occur within each of our borings and the site soils may be susceptible to caving within deeper excavations. All excavations should be constructed in accordance with the normal CalOSHA excavation criteria.

The surface soils encountered during our investigation were found to be moderately expansive. Laboratory testing indicated Expansion Indices of 21 and 32 for the near surface soils which correspond with the "low" expansion category in accordance with 1997 UBC Table 18-I-B.

The following recommendations present more detailed design criteria that have been developed on the basis of our field investigation and laboratory testing.

Foundation Design: The results of our investigation indicate that either conventional shallow continuous footings or isolated pad footings, that are supported upon properly compacted fill soils, may be expected to provide satisfactory support for the proposed new structure foundations. Proper demolition along with complete artificial fill removal and recompaction should be performed as recommended in the Site Preparation section of this report.

Exterior footings should extend at least 18 inches beneath lowest adjacent grade and interior footings should extend at least 12 inches below slab subgrade. Isolated square or rectangular footings at least 2 feet square and continuous footings at least 12 inches wide may be designed using an allowable bearing pressure of 2000 pounds per square foot. The allowable bearing pressure may be increased by approximately 250 psf for each additional 1 foot of width and 250 psf for each additional 6 inches of depth. The maximum allowable bearing pressure should be limited to 3000 psf unless confirmed by Sladden Engineering subsequent to performing specific settlement calculations. The allowable bearing pressures are for dead and frequently applied live loads and may be increased by 1/3 to resist wind, seismic or other transient loading.

The recommendations made in the preceding paragraph are based on the assumption that all footings will be supported upon properly compacted fill soils. All demolition and foundation area preparation should be performed under the testing and inspection of the Soils Engineer or his representative. Prior to the placement of concrete, we recommend that the footing excavations be inspected in order to verify that they extend into compacted soil and are free of loose and disturbed materials.

Because the site soils may be susceptible to settlement due to the introduction of excessive amounts of water, care should be taken to see that bearing soils are not allowed to become saturated from the introduction of storm water runoff or irrigation. Drainage from the building areas should be rapid and complete.

Settlements: Settlements may result from the anticipated foundation loads. These estimated ultimate settlements are calculated to be a maximum of 1 inch when using the recommended bearing values. As a practical matter, differential settlements between footings can be assumed as one-half of the total settlement.

Lateral Design: Resistance to lateral loads can be provided by a combination of friction acting at the base of the slabs or foundations and passive earth pressure along the sides of the foundations. A coefficient of friction of 0.40 between soil and concrete may be used for dead load forces only. A passive earth pressure of 275 pounds per square foot, per foot of depth, may be used for the sides of footings that are poured against properly compacted native soils. Passive earth pressure should be ignored within the upper 1 foot except where confined (such as beneath a floor slab or pavement).

Retaining Walls: Cantilever retaining walls may be designed utilizing "active" soil pressures. The "active" pressures may be estimated utilizing an equivalent fluid weight of 35 pounds per cubic foot (pcf) for drained level native backfill soils. For restrained walls "at rest" pressures should be utilized in design. The equivalent fluid weight should be increased to 55 pcf for restrained walls with level free-draining native backfill soils. The lateral pressures provided above should be applicable for use in temporary shoring system design.

Expansive Soils: Due to the prominence of "low" expansion category soils near the surface, expansive soil design criteria should not be a factor in the design of foundations and concrete slabs-on-grade. Final slab design should be based upon post grading expansion test results in accordance with design criteria outlined within applicable portions of the Uniform Building Code and should be determined by the Structural Engineer.

Concrete Slabs-on-Grade: All surfaces to receive concrete slabs-on-grade should be underlain by compacted fill soils as described in the Site Preparation section of this report. Where slabs are to receive moisture sensitive floor coverings or where dampness of the floor slab is not desired, we recommend the use of an appropriate vapor barrier or an adequate capillary break. Vapor barriers should be protected by sand in order to reduce the possibility of puncture and to aid in obtaining uniform concrete curing. If preferred, a capillary break consisting of a minimum 4 inch thick layer of crushed rock may be utilized.

Reinforcement of slabs-on-grade in order to resist expansive soil pressures may be necessary dependent upon post grading expansion test results and the quality of the possible import soils. Reinforcement will also have a beneficial affect in containing cracking due to concrete shrinkage. Temperature and shrinkage related cracking should be anticipated in all concrete slabs-on-grade. Floor slab reinforcement and the spacing of control joints, should be determined by the Structural Engineer.

Soluble Sulfates: The soluble sulfate concentrations of the surface soils were determined to be 82, 897, and 66 parts per million (ppm). The sulfate content determined suggests that the site soils are generally considered non-corrosive with respect to concrete. The use of Type 5 cement and/or special sulfate resistant concrete mix designs should not be necessary.

Tentative Pavement Design: Although R-Value of the surface soils was not specifically determined, based upon the generally sandy nature of the surface soils encountered throughout the site, we expect that the R-Value will be in excess of 50. The following preliminary pavement sections are based upon a design R-Value of 50.

Parking areas and areas limited to auto and light truck traffic (Traffic Index = 5.0)
Use 3.0 inches of asphalt on 4.0 inches of Class 2 base material

Drive lanes and areas of intermittent truck traffic (Traffic Index = 6.5)
Use 4.0 inches of asphalt on 6.0 inches of Class 2 base material

The recommended pavement sections should be provided with a uniformly compacted subgrade and precise control of thickness and elevations during placement. Drainage from paved areas should be rapid and complete.

If concrete pavement is preferred, a standard section of 6 inches of Portland Cement Concrete (PCC) on 4 inches of aggregate base material should be adequate for most traffic conditions. The section should be increased to 8 inches of PCC on aggregate base material in areas where regular heavy truck traffic is expected.

Pavement and slab designs should be confirmed at the completion of site grading when the subgrade soils are in-place. This should include sampling and R-Value testing of the actual subgrade soils and an analysis based upon the anticipated traffic loading.

Shrinkage and Subsidence: Volumetric shrinkage of the material that is excavated and replaced as controlled compacted fill should be anticipated. We estimate that this shrinkage may vary from 10 to 15 percent within the near surface native soils. Subsidence of the surfaces that are scarified and compacted is expected to vary from one-tenth to two tenths of a foot. This will vary depending upon the type of equipment used, the moisture content of the soil at the time of grading and the actual degree of compaction attained. These values for shrinkage and subsidence are exclusive of losses that will occur due to the removal of unsuitable materials and other subsurface obstructions.

General Site Preparation: All grading should be performed in accordance with the grading ordinance of the City of Los Angeles, California. The following recommendations have been developed on the basis of our field and laboratory testing:

1. **Clearing and Demolition:** Proper demolition of any existing structure components, slabs, footings, pavements and underground utilities will be very important. Soils that are disturbed due to the removal of the previous improvements or structure foundations should be removed and replaced as controlled compacted fill under the direction of the Soils Engineer. Debris an dother unsuitable material should be removed from the site.

2. **Preparation of Building and Foundation Areas:** All artificial fill soils and debris should be removed from the site. Removals should extend to competent native soils or a minimum depth of 3 feet below the bottom of the footings, whichever is deeper. The exposed surface should be scarified, moisture conditioned and recompacted to at least 90 percent relative compaction. Once unsuitable materials are removed, the excavated soils may be replaced as controlled compacted fill. Removals should be observed and compaction should be verified by testing.

   Removals should extend to the property lines, shoring may be required to accomplish the recommended artificial fill and debris removal in areas where fill depths exceed 10 feet.

3. **Preparation of Exterior Slab and Pavement Areas:** Disturbed native soil or unsuitable fill material should be removed from pavement areas and replaced as compacted fill material. The underlying native soils should be scarified, brought to near optimum moisture content, and compacted to a minimum of 90 percent relative compaction prior to replacing the fill material. As a minimum, slabs and pavements should be supported by a minimum of 12 inches of compacted soil.

4. **Placement of Compacted Fill:** Fill materials consisting of on-site soils or approved imported granular soils, should be spread in thin lifts, and compacted at near optimum moisture content to a minimum of 90 percent relative compaction.

   Imported material should have an Expansion Index not exceeding 20. The contractor shall notify the Soils Engineer at least 48 hours in advance of importing soils in order to provide sufficient time for the evaluation of the proposed import materials. The contractor shall be responsible for delivering material to the site that complies with the project specifications. Approval by the Soils Engineer will be based upon material delivered to the site and not the preliminary evaluation of import sources.

   Our observations of the material encountered during our investigation indicate that compaction will be most readily obtained by means of heavy rubber-wheeled equipment and/or sheepsfoot compactors. At the time of our investigation, the moisture content of the site soils was found to be very inconsistent. A more uniform and near optimum moisture content should be maintained during fill placement and compaction.

5. **Testing and Inspection:** During grading tests and observations should be performed by the Soils Engineer or his representative in order to verify that the grading is being performed in accordance with the project specifications and applicable ordinances. Field density testing shall be performed in accordance with acceptable ASTM methods.

   The minimum acceptable degree of compaction should be 90 percent of the maximum dry density as obtained by the ASTM D1557-91 test method. Where testing indicates insufficient density, additional compactive effort shall be applied until retesting indicates satisfactory compaction.

GENERAL

The findings and recommendations presented in this report are based upon an interpolation of the soil conditions between boring locations and extrapolation of these conditions throughout the proposed building addition area. Should conditions encountered during grading (or demolition) appear different than those indicated in this report, this office should be notified.

This report is considered to be applicable for use by Dynamic Builders, Inc. for the specific site and project described herein. The use of this report by other parties or for other projects is not authorized. The recommendations of this report are contingent upon monitoring of the grading operation by a representative of Sladden Engineering. All recommendations are considered to be tentative pending our review of the grading operations and additional testing, if indicated. If others are employed to perform any soil testing, this office should be notified prior to such testing in order to coordinate any required site visits by our representative and to assure indemnification of Sladden Engineering.

Our investigation was conducted prior to the completion of plans for the project. We recommend that a pre-job conference be held on the site prior to the initiation of site grading. The purpose of this meeting will be to assure a complete understanding of the recommendations presented in this report as they apply to the actual grading performed.

APPENDIX A

Site Plan
Boring Logs

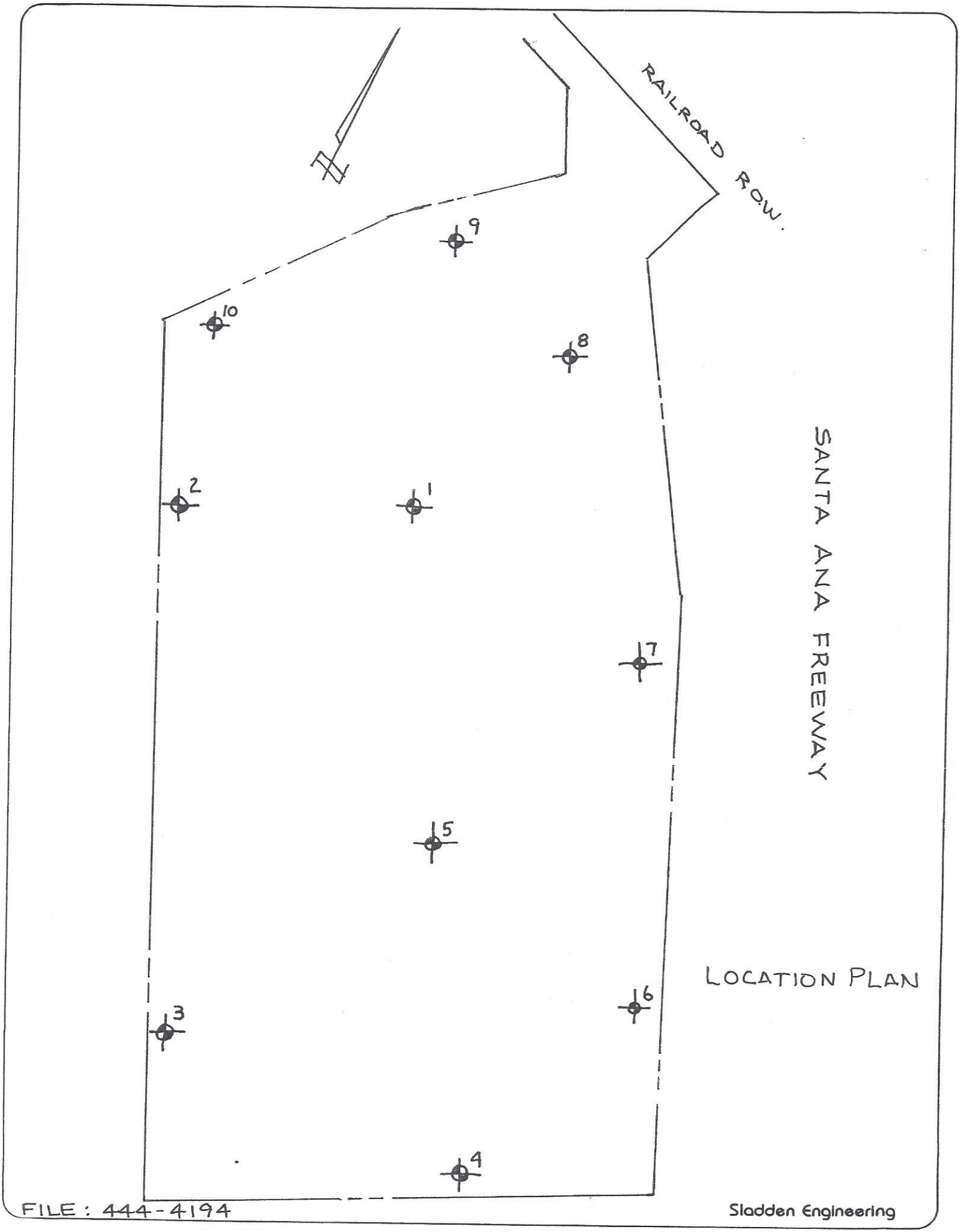
APPENDIX A

FIELD EXPLORATION

For the initial phase of our field investigation 10 exploratory borings were excavated on September 22, 2004 using a truck mounted Mobile B-61 drilling rig and hollow-stem augers. The approximate exploratory boring locations are indicated on the site plan included in this appendix. Boring logs are included in this appendix. Additional borings to further evaluate artificial fill depths are currently underway.

Representative undisturbed samples were obtained within our borings by driving a thin-walled steel penetration sampler (California split spoon sampler) or a Standard Penetration Test (SPT) sampler with a 140-pound hammer dropping approximately 30 inches (ASTM D1586). The number of blows required to drive the samplers 18 inches was recorded in 6-inch increments and blowcounts are indicated on the boring logs.

The California samplers are 3.0 inches in diameter, carrying brass sample rings having inner diameters of 2.5 inches. The standard penetration samplers are 2.0 inches in diameter with an inner diameter of 1.5 inches. Undisturbed samples were removed from the sampler and placed in moisture sealed containers in order to preserve the natural soil moisture content. Bulk samples were obtained from the excavation spoils and samples were then transported to our laboratory for further observations and testing.



LOCATION PLAN

FILE : 444-4194

Sladden Engineering

Dynamic Builders
7316 E. Gage Ave., Commerce

Date: 9/22/2004 **Boring No. 1** **Job Number:** 444-4194

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0			---	Silty Sands & Sandy Silts with Debris: Brown	---	---	---	---	Artificial Fill 29'
25			21/7/15	Sandy Silt with Gravel & Debris: Dark Grey	ML		11		
28			26/30/28	Silty Sand with Traces of Clay & Concrete: Dark Grey	SM		12		
35			8/13/19	Silty Sand: Dark Grey	SM		13		Native Soils
40			14/15/15	Sandy Silt: Grey	ML		22		Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.
45			7/12/20	Sandy Silt: Light Brown	ML		22		Total Depth = 80.5' No Bedrock No Groundwater
50			50-4"	Silty Sand: Light Grey	SM		4		

Dynamic Builders
7316 E. Gage Ave., Commerce

Date: 9/22/2004 **Boring No. 4** **Job Number:** 444-4194

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0			---	Silty Sand with Debris: Brown	SM	---	---	---	Artificial Fill 17'
20			7/12/17	Sandy Silt: Grey	ML	93	30	77	Native Soils
25			11/14/19	Sandy Silt: Grey	ML	96	27	80	
30			18/27/30	Sand: Light Grey	SM	99	2	8	
									Total Depth = 30.5' No Bedrock No Groundwater

Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.

Recovered Sample

Unrecovered Sample

Standard Penetration Sample

Dynamic Builders
7316 E. Gage Ave., Commerce

Date: 9/22/2004 **Boring No. 5** **Job Number:** 444-4194

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0			---	Sandy Silt with Traces of Clay & Debris: Dark Brown	ML	---	---	---	Aspahlt 7" Misc. Base 7" Artificial Fill 18'
10		⊠	11/16/19	Sandy Silt with Debris: Dark Brown	ML	---	---	---	No Sample Recovered
20		■	10/12/15	Sand: Light Grey	SM	92	5	10	Native Soils
25		■	17/20/20	Sand: Light Grey	SM	98	4	11	
30									Total Depth = 25.5' No Bedrock No Groundwater

Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.

■ Recovered Sample

⊠ Unrecovered Sample

◧ Standard Penetration Sample

Dynamic Builders
7316 E. Gage Ave., Commerce

Date: 9/22/2004 **Boring No. 6** **Job Number:** 444-4194

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0			---	Sandy Silt: Reddish Brown	ML	---	---	---	Asphalt 4.5"
									Artificial Fill 17'
			---	Silty Sand with Gravel & Debris: Brown	SM	---	---	---	
5									
10									
15									
20									Native Soils
25			30/50-4"	Sand with Thin Silt Lense: Grey	SM	99	4	9	
30			29/40/48	Sand with Thin Silt Lense: Grey	SM	102	3	10	
									Total Depth = 30.5'
35									No Bedrock
									No Groundwater
40				Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.					
45				Recovered Sample					
				Unrecovered Sample					
50				Standard Penetration Sample					

Dynamic Builders
7316 E. Gage Ave., Commerce

Date: 9/22/2004 **Boring No. 6** **Job Number:** 444-4194

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0			---	Sandy Silt with Traces of Clay: Reddish Brown	ML	---	---	---	Asphalt 2.5"
									Artificial Fill 18'
3		X	---	Silty Sand with Gravel & Debris: Brown	SM	---	---	---	
8		X	3/5/5	Silty Sand with Concrete & Debris: Light Grey	SM	---	---	---	No Sample Recovered
18			14/19/34	Sand: Light Grey	SM	101	7	9	Native Soils
25			13/14/21	Sandy Silt: Grey	ML	100	22	83	
30			10/11/12	Sandy Silt with Silt Stone Lense: Grey	ML	102	3	10	
									Total Depth = 30.5'
									No Bedrock
									No Groundwater

Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.

Recovered Sample

Unrecovered Sample

Standard Penetration Sample

Dynamic Builders
7316 E. Gage Ave., Commerce

Date: 9/22/2004 **Boring No. 8** **Job Number:** 444-4194

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0			---	Silty Sand with Debris: Brown	SM	---	---	---	Aspahlt 3.5" Misc. Base 4" Artificial Fill 10'
11			3/6/6	Sandy Silt: Grey Brown	ML		18		Native Soils
15			10/10/11	Sand: Light Grey	SM	95	3	8	
20			8/12/18	Sand: Light Grey	SM	93	3	9	
25			23/50-5"	Sandy Silt: Grey Brown	ML	107	10	75	
									Total Depth = 25.5' No Bedrock No Groundwater

Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.

Recovered Sample

Unrecovered Sample

Standard Penetration Sample

Dynamic Builders
7316 E. Gage Ave., Commerce

Date: 9/22/2004 **Boring No. 9** **Job Number:** 444-4194

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0			---	Sandy Silt with Traces of Clay: Reddish Brown	ML	---	---	---	Aspahlt 2.5" Misc. Base 5" Artificial Fill 1'
5			31/50-3"	Sandy Silt with Traces of Clay: Reddish Brown	ML	111	14	54	
10			15/25/30	Sand with Gravel: Light Brown	SM	102	3	9	
15			31/50-5"	Sand with Gravel: Light Brown	SM	112	3	8	
20			15/29/45	Sand with Gravel: Light Brown	SM	110	3	9	
25									Total Depth = 20.5' No Bedrock No Groundwater
30									
35									
40				Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.					
45				Recovered Sample					
				Unrecovered Sample					
50				Standard Penetration Sample					

Dynamic Builders
7316 E. Gage Ave., Commerce

Date: 9/22/2004 **Boring No. 10** **Job Number:** 444-4194

Depth, ft	Symbol	Core	Blows/6"	Description	Soil type	Unit Wt, pcf	Moisture, %	% Minus #200	Remarks
0			---	Sandy Silt: Brown	ML	---	---	---	Aspahlt 3"
									Misc. Base 4.5"
3			31/50-5"	Sandy Silt: Brown	ML				Artificial Fill 2'
10			14/15/23	Silty Sand: Brown	SM	110	10	36	
15			12/16/19	Sand: Brown	SM	112	9	14	
									Total Depth = 15.5'
									No Bedrock
									No Groundwater
20									
25									
30									
35									
40									
45									
50									

Note: The stratification lines represent the approximate boundaries between the soil types; the transition may be gradual.

Recovered Sample

Unrecovered Sample

Standard Penetration Sample

Gradation

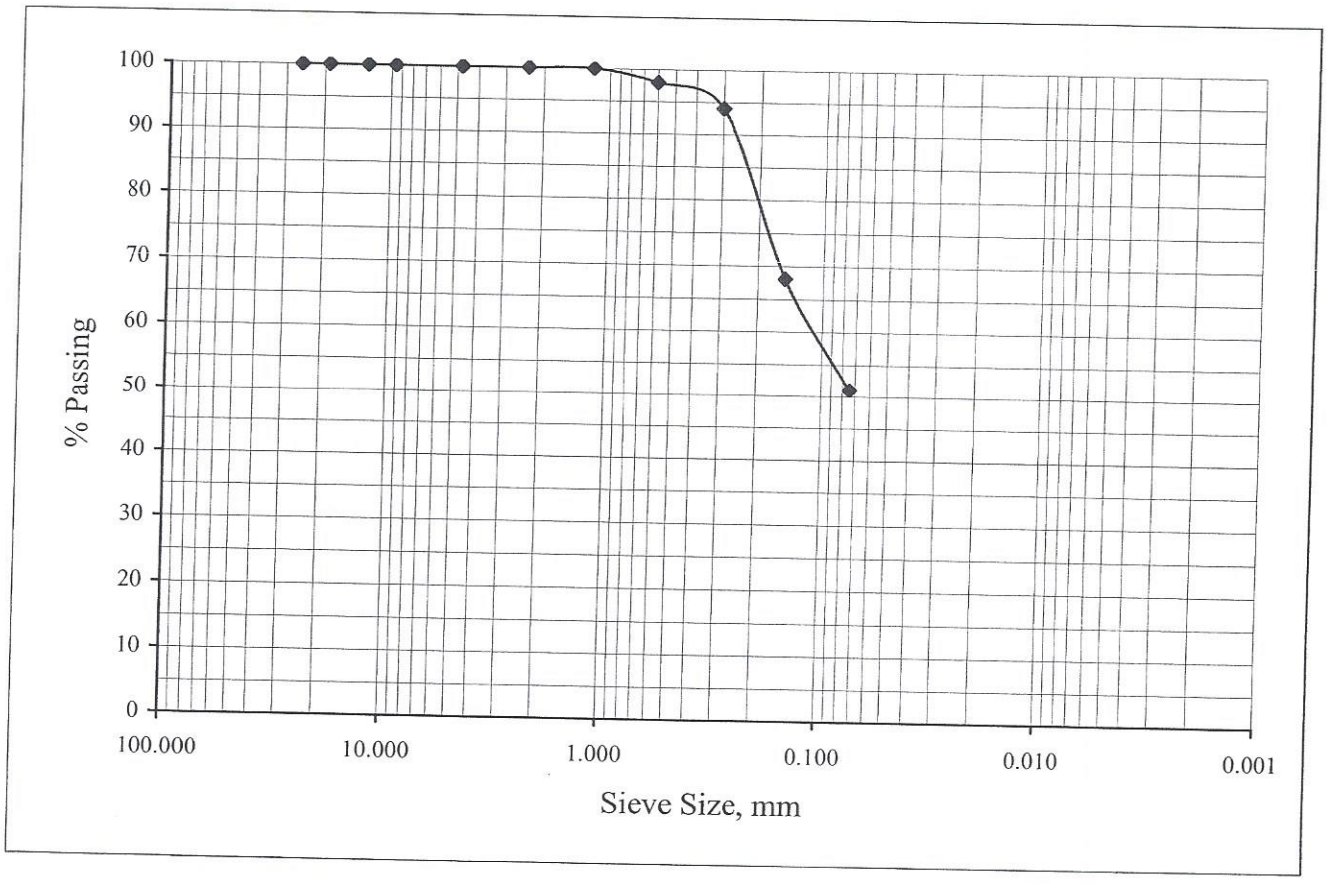
ASTM C117 & C136

Project Number: 444-4194
Project Name: 7316 E. Gage Ave., Commerce

October 11, 2004

Sample ID: Bulk 6 @ 0-5'

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	100.0
#8	2.36	100.0
#16	1.18	100.0
#30	0.60	98.0
#50	0.30	94.0
#100	0.15	68.0
#200	0.074	51.0



Gradation

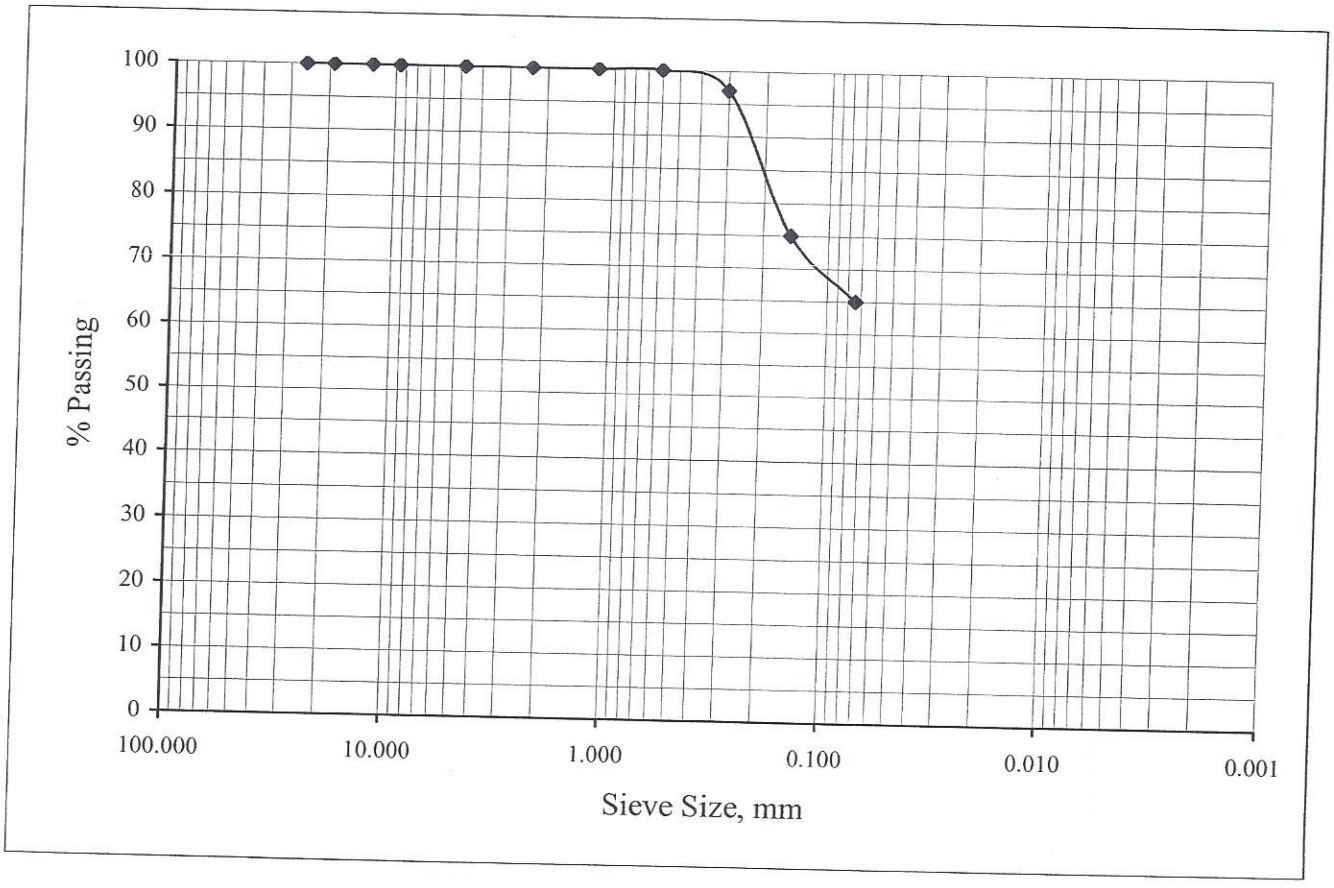
ASTM C117 & C136

Project Number: 444-4194
Project Name: 7316 E. Gage Ave., Commerce

October 11, 2004

Sample ID: Bulk 10 @ 25 - 30'

Sieve Size, in	Sieve Size, mm	Percent Passing
1"	25.4	100.0
3/4"	19.1	100.0
1/2"	12.7	100.0
3/8"	9.53	100.0
#4	4.75	100.0
#8	2.36	100.0
#16	1.18	100.0
#30	0.60	100.0
#50	0.30	97.0
#100	0.15	75.0
#200	0.074	65.0



One Dimensional Consolidation

ASTM D2435 & D5333

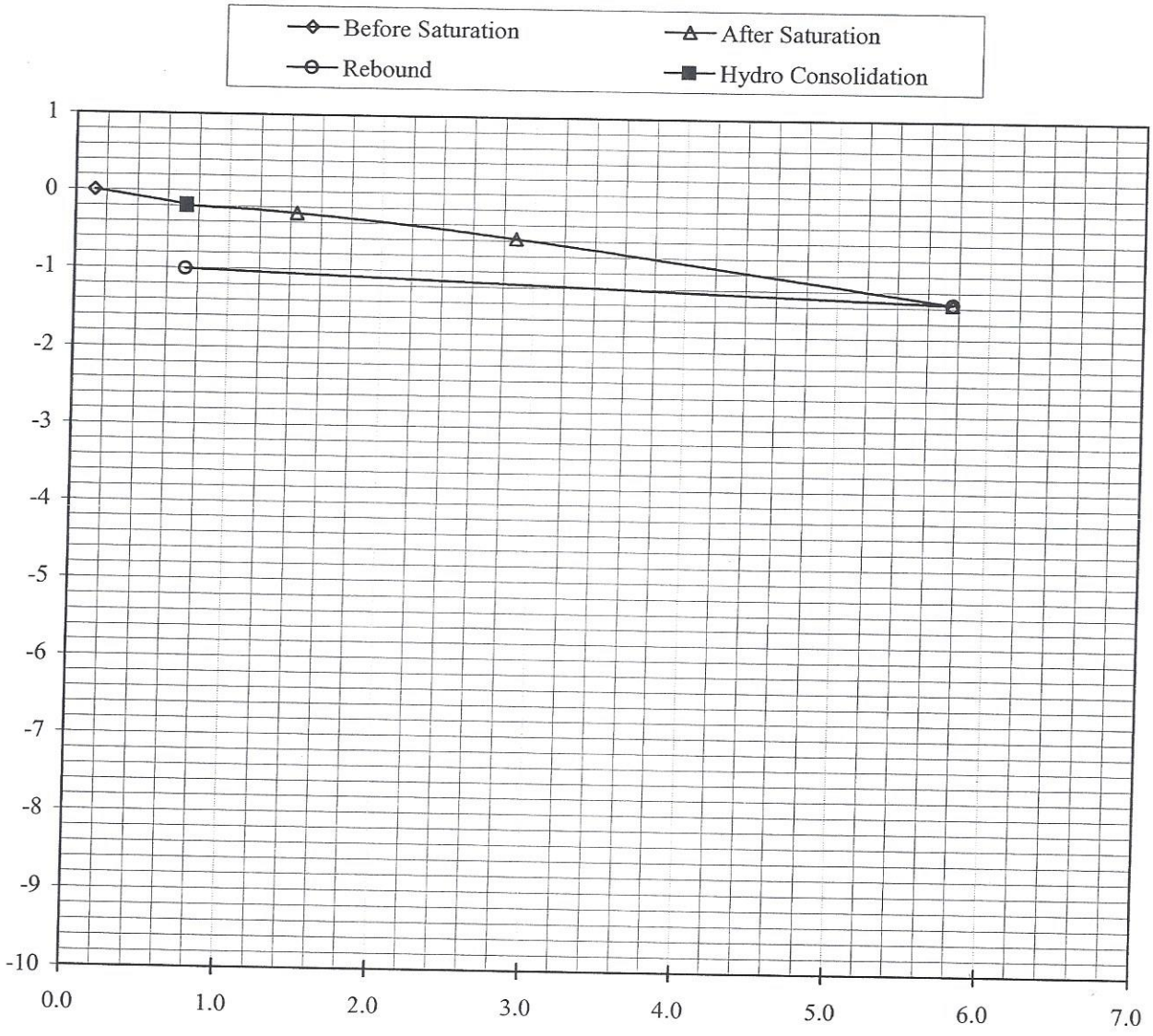
Job Number: 444-4194

October 11, 2004

Job Name: 7316 E. Gage Ave., Commerce
Sample ID: Boring 9 @ 5'
Soil Description: Sandy Silt

Initial Dry Density, pcf:	109.3
Initial Moisture, %:	14
Initial Void Ratio:	0.525
Specific Gravity:	2.67

% Change in Height vs Normal Presssure Diagram



One Dimensional Consolidation

ASTM D2435 & D5333

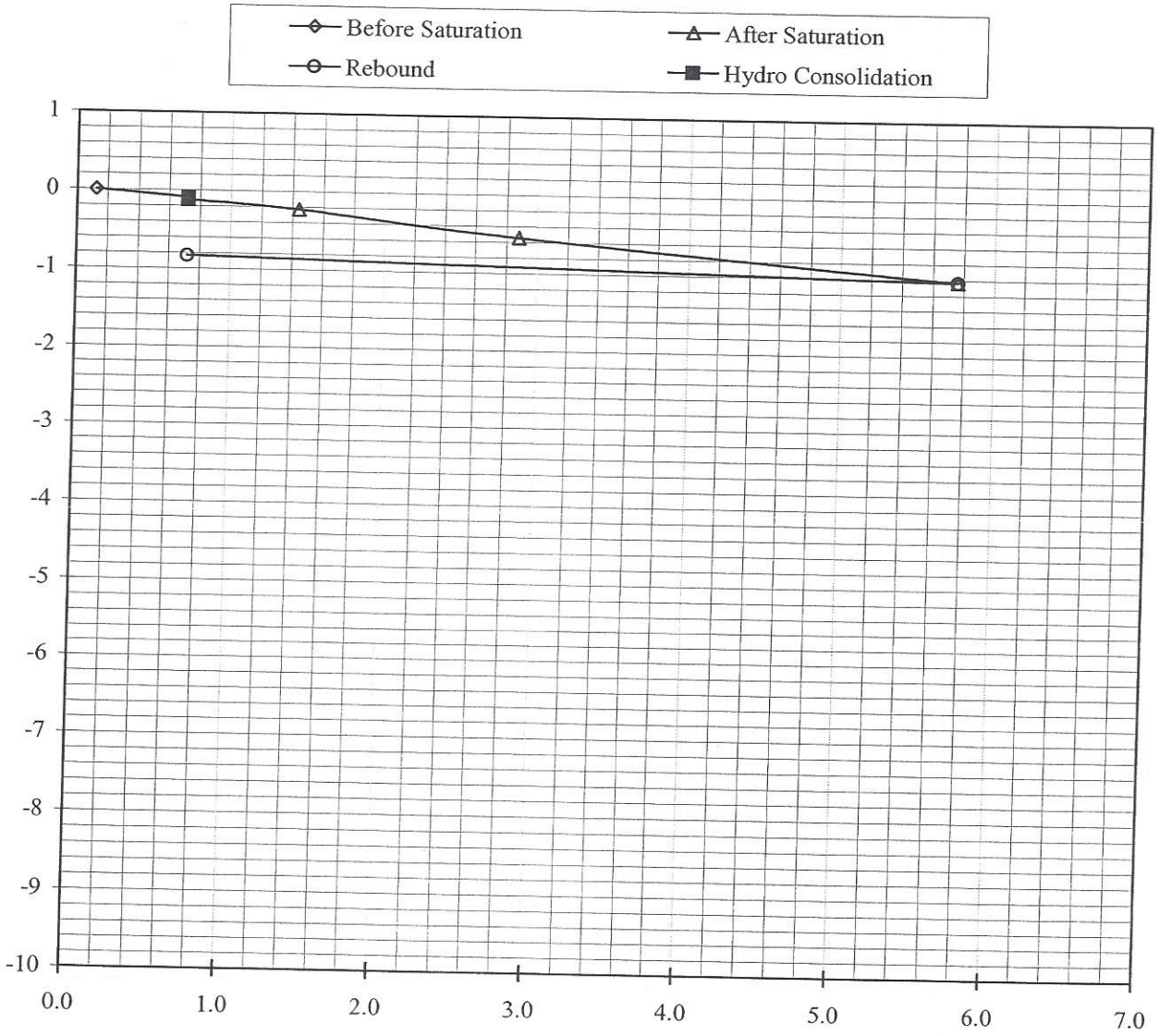
Job Number: 444-4194

October 11, 2004

Job Name: 7316 E. Gage Ave., Commerce
Sample ID: Boring 9 @ 10'
Soil Description: Sand

Initial Dry Density, pcf:	95.7
Initial Moisture, %:	3
Initial Void Ratio:	0.743
Specific Gravity:	2.67

% Change in Height vs Normal Presssure Diagram



One Dimensional Consolidation

ASTM D2435 & D5333

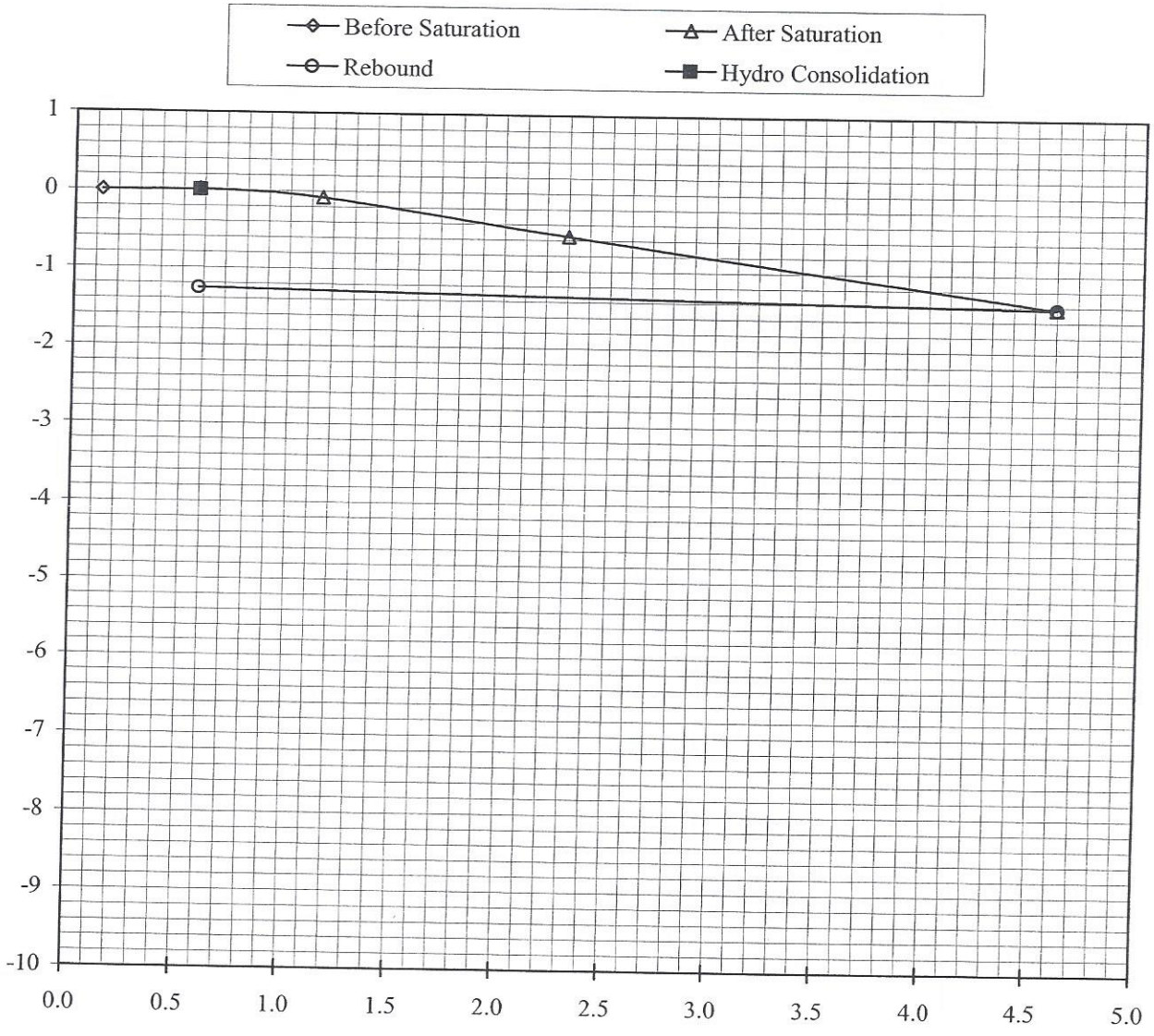
Job Number: 444-4194

October 11, 2004

Job Name: 7316 E. Gage Ave., Commerce
Sample ID: Boring 10 @ 3'
Soil Description: Sandy Silt

Initial Dry Density, pcf:	126.7
Initial Moisture, %:	5
Initial Void Ratio:	0.316
Specific Gravity:	2.67

% Change in Height vs Normal Presssure Diagram



One Dimensional Consolidation

ASTM D2435 & D5333

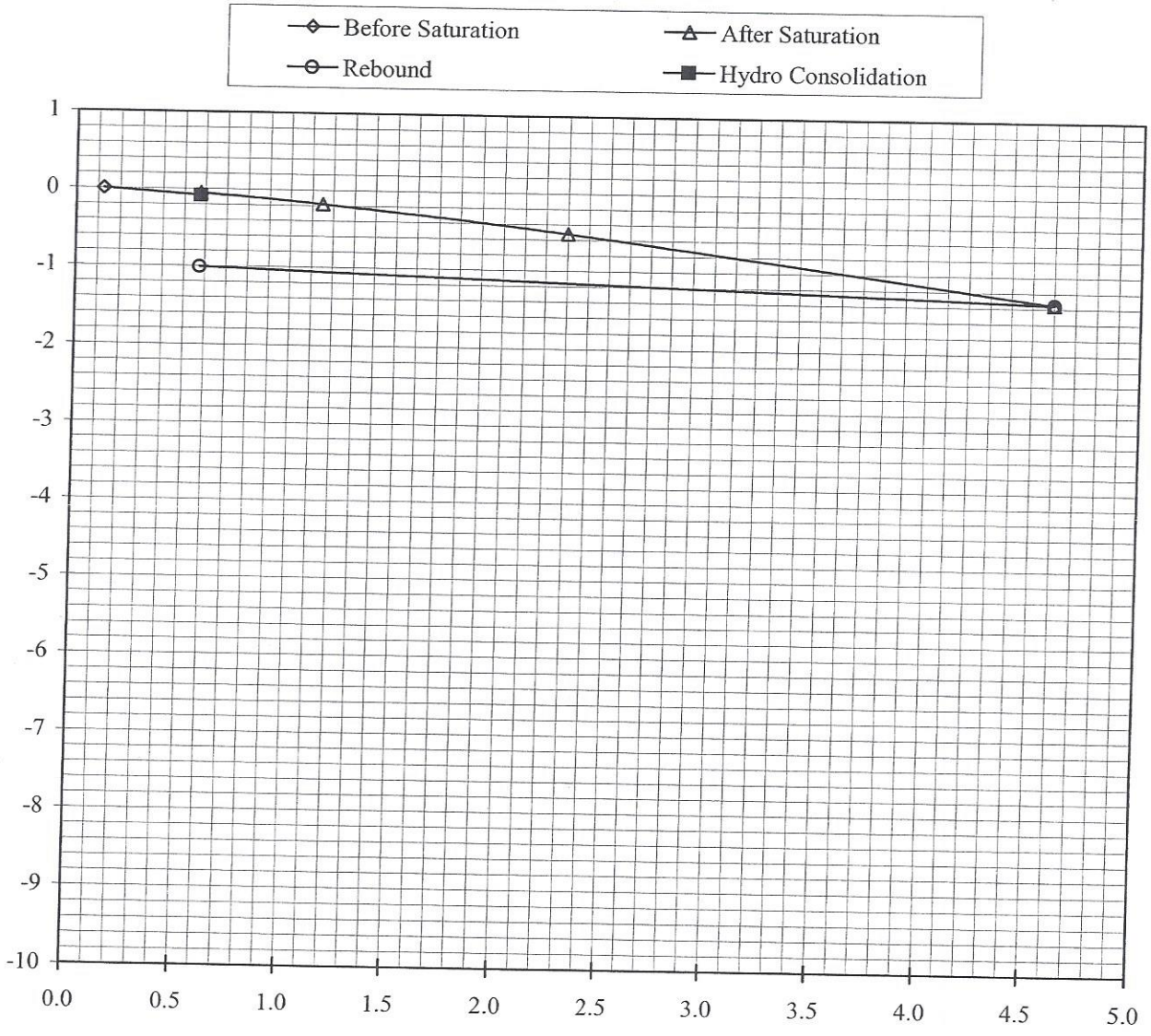
Job Number: 444-4194

October 11, 2004

Job Name: 7316 E. Gage Ave., Commerce
Sample ID: Boring 10 @ 10'
Soil Description: Sandy Silt

Initial Dry Density, pcf:	111.0
Initial Moisture, %:	7
Initial Void Ratio:	0.502
Specific Gravity:	2.67

% Change in Height vs Normal Presssure Diagram



Maximum Density/Optimum Moisture

ASTM D698/D1557

Project Number: 444-4194

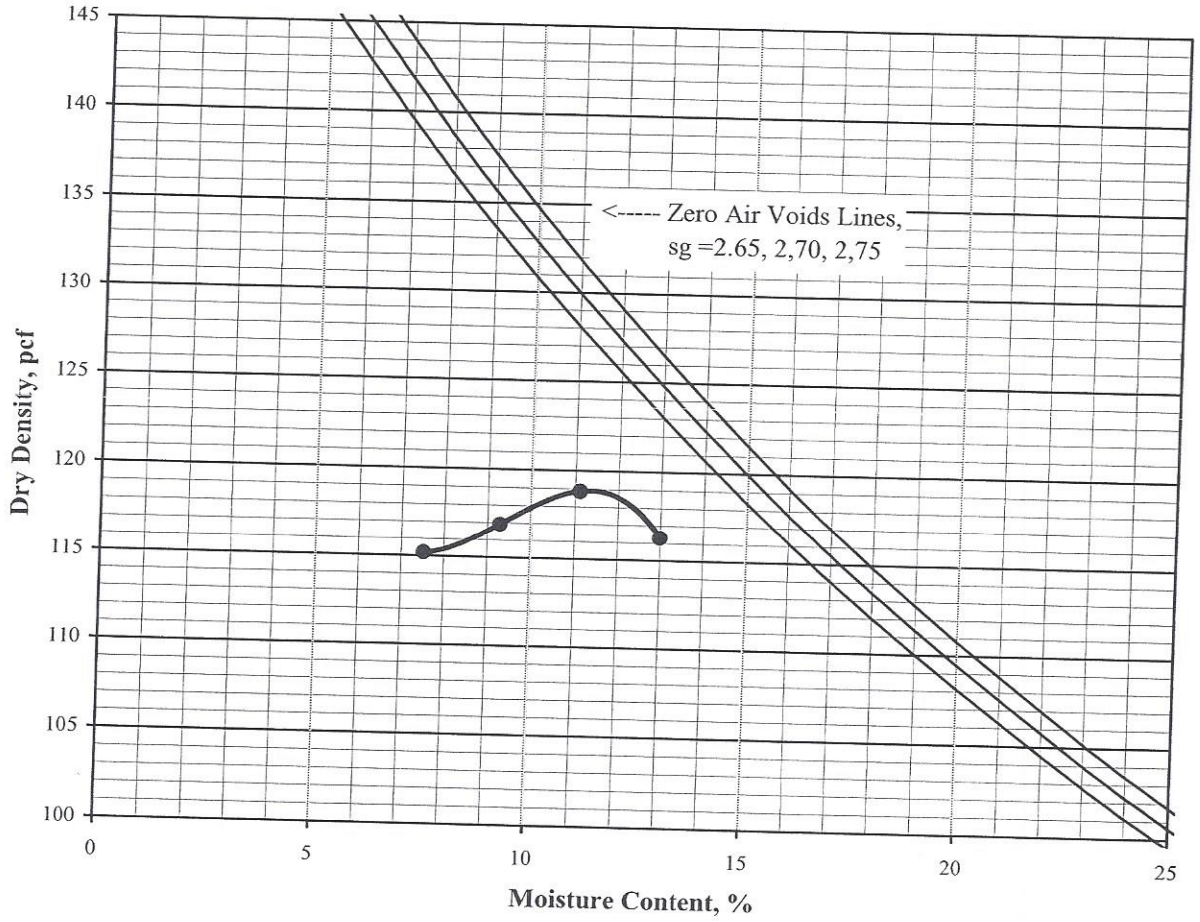
October 11, 2004

Project Name: 7316 E. Gage Ave., Commerce
Lab ID Number:
Sample Location: Bulk 6 @ 0-5'
Description: Sandy Silt

ASTM D-1557 A
Rammer Type: Manual

Maximum Density: 119 pcf
Optimum Moisture: 11%

Sieve Size	% Retained
3/4"	
3/8"	
#4	0.0



Maximum Density/Optimum Moisture

ASTM D698/D1557

Project Number: 444-4194

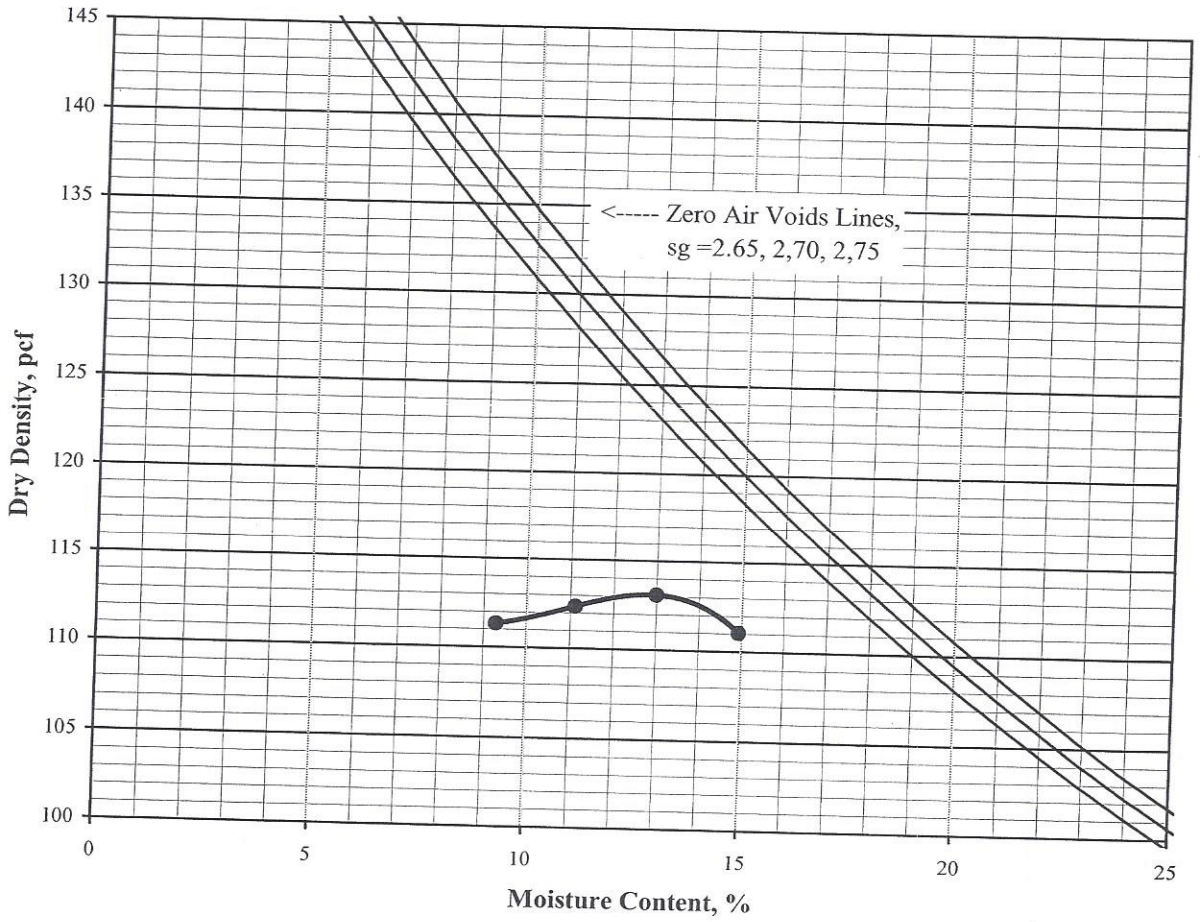
October 11, 2004

Project Name: 7316 E. Gage Ave., Commerce
Lab ID Number:
Sample Location: Bulk 10 @ 25 - 30'
Description: Sandy Silt

ASTM D-1557 A
Rammer Type: Manual

Maximum Density: 113 pcf
Optimum Moisture: 13%

Sieve Size	% Retained
3/4"	
3/8"	
#4	0.0



Expansion Index

ASTM D 4829/UBC 29-2

Job Number: 444-4194 Date: 10/11/2004

Job Name: 7316 E. Gage Ave., Commerce Tech: Jake

Lab ID:

Sample ID: Bulk 6 @ 0-5'

Soil Description: Sandy Silt

Wt of Soil + Ring:	585.0
Weight of Ring:	179.0
Wt of Wet Soil:	406.0
Percent Moisture:	9%

Wet Density, pcf:	123.0
Dry Denstiy, pcf:	112.9

% Saturation:	49.3

Expansion **Rack #**

Date/Time	10/13/2004	9:00 AM
Initial Reading	0.500	
Final Reading	0.521	

Expansion Index **21**

(Final - Initial) x 1000

Expansion Index

ASTM D 4829/UBC 29-2

Job Number: 444-4194 Date: 10/11/2004

Job Name: 7316 E. Gage Ave., Commerce Tech: Jake

Lab ID:

Sample ID: Bulk 10 @ 25 - 30'

Soil Description: Sandy Silt

Wt of Soil + Ring:	565.0
Weight of Ring:	179.0
Wt of Wet Soil:	386.0
Percent Moisture:	11%

Wet Density, pcf:	117.0
Dry Denstiy, pcf:	105.4

% Saturation:	49.6

Expansion

	Rack #	
Date/Time	10/12/2004	10:00 AM
Initial Reading	0.500	
Final Reading	0.532	

Expansion Index **32**

(Final - Initial) x 1000

ANAHEIM TEST LABORATORY

3008 S. ORANGE AVENUE
SANTA ANA, CALIFORNIA 92707
PHONE (714) 549-7267

TO: SLADDEN ENGINEERING:
114 S. CALIFORNIA AVE.
BEAUMONT, CA. 92223

ATTN: BRETT/DAVE

DATE: 10/05/04

P.O. No. Chain of Custody

Shipper No.

Lab. No. A-5856 1-3

Specification:

Material: SOIL

PROJECT: #444-4194

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

	pH	SOLUBLE SULFATES per CA. 417 ppm	SOLUBLE CHLORIDES per CA. 422 ppm	MIN. RESISTIVITY per CA. 643 ohm-cm
#1 BULK 4 @ 25'-30'	7.4	82	104	2,789
#2 BULK 6 @ 0-4'	6.7	897	96	600 max
#3 BULK 10 @ 0-5'	7.0	66	37	2,759

RESPECTFULLY SUBMITTED

POPPY BRIDGER Chief Chemist

FORM #2

1997 UNIFORM BUILDING CODE SEISMIC DESIGN INFORMATION

The International Conference of Building Officials (ICBO) 1997 Uniform Building Code contains substantial revisions and additions to the earthquake engineering section in Chapter 16. New concepts contained in the updated code that will likely be relevant to construction of the proposed structures are summarized below.

Ground shaking is expected to be the primary hazard most likely to affect the site, based upon proximity to significant faults capable of generating large earthquakes. Major fault zones considered to be most likely to create strong ground shaking at the site are listed below.

Fault Zone	Approximate Distance From Site	Fault Type (1997 UBC)
Newport/Inglewood	11 km	B
Hollywood/Raymond	9 km	B

Based on our field observations and understanding of local geologic conditions, the soil profile type judged applicable to this site is S_D, generally described as stiff or dense soil. The site is located within UBC Seismic Zone 4. The following table presents additional coefficients and factors relevant to seismic mitigation for new construction upon adoption of the 1997 code.

Seismic Source	Near-Source Acceleration Factor, N_a	Near-Source Velocity Factor, N_v	Seismic Coefficient C_a	Seismic Coefficient C_v
Newport/Inglewood	1.0	1.0	$0.44N_a$	$0.64N_v$
Hollywood/Raymond	1.0	1.0	$0.44N_a$	$0.64N_v$

```
**********************
*                    *
*    E Q F A U L T   *
*                    *
*    Version 3.00    *
*                    *
**********************
```

DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: 444-4194

DATE: 10-19-2004

JOB NAME: 7316 East Gage Avenue
City of Commerce, California

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: CDMGFLTE.DAT

SITE COORDINATES:
SITE LATITUDE: 33.9750
SITE LONGITUDE: 118.1265

SEARCH RADIUS: 100 mi

ATTENUATION RELATION: 5) Boore et al. (1997) Horiz. - SOIL (310)
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: cd_2drp
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: Campbell SHR:
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: CDMGFLTE.DAT

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

Page 1

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG. (Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
ELYSIAN PARK THRUST	0.0(0.0)	6.7	0.591	X
COMPTON THRUST	5.4(8.7)	6.8	0.385	X
WHITTIER	6.3(10.1)	6.8	0.291	IX
NEWPORT-INGLEWOOD (L.A.Basin)	9.3(15.0)	6.9	0.238	IX
RAYMOND	10.6(17.1)	6.5	0.214	VIII
VERDUGO	10.9(17.6)	6.7	0.233	IX
HOLLYWOOD	11.6(18.7)	6.4	0.190	VIII
SIERRA MADRE	14.3(23.0)	7.0	0.225	IX
SAN JOSE	14.5(23.3)	6.5	0.171	VIII
CLAMSHELL-SAWPIT	15.8(25.4)	6.5	0.160	VIII
PALOS VERDES	16.9(27.2)	7.1	0.172	VIII
SANTA MONICA	17.8(28.6)	6.6	0.155	VIII
CHINO-CENTRAL AVE. (Elsinore)	18.3(29.4)	6.7	0.160	VIII
SIERRA MADRE (San Fernando)	23.1(37.1)	6.7	0.134	VIII
MALIBU COAST	23.6(38.0)	6.7	0.132	VIII
NORTHRIDGE (E. Oak Ridge)	24.0(38.6)	6.9	0.144	VIII
CUCAMONGA	25.0(40.3)	7.0	0.147	VIII
SAN GABRIEL	25.3(40.7)	7.0	0.120	VII
NEWPORT-INGLEWOOD (Offshore)	29.2(47.0)	6.9	0.102	VII
ELSINORE-GLEN IVY	29.3(47.1)	6.8	0.097	VII
SANTA SUSANA	32.1(51.6)	6.6	0.099	VII
ANACAPA-DUME	32.6(52.4)	7.3	0.141	VIII
SAN ANDREAS - 1857 Rupture	36.2(58.2)	7.8	0.139	VIII
SAN ANDREAS - Mojave	36.2(58.2)	7.1	0.096	VII
HOLSER	37.3(60.0)	6.5	0.083	VII
SAN JACINTO-SAN BERNARDINO	40.1(64.5)	6.7	0.072	VI
SAN ANDREAS - San Bernardino	41.3(66.4)	7.3	0.097	VII
SAN ANDREAS - Southern	41.3(66.4)	7.4	0.102	VII
OAK RIDGE (Onshore)	42.9(69.1)	6.9	0.092	VII
SIMI-SANTA ROSA	44.2(71.2)	6.7	0.081	VII
CLEGHORN	44.5(71.6)	6.5	0.060	VI
SAN CAYETANO	48.4(77.9)	6.8	0.080	VII
CORONADO BANK	50.1(80.7)	7.4	0.088	VII
ELSINORE-TEMECULA	50.1(80.7)	6.8	0.064	VI
SAN JACINTO-SAN JACINTO VALLEY	51.1(82.2)	6.9	0.066	VI
NORTH FRONTAL FAULT ZONE (West)	53.6(86.3)	7.0	0.082	VII
SAN ANDREAS - Carrizo	54.7(88.0)	7.2	0.074	VII
SANTA YNEZ (East)	60.2(96.9)	7.0	0.062	VI
OAK RIDGE(Blind Thrust Offshore)	62.9(101.2)	6.9	0.069	VI
VENTURA - PITAS POINT	63.5(102.2)	6.8	0.065	VI

DETERMINISTIC SITE PARAMETERS

Page 2

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG. (Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
CHANNEL IS. THRUST (Eastern)	65.3(105.1)	7.4	0.087	VII
MONTALVO-OAK RIDGE TREND	68.6(110.4)	6.6	0.055	VI
M.RIDGE-ARROYO PARIDA-SANTA ANA	68.7(110.5)	6.7	0.058	VI
ROSE CANYON	70.9(114.1)	6.9	0.051	VI
SAN JACINTO-ANZA	71.2(114.6)	7.2	0.060	VI
HELENDALE - S. LOCKHARDT	72.0(115.9)	7.1	0.057	VI
RED MOUNTAIN	72.4(116.5)	6.8	0.058	VI
GARLOCK (West)	72.8(117.1)	7.1	0.056	VI
PLEITO THRUST	73.7(118.6)	7.2	0.071	VI
ELSINORE-JULIAN	76.0(122.3)	7.1	0.054	VI
BIG PINE	77.2(124.3)	6.7	0.043	VI
NORTH FRONTAL FAULT ZONE (East)	77.4(124.5)	6.7	0.053	VI
SANTA CRUZ ISLAND	79.6(128.1)	6.8	0.054	VI
PINTO MOUNTAIN	80.7(129.8)	7.0	0.049	VI
LENWOOD-LOCKHART-OLD WOMAN SPRGS	83.8(134.8)	7.3	0.056	VI
WHITE WOLF	85.4(137.5)	7.2	0.063	VI
GARLOCK (East)	90.7(146.0)	7.3	0.052	VI
JOHNSON VALLEY (Northern)	91.2(146.7)	6.7	0.038	V
GRAVEL HILLS - HARPER LAKE	91.9(147.9)	6.9	0.042	VI
LANDERS	92.4(148.7)	7.3	0.052	VI
NORTH CHANNEL SLOPE	92.8(149.3)	7.1	0.056	VI
SANTA YNEZ (West)	93.3(150.2)	6.9	0.042	VI
SAN ANDREAS - Coachella	95.0(152.9)	7.1	0.046	VI
BLACKWATER	96.4(155.2)	6.9	0.041	V
CALICO - HIDALGO	98.6(158.7)	7.1	0.044	VI
EMERSON So. - COPPER MTN.	98.9(159.1)	6.9	0.040	V
BURNT MTN.	98.9(159.2)	6.4	0.031	V
SAN JACINTO-COYOTE CREEK	99.4(160.0)	6.8	0.038	V
EUREKA PEAK	99.8 (160.6)	6.4	0.030	V

-END OF SEARCH- 69 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE ELYSIAN PARK THRUST FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 0.0 MILES (0.0 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.5910 g

Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

Vertebrate Paleontology Section
Telephone: (213) 763-3325

e-mail: smcleod@nhm.org

10 December 2019

Dudek
605 Third Street
Encinitas, CA 92024

Attn: Sarah Siren, Senior Paleontologist

re: Vertebrate Paleontology Records Check for paleontological resources for the proposed Commerce Modelo Project, Dudek Project # 12058, in the City of Commerce, Los Angeles County, project area

Dear Sarah:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for the proposed Commerce Modelo Project, Dudek Project # 12058, in the City of Commerce, Los Angeles County, project area as outlined on the portions of the South Gate and Whittier USGS topographic quadrangle maps that you sent to me via e-mail on 6 December 2019. We do not have any vertebrate fossil localities that lie directly within the proposed project area boundaries, but we do have localities nearby from the same sedimentary deposits that occur in the proposed project area, either at the surface or at depth.

Most of the proposed project area, the southern and southeastern portion, has surficial deposits of younger Quaternary Alluvium, derived as fluvial deposits from the flood plain of the Rio Hondo that currently flows in a channel adjacent to the southeastern border of the proposed project area, and possibly from the Los Angeles River that currently flows to the west. These younger Quaternary deposits usually do not contain significant fossil vertebrates, at least in the uppermost layers, but the underlying older Quaternary deposits found at varying depths may well contain significant vertebrate fossils. The smaller northern to northwestern portion of the proposed project area has surficial deposits of older Quaternary Alluvium, also derived from the Rio Hondo and possibly the Los Angeles River.

Our closest vertebrate fossil localities from these Quaternary deposits are LACM 7701-7702, just northwest of the proposed project area near the intersection of Atlantic Avenue and the Long Beach Freeway (I-710) north of the Los Angeles River, that produced fossil specimens of threespine stickleback, *Gasterosteus aculeatus*, salamander, *Batrachoseps*, lizard, Lacertilia, snake, Colubridae, rabbit, *Sylvilagus*, pocket mouse, *Microtus*, harvest mouse, *Reithrodontomys*, and pocket gopher, *Thomomys*, at depths of 11 to 34 feet below grade.

Shallow excavations in the younger Quaternary deposits exposed in most of the proposed project area are unlikely to encounter significant vertebrate fossils. Deeper excavations in those deposits that extend down into older Quaternary deposits, as well as any excavations in the older Quaternary deposits exposed in the northwestern portion of the proposed project area, however, may well uncover significant fossil vertebrate remains. Any substantial excavations in the proposed project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains discovered while not impeding development. Sediment samples from the proposed project area should also be collected and processed to determine the small fossil potential of the site. Any fossils recovered during mitigation should be deposited in an accredited and permanent scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,

Samuel A. McLeod

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice