WLC ARCHITECTS, INC.
8163 ROCHESTER AVENUE, SUITE 100
RANCHO CUCAMONGA, CA 91730
909.987.0909
Fax 909.980.9980

ADDENDUM 1

To: **All bidders**
From: **WLC ARCHITECTS, INC.**
Project: **F19-02 San Andreas HS – Growing Hope Phase II**
3232 Pacific Street, Highland, CA 92346
San Bernardino City Unified School District

Date: **February 15, 2019**

NOTICE TO BIDDERS

This Addendum forms a part of the Contract and modifies the original documents. It is intended that all work affected by the following modifications shall conform with related provisions and general conditions of the contract of the original drawings and specifications. Modify the following items wherever appearing in any drawing or sections of the specifications. Acknowledge receipt of Addendum No. 1 in the space provided on the Bid Form. Failure to do so may subject bidder to disqualification.

GENERAL ITEMS

1. **Bid Opening date has been moved from** Thursday, February 21, 2019**, to Thursday, March 21, 2019 @ 2:00pm** at the aforementioned location.

2. **Other Important Dates are revised as follow:**

   IMPORTANT DATES:

RFI'S DUE	THURSDAY MARCH 8, 2019 @ 4:00PM
PREQUALIFICATION DUE	**MONDAY, MARCH 11, 2019**
ADDENDUMS DUE	FRIDAY, MARCH 15, 2019
BID OPENING	**THURSDAY, MARCH 21, 2019 AT 2:00PM**
BID POSTING ON FACILITIES WEBSITE	FRIDAY, MARCH 22, 2019
TENTATIVE BOARD MEETING	TUESDAY, MAY 7, 2019
NOA ISSUED (TENTATIVE)	WEDNESDAY, MAY 8, 2019

REQUESTS FOR BID INFORMATION, CLARIFICATIONS, and ADDENDA
Questions in writing (only) may be directed to the District's Architect Representative, Mr. Jeffrey Tancharoen via email at jtancharoen@wlcarchitects.com.

3. **CLARIFICATION:**

PREQUALIFICATION OF BIDDERS: Mandatory

As a condition of submitting a bid for this Project, and in accordance with California Public Contract Code section 20111.6, prospective bidders are required to submit to the District a completed set of prequalification documents on forms provided by the District. These documents will be the basis for determining which bidders are qualified to bid on this Project.

Bids will not be accepted if a Contractor has not been prequalified where prequalification is required. Prequalification documents are available from the San Bernardino City Unified School District Website at http://sbcusdfacilities.com/wp-content/uploads/2018/10/Prequalification-Application-Sept.-4-2018.pdf and at Facilities Planning & Development Department, located at 956 West 9th Street, San Bernardino, CA 92411. Prequalification documents must be submitted to the Facilities Planning & Development Department no later than **Friday, March 15, 2019.** Contractors will be notified by e-mail, telephone, for by mail of their prequalification rating within a reasonable period of time after submission of their prequalification documents, but not less than five business days prior to the bid opening date.

PROJECT MANUAL

1. **Notice Inviting Bids**

   Replace Notice Inviting Bids in its entirety with attached revised section which reflects new RFI, Addendum, and BID Opening dates.

2. **BID Cover Sheet**

   Replace BID Cover Sheet with attached revised sheet reflecting new BID due date.

3. **Section 00 11 53 – Request for Qualifications**

   Include attached Section 00 11 53 – Request for Qualifications in Project Manual. Complete questionnaire and return to the District no later than Friday, March 15, 2019.

SUPPORTING DOCUMENTS

1. **Geotechnical Investigation**

   Review and adhere to recommendations outlined per attached Geotechnical Investigation from MTGL, dated September 11, 2018 during construction.

2. **Utility Survey**

   Review the existing site utility services per attached Utility Survey from CAL VADA Surveying, Inc., dated September 4, 2018.

End of Addendum

NOTICE INVITING BIDS

NOTICE IS HEREBY GIVEN that the San Bernardino City Unified School District ("DISTRICT") invites sealed bids for **Bid No. F19-02 San Andreas HS - Growing Hope Phase II**

SUBMITTAL OF BIDS: All bids shall be made on the Bid Forms furnished by the District. Bid Forms, together with all required attachments to the Bid Forms, shall be delivered to the DISTRICT in a sealed envelope with a copy of the completed required bid cover sheet affixed to the outside of the envelope and placed in the Bid Box in the Lobby of the San Bernardino City Unified School District SMART Building located at 793 North E Street, San Bernardino, CA 92410. **The Bids are due at 2:00pm on Thursday, March 21, 2019**.

Bid forms received by the stipulated times will be promptly opened in public and read aloud immediately after sealed envelopes are collected at the time, date, and location stated above in the SMART BUILDING – LAB I. Bid Forms or Attachments thereto received after the stipulated time will be rejected and returned to Bidders unopened. Each Bid shall be accompanied by a cashier's check made payable to the San Bernardino City Unified School District, or a satisfactory bid bond in favor of the DISTRICT, executed by the Bidder as principal and a California admitted surety company as Surety, in an amount not less than ten percent (10%) of the Base Bid submitted by the Bidder.

BID AND CONTRACT DOCUMENTS: The full notice inviting Bids, Bid documents and contract documents may be viewed and ordered through Crisp Imaging PlanWell Service online by clicking on 'PUBLIC PLANROOM' at www.crispimg.com after Thursday, January 24, 2019. There is a refundable deposit of fifty dollars ($50.00) for each set of drawings and specifications, upon payment by cashier's or company check made payable to San Bernardino City Unified School District. Prospective Bidders may secure up to two bid sets. Eligible deposits will be refunded upon return of said documents to Crisp Imaging in good acceptable condition within five (5) business days after bids are opened. Bidders in need of more than two sets of bid documents may purchase at their own cost based on Crisp Imaging 's current rates at that time.

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

Bid documents will be available at Crisp Imaging for viewing after Thursday, January 24, 2019. Bid documents will also be available at the following public plan rooms:

F.W. Dodge McGraw-Hill, Inc.
Public Plan Room; www.construction.com
4300 Beltway Place Suite 180
Arlington TX 76081
Diana Boyles
Dodge document we@mhfl.com
Phone: 1-800-393-6343
Fax: 1-877-836-7711

The Blue Book Building & Construction Network
Public Plan Room: www.thebluebook.com
800 E. Main St.
P.O. Box 500
Jefferson Valley, NY 10535
TJ Downey
tdowney@thebluebook.com
Phone: (800) 431-2584 Ext. 3177
Fax: (914) 243-4936

CMD GROUP
Public Plan Room: www.cmdgroup.com
30 Technology Pkwy S, Ste 100
Norcross, GA 30092
Michael Lunan mike.lunan@cmdgroup.com
Architectural Source Relations Specialist
Reed Construction Data
(770) 209-3414

REQUESTS FOR BID INFORMATION, CLARIFICATIONS, and ADDENDA: Questions in writing (only) may be directed to the District's Architect Representative, Mr. Jeff Tancharoen via email at jtancharoen@wlcarchitects.com. The deadline to submit Requests for Bid Information ("RFBI") is 4:00pm on **Friday, March 8, 2019**. All Responses to Requests for Bid Information, clarifications and/or addenda will be issued no later than **Friday, March 15, 2019** and will be issued to plan holders or registered plan reviewers only. Such responses will be posted at Crisp Imaging public plan room website at www.crispimg.com. Digital copies are considered an accepted form of Addenda delivery method.

PROJECT DELIVERY METHOD AND REQUIRED LICENSES: The work under this bid will be performed via single prime contract and all bidders to be considered responsive shall hold the following license(s):

General Contractor	B

PREVAILING WAGE: Department of Industrial Relations (DIR) compliance, Effective January 1, 2015:

No contractor or subcontractor may be listed on a bid proposal for a public works project (submitted on or after March 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5 [with limited exceptions from this requirement for bid purposes only under Labor Code section 1771.1(a)].

No contractor or subcontractor may be awarded a contract for public work on a public works project (awarded on or after April 1, 2015) unless registered with the Department of Industrial Relations pursuant to Labor Code section 1725.5.

This project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

PREQUALIFICATION OF BIDDERS~~: NOT APPLICABLE~~ MANDATORY

As a condition of submitting a bid for this Project, and in accordance with California Public

Contract Code section 20111.6, prospective bidders are required to submit to the District a completed set of prequalification documents on forms provided by the District. These documents will be the basis for determining which bidders are qualified to bid on this Project.

Bids will not be accepted if a Contractor has not been prequalified where prequalification is required. Prequalification documents are available from the San Bernardino City Unified School District Website at http://sbcusdfacilities.com/wp-content/uploads/2018/10/Prequalification-Application-Sept.-4-2018.pdf and at Facilities Planning & Development Department, located at 956 West 9th Street, San Bernardino, CA 92411. Prequalification documents must be submitted to the Facilities Planning & Development Department no later than **Friday, March 15, 2019.** Contractors will be notified by e-mail, telephone, for by mail of their prequalification rating within a reasonable period of time after submission of their prequalification documents, but not less than five business days prior to the bid opening date.

SCOPE OF WORK: The Scope of Work includes but is not limited to: electrical, mechanical, plumbing, accessibility, and related site work to develop an outdoor demonstration garden at San Andreas High School.

BUSINESS ENTERPRISE (DVBE) PARTICIPATION GOAL AND REQUIREMENTS: Bidders must adhere to the District's Disabled Veteran Business Enterprise (DVBE) participation goal, prevailing wages and labor compliance program, and license requirements; information regarding prevailing wage rates is available at http://www.pd.dgs.ca.gov/smbus/default.htm, http://search.cadvbe.org/dvbes/search and http://www.bidsync.com/DPXBisCASB.

PRE-BID CONFERENCES AND JOB WALKS A non-mandatory pre-bid conference and job walk will be held at the site on Tuesday, February 5, 2019 at 9:00 AM.

SITE: San Andreas High School (Meet at the Administration Office)
ADDRESS: 3232 Pacific Street, Highland, CA 92346

IMPORTANT DATES:

First Publication	THURSDAY, JANUARY 24, 2019
Second Publication	THURSDAY, JANUARY 31, 2019
Pre Bid Conference and Job Walk	TUESDAY, FEBRUARY 05, 2019 AT 9:00AM
RFI Due	FRIDAY, MARCH 8, 2019 AT 4:00PM
PRE-QUALIFICATIONS DUE	**MONDAY, MARCH 11, 2019 AT 4:00PM**
Addendum Due	FRIDAY, MARCH 15, 2019
Bid Opening	**THURSDAY, MARCH 21, 2019 AT 2:00PM**
Bid Posting on Facilities Website	FRIDAY, MARCH 22, 2019
Tentative Board Meeting	TUESDAY, APRIL 23, 2019
NOA Issued (Tentative)	WEDNESDAY, APRIL 24, 2019

END of NOTICE INVITING BID

Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

OFFICE LOCATIONS

ORANGE COUNTY
CORPORATE BRANCH

2992 E. La Palma Avenue
Suite A
Anaheim, CA 92806

Tel: 714.632.2999
Fax: 714.632.2974

SAN DIEGO
IMPERIAL COUNTY

6295 Ferris Square
Suite C
San Diego, CA 92121

Tel: 858.537.3999
Fax: 858.537.3990

INLAND EMPIRE

14467 Meridian Parkway
Building 2A
Riverside, CA 92518

Tel: 951.653.4999
Fax: 951.653.4666

INDIO

44917 Golf Center Pkwy
Suite 1
Indio, CA 92201

Tel: 760.342.4677
Fax: 760.342.4525

OC/LA/INLAND EMPIRE
DISPATCH

800.491.2990

SAN DIEGO DISPATCH

888.844.5060

www.mtglinc.com

GEOTECHNICAL INVESTIGATION

San Andreas High School Growing Hope –
Phase 2 – Proposed Greenhouse
3232 Pacific Street
Highland, San Bernardino County, California

Prepared For:
San Bernardino City Unified School District
Facilities Management
956 West 9th Street
San Bernardino, California 92411

Prepared By:
MTGL, Inc.
14467 Meridian Parkway, Building 2A
Riverside, California 92518

September 11, 2018

MTGL Project No. 1705A46
MTGL Log No. 18-3273

Geotechnical Engineering
Construction Inspection
Materials Testing
Environmental

OFFICE LOCATIONS

ORANGE COUNTY
CORPORATE BRANCH
2992 E. La Palma Avenue
Suite A
Anaheim, CA 92806
Tel: 714.632.2999
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SAN DIEGO DISPATCH
888.844.5060

www.mtglinc.com

September 11, 2018

MTG$_L$ Project No. 1705A46
MTG$_L$ Log No. 18-3273

San Bernardino City Unified School District
Facilities Management
956 West 9th Street
San Bernardino, California 92411

Subject: **GEOTECHNICAL INVESTIGATION**
San Andreas High School Growing Hope –
Phase 2 – Proposed Greenhouse
3232 Pacific Street
San Bernardino, San Bernardino County, California

Sherri Lien | Facilities Department

In accordance with your request and authorization, MTG$_L$, Inc. has completed a Geotechnical Investigation for the subject site. MTG$_L$, Inc. is pleased to present the following report which addresses both engineering geologic and geotechnical conditions of the subject site, including a description of the site conditions, results of MTG$_L$, Inc.'s field exploration and laboratory testing, and MTG$_L$, Inc.'s conclusions and recommendations for site grading and foundations design.

San Andreas High School is located at 3232 Pacific Street, in the City of Highland, County of San Bernardino, California. The project will consist of constructing a new greenhouse building, along with various site pavement improvements, in the west-central portion of the existing school campus.

Based on MTG$_L$, Inc.'s investigation, the site will be suitable for construction, provided the recommendations presented herein are incorporated into the plans and specifications for the proposed construction. Details related to geologic conditions, seismicity, site preparation, foundation and pavement design, and construction considerations are also included in the subsequent sections of this report.

MTG$_L$, Inc. appreciates this opportunity to be of continued service and look forward to providing additional consulting services during the planning and construction of the project. Should you have any questions regarding this report, please do not hesitate to contact us at your convenience.

Respectfully submitted,

MTG$_L$, Inc.

REGISTERED PROFESSIONAL ENGINEER
BRUCE A. HICK
No. GE2284
Exp. 12/31/18
GEOTECHNICAL
STATE OF CALIFORNIA

Bruce A. Hick, P.E., G.E.
Vice President | Engineering Manager

TABLE OF CONTENTS

ATTACHMENTS:

1.00 INTRODUCTION

In accordance with your request and authorization, MTGL, Inc. has completed a Geotechnical Investigation for the subject project located on the campus of San Andreas High School at 3232 Pacific Street, in the City of Highland, San Bernardino County, California. The following report presents as summary of MTGL, Inc.'s findings, conclusions and recommendations based on the field investigation, laboratory testing, and engineering analysis.

1.01 Planned Construction

The project will consist of constructing a new greenhouse building along with various site pavement improvements (see Boring Location Map, Figure 2). It is anticipated that the proposed structure will be of steel-frame construction with polycarbonate sheeting with conventional continuous (perimeter) and isolated pad (column) foundations, with a concrete slab-on-grade floor. Estimated maximum structural loads for the proposed building are 2,000 plf for continuous foundations and 50 kips for isolated pad foundations. Sewage disposal is anticipated to be provided by a public sewer system. Due to the relatively flat site topography, maximum slope heights of 10 feet are anticipated

1.02 Scope of Work

The scope of MTGL, Inc.'s geotechnical services included the following:

- Review of geologic, seismic, ground water and geotechnical literature.
- Logging, sampling and backfilling of three (3) exploratory borings drilled with an 8" hollow stem auger drill rig to a maximum depth of 28 feet below existing grades.
- Laboratory testing of representative samples (See Appendix C).
- Geotechnical engineering review of data and engineering recommendations.
- Preparation of this report summarizing MTGL, Inc.'s findings and presenting MTGL, Inc.'s conclusions and recommendations for the proposed construction.

1.03 Site Description

San Andreas High School is located at 3232 Pacific Street, in the City of Highland, Riverside County, California (see Site Vicinity Map, Figure 1). The school site located at approximate 34.1298° North Longitude and 117.2164 °West Latitude. The proposed building is located in the west-central portion of the school campus. This portion of the campus currently consist of asphalt concrete paved parking and drive improvements adjacent to the school athletic field (western edge) and existing school structures and pavement improvements (northern eastern and southern edges, see Boring Location Map, Figure 2). Access to the proposed building site is from existing asphalt concrete paved driveway/parking lot. Numerous underground utility lines (electric, gas, etc.) are located within the proposed building area. Topographically, the location of the proposed structure is essentially planar, gently sloping to the south/southwest. Elevation at the proposed building site is approximately 1,160 feet above mean sea level.

1.04 Field Investigation

Prior to the field investigation, a site reconnaissance was performed by an engineer from MTGL, Inc. to mark the boring locations, as shown on the Boring Location Map (Figure 2), and to evaluate the locations with respect to obvious subsurface structures and access for the drilling rig. Underground Service Alert was then notified of the marked locations for utility clearance.

The subsurface investigation consisted of drilling and sampling three (3) test borings utilizing a truck-mounted drill rig equipped with an 8" diameter hollow stem auger. Boring B-1 was terminated at 28 feet due to encountering a boulder. See Appendix B for further discussion of the field exploration including logs of test borings.

Borings were logged and sampled using Modified California Ring (Ring) samplers at selected depth intervals. Samplers were driven into the bottom of the boring with successive drops of a 140-pound weight falling 30 inches. Blows required driving the last 12 inches of the 18-inch Ring samplers are shown on the boring logs in the "blows/foot" column (Appendix B). Representative bulk soil samples were also obtained from the borings.

Each soil sample collected was inspected and described in general conformance with the Unified Soil Classification System (USCS). The soil descriptions were entered on the boring logs. All samples were sealed and packaged for transportation to MTGL, Inc.'s laboratory. After completion of drilling, borings were backfilled with the soil cuttings.

1.05 Laboratory Testing

Laboratory tests were performed on representative samples to verify the field classification of the recovered samples and to determine the geotechnical properties of the subsurface materials. All laboratory tests were performed in general conformance with ASTM or State of California Standard Methods. The results of our laboratory tests are presented in Appendix C of this report.

2.00 FINDINGS

2.01 Regional Geologic Conditions

As discussed in the Limited Engineering Geologic Hazard Evaluation of Property Report dated August 20, 2018 (Project No. 18030-01) prepared by Anderson Geology in Appendix D of this report, the school site is regionally located at the intersection of the east-central boundary of the Transverse Range Provence, southern boundary of the Mojave Desert Provence and the north boundary of the Peninsular Ranges Geomorphic Provence of Southern California. Locally, the site is situated within the northeastern portion of the Los Angeles Basin near the foothills of the San Bernardino Mountains. Detailed discussions of the geologic setting of the project site is presented in the referenced Geologic Hazard Evaluation in Appendix D of this report.

2.02 Site Soil Conditions

The proposed building site is located on generally planar terrain in the west-central portion of the existing high school campus at an average elevation of approximately 1,161 feet above sea level (Google Earth, 2016). The existing high school campus is surrounded by and existing elementary school, existing residential developments or paved, improved streets.

Three (3) 8-inch diameter hollow stem auger soil borings were advanced to characterize near-surface geologic conditions and to obtain soil samples for analyses. Boring locations and pertinent data for each boring are presented in the table below.

Boring No.	Depth (ft.)	Latitude	Longitude	Approx. Fill Thickness (ft)	Groundwater Depth (ft. bgs)
B1	28.0	34.1299°	-117.2165°	0	No GW
B2	21.0	34.1297°	-117.2164°	0	No GW
B3	11.0	34.1295°	-117.2163°	0	No GW

An approximate 2 to 3 inch thick asphalt concrete pavement is present at the surface of all the borings. As shown on the attached boring logs, the site is underlain by alluvium. The site soils consist of interbedded silty sands and relatively clean sands (SM and SP soil types based upon the Unified Soil Classification System. As previously discussed, Boring B-1 was terminated at 28 feet prior to planned depth (approximately 50 feet) due to encountering a boulder. Ground water was not encountered in any of the borings at the time of drilling (maximum depth drilled of 28.0 feet).

2.03 Flooding Potential

The site is located within an area described as having a "minimal flood hazard" (FEMA Map #06071C7965H, 8/28/2008).

2.04 Surface and Groundwater Conditions

No areas of ponding or standing water were present at the time of the field exploration. Further, no springs or areas of natural seepage were observed at the time of the field exploration.

Ground water was not encountered in any of the borings at the time of drilling (maximum depth drilled of 28 feet). Historic high groundwater levels in the immediate site vicinity are approximately 60 below existing ground surface (State of California Groundwater Data Library, Groundwater Levels for Station 341283N1172229W001).

2.05 Faulting and Seismicity

Detailed discussions of the faulting and seismicity of the proposed building site is presented in the referenced Geologic Hazard Evaluation Report in Appendix D of this report.

2.06 Liquefaction Potential and Dynamic Soil Settlement

Liquefaction is a phenomenon where earthquake-induced ground vibrations increase the pore pressure in saturated, granular soils until it is equal to the confining, overburden pressure. When this occurs, the soil can completely loose its shear strength and enter a liquefied state. The possibility of liquefaction is dependent upon grain size, relative density, confining pressure, saturation of the soils, strength of the ground motion and duration of ground shaking. In order for liquefaction to occur three criteria must be met: underlying loose, coarse-grained (sandy) soils, a groundwater depth of less than about 50 feet and a nearby large magnitude earthquake.

The site is not within a Seismic Special Studies Zone as currently mapped by the California Division of Mines and Geology (see Geologic Hazard Evaluation Report in Appendix D of this report). Based on the relative density of the subsurface soils and depth to groundwater (in excess of 60 feet below the existing ground surface), the potential for liquefaction is very low. Based upon review of the City of Highland General Plan (2006), the project site is not indicated as having a liquefaction susceptibility. Due to the dense nature of the subsurface soils, estimated dynamic settlement ("dry sand") settlement of the site soils are anticipated to be negligible.

2.07 LANDSLIDES

The site is not located in a hillside area of the county where earthquake induced landslides would cause permanent ground displacements. No reported occurrences of landslides or mudflows are known to have recently affected the site. Therefore, the potential for landslides and mudflows is considered to be very low at the site.

2.08 TSUNAMI AND SEICHE HAZARD

Given the inland location of the site at an elevation of approximately 1,191 feet MSL, the inundation hazard posed by tsunami is considered to be very low. Seiches are not considered a hazard due to the absence of above-ground tanks or reservoirs located immediately up gradient from the site. Detailed discussions of the secondary seismic hazards of the proposed building site is presented in the referenced Geologic Hazard Evaluation Report in Appendix D of this report.

3.00 CONCLUSIONS

3.01 GENERAL CONCLUSIONS

Based on our Geotechnical review of the planned construction, it is our opinion that the site is suitable for the proposed construction provided our conclusions are taken into consideration during design, and our recommendations are incorporated into the construction plans and specifications and implemented during grading and construction.

Given the findings of the investigation, it appears that the site geology is suitable for the proposed construction. Based on the investigation, it is our opinion that the proposed development is safe against landslides and settlement provided the recommendations presented in our report are incorporated into the design and construction of the project. Grading and construction of the proposed project will not adversely affect the geologic stability of adjacent properties. The nature and extent of the investigation conducted for the purposes of this declaration are, in our opinion, in conformance with generally accepted practice in this area. Therefore, the proposed project appears to be feasible from a geologic standpoint.

3.02 SEISMIC DESIGN PARAMETERS

The USGS Seismic Design Maps application, was used to calculate the CBC site specific design parameters as required by the 2016 California Building Code. Based upon the subsurface data, the site can be classified as Site Class D. Detailed discussions of seismic design criteria for the proposed building site is presented in the referenced Geologic Hazard Evaluation Report in

Appendix D of this report. The spectral acceleration values for 0.2 second and 1 second periods obtained from the computer program and in accordance with the 2016 California Building Code are tabulated below.

Ground Motion Parameter	Design Value
S_S	2.410 g
S_1	1.189 g
Site Class	D
F_a	1.0
F_v	1.5
S_{DS}	1.607 g
S_{D1}	1.189 g

4.00 RECOMMENDATIONS

MTGL, Inc.'s recommendations are considered minimum and may be superseded by more conservative requirements of the architect, structural engineer, building code, or governing agencies. The foundation recommendations are based on the expansion index and shear strength of the on-site soils. Import soils, if necessary should have a "very low" expansion index potential and should be approved by the Geotechnical Engineer prior to importing to the site. In addition to the recommendations in this section, additional general earthwork and grading specifications are included in Appendix E.

4.01 Excavation Characteristics/Shrinkage

The exploratory borings were advanced with little difficulty and no "oversize" materials were encountered within the anticipated depths of site grading/construction. Accordingly, it is expected that all earth materials will be rippable with conventional heavy duty grading equipment and oversized materials are not expected.

Shrinkage is the decrease in volume of soil upon removal and recompaction expressed as a percentage of the original in-place volume, which will account for changes in earth volumes that will occur during grading. MTGL, Inc.'s estimate for shrinkage of the on-site fill and native soils are expected to range from 20 to 25 percent.

4.02 Settlement Considerations

Foundations should be designed to resist the anticipated settlements. Settlement of an individual foundation will vary depending on the plan dimensions of the foundation and the actual load supported. It is estimated maximum settlement of foundations designed and constructed in accordance with the recommendations presented in this report to be on the order of ¾ inch. Differential settlement between similarly loaded and adjacent footings are expected to be a maximum of approximately ½ inch across 40 feet, provided footings are founded on similar materials. Settlement of all foundations is expected to occur rapidly and should be essentially complete shortly after initial application of the loads.

4.03 Site Clearing Recommendations

All surface vegetation, existing landscaping, trash, debris, asphalt concrete, Portland cement concrete and underground utilities should be cleared and removed from the proposed construction sites. Underground facilities such as utilities, pipes or underground storage tanks may exist at the site. Removal of underground tanks is subject to state law as regulated by the County, City and/or Fire Department. If storage tanks containing hazardous or unknown substances are encountered, the proper authorities must be notified prior to any attempts at removing such objects.

Any water wells, if encountered during construction, should be exposed and capped in accordance with the requirements of the regulating agencies. Depressions resulting from the removal of foundations of existing buildings, underground tanks and pipes, buried obstructions and/or tree roots should be backfilled with properly compacted material.

4.04 Site Grading Recommendations

All fill materials should be compacted to at least 90 percent of maximum dry density as determined by ASTM Test Method D1557. Fill materials should be placed in loose lifts, no greater than 8 inches prior to applying compactive effort. All engineered fill materials should be moisture-conditioned and processed as necessary to achieve a uniform moisture content that is near optimum moisture content and within moisture limits required to achieve adequate bonding between lifts.

4.05 Site Overexcavation

Building plans, grading plans and foundation elevations were not available at the time of MTG$_L$, Inc.'s investigation. Therefore, once formal plans are prepared and available for review, this office should review these plans from a geotechnical viewpoint, comment on any changes, and revise the recommendations of this report as necessary.

All artificial fills, organics, debris, trash and topsoil should be removed from the grading area and hauled offsite. Recommendations for site grading to prepare the building pad area for the support of structures are as follows.

It is recommended that the existing soils within the building pad area be over excavated to a minimum depth of 3 feet below the bottom of the proposed footings or 5 feet below the existing grade, whichever is greater. The required horizontal limits of the over excavated area shall be defined as the area extending from the edge of the perimeter footing for a distance of 5 feet, where obtainable

Hardscape areas which include all paved areas will require a minimum depth of 2 feet of removal and recompaction. Processing for hardscape areas should extend a minimum distance of 2 feet outside the hardscape limits, where obtainable.

4.06 Fill Materials

Removed and/or overexcavated soils may be moisture-conditioned to near optimum moisture content and recompacted as engineered fill, except for soils containing detrimental amounts of organic material. Our subsurface investigation indicates that the near surface materials are generally at or below its optimum moisture content. The fill materials should be compacted to a minimum of 90% of the maximum dry density per ASTM D-1557.

Imported materials shall be coarse grained, non-expansive, and non-plastic in nature. The materials should be free from vegetable matter and other deleterious substances, shall not contain rocks or lumps of a greater dimension than 3 inches, and shall be approved by the geotechnical consultant. Soils of poor gradation, expansion, or strength properties shall be placed in areas designated by the geotechnical consultant or shall be mixed with other soils providing satisfactory fill material.

4.07 Foundations

Spread and/or continuous footings on compacted fill materials may be used to support the proposed structure and designed using an allowable bearing pressure of 2,000 psf. This allowable bearing pressure may be increased by 20% for each additional foot of width and/or depth, to a maximum value of 3,500 psf. The allowable bearing capacity may also be increased by one-third for considerations of short term wind or seismic loads. The recommended minimum footing width and embedment depth below the lowest adjacent grade are as follows:

Foundation Type	Minimum Width	Minimum Depth
Continuous (Interior)	12 inches	12 inches
Continuous (Perimeter)	12 inches	18 inches
Spread Footings	24 inches	18 inches

Soil resistance developed against lateral structural movement can be obtained from the passive pressure value of 350 pcf. The upper one foot of passive pressure should be neglected unless confined by pavement or slab. For sliding resistance, a friction coefficient of 0.35 may be used at the concrete and soil interface. The passive pressure and the friction of resistance could be combined without reduction. In addition, the lateral passive resistance is taken into account only if it is ensured that the soil against embedded structures will remain intact with time.

The near surface soils have an expansion index classification of "very low" (0-20). Therefore, nominal reinforcement consisting of two #5 bars placed within 3 inches of the top of footings and two #5 bars placed within 3 inches of the bottom of footings are recommended. However, the structural engineer may require heavier reinforcement.

4.08 CONCRETE SLABS ON GRADE AND MISCELLANEOUS FLATWORK

Concrete slabs on grade and miscellaneous flatwork that are not subjected to vehicular loads may be designed with a minimum thickness of 4.0 inches for normal loading conditions. However, if heavier loads are anticipated, a modulus of subgrade reaction of 350 pounds per cubic inch may be used when the slabs are supported by compacted fill.

All slabs and flatwork should be reinforced with a minimum #4 bars, 18 inches on center, each direction, placed at the mid-height of the slab. The structural engineer may require heavier reinforcement. Special care should be taken so that reinforcement is placed at the slab mid-height. The floor slab should be separated from footings, structural walls, and utilities and provisions made to allow for settlement or swelling movements at these interfaces. If this is not possible from a structural or architectural design standpoint, it is recommended that the slab connection to footings be reinforced such that there will be resistance to potential differential movement.

Control joints should be constructed on all slabs on grade to create squares or rectangles with a maximum spacing of 12 feet on large slab areas. Where flatwork is adjacent to curbs, reinforcing bars should be placed between the flatwork and the curbs. Expansion joint material should be used between flatwork and curbs, and flatwork and buildings.

Subsurface moisture and moisture vapor naturally migrate upward through the soil and where the soil is covered by a building or pavement. To reduce the impact of the subsurface moisture and potential impact of future introduced moisture (such as landscape irrigation or precipitation) damp proofing should be provided under all slabs on grade with moisture sensitive floor coverings. The damp proofing should consist of a minimum 10 mil polyethylene liner placed with 2 inches of sand below and 2 inches of sand above the polyethylene liner. The liner should be carefully fitted around service openings with joints lapped not less than 6 inches.

Damp proofing typically will not necessarily assure that floor slab moisture transmission rates will meet floor-covering manufacturer standards. Other factors such as surface grades, adjacent planters, the quality of slab concrete and the permeability of the on-site soils will affect slab moisture. In many cases, floor moisture problems are the result of either improper curing of floors slabs or improper application of flooring adhesives. We recommend contacting a flooring consultant experienced in the area of concrete slab-on-grade floors for specific recommendations regarding the proposed flooring applications. We make no guarantee nor provide any assurance that use of a vapor retarder system will reduce concrete slab-on-grade floor moisture penetration to any specific rate or level, particularly those required by floor covering manufacturers. The builder and designers should consider all available measures for floor slab moisture protection.

Special precautions must be taken during the placement and curing of all concrete slabs. Excessive slump (high water-cement ratio) of the concrete and/or improper curing procedures used during either hot or cold weather conditions could lead to excessive shrinkage, cracking, or curling of the slabs. High water-cement ratio and/or improper curing also greatly increase the water vapor permeability of concrete. It is recommended that all concrete placement and curing operations be performed in accordance with the American Concrete Institute (ACI) manual.

The subgrade soils beneath all concrete flatwork should be compacted to a minimum of 90% relative compaction for a minimum depth of 24 inches. The geotechnical engineer should monitor the compaction of the subgrade soils and perform testing to verify that proper compaction has been obtained.

4.09 Prewetting Recommendation

Prior to placing concrete slabs and flatwork, the underlying soils should be brought to near optimum moisture content for a depth of six inches prior to the placement of concrete. The geotechnical consultant should perform in-situ moisture tests to verify that the appropriate moisture content has been achieved a maximum of 24 hours prior to the placement of concrete or moisture barriers.

Once the slab subgrade soil has been pre-wetted and compacted, the soil should not be allowed to dry prior to concrete placement. If the subgrade soil is dry, the moisture content of the soil should be restored prior to placement of concrete and re-tested.

Proper moisture conditioning and compaction of subgrade soils prior to placement is very important prior to concrete placement. Even with proper site preparation, some soil moisture changes of the subgrade soils supporting the concrete flatwork due to edge effects (shrink/swell) may occur. Drying and/or wetting of subgrade soils adjacent to landscaped areas or open fields may increase the potential of shrink/swell effects beneath concrete flatwork areas. To help reduce edge effects, lateral cutoffs, such as inverted curbs are recommended. Control joints should be used to reduce the potential for flatwork panel cracks as a result of minor soil shrink/swell.

4.10 Soil Corrosion Potential

Soluble sulfate tests indicate that concrete at the subject site will have a "moderate" (Class S1) exposure to water soluble sulfate in the soil. Recommendations for concrete exposed to sulfate-containing soils are presented below.

RECOMMENDATIONS FOR CONCRETE EXPOSED TO SULFATE CONTAINING SOILS

Sulfate Exposure Severity	Class	Water soluble sulfate (SO_4) in soil (% by wgt)	Sulfate (SO_4) in water (ppm)	Max Water to Cement Ratio by Weight	Minimum Compressive Strength (psi)	Cement Type	Calcium Chloride Admixture
Negligible	S0	0.00 - 0.10	0-150	---	2,500	---	No Restriction
Moderate	**S1**	0.10 - 0.20	150-1,500	0.50	4,000	II/V	No Restriction
Severe	S2	0.20 - 2.00	1,500-10,000	0.45	4,500	V	Not Permitted
Very Severe	S3	Over 2.00	Over 10,000	0.45	4,500	V Plus Pozzolan	Not Permitted

Corrositivity testing consisting of soils reactivity (pH) and resistivity (ohms-cm) were also tested on representative soils. The test results indicate that the soils have a soil reactivity (pH) of 7.2, and a resistivity 6,100 ohms-cm. A neutral or non-corrosive soil has a reactivity value ranging from 5.5 to 8.4. Generally, soils that could be considered corrosive to metal have resistivities less than 3,000 ohms. Those soils with resistivity values of less than 1,000 ohms-cm can be considered extremely corrosive.

Based on our test results, near surfaces are anticipated to have a slight to moderate corrosion potential. Protection of buried metal with sand bedding and protective coating may be used to further reduce corrosion potential. A qualified corrosion engineer should be consulted to further assess the corrosion potential, as necessary.

4.11 Retaining Walls

Embedded structural walls should be designed for lateral earth pressures exerted on the walls. The magnitude of these earth pressures will depend on the amount of deformation that the wall can yield under the load. If the wall can yield sufficiently to mobilize the full shear strength of the soils, it may be designed for the "active" condition. If the wall cannot yield under the applied load, then the shear strength of the soil cannot be mobilized and the earth pressures will be higher. These walls such as basement walls and swimming pools should be designed for the "at rest" condition. If a structure moves towards the retained soils, the resulting resistance developed by the soil will be the "passive" resistance.

For design purposes, the recommended equivalent fluid pressure for each case for walls constructed above the static groundwater table and backfilled with non-expansive soils is provided below. Retaining wall backfill should be compacted to at least 90% relative compaction based on the maximum density defined by ASTM D1557. Retaining structures may be designed to resist the following lateral earth pressures.

- Allowable Bearing Pressure – 2,000 psf
- Coefficient of Friction (Soil to Footing) – 0.35
- Passive Earth Pressure - equivalent fluid weight of 350 pcf (Maximum of 2,500 psf)
- At rest lateral earth pressure - 60 pcf
- Active Earth Pressures – equivalent fluid weights:

Slope of Retained Material	Equivalent Fluid Weight (pcf)
Level	40
2:1 (H:V)	65

It is recommended that all retaining wall footings be embedded at least 18 inches below the lowest adjacent finish grade, or a minimum of 12 inches below adjacent soil grade. In addition, the wall footings should be designed and reinforced as required for structural considerations. The wall areas should be over-excavated to a minimum depth of 3 feet below the bottom of the proposed footings. The required horizontal limits of the over excavated area shall be defined as the area extending from the edge of the footing for a minimum distance of 2 feet.

Lateral resistance parameters provided above are ultimate values. Therefore, a suitable factor of safety should be applied to these values for design purposes. The appropriate factor of safety will depend on the design condition and should be determined by the project Structural Engineer. If any super-imposed loads are anticipated, this office should be notified so that appropriate recommendations for earth pressures may be provided.

Retaining structures should be drained to prevent the accumulation of subsurface water behind the walls. Back drains should be installed behind all retaining walls exceeding 3.0 feet in height. A typical detail for retaining wall back drains is presented as Figure 3. All back drains should be outlet to suitable drainage devices. Walls and portions thereof that retain soil and enclose interior spaces and floors below grade should be waterproofed and damp-proofed accordingly.

4.12 Seismically Induced Lateral Earth Pressures

A seismic lateral increment of 30 pcf (equivalent fluid weight) may be applied as an incremental force which should be applied to the back of the wall in the upper 1/3 of the wall and also applied as a reduction of force to the front of the wall in the upper 1/3 of the footing.

4.13 Pavement Recommendations

Recommended pavement structural sections are based on the procedures outlined in "Design Procedures for Flexible Pavements" of the Highway Design Manual, California Transportation Department. This procedure uses the principal that the pavement structural section must be of adequate thickness to distribute the load from the design traffic (TI) to the subgrade soils in such a manner that the stresses from the applied loads do not exceed the strength of the soil (R value).

Pavement sections were designed based on an R-Value of 72 and assumed Traffic Index of 4.0 for light auto parking and drive lanes, 5.0 for commercial vehicles, and 70 for truck access/fire lanes. The recommend structural sections are as follows:

ASPHALT PAVEMENT STRUCTURAL SECTION

Pavement Area	Traffic Index	Asphalt Thickness	Aggregate Base Thickness
Light Auto Parking / Drive Lanes	4.0	4.0"	4.0"
Commercial Vehicles	5.0	4.0"	4.0"
Truck Access/Fire Lane (Heavy Truck Traffic)	7.0	4.0"	6.0"

Portland cement concrete (PCC) pavements for areas which are subject to traffic loads may be designed with a minimum thickness of 6.0 inches of Portland cement concrete on 4.0 inches of compacted aggregate base.

Prior to paving, the exposed subgrade soils should be scarified, adjusted to within 2% of optimum moisture and compacted to a minimum of 90% relative compaction for a minimum depth of 12 inches. All aggregate base courses should be compacted to a minimum of 95% relative compaction. Compaction should be confirmed by testing.

4.14 CONSTRUCTION CONSIDERATIONS

4.14.1 MOISTURE SENSITIVE SOILS/WEATHER RELATED CONCERNS

The upper soils encountered at this site may be sensitive to disturbances caused by construction traffic and to changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and its support capabilities. In addition, soils that become excessively wet may be slow to dry and thus significantly delay the progress of the grading operations. Therefore, it will be advantageous to perform earthwork and foundation construction activities during the dry season. Much of the on-site soils may be susceptible to erosion during periods of inclement weather. As a result, the project Civil Engineer/Architect and Grading Contractor should take appropriate precautions to reduce the potential for erosion during and after construction.

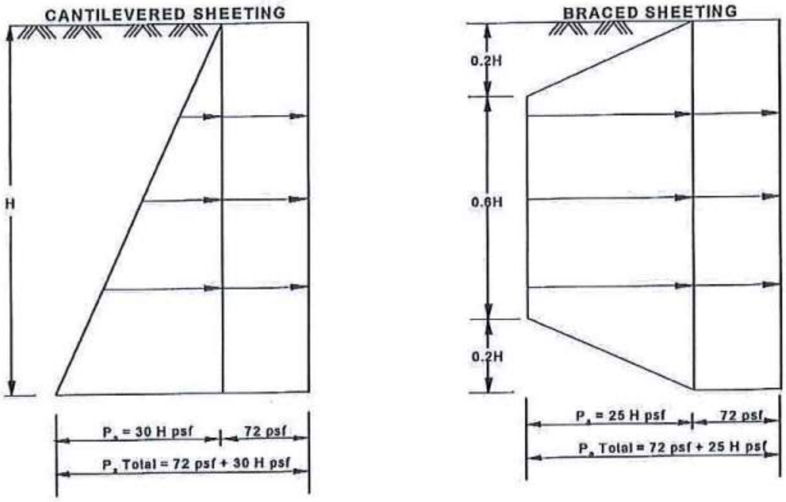
4.14.2 DRAINAGE AND GROUNDWATER CONSIDERATIONS

Historic high groundwater levels in the immediate site vicinity are approximately 60 feet below grade. Since this is below the anticipated depths of grading, the installation of subdrains is not expected to be necessary. However, variations in the ground water table may result from fluctuation in the ground surface topography, subsurface stratification, precipitation, irrigation, and other factors such as impermeable and/or cemented formational materials overlain by fill soils. In addition, during retaining wall excavations, seepage may be encountered. Therefore, it is recommended that a representative of MTG$_L$, Inc. be present during grading operations to evaluate areas of seepage. Drainage devices for reduction of water accumulation can be recommended should these conditions occur.

Water should not be allowed to collect in the foundation excavation, on floor slab areas, or on prepared subgrades of the construction area either during or after construction. Undercut or excavated areas should be sloped to facilitate removal of any collected rainwater, groundwater, or surface runoff. Positive site drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath the floor slabs. The grades should be sloped away from the building and surface drainage should be collected and discharged such that water is not permitted to infiltrate the backfill and floor slab areas of the building.

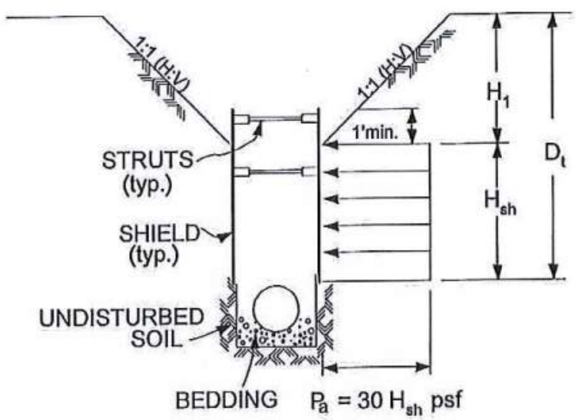
4.14.3 Temporary Excavations and Shoring

Short term temporary excavations in existing soils may be safely made at an inclination of 1:1 (horizontal to vertical) or flatter. If vertical sidewalls are required in excavations greater than 5 feet in depth, the use of cantilevered or braced shoring is recommended. Excavations less than 5 feet in depth may be constructed with vertical sidewalls without shoring or shielding. Our recommendations for lateral earth pressures to be used in the design of cantilevered and/or braced shoring are presented below. These values incorporate a uniform lateral pressure of 72 psf to provide for the normal construction loads imposed by vehicles, equipment, materials, and workmen on the surface adjacent to the trench excavation. However, if vehicles, equipment, materials, etc. are kept a minimum distance equal to the height of the excavation away from the edge of the excavation, this surcharge load need not be applied.



SHORING DESIGN: LATERAL SHORING PRESSURES

Design of the shield struts should be based on a value of 0.65 times the indicated pressure, Pa, for the approximate trench depth. The wales and sheeting can be designed for a value of 2/3 the design strut value.



HEIGHT OF SHIELD, H_{sh} = DEPTH OF TRENCH, D_t , MINUS DEPTH OF SLOPE, H_1

TYPICAL SHORING DETAIL

Placement of the shield may be made after the excavation is completed or driven down as the material is excavated from inside of the shield. If placed after the excavation, some overexcavation may be required to allow for the shield width and advancement of the shield. The shield may be placed at either the top or the bottom of the pipe zone. Due to the anticipated thinness of the shield walls, removal of the shield after construction should have negligible effects on the load factor of pipes. Shields may be successively placed with conventional trenching equipment.

Vehicles, equipment, materials, etc. should be set back away from the edge of temporary excavations a minimum distance of 15 feet from the top edge of the excavation. Surface waters should be diverted away from temporary excavations and prevented from draining over the top of the excavation and down the slope face. During periods of heavy rain, the slope face should be protected with sandbags to prevent drainage over the edge of the slope, and a visqueen liner placed on the slope face to prevent erosion of the slope face.

Periodic observations of the excavations should be made by the geotechnical consultant to verify that the soil conditions have not varied from those anticipated and to monitor the overall condition of the temporary excavations over time. If at any time during construction conditions are encountered which differ from those anticipated, the geotechnical consultant should be contacted and allowed to analyze the field conditions prior to commencing work within the excavation. All Cal/OSHA construction safety orders should be observed during all underground work.

4.14.4 Utility Trenches

All Cal/OSHA construction safety orders should be observed during all underground work. All utility trench backfill within street right of way, utility easements, under or adjacent to sidewalks, driveways, or building pads should be observed and tested by the geotechnical consultant to verify proper compaction. Trenches excavated adjacent to foundations should not extend within the footing influence zone defined as the area within a line projected at a 1:1 (horizontal to vertical) drawn from the bottom edge of the footing. Trenches crossing perpendicular to foundations should be excavated and backfilled prior to the construction of the foundations. The excavations should be backfilled in the presence of the geotechnical engineer and tested to verify adequate compaction beneath the proposed footing.

Utilities should be bedded and backfilled with clean sand or approved granular soil to a depth of at least 1-foot over the pipe. The bedding materials shall consist of sand, gravel, crushed aggregates, or native soils that are free draining with a sand equivalence of not less than 30. The bedding should be uniformly watered and compacted to a firm condition for pipe support.

The remainder of the backfill shall be typical on-site soil or imported soil which should be placed in lifts not exceeding 8 inches in thickness, watered or aerated to near optimum moisture content, and mechanically compacted to at least 90% of maximum dry density (ASTM D1557).

The bedding and backfill materials and placement shall conform to the requirements of the latest Standard Specifications for Public Works Construction (Greenbook).

4.14.5 Site Drainage

The site should be drained to provide for positive drainage away from structures in accordance with the building code and applicable local requirements. Unpaved areas should slope no less than 2% away from structure. Paved areas should slope no less than 1% away from structures. Concentrated roof and surface drainage from the site should be collected in engineered, non-erosive drainage devices and conducted to a safe point of discharge. The site drainage should be designed by a civil engineer.

4.15 Geotechnical Observation/Testing of Earthwork Operations

The recommendations provided in this report are based on preliminary design information and subsurface conditions as interpreted from the investigation. Our preliminary conclusion and recommendations should be reviewed and verified during site grading, and revised accordingly if exposed Geotechnical conditions vary from our preliminary findings and interpretations. The Geotechnical consultant should perform Geotechnical observation and testing during the following phases of grading and construction:

- During site grading and overexcavation.
- During foundation excavations and placement.
- Upon completion of retaining wall footing excavation prior to placing concrete.
- During excavation and backfilling of all utility trenches
- During processing and compaction of the subgrade for the access and parking areas and prior to construction of pavement sections.
- When any unusual or unexpected Geotechnical conditions are encountered during any phase of construction.

5.00 LIMITATIONS

The findings, conclusions, and recommendations contained in this report are based on the site conditions as they existed at the time of MTG$_L$, Inc.'s investigation, and further assume that the subsurface conditions encountered during MTG$_L$, Inc.'s investigation are representative of conditions throughout the site. Should subsurface conditions be encountered during construction that are different from those described in this report, this office should be notified immediately so that our recommendations may be re-evaluated.

This report was prepared for the exclusive use and benefit of the owner, architect, and engineer for evaluating the design of the facilities as it relates to geotechnical aspects. It should be made available to prospective contractors for information on factual data only, and not as a warranty of subsurface conditions included in this report.

MTG$_L$, Inc.'s investigation was performed using the standard of care and level of skill ordinarily exercised under similar circumstances by reputable soil engineers and geologists currently practicing in this or similar localities. No other warranty, express or implied, is made as to the conclusions and professional advice included in this report.

This firm does not practice or consult in the field of safety engineering. MTG$_L$, Inc.'s does not direct the Contractor's operations, and are not responsible for their actions. The contractor will be solely and completely responsible for working conditions on the job site, including the safety of all persons and property during performance of the work. This responsibility will apply continuously and will not be limited to MTG$_L$, Inc.'s normal hours of operation.

The findings of this report are considered valid as of the present date. However, changes in the conditions of a site can occur with the passage of time, whether they are due to natural events or to human activities on this or adjacent sites. In addition, changes in applicable or appropriate codes and standards may occur, whether they result from legislation or the broadening of knowledge.

Accordingly, this report may become invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and revision as changed conditions are identified.

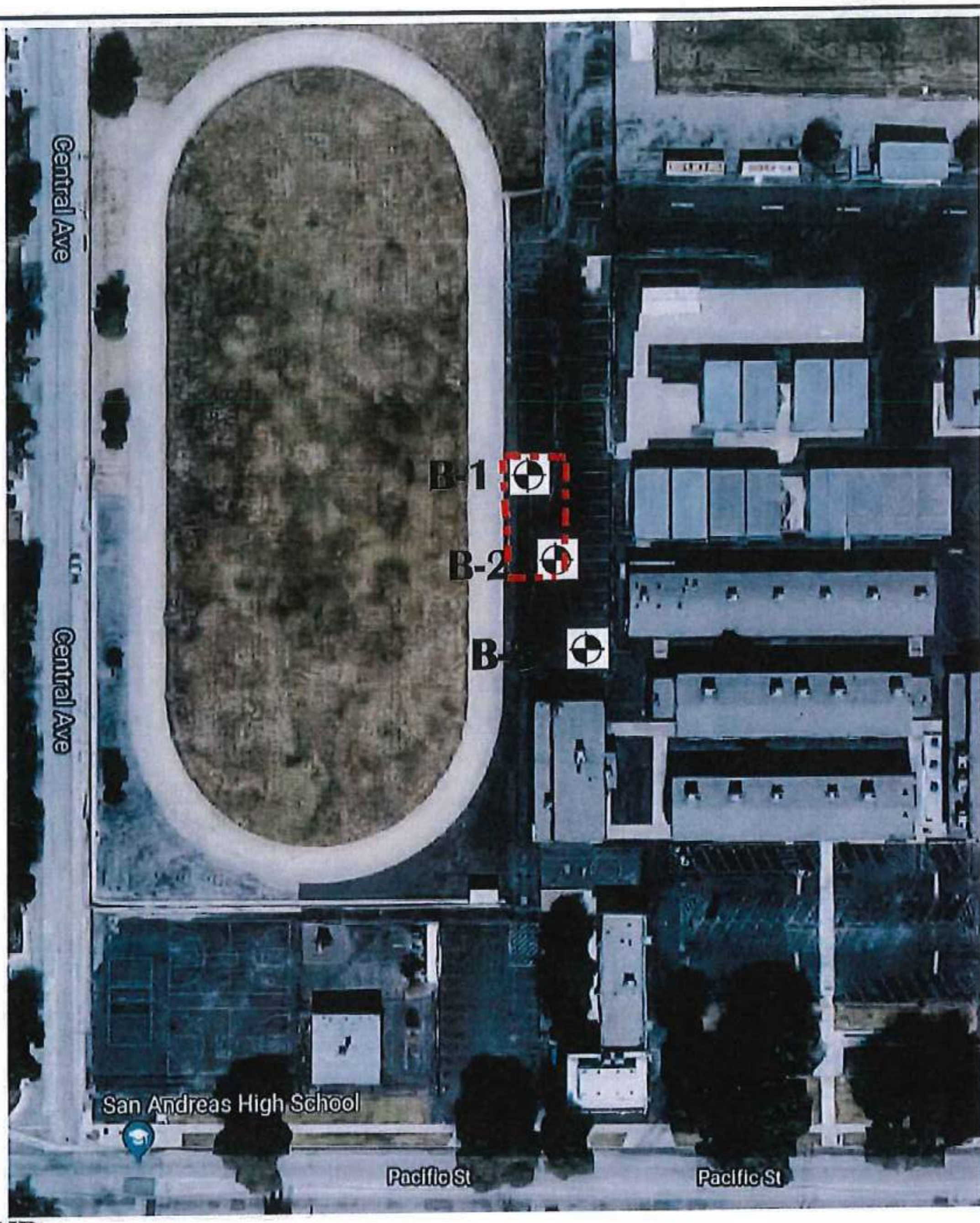
FIGURES

Source: Google Maps

SITE VICINITY MAP

APPROXIMATE LOCATION

GEOTECHNICAL INVESTIGATION San Andreas High School Growing Hope 3232 pacific Street, Highland, California	Project Number: 1705A46
	Scale: Not to Scale
	Date: 09-12-18
	Figure No. 1



N

LEGEND

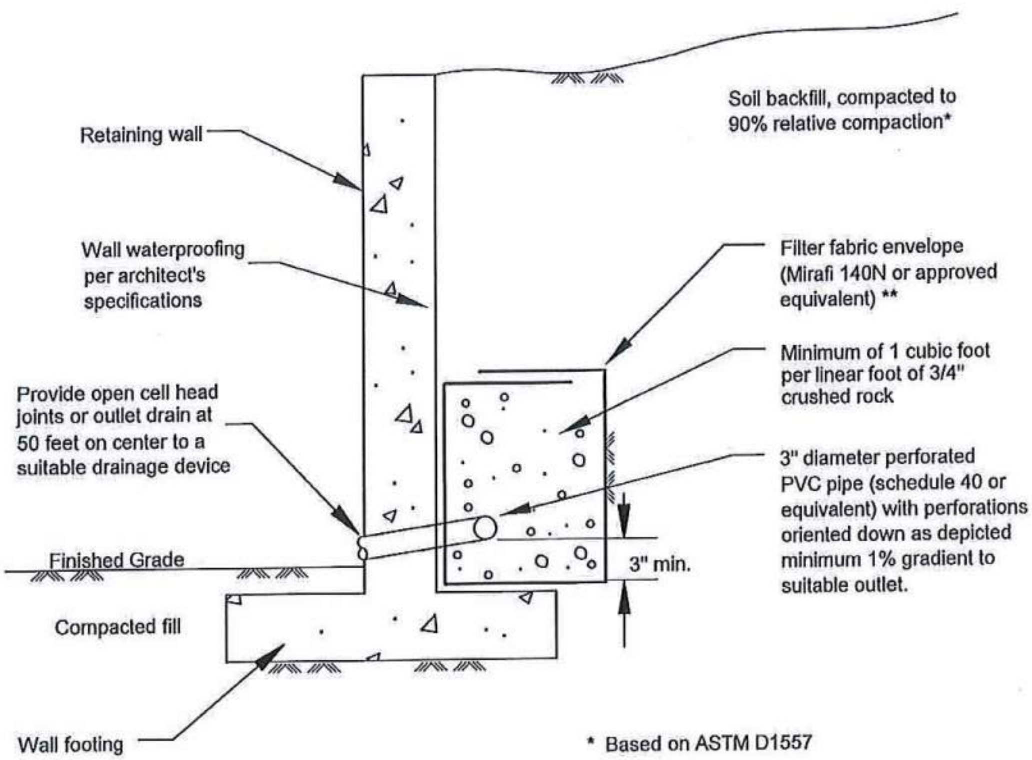
B-1 Boring Location

BORING LOCATION MAP

Source: Google Maps.

Approximate Location of Proposed Greenhouse

GEOTECHNICAL INVESTIGATION San Andreas High School Growing Hope 3232 Pacific Street, Highland, California	Project Number: 1705A46
	Scale: Not to Scale
	Date: 09-12-18
	Figure No. 2



* Based on ASTM D1557

** If class 2 permeable material (See gradation to left) is used in place of 3/4" - 1 1/2" gravel. Filter fabric may be deleted. Class 2 permeable material compacted to 90% relative compaction. *

SPECIFICATIONS FOR CLASS 2 PERMEABLE MATERIAL (CAL TRANS SPECIFICATIONS)

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

RETAINING WALL DRAINAGE DETAIL

Figure 3

APPENDIX A

REFERENCES

Appendix A

References

Anderson Geology Consulting, LLC, 2018, Limited Engineering Geologic Hazard Evaluation of Property, San Andreas High School, 3232 Pacific Street, Highland, California 92346, Project No. 18030-01, dated August 20, 2018 (included in Appendix D of this report).

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APPENDIX B

FIELD EXPLORATION PROGRAM

APPENDIX B

FIELD EXPLORATION PROGRAM

The subsurface conditions for this Geotechnical Investigation were explored by excavating exploratory borings with an 8-inch hollow-stem-auger to a maximum depth of 28.0 feet below existing grade. All drive samples were obtained by California Tube Sampler. The approximate locations of the borings are shown on the Boring Location Plan (Figure 2). The field exploration was performed under the supervision of a Geotechnical Engineer who maintained a continuous log of the subsurface soils encountered and obtained samples for laboratory testing.

Subsurface conditions are summarized on the accompanying Logs of Borings. The logs contain factual information and interpretation of subsurface conditions between samples. The stratum indicated on these logs represents the approximate boundary between earth units and the transition may be gradual. The logs show subsurface conditions at the dates and locations indicated, and may not be representative of subsurface conditions at other locations and times.

Identification of the soils encountered during the subsurface exploration was made using the field identification procedure of the Unified Soils Classification System (ASTM D2488). A legend indicating the symbols and definitions used in this classification system and a legend defining the terms used in describing the relative compaction, consistency or firmness of the soil are attached in this appendix. Bag samples of the major earth units were obtained for laboratory inspection and testing, and the in-place density of the various strata encountered in the exploration was determined

The exploratory borings were located in the field by using cultural features depicted on a preliminary site plan provided by the client. Each location should be considered accurate only to the scale and detail of the plan utilized.

The exploratory borings were backfilled with native soil cuttings, compacted, and patched where appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM					
No. 200 U.S. Standard Sieve is the smallest particle visible	Coarse-grained soils >1/2 of materials is larger than #200 sieve	GRAVELS are more than half of coarse fraction larger than #4 sieve	Clean Gravels (less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
			Gravels with fines	GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
		SANDS are more than half of coarse fraction larger than #4 sieve	Clean Sands (less than 5% fines)	GM	Silty Gravels, poorly-graded gravel-sand-silt mixtures
			Sands with fines	GC	Clayey Gravels, poorly-graded gravel-sand-clay mixtures
	Fine-grained Soils >1/2 of materials is smaller than #200 sieve	SILTS AND CLAYS Liquid Limit Less than 50		SW	Well-graded sands, gravelly sands, little or no fines
				SP	Poorly-graded sands, gravelly sands, little or no fines
				SM	Silty Sands, poorly-graded sands-gravel-clay mixtures
				SC	Clayey Sands, poorly-graded sand-gravel-silt mixtures
				ML	Inorganic clays of low to med plasticity, gravelly, sandy, silty, or lean clays
		SILTS AND CLAYS Liquid Limit Greater than 50		CL	Inorganic clays of low to med plasticity, gravelly, sandy, silty, or lean clays
				OL	Organic silts and clays of low plasticity
				MH	Inorganic silts, micaceous or diatomaceous fine sands or silts
				CH	Inorganic clays of high plasticity, fat clays
				OH	Organic silts and clays of medium to high plasticity
Highly Organic Soils				PT	Peat, humus swamp soils with high organic content

GRAIN SIZE				
Description		Sieve Size	Grain Size	Approximate Size
Boulders		>12"	>12"	Larger than basketball-sized
Cobbles		3"- 12"	3"- 12"	Fist-sized to basketball-sized
Gravel	Coarse	¾"- 3"	¾"- 3"	Thumb-sized
	Fine	#4 - ¾"	0.19" - 0.75"	Peat-sized to thumb-sized
Sand	Coarse	#10 - #4	0.079" - 0.19"	Rock salt-sized to pea-sized
	Medium	#40 - #10	0.017" - 0.079"	Sugar-sized to rock salt-sized
	Fine	#200 - #40	0.0029" - 0.017"	Flour-sized to sugar-sized
Fines		Passing #200	<0.0029"	Flour-sized or smaller

SIZE PROPORTION
Trace – Less than 5%
Few – 5% to 10%
Little – 15% to 20%
Some – 30% to 45%
Mostly – 50% to 100%

MOISTURE CONTENT
Dry – Absence of moisture
Moist – Damp but not visible
Wet – Visible free water

CONSISTENCY FINE GRAINED SOILS		
Apparent Density	SPT (Blows/Foot)	Mod CA Sampler (Blows/Foot)
Very Soft	<2	<3
Soft	2-4	3-6
Firm	5-8	7-12
Stiff	9-15	13-25
Very Stiff	16-30	26-50
Hard	>30	>50

RELATIVE DENSITY COARSE GRAINED SOILS		
Apparent Density	SPT (Blows/Foot)	Mod CA Sampler (Blows/Foot)
Very Loose	<4	<5
Loose	4-10	5-12
Medium Dense	11-30	13-35
Dense	31-50	36-60
Very Dense	>50	>60

BORING NO. 1

Logged by: BAH
Method of Drilling: 8-inch diameter hollw-stem auger - CME 75
Date Drilled: 8/10/2018
Elevation: 1261' msl

DEPTH (FT)	BLOWS PER FT	DRIVE SAMPLE	BULK SAMPLE	DENSITY (PCF)	MOISTURE (%)	DESCRIPTION	LAB TESTS
0–1						3" Asphalt Concrete at Surface	
2	8	CAL		97	8.1	Alluvium: Silty Sand (SM), moderate brown, fine to medium, slightly moist , loose.	Maximum Density & Optimum Moisture, Expansion Index, Remolded Shear
3						2" Gravel at 2.5 feet.	
4	6	CAL		104	6.6		Sieve Analysis
6	24	CAL		105	6.8	Alluvium: Silty Sand (SM), moderate brown, fine to medium, slightly moist , medium dense.	Consolidation
8	28	CAL		115	5.6		
11	55	CAL		116	2.7	Alluvium: Sand (SP), light brown, fine to medium, with gravel, slightly moist , dense.	
16	49	CAL		115	10.7		
18						Alluvium: Silty Sand (SM), moderate brown, fine to medium, with gravel, slightly moist, dense.	
21	52	CAL		116	9.0		
26	62	CAL		116	4.9		
28						Boring refusal at 28 feet due to encountering a boulder. Total Depth: 28 feet Groundwater not encountered Backfilled with tailings on 8/10/2018	

BORING NO. 2

Logged by: BAH
Method of Drilling: 8-inch diameter hollow-stem auger - CME 75

Date Drilled: 8/10/2018
Elevation: 1262' msl

DEPTH (FT)	BLOWS PER FT	DRIVE SAMPLE	BULK SAMPLE	DENSITY (PCF)	MOISTURE (%)	DESCRIPTION	LAB TESTS
						2" Asphalt Concrete at Surface	
1						Alluvium: Silty Sand (SM), moderate brown, fine to medium, slightly moist, loose.	
2							
3	5	CAL		93	7.1		Sieve Analysis
4							
5	5	CAL		102	5.7		
6							
7	20	CAL		105	4.8	Alluvium: Silty Sand (SM), moderate brown, fine to medium, slightly moist, medium dense.	
8							
9	27	CAL		106	4.3		
10							
11	22	CAL		105	4.2		Consolidation
12						Alluvium: Sand (SP), light brown, fine to medium, with gravel, slightly moist , dense.	
13							
14							
15							
16	39	CAL		115	4.6		
17							
18							
19							
20						2" Gravel	
21	50	CAL		119	4.8	Total Depth: 21.0 feet Groundwater not encountered Backfilled with tailings on 8/10/18	
22							
23							
24							
25							
26							
27							
28							
29							
30							

BORING NO. 3

Logged by: BAH
Method of Drilling: 8-inch diameter hollow-stem auger - CME 75

Date Drilled: 8/10/2018
Elevation: 1262' msl

DEPTH (FT)	BLOWS PER FT	DRIVE SAMPLE	BULK SAMPLE	DENSITY (PCF)	MOISTURE (%)	DESCRIPTION	LAB TESTS
						2" Asphalt Concrete at Surface	R-Value Soil Corrosion
1						<u>Alluvium: Silty Sand (SM), moderate brown, fine, slightly moist, medium dense.</u>	
2							
3	4	CAL					
4							
5							
6	26	CAL				<u>Alluvium:</u> Silty Sand (SM), moderate brown, fine to medium, slightly moist, medium dense.	
7							
8	26	CAL					
9							
10						<u>Alluvium:</u> Sand (SP), light brown, fine to medium, with gravel, slightly moist , dense.	
11	51	CAL					
12						Total Depth: 11.0 feet Groundwater not encountered Backfilled with tailings on 8/10/18	
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							

APPENDIX C

LABORATORY TESTING PROCEDURES

Appendix C

Laboratory Testing Procedures

1. Classification
   Soils were classified visually, generally according to the Unified Soil Classification System. Classification tests were also completed on representative samples in accordance with ASTM D422 for Grain Size. The test results are attached to this appendix.

2. Maximum Density
   Maximum density tests were performed on a representative bag sample of the near surface soils in accordance with ASTM D1557.

3. Direct Shear
   Direct Shear Tests were performed on in-place and remolded samples of site soils in accordance with ASTM D3080. Graphical plots of the tests are included in this appendix.

4. Consolidation
   Consolidation tests were performed on representative, relatively undisturbed samples of the underlying soils to determine compressibility characteristics in accordance with ASTM D2435. Test results are presented in this appendix.

5. R-Value Testing
   R-Value testing was completed in substantial compliance with Caltrans Test Method 301. Graphical plots of the tests are included in this appendix.

6. Expansion Index
   Expansion Index testing was completed in accordance with the standard test method ASTM D4829. Test results are presented below.

Sample Location	Expansion Index	Expansion Classification
B-1 @ 0-5 ft	2	Very Low

7. Corrosion

Chemical testing was performed on representative samples to determine the corrosion potential of the onsite soils. Testing consisted of pH, chlorides (CTM 422), soluble sulfates (CTM 417), and resistivity (CTM 643). Test results are as follows:

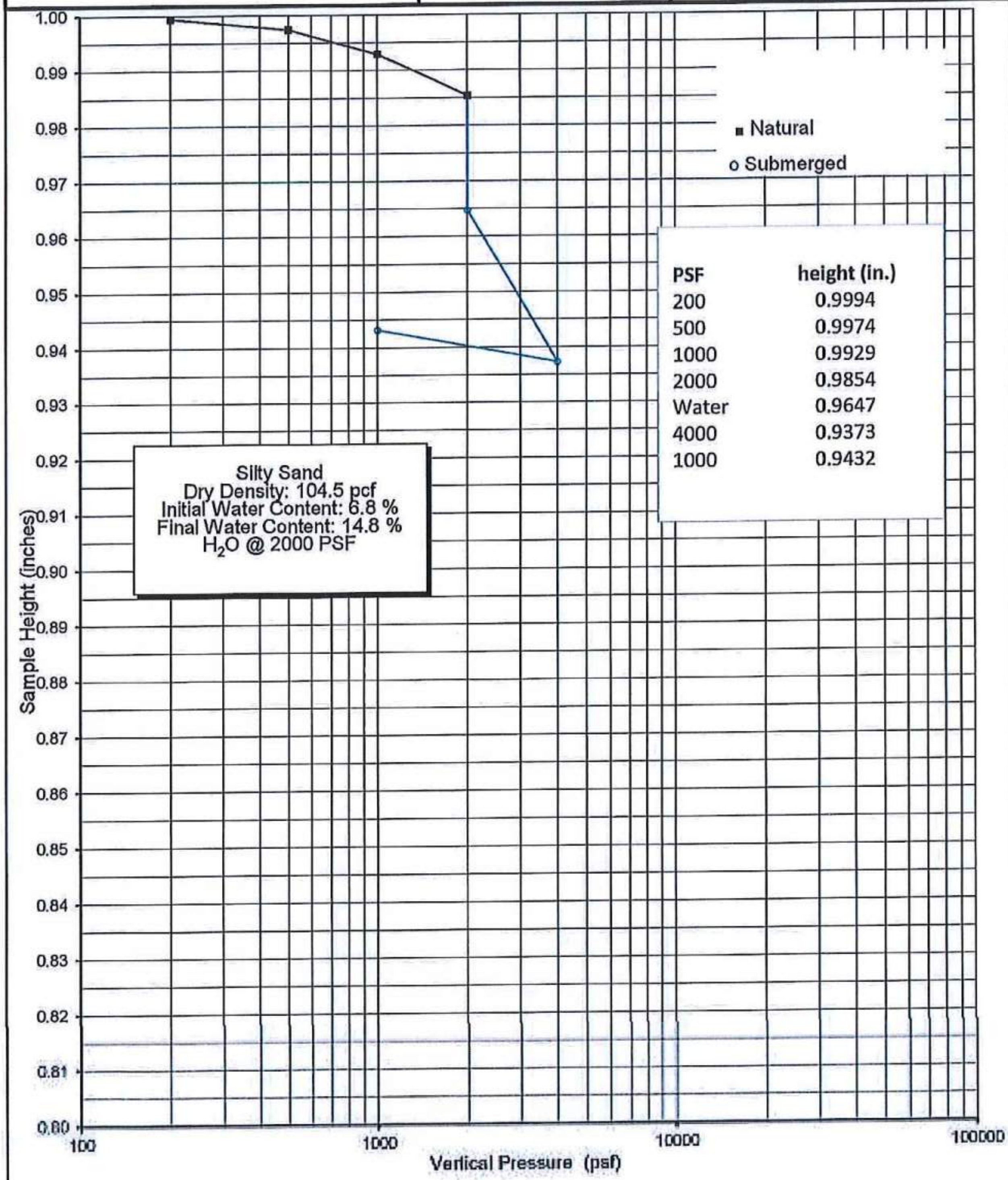
Sample Location	pH	Chlorides (ppm)	Sulfates (ppm)	Resistivity (ohm-cm
B-3 @ 0-5 ft	7.2	108	193	6,100

MTGL # 1705A46

CONSOLIDATION TEST - ASTM D2435

Job No. 2012-0123

Boring / Sample No.	B-1	Depth:	5.0'	Date	08-22-18



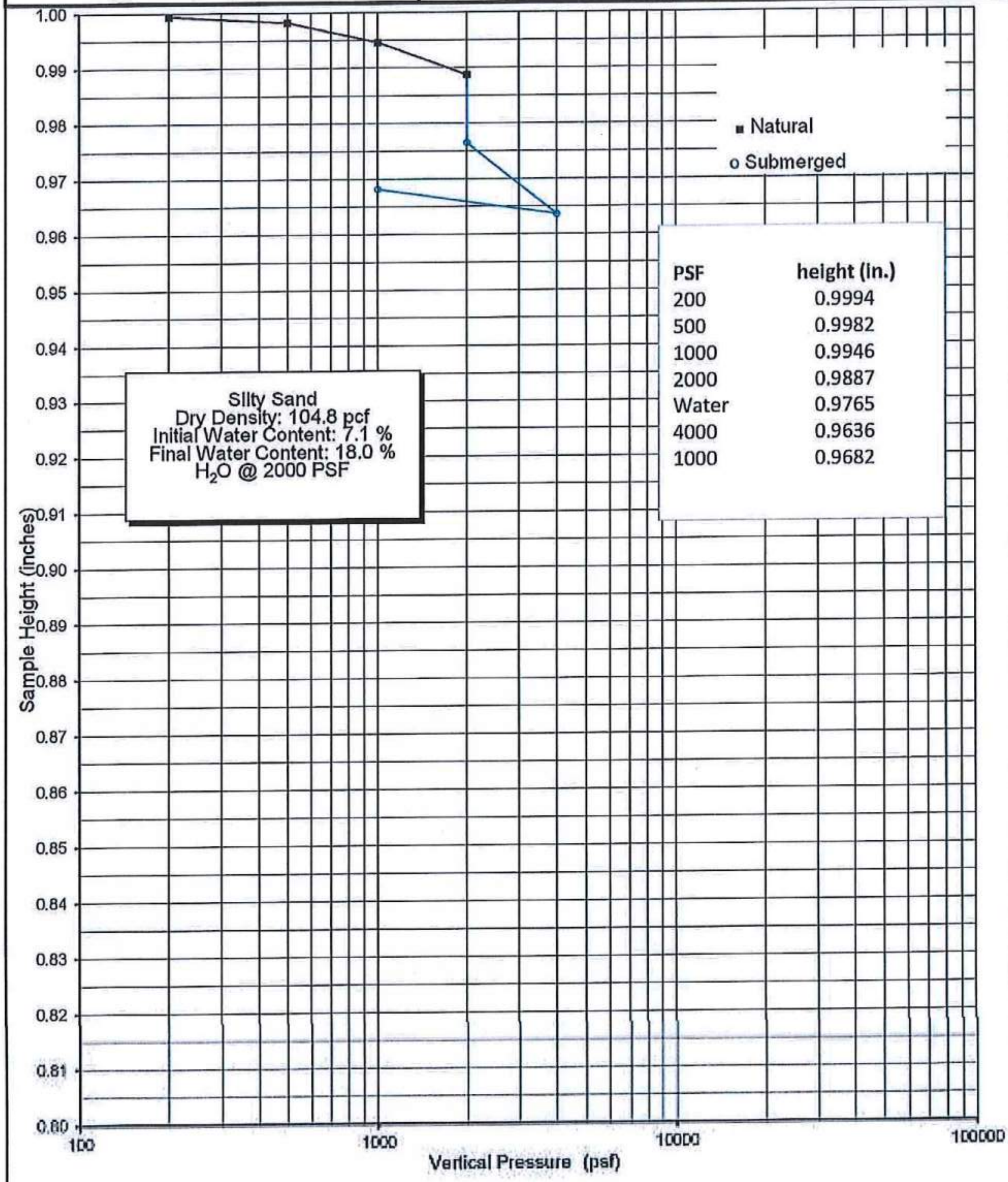
Geo-Logic

MTGL # 1705A46

CONSOLIDATION TEST - ASTM D2435

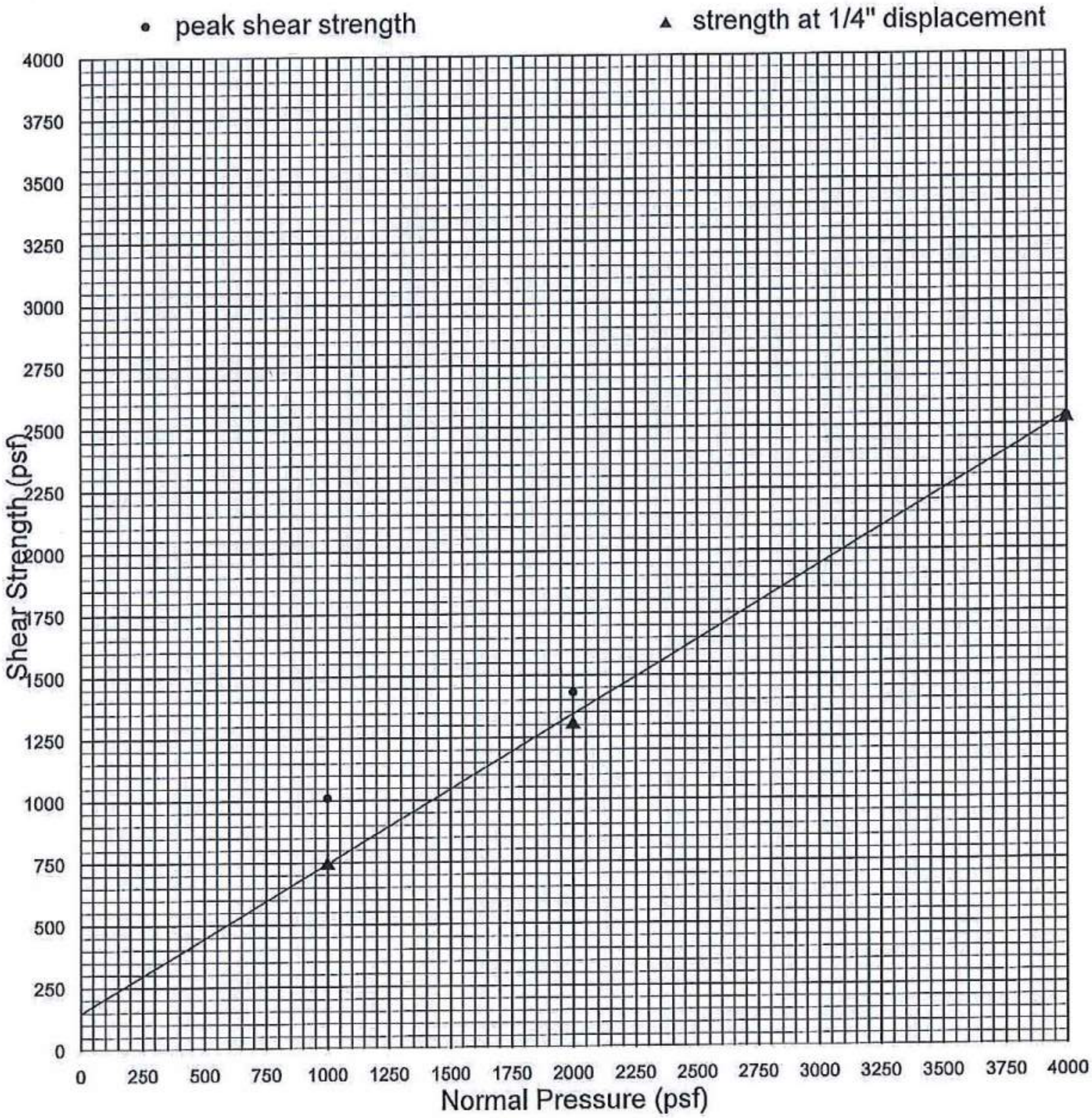
Job No. 2012-0123

Boring / Sample No.	B-2	Depth:	10.0'	Date	08-22-18



Geo-Logic

DIRECT SHEAR TEST - ASTM D-3080



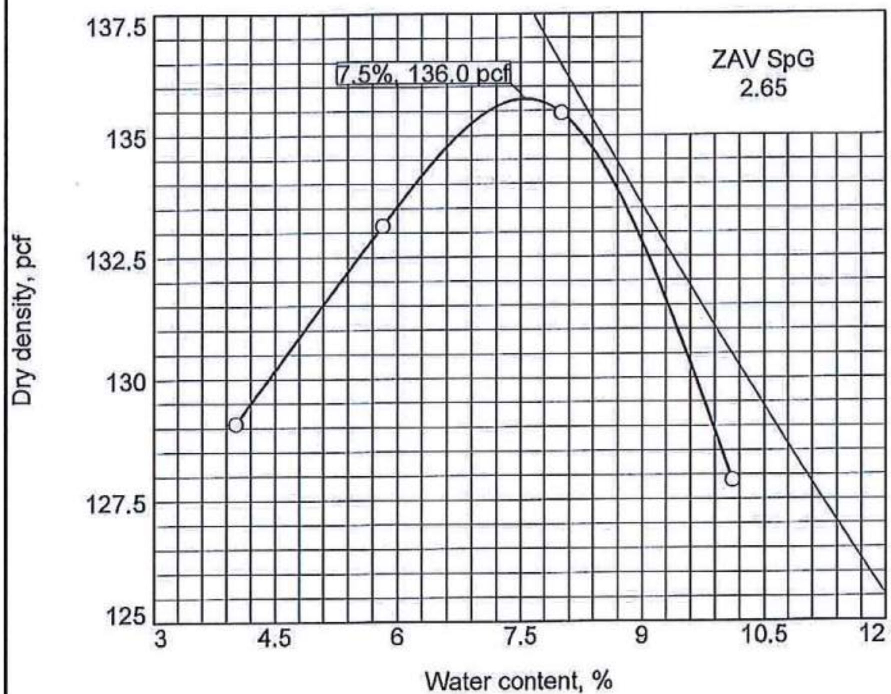
Strain Rate: 0.0084 in. / min.

Sample	**Type**	**Description**
B-1 @ 0 - 5'	Remolded @ 90% Max & Saturated	D. Brown, Sandy Silt w. trace Clay

Normal Pressure (psf)	Peak Shear Strength (psf)	Ultimate Shear Strength (psf)
1000	1010 @ 0.1450"	740
2000	1430 @ 0.0850"	1300
4000	2530 @ 0.2005"	2520
	C = 150 psf	C = 150 psf
	ϕ = 31 deg.	ϕ = 31 deg.

COMPACTION TEST REPORT

Curve No.
545



Test Specification:
ASTM D 1557-12 Method B Modified

Preparation Method MOIST
Hammer Wt. 10 lb.
Hammer Drop 18 in.
Number of Layers five
Blows per Layer 25
Mold Size 0.03333 cu. ft.
Test Performed on Material Passing 3/8 in. **Sieve**

NM ____ **LL** ____ **PI** ____
Sp.G. (ASTM D 854) 2.65
%>3/8 in. ____ **%<No.200** ____
USCS (ML) **AASHTO** ____
Date Sampled ____
Date Tested 85/15/18
Tested By RS

TESTING DATA

	1	2	3	4	5	6
WM + WS	6263.0	6345.0	6262.0	6163.0		
WM	4133.0	4133.0	4133.0	4133.0		
WW + T #1	287.4	262.9	286.4	253.9		
WD + T #1	271.6	243.4	260.1	244.1		
TARE #1	0.0	0.0	0.0	0.0		
WW + T #2						
WD + T #2						
TARE #2						
MOISTURE	5.8	8.0	10.1	4.0		
DRY DENSITY	133.1	135.5	127.9	129.1		

TEST RESULTS

Maximum dry density = 136.0 pcf

Optimum moisture = 7.5 %

Material Description

DRK BRN SANDY SILT W GRAVEL AND TRACE CLAY

Remarks:
SAMPLED BY: B HICKS

Project No. 1705A46 **Client:**
Project: SAN ANDREAS HS GREEN HOUSE

o **Location:** B1 @ 0-5' **Sample Number:** 545

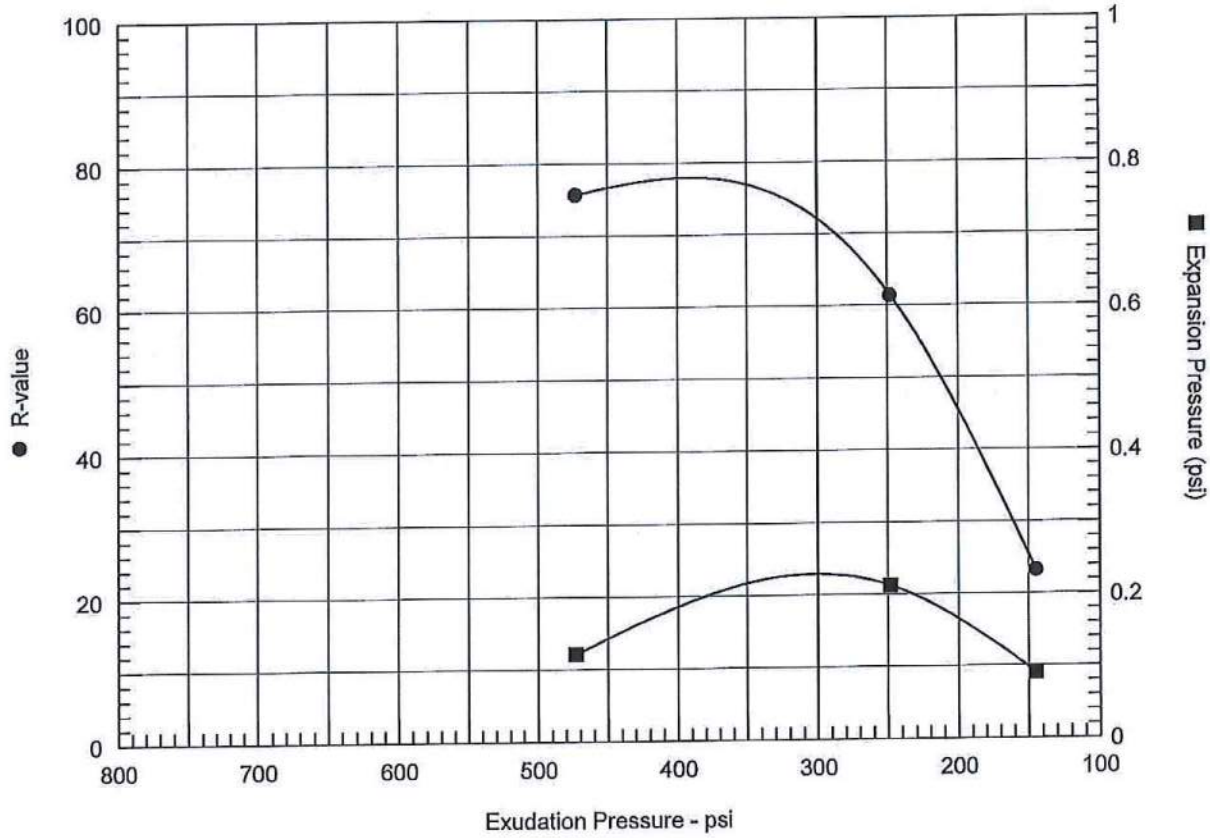
MTGL, Inc.

Anaheim, CA

Checked by: CF
Title: LAB MGR

Figure

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	200	139.7	0.0	0.09	99	2.55	145	23.2	23.2
2	350	141.0	0.0	0.21	40	2.50	248	61.4	61.4
3	350	139.9	0.0	0.12	26	2.50	473	75.7	75.7

Test Results

R-value at 300 psi exudation pressure = 72.1

Exp. pressure at 300 psi exudation pressure = 0.23 psi

Material Description

BRN SILTY SAND W GRAVEL

Project No.: 1705A46

Project: SAN ANDREAS HS GREEN HOUSE

Location: B3 @ 0-5'

Sample Number: 545

Date: 8/22/2018

Tested by: RS

Checked by: CF

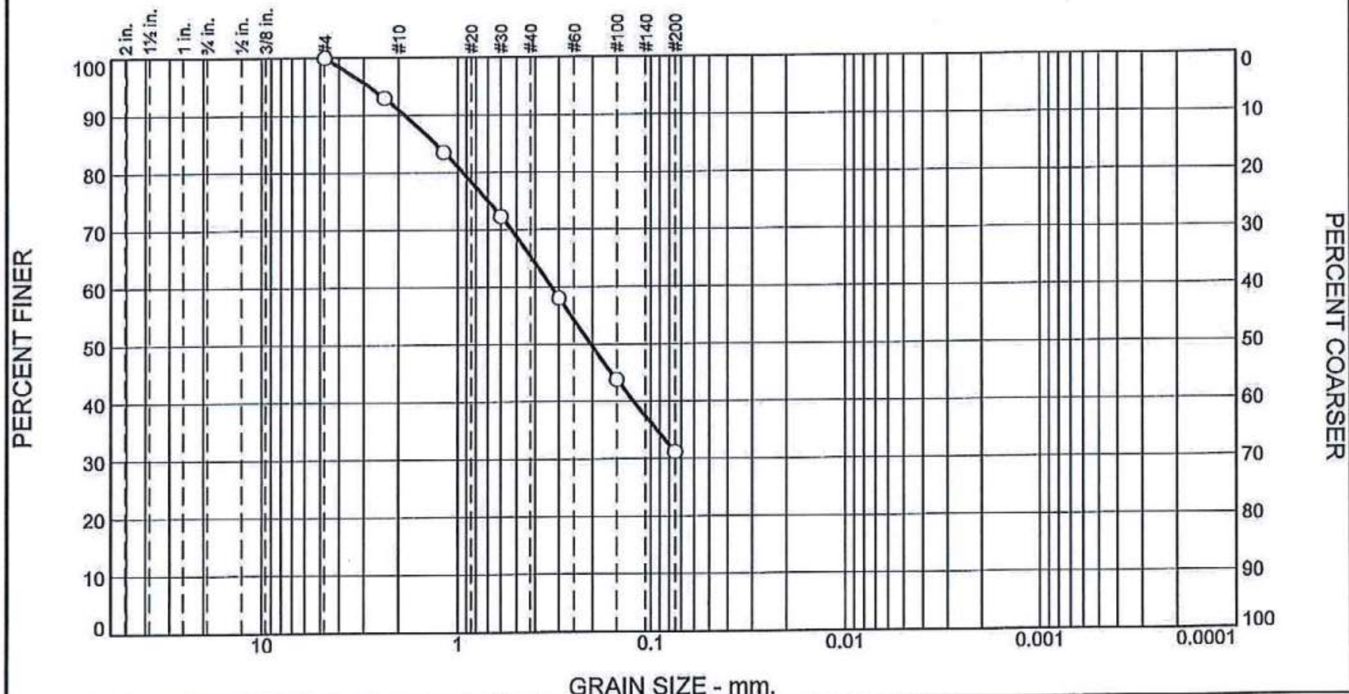
Remarks:
SAMPLED BY: B HICKS

R-VALUE TEST REPORT

MTGL, Inc.

Figure ______

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	9.0	25.6	34.2	31.2	

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#8	93.0		
#16	83.6		
#30	72.3		
#50	58.0		
#100	43.8		
#200	31.2		

* (no specification provided)

Material Description

DRK BRN SILTY SAND W TRACE PEA GRAVEL

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= AASHTO (M 145)=

Coefficients

D_{90}= 1.8578 D_{85}= 1.3002 D_{60}= 0.3296
D_{50}= 0.2049 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Remarks

SAMPLED BY: B HICKS
F.M.=1.49

Date Received: **Date Tested:** 8/20/18

Tested By: RS

Checked By: CF

Title: LAB MGR

Location: B2 @ 2'
Sample Number: 545

Date Sampled: 8/14/18

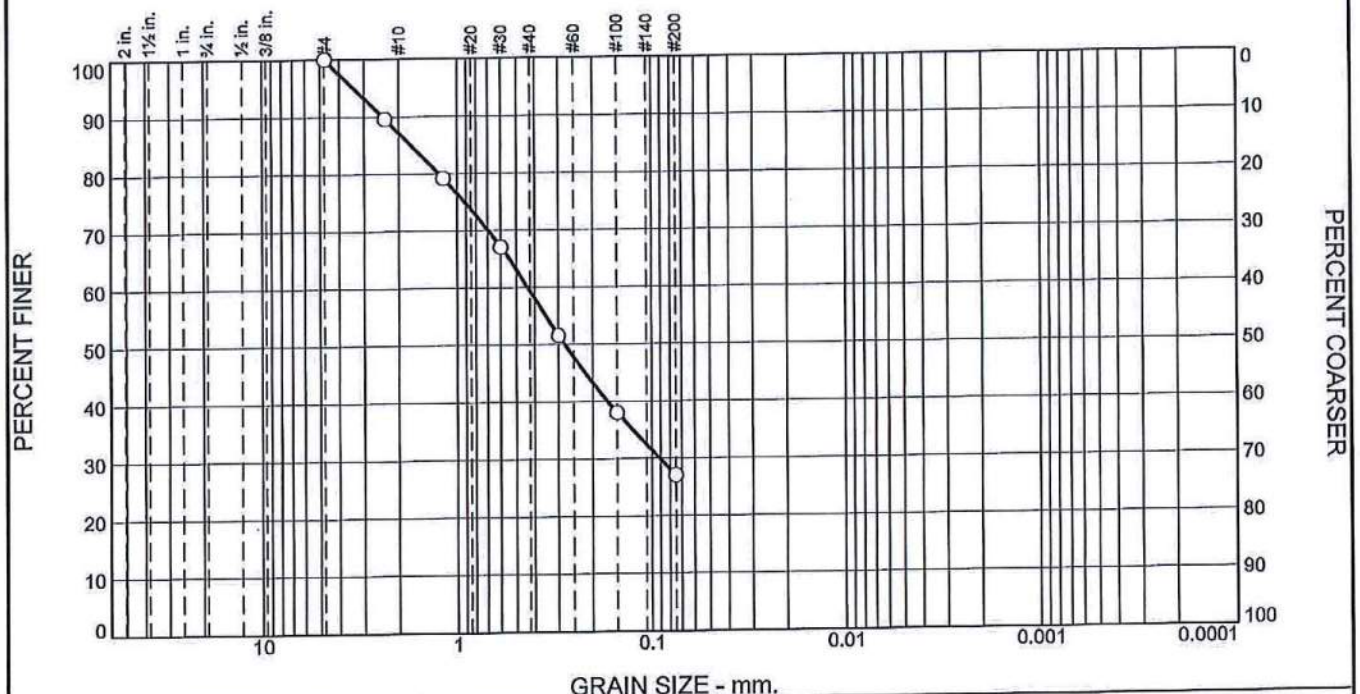
MTGL, Inc.

Anaheim, CA

Client:
Project: SAN ANDREAS HS GREEN HOUSE

Project No: 1705A46 **Figure**

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	12.9	27.7	32.3	27.1	

Test Results (ASTM C 136 & ASTM C 117)

Opening Size	Percent Finer	Spec.* (Percent)	Pass? (X=Fail)
#4	100.0		
#8	89.6		
#16	79.2		
#30	67.1		
#50	51.5		
#100	38.0		
#200	27.1		

* (no specification provided)

Material Description

LT BRN SILTY SAND W TRACE PEA GRAVEL

Atterberg Limits (ASTM D 4318)

PL= LL= PI=

Classification

USCS (D 2487)= AASHTO (M 145)=

Coefficients

D_{90}= 2.4320 D_{85}= 1.7311 D_{60}= 0.4354
D_{50}= 0.2797 D_{30}= 0.0909 D_{15}=
D_{10}= C_u= C_c=

Remarks

SAMPLED BY: B HICKS
F.M.=1.75

Date Received: **Date Tested:** 8/20/18

Tested By: RS

Checked By: CF

Title: LAB MGR

Location: B1 @ 3
Sample Number: 545

Date Sampled: 8/14/18

MTGL, Inc.

Anaheim, CA

Client:
Project: SAN ANDREAS HS GREEN HOUSE

Project No: 1705A46 **Figure**

ANAHEIM TEST LAB, INC

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

DATE: 08/20/18

MTGL, INC.
2992 LA PALMA AVE. #A
ANAHEIM, CA 92806

P.O. NO: Transmittal

LAB NO: C-2162

SPECIFICATION: CTM-417/422/643

MATERIAL: Dark Brown, Sandy Silt w. trace Gravel & trace Clay

PROJECT #: 1705A46

San Andreas High School
Greenhouse
Date sampled: 08/14/18
Sample No.: 1
Lab No.: 545

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

	PH	SOLUBLE SULFATES per CT. 417 ppm	SOLUBLE CHLORIDES per CT. 422 ppm	MIN. RESISTIVITY per CT. 643 ohm-cm
B-3 @ 0-5'	7.2	193	108	6,100

RESPECTFULLY SUBMITTED

WES BRIDGER CHEMIST

APPENDIX D

"Limited Engineering Geologic Hazard Evaluation of Property"
Anderson Geology Consulting, LLC,
Project No. 18030-01,
Dated August 20, 2018

August 20, 2018

Project No. 18030-01

To: MTGL Inc.
2992 East La Palma Avenue, Suite A
Anaheim, California 92806

Attention: Mr. Pablo Naranjo

Subject: Limited Engineering Geologic Hazard Evaluation of Property
San Andreas High School
3232 Pacific Street, Highland, California 92346

Introduction

At your request, ANDERSON GEOLOGY CONSULTING, LLC. (AG) has prepared a limited engineering geologic hazard evaluation for the proposed improvements to San Andreas High School, 3232 Pacific Street, Highland, California (Figure 1). It is our understanding that the proposed improvements include construction of a new green house structure within an asphalt paved area along the east edge of the existing track at the subject site. The purpose of this evaluation was to characterize site geologic and geotechnical conditions, to assess potential geologic and seismic hazards, and to provide generalized conclusions and recommendations with respect to the impact of the identified hazards to the proposed onsite development. This hazard evaluation has been prepared in general conformance with the *Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings (CGS Note 48, 2013).*

Scope of Services

- Review of the referenced geologic maps and reports for the subject site and surrounding area.
- Review of site specific geotechnical data provided by MTGL;
- Seismic and geologic hazard analysis for the site and surrounding area; and
- Preparation of this report and its illustrations.

This report presents our findings, conclusions and recommendations of a limited engineering geologic hazard evaluation for the proposed improvements to the subject site. It should be noted that this hazard evaluation did not include any subsurface exploration and it is understood that in-depth investigation of soil, geologic and foundation conditions, beyond those provided by MTGL regarding the subject property, are outside the scope of services requested. This work does not warranty the future performance of the property in any respect, nor does the work constitute an approval or certification of prior work by other geotechnical consultants. The scope of work does not include laboratory testing of soil samples, nor specific recommendations for design and construction of the proposed improvements.

List of Illustrations

Site Location and History

The subject site is located at 3232 Pacific Street, Highland, California (Figure 1). The site is bounded to the north by the 210 Freeway, east by the Highland Pacific Elementary School, south by Pacific Street and west by Central Avenue. The site is largely surrounded by residential properties.

The site consists of an approximately level building pad along gently southwest sloping natural ground. Maximum grade changes of 40 feet are identified across the site (Google Earth, 2018). Grade changes are accommodated through gently sloping ground and low height retaining walls throughout the site. No significant slopes or retaining structures (>6ft high) were identified onsite. The site is currently developed as a public High School (San Andreas High School- San Bernardino City Unified School District) and is developed with classrooms, office and administrative space, athletic facilities, associated structures, asphalt paved parking and utility infrastructure.

No information regarding past site grading or development was readily available through the City of Highland for the subject site and surrounding area. Past grading is anticipated to have occurred during construction of the building pads and associated structures, retaining walls, as well as during construction of the adjacent streets and utility infrastructure.

Geologic Setting

The property is regionally located at the intersection of the east-central boundary of the Transverse Range Provence, southern boundary of the Mojave Desert Provence and the north boundary of the Peninsular Ranges Geomorphic Province of Southern California. Locally the site is situated within the northeastern portion of the Los Angeles Basin near the foothills of the San Bernardino Mountains. The site is bounded to the north by the San Andreas Fault Zone and to the south-southwest by the San Jacinto Fault Zone. Based on regional geologic mapping (USGS, 2003) the site is anticipated to be underlain by late to middle Pleistocene age, old alluvial fan deposits (Qof) derived from the adjacent San Bernardino Mountains. Based on exploratory borings performed by MTGL (2018) the site is underlain by medium brown silty to coarse-grained sand with scattered gravel lenses and boulders to a maximum depth explored of 28-feet below existing ground surface (bgs). Bedrock was not encountered during MTGL's site exploration and is not anticipated to be encountered during construction.

Earth Materials

Exploratory borings performed by MTGL (2018) indicate that the site is underlain at the surface by loose to medium dense alluvial fan deposits. The alluvial deposits consist predominantly of loose to medium dense silty fine to coarse-grained sands in the upper approximately 10-feet, grading to medium dense gravelly sand below. The alluvial deposits are reported to be generally damp to slightly moist. Groundwater was not encountered to a maximum drilled depth of 28-feet bgs.

GEOLOGIC HAZARDS

Structure

The alluvial deposits exposed at the site are generally massive silty to coarse-grained sandy sediments and have no significant geologic structure. The underlying bedrock is not exposed at the site, and is anticipated to be located at a depth of greater than 50-feet below existing ground surface. Since the bedrock is not present within sloping areas, and is covered by a massive sequence of alluvial fan deposits, there is no known adverse geologic bedding structure that is likely to affect stability at the site.

Slope Stability

Our findings indicate that the site is composed of massive alluvial deposits with no significant geologic structure. No evidence of deep-seated gross instability was noted at the site during our literature and map review, or during MTGL's site-specific investigation. Based upon the past performance of the site and nearby slopes, the site appears to have performed well since the site was originally constructed.

Slope creep is not expected to be significant on this lot due to the relatively flat nature of the site and the lack of plasticity within the on-site sands. Other slope effects such as erosion should not adversely affect proposed improvements providing appropriate foundation setbacks are utilized, runoff is controlled and slopes and drainage features are properly maintained.

To our understanding, no slope modifications are planned as part of the proposed construction. Planned structures are expected to obtain bearing at depths and setbacks outside of the influence of the existing slopes and or adjacent retaining walls. Any planned building structures that are constructed along the top of slopes should be constructed with deepened foundation elements as necessary to maintain setbacks from the bottom of the footings at least equal to a horizontal distance of H/3 to the slope surface. Perimeter footings should not be allowed to surcharge existing retaining walls on adjoining properties. In general, these conditions are not expected to affect foundation construction based on current conceptual plans.

Groundwater

Groundwater was not encountered during MTGL's site exploration to a maximum drilled depth of 28-feet bgs. Perched groundwater can occur at shallow depth within the alluvial deposits and at the alluvium-bedrock contact. Groundwater is anticipated to remain at depths greater than 25-feet and is not anticipated to be a significant design or construction constraint, provided proper surface drainage and subdrainage systems (if necessary) are incorporated into the project.

Water Infiltration

On-site water infiltration is not recommended due to potentially high permeability rates within the subsurface sands and the potential for hydro-collapse of surficial soils. Introduction of subsurface water could adversely impact the site and neighboring properties. Surface and subsurface drainage should be directed toward approved offsite outlets.

Surficial Runoff

Proposed development should incorporate engineering and landscape drainage designed to transmit surface flow to the street and/or storm drain system via non-erosive pathways. Care should be taken to not allow water to pond or infiltrate soil adjacent to foundation elements.

Faulting / Seismic Considerations

The major concern relating to geologic faults is ground shaking that affects many properties over a wide area. Direct hazards from faulting are essentially due to surface rupture along fault lines that could occur during an earthquake. Therefore, geologists have mapped fault locations and established a criteria for determining the risks of potential surface rupture based on the likelihood of renewed movement on faults that could be located under a site.

Based on criteria established by the California Division of Mines and Geology (CDMG), now referred to as the California Geological Survey (CGS), faults are generally categorized as active, potentially active or inactive (Jennings, 1994). The basic principle of faulting concern is that existing faults could move again, and that faults which have moved more recently are the most likely faults to move again and affect us. As such, faults have been divided into categories based on their age of last movement. Although the likelihood of an earthquake or movement to occur on a given fault significantly decreases with inactivity over geologic time, the potential for such events to occur on any fault cannot be eliminated within the current level of understanding.

By definition, faults with no evidence of surface displacement within the last 1.6 million years are considered inactive and generally pose no concern for earthquakes due to renewed movement. Potentially-active faults are those with the surface displacement within the last 1.6 million years. Further refinement of potentially active faults are sometimes described based on the age of the last known movement such as late Quaternary (last 700,000 years) implying a greater potential for renewed movement. In fact, most potentially active faults have little likelihood of moving within the time frame of construction life, but the degree of understanding of fault age and activity is sometimes not well understood due to absence of geologic data or surface information, so geologists have acknowledged this doubt by using the term "potentially active." A few faults that were once thought to be potentially active, have later been found to be active based on new findings and mapping. Active faults are those with a surface displacement within the last 11,000 years and therefore most likely to move again. The State of California has, additionally, mapped known areas of active faulting as designated Alquist-Priolo (A-P) "Special Studies Zones," which requires special investigations for fault rupture to limit construction over active faults.

The site is not located within a fault-rupture hazard zone as defined by the Alquist-Priolo Special Studies Zones Act (CDMG, 1974) and no evidence of active faulting has been reported onsite (Figure 1). Also, based on mapping by the State (CGS, 2010 and Jennings, 1994), there are no active faults mapped at the site. The site is however bounded to the north by the San Andreas Fault Zone and to the south-southwest by the San Jacinto Fault Zone. Both of these fault zones are considered active and capable of producing significant ground shaking (magnitude 8+) during a seismic event.

The closest major active faults to the site are the San Andreas Fault located approximately 2.3 km north of the site (Figure 3) and the San Jacinto Fault located approximately 9.7 km to the southeast of the site.

CBC Seismic Ground Motion Analysis

The seismic design criteria based on the 2016 California Building Code (CBC) is presented in the following table:

Selected Seismic Design Parameters from 2016 CBC/ASCE 7-10	*Seismic Design Values*	*Reference*
Latitude	34.1298 North	
Longitude	-117.2164 West	
Nearest Seismic Source	San Andreas Fault	USGS 2014
Distance to Nearest Seismic Source	1.4 Miles (2.3 km)	USGS 2014
Site Class per Table 20.3-1 of ASCE 7-10	D	USGS, 2013
Spectral Acceleration for Short Periods (Ss)	2.410 g	USGS, 2013
Spectral Accelerations for 1-Second Periods (S1)	1.189 g	USGS, 2013
Site Coefficient F_a, Table 11.4-1 of ASCE 7-10	1.000	USGS, 2013
Site Coefficient F_v, Table 11.4-2 of ASCE 7-10	1.500	USGS, 2013
Design Spectral Response Acceleration at Short Periods (S_{DS}) from Equation 11.4-3 of ASCE 7-10	1.607 g	USGS, 2013
Design Spectral Response Acceleration at 1-Second Period (S_{D1}) from Equation 11.4-4 of ASCE 7-10	1.189 g	USGS, 2013
Peak Ground Acceleration (MCE_R) Corrected for Site Class Effects from Equation 11.8-1 of ASCE 7-10	0.929 g	USGS, 2013
Seismic Design Category, Section 11.6 of ASCE 7-10	D	USGS, 2013

Historical Seismicity

A search of recorded seismic events over the last 100 years within a 50km radius of the subject site was performed using the USGS website. A total of 51 seismic events with a magnitude of 4.5 or greater have occurred within a 50km radius since 1918. The closest seismic event was a 4.6 magnitude earthquake that occurred on October 2, 1985, approximately 11 km south-southwest of the site. The largest was a magnitude 6.3 Earthquake that occurred on June 28, 1992, approximately 35km northeast of the site. No earthquakes are reported to have occurred below the subject site, however, the site and surrounding area will be subject to significant shaking during seismic events on local and regional faults and future earthquakes should be anticipated.

Secondary Seismic Hazards

Review of the Public Health and Safety Element -City of Highland General Plan- (2006) indicates the site is not located within a zone of high liquefaction or landslide susceptibility. These findings are in keeping with the results of our study.

Other secondary seismic hazards to the site include deep rupture, shallow ground cracking, lurching with lateral movement and settlement. With the absence of active faulting onsite, the potential for deep fault rupture is not present. The potential for shallow ground cracking to occur during an earthquake is a possibility at any site, and may occur during significant seismic events on nearby faults. The potential for seismically induced lurching and settlement to occur is considered remote for the site. The potential for tsunami inundation at the site elevation is nil.

The site is not located within the 100-year or 500-year flood hazard areas or the 7 Oaks Dam failure hazard area as outlined by the City of Highland General Plan (2006).

CONCLUSION AND RECOMMENDATIONS

Based on our limited engineering geologic hazard evaluation of the subject site and our understanding of the proposed improvements, construction of the proposed green house structure appears feasible from an geologic hazard standpoint, providing our recommendations are considered during design, grading and construction of the proposed improvements.

Conclusions

The geologic hazards at the site are primarily from shaking due to movement of nearby or distant faults during earthquake events. The site consists of a flat lot located on a gently sloping alluvial fan of older alluvial sediments. There is no adverse geologic structure, active faulting beneath the site, shallow groundwater or other indications of geologic hazards that would affect the site as previously discussed.

- The subject site is anticipated to be underlain at depth by crystalline bedrock. The bedrock is overlain by old alluvial fan deposits. The alluvial deposits are anticipated to generally consist of medium dense silty sands with gravel. The near surface alluvial deposits are expected to have a very low expansion potential.
- No active faults are known to transect the site and therefore the site is not expected to be adversely affected by surface rupturing. It will, however, be affected by ground motions from earthquakes during the design life of the site. The potential for seismically induced liquefaction affecting the site is considered low.
- Groundwater is not expected to be a concern during construction. Suitable drainage elements need to be installed at retaining walls to mitigate possible transient seepage.
- The potential for land sliding affecting the site is considered to be very low given the gently sloping nature of the site and the massive nature of the alluvial deposits underlying the site.

Recommendations

The proposed improvements to the subject site should be designed and built in conformance with current California Building Code standards (2016, CBC) and ASCE standards (ASCE, 2010) as well as the requirements of the City of Highland. The recommendations provided by MTGL should also be implemented during design, grading and construction of the proposed improvements.

Limitations

This report has been prepared for the exclusive use of our client, MTGL Inc, within the scope of services requested by our client for the specific property at 3232 Pacific Street, City of Highland described herein. This report or its contents should not be used or relied upon for other projects or purposes, or by other parties without the acknowledgement of AG and the consultation of a geotechnical professional. The means and methods used by AG for this study are based on local geotechnical standards of practice, care, and requirements of governing agencies. No warranty or guarantee, expressed or implied, is given.

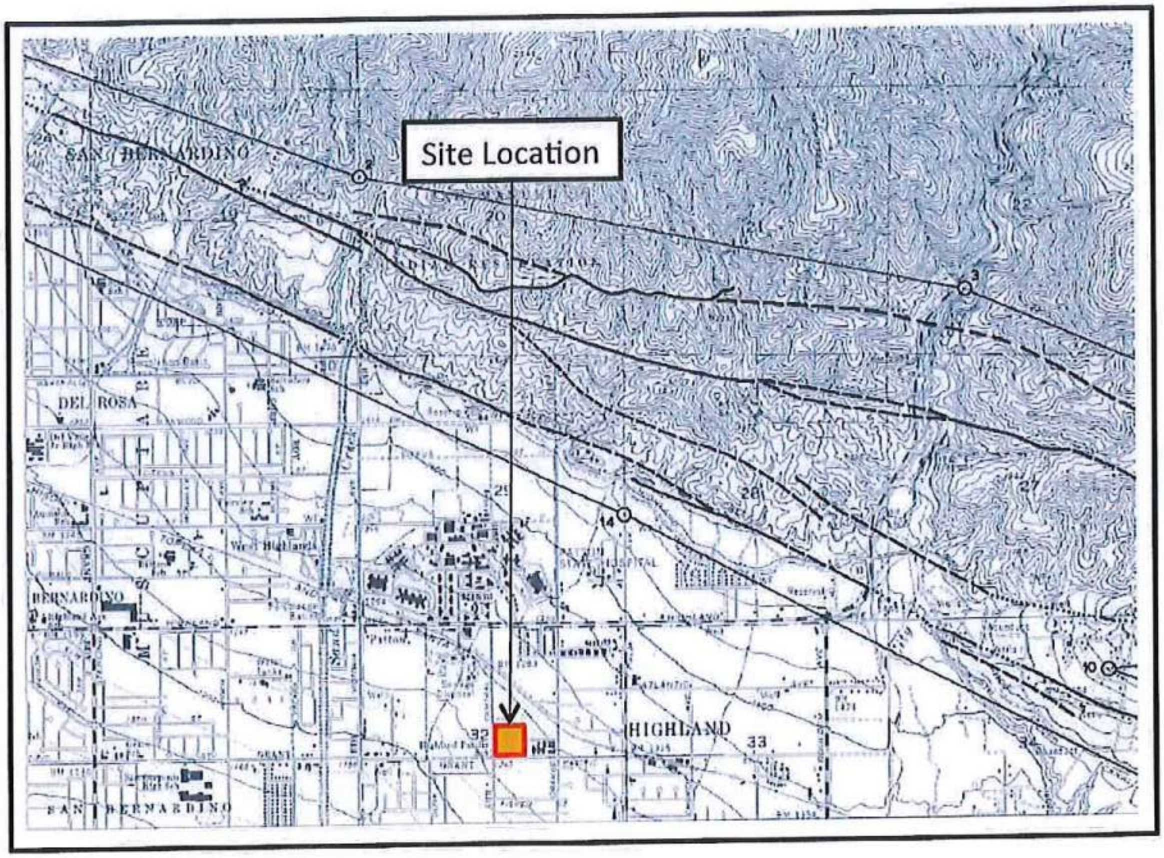
Our findings, conclusions, and recommendations are professional opinions based on a review of available existing geologic/seismic data as well as site specific subsurface data collected at a given time by outside consultants. By nature, geologic conditions can vary from point to point, can be very different in-between exploration points, and can also change over time. Our conclusions and recommendations are, by nature, preliminary and subject to verification and/or modification during grading and construction when more subsurface data is exposed.

If you have any questions regarding this report, please contact our office. We appreciate the opportunity to provide our services.

Respectfully submitted,

Peter Anderson CEG 2596
Principal Engineering Geologist

CERTIFIED ENGINEERING GEOLOGIST • STATE OF CALIFORNIA •
PETER G. ANDERSON
No. 2596
CERTIFIED
ENGINEERING
GEOLOGIST



MAP EXPLANATION

Potentially Active Faults

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

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

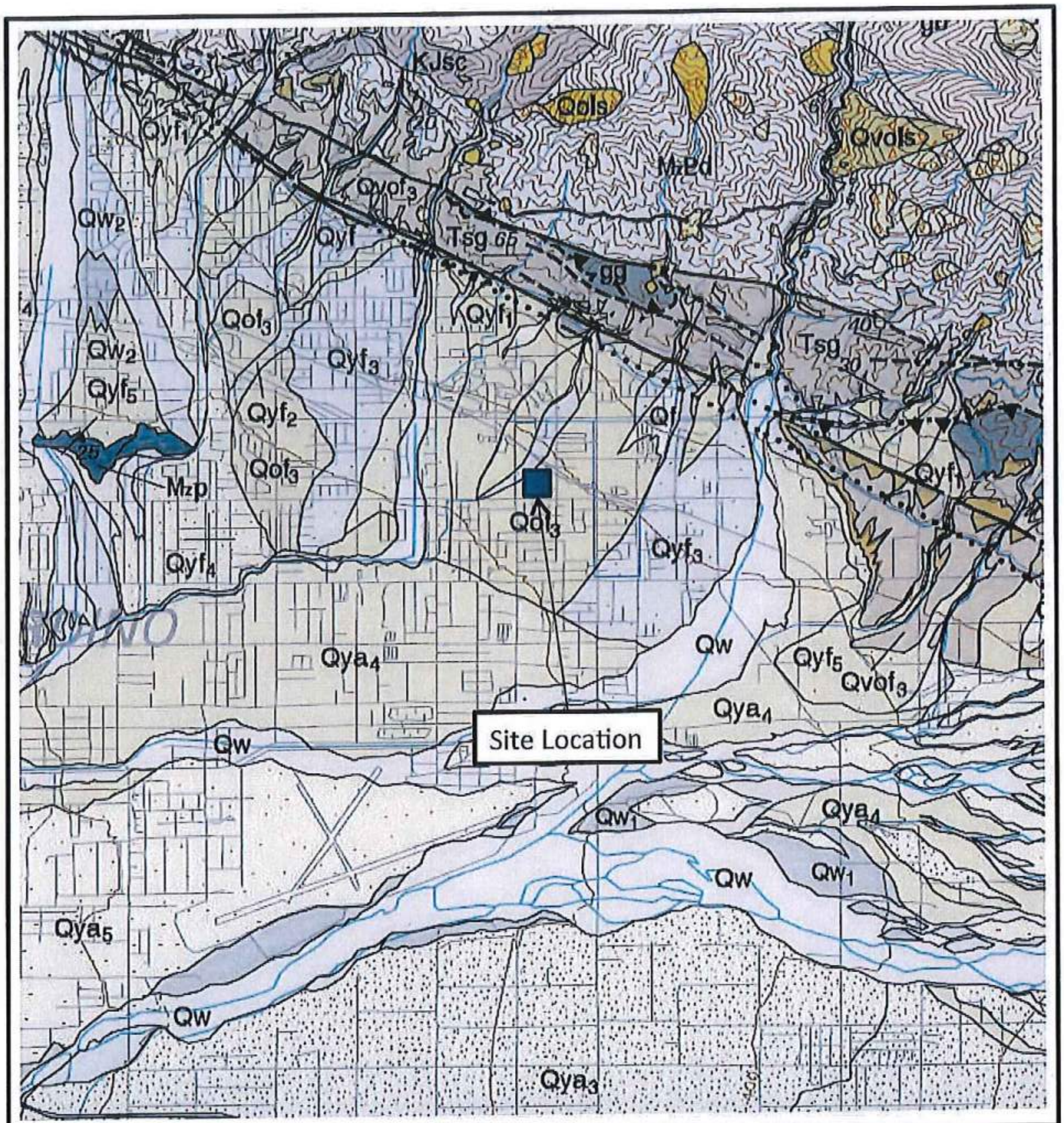
Special Studies Zone Boundaries

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

Seaward projection of zone boundary.

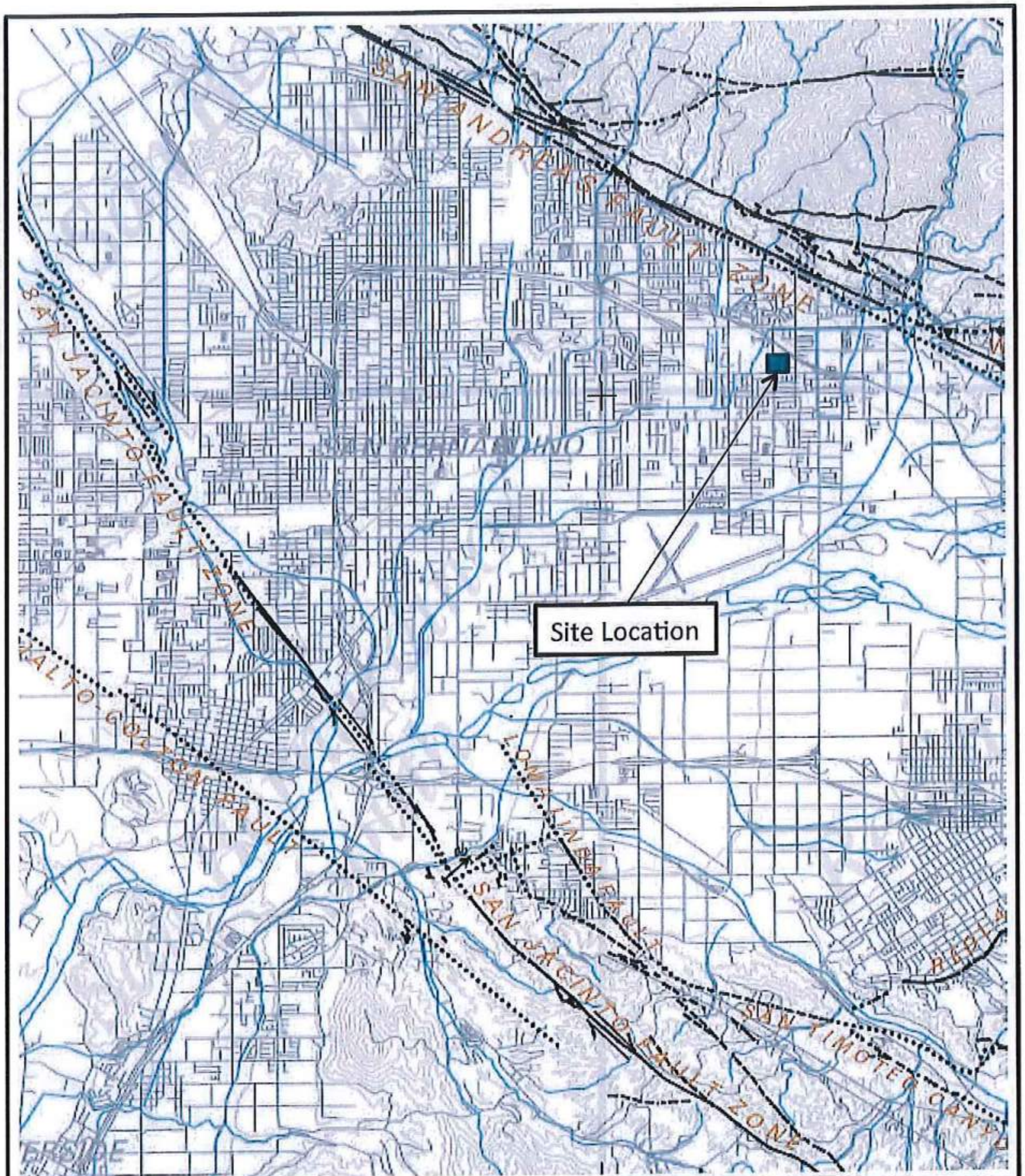
Source: Special Studies Zone- Harrison Mtn Quadrangle, 1974

Site Location and Seismic Hazard Map	
San Andreas High School 3232 Pacific Street Highland, California	Project Number: 18030-01 Date: August 2018 Figure No. 1



Source: Source: San Bernardino 30'x60' Quadrangle, USGS 2003

Geologic Map		A/G
San Andreas High School 3232 Pacific Street Highland, California	Project Number: 18030-01 Date: August 2018 Figure No. 2	



Source: Source: San Bernardino 30'x60' Quadrangle-Faults, USGS 2003

Fault Map		A/G
San Andreas High School 3232 Pacific Street Highland, California	Project Number: 18030-01 Date: August 2018 Figure No. 3	

Appendix A

APPENDIX A

REFERENCES

California Building Standards Commission, 2016 California Building Code, Title 24, Part 2.

California Building Standards Commission, California Green Building Standards Code, California Code of Regulations, Title 24, Part 11, effective date January 1, 2011.

California Division of Mines and Geology, 1997 and updated 2008, Guidelines for Evaluation and Mitigating Seismic Hazards in California, Special Publications 117 and 117A.

California Division of Mines and Geology, 1999, Fault-Rupture Hazard Zones in California, Special Publication 42, Revised 1997, 1 and 2 added 1999.

California Division of Mines and Geology, 1974, Special Studies Zones Map-Harrison Mountain Quadrangle, July 1, 1974.

California Geological Survey, 2010, Fault Activity Map of California, California Geologic Data Map Series Map No. 6.

California Geological Survey, 2013, Checklist for the Review of Engineering Geologic and Seismology Reports for California Public Schools, Hospitals and Essential Service Buildings, Note 48, October 2013.

City of Highland General Plan, 2006, Section 6.1, Public Health and Safety Element, March 2006.

Jennings, C. W., 1994, Fault Activity Map of California and Adjacent Areas, with Locations and Ages of Recent Volcanic Eruptions, California Department of Conservation, Division of Mines and Geology, Geologic Data Map No. 6.

U.S. Geological Survey, 2003, Preliminary Digital Geologic Map of the San Bernardino 30' X 60' Quadrangle, Southern California, dated 2003, CGS Open File Report 03-293.

U.S. Geological Survey, 2003, Preliminary Digital Geologic Map of the San Bernardino 30' X 60' Quadrangle- Faults, Southern California, dated 2003, CGS Open File Report 03-293.

U.S. Geological Survey, 2013, US Seismic Design Maps; web site address http://geohazards.usgs.gov/designmaps/us/application.phb

U.S. Geological Survey, 2014, Unified Hazard Tool: Deaggregation; web site address https://earthquake.usgs.gov/hazards/interactive/index.php

Appendix B

USGS Design Maps Summary Report

User–Specified Input

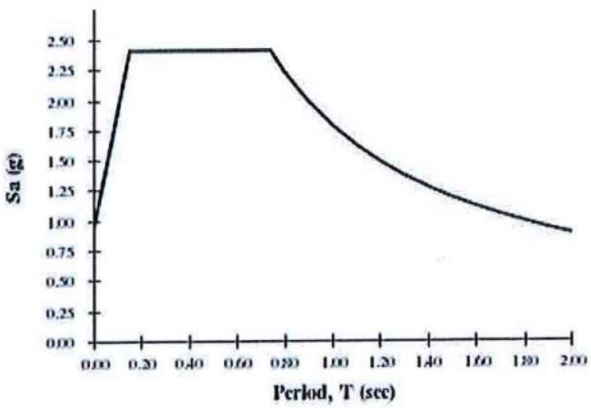
Report Title	San Andreas HS Fri August 17, 2018 15:18:35 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	34.1298°N, 117.2164°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	IV (e.g. essential facilities)

USGS–Provided Output

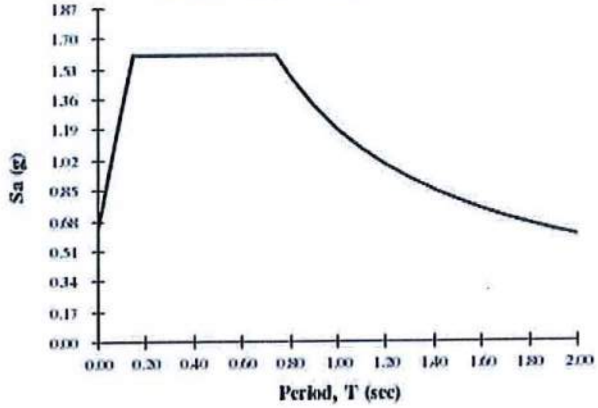
$S_S =$	2.410 g	$S_{MS} =$	2.410 g	$S_{DS} =$	1.607 g
$S_1 =$	1.189 g	$S_{M1} =$	1.784 g	$S_{D1} =$	1.189 g

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.

MCE_R Response Spectrum



Design Response Spectrum



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

USGS Design Maps Detailed Report

ASCE 7-10 Standard (34.1298°N, 117.2164°W)

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

Section 11.4.1 — Mapped Acceleration Parameters

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

From Figure 22-1 [1]	$S_S = 2.410$ g
From Figure 22-2 [2]	$S_1 = 1.189$ g

Section 11.4.2 — Site Class

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

Table 20.3–1 Site Classification

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

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

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

Table 11.4-1: Site Coefficient F_a

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

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

For Site Class = D and S_s = 2.410 g, F_a = 1.000

Table 11.4-2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1-s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	$\boxed{1.5}$
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 = 1.189 g, F_v = 1.500

Equation (11.4-1): $S_{MS} = F_a S_S = 1.000 \times 2.410 = 2.410$ g

Equation (11.4-2): $S_{M1} = F_v S_1 = 1.500 \times 1.189 = 1.784$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

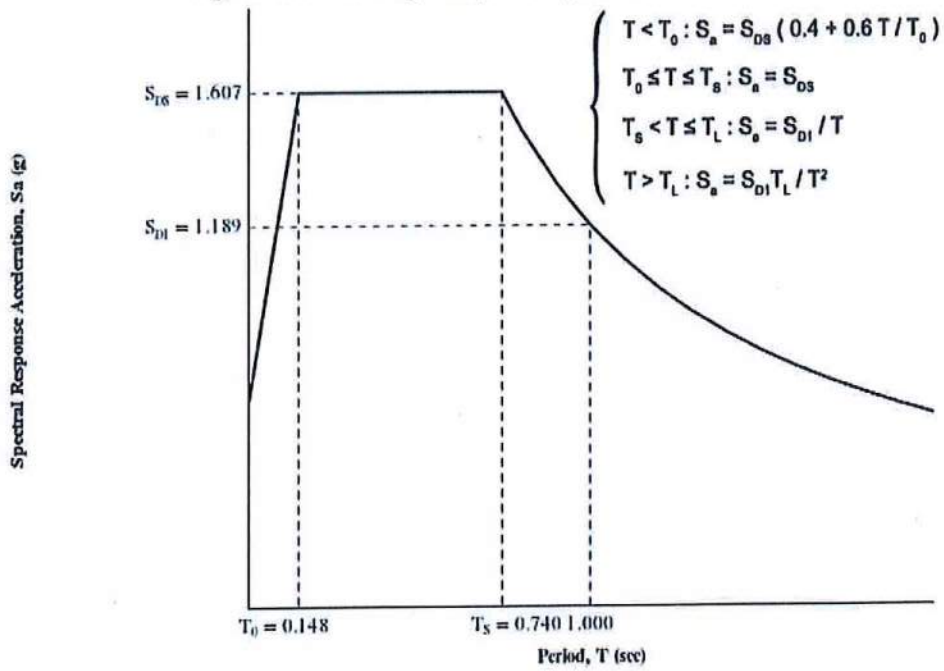
Equation (11.4-3): $S_{DS} = ⅔\, S_{MS} = ⅔ \times 2.410 = 1.607$ g

Equation (11.4-4): $S_{D1} = ⅔\, S_{M1} = ⅔ \times 1.784 = 1.189$ g

Section 11.4.5 — Design Response Spectrum

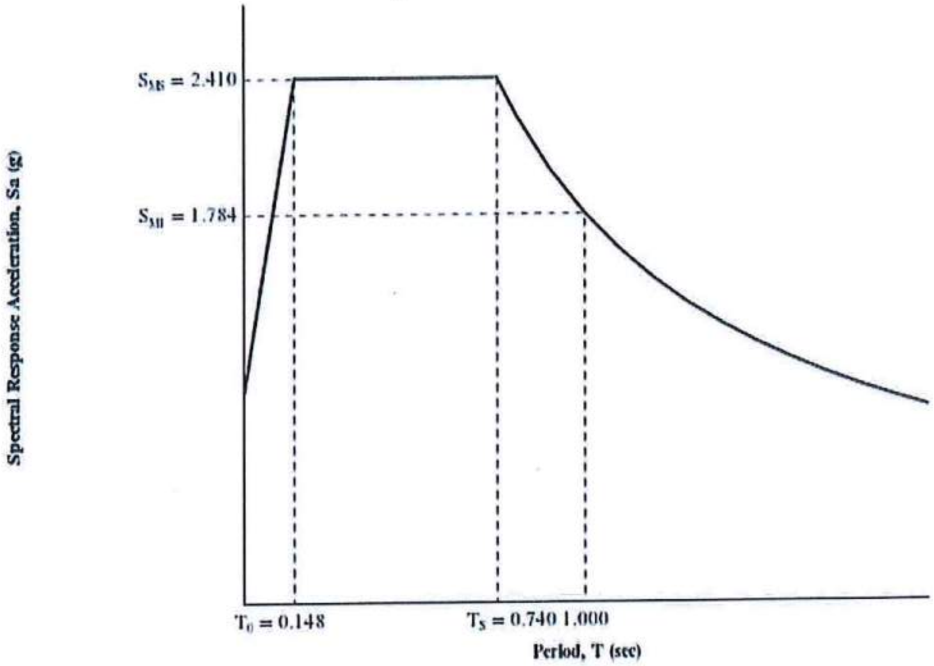
From <u>Figure 22-12</u> [3] $T_L = 8$ seconds

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 = 0.929
Equation (11.8–1):	$PGA_M = F_{PGA}PGA = 1.000 \times 0.929 = 0.929$ g

Table 11.8–1: Site Coefficient F_{PGA}

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

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

For Site Class = D and PGA = 0.929 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]	$C_{RS} = 0.996$
From Figure 22-18 [6]	$C_{R1} = 0.954$

Section 11.6 — Seismic Design Category

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

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

For Risk Category = IV and S_{DS} = 1.607 g, Seismic Design Category = D

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

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

For Risk Category = IV and S_{D1} = 1.189 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" = F

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

References

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

Appendix C

*** Deaggregation of Seismic Hazard at One Period of Spectral Acceleration ***
*** Data from Dynamic: Conterminous U.S. 2014 (v4.1.1) ****
PSHA Deaggregation. %contributions.
site: Test
longitude: 117.216°W
latitude: 34.130°E
imt: Peak ground acceleration
vs30 = 259 m/s (Site class D)
return period: 2475 yrs.
#This deaggregation corresponds to: Total
Summary statistics for PSHA PGA deaggregation, r=distance, ε=epsilon:
Deaggregation targets:
 Return period: 2475 yrs
 Exceedance rate: 0.0004040404 yr^{-1}
 PGA ground motion: 1.8808865 g
Recovered targets:
 Return period: 2710.9127 yrs
 Exceedance rate: 0.00036887946 yr^{-1}
Totals:
 Binned: 100 %
 Residual: 0 %
 Trace: 0.07 %
Mean (for all sources):
 r: 3.99 km
 m: 7.42
 ε_0: 0.55 σ
Mode (largest r-m bin):
 r: 3.81 km
 m: 7.91
 ε_0: 0.26 σ
 Contribution: 20.61 %
Mode (largest ε_0 bin):
 r: 2.23 km
 m: 7.91
 ε_0: -0.09 σ
 Contribution: 15.07 %
Discretization:
 r: min = 0.0, max = 1000.0, Δ = 20.0 km
 m: min = 4.4, max = 9.4, Δ = 0.2
 ε: min = -3.0, max = 3.0, Δ = 0.5 σ
Epsilon keys:
 ε 0: [-∞ ·· -2.5)
 ε 1: [-2.5 ·· -2.0)
 ε 2: [-2.0 ·· -1.5)
 ε 3: [-1.5 ·· -1.0)

ε 4: [-1.0 ·· -0.5)
ε 5: [-0.5 ·· 0.0)
ε 6: [0.0 ·· 0.5)
ε 7: [0.5 ·· 1.0)
ε 8: [1.0 ·· 1.5)
ε 9: [1.5 ·· 2.0)
ε 10: [2.0 ·· 2.5)
ε 11: [2.5 ·· +∞]

Closest Distance, rRup (km)	Magnitude (Mw)	ALL_ ε	ε =[2.5,∞)	ε =[2,2.5)	ε =[1.5,2)	ε =[1,1.5)	ε =[0.5,1)	ε =(-∞,0.5)	ε =[-0.5,∞)	ε =[-1,-0.5)	ε =[-1.5,-1)	ε =[-2,-1.5)	ε =[-2.5,-2)	ε =(-∞,-2.5)
50	7.7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	7.9	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	8.3	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	6.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	6.3	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	6.5	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	6.7	0.008	0.001	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	6.9	0.017	0.013	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	7.1	0.007	0.004	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	7.3	0.012	0.009	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	7.5	0.078	0.000	0.058	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	7.7	0.099	0.082	0.011	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	7.9	0.049	0.017	0.024	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	8.1	0.004	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	8.3	0.003	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

10 5.1 1.156 0.912 0.244 0.000 0.000 0.000 0.000 0.000 0.000 0.000
0.000 0.000 0.000
10 5.3 1.028 0.224 0.670 0.135 0.000 0.000 0.000 0.000 0.000 0.000
0.000 0.000 0.000
10 5.5 0.973 0.560 0.277 0.135 0.000 0.000 0.000 0.000 0.000 0.000
0.000 0.000 0.000
10 5.7 0.892 0.545 0.219 0.128 0.000 0.000 0.000 0.000 0.000 0.000
0.000 0.000 0.000
10 5.9 0.814 0.489 0.224 0.100 0.000 0.000 0.000 0.000 0.000 0.000
0.000 0.000 0.000
10 6.1 1.016 0.247 0.474 0.230 0.065 0.000 0.000 0.000 0.000 0.000
0.000 0.000 0.000
10 6.3 0.822 0.196 0.263 0.199 0.120 0.044 0.000 0.000 0.000 0.000
0.000 0.000 0.000
10 6.5 6.839 5.013 0.888 0.267 0.513 0.159 0.000 0.000 0.000 0.000
0.000 0.000 0.000
10 6.7 4.413 0.002 3.012 0.707 0.372 0.227 0.093 0.000 0.000 0.000
0.000 0.000 0.000
10 6.9 15.1101.696 12.0360.070 0.077 0.790 0.441 0.000 0.000 0.000
0.000 0.000 0.000
10 7.1 4.653 3.917 0.172 0.083 0.085 0.280 0.116 0.000 0.000 0.000
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10 7.3 2.997 2.609 0.011 0.061 0.069 0.216 0.031 0.000 0.000 0.000
0.000 0.000 0.000
10 7.5 3.609 0.016 2.783 0.094 0.222 0.208 0.244 0.041 0.000 0.000
0.000 0.000 0.000
10 7.7 9.264 1.185 5.424 1.127 0.743 0.073 0.592 0.120 0.000 0.000
0.000 0.000 0.000
10 7.9 20.61015.0710.000 3.627 0.364 0.086 1.263 0.200 0.000 0.000
0.000 0.000 0.000
10 8.1 18.71612.5000.035 4.859 0.035 0.006 1.060 0.221 0.000 0.000
0.000 0.000 0.000
10 8.3 6.805 3.792 1.201 1.354 0.033 0.025 0.297 0.104 0.000 0.000
0.000 0.000 0.000
Principal Sources (faults, subduction, random seismicity having > 3% contribution
UC33brAvg_FM31:
Percent Contributed: 46.75
Distance (km): null
Magnitude: null
Epsilon (mean values): null
San Andreas (San Bernardino S) [0]:
Percent Contributed: 30.43
Distance (km): 2.2756906
Magnitude: 7.4820423
Epsilon (mean values): 0.33072826
Azimuth: 35.812319

Latitude: 34.143522
Longitude: -117.20444
San Jacinto (San Bernardino) [3]:
Percent Contributed: 6.05
Distance (km): 9.6729566
Magnitude: 8.0475119
Epsilon (mean values): 0.76820856
Azimuth: 229.607
Latitude: 34.073619
Longitude: -117.29608
San Andreas (North Branch Mill Creek) [0]:
Percent Contributed: 3.66
Distance (km): 2.0296154
Magnitude: 7.957221
Epsilon (mean values): 0.048984279
Azimuth: 7.9020247
Latitude: 34.147758
Longitude: -117.21339
San Andreas (San Bernardino N) [5]:
Percent Contributed: 3.35
Distance (km): 2.3081729
Magnitude: 7.0163597
Epsilon (mean values): 0.56220669
Azimuth: 347.05257
Latitude: 34.15003
Longitude: -117.22202
UC33brAvg_FM32:
Percent Contributed: 46.72
Distance (km): null
Magnitude: null
Epsilon (mean values): null
San Andreas (San Bernardino S) [0]:
Percent Contributed: 30.51
Distance (km): 2.2756906
Magnitude: 7.4905843
Epsilon (mean values): 0.32640488
Azimuth: 35.812319
Latitude: 34.143522
Longitude: -117.20444
San Jacinto (San Bernardino) [3]:
Percent Contributed: 6
Distance (km): 9.6729566
Magnitude: 8.0424127
Epsilon (mean values): 0.7722057
Azimuth: 229.607
Latitude: 34.073619

Longitude: -117.29608
San Andreas (North Branch Mill Creek) [0]:
Percent Contributed: 3.78
Distance (km): 2.0296154
Magnitude: 7.9705831
Epsilon (mean values): 0.04284178
Azimuth: 7.9020247
Latitude: 34.147758
Longitude: -117.21339
San Andreas (San Bernardino N) [5]:
Percent Contributed: 3.25
Distance (km): 2.3081729
Magnitude: 7.0534928
Epsilon (mean values): 0.54289656
Azimuth: 347.05257
Latitude: 34.15003
Longitude: -117.22202
UC33brAvg_FM31 (opt):
Percent Contributed: 3.26
Distance (km): null
Magnitude: null
Epsilon (mean values): null
PointSourceFinite: -117.216, 34.161:
Percent Contributed: 1.04
Distance (km): 6.2061335
Magnitude: 5.5747027
Epsilon (mean values): 1.929018
Azimuth: 0
Latitude: 34.161276
Longitude: -117.2164
PointSourceFinite: -117.216, 34.161:
Percent Contributed: 1.04
Distance (km): 6.2061335
Magnitude: 5.5747027
Epsilon (mean values): 1.929018
Azimuth: 0
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Longitude: -117.2164
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Magnitude: null
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Longitude: -117.2164
PSHA Deaggregation. %contributions.
site: Test
longitude: 117.216°W
latitude: 34.130°E
imt: Peak ground acceleration
vs30 = 259 m/s (Site class D)
return period: 2475 yrs.
#This deaggregation corresponds to: Abrahamson, Silva & Kamai (2014)
Summary statistics for PSHA PGA deaggregation, r=distance, ε=epsilon:
Deaggregation targets:
Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 1.8808865 g
Recovered targets:
Return period: 2710.9127 yrs
Exceedance rate: 0.00036887946 yr^{-1}
Totals:
Binned: 0.58 %
Residual: 0 %
Trace: 0 %
Mean (for all sources):
r: 2.29 km
m: 7.45
ε_0: 2.7 σ
Mode (largest r-m bin):
r: 2.29 km
m: 6.85
ε_0: 2.75 σ
Contribution: 0.13 %
Mode (largest ε_0 bin):
r: 2.29 km
m: 6.85
ε_0: 2.75 σ

Contribution: 0.13 %
Discretization:
r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ
Epsilon keys:
ε 0: [-∞ ·· -2.5)
ε 1: [-2.5 ·· -2.0)
ε 2: [-2.0 ·· -1.5)
ε 3: [-1.5 ·· -1.0)
ε 4: [-1.0 ·· -0.5)
ε 5: [-0.5 ·· 0.0)
ε 6: [0.0 ·· 0.5)
ε 7: [0.5 ·· 1.0)
ε 8: [1.0 ·· 1.5)
ε 9: [1.5 ·· 2.0)
ε 10: [2.0 ·· 2.5)
ε 11: [2.5 ·· +∞]

Closest Distance, rRup (km)	Magnitude (Mw)	ALL_ ε	ε =[2.5,∞)	ε =[2,2.5)	ε =[1.5,2)	ε =[1,1.5)	ε =[0.5,1)	ε =(-∞,0.5)	ε =[-0.5,∞)	ε =[-1,-0.5)	ε =[-1.5,-1)	ε =[-2,-1.5)	ε =[-2.5,-2)	ε =(-∞,-2.5)
10	6.3	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.5	0.033	0.033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.7	0.022	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.9	0.134	0.134	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.1	0.036	0.036	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.3	0.022	0.000	0.022	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.5	0.034	0.000	0.034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.7	0.089	0.003	0.086	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.9	0.107	0.002	0.106	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	8.1	0.082	0.000	0.082	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	8.3	0.023	0.000	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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

PSHA Deaggregation. %contributions.
site: Test
longitude: 117.216°W
latitude: 34.130°E
imt: Peak ground acceleration
vs30 = 259 m/s (Site class D)
return period: 2475 yrs.
#This deaggregation corresponds to: Boore, Stewart, Seyhan & Atkinson (2014)
Summary statistics for PSHA PGA deaggregation, r=distance, ε=epsilon:
Deaggregation targets:
 Return period: 2475 yrs
 Exceedance rate: 0.0004040404 yr^{-1}
 PGA ground motion: 1.8808865 g
Recovered targets:
 Return period: 2710.9127 yrs
 Exceedance rate: 0.00036887946 yr^{-1}
Totals:
 Binned: 4.46 %
 Residual: 0 %
 Trace: 0 %
Mean (for all sources):
 r: 3.08 km
 m: 7.42
 ε_0: 2.25 σ
Mode (largest r-m bin):
 r: 2.89 km
 m: 7.91
 ε_0: 2.16 σ
 Contribution: 0.92 %
Mode (largest ε_0 bin):
 r: 2.23 km
 m: 7.91
 ε_0: 2.11 σ
 Contribution: 0.84 %
Discretization:
 r: min = 0.0, max = 1000.0, Δ = 20.0 km
 m: min = 4.4, max = 9.4, Δ = 0.2
 ε: min = -3.0, max = 3.0, Δ = 0.5 σ
Epsilon keys:
 ε 0: [-∞ ·· -2.5)
 ε 1: [-2.5 ·· -2.0)
 ε 2: [-2.0 ·· -1.5)
 ε 3: [-1.5 ·· -1.0)
 ε 4: [-1.0 ·· -0.5)
 ε 5: [-0.5 ·· 0.0)

ε 6: [0.0 ·· 0.5)
ε 7: [0.5 ·· 1.0)
ε 8: [1.0 ·· 1.5)
ε 9: [1.5 ·· 2.0)
ε 10: [2.0 ·· 2.5)
ε 11: [2.5 ·· +∞]

Closest Distance, rRup (km)	Magnitude (Mw)	ALL_ ε	ε =[2.5,∞)	ε =[2,2.5)	ε =[1.5,2)	ε =[1,1.5)	ε =[0.5,1)	ε =(-∞,0.5)	ε =[-0.5,∞)	ε =[-1,-0.5)	ε =[-1.5,-1)	ε =[-2,-1.5)	ε =[-2.5,-2)	ε =(-∞,-2.5)
10	5.3	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	5.5	0.053	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	5.7	0.058	0.058	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	5.9	0.050	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.1	0.080	0.071	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.3	0.044	0.035	0.009	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.5	0.307	0.283	0.024	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.7	0.166	0.155	0.011	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.9	0.749	0.744	0.005	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.1	0.227	0.218	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.3	0.146	0.144	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.5	0.162	0.156	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.7	0.404	0.375	0.030	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.9	0.920	0.836	0.084	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	8.1	0.814	0.696	0.118	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	8.3	0.278	0.025	0.187	0.066	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Principal Sources (faults, subduction, random seismicity having > 3% contribution
UC33brAvg_FM32:
Percent Contributed: 2.09
Distance (km): null

Magnitude: null
Epsilon (mean values): null
San Andreas (San Bernardino S) [0]:
Percent Contributed: 1.54
Distance (km): 2.2756906
Magnitude: 7.484428
Epsilon (mean values): 2.1928302
Azimuth: 35.812319
Latitude: 34.143522
Longitude: -117.20444
UC33brAvg_FM31:
Percent Contributed: 2.09
Distance (km): null
Magnitude: null
Epsilon (mean values): null
San Andreas (San Bernardino S) [0]:
Percent Contributed: 1.53
Distance (km): 2.2756906
Magnitude: 7.4753587
Epsilon (mean values): 2.1944805
Azimuth: 35.812319
Latitude: 34.143522
Longitude: -117.20444
PSHA Deaggregation. %contributions.
site: Test
longitude: 117.216°W
latitude: 34.130°E
imt: Peak ground acceleration
vs30 = 259 m/s (Site class D)
return period: 2475 yrs.
#This deaggregation corresponds to: Campbell & Bozorgnia (2014)
Summary statistics for PSHA PGA deaggregation, r=distance, ε=epsilon:
Deaggregation targets:
Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 1.8808865 g
Recovered targets:
Return period: 2710.9127 yrs
Exceedance rate: 0.00036887946 yr^{-1}
Totals:
Binned: 0 %
Residual: 0 %
Trace: 0 %
Mean (for all sources):
r: null km
m: null

ε_0: null σ
Mode (largest r-m bin):
r: null km
m: null
ε_0: null σ
Contribution: 0 %
Mode (largest ε_0 bin):
r: null km
m: null
ε_0: null σ
Contribution: 0 %
Discretization:
r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ
Epsilon keys:
ε 0: [-∞ · · -2.5)
ε 1: [-2.5 · · -2.0)
ε 2: [-2.0 · · -1.5)
ε 3: [-1.5 · · -1.0)
ε 4: [-1.0 · · -0.5)
ε 5: [-0.5 · · 0.0)
ε 6: [0.0 · · 0.5)
ε 7: [0.5 · · 1.0)
ε 8: [1.0 · · 1.5)
ε 9: [1.5 · · 2.0)
ε 10: [2.0 · · 2.5)
ε 11: [2.5 · · +∞]
Closest Distance, rRup (km) Magnitude (Mw) ALL_ ε ε =[2.5,∞) ε =[2,2.5) ε =[1.5,2) ε =[1,1.5) ε =[0.5,1) ε =(-∞,0.5) ε =[-0.5,∞) ε =[-1,-0.5) ε =[-1.5,-1) ε =[-2,-1.5) ε =[-2.5,-2) ε =(-∞,-2.5)

Principal Sources (faults, subduction, random seismicity having > 3% contribution
PSHA Deaggregation. %contributions.
site: Test
longitude: 117.216°W
latitude: 34.130°E
imt: Peak ground acceleration
vs30 = 259 m/s (Site class D)
return period: 2475 yrs.
#This deaggregation corresponds to: Chiou & Youngs (2014)
Summary statistics for PSHA PGA deaggregation, r=distance, ε=epsilon:
Deaggregation targets:
Return period: 2475 yrs

Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 1.8808865 g
Recovered targets:
Return period: 2710.9127 yrs
Exceedance rate: 0.00036887946 yr^{-1}
Totals:
Binned: 1.88 %
Residual: 0 %
Trace: 0 %
Mean (for all sources):
r: 2.45 km
m: 7.58
ε_0: 2.42 σ
Mode (largest r-m bin):
r: 2.38 km
m: 7.91
ε_0: 2.35 σ
Contribution: 0.44 %
Mode (largest ε_0 bin):
r: 2.23 km
m: 7.91
ε_0: 2.34 σ
Contribution: 0.43 %
Discretization:
r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ
Epsilon keys:
ε 0: [$-\infty$ · · -2.5)
ε 1: [-2.5 · · -2.0)
ε 2: [-2.0 · · -1.5)
ε 3: [-1.5 · · -1.0)
ε 4: [-1.0 · · -0.5)
ε 5: [-0.5 · · 0.0)
ε 6: [0.0 · · 0.5)
ε 7: [0.5 · · 1.0)
ε 8: [1.0 · · 1.5)
ε 9: [1.5 · · 2.0)
ε 10: [2.0 · · 2.5)
ε 11: [2.5 · · $+\infty$]
Closest Distance, rRup (km) Magnitude (Mw) ALL_ ε ε =[2.5,∞) ε =[2,2.5) ε =[1.5,2) ε =[1,1.5) ε =[0.5,1) ε =($-\infty$,0.5) ε =[-0.5,∞) ε =[-1,-0.5) ε =[-1.5,-1) ε =[-2,-1.5) ε =[-2.5,-2) ε =($-\infty$,-2.5)

10	6.1	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.3	0.006	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.5	0.079	0.079	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.7	0.052	0.000	0.052	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.9	0.317	0.015	0.303	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.1	0.102	0.030	0.072	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.3	0.069	0.062	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.5	0.089	0.000	0.087	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.7	0.219	0.000	0.214	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.9	0.436	0.001	0.425	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	8.1	0.384	0.364	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	8.3	0.125	0.109	0.015	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Principal Sources (faults, subduction, random seismicity having > 3% contribution
PSHA Deaggregation. %contributions.
site: Test
longitude: 117.216°W
latitude: 34.130°E
imt: Peak ground acceleration
vs30 = 259 m/s (Site class D)
return period: 2475 yrs.
#This deaggregation corresponds to: Idriss (2014)
Summary statistics for PSHA PGA deaggregation, r=distance, ε=epsilon:
Deaggregation targets:
 Return period: 2475 yrs
 Exceedance rate: 0.0004040404 yr^{-1}
 PGA ground motion: 1.8808865 g
Recovered targets:
 Return period: 2710.9127 yrs
 Exceedance rate: 0.00036887946 yr^{-1}
Totals:
 Binned: 93.08 %
 Residual: 0 %
 Trace: 0.08 %
Mean (for all sources):

r: 4.07 km
m: 7.42
ε_0: 0.42 σ
Mode (largest r-m bin):
r: 3.9 km
m: 7.91
ε_0: 0.11 σ
Contribution: 19.15 %
Mode (largest ε_0 bin):
r: 2.23 km
m: 7.91
ε_0: -0.09 σ
Contribution: 15.07 %
Discretization:
r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ
Epsilon keys:
ε 0: [-∞ ·· -2.5)
ε 1: [-2.5 ·· -2.0)
ε 2: [-2.0 ·· -1.5)
ε 3: [-1.5 ·· -1.0)
ε 4: [-1.0 ·· -0.5)
ε 5: [-0.5 ·· 0.0)
ε 6: [0.0 ·· 0.5)
ε 7: [0.5 ·· 1.0)
ε 8: [1.0 ·· 1.5)
ε 9: [1.5 ·· 2.0)
ε 10: [2.0 ·· 2.5)
ε 11: [2.5 ·· +∞]

Closest Distance, rRup (km)	Magnitude (Mw)	ALL_ ε	ε =[2.5,∞)	ε =[2,2.5)	ε =[1.5,2)	ε =[1,1.5)	ε =[0.5,1)	ε =(-∞,0.5)	ε =[-0.5,∞)	ε =[-1,-0.5)	ε =[-1.5,-1)	ε =[-2,-1.5)	ε =[-2.5,-2)	ε =(-∞,-2.5)
50	7.7	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	7.9	0.001	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	8.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	8.3	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	6.1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

30	6.3	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	6.5	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	6.7	0.008	0.001	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	6.9	0.017	0.013	0.004	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	7.1	0.007	0.004	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	7.3	0.012	0.009	0.003	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	7.5	0.078	0.000	0.058	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	7.7	0.099	0.082	0.011	0.006	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	7.9	0.049	0.017	0.024	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	8.1	0.004	0.000	0.003	0.001	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
30	8.3	0.003	0.000	0.001	0.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	5.1	1.156	0.912	0.244	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	5.3	1.026	0.224	0.670	0.133	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	5.5	0.920	0.560	0.277	0.082	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	5.7	0.834	0.545	0.219	0.070	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	5.9	0.763	0.489	0.224	0.050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.1	0.933	0.247	0.474	0.159	0.053	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.3	0.771	0.196	0.263	0.199	0.085	0.028	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.5	6.420	5.013	0.888	0.267	0.230	0.023	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	6.7	4.172	0.002	3.012	0.707	0.372	0.072	0.008	0.000	0.000	0.000	0.000	0.000	0.000
10	6.9	13.911	1.696	12.036	0.070	0.077	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.1	4.289	3.917	0.172	0.083	0.085	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.000
10	7.3	2.759	2.609	0.011	0.061	0.069	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000

10 7.5 3.324 0.016 2.783 0.094 0.222 0.208 0.000 0.000 0.000 0.000
0.000 0.000 0.000
10 7.7 8.551 1.185 5.424 1.127 0.743 0.072 0.000 0.000 0.000 0.000
0.000 0.000 0.000
10 7.9 19.14615.0710.000 3.627 0.364 0.084 0.000 0.000 0.000 0.000
0.000 0.000 0.000
10 8.1 17.43612.5000.035 4.859 0.035 0.006 0.000 0.000 0.000 0.000
0.000 0.000 0.000
10 8.3 6.379 3.792 1.201 1.354 0.033 0.000 0.000 0.000 0.000 0.000
0.000 0.000 0.000

Principal Sources (faults, subduction, random seismicity having > 3% contribution
UC33brAvg_FM31:
Percent Contributed: 43.44
Distance (km): null
Magnitude: null
Epsilon (mean values): null
San Andreas (San Bernardino S) [0]:
Percent Contributed: 27.91
Distance (km): 2.2756906
Magnitude: 7.4812418
Epsilon (mean values): 0.15263994
Azimuth: 35.812319
Latitude: 34.143522
Longitude: -117.20444
San Jacinto (San Bernardino) [3]:
Percent Contributed: 5.89
Distance (km): 9.6729566
Magnitude: 8.0467173
Epsilon (mean values): 0.71748569
Azimuth: 229.607
Latitude: 34.073619
Longitude: -117.29608
San Andreas (North Branch Mill Creek) [0]:
Percent Contributed: 3.33
Distance (km): 2.0296154
Magnitude: 7.9576182
Epsilon (mean values): -0.16349106
Azimuth: 7.9020247
Latitude: 34.147758
Longitude: -117.21339
San Andreas (San Bernardino N) [5]:
Percent Contributed: 3.12
Distance (km): 2.3081729
Magnitude: 7.0135099
Epsilon (mean values): 0.42243495
Azimuth: 347.05257

Latitude: 34.15003
Longitude: -117.22202
UC33brAvg_FM32:
Percent Contributed: 43.39
Distance (km): null
Magnitude: null
Epsilon (mean values): null
San Andreas (San Bernardino S) [0]:
Percent Contributed: 27.99
Distance (km): 2.2756906
Magnitude: 7.4898698
Epsilon (mean values): 0.14795594
Azimuth: 35.812319
Latitude: 34.143522
Longitude: -117.20444
San Jacinto (San Bernardino) [3]:
Percent Contributed: 5.84
Distance (km): 9.6729566
Magnitude: 8.0416206
Epsilon (mean values): 0.72178053
Azimuth: 229.607
Latitude: 34.073619
Longitude: -117.29608
San Andreas (North Branch Mill Creek) [0]:
Percent Contributed: 3.43
Distance (km): 2.0296154
Magnitude: 7.9710893
Epsilon (mean values): -0.17147477
Azimuth: 7.9020247
Latitude: 34.147758
Longitude: -117.21339
San Andreas (San Bernardino N) [5]:
Percent Contributed: 3.02
Distance (km): 2.3081729
Magnitude: 7.0505288
Epsilon (mean values): 0.4015631
Azimuth: 347.05257
Latitude: 34.15003
Longitude: -117.22202
UC33brAvg_FM31 (opt):
Percent Contributed: 3.12
Distance (km): null
Magnitude: null
Epsilon (mean values): null
UC33brAvg_FM32 (opt):
Percent Contributed: 3.12

Distance (km): null
Magnitude: null
Epsilon (mean values): null

APPENDIX E

STANDARD GRADING SPECIFICATIONS

APPENDIX E

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

GENERAL

These specifications present general procedures and requirements for grading and earthwork as shown on the approved grading plans, including preparation of areas to be filled, placement of fill, installation of subdrains, and excavations. The recommendations contained in the attached geotechnical report are a part of the earthwork and grading specifications and shall supersede the provisions contained herein in the case of conflict. Evaluations performed by the Consultant during the course of grading may result in new recommendations, which could supersede these specifications, or the recommendations of the geotechnical report.

EARTHWORK OBSERVATION AND TESTING

Prior to the start of grading, a qualified Geotechnical Consultant (Geotechnical Engineer and Engineering Geologist) shall be employed for the purpose of observing earthwork procedures and testing the fills for conformance with the recommendations of the geotechnical report and these specifications. It will be necessary that the Consultant provide adequate testing and observation so that he may determine that the work was accomplished as specified. It shall be the responsibility of the Contractor to assist the Consultant and keep them apprised of work schedules and changes so that he may schedule his personnel accordingly.

It shall be the sole responsibility of the Contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications and the approved grading plans.

Maximum dry density tests used to determine the degree of compaction will be performed in accordance with the American Society for Testing and Materials Test Method (ASTM) D1557.

PREPARATION OF AREAS TO BE FILLED

Clearing and Grubbing: All brush, vegetation and debris shall be removed or piled and otherwise disposed of.

Processing: The existing ground which is determined to be satisfactory for support of fill shall be scarified to a minimum depth of 6 inches. Existing ground, which is not satisfactory, shall be overexcavated as specified in the following section.

Overexcavation: Soft, dry, spongy, highly fractured or otherwise unsuitable ground, extending to such a depth that surface processing cannot adequately improve the condition, shall be overexcavated down to firm ground, approved by the Consultant.

Moisture conditioning: Overexcavated and processed soils shall be watered, dried-back, blended, and mixed as required to have a relatively uniform moisture content near the optimum moisture content as determined by ASTM D1557.

Recompaction: Overexcavated and processed soils, which have been mixed, and moisture conditioned uniformly shall be recompacted to a minimum relative compaction of 90 percent of ASTM D1557.

Benching: Where soils are placed on ground with slopes steeper than 5:1 (horizontal to vertical), the ground shall be stepped or benched. Benches shall be excavated in firm material for a minimum width of 4 feet.

FILL MATERIAL

General: Material to be placed as fill shall be free of organic matter and other deleterious substances, and shall be approved by the Consultant.

Oversize: Oversized material defined as rock, or other irreducible material with a maximum dimension greater than 12 inches, shall not be buried or placed in fill, unless the location, material, and disposal methods are specifically approved by the Consultant. Oversize disposal operations shall be such that nesting of oversized material does not occur, and such that the oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 feet vertically of finish grade or within the range of future utilities or underground construction, unless specifically approved by the Consultant.

Import: If importing of fill material is required for grading, the import material shall meet the general requirements.

FILL PLACEMENT AND COMPACTION

Fill Lifts: Approved fill material shall be placed in areas prepared to receive fill in near-horizontal layers not exceeding 6 inches in compacted thickness. The Consultant may approve thicker lifts if testing indicates the grading procedures are such that adequate compaction is being achieved with lifts of greater thickness. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to attain uniformity of material and moisture in each layer.

Fill Moisture: Fill layers at a moisture content less than optimum shall be watered and mixed, and wet fill layers shall be aerated by scarification or shall be blended with drier material. Moisture conditioning and mixing of fill layers shall continue until the fill material is at uniform moisture content at or near optimum.

Compaction of Fill: After each layer has been evenly spread, moisture conditioned, and mixed, it shall be uniformly compacted to not less than 90 percent of maximum dry density in accordance with ASTM D1557. Compaction equipment shall be adequately sized and shall be either specifically designed for soil compaction or of proven reliability, to efficiently achieve the specified degree of compaction.

Fill Slopes: Compacting on slopes shall be accomplished, in addition to normal compacting procedures, by backrolling of slopes with sheepsfoot rollers at frequent increments of 2 to 3 feet as the fill is placed, or by other methods producing satisfactory results. At the completion of grading, the relative compaction of the slope out to the slope face shall be at least 90 percent in accordance with ASTM D1557.

Compaction Testing: Field tests to check the fill moisture and degree of compaction will be performed by the consultant. The location and frequency of tests shall be at the consultant's discretion. In general, these tests will be taken at an interval not exceeding 2 feet in vertical rise, and/or 1,000 cubic yards of fill placed. In addition, on slope faces, at least one test shall be taken for each 5,000 square feet of slope face and/or each 10 feet of vertical height of slope.

SUBDRAIN INSTALLATION

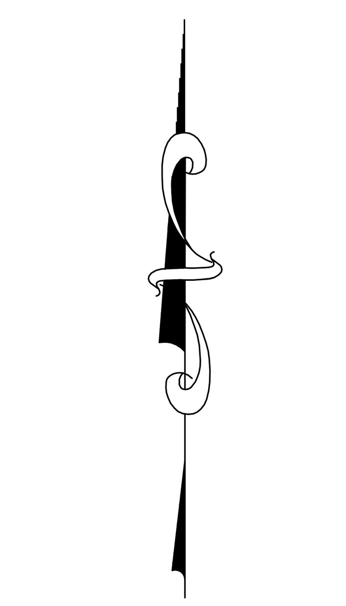
Subdrain systems, if required, shall be installed in approved ground to conform to the approximate alignment and details shown on the plans or herein. The subdrain location or materials shall not be changed or modified without the approval of the Consultant. The Consultant, however, may recommend and, upon approval, direct changes in subdrain line, grade or materials. All subdrains should be surveyed for line and grade after installation and sufficient time shall be allowed for the surveys, prior to commencement of fill over the subdrain.

EXCAVATION

Excavations and cut slopes will be examined during grading. If directed by the Consultant, further excavation or overexcavation and refilling of cut areas, and/or remedial grading of cut slopes shall be performed. Where fill over cut slopes are to be graded, unless otherwise approved, the cut portion of the slope shall be made and approved by the Consultant prior to placement of materials for construction of the fill portion of the slope.

UTILITY SURVEY

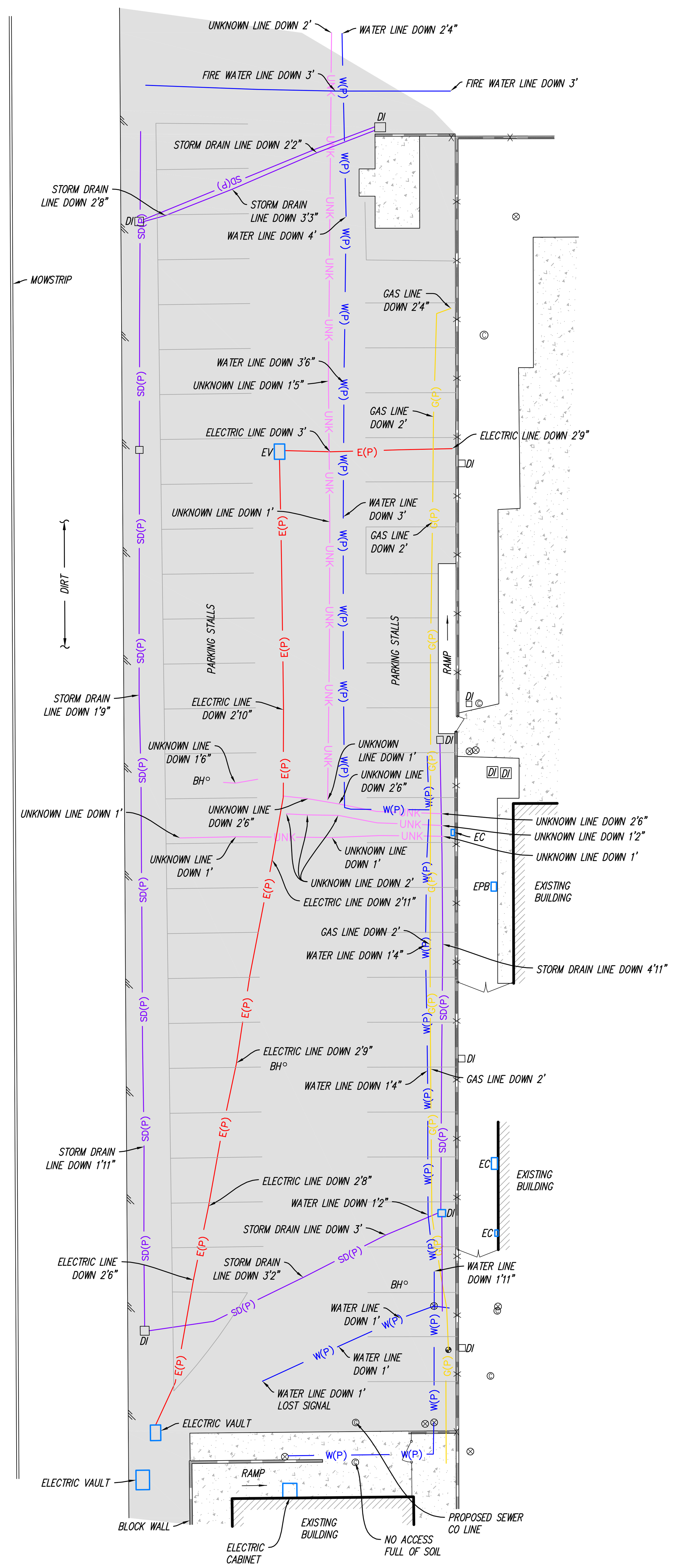
3232 PACIFIC STREET, HIGHLAND, CA 92346



GRAPHIC SCALE

20 0 10 20

FEET



LEGEND

- ASPHALT PAVEMENT
- CONCRETE PAVEMENT
- GAS VALVE
- GATE
- SEWER CLEAN OUT
- WATER VALVE
- BH — BOREHOLE
- DI — DRAIN INLET
- EC — ELECTRIC CABINET
- EPB — ELECTRIC PULL BOX
- EDGE OF PAVEMENT
- E(P) — ELECTRIC LINE PAINTED
- G(P) — GAS LINE PAINTED
- RETAINING/BLOCK/BRICK WALL
- SD(P) — STORM DRAIN LINE PAINTED
- UNK — UNKNOWN LINE PAINTED
- W(P) — WATER LINE PAINTED
- WROUGHT IRON FENCE

Underground Service Alert

Call: TOLL FREE 1-800 227-2600

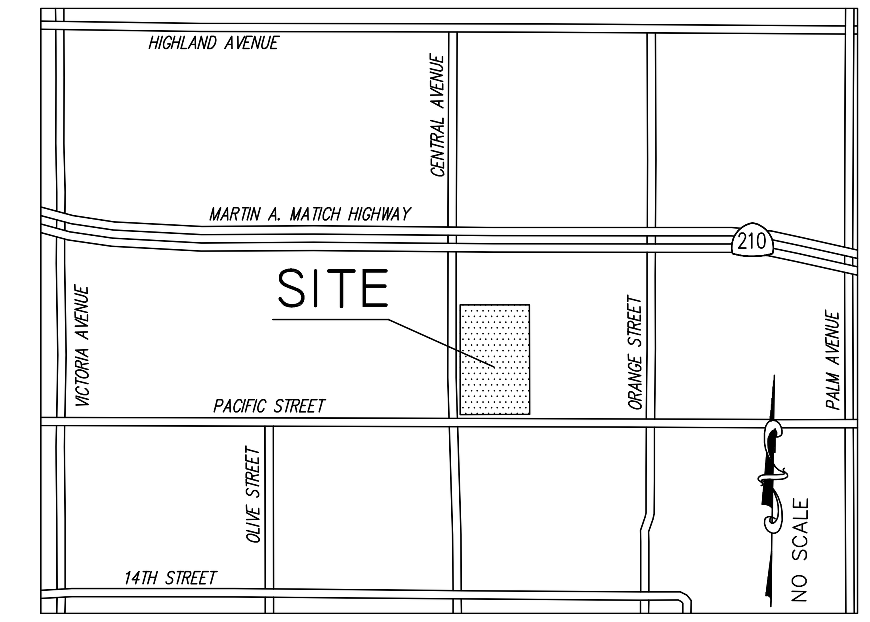
TWO WORKING DAYS BEFORE YOU DIG

PREPARED FOR:

SITESCAN DIVISION OF RMA GROUP

1210 E. 223RD ST. SUITE 319
CARSON, CA 9074
PHONE: (310) 684-4854
FAX: (424) 287-0622

VICINITY MAP



SITE INFORMATION

SITE ADDRESS: 3232 PACIFIC STREET, HIGHLAND, CA
HIGHLAND, CA 92346

BENCH MARK

THE SMARTNET NORTH AMERICA C.O.R.S. "CABD", ELEVATION = 1041.79 FEET (NAVD 88)

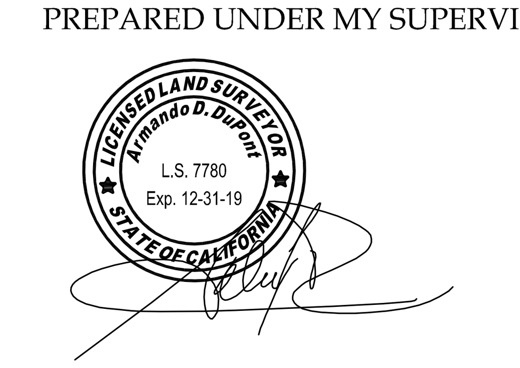
BASIS OF BEARINGS

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALIFORNIA COORDINATES SYSTEM (CCS 83), ZONE 5, 1983 DATUM, DEFINED BY SECTIONS 8801 TO 8819 OF THE CALIFORNIA PUBLIC RESOURCES CODE.

UTILITY STATEMENT

THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

PREPARED UNDER MY SUPERVISION:



Armando D. DuPont
Registration No. 7780
in the State of California

DATE OF SURVEY: AUGUST 31, 2018

NO.	DATE	REVISIONS	BY

CALVADA SURVEYING, INC.
411 Jenks Cir., Suite 205, Corona, CA 92880
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JOB NO. 181077

DATE: SEPTEMBER 4, 2018_GG SHEET 1 OF 1